Section 3 – The Dalles Dam

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The Dalles Dam

1. Fish Passage Information.

The locations of fish passage facilities at The Dalles Dam are shown on **Figures TDA-1 through TDA-3**. Dates for project operations for fish purposes and special operations are listed in **Table TDA-1**.

1.1. Juvenile Fish Passage.

1.1.1. Facilities Description. Turbine units at The Dalles Dam are not screened. Juvenile fish passage consists of the ice and trash sluiceway and one 6″-orifice in each gatewell. All 6″ orifices will be closed as units are dewatered. Currently unit 1 orifice is closed. The ice and trash sluiceway is a rectangular channel extending along the total length of the 22-unit powerhouse and is located in the forebay side of the powerhouse. Gatewell orifices allow flow into the sluiceway, providing a potential means of passing fish from the gatewells to the sluiceway. When any of the sluiceway gates (located in the forebay side of the sluiceway) are opened, water and juvenile migrants are skimmed from the forebay into the sluiceway and deposited in the tailrace downstream of the project.

1.1.2. Juvenile Migration Timing. The primary juvenile fish passage period at The Dalles Dam is April through November. Currently juvenile migration timing is monitored by PSMFC at John Day Dam. **Table JDA-2** in section 4 of the FPP reports data from 1994 to 2006. Since no juvenile monitoring is done at The Dalles Dam, refer to this table, and add approximately 1 day to the dates reported for each species to estimate juvenile fish arrival at The Dalles.

1.1.2.1. Diel passage at The Dalles sluiceway is affected by spill and flow conditions. In years of consistently high flow and spill, fish may be distributed higher in the water column and daytime passage may increase.

1.2. Adult Fish Passage.

1.2.1. Facilities Description. Adult fish passage facilities at The Dalles Dam are composed of a north shore fish ladder, which passes fish collected at the north end of the spillway, and an east fish ladder that passes those fish collected at the south end of the spillway and across the downstream face of the powerhouse.

1.2.1.1. A small hydropower facility, utilizing the north fishway ladder auxiliary water supply, was constructed in 1991 and is operated by the North Wasco PUD. Adult fishway criteria associated with this facility are monitored and maintained during the daily fishway inspections. A backup auxiliary water supply system, unscreened for juveniles has been upgraded to facilitate its use if required.

1.2.2. Adult Migration Timing and Counting. Upstream migrants are present at The Dalles Dam throughout the year and adult passage facilities are operated year round. Adult fish (salmon, steelhead, shad, and lamprey) are normally counted from February 20 through December 7 (**Table TDA-2**), and these data appear daily (or every three days during video counting periods) on the Corps adult count website. Migration timing data for these species, except shad, appear in **Table TDA-3**. Sturgeon and bull trout are also counted and recorded on the WDFW fish counters' daily summary sheet comments section, and these data are summarized in the Annual Fish Passage Report, but do not appear on the Corps daily website total due to relative infrequency of passage.

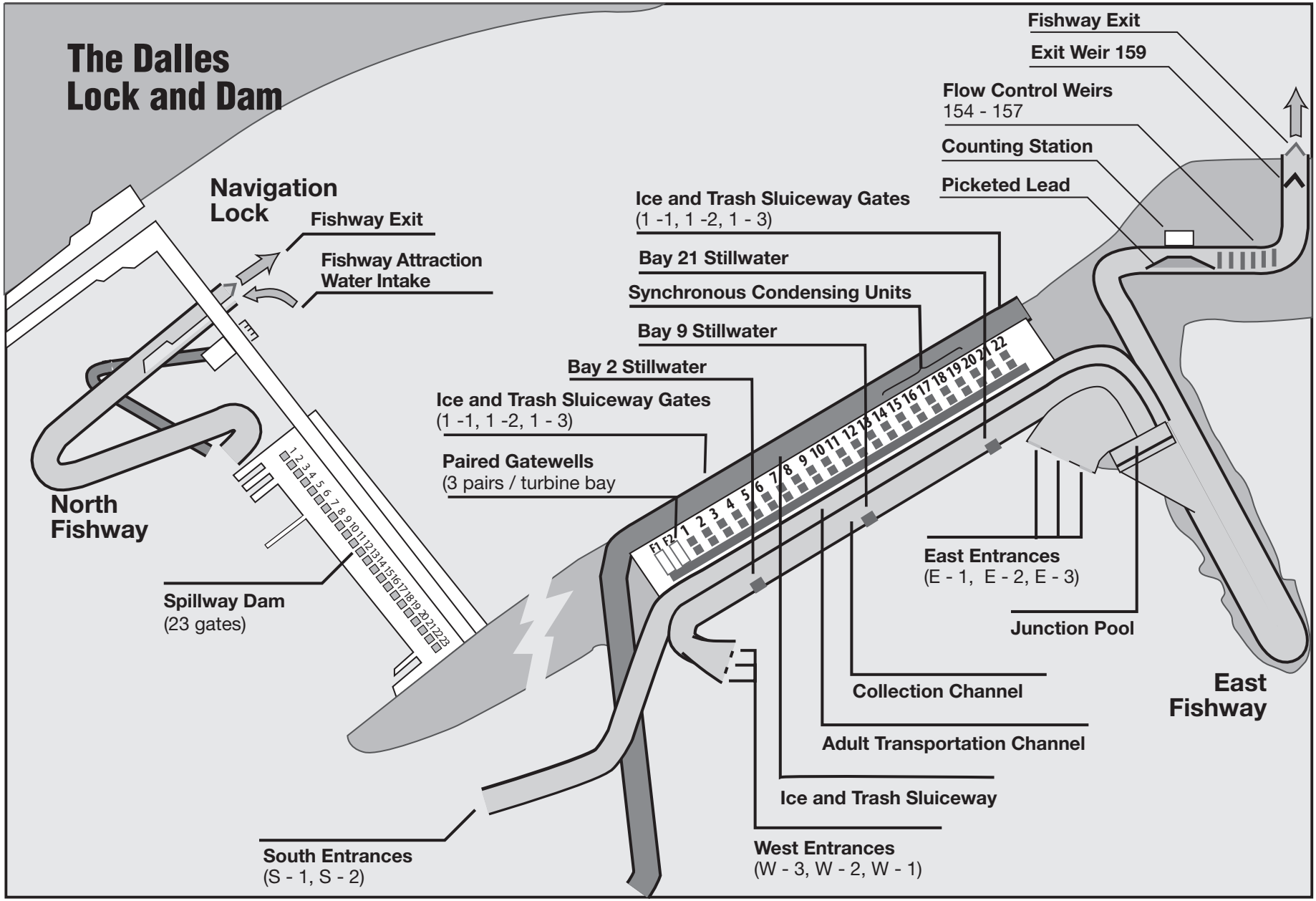


Figure TDA -1 The Dalles Dam.

