UMATILLA RIVER BASIN ANADROMOUS FISH HABITAT ENHANCEMENT PROJECT

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ABSTRACT

The Umatilla River Basin Anadromous Fish Habitat Enhancement Project continued to identify impacted stream reaches throughout the Umatilla River Basin for habitat improvements during the 2004-2005 contract period. Public outreach efforts, biological and physical monitoring assisted the project in fostering public cooperation, targeting habitat deficiencies, and determining habitat recovery measures. Instream improvements were made on Spring Hollow Creek and Sears Creek.

Projects were maintained on 55 private properties, two riparian easements were renewed, four new easements were secured, and two new projects were implemented to enhance anadromous fish habitat. New project locations included sites on the mid Umatilla River, mainstem Birch Creek, West Fork Birch Creek, and Wildhorse Creek. New enhancements included: (1) construction of 4,500 feet of fencing and three gates between Umatilla River Mile 39 and 44, (2) construction of 3,280 feet of fencing between Wildhorse Creek Mile 10 and 11, (3) Removal/salvage of 3,280 feet and 5,280 feet of old fencing on Wildhorse Creek and Greasewood Creek, respectively (4) stinging approximately 1,000 native willow cuttings into zone 1 of Wildhorse Creek, (5) installation of instream rock weirs in Spring Hollow Creek and Sears Creek in association with bridge reconstruction and culvert replacement, and (6) bank sloping/armoring and grass planting on Spring Hollow Creek adjacent to the reconstructed bridge.

A total of $290,000 financial cost share funds was obtained from the U.S. Department of Agriculture's WHIP program and the Pacific Coastal Salmon Recovery Fund (PCSRF) to assist with planning, implementation, and monitoring efforts for out-year fish passage and riparian improvement projects on Birch Creek and Meacham Creek. Some $8,600 of WHIP funds from a 2003 grant was used for the Spring Hollow/Sears Creeks project implementation. In addition, grant applications were submitted to NOAA and the Oregon Weed Control Board, respectively, for McKay Creek improvements and weed control on an easement that has serious noxious weed problems. A major portion of project staff time was devoted to preparation for utilizing cost share funds to eliminate fish passage problems at four locations in the Birch Creek drainage. Activities included acquisition of easements, pre-project planning, preparation/submittal of environmental compliance documents, and coordination with other agencies and organizations that have an interest in Birch Creek improvements.

Monitoring continued to quantify baseline conditions and the effects of habitat enhancements in the upper basin. Daily stream temperatures were collected from May through mid-October at 22 sites. Suspended sediment samples were obtained at three gage stations during 2004 to arrive at daily sediment load estimates. Photographs were taken at several existing photo points and eleven newly established photo points to document habitat recovery and pre-project conditions. Two longitudinal profiles and two channel cross sections were measured in the new easement on Wildhorse Creek to assist with engineering and design and to obtain baseline data regarding channel morphology. Macroinvertebrate surveys were conducted in existing McKay Creek, Spring Hollow Creek, Mission Creek, Buckaroo Creek and Meacham Creek project areas to assist in assessing the effects of enhancements on water quality and habitat recovery. Biological inventories were conducted at several locations between River Miles 3 and 10 of Birch Creek to determine pre-project conditions for anadromous fish.

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LIST OF ACRONYMS AND ABBREVIATIONS

BA	Biological Assessment
BCI	Biotic Condition Index
BIA	Bureau of Indian Affairs
BO	Biological Opinion
BPA	Bonneville Power Administration
cfs	cubic feet per second
cm	centimeters
COE	U.S. Army Corps of Engineers
CPUE	catch-per-unit-effort
CR	County Road
CRITFC	Columbia River Inter-Tribal Fish Commission
CRPP	Cultural Resources Protection Program
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
DBH	diameter at breast height
DNR	Department of Natural Resources
EPA	U.S. Environmental Protection Agency
EP/RP	Environmental Protection/Rights Protection
EPT	a count of the number of taxa belonging to the orders Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies)

EQIP	Environmental Quality Incentive Program
ESA	Federal Endangered Species Act
ESD	Umatilla-Morrow County Educational Service District
ESU	Evolutionary Significant Unit
FFG	function feeding group
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
Forks	confluence of the North and South Forks of the Umatilla River
FY	fiscal year (refers to Bonneville Power Administration's October through September fiscal period)
GIS	Geographic Information Systems
GPS	Global Positioning Satellite
HBI	Hilsenhoff Biotic Index
LWD	large woody debris
m	meters
mg/L	milligrams per liter; same as parts per million
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPPC	Northwest Power Planning Council
NRCS	Natural Resource Conservation Service
NTU	Nephelometric Turbidity Units
NWP	Nationwide Permit
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
ODSL	Oregon Division of State Lands (recently changed to Oregon Department of State Lands)
ORS	Oregon Revised Statute
OSU	Oregon State University
OWEB	Oregon Watershed Enhancement Board
OWRD	Oregon Water Resources Department
PCSRF	Pacific Coastal Salmon Recovery Fund
Project	Umatilla River Basin Anadromous Fish Habitat Enhancement Project
Reservation	Umatilla Indian Reservation
RGI	Rural Geographic Initiative
RM	river mile
SHPO	State Historic Preservation Office
SOW	Statement of Work
SWCD	Umatilla County Soil and Water Conservation District
SZAP	Stream Zone Alteration Permit
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UBNPME	Umatilla Basin Natural Production Monitoring and Evaluation Project
UBWC	Umatilla Basin Watershed Council
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UNF	Umatilla National Forest
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
UTM	Universal Transverse Mercator
WHIP	Wildlife Habitat Incentive Program
WQMP	Water Quality Management Plan
WY	Water Year (October through September)

1. INTRODUCTION

The Umatilla River Basin Anadromous Fish Habitat Enhancement Project (hereafter referred to as project) is funded with Bonneville Power Administration (BPA) funds and is consistent with the 1994 Northwest Power Planning Council's (NPPC) Columbia River Basin Fish and Wildlife Program, Section 7.6 – 7.8, which targets the improvement of water quality and restoration of riparian areas, specifically the holding, spawning and rearing habitats of anadromous salmonids. This project is also compatible with the Habitat Strategies section of the 2000 NPPC Columbia River Basin Fish and Wildlife Program, in that emphasis in the basin will depend "heavily on protection of, and improvements to, inland habitat as the most effective means of restoring and sustaining fish and wildlife populations". Funding of this project provides partial mitigation for losses of salmon and steelhead (*Oncorhynchus spp.*) populations in the Columbia River Basin from the construction and operation of hydroelectric dams. This Umatilla River Basin Anadromous Fish Habitat Enhancement Project Annual Report covers work accomplished by the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) from February 1, 2004 through January 31, 2005 as part of the Umatilla Basin Fisheries Restoration Program.

Significant effort and funds have been directed at restoration of anadromous fish in the Umatilla River Basin. This habitat project is one element in the comprehensive Umatilla Basin Fisheries Restoration Program that also includes artificial production, adult and juvenile passage improvements (ladders, screens, and trap and haul), instream flow enhancement, riparian vegetation planting, and monitoring and evaluation. Emphasis on watershed-wide habitat is needed for protection and enhancement of the natural production capabilities in the basin.

The primary problems continuing to impact water quality and limit available habitat and natural fisheries production capabilities in the Umatilla River Basin include: non-point source pollution due to poor cropland tillage and rotation practices, livestock overgrazing of riparian and upland areas, over-appropriation of instream flows for irrigation, and stream channelization, constriction, and floodplain modification from agricultural operations and road/railroad building and maintenance.

During 2004 the project focused on implementing cooperative instream and riparian habitat improvements and maintenance on private lands in the Umatilla Indian Reservation (hereafter referred to as Reservation) and surrounding private properties in the upper Umatilla watershed. These efforts will result in enhancement or maintenance of several miles of channel and riparian areas of the Umatilla River and its tributaries, namely Meacham Creek, Birch Creek, Wildhorse Creek, Spring Hollow Creek and Mission Creek.

In 1993, the project shifted emphasis from a site specific approach to an upland and riparian watershed-wide approach for identifying causative factors limiting anadromous fisheries habitat and natural fisheries production capabilities. Riparian and instream enhancement projects continued and were expanded to include tributaries outside of Reservation Boundaries. An additional seven river miles and some 600 acres of riparian zones on private property outside the Reservation were secured in 2004 for subsequent implementation of fisheries habitat improvement. Those new projects include habitat enhancements in the mid Umatilla River, Meacham Creek, mainstem Birch Creek, East Fork Birch Creek, Mission Creek, Wildhorse Creek, Greasewood Creek, , Spring Hollow Creek, and McKay Creek. A total of 55 easements have been secured with private landowners since initial 1988 implementation efforts.

The project represents a continuation and evolution of existing efforts to improve natural production in the Umatilla River Basin. A subbasin plan (Umatilla/Willow Creek Subbasin Plan or Subbasin Plan) was recently completed that incorporates a watershed assessment with prioritization of fisheries habitat needs and streamlining of project funding. Project planning and prioritization during

2004 followed guidance presented in the Subbasin Plan. The project complements fish passage and artificial production projects in the basin by integrating existing on-the-ground management programs on private and public lands with restoration activities to better justify expenditure of funds and time. Biological and physical surveys, summaries of existing survey information, and follow up surveys are coordinated with CTUIR's Umatilla Basin Natural Production Monitoring and Evaluation (UBNPME) Project. Remedial measures will be implemented to reduce or eliminate detrimental land use activities where possible. Continued operations and maintenance of existing enhancement projects are included under this integrated approach.

The restoration of anadromous fisheries resources in the Umatilla River Basin has been a coordinated effort between CTUIR, state and federal agencies, and the local community. Examples include this project, the Umatilla River Subbasin Fish Habitat Improvement Project, the Umatilla Basin Project, the Umatilla Basin Watershed Council, the Umatilla River Subbasin Salmon and Steelhead Production Plan, and development of the Umatilla Hatchery and associated artificial production plans. This coordination has continued and expanded among stakeholder groups and technical committees, local landowners, sportsman clubs, special interest groups, and resource agencies, formed to identify issues and develop creative solutions to land use problems in the basin.

2. DESCRIPTION OF PROJECT AREAS

The following CTUIR Habitat Enhancement Project Table illustrates enhancement project locations, number of stream miles enhanced, and number of landowner agreements secured in each drainage:

TABLE 1 – CTUIR HABITAT ENHANCEMENT PROJECT TABLE.

STREAM	IMPROVEMENTS IMPLEMENTED	RIVER MILE LOCATIONS	NO. OF STREAM MILES ENHANCED	NO.OF LANDOWNER AGREEMENTS
Mid Umatilla River	Instream; bioengineering	37.3 – 37.4	0.1	1
Mid Umatilla River	Fencing; upland water development	43.0 – 46.5	3.5	3
Mid Umatilla River	Fencing; riparian vegetation	39.5-43	4.0	1
Upper Umatilla River	Fencing; instream bioengineering.	63.5	0.05	1
Upper Umatilla River	Fencing; pool development	78.5 – 85.0	3.6	12
Lower Meacham Creek	Fencing; instream; Veg. plantings	0 – 4.5	4.5	14
Boston Canyon Creek	Fencing; instream; riparian veg. plantings	0 – 0.3	0.3	1
Mainstem Birch Creek	Dam removal	3	PASSAGE SITE	1
West Birch Creek	Dam/culvert renovation	@3	Passage Site	1
East Birch Creek	Fencing	10.3 – 10.5	0.2	1
Wildhorse Creek	Fencing; riparian veg. plantings; offstream water development	9.0 – 12.5	2.0	4
Greasewood Creek	Fencing; riparian veg. plantings	0 – 1.5	1.5	2
W. Fk. Greasewood Cr.	Fencing; riparian veg. plantings	0 – 0.3	0.3	2
Spring Hollow Creek	Fencing; riparian veg. plantings	3.4 – 4.0	0.6	1
Spring Hollow Creek	Instream rock vanes; bank strabilization	3.1	Passage site	County right of way
Mission Creek	Instream rock vanes;	2.9 – 3.3	0.4	1
Mission Creek	Fencing; veg. plantings	@ 1.3 and 3.0	Passage Site	1
Buckaroo Creek	Fencing; veg. plantings	1.0 – 2.6	1.6	6
Iskuulpa Creek	Fencing; veg. plantings	2.0 – 2.9 and 9.8 – 10.1 (Tribal Properties)	1.2	0 (Tribal Properties)
McKay Creek	Fencing; veg. plantings	21.5 – 22.25	0.4	2
Moonshine Creek	Instream bioengineering	@ 1.1	Passage Site	0
Cottonwood Creek	Instream bioengineering	@ 0.5 and 1.3	Passage Site	1
Sears Creek	Culvert removal; instream rock vanes	@ 0.25	Passage Site	County right of way
TOTAL			24.25	55

2.1 Upper Umatilla River System

The Umatilla River has a drainage basin of 2,290 square miles and is a tributary to the Columbia River at RM 289 (Gonthier and Harris, 1977). Elevations in the subbasin range from about 5,800 feet near Pole Springs on Thimbleberry Mountain to 260 feet at the mouth of the Umatilla River. After leaving the Blue Mountains, the North and South Fork of the Umatilla River merge to form the mainstem, a 90 mile reach of river which flows through a series of broad valleys that drain low rolling lands. All of the primary tributaries of the Umatilla River drain the Blue Mountains and enter the Umatilla River from the south. The North and South Forks (forks) of the Umatilla River and Meacham Creek account for approximately 14% of the Umatilla River subbasin drainage area, yet supply 40-50% of the average flow to the Umatilla River (Saul et al., 2001). The principle aquifer is quaternary alluvium composed of unconsolidated sand and gravel, and some silt. Alluvium may reach a depth of up to 12 feet (Gonthier and Harris, 1977).

2.1.1 Meacham Creek

Meacham Creek is a major tributary to the Umatilla River, entering at RM 79. It drains approximately 65 square miles and produces 145,000 acre-feet annually at RM 5 near the top of the project area. The average annual discharge for Meacham Creek is 193 cubic feet per second (cfs) (Saul et al., 2001).

2.1.2 Boston Canyon Creek

Boston Canyon Creek, entering Meacham Creek at RM 2.1, is the largest tributary to Meacham Creek within Reservation Boundaries. It contributes over 4,000 acre-feet annually to Meacham Creek from a drainage basin of approximately 5.5 square miles. It runs over and through large alluvial deposits as it enters the Meacham Creek floodplain.

Elevations in the upper Umatilla River, Meacham Creek and Boston Canyon Creek project areas range from 1,760 to 2,000 feet above sea level, giving the area an unusually long growing season. Stream gradient averages less than two percent. Flooding in project areas usually occurs in late winter and spring as a result of a rain on snow event. The flood peaks tend to be high and the volumes large, but the duration of damaging stages seldom last more than a day or two (U.S. Army Corps of Engineers, 1975).

The upper Umatilla River, Meacham Creek and Boston Canyon Creek project areas lie in a big game winter grazing zone as outlined by the CTUIR Land Development Code (1983). The primary land use is livestock grazing from May to November. Timber harvest is permissible under a conditional use permit. Major portions of these areas have been disconnected from their floodplains. Intensive land uses within floodplains have resulted in dramatic changes in waterway characteristics. Current and historical land use practices, including road and railroad construction and maintenance activities, overgrazing of riparian and upland areas and extensive timber harvests, have led to stream channelization, diking within floodplains, stream bank rip-rapping and elimination of riparian vegetation. These practices have impacted fish habitat by altering natural channel form and function. Loss of stream channel meander from channelization and diking has accelerated runoff velocity due to an increase in surface gradient.

