

FISH OPERATIONS PLAN IMPLEMENTATION REPORT

June 2022

U.S. Army Corps of Engineers
Northwestern Division
Portland, OR.

Introduction

The U.S. Army Corps of Engineers (Corps) developed this report in accordance with the 2022 Fish Operations Plan¹ (2022 FOP). The 2022 FOP describes the Corps' planned operations for juvenile fish passage at its four lower Snake River and four lower Columbia River dams during the 2022 spring and summer fish migration seasons, generally April 3 through August 31. The 2022 FOP is consistent with spill operations for juvenile fish passage and the regional forum process for adaptive management and in-season management provisions outlined in the Record of Decision for the Columbia River System Operations Environmental Impact Statement (CRSO EIS ROD) dated September 28, 2020, CRSO Final EIS, 2020 National Marine Fisheries Service (NMFS) Columbia River System and U.S. Fish and Wildlife Service Biological Opinions (2020 BiOps)², the Extensions of the 2008 Columbia Basin Fish Accords (Accord Extensions)³, the Corps' requirements under the Endangered Species Act (ESA), and the ongoing consultation and communications with the relevant wildlife agencies to ensure consistency with the Act. The 2022 FOP also incorporates spill operations agreed to in the Term Sheet for Stay of Preliminary Injunction Motion and Summary Judgment Schedule (referred to as the 2022 Agreement)⁴ for the *NWF et al. v. NMFS et al.* (3:01-cv-00640-SI) litigation. Other project operations and water management actions not specifically addressed in this document will be consistent with other guiding operative documents, including the 2022 Water Management Plan (WMP), seasonal WMP updates, and the 2022 Fish Passage Plan (FPP).

This report describes the Corps' implementation of the 2022 FOP during the month of June. Information in this report includes the following:

- total flow: the total hourly river flow rate;
- generation flow: the hourly flow through the powerhouse units;
- target spill: the spill target for that hour (Table 1);

¹ The 2022 FOP was posted to the Technical Management Team (TMT) website on March 24, 2022 (<http://pweb.crohms.org/tmt/documents/fpp/2022/>).

² The Corps, in coordination with the other Action Agencies, and NMFS, employs the Regional Implementation Oversight Group (RIOG) and technical teams including the Technical Management Team (TMT) and Fish Passage Operations & Maintenance (FPOM) coordination group, to coordinate with state, tribal and other federal experts for recommendations for implementing operations consistent with the 2020 BiOps.

³ The 2020 Amendment to and 2018 Extension of the 2008 Columbia Basin Fish Accords are available at <https://www.salmonrecovery.gov/Partners/FishAccords.aspx>

⁴ 2022 Agreement: https://pweb.crohms.org/tmt/JointMotion_TermSheet_CourtOrder_OCT2021.pdf

- adjusted spill: the hourly spill level that can be achieved taking into consideration that spill may vary as a function of total river flow, forebay elevation and generator capacity, and is subject to routine operational adjustments that limit the ability to spill to the target spill (see 2022 FOP, Section 4.1);
- actual spill: the hourly flow over the spillway; and,
- resultant 12-hour average TDG for the tailwater at each project.

This report also provides information on issues and unanticipated or emergency situations that arose during implementation of the 2022 FOP in June 2022.

Data Reporting

I. For each project providing fish passage operations, this report contains a graph displaying the performance of the spring fish passage spill program for the month of June, with hourly spill, target spill, adjusted spill, generation, and total flows. The monthly graphs begin on June 1 and end on June 30 and reflect the following operations for the lower Snake River and the lower Columbia River projects:

- The black line represents the average hourly total river flow through the project in thousand cubic feet per second (kcfs).
- The orange line represents the average hourly generation flow through the powerhouse each hour in kcfs.
- The thin solid blue line represents the actual average hourly spill level through the spillway in kcfs.
- The dashed blue line represents the spill cap portion of the target spill estimated to reach the gas cap or target TDG.
- The thick light blue line represents the performance standard spill level portion of the target spill.
- The thick dark blue line represents the adjusted spill cap spill: the hourly spill cap level that can be achieved taking into consideration that spill may vary as a function of total river flow, forebay elevation, and generator capacity, and is subject to routine operational adjustments that limit the ability to spill to the target spill (2022 FOP section 4.1).

II. The average daily %TDG for the 12 highest hours for all projects is shown in the June 2022 Average Percent TDG Values Table (Table 4). Red numbers indicate that the project exceeded the %TDG cap - i.e. 125% (tailwater) on that day.

General Implementation Remarks

For all projects that spill for fish passage, the actual spill may vary from the adjusted spill due to various conditions as described below. When actual spill varied from adjusted spill levels during periods of voluntary spill, the change in spill level is described below in the June 2022 Spill Variance Table (Table 2).⁵ The Spill Variance Table includes average hourly data; but

⁵ Forced spill conditions shown in the graphs are not considered variances and are not reported in the Spill Variance Table. Forced spill conditions may result from lack of load, high river inflows that exceed available powerhouse

when spill varies from adjusted spill for a portion of an hour, it is characterized as a variance for a full hour. There are instances when the hourly adjusted spill levels are not achievable due to mechanical limitations in setting spill gates to implement the regionally coordinated spill pattern. The project operator sets the spill gate stops to most closely approximate the adjusted spill to the extent practicable. Other routine activities that changed spill levels, which were coordinated with regional partners, are identified in the monthly Pre-Coordinated Operations Table (Table 3).

"Low flow" operations at the lower Columbia and lower Snake projects are triggered when inflow is insufficient to provide both minimum generation and the target spill levels. For this report, the decrease in target spill is represented as adjusted spill. In these situations, the projects operate at minimum generation and pass the remainder of project inflow as spill and through other routes, such as fish ladders, sluiceways, and navigation locks. As flows transition from higher flows to low flows, there may be situations when flows recede at a higher rate than forecasted. In addition, inflows provided by nonfederal projects upstream are variable and uncertain.

The combination of these factors may result in instances when unanticipated changes to inflow result in forebay elevations dropping to the low end of the Minimum Operating Pool (MOP). Since these projects have limited operating flexibility, maintaining minimum generation, MOP elevation, and the target spill may not be possible throughout every hour.

Actual spill levels at Corps projects may vary up to ± 2 kcfs within the hour (except as otherwise noted in the 2022 FOP for Bonneville and The Dalles dams,⁶ which may range up to ± 3 kcfs) as compared to a target spill. A number of factors influence actual spill, including hydraulic efficiency, exact gate opening calibration, spillway gate hoist cable stretch due to temperature changes, and forebay elevation (e.g. a higher forebay results in a greater level of spill since more water can pass under the spill gate). Transition periods between gas cap spill and performance standard spill hours may result in actual hourly spill levels that are slightly higher or lower than target spill levels. Occurrences requiring an adjustment in operations and/or regional coordination are described in greater detail in the "Operational Adjustments" section below.

