CTUIR GRANDE RONDE SUBBASIN RESTORATION PROJECT

A Columbia River Basin Fish Habitat Project

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ABSTRACT

*The **CTUIR Grande Ronde Subbasin Restoration Project**, initiated by the Confederated Tribes of the Umatilla Indian Reservation in 1996, is an ongoing effort to protect, enhance, and restore riparian and instream habitat for natural production of anadromous salmonids in the Grande Ronde River Subbasin. Project activities focus on improving juvenile rearing habitat with emphasis on restoring natural channel morphology and floodplain function, cold water refuge, complex aquatic habitat. During 2006, the CTUIR in cooperation with project partners, completed the two phases of the End Creek Restoration Project and the Meadow Creek Restoration Project. Project activities included completion of planning/design, environmental compliance, project stakeout and construction preparation, construction subcontracting, subcontract administration/inspection, and post-construction seeding and planting. Baseline and ongoing monitoring and evaluation activities were also completed during the reporting period on major project areas. Activities included collection and evaluation of water temperature data, groundwater data, vegetation plots and transects, and photo points. Ongoing project maintenance, including fence repair, vegetation management, and monitoring for trespass livestock, was accomplished.*

Implementation of the End Creek Restoration Project included construction of 1.46 miles of new channel for End Creek, 1.64 miles for South Fork Willow Creek, and 5.33 miles of spring-fed tributary channels. Work also included reclamation of 3 miles of existing channelized stream reaches and ditches, construction/contouring of 6 floodplain ponds (10 acres), constructing 0.68 miles of low elevation earthen terraces to direct floodflow, instream placement of 20 rock grade control structures (cross vanes), 121 rootwad revetments (20 complexes), and 200 pieces of large woody debris along the South Fork Willow Restoration channe, removal relocation of 5 existing culverts, completion of initial post-construction planting and seeding activities including installation of 7,800 pounds of native seed and15,000 native shrubs, and sedge/rush plugs, and installation of an irrigation system to increase plant survival.

Implementation of the Meadow Creek Restoration Project, part of the McCoy Meadows Restoration Project complex, was also completed during the reporting period. Project construction was initiated in early July 2006 and completed by early August 2006. Project accomplishments included: construction of 2,800 feet of restoration wetland channels and 3 floodplain ponds; construction of geomorphic riffle weirs (rock cross-vane type structures) and installation of large wood/whole trees in existing Meadow Creek to aggrade the channel, increase floodplain connectivity, and enhance availability of large pool habitat; activation of the restoration channel network; seeding and installation of sedge mats and whole willow shrub transplants; trap and haul (salvage) of fish, amphibians, and reptiles from existing streams reaches prior to channel diversion; and installation of a temporary irrigation system to facilitate vegetative recovery.

BACKGROUND

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

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

The project was initiated in 1996 under the NPCC-BPA Early Action Project process. The project was proposed through the GRMW and NPCC program to provide the basis from which to pursue partnerships and habitat grant funds to develop and implement watershed and fish habitat enhancement activities in the Subbasin. Annual project budgets have averaged about $136,000 and ranged from a high of $200,000 in 1999 to a low of $61,000 in 1996. The annual budget in the past three years has been $190,000. The project has administered a wide range grants on four primary project areas including NRCS WRP, CREP, WHIP, and EQUIP, OWEB, EPA-ODEQ 319, GRMW-BPA, CRITFC, NMFS, USFWS, ODOT, and NAWCA and developed an effective working relationship with multiple agencies and organizations.

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

During the 11-year project history, the CTUIR has administered and effectively put on the ground $1.5 million and restored or enhanced about 20 miles of instream habitat in several cooperative project efforts. Conservation easements totaling about 1,400 acres on three large ranches have been secured through a combination of NRCS WRP, CREP, and BPA programs. The project has constructed 12 miles of fence, eight off-channel water developments, and installed over 110,000 trees, shrubs, sedge/rush plugs, and seeded 500 acres with native, native-like grass seed. Improving habitat trends and biological response can be readily observed at previously implemented projects (McCoy Meadows, Longley Meadow, Wallowa River, and End Creek projects where existing channelized stream reaches have been replaced with restoration channels. 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 exclosure fencing, development of off-channel water sources, removal of livestock, revegetation 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 including:

- Improved stream channel stability with early succession dimension, pattern and profile (Rosgen "C" channel form developing towards "E" form as hydrophytic vegetation establishes concurrent with improved hydrology),
- Decreased channel width:depth ratios, gradient, entrenchment and increased channel sinuosity, length, floodplain connection, and enhanced pool habitat,
- Increased availability of instream habitat, including backwater and off channel rearing areas
- Increased groundwater elevations and available cold water refuge provided by hyporheic flow through interconnected floodplains and gravel bars,
- Increasing riparian and wetland plant communities, particularly carex/juncos and salix in meadow system projects,
- Increased instream habitat complexity and diversity (improved pool-riffle sequences associated with dynamically stable channel morphology and large wood additions to forested riparian system historically impacted by logging and decreased wood recruitment),
- Increased diversity and abundance of macroinvertebrate communities in restoration channels compared to channelized reaches (ODEQ, Personal communication with Rick Hafele, 319 Monitoring Program Leader, 2005),
- Increased spotted frog reproduction associated with floodplain ponds on McCoy Creek Project 5-fold increase in reproduction associated with floodplain ponds in McCoy Creek meadow floodplain(Laura Marht, Eastern Oregon University, 2003, personal communication).

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

Noteworthy accomplishments for the CTUIR Grande Ronde Subbasin Restoration Project during FY2006 included:

- Completed implementation of the Rice and Davidson components of the End Creek Restoration Project.
- Completed implementation of the Meadow Creek Restoration Project.
- Initiated planning, design, environmental compliance and project preparations for the Wallowa-McDaniel Restoration Project II.
- Initiated planning and design on the Ladd Marsh Restoration Project.
- Conducted project maintenance activities
- Conducted monitoring and evaluation project progress.

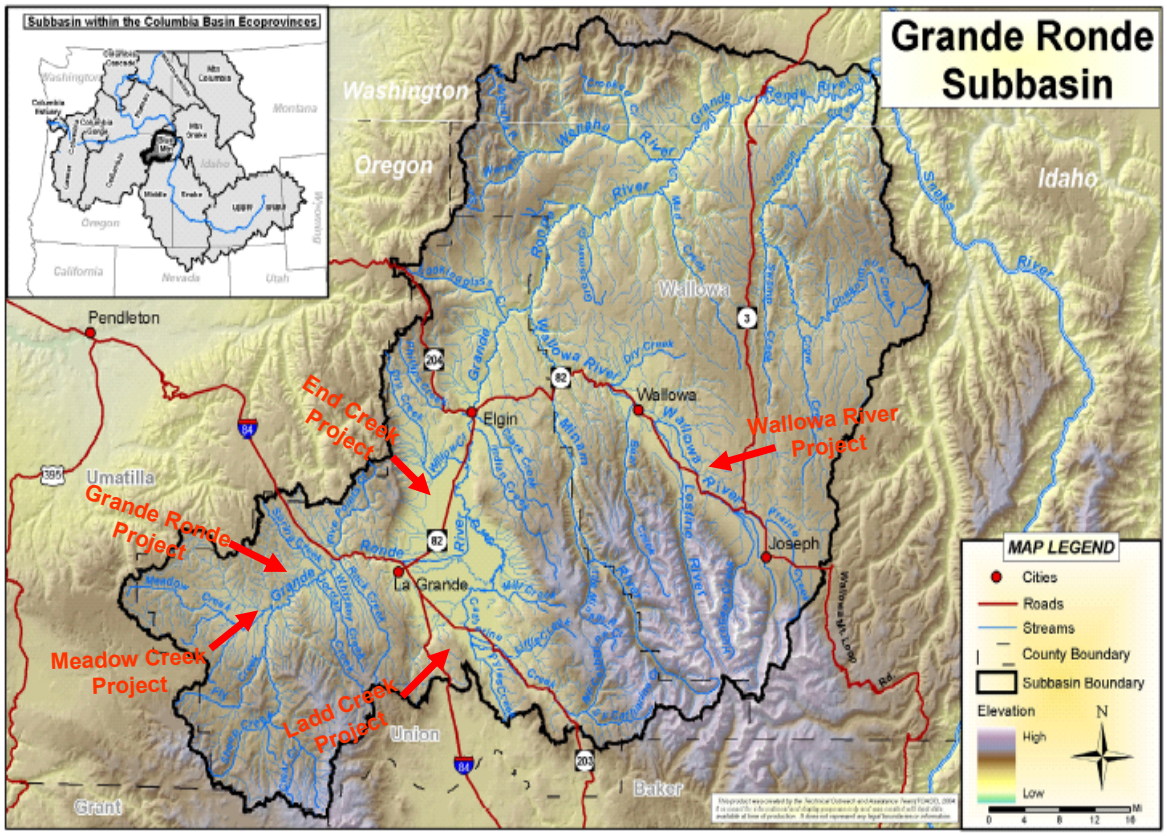
During the 2006 Northwest Power Planning Council project solicitation project, the CTUIR developed a schedule of planned actions for Fiscal Years 2007 through 2009 in cooperation with the Grande Ronde Model Watershed and Oregon Department of Fish and Wildlife as a component of Subbasin Plan implementation. In addition to ongoing project activities associated with completing projects currently underway and conducting annual maintenance and monitoring, the CTUIR and its' partners proposed development and implementation of five primary projects including: Meadow Creek Restoration Project, End Creek Restoration Project, Ladd Creek Restoration Project, Mainstem Grande Ronde River Enhancement Project, and Wallowa River/McDaniel Restoration Project which encompass over 1,500 acres and nearly 15 stream miles. See the following web links: http://www.nwcouncil.org/fw/budget/2007/reviews_detail.asp?id=231 and http://www.cbfwa.org/solicitation/components/forms/Proposal.cfm?PropID=231

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 Rivermile (RM) 169. The Subbasin is divided into three watershed areas—the Lower Grande Ronde, Upper Grande Ronde, and Wallowa watersheds. Approximately 46 percent of the Subbasin is under federal ownership. Historic land uses include timber harvest, livestock grazing, mining, agriculture and recreation.

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

Figure 1 Grande Ronde Subbasin Vicinity and Project locations



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

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

Grande Ronde Subbasin fish populations have declined and habitat degradation is widespread in tributary streams. Mainstem Columbia River harvest, development of Columbia and Snake River hydroelectric projects, and habitat degradation has played an important role in the demise of Grande Ronde Subbasin fisheries (NPCC 2004a and b). With declining populations, the Federal government listed spring/summer Chinook salmon, summer steelhead, and bull trout as threatened species under the Endangered Species Act in 1992, 1997, and 1998, respectively. The status of Pacific lamprey is unclear at this time and may have been extirpated from the Subbasin.

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

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

Table 1 Summary of estimated historic and current Grande Ronde spring Chinook salmon returns by population (data provided by B. Jonnasson, ODFW pers. comm. 2004)

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

Table 2 Summary of estimated historic and current Grande Ronde summer steelhead returns by population (data provided by B. Jonnasson, ODFW pers. comm. 2004)

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

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

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

Figure 2 EDT estimates of abundance, productivity, and life history diversity compared to estimated historic potential for Grande Ronde Subbasin Chinook (NPCC 2004a, Figure 8, pg. 54)

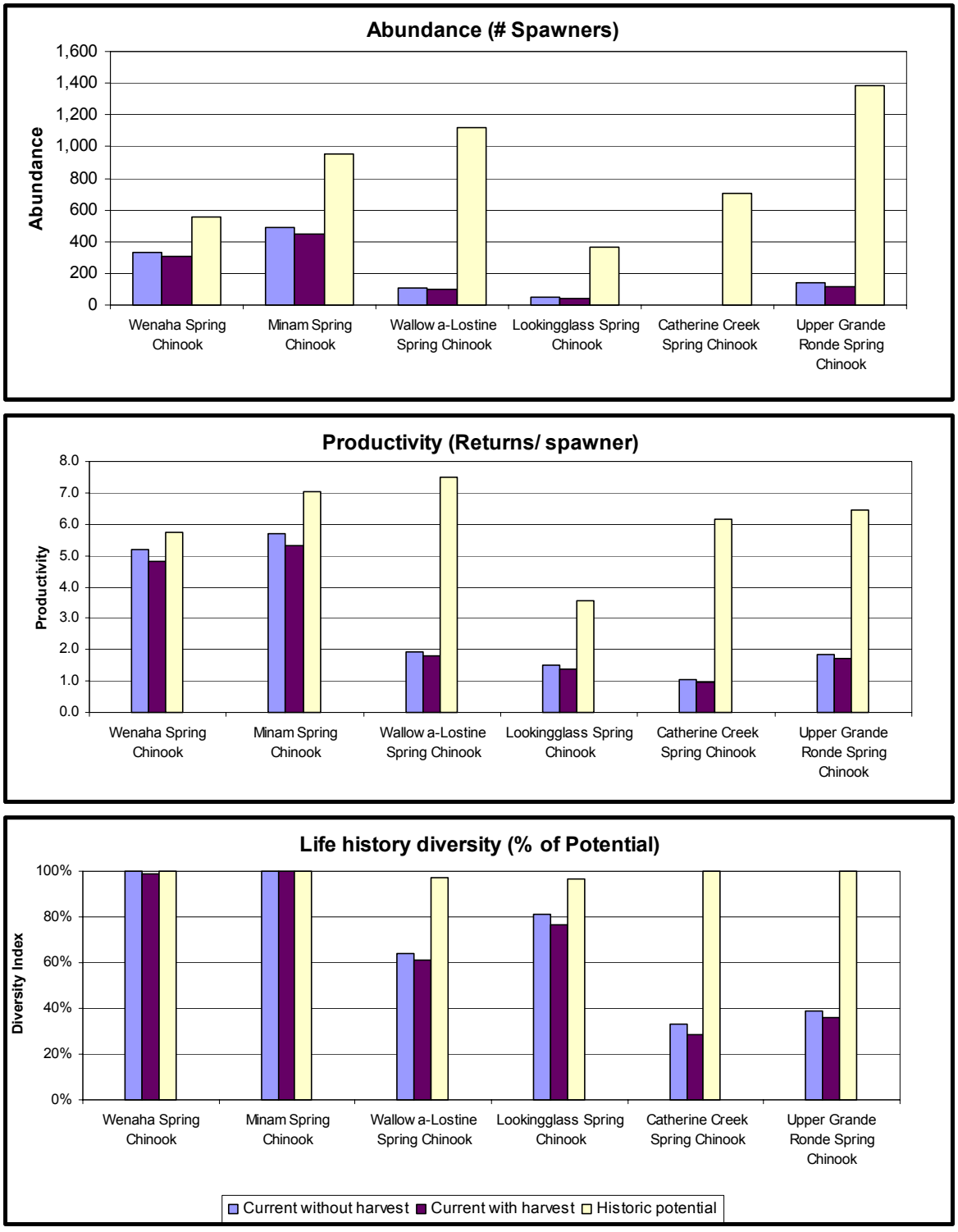
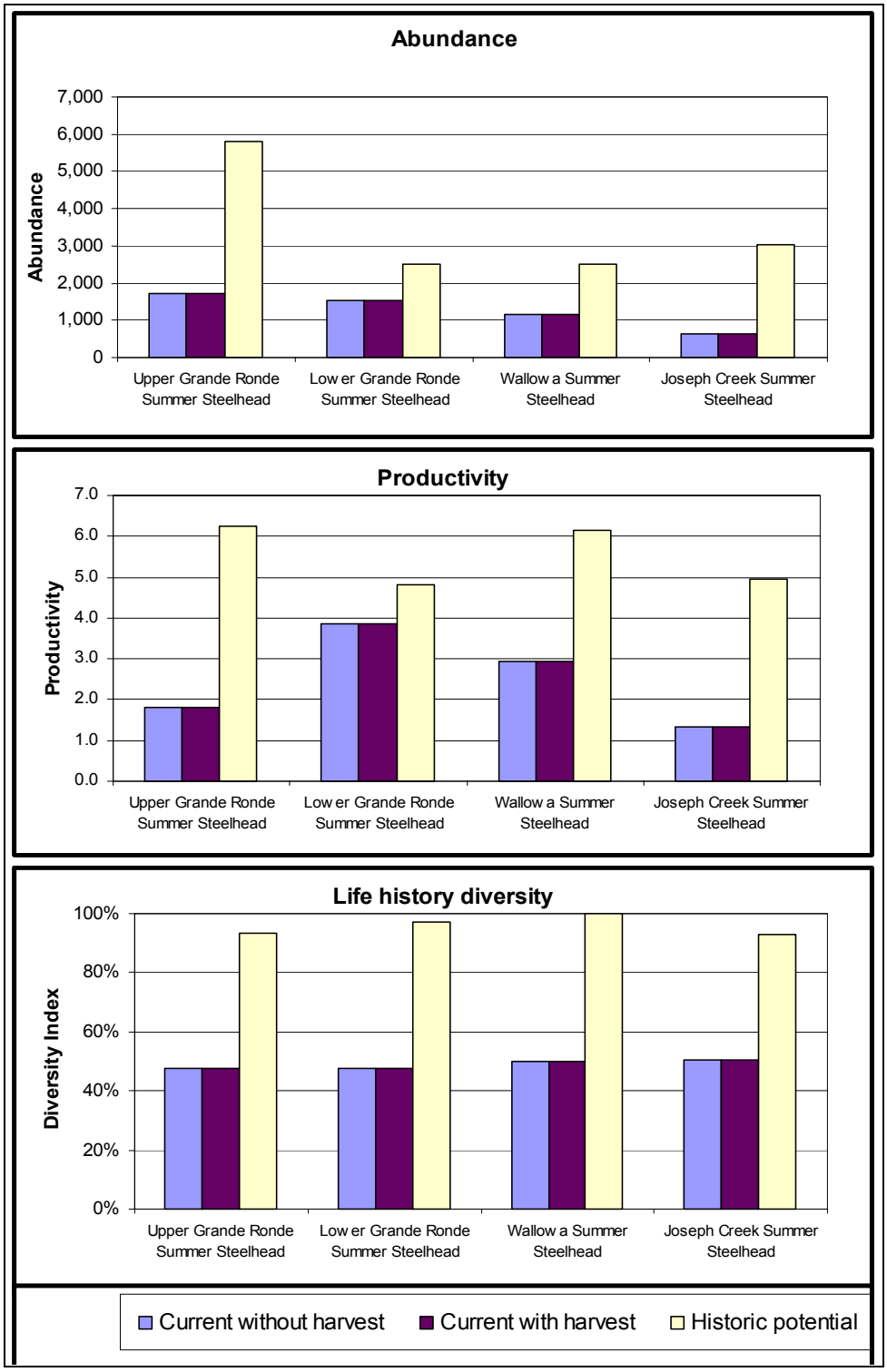


Figure 3 EDT estimates of abundance, productivity, and life history diversity compared to estimated historic potential for Grande Ronde Subbasin summer steelhead (NPCC 2004a, Figure 22, pg. 72)



Degradation of instream and riparian habitat in the Subbasin has been the dominant in-basin 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 roadless 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) list. Of these stream segments, 24 are listed for habitat modification, 27 for sediment, and 49 for temperature. Table 3 illustrates priority areas for water quality treatment in the Subbasin (ODEQ, 2000). .

Table 3 Geographic Priority Areas for Water Quality Treatment in the Upper Grande Ronde Watershed Developed through TMDL Process (H=high, M=medium, L=low)(NPCC 2004a, Table 18, ODEQ, 2000)

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

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

- **Channel Habitat Conditions** – Channel instability associated with removal of streamside cover and channelization has resulted in channel incision/downcutting, 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 baseflow, development of fish passage barriers, and increased summer water temperatures.

Table 4 illustrates key habitat limiting factors by geographic priority area. The table has been edited from the Subbasin plan to depict only those geographic areas addressed under this proposal. These geographic priority watersheds have been identified as the three highest priority areas to conduct habitat

restoration with the greatest response in Chinook salmon and steelhead production potential (NPCC, 2004a, Supplement, Pgs 49-50, Table 5-6).

Table 4 Grande Ronde Subbasin Priority Geographic Areas and Habitat Limiting Factors (NPCC, 2004a)

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

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

METHODS, RESULTS, AND DISCUSSION

The following sections present work elements, milestones, and milestone descriptions followed by discussion of accomplishments for the project during the contract period. Work elements and milestone descriptions were copied from the CTUIR Grande Ronde Subbasin Restoration Project FY06 Pisces Statement of Work and incorporated into this report to provide a comprehensive overview of work activities.

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. The following illustrates milestones, milestone descriptions, and project progress associated with management and administration of projects. The CTUIR administered construction subcontracting for the End Creek and Meadow Creek Restoration Project during the reporting period. ODFW, NRCS, and CTUIR technical staff provided field inspection and survey activities for both projects as well. In addition, an extensive planning process was completed under the FY2007-09 provincial review and project solicitation process conducted under the NPCC Fish & Wildlife Program. A complete overview of the CTUIR Grande Ronde Subbasin Restoration Project is contained in the following NPPC link: http://www.cbfwa.org/solicitation/components/forms/Proposal.cfm?PropID=231

A: 119. Manage and Administer Projects

Title: Manage and Administer CTUIR GR Subbasin Restoration Project

Description: Administration of BPA contract; administrative work to support BPA's programmatic requirements; administration of subcontracts; maintenance of vehicles, training attendance

Planned Metrics: <None>

Deliverable Specification: FY07 contract package (SOW, budget, property inventory), FY06 Metrics Report, June and September accrual estimates, administration of BPA contract and subcontracts

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Enter metric and location information into Pisces	4/1/2006	3/31/2007	Completed	Provide appropriate metric information in Pisces as deliverables are marked complete in Pisces status reports.
B. Administer Subcontracts	4/1/2006	3/31/2007	Completed	Subcontract administration includes processing invoices, tracking contract compliance and project progress, and incorporating contract modifications as necessary to accomplish contracted tasks.
C. Maintain Vehicles	4/1/2006	3/31/2007	Completed	Oversee and schedule maintenance of project vehicles including regular maintenance intervals and repairs.
D. Prepare and Submit Invoices to BPA	4/1/2006	3/31/2007	Completed	Invoices for project expenditures
E. Accrual - Submit June estimate to BPA	6/1/2006	6/15/2006	Completed	Provide BPA with an estimate of contract work that will occur prior to June 30, but will not be billed until July 1 or later. Generally, this should be done by June 10.
F. Accrual - Submit September estimate to BPA	9/1/2006	9/15/2006	Completed	Provide BPA with an estimate of contract work that will occur prior to September 30 but will not be billed until October 1 or later. Generally, this should be done by September 10.
G. Funding Package - Submit draft to COTR	12/4/2006	2/23/2007	Completed	Submit next year's SOW, Budget, Spending Plan, and Property Inventory to the BPA COTR. The SOW should include location information (latitude and longitude) for those work elements that require it. If contractor or contractor's organization takes longer than 30 days to sign the contract, the contractor will need to send this funding package to BPA more than 90 days before the end of the current contract.
H. Attend stream restoration training	1/1/2007	3/31/2007	Active	Northwest River Restoration Design Symposium is typically held in January/February.
Deliverable: I. Complete project administration		3/31/2007	Completed	*See the Deliverable Specification above*

Primary habitat restoration and enhancement projects implemented during the reporting period included the End Creek and Meadow Creek Restoration Projects. The following illustrates milestones and project progress associated with these two major project activities.

B: 119. Manage and Administer Projects

Title: Manage and administer End Creek Restoration Project

Description: Implement End Creek Restoration Project. Work Element includes overseeing and providing technical expertise in the planning, design, and construction of the project. CTUIR is co-lead agency with NRCS. Project involves approximately 4 miles of restoration channels, 8 miles of swale construction, and restoration of 400 acres of historic wetland and associated upland habitats in the Willow Creek watershed. Primary partners include the landowners (3), ODFW, NRCS, and GRMWP.

Planned Metrics: <None>

Deliverable Specification: Oversee the construction of the End Creek Restoration Project, which includes Approximately 4 miles of restoration channel and 8 miles of spring swales on End Creek, McDonald Creek, and several un-named tributaries and springs.

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Environmental Compliance requirements complete	4/1/2006	7/3/2006	Completed	Assure environmental compliance is completed before beginning any on the ground work.
B. Conduct field survey, layout, and staking in preparation for construction.	4/3/2006	6/16/2006	Completed	Activity includes channel and swale survey and staking, establishment of setback control survey stakes and identification of materials (rootwads and oversized basalt rock) stockpile locations.
C. Administer construction subcontracts/construct project.	4/3/2006	3/30/2007	Completed	CTUIR and ODFW lead project biologists and NRCS representative will oversee and administer all phases construction work. Includes communicating construction strategies and sequences, grade survey and staking, inspection, environmental compliance, and tracking equipment operation hours. Construction bid process, selection of contractor, and contract award completed in February 2006
Deliverable: D. Complete End Creek Project administration		3/30/2007	Completed	*See the Deliverable Specification above*

C: 119. Manage and Administer Projects

Title: Manage and administer Meadow Creek Restoration Project

Description: Project is planned as a phased-in restoration strategy involving the reactivation of abandoned floodplain associated with Meadow Creek within the McCoy Meadows Restoration Project. The project is a joint BPA, Wetland Reserve Program project involving the landowner, NRCS, ODFW, GRMWP, and CTUIR. Project construction includes channel restoration, floodplain pond development, embankment construction, and installation of graded riffle structures and large woody debris.

Planned Metrics: <None>

Deliverable Specification: Oversee the construction of Meadow Creek Restoration Project, which includes approximately 2,800 feet of restoration channel, 2 floodplain ponds (1.8 acres), installation of 5 geomorphic riffle weir/cross vane structures, 6 engineered log debris complexes, about 120 whole trees for instream structural diversity.

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Ensure environmental compliance requirements are completed.	4/1/2006	7/28/2006	Completed	Complete project environmental compliance. NEPA, Cultural, ESA consultation (USFWS), and DSL permit completed in 2006. USCOE permit and pending approval.
B. Conduct construction contract bid process	4/3/2006	5/12/2006	Completed	Prepare request for quotes (RFQ) for materials (oversized basalt rock) and fully operated equipment, review bids with project partners, select responsive bidder, prepare construction contract documents, inspect equipment, and issue construction contract to selected contractor(s). Note that individual material types may be contracted separate from equipment contract. Construction contract to be administered by CTUIR DNR Administration.
C. Conduct project layout and staking per engineering specifications	5/22/2006	8/31/2006	Completed	Conduct survey and stakeout for project. Includes channel alignment, ponds, and structure layout, construction staking, and overall layout of construction site.
D. Administer construction subcontract/construct project.	6/1/2006	8/31/2006	Completed	CTUIR and NRCS representatives will oversee and administer all phases of construction work. Includes communicating construction strategies and sequences, grade survey and staking, ensuring environmental compliance, and tracking equipment operation hours. Project construction includes channel restoration, floodplain pond development, embankment construction, and installation of graded riffle structures and large woody debris.
E. Conduct post-construction inspection.	8/1/2006	8/15/2006	Completed	CTUIR and NRCS representatives perform as contract technical representatives and verify that construction work was performed to engineering specifications.
Deliverable: F. Complete Meadow Creek Restoration Project administration		8/25/2006	Completed	*See the Deliverable Specification above*

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. Federal funding requires compliance with federal laws and regulations. Methods involve coordination with various federal and state agencies and development and submittal of permit applications, biological assessments, NEPA checklists, etc. Environmental compliance also includes the need to conduct site-specific surveys as is the case for cultural resource laws and regulations and the possible need to determine whether, for example, a federally protected species occurs within the project area. Part of the environmental compliance work element includes planning to develop site-specific techniques and designs such as where individual treatments units are located, how specific treatments will be implemented, and preparations for putting efforts on the ground, including preparations for subcontracting if necessary.

Primary environmental compliance accomplishments during the reporting period included coordination with BPA environmental compliance personnel to prepare supplemental documentation and reporting for ongoing and planned management actions. Activities included preparation of biological assessments, ODSL/USCOE permit applications, and cultural resource surveys/reports for the End Creek and Meadow Creek restoration projects. Close coordination with BPA personnel and regulatory agency personnel facilitated preparation and completion of all required environmental compliance and permitting needs for FY06 project activities.

D: 165. Produce Environmental Compliance Documentation

Title: Produce Environmental Compliance Documentation

Description: Write and submit Biological Assessments and coordinate with BPA NEPA staff to initiate/complete formal and informal consultations with USFWS and NOAA Fisheries. Write and submit permits required by various regulating agencies (Division of State Lands, US Army Corp of Engineers, Department of Environmental Quality, Oregon Department of Forestry). Coordinate archaeological evaluations, including surveys. Prepare NEPA checklists and coordinate development of supplemental environmental analyses tiered to BPA's Programmatic Watershed Management/Wildlife Program Environmental Impact Statements and Record of Decisions.

Planned Metrics: Are herbicides used as part of work performed under this contract?:

Deliverable Specification: Individual Biological Assessments for instream work projects, completion of consultations with NOAA Fisheries and USFWS, DSL/USACE/DEQ/ODF permits, and NEPA Checklists. Note that cultural resource investigations are cost-shared with project partners and generally conducted through CTUIR, DNR Cultural Resource Protection Program.

Milestone Title	Start Date	End Date	Status	Milestone Description
A. End Creek Permit Applications and Approvals	4/3/2006	4/21/2006	Completed	Submit fill/removal and 404 permits to ODSL and US Army Corps. Coordinate cultural resource surveys.
B. End Creek Biological Assessment & Consultation	4/3/2006	4/21/2006	Completed	Biological Assessment for End Creek Project complex. BA in draft and under review by BPA environmental compliance program.
C. Meadow Creek Restoration Project (McCoy Meadows) Biological Assessment and Consultation	4/3/2006	4/21/2006	Completed	Biological Assessment complete. Concurrence completed by USFWS on Meadow Creek, NMFS pending Portland Office approval.
D. Meadow Creek Restoration Project Permit Applications and Approvals	4/3/2006	4/21/2006	Completed	DSL permit complete. Submit 404 permits to US Army Corps. Cultural resource report completed and sent to SHPO in December 2005.
E. Herbicide Use Proposals & Application Summaries for CTUIR GR Habitat Program	12/1/2006	1/31/2007	Completed	Complete 2007 Herbicide Use Proposal and 2006 Application summary as required by BPA NEPA Program
Deliverable: F. Receipt of environmental compliance clearance from BPA.		1/31/2007	Completed	*See the Deliverable Specification above*

Coordination and Public Outreach/Education

Coordination and public education are two work elements undertaken to facilitate development of habitat restoration and enhancement on private lands, participate in subbasin planning processes, and assist with providing watershed restoration education. CTUIR technical staff coordinate 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.