2.2 Mid-Umatilla River system

The mid-Umatilla River has been highly altered by human development. Stream channel morphology and flows have been significantly altered by irrigation dams and pumps, channelization, and the development of farms, homes and industry in the riparian area and adjacent uplands

(Contor et al, 1997). Modern human activities have loaded the river with agricultural fertilizers, sewage, pesticides, and suspended sediments, as well as urban and industrial pollution (Contor et al, 1997). However, stream temperatures in the Barnhart vicinity (RM 35.0 through 49.0) are positively influenced by cold water releases from McKay Reservoir. These releases elevate flows from about 45 to 250-325 cfs (Yoakum gage), increase turbidity and decrease water temperatures (Zimmerman and Duke, 1996). The gradient in this reach is constant, and the increased flows provided abundant fast water habitat types (Contor et al, 1997). Flows released from McKay Reservoir are from the cooler hypolimnion layer, providing suitable stream temperatures for salmonids. Stream temperatures from RM 35.0 through RM 49.0 of the Umatilla River are comparable to those found in its headwaters (RM 80.0 through 90.0) (see Figure 1 below).

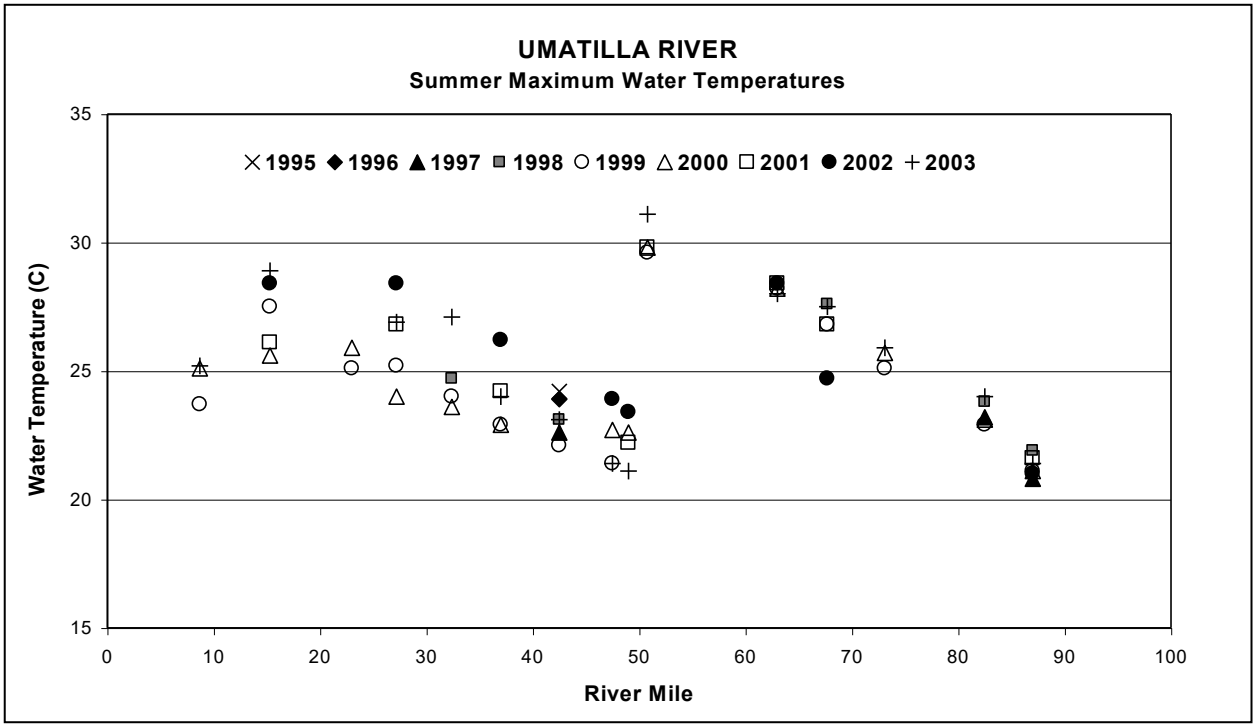


FIGURE 1 – MAXIMUM SUMMER WATER TEMPERATURES ALONG THE LENGTH OF THE UMATILLA RIVER.

2.2.1 Birch Creek

East Birch Creek originates at a 4,238 foot elevation in the southeast corner of Umatilla County and flows approximately 18 miles northwest to merge with West Birch Creek at the city of Pilot Rock. Gage station data collected near Pilot Rock by the U.S. Geological Survey (http://nwis.waterdata.usgs.gov/nwis/discharge) from 1967 through 1973 indicates that average monthly stream flows in East Birch Creek vary from a monthly average of 0.91 cfs in August to 76.8 cfs in April.

East Birch Creek land use is primarily rural-residential, hay production and grazing with timber production predominating in the headwater reaches. Mid to lower portions of East Birch Creek are characteristically braided, very entrenched, and contain moderate to high width/depth ratio channels that are highly dynamic and provide poor juvenile rearing habitat for salmonids. Many of these channels have lost connection with their historic floodplain and because of their degree of entrenchment are extremely erosive and unstable, producing excessive sediments, which fill in pools, embed spawning substrates and accelerate channel migration.

The East Birch Creek valley bottoms begin to noticeably widen downstream of Pearson Creek. As the valley floors widen, they begin to bare proportionately more features of historic channel mobility. Arcuate depressions can be found within existing floodplains and terraces that are remnant geomorphic features left by historic channels. Historic channels within this basin previously occupied higher base level elevations. Geologic, climatic, and finally human generated influences have caused substantial base level lowering. Contemporary terraces are the remnants of floodplains abandoned by former channels that occupied higher base levels (Bailey, 2001).

East Birch Creek is listed as water quality limited for temperature and habitat modification on Oregon's 1998 303(d) list. The listing for water temperature is based on exceedence of the statewide standard for salmonid rearing (64º F). The listing for habitat modification is based on habitat surveys conducted by the Oregon Department of Fish and Game (ODFW) in 1993 and deficiencies identified by comparison to ODFW habitat benchmarks for typical Eastern Oregon streams. A Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP) were written for the Umatilla River Basin, including Birch Creek, which should lead to water quality improvements over the long term (ODEQ et al 2000).

2.2.2 Wildhorse Creek

Wildhorse Creek is a 34-mile intermittent tributary to the Umatilla River, entering at RM 55 in the city of Pendleton, Oregon. It drains approximately 190 square miles and produces 14,000 acre-feet annually at the mouth. The highest point on the drainage divide of the basin is at an altitude of about 3,800 feet (Gonthier and Harris, 1977). Steep headwater topography of 15 to 35% contributes to rapid runoff rates. The slope in the lower and mid reaches varies from 0 to 3% (USDA, Soil Conservation Service, 1988).

Riparian and water storage capabilities in the upper Wildhorse Creek Watershed have been impacted from past timber harvest practices. Mid and low elevation lands are characterized by dryland crop farming, livestock grazing and residential use. Poor land use practices have impacted upland vegetation communities significantly, reduced riparian vegetation, degraded water quality, and diminished water table elevations and instream flows. Lack of conservation farming practices, such as strip cropping, terrace systems, no-till drill farming practices, and grass waterways, are common problems in mid and lower watershed areas. Overgrazing of livestock and absence of pasture rotation plans have contributed to poor water quality and loss of floodplain function. The communities of Athena and Adams, county and state highway departments and the Union Pacific Railroad have constrained the mainstem stream channel, resulting in down-cutting, loss of floodplain function and water quality impacts.

2.2.3 Greasewood Creek

Greasewood Creek originates approximately 3.25 miles northwest of the town of Helix and flows southeast to enter Wildhorse Creek at RM 9.3, 0.5 miles downstream of Rothrock Road. The West Fork of Greasewood Creek originates 1.75 miles southwest of Helix and enters mainstem Greasewood Creek 1.5 miles upstream of the Wildhorse Creek confluence. The Greasewood Creek Watershed drains approximately 20,452 acres over a 33 square mile area. Annual precipitation ranges from 12 to 15 inches per year with 70% of this moisture being obtained during October through April. Stream flows in mid and upper watershed areas are intermittent during summer and early fall months. However, in the lower watershed, springs provide year-round flows to the Greasewood Creek and West Fork Greasewood Creek project areas. A study conducted by the Natural Resource Conservation Service (NRCS) estimated the ten year peak flow in the upper 9,650 acres of the watershed (upstream of State Highway 334) at 143 cfs (Ray Wilson, personal communication). Elevations in the watershed range from 1,800 feet above sea level in the

headwaters to 1,400 feet above sea level at the confluence with Wildhorse Creek. Soils throughout the drainage are predominantly Walla Walla Series, consisting of deep, well-drained silt loams on 1 to 40% slopes.

NRCS personnel estimate that 98% of land use in the Greasewood Creek Watershed is comprised of cropland practices, primarily winter wheat/summer fallow operations (Ray Wilson, personal communication). The deep soils in this drainage are considered to be some of the most productive agricultural soils in the Umatilla River Basin. However, lack of terraces, grass waterways and contour farming practices, no-till seeding practices, and failure to return crop residue to the soil and farming in highway right-of-way areas results in extensive erosion of top soils from steep slopes into roadside ditches and waterways. NRCS staff estimate, as much as 130 tons/acre of topsoil erodes annually from cropland fields in the Greasewood Creek Watershed (Bob Adelman, personal communication).

2.2.4 Spring Hollow Creek

Spring Hollow Creek originates in sections 29, 26 and 23, T.3N., R.35E. in the northeast corner of the Reservation at elevations ranging from 2,166 feet (West Fork headwaters) to approximately 2,755 feet (East Fork headwaters) and flows northwest to empty into Wildhorse Creek at RM 13.7 at a 1,560 foot elevation upstream of Adams. The Spring Hollow Creek Watershed has a drainage basin of 18 square miles and supplies 1,500 acre-feet annually at its confluence with Wildhorse Creek (Gonthier and Harris, 1977). This system is one of the few streams originating on the Reservation which deliver year-round stream flows. Due to significant spring seepage throughout the drainage, stream temperatures commonly average between 60 and 68 degrees Fahrenheit in lower stream reaches during late summer. Annual precipitation in the upper watershed varies from 18 to 25 inches, while precipitation at lower elevations ranges between 5 and 20 inches annually (USDA, Soil Conservation Service, 1988).

Non-irrigated annual crop farming, typically small grain-pea rotations, is the primary land use in the Spring Hollow Creek Watershed. According to the Soil Survey of Umatilla County Area, Oregon, many of the properties located within this drainage classify as "prime farmlands" because the silt loam soils present have the ability to sustain high crop yields with minimal inputs of energy and economic resources, and farming such soils results in the least damage to the environment (USDA, Soil Conservation Service, 1988). However, failure to leave crop residue, maintain tilth, chisel stubble, contour farm, and construct terraces, diversions and grass waterways in this drainage continue to result in extensive erosion of top soils during wet winter months. Grazing is the second most prevalent land use occurring in the watershed. The majority of grazing occurs within floodplain areas in lower stream reaches. High stocking rates, absence of pasture rotation plans and failure to restrict grazing during wet periods results in compaction of soils, poor tilth and excessive runoff.

2.3 Other Umatilla River Tributaries

2.3.1 Mission Creek

Mission Creek originates in the western slope foothills of the Blue Mountain Range at an elevation of about 3,560 feet and flows northwesterly to empty into the Umatilla River at approximately RM 61.5 at an elevation of about 1,270 feet. This watershed is located entirely within Reservation Boundaries and has a total acreage of approximately 3,100 acres. The Mission Creek Watershed is comprised of the following landuse practices:

1) 2,100 acres of rangeland,
2) 670 acres of winter wheat/summer fallow cropland,

3) 180 acres of Conservation Reserve Program (CRP) land,
4) 140 acres of abandoned cropland and
5) 10 acres of residential property.

Average annual precipitation ranges from 16 to 24 inches with most of it falling between October and March as rain. Mission Creek is an intermittent stream with stream flows in the lower reaches and portions of the upper watershed going subsurface by mid-summer.

Conversion of historical, native plant communities to cropland and rangeland combined with realignment and shortening of lower stream channel reaches have altered the hydrologic capabilities of the Mission Creek Watershed, resulting in higher peak runoff rates during storm events, increased channel/stream bank erosion and loss of fish and wildlife habitat. Limited portions of the mid watershed sustain year-round stream flows and provide excellent salmonid habitat. Lack of perennial stream flows and insufficient riparian cover are the primary factors limiting anadromous fisheries production in this system.

Buckaroo Creek is an intermittent stream, originating in the vicinity of Deadmans Pass in the Blue Mountains at an elevation of approximately 3,600 feet. This 15 square mile drainage area is located entirely within Reservation Boundaries and flows northeasterly to enter the Umatilla River at Thorn Hollow (approximately RM 73.2) at an elevation of about 1,600 feet. This tributary has an annual stream discharge of 4,000 acre-feet and an average daily discharge of 10 cfs at the mouth (Gonthier and Harris, 1977). Soils within the watershed tend to be a mixture of moderately deep, well drained silt loams and shallow, well drained Gwin cobbly silt loams. Forage tends to be limited by the high content of rock fragments and shallow depth to bedrock in the Gwin soils (USDA, Soil Conservation Service, 1988).

Livestock grazing is the primary land use in the Buckaroo Creek Watershed. This drainage is located within Bureau of Indian Affairs (BIA) Range Unit Six. This system continues to be overgrazed due to high stocking rates and extended grazing seasons. The CTUIR is currently coordinating with the BIA in development of a long-term range management plan to address these concerns. Historical land uses in the watershed included timber harvest and sheep grazing. Impacts from these long ago and current events include increased runoff rates, elevated stream temperatures (see stream temperature graph A-12.), and diminished riparian and upland native vegetation communities.

2.3.2 Iskuulpa Creek

The Iskuulpa Creek Watershed is located approximately 18 miles east of Pendleton, Oregon. Iskuulpa Creek originates in the western flank of the Blue Mountains in the vicinity of Emigrant Springs and flows approximately 12 miles northward to empty into the Umatilla River at approximately RM 76.7. Elevations range from approximately 4,200 feet in the headwaters to 1,670 feet at the mouth (U.S. Soil Conservation Service, 1991). This drainage has a total area of 24,198 acres with 18,398 acres (including approximately 608 acres owned by the Boise Cascade Corporation) lying within Reservation Boundaries. Approximately 1,800 acres lie within Umatilla National Forest Boundaries and an additional 4,000 acres lies on private property outside of Reservation Boundaries (including approximately 2,628 acres owned by the Boise Cascade Corporation).

Iskuulpa Creek is an intermittent tributary with an annual stream discharge of 2,000 acre-feet (Gonthier and Harris, 1977). Average precipitation ranges from about 24 inches near the village of Meacham to 13 inches at the confluence with the Umatilla River (U.S. Soil Conservation Service, 1991). Stream gradient ranges from eight percent in the upper watershed to one percent at the mouth.

The riparian area has distinct storage and transport zones, but no well-defined depositional zone, and presence of young, shrub seedlings is sparse. Soils within the watershed are highly variable. The streambed on the lower five to six miles of Iskuulpa Creek transports materials up to six inches in diameter, and the channel and stream banks are extremely unstable. Extensive areas of bed load and scour are apparent (U.S. Soil Conservation Service, 1991).

Land use practices in the Iskuulpa Creek Watershed have primarily consisted of seasonal (May 1 through October 1) livestock grazing and timber harvest. This drainage is popular for recreational and subsistence hunting, and emphasis of these activities will likely increase with recent tribal land acquisitions.

