
2024 Fish Passage Plan

Chapter 5 – McNary Dam

Table of Contents

1. FISH PASSAGE INFORMATION	4
1.1. Juvenile Fish Facilities and Migration Timing	4
1.2. Adult Fish Facilities and Migration Timing.....	6
2. FISH FACILITIES OPERATIONS	9
2.1. General.....	9
2.2. Spill Management	9
2.3. Operating Criteria – Juvenile Fish Facilities	11
2.4. Operating Criteria - Adult Fish Facilities	18
2.5. Fish Facilities Monitoring & Reporting	20
3. FISH FACILITIES MAINTENANCE	21
3.1. Dewatering & Fish Handling	21
3.2. Maintenance - Juvenile Fish Facilities.....	21
3.3. Maintenance - Adult Fish Facilities.....	24
4. TURBINE UNIT OPERATIONS & MAINTENANCE	27
4.1. Turbine Unit Priority Order	27
4.2. Warm Water Turbine Operations.....	27
4.3. Turbine Unit Operating Range	28
4.4. Turbine Unit Maintenance.....	32
5. FOREBAY DEBRIS REMOVAL	33

McNary Dam *	
Project Acronym	MCN
River Mile (RM)	Columbia River – RM 292
Reservoir	Lake Wallula
Minimum Instantaneous Flow (kcfs)	Dec–Feb: 12.5 kcfs \ Mar–Nov: 50 kcfs
Forebay Normal Operating Range (ft)	337' – 340'
Tailrace Rate of Change Limit (ft)	1.5'/hour
Powerhouse Length (ft)	1,422'
Powerhouse Hydraulic Capacity (kcfs)	232 kcfs
Turbine Units (#)	14 Main Units (S. Morgan Smith Kaplan)
Turbine Unit Generating Capacity (MW)	Rated: 980 MW (70 MW/unit) \ Maximum: 1,127 MW (80.5 MW/unit)
Gatewell Orifice Diameter (in)	Two 12" orifices per gatewell (6 per unit)
Spillway Length (ft)	1,310'
Spillway Hydraulic Capacity (kcfs)	2,200 kcfs
Spillbays (#)	22
Spillway Weirs (#)	2 (Bays 19-20)
Navigation Lock Length x Width (ft)	650' x 84' (Usable Space)
Navigation Lock Maximum Lift (ft)	75'
FISH STRUCTURE/OPERATION START DATE	
Fish Lock	1953 (1 st Generation)
Adult Fish Counts – WA Shore & OR Shore	1954
Juvenile Bypass System (JBS)	1980 (1 st Generation); 1994 (current); Bypass Outfall Flume relocated 2012
Submersible Traveling Screens (STS)	1980 (Prototype Mesh)
Extended-Length Submersible Bar Screens (ESBS)	1997
Juvenile Fish Transportation Program - Corps	1981-2012
Temporary Spillway Weirs (TSW)	2007

* More information for McNary Dam is available on the Corps Walla Walla District website at: www.nww.usace.army.mil/Locations/District-Locks-and-Dams/McNary-Lock-and-Dam/

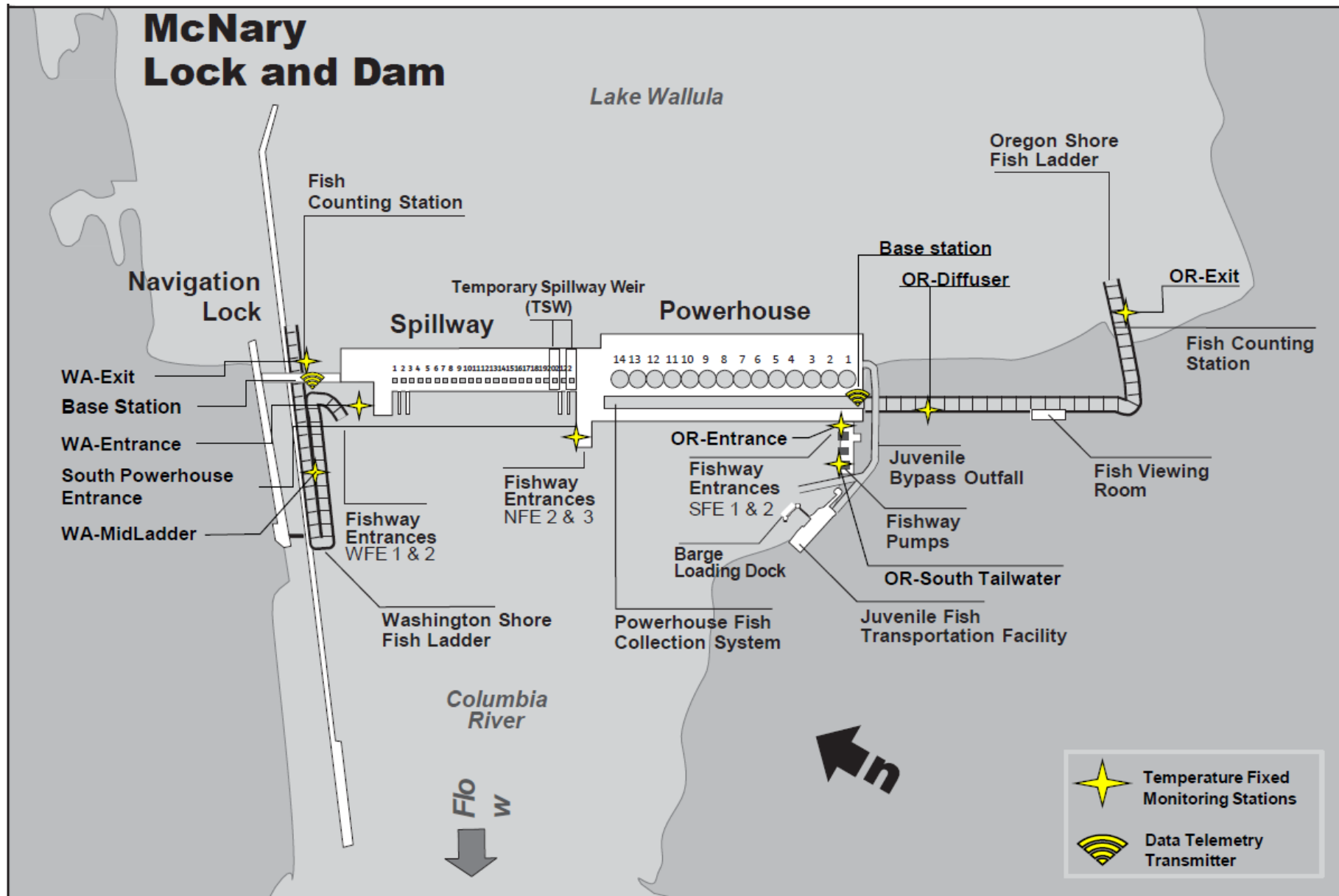


Figure MCN-1. McNary Lock & Dam General Site Plan. *AUGUST 2024: updated ladder temperature monitoring locations.*

Table MCN-1. McNary Dam Schedule of Operations and Actions Defined in the 2024 Fish Passage Plan.

Task Name	Start	End	FPP Section	2024												2025		
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
FISH PASSAGE FACILITIES	Fri 3/1/24	Mon 3/31/25																
Adult Facilities - Fish Passage Season	Fri 3/1/24	Tue 12/31/24	2.4.2															
Adult Facilities - Winter Maintenance	Wed 1/1/25	Sat 3/1/25	2.4.1															
Juvenile Facilities - Winter Maintenance	Fri 3/1/24	Sun 3/31/24	2.3.1															
Juvenile Facilities - Fish Passage Season	Mon 4/1/24	Sun 12/15/24	2.3.2															
Juvenile Facilities - Winter Maintenance	Mon 12/16/24	Mon 3/31/25	2.3.1															
PROJECT OPERATIONS FOR FISH PASSAGE	Fri 3/1/24	Wed 1/15/25																
Turbine unit priority order	Fri 3/1/24	Sat 11/30/24	4.1															
TSW20 for Adult Steelhead 4h/d	Fri 3/1/24	Wed 3/20/24	FOP & 2.2															
TSW20 for Adult Steelhead 24h/d	Thu 3/21/24	Tue 4/9/24	FOP & 2.2															
Both TSWs in operation 24h/d	Wed 4/10/24	Sat 8/31/24	2.3.2.6															
FOP Spring Spill	Wed 4/10/24	Sat 6/15/24	App E (FOP)															
FOP Summer Spill	Sun 6/16/24	Wed 7/31/24	App E (FOP)															
FOP Late Summer Spill	Thu 8/1/24	Sat 8/31/24	App E (FOP)															
TSW20 for Adult Steelhead 4h/d	Sun 9/1/24	Fri 11/15/24	FOP & 2.2															
Turbine unit 1% operating range	Wed 4/10/24	Sat 8/31/24	4.3															
ESBSs (installed by NLT 15-APR)	Mon 4/15/24	Mon 12/16/24	2.3.2.2															
Avian hazing	Sun 4/21/24	Sat 7/27/24	App L 6.3															
Inspect/rake trashracks	Mon 12/16/24	Wed 1/15/25	2.3.1.1.															
TDG MONITORING	Fri 3/1/24	Sat 3/1/25																
TDG Monitoring - Tailrace (year-round)	Fri 3/1/24	Sat 3/1/25	2.2															
TDG Monitoring - Forebay	Mon 4/1/24	Sat 8/31/24	2.2															
ADULT FISH COUNTING	Mon 4/1/24	Thu 10/31/24																
Day Visual 0500-2100 PDT	Mon 4/1/24	Thu 10/31/24	Table MCN-3															
Night Video 2100-0500 PDT	Sat 6/15/24	Mon 9/30/24	Table MCN-3															
REPORTS	Fri 3/1/24	Fri 1/31/25																
Weekly Reports	Fri 3/1/24	Tue 12/31/24	2.5.2															
Annual Report due NLT Jan 31	Fri 1/31/25	Fri 1/31/25	2.5.2															
SPECIAL OPS & STUDIES (Appendix A)	Sun 1/14/24	Sun 3/31/24																
Navigation Lock annual outage	Sun 1/14/24	Fri 3/29/24	App A 1.4															
Spillway Direct Injury Evaluation	Fri 3/1/24	Sun 3/31/24	App A 5.2															

1. FISH PASSAGE INFORMATION

Fish passage facilities at McNary Lock & Dam are shown in **Figure MCN-1**. The annual schedule of project operations, maintenance, and other actions described in this Fish Passage Plan (FPP) and Appendices is included in **Table MCN-1**.

1.1. Juvenile Fish Facilities and Migration Timing

1.1.1. Juvenile Facilities. Maintenance of juvenile fish facilities that may impact fish or facility operations should be conducted during the winter maintenance period. Juvenile fish passage structures and facilities at McNary Dam consist of:

- i. Extended-length submersible bar screens (ESBSs) with flow vanes.
- ii. Vertical barrier screens (VBSs).
- iii. Gatewell orifices.
- iv. Concrete collection channel with emergency bypass outlets.
- v. Primary and secondary dewatering structures.
- vi. Pipeline/corrugated metal flume for routing juvenile fish to the sampling facilities or bypassing them back to the river.
- vii. Full-flow PIT tag detection and deflection system.
- viii. Separator to separate adults from juvenile fish, and juvenile fish by size.
- ix. Covered raceways and tanks for holding sampled fish.
- x. Sampling facilities, office, and sampling building with fish marking facilities.

1.1.2. Juvenile Migration Timing. Juvenile fish passage timing at McNary Dam is shown in **Table MCN-2**, based on juvenile fish collection data over the most recent 10-year period (does not reflect bypass (FGE) or spillway passage). Salmon, steelhead, bull trout, lamprey, and other species are routinely counted.

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

Year	10%	50%	90%	# Days	10%	50%	90%	# Days
	Yearling Chinook (wild & hatchery)				Subyearling Chinook (wild & hatchery)			
2014	27-Apr	11-May	19-May	22	22-Jun	4-Jul	26-Jul	34
2015	27-Apr	7-May	19-May	22	14-Jun	2-Jul	10-Jul	26
2016	23-Apr	3-May	13-May	20	8-Jun	26-Jun	2-Jul	24
2017	23-Apr	5-May	19-May	26	6-Jun	2-Jul	22-Jul	46
2018	27-Apr	7-May	17-May	20	21-May	26-Jun	18-Jul	58
2019	19-Apr	9-May	21-May	32	4-Jun	22-Jun	14-Jul	40
2020*	21-Apr	7-May	21-May	30	2-Jun	18-Jun	12-Jul	40
2021	25-Apr	13-May	23-May	28	12-Jun	24-Jun	4-Jul	22
2022*	11-Apr	11-May	27-May	46	12-Jun	22-Jun	24-Jul	42
2023	23-Apr	11-May	21-May	28	15-May	22-Jun	8-Jul	54
10-Yr MEDIAN	24-Apr	8-May	20-May	27	10-Jun	26-Jun	16-Jul	40
10-Yr MIN	11-Apr	3-May	13-May	20	21-May	18-Jun	2-Jul	22
10-Yr MAX	23-Apr	11-May	21-May	46	15-May	22-Jun	8-Jul	58
	Unclipped Steelhead				Clipped Steelhead			
2014	23-Apr	7-May	19-May	26	25-Apr	5-May	15-May	20
2015	1-May	15-May	27-May	26	27-Apr	9-May	27-May	30
2016	19-Apr	3-May	23-May	34	21-Apr	1-May	15-May	24
2017	21-Apr	5-May	29-May	38	19-Apr	29-Apr	13-May	24
2018	19-Apr	5-May	27-May	38	19-Apr	1-May	13-May	24
2019	14-Apr	27-Apr	23-May	39	11-Apr	19-Apr	9-May	28
2020*	11-Apr	9-May	25-May	44	21-Apr	3-May	21-May	30
2021	21-Apr	9-May	29-May	38	21-Apr	29-Apr	19-May	28
2022*	17-Apr	19-May	6-Jun	50	7-Apr	5-May	21-May	44
2023	29-Apr	15-May	23-May	24	27-Apr	1-May	19-May	22
10-Yr MEDIAN	20-Apr	8-May	27-May	38	21-Apr	2-May	17-May	26
10-Yr MIN	11-Apr	27-Apr	19-May	24	7-Apr	19-Apr	9-May	20
10-Yr MAX	29-Apr	15-May	23-May	50	27-Apr	1-May	19-May	44
	Coho (wild & hatchery)				Sockeye (wild & hatchery)			
2014	1-May	17-May	2-Jun	32	3-May	17-May	23-May	20
2015	5-May	21-May	4-Jun	30	27-Apr	17-May	25-May	28
2016	29-Apr	13-May	25-May	26	29-Apr	11-May	19-May	20
2017	1-May	19-May	29-May	28	27-Apr	13-May	25-May	28
2018	29-Apr	11-May	27-May	28	5-May	11-May	17-May	12
2019	19-Apr	19-May	29-May	40	29-Apr	19-May	6-Jun	38
2020*	21-Apr	11-May	31-May	40	5-May	17-May	27-May	22
2021	29-Apr	19-May	2-Jun	34	1-May	15-May	27-May	26
2022*	27-Apr	25-May	4-Jun	38	7-May	21-May	10-Jun	34
2023	3-May	19-May	27-May	24	7-May	19-May	23-May	16
10-Yr MEDIAN	29-Apr	19-May	1-Jun	31	2-May	17-May	26-May	24
10-Yr MIN	19-Apr	11-May	25-May	24	27-Apr	11-May	17-May	12
10-Yr MAX	3-May	19-May	27-May	40	7-May	19-May	23-May	38

*Passage dates in 2020 and 2022 included early start of sampling at McNary on March 1st and 3rd.

1.2. Adult Fish Facilities and Migration Timing.

1.2.1. Adult Fish Passage Facilities. McNary Dam adult passage facilities consist of separate north and south shore facilities, described below. Maintenance of adult facilities is scheduled for January–February, typically one shore at a time, to minimize impacts on upstream migrants.

1.2.1.1. North Shore Adult Fish Facility. The north shore facilities are comprised of a fish ladder with counting station, submerged orifice PIT-tag antennas in the ladder, a small collection system, and a gravity-flow auxiliary water supply system that has a turbine unit on it operated by North Wasco County PUD. The gravity-flow auxiliary water supply system takes water from the forebay through two conduits, passes the water through a turbine unit (or through a bypass/energy dissipater when the turbine is not in operation) and distributes the water through a diffuser system at the bottom of the ladder and in the transportation channel. The north shore collection system has three downstream entrances (two of which are used during normal operation) and a side entrance into the spillway basin.

1.2.1.2. South Shore Adult Fish Facility. The south shore facilities are comprised of a fish ladder with counting station, submerged orifice PIT-tag antennas in the ladder and antennas at the counting station, two south shore entrances, a powerhouse collection system, and gravity and pumped auxiliary water supply systems.

1.2.1.3. Powerhouse Collection System. The powerhouse collection system contains three downstream entrances and one side entrance into the spillway basin at the north end of the powerhouse, twelve operating floating orifices, and a common transportation channel. At the north end of the powerhouse, two of the downstream entrances are used during normal operation with the other downstream and side entrances closed. The gravity-flow auxiliary water is provided by one conduit from the forebay and supplies the diffusers at the bottom of the ladder at tailwater level. The pumped auxiliary water is supplied by three electric pumps with variable-pitched blades. Two pumps can provide the required flow when the third pump is bulkheaded to prevent water from flowing back through the pump to the river. The electric pumps supply the auxiliary water for the diffusers at the entrances and in the transportation channel. Excess water from the primary dewatering structure in the juvenile fish collection channel is routed to the adult collection system at the north end of the powerhouse.

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, bull trout, shad, and lamprey are counted per the schedule in **Table MCN-3** and daily counts are posted online.¹ The presence of other species (e.g., sturgeon, grass carp, Atlantic salmon, etc.) are recorded as comments and reported 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 MCN-4**.

¹ Daily adult salmon counts: https://www.fpc.org/currentdaily/HistFishTwo_7day-ytd_Adults.htm

1.2.2.3. Time-of-day (diel) distributions of adult salmonid activity at McNary Dam fishway entrances and exits are shown in **Figure MCN-2**.

Table MCN-3. McNary Dam Adult Fish Counting Schedule March 2024 – February 2025.

Count Period	Counting Method and Hours *
April 1 – October 31	Day Visual 0500–2100 hours (PDT)
June 15 – September 30	Night Video 2100–0500 hours (PDT)

*PST = Pacific Standard Time. PDT = Pacific Daylight Time, in effect during daylight saving time.

Table MCN-4. McNary Dam Adult Fish Count Period and Peak Passage Timing (based on yearly counts from 1954 through most recent count year).

