CTUIR GRANDE RONDE SUBBASIN RESTORATION PROJECT

A Columbia River Basin Fish Habitat Project

Annual Report

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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 2013, the CTUIR was involved in numerous planning processes and projects. Planning efforts included: Snake River Basin salmon and steelhead recovery planning, including Project Leader 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 large wood installation on Graves Creek - Phase I of the Rock Creek Fish Habitat Enhancement Project - construction of engineered large wood structures on the Catherine Creek (CC 44) Fish Habitat Enhancement Project, weed treatment on the Willow Creek (Oregon Ag Foundation) Fish Habitat Enhancement Project, and collection of rock and large wood materials for the Rock Creek Fish Habitat Enhancement Project. Projects were administered and inspected by CTUIR Grande Ronde Fish Habitat Project staff during July 2013 through November 2013. Preparation for project construction included field stakeout and survey, construction subcontracting and administration, field supervision, grade checking, and inspection.

CTUIR staff also conducted 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 main-stem of Catherine Creek, Graves Creek, and Rock Creek. Activities included coordinating with project partners and private landowners to develop future 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 2013 and beyond.

BACKGROUND

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) retain aboriginal and treaty rights related to fishing, hunting, pasturing of livestock, and gathering of traditional plants within the Tribes Ceded Territory, including the Grande Ronde Subbasin. The CTUIR Department of Natural Resources (DNR) has developed and accepted a First Foods organization and approach to ecosystem management based on the cultural traditions and practices of the Longhouse. The organization follows the serving order of food and conceptually "Extends the Table" to manage for sustainability within the Ceded Territory. The First Foods are considered to be the minimum ecological products necessary to sustain CTUIR culture. The order is watershed-based beginning with water as the foundation and progressing to salmon (Pacific lamprey, steelhead, trout, whitefish), deer, couse, and huckleberry. The First Foods provide clear linkages to treaty rights and natural resources and defines direction and goals that relate to the community culture. In conjunction with the First Food principle, the CTUIR DNR developed the River Vision (Jones, 2008)that describes and organizes ecological processes and functions that provide the First Foods.

The River Vision outlines physical and biological processes encompassing 5 touchstones: **Hydrology, Geomorphology, Connectivity, Riparian Vegetation, and Aquatic biota** which together with the First Foods, provide an overall framework for guiding tribal programs in regards to protecting and restoring ecological processes and functions. Health watershed processes and functions are the fundamental elements that create diversity, resiliency, and the ability of our river systems to provide sustenance and natural resources to support our culture and heritage.

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 are paramount to tribal cultures, economies and the region (CBFWA, 1990) and (CRITFC, 1995). 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 (NPCCa, 2004) and (NPCCb, 2004). 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. By the early 1990's, Snake River spring-summer Chinook and summer steelhead populations were suppressed to the point of triggering Federal ESA listings (spring-summer Chinook in 1992 and summer steelhead in 1997, and bull trout in 1998). Other native fish, including Pacific lamprey populations are also highly suppressed and with possible future ESA listing possible. The following tables illustrate estimated historic and current spring Chinook salmon and summer steelhead returns to the Grande Ronde Subbasin (NPCCa, 2004). Of particular note is an 87 percent decrease in spring Chinook and 70 percent decrease in summer steelhead populations from estimated historic levels.

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	Estimated Historic Returns % of total	Estimated Current Returns count	Estimated Current Returns % 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%**

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	Estimated Historic Returns % of total	Estimated Current Returns count	Estimated Current Returns % 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%**

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 http://www.grmw.org/).

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 Natural Resource Conservation Service (NRCS) Wetland Reserve Program (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 described in the 2013 NPPC Project Proposal for the CTUIR Watershed Restoration Project (199608300) incorporated here by reference.

During the 17-year project history, the CTUIR has helped administer and implement a number of projects, enhancing nearly 50 miles of instream habitat. Conservation easements totaling about 1,900 acres on four large ranches/farms have been secured through a combination of NRCS WRP, CREP, and BPA programs. The project has constructed 17 miles of fence, 16 off-channel water developments, and installed over 150,000 trees, shrubs, sedge/rush plugs, and seeded over 800 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 DURING FY2013

- Implemented fish habitat enhancement activities on the Catherine Creek (CC 44) Phase I and Rock Creek Phase I Projects.
- Maintained and monitored a 15 year riparian conservation easement along 0.75 mile of Catherine Creek.

- Conducted baseline and post project morphological surveys along 2 miles of Catherine Creek.
- Initiated planning, field surveys, and design on projects planned for construction during 2013 through 2015 including:
    - Catherine Creek (CC44) Project in cooperation with the Union Soil and Water Conservation District (USWCD), Bureau of Reclamation (BOR), and Oregon Department of Fish and Wildlife (ODFW). Project covers 4 miles of mainstem Catherine Creek.
    - Continued morphological surveys and project design on Rock Creek and Graves Creek.
- Project staff repaired and maintained fences and planted 960 trees on the Meadow Creek (Habberstad) Project.
- Continued the Land Acquisition Planning process for several properties including the Cunha Ranch aimed at securing a permanent conservation easement on the 2,928 acre ranch, and future acquisition of the 545 acre Southern Cross Ranch.
- Initiated design and mapping of proposed fence lines for the Cunha Ranch conservation easement.
- Project Leader participated on the Grande Ronde Model Watershed Board of Directors and Technical Team to review and develop projects, including BiOp/Remand Projects.
- Project Leader participated on the Snake River Salmon and Steelhead Recovery Team (Habitat).
- Project Leader participated in the Technical Advisor Committee for the Atlas Process.
- Assistant Biologist participated in OWEB small grant committee.
- Assistant Biologist participated in NRCS Local Working Group meetings.
- Assistant Biologist and Habitat Biologist drafted riparian restoration section of NRCS Conservation Implementation Strategy (CIS) plans for the Upper Grande Ronde River watersheds.
- Assistant Biologist completed GIS work for CIS reports for 3 other watersheds (Catherine Creek, Willow Creek, and Indian Creek).
- Project Staff attended relevant trainings and classes (River Restoration Northwest, CHAMPS snorkel training).
- Project staff compiled monitoring data from 1997 to 2013 for Atlas Process.
- Staff conducted monitoring and evaluation activities on project areas.
- Implemented a weed treatment plan on the Willow Creek Project.
- Habitat Biologist drafted the Baseline Inventory Documentation and Acknowledgement of Property Condition report for the Southern Cross Ranch.
- Pursued future restoration efforts by continuing discussions with both state and private landowners about restoration opportunities along McDonald Creek, Hacker Creek, Lanman Creek, Fir Creek, Dry Creek, Whiskey Creek, Indian Creek and the Grande Ronde River (State Parks and ODOT).
- Completed and submitted the Grande Ronde Subbasin Restoration Project proposal for the 2013 ISRP Geographic Review.
- Project staff coordinated with landowners, NRCS, and UCSWCD to provide technical assistance for restoration project enrollment in EQUIP, CREP, and OWEB small grants. This work included:

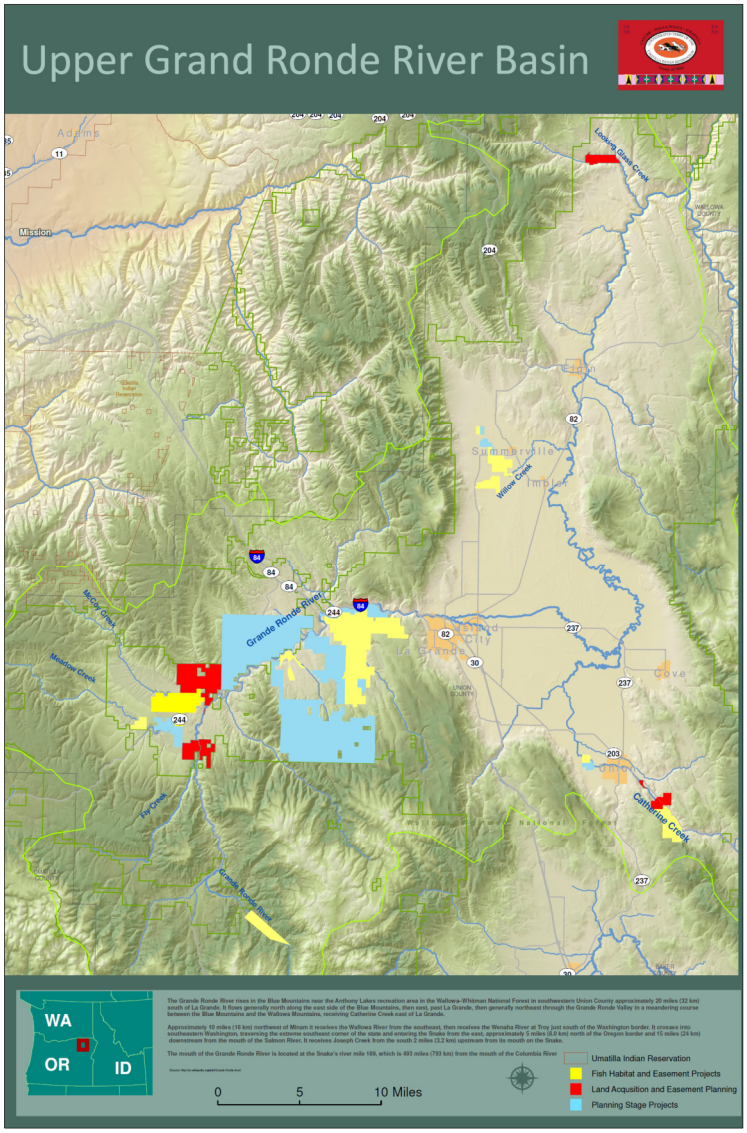
    - Willow Creek-OAF, Stephen Craig, and Wiseman property
    - Rock Creek
    - CC44-Fite (spring development-small grant)
    - CC44 –Kirby
    - Smith Creek – Ken McCoy property
- Project staff participated in public outreach activities including:
    - Newspaper article about the Willow Creek Project for the Confederated Umatilla Journal
    - Newspaper article about the Graves Creek Project for the Grande Ronde Model Watershed Ripples newsletter
    - Assistant Biologist and Habitat Biologist conducted tour of the Willow Creek Project to 50 middle school students
    - Project Leader and Habitat Technician participated with the Grande Ronde Model Watershed for student vegetation transect training/demonstration day at Ladd Marsh Wildlife Area

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.

FIGURE 1 UPPER GRANDE RONDE SUBBASIN VICINITY AND PROJECT LOCATIONS



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.

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%
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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)

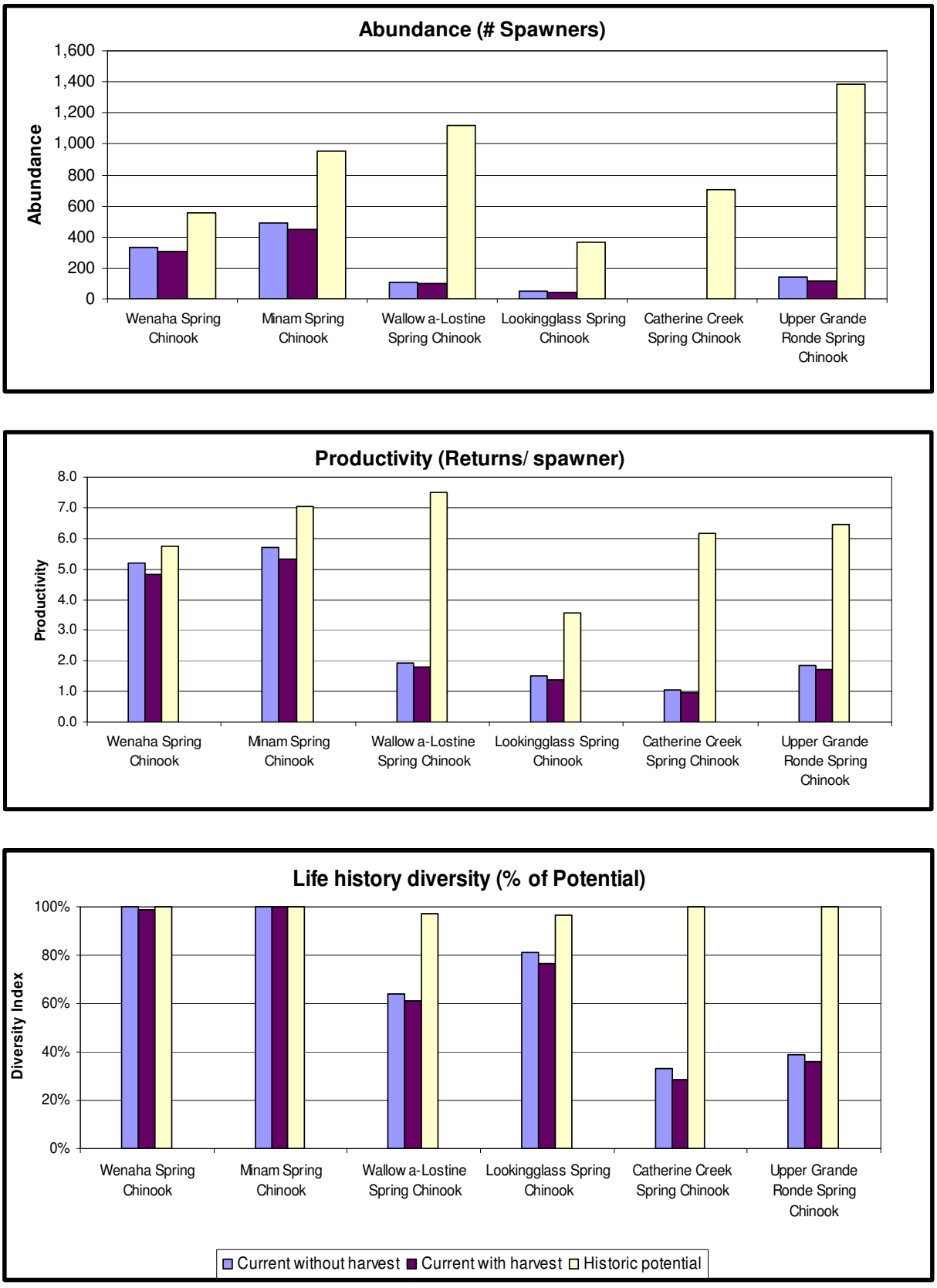
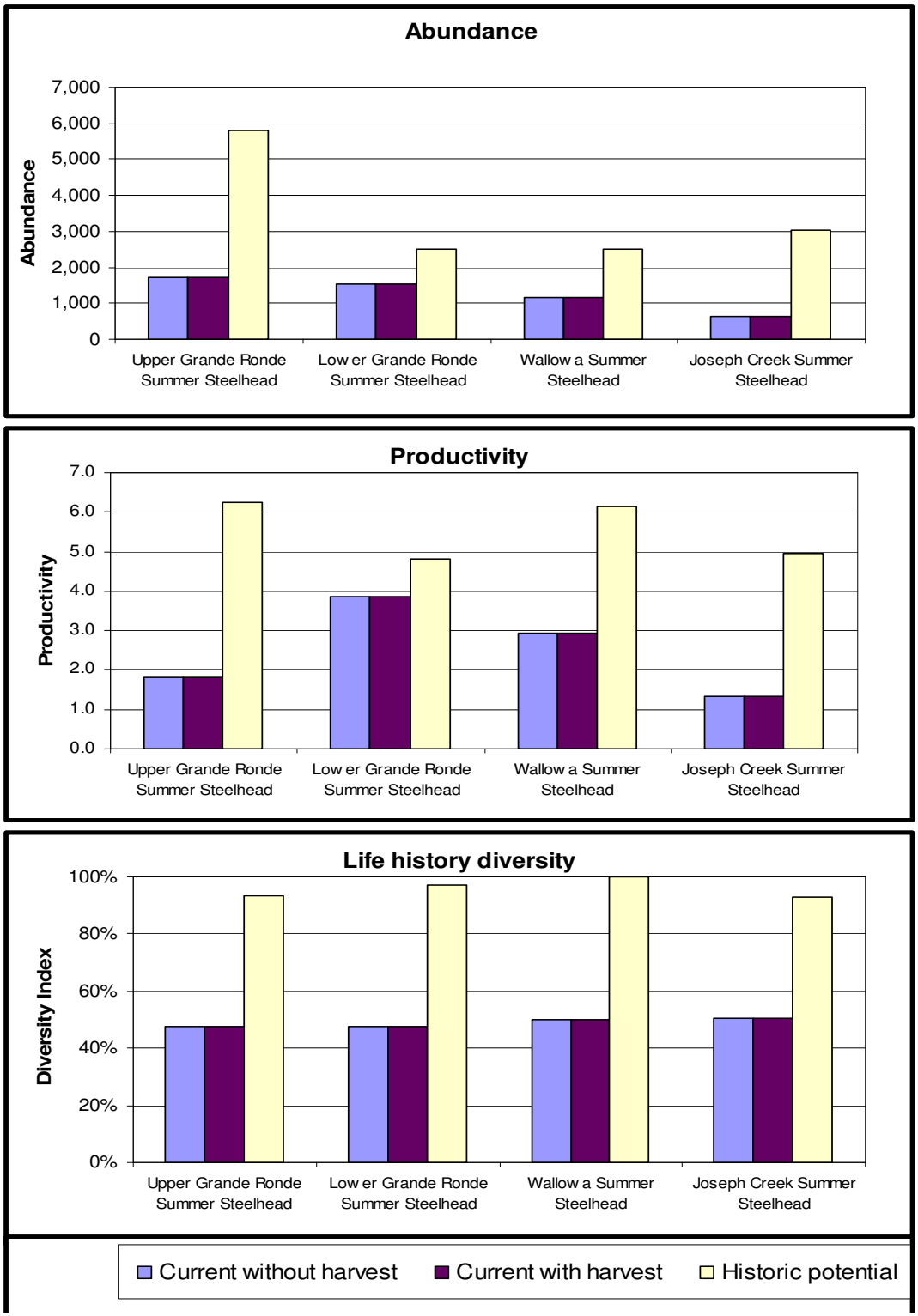


FIGURE 3 **EDT ESTIMATES OF ABUNDANCE, PRODUCTIVITY, AND LIFE HISTORY DIVERSITY COMPARED TO ESTIMATED HISTORIC POTENTIAL FOR GRANDE RONDE SUBBASIN SUMMER STEELHEAD (NPCC 2004A, FIGURE 22, PG. 72)**



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 THOURSOUGH 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, 1990), Wallowa-Whitman et.al. 1992, (Huntington, 1993) GRMWP (1994), (Mobrand, 2003), (NPCC, 2009), and (NPCCa, 2004). 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, 1997). 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 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 with NRCS staff on project design, permitting, project stakeout, and construction inspection for the McCoy Meadows Project repairs, the Dark Canyon (Cunha) Project spring developments, and the materials gathering for the Rock Creek (Bean) Project. CTUIR administered all aspects of construction subcontracting, materials acquisition, and administration for these projects during 2013.

The Project Leader supervised 3 permanent employees and a seasonal crew of 3 90-day e-hire employees to accomplish project activities. A part-time permanent Fisheries Technician position was created due to the seasonal workload to assist in meeting project deadlines projected through 2018. Staff training included 2013 River Restoration Northwest Symposium (Project Leader and Assistants).

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.

Additionally, CTUIR staff initiated preliminary EC compliance on projects planned for implementation beginning in 2013. 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 Rock Creek Project and Graves Creek Phase II in FY2013 with completion scheduled for late summer in preparation to construction initiation.

Coordination and Public Outreach/Education

Coordination and public education were 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 participates in multiple basin programs and processes associated with project prioritization and selection, funding, and technical review. Focus during FY2013 included work on the Catherine Creek Atlas process, initiation of the Upper Grande Ronde Atlas, and participation on the GRMW technical review team to evaluate and select projects for funding recommendations through the GRMW Step-Wise Process. Additionally, CTUIR staff continued working on look forward projects with close coordination between BPA and BOR to develop core project complexes and initiate concept planning in conjunction with CTUIR-BPA Accord land acquisition strategies.

CTUIR staff also participated in a several educational and public outreach activities which included a newspaper article about the Willow Creek Project for the Confederated Umatilla Journal, a newspaper article about the Graves Creek Project for the Grande Ronde Model Watershed Ripples newsletter, a field tour of the Willow Creek Project for 50 middle school students, and an educational field day demonstrating vegetation transects at Ladd Marsh Wildlife Area for middle school students.

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.

Staff efforts associated with planting during the reporting period included installation of several hundred containerized trees (Black Cottonwood, Hawthorne, and Red-Osier Dogwood) and live willow whips on disturbed banks of the CC44 Project. Disturbed areas were also seeded and mulched with a native grass seed mix consisting of Basin Wild Rye (33.06%), Rosanna Western Wheat Grass (19.07%), Snake River Wheat Grass (9.34%), Tufted Hairgrass (10.41%), Idaho Fescue (16.51%), Big Blue Grass (9.94%). In addition, several hundred containerized plants (Ponderosa Pine and Red Osier Dogwood) were planted on floodplain benches on the Meadow Creek Habberstad Project. Containerized plants stored at the ODF Larch seed orchard for future planting on the Willow Creek Project were irrigated bi-weekly throughout the growing season and were transported to an enclosure for storage through the winter.

Identify and Select Projects

Habitat protection, restoration and enhancement project opportunities were identified and developed during FY 2013. Activities included land and easement acquisition project identification and planning (Southern Cross Land Acquisition, Tsiatsos Ranch Conservation Easement, and Cunha Ranch Conservation Easement), coordination and planning with State, Federal, local partners, and private landowners, and participation on Grande Ronde Model Watershed (GRMW) Board and Technical Committee to evaluate projects for BPA funding through the Step-Wise Process.

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 included maintenance of plant enclosures and riparian fence along McCoy Meadows Project area, water gaps on Meadow Creek (Habberstad) and Catherine Creek (CC37), construction of ¼ mile of riparian fence on Catherine Creek (CC44) Project, and repairs to fences along the Catherine Creek (CC37) Project.

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

Water Temperature 2013 Summary:

During 2013 forty five (45) temperature probes were deployed within the Grande Ronde Basin by the Fish Habitat Project, all recording at 1-hour intervals. Four additional probes were deployed in 2013, one on the upper reach of Rock Creek as part of the Rock Creek Fish Habitat Enhancement Project monitoring and three on the Grande Ronde River - at Hilgard State Park, below the mouth of Jordan Creek, and at Bird Track Springs campground, to monitor pre-project temperatures for the upcoming Hilgard and Bird Track projects.

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, the number of records when temperatures were at or exceeded 20ºC, 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. Diurnal fluctuations in water temperature were also plotted.

The following summary of water temperature data will be broken down into an overview of each sub-watershed area which includes: the Upper Grande Ronde, the Mainstem Grande Ronde, Meadow Creek, McCoy Creek, Dark Canyon Creek, Rock Creek, and Lower Grande Ronde sub-basin (Willow Creek, South Fork of Willow Creek and End Creek). A summary of temperature metrics for the Upper Grande Ronde and sub-watersheds can be seen in Table 5, with Willow Creek metrics illustrated in Table 7.

Table 5 WATER TEMPERATURE PROBE METRICS FOR 32 SITES IN THE UPPER GRANDE RONDE, MAINSTEM GRANDE RONDE, ROCK CREEK, MEADOW CREEK, DARK CANYON CREEK, MCCOY CREEK, AND CATHERINE CREEK SUB-WATERSHEDS DURING 2013

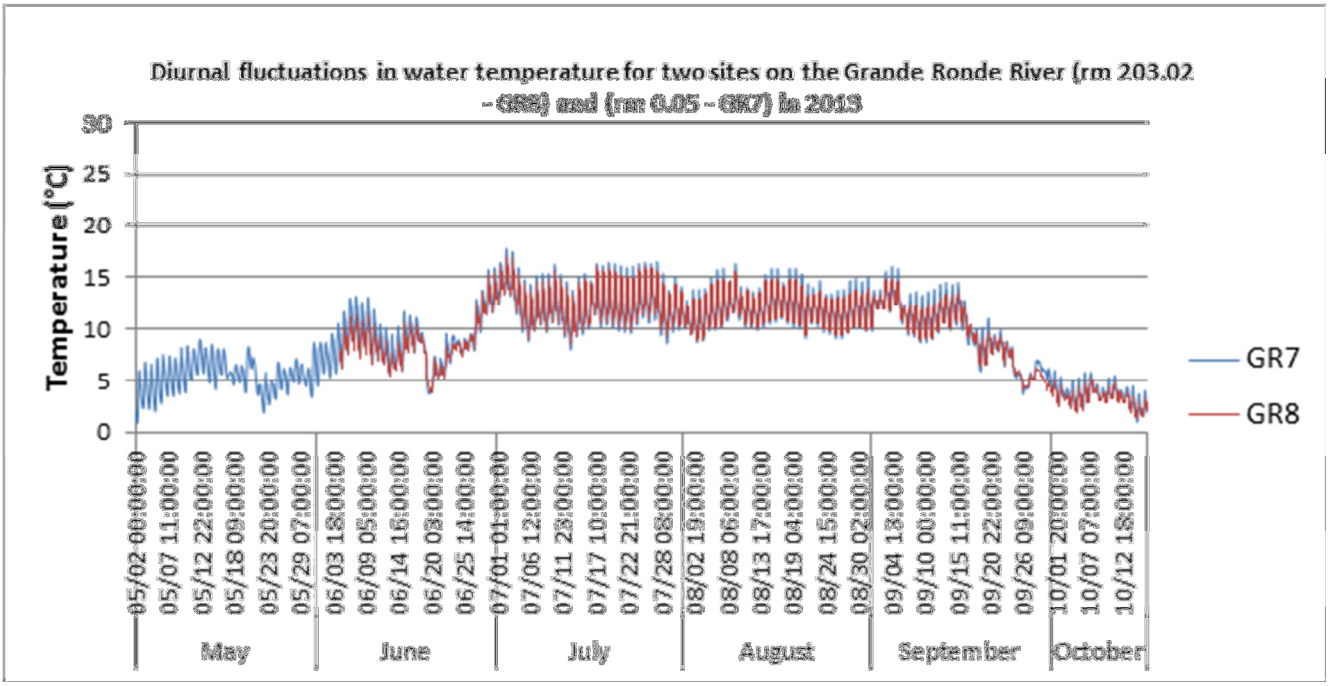
Stream	Location Name	River mile	Date Start	Date End	# of Days Deployed	# of Hours in Deployment Period	# of Hours For Analysis	Max Temperature (°C)	Hours >=25 ºC	Hours >=20 °C	Hours at 10-15.6 °C	% at 10-15.6 °C	Daily temp >= 17.8 (# days)
Battle Creek	BATTLE1	0.04	4/1/2013	11/12/2013	225	5400	5400	20.62	0	4	2839	52.6	0
Clear Creek	CLC1	0.06	5/2/2013	10/15/2013	167	4008	4008	18.52	0	0	1752	43.7	0
Dark Canyon	DC1	0.06	3/29/2013	10/30/2013	215	5160	5161	24.35	0	154	1988	38.5	5
Dark Canyon	DC2	1.9	3/29/2013	10/30/2013	215	5160	5161	24.93	0	257	1632	31.6	17
Grande Ronde River	GR1	176.2	5/17/2013	11/13/2013	181	4344	4200	30.66	301	1064	861	20.5	81
Grande Ronde River	GR3	174.7	5/17/2013	11/13/2013	181	4344	4344	30.46	309	1103	888	20.4	85
Grande Ronde River	GR4	194.23	5/2/2013	10/16/2013	168	4032	4032	27.17	72	686	1243	30.8	46
Grande Ronde River	GR5	199.7	5/2/2013	10/16/2013	168	4032	4032	20.81	0	9	1507	37.4	0
Grande Ronde River	GR6	202.3	5/2/2013	10/16/2013	168	4032	3840	18.9	0	0	1450	37.8	0
East Fork Grande Ronde	GR7	0.05	5/2/2013	10/16/2013	168	4032	4032	17.76	0	0	1803	44.7	0
Grande Ronde River	GR8	203.02	6/5/2013	10/16/2013	134	3216	3216	17.09	0	0	1851	57.6	0
Grande Ronde River	GR9	182.5	5/17/2013	11/13/2013	181	4344	3432	29.75	196	752	805	23.5	60
Grande Ronde River	GR10	169.6	5/17/2013	10/23/2013	159	3816	3827	30.66	306	1229	831	21.7	89
McCoy Creek	MCCOY1	2.7	4/3/2013	10/29/2013	210	5040	5016	30.36	109	809	1430	28.5	57
McCoy Creek	MCCOY6	1.5	4/3/2013	10/29/2013	210	5040	4800	29.45	176	902	1379	28.7	67
McCoy Creek	MCCOY7	0.1	4/3/2013	10/29/2013	210	5040	4800	31.17	244	1083	1170	24.4	82
Meadow Creek	MEADOW1	2.9	4/3/2013	10/29/2013	210	5040	5040	32.81	384	1075	1373	27.2	79
Meadow Creek	MEADOW2	1.5	4/3/2013	10/29/2013	210	5040	5040	30.96	171	1109	1105	21.9	86

Meadow Creek Wetland	MEADOW3	1.06	4/3/2013	5/3/2013	31	744	744	20.424	0	2	93	12.5	0
Meadow Creek Wetland	MEADOW4	.17	4/3/2013	8/8/2013	128	3072	3072	29.25	46	455	1044	34.0	12
Meadow Creek	MEADOW5	7.53	3/29/2013	11/11/2013	228	5472	5472	31.06	205	921	1447	26.4	66
Meadow Creek	MEADOW6	6.77	3/29/2013	11/11/2013	228	5472	5472	31.17	183	988	1390	25.4	67
Rock Creek	ROCK1	0.23	4/10/2013	10/22/2013	196	4704	4704	31.88	427	1024	1474	31.3	82
Rock Creek	ROCK2	1.7	4/10/2013	8/28/2013	141	3384	3384	29.15	135	678	1079	31.9	50
Rock Creek	ROCK3	3	4/10/2013	7/21/2013	103	2472	2472	30.1	70	247	946	38.3	14
Rock Creek	ROCK4	4.5	4/10/2013	10/22/2013	196	4704	4656	27.1	18	227	2126	45.7	12
Graves Creek	GRAVES1	.5	4/10/2013	10/22/2013	196	4704	4704	27.3	36	290	2180	46.3	16
Catherine Creek	CC37LOWER	36	5/16/2013	10/27/2013	165	3959	3960	24.5	0	602	876	22.1	50
Catherine Creek	CC37UPPER	37	4/1/2013	10/27/2013	210	5029	5030	23.4	0	522	1046	20.8	39
Catherine Creek	CC44LOWER	40	5/30/2013	10/27/2013	150	3610	3611	23.6	0	422	1053	29.2	18
Catherine Creek	CC44RICKER	38	5/30/2013	10/27/2013	151	3624	3611	23.9	0	485	984	27.3	30
Catherine Creek	CC44UPPER	44	5/30/2013	10/27/2013	150	3610	3611	22.9	0	258	1220	33.8	2

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 2013 these probes recorded data for a maximum of 168 days (between 5/2/2013 and 10/16/2013). There were 192 records removed from the dataset due to either a probe being out of the water or similar reported problems, leaving 23,160 hours logged for analysis. During 2013 there were 72 records at the lower site below Vey Meadows (GR4) for temperatures >= 25°C. There were 695 records of temperatures >= 20°C.

