UMATILLA RIVER BASIN ANADROMOUS FISH HABITAT

ENHANCEMENT PROJECT

1997 ANNUAL REPORT

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ABSTRACT

The Umatilla River Basin Anadromous Fish Habitat Enhancement Project continued to identify impacted stream reaches in the upper Umatilla River Basin for habitat improvements during the 1997 project period. Public scoping efforts, baseline monitoring and creation of Geographic Information System databases assisted the project in targeting habitat deficiencies and determining restoration and management measures.

Habitat enhancement projects continued to be implemented and maintained on 34 private properties to improve anadromous fish habitat and natural fisheries production capabilities in the upper Umatilla River Basin. A 25 year riparian easement was secured for enhancement of approximately 0.3 miles of riparian corridor in the Buckaroo Creek Drainage. Project funds were combined with Bonneville Power Administration Early Action Funds to plan, layout and construct 1,250 yards of smooth wire high tensile fencing on this property. A total of 140 logs were placed and cabled into structures and 20 tree bank revetments constructed in the existing Meacham Creek and Umatilla River project areas. Approximately 12,500 native trees and shrubs, and 350 pounds of native grass seed or native grass seed equivalents were planted in the 13.5 stream miles of project areas. Maintenance activities included repair of 71 sediment retention structures in the Greasewood Creek, Wildhorse Creek and Spring Hollow Creek project areas impacted from winter 1997 high flow events.

Monitoring continued to quantify short and long-term effects of habitat enhancements in the upper basin. Maximum, minimum and average daily stream temperatures were collected from June through September at 17 sites. Suspended sediment samples were obtained year-round at three gage stations to arrive at daily sediment load estimates. A total of 18 aquatic macroinvertebrate samples were collected upstream, downstream and within the Mission Creek and Spring Hollow Creek project areas. Alkalinity, conductivity, sulfate, nitrate, ortho phosphate and pH parameters were tested in conjunction with aquatic macroinvertebrate sampling. Two permanent transects and seven permanent photo points were established at stream channel cross sections in the Buckaroo Creek Project Area to obtain baseline data regarding channel morphology and provide a visual record of pre-project riparian vegetation conditions. Nineteen previously established transects were measured in the Wildhorse Creek and Greasewood Creek project areas and photographs were taken at 78 established photo points in all existing project areas to document habitat recovery.

Community outreach efforts and public education opportunities continued to assist in identification of detrimental land use practices, determination of innovative watershed improvements and to foster landowner cooperation.

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We would like to acknowledge cooperating landowner, Clifford Carson Picard, who supported our efforts and provided important background information on his property during the project period.

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INTRODUCTION

The Umatilla River Basin Anadromous Fish Habitat Enhancement Project is funded under the Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program, Section 7.6 - 7.8 and targets the improvement of water quality and restoration of riparian areas, and specifically the holding, spawning and rearing habitats of anadromous salmonids. Funding of this project provides partial mitigation for losses of salmon and steelhead 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 January 1, 1997 through December 31, 1997 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 which also includes artificial production, adult and juvenile passage improvements (ladders, screens and trap and haul), instream flow enhancement 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 riparian and upland areas, over-appropriation of instream flows to irrigators, and stream channelization, constriction, and floodplain modification from agricultural and road/railroad building and maintenance activities.

The project focused on implementing cooperative instream and riparian habitat improvements on private lands on the Umatilla Indian Reservation (hereafter referred to as Reservation) from April 1, 1988 to March 31, 1992. These efforts resulted in enhancement of 7.45 river miles on lower Boston Canyon Creek, lower Meacham Creek and the upper Umatilla River in the vicinity of Gibbon, Oregon. In 1993, the project shifted emphasis and began to identify upland and riparian watershed-wide causative factors limiting anadromous fisheries habitat and natural fisheries production capabilities throughout the Umatilla River Basin. Riparian and instream enhancement projects continued and were expanded to include tributaries outside of Reservation Boundaries. An additional 5.55 river miles of fisheries habitat improvement projects have been implemented on private properties, both on and off the Reservation since shifting to a more comprehensive approach. Additional projects have included habitat enhancements in the Meacham Creek, Mission Creek, Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek, Spring Hollow Creek and Buckaroo Creek drainages. A total of 34 riparian 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. Land use practices in the watershed, impacting fish habitat, continue to be analyzed to identify and address causative factors, reducing fish production capability. The project will continue to provide critical elements to a comprehensive watershed management approach to help guide implementing agencies, including CTUIR, in promoting anadromous fish rebuilding plans, and recommend necessary changes to management systems.

Technical integration and coordination is being provided by utilizing a Geographic Information System (GIS) data base for such components as habitat condition, land ownership, land use, ecotype and proposed management/restoration actions. The project complements ongoing fish passage and artificial production projects already in place in the basin and will integrate existing on-the-ground management systems and programs on private and public lands with restoration activities to better justify expenditure of funds and time. Stream habitat 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, local, state and federal agencies and the agricultural community. Examples include the Umatilla River Basin Anadromous Fish Habitat Enhancement 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 through scoping groups comprised of local land owners, sportsman clubs, special interest groups and resource agencies formed to identify issues and develop creative solutions to land use problems in the basin.

DESCRIPTION OF PROJECT AREAS

Project areas include portions of the Umatilla River between River Mile (RM) 78.5 and RM 82.7, the lower 4.5 miles of Meacham Creek, the lower 1/4 mile of Boston Canyon Creek, Wildhorse Creek between RM 9.5 to RM 10.5 and RM 11.5 to RM 12.5, the lower 1.5 miles of Greasewood Creek, the lower 1/4 mile of the West Fork of Greasewood Creek, Spring Hollow Creek between RM 3.4 and RM 4.0, Mission Creek between RM 2.9 and RM 3.3, and Buckaroo Creek at approximately RM 2.0. The CTUIR Habitat Enhancement Project Table on page illustrates enhancement project locations, number of stream miles enhanced and number of landowner agreements secured in each drainage.

The Umatilla River is a tributary to the Columbia River at RM 289. It has a drainage basin of 308 square miles below the confluence of Meacham Creek. 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).

Meacham Creek is a major tributary to the Umatilla River, entering at RM 79. It drains approximately 165 square miles and produces 145,000 acre-feet annually at RM 5 near the top of the project area.

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 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 gradients average 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 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, streambank riprapping and elimination of riparian vegetation. These practices have impacted fish habitat by altering natural

channel form and function. Loss of stream channel meader from channelization and diking has accelerated runoff velocity due to an increase in surface gradient.

