BONNEVILLE POWER ADMINISTRATION

Grande Ronde Model Watershed Project

Catherine Creek/Swackhammer Fish Passage and Erosion Mitigation

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Grande Ronde Model Watershed Project

Catherine Creek/Swackhammer Fish Passage and Erosion Mitigation

Completion Report

Performance Period
July 1, 2004 to December 31, 2005

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Introduction

Catherine Creek is one of the major Snake River spring chinook and summer steelhead systems in the Grande Ronde Subbasin. The Catherine Creek spring chinook is one of six distinct populations in the subbasin. The Catherine Creek population is severely depressed. It is estimated to be only 16 percent of the historic run (Grande Ronde Subbasin Plan, 2004). Catherine Creek steelhead are is part of the Upper Grande Ronde steelhead population. This population is estimated to be at 29 percent of historic numbers. The Swackhammer Ditch diversion structure is one of six major irrigation diversions on Catherine Creek. Two other structures provide reasonable passage because they have been recently modified. Two others are in the planning process for modification. One provides reasonable passage because it was satisfactorily designed and constructed when it was first installed.

Meeting fish passage standards in the Catherine Creek watershed is a high priority for restoration of the Catherine Creek Chinook and the Upper Grande Ronde steelhead populations.

This project is remedial action necessary to correct fish passage, erosion and bedload accumulation problems not completely addressed or aggravated by the replacement of the old Swackhammer diversion structure (1995 OWHP, BPA, ODFW, NOAA). The structure does not meet current fish passage guidelines, has caused severe bank erosion and does not facilitate diversion of water into the Swackhammer ditch. The project proposes to retrofit the diversion structure, reinstall the fish screen, install a combination of grade control structures (cross vanes and J-hooks), revegetate streambanks and reshape the irrigation ditch.

Location

This project is located on Catherine Creek, in the City of Union at the Swackhammer irrigation diversion structure, River Mile 18. The project legal description is T.4S., R. 40E., Sec. 19, NE¼ of NE 1/4. (see attached map).

Existing Condition

The Swackhammer irrigation diversion structure underwent major reconstruction in 1995 to alleviate fish passage problems. A single-step structure with inadequate fish ladder was replaced by a two-bay concrete weir structure. The design has caused or not completely addressed a number of problems.

The design of the structure has caused extreme deposition of bedload in the middle of the channel downstream of the structure, resulting in a split channel. The bedload deposition in combination with the alignment of the structure has also caused the gradual migration of the channel further to the north, eroding the streambank up to 20 feet in places. Deposition and revegetation continues on the mid-channel gravel bar further aggravating the situation and putting even more pressure on the north bank (see pictures). Although the north bank is well vegetated, continued mid-channel deposition and capacity reduction could result in substantial out-of-bank flow during a future flood event. This flow would be directed toward residential areas of Union.

Additionally the elevations of the weir walls, headgate structure, ditch and fish screen are such that the irrigators cannot divert their allotted water right without placing check boards on the upper most weir (design deficiency). Placement of the boards usually occurs around late-June, often during a period of relatively high flow and is an extremely hazardous activity. The boards, when in place, result in a drop in excess of 16" between the first and second weirs, limiting juvenile fish passage from mid-June through at least September. Current fish passage standard is 6 inches.

Project Description

The project objectives were:

- Establish year-around fish passage at the Swackhammer diversion structure
- Stop northward Catherine Creek channel migration
- Reduce streambank erosion, bedload additions and stream sedimentation
- Reestablish, as much as practical, natural bedload transport through the diversion structure and downstream of the structure
- Reduce the flood potential aggravated by construction of existing fish weir and accumulation of mid-channel bedload

Project tasks were:

- Install two additional concrete weir walls within the existing structure to reduce drop at each weir to approximately 8 inches.
- Modify the three existing weirs by filling in existing 17' wide flow notches and recutting 6' wide flow notches for fish passage closer to the headgate.
- Remove the mid-channel gravel bar and use material to rebuild streambank along the north side of the channel.
- Install two J-hook structures and one cross channel vane to direct flow through the middle of the structure and down through the middle of the channel below the structure (see drawings).
- Re-install the fish screen one foot lower to increase flow down the ditch.
- Lower and reshape the ditch (drop ditch bottom approximately one foot for a distance of 400 feet.
- Relocate (below deepened ditch) a City of Union water line that crosses the ditch just below the fish screen.
- Reseed disturbed ground.

