DAVIS DAMS FISH PASSAGE

Completion Report

Performance Period
April 1, 2011 to December 31, 2012

Prepared by:

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Prepared for:
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Bonneville Power Administration
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Project No. 1992-026-01
Contract No. 52075

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Background

The Catherine Creek system supports three ESA-listed fish species. They are Snake River spring Chinook and summer steelhead, and Columbia River bull trout. The spring Chinook population in Catherine Creek in one of the highest priority populations for restoration in the Grande Ronde Basin. Catherine Creek has been diverted at the Davis Dams since 1870 with the earliest water right. A variety of diversion structures have been in place in the past at both the Upper and Lower Davis Dams including gravel pushup dams. The Davis Dams were identified by the Oregon Department of Fish and Wildlife (ODFW) as complete barriers to upstream juvenile fish passage and partial barriers to adult Chinook depending on flow and run-timing. The project completely reconstructed the water diversion facilities and installed vertical slot fish ladders at each site.

Pre-Project Conditions

The Upper and Lower Davis Dam structures and fish ladders were constructed 30 years ago (Upper Dam) and 50 years ago (Lower Dam) to provide irrigation water for agricultural practices. Each dam was a full channel-spanning concrete structure designed to raise or "check" Catherine Creek water levels up to 6 feet through the placement of boards and plastic sheeting. This was necessary during most of the irrigation season when the natural stream stage was too low to reach irrigation headgates.

The method of diverting water in combination with inadequate fish ladders can, and often did restrict adult fish passage, particularly at the lower dam. Initially check boards were placed between June 1 and July 1 when flows ranged, on average, from about 150 cfs down to 90 cfs. That resulted in the majority of the stream flow passing over the check boards with minimal, or no flow in the fish ladders. Fluctuating water levels also often resulted in no flow in the ladders. Adult migration delay and stranding had been observed at the lower dam due to fish being attracted to flow passing over or through check boards and not finding, or being able to use the fish ladder. The facilities also restricted, and often eliminated upstream juvenile passage during the period check boards were in place (June 1 to October 31 on average). This was primarily due to excessive jump heights and limited flow in the ladders.

Project Location

The Davis Dams are located on the middle reaches of Catherine Creek in the Grande Ronde Valley. The lower dam is located at River Mile (RM) 34.4 and the upper dam is at RM 35. Catherine Creek at the project site is primarily a migration corridor but is also used by rearing juvenile steelhead and Chinook over the winter.

The legal descriptions are: Upper Davis Dam T4S, R39E, Sec. 3, SE ¼ of the SW ¼, and Lower Davis Dam T4S, R39E, Sec. 3, SW ¼ of the NW ¼.

Project Description

Pre-project planning and design work was coordinated by the Grande Ronde Model Watershed (GRMW) and involved multiple agencies and individuals. These included NOAA fisheries (biologists and fish passage engineer), the ODFW (biologists and fish passage engineer), U.S. Fish and Wildlife Service (biologists), the Oregon Water Resources Department (Watermaster), the irrigators and Anderson Perry & Associates (design engineers).

Pre-project planning began in late-2007 after damage to the diversion boards resulted in flow bypassing through the diversion at the lower dam and drying up the fish ladder for an extended period during the latter part of the adult Chinook migration. Migration of about 20 adults was

delayed for about 10 days. From 2008 through 2010 the planning team met frequently to consider and develop alternatives, and refine the designs.

Project Objectives were:

- Provide continuous and unobstructed adult Chinook passage through both dam sites, during the irrigation water withdrawal period, by designing and constructing fish ladders that meet NOAA and ODFW fish passage criteria.
- Provide juvenile fish passage through both dam sites, during the irrigation water withdrawal period, when flow is available for the ladders.
- Eliminate false attraction flows for adult Chinook at both dam sites by installing diversion facilities that direct all available flow through fish ladders.
- Improve all salmonid and native fish passage over concrete aprons outside of the irrigation withdrawal period.
- Facilitate juvenile fish passage back to the stream from the ditch inlets by upgrading culvert at ditch entrances.
- Promote continuous adult and juvenile passage, as much as practical, by designing and constructing facilities that require minimal operational adjustments and monitoring (vertical-slot fish ladders and remote/continuous flow monitoring).
- Reduce scour and excessive erosion that is occurring below each diversion.

The GRMW accomplished the following planning, design and implementation activities:

- Contracted with Anderson Perry & Associates to do site surveys and prepare engineering designs.
- Prepared a Project Proposal for BPA funding which was reviewed by the GRMW Technical Committee and approved by the GRMW Board of Directors
- Coordinated and completed ESA consultation
- Completed Cultural Resource Section 106 consultation with Oregon State Historic Preservation Office, the Confederated Tribes of the Umatilla Indian Reservation and the Nez Perce Tribe.
- Coordinated and obtained fish passage design approval from NOAA Fisheries and the Oregon Department of Fish and Wildlife (ODFW).
- Contracted with Anderson Perry & Associates to conduct construction engineering inspections.
- Conducted fish salvage operations.
- Coordinated construction activities with the landowners.

<u>Project Design</u>

The preferred alternative, developed by the planning team, in consultation with the irrigators, was to completely reconstruct both diversion structures and install vertical-slot fish ladders at each site. The selected diversion apparatus was a channel-spanning radial gate that could be lowered and raised as needed to divert water into ditches or pool water for the operation of irrigation pumps. The gates would be totally raised outside the irrigation season allowing free flow through the structures. The design included a bypass channel with a multi-leaf control gate, adjacent to the radial gate that would be operated to maintain pool elevation and maximum flow through the vertical-slot ladders. The radial gates and multi-leaf gates are operated with electric motors.

The vertical-slot fish ladders were a standard design used in applications where flow levels frequently fluctuate. There were a few modifications to the basic design such as two inlets to the ladder to facilitate fish entering the ladder at various flow levels coming through the bypass channel. The ladder at the upper dam has 11 pools and at the lower dam 12 pools. The ladders were designed to meet the 6 inch drop passage criteria and operate at flow levels ranging from a low of one cubic foot per second (cfs) for juvenile fish and four cfs for adults, up to 20 cfs (maximum capacity). Safety equipment included escape rungs in each pool, handrails around the ladders and aluminum grating to provide access the slots between pools for the placement of check boards.

Completed Construction Activities

The standard in-water work window for this reach of Catherine Creek is July 1 to October 15. A modified work window of July 15 to September 30 was negotiated with NOAA Fisheries, U.S. Fish and Wildlife and ODFW to reduce potential impacts to the tail end of the adult Chinook migration and the beginning of the fall juvenile outmigration. The construction contract was advertised and awarded to Mike Becker General Contracting in February, 2011. Exceptionally high water in the spring and early summer delayed the start of construction to August 15. The GRMW requested and received an in-water work extension to October 31. All in-water work was completed by October 24. The majority of the construction work outside of the ordinary high water elevation was completed December 28, 2011. Additional testing of the electrical components, concrete grouting and gate seal adjustments continued periodically through April 2012.