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). A steep headwater topography of 15 to 35 percent contributes to rapid runoff rates. The slope in the lower and mid reaches varies from 0 to 3 percent (U.S. Department of Agriculture, 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 significantly impacted upland vegetation communities, 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 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 flood plain 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 downcutting, loss of flood plain function and water quality impacts.

Greasewood Creek originates approximately 3.25 miles northwest of the town of Helix and flows southeast to enter Wildhorse Creek at RM 9.3, 1/2 mile downstream of the Blakely Grain Elevator. The West Fork of Greasewood Creek originates 1.75 miles southwest of Helix and enters mainstem Greasewood Creek 1.5 mile 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 recent 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 percent slopes.

NRCS personnel estimate that 98% of landuse 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, 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 top soil erodes annually from cropland fields in the Greasewood Creek Watershed (Bob Adelman, personal communication).
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 discharge ranging from 2 to 4 cfs and stream temperatures averaging between 60 and 65 degrees fahrenheit are normal in lower stream reaches during late summer (CTUIR, 1996). Annual precipatation in the upper watershed varies from 18 to 25 inches, while precipitation at lower elevations ranges between 5 and 20 inches annually (U.S. Department of Agriculture, 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 (U.S. Department of Agriculture, 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 flood plain 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.

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. The watershed is located entirely within Reservation Boundaries and has a total acreage of approximately 3,100 acres. The 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 has altered the hydrologic capabilities of the Mission Creek Watershed, resulting in higher peak runoff rates during storm events, increased channel/streambank 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 itermittent stream, originating in the vicinity of Deadman Pass in the Blue Mountains at an elevation of approximately 3,600 feet. This 15 square mile drainage area is located entirely with 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 (U.S. Department of Agriculture, 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 (temperatures sometimes exceed 80 degrees fahrenheit during summer months), and diminished riparian and upland native vegetation communities.

A map of the Umatilla River, Meacham Creek, Boston Canyon Creek, Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek, Spring Hollow Creek, Mission Creek and Buckaroo Creek project areas is illustrated in Figure 1.

METHODS AND MATERIALS

Objective I. . <u>Maintain and Continue Implementation of Habitat Enhancement Projects throughout the Umatilla River Watershed.</u>

1. ..... Pre-construction Preparation:

a..... <u>Assess Maintenance Needs</u>

The physical condition of improvements and general stream hydraulics were evaluated in the Meacham Creek, Boston Canyon Creek, Umatilla River, Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek, Spring Hollow Creek and Mission Creek project areas in late May 1997, following spring high flow events, to evaluate effectiveness and prescribe improvements and necessary maintenance to occur in 1997.

b..... <u>BIA Right-of-Way Clearances and CTUIR Riparian Easements</u>

The BIA requires a land survey of designated project area boundaries and the acquisition of a right-of-way agreement on private-owned, Indian Allotments (trust lands), prior to pursual of an easement. These agreements require considerable effort and landowner coordination.

A twenty-five year riparian easement was pursued and developed for habitat implementation activities on an Indian-owned property on Buckaroo Creek. An attempt was made to address landowner needs (livestock water gaps, stream crossing sites, etc.) and incorporate these needs into the final project design. Riparian easements protect habitat improvements and insure an early recovery period within project areas.

c..... <u>Project Cost Share</u>

Cost share funds were obtained and combined with BPA funds for financial assistance during the 1997 project period. These efforts effectively forge partnerships between resource agencies and the public and allow BPA funds to go further.

d..... Fill and Removal Permits

Instream work activities on the Umatilla Indian Reservation require a Tribal Stream Zone Alteration Permit and a U.S. Army Corps of Engineer's (COE) 404 Permit. Instream work activities off of the reservation generally require a General Authorization for Fish Habitat Enhancement Permit from the Oregon Division of State Lands (ODSL) in conjunction with a Corps 404 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 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.

e..... On-site Cultural/Archeological Monitoring

All habitat improvement projects utilizing federal monies and involving ground disturbance (high tensile fence construction, instream structures keyed into streambanks, etc.) require a cultural resource clearance, prior to project implementation. CTUIR's Cultural Resource Staff conduct file and literature searches, pedestrian surveys and/or archeological excavations on habitat improvement sites involving ground disturbance activities to determine if cultural resources potentially eligible for inclusion to the National Register of Historic Places are present on the site. 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 (for implementation efforts, both on and off the Reservation). All cultural clearances are obtained in compliance with Section 106 of the National Historic Preservation Act.

f..... Design and Layout

Design and layout of new habitat enhancement projects and existing project areas consisted of determining the quantity and type of materials required to build or repair fence and instream structures and develop heavy equipment access sites, haul roads and boulder storage sites. Proposed fence lines, instream structure sites and streambank areas were staked and flagged to provide assistance to sub-contractors.

g..... Contracts

Proposed implementation activities requiring rental of operated heavy construction equipment or construction of high tensile smooth wire fencing were advertised and pre-bid tours provided to potential sub-contractors. Sub-contracts

were awarded to selected sub-contractors.

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

The sub-contractor provides and maintains an inspection system acceptable to the CTUIR covering the services under the sub-contract. Complete records of all inspection work performed by the sub-contractor are maintained and made available to the CTUIR during sub-contract performance and for as long afterwards as the sub-contract requires.

Equipment is inspected at the time it is delivered to the worksite. 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. Equipment that does not meet sub-contract specifications and requirements is rejected.

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

h..... Transect and Photo Point Establishment

Permanent transects were established at channel cross sections in the Buckaroo Creek Project Area, prior to project implementation to obtain baseline data regarding channel morphology and riparian vegetation. These measurements will be repeated at three to five year intervals.

Permanent photo points were established prior to project implementation in conjunction with permanent transects. Standardized photos will be taken each spring and autumn to provide a visual record of changes in channel morphology and riparian recovery.

2. ..... Maintain and Implement Habitat Enhancements:

a..... Structural Maintenance and Large Woody Debris Placement

Sediment retention structures previously placed into Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek and Spring Hollow Creek during the 1994 - 1996 project periods were repaired during the 1997 project period. Sediment retention structures are designed to assist in speeding riparian recovery by slowing water velocities, recruiting sediments and depositing

sediments onto streambanks to provide substrate for revegetation.

CTUIR Habitat Enhancement Project Personnel continued to hilti-cable large woody debris, recruited from November 1995 and February 1996 flood events, to boulders and structures in project areas. Placement of large woody debris in habitat enhancement project areas will provide additional instream cover for salmonids and assist in rebuilding streambanks by slowing water velocities and capturing sediment deposits.

b..... Livestock Exclusion and Riparian Corridor Fencing

High tensile smooth wire fencing was constructed to exclude livestock and provide riparian protection and recovery in the Buckaroo Creek Project Area.

