FISH PASSAGE CENTER

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MEMORANDUM

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

FROM: Larry Basham

DATE: August 23, 2002

RE: **Fishway Inspections – July 2002**

State and federal inspectors completed inspections at the lower and upper Columbia River and Snake River dams in July at all projects. I assisted in training a new NMFS employee who will complete the facility inspections at Priest Rapids and Wanapum dams during the upcoming two months. Also, I was able to accompany Doug Case on fishway inspections of The Dalles and John Day dams this month.

Water temperatures were cooler than normal this spring and adult fish passage was somewhat delayed in their arrival at Bonneville Dam and upstream projects. Summer flows and spills remained fairly high in the Columbia and Snake River basins in June and early July. Potentially, higher fallback rates of adult fish likely occurred at some projects, e.g., Bonneville and The Dalles dams due to spill. Overall, most fish facilities were reported operating with few out of criteria problems during the month. The Snake River projects will be operating weirs on sill for most of the summer and fall so gate depths will be reduced at these projects. Other problems have mainly been as a result of debris or grasses in the fishways, rather than with pumps or fish turbines.

Bonneville Dam – Ed Meyer, NMFS, was accompanied by Marc DeHart, NMFS, on this inspection of the adult and juvenile fish facilities completed on July 30. River Q was 188 kcfs with about 75.4 kcfs spill. For the season, the WA Powerhouse will be prioritized for turbine operations. A test of daytime spill quantities will be ongoing through the fish passage season. New spill patterns have been developed for the season. Water turbidity was 5.5 ft with the water temperature at 67°F for the July inspection.

Powerhouse I – At the South end of the powerhouse collection channel Main entrance Gate 2 was submerged 7.8 ft with the head differential at 1.3. 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 readings on the north end of the powerhouse gave channel to tailwater head differential reading that was similar to the PLC reading. The water velocity in the north end of the powerhouse collection channel was reported at 1.4 fps and was 2.5 fps at the south end of the channel. The five sluice or orifice gates were not operating in synch during the inspection as both the orifice and sluice gate was open in Gate #62 and Gate #21 had the orifice open when it should have been the sluice gate operating. 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 July inspection. The exit from the ladder and the picketed lead section at the count station were fairly clear of debris and head loss across the leads was satisfactory.

B-Branch - The computer system was not operating during the July inspection and readings were taken from the staff gage and probe. Head differential was reported at 0.9 ft, well below 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 this month. Head differential was 2.3 ft during the inspection and fell outside the maximum criteria of 1.0 ft-2.0 ft. The depth of water over the ladder weirs was 1.3 ft and was satisfactory.

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 14.3 ft average with corresponding head differential of 1.0 ft at the upstream and downstream entrances. The north shore entrance gates were submerged about 14.65 ft average below tailwater with the head differential for the upstream and downstream entrance at 1.3 ft and 1.1 ft, respectively. The floating orifice gates along the channel were operating satisfactorily. The water velocity meter was reported at 1.3 fps during the July inspection. The exit from the fish ladder was clear of debris; however, the serpentine pool sections located upstream from the fish counting station had one log and one 2x4 stuck in the slots. The depth of water over the ladder weirs was 1.3 ft.

Overall, 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 this season. The B-Branch entrance was less than required criteria for head differential on this month's inspection (0.9 ft reported). The orifice gates and sluice gates along the B1 powerhouse collection channel should be checked for proper operation. Two of the five were out of synch or criteria for the inspection.

Juvenile System – The WA shore juvenile bypass facility was operating with all screens and orifices as required. The project was operating the low outfall. The ice/trash sluiceway was operating at the old powerhouse (10c and 7a were open). 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 July 16. Project discharge was 200.3 kcfs with 78.1 kcfs spill. Two fish turbines were operating at the OR fishway with a single fish turbine operating at the WA fishway. Water temperature was 68°F with the turbidity reading at 3.9 ft**.** When spill occurs for juvenile fish enhancement, the Northern spillbays (1-14 on this inspection) are prioritized. Passage of adult salmon through the WA shore fish ladder has been substantial during the past few years due mainly to the spill pattern change.