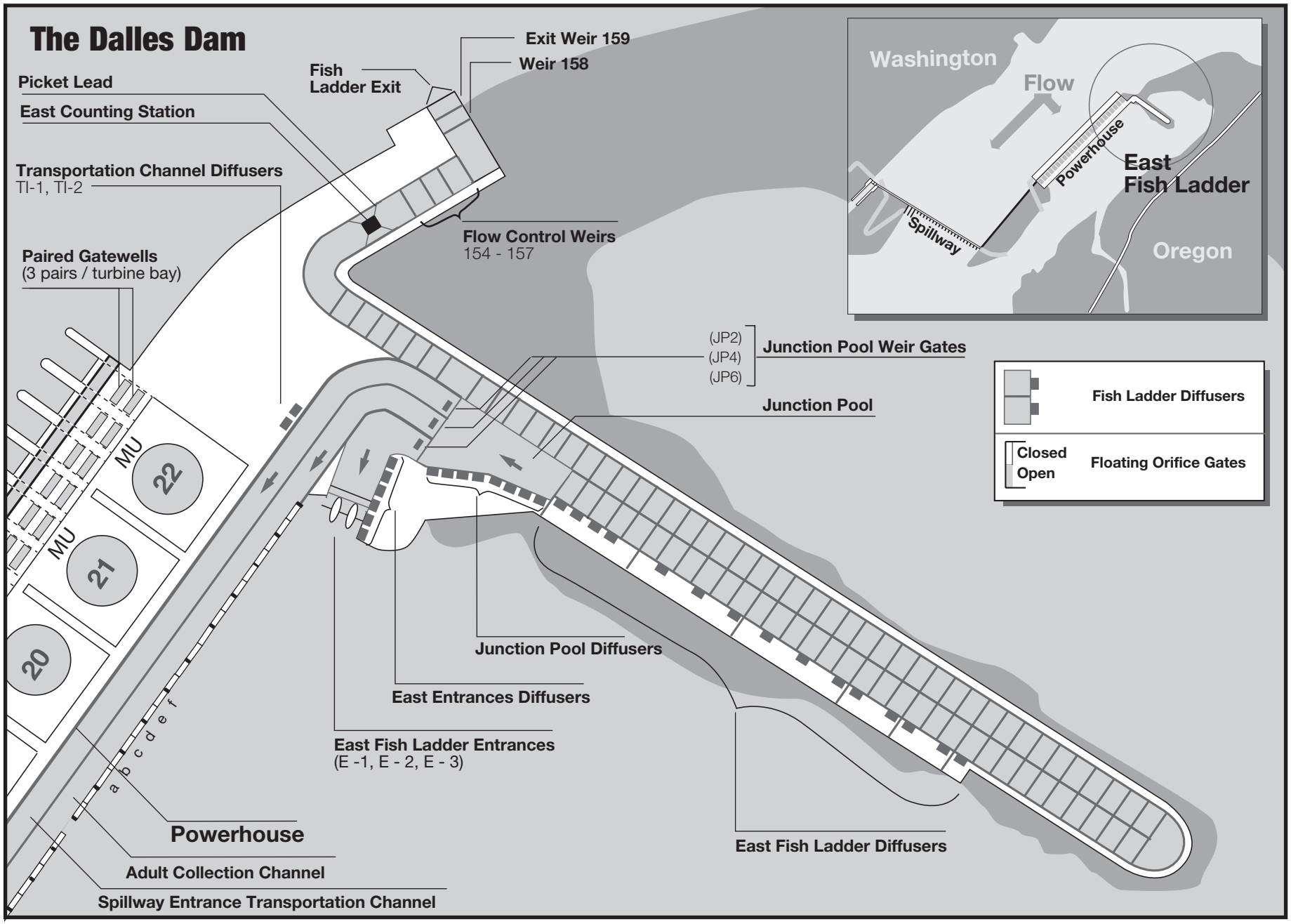


Figure TDA- 2 The Dalles Dam East Fish Ladder.

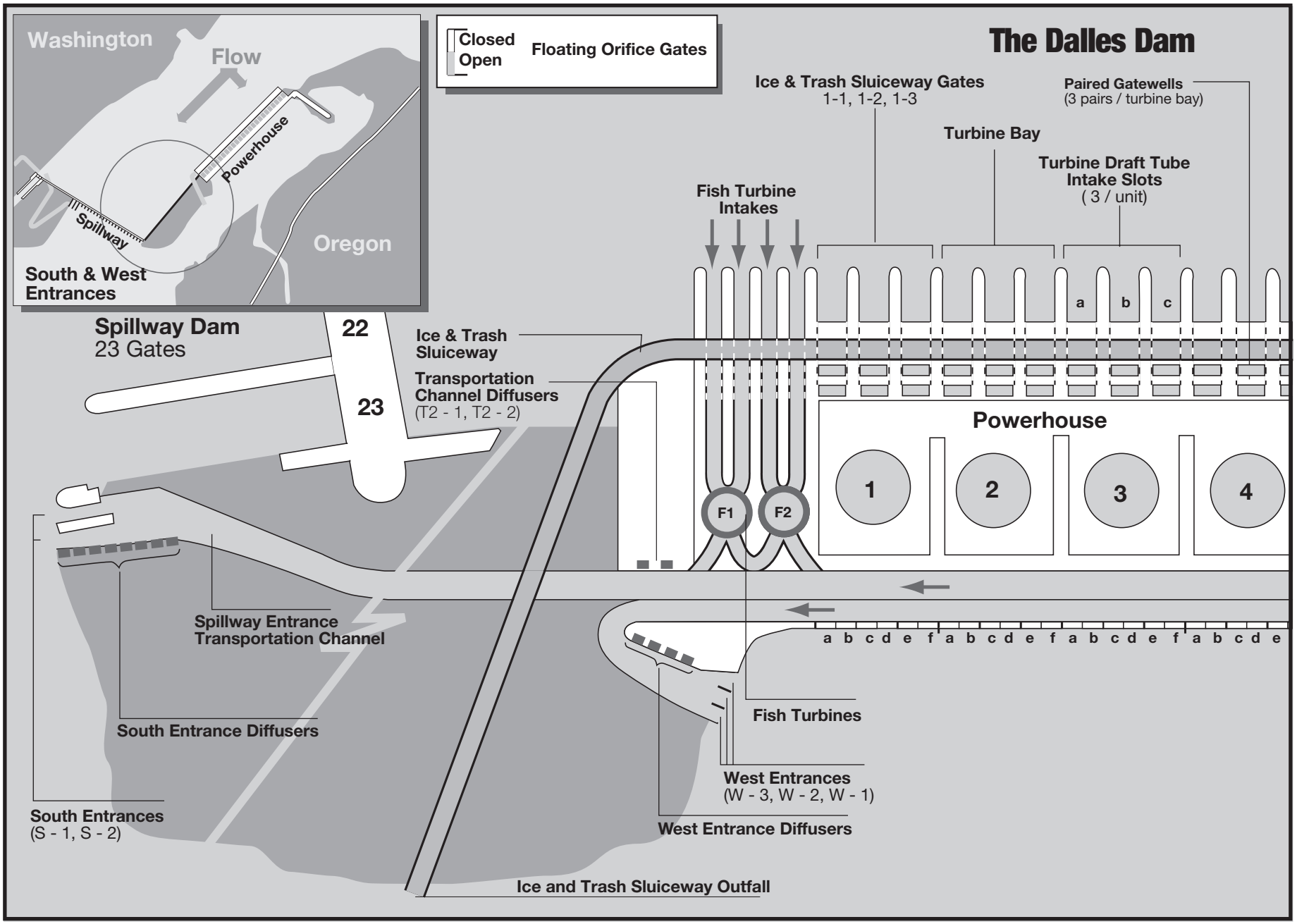


Figure TDA-3 The Dalles Dam South and West Fish Ladder Entrances.

