Wallowa river/McDaniel Habitat Restoration

Project 2
Completion Report

Bonneville Power Administration Project Number 1992-026-01
Contract #32151
Performance Period April 2007 – December 2007

Oregon Watershed Enhancement Board
Grant #207-129
Performance Period November 2006 – October 2008

US Fish and Wildlife Service
Service Agreement #13420-06-J633
Contract Period October 2006 – September 2008

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With input and clarification from
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Abstract

Restoration of the Wallowa River on property owned by Doug McDaniel near Lostine, Oregon has been ongoing for most of the last five years. Restorative efforts began in earnest in 2004 with the implementation of project 1 of this multiphase project. Over the course of the 2004 and 2005 field seasons a section of new channel, 2,572 feet in length, was constructed for the Wallowa River using Rosgen Natural Channel Design techniques. This new channel replaced a 1,800 ft section of the river that had been channelized in the 1950's, thereby increasing its gradient, reducing its sinuosity and simplifying its channel morphology (85% riffle and 15% pools). The 2007 and 2008 field seasons consisted of the same restorative actions immediately upstream of project 1 where 2,572 feet of the Wallowa River channel was reconstructed using the same methods and rationale. Project 2 replaced 1,789 feet of channel with 2,483 feet with gradient, sinuosity and flood plain function as would be expected in natural un-channelized conditions. The thalweg, or deepest part of the channel, was constructed to create the different features such as pools, riffles, runs and glides. Access was provided to the floodplains, a critical feature to avoid a "ditch-like" channel. Cross vanes were constructed for grade control (vertical stability), and revetments and sedge mats were installed for horizontal or lateral stability.

The Grande Ronde Model Watershed (GRMW) obtained project funding from three funding sources including Bonneville Power Administration (BPA), Oregon Watershed Enhancement Board (OWEB) and US Fish & Wildlife Service (USFWS). Oregon Department of Fish & Wildlife (ODFW) and Confederated Tribes of the Umatilla Indian Reservation (CTUIR) contributed additional funding through project design, construction management, fencing, fish salvage and revegetation efforts. The production team of ODFW and CTUIR managed all on-site activities including survey, design, construction management and planting. GRMW personnel managed all fiscal and contractual obligations of the project.

The project was divided into two construction phases with all dry land excavation completed in the summer of 2007. This work consisted of digging most of the new channel, installing grade control structures and root wad revetments, sedge mat transplanting, blended earthen terrace installation and staging spoils for reclamation of the old channel. Construction in 2008, the connection phase, consisted of installing more grade control and revetment structures, connecting the bottom and top of the new channel to the old, fish salvage and reclamation of the old channel with spoils generated in 2007. Revegetation efforts spanned both phases and consisted of seeding disturbed areas with native seed, planting of containerized and live whip trees, whole tree transplants and summer irrigation to increase chances of plant survival.

Project 2 over the 2007 and 2008 work seasons was accomplished with two construction contractors, 2 materials providers and one trucking company. Phase I of project 2, the out of live flow channel work, was contracted to LD Perry, Inc. of Enterprise, Oregon and consisted of the majority of excavation, blended earthen terrace construction, sedge mat transplants, grade control installation, root wad revetment work and materials staging work for reclamation of the old channel. Phase II, contracted to Partney Construction Inc. of La Grande, Oregon, consisted of a minority of the grade control and root wad revetment work, more sedge transplant work, diversion of the river into the new channel, and all of the old channel reclamation activities. Jones Excavation of Lostine, Oregon provided boulders for grade control structures and Henderson Logging of Wallowa, Oregon delivered 90 root wads for the revetments. Farm Supply of Enterprise, Oregon was contracted to deliver 12 highway dividers donated by ODOT (Oregon Department of Transportation) for use in diverting the river into the new channel.

Building upon the success of Project 1 downstream, Project 2 is well positioned to deliver the same habitat & hydrologic benefits. Both projects in total will have realigned nearly one mile of the Wallowa River channel complete with pools, riffles, glides and an active flood plane as would be expected in natural un-manipulated conditions. In additions to the construction work the landowner has enrolled project 1 in CREP (Conservation Resources Enhancement Program) and project 2 has been fenced under the Grande Ronde ODFW BPA livestock exclusion program, both eliminating grazing pressure through fencing in the riparian area for a minimum of 10 years. Project maintenance by ODFW, GRMW and the landowner through monitoring and adaptive management will help ensure project success over the next 10 years.

Introduction

The project area is located on the McDaniel property near the town of Lostine on the middle reach of the Wallowa River near RM 32 in the Grande Ronde Subbasin. This area was designated reach 5 by the 1992 ODFW Wallowa River survey, which extends from the confluence of the Wallowa River with the Lostine River upstream to Wade's bridge, approximately 7.85 miles. The project is located in Township 1 North, Range 43 East, Section 11, Willamette Meridian, in Wallowa County, Oregon.

An estimated 38 species of fish, including 15 introduced species, are found in the Grande Ronde River Subbasin (Grande Ronde Subbasin Summary, 2002). The Wallowa River reach within the project area supports spring Chinook salmon (O*ncorhynchus tshawytscha*), summer steelhead trout (*Oncorhynchus mykiss*), bull trout (S*alvelinus confluentus*), resident rainbow/redband trout (*Oncorhynchus mykiss gibbsi*), Mountain whitefish (*Prosopium williamsoni*), and a variety of non-game fish. Spring Chinook and summer steelhead inhabit the project reach year-round. Limited suitable spawning habitat exists for both species in the existing condition. Both species currently utilize the project reach for juvenile rearing. Fluvial bull trout are likely to inhabit the reach during winter and spring, using it as a migration route and as a foraging area.

This reach of the Wallowa River was channelized into a steep, narrow course at the toe of a slope along the eastern edge of the natural floodplain. An 1867 USGS survey shows the historic river to have been much different at that time, approximately 100 feet wide in an open gravelly bed, surrounded by thickets of "Balm, Birch, Willow and Alder". Balm, short for "Balm of Gilead", is the species we now refer to as Cottonwood. Mention was also made of Aspen ranging up to 5 feet in diameter immediately adjacent to the river, although there is some question as to whether they really were that large. A multitude of management and societal decisions led to the channelization of the Wallowa River including beaver trapping in the 1800's, livestock grazing, agriculture, railroad construction and post World War II dike development. Habitat and channel morphology parameters of concern include:

1. Water quality including temperature, chemistry and nutrients
2. Habitat elements including pool quality, off-channel habitat, and refugia
3. Poor riparian vegetation recruitment, growth and stability
4. Channel width to depth ratio
5. Altered peak and base flow characteristics (influenced by Wallowa Lake Dam)
6. Floodplain connectivity/interaction is absent because of incised channel and diked banks

Objectives:

1. Increase base flow depth in the Wallowa River 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.
2. Increase stream channel sinuosity, channel length, and geomorphic stability, and decrease channel gradient.
3. Improve instream, riparian, floodplain/meadow conditions and functions, including improved quality and use of riparian and meadow areas for native plant communities and wildlife.
4. Improve/increase vegetative cover/shade to moderate stream temperatures.
5. Improve/increase streambank stability.
6. Improve surface water and ground water interaction with resultant lowering of summertime stream temperature and increase wintertime stream temperature.
7. Improve properties of coldwater fish habitat and terrestrial and aquatic macroinvertebrate community composition.
8. Improve/restore use of restored stream channel segments by anadromous fish.