Species	Count Period	Earliest Peak	Latest Peak
Spring Chinook	Apr 1 – Jun 8	Apr 20	May 26
Summer Chinook	Jun 9 – Aug 8	Jun 13	Jul 26
Fall Chinook	Aug 9 – Oct 31	Sep 6	Sep 28
Steelhead	Apr 1 – Oct 31	Jul 9	Oct 13
Sockeye	Apr 1 – Oct 31	Jun 24	Oct 11
Coho	Apr 1 – Oct 31	Jun 27	Oct 5
Lamprey	Apr 1 – Oct 31	Jun 21	Aug 18

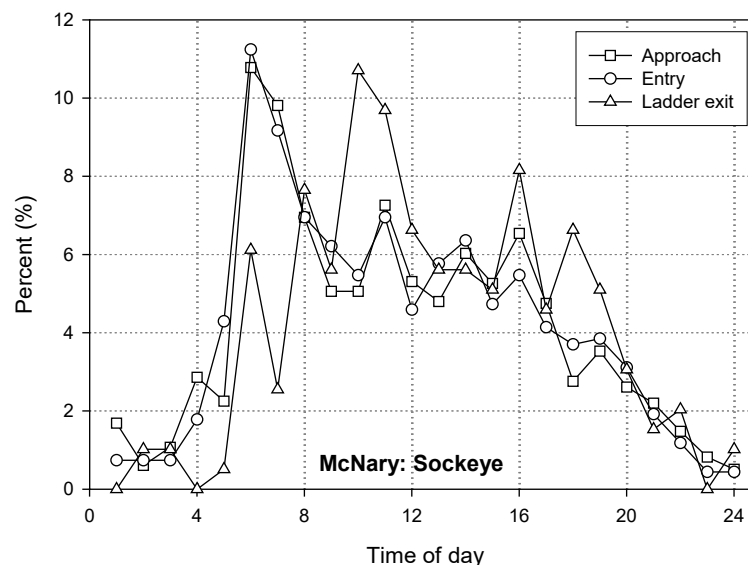
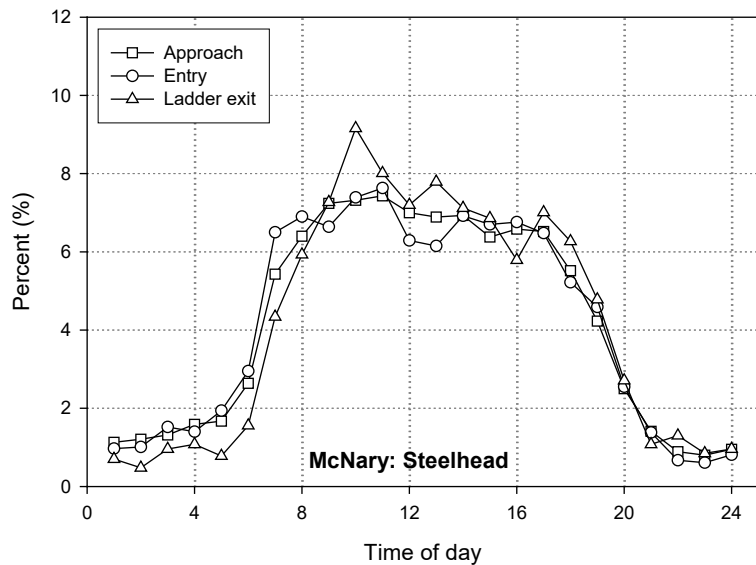
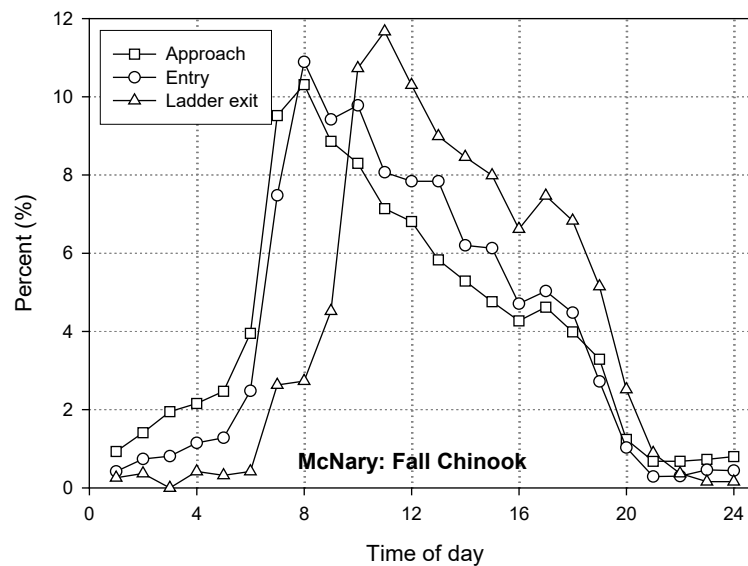
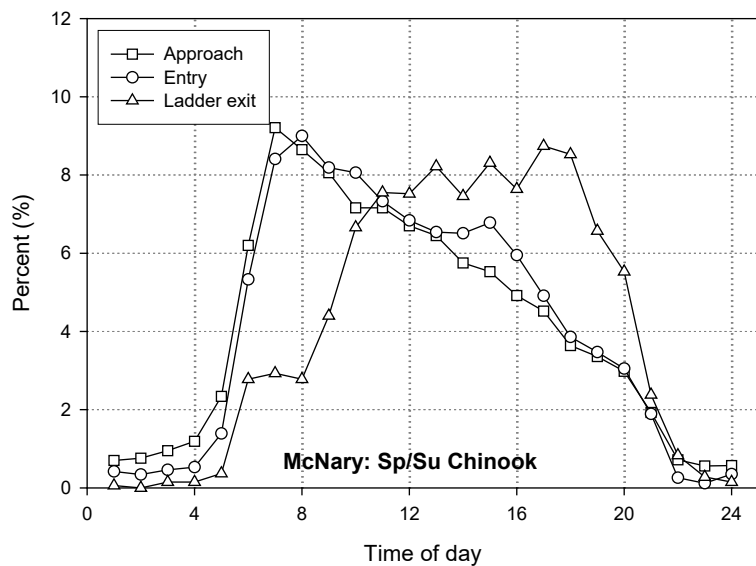


Figure MCN-2. Diel Distribution of Adult Salmonids at McNary Dam Fishway Entrances and Exits (Keefe & Caudill 2008). Report and summary letter available online at: pweb.crohms.org/tmt/documents/FPOM/2010/2013_FPOM_MEET/2013_JUN/

2. FISH FACILITIES OPERATIONS

2.1. General

2.1.1. Yearly special operations related to research are described as currently coordinated in **Appendix A - Special Project Operations & Studies**.

2.1.2. Research, non-routine maintenance activities and construction will not be conducted within 100 feet of any fishway entrance or exit, within 50 feet of any other part of the adult fishway, or directly in, above or adjacent to any fishway, unless coordinated by the Project, Walla Walla District (NWW) Operations and/or Planning or Construction office through FPOM or FFDRWG. Currently coordinated special operations related to research are described in *Special Project Operations & Studies (Appendix A)*. These distances are approximate and will be updated after data are collected and analyzed to understand where the threshold for adversely impacting adult fish behavior occurs. Alternate actions will be considered by District and Project biologists in conjunction with the regional fish agencies on a case-by-case basis. All activities within boat restricted zones (BRZ) will be coordinated with the Project at least 2 weeks in advance unless deemed an emergency (coordination guidance in **FPP Chapter 1 - Overview**).

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

2.2. Spill Management

2.2.1. Spill operations for fish passage are defined in the *Fish Operations Plan (FOP)*, included in the Fish Passage Plan as **Appendix E**. Spill at McNary Dam will be distributed in spill patterns as defined below in **section 2.2.5**.

2.2.2. **Surface Spill for Adult Steelhead Overshoots.** Surface spill will be implemented at John Day, McNary, and the four lower Snake River dams as described in the FOP (**Appendix E**) and summarized below to provide non-powerhouse downstream passage for adult steelhead that overshoot natal tributaries prior to spawning or that strive to repeat a subsequent reproduction cycle (iteroparity). This operation was first implemented in fall of 2020 at McNary and the four lower Snake projects March 1–30 and October 1–November 15 for 4 hours in the morning, 3 non-consecutive days a week, pursuant to terms and conditions in the 2020 NOAA Fisheries Columbia River System (CRS) Biological Opinion. This operation is also considered in the 2020 USFWS CRS Biological Opinion as a means of providing safe and effective downstream passage for adult steelhead and other fish.

2.2.2.1. Starting in 2024, this operation will be expanded pursuant to the “*U.S. Government Commitments in Support of the Columbia Basin Restoration Initiative*”, as included in the

2023 Memorandum of Understanding (MOU)². Details of this operation are defined in the FOP (see section 6 of **Appendix E**) and summarized below:

- March 1 – 20: Bay 20 TSW for 4 hours in the morning, 7 days/week.
- March 21 – April 9: Bay 20 TSW 24 hours/day, 7 days/week.
- September 1–November 15: Bay 20 TSW for 4 hours in the morning, 7 days/week.

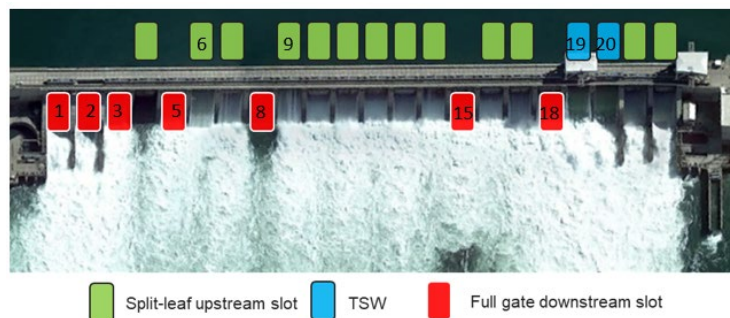
2.2.3. Involuntary spill is the result of river flow above powerhouse capacity, insufficient load (lack of load), turbine unit outages (forced or scheduled), or failure of a key component of the juvenile fish passage facility which forces spill to provide juvenile fish passage.

2.2.4. Total dissolved gas (TDG) is monitored at McNary Dam during the periods defined in **Table MCN-1**, pursuant to the Corps' annual *TDG Management Plan* and the current *Dissolved Gas Monitoring Plan of Action*.³

2.2.5. Interim Modified Spillway Operation.

The overloaded condition of McNary Dam spillway cranes and hoists limit their use until they can be replaced. As a result, Cranes 6 and 7 and seven of the 20 hoists can only be used twice per year (no more than 2 lifts every 12 months) to move a double-leaf (full) gate, while 13 hoists cannot be used to move a double-leaf gate. Lifting the top leaf of the spill gates will not overload cranes and hoists.

Starting in spring 2024, a total of 13 spill gates will be operated in the upstream slot in split-leaf configuration, 11 of which are on hoists and may be adjusted hourly as needed to adjust spill according to patterns in **Table MCN-8**. The other two split-leaf gates (bays 6 and 9) are on Cranes 6 and 7 and will be adjusted by a crew as often as possible, at least once per week. The remaining 7 spillbays (1, 2, 3, 5, 8, 15, 18) will remain closed in the downstream slot in double-leaf configuration and only opened if needed to pass high flows using the first of two overloaded movements allowed each year. After the high flow event, each double-leaf gate will be closed using the second overloaded movement allowed that year.



² See “Fall/Winter Spill Operations” in Attachment 2, Appendix B of the MOU, page 88 of 92 (pdf page 141): pweb.crohms.org/tmt/JointMotion_TermSheet_CourtOrder_and_Extensions_2023_and_Stay_Motion_MOU_2450-1.pdf

³ TDG Management Plan (Appendix 4 of the WMP): pweb.crohms.org/tmt/documents/wmp/
 TDG Monitoring Plan of Action: www.nwd.usace.army.mil/Missions/Water/Columbia/Water-Quality/

If lower flows are forecasted and meet *all* hydrologic criteria below, crews will open double-leaf gates 1 and 2 in the downstream slot to 4 stops (~7 kcfs spill) each on April 10 as early as possible during daylight hours and spill will be distributed according to patterns in **Table MCN-8-ALT**. From 0001 hours until gates 1 and 2 are opened, spill will be at the FOP target using patterns in **Table MCN-8**:

- a) Official April water supply forecast for The Dalles April-August runoff below 90 MAF,
- b) STP forecast for McNary inflow below 350 kcfs through the spring, and
- c) Internal weekly Corps system flood risk management (FRM) analyses indicates high probability of McNary inflows below 350 kcfs through the spring.

If the April WSF for The Dalles is greater than 90 MAF, or either the STP or internal Corps FRM analyses indicate flows peaking above 350 kcfs, gates 1 and 2 will remain closed in the downstream slot. Once the risk of inflows exceeding 350 kcfs has passed, and if spill gates 1 and 2 have not yet been opened, the gates will be opened to 4 stops each. Additional downstream gates can be used with a set (e.g., 4 stop) opening after the peak flow period has passed, as coordinated with FPOM. If gates 1 and 2 are needed to pass higher flows, they will be opened to a level that is expected to be sustainable through spring and early summer spill based on STP and ESP forecasts. Additional double-leaf gates in the downstream slots will be used as needed to pass high flow.

If gates 1 and 2 are opened, they will be closed using the second of two allowed overloaded movements at the end of early summer spill on July 31 or once spill is forecast to be below 70 kcfs for the remainder of the spill season.

2.3. Operating Criteria – Juvenile Fish Facilities

2.3.1. Juvenile Fish Facilities - Winter Maintenance Period (December 16 – March 31).

2.3.1.1. Prior to January 16, inspect or rake up to four trashracks to assess debris levels. Prioritize raking trashracks at units with known debris issues and longer run times, ensuring that raked units are distributed evenly across the powerhouse to the extent practicable.

2.3.1.2. Forebay Area and Intakes.

- i. Remove debris from forebay and trashracks.
- ii. Rake trashracks.
- iii. Remove debris from gatewell slots.
- iv. Measure and log drawdown in gatewell slots.
- v. Inspect and repair gatewell dip net as needed.

2.3.1.3. ESBSs, Flow Vanes, and VBSs.

- i. Remove ESBSs beginning on the Monday of the third week in December. After ESBSs are removed, inspect for juvenile salmonid mortalities and all other

incidental fish mortalities. Inspect ESBSs within a week after removal, or as soon as practical. Count all mortalities (or make best estimate) for each ESBS and report to CENWW-OD-T.

ii. Complete maintenance on all ESBSs.

iii. Inspect ESBSs for good running order and operate debris cleaner one trial run (dogged off at deck level).

iv. Inspect flow vanes to ensure they are in good condition and all surfaces are smooth. Repair as needed.

v. Inspect all VBSs at least once per year by either raising the VBS and visually inspecting or with an underwater video camera.

2.3.1.4. Collection Channel.

i. Maintain orifice lights in operational condition.

ii. Maintain orifices clean and valves operating correctly.

iii. Ensure the orifice air backflush system works correctly.

iv. Maintain the netting over handrails and orifice chutes in good condition.

v. Maintain the plastic covers over orifice chutes in good condition and clean so orifice flow is visible.

2.3.1.5. Dewatering Structure and Flume.

i. Maintain the inclined and side dewatering screens clean and in good condition with no gaps between screen panels, no damaged panels, and no missing silicone.

ii. Maintain the cleaning brush systems operating correctly.

iii. Maintain all valves in good condition and operating correctly.

iv. Maintain stilling well water level sensing device operating correctly.

v. Maintain flume and pipe interiors smooth with no rough edges.

vi. Maintain full-flow PIT-tag system as required. Coordinate with PSMFC.

2.3.1.6. Sampling Facilities.

i. Maintain the flume switch gate in operational condition.

ii. Ensure the flume, perforated plate, and bar screen edges are smooth with no rough edges.

- iii. Maintain the wet separator and fish distribution system operating as designed.
- iv. Maintain brushes on all crowders in good condition or new.
- v. Maintain crowders operating properly.
- vi. Maintain all valves, slide gates, and switch gates operating correctly.
- vii. Ensure raceway and tank retainer screens are set in place with no holes or sharp wires protruding.
- viii. Maintain all sampling equipment operating correctly.
- ix. Maintain juvenile PIT-tag system as required (see “*Columbia Basin PIT-tag Information System, General Gate Maintenance and Inspection, Walla Walla District*”, February 2003). Coordinate with PSMFC.

2.3.1.7. Record all maintenance and inspections.

2.3.1.8. Inspect bird wires, water cannon, and other predation deterrent devices and repair or replace as needed. Where possible, install additional bird wires or other deterrent devices to cover areas of known avian predation activity. Prepare avian abatement contract as needed. For information on avian management at McNary Dam, see the *Predation Monitoring and Deterrence Action Plans* in **Appendix L** (Table 2 and section 6).

2.3.2. Juvenile Fish Facilities – Fish Passage Season (April 1 – December 15).

Operate April 1– November 30 for juvenile fish bypass and sampling, and December 1–15 for adult fallback bypass. Operate according to criteria below and in the *Smolt Facility Operating Protocols* (**Appendix J**) for juvenile salmonid bypass and collection (for research purposes).

2.3.2.1. Forebay Area and Intakes.

- i. Remove debris from forebay.
- ii. Inspect gatewell slots daily for debris, fish buildup, and contaminating substances (particularly oil). Clean gatewells before they become 50% covered with debris. If the volume of debris precludes the ability to keep the gatewell at least 50% clear, clean at least once daily. If flows through an orifice or fish conditions give indications that an orifice may be partially obstructed with debris, close and backflush the orifice to remove the obstruction. If the obstruction cannot be removed, close the orifice and operate the alternate orifice for that gatewell slot. If both orifices become obstructed or plugged with debris, do not operate the turbine unit until the gatewell and orifices are clear of debris.
- iii. If a visible accumulation of contaminating substances (e.g., oil) is detected in a gatewell and cannot be removed within 24 hours, immediately close the gatewell orifices and shut down the turbine unit within one hour until the material has been

removed and any problems corrected. The preferred method for removing oil from the water surface is to install absorbent socks, booms, or pads capable of encapsulating the material, tied off with a rope for later disposal. Take action as soon as possible to remove oil from the gateway so the orifice can be reopened to allow the fish to exit the gateway. Do not close orifices for longer than 48 hours.

iv. Remove debris from forebay and trashracks as required to minimize fish impacts. Generally, this will result in removing debris from trashracks at least four times per year – just prior to fish passage season and monthly for the first three months. Raking may be required when heavy debris loads are present in the river. Fish quality and trashrack differential may also be an indicator of debris buildup on the trashracks. Project biologist shall determine when trash raking is required.

v. Coordinate cleaning efforts with personnel operating juvenile collection facilities.

vi. Dip bulkhead gateway slots to remove fish prior to installing bulkhead for dewatering bulkhead slot.

2.3.2.2. ESBSs and VBSs.

i. Installation of ESBSs may begin as early as April 2 starting at the lowest priority units (least likely to operate) and must be completed by no later than April 15.

ii. Operate ESBSs with flow vanes attached.

iii. Operate ESBSs with debris cleaners in automatic mode. Set cleaning frequency to 60 minutes. Increase or decrease frequency if needed to maintain clean screens.

iv. Inspect ESBSs weekly by underwater video in at least three operating turbine units. Spot-check VBSs at the same time.

v. Conduct additional ESBS inspections if fish condition warrants it.

vi. If an ESBS is damaged or fails during juvenile fish passage season, follow procedures in **section 3.2.2.2**. *In no case should a turbine unit be operated with a missing or known non-operational or damaged ESBS or VBS.* Units with ESBSs in place and closed orifices shall not operate for more than 10 hours, and preferably less than 3 hours. Minimize orifice closure by efficiently planning and implementing repairs (e.g., have equipment, materials, and personnel ready before closing orifices).

vii. Measure head differentials across VBSs daily during times of debris. Clean and inspect VBS when head differentials reach 1.5'. When a head differential of 1.5' is reached and the VBSs cannot be cleaned within 8 hours, operate the

respective turbine unit at a reduced generation loading to minimize loading on the VBS and potential fish impingement.

viii. Between the spring and summer periods, inspect at least four VBSs in two different turbine units that were operated frequently during the spring. If debris accumulation is noted, inspect other VBSs and clean debris as necessary.

ix. Inspect all VBSs at least once per year and when pulled for cleaning. Repair as needed.

x. At the end of the season, make formal determination as to adequacy of bar screen panels and debris cleaner brushes and replace components as necessary.

2.3.2.3. Collection Channel.

i. Maintain orifices clean and operating. Operate at least one orifice per gateway slot (preferably the south orifice). If orifices must be closed to repair any part of the facility, see **section 3.2.2.4** to determine if the unit must be shut down and if fish must be dipped from the gateway(s).

ii. Maintain orifice lights operational and lighted on open orifices. Orifice lights and area lights may be turned off the evening before the channel is dewatered at the end of the season (on or after December 16) to encourage fish to exit the channel volitionally. Area lights can be turned on briefly if needed for access.

iii. Replace all burned out orifice lights within 24 hours of notification. Orifice lights shall remain lighted 24 hours/day.

iv. Maintain orifice jets hitting no closer than 3' from back wall and collection channel full.

v. Operate orifice valves either fully open or closed.

vi. Cycle orifices at least once per day and more frequently if required. During periods of high fish and debris passage, April 1 through August 15, inspect and cycle orifices twice daily, or more frequently as determined by the Project biologist, to keep orifices clean. If debris is causing continual orifice plugging problems in a particular gateway, the respective turbine unit generation may be reduced to the lower end of the 1% efficiency range to minimize orifice plugging problems.

vii. Maintain netting along handrails in good condition (no holes or gaps).

viii. Maintain plastic covers over orifice chutes in good condition.

2.3.2.4. Dewatering Structure.

i. Ensure no gaps between panels or missing silicone in side and inclined screens.

ii. Maintain the trash sweeps operating correctly. The Project biologist shall determine the frequency of operation of the trash sweeps. The sweeps should operate at a frequency to maintain a clean screen given debris loads present. Frequency of operation may vary from once every 15 minutes to once every 2 or more hours. This frequency should coincide with the ESBS cycle time.

iii. If problems occur with the automated cleaning system, operate cleaners at least once per shift unless otherwise determined by the Project biologist.

iv. The dewatering structure may be dewatered twice during the season, during low fish passage periods in June and September, and for inspection and cleaning of the dewatering screens. Before dewatering occurs, the Project biologist must notify CENWW-OD-T who will coordinate the proposed action with NOAA Fisheries and other FPOM participants.

v. Turn off lights at the dewatering structure at night (unless needed for personnel access) to encourage fish to move downstream volitionally.

