



# FISH PASSAGE CENTER

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## MEMORANDUM

TO: Salmon Managers  
Fishway Inspectors  
Rick Klinge, Douglas PUD  
Chuck Peven, Chelan PUD  
Chris Carlson, Grant PUD  
Cal Sprague, COE Portland District  
Rex Baxter, COE Walla Walla District

FROM: Larry Basham

DATE: October 8, 2001

RE: **Fishway Inspections – September 2001**

Overall, river flow remained well below normal for the month of September as the drought conditions continued throughout the Columbia River basin. Spill was stopped at Bonneville and The Dalles dams by September 1. Due to the tightened security at mainstem dams, I was unable to complete scheduled inspections at the four Snake River dams this month. In addition, Ice Harbor and Lower Monumental dams were not inspected during September due to scheduling of the inspections with the high security system now in place at the COE projects. The inspectors must be escorted during the inspections by the project biologist or designated person. This requires extra planning and time to work within schedules of other project personnel. **Fishway inspectors and other personnel must assure that they follow the specific rules that each project has in place to gain access to the fish facilities.**

Throughout the basin, presence of milfoil and other grasses caused problems on the exit trashracks, pump intakes, and diffuser gratings. This condition began abating after mid-September. With the higher air temperatures through most of September, water temperatures have been higher than normal through the month. Cooler air temperatures and some rain moved into the region on September 25 and temporarily reduced water temperatures; however, air temperatures warmed again through the end of the month.

**Bonneville Dam** –Ed Meyer completed an inspection of the adult and juvenile fish facilities at Bonneville Dam on September 7. River Q was 86.5 kcfs with no spill occurring. Five of 8 main turbine units and both fish turbines were operating at the WA shore. No turbine units were operating at the old powerhouse. The turbidity of the water was 6.7-ft and the water temperature 67°F. As part of the FPP criteria, spillbays 1 and 18 were open 0.3 ft to provide attraction flows to the Cascades Island and B-Branch fishway entrances.

**Powerhouse I** – The main entrances to the powerhouse collection channel were submerged 3.5 ft with 1.8 ft head and 4.9 ft with 1.3 ft head at respective Gates 2 and 64 using the PLC readings. The readable staff gages on the north end of the powerhouse gave a channel to tailwater head differential reading of 1.7 ft. The velocity in the powerhouse collection channel was reported at 2.2 fps at the south end of the channel. The five sluice

gates were closed during the September inspection. The depth of water over the main Bradford fish ladder weirs was 1.0 ft, with 1.1 ft measured at the A-Branch and 1.0 ft at the B-Branch fish ladder. The exit from the ladder was rated satisfactory. **The picketed lead sections at the counting station had estimated head loss of 4-5 inches and required cleaning. This same problem existed during the August inspection.**

**B-Branch** - The computer system was again not operating so visual readings were taken from the staff gages. Head differential was estimated at 1.6 ft during the inspection; the tailwater was assumed at 7.6 ft. Both downstream entrances were open with the north side entrance open as required. Entrance requirements were met during the September inspection at the B-Branch Fishway. **Note that an alternate diffuser was in service to replace the malfunctioning diffuser.**

**Cascades Island** - The Cascades Island fishway entrance is similar in design to the B-Branch. Both downstream entrances were operating with a head differential of 1.6 ft using the channel staff gage and assuming a tailwater elevation of 7.6 ft. The depth of water over the ladder weirs was 1.1 ft. The computer system remained out of service, similar to the B-Branch Fishway. Entrance requirements were met during the September inspection at Cascades Island Fishway.

**WA shore fishway** –The new powerhouse adult collection system operates with two entrance gates located at each end of the powerhouse. Tailwater elevation permitting, the gates are operated 13 ft submerged below tailwater with the head differential between 1.0 and 2.0 ft.

The South Entrance gates were submerged about 6.8 ft with head differential at 0.9 ft (upstream) and 0.8 ft (downstream). The north shore entrance gates were submerged about 6.8 ft with the head differential ranging from 1.0 to 1.1 ft. Floating orifice gates along the channel were operating satisfactorily. The water velocity meter was out of service again during this inspection. The exit from the fish ladder was clear of debris, as were the serpentine pool sections located upstream from the fish counting station. The depth of water over the ladder weirs was 1.2 ft.

