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CTUIR GRANDE RONDE SUBBASIN RESTORATION PROJECT

A Columbia River Basin Fish Habitat Project

Annual Report

April 1, 2008 to March 31, 2009

Fiscal Year 2008

CONTRACT #

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CONFEDERATED TRIBES
UMATILLA
INDIAN RESERVATION

BONNEVILLE POWER
ADMINISTRATION

August 2007 Photo: Wallowa River-McDaniel II Project During Phase 1 Construction

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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 2008, the CTUIR in cooperation with project partners completed the initial construction phase of the Wallowa River-McDaniel II Restoration Project and final post-construction planting on the End Creek and Meadow Creek Restoration Projects constructed in 2006. Project activities on the Wallowa River project included completion of planning/design, environmental compliance, project stakeout and construction preparation, construction subcontracting, construction contract administration and inspection, materials acquisition, and spring 2008 planting. Implementation included construction of 0.5 miles of Wallowa River Restoration channel, installation of rootwad revetments and rock cross vanes, stockpiling excavated soil and gravel in preparation for channel activation and reclamation planned for 2008, and mechanical and manual installation of sedge/rush matts, live willow whips, and whole tree/shrub transplants. The project also continued monitoring and evaluation efforts associated with several project areas, including photo points, groundwater measurements, water temperature, and vegetation. Ongoing project maintenance, including fence repair, vegetation management, and monitoring for trespass livestock, was accomplished. The project biologist participated as a board member of the GRMW and on several subcommittees associated with ESA recovery planning, Biop/Remand project planning, and development in preparation for implementation during FY 2008-09.*

March 2007 Aerial Photo:
Longley Meadow Restoration Project

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 13-year project history, the CTUIR has helped administer and implement a number of projects, enhancing 21 miles of instream habitat. Conservation easements totaling about 1,400 acres on three large ranches/farms have been secured through a combination of NRCS WRP, CREP, and BPA programs. The project has constructed 12 miles of fence, eight off-channel water developments, and installed over 130,000 trees, shrubs, sedge/rush plugs, and seeded over 600 acres with native/native-like grass seed. Improving habitat trends and biological response can be readily observed at 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 FY2008 included:

- Participated in Phase 2 project construction and revegetation activities on the Wallowa River-McDaniel II Restoration Project involving activation of a restoration channel segment constructed in 2007
- Completed post-construction planting on the End Creek and Meadow Creek Restoration Projects
- Completed environmental compliance activities in cooperation with ODFW on the Ladd Marsh Restoration Project scheduled for initial construction during 2008 and 2009.
- Participated on the Grande Ronde Model Watershed Program and Foundation (Board and Technical Review Committee participation), including review and development of Biop/Remand Table 4 Projects
- Participated on the Snake River Salmon and Steelhead Recovery Team (Habitat)
- Initiated coordination with the USFS, LaGrande Ranger District to coordinate habitat restoration and enhancement in the Grande Ronde Subbasin on the Wallowa-Whitman National Forest
- Conducted project maintenance activities
- Conducted monitoring and evaluation activities on project areas.

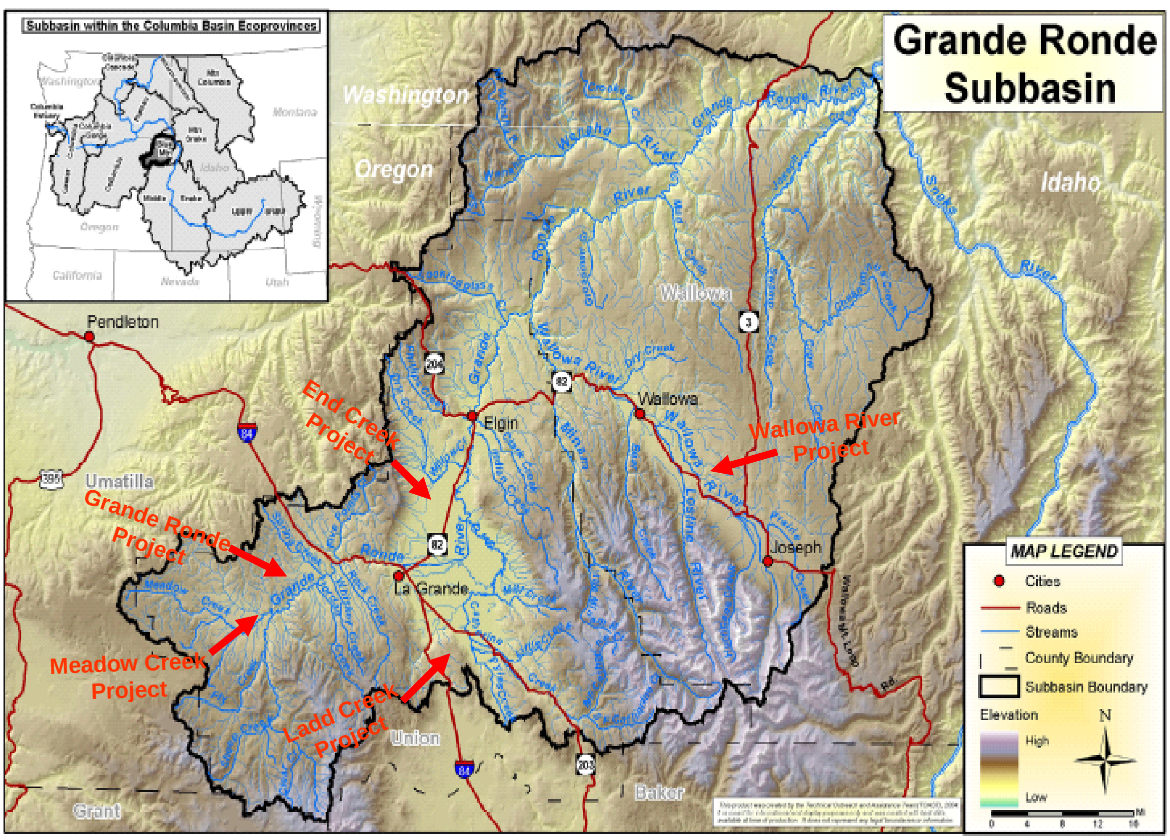
During the 2006 Northwest Power Planning Council project solicitation project, the CTUIR developed a schedule of planned actions for Fiscal Years 2007 through 2009 in cooperation with the Grande Ronde Model Watershed and Oregon Department of Fish and Wildlife as a component of Subbasin Plan implementation. 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	Estimated Historic Returns % of total	Estimated Current Returns count	Estimated Current Returns % of total	Miles of spawning habitat	Adults /Mile Template	Adults /Mile Current	% Decrease Historic to Current
Wenaha Spring Chinook	1,800	15%	453	30%	*45.60*	39.48	9.94	75%
Minam Spring Chinook	1,800	15%	347	23%	*42.54*	42.31	8.16	94%
Wallowa-Lostine Spring Chinook	3,600	30%	211	14%	*56.10*	64.17	3.76	95%
Lookingglass Spring Chinook	1,200	10%	190	12%	*29.82*	40.24	6.37	81%
Catherine Creek Spring Chinook	1,200	10%	188	12%	*29.82*	40.24	6.30	84%
Upper Grande Ronde Spring Chinook	2,400	20%	132	9%	*79.11*	30.34	1.67	84%
Total	**12,000**		**1,521**		***283.00***	**42.4**	**5.37**	**87%**

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

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)

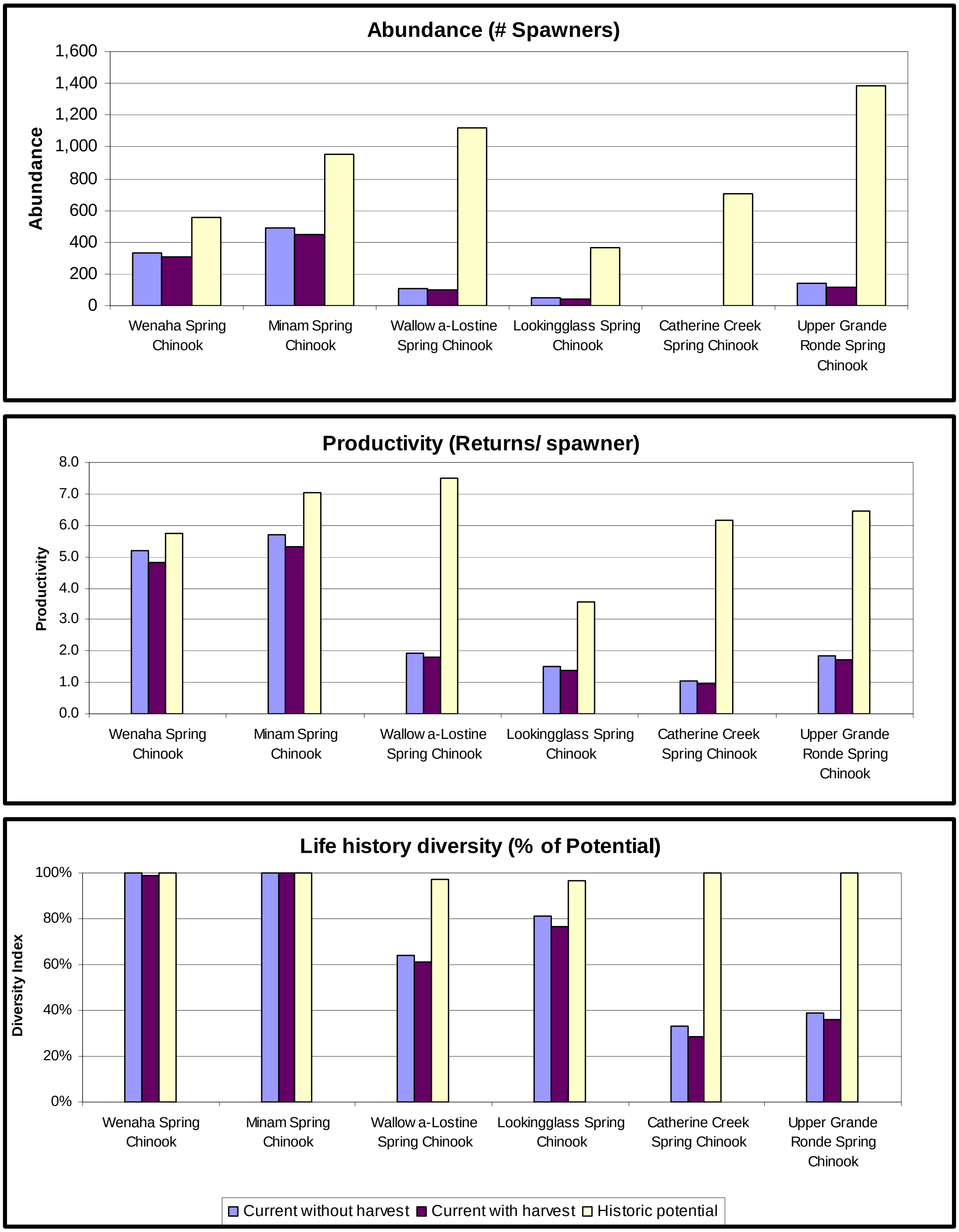
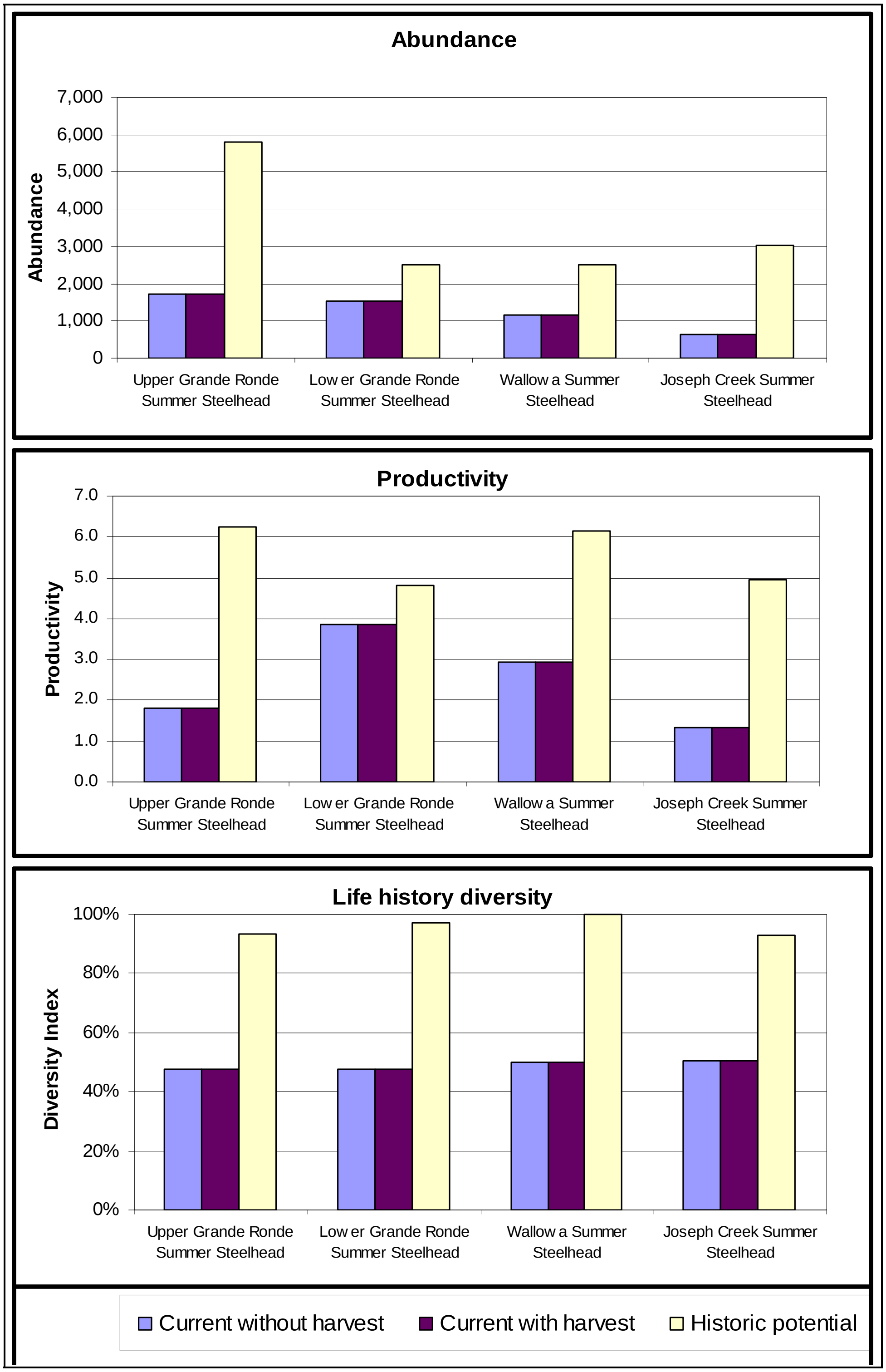


Figure 3 **EDT estimates of abundance, productivity, and life history diversity compared to estimated historic potential for Grande Ronde Subbasin summer steelhead (NPCC 2004a, Figure 22, pg. 72)**



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. CTUIR staff coordinated closely with GRMW staff in the development and administration construction contract documents for the Wallowa-McDaniel II Restoration Project. CTUIR provided template documents for the request for bids and construction subcontract, provided detailed reviews and comments on the documents to tailor specific needs of the project, and jointly administered project construction and inspection with project partners (GRMW and ODFW). Additionally, CTUIR staff provided administrative activities in cooperation with NRCS on the Meadow Creek and End Creek projects associated with project maintenance. Specific activities included additional seed purchases for the End Creek Project and equipment rental to conduct minor maintenance on the Meadow Creek Project using NRCS WRP funds which are administered through intergovernmental agreements between the CTUIR and NRCS. Project biologist supervised 3 permanent and 5 seasonal employees to accomplish project activities. Major purchases during the reporting period included a 500cc Artic Cat TBX ATV.

