

August 2000

**CTUIR GRANDE RONDE RIVER BASIN
WATERSHED RESTORATION PROGRAM
MCCOY CREEK/MCINTYRE CREEK ROAD CROSSING**

Annual Report September 15, 199 - December 31, 1999



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ANNUAL REPORT

September 15, 1996 – December 31, 1999

CTUIR Grande Ronde Watershed Restoration

McCoy Creek/McIntyre Creek Road Crossing

**Confederated Tribes of the Umatilla Indian Reservation
and
Bonneville Power Administration**

Contract Project Number 199608300

BPA IGA #98 FC 97498

August 2000

Prepared by: Allen Childs, Project Biologist

ABSTRACT

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and Bonneville Power Administration (BPA) entered into a contract agreement beginning in 1996 to fund watershed restoration and enhancement actions and contribute to recovery of fish and wildlife resources and water quality in the Grande Ronde River Basin. The CTUIR's habitat program is closely coordinated with the Grande Ronde Model Watershed Program and multiple agencies and organizations within the basin. The CTUIR has focused during the past 4 years in the upper portions of the Grande Ronde Subbasin (upstream of LaGrande, Oregon) on several major project areas in the Meadow, McCoy, and McIntyre Creek watersheds and along the mainstem Grande Ronde River. This Annual Report provides an overview of individual projects and accomplishments.

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INTRODUCTION

This Annual Report provides a detailed overview of watershed restoration accomplishments achieved by the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and project partners in the Upper Grande Ronde River Basin under contract with the Bonneville Power Administration (BPA) during the period September 15, 1996 through December 31, 1999. The Contract Agreement, entitled McIntyre Road/McCoy Creek Crossing (Project #96-83-00), includes habitat restoration planning, design, implementation, maintenance, and monitoring and evaluation for several projects in the Upper Grande Ronde River Basin, including the McCoy Meadows Restoration Project, Meadow Creek Fish Habitat Enhancement Project, Upper Mainstem Grande Ronde Large Wood Addition Project, and Middle Mainstem Grande River Fish Habitat Enhancement Project.

During the contract period, the CTUIR and partners (Mark and Lorna Tipperman, landowners), Oregon Department of Environmental Quality (ODEQ), U.S. Environmental Protection Agency (EPA), Oregon Department of Fish and Wildlife (ODFW), and Natural Resource Conservation Service (NRCS) initiated phase 1 construction of the McCoy Meadows Restoration Project. Phase I involved reintroduction of a segment of McCoy Creek from its existing channelized configuration into a historic meander channel. Project efforts included bioengineering and tree/shrub planting and protection, transporting salvaged cottonwood tree boles and limbs from offsite source to the project area for utilization by resident beaver populations for forage and dam construction materials, and relocation of existing BPA/ODFW riparian corridor fencing to outer edges of meadow floodplain. Monitoring and evaluation efforts included establishment of pre-project photo points, groundwater monitoring wells, channel cross sections, water quality monitoring stations, juvenile population sampling index sites, redd surveys, and habitat surveys.

Project activities also included coordination with the U.S. Forest Service, Wallowa-Whitman National Forest, LaGrande Ranger District (USFS) on the Forest Road 2137 (McIntyre Road) Relocation and Obliteration Project and the McCoy Creek crossing. The USFS completed engineering designs under the cooperative effort for the McCoy Creek crossing.

Project accomplishments on the Meadow Creek project included obliteration of approximately 3,000 feet of old railroad grade to reconnect Meadow Creek to its floodplain, installation of over 800 pieces of large woody debris, planting of 10,000 ponderosa pine seedlings, seeding for erosion control, and construction of a hardened crossing on Meadow Creek to reduce erosion.

Project activities accomplished on the Upper Mainstem Large Wood Addition Project included placement of approximately 120 whole trees to enhance instream structural diversity, pool habitat quality, streambank stability, and improved floodplain morphology.

Project activities accomplished on the Middle Mainstem Grande Ronde Habitat Enhancement Project included coordination with landowners (Shauna Musgrove of Cuhna Ranches, Dean Stone, and the Wallowa-Whitman National Forest, LaGrande Ranger District) to develop a habitat enhancement/restoration project opportunity along a 3 mile section of the mainstem Grande Ronde River and major tributaries including the lower reaches of Bear Creek and Jordan Creek. Upon securing an agreement with the landowners, project partners including the CTUIR, ODFW, NRCS, and USFS initiated development of project objectives and site-specific designs. By June 1998, project designs were completed and preparations nearly complete to initiate onsite project construction.

DESCRIPTION OF PROJECT AREAS

McCoy Meadows Restoration Project Area

The McCoy Meadows Restoration Project is located on the approximate 2,500 acre McCoy Meadows Ranch in the lower reaches of the Meadow, McCoy, and McIntyre Creek subbasins of the Upper Grande Ronde River Basin. The ranch encompasses about 2 miles of McCoy Creek, 1 mile of McIntyre Creek, and 4 miles of Meadow Creek. McIntyre Creek is a tributary to McCoy Creek, which is a tributary to Meadow Creek. Meadow Creek flows into the Grande Ronde River approximately 2 miles downstream from Starkey. Meadow Creek contains historic Snake River spring chinook habitat. All three streams provide critical habitat for threatened Snake River summer steelhead trout.

Northern bald eagles winter in the Upper Grande Ronde Basin including the Meadow and McCoy Creek subbasins and the project area contains the largest beaver wetland complex in the Upper Grande Ronde along Meadow Creek. McCoy Meadows supports the highest concentration of nesting neotropical migrant yellow warblers in the Grande Ronde Basin and supports sensitive species such as the spotted frog. In addition, the project contains native tufted hairgrass plant communities, which are currently limited to remnant wetland areas throughout the basin.

Pre-Project Conditions

Impaired water quality and severely reduced quality and quantity juvenile salmonid rearing habitat are currently limiting anadromous fish production in McCoy Creek, Meadow Creek, and in the Grande Ronde River downstream of the project area. An ODFW Stream Report (1992) describes the project area reach, “[t]here is a high proportion of units with actively eroding stream banks. Stream shading is very low.” The report further indicates little to no large wood interacting with the channel, that 73.4 percent of the banks are actively eroding and the average open sky is 90 percent.

