FISH PASSAGE CENTER

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MEMORANDUM

TO: Salmon Managers
Fishway Inspectors
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Chris Carlson, Grant PUD
Cal Sprague, COE Portland District
Rex Baxter, COE Walla Walla District

FROM: Larry Basham

DATE: October 7, 2002

RE: **Fishway Inspections – September 2002**

State and federal inspectors completed inspections at the lower and upper Columbia River and Snake River dams in September at all projects. Summer flows reduced throughout the month with no significant rainfall throughout the Columbia River basin in August and most of September. Water temperatures have been near normal at Snake River projects as well as the lower Columbia River. Adult fish passage has been fairly consistent for chinook salmon with a portion of the steelhead residing temporarily (usually days) in tributaries and cooler waters in July, August and part of September. Overall, most fish facilities were reported operating with few out of criteria problems during the month. The Snake River projects continued operation with entrance weirs on sill (due to low flows; hence low tailwater elevations) for most of the summer and into the fall. This operation requires entrance gates to be reduced at these projects. Problems as a result of pumps or fish turbines out of service have caused minimal out of criteria conditions so far this season.

Bonneville Dam – Ed Meyer, NMFS, completed an inspection of the adult and juvenile fish facilities on September 17. River Q was 120.9 kcfs with about 3.5 kcfs spill. For the season, the WA Powerhouse will be prioritized for turbine operations; however, due to high numbers of adult fish passing the WA shore fish ladder, a request was made via FPOM (Sep. mtg.) to operate 2 turbine units at the old powerhouse until numbers of adult fish declined significantly at the Project. Water turbidity was 5.5 ft with the water temperature at 65°F for the September inspection.

Powerhouse I – At the South end of the powerhouse collection channel Main entrance Gate 2 was submerged 7.6 ft with the head differential at 1.0 ft. Weir Gate 64, located on the North end of the powerhouse was submerged 8.4 ft with the head differential at 1.4 ft. The staff gage reading on the north end of the powerhouse

was unreadable for the tailwater elevation. The PLC reading was used. The water velocity in the north end of the powerhouse collection channel was reported at 1.3 fps with the south end meter recording 2.7 fps. The five sluice gates were operating satisfactorily during the inspection. The depth of water over the main Bradford fish ladder weirs was 1.1 ft, with 1.3 ft measured at the A-Branch and 1.2 ft at the B-Branch fish ladder for the September inspection. The exit from the ladder and the picketed lead section at the count station was clear of debris. The trash rack at FV 3-9 was reported with weeds across the racks.

B-Branch - The computer system was not operating during the September inspection and readings were taken from the staff gages. Head differential was reported at 1.6 ft, close to the target of 1.5 ft. The north and main downstream entrances were operating to attract adult fish to the B-Branch fish ladder.

Cascades Island - The Cascades Island fishway entrance is similar in design to the B-Branch. The computer system remained out of service, similar to the B-Branch Fishway. The downstream and south entrances were operating. Head differential was 1.6 ft during the inspection and fell within the criteria of 1.0 ft-2.0 ft. The depth of water over the ladder weirs was 1.1 ft.

WA shore fishway –Two small fish turbines supply about 5,000 cfs of water to four main entrance gates, two at each end of the powerhouse, and 12 floating orifice gates along the collection channel. Tailwater elevation permitting, the gates are operated 13 ft submerged below tailwater with the head differential between 1.0 and 2.0 feet and a targeted head of 1.5 feet.

The South Entrance gates were submerged 10.15 ft average with corresponding head differential of 0.9 ft at the upstream and downstream entrances. The north shore entrance gates were submerged about 10.6 ft average below tailwater with the head differential for the upstream and downstream entrance at 1.5 ft. The floating orifice gates along the channel were operating satisfactorily. The water velocity meter gave a reading of 0.5 fps. The exit from the fish ladder was clear of debris. The depth of water over the ladder weirs was 1.4 ft.