June Operations

The month of June was characterized by above average precipitation and flows for the lower Snake and lower Columbia rivers. The June 2022 observed precipitation was 107% of average on the Snake River above Ice Harbor and 132% of average on the Columbia River above The Dalles⁷. The NOAA Northwest River Forecast Center runoff summary for June indicated that the adjusted runoff for the Snake River at Lower Granite was 146% of the 30-year average (1991-2020) with a volume of 8.3 MAF (Million acre-feet). The June 2022 adjusted runoff for the Columbia River at The Dalles was 146% of the 30-year average (1981-2010) with a volume of 37.6 MAF.⁸

capacity, scheduled or unscheduled turbine unit outages or transmission outages of various durations, passing debris, etc.

⁶ As specified in the 2022 FOP Section 3.

⁷ Retrieved July 3, 2022: https://www.nwrfc.noaa.gov/water_supply/wy_summary/wy_summary.php?tab=5

⁸ Retrieved July 3, 2022: https://www.nwrfc.noaa.gov/runoff/runoff_summary.php

Spring spill operations occur April 3–June 20 at the four lower Snake River projects, and April 10–June 15 at the four lower Columbia River projects. The Corps initiates spill at 0001 hours, or shortly after midnight, at each of the projects on the start date. Target spill levels for spring 2022 at each project are defined in Table 1. If deleterious impacts of the proposed spill operations are observed in-season, existing adaptive management processes may be employed to address the cause of the impacts. Spill may be temporarily reduced at any project to ensure navigation safety or transmission reliability. In order to operate consistently with state water quality standards, spill may also be reduced if observed GBT levels exceed those identified in state water quality standards (See [WASH. ADMIN. CODE § 173-201A-200\(l\)\(f\)\(ii\)\(B\)\(III\)](#) and *Order Approving a Modification to the Oregon’s Water Quality Standard for Total Dissolved Gas in the Columbia River Mainstem*, page 5).

Spill up to the 125% Gas Cap is spill to the maximum level that meets, but does not exceed, the TDG criteria allowed under state laws. This includes a criterion for not exceeding 126% TDG for the average of the two greatest hourly values within a day.

Table 1: Summary of 2022 spring target spill levels at lower Snake River (April 3 – June 20) and lower Columbia River (April 10 – June 15) projects.

PROJECT	SPRING SPILL DATES	SPRING SPILL OPERATION
Lower Granite ^{A, C}	April 3 until adult criteria met (no later than April 24)	24 hours/day: 125% Gas Cap
	Adult criteria met (no later than April 24) – June 20	16 hours/day: 125% Gas Cap 8 hours/day: 20 kcfs Performance Standard
Little Goose ^{B, C}	April 3 – June 20	16 hours/day: 125% Gas Cap 8 hours/day: 30% Performance Standard
Lower Monumental ^{A, C}	April 3 until adult criteria met (no later than April 24)	24 hours/day: 125% Gas Cap
	Adult criteria met (no later than April 24) – June 20	16 hours/day: 125% Gas Cap 8 hours/day: 30 kcfs Performance Standard
Ice Harbor	April 3 – June 20	24 hours/day: 125% Gas Cap
McNary	April 10 – June 15	24 hours/day: 125% Gas Cap
John Day ^D	April 10 – June 15	16 hours/day: 125% Gas Cap 8 hours/day: 32% Performance Standard
The Dalles ^E	April 10 – June 15	24 hours/day: 40% Performance Standard
Bonneville ^F	April 10 – June 15	24 hours/day: 125% Gas Cap

- A. Lower Granite and Lower Monumental Adult Criteria – Within 1 business day of when the earliest of the following conditions occurs: (1) a cumulative total of 25 adult spring Chinook salmon (not including jacks) pass Lower Monumental Dam; or (2) a cumulative total of 50 adult spring Chinook salmon (not including jacks) pass Ice Harbor Dam; or (3) April 24, 2022, the Corps will implement performance standard spill for 8 consecutive AM hours, 0400–1200, to target hours of peak adult passage. If lack of load conditions preclude the implementation of performance standard spill during the targeted AM period, performance standard spill will begin as soon as practicable during AM hours and continue for up to 8 consecutive hours.
- B. Little Goose Adult Criteria – Within 1 business day of a cumulative total of 25 adult spring Chinook salmon (not including jacks) passing Lower Monumental Dam, the Corps will implement performance standard spill at Little Goose Dam for 8 consecutive AM hours (April 3–15 starting at 0500 hours; April 16–June 20 starting at 0400 hours) to target hours of peak adult passage. If lack of load conditions preclude the implementation of performance standard spill during the targeted periods, performance standard spill will begin as soon as practicable during AM hours and continue for up to 8 consecutive hours.
- C. During periods of high river flow that exceeds powerhouse hydraulic capacity, implementing performance standard spill for 8 consecutive hours as described in Footnotes A and B may result in storing additional inflow in the forebay above MOP. If it is necessary to pond water to achieve the 8-hour block of performance standard spill during high inflow, water stored above MOP should be drafted out over the remaining hours by increasing spill to pass inflow from 1200-1600 hours, then increasing spill as necessary from 1600-0400 to draft the pool back to MOP. If it is forecasted that the drafting spill will result in exceeding 130% TDG in the tailrace, all 16 hours will be used to return the pool to MOP.
- D. John Day Dam – The 8 hours/day of performance standard spill may occur with some flexibility, in either a single 8-hour block or two separate blocks per calendar day. Performance standard spill will not be implemented between 2200-0300 hours.
- E. The Dalles Dam –TDG in The Dalles tailrace may fluctuate up to 125% prior to reducing spill at upstream projects or reducing spill at The Dalles below 40%. Maintain 40% spill for 24 hours at The Dalles and reduce John Day spill below the 125% TDG spill cap as needed for TDG management.
- F. Bonneville Dam – Spill for fish passage should not exceed 150 kcfs due to erosion concerns.

Summer spill operations occur June 21–August 31 at the four lower Snake River projects, and June 16–August 31 at the four lower Columbia River projects. The Corps initiates spill at 0001 hours, or shortly after midnight, at each of the projects on the start date. Target spill levels for summer 2022 at each project are defined in Table 2. At the Snake River Projects spill may range up to ±1 kcfs during the summer spill operation from August 15 – August 31.

Table 2: Summary of 2022 summer target spill levels at lower Snake River and lower Columbia River projects.

PROJECT	SUMMER SPILL^A (June 21/16 – August 14) (24 hrs/day)	SUMMER SPILL^A (August 15 – August 31) (24 hrs/day)
Lower Granite ^B	18 kcfs	SW flow (as river flow allows)
Little Goose ^{B, C}	30%	SW flow or 9 kcfs spill
Lower Monumental ^{B, D}	17 kcfs	SW flow or 8 kcfs spill

Ice Harbor ^{B, E}	30%	SW flow or 9 kcfs spill
McNary	57%	20 kcfs
John Day	35%	20 kcfs
The Dalles	40%	30%
Bonneville	95 kcfs	50 kcfs

A. Spill may be temporarily reduced below the FOP target summer spill level at any project if necessary to ensure navigation safety or transmission reliability, or to avoid exceeding State TDG standards.

