
2018 Fish Passage Plan

Chapter 4 – John Day Dam

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John Day Dam *	
Project Acronym	JDA
River Mile (RM)	Columbia River – RM 215.6
Reservoir	Lake Umatilla
Minimum Instantaneous Flow (kcfs)	Dec–Feb: 12.5 kcfs \ Mar–Nov: 50 kcfs
Forebay Normal Operating Range (ft)	Nov–Jun: 260’–265’ \ Jul–Oct: 265’–268’
Tailrace Rate of Change Limit (ft)	3’/hr
Powerhouse Length (ft)	1,975’
Powerhouse Hydraulic Capacity (kcfs)	322 kcfs
Turbine Units (#)	16 (Units 1-16 BLH Kaplan)
Turbine Generating Capacity (MW)	Rated: 2,160 MW (135 MW/unit) \ Maximum: 2,480 MW (155 MW/unit)
Gatewell Orifice Diameter (in)	One 14” orifice per gatewell (3 per unit) = 48 total
Spillway Length (ft)	1,228’
Spillway Hydraulic Capacity (kcfs)	2,250 kcfs
Spillbays (#)	20
Spillway Weirs (#)	2 Temporary Spillway Weirs (TSW) Bays 18, 19
Navigation Lock Length x Width (ft)	650’ x 86’
Navigation Lock Max. Lift (ft)	113’

* More information is available on the Corps Portland District website for John Day Dam at:
www.nwp.usace.army.mil/Locations/Columbia-River/John-Day/

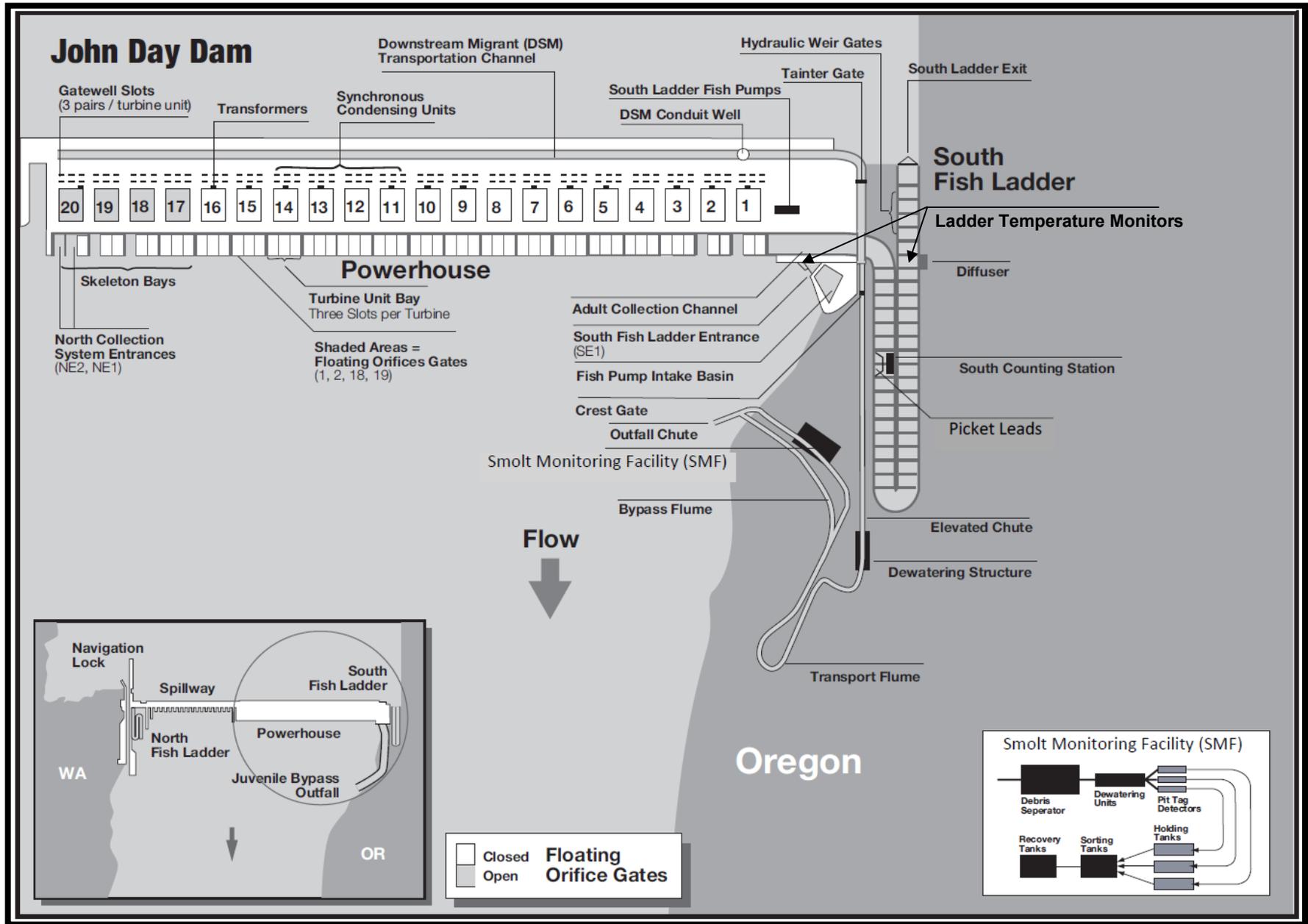


Figure JDA-1. John Day Dam South Fish Ladder, Powerhouse Collection System, and Juvenile Bypass System.

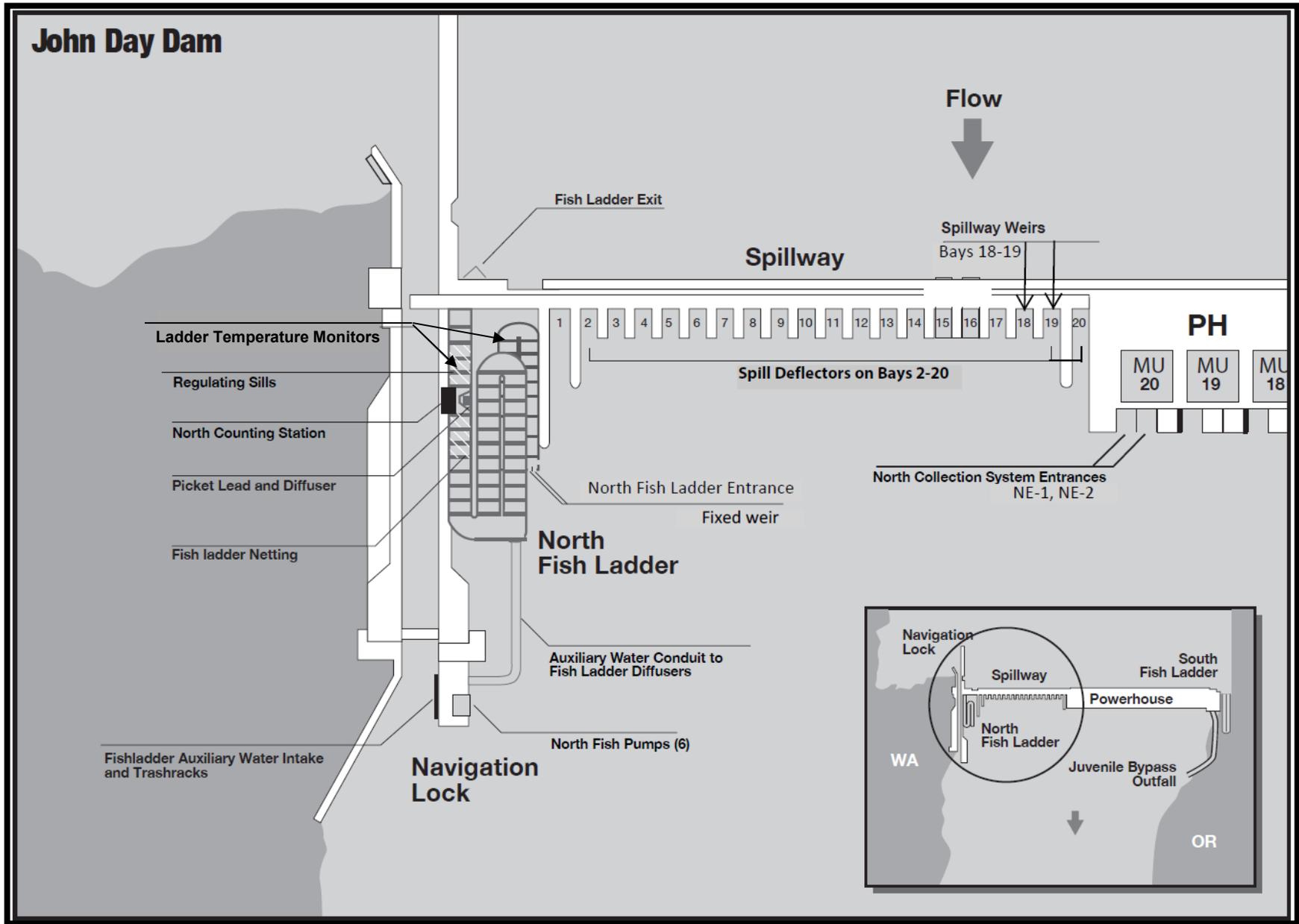


Figure JDA-2. John Day Dam Spillway and North Fish Ladder.

Table JDA-1. John Day Dam Schedule of Operations and Actions Defined in the 2018 Fish Passage Plan.

Task Name	Start	End	FPP Section	2018															
				Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar		
FISH PASSAGE FACILITIES	3/1/18	3/31/19																	
Adult Facilities - Fish Passage Season	3/1/18	11/30/18	2.4.2																
Adult Facilities - Winter Maintenance	11/30/18	2/27/19	2.4.1																
Juvenile Facilities - Fish Passage Season	3/1/18	11/30/18	2.3.2																
Juvenile Facilities - Winter Maintenance	3/1/18	3/31/18	2.3.1																
	12/1/18	3/31/19																	
PROJECT OPERATIONS FOR FISH PASSAGE	3/1/18	12/15/18																	
Turbine unit priority order	3/1/18	11/30/18	Table JDA-6																
STS Operation	3/1/18	12/15/18	2.3.2.1																
Turbine unit 1% operating range	4/1/18	10/31/18	5.2																
TSW Operation	4/10/18	8/31/18	2.3.2.16																
Spring Spill	4/10/18	6/15/18	App E (FOP)																
Avian Wires installed NLT April 10	4/10/18	4/10/18	App L 1.4																
Avian Hazing	4/10/18	7/31/18	App L 4.2																
Summer Spill	6/16/18	8/31/18	App E (FOP)																
Spill Bay 2 for adult attraction	9/1/18	11/30/18	2.2.3																
TDG MONITORING	3/1/18	2/28/19																	
TDG Monitoring - Tailrace (year-round)	3/1/18	2/28/19	2.2.2																
TDG Monitoring - Forebay	4/1/18	8/31/18	2.2.2																
ADULT FISH COUNTING	3/1/18	2/28/19																	
Day Video 0400-2000 PST	3/1/18	3/31/18	Table JDA-3																
Day Visual 0500-2100 PDT	4/1/18	10/31/18	Table JDA-3																
Night Video 2100-0500 PDT	6/15/18	9/30/18	Table JDA-3																
Day Video 0400-2000 PST	11/1/18	2/28/19	Table JDA-3																
REPORTS	3/1/18	2/28/19																	
Weekly Reports (year-round)	3/1/18	2/28/19	3.3																
Annual Report due NLT Jan 31	1/31/19	1/31/19	3.3.4																

1. FISH PASSAGE INFORMATION

Fish passage facilities at John Day Lock & Dam are shown on the general site plans in **Figures JDA-1** and **JDA-2**. The annual schedule of project operations, maintenance, and other actions that are described in this Fish Passage Plan (FPP) and appendices is in **Table JDA-1**.

1.1. Juvenile Fish Passage.

1.1.1. Juvenile Fish Facilities.

1.1.1.1. The Juvenile Bypass System (JBS) at John Day Dam was completed in 1987 and the Smolt Monitoring Facility (SMF) was completed in 1998. Each of the project's 16 turbine units includes one vertical barrier screen (VBS), one submersible traveling screen (STS), and three 14"-diameter orifices (one per gatewell).

1.1.1.2. During juvenile fish sampling at the SMF, flow with collected fish from the SMF is sent over the crest gate and down an elevated chute to the dewatering structure that reduces the flow to 30 cubic feet per second (cfs) before entering the transport flume. A switch gate diverts fish to either the SMF or directly to the outfall (emergency bypass only). Fish diverted for sampling pass a fish/debris separator that directs debris and adult fish into a separate flume to the outfall. Juvenile fish are interrogated by PIT-tag detectors and diverted either to the SMF for sampling or the outfall. When the SMF is not in operation, the bypass collection conduit connects to a transport channel that carries fish to the river below the dam (bypass mode). The differential between the forebay and bypass conduit is controlled by the tainter gate.

1.1.1.3. Maintenance of juvenile fish facilities is scheduled from approximately December 16 through March 31 to minimize impact on downstream migrants and reduce the possibility of adult fallbacks through turbine units. During this time, the JBS will be dewatered.

1.1.2. Juvenile Migration Timing.

1.1.2.1. Juvenile passage timing at John Day Dam has been determined by gatewell and SMF sampling (**Table JDA-2**). Results to-date of ongoing research show significant daytime passage during daytime operations. Bull trout, lamprey, juvenile sturgeon, and other listed salmonids are recorded as by-catch in the SMF report. Sample collection will continue through September 15 and PIT-tag interrogation will continue through November 30 (weather permitting). The JBS will operate through December 15.

1.1.2.2. Juvenile fish passage increases dramatically at dusk and peaks around 2300–2400 hours with a long period of elevated passage until dawn when passage decreases. Gatewell sampling data* indicate that roughly 80% of juvenile migrants pass John Day Dam between 2100 and 0600 hours. During the peak spring juvenile migration period at John Day Dam, 40% of spring Chinook and steelhead passage occurred between 0700 and 2200 hours.

*[*Data are for powerhouse passage only. More recent radio-tracking and hydroacoustic data indicate different passage patterns for the spillway and project when spill is occurring 24 hours/day.]*

Table JDA-2. Juvenile Salmonid Passage Timing at John Day Dam for Most Recent 10 Years (based on daily & yearly collection data).

Year	10%	50%	90%	# Days	10%	50%	90%	# Days
	Yearling Chinook				Subyearling Chinook *			
2008	4-May	22-May	1-Jun	29	24-Jun	9-Jul	5-Aug	43
2009	27-Apr	17-May	1-Jun	36	17-Jun	1-Jul	17-Jul	31
2010	1-May	18-May	6-Jun	37	14-Jun	1-Jul	20-Jul	37
2011	2-May	17-May	28-May	27	16-Jun	14-Jul	3-Aug	49
2012	27-Apr	6-May	22-May	26	27-Jun	13-Jul	29-Jul	33
2013	27-Apr	12-May	24-May	28	20-Jun	3-Jul	15-Jul	26
2014	28-Apr	9-May	24-May	27	21-Jun	5-Jul	20-Jul	30
2015	20-Apr	13-May	24-May	35	10-Jun	23-Jun	30-Jun	21
2016	18-Apr	30-Apr	10-May	23	10-Jun	23-Jun	30-Jun	21
2017	24-Apr	8-May	18-May	25	9-Jun	1-Jul	15-Jul	37
10-Yr MEDIAN	27-Apr	12-May	24-May	28	16-Jun *	29-Jun *	28-Jul *	43 *
10-Yr MIN	18-Apr	30-Apr	10-May	23	6-Jun *	27-Jun *	20-Jul *	31 *
10-Yr MAX	4-May	22-May	6-Jun	37	27-Jun *	30-Jul *	22-Aug *	59 *
	Unclipped Steelhead				Clipped Steelhead			
2008	6-May	21-May	1-Jun	27	7-May	16-May	30-May	24
2009	26-Apr	11-May	28-May	33	29-Apr	10-May	27-May	29
2010	27-Apr	12-May	8-Jun	43	3-May	11-May	9-Jun	38
2011	25-Apr	19-May	31-May	37	19-Apr	19-May	30-May	42
2012	25-Apr	1-May	19-May	25	25-Apr	3-May	15-May	21
2013	21-Apr	13-May	27-May	37	29-Apr	8-May	21-May	23
2014	23-Apr	9-May	27-May	35	30-Apr	8-May	21-May	22
2015	16-Apr	18-May	28-May	43	28-Apr	14-May	28-May	31
2016	18-Apr	28-Apr	12-May	25	22-Apr	30-Apr	10-May	19
2017	24-Apr	6-May	28-May	35	24-Apr	4-May	22-May	29
10-Yr MEDIAN	24-Apr	11-May	28-May	35	28-Apr	9-May	24-May	27
10-Yr MIN	16-Apr	28-Apr	12-May	25	19-Apr	30-Apr	10-May	19
10-Yr MAX	6-May	21-May	8-Jun	43	7-May	19-May	9-Jun	42
	Coho				Sockeye (Wild & Hatchery)			
2008	11-May	25-May	6-Jun	27	22-May	29-May	6-Jun	16
2009	16-May	29-May	13-Jun	29	10-May	25-May	7-Jun	29
2010	9-May	3-Jun	16-Jun	39	11-May	29-May	9-Jun	30
2011	10-May	23-May	6-Jun	28	10-May	22-May	2-Jun	24
2012	6-May	21-May	5-Jun	31	2-May	11-May	25-May	24
2013	6-May	19-May	1-Jun	27	10-May	19-May	28-May	19
2014	3-May	17-May	31-May	29	14-May	22-May	31-May	18
2015	23-Apr	20-May	4-Jun	43	11-May	20-May	27-May	17
2016	26-Apr	8-May	24-May	29	30-Apr	10-May	22-May	23
2017	2-May	18-May	1-Jun	31	30-Apr	14-May	24-May	25
10-Yr MEDIAN	6-May	20-May	4-Jun	31	10-May	21-May	29-May	21
10-Yr MIN	23-Apr	8-May	24-May	27	30-Apr	10-May	22-May	16
10-Yr MAX	16-May	3-Jun	16-Jun	43	22-May	29-May	9-Jun	30

*Subyearling Chinook **MEDIAN, MIN, MAX** based on 1998-2005 data. Data from 2006-present not included due to potential bias from missed sample days during high water temperature sampling protocols (**Appendix K**).

1.2. Adult Fish Passage.

1.2.1. Adult Fish Facilities. The John Day Dam adult fish facilities include a north shore ladder to pass fish from entrances at the north end of the spillway, and a south shore ladder to pass fish from entrances along a collection channel extending the full length of the powerhouse. Auxiliary water is pumped from the tailrace to all collection systems. South auxiliary water also includes forebay water from the fish turbines. Counting stations are provided in both fishways. Annual maintenance of adult fish facilities is scheduled December 1 through the end of February (winter maintenance period) to minimize impacts on upstream migrants.

1.2.2. Adult Fish Migration Timing & Counting.

1.2.2.1. Upstream migrants are present throughout the year and adult fish facilities are operated year-round. Adult salmon, steelhead, lamprey, and shad are typically counted April through October (**Table JDA-3**) and data are posted daily at:

www.fpc.org/adultsalmon_home.html. Sturgeon and bull trout are relatively infrequent and are reported in *Miscellaneous Fish Counts* and in the *Annual Fish Passage Report*.

1.2.2.2. Yearly counts through the most recent passage year are used to determine the earliest and latest dates of peak adult fish passage defined in **Table JDA-4**. Time-of-day (diel) distributions of adult salmonid activity at John Day Dam fishway entrances and exits are shown in **Figure JDA-2**.

Table JDA-3. John Day Dam Adult Fish Count Schedule, 3/1/2018 – 2/28/2019.

Count Period	Counting Method and Hours *
March 1 – 31	Day Video 0400–2000 (PST)
April 1 – October 31	Visual 0500–2100 hours (PDT)
June 15 – September 30	Night Video 2100–0500 hours (PDT)
November 1 – end of February	Day Video 0400–2000 (PST)

*PST=Pacific Standard Time. PDT=Pacific Daylight Time (in effect during Daylight Saving Time 3/11/18-11/4/18).

Table JDA-4. John Day Dam Adult Count Period and Peak Passage Timing (based on yearly counts since 1968, except lamprey since 2000).

Species	Count Period	Earliest Peak	Latest Peak
Spring Chinook	Apr 1 – Jun 5	Apr 14	May 24
Summer Chinook	Jun 6 – Aug 5	Jun 7	Aug 2
Fall Chinook	Aug 6 – Oct 31	Sep 2	Sep 25
Steelhead	Apr 1 – Oct 31	Aug 25	Oct 6
Sockeye	Apr 1 – Oct 31	Jun 21	Jul 10
Coho	Apr 1 – Oct 31	Sep 4	Oct 26
Lamprey	Apr 1 – Oct 31	Jun 30	Aug 12

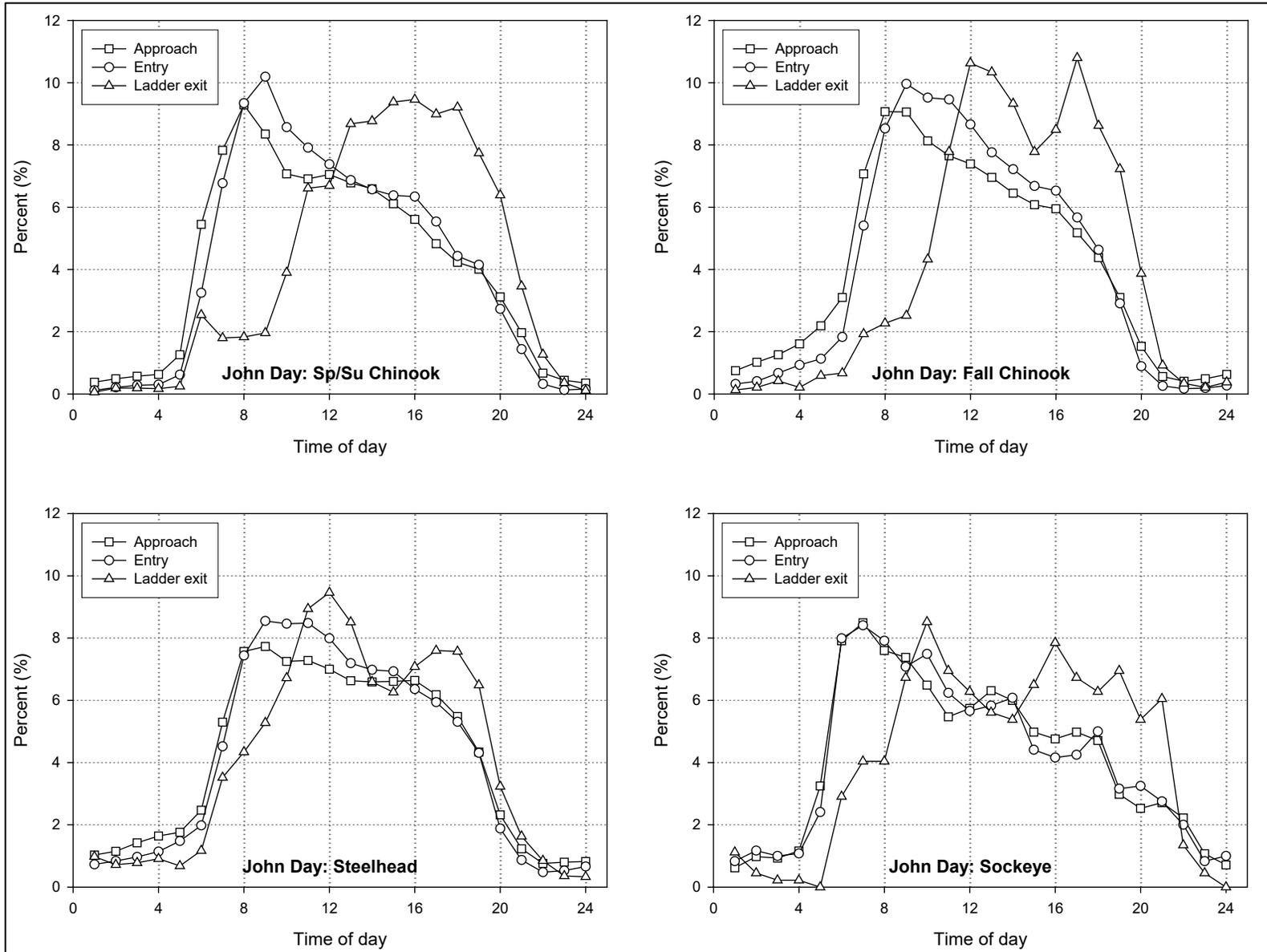


Figure JDA-3. Diel Distribution of Adult Salmonids at John Day Dam Fishway Entrances and Exits (Keefer & Caudill 2008).
pweb.crohms.org/tmt/documents/FPOM/2010/2013_FPOM_MEET/2013_JUN/

2. **FISH FACILITIES OPERATION**

2.1. **General.**

2.1.1. Research, non-routine maintenance, fish-related activities, and construction will not be conducted within 100' of any fishway entrance or exit, within 50' of any other part of the adult fishway, or directly in, above, or adjacent to any fishway, unless coordinated with FPOM or FFDRWG by the Project, District Operations and/or Planning or Construction office. 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. Yearly special operations related to research are described as currently coordinated in **Appendix A - Special Project Operations & Studies.**

2.1.3. Emergency situations should be dealt with immediately by the Project in coordination with the Project and/or District biologist. If unavailable, the biologists will be informed immediately following the incident of steps taken to correct the situation. On a monthly basis, as necessary, the Project Biologist will provide FPOM a summary of any emergency actions undertaken.