Project Methods & Materials

In cooperation with ODFW the GRMW initiated this project with the landowner Doug McDaniel. The GRMW acquired all necessary project funding, completed cultural resources clearance, contracted materials and service providers, managed all fiscal aspects, and administered the project. The GRMW is the project sponsor and non-technical partner of the production team and responsible for all implementation, monitoring and fiscal reporting.

Survey and design was completed by Vance McGowan, ODFW habitat biologist and Allen Childs, CTUIR wildlife biologist. In addition to design responsibilities ODFW & CTUIR managed all on-site construction activities, acquired biological clearance from both US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS), acquired removal/fill permits from both Oregon Department of State Lands (DSL) and Army Corps' of Engineers (ACOE), and accomplished all revegetation efforts with the exception of whole tree transplants and sedge mat planting which were contracted. This is the technical aspect of the projection team and responsible for project installation as per final design, adaptive construction management as necessary, and quantitative measurements and monitoring of the project.

Specific actions involved in channel construction include excavation of soil and gravel, shaping point bars, cutting and shaping outside meanders, riffle/channel cross-over sections, and channel thalweg, shaping terraces and streambank slopes, and revegetation. The construction specific actions were mostly contracted to excavation companies and are detailed by phase below.

Proposed Actions

Channel reconstruction: Construct approximately 2,550 feet of restoration channel. The restoration channel is a C3 Rosgen channel type and has the following characteristics:

1) Bankfull width of 54 feet
2) Mean bankfull depth of 2.26
3) Maximum bankfull depth of 3.25 feet
4) Cross sectional area of 121.9 square feet (at bankfull discharge).
5) Accommodate a bankfull discharge of approximately 675 cubic feet per second (cfs)
6) Sinuosity of 1.48
7) Slope of 0.0065.

Revetments: Approximately 85 large rootwads with tree boles attached will be used to construct rootwad revetments on outside meanders of the restoration channel to ensure stability of the constructed channel radius. Individual rootwads will be spaced approximately 15 feet apart with the tree both keyed into streambank at an approximate 45-degree angle. Oversized basalt rock (24-36 inches in diameter) will be utilized in key-ways for ballast and stability. A 12-15 foot footer log will be bedded below the streambed for each revetment to ensure the structures are not undermined. Footer logs are generally angled to face the thalweg of the stream channel with the rootwad bole positioned over the top & center of the footer log.

Grade Control: Six rock grade control structures (cross-vanes) will be installed at selected glide-riffle transition cross-sections to maintain vertical channel elevation and minimize risk of channel incision and head-cuts. Typically, cross-vanes are subsurface features and over time will be mostly buried by sediment, with low visual impact.

Revegetation: Extensive seeding and planting will be completed to accelerate vegetation establishment. Initial revegetation efforts are to be initiated during late summer and fall 2007 following completion of channel construction. Additional planting will be accomplished during the following spring. Planting efforts will be largely completed while plants were dormant to maximize potential for success. A combination of plant materials and strategies were employed including:

1) Broadcast seeding with native/native-like seed mix of all disturbed ground (including new channel and associated floodplain).
2) Installation of sedge/rush plugs and/or mats on suitable sections (fine soil) of the new channel
3) Live-whip installation of willow either mechanically (stinger) or manually
4) Salvage and transplant of shrubs and trees from sections of existing reach planned for reclamation.
5) Installation of containerized shrubs and trees, and
6) Installation of a temporary irrigation system utilizing landowners existing water right to provide water to plants during summer period to improve plant survival.

Easement: A conservation easement on the McDaniel property along the Wallowa River will be secured through the Conservation Reserve Enhancement Program (CREP) or similar program. Under the CREP easement, the landowner would receive annual payments on a per acre basis for a 10 to 15 year period in return for taking non-use (e.g., no grazing). Under this program, the NRCS and SWCD would be responsible for developing and securing the agreement with the private landowner.

STATEMENT OF WORK

Phase 1
Wallowa River/McDaniel Habitat Restoration Project 2
Contractor LD Perry Inc.

Scope of Work

A. All channel excavation and structures shall be excavated or built according to attached plans, drawings and specifications, and as directed on-site by the contract inspector.
B. All construction shall be performed in a manner specified by the GRMW. ODFW and CTUIR representatives will stake out work sites and conduct onsite surveying and grade control during construction.

Item 1- Mobilization
Point of Hire/Delivery is the Doug McDaniel Property located near Lostine, Oregon in Township 1 South, Range 43 East, Section 11, Willamette Meridian.

Item 2- Construct Wallowa River Restoration Channel
Bid item includes excavation of approximately 2,100 feet of restoration channel. Gravels and topsoils (estimated 50% each) will be separated and hauled to designated locations. Maximum haul distances are estimated at 1,200 ft. Topsoils will be stockpiled between the new channel and existing channel and will require ramping and stacking of material to heights as tall as practical due to space limitations. Gravels will be stockpiled to the west of the new channel and will also require ramping and stacking. Total neat line yardage is estimated at 18,000 cubic yards cut/fill. Channel excavation will start at the lower (downstream) end and progress upstream. Removal of existing vegetation is included in this bid item.

Item 3- Install Rock Cross Vanes
Cross vanes consist of approximately 135 cubic yards of material per site. Boulders are installed with footers below and surface boulders on top (see diagrams). Boulder sizes range from 36 to 84 inches with an average diameter (D50) of 54 inches (1.5 cubic yards). Cross vanes will be installed after main channel is constructed. A total of 6 rock cross vanes are included in this bid item. Rock materials will be delivered onsite and are not part of bid item.

Item 4- Install Rootwad Revetment Structures
Includes placement of root wads and footers (63 tree boles with attached rootwad and 63 footer logs). Revetments consist of a series of approximately 5 to 21 tree boles with attached root wad and footer log per site, spaced approximately 8-15 feet apart. Each tree bole/root wad will have a footer log placed underneath and perpendicular to the root wad bole. Root wads are angled upstream approximately 45 degrees. Tree materials used for revetments will be large diameter trees (average 20+ inches diameter at breast height), 6-12 foot diameter rootwads, with a 25 foot long tree bole attached to rootwad. Footers will be a minimum of 12 inches in diameter at the small end and 15 foot in length. Wood materials will be delivered onsite and are not part of bid item.

Item 5- Blended Earthen Terrace
Work includes hauling and spreading excess topsoil material available from channel construction. Blended terraces are constructed to maximum heights of 2.5 ft., with 25-30 ft. top widths and 10:1 side slopes. One earthen terrace will be constructed at the west (lower end) of project area. The terrace will be 500 feet in total length and require hauling and shaping approximately 1,800 cubic yards of soil.

Item 6 - Mechanical Planting
Work consists of mechanical stripping, hauling, and installation of approximately 6,400 square feet of native sedge/rush mats from onsite sources following completion of channel excavation and installation of rootwad revetments.

Item 7- Dike Removal

Work consists of excavation and removal of one existing dike, approximately 500 ft. in length and 1500 cubic yards of gravel and soil material.