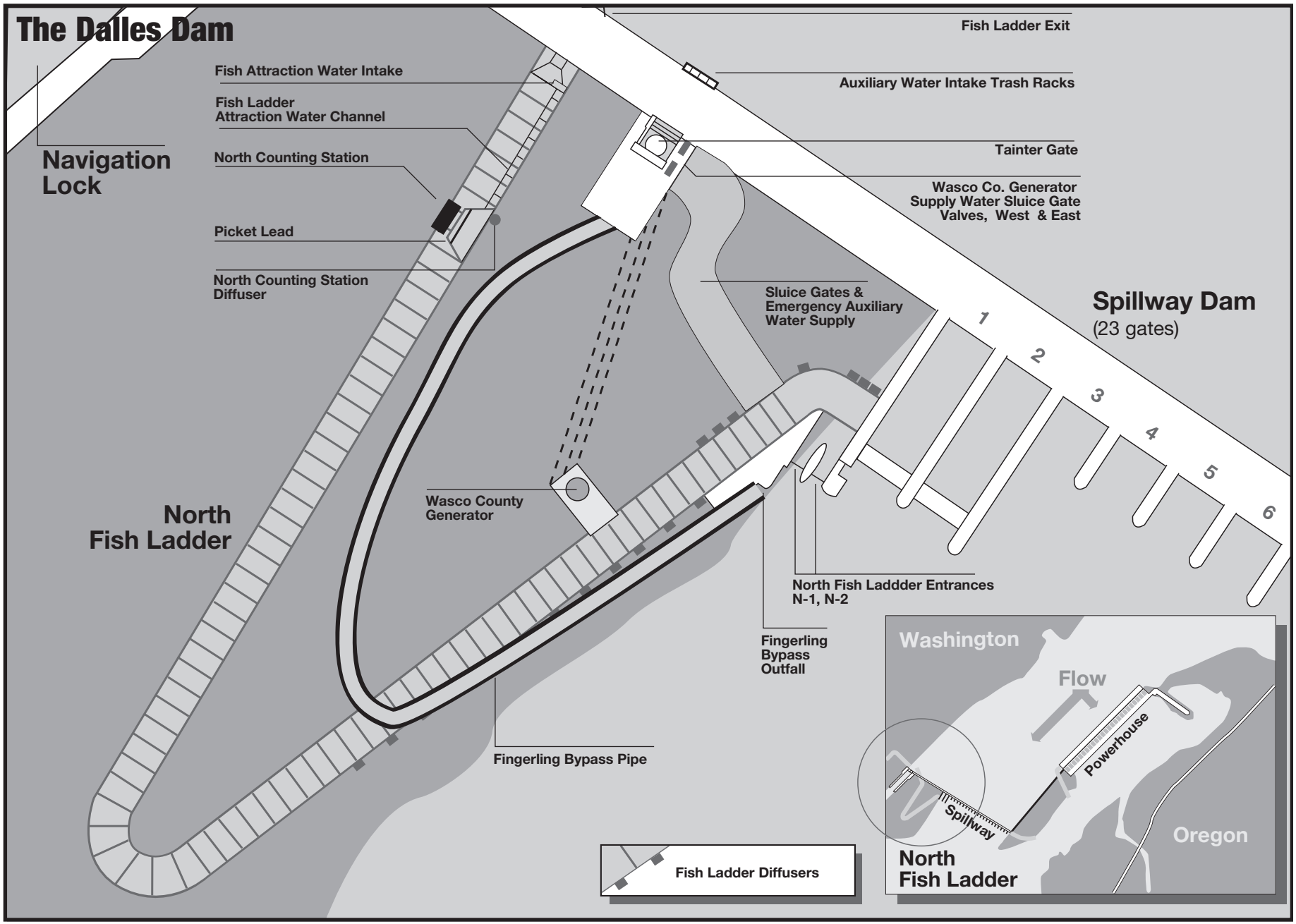
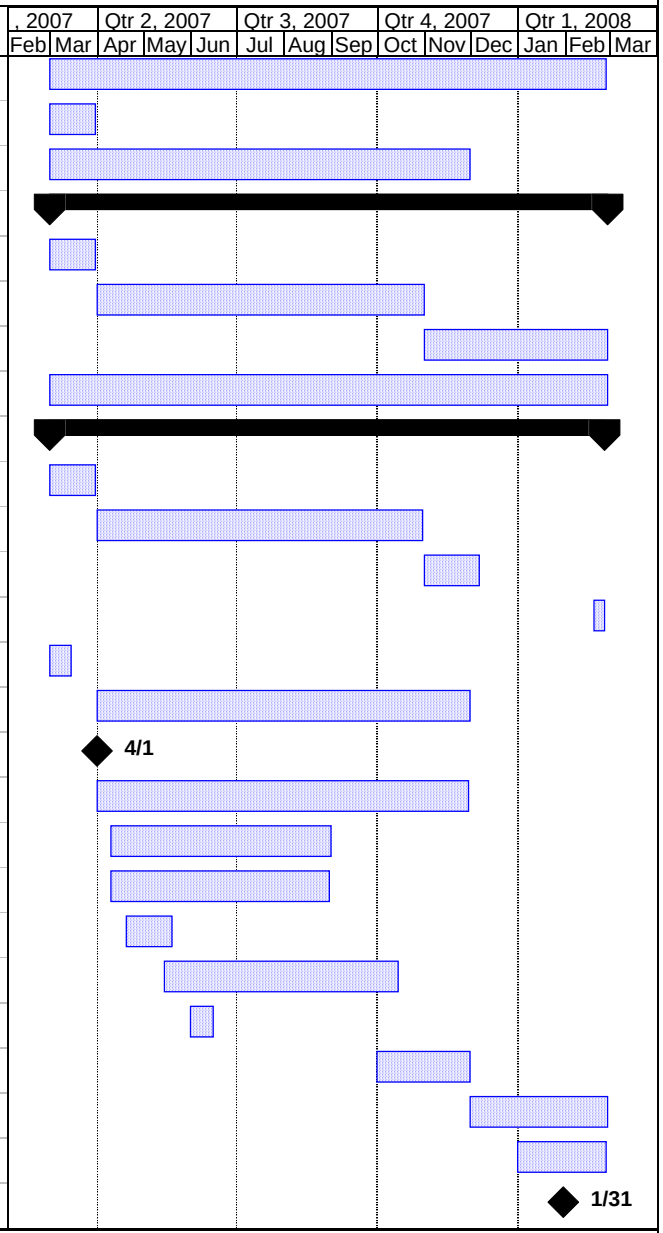


Figure TDA-4 The Dalles Dam North Fish Ladder and Spillway.

Table TDA-1. Dates of project operations for fish purposes at The Dalles, 2007 March 2007

Task Name	Start	Finish	FPP Reference
TDG Monitoring	3/1/07	2/28/08	App D Table 4
Juvenile Fish Maintenance Season	3/1/07	3/31/07	Tda 2.5.1.1
Adult Fish Passage Period	3/1/07	11/30/07	Tda 2.6.1.2
1% limitations	**3/1/07**	**2/28/08**	**Tda 4.4**
1% soft	3/1/07	3/31/07	Tda 4.4
1% hard	4/1/07	10/31/07	Tda 4.4
1% soft	11/1/07	2/28/08	Tda 4.4
Weekly Reports	3/1/07	2/28/08	Tda 2.7
Adult Fish Counting	**3/1/07**	**2/27/08**	**Tda 1.2.2.1**
Video 0400 -2000 PST	3/1/07	3/31/07	Tda 1.2.2.1
Visual 0400 -2000 PST	4/1/07	10/31/07	Tda 1.2.2.1
Video 0400 -2000 PST	11/1/07	12/7/07	Tda 1.2.2.1
Video 0400 -2000 PST	2/20/08	2/27/08	Tda 1.2.2.1
Equipment Installation	3/1/07	3/15/07	App A Tda 2.4
Juvenile Passage Period	4/1/07	11/30/07	Tda 1.1.2
Avian Abatement in Place	4/1/07	4/1/07	Tda 2.5.1.1 e
Operate Ice and Trash Chute	4/1/07	11/30/07	Tda 2.4.1.2 e
Spill for Fish	4/10/07	8/31/07	App E
Adult Salmon Studies	4/10/07	8/31/07	App A Tda 2.3
Spillwall Evaluations	4/20/07	5/20/07	App A Tda 2.1
Adult Lamprey Study	5/15/07	10/15/07	App A Tda 2.2
Rake Trash Racks Again	6/1/07	6/15/07	Tda 2.5.1.2 a
Sluiceway Studies	10/1/07	12/1/07	App A Tda 2.5
Winter Maintenance Adult Facilities	12/1/07	2/28/08	Tda 1.2.2.2
Juvenile Fish Maintenance Season	1/1/08	2/28/08	Tda 2.5.1.1
Annual Report	1/31/08	1/31/08	Tda 2.7



1.2.2.1. The adult fish counting schedule is shown in Table TDA-2. Fish passage from November through March is relatively light; fish counting is done for portions of this period by video rather than visual counting.

Table TDA-2. Adult fish counting schedule at The Dalles Dam.

Period	Counting Method
February 20 – March 31	Video count 0400 – 2000 PST
April 1 – October 31	Visual count 0400 - 2000 PST
November 1 – December 7	Video count 0400 – 2000 PST

1.2.2.2. Annual winter maintenance of adult fish facilities is scheduled from December 1 through February (in-water work period) to minimize impacts on upstream migrants.

1.2.2.3. Adult fish migration timing has been calculated for The Dalles Dam from count data collected by the Corps since 1957. Table TDA-3 summarizes adult fish passage timing through 2006. The primary passage period and the earliest and latest peaks of migration recorded are listed for each species (except shad). Peak lamprey migration timing for only the years 2000-2006 appears in this table.

Table TDA-3. The Dalles Dam adult migration timing, 1957-2006.

