CTUIR Grande Ronde Subbasin
Restoration Project

A Columbia Basin Fish Habitat Enhancement Project

REPORT OF PROJECT PROGRESS
2002-2003

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Department Natural Resources Wildlife Program

For
United States Department of Energy
Bonneville Power Administration

PROJECT #1996-083-00
Contract #00006229

Report also fulfills reporting requirements for:

McCoy Meadows Watershed Restoration Project, 1996-083-01, Contract #00002662
Longley Meadows Restoration Project, 1996-083-00, Contract #00012339
Grande Ronde Mainstem Enhancement, 199202601, Contract #00006251

CONFEDERATED TRIBES
UMATILLA INDIAN RESERVATION

BONNEVILLE POWER
ADMINISTRATION

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 2002-2003, the CTUIR, in cooperation with multiple partners, completed the McCoy Meadows Restoration Project, Longley Meadows Restoration Project, and the Mainstem Grande Ronde River Habitat Enhancement Project. Project activities included development of project designs, completion of environmental compliance and regulatory permitting requirements, procurement of construction services and materials, pre-construction preparations (survey and staking), project construction, and bioengineering/revegetation.

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, channel cross sections and longitudinal profiles, and photo points. Ongoing project maintenance, including fence repair, vegetation management, and monitoring for trespass livestock, was accomplished.

Implementation of the McCoy Meadows Project included activating an approximate 1.6 mile restoration channel constructed in 2001, reclamation of the channelized alignment, development of floodplain ponds,seeding disturbed areas, planting, and installation of riparian exclosure fencing. Implementation of the Longley Meadows Project included completion of a 1 mile Bear Creek restoration channel, reclamation of 0.5 miles of the existing channelized Bear Creek segment, placement of large woody debris along a 1 mile reach of Jordan Creek, installation of over 25,000 trees and shrubs, seeding to stabilize disturbed ground, installation of an off-channel water development (well, water delivery pipe and 8 concrete troughs), and installation of riparian boundary fences. In conjunction with these developments, a 440 acre joint BPA/CREP conservation easement was established along the mainstem Grande Ronde River, Bear Creek and lower Jordan Creek to protect habitat restoration efforts. In addition, a 60 acre BPA habitat easement was established between ODFW and the landowner along a 1 mile reach of upper Jordan Creek. During the reporting period, phase 2 of the Mainstem Grande Ronde River Habitat Enhancement Project was also implemented. This project included meander channel construction, installation of rootwad revetments, engineered log jams, rock cross vanes, and placement of individual whole trees/woody debris on gravel bars along an approximate 1.0 mile reach of the Grande Ronde River.

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BACKGROUND

The CTUIR Grande Ronde Subbasin Watershed Restoration Project, 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 has been successful in the development and implementation of several large-scale 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 important 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 2002 NPPC Project Proposal for the CTUIR Watershed Restoration Project (199608300) incorporated here by reference.

Project activities during the 2002-2003 project period included:

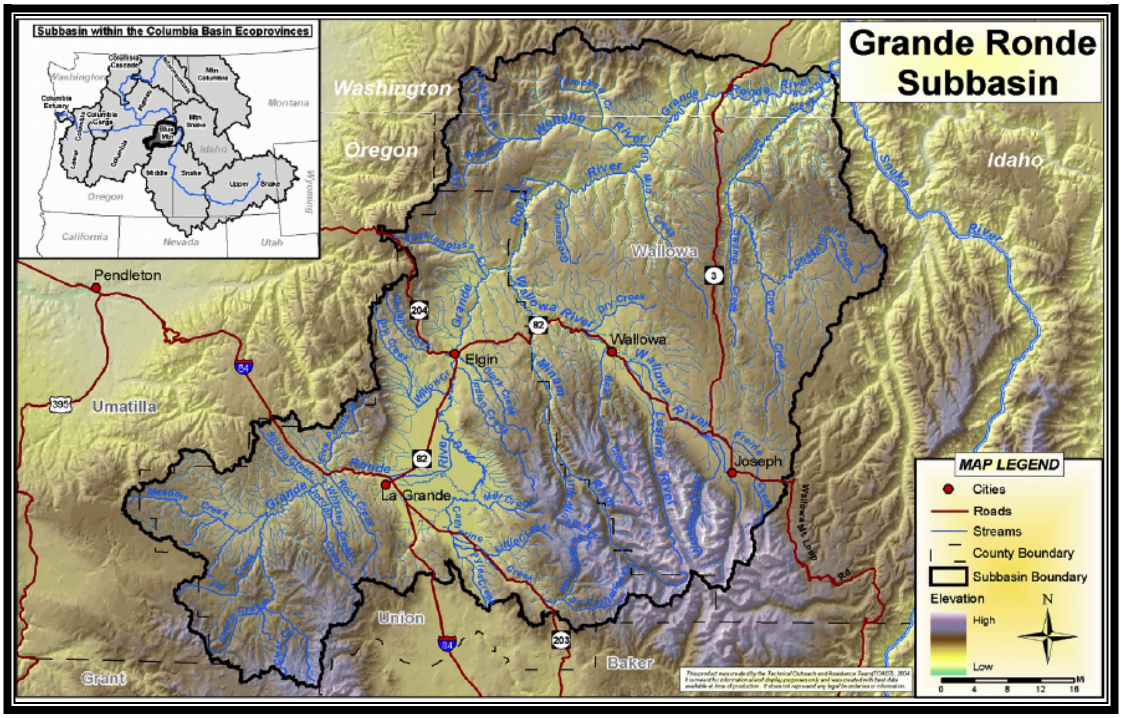
- Completed implementation of the McCoy Meadows Restoration Project.
- Completed implementation of the Longley Meadows Restoration Project.
- Completed Phase 2 of the Mainstem Grande Ronde River Habitat Enhancement Project.
- Conducted project maintenance activities
- Conducting monitoring and evaluation activities
- Initiated coordination and planning on the End Creek/Rice Restoration Project located in the Willow Creek Watershed.

INTRODUCTION

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.

FIGURE 1 GRANDE RONDE SUBBASIN VICINITY



The subbasin historically supported fisheries that were an important part of tribal cultures and economies (James 1984, Wallowa County and Nez Perce Tribe 1999, Ashe et al. 2000). An estimated 38 species of fish, including 15 introduced species, are found in the subbasin (NPPC, 2001). Historically, the subbasin supported large runs of spring-summer Chinook salmon and summer steelhead. The subbasin also historically supported coho and sockeye salmon. Coho salmon were extirpated from the subbasin in the 1980's. Both summer steelhead and spring chinook salmon in the Grande Ronde Basin are listed as threatened species under the Federal Endangered Species Act.

Fisheries managers estimate 12,200 spring chinook salmon historically escaped to the mouth of the Grande Ronde River in 1957 (COE 1975). Redd surveys, conducted by the ODFW and tribes since the late 1940's, indicate the subbasin supported large spring Chinook salmon runs until the 1970's. Despite large reductions in harvest, redd surveys have shown a declining trend through time (ODFW and CTUIR 1990). Historic summer steelhead runs to the subbasin are estimated at 15,900 to the mouth of the Grande Ronde in 1963 prior to the construction of Snake River dams (COE 1975). Spawning surveys conducted annually in the subbasin since 1964 also indicate a sharp decline in summer steelhead since the 1970s and early 1980s despite reductions in harvest.

Declines in anadromous salmonids in the subbasin have been attributed to a variety of factors including mortality at Columbia and Snake River dams and habitat degradation (ODFW and CTUIR 1990). Riparian and instream habitat degradation has most severely impacted spring chinook production potential (ODFW and CTUIR 1990). 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; Wissmar et al. 1994). Approximately 379 miles of degraded stream miles have been identified in the subbasin (ODFW et al. 1990). In the Upper Grande Ronde watershed, an estimated 80 percent of the anadromous fish habitat is considered to be in degraded condition (Anderson et al. 1992), and about 70 percent of large pool habitat lost since 1941 (McIntosh et al. 1994).

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 the Columbia River tributaries (ISG 1996). Multiple restoration plans have been drafted to address identified problems (CBFWA 1997). Timber harvest and livestock grazing are common land management practices in the subbasin.

Logging and associated road building in riparian and floodplain forests eliminates sources of large wood, reduces shade and bank stability, and increases erosion (Maser 1988; Meehan 1991). Overgrazing by domestic livestock can alter riparian and stream channel characteristics and detrimentally affect salmonid habitat (Bauer and Burton 1993; Kauffman and Krueger 1984; Platts 1990; Lichatowich and Mobrand 1995; Wissmar et al. 1994).

Habitat loss and degradation in the subbasin ultimately resulted in the inclusion of about 62 streams or stream segments on the State's list of water quality limited water bodies (303 (d) list) by the Oregon Department of Environmental Quality (ODEQ). Of these streams/segments 24 are listed for habitat modification, 27 for sediment and 49 for temperature.

Federal designation of several fish species as threatened or endangered under the Endangered Species Act (Snake River sockeye in 1991, spring/summer chinook in 1992, summer steelhead in 1997, and bull trout in 1998) resulted in increased efforts to implement ecosystem based, watershed approaches to species recovery within the subbasin (Anderson et al. 1992; CBFWA 1997; Huntington 1993; Mobrand and Lestelle 1997; NMFS 1997; Wallowa Co.-Nez Perce 1993).

In an effort to increase coordinated watershed restoration, the Northwest Power Planning Council (NPPC) selected the Grande Ronde subbasin as a "Model Watershed" for Oregon in 1992. The Grande Ronde Model Watershed Program (GRMWP) brings relevant interests together to address the needs of declining fish populations in the Grande Ronde subbasin. The program coordinates local habitat restoration with regional actions as outlined by the Northwest Power Planning Council in their 1994 Columbia River Basin Fish & Wildlife Program (Sections 7.0B.1, 7.6, 7.6C, 7.6D, 7.7b.2-3, 7.8A.4-5), and Endangered Species Act requirements as described in the National Marine Fisheries Service Snake River Salmon Recovery Plan (NMFS 1995, tasks 1.1.b, 1.4.d, 1.4.b, 1.5.b, and 1.6.b).

Habitat degradation within the Subbasin has been further documented and quantitified in reports commissioned by the GRMWP, graduate theses, and a multiple other reports and publications. Technical reports commissioned by the GRMWP include the *GRMWP Operations/Action Plan* (Duncan and Cawthon, 1994)*; Stream and Riparian Conditions in the Grande Ronde Basin* (Huntington, 1993); and the *Application of the Ecosystem Diagnosis and Treatment Method to the Grande Ronde Model Watershed Project* (Mobrand and Lestelle, 1997). The Grande Ronde Subbasin Summary (NPPC, 2001) provides of synthesis of past and ongoing research, existing resource conditions, and limiting factors. Additional subbasin planning has been initiated to conduct a detailed EDT process and develop a subbasin plan for the Grande Ronde Subbasin. This new process is expected to culminate in the management plan that will provide goals and objectives for watershed and fish habitat management and direction/priorities for fish and wildlife managers to identify and priorities management actions. The plan is expected to be completed in May 2004.

The GRMWP Action Plan identifies the following limiting factors for the Upper Grande Ronde and Catherine Creek:

Upper Grande Ronde River (upstream of La Grande). Habitat for spring chinook is greatly reduced from historic levels for certain life stages. Survival conditions have changed due primarily to increased water temperature, increased sediment load, loss in habitat diversity, changes in flow patterns, channel and bank destabilization, and alteration of the riparian zone (Mobrand and Lestelle, 1997; Duncan and Cawthon, 1994; Huntington, 1993).

Catherine Creek Spring chinook habitat losses are due to land development, channel straightening, removal of large organic structure, and de-watering. Productivity has declined sharply. (Mobrand and Lestelle, 1997; Duncan and Cawthon, 1994; Huntington, 1993).

Limiting Factors: **low summer flows, high summer temperatures, streambed sedimentation, reduced habitat complexity, adult passage.**

The Grande Ronde Subbasin Summary (NPPC, 2001) identifies two principle physical concerns that form the context for analysis of habitat conditions, limiting factors for fish and wildlife resources, and ultimately restoration recommendations for the Grande Ronde subbasin. Historic, recent, and current land use practices have altered the hydrologic cycle, including the storage, movement, and character of water resources through the subbasin. 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 widening, downcutting, vertical cut banks, and excessive gully development).

Aquatic habitat in the subbasin has undergone both chronic and acute destabilization through recent history (McIntosh et al. 1994). Improperly managed land uses act to destabilize natural hydrologic processes and amplify the impacts of natural events such as floods. Riparian habitat degradation is the most serious habitat problem in the subbasin for fish (McIntosh 1992, Wissmar et al. 1994, ICBEMP 2000). This loss leads to secondary effects that are equally harmful and limiting, including increased water temperature, low summer flows, excessive winter runoff, and sedimentation (Bottom et al. 1985).

The ***CTUIR Grande Ronde Subbasin Restoration Project*** coordinates through the GRMWP for funding, identification of priority project areas, monitoring and evaluation, and adaptive management. Cost-share funding for individual projects is annually secured through the GRMWP to supplement funds secured directly through the NPPC/BPA as well as other project partners. The CTUIR also coordinates closely with other resource managers in the basin (ODFW, USFS, NRCS) to cooperatively develop and implement individual projects. Various agency staff members take the lead on individual efforts and other agency staff provide techncial support in an interagency team approach. Examples of past cooperativ efforts include: McCoy Meadows, Mainstem Grande Ronde, Meadow Creek Enhancement, Alta Cunha Ranches McCoy Creek Habitat Enhancement, and the Longley Meadows Restoration Project.

Specific RPA's achieved through this project include 150 and 153. Action 150 of the NMFS Biological Opinion states, "In subbasins with listed salmon and steelhead, BPA shall fund protection of currently productive non-Federal habitat, especially if at risk of being degraded…" Conservation easements as well as other cooperative agreements with landowners and other agencies are a tool utilized under this project to protect and restore habitat. Action 153 of the NMFS Biological Opinion states, "BPA shall, working with the agricultural incentive programs, negotiate and fund long-term protection for 100 miles of riparian buffers per year…" Tribal staff continue to work closely with NRCS staff on site-specific projects involving a variety of federal conservation programs. Specific successful examples employed under this program include the McCoy Meadows and Longley Meadows Restoration Projects.

DESCRIPTION OF PROJECT AREAS

Grande Ronde Subbasin Overview

The Grande Ronde River Subbasin drains 4,070 square miles in northeast Oregon. The headwaters are in the Blue and Wallowa mountains in national forest lands, and the river flows through forested plateaus and then into the valley floor. The river flows 212 miles from the headwaters in the Blue Mountains to its confluence with the Snake River at river mile 168.7. The Wenaha, Minam and Lostine Rivers, and Catherine Creek are major tributaries in the subbasin. Numerous other tributaries are important to salmonid production. The headwaters of the Wallowa, Lostine and Minam Rivers and Catherine Creek originate in the Eagle Cap Wilderness Area in the Wallowa-Whitman National Forest. The Grande Ronde River valley, located between the Blue and Wallowa Mountains, covers approximately 360 square miles. The Wallowa River valley is adjacent to the north slope of the Wallowa Mountains and covers approximately 250 square miles. These valleys are privately owned and used extensively for agricultural production. Stream gradients are generally steeper in the headwaters and moderate through the valleys. Stream flow patterns in the Grande Ronde Subbasin originate primarily as snowmelt, and are similar to most northeast Oregon streams. Maximum flows typically occur in the spring, and minimum flows occur in August or September. Annual discharge at Troy, Oregon at river mile 45, averages 3,107 cubic feet per second.

The U. S. Forest Service (USFS), including the Wallowa-Whitman and Umatilla National Forests manage about 45 percent of the land in the subbasin. Most National Forest System Lands are managed for timber, grazing and recreation. Agriculture is the most important economic enterprise in the subbasin, with thousands of acres of privately owned irrigated cropland. Historically, the timber industry was a very important economic enterprise in the subbasin. La Grande is the largest town within the subbasin.

Fish and Wildlife Status

Spring Chinook: Natural spawning occurs in the Wenaha, Wallowa, Minam, Lostine, and upper Grande Ronde Rivers and in Bear, Hurricane, Prairie, Sheep, Lookingglass (currently restricted to below the hatchery), Indian and Catherine Creeks. These populations are listed under the ESA as threatened. Escapement in the last five years has been so low that a captive broodstock program was initiated for Catherine Creek and the Lostine and upper Grande Ronde rivers. The management intent for hatchery programs is for supplementation of natural production where biologically justified, using locally adapted broodstock.
Fall Chinook: A remnant population spawns in the lower Grande Ronde. This population is listed under the ESA as threatened. One pair spawned in lower Joseph Creek in 1998. The management intent is currently for natural production, although a hatchery supplementation program is being considered in the master planning process.

Summer Steelhead: Naturally spawning Group A run steelhead are found throughout the subbasin. Grande Ronde steelhead were listed as threatened under the ESA. Available spawning ground survey data indicate that escapement to the subbasin has decreased substantially in the last 20 years. Up to 90 percent of steelhead observed in ODFW creel census were of hatchery origin. The management intent for hatchery programs is for supplementation of natural production where biologically justified, using locally adapted brood stock.

Coho: Historically, naturally spawning coho were recorded in the Wenaha, Wallowa, Minam, and Lostine rivers and in Catherine, Prairie, and Spring creeks. Coho were declared extinct in the Snake River Basin in 1986. Reintroduction is being considered in the master planning process.

Sockeye: Formerly, sockeye spawned in the tributaries of Wallowa Lake. They were extirpated in 1905 because of poor hatchery practices. Rebuilding of the irrigation dam to its present height in 1916 precluded possible adult returns from ascending to the lake. Reintroduction is being considered in the master planning process.

Other fish species: Bull trout are found in upper reaches of the Wenaha, Minam and Lostine rivers and in parts of the upper Grande Ronde River, and also in Bear, Deer, Hurricane, Indian, and Catherine creeks in the summer, and throughout the subbasin during the winter. Bull trout populations have diminished in size, although no historic information is available to document a decreased distribution in the Grande Ronde River subbasin, with the exception of the extirpation of bull trout from Wallowa Lake in the 1950s. It was estimated, however, that more than 75 percent of the populations in the Grande Ronde Subbasin have moderate to high risk of extinction or are probably extinct. Bull trout were listed as threatened under the ESA in 1998. Bull trout populations have been impacted negatively by overharvest, habitat degradation, and interactions with introduced brook trout. Redband trout are widely dispersed and, in some places, locally abundant.

Wildlife: A variety of wildlife species, including upland game birds, waterfowl, fur bearers, big game, raptors, neo-tropical migrant song birds, reptiles and amphibians is associated with the Grande Ronde Subbasin terrestrial and aquatic habitats. Many populations have been impacted by habitat loss and degradation, human development and hydrosystem and other out-of-basin effects. The status of wildlife populations varies throughout the subbasin and by species. Shrub steppe wildlife assemblages are in a state of decline due to loss of habitat. Many wildlife species are listed as federal or state threatened, endangered, sensitive or species of special concern, including bald eagles, peregrine falcons, Canadian lynx, Pacific fisher and American marten. Big game, upland game bird, and waterfowl species are monitored by federal, state, and tribal managers to set harvest seasons and bag limits. Many raptors (e.g., golden eagle, American kestrel, prairie falcon) occur in the subbasin. Beaver, otter, mink, and muskrat occur along the Grande Ronde and its tributaries. Bighorn sheep have been reintroduced in the subbasin.

Overview of the Habitat Restoration and Enhancement Projects

The following sections provide descriptions of the major project areas the CTUIR focused habitat restoration and enhancement activities during the reporting period.

McCoy Meadows Restoration Project

The project area is located on the privately-owned 2,500 acre McCoy Meadows Ranch within the Upper Grande Ronde River (UGRR) Drainage, in the upper portion of the Upper Grande Ronde Subbasin (USGS HUC 17060104). The project area is located about 20 miles west of LaGrande, Oregon near Starkey in Union County. The legal description of the property is Township 3

South, Range 35 East, all or portions of sections 26, 27, 28, 33, 34, and 35, Willamette Meridian. The project area includes the lower 2 miles of McCoy Creek, 1 mile of Meadow Creek, and ¼ mile of McIntyre Creek. (See Figure 2).

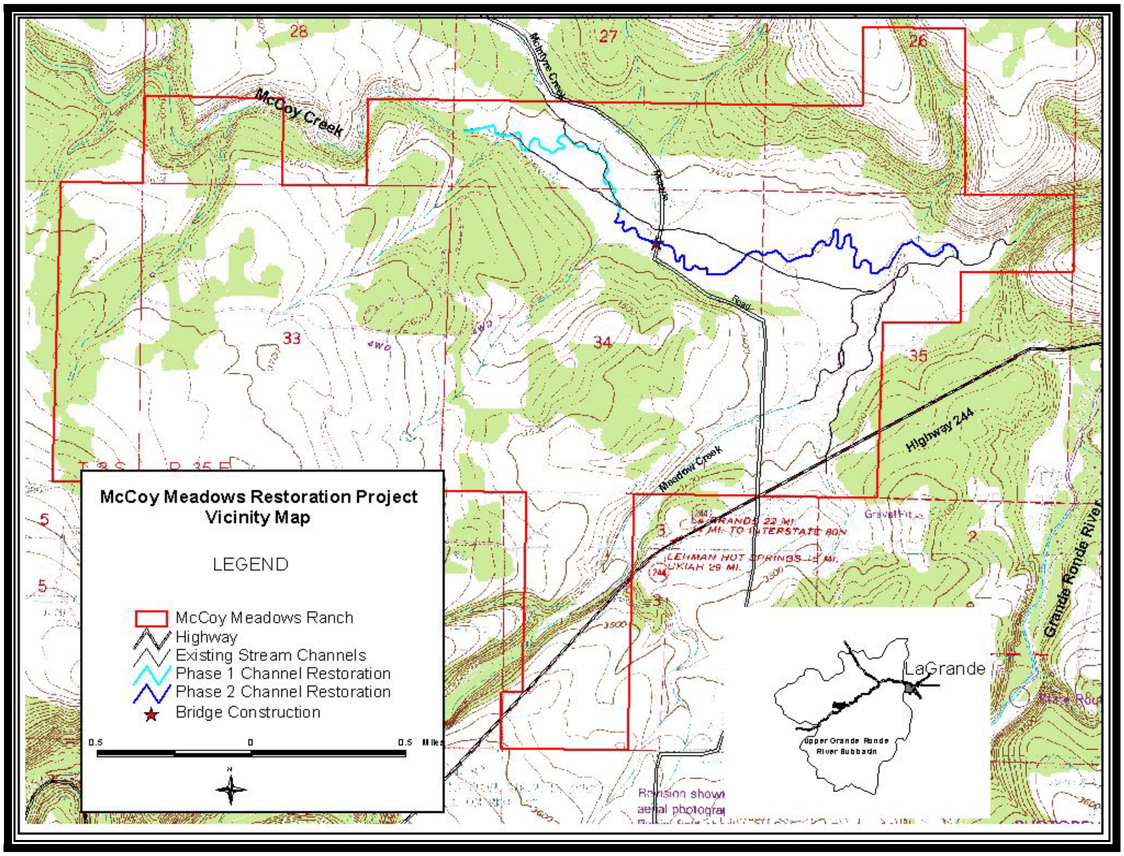
Lower McCoy Meadows at confluence of McCoy Creek and Meadow Creek (Pre-project channelized condition, May 1998)

The McCoy Meadows Restoration Project was initiated in 1995 under Section 319 of the Clean Water Act to address non-point sources of pollution in the Upper Grande Ronde River subbasin. Beginning in 1997, additional cost-share funding through the GRMWP, BPA, and NRCS was secured to implement the project. The project was implemented in several phases beginning with Phase 1 in 1997 and phases 2 and 3 beginning in 2000. Phase 3 project construction was largely completed in 2002. Ongoing activities include fence construction, tree and shrub planting, monitoring/evaluation, and planning/project designs for restoration and enhancement along Meadow Creek. The overall goal of the project is to restore the natural character and function of the wetland meadow complex with accompanying wetlands, beaver marsh, floodplain, and stable channel morphology. Water quality and fish habitat are key drivers to the project.