The following construction activities were completed at both the upper and lower dam sites:

- Constructed flow bypass channels lined with fabric to divert stream flow around the construction areas. Bypass channels facilitated both upstream and downstream fish passage during the construction period.
- Installed steel A-frame, plywood and plastic fabric coffer dams, one above each site and one below the upper site.
- Conducted demolition and disposal of the pre-existing fish ladders and much of old diversion structures. The walls on the west side of each structure and floors were maintained and became part of the new structures.
- Formed and poured structural components of the diversion structure, radial gate supports and flow bypass channel.
- Formed and poured the vertical-slot fish ladders.
- Installed grating, handrails and escape rungs on the fish ladders.
- Installed the radial and multi-leaf gates.
- Installed electrical components.
- Installed real-time, remote access flow gauges in each of the fish ladders.
- Installed large stream simulation and grade stabilization rock below each structure.
- Installed one large rock vane below each structure.
- Installed larger culverts and headgates to two irrigation ditches, one on the east side of the lower dam and one on the west side of the upper dam. Larger culverts were necessary to reduce water velocity to the ditches enabling juvenile fish to return to the stream.
- Completed site restoration including seeding with native grasses, willow staking and coconut fiber matting installation.

GRMW, ODFW and CTUIR staff and others conducted two fish salvage operations. The first was done on August 19 below the upper dam using an electro-shocker and nets. Thirteen juvenile Chinook and three juvenile steelhead were salvaged, placed in an aerated tank and transported to a release site just above Union. The second salvage was done on August 23 below the lower dam using the same procedures. Twenty seven juvenile Chinook were salvaged with one mortality.

Construction Challenges & Changes

Considering the scale of this project construction went relatively well. Abnormally high stream flows, especially for the first three weeks of the construction period and then again for a time in October was the most problematic. The start of in-water work was delayed about a month and even then flow through the bypass channels damaged and tore out the fabric lining at the lower site requiring the contractor to install rock at the outlet of the channel to stabilize the grade and redirect the flow more downstream and away from the opposite streambank. The month delay extended the in-channel work three weeks beyond the planned completion date and pushed the completion of the out-of-channel work to the end of December. Major construction issues were avoided due to an unseasonably warm winter.

Unexpected high flows following heavy rains the night of October 5 overtopped the cofferdam above the lower site causing it to fail. No one actually was on site when it failed but most likely a heavy surge of water went down Catherine Creek. The cofferdam was rebuilt in a few days using rock but it delayed work in an already tight construction schedule.

There were a few construction/design issues. One was with the existing floor of the upper diversion. A notch had to be cut out to install a steel plate to seal the bottom of the radial gate. When the notch was cut it was discovered that the slab was about half as thick as thought. This required consultations with the engineers, some redesign and some additional concrete reinforcement under the slab. Testing of the radial gates and electronics revealed that the motors operating the radial gates were undersized and that the gearing did not allow the hand operation of the gates. It was decided that the motors and gearing would be replaced at the end of the 2012 irrigation season.

In late May, 2012 GRMW staff, Anderson Perry personnel and the irrigators met on site to review operational procedures and begin operation of the facilities for the 2012 irrigation season. The radial gates were lowered and operated well, completely sealing off any bypass flow. The multi-leaf gates did not operate as designed, binding up in the partially raised position. It was thought that sediment and debris was causing the problem resulting in the gates getting out of alignment. The gates could be raised and lowered with the hand cranks. It was decided to continue to operate the gates through the 2012 irrigation season by hand and further diagnose the problem and make the necessary repairs at the end of the irrigation season.

In early November, 2012 a representative from the gate manufacturer (Rodney Hunt), GRMW staff, Anderson Perry staff and the construction contractor met on-site to make the necessary modifications of the radial gate motors, electronics and gearing, and to resolve the problems with the multi-leaf gates. The radial gate motors were replaced and modifications made to the electric control systems to accommodate the larger motors. The gears were replaced to allow hand crank operation. The multi-leaf gates were removed. The problem was determined to be a design fault with the seals allowing debris and sediment to get between and gates and no way for it to flush out. The contractor, Anderson Perry staff and Rodney Hunt representatives worked out a design

to modify the seals to reduce the amount of sediment that could get between the gates and also allow for sediment to be flushed out the bottom. The construction contractor ordered new seals, modified the gates and reinstalled both multi-leaf gates.

Operation and Maintenance

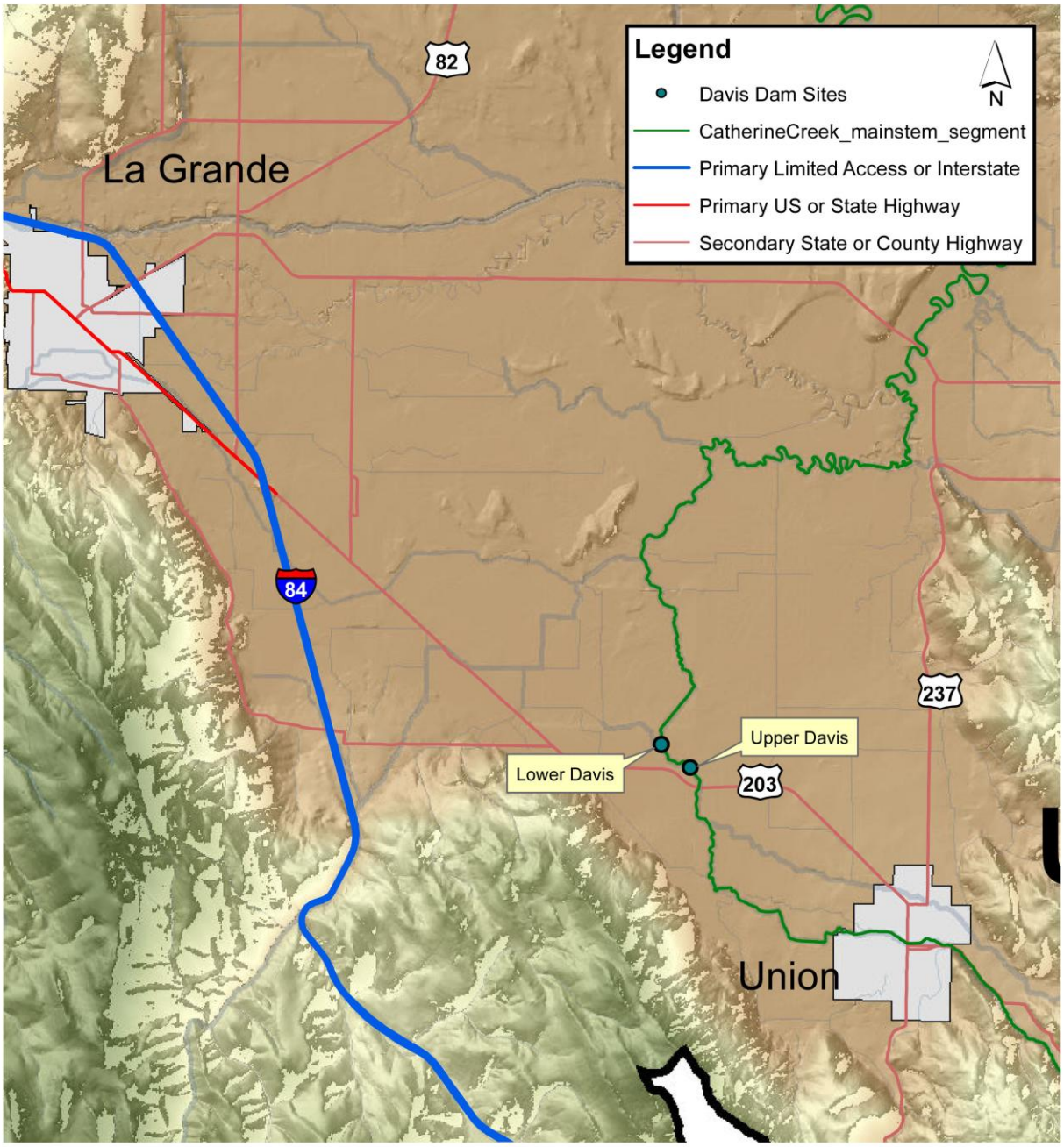
The GRMW in cooperation with ODFW and with review by NOAA Fisheries and USFWS developed a Memorandum of Understanding (MOU) between GRMW and the Davis Dam Irrigators as part of the Biological Assessment. The MOU was signed by all parties. The MOU specifies how the facilities will be operated and who will operate which components, e.g. radial gates, bypasss and fish ladders. The MOU also defines maintenance responsibilities, lines of communication and access protocols. The MOU is included at the end of this report.