Additionally, staff conducted ongoing coordination and participation with various organizations associated with the FY2007-2009 NPCC Project solicitation, ISRP review and response, and associated subbasin planning and subbasin project prioritization. Tasks included development of a comprehensive proposal in cooperation with ODFW and GRMW staff for the CTUIR Grande Ronde Subbasin Restoration Project, development of a detailed response to ISRP review comments, and participation in several meetings with subbasin co-managers to identify and prioritize project activities to achieve subbsin plan and NPCC objectives. Additionally, staff participated in development of various components associated with recovery planning documents through NMFS technical teams for ESA-listed salmon and steelhead stocks in the Grande Ronde Subbasin. Recovery planning is an ongoing task.

E: 118. Coordination

Title: CTUIR Grande Ronde Subbasin Restoration Coordination

Description: Develop habitat restoration and enhancement project opportunities through coordination and planning with State, Federal and local partners, and private landowners. Includes participation on GRMWP Board and Technical Committee.

Planned Metrics: <None>

Deliverable Specification: New project opportunities consistent with Subbasin Plan. As new project opportunities develop, SOW may need to be modified to incorporate additional work elements. Additional Work Elements my include, for example, WE 29, Increase Channel Complexity or WE 34, Develop Alternative Water Source. Annual report will include a summary of the meetings attended and their outcomes.

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Conduct regular meetings with project partners including prospective private landowners	4/1/2006	3/31/2007	Completed	Continue ongoing coordination with State, Federal and local partners (GRMWP, NRCS, ODFW, Union County SWCD, US Forest Service), and private landowners to develop new habitat restoration/enhancement opportunities.
B. Represent CTUIR on Grande Ronde Model Watershed Board and Technical Committee	4/1/2006	3/31/2007	Completed	Attend monthly GRMWP Board meetings and annual technical committee meetings to represent CTUIR interests in coordinated Subbasin Planning, policy development, and project development
Deliverable: C. Complete project coordination		3/31/2007	Completed	*See the Deliverable Specification above*

The CTUIR Grande Ronde Subbasin Restoration Project has limited direct funding for project implementation and therefore, must rely on the GRMWP and other funding organizations for implementation funds. During the reporting period, the CTUIR, ODFW, and GRMW successfully secured several cost-share resources for the End Creek and Meadow Creek projects. The End Creek Project was funded through the GRMW-BPA ($197,792), OWEB ($38,880), NRCS WRP ($157,853), ODFW-BPA ($50,000), CTUIR-BPA ($35,000) and in-kind contributions from the landowners ($20,000). Meadow Creek was funded through the GRMW-BPA ($92,155), NRCS WRP ($107,205), CTUIR-BPA ($25,000), and ODFW-BPA ($5,000). Completed tasks included development of project proposals and budgets for GRMW and OWEB project solicitations which were completed cooperatively by GRMW and CTUIR staff.

CTUIR staff have also participated annually since 2001 in the LaGrande School District Outdoor Education Program at Spring Creek each spring to help provide watershed restoration educational instruction to sixth grade students from the District. Staff provide instruction to an average of 100 students on stream channel morphology and fish habitat at one of many instructional stations during the two day event held each spring.

F: 99. Outreach and Education

Title: Public Outreach and Education

Description: Involve the public, school groups and other agencies with local habitat restoration projects using a variety of methods.

Planned Metrics:
* # of students reached:
* # of general public reached:
* # of teachers reached:

Deliverable Specification: Participate in 2-day field education program with LaGrande School District at Spring Creek. Develop 1-2 articles annually for GRMWP Riffles Journal regarding restoration and enhancement projects.

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Participate in LaGrande School District Outdoor School at Spring Creek.	5/25/2006	5/26/2006	Completed	Organize and instruct educational station about fish habitat and stream channel morphology along Spring Creek for LaGrande School District 6th Grade classes.
B. Participate in GRMWP Public Involvement and Education Program.	4/1/2006	3/31/2007	Completed	Particpate/develop in GRMW public involvement and education programs. Develop article(s) for Ripples Journal associated with restoration and enhancement projects.
Deliverable: C. Complete outreach and education activities		3/31/2007	Completed	*See the Deliverable Specification above*

Planting and Maintenance of Vegetation

The CTUIR habitat program annually participates and/or assumes the lead role in revegetation activities on individual habitat restoration and enhancement projects. The following illustrate milestones, descriptions, and accomplishments for several project activities undertaken during the reporting period. Additional detail is contained in project completion reports developed for individual projects that are uploaded onto the GRMW website at the following link: **http://www.grmw.org/projects/grmw-projects/grmw_project_ex_EndCrkRice.shtml.**

Planting and seeding methods are developed to address site specific conditions and vegetation objectives. Natural colonization and manual techniques are utilized. Channel construction projects warrant special consideration since construction disturbance creates bare soil conditions and potential for weed infestations. Locally adapted native species are utilized as available, although some cultivars have been utilized in grass seed mixes in conjunction with available native seed.

A variety of revegetation methods are employed and are designed to meet specific project objectives and site conditions. Techniques may include a combination of manual and/or mechanical practices and can include installation of live whips, conditioned whips, containerized stock, transplants/salvage, and broadcast seeding. Locally adaptive species of the appropriate elevation band are used to facilitate vegetation establishment. Planting efforts are usually constrained to late fall/early spring dormancy periods to minimize plant stress and optimize survival. Plant materials are secured through various means including the CTUIR native plant nursery where we outgrow plants for use on restoration projects or outside, private vendors that either grow plants speculatively or through agreements with CTUIR staff for individual projects. Planting tasks also include site preparation, such as scalping when necessary, installation of protection devices to minimize depredation, and soil moisture management through either manual application of water or installation of temporary irrigation systems. Revegetation activities accomplished during the reporting period included installation of approximately 20,000 plants (primarily live whips and sedge/rush plugs on the three primary project areas.

Noxious weeds are present on project areas. Landowner agreements include strategies to address weeds and are either completed by the landowner, CTUIR, subcontractor, and/or through the local weed control board. CTUIR staff provide assistance to landowners by coordinating with County Weed Board, securing funding, and developing treatment strategies. Manual, biological, and chemical treatment options may be employed consistent with existing standards for these practices. Key weed species prioritized for treatment in the basin include leafy spurge, spotted knapweed, and Canada thistle.

G: 47. Plant Vegetation

Title: Plant Vegetation on End Creek Restoration Project

Description: Plant and seed native vegetation throughout 776 acre project area.

Planned Metrics:
* # of riparian acres treated:
* # of upland acres treated:
* # of wetland acres treated:
* # of riparian miles treated:

Deliverable Specification: Plant/reseed approximately 10-12 miles of newly constructed stream channel on End Creek, McDonald Creek, and un-named spring tributaries. Initial planting efforts will include primarily live willow whip and sedge/rush plug installations. An estimated 20,000 plants and 4,000 lbs of native seed will be planted to initiate recovery. Note that planting budget is costs-shared with GRMWP, NRCS, and PCSRF funds.

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Environmental Compliance requirements complete	4/1/2006	4/30/2006	Completed	On-the-ground work associated with this work element cannot proceed until this milestone is complete. Milestone is complete when final documentation is received from BPA environmental compliance staff (completion can be based on pre-existing environmental documentation from BPA).
B. Complete initial planting efforts following implementation of phase 1 of the restoration	5/1/2006	3/30/2007	Completed	Plant/reseed approximately 10-12 miles of newly constructed stream channel on End Creek, McDonald Creek, and un-named spring tributaries. Additional planting needs will be assessed following initial effots.
Deliverable: C. Complete End Creek plantings		3/30/2007	Completed	*See the Deliverable Specification above*

Revegetation activities have continued on the Longley Meadow Restoration Project following restoration channel construction and activation completed in 2001 utilizing funds provided through the ODEQ wetlands and fish habitat mitigation program. Primary activities have included willow and tree installation al within a 0.15 acre wetland and along the mainstem Grande Ronde River.

H: 47. Plant Vegetation

Title: Plant Vegetation on Longley Meadow Restoration Project (funded by other entities)

Description: Continue revegetation activities associated with Bear Creek restoration channel and Mainstem Grande Ronde River Habitat Enhancement Project. Activities include primarily manual and mechanical installation of live shrub whips along project area stream channels.

Planned Metrics:
* # of riparian acres treated:
* # of upland acres treated:
* # of wetland acres treated:
* # of riparian miles treated:

Deliverable Specification: Continue planting along Bear Creek and Mainstem Grande Ronde River (phase 2) project to facilitate establishment of hydrophytic shrub and tree communities. Approximately 2,500 additional live willow whips planned for installation. Budget estimate is cost-shared with various funding sources including ODOT - Lower Perry Bridge Fish Mitigation Funds, Longley Meadow Restoration Project (BPA #00012339), NRCS WRP, and Pacific Coast Salmon Recovery Funds (PCSRF).

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Environmental Compliance requirements complete	4/1/2006	4/15/2006	Completed	On-the-ground work associated with this work element cannot proceed until this milestone is complete. Milestone is complete when final documentation is received from BPA environmental compliance staff (completion can be based on pre-existing environmental documentation from BPA).
B. Complete spring and fall planting along Grande Ronde River and Lower Bear Creek.	4/16/2006	11/10/2006	Completed	Continue planting along Bear Creek and Mainstem Grande Ronde River (phase 2) project to facilitate establishment of hydrophytic shrub and tree communities.
Deliverable: C. Complete Longley Meadow plantings		11/10/2006	Completed	*See the Deliverable Specification above*

I: 47. Plant Vegetation

Title: Plant Vegetation on Meadow Creek Project

Description: Plant or reseed native vegetation throughout 450 acre project area. Primary emphasis of planting efforts are to re-establish hydrophytic shrubs and carex/juncus species along McCoy and Meadow Creek. Revegetation activities are ongoing within project area.

Planned Metrics:
* # of riparian acres treated:
* # of upland acres treated:
* # of wetland acres treated:
* # of riparian miles treated:

Deliverable Specification: Installation of an estimated 15,000 plants (carex/juncus plugs (5,000), whole willow transplants, and installation of conditioned live willow whips) and erosion control seediing using native seed mix. Note that planting budget will be cost shared with NRCS WRP Restoration Funds and future GRMWP proposal if necessary.

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Environmental Compliance requirements complete	4/1/2006	4/15/2006	Completed	Environmental planning well underway. ESA consultation (USFWS), Cultural Resources, and DSL permit processes completed. Awaiting USCOE 404 permit and NMFS concurrence BO. On-the-ground work associated with this work element cannot proceed until this milestone is complete. Milestone is complete when final documentation is received from BPA environmental compliance staff (completion can be based on pre-existing environmental documentation from BPA).
B. Implement planting along McCoy Creek	4/16/2006	5/12/2006	Completed	Continue planting along McCoy to facilitate establishment of hydrophytic shrub and tree communities. Approximatley 2,500 additional live willow whips installed.
C. Initiate vegetation establishment along Meadow Creek Restoration Channel.	10/16/2006	3/31/2007	Completed	Initiate seeding and planting efforts following project construction including carex/juncus plugs (5,000), whole willow transplants, installation of conditioned live willow whips, and erosion control seediing using native seed mix. Project construction schedule requires initial revegetation activities to be initiated in fall 2006 and continue into spring 2007.
Deliverable: D. Conduct seeding and planting on Meadow Creek Project		3/31/2007	Completed	*See the Deliverable Specification above*

The project facilitated development of willow stoolbed fields at the CTUIR's native plant nursery to provide live willow whip materials for Grande Ronde Subbasin out planting since 1999. Approximately 1,000 square feet of stoolbed has been planted in locally derived native willow species which are harvested nearly annually to provide livewhip materials for installation on habitat restoration projects.

The stoobeds are capable of providing nearly 20,000 willow whips annually and have been utilized to conduct extensive planting at the McCoy Meadows, Longley Meadows, and End Creek Restoration Projects. The benefits of maintaining the nursery source of plant materials include eliminating the need to annual collect plant materials from riparian areas and improving efficiency of collection and preparation of such materials.

J: 98. Other

Title: Propagate Native Plants at CTUIR Native Plant Nursery for Grande Ronde Restoration Project

Description: Propagate plants at CTUIR Native Plant Nursery. Includes planting willow and red osier dogwood whips in fields to grow-out for live whip collection and outgrowing containerized hydrophytic shrub and tree stock to provide plant materials for restoration project. Some plant materials may need to be secured from private contractor sources and project needs and CTUIR Native Plant Nursery capacity dictate.

Planned Metrics: <None>

Deliverable Specification: Generate an estimated 5,000 willow whips and 500 containerized/bareroot plant stock annual depending on project needs.

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Environmental compliance requirements complete	4/1/2006	4/15/2006	Completed	On-the-ground work associated with this work element cannot proceed until this milestone is complete. Milestone is complete when final documentation is received from BPA environmental compliance staff (completion can be based on pre-existing environmental documentation from BPA).
B. Propagate plants at CTUIR Native Plant Nursery for outplanting on Grande Ronde projects	4/16/2006	3/31/2007	Completed	Propagate hyrophytic trees and shrubs at CTUIR Native Plant Nursery in Mission, Oregon. Task includes establishing/maintaining and rotating shrub fields to provide 5-10,000 live whips, bareroot shrubs from fields following 2-3 years of use as whip producers, and containerized plant materials annually. Operation has been in use for past 3 years and has been successful in providing approximately 25,000 live whips utilized in revegetation and bioengineering strategies employed on restoration/enhancement projects, including branch packing along stream banks, trenching in gravel bars, and mechanical stinger installation. Generally, shrub fields are established to support individual projects (i.e., McCoy Meadows, Longley Meadows, End Creek) to ensure appropriate source material and elevation matches. Utilizing nursery fields minimizes need to harvest plant material from basis sources which may be in short supply.
Deliverable: C. Complete plant propogation		3/31/2007	Completed	*See the Deliverable Specification above*

Private landowners are generally responsible for controlling noxious weeds on projects. Staff provide assistance in the form of coordination with funding entities and local expertise in the control and eradication of noxious and/or undesirable weed species.

Other vegetation maintenance activities undertaken to improve survival and/or reduce the impact of depredation from wildlife include installation and maintenance of temporary irrigation systems and installation of protection devices. During the reporting period, ODFW and CTUIR maintained and operated irrigation systems on the End Creek and Meadow Creek projects. Additional, 18 hog wire cages were installed along McCoy Creek to protect willow patches of elk depredation.

K: 22. Maintain Vegetation

Title: Maintain vegetation

Description: Improve plant survival through the installation/maintenance of protective cages/tubes, fertilization, watering, and controlling noxious weeds. Vegetation management efforts are tailored to the needs of individual project areas and depend on precipitation rates/weather, past success/failure, and condition of plant communities. Weed treatments techniques may include a combination of strategies including manual, biological, and chemical treatment. Staff coordinate with individual landowners to determine the best treatment options that may include the landowner conducting treatment activities, sub-contracting and/or utilizing the services of the Union County Weed Board.

Planned Metrics: <None>

Deliverable Specification: Temporary irrigation system installation and maintenance in cooperation with ODFW on End Creek Restoration Project to facilitate vegetation establishment. Maintenance of vegetation and control of noxious weeds on project areas, including End Creek (776 acres), McCoy Meadows (450 acres) and Longley Meadows (400 acres).

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Environmental Compliance requirements complete	4/1/2006	4/30/2006	Completed	On-the-ground work associated with this work element cannot proceed until this milestone is complete. Milestone is complete when final documentation is received from BPA environmental compliance staff (completion can be based on pre-existing environmental documentation from BPA).
B. Control noxious weeds on project areas	5/15/2006	7/1/2006	Completed	Implement noxious weed control as necessary using biological agents and herbicide application. Activity includes close coordination with landonwers and Union County Weed Control Board. Herbicide use will be consistent with the guidelines in the the BPA HIP BO.
C. Install and operate End Creek project irrigation system	5/12/2006	8/18/2006	Completed	Assist ODFW in the installation of an irrigation system to improve survival of planted vegetation along project restoration channels and swales. Water plants throughout the summer.
D. Inspect revegetation success on restoration projects during growing season.	6/1/2006	9/15/2006	Completed	Conduct field surveys of project areas to assess plant condition/vigor, determine presence and extent of depredation, watering needs, and overall maintenance needs to improve survival.
E. Conduct vegetation maintenance on project areas to improve plant survival	6/15/2006	10/15/2006	Completed	Includes installation/reinstallation of protection tubes, fertilizer, and bi-weekly watering.
Deliverable: F. Complete vegetation maintenance		10/5/2006	Completed	*See the Deliverable Specification above*

Operate and Maintain Habitat & Structures

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

L: 186. Operate and Maintain Habitat/Passage/Structure

Title: Maintain instream structures, fences, and off-channel water developments

Description: Annually inspect instream structures on restoration projects (mainstem Grande Ronde River, McCoy Creek, Meadow Creek, Bear Creek, and Jordan Creek) to ensure that structures are operating correctly and achieving goals specific to the stream reach, such as improving habitat complexity, floodplain connectivity, and stream bank or bed stability.

Bi-annually inspect and maintain structures on individual project areas to ensure performance. Maintenance is required to minimize potential for trespass livestock into riparian conservation easement areas and associated damage to instream and riparian habitat. These projects provide for the protection and enhancement of approximately 10 stream miles and 950 acres of riparian, riverine, and wetland habitat.

Planned Metrics: <None>

Deliverable Specification: Ongoing inspections and evaluations of habitat restoration and enhancement projects to ensure structures, channels, and other developments are functioning as planned.

Maintenance of 11 miles of riparian exclosure fence and 8 water developments on the McCoy Meadows and Longley Meadows Restoration Projects. Close coordination with landowners on riparian/instream habitat objectives and potential livestock utilization issues.

Annual report will include a summary of the structures that were maintained and the amount of O&M that was performed.

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Environmental compliance requirements complete	4/1/2006	4/15/2006	Completed	On-the-ground work associated with this work element cannot proceed until this milestone is complete. Milestone is complete when final documentation is received from BPA environmental compliance staff (completion can be based on pre-existing environmental documentation from BPA).
B. Conduct field review of instream structures and conduct appropriate maintenace	4/16/2006	6/1/2006	Completed	Conduct field visits on project areas to evaluate performance of structures, channel condition, and floodplain following annual spring (high) stream flow. Identify and record maintenance needs and conduct further evaluation to identify appropriate response. Conduct appropriate maintenance following completion of maintenance planning and completion of any required permitting/consultations, and other environmental compliance needs.
C. Conduct late spring/pre-grazing season review of water developments and conduct necessary maintenace	5/1/2006	5/12/2006	Completed	Conduct field review and meet with landowners to identify maintenance/repair needs on fences, water gaps, and water developments prior to May turnout of livestock. Conduct appropriate maintenance including fence repair, installation of panels on livestock crossings and water gaps, and prepare off-channel water developments.
D. Conduct periodic field inspection of riparian easements and conduct necessary maintenance	5/1/2006	10/27/2006	Completed	Conduct bi-weekly field inspection of riparian easements during grazing season (May through October). Remove livestock, mend fences, communicate with landonwers as issues arise.
E. Conduct post-grazing season field review, maintenance, and landonwer coordination.	10/2/2006	12/29/2006	Completed	Conduct post-grazing season field review and landonwer coordination to assess maintenance needs, potential changes to developments, and to remove livestock panels located in livestock water gaps.
Deliverable: F. Complete maintenance		12/29/2006	Completed	*See the Deliverable Specification above*

Monitoring & Evaluation

Monitoring and evaluation 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 photopoints, video, installation of water quality monitoring devices, channel cross sections, longitudinal surveys, fish population and habitat surveys, stocking/census surveys on revegetation 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 description of the various M&E components of the project followed by project specific monitoring results.

M: 157. Collect/Generate/Validate Field and Lab Data

Title:	Monitoring & Evaluation CTUIR GR Subbasin Restoration Project
Description:	Collect pre-project and post-project data using a variety of methods to determine if project goals are being met. Include data summaries in quarterly and annual reports.
Planned Metrics:	R, M, and E Focal Area :
Deliverable Specification:	

Photopoints:

Establish photopoints on new projects and bi-annually retake 40 photopoints on existing projects. Project photo points are taken at McCoy Meadow (including Meadow Creek), Longley Meadows, Mainstem Grande Ronde River Habitat Enhancement Project, and End Creek Restoration Project.

Vegetation Surveys:

Conduct field surveys using various protocols (line intercept and plots) to collect data on plant survival and plant community development as necessary. Basic stocking/census surveys are utilized at McCoy Meadows to evaluate plant survival. Daubenmire plots have been established at Longley Meadows as well as stocking/census surveys. A modified green line methodology is currently under development in cooperation with an OSU research project at Longley Meadow/Bear Creek which is being considered for use on End Creek and Meadow Creek

Rosgen/Habitat Surveys:

Collect channel morphology data on reference reaches and proposed work sites and use data as basis for new channel designs. Data includes cross sections, longitudinal profiles, pebble counts, erosion analysis, etc per standard survey protocols (Rosgen, 1997). Data provides quantitative metrics associated with stream channel morphology from which to compare baseline conditions with future conditions. Channel morphology and reference reach data collection is planned on Ladd Creek and Meadow Creek projects.

Monitor Water Quality:

Continue monitoring of stream and air temperatures at 18 sites on 5 streams. Project areas include McCoy, Meadow, Longley (Bear, Jordan, and Grande Ronde River), and End Creek (End Creek, McDonald Creek, and South Fork Willow Creek). Protocols vary depending on monitoring devices. A combination of data loggers and Vemco probes are utilized. Loggers and probes are calibrated in ice baths and tested prior to deployment. Deployment and recording data is programmed and probes are deployed according to invidividual project study plans. Study plans include combination of establishing data collection sites above and below projects areas. Data loggers collect data year round, while vemco probes are deployed during May 15 - Oct 15. Data is downloaded annually, sorted in Access data bases, uploaded onto CTUIR, DNR Fish and Wildlife Program website, and incorporated into project reports.

Groundwater Data:

Coordinate/assist with ODFW on groundwater monitoring at Longley Meadows and End Creek. Collect groundwater data at McCoy Meadows along McCoy Creek and Meadow Creek. Study plans for groundwater monitoring networks and installation of wells has been previously completed. All networks are currently in-place, and data is being collected to monitor changes in groundwater elevations over time in response to project actions.

Fish Population Data:

Juvenile fish population studies have been initiated by the CTUIR (under this project and #199800703, CTUIR Facility Operations and Program Monitoring and Evaluation for Grande Ronde Spring Chinook and Summer steelhead) on the End Creek Restoration Project. CTUIR also participates in studies in cooperation with ODFW. Methodologies and study designs are thoroughly described in the above project. Methodologies for juvenile fish population studies include establishing fix and/or randomized sampling sites, conducting 60-100 meter sampling reaches, conducting fish depletion electrofishing, recording fish captured by species, size, and condition, and recording habitat values using methods described by Moore/Hankin and Reeves. Data is tabulated in excel spreadsheets, and rearing densities are calculated using statistical analysis.

Aerial Photography:

Subcontract/secure services for low elevation aerial photography on large channel restoration projects, as necessary. Aerial photography has proven highly useful for presenting project accomplishments and providing long-term monitoring tools. During project reporting period, we are anticipating the availability of 2005 color aerial photography in seamless coverages, available by USGS quadrangle. The project will secure electronic versions of Subbasin USGS quadrangles for use in reference reach studies, project planning and design, and monitoring.

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Environmental compliance requirements complete	4/1/2006	4/15/2006	Completed	On-the-ground work associated with this work element cannot proceed until this milestone is complete. Milestone is complete when final documentation is received from BPA environmental compliance staff (completion can be based on pre-existing environmental documentation from BPA).

Milestone Title	Start Date	End Date	Status	Milestone Description
B. Take project photopoints	6/15/2006	7/31/2006	Completed	Methology includes: 1) selecting photo point location, 2) monumentation by taking gps coordinate and installing rebar pin w/cap or metal t-post, 3) recording site data and bearing/azmuith of photo(s), 4) recording photo on selected focal length, 5) dowloading and/or developing film and organizing into digital/hard copy photo album. Photo albums are maintained on file at CTUIR, DNR F&W Program Offices and incorporated into reports.
C. Conduct plant surveys	6/15/2006	8/30/2006	Completed	Conduct field surveys using various protocols (line intercept and plots) to collect data on plant survival and plant community development as necessary. Basic stocking/census surveys are utilized at McCoy Meadows to evaluate plant survival. Daubenmire plots have been established at Longely Meadows as well as stocking/census surveys. A modified green line methodology is currently under development in cooperation with an OSU research project at Longley Meadow/Bear Creek which is being considered for use on End Creek and Meadow Creek
D. Conduct Rosgen/Habitat Surveys (Ladd Creek in co-op with ODFW)	4/16/2006	3/31/2007	Completed	Ladd Creek surveys will initiate detailed planning and design in late 2006. Survey grade, trimble gps hardware will be utilized to collect and store data for this project. Topographic and feature data will be downloaded into autocad landdesktop software. Field is data is sorted and summarized in excel spreadsheets. Typical cross sections and longitudinal profiles are graphed in standardized formats to illustrate elevation breaks in local topography. An estimated 1,500 feet of longitindal profile and at least 8 channel cross sections will be measured to characterize the selected reference reach. Four to six channel cross section monitoring sites will be established on Meadow Creek Project. Methodology involves: 1) selecting monitoring location, based on representativeness of channel condition (4 riffles and 2 pools), 2) staking right and left ends of cross section, 3) stretching measuring tape from left pin to right, 4) starting from left bank, measure and record elevation by station using topcon lazer level, progressing from left to right, taking elevation and station measurements at each change in topography, and recording in tabular format. Survey elevations are tied into existing project elevation benchmarks to provide true elevational basis. Data is tabulated into excel worsheets, corrected. and plotted per standard graphing procedures.

Milestone Title	Start Date	End Date	Status	Milestone Description
E. Monitor water quality (installation/retreival of thermographs)	4/16/2006	3/31/2007	Completed	Continue monitoring of stream and air temperatures at 18 sites on 5 streams. Project areas include McCoy, Meadow, Longley (Bear, Jordan, and Grande Ronde River), and End Creek (End Creek, McDonald Creek, and South Fork Willow Creek). Protocols vary depending on monitoring devices. A combination of data loggers and vemco probes are utilized. Loggers and probes are calibrated in ice baths and tested prior to deployment. Deployment and recording data is programmed and probes are deployed according to invidividual project study plans. Study plans include combination of establishing data collection sites above and below projects areas. Data loggers collect data year round, while vemco probes are deployed during May 15 - Oct 15. Data is downloaded annually, sorted in Access data bases, uploaded onto CTUIR, DNR Fish and Wildlife Program website, and incorporated into project reports.
F. Collect groundwater data	4/16/2006	3/31/2007	Completed	Data collection includes manually measuring groundwater elevations using a graduated rod specifically fabricated for the purpose (e.g, 16 foot, 1 inch pvc pipe, inscribed every 1/10th of an inch. Measuring rod is inserted into well to top of groundwater surface. Water surface is indicated by audio response. Depth is recorded from top of groundwater surface to top of groundwater well pipe and recorded to nearest 0.05 of an inch on groundwater monitoring data sheet. Data is collected from 55 Meadow Creek wells, biweekly. Every 2 weeks, data is tabulated into master excel spreadsheet (soon to be converted to Access) and graphs are updated to illustrates groundwater elevations over time. 3 automated recorders have been installed in the Meadow Creek groundwater well network by OSU to provide continuous groundwater elevation data. This data will be utilized to correct bi-weekly data and to populate a groundwater elevation model currently under development for the McCoy Meadows Restoration Project.
G. Collect fish population data	7/3/2006	3/31/2007	Completed	Juvenile fish population studies have been initiated by the CTUIR (under this project and #199800703, CTUIR Facility Operaitons and Program Monitoring and Evalaution for Grande Ronde Spring Chinook and Summer steelhead) on the End Creek Restoration Project. CTUIR also participates in studies in cooperation with ODFW. Methodolgies and study designs are thoroughly described in the above project. Methologies for juvenile fish population studies include establishing fix and/or randomized sampling sites, conducting 60-100 meter sampling reaches, conducting fish depletion electrofising, recording fish captured by species, size, and condition, and recording habitat values using methods described by Moore/Hankin and Reeves. Data is tabulated in excel spreadsheets, and rearing densities are calculated using statical analysis.

Milestone Title	Start Date	End Date	Status	Milestone Description
H. Secure aerial photography	4/16/2006	3/31/2007	Completed	Subcontract/secure services for low elevation aerial photography on large channel restoration projects, as necessary. Aerial photography has proven highly useful for presenting project accomplishments and providing long-term monitoring tools. During project reporting period, we are anticipating the availability of 2005 color aerial photography in seamless coverages, available by USGS quadrangle. The project will secure electronic versions of Subbasin USGS quadrangles for use in reference reach studies, project planning and design, and monitoring.
Deliverable: I. Complete data collection		3/31/2007	Completed	*See the Deliverable Specification above*

N: 162. Analyze/Interpret Data

Title: Analysis and Interpret M&E Data

Description: Includes tabulation and organization of raw data (data input into spreadsheets, access data bases, graphing, photo albums), evaluation and analysis, and synthesis into adaptive management.

Planned Metrics:
* R, M, and E Focal Area :
* Primary R, M, and E Type :
* Secondary R, M, and E Type :

Deliverable Specification:

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Upload digital photo points, organize photo albums,	7/14/2006	2/9/2007	Completed	Visual observations can help managers track changes in habitat conditions from selective actions.
B. Tabulate and analyze vegetation data	6/19/2006	12/15/2006	Completed	Data is tabulated and summarized in excel spreadsheets and presented in graphs (bar, scatter) and pie charts.
C. Analysis of channel morphological and habitat data.	10/2/2006	12/29/2006	Completed	Channel longitudinal and cross section data is downloaded into excel spreadsheets and summarized in graph form.
D. Download thermograph data, enter into access database, and graph data	11/1/2006	1/5/2007	Completed	Our current data analysis involves visually displaying data in graphic form, under various scenarious to detect changes in thermal refuge, diurnal and seasonal water temperature flucuations, and average summer maximum, minimum, and average water temperature for study area streams.
E. Tabulate and evaluate groundwater data	4/3/2006	3/30/2007	Completed	Data is collected manually and tabululated into excel spreadsheet. Well data is plotted over time by elevation in relation to meadow surface.
F. Analysis fish population data from project area streams	8/7/2006	11/17/2006	Completed	Data is tabulated and summarized in excel and presented as fish/square meter or fish/100 square meter of habitat.
G. Secure aerial photography	4/3/2006	3/30/2007	Completed	Aerial photography is useful in large channel restoration projects to provide a visual record of changes over time. Aerial photography is also utilized to provide baseline maps that can be overlayed to survey grade topography themes.
Deliverable: H. Complete data analysis and interpretation		3/30/2007	Completed	*See the Deliverable Specification above*

Produce Pisces Status Reports

Quarterly Pisces reports were prepared generally on schedule and reviewed and accepted by the BPA project COTR. These reports provide a regular update on project progress on status of work elements and associated milestones.