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. Primary CTUIR activities during the reporting period included development of a biological assessment for the Wallowa-McDaniel II Project, coordination with GRMW and CTUIR cultural staff on the Ladd Creek cultural surveys, and review of the biological assessment for Ladd Creek. Additionally, the project biologist has taken the lead in developing the ODSL/USCOE permit application for Ladd Creek due to staffing and workload assignments of other project partners (GRMW and ODFW). In addition to the Ladd Creek EC compliance activities, project biologist has initiated planning/design for two, Biop/Remand projects in partnership with the Wallowa-Whitman National Forest (WWNF), LaGrande Ranger District. Projects include the Upper Grande Ronde Tailings Project and Camp Carson Erosion Control Project. Project biologist is initiating cultural resource investigation and planning for site survey. Project scheduled for implementation in 2009.

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, ESA recovery planning, and Biop/Remand project development and selection processes, and assist with providing watershed restoration education. CTUIR technical staff coordinates through the GRMW on the Board of Directors and Technical Committee to help facilitate development of management policies and strategies, project development, project selection, and priorities for available funding resources. Project biologist coordinates regularly with GRMW staff to discuss policy and technical issues, brainstorm project development, strategize near term and long term subbasin restoration activities, and participate in project tours scheduled by GRMW. In addition, staff continues participation in various recovery planning activities through the NMFS technical teams for ESA-listed salmon and steelhead stocks in the Grande Ronde Subbasin.

CTUIR project biologist (Allen Childs) and Winston Morton ODFW biologist lead tour of the 2007 Wallowa-McDaniel II Restoration Project for BPA representatives

In October, 2007 the project biologist presented a professional paper at the Native American Fish and Wildlife Society Annual Conference held in Kaneta, Oregon on the Warm Springs Indian Reservation. The presentation, entitled "CTUIR Grande Ronde Subbasin Restoration Projects" provided an overview of habitat enhancement and restoration activities and highlighted several large-scale projects undertaken by the CTUIR and project partners, including McCoy Meadows, Longley Meadows, End Creek, and the Wallowa River Projects. CTUIR staff has 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 provides 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.

LaGrande School District 6th grade students survey a channel cross section at the annual Spring Creek Outdoor Education Program.

Students plot data and graph surveyed channel cross section

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. 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 conditioned live whips (collected dormant, soaked in water until root nodule development for 2-3 weeks prior to out planting), containerized plant stock, whole tree/shrub transplants/salvage, and broadcast seeding. Locally adaptive species of the appropriate elevation band are used to facilitate vegetation establishment. Planting efforts are usually constrained to late fall/early spring dormancy periods to minimize plant stress and optimize survival. CTUIR and ODFW staff prefers spring planting which appears to optimize plant survival. Both fall and spring seeding however, is employed. 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. CTUIR Native Plant Nursery provides a full service nursery with greenhouse, refrigerated cooler, irrigated stool beds, and containerized plant stock.

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CTUIR Native Plant Nursery stool beds and containerized plant stock. Stool beds provide approximately 20,000 native willow whips annually for Grande Ronde habitat enhancement projects

The project biologist facilitated development of willow stool bed 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 stool bed has been planted in locally derived native willow species which are harvested annually to provide live whip materials for installation on habitat restoration projects. The stool beds 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.

During the FY2007 project period, several project planting efforts were completed, including End Creek and Meadow Creek during spring 2007 and Wallowa and McCoy Creek during spring 2008. Planting tasks include site planning and development of planting strategies, collection and preparation of materials (pruning and conditioning of live whip material), and installation. Planting techniques vary and are customized to each project area and planting location, type of material being planting, and soil/substrate conditions.

Willow (salix spp.) live whip installation is generally completed using KCB planting spades and dibble sticks (metal rod with handle) to create a small planting hole for whip materials up to 24 inches in length. In rocky soil conditions or where deep planting is necessary to reach groundwater tables, a combination of strategies may be used, including mechanical trenching using a small track-hoe or tractor or a gas-powered earth auger with 4 foot drill bit. Sedges and rushes are planted manually in 3 inch diameter plugs or mechanically in large matts. Additional activities may include installation of protective devices to reduce animal depredation and installation of temporary irrigation when water rights permit such use.

Tribal staff prepare for planting live willow whips collected from CTUIR Native Plant Nursery. Materials are collected during early spring dormancy, soaked in water for 2-3 weeks, and out planted at the onset of root nodule development.

Project planting activities undertaken during the reporting period are presented by project and time period. The reporting period encompassed two planting periods (April-May 2007 and March 2008).

Additional planting operations are currently underway at the End Creek Project complex (Dake property) with spring 2008 activities recently completed at the Wallowa River-McDaniel II project and the McCoy Meadows project complex.

Mechanical installation of live willow whips. Track-hoe is utilized to excavate small trench to install pre-conditioned whips. Deep planting improves survival and facilitates establishment.

Revegetation success at the McCoy Meadow Restoration Project Complex (McCoy Creek and Meadow Creek project components) has been challenging with several marginally successful efforts and a general poor success rate in establishing native willow communities. During late March, 2008 the project biologist completed an analysis of the groundwater monitoring data (see Monitoring & Evaluation section of this report for additional information) to identify areas where summer baseflow groundwater elevations were within 3 feet of the meadow surface elevation. These sites were then selected for strategic, deep planting using a hand-held earth auger, 3.5 foot long, 3 inch diameter drill bit

Five primary planting units were selected at groundwater well locations illustrating elevated groundwater elevations and positive trend lines for increased groundwater elevations following project construction, including wells 6, 8, and 9, 15 and 19, 21, 22, and 23, 24 and 27, and 37 and 39 (See following figure for well locations. The planting guide specified patch or group planting at each site with 120-150 willow bundles planted at each site in the vicinity of selected groundwater wells on a variable width spacing of 6-12 feet installation of 5 whips per hoe (pre-conditioned, 4-5 foot length willow whips consisting of booth and McKenzie willow).

Figure 4 McCoy Meadows Groundwater Monitoring Well Network

Auger holes were drilled to maximum depths unless large gravel/cobble was encountered. Plant materials were then placed in an upright position and backfilled with compacted soil. Following plant installation, approximately 25% (142 total) of the bundles were protected with a 2 foot diameter, 42 inch height, wire cage attached to a 5 foot t-post. Additional protection devices will be installed pending initial survival counts and observations of big game (primarily elk) depredation.

During spring 2007, CTUIR staff completed spring planting along the wetland channel network constructed during summer 2006. Activities included manual installation of 2,600 sedge/rush plugs and approximately 8,500 live willow whips. Planting locations included sites between sedge matts installed along channels during summer 2006 and throughout the lower restoration channel network. Late summer observations indicate that willow survival was poor due to a combination of extreme high summer temperatures and poor water/moist soil conditions. Additionally, heavy elk use of the meadow resulted in severe depredation on shrubs and newly established willows.

Deep willow clump plantings at McCoy Meadows. Past efforts to establish willows using shallow planting techniques have proven marginally successful due to lack of soil moisture during summer baseflow periods, loss of plants due to channel adjustment, and big game degradation. During spring 2008, project staff employed a different strategy involving selection of planting sites based on known, shallow groundwater areas, planting in patches, and installing protection devices which has proven greater success than unprotected plants at McCoy Meadows.

During March 2008 ODFW and CTUIR habitat crews completed extensive revegetation on the Wallowa River-McDaniel II Restoration Project. A combination of strategies were employed to complete revegetation efforts along approximately 0.4 miles of restoration channel constructed during summer 2007. Activities included excavating, hauling, and installation of approximately 240 native trees and shrubs (primarily black cottonwood, alder, booth willow, and aspen), mechanical installation of 4,000 coyote willow whips on gravel bars and an estimated 10,000 whips collected from pruned booth willow transplants.

Gravel bar coyote willow trenching using a small track-mounted excavator

Whole trees and shrubs were planting throughout the project floodplain. Coyote willow was trenched into gravel bars and in multiple rows, and booth willow whips were trenched on the floodplain interspersed with the whole tree/shrub transplants. Additionally, approximately 40 pieces of large wood debris was placed in debris jam configurations in conjunction with planting efforts. The entire project areas was then seeded by ODFW with a custom project seed mix featuring tufted hairgrass, basin wildrye, Idaho fescue, and bluebunch wheatgrass. The planting effort and seed purchases were funded under the GRMW through various project grants administered by the GRMW.

Large woody debris placement in conjunction with revegetation efforts. Project staff determined that completing wood placement prior to revegetation activities would minimize disturbance of planted and seeded materials

Upper project reach illustrating spring planting activities. Note whole tree and shrub planting in upper left of photo along floodplain. Willow whips in bottom foreground are temporarily stored in water prior to planting.

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

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. Approximately 12 miles of fence are maintained at McCoy Meadows and Longley Meadows.

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.

Water Quality Monitoring

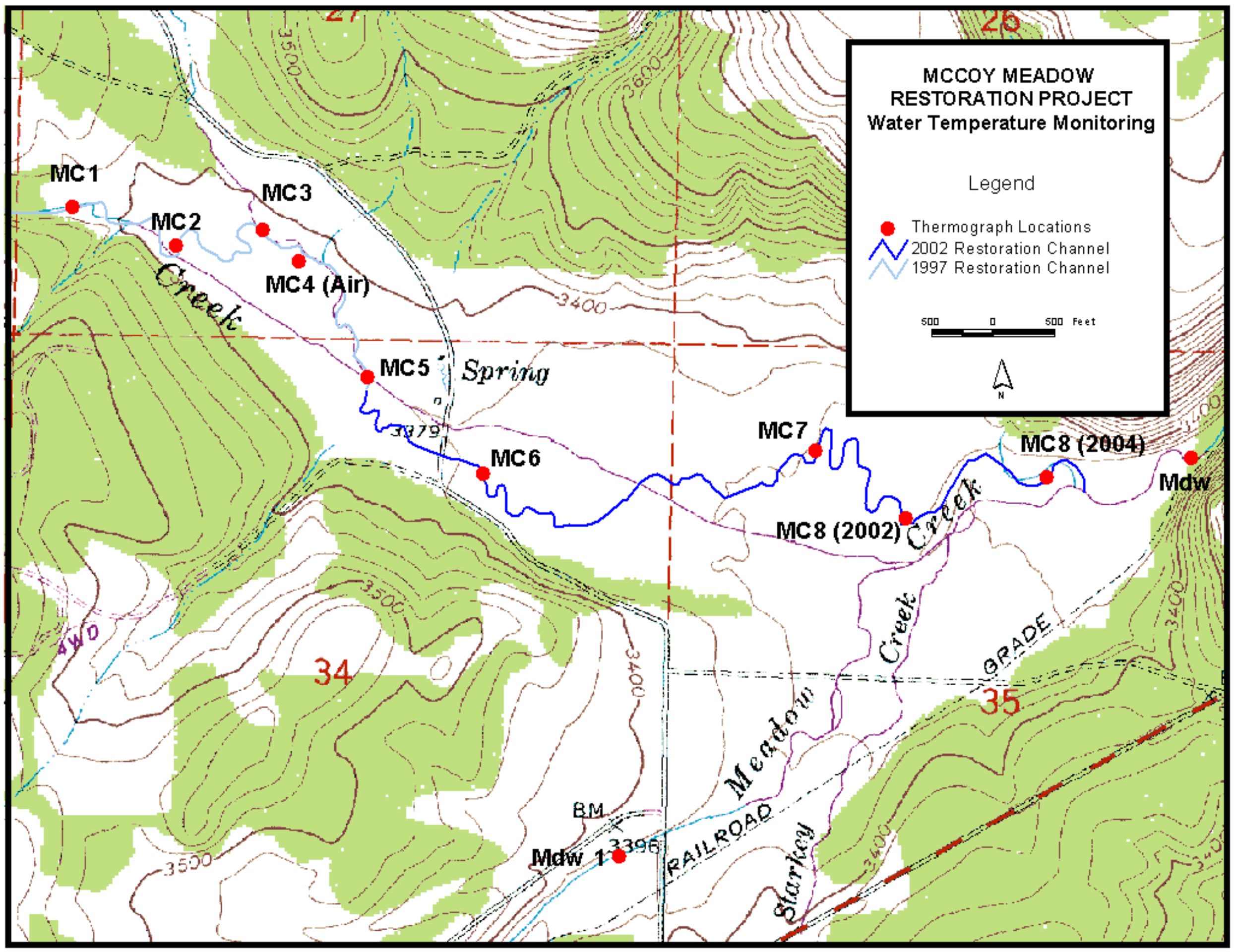
The CTUIR have conducted water quality monitoring in the Upper Grande Ronde Subbasin since 1997, initially at the McCoy Meadows project complex, with expansion of the monitoring effort to Longley Meadows in 2002 and End Creek in 2005. An average of 16 Onset thermographs are deployed at selected project sites to evaluate response of water temperatures in relation to habitat enhancement activities. Two Dataloggers were installed in lower Meadow Creek during 2007. Water temperature analysis is evaluated in relation to temperature tolerances for Chinook salmon and summer steelhead. Upper and lower lethal water temperature limits for salmonids are illustrated in the following table developed by the Independent Scientific Group (ISG, 1996). Following is a summary of water temperature monitoring efforts.