Species	Count Period	Earliest Peak	Latest Peak
Spring Chinook	2/20 - 6/3	4/13	5/13
Summer Chinook	6/4 - 8/3	6/6	8/1
Fall Chinook	8/4 – 12/7	9/2	9/16
Sockeye	2/20 – 12/7	6/20	7/10
Steelhead	2/20 – 12/7	7/9	9/23
Coho	2/20 – 12/7	9/3	10/25
Lamprey	2/20 – 12/7	7/14	8/1

2. Project Operation.

2.1. General.

2.1.1. Research, non-routine maintenance, other fish related activities, and construction activities will not be conducted within 100' of any fishway entrance or exit, or within 50' of any other part of the adult fishway, or directly in, above, or adjacent to any fishway, unless coordinated by the project, Portland District Operations and/or Planning, or CENWP Construction office through Fish Passage Operation and Maintenance Team (FPOM) and Fish Facility Design and Review Work Group (FFDRWG). Currently coordinated special operations related to research are described in Appendix A. Alternate actions will be considered by district and project biologists in conjunction with the Regional fish agencies on a case by case basis.

2.1.2. Emergency situations should be dealt with immediately by the project in coordination with the project or district biologist. If unavailable, the biologists will be informed of steps taken to correct the situation immediately following the incident. All activities within the boat-restricted zone (BRZ) will be coordinated at least 2 weeks in advance with the project, unless it is deemed an emergency (see also Overview for coordination guidance.

2.2. All fish passage related equipment and operation will be inspected twice daily.

2.3. Spill Management.

The spill schedules contained in the spreadsheet titled "TDASpillPatterns04.xls" will be utilized to provide spill for juvenile fish passage in 2007. Spill during 2007 will only be provided through operating bays 1-9, with priority given to bays 1-6 to protect juvenile migrants from piscivorous and avian predation. Bays 10-13 will be put on seal. If it is necessary to achieve 40% spill levels when total river flows exceed 450 kcfs, spill may be passed through bays 14-22, as requested and approved through interagency FFDRWG and FPOM coordination. A summary of the spill patterns is provided in Table TDA-5 at the end of this section.

2.4. Total Dissolved Gas Management and Control.

Additional spill management will be based on total dissolved gas (TDG) monitoring data and the observed condition of migrant juvenile and adult fish, along with juvenile migration data. The Corps will monitor TDG at The Dalles Dam forebay and tailrace. Data from automated stations will be reported every four hours from April 1 until September 15. The TDG monitoring system is described in detail in Appendix D.

2.4.1. Excessive TDG levels, which may harm fish, will be controlled to the extent possible, subject to river flow conditions. Control measures will include system spill allocations through the spill priority list issued by Reservoir Control Center (RCC), nighttime or daytime spill limits, and shaping of spill discharge.

2.5. Juvenile Fish Passage Facilities.

2.5.1. Operating Criteria.

2.5.1.1. December 1 through March 31 (Winter Maintenance Period)

a. With the use of an ROV, inspect trashracks and main unit intakes, and if necessary, remove debris from forebay, trashracks, gatewell slots, and gatewell orifices such that these areas are free of debris on April 1.

b. Inspect, lubricate, and test hoist-operated chain gates, end gates, and hoists for operation as needed.

c. Inspect and correct any epoxy or concrete deficiencies on the ice and trash sluiceway walls and floors, where accessible.

d. Inspect and, where necessary, repair spill gates and control systems. The spillway, except for coordinated changes, must be able to achieve spill patterns on April 1.

e. Reinstall or repair avian predator control lines as soon as possible following damage or removal. Install and maintain new avian predator control lines in locations determined to be significantly impacted by avian predators. Avian abatement measures shall be in place by April 1 unless this work is delayed because of inclement weather. If this occurs, the work will be completed as soon as the weather permits after that date. Hazing will be implemented 4/1-9/30. However, there will be no avian abatement measures, other than avian lines, performed from September through March each year.

f. The results of all inspections and the readiness of the facility for operation will be reported to the FPOM immediately prior to the juvenile fish passage season.

g. November 1 through February (per January 2004 FPOM agreement), discontinue operation of the Ice-Trash Sluiceway on a 24 hour basis. Close endgate, and open sluice gates 1-1 and 17-3 to allow fish egress from the ITS that has equalized with the forebay.

h. During March, set top of bottom endgate at elevation 142’ to create an orifice plunge pool. Maintain orifices clear of debris.

i. During March, inspect operating facilities once per day by project fish staff.

2.5.1.2. April 1 through November 30 (Fish Passage Season).

a. Measure gatewell drawdown a minimum of once per week, and more frequently, three times per week or more, as needed during high debris periods. Clean trashracks as flow conditions dictate, or when drawdown in gatewell slots exceeds 1.5’'. Rake trashracks in front of turbine units FU-1 through at least main unit 5 again between June 1 and June 15. All trashracks can be raked using the Hammerhead crane.

b. Remove debris from the forebay as needed by operating sluiceway.

c. Inspect all gatewells daily. The project will clean gatewells before the gatewell water surface becomes half covered with debris. If, due to the volume of debris, it is not possible to keep the gatewell surfaces at least clear, they will be cleaned at least once daily. Turbines with a gatewell fully covered with debris will not be operated except to be in compliance with other coordinated fish measures, and then only on a last on/first off basis.

d. Project maintenance will permanently close the gate slot orifices as the unit intakes are serviced over the next few years, utilizing orifice plates as covers.

e. Open ice and trash sluiceway (ITS) gates 1-1, 1-2, and 1-3 over operating Main Unit-1, and sluiceway gates 5-3, 18-2, and 18-3 over operating Main Unit 18. If either of these main units is out of service, operate the next available main unit and associated gates adjacent to these units, (i.e. operate MU-2 w/gates if MU-1 is OOS, and operate MU-17 w/gates **or** MU-19 w/gates if MU-18 is OOS). The ice and trash sluiceway will be operated on a 24-hour basis April 1 through November. From December 1 through the end of February, put the ITS on seal (do not operate). During periods when gates do not operate, set the top of the bottom end gate at elevation 142' to create an orifice plunge pool.

f. When units are being dewatered, set top of bottom end gate at an elevation to create an orifice plunge pool, and install orifice blocker. After orifice-sealing devices are installed, end gate should be returned to the open position during the juvenile passage season.

g. Efforts should be made to keep all petroleum out of gatewells. Project environmental section will determine cleanup efforts if needed. Regardless of unit operating status, oil accumulations will be dealt with promptly.

h. Reinstall or repair avian predator control lines as soon as possible following damage or removal. Install and maintain new avian predator control lines in locations determined to be significantly impacted by avian predators. Implement avian hazing measures as necessary from April through September only.

i. Follow the schedule in **Table TDA-5** for spill. This schedule was developed for juvenile fish passage.

2.6. Adult Fish Passage Facilities.

2.6.1. Operating Criteria.

2.6.1.1. December 1 through February (Winter Maintenance Period).

a. Inspect and calibrate all staff gages and water level indicators. Repair and/or clean where necessary.

b. Dewater all ladders and inspect for projections, debris, or plugged orifices that could injure fish or slow their progress up the ladder. Make necessary repairs and complete preventative maintenance.

c. Pull exit trashracks and inspect and clear debris from the ladder exits.

d. Inspect count station equipment and assure operational. Reinstall picket leads at counting stations prior to watering up the ladders. Ensure the leads are properly seated.

e. The results of all inspections and the readiness of the facilities for operation will be reported at the FPOM meeting immediately prior to the start of fish passage season.

2.6.1.2. March 1 through November 30 (Fish Passage Season).

a. All Adult Facilities.

1. Water depth over fish ladder weirs: 1.0′ +/- 0.1'. During the shad passage season (> 5000 shad/count station/day): 1.3′ +/- 0.1′. (See **2.6.1.2.b.2**. and **3**. for an exception).

2. Water temperatures will be measured in count station of each adult fishway and station service penstock. Temperatures will be recorded in the fishway status report. When water temperature reaches 70^{o} F, all fish handling activities will be coordinated through FPOM prior to any action to verify protocols that will be followed.