Key objectives include:

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

FIGURE 2 MCCOY MEADOWS RESTORATION PROJECT VICINITY MAP



McCoy Meadows was historically a large wetland meadow complex with multiple, sinuous stream channels, wetlands, backwater areas, ponds, and beaver colonies. Alteration of wetland hydrology probably began in the early 1800's with extensive beaver trapping. By the early 1900's, livestock grazing, road and railroad construction, logging, and farming severely altered the character and function of the meadow system and associated channel morpology. During the late 1960's, aggressive efforts were made to further drain palustrine emergent wetlands through channelization. McCoy Creek was channelized and relocated in two phases, first in 1968, and again in 1977. In addition, the meadow downstream of the McIntyre Road was land-leveled in the late 1970's. Channelization and the subsequent channel widening and deepening resulted in near elimination of out of bank stream flow during flood events and a significant decrease in meadow storage capacity. The McCoy Creek channel, in its pre-project form, had a capacity of about 1,400 cubic feet per second (cfs) or approximately a 20 year storm event. Flood velocities in the existing channel exceeded seven feet per second and tractive stresses exceeded one pound per square foot.

Meadow, McCoy and McIntyre Creeks provide spawning and rearing habitat for threatened Snake River summer steelhead and rearing habitat for juvenile spring chinook salmon. Impaired water quality and significantly reduced availability of instream habitat (reduced channel length resulting from channelization) are severely limiting anadromous fish production in McCoy Creek. A 1992 ODFW Stream Report describes the project area reach, "[t]here is a high proportion of units with actively eroding stream banks. Stream shading is very low." The report further indicates little to no large wood interacting with the channel, that 73.4 percent of the banks are actively eroding and the average open sky is 90 percent. Stream surveys conducted by CTUIR fisheries staff in the fall of 1995 documented similar conditions with about 40 percent glide habitat, 35 percent riffle habitat, and 25 percent pool habitat. Ground cover in the riparian area was estimated at about 2 percent shrubs and included 13 percent bare soil. Canopy closure ranged from 1-3 percent and open sky averaged 91 percent. Large wood averaged 0.8 pieces per 100 meters (about 12 pieces per mile).

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

Baseline data demonstrates that, though summer stream temperatures consistently exceed state water quality standards, additional thermal loading occurs within the project area. In addition, data collected by ODEQ in 1993 illustrate that the highest seven-day average of daily maximum temperatures were 25.8, 24.9, and 26.1 degrees Celsius for Upper, Middle, and Lower McCoy Creek, respectively. It is notable that, prior to the 97' restoration effort in the upper meadow, there was little difference in water temperatures between the three sites, suggesting that water temperature in the channelized reach was in equilibrium with air temperature.

Resource restoration activities began in the McCoy Meadows area in 1988 with construction of approximately 8 miles of livestock exclosure fence along Meadow Creek and McCoy Creek. The project was funded by BPA and administered by ODFW. In 1995, a cooperative watershed restoration project with the landowners began to take form with goals of restoring water quality, fish and wildlife habitat, and wetland function. A restoration analysis completed in early 1997 by the landowner and multi-agency team identified and evaluated project goals, objectives, and restoration actions. The analysis included a plan to divert McCoy Creek in the upper portion of the meadow into the channel occupied by McCoy Creek prior to 1977 and identify a framework for additional project phases. Construction of phase 1 was completed in July 1997, which included reintroducing the upper portion of McCoy Creek into the pre-77 channel, shaping outside meanders, and installation of grade control structures (including a single diversion structure to divert McCoy Creek from its channelized alignment).

Initial bioengineering was completed during the instream work window, following by extensive planting in the spring of 1998 and spring/fall 1999. During the summer of 1999, the diversion structure was modified in order to increase flow into the 97' restoration channel. Modifications included adding large woody debris to the existing rock structure in rootwad revetment configuration. In 2000, the diversion structure was completed and the full flow of McCoy Creek diversted by installing compacted fill downstream of the structure.

Between 1997 and 1999, the project design team continued analysis of the phase 1project and initiated additional planning to develop a restoration strategy for the lower meadow. Activities included contracting with Duck Unlimited to design a new bridge to improve water transport through the McIntrye Road prism and ann engineer to conduct topographic survey in the lower meadow and facilitate the design analysis. Beginning in 2000, the design team initiated restoration channel construction, bridge construction, relocation of boundary fences, and revegetation activities. During 2002-03, phase 3 of the project, consisting of diverting McCoy Creek into the restoration and reclaiming the channelized reaches, was completed. A detailed presentation on the results of the project area presented later in this report.

Longley Meadows Restoration Project

The Longley Meadows Restoration Project was initiated in 2002 by the CTUIR, ODFW, NRCS, and Alta Cunha Ranches to protect and restore instream, riparian, and wetland habitat along Bear Creek, Jordan Creek, Moss Creek, and the mainstem Grande Ronde River. Longley Meadows is located approximately 4 miles upstream from Hilgard State Park along the Grande Ronde River. The project area includes 2 miles of Jordan Creek, nearly 3 miles of Bear Creek, and 2 miles of the Grande Ronde River. The project area is located in the Upper Grande Ronde Rive Subbasin (USGS HUC 17060104), T. 3 S., R. 36 E., all or portions of Sections 14 and 15, Willamette Meridian. See Figure 3, Project Vicinity Map.

Longley Meadows Restoration Project, Lower Bear Creek (Pre-Project channelized condition, March 1999)

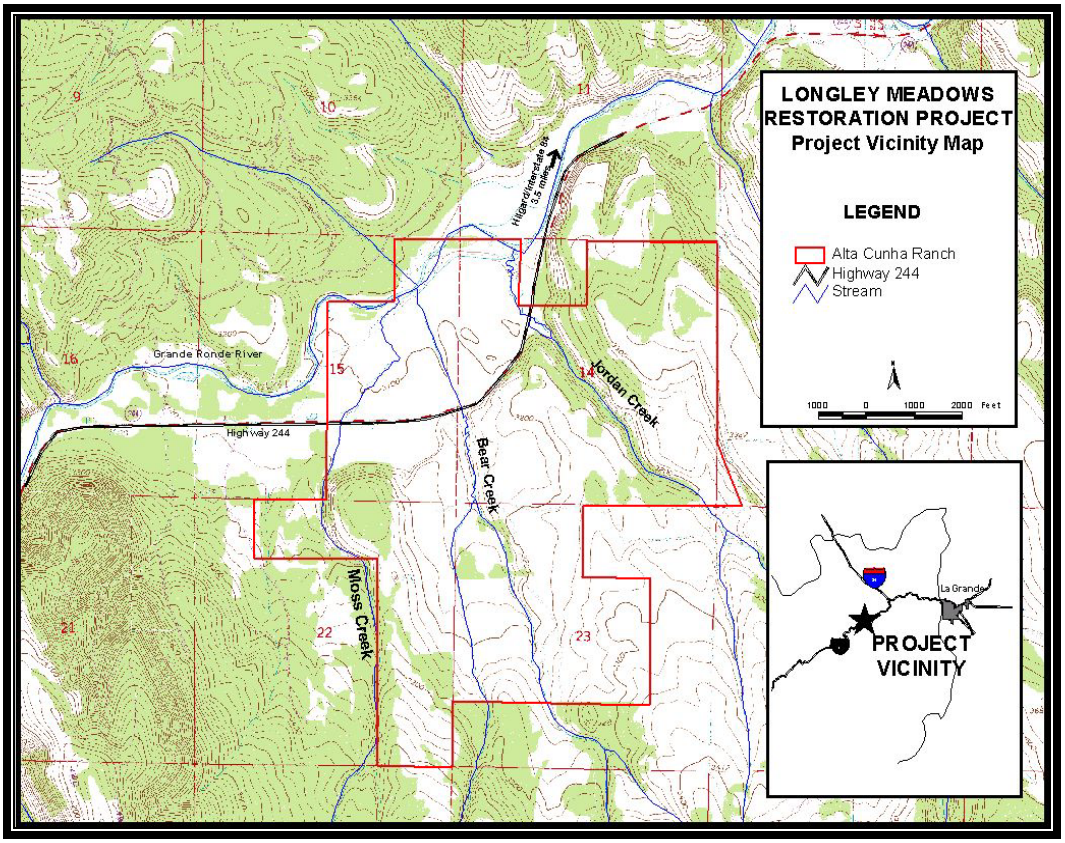
Longley Meadows, including the Mainstem Grande Ronde River Habitat Enhancement Project, is located along a unique, low gradient section of the upper Grande Ronde River with historic alluvial fans of the Grande Ronde River and Bear and Jordan Creeks. Low gradient sections along the mainstem Grande Ronde between La Grande and Meadow Creek are limited and provide morphological characteristics important in the formation of diverse aquatic habitat. Habitat alteration within the project area includes historic railroad construction, stream channelization, and livestock grazing. Past practices have resulted in significant modifications in hydrology, channel morphology, and fish and wildlife habitat.

The goal of the project is to restore the natural character and function of Longley Meadows with accompanying wetlands, floodplain, stable channel morphology, improved water quality, and improved fish habitat. Project objectives include:

- Increase base flow depth in Bear and Jordan Creek channels, increase flooding frequency and depth on the meadow, and create pool and riffle sequences that increase the consistency of bedload transport and deposition on the floodplain.
- Increase stream channel sinuosity, channel length, and geomorphic stability, and decrease channel gradient, capacity and cross-sectional area in Bear and Jordan Creeks.
- Improve instream, riparian, floodplain/meadow conditions and functions, including improved quality and utilization of riparian and meadow areas for native plant communities and wildlife.
- Improve/increase vegetative cover/shade to moderate summer stream temperatures and winter temperatures.

- Improve/increase streambank stability
- Improve surface water and ground water interaction with resultant lowering of summertime stream temperature and increase wintertime stream temperature.
- Improve properties of cold water fish habitat and terrestrial and aquatic macroinvertebrate community composition
- Improve/restore fish passage and utilization of restored stream channel segments by anadromous fish

FIGURE 3 LONGLEY MEADOWS RESTORATION PROJECT VICINITY

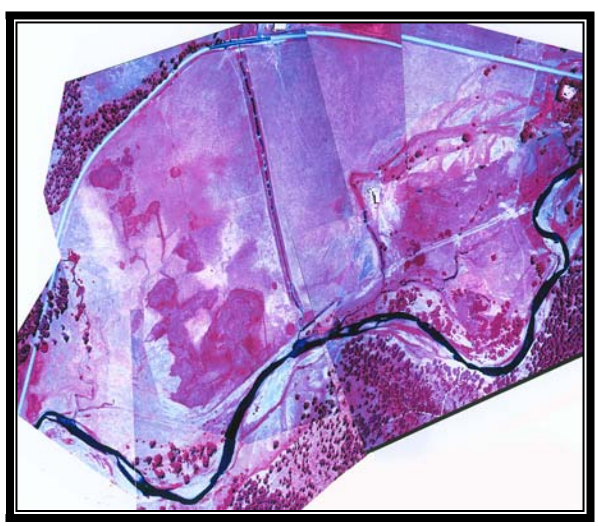


Both Jordan and Bear Creek historically provided spawning and rearing habitat for summer steelhead. Very little is known about spring Chinook salmon use in these tributaries. However, in December 1999 ODFW and CTUIR personnel observed juvenile spring chinook near the mouth of Bear Creek, indicating that these tributaries may support juvenile spring Chinook salmon winter habitat as well. Instream habitat conditions are fair to poor based on surveys conducted by CTUIR and ODFW project biologists. Past management activities including channelization, road/railroad construction, livestock overgrazing, cultivation, and logging have altered riparian, wetland and instream habitats. Jordan Creek suffers from high summer water temperatures, winter icing, and unstable streambanks. Instream habitat diversity is fair, but lacks large woody debris and complex pool habitat. Only 3 pieces of large wood were observed in upper Jordan Creek. Bear Creek suffers from similar problems, but is in a more severe condition than Jordan Creek. In the reach upstream of Highway 244, much of the large overstory tree (conifer/cottonwood) is absent and grazing has heavily impacted the understory of hardwood trees and shrubs. Bank erosion is excessive, and existing stream channel morphology conditions such as width/depth ratio and sinuosity are below potential for the reach.

The reach downstream of Highway 244 to the confluence with the Grande Ronde River remains in poor condition due to its channelized configuration. Fish passage in the lower portions of Bear Creek is seasonally blocked during summer baseflow due to existing log weir structures installed in the mid 1990's. Limited structural modifications were completed by ODFW and CTUIR to improve fish passage with marginal success in November 2000. These efforts included notching individual weirs and installing geofabric on weir faces to elevate surface water elevations and attempt to provide fish passage in the short-term. The following photos illustrate limiting factors associated with channelization and loss of floodplain connectivity in the Longley Meadows Restoration Project area.

Lower Bear Creek (Channelized Reach) viewing north, downstream from State Highway 244. March 1999.

Lower Bear Creek viewing south, upstream. Photo illustrates summer baseflow conditions and lack of fish passage created by log weir structure October 1999.



Infrared aerial photo of Longley Meadows (2001). Channelized Bear Creek segment prominent in center photo with lower Jordan Creek on left side of phot and Mainstem Grande Ronde River in lower portion. Note dark red coloration indicating palustrine emergent vegetation and historic stream channel

Project planning was initiated in early 2002 following an invitation by the landowner and subsequent application to apply for an NRCS Conservation Reserve Enhancement Program enrollment. The project design team, consisting of the landowner, CTUIR, ODFW, and NRCS began project planning by compiling available resource data, developing project goals and objectives, and identification of data gaps. Field review and additional data collection efforts were then initiated to provide baseline data to identify limiting factors and habitat opportunities. Data collection included a level 1 reference reach survey conducted by ODFW on upper Beqar Creek, longitudinal and cross section surveys on the lower, channelized reach of Bear Creek, and field observations of habitat conditions in upper Jordan Creek.

The baseline resource evaluation provided a framework for the development of a conceptual plan which included development of riparian conservation easements through a combination NRCS CREP and BPA habitat programs, a 1-mile restoration channel for lower Bear Creek, large wood/whole tree additions on a 1-mile reach of upper Jordan Creek, riparian conservation easement fences, off-channel water development (well, troughs, water delivery pipe, and water gaps), and tree, shrub,sedge/rush, and grass planting. The conceptual plan was then utilized to solicit funding through the Grande Ronde Model Watershed Prorgram and NRCS CREP Program for implementation funds. Figures 4 and 5 illustrate the selected management strategies and riparian conservation easements developed through the project planning process.

Detailed project planning and initiation of the environmental compliance review process was initiated during summer 2002 in preparation to begin project construction by October. Bear Creek channel construction, however, did not begin until December due to permit delays. Channel construction continued through the winter of 2002-2003 and by March approximately 5,550 feet of restoration channel was completed and ready for revegetation activities.

During spring and summer 2003, CTUIR and ODFW staff completed planting activities along the new channel and installed an irrigation system to water the newly constructed channel. In July 2003, 80 whole trees/large wood pieces were installed along upper Jordan Creek to enhance instream structural diversity, riparian boundary fences were constructed, and the off-channel water development was completed. In July 2004, Bear Creek was diverted into the restoration channel with reclamation of the existing channelized reach completed. Project implementation is more thoroughly described later in this report.

FIGURE 4 LONGLEY MEADOWS RESTORATION/ENHANCEMENT ACTIVITIES

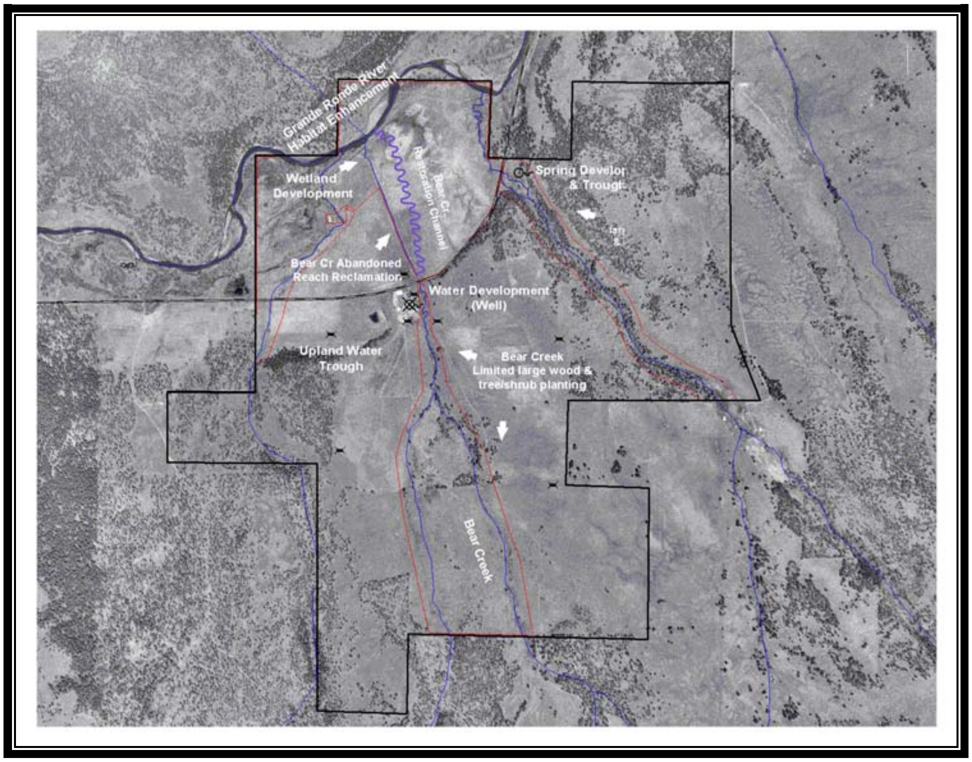
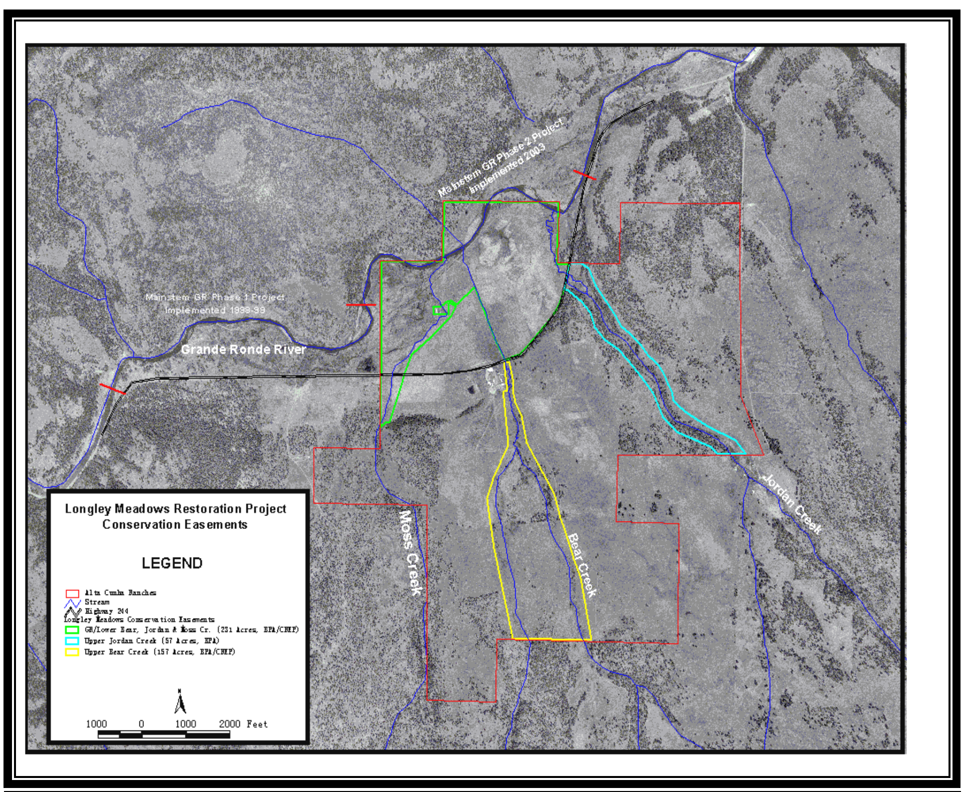


FIGURE 5 LONGLEY MEADOWS CONSERVATION EASEMENTS



Mainstem Grande Ronde River Habitat Enhancement Project

The Mainstem Grande Ronde River Habitat Enhancement Project is a multi-phase project initiated in 1998 in cooperation with the U.S. Forest Service, Wallowa-Whitman National National Forest, private landowners (Stone Ranch and Alta Cunha Ranch), CTUIR, ODFW, NRCS, GRMWP, and Oregon Department of Transportation (ODOT). The project reach includes about 6 miles of the mainstem Grande Ronde River from upper Bird Track Springs located on National Forest System lands downstream to the LaGrande Gunclub located about 2.5 miles upstream from Hilgard State Park. The project area was divided into three individual planning reaches for implementation. The project area overlaps the Longley Meadows Restoration Project described above. See Figure 6.