2012 Operation

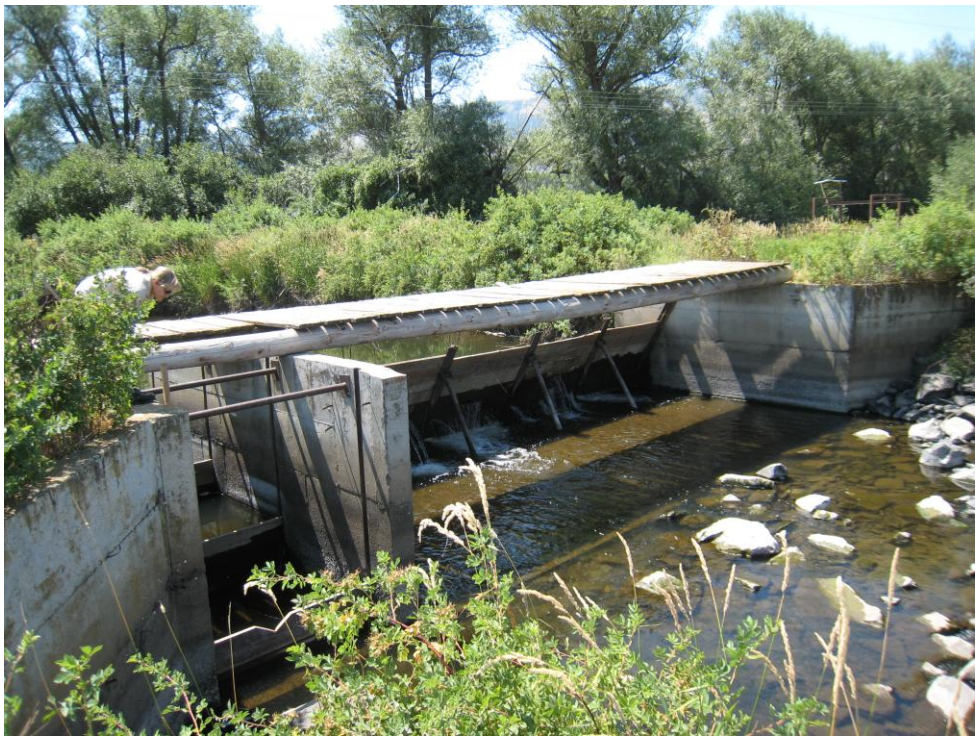
The facilities were successfully operated through the 2012 irrigation season, even with the problems with the radial gate motors and multi-leaf gates. The irrigators and GRMW staff made periodic adjustments to the multi-leaf gates to maintain full pools for irrigation water withdrawal as well as maintain flow in the vertical-slot fish ladders. The ODFW fish screen maintenance crew makes 2-3 visits weekly to ditch fish screens on Catherine Creek. During these visits they made adjustments to the fish ladders by adding check boards as flow dropped throughout the summer. At the beginning of the summer the flow gauges operated properly but in early July they began giving false readings. This problem continued periodically through the rest of the summer. The cause appears to be a software problem and will be diagnosed and corrected if it continues in the 2013 irrigation season.

Davis Dams Fish Passage					
Project Budget BPA Funds					
Activity Description		Unit	Unit Price	Quantity	Total Price
General Costs					
Mobilization		LS	$84,938	1	$84,938
Project Safety/Quality Control		LS	$22,300	1	$22,300
Job photos		EA	$10	40	$400
	Subtotal				$107,638
Upper Davis Dam Improvements					
Demolition		LS	$7,000	1	$7,000
Excavation/Backfill		LS	$23,400	1	$23,400
Vertical Slot Fish Ladder		LS	$226,400	1	$226,400
Radal Gate		LS	$257,800	1	$257,800
Multi-Leaf Gate		LS	$45,500	1	$45,500
Slide Gate		LS	$11,800	1	$11,800
Main Channel & Bypass Channel Concrete		LS	$25,200	1	$25,200
Walkway & Grating		LS	$77,400	1	$77,400
Electrical and Controls		LS	$37,500	1	$37,500
Culvert Replacement (irrigation ditches)		LS	$6,400	1	$6,400
Cross Vane		LS	$11,500	1	$11,500
Streambed Simulation Material		LS	$13,300	1	$13,300
Erosion Control		LS	$4,000	1	$4,000
Water Control/Work Area Isolation		LS	$58,000	1	$58,000
Surface Restoration/Seeding		LS	$1,500	1	$1,500
	Subtotal				$806,700
Lower Davis Dam Improvements					
Demolition		LS	$7,000	1	$7,000
Excavation/Backfill		LS	$24,200	1	$24,200
Vertical Slot Fish Ladder		LS	$243,800	1	$243,800
Radal Gate		LS	$257,800	1	$257,800
Multi-Leaf Gate		LS	$45,500	1	$45,500
Slide Gate		LS	$11,800	1	$11,800
Main Channel & Bypass Channel Concrete		LS	$25,200	1	$25,200
Walkway & Grating		LS	$77,500	1	$77,500
Electrical and Controls		LS	$37,500	1	$37,500
Culvert Replacement (irrigation ditches)		LS	$6,600	1	$6,600
Cross Vane		LS	$12,800	1	$12,800
Streambed Simulation Material		LS	$14,700	1	$14,700
Erosion Control		LS	$3,600	1	$3,600
Water Control/Work Area Isolation		LS	$49,000	1	$49,000
Surface Restoration/Seeding		LS	$1,500	1	$1,500
Streambank Stabilization		LS	$5,500	1	$5,500
	Subtotal				$824,000
Engineering Inspection		Mo.	$14,000	5	$70,000
	TOTAL				$1,808,338

