CTUIR GRANDE RONDE SUBBASIN RESTORATION PROJECT

A Columbia River Basin Fish Habitat Project

Annual Report

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Project Overview

The **CTUIR Grande Ronde Subbasin Restoration Project** was initiated by the Confederated Tribes of the Umatilla Indian Reservation in 1996 to protect, enhance, and restore riparian and instream habitat for natural production of anadromous salmonids in the Grande Ronde River Subbasin. The project works with other agencies and private landowners to promote land stewardship and enhance habitat for focal fish, primarily spring chinoook salmon, summer steelhead, bull trout, and resident trout. Emphasis is placed on improving improving juvenile rearing habitat and adult spawning habitat with emphasis on restoring natural channel morphology and floodplain function, cold water refuge and complex aquatic habitat that supports required life histories for focal species.

During 2010, the CTUIR was involved in numerous planning processes and projects. Planning efforts included: Snake River Basin salmon and steelhead recovery planning, including Project Biologist participation on the technical review habitat team, BiOp Remand project planning and participation the technical review team, participation on the Grande Ronde Model Watershed Board and Technical Committees, and coordination with multiple agencies, organizations, and private landowners associated with fish habitat project development. Additionally, project staff initiated BPA-CTUIR Accord land acquisition planning and continued identification and development of future site specific fish habitat projects. Project development and initial planning included baseline field surveys, assessments, development of conceptual project plans, coordination with private landowners, and initiation of environmental planning.

Fish habitat project implementation during the reporting period included enhancement on the McCoy Meadows Project and the Dark Canyon (Cunha) Fish Habitat Enhancement Project. Both projects were administered and inspected by CTUIR Grande Ronde Fish Habitat Project staff during July through October 2010. Combined, over 4 miles of habitat enhancement, consisting of stream channel construction, installation of large wood and rock, and planting and seeding was completed. Preparation for project construction included field stakeout and survey, construction subcontracting and administration, field supervision, grade checking, and inspection.

CTUIR staff also invested significant efforts in monitoring and evaluation, including water temperatures, groundwater elevations, vegetation, geomorphic and instream habitat, biological, and photo points.

Work during the reporting period also included coordinating, planning, field surveys, and initial project development/design for upcoming projects along the mainstem of Catherine Creek, Willow Creek, and a large project complex involving Rock Creek, Little Rock, Sheep, Graves, Little Graves, and a short reach of Whiskey Creek. Activities included working with and coordinating with project partners and private landowners to develop project opportunities, baseline field investigations and surveys, development of conceptual plans, initiation of funding proposals, and initiation of environmental compliance planning in preparation for further project development and implementation in 2011 and beyond.

BACKGROUND

The **CTUIR Grande Ronde Subbasin Restoration Project** (199608300), funded by Bonneville Power Administration (BPA) through the Northwest Power Planning Council Fish and Wildlife Program (NPPC), is an ongoing effort initiated in 1996 to protect, enhance, and restore fish habitat in the Grande Ronde River Subbasin. The project focuses on the mainstem Grande Ronde and major tributaries that provide spawning and rearing habitat for Threatened Snake River spring-summer chinook salmon, summer steelhead, and bull trout. The project also provides benefits to other resident fish and wildlife.

The project is an integral component of Subbasin Plan implementation and is well integrated into the framework of the Grande Ronde Model Watershed (GRMW) established by the NPCC in 1992 to coordinate restoration work in the Subbasin. As a co-resource manager in the Subbasin, the CTUIR contributes to the identification, development, and implementation of habitat protection and restoration in cooperation with Federal, State, and local agencies. The CTUIR, ODFW, GRMW, and other participating agencies and organizations have made significant progress towards addressing habitat loss and degradation in the Subbasin (see www.grmw.org/grmwp-project-page.html and www.grmw.org/project_inventory.html.).

The project was initiated in 1996 under the NPCC-BPA Early Action Project process. The project was proposed through the GRMW and NPCC program to provide the basis from which to pursue partnerships and habitat grant funds to develop and implement watershed and fish habitat enhancement activities in the Subbasin. Annual project budgets have averaged about $136,000 and ranged from a high of $200,000 in 1999. Annual operating budgets and associated tributary habitat efforts by the CTUIR were increased as a result of the CTUIR-BPA Accord Agreement with an annual average budget of $589,500. The project has historically administered multiple grants from various agencies, including NRCS WRP, CREP, WHIP, and EQUIP, OWEB, EPA-ODEQ 319, GRMW-BPA, CRITFC, NMFS, USFWS, ODOT, and NAWCA and developed an effective working relationship with multiple agencies and organizations.

The project has been successful in the development and implementation of several large-scale, partnership habitat enhancement projects and has developed effective interagency partnerships, working at the policy and technical levels with the Grande Ronde Model Watershed Program (GRMWP), federal and state agencies, and private landowners. A complete project overview and technical approach is thoroughly described in the 2006 NPPC Project Proposal for the CTUIR Watershed Restoration Project (199608300) incorporated here by reference.

During the 14-year project history, the CTUIR has helped administer and implement a number of projects, enhancing nearly 30 miles of instream habitat. Conservation easements totaling about 1,400 acres on three large ranches/farms have been secured through a combination of NRCS WRP, CREP, and BPA programs. The project has constructed 12 miles of fence, eight off-channel water developments, and installed over 150,000 trees, shrubs, sedge/rush plugs, and seeded over 600 acres with native/native-like grass seed. Improving habitat trends and biological response can be readily observed at a number of projects. A combination of both passive and active strategies have been developed and implemented and although project areas are in an early

stage of recovery, establishment of conservation easements, construction of riparian/wetland enclosure fencing, development of off-channel water sources, removal of livestock, re-vegetation efforts, instream work such as restoration channel construction and large wood additions, and removal of dikes and old roadbeds and railroad prisms have resulted in improving trends.

Project results are reported in various forms including Pisces status reports, project completion reports, and annual reports. The GRMW maintains a complete database on project implementation and results through development of project completion reports.

Noteworthy accomplishments for the CTUIR Grande Ronde Subbasin Restoration Project during FY2010

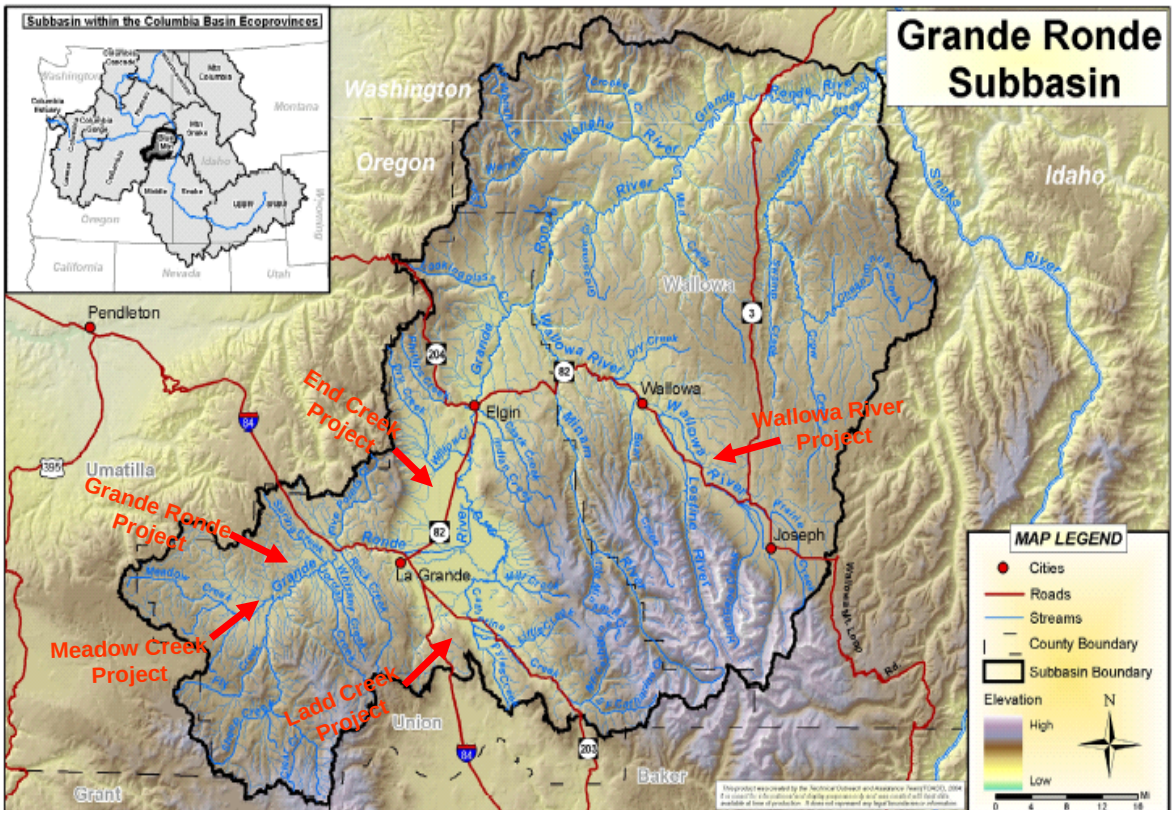
- Implemented enhancement activities on the McCoy Meadows Restoration Project complex, including wetland side channel construction, installation of engineered large wood structures and constructed riffles to provide vertical channel stability and increase floodplain connectivity, large wood additions to provide habitat complexity, streambank bioengineering to stabilize selected streambank reaches, planting of live willow whips and sedge/rush maps, native seeding, and installation of plant protection cages and fences to reduce big game depredation and improve plant survival.
- Implemented habitat enhancement along 0.75 miles of Meadow Creek and 2.5 miles of Dark Canyon Creek on the Dark Canyon (Cunha) Fish Habitat Enhancement Project, including placement of instream boulders and large wood complexes to enhance instream complexity. Project activities also included planning and design of upland water developments, pasture fences, and riparian fences as part of a grazing plan to redistribute cattle from fish bearing streams through a cooperative effort with NRCS and BPA funding programs.
- Initiated planning, field surveys, and design on 3 new projects planned for construction during 2011 through 2013, including the Catherine Creek (Yeargain) Project in cooperation with the Union Soil and Water Conservation District (USWCD), Bureau of Reclamation (BOR) and ODFW involving construction and activation of historic channel meanders, Willow Creek (Oregon Ag Foundation) Project in cooperation with GRMW and ODFW involving development of a 280 acre WRP easement, and the Rock Creek (Bean) Fish Habitat Enhancement Project involving over 15 miles of fish bearing streams along Rock, Little Rock, Sheep, Graves, Little Graves, and Whiskey Creek.
- Participated on the Grande Ronde Model Watershed Board of Directors and Technical Team to review and develop projects, including BiOp/Remand Projects
- Participated on the Snake River Salmon and Steelhead Recovery Team (Habitat)
- Initiated evaluation of potential land acquisition opportunities in the Upper Grande Ronde Basin under the CTUIR-BPA Accord.
- Conducted project maintenance on several projects, including inspections, fence repair, and repair maintenance on plant protection structures
- Conducted monitoring and evaluation activities on project areas.

INTRODUCTION and DESCRIPTION OF THE PROJECT AREA

The project is located in the Grande Ronde Subbasin, located in the southwest portion of the Blue Mountain Ecological province. The Subbasin encompasses about 4,000 square miles in northeastern Oregon and southeastern Washington. The headwaters of the Grande Ronde River originate near Anthony Lakes in the Elkhorn Mountains and flows northeast for about 212 miles before joining the Snake River in Washington at river-mile (RM) 169. The Subbasin is divided into three watershed areas—the Lower Grande Ronde, Upper Grande Ronde, and Wallowa watersheds. Approximately 46 percent of the Subbasin is under federal ownership. Historic land uses include timber harvest, livestock grazing, mining, agriculture and recreation.

A comprehensive overview of the Subbasin is contained in the Grande Ronde Subbasin Plan (NPPC, 2004). The CTUIR Grande Ronde Subbasin Restoration Project focuses primarily on the Upper Grande Ronde portion of the Subbasin, which includes approximately 1,650 square miles with 917 miles of stream network (about 221 miles of salmon habitat). However, past project development and success of the program in terms of the types of project that have been developed and the partnerships that have formed, are leading to watershed restoration project opportunities throughout the Subbasin. Figure 1 illustrates the vicinity of the Grande Ronde Subbasin within the Blue Mountain Province and key projects that have been completed, are underway, or planned under the CTUIR's Grande Ronde Subbasin Restoration Project.

FIGURE 1: GRANDE RONDE SUBBASIN VICINITY AND PROJECT LOCATIONS



The Subbasin historically supported viable and harvestable populations of spring/summer and fall Chinook salmon (*Oncorhynchus tshawytscha),* coho salmon (*O. kisutch*), sockeye salmon (*O. nerka),* summer steelhead *(O. mykiss),* Pacific lamprey (*Entosphenus tridentatus*), bull trout (*Salvelinus confluentus*), rainbow/redband *(O. mykiss sp.),* and mountain whitefish (*Prosopium williamsoni).* These native fishes were an important part of tribal cultures and economies (CBFWA, 1990 and CRITFC, 1995) and European settlers as well.

Beginning in the late 1800's, fish populations started to decline with sockeye and coho extirpated in the early 1900's. The abundance of Chinook, steelhead, bull trout, and other fish species has also been dramatically reduced (NPCC 2004 a, and b). With declining fish populations, Tribal governments and State agencies were obligated to eliminate or significantly reduce subsistence and sport fisheries by the mid 1970's.

Grande Ronde Subbasin fish populations have declined and habitat degradation is widespread in tributary streams. Mainstem Columbia River harvest, development of Columbia and Snake River hydroelectric projects, and habitat degradation has played an important role in the demise of Grande Ronde Subbasin fisheries (NPCC 2004a and b).

With declining populations, the Federal government listed spring/summer Chinook salmon, summer steelhead, and bull trout as threatened species under the Endangered Species Act in 1992, 1997, and 1998, respectively. The status of Pacific lamprey is unclear at this time and may have been extirpated from the Subbasin.

Although hatchery programs currently support subsistence and sport fishing opportunities for steelhead and limited Chinook salmon, there remains significant need to re-build viable and harvestable fish stocks throughout the Subbasin.

The following tables illustrate estimated historic and current spring Chinook salmon and summer steelhead returns to the Grande Ronde Subbasin (NPCC 2004a). Of particular note is an 87 percent decrease in spring Chinook and 70 percent decrease in summer steelhead populations from estimated historic levels.

TABLE 1: SUMMARY OF ESTIMATED HISTORIC AND CURRENT GRANDE RONDE SPRING CHINOOK SALMON RETURNS BY POPULATION (DATA PROVIDED BY B. JONNASSON, ODFW PERS. COMM. 2004)

Population	Estimated Historic Returns count	% of total	Estimated Current Returns count	% of total	Miles of spawning habitat	Adults /Mile Template	Adults /Mile Current	% Decrease Historic to Current
Wenaha Spring Chinook	1,800	15%	453	30%	*45.60*	39.48	9.94	75%
Minam Spring Chinook	1,800	15%	347	23%	*42.54*	42.31	8.16	94%
Wallowa-Lostine Spring Chinook	3,600	30%	211	14%	*56.10*	64.17	3.76	95%
Lookingglass Spring Chinook	1,200	10%	190	12%	*29.82*	40.24	6.37	81%
Catherine Creek Spring Chinook	1,200	10%	188	12%	*29.82*	40.24	6.30	84%
Upper Grande Ronde Spring Chinook	2,400	20%	132	9%	*79.11*	30.34	1.67	84%
Total	**12,000**		**1,521**		***283.00***	**42.4**	**5.37**	**87%**

TABLE 2: SUMMARY OF ESTIMATED HISTORIC AND CURRENT GRANDE RONDE SUMMER STEELHEAD RETURNS BY POPULATION (DATA PROVIDED BY B. JONNASSON, ODFW PERS. COMM. 2004)

Population	Estimated Historic Returns count	% of total	Estimated Current Returns count	% of total	Miles of spawning habitat	Adults /Mile Template	Adults /Mile Current	% Decrease Historic to Current
Lower Grande Ronde	2,400	16%	608	14%	253.84	9.45	2.39	75%
Joseph Creek	3,600	24%	945	21%	223.10	16.14	4.24	74%
Wallowa River	3,750	25%	1,193	27%	173.45	21.62	6.88	68%
Upper Grande Ronde	5,250	35%	1,755	39%	613.96	8.55	2.86	67%
Total	**15,000**		**4,500**		1,264.35			**70%**

Figures 2 and 3 display estimates of historic and current abundance, productivity, and life history diversity predicted through the Ecosystem Diagnosis and Treatment (EDT) Method for Grande Ronde Subbasin Chinook salmon and summer steelhead, respectively (NPCC, 2004a and Mobrand, 2003). Graphs illustrate that current abundance, productivity, and life history diversity for spring Chinook and summer steelhead has been reduced from estimated historic levels.

Chinook and steelhead populations furthest from historic potential are in geographic areas that have experienced the highest levels of anthropogenic influence with significant declines illustrated for Wallowa-Lostine, Catherine Creek, Lookingglass, and Upper Grande Ronde spring Chinook and Upper Grande Ronde, Wallowa, and Joseph Creek summer steelhead. Current productivity and life history diversity for spring Chinook in the Wenaha and Minam watersheds (primarily designated wilderness areas) is similar to estimated historic conditions (NPPC, 2004a).

FIGURE 2: EDT ESTIMATES OF ABUNDANCE, PRODUCTIVITY, AND LIFE HISTORY DIVERSITY COMPARED TO THE ESTIMATED HISTORIC POTENTIAL FOR GRANDE RONDE SUBBASIN CHINOOK SALMON (NPCC 2004A, FIGURE 8, PG. 54)

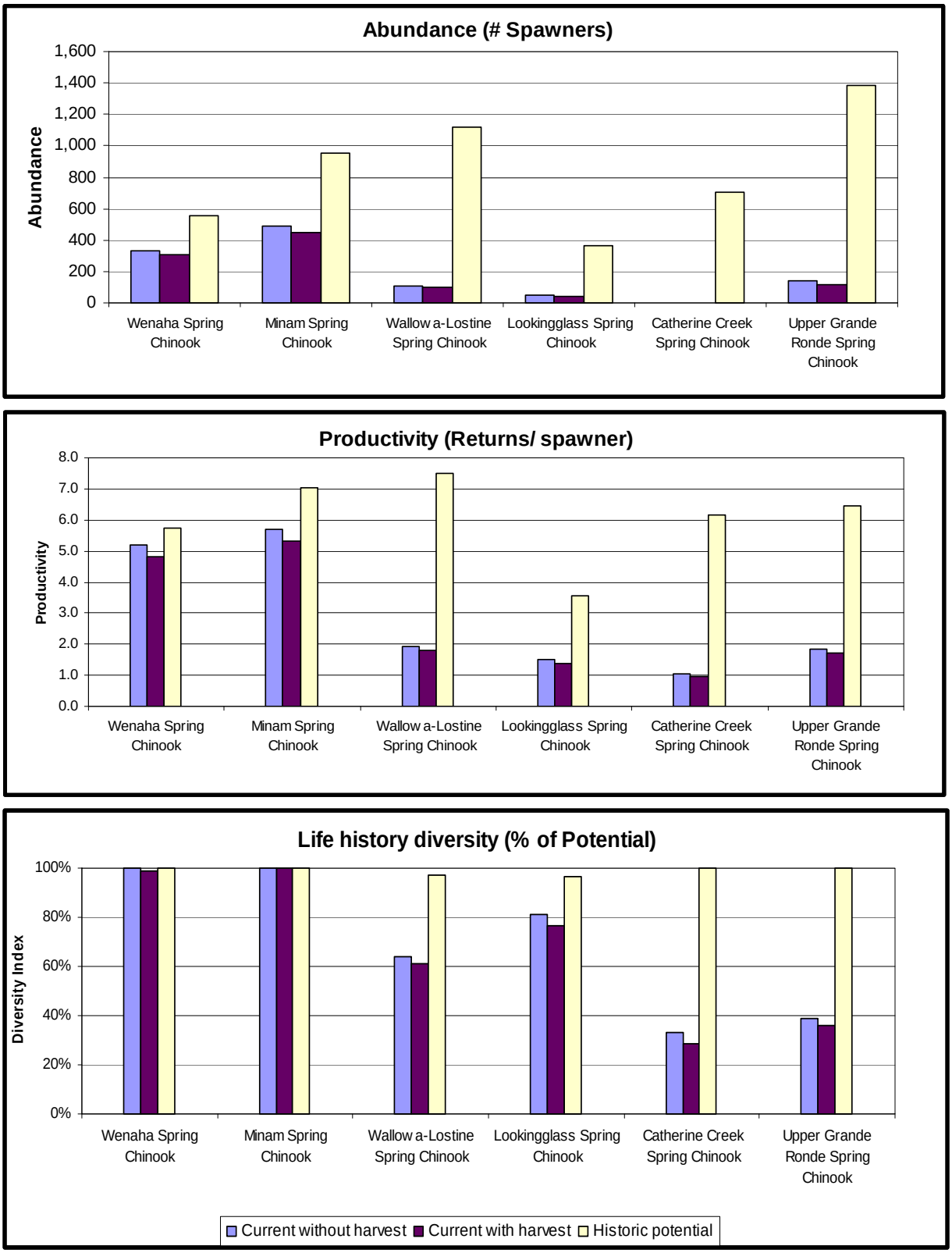
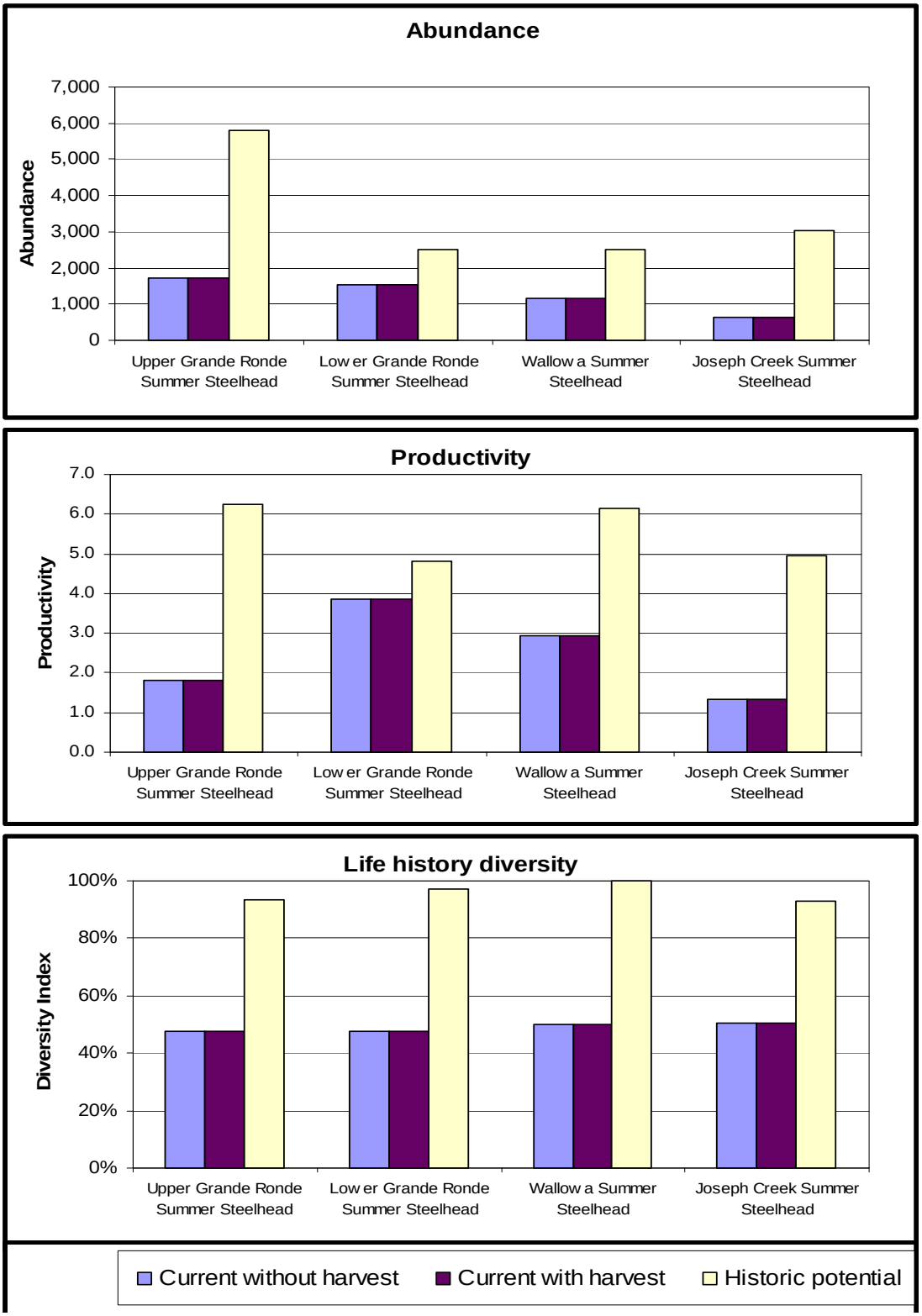


FIGURE 3: EDT ESTIMATES OF ABUNDANCE, PRODUCTIVITY, AND LIFE HISTORY DIVERSITY COMPARED TO ESTIMATED HISTORIC POTENTIAL FOR GRANDE RONDE SUBBASIN SUMMER STEELHEAD (NPCC 2004A, FIGURE 22, PG. 72)



Degradation of instream and riparian habitat in the Subbasin has been the dominant cause of salmon and steelhead decline (NPCC, 2004). The adverse effects of poorly managed logging, grazing, mining, dams, irrigation withdrawals, urbanization, exotic species introductions, and other human activities have

been documented in all of Columbia River tributaries (ISG 1996). Riparian and instream habitat degradation has most severely impacted spring Chinook production potential in the Grande Ronde Subbasin (ODFW and CTUIR 1990, NPCC 2004a) and habitat loss and degradation has been widespread with the exception of road-less and wilderness areas (Anderson et al. 1992; CTUIR 1983; Henjum et al.1994; McIntosh et al. 1994).

Approximately 379 miles of degraded stream miles have been identified in the Subbasin (ODFW et al. 1990), with an estimated 80 percent of anadromous fish habitat in a degraded condition (Anderson et al. 1992). McIntosh (1994) documented a 70 percent loss of large pool habitat in the Upper Grande Ronde River since 1941. Riparian shade on low gradient streams was found to be less than 30 percent (Huntington, 1993). Stream channelization, diking, wetland drainage, and use of splash dams was a common and widespread practice until the 1970's and resulted in severe channel incision and degradation in some locations. The Oregon Department of Environmental Quality (ODEQ) listed over 60 stream reaches in the Subbasin on the State's list of water quality limited water bodies 303 (d). Of these stream segments, 24 are listed for habitat modification, 27 for sediment, and 49 for temperature. Table 3 illustrates priority areas for water quality treatment in the Subbasin (ODEQ, 2000).

TABLE 3: GEOGRAPHIC PRIORITY AREAS FOR WATER QUALITY TREATMENT IN THE UPPER GRANDE RONDE WATERSHED DEVELOPED THROUGH TMDL PROCESS (H=HIGH, M=MEDIUM, L=LOW) (NPCC 2004A, TABLE 18, ODEQ, 2000)

Watershed	Temperature	Sediment	Flow
Lookingglass	L[1]	L	L
Lower Grande Ronde	L	L	L
Willow/Philips	H	H	H
Indian/Clark	M	M[2]	M
Catherine Creek	H	H	H
Beaver	M	M	L[3]
GRR Valley	H	H	H
Ladd Creek	H	H	H
Upper Grande Ronde	H	H	H[4]
Meadow Creek	H	H	H[4]
Spring/Five Pts.	H	M	M

Watershed analysis through the EDT (NPCC, 2004a and Mobrand, 2003) and synthesis through the Subbasin Plan Management Plan development process, identified instream habitat condition, high water temperature, sediment loads, and flow modification as primary limiting factors for Chinook and steelhead (pg 11 NPCC 2004c, pg 3 NPCC 2004d). Primary habitat degradation includes:

- **Channel Habitat Conditions** – Channel instability associated with removal of streamside cover and channelization has resulted in channel incision/down cutting, increased gradient, reduced channel length, elevated erosion, increased width-to-depth ratios, and loss of channel complexity. The quality of instream habitat has correspondingly been altered throughout much of the Subbasin.
- **Sediment** – Loss of upland and streamside vegetative cover has increased the rates of erosion. Soils lost from upland areas has overwhelmed hydraulic processes resulting in decreased availability of large pool habitat, spawning areas, riffle food production, and hiding cover.
- **Riparian Function** – Riparian habitat degradation is the most serious habitat problem in the subbasin for fish (McIntosh 1994, ICBEMP 2000). Loss of flooplain connectivity by roads, dikes, and channel incision, and in many streams reduced habitat suitability for beaver has altered dynamically stable floodplain environments which has contributed to degradation and limited habitat recovery. This loss leads to secondary effects that are equally harmful and limiting, including increased water temperature, low summer flows, excessive winter runoff, and sedimentation.
- **Low Flow** – Water resources in many streams have been over over-appropriated resulting in limited summer and fall base flow, development of fish passage barriers, and increased summer water temperatures.

Table 4 illustrates key habitat limiting factors by geographic priority area. The table has been edited from the Subbasin plan to depict only those geographic areas addressed under this proposal. These geographic priority watersheds have been identified as the three highest priority areas to conduct habitat restoration with the greatest response in Chinook salmon and steelhead production potential (NPCC, 2004a, Supplement, Pgs 49-50, Table 5-6).