Project objectives for this project were developed using the best available information. A reference stream reach in functional condition with similar characteristics has not been identified within the Subbasin. Therefore, ranges of values for channel dimension, pattern, and profile were derived from literature (Castro and Jackson 2001, Leopold 1994, Rosgen 1996, Williams 1986) and professionally accepted values. Project objectives include:

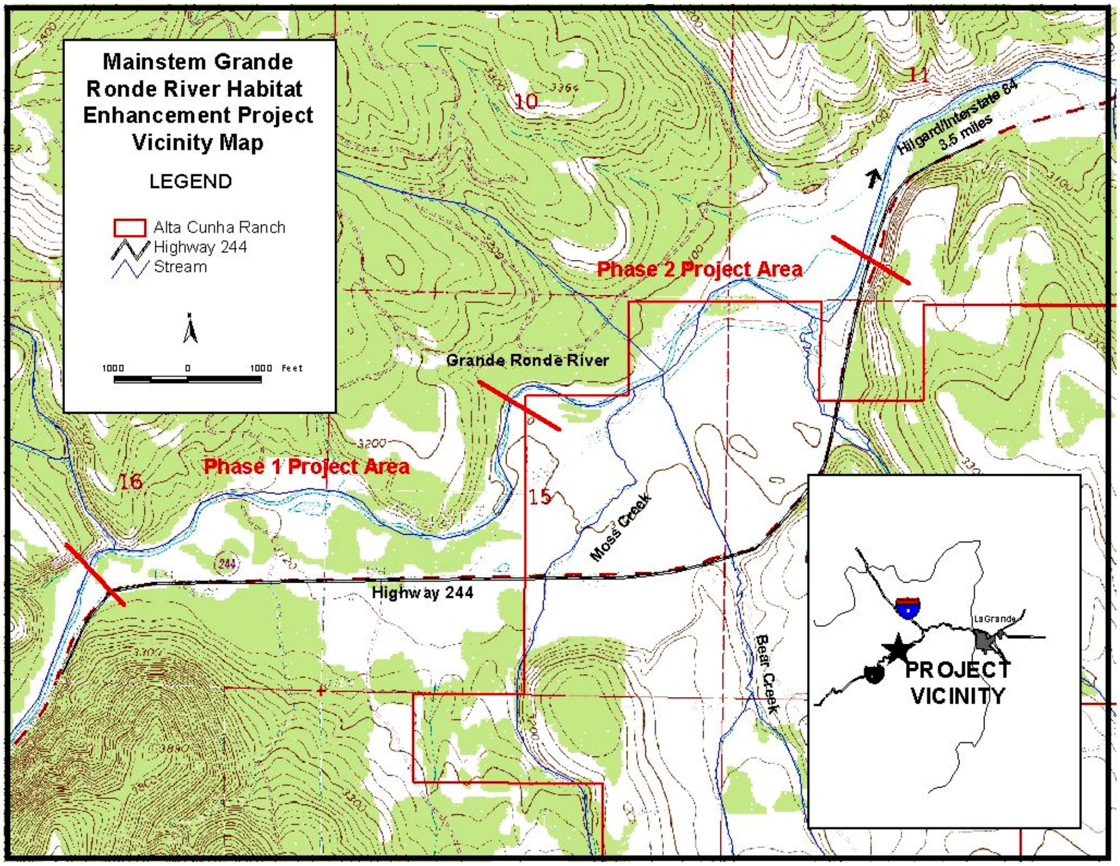
- Increase and enhance juvenile spring chinook salmon, summer steelhead, and bull trout rearing habitat
- Increase availability and quality of adult fish holding water (large pool habitat)
- Promote stable channel morphology
- Improve streambank stability and width:depth ratio
- Improve floodplain connectivity

Baseline resource assessments indicated that stream reaches were not functioning properly with multiple habitat limiting factors. Past management activities including splash dams, removal of large woody debris and boulders, livestock overgrazing, channelization, historic railroad construction, and contemporary recreational vehicle use have left project area reaches functioning well below levels that promote healthy salmonid fish populations. Specific baseline habitat conditions include:

- Lack of channel diversity and instream aquatic habitat features (USFS, 1998; USFS, 2000):
  --Pools having a residual depth of greater then 3.0 feet are at a frequency of less than 4 per mile, including the 5 rock weirs constructed in 1991 on the USFS Birdtrack Springs reach.
  --Riparian large woody debris of 12 inch diameter and longer than 35 feet is virtually absent at 4 pieces per mile with limited large wood recruitment potential.
  --Stream channel form is wide and shallow with width to depth ratios in riffles of 67:1 and average of 50:1.
  --Channel sinuosity is 1.25, which is lower than the expected sinuosity of 1.4 or greater based on the valley form and gradient.

- Connection is poor between the river and the floodplain and is evident in the vegetative response and channel formation.
  --Streambank stability is low and is apparent with a continual loss of bank (3 feet or more during large flow events) and increased lateral channel migration in several areas. The channel shifts are moving toward a degraded condition of lower sinuosity and increased bank erosion downstream streambank stability was visually estimated at 70% (USFS, 1998).
  --Sediment routing processes are out of balance as shown by large, unstable gravel bar development along the reach.
  --Shrub/tree successional development is lacking on streamside terraces. Cottonwood gallery reproduction is of special concern.

FIGURE 6 GRANDE RONDE RIVER HABITAT ENHANCEMENT PROJECT VICINITY MAP

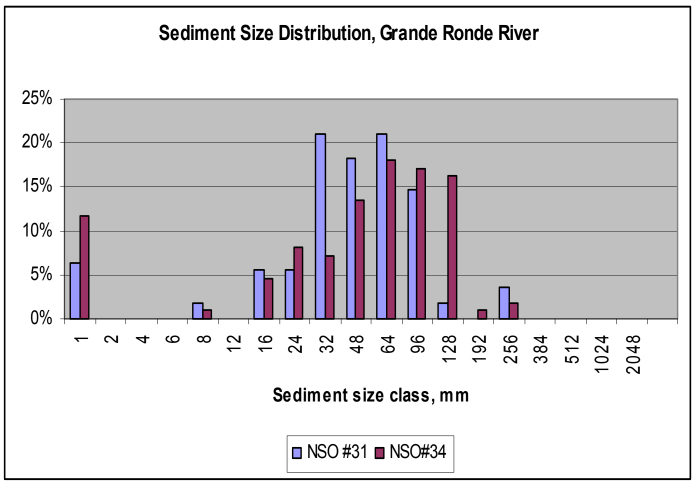


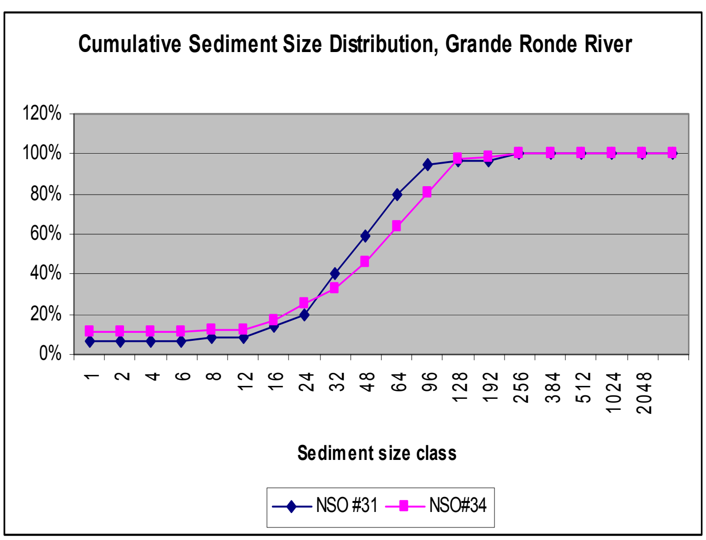
--Vegetated overhanging banks are lacking (<5% of bank length) and do not appear to be developing.
--Stream temperatures are limiting for salmonid fish species with summer temperatures exceeding 26^{o}C.

- Anthropogenic changes to stream and riparian function
  --Riparian and floodplain degradation and vandalism from recreational vehicle use and other causes.
  --Erosive concentrations of overland and out-of-bank flows along historical logging railroad grade.

In addition, water quality is limited within the project area. Summer low flow water temperatures annually exceed conditions suitable for cold-water salmonid species during the summer months (Bach 1995, Bohle 1994, USFS unpublished data). Bohle (1994) monitored stream temperature at several locations throughout the Upper Grande Ronde River Subbasin and showed that temperatures in the mainstem Grande Ronde River upstream of the project site annually exceed 26^{o}C. Temperatures of concern for juvenile Chinook salmon consist of lethal conditions at 25^{o}C and conditions for zero growth at 19^{o}C (Black 1953, Brett 1952). Bach (1995) states that temperatures above 22.8^{o}C will restrict rearing habitat and that the 1993 temperature data showed a 7-day mean maximum of over 25^{o}C downstream of Meadow Creek. Evidence suggests that anadromous salmonids using this reach of the Grande Ronde River are limited by these high water temperatures. Adult spring/summer Chinook observed in the project area during summer periods have been moving upstream and have not been holding for extended periods or spawning within this reach of the Grande Ronde River. Sampling done through snorkeling during periods of high water temperature has shown that juvenile salmonids in the project reach are located in backwater areas and available cold water gravel bar seems, indicated limited availability of cold water refuge.

Sediment distribution in the project area was measured at two separate locations by the Wolman Pebble Count method. Results displayed in the following tables suggest that stream energy may be slightly higher than expected. The D84 sediment size at both sites corresponds to a cobble material with a median diameter of 64mm to 96mm. Sediment distribution is segregated between fines and cobble sized material with the percentage of fines at each site being relatively low (6% and 11%). This suggests that suspended fines are transported through this reach due to high stream energy. Transported fines are extremely important in providing material for maintaining active floodplains and in the process of building stable banks. This reach of the Grande Ronde River is an area that would be expected to have a significant amount of fine sediment accumulation in key areas due to the lower channel gradient and wide valley form.





Phase 1 of the project was initiated on a 1.5 reach from the confluence of Bear Creek upstream to Bird Track Springs on National Forest System lands in 1998. Phase 1 included adaptive management and modification to instream structures installed by USFS in the early 1990's, installation of approximately 80 whole trees, 8 vortex rock weirs, and 6 rock barbs. Structural improvements were designed to facilitate and restore stable channel morphology and enhance instream fish habitat conditions including the maintenance and/or development of large pool habitat. In addition, approximately 2,000 feet of old railroad grade was obliterated and contoured to restore floodplain connection. In conjunction with the instream work, approximately 6,000 trees and shrubs were planted in the phase 1 reach to facilitate vegetative recovery. The following photos illustrate a sampling of project accomplishments.

Mainstem GR Phase 1Photo Point (Oct 99'). Streambank stabilization using rootwad revetments and bioenginnering to meet landowner streambank stabilization objectives.

Mainstem GR Phase 1Photo Point (Jun 01'). Photo point illustrates results of successful bioengineering and revegetation efforts.

Mainstem Grande Ronde Project – photo illustrates woody debris used in conjunction with natural channel design. Debris jam installed on point bar to encourage meander formation, reduce velocities, and develop point bar.

Phase 2 of the project, implemented in 2003, encompassed about 1.5 miles near the confluence areas of Bear Creek and Jordan Creek. Phase 2 was originally planned for implementation in 2002, but was delayed due to consultation with NOAA Fisheries and the USFWS. Initialization of consultation was conducted by the LaGrande Ranger District. Following several disputes, CTUIR staff voluntarily took over development of the Biological Assessment and initiated consultation through BPA to facilitate the process. By late June 2003, consultation was completed and appropriate permits secured (Biological Opinions from NOAA and USFWS, ODSL and Corps 404 permit). Project construction began on July 14, 2003 and was completed by October 15, 2003. Additional detail on phase 2 construction is presented later in this report.

METHODS AND MATERIALS

Program work is organized into the following categories: 1) Planning and design, 2) Construction and implementation, 3) Operations and maintenance, and 4) Monitoring and evaluation.

Project Planning and Design

Planning and design requires considerable staff time to develop habitat restoration and enhancement opportunities, formulate strategies, and complete steps necessary to facilitate project implementation. This task includes several elements including coordination with landowners and project partners, developing site specific restoration/enhancement plans, conducting field review and baseline habitat assessments, completing necessary environmental compliance requirements and securing permits, subcontracting for services, and soliciting/securing cost-share funds. Following are several tasks associated with this work element and the accomplishments during the reporting period.

Identification and Development of Restoration Project Opportunities

This task includes communicating with private landowners and resource agencies (GRMWP, ODFW, NRCS, ODEQ, USEPA, USFS) to develop project opportunities and partnerships primarily on private lands. Task includes conducting meetings, participating and/or facilitating strategic planning sessions, and maintaining close coordination on project development elements. During the reporting period, primary focus of these efforts were associated with preparing for phase 3 implementation of McCoy Meadows, development of the Longley Meadow project strategy, and completing permitting on the Mainstem Grande Ronde River Project.

Compile Data, Conduct Baseline Assessments, and Develop Project Goals/Objectives

These tasks include conducting office and field reviews of project areas, compilation of relevant data, development of project maps, assessment of existing resource conditions, development of goals and objectives, and formulation of restoration/enhancement strategies and techniques to address limiting factors. The task also includes conducting additional surveys and evaluation to provide additional necessary information.

Baseline assessments, development of goal/objectives, and project designs were largely completed for the McCoy Meadows project in 2001 prior to initiation of restoration channel construction. However, NRCS, ODFW, CTUIR, and the private landowner conducted several meetings during 2002-03 to finalize phase 3 plans and prepare for project construction. Primary emphasis included completing required environmental compliance evaluations for phase 3 and preparations for subcontracting construction work. Longley Meadows planning and design included completion of reference reach data collection by ODFW, topographic survey, development of design criteria for the Bear Creek restoration channel, and completion of project design report (ODFW , 2001). In addition, project partners completed project plans associated with off-channel water developments, riparian conservation fence needs, Jordan Creek whole tree/wood placement, and revegetation plan.

Preparation for construction of the Mainstem Grande Ronde River Habitat Enhancement Project was focused primarily on completing consultation with NOAA Fisheries and USFWS, which had been significantly delayed in 2001 by issues associated with effect determinations on listed fish stocks. CTUIR staff eventually took on the lead role of re-drafting a biological assessment and initiated formal consultation through BPA. Upon completion of regulatory requirements, preparations were made for subcontracting phase 2 construction activities.

Development of Grant Proposals to Secure Project Implementation Funding

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 successfully secured funds for the McCoy Meadows, Longley Meadows, and Mainstem Grande Ronde River Habitat Enhancement Project. Completed tasks included drafting GRMWP funding proposals and coordinating with GRMWP staff and BPA staff to secure funding contracts. Following is a summary of the grant funds secured for each of the three projects identified above:

McCoy Meadow Restoration Project: $101,700 GRMWP-BPA (contract #00002662), $140,100 CTUIR-BPA (contract #00006229), $135,000 North American Wetland Venture, $90,000 NRCS WRP Restoration, $50,000 ODEQ/USEPA 319 Fund, $10,000 (in-kind) ODFW-BPA, $30,000 USFWS Partners in Wildlife, $10,000 (in-kind) Ducks Unlimited, and $10,000 (in-kind) Union County Public Works.

Longley Meadow Restoration Project: $145,000 GRMWP-BPA (contract #00012339), and $17,600 ODOT Lower Perry Bridge Mitigation (ODOT-CTUIR MOA).

Mainstem Grande Ronde Project, Phase 2: $81,600 GRMWP-BPA (contract #00006251).

Environmental Compliance/Regulatory Reviews

This tasks includes preparing biological assessments, coordinating consultations through BPA, developing NEPA checklists, and preparing various permit applications such as Oregon Department of State Lands Fill/Removal Permit applications and U.S. Army Corps of Engineers 404 permits, and coordination of necessary archaeological surveys and evaluations. Accomplishments for the three primary projects during the reporting period included completion of biological assessments and ESA consultation concurrence, NEPA checklists and supplemental environmental analyses prepared by BPA NEPA staff, ODSL and Corps Fill/Removal and 404 permits, and State Historic Preservation Officer compliance for cultural resource clearances.

Preparations for Project Construction & Implementation

Construction preparation involves preparations to secure subcontracted services such as heavy equipment operation necessary for construction. This task includes preparation of Requests for Quotes/Proposals to solicit bids by prospective subcontractors, conducting site tours, conducting bid process and selecting subcontractor, development of subcontracting documentation, administration of subcontract, project inspection, and handling invoices/payments. During the reporting period, the CTUIR prepared and administered construction contracts associated with the three primary projects. Following is a summary of project accomplishments: McCoy Meadows – phase 3 construction subcontract, fence construction subcontract; Longley Meadows – phase 1 and 2 construction subcontracts, Jordan Creek Large Wood Placement subcontract, Off-Channel water development subcontract, and Jordan Creek fence installation subcontract; Mainstem Grande Ronde – phase 2 construction subcontract.

CBFWA Coordination

Task includes ongoing coordination on regional fish and wildlife issues and project development. Accomplishments during the reporting period included participation of several regional forums conducted by CBFWA focused on NPPC Fish and Wildlife Program development and implementation, and funding issues.

Construction and Implementation

Project Preparation

This activity includes field staking and layout, identification of staging areas, fueling areas, and materials stockpiling locations, ensuring all permits and other environmental compliance is in-place. Worksites may include fence construction, off-channel water developments, instream structures and channel re-alignment, and planting projects. Project layout during the reporting period included extensive work on the McCoy Meadows, Longley Meadows, and Mainstem Grande Ronde River projects. Activities were accomplished in cooperation with various project partners with shared tasks and responsibilities.

Subcontracting for Services and Materials

Federal procurement regulations pertaining to subcontracting work is closely adhered to in all CTUIR procurement procedures. The process includes developing construction plans and specifications, development of requests for quotes or proposals, notification and solicitations for services, reviewing bids and subcontractor responsiveness to bid packages, committee review and contractor selection, contract document development, contract award, contract inspection and administration, and payment of invoices. Services subcontracted through the program vary, but generally includes work elements such as heavy equipment construction, mechanical tree and shrub planting, and fence construction. Outside vendors are used for services that cannot be performed by CTUIR staff or where current workload limits staff availability. CTUIR staff conducted the majority subcontracting for the three primary projects completed during the reporting period and administered approximately $500,000 of project expenditures including channel construction, instream structures, bridge, off-channel water developments, fences, and planting efforts.

Riparian Conservation Easements

Task includes coordination with landowner and other agencies as necessary when non-BPA easement programs such as CREP and WRP are being considered and development of conservation easement agreements. Conservation easements are signed by participating parties, notarized, and filed with Union County System. Conservation easement agreements secured during the reporting period included McCoy Meadows WRP agreement (450 acres of perpetual easement) where the CTUIR is a party to the agreement with NRCS, ODFW, and the landowner, and a conservation easement on a portion of the Longley Meadows/Mainstem Grande Ronde River (400 acres, 15 year lease agreement concurrent with CREP enrollment).

Planting and Bioengineering

A variety of revegetation methods are employed and are designed to meet specific project objectives and site conditions. Techniques may include a combination of maual 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 depradation, 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 50,000 plants (primarily live whips and sedge/rush plugs on the three primary project areas.

Riparian Easement Fencing

Fences are utilized to reduce impacts to riparian and wetland habitat caused by unregulated livestock utilization. Installations are completed by both CTUIR project staff as well as subcontractors. Development of riparian easements is based on landowner preferences in regard to location and width of easement boundary. Staff work with landowners whenever possible to protect floodplains and associated wetland areas when possible. Fence construction material may include either high tensile or barbed wire. Fence specifications utilized are those developed by ODFW. Approximately 10 miles of new fence was installed during the reporting period on McCoy Meadow and Longley Meadows through subcontracts jointly administered and inspected by CTUIR and ODFW staff.

Off-Channel Water Developments

In conjunction with riparian easement boundary fences, off-channel water developments are sometimes necessary and desirable to minimize the need for livestock access to stream channel and undeveloped springs for water sources. A variety of tools are available including development of wells and water delivery systems as well as limited livestock water gaps where other options are not available or where the landowner has preference. Primary water development completed during the report period include well installation, water delivery pipe, and eight troughs on the Longley Meadow project.

Operations and Maintenance

Operations and maintenance includes administrative functions necessary to implement of fish habitat enhancement program and maintaining projects and associated developments. Following is a summary of O&M actiivities.

Administer CTUIR Grande Ronde River Basin Watershed Restoration Program

Activity includes preparation of annual statements of work and budgets and coordination with BPA COTR on contract renewals, financial reports, development of quarterly and annual reports, maintaining staffing and conducting annual performance reviews, payroll, purchasing and invoice payments, and fleet and equipment management.

Conduct Annual Project Maintenance Activities

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 by, maintaining communications and good standing with landowners, repairings 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. O&M also includes taking care of plants by watering and installing protection devices, managing weeds and other competing vegetation when necessary, and regularly maintaining equipment, tools, and vehicles.

Monitoring and 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.

Photo Points

Both ground based and aerial photography are taken at scheduled time periods on individual projects. A combination of both ground-based and aerial photo points are established primarily on project area involving large-scale meadow restoration and new channel construction, whereas ground-based point points are utilized on riparian exlosures and smaller restoration efforts involving both passive and actives restoration methods. A combination of slides, print film, and digital photos are taken annually at permanent monitoring points. Photo-points are taken annually or bi-annually with a 35-mm camera and a standard 50-mm lens and/or a digital camera. Project photo point albums are maintained at the CTUIR Fisheries and Wildlife Offices.

Vegetation Surveys

Monitoring plots and transects are utilized to monitor vegetation response to project activities. Various survey protocols have been utilized in the past and efforts are being made to standardize survey methodologies for project areas. We have utilized a combination of standard vegetation plot techniques (e.g., Daubenmire, Johnson) and line intercept techniques to evaluate shrub communities. In addition, basic plant stocking or census surveys have been conducted to evaluate plant survival in artificial propagation (planting) efforts. In general, the current plant community assessment tools utilized include a combination survey consisting of establishing transects, conducting shrub intercept measures, and randomizing vegetation plots along the transect.

Fish Population Surveys

Fish population assessments are conducted on McCoy Meadows by ODFW. CTUIR have assisted in data collection and in fish salvage operations on several projects. CTUIR staff are currently evaluating the need to develop larger scale M&E component for the Upper Grande Ronde Basin. At this point in time, project sponsors are not able to sufficiently evaluate fish response to habitat enhancement and restoration project. For future habitat projects, a concerted effort to bring ODFW and CTUIR researchers into the process is underway in order to develop improved strategies for tracking fish population responses to habitat efforts.

Water Temperature Monitoring

Water temperatures are monitored with Onset thermographs which are generally deploy in May and retrieved in October. Temperature probes are deployed to collect data on an hourly basis. Ambient air temperature probes are also deployed within project areas to provide a reference of water temperatures against seasonal changes in ambient air temperature. Water quality data is used to evaluate project progress toward meeting objectives of providing cold water habitat for salmonid fish and assessing habitat limiting factors. Water temperature data is collected annually on several projects including McCoy Meadows, Longley Meadows, and Enkay West Restoration Projects.