High tensile corridor fencing, gates and cross section fences in existing Meacham Creek, Boston Canyon Creek, Umatilla River, Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek, Mission Creek and Spring Hollow Creek project areas were repaired as needed. Frequent fence inspections were conducted throughout the project period to ensure continued exclusion of livestock and to allow for continued riparian recovery inside of project areas.

c..... Revegetation

The CTUIR Habitat Enhancement Project plants native riparian tree and shrub species along bank revetment structures, sediment retention structures and pool edges throughout enhancement areas to improve bank stability, provide insect drop, shade stream channels and provide future recruitable large woody debris. Streambanks, terraces and disturbed sites within the project areas are seeded with native grasses and/or close equivalents of native grasses to improve bank stability and to provide vertical surfaces 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 resistent 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, 1999). 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, 1999). 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 idegenous species grown out as bareroot stock or tublings at the CTUIR Native Plant Nursery. Native grass seed and close replicates of native grass seed are currently unavailable locally and continue to be purchased from Grassland West Seed Company in Clarkston, Washington.

3. ..... Post-implementation Activities and Habitat Enhancement Monitoring:

a..... Post-implementation Final Review

CTUIR Habitat Enhancement Project Personnel visit implementation sites immediately following final construction as indicated by the sub-contractor. Sub-contracted services are inspected to determine whether they conform with sub-contact requirements. If the sub-contract services are not accepted, CTUIR may require the sub-contractor to perform the services again in conformity with the sub-contract requirements.

b..... Transect Measurements and Photo Point Monitoring

Transects and photo points established in the Meacham Creek, Boston Canyon Creek, Umatilla River, Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek, Mission Creek and Spring Hollow Creek project areas during previous project periods continued to be monitored. Transect measurements are repeated at three to five year intervals following project implementation to measure changes in channel morphology and vegetative response to habitat enhancements.

Standardized photos were taken in spring and autumn of 1997 to provide a visual record of changes in channel morphology and riparian recovery. A photo point notebook containing 35 mm slides of annual changes at each photo point is currently maintained by the CTUIR Fisheries Habitat Enhancement Project.

c..... Determine Future Maintenance Needs

The physical condition of improvements and general stream hydraulics were evaluated in the Meacham Creek, Boston Canyon Creek, Umatilla River, Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek, Spring Hollow Creek, Mission Creek and Buckaroo Creek project areas in late December 1997, to assist in evaluating future maintenance needs to occur .

Objective II. <u>Collect Baseline Water Quality Data and Continue Post-project Monitoring to Identify Watershed Health Concerns and to Quantify the Short and Long- Term Effects of Habitat Enhancement Activities in the Umatilla River Basin.</u>

1. ..... Determine Existing Land Use Practices Impacting Salmon and Steelhead Habitat Capability:

a..... <u>Identification of Major Land Use Practices</u>

Past and present land use practices (dryland agriculture, irrigated agriculture, grazing, timber harvest, community developments, roads and railroads, etc.) within major subbasins of the Umatilla River Watershed continued to be identified during the project period. A data layer based on this theme is being developed for a GIS data base. Individual land use practices are currently being mapped by area. This effort is being coordinated with the CTUIR GIS Planning Staff.

b..... <u>Identification of Site Specific Detrimental Land Use Practices</u>

Areas where poor land use practices have altered natural floodplain dynamics and significantly reduced or eliminated critical fisheries habitat continued to be identified. These practices include improper tillage methods, overgrazing, overharvest of timber, floodplain encroachment due to development, stream channel constrainment and downcutting from road and railroad building and maintenance activities, etc. Maps of major subbasins are being developed illustrating where specific problems occur. Areas throughout the watershed, which are determined to have poor quality habitat, will be targeted for future habitat enhancement projects. This effort is being coordinated with NRCS and the CTUIR GIS Planning Staff.

2. ..... Fish Habitat Surveys:

The CTUIR UBNPME Staff conduct habitat surveys in conjunction with biological inventories in Umatilla River Basin Subwatersheds. These surveys assist in determining relations of anadromous fish habitat and abundance in different types of stream channels from a total basin perspective. CTUIR Habitat Enhancement Project Personnel utilize the summarized data to identify habitat deficient stream reaches within subwatersheds in which to focus habitat restoration efforts. When a recent habitat survey has not been conducted at a proposed enhancement site, CTUIR Habitat Enhancement Project Personnel physically survey the site prior to project implementation. All habitat surveys conducted by CTUIR are consistent with survey methodology developed by the Oregon Department of Fish and Wildlife (ODFW) Aquatic Inventory Program.

3. ..... Aquatic Macroinvertebrate Sampling:

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.

CTUIR Habitat Enhancement Project Personnel sampled aquatic macroinvertebrate populations during July 1997 in the Mission Creek and Spring Hollow Creek drainages. Three 100 ft (30 m) stations were established in each drainage. Stations were located in stream reaches upstream (a control), within and downstream of habitat enhancement project areas. Three stratified, random macroinvertebrate samples were collected from riffles within each station with a Winget-Modified Surber Net to provide a measure of community representation and data for statistical analysis. The Winget-Modified Surber Net has been used as standard quantitative aquatic macroinvertebrate sampling equipment by the U.S. Forest Service (USFS), U.S. Bureau of Land Management (BLM) and other agencies since 1977. Compared to other sampling devices used for collecting aquatic invertebrates, the Winget-Modified Surber Net is one of the most versatile and reliable for sampling and the benthic communities collected can be used to assess existing current conditions in aquatic ecosystems (USFS, 1995).

Various physical habitat characteristics and water chemistry parameters were measured at all stations in conjunction with macroinvertebrate sampling. Physical habitat and water chemistry data were integrated with macroinvertebrate data to evaluate and bring the total biological analysis into perspective. Aquatic macroinvertebrate samples and field support data were sent to the U.S Forest Service Aquatic Ecosystem Lab in Provo, Utah for analysis.

Macroinvertebrate surveys will continue to be repeated at the established stations in the Mission Creek and Spring Hollow Creek drainages at annual intervals. Macroinvertebrate data will provide an additional element in comparatively detecting trends over time to assist in determining habitat enhancement effectiveness.

4. ..... Water Temperature Monitoring:

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Ryan Tempmentor and Ryan RTM 2000 thermographs were deployed within selected stream reaches (see Figure 2) in the upper Umatilla River Watershed. Several of these instruments were installed upstream, downstream and/or within project areas in Meacham Creek, the upper Umatilla River, Wildhorse Creek, Greasewood Creek, Mission Creek, Spring Hollow Creek and Buckaroo Creek to monitor the effectiveness of habitat improvements on water temperature cooling. The remaining thermographs were installed in Moonshine Creek, Squaw Creek, RM 56 Umatilla River and RM 76.5 Umatilla River to obtain data on potential habitat limiting factors and existing water quality conditions.