Stream surveys conducted by CTUIR fisheries staff in the fall of 1995 documented similar conditions with about 40 percent glide habitat, 35 percent riffle habitat, and 25 percent pool habitat. Ground cover in the riparian area was estimated at about 2 percent shrubs and included 13 percent bare soil. Canopy closure ranged from 1-3 percent and open sky

averaged 91 percent. Large wood averaged 0.8 pieces per 100 meters (about 12 pieces per mile).

Water quality and biological resource monitoring in the project area was initiated by ODFW in 1988 and by ODEQ in 1993. Examination of ODFW data collected between 1988 and 1994 reveals that mean weekly maximum temperatures exceeded the new Oregon Stream Temperature standard (64° F/17.8° C: salmonid rearing) from the start of monitoring each year (about May 15) through the end of October. Hourly temperature data from thermographs showed that summer mean weekly maximum temperatures were consistently higher in the lower portions of the meadow compared to the upper meadow where McCoy Creek enters the meadow floodplain.

Data demonstrates that, though summer stream temperatures consistently exceed state water quality standards as a result of upstream activities and conditions, additional thermal loading occurs within the project area. In addition, data collected by the Oregon Department of Environmental Quality in 1992 and 1993 illustrate that in 1993 the highest seven-day average of daily maximum temperatures were 25.8, 24.9, and 26.1 degrees Celsius for Upper McCoy, Middle McCoy, and Lower McCoy, respectively. It is notable that there is little difference in water temperatures between the three sites, which suggests that water temperatures in this reach are in equilibrium with air temperature during this time of year.

Existing wildlife habitat conditions in the McCoy Meadows area are significantly different than historic conditions. The area is described in the Stuart Journals as a sinuous wetland meadow that contained such a high level of sinuosity, early explorers commonly became confused as to which streams they were following. Records maintained by early explorers and trappers also record the abundance of beaver commonly observed in the Grande Ronde River basin.

In current times, many streams in the upper basin contain primarily riffles and shallow glides, poor riparian habitat conditions with minimal overstory riparian tree and understory riparian shrub, very little structural diversity, and a notable absence of beaver, except for small, isolated colonies. Historic land uses have significantly reduced the extent and quality of wetland and riparian habitat resources in the McCoy Meadows area.

Channelization and agriculture in the area resulted in alteration of groundwater and surface water regimes, loss of riparian/wetland vegetation, and decreased suitability for beaver. The meadow area, portions of which historically contained a large, montane wetland complex, is currently grassland pasture with limited riparian/wetland complexity.

The following photo illustrates historic McCoy Meadows (Channel and Land-Use Alterations between 1937 and 1980).



Project Objectives

Key objectives of the McCoy Meadows Restoration Project include:

- Increase base flow depth in the stream channel, increase flooding frequency and depth on the meadow, and create pool and riffle sequences that increase the consistency of bedload transport and deposition on the floodplain.
- Increase stream channel sinuosity, channel length, and geomorphic stability, and decrease channel gradient, capacity and cross-sectional area.
- Improve instream, riparian, floodplain/meadow conditions and functions, including improved quality and utilization of riparian and meadow areas for native plant communities and wildlife, including beaver and other riparian dependent native species.
- Improve/increase vegetative cover/shade
- Improve/increase streambank stability
- Improve water chemistry
- Improve surface water and ground water interaction with resultant lowering of summertime stream temperature and increased wintertime stream temperature within the restored reach.
- Improve properties of coldwater fish habitat and terrestrial and aquatic macroinvertebrate community composition
- Improve/restore utilization of restored stream channel segments by anadromous fish
- Provide watershed restoration educational opportunities

Meadow Creek Riparian Restoration Project

The Meadow Creek Project is located on private land adjacent to the Wallowa-Whitman National Forest and Starkey Forest and Range Experimental Station. The project area includes about 1.5 miles of Meadow Creek beginning at River Mile (RM) 4 downstream of the Starkey Experimental Forest and Range on the Wallowa-Whitman National Forest in Union County. The property is located in T.3 S., R.34 E., Section 36; T.3 S., R.35 E., Section 31 and T.4 S., R.34 E., Section 1.. Historic and current land uses include grazing and logging. Extensive grazing, logging, and road and railroad have all contributed to poor streamchannel stability, constraints in floodplain function, and decreased fish habitat. Water temperatures exceed State standards throughout much of August and September. Floodplain vegetation is currently limited due to grazing pressure and hydrology. Large woody debris within the floodplain and especially within the active stream channel was less than 3 pieces (greater than 18” dbh and 20 feet in length) per mile, prior to project implementation.



Meadow Creek Fish Habitat Enhancement Project. Fly Ridge is in the southern horizon with Meadow Creek in center, foreground. Note old railroad grade in lower center. In July 1999, over 800 pieces of large woody debris were placed in the stream channel and floodplain to restore instream structural diversity and floodplain roughness. In addition, over 3,000 feet of old railroad grade (shown in lower-center portion of photo) was level and re-contoured to reconnect Meadow Creek with its floodplain.

The Meadow Creek project was initiated by the Oregon Department of Fish and Wildlife with the private landowner. Initial contacts indicated that the landowner was interested in protecting Meadow Creek from livestock damage and putting a portion of the property into a 15 year BPA conservation easement. In addition to the installation of a livestock enclosure along the 1.5 mile Meadow Creek project reach, the landowner was interested in seeing on-the-ground restoration of instream fish habitat and water quality.

The ODFW and CTUIR initiated a partnership, with ODFW designing and overseeing construction of the livestock enclosure and the conservation easement. Both ODFW and CTUIR technical staff assessed existing conditions and developed a conceptual design for enhancing floodplain and instream fish habitat conditions. Staff from both agencies implemented the project including obliteration of old railroad grade to reconnect portions of the Meadow Creek floodplain, tree planting, and installation of large woody debris.

Objectives for this project include:

- Restore degraded riparian and floodplain habitat;
- Improve instream habitat diversity and improve water quality for summer steelhead, and possibly spring chinook.

Meadow Creek historically has been a productive steelhead stream, and presence of spring chinook has also been documented (juvenile spring chinook found by ODFW in 1988). In this particular reach the landowner has noticed a gradual decline in habitat quality and has a strong desire to restore the stream to its former condition.

Management practices over the years that have contributed to habitat degradation within this project area include: livestock grazing; timber harvest practices; road construction; and an abandoned railroad grade that constrains flow and prevents the stream from interacting with the floodplain.