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. On this inspection, Gate N-1 was submerged 9.3 ft below tailwater elevation with a head differential reading of 1.5 ft. The gate depth and head differential at Weir N-1 was operated within the proper criteria range for the July inspection. The PUD trash racks had 0.6 ft head differential. The depth of water reported over the fish ladder weirs was 1.3 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 up stream and down stream 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. The South Entrance cables on Gate S-2 were broken prior to the mid March inspection date and, Gate S-2 remained bulkheaded off. Gate S-1 was submerged 7.5 ft below tailwater elevation and the head differential was 2.2 ft. The Project was asked to lower the S-1 gate to achieve at least an 8-9.5 ft depth range and maintain a head differential still near 1.5 ft.

At the West Entrance, Gates W-1 and W-2 were submerged 9.75 ft ave. depth with the head differential at 1.2 ft. The gate depths and head differential were within proper criteria settings during the July inspection. The electronic velocity meter has been out of service for the season; however, estimated water velocities for the inspection ranged from 2.0 fps to 3.0 fps through powerhouse transportation channel.

The East fishway entrance has two operating gates, E-2 and E-3. These gates were submerged 11.1 ft and 10 ft with the head differential at 1.6 ft. These gates are pushing out a large quantity of attraction flow for the adult fish approaching the eastern end of the powerhouse. All gate depths and head differential fell within the criteria range for the July inspection.

The exit from the fish ladder and the picketed leads at the count station were clear of debris. The Project is raking/cleaning the leads on a daily basis due to the amount of aquatic vegetation building up. The depth of water over the fish ladder weirs was 1.3 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. We recommend that the PUD trashrack be cleaned on a regular weekly basis; during this inspection there was a buildup of head with 0.6 ft recorded. The South Entrance was to be adjusted after the inspection and based on correspondence to FPOM from Bob Cordie, project biologist, the gate is maintaining approximately 10 ft weir depth and manually adjusted as required.

John Day Dam – Doug Case, ODFW, and I also inspected the John Day adult and juvenile fish facilities on July 16. Project Q was 195.9 kcfs with no spill during this inspection. Turbidity was 4.5 ft with the water temperature reported at 66°F for the July inspection. Three north shore (WA) and three south shore (OR) fish pumps were operating for the inspection. Fish facility equipment has worked satisfactorily to date through the adult fish passage.

OR fishway – During this inspection, the South (OR shore or SE-1) fishway entrance was operating with the gate depth at 8.2 ft on the gage and 8.7 ft at the panel. Head differential was 1.4 ft using the staff gage reading and 1.2 ft at the panel board. For this inspection, there was sufficient depth and head at the South Entrance to meet criteria. The two main entrances at the north powerhouse (Gates NE-1 & NE-2) were submerged from 8.3 to 8.7 ft using the gages and 8.2 ft submerged using the panel reading. Head differential was 1.5 ft using the staff gage and 1.7 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 2.2 fps for the July 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 1.2 ft.

WA fishway – Gate N-1 is operated at the WA shore fishway. The Gage and LED readings were within 0.2 ft so no calibration was required during this inspection. The gate depth was 9.1 ft with the head differential reading 1.5.ft at the staff gage and 1.1 ft at the LED gage during the July inspection. 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 1.3 ft.

Overall, the adult fish facilities were operating close to criteria at the fish ladders and main entrance gates during the July inspection date.

Juvenile Fish Facility – The Smolt Monitoring facility was operating satisfactorily; however, we did not do a detailed inspection of the lower section of the facility.

McNary Dam – Larry Swenson, NMFS, completed an inspection of the fishways on July 31. Project Q was 184.3 kcfs with 144.5 kcfs through the turbines and 35.1 kcfs through spill. River temperature was 69°F with turbidity reading at 4.4 ft during the July inspection. A fishway status report was obtained prior to the inspections to compare on-site elevation readings with computer readings.

Oregon Fishway – Three fish pumps were operating with pump angles recorded at 20° to 23°. 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. All auxiliary water systems were operating this month.