- The upper probe on the Grande Ronde River (GR8), at river mile 203, logged 3,216 hours of data, the East Fork Grande Ronde River (GR7) logged 4,032 hours of data. These sites had zero hours >= 25°C or >= 20°C, a maximum temperature of 17.1°C, 1851 records when temperatures ranged between 10° - 15.6°C (57.16% of the data), and zero records

FIGURE 4 DIURNAL FLUCTUATIONS IN WATER TEMPERATURE AT TWO LOCATIONS WITHIN THE UPPER GRANDE RONDE RIVER.



Temperatures were below 17.8°C for the recording period of 6/5/2013 to 10/16/2013 at the upper probe site and from 5/2/13 to 10/16/2013 on the East Fork of the Grande Ronde River. The plot shows similarity in water temperatures at the two sites. Diurnal fluctuations were typically within 4 degrees centigrade.

of mean daily temperatures exceeded 17.8°C.

- The probe below the Vey Ranch (GR4) had 72 hours of lethal limits recorded compared to 0 at the probe above the acclimation facility (GR5). There were 686 records of

temperatures >=20°C at GR4 and 9 records at GR5. Approximately 30% of the deployment period at GR4 site was in 10-15.6 °C range compared to 37% at GR5, and GR4 had 46 days recorded with a mean >= 17.8 °C compared to 0 at GR5.

- The middle Grande Ronde River probe (GR6) and the Clear Creek probe (CLC1) had 0 records of temperature >= 25°C or >=20°C. Approximately 43% of data at CLC1 was in 10-15.6°C range compared to 37.8% at GR6. No records of mean daily >=17.8 °C were recorded at either site.
- Comparisons with other years show:
    1. GR4 had the highest number of lethal limit and temperature >=20ºC since 2010. GR4 had the lowest percent of time in the 10-15.6ºC range, and the highest number of days with a mean daily temperature >=17.8ºC since 2010.
    2. GR5 had 9 hours with temperatures >=20ºC in 2013 compared to 0 in other years, the percentage of time in the 10-15.6ºC range was slightly higher than 2012 but lower than other years.
    3. GR6 had the highest maximum temperature (18.9ºC) recorded in 2013 compared to those recorded in 2010-2012 at this site.
    4. GR7 had the highest maximum temperature since 2010 (17.7ºC) but had the largest percentage of the deployment period in the 10-15.6ºC range compared to other years (44.7%).
    5. GR8 had the highest maximum temperature since 2010 (17ºC) but had the largest percentage of the deployment period in the 10-15.6ºC range compared to other years (57.6%).

FIGURE 5 DIURNAL FLUCTUATIONS IN WATER TEMPERATURE FOR CLEAR CREEK AND THE GRANDE RONDE RIVER (MID TAILINGS PROJECT) JUST UPSTREAM OF CLEAR CREEK.

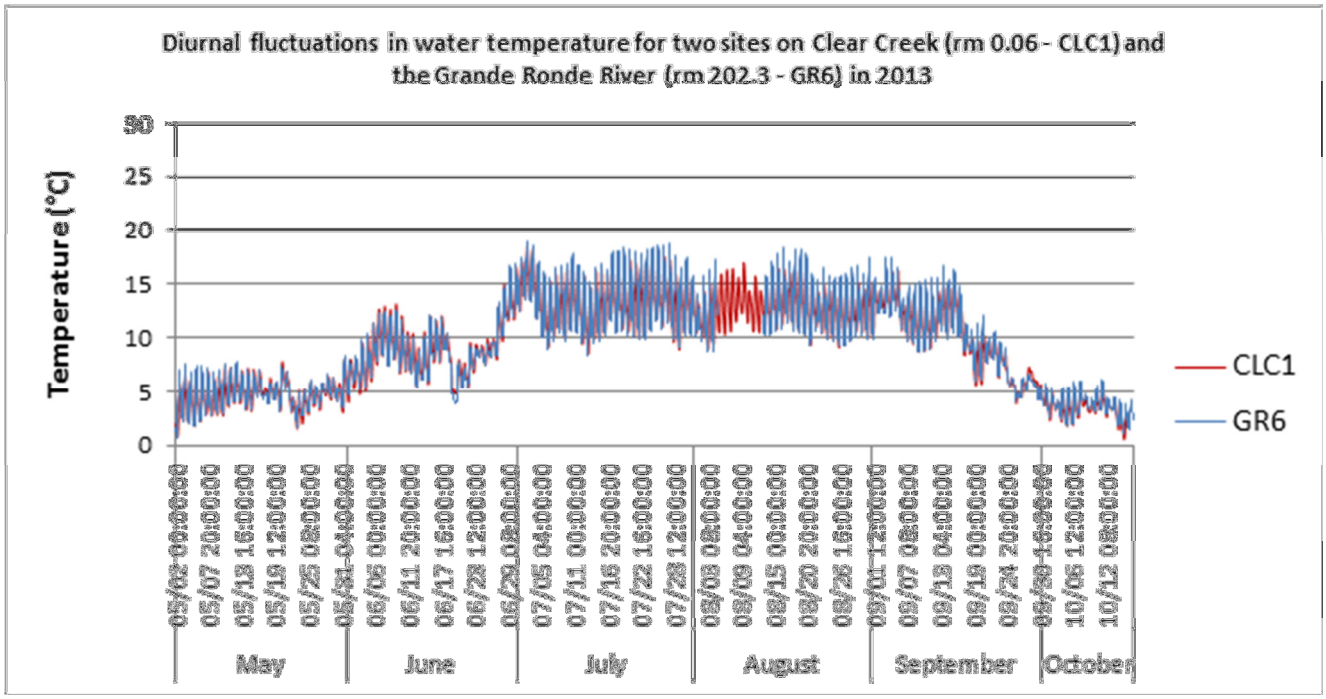
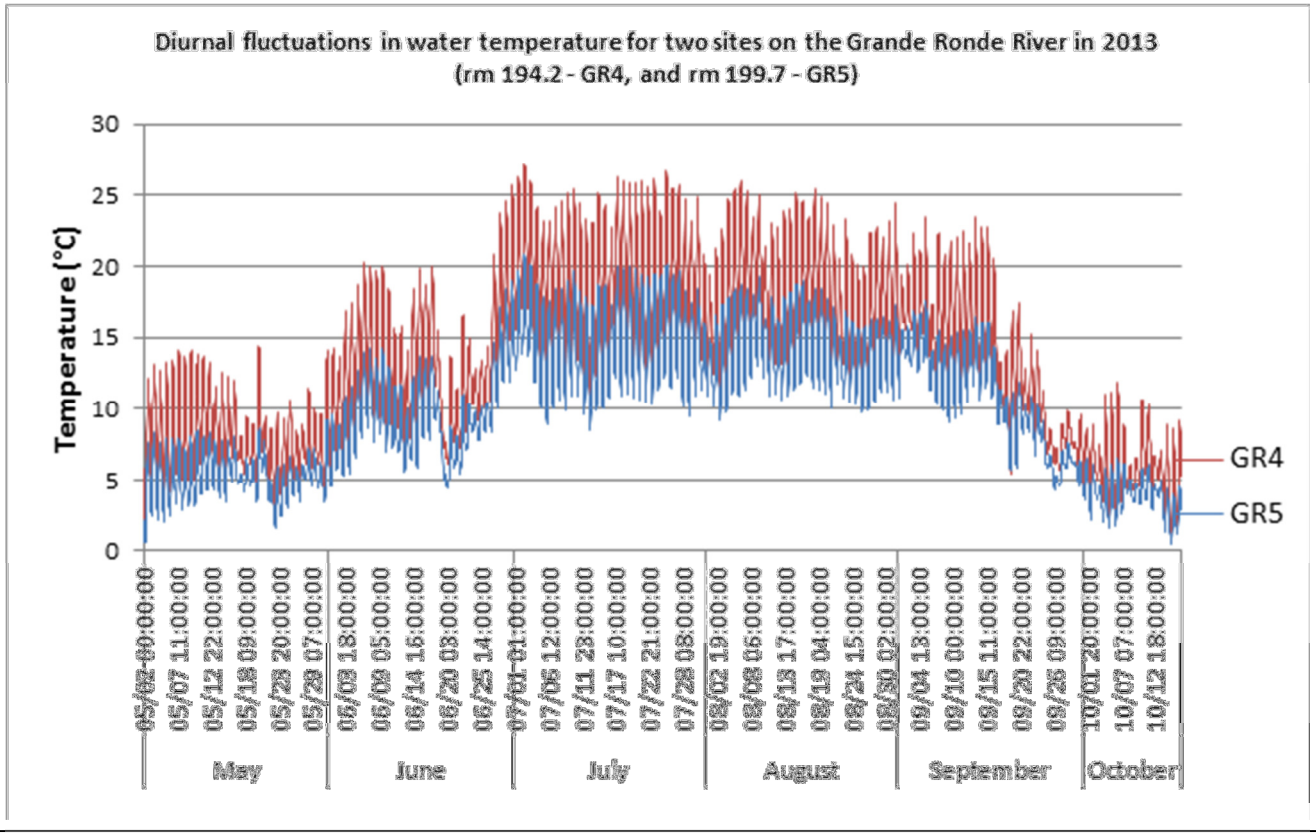


FIGURE 6 DIURNAL FLUCTUATIONS IN WATER TEMPERATURE ALONG THE GRANDE RONDE RIVER DURING 2013.



Meadow Creek Watershed

The CTUIR Fish Habitat Project had 12 probes deployed in 2013 within the Meadow Creek Watershed 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:

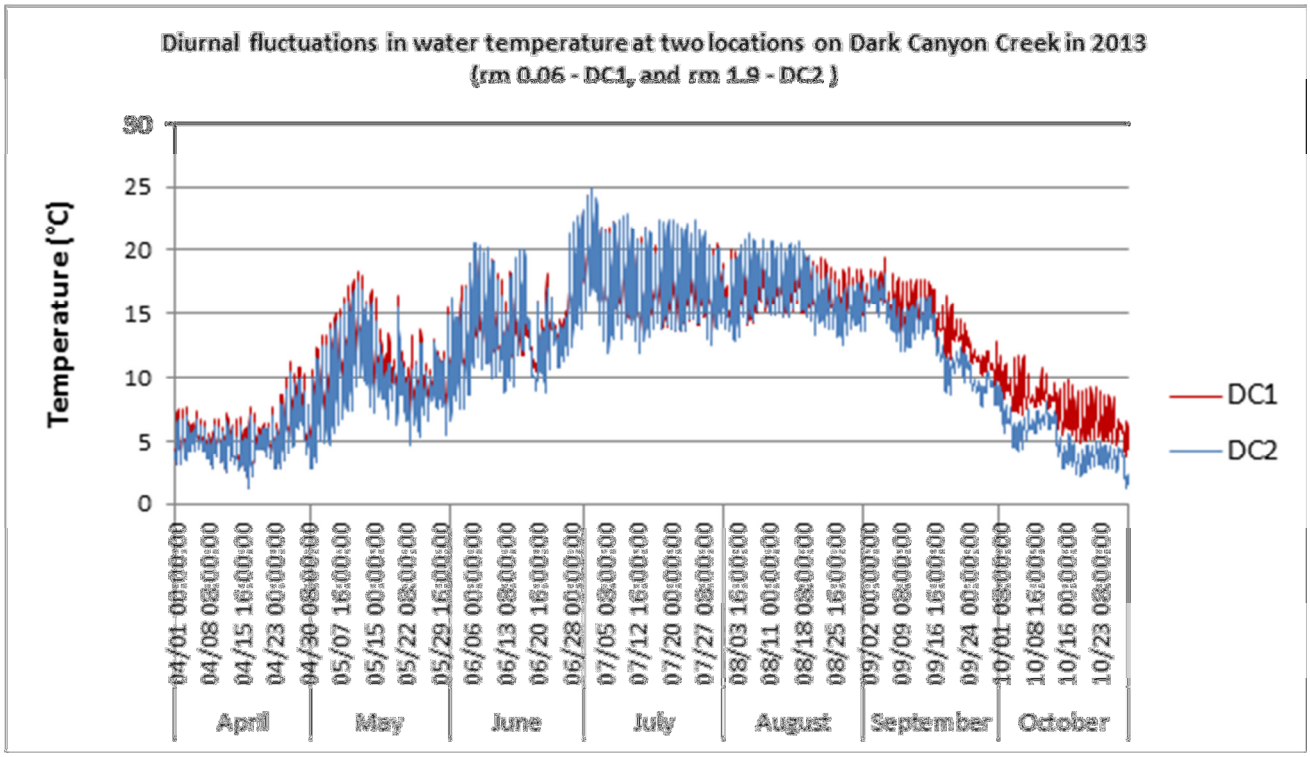
- Dark Canyon (landowner Joe Cunha), with 2 probes – DC1 and 2 at river miles 0.06 and 1.9 respectively.
- McCoy Meadows Ranch (landowner Mark and Lorna Tipperman) McCoy Creek, with 3 probes – MCCOY1, 6, 7 at river miles 2.7, 1.5, and 0.1 respectively.
- McCoy Meadows Ranch (landowner Mark and Lorna Tipperman) Meadow Creek and the Wetland Complex, with 4 probes – MEADOW1 and 2 on mainstem Meadow Cr 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.
- Meadow Creek Habberstad (landowner John Habberstad), with 3 probes – MEADOW5 and 6 at river mile 7.53 and 6.77 respectively and BATTLE1 on Battle Creek at river mile 0.04.

Dark Canyon Creek

The two probes along Dark Canyon Cr were deployed from 3/29/2013 to 10/30/2013 and logged a combined total of 10,320 hours of water temperature. There were 3,620 records where water temperature was between 10ºC and 15.6ºC (35.1% of all logged temperatures).

- No records of lethal limits (>= 25ºC). There were 411 records of temperatures >= 20°C.
- The upper site had 17 days and the lower site had 5 days where the mean daily was >=17.8ºC.
- The upper site had 31.6% of its logged temperatures between 10ºC and 15.6ºC (1,632 hours) compared to 38.5% for the lower site (1,988 hours).
- Both sites had more hours >=20 °C in 2013 compared to previous 3 years.
- The upper site had a maximum temperature of 24.9ºC compared to 24.3ºC at the lower site, recorded 7/2/23013.

FIGURE 7 DIURNAL FLUCTUATIONS IN WATER TEMPERATURE ALONG DARK CANYON CREEK DURING 2013.



McCoy Creek

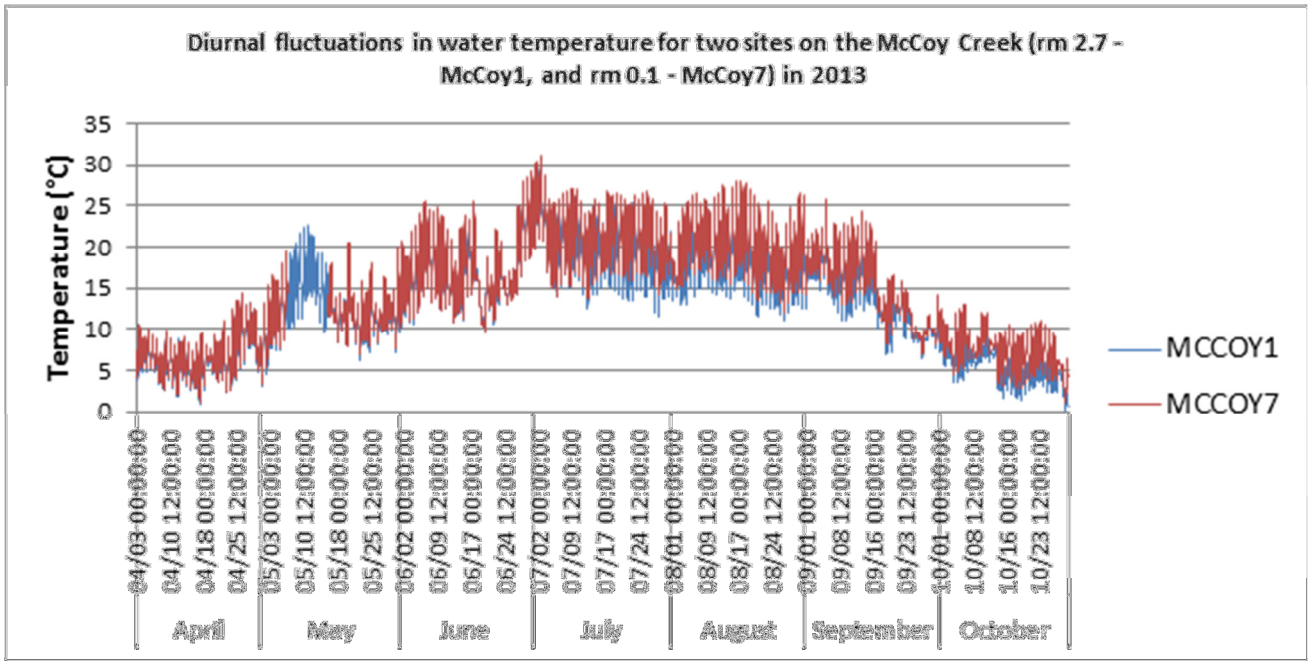
There were a total of 14,616 hours of data from 3 probes for the analysis collected between 4/3/2013 and 10/29/2013. Combining the data for the probes gave a total of 3,979 hours when water temperature was between 10ºC and 15.6ºC (27.2% of the data).

- A total of 529 hours logged when temperatures reached 25ºC or higher.
  - The lowest site on McCoy Creek in 2013 had the greatest number of records at lethal limits, greatest number of records where temperatures were >=20 °C and least percent time in 10-15.6 °C range compared to the other 2 sites.

- All 3 sites had the highest number of lethal limit and temperatures >=20ºC since 2010.
- All 3 sites had the lowest percent time in 10-15.6ºC range compared to 2010-2012.
- All 3 sites had the highest number of days with a daily mean >=17.8ºCsince 2010.

- There were a total of 2,794 records of temperatures >= 20°C,
  - MCCOY1 recording 809 hours,
  - MCCOY6 recording 902 hours,
  - MCCOY7 recording 1083 hours.
- Mean daily temperatures were >=17.8ºC on a maximum of 82 days at river mile 0.1 (see Table 5).

FIGURE 8 DIURNAL FLUCTUATIONS IN WATER TEMPERATURE ALONG MCCOY CREEK DURING 2013.

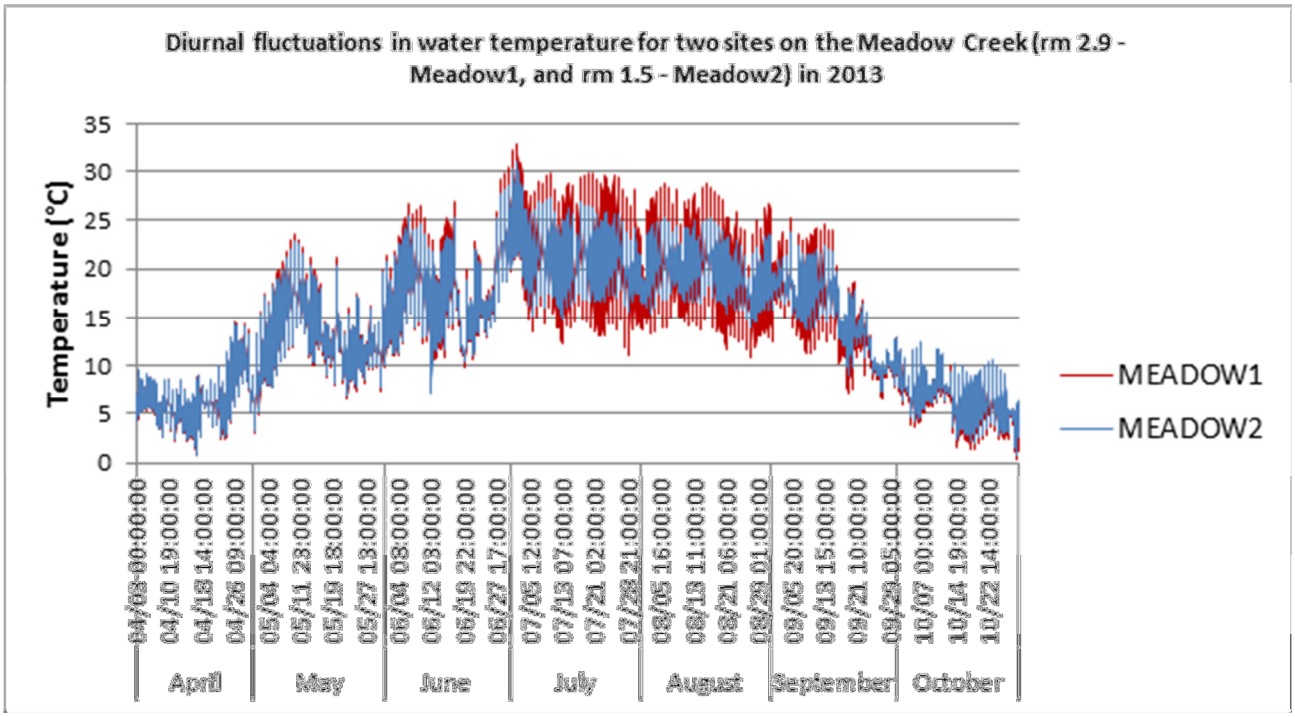


Meadow Creek and the Wetland Complex

Meadow Creek:

- Both probes at river mile 2.9 (MEADOW1) and river mile 1.5 (MEADOW2) were deployed for 210 days between 4/3/2013 and 10/29/2013. They recorded a total 10,080 hours of data for the analysis. Both sites had highest number of records >=25 °C and >= 20 °C compared to previous 3 years, with less hours at temperatures >=20º for the upper site compared to the lower site in 2013. The lowest percent of time at both sites in the 10-15.6ºC range occurred in 2013 compared to the previous 3 years, with the highest percent of time with mean daily temperatures >=17.8ºC compared to the previous 3 years.

FIGURE 9 DIURNAL FLUCTUATIONS IN WATER TEMPERATURE ALONG MEADOW CREEK DURING 2013.



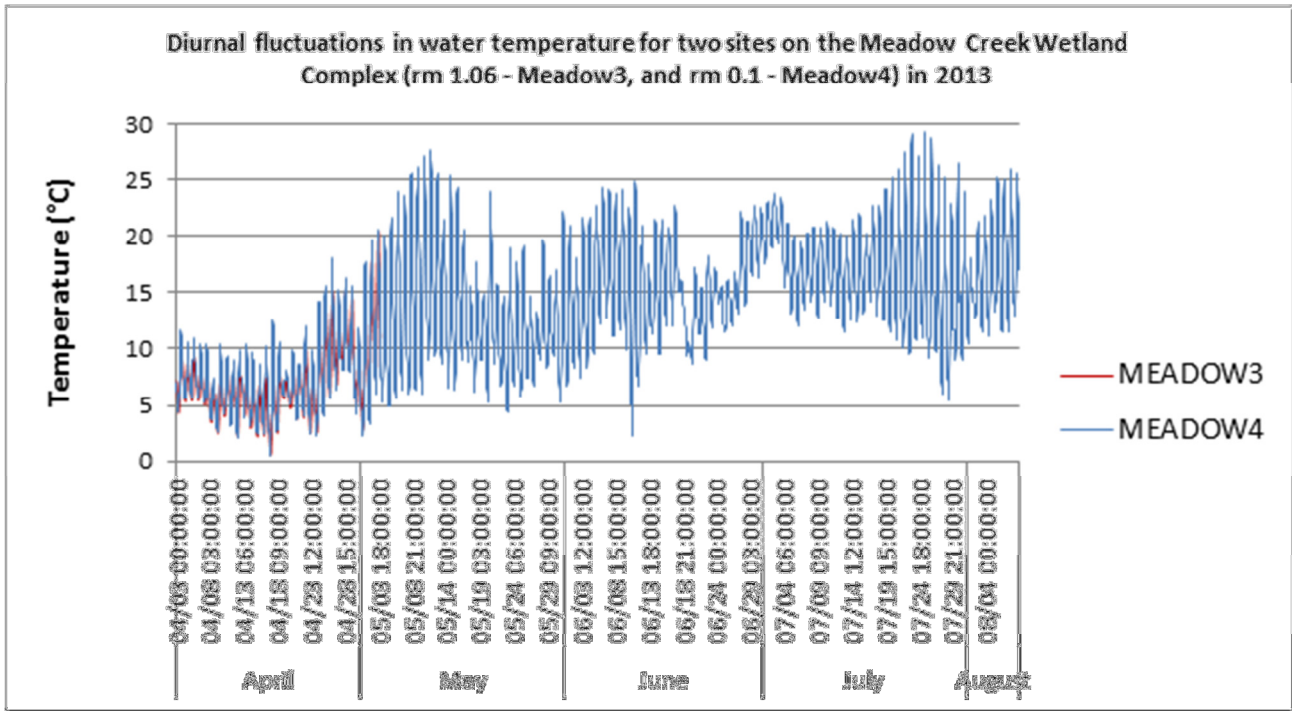
- MEADOW1 (river mile 2.9)
  - recorded 1,373 hours where temperatures were between 10ºC and 15.6ºC (27.2% of the data),
  - 384 hours were of temperatures >= 25ºC (compared to 263 in 2012),
  - 1075 hours of temperatures >= 20ºC,
  - 79 days with a mean daily value >=17.8ºC (65 days in 2012).

- MEADOW2 (river mile 1.5)
  - Recorded 1,105 hours where temperatures were between 10ºC and 15.6ºC (21.9% of the data),
  - 171 hours were of temperatures >= 25ºC for (compared to 98 hours in 2012),
  - 1109 hours of temperatures >= 20ºC,
  - 86 days with a mean daily value >=17.8ºC (49 days in 2012).

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 the upper probe (MEADOW3) deployed from 4/3/2013 to 5/3/2013 and the lower probe (MEADOW4) deployed from 4/3/2013 to 8/8/2013. During 2013 the wetland channel dried up by May 3rd (22 days earlier than in 2012, 49 days earlier than 2011 and 94 days earlier than in 2010).

FIGURE 10 DIURNAL FLUCTUATIONS IN WATER TEMPERATURE ALONG THE MEADOW CREEK WETLAND COMPLEX DURING 2013.



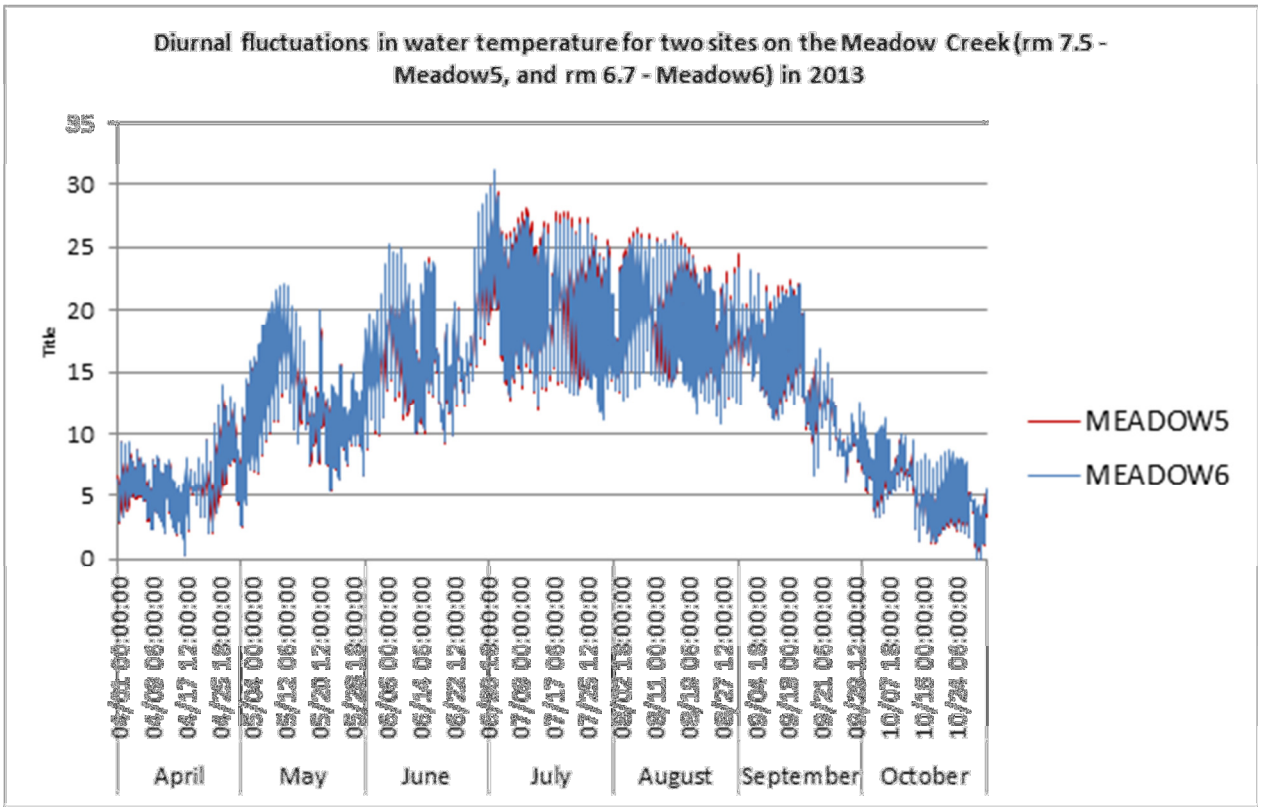
During the January and February 2011 ice events and high spring run-off the Meadow Creek Wetland Complex intake experienced a large deposit of gravels which have likely been contributing to the early drying up of the channel. There are currently discussions between CTUIR Fish Habitat and the Natural Resource Conservation Service (NRCS) to address channel down-cutting at the Meadow Creek grade control structure immediately downstream of the wetland intake. Should these discussions result in the need for instream work within Meadow Creek the barrier at the intake structure could be addressed as well.

Meadow Creek - Habberstad

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 for 228 days from 3/29/2013 to 11/11/2013.

- There were a total of 10,944 hours used for the analysis
  - 2,837 hours (25.9%) were of temperatures between 10ºC and 15.6ºC (compared to 33.8% of the 2012 data).
- There were 205 hours of temperatures >=25ºC at the upper site compared to 183 hours for the lower.
- The upper site also had 26.4% of its records between 10ºC and 15.6ºC compared to 25.4% for the lower site.
- Mean daily temperatures were >=17.8ºC for 67 days at the lower site compared to 66 days at the upper.
- There were 921 hours at the upper site of temperatures >=20°C and 988 hours at the lower site.

FIGURE 11 DIURNAL FLUCTUATIONS IN WATER TEMPERATURE AT TWO LOCATIONS ON MEADOW CREEK DURING 2011 WITHIN THE HABBERSTAD PROJECT AREA.