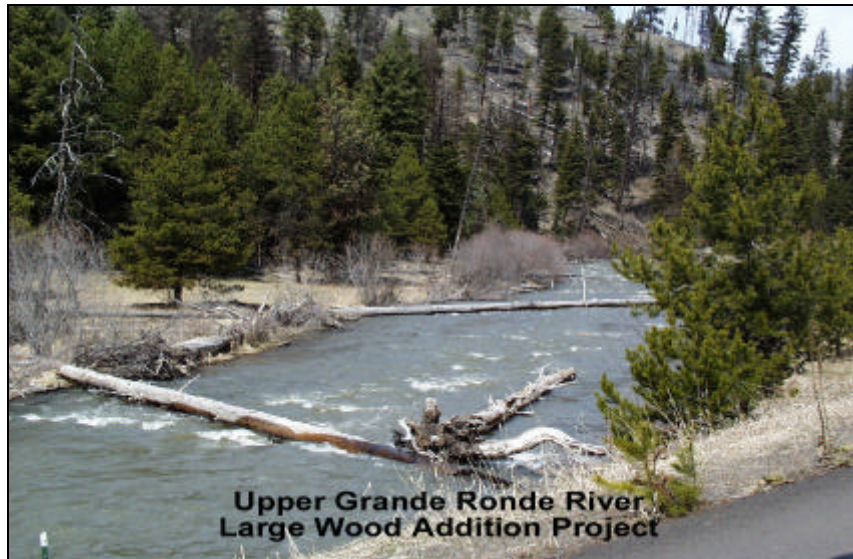
The landowner is willing to exclude the area from grazing and timber harvest for a 15 year period to allow recovery. The riparian fencing is part of a comprehensive grazing system designed by the landowner and NRCS, and will help manage cattle and produce wildlife benefits using a multi-pasture rotation scheme (grazing plan is available upon request). This project will address many of the factors limiting salmonid production in this reach through a combination of passive and active restoration techniques.

Meadow Creek in this reach suffers from high summer water temperatures, winter icing, lack of overstory canopy, unstable streambanks, and poor riparian and instream habitat diversity. Large woody debris and complex pool habitat are at low levels in this area, and the stream is artificially constrained in many places from the old railroad grade.

Upper Mainstem Grande Ronde Large Wood Addition Project

This project is located upstream from Starkey, Oregon along the upper Mainstem Grande Ronde River on National Forest System lands. The CTUIR directed BPA funds to assist in funding helicopter transport of large wood to project site and installation large wood debris and instream rock structures to restore instream structural diversity, large pool habitat availability, and improved stream stability and floodplain morphology.

Project implementation occurred during the instream work window beginning in July 1997. Approximately 120 whole trees with rootwads were flown in by helicopter and installed with ground-based equipment. Instream rock structures (vortex weirs and rock clusters) were also installed to improve instream structure. Tribal and USFS crews anchored whole trees with cable to minimize off-project transport of whole trees.



Middle Mainstem Grande Ronde Fish Habitat Enhancement Project

This project area is located in the middle Upper Grande Ronde River Basin approximately 4 miles upstream from Hilgard State Park on Longley Meadows near Bird Tract Springs. The project includes National Forest system lands and private lands. Two private ranches, including the Stone Ranch and Cunha Ranch, are part of the project.

The middle Upper Grande Ronde River provides critical adult salmon and steelhead holding and juvenile winter and summer rearing habitat. Major tributaries in the project area include Bear Creek and Jordan Creek which provide important backwater habitats for juvenile salmonids and critical spawning and rearing habitat for summer steelhead.



Past land uses such as railroad grade construction, channelization, removal of instream structure for waterway log transport (log fluming) and livestock grazing have altered and constrained floodplain morphology, de-stabilized streambanks, removed instream habitat structural diversity, and degraded riparian/floodplain conditions along the mainstem Grande Ronde and tributaries.

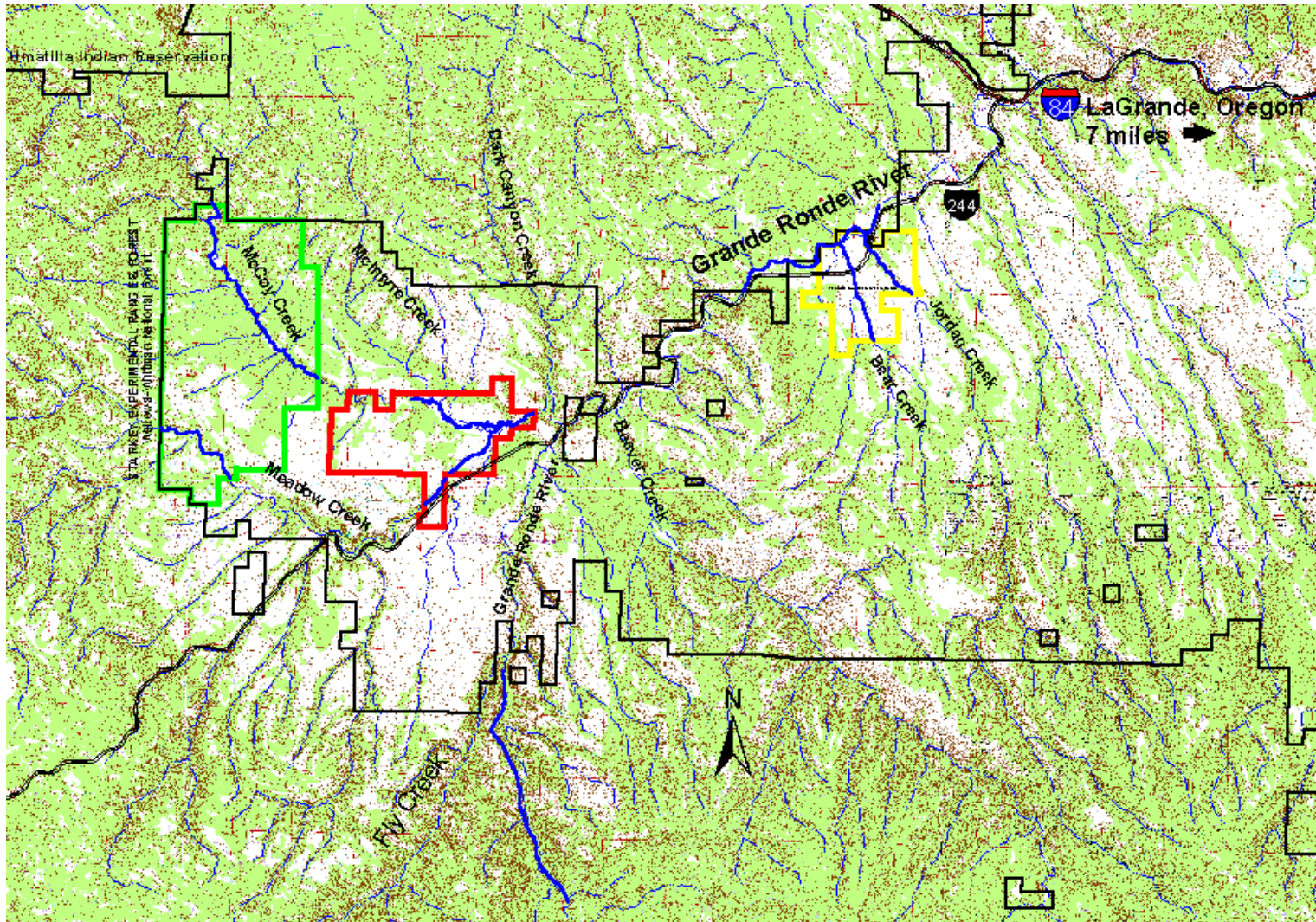
Severe icing, high summer and low winter water temperatures, and poor instream structural diversity including a lack of high quality large pool habitat currently limits habitat suitability for threatened Snake River salmon and steelhead populations.