**Overall**, low tailwater elevations resulted in reduced gate depths at the OR and WA shore fishways. **The computer (PLC) system at the B-Branch and Cascades Island fish ladders should be fixed and operable as soon as possible; it has not been operational for most of this season.** Both downstream gates at the B-Branch and Cascades Island fishways were open and better passage conditions for adult fish should be occurring. **The Project should calibrate the ph staff gages and computer readout (new ph); they differ. The head differentials across gates SUE and SDE were again less than the minimum 1.0 ft.**

**Juvenile System** – Both juvenile bypass facilities were operating with all screens and orifices as required. The project was operating the low outfall based on tailwater elevation at the juvenile fish facility. **The orifice lenses were not clear enough in some cases to determine whether the orifice flow was smooth and the orifices not plugged with debris (continual problem).** The ice/trash sluiceway was operating at the old powerhouse.

**The Dalles Dam** – Doug Case, ODFW, completed an inspection of the fish facilities at The Dalles Dam on September 14. Project discharge was 89.7 kcfs with flow passing through 7 operating turbines. No spill was occurring during the inspection. Both fish turbines were operating at the OR fishway with a single fish turbine operating at the WA fishway. Water temperature was 69°F with a turbidity reading of 4.0 ft.

**Washington Shore** - Wasco PUD operates a single turbine unit that supplies water to the diffusion system and into the lower end of the fish ladder. Gate N-1 was submerged 9.0 ft below tailwater elevation with the head differential reading 1.3 ft using the Selsyns gage. The gate depth and head differential at Weir N-1 were operated within the proper criteria range. The PUD trash racks had 0.3 ft head differential. The depth of water reported over the fish ladder weirs was 1.0 ft.

**Oregon fishway** – About 4,780 cfs of water was directed to the auxiliary water supply system via the fish turbines. At the South Entrances, 1.0 ft of head was recorded with 8.0/9.3 ft depth using the Selsyns gage. The

Selsyns gage at the East Entrances gave a reading of 1.4 ft head differential and 11.9\11.6 ft gate depths for the inspection. At the West Entrances, the gate depths were about 8.05 ft average with the head differential about 1.1 ft. These readings were satisfactory. The electronic velocity meter reported a water velocity of 1.8 fps through the collection channel.

The exit from the fish ladder was clear of debris at the exit trash rack. **The East Ladder picket leads required cleaning;** the project inspectors need to clean these pickets on a frequent basis with all the grasses presently floating in the river. The depth of water over the fish ladder weirs was 1.1 ft.

The normal sluice gates, Gates 1-1, 1-2, and 1-3, were operating as required to improve juvenile fish passage conditions at the project. The North shore juvenile fish facility was operating satisfactorily in bypass mode.

**Overall, the COE should repair and assure functionality of their PLC system so that operation of the fishways can be calibrated as needed and their readings at the main entrances kept in proper criteria, etc. The East Entrance readings were 20-foot off from normal; the West and South entrances were close to calibration. Doug and Miro further assessed channel and tailwater elevations at the project using the Selsyns Gage and Electronic Sensor Probe.**

**John Day Dam** – Doug Case, ODFW, inspected the John Day adult fish facilities on September 14. Project Q was 92.2 kcfs during the inspection with 6 turbine units operating. Turbidity was 5.0 ft with the water temperature at 69°F. Two north shore (WA) and three south shore (OR) fish pumps were operating to supply flow to the fishways.

**OR fishway** – During the inspection, the South (OR shore) fishway entrance was operating with a gate depth at SE-1 of 8.4 ft on the gage and 8.5 ft at the panel. Head differential was 1.4 ft using the gage reading and 1.5 ft at the panel board. For this inspection, there was sufficient depth and head at the South Entrance. The two main entrances at the north powerhouse (NE-1 & NE-2) were submerged about 8.55 ft with 1.1 ft “head” using the gages and 8.3 ft submerged with 1.4 ft head differential using the panel reading. Water velocity recorded along the powerhouse collection channel averaged about 1.8 fps during the inspection. Ten floating orifice gates were operating satisfactorily along the powerhouse collection channel. The picketed lead section at the counting station and the exit from the fish ladder was clear of debris. The depth of water over the weirs was 1.0 ft.