2.3.2.5. Sampling Facilities. [Note: normal operations when not sampling fish is to operate the juvenile bypass facilities in full flow bypass to the river. During this operation, fish may be periodically routed through the sampling facilities to sample fish for the Smolt Monitoring Program or for routine sampling to monitor facility descaling and fish condition. Sampling during full flow bypass operations will be coordinated on an as-needed basis. Sampling during the juvenile fish bypass season is normally done every other day, per **Appendix J.**]

i. There should be no holes or gaps between screen panels. Maintain all silicone sealer in good condition.

ii. Maintain the crowder screen brushes in good operating condition.

iii. Ensure that retainer screens in raceways and tanks are clean with no holes or protruding wires.

iv. Operate wet separator and fish distribution system as designed.

v. To prevent debris plugging in the spring, release ice blocks through each 10" bypass line, 1-3 times per day, as warranted by woody debris loads. Pass additional ice blocks down the pipelines during high debris periods as needed to keep the pipes debris free. Continue releasing ice blocks through the pipes during the summer when transporting fish, as determined by the Project biologist to keep the pipelines debris free.

vi. Inform PSMFC in advance if possible of situations that cause the PIT-tag system to become inoperable (e.g., power outages) or that could result in confounding the interpretation of PIT-tag data (e.g., bypassing fish from raceways to the river, operating in primary bypass mode without an operational full-flow detector, emergency dewatering).

2.3.2.6. Temporary Spillway Weirs (TSW).

- i. McNary Dam has two temporary, or top, spillway weirs (TSWs) in spillbays 19 and 20 that provide surface routes for fish passage.
- ii. The TSWs can be opened and closed from the control room (unless they are attached to a crane, then a crane operator is required).
- iii. The spill rate through each TSW is approximately 9.6 kcfs (19.2 kcfs total).
- iv. The process to remove the TSWs and re-install standard spill gate sections in bays 19, 20 may take up to 5 workdays.
- v. Spring and summer spill for fish passage will occur with both TSWs open per spill patterns in **Table MCN-7**, or the relevant Manual/Auto spill patterns in **Table MCN-11** (see **section 2.2.5**).
- vi. Both TSWs will be in service April 10 through August 31. The TSW in spillbay 20 will be operated for adult steelhead March 1 through April 9 and September 1 through November 15 as defined above in **section 2.2.2**, per the FOP (**Appendix E**).

2.3.2.7. Emergency Bypass.

- i. **Freezing Conditions.** Between November 1 and December 15, if the National Weather Service forecast for Umatilla, OR⁴ is a daily high temperature below 32°F or a daily low temperature below 20°F, the McNary Fisheries staff may place the JFF channel in emergency bypass mode until the beginning of the winter maintenance period when the channel is fully dewatered.
- ii. **Late Season Mechanical Failure.** After November 30, if a mechanical failure forces the JFF juvenile channel into emergency bypass mode, the McNary Fisheries staff may leave the juvenile channel in emergency bypass mode until the beginning of winter maintenance when the channel is fully dewatered.
- iii. If the project installs a proposed “X” or “Y” valve in the south trash sluiceway that eliminates the need for emergency bypass, the fisheries staff may shut down water supply to the JFF after November 1 until the JFF is re-watered the following March, unless earlier re-watering is required for testing or maintenance.

2.3.2.8. Inspect all facilities according to the fish facilities monitoring plan. Report findings per **section 2.5**.

⁴ NWS weather forecast for Umatilla, OR: forecast.weather.gov/MapClick.php?lat=45.917680000000075&lon=-119.34202999999997

2.3.2.9. Avian Predation Management. Operate in accordance with the *Predation Monitoring and Deterrence Action Plans* for McNary Dam in **Appendix L** (Table 2 and section 6). Monitor bird wires and other avian deterrent devices to ensure good condition and replace any broken wires or devices as soon as possible. Implement harassment program to deter avian predation in areas actively used by birds and not covered by bird wires or other devices. Routinely monitor project areas to determine areas of active avian predation and, if possible, adjust harassment program to cover these areas or install bird wires or other deterrent devices to discourage avian predation activities. Grebes should be routinely captured in the juvenile fish channel and released below the dam, in coordination with USDA/Wildlife Services.

2.4. Operating Criteria - Adult Fish Facilities

2.4.1. Adult Fish Facilities - Winter Maintenance Period (January 1 – end of February).

2.4.1.1. Dewater all ladders and inspect all dewatered sections of fish facilities for projections, debris, or plugged orifices which could injure fish or impede fish passage up the ladder. Fish ladder exit trashracks must have smooth surfaces where fish pass and must have downstream edges that are adequately rounded or padded. Inspect all diffuser gratings and chambers annually by dewatering or by using divers or video inspection techniques. All diffuser gratings and chambers are to be dewatered and physically inspected at least every 3 years. Repair deficiencies.

2.4.1.2. Minimize outage periods to the extent practicable. Only one ladder may be out of service or operating out of standard operating criteria at any one time, unless specifically coordinated with CENWW-OD-T and FPOM.

2.4.1.3. Inspect all staff gauges and water level indicators. Repair and/or clean where necessary. Calibrate all water level measuring devices as necessary for proper operations.

2.4.1.4. Inspect fish ladder exits for debris and clean as necessary.

2.4.1.5. Maintain all trashracks and picketed leads clean and installed correctly.

2.4.1.6. Inspect all spill gates and ensure they are operable.

2.4.1.7. Maintain fish pumps ready for operation.

2.4.1.8. Maintain adult PIT-tag system as required. Coordinate with PSMFC.

2.4.2. Adult Fish Facilities – Adult Fish Passage Season (March 1 – December 31).

2.4.2.1. Maintain all staff gauges in readable condition at all water levels encountered during the fish passage season. Repair or clean as necessary.

2.4.2.2. Maintain water depth over fishway ladder weirs in the range of 1.0'–1.3'.

2.4.2.3. Maintain head on all fishway entrances in the range of 1'–2'.

2.4.2.4. North Shore Entrances (WFE 2 & 3). Operate two downstream gates. Maintain weir depth at 8' or greater below tailwater.

2.4.2.5. North Powerhouse Entrances (NFE 2 & 3). Operate two downstream gates. Maintain weir depth at 8' or greater below tailwater.

2.4.2.6. South Shore Entrances (SFE 1 & 2). Operate two downstream gates. Maintain weir depth at 8' or greater below tailwater.

2.4.2.7. Channel Velocity.

i. Maintain water velocities in the adult collection channel in the range of 1.5–4.0 feet per second (fps), which is the optimum velocity for returning adult salmon and steelhead to migrate upstream through the fishway. Complete velocity readings three times per week and include in required fishway inspections and in weekly and annual reports.

ii. Measure surface water velocities in the open access area near the south shore entrance by using a large piece of woody debris (stick, bark) timed over a marked fixed distance. A Doppler meter location near the same location measures sub-surface flow. The measurement of water velocity at this location represents the slowest velocity conditions throughout the length of the channel.

2.4.2.8. Operate twelve FOGs: 1, 3, 4, 8, 14, 21, 26, 32, 37, 41, 43, and 44

2.4.2.9. Correctly install trashracks and picketed leads. Maximum head on ladder exits and picketed leads is 0.5'. Normal head differential on clean leads is 0.3'.

2.4.2.10. Inform PSMFC, in advance if possible, of situations that cause the PIT-tag system to become inoperable (e.g., power outages) or that could result in confounding the interpretation of PIT-tag data (e.g., emergency dewatering).

2.4.2.11. Counting Windows.

i. Maintain all equipment in good condition. Clean the counting window and backboard as needed to maintain good visibility.

ii. Crowder ranges at MCN are:

- Washington Shore = 19 ³/₁₆" (not adjustable)
- Oregon Shore downstream = 13 ¹/₈" – 17 ⁵/₈"
- Oregon Shore upstream = 13 ¹/₂" – 17 ¹/₈"

iii. When not counting, open crowder to full count slot width and remove picketed leads.

iv. During counting, open crowder as far as possible to allow accurate counting, no less than 18" to the extent possible. This will usually occur during high turbidity conditions to achieve count accuracy criteria.

2.4.2.12. Facility Inspections.

- i. Powerhouse operators shall inspect facilities once per day shift and check computer monitor information at least once during each back shift.
- ii. Project biologists shall inspect facilities three times per week according to the fish facilities monitoring program.
- iii. Inspect picketed leads during all inspections to ensure they are clean and in the correct position (all the way down).
- iv. Check calibration of fishway control system twice per month. This may be done as part of routine fishway inspections.
- v. Inspect fishways daily for foreign substances (particularly oil). If substances are found, corrective actions should be undertaken immediately.
- vi. Record all inspections.

2.4.2.13. Fishway Temperature Monitoring. From June 1 through September 30, measure water temperature at adult fishway entrances and exits and submit data to the Fish Passage Center (FPC) weekly for posting online.⁵ Ensure the location of the monitors meets the following criteria:

- i. Within 10 meters of all shore-oriented entrances and exits.
- ii. Entrance monitor within 1 meter above the ladder floor and at least 10 meters downstream of ladder diffusers, if possible, to allow for sufficient mixing with surface water.
- iii. Exit monitor within 1 meter above the ladder floor and above all diffusers to allow for sufficient mixing with surface water.
- iv. If an existing temperature monitoring location is proposed to be used for either the exit or entrance, verify that the site accurately reflects water temperature within 10 meters of the entrance or exit.

2.5. Fish Facilities Monitoring & Reporting

2.5.1. Monitoring.

2.5.1.1. Project biologists shall inspect fish passage facilities at the frequencies described above in the juvenile and adult fish facilities operating criteria, **sections 2.3 and 2.4.**

⁵ FPC ladder temperature data: www.fpc.org/smolt/smolt_queries/Q_ladderwatertempgraphv2.php

2.5.1.2. Project biologists will inspect project facilities for the presence of zebra and Quagga mussels once per month and during dewaterings, and will provide a monthly inspection report to CENWW-OD-T.

2.5.2. Reporting.

2.5.2.1. Weekly Reports. Project Biologists shall prepare weekly reports March 1– December 31 summarizing project and fish facility operations for each week (Friday through Thursday), along with an evaluation of resulting fish passage conditions. The reports will be e-mailed CENWW-OD-T by noon the following Monday. The weekly reports will include:

- i. Out-of-criteria situations and subsequent corrective actions taken.
- ii. Equipment malfunctions, breakdowns, or damage, with a summary of resulting repairs.
- iii. Adult fishway control calibrations.
- iv. ESBS and VBS inspections.
- v. Unusual activities that at the project that may have affected fish passage.

2.5.2.2. In-Season. Any adverse or negative impact to fish or fishways shall be reported in a *Memorandum for the Record* (MFR) prepared by Project biologists and sent to FPOM by the next working day, pursuant to the coordination process and template in **FPP Chapter 1 – Overview** (section 2.3.2).

2.5.2.3. Annual Reports. Project biologists shall prepare a draft annual report by February 10 and a final report by March 15 summarizing fish facility operations for the previous year. The annual report shall also include a description of all actions taken to discourage avian predation at the project, with an overview of the effectiveness of the actions.

3. FISH FACILITIES MAINTENANCE

3.1. Dewatering & Fish Handling

3.1.1. Project biologists should be present to provide technical guidance at all project activities that may involve fish handling. All dewaterings shall be accomplished in accordance with approved *Dewatering Guidelines and Fish Salvage Plans* (**Appendix F**). When river temperatures exceed 68°F at the Juvenile Fish Facility (JFF) sample tank, all adult fish handling will be coordinated through CENWW-OD-T. Project *Dewatering Plans*⁶ were reviewed and revised in 2011 to ensure they comply with **Appendix F**.

3.2. Maintenance - Juvenile Fish Facilities

3.2.1. Scheduled Maintenance. Scheduled maintenance of the juvenile facilities is conducted during the entire year. Long-term maintenance or modifications of facilities that require them to

⁶ Project Dewatering Plans: pweb.crohms.org/tmt/documents/FPOM/2010/

be out of service for extended periods of time are conducted during the winter maintenance period from December 16 – March 31. During the fish passage season parts of the facilities are maintained on a daily, weekly, or longer interval to keep them in proper operating condition.

3.2.2. Unscheduled Maintenance. Unscheduled maintenance is the correction of any situation that prevents facilities from operating according to criteria or that will impact fish passage or survival.

3.2.2.1. Notification/Reporting. Maintenance of facilities such as ESBSs that sometimes break down during fish passage season will be carried out as described below. In these cases, repairs will be made as prescribed, and CENWW-OD-T will be notified as soon as possible after it becomes apparent that repairs are required. The Operations Manager may determine that work must be initiated prior to notifying CENWW-OD-T if a delay will result in an unsafe situation for people, property, or fish. Unscheduled maintenance that will have a significant impact on fish passage shall be coordinated with NOAA Fisheries and FPOM on a case-by-case basis by CENWW-OD-T. Information required by CENWW-OD-T includes (see also **FPP Chapter 1 - Overview**):

- i. Description of outage.
- ii. Type of outage required.
- iii. Impact on facility operation.
- iv. Length of time for repairs.
- v. Potential fish impacts and proposed mitigation measures.

3.2.2.2. ESBSs. The ESBSs deflect fish and water up the gatewell slots as part of the fish bypass system and are inspected periodically throughout the juvenile passage season with a video monitoring system. If an ESBS is found to be damaged, it will be removed and either replaced with a spare or repaired and returned to service. A turbine unit shall not be operated with a known damaged or nonfunctioning screen or without a full complement of ESBSs, flow vanes and VBSs. If a screen fails on a weekend or at night when maintenance crews are not available, the respective turbine unit will be shut down and generation switched to a fully screened unit. If all screened turbine units are in service, water may be spilled until the affected screen can be removed and repaired or replaced.

3.2.2.3. VBSs. Each gatewell has a VBS located vertically between the bulkhead slot and the operating gate slot to guide fish away from the turbine intake. The VBSs are designed to distribute flow evenly through the screens to minimize fish impingement and/or descaling. The gatewell water surface elevations are routinely measured to determine head differential across the VBSs caused by debris. VBSs are to be pulled and cleaned when head differentials reach 1.5'. Prior to pulling a VBS for cleaning, the turbine unit loading will be lowered to the lower end of the 1% efficiency range, gatewell orifices closed, and the gatewell dipped with a gatewell basket to remove all fish present in the gatewell unless doing so results in increased mortality (e.g., high numbers of adult or juvenile shad in gatewells). Immediately after dipping, the VBS shall be raised and debris hosed off. The turbine unit shall remain operating at the lower end of 1% while the VBS is being cleaned so gatewell flow will carry the debris into the operating gatewell where it will pass through the turbine unit. Immediately after cleaning the VBS, the VBS shall be lowered to the normal operating position to prevent fish passing from the bulkhead slot into the operating gate slot and orifices reopened. The

VBSs shall not be raised longer than 30 minutes with the turbine unit running. If VBSs cannot be cleaned within 1 workday of the head differential reaching 1.5', the turbine unit loading will be lowered to the lower end of the 1% range until the VBS can be cleaned. If the cleaning frequency of VBSs exceeds Project personnel's cleaning capability of approximately 10 VBSs per day, 7 days per week, Project personnel will notify CENWW-OD-T. Then CENWW-OD-T will coordinate with NOAA Fisheries and other FPOM participants regarding an exemption to dipping gatewells prior to cleaning VBSs. An exemption to dipping gatewells prior to cleaning VBSs will be based on fish numbers and TDG levels. If a VBS is found to be damaged during an inspection or cleaning, the VBS panel will be repaired or replaced with a spare panel. The turbine unit will not be operated with a knowingly damaged VBS.

3.2.2.4. Gatewell Orifices. Each gatewell has two orifices with air operated valves to allow fish to exit the gatewell. Under normal operation, one orifice per gatewell (normally the south orifice) is operated. If an air-valve that operates the orifice fails or the orifice becomes blocked with debris or is damaged, it will be closed and the alternate orifice for that gatewell operated until repairs can be made. If both air-valves that operate the orifices fail and the orifice cannot be fully operated, or must be kept closed, the turbine unit will normally be taken out of service until repairs can be made. At the discretion of the Project Biologist, both orifices in a gatewell may be closed for up to 5 hours in an operating turbine unit with ESBSs in place, but orifice closure times may need to be less depending on fish numbers and condition. Reduce turbine unit loading to the lower end of the 1% efficiency range if deemed necessary by the Project Biologist. If both orifices remain closed after 5 hours, the turbine unit will be taken out of service. During any orifice closure, gatewells shall be monitored hourly (unit is operating) or at least every 2 hours (unit is not operating) by project personnel for signs of fish problems or mortality. If repairs are to take longer than 48 hours and both orifices in a gatewell need to remain closed, juvenile fish will be dipped from the gatewell with a gatewell dip basket in accordance with the project dewatering and fish-handling plan. During times of high fish passage or if there is evidence of any difficulty in holding fish in gatewells, fish are to be dipped from the gatewells prior to the 48 hours in accordance with the project dewatering and fish-handling plan.

3.2.2.5. Dewatering Structure. The dewatering structure acts as a transition from the collection channel to the bypass pipe/flume. An inclined screen and a side dewatering screen allow excess water to be bled off, with all fish and remaining water transitioning into the bypass pipe. Some of the excess water is discharged into the adult fish facility auxiliary water supply system and some is used as the water supply for the sampling facilities. The dewatering structure contains trash sweeps and an air-burst system for cleaning the dewatering screens of impinged debris. If a trash sweep breaks and interferes with juvenile fish passage through the structure or if a screen is damaged, an emergency bypass system in the collection channel may be used to bypass juveniles while repairs are made. Operation of the emergency bypass system requires the juvenile bypass system to be dewatered and stoplogs inserted at the upstream end of the dewatering structure. The emergency bypass is then opened and the bypass system operated with one orifice per gatewell open. Spill may also be required to bypass juvenile fish while in emergency bypass operations. Prior to any emergency dewatering of the collection channel, the project will notify CENWW-OD-T. Then CENWW-OD-T will be responsible for notifying NOAA Fisheries and other FPOM

participants of the action and coordinating changes in spill or other project operations. The emergency bypass system is not equipped with PIT-tag detectors.

3.2.2.6. Bypass Outfall Flume. The corrugated metal bypass flume routes juveniles to either the sampling facilities or to the river below the project through the primary bypass pipe. If a problem interferes with the flume's operation, the project can open the emergency bypass system in the collection system and all fish in the bypass system will be diverted into the ice and trash sluiceway and passed to the river through the north powerhouse ice and trash sluiceway exit.

3.2.2.7. Sampling Facilities. The sampling facilities can be operated to collect and hold juvenile fish for research and sampling purposes, enumerate fish through the sampling system, or bypass some or all of the fish back to the river (secondary bypass). If part of the facility malfunctions or is damaged, the switch gate in the bypass flume will be used to bypass fish directly to the river (primary bypass) until repairs can be made.

3.3. Maintenance - Adult Fish Facilities

3.3.1. Scheduled Maintenance. Scheduled maintenance of a facility that must be dewatered to work on or whose maintenance will have a significant effect on fish passage will be done during the January and February winter maintenance period. Maintenance of facilities that will have no effect on fish passage may be conducted at any time. Maintenance is normally conducted on one fish ladder at a time during the winter to always provide some fish passage at the project. When facilities are not being maintained during the winter maintenance period, they will be operated according to normal criteria unless otherwise coordinated with NOAA Fisheries and other FPOM participants.

3.3.2. Unscheduled Maintenance.

3.3.2.1. Notification/Reporting. Unscheduled maintenance that will significantly affect facility operation will be coordinated with NOAA Fisheries and other FPOM participants. Coordination procedures for unscheduled maintenance of adult facilities are the same as for juvenile facilities (**section 3.2.2**). If part of a facility malfunctions or is damaged during fish passage season and the facility can still be operated within criteria without any detrimental effects on fish passage, repairs may not be conducted until winter maintenance period or until fewer numbers of fish are passing the project. If part of a facility is damaged or malfunctions that may significantly impact fish passage, it will be repaired as soon as possible.

3.3.2.2. Fish Ladders & Counting Stations. Fish ladders contain tilting weirs, fixed weirs, counting stations with picket leads, and fish exits with trashracks. If any part of the fish ladder fails or is blocked with debris during fish passage season, efforts will first be made to correct the problem without dewatering the ladder. Trashracks, picket leads, tilting weir mechanisms, and counting stations can sometimes be repaired or maintained without dewatering the ladder. The decision to dewater the ladder and make repairs during the fish passage season or wait until the winter maintenance period will be made after coordination with the fish agencies and tribes.

3.3.2.2.a. Hazardous Materials Spill. 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.