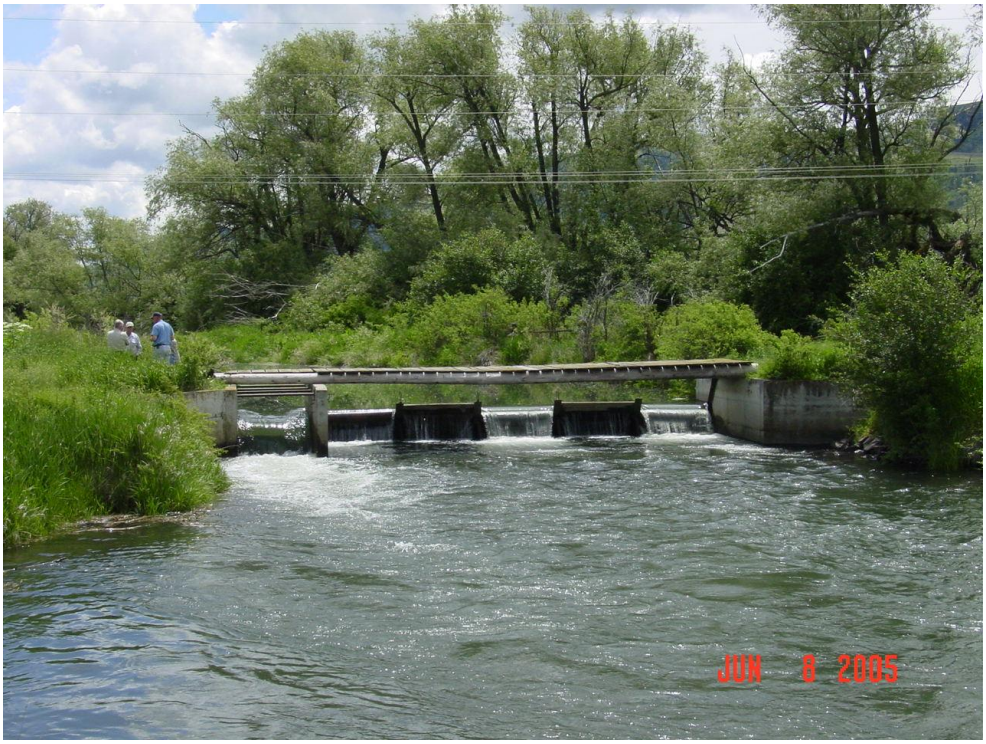
Catherine Creek Davis Dams Fish Passage
Vicinity Map



Upper Davis Dam Pre-Construction

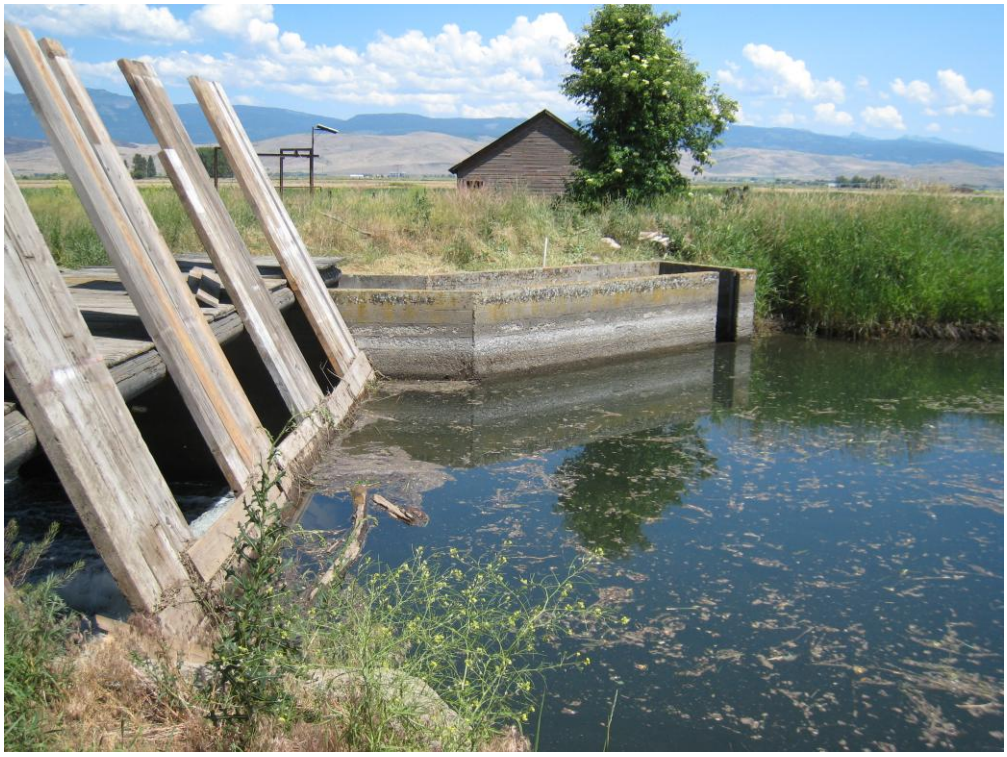


Low flow July 22, 2009. Note leakage through check boards and no flow in the fish ladder.

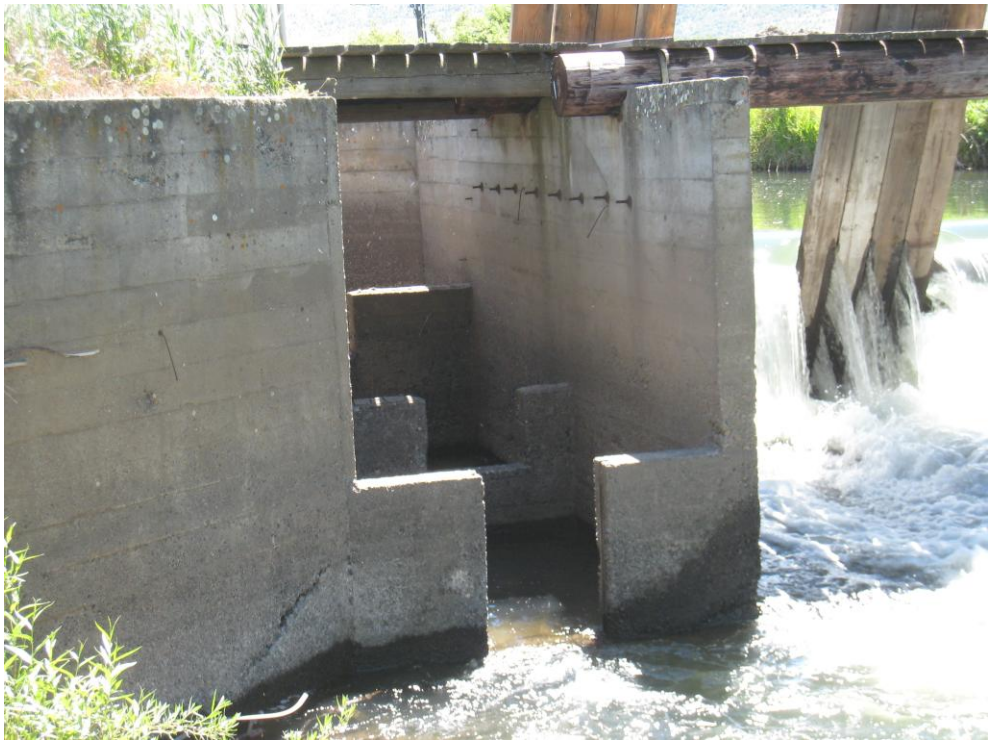


High flows with check boards installed. Although not meeting fish passage criteria, at this flow adult Chinook could pass the structure. Juveniles likely could not pass. This flow level was normally only maintained for a relatively short period after the check boards were installed.