Overall, the computer (PLC) system at the B-Branch and Cascades Island fish ladders should be fixed and operable; it has not been operational for this season. The depth of water over the weirs at several ladders were higher than recommended, i.e., 1.2-1.4 ft rather than 1.0ft ±0.1 ft (normal criteria). Velocity of the water flowing through the New powerhouse and at the North end of the Old powerhouse was less than the required 1.5 fps. Staff gages required cleaning at the old powerhouse. Visual readings were impossible at some locations.

Juvenile System – The WA shore juvenile bypass facility was operating with all screens and orifices as required; Unit 17 was off-line. The project was operating the low outfall. The ice/trash sluiceway was operating at the old powerhouse. The flow in the old powerhouse is running south so all fish will be exiting through the ice/trash sluiceway till the end of the fish passage season.

The Dalles Dam – Doug Case, ODFW, completed an inspection of the fish facilities at The Dalles Dam on September 10. Project discharge was 116.7 kcfs with no spill. Two fish turbines were operating at the OR fishway with a single fish turbine operating at the WA fishway. Water temperature was 69°F with the turbidity reading at 6.0 ft**.**

Washington Shore - Wasco PUD operates a single turbine unit that supplies water to the diffusion system in the lower WA shore fish ladder and then through main entrance Gate, N-1 to the tailwater. Gate N-1 was submerged 9.2 ft below tailwater elevation with a head differential reading of 1.3 ft. The gate depth and head differential at Weir N-1 was operated within the proper criteria range for this September inspection. The PUD trash racks had 0.1 ft head differential. The depth of water reported over the fish ladder weirs was 1.0 ft. The picketed leads at the count station and the north ladder exit were reported mostly clear of debris; however, some sticks were on the upstream and downstream pickets at the count station.

Oregon fishway – About 4,460 cfs of water was directed to the auxiliary water supply system via the fish turbines. South Entrance Gate S-2 has a bulkhead in place about 8.0 ft deep and this gate is manually regulated to maintain the differential at this South Entrance. Gate S-1 was submerged 7.6 ft below tailwater elevation and the head differential was 1.2 ft. The project will repair these entrance gates during the winter maintenance period.

At the West Entrance, Gates W-1 and W-2 were submerged 8.8 ft average depth with the head differential at 1.0 ft using the Selsyns gages. The PLC gave a depth of 9.2 ft with 1.1 ft head differential. The electronic velocity meter has been out of service for the season; however, estimated water velocities for the inspection ranged from 1.5 fps to >2.0 fps through powerhouse transportation channel.

The East fishway entrance has two operating gates, E-2 and E-3. These gates were submerged 13.1 ft average depth with the head differential at 1.2 ft. These gates continue to pass a large quantity of attraction flow for the adult fish approaching the eastern end of the powerhouse. Gate depths and head differential fell within the desired criteria range for this September inspection.

The exit from the fish ladder was clear of debris with aquatic vegetation building up on the pickets creating 0.3 ft differential between the upstream and downstream pickets. The project cleans the pickets on a daily basis or as needed with the amount of vegetation in the fish ladder. Bob Cordie cleaned the pickets and the differential dropped to the normal 0.1 ft through the leads. The depth of water over the fish ladder weirs was 1.1 ft and this reading was satisfactory.

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

Overall, the COE should continue repair and assure functionality of their PLC system so that operation of the fishways can be calibrated. During the winter maintenance season, the project should assure that the South Gates are repaired and working prior to next season.

John Day Dam – Doug Case, ODFW, inspected the John Day adult and juvenile fish facilities on September 10. Project Q was 133.5 kcfs with no spill occurring during this inspection. Turbidity was 6.0 ft with the water temperature reported at 68°F. Two north shore (WA), and 3-south shore (OR), fish pumps were operating for the inspection. For most of the season, fish facility equipment has worked satisfactorily.