3. Head on all entrances: 1' to 2' (1.5′ optimum). Refer to paragraph **3.3.1**., Routine Maintenance, when unable to achieve head criteria.

4. A water velocity of 1.5 to 4 fps (2 fps optimum) shall be maintained for the full length of the powerhouse collection channel and the lower ends of the fish ladders that are below the tailwater. Water velocities will be measured at one location directly and monitored during fishway inspections to verify channels are operating within velocity criteria.

5. Remove debris as required to maintain head below 0.5' on attraction water intakes and trash racks at all the ladder exits, with a 0.3' maximum head on all picket leads. Debris shall be removed when significant amounts accumulate.

6. Necessary staff gauges and water level indicators will be readable at all water levels encountered during the fish passage period and accuracy checked weekly. Instruments will be recalibrated when necessary, and ASAP.

7. Main entrance weir depths: 8' or greater below tailwater. Maintain a minimum tailwater at 70' msl to remain in entrance weir criteria operating range, which is regulated by RCC.

8. Count station crowders shall remain in the maximum width while visual counting and/or video-taping is being conducted. The crowder shall not be closed to less than 18" width. If passage is impaired by this condition, the count slot may be widened until proper passage conditions are achieved, even though count accuracy may be compromised to some degree. Project biologists, FFU, and fish counters shall coordinate to achieve optimum count slot passage and/or count accuracy conditions. The crowder shall remain fully open during hours when no fish counting is performed.

b. East Fishway.

1. Removable weirs #154 -#157 will drop into the ladder at a differential (water surface at respective weir location relative to the forebay) of 2.5' +/- 0.1'.

2. Telescoping weir #159 will adjust to maintain 1.1 +/- 0.1' depth over the weirs, measured below the counting station.

3. Telescoping weir #158 will track 1' +/- 0.1' below weir #159 at all times during fishway operation.

c. North Fishway Entrance. Operate one entrance weir, N1 or N2. Project biologists and Wasco Co. will work in conjunction to maintain fishway entrances within established criteria.

d. Powerhouse.

1. West Powerhouse Entrance: Operate entrance weirs W1 and W2. W3 will be closed at 81’msl, but remain operational as backup to W1 and W2.

2. East Powerhouse Entrance: Operate entrance weirs E2 and E3 to maintain gate crest > 8’below tailwater, currently operated at 13’below tailwater. Weir E1 to be closed at 81' msl, but remain operational. At lower range of tailwater elevation, E1 may be operated manually at any depth to provide criteria entrance differential.

3. Operate east ladder junction pool weirs at the following minimum depths in relation to east entrance tailwater surface elevation:

JP6.....>7’

4. South Spillway Entrance: Operate entrance weirs S1 and S2 to maintain gate crest at 8’ or greater below tailwater.

5. Discharge from the two operating fish units will be adjusted to maintain criteria at all associated fishway entrances. Discharge volume will be dependent on criteria levels at entrances.

2.6.1.3. December 1 through February (Winter Maintenance Period).

a. Operate the powerhouse and north and south spillway adult fish passage facilities according to the fish passage period standards above except the system may be dewatered or operated out of criteria for repair and maintenance. Adjust the counting station fish crowder to full open and rotate picket leads to the open position at the counting station at the end of the counting season.

b. Only one of the two adult fish facilities may be out of service at any one time unless coordinated through FPOM. The operating facility shall be operated at full fish passage season criteria unless specially coordinated. Outage periods will be minimized to the extent practicable.

c. Inspect operating facilities once per day by project fish staff.

2.7. Facility Monitoring and Reporting.

Project staff shall inspect fish passage facilities at the frequencies listed in the juvenile and adult fish facilities operating criteria sections. Additional fishway inspections may be performed by FFU and/or fisheries agencies. The project fish biologist and fish biological staff shall prepare weekly reports, throughout the year, summarizing project operations. The weekly reports will provide an overview of how the project and fish passage facilities operated during the week and an evaluation of resulting fish passage conditions. The reports shall include: any out of criteria situations observed and subsequent corrective actions taken; any equipment malfunctions, breakdowns, or damage along with a summary of resulting repair activities; adult fishway control calibrations; and any unusual activities which occurred at the project which may affect fish passage. The weekly reports shall cover a Sunday through Saturday time period and shall be sent to CENWP-OD and other interested parties as soon as possible the following week, with a copy to RCC, Attention: Fish Team. The project biologist shall prepare an annual report by January 31, summarizing the operation of the project fish passage facilities for the previous year. The report will cover from the beginning of one adult fish facility winter maintenance season to the beginning of the next. The annual report also will include a description of all action taken to discourage avian predation at the project. The annual report will be provided to CENWP-OD in time for distribution to FPOM members at the February meeting. Project biologist will report events such as fish kills or major equipment failure with in the next business day.

3. Fish Facilities Maintenance.

3.1. General.

3.1.1. Routine Maintenance.

3.1.1.1. Staff gages will be installed, cleaned, and/or repaired as required.

3.1.1.2. A zebra mussel monitoring program will continue. This includes veliger (free-swimming juvenile life-stage) sampling, colonization sample units, and dewatering inspections. These organisms have become a serious problem elsewhere in the country and may become introduced into the Columbia River basin.

3.1.1.3. Routine fishway maintenance, to the extent practicable, will be conducted during periods when passage has been documented to be at its lowest to minimize impacts to migrating salmonids. Maintenance activities that occur during the fish passage period and that may affect fish passage will be reported in the weekly reports (paragraph **2.6**).

3.2. Juvenile Fish Passage Facilities.

3.2.1. Routine Maintenance.

3.2.1.1. Collection and Transportation Systems. The Dalles Dam ice and trash sluiceway will receive preventive maintenance throughout the year. During the juvenile fish passage season, this will normally be above-water work, such as maintenance of automatic systems, air lines, electrical systems, and monitoring equipment. The system is then visually inspected in all accessible areas for damaged equipment and areas that may cause problems to the juvenile fish. Any problem areas identified are repaired and modifications to the channel and general maintenance are completed. The trash racks are raked if necessary as determined by ROV inspection just prior to the juvenile fish passage season (April 1), between June 1 and June 15, and whenever trash accumulations are suspected because of increased head across the trash racks.

3.2.1.2. Turbines and Spillways. Maintenance and routine repair of project turbines and spillways is a regular and recurring process which requires that units be shut down for extended periods(see **section 5**. Dewatering Plans.) The schedule for this maintenance is reviewed by the project and district biologists and coordinated within NWP, NWD, BPA, and among fish agencies and tribes through the FPOM. Certain turbine and spillway discharges at the projects are secondarily used to attract adult fish to the fishway entrance areas. The maintenance schedules for these turbines and spillways will reflect equal weighting given to fish, power, and water management, and will be coordinated with the appropriate resource agencies. No other fish related restrictions regarding maintenance will be placed on any units at this project, except to coordinate research activities. Some types of turbine maintenance will require testing operation of the turbine throughout its full range before returning it to normal service. Units which should receive low priority for scheduling maintenance during the fish passage season are F1, F2, 1, 2, 3, 4 5, and 18 (during ice and trash sluiceway operation).

3.2.2. Non-Routine Maintenance. Maintenance of all fish related facilities will be carried out as described below. Unscheduled maintenance that will have a significant impact on juvenile fish passage shall be coordinated through FPOM on a case-by-case basis by project and CENWP-OD biologists. The CENWP-OD biologists will be notified as soon as possible after it becomes apparent that maintenance repairs are required. The Project Operations Manager has the authority to initiate work prior to notifying CENWP-OD when delay of the work will result in an unsafe situation for people, property, or fish. (See also **Overview** section for coordination guidance). Information required by CENWP-OD includes:

a. Description of the problem.

b. Type of outage required.

c. Impact on facility operation.

d. Length of time for repairs.

e. Expected impacts on fish passage.