Methods, Results & Discussion

Project Management

The Swackhammer project was sponsored by the Grande Ronde Model Watershed Foundation (GRMWF). The GRMWF conducted all phases of project management

including project planning, coordination, ESA consultation, permitting, subcontracting, fiscal management. Construction funding was provided by BPA under the Fish and Wildlife Mitigation Program. The Bureau of Reclamation (BOR) designed the project. The Oregon Department of Fish and Wildlife provided resources for the fish screen replacement. Work was initially scheduled to be completed during the in-water work period in 2004. However due to discussions during ESA consultation, resulting design modifications and permitting delays the project missed the in-water work window in 2004. Work was completed in 2005.

The BOR began working on the design during the summer of 2003. The GRMW applied for and received BPA funds in early 2004. The design called for the installation of two additional concrete weir walls within the existing structure to reduce drop at each weir to approximately 8 inches. Three existing weirs walls were modified by filling in existing 17' wide flow notches and re-cutting 6' wide flow notches for fish passage closer to the headgate.

The initial design called for the removal of the mid-channel gravel bar and the placement of that material along the north side of the channel. One J-hook structure, approximately 75 feet above the concrete weir and one J-hook structure below the weir were designed to center the flow and allow the structure to more efficiently pass bedload. A cross channel vane approximately 150 feet below the weirs was proposed to keep bedload moving downstream of the concrete structure.

Additional work included the removal and re-installation of the fish screen approximately .8 of a foot lower then the existing screen, and the lowering and reshaping of the irrigation ditch to facilitate flow down the ditch. Lowering the ditch required the relocation of a City of Union waterline under the ditch.

During the ESA consultation process the design for the channel work below the structure was modified at the request of USFWS. A W-weir replaced the J-hook below the structure. The intent was to maintain a split channel with the majority of the flow and bedload passing through the south channel and a lesser amount (20-30%) flowing down the north channel for side-channel habitat. Root-wad revetments were proposed along the north bank of the north channel for habitat.

Construction

The construction contract was awarded to Mike Becker General Contracting on June 2, 2005. Anderson-Perry & Associates were subcontracted to perform the technical construction inspection. Lyle Kuchenbecker performed additional inspections and managed the project.

Construction on the project began on July 5, 2005 with the by-pass channel. Channel de-watering and fish salvage occurred on July 8th. In-water work, consisting of ditch water diversion piping, rock structure construction, root wad installation, channel grading and concrete weir work continued from July 11th through July 19th. The upper cofferdam was removed on July 20th and water returned to the channel. Cleanup work was completed on

July 21st. The final inspection on the channel work was done on July 25th. The work to lower the waterline was completed on July 25th and 26th.

ODFW removed and replaced the fish screen during October. Erosion control seeding and planting, for all disturbed ground, were implemented during the week of Novermber 14th. The final work to clean and lower the ditch was completed during the week of December 12th.

See the attached Construction Log for a detailed chronology of construction activities.

Financial

BPA funds (construction)	$118,621
ODFW (fish screen)	$20,000
BOR (design)	$37,824
Total project cost	$168,645

Results

Construction was completed as designed. Bids were slightly more than estimated resulting in a contract modification request to BPA for an additional $15,518 over the initial project projection.

Discussion

Construction progressed well, and as expected. The construction contract was awarded to an experienced, well equipped contractor. A subcontract to a local experienced engineering firm for construction inspection assured high quality construction.

The de-watering and associated fish salvage was one of the most challenging aspects of the project. The GRMW was able to enlist the expertise of biologists from ODFW and the Confederated Tribes of the Umatilla Indian Reservation to perform the necessary safe handling of juvenile fish.

Two issues arose during the latter part of construction and post construction that caused some consternation with the regulatory agencies. The first was that the USFWS consultation biologist felt that construction activities unnecessarily removed vegetation from the pre-existing mid-channel island downstream of the diversion structure, and that the W-weir installed at that location was larger than proposed. The GRMW maintained that the W-weir was constructed as designed (confirmed by Anderson-Perry) and that the construction of the weir and associated grading/recontouring necessitated removal of nearly all of the vegetation on the pre-existing island.