Table 5 Upper and Lower Water Temperature Tolerances for Salmonids

LIFE STAGE	WATER TEMPERATURE			
	Optimum	Range	Stressful	Lethal*
Adult migration & spawning	10°C	8-13°C	>15.6°C	>21°C
Incubation	<10°C	8-12°C	>13.3°C	>15.6°C
Juvenile rearing	15°C	12-17°C	>18.3°C	>25°C
*Based on 1 week exposure period, higher tolerances for shorter exposure period				

McCoy Meadows Water Temperature Monitoring: Thermographs were installed to measure water temperature along McCoy and Meadow Creek in 2009 with nine onset thermographs deployed: seven in McCoy Creek, and two in Meadow Creek wetland channel network constructed in 2006. 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 in the lower reaches near the confluence with Meadow Creek. An additional 6 probes have been deployed in the middle project reaches to evaluate water temperature changes within the project area. Figure 6 illustrates locations of water quality sampling locations.

Figure 5 McCoy Meadows Thermograph Locations



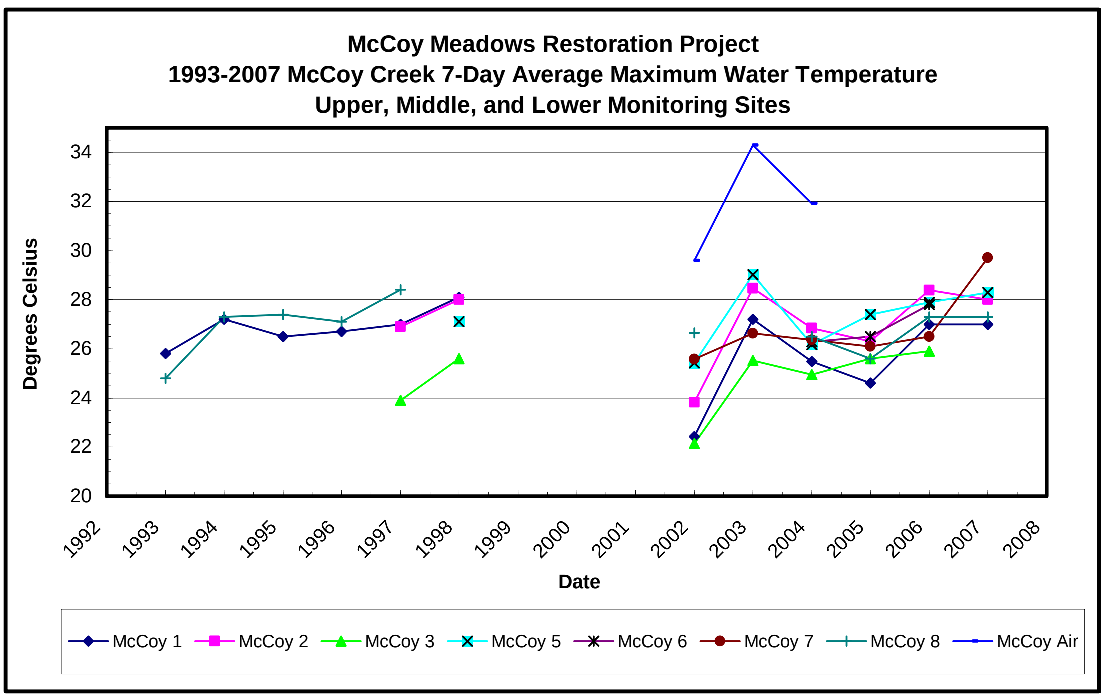
Average seven day maximum water temperatures for the McCoy Creek data set were obtained from data collected by the Oregon Department of Environmental Quality from 1993 to 1998, which are utilized as baseline data to compare with data collected by CTUIR. Two new Unidata Starloggers were installed in Meadow Creek in May 2007. The upper site was installed at river mile 2.8 (Meadow 1) and below the junction of McCoy Creek with Meadow Creek at river mile 1.5 (Meadow 2). The data loggers are equipped with two probes with one measuring air temperature and the other measuring water temperatures. 2007 was our first experience with Unidata loggers and staff encountered several problems with programming and damage caused by elk. A number of data gaps exist in the 2007 data set and staff are currently conducting an analysis of the data set to determine which components of the data are useable.

Table 6 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.

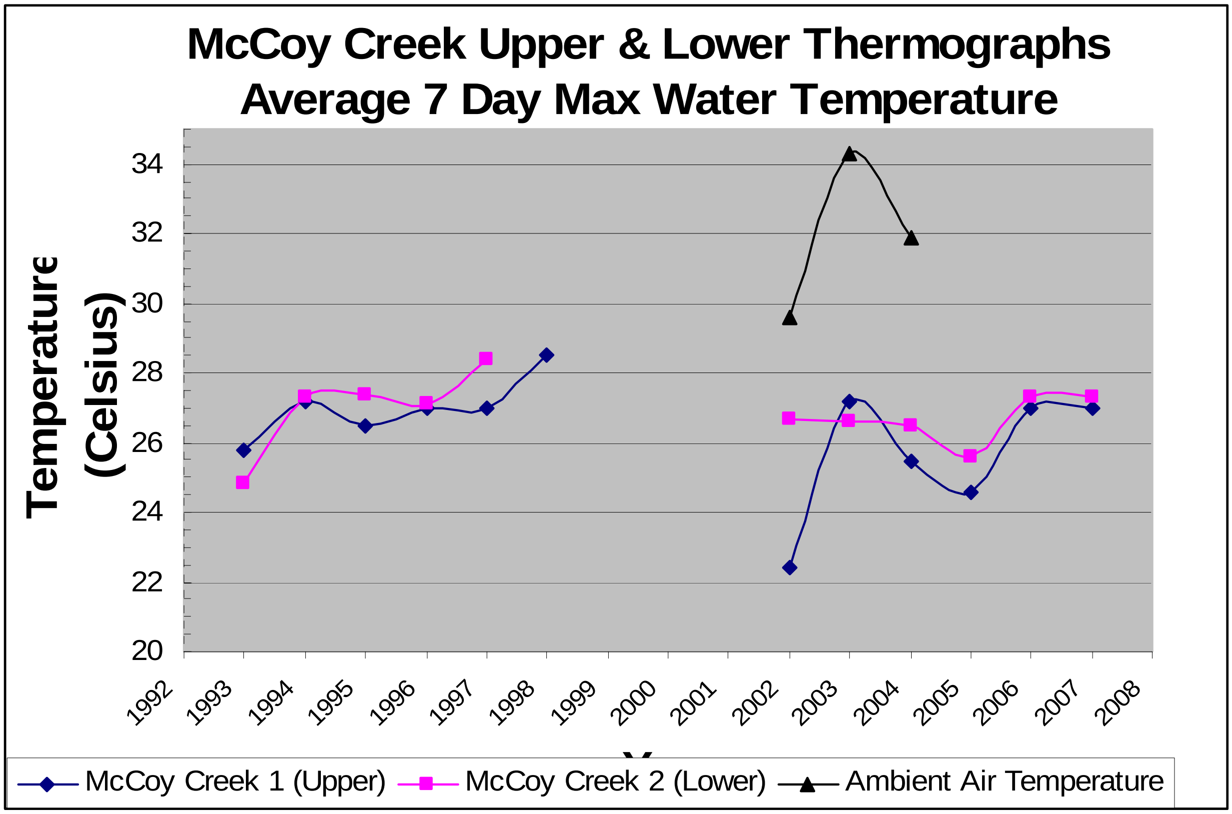
Year	McCoy 1	McCoy 2	McCoy 3	McCoy 5	McCoy 6	McCoy 7	McCoy 8	Meadow 1	Meadow 2	McCoy Air
1993	25.8						24.8		25.3	
1994	27.2						27.3		27.3	
1995	26.5						27.4		26.4	
1996	27						27.1		25.8	
1997	27	26.9	23.9				28.4		25.4	
1998	28.5	28	27.8	27.1					27.5	
2002	22.4	23.8	22.1	25.4	16.9	25.6	26.7	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	
2007	27	28	Dry	28.3	Dry	29.7	27.3	Data logger Error	Data Logger Error	

Figure 6 Lower McCoy Creek Average 7 Day Maximum Water Temperatures at Eight Sampling Locations



Baseline water temperature data from the late 1980's/early 1990's (ODFW, 2006 & ODEQ, 1999) indicate a 3.7 ºC difference between the upper and lower sampling locations, with a warming trend through the project reach. By 2005 following implementation of the 1997 and 2002 habitat enhancement projects, ODFW reports a 1.53 ^{O}C difference between the sites, indicating a decrease in the average 7 day maximum water temperature. CTUIR data indicate similar trends with 2007 data illustrating a 0.3^{o}C difference in maximum temperatures between the upper and lower sites (See Figure 8).

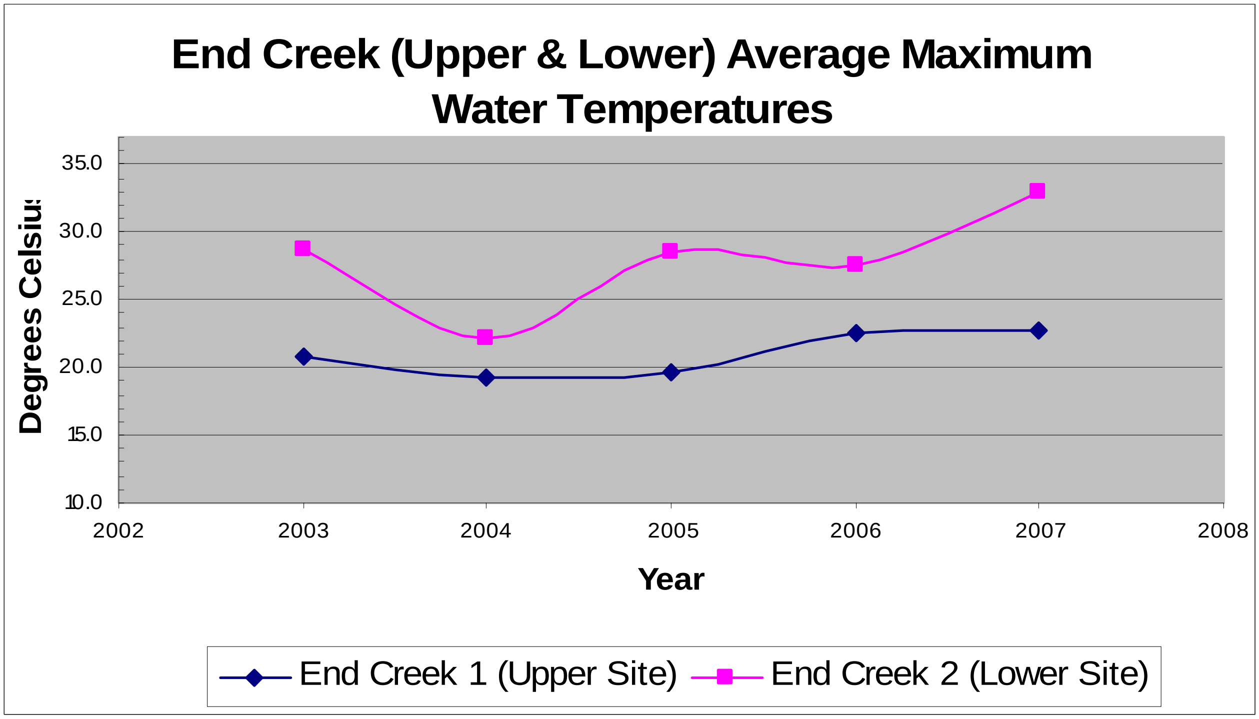
Figure 7 **McCoy Creek Average Maximum Water Temperature Sampled at Upper and Lower Monitoring Sites**



Although there appears to be a slight decrease in maximum water temperatures between the upper and lower sites, summer temperatures during baseflow conditions remain above salmonid tolerances described in the literature. Data reported by ODEQ (1999) as well as data illustrated in Figure 7 indicate however, there are stream segments within the project reach that appear to provide cold water refuge, particularly areas associated with documented improving trends in average groundwater elevations (See Groundwater Monitoring section later in this report). Specific reaches indicating cold water infusion includes areas represented by McCoy 3 and 8.

End Creek Water Temperature Monitoring: Water temperature monitoring was initiated by the CTUIR in 2003 along End Creek as part of a baseline assessment conducted by CTUIR and ODFW for the 776 acre End Creek Restoration Project. End Creek within the project reach was extensively channelized with stream segments incised upwards of 10-12 feet with vertical, eroding streambanks and very poor riparian vegetation. The upper site was originally established immediately downstream of Hunter Road approximately 025 miles upstream from the project but was relocated in 2007 to the upper project reach on the Davidson parcel. Baseline and recent water temperature data indicate thermal loading from the upstream to downstream sampling locations See Figure 9. In 2003, a 7.9 ^{o}C difference (7 day average maximum) between the upper and lower sampling locations was measured. The difference has varied between years with a minimum difference of 3^{o}C in 2004 to 10.3 ^{o}C in 2007. Additional analysis of the 2007 data at site 2 is necessary as the large increase in the difference between the upper and lower sites could be the result of several variables, including periods of probe exposure to ambient temperatures (dry conditions) caused by seasonal upstream irrigation withdrawals. ODFW maintains a permanent data logger downstream of the CTUIR's sampling site to compare data. However, data was not available in time for incorporation into this analysis. Annual monitoring efforts will continue provide data to evaluate project development in combination with other monitoring efforts conducted by CTUIR and ODFW (juvenile fish population rearing densities (see below), adult spawning ground surveys and groundwater (ODFW), and channel morphology and vegetation development.

Figure 8 End Creek Average Maximum Water Temperature Sampled at Upper and Lower Monitoring Sites



Groundwater Monitoring

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 tables, 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. The CTUIR conducts monitoring activities on a 55 well monitoring network on the McCoy Creek Restoration Project complex. The following figure illustrates the McCoy/Meadow Creek monitoring network.