Project objectives for the Mainstem Grande Ronde Habitat Enhancement Project include:

- Increase instream structural diversity and quantity and quantity of large pool habitat
- Improve adult holding and juvenile summer and rearing habitat complexity
- Improve water quality (decrease summer water temperatures and increase winter water temperatures)
- Improve streambank stability
- Improve/enhancement ability of private landowner (Cunha Ranch) to improve livestock distribution and eliminate streambank degradation caused by livestock

Figure 1 illustrates the vicinity of individual watershed restoration projects discussed above.

Figure 1 – Project Vicinity Map



METHODS AND MATERIALS

McCoy Meadows Restoration Project

Project development and implementation on the McCoy Meadows Project included coordination of project assessment and design, engineering and biological surveys, consultation and permitting with federal and state agencies, purchasing materials and supplies, collection and propagation of vegetation for use in restoration, planting and bioengineering, project contracting preparations, project construction, monitoring and evaluation, and maintenance.

Task 1 Pre-Construction Preparation

Coordination

The CTUIR is performing as project coordinator on the McCoy Meadows Restoration Project. Coordination activities include scheduling, organizing, and conducting design team meetings with multiple project partners including ODFW, NRCS, and GRMWP, maintaining communications with the landowner, and coordination and oversight of various project components such as surveys, designs, consultations with federal agencies under the Endangered Species Act and permitting, purchasing materials and supplies, preparing contract requests for proposals, contracting, and contract administration.

Engineering designs for McCoy Bridge

Work performed under this contract included maintaining coordination with the USFS on the McIntyre Creek Road Relocation and Obliteration Project. Under this project, the CTUIR directed BPA funding to cost-share the first phase of this project effort involving drawbottom road relocation. Future restoration efforts will be directed at restoring the McIntyre Creek floodplain currently constrained by the drawbottom road. As part of this cost-share effort, the USFS prepared engineering designs for the planned bridge crossing on McCoy Creek, which is part of the McCoy Meadows Restoration Project.

The USFS bridge designs, however, were not accepted by Union County Public works due to concerns regarding bridge footing designs. The CTUIR developed an agreement with Ducks Unlimited Inc., to take over bridge designs and contracting. Work is currently underway to complete a re-design on the bridge footings to address concerns of the county. Final designs and contracting is expected to be completed by June 2000 with construction planned to begin in July 2000.

Subcontracting

Project construction efforts involved subcontracting for heavy equipment. Work performed under this contract included planning and development of contact scopes of work, drafting requests for proposals, advertising and solicitation for bids, review of bid

proposals and contractor selection, contract awarding and coordination, and administration of contract (maintaining daily logs, negotiation with contractors, and billings/payments).

Contracting efforts for the McCoy Meadows Project has been largely focused on equipment rental contracts. Track-mounted excavators, dozers, front-end loaders, and back-hoes have all be utilized for project construction, tree and shrub planting with stingers, and maintenance.

Collection and Propagation of Plant Materials

Project work involved collection and propagation of approximately 10,000 cuttings of primarily willow (*salix* spp.) which were conditioned and grown in the CTUIR Native Plant Nursery as containerized stock. An additional 6,000 riparian tree and shrub tublings were purchased from an outside vender. Additional material is planned for collection and propagation to support vegetative restoration needs on the McCoy Meadows Project Area. The CTUIR Nursery is currently storing 10,000 containerized shrubs for use in the 1999 spring planting period.

Propagation material collection methods included pruning onsite source stock during the winter dormancy period and conditioning at the CTUIR nursery in bark and soil to stimulate root nodule development. Following conditioning, cuttings were then hand planted into containers to grow out as containerized stocked.

In addition to collection of material for propagation, CTUIR staff also collected several thousand whips for use in livestaking and bundle/fascine installation to help stabilize streambanks and encourage accelerated shade development.

During the July 1997 construction period, 24 whole willow rootwads were transplanted into an approximate 200 linear foot outside meander along McCoy Creek. The source material willow clumps were topped to minimize shock and to salvage whip material. The rootwads were excavated using a backhoe, loaded into a dumptruck, hauled to the transplant location, and installed using a tracked excavator. In addition, approximately 40 other tree and shrub clumps were salvaged and transplanted during the construction period.

Between April and May 1998, approximately 8,000 riparian shrub and tree tublings (primarily willow, red osier dogwood, mock orange, and black cottonwood), 1,000 conifer, 120 black cottonwood poles, and 800 linear feet of fascines were installed in the phase 1 project area. Methods included site preparation (scalping and excavation), planting, and installation of protection devices and shade cards. Bundles and fascines were installed by hand or with the use of equipment (small backhoe). Cottonwood livestakes were installed using a backhoe mounted stinger.

Between April and May 1999, an additional 3,000 riparian shrub tublings and an estimated 2,500 live willow stakes were planted in the upper phase 1 project area.

Task 2 Restoration Project Construction

In July 1997, the CTUIR and partners initiated phase 1 of the McCoy Meadows Project. Designs included relocation of a channelized segment of McCoy Creek into a historic meander channel segment. Methods involved heavy equipment to move and rearrange (cut and fill) approximately 3,000 cubic yards of cut and fill material. See Figure 2 for phase 1 construction.