B. Late summer spill August 15-August 31 will be through the SW or a constant spill rate through conventional spillbays using the appropriate FPP spill pattern. The SW spill rate is a function of forebay elevation (as pool elevation increases, more water is spilled over the SW), as defined in the FPP. The SWs will be operated per FPP criteria and closed when low flow criteria are met. When the SW is closed, the spill target will transition to a constant spill rate through conventional spillbays and will not vary with a fluctuating forebay elevation.

C. Flow corresponds to the SW high-crest position and a forebay elevation of 635.5 feet, the mid-point of the forebay range from 633-638 feet.

D. Flow corresponds to a forebay elevation of 538.5 feet, the mid-point of the forebay range from 537-540 feet.

E. Flow corresponds to a forebay elevation of 438.5 feet, the mid-point of the forebay range from 437-440 feet.

In its implementation of the 2022 FOP in June, the Corps evaluated conditions every day to establish spill caps at a level that was estimated to meet, but not exceed, the gas cap or target TDG in the tailrace (see Table 4).⁹ This evaluation considered: environmental conditions (e.g., river flow, wind, water temperature, barometric pressure, incoming TDG from upstream, and water travel time) and project operations (e.g., spill level, spill pattern, tailwater elevation, proportion of flow through the turbines, and project configuration).

⁹ See 2022 FOP, Section 2.2

Operational Adjustments

1. McNary Dam

McNary Dam's spillway weirs in bays 19 and 20 provide a surface passage route during spring spill for juvenile fish passage, April 10 through June 7, per the 2022 FOP section 8.5.1 and FPP section 2.3.2.6. Due to late spring high flows this year, the decision to keep both spillway weirs in service after June 7 until flows drop below 300 kcfs was coordinated with regional salmon managers via FPOM¹⁰. The intent of this operation is to avoid causing high TDG that would occur if spillbays 14–21 are closed for up to 5 days to remove the spillway weirs during high flows. This operation was coordinated with FPOM at the meeting on June 9.

2. Lower Granite, Lower Monumental, and Ice Harbor Dams

From June 11 through June 20, operations at Lower Granite, Lower Monumental, and Ice Harbor dams were modified to improve adult fish passage conditions during high flows, as coordinated with TMT at the June 10 meeting. The objective of the modifications was to reduce the magnitude of daily flow fluctuations in the lower Snake River by increasing the performance standard spill target at Lower Granite and Lower Monumental and increasing the reservoir storage space at Ice Harbor. The coordinated modified operations were as follows:

- Ice Harbor: expand the forebay operating range from MOP (437–438.5 feet) to the full normal operating range (437–440 feet).
- Lower Monumental: increase performance standard spill from 30 kcfs to up to 40% of outflow.
- Lower Granite: increase performance standard spill from 20 kcfs to up to 40% of outflow.

¹⁰ FPOM Memo of Coordination (MOC) 22MCN09:
https://pweb.crohms.org/tmt/documents/FPOM/2010/2022_FPOM_MEET/2022_JUN/22%20MCN%2009%20MOC%20Delay%20Removing%20TSWs.pdf

Table 3: Spill Variance Table – June 2022

Project	Parameter	Date	Time¹¹	# of Hours	Type	Reason
Lower Granite	Reduced Spill	6/5 6/17	2400 0200-0300	1 2	Human Error	Hourly spill decreased to 77 kcfs (less than adjusted spill target of 80 kcfs) due to a delay in changing spill gate openings in response to lower forebay elevation.
Little Goose	Additional Spill	6/27	1700	1	Program Error	Hourly spill increased to 32% (greater than adjusted spill target of 30%) due to an incorrect reading for spill bay gate 2.
Little Goose	Additional Spill	6/28	1700	1	Maintenance	Hourly spill increased to 35% (greater than adjusted spill target of 30%) due to an unscheduled outage of Unit 3.
Ice Harbor	Additional Spill	6/16	1700	1	Maintenance	Hourly spill increased to 116 kcfs (greater than adjusted spill target of 110 kcfs) due to an unscheduled outage of Unit 5.
Ice Harbor	Reduced Spill	6/17	1000, 1300	2	Human Error	Hourly spill decreased to 107 kcfs (less than adjusted spill target of 110 kcfs) due to a delay in changing spill gate openings in response to lower forebay elevation.
Ice Harbor	Additional Spill	6/29	1500	1	Maintenance	Hourly spill increased to 32% (greater than adjusted spill target of 30%) due to an unscheduled outage of Unit 5.

¹¹ Note: Data collected for reporting spill variances is reported using hourly-averaged data. Therefore, while spill may be increased or decreased for only a portion of an hour, it is represented in the Spill Variance Table as an hour.

Table 4: Pre-Coordinated Operations – June 2022

Project	Parameter	Date	Time ¹²	# of Hours	Type	Reason
Lower Granite	Reduced Spill	6/15	0700-0900	3	Navigation	Hourly spill decreased to between 70 and 74 kcfs (less than adjusted spill target of 80 kcfs) for safe navigation. Regionally coordinated via 2022 FOP, Sections 4.1 and 4.6.
Lower Granite	Reduced Spill	6/15	1500	1	Debris Spill	Hourly spill was decreased to 76 kcfs (less than adjusted spill target of 80 kcfs) when spill flow was re-directed through spill bay 1 to pass debris. Regionally coordinated via 2022 FPP, page LWG-36, Section 5.
Lower Monumental	Reduced Spill	6/1	1800-2000	3	Navigation	Hourly spill decreased to between 23 and 100 kcfs (less than adjusted spill target of 49 to 104 kcfs) for safe navigation. Regionally coordinated via 2022 FOP, Sections 4.1 and 4.6.
		6/3	1700-1900	3		
		6/5	1800-1900	2		
		6/9	1700-1900	3		
Lower Monumental	Additional Spill	6/7	1500-1600	2	Maintenance	Hourly spill increased to 113 kcfs (greater than adjusted spill target of 102 kcfs) while performing a fish screen inspection. Regionally coordinated via 2022 FPP, page LMN-12, Section 2.3.2.2.
McNary	Reduced Spill	6/3	0400	1	Transmission Reliability	Hourly spill was 226 kcfs (less than adjusted spill target of 239 kcfs) due to an increase in generation to deploy reserves. Regionally coordinated via 2022 FOP, Section 4.4.1.
John Day	Reduced Spill	6/1	1300	1	Navigation	Hourly spill decreased to between 172 and 223 kcfs (less than adjusted spill target of 195 to 231 kcfs) for safe navigation. Regionally coordinated via 2022 FOP, Sections 4.1 and 4.6.
		6/2	2400	1		
		6/3	0900, 1100	2		
		6/4	0400-0500, 1300-1400, 2400	5		
		6/5	0700	1		
		6/6	0700-0800, 1100	3		
		6/7	0300-0400, 0700-0800	4		
		6/8	0100, 0300, 0700	3		
		6/9	1400-1500, 2400	3		
		6/10	1000-1100, 1500, 1700	4		
		6/11	0500-0600	2		
6/14	0600, 1300, 1600, 1900	4				
6/15	1800	1				
The Dalles	Additional Spill	6/3	0300	1	Transmission Reliability	Hourly spill increased to 42% (greater than adjusted spill target of 40% ± 1%) to provide reserves. Regionally coordinated via 2022 FOP, Section 4.4.1.