McCoy Meadows Restoration Project Complex Groundwater Monitoring: Groundwater elevation monitoring is a part of the monitoring and evaluation efforts conducted at the McCoy Meadows Restoration Project. A network of 54 shallow groundwater wells was installed in stages by NRCS and CTUIR staff in 1996, 1998, and 2005 to evaluate groundwater response to restoration channel construction and floodplain improvements initiated along McCoy Creek beginning in 1997 and along Meadow Creek in 2006.

Groundwater data collection activities were initiated in the upper meadow complex on 20 wells (Wells 1-20) beginning on November 26, 1996. An additional 19 wells (Wells 21-39) were installed in the lower meadow during summer 1998 with data collection efforts initiated on August 19, 1998. Groundwater wells, consisting of 2 inch diameter, perforated PVC pipe, along McCoy Creek were manually installed using a hand-held earth auger, resulting in variations in well depth depending on sub-surface substrate conditions. Generally, 2-3 feet of fine sediment (sandy loam) was documented overlain several small to cobble sized gravel material. These wells vary in depth from as deep as 7.3 feet to as shallow as 2.60 feet, averaging 4.84 deep. McCoy Creek wells 1, 17, and 33 were subsequently damaged or destroyed during project construction efforts. Therefore, current monitoring efforts include 35 wells along McCoy Creek and 16 wells along Meadow Creek for a total of 51 wells.

Figure 9 McCoy Meadows Groundwater Monitoring Well Locations

Wells along Meadow Creek were installed by excavating a small trench up to 10 feet deep with a small, track-mounted excavator and placing a 10 foot long, 2 inch diameter section of perforated PVC pipe at the bottom of the well hole and backfilled. Subsurface sediment layers were also documented with an upper sandy loam 2-4 feet in depth, underlain with 4-6 feet of small to medium sized gravel. A volcanic tuft layer (clay) was generally encountered from 7-9 feet below the meadow surface. All groundwater wells were capped with screw on PVC caps, locations documented with hand-held gps units, and well head and adjacent ground elevations surveyed using a TopCon lazer level and survey rod. Well head and ground elevations were referenced to previously established benchmarks and recorded on each well.

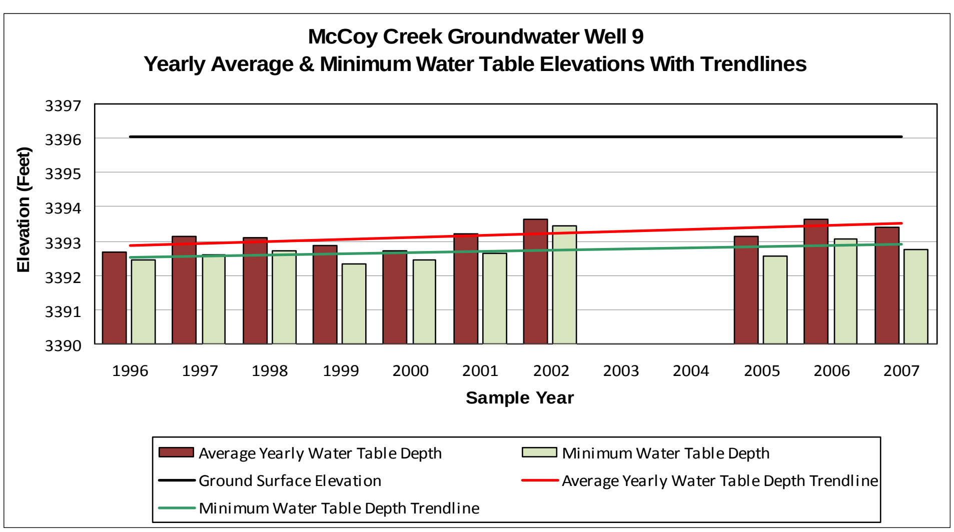
Data collection for the McCoy Creek well network was initially performed by the landowner until April 2005. From 2005 to the present, CTUIR staff has assumed data collection and management responsibilities for the entire groundwater well network. Well locations and maps, physical well data, and bi-weekly/monthly elevation data is maintained in an Excel spreadsheet.

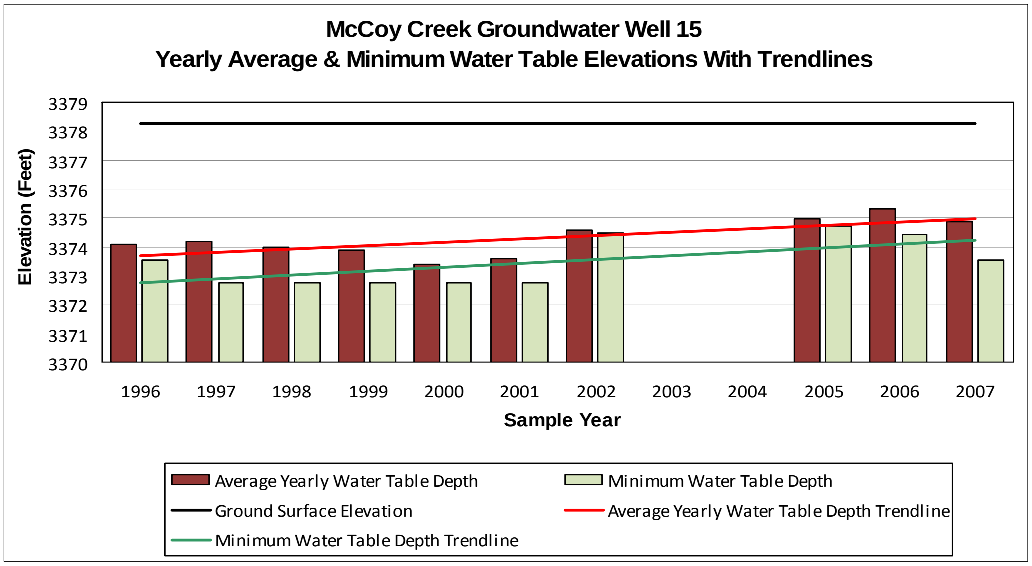
Following is an overview of the groundwater data collected for the McCoy Creek and Meadow Creek Restoration Projects. The data sets are presented separately because there have been several phases of project construction and implementation and different responses to completed actions.

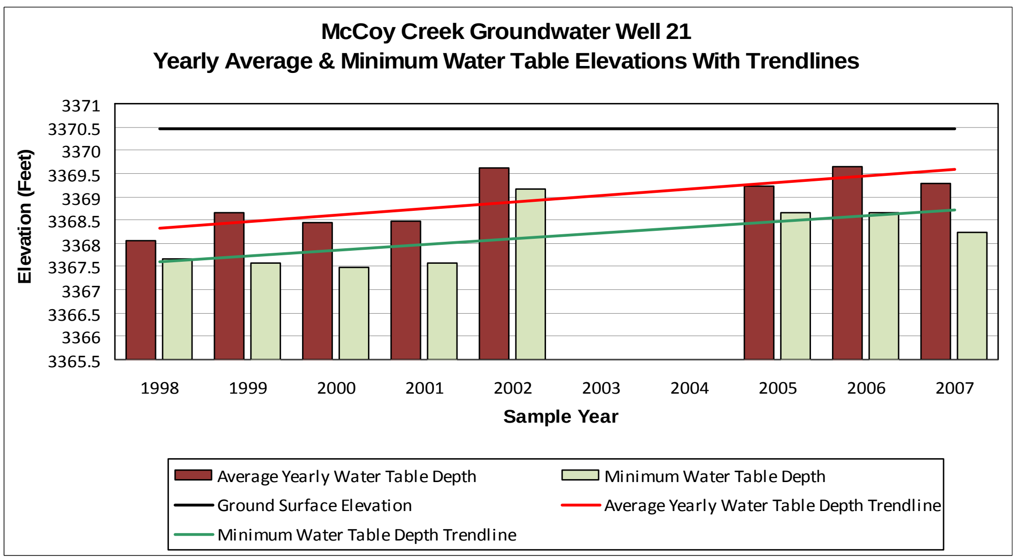
McCoy Creek Analysis – Restoration work along McCoy Creek was initiated in 1997 and completed in 2002. The 1997 phase included re-activation of the abandoned (Pre-1977) stream channel and reclaiming the channelized reach between 1997 and 1999. The second phase of the project included construction of approximately 8,500 feet of restoration channel beginning at the downstream reach of the first phase in the upper meadow to the lower meadow and confluence with Meadow Creek. Channel construction was completed in 2001 with activation in 2002.

Data analysis illustrates relative response of groundwater elevations in comparison with the pre-project baseline, as wells between individual wells and well network cross sections. In general, groundwater elevations are showing positive trend lines in the upper project reach (1997) and varying responses through the 2002 project reach with negative trendlines in the upper, middle reach and lower extent of the groundwater monitoring network, and positive trendlines in the area depicted in the vicinity of wells 21, 22, 23, 24, 25, 27, 29, 37, and 39.

Of the 35 groundwater monitoring wells, 40% (n=14) illustrate positive trendlines for average annual groundwater elevations with minimal increases in average annual minimum groundwater elevations. See the following graphs for examples of positive groundwater elevation response. Positive, improving trends are illustrated for both average annual and average minimum groundwater elevations at these monitoring well sites, although groundwater elevations remain several feet below respective ground surface elevations.

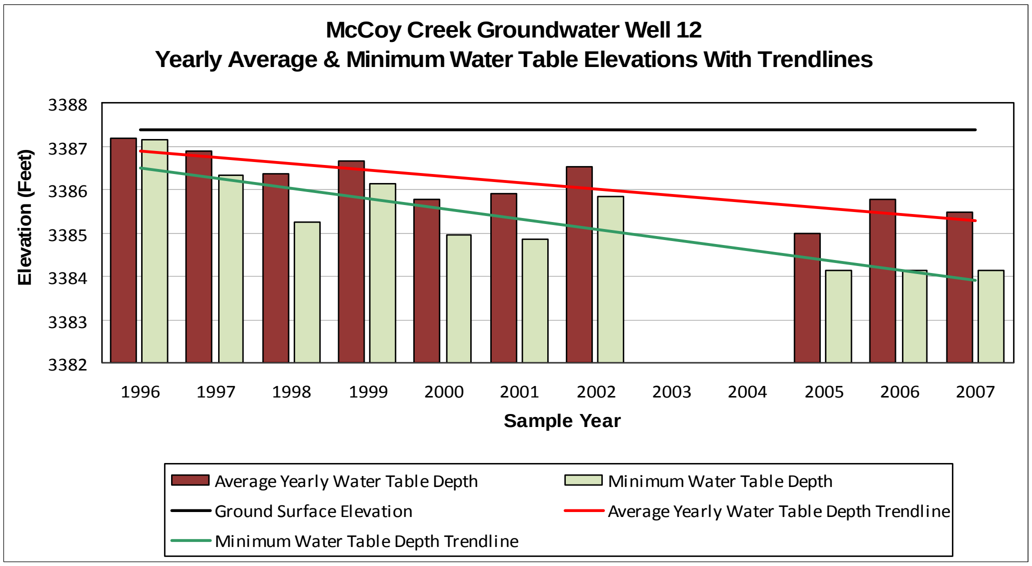


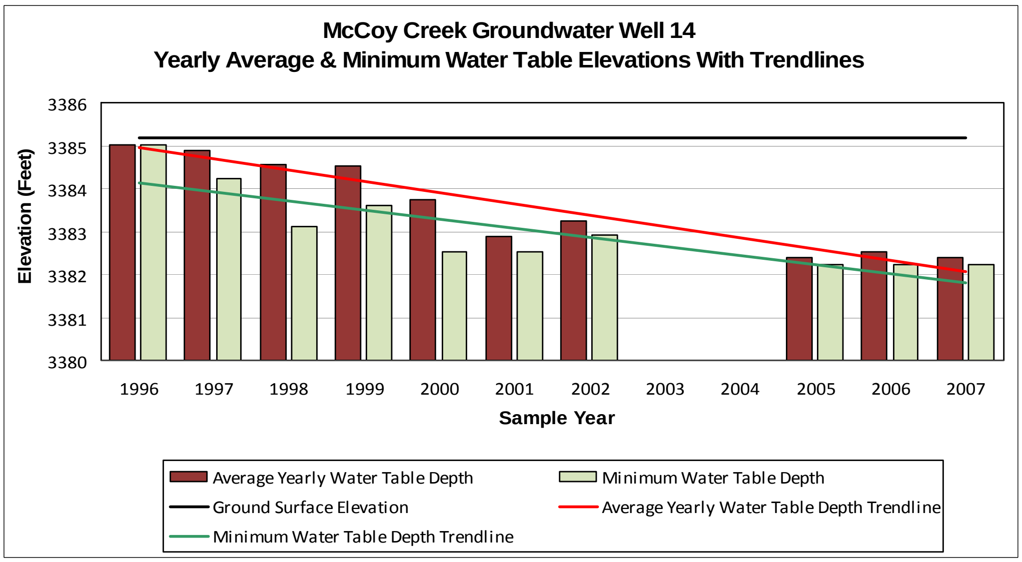


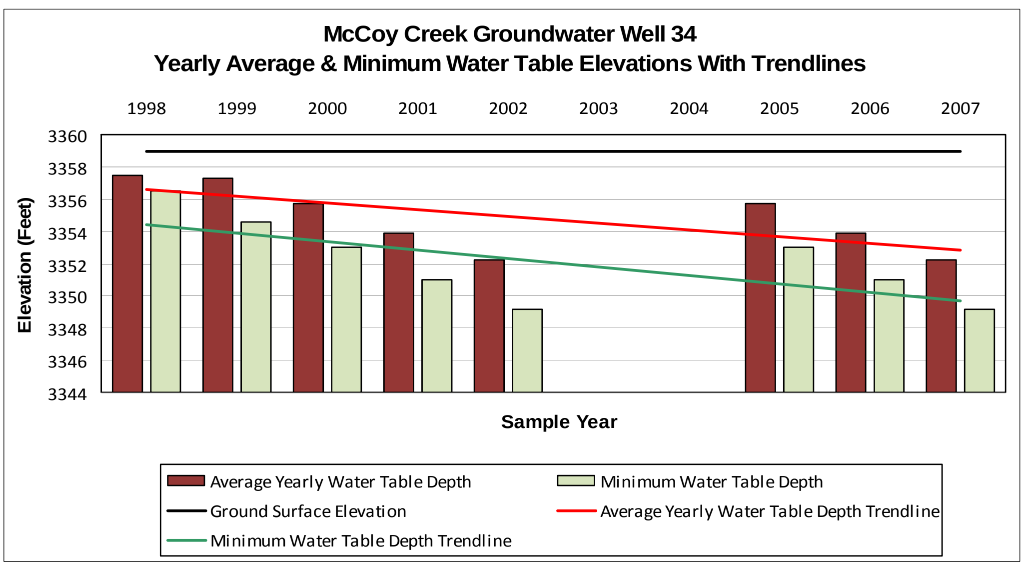


Seven (20%) of the wells (primarily in the middle project reach (wells 5, 11, 12, 13, 14, 34, and 35) show declining, negative trendlines for groundwater response. Of particular concern is the dramatic decrease and negative trendlines for wells in the vicinity (upstream and downstream) of the McIntyre Road bridge. This reach has been degraded by channel incision. The effects of downcutting and its impact on groundwater elevations can be readily observed from the following graphs. Resulting channel incision and lowered groundwater elevations have negatively 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. The remaining 40% of the wells (n=14) (#2, 3, 4, 7, 10, 16, 18, 20, 26, 28, 30, 31, 32, and 38) illustrate no change from the pre-project baseline.