2.1.4. All activities within boat restricted zones (BRZ) will be coordinated with the Project at least two weeks in advance, unless deemed an emergency (see **Chapter 1 - Overview**).

2.2. **Spill Management.**

2.2.1. Spring and summer spill operations for juvenile fish passage are defined in the *Fish Operations Plan* (FOP), included in the Fish Passage Plan as **Appendix E**. Spill patterns formulated with spillway deflectors in place for both adult and juvenile passage are defined in **Tables JDA-8, JDA-9**. Spill pattern modifications for barge traffic entering the navigation lock have been coordinated with the fish agencies and tribes through the proper regional fish forums (e.g., TMT, FPOM, FFDRWG). Minimum spill is 30% April 10–August 31 to provide adequate conditions in the tailrace for juvenile egress.

2.2.2. Excessive total dissolved gas (TDG) may harm fish and will be controlled to the extent possible, subject to river conditions. Management tools include system-wide spill distribution through the Spill Priority List issued by the Corps Northwestern Division Reservoir Control Center (RCC), night and/or day spill limits, and shaping of spill. Monitoring of TDG at John Day Dam occurs during the periods defined in **Table JDA-1**, pursuant to the Corps' annual *TDG Monitoring Plan* and *Dissolved Gas Monitoring Plan of Action 2015-2018*.¹

2.2.3. From September 1 through November 30, adult fish attraction flow will be provided by spilling through Bay 2 open one stop (approximately 1.6 kcfs) during daylight hours defined in **Table JDA-5**.

¹ TDG Monitoring Plan (Appendix 4 of the WMP): pweb.crohms.org/tmt/documents/wmp/. TDG Monitoring Plan 2015-2018: pweb.crohms.org/tmt/wqnew/tdg_monitoring/2015-18.pdf

Table JDA-5. Daytime Spill Hours for Adult Attraction at John Day Dam, September 1–November 30.

Date Range	Daytime Spill Hours	
	Begin	End
January 1–19	0700	1730
January 20 – February 14	0630	1800
February 15 – March 1	0600	1830
March 2 – April 2	0600	1930
April 3–20	0500	2030
April 21 – May 16	0500	2100
May 17–31	0430	2130
June 1–30	0430	2130
July 1–31	0430	2200
August 1–15	0500	2145
August 16–31	0500	2030
September 1–16	0530	2000
September 17 – October 4	0600	1930
October 5–19	0630	1900
October 20–29	0630	1830
October 30 – November 30	0630	1700
December 1–31	0630	1700

2.3. Operating Criteria - Juvenile Fish Facilities.

2.3.1. Juvenile Facilities - Winter Maintenance (December 1 – March 31*).

**In 2018, the JBS and SMF will begin operations on March 1, as described below.*

2.3.1.1. Submersible traveling screens (STS) will remain in place and the juvenile bypass system (JBS) channel will operate through December 15 to prevent adult salmonids from falling back through turbine units, thereby shortening some aspects of the winter maintenance period by two weeks. Priority units will be screened during this period to the extent practicable (barring operational failure); STSs will only be removed from non-priority units when necessary to begin maintenance. After December 15, all STSs may be removed.

2.3.1.2. Dewater DSM channel only when required for inspection, maintenance, or structural modifications (**section 5**). Minimize the outage period to the extent practicable.

2.3.1.3. All units are available to meet power demands.

2.3.1.4. Remove debris from the forebay, all trash racks, and gatewell slots so these areas are debris-free by April 1, except in 2018 when this is in effect March 1 due to early JBS start.

2.3.1.5. Inspect all VBSs for damage, holes, debris accumulations, or protrusions (video inspection acceptable). Clean and repair when necessary.

2.3.1.6. Inspect and operate each STS.

2.3.1.7. *In 2018, install STSs by March 1 in at least the first four operational units in the priority order (Table JDA-6). Additional units may be screened prior to April 1 if maintenance schedules allow.* By April 1, install STSs in each intake slot of all operational units unless otherwise coordinated with the fish agencies and tribes.

2.3.1.8. Inspect all gatewell orifices and orifice lighting systems. Clean and/or repair where necessary such that these systems are debris-free and operable on April 1, *except in 2018 when this is in effect March 1 due to early JBS start.*

2.3.1.9. Check automatic control calibration/operation for the DSM tainter gate and other necessary sensors weekly. Recalibrate as necessary and report summaries of equipment recalibration in the weekly SMF operation monitoring reports.

2.3.1.10. Inspect and maintain DSM conduit tainter gate. Repair where necessary.

2.3.1.11. Inspect walls and floor of DSM conduit, raceway, and outfall. Correct any deficiencies.

2.3.1.12. Inspect spillbay gates and associated control system. Repair where necessary. Spillbays must be able to achieve FPP spill patterns on April 10, unless otherwise coordinated.

2.3.1.13. Avian Lines. See the *Avian Monitoring & Deterrence Action Plans* in **Appendix L**. Avian abatement measures shall be in place by April 1, or as soon as weather permits.

2.3.1.14. Smolt Monitoring Facility (SMF). Ensure all following items are fully operational. *In 2018, the SMF will begin operations on March 1.*

2.3.1.14.a. Dewatering facilities, including weir gates, perforated plates, screens (free of holes or gaps), and screen cleaner brush system;

2.3.1.14.b. All valves and auxiliary water systems;

2.3.1.14.c. Flushing water valves and their perforated plates;

2.3.1.14.d. All gates, including the crest, tainter, switch, and rotating gates;

2.3.1.14.e. Fish/debris separator, including perforated plates and adult passage chamber;

2.3.1.14.f. PIT-tag detectors;

2.3.1.14.g. All sampling building systems, including holding tanks, valves, and conduits (see specific list in the *SMF Operation & Maintenance Manual*).

2.3.2. Juvenile Facilities - Fish Passage Season (April 1* – November 30).

**In 2018, the JBS and SMF will begin operations on March 1, as described below.*

2.3.2.1. In 2018, STSs will be installed by March 1 in at least the first four operational units in the priority order (Table JDA-6). Additional units may be screened prior to April 1 if maintenance schedules allow. STSs will be in place prior to the beginning of the juvenile fish passage season and will remain in operation through December 15 for adult fallbacks, even though the juvenile passage season officially ends November 30.

2.3.2.2. Units without a full complement of rotating STSs will not operate except to be in compliance with other coordinated fish measures.

2.3.2.3. Inspect each STS, VBS, and orifice once per month or every 720 hours run-time. Video inspections are acceptable. More frequent inspections may be required under the following conditions: deterioration of fish condition, increased debris load in JBS, or other indications of STS or VBS malfunction or failure. If STS or VBS damage or plugging is detected, follow procedures in **section 3** below. Inspection records will be reported in weekly fishway status reports and provided to FPOM. Unit 2 will operate when Unit 1 is out of service for STS inspections.

2.3.2.4. Observe each STS amp and/or watt meter readings at least once per shift. If an STS failure occurs, then follow procedures in **section 3** below.

2.3.2.5. Inspect all STS gatewells daily. Clean gatewells before the gatewell water surface becomes 50% covered with debris. If due to the volume of debris it is not possible to keep the gatewell surfaces at least 50% clear, clean gatewells at least once daily. Do not operate turbines that have a gatewell fully covered with debris except to be in compliance with other coordinated fish measures, and then only on a “last-on/first-off” basis. Close the powerhouse gatewell orifices during cleaning. After gatewell de-barking, cycle the orifice in that gatewell. Check gatewell drawdown.

2.3.2.6. Measure gatewell drawdown across trashrack a minimum of once per week. Remove debris from forebay and trashracks as required to maintain gatewell drawdown <1.5 ft. If VBS drawdown reaches 1.2 ft, inspect the screen and prepare to clean as necessary.

2.3.2.7. Open all gatewell orifices April 1–December 15, except in 2018 when this is in effect beginning March 1 due to early start of the JBS. Inspect orifice lights daily to ensure lights are operating. Replace all burned out orifice lights within 24 hours. Close and open each orifice three times daily, or more frequently as determined by the Project Biologist due to heavy debris accumulation in gatewells. If a unit goes out of service, orifices are to remain open in associated gatewells unless that gatewell is dewatered.

2.3.2.8. From April 1 through August 1, rake Units 1–5 monthly and Units 6–10 or 11–16 every other month, except in 2018 when this is in effect beginning March 1 due to early start of the JBS. After August 1, rake units as determined necessary by ROV inspection, or as needed to maintain gatewell drawdown in criteria.

2.3.2.9. Debris accumulations in the forebay of 300 ft or more in any direction from the face of the dam will be removed within 48 hours. Debris removal efforts should continue until the debris load has been removed.

2.3.2.10. If debris loads are obvious in the forebay, trash will be raked in front of the affected units weekly until the debris load has been removed.

2.3.2.11. Additional raking will occur whenever trash accumulations are suspected because of increased differential (≥ 1.5 ft) across the trash racks, or as determined by the Project Biologist in response to increased juvenile fish descaling at the dam, deteriorating fish condition observed at the SMF, or increased accumulation of tumbleweeds in the forebay. Gatewell orifices of the unit being raked must be closed during the raking operation.

2.3.2.12. When using a dip basket for gatewell cleaning, coordinate with SMF personnel.

2.3.2.13. Make best efforts 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.

2.3.2.14. Maintain water level in bypass conduit between 4.0'–5.0' as measured at Unit 16.

2.3.2.15. Smolt Monitoring Facility (SMF). From April 1–September 15 (*except in 2018 when the SMF will begin operations March 1*), the SMF will be monitored 24 hours/day, 7 days/week by Project fish personnel to ensure proper functioning and to provide quick response to an emergency. On-duty staff will perform a walking inspection of the entire SMF system every two hours to ensure safe passage conditions. The system will be fully staffed while the SMF is in operation (i.e., crest gate deployed and secondary dewatering structure receiving fish-laden flow). To ensure proper function of sampling systems, particular attention will be directed to the following:

- i.** Dewatering facilities, including screens, being free of holes or gaps, and the screen cleaner brush system;
- ii.** All valves and auxiliary water systems;
- iii.** Flushing water valves and perforated plates;
- iv.** All gates, including crest, tainter, switch, and rotating gates;
- v.** Fish/debris separator (FDS), including perforated plates and adult passage chamber;
- vi.** PIT-tag detectors;
- vii.** All sampling building systems, including holding tanks, valves, and conduits;
- viii.** During low to normal debris loads, cycle the Primary Dewatering Screen (PDS) sweepers twice per shift (six times per day). If higher debris loads, increase

frequency of screen sweeper cycling as determined by the Project Fisheries inspection.

ix. Pay particular attention to the fish/debris separator (FDS) that needs to be visually inspected every 30 minutes to prevent injury and/or mortality to fish. During high debris loading periods (likely during spring runoff), additional personnel may be required to keep the FDS free of any obstruction to fish passage. The Project Biologist will decide to assign a person to remove debris from the FDS on a shift basis (possibly 24 hours/day presence) for as long as necessary to assure the safety of passing fish.

x. When river temperatures are $\geq 70^{\circ}\text{F}$, all fish handling to remove adult fish from the PDS area will be coordinated through FPOM.

2.3.2.16. Temporary Spillway Weirs (TSWs).²

2.3.2.16.a. Both TSWs will be installed as early as possible on the first day of spring spill and operated throughout the spring and summer spill seasons. Both TSWs will be removed from service as late as possible on the last normal work day of the summer spill season (no later than August 31). Spill for juvenile fish passage will be maintained through August 31, pursuant to the FOP (**Appendix E**).

2.3.2.16.b. During high flow events, TSW removal is recommended prior to river flows exceeding 685 kcfs.

2.3.2.17. Avian Lines. See the *Avian Monitoring & Deterrence Action Plans* in **Appendix L**. Reinstall or repair avian predation control lines as soon as possible following damage or removal. Install and maintain new avian predation control lines in locations determined to be significantly impacted by avian predators. Implement other avian abatement (hazing) as necessary from April through August only.

2.4. Operating Criteria - Adult Fish Facilities.

2.4.1. Adult Facilities - Winter Maintenance (December 1 – end of February).

2.4.1.1. Operate according to criteria for adult fish passage season (see **section 2.4.2**) except facilities may be dewatered or operated out of criteria for maintenance or repair. Outage periods will be minimized to the extent practicable. Only one of the two adult fish passage facilities may be out of service at a time. The other facility must be operated within passage season criteria unless otherwise coordinated with FPOM. However, Unit 2 may be operated in place of Unit 1 without special coordination when the south fishway is in service.

² Spillway weirs provide surface passage routes via spillbay(s). Temporary, or Top, Spillway Weirs (TSWs) at Little Goose, McNary and John Day dams can be installed, uninstalled, and moved between bays using the gantry crane. Removable Spillway Weirs (RSWs) at Lower Granite, Lower Monumental, and Ice Harbor dams are “removed” by controlled descent to the bottom of the forebay.

2.4.1.2. Inspect and calibrate all staff gauges, water level sensors, and indicators. Repair and/or clean where necessary.

2.4.1.3. Dewater and inspect all ladders and other dewatered sections of fish facilities for projections, debris, or plugged orifices that could injure or delay fish. Repair as needed.

2.4.1.4. Inspect ladder exits for debris and clean when necessary.

2.4.1.5. At the end of the adult fish counting season (see **Table JDA-3**), pull picket leads at counting stations and adjust crowdiers so that the counting slots are fully opened (this will be done shortly after adult fish counting ends). Reinstall picket leads at counting stations prior to watering up ladders during maintenance.

2.4.1.6. Repair or, when necessary, upgrade netting and padding at top of north fish ladders to address the fish jumping problem in this area.

2.4.1.7. Maximum head of 0.5' on attraction water intakes and trash racks at all ladder exits. Debris shall be removed when significant amounts accumulate.

2.4.2. Adult Facilities - Fish Passage Season (March 1 – November 30).

2.4.2.1. Water depth over fish ladder weirs $1.0' \pm 0.1'$. When shad numbers exceed 5,000 per day per count station at Bonneville Dam, water depth should be increased to $1.3' \pm 0.1'$.

2.4.2.2. Temperature Monitoring.

2.4.2.2.a. Measure water temperatures at the count stations of each ladder and include the weekly means in the status report. When water temperature reaches 70°F all fish handling activities will be coordinated with the Regional fish agencies through FPOM prior to any action to verify protocols that will be followed.

2.4.2.2.b. From June 1 through September 30, water temperature will be monitored at adult fishway entrances and exits.

b.1. Temperature monitors shall be placed within 10 meters of all shore-oriented entrances and exits.

b.2. If possible, the entrance monitor shall be within 1 meter above the ladder floor and at least 10 meters downstream of ladder diffusers to allow for sufficient mixing with surface water.

b.3. The exit monitor shall be within 1 meter above the ladder floor and above all diffusers to allow for sufficient mixing with surface water.

b.4. If an existing temperature monitoring location is proposed for either the exit or entrance, it shall be verified that the site accurately reflects water temperature within 10 meters of the entrance or exit.

2.4.2.2.c. Project Fisheries will submit temperature data to the Fish Passage Center (FPC) weekly for posting online at: www.fpc.org/river/Q_ladderwatertempgraph.php.

2.4.2.3. Head on all entrances: 1'–2' (1.5' optimum). Refer to **section 3.3** when unable to achieve head criteria.

2.4.2.4. Maintain water velocity at 1.5–4.0 feet per second (2 fps optimum) in all channels and the lower ends of fish ladders that are below the tailwater. Open floating orifice gates 1, 2, 18 and 19, and operate three fish pumps to maintain fishway criteria. The entrance gate should be submerged 8' deep or greater to be in criteria. Fishway channel water velocities will be measured a minimum of three times weekly (daily preferred) during adult fish passage season (Mar 1 – Dec 1) as part of the fishway inspection program. Floats will be timed through all fishway channels that are supplemented by auxiliary water, and results reported in the project weekly fishway status report.

2.4.2.5. Maximum head of 0.5' on attraction water intakes and trashracks at all ladder exits, with a 0.3' maximum on all picket leads. Remove debris when significant amounts build up.

2.4.2.6. Staff gauges and water level indicators will be readable at all water levels encountered during the fish passage period, and calibration checked weekly. Instruments will be cleaned and/or recalibrated when necessary as soon as practicable.

2.4.2.7. Main entrance weir depths: 8' or greater below tailwater. Maintain tailwater elevation above 158' msl to stay within criteria operation range for entrance weirs.

2.4.2.8. Fish Counting. The current fish counting schedule is in **Table JDA-3**. The crowder shall be opened to full count slot width when not counting. The crowder shall be open as far as possible to allow accurate counting and shall not be closed to less than 18 inches while counting. This will usually occur during high turbidity conditions to maintain count accuracy.

2.4.2.8.a. Count station crowders shall be at maximum width that allows count or video accuracy. The minimum count slot width shall be $\geq 18''$. Crowder ranges are as follows:

i. JDA-North = 18''–28''

ii. JDA-South = 18''–30''

2.4.2.8.b. If passage is impaired by narrow count slot conditions, the count slot will be widened until proper passage conditions are achieved, despite count accuracy.

2.4.2.8.c. Project biologists, FFU, and the fish count supervisor shall coordinate to achieve optimum count slot passage and/or count accuracy conditions.

2.4.2.8.d. If counting is temporarily discontinued due to unscheduled events, the crowder shall be fully opened.

2.4.2.8.e. The crowder may remain in the operating position during the counters' hourly 10-minute break.

2.4.2.9. North Fishway.

2.4.2.9.a. Starting September 1, spill from Bay 2 (1 stop = 1.5k) for adult attraction during daylight hours through November (**Table JDA-5**).

2.4.2.9.b. Maintain netting and padding for the North fishway to address the adult salmonid jumping problem. All holes in the netting large enough to catch or allow escapement of an adult salmonid must be closed.

2.4.2.10. South Fishway. Operate entrance weir SE-1.

2.4.2.11. Powerhouse.

2.4.2.11.a. Operate entrances NE-1 and NE-2.

2.4.2.11.b. Operate four powerhouse floating orifices (1, 2, 18, 19) and open associated auxiliary water diffusers (see also **section 2.4.2.4**).

2.4.2.11.c. From 0400–2000 hours, operate Unit 1 near 100 megawatts (± 10) to provide best entrance conditions. If additional load is required by BPA, Unit 1 may be operated above 100MW, but it should be the last brought up to full load when demand increases and the first to reduce when demand decreases (**Appendix C - Load Shaping Guidelines**).

3. FISH FACILITIES MONITORING & REPORTING

3.1. Inspections.

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

3.1.2. During fish passage season, fish passage facilities will be inspected at least twice/day, seven days/week to assure operation according to established criteria.

3.1.3. During winter maintenance, fish facilities will be inspected once/day, seven days/week.

3.1.4. More frequent inspections of some facility components will occur as described throughout this document.

3.1.5. Additional fishway inspections may be performed by FFU and fish agencies.

3.2. Zebra Mussel Monitoring.

3.2.1. A zebra mussel monitoring program will continue. These organisms are a serious problem elsewhere in the country and may become introduced into the Columbia River basin. Inspections should also be made when dewatering all project facilities.

3.3. Reporting.

3.3.1. Project biologists shall prepare weekly reports throughout the year summarizing project operations. The weekly reports will provide an overview of how the project and the fish passage facilities operated during the week and an evaluation of resulting fish passage conditions. The reports shall include:

- i. Any out-of-criteria situations observed and subsequent corrective actions taken;
- ii. Any equipment malfunctions, breakdowns, or damage along with a summary of resulting repair activities;
- iii. Adult fishway control calibrations;
- iv. STS and VBS inspections;
- v. AWS closures (i.e. cleaning times);
- vi. Any unusual activities that occurred at the project that may affect fish passage.

3.3.2. Weekly reports shall cover Sunday–Saturday period and shall be e-mailed to CENWP-OD, CENWD-PDW-RCC, and other interested parties as soon as possible the following week.

3.3.3. *Memorandum for the Record (MFR)* shall be prepared by Project biologists for any adverse or negative impact to fish or fishways. See **FPP Chapter 1 – Overview** for the MFR instructions and template. The MFR will be sent to FPOM by the next working day and added to the next FPOM agenda for review.

3.3.4. Project biologists shall prepare an annual report by January 31, summarizing the operation of the project fish passage facilities for the previous year.

3.3.4.1. The report will cover from the beginning of one adult fish facility winter maintenance period to the beginning of the next.

3.3.4.2. The annual report also will include a description of all actions taken to discourage avian predation at the project, with an overview of the effectiveness of the activities in discouraging avian predation.

3.3.4.3. The annual report will be provided to CENWP-OD in time for distribution to FPOM members at the February meeting.