Contracted actions Phase II (2008)

STATEMENT OF WORK

Phase 2 (Channel Activation Phase)
Wallowa River-McDaniel Habitat Restoration Project 2
Contractor Partney Construction, Inc.

Scope of Work

Phase 2 project construction involves completing restoration channel segment construction, installation of rock and wood structures, activation of restoration channel, and reclamation of the existing channel alignment. Work will be performed in July 2008 during the instream work window.

A. All channel excavation and structures shall be excavated or built according to attached plans, drawings and specifications, and as directed on-site by the contract inspector.
B. All construction shall be performed in a manner specified by the GRMW and its agents (ODFW & CTUIR). ODFW and CTUIR representatives will stake out work sites, conduct onsite inspection, surveying and grade control during construction.

Item 1- Mobilization
Point of Hire/Delivery is the Doug McDaniel Property located near Lostine, Oregon in Township 1 South, Range 43 East, Section 11, Willamette Meridian.

Item 2- Construct Wallowa River Restoration Channel Segments
Bid item includes excavation of approximately 423 feet of restoration channel at two locations, one segment at the upper reach of the project and one segment at the lower project reach. Total neat line yardage is estimated at 3,000 cubic yards. The majority of channel segment construction is located within the existing Wallowa River channel. Materials will consist primarily of small to large gravel. At the upper site, excavated material will be utilized in conjunction with previously stockpiled materials to construct the diversion streambank/rootwad revetment (Item 4) and will generally not require any hauling. Material excavated at the lower channel segment (approximately 50% of the material) will be hauled approximately 600 feet to an existing gravel stockpile.

Item 3- Install 1 Rock Cross Vane
Cross vanes consist of approximately 135 cubic yards of material per site. Boulders are installed with footers below and surface boulders on top. Boulder sizes range from 36 to 84 inches with an average diameter (D50) of 54 inches (1.5 cubic yards). A single cross vane structure will be constructed under this bid item, which will be installed prior to channel activation. Rock material is stockpiled at structure location and is not part of bid item.

Item 4- Install Rootwad Revetment Structures
A total of 21 rootwad revetments will be installed in two locations (complexes) in the uppermost and lowermost project reaches. Project revetments consist of a large rootwad with attached bole (20-25 feet in length) and a 15-foot footer log installed along outside meander stream banks. Installation is completed using an excavator with hydraulic thumb by excavating a “T” shaped trench into the streambank. The footer trench is oriented perpendicular to the channel thalweg with the trench for the tree bole and rootwad excavated into the bank at an approximate 45-degree angle to the thalweg. The top elevation of the footer is set at approximately streambed elevation. Following placement of footer log and rootwad, trenches are backfilled. The final step involves compacting and shaping the streambank along the face of the revetment structures and matching grade of the designed floodplain elevation. Onsite inspectors will paint each revetment location and survey footer elevations. Wood materials are stockpiled onsite and are not part of bid item. The upper revetment structure complex will be constructed in conjunction with channel segment excavation, diversion, and reclamation (See Items 2, 5, and 6).

Item 5- Channel Diversion

Work involves installing a temporary structure using concrete highway divider blocks and gravel/soil material to divert the Wallowa River into the restoration channel and dewater the existing channel. Specific work includes unloading and loading divider blocks from delivery truck and placing blocks in tandem to form a concrete wall to initiate diversion. An estimated 12 blocks will be utilized. Gravel material will be temporarily backfilled against the concrete barrier to complete diversion and dewater the existing channel and work area prior to installation of compacted earthen plug (Item 6 and rootwad revetment, Item 4).

Item 6- Compacted Earthen Plug and Channel Reclamation

Work involves installation of a compacted earthen plug at the channel diversion point and filling selected reaches of the existing Wallowa River channel with gravel and soil material stockpiled during restoration channel excavation completed in 2007. Approximately 13,000 cubic yards of mixed material (fine soil/sediment, and small to large gravel) is stockpiled immediately adjacent to the reclamation areas (dewatered reaches of the Wallowa River) in three different stockpiles and will be utilized to construct the earthen plug and backfill selected portion of the abandoned stream channel.

Work associated with the compacted plugs includes excavation of a large trench, approximately 60 feet in length, 15 feet in width, and 10-12 feet deep, into the bottom of the dewatered Wallowa channel. The trench will then be backfilled in 12-16 inch compacted lifts with locally available spoils to create a near impermeable barrier to subsurface stream flow. The earthen plug will be constructed approximately 25 feet downstream from the streambank and rootwad revetment structure, which will be constructed under Item 4.

Channel reclamation (backfilling the abandoned channel) can be accomplished using a combination of methods including pushing with large dozers and/or loading and hauling material in dump trucks. Back-filled material will be installed in large earthen plugs. Material will be graded and contoured into adjacent topography.

Item 7- Hourly Equipment Rental Rate Price Quote

This bid item includes price quotes for the following specified, fully operated equipment to perform work that is difficult to provide specifications for or that is unknown in scope or quantity at this time. Estimated hours on selected equipment are not guaranteed and will be based on project need as determined by GRMW. Generally, work will consist of miscellaneous site clean up, access road scarification/ripping, boulder/large woody debris placement, and mechanical planting at spot locations. Following is a summary of equipment specifications and estimated rental hours:

a. 200 Series (or equivalent) Track-Mounted Excavator with hydraulic thumb: 24 hours
b. 10-12 Cubic Yard Dump Truck: 8 hours
c. D4 dozer or larger with rear ripper attachment (8 hours)

Project Results

Action	Proposed	Contracted	Delivered	Difference
Channel reconstruction (contracted)	2000 feet.	2550 feet.	2483 feet.	+ 483 feet.
Rootwad revetments (contracted)	50 individual revetments.	94 individual revetments.	85 individual revetments.	+ 35 revetments.
Grade control structures (contracted)	4 cross vanes and 1 J-hook.	7 cross vanes.	6 cross vanes.	+ 2 cross vanes. - 1 J-hook.
Revegetation (ODFW)	Amount and species undefined in proposal.	Not contracted.	See table below	Revegetation accomplished as intended.
Easement (ODFW)	Enroll in CREP.	Agreement between ODFW & landowner.	ODFW BPA exclusion fence & deferred grazing agreement.	Similar to proposed.
Video production	15-minute video.	Removed from project.	None.	- 1 video.
Blended earthen terrace (contracted)	Not in original proposal.	Construct terrace.	Constructed terrace.	+ 1 terrace.
Mechanical planting (contracted)	Not detailed in original proposal.	6,400 square feet + not specified.	12,462 square feet.	+ 6062 square feet.
Dike removal (contracted)	Not detailed in original proposal.	Remove dike as part of channel diversion and reclamation.	As specified	Dike removal accomplished as intended.
Channel diversion and reclamation (contracted)	Not detailed in original proposal.	Contracted actions 5 & 6 phase II.	As specified	Channel diversion and reclamation accomplished as intended.
Construct exclusion fence (ODFW built)	Not detailed in original proposal.	Not contracted.	2,038 ft fence protects 0.70 mi. stream & 42.5 acres for 10 years.	Exclusion fence constructed as intended.