McCoy Creek Groundwater Well 12
Yearly Average & Minimum Water Table Elevations With Trendlines
Elevation (Feet)
3388
3387
3386
3385
3384
3383
3382
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline

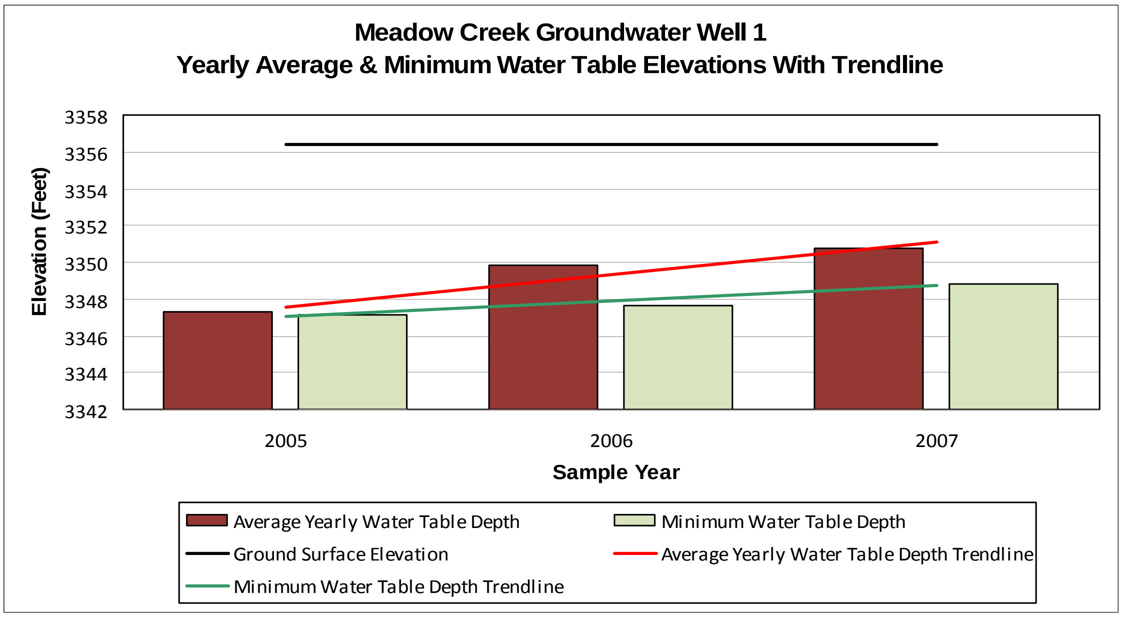

McCoy Creek Groundwater Well 14
Yearly Average & Minimum Water Table Elevations With Trendlines
Elevation (Feet)
3386
3385
3384
3383
3382
3381
3380
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline


McCoy Creek Groundwater Well 34
Yearly Average & Minimum Water Table Elevations With Trendlines
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Elevation (Feet)
3360
3358
3356
3354
3352
3350
3348
3346
3344
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline

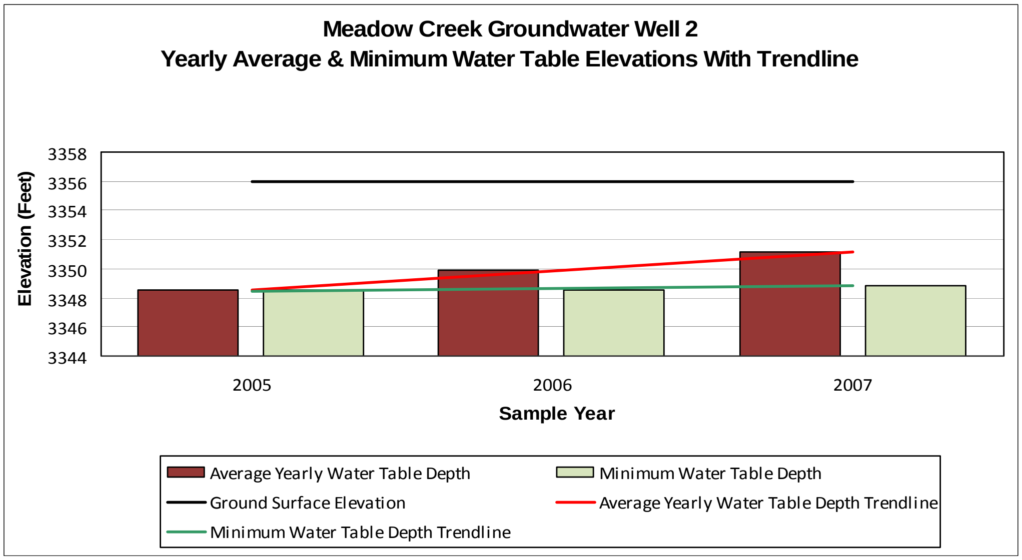
Meadow Creek Groundwater Analysis: The following figures illustrate groundwater elevation data for the Meadow Creek portion of the McCoy Meadows project completed between the monitoring period 2005 (pre-project baseline) through 2007. Following construction and activation of the wetland restoration channel in network during late summer 2006, all 16 wells have exhibited an increase in both the average annual and average minimum groundwater elevations as well as positive trends lines for average annual and average minimum groundwater elevations.

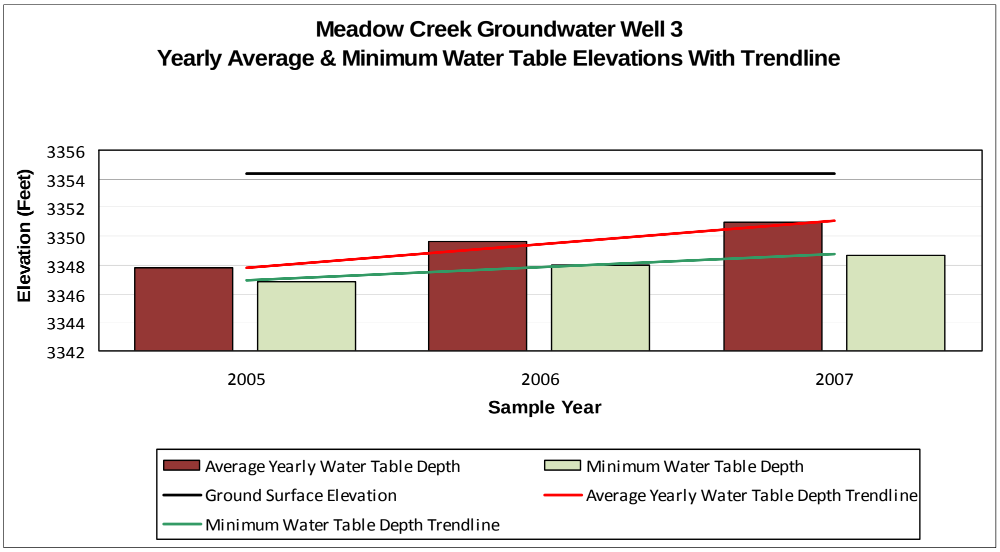
Data is plotted in relation to the meadow surface elevations at each monitoring well site in order to evaluate seasonal groundwater depths in relation to the surface and potential to provide moist soil conditions which could support development/recovery of hydrophytic vegetation. Of the 16 wells, two (14 and 16) illustrate average annual minimum groundwater elevations that were within 2.9 to 3.6 feet (respectively) of the meadow surface during the summer 2007 baseflow period. These wells are located in the upper segment of the restoration reach and the wells are in the vicinity of old stream channel scrolls which appear to be responding positively.

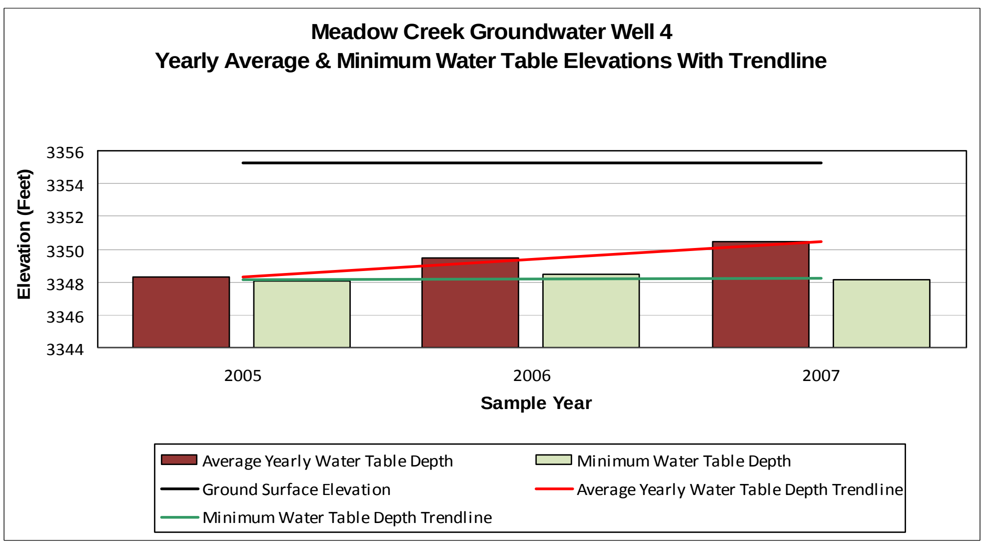
Pre-project baseline data indicated that the average minimum elevations in this portion of the project area were 4.0 and 6.3 feet (respectively). Six of the 16 wells, (#3, 10, 11, 12, 13, and 15) also responded positively with average minimum groundwater elevations within 4.1 to 6 feet of the meadow surface (compared to an average minimum 6.47 feet below the meadow surface during 2005).

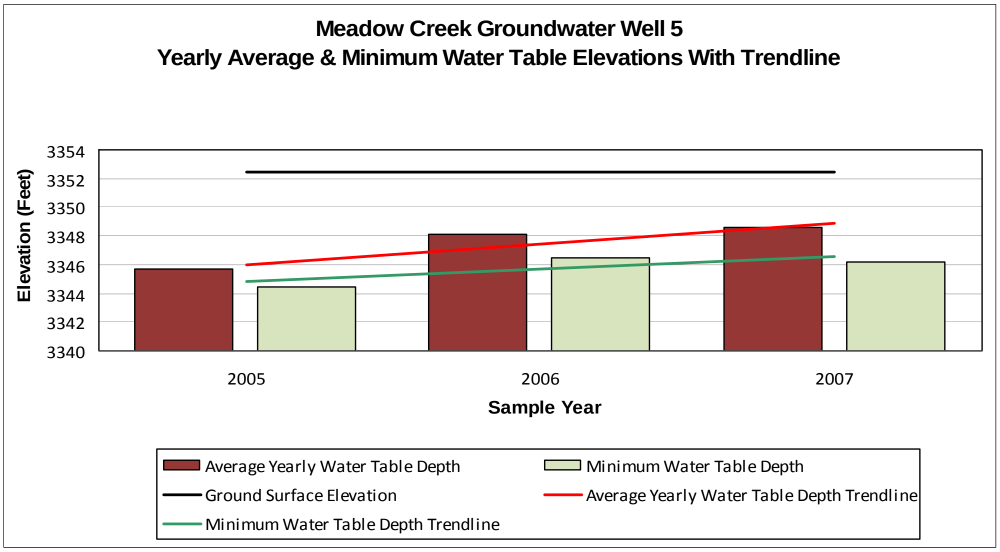


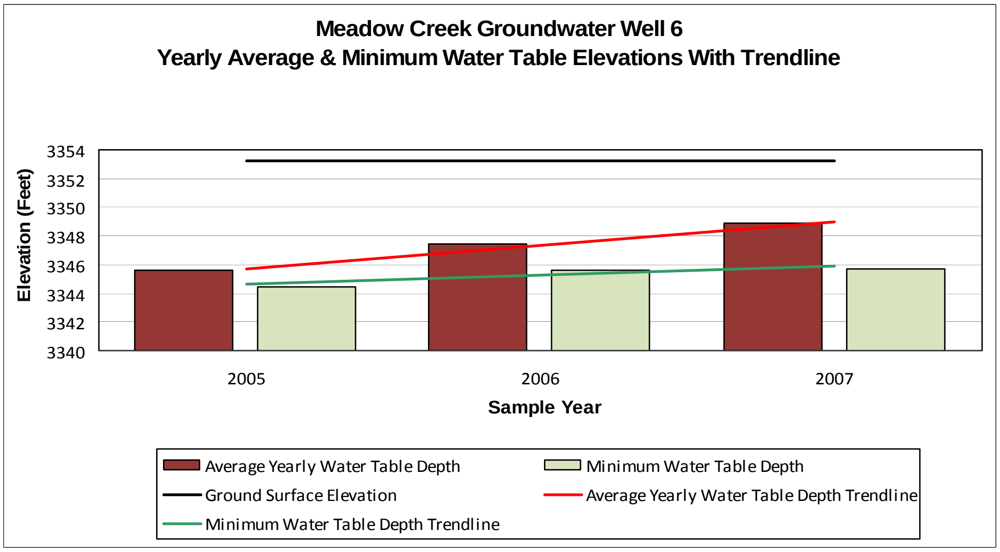
Groundwater data for eight of the 16 wells, (#1, 2, 4, 5, 7, 6, 8, and 9) illustrated less dramatic adjustments with average annual minimum groundwater elevations from 6.3 to 7.6 feet below the meadow elevation (a slight increase from groundwater elevations measured during the 2005 summer baseline data set).