O: 185. Produce Pisces Status Report

Title: Quarterly Status Reports for BPA

Description: The Contractor shall report on the status of milestones and deliverables in Pisces. Reports shall be completed quarterly. Additionally, when indicating a deliverable milestone as COMPLETE, the contractor shall provide metrics and the final location (latitude and longitude) prior to submitting the report to the BPA COTR.

Planned Metrics: <None>

Deliverable Specification:

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Apr-Jun 2006	7/1/2006	7/15/2006	Completed	
B. Jul-Sep 2006	10/1/2006	10/15/2006	Completed	
C. Oct-Dec 2006	1/1/2007	1/15/2007	Completed	
D. Final Status Report	3/24/2007	3/31/2007	Completed	

Produce Annual Report

Annual reports provide updates on project progress on an annual basis and follow standard BPA formatting.

P: 132. Produce (Annual) Progress Report

Title: Annual Reporting CTUIR GR Subbasin Restoration Project

Description: Prepare and submit FY06 annual report describing program accomplishments. Post on BPA website and distribute to project partners.

Planned Metrics: <None>

Deliverable Specification: Annual Report content and formatting specifications can be found at:
http://www.efw.bpa.gov/Integrated_Fish_and_Wildlife_Program/ReportingGuidelines.pdf

Final versions of annual/technical reports should be submitted electronically, preferably as a portable document format (pdf) file, in one of the following ways:
1. Upload on-line (60MB maximum file size).
2. Copy to a CD or other portable storage device for mail or hand delivery (recommended for non-pdf files and documents over 60MB).
3. Attach to an email (for documents under 5MB).
Other periodic reports (monthly, quarterly, etc.) should be submitted either by email or, for large documents, by CD.

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Submit draft of FY06 report to BPA	1/1/2007	3/31/2007	Active	Annual report describing program accomplishments submitted to BPA COTR for review via e-mail.
B. Upload FY06 report to BPA's website.	3/1/2007	3/31/2007	Active	Upload annual report describing program accomplishments to BPA's website.
Deliverable: C. Complete FY06 annual report		3/31/2007	Active	*See the Deliverable Specification above*

Habitat Restoration Project Overview & Results

The following sections provide an overview of accomplishments for the End Creek and Meadow Creek Restoration Project that were implemented during the reporting period. Project Completion Reports can be viewed on the GRMW's Website at the following link: **http://www.grmw.org/projects/grmw-projects/grmw_project_examples.shtml**

END CREEK RESTORATION PROJECT

The summer of 2006 culminated in the successful implementation of three consecutive phases of the End Creek Restoration Project located in the northwest Grande Ronde Valley within the Grande Ronde Subbasin of eastern Oregon. The project was developed and implemented by the landowners, Oregon Department of Fish and Wildlife (ODFW), Natural Resource Conservation Service (NRCS), Confederated Tribes of the Umatilla Indian Reservation (CTUIR), and several cooperating/funding agencies including the Grande Ronde Model Watershed (GRMW), Bonneville Power Administration (BPA), and Oregon Watershed Enhancement Board (OWEB). This report provides an overview of the project purpose, existing conditions and limiting factors, project goals and objectives, accomplishments, and expenditures for the project and fulfills reporting requirements for OWEB and GRMW/BPA.

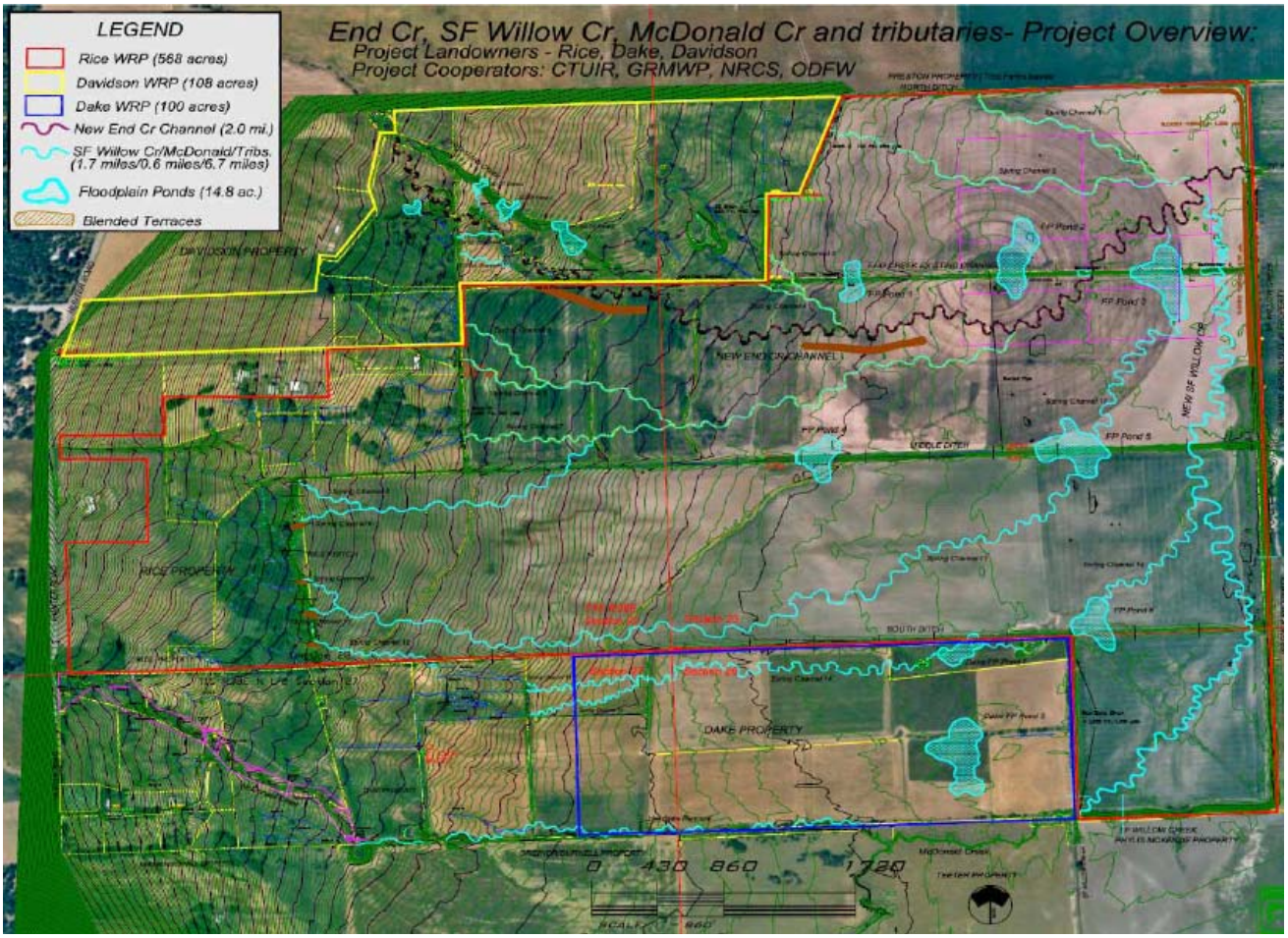
The project was funded by multiple agencies through several grants and funding sources, including GRMW/BPA, NRCS - Wetland Reserve Program (WRP), ODFW, and CTUIR. The NRCS was the lead agency for administering the WRP with ODFW and CTUIR contributing to securing cost-share funding, planning and design, permitting, construction contract and field administration, maintenance, and monitoring/evaluation.

The End Creek Project complex encompasses approximately 777 acres within three contiguous private land parcels, 1.13 miles of End Creek, 1.06 miles of the South Fork Willow Creek, 0.65 miles of McDonald Creek, and several spring-fed tributaries in the Willow Creek Watershed. BPA and OWEB funding was utilized on the Rice portion of the project involving about 450 acres of the project, lower End Creek, South Fork Willow Creek, several spring channels, floodplain ponds, and ditch reclamation. Project accomplishments are illustrated in the following figure:

Table 5 End Creek Restoration Project Accomplishments

PROJECT ACTION	PROJECT METRICS
Restoration Channel Construction **--End Creek** **--South Fork Willow Creek**	 7,708 feet 3.1 miles 8,659 feet
Spring Channel Construction	28,142 feet 5.33 miles total
Rock Cross Vanes	20 structures (vertical grade control in restoration channel)
Rootwad Revetments	121 structures (20 complexes along approx 960 feet of outside streambank meanders). Note: one structure is a footer log and rootwad with tree bole.
Woody Debris Additions	200 pieces large woody debris placement on Willow Creek restoration channel. Woody debris included 8-12 inch diameter, 10-20 foot length pieces placed in log jam configuration to enhance channel roughness and habitat complexity.
Channel/Ditch and Terrace Reclamation	21, 542 feet 4.08 miles
Floodplain Ponds/Backwater Habitat	6 ponds (10 acres) & 2 backwater habitats (End Creek & South Fork Willow Creek)
Blended Earthen Terraces	3,590 feet (0.68 miles) of low elevation terraces to control floodflow and protect adjacent private lands
Revegetation and Planting	Completed site preparation and seeding on 430 acres (ground-based and aerial application of 7,200 pounds native seed). Installed 12,650 sedge rush plugs. Mechanically installed 60 willow shrubs and approximately 5,180 square feet of sedge/rush matts. Additional planting and weed control planned for 07' and 08'.
Culvert Removal/Relocation	5 culverts removed, two reinstalled on access roads.

Figure 4 End Creek Restoration Project Overview



Project construction was initiated in late June with major construction on the Rice portion of the project area completed by October. During October through late November, an additional project phase involving construction of approximately 0.5 miles of the upper End Creek restoration channel, reclamation of channelized stream reaches, and construction of floodplain ponds was completed through a separate OWEB grant and NRCS WRP restoration fund on the Davidson property within the project complex. The final project component, located on the Dake property in the southern portion of the project complex, will be constructed during 2007 using NRCS WRP and GRMW/BPA funds. Planned actions for the project in 2007 include construction of additional stream channels along McDonald Creek, installation of two additional floodplain ponds, ditch reclamation, planting, weed control, irrigation system operation, other maintenance needs, and monitoring/evaluation.

Following are a series of project photographs that provide a visual overview of the End Creek Restoration Project. Additional photos and photo points are contained in the referenced project completion report.

Upstream reach of End Creek (Rice) Restoration Channel, viewing east (downstream) towards South Fork Willow Creek confluence. Note reclaimed channelized reach in left corner of photo and floodplain ponds incorporated into reclamation plan. December 2006

Upstream view of upper End Creek restoration channel. December 2006

Lower End Creek Restoration Channel with floodplain pond in middle foreground. December 2006

Floodplain pond with spring channel outlet. December 2006

March 2007 – End Creek project complex illustrating spring high flow conditions.

March 2007- End Creek project complex illustrating South Fork Willow Creek restoration channel during spring high flow conditions.

MEADOW CREEK RESTORATION PROJECT

The Meadow Creek Restoration Project, a component of the McCoy Meadows Ranch Restoration complexlocated in the Upper Grande Ronde Subbasin, was implemented during the summer of 2006. The project was developed and implemented by the landowners Mark Tipperman and Lorna Williamson, Natural Resource Conservation Service (NRCS), Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Oregon Department of Fish and Wildlife (ODFW), and cooperating/funding agencies including the Grande Ronde Model Watershed (GRMW) and Bonneville Power Administration (BPA).

The project was funded through two grants under the GRMW/BPA fish habitat program and NRCS Wetland Reserve Program (WRP). The NRCS was the lead agency for administering the WRP with CTUIR and ODFW contributing to securing cost-share funding, planning and design, permitting, construction contract and field administration, maintenance, and monitoring/evaluation through BPA's fish and wildlife program. The Meadow Creek project encompasses approximately 144 acres within the 450 McCoy Meadows Wetland Reserve Program perpetual conservation easement. Project construction was initiated in early July 2006 and completed by early August 2006. Project accomplishments included:

Table 6 Meadow Creek Restoration Project Accomplishments

PROJECT ACTION	PROJECT METRICS
Restoration Channel Construction	2,800 feet 0.53 miles
Rock Cross Vanes/Graded Riffle Weirs	6 structures (vertical grade control in restoration channel)
Rootwad Revetments	18 structures (2 complexes along approx 200 feet of outside streambank meanders). Note: one structure is a footer log and rootwad with tree bole.
Woody Debris Additions	100 pieces large woody debris placement along 0.3 mile reach of Meadow Creek in log jam configuration to enhance channel roughness and habitat complexity.
Floodplain Ponds/Backwater Habitat	2 ponds (0.3 acres)
Blended Earthen Terraces/Pond Manifold	1,200 feet of low elevation terrace/pond manifold to direct floodflow and or direct water into restoration channel network
Revegetation and Planting	Completed site preparation and seeding on 50 acres (ground-based application of 500 pounds native seed). Installed 2,600 sedge rush plugs and 8,500 live willow cuttings. Mechanically installed 20 willow shrubs and approximately 2,000 square feet of sedge/rush matts. Additional planting and weed control planned for 07' and 08'.

Figure 5 Meadow Creek Restoration Project Vicinity Map

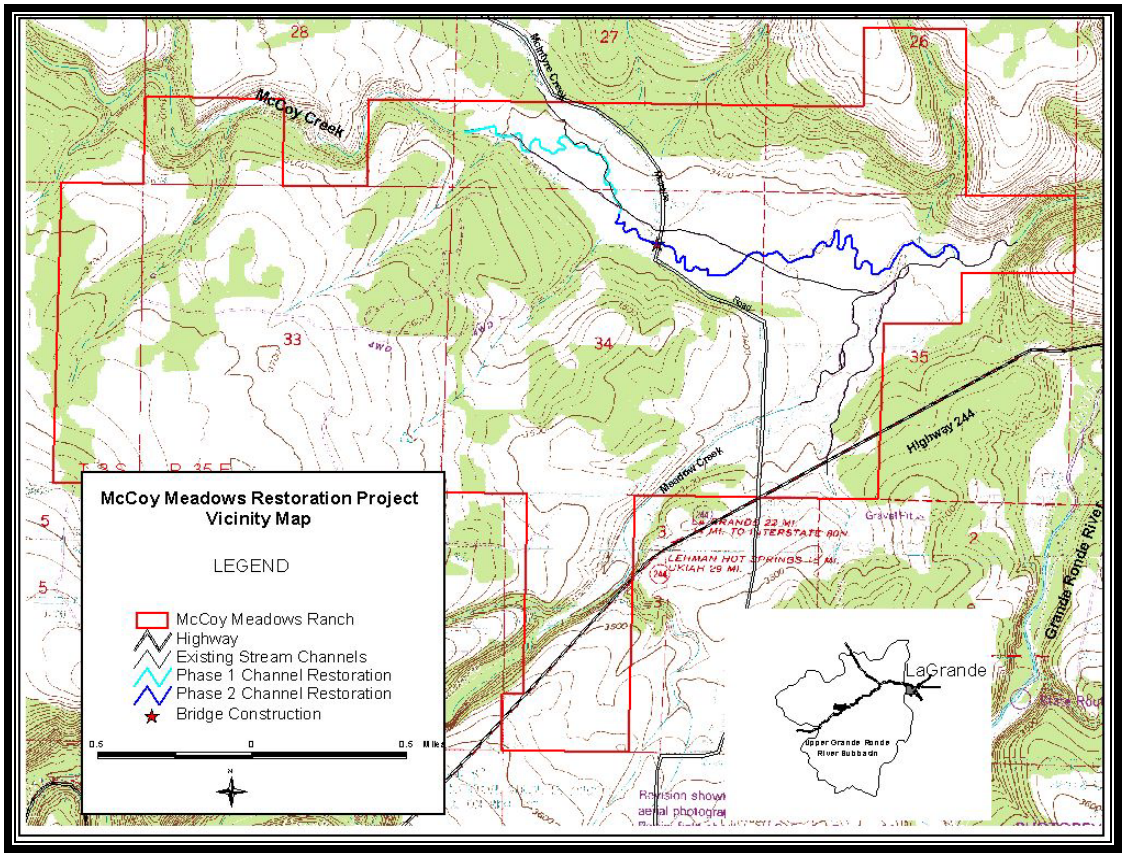
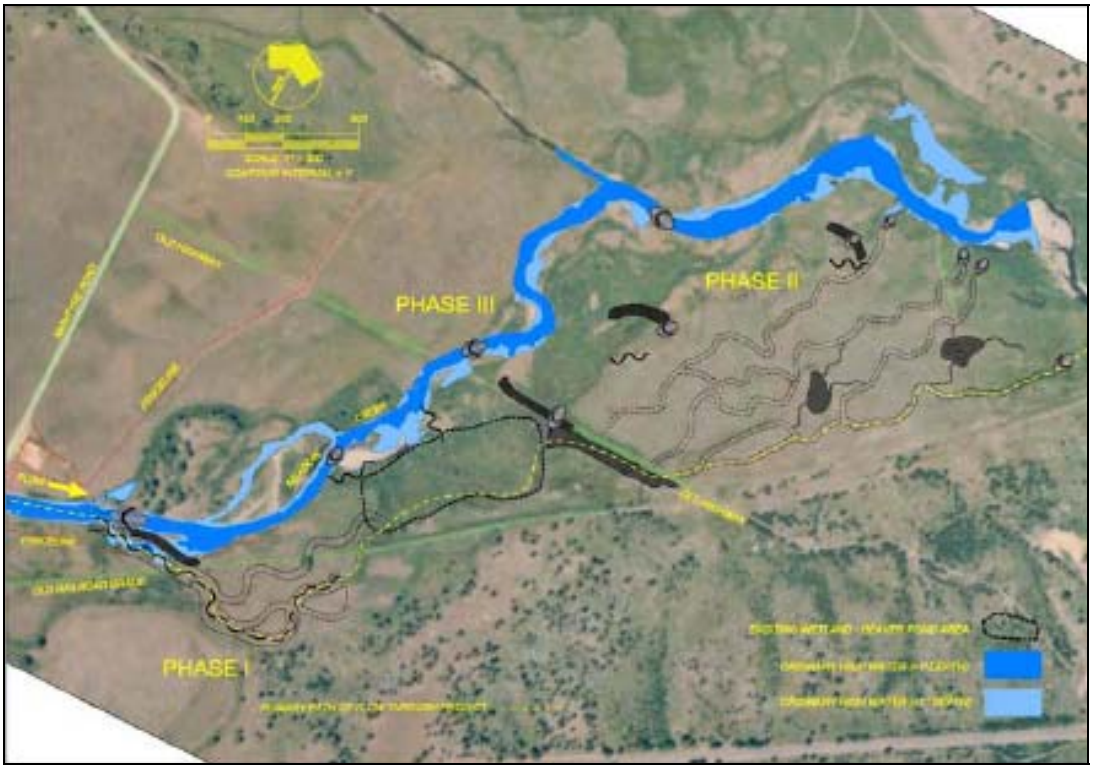


Figure 6 Meadow Creek Restoration Project Overview



May 2000, McCoy Meadows (Meadow Creek Restoration Project Area)

March 2007, McCoy Meadows (Meadow Creek Restoration Project) during spring high flow conditions

March 2007, Meadow Creek Restoration Project – Photo illustrates upper project area and entrance to wetland channel restoration network adjacent to Meadow Creek.

March 2007, Meadow Creek Restoration Project – Photo illustrates upper project area during spring high flow conditions. Note temporary irrigation system installed during summer 2006 to facilitate vegetative recovery.

March 2007, Meadow Creek Restoration Project – Photo illustrates pond manifold developed by taking advantage of an old highway road prism. Manifold is utilized as a water control structure to manage streamflow into wetland restoration network.

March 2007, Meadow Creek Restoration Project – Photo illustrates graded riffle weirs and large wood placement along Meadow Creek.

McCoy Meadows Water Temperature Monitoring

Thermographs were installed to measure water temperature along McCoy and Meadow Creek in 2006. Nine thermographs were deployed in 2006: seven in McCoy Creek, and two in Meadow Creek. McCoy 1 thermograph was placed just upstream of the start of the project reach at river mile 2.7 on McCoy Creek, with McCoy 8 placed downstream of the project at the mouth of McCoy Creek, and others in between in descending order. Thermographs at Meadow Creek were in the upper portion of Meadow Creek at river mile 2.9 (Meadow 1) and below the junction of McCoy Creek with Meadow Creek at river mile 1.5 (Meadow 2). Air temperature was not measured in 2006. Average seven day maximum water temperatures were obtained from data collected by the Oregon Department of Environmental Quality from 1993 to 1998, and where used as baseline data to compare with data collected by CTUIR.

Figure 6 McCoy Meadows Thermograph Locations

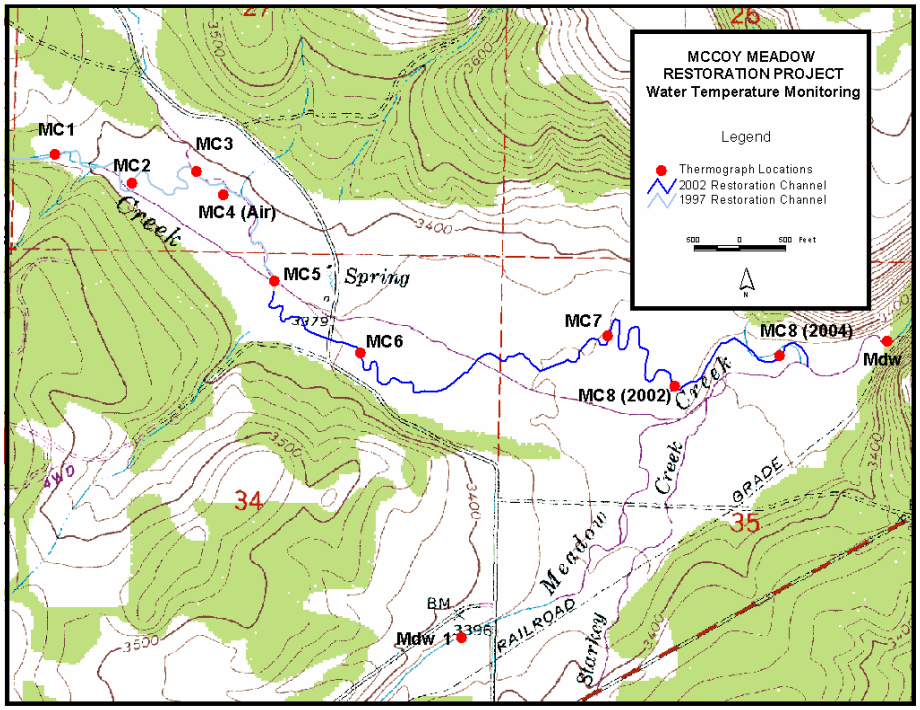


Table 7 McCoy Meadows Average 7 Day Maximum Water Temperatures

Table illustrates average 7 day maximum water temperatures from 1993 to 2006 taken at McCoy 1 through McCoy 8, and Meadow Creek 1 and 2. Data from 1993 to 1998 collected by ODEQ.

Year	McCoy 1	McCoy 2	McCoy 3	McCoy 5	McCoy 6	McCoy 7	McCoy 8	Meadow 1	Meadow 2	McCoy Air
1993	25.8						24.8		25.3	
1994	27.2						27.3		27.3	
1995	26.5						27.4		26.4	
1996	27						27.1		25.8	
1997	27	26.9	23.9				28.4		25.4	
1998	28.5	28	27.8	27.1					27.5	
2002	22.4	23.8	22.1	25.4	16.9	25.6	26.7	25.5	28.1	29.6
2003	27.2	28.5	25.5	29.0		26.6			27.9	34.3
2004	25.5	26.8	24.9	26.2	26.3	26.4	26.5	29.1	29.7	31.9
2005	24.6	26.3	25.6	27.4	26.5	26.1	25.6	29.6		
2006	27	28.4	25.9	27.9	27.8	26.5	27.3	30	30	

Daily maximum and minimum water temperatures were also taken by ODFW in 1997 for McCoy 1 and McCoy 8 locations. McCoy 1 had an average 7 day maximum temperature of 24.0, and McCoy 8 had an average 7 day maximum temperature of 22.8. Discrepancies in temperatures from ODEQ and ODFW are a result of thermographs being placed in different sections of the creek (pools versus riffles).

A comparison of ODEQ and CTUIR data does not show significant changes in water temperature in McCoy and Meadow Creeks, although cold water inputs from groundwater have been detected as indicated above. For example, 1997 data for McCoy 1 and McCoy 3 show a 3.1 degree Celsius decrease in the upper bracketed reach. Similar results were detected through 2006 as well. Monitoring sites in lower McCoy Creek consistently detect increased water temperatures, indicating thermal loading. High temperatures at Meadow Creek in 2006 may have been a result of disturbance caused by channel work that August.

Figure 7 McCoy Meadows average 7 day maximum water temperatures

Average 7 day maximum water temperatures from 1993 to 2006 taken at McCoy 1 through McCoy 8, including air temperature from 2002 to 2004. 1993 to 1998 data from ODEQ.

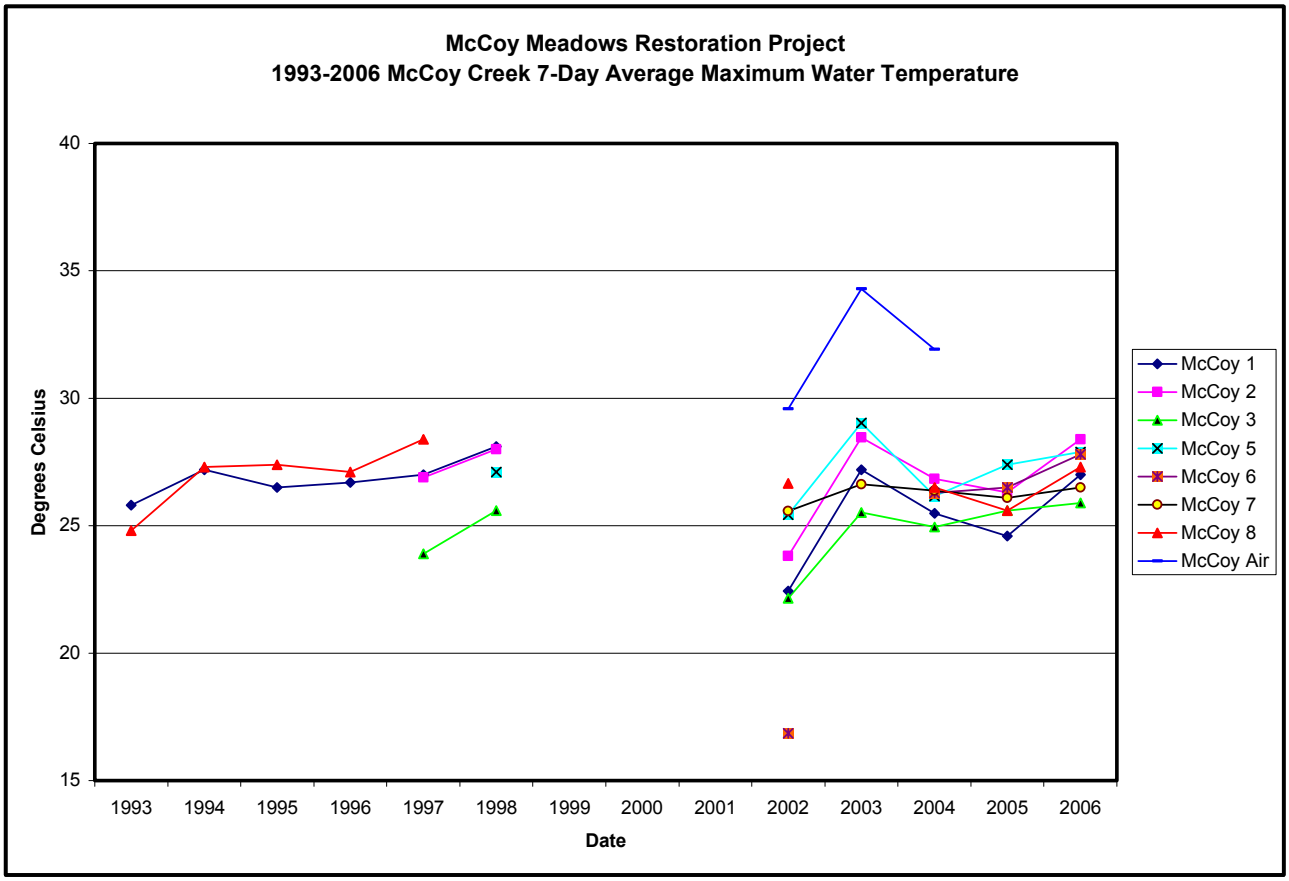
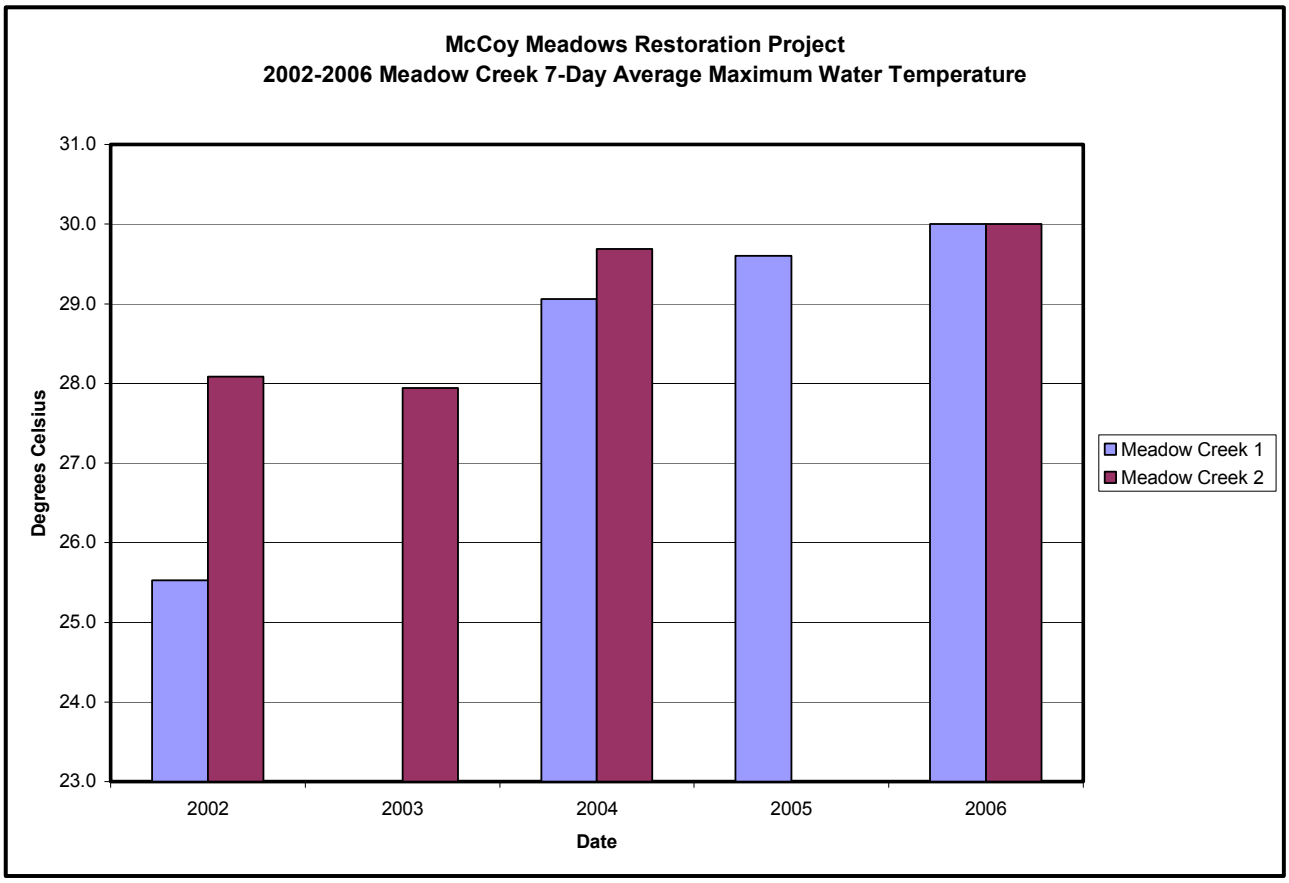


Figure 8 McCoy Meadows average 7 day maximum water temperatures

Average 7 day maximum water temperatures from 2002 to 2006 taken at Meadow Creek 1 and 2.