The second issue was the timing of post-project erosion control activities. The Department of State Lands permit, pertaining to erosion control, states that seeding or planting will occur immediately after project completion and woody vegetation will be replaced within one year of project completion. The GRMW maintained that erosion seeding would be ineffective if done before onset of late summer or fall precipitation and

did not seed disturbed ground until November. For future projects, either permit language needs to be changed or personnel that enforce permits need to provide leeway in implementation of those provisions to account for on-site conditions.

Pictures

Mid-channel gravel bar - Pre-construction

By-pass Channel

Fish Salvage – Electro-shocking

Concrete Weir-wall Construction

Completed Weir-wall Modifications

Swackhammer Project/Construction Log
Lyle Kuchenbecker

Inspections were performed by Lyle Kuchenbecker, GRMWP. Additional technical inspections done by Brett Moore, Anderson-Perry & Associates.

07-05-05
Becker Contracting moved equipment to site and began bypass construction. Met with Lee Ricker (construction superintendent) and Brett Moore (AP). Discussed required bypass channel capacity. Shad Hattan (OWRD Watermaster) estimated current Catherine Creek flow at 65 cfs at upper guage but will be dropping as upstream irrigators increase withdrawals. Capacity should not be an issue barring intensive rain storm. Contractor requested the go-ahead to remove the large cottonwood adjacent to SW side of structure, bypass construction will cut half of root system, it would be susceptible to windthrow. OK'd removal. Met Howard Postivite (ODOT) on-site, he inquired about plant and CR clearance, all have been done. Lee inquired about truck access and ramp construction off of highway, he will need to work with ODOT. PM, inspected work site, bypass construction to about lower end of diversion structure.

07-06-05
Advised Lee that fish salvage could occur Friday, I am coordinating personnel and equipment for that day. PM inspection, bypass channel construction has progressed to about 30 feet from outlet to stream channel, will likely be completed tomorrow. Native material being placed in bottom of bypass as per BO requirements. Contractor will pump water into ditch to settle out sediment.

07-07-05
Site inspection, 1000 hrs. Some water leaking into bypass and passing through to outlet. Ecoblock cofferdam partially placed at approx. 1200, about 20% of stream flow passing through bypass. Fines washing out of bypass, turbidity standards exceeded from 1200 to 1345, water cleared.

07-08-05
Arrived on-site for fish salvage 0530. Crew of 13 ready to begin at 0630. ODFW Research crew, Nadine Craft, CTUIR crew conducted operation. ODFW fish transport truck used to hold and transport fish. Contractor placed remaining ecoblocks at upstream end, we placed block net. About 20% of flow maintained throughout stream reach during fish salvage. Crew made multiple passes through upper reach to diversion structure with 3 shockers. Contractor sealed off cofferdam with tarps, about 1 cfs maintained. Lower end block netted off. Crew made multiple passes through lower two channels up to 1100. Bob Becker (ODFW) tallying fish and recording water temperature. Temperature reached 64 degrees at 1330. Crew made multiple seine passes through diversion structure pools. Large #'s of fish were found in the weir pools. Fish salvage concluded by about 1400. Salvaged fish were transported to an upstream location by ODFW's fish hauling tanker truck.

Final fish numbers: 620 steelhead, 240 chinook, 120 sculpin, 45 whitefish, 200 misc. Mortalities from initial salvage: 1 steelhead, 2 chinook, 2 whitefish. I observed 2 additional steelhead mortalities in dewatered channel at 1800.

Contractor connected ditch pipe and established flow to ditch at approximately 1200. Large rock was placed in the bypass and at bypass outlet to reduce water velocity and maintain passage. Will check below bypass periodically throughout project for adult Chinook holding below the bypass. Contractor installed trash pump in sump adjacent to ditch headgate to dewater diversion structure. Diversion pools dewater and concluded removing bedload and sediment from upper diversion pool by 1700.

07-10-05
Rain storms passed through upper watershed. Checked water level, very minimal increase in flow, bypass functioning well.

07-11-05
Conducted am and pm inspections. 0700 checked for holding adult Chinook below bypass outlet, found none. Flow dropping, bypass functioning well. Diversion structure de-watered and being pumped into ditch, continual. Concrete pour planned for Friday. Upper J-hook construction started and mostly complete by end of day. Partial vegetation removal and preliminary grading of gravel island done, prior to W-weir staking. Portion of rock for W-weir staged on north edge of channel.