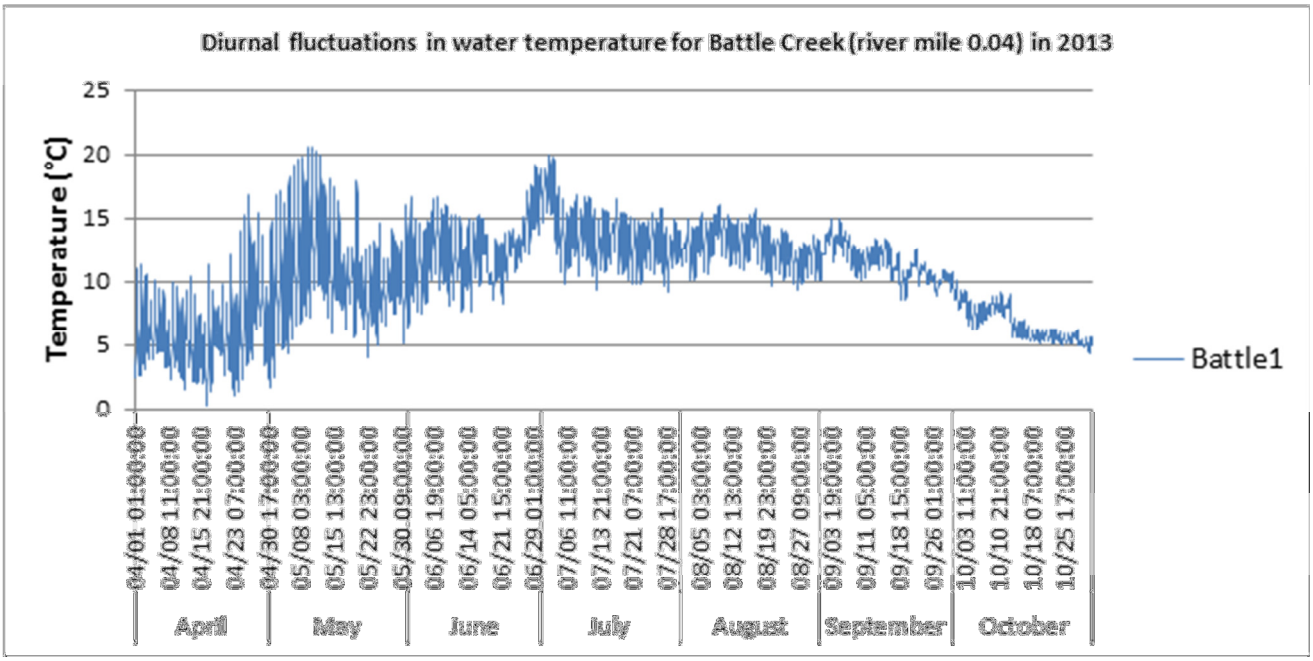


Battle Creek - Habberstad

There was one probe deployed on Battle Creek during 2013 at river mile 0.04 between 4/1/2013 and 11/12/2013.

- This probe had 5,400 hours logged for the analysis of which 2,839 hours were between 10ºC and 15.6ºC (52.6% of the data).
- There were no records of temperatures >= 25ºC or a mean daily temperature >=17.8ºC.
- There were 4 hours recorded when temperatures were >=20°C.
- The maximum temperature was less than those recorded 2009-2012.
- The number of hours >=20ºC was considerably less than those recorded each year since 2009.
- The percent time in 10-15.6°C range in 2013 (52.6%) was higher than other years except that of 2011 (53.1%)

FIGURE 12 DIURNAL FLUCTUATIONS IN WATER TEMPERATURE ON BATTLE CREEK DURING 2011 WITHIN THE HABBERSTAD PROJECT AREA.



Willow Creek and Tributaries on McKenzie Trust and Stephen Craig Propertes

Seven probes were deployed within the boundaries of the McKenzie Trust property in order to monitor the Willow Creek Fish Habitat Enhancement Project on the Mackenzie Trust/Stephen Craig properties. Five probes were installed on mainstem Willow Creek (WILL1 – WILL5) and the remaining 2 on Dry Creek and Fir Creek. Data was recorded for 216 days between 4/4/2013 and 11/5/2013. There was a total of 34,511 hours logged for analysis, wherein 1 probe (WILL1) reached the DEQ salmonid lethal temperature limit of 25°C for 82 hours and temperatures ranged between 10° - 15.6°C for 10,606 hours (about 30% of the data). Diurnal fluctuations in water temperatures were plotted and a sample of these data is displayed below in Figures 12-14.

- Four of the five Willow Creek probes did not record lethal temperatures, with the maximum being 27.5°C, at river mile 7.65 (WILL1).
- The probes recorded progressively warmer maximum temperatures downstream of the McKenzie road bridge.
    - The probe at river mile 10.76 (WILL5) had 42 hours of temperatures >=20°C
    - The probe at river mile 9.6 (WILL4) had 110 hours of temperatures >=20°C
    - The probe at river mile 9.12 (WILL3) had 75 hours of temperatures >=20°C
    - The probe at river mile 7.89 (WILL2) had 294 hours of temperatures >=20°C
    - The probe at river mile 7.65 (WILL1) had 800 hours of temperatures >=20°C
- The probe on Fir Creek at river mile .03 (FIRCR1) had 170 hours of temperatures >=20°C, and the probe on Dry Creek at river mile .44 (DRYCR1) had 0 hours.
- The probe on Dry Creek at the upper McKenzie Trust property boundary recorded the coolest temperatures with no records of temperatures >=25°C, >=20°C, or with mean daily values >=17.8°C,
    - 42.1% of all Dry Creek records over the 135 days it was deployed were of temperatures between 10°C and 15.6°C.
    - The maximum temperature at this site was 19°C on 7/02/2013.

Fir Creek, as with 2012, provided a warming influence on Willow Creek above the McKenzie road bridge,

- It had no records >=25°C
- 170 hours >=20°C
- This stream had 88 days when mean temperatures were >=17.8°C
- 1,845 hours of temperatures between 10°C and 15.6°C (35.8% of the data for this site compared to 45.4% for 2012).

Catherine Creek 37

Two probes were deployed within the boundaries of the Yeargain property in order to monitor the CC37 Fish Habitat Enhancement Project, constructed July-August, 2012. The lower probe at river mile 36 had less hours for analysis (3690 hours) compared to the upper probe at river mile 37 (5030 hours). Both probes had 0 records of lethal limits.

- The lower probe had 602 records of temperatures >=20ºC compared to 522 at the upper site.
- The lower probe had a greater percent of time (22%) in 10-15.6ºC range compared to the upper site (20%).
- The lower probe had 30% of data where the mean daily temperatures were >=17.8ºC compared to 18.6% at the upper site.
- Comparisons with 2012 data:
    - The lower site had similar hours for analysis in 2013 compared to 2012
    - The lower site had a greater number of hours with temperatures >=20ºC in 2013 compared to 2012
    - The lower site had more days with a mean >= 17.8°C in 2013 compared to 2012
    - The lower site had less time in 10-15.6 °C range in 2013 compared to 2012
    - The upper site had less percentage of records in the 10-15.6 °C range in 2013 (20.8% compared to 2012 (31.1%)
    - The percentage of records where mean daily values were >= 17.8 °C were less in 2013 (18.6%) compared to 2012 (23.7%).

FIGURE 13 AVERAGE WEEKLY TEMPERATURE AT THE CATHERINE CREEK 37 UPPER PROBE (CC37_UPPER) IN 2012 AND 2013.

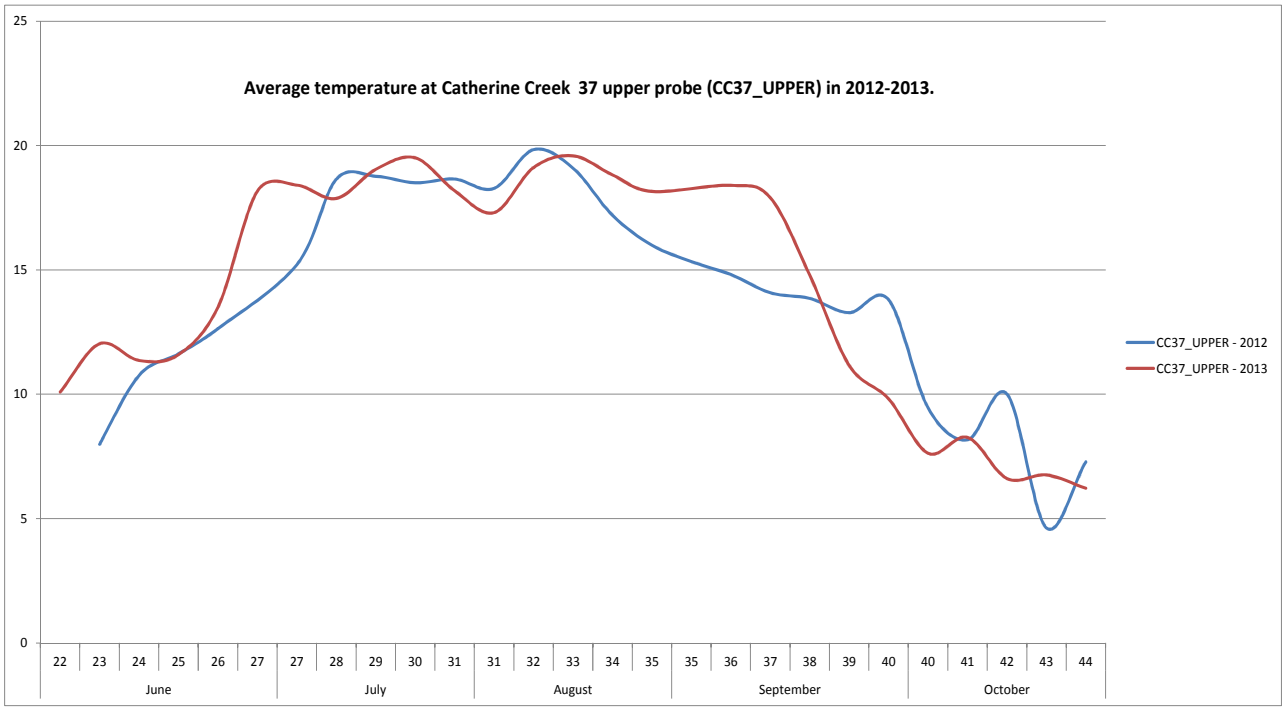


FIGURE 14 AVERAGE WEEKLY TEMPERATURE AT THE CATHERINE CREEK 37 UPPER PROBE (CC37_UPPER) AND LOWER PROBE (CC37_LOWER) IN 2012 AND 2013.

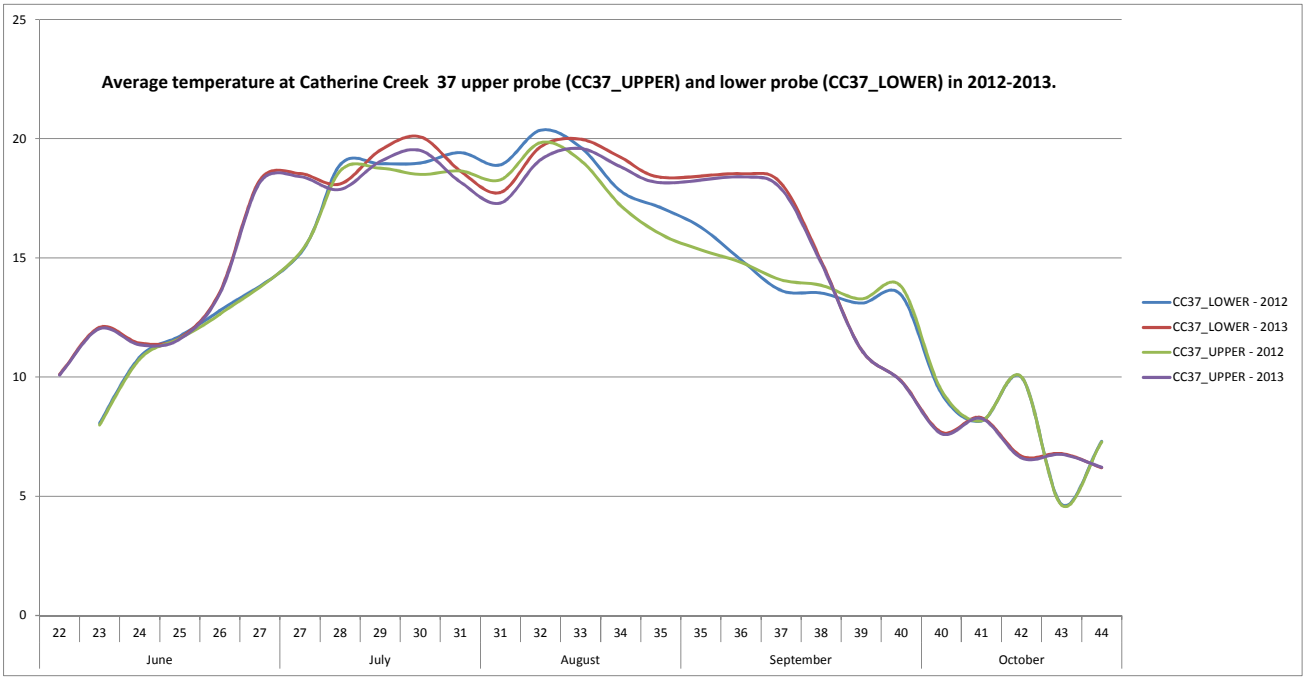
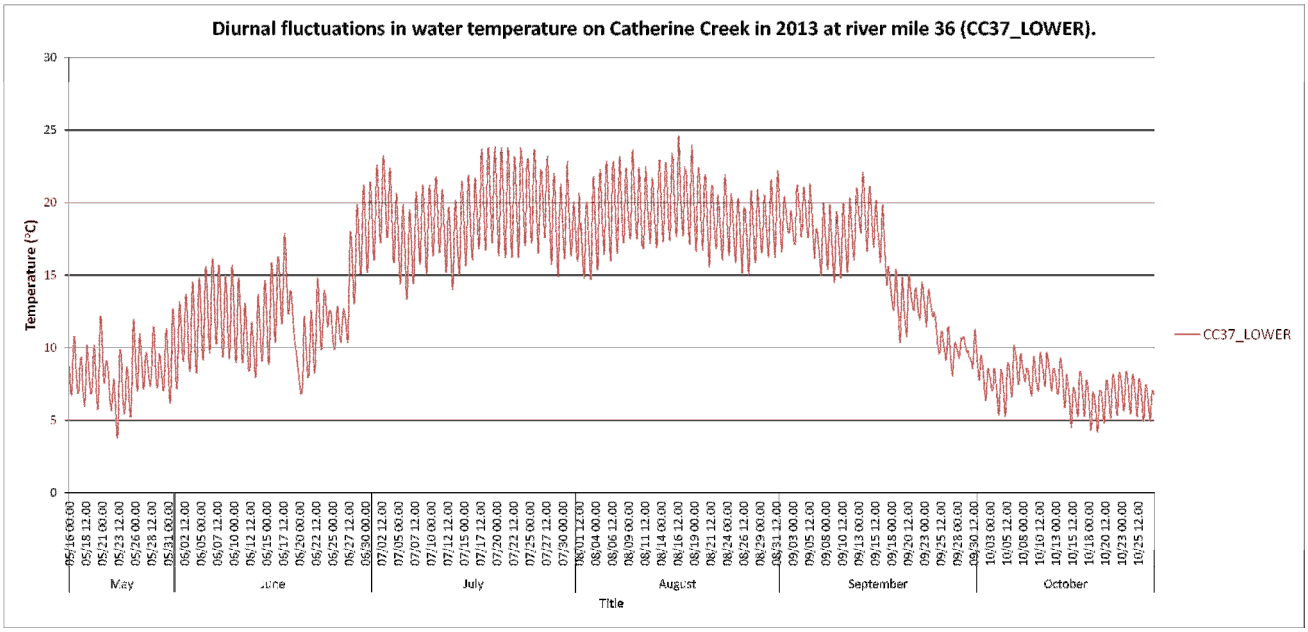


FIGURE 15 DIURNAL FLUCTUATIONS IN WATER TEMPERATURE AT THE CATHERINE CREEK 37 LOWER PROBE (CC37_LOWER) IN 2013.



Catherine Creek 44

To monitor water quality (temperature) within the Catherine Creek River Mile 44 (CC44) Project area CTUIR deployed Hobo Pendant temperature probes within the boundaries of several property owners – 2 probes in 2012 and 3 probes in 2013. 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, the number of records when temperatures were at or exceeded 20ºC, 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. Diurnal fluctuations in water temperature were also plotted.

Probes recorded a total of 10,833 hours at these sites. All probes had 0 records of lethal limits (temperatures >= 25°C) in 2012 and 2013.

- For 2013:
    - Records of temperatures >= 20 °C increased downstream with the lowest site having the most records (422 hours). Temperatures >= 20 °C can cause changes in behavior in juvenile salmonid species, a reduction in feeding, and disruption of growth.
    - The upper site had the greatest percent of time in the 10-15.6 °C range (33.8%) followed by the mid site (29.2%) and then the lower site (27.3%).
    - The number of days with a mean temperature >=17.8 °C also increased downstream with only 2 days recorded at the upper probe, 18 days at the mid probe, and 30 days at the lower probe.
- Comparisons with 2012 data:
    - The upper and mid site recorded higher temperatures and less time in the 10-15.6°C range in 2012 compared to 2013.
    - The upper and mid site recorded more days with mean temperatures >= 17.8 °C in 2012 compared to 2013.

Table 6: WATER TEMPERATURE PROBE METRICS FOR THE CATHERINE CREEK RIVER MILE 44 PROJECT FOR 2012 (SHADED ROWS) AND 2013 (UNSHADED ROWS).

Stream	Location Name	River mile	Year	Start date	End date	Max Temperature (° C)	Hours >=25 ° C	Hours >=20 ° C	Hrs. at 10 - 15.6 ° C	% at 10 - 15.6 ° C	Mean daily >=17.8 ° C (# days)	% of deployment when Mean daily >=17.8 ° C
Catherine Creek	CC44LOWER	40	2012	6/20/2012	11/26/2012	23.7	0	304	1341	35.1	29	18.2
Catherine Creek	CC44UPPER	44	2012	6/20/2012	9/6/2012	23.1	0	189	887	47.6	3	3.8
Catherine Creek	CC44LOWER	40	2013	5/30/2013	10/27/2013	23.6	0	422	1053	29.2	18	12.0
Catherine Creek	CC44UPPER	44	2013	5/30/2013	10/27/2013	22.9	0	258	1220	33.8	2	1.3
Catherine Creek	CC44RICKER1	38	2013	5/30/2013	10/27/2013	23.9	0	485	984	27.3	30	19.9

FIGURE 17 DIURNAL FLUCTUATIONS IN WATER TEMPERATURE AT THE CATHERINE CREEK 44 UPPER PROBE (CC44_UPPER) AND LOWER PROBE (CC44RICKER1) IN 2013.

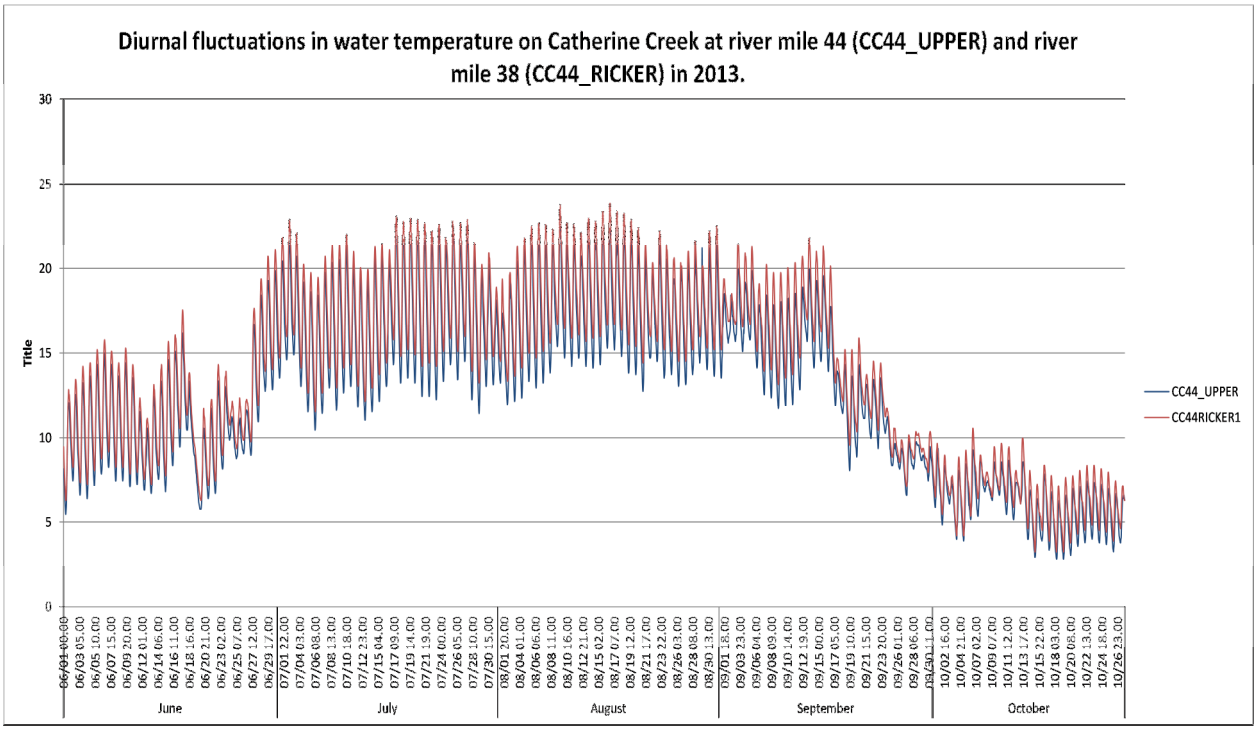


FIGURE 16 AVERAGE WEEKLY TEMPERATURE AT THE CATHERINE CREEK 44 MIDDLE PROBE IN 2012 AND 2013.

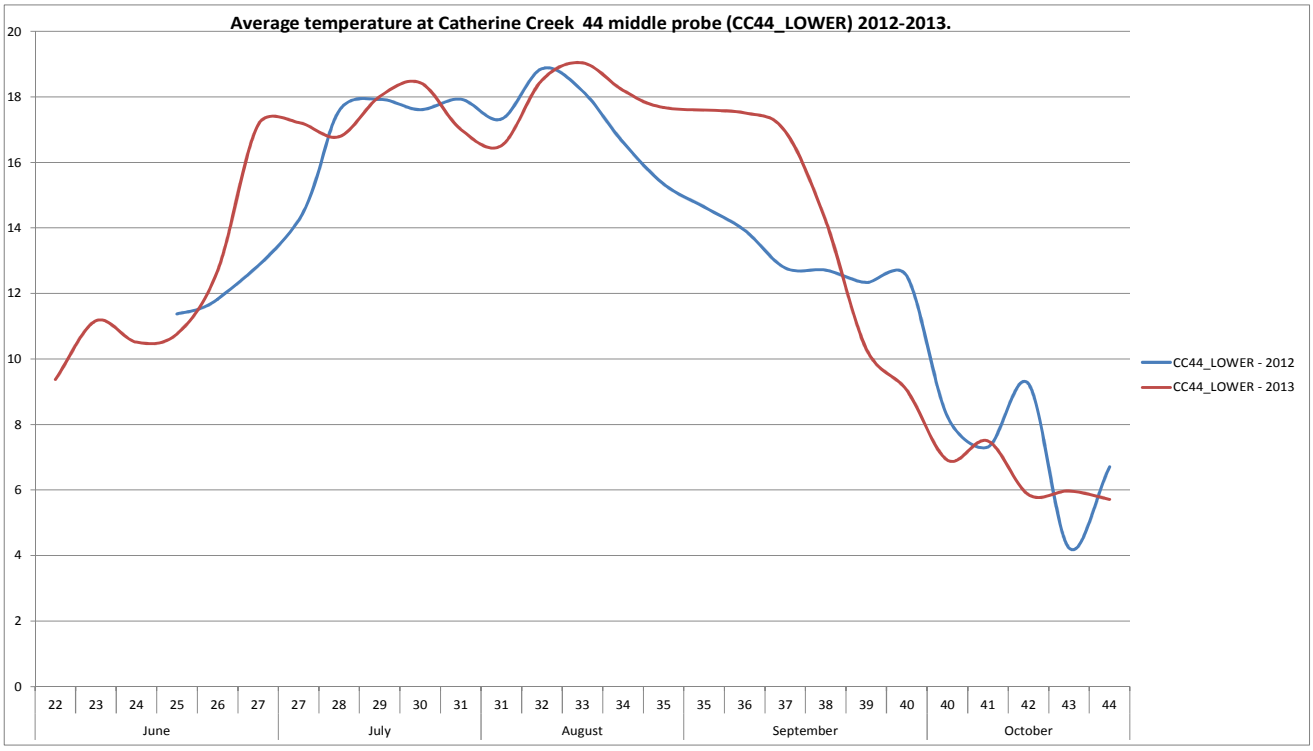
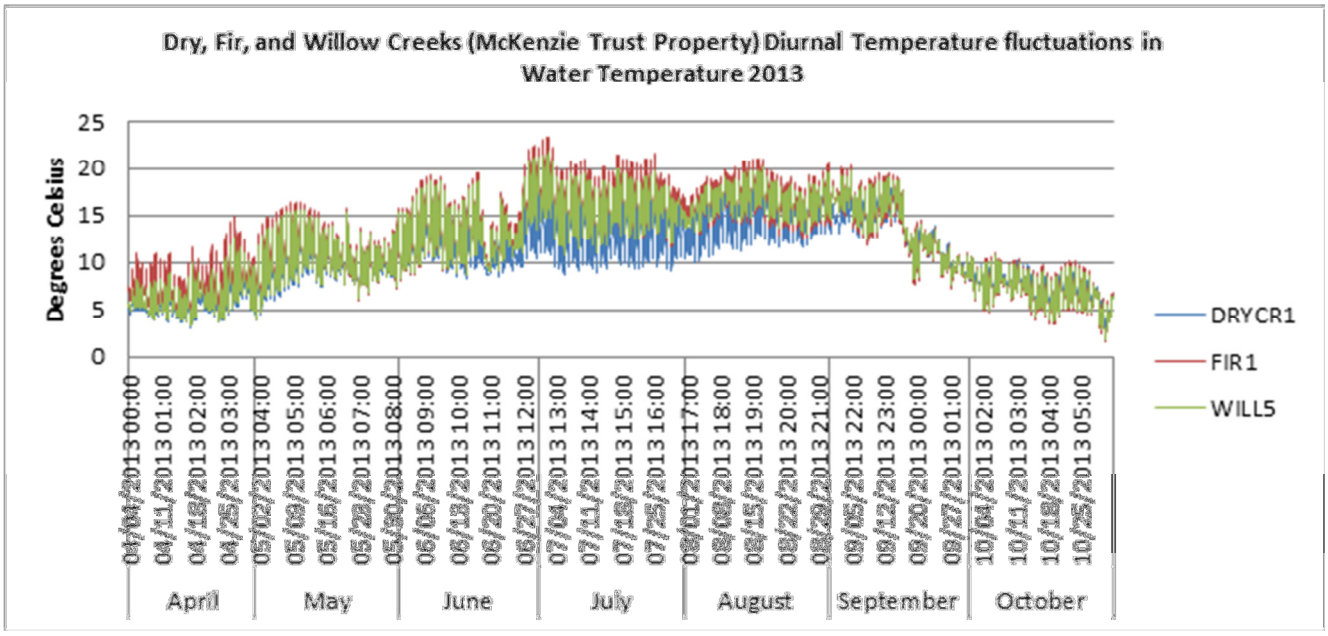


Table 7 WATER TEMPERATURE PROBE METRICS FOR THE WILLOW CREEK DRAINAGE FOR 2013.

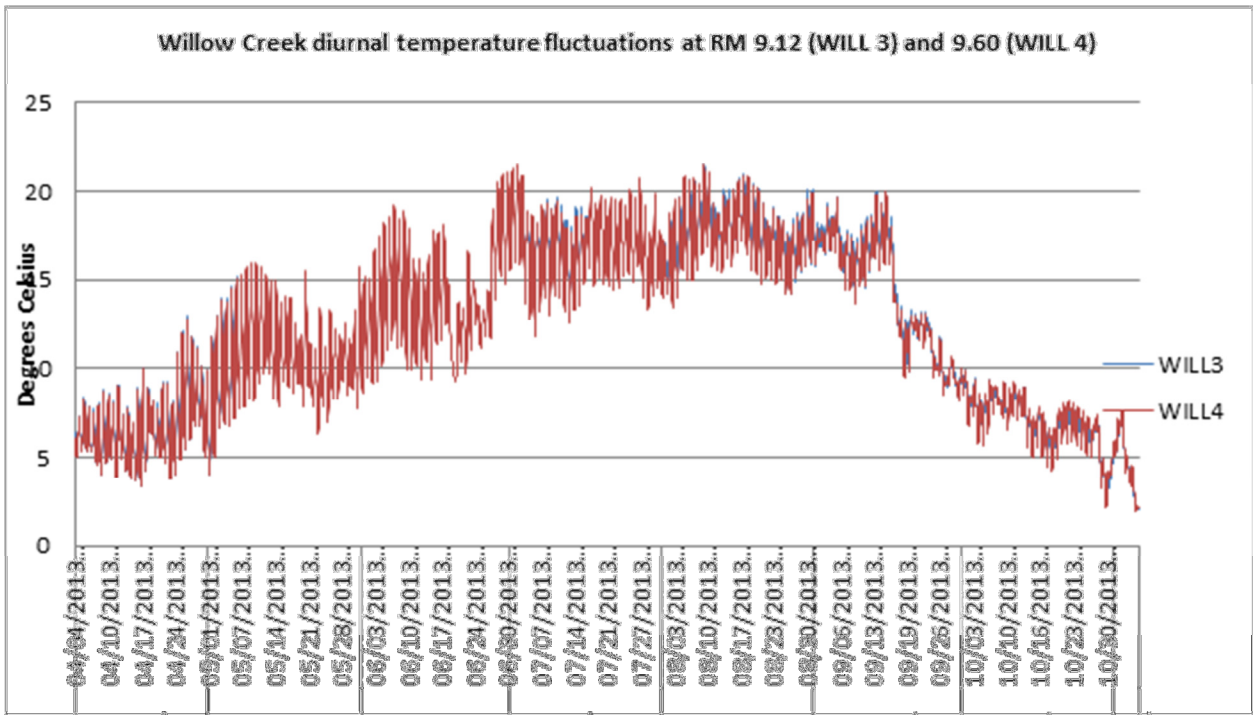
Stream	Location	River mile	Date Start	Date End	# of Days Deployed	# of Hours in Deployment Period	# of Hours For Analysis	Max Temperature (°C)	Hours >=25 °C	Hours >=20 °C	Hours at 10-15.6 °C	% at 10-15.6 °C	$\bar{X}$ Daily temp >= 17.8 °C (# days)
Dry Creek	DRYCR1	0.44	04/4/13	11/5/13	216	5184	5184	19.0	0	0	2183	42.1	0
End Creek	END1	1.4	04/4/13	11/3/13	214	5136	5136	23.9	0	346	1858	36.2	0
End Creek	END2	0.02	04/4/13	11/3/13	214	5136	5136	28.5	56	510	1289	25.1	7
Fir Creek	FIRCR1	0.03	04/4/13	11/5/13	216	5184	5160	23.3	0	170	1845	35.8	88
South Fork Willow Creek	SFW1	1.51	07/18/13	11/3/13	109	2616	2616	24.5	0	313	617	23.6	9
South Fork Willow Creek	SFW2	.1	04/4/13	11/3/13	214	5136	5136	33.6	399	1293	1266	24.6	33
Willow Creek	WILL1	7.65	04/4/13	11/5/13	216	5184	5184	27.5	82	800	1417	27.3	96
Willow Creek	WILL2	7.89	04/4/13	11/5/13	216	5184	5183	22.1	0	294	1288	24.9	71
Willow Creek	WILL3	9.12	04/4/13	11/5/13	216	5184	3432	21.5	0	75	548	16.0	55
Willow Creek	WILL4	9.6	04/4/13	11/5/13	216	5184	5184	21.6	0	110	1521	29.3	21
Willow Creek	WILL5	10.76	04/4/13	11/5/13	216	5184	5184	21.8	0	42	1804	34.8	20

FIGURE 18 DIURNAL FLUCTUATIONS IN WATER TEMPERATURE OF DRY CREEK, FIR CREEK AND WILLOW CREEK AT CONFLUENCE OF DRY CREEK AND FIR CREEK.