Groundwater Monitoring Wells

Monitoring of groundwater elevations has been employed on several meadow restoration projects to provide data on the response of groundwater elevations in relation to restoration stream channel construction. Projects such as McCoy Meadows and Longley Meadows were initiated to address past practices associated with channelization and draining of wetlands. The effects of these practices resulted in development of deeply incised stream channels and corresponding lowering of the water table. Key objectives of these restoration projects are to improve floodplain connectivity, elevate the thalweg of the stream closer to the meadow surface elevation, and improve/restore groundwater storage. In theory, the restoration strategies could result in elevated groundwater elevations, increased water storage, and improvement in late season flow conditions and cold water habitats. Groundwater monitoring in conjunction with water temperature monitoring can help understand the effects of these types of projects. Our monitoring efforts to date have included installation of 39 wells on McCoy Meadows and 16 wells on Longley Meadows.

The following figure shows groundwater elevations of the wells measured at McCoy Creek and Meadow Creek during 2006. Many of these wells go dry in the summer, several wells are dry most of the time. In August 2006, Meadow Creek channel was altered, which corresponded with a rise in the water elevation across all wells.

Figure 9 McCoy Creek Groundwater Well Data during 2006.

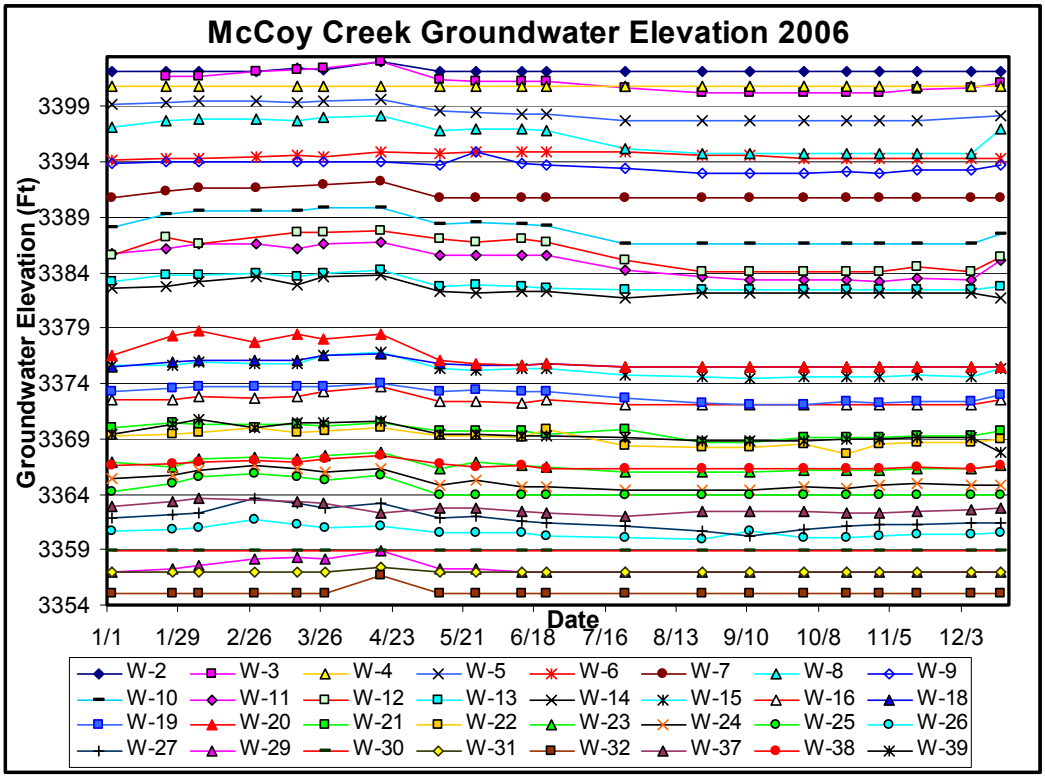


Figure 10 McCoy Creek Groundwater Well Monitoring Locations

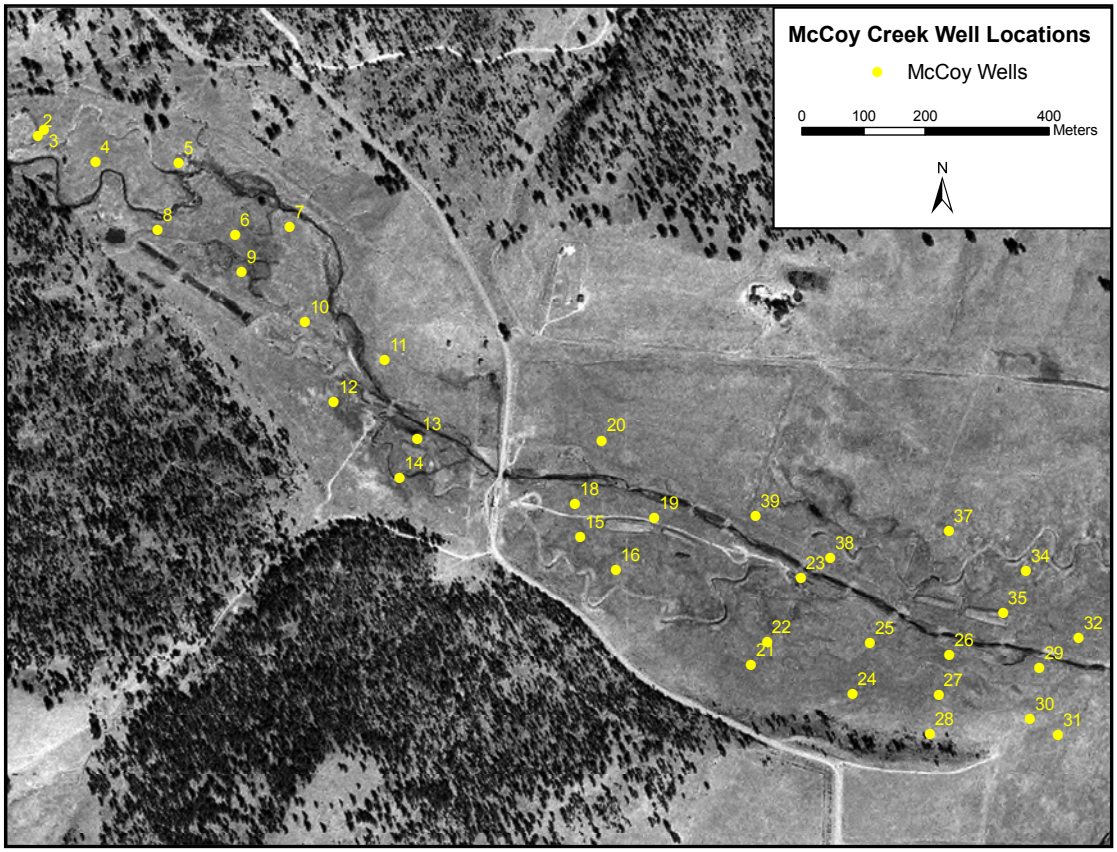
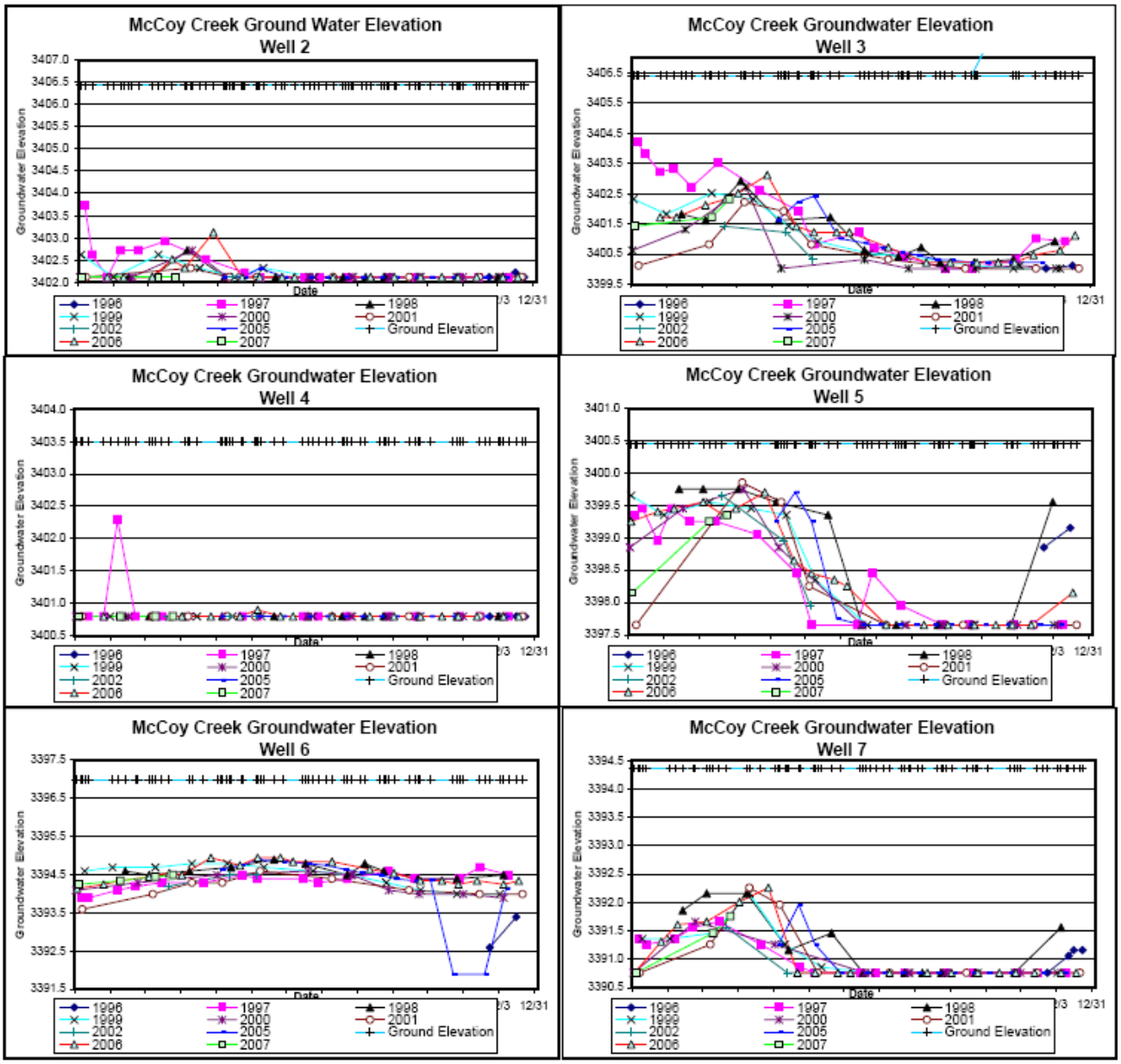


Figure 11 McCoy Creek Groundwater Well Data (Wells 2-7)



Groundwater monitoring data in the middle reaches of the McCoy Creek restoration channel illustrate the effects of channel incision incurred following several high flow events in the vicinity of the new bridge located on the McIntyre Road. Resulting channel incision and lowered groundwater elevations have affected hydrophytic plant recovery and is limiting achievement of overall project objectives. CTUIR, ODFW, and NRCS are conducting additional evaluation to development an action plan to address shortcomings of the original project design, which did not sufficiently address issues associated with concentrated water flow through the road prism, a likely oversizing of channel dimension, and elevated stream gradient which all contributed to excess energy being focused on the stream channel thalweg and adjacent streambanks. Planning is currently underway with the objective of initiating improvements during 2008-2009.

Figure 12 McCoy Creek Groundwater Well Data (Wells 8-15)

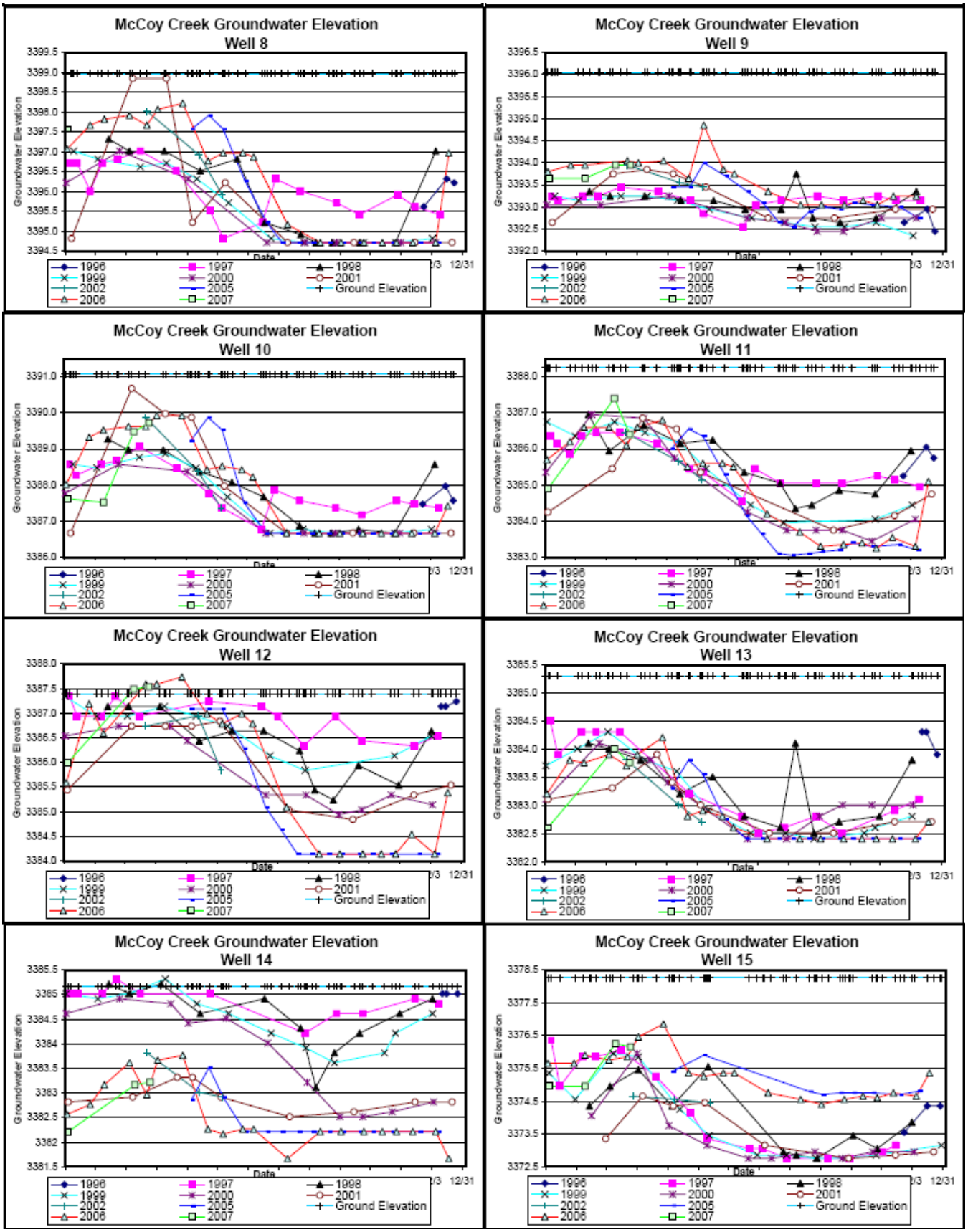


Figure 13 McCoy Creek Groundwater Well Data (Wells 16-23)

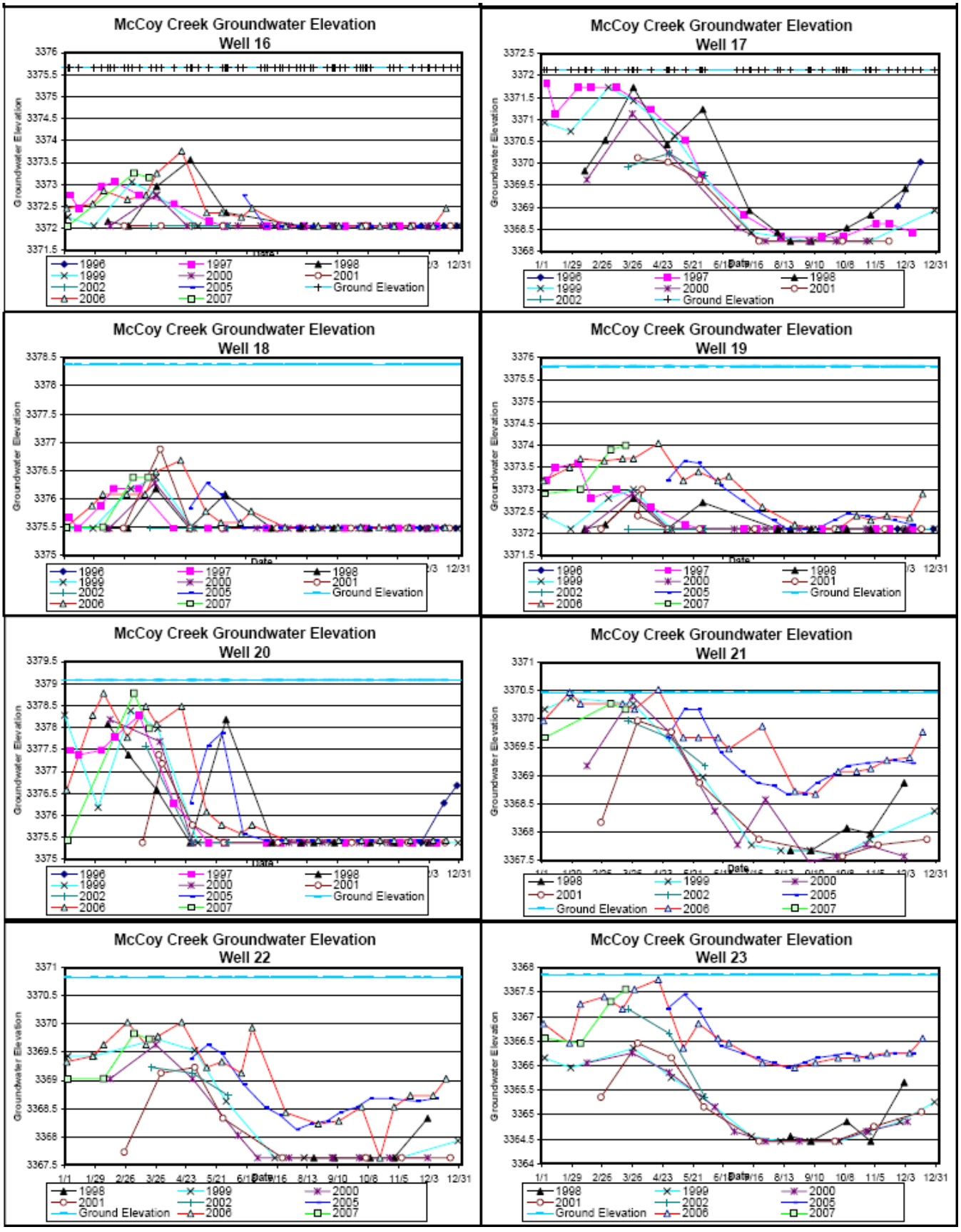


Figure 14 McCoy Creek Groundwater Well Data (Wells 24-31)

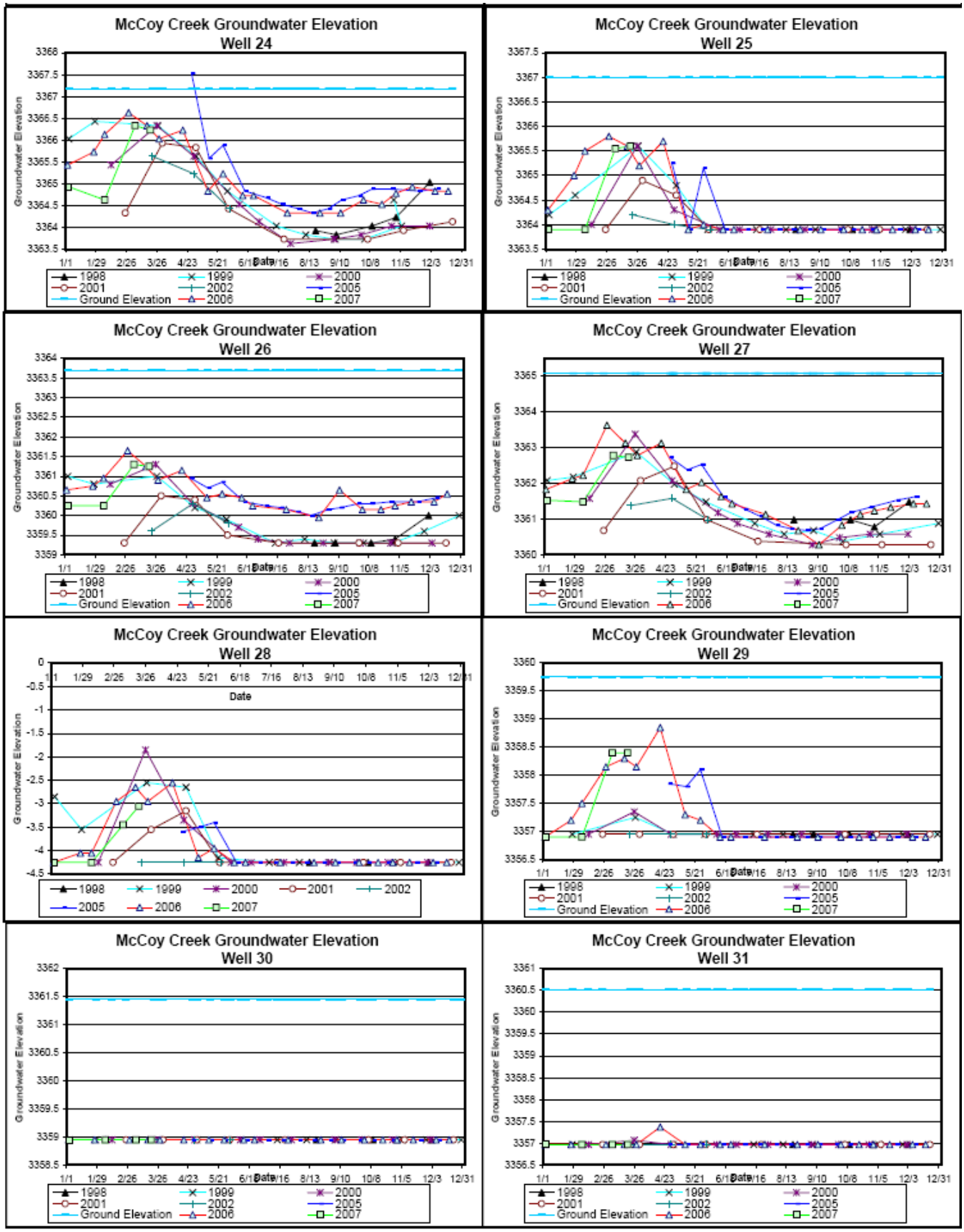


Figure 15 McCoy Creek Groundwater Well Data (Wells 32-39)

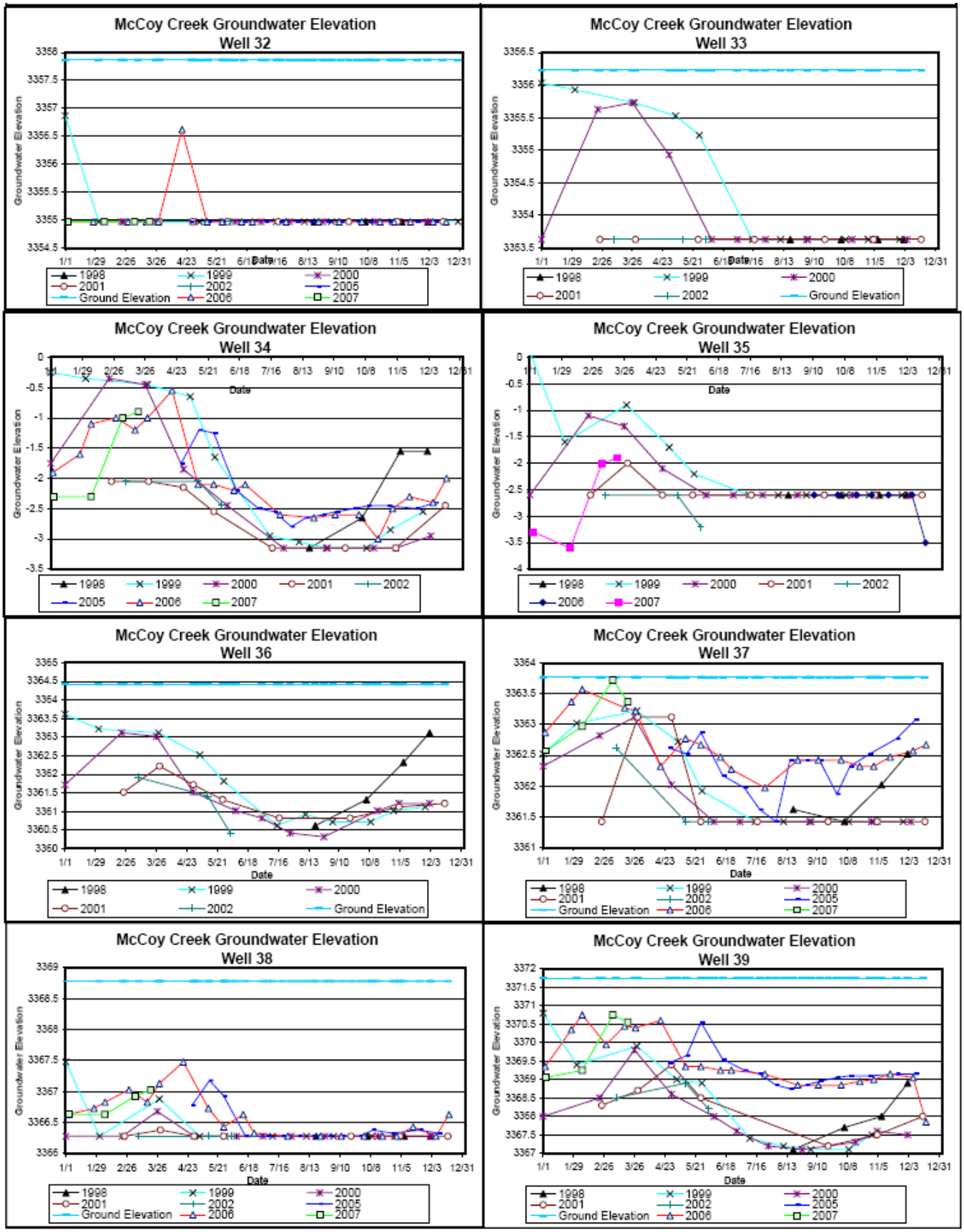


Figure 16 Meadow Creek Groundwater Monitoring Well Locations

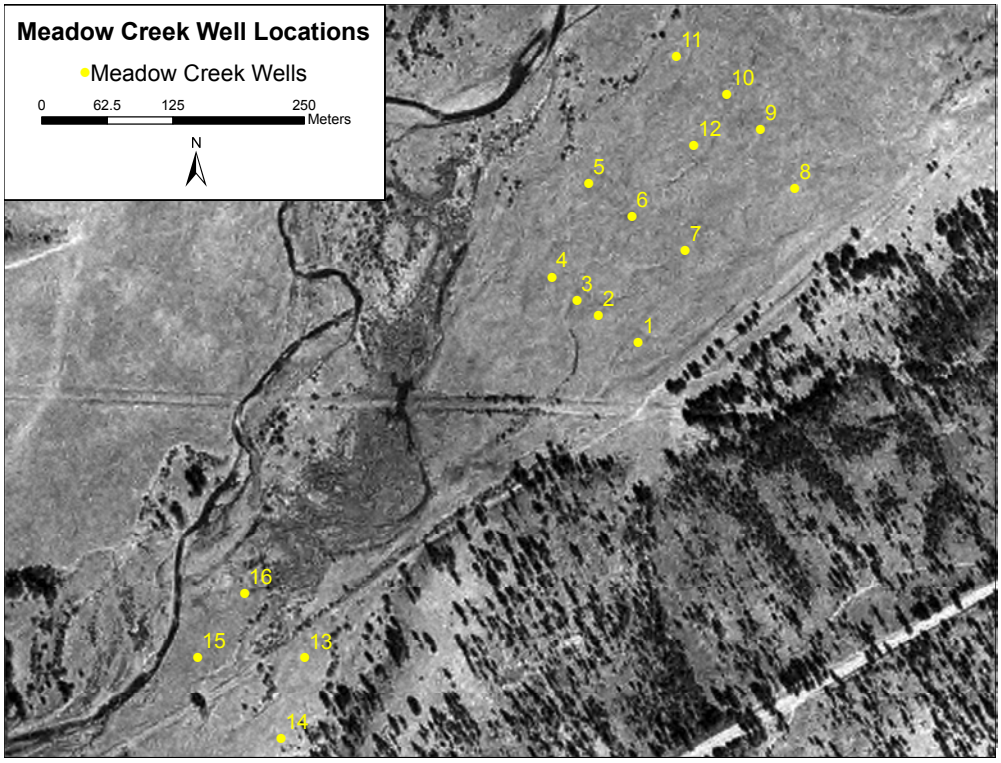


Figure 17 Meadow Creek Groundwater Monitoring Well Data From 2006

Meadow Creek channel was restored on August 15, 2006, shown by the vertical line. Note the increase in groundwater elevations following channel activation for all monitoring wells.