07-12-05
Met Brett Moore on site 0700. Inspected upper J-hook. Brett prescribed minor adjustments, contractor completed. Contractor staked W-weir, Brett checked. Contractor continued stockpiling W-weir rock. 1630-1730 contractor placed lower cofferdam ecoblocks, maintaining one block gap. We will conduct fish salvage tomorrow am in small pool above lower cofferdam.

Had telecom discussions with Jeff McLaughlin (BOR designer), ref. moving 6-foot notches progressively toward center of structure. Brett felt this would better direct thalwag toward left channel and aid bedload transport. Consensus at this time was that in-line design was OK (later adjusted one foot left at each wall).

07-13-05
Conducted final fish salvage in pool above lower cofferdam, 0630-0800. Block netted along ecoblocks. Crew of Nadine, Brett, Kelly Mason, Lorie Hewitt and myself. Salvaged a mix of 18 steelhead and chinook, and one 5 inch bull trout.

Am, W-weir under construction, supervised by Brett. Brett and I discussed root wad installation and source (possible ODOT stockpile at staging area). Also discussed removal of all of island to design specifications and grade. 1700 inspection, W-weir construction complete, contractor had graded channel from 50 feet below diversion to lower end of island. Visual to me appears elevation is higher than plans, need to get Brett to check elevations. More bedload placed along north bank from structure down to W-weir than desirable. Will discuss with Brett and John Kinney (USFWS) at on-site meeting tomorrow 0715.

07-14-05
Met on-site 0715 with Brett Moore and John Kinney. John expressed opinion that W-weir was much larger than he expected and that as per prior discussions he expected that much

of vegetation on island would have remained. Additionally he felt too little flow would be maintained the north channel during low flow periods. I explained that W-weir was constructed as per design and that construction and grading to design required removal of the vegetation on at least the upper 70% of the island. John felt we should have notified the Services when we realized how large the W-weir would be and the amount of vegetation removal. Note: draft design package including W-weir location and grading plan were distributed for review by BOR prior to finalizing the design. Submitted comments were incorporated into the final BOR design package (see additional ESA consultation comments). Discussed removal of additional bedload that had been deposited/pushed up along north bank below diversion structure and adjacent to W-weir where it was keyed into north bank.

We agreed to have contractor adjust rock location and elevation at upstream tip of north side of W-weir to allow more water down the north channel at low flows. This was later done.

07-15-05
Contractor poured concrete walls. All work and materials inspected by Brett Moore. Concrete watering and curing over the weekend.

07-18-05
Contractor brought in and installed two large conifer root wads. Brett supervised installation. Very nice installations, streambank disturbance was minimal and they were keyed in/stabilized well with large rock.

07-19-05
The in-water work is mostly complete. Rock structures look good, Brett has checked elevations and they are very close to design specifications. Stream channel grading is also close to design. The adjustment in the rock at the tip of the W-weir is allowing limited flow from the screen bypass pipe to flow down the side channel. The root wad installations are at a low enough elevation to be near water level at very low flow. The contractor randomly placed a few rocks in the south channel.

07-20-05
Upper cofferdam removal started at 0630, allowing water to flow back into the channel and gradually reducing flow in the bypass. By 0900 90% of the water was flowing down the channel. Brett and I monitored the bypass as flow was dropping. Juvenile fish exited out the lower end volitionally. Contractor began filling bypass channel.

07-21-05
Site rehab, grading and cleanup is in progress and proceeding well. There are a few minor items to address, a little more material to pull out from tree-line along road and a couple of pieces of old culvert to remove. Irrigators put stanchions on upper wall and put board in 6-foot slot. They are not able to get water allotment at this point until ditch cleaning is complete and until fish screen is lowered. Drop at board in slot is about 12” which does not meet fish passage criteria but likely is not preventing juvenile passage (during fish salvage juvenile fish were observed passing from upper diversion pool to channel above, 14”+).

07-25-05
Brett and I conducted final on-site inspection with Mike Barry (ODOT) at 0800. Re-contouring of road and disturbed ground is satisfactory. Mike would like vehicle access permanently blocked from the access road and directly from the highway. He prescribed a row of rocks approximately 8 feet from the toe of the highway cut slope and large rock at the road entrance.