In addition to the cut and fill activities associated with constructing and reconnecting historic meander channels, project work also involved filling drainage ditches developed in the early 1900's that were designed to drain the meadow floodplain and removal of culverts and dikes. Activities were directed primarily to alleviate concentrated water flow in ditched configurations and spread out water in sheet flow to reduce erosive energy and increase water storage in the upper meadow floodplain.

During the summer of 1999, project maintenance was undertaken to reconstruct the streamchannel diversion initially installed in July 1997. Work consisted of constructing an engineered debris jam in rootwad revetment configuration to further "plug" of the channelized stream segment in the phase 1 project area and divert the majority of McCoy Creek into the 97' restoration channel. Approximately 40 whole trees were utilized to construct the debris jam. Large boulders that were installed in 1997 were re-arranged and utilized

Task 3 Post construction activities and monitoring

Post construction activities included inspecting contracted work and determination of project completion. Contractor was then released from project site upon successful completion of contract requirements.

Monitoring and evaluation activities on the McCoy Meadows Restoration Project is ongoing. M&E includes water quality, groundwater, instream habitat, fish populations, photo points, aerial photography, permanent vegetation plots, and stocking survey plots.

CTUIR staff are responsible for photo points, vegetation plots, and stocking survey plots. ODEQ is conducting extensive water quality monitoring including water temperature and chemistry, macroinvertebrates, and channel cross sections. NRCS is monitoring groundwater. ODFW is monitoring instream habitat conditions and fish populations. Monitoring reports available at this time are included as appendices in this annual report.

Task 4 Phase 2 McCoy Meadows Project Designs

Phase 2 project design development is currently ongoing. Final designs will be completed in early spring 2000 with project construction scheduled to begin July 2000..

Phase 2 designs are being closely integrated with the bridge construction effort described earlier. The new bridge will be located approximately 200 feet south of the current crossing due to concerns associated with the lack of grade control in the channelized configuration. Phase 2 channel design alignment integrates this features into the channel location and configuration. Designs also include provision for maintaining continuity of overflow in the meadow by integrating additional culverts (and meadow flood capacity) in the existing road prism, which currently acts like a dam or dike.

In conjunction with phase 2 project design development, the design team is currently assessing and developing additional work elements in the upper meadow, phase 1 project area. Project construction activities planned in the upper meadow include for the July 1999 work window include construction of an engineered debris jam at the 97' channel entrance location and filling the portions of the channelized reach to direct additional flow into the restoration channel.

CTUIR staff in conjunction with project partners are currently preparing biological assessments, permits, and NEPA compliance reports for the bridge, ongoing phase 1 project activities, and phase 2 channel restoration work.

Meadow Creek Fish Habitat Enhancement Project

ODFW administered a contract to construct 3.8 miles of six strand hi-tensile fence along Meadow Creek, which protected approximately 136 acres of instream, riparian and upland habitat. The fence was located on the hillslopes an average of 670 feet from the high water line. This will reduce long term maintenance of the project since fencing will be located well away from high spring flows and winter icing. It will also better facilitate pasture management both at present and at the end of the 15 year exclusion, when it may be placed into a pasture rotation system that the landowner and NRCS are currently working on. Approximately ¼ mile of old barbed wire fencing will be removed prior to construction of the new fence.

ODFW, NRCS, CTUIR and the landowner coordinated on removing approximately 2,100 ft. of the old railroad grade that restrict floodplain function in several locations. Railroad grade obliteration was accomplished with a D6 dozer. A rock crossing was also improved to reduce local sediment input and allow better access.

Approximately 10,000 conifer seedlings (ponderosa pine, western larch, and Douglas-fir) were planted by CTUIR, Salmon Corps, and ODFW staff in late April and early May 1999. Seedlings were planted throughout the floodplain within the project area to initiate vegetative recovery. Efforts included installation of protection devices and shade cards on

about 20% of the planted trees and Salmon Corp watered periodically throughout the summer to increase survival.

Instream work on Meadow Creek was completed during the last two weeks of July by CTUIR and ODFW staff. A total of 115 large-medium pieces of wood were placed at 25 work sites. Eighty-eight of these pieces were whole conifer trees with root wads attached. Trees ranged in size from 9-30 inches in diameter, and 35-100 feet in length. An additional 596 pieces of small wood were placed, with the vast majority of this wood coming from unburned slash piles from a recent logging operation. All of the wood, rock and boulders were donated by the landowner.

Medium and large wood was uprooted from nearby hillslopes and transported using track-mounted excavators. Whole trees were placed in a variety of configurations depending on individual site conditions. Generally, wood was selected to meet the ODF/ODFW minimum size guidelines and was used as key structural members of log debris jams. Materials consisted of whole trees with root wads attached and a minimum length of 1½ times the active channel width. In many cases wood was placed to create scour pools which are lacking in this reach; other structures were designed to aggrade the channel and reactivate the floodplain where the stream had downcut and was disconnected. In most cases, several pieces of wood were used together to mimic natural debris collecting structures. At a few sites it was determined that engineered logjams (ELJ's) were appropriate. A minimal amount of cabling was done, securing key members at a few main joints. It is anticipated that some movement or shifting will occur during high flows.

A dump truck was used to haul smaller woody debris to the work sites. Excavators were utilized to place the whole trees and smaller woody debris. Small wood was not cabled and was placed both within and outside the wetted channel. This strategy will allow the small wood to move freely and hang up on the larger key pieces, creating complex debris jams. Some of it was placed in high water channels and on point bars where it will help collect sediments and create seedbeds for native riparian vegetation to become established.

The majority of boulders used were placed in two rock weir structures. One weir was designed specifically to stabilize a road crossing. Other boulders were used at wood structures sites to provide additional habitat or help secure the wood. One last section of old railroad grade that was not removed last year was obliterated. One backwater pool was constructed, providing fish access to cold water from a floodplain tail seep. Bank shaping was done at two sites on vertical cut banks to reconnect the floodplain and channel, and speed vegetative recovery.

ODFW personnel cabled structures as needed, and installed coir fabric. A total of 118 hours of trackhoe time and 23 hours of dump truck time were required to complete the project.

Mainstem Grande Ronde River Fish Habitat Enhancement Project

Task 1 Project Development and Designs

Project proposal and conceptual designs have been developed cooperatively with Grande Ronde Model Watershed Program, NRCS, ODFW, USFS, and CTUIR. Designs consisted of plan views, design drawings, and engineering specifications for individual project reaches. Project designs were completed by the design team with NRCS taking the lead on engineering specifications. Project designs were completed in July 1998 with contracting, permitting, NEPA compliance, and field preparations being completed by August 1998.