¹² Note: Data collected for reporting spill variances is reported using hourly-averaged data. Therefore, while spill may be increased or decreased for only a portion of an hour, it is represented in the Pre-Coordinated Operations Table as an hour.

Table 5: June 2022 Average Percent TDG Values Table

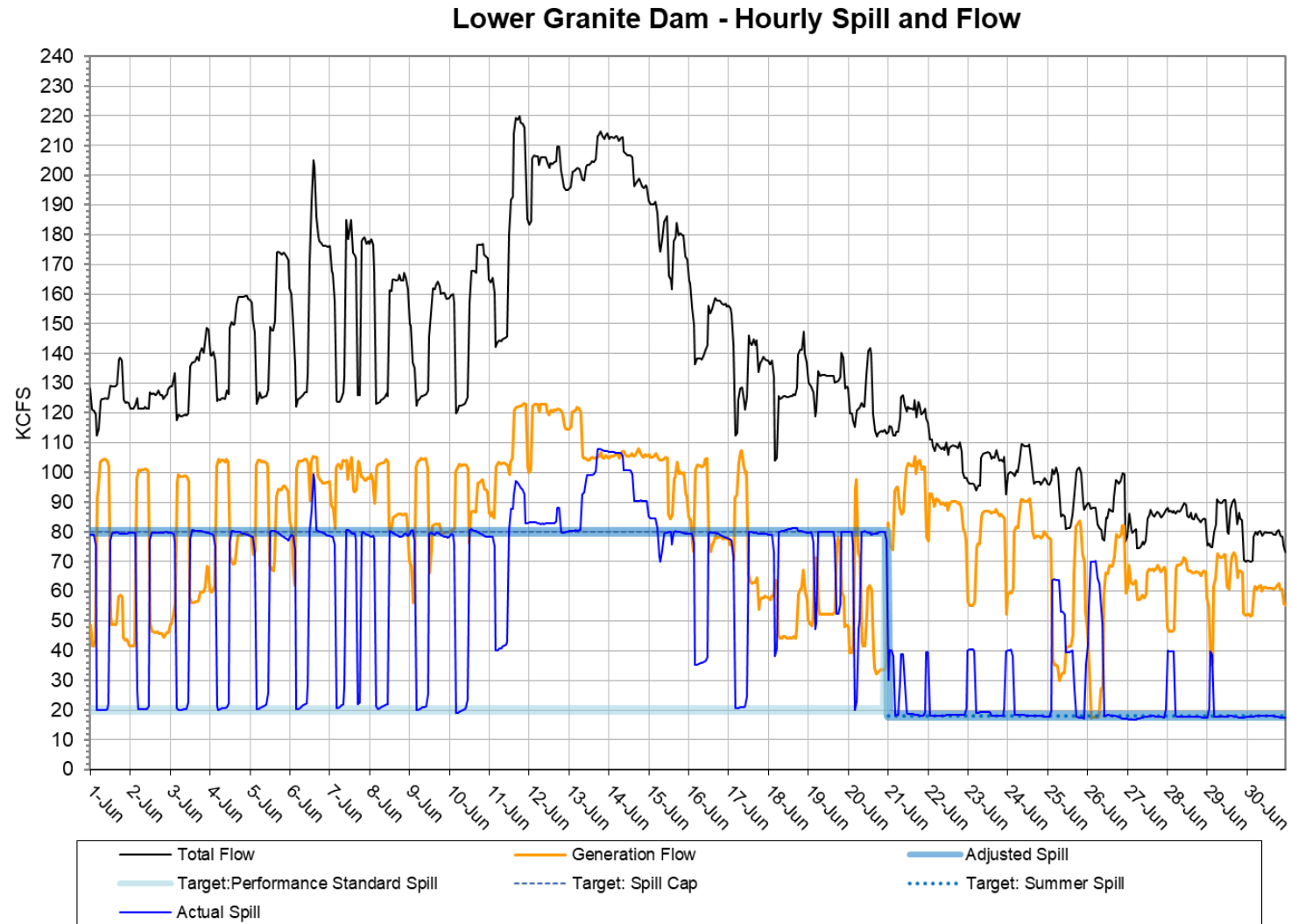
Station:	LWG	LGNW	LGSA	LGSW	LMNA	LMNW	IHRA	IDSW	MCNA	MCPW	JDY	JHAW	TDA	TDDO	BON	CCIW
Gas Cap %:	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115	120
6/1/2022	105	125	120	125	• ¹³	124	123	126	116	124	113	125	126	127	123	124
6/2/2022	106	125	121	125	•	124	124	126	117	124	119	125	126	127	125	124
6/3/2022	106	125	120	126	•	125	123	126	118	125	123	125	125	126	124	124
6/4/2022	105	125	120	126	•	126	123	126	117	125	123	125	126	127	124	124
6/5/2022	104	125	120	127	•	126	123	126	116	125	123	126	125	126	124	124
6/6/2022	104	125	117	129	•	126	122	128	113	125	119	126	122	125	121	124
6/7/2022	104	124	117	129	•	128	123	127	115	125	119	126	124	127	122	123 ¹⁴
6/8/2022	105	125	119	127	•	126	124	125	116	124	118	126	122	125	124	124
6/9/2022	106	125	118	126	•	126	124	125	118	125	120	126	122	126	124	124
6/10/2022	105	125	118	128	•	125	123	125	117	125	121	126	121	125	124	126
6/11/2022	105	• ¹⁵	118	129	•	127	122	130	117	125	121	127	121	124	123	127
6/12/2022	106	•	118	129	•	127	124	132	116	126	120	127	122	124	122	127
6/13/2022	105	•	118	128	•	127	122	130	113	125	116	126	117	122	118	127
6/14/2022	105	•	116	129	•	127	121	130	111	126	111	125	116	122	118	126
6/15/2022	108	•	121	128	131	127	125	127	114	128	111	126	118	123	122	126
6/16/2022	109	•	122	127	131	126	125	125	116	128	113	125	118	124	122	127
6/17/2022	108	•	122	126	128	125	125	125	118	128	118	125	118	125	123	126
6/18/2022	105	•	118	125	126	124	122	125	116	126	118	125	118	125	120	126
6/19/2022	103	•	117	125	124	124	120	125	115	125	116	124	118	123	121	126
6/20/2022	103	•	119	124	125	124	120	125	116	125	115	124	116	123	119	125
6/21/2022	104	•	120	120	124	118	121	119	118	125	118	125	121	125	122	125
6/22/2022	106	•	122	118	125	122	122	119	121	125	120	122	119	124	124	125
6/23/2022	107	•	120	116	122	121	121	117	121	124	121	123	119	124	120	124
6/24/2022	106	•	112	115	119	120	119	117	119	124	121	123	121	125	122	124
6/25/2022	104	•	110	118	116	119	118	118	119	124	120	123	122	126	124	124
6/26/2022	105	•	111	119	116	117	117	118	120	124	122	123	122	126	125	124
6/27/2022	106	•	114	115	119	119	118	117	122	125	123	122	122	125	125	124
6/28/2022	105	113	116	115	120	119	118	116	121	124	122	123	119	123	122	123
6/29/2022	104	111	112	113	114	118	115	116	117	123	119	121	118	124	120	124
6/30/2022	104	109	111	112	114	118	115	116	119	122	117	121	119	122	120	125
Exceedances:			4	15	12	14	8	12	14	18	13	25	18	22	15	21

¹³ The Lower Monumental forebay (LMNA) sonde failed on May 23, but the issue was not discovered until a maintenance visit on June 13.