The South Powerhouse and North Powerhouse entrance gates were submerged 9.2 ft below tailwater elevation, with the head differential reading 1.2 ft at the South entrances and 1.5 ft at the North Powerhouse entrances in July. Gate depths and head differentials were found within proper criteria range at the powerhouse entrances. The orifice gates along the collection channel were also operating satisfactorily. 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 3.5 fps. The depth of water over the fish ladder weirs was 1.1 ft. The exit from the fish ladder was reported with light debris and the fish counting facility was reported clear of debris. New PIT tag detector antennas were being placed on the OR counting window. The fish counter had noted that the adult fish passage had stopped when the riggers started removing and installing the antennas.

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 1.5 ft and the gates submerged an average depth of 10.0 ft during the inspection. Some weeds were building at the exit from the fish ladder that should be cleared off from the rack. The picketed leads showed a 0.6 ft differential across the leads and required cleaning. The depth of water over the fish ladder weirs was 1.1ft for the July 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. The debris in the fish ladder was especially excessive in the WA fish ladder as 0.5 ft head loss was reported across the picketed leads.

Juvenile Fish Facility – Debris in front of the project was mainly concentrated in front of Units 4 and 5. No reports were received of problems or mortality due to water temperatures this summer to date. Two orifice illumination lamps were not functioning along the channel.

Priest Rapids Dam – I accompanied Marc DeHart, NMFS, for the July inspection of the adult fish facilities at Priest Rapids Dam on the 24th. Project discharge was 144 kcfs with spill at 73.4 kcfs. Water temperature was 64.9°F with the turbidity reading 10.5 ft. Five fish pumps (tailwater) and gravity-flow water (gravity intake gate 10 ft open) supplied flow to the supply pool. This pool normally maintains about 6.5 ft head above the tailwater elevation.

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 1.4 ft head differential and Gate LSE-2 with 1.4 ft head differential. Both gates were within criteria range of 1.0-2.0 ft. The LSE-2 met the target differential this month, with the LSE-4 within 0.1 ft of the targeted differential of 1.5 ft. Water velocity reported at the eastern end of the collection channel was nearly 1.5 fps. Without a velocity meter, it is almost impossible to gage velocity through that section of the channel; however, this reading was less than the normal for the season. The exit from the fish ladder was reported clear of debris during this inspection. The depth of water recorded over the ladder weirs was less than criteria and was reported at 0.8 ft. The project noted that this would be remedied ASAP.

Right Bank Fishway – Slotted entrance (RSE-1) was operating with 1.4 ft head differential during the July inspection and was satisfactory. We noted a lot of fish passing up through the Right Bank fish ladder during this trip. 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.

Wanapum Dam – I accompanied Marc DeHart, NMFS, on an inspection of the adult fish passage facilities at Wanapum Dam on July 24th. Project discharge was 132.8 kcfs with 48.8 kcfs spill and the remainder through the seven operating turbines. Water temperature was reported at 64°F.

Left Bank Fishway – Two fish pumps were operating at 150-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 July inspection, the LSE-2 Gate had 1.8 ft and the LSE-3 Gate, 1.8 ft head differential. Both readings were within the proper range and met target differential at both entrance gates. Water velocity was estimated at nearly 2.0 fps at the East end of the channel and appeared to stay close to that velocity through the channel toward the West end of the channel. The exit from the fish ladder was reported clear of debris in July. 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 measured 1.3 ft and was within the criteria range of 1.0 to 2.0 ft but slightly below the target head of 1.5 ft. The exit from the fish ladder was clear of debris during this July inspection date. Depth of water over the fish ladder weirs was 1.2 feet.

Overall, fishways were operating within acceptable criteria range during the July inspection. A back eddy was forming near the RSE and spill pattern should be evaluated to assure passage is not affecting adult fish passage. In addition, the project should have a velocity meter available to measure water flow through the channel area. In addition, the project should complete work on their video counting so that assessment of

passage can be gathered at Left and Right Bank fish ladders on a real time basis. This would be beneficial to better assess whether fish are being delayed due to spill pattern changes, etc., that might occur during a year.

Rock Island Dam – Denise McCarver, WDFW, completed inspection of the adult fish facilities on July 17. Project discharge was 166 kcfs with fish spill at about 23.3% of river flow or nearly 39 kcfs. As in previous years, the bulk of the river is passing through the new powerhouse with three of ten turbine units operating at the old powerhouse. Turbidity was reported at 11 ft with the water temperature reading 62.4° F.