TABLE 4: GRANDE RONDE SUBBASIN PRIORITY GEOGRAPHIC AREAS AND HABITAT LIMITING FACTORS (NPCC, 2004A)

Watershed	Fish Population(s)	EDT Priority Geographic Area(s) highlighted areas are priorities for multiple pops.	Habitat Limiting Factors
Wallowa River (including Lostine River)	Wallowa Steelhead Wallowa-Lostine Chinook Lostine/ Bear Ck Bull Trout	**Steelhead Priorities** Prairie Creek Upper Wallowa River –Wallowa Chinook Hurricane Ck , Whiskey Ck Lower Wallowa (1-3) -Minam Steelhead **Chinook Priorities** Lower Lostine – Wallowa Steelhead Mid-Wallowa – Wallowa Steelhead	➢ Key Habitat Quantity (reduced wetted widths) ➢ Habitat Diversity (reduced wood, riparian function) ➢ Sediment ➢ Temperature ➢ Flows
Upper Grande Ronde	Upper GR Steelhead Upper GR Chinook Upper GR Complex Bull Trout	Mid GR 4 (GR 37 - 44) - Chinook Mid GR Tribs 4 (Whiskey, Spring, Jordan, Bear, Beaver, Hoodoo…) Phillips Creek Upper GR Ronde 1 (45-48) - Chinook Mid GR 3 (GR – 34-36) Valley Sheep Ck, Fly Ck, Lower Meadow Ck - Chinook	➢ Sediment ➢ Flow ➢ Temperature ➢ Key Habitat Quantity (reduced wetted widths)
Catherine Creek/ Middle Grande Ronde	Upper GR Steelhead Catherine Ck Chinook Catherine Ck Bull Trout Indian Ck Bull Trout	Mid Catherine Creek (2-9) – UGR Sthd SF, NF Catherine Creek Lower Grande Ronde R. 2	➢ Key Habitat Quantity (reduced wetted widths) ➢ Habitat Diversity (reduced wood, riparian function) ➢ Sediment ➢ Flow ➢ Temperature

Habitat protection and restoration needs in the Subbasin have been recognized in numerous reviews, planning processes, and reports (CTUIR 1983, Noll and Boyce 1988, ODFW et. al. 1990, Wallowa-Whitman et.al. 1992, Huntington (1993), GRMWP (1994), Mobrand and Lestelle (1997), NPCC 2001, and NPCC 2004a). NPCC (2004a) Appendix 5 (pg 254) provides a relatively complete list of habitat protection and restoration strategies that can be applied to achieve goals and objectives. The NMFS proposed recovery plan for Snake River Chinook salmon recognized the importance of tributary habitat restoration and protection of habitat on both federal and private lands to chinook an steelhead recovery (NMFS, 1995). NMFS has recently restarted the recovery planning effort for Chinook salmon and steelhead and tributary habitat restoration and is expected to play a prominent role in the final NMFS recovery plan. NRC (1996) also noted the importance of protecting and rehabilitating freshwater habitat as part of salmon recovery. They specifically note the importance of riparian areas and recommend that habitat reclamation or enhancement should emphasize rehabilitation of ecological processes and function. The USFWS draft bull trout recovery plan recognized the importance of habitat protection and restoration as well (USFWS, 2002), specifically noting the need to improve water quality, reduce or eliminate fish passage barriers, and restoring impaired instream and riparian habitat.

METHODS, RESULTS, AND DISCUSSION

The following sections present work elements, milestones, and milestone descriptions followed by discussion of accomplishments for the project during the contract period.

Manage and Administer Projects

This work element includes a suite of management actions required to administer the project, including preparation of annual operations and maintenance budgets, managing and preparing statements of work and budgets, and milestone and metrics reporting in Pisces, supervising and directing staff activities, conducting vehicle and equipment maintenance and management, payroll, purchasing, subcontracting for services, and administering/inspecting habitat enhancement activities. CTUIR staff coordinated NRCS staff on project design, permitting, project stakeout, and construction inspection for the McCoy Meadows Project and the GRMW for BiOp funding for the Dark Canyon Project. CTUIR administered all aspects of construction subcontracting, materials acquisition, and administration for these projects during 2010.

The Project Biologist leader supervised 2 permanent and 2 seasonal employees to accomplish project activities. Staff training included Rosgen Level I (Assistant Project Biologist and Biologist I), 2010 Northwest River Restoration Symposium (Project Leader and Assistants), and AutoCAD and AutoCAD Civil 3D training (Project Biologist). Major purchases during the reporting period included:

- 2010 650cc Arctic Cat TBX ATV
- CART Pro Statistical Software
- Nikon D 3100 Digital Camera
- AutoCAD 2011 Civil 3D

Environmental Compliance and Permits

Environmental compliance methods include development of appropriate documentation under various federal and state laws and regulations governing federally funded project work. Methods involve coordination with various federal and state agencies and development, oversight, and submittal of permit applications, biological assessments, cultural resource surveys, etc.

Primary accomplishments during the reporting period included coordination with BPA environmental compliance personnel to prepare supplemental documentation and reporting for ongoing and planned management actions. CTUIR staff completed all environmental compliance documentation and permitting for the McCoy Meadows Enhancement Project and the Dark Canyon (Cunha) Fish Habitat Enhancement Project.

EC compliance for these two projects included preparation of HIPII BiOp documentation for ESA chinook and summer steelhead, preparation of Biological Assessments for USFWS ESA species, cultural resource surveys and preparation of reports, and preparation of permit applications and documentation for USCOE and Oregon DSL permits. CTUIR and NRCS cultural staff also provided onsite observation during project construction of both projects to comply with requirements of the Oregon SHPO permits for each project respectively.

Additionally, CTUIR staff initiated preliminary EC compliance planning on projects planned for implementation beginning in 2011. Activities included preparation of maps illustrating the Area of Potential Effect (APE) to initiate cultural resource investigations and compilation of ESA species

information for incorporation into ESA compliance documentation. EC compliance activities will be ongoing for the Catherine, Willow, and Rock Creek projects in FY2011 with completion scheduled for late summer in preparation to construction initiation.

Coordination and Public Outreach/Education

Coordination and public education are undertaken to facilitate development of habitat restoration and enhancement on private lands, participate in subbasin planning, ESA recovery planning, BiOp/Remand project development and selection processes, and assist with providing watershed restoration education. CTUIR technical staff coordinates through the GRMW on the Board of Directors and Technical Committee to help facilitate development of management policies and strategies, project development, project selection, and priorities for available funding resources.

The Project Biologist coordinates regularly with GRMW staff to discuss policy and technical issues, brainstorm project development, strategize near term and long term subbasin restoration activities, and participate in project tours scheduled by GRMW. In addition, staff continues participation in various recovery planning activities through the NMFS technical teams for ESA-listed salmon and steelhead stocks in the Grande Ronde Subbasin.

During the reporting period, CTUIR staff prepared two articles for the GRMW Ripples quarterly newsletter on the Dark Canyon (Cunha) and McCoy Meadows Enhancement projects (included in Appendices), participated in 3 multi day BiOp project field tours, 3 BOR Tributary Assessment planning meetings, 2 Snake River Basin ESA Recovery Plan meetings, and participated in extensive technical review and comment on BiOp project proposals as part of the BPA-GRMW Stepwise project review process.

Planting and Maintenance of Vegetation

The CTUIR habitat program annually participates and/or assumes the lead role in re-vegetation activities on individual habitat restoration and enhancement projects. Planting and seeding methods are developed to address site specific conditions and vegetation objectives. Natural colonization and manual techniques are utilized.

Channel construction projects warrant special consideration since construction disturbance creates bare soil conditions and potential for weed infestations. Locally adapted native species are utilized as available, although some cultivars have been utilized in grass seed mixes in conjunction with available native seed. A variety of re-vegetation methods are employed and are designed to meet specific project objectives and site conditions.

Techniques include a combination of manual and/or mechanical practices and can include installation of conditioned live whips (collected dormant, soaked in water until root nodule development for 2-3 weeks prior to out planting), containerized plant stock, whole tree/shrub transplants/salvage, and broadcast seeding. Locally adaptive species of the appropriate elevation band are used to facilitate vegetation establishment. Planting efforts are usually constrained to late fall/early spring dormancy periods to minimize plant stress and optimize survival. Noxious and/or undesirable weeds are present on several project areas.

Landowner agreements include strategies to address weeds and are either completed by the landowner, CTUIR, subcontractor, and/or through the local weed control board. CTUIR staff provides assistance to

landowners by coordinating with County Weed Board, securing funding, and developing treatment strategies. Manual, biological, and chemical treatment options may be employed consistent with existing standards for these practices. Key weed species prioritized for treatment in the basin include leafy spurge, spotted knapweed, and Canada thistle.

Staff efforts associated with plant protection during the reporting period included installation of an additional 20 large riparian enclosures and multiple single plant protective devices along McCoy and Meadow Creek in order to exclude wild ungulates. Enclosures ranged in size from single plant protective devices, about 3'x 5', to larger 16'x16' or 48'x60', placed at strategic locations containing patches of regenerating willow communities that have either been planted or are natural regeneration. Large enclosures consisted of 10 foot t-posts and 4'x16' hog panels and woven fence and t-posts for smaller single units.

Employing the use of enclosures at McCoy Meadows has been prompted by significant and chronic damage and mortality to shrubs, primarily from elk browsing. A stocking survey conducted by CTUIR in 2008 revealed that 100% of planted units that were not protected by enclosures were damaged and experienced nearly 100% mortality compared with 70%+ survival on protected plants. The objective of these structures is to eliminate wildlife depredation and protect regenerating willow communities that are lacking within the historic wetland complex.

Operate and Maintain Habitat & Structures

Project maintenance includes conducting custodial responsibilities on individual projects to ensure that developments remain in functioning repair and habitat recovery is progressing towards meeting projects goals and objectives. Activities include, but are not limited to, maintaining communications and good standing with landowners, repairing fences, water gaps, instream structures, or other developments, and monitoring project sites regularly to assess presence of trespass livestock or potential problems as they may develop. During the reporting period, project impacts from trespass livestock were minimized by conducting bi-weekly project visits and working with private landowners to remove problem livestock.

Grande Ronde Subbasin Assessment

In order to guide CTUIR Grand Ronde Habitat restoration projects, in conjunction with the Grande Ronde Subbasin Plan and Draft Snake River Basin Recovery Plan, we have developed and implemented methods to characterize and model fish use of stream habitats. To accomplish this we created several geomorphic classifications, and related the individual parameters of the geomorphic classifications to the presence of Spring Chinook redds in the Upper Grand Ronde River. Geomorphic classifications included a modified Montgomery and Buffington (1997) and a statistically based classification using hierarchical clustering. These classification parameters were then compared to a presence absence model for Spring Chinook redds. To predict the potential distribution of Spring Chinook redds across the study area, we used Classification and Regression Trees [CART] and Neural Network techniques. Outputs of this work will be tested by comparing resulting redd prediction maps to known areas of Spring Chinook spawning and through cross-validation using the training data and Monte Carlo simulation techniques. Early results show that Neural networks produce relatively high R^2 values, however they are difficult to interpret and communicate. However, CART models have relatively high predictive power and provide a relatively straight forward understanding of the relationships between variables. Currently, we are finishing the Upper Grand Ronde River assessment. The increased size and complexity of the lower Grand Ronde basin warrant a larger effort. Using support from the Pacific Coastal Salmon Recovery Fund, we will complete the remainder of the Grand Ronde drainage in 2012.

A final report and all products developed from the assessment will be uploaded as an appendix to this annual report as soon as it is available.

Monitoring & Evaluation

Monitoring and evaluation (M&E) of individual projects is conducted either independently by the CTUIR or jointly with project partners depending on the project. Monitoring and evaluation efforts include annual photo-points, installation of water and air temperature probes, stream channel cross sections and longitudinal profiles, pebble counts, juvenile fish population and habitat surveys, stocking/census surveys on re-vegetation efforts, and groundwater monitoring. Public tours, workshops, and presentations of individual projects will continue to be conducted. These activities provide for the discussion of various approaches, restoration techniques, successes, failures, and ultimately adaptive management.

Following are descriptions of the various M&E components of the project followed by project specific monitoring results.

Water Temperature Monitoring

During 2010, thirty three (33) temperature probes were deployed within the Grande Ronde Basin by the CTUIR (compared to 22 sites in 2009), all recording at 1-hour intervals. Water temperatures at the same locations used in 2009 were again monitored and an additional 10 probes deployed at the Willow Creek (Oregon Ag Foundation) Project area near Summerville, along Willow Creek and its tributaries. The air probe at the End Creek project was also re-deployed in 2010.

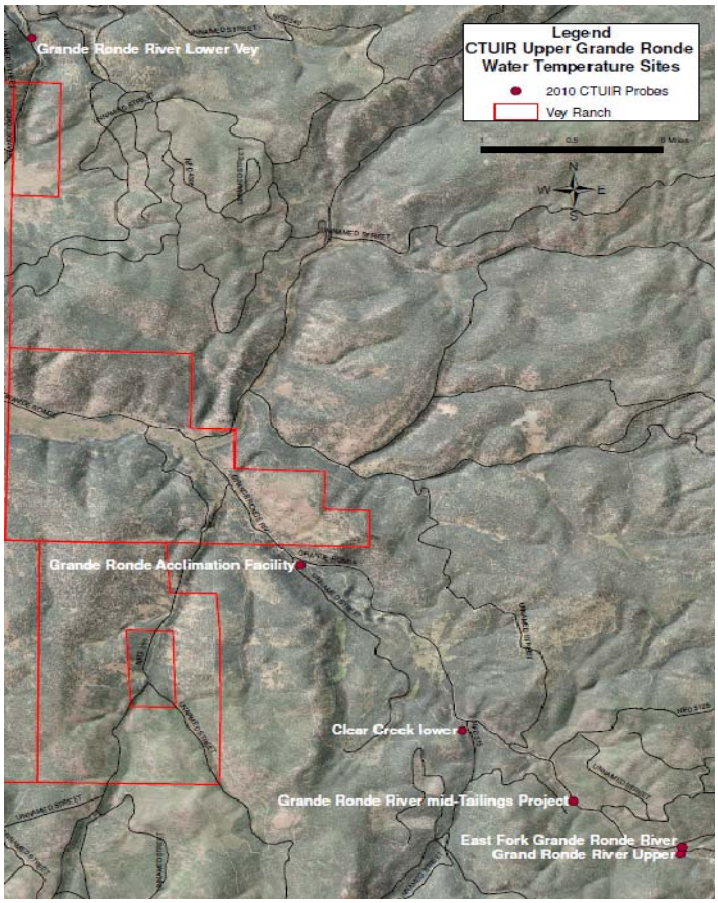
Summary statistics were calculated for each probe that included the number of records when temperatures were at or exceeded the DEQ lethal limit of 25ºC, when temperatures were within a range of 10ºC to 15.6ºC (the preferred temperature range of juvenile Chinook salmon – as cited by Yanke et. al. 2003. The number of days when the mean temperature was at or exceeded the DEQ standard of 17.8ºC was also calculated.

Table 5. Water temperature probe metrics for 18 sites in the Upper Grande Ronde Basin and Meadow Creek sub-basin during 2010

Probe Id	Stream Name	River Mile	Start Date	End Date	Days deployed	Hours deployed	Hours for analysis	Hours Between 10-15.6°C	Hours >=25°C	# Days $\bar{x}$ >=17.8°C
BATTLE1	Battle	0.04	3/29	11/19	235	5640	4915	1623	0	0
CLC1	Clear	0.06	5/11	10/28	170	4080	4007	1220	0	0
DC1	Dark Canyon	0.06	4/7	11/19	226	5424	5398	2156	0	0
DC2	Dark Canyon	1.90	4/7	11/19	226	5424	5399	1761	0	6
GR4	Grande Ronde	194.23	5/11	10/28	170	4080	4079	1467	4	18
GR5	Grande Ronde	199.75	6/22	10/28	128	3072	3023	1314	0	0
GR6	Grande Ronde	202.30	5/11	10/28	170	4080	4079	1276	0	0
GR7	East Fork Grande Ronde	0.05	5/11	10/28	170	4080	4078	1152	0	0
GR8	Grande Ronde	203.02	5/11	10/28	170	4080	2528	908	0	0
MCCOY1	McCoy	2.70	3/29	11/19	235	5640	3648	1255	23	40
MCCOY6	McCoy	1.50	3/29	11/19	235	5640	5605	1816	71	46
MCCOY7	McCoy	0.10	3/29	11/19	235	5640	5533	1803	101	51
MEADOW1	Meadow	2.90	5/1	11/19	202	4848	4765	1462	231	64
MEADOW2	Meadow	1.50	5/1	11/19	202	4848	4719	1614	88	51
MEADOW3	Meadow	1.06	3/29	8/5	129	3096	2749	822	122	26
MEADOW4	Meadow	0.17	3/29	8/5	129	3096	2716	908	105	19
MEADOW5	Meadow	7.53	3/29	11/19	235	5640	4891	1514	32	15
MEADOW6	Meadow	6.77	6/22	11/19	150	3600	2892	1060	19	17

Diurnal fluctuations in water temperature were also plotted. The following summary of water temperature data is broken down into an overview of each watershed area which includes: the Upper Grande Ronde, Meadow Creek, and Lower Grande Ronde (Willow Creek, South Fork of Willow Creek and End Creek). A summary of temperature metrics for the Upper Grande Ronde and Meadow Creek sub-basin can be seen in Table 5, with Willow Creek basin being in Tables 9 and 10.

FIGURE4. CTUIR WATER TEMPERATURE PROBE LOCATIONS ALONG THE UPPER GRANDE RONDE RIVER



Six probes were deployed along the Upper Grande Ronde River (including the East Fork and Clear Creek) to encompass the Mine Tailings Removal Project and downstream of Vey Meadows Ranch. During 2010 these probes recorded data for a maximum of 170 days (between 5/11/2010 and 10/28/2010). There were 1,678 records removed from the dataset due to either a probe being out of the water or similar reported problems, leaving 21,794 hrs logged for analysis.

During 2010 the probe below the Vey Ranch (GR4) was the only probe to have temperatures at or above the DEQ lethal limit of 25°C, with 4 hrs logged spread over 2 days (3 consecutive hours on July 30th and 1 hour on August 5th).

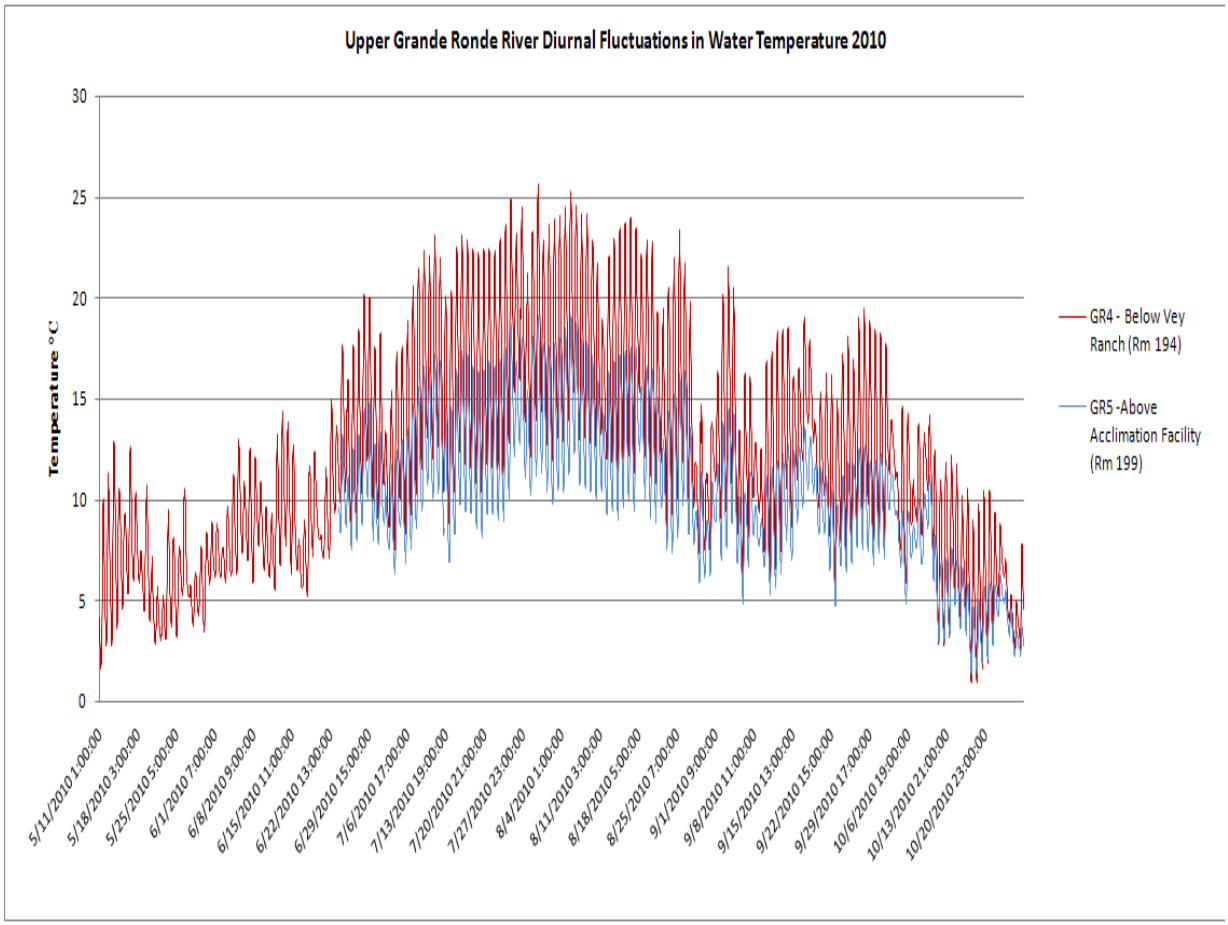
There were 7,337 records when temperatures ranged between 10° - 15.6°C (34% of the data). Mean daily temperatures exceeded 17.8°C on 18 days at the GR4 – river mile 194.2 below Vey Ranch, and did not exceed this limit at the other sites above the ranch.

The upper probe on the Grande Ronde River (GR8), at river mile 203, was first deployed on 5/11/2010, but was lost when the cable was cut. A new probe was deployed on 7/14/2010 at the same location that subsequently logged 2,528 hrs of data.

The Clear Creek probe was reported out of the water on 7/13/2010 and its battery was replaced on 8/17/2010 leaving 4,007 hrs of data for the analysis compared to 4,079 hrs for the mid Mine Tailings Project probe (GR6) at river mile 202.3. Both these probes did not record a mean daily value greater than 14ºC and had temperatures between 10ºC and 15.6ºC for 2,496 hrs (30% of the logged temperatures).

The probe on the Grande Ronde River at river mile 199 (GR5) was lost when the cable was cut. It was replaced on 6/21/2010 and recorded 3,023 hrs for the analysis compared to the probe at river mile 194 (GR4) that had 4,079 hrs logged. The GR5 probe had 1,314 hrs logged when the water temperature was between 10ºC and 15.6ºC (43% of the hours logged) and the GR4 probe had 1,476 hrs (36% of the hours logged). The maximum daily temperatures for the two probes were 19.1ºC (GR5) and 25.6ºC (GR4). The diurnal fluctuations in water temperature were also greater for the GR4 probe and were similar to the 2009 levels.

FIGURE 5. DIURNAL FLUCTUATIONS IN WATER TEMPERATURE ALONG THE GRANDE RONDE RIVER DURING 2010.



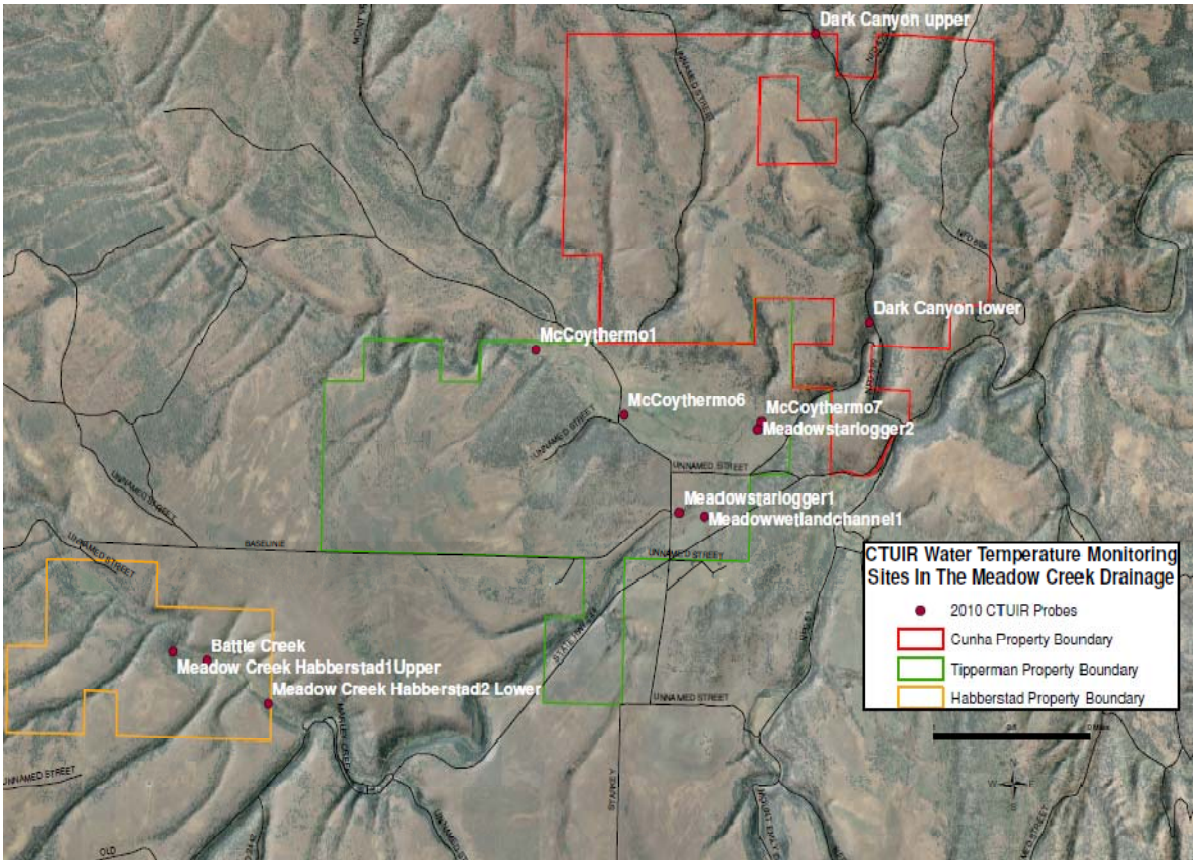
This plot shows the greater fluctuations in diurnal water temperature for the probe below the Vey Ranch (GR4) at river mile 194 compared to that above the ranch near the CTUIR acclimation facility (GR5) at river mile 199. These differences between the two sites are similar to those recorded in 2009.

Meadow Creek Drainage

The CTUIR Fish Habitat Project had 12 probes deployed in 2010 within the Meadow Creek Drainage covering 4 streams – Battle Creek, Meadow Creek, McCoy Creek, and Dark Canyon Creek. The probe data was then grouped by project for this report. The projects were:

1. Dark Canyon (Cunha), with 2 probes – DC1 and 2 at river miles 0.06 and 1.9 respectively.
2. McCoy Meadows Ranch, McCoy Creek, with 3 probes – MCCOY1, 6, 7 at river miles 2.7, 1.5, and 0.1 respectively.
3. McCoy Meadows Ranch, Meadow Creek and the Wetland Complex, with 4 probes – MEADOW1 and 2 on mainstem Meadow Creek at river mile 2.9 and 1.5 respectively, and MEADOW3 and 4 on the wetland channel at river mile 1.06 and 0.17 respectively.
4. Meadow Creek Habberstad, with 3 probes – MEADOW5 and 6 at river mile 7.53 and 6.77 respectively and BATTLE1 at river mile 0.04.