4. FISH FACILITIES MAINTENANCE

4.1. General.

4.1.1. Routine Maintenance. Scheduled 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 (**section 3.3**).

4.1.1.1. Staff gauges will be installed, cleaned, and/or repaired as required.

4.2. **Maintenance - Juvenile Fish Facilities.**

4.2.1. Routine Maintenance.

4.2.1.1. Submersible Traveling Screens (STS). The STS system may receive preventive maintenance or repair any time of the year as necessary. Most maintenance will occur during the winter maintenance period when all STSs may be removed from intakes. From April 1–December 15, a turbine unit cannot operate without a full complement of functioning STSs, *except in 2018 when at least the first four available priority units must have a full complement of STSs installed by March 1.*

4.2.1.2. Juvenile Bypass System (JBS). The JBS facilities may receive preventive maintenance at any time of the year as necessary in coordination with FPOM. During the juvenile fish passage season, this will normally be out-of-water work (e.g., maintenance of automatic systems, air lines, electrical systems, and monitoring equipment). During the winter maintenance period, the system is dewatered and visually inspected in all accessible areas for damaged equipment and areas that may cause potential problems to juvenile fish. Identified problems will be repaired by project maintenance or the contractor as soon as possible. Extended repair projects will be coordinated through FPOM.

4.2.1.3. Turbines and Spillway. Maintenance and routine repair of project turbines and spillways is a regular and recurring process that requires units shut down for extended periods of time (see **section 5**). Maintenance schedules for these turbines and spillways will be coordinated through FPOM. Certain turbine and spillway discharges at the projects are secondarily used to attract adult fish near fishway entrances to keep predator fish from accumulating in the area of juvenile release sites and to move juveniles downstream away from the project. The maintenance schedules for these turbines and spillways will reflect equal weight given to fish, power, and water management and will be coordinated with the appropriate fish agencies. Units that should not be scheduled for maintenance during the fish passage season are 1, 2, and 5. Some types of turbine maintenance will require testing turbine operation throughout the full operating range before returning it to normal service.

4.2.2. Non-Routine Maintenance. Non-routine maintenance of facilities will occur as described below. Activities that will significantly impact juvenile fish passage shall be coordinated through FPOM on a case-by-case basis by project and CENWP-OD biologists. See **FPP Chapter 1 – Overview** for the *Memo of Coordination* (MOC) instructions and template. 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 will result in an unsafe situation for people, property, or fish.

4.2.2.1. Submersible Traveling Screens (STS). If an STS or VBS is damaged or inoperative in an operating unit, the unit will be regarded as an unscreened unit. The screen will be repaired or replaced before returning the unit to service.

4.2.2.2. Juvenile Bypass System (JBS).

4.2.2.2.a. The JBS is automatically controlled. If the automatic system fails, it will be operated manually until automation repairs are made. If the orifices become plugged with debris, the turbine will not be operated until it has been cleaned.

4.2.2.2.b. Inspect all STS gatewells daily. Clean gatewells before the water surface becomes 50% covered with debris. If due to the volume of debris it is not possible to keep the gatewell surfaces at least 50% clear, they will be cleaned at least 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. The gatewell orifices must be closed during the cleaning process. Juvenile mortality numbers will be monitored in all gatewells, as potential indicators of gatewell environment problems. Mortality estimates will be recorded and reported in the weekly status reports.

4.2.2.2.c. If the bypass system fails in the powerhouse conduit, tainter gate, or transportation outfall making the system unsafe for fish, a decision will be made in coordination with FPOM. During this emergency operating mode, power generation will be minimized to the extent practicable. If this operating mode is expected to last longer than four days, then all units required for generation will be shut down sequentially, fish salvaged from gatewells, STSs removed, and the unit restarted. Orifice gates will be closed during this process.

4.2.2.2.d. During fishway inspection activities, VBSs may be found plugged with debris, damaged or not properly seated. In these cases, the associated unit will be regarded as if unscreened and repairs will be made before returning the unit to operation.

4.2.2.3. Turbines and Spillways.

4.2.2.3.a. If a spill gate becomes inoperable, the operators will make the changes necessary to accommodate the spill and then immediately notify the operations supervisor and Project Biologist to determine the best pattern to follow until repairs can be made. This interim operation shall be coordinated with the FPOM through the district biologist who will provide additional guidance to the project.

4.2.2.3.b. Unit 2 will replace Unit 1 for adult attraction whenever Unit 1 is not operating.

4.2.2.3.c. From September 15 through end of February, spillbay 2 may be closed for up to one work day for maintenance activities. During the outage, spillbay 3 will be opened for attraction flow.

4.3. Maintenance - Adult Fish Facilities.

4.3.2. 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 3.3**).

4.3.2.1. Fishway Auxiliary Water Systems. John Day Dam has tailwater pump auxiliary water systems. Preventive maintenance and normal repair are carried out throughout the year.

Trash racks for the AWS intakes will be raked when drawdown exceeds criteria. When practicable, rake trash racks during the time of day when fish passage is least affected. During the annual navigation lock maintenance outage, the north fish ladder auxiliary water is shut off for about half a day. This is required to allow divers to clean off the navigation lock discharge sill so that a bulkhead can be placed.

4.3.2.2. Powerhouse and Spillway Fish Collection Systems. Preventive maintenance and repair occurs throughout the year as needed. During the adult fish passage season, this maintenance will not result in failing to achieve fishway criteria, unless coordinated through FPOM. During the winter maintenance period, an inspection will occur through dewatering or divers per discretion of the Project Biologists. One additional underwater diver/ROV will occur during August 1 - 15. Timing of this inspection will be coordinated through FPOM. The Project Biologist or alternate Corps fish personnel will attend all dewatering and inspection activities potentially involving fish (**section 5**).

4.3.2.3. Adult Fish Ladders and Counting Stations. Adult fish ladders will be dewatered once per year during the winter maintenance period. Unless specially coordinated, only one ladder will be dewatered at a time with the other ladder operating within criteria. During this time, the ladders are inspected for necessary maintenance needs and potential fish passage problems (e.g., blocked orifices, projections into the fishway that may injure fish, unstable weirs, damaged picket leads, exit gate problems, loose diffuser gratings, unreadable or damaged staff gauges, defective diffuser valves, and malfunctioning equipment at the counting stations). Potential problems identified throughout the passage year that do not impact fish passage, as well as those identified during the dewatered period, are then repaired. Trash racks at ladder exits will be raked when criteria are exceeded. When practicable, rake trash racks during the time of day when fish passage would be least impacted. Fish count station windows, light panels, and crowder panels will be cleaned as needed to achieve accurate counts and, when practicable, during the time of day when fish passage is least impacted. North netting installed on ladders to prevent fish leaping will be inspected daily and maintained as necessary. Inspection summaries will be included in the weekly activity report.

4.3.3. 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 3.3**). Non-routine maintenance that will significantly affect the operation of a facility, such as repair of displaced diffuser gratings, will be coordinated through FPOM. Coordination procedures for non-routine maintenance of adult facilities are the same as for juvenile facilities (**section 4.2.2**).

4.3.3.1. Fishway Auxiliary Water Systems. The fishway auxiliary water systems are mostly automated. If the automatic system fails, the system will be operated manually by project personnel. This will allow the fish facility to operate according to criteria while the automatic system is repaired. When this operation becomes necessary, project personnel will increase the surveillance of the adult system to ensure that criteria are being met. The FPOM will work with the project to determine the best operation in the event of an AWS failure during the adult passage season.

4.3.3.1.a. South Ladder. If one of the three auxiliary water turbines fails, assuming all three turbines are being used to meet criteria, the output of the two remaining turbines will be increased to meet adult fishway criteria. If a second turbine unit fails, the adult fish facility will be operated as follows until a fishway head of 1' is achieved:

- i. Increase discharge of remaining unit to maximum capacity;
- ii. Close NE-1;
- iii. Leave NE-2 at a depth of 8';
- iv. Close remaining floating submerged orifice gate entrances starting at north end;
- v. Leave south powerhouse entrance weir (SE-1) at 8' depth below tailwater surface.
- vi. If criteria are still not achieved, reduce entrance weirs depth to 6', then to 4' if necessary, until more auxiliary water is available. Then reverse the above procedure.
- vii. If all three turbine units fail, operate as follows until repairs can be made:
 - Open SE-1 with the weir crest 6' below the tailwater surface;
 - Close NE1 and NE2;
 - Place cross-channel bulkheads in powerhouse collection channel between Units 2 and 3;
 - Close floating orifice gate in front of Unit 2, leaving the floating orifice gate in front of Unit 1 open.

4.3.3.1.b. North Ladder. The 6 AWS pumps installed in 2011 are capable of achieving the optimal attraction criteria of 1.5' at all tailrace elevations. There is a built-in contingency as 1 of the 6 pumps is always spare and will be automatically started by PLC in case of another pump's failure.

4.3.3.2. Powerhouse and Spillway Fish Collection Systems. John Day Dam contains several types of fishway entrances. If failures occur, in most cases the entrance can be operated manually by project personnel until repaired. When this operation becomes necessary, project personnel will increase the surveillance of 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 the entrance will be returned to manual or automatic control at the earliest possible date.

4.3.3.3. Adult Fish Ladders and Counting Stations. Pickets with excessive spacing (>1"), erosion of concrete around the picket leads, or missing pickets can allow fish into areas where they cannot escape. The north count station upstream picket leads have an exit hatch that can be opened to allow fish to escape. Repair will be required for picket lead failure at the south count station. In the instances of picket lead failure or concrete erosion, the timing

and method of repair will depend upon the severity of the problem. The decision of whether or not to dewater the fishway for repairs will be made in coordination with FPOM.

4.3.3.4. Diffuser Gratings. Diffuser chambers for adding auxiliary water to ladders and collection channels are covered by gratings attached by several methods. Diffuser gratings are normally inspected during winter maintenance to ensure integrity. Inspections are done by either dewatering the fishway and/or collection channel, or by using video cameras and divers or other methods to inspect the gratings underwater. Diffuser gratings may come loose during fish passage season due to a variety of reasons. Daily inspections of the ladders and collection systems should include looking for flow changes that may indicate problems with diffuser gratings. If a diffuser grating is known to or suspected of having moved, creating an opening into a diffuser chamber, 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 diffusers gratings are found to be missing or displaced, close associated diffuser and develop a method of repair as coordinated with FPOM. Repair as quickly as possible unless coordinated differently.

5. TURBINE UNIT OPERATION & MAINTENANCE

5.1. Turbine Unit Priority Order.

5.1.1. Units will be operated in the order of priority defined in **Table JDA-6**, including time during synchronous condensing. If a unit is out of service for maintenance or repair, the next unit in the priority order shall be operated. Unit priority order may be coordinated differently for fish research, construction, or project maintenance.

Table JDA-6. John Day Dam Turbine Unit Priority Order.

Season	TSWs	Unit Priority Order*
March 1 – November 30 Fish Passage Season	With TSWs	5, 1, 3, 16, 14, 12, 10, 8, 15, 2, 11, 7, 4, 13, 9, 6
	No TSWs	1–4 any order, then 5–16 any order
December 1 – end of February Winter Maintenance Period	n/a	Any Order

*When a main unit is not available, the paired adjacent unit will be used to comply with requested priority.

5.2. Turbine Unit Operating Range.

5.2.1. In-Season (April 1–October 31). As defined in the *BPA Load Shaping Guidelines (Appendix C)*, all units will be operated within $\pm 1\%$ of peak turbine efficiency (1% range) to maximize survival of juvenile fish that pass through the turbines. Turbine unit flow and power output at the lower and upper limits of the 1% range are defined in **Table JDA-7**.

5.2.1.1. If necessary to operate turbines outside the 1% range, they will be operated in sequence from north to south since juvenile passage through turbines decreases from south to north, making inefficient operation of Unit 16 least likely to impact fish. However, allowance will also be given to special project requirements for stable voltage control that requires load

distribution between transformer banks. If operation outside the 1% range is necessary, Project personnel shall record the information to provide to BPA on a weekly basis according to the *Guidelines*. Operation outside the 1% range may be necessary to:

- i. Meet BPA load requests made pursuant to BPA's policy, statutory requirements, and *Load Shaping Guidelines (Appendix C)*;
- ii. If the draft tube is to be dewatered (**section 4.3.4**), the unit will be operated at full load >1% (or at speed-no-load <1% if not possible to load) for a minimum of 15 minutes prior to installing tail logs in order to flush fish from the unit;
- iii. Operate a turbine unit solely to provide station service; or
- iv. Comply with other coordinated fish measures.

5.2.2. Off-Season (November 1–March 31). While not required to do so in the off-season, turbines will normally run within the 1% range since it is the optimum point for maximizing energy output of a given unit of water over time. Operation outside the 1% range is allowed if needed for power generation or other needs.

Table JDA-7. John Day Dam Turbine Unit Power (MW) and Flow (cfs) at $\pm 1\%$ of Peak Turbine Efficiency (Lower and Upper Limits of 1% Range) and Operating Limits. ^a

Project Head (feet)	JDA Units 1-16 ^b - With STS						JDA Units 1-16 ^b - No STS					
	1% Lower Limit		1% Upper Limit		Operating Limit		1% Lower Limit		1% Upper Limit		Operating Limit	
	MW	cfs	MW	cfs	MW	cfs	MW	cfs	MW	cfs	MW	cfs
80	65.4	11,338	118.0	20,472	129.9	23,194	71.7	12,305	122.8	21,074	129.9	22,684
81	66.7	11,416	120.8	20,671	132.1	23,228	73.2	12,391	125.7	21,290	132.1	22,697
82	68.1	11,492	123.6	20,864	134.3	23,261	74.7	12,473	128.7	21,500	134.3	22,710
83	69.4	11,566	126.4	21,052	136.5	23,292	76.1	12,554	131.6	21,703	136.5	22,720
84	70.8	11,638	129.1	21,234	138.7	23,321	77.6	12,631	134.6	21,901	138.7	22,730
85	72.1	11,707	131.9	21,411	140.9	23,349	79.1	12,707	137.5	22,093	140.9	22,738
86	72.9	11,692	134.7	21,593	142.7	23,282	80.0	12,690	140.1	22,223	142.7	22,722
87	73.7	11,676	137.5	21,770	144.5	23,214	80.9	12,674	142.6	22,349	144.5	22,704
88	74.5	11,661	140.2	21,942	146.2	23,145	81.7	12,657	145.1	22,471	146.2	22,684
89	75.3	11,646	143.0	22,110	148.0	23,074	82.6	12,641	147.6	22,591	148.0	22,662
90	76.1	11,632	145.8	22,274	149.7	23,001	83.5	12,625	150.2	22,707	149.7	22,638
91	77.0	11,622	146.9	22,164	151.1	22,917	84.5	12,616	151.7	22,656	151.1	22,562
92	77.9	11,613	148.0	22,057	152.5	22,831	85.5	12,606	153.2	22,606	152.5	22,484
93	78.8	11,604	149.1	21,951	153.8	22,743	86.4	12,596	154.8	22,556	153.8	22,403
94	79.7	11,595	150.2	21,848	155.1	22,652	87.4	12,586	155.2 ^c	22,321	155.1	22,321
95	80.6	11,585	151.3	21,746	155.2	22,383	88.4	12,576	155.2 ^c	22,062	155.2	22,062
96	81.7	11,604	151.6	21,532	155.2	22,115	89.6	12,597	155.2 ^c	21,797	155.2	21,797
97	82.8	11,623	151.8	21,323	155.2	21,852	90.8	12,617	155.2 ^c	21,538	155.2	21,538
98	83.8	11,640	152.1	21,118	155.2	21,595	92.0	12,636	155.2 ^c	21,284	155.2	21,284
99	84.9	11,657	152.4	20,917	155.2	21,343	93.1	12,655	155.2 ^c	21,035	155.2	21,035
100	86.0	11,674	152.7	20,720	155.2	21,096	94.3	12,673	155.2 ^c	20,792	155.2	20,792
101	86.9	11,675	154.9	20,800	155.2	20,852	95.3	12,675	155.2 ^c	20,554	155.2	20,554
102	87.9	11,677	155.2 ^c	20,613	155.2	20,613	96.4	12,676	155.2 ^c	20,321	155.2	20,321
103	88.8	11,678	155.2 ^c	20,378	155.2	20,378	97.4	12,678	155.2 ^c	20,092	155.2	20,092
104	89.7	11,679	155.2 ^c	20,149	155.2	20,149	98.4	12,679	155.2 ^c	19,868	155.2	19,868
105	90.6	11,680	155.2 ^c	19,923	155.2	19,923	99.4	12,680	155.2 ^c	19,649	155.2	19,649
106	91.4	11,658	155.2 ^c	19,711	155.2	19,711	100.2	12,656	155.2 ^c	19,442	155.2	19,442
107	92.1	11,637	155.2 ^c	19,503	155.2	19,503	101.0	12,633	155.2 ^c	19,239	155.2	19,239
108	92.8	11,615	155.2 ^c	19,299	155.2	19,299	101.8	12,610	155.2 ^c	19,040	155.2	19,040
109	93.6	11,594	155.2 ^c	19,098	155.2	19,098	102.6	12,587	155.2 ^c	18,845	155.2	18,845
110	94.3	11,574	155.2 ^c	18,901	155.2	18,901	103.5	12,565	155.2 ^c	18,653	155.2	18,653

- a. Table values derived from HDC report (Nov 2002). Flow (cfs) is calculated based on turbine efficiency, head, and power output (MW). "Operating Limit" is the maximum safe operating point, based on cavitation or generator limit (added Feb 2018).
- b. As of Feb 2018, Units 4, 8, 9, 11, and 12 have fixed blades and restricted operating range of approximately 17-19 kcfs.
- c. At project head ≥ 102 ft (with STS) and ≥ 94 ft (no STS), JDA units are restricted by the Operating Limit and cannot achieve the modeled upper limit of the 1% turbine efficiency range. Power (MW) and flow (cfs) values shown are at the Operating Limit, not the 1% upper limit.

5.3. Turbine Unit Maintenance.

5.3.1. Maintenance Schedules. Turbine unit maintenance schedules will be reviewed by Project and District biologists for fish impacts.

5.3.2. Operational Testing. Operational testing of a unit under maintenance is in addition to a unit in run status required for power plant reliability. Operational testing may deviate from FPP priority order and may require water that would otherwise be used for spill if the unit running for reliability is at its 1% lower limit (i.e., minimum generation). Water for operational testing will be used from powerhouse allocation when possible, and diverted from spill only to the extent necessary to maintain generation system reliability.

5.3.2.1. Pre-Maintenance: Before units go into maintenance status, units may be operationally tested for up to 30 minutes by running at speed-no-load and various loads within the 1% range for pre-maintenance measurements and testing, and to allow all fish to move through the unit as defined in **section 6.5.2.**

5.3.2.2. Post-Maintenance: After maintenance or repair, units may be operationally tested while remaining in maintenance or forced outage status for up to a cumulative time of 30 minutes (within 1% range) before returning to operational status.

5.3.3. Wicket gate opening for functional testing of a watered-up unit will be less than 15 minutes total open time.

6. DEWATERING PLANS

6.1. General.

6.1.1. Guidelines for Dewatering and Fish Handling (Appendix F) and project *Dewatering Plans*³ have been developed by the projects and approved by FPOM, and are followed for most project facility dewaterings. The appropriate plans are reviewed by participants before each salvage operation. The plans include consideration for fish safety and are consistent with the following general guidance.

6.1.2. The project biologist and/or alternate Corps fish personnel will attend all project activities involving fish handling. Personnel shall remain present onsite during pumping operations to ensure stranding does not occur or a water level sensor that deactivates the dewatering process will be used. The fish agencies and tribes will be encouraged to participate in all ladder dewaterings.

6.1.3. During the pumping or draining operation to dewater a portion or all, the water level will not be allowed to drop so low it strands fish.

³ Dewatering Plans are available on the FPOM website at: pweb.crohms.org/tmt/documents/FPOM/2010/

6.2. Dewatering – Adult Fish Ladders.

6.2.1. Routine Maintenance.

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

6.2.1.2. The Project Biologist will ensure that fish rescue equipment is available and will coordinate to provide adequate personnel to move fish out of the dewatered ladder.

6.2.1.3. Project personnel will install head gates⁴ to shut down ladder flow. Where possible, a flushing flow of 1”–2” will be maintained in the ladder until fish are rescued.

6.2.1.4. The Project Biologist or alternate Corps fish personnel will oversee fish rescue when the ladders are dewatered. The Project Biologist will invite fish agency and/or tribal biologists to participate in the dewatering activities. Captured fish will then be 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, steelhead kelts should be released into the tailrace.

6.2.1.5. Orifice blocking devices, which are placed in the lower-most weirs to prevent fish from re-ascending the dewatered portion of the adult fishway, shall have ropes attached to them by project operations and be tied off to fishway railings. The blocking devices shall be removed just before the fishway is returned to service. These devices will be noted on the pre-water-up checklist maintained by project fish biologists. This will prevent the orifice blocks from being unintentionally left in place following fishway water-up.

6.2.2. Non-Routine Maintenance. When possible, discontinue auxiliary water and operate ladder at reduced flow as long as possible for up to 72 hours prior to dewatering. Follow guidance in **section 6.4.**

6.3. Dewatering – Powerhouse Fish Collection System.

6.3.1. Routine Maintenance. During the pumping or draining operation to dewater a portion or the entire collection channel, the water will not be allowed to drop to a level which strands fish. Personnel shall remain present onsite during pumping operations to ensure that stranding does not occur. The Project Biologist will assure that all necessary rescue equipment is available. The Project Biologist or alternate Corps fish personnel will provide technical guidance on fish safety and will assist directly in rescue operations.

⁴ Head gates may also be referred to as “operating” gates at some projects. The terms are interchangeable.

6.4. Dewatering – Juvenile Bypass System (JBS).

6.4.1. Routine Maintenance. When draining the juvenile bypass channel, it is typical to flush the channel with only bay 16 bypass orifices open. Bay 16 gatewells will be dipped in advance to minimize the number of fish contained in this flushing water during fish passage season.

6.5. Dewatering – Turbine Units.

6.5.1. Gatewell Dipping: Remove juvenile fish from gatewell(s) that will be drained by use of a special dipping basket. During fish passage season, April 1–December 15, gatewell dipping is mandatory whether or not fish screens are installed, *except in 2018 when this goes into effect starting March 1 for units that have screens installed for the early JBS start-up (see section 2.3.2)*. Dipping is not required during winter maintenance, December 16–March 31, when fish screens have been removed, *except in 2018 when screens will be installed by March 1 in at least the first four priority units*. To minimize the number of fish contained in the gatewell:

- i. Shut down the turbine the previous evening/night and leave idle with all orifices open overnight if power demand allows;
- ii. Keep orifices open during the removal of screens/STSs, during turbine spinning, and while gatewell dipping is performed;
- iii. Close orifices only after gatewell dipping/fish removal has been completed and immediately before installing the bulkhead;
- iv. It is strongly preferred that, if possible, two roller gates and one bulkhead are deployed to isolate a turbine for dewatering.