3.3.2.3. North Shore Auxiliary Water Supply System. The auxiliary water for the north shore fish ladder is provided by gravity-flow from the forebay. The water passes either through a turbine unit or through a bypass system. The turbine/bypass system is operated by North Wasco County PUD. During normal operations, when the turbine unit is operating, water passes through conduits 3 and 4 to the turbine unit. From the turbine unit, the water discharges into an open pool where it feeds into ladder diffusers. If there are problems with the turbine unit, automatic valves close and the auxiliary water is diverted through conduits 1 and 3A to the baffled bypass system within the old fish lock, where the hydraulic head is dissipated and the water discharged into the diffuser pool.

3.3.2.4. South Shore Auxiliary Water Supply System. The south shore auxiliary water is made up of a combination of gravity flow from the forebay, pumped water from the tailrace and 450 cfs of water from the juvenile collection channel. The gravity flow supplies the diffusers above weir 253 (diffusers 7 through 14) and the pumps supply diffusers below weir 253 (diffusers 1 through 7 and main unit diffusers). Diffuser 7 is where both systems meet and is supplied by either gravity flow or pumped flow. Gravity flow diffusers are regulated by rotovalves and pumped flow diffusers by sluice gates. Water from the juvenile collection channel enters the south fishway near the north powerhouse entrances.

- i.** If a rotovalve fails, the nearest closed rotovalve will be opened to supply flow. If more rotovalves fail than there are closed valves, the sluice gates in diffusers 3 through 7 will be opened more to provide required flows.
- ii.** If any sluice gates fail, the nearest sluice gates will be opened further to make up the flow.
- iii.** If one pump fails, the other two pumps will be operated to maintain facilities within criteria.
- iv.** If two pumps are expected to be out of service short-term (up to five days), NFE3 will be closed and SFE1, SFE2, NFE2 will be operated as deep as possible while maintaining head differential at 1–2' at both north and south PH entrances.
- v.** If 2 pumps are expected to be out of service 6 days or longer, then the middle 8 of 12 open floating orifices (4, 8, 14, 21, 26, 32, 37, 41) should be closed and monitored before closing main entrances. If extra water is still needed, NFE3 will be closed and SFE1, SFE2, NFE2 will be operated as deep as possible to maintain head differential at 1–2' at both north and south PH entrances.
- vi.** If all three pumps fail and the outage is expected to last five days or less, CENWW-OD-T will be notified and in turn will coordinate with NOAA Fisheries and other FPOM participants.

vii. If all three pumps fail and the outage is expected to last six days or longer, NFE3 and the middle eight of twelve open floating orifices (4, 8, 14, 21, 26, 32, 37, 41) will be closed, and SFE1 and SFE2 operated as deep as possible while maintaining head differential at 1–2' at the south PH entrances. If a depth of 6' on both gates cannot be maintained, SFE1 will be closed as long as the lamprey passage structure is in place at SFE2; if the lamprey structure is not in place, then SFE2 will be closed.

viii. If both pumped auxiliary water supply systems and juvenile collection channel are closed or in emergency bypass (eliminating the 450 cfs contribution from the juvenile system), close north powerhouse entrances and eight of twelve open floating orifices starting at the north end of collection channel, and operate SFE1, SFE2 as deep as possible while maintaining head differential at 1–2' at the south PH entrances. If both gates cannot be maintained at a depth of 6', SFE1 will be closed as long as the lamprey passage structure is in place at SFE2. If the lamprey structure is not in place, close SFE2.

3.3.2.5. Fishway Entrances. Fishway entrances consist of main entrance weirs with hoists and automatic controls, and floating orifices that self-regulate with tailwater fluctuations. If any automatic controls malfunction, the weirs can be operated manually by Project personnel and kept within criteria. If there is a further failure that prevents the entrance from being operated manually, the entrance may be lowered down and left in an operating position or an alternate entrance opened until repairs can be made. If a floating orifice fails, it will be pulled out of the water and replaced with a spare floating orifice.

3.3.2.6. Diffuser Gratings. Diffuser chambers for adding auxiliary water to fish ladders and collection channels are covered by gratings attached by several different methods. Diffuser gratings are normally checked during winter maintenance to ensure they are in place. These inspections are done by both dewatering and physically inspecting the diffuser gratings, or by using underwater video cameras, divers, or other methods. Diffuser gratings may come loose during the fish passage season due to a variety of reasons. Daily inspections of fish ladders and collection systems should include looking for any flow changes that may indicate problems with diffuser gratings. If a diffuser grating is known or suspected to have 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. Coordination of the problems should begin immediately through the established coordination procedure in **section 3.2.2**. If possible, a video inspection should be made as soon as possible to determine extent of the problem. If diffuser gratings are found to be missing or displaced, creating openings into the diffuser chambers, a method of repair shall be developed and coordinated with the fish agencies and tribes through the established coordination procedure. Repairs shall be made as quickly as possible unless otherwise coordinated.

4. TURBINE UNIT OPERATIONS & MAINTENANCE

4.1. Turbine Unit Priority Order

4.1.1. Turbine units will be operated in the order of priority defined in **Table MCN-5** to optimize adult and juvenile fish passage. If a unit is out of service, the next unit in the priority order will be operated. Unit priority order may be coordinated differently for fish research, construction, or project maintenance. Unit operations during warm water events are described in **section 4.2**.

Table MCN-5. McNary Dam Turbine Unit Priority Order.

Dates/Operation	Unit Priority Order
March 1 – November 30 Fish Passage/Bypass Season	1, then 14–2 in descending order ^a
Warm Water Operations ^b (see section 4.2)	U1 available: STOP every other unit starting w/ 2 and move north. = 2, 4, 6, 8, 10, 12, 14, 3, 5, 7, 9, 11, 13, 1 Unit 1 OOS: STOP every other unit starting w/ 3 and move north. = 3, 5, 7, 9, 11, 13, 2, 4, 6, 8, 10, 12, 14
December 1 – End February Winter Maintenance Period	Any Order (if OR ladder is in service, request to operate Unit 1 or 2 if possible)

a. Provides positive downstream flows at the outfall, based on unit availability.

b. Warm Water Operations priority order may be adjusted if needed, as coordinated by the Project Biologist.

4.2. Warm Water Turbine Operations

4.2.1. To minimize thermal stress on juvenile salmonids during warm water conditions, the turbine operations described below will be implemented at the request of the Project Biologist when *any* of the following conditions occur:

- i. Water temperature in the McNary JFF sample tank > 68°F.
- ii. Water temperature elsewhere at the Project (e.g., gatewells) that is likely to induce thermal stress in juvenile salmonids.
- iii. Temperature gradients > 5°F.
- iv. Sample mortality > 3%.
- v. System mortality > 6%.

4.2.2. Operation in Secondary Bypass or Sample Mode. When any of the conditions listed above occur, the Project will begin to shut down units in a staggered order per **Table MCN-5**, stopping every other unit starting at Unit 2 then ascending as necessary to avoid temperature shocks in the juvenile channel (i.e., shutting down units 2, 4, 6, 8, 10, 12, 14). If possible, Unit 1 shall be operated for attraction flow to the two Oregon shore ladder entrances. Project Fisheries will coordinate with CENWW to modify the sequence as necessary to provide equal or better levels of fish protection. Starting and stopping two or more units at a time should be avoided during warm water conditions, if possible, especially during the hours of 1000–2400. The Project and CENWW will coordinate these protocols through FPOM and other entities as necessary. The

purpose of these protocols is to provide precautionary measures to avoid or minimize any direct or delayed mortality resulting from additional thermal stress when handling juvenile salmonids.

4.2.3. Continued Mortality. If juvenile salmonid populations continue to experience high mortality after implementing the above turbine operations, collection for fish condition sampling by smolt monitoring staff should continue for up to 8 hours a day. Except for daily monitoring, the Project shall switch to primary bypass, routing fish past the JFF and through the bypass outfall for the duration of the event.

4.3. Turbine Unit Operating Range

4.3.1. Turbine unit flow and power output at the lower and upper limits of the $\pm 1\%$ peak efficiency range, and at the operating limit, are defined in **Table MCN-6**, except Units 5 and 6 with locked blades are in **Table MCN-6-A**. Turbine units will be operated within these ranges according to *BPA's Load Shaping Guidelines (Appendix C)*, as summarized below.

4.3.2. In-Season: April 10–August 31 (Spring/Summer Spill for Juvenile Fish Passage).

Turbine units will be operated within $\pm 1\%$ of peak turbine efficiency (1% range), except under limited conditions and durations when turbines may be operated above the 1% range for the use of reserves or for TDG management during high flows (refer to **Appendix C** for more information). All required fish passage spill operations will be met prior to operating turbines above the 1% range. If in-season operation outside the 1% range is necessary, Project personnel shall record the information and 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 4.4.7**), 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 to flush fish from the unit.
- iii.** Operate a turbine unit solely to provide station service.
- iv.** Comply with other coordinated fish measures.

4.3.3. Off-Season: September 1–April 9. 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 MCN-6. McNary Dam Turbine Unit Power (MW) and Flow (cfs) at ±1% of Peak Turbine Efficiency (Lower and Upper Limits of 1% Range) and Operating Limits. ^{a, b}

Project Head (feet)	MCN Units 1–14 With ESBS						MCN Units 1–14 No ESBS					
	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
62	35.1	7,886	51.0	11,476	65.7	15,244	33.6	7,415	49.3	10,889	68.8	16,440
63	35.6	7,857	51.8	11,441	66.8	15,183	34.4	7,474	50.6	10,996	70.4	16,488
64	36.2	7,842	52.5	11,397	68.2	15,212	35.2	7,538	51.8	11,085	71.9	16,501
65	36.8	7,847	53.3	11,352	69.8	15,306	36.1	7,595	53.1	11,164	73.6	16,556
66	37.6	7,870	54.0	11,312	71.4	15,392	36.9	7,637	54.3	11,245	75.6	16,740
67	38.4	7,908	54.7	11,264	72.9	15,467	37.6	7,657	55.7	11,350	77.6	16,918
68	39.3	7,947	55.5	11,242	73.5	15,316	38.3	7,667	57.1	11,442	78.2	16,573
69	40.1	7,977	56.6	11,267	74.3	15,214	38.9	7,682	58.5	11,534	78.8	16,258
70	40.7	7,985	57.9	11,352	75.2	15,127	39.7	7,710	59.8	11,616	79.3	15,974
71	41.4	7,987	59.4	11,473	76.0	15,022	40.5	7,745	61.3	11,730	79.8	15,758
72	42.0	7,997	61.0	11,612	76.8	14,892	41.3	7,778	62.9	11,854	80.4	15,583
73	42.8	8,015	62.6	11,740	77.4	14,746	42.0	7,810	64.5	11,976	81.0	15,444
74	43.5	8,031	64.1	11,847	78.0	14,595	42.8	7,846	65.8	12,057	81.7	15,324
75	44.1	8,038	65.4	11,923	78.5	14,454	43.7	7,888	66.9	12,084	82.4	15,212
76	44.4	7,983	66.0	11,868	79.1	14,360	44.1	7,856	67.2	11,969	83.0	15,121
77	44.7	7,930	66.4	11,771	79.7	14,277	44.6	7,832	67.1	11,777	83.7	15,028
78	45.0	7,884	66.4	11,632	80.3	14,203	45.2	7,812	66.7	11,536	84.3	14,930
79	45.4	7,847	66.5	11,487	81.0	14,139	45.7	7,789	66.4	11,324	84.7	14,791
80	45.8	7,814	66.8	11,392	81.7	14,081	46.1	7,762	66.7	11,215	84.7	14,583
81	46.2	7,785	67.0	11,286	82.3	14,022	46.5	7,730	67.3	11,172	84.7	14,383
82	46.6	7,753	67.4	11,223	82.9	13,957	46.9	7,697	68.0	11,155	84.7	14,191
83	47.0	7,726	67.6	11,121	83.4	13,876	47.3	7,669	68.7	11,123	84.7	14,002
84	47.4	7,703	68.1	11,065	83.7	13,777	47.7	7,641	69.3	11,097	84.7	13,819
85	47.9	7,691	68.4	10,989	84.0	13,657	48.2	7,619	69.8	11,044	84.7	13,641
86	48.4	7,684	68.9	10,939	84.1	13,519	48.6	7,601	70.4	10,994	84.7	13,467
87	48.9	7,677	69.4	10,899	84.1	13,365	49.0	7,569	70.8	10,931	84.7	13,300

- a. Values provided by HDC based on the 1950 Model Test, 2023 "With Screens" Index Test on Unit 9, and 2024 "No Screens" Index Test on Unit 14 (FPP updated Nov 2024). Flow (cfs) was calculated based on turbine efficiency, project head, and power output (MW). "Operating Limit" is the maximum safe operating point based on cavitation or generator limit (added Feb 2018).
- b. Units 5 and 6 have hydraulically locked blades and restricted operating ranges defined below in **Table MCN-6-A**.

Table MCN-6-A. Temporary Operating Range for McNary Units 5 and 6 with Locked Blades.

Project Head (feet)	MCN Unit 5 (Blades Locked at 22.0°) – With ESBS						MCN Unit 5 (Blades Locked at 22.0°) – No ESBS					
	Lower Limit		Peak Efficiency		Upper Limit		Lower Limit		Peak Efficiency		Upper Limit	
	MW	cfs	MW	cfs	MW	cfs	MW	cfs	MW	cfs	MW	cfs
62	44.9	10,245	46.7	10,585	48.6	11,084	45.8	10,236	47.6	10,570	49.5	11,059
63	45.7	10,239	47.6	10,610	49.7	11,143	46.6	10,230	48.5	10,595	50.6	11,117
64	46.4	10,232	48.5	10,633	50.8	11,198	47.3	10,224	49.4	10,618	51.7	11,173
65	47.2	10,226	49.4	10,656	51.9	11,252	48.1	10,217	50.3	10,641	52.8	11,227
66	48.0	10,228	50.3	10,654	52.8	11,247	48.9	10,220	51.2	10,640	53.7	11,222
67	48.8	10,229	51.1	10,652	53.6	11,240	49.7	10,222	52.1	10,638	54.6	11,216
68	49.6	10,230	52.0	10,650	54.5	11,234	50.6	10,223	52.9	10,636	55.5	11,210
69	50.5	10,230	52.8	10,647	55.4	11,227	51.4	10,224	53.8	10,633	56.4	11,204
70	51.3	10,230	53.7	10,643	56.2	11,220	52.3	10,224	54.7	10,630	57.2	11,197
71	52.3	10,275	54.7	10,673	57.2	11,233	53.3	10,269	55.7	10,660	58.2	11,210
72	53.4	10,319	55.7	10,701	58.2	11,245	54.4	10,313	56.7	10,689	59.2	11,223
73	54.4	10,360	56.7	10,728	59.1	11,256	55.5	10,355	57.7	10,716	60.2	11,234
74	55.5	10,400	57.7	10,754	60.1	11,266	56.5	10,395	58.8	10,742	61.2	11,245
75	56.5	10,438	58.7	10,778	61.0	11,276	57.6	10,433	59.8	10,767	62.1	11,255
76	57.4	10,459	59.7	10,810	62.1	11,320	58.5	10,454	60.8	10,799	63.2	11,299
77	58.3	10,479	60.7	10,841	63.2	11,363	59.4	10,475	61.8	10,830	64.4	11,342
78	59.2	10,499	61.6	10,871	64.3	11,405	60.3	10,494	62.8	10,860	65.5	11,384
79	60.1	10,518	62.6	10,900	65.4	11,446	61.3	10,513	63.8	10,889	66.6	11,425
80	61.0	10,536	63.6	10,928	66.5	11,485	62.2	10,531	64.8	10,917	67.7	11,464
81	61.9	10,558	64.5	10,944	67.4	11,495	63.1	10,553	65.7	10,933	68.6	11,474
82	62.8	10,579	65.4	10,960	68.3	11,504	64.0	10,575	66.6	10,949	69.5	11,483
83	63.7	10,600	66.3	10,975	69.2	11,513	64.9	10,596	67.6	10,964	70.4	11,492
84	64.6	10,620	67.2	10,990	70.1	11,522	65.9	10,616	68.5	10,979	71.3	11,501
85	65.5	10,640	68.1	11,004	71.0	11,531	66.8	10,635	69.4	10,993	72.3	11,510
86	66.5	10,679	69.1	11,027	71.9	11,537	67.8	10,675	70.4	11,028	73.3	11,541
87	67.5	10,718	70.0	11,050	72.7	11,543	68.8	10,714	71.5	11,063	74.3	11,571
	MCN Unit 6 (Blades Locked at 22.5°) – With ESBS						MCN Unit 6 (Blades Locked at 22.5°) – No ESBS					
62	46.8	10,665	49.1	11,130	49.8	11,345	47.6	10,648	49.9	11,078	50.5	11,289
63	47.5	10,659	50.1	11,175	50.9	11,405	48.4	10,641	50.9	11,122	51.6	11,348
64	48.3	10,652	51.2	11,218	52.0	11,462	49.2	10,635	52.0	11,165	52.8	11,405
65	49.1	10,645	52.2	11,259	53.1	11,517	50.0	10,628	53.0	11,205	53.9	11,460
66	49.9	10,647	53.1	11,255	54.0	11,511	50.9	10,631	53.9	11,202	54.8	11,455
67	50.8	10,649	54.0	11,251	54.9	11,505	51.7	10,633	54.8	11,198	55.7	11,449
68	51.7	10,650	54.9	11,246	55.8	11,498	52.6	10,634	55.7	11,194	56.6	11,443
69	52.5	10,650	55.8	11,241	56.7	11,491	53.5	10,635	56.6	11,189	57.5	11,436
70	53.4	10,650	56.6	11,235	57.6	11,484	54.4	10,635	57.5	11,184	58.4	11,429
71	54.5	10,697	57.6	11,256	58.5	11,497	55.5	10,682	58.5	11,205	59.4	11,443
72	55.6	10,742	58.7	11,275	59.5	11,509	56.6	10,728	59.6	11,225	60.4	11,455
73	56.6	10,785	59.7	11,294	60.5	11,521	57.7	10,771	60.6	11,244	61.4	11,467
74	57.7	10,827	60.7	11,311	61.5	11,531	58.8	10,813	61.6	11,262	62.4	11,478

75	58.8	10,866	61.7	11,328	62.5	11,541	59.9	10,853	62.6	11,279	63.4	11,488
76	59.8	10,888	62.8	11,368	63.6	11,587	60.9	10,875	63.7	11,319	64.6	11,534
77	60.7	10,909	63.8	11,407	64.7	11,631	61.8	10,896	64.8	11,357	65.7	11,578
78	61.6	10,929	64.9	11,444	65.8	11,674	62.8	10,916	65.9	11,395	66.8	11,620
79	62.6	10,949	66.0	11,481	66.9	11,715	63.7	10,936	67.0	11,431	67.9	11,662
80	63.5	10,968	67.0	11,516	68.0	11,755	64.7	10,955	68.1	11,466	69.1	11,702
81	64.4	10,991	68.0	11,529	69.0	11,765	65.6	10,978	69.0	11,479	70.0	11,712
82	65.4	11,013	68.9	11,541	69.9	11,775	66.6	11,000	70.0	11,492	71.0	11,721
83	66.3	11,035	69.8	11,553	70.8	11,784	67.5	11,022	70.9	11,504	71.9	11,731
84	67.3	11,056	70.8	11,565	71.7	11,793	68.5	11,043	71.8	11,515	72.8	11,740
85	68.2	11,076	71.7	11,576	72.7	11,802	69.5	11,063	72.8	11,527	73.8	11,749
86	69.2	11,117	72.6	11,590	73.5	11,808	70.5	11,104	73.7	11,541	74.7	11,755
87	70.3	11,158	73.5	11,604	74.4	11,815	71.6	11,145	74.7	11,555	75.6	11,761

- a. Units 5 and 6 have hydraulically locked (non-adjustable) runner blades to prevent oil leaks and are restricted to a smaller operating range until the blade seals are repaired. Values provided by HDC based on the abbreviated index test of Unit 5 (Aug 2021) and Unit 6 (Jan 2019).

4.4. Turbine Unit Maintenance

4.4.1. Turbine unit maintenance schedules will be reviewed annually by Project and District Operations biologists for fish impacts. If maintenance requires operating outside of FPP criteria, the work will be coordinated with FPOM per the procedures defined in **FPP Chapter 1–Overview** (section 2.3).

4.4.2. Priority unit maintenance will be scheduled for the winter maintenance period or when there are few fish passing the project, to the extent possible. Impacts to migrating adults should be minimized. When possible, units used for temperature operations should remain available.

4.4.3. Each unit requires annual maintenance that may take several days up to two weeks and is normally scheduled from mid-July through late December. Annual maintenance of priority units for adult passage is normally conducted in November-December but can be completed in mid-August.