Final Restored Channel Dimensions: Constructed approximately 2,483 feet of restoration channel. The restoration channel is a C3 Rosgen channel type and has the following characteristics:

1) Bankfull width of 46 feet
2) Mean bankfull depth of 2.57
3) Maximum bankfull depth of 3.50 feet
4) Cross sectional area of 118 square feet (at bankfull discharge).
5) Accommodate a bankfull discharge of approximately 675 cubic feet per second (cfs)
6) Sinuosity of 1.44
7) Slope of 0.0052.

Revegetation Summary:

Wallowa River/McDaniel Reach 2, 2008 Planting Summary

		Size/Type				
		1/2 gallon	Small (<8')	Large (>8')	Trench	Species
Species	Mats (ft^2)	container	transplants	transplants	Cuttings	Totals
Alder		125	31	13		169
Booth Willow			115		2,790	2,905
Cottonwood		125	41	27		193
Coyote Willow			12		4,000	4,012
Dogwood		100				100
Peachleaf Willow				1		1
Quaking Aspen		50		30		80
Water Birch		50		9		59
Sedges/Rushes	2,240					2,240
Sub-totals:	2,240	450	199	80	6,790	**9,759**

Sedge/rush mats were placed along 200 linear feet of channel at the upper diversion structure and lower pool. Approximately 100 pounds of riparian seed mix was used to reseed all areas disturbed during construction. The total area planting along this ½ mile reach was approximately 4.6 acres.

Partney Construction used a tracked excavator to transplant the majority of small and large transplants in late winter, and later completed all sedge/rush mats during the August 2008 construction period. Other plantings were installed by ODFW and CTUIR staff with assistance from Hells Canyon Preservation volunteers. ODFW staff installed and operated an irrigation system to improve survival of all seeding & plantings.

Discussion

Lessons Learned:

The inception, design and application of the Wallowa River/McDaniel Habitat Restoration Project 2 was nearly identical to that of project 1 in 2004 and 2005. This similarity combined with the continued complexity of channel realignment projects, difficult permitting and consultation processes, and the likelihood of future project maintenance requires support beyond what any landowner can reasonably produce. The following bullets echo what was summarized for project 1 and continue to be relevant.

1. Due to overlapping jurisdictions and permitting requirements, it is essential to have a lead agency well versed in the laws, regulations and permitting processes required for river restoration, particular where the river provides habitat to threatened and endangered species. Private landowners cannot be expected to pursue this process without guidance, support and leadership from an experienced and skilled lead agency. The production team of ODFW, CTUIR, and GRMW served this purpose.

2. Pre-design consultation with landowners, contractors and companies that may have an interest in the riparian aggregate removed may allow for lower costs in channel construction. If the values of the materials to be removed (top soil, gravel, aggregate, etc.) are known in advance, along with the specifications for such material in local markets, the project may generate considerable income from the sale of such material, which could offset construction costs. This may result in slightly higher excavation costs due to the processing requirements to meet market specifications for any product, but this may be justified if the revenue exceeds such costs. Opportunities in this area should be explored further in future projects.

3. To the extent possible, flexibility for on-site design modifications should be built into the regulatory review and permitting process. This process remains rigid and risk averse and may result in missed opportunities to improve end results.

4. Due to the active restoration and dynamic nature of rivers funding agencies should be prepared to support maintenance and modification of these projects in response to lessons learned from continued monitoring and from short-term disturbances (i.e. spring flooding) that reveal weaknesses in the original design.

Objective Assessment:
The as built dimension and capacity of the reconstructed channel and floodplain suggest that channel form and function, riparian habitat and hydrologic characteristics are staged for improvement. Lengthening the channel through increased sinuosity, activating the floodplain through dike removal and an aggressive planting plan complete with irrigation will promote project objectives. Specific actions to achieve objectives:

1. The Wallowa River channel was rebuilt to a width, depth and gradient as would be expected in natural conditions to increase base flow depth in the Wallowa River 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. In the project area the channel is now longer with increased sinuosity and geomorphic stability. Rock cross vanes, rootwad revetments, sedge mat transplants and riparian planting are a combination of short and long term strategies to maintain as built channel characteristics and stability.

2. The adjacent to channel constructed floodplain and meadow that is seasonally inundated during high, out of bank flow will improve vegetative conditions that moderate stream temperature, provide an area for fine sediment deposition, and improve water chemistry. Removing dikes, engineering floodplain access and the aggressive planting activities are short and long term strategies to improve water quality.

3. Hydrologic function including stream bank and floodplain water storage will improve due to the constructed complex nature of the channel and floodplain access. The lengthening of the channel, reducing flow velocity locally, and spreading flow across the landscape seasonally acts to make water transport less efficient resulting in more surface and groundwater throughout the year. These actions produce improved aquatic and terrestrial habitat features.

A combination of monitoring activities has been implemented to document project effectiveness over the next 10 years. Monitoring includes:

1. Longitudinal profile: A profile of the prior existing channel was completed during the design phase of the project. This profile combined with an as built profile and periodic repeated profiles define features of the original channel, the as-built channel, and channel maturation over time. Longitudinal profiles define pool, riffle, glide, tailout sequence characteristics and their adjustment over time.

2. Channel cross-sections: Original channel cross sections were completed during the design phase of the project. These cross-sections combined with as-built cross sections and periodic repeated measurements define lateral features of the original channel, the as-built channel, and maturation over time. Bank stability, channel feature depth, and lateral adjustment over time are characterized by these measurements.

3. Pebble counts to measure and assess improvements to the channel substrate, sediment transport, scouring and deposition.

4. Fixed photo-point monitoring to capture channel, streambank, floodplain and vegetative changes over time.

5. Plant surveys to document survival, species, composition and diversity.

Acknowledgment

The Grande Ronde Model Watershed would like to take this opportunity to thank all of those organizations that made the Wallowa River/McDaniel Habitat Restoration project possible. Without the generous funding support of OWEB, BPA & US Fish and Wildlife Service, the dedicated production team of ODFW and CTUIR, the willing landowners Doug & Gail McDaniel, and the diverse group of volunteers this project would not have been possible.

Final Budget

BPA Contract # 32151				
Contract Title: 1992-026-01 Wallowa River/McDaniel Rechannel Phase II				
Performance Period: April 1, 2007 - December 31, 2007				
		Total of	**Total**	**Total**
	Approved	**Previous**	**Invoices**	**Remaining**
	Budget	**Invoices**	**to Date**	
Cultural Resource Survey	$3,000.00	$3,378.03	$3,378.03	
Channel Excavation	$88,300.00	$88,300.00	$88,300.00	
Root Wad Installation	$7,000.00	$7,000.00	$7,000.00	
Cross Vane Install Grade Control	$4,000.00	$4,000.00	$4,000.00	
Root Wad Revetment - Henderson	$5,000.00	$4,621.97	$4,621.97	
Total	107,300.00	107,300.00	107,300.00	0.00

US Fish & Wildlife Service Agreement # 13420-06-J633				
Contract Title: McDaniel II Wallowa River Channel Reconstruction				
Period of Contract: October 1, 2006 – September 30, 2008				
		Total of	**Total**	
	Approved	**Previous**	**Invoices**	**Total**
	Budget	**Invoices**	**to Date**	**Remaining**
Channel Reconstruction Materials:				
Root Wad Revetments	$12,000.00	$12,000.00	$12,000.00	
Boulders	$33,000.00	$33,000.00	$33,000.00	
Plant Materials - CTUIR	$8,836.00	$8,836.00	$8,836.00	
Subtotal	**$53,836.00**	**$53,836.00**	**$53,836.00**	
Administration	$5,397.00	$5,397.00	$5,397.00	
Total	**$59,233.00**	**$59,233.00**	**$59,233.00**	$0.00