OR fishway – During this inspection, the South (OR shore or SE-1) fishway entrance was operating with the gate depth at 8.7 ft on the gage and 8.9 ft at the panel. Head differential was 1.2 ft using the staff and 1.5 ft using the panel reading. The gate depth and head at the South Entrance met criteria. The two main entrances at the north powerhouse (Gates NE-1 & NE-2) were submerged from 8.0 to 8.3 ft using the gages and 8.0 ft submerged using the panel reading. Head differential was 1.2 ft using the staff gage and 1.4 ft using the panel gage. All gate depths and head differentials fell within the criteria range for the North Powerhouse Entrances. Water velocity recorded along the powerhouse collection channel averaged about 2.1 fps for the September 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 during this inspection. The depth of water over the weirs was 1.1 ft.

WA fishway – Gate N-1 was operating at the WA shore fishway. The staff gage and LED readings were slightly off for the tailwater readings and possibly, the system required calibration during this inspection. The gate depth was 8.1 ft with the head differential reading 1.0 ft using the LED gage. 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 were clear of debris. The depth of water over the fish ladder weirs was 1.0 ft.

Overall, the OR and WA fishways were operating close to criteria at the fish ladders and main entrance gates.

Juvenile Fish Facility – The Smolt Monitoring facility was operating satisfactorily during this inspection. The facility will be taken out of service for the year on Monday, September 16. As an aside, this date was not met as the project had problems with the Crest Gate which required repair. It should be completed by September 27 or the following week.

McNary Dam – Larry Swenson, NMFS, and I completed an inspection of the fishways on September 18. Project Q was 116.3 kcfs with no spill at time of inspection. River temperature was 68°F with turbidity reading at 4.8 ft. A fishway status report was obtained prior to the inspections to compare on-site elevation readings with computer readings.

Oregon Fishway – Two fish pumps were operating with pump angles recorded at 26° to 28°. About 450 cfs water Q from the juvenile bypass system is added to the powerhouse collection channel flow at the north end of the powerhouse, near the North Entrance gates. Gravity flow water from the forebay is also added in the lower end of the OR fish ladder. As noted, only 2 of the 3 fish pumps were operating this month at the OR fishway.

The South Powerhouse and North Powerhouse entrance gates were submerged 9.2 ft and 9.1 ft. respectively, below tailwater elevation, with the head differential reading 1.1 ft at the South and 1.0 ft at the North Powerhouse entrances. Gate depths and head differentials were found within proper criteria range at the Oregon fishway entrances. All orifice gates along the collection channel were satisfactorily operating during the inspection. The velocity reported at the south end of the collection channel was about 0.9 fps, and at the northern end of the channel it was nearly 3.6 fps. The depth of water over the fish ladder weirs was 1.0 ft. The exit from the fish ladder was reported clear of debris with the fish counting facility also 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 requirements. 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 during the inspection. The exit from the fish ladder and picketed leads at the count station were clear of debris. The depth of water over the fish ladder weirs was 1.0ft for the September inspection.

Overall, the adult fish passage facilities at the OR and WA fishways were operating within normal criteria at main entrance gates with sufficient head differential and gate depth reported. Several floating orifice gates were overtopped with water.

Juvenile Fish Facility – Debris in front of the project was basically reported as very light. No reports were received of problems or mortality due to water temperatures this summer to date. One orifice illumination lamp was burned out.

Priest Rapids Dam – Marc DeHart, NMFS, completed an inspection of the adult fish facilities at Priest Rapids Dam on September 11. Project discharge was 46.1 kcfs with 600 cfs spill for assisting adult fish passage downstream past the project. Water temperature was 66.1°F with the turbidity reading 11.9 ft. Five fish pumps (tailwater) and gravity-flow water (gravity intake gate 7.0 ft open) supplied flow to the supply pool. This pool normally maintains about 6.5 ft head above the tailwater elevation; it was 7.0 ft on this inspection.