2.3.3 McKay Creek

The headwaters of McKay Creek are located within the Blue Mountains, and the drainage divide at its highest point near Kamela, Oregon is at an altitude of about 4,500 feet (Gonthier and Harris, 1977). McKay Creek flows westward 38 miles to empty into the Umatilla River at approximately RM 51. This stream enters the southernmost portion of the Reservation at RM 23 and exits the West Reservation Boundary at RM 15. McKay Creek drains into the McKay Creek National Wildlife Refuge, which encompasses McKay Creek Reservoir, at approximately RM 10. McKay Creek exits the 1,200 surface acre reservoir (71,500 acre-feet) at McKay Dam, an earth-fill structure with a reinforced concrete upstream slope, located at approximately RM 6 (U.S. Bureau of Reclamation, 2000). Average annual discharge (based on a period of record from 1930 to 1985) upstream of the reservoir is 103 cfs (Alexander et al., 1987).

Historically, it is likely that the McKay Creek Drainage supported abundant summer steelhead populations. Physical stream characteristics within the watershed are representative of preferred steelhead habitat. However, construction of 165-foot high McKay Dam from 1923 through 1927 would have permanently obstructed all anadromous fish passage. Today, McKay Creek Reservoir, managed by the U.S. Bureau of Reclamation, provides habitat to various species of waterfowl, non-native warm-water fish and rainbow trout. Rainbow trout also occur within and upstream of McKay Reservoir.

Primary land uses within the McKay Creek Watershed include, 1) home-site development, 2) livestock grazing of rangeland areas and irrigated pastures, 3) production of non-irrigated small grain crops, 4) production of irrigated crops, such as alfalfa hay and small grains, 5) timber harvesting in upper watershed areas, and 6) outdoor recreational opportunities, including fishing, hunting, boating and water skiing.

Development of homes, farm buildings and roads within the floodplain have resulted in straightened and confined stream channels throughout the mid and lower watershed. These construction activities along with McKay Creek Dam operations and water releases have increased stream velocities, increased in-stream gravel movement, and significantly reduced available fish and wildlife habitat in mainstem McKay Creek. Failure to implement proper stocking rates, pasture rotation and deferred grazing plans, and restrictive grazing during wet periods throughout the drainage has compacted top soils, resulted in poor soil tilth and excessive runoff, impacted upland and riparian native vegetation communities and degraded water quality. Cropland management practices, which conserve soil moisture and reduce wind and water erosion of soil surface layers, are not frequently utilized in lower watershed areas and need to be more widespread. Increased use of soil conservation practices, such as stubble-mulch tillage, limited seedbed preparation tillage, early fall seeding, contour farming, windbreak establishments and grass waterways, would improve riparian and upland conditions. Areas within the upper McKay Creek Watershed have been extensively

logged, likely resulting in reduced ground water storage, decreased soil permeability and increased soil erosion rates.

McKay Dam was originally constructed to furnish a supplementary supply of water to Stanfield and Westland Irrigation Districts in the lower Umatilla River Basin (U.S. Bureau of Reclamation, 2000). The Congressional Act of March 11, 1976 (90 Stat. 205, Public Law 94-288) reauthorized McKay Dam and Reservoir for the purposes of irrigation, flood control, fish and wildlife resources, recreation, and safety of dams (U.S. Bureau of Reclamation, 2000). The Act of October 28, 1988 (102 Stat. 2791, Public Law 100-557) was authorized for the purposes of mitigating losses to anadromous fishery resources and continuing water service to irrigation districts (U.S. Bureau of Reclamation, 2000). This cooperative local, state, tribal and federal water exchange effort, known as the Umatilla Basin Project, has served to resolve potential conflict between fishery and irrigation needs in the Umatilla River Basin. The project delivers Columbia River water to three irrigation districts in exchange for leaving in-stream flows in the Umatilla River for anadromous fish passage and rearing. In addition, a large portion of space in McKay Reservoir is devoted to in-stream flow augmentation (Heirs, 1996). While upper McKay Creek is inaccessible to anadromous fish, habitat enhancements in the McKay Creek Watershed are directed at improving water quality conditions for salmon and steelhead downstream in the Umatilla River.

2.3.4 Moonshine Creek

Moonshine Creek is located entirely within Reservation Boundaries and originates in the vicinity of Emigrant Hill at an elevation of approximately 3,720 feet. This stream flows northwesterly to empty into the Umatilla River at approximately RM 67.2 at an elevation of about 1,400 feet. Moonshine Creek drains a total of approximately 5.5 square miles and contributes 2,480 acre-feet annually at RM 1.1 (a drainage area of 4.62 square miles) near the top of the passage improvement site (just upstream of Umatilla County Road 900 Box Culvert). Summer stream temperatures in the lower portion of this Umatilla River tributary generally range from 50 to 79 degrees Fahrenheit (Shaw and Sexton, 1999). A habitat survey conducted from the mouth to the stream forks (RM 4.4) in late August and early September of 1995 noted that 58% of the stream channel was dry and salmonid habitat was marginal (Contor et al., 1996). Other physical features characterized during this survey indicate that Moonshine Creek is primarily a single channel confined by high terraces, stream channel gradient averages 2.7%, the average wetted width to depth ratio is 8.9:1 in slow water habitat and 20:1 in riffles, the dominant riparian vegetation (51%) is comprised of various grasses, 27 surface springs occur in the lower 4.4 stream miles, and beaver dams are common in the lower watershed (Contor et al., 1996). Annual precipitation varies from 15 to 25 inches throughout the watershed (USDA, Soil Conservation Service, 1988).

2.3.5 Cottonwood Creek

The Cottonwood Creek Watershed is located on the Reservation immediately west of Moonshine Creek. Cottonwood Creek originates on Emigrant Hill in the western slope foothills of the Blue Mountain Range at elevations ranging from 3,400 feet (West Fork headwaters) to approximately 3,480 (East Fork headwaters) and flows northwest to enter the Umatilla River at approximately RM 65 at a 1,330 foot elevation. This stream drains an area of approximately 5 square miles and has an average annual discharge of 1,940 acre-feet at RM 1.3 (a drainage area of 4.01 square miles) near the top of the upper passage improvement site (just upstream of Umatilla County Road 900 Box Culvert). Stream temperatures, recorded between June 20 and August 1, 1995, varied from 51 to 80.6 degrees Fahrenheit (Contor et al., 1996). A habitat inventory conducted from the mouth to the stream forks (RM 4.1) during the summer of 1995 noted that 49.2% of the stream channel was dry and salmonid habitat was marginal (Contor et al., 1996). Other physical features documented during this survey indicate that 7% of Cottonwood Creek is comprised of secondary (braided) channels,

high terraces and hill slopes are the most common landform, stream channel gradient averages 3.3%, the average wetted width to depth ratio is 8.9:1 in slow water areas and 20.8:1 in riffles, the dominant riparian vegetation (53%) is comprised of various grasses, 23 surface springs were identified throughout the watershed, and beaver dams are common in lower stream reaches (Contor et al., 1996).

Soils throughout the Moonshine and Cottonwood Creek drainages are highly variable. Soils consist of deep and shallow, well-drained loams, including silt loams, silty clay loams, cobbly loams and gravelly silty clay loams. Slopes in these drainages range from 0 to 70%, have rapid runoff rates and potential water erosion hazard is high (USDA, Soil Conservation Service, 1988).

Vegetation found within the upper watersheds of these drainages includes elk sedge, pinegrass, mallow ninebark, prince's pine and myrtle pachystima in the understory, and Douglas fir, ponderosa pine, grand fir and western larch in the overstory. Historically, these areas likely supported extensive communities of native grasses, such as bluebunch wheatgrass, Sandberg bluegrass and Idaho fescue. Remnant populations of these grasses still occur, but have largely been out-competed by cheat grass and medusa head.

Primary land use practices in the Moonshine and Cottonwood Creek drainages include home-site development, livestock grazing (pastures and BIA Range Units Three and Six) and production of non-irrigated small grain crops. Several dwellings have been constructed within floodplains in the lower watersheds of these systems. These structures along with road developments have prevented lateral stream channel movement and disconnected portions of the streams from their floodplains. A culvert, impeding fish passage in lower Cottonwood Creek, was addressed during the project period. This improvement is further described within this report. Decades of season-long grazing and poor livestock distribution has resulted in over utilization of native perennial grasses and establishment of nuisance annual grasses (primarily cheat grass and medusa head). Overgrazing has also contributed to reduced riparian canopy cover, eroding stream banks, exposed soil surfaces and increased runoff rates. The majority of farming in the Moonshine and Cottonwood Creek watersheds is a grain – fallow cropping system. Soil conservation practices need to be more widely applied to reduce runoff and control erosion in the lower watersheds. Conservation measures applicable to these watersheds include early fall seeding, stubble-mulch tillage and construction of terraces, grass filter strips and grass waterways.

A map of the mid Umatilla River, upper Umatilla River, Meacham Creek, Boston Canyon Creek, East Birch Creek, Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek, Spring Hollow Creek, Mission Creek, Buckaroo Creek, Iskuulpa Creek, McKay Creek, Moonshine Creek and Cottonwood Creek project areas is illustrated in **Error! Reference source not found.** on the following page.

3. METHODS AND MATERIALS

3.1 Objective 1: Identify priority stream reaches for habitat enhancements on private lands within the Umatilla river Basin to achieve desired habitat recovery

3.1.1. Pre-construction Preparation:

a. Assess Maintenance Needs

The physical condition of habitat improvements are annually evaluated in existing project areas, following spring high flow events, to determine effectiveness and prescribe any maintenance to occur during the project funding period.

b. Project Cost Share

Cost share funds are obtained and combined with BPA funds for financial assistance. These efforts effectively forge partnerships between resource agencies and the public and allow BPA funds to go further. CTUIR's typical cost share ratio with agencies outside of BPA is 25% from BPA and 75% from the other cost share entity(s).

c. Clearances and Land Owner Agreements

Various clearances and landowner agreements must be obtained before CTUIR can initiate habitat improvements on private properties.

The BIA may require a land survey of designated project area boundaries and do require acquisition of right-of-way agreements on private-owned, Indian Allotments (trust lands), prior to pursuit of riparian easements.

Riparian Conservation Agreements restrict landowners from certain land use activities, such as grazing, removal of vegetation, and use of weed or insect control measures within enhanced riparian corridor areas. The term of these agreements varies from 10 years to perpetuity with CTUIR attempting to secure as long an agreement as possible. The landowner(s) accepts the costs of all habitat improvements along with CTUIR's maintenance of these improvements as consideration for participating in project recovery efforts. An attempt is made to address landowner needs (such as livestock water gaps, stream crossing sites, and off-stream water developments) and incorporate these needs into the final agreement. Riparian easements protect habitat improvements and ensure an early recovery period within project areas.

Access, implementation and maintenance agreements are obtained for projects that involve strictly instream habitat enhancements. These agreements typically have a five-year term. As with the riparian conservation agreements, the landowner accepts the costs of all habitat improvements and CTUIR's maintenance of these improvements as consideration for participating in project recovery efforts. The purpose of these projects is to improve stream bank stability and increase in-stream habitat diversity. The five-year

term provides a period in which to monitor project recovery and perform any necessary maintenance to in-stream structures.

Other necessary clearances may include obtaining permits from Umatilla County to construct habitat improvements within county road right-of-way areas or burning permits to burn noxious weeds within existing project areas. Considerable effort and coordination is required to secure clearances and landowner agreements.

d. Removal/Fill Permits

Instream work activities on the Reservation require a CTUIR Tribal Stream Zone Alteration Permit (SZAP) and a U.S. Any instream work proposed within CTUIR's identified flood hazard sub-district or potential special flood hazard areas on the Reservation require a Tribal Development Permit from the CTUIR Planning Office.

Instream work activities off of the Reservation either require a General Authorization for Fish Habitat Enhancement Permit or a Removal/Fill Permit (dependent upon the scope of activities and scale of the proposed project) from the Oregon Department of State Lands (ODSL) in conjunction with a COE 404 Removal/Fill Permit. Applications for these permits should be completed and returned to the respective agencies a minimum of 90 days prior to anticipated instream work. Permitted instream work activities in the Umatilla River Basin are restricted to specific instream work periods. These instream work periods are based upon when migrating and spawning salmonids are least likely to be impacted by fill and removal activities. Work windows vary throughout the basin, but range from May through October.

e. Endangered Species Act Requirements

The Columbia River population of bull trout (*Salvelinus confluentus*) and mid-Columbia Evolutionary Significant Unit (ESU) summer steelhead (*Oncorhynchus mykiss*) are listed as threatened species under the federal Endangered Species Act (ESA). Any proposed instream work activities in areas within the Umatilla Basin, currently supporting these species or providing critical habitat for them, require ESA, Section 7 consultation when federal funding is utilized. Upon receiving a completed 404 Removal/Fill permit application, BPA initiates Section 7 consultation proceedings with the appropriate federal agencies. The U.S. Fish and Wildlife Service (USFWS) is consulted for potential resident fish species (such as bull trout) impacts. The National Marine Fisheries Service (NMFS) is consulted for potential anadromous fish species (such as summer steelhead) impacts. Instream work in critical bull trout and summer steelhead habitat areas generally requires the project proponent to develop Biological Assessments (BA's) to determine the extent of impact, if any, from proposed habitat enhancements. BA's are reviewed by USFWS and NMFS, during consultation proceedings, and assist in determining if an instream project will occur, as proposed, or if modification is necessary to limit potential impacts. Consultation proceedings can considerably delay obtainment of instream permits.

f. Cultural/Archeological Monitoring

The project coordinates with CTUIR's Cultural Resource Protection Program (CRPP) at proposed habitat enhancement sites involving ground disturbance (fence construction, structures keyed into stream banks, etc.), prior to project implementation to obtain cultural clearances. 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 BIA Umatilla Agency Real Property Management Office (for implementation efforts on the Reservation) and to the State Historic Preservation Office (SHPO) (for implementation efforts, both on and off the Reservation). CRPP Staff may also conduct on-site monitoring of projects during implementation at culturally sensitive locations. All cultural clearances are obtained in compliance with Section 106 of the National Historic Preservation Act.

Section 106 also provides for cultural resource surveys of projects that are funded by the U.S. Department of Agriculture WHIP program. Accordingly, CTUIR projects using WHIP funding undergo cultural surveys by an Natural Resource Conservation Service (NRCS) archaeologist.

g. Design and Layout

Design and layout of proposed projects consists of coordinating with the CTUIR Hydrologist to develop hydraulic designs, determining the quantity and type of materials required to build or repair fence and instream structures, and developing heavy equipment access sites, haul roads and boulder storage sites. Proposed fence lines, instream structure sites and stream bank areas are staked and flagged to provide assistance to subcontractors.

h. Contracts and Professional Services Agreements

Proposed implementation activities, requiring rental of operated heavy construction equipment, construction of fencing, and purchase and transport of rock or root wads, are advertised and pre-bid tours provided to potential subcontractors. Subcontracts are awarded to the lowest bidder.

Prior to commencement of a subcontract, the subcontractor meets with CTUIR Habitat Enhancement Project Personnel to discuss subcontract terms, work performance requirements, a work progress schedule, petroleum spill plans, and fire prevention and suppression plans. Notices to proceed are issued in writing to the subcontractor.

The subcontractor provides and maintains an inspection system acceptable to the CTUIR, covering the services under the subcontract. Complete records of all inspection work performed by the subcontractor are maintained and made available to the CTUIR during subcontract performance and for as long afterwards as the subcontract deems

necessary.

Equipment is inspected at the work site at the time of delivery. All equipment must be in good working condition, free from excessive leaks in hydraulic, fuel and power systems and clean enough to allow close inspection of these systems. Any equipment that does not meet subcontract specifications and requirements is rejected.

CTUIR Habitat Enhancement Project Personnel monitor the subcontractor's progress and photo document various stages of project implementation.