3.2.2.1. Collection and Transportation Systems. The ice and trash sluiceway is now being used as a juvenile bypass system.

a. The chain/hoist gates are fully opened during normal operation. If a chain gate fails, an adjacent gate can be operated until repairs can be made.

b. Inspect all gatewells daily. The project will clean gatewells before the gatewell water surface becomes half covered with debris. If due, to the volume of debris, it is not possible to keep the gatewell surfaces at least half clear, they will be cleaned at least once daily. Turbines with a gatewell fully covered with debris will not be operated except on a last on/first off basis, if required to be in compliance with other coordinated fish measures. This is to maintain clean orifices and minimize fish injury.

c. If a gate hoist fails, it will be repaired promptly. The gate will be removed when there are problems with the seal and the difficulty cannot be repaired promptly. If the epoxy-lined section of the sluiceway is damaged, it will be repaired.

3.2.2.2. Turbines and Spillways- Spill Gate Failure. If a spill gate becomes inoperable, the operators will make the changes necessary to accommodate the spill and then immediately notify the Project Operations supervisor and the project biologist to determine the best pattern to follow until repairs can be made. This interim operation shall be coordinated with FPOM and FFDRWG through the CENWP-OD biologist, who will, depending on coordination, provide additional guidance to the project (see also **2.2**. Spill Management).

3.3. Adult Fish Passage Facilities.

3.3.1. Routine Maintenance. Maintenance activities that occur during the fish passage period and that may affect fish passage will be reported in the weekly reports (paragraph 2.6).

3.3.1.1. Fishway Auxiliary Water Systems. The Dalles Project fishway auxiliary water is provided by discharge from hydroelectric turbine systems. Preventive maintenance and normal repair occur throughout the year. Trashracks for the AWS intakes will be raked when drawdown exceeds criteria. When practicable, rake trashracks during the time of day when fish passage is least affected.

3.3.1.2. Powerhouse and Spillway Adult Collection Systems. Preventive maintenance and repair occurs throughout the year. During the adult fish passage season the maintenance will not involve any operations that will cause a failure to comply with the fishway criteria, unless specially coordinated. Inspection of those parts of the adult collection channel systems, such as diffusion gratings, picket leads, and entrance gates, will be scheduled once per year during the winter maintenance season while the system is dewatered. An inspection during first week of august with the system watered up will also be conducted (see section 5. Dewatering Plans.). A diver or underwater video system may be used for underwater inspections. Any non-routine maintenance and fishway modification will be handled on a case-by-case basis.

3.3.1.2.1. The project fish biologist or alternate Corps fish personnel will attend all dewatering activities potentially involving fish, as well as inspections to provide fish input (see **section 5**.).

3.3.1.3. Adult Fish Ladders and Counting Stations. The adult fish ladders will be dewatered once each year during the winter maintenance period. Unless specially coordinated, only one ladder will be dewatered at a time, with the other ladder capable of operating within criteria. During this time, the ladders are inspected for blocked orifices, projections into the fishway that may injure fish, stability of the weirs, damaged picket leads, exit gate problems, loose diffuser valves, ladder orifice reduction plates, malfunctioning equipment at the counting stations, and other potential problems. Problems identified throughout the passage year that do not affect fish passage, as well as those identified during the dewatered period are then repaired. Trashracks at the ladder exits and the north AWS intake will be raked when criteria are exceeded. Rake trashracks between 1100 and one hour prior to sunset. Fish count station windows will be cleaned when necessary, and when practicable.

3.3.2. Non-Routine Maintenance. Maintenance activities that occur during the fish passage period and that may affect fish passage will be reported in the weekly reports (section 2.6). Non-routine maintenance that will significantly affect the operation of a facility, such as repair of displaced diffuser gratings, will be coordinated with the Region, through FPOM. Coordination procedures for non-routine maintenance of adult facilities are the same as for juvenile facilities (paragraph **3.2.2**, and **Overview** section).

3.3.2.1. Fishway Auxiliary Water Systems. Most fishway auxiliary water systems operate automatically. If the automatic system fails, the system will be manually operated by the project personnel until the system is repaired. When this operation becomes necessary, project personnel will increase surveillance on the adult system to ensure that criteria are being met. In the event of AWS failure, FPOM will work with the project to determine the best operating procedure.

a. Powerhouse. If one of the two fishway auxiliary water turbines fails or malfunctions for eight hours or longer, use the following sequential procedure until a fishway entrance head of 1' is achieved:

1. Increase discharge of remaining operating fish unit to maximum operating capacity.

2. Raise entrance weir E2 and E3 to 8’ depth.

3. Close entrance weir S1.

4. Close entrance weir S2 in 1’ increments.

5. Close entrance weir W2 in 1’ increments.

6. Close entrance weir W1 in 1’ increments.

7. Differentials for open entrances should be checked between each of the above steps.

b. If both of the fishway auxiliary water turbines fail or malfunction, regardless of fish passage season, the adult fish passage facility will be operated as follows:

1. Raise the south entrance weirs to elevation 81’msl (closed position).

2. Close west entrance.

3. Close entrance weir E1 and E2 and keep E3 at 6’ depth

c. North Ladder. If the North Wasco County power unit auxiliary water system fails, the backup auxiliary water system will be started and the system operated at criteria. If the backup auxiliary water system fails, N1 will remain open with a weir depth of 6' below the tailwater surface.

3.3.2.2. Powerhouse and Spillway Adult Fish Collection Systems. The Dalles Dam contains several types of fishway entrances. In most cases, if failures occur, the entrance will be operated manually by project personnel until repairs are made. If this operation becomes necessary, project personnel will increase surveillance on the adult system to ensure criteria are being met. In those cases in which the failure will not allow the entrance to be operated manually, the gate will be maintained, to the extent possible, in an operational position. If this is not possible, the entrance will be repaired expediently, and it will be returned to manual or automatic control at the earliest possible date.

3.3.2.3. Adult Fish Ladders and Counting Stations. The ladder structures include picket leads, counting stations, fishway exits, and overflow weirs with orifices. Picket leads with excessive spacing (greater than 1"), erosion of concrete around the picket leads or missing pickets can allow fish into areas where escape is not likely. If picket lead failure or concrete erosion occurs, then the timing and method of repair will depend upon the severity of the problem. The decision of whether or not to dewater the fishway and repair any problem will be made in coordination with the fish agencies and tribes through the FPOM.

3.3.2.4. Diffuser Gratings. Diffuser chambers for adding auxiliary water to fish ladders and collection channels are covered by gratings attached by several different methods. Diffuser gratings are normally checked during the winter maintenance period to make sure they are in place. These inspections are done by either dewatering the fish passage system and physically inspecting the diffuser gratings, or using underwater video cameras and divers or other methods to inspect the gratings. Diffuser gratings may come loose during the fish passage season due to a variety of reasons. If a diffuser grating is known to or suspected of having moved, creating an opening into a diffuser chamber, close associated diffuser valve ASAP. Efforts must immediately be taken to correct the situation and minimize impacts on adult fish in the fishway. If possible, a video inspection should be made as soon as possible to determine the extent of the problem. If diffuser gratings are

found to be missing or displaced, creating openings into the diffuser chambers, a method of repair shall be developed and coordinated with the fish agencies and tribes through the established FPOM coordination procedure. Repairs shall be made as quickly as possible unless coordinated differently.

4. Turbine Unit Operation and Maintenance.

4.1. Throughout the juvenile fish passage season, either turbine unit 1 or unit 2 or both units will operate during daylight hours unless specially coordinated with FPOM. In order to provide favorable fish passage conditions while meeting transmission line needs, the main powerhouse turbine units will operate in the following priority order: Unit 1 then Unit 2 at the west end of the powerhouse, then place every other available unit on line until the east end of the powerhouse is reached. Then go back to the west end of the powerhouse and place the remaining available units on line, from west to east, until all the available units are on line. Reverse the order when reducing load.

4.2. The project turbine unit maintenance schedules will be reviewed by project and district biologists for fish impacts and be coordinated with FPOM.

4.3. Guidelines for operation of the turbine units within 1% of best efficiency at various head ranges are shown in Table TDA-4.

4.4. To the extent technically feasible, turbines will be operated within +/- 1% of best turbine efficiency from April 1 through October 31 (as specified in the BPA load shaping guidelines). However, during the rest of the year, the project will continue to operate units within the turbine efficiency range, except as specifically requested by BPA to do otherwise as power requirements demand.