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. Gate LSE-4 was recorded with 2.1 ft head differential and Gate LSE-2 with 1.7 ft head differential. Gate LSE-4 was slightly above the normal criteria range of 1.0-2.0 ft, but was considered satisfactory. The LSE-2 and LSE-4 met the targeted head differentials this month. Water velocity reported at the eastern end of the collection channel was almost zero and no discernible velocity was seen. For the 3rd month in a row, water velocity through that section of the channel was less than the normal for

the season. The project should check whether there were diffuser changes made that might slow flows through that end of the channel. The exit from the fish ladder was reported clear of debris during this inspection. The depth of water recorded over the ladder weirs was within criteria and reported at 1.1 ft.

Right Bank Fishway – Slotted entrance (RSE-1) was operating with 1.6/1.7 ft head differential using staff gage and water sensor equipment to measure elevations. The head differential of 1.6/1.7 ft met the target of 1.5 ft during this September inspection. The fish ladder exit was reported clear of debris, and the picketed leads at the counting station were also clear of debris. The depth of water recorded over the fish ladder weirs was 1.0 ft.

Overall, the adult fish passage facility was operating within criteria ranges (1.0 to 2.0 ft) at the main entrance gates when checking the computer reading and readable staff gages and the newer sensor gages. A velocity meter is required to accurately assess flows through the powerhouse channel; however, no visible flow was noted where observed on the east end of the channel. This area can be a problem area, but normally velocities have been satisfactory until recent inspections. The project should assess whether diffuser changes or other changes were made that would affect velocities through this area. Last year, with tailwater elevations slightly lower than noted during this inspection, the velocity was recorded at 2.8 fps.

Wanapum Dam – Marc DeHart, NMFS, completed an inspection of the adult fish passage facilities at Wanapum Dam on September 11. Project discharge was 37.7 kcfs with 1.4 kcfs spill (sluice) and the remainder through the three operating turbines. Water temperature was reported at 66.5°F.

Left Bank Fishway – Two fish pumps were operating at 135-rpm average and supplying sufficient flow volume to the adult fishway. 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 LSE-2 and 1.25 ft at LSE-3. During the September inspection, the LSE-2 Gate had 2.2 ft and the LSE-3 Gate, 1.9 ft head differential. The LSE-2 Gate head differential was slightly above the normal range, but both gates were above their targeted head differential. Water velocity was estimated at nearly 2.0 fps at the East end of the channel and maintained that velocity through the channel toward the West entrance (LSE-3). The exit from the fish ladder was reported clear of debris. The depth of water recorded over the fish ladder weirs was 1.1 ft during the inspection.

Right Bank Fishway – Gravity-fed water from the forebay of the project supplies flow to the main entrance gate (RSE-2). The head differential was measured at 1.2 ft and was within the criteria range of 1.0 to 2.0 ft but less than the targeted head of 1.5 ft. The exit from the fish ladder was clear of debris. Depth of water over the fish ladder weirs was 1.1 foot.

Overall, fishways were operating close to acceptable criteria range during the September inspection.

Rock Island Dam – Steve Gacek, WDFW, completed an inspection of the adult fish facilities on September 18. Project discharge was 96.6 kcfs with no spill occurring during the inspection; spill ended August 26 for the season. Seven of 8 turbine units at the new powerhouse were operating. Turbidity was reported at 14.8 ft with the water temperature reading 66.0° F.

Left Bank Fishway – Water from the immediate forebay supplies flow through the diffusion system to the two downstream entrances. Gate depth criterion is: 6.0 ft minimum depth with the head differential maintained between 1 - 2 ft. For the September inspection, the gates were submerged 6.8 ft below tailwater with the ΔH 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. All readings at this fishway were satisfactory during this inspection.

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 8.7 ft (criteria = 8.5 ft or >) with the ΔH reported at 1.2 ft. The side entrance is fixed-open and depends on "head" only to be within criteria.