3.1.2. Maintain and Implement Habitat Enhancements:

a. Instream and Stream Bank Improvements

Stream bank revetments, log and boulder weirs, log and boulder deflectors, rock vanes and grade control/sediment retention structures previously placed into the Umatilla River, Meacham Creek, Wildhorse Creek, Greasewood Creek, the West Fork of Greasewood Creek and Spring Hollow Creek project areas are repaired annually as needed. These structures are designed to increase instream habitat diversity, increase pool frequency, stabilize stream banks and stream channels, and recruit and deposit sediments onto stream banks to provide substrate for revegetation.

Newly proposed in-stream and stream bank project designs are determined and developed jointly by the CTUIR Hydrologist and CTUIR Habitat Enhancement Project Personnel. Project personnel place large woody debris (LWD) into areas where natural wood recruitment and habitat diversity is low. Placement of LWD provides additional instream cover for salmonids and organic material for aquatic organisms to feed upon, and assists in rebuilding stream banks by slowing water velocities and capturing sediments. Hydrological controls (root wad and rock revetments, deflectors, vanes, weirs, etc.) are used sparingly and restricted to stream reaches where benefits (grade control, sediment deposition, stream bank stability, growth of riparian vegetation and increased instream habitat) are immediate. More costly bio-engineering approaches are reserved for areas that will not recover in a timely or natural manner.

b. Fish Passage Improvements

Locations of numerous passage barriers have been identified through the ongoing Umatilla Subbasin/Willow Creek Subbasin Planning process. Project staff are currently coordinating closely with CTUIR's Monitoring and Evaluation Unit and the Oregon Department of Fish and Wildlife (DF&W) to verify and prioritize these passage concerns. Birch Creek system passage impediments will be the focus in 2005 and 2006 where removal or modification of passage barriers will provide access to currently unavailable or under-utilized stream reaches and improve migration for adult spawning, juvenile rearing, and adult and juvenile holding. The effects of such efforts, in conjunction with continued restoration of riparian and upland areas, will aid especially in increasing salmon and dwindling ESA listed summer steelhead populations.

c. Livestock Exclusion and Riparian Corridor Fencing

Fencing is constructed to exclude livestock from floodplain and riparian areas. Livestock exclusion provides stream bank protection and allows vegetative recovery to occur within project areas.

The project constructs both, smooth-wire high tensile and barbed-wire fencing for livestock management. Smooth-wire high tensile fencing is utilized in areas where livestock are distributed over vast areas (open range) and tree blow-down is frequent. Barbed-wire fencing is useful when livestock pressure is significant, such as when large numbers of cattle are confined in pastures, there is high potential for fire damage, and tree density is low.

Fences, gates and cross fences in existing project areas are repaired by project personnel as needed. Frequent fence inspections are conducted to ensure continued exclusion of livestock and to allow for continued riparian recovery inside of project areas.

d. Off-stream Livestock Water Developments

Off-stream water sources are developed to prevent stream bank erosion from livestock trailing and eliminate high maintenance costs associated with water gaps in fenced riparian corridors. Existing springs are developed and shallow or deep wells drilled to provide a necessary water source for livestock.

Typically, these projects involve landowner financial and in-kind cost share assistance. The project funds any subcontracted services, electrical hook-ups and installations, and solar panels, pumps, pipe and associated hardware, water troughs and other material items. The landowner pays for electrical costs to operate pumps, and may provide equipment and labor to install plumbing and water troughs.

e. Revegetation

The CTUIR Habitat Enhancement Project utilizes heavy equipment and hand plants native riparian tree and shrub species along bank revetment structures, sediment retention structures and stream margins to improve bank stability, provide insect drop, shade streams and provide future recruitable LWD. Stream banks, terraces and disturbed sites within project areas are seeded with native grasses and/or close equivalents of native grasses to improve bank stability and to capture and retain sediments during high flow events.

Native plants are acclimated to the local climate, provide natural forage for wildlife and are much more resistant to the area's disease and insect problems. Studies have found that exotic species may out-compete and displace native riparian vegetation (Gordon et al., 1993). In addition to historical and present impacts of disturbance on riparian vegetation connectivity and diversity, plantings of exotic riparian vegetation (e.g. Russian olive) and the potential of hybrid poplar monocultures could disrupt riparian processes (Li, 1998). In Europe, plantations of exotic monocultures have replaced the natural

diversity of riparian vegetation along stream banks of various watersheds (Cortes et al., 1994). This has changed the trophic structure of affected streams and influenced the input of terrestrial invertebrates that form the bulk of drifting prey for surface feeding fishes in headwater streams. The timing and quality of litter inputs from single species plantings or exotic species may differ greatly from diverse systems and lead to reduced food resources for aquatic species (Li, 1998). There may also be concerns about pollution of the gene pool of existing plant populations when non-local plants are introduced to a site (Lambert et al., 1995).

Trees and shrubs planted in CTUIR Habitat Enhancement Project Areas are locally obtained, indigenous species grown out as bareroot stock or tublings. Native grass seed and close replicates of native grass seed are currently unavailable locally and continue to be purchased from various grass seed companies. CTUIR is collaborating with the USDA's CREP program to facilitate riparian vegetation plantings. CREP contractors that have NRCS certification for CREP conservation plan preparation also use local or regional endemic species for planting riparian zones, i.e., in zone 1 (1st 15' from the stream) and zone 2 (from 15' to 180' from the stream). Typical zone 1 plantings are willows, cottonwood, blue elderberry, and alder. Zone 2 plantings generally consist of red ocher dogwood, wild rose, Douglas hawthorne, golden current, and chokecherry

f. Noxious Weed Control

The CTUIR subcontracts herbicide applicators to chemically treat noxious weeds up to three times per year in existing project areas. Only the most invasive noxious weeds, identified as "A" Pest Weeds on Umatilla County's Noxious Weed List, are treated. All chemical applications are consistent with Oregon Revised Statute (ORS).570.505, Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) Regulations, and NMFS and USFWS recommendations regarding ESA concerns.

When other noxious weed species are identified as detrimental to project success or are of special concern to the landowner, CTUIR habitat enhancement project personnel treat these weeds as needed.

3.1.3 Post-implementation Final Review

CTUIR personnel visit implementation sites immediately following final construction as indicated by the subcontractor. Subcontracted services are inspected to determine whether they conform with subcontract requirements. If subcontract services are not acceptable, CTUIR may (1) require the subcontractor to perform the services again in conformity with contract requirements, (2) reduce the contract price to reflect the reduced value of services performed, (3) hire another subcontractor to perform the services and charge the original subcontractor any cost incurred by the CTUIR, or (4) terminate the contract for default.

3.2 Objective 2. Collect Baseline Data to Assess Pre-project Conditions and Continue Post-project Monitoring to Identify Habitat Limiting Factors and to Quantify Short and Long-Term Effects of Habitat Enhancement Activities in the Umatilla River Basin.

3.2.1 Geomorphologic and Hydraulic Data Monitoring:

Geomorphologic and hydraulic data are collected to measure changes in channel morphology and vegetative response to habitat enhancements. This monitoring usually includes the following:

- **Longitudinal survey** - these data provides a graphical representation of the stream-bed contour. From this, stream habitat may be categorized into habitat unit types, such as pools, glides, riffles, rapids, or cascades. By comparing this information to "standards" developed in the literature, the project can better plan restoration strategies and quantify change over time.

- **Cross section survey** - this information is collected at two to ten (depending on total project length) permanent monitoring points at various locations in the stream reach being enhanced. Transects are taken perpendicular to the stream's thalweg and generally continue outward on each shoreline to a point above bank-full width. Transects are established at areas representative of different channel types. Among other things, cross-sectional data generates maximum widths and depths, bank-full widths, bank heights, width to depth ratios, entrenchment ratios, and discharge. By comparing this information to "standards" developed within the literature, the project is better able to plan restoration strategies and understand channel formation changes over time. A trend toward channel narrowing and deepening is most desirable for improvements in salmonid health, channel stability and water quality. These measurements may be repeated in out-years to measure changes in channel morphology and vegetative responses to habitat enhancements.

- **Habitat survey data** - literature searches are conducted and any available habitat inventory data previously collected at the stream reach level will be utilized for project planning purposes and to assist in analyzing recovery trends. In-field measurements of physical attributes, such as pool frequency, pool quality, available LWD, substrate types, water quality, stream flows and potential environmental impacts from current land uses and historical disturbances will be identified.

- **Photo points** - Permanent photo points are established prior to project implementation in conjunction with permanent transects. Standardized photos are taken to provide a visual record of changes in channel morphology and riparian recovery. Photos are cataloged and stored on computer hard drives and back up disks, maintained by the CTUIR Fisheries Habitat Enhancement Project. This information provides a very valuable visual source of restoration progress

and public education.

3.2.2 Biological Inventories:

Fisheries communities are good indicators of long-term effects and broad habitat conditions because they are relatively long-lived and mobile (Karr et al., 1986). However, the fish population at any location is influenced by activities throughout the stream length because fish use different habitats at various life stages and may migrate long distances (Bauer and Burton, 1993).

Project staff coordinate with CTUIR's Monitoring and Evaluation Project Unit to collect pre-project fish community data. Representative samples of fish species and size classes are collected with a backpack electrofisher in proposed project areas. A single pass with the electrofisher is made to evaluate community composition. All salmonids captured are counted, fork lengths measured and identified to species in the field. All other fish species numbers are visually estimated during sampling. Biological inventories are generally completed during the stable low flow period in mid-summer to avoid spawning migrations and seasonal fish movement (Karr et al., 1986).

Fish collection permits are required in the Umatilla River Basin because bull trout and summer steelhead are listed as threatened under the federal ESA. These permits specify sampling gear types and sampling periods. The UBNPME Project applies for and obtains all collection permits utilized by this project for fish sampling efforts.

Although fish collection did not occur during 2004, post-project biological inventories in 2005 and 2006 will occur in future project periods to assess fish utilization of instream enhancements and assist in evaluation of habitat recovery.

3.2.3 Aquatic Macroinvertebrate Sampling:

Macroinvertebrates are components of the aquatic environment that provide a connecting link in the food chain between multicelled periphyton, detritus from terrestrial sources and the fish population. As a food source they are essential to the growth and production of fish and, because of their strict habitat requirements, are very useful as indicators of changes in aquatic habitat (USDA, Forest Service, 1985). The diet of immature chinook salmon has been shown to be 95% insects, and immature coho salmon consume about 99% insects (Johnson and Ringler, 1980). Steelhead diets are largely insect as well (Johnson and Ringler, 1980).

Aquatic macroinvertebrate communities can reveal the quality of habitat components essential to aquatic fauna, such as water quality, substrate composition, riparian habitat quality, ecosystem stability, and past history (U.S. Bureau of Land Management, 1988). Aquatic macroinvertebrate communities are useful for monitoring biological integrity of streams since they function as integrators of pollution over time and are a direct measure of beneficial uses (aquatic life support) (Meyers, 1987). According to Schoen (1991), macroinvertebrates cover the whole range of pollution sensitivity, from highly sensitive stoneflies and mayflies down to very tolerant aquatic worms, so the presence

or absence of particular taxonomic groups provides a good yardstick of pollution. Unlike fish, macroinvertebrates are relatively immobile. So, if macroinvertebrates are absent from their normal habitat, it is likely that pollution drove them out. In a healthy stream, one should find a balanced population consisting of many different kinds of organisms. Adverse chemical or physical changes that disrupt any part of the stream ecosystem often decrease community diversity. Macroinvertebrate populations usually recover more quickly than fish populations in response to water quality improvements and thus, appear to provide better subjects for assessing habitat recovery.

The project annually hires entomologists with Oregon State University (OSU) to sample aquatic macroinvertebrate populations in the McKay Creek, Wildhorse Creek, Spring Hollow Creek, Mission Creek, Buckaroo Creek and Meacham Creek project areas. Their study design involves sampling invertebrates at two sites per project area. One site is located within downstream portions of CTUIR habitat enhancement projects (the "Restoration" site). Water quality is examined at these sites as flows exit the project areas. The second site is located upstream of project areas, within 300 m of the projects' upper boundaries. Water quality is examined at these sites as flows enter project areas (the "Control" site). The general hypothesis is, "restoration will have a positive influence on water quality as reflected by macroinvertebrate community structure".

Four benthic samples are obtained at each sampling site with a 30 cm, 250 micron mesh D-frame net. Samples are collected by firmly placing the net against substrate and disturbing the substrate in a 30 cm by 60 cm area in front of the net for a one minute period. An effort is made to disturb the substrate to a standard depth of 10 cm.

Macroinvertebrates are sorted from detritus, counted and identified to the lowest taxonomic level feasible in the laboratory. Samples are either completely sorted or sub-sampled when large amounts of sediment are present in the sample. Sub-sampling involves dispersing the sample evenly across a 20 cm diameter coffee filter, randomly choosing a quarter-section of the filter, cutting away that portion from the remainder of the filter and then sorting all macroinvertebrate from the quarter-section. Data from the four samples taken from a sampling site are pooled to provide a single measure of macroinvertebrate community structure at each site.

To examine the difference in community structure between the paired control and restoration sites for each stream, the following metrics are examined:

1) Taxa richness – a simple count of the number of taxa present at a site. This metric is predicted to decrease with decreasing water quality.
2) EPT richness – a count of the number of taxa belonging to the orders Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies). Most taxa within these orders are sensitive to pollution and therefore this metric is predicted to decrease with decreasing water quality.
3) Plecoptera richness – a count of the number of taxa belonging to the order Plecoptera. This metric is very similar to EPT; however, it has been found to perform better than EPT in the Pacific Northwest (Karr and Chu 1999). This metric is predicted to decrease with decreasing water quality.

4) Intolerant taxa richness – a count of the number of taxa considered to be intolerant or sensitive to pollution. This metric is expected to decrease with decreasing water quality.
5) Tolerant taxa richness – a count of the number of taxa considered to be tolerant or insensitive to pollution. This metric is expected to increase with decreasing water quality.
6) Sediment-tolerant taxa richness – a count of the number of taxa considered to be tolerant or insensitive to sediment. This metric is expected to increase with decreasing water quality.
7) % Predators – the proportion of predators found in a community. In general, this metric is expected to decrease with decreasing water quality.
8) Functional Feeding Group (FFG) structure – the proportion of taxa found within functional feeding groups. Other than the proportion of predators decreasing with decreasing water quality (metric 8), there are few specific predictions about how FFG structure should change with changes in water quality. However, FFG structure can provide information on the diversity of basal resources at a site and in general this diversity is expected to increase with increasing water quality.
9) Shannon's Diversity Index – a measure that takes into account both the number of distinct taxa at a site and their relative abundances. This measure is expected to decrease with decreasing water quality.
10) Percent Dominance – a metric of the proportion of the community made up of the three most abundant taxa. This metric is expected to increase with decreasing water quality.
11) Hilsenhoff Biotic Index (HBI) – a metric of community structure that is especially sensitive to organic enrichment. Taxa are assigned an index score ranging from 0 (very sensitive taxa) to 10 (highly pollution tolerant). The index is an average score weighted by the abundance of each taxa. Scores ranging from 0-2 are considered indicative of clean water, 2-4 slightly enriched water, 4-7 enriched water, and 7-10 very polluted water (Hilsenhoff 1987).
12) Biotic Condition Index (BCI) – a metric of community structure indicative of pollution. This index measures a site's quality relative to a predicted quality based on physical and chemical parameters. Thus, each site is measured against its own "potential." Each taxa is assigned a score ranging from 2 (very sensitive taxa) to 108 (very tolerant taxa) and the weighted average of all scores are taken and then compared to the predicted score. BCI values greater than 90 are indicative of high quality conditions, 80-90 good conditions, 72-79 fair conditions, and less than 72 poor conditions (Platts et al. 1983).
13) Oregon Department of Environmental Quality's (ODEQ) Grande Ronde Multimetric Index – a single measure of water quality that is comprised of ten individual metrics: taxa richness, Ephemeroptera taxa richness, Plecoptera taxa richness, Trichoptera taxa richness, number of intolerant taxa, number of sediment - intolerant taxa, percent dominance of the three most abundant taxa, proportion of tolerant taxa, proportion of sediment-tolerant taxa, and HBI. Higher values of this index indicate better water quality. This metric was developed by Rick Hafele and Shannon Hubler of the ODEQ specifically for the Grande Ronde Subbasin. It has not been tested in the Umatilla Subbasin, but shall be included in evaluating macroinvertebrates collected under this project.