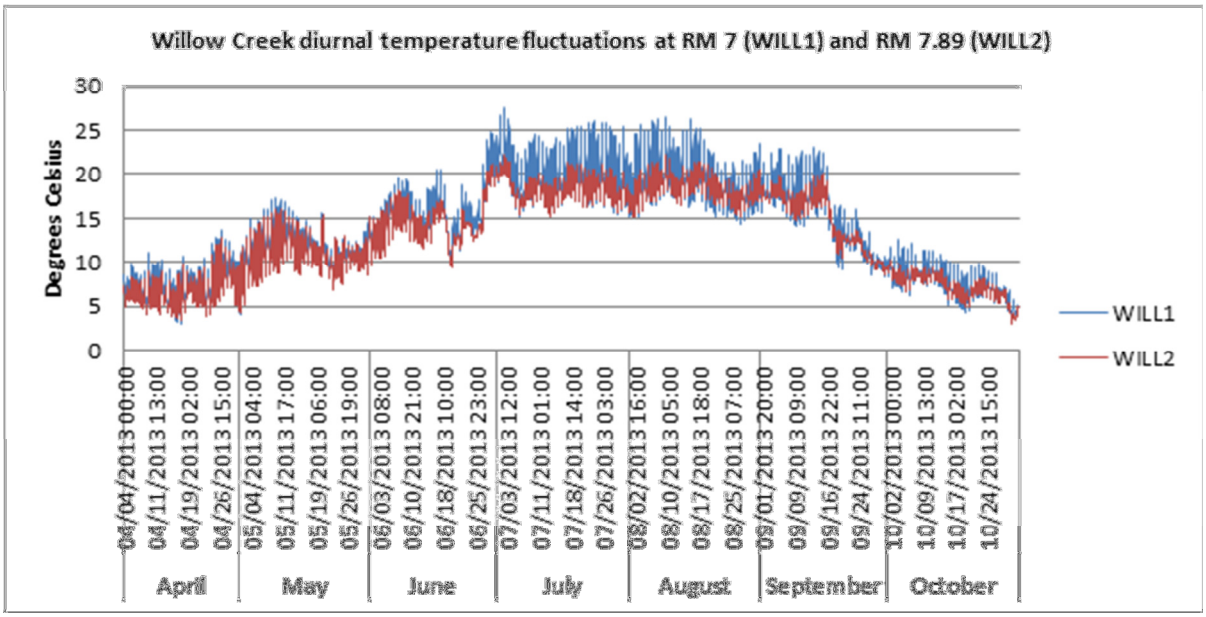
During reporting period (5/14/2013 - 11/14/2013); DRYCR1 was cooler during the summer months and was between 10-15.6 C° for the majority of the time (54.3%); Fir Creek had mean daily temperatures >=17.8°C for 7 days as opposed to 2 days for Willow Creek and none for Dry Creek.

FIGURE 19 DIURNAL WATER TEMPERATURE FLUCTUATIONS AT MIDDLE WILLOW CREEK DURING 2013.



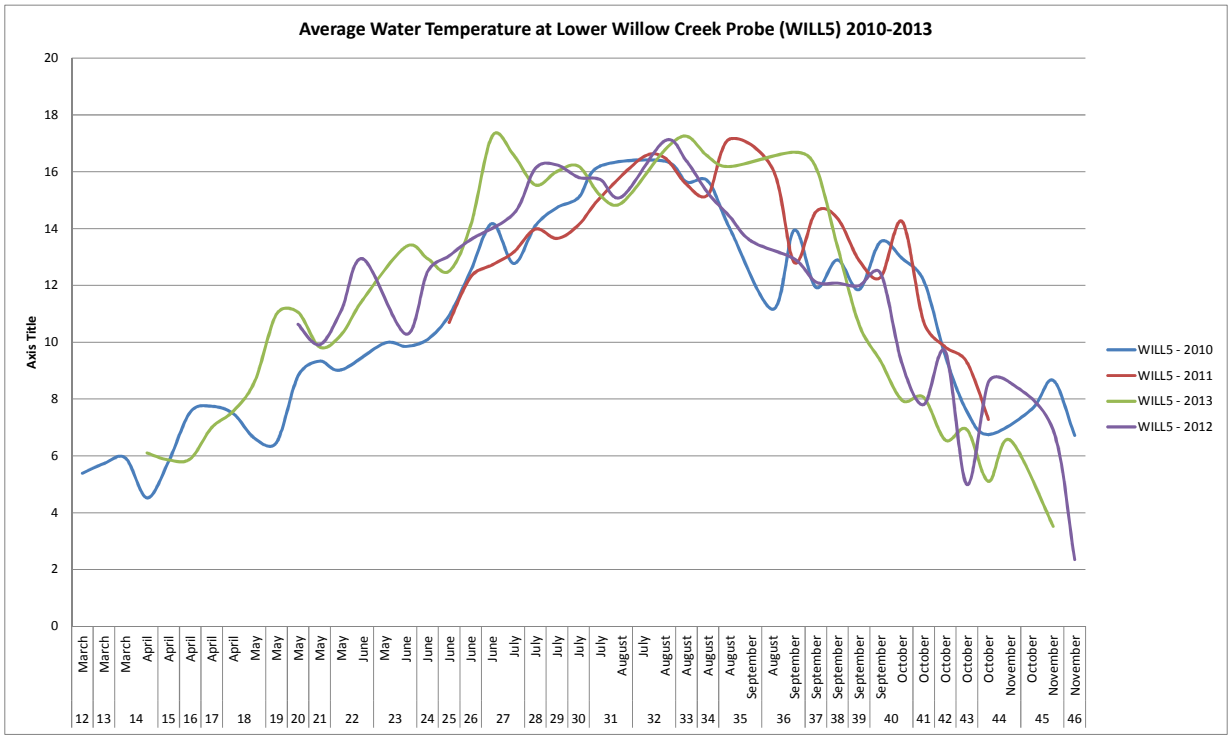
Data for Willow Creek downstream from the McKenzie road bridge; WILL4 had mean daily temperatures >=17.8°C for 16 days as opposed to 8 for WILL3 from 5/14/2013-11/14/2013.

FIGURE 20 DIURNAL WATER TEMPERATURE FLUCTUATIONS FOR WILLOW CREEK AT RIVER-MILE 7.89 (WILL2) AND 7.65 (WILL1).



Data for the lower probes on Willow Creek on the Craig property (WILL1) and the McKenzie Trust Property (WILL2); WILL1 had mean daily temperatures >=17.8°C for 45 days as opposed to 23 for WILL3 from 5/14/2013-11/14/2013.

FIGURE 21 AVERAGE WEEKLY WATER TEMPERATURE AT THE LOWER WILLOW CREEK PROBE (WILL5) 2010-2013.



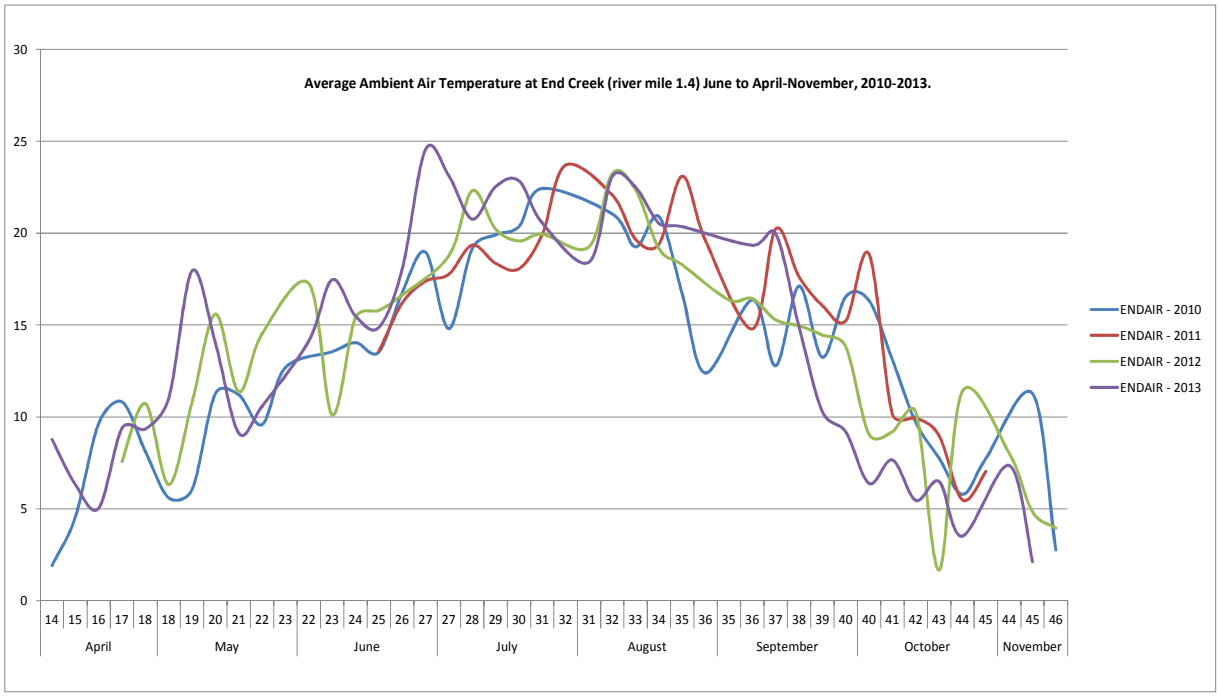
End Creek and South Fork Willow Creek

Four probes were deployed within the boundaries of the End Creek stream restoration project, two in End Creek (END1 and END2) and two in South Fork Willow Creek (SFW1 and SFW2). These probes recorded data for 214 days at the upper and lower End Creek sites and the lower South Fork Willow Creek site (SFW2) and for 109 days at the upper South Fork Willow site (SFW1).

- Along End Creek there were a total of 10,272 hours logged for analysis, wherein probes reached the DEQ salmonid lethal temperature limit of 25°C for a total of 56 hours (all at the lower probe site), which was higher than the 2010 limit (by 48 hours).
- Temperatures ranged between 10° - 15.6°C for 3,147 hours (about 31% of the time compared to 29% in 2012) along this section of End Creek.
    - 36.2% at the upper site (29.8% in 2012)
    - 25.1% at the lower site (27.8% in 2012)
- The upper site had the greatest amount of records of temperatures >= 20 °C in 2013 compared to those of 2010-2012.
- The upper site had the second largest percentage of records in the 10-15.6 °C range in 2013 compared to the other years (2011 was the largest with 47.4%).
- The lower site had the greatest # of lethal limit records and temperatures >=20 °C in 2013 compared to those of earlier years.

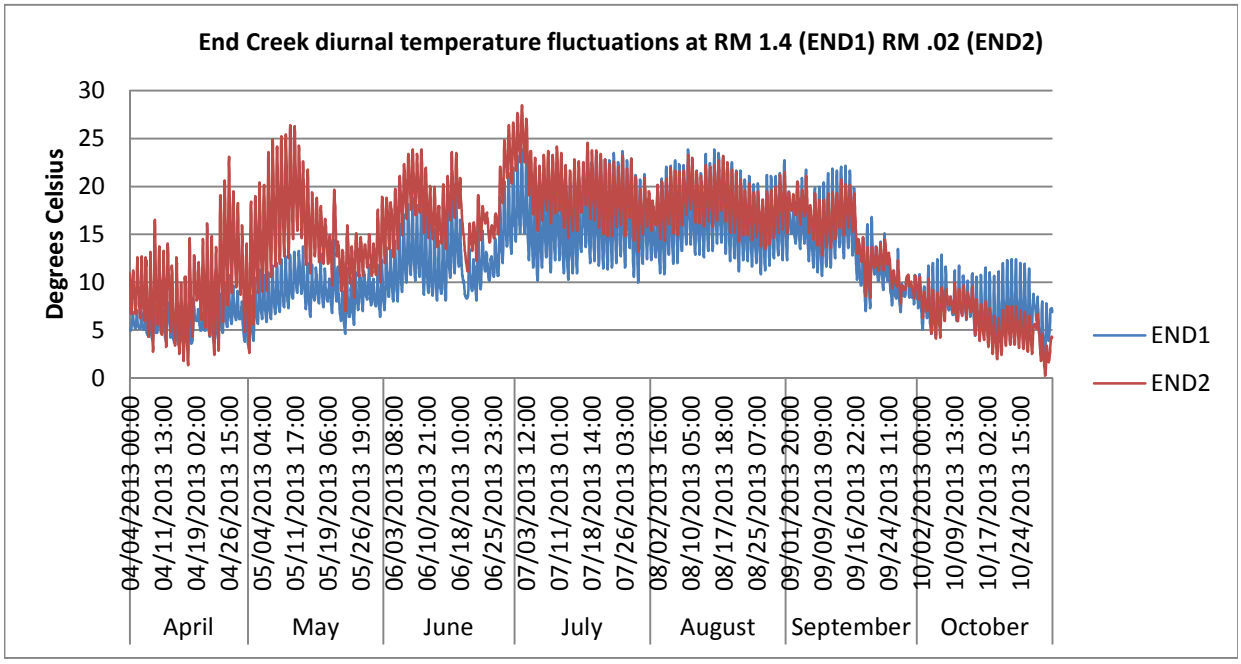
- The lower site had the smallest percent of records in the 10-15.6 °C range in 2013 compared to other years.
- South Fork of Willow Creek at river mile 1.51 had 0 hours of lethal limits, (whereas in 2012 the same location recorded 29 hours).
    - SFW1 had 313 hours >=20°C
    - 617 hours between 10° - 15.6°C (23.6% of the time)
    - 9 days with mean temperatures >=17.8°C
- South Fork of Willow Creek at river mile .1 had 399 hours of lethal limits, (whereas in 2012 the same location recorded 331 hours).
- The upper site in 2013 had less percentage of temperatures in the 10-15.6 °C range than those recorded 2010-2012 but had fewer days where the mean was >= 17.8 °C.

FIGURE 22 PLOTS OF WEEKLY AVERAGE AIR TEMPERATURE AT END CREEK APRIL TO NOVEMBER 2010 (BLUE LINE), 2011 (RED LINE), 2012 (GREEN LINE), AND 2013 (PURPLE LINE).



Plots show that average air temperatures in 2013 were slightly higher in the first half of the recording period and slightly lower in the later part of the recording period compared to 2010-2012.

FIGURE 23 PLOTS OF DIURNAL FLUCTUATIONS IN WATER TEMPERATURE FOR END CREEK 2013 AT RIVER MILES 1.4 (BLUE LINE) AND 0.02 (RED LINE).



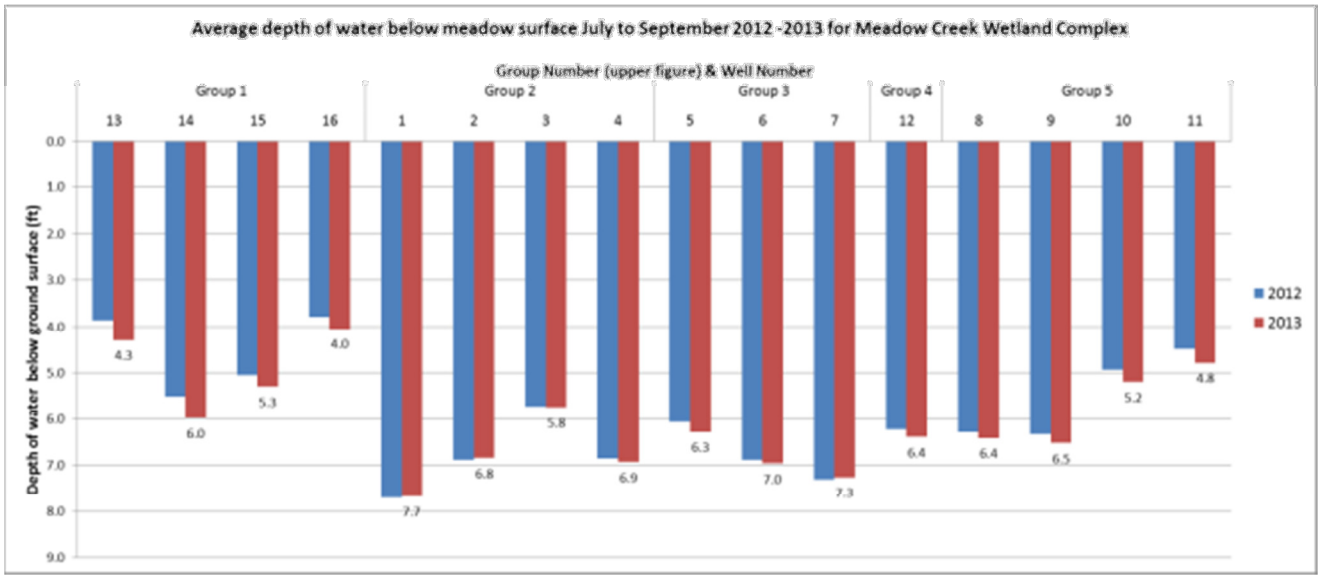
Groundwater Monitoring

Meadow Creek Groundwater

There were 16 shallow groundwater wells monitored in 2013 by CTUIR along the Meadow Creek Wetland complex on the McCoy Meadows Ranch. 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 (wells 13 to 16) and group 5 being the most downstream group (wells 8 to 11).

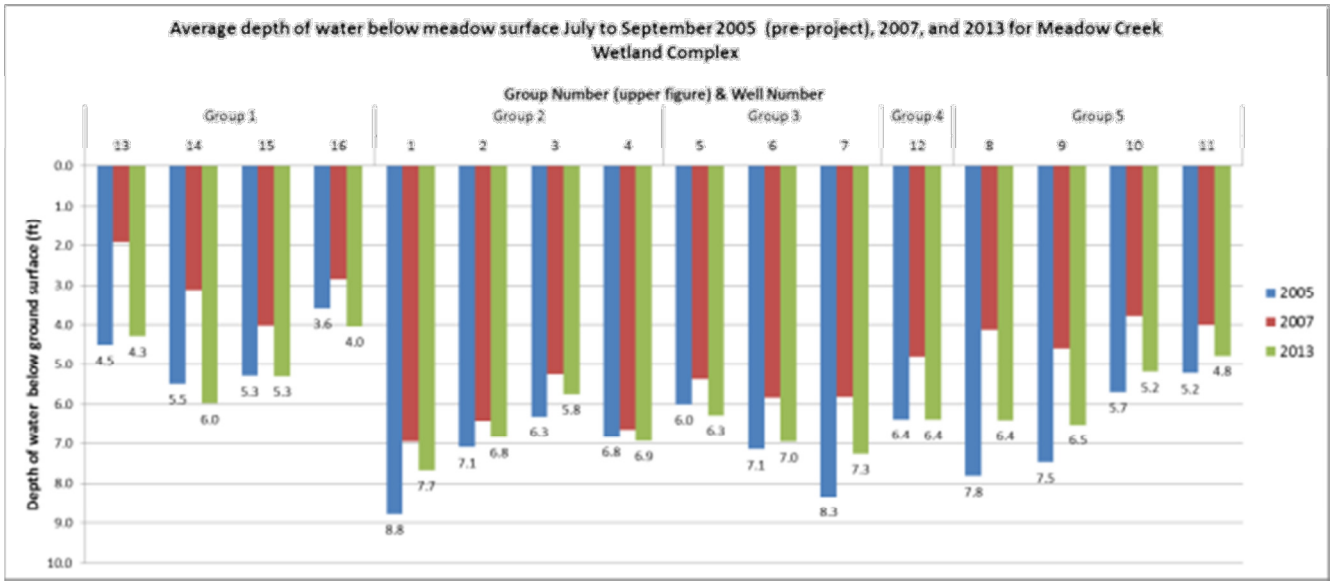
When comparing average groundwater elevations in July to September 2012 with those observed in July to September 2013 it appears that the shallow groundwater was closer to the meadow surface in 2012 for all wells except for those in Group 2 which didn't change (see Figure 24). The level of difference varies from just 1 tenth of a foot to 5 tenths. It is possible that the sediment build up in late Winter/Spring 2013 and a possible down-cutting of Meadow Creek contributed to these groundwater differences. Average depth to water July – August 2009 to 2013 also indicates this drop in elevation and is plotted in Figure 25. In 2013 there were 9 of the 16 wells where average depth to water was below, equal to, or within 3 tenths of a foot of the pre-project (2005) levels; however no dry wells were recorded.

FIGURE 24 2012-2013 AVERAGE GROUNDWATER ELEVATIONS ALONG MEADOW CREEK WITHIN THE MCCOY MEADOWS AREA.



*Plot indicates a lowering of the sub-surface water in 2013 compared to the previous year for all wells, except those that did not see any change in average depth. Zero on the Y axis indicates the meadow surface.

FIGURE 25 MEADOW CREEK AVERAGE GROUNDWATER ELEVATIONS WITHIN MCCOY MEADOWS (JULY THROUGH AUGUST 2005, 2007, 2013).



*Plot indicates deepening sub-surface water elevations toward pre-project levels during this 9 year period.

McCoy Creek Groundwater

Groundwater well data was collected every two weeks beginning February 19, 2013 and ending December 2, 2013. A total of 21 surveys were conducted to measure the water table depth throughout the year. There were 34 ground water wells monitored along the McCoy Creek restoration project in 2013, with well # 14 no longer being in place. The percent of well data when wet versus dry samples were recorded was plotted (Figure 26) and shows a trend in increased groundwater within the project area from 2009 to 2010, a decrease from 2010 to 2012, and an increase of 3% more wet well measurements observed in 2013. Of the 714 samples taken between 2/19/2013 and 12/2/2013 81% were when wells contained water (wet) compared to 69% in 2009. Figure 27 shows that sub-surface water is closer to the meadow post restoration effort in 8 of the 20 wells plotted compared to well measurements from 2009.

- There were 252 groundwater measurements taken above the McIntyre road bridge in 2013. Of these 176 (70%) were records of the wells containing water, which is an increase, compared to those recorded in 2009 (59%).
- There were 442 groundwater measurements taken below the bridge, with 69% of these being wet wells compared to 63% in 2009 and 74% in 2011.
- There were 14 wells that remained wet all year. Three wells remained dry all year, and 9 more that were dry for over half of the survey period.

FIGURE 26 PLOT OF WET VERSUS DRY WELL MEASUREMENTS ALONG MCCOY CREEK 1997 TO 2013.

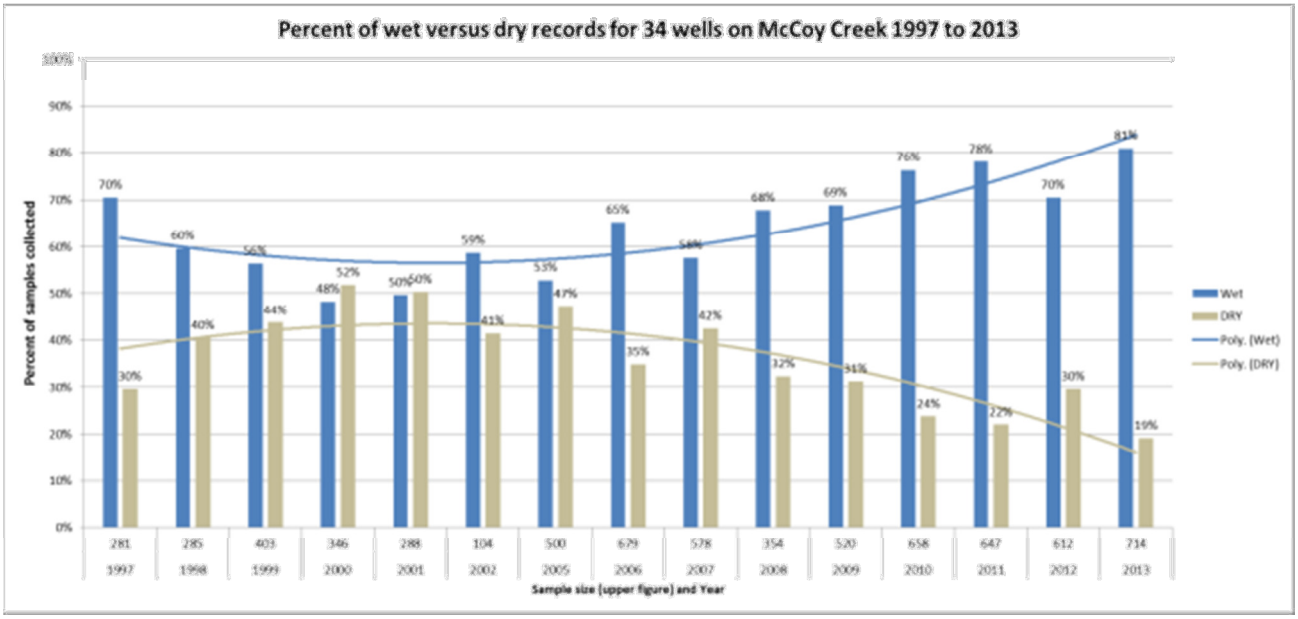
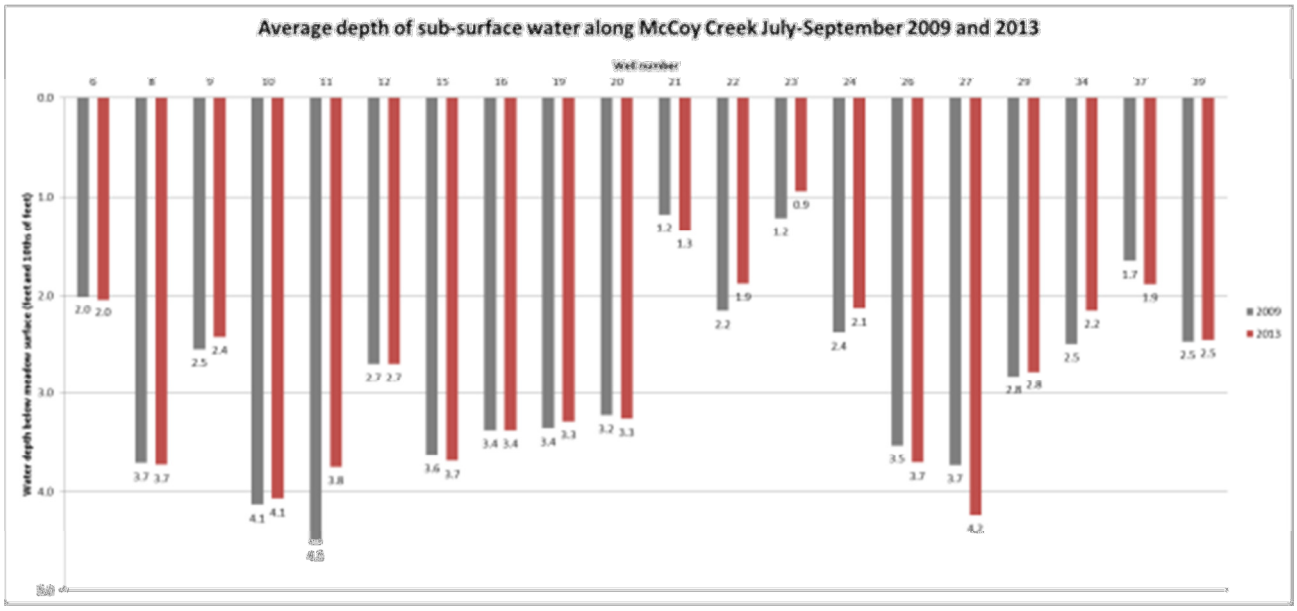


FIGURE 27 PLOT OF AVERAGE SUB-SURFACE WATER ELEVATIONS JULY TO SEPTEMBER FOR 2009 AND 2013 ALONG MCCOY CREEK.



Groundwater Summary

Following the restoration efforts there appears to be some increase in the average sub-surface water elevation within the project area. Increased groundwater elevations are most evident near the upstream log structure (above the McIntyre road bridge), but is also evident within all the wells. There is a widespread increase in sub-surface water and the rising trend seen after 2000 is continuing. This trend of a sudden increase in sub-surface water followed by a gradual 'settling' has also been recorded along Meadow Creek. It is anticipated that with the activation of the McCoy Creek side channels, greater floodplain access at high flows, and the backing up of water within proximity to the log and riffle structures the sub-surface water within the well network will continue to be at a level greater than the lows of 2000 and 2001.

In contrast to McCoy Creek the sub-surface water within the Meadow Creek Wetland Complex has continued to decrease and is further down from the meadow surface in 2013 than any year since the activation of the wetland channel network. This reduction has reached the pre-project levels seen in 2005 at wells 4, 5, 14, 15 and 16 and is within 2 – 3 tenths of a foot of those levels for 3 other wells when comparing summer groundwater depths July – September.

2013 Steelhead Spawning Surveys

In 2013 the CTUIR fish habitat crew conducted steelhead spawning surveys on 17 miles of streams within the Grande Ronde Basin as part of ongoing presence/absence surveys. The eight project streams that were surveyed form the Meadow Creek and Rock Creek watersheds, and flow throughout the properties of four landowners. Spawning surveys were conducted approximately every 10 days and were typically conducted by starting at the downstream project boundary and walking upstream to observe fish more easily without disturbing their spawning behavior. The surveyors would record the date, start and end times and water temperature, as

well as the day's weather, water visibility and flow level. When a redd was observed the surveyor would flag the location, record the GPS coordinates and make a note as to whether the redd was located closest to the right or left stream bank or mid channel.

The following is a summary of the data collected from fish habitat projects on Joe Cunha's section of Dark Canyon Creek, Jon Habberstad's section Meadow Creek, Mark Tipperman's sections of McCoy Creek and Meadow Creek Wetland Complex, Rock Creek, Little Rock Creek, Graves Creek, Little Graves Creek, Sheep Creek, Fir Creek, Hacker Creek, and Lanman Creek.

Dark Canyon Creek – Cunha

The 1.9 mile stretch of Dark Canyon Creek on Joe Cunha's property was surveyed six times between 3/26/13 and 5/29/13. During this time a total of 16 redds and one steelhead were observed, as well as one resident fish with the spawning steelhead. It was unknown if the steelhead was native or of hatchery origin. The survey began at the mouth of Dark Canyon just before the confluence with Meadow Creek and ended at the U.S. Forest Service boundary 1.9 miles upstream. Six redds were identified during the first survey on 3/26/13, seven redds were identified on 4/10/13, two redds identified on 4/25/13, and one redd on 5/6/13. No new redds were observed during the final two spawning surveys on 5/22 and 5/29. An attempt was made to survey Dark Canyon on 4/22 but was abandoned due to low visibility resulting from high turbidity. During the first survey on 3/26 one steelhead and one resident fish were observed on a redd. The stream was at moderate flow with a starting temperature of 3.2 degrees C and end temperature of 4.4 degrees C (the coolest survey of the season) Water visibility was such that surveyors were able to see to the bottom of riffles and pools. No other steelhead were observed throughout the remainder of the spawning season.