¹⁴ The Bonneville tailwater (CCIW) real-time gauge was replaced with a data logger on June 7 due to high flows (per the MFR dated 14 April 2019). The real-time gauge was re-installed on June 22.

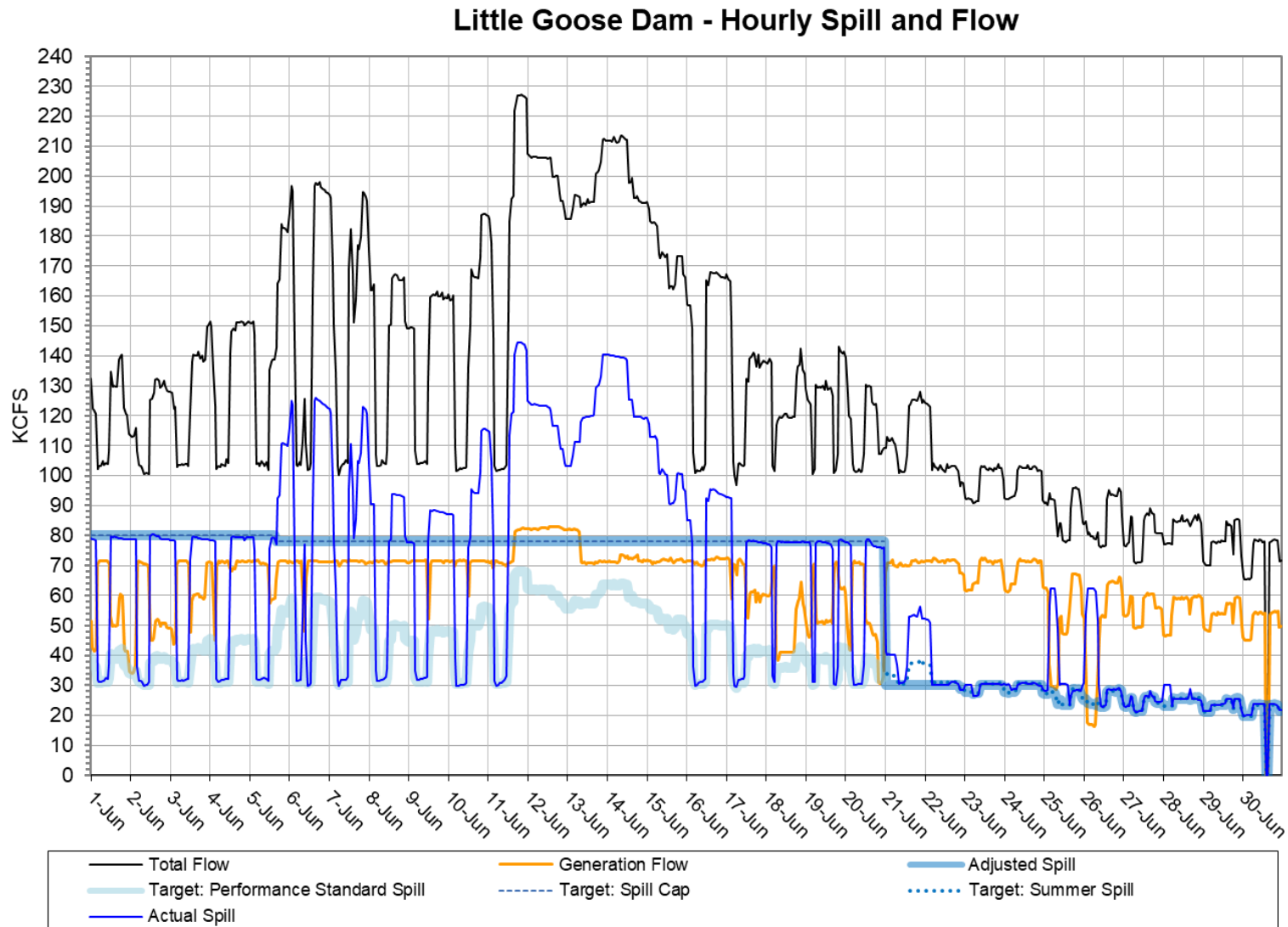
¹⁵ The Lower Granite tailwater gauges (LGNW) was washed out during high flows. A temporary gauge was deployed from the shore; however, incoming values were deleted as the depth of the sonde was deemed too shallow. The temporary gauge was re-deployed on June 27 at a depth of approximately 20 ft. The station will be rebuilt at the end of FY 2022.

Figure 1¹⁶



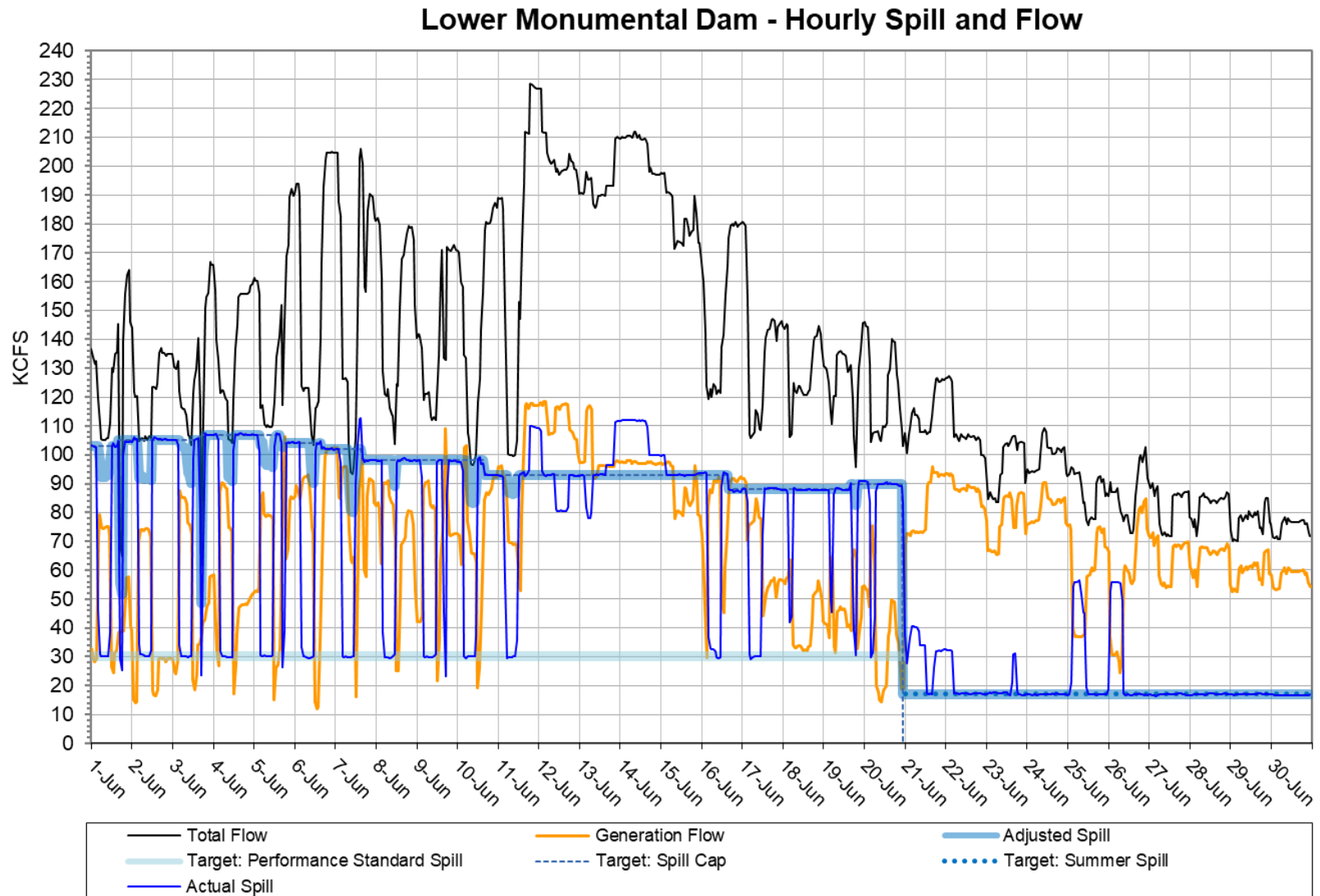
¹⁶ The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 2¹⁷