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 o of the water table. Key objectives of these restoration projects is 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 data have included installation of 39 wells on McCoy Meadows and 12 wells on Longley Meadows. Two stage recorders were also installed at McCoy Meadows to measure changes in discharge, but funding availability have limited our abilities fully collect and utilize data to date.

Longitudinal and Channel Cross Section Surveys

Longitudinal data is collected by walking the length of the stream, categorizing habitat types (pools, glides, riffles, runs) and taking elevation points either with a lazer level or, preferably, with survey grade geographical information system (GPS). Cross section data is collected on individual permanent monitoring stations. The number of cross sections is determined on a project by project basis based on project length and channel diversity. Transects are established perpendicular to the streams thalweg and extend outward from center channel to adjacent terrace at a point above and beyond the bank-full channel width. Transect are established in stream reaches representative of difference habitat types. Data is utilized to monitor geomorphic changes in project channels or time. A narrowing and deepening trend is most desirable for quality aquatic habitat, water quality, and channel stability.

Fish Habitat Surveys

Past fish habitat surveys have been focused on collecting information using a modified Hankin and Reeves protocol as modified by ODFW. Recently, there has been a shift to collect additional information associated with channel morphology. Level 1 Rosgen surveys, for example includes data collection on channel type, bankfull cross sectional area, cross sections on pools and riffles, longitudinal channel profile, valley form, floodplain and riparian condition, channel/valley gradient, sinuosity, and meander widths.

Geographic Information System/Relation Database Development/GPS Data

Mapping and development of data themes, including digitizing streams, physical features, and/or incorporating GPS data points, lines, and polygons, is generally completed on all projects. Associated data sets can help with maintaining and analyzing data for monitoring and evaluation purposes, maintaining long-term records, and presenting information for presentations and in reports. GIS data is both managed and created in ArcView and ArcInfo software programs. The program has established an extensive electronic data library consisting of digital ortho quadrangles, usgs quadrangles, and a variety of regional and project specific data themes. In addition, project partners generally coordinate closely in sharing data for use in analyses, project map development, and monitoring/evaluation purposes.

Budget

The following tables summarize budget expenditures of BPA funds provided directly to the CTUIR to implement the CTUIR Grande Ronde Subbasin Restoration Project. Additional budget information is provided by individual major project area to document expenditures of BPA funds as well as fund secured from other agencies and funding sources.

Table 1 Fiscal Year 2002 Budget Expenditures

FY 2002 CTUIR Grande Ronde Subbasin Restoration Project Budget Expenditures	
Budget Category	**Budget Amount**
Personnel (Salaries and Fringe Benefits)	$61,384
Vehicles & Travel	$7,900
Training	$1,000
Materials/Supplies and Services	$16,334
Subcontracts	$77,150
Indirect (34%)	$32,078
Total Expenditure	**$195,846**

Table 2 Fiscal Year 2003 Budget Expenditures

FY 2003 CTUIR Grande Ronde Subbasin Restoration Project Budget Expenditures	
Budget Category	**Budget Amount**
Personnel (Salaries and Fringe Benefits)	$71,222
Vehicles & Travel	$11,027
Training	$0
Materials/Supplies and Services	$22,518
Subcontracts	$15,531
Indirect (34%)	$41,381
Total Expenditure	**$161,679**

Note that budget tables above illustrate funds provided by BPA to CTUIR to administer and manage the CTUIR Grande Ronde Subbasin Restoration Project. Cost share funds and expenditures secured through the Grande Ronde Model Watershed Program and other sources (presented in the Methods and Materials Section above) are discussed under individual projects below.

RESULTS AND DISCUSSION

McCoy Meadows Restoration Project

The following table summarizes accomplishments for the McCoy Meadows project followed by a presentation of project phases, results, and monitoring and evaluation data.

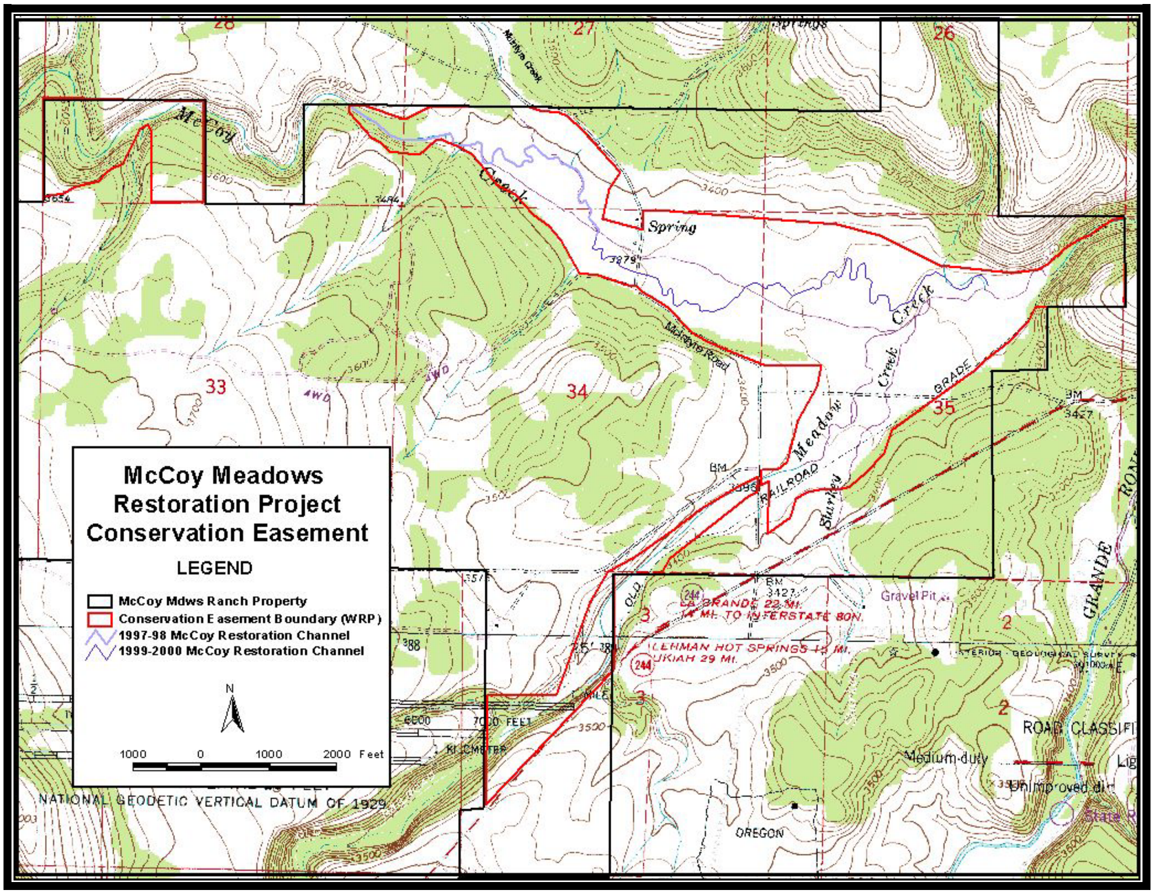
Table 3 McCoy Meadows Restoration Project Accomplishment Summary

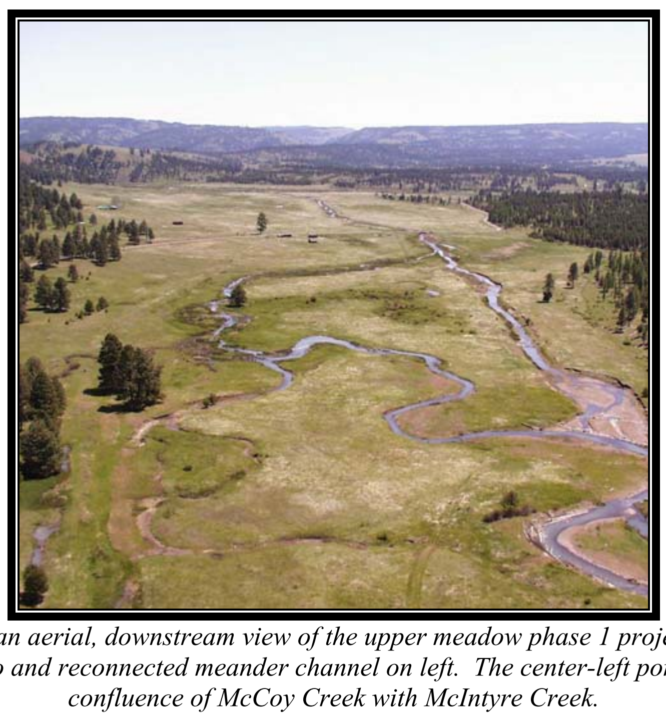
Site/Work Type	Fence Miles	Stream Mi Treated	Acres Treated	Acres Benefited	# Structures
Instream Habitat Restoration & Protection	3.88	2.94		450 acres	12
Restoration Channel Construction		1.23			2
Bridge Construction					1
Revegetation/ Bioengineering		2.94			35,000 plants/stems
Seeding			30 acres		

Phase 1 (Upper Meadow Restoration 1997-1999): In July, 1997 the McCoy Meadows design team initiated the first step in restoring the natural character and function of McCoy Meadows by reintroducing McCoy Creek into its' pre-1977 stream channel. Phase 1 included partial channel diversion, installation of 5 rock grade control structures in the channelized stream reach to trap sediment and aggrade the channel, and recontouring old drainage ditches to improve floodplain connection. Approximately 3,000 feet of channel was involved in the phase 1 project. Of the total, about 600 of feet of new channel excavation was completed. Over 1,200 feet of channel re-activation was accomplished. In addition, NRCS, CTUIR, and ODFW worked with the landowners to establish a permanent riparian and wetland conservation easement through the Federal Wetland Reserve Program (WRP). See Figure 7. Both CTUIR and ODFW were identified in the agreement as project partners under the BPA Fish and Wildlife Program. As part of the agreement, several miles of existing BPA habitat program fence originally installed in 1985 along the channelized alignment, were identified for relocation to the outer edges floodplain contained within the conservation easement boundary. Approximately 450 acres of riparian and wetland habitat is protected under the easement which includes about 3.5 miles of instream habitat associated with McCoy Creek, Meadow Creek, and McIntrye Creek. Figure 7 illustrates the conservation easement boundary.

Key habitat improvements included increased channel length and sinuosity, decreased gradient and water velocities, improved width:depth ratio, and improved habitat complexity. Vegetation response to channel reintroduction in the pre-1997 channel segment was significant with rapid recolonization of sedges and rushes (carex and juncus spp.) throughout the reach. Artificial propagation of hydrophytic shrubs, however, has been generally poor. A variety of planting techniques and materials have been employed in the phase 1 project reach with marginal results. Use of small containerized shrubs was initially selected as the primary technique based on literature review and recommendations from various native plant nurseries. In conjunction with containerized plugs, use of live whips and salvage of whole shrubs was also utilized. Approximately 14,000 shrub tublings, 10,000 willow whips, 1,000 bareroot conifers, 40 whole shrub transplants, 120 cottonwood poles, and about 800 feet of willow fascines were been installed in the phase 1 project reach. Survival and establishment of hydrophytic shrubs has been minimal and is attributed to several factors including streambank erosion, drought, big game/wildlife depredation, and selection of techniques and materials. Streambank erosion and channel adjustment has generally stabilized in conjunction with colonization by sedges and rushes and planting success with hydrophytic shrubs is generally increasing with repeat planting efforts. The following figures show the upper meadow following initial phase 1 construction and habitat features associated with the upper reaches of McCoy Creek.

FIGURE 7 McCOY MEADOWS CONSERVATION EASEMENT





May 1998 photo provides an aerial, downstream view of the upper meadow phase 1 project area. Note channelized reach on right side of photo and reconnected meander channel on left. The center-left portion of the photo shows the confluence of McCoy Creek with McIntyre Creek.

Phase 1 restoration channel reach illustrating riparian/wetland communities during late spring 1998 during near bankfull discharge. Extensive recovery of rushes and sedges is prominent. Note gentle gradient and encroachment of hydrophytic plants.

Upper Meadow Phase 1 Project Area, April 1998. Note floodplain activation

Phase 2 (Lower Meadow Restoration), 2001-2002: During the 2001 field season, phase 2 of the project was implemented, including construction of approximately 6,500 linear feet of restoration channel, installation of rootwad revetment structures at 12 sites to stabilize newly constructed streambanks on pools, and installation of 10 rock grade control structures within the channelized McCoy Creek alignment. NRCS and CTUIR staff conducted field stakeout, established survey benchmarks, and conducted pre-construction bid tours as part of the pre-project preparation phase. CTUIR administered several subcontracts associated with phase 2 implementation and fence construction.

Phase 2 McCoy Creek channel construction. Photo illustrates use of large construction equipment including scraper loaders and track-mounted dozers.

Phase 2 Restoration Channel Construction. October 2001

Project construction was initiated in July and completed in early September. In addition to phase 2 channel construction, additional construction activities in the upper meadow, phase 1 reach were completed, including completion of the 97' channel diversion structure and reclamation of the abandoned channel in the phase 1 reach. Work on the diversion structure consisted of installation of compacted backfill over the rootwad revetment/rock structure and contouring slopes in preparation for vegetation placement. Approximately 800 cubic yards of soil and gravel, generated from floodplain pond shaping, was utilized to complete the structure. Reclamation of the channelized reach included installation of compacted plugs and feather terraces to direct floodplain water flow, and contouring slopes and floodplain ponds. Photos below illustrate the 97' diversion structure and floodplain pond features.

Phase 1 McCoy Creek Restoration Project Diversion Structure (1997)

Phase 1 McCoy Creek Restoration Project Diversion Structure (2002)

Phase 1 McCoy Meadows Floodplain Ponds. Photo illustrates pond features developed as part of the reclamation of the channelized reach following channel diversion.

The following photos illustrate restoration channel construction, bridge construction, and reclamation of the channelized reach. Figure 8 and 9 illustrate phase 1-3 of the McCoy Meadows Restoration Project

In addition to restoration channel construction and reclamation activities in the phase 1 reach, project partners also completed designs and installation of a new bridge on the McIntyre Road to replace an existing, undersized culvert. The new bridge consisted of a 60 foot, pre-cast concrete structure, designed to accommodate a 50 year flood flow and compliment the restoration project. Bridge construction was initiated in late 2001 and completed in October 2002. Bridge design, installation, and construction inspection was organized and coordinated by Ducks Unlimited through a cooperative agreement with the CTUIR.

Pre-project triple culvert on McIntyre Road. Existing structure was severely undersized for McCoy Creek.

New McCoy Creek bridge provides greater capacity to better provide floodplain connectivity.

Initial planting and seeding of the phase 2 project reach was initiated in late October 2001. Additional planting was completed during spring 2002. Techniques included broadcast seeding of native/native-like seed mix and installation of hydrophytic shrubs, primarily salix spp. Seeding consisted of application of about 600 pounds of custom seed mix using an ATV-mounted seeder and sowing using an ATV-mounted harrow. Approximately 30 acres of disturbed ground was treated to initiate vegetative recovery, stabilize construction-related disturbance, and minimize weed infestations. Initial planting activities included mechanical installation of live willow whips along the restoration within the bankfull channel of the restoration channel.

Salmon Corps planting vegetation on the McCoy Creek Restoration channel following construction.

Approximately 2,000 willow whip bundles were installed within the rootwad revetment structures using a stinger mounted on a track-mounted excavator. The technique includes preparation of willow whip bundles, inserting the stinger into selected planting locations, installation of the bundle into the stinger hole, and backfilling the planted bundle. In addition to mechanical whip planting, and additional 1,500 whips and 400 bareroot willow plants were manually planted on gravel bars and in riffle sections.

In an attempt to improve plant survival, a temporary, gravity-fed irrigation system, consisting of 3 separate screened water intake pipes and water delivery pipe, was installed to provide water to the restoration channel during the 2001 summer season. Due to the lack of a water right on the property, a temporary water right to utilize water from McCoy Creek during the spring high flow period was secured from the Union County watermaster. The 3 intakes were strategically placed to deliver water to the upper, middle, and lower reaches of the restoration channel. Water availability during the summer of 2002 was limited and the water right expired by the middle of June, requiring CTUIR staff to cap the intake pipes and limit water access to the new channel. A long, hot and dry summer resulted in generally poor to fair survival of shrubs in the phase 2 project reach during the first growing season.

Revegetation success on the project area has been much debated as to the appropriate techniques. Past efforts have been focused primarily on hydrophytic shrubs without any direct efforts to facilitate establishment of sedges and rushes. Based on the recolonization of sedges and rushes experienced in the phase 1 reach, similar results were anticipated in the lower project reaches. However, establishment of these important plant communities has been moderately slow.

Revegetation efforts within McCoy Meadows are an ongoing effort. Refined techniques and a change in approach is necessary to achieve vegetative objectives that will help stabilize the restoration channel and improve channel morphology. Results of early efforts indicate that the most probably method of success includes deep planting of conditioned willow whip material on gravel bars and installation of sedge/rush plugs and matts to provide local, stabile communities that will expand over time and colonize currently unvegetation/unstable areas.

FIGURE 8 UPPER MCCOY MEADOWS, PHASE 1-2 ILLUSTRATION

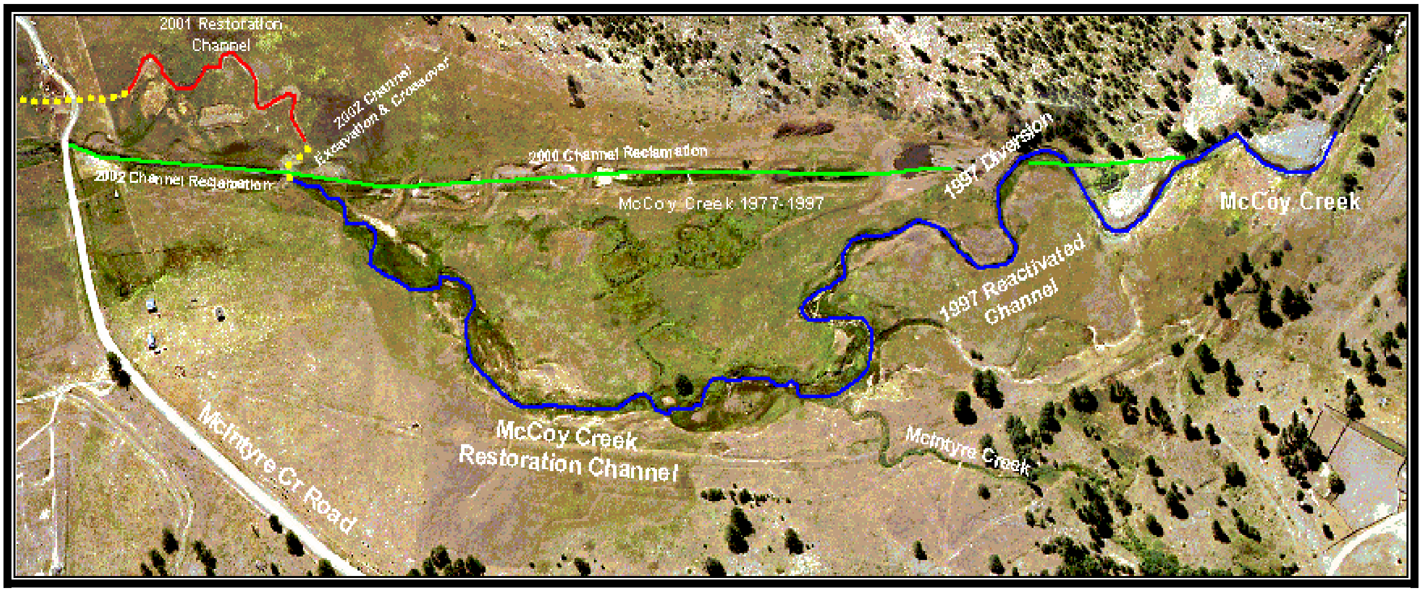
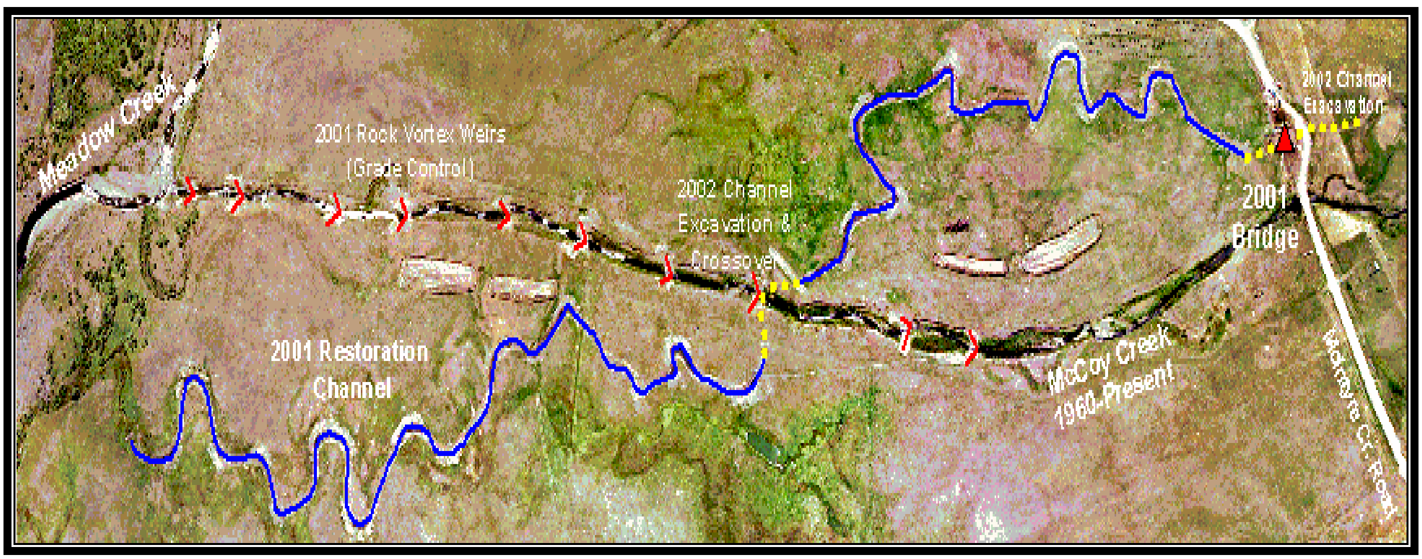


FIGURE 9 LOWER MCCOY MEADOWS, PHASE 1-2 ILLUSTRATION



Phase 3 McCoy Meadow Project Completion (2002-2003): On July 1, 2002, project sponsors initiated construction of the final phases of project. Phase 3 included completing restoration channel construction, fish trap and haul/salvage prior to channel diversion, channel diversion, and reclamation the existing channelized reaches. Restoration channel construction consisted excavating an additional 800 feet of channel to connect channel segments constructed in 2001. In conjunction with the channel excavation, approximately 400 feet of rootwad revetment structures were installed along two segments where the restoration crossed the existing channel (one in the upper meadow and one in the lower meadow). Channel reclamation consisted of constructing compacted earthen plug structures in the channelized reach and contouring/shaping slopes to develop a network of floodplain ponds. An estimated 15,000 cubic yards of material excavated from the new channel was utilized to create the compacted plugs and fill about 40% of the channelized reach. Additional channel swale construction was accomplished to interconnect the floodplain pond network.