Thermographs were deployed in May 1997. The instruments were recovered and downloaded into a computer program in October and November 1997. The thermographs collected one temperature reading per hour. Maximum, minimum and average daily water temperatures were compiled in tabular form. Water temperatures were graphed during warmer months (June, July, August and September) to determine if temperatures were reached which could prove detrimental to salmonids.

Figure 2. Thermograph Locations 1997 Project Period
Location
1. .....Umatilla River - RM 56 @ West Reservation Boundary
2. .....Umatilla River - RM 76.5 downstream from confluence with Squaw Creek
3. .....Umatilla River - RM 81.7 @ USGS Gage Station No. 14020000 (East Reservation Boundary)
4. .....Wildhorse Creek - RM 0 upstream from confluence with

Umatilla River
5. .....Wildhorse Creek - RM 9.5 upstream of Greasewood Creek Confluence (within project area)
6. .....Wildhorse Creek - RM 26
7. .....Greasewood Creek - RM 0.1 upstream of Wildhorse Creek confluence (within project area)
8. .....Spring Hollow Creek - RM 3.5 (within project area)
9. .....Mission Creek - RM 1.25 upstream of Umatilla County Road 900
10. .....Mission Creek - RM 3.7 downstream of stream forks
11. .....Mission Creek - RM 3.8 downstream of stream forks
12. .....Moonshine Creek - RM 1.1 upstream of Umatilla County Road 900
13. .....Buckaroo Creek - RM 2 upstream of project area
14. .....Squaw Creek - RM 2 .....
15. .....Squaw Creek - RM 9 @ Little Squaw Creek confluence
16. .....Meacham Creek - RM 2 @ USGS Gage Station No. 14020300 (within project area)
17. .....Meacham Creek - RM 5.25 @ East Reservation Boundary

5. ..... Suspended Sediment Monitoring:

Three Isco Model 2700 Wastewater Samplers were deployed to obtain estimates of suspended sediments. These sampling sites included RM 81.7 Umatilla River, RM 56 Umatilla River and RM 2 Meacham Creek. Sampling sites were located at or near thermographs and gage stations (see Figure 3 for gage station agency and identification numbers).

Samples were taken year round at 6 hour intervals to create a composite daily sample. The samples were processed monthly by Umatilla National Forest Service Personnel at the USFS Lab in Pendleton, Oregon to determine Jackson

Turbidity Units, conductivity and total dissolved solids. CTUIR staff correlated suspended sediment data with stream flow data collected from the adjacent gage stations to arrive at daily sediment loads (tons/day) estimates.

Figure 3. .....Suspended Sediment Monitoring Sites 1997
Location
Umatilla River - RM 56 @ 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 @ USGS Gage Station No. 14020300

Objective III: <u>Continue Watershed Planning/Scoping/Education Process by Identifying Problems and Developing Creative Solutions to Land Use Problems Impacting Fisheries Habitat in the Umatilla River Basin:</u>

1. ..... Community Outreach Effort:

A community outreach effort continued throughout the 1997 project period. Coordination activities with land owners, special interest groups, and resource agencies, (whom had previously participated in public scoping meetings) continued to assist the project in identification of detrimental land use practices and development of site-specific habitat restoration measures and mitigation efforts.

2. ..... Public Educational Opportunities:

The CTUIR Habitat Enhancement Project sponsors/participates in workshops, provides tours of habitat enhancement project areas, distributes literature and gives presentations to the public. Such activities serve to increase public awareness of habitat and watershed health issues in the Umatilla River Basin and foster landowner cooperation regarding habitat restoration efforts.

Objective IV..... <u>Pursue Alternative Management Methods to Mitigate Impacts from Past and Ongoing Land Management Activities:</u>

1. ..... Acquisition Land/Management Rights:

An attempt was made to identify properties available for purchase, containing significant reaches of high quality or potentially high quality anadromous salmonid

habitat in the Umatilla River Basin, and explore funding opportunities for land acquisition. Properties purchased will be restored as needed and/or protective management measures implemented.

Management rights, including water rights, timber rights and grazing rights, can also be acquired to provide fisheries habitat protection. Purchase of management rights would restrict landowners from various land use activities over a period of time. The term of an agreement is dependent upon the current habitat condition of the site being protected and the desired future condition.

RESULTS AND DISCUSSION

Objective I. . **Maintain and Continue Implementation of Habitat Enhancement Projects throughout the Umatilla River Watershed.**

1. ..... Pre-construction Preparation:

a..... Assess Maintenance Needs

The physical condition and structural integrity of improvements within Umatilla

River, Meacham Creek, Boston Canyon Creek, Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek, Spring Hollow Creek and Mission Creek project areas were evaluated following spring 1997 high flow events. It was determined that rock would be purchased and an operated heavy equipment rental subcontract developed for repair of 71 sediment retention structures in the Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek and Spring Hollow Creek project areas. An equipment rental subcontract was also developed for in-stream and bank placement of 160 root wads and trees in the Meacham Creek and Umatilla River project areas. Minor fence maintenance in project areas was accomplished by CTUIR Habitat Enhancement Project Personnel.

b..... BIA Right-of-Way Clearances and CTUIR Riparian Easements

BIA clearances were not required during the 1997 project period because no agreements were secured on Indian Allotments. However, CTUIR Habitat Enhancement Project Personnel did continue negotiation of agreements with several Indian landowners in the Buckaroo Creek Watershed.

A 25 year riparian easement was entered into on , 1997 between CTUIR and Mr. Clifford Carson Picard for habitat enhancements in the Buckaroo Creek Drainage. This Indian-owned property is a Umatilla County Tax Lot located at approximately RM 2.0 within Reservation Boundaries. Habitat enhancement efforts implemented on this property represent CTUIR's initial restoration efforts on this Umatilla River tributary.

c..... Project Cost Share

Project monies were combined with BPA Early Action Watershed Project Funding (BPA Project Number 96-45) to cover: (1) repair of 17 sediment retention structures (operated heavy equipment subcontract) between RM 3.4 and RM 4.0 Spring Hollow Creek, (2) purchase of 300 cubic yards of diced basalt rock for repair of Spring Hollow Creek Project sediment retention structures, (3) acquisition of 1,250 yards of riparian corridor fence materials to enclose the Buckaroo Creek Project Area, (4) purchase and planting of 17,000 native shrubs and trees, and purchase and installation of 1,200 tree shelters in all new and existing project areas, (5) eradication of noxious weeds (noxious weed control subcontract) in Buckaroo Creek and Spring Hollow Creek project areas and (6) personnel services necessary to accomplish project efforts.