Moderate flow June 30, 2009. Even at moderate flows the step-pool ladder was not functioning.



Low flow July 10, 2009. Water is leaking through check boards and fish ladder is not functioning.



June 30, 2009. Inlet to fish ladder. Even at moderately high flows the fish ladder often had very little flow to attract migrating adults

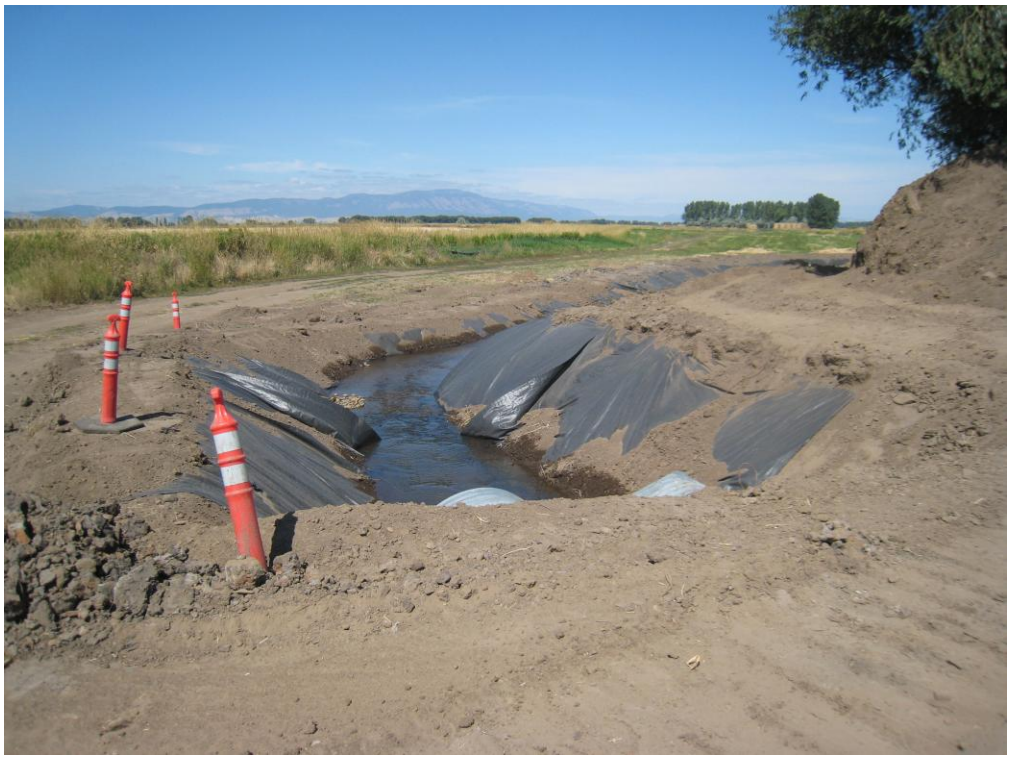
July 10, 2009. Somewhat lower streamflow than above. False attractant flow is coming through check boards with very little flow in the ladder

Upper Davis Dam Construction

The entire construction site was dewatered. Concrete forming and rebar installation is in progress for the fish ladder. Rock in foreground will be used for the rock vane about 50 feet below the structure.

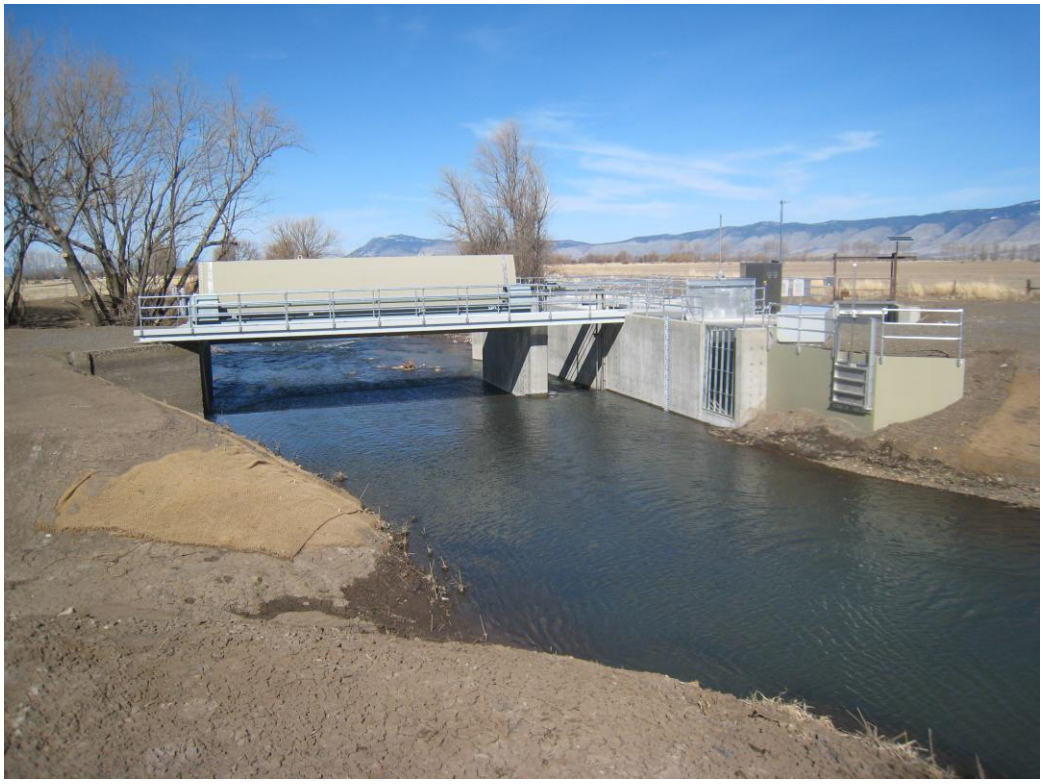
Cofferdam above the construction site diverted streamflow around the site. The left wall and slab from the original structure was incorporated into the new structure.

Forming for the vertical-slot fish ladder. The old ladder was completely removed. The floor and the left wall of the old structure was retained. All construction work occurred in a dry channel.