Photo sequence taken illustrates lower channel diversion in phase 3 project reach. Upper photos show initial channel diversion efforts. Lower photos show the constructed outside meander with rootwad revetments and revegetation activities. Note vegetative recovery in lower right photo following installation of shrubs and sedge/rush mats.

Phase 2 channel excavation and diversion of McCoy Creek into restoration channel

Installation of log "V" weir for streambed grade control and stream gaging station

Abandoned McCoy Creek channel incorporated into floodplain pond network. Note earthen berm in background.

Following channel construction completion and prior to channel diversion, CTUIR and ODFW crews conducted extensive trap and haul efforts to remove and relocate all fish, amphibians and reptiles encountered to upstream locations. Techniques included seining and electrofishing with dip nets. Fish species were identified and salmonids were classified by age. Fish, amphibians, and reptiles were temporarily held in aerated coolers mounted on ATV's then transported upstream and released approximately 0.5 miles from the project reach. Approximately 400 salmonids (summer steelhead juveniles and two spring Chinook salmon juveniles), aged primarily as zeros and ones, were salvaged and released. An estimated 2,500 non-game fish (sculpins, dace, red-sided shiners), amphibians (spotted frogs), and reptiles (garter snakes) were also salvaged and released.

CTUIR and ODFW crews conduct fish trap and haul operations in channelized McCoy Creek reach prior to channel diversion in phase 3.

During late fall 2002 and early spring 2003, additional seeding and planting was completed to facilitate vegetative recovery and minimize the spread of weeds. Activities included broadcast seeding of approximately 400 pounds of seed and manual installation 3,000 live willow whips and 800, two year bareroot willow stock grown-out at the CTUIR Native Plant Nursery.

Figures 10 and 11provide an aerial illustration of post-phase 3 construction. These photos were taken by a private vendor hired by CTUIR and ODFW to conduct low elevation aerial photos of McCoy Meadows and several other project areas in the Upper Grande Ronde River and are useful in tracking changes in habitat conditions from an aerial perspective.

Following spring 2003 floodflow and estimated average run-off conditions, project assessment and evaluation was initiated to determine how well the channel functioned and whether any problems developed such as headcutting and streambank erosion. Initial evaluations during peak flow events indicated that several stream segments experienced excessive water velocities and lacked interaction with the floodplain. In addition, several section of excessive streambank instability were readily apparent. Later in the spring following receding streamflows, it became even more apparent that several headcuts had developed, particularly in the reaches upstream of the new bridge. ODFW conducted additional detailed survey of the longitudinal profile and channel cross sections to provide data for further evaluation and comparison with the as-built channel conditions. Detailed review of the pre-project and post project conditions is currently underway, including an evaluation by NRCS engineering staff to determine potential causes of localized channel failure and recommended modifications to ensure that project objectives will be achieved over time. Appendix X contains several illustrations of the as built channel profile and plan view.

FIGURE 10 FENCE CONSTRUCTION/RELOCATION ALONG CONSERVATION EASEMENT BOUNDARY

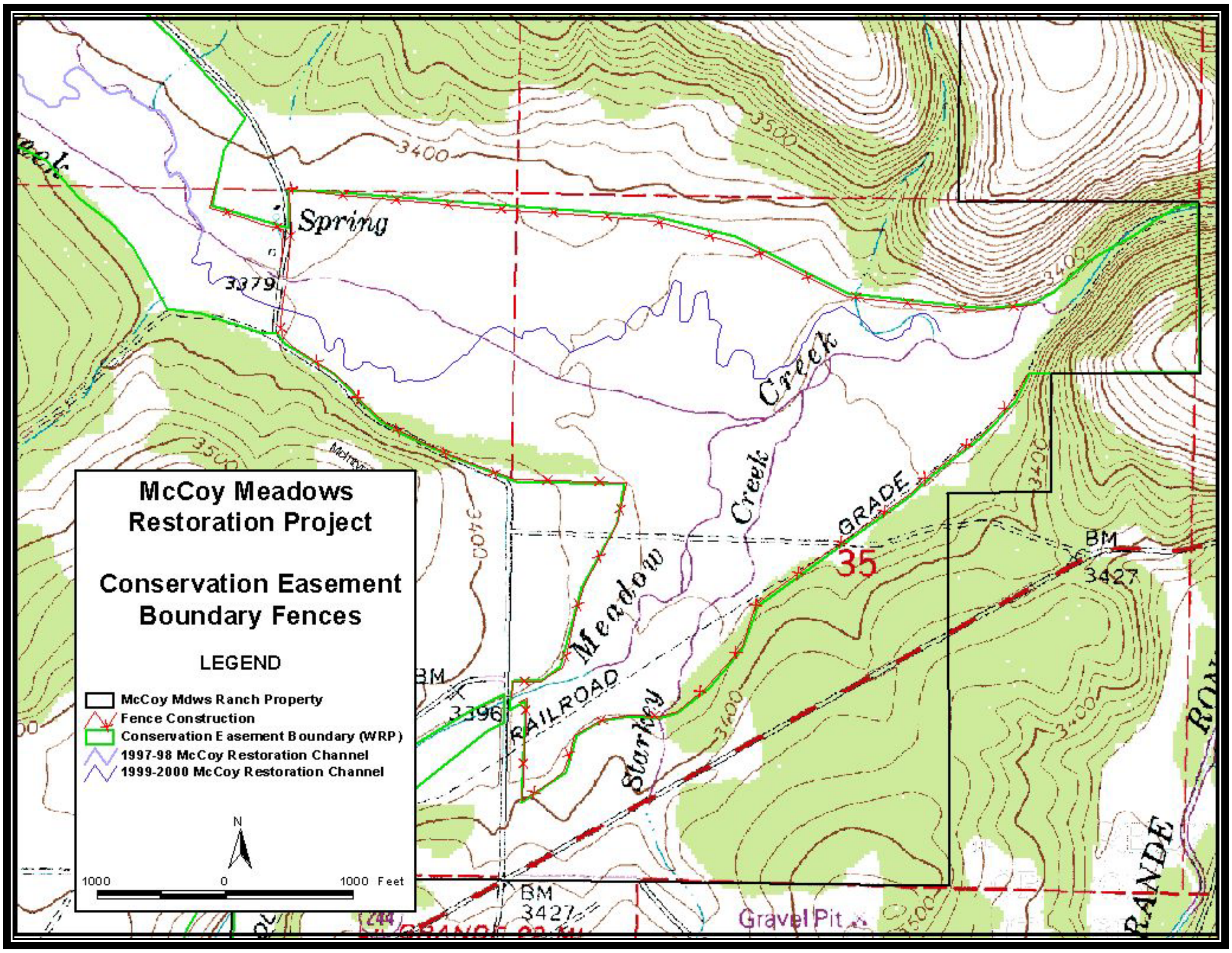


FIGURE 11 UPPER MCCOY MEADOW COMPLETED PROJECT

Upper Meadow (October 2002). Illustrates Phase 1-3 project efforts following channel diversion shown in upper left and reclamation efforts along channelized reach (upper center of photo)

FIGURE 12 LOWER MCCOY MEADOWS COMPLETED PROJECT

Lower Meadow McCoy Meadows (October 2002). Illustrates Phase 1-3 project efforts following channel diversion and reclamation efforts along channelized reach

Ongoing monitoring and evaluation efforts include photo points (both aerial and ground-based), water temperature, groundwater elevations, vegetative transacts and plots, channel morphology (cross sections, longitudinal profile, and biological monitoring (juvenile fish population/redd surveys). In addition, point/nesting bird counts and amphibian surveys are conducted by private and EOU staff.

During the summer of 1997 following channel relocation, temperature probes detected presence of cold water inputs, presumably from groundwater, with localized areas providing cold water refuge. Water temperature data also illustrates that diurnal temperature fluctuations were moderated in the project reach compared to channelized reaches. During the summer of 1998, water temperature data was similar to 1997 data. Maximum water temperatures in the restored channel segments reached 78.8°F (26°C) during July compared to maximum temperatures of 84.2°F (29°C) in the channelized segments downstream from the phase 1 project area. A very similar trend has continued since 1998 with a general cooling trend through the phase 1 project area and rapid water temperature increases in the lower meadow downstream of the phase 1 restoration reach. (ODEQ, 2000).

Additional thermographs were installed to measure water temperature along McCoy and Meadow Creek in 2002 and 2003. Thermographs recorded minimum and maximum temperatures on an hourly bases and were generally placed within the center of the creek channel in a rifle. Ten thermographs were deployed each year: seven in McCoy Creek, and two in Meadow Creek. An ambient air temperature monitoring probe was also installed to compared observed water temperatures with seasonal variations in ambient air temperature. McCoy 1 thermograph was placed just upstream of the start of the project reach on McCoy Creek, with McCoy 8 downstream of the project near the mouth of McCoy Creek, and others in between in descending order. Thermographs at Meadow Creek were in the upper portion of Meadow Creek and below the junction of McCoy Creek with Meadow Creek. In 2003 McCoy 8 and Meadow Creek 1 thermographs were lost.

Average seven day maximum water temperatures were obtained from data collected by the Oregon Department of Environmental Quality from 1993 to 1998, and were used as baseline data to compare with data from 2002 and 2003. Average 7 day maximum water temperatures from McCoy 6, McCoy 8 and Meadow 1 in 2003 are unavailable due to a lost or dry thermograph.

FIGURE 13 MCCOY MEADOWS THERMOGRAPH LOCATIONS

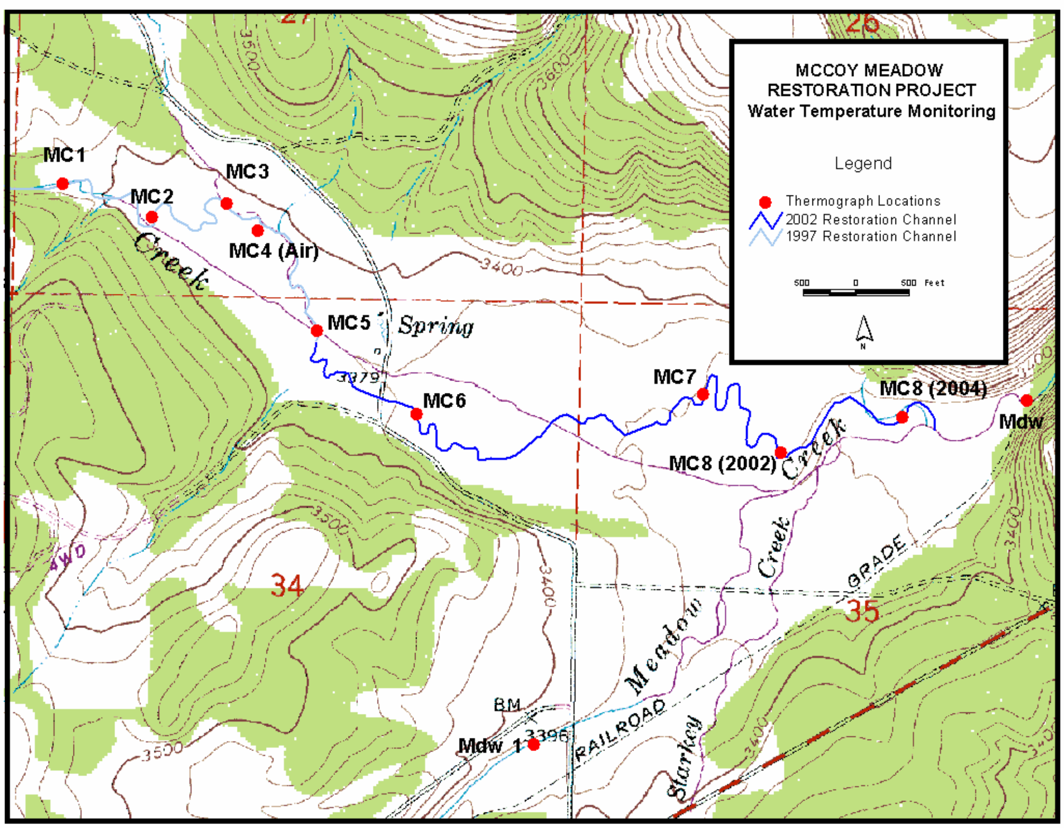


Table 4 McCoy Meadows Average 7 Day Maximum Water Temperatures

Table illustrates average 7 day maximum water temperatures from 1993 to 2003 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
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
1999									
2002	22.4	23.8	22.1	25.4	16.9	25.6	26.7	25.5	28.1
2003	27.2	28.5	25.5	29.0	NA	26.6	NA	NA	27.9

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 slightly different sections of stream (pools versus riffles).

A comparison of ODEQ data from 1993 to 1998 and CTUIR data from 2002 and 2003 do 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 in 1998 through 2003 as well. Monitoring sites in lower McCoy Creek consistently detect increased water temperatures, indicated thermal loading.. High water temperatures in 2003 correlates with high air temperatures.

FIGURE 14 MCCOY MEADOWS AVERAGE 7 DAY MAXIMUM WATER TEMPERATURES

Average 8 day maximum water temperatures from 1993 to 2003 taken at McCoy 1 through McCoy 8. 1993 to 1998 data from ODEQ.

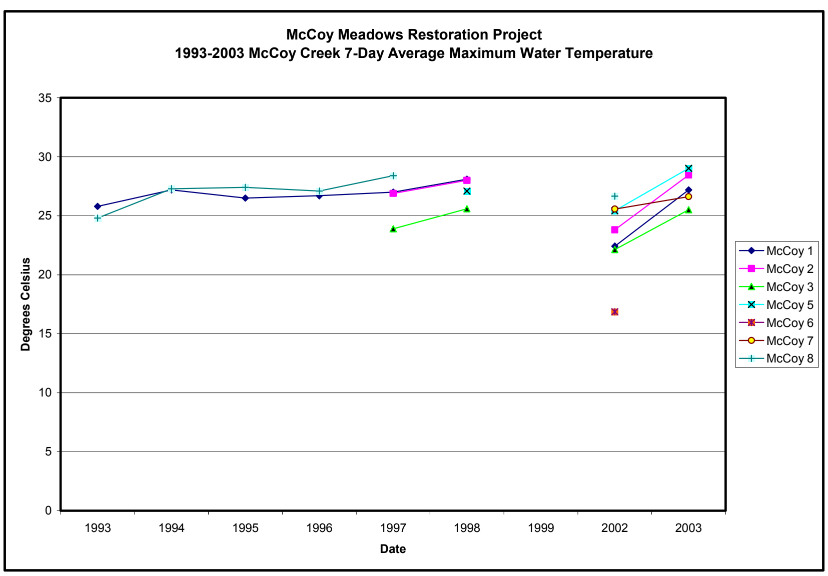
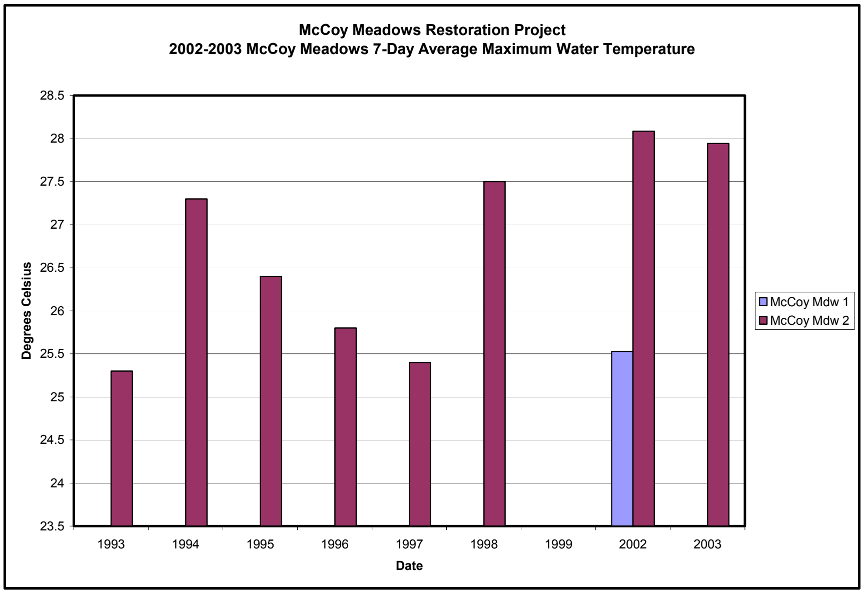


FIGURE 15 MCCOY MEADOWS AVERAGE 7 DAY MAXIMUM WATER TEMPERATURES

Average 7 day maximum water temperatures from 1993 to 2003 taken at Meadow Creek 1 and Meadow Creek 2. 1993 to 1998 data from ODEQ.



A comparison of ODFW data from 1997 and CTUIR data from 2002 and 2003 for McCoy 1 and 8 show no significant changes in water temperature. Maximum and minimum daily water temperatures are shown. Temperatures in 1997 were intermediate between 2002 and 2003. High water temperatures in 2003 correlates with high air temperatures.

FIGURE 16 MCCOY MEADOWS DAILY AVERAGE MAXIMUM AND MINIMUM WATER TEMPERATURES

Graph illustrates comparison of observed daily maximum and minimum water temperatures from 1997, 2002, and 2003 taken at McCoy 1. 1997 data from ODFW.

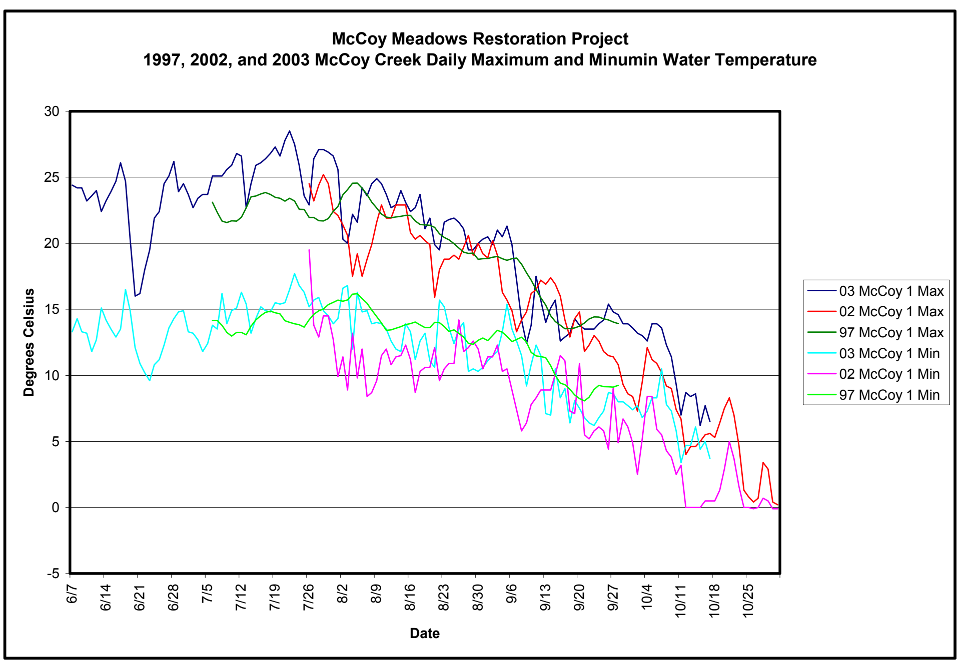
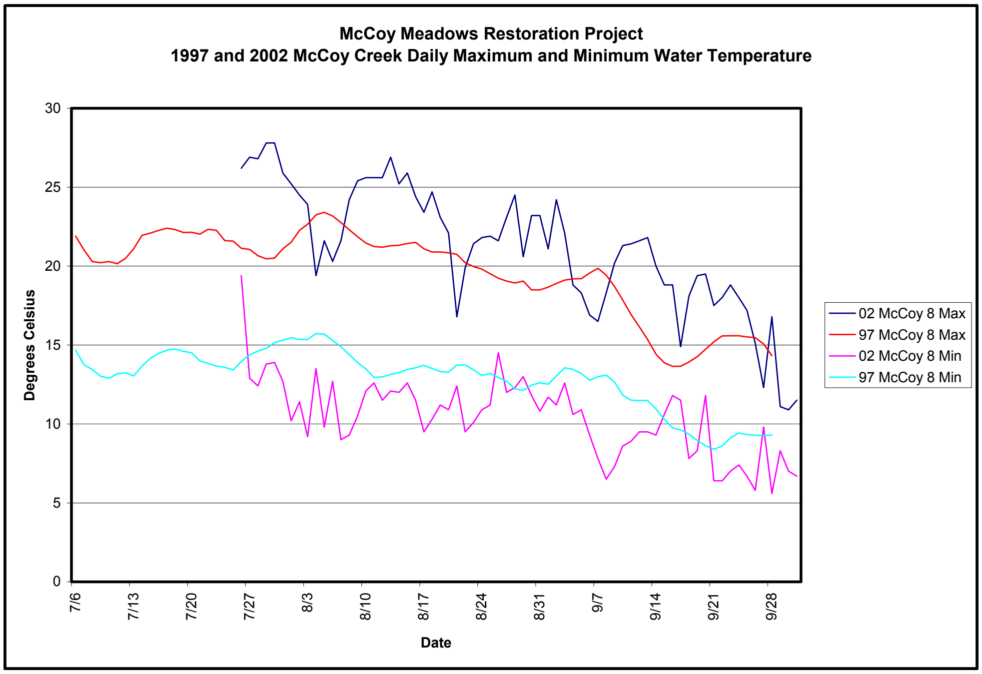


FIGURE 17 MCCOY MEADOWS DAILY AVERAGE MAXIMUM AND MINIMUM WATER TEMPERATURES

Graph compares daily maximum and minimum water temperatures from 1997 and 2002 taken at McCoy 8. 1997 data from ODFW.



Thermographs at McCoy 1, 2, 3 and 5 have data from both years that can be readily compared. McCoy 1 is upstream of the project reach, with McCoy 2, 3, and 5 further downstream respectively within the project reach. Daily maximum water and air temperatures were used for comparison. Highest water temperatures were recorded between 7/17 and 7/23 in 2003, and between 7/26 and 8/1 in 2002, and no water temperatures were recorded before 7/26 in 2002.

Air temperatures on average were higher in 2003 than in 2002, resulting in overall higher water temperatures in 2003, as seen in a comparison of McCoy 3 and McCoy 5 in 2002 and 2003 with the air temperature from each year (Figures 12 and 13). The difference in temperature between McCoy 5 from 2002 and 2003 were greater than the difference in temperatures between McCoy 3 in 2002 and 2003.