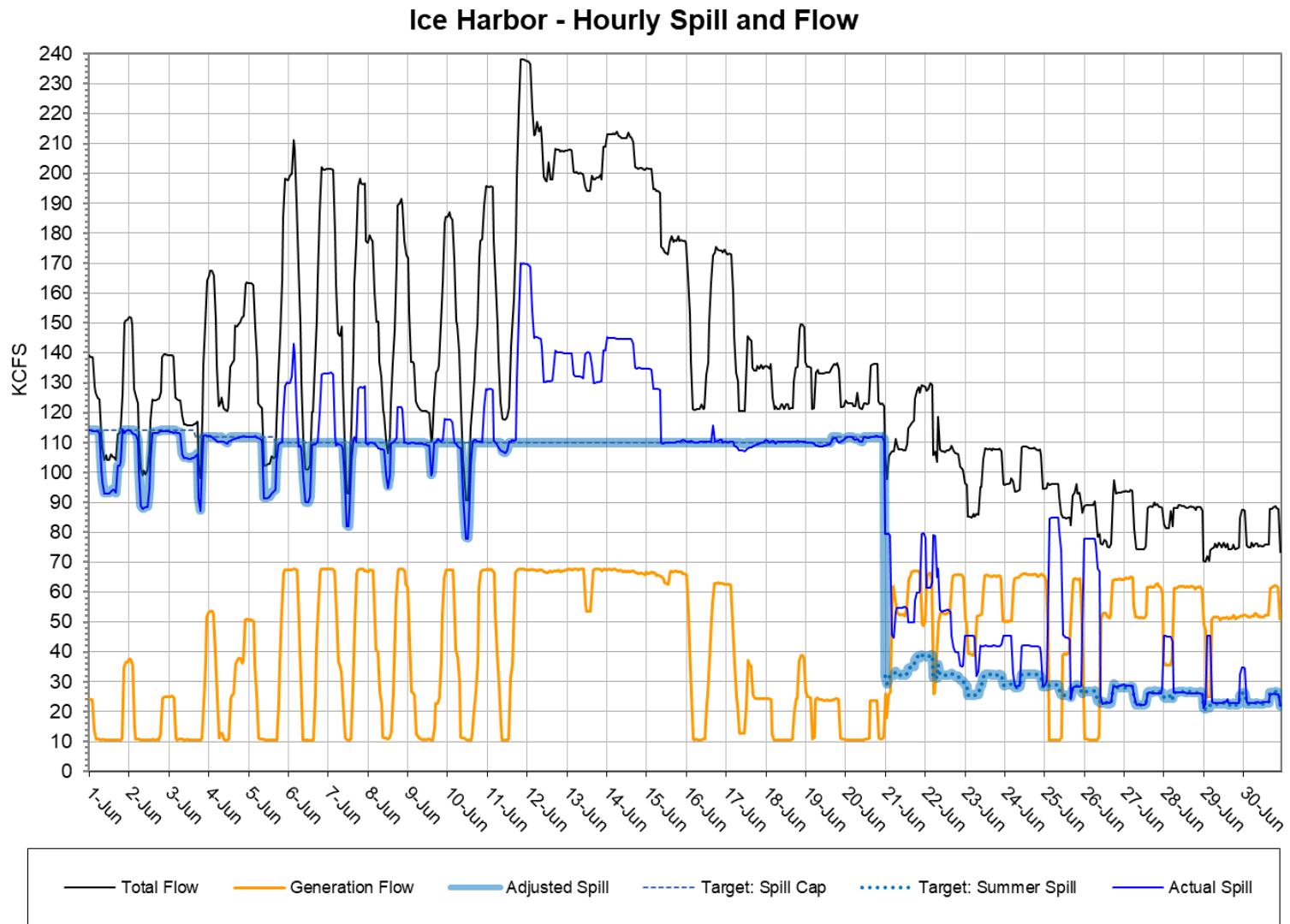
¹⁷ The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 3¹⁸