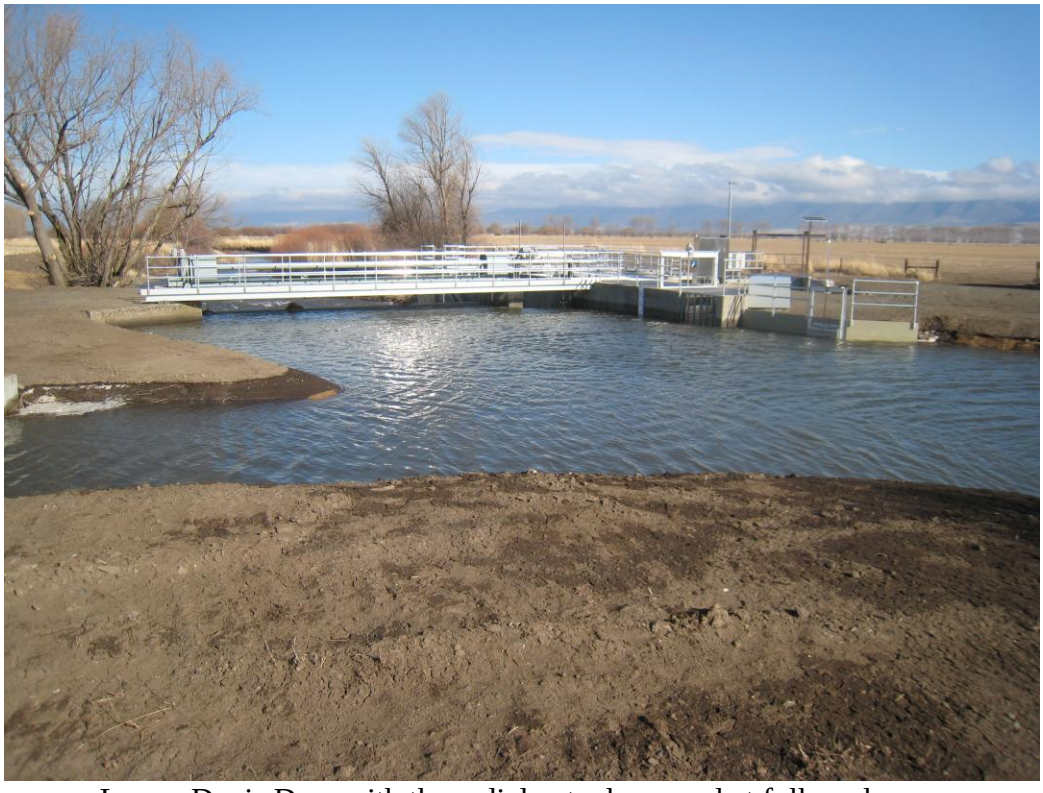


Flow bypasses were constructed around each construction site to dewater work areas.

Post Construction

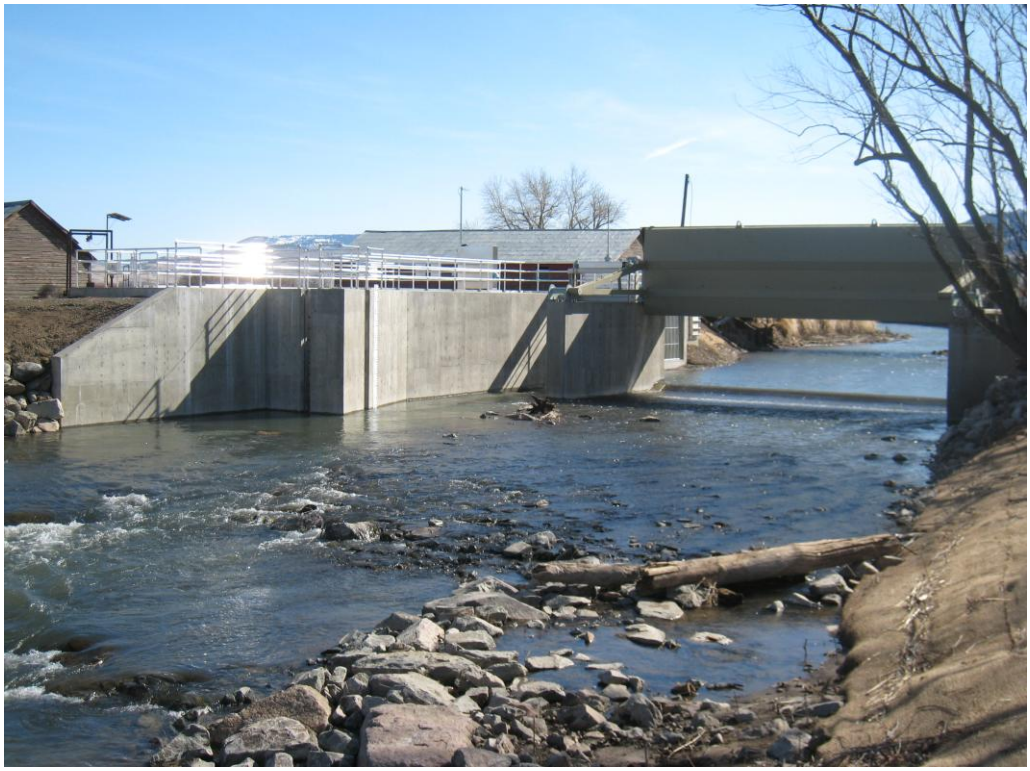


Lower Davis Dam with the radial gate in the up position. Multi-leaf gate in the flow bypass (right side of radial gate) is down in the open position. Fish ladder outlet is to the right of the flow bypass and the irrigation ditch entrance is to the far right.



Lower Davis Dam with the radial gate down and at full pool.

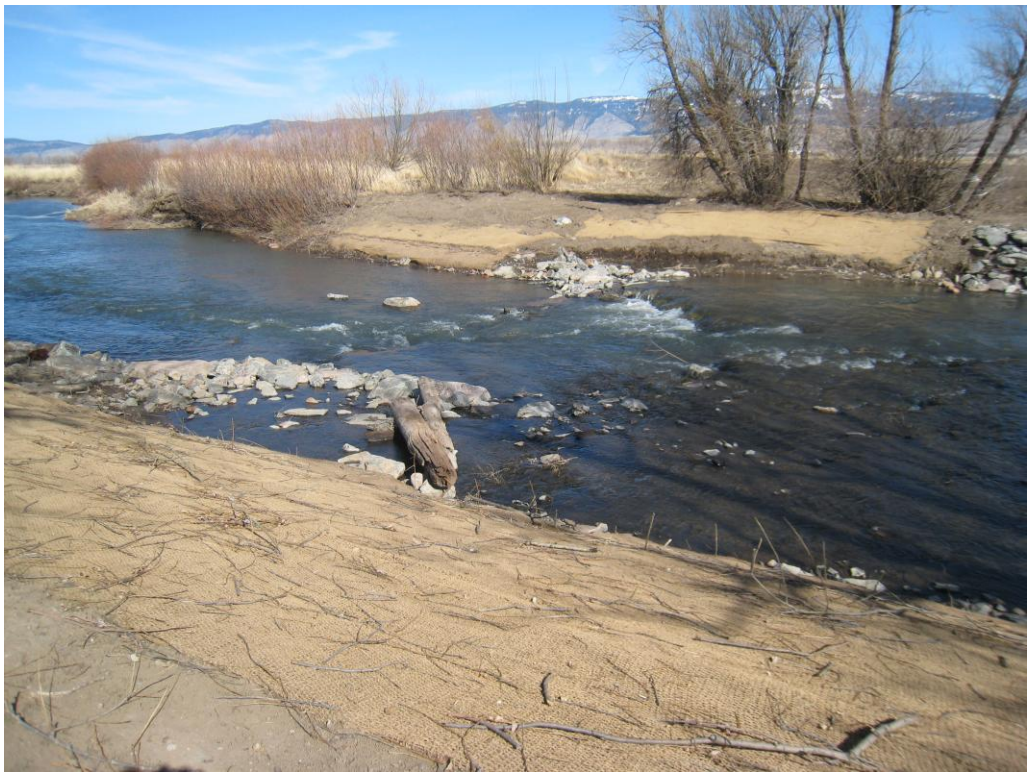
Post Construction



Lower Davis Dam with the radial gate in the up position as it will be outside the irrigation season. Note the fish ladder has two entrances, the one facing downstream will be open when the bypass is running nearly full. The one facing the stream will be used at low flows.