In addition to the benthic macroinvertebrate samples, the following water quality measurements are made: turbidity, conductivity, pH, dissolved oxygen, and continuous water temperature. Turbidity is measured using a LaMotte 2020 Turbidimeter. Conductivity, pH and dissolved oxygen are measured using a WTW Multiline P4 meter. Continuous temperature is taken using Hobo H8 data loggers. Macroinvertebrate surveys will continue to be repeated annually at project sites. Macroinvertebrate data will provide an additional element in comparatively detecting trends over time to assist in determining habitat enhancement effectiveness.

3.2.4 Water Temperature Monitoring:

Vemco Minilog Thermographs are deployed within selected stream reaches (see Table) in the upper Umatilla River Watershed. Several of these instruments are installed upstream, downstream and/or within project areas in the Umatilla River, Meacham Creek, Wildhorse Creek, Greasewood Creek, Spring Hollow Creek, Mission Creek, Buckaroo Creek and Iskuulpa Creek to monitor the effectiveness of habitat improvements on water temperature cooling. The remaining thermographs are installed in Moonshine Creek, Coonskin Creek, Little Buckaroo Creek, Eagle Creek, and at additional Umatilla River and Wildhorse Creek sites to obtain data on potential habitat limiting factors and existing water quality conditions.

Thermographs are deployed in May. All instruments are recovered and downloaded into a computer program in October. The thermographs collect one temperature reading per hour. Water temperatures are graphed for warmer months (June, July, August and September) to determine if temperatures are reached which could prove detrimental to salmonids.

TABLE 2 – THERMOGRAPH LOCATIONS FOR THE 2004 PROJECT PERIOD	
	Location
1.	Umatilla River - RM 56.0 (West Reservation Boundary)
2.	Umatilla River - RM 81.7 (USGS Gage Station No. 14020000)
3.	Wildhorse Creek – RM 1.4 (Oregon Water Resources Gage)
4.	Wildhorse Creek – RM 26.0
5.	Greasewood Cr. – RM 0.1 (upstream of confluence with Wildhorse Creek)
6.	Spring Hollow Creek - RM 3.5
7.	Eagle Creek - RM 0.2 (at Umatilla County Road 685 Bridge)
8.	Mission Creek - RM 1.25 (upstream of Umatilla County Road 900 Bridge)
9.	Mission Creek - RM 3.7 (upstream of St. Andrew's Church)
10.	Mission Creek - RM 3.8 (downstream of stream forks)
11.	Moonshine Creek – RM 1.1 (upstream of Umatilla County Road 900 Bridge)
12.	Coonskin Creek – RM 0.2 (upstream of Umatilla County Road 900 Bridge)
13.	Buckaroo Creek – RM 2.0
14.	Little Buckaroo Cr. – RM 0.04 (upstream from confluence with Buckaroo Cr.)
15.	Iskuulpa Creek - RM 2.0
16.	Iskuulpa Creek - RM 9.0 (at confluence with Little Iskuulpa Creek)
17.	Meacham Creek – RM 1.4 (USGS Gauge Station No. 14020300)
18.	Meacham Creek – RM 2.0
19.	Meacham Creek – RM 5.25 (East Reservation Boundary)

3.2.5 Suspended Sediment and Turbidity Monitoring

Siltation, a leading cause of non-point source pollution, is especially harmful to fish and aquatic ecosystems. Sediments harm fish by reducing dissolved oxygen levels and by smothering eggs and newly hatched fry. Sediment deposits also can eliminate aquatic plants that provide cover for fish and the invertebrates they consume (Trout Unlimited, 1994).

Three Isco Model 2700 Wastewater Samplers are deployed to obtain estimates of suspended sediments. These sampling sites include RM 81.7 Umatilla River, RM 56.0 Umatilla River and RM 2 Meacham Creek. Sampling sites are located at USGS Gage Stations (see Table below) and near CTUIR thermographs.

Samples are taken year round at 6-hour intervals to create a composite daily sample. The samples are collected every 21 days and analyzed by Umatilla National Forest Service (UNF) Personnel at the United States Forest Service (USFS) Lab in Pendleton, Oregon to determine turbidity in Nephelometric Turbidity Units (NTU), specific conductivity and total suspended solids (TSS). CTUIR staff correlate suspended sediment data with stream flow data collected from the adjacent gage stations to calculate total sediment load (tons/day).

TABLE 3 – SUSPENDED SEDIMENT AND TURBIDITY MONITORING SITES IN 2002 AND 2003.

Location
Umatilla River – RM 56.0 @ USGS Gage Station No. 14020850 (West Reservation Boundary)
Umatilla River – RM 81.7 @ USGS Gage Station No. 14020000 (East Reservation Boundary)
Meacham Creek – RM 2.0 @ USGS Gage Station No. 14020300

3.3 Objective 3: Continue Watershed Planning, Scoping and Education Process by Identifying and Developing Creative Solutions to Land Use Problems Impacting Fisheries Habitat in the Umatilla River Basin.

3.3.1 Watershed Assessment

Completion of the Umatilla Subbasin/Willow Creek Subbasin Summary and Meacham Creek Watershed Analysis and Action Plan, and continued development of the Umatilla Subbasin/Willow Creek Subbasin Watershed Assessment assisted in sub-watershed prioritization of anadromous fisheries habitat needs and determination of future habitat improvements. A prioritization schedule for BPA funded fisheries habitat projects in the Umatilla Basin was last provided in the Umatilla Drainage Fish Habitat Improvement Implementation Plan (Oregon Department of Fish & Wildlife, USFS and CTUIR, 1988), which was produced in 1988. Many of the habitat enhancements, recommended in that document, are no longer biologically valid (in-stream hard structures, rip-rapping, etc). Furthermore, some of the habitat deficient areas that were identified in the plan have been addressed. The updated documents, mentioned above, include information pertaining to historical watershed conditions, present-day watershed conditions, on-going land use practices, biological data, anadromous fish habitat limiting factors, and

identify data gaps. They also prove useful in guiding future project activities.

3.3.2 Community Outreach Efforts

The project conducts local outreach efforts. Outreach activities are coordinated with landowners, special interest groups and resource agency personnel. These activities assist the project in obtaining public input and support, identifying detrimental land use practices, and developing site-specific habitat restoration and mitigation measures. Watershed improvement workshops, tours and presentations are provided to area residents, students, agency personnel and other interested individuals.

4. RESULTS AND DISCUSSION

4.1 Plan and Design

Objective 1: Identify priority stream reaches for habitat enhancements on private lands within the Umatilla river Basin to achieve desired habitat recovery.

4.1.1 Subbasin Plan

Utilization of the Umatilla Subbasin/Willow Subbasin Summary and Assessment to target areas for habitat restoration. A draft of the Subbasin Plan including the Summary and Assessment became available in the spring of 2004. Pre-conceived ideas and ongoing project work was compared with the Subbasin Plan particularly as concerns priorities assigned to various streams in the Umatilla watershed. The document reinforced the importance of Meacham and Birch Creeks as priority water bodies for instream and riparian improvements. Recommendations in the Plan meshed well with the BPA/CTUIR statement of work for 2004.

4.1.2 Local Outreach Efforts

Several properties were identified that are amenable for improvements under the CREP program. Those owners were contacted and CTUIR personnel met with them to explain CREPS purpose, administration, and benefits. At this time the following owners have enrolled in CREP or have expressed their intention to do so: B & G Resources, Francis and Dave Burnett, and Delwin Hendrickson on the Umatilla River; Jim Whitney on Birch Creek; Bud Schmtidgall (S & M Farms) on Wildhorse and Greasewood Creeks; and Haynes/Meirs on Wildhorse Creek. CTUIR personnel have collaborated with the owners, NRCS, and contractors to produce and implement conservation plans for riparian vegetative planting.

CTUIR Habitat personnel participate in a technical coordinating committee that is chaired by the UBWC. The committee includes membership from federal, state, county and CTUIR units that are responsible for planning and implementation of projects affecting streams and their riparian zones. The committee normally meets at key times

during the year to discuss present activities, future plans, and results of environmental monitoring.

Project personnel coordinated informally during the year with NRCS, FSA, SWCD, UBWC and ODFW to identify future projects. Also, personnel met in September with other agency representatives to advise the U.S. Bureau of Reclamation concerning management of a 300-acre parcel owned by the Bureau. The parcel is located just northwest of Hermiston, Oregon.

4.1.3 Property Acquisition for Purchase

The Gladow property that fronts some five stream miles on the east bank of Meacham Creek was recommended to the CTUIR Land Acquisition Committee as a property that should be purchased to retain habitat values into the future. CTUIR's easement for the property ended in 2004. There is a possibility of landuse changes that lead to loss of habitat on a stream that is critical for summer steelhead and spring chinook salmon reproduction.

4.1.4. Management Plans for Project Sites

Plans were prepared for work at Spring Hollow Creek, Sears Creek, and Mission Creek as shown in Appendices A, B, and C. Spring Hollow and Sears Creek work was completed. Mission Creek was held up for lack of NEPA consultation. In addition, a projection of activities and their estimated cost was prepared for work at the Adams and B & G Resources easements.

4.1.5 Pre-Construction Preparation

- Project Grants and Cost Share

A total of $301,000 in new grants was received or pledged during the 2004 year. Pacific Coastal Salmon Restoration funds, $90,000, were approved for the Hoeft passage barrier project on Birch Creek. Wildlife Habitat Incentive Program (WHIP) dollars in the amount of $100,000 each were approved for projects on Birch Creek and for Meacham Creek where the major expenditures are projected for years 2005 and 2006. In addition, the Oregon Watershed Enhancement Board (OWEB) pledged $8,000 for costs involving engineering design for the Hoeft and Broun projects on Birch Creek. OWEB dollars are to be administered by the UBWC. Also, the Birch Creek Water Conservation District has informally accepted proposals for assistance in the amount of $1,000 each for design of the Hoeft, Peterson/Whitney, and Broun passage improvement projects. A grant application was made to NOAA for $25,000 to assist in instream and riparian improvements to McKay Creek upstream from McKay Reservoir. The success of that application will be known during 2005. CTUIR/BPA cost share in implementing the projects described above will be some $30,000 in staff salaries, fringe, and overhead.

In addition to the above, some $8,600 of 2003-approved WHIP dollars were used to implement the Spring Hollow Creek and Sears Creek instream projects. CTUIR's cost

share for that work (25 percent of the total cost) was about $2,900 and consisted of rock for instream cross vanes, cultural preservation observation, and grass seed. Additional 2003-approved WHIP dollars will be used for installation of rock vanes in Mission Creek during 2005 as soon as environmental compliance approval is received from the gauntlet of agencies involved with permits and approvals.

About $30,000 of the BPA project budget staff time was used to cost share with CREP for preparing for and/or making improvements on the Adams, B & G Resources, and S & M Farms easements. About $14,000 of the project's budget line 6100 was used on the Adams easement for fence removal, fence/gate construction, and zone 1 plantings of willows. Of that amount, some $10,000 and $4,000 were used for payments to fencing and planting subcontractors, respectively, on the Adams easement. An additional $6,485 was paid to a subcontractor for fencing and gate construction on the B & G resources easement.

The project and CTUIR Environmental Planning/Rights Protection Personnel cooperatively collected daily suspended sediment data from three ISCO Model 2700 Wastewater Samplers at RM 2 Meacham Creek, RM 56 Umatilla River and RM 81.7 Umatilla River. EP/RP contributed some $ 8,000 in EPA cost share funds to cover salary, fringe benefits and associated indirect costs for a CTUIR Water Quality Technician to collect data and service the sampling stations. The CTUIR Habitat Enhancement Project provided about $ 7,000 in BPA project dollars to finance USFS lab analysis of sediment samples and associated indirect expenses.

OSU contributed about $ 8,000 in in-kind support to cover salaries and associated fringe benefits, travel, monitoring equipment, field supplies and related indirect expenses for sampling and analysis of macro-invertebrates in the McKay Creek, Wildhorse Creek, Spring Hollow Creek, Mission Creek, Buckaroo Creek and Meacham Creek project areas. BPA monies supplied some $5,700 to cost share laboratory time and data analysis.

- <u>Easement Agreements</u>

A 10-year riparian conservation easement was secured with Homer Peterson in 2004 for riparian and instream habitat improvements on property located between river mile 3-4 on mainstem Birch Creek (see Figure… map). The intent of these improvements is to stabilize the stream channel, increase in-stream habitat diversity, and encourage floodplain, wetland and riparian recovery. Improvements under this easement will involve instream and the riparian zone.

The CTUIR secured a 20-year riparian conservation easement for the B & G Resources property located between RM 40 and 44 of the Umatilla River west of Pendleton (see Figure ..). The easement restricts livestock from the riparian corridor to allow natural recovery and long-term protection of native plant communities. Major activities during 2005 and subsequent years are noxious weed control, grass planting in the flood plain adjacent to CREP units, and coordinating with the CREP contractor for zone 1 and zone 2 shrub/tree planting. As shown in the accompanying photo, this

property is beset by a serious weed problem.



B & G Resources

Two existing riparian conservation easements with John Adams were renewed during May 2004 for another 20 years. These properties are located between approximately RM 9-11 on Wildhorse Creek just downstream from Adams, Oregon. The purposes of these easements are to continue livestock exclusion from the riparian corridor and to promote habitat recovery. Easement activities will be coordinated with the CREP program which will result in planting of native trees and shrubs in zones 1 and 2 of the easement's riparian area.

A new easement was signed during May 2004 with John Adams for an approximately 29-acre property located on Wildhorse Creek between RM 7 and 8 contiguous with Greasewood Creek, a tributary to Wildhorse Creek. The easement prevents livestock use and calls for coordination between CTUIR and the CREP program for planting native trees and shrubs in zones 1 and 2 of the riparian corridor and in a 3-acre side draw that enters the easement area from the south.

A 10-year easement was consummated between CTUIR and the Cunningham Sheep Company for instream work associated with a box culvert at about RM 3.3 on West Fork Birch Creek. An approximately three foot drop, which causes a passage impediment to migrating summer steelhead, is extant at the downstream end of the culvert. Work consisting of the placement of rock weirs for channel gradient control will proceed in 2004 after environmental clearance has been obtained (See photo in Appendix C).

The CTUIR and the Umatilla County Department of Public Works signed an agreement for instream improvements associated with bridge renovation on Spring Hollow Creek and culvert improvements in Sears Creek and Mission Creek.

- Removal/Fill Permits

U.S. Crops of Engineers (USCE) & Oregon Department of State Lands (ODSL)

In June 2004, project staff submitted a joint permit application to the U.S. Corps of Engineers (COE) and the State Lands Department (SLD) for instream improvements in the form of rock vanes for Spring Hollow, Sears, and Mission Creeks at the locations described above in section 4.1.1.b. As of April 2005, no response had been received by CTUIR concerning those projects. In addition, preliminary permit applications were submitted to those agencies in December 2004 for instream work planned for 2005 or 2006 in Birch Creek at the Peterson/Whitney, Broun, Hoeft, and Cunningham Sheep properties. A response to those applications from ODSL in December requested more detailed information on project design. That detail will be provided when CTUIR has secured easements with the above landowners and when a subcontractor(s) has completed the detailed engineering design drawings.