Initial project construction activities were implemented during August-September 1998. Project planning and preparations included: 1) contract preparation (USFS); 2) coordination with landowners on access routes and staging areas; 3) field reconnaissance to locate large wood planned to be flown to project area via helicopters; and 4) planning for range improvements and riparian conservation easement. Biological Assessment/Evaluations completed by USFS. ODFW has completed Section 404 permit application. NEPA and cultural review also completed by USFS.

Task 2 Project Implementation

Implementation activities included purchase and delivery of materials including approximately 1,500 cubic yards of 36 to 48 inch angular basalt and delivery of approximately 100 whole trees by helicopter and self loading log truck. Existing rock vortex weirs on National Forest System lands initially constructed in 1992 were repaired and whole trees with rootwads were installed to improve instream structural diversity associated with the large pool habitat formed by the rock weirs. Approximately 700 feet of streambank repair was accomplished through the installation of rootwad revetments. Gravel bars were stabilized by the additional of large whole trees.

Upper Mainstem Grande Ronde Large Woody Debris Addition Project

Methods employed under this project included identification of suitable whole trees from adjacent National Forest System lands, contracting helicopter flight services, flying whole trees to pre-determined locations along the Grande Ronde River floodplain, and instream placement of whole trees and rock structures with a tracked excavator. Whole trees were then anchored to large rocks using stainless steel cable and epoxy by tribal and USFS staff. All woody debris installed under the project was mapped and counted as part of the monitoring program to assess wood transport through the system. Contracting and project administration was provided by USFS staff.

RESULTS AND DISCUSSION

McCoy Meadows Restoration Project

In July, 1997 the McCoy Meadows design team initiated the first step in restoring the natural character and function of McCoy Meadows by reintroducing McCoy Creek into a pre-1977 stream channel, planting thousands of riparian shrubs and trees, and filling old drainage ditches in order to allow spring runoff to flood the meadow and restore groundwater storage.

In 1997 alone, over 1,200 linear feet of stream channel was restored above pre-project, channelized conditions. An additional 1,800 linear feet of existing stream channel (utilized by McIntyre Creek following 1977 channelization efforts) was enhanced by increased summer baseflow provided by McCoy Creek. In dryer years, this stream segment provided intermittent stream flow. Post project conditions included perennial flow throughout the season. Prior to project implementation, this reach contained a single beaver dam and associated lodge structure. During 1997 and through 1998 following phase 1 project implementation, approximately 12 new beaver dams were established. To facilitate beaver dam development and their beneficial effects in the meadow complex, approximately 120 pieces of 4-8 inch diameter (up to 8 feet lengths) cottonwood limbs and boles salvaged from off-site were deposited near the existing beaver lodge by tribal staff. Depositing this material was intended to provide a forage resource and larger diameter material to re-enforce existing dam structures and potentially reduce depredation on both existing and planted shrubs. Without exception, all wood was utilized for foraging and incorporated into dam structures. Although carrying capacities for beaver in this reach has not been determined, forage and dam construction resources of relatively abundant supply are nearby and beaver control has not been identified as a project need. Monitoring efforts are ongoing.

Channel gradient in the phase 1 project reach decreased from approximately .7 feet/100 feet to .5 feet/100 feet along the main McCoy Creek segment with a corresponding increase in channel sinuosity from 1.08 to 1.33. Channel gradient in the restored channel of .3 feet/100 feet compares favorably to the channelized section which has a gradient of .8 feet/100 feet. Sinuosity of the restored channel is also much greater--1.52 compared to 1.01 in the channelized segment. Physical habitat conditions in the restored channel segments also compare favorably with channelized segments. Pool habitat availability has increased to over 50 percent compared to less than 12 percent in channelized segments, average pool depth is greater in the restored channel (by up to 40 percent), the width to depth ratio has decreased by an estimated 45 percent, and streambank stability is roughly 60 percent greater in the restored channel compared to channelized segments (ODFW Aquatic Habitat Inventory, July 1998, Appendix B). Stream shade provided by vegetation on restored stream segments is currently similar to channelized segments. However, we anticipate stream shade to increase dramatically over the next decade over pre-project conditions due to decreased stream gradient, greater streambank stability, improved hydrologic conditions, and the aggressive revegetation program currently underway.



June 1998 Aerial view of Phase I project implementation. McCoy Creek was partially diverted in 1997. Rock structures installed at diversion point (center-upper of photo) was set at grade to split about 300 cfs down the new channel. The channelized reach is temporarily functioning as an overflow channel to provide recovery time in the restored channel segments. This aerial photo of upper McCoy Meadows, taken in June, 1998 illustrates restored meander channel and channelized section.



The above photo provides a downstream view of the McCoy Meadows Meadow Restoration phase I project area. Note channelized reach on right side of photo and reconnected meander channel on left. The center-left portion of the photo shows the confluence of McCoy Creek with McIntyre Creek. In July 2000, the channelized stream segments will be rehabilitated by filling portions of the channel and recontouring streambanks to develop ponds and wetland areas.



McCoy Creek 1997-98 Diversion Structure



Diversion structure and Channelized McCoy Creek Segment. Segment scheduled for rehabilitation in 2000.



New McCoy Creek channel during spring flow event in 1998 following 97' Phase I Restoration Project.



Channelized McCoy Creek downstream from diversion. Rock structures in middle-ground installed to trap sediment and aggrade stream channel for future restoration.

Water quality in the restored channel reach has been positively influenced by project activities. During the summer of 1997 following channel relocation, water quality monitoring data illustrates that water temperatures decreased by an average of 6⁰F (Fahrenheit) compared with the channelized stream segments located upstream from the project area.

Water temperature cooled down as it traveled through the restoration reach and increased in downstream channelized segments. In addition, data illustrates that diurnal temperature fluctuations were moderated in the project reach compared to channelized reaches.

Grab samples of water temperature in the restored channel also demonstrated 10⁰F degree cooler water in both pools and backwater areas along the restoration reach compared to channelized segments. During the summer of 1998, water temperature data was similar to 1997 data.

Maximum water temperatures in the restored channel segments reached 78.8⁰F (26⁰C) during July compared to maximum temperatures of 84.2⁰F (29⁰C) in the channelized segments downstream from the phase 1 project area which illustrates a 5.4⁰F temperature difference.