The main electric panel controls the motors for the radial and multi-leaf gates. The fish ladder has guard rails and partial coverage with aluminum grating.

Post Construction



Rock vortex weirs were installed below each structure to center the stream flow and stabilize the streambed

MEMORANDUM OF UNDERSTANDING

between

Grande Ronde Model Watershed

and

Davis Dams Irrigators (Cooperators)

for

Operation of Upper and Lower Davis Dams Irrigation and Fish Passage Facilities

This serves as the agreement between the Grande Ronde Model Watershed and Davis Dams Irrigators(Cooperators), in consideration of the mutual covenants contained herein**.**

Purpose: To formalize GRMW's and Cooperators' agreement to jointly operate and maintain newly constructed irrigation and fish passage facilities at Upper and Lower Davis Dams (Davis Dams) along Catherine Creek in Union County, Oregon. The facilities at each site consist of a concrete irrigation diversion structure with a radial gate, a flow by-pass channel and a fishway (vertical-slot fish ladder).

Effective Date and Duration: The effective start date of this Agreement is the date reconstruction of Davis Dams facilities are completed and will only terminate as provided for in this Agreement.

Statement of Work: The parties agree to share responsibilities for routine operations and maintenance of the Davis Dams irrigation and fish passage facilities as outlined in Exhibit A.

Consideration: GRMW does not agree to pay the Cooperators any costs regarding their responsibilities under this agreement. GRMW is not responsible for any related project liabilities resulting during and after completion of the work required by this Agreement.

Amendments: The terms of this Agreement may not be waived, altered, modified, supplemented, or amended except by written instrument signed by both parties. No amendment is effective or binding on either party until signed by both parties to this Agreement and all required state approvals have been obtained.

GRMW's Right to Terminate for Cause: GRMW may terminate this Agreement, in whole or in part, immediately upon notice to the Cooperators, or at such later date as party may establish in such notice, upon the occurrence of the following events:

- Federal funding (i.e. Bonneville Power Administration received by the GRMW is insufficient to meet the requirements outlined in this Agreement.

Cooperators' Right to Terminate for Cause: The Cooperators may terminate this Agreement upon 30 days' notice to GRMW if GRMW fails to fulfill the terms of this Agreement and GRMW fails to cure within 30 business days after receipt of Cooperators's notice, or such longer period of cure as Cooperators may specify in such notice.

If Termination is invoked: Neither party shall incur any new obligations for the terminated portion of the Agreement after termination.

Disputes: Both parties will try to resolve all Agreement issues by mutual consent without litigation. In appropriate circumstances, before issuance of the Agency's decision on a claim, the Agency will initiate informal discussions between the parties, facilitated by individuals who have not participated substantially in the matter in dispute, to aid in resolving the differences. If the informal discussions are not successful, both parties will use mediation to resolve the dispute.

Indemnity: The Cooperators and GRMW are responsible to the extent permitted by the Oregon Tort Claims Act (ORS 30.260 – 30.300) and Article XI, section 7 of the Oregon Constitution only for the acts, omissions, or negligence of their own officers, employees, or agents.

Captions: The captions and headings in this Agreement are for convenience only and in no way define, limit or describe the scope or intent of any provisions of this Agreement.

Compliance with Applicable Law: Cooperators will comply with all federal, state and local laws, regulations, executive orders and ordinances applicable to the Work under this Agreement.

Force Majeure: Neither the GRMW nor the Cooperators shall be responsible for any breach or for any delay in the performance of any obligation under this Agreement caused by fire, riot, acts of God, terrorism, war, or any other cause which is beyond the breaching party's reasonable control.

Participation in Similar Activities: This instrument in no way restricts GRMW or Cooperators from participating in similar activities with other public or private agencies, organizations, and individuals.

Endorsement: Any GRMW contributions made under this instrument do not by direct reference or implication convey Cooperators endorsement of the GRMW's products or activities.

Merger Clause; Waiver: This Agreement constitutes the entire agreement between the parties on the subject matter hereof. There are no understandings, agreements, or representations, oral or written, not specified herein regarding this Agreement. No waiver, consent, modification, or change of terms of this Agreement will bind either party unless placed in writing and signed by both parties and all necessary approvals have been obtained. Such waiver, consent, modification or change, if made, is effective only in the specific instance and for the specific purpose given.

Ownership: Upon completion of construction, all facilities become the property of the Cooperators.

Catastrophic Damage: In the event of major damage to the facilities as a result of an outside force, such as but not limited to flooding, or failure of structural or mechanical components, the GRMW will pursue funding to repair the facilities to per-damage condition.

Authorized Representatives: By signature below, the GRMW and Cooperators certify the individuals listed in this document as representatives of the GRMW and Cooperators are authorized to act in their respective areas for matters related to this Agreement.

BY EXECUTION OF THIS AGREEMENT, ALL PARTIES ACKNOWLEDGE THAT THEY HAVE READ THIS AGREEMENT, UNDERSTAND IT AND AGREE TO BE BOUND BY ITS TERMS AND CONDITIONS.

Approved by the GRMW**:**

_____ _____
Signature Date

Name Jeff Oveson
Title Executive Director

Approved by Cooperator**:**

_____ _____
Signature Date

Name Sherman Hawkins
Title Irrigator (Upper and Lower Davis Dam)

Approved by Cooperator**:**

_____ _____
Signature Date

Name Oregon Department of Fish and Wildlife
Title Irrigator (Lower Davis Dam)

Approved by Cooperator**:**

_____ _____
Signature Date

Name Gary Kohler
Title Irrigator (Upper Davis Dam)

Approved by Cooperator**:**

_____ _____
Signature Date

Name Byron Rovey
Title Irrigator (Upper Davis Dam)

Approved by Cooperator**:**

_____ _____
Signature Date

Name Sam Baker
Title Irrigator (Upper Davis Dam)

Approved by Cooperator**:**

_____ _____
Signature Date

Name Allen Chapman
Title Irrigator (Upper Davis Dam)

Note: The GRMW has a signed copy of the MOU on file.