Thermographs only measured up to 36.3 degrees Celsius, thermographs within the creek measuring that high were considered dry. McCoy 6, 7, and 8 thermographs were incomparable either due to missing data or dry thermograhs.

FIGURE 18 MCCOY MEADOWS DAILY MAXIMUM WATER TEMPERATURES (2002)

Graph compares daily maximum water temperatures in 2002 and 2003 taken at McCoy 3 on McCoy Creek, compared with air temperature at McCoy Meadows. Higher air temperature in 2003 resulted in a higher water temperature.

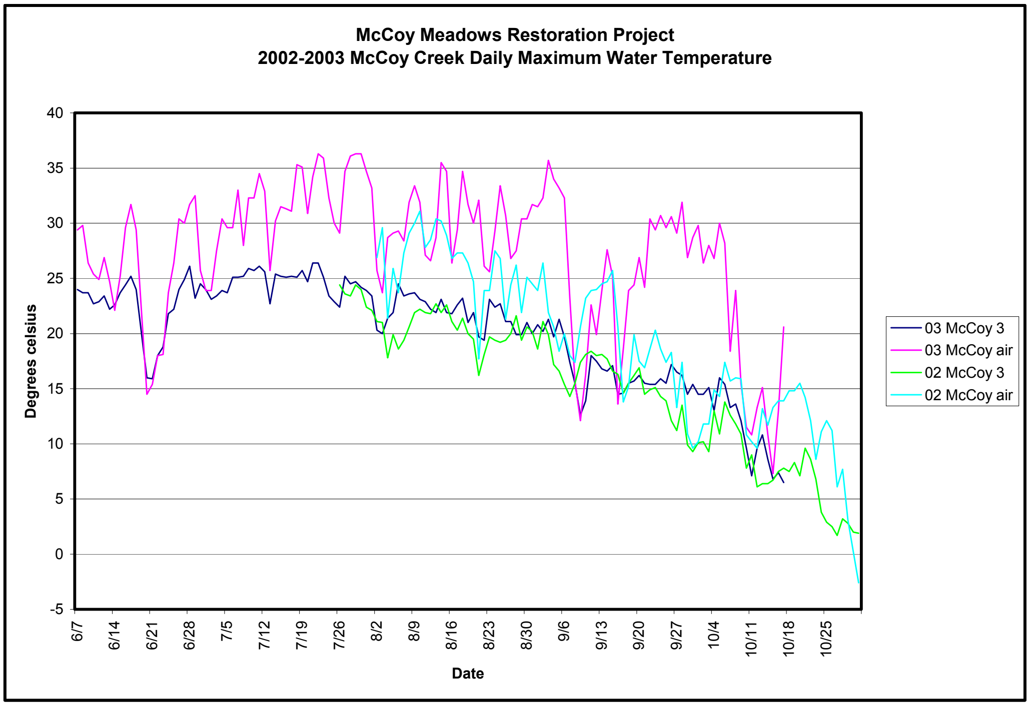
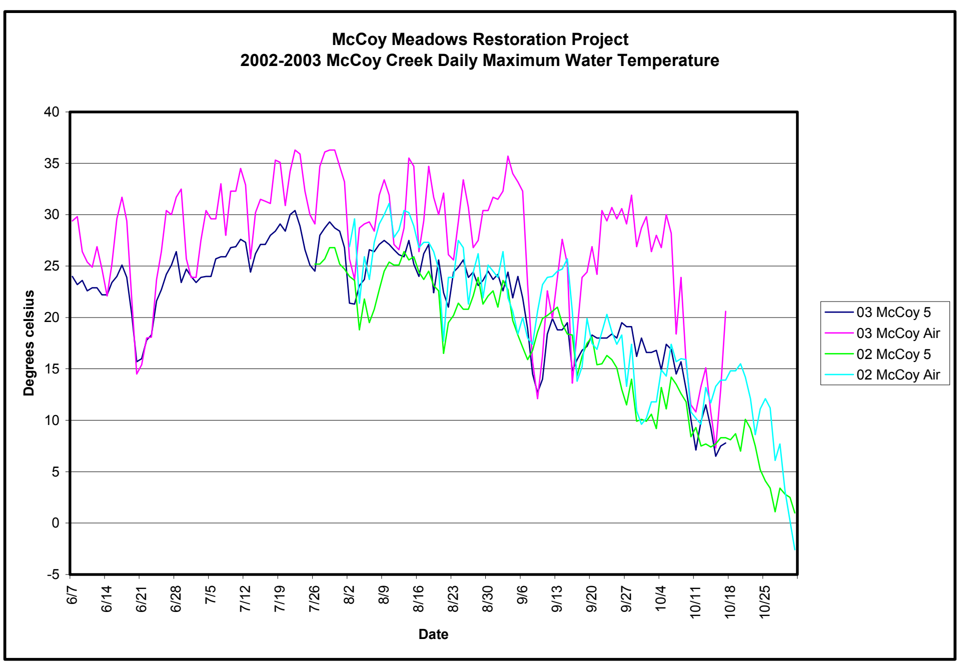


FIGURE 19 MCCOY MEADOWS DAILY MAXIMUM WATER TEMPERATURES (2002)

Graph compares daily maximum water temperatures in 2002 and 2003 taken at McCoy 5 on McCoy Creek, compared with air temperature at McCoy Meadows. Higher air temperature in 2003 resulted in a higher water temperature.



McCoy 1 was consistently cooler than McCoy 2, which was cooler than McCoy 5, for both years (Figures 14 and 15). In 2002, temperature differences between McCoy 1, 2, and 5 were relatively constant. In 2003, water temperature increased further downstream between McCoy 1, McCoy 2, and McCoy 5 as the summer progressed, probably as a result of increased air temperatures. Still, water temperatures in 2002 were closer to air temperature than in 2003, especially in September. This indicated water temperatures were less susceptible to air temperature rises in 2003.

FIGURE 20 MCCOY MEADOWS DAILY MAXIMUM WATER TEMPERATURES (2002)

Graph compares daily maximum water temperatures in 2002 taken at McCoy 1, McCoy 2, and McCoy 5 on McCoy Creek, compared with air temperature at McCoy Meadows. McCoy 1 was the coolest, McCoy 5 the warmest.

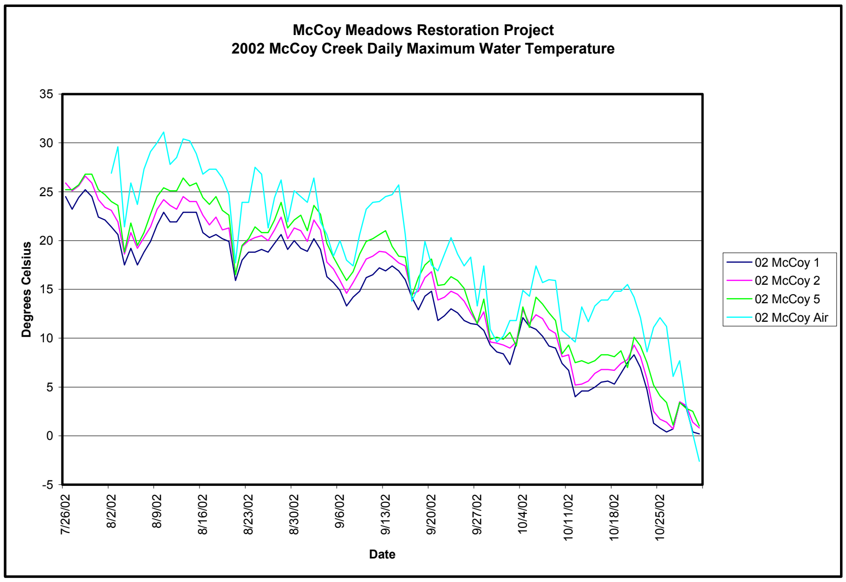
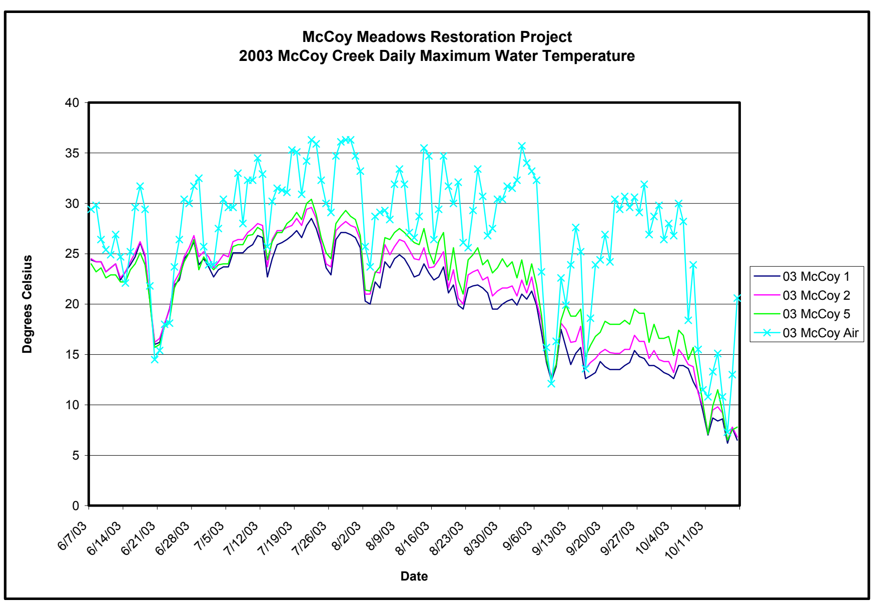


FIGURE 21 MCCOY MEADOWS DAILY MAXIMUM WATER TEMPERATURES (2003)

Graph compares daily maximum water temperatures in 2003 taken at McCoy 1, McCoy 2, and McCoy 5, compared with air temperature at McCoy Meadows. McCoy 1 was the coolest, McCoy 5 the warmest.



Longley Meadows Restoration Project

Project planning and design was initiated in late 1999 by the landowner, ODFW, CTUIR, and NRCS. Data collection included surveying reference reaches and compiling existing information from literate and data base files from various agencies. In early 2000, project sponsors completed detailed project designs, solicited cost-share funding through the GRMWP, Farm bill, and CTUIR/ODFW and BPA habitat programs, and completed environmental compliance and permitting requirements including biological assessments and consultation with NOAA fisheries and USFWS, NEPA checklist, cultural resource investigation and SHPO consultation, ODSL fill-removal permit, and U.S. Army Corps of Engineers 404 permit.

On December 2, 2002, Bear Creek Restoration Channel construction was initiated. Channel excavation was completed on March 3, 2003. Construction activities associated with Bear Creek continued throughout the spring season including installation of rock grade control structures and rootwad revetments in the new channel and extensive seeding and planting. ODFW installed a pump-driven irrigation system to improve plant survival and a small wetland swell was developed to return artesian flow from a well drilled through the CREP program for upland livestock water sources. In July 2003, phase 2 of the project was initiated to divert Bear Creek from its channelized alignment into the restoration channel. Phase 2 construction included completing channel excavation, diverting the stream, conducting fish trap and haul, and reclamation of the abandoned, channelized alignment. The following table summarizes project accomplishments. Figures 22 and 23 illustrate the lower Bear Creek restoration channel and locations of new fences and water developments. Fences and water developments were developed using both BPA and NRCS CREP funding, primarily through private subcontractors. CTUIR and ODFW provided project design and layout, subcontract development, and inspection services for the project.

Table 5 Longley Meadow Restoration Project Accomplishments

Longley Meadows Restoration Project Accomplishments	
Treatment	**Quantity**
Bear Creek Restoration Channel	5,600 feet restoration channel
Instream Wood Placement (Jordan Creek)	1 mile treated, approximately 60 pieces of large woody debris and whole trees installed
Off-Channel Water Developments	-Well and pump installation (Bear Cr.) -Solar well installation (Jordan Cr.) -10 off-channel water troughs -9,800 feet water delivery pipe -2 livestock water gaps (Jordan & Bear Cr.)
Riparian Conservation Easement Fence	-5.7 miles along Moss Creek, Upper Bear Creek, and Upper Jordan Creek.
Riparian Conservation Easements and Stream Miles Protected (445 acres, 5.5 stream miles)	-BPA/CREP (388 acres): Grande Ronde River, 0.90 miles, Bear Creek, 2.25 miles, West Bear Creek, 0.82 miles, Moss Creek, 1.24 miles, and Lower Jordan Creek, 0.3 miles. -BPA (57 acres): Upper Jordan Creek, 1.07 miles.
Tree, shrub, and sedge/rush plug planting	-BPA Planting (25,000 plants) -CREP Planting (20,000 plants) -ODOT Lower Perry Bridge Mitigation (8,000 plants installed to date, 5,000 additional planned)

FIGURE 22 LONGLEY MEADOWS, BEAR CREEK RESTORATION CHANNEL

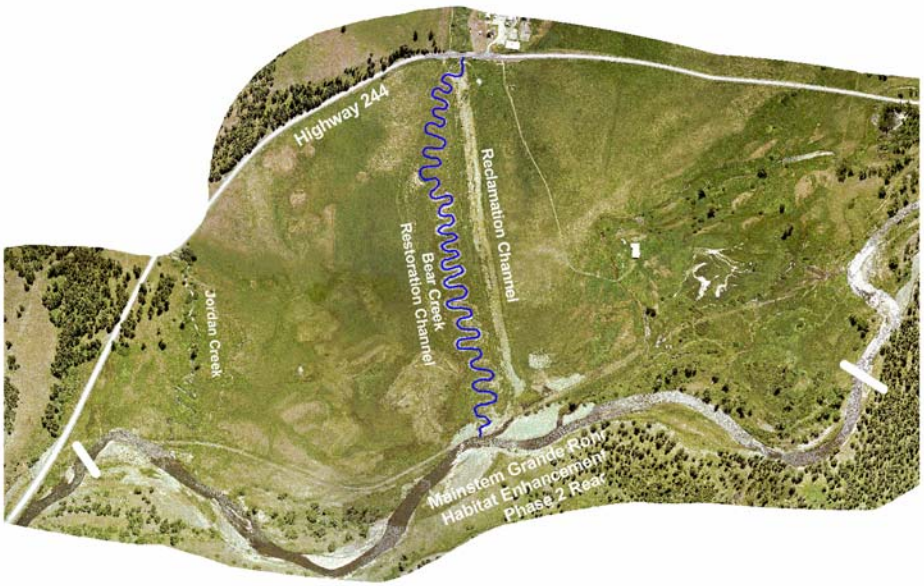
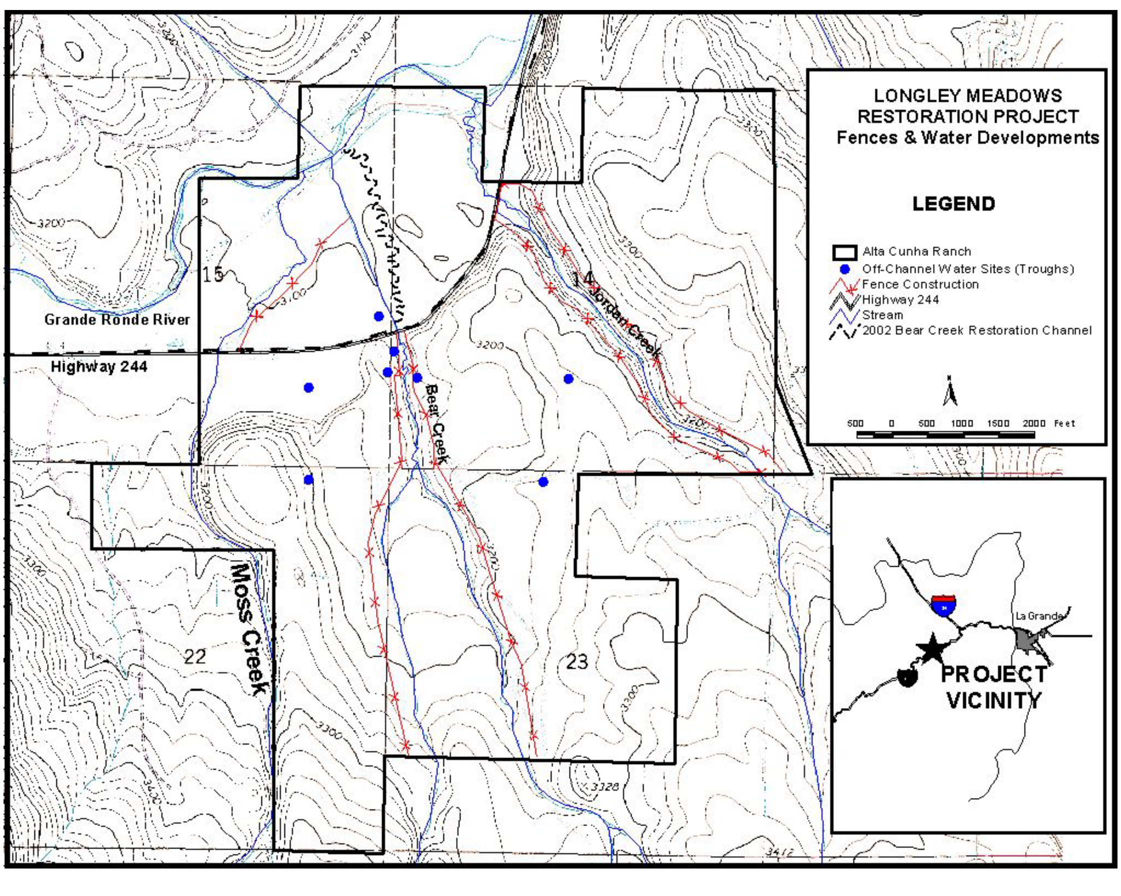


FIGURE 23 LONGLEY MEADOWS, FENCES AND WATER DEVELOPMENTS



Lower Bear Creek photo sequence taken by ODFW illustrating pre-project 2002, during project, and post project (2003). Note vegetation establishment is just getting underway with one growing season. Initial planting efforts including seeding and installation of sedge/rush plugs and livewhip willow

Mainstem Grande Ronde Habitat Enhancement Phase 2

This phase of the Mainstem Grande Habitat Enhancement Project included about 1.5 miles of the Grande Ronde River through the Longley Meadow Restoration Project area. A thorough topographic survey of the Longley Meadows area was completed in 2002 and included the longitudinal profile and monitoring cross-sections on the Grande Ronde River. This assured that consistent elevations were used between the Grande Ronde River project and the Bear Creek project.

Primary accomplishments included construction and modification of 2 channel meander bends, installation of rootwad revetments, installation of whole trees in several debris jams, boulder grade control structures, and revegetation activities.

Bear Creek restoration channel design planning and construction was closely coordinated with planning and design on the Mainstem Grande Ronde River project to ensure channel form, gradient, and channel bed elevations were appropriately matched. Primary accomplishments under phase 2 included construction of approximately 950 feet of restoration channel to increase channel length and sinuosity, decrease channel gradient, and improve availability of large pool habitat.

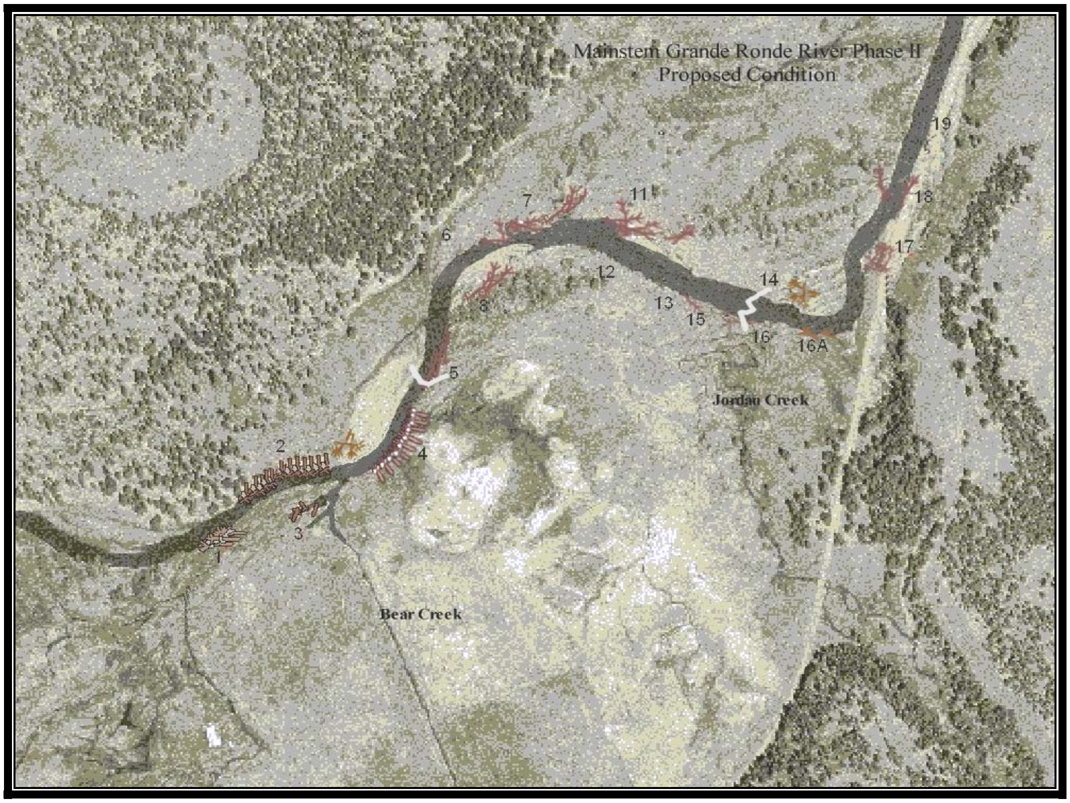
In conjunction with channel meander construction, approximately 300 feet of rootwad revetments were installed on the outside streambank meanders to insure streambank stability and provide habitat complexity. Additional phase 2 actions included installation of 40 whole trees in several debris jams, rootwad revetments, two grade control structures (one vortex wier and one "w" weir), and revegetation activities.

The most complex and time consuming portion of this project phase was the construction of approximately 950 feet of new channel and associated pointbars and stabilization. Two meander bends at the confluence of Bear Creek were enhanced and channel position of the Grande Ronde River was modified in order to increase sinuosity and channel length while decreasing channel gradient. The availability of large pool habitat was also improved by this action.

The new channel was constructed to a design bankfull width of 90 feet, a bankfull run depth of 5 feet, a pool depth of 7 to 9 feet, and a gradient of 0.0048. The main channel construction and shaping was completed by the use of a tracked excavator (see following photographs). Channel length was increased through the first meander by 51 feet over a distance of 721 feet and through the second meander by 12 feet over a distance of 217 feet.