4.4.4. Turbine units may occasionally require overhauls to repair major problems with the turbine or generator. Overhauls may take over one year to accomplish.

4.4.5. Turbines, governors, exciters, and control systems require periodic maintenance, calibration, and testing which may take them outside of the 1% range. This work will be scheduled in compliance with the *BPA Load Shaping Guidelines (Appendix C)* to minimize impacts on juvenile fish.

4.4.6. **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 project is operating at minimum generation requirements. 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.

4.4.6.1. Pre-Maintenance: Units may be operationally tested for up to 30 minutes prior to going into maintenance status by running at speed-no-load and various loads within the 1% range for measurements and testing and to allow all fish to move through the unit.

4.4.6.2. Post-Maintenance: Units may be operationally tested while remaining in maintenance or forced outage status by running the unit for up to a cumulative time of 30 minutes (within 1% range) before returning to operational status.

4.4.7. **Dewatering.** Dewatering turbine units should be accomplished in accordance with project dewatering plans. If the turbine unit draft tube is to be dewatered, operate unit with full load for a minimum of 15 minutes prior to installing tail logs. If not possible to load, run unit at speed-no-load for minimum of 15 minutes. This is to reduce the number of fish in the scrollcase prior to installing stop logs. If a turbine unit is out of service for maintenance for an extended period without tailrace stoplogs in place, efforts should be made to not open the wicket gates if the scroll case must be dewatered at a later date without the unit being spun beforehand.

4.4.8. **Head Gates (also referred to as Operating Gates).** Head gates will normally remain in standard operating position except as required for maintenance.

5. FOREBAY DEBRIS REMOVAL

5.1.1. Debris at projects can adversely impact fish passage conditions by plugging or blocking trashracks, VBSs, gatewell orifices, dewatering screens, separators, and facility piping resulting in impingement, injuries, and descaling. Removing debris at its source in the forebay is sometimes necessary to maintain safe and efficient fish passage conditions, navigation, and other project activities. The preferred option is to remove debris at each project when possible to avoid passing debris on to the next project downstream. Debris can be removed from the forebay by:

- i. Using a boat to encircle debris with a log boom and pull it to the spillway where operators can spill it or to the shore to be removed by crane.
- ii. Removing the debris from the top of the dam using a crane and scoop.
- iii. Passing debris via the spillway with special turbine and/or spill operations.
- iv. Using a boom, spreader bar or other device, suspended from a crane, to move the debris to the spillway, in coordination with special powerhouse and spill operations (if needed).

5.1.2. Debris Spill. If the Project does not have forebay debris removal capability, the only viable alternative is to pass the debris via spill. Except in an emergency, the Project shall contact CENWW-OD-T and the John Day Dam Control Room and Fishery Biologist at least one workday in advance of debris spill operations. CENWW-OD-T will notify FPOM and the special operation will be detailed in a teletype issued by RCC. In an emergency operation, notification may be provided as described below.

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

5.1.4. Emergency Spills. Implement as necessary to pass woody debris that is accumulating in the forebay and compromising the safe, unobstructed passage of fish. The operating project will immediately spill the woody debris to remove obstructions to fish passage. The operating project will notify CENWW-OD-T of the emergency spill as soon as possible to notify RCC, NOAA Fisheries, and other FPOM participants.

Table MCN-7. Original (Pre-2021) McNary Dam Spill Patterns for Fish Passage with TSWs in Bays 19-20.
INCLUDED FOR REFERENCE ONLY. NOT FOR USE UNTIL SPILLWAY REPAIRS ARE COMPLETE.

Table MCN-7. Spill Patterns with TSWs (# Gate Stops per Spillbay) – <i>NOT FOR USE UNTIL SPILLWAY REPAIRS ARE COMPLETE</i>																					Total Stops (#)	Spill ^a (kcfs)		
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19 ^c	20 ^c	21	22 ^b			
																		TSW	TSW	1		1	21.2	
																	1	TSW	TSW	1		2	23.2	
																	1	TSW	TSW	1	1	3	25.2	
																	1	TSW	TSW	2	1	4	27.1	
																	2	TSW	TSW	2	1	5	29.0	
																1	2	TSW	TSW	2	1	6	31.0	
																2	2	TSW	TSW	2	1	7	32.9	
															1		2	2	TSW	TSW	2	1	8	34.9
															1		2	2	TSW	TSW	2	2	9	36.8
															2		2	2	TSW	TSW	2	2	10	38.7
															2	1	2	2	TSW	TSW	2	2	11	40.7
															2	2	2	2	TSW	TSW	2	2	12	42.6
																1	2	2	2	2	2	2	13	44.6
																2	2	2	2	2	2	2	14	46.5
											1		2			2	2	2	2	2	2	2	15	48.5
											2		2			2	2	2	2	2	2	2	16	50.4
											1		2			2	2	2	2	2	2	2	17	52.4
											2		2			2	2	2	2	2	2	2	18	54.3
											2	1	2			2	2	2	2	2	2	2	19	56.3
											2	2	2			2	2	2	2	2	2	2	20	58.2
											2	2	2			2	1	2	2	2	2	2	21	60.2
											2	2	2			2	2	2	2	2	2	2	22	62.1
											2	2	2			2	2	2	2	2	2	2	23	64.1
											2	2	2			2	2	2	2	2	2	2	24	66.0
											1		2			2	2	2	2	2	2	2	25	68.0
											2		2			2	2	2	2	2	2	2	26	69.9
											1		2			2	2	2	2	2	2	2	27	71.9
											2		2			2	2	2	2	2	2	2	28	73.8
2.5	2	3.5									2		1	2		2	2	TSW	TSW	2	2	29	75.3	
2.5	2	3.5									2		1	2	1	2	2	TSW	TSW	2	2	30	77.3	
2.5	2	3.5									2		1	2	1	2	2	TSW	TSW	2	2	31	79.3	
2.5	2	3.5									2		1	2	1	2	2	TSW	TSW	2	2	32	81.3	
2.5	2	3.5									2		1	2	1	2	2	TSW	TSW	2	2	33	83.3	
2.5	2	3.5									1		2	1	2	1	2	2	TSW	TSW	2	2	34	85.3
2.5	2	3.5	1								2		1	2	1	2	2	TSW	TSW	2	2	35	87.3	
2.5	2	3.5	1	2							1		2	1	2	1	2	2	TSW	TSW	2.5	2.5	36	89.0
2.5	2	3.5	1	2	1						2		2	2	1	2	2	TSW	TSW	2.5	2.5	37	90.9	
2.5	2	3.5	1	2	1	2					1		2	2	2	2	2	TSW	TSW	2.5	2.5	38	92.8	

Table MCN-7. Spill Patterns with TSWs (# Gate Stops per Spillbay) – <i>NOT FOR USE UNTIL SPILLWAY REPAIRS ARE COMPLETE</i>																						Total Stops (#)	Spill ^a (kcfs)
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19 ^c	20 ^c	21	22 ^b		
2.5	2	3.5	1	2	2	2	1	2	1	2	1	2	2	2	2	2	2	TSW	TSW	2.5	2.5	39	94.7
2.5	2	3.5	1	2	2	2	1	2	2	2	1	2	2	2	2	2	2	TSW	TSW	2.5	2.5	40	96.6
2.5	2	3.5	1	2	2	2	1	2	2	2	2	2	2	2	2	2	2	TSW	TSW	2.5	2.5	41	98.5
2.5	2	3.5	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	TSW	TSW	2.5	2.5	42	100.4
2.5	2	3.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	TSW	TSW	2.5	2.5	43	102.3
2.5	2.5	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	TSW	TSW	2.5	2.5	44	103.9
2.5	2.5	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	TSW	TSW	3.5	2.5	45	105.6
2.5	2.5	4	2	2	2	2	2	2	2	2	2	2	2	2	2.5	2.5	3	TSW	TSW	2.5	2.5	46	107.3
2.5	2.5	4	2	2	2	2.5	2	2	2	2.5	2	2	2	2	2.5	2.5	3	TSW	TSW	2.5	2.5	47	109.0
2.5	2.5	4	2	2.5	2	2.5	2	2	2	2.5	2	2	2	2.5	2.5	2.5	3	TSW	TSW	2.5	2.5	48	110.7
2.5	2.5	4	2	2.5	2	2.5	2	2.5	2	2.5	2	2.5	2	2.5	2.5	2.5	3	TSW	TSW	2.5	2.5	49	112.4
2.5	2.5	4	2	2.5	2.5	2.5	2	2.5	2.5	2.5	2	2.5	2	2.5	2.5	2.5	3	TSW	TSW	2.5	2.5	50	114.1
2.5	2.5	4	2	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2	2.5	2.5	2.5	3	TSW	TSW	2.5	2.5	51	115.8
2.5	2.5	4	3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	TSW	TSW	2.5	2.5	52	117.5
2.5	2.5	4	3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	TSW	TSW	3	2.5	53	119.2
2.5	2.5	4	3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3	TSW	TSW	3	2.5	54	120.9
2.5	2.5	4.5	3	2.5	2.5	2.5	2.5	2.5	2.5	3	2.5	2.5	2.5	2.5	3	3	3	TSW	TSW	3	2.5	55	122.6
2.5	2.5	4.5	3	2.5	2.5	3	2.5	2.5	2.5	3	2.5	3	2.5	2.5	3	3	3	TSW	TSW	3	2.5	56	124.3
2.5	2.5	4.5	3	3	2.5	3	2.5	3	2.5	3	2.5	3	2.5	2.5	3	3	3	TSW	TSW	3	2.5	57	126.0
2.5	2.5	4.5	3	3	3	3	2.5	3	2.5	3	2.5	3	2.5	3	3	3	3	TSW	TSW	3	2.5	58	127.7
2.5	2.5	5	3	3	3	3	2.5	3	3	3	2.5	3	2.5	3	3	3	3	TSW	TSW	3	2.5	59	129.3
2.5	2.5	5	3	3	3	3	3	3	3	3	3	3	2.5	3	3	3	3	TSW	TSW	3	2.5	60	131.0
3	3	5	3	3	3	3	3	3	3	3	3	3	2.5	3	3	3	3	TSW	TSW	3	2.5	61	132.7
3	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	TSW	TSW	3	3	62	134.4
3	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	TSW	TSW	3	3	63	136.0
3	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	TSW	TSW	3	3	64	137.6
3	4	5	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	TSW	TSW	3	3	65	139.2
4	4	5	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	TSW	TSW	3	3	66	140.8
4	4	5	3	3	3	4	3	3	3	3	3	3	3	3	3	4	4	TSW	TSW	3	3	67	142.4
4	4	5	3	3	3	4	3	3	3	4	3	3	3	3	3	4	4	TSW	TSW	3	3	68	144.0
4	4	5	3	4	3	4	3	3	3	4	3	3	3	3	3	4	4	TSW	TSW	3	3	69	145.6
4	4	5	3	4	3	4	3	3	3	4	3	3	3	3	4	4	4	TSW	TSW	3	3	70	147.2
4	4	5	3	4	3	4	3	4	3	4	3	3	3	3	4	4	4	TSW	TSW	3	3	71	148.8
4	4	5	3	4	3	4	3	4	3	4	3	4	3	4	3	4	4	TSW	TSW	3	3	72	150.4
4	4	5	3	4	4	4	3	4	4	4	3	4	3	4	3	4	4	TSW	TSW	3	3	73	152.0
4	4	5	3	4	4	4	3	4	4	4	3	4	3	4	3	4	4	TSW	TSW	3	3	74	153.6
4	4	5	3	4	4	4	3	4	4	4	4	4	3	4	3	4	4	TSW	TSW	3	3	75	155.2
4	4	5	3	4	4	4	4	4	4	4	4	4	3	4	3	4	4	TSW	TSW	3	3	76	156.8
4	4	5	3	4	4	4	4	4	4	4	4	4	3	4	4	4	4	TSW	TSW	3	3	77	158.4
4	4	5	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4	TSW	TSW	3	3	78	160.0
4	4	5	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4	TSW	TSW	4	3	79	161.6

Table MCN-7. Spill Patterns with TSWs (# Gate Stops per Spillbay) – <i>NOT FOR USE UNTIL SPILLWAY REPAIRS ARE COMPLETE</i>																					Total Stops (#)	Spill ^a (kcfs)	
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19 ^c	20 ^c	21	22 ^b		
4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	TSW	TSW	4	3	80	163.2
4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5	TSW	TSW	4	3	81	164.8
4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5	TSW	TSW	4	3	82	166.4
4	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5	TSW	TSW	4	3	83	168.0
5	5	5	4	4	4	4	5	4	4	4	4	4	4	4	4	5	5	TSW	TSW	4	3	84	169.6
5	5	5	4	4	4	5	4	4	4	5	4	4	4	4	4	5	5	TSW	TSW	4	3	85	171.2
5	5	5	4	5	4	5	4	4	4	5	4	4	4	4	4	5	5	TSW	TSW	4	3	86	172.8
5	5	5	4	5	4	5	4	4	4	5	4	4	4	4	4	5	5	TSW	TSW	4	3	87	174.4
5	5	5	4	5	4	5	4	4	4	5	4	4	4	5	4	5	5	TSW	TSW	4	3	88	176.0
5	5	5	4	5	4	5	4	5	4	5	4	4	4	5	4	5	5	TSW	TSW	4	3	89	177.6
5	5	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	5	TSW	TSW	4	3	90	179.2
5	5	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	5	TSW	TSW	5	3	91	180.8
5	5	5	4	5	5	5	4	5	4	5	4	5	4	5	4	5	5	TSW	TSW	5	3	92	182.4
5	5	5	4	5	5	5	4	5	5	5	5	5	4	5	4	5	5	TSW	TSW	5	3	93	184.0
5	5	5	4	5	5	5	4	5	5	5	5	5	4	5	4	5	5	TSW	TSW	5	3	94	185.6
5	5	5	4	5	5	5	5	5	5	5	5	5	4	5	4	5	5	TSW	TSW	5	3	95	187.2
5	5	5	4	5	5	5	5	5	5	5	5	5	4	5	5	5	5	TSW	TSW	5	3	96	188.8
5	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	TSW	TSW	5	3	97	190.4
5	5	6	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	TSW	TSW	5	3	98	192.0
5	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	TSW	TSW	5	3	99	193.6
5	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6	TSW	TSW	5	3	100	195.2
5	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5	6	6	TSW	TSW	5	3	101	196.8
5	5	6	5	5	5	5	5	5	5	5	5	5	5	6	5	6	6	TSW	TSW	5	3	102	198.4
5	5	6	5	5	5	5	5	5	5	5	5	6	5	6	5	6	6	TSW	TSW	5	3	103	200.0
5	5	6	5	5	5	5	5	5	5	5	5	6	5	6	6	6	6	TSW	TSW	5	3	104	201.6
5	5	6	6	5	5	5	5	5	5	5	5	6	5	6	6	6	6	TSW	TSW	6	3	105	203.2
5	5	6	6	5	5	5	5	5	5	5	5	6	5	6	6	6	6	TSW	TSW	6	3	106	204.8
5	5	6	6	5	5	5	5	5	5	5	6	6	5	6	6	6	6	TSW	TSW	6	3	107	206.4
5	5	6	6	5	5	5	5	5	5	5	5	6	6	6	6	6	6	TSW	TSW	6	4	108	208.0
5	5	6	6	6	5	5	5	5	5	5	6	6	6	6	6	6	6	TSW	TSW	6	4	110	211.2
5	5	6	6	6	6	5	6	5	5	6	6	6	6	6	6	6	6	TSW	TSW	6	4	112	214.4
5	5	6	6	6	6	6	6	5	6	5	6	6	6	6	6	6	6	TSW	TSW	6	4	114	217.6
5	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	TSW	TSW	6	4	116	220.8
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	TSW	TSW	6	4	118	224.0
6	6	6	6	6	6	6	6	6	6	7	6	7	6	7	6	7	6	TSW	TSW	6	4	122	230.4
6	6	6	6	6	6	7	6	7	6	7	6	7	6	7	6	7	6	TSW	TSW	6	4	124	233.6
6	6	7	6	7	6	7	6	7	6	7	6	7	6	7	6	7	6	TSW	TSW	6	4	126	236.8
7	6	7	6	7	6	7	6	7	6	7	6	7	6	7	6	7	7	TSW	TSW	6	4	128	240.0
7	6	7	6	7	6	7	6	7	6	7	6	7	7	7	7	7	7	TSW	TSW	6	4	130	243.2
7	6	7	6	7	6	7	6	7	7	7	7	7	7	7	7	7	7	TSW	TSW	6	4	132	246.4
7	6	7	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	TSW	TSW	6	4	134	249.6

Table MCN-7. Spill Patterns with TSWs (# Gate Stops per Spillbay) – <i>NOT FOR USE UNTIL SPILLWAY REPAIRS ARE COMPLETE</i>																					Total Stops (#)	Spill ^a (kcfs)	
1 ^b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19 ^c	20 ^c	21	22 ^b		
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	TSW	TSW	6	4	136	252.8
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	TSW	TSW	6	6	138	256.0
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	TSW	TSW	7	7	140	259.2
8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	TSW	TSW	7	8	142	262.6
8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	TSW	TSW	8	8	144	266.0
8	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	TSW	TSW	8	8	145	267.7
8	8	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	TSW	TSW	8	8	146	269.4
8	8	8	8	8	7	7	7	7	7	7	7	7	7	7	7	7	8	TSW	TSW	8	8	148	272.8
8	8	8	8	8	8	7	7	7	7	7	7	7	7	7	7	8	8	TSW	TSW	8	8	150	276.2
8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	8	8	8	TSW	TSW	8	8	152	279.6
8	8	8	8	8	8	8	8	8	7	7	7	7	7	8	8	8	8	TSW	TSW	8	8	154	283.0
8	8	8	8	8	8	8	8	8	8	7	7	7	8	8	8	8	8	TSW	TSW	8	8	156	286.4
8	8	8	8	8	8	8	8	8	8	8	7	7	8	8	8	8	8	TSW	TSW	8	8	158	289.8
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	TSW	TSW	8	8	160	293.2
9	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	TSW	TSW	8	9	162	296.4
9	9	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	TSW	TSW	9	9	164	299.6
9	9	9	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	TSW	TSW	9	9	165	301.2
9	9	9	9	8	8	8	8	8	8	8	8	8	8	8	8	8	8	TSW	TSW	9	9	166	302.8
9	9	9	9	9	8	8	8	8	8	8	8	8	8	8	8	8	9	TSW	TSW	9	9	168	306.0
9	9	9	9	9	9	8	8	8	8	8	8	8	8	8	8	9	9	TSW	TSW	9	9	170	309.2
9	9	9	9	9	9	9	8	8	8	8	8	8	8	8	9	9	9	TSW	TSW	9	9	172	312.4
9	9	9	9	9	9	9	9	8	8	8	8	8	8	9	9	9	9	TSW	TSW	9	9	174	315.6
9	9	9	9	9	9	9	9	9	8	8	8	8	9	9	9	9	9	TSW	TSW	9	9	176	318.8
9	9	9	9	9	9	9	9	9	9	8	8	9	9	9	9	9	9	TSW	TSW	9	9	178	322.0
9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	TSW	TSW	9	9	180	325.2
10	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	TSW	TSW	9	10	182	328.4
10	10	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	TSW	TSW	10	10	184	331.6

- a. Spill (kcfs) is calculated as a function of the total number of gate tops + TSW spill at forebay elevation 339 ft.
- b. Bays 19-20 with TSWs spill approx 19.2 kcfs (9.6 kcfs/bay) at fb el 339'. The upper TSW gates will be raised 3-5 ft above the water surface to ensure free flow over the TSW crests.