The following figure illustrates streambank stabilization and large woody debris additions on the upper reach of the phase 1 project area.

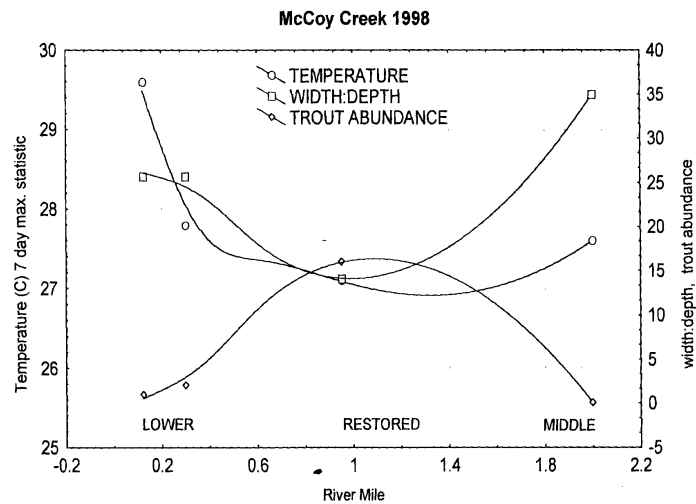


This photo illustrates a segment in the phase 1 restoration project reach. The segment is part of the historic (pre-1977) McCoy Creek, which flowed intermittently prior to the 1997 restoration effort.



Restored channel segment in McCoy Creek. Note recovery of sedges and rushes along stream margins.

Figure 2 – This figure illustrates parameters of water temperature, width:depth ratio, and trout abundance in the restoration reach along Upper McCoy Creek compared to segments upstream and downstream of the 1997 and 1998 restoration project area.



Overall, reintroduction of McCoy Creek into the pre-1977 channel segments under phase 1 of the project has initiated improvement in water quality and fish habitat compared to pre-project conditions. The influence of increased groundwater storage in conjunction with a significant decrease in the width to depth ratio and an increase in average depth has initiated an improving trend in water quality and initiated the first major step towards achieving the goals and objectives of the McCoy Meadows Restoration Project. Project staff speculate these conditions will continue on an improving trend in the restoration reach with additional groundwater storage (as more meadow floodplain is reactivated), increased shade provided by restored native riparian and wetland plant communities, and an increase in average depth resulting from continued beaver activity.

Current monitoring and evaluation efforts for water quality and groundwater is not sufficient to accurately portray the interaction of groundwater-surface water interactions and the microhabitat effects provided by groundwater discharge throughout the project reach. Efforts are currently underway to increase water quality and groundwater data collection to better assess project effectiveness and to increase our understanding of the importance of wet meadows in watershed restoration and recovery of endangered salmonids. Increased M&E may include installation of additional water temperature probes, installation of continuously recording temperature probes in existing groundwater wells, and development of a groundwater map.

Meadow Creek Fish Habitat Enhancement Project

Results of the project include: 1) protection of over 1.5 miles of Meadow Creek under a 15 year BPA-ODFW conservation easement; 2) installation of over 10,000 conifer seedlings to facilitate restoration of conifers and long-term woody debris (much of which has been removed by logging during the past 100 years); 3) obliteration of about 2,100 linear feet of old railroad grade designed to reconnect Meadow Creek to its historic floodplain; and 4) installation of over 700¹ pieces of woody debris designed to enhance instream habitat conditions and improve floodplain stability.



Large wood in existing pool creates overhead cover, shade, and streambank protection.

¹ A total of 115 large-medium pieces of wood were placed at 25 work sites. Eighty-eight of these pieces were whole conifer trees with root wads attached. Trees ranged in size from 9-30 inches in diameter, and 35-100 feet in length. An additional 596 pieces of small wood were placed, with the vast majority of this wood coming from unburned slash piles from a recent logging operation.



Outside stream channel meander construction to decrease stream gradient, increase channel length, and restore fluvial processes



Meadow Creek stream channel meander construction. Photo illustrates bioengineering technique involving use of coconut fabric.



Large woody debris installed to stabilize gravel bar and provide cover and backwater habitat during spring flow periods.



Meander restoration segment. Photo illustrates gravel bar stabilization and backwater habitat restoration.



Large woody debris positioned in conjunction with existing wood for streambank stability, overhead cover, and instream structural diversity.



Large woody debris structure designed to scour large pool habitat

The physical aspects of the project, in terms of numbers of pieces of large wood, trees planted, amount of fence constructed, etc are well documented and appear to be moving the project area towards meeting objectives described above. However, the restoration activities undertaken under this project were intended to initiate recovery and time is needed to fully recognize the biological benefits of these efforts. The project, particularly the large wood addition component, functioned very well through the first spring flow event. At nearly every site of the 25 established, the woody debris functioned as predicted with complex pool scouring. Of the 25 sites, only one site had a key member structure that moved during high stream flows. Much of the wood that did move, was deposited on gravel bars or was trapped by downstream log debris jams.

The fence construction effort has been successful in removing livestock from the majority of the floodplain, with the exception of occasional stray cattle. Vegetation, particularly grasses and sedges, appear to be in good condition with abundant seed heads and decreasing percentage of bare ground. Livestock exclusion is also benefiting the 10,000 plus ponderosa pine and western larch seedlings planted as part of the project. First year survival estimates are as high as 90% in most planting sites. However, survival in individual sites was highly variable with poor survival in cooler/moist environments, indicating that some selected sites are less suitable for conifers and more suitable for wetland dependant species such as rushes and sedges. In addition to environmental factors, an undetermined, but substantial source of mortality on individual sites occurred as a result of large, wild ungulates (primarily elk) from trampling and browsing.

Mainstem Grande Ronde Fish Habitat Enhancement Project

Project development accomplished during the contract period consisted of working with private landowners and developing consensus on project designs, establishment of an inter-agency design team, development of project designs (including engineering survey and development of design drawings and specifications), securing cost share funding for the project (including Grande Ronde Model Watershed Program), and completion of pre-construction preparations. Pre-construction preparation included development and solicitation of equipment rental contract bids, purchasing materials and supplies, location and mapping of whole trees, on-site project layout, and initial delivery of materials to the project site. Project materials included whole trees and approximately 1,500 cubic yards of angular basalt. Whole trees were identified on adjacent National Forest System Lands, and on private lands. Prior to initiation of helicopter flights, individual trees were dislodged using tracked excavators in order to ensure the helicopter could lift the structure. Rock was secured by a contractor and hauled and stocked-piled at pre-designated locations. Initial project implementation was completed during the instream work window between August through September 1999. Monitoring and evaluation including photo points, channel cross sections, habitat surveys, and juvenile population surveys are ongoing. Additional monitoring efforts will include survival monitoring of bioengineering and planting sites to determine stocking survival.