6.5.2. If the turbine draft tube is dewatered, operate unit at full load for a minimum of 15 minutes immediately prior to installing tail logs. If not possible to load, run unit at speed-no-load for a minimum of 15 minutes. Install the bottom two tail logs side-by-side prior to stacking the remainder to minimize risk of sturgeon entering the draft tube before dewatering. This is necessary for both scheduled and unscheduled outages.

6.5.3. If a turbine unit is idle and partially dewatered, and tail logs are to be 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. Adequate inspections will need to be conducted to ensure that the safety pool is maintained and fish are in good condition. Water levels in the draft tube will not be allowed to drop to a level that strands fish.

6.5.4. Fish rescue personnel will inspect dewatered turbine draft tubes, scroll cases, and intakes as soon as they can gain access and the water levels reach a depth permitting visual inspection. The Project Biologist or alternate fish personnel will provide technical guidance on fish safety and will directly participate in fish salvage.

6.5.5. The Project Biologist will assure that all necessary rescue equipment is available.

6.6. Dewatering – Navigation Lock.

6.6.1. The navigation lock is frequently dewatered for routine maintenance in late February/early March, in conjunction with navigation lock outages at The Dalles and Bonneville dams.

6.6.2. The area between the upstream bulkhead and the upstream gate is surveyed for fish as water levels allow. The lateral and pool areas on the floor of the lock are surveyed for fish from above. Most of these areas remain full of water, precluding the ability to implement successful fish salvage operations. Areas where water levels slowly decrease are accessed via crane when pool levels reach a depth of approximately 3 feet. The fill conduits are accessed and checked for fish only if needed and can be done safely. All salvaged fish are removed, transported via bag or tank and released to the river.

7. FOREBAY DEBRIS REMOVAL

7.1.1. Debris at projects can impact fish passage conditions. It can plug or block trash racks, VBSs, gatewell orifices, dewatering screens, separators, and facility piping resulting in impingement, injuries, and descaling of fish. Removing debris at its source in the forebay is sometimes necessary to maintain safe and efficient fish passage conditions, navigation, and other project activities. In this case, the only viable alternative is to spill to pass the debris.

7.1.2. Special spill operations that don't follow the normal spill schedule or volume limits will be coordinated prior to their execution. Normally, the project shall contact CENWP-OD at least two workdays prior to the day the special operation is required. Using information provided by the project, CENWP-OD will coordinate with FPOM and with RCC, as necessary. Once the coordination is complete, RCC will issue a teletype detailing the special operations.

8. RESPONSE TO HAZARDOUS MATERIALS SPILLS

8.1.1. John Day Project's guidance for responding to hazardous substance spills is contained in its *Emergency Spill Response Plan*. This guidance will be followed in case of a spill.

8.1.2. In the event of a hazardous materials spill, the Project Biologist has the authority to make fishway adjustments outside of operating criteria as necessary to prevent contamination of the ladder until unified command is formed and consultation is established with FPOM. NOAA Fisheries will be notified within 24 hours of a ladder closure.

8.1.3. Project Fisheries will be contacted as soon as possible after a hazardous material release and prior to any modification to fishway operations. Project Fisheries will then contact the CENWP-OD biologist and FPOM. Attempts should be made to first contact the Project Biologist on duty. During fish passage season there is a Project Biologist on duty 7 days/week. If a Project Biologist cannot be reached by radio or in the office, attempts to contact Project Fisheries will occur in the following order:

- i.** Miro Zyndol (541) 506-7860 or 980-9958. Home # available in Control Room.
- ii.** Tammy Mackey (503) 961-5733.

Table JDA-8. [pg 1 of 11] John Day Dam Spill Patterns with TSWs in Bays 18-19.

JDA Spill Patterns with TSWs in Bays 18, 19 - # Gate Stops per Spillbay																				Total Stops (#)	Spill ^a (kcfs)	
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18 ^c	19 ^c	20 ^b			
																	TSW	TSW		0	19.4	
																	TSW	TSW	1	1	21	
																	TSW	TSW	1.5	1.5	21.8	
	1																TSW	TSW	1.5	2.5	23.4	
	1	1															TSW	TSW	1.5	3.5	25	
	1	1														1	TSW	TSW	1.5	4.5	26.6	
	1	1														1	1	TSW	TSW	1.5	5.5	28.2
	1	1													1	1	1	TSW	TSW	1.5	6.5	29.8
	1	1											1	1	1	1	1	TSW	TSW	1.5	7.5	31.4
	1	1										1	1	1	1	1	1	TSW	TSW	1.5	8.5	33
	1	1									1	1	1	1	1	1	1	TSW	TSW	1.5	9.5	34.6
	1	1								1	1	1	1	1	1	1	1	TSW	TSW	1.5	10.5	36.2
	1	1							1	1	1	1	1	1	1	1	1	TSW	TSW	1.5	11.5	37.8
	1	1						1	1	1	1	1	1	1	1	1	1	TSW	TSW	1.5	12.5	39.4
	1	1					1	1	1	1	1	1	1	1	1	1	1	TSW	TSW	1.5	13.5	41
	1	1				1	1	1	1	1	1	1	1	1	1	1	1	TSW	TSW	1.5	14.5	42.6
	1	1	1			1	1	1	1	1	1	1	1	1	1	1	1	TSW	TSW	1.5	15.5	44.2
	1	1	1			1	1	1	1	1	1	1	1	1	1	1.5	TSW	TSW	1.5	16	45	
	2	1	1			1	1	1	1	1	1	1	1	1	1	1.5	TSW	TSW	1.5	16.5	45.8	
	2	1.5	1			1	1	1	1	1	1	1	1	1	1	1.5	TSW	TSW	1.5	17	46.6	
	2	1.5	1	1		1	1	1	1	1	1	1	1	1	1	1.5	TSW	TSW	1.5	18	48.2	
	2	1.5	1	1		1	1	1	1	1	1	1	1	1	1.5	1.5	TSW	TSW	1.5	18.5	49	
	2	1.5	1.5	1		1	1	1	1	1	1	1	1	1	1.5	1.5	TSW	TSW	1.5	19	49.8	
	2	1.5	1.5	1		1	1	1	1	1	1	1	1	1	1.5	1.5	TSW	TSW	2	19.5	50.6	
	2	1.5	1.5	1	1	1	1	1	1	1	1	1	1	1	1.5	2	TSW	TSW	2	20	51.4	
	2	1.5	1.5	1	1	1	1	1	1	1	1	1	1	1	1.5	2	TSW	TSW	2	21	53	
	2	1.5	1.5	1.5	1	1	1	1	1	1	1	1	1	1	1.5	2	TSW	TSW	2	21.5	53.8	
	2	1.5	1	1.5	1	1	1	1.5	1	1	1	1	1	1	1.5	2	TSW	TSW	2	22	54.6	
	2	1.5	1	1.5	1	1.5	1	1.5	1	1	1	1	1	1	1.5	2	TSW	TSW	2	22.5	55.4	
	2	1.5	1	1.5	1	1.5	1	1.5	1	1	1	1	1	1.5	1.5	2	TSW	TSW	2	23	56.2	
	2	1.5	1	1.5	1	1.5	1	1.5	1	1	1	1	1	1.5	2	2	TSW	TSW	2	23.5	57	
	3	1.5	1	1.5	1	1.5	1	1.5	1	1	1	1	1	1.5	2	2	TSW	TSW	2	24	57.8	
	3	1.5	1	1.5	1	1.5	1	1.5	1.5	1	1	1	1	1.5	2	2	TSW	TSW	2	24.5	58.6	
	3	1.5	1	1.5	1	1.5	1.5	1.5	1.5	1	1	1	1	1.5	2	2	TSW	TSW	2	25	59.4	
	3	1.5	1	1.5	1	1.5	1.5	1.5	1.5	1	1	1	1.5	1.5	2	2	TSW	TSW	2	25.5	60.2	
	3	1.5	1	1.5	1	1.5	1.5	2	1.5	1	1	1	1.5	1.5	2	2	TSW	TSW	2	26	61	
	3	1.5	1	1.5	1.5	1.5	1.5	2	1.5	1	1	1	1.5	1.5	2	2	TSW	TSW	2	26.5	61.8	
	3	1.5	1	1.5	1.5	1.5	1.5	2	1.5	1	1	1.5	1.5	1.5	2	2	TSW	TSW	2	27	62.6	
	3	1.5	1	1.5	1.5	1.5	1.5	2	1.5	1	1.5	1.5	1.5	1.5	2	2	TSW	TSW	2	27.5	63.4	
	3	1.5	1	1.5	1.5	2	1.5	2	1.5	1	1.5	1.5	1.5	1.5	2	2	TSW	TSW	2	28	64.2	
	3	1.5	1	1.5	1.5	2	1.5	2	1.5	1	1.5	1.5	1.5	1.5	2	2.5	TSW	TSW	2	28.5	65	
	3	1.5	1	1.5	1.5	2	1.5	2	1.5	1	1.5	1.5	1.5	2	2	2.5	TSW	TSW	2	29	65.8	
	3	1.5	1	1.5	1.5	2	1.5	2	1.5	1.5	1.5	1.5	1.5	2	2	2.5	TSW	TSW	2	29.5	66.6	

^a Spill (kcfs) is calculated as a function of total stops + TSW spill. At Spill >305 kcfs, transition from pattern for juvenile fish to flood.
^b Gates 1 & 20 blocked at 11 stops (10.3 ft opening).
^c TSWs in Bays 18-19 = fixed spill of ~19.4 kcfs (~9.7 kcfs/bay). TSW removal recommended for flow > 685 kcfs. TSW does not affect spillway flood capacity until flow ≥ 1,492 kcfs.

JDA Spill Patterns with TSWs in Bays 18, 19 - # Gate Stops per Spillbay																				Total Stops (#)	Spill ^a (kcfs)		
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18 ^c	19 ^c	20 ^b				
	3	1.5	1.5	1.5	1.5	2	1.5	2	1.5	1.5	1.5	1.5	1.5	2	2	2.5	TSW	TSW	2	30	67.4		
	3	1.5	1.5	1.5	1.5	2	2	2	1.5	1.5	1.5	1.5	1.5	2	2	2.5	TSW	TSW	2	30.5	68.2		
	3	1.5	1.5	1.5	1.5	2	2	2	1.5	1.5	1.5	1.5	2	2	2	2.5	TSW	TSW	2	31	69		
	3	1.5	1.5	1.5	1.5	2	2	2	1.5	1.5	1.5	1.5	2	2	2.5	2.5	TSW	TSW	2	31.5	69.8		
	3	2	1.5	1.5	1.5	2	2	2	1.5	1.5	1.5	1.5	2	2	2.5	2.5	TSW	TSW	2	32	70.6		
	3	2	1.5	1.5	1.5	2	2	2	1.5	1.5	1.5	1.5	2	2	2.5	2.5	TSW	TSW	2.5	32.5	71.4		
	3	2	1.5	1.5	1.5	2	2	2	1.5	1.5	1.5	2	2	2	2.5	2.5	TSW	TSW	2.5	33	72.2		
	3	2	1.5	1.5	1.5	2	2	2	1.5	1.5	1.5	2	2	2	2.5	2.5	TSW	TSW	2.5	33.5	73		
	3	2	1.5	2	1.5	2	2	2	1.5	1.5	1.5	2	2	2	2.5	2.5	TSW	TSW	2.5	34	73.8		
	3	2	1.5	2	1.5	2	2	2	1.5	1.5	2	2	2	2	2.5	2.5	TSW	TSW	2.5	34.5	74.6		
	3	2	1.5	2	1.5	2	2	2	2	2	2	2	2	2	2.5	2.5	TSW	TSW	2.5	35	75.4		
	3	2	1.5	2	1.5	2	2	2	2	2	2	2	2	2	2.5	2.5	TSW	TSW	2.5	35.5	76.2		
	3	2	1.5	2	2	2	2	2	2	2	2	2	2	2	2.5	2.5	TSW	TSW	2.5	36	77		
	3	2	1.5	2	2	2.5	2	2	2	2	2	2	2	2	2.5	2.5	TSW	TSW	2.5	36.5	77.8		
	3	2	2	2	2	2.5	2	2	2	2	2	2	2	2	2.5	2.5	TSW	TSW	2.5	37	78.6		
	3	2.5	2	2	2	2.5	2	2	2	2	2	2	2	2	2.5	2.5	TSW	TSW	2.5	37.5	79.4		
	3	2.5	2	2	2.5	2.5	2	2	2	2	2	2	2	2	2.5	2.5	TSW	TSW	2.5	38	80.2		
	4	2.5	2	2	2.5	2.5	2	2	2	2	2	2	2	2	2.5	2.5	TSW	TSW	2.5	38.5	81		
	4	2.5	2	2	2.5	2.5	2	2	2	2	2	2	2	2	2.5	2.5	2.5	TSW	TSW	2.5	39	81.8	
	4	2.5	2	2	2.5	2.5	2.5	2	2	2	2	2	2	2	2.5	2.5	2.5	TSW	TSW	2.5	39.5	82.6	
	4	2.5	2	2	2.5	2.5	2.5	2	2	2	2	2	2.5	2.5	2.5	2.5	2.5	TSW	TSW	2.5	40	83.4	
	4	2.5	1.5	2	2.5	2.5	2.5	2.5	2	2	2	2.5	2.5	2.5	2.5	2.5	2.5	TSW	TSW	2.5	40.5	84.2	
	4	2.5	1.5	2	2.5	2.5	2.5	2.5	2.5	2	2	2.5	2.5	2.5	2.5	2.5	2.5	TSW	TSW	2.5	41	85	
	4	2.5	1.5	2	2.5	2.5	2.5	2.5	2.5	2	2	2.5	2.5	2.5	3	2.5	2.5	TSW	TSW	2.5	41.5	85.8	
	4	2.5	1.5	2	2.5	2.5	2.5	2.5	2.5	2	2	2.5	2.5	3	3	2.5	2.5	TSW	TSW	2.5	42	86.6	
	4	2.5	1.5	2	2.5	2.5	2.5	2.5	2.5	2	2.5	2.5	2.5	3	3	2.5	2.5	TSW	TSW	2.5	42.5	87.4	
	4	3	1.5	2	2.5	2.5	2.5	2.5	2.5	2	2.5	2.5	2.5	3	3	2.5	2.5	TSW	TSW	2.5	43	88.2	
	4	3	1.5	2	2.5	2.5	2.5	2.5	2.5	2	2.5	2.5	3	3	3	2.5	2.5	TSW	TSW	2.5	43.5	89	
	4	3	1.5	2	2.5	3	2.5	2.5	2.5	2	2.5	2.5	3	3	3	2.5	2.5	TSW	TSW	2.5	44	89.8	
	4	3	1.5	2	2.5	3	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3	2.5	2.5	TSW	TSW	2.5	44.5	90.6	
	4	3	2	2	2.5	3	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3	2.5	2.5	TSW	TSW	2.5	45	91.4	
	4	3	2	2	2.5	3	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3	3	2.5	2.5	TSW	TSW	2.5	45.5	92.2
	4	3	2	2.5	2.5	3	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3	3	2.5	2.5	TSW	TSW	2.5	46	93
	4	3	2	2.5	2.5	3	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3.5	3	2.5	2.5	TSW	TSW	2.5	46.5	93.8
	4	3.5	2	2.5	2.5	3	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3.5	3	2.5	2.5	TSW	TSW	2.5	47	94.6
	4	3.5	2	2.5	2.5	3	3	2.5	2.5	2.5	2.5	2.5	3	3	3.5	3	2.5	2.5	TSW	TSW	2.5	47.5	95.4
	4	3.5	2	2.5	2.5	3	3	2.5	2.5	2.5	2.5	2.5	3	3	3.5	3.5	2.5	2.5	TSW	TSW	2.5	48	96.2
	4	3.5	2	3	2.5	3	3	2.5	2.5	2.5	2.5	2.5	3	3	3.5	3.5	2.5	2.5	TSW	TSW	2.5	48.5	97
	4	3.5	2.5	3	2.5	3	3	2.5	2.5	2.5	2.5	2.5	3	3	3.5	3.5	2.5	2.5	TSW	TSW	2.5	49	97.8
	4	3.5	2.5	3	2.5	3	3	3	2.5	2.5	3	2.5	3	3	3.5	3.5	2.5	2.5	TSW	TSW	2.5	49.5	98.6
	4	3.5	2.5	3	2.5	3	3	3	3	2.5	3	2.5	3	3	3.5	3.5	2.5	2.5	TSW	TSW	2.5	50	99.4
	4	3.5	2.5	3	2.5	3	3	3	3	2.5	3	2.5	3	3	3.5	3.5	2.5	2.5	TSW	TSW	2.5	50.5	100.2
	4	3.5	2.5	3	2.5	3	3	3	3	2.5	3	3	3	3	3.5	3.5	2.5	2.5	TSW	TSW	2.5	51	101
	4	3.5	2.5	3.5	2.5	3	3	3	3	2.5	3	3	3	3	3.5	3.5	2.5	2.5	TSW	TSW	2.5	51.5	101.8
	4	3.5	3	3.5	2.5	3	3	3	3	2.5	3	3	3	3	3.5	3.5	2.5	2.5	TSW	TSW	2.5	52	102.6
	4	3.5	3	3.5	2.5	3	3	3	3	2.5	3	3	3	3	3.5	4	2.5	2.5	TSW	TSW	2.5	52.5	103.4
	4	3.5	3	3.5	2.5	3	3	3	3	2.5	3	3	3	3.5	3.5	4	2.5	2.5	TSW	TSW	2.5	53	104.2
	4	3.5	3	3.5	2.5	3	3	3	3	2.5	3	3	3	3.5	3.5	4	2.5	2.5	TSW	TSW	2.5	53.5	105
	4	3.5	3	3.5	2.5	3	3	3	3	3	3	3	3	3.5	3.5	4	2.5	2.5	TSW	TSW	2.5	54	105.8
	4	3.5	3	3.5	3	3	3	3	3	3	3	3	3	3.5	3.5	4	2.5	2.5	TSW	TSW	2.5	54.5	106.6

JDA Spill Patterns with TSWs in Bays 18, 19 - # Gate Stops per Spillbay																				Total Stops (#)	Spill ^a (kcfs)		
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18 ^c	19 ^c	20 ^b				
	4	3.5	3	3.5	3	3	3	3	3	3	3	3	3	3.5	4	4	TSW	TSW	2.5	55	107.4		
	4	3.5	3	3.5	3	3	3	3	3	3	3	3	3.5	3.5	4	4	TSW	TSW	2.5	55.5	108.2		
	4	4	3	3.5	3	3	3	3	3	3	3	3	3.5	3.5	4	4	TSW	TSW	2.5	56	109		
	4	4	3	3.5	3	3	3	3	3	3	3.5	3	3.5	3.5	4	4	TSW	TSW	2.5	56.5	109.8		
	4	4	3	3.5	3	3.5	3	3	3	3	3.5	3	3.5	3.5	4	4	TSW	TSW	2.5	57	110.6		
	4	4	3	3.5	3	3.5	3	3	3	3.5	3.5	3	3.5	3.5	4	4	TSW	TSW	2.5	57.5	111.4		
	4	4	3	3.5	3	3.5	3	3	3	3.5	3.5	3.5	3.5	3.5	4	4	TSW	TSW	2.5	58	112.2		
	4	4	3	3.5	3.5	3.5	3	3	3	3.5	3.5	3.5	3.5	3.5	4	4	TSW	TSW	2.5	58.5	113		
	4	4	3	3.5	3.5	3.5	3	3.5	3	3.5	3.5	3.5	3.5	3.5	4	4	TSW	TSW	2.5	59	113.8		
	4	4	3	3.5	3.5	3.5	3	3.5	3	3.5	3.5	3.5	3.5	3.5	4	4.5	TSW	TSW	2.5	59.5	114.6		
	4	4	3	3.5	3.5	3.5	3	3.5	3	3.5	3.5	3.5	3.5	3.5	4	4.5	TSW	TSW	3	60	115.4		
	4	4	3	3.5	3.5	3.5	3	3.5	3	3.5	3.5	3.5	3.5	4	4	4.5	TSW	TSW	3	60.5	116.2		
	4	4	3.5	3.5	3.5	3.5	3	3.5	3	3.5	3.5	3.5	3.5	4	4	4.5	TSW	TSW	3	61	117		
	4	4	3.5	3.5	3.5	3.5	3.5	3.5	3	3.5	3.5	3.5	3.5	4	4	4.5	TSW	TSW	3	61.5	117.8		
	4	4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	4	4	4.5	TSW	TSW	3	62	118.6		
	4	4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	4	4.5	4.5	TSW	TSW	3	62.5	119.4		
	4	4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	4	4	4.5	4.5	TSW	TSW	3	63	120.2		
	4	4.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	4	4	4.5	4.5	TSW	TSW	3	63.5	121		
	4	4.5	3.5	4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	4	4	4.5	4.5	TSW	TSW	3	64	121.8		
	4	4.5	3.5	4	3.5	3.5	3.5	3.5	3.5	3.5	4	3.5	4	4	4.5	4.5	TSW	TSW	3	64.5	122.6		
	4	4.5	3.5	4	3.5	4	3.5	3.5	3.5	3.5	4	3.5	4	4	4.5	4.5	TSW	TSW	3	65	123.4		
	4	4.5	3.5	4	3.5	4	3.5	3.5	3.5	4	4	3.5	4	4	4.5	4.5	TSW	TSW	3	65.5	124.2		
	4	4.5	3.5	4	3.5	4	3.5	3.5	3.5	4	4	4	4	4	4.5	4.5	TSW	TSW	3	66	125		
	4	4.5	3.5	4	4	4	3.5	3.5	3.5	4	4	4	4	4	4.5	4.5	TSW	TSW	3	66.5	125.8		
	4	4.5	3.5	4	4	4	3.5	4	3.5	4	4	4	4	4	4.5	4.5	TSW	TSW	3	67	126.6		
	4	4.5	3.5	4	4	4	3.5	4	3.5	4	4	4	4	4	4.5	5	TSW	TSW	3	67.5	127.4		
	4	4.5	3.5	4	4	4	3.5	4	3.5	4	4	4	4	4	4.5	5	TSW	TSW	3.5	68	128.2		
	4	4.5	3.5	4	4	4	3.5	4	3.5	4	4	4	4	4	4.5	4.5	5	TSW	TSW	3.5	68.5	129	
	4	4.5	4	4	4	4	3.5	4	3.5	4	4	4	4	4	4.5	4.5	5	TSW	TSW	3.5	69	129.8	
	4	4.5	4	4	4	4	4	4	3.5	4	4	4	4	4	4.5	4.5	5	TSW	TSW	3.5	69.5	130.6	
	4	4.5	4	4	4	4	4	4	4	4	4	4	4	4	4.5	4.5	5	TSW	TSW	3.5	70	131.4	
	4	4.5	4	4	4	4	4	4	4	4	4	4	4	4	4.5	5	5	TSW	TSW	3.5	70.5	132.2	
	4	4.5	4	4	4	4	4	4	4	4	4	4	4	4	4.5	4.5	5	5	TSW	TSW	3.5	71	133
	4	5	4	4	4	4	4	4	4	4	4	4	4	4.5	4.5	5	5	TSW	TSW	3.5	71.5	133.8	
	4	5	4	4.5	4	4	4	4	4	4	4	4	4	4.5	4.5	5	5	TSW	TSW	3.5	72	134.6	
	4	5	4	4.5	4	4	4	4	4	4	4	4	4	4.5	4.5	5	5	TSW	TSW	3.5	72.5	135.4	
	4	5	4	4.5	4	4.5	4	4	4	4	4	4	4	4.5	4.5	5	5	TSW	TSW	3.5	73	136.2	
	4	5	4	4.5	4	4.5	4	4	4	4	4	4	4	4.5	4.5	5	5	TSW	TSW	3.5	73.5	137	
	4	5	4	4.5	4	4.5	4	4	4	4	4	4	4	4.5	4.5	5	5	TSW	TSW	3.5	74	137.8	
	4	5	4	4.5	4.5	4.5	4	4	4	4	4	4	4	4.5	4.5	5	5	TSW	TSW	3.5	74.5	138.6	
	4	5	4	4.5	4.5	4.5	4	4.5	4	4	4	4	4	4.5	4.5	5	5	TSW	TSW	3.5	75	139.4	
	4	5	4	4.5	4.5	4.5	4	4.5	4	4	4	4	4	4.5	4.5	5	5.5	TSW	TSW	3.5	75.5	140.2	
	4	5	4	4.5	4.5	4.5	4	4.5	4	4	4	4	4	4.5	4.5	5	5.5	TSW	TSW	4	76	141	
	4	5	4	4.5	4.5	4.5	4	4.5	4	4	4	4	4	4.5	4.5	5	5	5.5	TSW	TSW	4	76.5	141.8
	4	5	4.5	4.5	4.5	4.5	4	4.5	4	4	4	4	4	4.5	4.5	5	5	5.5	TSW	TSW	4	77	142.6
	4	5	4.5	4.5	4.5	4.5	4.5	4.5	4	4	4	4	4	4.5	4.5	5	5	5.5	TSW	TSW	4	77.5	143.4
	4	5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	5	5	5.5	TSW	TSW	4	78	144.2	
	4	5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	5	5.5	5.5	TSW	TSW	4	78.5	145	
	4	5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	5	5	5.5	5.5	TSW	TSW	4	79	145.8	
	4	5.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	5	5	5.5	5.5	TSW	TSW	4	79.5	146.6		