Department of Water Resources

Applications to CTUIR's Department of Water Resources for instream work were submitted for Spring Hollow, Sears, and Mission Creeks. Approval from the Department - which oversees instream work on the Reservation – was received during August 2004.

- Endangered Species Act Requirements

Biological Assessments and NEPA checklists

A “combined” biological assessment (BA) along with NEPA checklists were submitted for the Spring Hollow, Sears, and Mission Creek projects in September 2004. This BA was submitted to BPA Environmental Compliance Staff to forward onto the USFWS and NMFS to initiate ESA, Section 7 consultation proceedings for the proposed projects. In a Biological Opinion (BO), NMFS concluded that “the proposed action is not likely to minimize potential for incidental take associated with this project”. The USFWS concurred with CTUIR and BPA that “the proposed action is not likely to adversely affect summer steelhead or bald eagle”.

BPA consultation with NMFS and USF&WS was completed allowing for implementation of the former two projects during October and November 2004. Consultation for the Mission Creek instream work was not completed by April 2005 with no response by BPA or NOAA on the status of that consultation. Lack of consultation prevented implementation of the Mission Creek improvements.

During January 2005, A BA with an EFH assessment and NEPA checklists were under preparation for Birch Creek projects planned for implementation in 2005 and 2006. This was done in an attempt to obtain environmental compliance for at least the Peterson/Whitney and Cunningham Sheep projects during 2005. Using 2004 experience as an example, up to a year can pass without obtaining environmental compliance even though sufficient information for action is forwarded to permitting and regulatory agencies. Project size and complexity appears to have no bearing on processing of environmental approval requests. The fact that project grant dollars may be lost for lack of project implementation within grant time limits appears to have no impact on decision making.

Essential Fish Habitat Assessment (EFH)

An EFH was included with the BA for the Spring Hollow, Sears, and Mission Creek projects. Consultation resulted in agreement that no essential habitat for threatened or endangered species was involved with Spring Hollow or Sears Creek projects. As mentioned above NOAA has not acted on the Mission Creek project.

- Cultural/Archeological Monitoring

Applications for cultural resources clearance were filed with CTUIR’s Historical Resources Protection Office (CHPO) for the Spring Hollow, Sears, and Mission Creek projects in July 2004. That office notified the Project that cultural resources were not a concern for the former two sites, but that Sears Creek needed a survey. Because Sears Creek (as well as Spring Hollow and Mission Creek) was to be funded by federal dollars (WHIP), CHPO remanded the Sears Creek survey to NRCS. By November, no survey had been conducted and no reply from either CHPO or NRCS was forthcoming on cultural resource status. Accordingly, the Sears Creek project was initiated which was imperative if WHIP dollars from the 2003 grant were to be secured. BPA was informed by CHPO that work had started at the Sears Creek site, and BPA subsequently issued a stop-work order. Ultimately, work was allowed to proceed with the presence of a CHPO observer, and work was completed without the presence of artifacts being noted.

A cultural resources survey was conducted by an NRCS archaeologist prior to CTUIR fence construction on the Adams and B & G easements. These surveys, which occurred in September and December, respectively, found no cultural resources of concern at these sites.

The State Historical Preservation Office (SHPO) was notified in November 2004 of proposed instream improvement projects in the Birch Creek watershed. SHPO replied in December 2004 that no information was on record for the project sites and that an on-site survey was required before the projects could proceed. CTUIR staff will follow up on cultural requirements during the first part of 2005.

- Design and Layout

The Project retained Anderson Perry Associates, Inc., as a subcontractor to prepare engineering design drawings for instream improvements (rock vanes) for Spring Hollow, Sears, and Mission Creeks.

CTUIR Habitat Enhancement Project Technicians coordinated the layout of fence lines and gate locations for: (1) construction of 3,280 feet of 6-strand barbed-wire livestock exclusion fencing with installation of three gates, between RM 11 and 12 and in the Wildhorse Creek flood plain on the John Adams easement, removal of about 8,500 feet of deteriorating fence on the Spratling and Adams easements on Greasewood and Wildhorse Creek; and (2) construction of 4,280 feet of four–strand, barbed-wire fencing with two 16‘ gates on the B & G Resources easement between RM 43 and 44 of the Umatilla River.

- Contracts and Professional Services Agreements

The following subcontracts or professional service agreements (PSAs) were awarded in order to augment CTUIR personnel in carrying out the contract SOW:

- Anderson Perry Associates, Inc. for preparation of engineering drawings for instream rock vanes installation at Spring Hollow, Sears, and Mission Creeks - $13,200

- Umatilla County Road Department for installation of rock vanes on Spring Hollow Creek and installation of rock vanes and an arch culvert on Sears Creek - $6,353

- Borgerding Fence Construction, Inc. for fence removal and construction on the Adams and Spratling easements and fence reconstruction on the Adams easement - $9,949

- Borgerding Fence Construction, Inc. for fence construction and gate installation at B & G Resources - $5,915

- McLain Spraying to eradicate noxious weeds in approximately 8.3 miles of stream corridor within the mid Umatilla River, McKay Creek, Wildhorse Creek, Greasewood Creek, the West Fork of Greasewood Creek, Spring Hollow Creek and Mission Creek project areas - $12,500

- Indian Heaven Construction for planting of willows in zone 1 of the Adams easement - $4,080

- David Wooster and Oregon State University for collection, identification, and reporting of aquatic invertebrate populations as affected by project activities - $4,320

- U.S. Forest Service for analysis of suspended solids and turbidity samples in the amount of $2,700.

CTUIR Habitat staff met with subcontractors, prior to proposed project implementations, to discuss subcontract terms and work performance requirements, work progress schedules, petroleum spill plans, and fire prevention and suppression plans.

CTUIR Habitat Enhancement Project Personnel inspected all equipment utilized under the above agreements upon project initiation and determined all equipment was in good working order and free from excessive leaks in hydraulic, fuel and power systems.

4.2 Construction and Implementation

Objective 2: Implement habitat enhancement projects consistent with goals and actions listed in the Umatilla Subbasin/Willow Plan on private properties in the Umatilla River Basin to achieve habitat recovery

4.2.1 Instream Improvements

(a) Mainstem Birch Creek

- **Peterson/Whitney Dam Project**

By the end of 2004, pre-planning and pre-construction activities for the Peterson/Whitney project was ready for preparation of design and specifications for dam removal and channel restoration. Mr. Whitney has negotiated an agreement with the Oregon Water Trust to lease a major part of his water right to the Trust for instream purposes. CTUIR's easement with Mr. Whitney will call for dam removal upon consummation of the aforementioned lease. Preliminary applications for USCE and OR DSL dredge and fill permits were filed with the expectation of re-submitting the applications when the project design and specifications are completed.

- **Broun Dam Project**

During 2004, CTUIR personnel met several times with the owner, renter, and neighbors of the landowner to discuss an agreement that would lead to removal of a diversion dam that serves an unscreened diversion. The diversion was used in the past by three water right holders, each of which must approve removal of the dam and deactivation of the diversion. The improvement concept is for: (1) the owner to file with, and obtain a permit from, the Oregon Department of Water Resources (ODWR) for a change in diversion location, (2) CTUIR to acquire a subcontractor and oversee digging of a well and provision of an irrigation pump to replace the direct diversion, (3) CTUIR provide irrigation lines from the new pump to the water right holders in lieu of their dependence on the diversion ditch, (4) removal of the existing dam, and (5) grading and stabilizing the stream channel upstream and downstream from the dam by means of rock weirs to create scour pools. CTUIR expects an easement to be signed by the owner early in 2005 and a water right application to be acted upon favorably by (ODWR) by the fall of 2006. Along with the satisfaction of environmental requirements, these steps will allow for project implementation during 2006.

(b) West Fork Birch Creek

- **Hoeft Dam Project**

At the conclusion of the 2004 contract, the land owner announced his intention to sign an easement with CTUIR that will allow for correction of the fish passage problem by installing a full-channel concrete fish ladder that starts at the dam face and continues downstream with some six jump pools. A subcontract will be awarded for final engineering design and specifications for the structure. Upon completion of the design, a revised application for a dredge and fill permit will be submitted to USCE and the OR DSL. With the anticipated approval of environmental compliance requirements, the structure will be constructed in 2006 in partnership with the ODF&W, the UBWC, and the Birch Creek Water Conservation District. Major funding for implementation will come from PCSRF and WHIP.

- **Cunningham Sheep Co. Box Culvert Project**

At the end of 2004, CTUIR signed an easement with the landowner that calls for re-establishing the gradient downstream from an existing box culvert that serves as a bridge to reach the western part of the owner's property. Preliminary applications for a dredge and fill permit was filed with USCE and ODSL with the intent of a revised application being submitted when engineering design drawings and specifications are obtained early in 2006.
Upon approval of environmental requirements, the project will be constructed in the summer or fall of 2006.

(c) Spring Hollow Creek

Two rock vanes were installed downstream from Wamishta Road after the channel was re-graded. Vanes consisted of up to 24 inch rock with the base inserted at least 12 inches into the channel to withstand high flows. In addition, the streambanks on either side of the Creek were sloped back to the angle of repose and 24 inch or larger rock was placed at the base as armoring to prevent further bank cutting. Work areas were planted with native grasses and straw was spread to encourage grass growth and retard erosion. The drop that was an impediment for redband trout passage has been eliminated.

(d) Sears Creek

The existing pipe culvert was removed and a new arch culvert was installed under the road located near the mouth of Sears Creek and east of Meacham Creek. A temporary detour was constructed around the work area when the intermittent stream was without flow. Rock vanes consisting of up to 24 inch rock was placed a minimum of 12 inches into the channel substrate upstream and downstream from the culvert. Upon placement of the culvert, which was bolted to 12 inch x 24 inch by 25 foot concrete foundations, the road detour area was re-graded. Areas of disturbed soil were planted with native grasses and covered with straw to retard erosion. The approximately 3-foot drop at the downstream end of the old culvert was eliminated. This improvement will allow for unimpeded passage of adult summer steelhead to the headwaters of Sears Creek.

4.2.2 Riparian Improvements

- Adams Easements

The project involved installation of some 1,000 native willow cuttings in stream banks and gravel bars and construction of about 3,280 feet of livestock exclusion fencing to promote and protect growth of riparian vegetation. Willow cuttings were stung into stream banks with a stinger mounted on an

excavator bucket or trenched into stream channel margins with an excavator. These planting techniques achieve greater soil depths, insuring that cuttings are placed well within the annual water table, resulting in increased tree survival.

Plant reestablishment will provide additional bank stabilization, encourage pool development, increase insect drop for fish, aid in the reduction of water temperatures, improve bank storage, and improve natural floodplain and channel function.

Overall, this project will result in increased pool habitat complexity, regeneration of a healthy and self-sustaining riparian zone, and ultimately improved water quality.

- B & G Resources Easement

About 4,280 feet of four-strand barb wire fence with two gates was installed adjacent to the Umatilla River for livestock exclusion and to prevent vehicular trespass. This part of the overall project was done first and is to be followed by: (1) weed control, land preparation, and grass planting during the fall of 2005, and (2) installation of a well, pumping facilities, and watering trough during the summer of 2005, and (3) planting of riparian vegetation by the CREP contractor during the fall of 2005.

Overall benefits expected to be achieved from this project include: (1) arresting bank undercutting and mass wasting on the north stream bank, (2) improving channel morphology through increasing channel sinuosity and reducing width to depth ratios, (3) improving floodplain connectivity by improving bank stability and reestablishing native vegetation communities, (4) improving wildlife habitat and promoting erosion control by planting of native grasses in the CREP zones and adjoining flood plain, and (5) controlling noxious weeds that have been a source of complaint from adjacent land owners and the County for several years.

- Cripe Easement

An additional 1,000 native willow cuttings were collected by project technicians and provided to students for planting in zone 1 at RM 21.5 of McKay Creek during the ESD Watershed Field Days in May 2004. Plant source materials for all of these projects were locally obtained from within the Umatilla River Basin.

4.3 Operation and Maintenance

Objective 3: Maintain habitat enhancements to insure continued habitat recovery within existing project areas

4.3.1 Assess Maintenance Needs

The physical condition and structural integrity of improvements within the upper and mid Umatilla River, Meacham Creek, Wildhorse Creek, Greasewood Creek, Spring Hollow Creek, Mission Creek, and McKay Creek project areas were evaluated in the spring of 2004.

Fence maintenance was identified as needed on Wildhorse, Mission, Greasewood, Spring Hollow, McKay, Buckaroo Creek easements as well as Umatilla River easements.

In addition to fence repair, the landowners of the Schmitdgall and Adams properties on Greasewood and Wildhorse Creeks, respectively, requested that previously constructed fencing be removed where the owners intend to restrict livestock from the entire property.

Weed control was found to be needed on the CTUIR easements with the main noxious weed species being Scotch thistle, yellowstar thistle, dalmation toad flax, knapweed, and spurge.

A head-cut noted upstream from a culvert that was installed in 2000 in Mission Creek under St. Andrews Road was noted to have moved upstream some 100 feet since installation of the culvert. In addition, a water drop of between 2-3 feet was noted at the downstream end of the culvert. Both the head-cut and culvert drop pose a passage problem for adult summer steelhead. The Umatilla County Road Department agreed with CTUIR staff that the Mission Creek channel needs stabilization and grade control through the reach from the head-cut downstream past the downstream end of the culvert.

A bridge crossing over Spring Hollow Creek on Wamishta Road had created a 2-3 foot drop in the channel just downstream from the bridge. The drop posed a passage impediment for rainbow trout. In addition, a vertical bank has been cut on the east bank of the Creek downstream from the bridge. Continued bank cutting will result in deposition of solids in the Creek and in downstream Wildhorse Creek.

A previously installed pipe culvert in Sears Creek, tributary to Meacham Creek in the upper Umatilla River system was found to have deteriorated resulting in flow restriction at the upstream end and a water drop of some 3' at the downstream end of the culvert. Although a small watershed, Sears Creek sustains summer steelhead which would be restricted from upstream passage by the drop from the culvert.

Meacham Creek in the reach between river mile 2 and 10 continues to be constrained by levees constructed previously in conjunction with the railroad right-of-way. The levees prevent channel meander which is needed to reduce flow velocities and promote flood plain deposition and channel complexity. The Creek channel could benefit from placement of large woody debris (LWD) to promote pool habitat and to create/maintain point bars that will sustain riparian canopy. Also, minor passage barriers to spring chinook salmon and summer steelhead migration exist.

The Birch Creek watershed including its West and East Forks continues to have fish migration problems and degraded riparian areas. The watershed was assessed to identify potential CREP project areas and priority fish passage impediments. This assessment resulted in a potential of four barriers that are amenable to resolving and several properties that could benefit from conservation practices that can be implemented under the CREP program. Passage impediments were characterized on the Peterson, Broun, Hoeft, and Cunningham Sheep properties. The Peterson and Whitney properties, on about river miles 3-4 on mainstem Birch Creek were found to be conducive to application of CREP practices.

Two properties in the mid-Umatilla River area manifest riparian problems. The Beebe property, which is under a CTUIR easement, received zone 2 plantings by NRCS in 2001 that failed. Because of the importance of zone 2 to wildlife and water quality, a healthy stand of native trees and shrubs would be beneficial on some 0.8 miles of riparian zone. Just upstream from the Beebe property is the B & G Resources property that occupies almost 400 acres including the riparian and flood plain zones. That property could benefit from livestock exclusion, riparian planting, grass planting of flood plain areas,

and weed control. The latter is particularly needed in that the B & G Resources property has one of the more severe noxious weed problems in Umatilla County. A combination of CREP conservation practices and flood plain interventions in the form of weed control and planting of native grasses will greatly improve habitat quality on the property.