Only five redds were observed in the spring of 2010 and four redds in 2011. The Dark Canyon stream enhancement project was implemented in summer 2010 and since then there has been a significant increase in number of redds observed with 19 redds in 2012 and 16 redds in 2013. Compared to pre-project numbers and the season immediately following project implementation the number of redds observed per year have nearly quadrupled.

Meadow Creek – Habberstad

Jon Habberstad's 2 mile stretch of Meadow Creek was surveyed three times between 3/28 and 5/1 in 2013. No redds and no fish were observed during each of the surveys. Water was at moderate flow each survey and the observers were able to see to the bottom of riffles but not deeper pools.

Meadow Creek – Tipperman

Mark Tipperman's 1.4 mile stretch of Meadow Creek was surveyed one time on 5/1/2013. One redd was observed during the survey. The water visibility allowed the observer to see only to the bottom of riffles.

McCoy Creek – Tipperman

The 2.8 miles of main channel McCoy Creek on Mark Tipperman's property was surveyed three times between 3/26/13 and 5/1/13. One redd was observed on 4/10/13 but no fish were observed. Water visibility allowed the surveyor to see to the bottom of riffles but not pools.

McCoy Creek 'A' Channel was surveyed once on 3/26/13 and no redds or fish were observed although water visibility was clear enough to see the bottom of riffles and pools.
McCoy Creek 'B' Channel was surveyed three times in 2013 from 3/26 to 5/1 and no redds or fish were observed. The surveyor could see to the bottom of both riffles and pools during the first survey, but for the remaining surveys could only see to the bottom of riffles.

Rock Creek – Bean
The 4.8 miles of Rock Creek on the For the Girls LLC property was surveyed on six occasions between 3/25/13 and 5/29/13. During this time four new redds were found. It wasn't until 5/7 that the first redd was observed. No fish were observed during any of the Rock Creek surveys.

Little Rock Creek – Bean
A 0.5 mile stretch of Little Rock Creek on the For the Girls LLC property was surveyed for redds four times between 3/25/13 and 5/7/13. Three total redds were observed during 2013, two during the first survey and one during the final spawning survey of the season. One resident fish was observed during the first survey on 3/25. No other fish were observed during the remaining surveys.

Graves Creek – Bean
A 3.9 mile stretch of Graves Creek on the For the Girls LLC property was surveyed four times between 3/25/13 and 5/7/13. No redds and no fish were observed during the surveys.

Little Graves Creek – Bean
A 3.9 mile stretch of Little Graves Creek on the For the Girls LLC property was surveyed three times between 3/25/13 and 4/23/13. No redds and no fish were observed during the surveys.

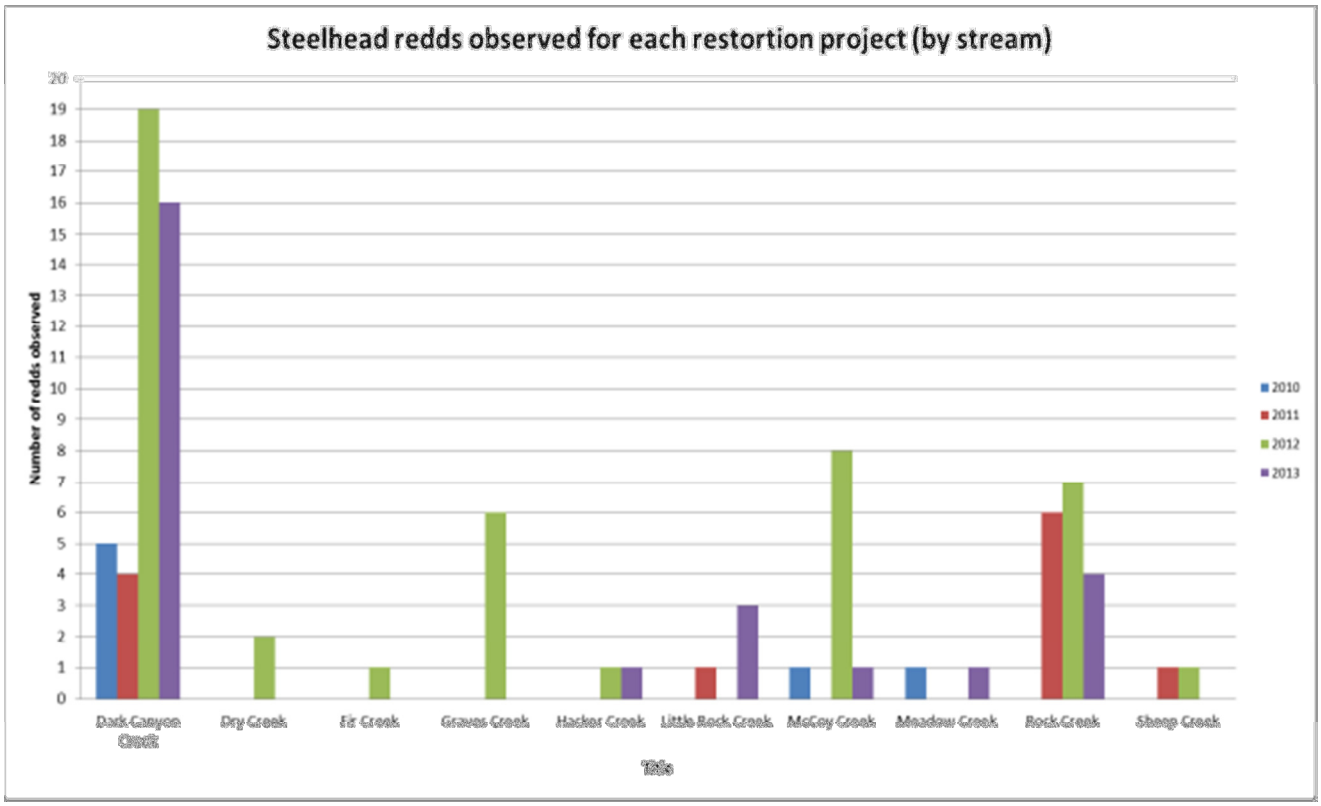
Sheep Creek – Bean
A 1.2 mile stretch of Sheep Creek on the For the Girls LLC was surveyed four times between 3/25/13 and 5/07/13. No redds and no fish were observed during the surveys. The water visibility for each survey was such that the surveyors could see to the bottom of stream riffles but not to the bottom of deeper pools.

Fir Creek – Wyland/Webb
Wyland/Webb's .4 mile stretch of Fir Creek was surveyed once on 4/8/13. One steelhead and one resident fish were observed during the survey by Wyland's house, but no redds were identified. Water visibility allowed the surveyor to see to the bottom of both riffles and pools, and flow was moderate.

Hacker Creek – Wyland/Webb
Wyland/Webb's .4 mile stretch of Hacker Creek was surveyed once on 4/8/13. One redd was observed. Water clarity was poor due to high turbidity. No fish were observed during the survey.

Lanman Creek – Wyland/Webb
Wyland/Webb's .3 mile stretch of Lanman Creek was surveyed once on 4/8/13. No redds and no fish were observed during this survey. Water clarity was such that the surveyor was able to see to the bottom of riffles as well as pools.

FIGURE 28 PLOT OF STEELHEAD REDDS OBSERVED ON SURVEYED RESTORATION PROJECTS - 2010-2013.



2013 Snorkel Surveys

In 2013 CTUIR Fish Habitat conducted snorkel presence/absence surveys on 5 streams associated with restoration activities: Meadow Creek, Dark Canyon Creek, McCoy Creek, Rock Creek, and Dry Creek. (Table XX for detailed stream metrics).
Survey protocols followed those laid out in Thurow (1994) and White et al (2011). Data on water temperature, average pool length and width surveyed and density of fish per 100m^2 of pool habitat was calculated and plotted (Figure 22).

- Chinook
  - Juvenile Chinook (>=80mm) were found on Dark Canyon Creek (river mile 0.4).
  - Dark Canyon Creek – (Cunha property) had a combined reach density of 11.6 juvenile Chinook per 100m^2 of stream. The treated reach surveyed on Dark Canyon Creek was 320 meters in length and contained 152 juvenile Chinook for a density of 23.8/100m^2. Unlike the other stream surveys individual pools were not measured, therefore reporting for this creek is not broken down to fish per 100m^2 of pool habitat but rather fish density over the reach. The untreated reach was 400 meters long and contained 85 juvenile Chinook for a density of 6.07/100m^2, significantly lower than the treated reach.
  - Chinook were not observed in any of the other project streams during 2013 snorkel surveys.

- *O.mykiss*
    - Rock Creek (Doug Bean's 516 ranch) is divided into 8 reaches with reach 1 most downstream and reach 8 most upstream; each reach is 1001 m in length. Only pools were surveyed within reaches. Individual pool areas were recorded and fish densities calculated. In 2013 40 STS were observed in reach 8 that resulted in this reach having the highest STS density, with 7.7*O.mykiss*/100m2. However, reach 8 also had the smallest average pool size (27.3m2) and the second lowest total pool area of all 8 reaches even though the number of pools (19) is above the average. Reach 1 was found to also have 19 pools, but they were slightly larger with an average size of 41 m2 per pool. In addition, reach 1 had the least number of fish (10) and the lowest density (1.3 STS/100m2).

    - Meadow Creek – (John Habberstad's property) three reaches of Meadow Creek were surveyed in July 2013. The average densities of *O.mykiss* per $100m^2$ for each of the three reaches are: Reach1 – 0.40, Reach2 – 0.32, Reach3 – 0.20 *O.mykiss* /$100m^2$
      The average number of *O.mykiss* /$100m^2$ for the entire survey area is (47o.mykiss/15021.40 m^2)*100= 0.31 *O.mykiss* /$100m^2$.

      Records show that in 2011 CTUIR Fish Habitat staff surveyed a total of 25 pools on Meadow Creek, as opposed to 39 pools in 2013. However, the average individual pool size encountered in 2011 (not considering the 45 foot long glide outlier) was 14.8*5.5= 81.4 m^2 In 2013 the average pool area (not considering the same glide, in this case 80 feet long) was 10.3*4.4= 45.3. Although there were more pools surveyed in 2013, the average size of a single pool was 44% smaller (approximately 36 m^2 less water per pool) than the average pool size surveyed two years prior. Temperature of the stream when each survey was conducted also may have been a factor affecting fish. Start and stop temps for September survey 2011 was 13.3 and 16.7 degrees C. The water temperature in July 2013 at the time of the second survey was quite warmer with start and stop temperatures at 24 and 27.5 degrees C.

    - Dark Canyon Creek – (Cunha property) is divided into two reaches, and only pools were surveyed. There were 200 STS observed in the downstream reach (treated) and 213 STS observed in the upstream reach (untreated). Pools were not measured during this survey so fish density calculations are based on the entire reach area. The last four years of *O.mykiss* densities can be compared: 16 fish/$100m^2$ in 2010 (pre-project), 20 fish/$100m^2$ in 2011, 23.5 fish/$100m^2$ in 2012 (July survey), rising to 32 fish/$100m^2$ in 2013. An increase is seen not only in the "treated" reach (the lower reach of the stream that received wood placement), but also in the "un-treated" reach above the wood placement sites.

    - McCoy Creek – (Tipperman property) - A total of 61 pools were snorkeled in 2013 on 7/9. Reach 1 had 18 pools totaling $951m^2$ in which 18 *O.mykiss* were observed, resulting in a fish density of about 1.9/$100m^2$. Reach 2 had 20 pools totaling $1637m^2$ in which 46 *O.mykiss* were observed, resulting in a fish density

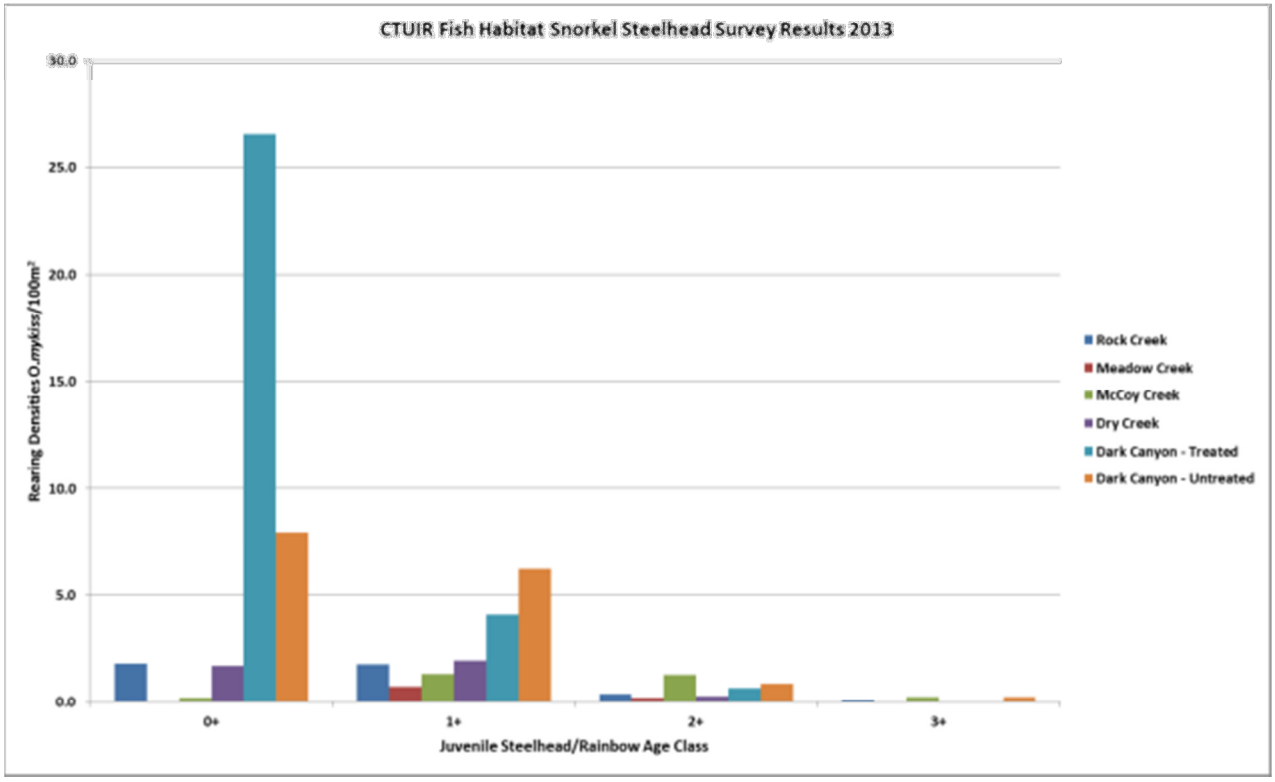
of about 2.8/100m^2. Reach 3 had 23 pools totaling 1696m^2 in which 48 *O.mykiss* were observed, resulting in a fish density of about 2.8/100m^2. The overall density of fish in the pool areas surveyed on McCoy Creek is 2.6/100m^2.

- Dry Creek – (Oregon Ag Foundation property) A total of 43 pools totaling 2945m^2 were snorkeled on 7/8/2013 in which 185 fish were observed, resulting in a fish density of 6.3/100m^2 of pool habitat.

Table 8 RESULTS OF SNORKEL SURVEYS CARRIED OUT IN 2013 ON 5 STREAMS WITHIN THE GRANDE RONDE BASIN. RB_ST_ = RAINBOW TROUT (*O.MYKISS*).

			Age/size class						
Stream	Year	Chinook	RB_St_ 0	RB_St_ 1	RB_St_ 2	RB_St_ 3	Avg Temp C	Total surveyed Length (ft)	Avg Width (ft)
Meadow Creek	2013	0	0	36	10	1	25.6	11033.5	14.8
Dry Creek	2013	0	80	92	13	0	14.7	3103.7	16.7
McCoy Creek	2013	0	7	48	48	9	22.0	7391.7	15.7
Rock Creek	2013	0	79	82	20	4	18.8	26273.0	15.4
Dark Canyon Treated	2013	152	170	26	4	0	19.1	1050.9	6.6
Dark Canyon Untreated	2013	85	111	87	12	3	17.9	1312.3	11.5

FIGURE 29 PLOT OF DENSITIES OF *O.MYKISS* ON 5 SNORKELED STREAMS WITHIN THE GRANDE RONDE BASIN DURING SUMMER 2013. PLOT SHOWS THE HIGH DENSITY OF FISH IN DARK CANYON CREEK.



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.

Staff efforts associated with plant protection during the reporting period included installation of 40 small riparian enclosures along Catherine Creek (river mile 37) in order to exclude wild ungulates. Enclosures were constructed using 4'x16' hog panels attached to t-posts and ranged in size from 2-panel ovals to polygons made up of 15 or more panels, depending on the cluster of plants that were to be enclosed. The "pods" were built at strategic locations along the stream bank and floodplain and contain patches of willow, dogwood, river birch, cottonwood, currant, and hawthorn communities planted following CC37 construction. Site-appropriate native grasses (approximately 600 lbs.) including locally derived Great basin wild rye, blue-bunch wheatgrass, Idaho fescue, and tufted hair grass were planted on 16 acres of stream banks, upland terraces, and adjacent riparian habitat on the project. A conservation easement riparian fence constructed in late Fall, 2012, will provide protection from livestock and allow vegetation to mature.

Monitoring Riparian Vegetation at CC37

In an attempt to document the survival and mortality rates of the riparian plantings within CC37 project area, CTUIR Fish Habitat Staff designed a monitoring study based on repeated surveys of the plants. A total of 1,350 containerized plants were planted after project construction had finished in November 2012. 40 riparian enclosures were strategically constructed around small groups of plants to protect them from wild ungulate grazing (elk and deer). 172 plants were enclosed on the right bank within 24 enclosures and 132 plants on the left bank within 16 enclosures for a total of 304 enclosed plants.

To determine the effect, if any, the hog panel pods have on the survival of the enclosed plants the experiment required a population of unenclosed plants to compare to. Ten unenclosed vegetation plots were selected, five on each bank, and marked with a t-post. The area of each of these vegetation plots is approximately 78.5m^2 and is defined by a 5-meter radius from the t-post marker. The surveyor attaches a meter tape to the central t-post, and with the other end outstretched 5 meters, walks a complete circle around the post. The plants that are to be surveyed fall within the circle, including any plants that the outer most edge intercepts. At the time the outside vegetation plots were created, 48 plants fell within the survey area on the right bank, and 48 plants within the survey area on the left bank.

The plants were surveyed in May 2013, just over six months after the initial fall plantings and plant counts were made. Hypothetically, the plants protected within enclosures will exhibit higher survival rates than unprotected plants outside of the pods, which are vulnerable to browsing by wild ungulates. To determine if this is a true assumption the plants were surveyed to determine general survival rates and also to observe differences in those rates between enclosed

plants and unenclosed plants. Comparisons were also made between survival rates of right bank plants to left bank plants to determine if that played a factor in plant success. In addition, the survival rates of each separate species were calculated, allowing the comparison of individual species success.

The total number of enclosed plants that were observed to be living (having one or more green leaves) during the May 2013 survey was 262. There were 304 plants enclosed at the time of the initial count in November 2012. This means that (262/304) X 100 = 86.2 % of the original enclosed plants were still living.

The total number of outside plants within the plot areas observed to be living during the May 2013 survey was 95. There were 96 live plants observed at the time the outside vegetation plots were created in November 2012. This means that all but one of the plants survived; in other words (95/96) X 100 = 99.0 % of the original unenclosed plants were still living.

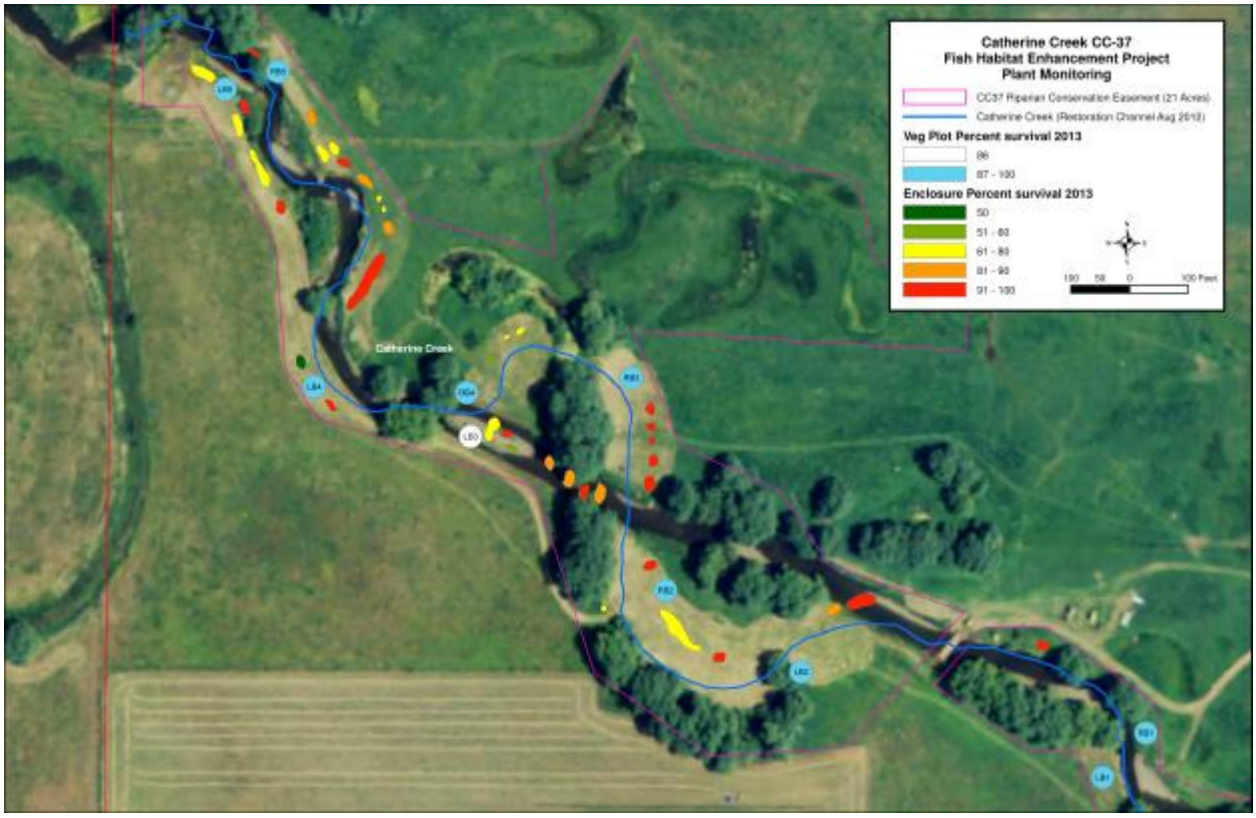
FIGURE 30 INTERIOR OF PLANT ENCLOSURE, LOOKING DOWNSTREAM.

The results were plotted onto an aerial map of the project area, showing the location of each enclosure or outside plot and the survival rate range for each plot. This technique is helpful when attempting to expose spatial patterns of plant survival or concentrated areas of higher mortality.

The outside vegetation plot that experienced the death of the one plant (LB3) lies on the left bank, over top where the old channel used to flow before the channel was filled in and the north meander was excavated. The map shows this location to be much further from the present channel than any other plot location and the area did not experience overland flooding during the months after planting up until the spring survey. Interestingly this outside vegetation plot is directly adjacent to a cluster of 5 pods that experienced the highest plant mortality (enclosures 3,

5, 6, 7, 9) with a total of 8 plant mortalities. This correlation suggests that higher mortality rates (lower survival rates) will be observed in plants located further from stream bank's edge compared to plants that exist closer to the channel. This suggestion is supported by the map, which gives us evidence that the plots with the highest survival rates are located closest to Catherine Creek. Example - cluster of enclosures RBEN 7-11 on right bank floodplain directly adjacent to stream all had 100% plant survival rate when surveyed in May 2013. In addition, enclosure RBEN 15 sits on the right bank floodplain directly adjacent to the stream. It is the largest enclosure containing 29 original plants, and only experienced two plant deaths (1 river birch & 1 dogwood) by the spring survey. (27/29)X100 = 93% plant survival rate.

FIGURE 31 VEGETATION ENCLOSURE MAP



However, there are exceptions to the pattern of higher survival probability the closer the plants live to the stream. The cluster of enclosures RBEN 12-14 experienced an overall average of 67% survival rate when surveyed in the spring after initial planting, and these enclosures lie close to the stream bank. Though it's important to note there are only 12 plants contained in these three enclosures, so the loss of just 4 plants quickly lowers the survival rate.

The following spring (May 28, 2013) the plants were surveyed to determine survival. Given that the plants were planted in November and surveyed six months later may not have allowed enough time to pass to notice obvious effects of wild ungulate grazing. Other factors such as frost and low winter temperatures could also have affected the plants' survival.

Of the several species of riparian plants that were planted dogwoods seemed to exhibit the least success. Of the 142 dogwoods considered in the vegetation monitoring study at CC37 in November, 116 remained alive by the following May 2013 plant survival survey, resulting in 82% survival rate. During the spring survey some dogwoods may have been inaccurately recorded as dead. Most dogwood stems contained very few green leaves, if any at all. But upon closer inspection many of the plants contained very few and very small green leaves at the base, qualifying them as technically still living.

After the survey was completed it appeared that many dogwoods had died in the six months since planting. To make sure this was an accurate conclusion the dogwoods were surveyed once more with closer inspection to determine if there were actually some amount of green leaves still attached to the plant. Red flags were placed by live dogwoods (any amount of green leaves) and white flags were used to mark definitely dead dogwoods. Flags were used so that the surveyor could return to the marked live plants and record whether the dogwoods recovered or died. The marked dead plants could also be re-surveyed to see if they were in fact correctly identified as dead or if they had revived.

The species which showed the largest difference in survival was cottonwoods, when comparing left and right bank survival rates. At the time these plants were put in the ground in November 2012, 35 cottonwoods were included in the survey from the Left Bank, and 51 on the Right Bank. Of these initial plantings, 29 were alive on the Left Bank and 50 on the Right bank when the planting area was surveyed in May 2013. The data gives us a survival rate of 83% for Left Bank cottonwoods, and 98% survival on the Right Bank. That is a 15% difference in survival between the banks, with the Left Bank exhibiting much higher mortality numbers. 92% of cottonwoods survived the first winter after Fall planting, and every Hawthorn and Currant and Willow survived.

Photo Point Monitoring

Photo Point Summary

Photo points are an effective monitoring method used to document morphological changes on restoration projects. Representative photos are taken at intervals throughout each project, the number being determined by the project size and complexity. A master photo point notebook is used to align each subsequent year's photo with the image taken the previous year. Ideally, images are captured in the exact location as the earlier image, with landmarks (trees, hillsides, etc.) used to align the photo. Images are taken during midday for optimal lighting conditions with a Nikon D3100 camera and jpeg images are saved into a master photo point file. Aerial photos are also taken at varying intervals along several project locations.

During 2013 photo points were taken at 12 separate projects. A total of 125 photos were taken, and GPS coordinates were recorded at each photo point site. Each photo point site is marked with a green T-133 post or a 1 foot rebar stake. Photo points are located at sites along project reaches with good visibility of stream-bank vegetation areas where morphological changes are likely to occur. Photo points are typically taken other year; however, some project photo points are taken every other year. On April 17, 2013, Aerial photos were taken from a helicopter at locations above several completed and upcoming projects.

A summary of 2013 photo points (ppts) at 12 project sites and examples of are as follows:

Meadow Creek Habberstad: 5 ppts
McCoy Creek Tipperman: 5 ppts
Meadow Creek Tipperman: 7 ppts
Meadow Creek and Dark Canyon Creek Cunha: 7 ppts
Bear Creek, Longley Meadows: 5 ppts
Wallowa River McDaniel's: 5 ppts
End Creek: 3 ppts
Willow Creek: 15 ppts
Catherine Creek 37: 7 ppts
Catherine Creek 44: 8 ppts
Rock Creek: 8 ppts
Graves Creek: 7 ppts

Catherine Creek (CC44) Photo Point #1A

Pre-Project 9/16/2013

Post-Project 10/22/2013

Catherine Creek (CC44) Photo Point #3A

Pre-Project 9/16/2013

Post-Project 10/22/2013

Catherine Creek (CC44) Photo Point #5

Pre-Project 9/16/2013

Post-Project 10/22/2013

Catherine Creek (CC44) Photo Point #7A

Pre-Project 9/16/2013

Post-Project 10/22/2013

Graves Creek Photo Point #6A

Pre-Project 6/6/2013

Post-Project 10/23/2013

Graves Creek Photo Point #6C

Pre-Project 6/6/2013

Post-Project 10/23/2013

Graves Creek Photo Point #7A

Pre-Project 6/6/2013

Post-Project 10/23/2013

Graves Creek Photo Point #7A

Pre-Project 6/6/2013

Post-Project 10/23/2013

Catherine Creek (CC37) Photo Point #5D

Pre-Project 3/28/2012

Post-Project 7/22/2013

Catherine Creek (CC37) Photo Point #5D

Pre-Project 3/28/2012

Post-Project 7/22/2013

Willow Creek Photo Point #1

Pre-Project 10/24/2011

Post-Project 7/11/2013

Willow Creek Photo Point #2A

Pre-Project 10/24/2011

Post-Project 7/11/2013

Willow Creek Photo Point #8

Pre-Project 4/11/2012

Post-Project 7/11/2013

Willow Creek Photo Point #9B

Pre-Project 4/11/2012

Post-Project 7/11/2013

Willow Creek Photo Point #10B

Pre-Project 11/13/2011

Post-Project 7/22/2013

McCoy Creek Tipperman Photo Point #4

Pre-Project 9/27/2010

Post-Project 7/18/2013

Meadow Creek Cunha Photo Point #1

Pre-Project 7/27/2010

Post-Project 8/17/2013

Aerial Photo Points

Grande Ronde River Tailings Pre-Project 6/11/2009

Grande Ronde River Tailings Post-Project 4/20/2012

Catherine Creek 37 Pre Project 4/20/2012

Catherine Creek 37 Post Project 4/17/2013

Willow Creek Pre-Project 4/20/2012

Willow Creek Post Project 4/17/2013

McCoy Creek 6/11/2009

McCoy Creek 4/20/2012

McCoy Creek 6/11/2009

McCoy Creek 4/17/2013

Longley Meadows/Bear Creek 6/11/2009

Longley Meadows/Bear Creek 4/20/2012

South Fork Willow Creek 6/11/2009

South Fork Willow Creek 4/20/2012

FISH HABITAT PROJECT IMPLEMENTATION DURING FY2013

Graves Creek Phase I

Project Description

The Graves Creek Phase I Project is part of the Rock Creek Fish Habitat Enhancement Project, which encompasses 15 miles of fish habitat on Rock, Little Rock, Sheep, Graves, Little Graves, and Little Whiskey Creek within the UGC-2 and UGS-16 Snake River Basin Recovery Plan assessment units. UGS-16 has been identified by the BiOp Expert Panel as one of the highest priority geographic units to protect and restore summer steelhead habitat. UGC-2 is identified as having high intrinsic potential for Chinook in the lower reaches of Rock Creek and low to medium intrinsic potential for Chinook within upper stream reaches. The lower reaches have been shown to provide potential juvenile Chinook rearing habitat from data collected during snorkel surveys conducted by project staff in 2011 and 2012. The primary purpose of the project includes restoring degraded riparian and floodplain habitat, improving instream habitat diversity, and improving water quality for adult and juvenile summer steelhead and spring Chinook salmon

The project is located in the Upper Grande Ronde River Subbasin on the 'For the Girls LLC' Ranch 6.8 miles west of La Grande, Oregon in Township 3 South, Range 37 East, portions of Sections 8, 16, 17, 20, and 21. The property is located within Union County tax lots 500, 2400, and 2500 within the 6th field HUC – 170601040307. Elevation on the ranch ranges from 3,000 to 4,000 feet. The project area is characterized as a typical mid-elevation Blue Mountain forested watershed interspersed with open dry meadows in the uplands and typically narrow floodplains. Stream channel types include Rosgen B2 and B3 channels in steeper forested reaches and C3/C4 and E3/E4 channel types in low gradient wide valley forms.