JDA Spill Patterns with TSWs in Bays 18, 19 - # Gate Stops per Spillbay																				Total Stops (#)	Spill ^a (kcfs)
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18 ^c	19 ^c	20 ^b		
	4	5.5	4.5	5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	5	5	5.5	5.5	TSW	TSW	4	80	147.4
	4	5.5	4.5	5	4.5	4.5	4.5	4.5	4.5	4.5	5	4.5	5	5	5.5	5.5	TSW	TSW	4	80.5	148.2
	4	5.5	4.5	5	4.5	5	4.5	4.5	4.5	4.5	5	4.5	5	5	5.5	5.5	TSW	TSW	4	81	149
	4	5.5	4.5	5	4.5	5	4.5	4.5	4.5	5	5	4.5	5	5	5.5	5.5	TSW	TSW	4	81.5	149.8
	4	5.5	4.5	5	4.5	5	4.5	4.5	4.5	5	5	5	5	5	5.5	5.5	TSW	TSW	4	82	150.6
	4	5.5	4.5	5	5	5	4.5	4.5	4.5	5	5	5	5	5	5.5	5.5	TSW	TSW	4	82.5	151.4
	4	5.5	4.5	5	5	5	4.5	5	4.5	5	5	5	5	5	5.5	5.5	TSW	TSW	4	83	152.2
	4	5.5	4.5	5	5	5	4.5	5	4.5	5	5	5	5	5	5.5	6	TSW	TSW	4	83.5	153
	4	5.5	4.5	5	5	5	4.5	5	4.5	5	5	5	5	5	5.5	6	TSW	TSW	4.5	84	153.8
	4	5.5	4.5	5	5	5	4.5	5	4.5	5	5	5	5	5.5	5.5	6	TSW	TSW	4.5	84.5	154.6
	4	5.5	5	5	5	5	4.5	5	4.5	5	5	5	5	5.5	5.5	6	TSW	TSW	4.5	85	155.4
	4	5.5	5	5	5	5	5	5	4.5	5	5	5	5	5.5	5.5	6	TSW	TSW	4.5	85.5	156.2
	4	5.5	5	5	5	5	5	5	5	5	5	5	5	5.5	5.5	6	TSW	TSW	4.5	86	157
	4	5.5	5	5	5	5	5	5	5	5	5	5	5	5.5	6	6	TSW	TSW	4.5	86.5	157.8
	4	5.5	5	5	5	5	5	5	5	5	5	5	5.5	5.5	6	6	TSW	TSW	4.5	87	158.6
	4	6	5	5	5	5	5	5	5	5	5	5	5.5	5.5	6	6	TSW	TSW	4.5	87.5	159.4
	4	6	5	5.5	5	5	5	5	5	5	5	5	5.5	5.5	6	6	TSW	TSW	4.5	88	160.2
	4	6	5	5.5	5	5	5	5	5	5	5.5	5	5.5	5.5	6	6	TSW	TSW	4.5	88.5	161
	4	6	5	5.5	5	5.5	5	5	5	5	5.5	5	5.5	5.5	6	6	TSW	TSW	4.5	89	161.8
	4	6	5	5.5	5	5.5	5	5	5	5.5	5.5	5	5.5	5.5	6	6	TSW	TSW	4.5	89.5	162.6
	4	6	5	5.5	5	5.5	5	5	5	5.5	5.5	5.5	5.5	5.5	6	6	TSW	TSW	4.5	90	163.4
	4	6	5	5.5	5.5	5.5	5	5	5	5.5	5.5	5.5	5.5	5.5	6	6	TSW	TSW	4.5	90.5	164.2
	4	6	5	5.5	5.5	5.5	5	5.5	5	5.5	5.5	5.5	5.5	5.5	6	6	TSW	TSW	4.5	91	165
	4	6	5	5.5	5.5	5.5	5	5.5	5	5.5	5.5	5.5	5.5	5.5	6	6.5	TSW	TSW	4.5	91.5	165.8
	4	6	5	5.5	5.5	5.5	5	5.5	5	5.5	5.5	5.5	5.5	5.5	6	6.5	TSW	TSW	5	92	166.6
	4	6	5	5.5	5.5	5.5	5	5.5	5	5.5	5.5	5.5	5.5	6	6	6.5	TSW	TSW	5	92.5	167.4
	4	6	5.5	5.5	5.5	5.5	5	5.5	5	5.5	5.5	5.5	5.5	6	6	6.5	TSW	TSW	5	93	168.2
	4	6	5.5	5.5	5.5	5.5	5.5	5.5	5	5.5	5.5	5.5	5.5	6	6	6.5	TSW	TSW	5	93.5	169
	4	6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	6	6	6.5	TSW	TSW	5	94	169.8
	4	6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	6	6.5	6.5	TSW	TSW	5	94.5	170.6
	4	6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	6	6	6.5	6.5	TSW	TSW	5	95	171.4
	4	6	5.5	6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	6	6	6.5	6.5	TSW	TSW	5	95.5	172.2
	4	6	5.5	6	5.5	5.5	5.5	5.5	5.5	5.5	6	5.5	6	6	6.5	6.5	TSW	TSW	5	96	173
	4	6	5.5	6	5.5	6	5.5	5.5	5.5	5.5	6	5.5	6	6	6.5	6.5	TSW	TSW	5	96.5	173.8
	4	6	5.5	6	5.5	6	5.5	5.5	5.5	6	6	5.5	6	6	6.5	6.5	TSW	TSW	5	97	174.6
	4	6	5.5	6	5.5	6	5.5	5.5	5.5	6	6	6	6	6	6.5	6.5	TSW	TSW	5	97.5	175.4
	4	6	5.5	6	6	6	5.5	5.5	5.5	6	6	6	6	6	6.5	6.5	TSW	TSW	5	98	176.2
	4	6	5.5	6	6	6	5.5	6	5.5	6	6	6	6	6	6.5	6.5	TSW	TSW	5	98.5	177
	4	6	5.5	6	6	6	5.5	6	5.5	6	6	6	6	6	6.5	7	TSW	TSW	5	99	177.8
	4	6	5.5	6	6	6	5.5	6	5.5	6	6	6	6	6	6.5	7	TSW	TSW	5.5	99.5	178.6
	4	6	5.5	6	6	6	5.5	6	5.5	6	6	6	6	6.5	6.5	7	TSW	TSW	5.5	100	179.4
	4	6	6	6	6	6	5.5	6	5.5	6	6	6	6	6.5	6.5	7	TSW	TSW	5.5	100.5	180.2
	4	6	6	6	6	6	6	6	5.5	6	6	6	6	6.5	6.5	7	TSW	TSW	5.5	101	181
	4	6	6	6	6	6	6	6	6	6	6	6	6	6.5	6.5	7	TSW	TSW	5.5	101.5	181.8
	4	6	6	6	6	6	6	6	6	6	6	6	6	6.5	7	7	TSW	TSW	5.5	102	182.6
	4	6	6	6	6	6	6	6	6	6	6	6	6.5	6.5	7	7	TSW	TSW	5.5	102.5	183.4
	4	6	6	6.5	6	6	6	6	6	6	6	6	6.5	6.5	7	7	TSW	TSW	5.5	103	184.2
	4	6	6	6.5	6	6	6	6	6	6	6.5	6	6.5	6.5	7	7	TSW	TSW	5.5	103.5	185
	4	6	6	6.5	6	6.5	6	6	6	6	6.5	6	6.5	6.5	7	7	TSW	TSW	5.5	104	185.8
	4	6	6	6.5	6	6.5	6	6	6	6.5	6.5	6	6.5	6.5	7	7	TSW	TSW	5.5	104.5	186.6

JDA Spill Patterns with TSWs in Bays 18, 19 - # Gate Stops per Spillbay																				Total Stops (#)	Spill ^a (kcfs)	
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18 ^c	19 ^c	20 ^b			
	4	6	6	6.5	6	6.5	6	6	6	6.5	6.5	6.5	6.5	6.5	7	7	TSW	TSW	5.5	105	187.4	
	4	6	6	6.5	6.5	6.5	6	6	6	6.5	6.5	6.5	6.5	6.5	7	7	TSW	TSW	5.5	105.5	188.2	
	4	6	6	6.5	6.5	6.5	6	6.5	6	6.5	6.5	6.5	6.5	6.5	7	7	TSW	TSW	5.5	106	189	
	4	6	6	6.5	6.5	6.5	6	6.5	6	6.5	6.5	6.5	6.5	6.5	7	7.5	TSW	TSW	5.5	106.5	189.8	
	4	6	6	6.5	6.5	6.5	6	6.5	6	6.5	6.5	6.5	6.5	6.5	7	7.5	TSW	TSW	6	107	190.6	
	4	6	6	6.5	6.5	6.5	6	6.5	6	6.5	6.5	6.5	6.5	7	7	7.5	TSW	TSW	6	107.5	191.4	
	4	6	6.5	6.5	6.5	6.5	6	6.5	6	6.5	6.5	6.5	6.5	7	7	7.5	TSW	TSW	6	108	192.2	
	4	6	6.5	6.5	6.5	6.5	6.5	6.5	6	6.5	6.5	6.5	6.5	7	7	7.5	TSW	TSW	6	108.5	193	
	4	6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	7	7	7.5	TSW	TSW	6	109	193.8	
	4	6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	7	7.5	7.5	TSW	TSW	6	109.5	194.6	
	4	6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	7	7	7.5	7.5	TSW	TSW	6	110	195.4	
	4	6	6.5	7	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	7	7	7.5	7.5	TSW	TSW	6	110.5	196.2	
	4	6	6.5	7	6.5	6.5	6.5	6.5	6.5	6.5	7	6.5	7	7	7.5	7.5	TSW	TSW	6	111	197	
	4	6	6.5	7	6.5	7	6.5	6.5	6.5	6.5	7	6.5	7	7	7.5	7.5	TSW	TSW	6	111.5	197.8	
	4	6	6.5	7	6.5	7	6.5	6.5	6.5	7	7	6.5	7	7	7.5	7.5	TSW	TSW	6	112	198.6	
	4	6	6.5	7	6.5	7	6.5	6.5	6.5	7	7	7	7	7	7.5	7.5	TSW	TSW	6	112.5	199.4	
	4	6	6.5	7	7	7	6.5	6.5	6.5	7	7	7	7	7	7.5	7.5	TSW	TSW	6	113	200.2	
	4	6	6.5	7	7	7	6.5	7	6.5	7	7	7	7	7	7.5	7.5	TSW	TSW	6	113.5	201	
	4	6	6.5	7	7	7	6.5	7	6.5	7	7	7	7	7	7.5	8	TSW	TSW	6	114	201.8	
	4	6	6.5	7	7	7	6.5	7	6.5	7	7	7	7	7	7.5	8	TSW	TSW	6.5	114.5	202.6	
	4	6	6.5	7	7	7	6.5	7	6.5	7	7	7	7	7.5	7.5	8	TSW	TSW	6.5	115	203.4	
	4	6	7	7	7	7	6.5	7	6.5	7	7	7	7	7.5	7.5	8	TSW	TSW	6.5	115.5	204.2	
	4	6	7	7	7	7	7	7	6.5	7	7	7	7	7.5	7.5	8	TSW	TSW	6.5	116	205	
	4	6	7	7	7	7	7	7	7	7	7	7	7	7.5	7.5	8	TSW	TSW	6.5	116.5	205.8	
	4	6	7	7	7	7	7	7	7	7	7	7	7	7.5	8	8	TSW	TSW	6.5	117	206.6	
	4	6	7	7	7	7	7	7	7	7	7	7	7	7.5	7.5	8	8	TSW	TSW	6.5	117.5	207.4
	4	6	7	7.5	7	7	7	7	7	7	7	7	7	7.5	7.5	8	8	TSW	TSW	6.5	118	208.2
	4	6	7	7.5	7	7	7	7	7	7	7.5	7	7.5	7.5	8	8	TSW	TSW	6.5	118.5	209	
	4	6	7	7.5	7	7.5	7	7	7	7	7.5	7	7.5	7.5	8	8	TSW	TSW	6.5	119	209.8	
	4	6	7	7.5	7	7.5	7	7	7	7.5	7.5	7	7.5	7.5	8	8	TSW	TSW	6.5	119.5	210.6	
	4	6	7	7.5	7	7.5	7	7	7	7.5	7.5	7.5	7.5	7.5	8	8	TSW	TSW	6.5	120	211.4	
	4	6	7	7.5	7.5	7.5	7	7	7	7.5	7.5	7.5	7.5	7.5	8	8	TSW	TSW	6.5	120.5	212.2	
	4	6	7	7.5	7.5	7.5	7	7.5	7	7.5	7.5	7.5	7.5	7.5	8	8	TSW	TSW	6.5	121	213	
	4	6	7	7.5	7.5	7.5	7	7.5	7	7.5	7.5	7.5	7.5	7.5	8	8.5	TSW	TSW	6.5	121.5	213.8	
	4	6	7	7.5	7.5	7.5	7	7.5	7	7.5	7.5	7.5	7.5	7.5	8	8.5	TSW	TSW	7	122	214.6	
	4	6	7	7.5	7.5	7.5	7	7.5	7	7.5	7.5	7.5	7.5	8	8	8.5	TSW	TSW	7	122.5	215.4	
	4	6	7.5	7.5	7.5	7.5	7	7.5	7	7.5	7.5	7.5	7.5	8	8	8.5	TSW	TSW	7	123	216.2	
	4	6	7.5	7.5	7.5	7.5	7.5	7.5	7	7.5	7.5	7.5	7.5	8	8	8.5	TSW	TSW	7	123.5	217	
	4	6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	8	8	8.5	TSW	TSW	7	124	217.8	
	4	6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	8	8.5	8.5	TSW	TSW	7	124.5	218.6	
	4	6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	8	8	8.5	8.5	TSW	TSW	7	125	219.4	
	4	6	7.5	8	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	8	8	8.5	8.5	TSW	TSW	7	125.5	220.2	
	4	6	7.5	8	7.5	7.5	7.5	7.5	7.5	8	7.5	8	8	8	8.5	8.5	TSW	TSW	7	126	221	
	4	6	7.5	8	7.5	8	7.5	7.5	7.5	8	7.5	8	8	8	8.5	8.5	TSW	TSW	7	126.5	221.8	
	4	6	7.5	8	7.5	8	7.5	7.5	7.5	8	8	7.5	8	8	8.5	8.5	TSW	TSW	7	127	222.6	
	4	6	7.5	8	7.5	8	7.5	7.5	7.5	8	8	8	8	8	8.5	8.5	TSW	TSW	7	127.5	223.4	
	4	6	7.5	8	8	8	7.5	7.5	7.5	8	8	8	8	8	8.5	8.5	TSW	TSW	7	128	224.2	
	4	6	7.5	8	8	8	7.5	8	7.5	8	8	8	8	8	8.5	8.5	TSW	TSW	7	128.5	225	
	4	6	7.5	8	8	8	7.5	8	7.5	8	8	8	8	8	8.5	9	TSW	TSW	7	129	225.8	
	4	6	7.5	8	8	8	7.5	8	7.5	8	8	8	8	8	8.5	9	TSW	TSW	7.5	129.5	226.6	

JDA Spill Patterns with TSWs in Bays 18, 19 - # Gate Stops per Spillbay																				Total Stops (#)	Spill ^a (kcfs)	
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18 ^c	19 ^c	20 ^b			
	4	6	7.5	8	8	8	7.5	8	7.5	8	8	8	8	8.5	8.5	9	TSW	TSW	7.5	130	227.4	
	4	6	8	8	8	8	7.5	8	7.5	8	8	8	8	8.5	8.5	9	TSW	TSW	7.5	130.5	228.2	
	4	6	8	8	8	8	8	8	7.5	8	8	8	8	8.5	8.5	9	TSW	TSW	7.5	131	229	
	4	6	8	8	8	8	8	8	8	8	8	8	8	8.5	8.5	9	TSW	TSW	7.5	131.5	229.8	
	4	6	8	8	8	8	8	8	8	8	8	8	8	8.5	9	9	TSW	TSW	7.5	132	230.6	
	4	6	8	8	8	8	8	8	8	8	8	8	8.5	8.5	9	9	TSW	TSW	7.5	132.5	231.4	
	4	6	8	8.5	8	8	8	8	8	8	8	8	8.5	8.5	9	9	TSW	TSW	7.5	133	232.2	
	4	6	8	8.5	8	8	8	8	8	8	8.5	8	8.5	8.5	9	9	TSW	TSW	7.5	133.5	233	
	4	6	8	8.5	8	8.5	8	8	8	8	8.5	8	8.5	8.5	9	9	TSW	TSW	7.5	134	233.8	
	4	6	8	8.5	8	8.5	8	8	8	8.5	8.5	8	8.5	8.5	9	9	TSW	TSW	7.5	134.5	234.6	
	4	6	8	8.5	8	8.5	8	8	8	8.5	8.5	8.5	8.5	8.5	9	9	TSW	TSW	7.5	135	235.4	
	4	6	8	8.5	8.5	8.5	8	8	8	8.5	8.5	8.5	8.5	8.5	9	9	TSW	TSW	7.5	135.5	236.2	
	4	6	8	8.5	8.5	8.5	8	8.5	8	8.5	8.5	8.5	8.5	8.5	9	9	TSW	TSW	7.5	136	237	
	4	6	8	8.5	8.5	8.5	8	8.5	8	8.5	8.5	8.5	8.5	8.5	9	9.5	TSW	TSW	7.5	136.5	237.8	
	4	6	8	8.5	8.5	8.5	8	8.5	8	8.5	8.5	8.5	8.5	8.5	9	9.5	TSW	TSW	8	137	238.6	
	4	6	8	8.5	8.5	8.5	8	8.5	8	8.5	8.5	8.5	8.5	9	9	9.5	TSW	TSW	8	137.5	239.4	
	4	6	8	8.5	8.5	8.5	8.5	8.5	8	8.5	8.5	8.5	8.5	9	9	9.5	TSW	TSW	8	138	240.2	
	4	6	8	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	9	9	9.5	TSW	TSW	8	138.5	241	
	4	6	8	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	9	9.5	9.5	TSW	TSW	8	139	241.8	
	4	6	8	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	9	9	9.5	9.5	TSW	TSW	8	139.5	242.6	
	4	6	8	9	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	9	9	9.5	9.5	TSW	TSW	8	140	243.4	
	4	6	8	9	8.5	8.5	8.5	8.5	8.5	8.5	9	8.5	9	9	9.5	9.5	TSW	TSW	8	140.5	244.2	
	4	6	8	9	8.5	9	8.5	8.5	8.5	8.5	9	8.5	9	9	9.5	9.5	TSW	TSW	8	141	245	
	4	6	8	9	8.5	9	8.5	8.5	8.5	9	9	8.5	9	9	9.5	9.5	TSW	TSW	8	141.5	245.8	
	4	6	8	9	8.5	9	8.5	8.5	8.5	9	9	9	9	9	9.5	9.5	TSW	TSW	8	142	246.6	
	4	6	8	9	9	9	8.5	8.5	8.5	9	9	9	9	9	9.5	9.5	TSW	TSW	8	142.5	247.4	
	4	6	8	9	9	9	8.5	9	8.5	9	9	9	9	9	9.5	9.5	TSW	TSW	8	143	248.2	
	4	6	8	9	9	9	8.5	9	8.5	9	9	9	9	9	9.5	10	TSW	TSW	8	143.5	249	
	4	6	8	9	9	9	8.5	9	8.5	9	9	9	9	9	9.5	10	TSW	TSW	8.5	144	249.8	
	4	6	8	9	9	9	8.5	9	8.5	9	9	9	9	9.5	9.5	10	TSW	TSW	8.5	144.5	250.6	
	4	6	8	9	9	9	9	9	8.5	9	9	9	9	9.5	9.5	10	TSW	TSW	8.5	145	251.4	
	4	6	8	9	9	9	9	9	9	9	9	9	9	9.5	9.5	10	TSW	TSW	8.5	145.5	252.2	
	4	6	8	9	9	9	9	9	9	9	9	9	9	9.5	10	10	TSW	TSW	8.5	146	253	
	4	6	8	9	9	9	9	9	9	9	9	9	9	9.5	9.5	10	10	TSW	TSW	8.5	146.5	253.8
	4	6	8	9.5	9	9	9	9	9	9	9	9	9	9.5	9.5	10	10	TSW	TSW	8.5	147	254.6
	4	6	8	9.5	9	9	9	9	9	9	9.5	9	9.5	9.5	10	10	TSW	TSW	8.5	147.5	255.4	
	4	6	8	9.5	9	9.5	9	9	9	9	9.5	9	9.5	9.5	10	10	TSW	TSW	8.5	148	256.2	
	4	6	8	9.5	9	9.5	9	9	9	9	9.5	9.5	9	9.5	9.5	10	10	TSW	TSW	8.5	148.5	257
	4	6	8	9.5	9	9.5	9	9	9	9	9.5	9.5	9.5	9.5	9.5	10	10	TSW	TSW	8.5	149	257.8
	4	6	8	9.5	9.5	9.5	9	9	9	9	9.5	9.5	9.5	9.5	9.5	10	10	TSW	TSW	8.5	149.5	258.6
	4	6	8	9.5	9.5	9.5	9	9.5	9	9.5	9.5	9.5	9.5	9.5	9.5	10	10	TSW	TSW	8.5	150	259.4
	4	6	8	9.5	9.5	9.5	9	9.5	9	9.5	9.5	9.5	9.5	9.5	9.5	10	11	TSW	TSW	8.5	151	260.2
	4	6	8	9.5	9.5	9.5	9	9.5	9	9.5	9.5	9.5	9.5	9.5	9.5	10	11	TSW	TSW	9	151.5	261
	4	6	8	9.5	9.5	9.5	9	9.5	9	9.5	9.5	9.5	9.5	9.5	10	10	11	TSW	TSW	9	152	261.8
	4	6	8	9.5	9.5	9.5	9.5	9.5	9	9.5	9.5	9.5	9.5	9.5	10	10	11	TSW	TSW	9	152.5	262.6
	4	6	8	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	10	10	11	TSW	TSW	9	153	263.4
	4	6	8	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	10	11	11	TSW	TSW	9	154	264.2
	4	6	8	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	10	10	11	11	TSW	TSW	9	154.5	265
	4	6	8	10	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	10	10	11	11	TSW	TSW	9	155	265.8
	4	6	8	10	9.5	9.5	9.5	9.5	9.5	9.5	9.5	10	9.5	10	10	11	11	TSW	TSW	9	155.5	266.6