4.3.2 Fence Maintenance

Fence repairs and water gap maintenance were performed by CTUIR Habitat Enhancement Project Personnel in the Umatilla River, Meacham Creek, Boston Canyon Creek, Mission Creek, Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek, Spring Hollow Creek, Buckaroo Creek, Iskuulpa Creek and McKay Creek project areas.

4.3.3 Noxious Weed Control

McLain Spraying was subcontracted to eradicate noxious weeds in approximately 8.3 miles of stream corridor within the mid Umatilla River, McKay Creek, Wildhorse Creek, Greasewood Creek, the West Fork of Greasewood Creek, Spring Hollow Creek and Mission Creek as well as Umatilla River project areas during the 2002 and 2003 project periods.

Herbicide application occurred in the spring and, in some cases , the fall with 4-wheeler with tank, a backpack sprayer or hand wand during each growing season. The project prioritized eradicating weeds designated as "A" Pest Weeds on Umatilla County's Noxious Weed List because these weeds are much more evasive and ecologically considered to be more of a threat to native plant communities. Other invasive weed species were treated as deemed necessary.

Following completion of annual treatments, the project supplied BPA with a summary including acres treated, application methods employed, treatment dates, herbicides utilized, percent active ingredient in herbicides, type and percent of each adjuvant used and herbicide application rates per acre as shown in Table 4. All chemical applications were consistent with ORS.570.505, FIFRA Regulations, and NMFS and USFWS recommendations regarding ESA concerns.

4.3.4 Post-Construction Final Review

All subcontractors maintained a daily log and work progress schedule.

CTUIR Habitat Enhancement Project Personnel inspected all instream and stream bank improvements, including sloped stream banks, constructed point bars, root wad revetments, cross and J-vanes, constructed log jams and willow plantings at mid and upper Umatilla River project sites to determine if maintenance was required.

Fencing construction was inspected to ensure consistency with CTUIR contract specifications and ODFW smooth-wire and NRCS barbed-wire construction specifications.

McLain Spraying provided annual descriptions and summaries of all noxious weeds identified and treated in project areas. Project personnel coordinated closely with these subcontractors and individual landowners to assure that nuisance weeds were adequately identified and eradicated.

All subcontract services implemented during the 2004 project periods met subcontract requirements and were completed in a satisfactory and timely manner. CTUIR Personnel photo documented various stages of project implementations.

4.4 Collect Baseline Data

Objective 4: Collect Baseline Data to identify habitat limiting factors, Determine benefits to salmonid species, quantify short and long-term effects of habitat enhancement activities and assist with adaptive management decisions in the Umatilla River Basin

4.4.1 Geomorphologic and Hydraulic Data Monitoring:

The project funded Jim Webster, the CTUIR Hydrologist, to assist in obtaining baseline physical data and assessing geomorphologic and hydrologic conditions at the new Adams easement on Wildhorse Creek upstream and downstream from the confluence with Greasewood Creek.



Channel Morphological Measurements in
Wildhorse Creek

A longitudinal survey was conducted at two sites with three cross sectional measured at each site prior to zone 1 and zone 2 riparian vegetation planting at approximately RM 9 on Wildhorse Creek (see Figure 3 for longitudinal results and Figures 4 and 5 for cross section results). Longitudinal survey data provided a graphical representation of the streambed elevation and gradient. Cross section data represent the channel profile at a given axis from bank to bank. Sites 1 and 2 are downstream and upstream, respectively.

These measurements will be repeated at three to five year intervals in order to document changes in stream morphology that are attributable to zone 1 and zone two vegetative plantings.

FIGURE 3. LONGITUDINAL CHARACTERISTICS OF WILDHORSE CREEK – JANUARY 2005



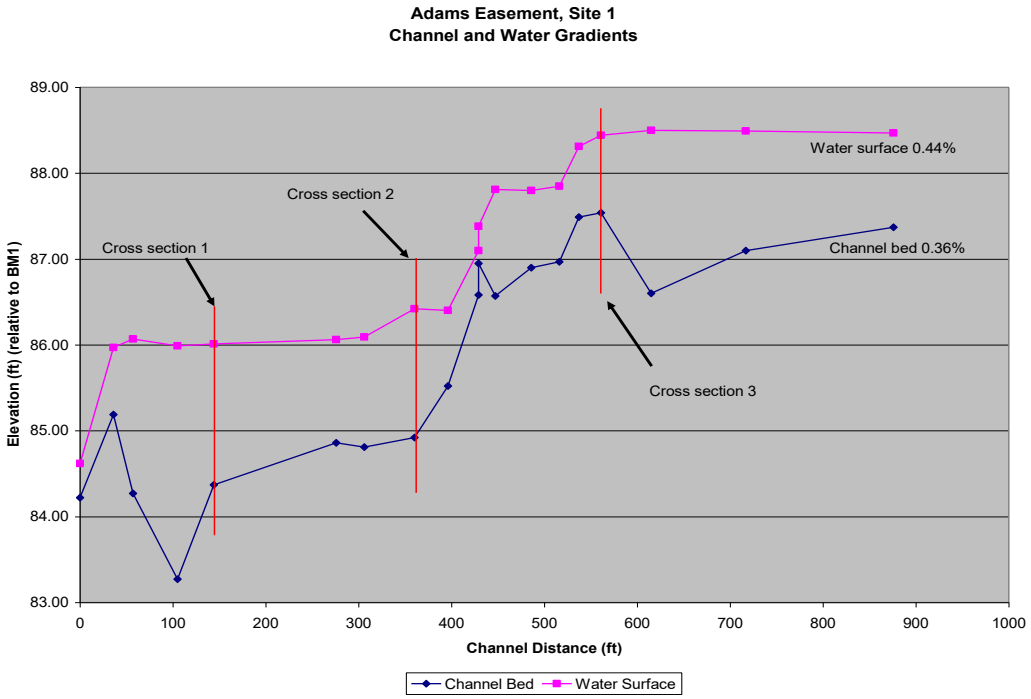
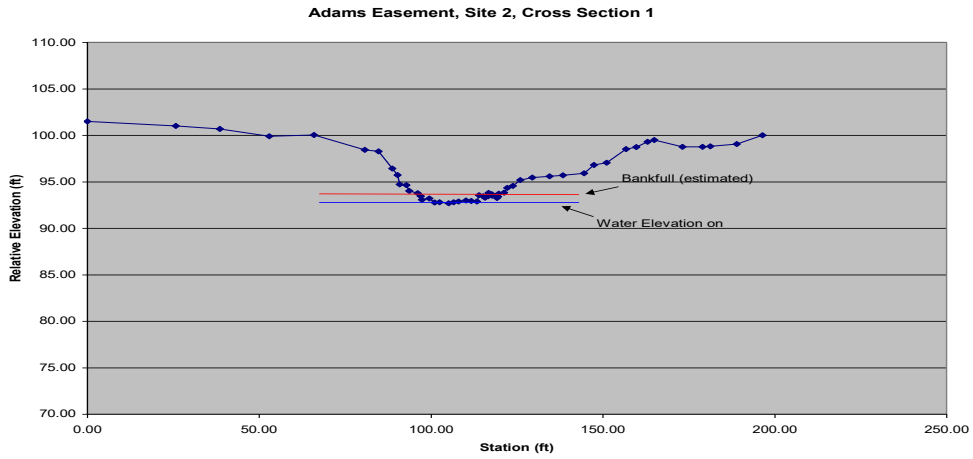
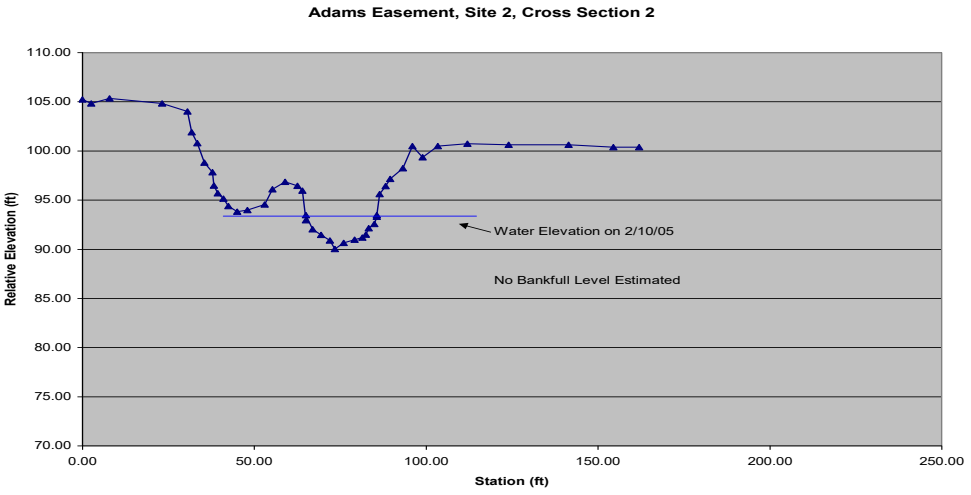


FIGURE 4. CROSS SECTIONS IN SITE 2 ON WILDHORSE CREEK – JANUARY 2005





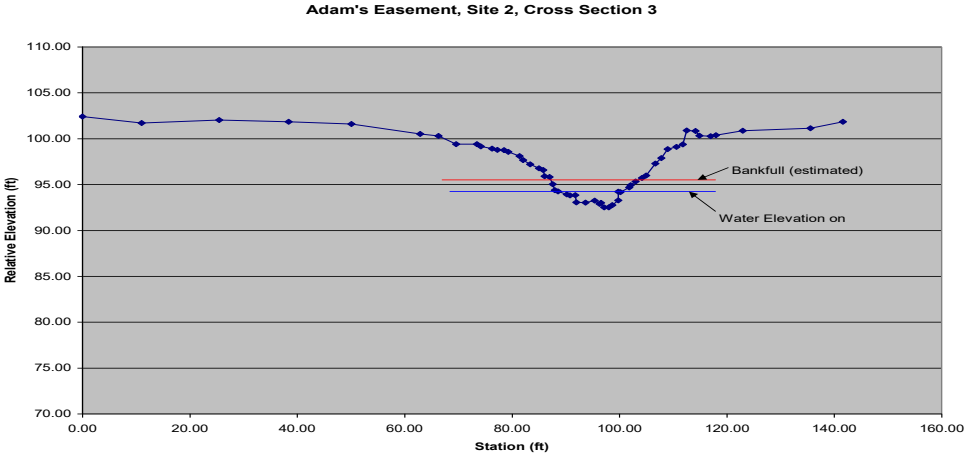
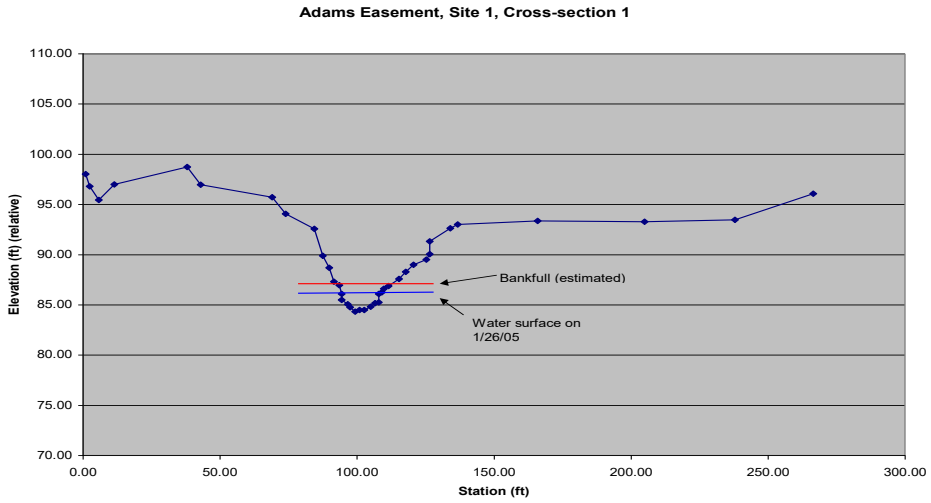
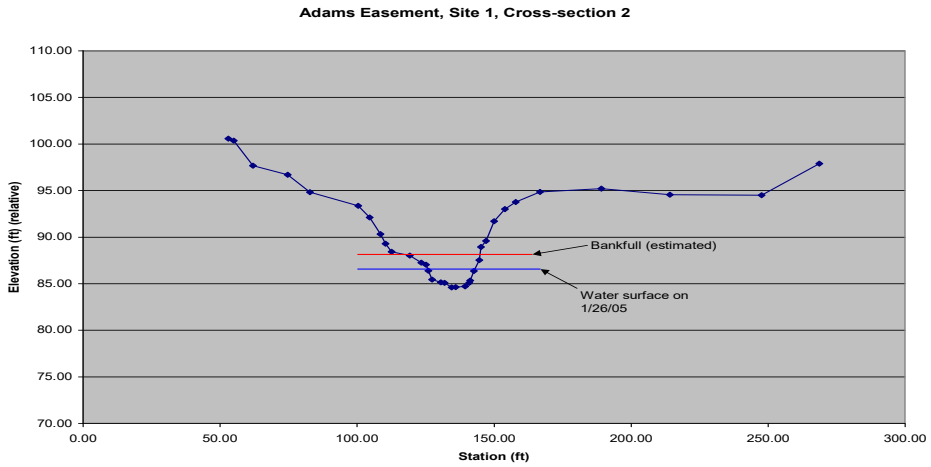
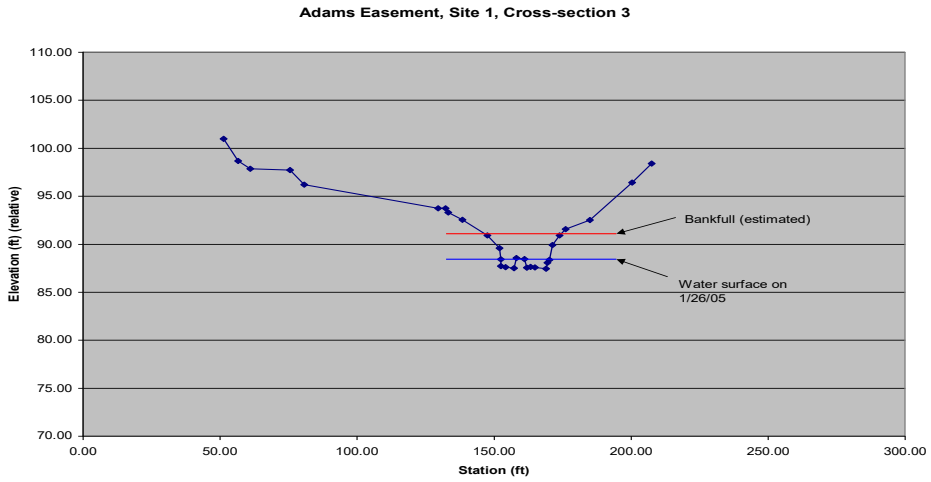


FIGURE 5. CROSS SECTIONS IN SITE 1 ON WILDHORSE CREEK – JANUARY 2005







4.4.2 Biological Inventories:



East Fork Birch Creek

A pre-project presence/absence fish inventory was carried out for North Fork McKay Creek where an instream/riparian improvement project has been proposed that use joint NOAA and landowner funding for project implementation. Observations verified that juvenile and adult redband trout are present, but that trout populations are limited by a general absence of pool and glide habitat.