Phase I of the project included:

1. Installation of 25 riffle complexes to; aggrade currently incised channel segments, connect Graves Creek to its historic floodplain, and enhance annual floodplain activation and wetland restoration.

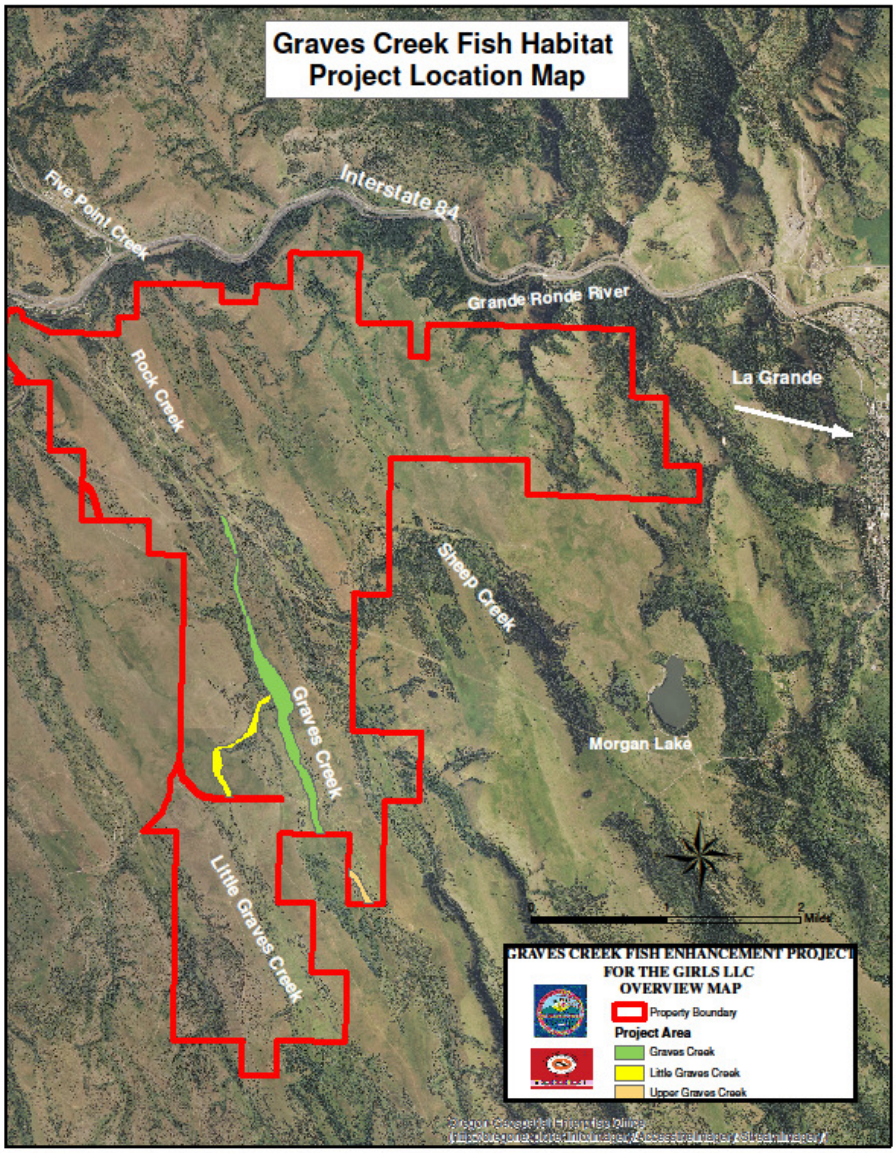
2. Installation of 128 large wood complexes (1,490 pieces of wood) along Graves Creek, Little Graves, and historic side channels to stabilize actively eroding streambanks and provide habitat complexity and diversity while riparian and wetland vegetation recolonizes the project reach through re-vegetation efforts and natural regeneration.
3. Seeding with a native grass seed mix (locally adapted Idaho fescue, bluebunch wheatgrass, basin wild rye, and tufted hairgrass) along 5.2 miles of Graves, Little Graves and associated floodplains, disturbed areas, and access roads to facilitate restoration of native plant communities.

Construction of the Graves Creek Phase I Project was delayed due to cultural resource concerns, but began late September 2013 and was completed early November, 2013. The project area encompasses approximately 144 acres and is the first step in a larger restoration effort on the ranch that covers a total of 450 acres of riparian habitat. The CTUIR secured a 15-year riparian conservation easement with the landowner. Following the completion of the instream habitat enhancement work, approximately 75% of the riparian easement will be converted/enrolled into the Farm Service Agency (FSA) CREP program, with the remaining riparian areas that do not quality for CREP remaining under easement through the CTUIR/BPA. In conjunction with fish habitat and riparian enhancement, off-channel water sources for livestock will be developed on the ranch using a combination of funds from FSA (CREP), NRCS (EQUIP), CTUIR/BPA Accord, and OWEB small grant applications.

Additional project phases planned for construction between 2014 and 2015 along Rock Creek and tributaries will be covered under separate permitting processes. Project scope for Rock Creek Phase II includes:

- Channel segment construction, removal of artificial berms/dikes, large wood and boulder installation, draw-bottom road obliteration, riparian planting, and installation of riparian fences and off-channel water developments along 4 miles of Rock Creek, 0.4 miles of Little Rock Creek, and 1 mile of Sheep Creek

FIGURE 32 GRAVES CREEK PHASE I OVERVIEW MAP



The landowner and Oregon Department of Forestry (ODF) initiated the Rock Creek project to address poor road access and historic forest management practices within the ranch boundaries. Planning efforts expanded into a more comprehensive perspective related to natural resource management and ultimately opportunities to protect and enhance significant riparian, floodplain, and instream habitat for ESA listed Snake River Basin spring Chinook salmon and summer steelhead, and resident fishery resources. The landowner enlisted the assistance of the CTUIR, NRCS, and ODF to develop conservation plans for water, fisheries and upland habitat which will ultimately be accomplished through multiple programs, including BPA sponsored fish habitat programs, CREP, EQUIP, and ODF programs.

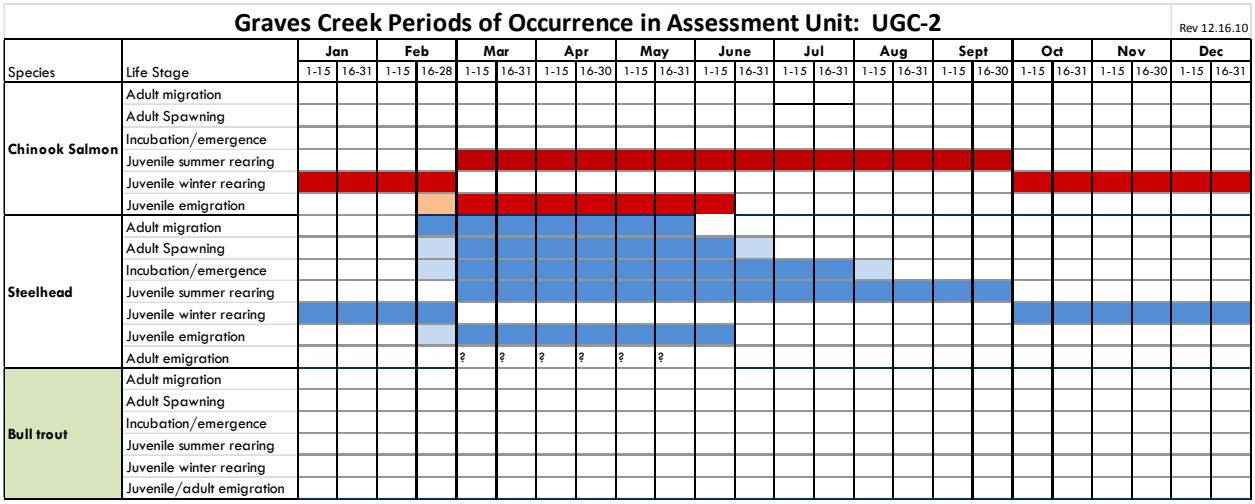
The potential of altered reaches within the project include meandering riffle, transition, pool dominated E5, E4, C5, C4, and B channel types developed within a diverse and complex riparian floodplain. Large wood complexes would be installed to enhance large pool habitat, providing complexity, cover, and

velocity refuge. While it is recognized that the primary channel form is a single-threaded plan form, diverse floodplain microhabitats in the form of active side channels, backwater areas and low velocity zones are desired features for increasing habitat complexity for target fish species.

Project Goal, Objectives, and Limiting Factors

Fish habitat has been adversely affected by historic land uses, including livestock overgrazing, road construction, logging, and channelization. Approximately 0.2 mile of Graves Creek has been channelized resulting in channel incision, increased channel slope, streambank erosion, elevated water temperatures and decreased base flow conditions, and loss of floodplain and hyporheic connectivity, riparian and wetland vegetation, and habitat diversity and complexity. Riparian conditions throughout the project are poor with lack of floodplain connectivity and altered hydrology which is limiting recovery of riparian and wetland vegetation and associated beaver colonization.

The overall goal of the project is to restore and protect hydrologic and geomorphic processes and functions that provide high quality spawning and rearing habitat for Threatened Snake River Basin ESA fish stocks and resident fishery resources. The Graves Creek project supports primarily summer steelhead with potential benefits for juvenile spring-summer Chinook salmon. The following chart illustrates periods of occurrence for ESA fish stock, noting primary use of Graves Creek is juvenile rearing and summer steelhead spawning.



Project objectives include habitat protection, re-activating the historic floodplain and associated channel network, increasing hyporheic connectivity and cold-water refuge, facilitating vegetative recovery, and encouraging long-term beaver re-colonization

Protect Habitat:

- Develop riparian easement (CTUIR/BPA/CREP easements).

Enhance Floodplain Connectivity:

Remove channel confinement structures and activate historic channel and floodplain network.

Enhance in-stream structural diversity, complexity, and geomorphic stability:

- Re-activate abandoned meandering reaches along Graves Creek to increase fish production capacity (spawning and rearing) and promote diversity and complexity of habitat types, decrease channel slope, decrease width: depth, and diversify sediment distribution. Install large wood and riffle complexes to provide roughness, overhead cover, and velocity diversity.

Enhance Riparian Habitat:

- Plant and seed riparian with native plant mix. Protect plantings until vegetation has established and is providing bank stability and shade.

Reduce streambank erosion rates:

- Use bioengineering techniques, planting/seeding, activation of floodplain, and protection (fencing) of riparian area to facilitate bank stability. Visual assessments indicated that the bulk of the sediment supply is from localized stream bank erosion. Stream bank stabilization may be achieved using several techniques including rest from overgrazing, or physically reshaping some banks and adding native material such as large woody debris (LWD), sedge/rush mats, shrub transplants or other plantings. This should greatly reduce the sediment supply, decrease percentage of fine sediment in the substrate and provide complex habitat.

Decrease peak summer temperatures:

- Improve/increase channel and floodplain conditions to diversify hyporheic exchange, facilitate vegetative cover/shade, and promote decreased channel width-depth ratio to decrease summer stream temperatures and increase winter temperatures.

The following summary table illustrates BiOp assessment units, CTUIR River Vision Touchstones, BiOp limiting factors, goals, objectives, actions, and monitoring, and other activities developed as part of baseline and pre-project planning for the Rock Creek project complex.

Recent and historic aerial photography of the Graves Creek project component illustrates an aerial perspective of current and historic conditions.

Project Name	Streams	Year	Assessment Unit steelhead	Assessment Unit Chinook	River Vision Touchstones	BiOP Limiting Factor ID	Snake River Basin Draft Recovery Plan/BiOP Identified Limiting Factors	Eco Concern Sub-Cat ID	Ecological Concern-Sub Category	Project Goals	Project Objectives	Implementation Actions/Metrics	Monitoring Metrics
Rock Creek Fish Habitat Enhancement Project Complex	Rock Cr, Little Rock Cr, Sheep Cr, Graves Cr, Little Graves Cr, Little Whiskey Cr	2013 2016	UGS16	UGC2	Biota-Connectivity	1	Habitat Quantity	1.1	Anthropogenic Barriers	Replace undersized culvert on Graves Creek	**Habitat Quantity:** Replace undersized culvert on Graves Creek. **Protect Habitat:** Develop riparian easement (CTUIR/BPA easement as well as CREP). **Enhance riparian habitat:** Plant and seed riparian with native plant mix. Protect plantings until vegetation has established and is providing bank stability and shade. **Enhance floodplain connectivity:** Remove channel confinement structures (earthen banks) and activate side channels. **Enhance in-stream structural diversity, complexity, and geomorphic stability:** Re-meander channelized stream reaches/re-activate abandoned meandering reaches along Rock and Graves Creek to promote diversity and complexity of habitat types, decrease channel slope, decrease width:depth, and diversify sediment distribution. Install large wood and riffle complexes to provide roughness, overhead cover, and velocity diversity. Protect riparian corridor to allow vegetation to establish. **Reduce streambank erosion rates:** Use bio-engineering techniques, planting/seeding, activation of floodplain, and protection (fencing) of riparian area to facilitate bank stability. **Decrease peak summer temperatures:** Improve/increase vegetative cover/shade to decrease summer stream temperatures and increase winter temperatures.	15 year conservation easement covering 16 miles of streams (approx 450 acres) signed in 2012. 11 miles of in-stream habitat complexity planned. 2 miles of channel construction (Rock Cr). 1 mile of historic channel activation planned (Graves Creek). 2-3 miles of side channel developement 2 miles of abandoned floodplain activation planned. Large wood and riffle/boulder complexes. 1 undersized culvert to be replaced. 4 overflow culverts to be placed. 25.5 miles of riparian fence planned.	**Enhance riparian habitat:** Pre-project snorkel and Spawning data collected. **Enhance floodplain connectivity:** Topography and longitudinal profiles and cross-sections surveyed with Trimble R8 in 2011. **Enhance in-stream structural diversity and complexity:** GPS and record configuration of wood structures, Photo-points. **Decrease width:depth ratios and slope:** Pre-project cross-sections surveyed with Trimble R8 in 2011. Pebble counts taken. **Decrease peak summer temperatures:** Water temperature - hourly data - Hobo Pendant loggers - May to November starting 2011.
					Riparian Vegetation	4	Riparian Condition	4.1	Riparian Condition	Protect Habitat. Subbasin Plan Reference: Habitat Protection (page 258).			
								4.2	LWD Recruitment	Enhance riparian habitat conditions. Subbasin Plan Reference: Riparian Conditions (page 262).			
					Connectivity	5	Peripheral and Transitional Habitats	5.1	Side Channel and Wetland Conditions	Enhance Floodplain Connectivity. Subbasin Plan Reference: Channel Conditions (page 260).			
								5.2	Floodplain Condition				
					Geomorphology	6	Channel Structure and Form	6.1	Bed and Channel Form	Enhance in-stream structural diversity and complexity. Subbasin Plan Reference: Channel Conditions (page 260).			
								6.2	Instream Structural Complexity				
						7	Sediment Conditions	7.1	Decreased Sediment Quantity	Increase suitable spawning gravel recruitment. Subbasin Plan Reference: Sediment Conditions (page 261).			
								7.2	Increased Sediment Quantity	Reduce excessive sediment. Subbasin Plan Reference: Sediment Conditions (page 261).			
					Hydrology	8	Water Quality	8.1	Temperature	Decrease summer peak temperatures. Subbasin Plan Reference: Riparian Conditions (page 262).			
						9	Water Quantity	9.2	Decreased Water Quantity	Increase summer water quantity. Subbasin Plan Reference: Low Flow Conditions (page 263).			

FIGURE 33 GRAVES CREEK SHOWING THE LACK OF RIPARIAN VEGETATION, MAY 2012.

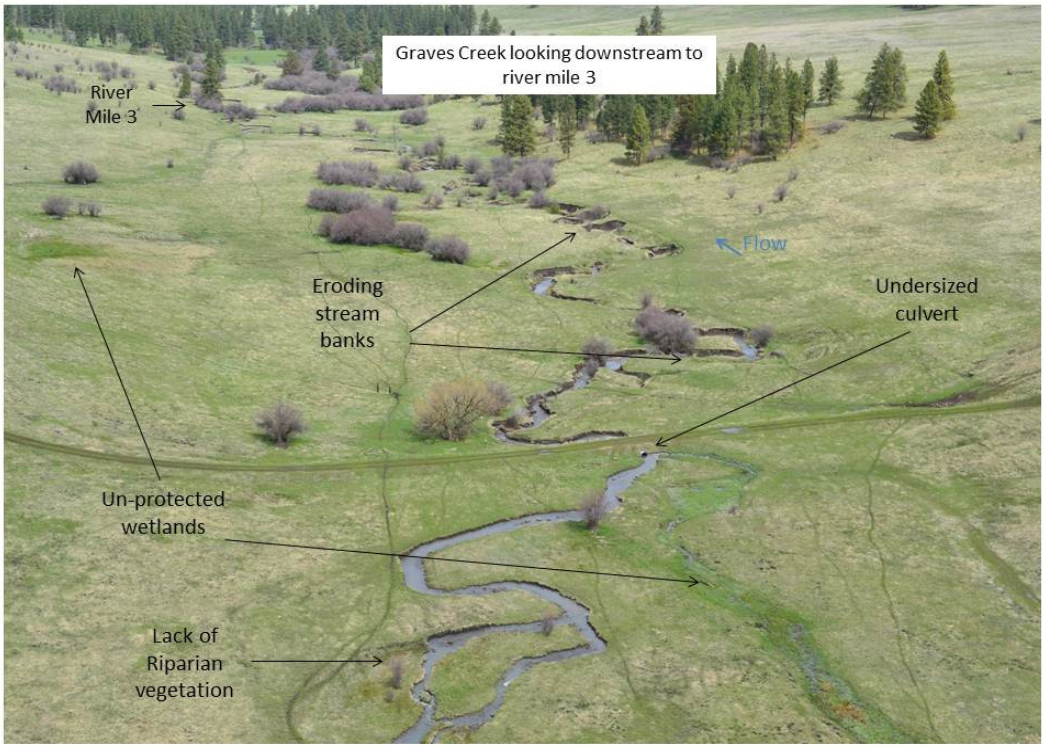


FIGURE 34 GRAVES CREEK VIEWING DOWNSTREAM, MAY 2012.

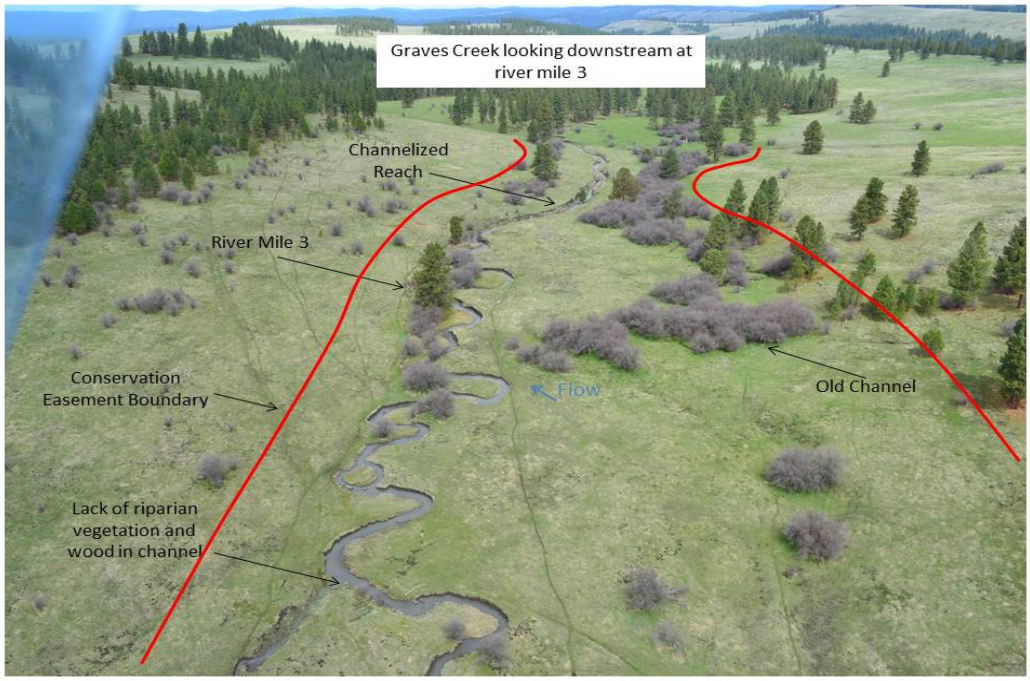


FIGURE 35 GRAVES CREEK CHANNELIZED REACH, APRIL 2013.

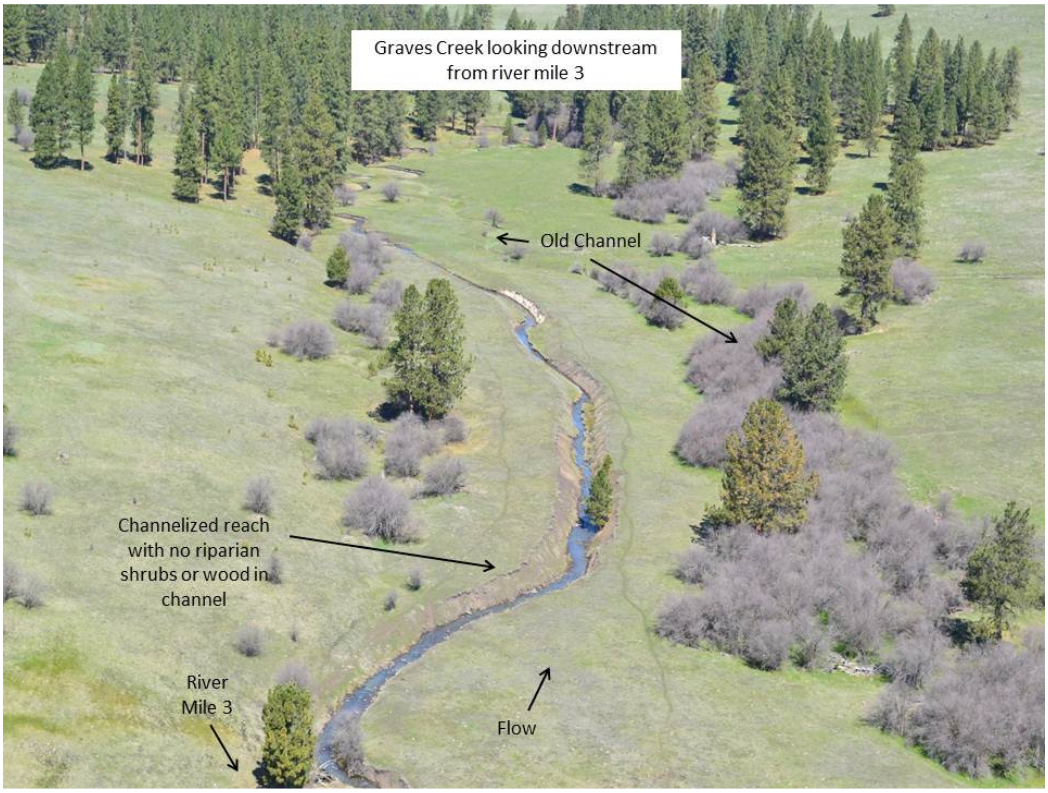
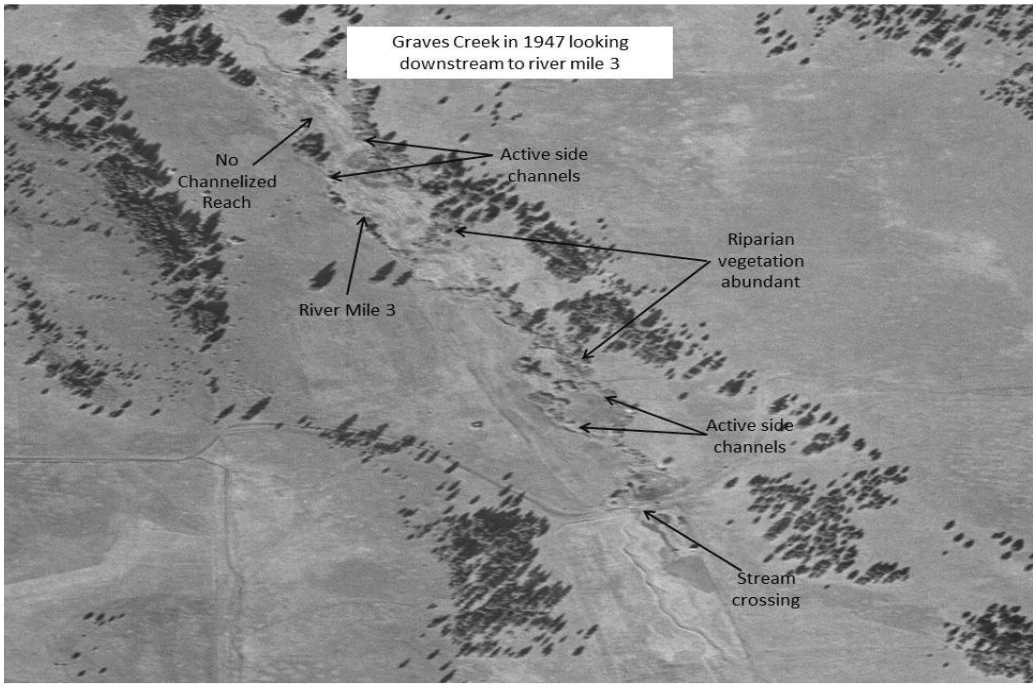


FIGURE 36 GRAVES CREEK IN 1947 PRIOR TO CHANNELIZATION. IMAGE SHOWS THE ABUNDANT RIPARIAN VEGETATION AND MULTIPLE ACTIVE SIDE CHANNELS.



Basic Data

Watershed Analysis

A watershed analysis was conducted in 2011 - 2013 to determine past land use history and determine causes of channel dis-equilibrium. The analysis included:

- Determine the drainage area
- Review past & current land uses
- Examine 1937 to 2012 aerial photographs
- Onsite inspections of various portions of the watershed by project biologists
- Collect channel cross sections, longitudinal profiles and pebble counts
- Conduct GPS survey of the work area and produce a topographic map at 1 ft. contours
- Conduct cultural resource surveys
- Review Soil Surveys and compare to profiles
- Review wetland delineation maps
- Review 1941 habitat survey

There are currently 9.02 acres of wetlands within the Graves /Little Graves Creek project area delineated by the NWI comprising:

- PEMC = 0.22 acres (Riverine Impounded).
- PSSA = 1.41 acre (Riverine Impounded).
- R4SBF = 4.7 acres (Riverine Flow through).
- R4SBC = 2.69 acre (Riverine Flow through).

However, an analysis of soil types shows an extensive network of hydric soils indicating this area historically supported an extensive wetland complex with approximately 2.04 miles of stream traversing through hydric soils. Soil types and lineal stream distance are as follows:

- 39C = Hydric soil - (Looking-glass silt loam, 2% to 12% slopes) – 1.31 miles of stream.
    - The largest continuous soil type within the project area.
    - Slow permeability of underlying clay subsoil and seasonally perched water table.
- 60D = Hydric soil – (Ukiah silty clay loam, 2% to 20% slopes) – 0.73 miles of stream.
    - Found on Little Graves Creek between river mile 0.5 and 1.4.
    - Slow permeability.
- 35E = (Klicker-Anatone complex, 5% to 40 % slope) – 1.2 miles of stream.
    - Mostly pine sites with steep slopes and stony soils.
    - Soil type is found in the ‘B’ channel form near river mile 1.
- 12D = (Cowsly very stony silt loam, 2% to 20% slopes) – 1 mile of stream.
    - Mostly pine sites with stony soils found around river mile 4 on Graves Creek and within the first ½ mile of Little Graves Creek.
    - The soil is moderately well drained.
- 61E = (Ukiah-Starkey complex, 5% to 40% slopes) – 0.2 miles of stream.
    - Typically found in uplands this soil type can have high erosion rates if un-vegetated.
    - This soil type is limited within the project area to a section of Graves Creek where the channel has been moved to the valley left and straightened.
- 66 = (Veazie-Voats complex, 0% to 3% slopes) – 0.3 miles of stream.
    - Typically low stream terraces with grasses, forbs, and scattered trees that seasonally flood.
    - This soil type is found on Graves Creek at the confluence with Rock Creek.

Site Surveys

Field surveys and assessment included general field surveys, photographs, collection of historic and current information available for the project (habitat surveys, water temperature data, historic aerial photography), and initiation of detailed morphologic surveys (longitudinal profiles, channel cross section, pebble counts), and collection of topographic data. Additionally, staff deployed a network of water temperature monitoring probes, and conducted presence/absence fish snorkel surveys and adult steelhead spawning surveys along project area streams.

Stream Processes

Graves Creek is located within a wide gentle valley slope with well-developed floodplain adjacent to the stream (Valley Type VIII). Stream segments along Graves Creek classify as Rosgen B2 and B3 channels in steeper forested reaches near the confluence with Rock Creek and C3/C4 and E3/E4 channel types in low gradient wide valley forms in the central portion of the project area. Channelized reaches in the mid project area consist of G and F channel types with little to no recovery (e.g., benches and/or inset floodplains). Channel slope averages 1.07% with slopes as high as 1.37% in channelized reaches to 0.67% in intact and less entrenched reaches. Large segments of Graves Creek exhibit a sinuous channel network (1.5 – 1.8) slight to high entrenchment, over-steepened profile, and oversized channel dimension. Graves Creek has been extensively affected by historic land uses including beaver removal, road and railroad construction, culverts, livestock grazing, and logging. Riparian and wetland vegetation is sparse with generally poor riparian condition, limited natural regeneration and colonization, and notable absence of beaver activity. Vertical, actively eroding streambanks are prominent. Extensive livestock grazing in the floodplain and along Graves Creek is evident and currently limiting development.