Contractor shut down the majority of the water in the irrigation ditch late evening on 07-24-05. 0700 set up sump just below pipe relocation site to dewater work area. They coordinated the shut down with Swackhammer ditch users. Contractor coordinated shut down of city water line with Paul Phillips, Union PWD, for relocation of the city water line. City had to provide water via hoses to two residences. Contractor worked throughout the day digging out old pipe, assembling new pipe, valves and joints, and bedding new pipe. Nearly all assembly was completed by 2000. Ditch was turned back on late in the evening. Talked to Donna Royal, cleanup is acceptable except for a couple of pieces of old CMP which I will have contractor remove.

07-26-05
Contractor poured thrust blocks about 1100 and filled in remainder of trenches. City water line will be turned on about 12 hours after pouring of the thrust blocks. I had them do additional ditch cleaning to the fence line approximately 150 feet below the screen. More ditch cleaning remains to be done down to about 600 feet below the fish screen.

07-27-05
Met on-site with Lee Ricker to discuss final work, that at this point consists of placing the rocks along the highway to block access.

Met with John Kinney in La Grande. He wanted the old CMP's and another chunk of concrete removed. I called Lee and told him about the chunk of concrete. John feels we didn't fully meet project objectives, primarily due to the removal of all of the vegetation on the gravel bar and its affect on the secondary north channel. I reaffirmed that the primary project objectives as stated in the project proposal and the Biological Assessment were: restore fish passage, improved bedload transport, reduce streambank erosion, and reduce flooding potential. At John's request (June 2004) we agreed to a design change from the original J-hook below the diversion structure to a W-weir to maintain habitat in the secondary channel. We also added three root wads to the design along the north bank (two were installed).

07-27-05
Met on-site with John Kinney, Eric Murray and Coby Menton. The irrigators have placed a 2x10 board in the fish passage slot and replaced their boards on the upper wall. The boards in the slot do not meet fish passage criteria. I explained that the final work on the ditch, consisting of lowering the fish screen and cleaning the ditch is not done. Until it is completed, the irrigators will not be able to get their allotted water. This work will be completed prior to September 30.

John wanted additional material removed from the streambank at three locations. They are above the diversion structure on the south bank (about 20 x 3 feet), just below the

diversion structure on the south bank (2-3 yds), and just downstream of the point where the W-weir intersects the north bank (3-4 yds). Note: if done after August 11th this will require an in-water work extension. I will pursue this with Jeff Zakel. He also requested complete seeding of disturbed ground and willow or cottonwood planting on the gravel bar and disturbed areas along the streambanks. We will do the seeding as prescribed in the proposal in the fall following adequate rainfall. We agreed to plant the disturbed streambanks and the lower end of the gravel bar below the W-weir with willow cuttings. This cannot occur until mid-October at the earliest, after willow becomes dormant.

Week of August 22nd

Jeff Oveson and I met on-site with Kevin Herkamp to discuss erosion control measures. He requested that erosion control be implemented as soon as possible, ie. before significant precipitation. We advised him that we would do the erosion seeding and mulching as soon as we had sufficient moisture to allow for seed germination. We would do the willow planting as soon as we could collect dormant cuttings, mid to late October at the earliest.

10-5-05

Met on-site with Gary Findley, Chuck Simpson screen and crew (ODFW screen shop). ODFW is preparing to remove and replace the fish screen. We agreed that the fish screen will be lowered 8 inches. ODFW had contracted with Mike Becker to remove the old concrete, this was done last weekend. I arranged for ODFW to remove the material John Kinney wanted taken out of the channel.

10-31-05

Concrete for new screen is installed. The screens are installed in one bay. The fence around the screen has not been reinstalled. I will meet with Chuck Simpson on-site November 3 to discuss where the ditch work needs to be done. Backhoe did minimal removal on the south bank above and below the structure.

Week of November 14th

I harvested willow cuttings from Ladd Marsh Wildlife Area for planting on the project. I acquired native seed for erosion seeding from the USFS. Coby Menton and I installed willow cuttings at the water line adjacent to the J-hooks, the W-weir, the mid-channel island and any disturbed ground. I broadcast seeded the native seed and mulched with grass seed straw from certified grass seed fields north of Imbler.

Week of December 12th

Subcontracted with Bob Judy Construction to do the ditch work. Bob completed work from the fence line approximately 150 feet below the fish screen to the lower end of Kim and Kerry Adkins property, approximately 500 feet below the fish screen. I completed erosion seeding on all ground disturbed by the ditch cleaning.

Project is complete.