Soil and gravel material was sorted by size as the new channel was constructed and then placed on the inside of the meander to create the pointbar. The larger material was layed down first as a base with the finer soil material on top and toward the back of the bar. The pointbar surface was shaped with a dozer so that it tapered back to the top of the right terrace at a constant slope from bankfull elevation. The following figure illustrates Phase 2 construction activities followed by photos showing construction of the new channel and pointbar near the confluence of Bear Creek.

FIGURE 24 PHASE 2 MAINSTEM GRANDE RONDE RIVER HABITAT ENHANCEMENT PROJECT



Mainstem Grande Ronde Project – modified aerial photograph of proposed project actions. Structure sites are numbered and correspond with the attached action plan. Note: Photo does not show project modifications to Bear Creek.

Mainstem Grande Ronde Project – photo of new meander channel looking upstream. Grande Ronde River channel is located to the left of photo. The excavator is shaping the left bank.

Mainstem Grande Ronde Project – photo illustrates the construction of new meander channel just upstream of Bear Creek. The excavator is shaping the bankfull channel form and right bank. In this photo the Grande Ronde River is still flowing in its old location along the right side.

Mainstem Grande Ronde Project – photo illustrates post construction of new meander channel just upstream of Bear Creek. Channel diversion is complete and revegetation activities have been initiated.

Mainstem Grande Ronde Project – photo shows the construction of a pointbar along the right bank. Material was sorted and transported from the new channel to the pointbar by truck in order to avoid sedimentation. A dozer was later used to shape the pointbar surface.

Mainstem Grande Ronde Project – photo shows completed construction. Note Moss Creek (a small tributary to the Grande Ronde upstream from Bear Creek).

Large woody debris was used through this phase of the project to enhance deposition in appropriate areas and improve bank and floodplain stability. Approximately 300 feet of streambank was treated with rootwad revetment structures using 22 tree pieces with rootwads along with 22 footer logs. The rootwad pieces included a 20-foot long tree bole laid over an 18-foot long footer log at the elevation of the channel bed. These structures are intended to increase bank stability by reducing undercutting and sloughing and also create protected areas where plants can get established. Approximately 110 ft^3 of large boulder material was also installed with the revetments for ballast.

Mainstem Grande Ronde Project – photo shows the construction of a rootwad revetment along the right bank at site 4, just downstream of Bear Creek. Rootwads with 20-foot boles are placed on top of footer logs and then backfilled. The upper portion of the bank will be tapered back to a 4:1 slope.

Logjams were constructed on pointbars at seven locations with 40 total pieces of large wood and whole trees to create low energy flow areas at and above the bankfull flow elevation. Another 36 miscellaneous logs and large tree pieces were placed in along the banks and floodplain and secured by burying key pieces and interlocking others or using large boulders as ballast.

Mainstem Grande Ronde Project – Point bar logjam.

Bed elevation and vertical stability of the channel bed was addressed by the construction of two boulder grade control structures. The first structure, a channel-spanning cross-vane, was constructed at site 5 and located 350 downstream of the confluence of Bear Creek. This structure is an upstream "U" constructed as a double layer of large boulder materials. The top layer of boulders are placed on the upstream side of the bottom layer and their height was adjusted to create a constant 3% grade from an elevation just below bankfull at each bank and tapered down to the center of the channel. The top row of rock in the center portion of the channel was spaced 16" apart in order to pass bedload material. At each bank, ten feet of the structure was keyed into the floodplain and backfilled. The second grade control structure, a full-spanning "W" weir, is located at site 16. This structure is also constructed of 2 rows of large boulders with the top row of rock being spaced 16" apart to allow for bedload movement. The structure is constructed to direct the deepest flow and formation of the channel thalweg to right of center and is intended to narrow this overwidened section of river.

Cross vane rock structure designed to maintain channel grade downstream of the Bear Creek confluence with the Grande Ronde River.

"W" weir installed in Mainstem Grande Ronde River to maintain channel grade, direct thalweg, and improve the width:depth ratio. Structure is located upstream of Jordan Creek confluence.

Following completion of construction activities, initial revegetation actions were implemented including broadcast seeding with native/native-like seed mix, mechanical live willow whip installations, mechanical planting of 2-year old bareroot willow stock (outgrown at the CTUIR Native Plant nursery), and manual installation of containerized gallon shrub stock (dogwood, willow, and cottonwood) secured through a private vendor.

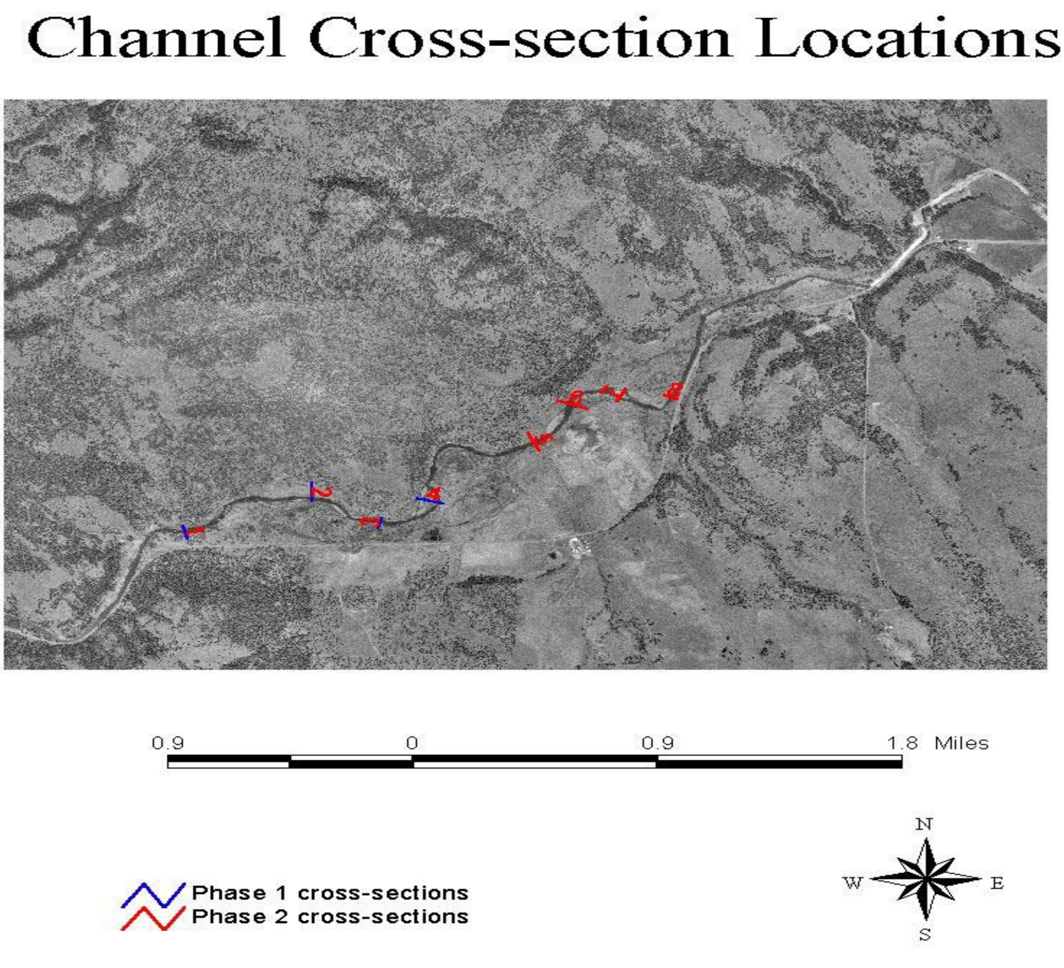
Mainstem Grande Ronde River – Shrub planting included mechanical installation of bundled, conditioned live willow whips. Strategy includes deep installation of material near water sources to facilitate recovery.

Photo illustrates gravel bar planting using technique described above. In addition to conditioned livewhip, bareroot stock is also mechanically planted. Materials for the project were grown-out at CTUIR Native Plant Nursery.

Project effectiveness and success is currently be evaluated against the project goals and objectives. Monitoring efforts are intended to measure progress of channel and habitat attributes toward desired conditions over time. The monitoring plan includes channel cross section, longitudinal profile, permanent photographic points, habitat surveys, fish species presence/absence sampling, noxious weed surveys, and water quality monitoring. In addition, incremental field visits will be made to assess channel and project function at various flows and during different seasons of the year. At this time project monitoring is limited to assessing the implementation of the proposed plan. Effectiveness monitoring results will be analyzed and reported in the future after channel forming flows have occurred and attributes within the project reach react to changes. Following is a presentation on monitoring results.

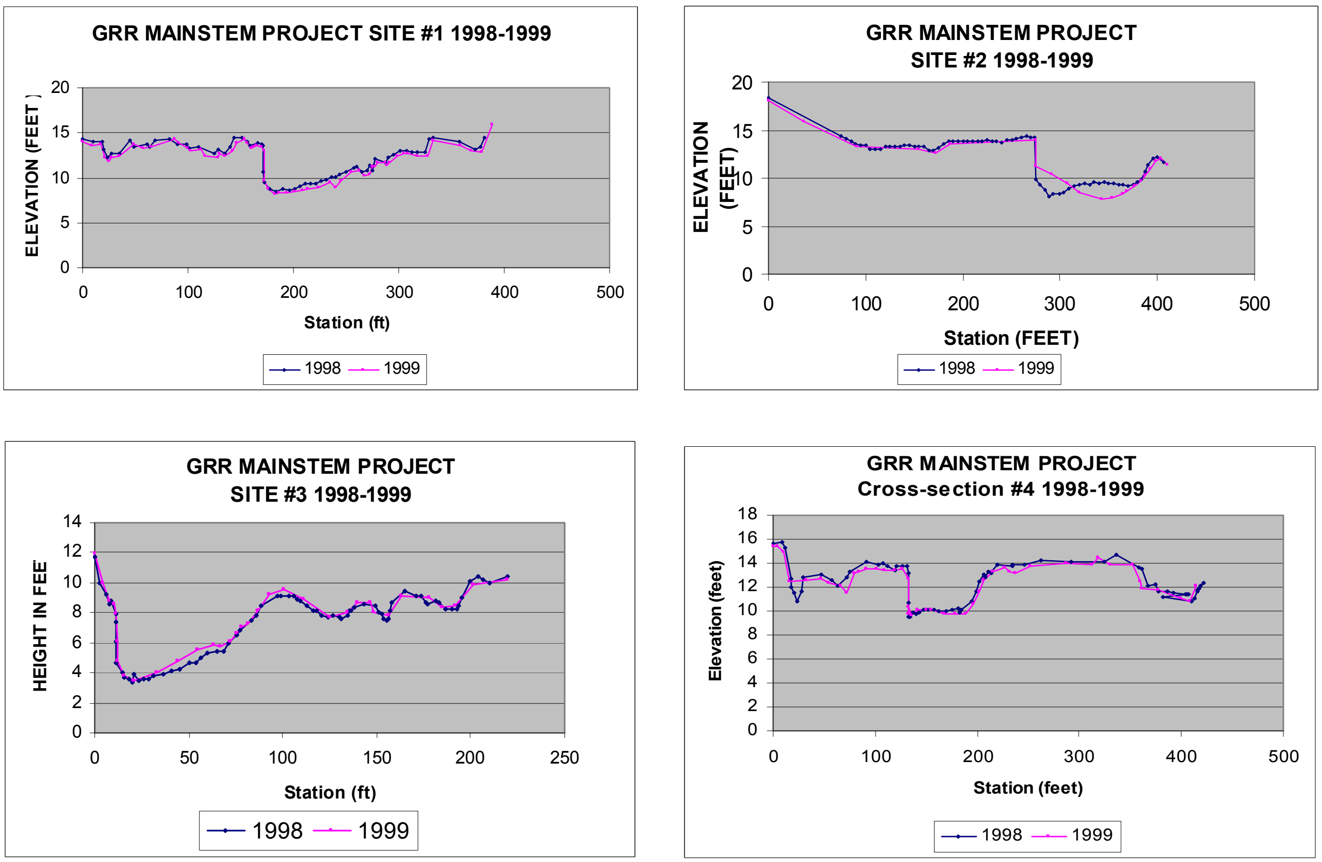
Channel Cross Section and Longitudinal Profile - Channel cross-sections have been located in both the Phase 1 and 2 reaches along with a full length longitudinal profile. The cross-sections are oriented laterally across the floodplain and perpendicular to streamflow at each specific point. A total of 4 cross-sections are located in the Phase 1 reach and another 4 located in the Phase 2 reach and are shown in the following figure.

FIGURE 25 MAINSTEM GRANDE RONDE RIVER CROSS SECTIONS



Phase 1 cross-sections (CS1, CS2, CS3, CS4) were first established and measured in 1998 prior to Phase 1 construction activities. These cross-sections were then remeasured in 1999 following instream construction and peakflows during the spring. Changes between the two years, as shown in the comparison graphs below, are mainly the result of construction actions. Channel adjustments will be evaluated in the future as additional channel changing peakflows occur.

FIGURE 26 MAINSTEM GRANDE RONDE RIVER CHANNEL CROSS SECTIONS



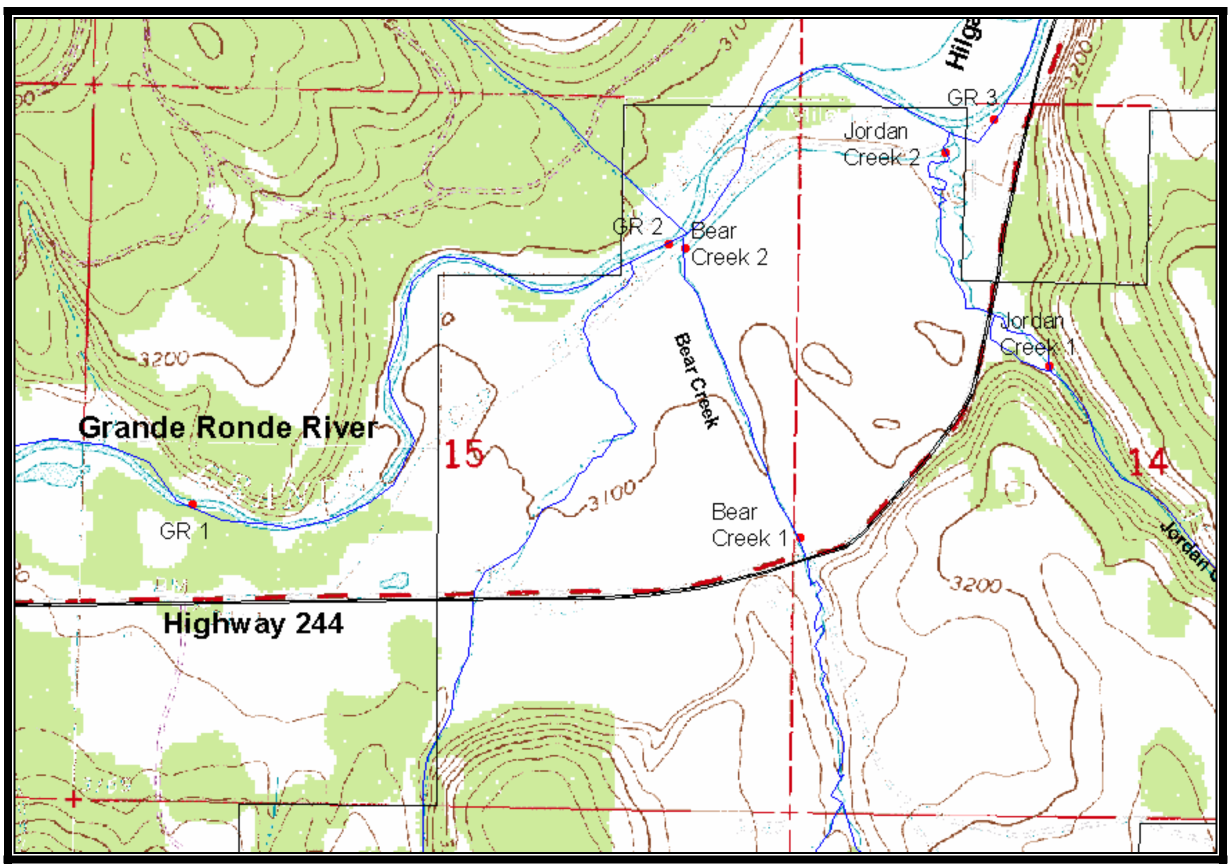
Water Temperature Data

Thermographs were installed to measure water temperature along Bear Creek, Jordan Creek, and the mainstem Grande Ronde River in 2002 and 2003. Thermographs recorded minimum and maximum temperatures on an hourly bases and were generally placed within the center of the creek channel in a rifle. Daily maximum water and air temperatures were used for comparison.

Seven thermographs were deployed in 2002, two placed in Jordan Creek, one in lower Bear Creek, three along the mainstem Grande Ronde River, and one recorded air temperature along Bear Creek. Eight thermographs were deployed in 2003: air temperature along Bear Creek, two in Jordan Creek, two in Bear Creek, and three along the mainstem Grande Ronde River. Thermographs in Jordan Creek and Bear Creek were placed in the upper and lower parts of the creek in the project area. Grande Ronde thermographs were placed upstream of the project reach, above the confluence of Bear Creek and the Grande Ronde, and above the confluence of Jordan Creek and the Grande Ronde River. Data from thermographs in Bear Creek and the Grande Ronde River in 2002 were lost.

FIGURE 27 LONGLEY MEADOWS THERMOGRAPH LOCATIONS (2003)

Longley Meadow (2003). Illustrates location of thermographs used to measure water and air temperature above, below, and within the project reach. Locations of thermographs in Jordan Creek are same in 2002.



Only air temperature data and water temperature data from Jordan Creek are available for 2002. Thermographs only measured up to 36.3 degrees Celsius, thermographs within the creek measuring that high were considered dry. Spikes in the temperature of Jordan 2 in 2002 also indicate a dry thermograph. Jordan 2, near the mouth of Jordan Creek, was overall cooler than Jordan 1, located above the project reach (Figure 17**)**.

Air temperatures on average were higher in 2003 than in 2002, resulting in overall higher water temperatures in 2003, as seen in a comparison of Jordan 1 in 2002 and 2003 with the air temperature from each year (Figure 18). Jordan 1 recorded temperatures higher than 30 degrees Celsius between 7/18 and 8/2 in 2003.

Jordan 2 in 2003 was mostly dry. Air temperatures exceeded 36.3 degrees Celsius on most days in 2003 and on most days between 8/9 and 9/13 in 2002. Jordan 2 and Bear Creek 1 and 2 thermographs in 2003 were incomparable either due to missing data or dry thermograhs.

FIGURE 28 LONGLEY MEADOWS DAILY MAXIMUM WATER TEMPERATURES (2002)

Graph compares daily maximum water temperatures in 2002 taken at Jordan Creek 1 and 2, and air temperature. Spikes in temperature on Jordan 2 indicate a dry thermograph.

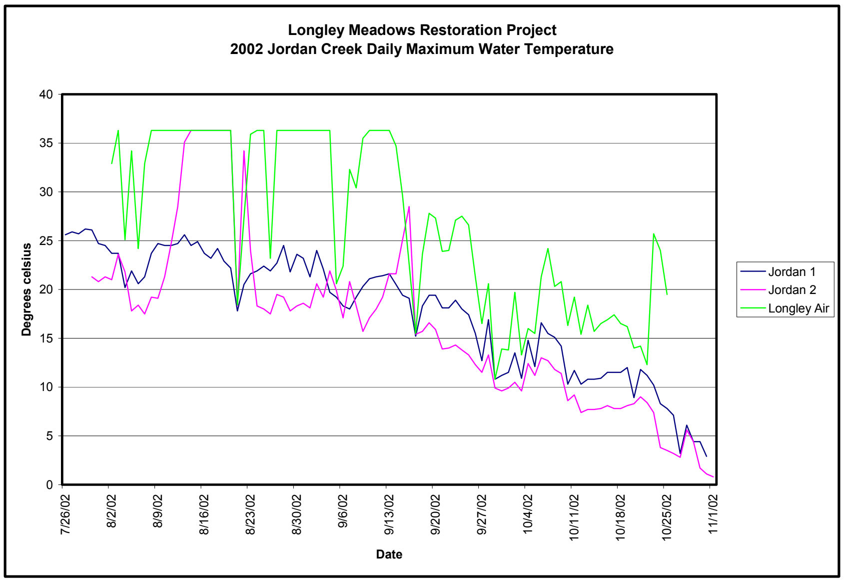
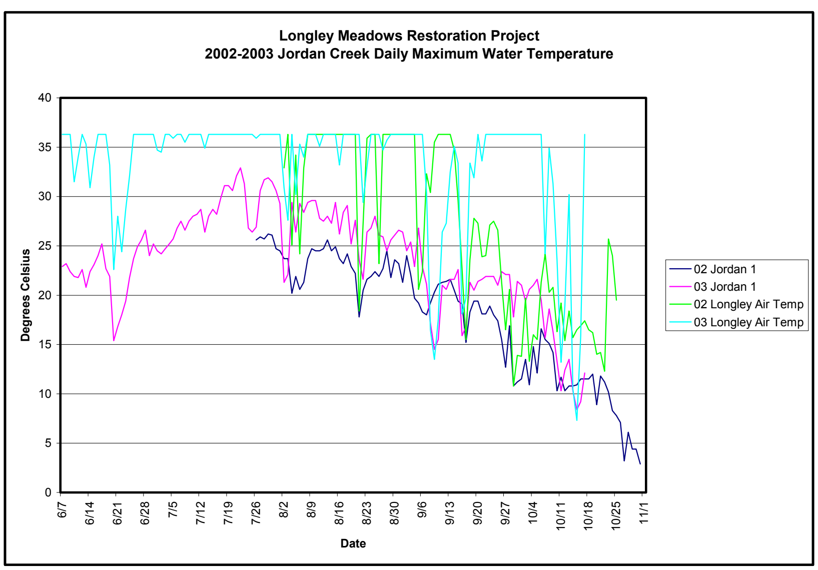


FIGURE 29 LONGLEY MEADOWS DAILY MAXIMUM WATER TEMPERATURES (2002-2003)

Graph compares daily maximum water temperatures in 2002 and 2003 taken at Jordan 1 with Longley Meadows air temperature. Jordan 1 and air temperatures were the coolest in 2002.



GR 1 was placed upstream of the project reach, GR 2 above the confluence of Bear Creek and the Grande Ronde River, and GR 3 above the confluence of Jordan Creek and the Grande Ronde River. Air temperature in 2003 was mostley at or above 36.3 degress Celsius, and the spikes in water temperatures at 36.3C on GR 3 indicate a dry thermograph. Water temperatures of GR 3, the furthest downstream, were warmer than GR 1 or 2, and the difference in temperature increased as the summer progressed. The water temperatures of GR 1 and 2 were nearly identical.