Left Bank Fishway – Water from the immediate forebay supplies flow through the diffusion system to the two downstream entrances. Gate depth criterion: 6.0 ft minimum and a head differential of 1 - 2 ft. The gates were submerged 6.5 ft below tailwater with the ΔH at 1.4 ft during the inspection. 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 during the inspection were satisfactory.

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 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 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 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 1.0 ft "head", 0.9 ft "head" at the LPE, and 0.7 ft at the TRE (downstream) entrance during the July inspection. The tailwater elevation was less than 575 ft elev., but the LPE and TRE gates still had less than the minimum criteria level for head differential of 1.0 ft. The water velocity in the left powerhouse collection channel was 3.7 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 satisfactory at the Left and Center Fishway, but less than minimum criteria of 1.0 ft head differential was maintained at two of the Right Fishway Entrances.

Rocky Reach Dam – The adult fish facilities were inspected by Denise McCarver, WDFW, on July 17. River Q was 212.5 kcfs; there was 36 kcfs spill during the inspection. The water temperature was 61.3°F with the turbidity about 13 ft. The project was operating three fish pumps at 92% 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 10.4 ft below tailwater elevation with the head differential at 1.1 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 one and two 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 a gate depth of 10.6 ft and the head differential at 0.8 ft. The same criteria of gate depth and head differential as for the LPEs applies for the Spillway entrance. The head differential was below the 1.0 minimum during the inspection. The probable cause was likely due to plugged intake screens due to buildup of milfoil. A work order was sent in for action. Water velocity through the transportation channel was reported at 1.8 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 powerhouse entrance gates with the Spillway entrance gate less than criteria for the July inspection. Turbine Unit 11 is currently being overhauled.

Wells Dam – Stewart Mitchell, WDFW, inspected the adult fish facilities on July 25. Project discharge was 152 kcfs with all 10 main turbine units operating and the remainder of flow through the spillbays used to enhance juvenile fish passage at the project. River temperature was 65°F with the turbidity reading 11.0 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 eight feet open with head differential targeted for 1.5 ft at both fishway entrances.

At the **East** fishway, the channel and tailwater elevations were within 0.3 ft of each other with the deck and staff gages and computer reading. The head differentials from the deck gage read 1.4 ft, the staff gage read 1.4 ft, and the computer reading was 1.3 ft. Depth of water over the ladder weirs was 1.4 ft. The east fish ladder reported a differential through the exit pool to the forebay of 0.8 ft. The normal head through that exit trash rack ranges from 0.5 ft to 0.8 ft.

At the **West** fishway, all measuring gages and computer readings were within 0.2 ft for channel elevation and read the same for the tailwater elevation. The head differential measured was 1.4 ft for the staff gage, 1.2 ft for the deck gage, and 1.3 ft 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 ft. The exit from the west bank fish ladder was 0.7 ft.

Overall, the adult fish facilities were found operating slightly below normal during the July inspection. The **targeted head differential of 1.5 ft was not being met at the West and East Fishway Entrance Gate; however, all readings were between 1.2 and 1.4 ft.** Also, the depth of water over the ladder weirs was too high at both ladders, with 1.4 ft recorded on the East fish ladder.

Ice Harbor Dam – Steve Richards, WDFW, completed an inspection of the adult fish facilities on July 24. Project Q was 31.8 kcfs with 20.9 kcfs spill during the inspection. Water temperature was 68°F with a turbidity reading of about 7.5 ft. Eight pumps were operating and supplying water to the South Shore and three 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 7.0 ft below tailwater with head differential at 2.1 ft. The North powerhouse entrance was submerged 7.1 ft with 2.1 ft head differential. Seven orifice gates were operating along the powerhouse collection channel. The water velocity through the powerhouse collection channel was reported as 2.4 fps. The South shore and North powerhouse entrance gates were operating near sill during the inspection with the head differential reported at 2.1 ft (slightly above the 1.0-2.0 ft range) at these entrances. 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 0.1 ft.