4.5. When it is necessary to operate turbines outside of the 1% efficiency range, the units will be selected according to the following guidance: Units 7 through 14 will be selected first, spacing by at least one unit. For example, assuming they are available to operate, the following sequence might be used: 7, 9, 11, 13, 15, 5, 2, 1, 8, etc. Since each successive unit in this list is thought to pass more fish, this outage priority sequence is intended to have a lower negative impact on fish during turbine unit passage, if units are taken out of service in this order.

5. Dewatering Plans.

5.1. Guidelines for Dewatering and Fish Handling Plans have been developed by the projects and approved by FPOM, and are followed for most project facilities dewaterings. These plans include consideration for fish safety and are consistent with the following general guidance. The appropriate plans are reviewed by participants before each salvage operation.

5.2. The project fish biologist and/or alternate Corps fish personnel will attend all project activities involving fish handling.

5.3. The fish agencies and tribes are encouraged to participate in all ladder dewaterings. Agency fish count supervisor required, per contract, to attend.

5.4. Adult Fish Ladder.

5.4.1. Routine maintenance.

5.4.1.1. When possible, operate the ladder to be dewatered at orifice flow with the AWS off for at least 24 hours, but not more than 96 hours prior to dewatering.

5.4.1.2. A project biologist will assure that fish rescue equipment is available, and will coordinate to ensure adequate numbers of personnel will be available to move fish out of the dewatered ladder.

5.4.1.3. Project personnel will install exit bulkheads to shut down ladder flow. Where possible, a minimum flow of 1"-2" will be maintained in the ladder until fish are rescued.

5.4.1.4. The project biologist or alternate Corps fish personnel will oversee fish rescue when the ladders are dewatered. The fish are then transported to the forebay or tailwater, depending on the fish life stage (adults to forebay, juveniles to tailrace), for release. If a ladder is dewatered in the spring or summer, identifiable steelhead kelts should be released into the tailrace.

5.4.1.5. Orifice blocking devices, with attachment ropes tied to handrails, may be placed in the lower-most weirs to prevent fish from re-ascending the dewatered portion of the adult fishway. Use of orifice blocking devices will be at the discretion of the project biologist. The fishway return-to-service checklist is as follows:

a. Remove orifice blocking devices if used.

b. Activate automation for systems.

c. Assure all count station lighting is operational.

d. Open count station crowder

e. Close picket leads.

f. Remove all tools, equipment, and debris from inside ladder.

5.4.2. Non-Routine Maintenance.

5.4.2.1. When possible, discontinue fishway auxiliary water and operate ladder at reduced flow as long as possible (prefer 3-24 hours) prior to dewatering.

5.4.2.2. Follow steps 5.4.1.3. through 5.4.1.5. above.

5.5. Powerhouse Collection System.

5.5.1. Routine Maintenance.

5.5.1.1. During the pumping or draining operation to dewater a portion or the entire collection channel, the water level will not be allowed to drop so low it strands fish. Personnel shall remain present onsite during pumping operations to ensure stranding does not occur or a water level sensor that de-activates the dewatering process will be used.

5.5.1.2. The project biologist will ensure that rescue equipment is available if needed.

5.5.1.3. The project biologist or alternate Corps fish personnel will provide technical guidance on fish safety and will assist directly in rescue operations.

5.6. Turbines.

5.6.1. Gatewells need not be dipped as is required at other projects due to the lack of VBSs. Instead, the following procedure shall be used. The unit will be shut down for at least 24 hours before it is drained. Then, immediately before draining it will be operated at speed/no load briefly to flush fish out of the draft tube.

5.6.2. When possible, place head gates and tail logs immediately after the turbine unit is shut down if the draft tube is to be dewatered. Operate at speed/no load just prior to shut down. Install bottom two tail logs side-by-side first before stacking the remainder to minimize sturgeon from entering the draft tube before dewatering. This is necessary for both scheduled and unscheduled outages.

5.6.4. If a turbine unit is idle and partially dewatered, and tail logs are put into place, an adequate safety pool may be maintained for up to 4 days to accommodate fish trapped in the draft tube (If longer timeframes are needed for the safety pool, project fisheries will coordinate with FPOM on a case-by-case basis). The safety pool will be maintained at an appropriate level which will be determined by the project biologist.

5.6.5. Fish rescue personnel will inspect dewatered turbine draft tubes and intakes as soon as the water levels reach a depth permitting visual inspection and the hatch cover is opened. The project biologist or alternate Corps fish personnel will provide technical guidance on fish safety, will assure that rescue equipment is available if needed, and will directly participate in fish salvage.

Table TDA-4. Ranges for turbine operation within 1% of best efficiency at The Dalles Dam.

Head Ft	Units 1-14				Units 15-22			
	Lower Limit MW	Lower Limit cfs	Upper Limit MW	Upper Limit cfs	Lower Limit MW	Lower Limit cfs	Upper Limit MW	Upper Limit cfs
55	35.1	8,854	44.1	11,108	38.5	9,643	49.3	12,346
56	35.9	8,875	45.1	11,147	39.0	9,554	50.6	12,402
57	36.7	8,894	46.2	11,184	39.4	9,468	51.9	12,454
58	37.5	8,912	47.2	11,219	39.9	9,384	53.2	12,503
59	38.3	8,929	48.3	11,252	40.4	9,302	54.4	12,548
60	39.1	8,945	49.4	11,282	40.8	9,223	55.7	12,590
61	39.5	8,870	50.8	11,415	41.6	9,219	56.8	12,599
62	39.9	8,798	52.3	11,543	42.3	9,215	57.9	12,607
63	40.3	8,728	53.8	11,665	43.0	9,211	58.9	12,613
64	40.7	8,660	55.3	11,783	43.8	9,207	60.0	12,619
65	41.0	8,593	56.8	11,896	44.5	9,202	61.1	12,624
66	41.8	8,614	58.0	11,939	45.1	9,164	62.5	12,719
67	42.6	8,633	59.2	11,980	45.6	9,127	64.0	12,810
68	43.4	8,652	60.3	12,019	46.1	9,091	65.5	12,899
69	44.2	8,670	61.5	12,056	46.7	9,056	66.9	12,984
70	45.0	8,686	62.7	12,092	47.2	9,021	68.4	13,066
71	45.8	8,693	63.7	12,111	47.9	9,019	70.0	13,168
72	46.5	8,700	64.5	12,067	48.6	9,016	70.6	13,105
73	47.2	8,706	65.2	12,024	49.3	9,014	71.3	13,043
74	47.9	8,712	65.9	11,982	50.0	9,011	72.0	12,983
75	48.6	8,717	68.0	12,179	50.7	9,008	76.2	13,542
76	49.1	8,673	69.2	12,226	51.3	8,984	77.8	13,638
77	49.5	8,629	70.4	12,270	51.8	8,960	79.4	13,731
78	49.9	8,587	71.6	12,314	52.4	8,936	81.0	13,821
79	50.4	8,545	72.8	12,356	53.0	8,913	82.6	13,908
80	50.8	8,505	74.0	12,396	53.5	8,891	84.3	13,993
81	51.4	8,493	75.4	12,471	54.2	8,896	85.9	14,092
82	52.0	8,482	76.8	12,543	54.9	8,902	87.5	14,188
83	52.5	8,471	78.2	12,613	55.6	8,908	89.2	14,283
84	53.1	8,460	79.6	12,681	56.3	8,914	90.8	14,375
85	53.7	8,449	81.0	12,748	57.0	8,919	92.4	14,465
86	54.3	8,441	82.5	12,833	57.5	8,898	94.1	14,564
87	54.9	8,433	84.0	12,916	58.0	8,877	95.8	14,660
88	55.5	8,425	85.6	12,997	58.5	8,856	97.4	14,755
89	56.0	8,417	87.1	13,076	59.0	8,836	98.7	14,786
90	56.6	8,409	88.6	13,154	59.5	8,817	98.7	14,602
91	57.3	8,411	89.7	13,236	60.1	8,815	98.7	14,429
92	57.9	8,414	89.7	13,080	60.8	8,813	98.7	14,260
93	58.6	8,416	89.7	12,928	61.4	8,811	98.7	14,094
94	59.2	8,418	89.7	12,779	62.1	8,809	98.7	13,932
95	59.8	8,420	89.7	12,634	62.7	8,808	98.7	13,773

Note: Tables is based on information provided by HDC in 2001 and 2002(Table TDA-4 revised, 2006).