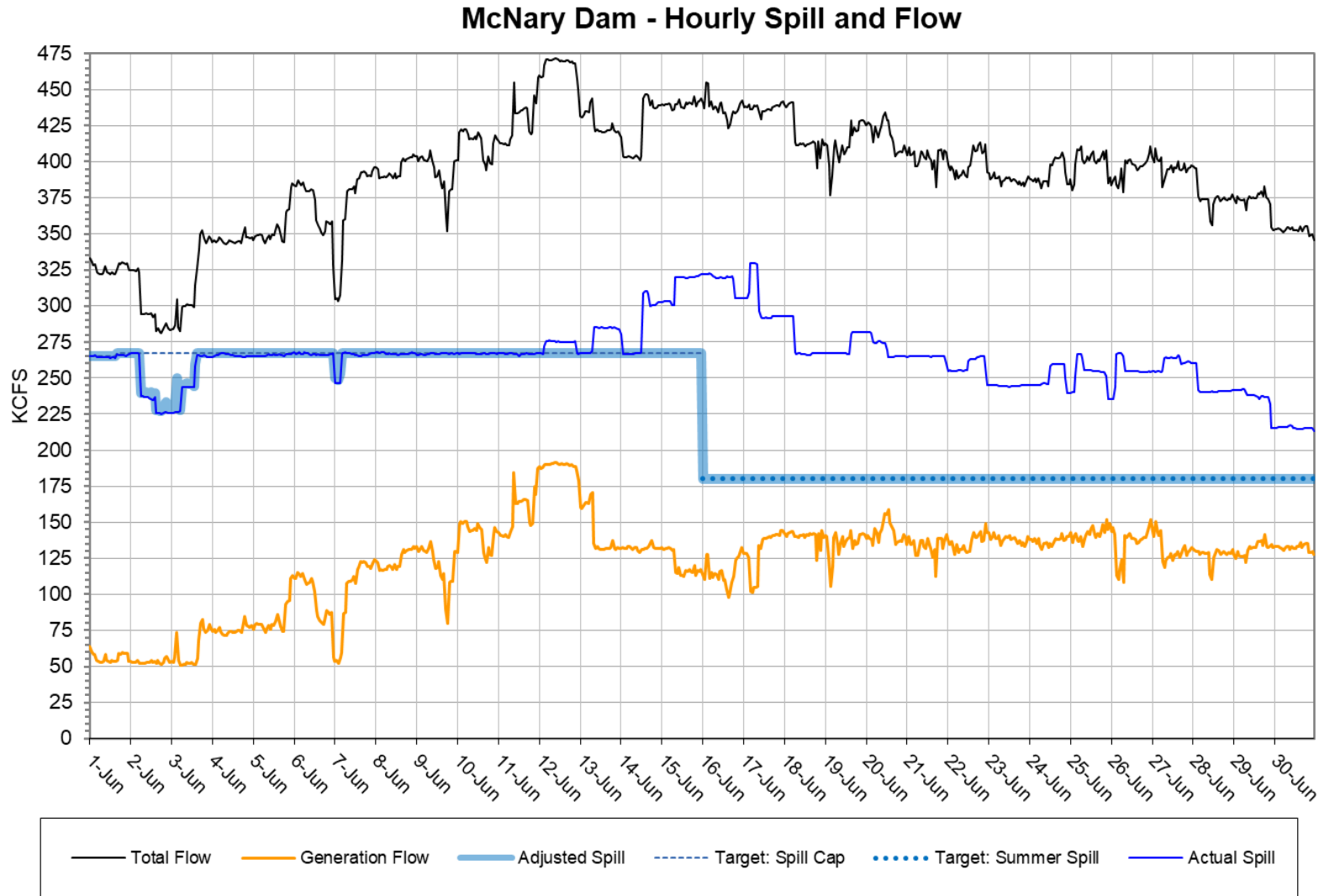
¹⁸ The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 4¹⁹



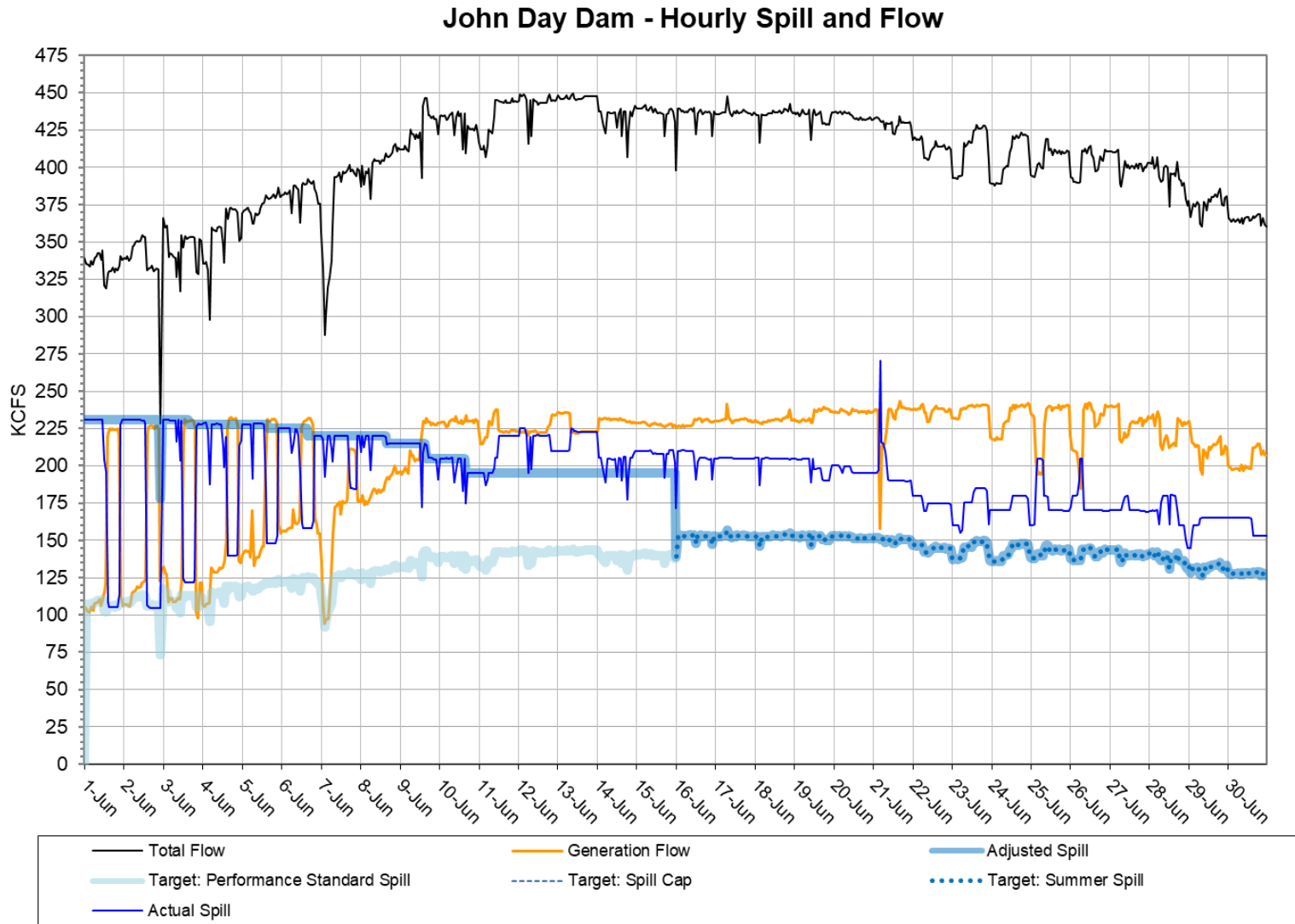
¹⁹ The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 5²⁰