Table MCN-8. INTERIM McNary Dam Spill Patterns with TSWs in Bays 19-20 and 13 Bays in Split-Leaf in Upstream Slot. ^a

Table MCN-8. Interim Patterns w/ 13 Gates in Split-Leaf in Upstream Slot (# Gate Stops per Spillbay)																						Total Stops (#)	Spill (kcf)	
1	2	3	4	5	6 ^a	7	8	9 ^a	10	11	12	13	14	15	16	17	18	19 ^b	20 ^b	21	22			
																		TSW	TSW			0	20.0	
																	4		TSW	TSW			4	25.0
																	5		TSW	TSW			5	26.0
																	5		TSW	TSW	4		9	31.0
																	5		TSW	TSW	5		10	32.0
																	5		TSW	TSW	5	4	14	37.0
																	5		TSW	TSW	5	5	15	38.0
													4				5		TSW	TSW	5	5	19	43.0
													5				5		TSW	TSW	5	5	20	44.0
													5				6		TSW	TSW	5	5	21	45.0
													5				7		TSW	TSW	5	5	22	46.0
											4		5				7		TSW	TSW	5	5	26	51.0
											5		5				7		TSW	TSW	5	5	27	52.0
											5		6				7		TSW	TSW	5	5	28	53.0
											5		7				7		TSW	TSW	5	5	29	54.0
										4			5				7		TSW	TSW	5	5	33	59.0
										5			5				7		TSW	TSW	5	5	34	60.0
										5			6				7		TSW	TSW	5	5	35	61.0
										5			7				7		TSW	TSW	5	5	36	62.0
			4							5			7				7		TSW	TSW	5	5	40	67.0
			5							5			7				7		TSW	TSW	5	5	41	68.0
			5							6			7				7		TSW	TSW	5	5	42	69.0
			5							7			7				7		TSW	TSW	5	5	43	70.0
			6							7			7				7		TSW	TSW	5	5	44	71.0
			7							7			7				7		TSW	TSW	5	5	45	72.0
			7		4					7			7				7		TSW	TSW	5	5	49	77.0
			7		5					7			7				7		TSW	TSW	5	5	50	78.0
			8		5					7			7				7		TSW	TSW	5	5	51	79.0
			9		5					7			7				7		TSW	TSW	5	5	52	79.9

^a A total of 13 spill gates will be operated in the upstream slot in split-leaf configuration, 11 of which are on hoists and may be adjusted hourly as needed to adjust spill. Gates 6 and 9 are on a crane and will be adjusted at least once per week. The remaining 7 spillbays (1, 2, 3, 5, 8, 15, and 18) are double-leaf gates in the downstream slot and will remain closed unless needed to pass high flows using the first of two overloaded movements allowed each year (12 months). After the high flow event, open double-leaf gates will be closed using the second of two allowed overloaded movements.

^b Bays 19-20 with TSWs spill approx 19.2 kcf (9.6 kcf/bay) at forebay 339'. The upper TSW gates will be raised 3-5 ft above the water surface to ensure free flow over the TSW crests.

Table MCN-8. Interim Patterns w/ 13 Gates in Split-Leaf in Upstream Slot (# Gate Stops per Spillbay)																						Total Stops (#)	Spill (kcfs)
1	2	3	4	5	6 ^a	7	8	9 ^a	10	11	12	13	14	15	16	17	18	19 ^b	20 ^b	21	22		
			10		5				7		7		7			7		TSW	TSW	5	5	53	80.8
			10		6				7		7		7			7		TSW	TSW	5	5	54	81.8
			10		7				7		7		7			7		TSW	TSW	5	5	55	82.8
			10		8				7		7		7			7		TSW	TSW	5	5	56	83.8
			10		9				7		7		7			7		TSW	TSW	5	5	57	84.7
			10		10				7		7		7			7		TSW	TSW	5	5	58	85.6
			10		10			4	7		7		7			7		TSW	TSW	5	5	62	90.6
			10		10			5	7		7		7			7		TSW	TSW	5	5	63	91.6
			10		10			6	7		7		7			7		TSW	TSW	5	5	64	92.6
			10		10			7	7		7		7			7		TSW	TSW	5	5	65	93.6
			10		10	4		7	7		7		7			7		TSW	TSW	5	5	69	98.6
			10		10	5		7	7		7		7			7		TSW	TSW	5	5	70	99.6
			10		10	6		7	7		7		7			7		TSW	TSW	5	5	71	100.6
			10		10	7		7	7		7		7			7		TSW	TSW	5	5	72	101.6
			10		10	7		7	7		7		7		4	7		TSW	TSW	5	5	76	106.6
			10		10	7		7	7		7		7		5	7		TSW	TSW	5	5	77	107.6
			10		10	7		7	7		7		7		6	7		TSW	TSW	5	5	78	108.6
			10		10	7		7	7		7		7		7	7		TSW	TSW	5	5	79	109.6
			10		10	7		7	7		7	4	7		7	7		TSW	TSW	5	5	83	114.6
			10		10	7		7	7		7	5	7		7	7		TSW	TSW	5	5	84	115.6
			10		10	7		7	7		7	6	7		7	7		TSW	TSW	5	5	85	116.6
			10		10	7		7	7		7	7	7		7	7		TSW	TSW	5	5	86	117.6
			10		10	7		7	7	4	7	7	7		7	7		TSW	TSW	5	5	90	122.6
			10		10	7		7	7	5	7	7	7		7	7		TSW	TSW	5	5	91	123.6
			10		10	7		7	7	6	7	7	7		7	7		TSW	TSW	5	5	92	124.6
			10		10	7		7	7	7	7	7	7		7	7		TSW	TSW	5	5	93	125.6
			10		10	8		7	7	7	7	7	7		7	7		TSW	TSW	5	5	94	126.6
			10		10	9		7	7	7	7	7	7		7	7		TSW	TSW	5	5	95	127.5
			10		10	10		7	7	7	7	7	7		7	7		TSW	TSW	5	5	96	128.4
			10		10	10		7	7	7	7	7	7		7	7		TSW	TSW	6	5	97	129.4
			10		10	10		7	7	7	7	7	7		7	7		TSW	TSW	7	5	98	130.4
			10		10	10		7	7	7	7	7	7		7	7		TSW	TSW	7	6	99	131.4
			10		10	10		7	7	7	7	7	7		7	7		TSW	TSW	7	7	100	132.4
			11		10	10		7	7	7	7	7	7		7	7		TSW	TSW	7	7	101	133.3
			11		11	10		7	7	7	7	7	7		7	7		TSW	TSW	7	7	102	134.2
			11		11	11		7	7	7	7	7	7		7	7		TSW	TSW	7	7	103	135.1
			11		11	11		7	7	7	7	7	7		7	8		TSW	TSW	7	7	104	136.1
			11		11	11		7	7	7	7	7	7		8	8		TSW	TSW	7	7	105	137.1
			11		11	11		8	7	7	7	7	7		8	8		TSW	TSW	7	7	106	138.1
			11		11	11		8	8	7	7	7	8		8	8		TSW	TSW	7	7	108	140.1
			11		11	11		8	8	7	7	8	8		8	8		TSW	TSW	7	7	109	141.1

Table MCN-8. Interim Patterns w/ 13 Gates in Split-Leaf in Upstream Slot (# Gate Stops per Spillbay)																						Total Stops (#)	Spill (kcfs)
1	2	3	4	5	6 ^a	7	8	9 ^a	10	11	12	13	14	15	16	17	18	19 ^b	20 ^b	21	22		
			11		11	11		8	8	8	7	8	8		8	8		TSW	TSW	7	7	110	142.1
			11		11	11		8	8	8	8	8	8		8	8		TSW	TSW	7	7	111	143.1
			11		11	11		8	8	8	8	8	8		8	8		TSW	TSW	8	7	112	144.1
			11		11	11		8	8	8	8	8	8		8	8		TSW	TSW	8	8	113	145.1
			12		11	11		8	8	8	8	8	8		8	8		TSW	TSW	8	8	114	146.0
			12		12	11		8	8	8	8	8	8		8	8		TSW	TSW	8	8	115	146.9
			12		12	12		8	8	8	8	8	8		8	8		TSW	TSW	8	8	116	147.8
			12		12	12		8	8	8	8	8	8		8	9		TSW	TSW	8	8	117	148.7
			12		12	12		8	8	8	8	8	8		9	9		TSW	TSW	8	8	118	149.6
			12		12	12		9	8	8	8	8	8		9	9		TSW	TSW	8	8	119	150.5
			12		12	12		9	9	8	8	8	9		9	9		TSW	TSW	8	8	121	152.3
			12		12	12		9	9	8	8	9	9		9	9		TSW	TSW	8	8	122	153.2
			12		12	12		9	9	9	8	9	9		9	9		TSW	TSW	8	8	123	154.1
			12		12	12		9	9	9	9	9	9		9	9		TSW	TSW	8	8	124	155.0
			12		12	12		9	9	9	9	9	9		9	9		TSW	TSW	9	8	125	155.9
			12		12	12		9	9	9	9	9	9		9	9		TSW	TSW	9	9	126	156.8
			13		12	12		9	9	9	9	9	9		9	9		TSW	TSW	9	9	127	157.5
			13		13	12		9	9	9	9	9	9		9	9		TSW	TSW	9	9	128	158.2
			13		13	13		9	9	9	9	9	9		9	9		TSW	TSW	9	9	129	158.9
			13		13	13		9	9	9	9	9	9		9	10		TSW	TSW	9	9	130	159.8
			13		13	13		9	9	9	9	9	9		10	10		TSW	TSW	9	9	131	160.7
			13		13	13		10	9	9	9	9	9		10	10		TSW	TSW	9	9	132	161.6
			13		13	13		10	10	9	9	9	10		10	10		TSW	TSW	9	9	134	163.4
			13		13	13		10	10	10	9	10	10		10	10		TSW	TSW	9	9	135	164.3
			13		13	13		10	10	10	10	10	10		10	10		TSW	TSW	9	9	136	165.2
			13		13	13		10	10	10	10	10	10		10	10		TSW	TSW	9	9	137	166.1
			13		13	13		10	10	10	10	10	10		10	10		TSW	TSW	10	9	138	167.0
			13		13	13		10	10	10	10	10	10		10	10		TSW	TSW	10	10	139	167.9
			14		13	13		10	10	10	10	10	10		10	10		TSW	TSW	10	10	140	168.7
			14		14	13		10	10	10	10	10	10		10	10		TSW	TSW	10	10	141	169.5
			14		14	14		10	10	10	10	10	10		10	10		TSW	TSW	10	10	142	170.3
			14		14	14		10	10	10	10	10	10		10	11		TSW	TSW	10	10	143	171.2
			14		14	14		10	10	10	10	10	10		11	11		TSW	TSW	10	10	144	172.1
			14		14	14		11	10	10	10	10	10		11	11		TSW	TSW	10	10	145	173.0
			14		14	14		11	11	10	10	10	11		11	11		TSW	TSW	10	10	147	174.8
			14		14	14		11	11	11	10	11	11		11	11		TSW	TSW	10	10	148	175.7
			14		14	14		11	11	11	11	11	11		11	11		TSW	TSW	10	10	149	176.6
			14		14	14		11	11	11	11	11	11		11	11		TSW	TSW	10	10	150	177.5
			14		14	14		11	11	11	11	11	11		11	11		TSW	TSW	11	10	151	178.4
			14		14	14		11	11	11	11	11	11		11	11		TSW	TSW	11	11	152	179.3
			15		14	14		11	11	11	11	11	11		11	11		TSW	TSW	11	11	153	180.1

Table MCN-8. Interim Patterns w/ 13 Gates in Split-Leaf in Upstream Slot (# Gate Stops per Spillbay)																						Total Stops (#)	Spill (kcfs)
1	2	3	4	5	6 ^a	7	8	9 ^a	10	11	12	13	14	15	16	17	18	19 ^b	20 ^b	21	22		
			15		15	14		11	11	11	11	11	11		11	11		TSW	TSW	11	11	154	180.9
			15		15	15		11	11	11	11	11	11		11	11		TSW	TSW	11	11	155	181.7
			15		15	15		11	11	11	11	11	11		11	12		TSW	TSW	11	11	156	182.6
			15		15	15		11	11	11	11	11	11		12	12		TSW	TSW	11	11	157	183.5
			15		15	15		12	11	11	11	11	11		12	12		TSW	TSW	11	11	158	184.4
			15		15	15		12	12	11	11	11	12		12	12		TSW	TSW	11	11	160	186.2
			15		15	15		12	12	11	11	12	12		12	12		TSW	TSW	11	11	161	187.1
			15		15	15		12	12	12	11	12	12		12	12		TSW	TSW	11	11	162	188.0
			15		15	15		12	12	12	12	12	12		12	12		TSW	TSW	11	11	163	188.9
			15		15	15		12	12	12	12	12	12		12	12		TSW	TSW	12	11	164	189.8
			15		15	15		12	12	12	12	12	12		12	12		TSW	TSW	12	12	165	190.7
			15		15	15		12	12	12	12	12	12		12	13		TSW	TSW	12	12	166	191.4
			15		15	15		12	12	12	12	12	12		13	13		TSW	TSW	12	12	167	192.1
			15		15	15		13	12	12	12	12	12		13	13		TSW	TSW	12	12	168	192.8
			15		15	15		13	13	12	12	12	13		13	13		TSW	TSW	12	12	170	194.2
			15		15	15		13	13	12	12	13	13		13	13		TSW	TSW	12	12	171	194.9
			15		15	15		13	13	13	12	13	13		13	13		TSW	TSW	12	12	172	195.6
			15		15	15		13	13	13	13	13	13		13	13		TSW	TSW	12	12	173	196.3
			15		15	15		13	13	13	13	13	13		13	13		TSW	TSW	13	12	174	197.0
			15		15	15		13	13	13	13	13	13		13	13		TSW	TSW	13	13	175	197.7
			15		15	15		13	13	13	13	13	13		13	14		TSW	TSW	13	13	176	198.5
			15		15	15		13	13	13	13	13	13		14	14		TSW	TSW	13	13	177	199.3
			15		15	15		14	13	13	13	13	13		14	14		TSW	TSW	13	13	178	200.1
			15		15	15		14	14	13	13	13	14		14	14		TSW	TSW	13	13	180	201.7
			15		15	15		14	14	13	13	14	14		14	14		TSW	TSW	13	13	181	202.5
			15		15	15		14	14	14	13	14	14		14	14		TSW	TSW	13	13	182	203.3
			15		15	15		14	14	14	14	14	14		14	14		TSW	TSW	13	13	183	204.1
			15		15	15		14	14	14	14	14	14		14	14		TSW	TSW	14	13	184	204.9
			15		15	15		14	14	14	14	14	14		14	14		TSW	TSW	14	14	185	205.7
			15		15	15		14	14	14	14	14	14		14	15		TSW	TSW	14	14	186	206.5
			15		15	15		14	14	14	14	14	14		15	15		TSW	TSW	14	14	187	207.3
			15		15	15		15	14	14	14	14	14		15	15		TSW	TSW	14	14	188	208.1
			15		15	15		15	15	14	14	14	15		15	15		TSW	TSW	14	14	190	209.7
			15		15	15		15	15	14	14	15	15		15	15		TSW	TSW	14	14	191	210.5
			15		15	15		15	15	15	14	15	15		15	15		TSW	TSW	14	14	192	211.3
			15		15	15		15	15	15	15	15	15		15	15		TSW	TSW	14	14	193	212.1
			15		15	15		15	15	15	15	15	15		15	15		TSW	TSW	15	14	194	212.9
			15		15	15		15	15	15	15	15	15		15	15		TSW	TSW	15	15	195	213.7
			19		15	15		15	15	15	15	15	15		15	15		TSW	TSW	15	15	199	217.4
			19		15	15		15	15	15	15	15	15		15	15		TSW	TSW	15	19	203	221.1
			19		19	15		15	15	15	15	15	15		15	15		TSW	TSW	15	19	207	224.8

Table MCN-8. Interim Patterns w/ 13 Gates in Split-Leaf in Upstream Slot (# Gate Stops per Spillbay)																						Total Stops (#)	Spill (kcfs)
1	2	3	4	5	6 ^a	7	8	9 ^a	10	11	12	13	14	15	16	17	18	19 ^b	20 ^b	21	22		
			19		19	15		15	15	15	15	15	15		15	15		TSW	TSW	19	19	211	228.5
			19		19	19		15	15	15	15	15	15		15	15		TSW	TSW	19	19	215	232.2
			19		19	19		15	15	15	15	15	15		15	19		TSW	TSW	19	19	219	235.9
			19		19	19		19	15	15	15	15	15		15	19		TSW	TSW	19	19	223	239.6
			19		19	19		19	19	15	15	15	15		19	19		TSW	TSW	19	19	227	243.3
			19		19	19		19	19	15	15	15	15		19	19		TSW	TSW	19	19	231	247.0
			19		19	19		19	19	15	15	15	19		19	19		TSW	TSW	19	19	235	250.7
			19		19	19		19	19	19	15	15	19		19	19		TSW	TSW	19	19	239	254.4
			19		19	19		19	19	19	15	19	19		19	19		TSW	TSW	19	19	243	258.1
			19		19	19		19	19	19	19	19	19		19	19		TSW	TSW	19	19	247	261.8
	20		19		19	19		15	15	15	15	15	15		15	15		TSW	TSW	19	19	235	264.3
	20		19		19	19		15	15	15	15	15	15		15	19		TSW	TSW	19	19	239	268.0
	20		19		19	19		19	15	15	15	15	15		15	19		TSW	TSW	19	19	243	271.7
	20		19		19	19		19	15	15	15	15	15		19	19		TSW	TSW	19	19	247	275.4
	20		19		19	19		19	19	15	15	15	15		19	19		TSW	TSW	19	19	251	279.1
	20		19		19	19		19	19	15	15	15	19		19	19		TSW	TSW	19	19	255	282.8
	20		19		19	19		19	19	19	15	15	19		19	19		TSW	TSW	19	19	259	286.5
	20		19		19	19		19	19	19	15	19	19		19	19		TSW	TSW	19	19	263	290.2
	20		19		19	19		19	19	19	19	19	19		19	19		TSW	TSW	19	19	267	293.9
	20		19	20	19	19		15	15	15	15	15	15		15	15		TSW	TSW	19	19	255	296.4
	20		19	20	19	19		15	15	15	15	15	15		15	19		TSW	TSW	19	19	259	300.1
	20		19	20	19	19		19	15	15	15	15	15		15	19		TSW	TSW	19	19	263	303.8
	20		19	20	19	19		19	15	15	15	15	15		19	19		TSW	TSW	19	19	267	307.5
	20		19	20	19	19		19	19	15	15	15	15		19	19		TSW	TSW	19	19	271	311.2
	20		19	20	19	19		19	19	15	15	15	19		19	19		TSW	TSW	19	19	275	314.9
	20		19	20	19	19		19	19	19	15	15	19		19	19		TSW	TSW	19	19	279	318.6
	20		19	20	19	19		19	19	19	15	19	19		19	19		TSW	TSW	19	19	283	322.3
	20		19	20	19	19		19	19	19	19	19	19		19	19		TSW	TSW	19	19	287	326.0
	20		19	20	19	19		15	15	15	15	15	15		15	15	20	TSW	TSW	19	19	275	328.5
	20		19	20	19	19		15	15	15	15	15	15		15	19	20	TSW	TSW	19	19	279	332.2
	20		19	20	19	19		19	15	15	15	15	15		15	19	20	TSW	TSW	19	19	283	335.9
	20		19	20	19	19		19	15	15	15	15	15		19	19	20	TSW	TSW	19	19	287	339.6
	20		19	20	19	19		19	19	15	15	15	15		19	19	20	TSW	TSW	19	19	291	343.3
	20		19	20	19	19		19	19	15	15	15	19		19	19	20	TSW	TSW	19	19	295	347.0
	20		19	20	19	19		19	19	19	15	15	19		19	19	20	TSW	TSW	19	19	299	350.7
	20		19	20	19	19		19	19	19	15	19	19		19	19	20	TSW	TSW	19	19	303	354.4
	20		19	20	19	19		19	19	19	19	19	19		19	19	20	TSW	TSW	19	19	307	358.1
20	20		19	20	19	19		15	15	15	15	15	15		15	15	20	TSW	TSW	19	19	295	360.6
20	20		19	20	19	19		15	15	15	15	15	15		15	19	20	TSW	TSW	19	19	299	364.3
20	20		19	20	19	19		19	15	15	15	15	15		15	19	20	TSW	TSW	19	19	303	368.0
20	20		19	20	19	19		19	15	15	15	15	15		19	19	20	TSW	TSW	19	19	307	371.7

