FISH OPERATIONS PLAN IMPLEMENTATION REPORT

June 2023

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 2023 Fish Operations Plan[1] (2023 FOP). The 2023 FOP describes the Corps' planned operations for juvenile fish passage at its four lower Snake River and four lower Columbia River dams during the 2023 spring and summer fish migration seasons, generally April 3 through August 31. The 2023 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 2023 FOP also incorporates spill operations agreed to in the Term Sheet for Stay of Preliminary Injunction Motion and Summary Judgment Schedule[4] for the *NWF et al. v. NMFS et al.* (3:01-cv-00640-SI) litigation, as extended and modified through the Administration's Commitments in Exhibit 2 of the Joint Motion to Extend the Litigation Stay filed August 4, 2022 (referred to collectively as 2022 Agreement). Other project operations and water management actions not specifically addressed in this document will be consistent with other guiding operative documents, including the 2023 Water Management Plan (WMP), seasonal WMP updates, and the 2023 Fish Passage Plan (FPP).

[1] The 2023 FOP was posted to the Technical Management Team (TMT) website on March 27, 2023 (http://pweb.crohms.org/tmt/documents/fpp/2023/).

[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

This report describes the Corps' implementation of the 2023 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);
- 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 2023 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 2023 FOP in June 2023.

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 (2023 FOP section 4.1).

II. The average daily %TDG for the 12 highest hours for all projects is shown in the June 2023 Average Percent TDG Values Table (Table 5). 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 2023 Spill Variance Table (Table 3).[5] The Spill Variance Table includes average hourly data; but 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 4).

"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 2023 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.

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

[6] As specified in the 2023 FOP Section 3.

June Operations

The month of June was characterized by above average precipitation and below average flows for the lower Snake and lower Columbia rivers. The June 2023 observed precipitation was 156% of average on the Snake River above Ice Harbor and 111% of average on the Columbia River above The Dalles.[7] The NOAA Northwest River Forecast Center runoff summary for June indicated that the adjusted runoff for the Snake River at Lower Granite was 79% of the 30-year average (1991-2020) with a volume of 4.5 MAF (Million acre-feet). The June 2023 adjusted runoff for the Columbia River at The Dalles was 60% of the 30-year average (1991-2020) with a volume of 15.4 MAF.[8]

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 2023 at each project are defined in Table 1 (Table 3 in the 2023 FOP). 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.

[7] Retrieved July 5, 2023: https://www.nwrfc.noaa.gov/water_supply/wy_summary/wy_summary.php?tab=5
[8] Retrieved July 5, 2023: https://www.nwrfc.noaa.gov/runoff/runoff_summary.php

Table 1.– Summary of 2023 spring target spill levels at lower Snake River (April 3 – June 20) and lower Columbia River (April 10 – June 15) projects (Table 3 in the 2023 FOP).

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: 40%
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, 2023, the Corps will implement 20 kcfs performance standard spill, up to 40% spill to manage high flows, at Lower Granite and 40% spill at Lower Monumental for 8 consecutive AM hours, 0400–1200, to target hours of peak adult passage. If lack of load conditions precludes the implementation of 20 kcfs performance standard spill at Lower Granite and 40% spill at Lower Monumental during the targeted AM period, those blocks will begin as soon as practicable during AM hours and continue for up to 8 consecutive hours. If a second block is needed, it will start as soon as load conditions allow, continue for at least two consecutive hours, and conclude no later than 2000. During periods of high river flow, the 8-hour Lower Granite performance standard spill may increase from 20 kcfs up to 40% of total river outflow if needed to improve conditions to meet performance standard blocks.

B. Little Goose – The 8 hours of performance standard spill will occur between the hours of 0300 and 2200 in one or two blocks per calendar day. 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. If a second block is needed, it will start as soon as load conditions allow, continue for at least two consecutive hours, and conclude no later than 2000.

C. During periods of high river flow that exceeds powerhouse hydraulic capacity, implementing 8 consecutive hours of spill 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 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. In lack of load conditions performance standard spill blocks will be prioritized at Little Goose, Lower Monumental, and Lower Granite dams, in that order.

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. Spill above 40%, up to 125% TDG, may occur for TDG management or for carrying reserves.

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 2023 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 2023 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 7 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 [F]	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 surface weir (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 elevation as adjusted relative to the forebay operating range (see FPP Chapter 8, section 2.3.2.7).
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.
F. From June 16-August 14, McNary will adjust spill once a day to 57% of the previous day's average project outflow. The intent is to reduce the frequency of spillgate changes while implementing a more uniform pattern to the extent it can be done safely (see FPP Chapter 5, section 2.2.1.1).

In its implementation of the 2023 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 5).[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 2023 FOP, Section 2.2

Operational Adjustments

1. Lower Snake River

On May 30, the incidence of gas bubble trauma (GBT) exceeded the State of Washington's action criterion threshold of 15 percent GBT in non-paired fins at 15.4 percent for 106 native non-salmonids sampled below Ice Harbor. Since Washington's 125 percent TDG gas cap is conditional on low rates of GBT, the gas cap reverted to 120 percent TDG in the tailrace/115 percent TDG in the next downstream forebay at Little Goose, Lower Monumental, and Ice Harbor in accordance with the in-season guidance from WDOE. Spill levels to meet 115/120 percent TDG were implemented on May 31 at 1600. Regional sovereigns were notified of this operational adjustment on May 31, via email coordination, and the Corps convened an unscheduled TMT meeting to coordinate these adjustments on June 2.

As outlined in the 2023 GBT Biological Monitoring Plan, the following criteria were followed to guide reinstatement of spring spill operations up to 125 percent TDG:

a. If gas bubble trauma exceeds any of the action criteria, additional GBT monitoring must demonstrate the incidence of GBT is below the applicable action criterion before spill up to 125 percent TDG can resume.
b. GBT must be below the applicable action criterion over the next 7-day period before spill up to 125 percent TDG can be applied again.