Hydrology

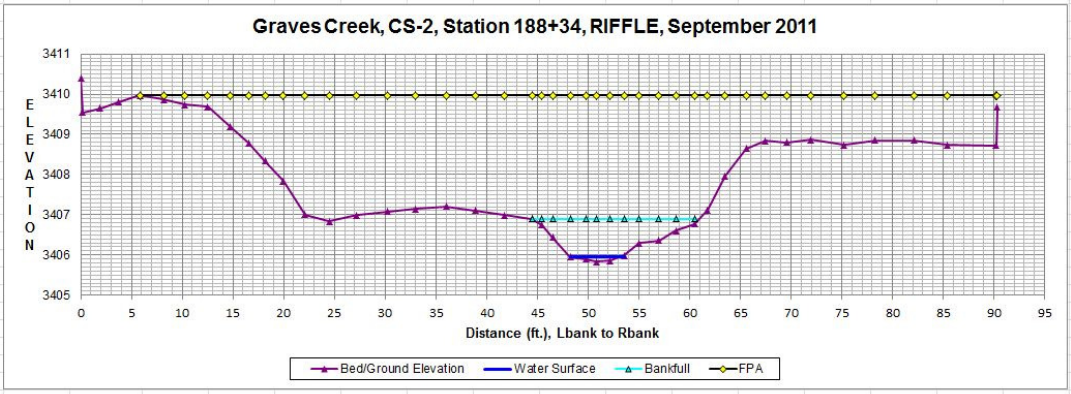
No gaging stations are located on Graves Creek or in the Rock Creek watershed; therefore, stream bank-full discharges for Graves Creek were estimated using several techniques, including assessment of regional curves, and velocity and flow calculations using Manning's roughness coefficient by channel type, relative roughness and resistance, and Manning's from resistance factor.

Regional Curves

The closest gage station (station number 13319000) is on the Grande Ronde River at river mile 164 in La Grande. The station has been active since 1904. H.L. Silvey developed regional curve and bank-full discharge estimates for the gage in 1999. The Grande Ronde River stream gage drainage basin area is 678 square miles. Based on a bank-full discharge of 2,750 cfs, a value of 4.06 cfs/mi^2 of drainage area was calculated for the Grande Ronde River. The watershed area for Rock Creek was delineated by CTUIR using The National Hydrology dataset in Arc GIS. In addition, the drainage area for Graves Creek was mapped and its area calculated as 10 mi^2. The Rock Creek Watershed covers approx. 50.6 mi^2 and would therefore have a bank-full discharge of 205.4 cfs. This equates to approx. 40-45 cfs bank-full discharge for the Graves Creek drainage.

GRAVES CREEK HYDROLOGIC SUMMARY	
Q (bank full discharge, 1.5 yr.)	45 cfs
Channel Slope (avg.)	1.0795%
Valley Slope	1.60%
Width to Depth ratio	14.4
Cross Sectional Area (avg. ft.)	13.2
Bank Full Width (avg. ft.)	11.4
Max Depth (ft.)	1.38
D50 (mm)	10.68
D84 (mm)	30.67

Analysis of field collected channel cross section data indicates an average riffle cross sectional area of approximately 12 square feet. Flow calculations using Manning's by channel type, relative roughness & resistance factor, and Manning's from resistance factor indicate a 1.5-year bankfull discharge of 38 to 46 CFS. Comparison of regional curve discharge data with field collected channel data, a 1.5-year bankfull discharge value of 45 cfs appears a reasonable estimate for the Upper Graves Creek project reaches.



		elevation					
			VELOCITY & FLOW CALCULATIONS:				
dmax @	50.8	3405.84					
BKF@	44.5	3406.90	1) Manning's by channel type:				
DMAX =	1.06			s =	0.01200		local slope 147 ft. above/below x-section
FPA elev.	N/A	3407.96		R =	0.5950		A/Wp
FPA width	200.00	*(estimated minimum)*		n =	0.0260		from pg. 187 in Ref. Reach field book
Wbkf	16.0			u =	4.43		1.4865*(R2/3*s1/2)/n
Dave	0.64			Q =	**46**		A*u
CSA	10.27						
W/D ratio	24.86		2) Relative roughness & Resistance factor:		ft	mm	
ER =	12.52			D84 in riffles =	0.0894	27.24	
slope =	0.012			R/D84 =	6.66		Rel. Roughness = R/d84
Stream type =	C4			u/u* =	8		Friction Factor from chart pg.188
XX cfs on X-X-xx:		**xxxx.xx**		u* =	0.478958		Shear Velocity = Sq. rt. Of g*R*s
				u =	3.83		
				Q =	**39**		
			3) Manning's from Resistance Factor:				
				u/u* =	7.522871		Resistance Factor (u/u*) = 2.83+5.7*logR/D84
				Manning's n =	0.031		from plot pg. 189
				u =	3.72		1.4865*(R2/3*s1/2)/n
				Q =	**38**		

Project Elements

Several habitat actions were incorporated into the project to address habitat-limiting factors with a focus on restoration of process and function. These require habitat protection and redistribution of livestock from the floodplain and along project area streams, and embracing a long-term commitment to allowing

natural processes to shape and form complex, dynamic, and productive fish habitat over time with the intent of facilitating beaver re-colonization. Following is a brief description of project components incorporated into the design and constructed to initiate channel and floodplain enhancements.

Habitat Complexity and Diversity

Large Wood Additions
Incorporation of large wood complexes and margin roughness into pools facilitates bank stabilization, supports scour and maintenance, provides overhead cover, creates low velocity margins and diversifies hydraulic conditions to support instream habitat. Pool scour also supports sediment partitioning, pool tail – out – glide maintenance and resulting spawning habitat. The LWD structures provide in-stream hydraulic and geotechnical control of stream-bank erosion, and maintain hydraulic geometry. One hundred and twenty eight (128) large wood complexes were installed within the Phase I project area. Due to cultural resource concerns, all LWD structures were installed using "soft" placement techniques instead of excavating the structures into the banks as originally planned.

FIGURE 37 GRAVES CREEK LARGE WOOD ADDITION.

Constructed Riffles
Channel cross sectional area, slope, and entrenchment along Graves Creek varies depending on level of effect from roads and culverts, livestock grazing and vegetation loss, and effects of channelization. Reaches along stations 179+00 to 161+00 (from culvert downstream approximately 1,800 lineal feet) and stations 140+00 to 123+00 (within channelized reach) are priority reaches to address channel incision and entrenchment. Planned techniques to increase floodplain connectivity, decrease channel gradient, and adjust the vertical profile along Graves Creek include: a combination of reconnecting the historic side channel and floodplain network by removing earthen plugs at entrance of side channel entrances in conjunction with installation of constructed riffles using methods described in (Newbury & Gasboury, 1994), and (Newbury, Gaboury, & Bates, 1997).

Constructed riffles were installed at 25 strategic locations along Graves Creek in segments exhibiting entrenchment and lack of connection with associated floodplain to restore critical functions including geomorphic stability, floodplain activation, and diversity of water depth, substrate, velocity, and habitat complexity. Large wood/channel roughness was incorporated along the riffle margins to support low velocity and forage habitat as well as bank stability to protect from lateral scour while riparian vegetation recolonizes and stabilizes each site. Riffles were constructed with local, rounded river rock and included a gradation of particles, including fines, to facilitate compaction of each constructed riffle. The average D85 of approximately 27mm along Graves Creek riffle cross sections provided a guide for gradation for gravel material to be used in riffle constructed. Local material derived from materials dredged by previous floodplain control efforts along lower Rock Creek were utilized for riffle construction. Available material generally contained rounded river rock with an approximate D50 of 70-100mm intermixed with fine sand and soil, which were utilized to construct the core riffle structure. Suitable, clean spawning gravels with a D85 of 25-30mm were installed on top of core riffle complexes.

The following table illustrates the riffle schedule and design elevations at each site based on local vertical channel thalweg elevation compared with measured bankfull and adjacent terrace and floodplain elevations.

Graves Riffle Calculations & Design Elevations

Riffle Site	Stake pt	River Sta	Q Total	Min Ch El	W.S. Elev	E.G. Elev	E.G. Slope	Vel Chnl	Top Width	Max Ch Dpth				SOLVED							
			(cfs)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(ft)	(ft)	Crit Depth	Crit Velocity	Crit Spec Enrgy	Weir Elev	Weir Height	4 To 1	12 to 1	V up	V down	Riffle Yardage	Notes
1	25016	178+50	45	3394.28	3395.42	3397.5	0.0159	4	8.46	1.14	0.96	5.55	1.44	3396.06	1.78	7	21	6.36	19.08	4	
2	25184	177+10	45	3392.33	3393.595	3395.21	0.0159	4	15.4	1.262	0.64	4.55	0.96	3394.25	1.92	8	23	7.35	22.05	6	
3	25018	173+40	45	3388.19	3389.461	3391.5	0.0098	4	11.14	1.27	0.80	5.07	1.20	3390.30	2.11	8	25	8.92	26.76	9	
4	25028	172+00	45	3387.57	3388.875	3391	0.0159	4	6.99	1.31	1.09	5.92	1.63	3389.37	1.80	7	22	6.48	19.43	5	
5	25029	169+25	45	3381.95	3382.728	3385.5	0.0189	4	9.49	0.878	0.89	5.35	1.33	3384.17	2.32	9	28	10.76	32.27	13	
6	25030	166+50	45	3379.60	3380.725	3383	0.0084	4	10.03	1.121	0.86	5.25	1.28	3381.72	2.11	8	25	8.93	26.79	9	
7	25032	164+25	45	3376.03	3377.671	3380	0.0093	4	7.54	1.639	1.03	5.75	1.54	3378.46	2.43	10	29	11.81	35.44	16	
8	25034	161+75	45	3374.02	3375.299	3378	0.0080	4	9.17	1.277	0.91	5.41	1.36	3376.64	2.62	10	31	13.69	41.07	21	
9	25038	154+25	45	3367.08	3370.5	3371	0.0074	4	6.4	3.416	1.15	6.09	1.73	3369.27	2.19	9	26	9.56	28.67	10	
10	25040	151+00	45	3366.30	3367.575	3369.5	0.0051	4	9.94	1.271	0.86	5.26	1.29	3368.21	1.91	8	23	7.26	21.79	6	
11	25043	147+35	45	3362.96	3364.315	3366.5	0.0031	4	8.07	1.353	0.99	5.64	1.48	3365.02	2.06	8	25	8.45	25.35	8	
12	25185	146+25	45	3362.71	3363.937	3365.61	0.0193	4	14.56	1.228	0.67	4.64	1.00	3364.60	1.90	8	23	7.18	21.55	6	
13	25066	139+50	45	3354.36	3355.189	3358	0.0216	4	9.64	0.834	0.88	5.32	1.32	3356.68	2.33	9	28	10.84	32.51	13	Channelized Reach
14	25067	137+00	45	3348.27	3349.71	3352	0.0241	4	11.96	1.445	0.76	4.95	1.14	3350.86	2.59	10	31	13.46	40.38	20	Channelized Reach
15	25068	135+50	45	3345.31	3346.185	3349	0.0137	4	10.81	0.879	0.81	5.12	1.22	3347.78	2.47	10	30	12.24	36.71	17	Channelized Reach
16	25069	133+50	45	3343.21	3344.774	3347	0.0108	4	8.87	1.564	0.93	5.47	1.39	3345.61	2.40	10	29	11.50	34.50	15	Channelized Reach
17	25070	131+50	45	3339.75	3343.056	3343.5	0.0112	4	11.38	3.306	0.79	5.03	1.18	3342.32	2.57	10	31	13.22	39.65	19	Channelized Reach
18	25071	129+50	45	3339.41	3341.35	3343	0.0047	4	11.13	1.938	0.80	5.07	1.20	3341.80	2.39	10	29	11.43	34.30	15	Channelized Reach
19	25072	127+50	45	3338.06	3340.362	3341.5	0.0067	4	14.51	2.299	0.67	4.64	1.00	3340.50	2.43	10	29	11.85	35.54	16	Channelized Reach
20	25088	125+50	45	3336.38	3337.764	3339.5	0.0130	4	10.62	1.381	0.82	5.15	1.23	3338.27	1.88	8	23	7.08	21.25	6	Channelized Reach
21	25089	123+25	45	3332.67	3334.433	3335.5	0.0158	4	15.65	1.768	0.64	4.52	0.95	3334.55	1.88	8	23	7.08	21.23	6	
22	25091	119+75	45	3327.05	3329.06	3330.5	0.0115	4	8.32	2.008	0.97	5.58	1.45	3329.05	2.00	8	24	7.96	23.88	7	
23	25095	113+00	45	3322.71	3324.59	3326	0.0073	4	8.38	1.883	0.96	5.57	1.45	3324.55	1.85	7	22	6.82	20.47	5	
24	25098	109+00	45	3320.10	3321.558	3323	0.0165	4	13.44	1.463	0.70	4.76	1.06	3321.94	1.85	7	22	6.84	20.52	5	
25	25101	104+50	45	3310.86	3312.493	3313.5	0.0133	4	12.91	1.637	0.72	4.82	1.08	3312.42	1.56	6	19	4.87	14.60	3	

Constructed riffle design elevations ranged from approximately 1.5 feet above existing thalweg elevation to 2.6 feet. Average fill material at each riffle site included approximately 9 cubic yards with higher design elevations and volumes associated with the channelized reach. Riffle material was graded and compacted in place with a 4:1 slope on the upstream face and a 12:1 slope on the downstream face to maintain a gradual slope while increasing the invert elevation of the channel at strategic locations along Graves Creek where the largest departures between the thalweg invert and adjacent terrace elevations were the greatest. Of the riffles, 16 included installation of margin roughness in the form of woody debris to provide streambank stability and riffle habitat diversity.

Reconnect Floodplain Side Channel Habitat

Historic channels along Graves Creek will be re-activated in Summer 2014 as part of the Phase II project in conjunction with abandoning the channelized reach. Four side channels, with a total combined length of 1.04 miles, will be re-activated. The side channel located at station 186+50 will be adequately activated during installation of two, Type II wood structures and will not require additional excavation. Side channels at stations 172+00 and 137+00 will require additional excavation to remove earthen plugs in order to activate them. Less than 50 combined cubic yards of material will need to be excavated. Spoil materials will be graded and blended into the site. Typical cross sections of side channel entrances will be 12' wide, 15 ' in length, and 2.5' in depth. The historic channel mouth at 147+35 will also be excavated in 2014 and 4 earthen plugs installed in the channelized reach to create floodplain ponds with the upper plug diverting the main flow of Graves Creek back into it's historic meandering channel.

Side channel habitat features are low gradient, highly sinuous, low width – depth ratio channels that provide complex, low velocity, perennially connected habitats with deep narrow channels, dominated by undercut banks and overhanging herbaceous vegetation. Side channel and alluvial habitats represent critical juvenile Chinook and steelhead rearing habitat and provide thermal refugia through hyporheic input. Typically, these features are facilitated through the influence of beaver activity and represent high quality, low velocity juvenile rearing habitat, with complex overhead cover, and thermal regulation through hyporheic connections through the hydraulic conductivity of floodplain sediments. Wood debris including small stems, slash and brush will be placed to increase frictional resistance and additional channel structure. Alcoves will be enhanced where existing side channels flow into the main stem. Side channels provide low velocity habitats for resting and rearing and contain nutrients and forage opportunities due to eddy and backwater effects from the mainstem. Deposition of organic materials recruited from the floodplain generally occurs in these areas. Thermal refugia are also present and driven by the down-valley groundwater gradient within the upstream floodplain. Alcoves would also be enhanced with the addition of LWD to promote organic retention, invertebrate habitats and hydraulic complexity.

Vegetation

A key element to the restoration design maturing to full potential will include the integration of a comprehensive re-vegetation strategy which will be implemented during phases of project construction. The planting strategy will incorporate a combination of techniques, including installation of containerized shrubs and trees, deep live-whip willow planting, installation of sedge/rush plugs and matts, and custom seeding with a native seed mix complimentary to upland and riparian/wetland species occurring on the project site. Ultimate success of the proposed restoration effort will result in an increased biologic signature and species utilization of the project reach.

Existing riparian is in poor condition. A 15-year riparian easement was secured by the CTUIR in cooperation with the landowner. Tree, shrub, and herbaceous planting along with protection from livestock is recognized as a critical element to project success. Extensive seeding and planting will be completed to accelerate vegetation establishment throughout the project using a variety of mechanical and

manual techniques. The long-term vision for the project area is a diverse assemblage of native plant communities that reflect site potential and contribute to the natural function, resiliency, and stability of a self-sustaining environment. Conservation easement planning incorporates the landowner's desire to enroll as much of the project area into the FSA CREP program as possible following completion of fish habitat enhancement efforts. Based on preliminary assessments approximately 75% of the project area will qualify for the CREP program on reaches that contain non-forested soils. Those areas not qualifying for the CREP program will remain in a CTUIR/BPA conservation easement for a 15-year period.

CTUIR native plant nursery is currently growing approximately 7,500 containerized plants for the project area:

Black Cottonwood	*Populus trichocarpa*	4" x 14" Long Tube
Red-Osier Dogwood	*Cornus sericea*	4" x 14" Long Tube
Narrow Leaved Alder	*Alnus incana*	4" x 14" Long Tube
Black Hawthorne	*Crataegus douglasii*	4" x 14" Long Tube
Water Birch	*Betula occidentalis*	4" x 14" Long Tube
Blue Elderberry	*Sambucus cerulea*	4" x 14" Long Tube
Mockorange	*Philadelphus lewisii*	4" x 14" Long Tube
Golden Currant	*Ribes aureum*	4" x 14" Long Tube
Chokecherry	*Prunus virginiana*	4" x 14" Long Tube
Common Snowberry	*Symphoricarpos albus*	4" x 14" Long Tube

In addition to containerized plants approximately 5,000 native, locally harvested, willow whips will be planted within the project area. Whips will be planted on a 6'x6' variable width spacing in areas of disturbed ground within the riparian area, within wood complexes, and along eroding banks. Disturbed area within the riparian area will also be seeded immediately following the construction with a native grass mix consisting of: Idaho Fescue, Basin Wild Rye, Blue Wild Rye, Blue bunch Wheatgrass, Western Wheatgrass, Sherman Big Bluegrass, and Tufted Hairgrass.

Project Monitoring

Monitoring of the Rock Creek Fish Habitat Restoration and Enhancement Project has been carried out by CTUIR since 2010 and has focused on baseline data collection for use in a 'Before/After' (BA) experimental design and to provide data for use in project planning and design. The following metrics have been measured:

- Water temperature data: collected for 3 years on Rock Creek and for 2 years on Graves Creek.
- Stream morphological surveys (cross-sections and longitudinal profiles, pebble counts, topographic data): collected for Graves Creek during 2011 and 2012.
- Adult steelhead redd surveys: collected on Rock, Graves, Little Graves, Little Rock and Sheep creeks for 3 years (2011 to 2013).
- Presence/absence fish snorkel surveys: collected for 3 years on Rock Creek (2011 to 2013) and 1 year on Graves Creek (2011).
- Columbia River Inter-Tribal Fish Commission (CRITFC) and Oregon Department of Fish and Wildlife (ODFW) collected stream habitat and biological data on Rock Creek in 2012 as part of CHaMP monitoring and will repeat these surveys in 2013.

- The CTUIR Grande Ronde RM&E Program is scheduled to conduct biological monitoring within the project area in 2013 (details of bio-monitoring program are laid out in RMECAT – 2009-014-00. http://www.cbfish.org/Proposal.mvc/Summary/RMECAT-2009-014-00).

The Rock Creek Drainage exhibits biologically significant thermal loading during summer base flows as it progresses downstream. Data collected during 2011 and 2012 show temperatures consistently reaching upper lethal limits for salmonid species (temperatures >=25°C). Mean daily temperatures were at or above the DEQ standard of 17.8 °C for 50 days out of 152 in 2011 and 57 days out of 211 in 2012 at Lower Rock Creek. Graves Creek typically becomes sub surface for the majority of its length during the summer months, however there are some isolated pools scattered throughout the ranch where juvenile *O.mykiss* were observed in 2011 at an average density of 2.4 fish/100m^2 of pool habitat.

Steelhead spawning surveys were conducted on 11.29 miles of stream within the ranch boundary during 2011 and 2012, and 2013. Streams surveyed were: Rock Creek, Little Rock Creek, Sheep Creek, Graves Creek, and Little Graves Creek. There were an average of 0.7 redds/mile in 2011, 1.2 redds/mile in 2012, and 0.4 redds/mile in 2013. Data from these surveys indicate that the majority of spawning in Rock Creek occurs upstream of river mile 2.5, which may be a function of the lack of suitable substrate at the lower reaches. There were no redds observed in 2013 on Graves Creek, however, there were 6 redds observed in 2012 between river mile 1 and 4.2. This corresponds with pebble count data and longitudinal profile surveys conducted in 2011 that showed increased stream slope and larger substrate at the lower reaches compared to upper reaches. No redds were observed on Little Graves Creek each year of survey.

Forward Looking Infrared (FLIR) data was collected for the Rock Creek drainage by CRITFC in 2010 and made available to the CTUIR Fish Habitat Program. These data indicate that the drainage is a warming influence on the Grande Ronde River. However, the FLIR data also documented a number of areas with apparent hyporheic upwelling and the presence of cold-water refuges, particularly at the confluence of tributaries and areas with greater sinuosity. These data are being used in the planning stage of habitat restoration for Phase 2.

The Rock Creek Drainage within the project area has a number of limiting factors inhibiting salmonid spawning and juvenile survival. The area exhibits lethal limit water temperatures throughout the summer period, has little riparian cover/shade, actively eroding stream banks, has a simplified channel with coarse substrate, and is isolated from the majority of its floodplain by draw bottom roads and dikes. The densities of steelhead redds per mile are amongst the lowest of all the project streams surveyed by CTUIR Fish Habitat staff and yet densities of juvenile fish are amongst the highest of those projects sampled. It appears from the snorkel surveys that the age class of *O.mykiss* are dominated by 1's and 2's (1 year and 2 year old fish) with little or no presence of zero's (current years young). It is possible that the young of the year are rearing upstream of the project area close to where the majority of spawning is believed to occur and in areas that do not have as high summer base flow water temperatures (as seen in the FLIR data).

Planned habitat protection, re-connection of historic channels, re-connection of floodplain, and recovery of riparian and wetland vegetation has the potential to increase ecological processes and promote significant biological response in this project area.

Catherine Creek 44 (CC44) Fish Habitat Enhancement Project

The large scale, multi-faceted project is a partnership between eight private landowners/ranches and USWCD, BOR, CTUIR, and ODFW. Multiple partners are working to plan, design, and implement a project that addresses multiple limiting factors and biological objectives through a variety of techniques. The primary purposes of the project include restoring degraded riparian and floodplain habitat, improving instream habitat diversity, and improving water quality for adult and juvenile summer steelhead and spring Chinook salmon.

Fish habitat has been adversely affected in this reach by channelization and diking, development (structures), farming, grazing, and over-appropriation of water. Habitat conditions vary from poor to fair with increased channel slope, decreased sinuosity, limited large pool habitat, lack of complexity and diversity, coarse sediment, lack of floodplain connectivity, high summer water temperatures, and low summer base flow. This reach has very high potential for increasing spring-summer Chinook spawning and rearing capacity. The potential condition of altered reaches within the project includes meandering riffle-pool dominated stream types developed within a diverse and complex riparian floodplain. Large wood complexes were installed at three sites during Phase I in FY2013 and will continue to be installed throughout this multi-phase project to enhance large pool habitat, providing complexity, cover, and velocity refuge. While it is recognized that the primary channel form is a single-threaded plan form, diverse floodplain microhabitats in the form of active side channels, backwater areas and low velocity zones are desired features for increasing habitat complexity for target fish species.

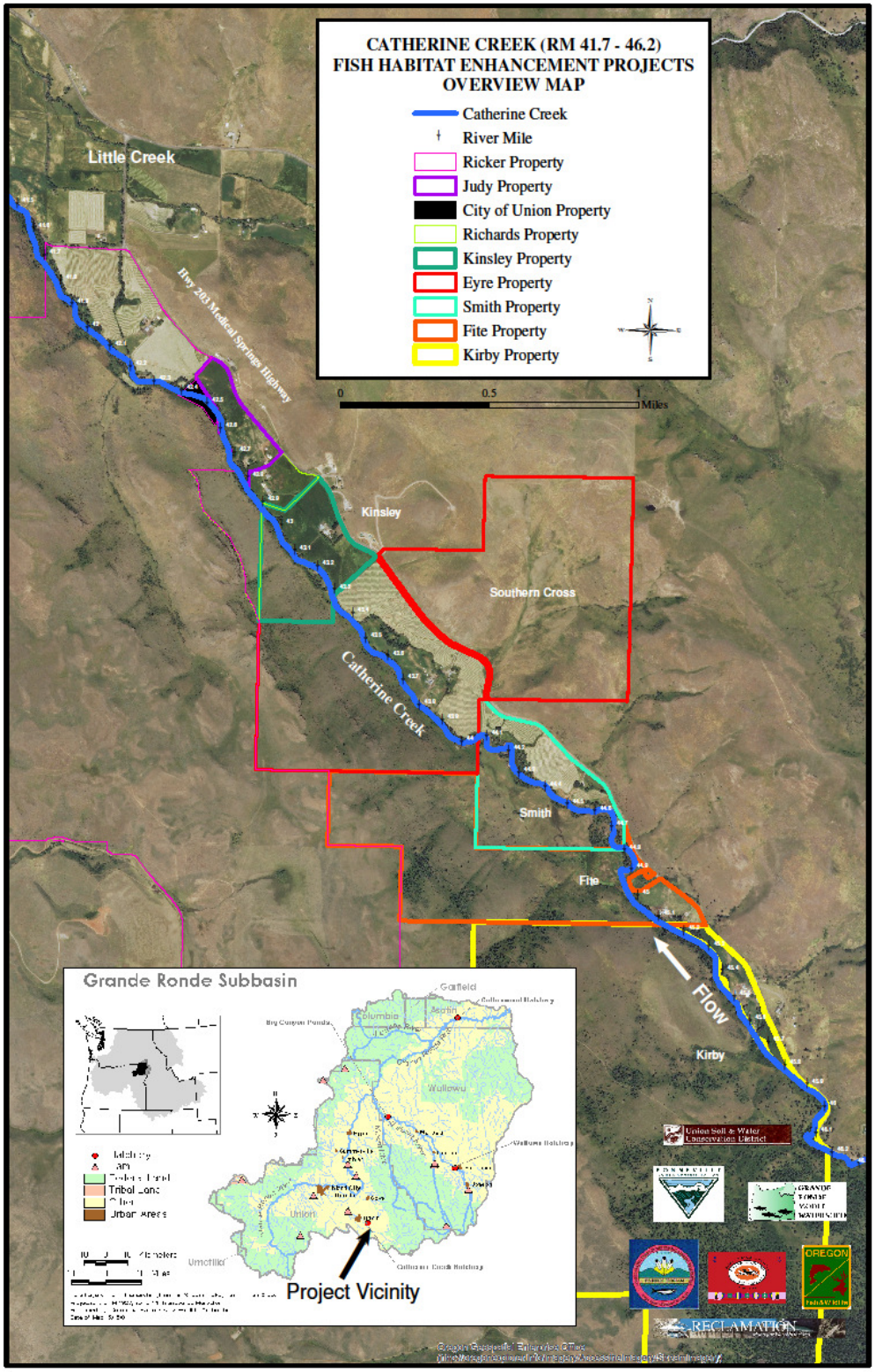
Design and implementation includes a variety of habitat enhancement and restoration strategies such as:

- Re-meandering channel segments
- Re-activation of historic channel segments
- Construction/re-activation of side channels and alcove habitat
- Reclamation of channelized reaches into complex side channel and wetland habitat
- Removal of dikes to reconnect floodplains
- Installation of LWD and riffle complexes to increase complexity and stability
- Planting and seeding to facilitate vegetative recovery
- Installation of off-channel water and riparian fences improve range and livestock management.

Additionally, the project includes consolidation of irrigation Points of Diversion (POD's), removal of seasonal push-up dams, and water conservation measures (piped delivery systems, potential conversion to sprinklers) and the opportunity to facilitate development of cost share programs with Farm bill and FSA/NRCS conservation programs (e.g., EQUIP and CREP).

The Catherine Creek (CC44) Project reach encompasses over 5 miles of critical spring-summer Chinook spawning and rearing habitat upstream from Union, Oregon, within the CCC3B and UGS10B Snake River Basin Recovery Plan assessment units. The project is located in between river miles 42-45 in Township 4S South, Range 40 East WM, Sections 3, 33, 34, 20, 29, and 28.

FIGURE 38 CATHERINE CREEK 44 FISH HABITAT ENHANCEMENT PROJECT OVERVIEW MAP.



Project Name	Streams	Year	Assessment Unit steelhead	Assessment Unit Chinook	River Vision Touchstones	BiOP Limiting Factor ID	Snake River Basin Draft Recovery Plan/BiOP Identified Limiting Factors	Eco Concern Sub-Cat ID	Ecological Concern-Sub Category	Project Goals	Project Objectives	Implementation Actions/Metrics	Monitoring Metrics
Catherine Creek RM44 Fish Habitat Enhancement Project (Project in planning stage)	Catherine Creek	2014 2017	UGS10B	CCC3B	Biota-Connectivity	1	Habitat Quantity	1.1	Anthropogenic Barriers	Improve diversion structures. Subbasin Plan Reference: Channel Conditions. (page 260)	**Protect Habitat:** Develop riparian easement with 8 landowners (CTUIR/BPA/ODFW easement and/or CREP). **Enhance riparian habitat conditions:** Increase riparian plant communities through planting and seeding and natural recruitment. **Enhance Floodplain Connectivity:** Remove channel confinement structures. **Enhance in-stream structural diversity and complexity:** Re-activate historic channel meanders to increase sinuosity and place large wood within active channel. **Reduce excessive sediment:** Manage riparian grazing with exclusion fences, stabilize existing erosion sites with wood structures and re-establishment of vegetation. **Decrease summer peak temperatures:** Improve/increase vegetative cover/shade to decrease summer stream temperatures and increase winter temperatures. **Decreased Water Quantity;** Consolidate points of diversion. Purchase water rights.	Conceptually includes: 2 miles restoration channel, 3-4 miles of side channel habitat, 5.5 miles habitat complexity. Removal of irrigation push up dams (4) Planting within riparian area. Seeding disturbed ground. Construct riparian fence. Off-channel water to be developed	**Enhance Floodplain Connectivity:** Topographical GPS points collected pre project using Trimble R8 GPS. **Enhance in-stream structural diversity and complexity:** Longitudinal profile and cross-sections pre project surveyed using Trimble R8 GPS. **Reduce excessive sediment:** Pebble counts at permanent cross-sections pre project. **Decrease summer peak temperatures:** Water temperature - hourly data - Hobo Pendant loggers - April to November starting 2012.
					Riparian Vegetation	4	Riparian Condition	4.1	Riparian Condition	Protect Habitat. Subbasin Plan Reference: Habitat Protection (page 258).			
										Enhance riparian habitat conditions. Subbasin Plan Reference: Riparian Conditions (page 262).			
								4.2	LWD Recruitment				
					Connectivity	5	Peripheral and Transitional Habitats	5.1	Side Channel and Wetland Conditions	Enhance Floodplain Connectivity. Subbasin Plan Reference: Channel Conditions (page 260).			
								5.2	Floodplain Condition				
					Geomorphology	6	Channel Structure and Form	6.1	Bed and Channel Form	Enhance in-stream structural diversity and complexity. Subbasin Plan Reference: Channel Conditions (page 260).			
								6.2	Instream Structural Complexity				
						7	Sediment Conditions	7.2	Increased Sediment Quantity	Reduce excessive sediment. Subbasin Plan Reference: Sediment Conditions (page 261).			
					Hydrology	8	Water Quality	8.1	Temperature	Decrease summer peak temperatures. Subbasin Plan Reference: Riparian Conditions (page 262).			
						9	Water Quantity	9.2	Decreased Water Quantity	Increase summer water quantity. Subbasin Plan Reference: Low Flow Conditions (page 263).			