BIA funds were cost shared with BPA project dollars to assist with noxious weed treatments on Reservation Indian Allotments in the Umatilla River, Meacham Creek, Boston Canyon Creek, Buckaroo Creek and Mission Creek project areas and to provide more comprehensive watershed-wide noxious weed eradication.

d..... Fill and Removal Permits

The CTUIR Habitat Enhancement Project Leader coordinated with the CTUIR Water Resources Program to renew Tribal Stream Zone Alteration Permits for large woody debris placement in the Meacham Creek and Umatilla River project areas, and for repair of 17 sediment retention structures in the Spring Hollow Creek Project Area. The project leader also submitted requests for renewal of two General Authorization for Fish Habitat Enhancement Permits to ODSL to repair 54 sediment retention structures in the Wildhorse Creek, Greasewood Creek and the West Fork of Greasewood Creek project areas. All requested ODSL permit renewals were granted. The COE indicated that all proposed 1997 in-stream repair activities would not require permit renewal because the initial permits (authorizing construction activities) had included a provision for maintenance or had been permitted under Nationwide Permit 03 - Maintenance.

e..... On-site Cultural/Archaeological Monitoring

No cultural resource clearances were required during the 1997 project period. The CTUIR Cultural Resources Staff previously conducted pedestrian surveys in the Spring Hollow Creek Project Area and the proposed Buckaroo Creek Project Area during the 1996 project period and determined that construction activities would not impact cultural resources at these sites (CTUIR, 1997).

f..... Design and Layout

Riparian corridor fence lines and fence structure sites were staked in the proposed Buckaroo Creek Project Area to assist fence subcontractors in determining construction locations. Instream structure locations were staked at existing structure sites within the Umatilla River, Meacham Creek, Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek and Spring Hollow Creek project areas to provide site assistance to heavy equipment operators. Boulders were delivered to the Umatilla River and Meacham Creek project areas to anchor large woody debris. Diced rock was delivered to the Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek and Spring Hollow Creek project sites for repair of sediment retention structures.

g..... Contracts

CTUIR Habitat Enhancement Project Personnel met with subcontractors, prior to proposed project implementations to discuss sub-contract terms and work performance requirements, work progress schedules, petroleum spill plans, and fire prevention and suppression plans.

The following operated heavy equipment rental subcontracts were issued: (1) a 13.5 day contract to Thacker Excavating, Inc. on August 26, 1997 for placement

and anchoring of trees in the Umatilla River and Meacham Creek project areas, and (2) a 30 day contract to K.R. Strickland Company Building and Excavation on September 2, 1997 for repair of 71 in-stream sediment retention structures in the Wildhorse Creek, Greasewood Creek, West Fork Greasewood Creek and Spring Hollow Creek project areas (cost shared with BPA Early Action Watershed Funds). All equipment was inspected at project sites by CTUIR Habitat Enhancement Project Personnel and determined to be in good working order, free from excessive leaks in hydraulic, fuel and power systems.

A high tensile smooth-wire fence construction subcontract was awarded to H&H Fencing on August 11, 1997 to construct 1,250 yards of riparian corridor fencing at approximately RM 2.0 Buckaroo Creek (this subcontract was funded entirely with BPA Early Action Watershed Funds).

Earth Conservation Corps - Salmon Corps at Umatilla were awarded three subcontracts to plant a total of 17,000 native shrubs and trees and install 1,200 tree shelters in all new and existing project areas (subcontracts were funded entirely with BPA Early Action Watershed Funds).

Umatilla County Weed Control was subcontracted to eradicate noxious weeds in all 13.5 stream miles of existing project areas (project funds were cost shared with BIA dollars and BPA Early Action Watershed Funds).

h. ..... Transect and Photo Point Establishment

Prior to project implementation, two permanent transects were established at channel cross section sites within the proposed Buckaroo Creek Project Area to obtain baseline data regarding channel morphology. Measurements will be repeated at one to five year intervals.
Seven permanent photo points were established in partial conjunction with the transects. Slides were taken at these sites to document pre-project conditions. Slides will continue to be taken each spring and autumn to provide a visual record of changes in channel morphology and riparian vegetative recovery.

2. ..... Maintain and Implement Habitat Enhancements:

a..... Structural Maintenance and Large Woody Debris Placement

Seventy-one sediment retention structures were repaired in the existing Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek and Spring Hollow Creek project areas. These structures functioned adequately under normal stream flow conditions, depositing several tons of sediments on streambanks throughout the winter of 1996 - 1997. However, due to several high flow periods in winter and spring of 1997, some structures required maintenance. A total of 1,500 cubic yards of diced basalt rock was purchased to repair sediment

retention structures.

The structures were originally designed by Ed Calame, former Hydrological Technician, with the Umatilla National Forest. Each structure consists of approximately 12 to 20 cubic yards of diced basalt rock varying from 2 to 25 inches in diameter. The structures were placed throughout the stream length of project areas, so that there is one structure per each one foot rise in stream bed gradient from the upper to lower pool. This design creates a back water and allows for sufficient fish passage. The structures have an 8:2 slope of repose, are keyed into adjacent streambanks and average approximately 12 feet in length.

The sediment structures were effective in capturing sediment loads and depositing sediments onto streambanks during 1996 - 97 high flow events. Sediments deposited on streambanks upstream of the structures, will continue to be seeded with native grasses and planted with trees and shrubs as needed.

An excavator was utilized to place large woody debris into stream channel reaches, exhibiting low natural wood recruitment, and on eroding stream banks in existing Meacham Creek and Umatilla River project areas. CTUIR Habitat Enhancement Project Personnel hilti-cabled these materials to boulders to ensure increased stability and long-term structural integrity. A total of 140 logs and root wads were placed and cabled to provide in-stream cover for salmon and steelhead, and 20 tree bank revetments were placed and cabled to assist in rebuilding streambanks by slowing water velocities and capturing sediments for substrate. The majority of large woody debris was readily available from major flood events during the last week of November 1995 and the first week of February 1996.

b..... Livestock Exclusion and Riparian Corridor Fencing

A 1,250 yard high tensile smooth-wire fence was constructed between approximately RM 1.8 and RM 2.1 Buckaroo Creek to exclude cattle from the riparian corridor. One livestock water gap was incorporated into the Buckaroo Creek Project Area fence design. Fence construction costs were funded entirely with BPA Early Action Watershed Funding (Project Number 96-45). Project funds assisted with fence material purchases.
Minor 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 and Spring Hollow Creek project areas.

c..... Revegetation

The CTUIR subcontracted Earth Conservation Corps - Salmon Corps at Umatilla to plant 15,500 native bare root shrubs and trees in the Umatilla River, Meacham

Creek, Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek, Spring Hollow Creek and Buckaroo Creek project areas. Species planted included black cottonwood, redosier dogwood, woods rose, snowberry, serviceberry, chokecherry, ponderosa pine and various willow species.