FIGURE 6. CTUIR WATER TEMPERATURE PROBE LOCATIONS WITHIN THE MEADOW CREEK DRAINAGE



Dark Canyon Creek

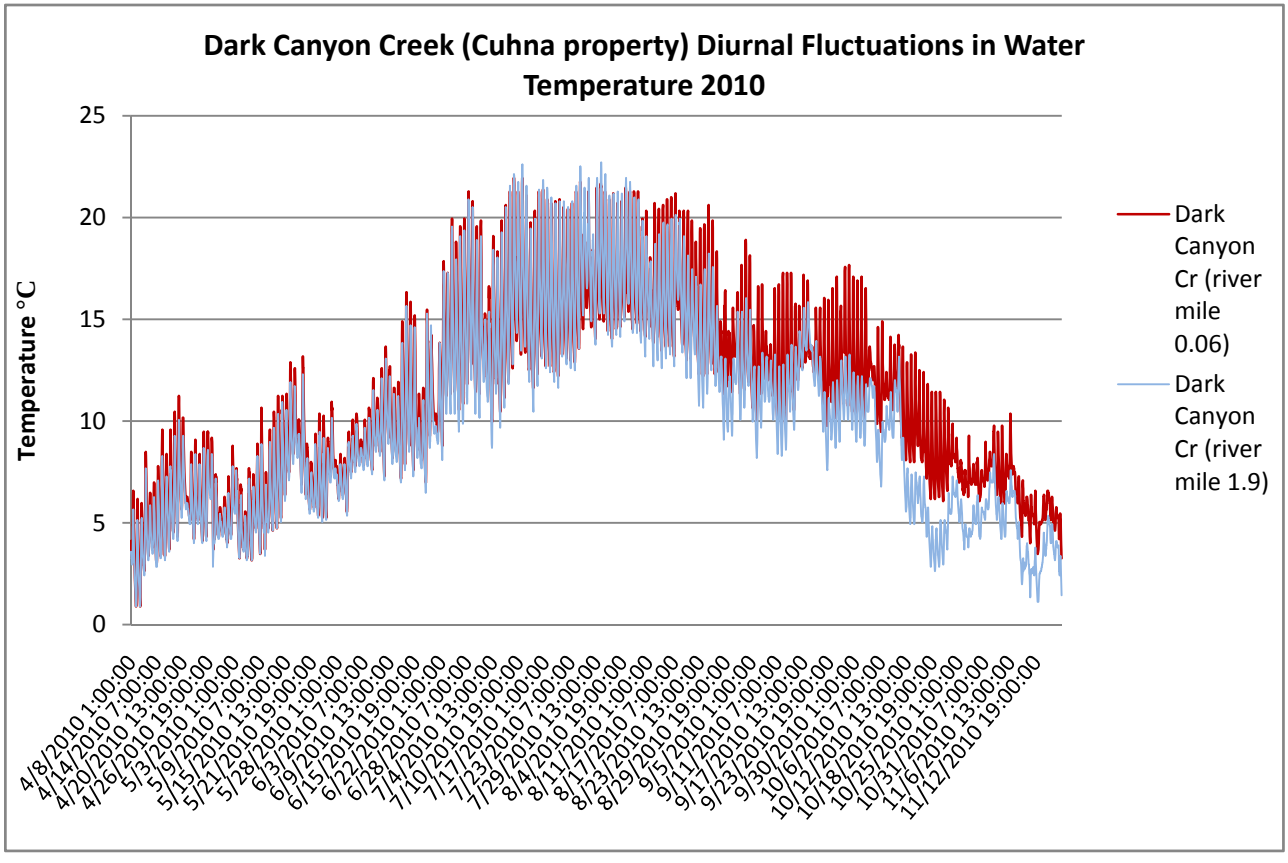
Restoration work along 1.9 miles of Dark Canyon Creek was implemented in 2010. These efforts included the placement of wood structures in approximately 18 locations and the enrollment by the landowner into a CREP scheme to protect the riparian zone from livestock grazing. It is anticipated that planting of riparian vegetation will be undertaken in 2011 after the fences are completed.

The two probes along Dark Canyon Cr were deployed from 4/7/2010 to 11/19/2010 and logged 10,797 hrs of water temperature. There were 3,917 hrs where water temperature was between 10ºC and 15.6ºC (36% of all logged temperatures) and no records of lethal limits (>= 25ºC).

The upper probe (DC2) had 6 days where the mean daily temperature was >=17.8ºC in contrast to the lower with no records. The upper site had 33% of its logged temperatures between 10ºC and 15.6ºC compared to 40% for the lower site. It appears from these metrics that the upper probe is recording warmer temperatures; however, by examining the plots of diurnal fluctuations (Figure 7) it is evident that the two locations had similar overall temperatures and fluctuations until mid July when the upper probe recorded elevated levels for several days until the first week of August.

After this point the upper site cooled quicker than the lower site during the remainder of August and had narrower diurnal fluctuations for the rest of the record period. There were no records of problems with the upper probe, either battery related or being de-watered, and from these data it is unclear why there was a spike in water temperatures.

FIGURE 7. DARK CANYON CREEK DIURNAL WATER TEMPERATURES DURING 2010



McCoy Creek

There were a total of 14,786 hrs of data from 3 probes for the analysis collected between 3/29/2010 and 11/19/2010. Combining the data for the probes gave a total of 4,874 hrs when water temperature was between 10ºC and 15.6ºC (33% of the data) and a maximum of 101 hrs logged when temperatures reached 25ºC or higher (at river mile 0.1). Mean daily temperatures were >=17.8ºC on a maximum of 51 days at river mile 0.1 (see Table 6). The upper most probe (MCCOY1) had a battery replaced and was out of the water for a short period, therefore, it logged 3,648 hrs compared to >5,500 hrs for the other two probes.

This probe also logged the shortest time period of temperatures >= 25ºC at 23 hrs spread over 7 days compared to 71hrs over 23 days for river mile 1.5 (MCCOY6), and 101 hrs over 27 days for river mile 0.1.

The longest consecutive hours of lethal temperatures was recorded at the lowest probe (MCCOY7 river mile 0.1) on 7/30/2010 and was for 7 hrs. See Table 6 for a breakdown of the number of hours per day that lethal limits were recorded.

Table 6. Number of hours per day that water temperature was >=25ºC at 3 locations along McCoy Creek during 2010

Date	MCCOY1 (river mile 2.7)	MCCOY6 (river mile 1.5)	MCCOY7 (river mile 0.1)
06/28/10	3	0	1
07/08/10	2	1	5
07/09/10	5	3	6
07/10/10	4	3	4
07/11/10	4	3	6
07/15/10	0	0	3
07/16/10	0	1	4
07/17/10	0	0	2
07/20/10	0	0	1
07/24/10	0	4	5
07/25/10	1	4	6
07/27/10	0	1	3
07/29/10	0	3	4
07/30/10	4	6	7
07/31/10	0	3	5
08/03/10	0	4	3
08/04/10	0	4	5
08/05/10	0	5	6
08/06/10	0	3	5
08/07/10	0	1	2
08/08/10	0	1	3
08/13/10	0	0	2
08/14/10	0	2	3
08/15/10	0	1	3
08/16/10	0	5	3
08/17/10	0	6	3
08/18/10	0	5	1
08/25/10	0	2	0
Total hours >= 25°C	23	71	101

Table 7. Number of hours per day that water temperature was >=25ºC along Meadow Creek at the McCoy Meadows Project Area during 2010

Date	MEADOW1 (river mile 2.9)	MEADOW2 (river mile 1.5)
06/28/10	5	3
06/29/10	3	0
07/07/10	3	0
07/08/10	5	5
07/09/10	7	6
07/10/10	6	5
07/11/10	7	6
07/12/10	5	0
07/14/10	3	0
07/15/10	6	4
07/16/10	6	3
07/17/10	6	2
07/18/10	5	1
07/19/10	5	2
07/20/10	6	2
07/21/10	6	0
07/22/10	4	0
07/23/10	6	0
07/24/10	7	5
07/25/10	8	5
07/26/10	6	2
07/27/10	7	4
07/29/10	7	5
07/30/10	8	6
07/31/10	7	5
08/01/10	5	1
08/02/10	6	2
08/03/10	6	2
08/04/10	7	3
08/05/10	7	5
08/06/10	6	3
08/07/10	5	0
08/08/10	6	1
08/09/10	2	0
08/10/10	2	0
08/13/10	3	0
08/14/10	5	0
08/15/10	5	0
08/16/10	5	0
08/17/10	5	0
08/18/10	4	0
08/19/10	3	0
08/20/10	1	0
08/25/10	4	0
Total hours >= 25°C	231	88

Meadow Creek and the Wetland Complex

Meadow Creek:

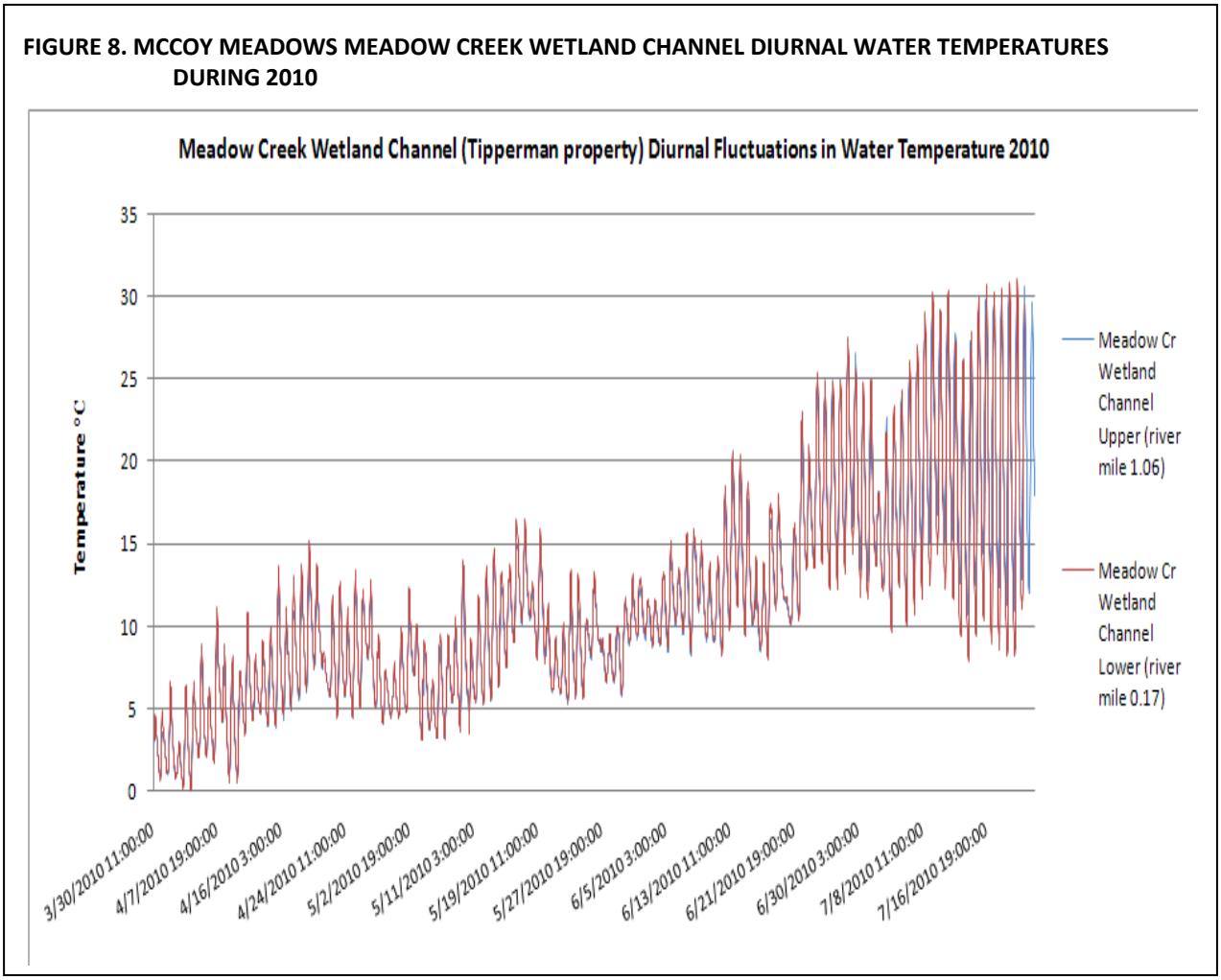
The two probes on Meadow Cr at river miles 2.9 and 1.5 were replacements for the Starlogger probes at the same locations which had download problems in 2009. The Starlogger site at river mile 2.9 was subsequently destroyed during an ice event in winter 2010/2011. However, the location will continue to be used for the 2011 season. The probe at river mile 2.9 was reported out of the water between 8/26/2010 and 8/27/2010, then again on 9/7/2010. The probe at river mile 1.5 was out of the water on 7/21/2010 – 7/23/2010, and 9/27/2010 - 9/28/2010. Temperatures from these time periods were removed from the data set.

The two probes had 9,484 hrs of data logged for the analysis. Of this 3,076 hrs were of

temperatures between 10ºC and 15.6ºC (32% of the data), 319 hrs were of temperatures >= 25ºC, and a maximum of 64 days with a mean daily value >=17.8ºC (at river mile 2.9). See Table 7 for a breakdown of the number of hours per day that lethal limits were recorded and temperature metrics. The 2010 data for these sites appears to indicate that stream temperatures are cooler at the lower section than nearer the McIntyre road bridge. Temperatures through this section of Meadow Creek may be influenced by groundwater re-charge from the Wetland Complex, which has had a raised sub-surface water table since its activation in 2006 (Childs et. al. 2009).

Meadow Creek Wetland Complex:
Two probes were placed within the constructed channel (the 'C' channel) at river miles 1.06 and 0.17, with the deployment dates for 2010 being 3/29/2010 to 8/5/2010. The wetland channel typically goes dry at the lower end first, shortly followed by the upper reach, in late July to early August. However, the middle section of the reach, the old beaver complex, appears to retain water all year but probes are not re-deployed later in the summer/early fall when the channel is observed to have flowing water again. During 2010 the two probes logged 5,465 hrs for the analysis, with 1,730 hrs (32%) being between 10ºC and 15.6ºC. There was a maximum of 122 logged hrs of temperatures >= 25ºC (MEADOW3), and a maximum of 26 days with a mean daily value >=17.8ºC at river mile 1.06 (MEADOW3) compared to 19 days at the lower site. Diurnal fluctuations in water temperature were within 5 to 6ºC early in the season but then jump to approximately 10ºC by July as the water levels recede (see Figure 8).

FIGURE 8. MCCOY MEADOWS MEADOW CREEK WETLAND CHANNEL DIURNAL WATER TEMPERATURES DURING 2010



Meadow Creek Habberstad Project

Meadow Creek:

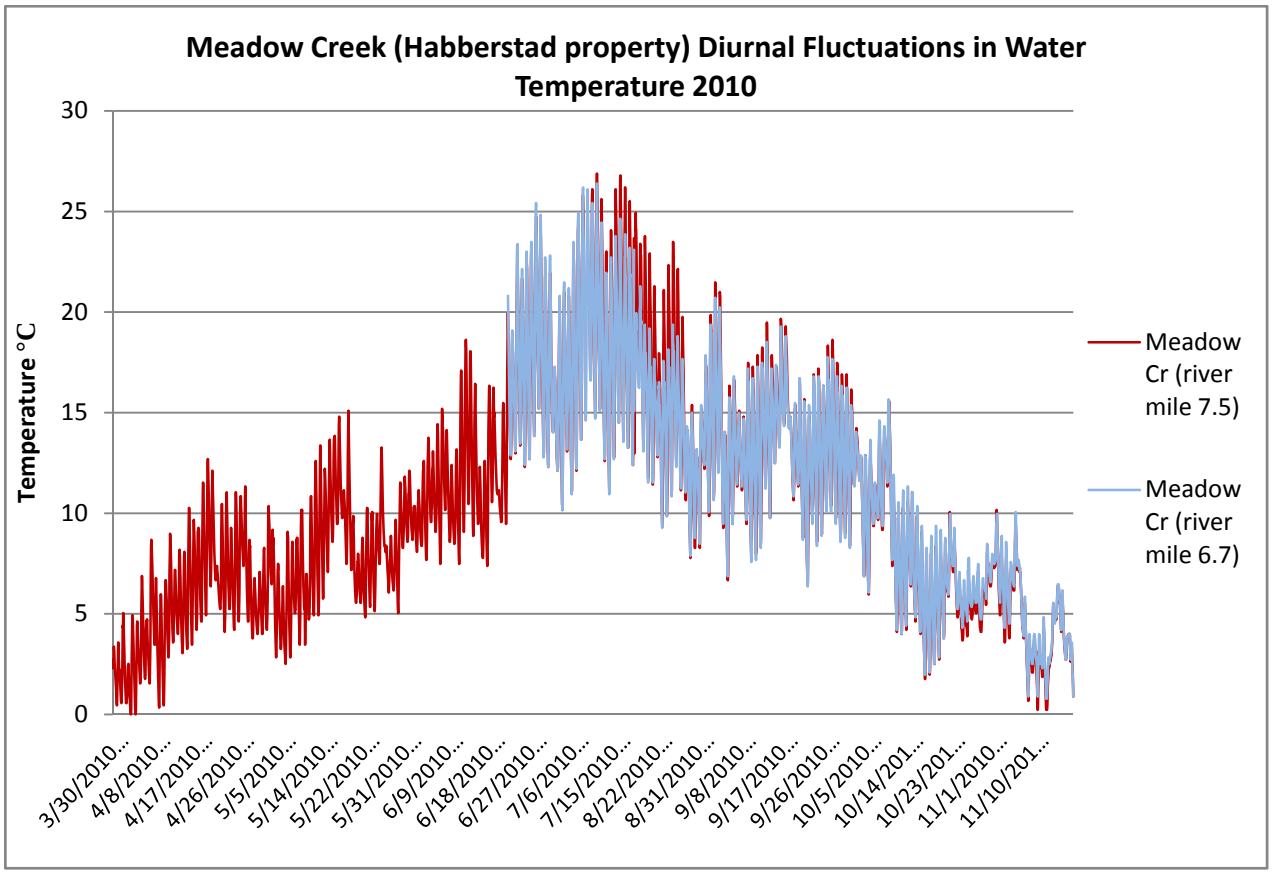
Two probes were deployed on Meadow Creek within the Habberstad restoration project. These probes were at river mile 7.53 (MEADOW5), and 6.77 (MEADOW6) and were deployed from 3/29/2010 to 11/19/2010. There were a total of 7,783 hrs used for the analysis of which 2,574 hrs (33%) were of temperatures between 10ºC and 15.6ºC.

The lower probe at river mile 6.77 was lost in a high water event and was replaced on 6/22/2010 whereupon it recorded 2,892 hrs for the analysis compared to 4,891 hrs for the upper probe. There were 32 hrs of temperatures >= 25ºC over 8 days at the upper site compared to 19 hrs over 5 days for the lower site (Table 8). The upper site also had 31% of its records between 10ºC and 15.6ºC compared to 37% for the lower site. Mean daily temperatures were >=17.8ºC for 17 days at the lower site compared to 15 days at the upper. Despite the difference in mean daily temperature ranges it appears that Meadow Creek experiences some localized cooling as it moves through the project area.

Table 8. Number of hours per day that water temperature was >=25ºC along Meadow Creek within Habberstad Project during 2010

Date	MEADOW5 (river mile 7.53)	MEADOW6 (river mile 6.77)
06/28/10	0	2
07/08/10	4	4
07/09/10	0	5
07/10/10	4	3
07/11/10	6	5
07/12/10	2	0
07/15/10	4	0
07/16/10	6	0
07/17/10	4	0
07/18/10	2	0
Total hours >= 25°C	32	19

FIGURE 9. MEADOW CREEK (HABBERSTAD) DIURNAL WATER TEMPERATURES DURING 2010

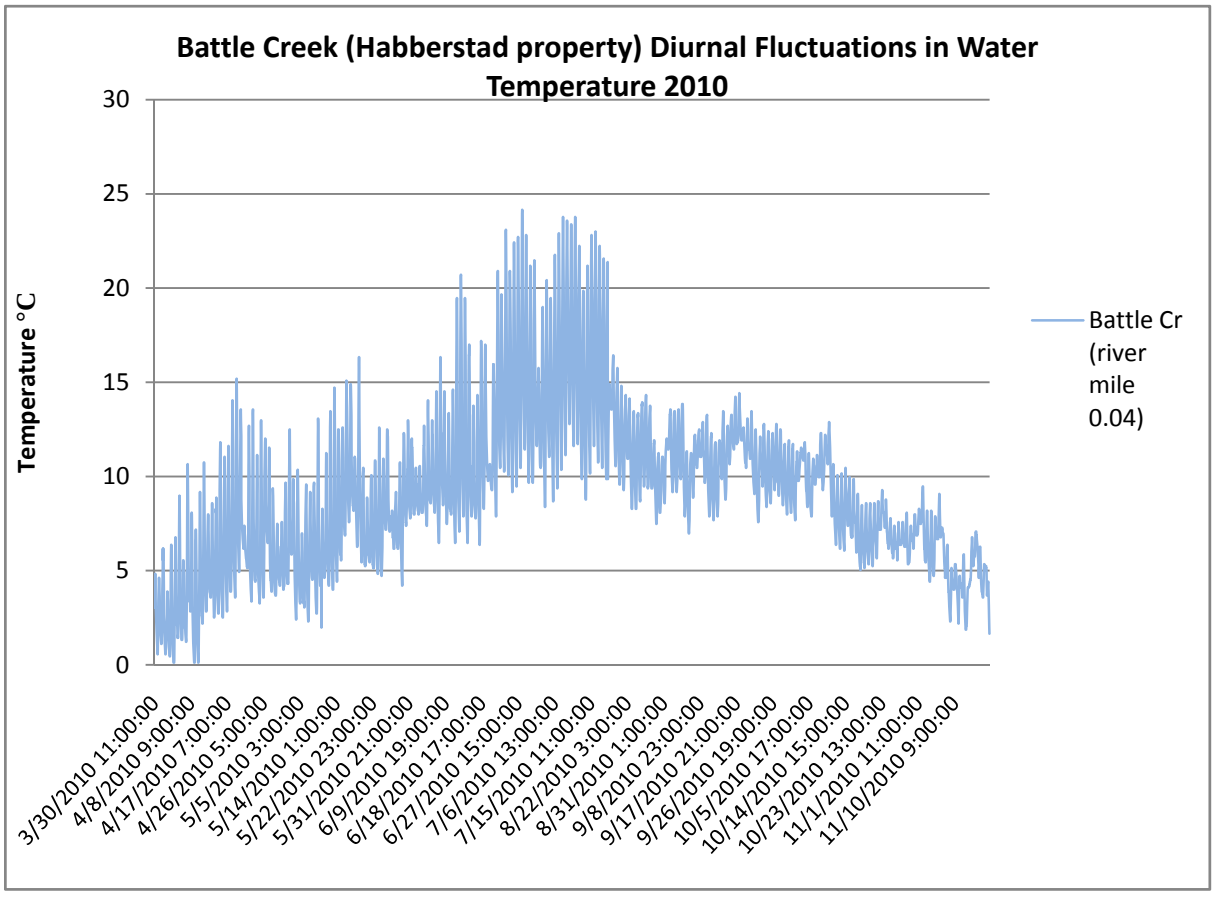


This is highlighted in the lower number of lethal limit records for the lower site and, when examining the diurnal fluctuations of water temperature (Figure 9), the drop in water temperature at the lower site during mid to late August. This drop may be attributed to cooler water entering from Battle Creek and an un-named drainage both of which enter the main creek mid project.

Battle Creek

There was one probe deployed on Battle Creek during 2010 at river mile 0.04 between 3/29/2010 and 11/19/2010. This probe had 4,195 hrs logged for the analysis of which 1,623 hrs were between 10ºC and 15.6ºC (33% of the data). There were no records of temperatures >= 25ºC or a mean daily temperature >=17.8ºC. Temperatures at the probes location drop considerably in mid August, as do the diurnal fluctuations (Figure 10). When interpreting this change it should be noted that for most of its length, from its origins on the National Forest to its confluence with Meadow Creek, Battle Creek goes sub-surface each summer. There are small pocket pools dotted throughout its length and a section of stream approximately 300 to 400 feet above the probe site retains flowing water all year. The higher temperatures early in the summer may therefore be a function of the influence of warm surface water on the overall temperature of the stream and once this dries up the cooler sub-surface water maintains the low temperatures recorded near the mouth. This cooler water may also be a factor in the location of a colony of freshwater mussels observed near the confluence with Meadow Creek.

FIGURE 10. BATTLE CREEK (HABBERSTAD) DIURNAL WATER TEMPERATURES DURING 2010



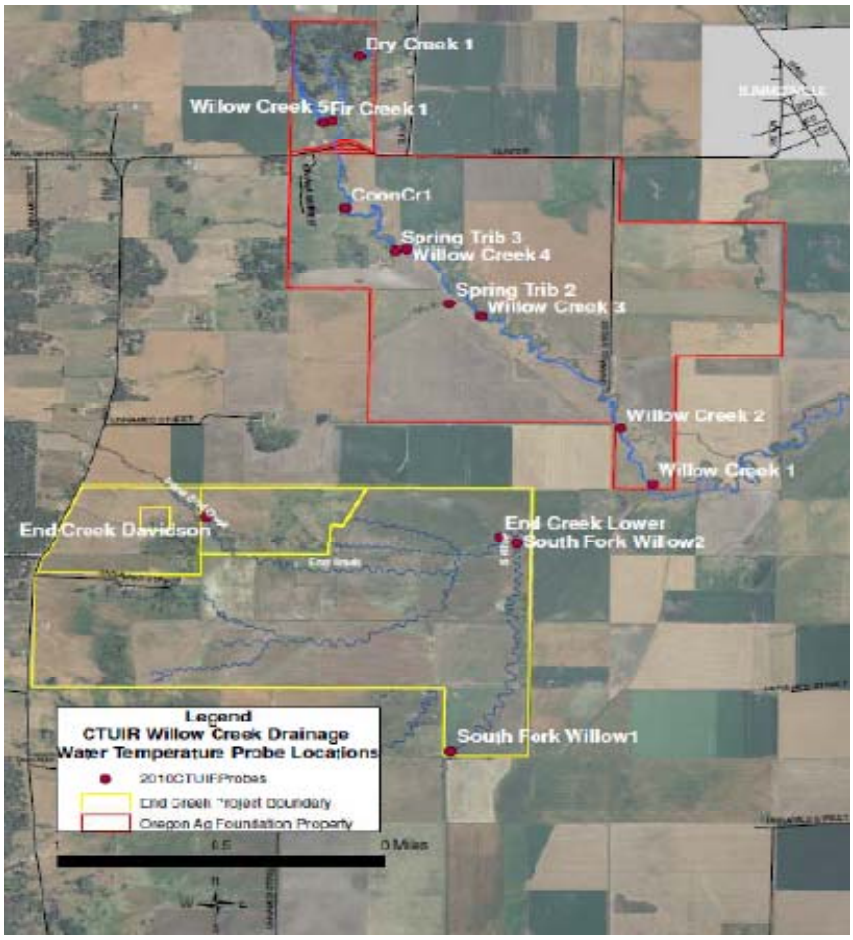
Willow Creek and Tributaries on Oregon Agricultural Foundation Trust Property

Ten probes were deployed within the boundaries of the Willow Creek Oregon Ag Foundation property in order to collect baseline information for the project. Five probes were installed on mainstem Willow Creek (WILL1 – WILL5) and the remaining five near the mouth of its tributaries which include, Dry Creek, Fir Creek, Coon Creek and two springs (DRYCR1, FIRCR1, COONCR1, SPRTRIB2 and SPRTRIB3) (see Figure 11 for probe locations). The probes at the springs (SPRTRIB2 and SPRTRIB3) were omitted from analysis due to trampling by cattle, dry channels and battery related issues, therefore the following calculations are for the remaining eight probes. Data was recorded for up to 235 days, starting at midnight on 03/20/2010 and recording until 11:00 p.m. on 11/09/2010 (with the exception COONCR1 which began recording at 1:00 a.m. on 04/13/2010). Between three probes (WILL5, WILL2 and WILL1), 6,072 records (hours) were removed from the dataset due to either the probes being out of the water or similar reported problems. There was a total of 38,471 hours logged for analysis, wherein no probes reached the DEQ salmonid lethal temperature limit of 25°C and temperatures ranged between 10° - 15.6°C for 15,515 hours (about 40% of the time). Between the five probes mean daily temperatures exceeded 17.8°C for 37 days.