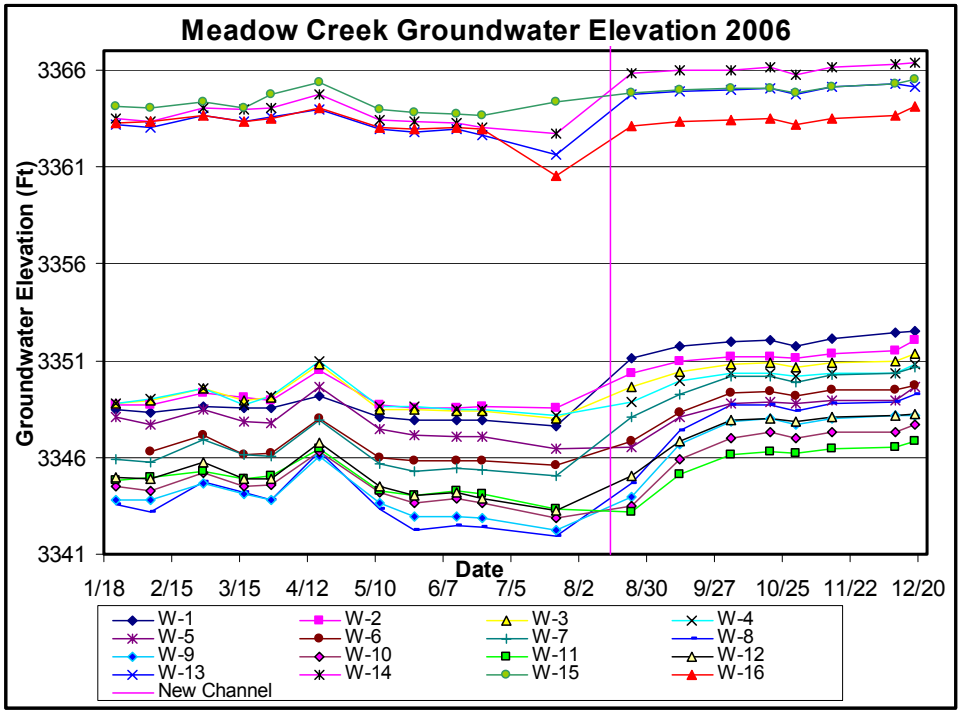


Figure 18 Meadow Creek Groundwater Well Data (Wells 1-8)

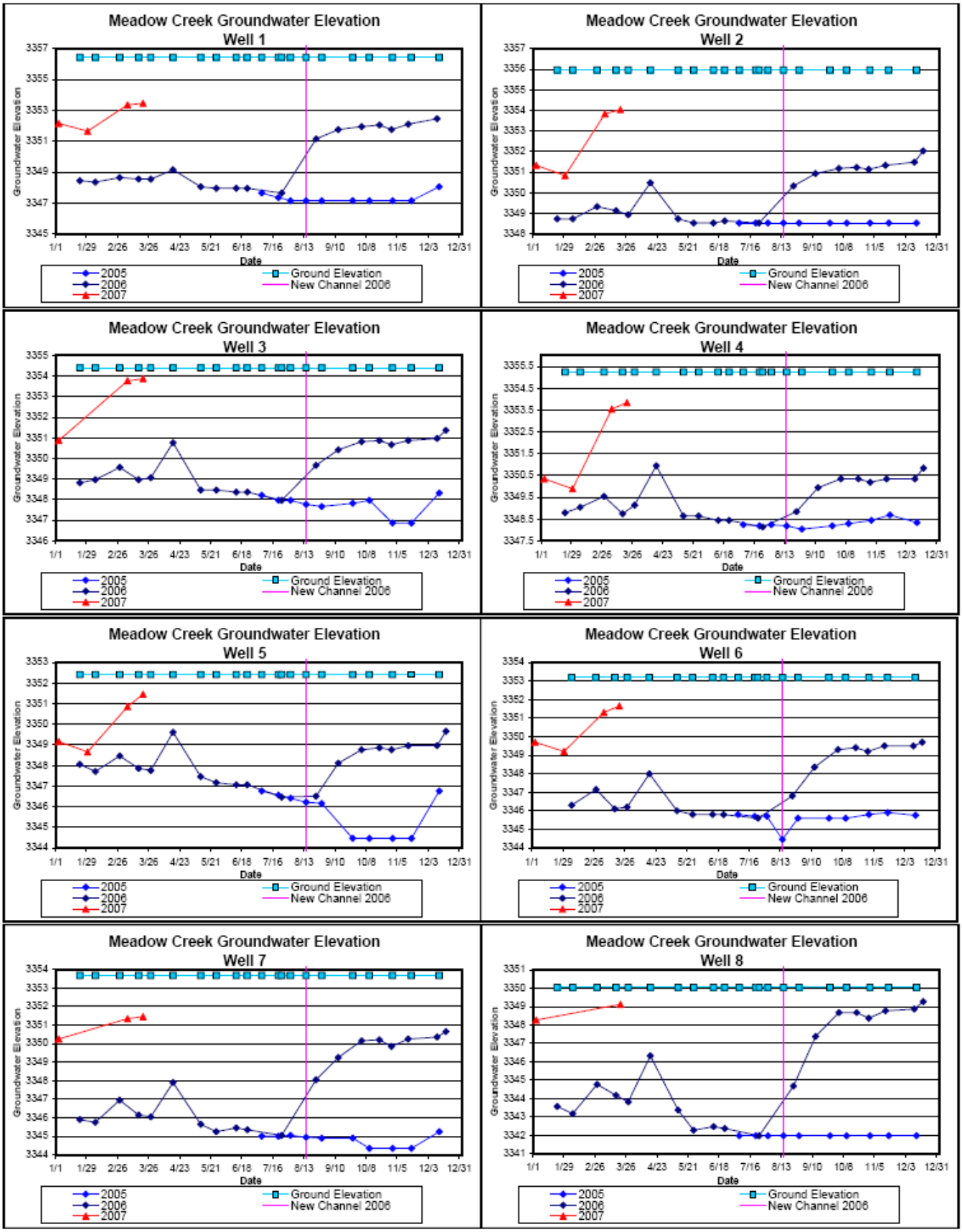
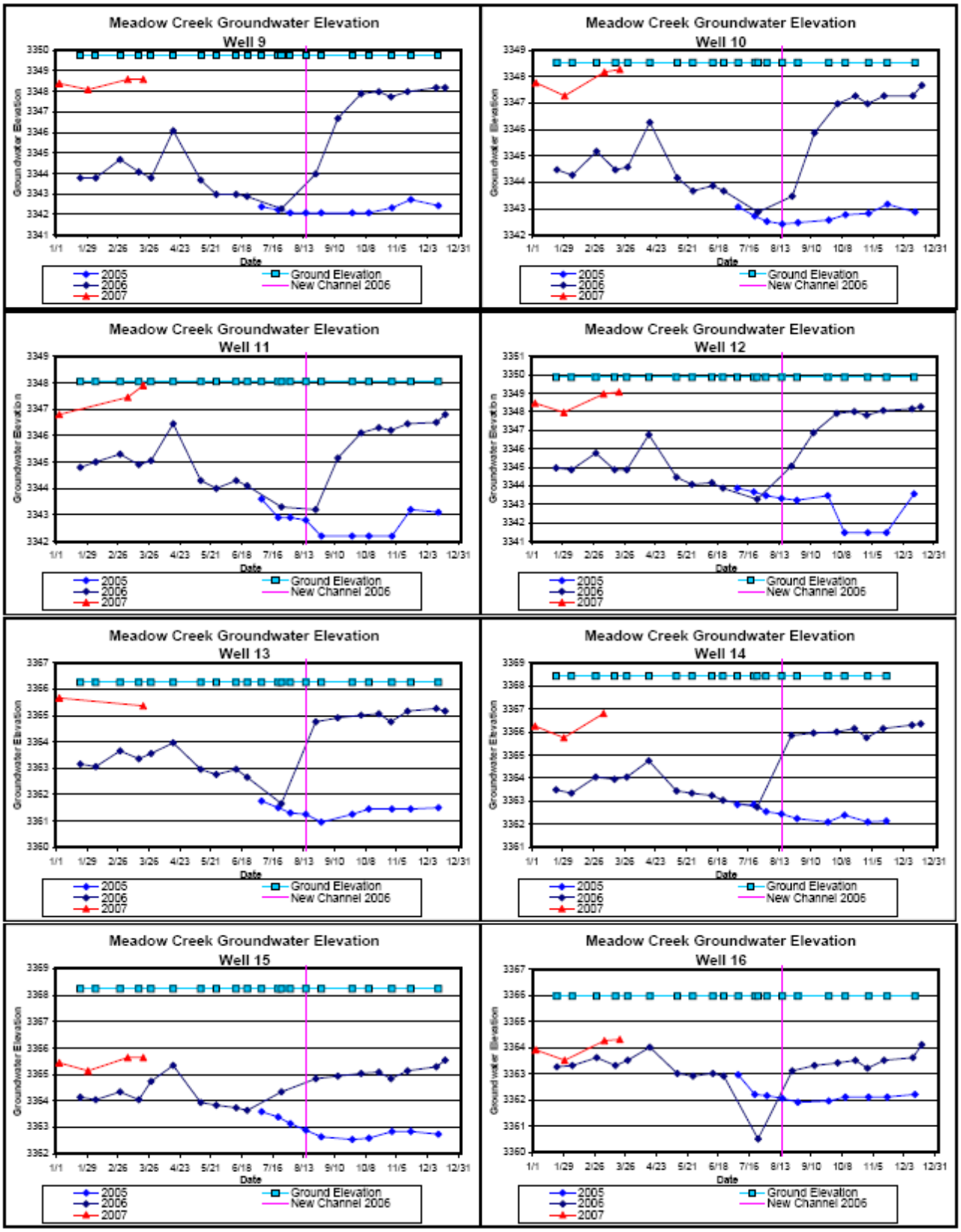

Meadow Creek Groundwater Elevation
Well 1
Groundwater Elevation
Date
2005
2006
2007
Ground Elevation
New Channel 2006
Meadow Creek Groundwater Elevation
Well 2
Groundwater Elevation
Date
2005
2006
2007
Ground Elevation
New Channel 2006
Meadow Creek Groundwater Elevation
Well 3
Groundwater Elevation
Date
2005
2006
2007
Ground Elevation
New Channel 2006
Meadow Creek Groundwater Elevation
Well 4
Groundwater Elevation
Date
2005
2006
2007
Ground Elevation
New Channel 2006
Meadow Creek Groundwater Elevation
Well 5
Groundwater Elevation
Date
2005
2006
2007
Ground Elevation
New Channel 2006
Meadow Creek Groundwater Elevation
Well 6
Groundwater Elevation
Date
2005
2006
2007
Ground Elevation
New Channel 2006
Meadow Creek Groundwater Elevation
Well 7
Groundwater Elevation
Date
2005
2006
2007
Ground Elevation
New Channel 2006
Meadow Creek Groundwater Elevation
Well 8
Groundwater Elevation
Date
2005
2006
2007
Ground Elevation
New Channel 2006

Figure 19 Meadow Creek Groundwater Well Data (Wells 9-16)



SUMMARY AND CONCLUSIONS

Project development and implementation under this project progressed well through FY2006 with completion of two large fish habitat and wetland restoration projects completed. Habitat development on all projects is generally resulting in improving trends in riparian and wetland conditions, instream fish habitat, water quality, and groundwater/hyporeic exchange.

The project continues to provide technical, administrative, and construction/implementation support to the GRMW, landowners, and other agencies to develop and implement projects. Technical support is provided through the GRMW Board of Directors and Technical Committee and by assisting others with technical needs on potential projects, including developing project opportunities, assisting landowners with meeting their objectives, conducting field surveys and baseline investigations, identifying and securing cost-share funding, and developing documentation for various environmental compliance and permit needs. Part of the strength of this project is its' ability to work cooperatively with co-managers which facilitates opportunities to develop consistent strategies, share responsibilities associated with project planning, design, implementation, and monitoring/evaluation, and provides a forum in which to solicit and secure multiple cost share project options. Landowner incentive programs administered by the Department of Agriculture through NRCS (Wetland Reserve Program, Conservation Reserve and Enhancement Program), for example, have generated considerable interest in the Subbasin by large private landowners that might otherwise not be interested in conservation programs and/or habitat restoration opportunities. Several past and proposed CTUIR-BPA and co-manager sponsored have been successfully linked to these programs which provides significant opportunities to protect and restore habitat and leverage cost-share funds through other funding sources (EPA, OWEB, NAWCA, BMRC, etc). In addition, these cooperative inter-agency relationships provide opportunities to jointly develop project-specific objectives, strategies, and techniques, brings in specialized expertise such as engineers, fluvial geomorphologists, and biologists, and spreads the workload associated with Subbasin restoration and enhancement projects.

Formal staff training and application of practical experience contributes to well developed approach to project planning, design, and implementation. Working in a cooperative, interdisciplinary team approach with GRMW, ODFW, and NRCS has increased credibility with landowners and other resource managers in the basin and led to development of additional project opportunities on private lands. By teaming with project partners, the CTUIR is an integral part of an effective restoration team. Several examples stand out which are testimony to the effectiveness of this cooperative approach, including the Wallowa (McDaniel) Restoration Project (BPA Contract No. 18819, GRMWP Project No. 1666, OWEB Project No. 205-095) completed during 2005, the Longley Meadows Restoration Project, which received the 2004 Oregon State Land Board Stream Project Award (see www.oregon.gov/DSL/new/pr0527_stream_award.shtml), and both the Meadow Creek and End Creek Restoration Projects.

Project staff look forward to continuing working with project partners in the basin and achieving notable improvements in watershed conditions, fish and wildlife habitat suitability, and recovery of ESA fish stocks in the Grande Ronde Subbasin.

SUMMARY OF EXPENDITURES

Confederated Tribes of the Umatilla Indian Reservation
Revenue & Expense without Commitments
Fiscal year thru period ending April 30, 2007

488 006 - BPA1996-083-00 McRd 4/06-3/07	Current Month Actual	Year to Date Actual	Total Budget	Budget Variance	% Used
Revenues					
488 006 4010 Grant/Contract Income	(1,721.36)	28,940.09	28,962.52	(22.43)	-99.90
Total Revenues	**(1,721.36)**	**28,940.09**	**28,962.52**	**(22.43)**	**-99.90**
Direct Expenses					
488 006 5000 Salaries & Wages	(888.19)	15,046.66	11,208.39	(3,838.27)	134.20
488 006 5010 Fringe Benefits	(363.16)	3,649.22	3,238.57	(410.65)	112.70
488 006 5101 Travel-Per Diem	0.00	0.00	428.00	428.00	0.00
488 006 5150 Training	0.00	475.00	500.00	25.00	95.00
488 006 5160 Auto Insurance	0.00	0.00	756.00	756.00	0.00
488 006 5190 Vehicle Expense	0.00	1,098.42	2,009.07	910.65	54.70
488 006 5210 Supplies	0.00	0.00	44.98	44.98	0.00
488 006 5225 Materials	0.00	443.60	973.95	530.35	45.50
488 006 5250 Non Capital Equipment	0.00	0.00	446.67	446.67	0.00
488 006 5400 Communications	0.00	325.26	452.08	126.82	71.90
488 006 5410 Postage & Freight	0.00	0.00	0.14	0.14	0.00
488 006 5440 Equipment Rental	0.00	0.00	1.00	1.00	0.00
488 006 5450 Printing & Duplication	0.00	0.00	131.00	131.00	0.00
488 006 5470 Repairs & Maintenance	0.00	0.00	96.01	96.01	0.00
488 006 5770 Professional Services	0.00	0.00	1,050.00	1,050.00	0.00
Sub-Total	**(1,251.35)**	**21,038.16**	**21,335.86**	**297.70**	**98.60**
Pass-through Expenses					
488 006 6300 Capital Equip-Gov't Funds	0.00	0.00	178.00	178.00	0.00
Sub-Total	**0.00**	**0.00**	**178.00**	**178.00**	**0.00**
Cost of Goods Sold					
488 006 8500 Indirect	(470.01)	7,901.93	7,448.66	(453.27)	106.10
Total Expenses	**(1,721.36)**	**28,940.09**	**28,962.52**	**22.43**	**99.90**
Net Difference	0.00	0.00	0.00	0.00	0.00

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Appendix 1

End Creek

PROJECT COMPLETION REPORT

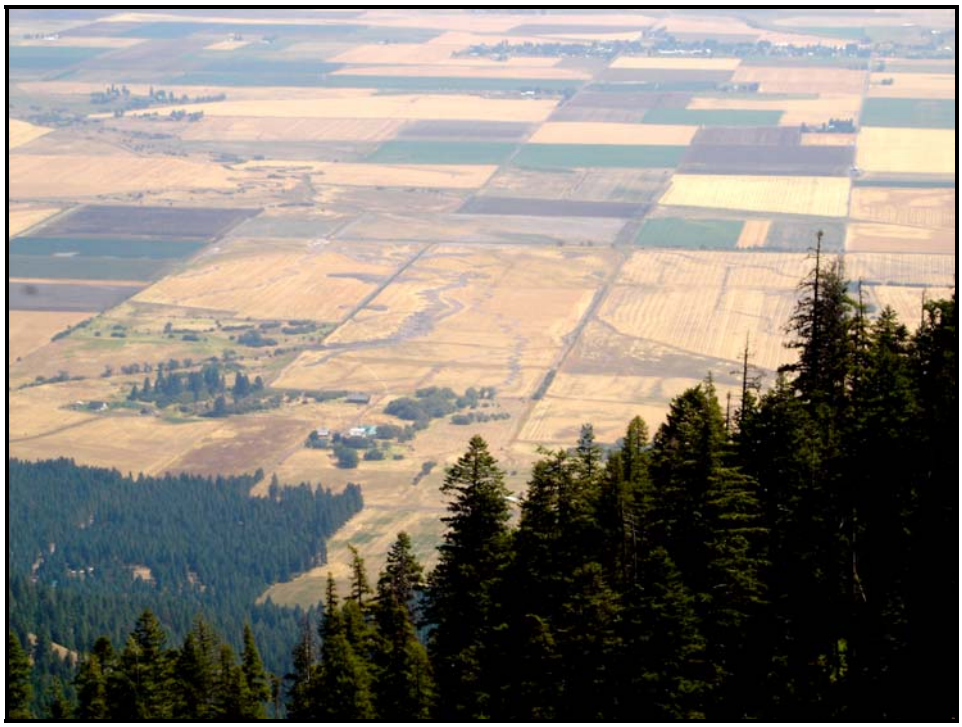
End Creek-Rice Fish Habitat & Wetland Restoration Project

Oregon Watershed Enhancement Board Project No. 204-434

Grande Ronde Model Watershed/Bonneville Power Administration
Project PI 1992-026-01/Contract #00020546

Natural Resource Conservation Service
Rice-Wetland Reserve Program Project # 66-0436-3-040

January 2007



End Creek Restoration Project Complex. Summer 2006 Construction viewing northeast from Grandview Campground atop Mount Emily

Prepared by:

Allen Childs
CTUIR Grande Ronde Subbasin Restoration Project Leader
Fish and Wildlife Biologist

Vance McGowan
ODFW Northeast Oregon Fish Habitat Enhancement Project Leader
Fish Biologist

PROJECT PARTNERS & COOPERATORS

Dr. Joel Rice (Landowner)
Oregon Department of Fish and Wildlife
Natural Resource Conservation Service
Confederated Tribes of the Umatilla Indian Reservation
Oregon Watershed Enhancement Board
Grande Ronde Model Watershed

Confederated Tribes of the Umatilla Indian Reservation
Administrative Summary

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Confederated Tribes of the Umatilla Indian Reservation
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Suggested Citation:

Childs, Allen, B. McGowan, Vance. 2007. End Creek-Rice Fish Habitat and Wetland Restoration Project. Project Completion Report. Confederated Tribes of the Umatilla Indian Reservation.

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1. INTRODUCTION and BACKGROUND

The summer of 2006 culminated in the successful implementation of three consecutive phases of the End Creek Restoration Project located in the northwest Grande Ronde Valley within the Grande Ronde Subbasin of eastern Oregon. The project was developed and implemented by the landowners, Oregon Department of Fish and Wildlife (ODFW), Natural Resource Conservation Service (NRCS), Confederated Tribes of the Umatilla Indian Reservation (CTUIR), and several cooperating/funding agencies including the Grande Ronde Model Watershed (GRMW), Bonneville Power Administration (BPA), and Oregon Watershed Enhancement Board (OWEB). This report provides an overview of the project purpose, existing conditions and limiting factors, project goals and objectives, accomplishments, and expenditures for the project and fulfills reporting requirements for OWEB and GRMW/BPA.

The project was funded by multiple agencies through several grants and funding sources, including GRMW/BPA, NRCS - Wetland Reserve Program (WRP), ODFW, and CTUIR. The NRCS was the lead agency for administering the WRP with ODFW and CTUIR contributing to securing cost-share funding, planning and design, permitting, construction contract and field administration, maintenance, and monitoring/evaluation.

The End Creek Project complex encompasses approximately 776 acres within three contiguous private land parcels, 1.13 miles of End Creek, 1.06 miles of the South Fork Willow Creek, 0.65 miles of McDonald Creek, and several spring-fed tributaries in the Willow Creek Watershed. BPA and OWEB funding was utilized on the Rice portion of the project involving over 500 acres, lower End Creek, South Fork Willow Creek, several spring channels, floodplain ponds, and ditch and terrace reclamation. Project accomplishments included:

1. Construction of approximately 1.46 miles of new channel for End Creek, 1.64 miles for South Fork Willow Creek, and 5.33 miles of spring-fed tributary channels.
2. Reclamation of 2.92 miles of existing channelized stream reaches and ditches and 1.16 miles of terraces.
3. Construction and contouring 6 floodplain ponds (10.15 acres).
4. Construction of approximately 0.68 miles of low elevation, earthen terraces to protect adjacent private land from overland floodflow and/or to direct floodflow along End Creek restoration channel.
5. Instream placement of 20 rock grade control structures (cross vanes), 121 rootwad revetments (20 complexes), and 200 pieces of large woody debris along the South Fork Willow Creek restoration channel.
6. Removal of 5 existing culverts to improve channel conditions and fish passage and reinstallation of 2 culverts on access roads.
7. Initiation of native plant community restoration, including installation of 12,650 sedge/rush plugs, mechanical installation of 60 whole shrubs and approximately 5,180 square feet of sedge/rush matts (salvaged from the existing channelized End Creek reach) and installation of 7,800 pounds of native seed on approximately 430 acres.
8. Trap and haul (salvage) of fish, amphibians, and reptiles from existing streams reaches prior to channel diversions and restoration channel activation.
9. Installation of an irrigation system to facilitate vegetative recovery.

Project construction was initiated in late June with major construction on the Rice portion of the project area completed by October. During October through late November, an additional project phase involving construction of approximately 0.5 miles of the upper End Creek restoration channel, reclamation of channelized stream reaches, and construction of floodplain ponds was completed through a separate OWEB grant and NRCS WRP restoration fund on the Davidson property within the project complex. The final project component, located on the Dake property in the southern portion of the project complex, will be constructed during 2007 using NRCS WRP and GRMW/BPA funds. Planned actions for the project in 2007 include construction of additional stream channels along McDonald Creek, installation of two additional floodplain ponds, ditch reclamation, planting, weed control, irrigation system operation, other maintenance needs, and monitoring/evaluation.

2. PROJECT DESCRIPTION & EXISTING RESOURCE CONDITIONS

Project Area Description

The End Creek Restoration Project is located in the upper Willow Creek watershed in the Upper Grande Ronde River Subbasin (6th Field HUC 17060104803). The project is located in the northwest portion of the Grande Ronde Valley about 8 miles north of LaGrande, Oregon in Union County approximately 1 mile upstream from the confluence with Willow Creek in Township 1 South, Range 38 East, all or portions of Sections 22, 23, 26, and 27, Willamette Meridian. The project complex encompasses three contiguous private land parcels: Rice (568 acres); Davidson (108 acres); and Dake (100 acres). See Figure 1, Project Vicinity Map. In context of the Grande Ronde Subbasin Plan (NPCC, 2004), the project area is located in the Mid Grande Ronde Valley Geographic Priority Area (Lower Willow/mid Grande Ronde). Habitat limiting factors include sediment, flow, temperature, and key habitat quantity. Primary focal species include summer steelhead (spawning/rearing) and spring Chinook salmon (rearing habitat). Other species include resident trout and riparian/wetland dependent wildlife.

The End Creek watershed drains an area along the eastern foothills of the Blue Mountain Range, at the base of Mt. Emily. The drainage area includes approximately 4.9 square miles with a mean annual precipitation of 24 inches. Approximately 75 percent of the area is forested with 25 percent in agricultural production. End Creek is about 5 miles in length with headwaters originating at an elevation of 6,000 feet and a confluence elevation at the South Fork of Willow Creek of 2,700 feet. Based on USGS quadrangle maps, the forested headwater reaches are located on very steep slopes with an average gradient of 28 percent. The 1.5 mile middle transitional reach, consisting of a mixture of forest and agriculture use, has moderately steep terrain with an average 5.5 percent slope. The lower 1.5 miles, downstream of Hunter Road, are located along a relatively flat depositional and floodplain area with agricultural production being the primary activity. The reach averages 1.6 percent slope.