Table MCN-8. Interim Patterns w/ 13 Gates in Split-Leaf in Upstream Slot (# Gate Stops per Spillbay)																						Total Stops (#)	Spill (kcfs)
1	2	3	4	5	6 ^a	7	8	9 ^a	10	11	12	13	14	15	16	17	18	19 ^b	20 ^b	21	22		
20	20		19	20	19	19		19	19	15	15	15	15		19	19	20	TSW	TSW	19	19	311	375.4
20	20		19	20	19	19		19	19	15	15	15	19		19	19	20	TSW	TSW	19	19	315	379.1
20	20		19	20	19	19		19	19	19	15	15	19		19	19	20	TSW	TSW	19	19	319	382.8
20	20		19	20	19	19		19	19	19	15	19	19		19	19	20	TSW	TSW	19	19	323	386.5
20	20		19	20	19	19		19	19	19	19	19	19		19	19	20	TSW	TSW	19	19	327	390.2
20	20		19	20	19	19		15	15	15	15	15	15	20	15	15	20	TSW	TSW	19	19	315	392.7
20	20		19	20	19	19		15	15	15	15	15	15	20	15	19	20	TSW	TSW	19	19	319	396.4
20	20		19	20	19	19		19	15	15	15	15	15	20	15	19	20	TSW	TSW	19	19	323	400.1
20	20		19	20	19	19		19	15	15	15	15	15	20	19	19	20	TSW	TSW	19	19	327	403.8
20	20		19	20	19	19		19	19	15	15	15	15	20	19	19	20	TSW	TSW	19	19	331	407.5
20	20		19	20	19	19		19	19	15	15	15	19	20	19	19	20	TSW	TSW	19	19	335	411.2
20	20		19	20	19	19		19	19	19	15	15	19	20	19	19	20	TSW	TSW	19	19	339	414.9
20	20		19	20	19	19		19	19	19	15	19	19	20	19	19	20	TSW	TSW	19	19	343	418.6
20	20		19	20	19	19		19	19	19	19	19	19	20	19	19	20	TSW	TSW	19	19	347	422.3
20	20	20	19	20	19	19		15	15	15	15	15	15	20	15	15	20	TSW	TSW	19	19	335	424.8
20	20	20	19	20	19	19		15	15	15	15	15	15	20	15	19	20	TSW	TSW	19	19	339	428.5
20	20	20	19	20	19	19		19	15	15	15	15	15	20	15	19	20	TSW	TSW	19	19	343	432.2
20	20	20	19	20	19	19		19	15	15	15	15	15	20	19	19	20	TSW	TSW	19	19	347	435.9
20	20	20	19	20	19	19		19	19	15	15	15	15	20	19	19	20	TSW	TSW	19	19	351	439.6
20	20	20	19	20	19	19		19	19	15	15	15	19	20	19	19	20	TSW	TSW	19	19	355	443.3
20	20	20	19	20	19	19		19	19	19	15	15	19	20	19	19	20	TSW	TSW	19	19	359	447.0
20	20	20	19	20	19	19		19	19	19	15	19	19	20	19	19	20	TSW	TSW	19	19	363	450.7
20	20	20	19	20	19	19		19	19	19	19	19	19	20	19	19	20	TSW	TSW	19	19	367	454.4
20	20	20	19	20	19	19	20	15	15	15	15	15	15	20	15	15	20	TSW	TSW	19	19	355	456.9
20	20	20	19	20	19	19	20	19	15	15	15	15	15	20	15	19	20	TSW	TSW	19	19	359	460.6
20	20	20	19	20	19	19	20	19	15	15	15	15	15	20	19	19	20	TSW	TSW	19	19	363	464.3
20	20	20	19	20	19	19	20	19	19	15	15	15	15	20	19	19	20	TSW	TSW	19	19	367	468.0
20	20	20	19	20	19	19	20	19	19	15	15	15	15	20	19	19	20	TSW	TSW	19	19	371	471.7
20	20	20	19	20	19	19	20	19	19	15	15	15	19	20	19	19	20	TSW	TSW	19	19	375	475.4
20	20	20	19	20	19	19	20	19	19	19	15	19	19	20	19	19	20	TSW	TSW	19	19	379	479.1
20	20	20	19	20	19	19	20	19	19	19	15	19	19	20	19	19	20	TSW	TSW	19	19	383	482.8
20	20	20	19	20	19	19	20	19	19	19	19	19	19	20	19	19	20	TSW	TSW	19	19	387	486.5
20	20	20	19	20	19	19	20	19	19	19	19	19	19	20	19	19	20	21	TSW	19	19	408	496.5
20	20	20	19	20	19	19	20	19	19	19	19	19	19	20	19	19	20	21	21	19	19	429	506.5
20	Free	20	19	20	19	19	20	19	19	19	19	19	19	20	19	19	20	21	21	19	19	409	536.6
20	Free	20	19	20	19	19	20	19	19	19	19	19	19	20	19	19	Free	21	21	19	19	389	566.7
20	Free	20	19	Free	19	19	20	19	19	19	19	19	19	20	19	19	Free	21	21	19	19	369	596.8
20	Free	20	19	Free	19	19	20	19	19	19	19	19	19	Free	19	19	Free	21	21	19	19	349	626.9
20	Free	20	19	Free	19	19	Free	19	19	19	19	19	19	Free	19	19	Free	21	21	19	19	329	657.0
Free	Free	20	19	Free	19	19	Free	19	19	19	19	19	19	Free	19	19	Free	21	21	19	19	309	687.1
Free	Free	Free	19	Free	19	19	Free	19	19	19	19	19	19	Free	19	19	Free	21	21	19	19	289	717.2

Table MCN-8-ALT. ALTERNATIVE INTERIM McNary Dam Spill Patterns with TSWs in Bays 19-20 and 13 Bays in Split-Leaf (upstream slot) and Bays 1&2 Open in Double-Leaf (downstream slot).^{a, b}

Table MCN-8-ALT. Alternative Interim Patterns w/ 13 Gates in Split-Leaf in Upstream Slot + Bays 1&2 (# Gate Stops per Spillbay)																						Total Stops (#)	Spill (kcfs)
1	2	3	4	5	6 ^b	7	8	9 ^b	10	11	12	13	14	15	16	17	18	19 ^c	20 ^c	21	22		
																		TSW	TSW			0	19.4
																4		TSW	TSW			4	24.4
																5		TSW	TSW			5	25.4
																5		TSW	TSW	4		9	30.4
																5		TSW	TSW	5		10	31.4
																5		TSW	TSW	5	4	14	36.4
																5		TSW	TSW	5	5	15	37.4
												4				5		TSW	TSW	5	5	19	42.4
												5				5		TSW	TSW	5	5	20	43.4
												5				6		TSW	TSW	5	5	21	44.4
												5				7		TSW	TSW	5	5	22	45.4
											4	5				7		TSW	TSW	5	5	26	50.4
											5	5				7		TSW	TSW	5	5	27	51.4
											5	6				7		TSW	TSW	5	5	28	52.4
											5	7				7		TSW	TSW	5	5	29	53.4
									4		5	7				7		TSW	TSW	5	5	33	58.4
									5		5	7				7		TSW	TSW	5	5	34	59.4
									5		6	7				7		TSW	TSW	5	5	35	60.4
									5		7	7				7		TSW	TSW	5	5	36	61.4
			4						5		7	7				7		TSW	TSW	5	5	40	66.4
			5						5		7	7				7		TSW	TSW	5	5	41	67.4
			6						5		7	7				7		TSW	TSW	5	5	42	68.4
			7						5		7	7				7		TSW	TSW	5	5	43	69.4
4	4		5						4		4	4				4		TSW	TSW	5	5	39	71.4
4	4		5						4		4	5				5		TSW	TSW	5	5	41	73.4

^a These alternate patterns in **Table MCN-8-ALT** will be used if low flows are forecasted and meet all hydrologic criteria defined in **section 2.2.5**. Double-leaf spill gates 1 and 2 will be opened once to 4 stops (~7 kcfs per bay) on April 10 through early summer spill on July 31, or when flows drop below 70 kcfs. Opening and closing gates 1&2 will use both overloaded movements allowed each year (no more than 2 lifts every 12 months).

^b A total of 13 spill gates will be operated in the upstream slot in split-leaf, 11 of which are on a hoist and may be adjusted hourly as needed to adjust spill. Gates 6 and 9 are on a crane and will be adjusted at least once per week. The remaining 5 spillbays (3, 5, 8, 15, and 18) are double-leaf gates in the downstream slot and will remain closed unless needed to pass high flows using the first of two overloaded movements allowed each year (12 months). After the high flow event, open double-leaf gates will be closed using the second of two allowed overloaded movements.

^c Bays 19-20 with TSWs spill approx 19.2 kcfs (9.6 kcfs/bay) at forebay 339'. The upper TSW gates will be raised 3-5 ft above the water surface to ensure free flow over the TSW crests.

Table MCN-8-ALT. Alternative Interim Patterns w/ 13 Gates in Split-Leaf in Upstream Slot + Bays 1&2 (# Gate Stops per Spillbay)																						Total Stops (#)	Spill (kcfs)
1	2	3	4	5	6 ^b	7	8	9 ^b	10	11	12	13	14	15	16	17	18	19 ^c	20 ^c	21	22		
4	4		5						5		5		5			5		TSW	TSW	5	5	43	75.4
4	4		5						5		5		5			7		TSW	TSW	5	5	45	77.4
4	4		5						5		5		7			7		TSW	TSW	5	5	47	79.4
4	4		5		4				5		5		5			5		TSW	TSW	5	5	47	80.4
4	4		6		5				5		5		5			5		TSW	TSW	5	5	49	82.4
4	4		7		5				5		5		5			5		TSW	TSW	5	5	50	83.4
4	4		7		6				5		5		5			5		TSW	TSW	5	5	51	84.4
4	4		8		6				5		5		5			5		TSW	TSW	5	5	52	85.4
4	4		8		7				5		5		5			5		TSW	TSW	5	5	53	86.4
4	4		9		7				5		5		5			5		TSW	TSW	5	5	54	87.3
4	4		9		8				5		5		5			5		TSW	TSW	5	5	55	88.3
4	4		10		8				5		5		5			5		TSW	TSW	5	5	56	89.2
4	4		10		8			4	5		5		5			5		TSW	TSW	5	5	60	94.2
4	4		10		8			5	5		5		5			5		TSW	TSW	5	5	61	95.2
4	4		10		9			5	5		5		5			5		TSW	TSW	5	5	62	96.1
4	4		10		10			5	5		5		5			5		TSW	TSW	5	5	63	97.0
4	4		10		7	4		5	5		5		5			5		TSW	TSW	5	5	64	99.2
4	4		10		9	5		5	5		5		5			5		TSW	TSW	5	5	67	102.1
4	4		10		9	6		5	5		5		5			5		TSW	TSW	5	5	68	103.1
4	4		10		10	6		5	5		5		5			5		TSW	TSW	5	5	69	104.0
4	4		10		10	7		5	5		5		5			5		TSW	TSW	5	5	70	105.0
4	4		10		10	9		5	5		5		5			5		TSW	TSW	5	5	72	106.9
4	4		10		10	7		5	5		5		5		4	5		TSW	TSW	5	5	74	110.0
4	4		10		10	7		5	5		5		5		5	5		TSW	TSW	5	5	75	111.0
4	4		10		10	7		5	5		5		5		5	6		TSW	TSW	5	5	76	112.0
4	4		10		10	7		5	5		5		5		6	6		TSW	TSW	5	5	77	113.0
4	4		10		10	8		5	5		5		5		6	6		TSW	TSW	5	5	78	114.0
4	4		10		10	7		5	5		5	4	5		6	6		TSW	TSW	5	5	81	118.0
4	4		10		10	7		5	5		5	5	5		6	6		TSW	TSW	5	5	82	119.0
4	4		10		10	7		6	5		5	5	5		6	6		TSW	TSW	5	5	83	120.0
4	4		10		10	7		6	6		5	5	5		6	6		TSW	TSW	5	5	84	121.0
4	4		10		10	7		5	5	4	5	5	5		6	6		TSW	TSW	5	5	86	124.0
4	4		10		10	7		5	5	5	5	5	5		6	6		TSW	TSW	5	5	87	125.0
4	4		10		10	7		6	5	5	5	5	5		6	6		TSW	TSW	5	5	88	126.0
4	4		10		10	7		6	6	5	5	5	5		6	6		TSW	TSW	5	5	89	127.0
4	4		10		10	8		6	6	5	5	5	5		6	6		TSW	TSW	5	5	90	128.0
4	4		10		10	8		6	6	5	5	5	6		6	6		TSW	TSW	5	5	91	129.0
4	4		10		10	8		6	6	5	5	6	6		6	6		TSW	TSW	5	5	92	130.0
4	4		10		10	8		6	6	5	6	6	6		6	6		TSW	TSW	5	5	93	131.0
4	4		10		10	8		6	6	6	6	6	6		6	6		TSW	TSW	5	5	94	132.0
4	4		10		10	8		6	6	6	6	6	6		6	6		TSW	TSW	6	5	95	133.0

Table MCN-8-ALT. Alternative Interim Patterns w/ 13 Gates in Split-Leaf in Upstream Slot + Bays 1&2 (# Gate Stops per Spillbay)																						Total Stops (#)	Spill (kcfs)
1	2	3	4	5	6 ^b	7	8	9 ^b	10	11	12	13	14	15	16	17	18	19 ^c	20 ^c	21	22		
4	4		10		10	8		6	6	6	6	6	6		6	6		TSW	TSW	6	6	96	134.0
4	4		10		10	9		6	6	6	6	6	6		6	6		TSW	TSW	6	6	97	134.9
4	4		10		10	9		6	6	6	6	6	6		6	7		TSW	TSW	6	6	98	135.9
4	4		10		10	9		6	6	6	6	6	6		7	7		TSW	TSW	6	6	99	136.9
4	4		11		10	9		7	6	6	6	6	6		7	7		TSW	TSW	6	6	101	138.8
4	4		11		10	9		7	7	6	6	6	6		7	7		TSW	TSW	6	6	102	139.8
4	4		11		10	9		7	7	6	6	6	7		7	7		TSW	TSW	6	6	103	140.8
4	4		11		10	9		7	7	6	6	7	7		7	7		TSW	TSW	6	6	104	141.8
4	4		11		10	9		7	7	7	6	7	7		7	7		TSW	TSW	6	6	105	142.8
4	4		11		10	9		7	7	7	7	7	7		7	7		TSW	TSW	6	6	106	143.8
4	4		11		10	9		7	7	7	7	7	7		7	7		TSW	TSW	7	6	107	144.8
4	4		11		10	9		7	7	7	7	7	7		7	7		TSW	TSW	7	7	108	145.8
4	4		11		10	10		7	7	7	7	7	7		7	7		TSW	TSW	7	7	109	146.7
4	4		11		11	10		7	7	7	7	7	7		7	7		TSW	TSW	7	7	110	147.6
4	4		11		11	10		7	7	7	7	7	7		7	8		TSW	TSW	7	7	111	148.6
4	4		11		11	10		7	7	7	7	7	7		8	8		TSW	TSW	7	7	112	149.6
4	4		11		11	10		8	7	7	7	7	7		8	8		TSW	TSW	7	7	113	150.6
4	4		11		11	10		8	8	7	7	7	7		8	8		TSW	TSW	7	7	114	151.6
4	4		11		11	10		8	8	7	7	7	8		8	8		TSW	TSW	7	7	115	152.6
4	4		11		11	10		8	8	7	7	8	8		8	8		TSW	TSW	7	7	116	153.6
4	4		11		11	10		8	8	8	7	8	8		8	8		TSW	TSW	7	7	117	154.6
4	4		11		11	10		8	8	8	8	8	8		8	8		TSW	TSW	7	7	118	155.6
4	4		11		11	10		8	8	8	8	8	8		8	8		TSW	TSW	8	7	119	156.6
4	4		11		11	10		8	8	8	8	8	8		8	8		TSW	TSW	8	8	120	157.6
4	4		12		11	10		8	8	8	8	8	8		8	8		TSW	TSW	8	8	121	158.5
4	4		12		12	10		8	8	8	8	8	8		8	8		TSW	TSW	8	8	122	159.4
4	4		12		12	11		8	8	8	8	8	8		8	8		TSW	TSW	8	8	123	160.3
4	4		12		12	11		8	8	8	8	8	8		8	9		TSW	TSW	8	8	124	161.2
4	4		12		12	11		8	8	8	8	8	8		9	9		TSW	TSW	8	8	125	162.1
4	4		12		12	11		9	8	8	8	8	8		9	9		TSW	TSW	8	8	126	163.0
4	4		12		12	11		9	9	8	8	8	9		9	9		TSW	TSW	8	8	128	164.8
4	4		12		12	11		9	9	8	8	8	9		9	9		TSW	TSW	8	8	128	164.8
4	4		12		12	11		9	9	8	8	9	9		9	9		TSW	TSW	8	8	129	165.7
4	4		12		12	11		9	9	9	8	9	9		9	9		TSW	TSW	8	8	130	166.6
4	4		12		12	11		9	9	9	9	9	9		9	9		TSW	TSW	8	8	131	167.5
4	4		12		12	11		9	9	9	9	9	9		9	9		TSW	TSW	9	8	132	168.4
4	4		12		12	11		9	9	9	9	9	9		9	9		TSW	TSW	9	9	133	169.3
4	4		13		12	11		9	9	9	9	9	9		9	9		TSW	TSW	9	9	134	170.0
4	4		13		13	11		9	9	9	9	9	9		9	9		TSW	TSW	9	9	135	170.7
4	4		13		13	12		9	9	9	9	9	9		9	9		TSW	TSW	9	9	136	171.6
4	4		13		13	12		9	9	9	9	9	9		9	10		TSW	TSW	9	9	137	172.5

Table MCN-8-ALT. Alternative Interim Patterns w/ 13 Gates in Split-Leaf in Upstream Slot + Bays 1&2 (# Gate Stops per Spillbay)																						Total Stops (#)	Spill (kcfs)
1	2	3	4	5	6 ^b	7	8	9 ^b	10	11	12	13	14	15	16	17	18	19 ^c	20 ^c	21	22		
4	4		13		13	12		9	9	9	9	9	9		10	10		TSW	TSW	9	9	138	173.4
4	4		13		13	12		10	9	9	9	9	10		10	10		TSW	TSW	9	9	140	175.2
4	4		13		13	12		10	10	9	9	9	9		10	10		TSW	TSW	9	9	140	175.2
4	4		13		13	12		10	10	9	9	9	10		10	10		TSW	TSW	9	9	141	176.1
4	4		13		13	12		10	10	10	9	10	10		10	10		TSW	TSW	9	9	143	177.9
4	4		13		13	12		10	10	10	10	10	10		10	10		TSW	TSW	10	9	145	179.7
4	4		13		13	12		10	10	10	10	10	10		10	10		TSW	TSW	10	10	146	180.6
4	4		14		13	12		10	10	10	10	10	10		10	10		TSW	TSW	10	10	147	181.4
4	4		14		13	12		10	10	10	10	10	10		10	10		TSW	TSW	10	10	147	181.4
4	4		14		14	12		10	10	10	10	10	10		10	10		TSW	TSW	10	10	148	182.2
4	4		14		14	13		10	10	10	10	10	10		10	10		TSW	TSW	10	10	149	182.9
4	4		14		14	13		11	10	10	10	10	10		10	11		TSW	TSW	10	10	151	184.7
4	4		14		14	13		11	10	10	10	10	10		11	11		TSW	TSW	10	10	152	185.6
4	4		14		14	13		11	11	10	10	10	11		11	11		TSW	TSW	10	10	154	187.4
4	4		14		14	13		11	11	10	10	10	11		11	11		TSW	TSW	10	10	154	187.4
4	4		14		14	13		11	11	10	10	10	11		11	11		TSW	TSW	10	10	154	187.4
4	4		14		14	13		11	11	11	10	11	11		11	11		TSW	TSW	10	10	156	189.2
4	4		14		14	13		11	11	11	11	11	11		11	11		TSW	TSW	10	10	157	190.1
4	4		14		14	13		11	11	11	11	11	11		11	11		TSW	TSW	11	10	158	191.0
4	4		14		14	13		11	11	11	11	11	11		11	11		TSW	TSW	11	11	159	191.9
4	4		15		14	13		11	11	11	11	11	11		11	11		TSW	TSW	11	11	160	192.7
4	4		15		15	13		11	11	11	11	11	11		11	11		TSW	TSW	11	11	161	193.5
4	4		15		15	14		11	11	11	11	11	12		11	11		TSW	TSW	11	11	163	195.2
4	4		15		15	14		11	11	11	11	11	11		11	12		TSW	TSW	11	11	163	195.2
4	4		15		15	14		11	11	11	11	11	11		12	12		TSW	TSW	11	11	164	196.1
4	4		15		15	14		12	11	11	11	11	11		12	12		TSW	TSW	11	11	165	197.0
4	4		15		15	14		12	12	11	11	11	12		12	12		TSW	TSW	11	11	167	198.8
4	4		15		15	14		12	12	11	11	12	12		12	12		TSW	TSW	11	11	168	199.7
4	4		15		15	14		12	12	12	11	12	12		12	12		TSW	TSW	11	11	169	200.6
4	4		15		15	14		12	12	12	12	12	12		12	12		TSW	TSW	11	11	170	201.5
4	4		15		15	14		12	12	12	12	12	12		12	12		TSW	TSW	12	11	171	202.4
4	4		15		15	14		12	12	12	12	12	13		12	12		TSW	TSW	12	12	173	204.0
4	4		16		15	14		12	12	12	12	12	12		12	12		TSW	TSW	12	12	173	204.3
4	4		16		16	14		12	12	12	12	12	12		12	12		TSW	TSW	12	12	174	205.3
4	4		16		16	15		12	12	12	12	12	12		12	12		TSW	TSW	12	12	175	206.1
4	4		16		16	15		12	12	12	12	12	12		12	13		TSW	TSW	12	12	176	206.8
4	4		16		16	15		12	12	12	12	12	12		13	13		TSW	TSW	12	12	177	207.5
4	4		16		16	15		13	12	12	12	12	12		13	13		TSW	TSW	12	12	178	208.2
4	4		16		16	15		13	13	12	12	12	13		13	13		TSW	TSW	12	12	180	209.6
4	4		16		16	15		13	13	12	12	13	13		13	13		TSW	TSW	12	12	181	210.3
4	4		16		16	15		13	13	13	12	13	13		13	13		TSW	TSW	12	12	182	211.0