Stream banks and terraces, eroded by elevated stream flows or disturbed from equipment implementing enhancements, were seeded with 350 pounds of native bunch grasses and close equivalents in the Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek and Spring Hollow Creek project areas. The grass seed mixture used to seed riparian corridors and channel margins was comprised of 40% western wheatgrass, 25% sand dropseed, 18% great basin wild rye and 17% sherman big bluegrass. The grass seed mixture used to seed terraces and dry sites included 36% Indian ricegrass, 36% western wheatgrass, 12% great basin wild rye, 9% sand dropseed and 6% sherman big bluegrass. Sediment retention structures in these project areas were seeded with tufted hair grass during the summer of 1997 to assist in stabilization of these structures. Seeding of native grasses and native grass equivalents assist with stream channel stabilization and sediment filtering during high flow periods.

3. ..... Post-implementation Activities and Habitat Enhancement Monitoring:

a..... Post-implementation Final Review

All subcontractors maintained a daily log and work progress schedule.

CTUIR Habitat Enhancement Project Personnel inspected in-stream and bank stabilization structures in the Umatilla River, Meacham Creek, Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek and Spring Hollow Creek project areas immediately following maintenance repairs.

Subcontracted high tensile smooth-wire fence construction in the Buckaroo Creek Project Area was inspected to ensure that fences were consistent with CTUIR specifications.

Umatilla County Weed Control provided an annual description and summary of all noxious weeds identified and treated in project areas. Project personnel coordinated closely with Umatilla County Weed Control and individual landowners to assure that nuisance weeds were adequately identified and eradicated.

Approximately 4,500 native shrubs and trees purchased and released to Salmon Corps at Umatilla for planting in project areas were never planted. The loss of these plants and there whereabouts remains unknown. All other services subcontracted during the project period met subcontract requirements and were completed in a satisfactory and timely manner.

CTUIR Habitat Enhancement Project Personnel photo documented various stages of project implementations.

b..... Transect Measurements and Photo Point Monitoring

Twenty-two stream channel cross section measurements were repeated in the Meacham Creek, Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek and Spring Hollow Creek project areas to measure changes in channel morphology and vegetative response to habitat enhancements. Stream channel cross sections were not scheduled to be measured at established transect sites in the Umatilla River, Boston Canyon Creek and Mission Creek project areas. These cross sections will continue to be measured at one to five year intervals.

Slides continued to be taken at all 78 photo point locations within the Umatilla River, Meacham Creek, Boston Canyon Creek, Wildhorse Creek, Greasewood Creek, West Fork of Greasewood Creek and Mission Creek project areas to document project recovery and to provide a visual record of annual changes within the floodplain. Photographs indicate an upward, downward, or static trend in woody vegetation, streambank stability and cover (Meyers, 1987). However, initial vegetation "expression", obvious in photographs, should not be confused with vegetation "succession" required for stream ecosystem health (Elmore and Beschta, 1987).

Objective II. Collect Baseline Water Quality Data and Continue Post-project Monitoring to Identify Watershed Health Concerns and to Quantify the Short and Long- Term Effects of Habitat Enhancement Activities in the Umatilla River Basin.

1. ..... Determine Existing Land Use Practices Impacting Salmon and Steelhead Habitat Capability:

a..... Identification of Major Land Use Practices

.....CTUIR Habitat Enhancement Project Personnel continued gathering historical and current Umatilla River Basin land use data and developing a data layer based on current land use practices for a GIS data base.

b..... Identification of Site Specific Detrimental Land Use Practices

CTUIR Habitat Enhancement Project Personnel continued to coordinate with the CTUIR Water Resources Program and NRCS to identify site-specific land use practices impacting fisheries habitat in the Umatilla River Basin. Identified poor land use practices continued to be incorporated into a GIS data layer for a GIS data base.

2. ..... Fish Habitat Surveys:

No habitat surveys were conducted by the CTUIR Habitat Enhancement Project during the 1997 project period. A habitat survey of the Buckaroo Creek Watershed was conducted by the CTUIR UBNPME Staff during the summer of 1993. This data is being relied upon to provide pre-project habitat conditions of the Buckaroo Creek Project Area. Extreme flood events occurred throughout the Umatilla River Basin during the fall of 1995 and winter of 1996. However, because the Buckaroo Creek Project Site is confined within narrow basalt canyon walls and the substate is comprised primarily of bedrock, habitat characteristics in this stream reach did not fluctuate. Buckaroo Creek Habitat Survey Data can be viewed in the 1992 - 1993 Umatilla Basin Natural Production Monitoring and Evaluation Annual Report (CTUIR, 1994).

3. ..... Aquatic Macroinvertebrate Sampling:

Macroinvertebrate surveys are an important tool in describing the condition and relative health of the aquatic ecosystem. 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).

CTUIR Habitat Enhancement Project Personnel conducted post-implementation sampling of aquatic macroinvertebrate populations in early July 1997 in the Spring Hollow Creek and Mission Creek project areas. Three stratified, random macroinvertebrate samples were collected from riffles within each of three established stations (stations were located in stream reaches upstream (a control), within and downstream of habitat enhancement project areas) in each stream. A total of nine macroinvertebrate samples were collected per stream.
Physical habitat characteristics collected in conjunction with aquatic macroinvertebrate surveys included: stream gradient, depth, velocity, discharge, instream flow levels, substrate types and streambank vegetation. Water chemistry parameters measured at the time of the surveys included: stream temperatures and alkalinity, specific conductance, pH, sulfate, nitrate nitrogen and ortho phosphate concentrations.

Aquatic macroinvertebrate samples and field support data were sent to the U.S Forest Service Aquatic Ecosystem Lab in Provo, Utah for analysis in fall 1997. Data analysis indices include: richness, abundance, EPT indices, diversity

indices, USFS Biotic Condition Index, modified Hilsenhoff Biotic Index, relative taxon pollution tolerance and voltinism. Data summaries can be viewed in Appendix A - Aquatic Macroinvertebrate Summary Data. Macroinvertebrate data collected during the 1996 project period has been included in Appendix A. This data had not yet been analyzed when the 1996 Umatilla River Basin Anadromous Fish Habitat Enhancement Project Annual Report was prepared.