FIGURE 30 LONGLEY MEADOWS DAILY MAXIMUM WATER TEMPERATURES (2003)

Graph compares daily maximum water temperatures in 2003 taken at GR 1, GR 2, and GR 3. GR 1 was the coolest, GR 3 the warmest.

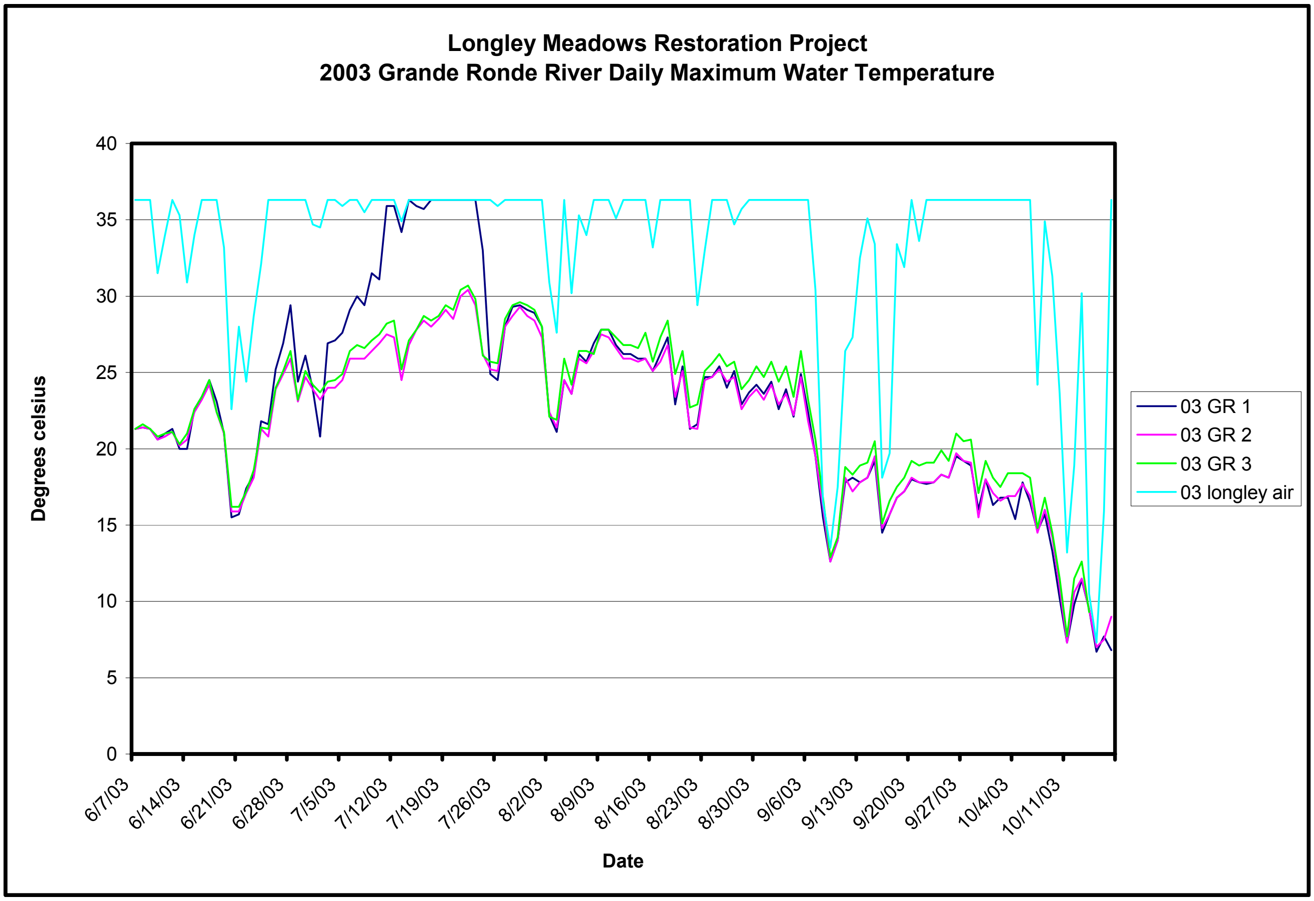


Table 6 Longley Meadows average 7 day maximum water temperatures

Table compares average 7 day maximum water temperatures in degrees Celsius from 2002 and 2003 taken at Grande Ronde 2 and 3 in 2003, and at Jordan 1 in 2002 and 2002. Average 7 day maximum temperatures for other sites were unavailable due to lack of data or dry thermographs.

Year	Grande Ronde 2	Grande Ronde 3`	Jordan Creek 1
2002	Lost Data	Lost Data	24.8
2003	29.1	29.5	31.3

SUMMARY AND CONCLUSIONS

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

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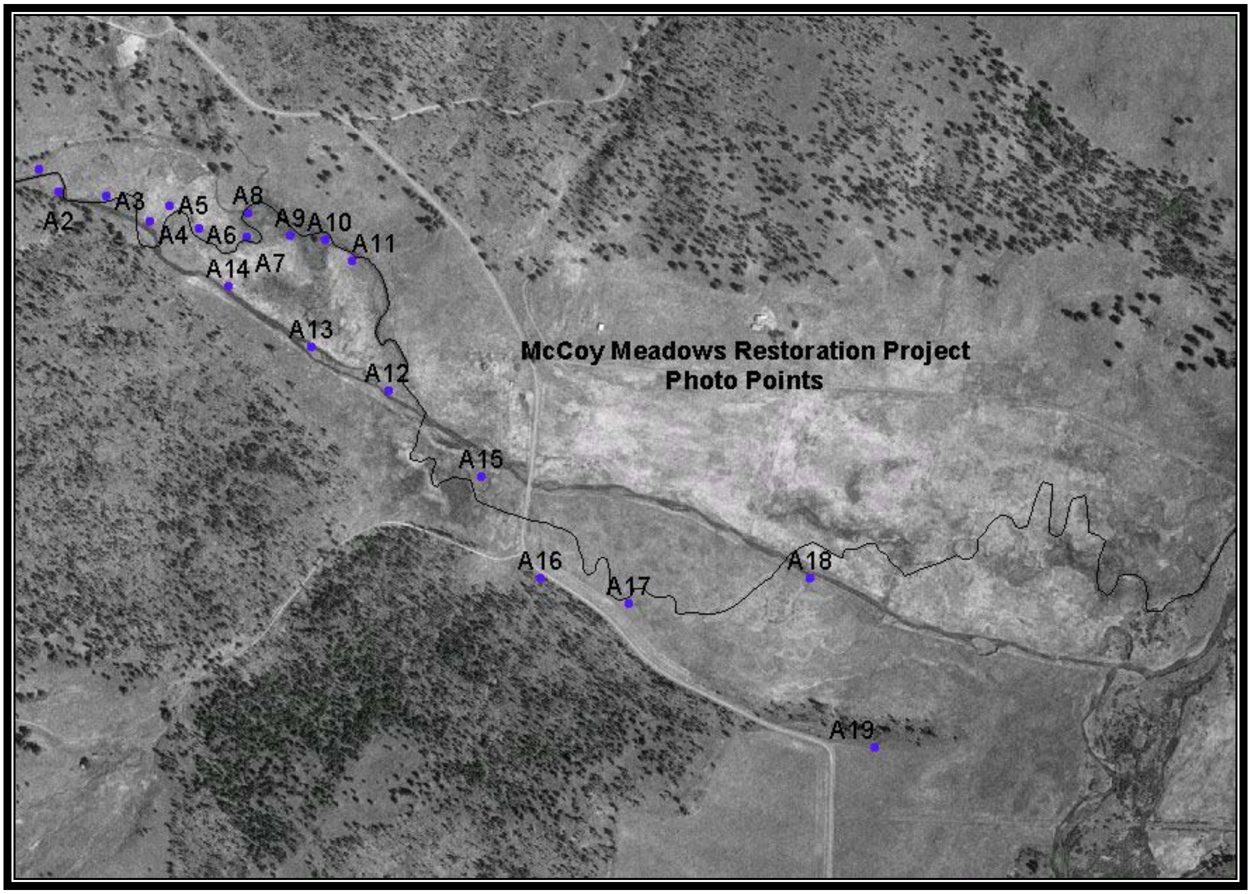
APPENDIX A – PROJECT PHOTO POINTS

MCCOY MEADOWS RESTORATION PROJECT



McCoy Meadows, June 1997, Photo Point A1-1 (Upper Meadow Pre-Project)

McCoy Meadows June 2002 Photo Point A1-1

McCoy Meadows 6/97,   Pre-Construction Photo Point A1-2

McCoy Meadows 6/02,   Photo Point A1-2

McCoy Meadows 6/97, Pre-Construction Photo Point A2-3

McCoy Meadows 6/02, Photo Point A2-3

McCoy Meadows 6/97, Pre-Construction Photo Point A2-4

McCoy Meadows 6/02, Photo Point A2-4

McCoy Meadows 6/97, Pre-Construction Photo Point A3-5

McCoy Meadows 6/02, Photo Point A3-5

McCoy Meadows 6/97, Pre-Construction Photo Point A3-6

McCoy Meadows 6/02, Photo Point A3-6

McCoy Meadows 6/97, Pre-Construction Photo Point A3-7

McCoy Meadows 6/02, Photo Point A3-7

McCoy Meadows 6/97, Pre-Construction Photo Point A4-8

McCoy Meadows 6/02 Photo Point A4-8

McCoy Meadows 6/97, Pre-Construction Photo Point A4-9

McCoy Meadows 6/02, Photo Point A4-9

McCoy Meadows 6/97, Pre-construction Photo Point A4-10

McCoy Meadows 6/02, Photo Point A4-10

McCoy Meadows 6/97, Pre-Construction Photo Point A5-11
(Located at phase 1, upper meadow diversion point)

McCoy Meadows 6/02, Photo Point A5-11

McCoy Meadows 6/97, Pre-Construction Photo Point A5-12

McCoy Meadows 6/02, Photo Point A5-12

McCoy Meadows 6/97, Pre-Construction Photo Point A6-13

McCoy Meadows 6/02, Photo Point A6-13

McCoy Meadows 6/97, Pre-Construction Photo Point A6-14

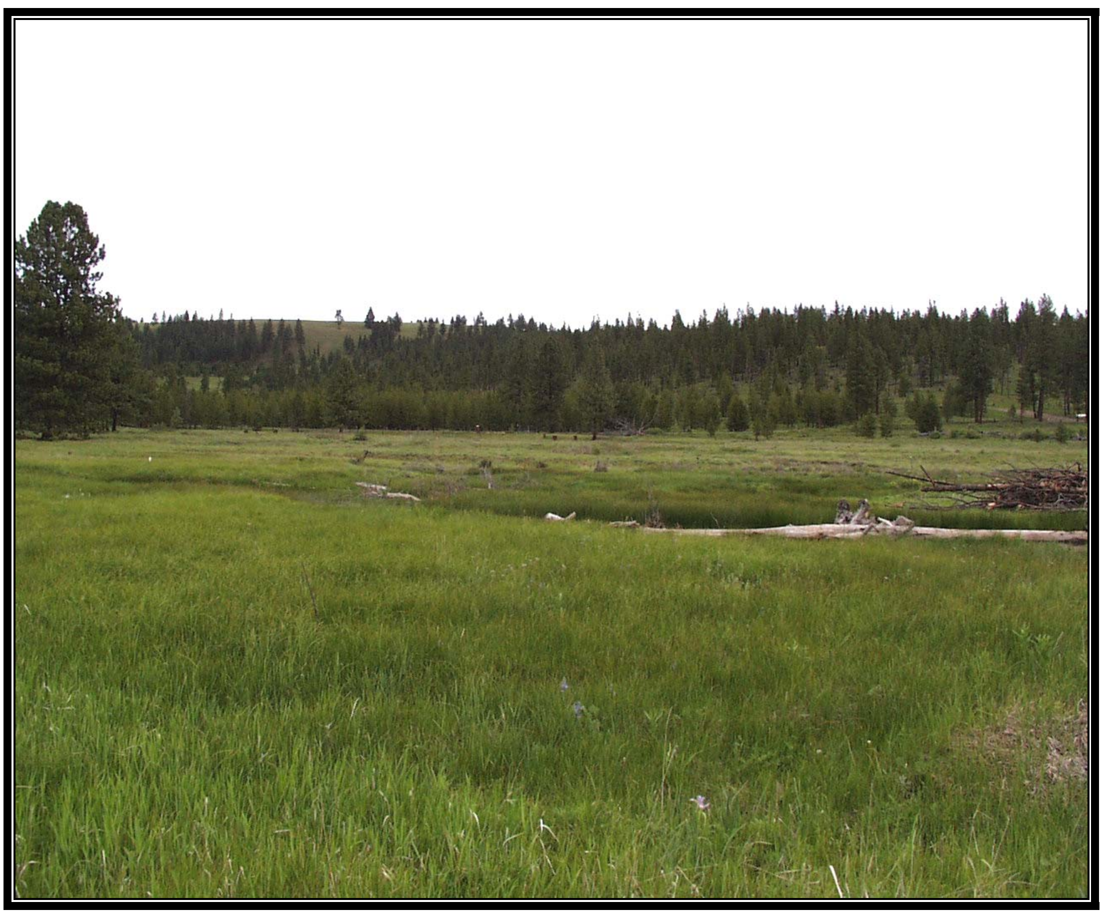
McCoy Meadows 6/02, Photo Point A6-14

McCoy Meadows 6/97, Pre-Construction Photo Point A7-16

McCoy Meadows 6/02, Photo Point A7-16

McCoy Meadows 6/97, Pre-Construction Photo Point A7-17

McCoy Meadows 6/02, Photo point A7-17



McCoy Meadows 6/97, Pre-Construction Photo Point A8-18

McCoy Meadows 6/02, Photo Point A8-18

McCoy Meadows 6/97, Pre-Construction Photo Point A8-19

McCoy Meadows 6/02, Photo Point A8-19

McCoy Meadows 6/97, Pre-Construction Photo Point A9-20

McCoy Meadows 6/02, Photo Point A9-20

McCoy Meadows 6/97, Pre-Construction Photo Point A10-21

McCoy Meadows 6/02, Photo Point A10-21

McCoy Meadows 6/97, Pre-Construction Photo Point A10-22

McCoy Meadows 6/02, Photo Point A10-22

McCoy Meadows 6/97, Pre-Construction Photo Point A11-23

McCoy Meadows 6/02, Photo Point A11-23

McCoy Meadows 6/97, Pre-Construction Photo Point A12-24
(Channelized reach in upper meadow)

McCoy Meadows 6/02, Photo Point A12-24 (Reclamation activities along pre-project channelized reach. Compacted earthern plug and floodplain pond shaping)

McCoy Meadows 6/97, Pre-Construction Photo Point A13-25
(Channelized reach in lower meadow)

McCoy Meadows 6/02, Photo Point A13-25
(Floodplain pond shaping in channelized reach)

McCoy Meadows 6/97, Pre-Construction Photo Point A14-26. Photo sequence illustrates pre-project through post-project construction (reclamation of channelized reach)

McCoy Meadows 6/00, Phase 1 Photo Point A14-26 (Note grade control structures)

McCoy Meadows 6/02, Phase 2 Photopoint A14-26

McCoy Meadows 6/01, Phase 2 Photopoint A15 (Note restoration channel construction, rootwad revetment installation in pool habitat, and vegetation establishment)

McCoy Meadows 6/03, Phase 2 Photopoint A15

McCoy Meadows 6/01, Phase 2 Photopoint A16-1. McIntyre Road in foreground. Future site of bridge construction

McCoy Meadows 6/03, Phase 2 Photopoint A16-1.
(Completed bridge structure and fence installation)

McCoy Meadows 6/01, Phase 2 Photopoint A16-3

McCoy Meadows 6/02, Phase 2 Photopoint A16-3

McCoy Meadows 6/01, Photopoint A17
Phase 2 channel construction and initiation of revegetation activities

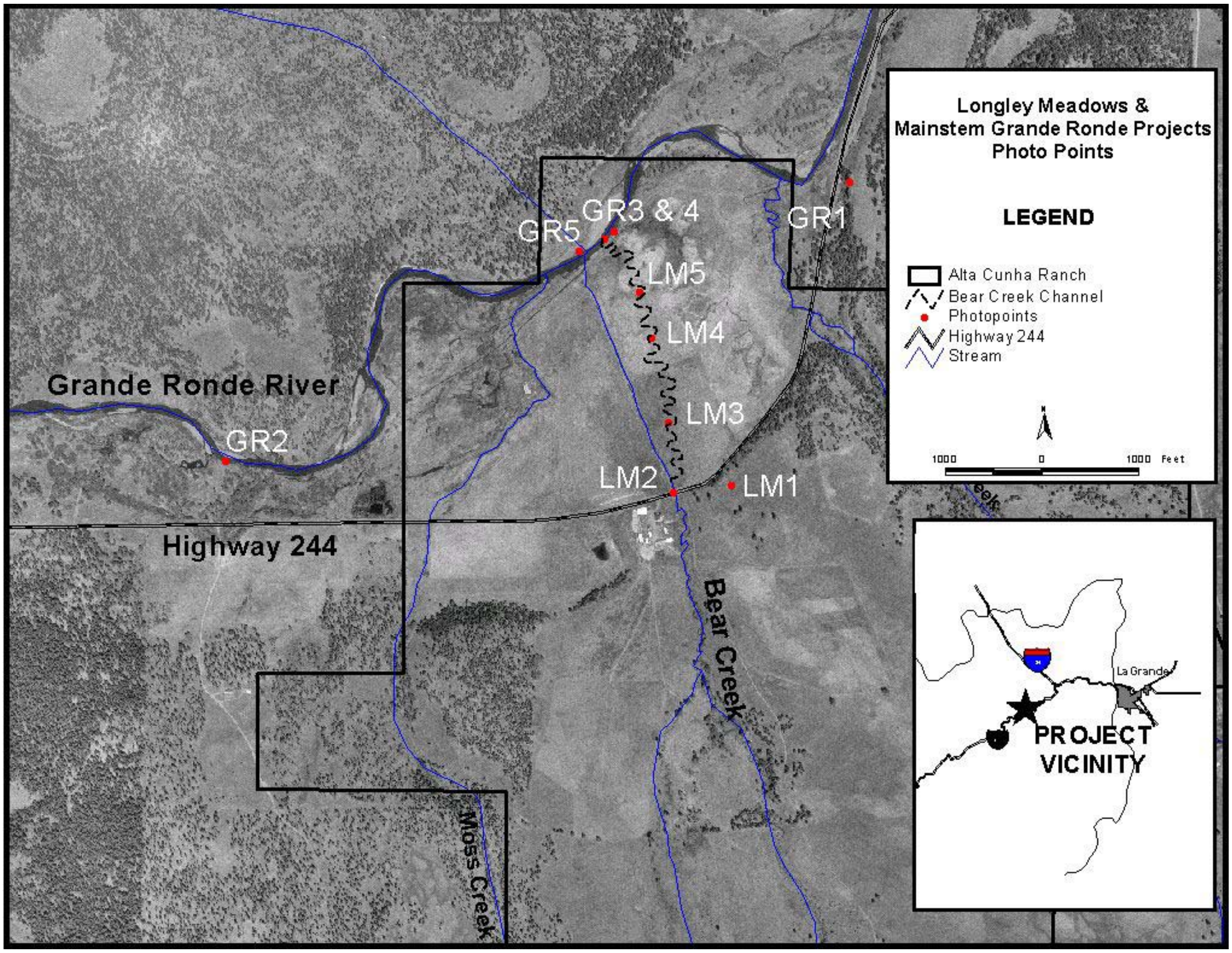
McCoy Meadows 6/02, Photopoint A17
Note vegetation development following a single growing season

McCoy Meadows 6/01, Photopoint A18

McCoy Meadows 6/02, Photopoint A18
Note hydrophytic shrub development and sedge/rush colonization

LONGLEY MEADOWS RESTORATION PROJECT
PHOTO POINTS

Map



Longley Meadows, Bear Creek Photo Point LM-1, 10/02, Pre-Project

Longley Meadows, Bear Creek Photo Point LM-1, 5/02, Post Phase 1 (Note stockpile of excavated soil in center of photo staged for phase 2 reclamation)

Longley Meadows, Bear Creek Photo Point LM-2, 11/98, Pre-Project
(Viewing downstream from Highway 244)

Longley Meadows, Bear Creek Photo Point LM-2, 5/03, Post-Phase 2 Construction

Longley Meadows, Bear Creek Photo Point LM-3, 11/02, Pre-Project

Longley Meadows, Bear Creek Photo Point LM-3, 7/03, Post-Phase 1 Construction

Longley Meadows, Bear Creek Photo Point LM-4, 11/02, Pre-Project

Longley Meadows, Bear Creek Photo Point LM-4, 7/03, Post-Phase 1 Construction

Longley Meadows, Bear Creek Photo Point LM-5, 11/02, Pre-Project

Longley Meadows, Bear Creek Photo Point LM-5, 7/03, Post-Phase 1 Construction

MAINSTEM GRANDE RONDE RIVER
HABITAT ENHANCEMENT PROJECT
PHOTO POINTS

Longley Meadows, Grande Ronde Photo Point GR-1, 11/98. Viewing west, upstream (Lower reach of Longley Meadows)

Longley Meadows, Grande Ronde Photo Point GR-1, 7/02

Longley Meadows, Grande Ronde Photo Point GR-2 upstream, 8/99
(Phase 1 Project Reach. Stone Ranch streambank stabilization)

Longley Meadows, Grande Ronde Photo Point GR-2 upstream, 7/02 (note vegetative recovery)

Longley Meadows, Grande Ronde Photo Point GR-2, downstream 7/00
Phase 1 Project Reach. Stone Ranch streambank stabilization. Rootwad revetments and bionengineering. Note log jam in background)

Longley Meadows, Grande Ronde Photo Point GR-2 downstream, 8/02
(Note vegetative recovery)

Longley Meadows, Grande Ronde Photo Point GR-3, 2/02
Phase 2 Project Reach downstream of Bear Creek confluence, Pre-project

Longley Meadows, Grande Ronde Photo Point GR-3 10/04. Post-phase 2 construction. (Note rootwad revetments, streambank contouring, and large pool habitat development)

Longley Meadows, Grande Ronde Photo Point GR-4, 2/02
Phase 2 Project Reach Upstream of Bear Creek confluence, Pre-project

Longley Meadows, Grande Ronde Photo Point GR-4, 10/04. Post-phase 2 construction. (Note new Bear Creek confluence and realignment of mainstem Grande Ronde River)

Longley Meadows, Mainstem Grande Ronde Project, Photo Point GR-5 – photos illustrate the construction of new meander channel just upstream of Bear Creek.