OWEB Grant # 207-129						
McDaniel Phase 2 Wallowa River						
Period: November 9, 2006 - October 31, 2008						
Date	**Vendor**	**Invoice #**	**Project Management $5,150.00**	**Contract Services $70,294.04**	**Fiscal Admin $7,544.40**	**Total $82,988.44**
8/29/07	LD Perry, Inc.	1	$0.00	$5,252.54		$5,252.54
9/10/07	GRMW				$262.63	$262.63
10/29/07	LD Perry, Inc.	2		$16,000.00		$16,000.00
10/30/07	GRMW				$800.00	$800.00
8/15/08	Farm Supply	991		$550.00		$550.00
8/19/08	Rahn's	192		$77.50		$77.50
8/20/08	Partney Con.			$47,215.00		$47,215.00
8/21/08	Farm Supply	997		$330.00		$330.00
8/25/08	GRMW	1037	$3,150.00			$3,150.00
8/25/08	GRMW				$2,609.58	$2,609.58
10/29/08	GRMW	1038	$2,000.00			$2,000.00
10/29/08	GRMW				$100.00	$100.00
		Total	$5,150.00	$69,425.04	$3,772.21	$78,347.25

In-Kind Contributions				
Task	**GRMW**	**ODFW**	**CTUIR**	**Total**
Survey & Design		$3,900		$3,900
ESA Consultation			$2,500	$2,500
Permit Management			$3,500	$3,500
Contracting	$2,000			$2,00
Construction Supervision		$11,700		$11,700
Project Coordination	$3,150			$3,150
Travel	$3,204			$3,204
Fish Salvage		$2,000	$2,000	$4,000
Fence & Materials	$5,000	$5,000		$10,000
Total	$13,354	$22,600	$8,000	$41,954

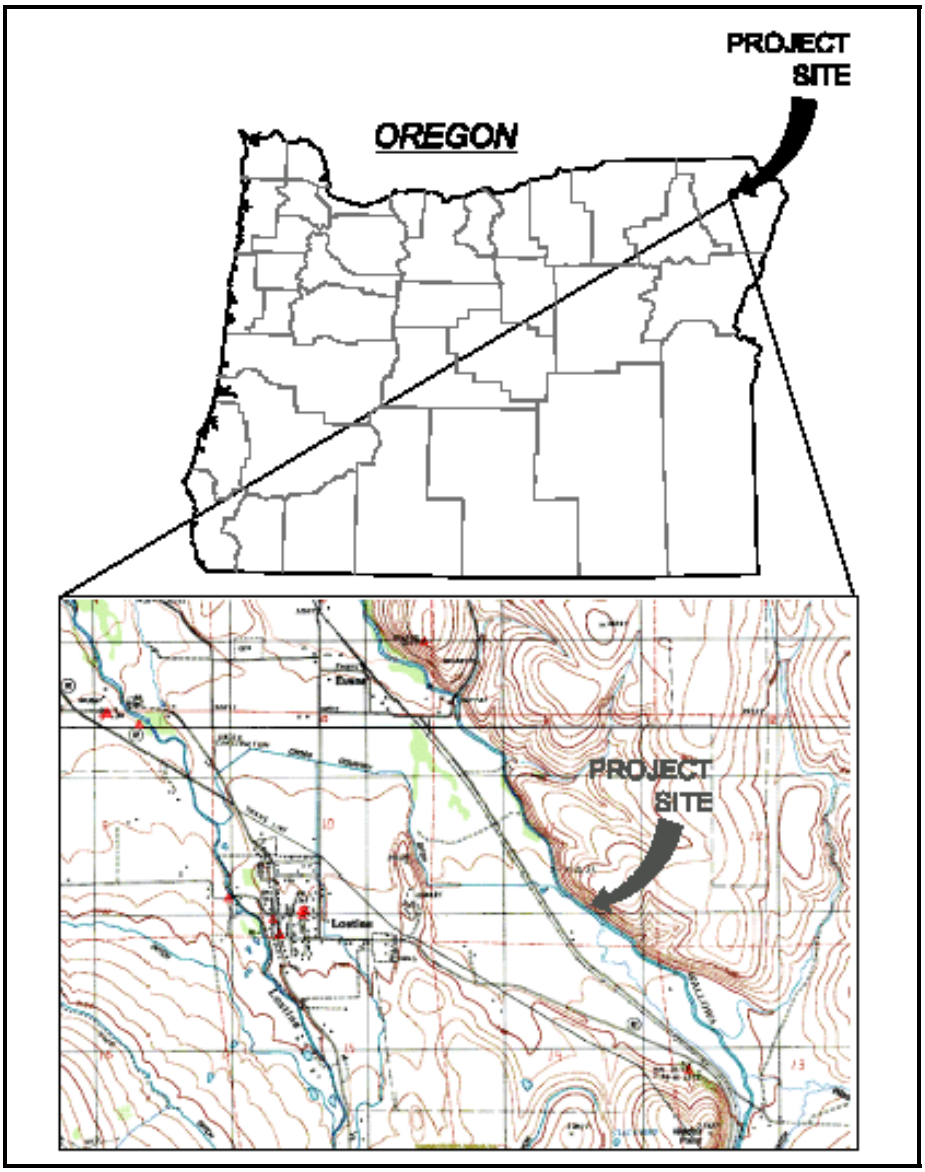
Total BPA funds = $107,300
Total US FWS funds = $59,233
Total OWEB Funds = $78,347.25
Total In-Kind = $41,954

Project total = $286,834.25

Attachments

Map 1

Project Vicinity Map (T1S R43E, Section 11)