Primary habitat limiting factors identified within the project area have been developed through literature review, field visits by basin biologists, and field investigations and reference of the NOAA Fisheries NE Oregon Snake River Recovery Plan and BiOp Expert Panel Process commissioned by BOR and BPA. Key habitat limiting factors to be addressed include:

CCC3 and UGS10B - Middle Catherine Creek (Pyles Creek To North and South Forks of Catherine Creek)
4.1: Riparian Condition: Degraded riparian conditions.
4.2: Riparian Condition: Large wood Recruitment.
5.2: Peripheral and Transitional Habitats: Floodplain condition.
7.2: Sediment Conditions: Increased sediment quantity/excess fine sediment.
8.1: Water Quality: Temperature, elevated summer stream temperatures, low DO levels.
9.2: Water Quantity: Decreased water quantity, lower summer flows.

Project Goal Statement

The overall project goal is to restore fish habitat within the natural character and function of Catherine Creek while protecting and maintaining the utility and economic viability of a working ranch. The project's goals are to protect habitat, enhance floodplain connectivity, in-stream structural diversity and complexity, and riparian habitat conditions assisting Salmon/Steelhead populations and habitat recovery. The project potentially reduces excessive severe bank erosion, heavy sediment loads, and high water temperatures, while creating and or enhancing complex fish habitat, especially large wood structures, and increasing riparian vegetation. Consequently, limiting factors for Spring/Summer Chinook, Steelhead, and Bull trout in the Upper Grande Ronde/Catherine Creek Subbasin are being addressed. Stabilizing bank sides at 5 high priority targeted sites with large woody structures and riparian plantings, then placing this project under a conservation easement program, benefits these ESA fish populations and habitat.

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

Project Specific Objectives

Protect Habitat:

Develop a riparian conservation easement along both sides of approximately 0.25 mile (5 separate locations) of Catherine Creek. The conservation strategy includes either a BPA Riparian Conservation Easement and or a FSA CREP Easement. This would be a separate contract agreement implemented immediately after construction. Stream banks within the project area are currently fenced and livestock are excluded from grazing the riparian area.

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.

Enhance Floodplain Connectivity and In-stream Structural Diversity and Complexity

Remove channel confinement structures and place large wood within the active channel.

Subbasin Plan Reference: Channel Conditions (page 260)

Maintain existing LWD (large woody debris) by promoting BMPs (best management practices) for forestry practices. Add LWD where deficient and appropriate to meet identified short-term deficiencies.

Install in-channel structures (LWD).

Enhance Riparian Habitat Condition and Reduce Excessive Sediment

In conjunction with stream channel restoration and protection efforts (enclosure fencing and removal of livestock from riparian corridor), increase riparian plant communities through planting, seeding, and natural recruitment. Manage riparian grazing with exclusion fences; stabilize existing erosion sites with wood structures and re-establishment of vegetation.

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, and herding.
Re-establish 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, or EQIP.
Promote/implement development of grazing plans to improve upland vegetative condition.

Decrease Summer Peak Temperatures

Improve/increase vegetative cover/shade to decrease summer stream temperatures and increase winter temperatures.

Subbasin Plan Reference: High and Low Water Temperatures (page 263)

High and low water temperatures and dissolved oxygen conditions shall be restored as near as possible to historic conditions, as a result of restoring channel conditions, reducing sediment loads, improving riparian conditions, and improving low flow conditions.

Project Description

The project area is located within Reach UGS10A (Summer Steelhead) and Reach CCC3 (Spring-Summer Chinook) (Northeast Oregon Snake River Recovery Plan, Draft (NOAA, March 2012) and BiOp Expert Panel Draft Reach Delineations (BPA/BOR, April 2012). Geographically, these reaches encompass Middle Catherine Creek from the confluence of Pyles Creek upstream to the North and South Forks of Catherine Creek. The Project Area is also located within Reach 4 of the Bureau of Reclamation Tributary Assessment (BOR, February 2012) and has been identified as one of the highest priority reaches for restoration actions. BOR and ODFW assessments found this Catherine Creek project area to include severe stream bank instability, high channel width/depth ratios, riparian vegetation loss, which produces heavy in-stream sedimentation, potentially causing high summer water temperatures.

Phase I proposed installation of 18 engineered large woody material jam structures at 5 targeted critical project reach sites, and 2.32 acres of riparian plantings. Due to Chinook redds located at 2 sites within the Phase I project area only 7 engineered large woody material structures were completed, with the remaining sites scheduled for installation in 2014. In addition to the large wood installation and plantings, several abandoned car bodies were removed from the creek channel. Various diameter boulder and rock materials were also placed to protect banks and high flow channels. All temporary disturbed impact were re-seeded, planted, and restored following construction. With the completion of Phase I (current phase), project partners and landowners are moving forward with a proposed Phase II scheduled for construction in 2014 that includes: irrigation points of diversion consolidations, irrigation pipelines, and riparian corridor enhancement through floodplain connectivity, in-stream complexity, and riparian vegetation plantings.

Existing Conditions

Environmental baseline conditions were derived from various sources; including baseline field surveys, site aerial photography and LiDAR imagery, habitat characterization reports, and communication with the landowners and other agency staff with knowledge of the action area. Project partners have worked together to compile datasets and develop baseline assessment data with an accompanying hydraulic model and a 100-year flood event model. Additional limiting factors and existing conditions data were compiled from ODFW habitat surveys and from the BOR Catherine Creek Tributary Assessment. Anderson Perry completed a Wetland Delineation Report in the Spring of 2013.

The existing channel is relatively homogenous with minimal habitat availability and complexity. Current ODFW fish monitoring and BOR assessment confirms this project site is a high priority critical area for juvenile Chinook salmon over-wintering habitat, spawning, and rearing. During the winters of 2009-2012, the ODFW fish tracking study of over-wintering juveniles in the area showed a preference for deeper pools with cover habitat (overhanging vegetation and/or submerged LWD). The lack of LWD has reduced the available cover habitat and ability to sustain deep pools. In addition, high summer water temperatures are common during the irrigation season.

Generally, the project Reach is in poor to fair condition with stream segments exhibiting a lack of deep pools, little complex cover, channel incision, and poor riparian vegetation communities with some large trees and little overhanging vegetation. Prior channelization has removed the meander bends and point bars that are essential to create and maintain deep pools. Sediment storage in the channel has caused severe localized bank erosion and over-widening. The channel is becoming shallower which further exacerbates many of the problems already present in the area. Stream bank erosion is prominent along many portions of the Creek which have actively eroding stream banks and contribute excessive sediment into Catherine Creek. Channelization and past intensive in-channel grazing practices have led to high channel project reach width/depth ratios, loss and suppression of riparian vegetation with the subsequent loss of future channel complexity, and stream bank erosion and unstable stream banks leading to excessive fine sediment loads in the channel. The project complements completed and on-going fish habitat enhancement activities in the Catherine Creek watershed.

Specific Actions

Install bioengineered Large Wood Debris Structures

- Large Wood Debris Structures, with logs approximately 18-30" diameter by 20-60' long, installed at seven targeted critical project sites. Logs with and without 5-6' attached root wads were installed. Surrounding and among the structures' key logs wood racking materials consisting of 4–12" diameter by 6-20' long wood pieces were placed. These materials create voids and spaces within logjams, which increases habitat complexity. All key materials was buried or partially buried into the channel bank with native backfill to provide stability. Key structure logs were also stabilized and connected by rebar.

Site 1- This project area consisted of two wood placement sites. The left bank site is located downstream on the outside of a channel meander bend. This site has been historically protected by car bodies placed in and adjacent to the channel to aid in bank stabilization. These were removed and a bioengineered logjam installed to reform the bank, concentrate scour around the structure to enhance the existing pool, and provide cover and habitat complexity. The actions at this site included the placement of a flow through logjam at the upstream end of the meander, and 4 flow deflector jams located downstream, providing habitat complexity during high flows when the side channel is activated. The large wood associated with this site included approximately 27 key logs and 54 racking members.

Site 1's second upstream right bank habitat structure area which consisted of two wood placement sites; a grouping of structures along a left bank gravel bar and a grouping of structures along a left bank meander bend. The left bank is located downstream along the inside of a channel meander bend. This section is located

immediately upstream of a proposed consolidated diversion location (CC-44 Phase II). This included approximately 36 key logs, and 62 racking members. The upstream site is located along the left bank around the outside of a channel meander bend. The actions at this site included the placement of a flow through logjam at the upstream end of the meander, and five flow deflector jams at the downstream end, providing habitat complexity in the side channel. In addition, four sweeper logs provide more complexity and aid in reducing erosion during high flow events. The large wood associated with this site included approximately 46 key logs and 87 racking members.

FIGURE 39 CC44 LARGE WOOD ADDITION, SITE 1.

Site 2- This habitat structure consisted of two large wood placement sites, a grouping of structures along a left bank gravel bar, and a grouping of structures along a left bank meander bend. The left bank is located downstream along the inside of a channel meander bend. This section is located immediately upstream and across from a proposed consolidated diversion location (CC-44 Phase II). Proposed actions include installation of four logjam structures to promote deposition along the left bar, concentrate scour and flow along the right bank, enhance the existing pool, and provide cover and habitat complexity throughout the bend. The large wood associated with this site includes approximately 36 key logs and 62 racking members. The upstream site is located along the left bank around the outside of a channel meander bend. The proposed actions include the placement of a flow through logjam at the upstream end of the meander and five flow deflector jams at the downstream end, providing habitat complexity in the side channel. In addition, four sweeper logs will provide more complexity and reduces erosion during high flow events. The large wood associated with this site included approximately 46 key logs and 87 racking members.

Site 3- This habitat structure consisted of one large wood placement site along a portion of right bank eroding rapidly. Proposed actions include the installation of a wood structure along the right bank to reduce near bank velocities, providing cover and creating habitat complexity. Wood placement will allow the fence to be set back to create a riparian buffer, promote natural vegetation regrowth, and reduce the near bank impact from livestock activity. The large wood associated with this site included approximately 29 key logs and 31 racking members.

Site 4- This habitat structure consisted of large wood placement along the right bank upstream and downstream of the bridge, in addition to some boulder placement within the channel. This area includes a portion of right bank

severely eroding immediately upstream and downstream of an existing bridge crossing. The wood placement along this bank will create diversity in velocity distribution across the channel section and provide an area for juvenile fish refuge within the main channel. The wood placement will also protect the banks from further erosion and aid in creating/maintaining a pool underneath the existing bridge. The large wood associated with this site included approximately 43 key logs and 43 racking members.

Site 5. This habitat structure consisted of large wood placement along the right bank upstream and downstream of an existing point of diversion, with some boulder placement within the channel, and de-activation of a historic currently unused diversion ditch. This area includes the immediate area around the landowner's irrigation diversion. This includes the right bank immediately downstream of the diversion location and the historic diversion ditch. The right bank downstream of the diversion is eroding releasing fine sediment into the channel. Protecting this bank with large wood will potentially create diversity in velocity and provide refuge cover for juvenile salmonid sp. The landowner currently accesses the channel at this location to maintain an irrigation pool. The placement of wood and rock upstream will help maintain the diversion pool, and provide an increase in habitat and depth of cover for adult salmonid spp. The large wood associated with this site will include approximately seven key logs and seven racking members.

FIGURE 40 CC44 LARGE WOOD ADDITION, SITE 3.

Re-seed and Re-plant Disturbed Areas

- Using a combination of live stakes, plugs, and container plants all areas disturbed during construction were re-seeded using native seed mixes and plants. The establishment of a healthy, self-sustaining native vegetative community throughout the project site is vital to the success of a stream enhancement project. Re-vegetation immediately after grading provides key initial site stabilization and energy dissipation. Such communities promote short-term and long-term bank stabilization; shade for cooler water; protective cover for fish; habitat for terrestrial wildlife (birds, mammals, amphibians, and macro invertebrates), and future woody debris recruitment.

Approximately 11 acres of the project area are currently enrolled in a Conservation Reserve Enhancement Program (CREP) program and have been fenced to exclude livestock. The areas that are currently fenced include the area around Site 1. Although not enrolled in any easement programs, currently there is fencing along Catherine Creek throughout the entire project reach. This will ensure Phase I project sites will be excluded from livestock access. There will not be additional fencing installed as part of Phase I. However, Phase II of this project will establish additional exclusion fencing and conservation easements which will encompass the entire project area.

Trap and haul (salvage) fish and other aquatic species from construction areas to avoid any unintentional take or injury

- All fish capture, handling, and relocation was directed by qualified and experienced fish biologists in accordance with NMFS, USFWS, and ODFW fish removal protocol with guidelines.
- There were 827 salmonid species salvaged from the project area during the 2013 construction window (529 juvenile Chinook, and 298 juvenile *O.mykiss*) and 616 other species of fish (Dace, Suckers, Sculpin etc.).

Benefits

The project complements completed and on-going fish habitat enhancement activities in the Catherine Creek watershed. The project site is within historic ESA listed Salmonid spawning, rearing and over-wintering habitat. ODFW fish monitoring and BOR Tributary Assessment studies indicate a serious lack of stream complexity and fish habitat, particularly in the middle Catherine Creek area, between Union and Pyles Creek, where this project is located. Project benefits address these issues by developing an enhanced more stable and diverse riverine reach with higher ecosystem value, especially with respect to anadromous salmonid spp. The completed project area will further sustain Steelhead, Chinook and Bull trout, as well as other species. Benefits from the proposed improvements to in-stream and off-channel habitats increase the rearing capacity for these species. In addition, the Phase I project area after Phase II completion will be protected and allowed to mature under 10-15 year conservation easements. Specific project benefits include:
Bio-engineered LWD structures will maintain the new desired channel configuration and increase stream and habitat complexity.
Creation of scour pools, runs, and riffles of various sizes and complexity.
Potential increase for sediment storage at controlled locations.
Replace current LWD recruitment from near non-existent conditions. Re-vegetation of native Willow, Cottonwood, Alder, shrubs and grass plantings will increase potential future LWD recruitment. The additional vegetation will also add stability to stream banks and decrease erosion and sediment loads into the creek.
Plantings and enclosure riparian fencing will increase wildlife habitat created within the project area.
Conservation easements will protect the project and allow it to mature.

Project Maintenance

USWCD, CTUIR, ODFW staff, and the landowners will maintain the project. Extensive maintenance of in-stream habitat enhancement structures and enclosure fencing is not anticipated. Maintenance associated with the conservation easements includes annual fence inspection, repair and maintenance of planted materials consisting of managing competing vegetation to increase plant survival rates. A weed management plan will be developed and implemented once Phase II of the project is completed.

Permits

Project partner staff completed all environmental compliance requirements in cooperation with BPA staff. These requirements include ESA and cultural resource consultations, and Oregon DSL and USCOE Fill Remove and Wetland Mitigation permit authorizations. BOR conducted a cultural resources survey in the summer/winter of 2012. Currently, the cultural resource consultation is near completion and the permitting process has begun with all permit applications submitted.

Monitoring Plan

Photo points were established in 2013 by the CTUIR fish habitat biologist to provide comparative progress of implementation success and habitat complexity. All required monitoring reports will be submitted to the appropriate funding and permitting agencies. A monitoring plan has been developed to evaluate project objectives that include periodic visits to photo points, surveys of cross-sections to monitor channel processes, water temperature monitoring, and spawning surveys.

Land Acquisition Planning

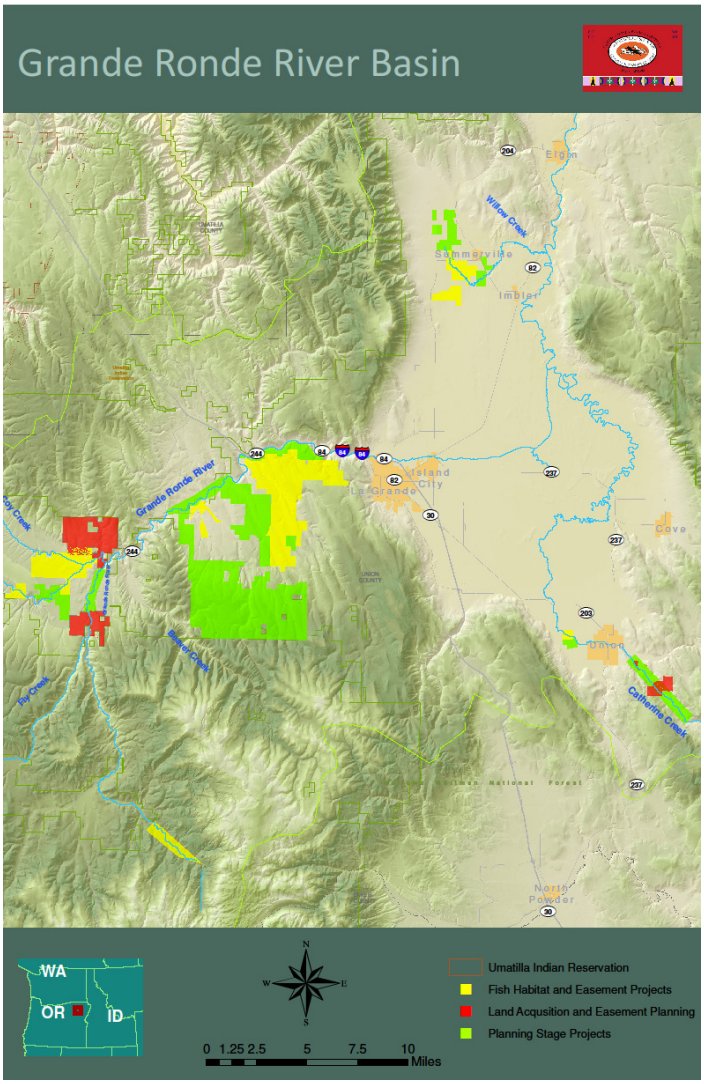
Staff initiated land acquisition planning under the CTUIR-BPA Accord Land Acquisition Project to identify and develop opportunities to protect key spawning and rearing habitat for Chinook and steelhead in the Upper Grande Ronde Subbasin.

Work consisted of:

- Communicating with real estate agents to identify land parcels currently and prospective on the market along the main stem Grande Ronde River, Meadow Creek, Catherine Creek, and Lookingglass Creek.
- Documentation of limiting factors, and preparation of prioritization criteria checklists consistent with the land acquisition strategy developed by the CTUIR and reviewed by the ISRP.
    - Several project prospects were identified and screened through the prioritization criteria. Internal coordination within the CTUIR government and fisheries program as well as coordination with BPA, landowners, and real estate agents is ongoing prior to development of a final list of projects that will be proposed for further assessment and prioritization.

Following is a list of potential land/easement acquisition projects that are currently under review.

FIGURE 41 CTUIR GRANDE RONDE SUBBASIN LAND ACQUISITION PLANNING OVERVIEW MAP.



Joseph Cunha Ranch, LLC Perpetual Conservation Easement

Project staff worked with ODFW and the Rocky Mountain Elk Foundation (RMEF) on the planning and acquisition justification document for the Joseph Cunha Ranch, LLC Perpetual Conservation Easement. The RMEF were not able to continue with acquisition of the easement, therefore CTUIR engaged the Blue Mountain Land Trust (BMLT) to continue the process.

The project is located near Starkey, Oregon in Township 3 South, Range 35 East of the Willamette Meridian on portions of Sections 24, 25, and 36, Union County Tax Lot 500. The project encompasses approximately 2,928 acres of mixed coniferous forest, native grasslands, forested and shrub-scrub wetlands and riparian habitat along approximately 2.0 miles of Dark Canyon Creek and 1.0 mile of Meadow Creek. The project proposal is to purchase a perpetual conservation easement (CE) on the Joseph Cunha Ranch, LLC in the Upper Grande Ronde Subbasin. The CE will permanently protect 3 miles of critical habitat for Threatened Snake River Basin spring-summer Chinook salmon and summer steelhead along Meadow Creek and Dark Canyon Creek. Nearly 3,000 acres of critical big game winter range and a significant big game migration corridor in Oregon's Starkey Big Game Management Unit will be protected from future development and subdivision while providing opportunities to restore and enhance high quality instream, riparian, wetland, and upland forest and native grasslands. The property provides habitat for at least 20 Oregon listed sensitive species and one federal candidate wildlife species. An estimated half a million dollars (one third of the market value) is needed to secure the easement. Multiple funding sources are being sought by project sponsors to secure the conservation values of the property with cost sharing between the CTUIR Ceded Area Priority Stream Corridor Conservation and Protection Project/CTUIR-BPA Accord, Blue Mountain Land Trust and other conservation and user groups.

Southern Cross Ranch

This 545-acre ranch includes .75 miles of Catherine Creek, approximately 78 acres of pasture/floodplain adjacent to Catherine Creek, and 3.78 acres of Palustrine Emergent wetlands. The majority of the Property has been in agricultural production throughout the ranch's history. The lower floodplain/riparian has been grazed by livestock and been used in hay production, the uplands have been grazed by livestock. The property has important conservation values for potential non-structural storage of floodwater, improved wetland and riparian habitats, increased hyporheic groundwater exchange, increased juvenile Chinook and Steelhead rearing habitat, improved adult Chinook and Steelhead spawning habitat, and improved upland deer and elk habitat. In 2013, Western Rivers purchased the ranch. The CTUIR Ceded Area Priority Stream Corridor Conservation and Protection Project/CTUIR-BPA Accord plans to purchase Ranch in late 2014 for the CC44 Phase III Project implementation.

Vey Ranch

The Vey Ranch is a key property in the Upper Grande Ronde Subbasin that has long been sought to restore spring-summer Chinook in the Grande Ronde. The property includes 36.75 miles of spawning and rearing habitat and 13,567 acres. All life stages of Threatened Snake River ESU spring-summer Chinook salmon, summer steelhead, and fluvial Bull Trout occur on the property. Limiting factors include excess fine sediment; water quantity (low summer flow); water quality (high summer water temperatures, pH); lack of habitat quantity/diversity (pools and large wood); degraded riparian conditions; winter icing, and fish passage. The likelihood of a potential project is very low.

Lookingglass Creek

This property includes 2.34 miles of main stem Lookingglass Creek upstream from the Lookingglass fish hatchery. The property is currently on the real estate market and includes approximately 663 acres for an estimated $1.8 million. The property includes mixed conifer forest, native grasslands, and riparian/wetland (forest/scrub-scrub/emergent) (123 acres). All life stages of Threatened Snake River ESU spring-summer Chinook salmon (functionally extirpated, efforts underway to reintroduce natural populations), summer steelhead and bull trout. Limiting factors include fish passage/habitat access, habitat quantity/diversity (low pool frequency, lack of diversity, substandard stream-bank conditions), excess fine sediment, water quantity (especially low summer

flows), channelization, degraded riparian condition, lack of floodplain connectivity, lack of spawning gravels, predation, poor water quality (high summer temperatures).

Main stem Grande Ronde River (Starkey Reach)

This property includes 0.31 miles of main stem Grande Ronde River and 10.4 acres near Starkey, Oregon. Estimated land acquisition cost would be $70,000. Property includes habitat for all life stages of Threatened Snake River ESU spring-summer Chinook salmon and summer steelhead. Passage and overwinter habitat for Threatened fluvial Bull Trout is also present within the property. Limiting factors include excess fine sediment, water quantity (low summer flow), water quality (high summer water temperatures), lack of habitat quantity/diversity (pools and large wood), and degraded riparian conditions.

Project Name: Main stem Grande Ronde River and Warm Springs Creek

Property includes 0.76 miles of main stem Grande Ronde River and 1 mile of Warm Springs Creek and a total of 1,266 acres upstream from Starkey, Oregon. Property provides habitat for all life stages of Threatened Snake River ESU spring-summer Chinook salmon and summer steelhead with passage and overwinter habitat for fluvial Bull Trout. Limiting factors include excess fine sediment, water quantity (low summer flow), water quality (high summer water temperatures), lack of habitat quantity/diversity (pools and large wood), and degraded riparian conditions.

SUMMARY OF EXPENDITURES

The following figure illustrates the budget for the project during the period May 1, 2013 through April 30, 2014. The final budget is pending close out of all invoices and billings and will be updated by the CTUIR accounting department following contract closure within 30 days of the contract end data.

FIGURE 42 EXPENDITURES FOR FY 2013

Confederated Tribes of the Umatilla Indian Reservation

Revenue & Expense with Commitments - DNR Fisheries

Fiscal year thru period ending December 31, 2013

488 013 - E.F.A. Grande Ronde Salmon & Restoration 8/01/13 - 4/30/14	Current Month Actual	Year to Date Actual	Open Purchase Orders	Total Committed	Total Budget	Variance	% Used
Revenues							
488 013 4010 Grant/Contract Income	36,110.55	571,760.75	0.00	571,760.75	906,063.00	(334,302.25)	63.10
Total Revenues	36,110.55	571,760.75	0.00	571,760.75	906,063.00	(334,302.25)	63.10
Direct Expenses							
488 013 5000 Salaries & Wages	14,212.30	161,009.41	0.00	161,009.41	177,376.00	16,366.59	90.80
488 013 5010 Fringe Benefits	5,865.93	49,050.69	0.00	49,050.69	57,240.00	8,749.31	84.90
488 013 5101 Travel-Per Diem	0.00	0.00	0.00	0.00	2,250.00	2,250.00	0.00
488 013 5150 Training	0.00	0.00	0.00	0.00	2,625.00	2,625.00	0.00
488 013 5160 Auto Insurance	0.00	166.53	0.00	166.53	1,272.00	1,105.47	13.09
488 013 5180 Vehicle Expense	2,958.69	11,985.03	0.00	11,985.03	13,180.00	1,294.97	90.91
488 013 5210 Supplies	0.00	0.00	0.00	0.00	350.00	350.00	0.00
488 013 5225 Materials	23.11	5,309.25	1,903.79	7,213.04	13,144.00	5,930.96	54.89
488 013 5226 Books/Journals	0.00	0.00	0.00	0.00	336.00	336.00	0.00
488 013 5250 Non Capital Equipment	0.00	2,168.80	0.00	2,168.80	1,674.00	(494.80)	129.56
488 013 5400 Communications	62.47	697.97	0.00	697.97	3,240.00	2,542.03	21.54
488 013 5410 Postage & Freight	0.00	0.00	0.00	0.00	200.00	200.00	0.00
488 013 5430 Dues & Subscriptions	0.00	0.00	0.00	0.00	636.00	636.00	0.00
488 013 5440 Equipment Rental	0.00	0.00	0.00	0.00	3,336.00	3,336.00	0.00
488 013 5441 Computer Lease	168.89	1,599.04	0.00	1,599.04	1,936.00	336.96	82.60
488 013 5450 Printing & Duplication	0.00	0.00	0.00	0.00	336.00	336.00	0.00
488 013 5470 Repairs & Maintenance	0.00	571.20	0.00	571.20	1,000.00	428.80	57.12
488 013 5480 Advertising	0.00	0.00	0.00	0.00	400.00	400.00	0.00
488 013 5770 Professional Services	0.00	0.00	0.00	0.00	3,336.00	3,336.00	0.00
Sub-Total	23,011.37	232,272.94	1,903.79	234,176.74	286,094.00	51,917.26	81.85
Pass-through Expenses							
488 013 6100 Subcontractor fees	13,099.18	339,487.81	11,640.00	351,127.81	620,063.00	268,935.19	56.62
Sub-Total	13,099.18	339,487.81	11,640.00	351,127.81	620,063.00	268,935.19	56.62
Cost of Goods Sold							
488 013 9000 Indirect	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Expenses	36,110.55	571,760.75	13,543.79	585,306.55	906,157.00	320,852.45	64.59
Net Difference	0.00	0.00	(13,543.79)	(13,543.79)	(94.00)	(13,449.79)	14,407.43

Confederated Tribes of the Umatilla Indian Reservation

Revenue & Expense with Commitments - DNR Fisheries

Fiscal year thru period ending December 31, 2014

488 013 - E.F.A. Grande Ronde Salmon & Restoration 8/01/13 - 4/30/14	Current Month Actual	Year to Date Actual	Open Purchase Orders	Total Committed	Total Budget	Variance	% Used
Revenues							
488 013 4010 Grant/Contract Income	0.00	122,571.79	0.00	122,571.79	0.00	122,571.79	0.00
Total Revenues	0.00	122,571.79	0.00	122,571.79	0.00	122,571.79	0.00
Direct Expenses							
488 013 5000 Salaries & Wages	0.00	69,260.94	0.00	69,260.94	85,987.00	16,726.06	78.90
488 013 5010 Fringe Benefits	0.00	23,782.54	0.00	23,782.54	28,925.00	5,142.46	82.20
488 013 5101 Travel-Per Diem	0.00	2,875.04	0.00	2,875.04	1,139.00	(1,736.04)	252.40
488 013 5150 Training	0.00	3,860.00	0.00	3,860.00	1,449.00	(2,411.00)	266.40
488 013 5160 Auto Insurance	0.00	1,464.55	0.00	1,464.55	633.00	(831.55)	231.30
488 013 5180 Vehicle Expense	0.00	2,385.68	1,487.91	3,873.59	6,209.00	2,335.41	62.39
488 013 5210 Supplies	0.00	647.32	0.00	647.32	125.00	(522.32)	517.86
488 013 5225 Materials	0.00	2,168.35	82.16	2,250.51	6,590.00	4,339.49	34.15
488 013 5226 Books/Journals	0.00	0.00	0.00	0.00	164.00	164.00	0.00
488 013 5250 Non Capital Equipment	0.00	0.00	0.00	0.00	835.00	835.00	0.00
488 013 5400 Communications	0.00	247.44	202.55	449.99	1,600.00	1,150.01	28.10
488 013 5410 Postage & Freight	0.00	0.00	0.00	0.00	100.00	100.00	0.00
488 013 5430 Dues & Subscriptions	0.00	1,040.29	0.00	1,040.29	314.00	(726.29)	331.30
488 013 5432 Permits & Lic.	0.00	60.00	0.00	60.00	0.00	(60.00)	0.00
488 013 5440 Equipment Rental	0.00	778.70	0.00	778.70	1,664.00	885.30	46.80
488 013 5441 Computer Lease	168.89	3,366.09	0.00	3,366.09	967.00	(2,399.09)	348.10
488 013 5450 Printing & Duplication	0.00	0.00	0.00	0.00	164.00	164.00	0.00
488 013 5470 Repairs & Maintenance	0.00	1,240.68	82.00	1,322.68	500.00	(822.68)	264.54
488 013 5480 Advertising	0.00	0.00	0.00	0.00	200.00	200.00	0.00
488 013 5770 Professional Services	0.00	0.00	0.00	0.00	3,336.00	3,336.00	0.00
Sub-Total	199.89	113,254.42	1,758.61	115,013.03	144,013.00	29,004.97	79.90
Pass-through Expenses							
488 013 6100 Subcontractor fees	0.00	0.00	0.00	0.00	95,438.00	95,438.00	0.00
Sub-Total	0.00	0.00	0.00	0.00	95,438.00	95,438.00	0.00
Cost of Goods Sold							
488 013 9000 Indirect	0.00	37,376.68	0.00	37,376.68	62,720.00	25,343.32	59.60
Total Expenses	199.89	150,631.00	1,758.61	152,389.61	302,179.00	149,790.39	50.40
Net Difference	(199.89)	(28,059.21)	(1,758.61)	(29,816.82)	(302,179.00)	272,362.18	-9.90

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