Table MCN-8-ALT. Alternative Interim Patterns w/ 13 Gates in Split-Leaf in Upstream Slot + Bays 1&2 (# Gate Stops per Spillbay)																						Total Stops (#)	Spill (kcfs)
1	2	3	4	5	6 ^b	7	8	9 ^b	10	11	12	13	14	15	16	17	18	19 ^c	20 ^c	21	22		
4	4		16		16	15		13	13	13	13	13	13		13	13		TSW	TSW	12	12	183	211.7
4	4		16		16	15		13	13	13	13	13	13		13	13		TSW	TSW	13	12	184	212.4
4	4		16		16	15		13	13	13	13	13	13		13	13		TSW	TSW	13	13	185	213.1
4	4		17		16	15		13	13	13	13	13	13		13	13		TSW	TSW	13	13	186	214.0
4	4		17		17	15		13	13	13	13	13	13		13	13		TSW	TSW	13	13	187	214.9
4	4		17		17	16		13	13	13	13	13	13		13	13		TSW	TSW	13	13	188	215.9
4	4		17		17	16		13	13	13	13	13	13		13	14		TSW	TSW	13	13	189	216.7
4	4		17		17	16		13	13	13	13	13	13		14	14		TSW	TSW	13	13	190	217.5
4	4		17		17	16		14	13	13	13	13	13		14	14		TSW	TSW	13	13	191	218.3
4	4		17		17	16		14	14	13	13	13	14		14	14		TSW	TSW	13	13	193	219.9
4	4		17		17	16		14	14	14	13	14	14		14	14		TSW	TSW	13	13	195	221.5
4	4		17		17	16		14	14	14	14	14	14		14	14		TSW	TSW	13	13	196	222.3
4	4		17		17	16		14	14	14	14	14	14		14	14		TSW	TSW	14	13	197	223.1
4	4		17		17	16		14	14	14	14	14	14		14	14		TSW	TSW	14	14	198	223.9
4	4		18		17	16		14	14	14	14	14	14		14	14		TSW	TSW	14	14	199	224.8
4	4		18		18	16		14	14	14	14	14	14		14	14		TSW	TSW	14	14	200	225.7
4	4		18		18	17		14	14	14	14	14	14		14	14		TSW	TSW	14	14	201	226.6
4	4		18		18	17		14	14	14	14	14	14		14	15		TSW	TSW	14	14	202	227.4
4	4		18		18	17		14	14	14	14	14	14		15	15		TSW	TSW	14	14	203	228.2
4	4		18		18	17		15	14	14	14	14	14		15	15		TSW	TSW	14	14	204	229.0
4	4		18		18	17		15	15	14	14	14	15		15	15		TSW	TSW	14	14	206	230.6
4	4		18		18	17		15	15	15	14	15	15		15	15		TSW	TSW	14	14	208	232.2
4	4		18		18	17		15	15	15	15	15	15		15	15		TSW	TSW	15	14	210	233.8
4	4		18		18	17		15	15	15	15	15	15		15	15		TSW	TSW	15	15	211	234.6
4	4		19		18	17		15	15	15	15	15	15		15	15		TSW	TSW	15	15	212	235.5
4	4		19		19	17		15	15	15	15	15	15		15	15		TSW	TSW	15	15	213	236.4
4	4		19		19	18		15	15	15	15	15	15		15	15		TSW	TSW	15	15	214	237.3
4	4		19		19	18		15	15	15	15	15	15		16	16		TSW	TSW	15	15	215	238.3
4	4		19		19	18		15	15	15	15	15	15		16	16		TSW	TSW	15	15	216	239.3
4	4		19		19	18		16	15	15	15	15	15		16	16		TSW	TSW	15	15	217	240.3
4	4		19		19	18		16	16	15	15	15	16		16	16		TSW	TSW	15	15	219	242.3
4	4		19		19	18		16	16	16	15	16	16		16	16		TSW	TSW	15	15	221	244.3
4	4		19		19	18		16	16	16	16	16	16		16	16		TSW	TSW	15	15	222	245.3
4	4		19		19	18		16	16	16	16	16	16		16	16		TSW	TSW	16	15	223	246.3
4	4		19		19	18		16	16	16	16	16	16		16	16		TSW	TSW	16	16	224	247.3
4	4		19		19	19		16	16	16	16	16	16		16	16		TSW	TSW	16	16	225	248.2
4	4		19		19	19		16	16	16	16	16	16		16	17		TSW	TSW	16	16	226	249.1
4	4		19		19	19		16	16	16	16	16	16		17	17		TSW	TSW	16	16	227	250.0
4	4		19		19	19		17	16	16	16	16	16		17	17		TSW	TSW	16	16	228	250.9
4	4		19		19	19		17	17	16	16	16	17		17	17		TSW	TSW	16	16	230	252.7
4	4		19		19	19		17	17	17	16	17	17		17	17		TSW	TSW	16	16	232	254.5

Table MCN-8-ALT. Alternative Interim Patterns w/ 13 Gates in Split-Leaf in Upstream Slot + Bays 1&2 (# Gate Stops per Spillbay)																						Total Stops (#)	Spill (kcfs)
1	2	3	4	5	6 ^b	7	8	9 ^b	10	11	12	13	14	15	16	17	18	19 ^c	20 ^c	21	22		
4	4		19		19	19		17	17	17	17	17	17		17	17		TSW	TSW	16	16	233	255.4
4	4		19		19	19		17	17	17	17	17	17		17	17		TSW	TSW	16	17	234	256.3
4	4		19		19	19		17	17	17	17	17	17		17	17		TSW	TSW	17	17	235	257.2
4	4		19		19	19		17	17	17	17	17	17		17	18		TSW	TSW	17	17	236	258.1
4	4		19		19	19		17	17	17	17	17	17		18	18		TSW	TSW	17	17	237	259.0
4	4		19		19	19		18	17	17	17	17	17		18	18		TSW	TSW	17	17	238	259.9
4	4		19		19	19		18	18	17	17	17	18		18	18		TSW	TSW	17	17	240	261.7
4	4		19		19	19		18	18	18	17	18	18		18	18		TSW	TSW	17	17	242	263.5
4	4		19		19	19		18	18	18	18	18	18		18	18		TSW	TSW	17	17	243	264.4
4	4		19		19	19		18	18	18	18	18	18		18	18		TSW	TSW	17	18	244	265.3
4	4		19		19	19		18	18	18	18	18	18		18	18		TSW	TSW	18	18	245	266.2
4	4		19		19	19		18	18	18	18	18	18		18	19		TSW	TSW	18	18	246	267.1
4	4		19		19	19		18	18	18	18	18	18		19	19		TSW	TSW	18	18	247	268.0
4	4		19		19	19		19	18	18	18	18	18		19	19		TSW	TSW	18	18	248	268.9
4	4		19		19	19		19	19	18	18	18	19		19	19		TSW	TSW	18	18	250	270.7
4	4		19		19	19		19	19	19	18	19	19		19	19		TSW	TSW	18	18	252	272.5
4	4		19		19	19		19	19	19	19	19	19		19	19		TSW	TSW	18	18	253	273.4
4	4		19		19	19		19	19	19	19	19	19		19	19		TSW	TSW	18	19	254	274.3
4	4		19		19	19		19	19	19	19	19	19		19	19		TSW	TSW	19	19	255	275.2
4	4		19	20	19	19		15	15	15	15	15	15		15	15		TSW	TSW	19	19	243	277.7
4	4		19	20	19	19		15	15	15	15	15	15		15	16		TSW	TSW	19	19	244	278.7
4	4		19	20	19	19		15	15	15	15	15	15		16	16		TSW	TSW	19	19	245	279.7
4	4		19	20	19	19		16	15	15	15	15	15		16	16		TSW	TSW	19	19	246	280.7
4	4		19	20	19	19		16	16	15	15	15	16		16	16		TSW	TSW	19	19	248	282.7
4	4		19	20	19	19		16	16	16	15	16	16		16	16		TSW	TSW	19	19	250	284.7
4	4		19	20	19	19		16	16	16	16	16	16		16	16		TSW	TSW	19	19	251	285.7
4	4		19	20	19	19		16	16	16	16	16	16		16	17		TSW	TSW	19	19	252	286.6
4	4		19	20	19	19		16	16	16	16	16	16		17	17		TSW	TSW	19	19	253	287.5
4	4		19	20	19	19		17	16	16	16	16	16		17	17		TSW	TSW	19	19	254	288.4
4	4		19	20	19	19		17	17	16	16	16	17		17	17		TSW	TSW	19	19	256	290.2
4	4		19	20	19	19		17	17	17	16	17	17		17	17		TSW	TSW	19	19	258	292.0
4	4		19	20	19	19		17	17	17	17	17	17		17	17		TSW	TSW	19	19	259	292.9
4	4		19	20	19	19		17	17	17	17	17	17		18	18		TSW	TSW	19	19	261	294.7
4	4		19	20	19	19		18	17	17	17	17	17		18	18		TSW	TSW	19	19	262	295.6
4	4		19	20	19	19		18	18	16	17	17	18		18	18		TSW	TSW	19	19	263	296.5
4	4		19	20	19	19		18	18	18	17	18	18		18	18		TSW	TSW	19	19	266	299.2
4	4		19	20	19	19		18	18	18	18	18	18		18	18		TSW	TSW	19	19	267	300.1
4	4		19	20	19	19		18	18	18	18	18	18		18	19		TSW	TSW	19	19	268	301.0
4	4		19	20	19	19		18	18	18	18	18	18		19	19		TSW	TSW	19	19	269	301.9
4	4		19	20	19	19		19	18	18	18	18	19		19	19		TSW	TSW	19	19	271	303.7
4	4		19	20	19	19		19	19	18	18	19	19		19	19		TSW	TSW	19	19	273	305.5

Table MCN-8-ALT. Alternative Interim Patterns w/ 13 Gates in Split-Leaf in Upstream Slot + Bays 1&2 (# Gate Stops per Spillbay)																						Total Stops (#)	Spill (kcfs)
1	2	3	4	5	6 ^b	7	8	9 ^b	10	11	12	13	14	15	16	17	18	19 ^c	20 ^c	21	22		
4	4		19	20	19	19		19	19	19	19	19	19		19	19		TSW	TSW	19	19	275	307.3
4	4		19	20	19	19		15	15	15	15	15	15		15	15	20	TSW	TSW	19	19	263	309.8
4	4		19	20	19	19		15	15	15	15	15	15		16	16	20	TSW	TSW	19	19	265	311.8
4	4		19	20	19	19		16	15	15	15	15	16		16	16	20	TSW	TSW	19	19	267	313.8
4	4		19	20	19	19		16	16	15	15	16	16		16	16	20	TSW	TSW	19	19	269	315.8
4	4		19	20	19	19		16	16	16	16	16	16		16	16	20	TSW	TSW	19	19	271	317.8
4	4		19	20	19	19		16	16	16	16	16	16		17	17	20	TSW	TSW	19	19	273	319.6
4	4		19	20	19	19		17	16	16	16	16	17		17	17	20	TSW	TSW	19	19	275	321.4
4	4		19	20	19	19		17	17	16	16	17	17		17	17	20	TSW	TSW	19	19	277	323.2
4	4		19	20	19	19		17	17	17	17	17	17		17	17	20	TSW	TSW	19	19	279	325.0
4	4		19	20	19	19		17	17	17	17	17	17		18	18	20	TSW	TSW	19	19	281	326.8
4	4		19	20	19	19		18	17	17	17	17	18		18	18	20	TSW	TSW	19	19	283	328.6
4	4		19	20	19	19		18	18	16	17	18	18		18	18	20	TSW	TSW	19	19	284	329.5
4	4		19	20	19	19		18	18	18	18	18	18		18	18	20	TSW	TSW	19	19	287	332.2
4	4		19	20	19	19		18	18	18	18	18	18		19	19	20	TSW	TSW	19	19	289	334.0
4	4		19	20	19	19		19	18	18	18	18	19		19	19	20	TSW	TSW	19	19	291	335.8
4	4		19	20	19	19		19	19	18	18	19	19		19	19	20	TSW	TSW	19	19	293	337.6
4	4		19	20	19	19		19	19	19	19	19	19		19	19	20	TSW	TSW	19	19	295	339.4
4	4		19	20	19	19		15	15	15	15	15	15	20	15	15	20	TSW	TSW	19	19	283	341.9
4	4		19	20	19	19		15	15	15	15	15	15	20	16	16	20	TSW	TSW	19	19	285	343.9
4	4		19	20	19	19		16	15	15	15	15	16	20	16	16	20	TSW	TSW	19	19	287	345.9
4	4		19	20	19	19		16	16	15	15	16	16	20	16	16	20	TSW	TSW	19	19	289	347.9
4	4		19	20	19	19		16	16	16	16	16	16	20	16	16	20	TSW	TSW	19	19	291	349.9
4	4		19	20	19	19		16	16	16	16	16	16	20	17	17	20	TSW	TSW	19	19	293	351.7
4	4		19	20	19	19		17	16	16	16	16	17	20	17	17	20	TSW	TSW	19	19	295	353.5
4	4		19	20	19	19		17	17	16	16	17	17	20	17	17	20	TSW	TSW	19	19	297	355.3
4	4		19	20	19	19		17	17	17	17	17	17	20	17	17	20	TSW	TSW	19	19	299	357.1
4	4		19	20	19	19		17	17	17	17	17	17	20	18	18	20	TSW	TSW	19	19	301	358.9
4	4		19	20	19	19		18	17	17	17	17	18	20	18	18	20	TSW	TSW	19	19	303	360.7
4	4		19	20	19	19		18	18	17	17	18	18	20	18	18	20	TSW	TSW	19	19	305	362.5
4	4		19	20	19	19		18	18	18	18	18	18	20	18	18	20	TSW	TSW	19	19	307	364.3
4	4		19	20	19	19		18	18	18	18	18	18	20	19	19	20	TSW	TSW	19	19	309	366.1
4	4		19	20	19	19		19	18	18	18	18	19	20	19	19	20	TSW	TSW	19	19	311	367.9
4	4		19	20	19	19		19	19	18	18	19	19	20	19	19	20	TSW	TSW	19	19	313	369.7
4	4		19	20	19	19		19	19	19	19	19	19	20	19	19	20	TSW	TSW	19	19	315	371.5
4	4	20	19	20	19	19		15	15	15	15	15	15	20	15	15	20	TSW	TSW	19	19	303	374.0
4	4	20	19	20	19	19		15	15	15	15	15	15	20	16	16	20	TSW	TSW	19	19	305	376.0
4	4	20	19	20	19	19		16	15	15	15	15	16	20	16	16	20	TSW	TSW	19	19	307	378.0
4	4	20	19	20	19	19		16	16	15	15	16	16	20	16	16	20	TSW	TSW	19	19	309	380.0
4	4	20	19	20	19	19		16	16	16	16	16	16	20	16	16	20	TSW	TSW	19	19	311	382.0
4	4	20	19	20	19	19		16	16	16	16	16	16	20	17	17	20	TSW	TSW	19	19	313	383.8

Table MCN-8-ALT. Alternative Interim Patterns w/ 13 Gates in Split-Leaf in Upstream Slot + Bays 1&2 (# Gate Stops per Spillbay)																						Total Stops (#)	Spill (kcfs)
1	2	3	4	5	6 ^b	7	8	9 ^b	10	11	12	13	14	15	16	17	18	19 ^c	20 ^c	21	22		
4	4	20	19	20	19	19		17	16	16	16	16	17	20	17	17	20	TSW	TSW	19	19	315	385.6
4	4	20	19	20	19	19		17	17	16	16	17	17	20	17	17	20	TSW	TSW	19	19	317	387.4
4	4	20	19	20	19	19		17	17	17	17	17	17	20	17	17	20	TSW	TSW	19	19	319	389.2
4	4	20	19	20	19	19		17	17	17	17	17	17	20	18	18	20	TSW	TSW	19	19	321	391.0
4	4	20	19	20	19	19		18	17	17	17	17	18	20	18	18	20	TSW	TSW	19	19	323	392.8
4	4	20	19	20	19	19		18	18	17	17	18	18	20	18	18	20	TSW	TSW	19	19	325	394.6
4	4	20	19	20	19	19		18	18	18	18	18	18	20	18	18	20	TSW	TSW	19	19	327	396.4
4	4	20	19	20	19	19		18	18	18	18	18	18	20	19	19	20	TSW	TSW	19	19	329	398.2
4	4	20	19	20	19	19		19	18	18	18	18	19	20	19	19	20	TSW	TSW	19	19	331	400.0
4	4	20	19	20	19	19		19	19	18	18	19	19	20	19	19	20	TSW	TSW	19	19	333	401.8
4	4	20	19	20	19	19		19	19	19	19	19	19	20	19	19	20	TSW	TSW	19	19	335	403.6
4	4	20	19	20	19	19	20	15	15	15	15	15	15	20	15	15	20	TSW	TSW	19	19	323	406.1
4	4	20	19	20	19	19	20	15	15	15	15	15	15	20	16	16	20	TSW	TSW	19	19	325	408.1
4	4	20	19	20	19	19	20	16	15	15	15	15	16	20	16	16	20	TSW	TSW	19	19	327	410.1
4	4	20	19	20	19	19	20	16	16	15	15	16	16	20	16	16	20	TSW	TSW	19	19	329	412.1
4	4	20	19	20	19	19	20	16	16	16	16	16	16	20	16	16	20	TSW	TSW	19	19	331	414.1
4	4	20	19	20	19	19	20	16	16	16	16	16	16	20	17	17	20	TSW	TSW	19	19	333	415.9
4	4	20	19	20	19	19	20	17	16	16	16	16	17	20	17	17	20	TSW	TSW	19	19	335	417.7
4	4	20	19	20	19	19	20	17	17	16	16	17	17	20	17	17	20	TSW	TSW	19	19	337	419.5
4	4	20	19	20	19	19	20	17	17	17	17	17	17	20	17	17	20	TSW	TSW	19	19	339	421.3
4	4	20	19	20	19	19	20	17	17	17	17	17	17	20	18	18	20	TSW	TSW	19	19	341	423.1
4	4	20	19	20	19	19	20	18	17	17	17	17	18	20	18	18	20	TSW	TSW	19	19	343	424.9
4	4	20	19	20	19	19	20	18	18	17	17	18	18	20	18	18	20	TSW	TSW	19	19	345	426.7
4	4	20	19	20	19	19	20	18	18	18	18	18	18	20	18	18	20	TSW	TSW	19	19	347	428.5
4	4	20	19	20	19	19	20	18	18	18	18	18	18	20	19	19	20	TSW	TSW	19	19	349	430.3
4	4	20	19	20	19	19	20	19	18	18	18	18	19	20	19	19	20	TSW	TSW	19	19	351	432.1
4	4	20	19	20	19	19	20	19	19	18	18	19	19	20	19	19	20	TSW	TSW	19	19	353	433.9
4	4	20	19	20	19	19	20	19	19	19	19	19	19	20	19	19	20	TSW	TSW	19	19	355	435.7
4	4	20	19	20	19	19	20	19	19	19	19	19	19	20	19	19	20	21	TSW	19	19	376	446.0
4	4	20	19	20	19	19	20	19	19	19	19	19	19	20	19	19	Free	21	21	19	19	397	456.3
4	4	20	19	Free	19	19	20	19	19	19	19	19	19	20	19	19	Free	21	21	19	19	377	486.4
4	4	20	19	Free	19	19	20	19	19	19	19	19	19	Free	19	19	Free	21	21	19	19	357	516.5
4	4	20	19	Free	19	19	Free	19	19	19	19	19	19	Free	19	19	Free	21	21	19	19	337	546.6
4	4	Free	19	Free	19	19	Free	19	19	19	19	19	19	Free	19	19	Free	21	21	19	19	297	606.8