Data about macroinvertebrates is site-specific. Aquatic ecosystems cannot be managed on the basis of average values over large diverse areas (BLM, 1988). However, site-specific aquatic macroinverbrate data will assist in assessment and improvement of aquatic habitat and water quality within a given stream reach. Information obtained from aquatic macroinvertebrate surveys should prove useful in showing the effects of physical and water chemistry influences (i.e. habitat improvements) within project areas over time. This was the second year macroinvertebrates were sampled in the Spring Hollow Creek and Mission Creek project areas. Aquatic macroinvertebrate sampling will continue to be repeated annually at these sites.

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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 prespawning 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 17 locations including: three sites on the Umatilla River, three sites on Wildhorse Creek, one site on Greasewood Creek, one site on Spring Hollow Creek, three sites on Mission Creek, one site on Moonshine Creek, one site on Buckaroo Creek, two sites on Squaw Creek and two sites on Meacham Creek. (see Figure 2, page for river mile locations). Stream temperature data was summarized into tabular form, illustrating maximum, minimum and average daily celsius and fahrenheit temperatures during thermograph deployment periods. A binder containing water temperature tables is 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 B.

The thermograph deployed at RM 56 Umatilla River was discovered out of water in summer 1997. This resulted in air temperatures being recorded and water temperature data being lost between July 20 through August 13, 1997. June 1 through July 19 and August 14 through September 30, 1997 temperature data

was collected at this location and graphed. Maximum stream temperatures at this site exceeded 80 F for two to six hour periods on several days from July through early September. Average daily stream temperatures at RM 56 Umatilla River frequently exceeded 70 F during this same time period.

Daily stream temperatures at RM 76.5 Umatilla River, downstream of the Squaw Creek confluence, averaged above 65 F on 41 consecutive days between July 15 and August 24, 1997. Stream temperatures reached as high as 78.9 F at this location on August 6, 1997.

Average stream temperatures exceeded 65 F for 11 to 15 hour periods on 17 days between August 2 and August 23, 1997 at RM 81.7 Umatilla River. Maximum stream temperatures at this site exceeded 75 F on six days in August and peaked at 77.5 F on August 6, 1997.

Stream temperatures obtained at RM 0 Wildhorse Creek and at RM 9.5 in the lower Wildhorse Creek Project Area were warm from early June through early September 1997. Maximum stream temperatures reached 84 F at RM 0 on August 6, 1997 and exceeded 80 F on seven different days in late July and early August. Maximum temperatures exceeded 80 F at RM 9.5 on nine days in late July and early August, and peaked at 84.6 F on August 6, 1997. Average daily stream temperatures exceeded 70 F on 44 days between mid June and mid August 1997 at, both RM 0 and RM 9.5.

The maximum stream temperature reached at RM 26 Wildhorse Creek was 74.1 F on August 6, 1997. Maximum temperatures reached or exceeded 70 F on 14 days between July 4 and August 8, 1997. Average daily temperatures exceeded 65 F on 22 days during this same time period. The 1997 data represents the maximum number of days that average daily stream temperatures exceeded 65 F at this site over a consecutive five year period (1992 - 1997). Data collected over the previous four summers has exhibited average daily temperatures exceeding 65 F on three to 11 days.

Daily stream temperatures at RM 0 Wildhorse Creek ranged between five to 12 F warmer than those recorded at RM 26 Wildhorse Creek. Although lower Wildhorse Creek (unlike upper Wildhorse Creek) maintains perennial stream flows, lack of thermal cover (riparian vegetation) throughout much of the length of Wildhorse Creek is suspect of contributing to this downstream warming trend.

A thermograph deployed within the lower Greasewood Creek Project Area at RM 0.1 recorded stream temperatures reaching 81.1 F on August 6, 1997, and reaching or exceeding 75 F on 20 different days in August. Average daily stream temperatures exceeded 65 F on 60 days in late May through late August, and reached or exceeded 70 F on eight days in late July and early August 1997.

Average daily stream temperatures at RM 3.5 Spring Hollow Creek peaked at

65.6 F on August 6, 1997. Maximum daily stream temperatures at this project location exceeded 65 F on 59 days between May 17 and August 23, 1997 and peaked at 70.7 F on August 6, 1997.

The maximum stream temperature at RM 1.25 Mission Creek was 55.9 F recorded on August 14, 1997. Average stream temperatures recorded at this site never reached 55 F. June through September average stream temperatures at RM 1.25 ranged from 50.6 F to 54.6 F.

Stream temperatures at RM 3.7 Mission Creek reached a maximum temperature of 60.6 F on August 6 and August 14, 1997. Average daily summer temperatures obtained at this site from June through September ranged from 50 F on June 4 and June 5 to 58 F on August 6, 1997. An additional thermograph was deployed at RM 3.8 during the project period to document temperature variations with the downstream instrument at RM 3.7. The thermograph at RM 3.8 Mission Creek recorded a maximum stream temperature of 69 F on August 6, 1997. This temperature was 8.4 F warmer than the maximum temperature obtained downstream at RM 3.7 on the same date. Average daily temperatures at RM 3.8 ranged from 49.9 F on June 4 to 62.7 F on August 6, 1997. In general, average daily stream temperatures throughout the summer of 1997 were two to three degrees cooler at RM 3.7, the downstream thermograph location. The upstream thermograph at RM 3.8 was deployed in a stream reach with little riparian cover and was much more exposed to solar input than the downstream instrument at RM 3.7. This is the most likely explanation for the temperature variations documented in this stream reach. While Mission Creek temperatures appear to be excellent for salmonid survival and rearing, a habitat inventory conducted during the summer of 1995 documented that 77% of the stream was dry by mid to late summer (CTUIR, 1996). All thermographs deployed in this drainage were placed at locations with year-round stream flows. Increased and continued temperature monitoring in the Mission Creek Drainage should provide a better understanding of temperature relationships and conditions in the watershed.

A thermograph was deployed at a new site, RM 1.1 Moonshine Creek, during the 1997 project period. Average June through September stream temperatures in Moonshine Creek varied from 55.8 F on June 4 to 72.2 F on August 6, 1997. Average daily stream temperatures at this location exceeded 65 F on 36 days and 70 F over a two day period in early August. Maximum summer stream temperatures at RM 1.1 Moonshine Creek peaked at 79.6 F on August 6, 1997 and exceeded 70 F on 55 different summer days. Stream temperatures were frequently above 65 F for several hour periods.

Maximum Buckaroo Creek stream temperatures recorded at RM 2 exceeded 75 F on 43 different days between July 4 and August 23, 1997. The maximum summer temperature at this site was 83.7 F on August 6, 1997. Temperatures in this stream reach exceeded 65 F for one to 24 hour intervals from early June into mid September and exceeded 68 F for a 63 hour period in early August 1997.