The gate depth and head differential was within proper criteria range during the inspection. The exit from the fish ladder and the picket lead section at the counting window was reported clear of debris. 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 attraction water jet was operating as required. 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 1.4 ft "head", 1.2 ft "head" at the LPE and 1.3 ft at the TRE (downstream) entrance during the September inspection. The tailwater elevation had dropped to nearly 571 ft elevation, and all readings taken at the entrances were found operating within acceptable criteria. The water velocity in the left powerhouse collection channel was 4.9 fps. The exit from the fish ladder and the picket lead section at the counting station was clear of debris. The depth of water recorded over the fish ladder weirs was 1.1 feet.

Overall, the adult fishway entrances were operating at satisfactory levels at the Left, Center and Right Fishways for the September inspection. The Left Bank fishway was partially dewatered on Tuesday, September 24 to begin installation of a set of PIT tag coils for testing (noise/interference). Substantial numbers of large adult chinook were noted holding below the counting station after starting the dewatering of the ladder. It was expected that these fish would move down several weirs to a holding pool; however, that did not happen as expected. Rather than risk harm to the fish, the fish ladder was watered back up to normal operating level after salvaging three of these fish (placed in forebay of project). Thad Mosey, Chelan PUD biologist, sent an e-mail update that indicated that the dewatering of the left ladder and the middle ladder has been postponed to a later timeframe most likely in November/December. The installation of the PIT coils will eventually be completed in all ladders, most likely prior to March.

Rocky Reach Dam – The adult fish facilities were inspected by Steve Gacek, WDFW, on September 18. Project Q was only 49.1 kcfs with 5 of 11 main turbine units operating; there was no spill during the inspection. The water temperature was 64.6°F with the turbidity about 19 ft. The project was operating three fish pumps at 52% open and flow was distributed to the LPEs, RPEs, and the spillway entrance.

Fishway Entrances -The left powerhouse entrance gates (LPE-1 and LPE-2) were submerged 10.7 ft below tailwater elevation with the head differential at 1.2 ft during this inspection. Entrance depth (10-ft or >) and head differential (1-2 ft) criteria standards were met. The right powerhouse entrances (RPE-1 and RPE-2) are fixed-open at 3-ft and must maintain head differential between 1 and 2-ft to meet criteria standards. The RPEs were reported with 1.1 ft head differential and met the criteria standards. The spillway entrance, MSE was operating with gate depth of 9.0 ft with the head differential at 1.4 ft. The same criteria of gate depth and head differential as for the LPEs applies for the Spillway entrance. The head differential was satisfactory during this month's inspection; the gate was on sill, so no further depth could be attained as was considered satisfactory. Water velocity through the transportation channel was reported at 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 all main powerhouse entrances as well as at the Spillway entrance gate (gate on sill). The inspector reported heavy concentrations of grasses in the forebay. The trash boom has been removed for bypass construction. This may become a problem should the grasses concentrate in the exit of the fish ladder.

Wells Dam – Stewart Mitchell, WDFW, inspected the adult fish facilities on September 24. Project discharge was 120 kcfs with 7 of 10 main turbine units operating; there was no spill for this inspection date. River temperature was 66.6°F with the turbidity reading 15.0 ft. To assess calibration of the computer readings, staff gages and deck sensor gages located at the entrance gates are read and recorded. These readings are then compared to the computer readings that are simultaneously phoned in from the shift operator. The readings should come within 0.2 ft of each other to assure calibration of the computer system 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 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 to each other with the deck and staff gages and computer reading. The head differentials from the deck gage, staff gage, computer reading was 1.5 ft. 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 0.7 ft. The normal head through that exit trash rack ranges from 0.5 ft to 0.8 ft so the reading was within the normal expected differential.

At the **West** fishway, all measuring gages and computer readings were within 0.1 ft for channel and tailwater elevations. The head differential measured was 1.5 ft for the staff gage, the deck gage, and for the computer. The end gate was set at 8.0 ft open. The depth of water over the fish ladder weirs was 1.2/1.3 ft; this reading was higher than desired. The exit from the west bank fish ladder was 0.9 ft and the project should assess whether the exit required cleaning. This reading showed 0.2 ft greater head loss across the trash rack than the other East fishway exit reading.