The headwaters of East Fork Birch Creek was surveyed to determine steelhead and redband trout spawning potential, condition of the riparian and upland zones, and potential benefits from an easement that would result in construction of a perimeter fence enclosing some 4,800 acres of fish and wildlife habitat. Based on those findings, an easement will be pursued with the landowner, Curtis Baker, in 2005 that would result in fencing that would protect habitat over a 20-25 year period.

These biological inventories provide baseline data that can be compared over time. Post-project biological inventories will be conducted approximately every three years to compare habitat conditions and to assess fish utilization of potential instream enhancements. These data will assist with understanding the influence of habitat restoration on species composition.

4.4.3 Aquatic Macroinvertebrate Sampling:

OSU Hermiston Agricultural Research and Extension Center Entomologists, David Wooster and Sandra DeBano, were subcontracted by the project to conduct macroinvertebrate monitoring at several existing habitat enhancement sites during the 2004 period. Macroinvertebrate samples were collected during the 2004 project period at the sites and on the dates shown in Table 5.

TABLE 5. LOCATIONS, ELEVATIONS, AND SAMPLING OF MACROINVERTEBRATES SAMPLED IN 2004

Waterbody	Site	Latitude	Longitude	Elevation (m)	Sampling Date
Spring Hollow	Control 1	45˚ 45.40	118˚ 29.78	536	7/8/03
	Restoration	45˚ 45.30	118˚ 30.45	521	7/2/03
	Control 2	45˚ 45.18	118˚ 30.82	511	7/3/03
	Control 3	45˚ 45.20	118˚ 30.97	508	7/3/03

Mission Cr.	Control 1	45˚ 38.05	118˚ 37.35	522	6/23/04
	Control 2	45˚ 38.14	118˚ 37.47	515	6/23/04
	Restoration	45˚ 38.36	118˚ 37.57	503	6/22/04
	Control 3	45˚ 38.85	118˚ 37.76	471	6/22/04
Buckaroo Cr.	Restoration	45˚ 40.11	118˚ 28.27	548	7/16/03
	Control 2	45˚ 40.41	118˚ 27.91	519	7/9/03
	Control 3	45˚ 40.56	118˚ 27.81	507	7/9/03
Meacham Cr.	Control 1	45˚ 38.60	118˚ 21.58	603	7/15/03
	Control 2			585 (est.)	7/14/03
	Restoration	45˚ 41.51	118˚ 21.19	545	7/11/03
	Control 3	45˚ 41.94	118˚ 21.13	543	7/14/03
McKay Creek	Restoration	45˚ 30.55	118˚ 42.60	490	8/11/04
	Control 2	45˚ 30.50	118˚ 42.83	487	8/11/04
	Control 3	45˚ 30.58	118˚ 43.17	482	8/10/04

Findings are reported in the attached Appendix C, "Biomonitoring of Restoration Projects Using Aquatic Macroinvertebrates". Results failed to detect any impact of riparian restoration on important macroinvertebrate metrics of stream reach quality (see Table 6). However, lack of impacts might result from project size and their inability to buffer the stream reach from larger scale and cumulative impacts.

TABLE 6. ONE-SAMPLE T-TEST RESULTS FOR THE RATIOS OF THE NUMBER OF EPT TAXA AND THE NUMBER OF PLECOPTERA TAXA TO THE AVERAGE NUMBERS FOR CONTROL SITES[1].

Number of EPT Taxa				
Stream	**Restoration**	**Mean for Controls**	**Ratio**	**t-test Results**
Spring Hollow	4	3	1.33	Overall mean=
Mission Creek	9	9	1.0	1.0
Buckaroo Creek	8	11	0.73	
Meacham Creek	6	8.33	0.72	t = 0.00
McKay Creek	11	9	1.22	p = 1.00
Number of Plecoptera Taxa				
Stream	**Restoration**	**Mean for Controls**	**Ratio**	**t-test Results**
Spring Hollow	1	1	1.0	Overall
Mission Creek	2	2	2.0	mean=0.80
Buckaroo Creek	2	4	0.5	
Meacham Creek	0	1.33	0.0	t=-2.14
McKay Creek	1	2	0.5	p=0.099

Environmental variables associated with macroinvertebrate populations at Spring Hollow Creek sampling sites are shown in Table 7. There were no consistent trends in restoration sites having the highest or lowest values within each stream of any of the environmental parameters measured.

[1] Average ratio values were compared to the null expectation of 1.0 (the value indicating no difference between restoration and control sites).

TABLE 7. ENVIRONMENTAL VALUES FOR THE FOUR STUDY SITES IN SPRING HOLLOW CREEK[2]

Variable	Control 1	Restoration	Control 2	Control 3
% Sediment	32.5	**34**	**13**	31.9
% Riffle	21.4	21.8	**41.1**	**10.9**
Number LWD + Debris Dams	**0**	**2**	1	**0**
Mean Cover	1.19	**1.48**	0.81	**0**
% Cover Class 3	**0**	**33**	24	**0**
D.O. % Saturation	95.1	**70.7**	95.6	**95.7**
Conductivity	**466.7**	470	480	**483.3**
pH	**8.22**	**7.71**	7.89	7.89
Alkalinity	310	**448**	**175**	316
Turbidity	**1.63**	**6.51**	5.29	4.32
Velocity	16.4	**11.1**	16.6	**24.1**
Max Temp	20.95	**17.9**	22.48	**23.63**
Mean Temp	16.13	**14.59**	16.92	**17.71**

4.4.4 Water Temperature Monitoring:

Temperatures in excess of 65°F impair growth and survival in salmonids (USFWS and National Marine Fisheries Service, 1981). Abnormally high temperature conditions during migration can contribute to outbreaks of disease among adult Chinook salmon often resulting in pre-spawning mortality. Temperatures in excess of 68°F have been shown to result in impairment of Chinook salmon. High stream temperatures may also stress juvenile steelhead during warm summer months. Temperatures exceeding 73°F result in direct mortality to Chinook salmon and steelhead (Bell, 1984).

Thermographs were deployed at 22 locations throughout the Umatilla River Basin (see Table 2) and data was collected successfully at 19 stations. Stream temperature data was summarized in tabular form, illustrating maximum, average and minimum daily Fahrenheit temperatures during thermograph deployment periods. Digital copies of these water temperature tables are maintained in the CTUIR Habitat Enhancement Project Office. Summer (June, July, August and September) stream temperatures were graphed to determine if temperatures exceeded limits detrimental to anadromous salmonids. Graphed data can be viewed in Appendix E.

Mission Creek and the upper Umatilla River (RM 81.7) exhibited the temperatures most conducive for salmonid survival and rearing. The upper Umatilla River, however, maintains flows year round and surveyors found a moderate number of fish (0.45

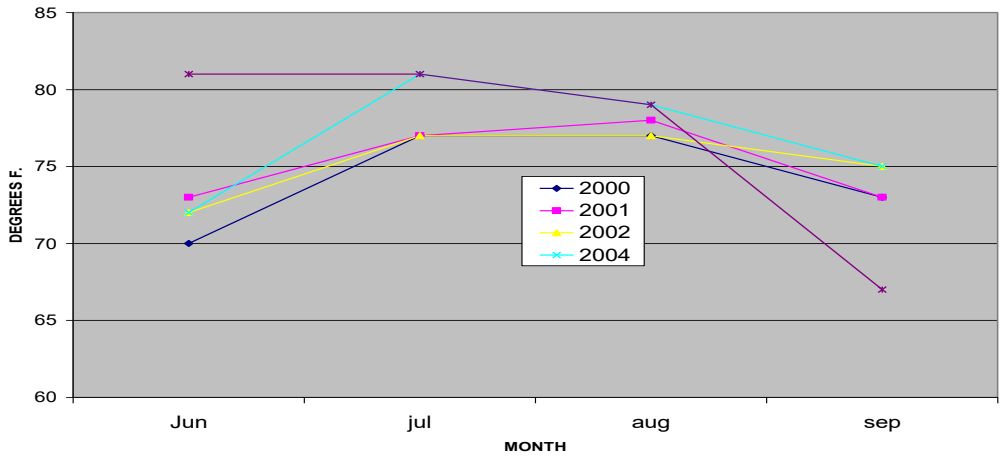
[2] Maximum and minimum values for each variable are in **bold type**.

salmonids/m^2) between RM 81.8 and RM 89.6 (Contor et al., 1996). Based on salmonids densities and low summer instream temperatures, this section of the Umatilla River appears to be the most important rearing area for salmonids. Stream temperatures were highest, exceeding 85° F on several days, at RM 56 Umatilla River.

The influence of hyporheic flow on stream temperature was manifested at the Meacham Creek stations. Temperature decreased through the reach from RM 5.25 to RM 1.4 where the solar influence would be expected to increase temperatures from upstream to downstream. This factor demonstrates the importance of rock bars that allow interchange of water from the stream channel with waters in the adjacent gravels.

Figure 6 is an example of variation in maximum water temperature since year 2000. Mile 5.25 of Meacham Creek is indicative of most of the 22 monitoring points; i.e., there has been little variation in maximum temperature during those years.

FIGURE 6. MAXIMUM WATER TEMPERATURE AT MEACHAM CR. RM 5.25, YEARS 2000-2004



4.4.5 Suspended Sediment and Turbidity Monitoring:

CTUIR EP/RP Personnel collected daily suspended sediment and turbidity data from three ISCO Model 2700 Wastewater Samplers. Data was obtained at RM 2.0 Meacham Creek (at USGS Gage Station No. 14020300), RM 56.0 Umatilla River (at USGS Gage Station No. 14020850) and RM 81.7 Umatilla River (at USGS Gage Station No. 14020000. These data are shown in Tables 8 and 9, respectively and prepared in graph form in Appendix F.

High levels of suspended solids and turbidity can adversely impact instream conditions. Results can be seen with increased depositional layers in the system. Increased turbidity and suspended solids can impact feeding and respiration functions, and cause damage to spawning sites by limiting oxygen. Although the EPA and the State of Oregon don't have numeric water quality standards for suspended solids or streambed fines, excessive fine sediment is addressed through the applied narrative criteria.

TABLE 8. MONTHLY AVERAGE AND MAXIMUM CONCENTRATION OF TOTAL SUSPENDED SOLIDS NOV. 2003 – SEP 2004

Location	Date	Ave. Concentration3 (mg/l)	Max. Concentration (mg/l)
Umatilla R. @ Gibbon	Nov. 2003	3	6
	Dec. 2003	11	21
	Jan. 2004	39	391
	Feb. 2004	5	38
	Mar. 2004	3	7
	Apr. 2004	3	4
	May 2004	22	60
	Jun. 2004	9	14
	Jul. 2004	9	15
	Aug. 2004	12	27
	Sep. 2004	13	23
Umatilla R. @ Western Boundary	Oct. 2003	9	22
	Nov. 2003	23	65
	Dec. 2003	15	80
	Jan. 2004	97	465
	Feb. 2004	26	158
	Mar. 2004	8	28
	Apr. 2004		
	May 2004		
	Jun. 2004		
	Jul. 2004		
	Aug. 2004	4	13
	Sep. 2004	3	5
Buckaroo Cr.	Oct. 2003	4	14
	Feb. 2004	8	40
	Mar. 2004	9	52
	Apr. 2004	2	3
	May 2004	7	14
	Jun. 2004	7	71
	Jul. 2004	7	23
	Aug. 2004	4	16
	Sep. 2004	3	14
Iskuulpa Cr.	Dec. 2003	30	44
	Jan. 2004	7	30
	Feb. 2004	1	2
	Mar. 2004	1	5
	Apr. 2004	1	4
	May 2004	7	23
	Jun. 2004	2	6
	Jul. 2004	3	7
	Aug. 2004	3	7
	Sep. 2004	1	4
Meacham Cr.	Oct. 2003	6	14
	Nov. 2004	9	52
	Dec. 2003	17	40
	Jan. 2004	18	86
	Feb. 2004	2	14
	Mar. 2004	4	19
	Apr. 2004	1	2

3 Rounded to nearest whole number.

May 2004	6	21
Jun. 2004	2	6
Jul. 2004	10	21
Aug. 2004	5	14
Sep. 2004	1	2

TABLE 9. MONTHLY AVERAGE AND MAXIMUM CONCENTRATION OF TURBIDITY NOV. 2003 – SEP 2004

Location	Date	Ave. Concentration[4] (turbidity units)	Max. Concentration (turbidity units)
Umatilla R. @ Gibbon	Nov. 2003	2	4
	Dec. 2003	3	5
	Jan. 2004	16	111
	Feb. 2004	3	10
	Mar. 2004	3	6
	Apr. 2004	3	3
	May 2004	22	60
	Jun. 2004	2	3
	Jul. 2004	2	4
	Aug. 2004	5	14
	Sep. 2004	5	9
Umatilla R. @ Western Boundary	Oct. 2003	5	10
	Nov. 2003	8	15
	Dec. 2003	4	13
	Jan. 2004	43	233
	Feb. 2004	11	47
	Mar. 2004	4	10
	Aug. 2004	2	7
	Sep. 2004	2	3
Buckaroo Cr.	Oct. 2003	3	7
	Feb. 2004	7	20
	Mar. 2004	7	14
	Apr. 2004	3	5
	May 2004	5	7
	Jun. 2004	3	11
	Jul. 2004	3	11
	Aug. 2004	2	5
	Sep. 2004	2	5
Iskuulpa Cr.	Oct. 2003	5	9
	Dec. 2003	5	13
	Jan. 2004	7	13
	Feb. 2004	3	4
	Mar. 2004	3	5
	Apr. 2004	2	4
	May 2004	4	8
	Jun. 2004	2	3
	Jul. 2004	2	3
	Aug. 2004	2	3
	Sep. 2004	1	2
Meacham Cr.	Oct. 2003	3	9
	Nov. 2004	4	22
	Dec. 2003	4	8
	Jan. 2004	18	86
	Feb. 2004	3	6
	Mar. 2004	4	9
	Apr. 2004	2	3
	May 2004	3	8
	Jun. 2004	2	3
	Jul. 2004	2	3
	Aug. 2004	2	7
	Sep. 2004	1	2

4.5 Watershed Planning, Scoping, and Education Process

[4] Rounded to nearest whole number.

4.5 Objective 5 Continue Watershed Planning, Scoping and Education Process by Identifying Problems and Developing Creative Solutions to Land Use Problems Impacting Fisheries Habitat in the Umatilla River Basin.

4.5.1 Watershed Assessment

The Umatilla Subbasin/Willow Creek Subbasin Summary and Meacham Creek Watershed Analysis and Action Plan were completed and approved. Development of the Umatilla Subbasin/Willow Creek Subbasin Watershed Assessment continued during the 2004 project period. These documents provided guidance in planning and implementing 2004 and out-year project activities.

The 2004 assessment verified that the Birch Creek and Meacham Creek watersheds are the highest priorities for instream and riparian improvements.

4.5.2 Community Outreach Efforts

The following public outreach efforts occurred during the 2004 project period:

- Attended and provided input at the UBWC Technical Committee Meetings to rank and select projects to be funded by OWEB.

- Participated at an OWEB work shop in Pendleton to familiarize members and agricultural interests with CTUIR's ongoing habitat enhancement efforts and to facilitate obtaining future cost share funding.

- Provided the McKay Creek Project Area, native willow cuttings and riparian habitat restoration/recovery instruction to elementary students participating in ESD Watershed Field Days.

- Provided a tour of the planned Birch Creek barrier amelioration projects for USCE, SLD, NOAA, and USF&WS staff.

- Participated in an OSU Agricultural Research Station and SWCD workshop to characterize morphological changes in the Umatilla Basin over time especially as related to floods of record.

- Participated in a multi-basin two day tour of BPA funded CTUIR habitat enhancement projects to become familiar with other restoration efforts and exchange information.

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