Average daily stream temperatures exceeded 65 F on 47 days and 70 F on five consecutive days during this time period.

Maximum stream temperatures recorded at RM 2 Squaw Creek reached or exceeded 70 F on 59 different days between June 15 and September 10, 1997 for two to ten hour intervals. Average daily stream temperatures reached or exceeded 65 F on 21 days between July 20 and August 23, 1997. Water temperatures recorded at RM 9 Squaw Creek near the confluence with Little Squaw Creek exceeded 80 F on seven days in late July and early August 1997. Average daily stream temperatures at RM 9 exceeded 70 F on one day, August 6, 1997 and reached or exceeded 65 F on 20 days between July 17 and August 23, 1997. Daily stream temperatures averaged 0.1 to 2 F warmer at RM 9 than RM 2 throughout the summer of 1997.

Stream temperature fluctuations were similar between RM 2 Meacham Creek and RM 5.25 Meacham Creek. However, average daily stream temperatures were approximately 3 to 5 F cooler during the summer of 1997 at RM 5.25 than at RM 2 Meacham Creek. In previous summers, stream temperatures were slightly cooler at RM 2, rather than at RM 5.25. However, summer stream temperatures during both 1996 and 1997 were notably cooler at RM 5.25. Significant losses of riparian vegetation between RM 2 and RM 4.75 Meacham Creek from major flood events during the fall of 1995 and winter of 1996 may have increased solar input within this stream reach, contributing to warmer downstream temperatures. Stream temperatures at RM 2 reached or exceeded 75 F on ten days in late July through mid August 1997. Stream temperatures at RM 5.25 did not reach 75 F, but reached or exceeded 70 F on 14 individual days from early July into mid August 1997. Daily average stream temperatures reached or exceeded 65 F at RM 2 on 48 days and at RM 5.25 on four days during the summer of 1997.

In general, 1997 stream temperatures in the Umatilla River Basin remained warmer (68 F or higher) over a longer duration (increased hours and more summer days), than during previous years.

5. ..... Suspended Sediment 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).

CTUIR Habitat Enhancement Project Personnel collected daily suspended sediment data from three ISCO Model 2700 Wastewater Samplers. Data obtained was averaged and combined with gage station stream flow data to arrive at daily estimates of total sediment yield at RM 2 Meacham Creek (at USGS Gage Station No. 14020300), RM 56 Umatilla River (at USGS Gage Station No. 14020850) and

RM 81.7 Umatilla River (at USGS Gage Station No. 14020000) for the 1997 annual year. Due to the samplers malfunctioning or requiring repair from flood events, several months of suspended sediment data was unable to be obtained. Only those months containing consecutive supended sediment data at the above mentioned sites have been graphed for this report. This information is presented in Appendix B. Tabular daily sediment yield data and stream discharge data is currently maintained at the CTUIR Habitat Enhancement Project Office.

Stream flows during 1997 ranged from a peak of 3,600 cfs on January 1 to a minimum of 11 cfs over a two to three week period in late August and early September at RM 2 Meacham Creek, a peak of 8,450 cfs on January 1 to a minimum of 45 cfs on several days in late August and early September at RM 56 Umatilla River, and a peak of 3,630 cfs on January 1 to a minimum of 41 cfs on September 1 at RM 81.7 Umatilla River.

Peaks in sediment yield generally corresponded closely with winter and early spring high flow events. Maximum documented 1997 daily sediment yields of 1,292 tons per day at RM 2 Meacham Creek on January 1, 1997, 11,060 tons per day at RM 56 Umatilla River on February 1, 1997 and 1,394 tons per day at RM 81.7 Umatilla River on January 31, 1997 occurred during major high flow events. Higher sediment yield peaks may have occurred during periods when sediment samplers were malfunctioning.

Objective III. <u>Continue Watershed Planning/Scoping/Education Process by Identifying Problems and Developing Creative Solutions to Land Use Problems Impacting Fisheries Habitat in the Umatilla River Basin:</u>

1..... Community Outreach Effort:

The following public outreach efforts occurred during the 1997 project period:

. ..... Coordinated Mission Creek Watershed restoration efforts with NRCS to continue assessment of baseline watershed conditions and to develop restoration and management agreements with landowners in the watershed.

. ..... Participated in Umatilla River Basin Regulatory Work Group Meetings with ODSL, COE, other commenting agencies and the public. The focus of this group is to provide technical assistance to landowners before approving their instream permit requests (as permitted under 401 and 404 federal Clean Water Act Regulations), provide a more streamlined permit review process for landowners and to address instream activities on a reach by reach basis (to discourage unnecessary detrimental instream practices). CTUIR participated not only because of our role as a commenting agency, but also to address potential detrimental instream practices impacting

watershed health.

. ..... Participated in Lower Mid Columbia Watershed Alliances Workshop in Hood River, Oregon to discuss and obtain information regarding ongoing Columbia Basin Watershed restoration efforts.

. ..... Met with Washington State University (WSU) Environmental Learning Center Staff to discuss development of a Umatilla River Basin Watershed Analysis. This proposed effort will be initiated by WSU graduate students and faculty during the 1998 project period and identified as as a task in the 1998 BPA Statement of Work. The document created from this effort will assist the CTUIR Habitat Enhancement Project and implementing agencies with sub-basin prioritization of fisheries habitat enhancement needs.

2. ..... Public Education Opportunities:

The following public education efforts occurred during the 1997 project period:

. ..... Participated and provided displays and educational literature to the public at the Umatlla-Morrow Education Service District Career Showcase and at the Northeast Oregon Sportsman Show.

. ..... Provided slide presentations of CTUIR habitat improvements to Pilot Rpck High School Enriched Learning Center Students, the Blue Mountain Audobon Society, the Columbia River Basin Fish and Wildlife Authority Program - Review of Projects and the CTUIR Summer Youth Program.

. ..... Provided a tour of the Wildhorse Creek Project Area to the Columbia Basin Law Enforcement Council.

. ..... Participated in the North Fork Umatilla River Salmon Walk and provided presentations regarding macroinvertebrate sampling techniques.

Objective IV..... <u>Pursue Alternative Management Methods to Mitigate Impacts from Past and Ongoing Land Management Activities:</u>

1. ..... Acquisition Land/Management Rights:

No properties were identified for potential purchase by the CTUIR Habitat Enhancement Project during the 1997 project period. The project coordinated with CTUIR Wildlife Program Personnel regarding acquisition of Squaw Creek Watershed Properties.

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Appendix A

Water Temperature Graphs

Appendix B

Baseline Habitat Survey Data

i..... Native Grasses, Riparian Shrubs and Trees

d. ..... Construction Activities - Project Review and Inspection