Table 9. Water temperature probe metrics for Willow Creek and tributaries within the boundaries of the Mackenzie Trust property for 2010

Probe ID	River Mile	Start Date	End Date	Total Hours	Hours Between 10-15.6°C	Hours >=25°C	Total Days	# Days >=17.8°C
WILL1	7.65	3/20	6/17	2160	605	0	90	0
WILL2	7.89	3/20	7/31	3216	1005	0	134	13
WILL3	9.12	3/20	11/9	5640	2149	0	235	10
WILL4	9.6	3/20	11/9	5640	2266	0	235	6
WILL5	10.76	3/20	11/9	5472	2299	0	228	0
DRYCR1	0.44	3/20	11/9	5640	2333	0	235	0
FIRCR1	0.03	3/20	11/9	5640	2625	0	235	5
COONCR1	0.01	4/13	11/9	5063	2233	0	211	3

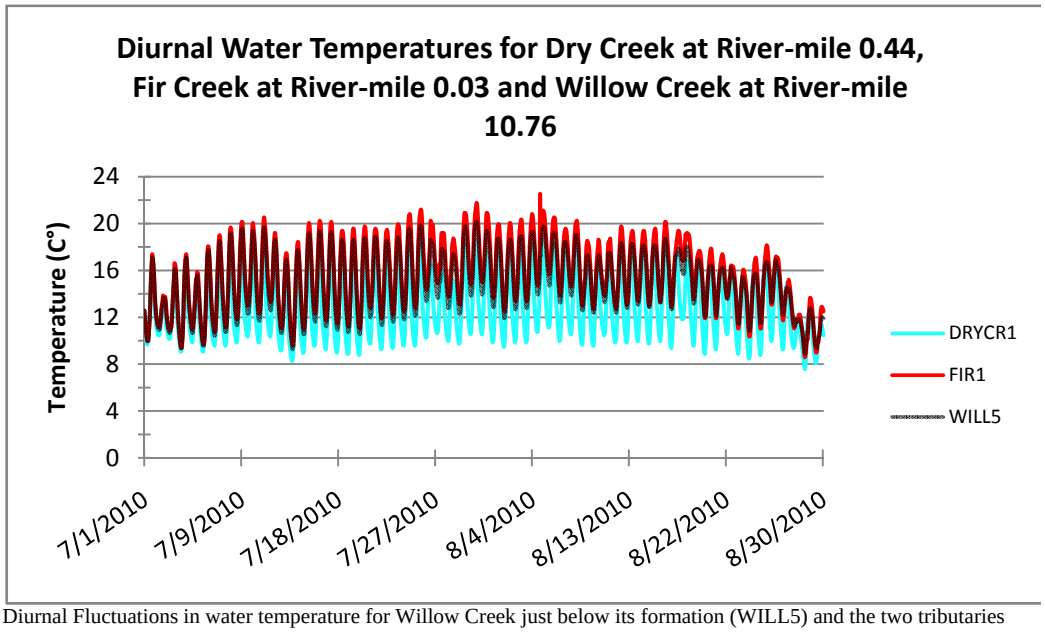
FIGURE 11. CTUIR WATER TEMPERATURE PROBE LOCATIONS WITHIN THE WILLOW CREEK DRAINAGE



Diurnal fluctuations in water temperatures were plotted and a sample of these data is displayed below in Figures 12-14. Considerable differences in tributary water temperatures and their related effects on Willow Creek are shown during the months of July and August. Downstream thermal loading is depicted by the uppermost probe on Willow Creek at river mile

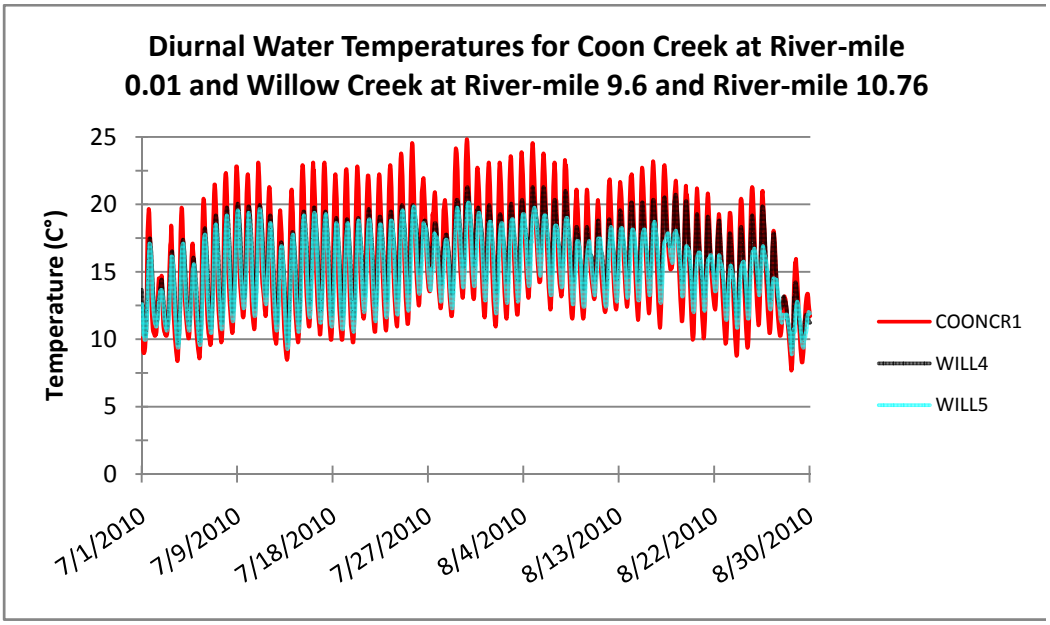
10.76 (WILL5), which is relatively cooler during the summer months than the probes located at river mile 9.12 (WILL3) and river mile 7.89 (WILL2). The lower most probe (WILL1) is not depicted due to large data gaps. These data suggest that upper Willow Creek, Dry Creek and Fir Creek may be providing coldwater refuge for focal fish species.

FIGURE 12. DIURNAL WATER TEMPERATURE FLUCTUATIONS IN DRY, FIR, AND WILLOW CREEKS



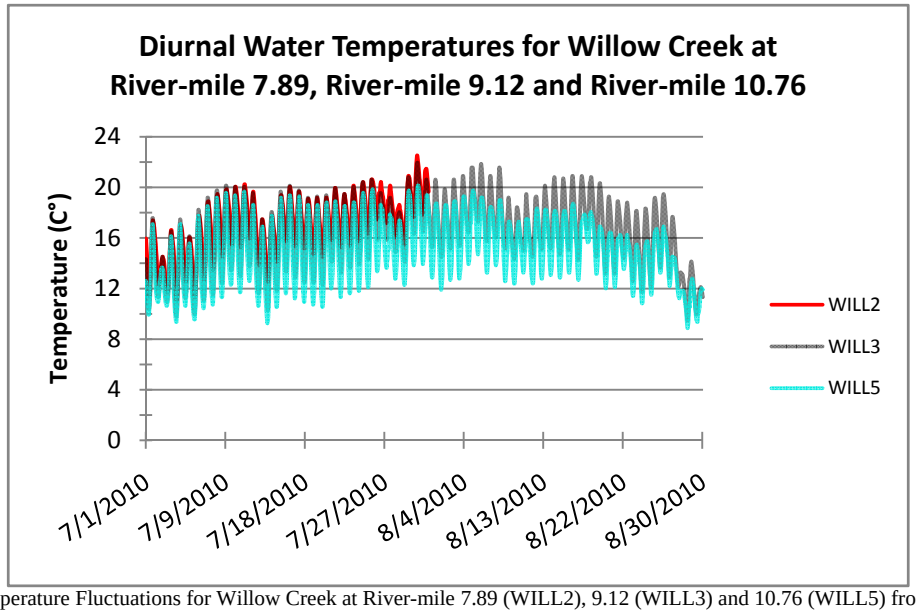
Diurnal Fluctuations in water temperature for Willow Creek just below its formation (WILL5) and the two tributaries that form it, Dry Creek (DRYCR1) and Fir Creek (FIR1), from 7/1/2010 - 8/30/2010; DRYCR1 is cooler during the summer months and is between 10-15.6 C° for the majority of the time; WILL5 depicts that from inception, Willow Creek's water temperature is a combination of Dry and Fir Creeks water temperature. FIR1 had mean daily temperatures >=17.8°C for 5 days as opposed to none for WILL5 and DRYCR1.

FIGURE 13. DIURNAL WATER TEMPERATURE FLUCTUATIONS IN COON AND WILLOW CREEKS



Diurnal water temperature fluctuations from 7/1/2010-8/30/2010 for Coon Creek (COONCR1) and Willow Creek above (WILL5) and below (WILL4) their confluence; COONCR1 has highly variable diurnal temperatures, is a source of warmer water, had mean daily temperatures >=17.8°C for 3 days and appears to have a significant effect on Willow Creek's water temperature during late summer; WILL4 had mean daily temperatures >=17.8°C for 6 days as opposed to none for WILL5

FIGURE 14. DIURNAL WATER TEMPERATURES FOR WILLOW CREEK AT RM 7.89, 9.12, AND 10.76



Diurnal Water Temperature Fluctuations for Willow Creek at River-mile 7.89 (WILL2), 9.12 (WILL3) and 10.76 (WILL5) from 7/1/2010 – 8/30/2010 (WILL2 is from 7/1 - 7/31 only due to probe issues); downstream thermal loading is evident, where WILL5 did not have mean daily temperatures >=17.8°C, WILL3 had mean daily temperatures >=17.8°C for 10 days and WILL2 had mean daily temperatures >=17.8°C for 13 days

End Creek and South Fork Willow Creek

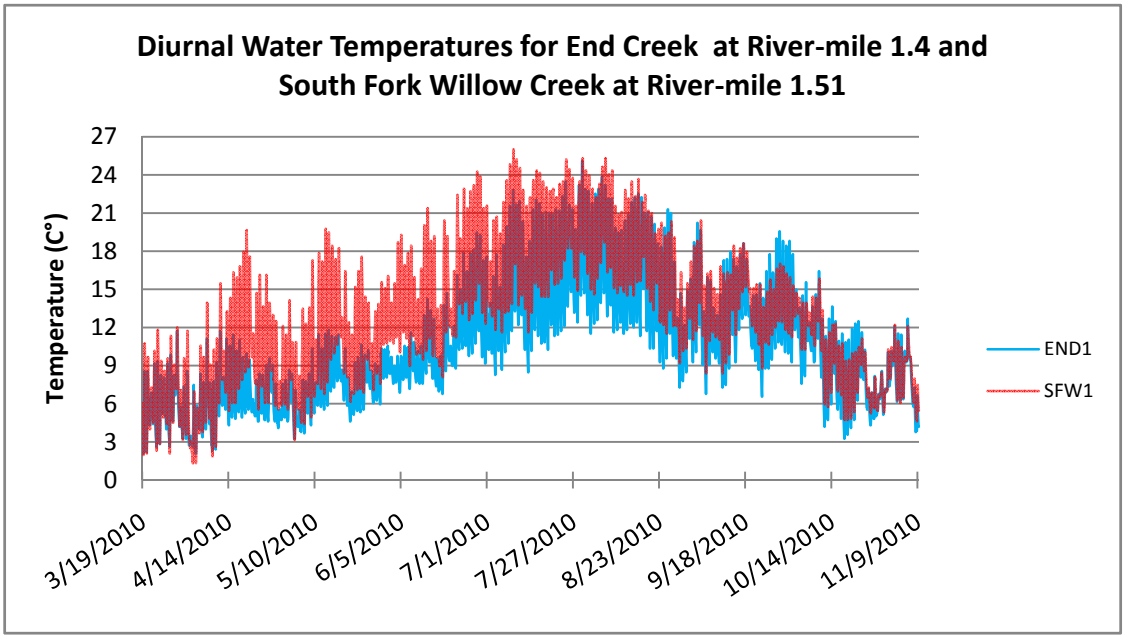
Four probes were deployed within the boundaries of the End Creek Restoration Project, two in End Creek (END1 and END2) and two in South Fork Willow Creek (SFW1 and SFW2) (see Figure 11 for probe locations). These probes recorded data for up to 236 days, starting at midnight on 03/19/2010 and recording until 11:00 p.m. on 11/09/2010. Between two probes along lower End Creek at river-mile 0.02 (END2) and lower South Fork Willow Creek at river-mile 0.1 (SFW2), 7,329 records (hours) were removed from the dataset due to either the probes being out of the water or similar reported problems. There was a total of 15,327 hours logged for analysis, wherein probes reached the DEQ salmonid lethal temperature limit of 25°C for a total of 25 hours and temperatures ranged between 10° - 15.6°C for 5,966 hours (about 39% of the time). Between all four probes mean daily temperatures exceeded 17.8°C for 63 days.

Diurnal fluctuations in water temperatures were plotted and a sample of these data is displayed below in Figure 15. Considerable differences in water temperatures are depicted for the uppermost probe on End Creek at river-mile 1.4 (END1) and the uppermost probe on South Fork Willow Creek at river-mile 1.51(SFW1). The lower most probes (END2 and SFW2) are not depicted due to extensive data gaps. End Creek is a tributary to South Fork Willow Creek, thus these data illustrate that End Creek is a source of cooler water during the summer months and may be providing coldwater refuge for focal fish species.

Table10. Water temperature probe metrics for End Creek (END1 and END2) and South Fork Willow Creek (SFW1 and SFW2) during 2010

Probe ID	River Mile	Start Date	End Date	Total Hours	Total Days	Hours Between 10-15.6°C	Hours >=25°C	# Days >=17.8°C
END1	1.4	3/19	11/9	5664	236	1892	1	4
END2	0.02	8/19	11/9	1992	83	954	0	2
SFW1	1.51	3/19	11/9	5664	236	2249	13	46
SFW2	0.1	8/18	11/9	2007	83.625	871	11	11

FIGURE 15. END CREEK AND SOUTH FORK WILLOW CREEK DIURNAL WATER TEMPERATURES DURING 2010



Diurnal water temperature fluctuations for End Creek at River-Mile 1.4 (END1) and South Fork Willow Creek at River-mile 1.51 (SFW1) from 3/19/2010 - 11/9/2010; END1 is much cooler and had 1 record (hour) of >=25°C and a mean daily average temperature of >=17.8°C for 4 days; SFW1 had 13 records (hours) >=25°C and a mean daily average temperature of >=17.8°C for 46 days.

Project Groundwater Monitoring

Meadow Creek Groundwater

McCoy Meadows – Meadow Creek Wetland Complex Groundwater Data Analysis

Groundwater elevations within the 16 monitoring wells along the Meadow Creek wetland complex were typically higher than those seen in 2005 (pre-project) and no instances of dry wells were recorded. However, the maximum depth (when water is furthest from the meadow surface) within the upper most wells (#'s 13, 14, 15, and 16) were seen to be deeper than the 2009 levels possibly indicating a reduction in groundwater at those sites. This difference was 0.8 ft for well # 13, 0.7 ft for well # 14, 0.2 ft for well # 15, and 0.4 ft for well # 16. This was in contrast to the other wells which all had a maximum water depth equal to or nearer the meadow surface compared to the 2009 elevations. Data is plotted in relation to the meadow surface elevations at each monitoring well site in order to evaluate seasonal groundwater depths. Wells are grouped for these plots into 5 units that represent their position within the meadow system, with group 1 being at the upstream portion of the project and group 5 being the most downstream group (see Figure 16).

Wells 5 through 12 had maximum water elevations nearer the meadow surface compared to the 2009 records and at each of these sites the wells nearest to Meadow Creek had the highest groundwater levels. Well #'s 1 through 4 had maximum elevations equal to those of 2009. See data illustrated in Figure 17.

FIGURE 16. MCCOY MEADOW GROUNDWATER MONITORING WELLS

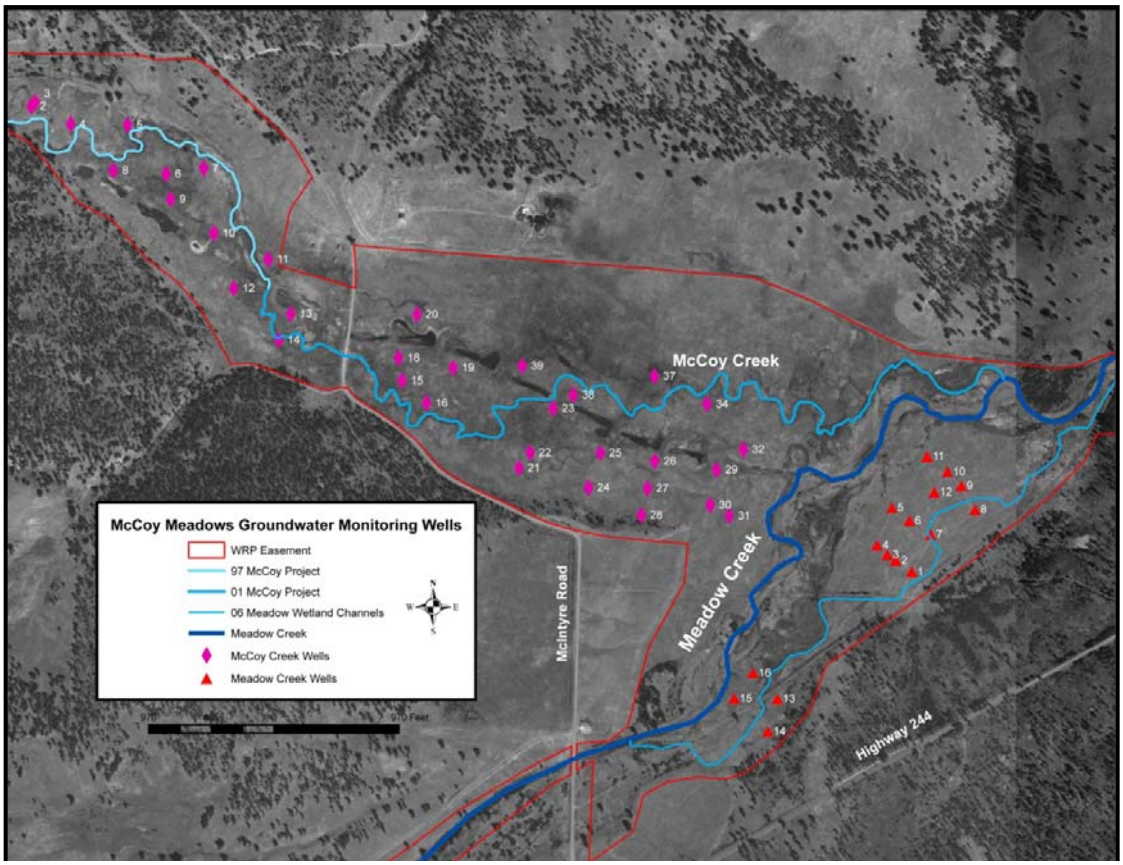
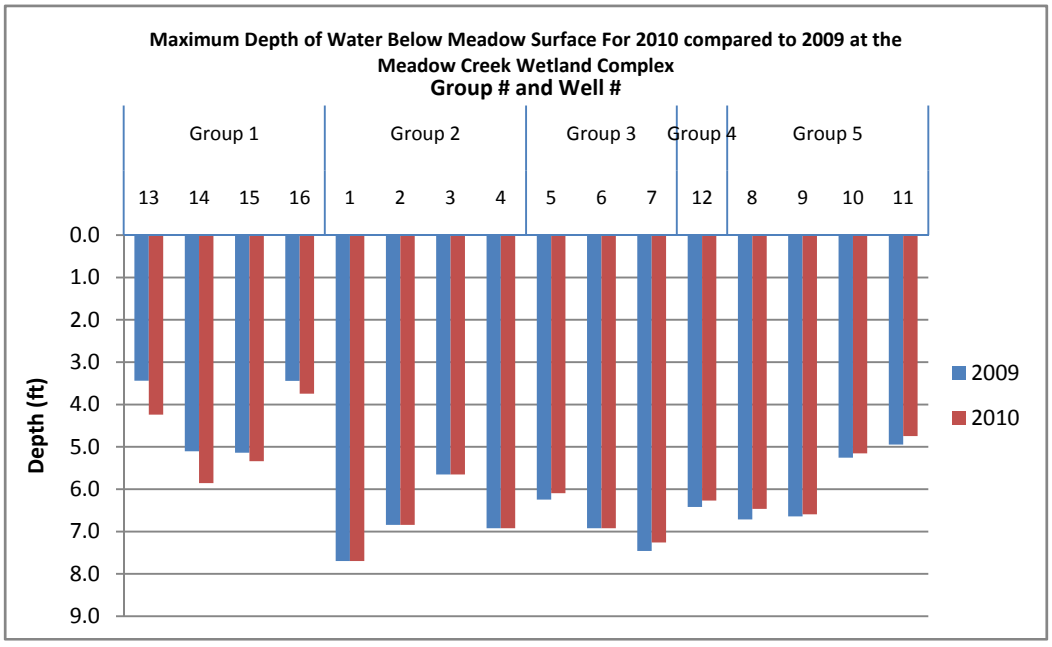


FIGURE 17. 2010 MEADOW CREEK WETLAND COMPLEX GROUNDWATER ELEVATIONS COMPARED TO 2009.

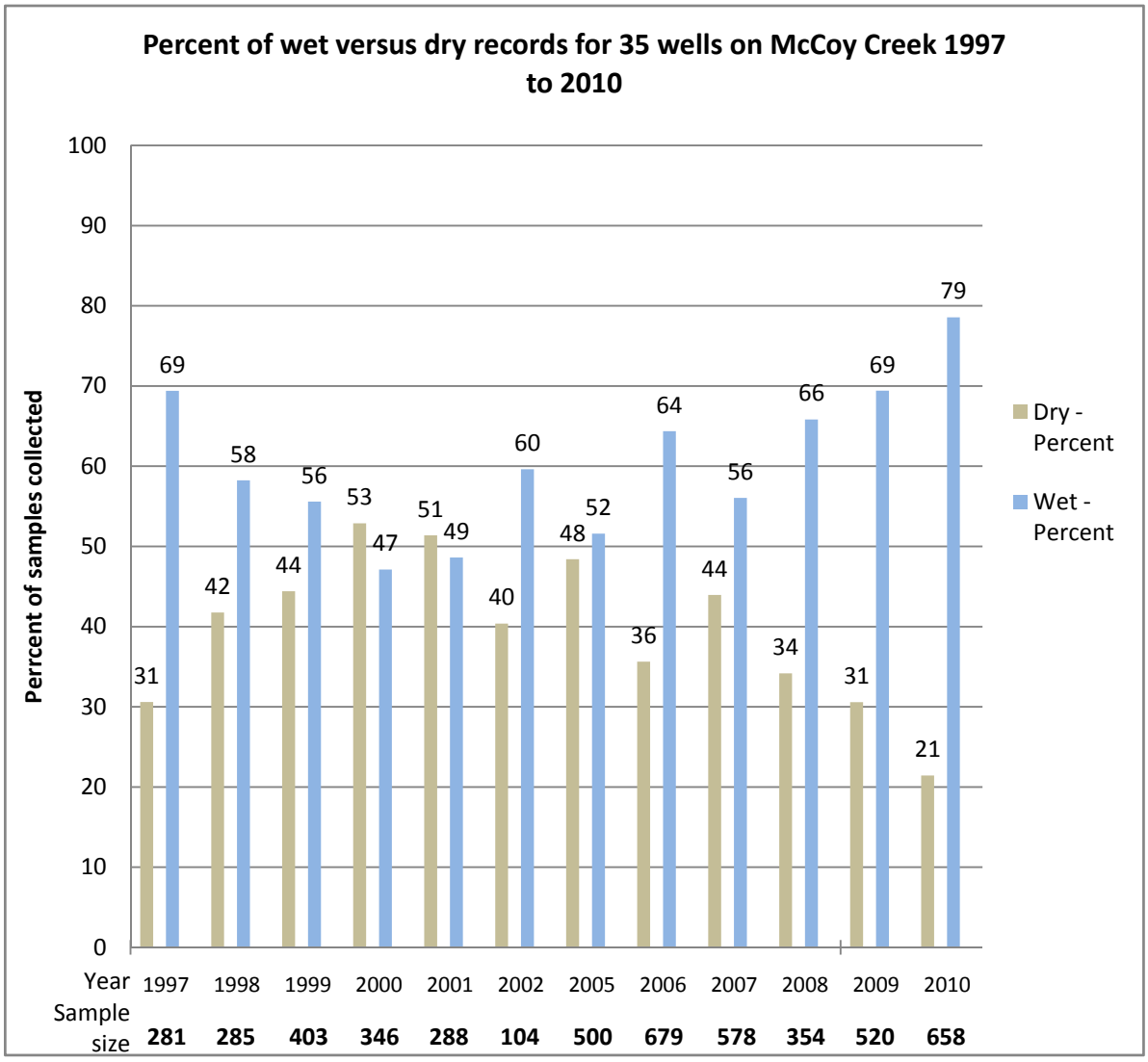


MAXIMUM DEPTH TO GROUNDWATER WAS CLOSER TO THE MEADOW SURFACE DURING 2010 COMPARED TO 2009 FOR ALL THE WELLS EXCEPT THE UPPERMOST FOUR (WELL 13 THROUGH 16). FOR THIS PLOT THE MEADOW SURFACE AT EACH WELL LOCATION IS AT ZERO ON THE Y AXIS.

McCoy Meadows – McCoy Creek Wetland Complex Groundwater Data Analysis

There were 35 ground water wells monitored along the McCoy Creek restoration project in 2010. The percent of well data when wet versus dry samples were recorded was plotted (Figure 18) and shows a trend in increased groundwater within the project area. Of the 658 samples taken in 2010 79% were when wells contained water (wet) compared to 69% in 2009. There were 243 groundwater measurements taken above the McIntyre road bridge in 2010. Of these 71% were records of the wells containing water, which is an increase compared to those recorded in 2009 (59%). There were 415 groundwater measurements taken below the bridge, with 83% of these being wet wells compared to 71% in 2009.

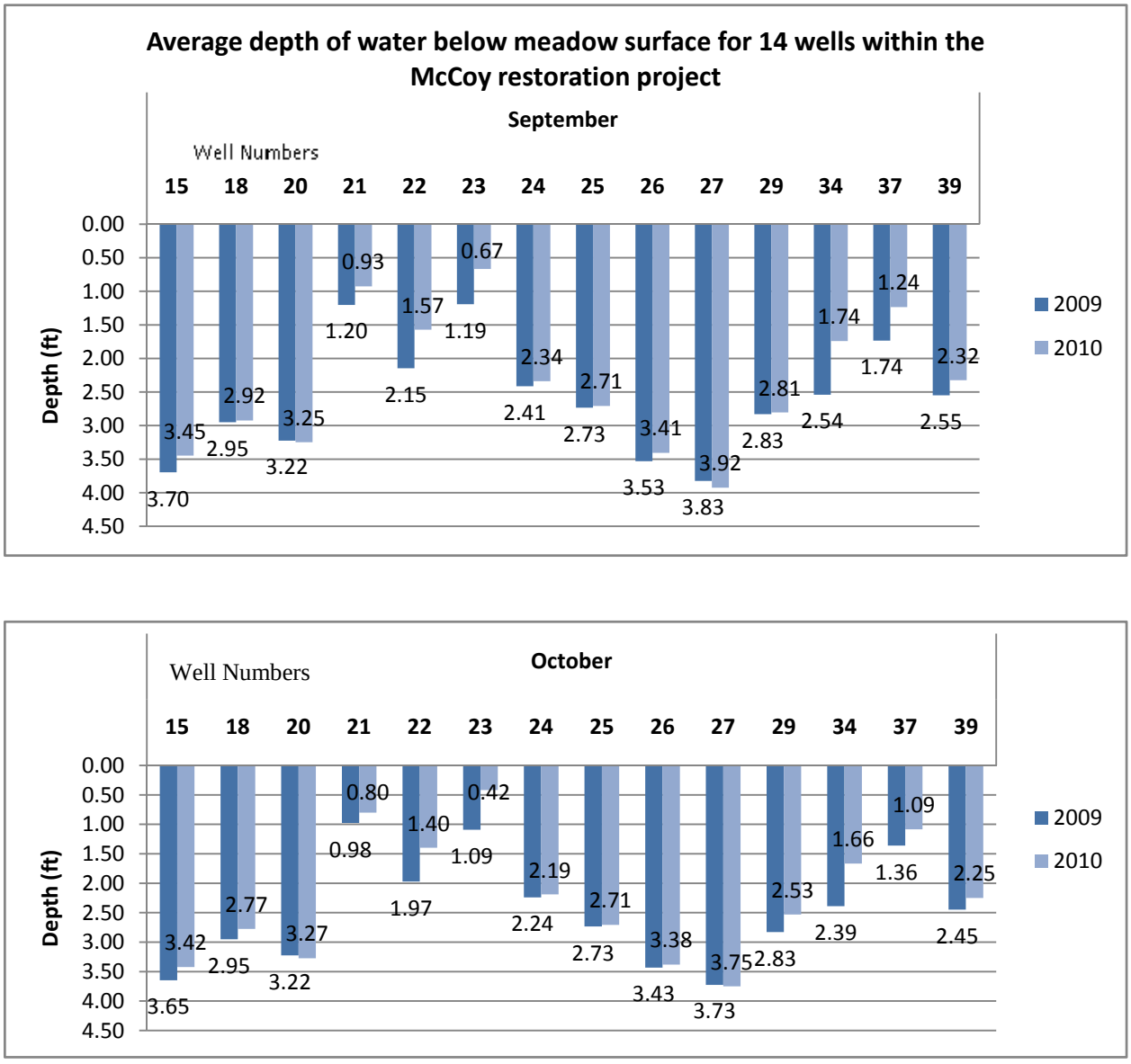
FIGURE 18. MCCOY CREEK WETLAND GROUNDWATER WELL DATA SUMMARY 1997-2010



Of the 35 wells, 14 downstream from McIntyre Creek Road retained water throughout the year with water depths within 0.5 to 3.8 feet of the meadow surface post summer 2010 project construction (August 2010).

Water elevations at 4 of the wells (22, 23, 34, and 37) were 0.4 to 0.8 feet higher in September and October 2010 than the same locations in 2009 (Figure 19) and showed a positive trend in water elevations compared to earlier years. This increase in localized sub-surface water may be a function of the wells proximity to either the riffles constructed along McCoy Creek in 2010 and/or the constructed wetland side channels. Continued data collection in 2011 will provide insight into the effects of the 2010 enhancement project. Preliminary results indicate that the constructed riffles, engineered large wood structures, and wetland sides channels have improved floodplain connectivity and increased the interaction of surface water and the historic wetland meadow complex which is anticipated to increase floodplain and hyporheic exchange, increased groundwater elevations, moderation of diurnal water temperature fluctuations, and decreased maximum summer water temperatures.

FIGURE 19. MCCOY MEADOWS, MCCOY CREEK WETLAND COMPLEX GROUNDWATER MONITORING SUMMARY FOR 2009 AND 2010



AVERAGE WATER DEPTH BELOW THE MEADOW SURFACE FOR WELLS THAT RETAINED WATER IN BOTH 2009 AND 2010. PLOTS SHOW AN INCREASE IN WATER ELEVATIONS OVERALL IN BOTH SEPTEMBER AND OCTOBER OF 2010 COMPARED TO 2009, WITH THE GREATEST INCREASE EVIDENT FOR WELL #'S 22, 23, 34, AND 37. FOR THIS PLOT ZERO ON THE Y-AXIS REPRESENTS THE MEADOW SURFACE.