JDA Spill Patterns with TSWs in Bays 18, 19 - # Gate Stops per Spillbay																				Total Stops (#)	Spill ^a (kcfs)
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18 ^c	19 ^c	20 ^b		
	4	6	8	10	9.5	10	9.5	9.5	9.5	9.5	10	9.5	10	10	11	11	TSW	TSW	9	156	267.4
	4	6	8	10	9.5	10	9.5	9.5	9.5	10	10	9.5	10	10	11	11	TSW	TSW	9	156.5	268.2
	4	6	8	10	9.5	10	9.5	9.5	9.5	10	10	10	10	10	11	11	TSW	TSW	9	157	269
	4	6	8	10	10	10	9.5	9.5	9.5	10	10	10	10	10	11	11	TSW	TSW	9	157.5	269.8
	4	6	8	10	10	10	9.5	10	9.5	10	10	10	10	10	11	11	TSW	TSW	9	158	270.6
	4	6	8	10	10	10	9.5	10	9.5	10	10	10	10	10	11	11	TSW	TSW	9	158	271.4
	4	6	8	10	10	10	9.5	10	9.5	10	10	10	10	10	11	11	TSW	TSW	9.5	158.5	272.2
	4	6	8	10	10	10	9.5	10	9.5	10	10	10	10	11	11	11	TSW	TSW	9.5	159.5	273
	4	6	8	10	10	10	10	10	9.5	10	10	10	10	11	11	11	TSW	TSW	9.5	160	273.8
	4	6	8	10	10	10	10	10	10	10	10	10	10	11	11	11	TSW	TSW	9.5	160.5	274.6
	4	6	8	10	10	10	10	10	10	10	10	10	10	11	11	11	TSW	TSW	9.5	160.5	275.4
	4	6	8	10	10	10	10	10	10	10	10	10	11	11	11	11	TSW	TSW	9.5	161.5	276.2
	4	6	8	11	10	10	10	10	10	10	10	10	11	11	11	11	TSW	TSW	9.5	162.5	277
	4	6	8	11	10	10	10	10	10	10	11	10	11	11	11	11	TSW	TSW	9.5	163.5	277.8
	4	6	8	11	10	11	10	10	10	10	11	10	11	11	11	11	TSW	TSW	9.5	164.5	278.6
	4	6	8	11	10	11	10	10	10	11	11	10	11	11	11	11	TSW	TSW	9.5	165.5	279.4
	4	6	8	11	10	11	10	10	10	11	11	11	11	11	11	11	TSW	TSW	9.5	166.5	280.2
	4	6	8	11	11	11	10	10	10	11	11	11	11	11	11	11	TSW	TSW	9.5	167.5	281
	4	6	8	11	11	11	10	11	10	11	11	11	11	11	11	11	TSW	TSW	9.5	168.5	281.8
	4	6	8	11	11	11	10	11	10	11	11	11	11	11	11	12	TSW	TSW	9.5	169.5	282.6
	4	6	8	11	11	11	10	11	10	11	11	11	11	11	11	12	TSW	TSW	10	170	283.4
	4	6	8	11	11	11	10	11	10	11	11	11	11	11	11	12	TSW	TSW	10	170	284.2
	4	6	8	11	11	11	11	11	10	11	11	11	11	11	11	12	TSW	TSW	10	171	285
	4	6	8	11	11	11	11	11	11	11	11	11	11	11	11	12	TSW	TSW	10	172	285.8
	4	6	8	11	11	11	11	11	11	11	11	11	11	11	12	12	TSW	TSW	10	173	286.6
	4	6	8	11	11	11	11	11	11	11	11	11	11	11	12	12	TSW	TSW	10	173	287.4
	4	6	8	11	11	11	11	11	11	11	11	11	11	11	12	12	TSW	TSW	10	173	288.2
	4	6	8	11	11	11	11	11	11	11	11	11	11	11	12	12	TSW	TSW	10	173	289
	4	6	8	11	11	11	11	11	11	11	11	11	11	11	12	12	TSW	TSW	10	173	289.8
	4	6	8	11	11	11	11	11	11	11	11	11	11	11	12	12	TSW	TSW	10	173	290.6
	4	6	8	11	11	11	11	11	11	11	11	11	11	11	12	12	TSW	TSW	10	173	291.4
	4	6	8	11	11	11	11	11	11	11	11	11	11	11	12	12	TSW	TSW	10	173	292.2
	4	6	8	11	11	11	11	11	11	11	11	11	11	11	12	12	TSW	TSW	10	173	293
	4	6	8	11	11	11	11	11	11	11	11	11	11	11	12	12	TSW	TSW	10	173	293.8
	4	6	8	11	11	11	11	11	11	11	11	11	11	11	12	12	TSW	TSW	10.5	173.5	294.6
	4	6	8	11	11	11	11	11	11	11	11	11	11	12	12	12	TSW	TSW	10.5	174.5	295.4
	4	6	8	11	11	11	11	11	11	11	11	11	11	12	12	12	TSW	TSW	10.5	174.5	296.2
	4	6	8	11	11	11	11	11	11	11	11	11	11	12	12	12	TSW	TSW	10.5	174.5	297
	4	6	8	11	11	11	11	11	11	11	11	11	11	12	12	12	TSW	TSW	10.5	174.5	297.8
	4	6	8	11	11	11	11	11	11	11	11	11	12	12	12	12	TSW	TSW	10.5	175.5	298.6
	4	6	8	12	11	11	11	11	11	11	11	11	12	12	12	12	TSW	TSW	10.5	176.5	299.4
	4	6	8	12	11	11	11	11	11	11	12	11	12	12	12	12	TSW	TSW	10.5	177.5	300.2
	4	6	8	12	11	12	11	11	11	11	12	11	12	12	12	12	TSW	TSW	10.5	178.5	301
	4	6	8	12	11	12	11	11	11	12	12	11	12	12	12	12	TSW	TSW	10.5	179.5	301.8
	4	6	8	12	11	12	11	11	11	12	12	12	12	12	12	12	TSW	TSW	10.5	180.5	302.6
	4	6	8	12	12	12	11	11	11	12	12	12	12	12	12	12	TSW	TSW	10.5	181.5	303.4
	4	6	8	12	12	12	11	12	11	12	12	12	12	12	12	12	TSW	TSW	10.5	182.5	304.2
	4	6	8	12	12	12	11	12	11	12	12	12	12	12	12	12	TSW	TSW	11	183	305
	4	6	8	12	12	12	12	12	11	12	12	12	12	12	12	12	TSW	TSW	11	184	305.8

JDA Spill Patterns with TSWs in Bays 18, 19 - # Gate Stops per Spillbay																				Total Stops (#)	Spill ^a (kcfs)
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18 ^c	19 ^c	20 ^b		
	4	6	8	12	12	12	12	12	11	12	12	12	12	12	12	12	TSW	TSW	11	184	306.6
	4	6	8	12	12	12	12	12	11	12	12	12	12	12	12	12	TSW	TSW	11	184	307.4
	4	6	8	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	185	308.2
	4	6	8	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	185	309
	4	6	8	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	185	309.8
	4	6	8	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	185	310.6
	4	6	8	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	185	311.4
	4	6	8	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	185	312.2
	4	6	8	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	185	313
	4	6	8	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	185	313.8
	4	6	8	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	185	314.6
	4	6	8	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	185	315.4
1	4	6	8	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	186	317
2	4	6	8	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	187	318.6
3	4	6	8	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	188	320.2
3	4	6	9	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	189	321.8
4	4	6	9	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	190	323.4
4	5	6	9	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	191	325
4	5	7	9	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	192	326.6
4	5	7	10	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	193	328.2
5	5	7	10	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	194	329.8
5	6	7	10	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	195	331.4
5	6	8	10	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	196	333
5	6	8	11	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	197	334.6
6	6	8	11	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	198	336.2
6	7	8	11	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	199	337.8
6	7	9	11	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	200	339.4
6	7	9	12	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	201	341
7	7	9	12	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	202	342.6
7	8	9	12	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	203	344.2
7	8	10	12	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	204	345.8
8	8	10	12	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	205	347.4
8	9	10	12	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	206	349
8	9	11	12	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	207	350.6
9	9	11	12	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	208	352.2
9	10	11	12	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	209	353.8
10	10	11	12	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	210	355.4
10	11	11	12	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	211	357
10	11	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	212	358.6
11	11	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	213	360.2
11	11	13	12	12	12	12	12	12	12	12	12	12	12	12	12	12	TSW	TSW	11	214	361.8
11	11	13	12	12	12	12	12	12	12	12	12	12	12	12	12	13	TSW	TSW	11	215	363.4
11	11	13	13	12	12	12	12	12	12	12	12	12	12	12	12	13	TSW	TSW	11	216	365
11	11	13	13	12	12	12	12	12	12	12	12	12	12	13	12	13	TSW	TSW	11	217	366.6
11	11	13	13	13	12	12	12	12	12	12	12	12	12	13	12	13	TSW	TSW	11	218	368.2
11	11	13	13	13	12	12	13	12	12	12	12	12	12	13	12	13	TSW	TSW	11	219	369.8
11	11	13	13	13	12	12	13	12	13	12	12	12	12	13	12	13	TSW	TSW	11	220	371.4
11	11	13	13	13	12	12	13	12	13	12	13	12	12	13	12	13	TSW	TSW	11	221	373
11	11	13	13	13	13	12	13	12	13	12	13	12	12	13	12	13	TSW	TSW	11	222	374.6
11	11	13	13	13	13	12	13	12	13	12	13	12	12	13	13	13	TSW	TSW	11	223	376.2

JDA Spill Patterns with TSWs in Bays 18, 19 - # Gate Stops per Spillbay																				Total Stops (#)	Spill ^a (kcfs)
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18 ^c	19 ^c	20 ^b		
11	11	13	13	13	13	13	13	12	13	12	13	12	12	13	13	13	TSW	TSW	11	224	377.8
11	11	13	13	13	13	13	13	12	13	12	13	12	13	13	13	13	TSW	TSW	11	225	379.4
11	11	13	13	13	13	13	13	13	13	12	13	12	13	13	13	13	TSW	TSW	11	226	381
11	11	13	13	13	13	13	13	13	13	13	13	12	13	13	13	13	TSW	TSW	11	227	382.6
11	11	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	TSW	TSW	11	228	384.2
11	11	14	13	13	13	13	13	13	13	13	13	13	13	13	13	13	TSW	TSW	11	229	385.8
11	11	14	13	13	13	13	13	13	13	13	13	13	13	13	13	14	TSW	TSW	11	230	387.4
11	11	14	14	13	13	13	13	13	13	13	13	13	13	13	13	14	TSW	TSW	11	231	389
11	11	14	14	13	13	13	13	13	13	13	13	13	13	14	13	14	TSW	TSW	11	232	390.6
11	11	14	14	14	13	13	13	13	13	13	13	13	13	14	13	14	TSW	TSW	11	233	392.2
11	11	14	14	14	13	13	14	13	13	13	13	13	13	14	13	14	TSW	TSW	11	234	393.8
11	11	14	14	14	13	13	14	13	14	13	13	13	13	14	13	14	TSW	TSW	11	235	395.4
11	11	14	14	14	13	13	14	13	14	13	14	13	13	14	13	14	TSW	TSW	11	236	397
11	11	14	14	14	14	13	14	13	14	13	14	13	13	14	13	14	TSW	TSW	11	237	398.6
11	11	14	14	14	14	13	14	13	14	13	14	13	13	14	14	14	TSW	TSW	11	238	400.2
11	11	14	14	14	14	14	14	13	14	13	14	13	13	14	14	14	TSW	TSW	11	239	401.8
11	11	14	14	14	14	14	14	13	14	13	14	13	14	14	14	14	TSW	TSW	11	240	403.4
11	11	14	14	14	14	14	14	14	14	13	14	13	14	14	14	14	TSW	TSW	11	241	405
11	11	14	14	14	14	14	14	14	14	14	14	13	14	14	14	14	TSW	TSW	11	242	406.6
11	11	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	TSW	TSW	11	243	408.2
11	11	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14	TSW	TSW	11	244	409.8
11	11	15	14	14	14	14	14	14	14	14	14	14	14	14	14	15	TSW	TSW	11	245	411.4
11	11	15	15	14	14	14	14	14	14	14	14	14	14	14	15	15	TSW	TSW	11	246	413
11	11	15	15	14	14	14	14	14	14	14	14	14	14	15	14	15	TSW	TSW	11	247	414.6
11	11	15	15	15	14	14	14	14	14	14	14	14	14	15	14	15	TSW	TSW	11	248	416.2
11	11	15	15	15	14	14	15	14	14	14	14	14	14	15	14	15	TSW	TSW	11	249	417.8
11	11	15	15	15	14	14	15	14	15	14	14	14	14	15	14	15	TSW	TSW	11	250	419.4
11	11	15	15	15	14	14	15	14	15	14	15	14	14	15	14	15	TSW	TSW	11	251	421
11	11	15	15	15	15	14	15	14	15	14	15	14	14	15	14	15	TSW	TSW	11	252	422.6
11	11	15	15	15	15	14	15	14	15	14	15	14	14	15	15	15	TSW	TSW	11	253	424.2
11	11	15	15	15	15	15	15	14	15	14	15	14	14	15	15	15	TSW	TSW	11	254	425.8
11	11	15	15	15	15	15	15	14	15	14	15	14	15	15	15	15	TSW	TSW	11	255	427.4
11	11	15	15	15	15	15	15	15	15	14	15	14	15	15	15	15	TSW	TSW	11	256	429
11	11	15	15	15	15	15	15	15	15	15	15	14	15	15	15	15	TSW	TSW	11	257	430.6
11	11	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	TSW	TSW	11	258	432.2
11	11	16	15	15	15	15	15	15	15	15	15	15	15	15	15	15	TSW	TSW	11	259	433.8
11	11	16	15	15	15	15	15	15	15	15	15	15	15	15	15	16	TSW	TSW	11	260	435.4
11	11	16	16	15	15	15	15	15	15	15	15	15	15	15	15	16	TSW	TSW	11	261	437
11	11	16	16	15	15	15	15	15	15	15	15	15	15	16	15	16	TSW	TSW	11	262	438.6
11	11	16	16	16	15	15	15	15	15	15	15	15	15	16	15	16	TSW	TSW	11	263	440.2
11	11	16	16	16	15	15	16	15	15	15	15	15	15	16	15	16	TSW	TSW	11	264	441.8
11	11	16	16	16	15	15	16	15	16	15	15	15	15	16	15	16	TSW	TSW	11	265	443.4
11	11	16	16	16	15	15	16	15	16	15	16	15	15	16	15	16	TSW	TSW	11	266	445
11	11	16	16	16	16	15	16	15	16	15	16	15	15	16	15	16	TSW	TSW	11	267	446.6
11	11	16	16	16	16	15	16	15	16	15	16	15	15	16	16	16	TSW	TSW	11	268	448.2
11	11	16	16	16	16	16	16	15	16	15	16	15	15	16	16	16	TSW	TSW	11	269	449.8
11	11	16	16	16	16	16	16	15	16	15	16	15	16	16	16	16	TSW	TSW	11	270	451.4
11	11	16	16	16	16	16	16	16	16	15	16	15	16	16	16	16	TSW	TSW	11	271	453
11	11	16	16	16	16	16	16	16	16	16	16	15	16	16	16	16	TSW	TSW	11	272	454.6
11	11	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	TSW	TSW	11	273	456.2

JDA Spill Patterns with TSWs in Bays 18, 19 - # Gate Stops per Spillbay																				Total Stops (#)	Spill ^a (kcfs)
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18 ^c	19 ^c	20 ^b		
11	11	17	16	16	16	16	16	16	16	16	16	16	16	16	16	16	TSW	TSW	11	274	457.8
11	11	17	16	16	16	16	16	16	16	16	16	16	16	16	16	17	TSW	TSW	11	275	459.4
11	11	17	17	16	16	16	16	16	16	16	16	16	16	16	16	17	TSW	TSW	11	276	461
11	11	17	17	16	16	16	16	16	16	16	16	16	16	17	16	17	TSW	TSW	11	277	462.6
11	11	17	17	17	16	16	16	16	16	16	16	16	16	17	16	17	TSW	TSW	11	278	464.2
11	11	17	17	17	16	16	17	16	16	16	16	16	16	17	16	17	TSW	TSW	11	279	465.8
11	11	17	17	17	16	16	17	16	17	16	16	16	16	17	16	17	TSW	TSW	11	280	467.4
11	11	17	17	17	16	16	17	16	17	16	17	16	16	17	16	17	TSW	TSW	11	281	469
11	11	17	17	17	17	16	17	16	17	16	17	16	16	17	16	17	TSW	TSW	11	282	470.6
11	11	17	17	17	17	16	17	16	17	16	17	16	16	17	17	17	TSW	TSW	11	283	472.2
11	11	17	17	17	17	17	17	16	17	16	17	16	16	17	17	17	TSW	TSW	11	284	473.8
11	11	17	17	17	17	17	17	16	17	16	17	16	17	17	17	17	TSW	TSW	11	285	475.4
11	11	17	17	17	17	17	17	17	17	16	17	16	17	17	17	17	TSW	TSW	11	286	477
11	11	17	17	17	17	17	17	17	17	17	17	16	17	17	17	17	TSW	TSW	11	287	478.6
11	11	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	TSW	TSW	11	288	480.2
11	11	18	17	17	17	17	17	17	17	17	17	17	17	17	17	17	TSW	TSW	11	289	481.8
11	11	18	17	17	17	17	17	17	17	17	17	17	17	17	17	18	TSW	TSW	11	290	483.4
11	11	18	18	17	17	17	17	17	17	17	17	17	17	17	17	18	TSW	TSW	11	291	485
11	11	18	18	17	17	17	17	17	17	17	17	17	17	18	17	18	TSW	TSW	11	292	486.6
11	11	18	18	18	17	17	17	17	17	17	17	17	17	18	17	18	TSW	TSW	11	293	488.2
11	11	18	18	18	17	17	18	17	17	17	17	17	17	18	17	18	TSW	TSW	11	294	489.8
11	11	18	18	18	17	17	18	17	18	17	17	17	17	18	17	18	TSW	TSW	11	295	491.4
11	11	18	18	18	17	17	18	17	18	17	18	17	17	18	17	18	TSW	TSW	11	296	493
11	11	18	18	18	18	17	18	17	18	17	18	17	17	18	17	18	TSW	TSW	11	297	494.6
11	11	18	18	18	18	17	18	17	18	17	18	17	17	18	18	18	TSW	TSW	11	298	496.2
11	11	18	18	18	18	18	18	17	18	17	18	17	17	18	18	18	TSW	TSW	11	299	497.8
11	11	18	18	18	18	18	18	18	17	18	17	18	18	18	18	18	TSW	TSW	11	300	499.4
11	11	18	18	18	18	18	18	18	18	18	17	18	18	18	18	18	TSW	TSW	11	301	501
11	11	18	18	18	18	18	18	18	18	18	18	17	18	18	18	18	TSW	TSW	11	302	502.6
11	11	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	TSW	TSW	11	303	504.2
11	11	19	18	18	18	18	18	18	18	18	18	18	18	18	18	18	TSW	TSW	11	304	505.8
11	11	19	18	18	18	18	18	18	18	18	18	18	18	18	18	19	TSW	TSW	11	305	507.4
11	11	19	19	18	18	18	18	18	18	18	18	18	18	18	18	19	TSW	TSW	11	306	509
11	11	19	19	18	18	18	18	18	18	18	18	18	18	19	18	19	TSW	TSW	11	307	510.6
11	11	19	19	19	18	18	18	18	18	18	18	18	18	19	18	19	TSW	TSW	11	308	512.2
11	11	19	19	19	18	18	19	18	18	18	18	18	18	19	18	19	TSW	TSW	11	309	513.8
11	11	19	19	19	18	18	19	18	19	18	18	18	18	19	18	19	TSW	TSW	11	310	515.4
11	11	19	19	19	19	18	19	18	19	18	19	18	18	19	18	19	TSW	TSW	11	311	517
11	11	19	19	19	19	18	19	18	19	18	19	18	18	19	18	19	TSW	TSW	11	312	518.6
11	11	19	19	19	19	18	19	18	19	18	19	18	18	19	19	19	TSW	TSW	11	313	520.2
11	11	19	19	19	19	19	19	18	19	18	19	18	18	19	19	19	TSW	TSW	11	314	521.8
11	11	19	19	19	19	19	19	18	19	18	19	18	19	19	19	19	TSW	TSW	11	315	523.4
11	11	19	19	19	19	19	19	19	19	18	19	18	19	19	19	19	TSW	TSW	11	316	525
11	11	19	19	19	19	19	19	19	19	19	19	18	19	19	19	19	TSW	TSW	11	317	526.6
11	11	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	TSW	TSW	11	318	528.2
11	11	20	19	19	19	19	19	19	19	19	19	19	19	19	19	19	TSW	TSW	11	319	529.8
11	11	20	19	19	19	19	19	19	19	19	19	19	19	19	19	20	TSW	TSW	11	320	531.4
11	11	20	20	19	19	19	19	19	19	19	19	19	19	19	19	20	TSW	TSW	11	321	533
11	11	20	20	19	19	19	19	19	19	19	19	19	19	20	19	20	TSW	TSW	11	322	534.6
11	11	20	20	20	19	19	19	19	19	19	19	19	19	20	19	20	TSW	TSW	11	323	536.2