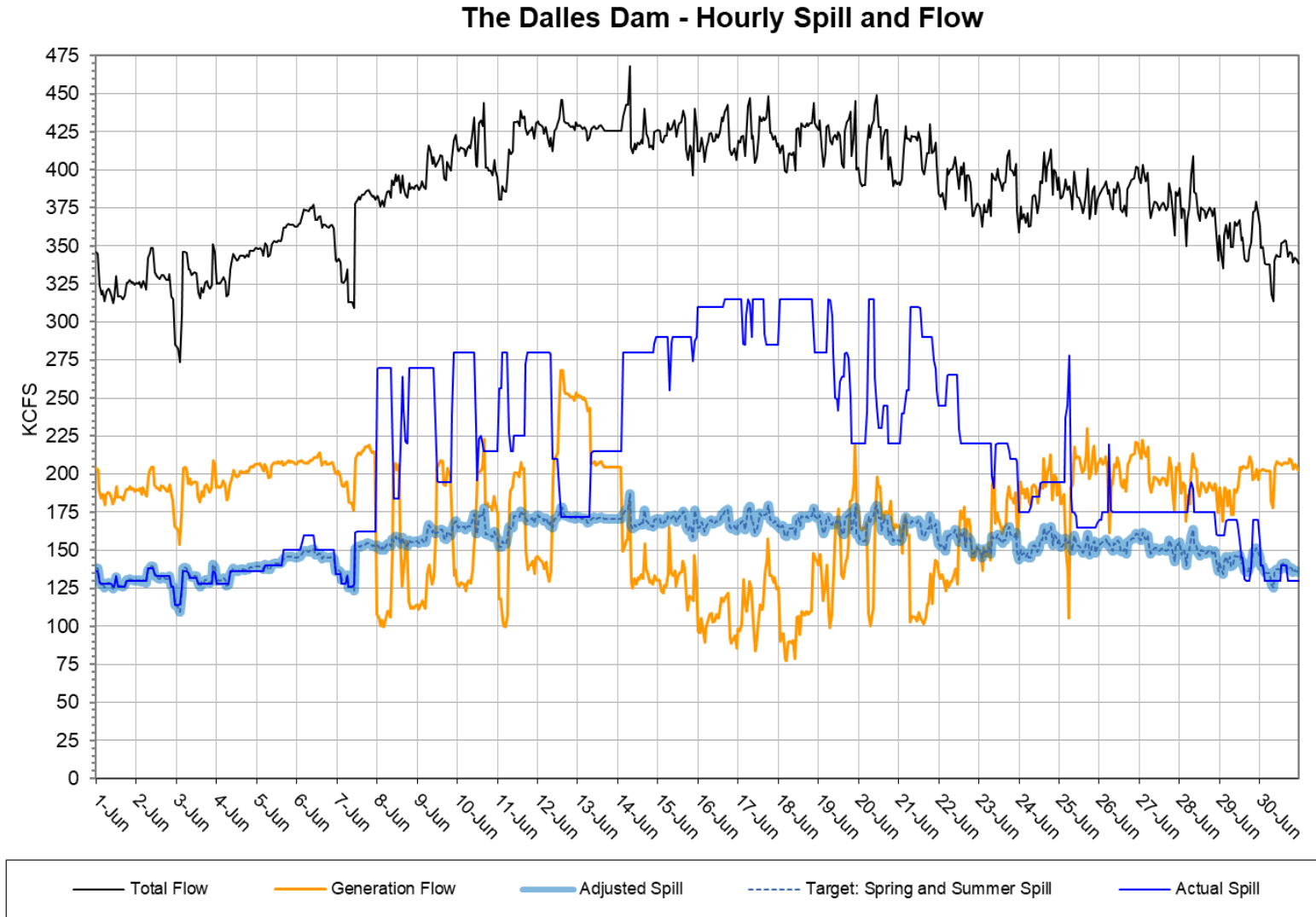
²⁰ The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 6²¹



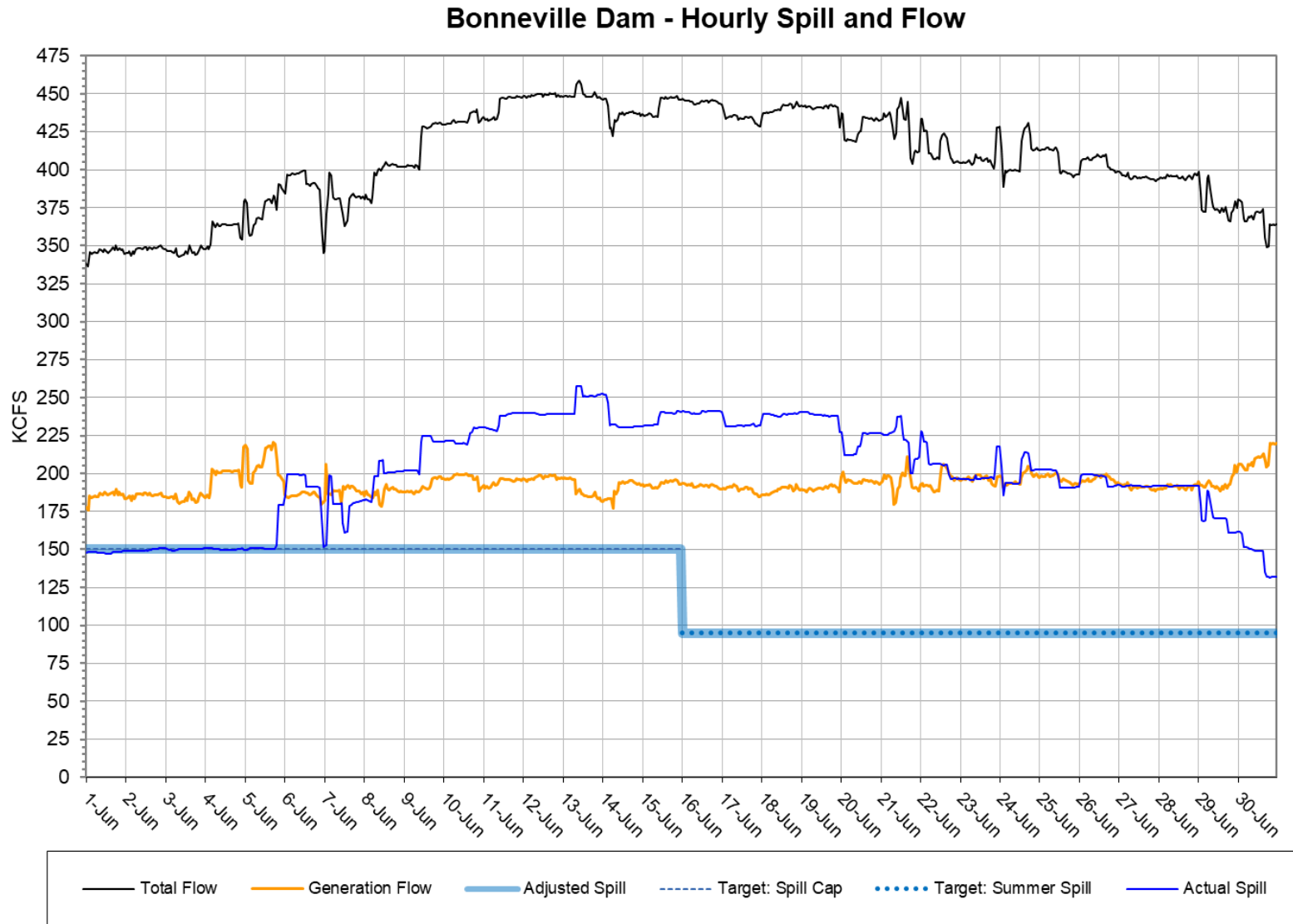
²¹ The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 7²²



²² The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 8²³



²³ The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.