Figure 1 End Creek Project Vicinity

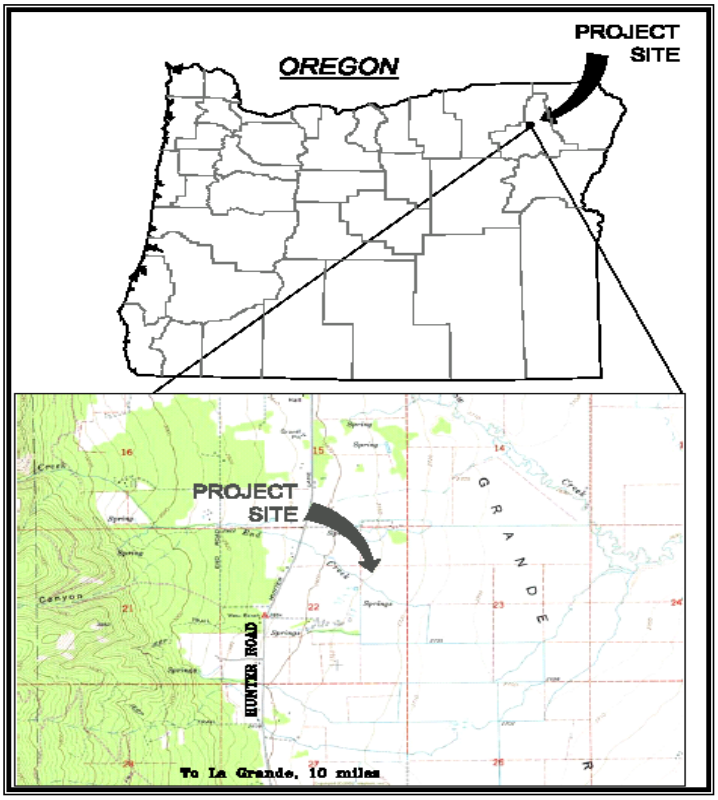


Figure 2 Restoration Project Overview

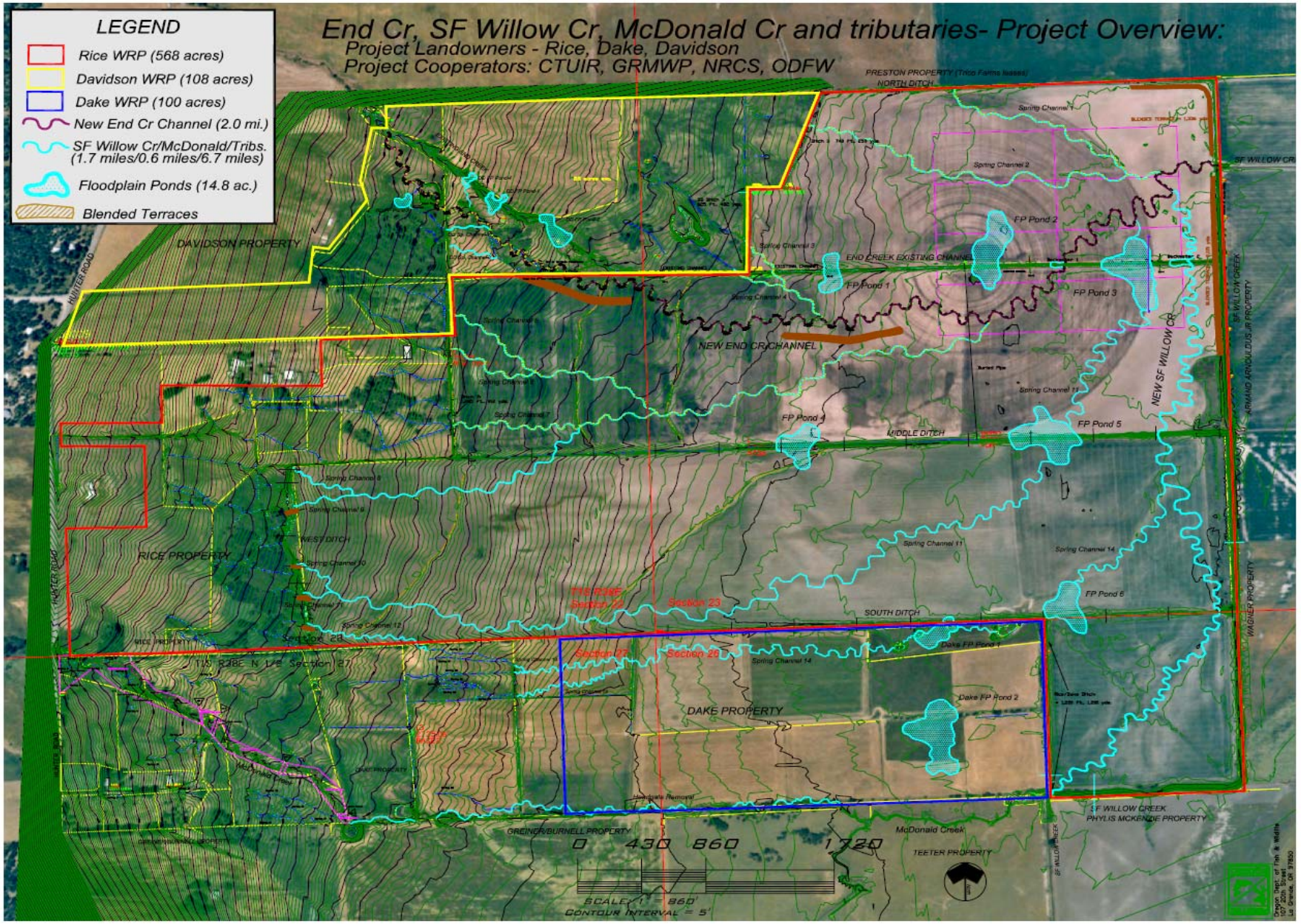


Figure 3 Project Area Tax Lot Map

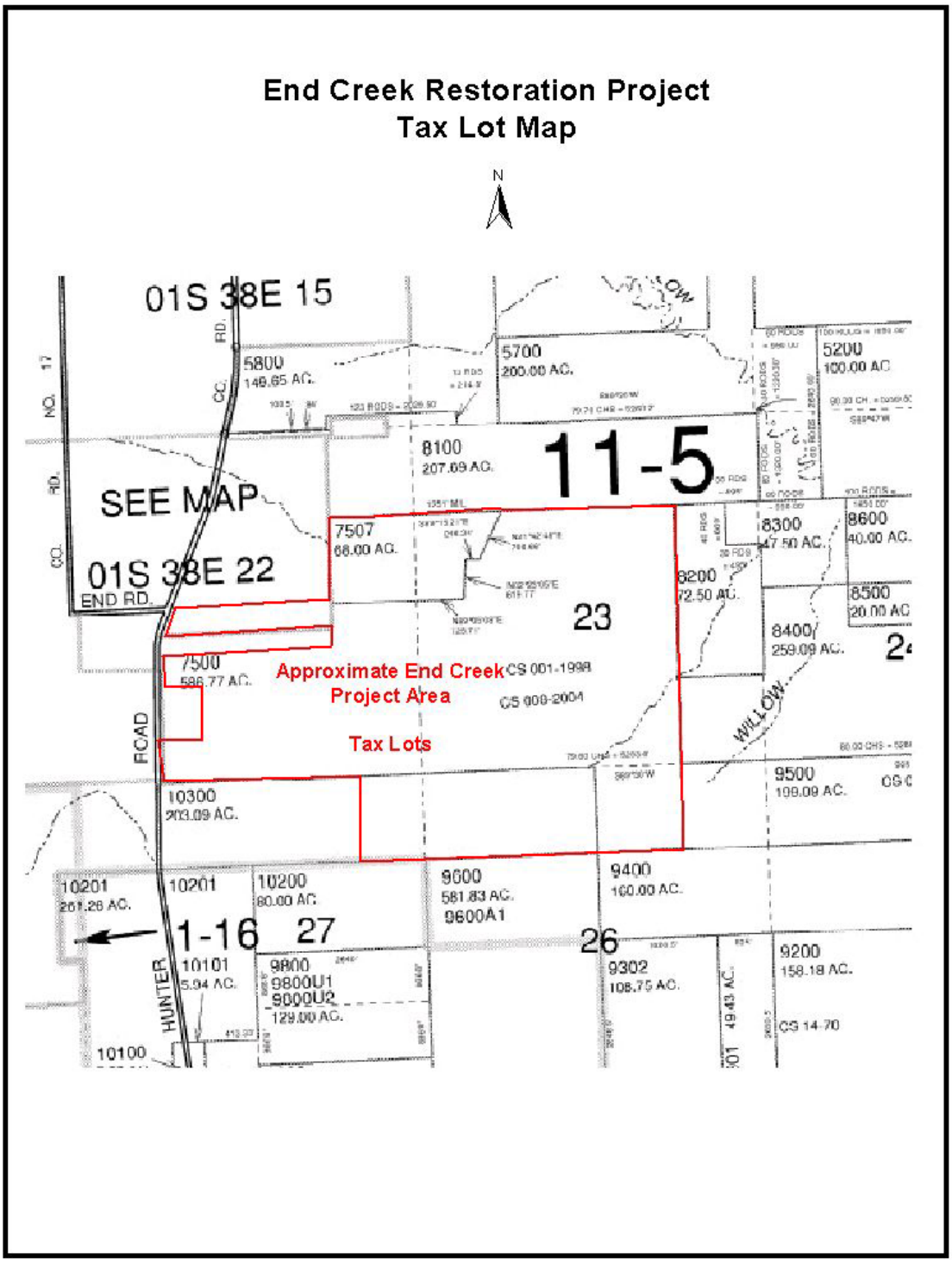


Figure 4 Construction Staging Areas & Culverts/Headgate Work Areas

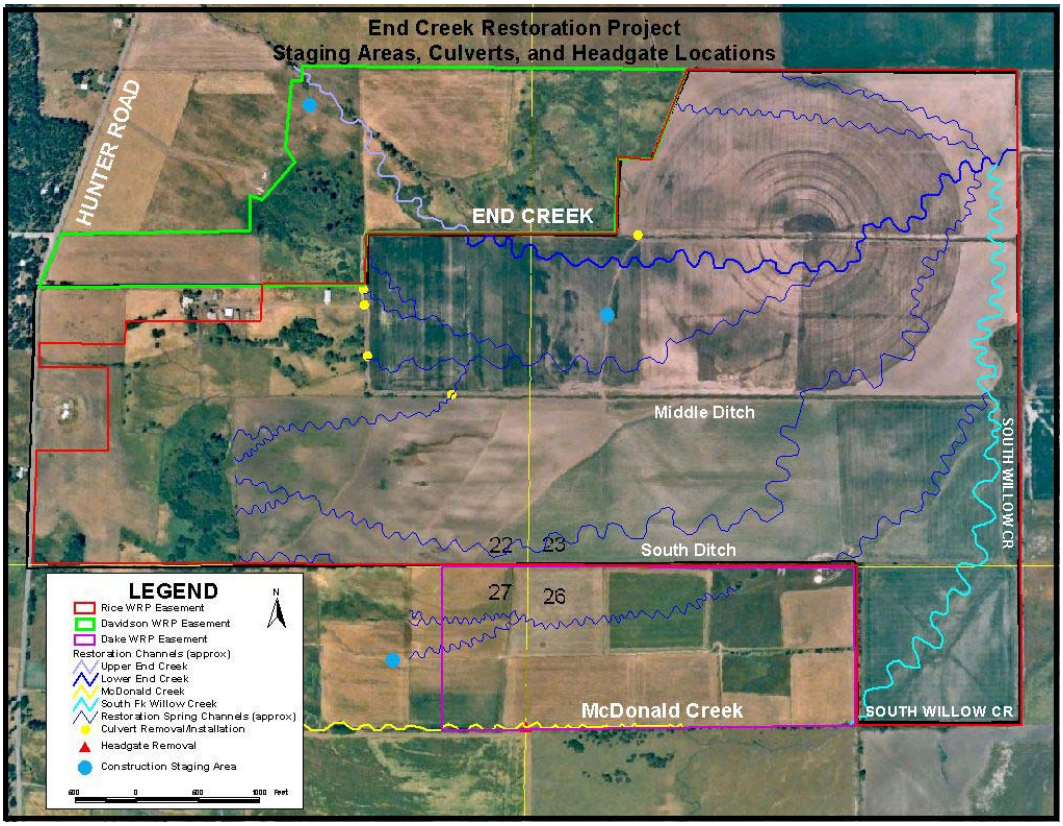
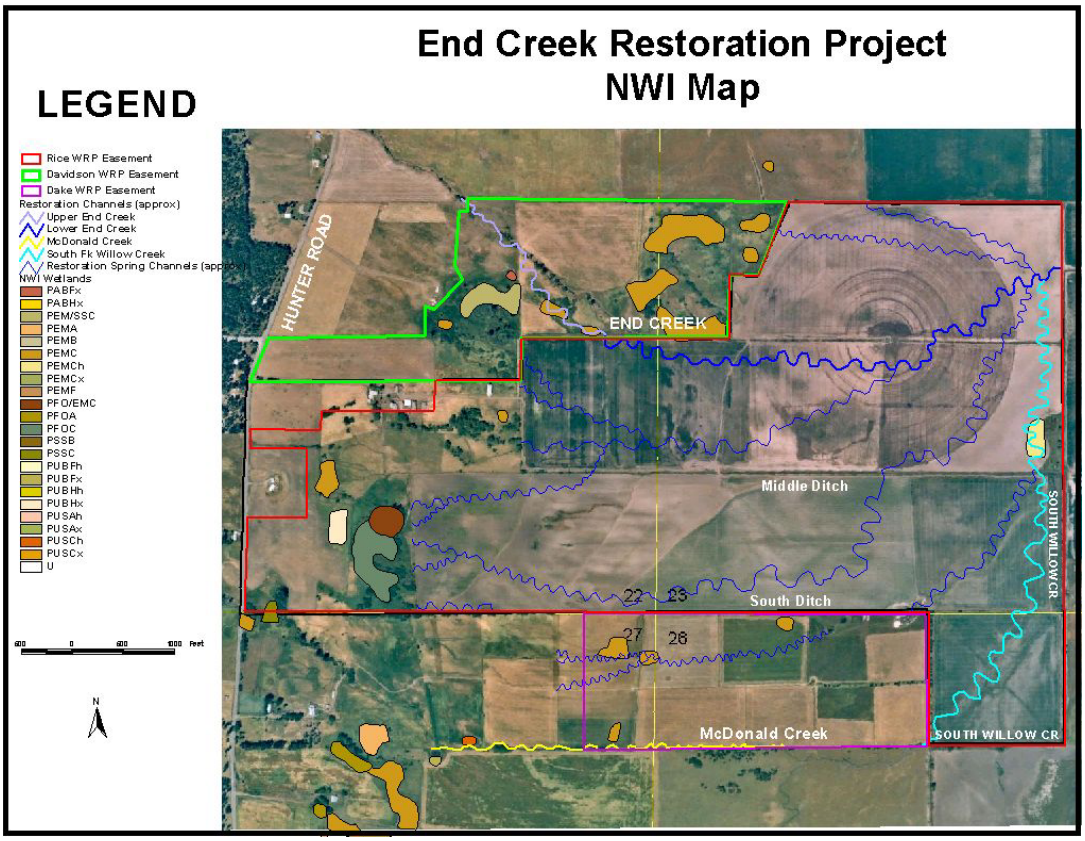


Figure 5 National Wetland Inventory Map



Existing Resource Conditions

Private lands in the project area have a long history of agricultural cultivation, channelization/ditching, and wetland conversion. The proposed action is to restore instream, riparian, and wetland habitat through active strategies involving restoration channel construction, floodplain improvements, and habitat protection through perpetual and term conservation easements. The project will facilitate restoration of wetlands and stable stream channel morphology with a network of meandering stream channels, palustrine emergent and shrub-scrub wetlands, and associated native upland habitats. Lack of cold water refuge and complex instream habitat currently limits productivity and summer distribution of salmonids to upper headwater reaches.

Historic land use practices have altered the hydrologic cycle, including the storage, movement, and character of water resources throughout the Subbasin (NPCC, 2001). Changes in the hydrologic cycle are demonstrated by excessive runoff, altered peak flow regimes, lack of ground water recharge, reduction in soil moisture, reduced storage capacity, and low late-season flow. Historic and current land use, in combination with hydrologic changes, have resulted in stream channel instability (channel incision, increased width:depth ratios, vertical cut banks, sedimentation, and loss of hydrophytic vegetation). Improperly managed land uses act to destabilize natural hydrologic processes and amplify the impacts of natural events such as floods. In an effort to enhance drainage for agricultural production, End Creek, South Fork Willow, McDonald Creek and several spring-fed tributaries were channelized in the early 1900's, resulting in a series of linear ditches currently lacking instream habitat complexity, riparian/wetland vegetation, and extensive vertical, eroding stream banks. Anthropogenic practices were extensively successful in draining wetlands and lowering local water tables, which allowed farming on much of the project area. In the existing condition, approximately 600 acres are annually tilled and planted to various crops. The balance of the project area is in pasture and Idaho fescue seed production.

The Willow Creek Watershed, including End Creek, South Fork Willow, and McDonald Creek are known to provide habitat for Federally listed Snake River summer steelhead. Willow Creek may provide rearing habitat for spring Chinook salmon and may have historically provided spawning habitat. End Creek was identified in the Willow Creek Coordinated Resource Management Plan (CRMP) (Union SWCD, 2002) and in the Union County Soil and Water Conservation District's water quality monitoring program as a high contributor of sediment to Willow Creek due to aggressive headcuts and streambank erosion. Channelization, channel incision, high width:depth ratios, confinement/poor floodplain connectivity, and limited riparian-wetland vegetation contributes to poor instream habitat diversity and water quality throughout the project area.

June 2003 Photos illustrate lower channelized End Creek. Extensive channelization in project area created unstable stream channels, excessive erosion, elevated water temperatures, loss of riparian and wetland vegetation, and poor fish habitat.

The following figure depicts a typical riffle cross section generated from survey data collected at Station 13+40 along lower End Creek. The cross section clearly illustrates the extent of channel incision and lack of floodplain connectivity. Flood conveyance capacity of the channel is significant which contributes to unstable stream banks shown in the above photos. Note that both the bankfull discharge and floodprone area are contained entirely within the existing channel, limiting connectivity to the floodplain.

Figure 6 Riffle Cross Section of Existing End Creek Reach

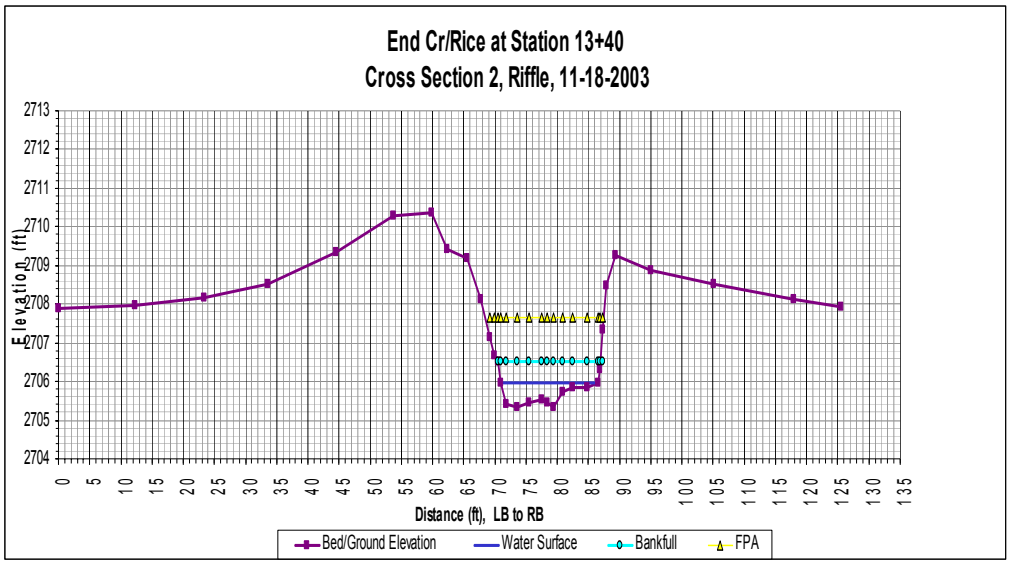
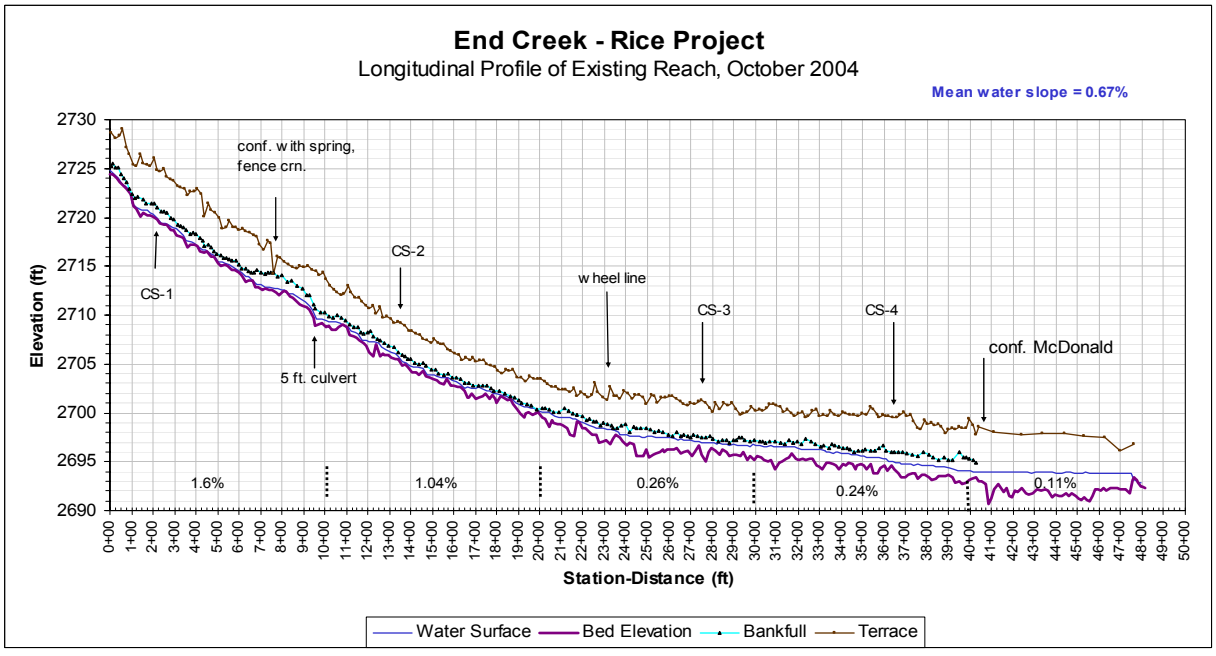


Figure 7 illustrates the profile of lower End Creek. Note the relation of the channel thalweg in comparison to adjacent terraces which illustrates extensive channel entrenchment, confinement, and high water slopes (mean of 0.67%). Also of note in the profile is the lack of large pool habitat. In the current condition, End Creek is severely unstable and lacks stable morphology necessary to develop high quality fish habitat.

Figure 7 Longitudinal Profile of Lower End Creek



During early August 2005, the CTUIR surveyed 15 randomized juvenile fish population index sites along End Creek, South Fork Willow, and McDonald Creek. Spring-fed tributaries within the project area were also sampled to determine fish presence/absence.

Fish species observed included summer steelhead/resident rainbow (O. Mykiss), sculpin, dace, red-sided shiner, sucker, northern pike minnow, pumpkinseed, and bluegill. Data indicates that summer distribution of O. Mykiss is limited to upper reaches of project area streams.

CTUIR fish crews conducting juvenile fish sampling at a sampling location along McDonald Creek August 2005.

Rearing O. Mykiss densities along End Creek ranged from 0.0 fish/square meter of habitat in the lower reaches (RM 0.0 to 0.5) to 0.93 fish/sq.m. in the upper project reaches at RM 1.2. Similar O. Mykiss rearing densities were observed in McDonald Creek, although a site at RM 1.05 was recorded at 1.8 fish/sq.m.

The South Fork Willow and lower reaches of both McDonald Creek and End Creek showed a distinct absence of salmonid presence due, presumably, to summer high water temperatures. Sites containing O. Mykiss also showed a distribution of age classes from age class 0 to age class 2 indicating local spawning and rearing of both anadromous and resident fish.

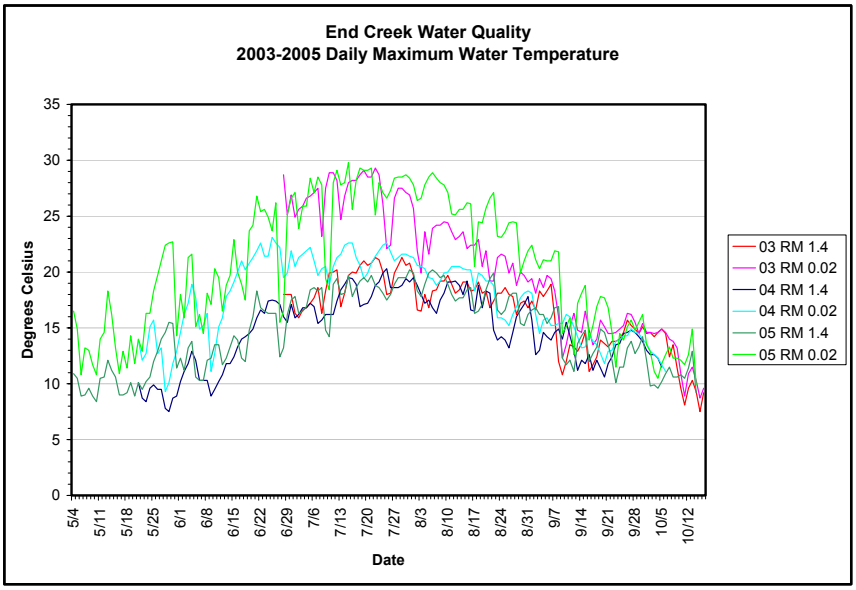
O. Mykiss catch at McDonald Creek sample site.

In addition, sampling also revealed a noted absence of native amphibians (particularly spotted frogs) and a general abundance of bull frog adults and juvenile tadpoles. The lower reaches of the South Fork Willow contained a substantial bull frog population with over 50 individual juveniles captured.

Water quality data is limited for the project area. Two Vemco temperature probes that record hourly water temperatures have been deployed in End Creek by the CTUIR since 2003. Monitoring sites are located at RM 2 approximately 0.1 miles upstream from the project area and RM 0.25 near the confluence with the South Fork Willow. Additional water quality monitoring was initiated in 2005 with ODFW installing Data Logger near RM 0.1 and RM 1.5 to collect year-round water temperature data.

Water temperatures recorded at the upper monitoring site have been observed to be consistently cooler than the lower site during 2003 through 2005 with a consistent heating trend detected through the lower channelized project reach. Observed maximum temperatures indicate that summer salmonid distribution in lower End Creek is limited by high summer water temperatures. Figure 8 illustrates data collected during 2003 through 2005.

Figure 8 End Creek Daily Maximum Water Temperatures 2003-2005



Other water quality monitoring on the project area is being conducted by Eastern Oregon University (EOU) through an agreement with the GRMW. Initiated in 2004, EOU is conducting annual water chemistry monitoring to evaluate chemical properties, including temperature, dissolved oxygen, phosphorous, nitrates, alkalinity, etc. Discussions are currently underway with EOU and the GRMW to expand this monitoring effort to other project area streams as well as other subbasin tributaries to provide baseline information on water quality that can be utilized for comparison over time. Water quality analysis will continue through project development to evaluate baseline and post-project water quality conditions.

ODFW is also monitoring groundwater elevations. Baseline data collection was initiated in 2005 with installation of a groundwater monitoring well network (15 wells total) along lower End Creek. Figure 9 illustrates well locations and Figure 10 presents an overview of pre-project, seasonal groundwater elevations.

Figure 9 End Creek Groundwater Monitoring Wells

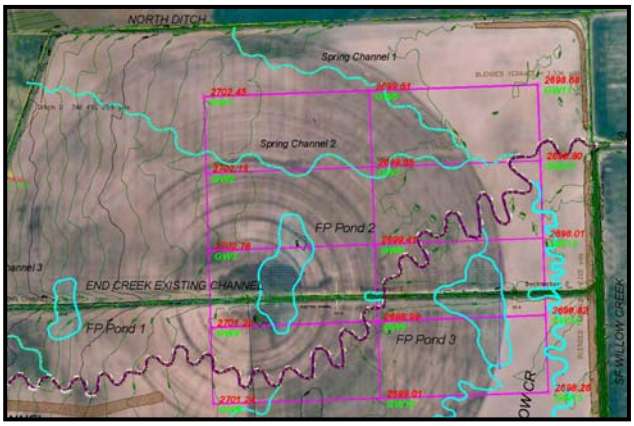
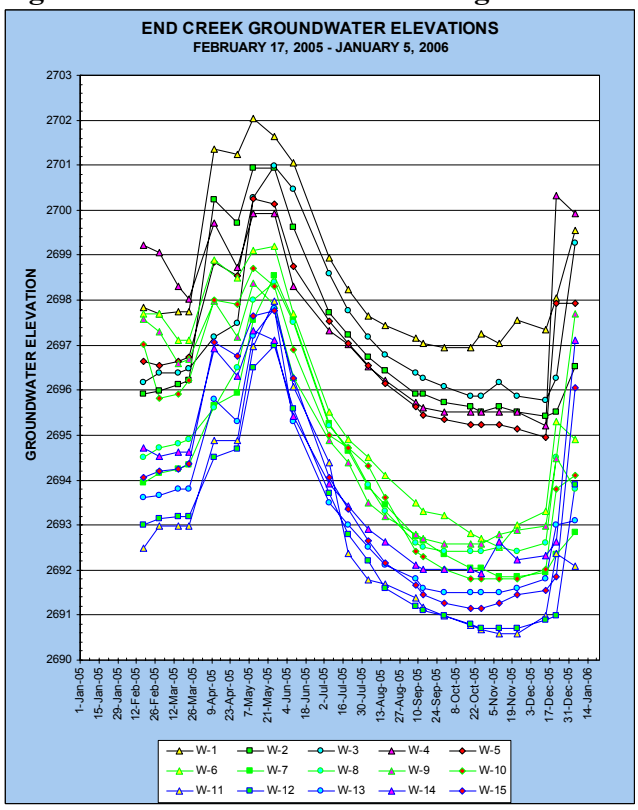


Figure 10 Groundwater Monitoring Data



3. PROJECT GOALS AND OBJECTIVES

The overall goal of the project is to restore the natural character and function of End Creek, South Fork Willow, McDonald Creek, and spring-fed tributaries with accompanying riparian and wetland vegetation, well connected floodplain, and stable, natural stream channels. Water quality, fish habitat, and wetland-riparian habitat restoration are key drivers for the project. The following project objectives have been identified for the End Creek Restoration Project complex:

- Improve channel dimension, pattern, and profile consistent with valley form, hydrology, and sediment.
- Restore emergent and shrub-scrub wetlands (camas)
- Reconnect floodplain and enhance groundwater/hyporheic exchange
- Increase cold water refuge and increase winter water temperatures
- Increase suitable steelhead spawning habitat
- Increase juvenile steelhead survival/productivity by increasing habitat quantity and quality
- Enhance diversity and abundance of macroinvertebrate communities

Regional Strategies/Objectives

This project is part of a region-wide effort to protect and restore anadromous fish habitat in the Grande Ronde Subbasin. The following reference documents and plans provide guidance for prioritizing habitat and watershed enhancement activities and provide context for the restoration project effort.

--Grande Ronde Subbasin Plan, NPCC. 2004
--Grande Ronde Subbasin Summary, NPCC 2001
--Willow Creek Watershed Assessment (GRMWP 2001)
--Willow Creek Coordinated Resource Management Plan (CRMP) (Union SWCD 2002)
--Grande Ronde River Subbasin- Salmon and Steelhead Production Plan, Columbia Basin System Planning, ODFW, CTUIR, NPT, WDF, WDW. 1990.
--CTUIR - Columbia Basin Salmon Policy, 1995.
--Stream and Riparian Conditions in the Grande Ronde Basin: A Report to the G.R. Model Watershed Board, Huntington, 1993.
--Upper Grande Ronde Subbasin Water Quality Management Plan (ODA 1990)
--Upper Grande Ronde TMDL (ODEQ 2000)
--Grande Ronde Model Watershed Action Plan (GRMWP 1994)

Watershed analysis through the EDT (NPCC, 2004a and Mobrand, 2003) and synthesis through the 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:

Habitat Limiting Factors

- **Channel Habitat Conditions** – Channel instability associated with removal of streamside cover and channelization has resulted in channel incision/downcutting, 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 baseflow, development of fish passage barriers, and increased summer water temperatures.

The Willow Creek Watershed Assessment specifically identified lack of shade, large wood deficiencies, channelization, wetland drainage, high stream temperatures, and high nutrient levels as limiting factors in the Willow Creek watershed. Landowners identified a primary concern as lack of streamside vegetation. The Assessment identified the opportunity to restore channelized streams to natural, stable channels. The Willow Creek CRMP, developed by the GRMW, Union County SWCD, and participating landowners identified several goals for the watershed including: 1) make the stream more hospitable to fish (restore streamside vegetation, reestablish desirable cover, increase shade, reduce streambank erosion); and 2) improve fish habitat.

4. PROJECT ACCOMPLISHMENTS & ACTIVITIES

Table 1 illustrates project actions and metrics. Additional discussion follows the table to describe the various work related components involved in the development and implementation of the project.

Table 1 Summary of End Creek-Rice Restoration Project Accomplishments

PROJECT ACTION	PROJECT METRICS
Restoration Channel Construction **--End Creek** **--South Fork Willow Creek**	 7,708 feet 3.1 miles 8,659 feet
Spring Channel Construction	28,142 feet 5.33 miles total
Rock Cross Vanes	20 structures (vertical grade control in restoration channel)
Rootwad Revetments	121 structures (20 complexes along approx 960 feet of outside streambank meanders). Note: one structure is a footer log and rootwad with tree bole.
Woody Debris Additions	200 pieces large woody debris placement on Willow Creek restoration channel. Woody debris included 8-12 inch diameter, 10-20 foot length pieces placed in log jam configuration to enhance channel roughness and habitat complexity.
Channel/Ditch and Terrace Reclamation	21, 542 feet 4.08 miles
Floodplain Ponds/Backwater Habitat	6 ponds (10 acres) & 2 backwater habitats (End Creek & South Fork Willow Creek)
Blended Earthen Terraces	3,590 feet (0.68 miles) of low elevation terraces to control floodflow and protect adjacent private lands
Revegetation and Planting	Completed site preparation and seeding on 430 acres (ground-based and aerial application of 7,200 pounds native seed). Installed 12,650 sedge rush plugs. Mechanically installed 60 willow shrubs and approximately 5,180 square feet of sedge/rush matts. Additional planting and weed control planned for 07' and 08'.
Culvert Removal/Relocation	5 culverts removed, two reinstalled on access roads.