Adult Redd Surveys

Steelhead redd counts were conducted during the spring of 2010 on the project reaches of McCoy Creek, Meadow Creek, Meadow Creek wetland channels, Dark Canyon Creek, upper Grande Ronde River and Dry Creek. Surveys were conducted in order to monitor steelhead spawning activity within the confines of past or future restoration projects. Surveys were conducted sporadically as time and stream turbidities permitted. Lengths of stream surveyed varied from 0.5 to 6 miles dependent upon the available spawning habitat within the project.

Table 11 depicts the stream name, miles of river surveyed, number of survey events, total number of adult steelhead observed, total number of redds and the number of redds per mile. Figure 20 illustrates adult steelhead redd survey locations and figure 21 illustrates observed redd locations within the Dark Canyon (Cunha) Fish Habitat Enhancement Project. Dark Canyon Creek had the highest abundance of redds with approximately 2.63 redds per mile.

FIGURE 20. UPPER GRANDE RONDE SUBBASIN SUMMER STEELHEAD REDD SURVEYS AND JUVENILE FISH SNORKEL SURVEY LOCATIONS

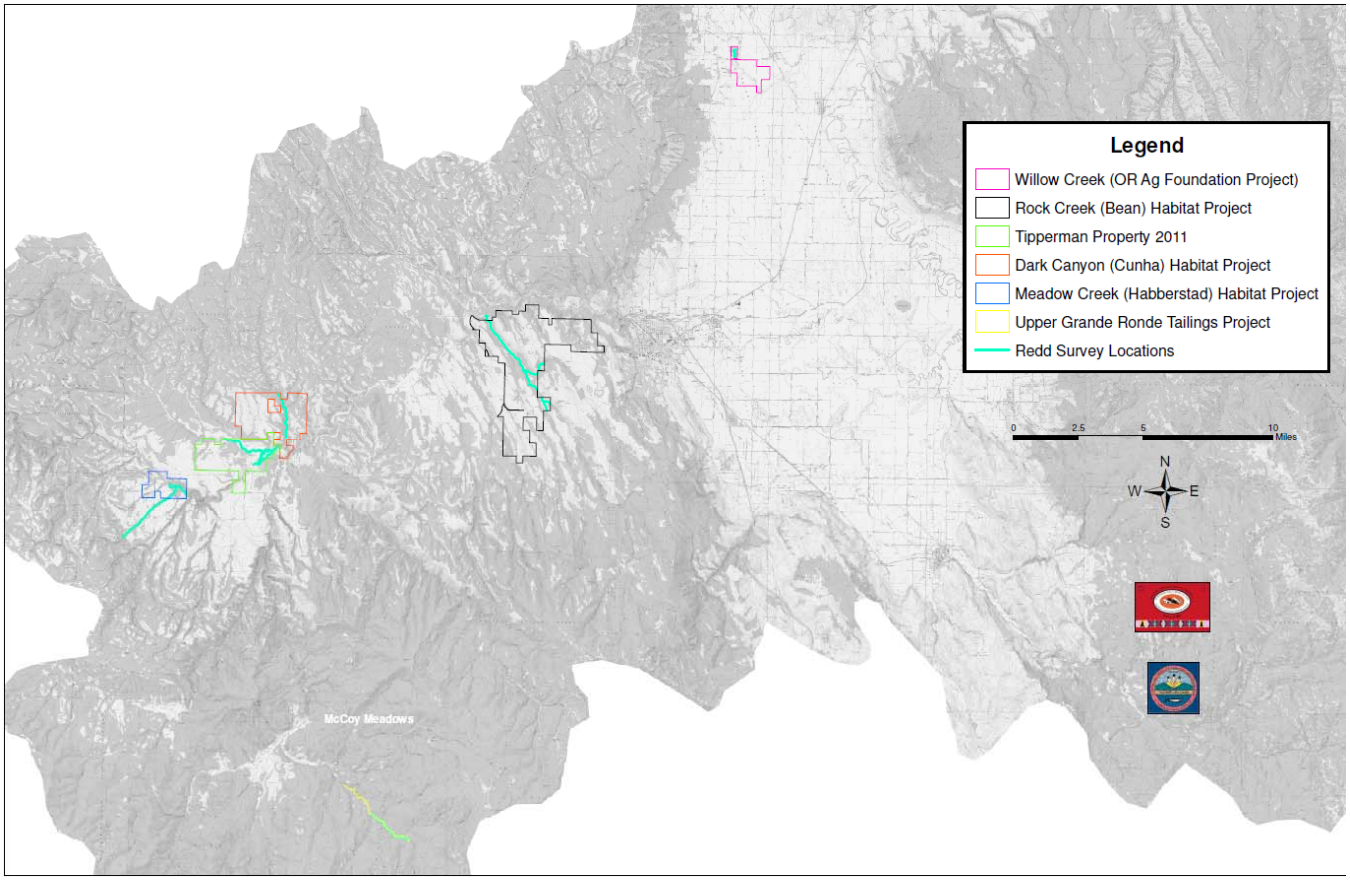


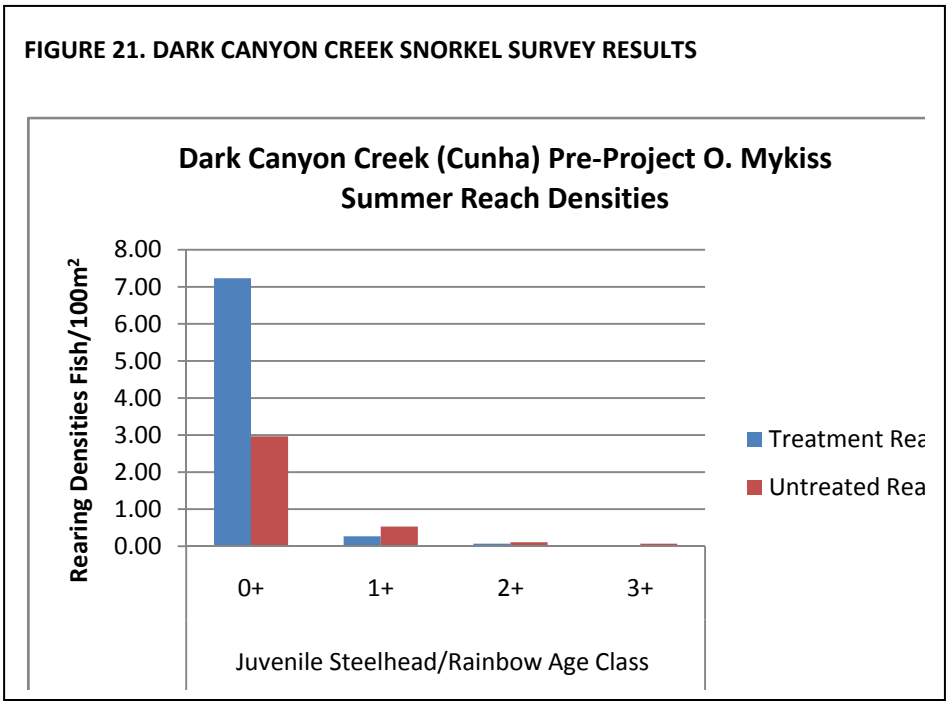
Table 11. 2010 Adult Summer Steelhead Survey Streams

Stream	Miles Surveyed	Survey events	Total # of Adult Steelhead Observed	Total # of Redds	Redds/Mile
McCoy Creek	2.6	2	3	1	0.38
Meadow Creek	1.25	1	0	1	0.80
Meadow Wetland Channels	0.5	5	1	0	0
Dark Canyon Creek	1.9	3	6	5	2.63
Upper Grande Ronde River	6	2	0	0	0
Dry Creek	0.5	2	0	0	0

Juvenile Population Surveys

During July, 2010 CTUIR staff initiated juvenile fish monitoring on two reaches of Dark Canyon Creek in order to establish a pre-project implementation baseline from which to evaluate project goals and objectives associated with restoring and enhancing summer steelhead spawning and juvenile rearing habitat. Specific objectives of the monitoring and evaluation effort include estimating the abundance and age class for summer steelhead/rainbow trout within a restoration reach and analyzing their subsequent responses to restoration actions. Reaches were split in to two categories, a treatment reach (where restoration occurred) and an untreated reach (between areas of restoration). Each reach was 1,000 meters in length and averaged 2.81 meters wide. Therefore, the total surface area sampled for each reach was approximately 2,813.3 square meters. GPS locations were acquired at the start and end points of each reach in order to insure the repeatability of the survey, also t-posts were placed at each point for a visual representation of start and end points.

FIGURE 21. DARK CANYON CREEK SNORKEL SURVEY RESULTS

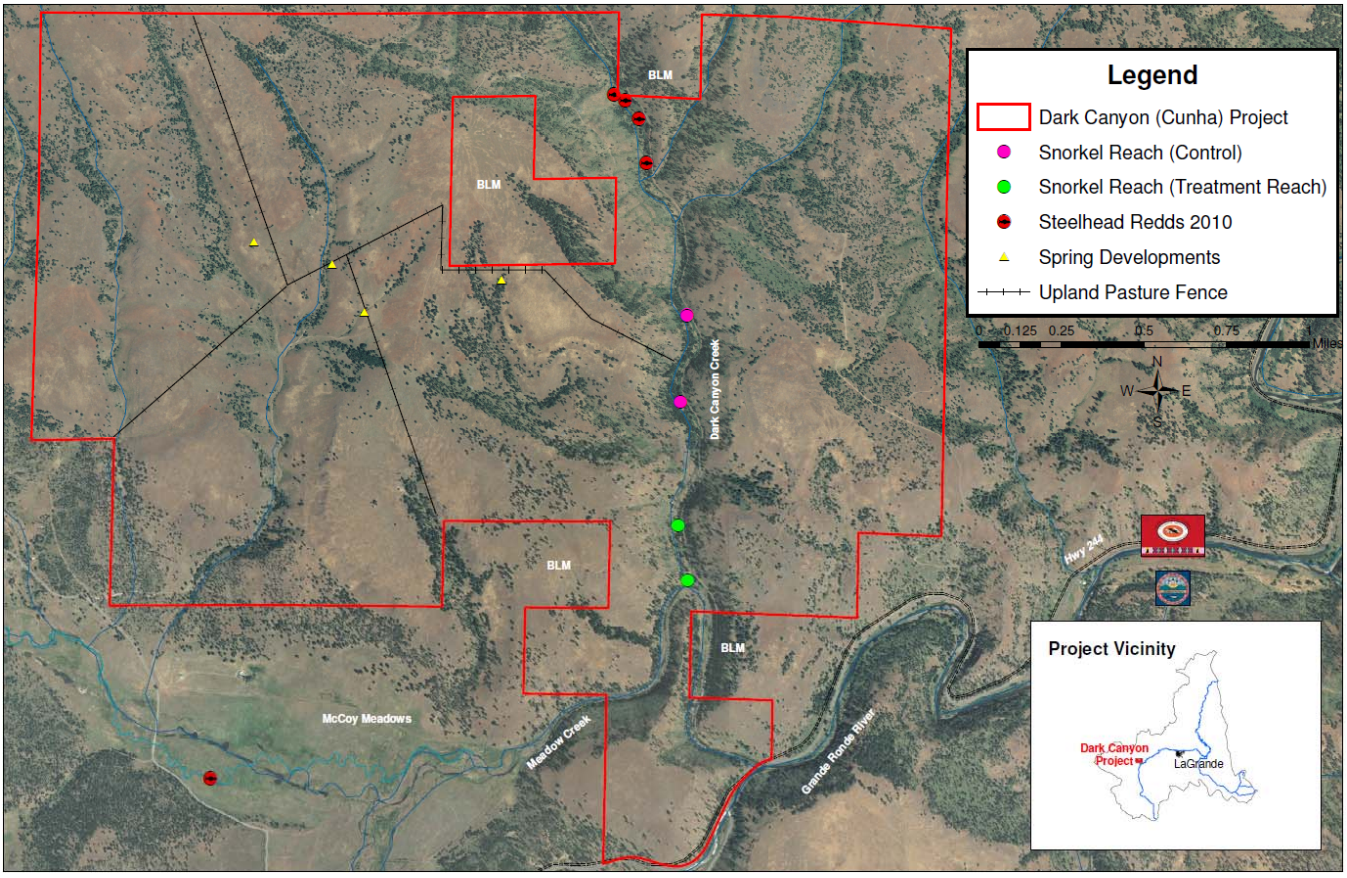


Surveyors wore stream survey style dry-suits with a standard snorkel and mask. Fish were counted by underwater observation and tallied on to a dry-erase board platform that is worn on the arm of each surveyor. Surveys were conducted simultaneously, with ample "rest time" between surveys for each reach. Snorkel survey locations are illustrated in Figure 22. Table 12 presents snorkel data and Figure 19 provides a graphical view of the data summary.

Table 12. 2010 Dark Canyon Fish Snorkeling Units and Observed O. Mykiss Rearing Densities

Site	GPS Start (UTM)	GPS End (UTM)	Length (m)	Mean Width	Surface Area (m^2)	Age Class Rearing Densities Fish/100m^2				
						0+	1+	2+	3+	total
Treated	X=0391594.4 Y=5014114.9	X=0391547.7 Y=5014380.5	1000.00	2.81	2813.30	7.23	0.27	0.07	0.00	7.57
Untreated	X=0391558.1 Y=5014984.8	X=0391590.2 Y=5015403.7	1000.00	2.81	2813.30	2.97	0.53	0.11	0.07	3.68

FIGURE 22. ADULT STEELHEAD REDD SURVEYS AND SNORKEL REACHES WITHIN THE DARK CANYON (CUNHA) FISH HABITAT ENHANCEMENT PROJECT



Fish Habitat Project Implementation During FY2010

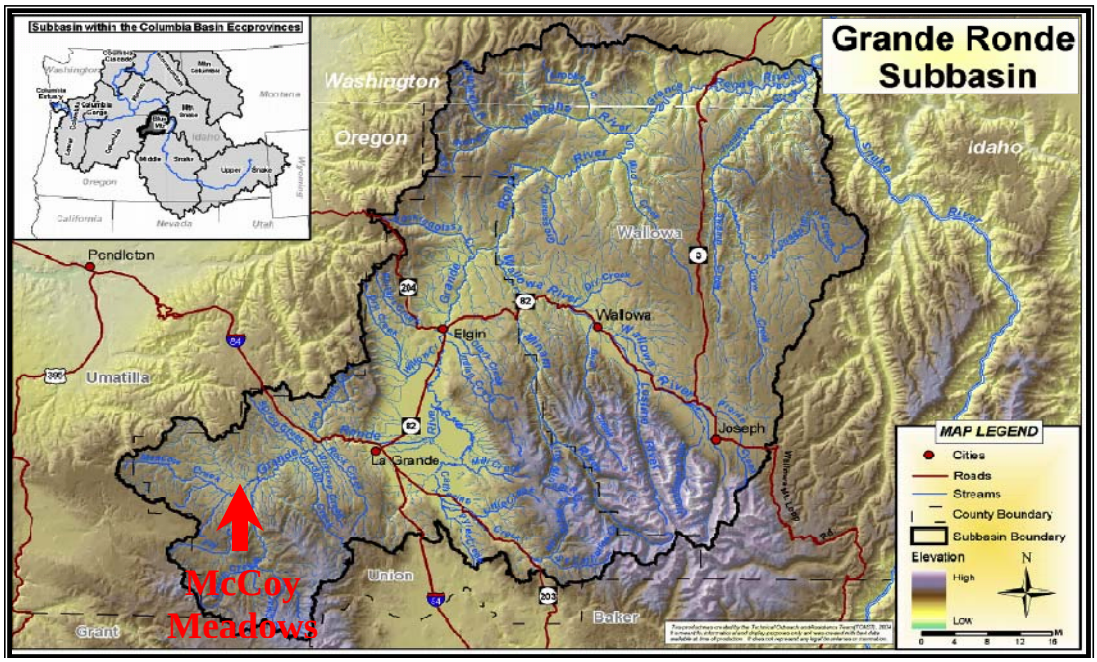
McCoy Meadows (Tipperman) Enhancement Project

The McCoy Meadows project is a large wetland complex along McCoy, Meadow, and McIntyre Creek that has been the subject of multiple, phased, habitat enhancement actions commissioned by the CTUIR, ODFW, NRCS, and the GRMW. Channel and side channel construction and activation of historic channel scrolls, large wood additions, and planting and seeding have been employed to restore the meadow system, beginning in 1997. During the summer of 2010, CTUIR and NRCS implemented an enhancement effort to remedy some reach specific channel incision and streambank erosion and improve channel morphology, floodplain connectivity, and stabilize streambanks along McCoy Creek.

The project area is located on the privately owned McCoy Meadows Ranch approximately 25 miles southwest of La Grande. Planning and design efforts were initiated in 2008 following monitoring and evaluation of project performance following Phase 2 of the project which included approximately 1.5 miles of restoration channel construction. Channel morphology monitoring conducted by ODFW and groundwater monitoring by CTUIR indicated that the portion of the channel had incised, effectively disconnecting McCoy Creek from its historic floodplain and causing excessively shear on streambanks and a corresponding decrease in average annual groundwater elevations which are critical for hyporheic exchange, transient groundwater seepage time, contribution of cold water to fish bearing streams during summer periods and in supporting hydrophytic vegetation. NRCS engineers with the assistance of CTUIR and ODFW habitat biologists completed a design to remedy degraded conditions and promote natural wet meadow morphology and associated benefits.

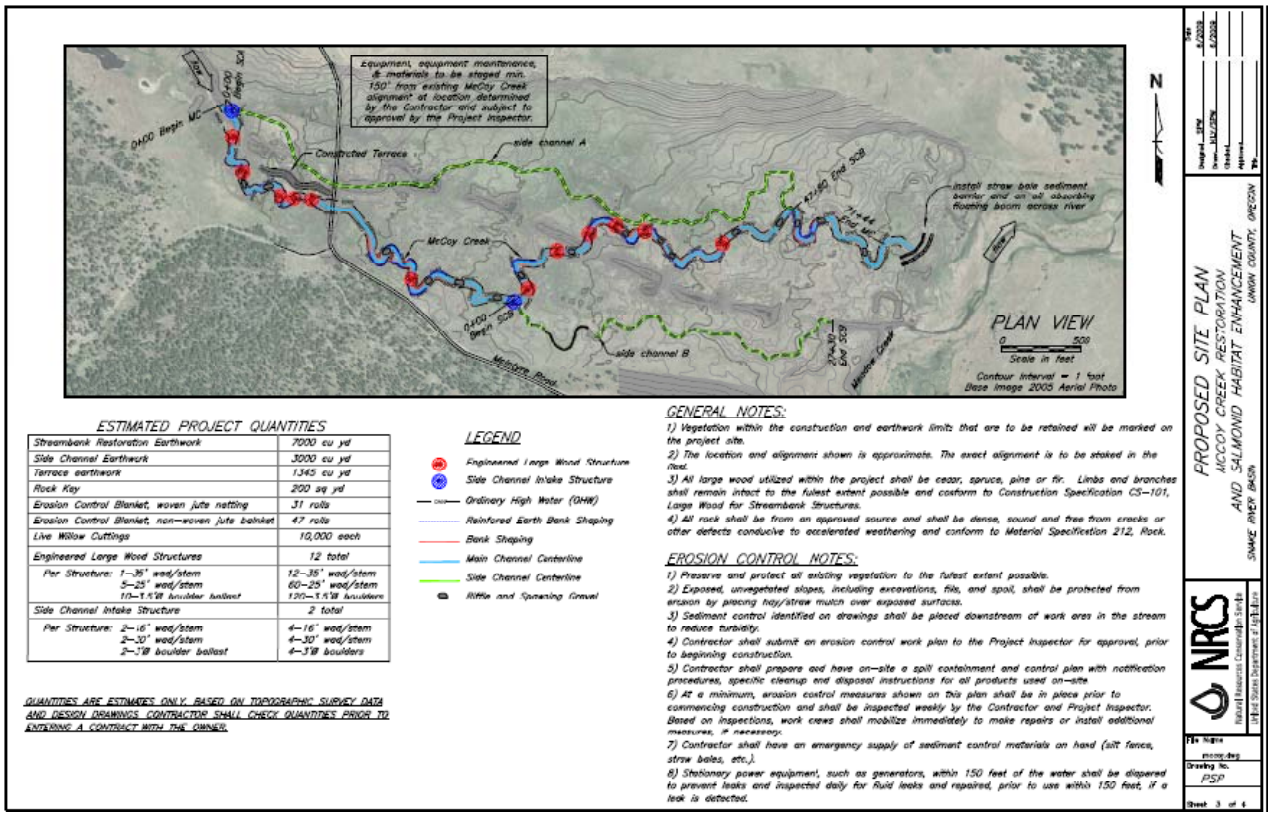
The project design include a combination of techniques, including instream construction and placement of engineered large wood structures and spawning/riffle gravels to elevate the invert elevation of McCoy Creek, construction of wetland side channels to active the historic floodplain and dissipate energy within McCoy Creek, floodplain terrace construction, and extensive streambank bioengineering and planting/seeding.

FIGURE 23. MCCOY MEADOWS HABITAT ENHANCEMENT PROJECT VICINITY



The following figure illustrates the project area and locations of the design features incorporated into the project. CTUIR staff provided administration (subcontracting oversight) survey and stakeout, and inspection services. NRCS Oregon State Hydraulic Engineer provided overall project oversight and inspection. The project was constructed between July 1 and October 30, 2010 with primary instream work (engineering large wood structures, riffles, and side channels) completed during July and streambank sloping, installation of bioengineered streambanks, and planting implementation during mid October to allow for installation of live willow whips during the advent of late fall dormancy period.

FIGURE 24. 2010 MCCOY MEADOWS PROJECT DESIGN

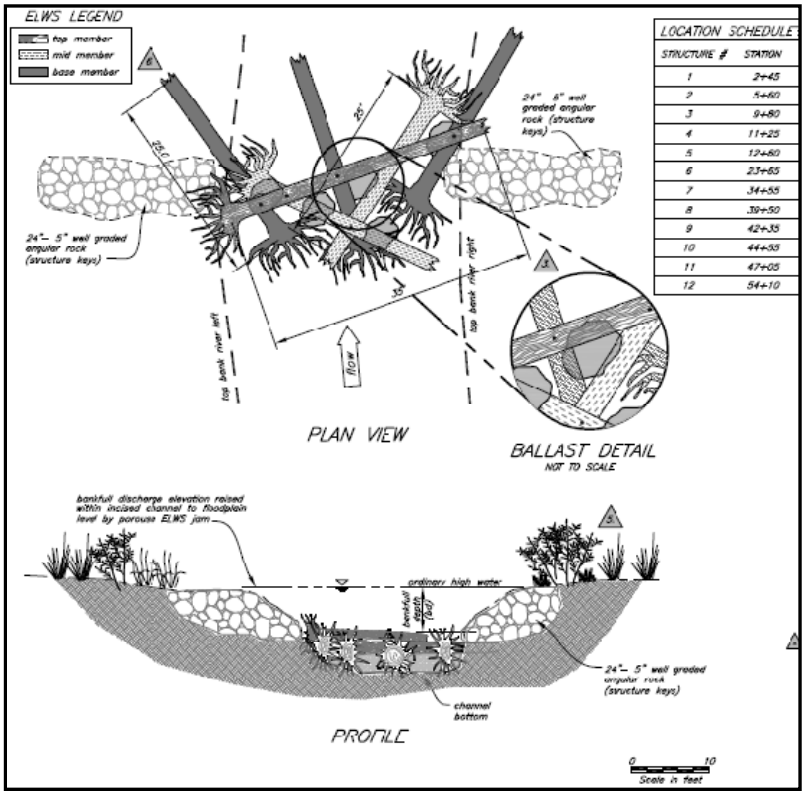


Following is a summary of the primary construction components.

ENGINEERED LOG WOOD STRUCTURES – A total of twelve (12) structures were constructed at strategic locations along McCoy Creek to elevate the streambed elevation and address channel incision concerns. Over 100, large, whole trees with intact rootwad, were donated to the project by the Oregon Department of Transportation in cooperation with the CTUIR. Construction of each structure included streambed excavation and placement of 6 whole trees with intact rootwad in the configuration detailed in the following figure. Log structures were pinned using 1.5 inch diameter rebar pins with oversized rock ballast to anchor the structure and provide stability. Excavated streambed materials were back-filled and graded into each log structure. Additionally, each structure included installation of rock keys on both left and right banks of structure to prevent erosion around the structures. Rock key material consisted of 200 cubic yards of well-graded angular rock or quarry spall ranging from 4 inches to 10

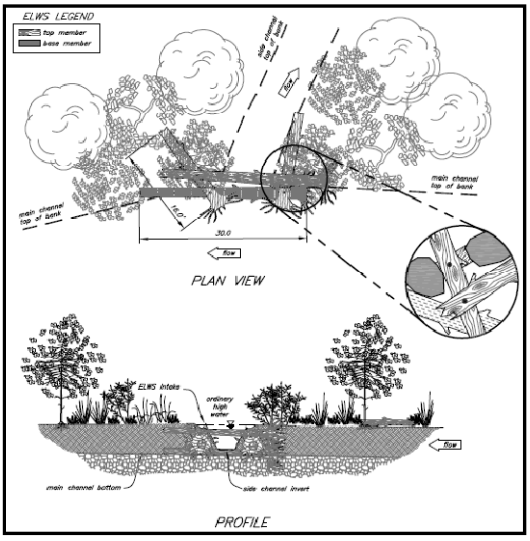
inches in diameter, with a D50 of 5 inches. Rock keys were backfilled in 4 inch lifts and compacted ensure the material is compacted to match consolidation properties of surrounding undisturbed material. Minimum thickness (vertical depth) of the rock keys was 24 inches. The keys were extended approximately 20 feet into each bank.

FIGURE 25. ENGINEERED LARGE WOOD STRUCTURE DESIGN



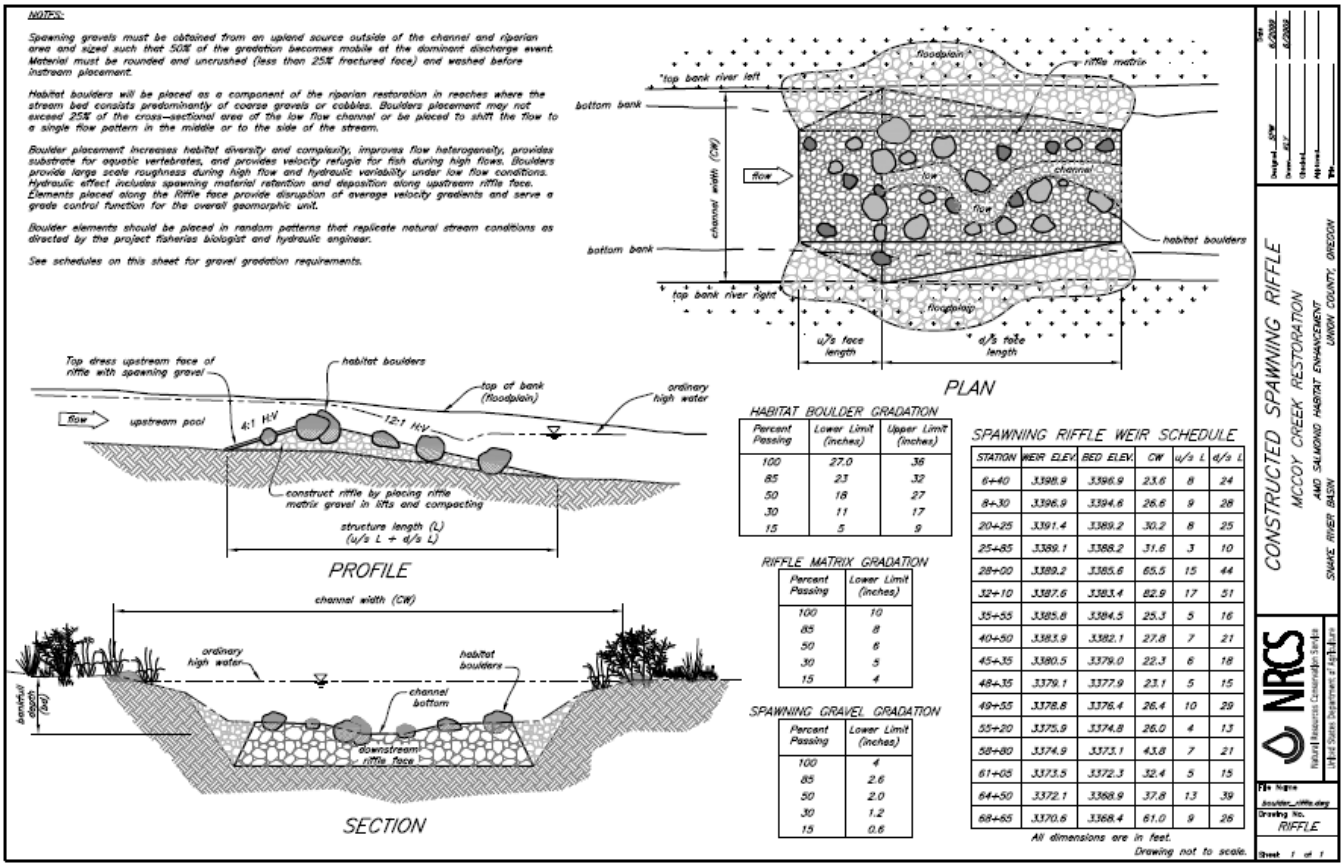
ENGINEERED LARGE WOOD INTAKE STRUCTURE (WETLAND SIDE CHANNEL) – Two wetland channel intake structures (Engineered large wood structures) were installed at the intake locations for wetland side channels A and B. Each structure consisted of excavation, placement of four whole trees, rebar pinning, and rock ballast installation. These structures were design to control the amount of water flowing into the side channels. Side channels were designed (sized) to accommodate approximately 100 cfs.