**WA fishway** – One main entrance gate is operated at the WA shore fishway. The Gage and LED readings were within 0.2 ft so no calibration was required. The gate depth was 8.8 ft with the head differential reading 0.85 ft of average. Readings from the WA shore fish ladder were as follows: the picketed lead section at the counting station and the exit from the fish ladder was clear of debris. The depth of water over the fish ladder weirs was 1.0 ft.

**Overall, the fish facilities were operating close to criteria with exception of the North Shore Entrance Gate where the head differential fell below the minimum 1.0 ft.**

**Juvenile Fish Facility** – The Smolt Monitoring facility was operating during the September inspection. The JBS screen cleaners were operating in cycle mode in automatic operation.

**McNary Dam** – Larry Swenson, NMFS, completed an inspection of the fishways on September 25. Project Q was 104 kcfs with no spill and 10 turbine units operating. River temperature was 67°F with the turbidity reading 6.0 ft. A fishway status report was obtained prior to and after the inspection to compare on-site elevation readings with computer readings. Because of the heightened security at the project, no vehicles are allowed to drive across the powerhouse decks. This resulted in a lot of extra time to complete the inspection and only the status report taken after the inspection gave readings that could be used for calibration of the fishway controls if necessary.

**Oregon Fishway** – Three fish pumps were operating with pump angles recorded at 20° each. About 450 cfs flow from the juvenile bypass system was joining the auxiliary water at the north end of the powerhouse

collection channel. Gravity flow water from the forebay is also added in the lower end of the OR fish ladder. All auxiliary water systems were operating through the month.

The South Powerhouse and North Powerhouse entrance gates were submerged 9.3 to 9.7 ft below tailwater elevation, with the head differential ranging between 1.4 ft and 1.7 ft during the inspection. Both gate depth and head differential were found within proper criteria range at the powerhouse entrances. The orifice gates along the collection channel were operating satisfactorily. The velocity reported at the south end of the collection channel was about 0.8 fps, and at the northern end of the channel it was estimated at 2.8 fps. The depth of water over the fish ladder weirs was 1.0 ft. The exit from the fish ladder was reported with a small log jam on it while the picket leads at the fish counting facility were reported clear of debris.

**Washington Fishway** – The fish turbine operated by North Wasco PUD was supplying sufficient flow to the WA shore fishway entrances to meet criteria levels. Entrances WFE-2 and WFE-3 were operating with head differential of 1.6 ft and the gates submerged an average depth of 9.0 ft below tailwater elevation during the inspection. The exit from the fish ladder and the picket leads at the counting station were clear of debris. The depth of water over the fish ladder weirs was 0.9 ft, about 0.1 ft below the norm of 1.0 ft.

**Overall**, the adult fish passage facilities were operating within normal criteria at all main entrance gates on the September inspection. The computer printout was compared with the actual on site readings and no calibration appeared necessary; all readings were within 0.2 ft. **The velocity at the South end of the collection channel was less than criteria, only 0.8 ft reported on this inspection.** Larry Swenson noted that the project electricians were working on the controls for the tilting weirs located in the exit section of the fish ladder.

**Juvenile Fish Facility** – Debris in front of the project was termed as very light, i.e., only a small amount was floating and mainly centered at Unit 10B. The screens, orifices, and other juvenile fish facility equipment appeared to be operating satisfactorily; however, there was floating debris in Gatewell 6A as well as lots of weeds/grasses on the VBSs.

**Priest Rapids Dam** – Melissa Jundt, NMFS, completed an inspection of the adult fish facilities on September 27. Project discharge was 41.0 kcfs; 1.0 kcfs through spill and the remainder through 4 main turbine units. Water temperature was 64°F with the turbidity reading 11.9 ft. Fish pumps (tailwater) and gravity-flow water (forebay) discharge water to a large supply pool that distributes this water through diffusers that supply water in the junction pool area and near the main fishway entrances.