The following photos illustrate streambank stabilization efforts and backwater habitat development.





Photo illustrates floodplain meadow restoration efforts involving obliteration of old railroad grade.



Backwater habitat adjacent to Grande Ronde River. Note rush and sedge complex and narrow, deep side channel.

Additional project implementation activities include development of off-channel livestock water sites and installation of riparian corridor and pasture cross fences. These activities are scheduled to be completed during summer 1999.

Upper Mainstem Grande Ronde River Large Wood Addition Project

Under this project approximately 3 miles of instream habitat work was accomplished during the 1998 instream work window. Approximately 140 whole trees and 35 instream rock structures were installed. Whole trees with intact rootwads were flown to the project site by helicopter and temporarily placed in the floodplain for placement by tracked excavator.

Whole tree placement was focused on existing gravel bars to assist in stabilization and to promote natural geomorphic channel migration and development and increasing instream structural diversity for rearing juvenile salmonids. Additional structural installation included placement of individual and clusters of large boulders to enhance instream structural diversity.



SUMMARY AND CONCLUSIONS

The goals and objectives of this contract have been achieved through implementation of the initial phase of the of the McCoy Meadows project, project development, designs, and initial implementation of the mainstem Grande Ronde Habitat Enhancement Project, and implementation of the Upper Mainstem Grande Ronde River Large Wood Addition Project. Biological objectives of improving water quality, instream habitat diversity, floodplain function, and channel morphology are being achieved as planned. However, additional monitoring and evaluation will help us assess and track project benefits over time. Project designs and implementation efforts on both the McCoy and Mainstem Grande Ronde project are ongoing efforts involving several miles of key salmonid spawning and rearing habitat in the Upper Grande Ronde River Basin.

McCoy Meadows Project

Our initial assessment of the McCoy Meadows Project is that the project has demonstrated significant habitat and water quality restoration in McCoy Creek. Habitat quantity has been nearly doubled by reintroducing channelized segments into historic meander segments, multiple instream and floodplain habitat variables are showing increasing trends (width:depth ratio, pool depth, % streambank stability), groundwater storage has increased, and water temperatures have been reduced over pre-project conditions. An overall water temperature reduction of 5^oF during the summer low flow period is an important indicator of the beneficial effects of enhanced groundwater storage in wetland meadow complexes. It is important to note that the temperature reduction has been accomplished without the benefit of a significant amount of vegetative shade. Over time, we expect these benefits to increase throughout the entire wetland meadow complex as additional channel reintroduction efforts are completed, beaver recolonization and dam construction, and as native vegetation becomes established and matures.

Future restoration work planned on the McCoy Meadows project area includes initiation of reclamation activities associated with the channelized segments located in the upper meadow into the historic floodplain. Techniques will involve construction of a debris jam on the channel structure located at the 97' McCoy channel diversion, backfilling at least a portion of the upper channelized section, and contouring areas along the channelized section to create floodplain complexity and to encourage palustrine emergent wetland development.

Additional planned restoration work during the 1999-2000 contracting periods includes: construction of a replacement bridge on McCoy Creek to improve fish passage, increase capacity, and provide greater continuity of overland flow; channel construction and reintroduction activities in the lower meadow complex to expand the benefits described above throughout the lower meadow complex (over 3,000 linear feet of reclaimed channel over existing channelized condition); relocation of existing BPA/ODFW riparian corridor fencing to outer edges of floodplain meadow, and planting and bioengineering to facilitate vegetative recovery.



This photograph illustrates channelization of lower McCoy Creek at the confluence with Meadow Creek. The area is part of the phase 2 restoration effort scheduled to begin in July 2000. A new channel over 8,600 feet in length will be reconstructed in the meadow to increase channel length and sinuosity, decrease gradient, and restore natural wetland hydrology.

In addition, the 2137 Road Relocation and Obliteration project is planned to begin the construction phase during the summer of 1999. Relocation of approximately 2.5 miles of existing drawbottom to a ridgetop system will assist in restoring floodplain and riparian conditions in the McIntyre Creek subbasin. In conjunction with the road relocation effort, planning will be initiated to determine appropriate strategies to restore the existing road prism and riparian habitat features. Coordination with a private landowner needs to begin to develop opportunities to restore floodplain conditions between the McCoy Meadows Project and the upstream National Forest System lands effort.

Meadow Creek Fish Habitat Enhancement Project

Initial assessment of the Meadow Creek project indicates that the project has been largely a success. Floodplain protection and reconnection has been accomplished through removal of the old railroad grade and construction of the 136 acre livestock enclosure. Instream fish habitat has been enhanced by the addition of large woody debris which is natural functioning to scour and maintain pool habitat and provide overhead cover. Vegetative restoration has been initiated through CTUIR-led planting program. Over time, we anticipate natural processes to improve geomorphic stability and natural function which will create a more self sustaining stream reach that provides the resources intended

under this project. Ongoing monitoring and evaluation will help better quantify and the successes, and failures, of these project efforts.

Middle Mainstem Grande Ronde Fish Habitat Enhancement Project

Initial project implementation was completed in September 1999. Current activities include preparations for spring planting, additional floodplain restoration (railroad grade removal), and installation of range developments including riparian fencing and off-channel water developments. Instream structural additions, including streambank stabilization using rootwad revetments are performing well. Spring run-off is currently providing an opportunity to visually assess the function of these structures. We anticipate significant benefits in terms of stabilization of actively eroding streambanks, improve geomorphic function, and enhanced instream structural diversity and complexity, and increased pool habitat quality and quantity.

Upper Mainstem Grande Ronde Large Woody Debris Addition Project

Implementation of this project increased stability of gravel bars and will assist in improving long-term geomorphic function. The project was designed to replace system components (large wood and structure) removed during the last century by logging and road development and restore instream structural diversity and stability. The project is considered highly successful in achieving the short term objectives. Longer term objectives will be achieved over time by natural processes (i.e., hydrologic and geomorphic processes) to develop a naturally stable stream reach that provides abundant high quality pool habitat for rearing juvenile salmonids.