FIGURE 26. WETLAND SIDE CHANNEL INTAKE WOOD STRUCTURE



SPAWNING RIFFLE CONSTRUCTION – A total of 16 riffles were constructed along McCoy Creek in tandem with the ELWS to provide vertical grade control, decrease channel slope, and decrease the cross sectional area at selected riffle locations. Each riffle included placement of matrix gravel (D50 = 6 inches, approximately 63 cubic yards), spawning gravel (D50 = 2 inches, 6.3 cubic yards), and habitat boulders (minimum of 8, 0.2 cubic yard boulders) per riffle complex (1.6 cubic yards total per structure). Habitat boulders were incorporated into the design to provide roughness and complexity.

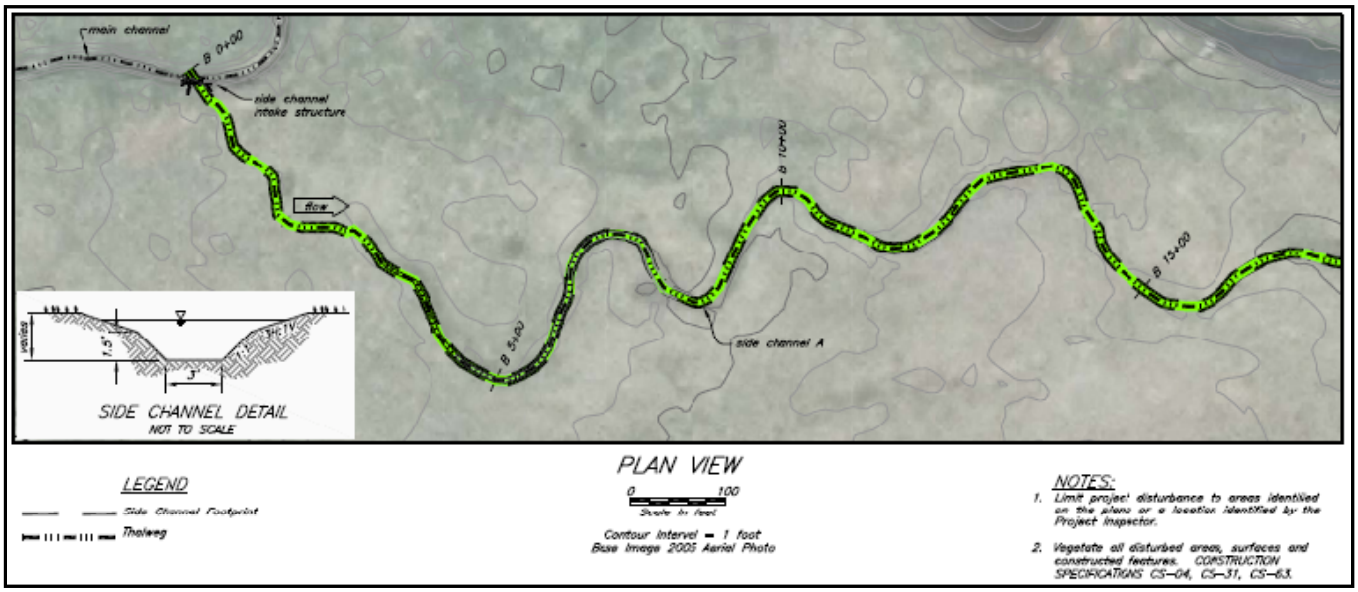
FIGURE 27. SPAWNING RIFFLE DESIGN



WETLAND SIDE CHANNEL CONSTRUCTION – Approximately 9,500 linear feet of wetland side channel was constructed/connected to design grade and cross sectional area to provide side channel habitat, floodplain connectivity, and to reduce shear and energy within the recovering McCoy Creek reach within the project area. Approximately 3,000 cubic yards of topsoil, sand, and gravel was excavated and disposed in adjacent upland areas and/or within the constructed terrace feature.

Construction was stage and implemented to minimize impacts to existing wetlands by constructing during the summer base flow period and keeping heavy equipment out of wetlands and operating from adjacent upland areas. Existing wetland vegetation, consisting of sedges and rushes were salvaged and re-installed along wetland channel network following completion of excavation and grading to facilitate vegetative recovery. The salvage operation was initiated during the grubbing phase of side channel construction and generally consisted of rolling existing sedge mattes to the margins of the channel alignment which were then rolled/placed into the newly constructed channel segments. Off the 9,500 feet of side channel constructed, approximately 4,011 feet were located within existing channel scrolls and swale and did not require extensive construction.

FIGURE 28. WETLAND SIDE CHANNEL SEGMENT TEMPLATE



STREAMBANK RESTORATION – Approximately 3,984 linear feet of streambanks were stabilized utilizing bioengineering techniques. An additional 3,000 linear feet were shaped and sloped to a 2:1 or 3:1 depending on location. Streambank bioengineering consisted of excavating the streambank to establish a bench and installing earthen wraps/rolls with GEOCOIR 700 woven erosion control coir fabric and NAG C-135 BN non-woven erosion control fabric filled with soil and alluvium. Streambanks were reconstructed using either single or double rolls (lifts) depending on streambank height with each toe and lift planted with conditioned live willow whips and seeded with a custom native see mix.

FIGURE 29. BIOENGINEERED STREAMBANK DESIGN

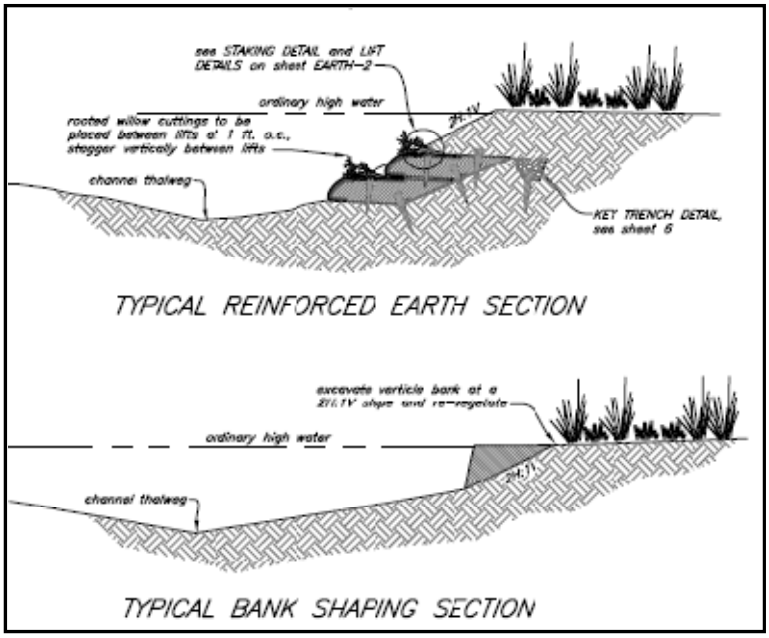
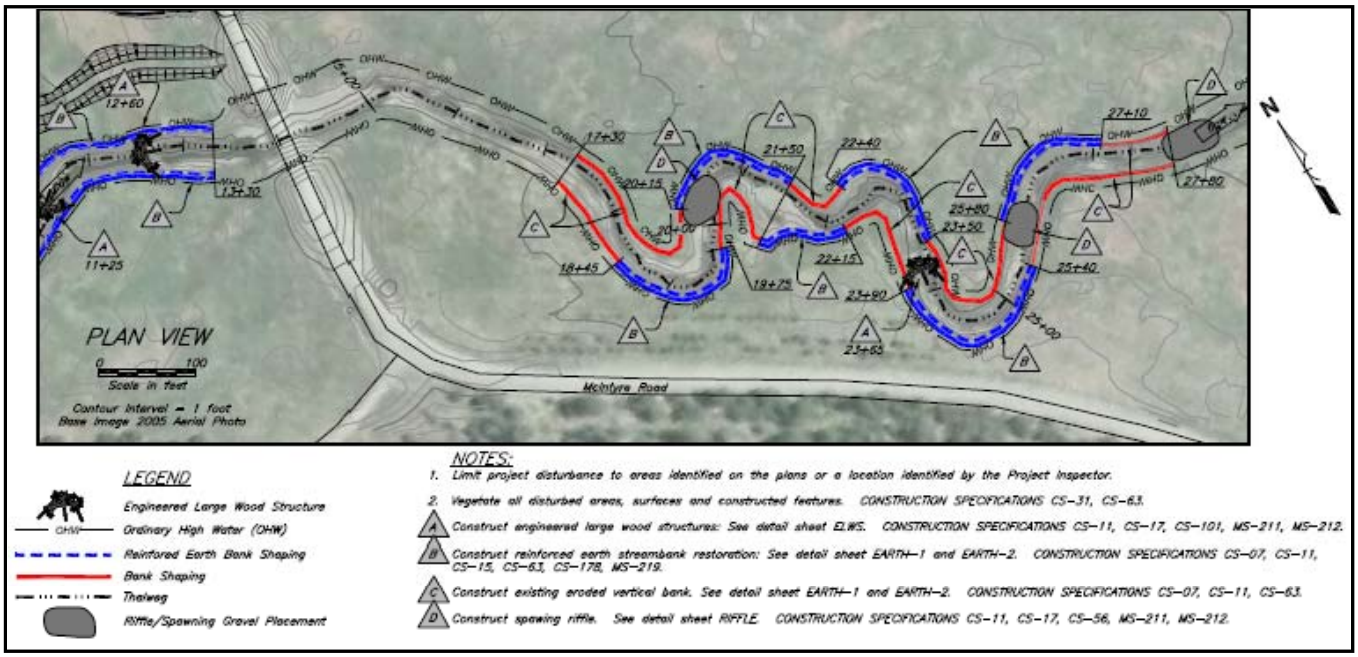
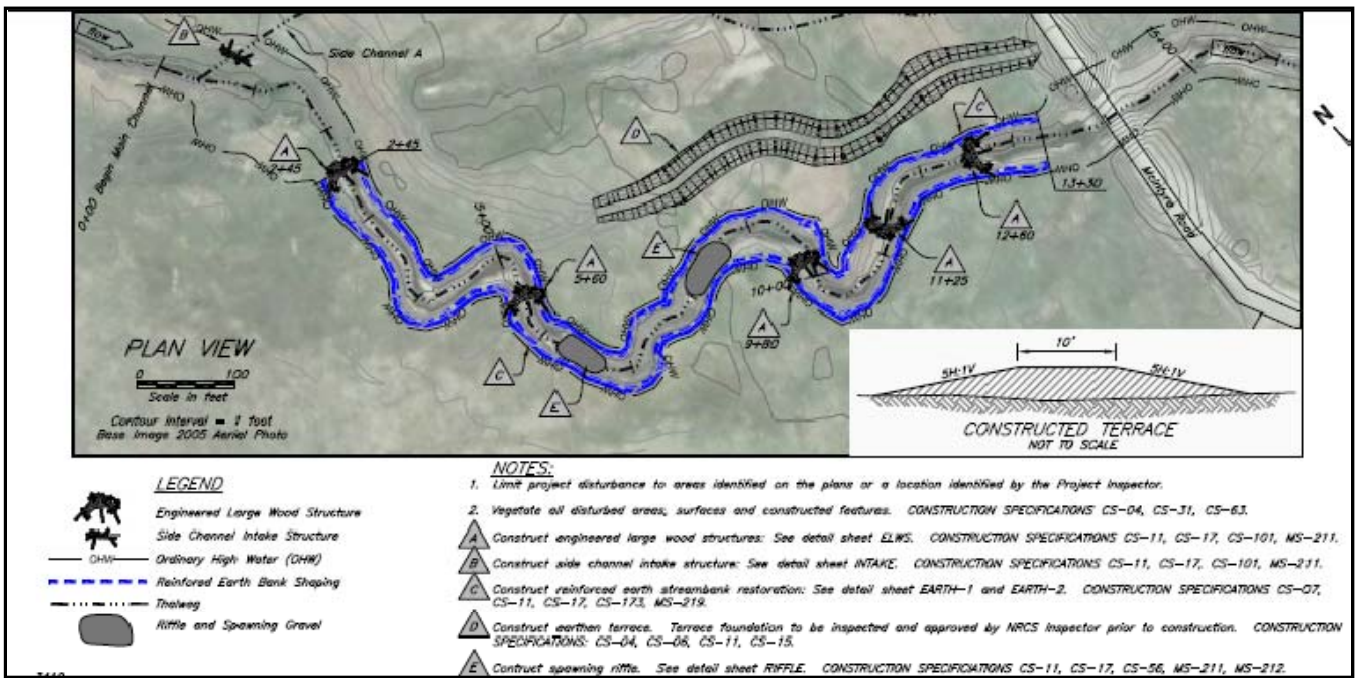


FIGURE 30. STREAMBANK BIOENGINEERING AND SLOPING (EXAMPLE REACH)



CONSTRUCT EARTHEN TERRACE – Worked included extending an existing earthen terrace at the upper reach of the project area to direct flood flow. The extensive included placement of excavated spoils from side channel construction, compaction, shaping, and seeding.

FIGURE 31. EARTHEN TERRACE CONSTRUCTION



EROSION CONTROL – Work included installation and maintenance of a straw bale sediment barrier at lower reach of project area and oil absorbing floating boom. Following completion of construction, CTUIR staff seeded approximately 15 acres of disturbed ground and initiated planting efforts including mechanical installation of willow whips and sedge/rush mattes throughout the

project area. Additionally, certified weed-free straw mulch was installed on seeded areas to protect areas from erosion.

Additional activities within the project area include construction of 35 new riparian exclosure fences around planting areas as well as on areas with established and/or regenerating native shrubs. The McCoy Meadows area receives extensive grazing and browsing pressure from a large elk herd which is suppressing recovery of healthy riparian shrub communities and limiting our ability to meet project objectives associated with wetland, riparian, instream, and beaver restoration. Initial vegetative response appears promising and CTUIR staff continues to strategize locations for new exclosures as well as maintain existing units. See example of exclosure unit in picture below.

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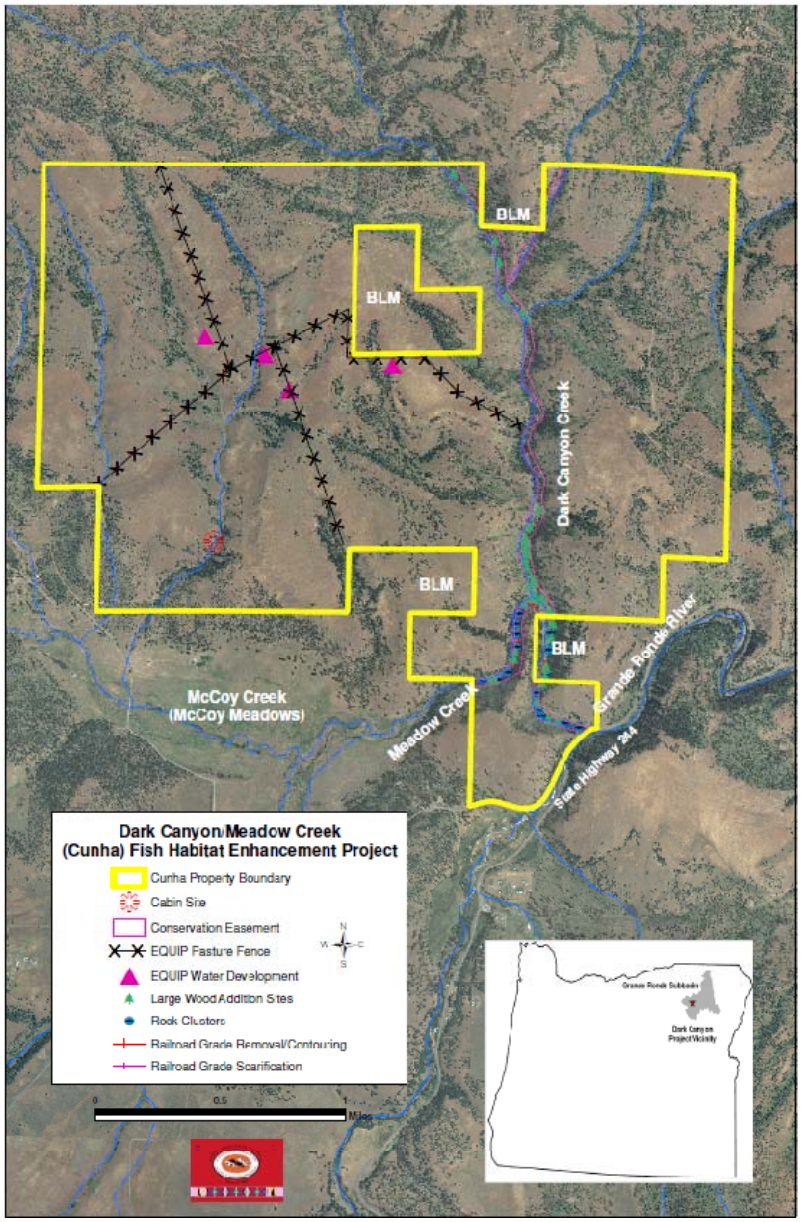
Dark Canyon (Cunha) Fish Habitat Enhancement Project

Following is a summary of the Dark Canyon Project that was initiated by CTUIR during the summer of 2010. The majority of planned actions were completed, excluding removal of a segment of historic railroad grade along Meadow Creek due to our inability to complete consultation with the Oregon SHPO in a timely manner. Remaining work is planned for construction during FY2011. For a more detailed description of baseline project conditions, project goals and objectives, planned actions, and budget, please refer to Appendix 3 which contains a funding proposal developed by the CTUIR to the Grande Ronde Model Watershed for BiOp Remand funding support. During FY2010 the instream portion of the restoration project was implemented which encompassed roughly 1 mile of Dark Canyon Creek (about the upper and lower one-third of the property) and Meadow Creek from the upper property boundary to its confluence Grande Ronde River (about 1 mile). The project area included the Cunha ranch and two small Bureau of Land Management (BLM) tracts, one along Dark Canyon Creek at the upper reaches of the project area, and one along the lower reach of Meadow Creek (see vicinity map).

FIGURE 32. DARK CANYON/MEADOW CREEK (CUNHA) FISH HABITAT ENHANCEMENT PROJECT



Large Wood Additions:

A total of approximately 150 pieces of large wood was added to Dark Canyon Creek and Meadow Creek in existing pools, or placed in a manner to create pool habitat and provide in-stream habitat complexity. The objective of the large wood additions was to contribute to floodplain formation and stability by increasing roughness, slowing water velocities, and trapping sediment. Furthermore, large wood was used in order to increase pool habitat quality and quantity and to provide thermal and predatory refuge for aquatic species including the aforementioned ESA listed fish species.

Meadow Creek:

Log jams were installed on Meadow Creek at 12 strategic locations. These structures included large diameter materials (greater than 24 inch diameter at breast height (DBH) and 35 feet in length) hauled from an offsite location, wherein anchor logs were excavated and back-filled into the floodplain to increase structure rigidity and rock ballast (greater than 3 feet in width) was used to decrease the likelihood of structure failure. Logs jams were placed in areas that contained the highest potential to form large, complex pool habitat (existing pools with gravel substrate) and in areas that can potentially provide thermal refuge in conjunction with complex pool habitat (i.e. the confluence of Dark Canyon Creek and the side channels associated with an existing abandoned floodplain caused by the railroad grade). No steel pins or cables were used in the formation of the jams. The objective of these structures is to provide a hardened structure to direct the stream's thalweg and energy in order to scour or maintain pool depths and to provide channel complexity where little existed previously.

Dark Canyon Creek:

Log jams were installed on Dark Canyon Creek at 18 sites along the lower section and 10 sites near the upper property boundary. The wood utilized for the lower section was hauled from offsite areas and was generally between 16 and 24 inch DBH and greater than 35 feet long. Large wood used in the upper section was collected from adjacent uplands using mainly dead and/or downed material that was generally limited to 12-16 inch DBH and greater than 20 feet in length. Logs were placed in configurations that mimicked natural wood recruitment.

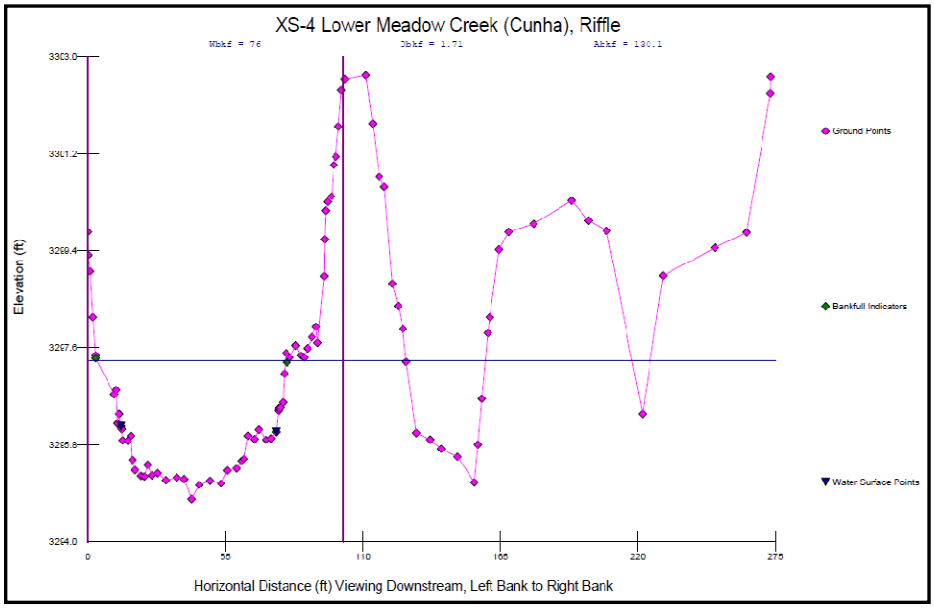
Boulder Placement in Meadow Creek:

Clearing of in-stream channel obstructions such as boulders and logging inside riparian zones has reduced the availability of in-channel habitat diversity. The majority of the project reach provided riffle habitat with limited pools and pocket pools that lacked depth. Therefore, in conjunction with installation of the previously mentioned log jams, large boulders collected on-site were placed at 20 selected sites in Meadow Creek. Boulders were placed either individually, or in clusters, in existing riffles and pools to increase complexity and enhance availability of pocket and step-pool habitat.

Enhance Floodplain Connectivity and Riparian Habitat Condition:
An approximate 0.45 segment of historic railroad grade adjacent to Meadow Creek is scheduled for removal to improve floodplain connectivity and enhance riparian and wetland habitat. Figure 25 illustrates the railroad grade within the center of the historic floodplain the constraint of the feature on channel morphology and habitat development. The reach is characterized as high gradient, wide and shallow, a width:depth ratio of nearly 45, and lacks complexity. Removal of the railroad grade segment in conjunction with floodplain contouring, installation of large wood and structure rock would increase the flood prone area, decrease gradient, allow for lateral channel migration and promote recovery of riparian and instream habitat.

This component of the project was originally scheduled to be completed during 2010, but concurrence from Oregon SHPO on cultural resources was not received promptly and the issue of management of the Upper Grande Ronde railroad grade is an ongoing discussion between SHPO, USFS, BLM and BPA. Pending completion of that process, CTUIR will initiate construction during summer 2011 to complete the construction phase of the project.

FIGURE 33. MEADOW CREEK CROSS SECTION ILLUSTRATING FLOODPLAIN CONSTRAINT DUE TO HISTORIC RAILROAD GRADE



Following completion of the "active" phases of the project, CTUIR, NRCS, and the landowner are preparing to implement additional elements of the project that will be largely funded under FSA programs, including EQUIP and CREP. Activities under these programs include upland pasture and riparian fencing and installation of water developments in the upland pasture to provide for riparian and fish habitat protection while providing the infrastructure for the landowner to productively manage a cattle operation. As fences are completed, Dark Canyon and Meadow Creek will be planted with conifers, hardwoods, and riparian shrubs to facilitate vegetative recovery. The overall project is scheduled for completion in 2012.

<u>Pre and Post Project Monitoring:</u>
In the early spring of 2010 CTUIR biologists counted multiple steelhead spawning redds within the project area of Dark Canyon Creek. Furthermore, in the summer of 2010, before implementation began, CTUIR biologists snorkeled two sections of the creek and observed all age classes of juvenile steelhead/rainbow trout (See monitoring and evaluation section for results). CTUIR staff will conduct redd surveys on an annual basis in order to monitor steelhead spawning activity on the ranch. Snorkel surveys will be conducted on Meadow Creek and Dark Canyon Creek in FY2011, data will be used for comparison of pre and post project implementation juvenile steelhead abundances on Dark Canyon

Creek in delineated survey reaches. Meadow Creek juvenile steelhead/rainbow trout data will be used to depict the density of salmonids utilizing implemented habitat structures.

CTUIR biologists conducted stream morphological surveys in order to establish a pre-project baseline in the early summer of 2010. On Meadow Creek permanent cross sections were established in order to monitor the width to depth ratio and overall morphological changes following project implementation. Additionally, a longitudinal stream profile was collected for approximately 1500 feet of Dark Canyon Creek and all of Meadow Creek in order to monitor the abundance and frequency of stream habitats (i.e. pools and riffles). These surveys will be repeated at regular intervals in order to monitor changes resulting from habitat restoration actions.

SUMMARY AND CONCLUSIONS

Project development and implementation during FY2010 generally proceeded as planned. Major highlights of the project included impelementation of the McCoy Meadows Enhancement Project and the Dark Canyon (Cunha) Fish Habitat Enhancement Project. Project planning efforts have also provided new project opportinuties in priority reaches within the subbasin for future implementation, including the Catherine Creek (Yeargain) Restoration Project, Willow Creek (Oregon Ag Foundation) Restoration Project, and the Rock Creek (Bean) Fish Habitat Enhancement Project. These project prospects are currently undergoing detailed planning, design, environmental planning, funding acqusition, and prepration for construction.

The Catherine Creek project includes approximately 0.75 miles of the mainstem Catherine Creek and involves establishment of an easement and remvoal of cattle, construction/activation of historic channel meanders, streambank bioengineering, and installation of large wood complexes. The Willow Creek Project includes over 280 acres of a future 30 year WRP conservation easement and removal of cattle, re-activation of historic meandering stream segments, streambank bioengineering and planting, restoration and conversion of existing cultivated historic wetlands, and instream placement of large wood complexes. The Rock Creek project includes over 15 miles of fish bearing stream along Rock Creek, Little Rock, Sheep, Graves, Little Graves, and Whiskey Creek. Planned actions include a combination of re-connectino of historic channel schrolls, floodplain grading and contouring, instream placement of large wood, and road obliteration. Between BPA and NRCS programs (CREP, EQUIP), the project will include riparian fencing, livestock exclusion, upland water developments, and planting to facilitate vegetative recovery.

The project continues to provide technical, administrative, and construction/implementation support to the GRMW, landowners, and other agencies to develop and implement projects. Technical support is provided through the GRMW Board of Directors and Technical Committee and by assisting others with technical needs on potential projects, including developing project opportunities, assisting landowners with meeting their objectives, conducting field surveys and baseline investigations, identifying and securing cost-share funding, and developing documentation for various environmental compliance and permit needs. Part of the strength of this project is its' ability to work cooperatively with co-managers which facilitates opportunities to develop consistent strategies, share responsibilities associated with project planning, design, implementation, and monitoring/evaluation, and provides a forum in which to solicit and secure multiple cost share project options.

Landowner incentive programs administered by the Department of Agriculture through NRCS (Wetland Reserve Program, Conservation Reserve and Enhancement Program), for example, have generated considerable interest in the Subbasin by large private landowners that might otherwise not be interested in conservation programs and/or habitat restoration opportunities. Several past and proposed CTUIR-BPA and co-manager sponsored have been successfully linked to these programs which provide significant opportunities to protect and restore habitat and leverage cost-share funds through other funding sources (EPA, OWEB, NAWCA, BMRC, etc). In addition, this cooperative inter-agency relationship provide opportunities to jointly develop project-specific objectives, strategies, and techniques, brings in specialized expertise such as engineers, fluvial morphologists, and biologists, and spreads the workload associated with Subbasin restoration and enhancement projects.

Formal staff training and application of practical experience contributes to a well developed approach to project planning, design, and implementation. Working in a cooperative, interdisciplinary team approach with GRMW, ODFW, and NRCS has increased credibility with landowners and other resource managers in the basin and led to development of additional project opportunities on private lands. By teaming with project partners, the CTUIR is an integral part of an effective restoration team.

SUMMARY OF EXPENDITURES

A final financial was not available at the time this annual report was compiled. CTUIR Administration and Accounting will have a final financial prepared within 30 day of the end of this contract period and will be posted when it becomes available. The following figure illustrates the budget for the project during the period May 1, 2010 through April 30, 2011.