Map 2

Wallowa River – McDaniel Restoration Project II Overview

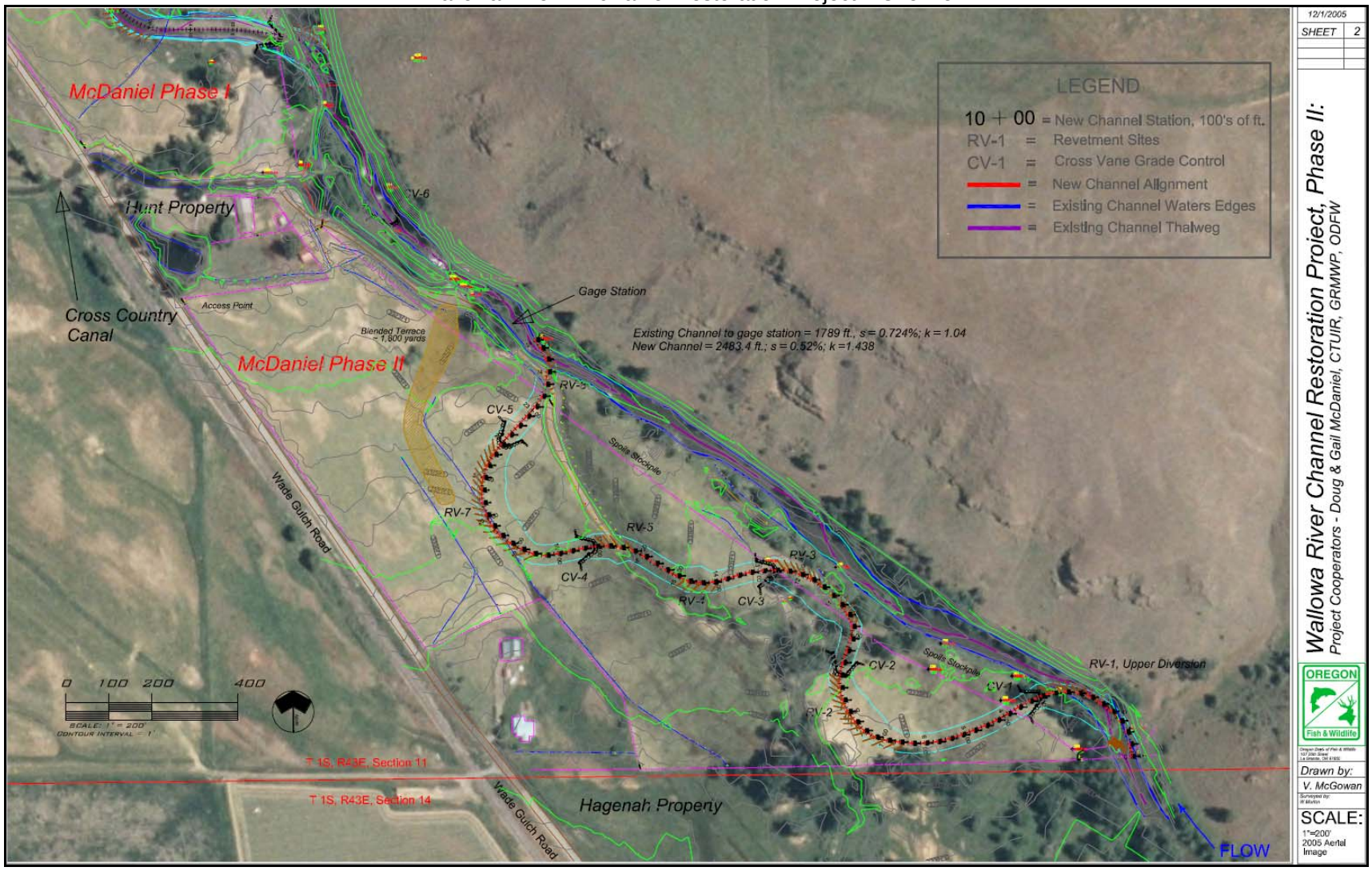


Figure 1

Longitudinal Profile of Channel Before Reconstruction

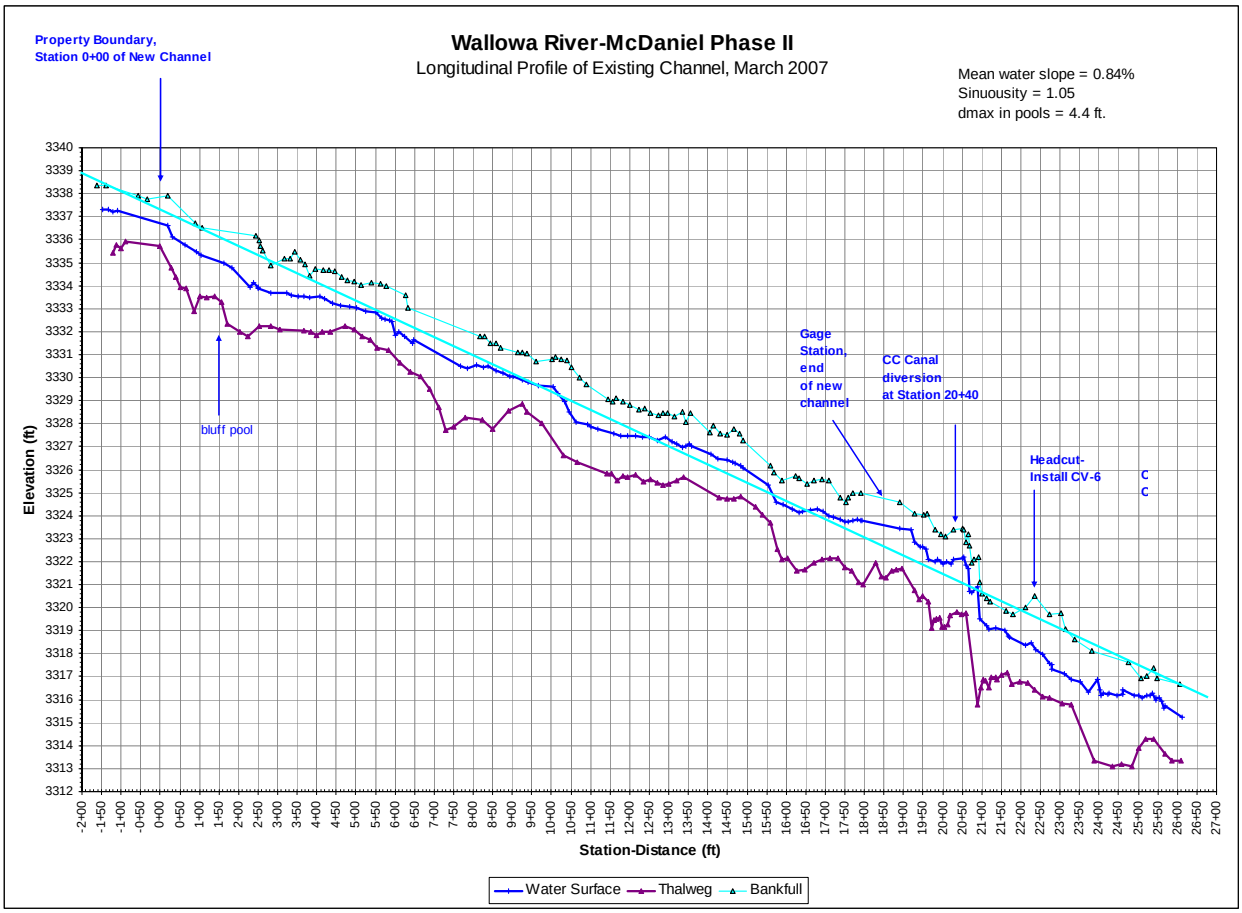


Figure 2

Typical Riffle Cross Section Before Reconstruction

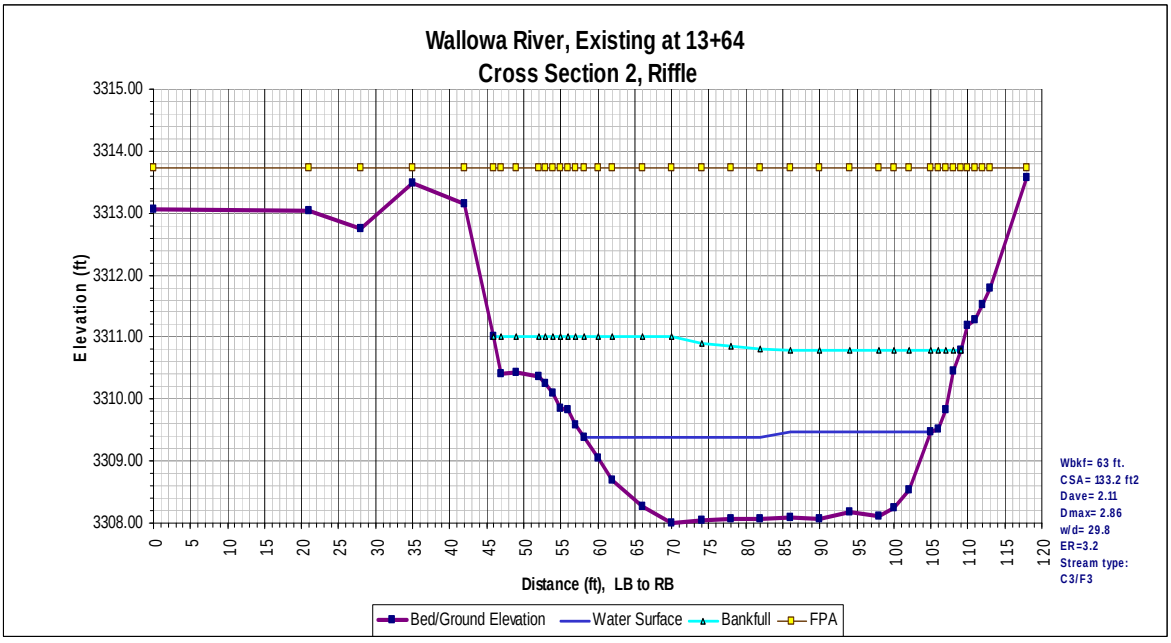


Figure 3

Typical Pool Cross Section of Channel Before Reconstruction

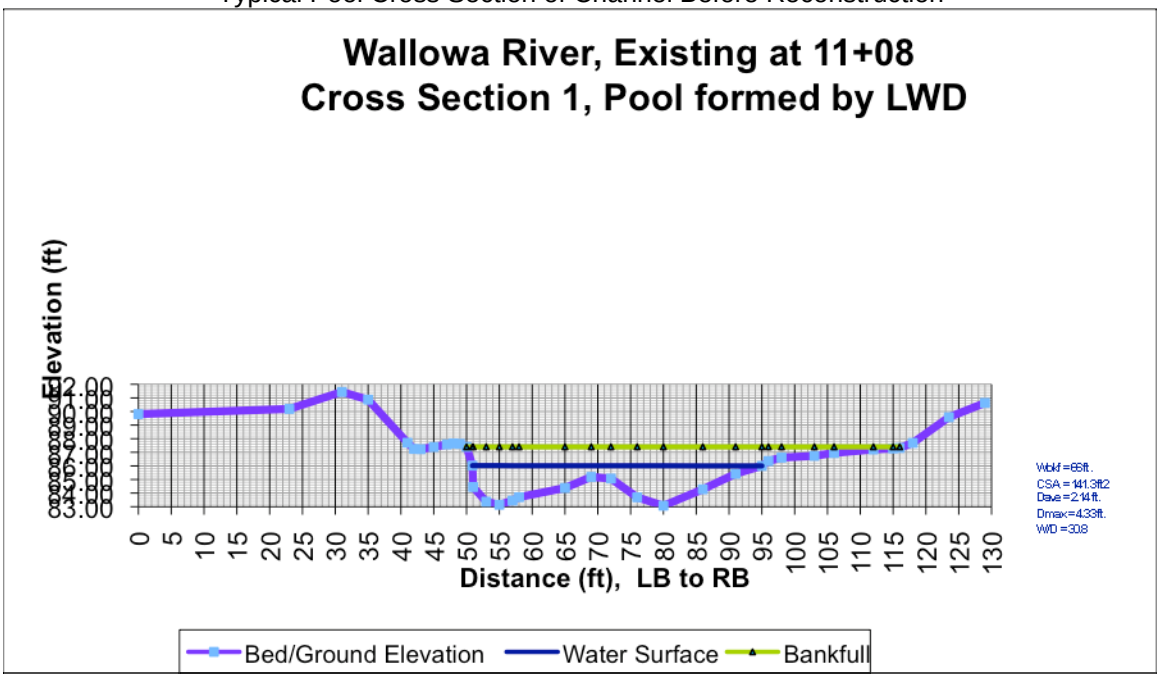


Figure 4

Restored Channel Longitudinal Profile

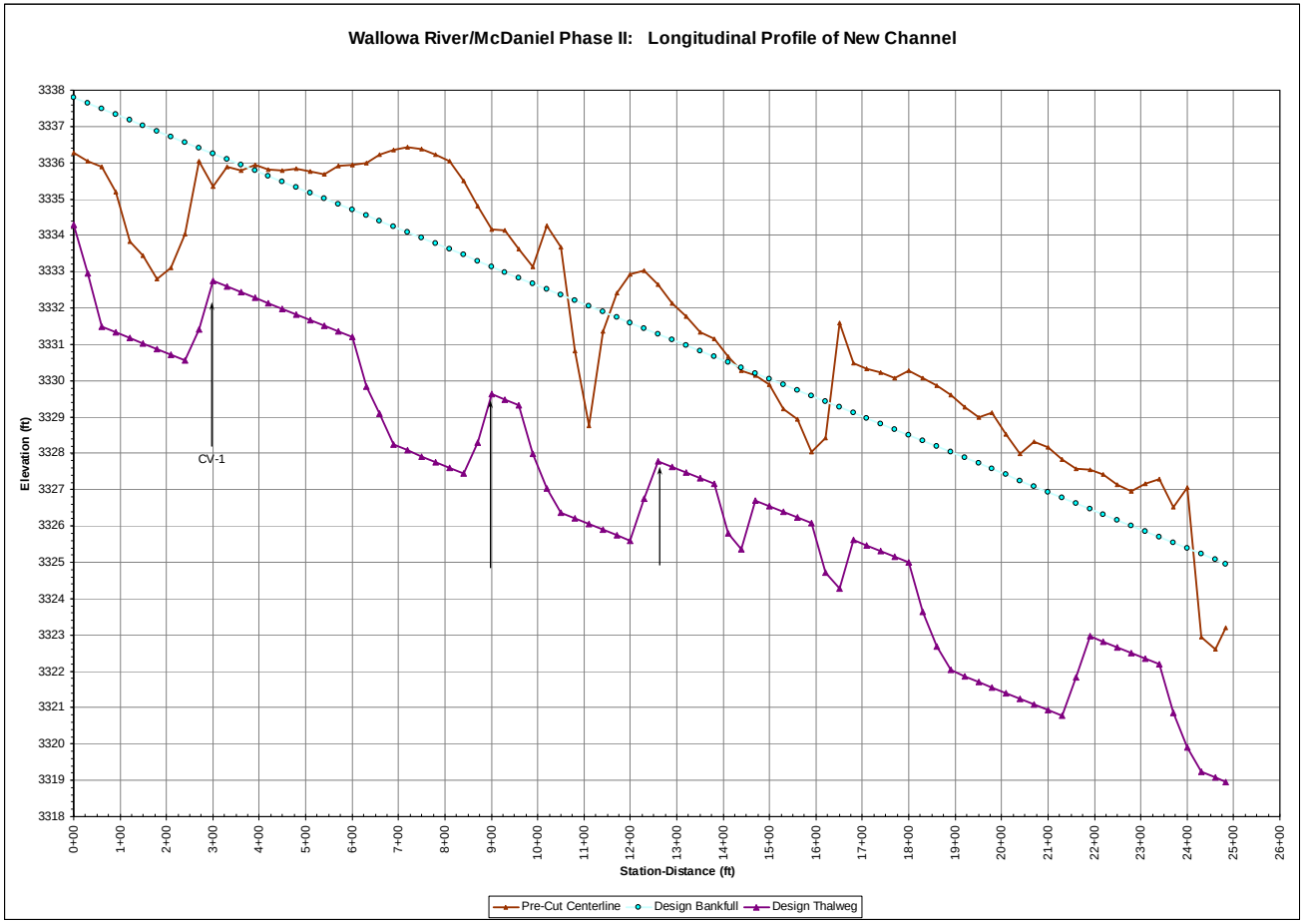
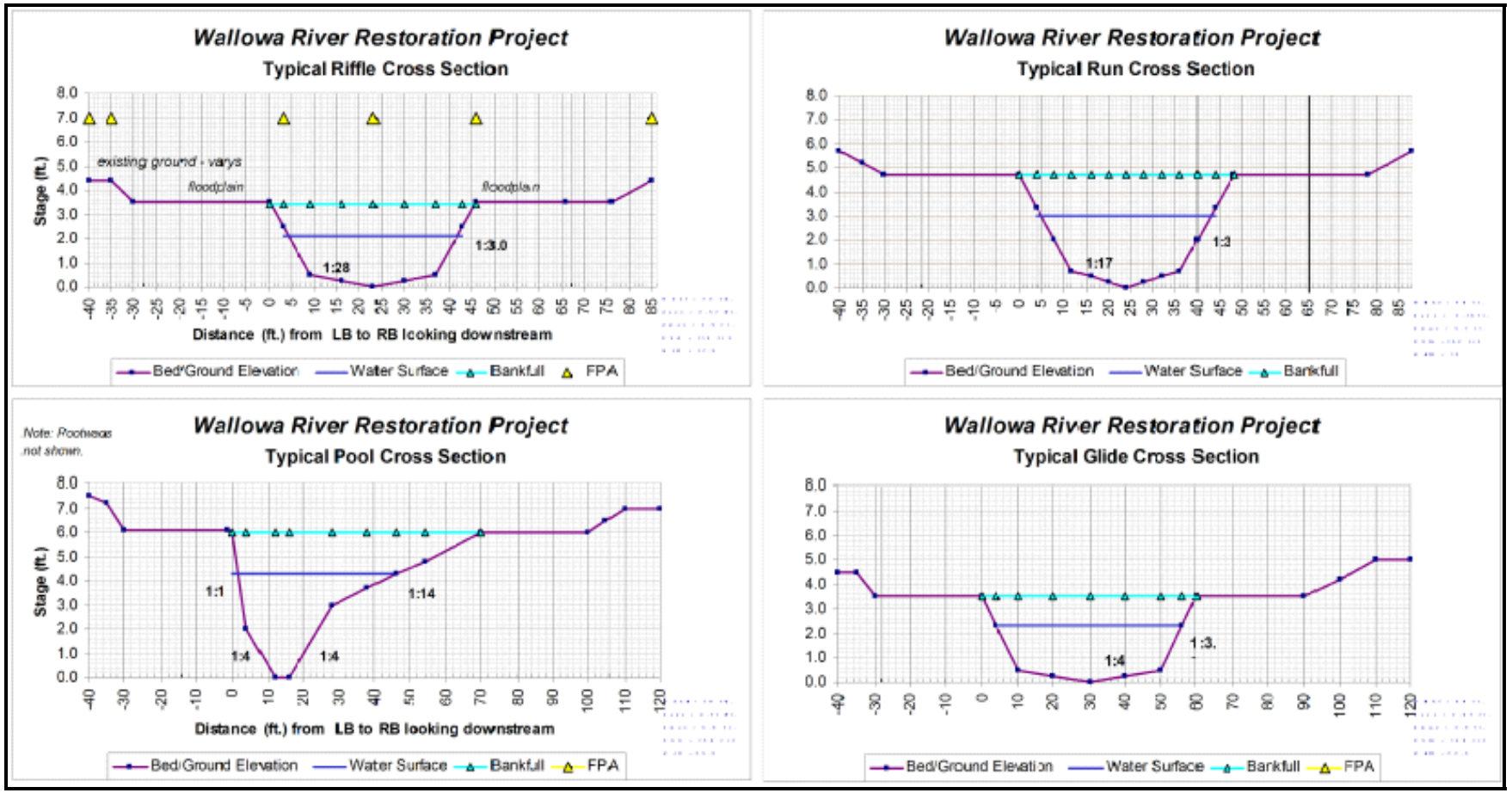


Figure 5