Overall, the adult fish facilities were found operating at the targeted head differential of 1.5 ft at the west and east fishway entrance gates. The depth of water over the ladder weirs was nearly normal at the East fish ladder but was higher than desired on the West fish ladder (1.2/1.3 ft) during this inspection. The project is planning to repair problem valves or screens in the fish ladder that have caused the higher than required depth of water at both ladders during the season.

Ice Harbor Dam – Steve Richards, WDFW, completed an inspection of the adult fish facilities on September 20. Project Q was 9.3 kcfs with flow a single turbine unit during the inspection. Water temperature was 66°F with turbidity reading of about 6.0 ft. Eight pumps were operating and supplying water to the South Shore and 3 pumps to the North Shore fishway. In addition, about 250 cfs of excess flow from the juvenile bypass system is continually shunted to the South fishway whenever the bypass system is operated.

South Shore – The South Shore entrance was submerged 5.8 ft below tailwater with head differential at 2.2 ft. The North powerhouse entrance was submerged 5.9 ft with 1.7 ft head differential. Seven orifice gates were operating along the powerhouse collection channel. The water velocity through the powerhouse collection channel was reported as 2.6 fps. The South shore entrance gate was near sill (0.4 ft above sill); the North powerhouse entrance gate was operating near sill (0.3 ft above sill) with the head differentials reported above 1.5 ft. The fish ladder was reported with 1.1 ft depth of water over the weirs during the inspection. The exit trash rack and picketed leads at the count station were reported clear of debris. The head loss across the picketed leads at the counting station was up to 0.3 ft and required cleaning as the debris was likely lower on the leads and not visible to surface observation.

North Shore – The North Shore entrance was submerged 5.2 ft with 1.6 ft head differential using the channel staff gage and the LED tailwater elevation, and 5.3 ft with 1.2 ft head using the LED display for the September inspection. The gate's depth could have been improved (lowered) with the head differential. The elevation of the channel reading for the LED and the staff gage reading varied by 0.4 ft and would suggest that calibration of the system would be required. The fish ladder had 1.1 ft depth of water over the weirs and was satisfactory. The exit trash rack and picketed leads were clear of debris on this inspection date.

Overall, the project was operating with reduced gate depths due to low tailwater elevations at the project. The North Shore tailrace staff gage is in need of repair. Potentially, the NPW should consider closing all or a portion of the orifice gates at the project during the summer months when head differentials and gate depths are reduced to assure that they can meet criteria. The PLC and control systems must be improved through the winter maintenance period.

Lower Monumental Dam – Steve Richards, WDFW, inspected the adult and juvenile fish facilities on September 18. Project Q was 21.1 kcfs (1 main turbine units operating) with no spill during the inspection. Water temperature was 66.6°F with the turbidity reading at >4.0 ft. Three turbine-driven pumps operating at 75-rpm average and excess flow from the juvenile bypass system were supplying attraction water to the adult fishway.

North Shore – The entrance gates were submerged 8.1 ft below tailwater elevation with the head differential reading 1.7 ft for the inspection. The South Powerhouse entrance gates were on sill and submerged 7.6 ft and maintained head differential of 1.4 ft. The water velocity through the powerhouse collection channel was recorded at 2.1 fps. All readings taken at the North shore entrance gates were considered satisfactory as the head differential fell within the range of 1.0 to 2.0 ft and the gate depth was more than the 8.0 ft minimum. The south powerhouse gates were on sill so no further depth could be attained; however, the head differential was 1.4 ft and attraction flows should have been satisfactory. The north fish ladder was reported with 1.1 ft depth of water over the ladder weirs. The picketed lead section at the count station was clear of debris. The inspector noted that there was "lots" of woody debris floating above the North Shore fishway exit.