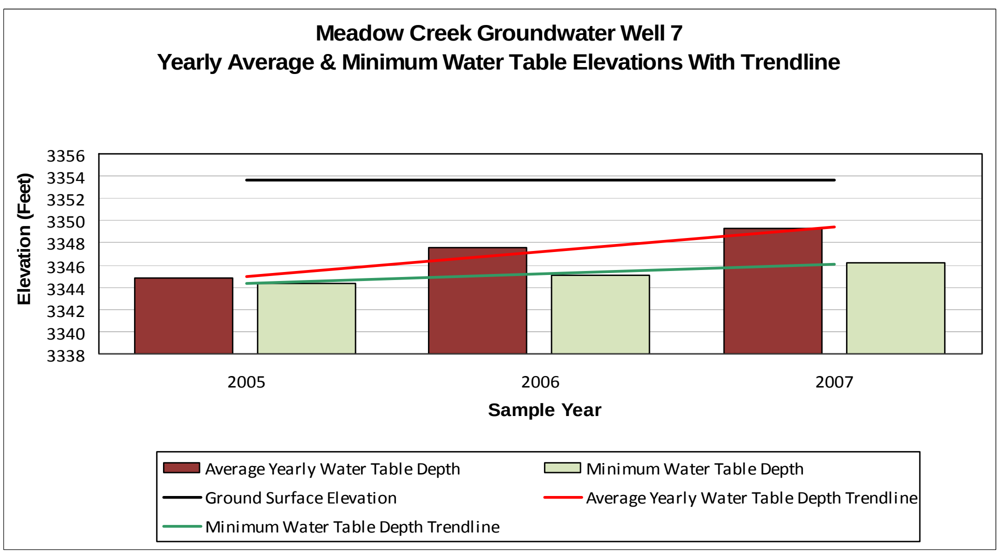

Meadow Creek Groundwater Well 2
Yearly Average & Minimum Water Table Elevations With Trendline
Elevation (Feet)
3358
3356
3354
3352
3350
3348
3346
3344
2005
2006
2007
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline


Meadow Creek Groundwater Well 3
Yearly Average & Minimum Water Table Elevations With Trendline
Elevation (Feet)
3356
3354
3352
3350
3348
3346
3344
3342
2005
2006
2007
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline


Meadow Creek Groundwater Well 4
Yearly Average & Minimum Water Table Elevations With Trendline
Elevation (Feet)
3356
3354
3352
3350
3348
3346
3344
2005
2006
2007
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline


Meadow Creek Groundwater Well 5
Yearly Average & Minimum Water Table Elevations With Trendline
Elevation (Feet)
3354
3352
3350
3348
3346
3344
3342
3340
2005
2006
2007
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline


Meadow Creek Groundwater Well 6
Yearly Average & Minimum Water Table Elevations With Trendline
Elevation (Feet)
3354
3352
3350
3348
3346
3344
3342
3340
2005
2006
2007
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline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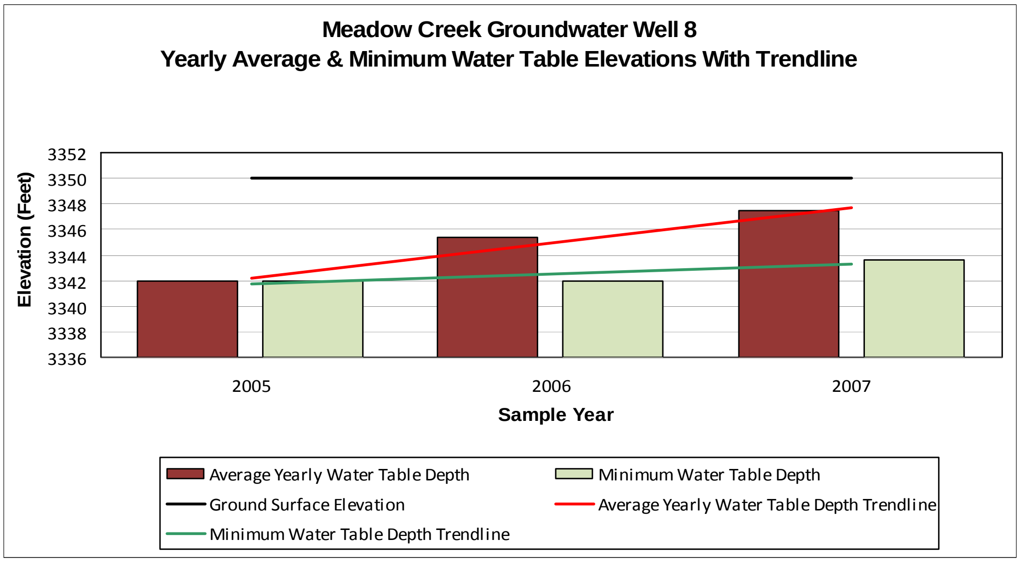
Yearly Average & Minimum Water Table Elevations With Trendline
Elevation (Feet)
3356
3354
3352
3350
3348
3346
3344
3342
3340
3338
2005
2006
2007
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline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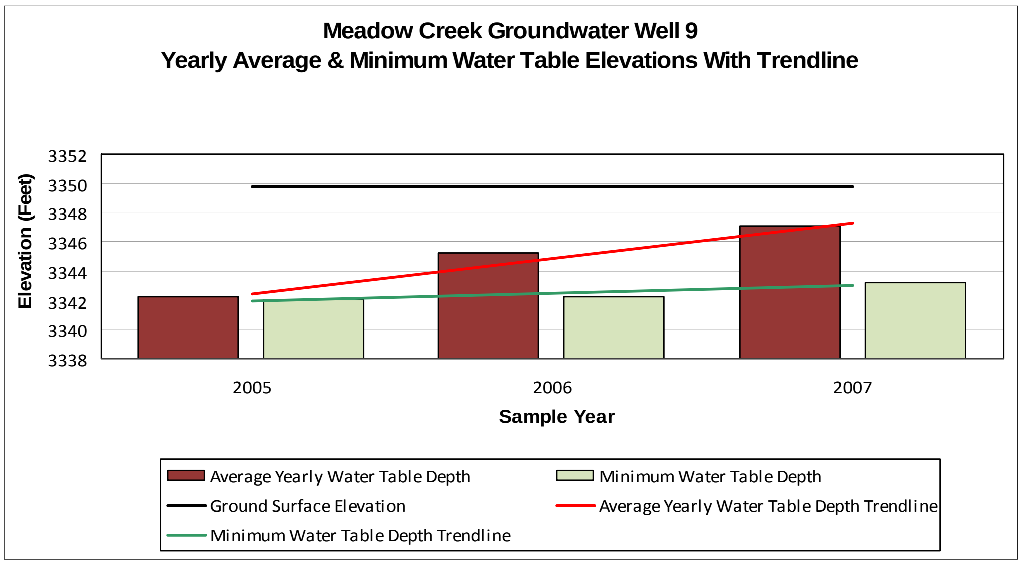
Yearly Average & Minimum Water Table Elevations With Trendline
Elevation (Feet)
3352
3350
3348
3346
3344
3342
3340
3338
3336
2005
2006
2007
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline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Yearly Average & Minimum Water Table Elevations With Trendline
Elevation (Feet)
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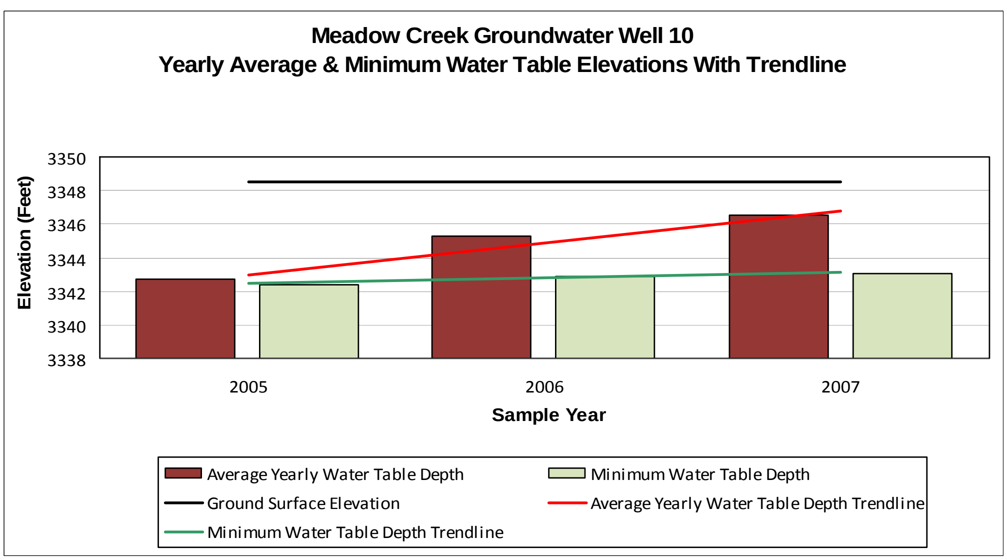
3350
3348
3346
3344
3342
3340
3338
2005
2006
2007
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline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Yearly Average & Minimum Water Table Elevations With Trendline
Elevation (Feet)
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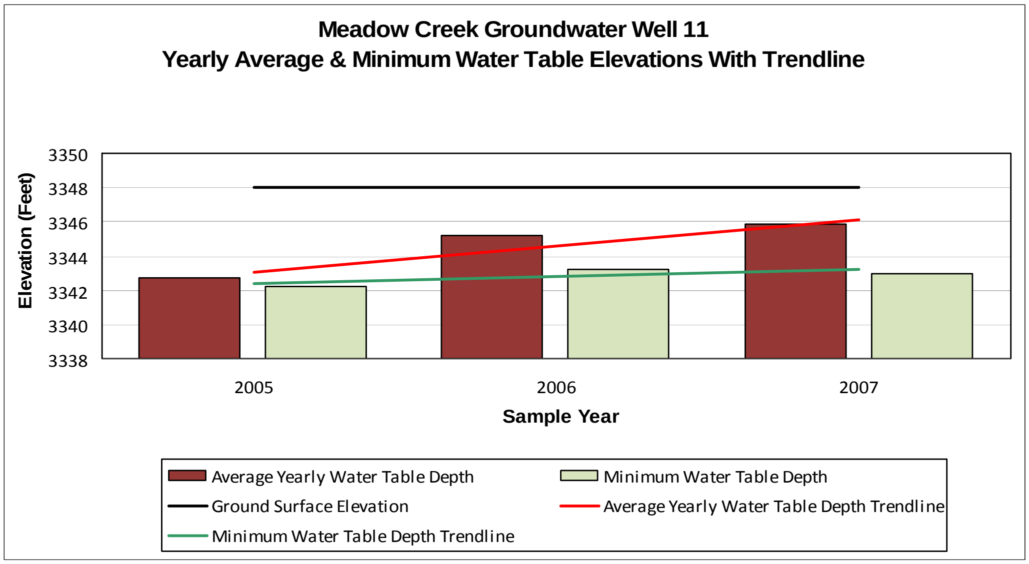
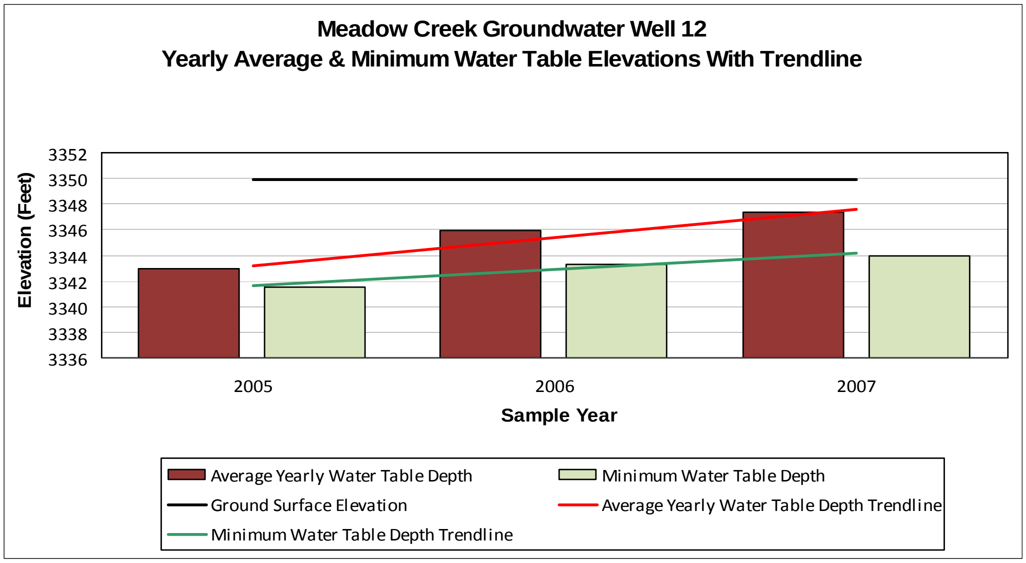
3348
3346
3344
3342
3340
3338
2005
2006
2007
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline



Meadow Creek Groundwater Well 11
Yearly Average & Minimum Water Table Elevations With Trendline
Elevation (Feet)
3350
3348
3346
3344
3342
3340
3338
2005
2006
2007
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline



Meadow Creek Groundwater Well 12
Yearly Average & Minimum Water Table Elevations With Trendline
Elevation (Feet)
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3350
3348
3346
3344
3342
3340
3338
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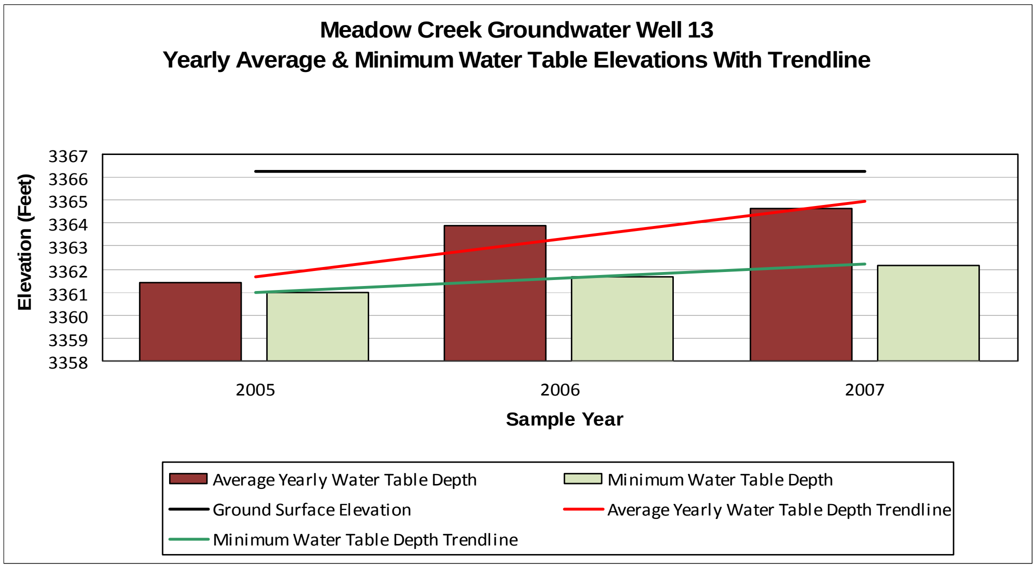
2005
2006
2007
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline



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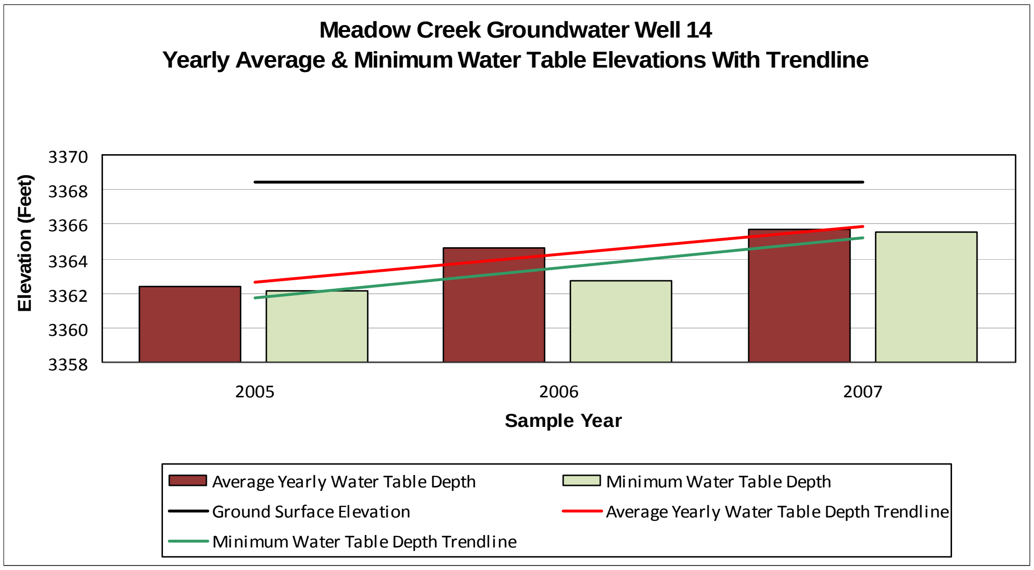
Yearly Average & Minimum Water Table Elevations With Trendline
Elevation (Feet)
3367
3366
3365
3364
3363
3362
3361
3360
3359
3358
2005
2006
2007
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline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Yearly Average & Minimum Water Table Elevations With Trendline
Elevation (Feet)
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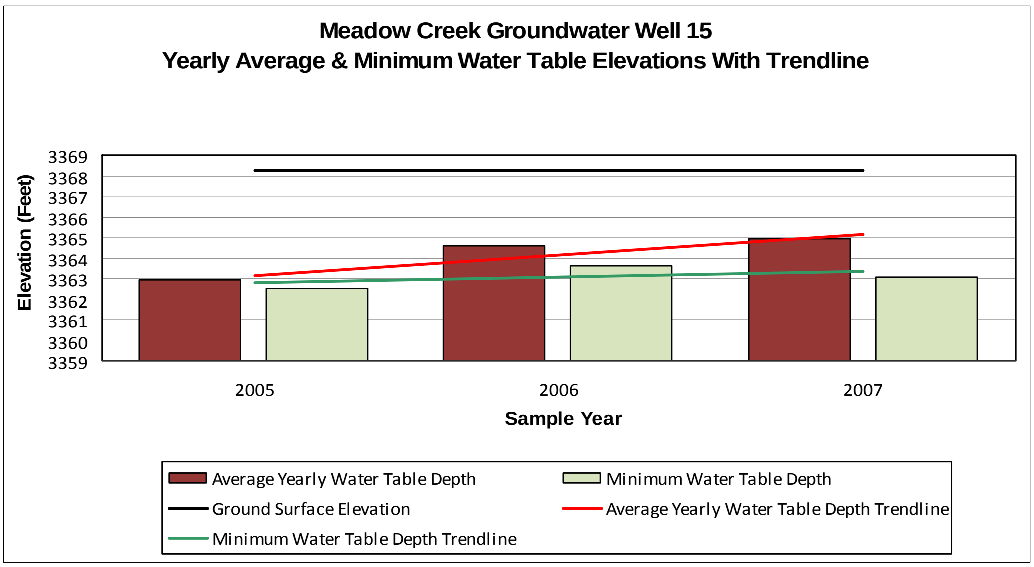
3368
3366
3364
3362
3360
3358
2005
2006
2007
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline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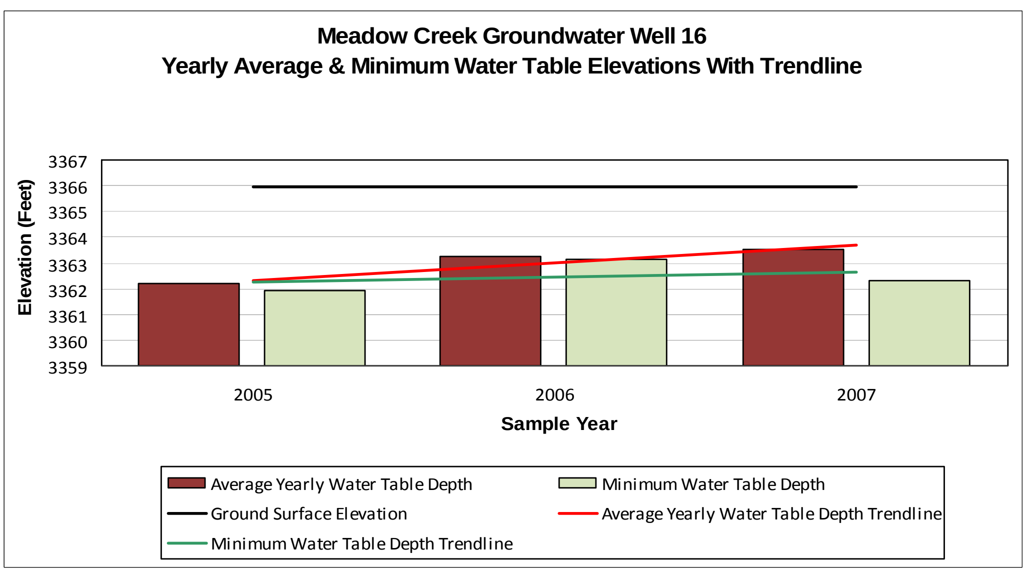
Yearly Average & Minimum Water Table Elevations With Trendline
Elevation (Feet)
3369
3368
3367
3366
3365
3364
3363
3362
3361
3360
3359
2005
2006
2007
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline


Meadow Creek Groundwater Well 16
Yearly Average & Minimum Water Table Elevations With Trendline
Elevation (Feet)
3367
3366
3365
3364
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3362
3361
3360
3359
2005
2006
2007
Sample Year
Average Yearly Water Table Depth
Minimum Water Table Depth
Ground Surface Elevation
Average Yearly Water Table Depth Trendline
Minimum Water Table Depth Trendline

Fish Population Monitoring

End Creek Juvenile Fish Population Monitoring: CTUIR staff initiated juvenile fish monitoring at the End Creek Restoration Project in 2005 to establish a baseline from which to evaluate project goals and objectives associated with restoring and enhancing summer steelhead spawning and juvenile rearing habitat. ODFW has been conducting adult redd surveys in the project area since 2005 as part of the project monitoring effort. Specific objectives of the salmonid monitoring and evaluation effort include estimating the abundance and age class for rainbow trout (O. mykiss) and response to project actions.

As part of the baseline assessment, the CTUIR surveyed 15 randomized juvenile fish population index sites along End Creek, South Fork Willow, and McDonald Creek including sampling of control sites for reference outside the influence of project activities. The initial sample was completed in late August 2005. Spring-fed tributaries within the project area were also sampled to determine fish presence/absence. Baseline data indicated that summer distribution of O. Mykiss (summer steelhead and resident rainbow trout) is limited to upper reaches of project area streams. Rearing densities ranged from 0.0 to 3.33 fish per square meter with sites along upper End Creek (RM 1.5) and McDonald Creek (RM 1.0) containing the highest rearing densities observed (See 2005 data table below). Lower reaches along these three tributaries showed a distinct absence of salmonid fish presence due, presumably, to summer high water temperatures. Sites containing rearing 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.

Table 6 2005 End Creek Restoration Project Juvenile Fish Index Sites

Stream reach	Date	Site length	Mean width	Area	Summer Steelhead /Rainbow Trout Age/size				
Site name	**(mm/dd)**	**(m)**	**(m)**	**(m^2)**	**0+**	**1+**	**>200mm**	**Total**	**Rearing Density/m2**
End Creek									
END-1	7/21	60.0	3.0	180.0	0.55[a]	11.10	0.00	12.20	0.07
END-3	7/19	60.0	1.5	90.0	84.4	13.30	0.00	93.30	1.04
END-4	7/19	60.0	1.2	72.0	23.6	11.11	0.00	34.70	0.48
END-5	7/21	85.0	0.8	70.6	0.00	0.00	0.00	0.00	0.00
END-7	7/19	60.0	2.0	120.0	0.00	0.00	0.00	0.00	0.00
END-9	7/19	60.0	2.6	156.0	0.00	1.2[a]	0.00	1.20	0.01
END-24	7/18	60.0	1.5	90.0	5.55[a]	2.2[a]	0.00	7.70	0.09
END-25	7/18	60.0	1.9	114.0	0.00	0.877[a]	0.00	0.88	0.01
McDonald Creek									
MCD-10	7/20	60.0	1.5	90.0	0.00	0.00	0.00	0.00	0.00
MCD-14	7/19	60.0	1.8	108.0	0.00	0.925[a]	0.00	0.93	0.01
MCD-15	7/20	60.0	0.9	54.0	159.2	42.59	0.00	179.62	3.33
MCD-16	7/21	60.0	1.3	78.0	1.2[a]	5.12	0.00	6.40	0.08
MCD-26	7/21	100.0	1.3	130.0	0.00	0.00	0.00	0.00	0.00
MCD-27	7/20	60.0	3.2	192.0	0.00	0.00	0.00	0.00	0.00
South Willow Creek									
SWC-12	7/20	60.0	1.5	90	0.00	0.00	0.00	0	0.00

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 populution with over 50 individual juveniles captured.

In 2007, the CTUIR modified the sampling design to align with literature from the ISRP regarding sampling design and methodologies. A Mark-Recapture Backpack Electrofishing Protocol (adapted from Johnson et al. 2007; Salmonid Field Protocols Handbook) with data collection and analysis following protocols for back-pack electrofishing, closed model Petersen mark-recapture estimator were employed during the 2007 effort.

Table 7 2007 End Creek Restoration Project Juvenile Fish Index Sites

					Summer steelhead/rainbow trout				
Stream reach	**Date**	**Site length**	**Mean width**	**Area**	**Age/size**				
Site name	**(mm/dd)**	**(m)**	**(m)**	**(m^2)**	**0+**	**1+**	**>200mm**	**Total**	**Rearing Density/m2**
End Creek									
END 3	7/23	200.0	1.9	380.0	0.0	0.00	0.00	0.00	0.00
END 7	7/23	200.0	1.1	220.0	0.0	0.00	0.00	0.00	0.00
END 10	7/23	200.0	1.3	250.0	0.0	0.00	0.00	0.00	0.00
END 13	7/24	200.0	1.5	308.0	316.4	22.75	0.00	339.17	1.10
END 17	7/24	200.0	1.6	320.0	90.2	21.80	0.00	112.10	0.35
END 29	7/25	200.0	2.3	460.0	22.4	32.00	0.77	55.20	0.12

Sample site numbers illustrated in Tables 6 and 7 do not correspond to the same sampling locations due to changes in the End Creek Stream channel and adjustments in sampling design. End Creek 3 and 4 from the 2005 sample and 13 and 17 from the 2007 sample are at approximately the same elevation banks within the project area. Sampled rearing densities at these sites are similar between sampling periods. O. mykiss presence/absence sampling in the lower project reaches during 2007 reflect the similar results documented in the baseline survey with a noted absence of salmonids in the mid to lower reaches of End Creek. Salmonid absence in the lower reach of End Creek is assumed to be directly related to elevated water temperatures with salmonid presence documented only in the upper, cooler reaches of the project area as described in the water quality monitoring section of this report. Additional data analysis is currently underway to evaluate and compare the 2005 and 2007 data sets to determine if any meaningful information can be inferred from a sampling period one year after project implementation. An update will be compiled and incorporated into Pisces status reports prior to the FY2008 Annual Report.

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.

Produce Annual Report

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

Habitat Enhancement & Restoration Project Implementation During FY2007
The following section provides an overview of accomplishments on the Wallowa-McDaniel II Restoration Project which was implemented during the reporting period.