CONTACT INFORMATION

GRANDE RONDE MODEL WATERSHED:

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	La Grande OR 97850
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E-mail:	None

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E-mail:	eaglecarriage@eoni.com

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	Woodburn OR 97071
Telephone:	(503) 634-2516
E-mail:	None

EXHIBIT A

STATEMENT OF WORK

Operation of Upper and Lower Davis Dams Irrigation and Fish Passage Facilities
Catherine Creek, Union County, Oregon

GRMW, or a designated representative selected by GRMW, and agreed to by the Cooperators will:

1. Operate the fishways at the Upper and Lower Davis Dams as described in the Operating Guidelines (Exhibit B).
2. Share responsibility for providing routine maintenance of the facilities with Cooperators in a manner consistent with Operating Guidelines (Exhibit B).
3. Advise the Cooperators regarding the operations of the radial gates and flow by-passes in order that these facilities are operated in a manner favorable to the passage of fish past the Davis Dams.
4. Be responsible for maintenance and repairs of the fishway as long as federal funding (i.e. Bonneville Power Administration, National Marine Fisheries Service Mitchell Act, etc) is available.

Cooperators will:

1. Provide the GRMW and designated representative legal access to both Upper and Lower Davis Dam sites for the purpose of operating and maintaining the fishways in accordance with Operating Guidelines (Exhibit B).
2. Share responsibility for providing routine maintenance of the facilities with the GRMW and designated representative in a manner consistent with Operating Guidelines (Exhibit B).
3. Operate the radial gates and flow by-pass in a manner consistent with Operating Guidelines (Exhibit B).
4. Be responsible for routine maintenance and repairs of the radial gate and flow bypass.
5. Provide a minimum flow At Lower Davis Dam of 1 cubic-feet-per-second (cfs) through the fishway as measured by 3 inches water depth through the vertical slots fishway when the radial gate is down and Oregon Water Resources Department is not regulating water withdrawals on Catherine Creek.

EXHIBIT B

OPERATING GUIDELINES

Operation of Upper and Lower Davis Dams Irrigation and Fish Passage Facilities
Catherine Creek, Union County, Oregon

General Operation of the Facilities at Upper and Lower Davis Dams

1. Radial gates and flow by-passes will be fully open when water is not being legally appropriated.
2. During the March 1 through October 31 irrigation season the intent at both sites is to optimize fish passage by maintaining maximum flow of available water passing through the fishways.
3. During the March 1 through October 31 irrigation season flow excess to the capacity of the fish ladder and irrigation withdrawals will be passed through the flow bypasses.

Operation of the Radial Gates at Upper and Lower Davis Dams

1. Cooperators maintain the sole authority for operation and routine maintenance of the radial gates.
2. The radial gates will be maintained fully in the upright position when water is not legally being appropriated.
3. Under normal conditions the lower radial gate will be closed before the upper radial gate.
4. Period of Operation – The radial gates may be lowered to the down position to enable water rights holders to legally appropriate/divert water. Radial gates normally will not be closed at flows greater than 250 cfs as measured on the staff gauge at the lower dam site (1.5 - 2.0 feet stage). The intent is that the gates would be lowered only when necessary to increase the water surface elevation for water rights holders to divert irrigation and stock water legally available to them.
5. The radial gate shall be operated either fully open or completely closed.
6. When the radial gate is down, the flow by-pass and fishway shall be operated in a manner to prevent spill over the top of the radial gate. If the flow by-pass and fishway are fully open and water is still spilling over the radial gate, GRMW or designated representative and Cooperators shall consult to jointly determine the best course of action to prevent spill over the radial gate and false attraction of fish to the dam.
7. When the radial gate is raised, it shall be done in a manner so as to prevent sending a large surge of water downstream and to allow the pool above the dams to drop to river level over a two hour period. The flow by-pass will be fully opened and pool elevation above the dam substantially lowered before raising the radial gate.
8. The Cooperators shall manage the water surface elevation above the dams, when the gates are down, so that it does not drop below a level that maintains flow through the fish ladder.
9. Cooperators will record operational changes made to the facilities in log books established at each site.

Operation of the Flow By-passes at Upper and Lower Davis Dams

1. Cooperators have authority for operation and routine maintenance of the flow by-passes. GRMW or designated representative may adjust the flow by-passes to reduce or eliminate spill over the radial gates upon permission from Cooperators.
2. When the radial gates are fully open, the gates for the flow-bypasses shall be fully open.
3. When the radial gates are down, the gates for the flow by-passes shall be fully closed unless flows in Catherine Creek at the dams are in excess of what can be sent through the fishways, thereby causing spill over the radial gates.
4. When flows in Catherine Creek at the dam are in excess of what can be sent through the fishway, the flow by-pass shall be operated to prevent water from spilling over the radial gates, to the extent practicable.
5. When the radial gates are in the down position, and flow is available, the flow by-pass will be operated in manner to control water depth in the fishway at an optimal level (approximately 4 feet).
6. Both parties will record operational changes made to the facilities in log books established at each site.

Operation of the Fishways at Upper and Lower Davis Dams

1. GRMW or designated representative shall implement and/or authorize all operational adjustments to the fishways. Cooperators may adjust the fishways upon permission from GRMW or designated representative.
2. During the irrigation season, when the radial gates are closed, GRMW or designated representative and Cooperators shall maintain the fishways as necessary to ensure they are clear of obstructions.
3. When flows are available for the fishways, and the radial gates are in the down position, flow to the fishways shall not be shut-off without permission from GRMW or designated representative (e.g. for debris removal, emergency repair, check board adjustment). For debris removal or check board adjustment flow shut off will not be more than 2 hours. The GRMW or designated representative will conduct any emergency repairs requiring more than a 2 hour shut-off.
4. The fishways shall be operated in a manner such that irrigation withdrawals are not interrupted and are equal to pre-project levels. Both the GRMW or designated representative and Cooperators shall cooperate in accomplishing this end.
5. Flow monitoring equipment shall be operated and maintained by GRMW or designated representative in the fishway at the Lower Davis Dam so that GRMW or designated representative can remotely monitor flow in the fishway and respond to operational issues in a timely manner. This will allow GRMW or designated representative to effectively operate the fishway, while minimizing the number of visits to the site.
6. Both parties will record operational changes made to the facilities in log books established at each site.

Communication

The parties agree to effectively communicate in order that the needs of fish passage and irrigation water delivery are carried out in the best interest of the parties involved.

1. Cooperators shall notify GRMW or designated representative 48 hours in advance of when the radial gates are raised or lowered (except in emergency high flow events)
2. Cooperators shall notify GRMW or designated representative within 24 hours of when adjustments are made to the flow by-passes (except in emergency high flow events).
3. Cooperators shall make every effort to notify GRMW or designated representative 48 hours in advance of when adjustments are needed to the fishways in order to maintain irrigation water diversions.
4. GRMW or designated representative shall notify Cooperators within 24 hours of when adjustments are made to the fishway.
5. GRMW or designated representative shall notify Cooperators when operational changes to the radial gate or flow-by-pass are needed to meet fish passage needs.

Access to Upper and Lower Davis Dams

1. During the irrigation season (March 1 – October 31) GRMW or designated representative shall have free access to both sites in order to effectively operate and maintain the fish ladders. A log book will be established at each site in which GRMW or designated representative will record the purpose of the visit, date visited, and actions taken.
2. During the non-irrigation season (November 1 – February 28) GRMW or designated representative shall have access to the sites for the purpose of operations and maintenance, but shall notify Cooperators 12 hours in advance of the visit.