**Left Bank Fishway** – At each end of the powerhouse, a slotted entrance is open to attract adult fish into the fishway/channel that leads to the fish ladder. The orifice gates remain closed through the end of the season. Gate LSE-4 was recorded with 1.3 ft head differential and Gate LSE-2 with 1.6 ft head differential. Both gates were within criteria range of 1.0-2.0 ft; Gate LSE-2 met the target differential. Water velocity reported at the eastern end of the collection channel was 2.8 fps and was within the criteria range of 1.5 to 4.0 fps. The exit from the fish ladder was reported clear of debris. The depth of water recorded over the ladder weirs was 1.0 ft.

**Right Bank Fishway** – Slotted entrance (RSE-1) was operating with 1.0 ft of head differential at the time of inspection using the staff gages. The computer readout listed the reading at 1.3 ft. The head differential was reading between the acceptable criteria range of 1.0 and 2.0 ft. The fish ladder exit was reported clear of debris. The depth of water recorded over the fish ladder weirs was 1.0 ft.

**Overall**, the adult fish passage entrances were operating within criteria ranges (1.0 to 2.0 ft) but below target elevations at LSE-4 and RSE-1. The adult trap located on the Left Bank fish ladder near the ladder's exit was operating again. A problem was reported in early September relating to the safe operation and ability of the trap to function due to suspected increase in milfoil and other grasses blocking the entrance to the adult trap.

**Wanapum Dam** – Melissa Jundt, NMFS, completed an inspection of the fish facilities on September 27. Project discharge was 63.2 kcfs with 1.6 kcfs passing through spill and the remainder through 6 main turbine units. The spilled flow is used to pass juvenile fish or adult fallbacks at the project. The water temperature was reported 63°F with the turbidity reading same as at Priest Rapids Dam.

**Left Bank Fishway** – Two fish pumps operating at 135-rpm average, and gravity-fed water from the forebay of the project supply water to the adult fishways. The Main Entrance gates are slotted and rely on meeting head differential criteria of 1.0 to 2.0 ft (range) with the preferred target of 1.5 ft at the SE-2 and 1.25 ft at SE-3. During this inspection, the SE-2 Gate had 1.8 ft and the SE-3 Gate, 1.4 ft head differential. Both readings were within the proper range and exceeded the target differential as well. Orifice gates along the powerhouse collection channel remained closed. The water velocity was estimated at 2.3 fps. The exit from the fish ladder was reported with clear of debris. The depth of water recorded over the fish ladder weirs was at 1.2 ft.

**Right Bank Fishway** – Gravity-fed water from the forebay of the project supplies flow to the main entrance gate (REW-2). The head differential measured 1.5 ft and was within a criteria range of 1.0 to 2.0 ft. The exit from the fish ladder was clear of debris. Depth of water over the fish ladder weirs was 1.1 feet.

**Overall**, the fish facilities were operating within criteria at all points checked.

**Rock Island Dam** – Steve Gacek, WDFW, completed an inspection of the fish facilities on September 26. Project discharge was 52.2 kcfs with flow passing through 5 turbine units at the new powerhouse; no Units were operating at the old powerhouse. No spill for juvenile fish was occurring during this inspection. Turbidity was reported at 13.2 ft with the water temperature reading 65.7° F.

**Left Bank Fishway** – Water from the immediate forebay supplies flow through the diffusion system to the two downstream entrances. The criteria ranges for gate depth (6.0 ft minimum) and head differential (1-2 ft) are normally met under any river flow scenario. The gates were submerged 7.0 ft below tailwater with the  $\Delta H$  at 1.2 ft. The exit from the fish ladder and the picket lead section at the counting station were clear of debris. The depth of water over the ladder weirs was 1.1 ft.