North Shore – The North Shore entrance was submerged 4.8 ft with 1.3 ft head differential for the July inspection. The gate depth was well below the expected operating depth on this occasion. The elevation of the channel reading for the LED and the staff gage reading varied by 0.7 ft and would suggest that calibration of the system would be required. The fish ladder had 1.0 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 close to satisfactory criteria ranges at the south main fishway entrances and fish ladder. The North Shore fishway entrance was reported with only 4.8 ft depth.

Lower Monumental Dam – Steve Richards, WDFW, inspected the adult and juvenile fish facilities on August 8 (for July inspection). Project Q was 21.1 kcfs with no spill during the inspection. Water temperature was 69.4°F with the turbidity reading at 4.0 ft. Three turbine-driven pumps were operating at 73 rpm average and with the excess flow from the juvenile bypass system, supplying attraction water to the adult fishway.

North Shore – The North Shore entrances were submerged 8.1 ft below tailwater elevation with the head differential reading 1.8 ft for the inspection. The N. Shore entrances were on sill. The South Powerhouse entrance gates were on sill and submerged 7.1 ft and maintained head differential of 1.5 ft. The water velocity through the powerhouse collection channel was recorded at 1.7 fps for the inspection. 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 1.5 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 and the exit from the fish ladder was clear of debris.

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 8.1 ft and the corresponding head differential was 1.1 ft. Gate SSE-2 is a continuous open gate with a 6-ft opening. All readings at the entrances exceeded minimum criteria ranges and were satisfactory. The south fish ladder was reported with 1.1 ft of water over the ladder weirs. The picketed leads and the exit from the fish ladder were clear of debris during the inspection. Relating to the juvenile system, gatewells and all operating orifices were clear of debris.

Overall, the adult fish facilities were operating within acceptable criteria ranges for the July inspection.

Little Goose Dam – Josh Hanson, ODFW, inspected the adult fish facilities on July 17. Project discharge was 42.5 kcfs with no daytime spill during the inspection. Water temperature was 68.1°F with the turbidity reading at 5.8 ft. Two turbine-driven pumps were operating at 73.5-rpm average. Excess flow from the juvenile bypass system also supplies water to the adult fishway.

The South Shore fishway entrances, SSE-1 and SSE-2, were on sill and submerged 9.1 ft with 1.8 ft head differential using the staff gage and 8.8 ft and 1.9 ft head using the FSC Board readings. Channel velocity recorded at the south end of the channel registered about -0.1 fps. The water velocity was reported at 2.6 fps at the north shore channel. North Powerhouse entrance gates, NPE-1 and NPE-2, were on sill and submerged 5.8 feet deep with the head differential at 1.6 for the July inspection. The North Shore Entrances, NSE-1 and NSE-2, were submerged 6.05 ft on average with the "head" at 1.5 ft with the FSC Board for the month. The tailwater staff gage was unreadable so no comparison of elevations was completed. 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 water velocity reported at the South end of the collection channel indicated that the velocity meter was not functioning. The NPE and NSE spillway channel lights were repaired and operating.

Lower Granite Dam – Josh Hanson, ODFW, inspected the adult fish facilities on July 16. During the inspection, project Q was 38.3 kcfs with no daytime spill. Water temperature was 68°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 8.25 ft on average and ΔH of 1.7 ft. The FSC Board and the staff gage readings were identical on this inspection. The **North Powerhouse** entrances were on sill so no further depth could be attained during the inspection. The weir depth was 6.5 ft using the FSC reading and 6.6 ft using the staff gage tailwater reading. The ΔH was 1.0 ft using staff gage readings and 1.2 ft using the FSC Board. The velocity in the powerhouse collection channel was about 1.1 fps at the south end of the powerhouse collection channel and 1.8 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 5.8 ft below tailwater elevation with the head differential reading of 1.0 ft at the staff gage and the FSC Board reading.

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 1.1 ft during the inspection.

Overall, the NPEs were on sill during the July inspection so no further depth could be attained. The water velocity at the south end of the collection channel was less than the 1.5 ft minimum criteria for the month. **The project did an excellent job calibrating the FSC Board readings to match the staff gage readings.** The NSEs were submerged less than the required 7.0 ft depth. All head differentials were satisfactory.