South Shore – Flow to the South Shore entrance gates is provided from the North Shore water supply source plus the South fish ladder flow. The gate depth at SSE-1 was 8.5 ft with the corresponding head differential at 1.2 ft. Gate SSE-2 is a continuous open gate with a 6-ft opening. Gate SSE-1 was on sill so no further depth could be attained at the entrance gate. The south fish ladder was reported with 1.0 ft of water over the ladder weirs. The picketed leads and the exit from the fish ladder were clear of debris during the inspection.

Juvenile System -No gatewells or operating orifices were reported with debris.

Overall, the adult fish facilities were operating within acceptable criteria ranges for the September inspection when considering that the SPEs were on sill.

Little Goose Dam – Ben Clemens, ODFW, inspected the adult fish facilities on September 18. Project discharge was 21.8 kcfs with one main turbine unit operating; no spill occurred during the inspection. Water temperature was 65.2°F with the turbidity reading 5.6 ft. Two turbine-driven pumps operating at 73-rpm average plus excess flow from the juvenile bypass system were supplying water to the adult fishway.

The South Shore fishway entrances, SSE-1 and SSE-2, were submerged 9.6 ft with 1.4 ft head differential using the staff gage and 9.2 ft and 1.7 ft head using the FSC Board readings. Channel velocity recorded at the south end of the channel registered about -0.1 fps with water velocity reported at 2.2 fps at the north shore channel. North Powerhouse entrance gates, NPE-1 and NPE-2, were off sill and submerged 6.5 ft deep with 1.6 ft head differential using the staff gage and 6.1 ft submerged with 1.7 ft head differential using the FSC Board. The North Shore Entrances, NSE-1 and NSE-2, were submerged 6.15 ft average with the "head" at 1.6 ft with the FSC Board for the month. The tailwater staff gage was readable this month and was 0.2 ft different from the computer reading. The exit from the fish ladder and the picket lead section at the counting station appeared clear of debris; however, the differential was 0.2 ft between the upstream and downstream pickets (same as for the August inspection). The depth of water over the ladder weirs was 1.2 ft.

Overall, the water velocity reported at the South end of the collection channel indicated that the velocity meter was not functioning and needs replacing. No gates were on sill for the inspection; it appeared that the NPEs could have been lowered to achieve the 7.0 ft weir submergence required for that entrance.

Lower Granite Dam – Ben Clemens, ODFW, inspected the adult fish facilities on September 19. During the inspection, project Q was 20.0 kcfs with flow passing through a single turbine unit; no spill occurred during the inspection. Water temperature was 65.1°F (taken at the count station) with the turbidity reading at >5.0 ft. Two electric fish pumps (1 and 2) were supplying flow to the adult fishway entrances and powerhouse collection channel.

The **South Shore** entrances were submerged 8.0 ft average and ΔH of 1.7 ft and 1.8 ft for the respective staff and FSC Board readings. The **North Powerhouse** entrances were off sill with the weir depth at 8.2 ft using the FSC reading and 8.4 ft using the staff gage tailwater reading. The ΔH was 1.1 ft using staff gage and the FSC Board readings. The velocity in the powerhouse collection channel was about 0.9 fps at the south end of the powerhouse collection channel and 1.4 fps at the North Shore. Four orifice gates were operating along the powerhouse collection channel [1, 4, 7 and 10]. At the **North Shore**, Gates NSE-1 and NSE-2 were submerged 5.4 ft below tailwater elevation with the head differential reading of 1.0 ft using the FSC Board reading. The staff gage reading gave a head differential of 1.2 ft with the weirs submerged 5.7 ft.

The exit from the fish ladder was reported clear of debris; the picket lead section at the counting station was reported with 0.1 ft head across the pickets and was clear of debris. The depth of water over the fish ladder weirs was not measured due to the COE chipping rocks and making that area of the road inaccessible for the inspector.

Overall, the NSEs were less than 6.0 ft submerged below tailwater elevation but head differential was satisfactory. The SSEs and the NPEs had satisfactory gate depth and head differentials during this September inspection. The water velocity at the south end of the collection channel was less than the 1.5 ft minimum criteria.