**Middle Fishway** – Gravity-flow water from the forebay of the project is directed through the diffusion system to the downstream gate and the side entrance. The downstream gate was submerged 8.5 ft (criteria = 8.5 ft or >) with the  $\Delta H$  reported at 1.4 ft. The side entrance is fixed-open and depends on “head” only to be within criteria. The gate depth and head differential were found within criteria ranges on this inspection. The exit from the fish ladder and the picket lead section at the counting window was reported clear of debris during the inspection. The depth of water over the ladder weirs was 1.1 ft.

**Right Bank Fishway** – The gravity flow water (100% open) plus three fish pumps supply water to the Right Bank Fishway. The main entrances are fixed-open at 3-ft and require a minimum head differential of 1.0 ft to be within criteria. The RPEs were reported with 1.5 ft average “head”, 1.4 ft “head” at the LPE, and 1.3 ft at the TRE (downstream) entrance. The velocity in the left powerhouse collection channel was measured at 4.4 fps. The Attraction Water jet was operating at the Right Bank fishway. The exit from the fish ladder and the picket lead section at the counting station was clear of debris during the inspection. The depth of water recorded over the fish ladder weirs was 1.1 feet.

**Overall**, the adult fishway entrances were within acceptable criteria for the September inspection.

**Rocky Reach Dam** – The adult fish passage facilities were inspected by Steve Gacek, WDFW, on September 26. Project discharge was 72.5 kcfs with flow directed through 7 main turbine units. No spill was occurring during this inspection. Water temperature was 66.4°F with the turbidity reading 18.5 ft. Three fish pumps were operating at 47% wicket gate opening. The main spillway entrance remained closed.

**Fishway Entrances** -The left powerhouse entrance gates are operated to maintain a minimum gate depth of 10 feet or more, while the right powerhouse entrances are fixed-open at 3-ft. Two entrance gates were operating at the right powerhouse (RPE-1 and RPE-2) and two gates at the left powerhouse (LPE-1 and LPE-2). The LPEs were submerged 12.0 ft with a head differential of 1.4 ft; while the right powerhouse entrances had satisfactory “head” with 1.0 ft recorded. In the collection channel, there was an approximate 1.3 ft drop in elevation from the LPEs to the RPEs while the tailwater elevation dropped 0.9 ft resulting in the minimum 1.0 ft head differential at the RPEs. Velocity through the transportation channel was 1.7 fps. The exit from the fish ladder and picket lead section was clear of debris. The depth of water over the ladder weirs was 1.0 ft. Orifice gates operating along the collection channel were in slots 1, 2, 3, 14, 16, and 20.

**Overall, the fishway was operating at satisfactory criteria levels relating to gate depth and head differentials at the main entrance gates for the September inspection. The surface collector was in operation up to mid-month before being shut down. The pumps were shut down overnight to complete required closure procedures for the juvenile surface collector.**

**Wells Dam** – Stewart Mitchell, WDFW, completed an inspection of the adult fish facilities on September 28. Project discharge was 96 kcfs with 8 main turbine units operating. Spill for juvenile fish protection was shut down for the year. River temperature was 65.9°F. Readings from the control room are taken which includes the hydraulic data and turbine/spill operations that are occurring at the time of inspection. After that information is recorded, the inspector and an operator with a radio go to either the East or West entrance and record the staff gage, deck gage, and call the control room operator to obtain the computer readings for the channel and tailwater elevations. These readings should come within 0.2 ft on a normal inspection.

**East and West Fishways** – At the Wells project, both the east and west fishways are of similar design. Two fish pumps are located on each shore and supply attraction flow to the fishway entrances. The downstream gate normally operates at 8-ft open with head differential targeted for 1.5 ft at both fishway entrances.

At the **East** fishway, the channel and tailwater elevations were similar among the Control Room gages, the deck gages, and the staff gages. The head differential was 1.6 ft and was within normal criteria range. Depth of water over the ladder weirs was 1.1 ft. The east fish ladder reported a differential through the exit pool to the forebay of 1.0 ft. The normal head through that exit trash rack ranges from 0.5 ft to 0.8 ft so it was high and will likely require cleaning (**same as for the August inspection**).