WALLOWA RIVER-MCDANIEL RESTORATION PROJECT

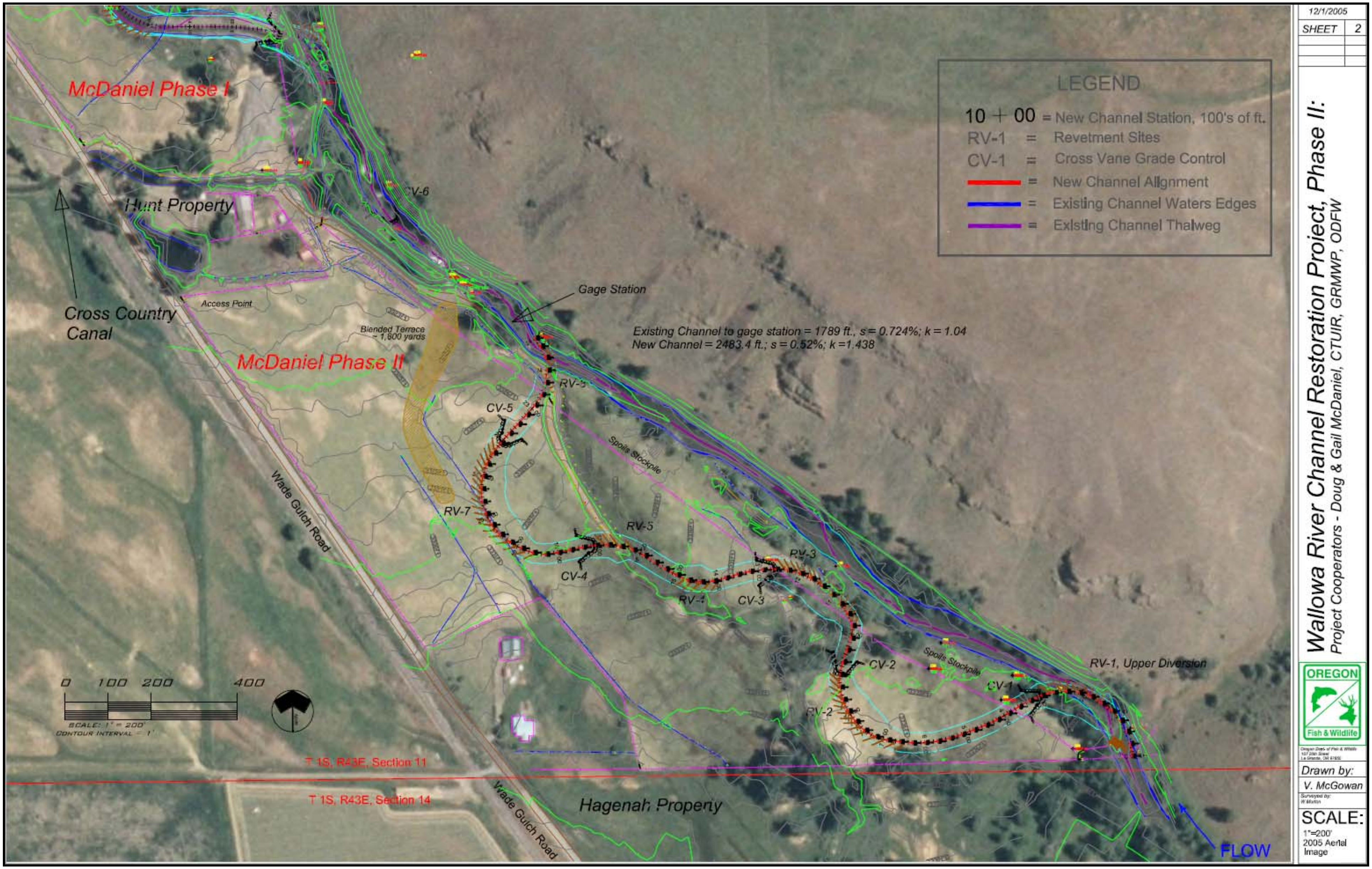
ODFW, GRMW, and CTUIR staff partnered to complete planning/design, permitting, construction subcontracting, project staking and layout, materials acquisition, and phase 1 construction of the Wallowa-McDaniel II Restoration Project located on the mainstem Wallowa River near Lostine, Oregon. Project partners completed development of the construction statement of work and bid solicitation and advertised the invitation for bids in late May. A pre-bid site tour was conducted by ODFW and CTUIR staff with bidding and contractor selection through the competitive bid process completed by late June in preparation for early July construction initiation.

Project construction was initiated on July 10, 2007 with mobilization of heavy equipment to the project site by the construction subcontractor. Major construction started during the latter part of July and completed by August 22, 2007. The following table illustrates project accomplishments to date:

Table 8 Wallowa-McDaniel Restoration Project Metrics

PROJECT ACTION	PROJECT METRICS
Stream channel excavation	2,100 feet (18,000 cubic yards, neat line yardage)
Rock Cross Vanes/Vertical Grade Control	5 structures (vertical grade control in restoration channel)
Rootwad Revetments	62 structures (5 complexes). Note: one structure is a footer log and rootwad with tree bole.
Large Woody Debris Additions	18 Large woody debris key member pieces installed in debris jam confirmations at 6 sites.
Channel Reclamation of channelized reach	Schedule for FY2008
Dike Removal	500 feet (1,500 cubic yards)
Blended Earthen Terraces	500 feet (1,800 cubic yards)
Post-Construction Planting and Seeding	-200# native seed mix installed -20,222 square feet sedge/rush matt mechanically installed --4,000 coyote willow mechanically trenched into gravel bars -8,000 plus booth willow live whips mechanically installed in floodplain -3,000 live whip booth willow manual installed -240 whole trees/shrubs mechanically installed

Figure 10 Wallowa-McDaniel II Restoration Project Planview



Wallowa-McDaniel II Restoration Project: July-August 2007 Construction Sequence at Station 6+00 (Meander Pool, Left Bank viewing downstream)

Wallowa-McDaniel II Restoration Project: July-August 2007 Construction Sequence at Station 6+00 (Riffle Reach, Left Bank viewing upstream)

Wallowa-McDaniel II Restoration Project: August 2007 Construction, Lower Project Area

Wallowa-McDaniel II Restoration Project: August 2007 Construction, Middle Project Area

SUMMARY AND CONCLUSIONS

Project development and implementation FY2007 generally proceeded as planned. Major highlights of the project included impelemnation of the initial construction phase of the Wallowa-McDaniel Restoration Project. The Grande Ronde Subbasin is presented with significant challenges associated with recovery of ESA fish stocks and improving/restoring suitable habitat. Coordinated efforts through the GRMW associated with selection and prioritization of habitat actions, ongoing planning, and Biop/Remand habitat project planning has resulted in the development of a 3 year priorization action plan which will be implemented during the several fiscal years. CTUIR has been in a cooperative role in these efforts and are optimistic that the course of action will facilitate actions that address limiting factors and continue towards improving watershed conditions capable of supporting viable and harvested fish populations.

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

Formal staff training and application of practical experience contributes to 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. End Creek was awarded the 2007 Western Division of the American Fisheries Society Riparian Challenge Award (see http://www.grmw.org/publications/newsletter/index.shtml) and http://www.wdafs.org/committees/Riparian_Watersheds_Habitat/Riparian_Watersheds_Habitat_comm.htm

Project staff look forward to continuing working with project partners in the basin and achieving notable improvements in watershed conditions. Key projects planned for FY2008 include the Ladd Creek Restoration Project with ODFW and GRMW and the Upper Grande Ronde River Mine Tailing Rehabilitation and Camp Carson Erosion Control projects in cooperation with the Wallowa-Whitman National Forest, LaGrande Ranger District on National Forest System lands.

SUMMARY OF EXPENDITURES

CTUIR GRANDE RONDE SUBBASIN RESTORATION PROJECT
FY 2007 BUDGET
Contract Period: April 1, 2007 - March 31, 2008
Project # 1996-083-00 - CONTRACT 32222

	PERSONNEL SERVICES	**AMOUNT**
5000	Salaries	$91,459.12
5010	Fringe Benefits	$24,334.07
	TOTAL: Personnel Services:	**$115,793.19**
	TRAVEL	
5101	Per Diem	$731.06
5150	Training	$475.00
5160	Insurance:	$143.50
5190	GSA Vehicle	$8,226.79
	TOTAL: Travel:	**$9,576.35**
	MATERIALS/SUPPLIES & SERVICES	
5210	Office supplies (paper, pens, et al.)	$25.00
5225	Materials	$6,012.41
5400	Communications - (Cellular service)	$1,418.71
5410	Postage/Freight	$0.00
5440	Equipment Rental (Track hoe rental)	$0.00
5440	Equipment Rental (fax, duplication)	$160.56
5450	Duplication/Printing (copies, film process.)	$0.00
5470	Repairs and Maintenance	$1,004.38
5770	Professional Services	$1,050.00
6300	Capital Equipment (ATV purchase)	$4,236.24
	TOTAL: Services & Supplies:	**$13,907.30**
	TOTAL: PERSONNEL SERVICES, TRAVEL, SERVICES & SUPPLIES:	
	INDIRECT @ 38.8%	**$50,723.16**
	Total FY 2008 Budget	**$190,000.00**

LITERATURE CITED

Anderson, J.W., and others. 1992. Upper Grande Ronde River Anadromous Fish Habitat Protection, Restoration, and Monitoring Plan. USFS, PNWFRS, ODFW, CRITFC, CTUIR, NPT, OSU.

CBFWA. 1990. Columbia Basin Fish and Wildlife Authority. Integrated System Plan for Salmon and Steelhead Production in the Columumiba River Basin.

CRITFC. 1995. Wykan Ush Me Wa Kush, Spirit of the Salmon. Columbia River Basin Salmon Policy. Columbia River Inter-Tribal Fish Commission. Columbia Basin Salmon Policy, 1995.

CTUIR. 1983. Confederated Tribes of the Umatilla Indian Reservation. Summary Report: Salmon and steelhead habitat improvement initiatives--John Day, Umatilla, Grande Ronde and Imnaha drainages.

Grande Ronde Model Watershed Program, et., al. 2004. Grande Ronde Subbasin Plan. Northwest Power Planning Council Fish and Wildlife Program.

Henjum, M. G., J.R. Karr, D. L. bottom, D. A. Perry, J. C. Bennarz, S. G. Wright, S. A. Beckwitt and E. Beckwitt. 1994 Interim Protection for Late-Successional Forest, Fisheries, and Watersheds: National Forest East of the Cascade Crest, Oregon and Washington.

Huntington, C. H. 1993. Clearwater BioStudies. Final Report. Stream and Riparian Conditions in the Grande Ronde Basin. Grand Ronde Model Watershed Operations-Action Plan, Appendix A and B.

Impendent Scientific Group. 1996. Return to the River: Restoration of Salmonid fishes in the Columbia River Ecosystem. September 1996.

McIntosh, B.A., J.R. Sedell, J.E. Smith, R.C. Wismar, S.E. Clarke, G.H. Reeves, and L.A. Brown. 1994. Management history of eastside ecosystems: Changes in fish habitat over 50 years, 1935-1992. General Technical Report, PNW-GTR-321, Report. USDA, Forest Service

Mobrand, L. and L. Lestelle. 1997. Application of the ecosystem diagnosis and treatment method to the Grande Ronde Model Watershed Project. BPA Task Order Number 95AT61148.

Mobrand, L. 2003. Application of the Ecosystem Diagnosis and Treatment Method to the Grande Ronde Subbasin.

NMFS. 1997. National Marine Fisheries Service. Snake River Salmon Recovery Plan (8/97 draft), Chap.4, pg. 61, 1997.

NMFS. 1995. National Marine Fisheries Service. Snake River Salmon Recovery Plan.

Noll, W., Williams, S., and R. Boycce. 1988. Grande Ronde river basin fish habitat improvement implementation plan. Oregon Department of Fish and Wildlife.

Nehlsen, W., J. E. Williams, and J. A. Lichatowich. 1991. Pacific salmon at the crossroads: stocks at risk from California, Oregon, Idaho, and Washington. Fisheries Bulletin, American Fisheries Society, Bethesda, Maryland.

NPCC. 1994. Columbia River Basin Fish and Wildlife Program. Northwest Power Conservation Council.

NPPC. 2001. Grande Ronde River Subbasin Summary. Northwest Power Conservation Council.

NPCC. 2004a. Grande Ronde Subbasin Plan. Prepared for Northwest Power and Conservation Council by Grande Ronde Model Watershed Program. Pgs 491. Available from www.nwcouncil.org/fw/subbasinplanning/granderonde/plan/

NPCC. 2004b. Imnaha Subbasin Plan. Prepared for Northwest Power and Conservation Council by Wallowa County Natural Resources Advisory Committee. Paged by section. Available from www.nwcouncil.org/fw/subbasinplanning/imnaha/plan/

NPCC. 2004c. Grande Ronde Subbasin Plan Supplement. Prepared for Northwest Power and Conservation Council by Grande Ronde Model Watershed Program. Pgs 51. Available from www.nwcouncil.org/fw/subbasinplanning/granderonde/plan/

NPCC. 2004d. Imnaha Subbasin Plan Supplement. Prepared for Northwest Power and Conservation Council by Wallowa County Natural Resources Advisory Committee. Pgs 20. Available from www.nwcouncil.org/fw/subbasinplanning/imnaha/plan/

NPPC. 2000. Columbia River Basin Fish and Wildlife Program. Portland, OR. Available from www.nwcouncil.org/library/2000/2000-19/Default.htm

NRC. 1996. Upstream. Salmon and society in the Pacific Northwest. National Research Council, Washington D.C. 452 pp.

ODEQ. 1999. Grande Ronde Section 319 National Monitoring Program Project. Temperature Monitoring Summary Report, 1993-1998. Oregon Department of Environmental Quality.

ODFW, 1990. Oregon Department of Fish and Wildlife and National Marine Fisheries Service. 1990. Past and present abundance of Snake River sockeye, Snake River chinook, and lower Columbia River coho salmon. A report prepared for Senator Mark Hatfield, U. S. Senate.

ODFW, 1990. Oregon Department of Fish and Wildlife and four other agencies. 1990. Grande Ronde River Subbasin, salmon and steelhead production plan. Northwest Power Planning Council, Portland, Oregon.

ODFW, 1996. Oregon Department of Fish and Wildlife. 1996. Grande Ronde Basin Fish Habitat Enhancement Project. 1996 Annual Report.

Rosgen, D., 1996 Applied river morphology. Wildland Hydrology, Pagosa Springs, Colorado.

Rosgen, D.L. 1998. The reference reach – a blueprint for natural channel design. Presented at the ASCE, Denver, Co

USFS et., al. 1992. Upper Grande Ronde River Anadromous Fish Habitat Protection, Restoration, and Monitoring Plan, USFS, PNFRES, ODFW, CRITFC, CTUIR, NPT, OSU.

USFWS. 2002. Bull Trout Draft Recovery Plan. U. S. Fish and Wildlife Service. Paged by section. Available from http://ecos.fws.gov/docs/recovery_plans/2002/021129.pdf