6. Forebay Debris Removal.

Debris at projects can impact fish passage conditions. It can plug or block trashracks, gatewell orifices, dewatering screens, separators, and facility piping resulting in impingement, injuries, and descaling of fish. The preferred option is to remove debris at each project when possible to avoid passing a debris problem on to the next project downstream. This is not always possible at each project as some projects do not have forebay debris removal capability. In this case, the only viable alternative is to spill to pass the debris.

6.1. All special spills (other than normal spill patterns for ongoing spill operations) and project operations for passing debris will be coordinated prior to the operations taking place. Each project shall contact CENWP-OD at least two work days prior to the day they want the special project operations for spilling to pass debris. CENWP-OD shall coordinate the special operations with RCC and FPOM. Project personnel shall provide CENWP-OD the reason for the debris spill request, including an explanation of project facilities being impacted by the debris, the date and time of the requested spill, and any special powerhouse or other operations required to move the debris to the spillway. When a debris spill is coordinated and approved, RCC shall issue a teletype detailing the specifics of the special operations.

Table TDA-5. Examples of spill patterns for juvenile fish passage at The Dalles Dam. The full spill patterns are contained in the spreadsheet titled "TDA Spill Pattern May 2006.xls". Patterns vary as a function of total river flow, forebay elevation, and tailwater elevation at the spillway stilling basin.

Spillway Bay Number																							Total	Total	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Feet	Spill	Flow
vertical gate opening (ft.)																							(ft)	(cfs)	(cfs)
4																							4	6,000	15,000
4	4																						8	12,000	30,000
6	6																						12	18,000	45,000
		4	4	4	4																		16	24,000	60,000
	4	4	4	4	4																		20	30,000	75,000
4	4	4	4	4	4																		24	36,000	90,000
4.5	4.5	4.5	4.5	4.5	4.5																		27	40,500	101,250
5	5	5	5	5	5																		30	45,000	112,500
5.5	5.5	5.5	5.5	5.5	5.5																		33	49,500	123,750
6	6	6	6	6	6																		36	54,000	135,000
6.5	6.5	6.5	6.5	6.5	6.5																		39	58,500	146,250
7	7	7	7	7	7																		42	63,000	157,500
7.5	7.5	7.5	7.5	7.5	7.5																		45	67,500	168,750
8	8	8	8	8	8																		48	72,000	180,000
8.5	8.5	8.5	8.5	8.5	8.5																		51	76,500	191,250
9	9	9	9	9	9																		54	81,000	202,500
9.5	9.5	9.5	9.5	9.5	9.5																		57	85,500	213,750
10	10	10	10	10	10																		60	90,000	225,000
10.5	10.5	10.5	10.5	10.5	10.5																		63	94,500	236,250
11	11	11	11	11	11																		66	99,000	247,500
11.5	11.5	11.5	11.5	11.5	11.5																		69	103,500	258,750
12	12	12	12	12	12																		72	108,000	270,000

Table TDA-5 continued

Spillway Bay Number																							Total	Total	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Feet	Spill	Flow
vertical gate opening (ft.)																							(ft)	(cfs)	(cfs)
12.5	12.5	12.5	12.5	12.5	12.5																		75	112,500	281,250
13	13	13	13	13	13																		78	117,000	292,500
13.5	13.5	13.5	13.5	13.5	13.5																		81	121,500	303,750
14	14	14	14	14	14																		84	126,000	315,000
14	14	14	14	14	14	3																	87	130,500	326,250
13	13	13	13	13	13	10																	88	132,000	330,000
13	13	13	13	13	13	11																	89	133,500	333,750
13	13	13	13	13	13	12																	90	135,000	337,500
14	14	14	14	14	14	12																	96	144,000	360,000
14	14	14	14	14	14	12	3																99	148,500	371,250
13	13	13	13	13	13	12	10																100	150,000	375,000
13	13	13	13	13	13	12	11																101	151,500	378,750
13	13	13	13	13	13	12	12																102	153,000	382,500
14	14	14	14	14	14	12	12																108	162,000	405,000
14	14	14	14	14	14	12	12	3															111	166,500	416,250
13	13	13	13	13	13	12	12	10															112	168,000	420,000
13	13	13	13	13	13	12	12	11															113	169,500	423,750
13	13	13	13	13	13	12	12	12															114	171,000	427,500
14	14	14	14	14	14	12	12	12															120	180,000	450,000
14	14	14	14	14	14	12	12	12	0	0	0	0	1										121	181,500	453,750
14	14	14	14	14	14	12	12	12	0	0	0	0	1	1									122	183,000	457,500
14	14	14	14	14	14	12	12	12	0	0	0	0	1	1	1								123	184,500	461,250
14	14	14	14	14	14	12	12	12	0	0	0	0	1	1	1	1							124	186,000	465,000

Table TDA-5 continued

Spillway Bay Number																						Total	Total	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Feet	Spill	Flow
vertical gate opening (ft.)																							(ft)	(cfs)	(cfs)
14	14	14	14	14	14	12	12	12	0	0	0	0	1	1	1	1	1						125	187,500	468,750
14	14	14	14	14	14	12	12	12	0	0	0	0	1	1	1	1	1	1					126	189,000	472,500
14	14	14	14	14	14	12	12	12	0	0	0	0	1	1	1	1	1	1	1				127	190,500	476,250
14	14	14	14	14	14	12	12	12	0	0	0	0	1	1	1	1	1	1	1	1			128	192,000	480,000
14	14	14	14	14	14	12	12	12	0	0	0	0	2	2	2	2	2	2	2	2			136	204,000	510,000
14	14	14	14	14	14	12	12	12	0	0	0	0	3	3	3	3	3	3	3	3			144	216,000	540,000
14	14	14	14	14	14	12	12	12	0	0	0	0	4	4	4	4	4	4	4	4			152	228,000	570,000
14	14	14	14	14	14	12	12	12	0	0	0	0	5	5	5	5	5	5	5	5			160	240,000	600,000
14	14	14	14	14	14	12	12	12	0	0	0	0	6	6	6	6	6	6	6	6			168	252,000	630,000
14	14	14	14	14	14	12	12	12	0	0	0	0	7	7	7	7	7	7	7	7			176	264,000	660,000
14	14	14	14	14	14	12	12	12	0	0	0	0	8	8	8	8	8	8	8	8			184	276,000	690,000
14	14	14	14	14	14	12	12	12	0	0	0	0	9	9	9	9	9	9	9	9			192	288,000	720,000
14	14	14	14	14	14	12	12	12	0	0	0	0	10	10	10	10	10	10	10	10			200	300,000	750,000
14	14	14	14	14	14	12	12	12	0	0	0	0	11	11	11	11	11	11	11	11			208	312,000	780,000
14	14	14	14	14	14	12	12	12	0	0	0	0	12	12	12	12	12	12	12	12			216	324,000	810,000
14	14	14	14	14	14	12	12	12	0	0	0	0	12	12	12	12	12	12	12	12	6		222	333,000	832,500
14	14	14	14	14	14	12	12	12	0	0	0	0	12	12	12	12	12	12	12	12	12		228	342,000	855,000
14	14	14	14	14	14	12	12	12	0	0	0	0	12	12	12	12	12	12	12	12	12	6	234	351,000	877,500
14	14	14	14	14	14	14	14	14	0	0	0	0	14	14	14	14	14	14	14	14	14	7	259	388,500	971,250
14	15	15	15	15	15	15	15	15	0	0	0	0	15	15	15	15	15	15	15	15	15	7	276	414,000	1,035,000
14	16	16	16	16	16	16	16	16	0	0	0	0	16	16	16	16	16	16	16	16	16	8	294	441000	1,102,500
14	17	17	17	17	17	17	17	17	0	0	0	0	17	17	17	17	17	17	17	17	17	8	311	466500	1,166,250
15	18	18	18	18	18	18	18	18	0	0	0	0	18	18	18	18	18	18	18	18	18	9	330	495000	1,237,500

NOTE 1: Bays 14 through 21 should be open incrementally a foot at a time to get to the desired spill.