Environmental Compliance/Regulatory Reviews

CTUIR, ODFW, and NRCS staff worked cooperatively to address regulatory compliance requirement and secure necessary permits and clearances to implement the project. Project permitting was initiated concurrent with project design development and completed prior to initiating project construction. Tasks included developing a NEPA checklist through BPA's environmental compliance program, preparing biological assessments, coordinating formal and informal consultations with NMFS and USFWS through BPA, developing permit applications for ODSL and USCOE fill/removal permit processes, and coordinating archaeological surveys and consultation with Oregon SHPO. The environmental compliance process was conducted for the entire project complex to maximize planning and permitting efficiency. All environmental planning documents, permits, and concurrences are on file at CTUIR DNR Fish and Wildlife Program office.

Construction Subcontracting, Administration/Inspection, Materials, & Project Layout

The CTUIR provided construction subcontracting and administrative functions for the project, including management of project grant funds from GRMW-BPA, OWEB, and NRCS WRP, construction subcontracting, and materials purchasing. Tasks included preparation of subcontractor solicitations, conducting site tours and bidding processes, subcontractor selection, subcontracting document preparation and award, inspection, and payment. ODFW and NRCS technical representatives participated with all aspects of construction subcontract development and project implementation including development of statements of work, participating in site tours, and providing project inspection and oversight. ODFW provided a lead role in project construction oversight inspection and project layout. CTUIR also managed several materials purchasing needs, including acquisition of native seed, irrigation equipment, and supplies.

Restoration Channel Design and Construction

Project planning and design was accomplished over an approximate 2 year period and involved interagency and landowner meetings, coordination with adjacent private landowners, and development of funding proposals. ODFW staff provided a leading role in pre-design surveys and development of project designs (McGowan, 2005). Project planning was driven by landowner objectives, limiting factors, project goals, and biological objectives. Products of the planning effort and project design process were developed through an extensive watershed analysis conducted during 2003-04. The analysis was undertaken to evaluate past land use history and present conditions, identify habitat limiting factors, and develop a suite of actions to address the limiting factors. The analysis included:

- Determine the drainage area
- Review past & current land uses
- Examine 1930's aerial photographs
- Onsite inspections of various portions of the watershed by project biologists, engineers and geomorphologists
- Collect stream flow data at Hunter Road at bankfull stage
- Collect channel cross sections, longitudinal profiles and pebble counts
- Conduct a GPS survey of the entire work area and produce a topographic map at 1 ft. contours
- Install 15 groundwater wells and document soil profiles to depths of 10 ft.

Field data collected from four channel sections in the existing End Creek channelized reach indicated either an entrenched condition or a channel in the early stages of recovery (Rosgen G and F channels). The areas in recovery had begun to extend (erode) laterally against steep, vertical side-slopes of ditches that had been constructed with heavy equipment, dating back to the 1930's. Lack of maintenance of the ditch was allowing the stream to erode the banks and redeposit sediment, essentially forming a new floodplain. However, the severity of overall channel entrenchment, due to existing spoils piles created from ditch excavation, was such that the channel would take decades recover, in terms of channel aggradation, increased sinuosity, and reconnection to its former floodplain. Examination of aerial photographs from the 1930's illustrate that End Creek had already been straightened, with little evidence of historic channel meander scrolls evident. Analysis of local topography, however, indicated that the historic End Creek stream channel was likely located to the south of the pre-project location. The initial analysis indicated that an "active" restoration strategy would be necessary to facilitate recovery of stable stream channel morphology and associated benefits of enhanced instream structural complexity, floodplain connectivity, and restored hydrophytic plant communities and formed the basis from which to base more detailed analysis and project development.

Development of restoration stream channel design criteria was based on comparison of existing conditions measured at a selected reference site located along upper End Creek, analysis of hydrological conditions, and professional judgment. Table 2 summarizes reference conditions and channel design criteria developed through the analysis. Criteria presented in the table were utilized to design the End Creek restoration channel as well restoration channels for South Fork Willow Creek and McDonald Creek. All three tributaries approximate similar hydrology, watershed size and condition, valley form, and geomorphology.

Bankfull discharge (channel forming streamflow) was calculated using several methods, including: 1) collecting flow data at Hunter Road 2) Manning's N by channel type, 3) Relative roughness (R/d84) and resistance factor, 4) Manning's N from resistance factor, 5) Regional Curve and Continuity Equation, and 6) USGS Regression Analysis. NRCS staff conducted additional modeling using HEC-RAS to evaluate preliminary project designs. The analysis concluded that mean water velocities in the designed channel would be acceptable. The basic channel design template for End Creek, South Willow, and McDonald Creek was derived from reference conditions and is categorized as a Rosgen C channel (with a W/D ratio of 14). The long-term objective for channels under this design is to facilitate vegetative recovery and development of constructed "C" channels into "E" channels (W/D ratio <12).

Table 2 Morphological Characteristics for the Existing and Proposed Channels with Gage Station and Reference Reach Data (Rosgen, 1996)

VARIABLES	EXISTING CHANNEL*		PROPOSED REACH		REFERENCE REACH	
1. Stream Type	B4c/G4c & F4*		C4, C5, C6		E4c	
2. Drainage Area (sq. miles)	4.9 Mi.2		4.9 Mi.2		3.6 Mi.2	
3. Bankfull Width (Wbkf)	12.1 7.7-16.5	(Mean) (Range)	11.0 8-13	(Mean) (Range)	7.1	(Mean) (Range)
4. Bankfull Mean Depth (dbkf)	0.935 0.86-1.01	(Mean) (Range)	0.79	(Mean) (Range)	0.9	(Mean) (Range)
5. Width/Depth ratio (Wbkf/dbkf)	13.4 7.6-19.1	(Mean) (Range)	14.00	(Mean) (Range)	7.9	(Mean) (Range)
6. Bankfull Cross-sectional Area (Abkf)	10.95 7.7-14.2	(Mean) (Range)	8.65	(Mean) (Range)	6.37	(Mean) (Range)
7. Bankfull mean Velocity (Vbkf)	4.45		4.62		5.9	
8. Bankfull Discharge (cfs) (Qbkf)	49		40		33	
9. Bankfull Maximum depth (dmax)	1.25		1.2		0.95	
10. Max driff/dbkf ratio	1.34		1.52		1.06	
11. Low bank height to max. dbkf ratio	3.03, 3.52		1.00		1.00	
12. Width of Flood prone area (Wfpa)	15.4		40		17.00	
13. Entrenchment ratio(Wfpa/Wbkf)	1.27		3.64		2.4	
14. Meander Length (Lm)	channelized		126.5		84	
15. Ratio of Meander Length to bankfull Width (Lm/Wbkf)	N/A	(Mean) (Range)	11.50 9-14	(Mean) (Range)	11.83	(Mean) (Range)
16. Radius of Curvature (Rc)	N/A	(Mean) (Range)	30 27-33	(Mean) (Range)	20	(Mean) (Range)
17. Ratio of Radius of Curvature to Bankfull Width (Rc/Wbkf)	N/A	(Mean) (Range)	2.75 2.5-3.0	(Mean) (Range)	2.82	(Mean) (Range)
18. Belt Width (Wblt)	N/A	(Mean) (Rang)	55	(Mean) (Range)	55	(Mean) (Range)
19. Meander Width Ratio (Wblt/Wbkf)	N/A	(Mean) (Rang)	5.00	(Mean) (Range)	7.75	(Mean) (Range)

VARIABLES	EXISTING CHANNEL*	PROPOSED REACH	REFERENCE REACH
20. Sinousity (stream length/valley distance) (k)	**1.00**	**1.82**	**1.3**
21. Valley Slope (ft/ft)	**0.0077**	**0.0091**	**0.0385**
22. Average Slope (Savg) = (Svalley/k)	**0.0077**	**0.0050**	**0.0296**
23. Pool Slope (Spool)	**varies**	**0.001**	**0.0134**
24. Ratio of Pool slope to average slope (Spool/Sbkf)	**varies**	***0.2-0.3***	**0.4527**
25. Maximum Pool Depth (dpool)	**1.70**	**2.2**	**1.63**
26. Ratio of pool depth to average bankfull depth (dpool/dbkf)	**1.81**	**2.78**	**1.72**
27. Pool Width (Wpool)	**12.45**	**15.0**	**7.8**
28. Ratio of Pool Width to bankfull width (Wpool/Wbkf)	**1.03**	**1.36**	**1.10**
29. Ratio of Pool Area to bankfull area	**1.35**	**1.79**	**1.17**
30. Pool to Pool spacing (p-p)	**67**	**63**	**42**
31. Ratio of p-p spacing to bankfull width (p-p/Wbkf)	**5.54**	**4.5-7**	**5.92**
32. Riffle Slope (Sriff)	**0.0163**	**0.0088**	**0.0496**
33. Ratio of Riffle Slope to average slope (Sriff/Sbkf)	**1.27**	**1.5-2**	**1.68**
34. Maximum Riffle Depth (driff)	**1.34**	**1.2**	**0.95**
35. Ratio of maximum riffle depth to average depth (driff/dbkf)	**1.43**	**1.52**	**1.06**
MATERIALS:			
1. Particle Size distribution of Channel Material D16	**upper mm: 0** / **lower mm: 0**	**See Reference Reach Data**	**upper mm: 17** / **lower mm: 12**
D35	**0.5** / 0		**34** / **34**
D50	**9** / 0		**43** / **46**
D84	**60** / **0.06**		**96** / **84**
D95	**90** / **0.5**		**120** / **115**
2. Particle Size distribution of Bar Material D16	**See Reference Reach Data**	**See Reference Reach Data**	**mm: 25** / **mm: 5**
D35			**27** / **13**

VARIABLES	EXISTING CHANNEL*	PROPOSED REACH	REFERENCE REACH	
D50			**37**	**20**
D84			**60**	**48**
D95			**90**	**76**
3. Largest size particle at the toe (lower third) of the bar	**See Reference Data**	**See Reference Data**	**69**	**73**

NOTES: *Existing channel morphology are averages of 2 sample sites.

SEDIMENT TRANSPORT VALIDATION (Based on Bankfull Shear Stress)

Method	Existing	Proposed
Calculated value (mm) from curve	(Tc = 1.32) 180	(Tc = 0.73) 7
Value from Shield Diagram (lbs./ft2)	100	
Critical Dimensionless Shear Stress	0.053	0.05
Min. mean dbkf calculated using critical dimensionless Shear Stress equations	0.7	
Remarks: using bedload data adjusted shields relation.		

The following graphs illustrate typical stream channel cross sections and the restoration channel longitudinal profile. Channel cross sections are presented for each of the four habitat types (e.g., run, riffle, pool, and glide) and provide the "blueprint" for channel construction with details on channel dimension (cross sectional area) and streambank slopes. Following the channel cross section templates, a series of longitudinal profiles for the designed End Creek restoration channel are presented to illustrate channel profile. The design profile depicts the channel thalweg (bottom of stream channel), bankfull channel (channel forming flow) elevation, relation of bankfull channel to adjacent floodplain elevation (both before and after project) which illustrates floodplain connectivity and flood-prone area, and channel (water slope).

Construction specifications utilized during project implementation were generally maintained within (+/-) $1/10^{th}$ of an inch whenever possible to ensure stream channel dimension, pattern, and profile was constructed per channel designs. Channel construction inspection was continuous with field staff providing field staking and elevation survey throughout the construction process. Elevation control was provided by elevation benchmarks established throughout the project area using Topcon lazer survey equipment and direct read and/or survey rods.

Construction efforts were initiated by delivery of rock and wood materials in late June with construction of the End Creek channel initiated by early July, beginning at the lowermost project reach and proceeding upstream to the Davidson property. Following completion of the restoration channel, rock cross vanes and rootwad revetments were installed and channel diversion completed. Prior to reclamation of the existing End Creek channel, all native plant materials (shrubs and sedges/rushes) were mechanically salvaged and installed along the restoration channel followed by installation of a temporary irrigation system. By late August, construction was initiated on the South Fork Willow restoration channel with continuation of channel/ditch reclamation, and pond construction. The Rice portion of the project was largely completed by mid-October, at which time, project managers initiated construction of the upper End Creek reach on the Davidson property and completed large wood placement on the newly constructed South Willow restoration channel.

Figure 10 Typical Run Cross Section for the End Creek Restoration Channel

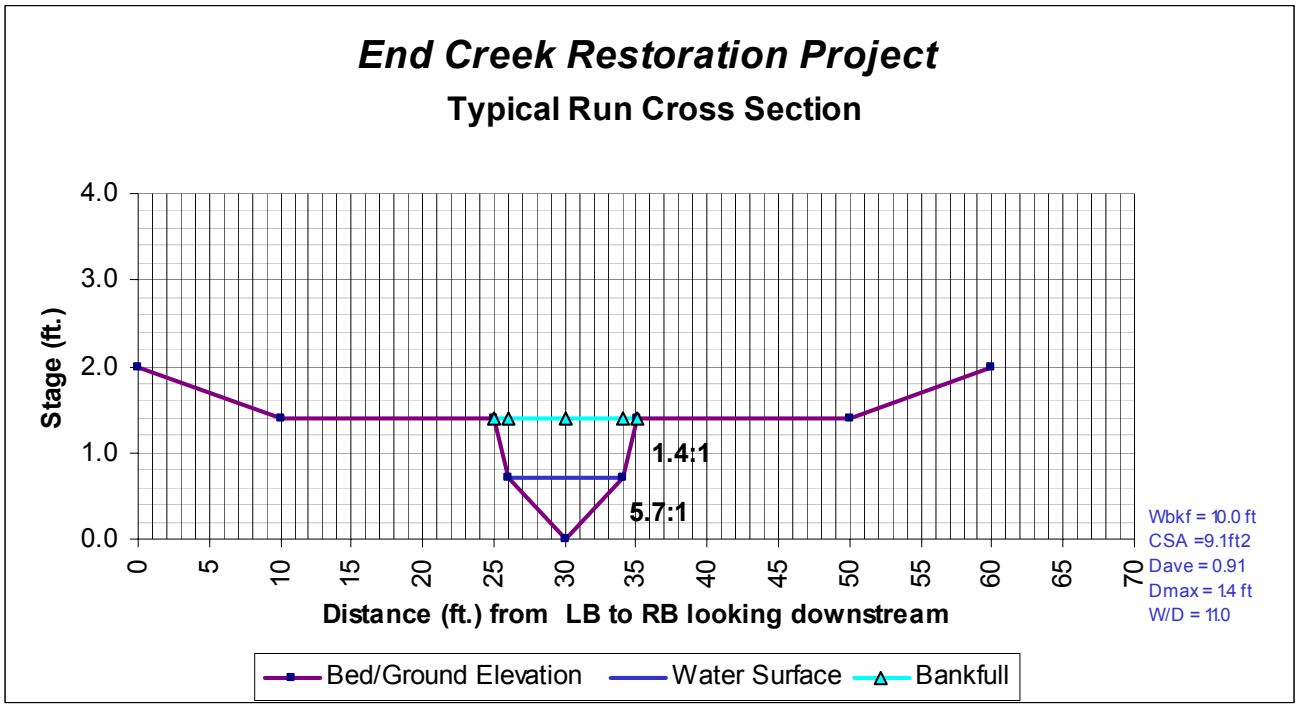


Figure 11 Typical Riffle Cross Section for the End Creek Restoration Channel

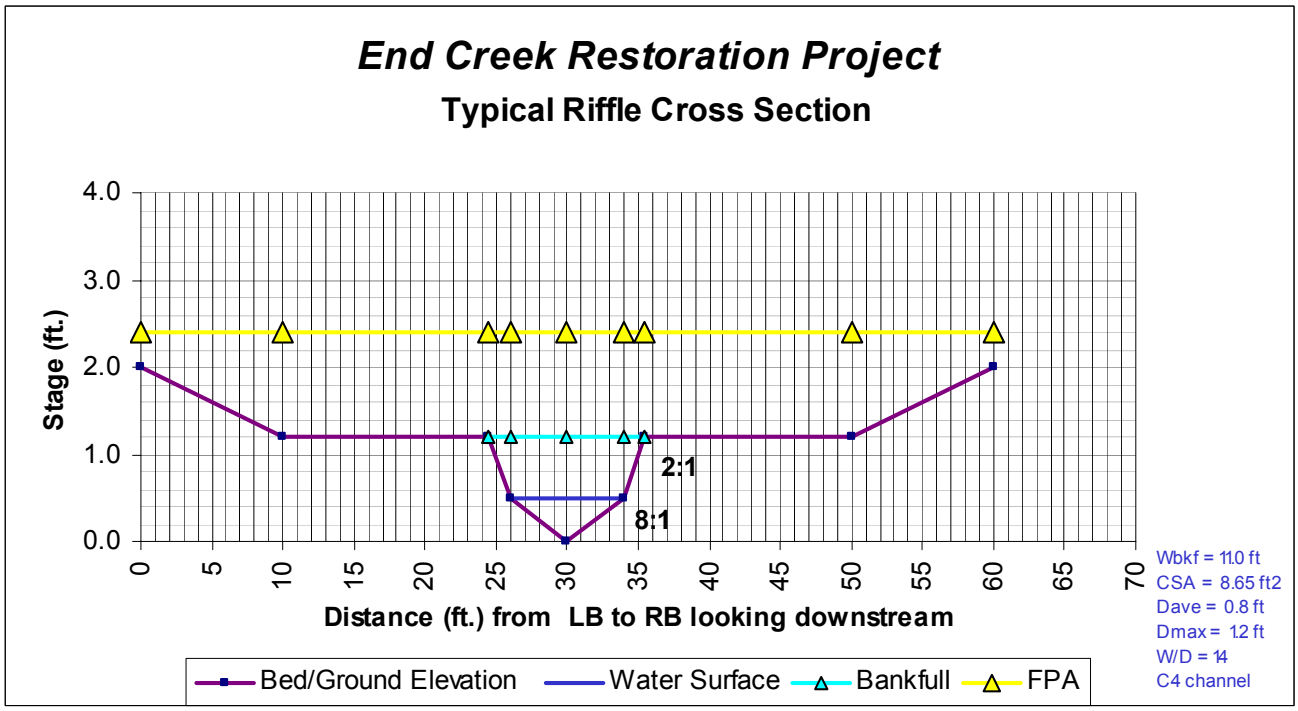


Figure 12 Typical Pool Cross Section for the End Creek Restoration Channel

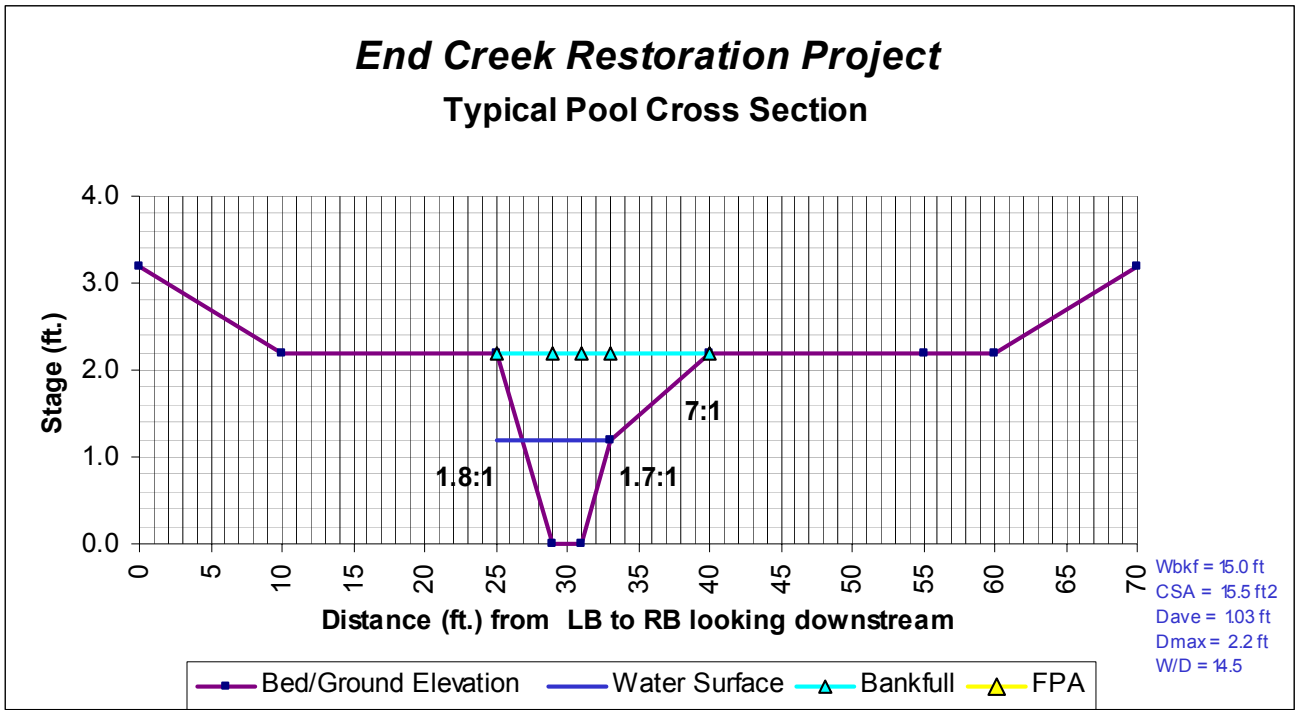


Figure 13 Typical Glide Cross Section for the End Creek Restoration Channel

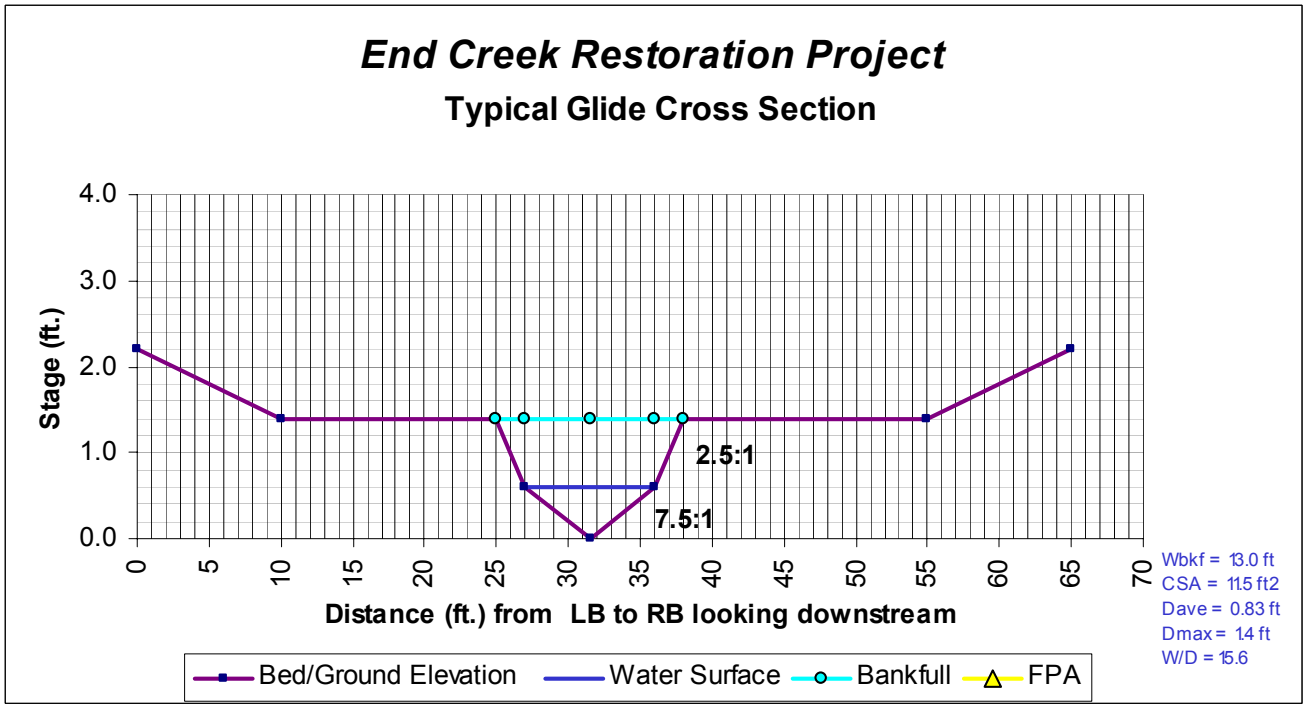


Figure 14 Longitudinal Profile of End Creek Restoration Channel

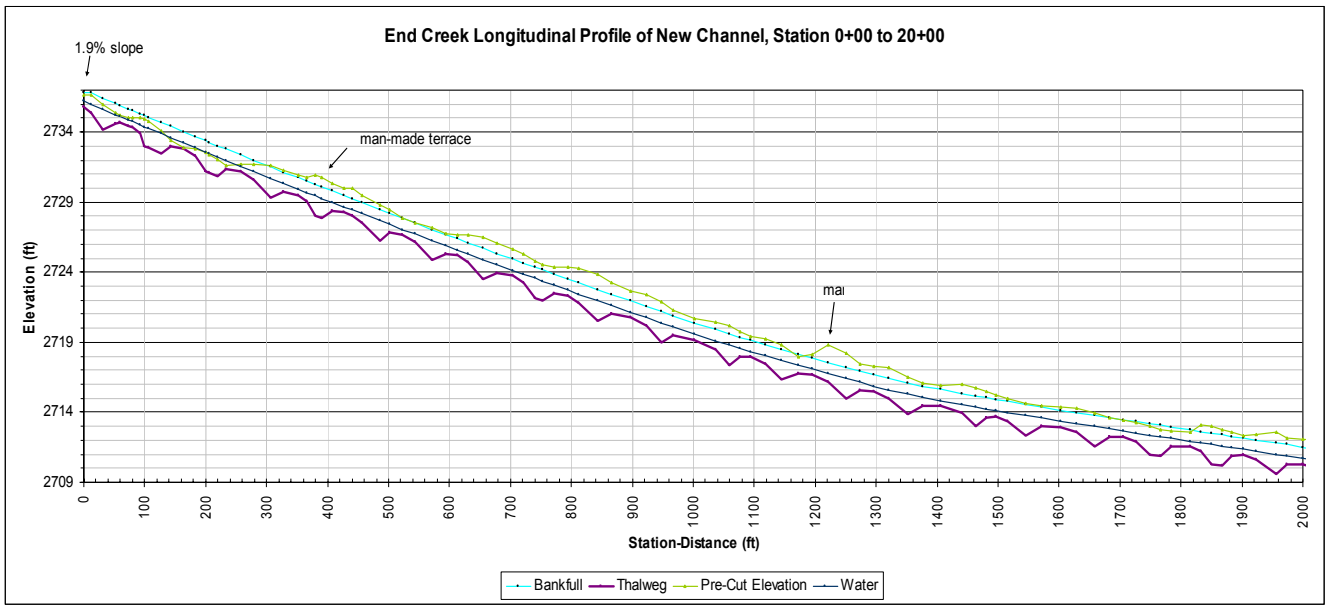


Figure 15 Longitudinal Profile of End Creek Restoration Channel (Cont.)

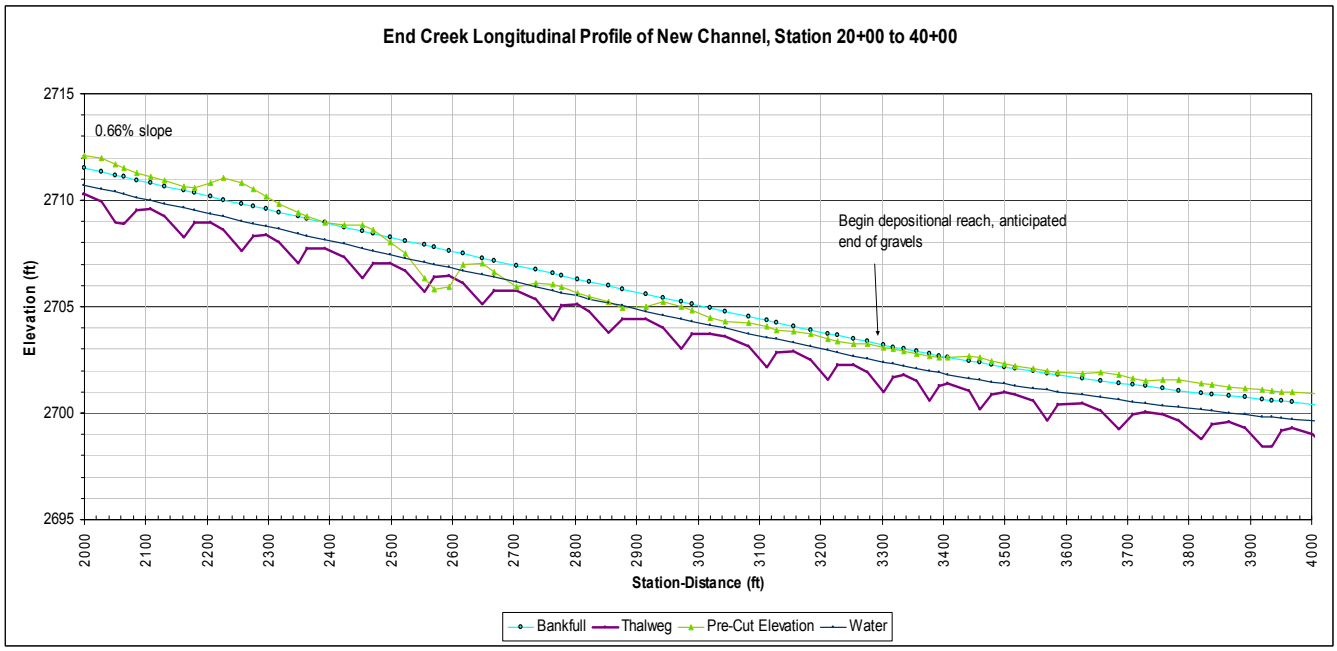


Figure 16 Longitudinal Profile of End Creek Restoration Channel (Cont.)