FIGURE 34: EXPENDITURES FOR FY 2010

1996-083-00 FY 2010 Budget
CTUIR Grande Ronde Subbasin Restoration Project
May 1, 2010 - April 30, 2011
CR 47504

		Qtny	Unit		Unit Cost	COST	Budget Line Item Modification	Revised Cost
A.	**PERSONNEL (Salaries 5000 & Fringe 5010)**					**$366,016**	**($2,776)**	**$363,240**
	DNR Admin Operations	0.25	mo.	@	$ 4,515.00 /mo.	$1,128.75	$0.00	$1,128.75
	DNR F&W Administrative Mgr	1.50	mo.	@	$ 6,385.26 /mo.	$9,577.89	($638.53)	$8,939.36
	DNR F&W Office Mgr.	0.50	mo.	@	$ 4,531.76 /mo.	$2,265.88	$0.00	$2,265.88
	Fish Habitat Supervisor	1.00	mo.	@	$ 6,309.22 /mo.	$6,309.22	$0.00	$6,309.22
	Project Biologist	12.0	mo.	@	$ 6,080.06 /mo.	$72,960.72	($6,080.06)	$66,880.66
	Assistant Project Biologist (Bio 2)	12.0	mo.	@	$ 3,701.00 /mo.	$44,412.00	($1,850.50)	$42,561.50
	Lead Biological Technician (Tech 3)	12.0	mo.	@	$ 2,828.00 /mo.	$33,936.00	$0.00	$33,936.00
	Bio Technician (*Temp*)	12.0	mo.	@	$ 2,500.00 /mo.	$30,000.00	$5,000.00	$35,000.00
	Bio Technician	4.0	mo.	@	$ 2,950.00 /mo.	$11,800.00	$0.00	$11,800.00
	Principle Investigator (Cultural Resources)	0.5	mo.	@	$ 5,000.00 /mo.	$2,500.00	$1,250.00	$3,750.00
	Archaeologist	0.5	mo.	@	$ 4,000.00 /mo.	$2,000.00	$1,000.00	$3,000.00
	Cultural Resource Technicians (*Temp*)	1.0	mo.	@	$ 2,000.00 /mo.	$2,000.00	$0.00	$2,000.00
	Research Geographer (Watershed Assessment)	7.0	mo.	@	$ 6,522.00 /mo.	$45,654.00	$0.00	$45,654.00
	Overtime					$15,000.00	$0.00	$15,000.00
	Permanent	4.25	FTE's					
	Temporary	1.1	FTE's					
					Subtotal PermSalaries	$247,544.46	-$6,319.09	$241,225.37
					Subtotal TempSalaries	$32,000.00	$5,000.00	$37,000.00
	FRINGE BENEFITS - Permanent Employees		Health Ins.		*$9,636* /yr/FTE	$40,953.00	($883.30)	$40,069.70
			Life Ins.		*$18* /yr/FTE	$76.50	($1.65)	$74.85
			FICA/MEDFICA		*7.65%* of salary	$18,937.15	($483.41)	$18,453.74
			SUTA		*2.40%* of salary	$5,941.07	($151.66)	$5,789.41
			401(k)		*7.00%* of salary	$17,328.11	($442.34)	$16,885.78
	FRINGE BENEFITS - Temporary Employees		Health Ins.		*$0* /yr/FTE	$0.00	$0.00	$0.00
			Life Ins.		*$18* /yr/FTE	$19.50	$3.00	$22.50
			FICA/MEDFICA		*7.65%* of salary	$2,448.00	$382.50	$2,830.50
			SUTA		*2.40%* of salary	$768.00	$120.00	$888.00
	Sub-Total Fringe					*$86,471*	*($1,457)*	*$85,014*
B.	**TRAVEL/TRAINING/VEHICLES**					**$31,717**	**($174)**	**$31,543**
5101	Per diem - Vancouver, WA (3 staff)	15	day	@	$56 day	$840		$840.00
	Lodging (3 staff)	12	night	@	$125 night	$1,500		$1,500.00
	Per Diem - Missoula, MT (2 staff)	12	day	@	$51 day	$612		$612.00
	Lodging (2 staff)	10	night	@	$121 night	$1,210		$1,210.00
	Per diem - Portland, OR (1 staff	5	day	@	$66 day		$330	$330.00
	Lodging (1 staff)	4	night	@	$120 night		$480	$480.00
B.	**TRAVEL/TRAINING/VEHICLES CONTINUED**							
5190	VEHICLE EXPENSES							
	GSA rental (3)	36	mo	@	$315 mo	$11,340	($472.50)	$10,867.50
	GSA mileage (3 vehicles)	30000	mi.	@	$0.35 mi	$10,500	($420.00)	$10,080.00
5160	VEHICLE INSURANCE (3 vehicles) **	36	mo	@	$ 60.83 mo.	$2,190	($91.25)	$2,098.64
5150	Training & Conferences (WE H)							
	Northwest River Restoration Symposium + short course (Jan 31 - Feb 4, 2011) (3 staff)					$2,025		$2,025.00
	Rosgen Level I (Assistant Bio and Lead Tech)					$1,500		$1,500.00
C.	**MATERIALS, SUPPLIES AND SERVICES**					**$45,275**	**$1,228**	**$46,503**

1996-083-00 FY 2010 Budget
CTUIR Grande Ronde Subbasin Restoration Project
May 1, 2010 - April 30, 2011
CR 47504

		Qtny	Unit		Unit Cost	COST	Budget Line Item Modification	Revised Cost
	5210 - Office supplies (paper, pens, et al.)	12	mo	@	$49 mo	$587		$586.92
	5225 - Field Survey/Monitoring Supplies (stakes/monuments, tags, paint, flagging)					$1,500		$1,500.00
	5225 - Misc Supplies/Materials/ small hand tools/field gear					$21,699	$328.00	$22,026.50
	5226 - Books and Journals (Technical reference books)					$500		$500.00
	5250 - Non Capital Equipment (Statistical software)					$2,890		$2,890.00
	5250 - Non Capital Equipment (Digital Camera)						$900.00	$900.00
	5400 - Communication Cellular Service	36	mo	@	$100 mo	$3,600		$3,600.00
	5400 - Communication (charter internet and phone service)	12	mo	@	$650 mo	$7,800		$7,800.00
	5410 - Postage/Freight					$300		$300.00
	5430 - Dues/Subscriptions: Civil 3D 2009 1-year subscription					$1,000		$1,000.00
	5440 - Equipment Rental (Track hoe rental for mechnical planting)					$1,500		$1,500.00
	5440 - Equipment Rental (fax, duplication)	12	mo	@	$25 mo	$300		$300.00
	5450 - Duplication/Printing (copies, business cards)	12	mo	@	$25 mo	$300		$300.00
	5470 - Repairs and Maintenance					$1,500		$1,500.00
	5770 - Professional Services (Helicopter Flight/Project Reconn)	4	hr		$450 hr	$1,800		$1,800.00
D.	**DIRECT COST (Sum of Items A-C)**					**$443,008**	**($1,722)**	**$441,286**
E.	**INDIRECT COST**	**35.04% of D**				**$155,230**	**($603)**	**$154,627**
F.	**CAPITAL EQUIPMENT 6300**					**$6,000**	**$2,325.00**	**$8,325**
	All Terrain Vehicle **					$6,000	$2,325.00	$8,325.00
G.	**SUBCONTRACTS**					**$0**	**$29,991**	**$29,991**
	USFS Upper Grande Ronde River Tailings Project					$0	$29,990.53	$29,990.53
H.	**TOTAL CONTRACT COST**					**$604,238**	**$29,991**	**$634,229**

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APPENDIX 1 – DARK CANYON (CUNHA) FISH HABITAT ENHANCEMENT PROJECT, GRWM Ripples Article

Ripples in the Grande Ronde

Spring 2010

RIVERS UNITING NEIGHBORS-QUARTERLY NEWS FROM THE GRANDE RONDE MODEL WATERSHED

A New Chapter in the History of Cunha Ranch

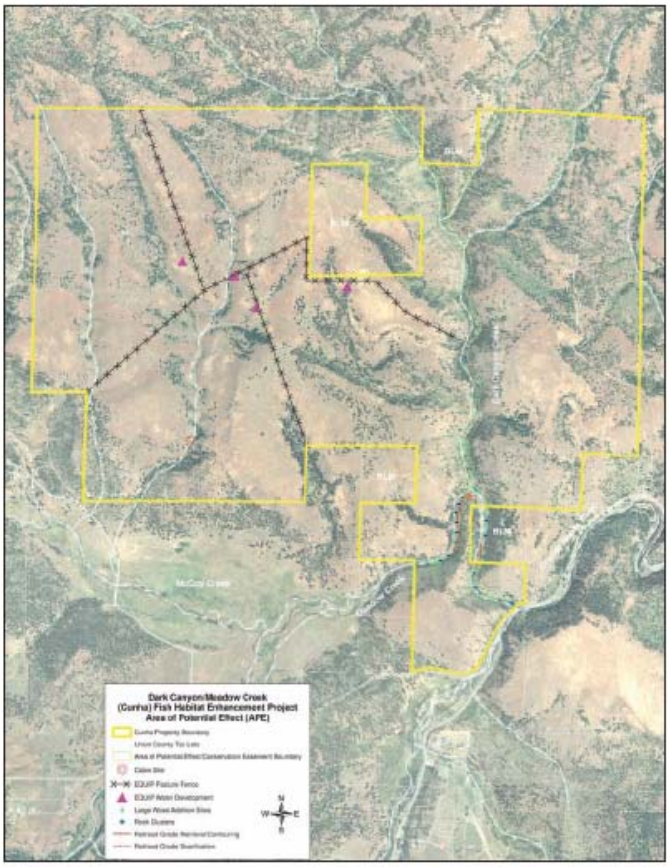
by Allen Childs, Confederated Tribes of the Umatilla Indian Reservation (CTUIR)
All photos courtesy of the CTUIR

Joseph Cunha is a lifelong resident of northeast Oregon and the owner of the 3,000-acre Joseph Cunha Ranch, LLC., near Starkey. He has seen his share of change in his lifetime as a member of a ranching family in the Grande Ronde subbasin. As a 5-year old, Joe remembers 1955 as one of the last years that the family grazed sheep on the ranch. It is not surprising that the sheep ranching left an impression on a young boy, as the grazing operation included six bands of sheep (more 6,000 ewes and lambs) that provided wool and meat for the market, which the family depended on for their livelihood. In the 1960s and continuing to the present day, ranchers turned to cattle ranching and logging activities to make ends meet.

A long history of splash-dam logging on both Meadow Creek and Dark Canyon Creek as well as livestock grazing, road and railroad construction, and commercial logging has shaped the landscape on the Cunha Ranch. Upland range conditions are generally poor in the harsh, dry environment found on the shallow, rocky soils. Historic alteration of riparian and riverine habitat, particularly related to railroad and road construction, has limited normal habitat formation processes by constricting or eliminating floodplains and decreasing the diversity of in-stream habitat types normally found in unaltered rivers and streams.

Revitalizing Cunha Ranch Rangeland and Fish Habitat

In order to improve some of these rangeland and watershed conditions on their ranch, Joe and his wife, Patricia, recently decided to embark on a rangeland and fish and wildlife habitat enhancement project. Their land straddles about one mile of lower Meadow Creek and more than three miles of Dark Canyon Creek near the confluence of Meadow Creek and the Grande Ronde River. The project emphasizes restoring upland grasslands for big game and livestock as well as riparian and in-stream habitat for salmon and steelhead. Joe and Patricia initially contacted the local Natural Resource Conservation Service (NRCS) to look into available conservation programs, with the objective of trying to find ways to increase the quantity and quality of range resources and improve water availability for livestock. Watering sites are limited in the upland pastures, and operators have been forced to utilize Dark Canyon Creek and Meadow Creek for decades. Both Joe and Patricia felt that something could be done to enhance and restore upland and watershed conditions, but they needed technical and financial assistance to design and fund necessary range infrastructure and attract interest in the fish habitat their ranch provides to the subbasin.



ABOVE: Vicinity map of the Cunha Ranch project.

Building the Project Team

Following initial contact with local NRCS Conservationist Mike Burton, Joe and Patricia elected to invite biological staff from the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) Grande Ronde Fish Habitat Program (based at the Agriculture Service Station in Island City) to discuss additional conservation and cost-share opportunities to meet their overall objectives. CTUIR biologists then initiated habitat surveys and field review along Dark Canyon Creek and Meadow Creek to assess existing conditions, identify factors limiting fish production, and develop a list of opportunities to improve in-stream and riparian habitat conditions.

The Project's Objectives

Following the initial assessment, both NRCS and CTUIR with assistance from the Cunhas completed a more detailed plan that identified management practices, infrastructure needs, habitat project elements, and a strategy to fund project elements. The overall project plan includes construction of 3.4 miles of upland pasture cross-fencing and installation of four livestock watering facilites on existing springs to provide for improved livestock distribution and management.

Project objectives include:

- **Developing Protect Habitat.** This objective involves developing a riparian conservation easement along 3.5 miles of Dark Canyon and 0.5 miles of Meadow Creek. Currently, Bureau of Land Management tracts within the project area are fenced and excluded from grazing, which will be opened with the new conservation easement.
- **Enhancing In-stream Structural Diversity and Complexity.** This objective involves installing large wood complexes and rock structures to facilitate the development of riffle, run, pool, and glide habitat representation and provide in-stream diversity, mimicking the natural recruitment of wood and rock needed for productive fish habitat.
- **Enhancing Floodplain Connectivity.** This objective involves removing and/or breaching segments of old railroad grade that currently restrict floodplain function and riparian/wetland habitat along Meadow Creek.
- **Enhancing Riparian Habitat Conditions.** In conjunction with planned upland infrastructure developments and establishment of the riparian conservation easement, this objective involves eliminating livestock use of riparian habitat along Dark Canyon Creek and Meadow Creek, enhancing hydrologic connectivity where feasible, and increasing riparian aquatic plant communities through artificial (planting/seeding) and natural recruitment strategies.

The fish habitat component of the project encompasses approximately 3.5 miles of Dark Canyon Creek and 0.75 miles of Meadow Creek, beginning at the confluence of Meadow Creek with the Grande Ronde River and continuing upstream along Meadow Creek to McCoy Meadows, then along Dark Canyon to the Wallowa-Whitman National Forest boundary. Fish habitat improvements include placing wood and rock clusters in-stream to enhance in-stream diversity and create pool habitat as well as removing a portion of an old railroad grade to re-activate the floodplain along Meadow Creek during high-water events. Funding for the fish habitat component of the project will be provided by the GRMW, the Bonneville Power Administration, and the CTUIR.

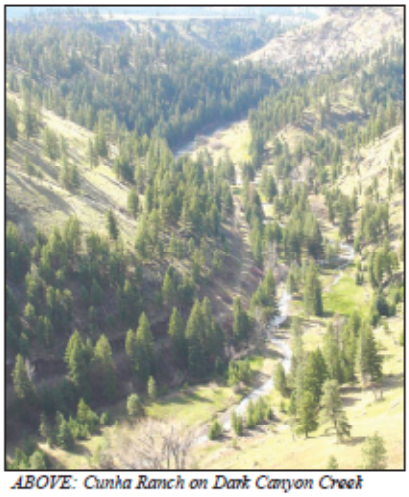
Following completion of the in-stream habitat work planned for Summer 2010, the landowners will enroll approximately 65 acres of riparian habitat along Dark Canyon and Meadow Creek into the Conservation Reserve and Enhancement Program (CREP), which will provide funding for the installation of riparian fencing and planting to be completed by Summer 2011.

Project Benefits

Project benefits include the Cunhas' enhanced ability to manage livestock by using a rest pasture rotation system with adequate upland water resources. Another benefit is the protection of approximately four miles of summer steelhead spawning and rearing habitat as well as protection of rearing habitat for spring Chinook salmon. Under the project plan, grassland communities and riparian and in-stream habitat should improve significantly over the long term.

The project is closely related to ongoing and proposed restoration activity in the Meadow Creek watershed. Since the mid-1980s, ongoing restoration efforts along Meadow Creek and its tributaries (McCoy Creek, McIntyre Creek, and Dark Canyon Creek) have included obliteration of extensive amounts of roadways, removal of railroad grade, the addition of large woody structures, construction of meandering river channels in areas where streams had been previously channelized, and improvement of rangeland conditions, such as water developments and fencing, riparian planting, and noxious weed control.

The foresight and willingness of landowners like Joe and Patricia to contribute to conservation efforts while maintaining a working ranch help improve fish and wildlife habitats within the Grande Ronde Basin. Projects like this one on the Cunha Ranch greatly contribute to other restoration actions in the watershed by providing connectivity between projects near the confluence of the mainstem Grande Ronde River. This connectivity is important for the long-term improvement of available habitat needed to sustain threatened and endangered fish species as well as wildlife.



ABOVE: Cunha Ranch on Dark Canyon Creek looking south (downstream) toward its confluence with Meadow Creek.

ABOVE: Meadow Creek. Note the abandoned floodplain at left and the railroad grade (the mound of earth at right).

ABOVE: Lower Meadow Creek. The old railroad grade is located along the right side of the streambank.

APPENDIX 2 – MCCOY MEADOWS ENHACEMENT PROJECT – GRMW Ripples Article

Ripples in the Grande Ronde

Winter 2011

RIVERS UNITING NEIGHBORS · QUARTERLY NEWS FROM THE GRANDE RONDE MODEL WATERSHED

The McCoy Meadows Restoration Project: A Short History

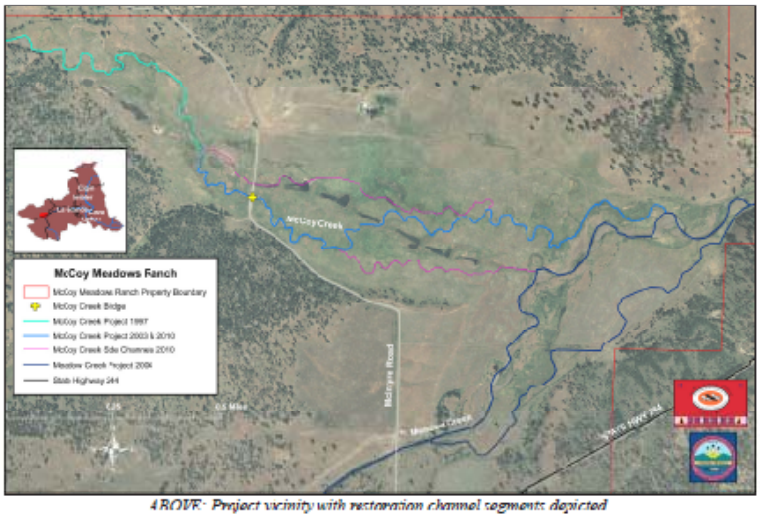
By Allen Childs, Fish Habitat Project Leader & Jason Grant, Assistant Fish Habitat Biologist, Confederated Tribes of the Umatilla Indian Reservation (CTUIR). Images courtesy of CTUIR.

The McCoy Meadows Ranch is located in Union County about 20 miles southwest of La Grande, Oregon, near the confluence of Meadow Creek with the upper Grande Ronde River. Due to its geographical location and topography, the ranch has the potential to be a stronghold for native fish and wildlife and provide important habitat for a variety of focal species. A diversity of fish and wildlife use the area, including bald eagles, beavers, spotted frogs, yellow warblers, rocky mountain elk, white-tail and mule deer, coyotes, and cougars. The property encompasses nearly 2.9 miles of lower Meadow Creek, 3.3 miles of McCoy Creek, and 0.5 miles of McIntyre Creek, which provide spawning and rearing habitats for Snake River Basin summer steelhead and rearing habitat for spring-summer Chinook salmon, both of which are listed as threatened under the Endangered Species Act (ESA) and are important cultural and subsistence resources for the Confederated Tribes of the Umatilla Indian Reservation (CTUIR).

A History of Simplification

Historically, McCoy Meadows was a large wetland meadow complex with an abundance of sinuous stream channels, backwater areas, ponds, and what was believed to be one of the larger beaver colonies in the upper Grande Ronde Subbasin. Alteration of the wetland complex probably began in the early 1800s with extensive beaver trapping. By the early 1900s, livestock grazing, road and railroad construction, logging, and farming severely altered the character and function of the meadow system, by the late 1960s, the meadow's wetlands were subject to aggressive draining efforts to promote agricultural uses. The lower reaches of McCoy Creek were channelized, straightened, and relocated in two phases, first in 1968 and again in 1977. In addition, the lower portion of McCoy Meadows was land-leveled in the late 1970s. Channelization and subsequent channel widening and deepening resulted in the loss of wetlands, simplification and reduction of in-stream habitats, decreased channel stability, and increased erosion. Channelization also damaged the natural function of the meadow and its ability to absorb large flood events, dissipate energy, and recharge groundwater, which can contribute to increased stream flow during summer periods.

ABOVE: Aerial view of lower McCoy Creek in 1999 illustrating the lower channel reach of McCoy Creek



ABOVE: Project vicinity with restoration channel segments depicted

Cooperative Habitat Restoration Partnerships

The Oregon Department of Fish and Wildlife (ODFW) initiated stream protection and restoration in 1988 in McCoy Meadows with the construction of approximately 8 miles of livestock exclusion fencing along Meadow Creek and McCoy Creek under the Bonneville Power Administration's (BPA) Fish and Wildlife Program. Fencing and protection from livestock facilitated improvements in stream bank stability along both streams. However, channelized stream reaches in their widened and deepened condition continued to actively erode, limiting the ability of these streams to progress towards a stable, natural channel configuration, with access to the floodplain to dissipate energy and vegetation capable of strengthening stream banks through extensive root systems.

At the request of the landowner, a working group was established in 1995 to inventory and assess existing conditions, identify factors limiting production of cold-water fish, develop goals and objectives, and identify potential restoration strategies that could augment the benefits achieved from the initial ODFW project. The group included the landowners and representatives from tribal, state, and federal agencies including the CTUIR, ODFW, Environmental Protection Agency (EPA), the Oregon Department of Environmental Quality (DEQ), and Natural Resource Conservation Service (NRCS).

By late 1996, the working group completed a restoration analysis that established project goals, objectives, initial restoration actions, and a framework from which to plan and design future restoration actions. The resulting overall project goals were defined as "restoring, to the extent feasible, the

the natural function and character of the wetland meadow complex." Key objectives included restoring stream channel morphology, fish and wildlife habitat, and palustrine emergent and shrub-scrub wetlands; enhancing floodplain connectivity and groundwater; and improving water quality (i.e., decreasing summer stream temperatures, increasing winter stream temperatures, and decreasing turbidity). The project was implemented in several phases: Phase 1 (upper meadow) in 1997, Phase 2 (lower meadow) in 2000-2002, Meadow Creek in 2006, and McCoy Creek enhancements in 2010.

Phases 1 and 2

Phase 1 included re-activating an approximate 0.23-mile reach of upper McCoy Creek to its historic (pre-1977) channel alignment. The project was relatively simple conceptually, as most of the historic alignment in the upper meadow remained intact and only required the removal of an earthen dam that had been left in place during the channelization process. Rather than divert McCoy Creek into the historic channel all at once, project sponsors elected to activate the channel over a period of a couple of years to facilitate re-establishment of vegetation through a combination of natural regeneration and planting prior to final diversion. During the summer of 1999, McCoy Creek was completely diverted and the channelized reach reclaimed through the installation of a series of earthen terraces and ponds.

In 1999, the project team initiated Phase 2 to develop a restoration strategy for the lower meadow. Activities included contracting with Ducks Unlimited (in cooperation with the Union County Public Works Department) to design and install a new bridge in order to improve fish passage and water transport through the McIntyre Road. NRCS completed the design, and Phase 2 of the project was implemented during 2000-2003. Implementation included 6,500 feet of channel construction, installation of rock and wood structures, revegetation, and reclamation of the channelized reach, which involved construction of earthen berms and floodplain ponds. Additionally, new boundary fences were constructed around the newly established 450-acre permanent conservation easement.

Phase 1 of the project has been successful in improving channel morphology in terms of increased sinuosity, decreased slope, decreased channel width-to-depth ratios, enhanced in-stream complexity and fish habitat, and promotion of riparian and wetland vegetation. Overall, the project reach is stable, provides complex habitat, and demonstrates improving groundwater elevation and water temperature trends. Phase 2 of the project has also progressed toward achieving multiple objectives but has experienced several shortcomings, including localized channel incision and elevated slope, stream bank erosion in areas with excessive energy, and lack of vegetation colonization due factors such as stream bank erosion and depredation by big game.

ABOVE: The Phase 2 McIntyre Road bridge replacement project improved fish passage and water transport

Despite some of these limitations, a number of positive responses have also been observed, particularly in the lower reaches of the project that remain relatively stable. Key achievements have included increased channel length and habitat complexity, moderation of daily maximum and minimum water temperature fluctuations, and increased groundwater elevation in multiple areas, which promotes establishment of desirable riparian and wetland vegetation.

Continued on page 6

ABOVE: Aerial view of the Phase 1 project area in 2010

ABOVE: Photo within Phase 1 project area showing a recovering channel segment being used by beavers

LEFT: 2010 McCoy Creek project overview

Meadow Creek and McCoy Creek Enhancements

In order to address the shortcomings of the Phase 2 project, the NRCS, CTUIR, and ODFW initiated restoration planning and design efforts in 2009 and prepared for construction in 2010. Primary objectives included decreasing channel slope, distributing energy from high-water events by improving floodplain connectivity, and stabilizing stream banks through bioengineering techniques. Project elements included installation of engineered large wood structures and rock riffles at strategic locations along McCoy Creek to adjust channel slope; construction of 5,500 feet of wetland side channels to direct stream energy from McCoy Creek to the floodplain and provide off-channel habitat; and installation of 4,000 feet of stream bank treatments such as erosion-control fabric and extensive planting and seeding. A total of 12 wood structures and 16 rock riffles were constructed along the project reach. The Oregon Department of Transportation (ODOT) provided large wood material through its Highway 244 hazardous tree removal program. More than 30 big game fence exclosures of various sizes have been constructed throughout the project area to protect plants from depredation and facilitate development of riparian shrubs within the meadow.

Between the 2003 and 2010 project periods along McCoy Creek, the NRCS, CTUIR, and Grande Ronde Model Watershed (GRMW)/BPA implemented an additional project component along Meadow Creek to facilitate re-activation of an historic wetland located on the southeastern portion of McCoy Meadows. A railroad grade and highway road built in the 1920s transected the meadow, restricting the ability of Meadow Creek and associated side channels to access the floodplain. Like the McCoy Creek phases, restoration objectives included increasing stream channel sinuosity and length, boosting groundwater elevations, decreasing high stream temperatures during the summer and increasing low temperatures during the winter, and enhancing the habitat use among anadromous fish during the summer and winter months. The project's primary strategies involved designing and constructing a wetland channel network to re-activate

ABOVE: stream bank stabilization (erosion control) during implementation in 2010

the abandoned floodplain and allow flood flow to dissipate energy on the low gradient floodplain, expanding an existing wetland beaver complex, and increasing the amount of in-stream habitat complexity.

This component of the project encompassed approximately 144 acres and included construction of 2,800 feet of side channels and 3 floodplain ponds, installation of geomorphic riffle weirs (vertical channel grade control), and extensive planting. Large wood placement along Meadow Creek and the wetland side channels was also implemented to encourage fine sediment deposition for re-vegetation establishment.

RIGHT: Overview of completed Meadow Creek project in 2007

Summary and Conclusions

The challenging and rewarding McCoy Meadows project has provided an incredible opportunity to enhance and restore fish and wildlife habitat, watershed processes and functions, and water quality on a large scale in a key area of the Upper Grande Ronde River Subbasin. Although the project collaborators have experienced a number of setbacks in achieving project objectives, the overall project is progressing toward the desired goal of achieving a self-maintaining, naturally stable meadow complex that can support multiple life history stages of Chinook salmon and summer steelhead populations, provide high-quality habitat for riparian- and wetland-dependent wildlife, and contribute to restoration projects promoting ESA-listed fish recovery and overall watershed health throughout the Grande Ronde Subbasin.

Thanks to the financial support of the BPA/GRMW and NRCS that funded the majority of this large-scale project, many valuable partnerships have been formed among the Oregon Watershed Enhancement Board (OWEB), the Union County Public Works Department, U.S Fish and Wildlife Service, Pacific Coast Salmon Recovery Fund, the DEQ, the Environmental Protection Agency, Ducks Unlimited, ODOT, ODFW, and the CTUIR.

This article offered an overview of the multiple project activities that have occurred at McCoy Meadows. A future article will report results, changes, and trends at McCoy Meadows associated with stream channel geomorphology, fish habitat, water quality, groundwater hydrology, and biological responses.