JDA Spill Patterns with TSWs in Bays 18, 19 - # Gate Stops per Spillbay																				Total Stops (#)	Spill ^a (kcfs)
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18 ^c	19 ^c	20 ^b		
11	11	20	20	20	19	19	20	19	19	19	19	19	19	20	19	20	TSW	TSW	11	324	537.8
11	11	20	20	20	19	19	20	19	20	19	19	19	19	20	19	20	TSW	TSW	11	325	539.4
11	11	20	20	20	19	19	20	19	20	19	20	19	19	20	19	20	TSW	TSW	11	326	541
11	11	20	20	20	20	19	20	19	20	19	20	19	19	20	19	20	TSW	TSW	11	327	542.6
11	11	20	20	20	20	19	20	19	20	19	20	19	19	20	20	20	TSW	TSW	11	328	544.2
11	11	20	20	20	20	20	20	19	20	19	20	19	19	20	20	20	TSW	TSW	11	329	545.8
11	11	20	20	20	20	20	20	19	20	19	20	19	20	20	20	20	TSW	TSW	11	330	547.4
11	11	20	20	20	20	20	20	20	20	19	20	19	20	20	20	20	TSW	TSW	11	331	549
11	11	20	20	20	20	20	20	20	20	20	20	19	20	20	20	20	TSW	TSW	11	332	550.6
11	11	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	TSW	TSW	11	333	552.2
11	11	21	20	20	20	20	20	20	20	20	20	20	20	20	20	20	TSW	TSW	11	334	553.8
11	11	21	20	20	20	20	20	20	20	20	20	20	20	20	20	21	TSW	TSW	11	335	555.4
11	11	21	21	20	20	20	20	20	20	20	20	20	20	20	20	21	TSW	TSW	11	336	557
11	11	21	21	20	20	20	20	20	20	20	20	20	20	21	20	21	TSW	TSW	11	337	558.6
11	11	21	21	21	20	20	20	20	20	20	20	20	20	21	20	21	TSW	TSW	11	338	560.2
11	11	21	21	21	20	20	21	20	20	20	20	20	20	21	20	21	TSW	TSW	11	339	561.8
11	11	21	21	21	20	20	21	20	21	20	20	20	20	21	20	21	TSW	TSW	11	340	563.4
11	11	21	21	21	20	20	21	20	21	20	21	20	20	21	20	21	TSW	TSW	11	341	565
11	11	21	21	21	21	20	21	20	21	20	21	20	20	21	20	21	TSW	TSW	11	342	566.6
11	11	21	21	21	21	20	21	20	21	20	21	20	20	21	21	21	TSW	TSW	11	343	568.2
11	11	21	21	21	21	21	21	20	21	20	21	20	20	21	21	21	TSW	TSW	11	344	569.8
11	11	21	21	21	21	21	21	21	21	20	21	20	21	21	21	21	TSW	TSW	11	345	571.4
11	11	21	21	21	21	21	21	21	21	21	20	21	21	21	21	21	TSW	TSW	11	346	573
11	11	21	21	21	21	21	21	21	21	21	21	20	21	21	21	21	TSW	TSW	11	347	574.6
11	11	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	TSW	TSW	11	348	576.2
11	11	22	21	21	21	21	21	21	21	21	21	21	21	21	21	21	TSW	TSW	11	349	577.8
11	11	22	21	21	21	21	21	21	21	21	21	21	21	21	21	22	TSW	TSW	11	350	579.4
11	11	22	22	21	21	21	21	21	21	21	21	21	21	21	21	22	TSW	TSW	11	351	581
11	11	22	22	21	21	21	21	21	21	21	21	21	21	22	21	22	TSW	TSW	11	352	582.6
11	11	22	22	22	21	21	21	21	21	21	21	21	21	22	21	22	TSW	TSW	11	353	584.2
11	11	22	22	22	21	21	22	21	21	21	21	21	21	22	21	22	TSW	TSW	11	354	585.8
11	11	22	22	22	21	21	22	21	22	21	21	21	21	22	21	22	TSW	TSW	11	355	587.4
11	11	22	22	22	21	21	22	21	22	21	22	21	21	22	21	22	TSW	TSW	11	356	589
11	11	22	22	22	22	21	22	21	22	21	22	21	21	22	21	22	TSW	TSW	11	357	590.6
11	11	22	22	22	22	21	22	21	22	21	22	21	21	22	22	22	TSW	TSW	11	358	592.2
11	11	22	22	22	22	22	22	21	22	21	22	21	21	22	22	22	TSW	TSW	11	359	593.8
11	11	22	22	22	22	22	22	21	22	21	22	21	22	22	22	22	TSW	TSW	11	360	595.4
11	11	22	22	22	22	22	22	22	22	21	22	21	22	22	22	22	TSW	TSW	11	361	597
11	11	22	22	22	22	22	22	22	22	22	22	21	22	22	22	22	TSW	TSW	11	362	598.6
11	11	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	TSW	TSW	11	363	600.2

Table JDA-9. [pg 1 of 8] John Day Dam Spill Pattern with No TSWs (Bays 18-19 Closed).

JDA Spill Patterns with No TSWs - # Gate Stops per Spillbay																				Total	Spill ^a
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Stops (#)	(kcfs)
	3	2	1														CLOSE	CLOSE		6	9.6
	3	2	2														CLOSE	CLOSE		7	11.2
	3	3	2														CLOSE	CLOSE		8	12.8
	3	3	2	1													CLOSE	CLOSE		9	14.4
	3	3	2	2													CLOSE	CLOSE		10	16.0
	3	3	2	2	1												CLOSE	CLOSE		11	17.6
	3	3	2	2	2												CLOSE	CLOSE		12	19.2
	3	3	2	2	2	1											CLOSE	CLOSE		13	20.8
	3	3	2	2	2	2											CLOSE	CLOSE		14	22.4
	3	3	2	2	2	2	1										CLOSE	CLOSE		15	24.0
	3	3	3	2	2	2	1										CLOSE	CLOSE		16	25.6
	3	3	3	2	2	2	2										CLOSE	CLOSE		17	27.2
	3	3	3	2	2	2	2	1									CLOSE	CLOSE		18	28.8
	3	3	3	3	2	2	2	1									CLOSE	CLOSE		19	30.4
	3	3	3	3	3	2	2	1									CLOSE	CLOSE		20	32.0
	3	3	3	3	3	2	2	2									CLOSE	CLOSE		21	33.6
	3	3	3	3	3	2	2	2	1								CLOSE	CLOSE		22	35.2
	3	3	3	3	3	2	2	2	2								CLOSE	CLOSE		23	36.8
	3	3	3	3	3	2	2	2	2	1							CLOSE	CLOSE		24	38.4
	3	3	3	3	3	2	2	2	2	2							CLOSE	CLOSE		25	40.0
	3	3	3	3	3	2	2	2	2	2	1						CLOSE	CLOSE		26	41.6
	3	3	3	3	3	2	2	2	2	2	2						CLOSE	CLOSE		27	43.2
	3	3	3	3	3	3	2	2	2	2	2						CLOSE	CLOSE		28	44.8
	3	3	3	3	3	3	2	2	2	2	2	1					CLOSE	CLOSE		29	46.4
	3	3	3	3	3	3	2	2	2	2	2	2					CLOSE	CLOSE		30	48.0
	3	3	3	3	3	3	2	2	2	2	2	2	1				CLOSE	CLOSE		31	49.6
	3	3	3	3	3	3	3	2	2	2	2	2	1				CLOSE	CLOSE		32	51.2
	3	3	3	3	3	3	3	2	2	2	2	2	2				CLOSE	CLOSE		33	52.8
	3	3	3	3	3	3	3	2	2	2	2	2	2	1			CLOSE	CLOSE		34	54.4
	3	3	3	3	3	3	3	2	2	2	2	2	2	2			CLOSE	CLOSE		35	56.0
	3	3	3	3	3	3	3	2	2	2	2	2	2	2	1		CLOSE	CLOSE		36	57.6
	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2		CLOSE	CLOSE		37	59.2
	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	1	CLOSE	CLOSE		38	60.8
	4	3	3	3	3	3	3	2	2	2	2	2	2	2	2	1	CLOSE	CLOSE		39	62.4
	4	4	3	3	3	3	3	2	2	2	2	2	2	2	2	1	CLOSE	CLOSE		40	64.0
	4	4	4	3	3	3	3	2	2	2	2	2	2	2	2	1	CLOSE	CLOSE		41	65.6
	4	4	4	4	3	3	3	2	2	2	2	2	2	2	2	1	CLOSE	CLOSE		42	67.2
	4	4	4	4	3	3	3	3	2	2	2	2	2	2	2	1	CLOSE	CLOSE		43	68.8
	4	4	4	4	3	3	3	3	3	2	2	2	2	2	2	1	CLOSE	CLOSE		44	70.4
	4	4	4	4	4	3	3	3	3	2	2	2	2	2	2	1	CLOSE	CLOSE		45	72.0
	4	5	4	4	4	3	3	3	3	2	2	2	2	2	2	1	CLOSE	CLOSE		46	73.6
	4	5	4	4	4	3	3	3	3	2	2	2	2	2	2	2	CLOSE	CLOSE		47	75.2
	4	5	4	4	4	3	3	3	3	3	2	2	2	2	2	2	CLOSE	CLOSE		48	76.8
	4	5	4	4	4	3	3	3	3	3	3	2	2	2	2	2	CLOSE	CLOSE		49	78.4
	4	5	5	4	4	3	3	3	3	3	3	2	2	2	2	2	CLOSE	CLOSE		50	80.0

^a Spill (kcfs) is calculated as a function of total stops + TSW spill. At Spill >305 kcfs, transition from pattern for juvenile fish to flood.

^b Gates 1 & 20 blocked at 11 stops (10.3 ft opening).

JDA Spill Patterns with No TSWs - # Gate Stops per Spillbay																				Total	Spill ^a	
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Stops (#)	(kcf)	
	4	5	5	4	4	4	3	3	3	3	2	2	2	2	2	CLOSE	CLOSE			51	81.6	
	4	5	5	4	4	4	3	3	3	3	3	3	2	2	2	2	CLOSE	CLOSE			52	83.2
	4	5	5	4	4	4	3	3	3	3	3	3	3	2	2	2	CLOSE	CLOSE			53	84.8
	4	5	5	4	4	4	3	3	3	3	3	3	3	3	2	2	CLOSE	CLOSE			54	86.4
	4	5	5	4	4	4	3	3	3	3	3	3	3	3	3	2	CLOSE	CLOSE			55	88.0
	4	5	5	4	4	4	4	3	3	3	3	3	3	3	3	2	CLOSE	CLOSE			56	89.6
	4	5	5	4	4	4	4	4	3	3	3	3	3	3	3	2	CLOSE	CLOSE			57	91.2
	4	5	5	5	4	4	4	4	3	3	3	3	3	3	3	2	CLOSE	CLOSE			58	92.8
	4	5	5	5	4	4	4	4	4	3	3	3	3	3	3	2	CLOSE	CLOSE			59	94.4
	4	5	5	5	4	4	4	4	4	4	3	3	3	3	3	2	CLOSE	CLOSE			60	96.0
	4	5	5	5	4	4	4	4	4	4	3	3	3	3	3	3	CLOSE	CLOSE			61	97.6
	4	5	5	5	4	4	4	4	4	4	4	3	3	3	3	3	CLOSE	CLOSE			62	99.2
	4	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4	CLOSE	CLOSE			63	100.8
	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	CLOSE	CLOSE			64	102.4
	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	CLOSE	CLOSE			65	104.0
	4	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	CLOSE	CLOSE			66	105.6
	4	5	5	4	4	4	4	4	4	4	4	4	4	4	4	5	CLOSE	CLOSE			67	107.2
	4	5	5	4	4	4	4	4	4	4	4	4	4	5	4	5	CLOSE	CLOSE			68	108.8
	4	5	5	5	4	4	4	4	4	4	4	4	4	5	4	5	CLOSE	CLOSE			69	110.4
	4	5	5	5	4	4	5	4	4	4	4	4	4	5	4	5	CLOSE	CLOSE			70	112.0
	4	5	5	5	4	4	5	4	5	4	4	4	4	5	4	5	CLOSE	CLOSE			71	113.6
	4	5	5	5	4	4	5	4	5	4	5	4	4	5	4	5	CLOSE	CLOSE			72	115.2
	4	5	5	5	5	4	5	4	5	4	5	4	4	5	4	5	CLOSE	CLOSE			73	116.8
	4	5	5	5	5	4	5	4	5	4	5	4	4	5	5	5	CLOSE	CLOSE			74	118.4
	4	5	5	5	5	5	5	4	5	4	5	4	4	5	5	5	CLOSE	CLOSE			75	120.0
	4	5	5	5	5	5	5	4	5	4	5	4	5	5	5	5	CLOSE	CLOSE			76	121.6
	4	5	5	5	5	5	5	5	5	5	4	5	4	5	5	5	CLOSE	CLOSE			77	123.2
	4	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	CLOSE	CLOSE			78	124.8
	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	CLOSE	CLOSE			79	126.4
	4	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	CLOSE	CLOSE			80	128.0
	4	6	6	5	5	5	5	5	5	5	5	5	5	5	5	5	CLOSE	CLOSE			81	129.6
	4	6	6	5	5	5	5	5	5	5	5	5	5	6	5	6	CLOSE	CLOSE			82	131.2
	4	6	6	6	5	5	5	5	5	5	5	5	5	6	5	6	CLOSE	CLOSE			83	132.8
	4	6	6	6	5	5	6	5	5	5	5	5	5	6	5	6	CLOSE	CLOSE			84	134.4
	4	6	6	6	5	5	6	5	6	5	5	5	5	6	5	6	CLOSE	CLOSE			85	136.0
	4	6	6	6	5	5	6	5	6	5	5	5	5	6	5	6	CLOSE	CLOSE			86	137.6
	4	6	6	6	5	5	6	5	6	5	6	5	5	6	5	6	CLOSE	CLOSE			87	139.2
	4	6	6	6	6	5	6	5	6	5	6	5	5	6	5	6	CLOSE	CLOSE			88	140.8
	4	6	6	6	6	6	6	5	6	5	6	5	5	6	6	6	CLOSE	CLOSE			89	142.4
	4	6	6	6	6	6	6	6	6	5	6	5	5	6	6	6	CLOSE	CLOSE			90	144.0
	4	6	6	6	6	6	6	6	6	5	6	5	6	6	6	6	CLOSE	CLOSE			91	145.6
	4	6	6	6	6	6	6	6	6	6	6	5	6	6	6	6	CLOSE	CLOSE			92	147.2
	4	6	6	6	6	6	6	6	6	6	6	6	5	6	6	6	CLOSE	CLOSE			93	148.8
	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	CLOSE	CLOSE			94	150.4
	4	6	7	6	6	6	6	6	6	6	6	6	6	6	6	6	CLOSE	CLOSE			95	152.0
	4	6	7	6	6	6	6	6	6	6	6	6	6	6	6	7	CLOSE	CLOSE			96	153.6
	4	6	7	6	6	6	6	6	6	6	6	6	6	7	6	7	CLOSE	CLOSE			97	155.2
	4	6	7	7	6	6	6	6	6	6	6	6	6	7	6	7	CLOSE	CLOSE			98	156.8
	4	6	7	7	6	6	7	6	6	6	6	6	6	7	6	7	CLOSE	CLOSE			99	158.4
	4	6	7	7	6	6	7	6	7	6	6	6	6	7	6	7	CLOSE	CLOSE			100	160.0

JDA Spill Patterns with No TSWs - # Gate Stops per Spillbay																				Total	Spill ^a
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Stops (#)	(kcf)
	4	6	7	7	6	6	7	6	7	6	7	6	6	7	6	7	CLOSE	CLOSE		101	161.6
	4	6	7	7	7	6	7	6	7	6	7	6	6	7	6	7	CLOSE	CLOSE		102	163.2
	4	6	7	7	7	6	7	6	7	6	7	6	6	7	7	7	CLOSE	CLOSE		103	164.8
	4	6	7	7	7	7	7	6	7	6	7	6	6	7	7	7	CLOSE	CLOSE		104	166.4
	4	6	7	7	7	7	7	6	7	6	7	6	7	7	7	7	CLOSE	CLOSE		105	168.0
	4	6	7	7	7	7	7	7	7	6	7	6	7	7	7	7	CLOSE	CLOSE		106	169.6
	4	6	7	7	7	7	7	7	7	7	7	6	7	7	7	7	CLOSE	CLOSE		107	171.2
	4	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	CLOSE	CLOSE		108	172.8
	4	6	8	7	7	7	7	7	7	7	7	7	7	7	7	7	CLOSE	CLOSE		109	174.4
	4	6	8	7	7	7	7	7	7	7	7	7	7	7	7	8	CLOSE	CLOSE		110	176.0
	4	6	8	7	7	7	7	7	7	7	7	7	7	8	7	8	CLOSE	CLOSE		111	177.6
	4	6	8	8	7	7	7	7	7	7	7	7	7	8	7	8	CLOSE	CLOSE		112	179.2
	4	6	8	8	7	7	8	7	7	7	7	7	7	8	7	8	CLOSE	CLOSE		113	180.8
	4	6	8	8	7	7	8	7	8	7	7	7	7	8	7	8	CLOSE	CLOSE		114	182.4
	4	6	8	8	7	7	8	7	8	7	8	7	7	8	7	8	CLOSE	CLOSE		115	184.0
	4	6	8	8	8	7	8	7	8	7	8	7	7	8	8	8	CLOSE	CLOSE		116	185.6
	4	6	8	8	8	7	8	7	8	7	8	7	7	8	8	8	CLOSE	CLOSE		117	187.2
	4	6	8	8	8	8	8	7	8	7	8	7	7	8	8	8	CLOSE	CLOSE		118	188.8
	4	6	8	8	8	8	8	8	7	8	7	8	7	8	8	8	CLOSE	CLOSE		119	190.4
	4	6	8	8	8	8	8	8	8	7	8	7	8	8	8	8	CLOSE	CLOSE		120	192.0
	4	6	8	8	8	8	8	8	8	8	8	8	7	8	8	8	CLOSE	CLOSE		121	193.6
	4	6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	CLOSE	CLOSE		122	195.2
	4	6	8	8	8	8	8	8	8	8	8	8	8	8	8	9	CLOSE	CLOSE		123	196.8
	4	6	8	8	8	8	8	8	8	8	8	8	8	9	8	9	CLOSE	CLOSE		124	198.4
	4	6	8	9	8	8	8	8	8	8	8	8	8	9	8	9	CLOSE	CLOSE		125	200.0
	4	6	8	9	8	8	9	8	8	8	8	8	8	9	8	9	CLOSE	CLOSE		126	201.6
	4	6	8	9	8	8	9	8	9	8	8	8	8	9	8	9	CLOSE	CLOSE		127	203.2
	4	6	8	9	8	8	9	8	9	8	9	8	8	9	8	9	CLOSE	CLOSE		128	204.8
	4	6	8	9	9	8	9	8	9	8	9	8	8	9	8	9	CLOSE	CLOSE		129	206.4
	4	6	8	9	9	8	9	8	9	8	9	8	8	9	9	9	CLOSE	CLOSE		130	208.0
	4	6	8	9	9	9	9	8	9	8	9	8	8	9	9	9	CLOSE	CLOSE		131	209.6
	4	6	8	9	9	9	9	9	9	8	9	8	9	9	9	9	CLOSE	CLOSE		132	211.2
	4	6	8	9	9	9	9	9	9	9	8	9	8	9	9	9	CLOSE	CLOSE		133	212.8
	4	6	8	9	9	9	9	9	9	9	9	9	8	9	9	9	CLOSE	CLOSE		134	214.4
	4	6	8	9	9	9	9	9	9	9	9	9	9	9	9	9	CLOSE	CLOSE		135	216.0
	4	6	8	9	9	9	9	9	9	9	9	9	9	9	9	10	CLOSE	CLOSE		136	217.6
	4	6	8	9	9	9	9	9	9	9	9	9	9	10	9	10	CLOSE	CLOSE		137	219.2
	4	6	8	10	9	9	9	9	9	9	9	9	9	10	9	10	CLOSE	CLOSE		138	220.8
	4	6	8	10	9	9	10	9	10	9	9	9	9	10	9	10	CLOSE	CLOSE		139	222.4
	4	6	8	10	9	9	10	9	10	9	9	9	9	10	9	10	CLOSE	CLOSE		140	224.0
	4	6	8	10	9	9	10	9	10	9	10	9	9	10	9	10	CLOSE	CLOSE		141	225.6
	4	6	8	10	10	9	10	9	10	9	10	9	9	10	9	10	CLOSE	CLOSE		142	227.2
	4	6	8	10	10	9	10	9	10	9	10	9	9	10	10	10	CLOSE	CLOSE		143	228.8
	4	6	8	10	10	10	10	9	10	9	10	9	9	10	10	10	CLOSE	CLOSE		144	230.4
	4	6	8	10	10	10	10	9	10	9	10	9	10	10	10	10	CLOSE	CLOSE		145	232.0
	4	6	8	10	10	10	10	10	10	9	10	9	10	10	10	10	CLOSE	CLOSE		146	233.6
	4	6	8	10	10	10	10	10	10	10	10	9	10	10	10	10	CLOSE	CLOSE		147	235.2
	4	6	8	10	10	10	10	10	10	10	10	10	10	10	10	10	CLOSE	CLOSE		148	236.8
	4	6	8	10	10	10	10	10	10	10	10	10	10	10	10	11	CLOSE	CLOSE		149	238.4
	4	6	8	10	10	10	10	10	10	10	10	10	10	10	10	11	CLOSE	CLOSE		150	240.0