At the **West** fishway, all measuring gages and computer readings were similar for channel elevation and for the tailwater elevation. The head differential measured was only 1.0 ft. The end gate had been reduced from 8.0 ft to 4-ft due to the as following. **Douglas PUD had coordinated with NMFS and WDFW regarding the problem that now exists at Wells Dam. There was approximately 2-ft head differential across the diffuser gratings (side) and to avert potential of blowing off the gratings, flow through the grating system was reduced until the problem could be further addressed by the project.** The depth of water over the fish ladder weirs was 1.1 ft. The exit from the west bank fish ladder was 0.6 ft.

**Overall, milfoil and grasses have caused the project to change normal operations of their fish passage facilities due to the build-up of these grasses on the diffuser gratings of the West fishway. This situation should be remedied to preclude damage to their screens, etc. Trapping was occurring from Monday through Wednesday from 0800 to 2000h on the West ladder.**

**Ice Harbor Dam** – Note: Unable to complete fishway inspections at IH and LWN due to high security situation and special timing to complete the inspections.

**Lower Monumental Dam** – See note above for IH.

**Little Goose Dam** – Josh Hanson, ODFW, inspected the adult fish facilities on September 21. Project discharge was 12.8 kcfs with flow through Unit 5. Water temperature was 68°F with a turbidity reading of 5.9 ft. Three turbine-driven pumps operating at 74-rpm average, and excess flow from the juvenile bypass system were supplying water to the adult fishway.

The South Shore fishway entrances, SSE-1 (on-sill) and SSE-2, were submerged about 9.8 ft average depth with the head differential at 1.7 ft using the staff gage reading, and 9.6 ft gate depth and 1.8 ft head differential using the FSC Board Reading. Channel velocity recorded at the south end of the channel registered about 0.9 fps, with the velocity up to 1.7 fps at the north shore channel. Orifice gates along the powerhouse collection channel remained closed for the 2001 adult migration season. North Powerhouse entrance NPE-1 was on sill with the gates submerged an average of 6.6 ft with the “head” at 1.6 ft using the FSC Board reading and 1.4 ft using the staff gage. The North Shore Entrances were submerged 6.0 ft deep (FSC Reading) with the “head” at 1.5 ft. The exit from the fish ladder and the picket lead section at the counting station appeared clear of debris. The depth of water over the ladder weirs was 1.2 ft.

**Overall, the velocity reported at the South end of the collection channel was 0.9 fps and was less than the 1.5 fps called for in the FPP. NPE-2 was operating at less depth than criterion level.**

**Lower Granite Dam** – Josh Hanson, ODFW, completed an inspection of the adult fish facilities on September 19. Project discharge was 15.2 kcfs with 1 of 6 main turbine units operating. Water temperature was 68.5°F (taken at the count station) with the turbidity reading at >5.0 ft. Two electric fish pumps (1 and 3) were supplying flow to the adult fishway entrances and powerhouse collection channel.

The South Shore entrances were submerged 7.75 ft average depth with  $\Delta H$  of 1.9 ft and 1.8 ft, respectively using the staff gage and the FSC Board readings. The North Powerhouse entrances were submerged an average of 5.35 ft with  $\Delta H$  of 1.4 ft using the staff gage and the FSC Board reading. The weirs were resting on sill at the NPEs so no further depth could be attained. The velocity in the powerhouse collection channel was about 0.9 fps at the south end of the powerhouse collection channel and 2.2 fps at the North Shore. Four orifice gates operate along the powerhouse collection channel [1, 4, 7 and 10]. At the North Shore, Gates NSE-1 and NSE-2 were submerged 5.6 ft below tailwater elevation with the head differential reading of 1.1 ft average (staff gage and FSC reading). The exit from the fish ladder was reported clear of debris as was the picket lead section at the counting station. The depth of water over the fish ladder weirs was 1.1 ft.

**Overall, the September inspection reported lower than desired gate depths with most entrance gates on sill or close; however, all head differentials were satisfactory. There remains no staff gage or other site gage to measure the North Shore Entrance (tailwater elevation). The velocity at the south end of the powerhouse collection channel was about 0.9 fps and falls below the 1.5 fps minimum criterion. The inspector was unable to see the NPE channel lights; they may be burned out.**