Appendix 3 Dark Canyon (Cunha) Fish Habitat Enhancement Project, Grande Ronde Model Watershed BiOp Funding Proposal

GRANDE RONDE MODEL WATERSHED

Watershed Enhancement Project Proposal
March 2010

1. **Project Name:** Dark Canyon/Meadow Creek (Cunha) Fish Habitat Enhancement Project

2. **Applicant:** Confederated Tribes of the Umatilla Indian Reservation, Grande Ronde Subbasin Fish Habitat Restoration Project

3. **Participating Landowner(s) and Agencies:**

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   43530 Shetland Court, Pendleton, Oregon 97801
   pjcunha@q.com
   541-276-8031 (home)

4. **Project Contact(s):**

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   Island City, Oregon 97850
   allenchilds@ctuir.com
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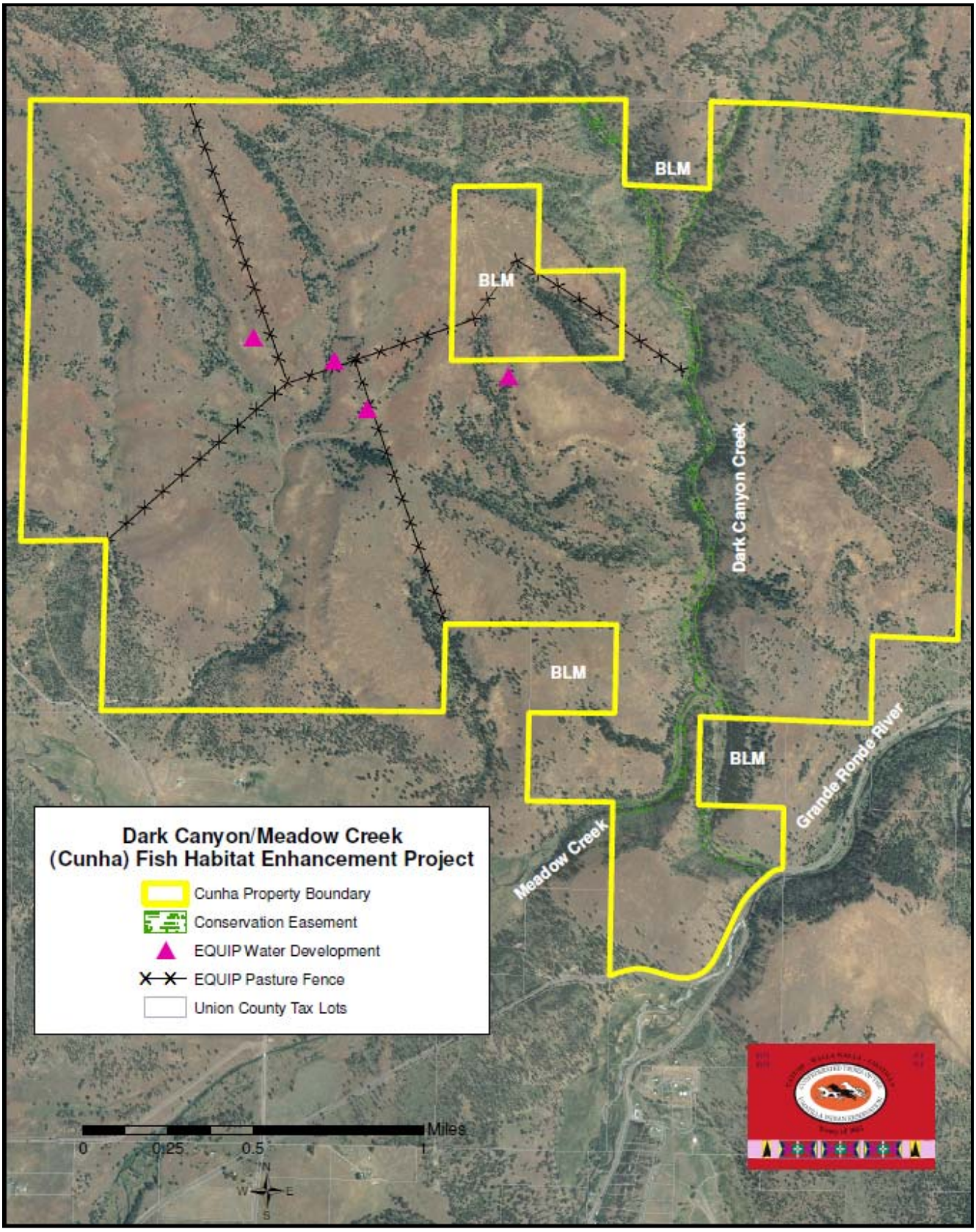
   541.969.3142 (mobile)

   Administrative Contact:
   Julie Burke, DNR Administrative Manager
   PO Box 638
   Pendleton, Oregon 97801
   julieburke@ctuir.com
   541.429.7292 (office & fax)

5. **Project Location:**
   The proposed project is located near Starkey, Oregon in the Upper Grande Ronde Subbasin. The project legal description is: Township 3 South, Range 35 East, portions of Sections 24, 25, and 36, Willamette Meridian, Union County Tax Lot 500. The project encompasses approximately 3.5 miles of Dark Canyon Creek and 0.5 miles of Meadow Creek beginning at the confluence of Meadow Creek with the mainstem Grande Ronde River upstream along Meadow Creek to McCoy Meadows and along Dark Canyon to the Wallowa-Whitman National Forest Boundary. The project area includes private land and two BLM tracts, one along Dark Canyon at the upper reaches of the project area and along the lower reach of Meadow Creek. See Figure 1.

Figure 1 Project Vicinity Map



6. Project Objectives:

The following identifies project specific objectives and references to specific objectives identified in the Grande Ronde Subbasin Plan:

a. **Protect Habitat:** Develop riparian conservation easement along 3.5 miles of Dark Canyon and 0.5 miles of Meadow Creek. Conservation strategy includes CTUIR-BPA riparian conservation easement and NRCS/FSA CREP Easement. BLM tracts within the project area are currently fenced and excluded from grazing.

Subbasin Plan Reference: Habitat Protection. (page 258):
• Protect high quality habitat, restore degraded habitats, and provide connectivity between functioning habitats.
• Manage for healthy ecosystems to support aquatic resources and native species

b. **Enhance Instream Structural Diversity and Complexity:** Install/construct large wood complexes and limited rock structures to facilitate development of riffle, run, pool, glide habitat representation and provide instream diversity, mimicking natural recruitment of wood and rock, respective of channel types.

Subbasin Plan Reference: Channel Conditions (page 260):
•Maintain existing LWD by promoting BMP's for forestry practices. Add LWD where deficient and appropriate to meet identified short term deficiencies.
• Reconnect channels with floodplain or historic channels where appropriate and feasible. •Install in-channel structures (LWD, boulders).

c. **Enhance Floodplain Connectivity:** Remove and/or breach segments of old railroad grade currently confining floodplain function and riparian/wetland habitat along Meadow Creek.

Subbasin Plan Reference: Channel Conditions (page 260):
• Remove or relocate channel confinement structures such as draw-bottom roads and dikes where appropriate and feasible.

d. **Enhance Riparian Habitat Condition:** In conjunction with planned upland infrastructure developments through FSA-EQUIP and CTUIR-PCSRF funding (upland range pasture fence installation and water developments) and establishment of term riparian conservation easement, remove livestock utilization from riparian habitat along Dark Canyon Creek and Meadow Creek, enhance hydrologic connectivity where feasible, and increase riparian hydrophytic plant communities through artificial (planting/seeding) and natural recruitment.

Subbasin Plan Reference: Riparian Conditions (page 262):
• Improve the density, condition and species composition of riparian vegetation through planting, seeding, improved grazing and forest management practices.
Subbasin Plan Reference: Sediment Conditions (page 261):
• Manage grazing in riparian areas following grazing plans designed to improve riparian condition; could include exclusion, partial season use, development of off-site water, herding.
• Reestablish riparian vegetation by planting trees, shrubs, sedges (native species preferred)
• Stabilize active erosion sites, where appropriate, through integrated use of wood structures (limited use of rock if necessary) and vegetation reestablishment.
• Encourage landowner participation in riparian management incentive programs, e.g. CREP, WRP, EQIP.
• Promote/implement development of grazing plans to improve upland vegetative condition.

7. Project Description

Introduction - The project proposes a coordinated approach to address management challenges on a private cattle ranch and habitat limiting factors associated with priority ESA fish habitat in the Upper Grande Ronde Subbasin for Threatened Snake River ESU summer steelhead and spring-summer Chinook. The project includes assisting the private landowner with upland infrastructure development to offset a reduction in access to pastures and water resources for habitat conservation purposes along Meadow Creek and Dark Canyon Creek. The upland portion of the project, consisting of 3.4 miles of pasture cross fence and four spring developments, has been funded through non-BPA sources and schedule for completion in late 2010.

This proposal focuses on securing BPA funding for instream habitat enhancement activities, including instream structural additions (large wood complexes and rock clusters) and removal/breaching portions of an old railroad grade adjacent to Meadow Creek. Following completion of "active" instream habitat actions, riparian habitat along Dark Canyon and Meadow Creek will be enrolled in the FSA CREP program which will provide funding for planting, seeding, and riparian conservation easement boundary fencing.

Funding secured for instream habitat implementation through this proposal will be administered by the CTUIR under its' existing BPA-Accord contract. BPA-Remand funds will be entirely "pass through expenses" and be applied directly to on the ground actions.

Habitat Limiting Factors and Existing Conditions

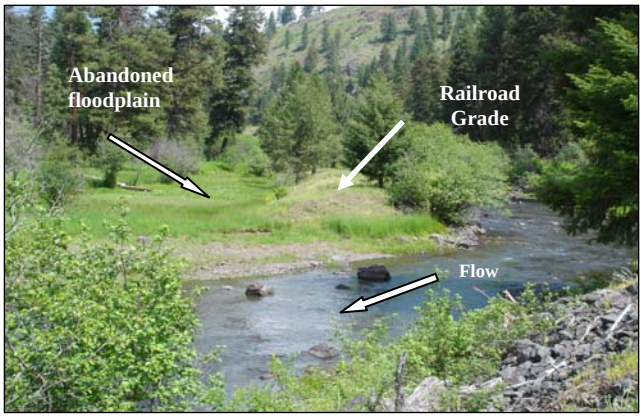
Habitat assessments and field surveys were initiated by CTUIR staff in June 2009 and consisted of a walk through survey along the Dark Canyon and Meadow Creek project reach to inventory large wood and qualitatively assess riparian, instream, and morphological condition. Baseline channel morphology and habitat surveys are currently underway with channel cross sections, longitudinal profile, and channel substrate survey scheduled for completed by early spring 2010. Following is a summary of habitat limiting factors identified during our initial project assessment and survey effort.

Generally, the upper reaches of Dark Canyon Creek are in fair condition compared with the lower reaches of both Dark Canyon and Meadow Creek with a more intact and mature riparian plant community, higher occurrence of large woody debris, and generally greater habitat complexity. The lower 2 miles of Dark Canyon Creek illustrates a long history of riparian logging, extensive livestock grazing, and a general lack of large wood within the floodplain. Instream habitat conditions degrade from upstream to downstream reaches with poor habitat complexity, lack of large pool habitat, and excessive streambank erosion. Meadow Creek within the project area provides limited habitat complexity with poor availability of large pool habitat and a constrained floodplain created by an old railroad grade. Following is a summary of specific habitat limiting factors with additional discussion.

Dark Canyon Creek illustrating channel incision, streambank erosion, and poor riparian conditions

Habitat Conditions/Habitat Complexity – Channel instability associated with removal of streamside cover, logging in riparian areas, historic splash dam logging, and railroad grade construction has resulted in modification of natural channel processes, altered width/depth ratio's, elevated erosion, and simplified habitat. Field surveys along Dark Canyon Creek indicated an average of 13 pieces of large wood/per mile with the upper 1.5 miles providing higher quality riparian habitat and wood recruitment compared to the lower 1.5 miles which contained only 3 pieces of wood greater than 12 inches in diameter. Future wood recruitment potential in the upper and middle reaches of Dark Canyon is generally good with mid-seral stands of Douglas-fir, spruce, and ponderosa pine compared to the lower. Riparian shrub and tree cover is notably lacking, though the upper reaches of the Dark Canyon Creek contain scattered, mature cottonwoods.

Meadow Creek within the project area provides poor habitat with a distinct lack of pool habitat and structure. Additionally, the entire length of Meadow Creek within the project area is constrained by the railroad grade located along its length on the left bank and along an approximate 800 foot segment along the right bank. The lower 0.4 miles of Meadow Creek has a wider, historic floodplain while the upper 0.5 miles are located within a confined valley form with limited potential for meander development. Channel classification transitions from a Rosgen "B" channel form to a "C" form but is largely constrained and disconnected from its historic floodplain by the railroad grade.



Meadow Creek at RM 0.2 upstream from confluence with Dark Canyon Creek.

• Sediment – Loss of upland and streamside vegetative cover has increased the rates of erosion. Soils lost from upland areas has overwhelmed hydraulic processes resulting in decreased availability of large pool habitat, spawning areas, riffle food production, and hiding cover. Field observations of Dark Canyon Creek and Meadow Creek within the project indicate locations with chronic streambank erosion and sediment transport to fish bearing streams. Road segments and portions of the historic railroad grade are actively eroding and streambank stability along lower Dark Canyon Creek is generally poor due to unstable channel morphology, lateral channel migration, and poor riparian conditions.

• Riparian Function – Riparian habitat degradation is the most serious habitat problem in the subbasin for fish (McIntosh 1994, ICBEMP 2000). Loss of floodplain connectivity by roads, dikes, and channel incision, and in many streams reduced habitat suitability for beaver, has altered dynamically stable floodplain environments, which has contributed to degradation and limited habitat recovery. This loss leads to secondary effects that are equally harmful and limiting, including increased water temperature, low summer flows, excessive winter runoff, and sedimentation.

• Low Flow – Water resources in many streams have been over-appropriated resulting in limited summer and fall base flow, development of fish passage barriers, and increased summer water temperatures. Water temperature monitoring initiated by the CTUIR in 2009 on Dark Canyon Creek documented 7 day summer maximum temperatures exceeding 23 ºC near the confluence with Meadow Creek 22 ºC at the upstream property boundary (Figure 1). Ongoing monitoring along Meadow Creek at McCoy Meadows reveals summer maximum temperatures exceeding 28 ºC.

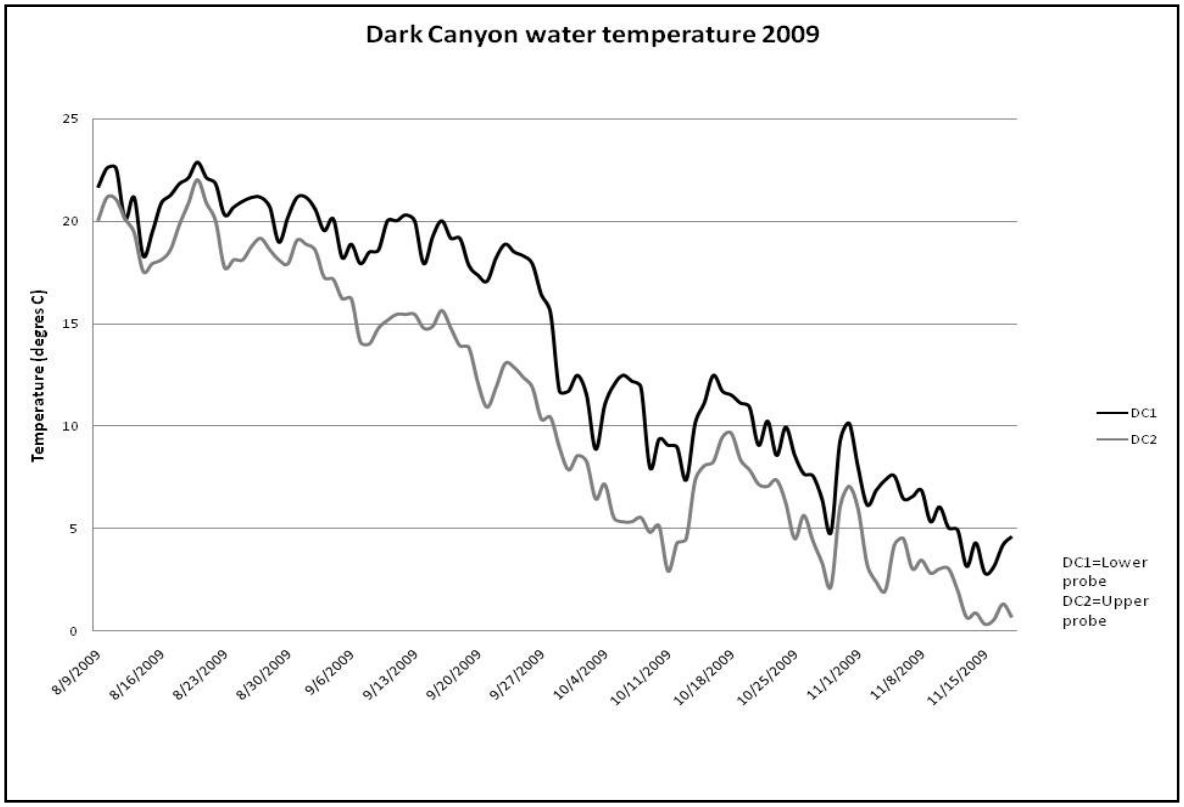
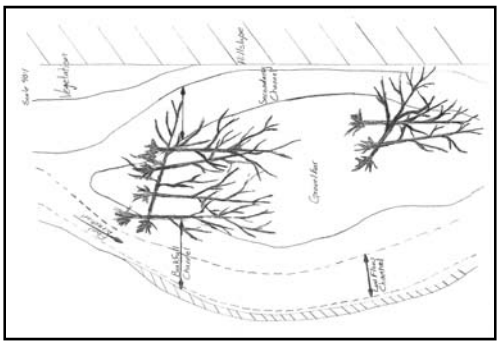


Figure 2: Water temperature (ºC) for Dark Canyon Cr at the upper property boundary (DC2) compared to the lower property boundary (DC1) for the same dates/times during 2009.

Specific Actions – Project activities funded under this BPA-Biop Remand proposal include: Instream habitat enhancement (installation of large wood and rock) and floodplain improvements associated with breaching and/or removal of railroad grade segments along Meadow Creek. Figure 3 illustrates locations of planned actions. Following is a description of planned treatments.

1. **Large Wood Additions** – Approximately 18 sites along Dark Canyon Creek and 9 sites along Meadow Creek have been identified for wood placement. An estimated 150 pieces of large wood will be added to existing pools, or placed in a manner to create pool habitat and provide habitat complexity. Wood material utilized in the Dark Canyon portion of the project will be collected from adjacent uplands, focusing primarily on dead and down material that is available onsite. Previous logging activities and difficult access to the area limits our ability to haul wood material from off-site areas. The largest material available will be utilized but will generally be limited to 12-16 inch dbh and greater than 20 feet in length. Individual trees with rootwads (where available) and dead/down logs will be placed in log jam configurations or in clusters to mimic natural recruitment and log jam formation, similar to the natural log jam located in Dark Canyon Creek illustrated above. The plan view to the left illustrates application of log jams on center channel gravel bars and side channels to trap sediment, facilitate riparian vegetation establishment, and provide complexity.



Wood placement sites identified along Meadow Creek were strategically located in areas containing the highest potential to form large, complex pool habitat (existing pools with gravel substrate) and in areas that can potentially provide thermal refuge in association with complex pool habitat (confluence of Dark Canyon Creek and side channels associated with existing abandoned floodplain caused by the railroad grade). The project will focus on creating large pool habitat in 5 primary areas (two in the upper project reach, the segment at the confluence of Dark Canyon, and two sites in the lower project reach, including a backwater habitat area associated within an existing side channel at the lower section of the railroad grade and along an outside meander pool downstream from the BLM parcel. Wood placement in Meadow Creek will require construction of engineered log jams (12 structures) that include large diameter materials (>24 inch dbh and 35 feet in length), racking and/or anchor logs that are excavated and back-filled into the floodplain, and rock ballast. No steel pins or cable will be utilized. The objective of these structures is to provide a hardened structure to direct the stream channel thalweg and energy to scour and maintain pool depth and provide in channel diversity. Large wood additions will contribute to floodplain stability by increasing roughness, slowing water velocities, and trapping sediment. Also, large wood will increase pool habitat quality and provide thermal and predatory refuge for aquatic species.

2. Rock Placement Along Meadow Creek – Historic splash dam logging (and associated clearing of in-channel obstructions such as log jams and rock) as well as logging riparian habitat has reduced the availability diverse habitat. The majority of the reach provides riffle habitat with limited pools and pocket pools that lack depth. In conjunction with installation of log jams at selected pool sections, sponsors propose re-installing large boulders that have are available

along the 0.5 mile project reach in clusters and individually in riffles and existing pools to increase complexity and enhance availability of pocket and step-pool habitat. Includes approximately 20 sites. With the availability of rock material within the project reach, costs of installing rock material would be minimal.

3. Railroad Grade Removal – Approximately 0.15 miles of railroad grade will be excavated and removed and an additional 0.10 miles contoured to the adjacent hillslope and/or scarified.

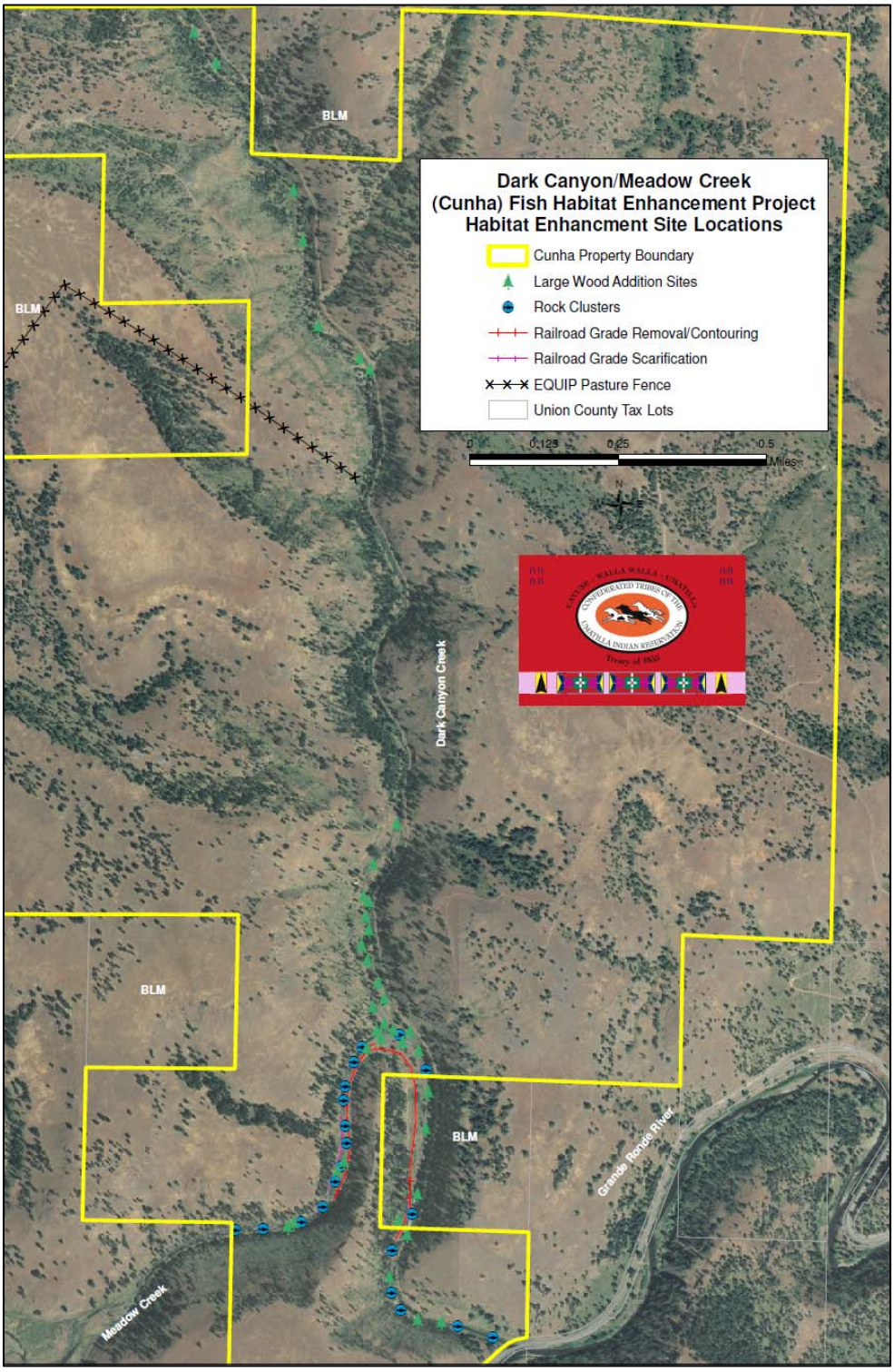
Railroad grade segments located upstream from the confluence of Dark Canyon Creek on the right bank of Meadow Creek will be pulled back (excavated) approximately 30 feet from the bankfull channel of Meadow Creek and contoured into the adjacent hillside. An ATV route along the hillslope edge of the grade will be maintained for management purposes. Additionally, approximately 800 feet of railroad grade located along the right bank of Meadow Creek will be bench-cut and scarified to facilitate seedbed preparation and natural regeneration.

Upper Meadow Creek railroad grade along right bank.

The lower 0.15 miles of railroad grade along Meadow Creek isolates floodplain habitat and limits development of meander pools and high quality habitat. Sponsors propose to excavate, haul, and contour this reach to restore floodplain connectivity and the associated morphological benefits that create complex instream habitat.

Lower Meadow Creek Railroad Grade. Segment planned from removal to activate abandoned floodplain along right bank

Figure 3 Habitat Enhancement Site Locations



Benefits – Approximately 4 miles of summer steelhead spawning and rearing habitat will be protected and enhanced under a 15 year conservation easement. Project benefits also extend to spring Chinook with suitable rearing habitat in both Meadow Creek and Dark Canyon. Expected project results include increased availability of large pool habitat associated with installation of large wood and rock complexes, recovery of riparian vegetation, including conifers, hydrophytic trees and shrubs, and macrophytes through a combination of active (planting) and passive (protection and elimination of livestock grazing), and improved floodplain connectivity along 0.25 miles of lower Meadow Creek by removing artificial channel confinement (railroad grade) and restoration of channel morphology processes that promote habitat complexity and function. Additionally, the project could potentially lead to improved trends in water quality (long-term) with a decrease in diurnal water temperature variations and decreased summer maximum water temperatures with improving trends in channel morphology (decreased width:depth) and riparian vegetation.

In addition to expected direct effects, the project will complement completed and ongoing habitat enhancement activities in the Meadow Creek watershed. For example, the project is located immediately downstream of the McCoy Meadows complex where restoration work has been ongoing since the 1980's and on National Forest system lands in Dark Canyon where the Forest Service has obliterated roads and completed instream habitat activities.

Project Maintenance – CTUIR staff will maintain the project. Extensive maintenance of instream habitat enhancement structures and railroad grade removal is not anticipated. Maintenance associated with the term conservation easement includes annual fence inspection and repair and maintenance of planted materials consisting of managing competing vegetation and protection devices to minimize depredation.

Permits – CTUIR staff will complete all environmental compliance needs in cooperation with BPA. ESA consultations with NOAA Fisheries and USFWS will be completed through BPA's environmental compliance program. A cultural resource survey, currently underway, will be completed by CTUIR cultural resource staff with SHPO consultation completed through BPA. A DSL/Corps permit application is under development by CTUIR staff. The WWNF LaGrande Ranger District will complete ESA consultation and NEPA requirements for the BLM portions of the project area.

Monitoring Plan – The following monitoring plan has been developed to evaluate project objectives:

a) **Protect Habitat:** Photo points have been established in 2009 to provide pre-implementation qualitative data on vegetation and channel conditions. These photo points will be repeated immediately post implementation then every 3 years thereafter until the riparian lease has expired.

b) **Enhance Instream Structural Diversity and Complexity:** A baseline assessment of existing conditions has been initiated by the CTUIR. A longitudinal profile and channel cross sections will provide an overview of morphological features and habitat complexity in associated with the large wood inventory completed in 2009. Channel morphology surveys will be repeated in subsequent years post implementation to monitor changes in channel morphology and habitat complexity.

c) **Enhance Floodplain Connectivity:** This objective will be monitored through the establishment of photo points, as detailed in a) above.

d) **Enhance Riparian Habitat Condition:** Vegetation surveys (such as a shrub intercept or 'green-line' survey) will be undertaken during 2010 and repeated 3 and 5 years post project. In addition planting efforts implemented under the CREP program will be monitoring through stocking surveys.

e) **Water Quality** - In addition to the monitoring efforts listed above water quality (temperature) will be recorded for the duration of the riparian lease. Temperature data was collected during 2009 (Figure 1) and will be used in an EPT (extensive post treatment) monitoring design. It is anticipated that the analysis of these data would consist of summary statistics for each year/probe location with addition tests for differences in mean maximum weekly water temperatures between probe locations and between years done using either a paired t-test and/or a mixed model repeated measures analysis (providing these data meet the assumptions of these tests).

Work Dates – Project implementation is scheduled to be completed during summer 2010. Specific dates for various project aspects include:

- Permitting/ Consultation - February 15-July 1, 2010.
- Construction - July 1-31, 2010
- Monitoring – Initiated in 2009 and will continue through 2024.

8. Project Budget

Actions funded under the CTUIR-BPA Accord Agreement include: planning/design, permitting, subcontracting, administration/inspection, and monitoring/evaluation. Additionally, CTUIR staff will assist the landowner in preparing for CREP enrollment, assist in the development of fencing and planting plans, and administer fencing and planting subcontracts on behalf of the landowner.

Dark Canyon-Meadow Creek (Cunha) Fish Habitat Enhancement Project			
Work Item	**Description**	**Detail**	**Cost Estimate**
Item 1	Mobilization	Lump Sum	$5,000.00
Item 2	Dark Canyon Wood Placement	18 sites, 5 pieces/site, 1.3 miles total, 200 series track-hoe: 120 hours @ $140/hr	$16,800.00
Item 3	Meadow Creek Log Structures	12 Engineered log jams: $3500 each	$42,000.00
Item 4	Meadow Creek Rock Placement	0.5 miles, 20 sites, 200 series track-hoe: 40 hours @ $140/hr)	$5,600.00
Item 5	Meadow Creek Railroad Grade (Contouring)	0.10 miles, 200 series track-hoe: 60 hours @$140/hour	$8,400.00
Item 6	Meadow Creek Railroad Grade (Removal)	0.15 miles, 3500 cubic yards @ $4/yard	$14,000.00
		TOTAL	**$91,800**