JDA Spill Patterns with No TSWs - # Gate Stops per Spillbay																				Total	Spill ^a
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Stops (#)	(kcfcs)
	4	6	8	10	10	10	11	10	10	10	10	10	10	11	10	11	CLOSE	CLOSE		151	241.6
	4	6	8	10	10	10	11	10	11	10	10	10	10	11	10	11	CLOSE	CLOSE		152	243.2
	4	6	8	10	10	10	11	10	11	10	11	10	10	11	10	11	CLOSE	CLOSE		153	244.8
	4	6	8	10	11	10	11	10	11	10	11	10	10	11	10	11	CLOSE	CLOSE		154	246.4
	4	6	8	10	11	10	11	10	11	10	11	10	10	11	11	11	CLOSE	CLOSE		155	248.0
	4	6	8	10	11	11	11	10	11	10	11	10	10	11	11	11	CLOSE	CLOSE		156	249.6
	4	6	8	10	11	11	11	10	11	10	11	10	11	11	11	11	CLOSE	CLOSE		157	251.2
	4	6	8	10	11	11	11	11	11	10	11	10	11	11	11	11	CLOSE	CLOSE		158	252.8
	4	6	8	10	11	11	11	11	11	11	11	10	11	11	11	11	CLOSE	CLOSE		159	254.4
	4	6	8	10	11	11	11	11	11	11	11	11	11	11	11	11	CLOSE	CLOSE		160	256.0
	4	6	8	10	11	11	11	11	11	11	11	11	11	12	11	11	CLOSE	CLOSE		161	257.6
	4	6	8	10	11	11	12	11	11	11	11	11	11	12	11	11	CLOSE	CLOSE		162	259.2
	4	6	8	10	11	11	12	11	12	11	11	11	11	12	11	11	CLOSE	CLOSE		163	260.8
	4	6	8	10	11	11	12	11	12	11	12	11	11	12	11	11	CLOSE	CLOSE		164	262.4
	4	6	8	10	12	11	12	11	12	11	12	11	11	12	11	11	CLOSE	CLOSE		165	264.0
	4	6	8	10	12	11	12	11	12	11	12	11	11	12	12	11	CLOSE	CLOSE		166	265.6
	4	6	8	10	12	12	12	11	12	11	12	11	11	12	12	11	CLOSE	CLOSE		167	267.2
	4	6	8	10	12	12	12	11	12	11	12	11	12	12	12	11	CLOSE	CLOSE		168	268.8
	4	6	8	10	12	12	12	12	12	11	12	11	12	12	12	11	CLOSE	CLOSE		169	270.4
	4	6	8	10	12	12	12	12	12	12	12	11	12	12	12	11	CLOSE	CLOSE		170	272.0
	4	6	8	10	12	12	12	12	12	12	12	12	12	12	12	11	CLOSE	CLOSE		171	273.6
	4	6	8	10	12	12	12	12	12	12	12	12	12	13	12	11	CLOSE	CLOSE		172	275.2
	4	6	8	10	12	12	13	12	12	12	12	12	12	13	12	11	CLOSE	CLOSE		173	276.8
	4	6	8	10	12	12	13	12	13	12	12	12	12	13	12	11	CLOSE	CLOSE		174	278.4
	4	6	8	10	12	12	13	12	13	12	13	12	12	13	12	11	CLOSE	CLOSE		175	280.0
	4	6	8	10	12	12	13	12	13	12	13	12	12	13	13	11	CLOSE	CLOSE		176	281.6
	4	6	8	10	12	13	13	12	13	12	13	12	12	13	13	11	CLOSE	CLOSE		177	283.2
	4	6	8	10	12	13	13	12	13	12	13	12	13	13	13	11	CLOSE	CLOSE		178	284.8
	4	6	8	10	12	13	13	13	13	12	13	12	13	13	13	11	CLOSE	CLOSE		179	286.4
	4	6	8	10	12	13	13	13	13	13	13	12	13	13	13	11	CLOSE	CLOSE		180	288.0
	4	6	8	10	12	13	13	13	13	13	13	13	13	13	13	11	CLOSE	CLOSE		181	289.6
	4	6	8	10	12	13	13	13	13	13	13	13	13	14	13	11	CLOSE	CLOSE		182	291.2
	4	6	8	10	12	13	14	13	13	13	13	13	13	14	13	11	CLOSE	CLOSE		183	292.8
	4	6	8	10	12	13	14	13	14	13	13	13	13	14	13	11	CLOSE	CLOSE		184	294.4
	4	6	8	10	12	13	14	13	14	13	14	13	13	14	13	11	CLOSE	CLOSE		185	296.0
	4	6	8	10	12	13	14	13	14	13	14	13	13	14	14	11	CLOSE	CLOSE		186	297.6
	4	6	8	10	12	14	14	13	14	13	14	13	14	14	14	11	CLOSE	CLOSE		187	299.2
	4	6	8	10	12	14	14	14	14	13	14	13	14	14	14	11	CLOSE	CLOSE		188	300.8
	4	6	8	10	12	14	14	14	14	14	14	13	14	14	14	11	CLOSE	CLOSE		189	302.4
	4	6	8	10	12	14	14	14	14	14	14	14	14	14	14	11	CLOSE	CLOSE		190	304.0
	4	6	8	10	12	14	14	14	14	14	14	14	14	14	14	11	CLOSE	CLOSE		191	305.6
	4	6	8	10	12	14	14	14	14	14	14	14	14	14	15	11	CLOSE	CLOSE		192	307.2
	4	6	8	10	12	14	15	14	14	14	14	14	14	15	14	11	CLOSE	CLOSE		193	308.8
	4	6	8	10	12	14	15	14	15	14	14	14	14	15	14	11	CLOSE	CLOSE		194	310.4
	4	6	8	10	12	14	15	14	15	14	15	14	14	15	14	11	CLOSE	CLOSE		195	312.0
	4	6	8	10	12	14	15	14	15	14	15	14	14	15	15	11	CLOSE	CLOSE		196	313.6
	4	6	8	10	12	14	15	15	15	14	15	14	15	15	15	11	CLOSE	CLOSE		197	315.2
	4	6	8	10	12	14	15	15	15	15	15	14	15	15	15	11	CLOSE	CLOSE		198	316.8
	4	6	8	10	12	14	15	15	15	15	15	15	15	15	15	11	CLOSE	CLOSE		199	318.4
	4	6	8	10	12	14	15	15	15	15	15	15	15	15	15	11	CLOSE	CLOSE		200	320.0

JDA Spill Patterns with No TSWs - # Gate Stops per Spillbay																				Total	Spill ^a
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Stops (#)	(kcf/s)
	4	6	8	10	12	14	15	15	15	15	15	15	15	16	15	11	CLOSE	CLOSE		201	321.6
	4	6	8	10	12	14	16	15	15	15	15	15	15	16	15	11	CLOSE	CLOSE		202	323.2
	4	6	8	10	12	14	16	15	16	15	15	15	15	16	15	11	CLOSE	CLOSE		203	324.8
	4	6	8	10	12	14	16	15	16	15	16	15	15	16	15	11	CLOSE	CLOSE		204	326.4
	4	6	8	10	12	14	16	15	16	15	16	15	15	16	16	11	CLOSE	CLOSE		205	328.0
	4	6	8	10	12	14	16	15	16	15	16	15	16	16	16	11	CLOSE	CLOSE		206	329.6
	4	6	8	10	12	14	16	16	16	15	16	15	16	16	16	11	CLOSE	CLOSE		207	331.2
	4	6	8	10	12	14	16	16	16	16	16	15	16	16	16	11	CLOSE	CLOSE		208	332.8
	4	6	8	10	12	14	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		209	334.4
	4	6	8	10	12	15	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		210	336.0
	4	6	8	10	13	15	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		211	337.6
	4	6	8	11	13	15	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		212	339.2
	4	6	9	11	13	15	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		213	340.8
	4	7	9	11	13	15	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		214	342.4
	5	7	9	11	13	15	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		215	344.0
1	5	7	9	11	13	15	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		216	345.6
1	5	7	9	11	13	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		217	347.2
1	5	7	9	11	14	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		218	348.8
1	5	7	9	12	14	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		219	350.4
1	5	7	10	12	14	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		220	352.0
1	5	8	10	12	14	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		221	353.6
1	6	8	10	12	14	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		222	355.2
2	6	8	10	12	14	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		223	356.8
2	6	8	10	12	15	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		224	358.4
2	6	8	10	13	15	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		225	360.0
2	6	8	11	13	15	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		226	361.6
2	6	9	11	13	15	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		227	363.2
2	7	9	11	13	15	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		228	364.8
3	7	9	11	13	15	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		229	366.4
3	7	9	11	13	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		230	368.0
3	7	9	11	14	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		231	369.6
3	7	9	12	14	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		232	371.2
3	7	10	12	14	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		233	372.8
3	8	10	12	14	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		234	374.4
4	8	10	12	14	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		235	376.0
4	8	10	12	15	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		236	377.6
4	8	10	13	15	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		237	379.2
4	8	11	13	15	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		238	380.8
4	9	11	13	15	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		239	382.4
5	9	11	13	15	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		240	384.0
5	9	11	13	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		241	385.6
5	9	11	14	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		242	387.2
5	9	12	14	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		243	388.8
5	10	12	14	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		244	390.4
6	10	12	14	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		245	392.0
6	10	12	15	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		246	393.6
6	10	13	15	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		247	395.2
6	11	13	15	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		248	396.8
7	11	13	15	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		249	398.4
7	11	13	16	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		250	400.0

JDA Spill Patterns with No TSWs - # Gate Stops per Spillbay																				Total	Spill ^a
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Stops (#)	(kcfs)
7	11	14	16	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		251	401.6
8	11	14	16	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		252	403.2
8	11	15	16	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		253	404.8
9	11	15	16	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		254	406.4
9	11	16	16	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		255	408.0
10	11	16	16	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		256	409.6
11	11	16	16	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		257	411.2
11	11	17	16	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		258	412.8
11	11	17	17	16	16	16	16	16	16	16	16	16	16	16	16	11	CLOSE	CLOSE		259	414.4
11	11	17	17	16	16	16	16	16	16	16	16	16	16	17	16	11	CLOSE	CLOSE		260	416.0
11	11	17	17	17	16	16	16	16	16	16	16	16	16	17	16	11	CLOSE	CLOSE		261	417.6
11	11	17	17	17	16	16	17	16	16	16	16	16	16	17	16	11	CLOSE	CLOSE		262	419.2
11	11	17	17	17	16	16	17	16	17	16	16	16	16	17	16	11	CLOSE	CLOSE		263	420.8
11	11	17	17	17	16	16	17	16	17	16	17	16	16	17	16	11	CLOSE	CLOSE		264	422.4
11	11	17	17	17	17	16	17	16	17	16	17	16	16	17	16	11	CLOSE	CLOSE		265	424.0
11	11	17	17	17	17	17	16	17	16	17	16	16	16	17	17	11	CLOSE	CLOSE		266	425.6
11	11	17	17	17	17	17	17	16	17	16	17	16	16	17	17	11	CLOSE	CLOSE		267	427.2
11	11	17	17	17	17	17	17	16	17	16	17	16	17	17	17	11	CLOSE	CLOSE		268	428.8
11	11	17	17	17	17	17	17	17	16	17	16	17	17	17	17	11	CLOSE	CLOSE		269	430.4
11	11	17	17	17	17	17	17	17	17	16	17	16	17	17	17	11	CLOSE	CLOSE		270	432.0
11	11	17	17	17	17	17	17	17	17	17	17	17	17	17	17	11	CLOSE	CLOSE		271	433.6
11	11	18	17	17	17	17	17	17	17	17	17	17	17	17	17	11	CLOSE	CLOSE		272	435.2
11	11	18	18	17	17	17	17	17	17	17	17	17	17	17	17	11	CLOSE	CLOSE		273	436.8
11	11	18	18	17	17	17	17	17	17	17	17	17	17	18	17	11	CLOSE	CLOSE		274	438.4
11	11	18	18	18	17	17	17	17	17	17	17	17	17	18	17	11	CLOSE	CLOSE		275	440.0
11	11	18	18	18	17	17	18	17	17	17	17	17	17	18	17	11	CLOSE	CLOSE		276	441.6
11	11	18	18	18	17	17	18	17	18	17	17	17	17	18	17	11	CLOSE	CLOSE		277	443.2
11	11	18	18	18	17	17	18	17	18	17	18	17	17	18	17	11	CLOSE	CLOSE		278	444.8
11	11	18	18	18	18	17	18	17	18	17	18	17	17	18	17	11	CLOSE	CLOSE		279	446.4
11	11	18	18	18	18	17	18	17	18	17	18	17	17	18	18	11	CLOSE	CLOSE		280	448.0
11	11	18	18	18	18	18	18	17	18	17	18	17	17	18	18	11	CLOSE	CLOSE		281	449.6
11	11	18	18	18	18	18	18	18	18	17	18	17	18	18	18	11	CLOSE	CLOSE		282	451.2
11	11	18	18	18	18	18	18	18	18	18	17	18	18	18	18	11	CLOSE	CLOSE		283	452.8
11	11	18	18	18	18	18	18	18	18	18	18	17	18	18	18	11	CLOSE	CLOSE		284	454.4
11	11	18	18	18	18	18	18	18	18	18	18	18	18	18	18	11	CLOSE	CLOSE		285	456.0
11	11	19	18	18	18	18	18	18	18	18	18	18	18	18	18	11	CLOSE	CLOSE		286	457.6
11	11	19	19	18	18	18	18	18	18	18	18	18	18	18	18	11	CLOSE	CLOSE		287	459.2
11	11	19	19	18	18	18	18	18	18	18	18	18	18	19	18	11	CLOSE	CLOSE		288	460.8
11	11	19	19	19	18	18	19	18	18	18	18	18	18	19	18	11	CLOSE	CLOSE		289	462.4
11	11	19	19	19	18	18	19	18	19	18	18	18	18	19	18	11	CLOSE	CLOSE		290	464.0
11	11	19	19	19	18	18	19	18	19	18	18	18	18	19	18	11	CLOSE	CLOSE		291	465.6
11	11	19	19	19	18	18	19	18	19	18	19	18	18	19	18	11	CLOSE	CLOSE		292	467.2
11	11	19	19	19	19	18	19	18	19	18	19	18	18	19	18	11	CLOSE	CLOSE		293	468.8
11	11	19	19	19	19	18	19	18	19	18	19	18	18	19	19	11	CLOSE	CLOSE		294	470.4
11	11	19	19	19	19	19	19	18	19	18	19	18	18	19	19	11	CLOSE	CLOSE		295	472.0
11	11	19	19	19	19	19	19	19	18	19	18	19	19	19	19	11	CLOSE	CLOSE		296	473.6
11	11	19	19	19	19	19	19	19	19	18	19	18	19	19	19	11	CLOSE	CLOSE		297	475.2
11	11	19	19	19	19	19	19	19	19	19	19	18	19	19	19	11	CLOSE	CLOSE		298	476.8
11	11	19	19	19	19	19	19	19	19	19	19	19	19	19	19	11	CLOSE	CLOSE		299	478.4
11	11	20	19	19	19	19	19	19	19	19	19	19	19	19	19	11	CLOSE	CLOSE		300	480.0

JDA Spill Patterns with No TSWs - # Gate Stops per Spillbay																				Total	Spill ^a
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Stops (#)	(kcf)
11	11	20	20	19	19	19	19	19	19	19	19	19	19	19	19	11	CLOSE	CLOSE		301	481.6
11	11	20	20	19	19	19	19	19	19	19	19	19	19	20	19	11	CLOSE	CLOSE		302	483.2
11	11	20	20	20	19	19	19	19	19	19	19	19	19	20	19	11	CLOSE	CLOSE		303	484.8
11	11	20	20	20	19	19	20	19	19	19	19	19	19	20	19	11	CLOSE	CLOSE		304	486.4
11	11	20	20	20	19	19	20	19	20	19	19	19	19	20	19	11	CLOSE	CLOSE		305	488.0
11	11	20	20	20	19	19	20	19	20	19	20	19	19	20	19	11	CLOSE	CLOSE		306	489.6
11	11	20	20	20	20	19	20	19	20	19	20	19	19	20	19	11	CLOSE	CLOSE		307	491.2
11	11	20	20	20	20	19	20	19	20	19	20	19	19	20	20	11	CLOSE	CLOSE		308	492.8
11	11	20	20	20	20	20	20	19	20	19	20	19	19	20	20	11	CLOSE	CLOSE		309	494.4
11	11	20	20	20	20	20	20	19	20	19	20	19	20	20	20	11	CLOSE	CLOSE		310	496.0
11	11	20	20	20	20	20	20	20	20	19	20	19	20	20	20	11	CLOSE	CLOSE		311	497.6
11	11	20	20	20	20	20	20	20	20	20	20	19	20	20	20	11	CLOSE	CLOSE		312	499.2
11	11	20	20	20	20	20	20	20	20	20	20	20	20	20	20	11	CLOSE	CLOSE		313	500.8
11	11	21	20	20	20	20	20	20	20	20	20	20	20	20	20	11	CLOSE	CLOSE		314	502.4
11	11	21	21	20	20	20	20	20	20	20	20	20	20	20	20	11	CLOSE	CLOSE		315	504.0
11	11	21	21	20	20	20	20	20	20	20	20	20	20	21	20	11	CLOSE	CLOSE		316	505.6
11	11	21	21	21	20	20	20	20	20	20	20	20	20	21	20	11	CLOSE	CLOSE		317	507.2
11	11	21	21	21	20	20	21	20	20	20	20	20	20	21	20	11	CLOSE	CLOSE		318	508.8
11	11	21	21	21	20	20	21	20	21	20	20	20	20	21	20	11	CLOSE	CLOSE		319	510.4
11	11	21	21	21	20	20	21	20	21	20	21	20	20	21	20	11	CLOSE	CLOSE		320	512.0
11	11	21	21	21	21	20	21	20	21	20	21	20	20	21	20	11	CLOSE	CLOSE		321	513.6
11	11	21	21	21	21	20	21	20	21	20	21	20	20	21	21	11	CLOSE	CLOSE		322	515.2
11	11	21	21	21	21	21	21	20	21	20	21	20	20	21	21	11	CLOSE	CLOSE		323	516.8
11	11	21	21	21	21	21	21	20	21	20	21	20	21	21	21	11	CLOSE	CLOSE		324	518.4
11	11	21	21	21	21	21	21	21	21	20	21	20	21	21	21	11	CLOSE	CLOSE		325	520.0
11	11	21	21	21	21	21	21	21	21	21	21	20	21	21	21	11	CLOSE	CLOSE		326	521.6
11	11	21	21	21	21	21	21	21	21	21	21	21	21	21	21	11	CLOSE	CLOSE		327	523.2
11	11	22	21	21	21	21	21	21	21	21	21	21	21	21	21	11	CLOSE	CLOSE		328	524.8
11	11	22	22	21	21	21	21	21	21	21	21	21	21	21	21	11	CLOSE	CLOSE		329	526.4
11	11	22	22	21	21	21	21	21	21	21	21	21	21	22	21	11	CLOSE	CLOSE		330	528.0
11	11	22	22	22	21	21	21	21	21	21	21	21	21	22	21	11	CLOSE	CLOSE		331	529.6
11	11	22	22	22	21	21	22	21	21	21	21	21	21	22	21	11	CLOSE	CLOSE		332	531.2
11	11	22	22	22	21	21	22	21	22	21	21	21	21	22	21	11	CLOSE	CLOSE		333	532.8
11	11	22	22	22	21	21	22	21	22	21	22	21	21	22	21	11	CLOSE	CLOSE		334	534.4
11	11	22	22	22	22	21	22	21	22	21	22	21	21	22	21	11	CLOSE	CLOSE		335	536.0
11	11	22	22	22	22	21	22	21	22	21	22	21	21	22	22	11	CLOSE	CLOSE		336	537.6
11	11	22	22	22	22	22	22	21	22	21	22	21	21	22	22	11	CLOSE	CLOSE		337	539.2
11	11	22	22	22	22	22	22	21	22	21	22	21	22	22	22	11	CLOSE	CLOSE		338	540.8
11	11	22	22	22	22	22	22	22	22	21	22	21	22	22	22	11	CLOSE	CLOSE		339	542.4
11	11	22	22	22	22	22	22	22	22	22	22	21	22	22	22	11	CLOSE	CLOSE		340	544.0
11	11	22	22	22	22	22	22	22	22	22	22	22	22	22	22	11	CLOSE	CLOSE		341	545.6
11	11	23	22	22	22	22	22	22	22	22	22	22	22	22	22	11	CLOSE	CLOSE		342	547.2
11	11	23	23	22	22	22	22	22	22	22	22	22	22	22	22	11	CLOSE	CLOSE		343	548.8
11	11	23	23	22	22	22	22	22	22	22	22	22	22	23	22	11	CLOSE	CLOSE		344	550.4
11	11	23	23	23	22	22	22	22	22	22	22	22	22	23	22	11	CLOSE	CLOSE		345	552.0
11	11	23	23	23	22	22	23	22	22	22	22	22	22	23	22	11	CLOSE	CLOSE		346	553.6
11	11	23	23	23	22	22	23	22	23	22	22	22	22	23	22	11	CLOSE	CLOSE		347	555.2
11	11	23	23	23	22	22	23	22	23	22	23	22	22	23	22	11	CLOSE	CLOSE		348	556.8
11	11	23	23	23	23	22	23	22	23	22	23	22	22	23	22	11	CLOSE	CLOSE		349	558.4
11	11	23	23	23	23	22	23	22	23	22	23	22	22	23	23	11	CLOSE	CLOSE		350	560.0

JDA Spill Patterns with No TSWs - # Gate Stops per Spillbay																				Total	Spill ^a
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Stops (#)	(kcf/s)
11	11	23	23	23	23	23	23	22	23	22	23	22	22	23	23	11	CLOSE	CLOSE		351	561.6
11	11	23	23	23	23	23	23	22	23	22	23	22	23	23	23	11	CLOSE	CLOSE		352	563.2
11	11	23	23	23	23	23	23	23	23	22	23	22	23	23	23	11	CLOSE	CLOSE		353	564.8
11	11	23	23	23	23	23	23	23	23	23	23	22	23	23	23	11	CLOSE	CLOSE		354	566.4
11	11	23	23	23	23	23	23	23	23	23	23	23	23	23	23	11	CLOSE	CLOSE		355	568.0
11	11	24	23	23	23	23	23	23	23	23	23	23	23	23	23	11	CLOSE	CLOSE		356	569.6
11	11	24	24	23	23	23	23	23	23	23	23	23	23	23	23	11	CLOSE	CLOSE		357	571.2
11	11	24	24	23	23	23	23	23	23	23	23	23	23	24	23	11	CLOSE	CLOSE		358	572.8
11	11	24	24	24	23	23	23	23	23	23	23	23	23	24	23	11	CLOSE	CLOSE		359	574.4
11	11	24	24	24	23	23	24	23	23	23	23	23	23	24	23	11	CLOSE	CLOSE		360	576.0
11	11	24	24	24	23	23	24	23	24	23	23	23	23	24	23	11	CLOSE	CLOSE		361	577.6
11	11	24	24	24	23	23	24	23	24	23	24	23	23	24	23	11	CLOSE	CLOSE		362	579.2
11	11	24	24	24	24	23	24	23	24	23	24	23	23	24	23	11	CLOSE	CLOSE		363	580.8
11	11	24	24	24	24	23	24	23	24	23	24	23	23	24	24	11	CLOSE	CLOSE		364	582.4
11	11	24	24	24	24	24	24	23	24	23	24	23	23	24	24	11	CLOSE	CLOSE		365	584.0
11	11	24	24	24	24	24	24	23	24	23	24	23	24	24	24	11	CLOSE	CLOSE		366	585.6
11	11	24	24	24	24	24	24	24	24	23	24	23	24	24	24	11	CLOSE	CLOSE		367	587.2
11	11	24	24	24	24	24	24	24	24	24	24	23	24	24	24	11	CLOSE	CLOSE		368	588.8
11	11	24	24	24	24	24	24	24	24	24	24	24	24	24	24	11	CLOSE	CLOSE		369	590.4
11	11	25	24	24	24	24	24	24	24	24	24	24	24	24	24	11	CLOSE	CLOSE		370	592.0
11	11	25	25	24	24	24	24	24	24	24	24	24	24	24	24	11	CLOSE	CLOSE		371	593.6
11	11	25	25	24	24	24	24	24	24	24	24	24	24	25	24	11	CLOSE	CLOSE		372	595.2
11	11	25	25	25	24	24	24	24	24	24	24	24	24	25	24	11	CLOSE	CLOSE		373	596.8
11	11	25	25	25	24	24	25	24	24	24	24	24	24	25	24	11	CLOSE	CLOSE		374	598.4
11	11	25	25	25	24	24	25	24	25	24	24	24	24	25	24	11	CLOSE	CLOSE		375	600.0