Typical Channel Cross Sections for Reconstructed Channel



Photographs

Photo 1: Constructed channel, adjacent carved floodplain and staged rootwads for revetments.

Photo 2: Excavators, 20 yard off-road dump truck & 10 yard dump truck. Staged rock for cross vain & rootwads for revetment. Spoils pile will be used to reclaim old channel.

Photo 3: Excavated channel filled by groundwater; channel not connected to live flowing channel.

Photo 4: Rootwad revetments installed.

Photo 5: Rock cross-vain mostly a subsurface feature to stabilize channel elevation and grade.

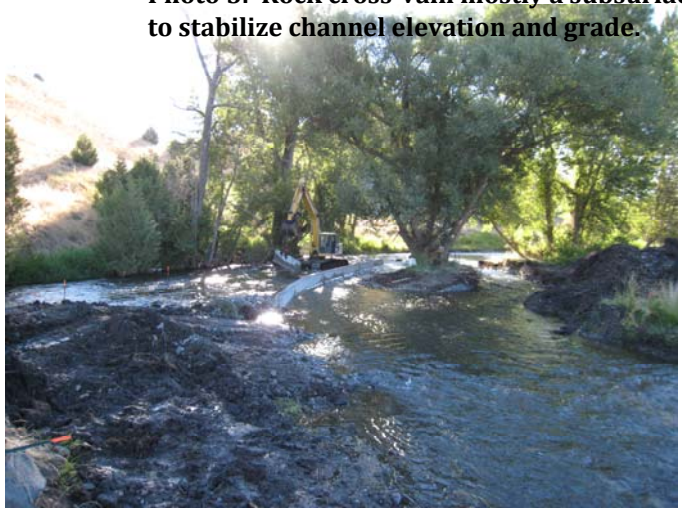


Photo 6: Sedge mats installed above rootwads to

Photo 7: Diversion into the restoration channel. Highway dividers are used as a cofferdam to slowly divert flow. The dam is sealed with channel substrate material.

Photo 8: Fish salvage effort lead by CTUIR & ODFW with volunteer support from Wallowa Resources Outdoor School.

Photo 9: Fish salvage bucket brigade taking fish from dewatered river to coolers on ATV. Fish are then transported to processing station where fish are counted & measured by species then released back to the live flowing channel.