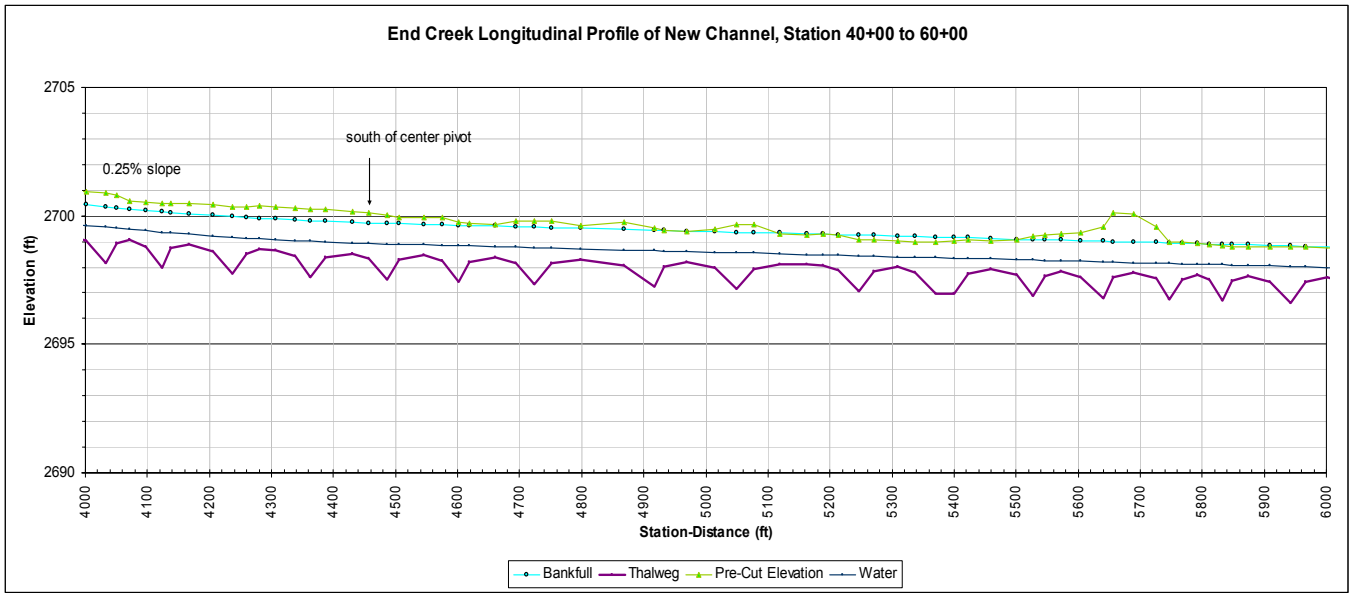
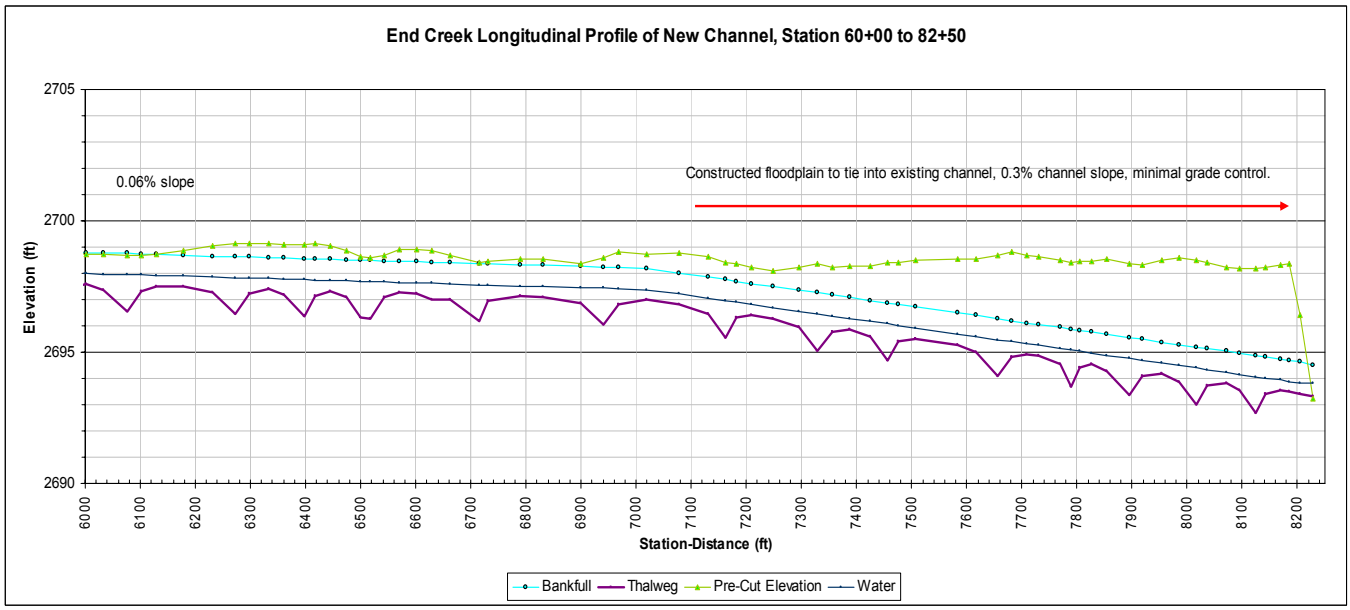


Figure 17 Longitudinal Profile of End Creek Restoration Channel (Cont.)



Initiation of End Creek restoration channel construction. July 2006

Channel construction was performed using a 200 series track-mounted excavator, D5 dozer, and dump trucks. In stream channel segments requiring floodplain excavation (areas where the bankfull channel was deeper than existing ground surface), the floodplain was excavated first, followed by the bankfull channel and associated typical cross sections. Floodplain cuts involving extensive earth excavation were generally cut first using a dozer to bulk material which was then loaded by track-hoe onto dump trucks and hauled to designated locations (i.e., earthen terrace locations, backfill for channel reclamation, etc). In other channel segments that did not require floodplain construction, a track-hoe was utilized to sequentially excavate the channel per typical cross sectional dimensions in a downstream to upstream manner.

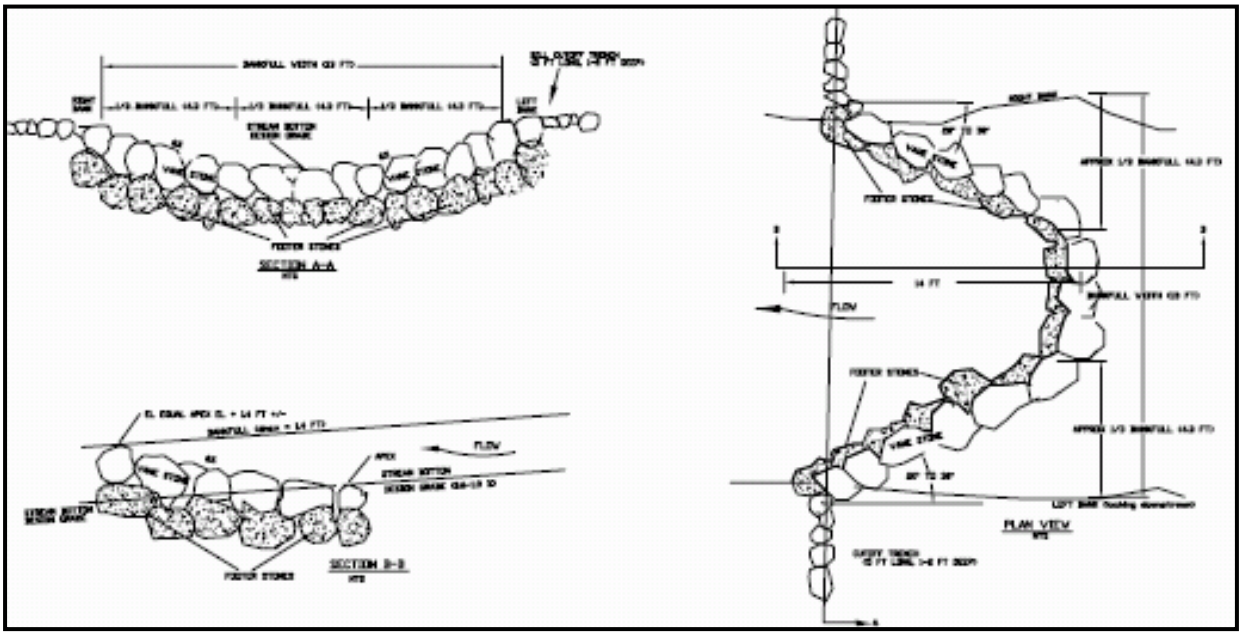
D5 Dozer grading material from floodplain in preparation for bankfull channel excavation by track-hoe. July 2006

In addition to fish-bearing restoration stream channels constructed under this restoration effort, approximately 5.33 miles of small, spring fed restoration channels were constructed throughout the project area to replace existing ditches and facilitate wetland restoration. Typical spring channels were designed as small, meandering, v-shaped channels with maximum depths in the center of 1.0 to 1.5 feet. Spring channel were designed and constructed to maximize the use of existing topography and minimize earthwork requirements.

Rock Cross Vane Grade Control Structures

Typical rock cross vane designs are illustrated in Figure 18. These features are incorporated into channel designs to provide vertical grade control and minimize potential for channel incision. The structures were designed and installed at the junction of glides (downstream from pools) and riffles (natural grade control features). Rock within the cross vanes will be nearly indiscernible within the structure and will serve as a lithologic element that provides vertical channel stability. A total of 20 structures were installed in the Rice portion of the End Creek Restoration channel with the majority of placed in the upper sections to address higher channel slopes. Three structures were installed in the lower reaches to "step down" the channel entrance to the existing South Fork Willow Creek. Each structure consisted of approximately 15 cubic yards of angular basalt boulders with material ranging in size from 18-36 inches (average diameter (D50) of 28 inches (0.50 cubic yards each)).

Figure 18 Cross Vane Diagram



Photos below illustrate structure layout in the constructed restoration channel and an installed structure prior to backfill. Note that the elevation (invert) of the structure is the same as the bottom (thalweg) of the channel. August 2006.

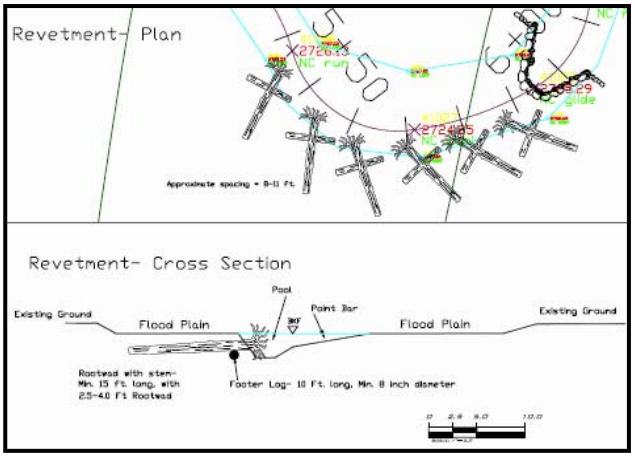
Rootwad Revetments & Large Wood Placement

Rootwad revetments were incorporated into the project design to provide streambank stability on outside meander streambanks until vegetation re-colonizes the site. Additionally, the rootwads provide structural diversity and contribute to complex pool habitat. Revetments consist of a tree bole with attached rootwad and a footer log which are keyed (excavated) into the streambed and streambank and backfilled.

Rootwad revetment installation. Photo illustrates installed footer log and keyway for rootwad and tree bole installation. August 2006

Revetments were installed in complexes along selected meanders with radius' of curvature (<30') in order to address concerns with potential for erosion associated with slightly greater water velocities and lack of vegetative stability. Figure 19 illustrates a planview of a typical revetment complex with a cross section of an individual revetment.

Figure 19 Rootwad Revetment Diagram



Tree boles were generally spaced 8-10 feet apart and the footers were installed at, or below, the streambed elevation in pools. Each tree bole/root wad had a footer log placed underneath and perpendicular to the root wad bole. Root wad and bole were angled upstream at approximately 45 degrees to face the channel thalweg.

Root wad diameters were 2.5 feet minimum and up to 4.0 feet maximum. Tree bole length minimum was 15 feet and footer logs were 10 feet in length and 8 inches minimum diameter on both ends. Approximately 960 linear feet of restoration channel streambank were stabilized with revetments. A total of 121 revetment logs 20 sites were installed on the Rice portion of the End Creek restoration channel.

September 2006 photo illustrating rootwad revetment and installation of sedge/rush matts.

Approximately 200 pieces of large wood was placed along the South Willow Creek channel to enhance floodplain roughness and instream habitat complexity.

November 2006 photo illustrating wood placement along South Fork Willow restoration channel.

Tree boles with intact rootwad and tops were generally placed on log debris jam configurations at strategic locations throughout the new channel reach. Additional wood placement is planned to complete the effort pending improved access conditions.

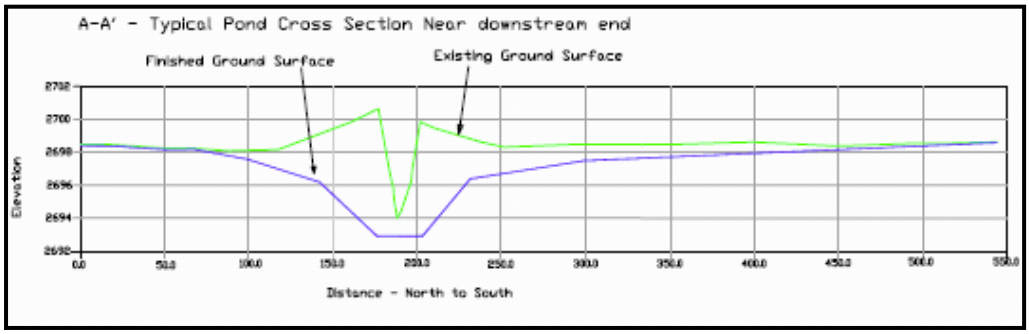
Channel/Ditch Reclamation, Floodplain Ponds, and Backwater Habitat

Following completion of channel diversion and removal of fish and other organisms from the channelized/abandoned stream reaches, reclamation activities along existing stream channels and ditches wera initiated along all channelized stream channels and ditches throughout the project area. The available quantity of excavated material from restoration channels (based on cut/fill calculations, design channel dimensions, and cross sectional measurement of channelized reaches) was found to be sufficient to backfill abandoned channels. Material in excess to that needed for channel reclamation was utilized to construct terraces along the eastern project area boundary and/or blended into floodplain adjacent to restoration channels. Reclamation work consisted of filling in and contouring soil and gravels along approximately 4 miles of existing channel. Fill material was blended into existing ground topography and contoured to provide a "natural" appearance.

Reclamation of channelized End Creek following activation of restoration channel. August 2006.

Six floodplain ponds, totaling about 10 acres were constructed on the Rice portion of the project. Ponds were incorporated into the project design to provide open water habitat and develop associated wetland habitat. Ponds were located along channel and/or ditch segments planned for reclamation, taking advantage of entrenched channel segments to function as deep water habitat within the constructed pond. Constructed ponds vary in size from 0.7 to 2.4 acres with average depths of 1.0-1.5 feet deep and maximum depths of 6-7 feet. Existing steep side slopes along the channels were graded with a D6 dozer at 20:1 slope at the downstream portions of each pond. Fill material generated during pond excavation was utilized to fill upstream and downstream channel reclamation segments. Excess was utilized to construct feathered terraces and/or to fill man-made swells adjacent to the stream channel and floodplain pond network. The following figure illustrates a typical floodplain pond cross section.

Figure 20 Typical Floodplain Pond Cross Section



Ponds were shaped into various patterns (oxbow, meander) and contoured to develop diversity of macro topographic basins with both shallow and deep water habitat. Nearly all of the ponds filled with groundwater upon completion. Within two months of construction, all ponds were overflowing and activating spillways constructed to maintain connection between the pond and adjacent floodplain and/or spring channel. Waterfowl and shorebird use was observed shortly following construction, including long-necked stilts, avocets, mallard, American wigeon, blue winged teal, Canada goose, and Tundra swan.

Floodplain pond construction. August 2006.

Earthen Terraces

Earthen terraces were incorporated into project designs as floodplain features to minimize potential adverse effects from floodflow on adjacent private lands and/or to direct overland flow within the project area. Construction activities associated with these structures included hauling and spreading excess topsoil material generated from channel or pond construction activities. Blended terraces were constructed to a maximum height of 1.0 foot, with a 25-30 foot top width and 10:1 side slopes. Four blended terraces, totaling approximately 3,600 feet, were constructed on the Rice portion of the project area.

Earthen terrace constructed along eastern project boundary to minimize potential for flooding on adjacent private land. July 2006

Culvert Removal and Reinstallation

Five existing culverts were removed and two reinstalled on access roads. Three culverts, including a large 60 inch culvert on the existing End Creek channel (Station 9+50) was not needed for project function. Two small, 20 inch culverts were reinstalled on an access road to service spring-fed tributaries. will be removed and/or relocated from project area ditches and streams to address resource needs.

Revegetation and Bioengineering

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. In effect, project landowners and sponsors are trying to recreate, to the extent feasible, an environment similar to that which existed prior to European settlement and advent of agriculture, channelization, and draining of wetlands.

As part of the vision, a variety of plant communities and environments will be developed including emergent wetlands, shrub-scrub wetlands, riparian forest, and upland grassland and tree/shrub inclusions. In general, the upper, steeper portions of the project area will be more dominated by shrubs, trees, and upland grasses with the low gradient areas in the lower portions of the project dominated by emergent vegetation with sedges, rushes, and camas. Beaver colonization, as suitable habitat develops, will eventually contribute to the desired dynamic state of equilibrium.

Achieving the vision is perhaps one of the most challenging aspects of the project and demands attention to detail and persistence. Success in revegetation efforts will be dependant on a variety of factors including restoration of hydrology, selection of locally adapted species, and effective weed control. Planned techniques have been refined by project sponsors through evaluation of available research, practical application, trial and error, and persistence. Our planned approach utilizes a combination of techniques and includes installation and maintenance of temporary irrigation systems which has proven effective on similar projects in other portions of the basin.

Native grass seed mixes will generally consist of locally adapted Idaho fescue, bluebunch wheatgrass, basin wildrye, tufted hairgrass, and other appropriate and available species. Native seed mixes will be utilized throughout the project area with upland species such as Idaho fescue and blue bunch colonizing upland inclusions and basin wildrye dominating terraces and transition zones. Hydrophytic species such as tufted hairgrass, camas, and colonizing sedge and rush species will dominate low lying areas subject to annual moist soil conditions.

Shrub and tree planting will be accomplished adjacent to restoration channels and in upland inclusions distributed throughout the project area. Hydrophytic shrubs and trees planned for propagation include but are not limited to various willow species, red osier dogwood, black cottonwood, alder, and hawthorne while upland communities will include ponderosa pine, hawthorne, elderberry, rosehip, and snowberry. A combination of livewhips and containerized stock will be utilized on the project area beginning in spring 07'.

During the Fall of 2006, project sponsors initiated the first steps in moving towards the vision with completion of major project construction, site preparation, extensive seeding, and initial planting efforts. Following is an overview of the accomplishments to date.

Site Preparation – Ground disturbance created during construction efforts, accompanied by mowing and beating residual straw from the 06' wheat crop, provided a disturbed seed bed in preparation for seed installation. Mowing/beating was accomplished with a small tractor and mower on approximately 350 acres.

Native Seed Installation – Initial seeding efforts were completed along the End Creek restoration channel and floodplain ponds following construction using ATV mounted seed broadcaster and/or manual spreader.

Approximately 600 pounds of native tufted hairgrass and blue wildrye was applied on 30 acres and irrigated in late August to facilitate germination and growth along newly disturbed areas.

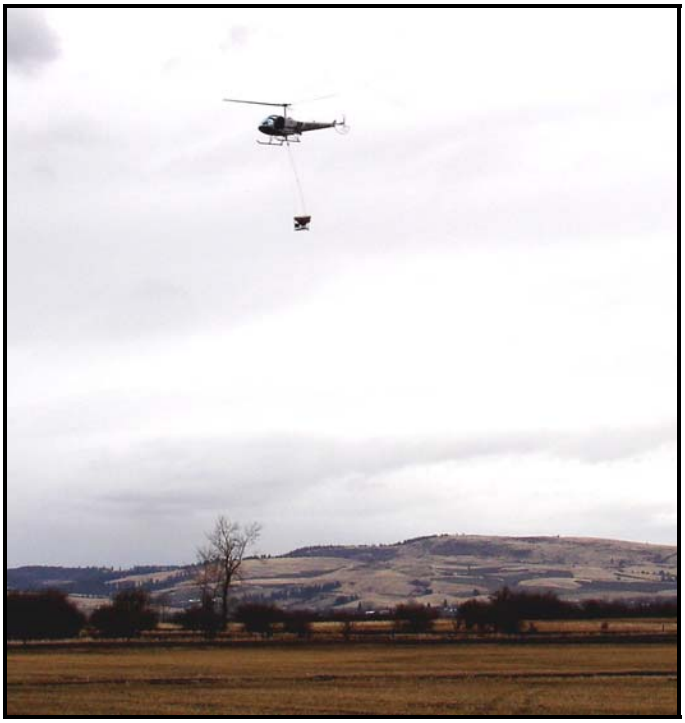
Project sponsors were planning on seeding the remainder of the project using a rangeland drill provided by ODFW, but delays associated with securing the drill due to post-fire rehabilitation efforts in other areas of the region and then heavy moisture by late November, limited our ability to complete project area seeding needs.

In mid December, the decision was made to secure the services of helicopter contract and proceed with an aerial seeding application, which was completed during December 11-12th. The operation consisted of CTUIR staff staging and loading seed into a 300 pound capacity seed hopper and aerially applying seed at an approximate rate of 18 pounds/acre.

The custom native seed mix included:

31.64% Idaho fescue
18.56% Grande Ronde Basin/Trailhead Wildrye
18.15% Blue wildrye
12.6% Bluebunch wheatgrass
9.18% Rosanna western wheatgrass
7.78% Sherman big bluegrass
2.09% Tufted hairgrass

Helicopter contract preparing for aerial seeding during December 2006



Aerial seeding was accomplished using an Enstrom helicopter.

The operation included installation of approximately 7,200 pounds of native seed on 430 acres, which covered all disturbed areas, including overseeding areas previously seeded during ground-based operations.

Plant Salvage and Installation – Following diversion of End Creek into the restoration channel and prior to reclamation of the channelized reach, project sponsors directed a plant salvage effort from the existing End Creek alignment to provide plant materials for the restoration channel. The salvage effort included excavation of available shrubs (primarily salix spp.) and native sedge/rush matts using an excavator with hydraulic thumb and dump truck(s) to haul plant materials to designated locations.

The following photos illustrate the basic process which has been found to be highly efficient and effective in facilitating vegetative recovery following construction of restoration channels by project managers.

Excavator prepares excavate and load sedge matt from the channelized End Creek alignment prior to reclamation (backfilling). September 2006.

Salvage efforts were initiated in the lowermost channel reach, progressing upstream. Generally, salvage of whole shrubs with rootwad was conducted separately from sedge/rush matts in order to minimize damage to roots and stems of the willows.

Willow material was strategically staged for later mechanical installation in the upper, steeper regions of the restoration channel while sedge/rush matts were staged along nearly every outside channel meander.

Dump truck hauling and stockpiling plant materials at selected locations along End Creek restoration channel. September 2006.

Approximately 60 shrubs and 5,180 square feet of sedge/rush matts were salvage and reinstalled along the End Creek restoration channel. Shrubs were generally installed in small groups on point bars while sedge/rush matts were planted on streambanks along outside channel meanders in order to facilitate development of stable banks.

Excavator installing sedge/rush matts along outside stream meander on rootwad revetment. September 2006

Because the salvage efforts were conducted during the summer growing season by necessity, special provisions are implemented to improve plant survival, including installation of irrigation systems to maintain moist soil conditions. Despite irrigation application, however, shrubs excavated outside of normal dormancy periods do not generally have high survival rates.

Sedge/Rush Plug Planting – Fall planting activities were focused on native sedge/rush plug installation along the End Creek and lower South Fork Willow Creek restoration channels. Local source sites were utilized to cut 3 inch diameter plugs using a simple plug cutting tool which were then hauled to planting locations and installed using a 4 inch power augur. Planting specifications required installation at one foot centers along entire length of channel, generally within the bankfull channel elevation in order to maximize access to moist soil conditions and improve survival. Between late September through mid-November, approximately 12,650 plugs were installed along approximately 10,708 feet of restoration channel. Additional sedge/rush planting is scheduled to get underway during spring 07' and encompass the remainder of the South Willow channel, spring channels, and floodplain ponds.

CTUIR habitat crew installing sedge/rush plugs along South Fork Willow Creek. October 2006

Trap and Haul/Relocate Fish, Amphibians, and Reptiles Prior To Channel Diversion

An ODFW crew with assistance from CTUIR technicians conducted salvage operations along End Creek during August 23, 30, 31, September 5, and October 17-18. A total of 344 O. mykiss and 1,339 non-game species (sculpin, dace, shiner) were trapped and hauled from the End Creek channel prior diversion. Channel diversion was completed in phases, beginning with the lower sections and progessing upstream to the upper project reach. A total of 8 O. mykiss mortalities were recorded during the salvage operation.

Fish salvage operations were implemented under the following process, consistent with all Reasonable and Prudent Actions outlined in the Biological Opinion issued by NMFS:

1. The upper and lower reaches of the stream were block-netted to prevent movement of fish into the restoration reach.
2. Seine nets were be utilized first (where possible) to capture/remove fish.
3. A Smith-Root Model 12A POW electroshocker was utilized to capture remaining fish, using NMFS protocol ("Backpack Electrofishing Guidelines", NMFS June 2000 or later versions if available).
4. Fish transport was conducted using 6-wheeled, All Terrain Vehicles (ATVs) with integrated utility beds for secured storage of fish containers.
5. Fish were transported in large, aerated coolers and secured in ATV utility beds. Fish hold times were minimized by making multiple transport trips. Water temperatures were continuously monitored as work progressed to avoid thermal stress.

6. All encountered fish (salmonid and non-salmonid species), amphibians, and reptiles were salvaged from the channel prior to dewatering and relocated to upstream locations; and
7. Transported fish, amphibians, and reptiles were relocated to several designated sections above the restoration reach to avoid concentrating fish at designated release sites.

Riparian Conservation Easement Fence Construction

Approximately 776 acres were enrolled into the Federal Wetland Resource Program with about 676 acres permanent easements and 100 acres in a 30 year conservation easement on the Rice, Davidson, and Dake private parcels. As project development continues, a detailed management plan will be developed for each of the three parcels to ensure that resource objectives are being achieved over time. With the cost-share investment of BPA funds, both the CTUIR and ODFW are incorporated into the long-term agreements to assist in planning, implementation, and maintenance of the conservation easements. Approximately 2 miles of new fence boundary fence is planned for construction by the landowners.

5. PROJECT PHOTOGRAPHS

Upstream reach of End Creek (Rice) Restoration Channel, viewing east (downstream) towards South Fork Willow Creek confluence. Note reclaimed channelized reach in left corner of photo and floodplain ponds incorporated into reclamation plan. December 2006

Upstream view of upper End Creek restoration channel. December 2006

Middle reach of End Creek restoration channel viewing upstream. December 2006

Initiation of channel construction on lower End Creek. December 2006

Upper reach of South Fork Willow Creek restoration channel viewing downstream towards confluence with End Creek restoration channel. Note large woody debris placement in channel and floodplain. December 2006

Restoration spring channel paralleling End Creek Restoration Channel. December 2006

Lower End Creek Restoration Channel with floodplain pond in middle foreground. December 2006

Floodplain pond with spring channel outlet. December 2006

6. PROJECT EXPENDITURES

Work Item	Description	Detail	Bid/Cost Estimate	OWEB Rice ($38,880)	BPA-GRMW Rice ($197,792)	NRCS-WRP Rice ($157,853)	Total
Item 1	Mobilization	Unit Price	3,658	0	1,829	1,829	3,658
Item 2	Construct Lower End Cr Channe	8,229 feet, 13,170 yds	55,051	13,170	20,940	20,940	55,051
Item 3	Cross Vanes	27structures, 405 yds	12,801	0	12,801		12,801
Item 4	Revetments	20 units, 121 trees, approx 1,200 feet	37,620	0	18,810	18,810	37,620
Item 5	End Cr Channel Reclamation	3,730 feet, 6,248 yds	25,080	0	12,540	12,540	25,080
Item 6	Floodplain Ponds	8.98 acres, 15,054 yds	55,060	0	55,060		55,060
Item 7	Swale Construction	13,054 feet, 3,917 yds	12,279	5,875	0	6,404	12,279
Item 8	Ditch Reclamation	2 ditches, 2,025 ft, 1,171 yds	3,605	0	1,803	1,803	3,605
Item 9	Earthen Terraces	2 each, 2,382 feet/3,452 yds	10,822	0	0	10,822	10,822
Item 10	Planting	Mechanical salvage and installation	6,270	0	0	6,270	6,270
Item 11	Culverts	Removal (5), Installation (4)	3,135	0	3,135	0	3,135
TOTAL		**CONSTRUCTION SUBTOTAL**	**225,380**	**19,045**	**126,918**	**79,417**	**225,380**
Phase 3 (Rice) Summary (plus phase 1 elements)							
Item 1	Mobilization	Lump Sum	0	0	0	0	0
Item 2	Construct South Fk Willow Cr	8,648 ft. , 4325 yds	30,268	19,835	10,433	0	30,268
Item 3	Cross Vanes & Rock Crossings	2 CV structures (30 yds), 3 crossings (80 yds)	7,660	0	3,830	3,830	7,660
Item 4	Large Wood Placement	200 pieces, South Willow	35,840	0	17,920	17,920	35,840
Item 5	Floodplain Ponds	1 pond, 1.4 acres, 2,253 yds	7,886	0	7,251	635	7,886
Item 6	Spring Channel Construction	5 channels, 14,131 ft, 4239 yds	14,131	0	7,066	7,065	14,131
Item 7	Ditch & Terrace Reclamation	Ditch reclamation (middle, west, Dake/Rice, S Willow), (10,594 ft, 20,334 yds), 5 terraces (13,200 ft.)	31,885	0	0	31,885	31,885
		CONSTRUCTION SUB-TOTAL	**127,670**	**19,835**	**46,499**	**61,336**	**127,670**
	CONSTRUCTION TOTAL (PHASES 1 & 3)		**353,050**	**38,880**	**173,417**	**140,753**	**353,050**
	MISC Expenses						
Misc	Irrigation equipment	Irrigation pipe and pump	10,000		10,000		10,000
Misc	Site Preparation and Seeding	Wheat stubble beating, seed purchase, and installation	27,100		10,000	17,100	27,100
	Fence materials	purchase of materials for boundary fences	4,375		4,375		4,375
		MISC SUBTOTAL	**41,475**				**41,475**
Misc	**TOTAL - CONSTRUCTION, MATERIALS, & MISC**		**394,525**	**38,880**	**197,792**	**157,853**	**394,525**
InkInd	Project Design, Permitting, Layout, Contracting & Inspection (ODFW, CTUIR, & NRCS)						105,000

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