Sampling downstream of Ice Harbor occurred again on June 6 and indicated GBT was less than action criteria. The 125 percent TDG gas cap operations resumed on June 7 at 1600.

2. Lower Monumental Dam

Beginning June 28 at 1200 hours, the uniform spill pattern[10] was applied to spill at Lower Monumental Dam in place of the bulk spill pattern specified in the 2023 FOP section 8.2.3. This action was in response to TDG exceeding state standards in the Ice Harbor Dam forebay resulting from summer spill (17 kcfs) at Lower Monumental dam using the bulk spill pattern.[11] Regional salmon managers were made aware of this operational adjustment at TMT on June 28.

3. 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 8, per the 2023 FPP section 2.3.2.6. Due to spring high flows, the decision to keep both spillway weirs in service until June 20 was coordinated with regional salmon managers via FPOM on June 8.[12] The intent of this operation was to avoid causing high TDG and poor tailrace hydraulics for fish passage that would occur from closing multiple spillbays during high flows.

[10] See 2023 FPP, Table LMN-8, Lower Monumental Dam Uniform Spill Patterns with RSW.
[11] See 2023 FPP, Table LMN-7, Lower Monumental Dam Bulk Spill Patterns with RSW.
[12] FPOM Memo of Coordination (MOC) 22MCN09

Table 3: Spill Variance Table – June 2023 (6/1 to 6/30)

Project	Parameter	Date	Time[13]	# of Hours	Type	Reason
Little Goose	Reduced Spill	6/12	0900	1	Human Error	Hourly spill decreased to 28% kcfs (less than adjusted spill target of 30% ± 1%) when spill was not adjusted to compensate for raising the ASW to high crest position.
Lower Monumental	Reduced Spill	6/12	1000	1	Program Error	Hourly spill decreased to 36% (less than adjusted spill target of 40% ± 1%) due to GDACs failover testing.
Ice Harbor	Reduced Spill	6/28	0800-1000	3	Maintenance	Hourly spill decreased to between 0 and 1% (less than adjusted spill target of 30% ± 1%) due to a full spillway outage to repair the north fish ladder exit debris boom. Regionally coordinated via 23 IHR 06.[14]
McNary	Additional Spill	6/17	1700	1	Debris Spill	Hourly spill increased to 109 kcfs (greater than adjusted spill target of 105 kcfs) to extinguish fire in forebay debris. Reported to the region via 23 MCN 07 MFR.
The Dalles	Reduced Spill	6/20	0600	1	Human Error	Hourly spill decreased to 38% (less than adjusted spill target of 40% ± 1%) due to a delay in changing to the appropriate spill target.

[13] 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.

[14]://pweb.crohms.org/tmt/documents/FPOM/2010/NWW%20Memos%20of%20Coordination%20and%20Notification/IHR%20MOC%20and%20MFR/23%20IHR%2006%20MFR%20-%20Spillway%20OPutage%20to%20Repair%20Fishway%20Debris%20Boom.pdf

Table 4: Pre-Coordinated Operations – June 2023 (6/1 to 6/30)

Project	Parameter	Date	Time[15]	# of Hours	Type	Reason
Lower Monumental	Reduced Spill	6/1 6/3 6/5 6/7 6/20 6/22	1800-2000 1700-1900 1800-1900 1900 1000 0900	3 3 2 1 1 1	Navigation	Hourly spill decreased to between 13 and 35 kcfs (less than adjusted spill target of between 17 and 100 kcfs) for navigation. Regionally coordinated via 2023 FOP, Sections 4.1 and 4.6.
Ice Harbor	Reduced Spill	6/7	1000	1	Maintenance	Hourly spill decreased to 81 kcfs (less than adjusted spill target of 92 kcfs) for annual testing of Unit 4. Regionally coordinated via the 2023 FOP Section 4.5.
Ice Harbor	Reduced Spill	6/20	1000, 1200-1300, 1500	4	Maintenance	Hourly spill was 45 kcfs (less than adjusted spill target between 48 and 50 kcfs) during Unit 3 commissioning. Regionally coordinated MOC 23 IHR 04[16].
Ice Harbor	Reduced Spill	6/21 6/22 6/23 6/24	1000, 1500, 1800-1900 0900, 1100-1200, 1600 1000-1300 0700	4 4 4 1	Maintenance	Hourly spill decreased to between 25 and 28% (less than adjusted spill target of 30% ± 1%) during Unit 3 commissioning. Regionally coordinated MOC 23 IHR 04.
Ice Harbor	Reduced Spill	6/21 6/22 6/23 6/25 6/27	0500 1700-1800 0900 0800 0500	1 2 1 1 1	Navigation	Hourly spill decreased to between 27 and 28% (less than adjusted spill target of 30% ± 1%) for navigation. Regionally coordinated via 2023 FOP, Sections 4.1 and 4.6.
Ice Harbor	Additional Spill	6/27	0900, 1300	2	Maintenance	Hourly spill increased to between 32 and 33% (greater than adjusted spill target of 30% ± 1%) during Unit 3 commissioning. Regionally coordinated MOC 23 IHR 04.
McNary	Additional Spill	6/26	1100	1	Maintenance	Hourly spill increased to 83 kcfs (greater than adjusted spill target of 80 kcfs) during TSW removal. Regionally Coordinated via 23 MCN 06. [17]
The Dalles	Additional Spill	6/29	2100	1	Transmission Reliability	Hourly spill increased to 42% (greater than adjusted spill target of 40% ± 1%) to provide reserves. Regionally coordinated via 2023 FOP, Section 4.4.1.

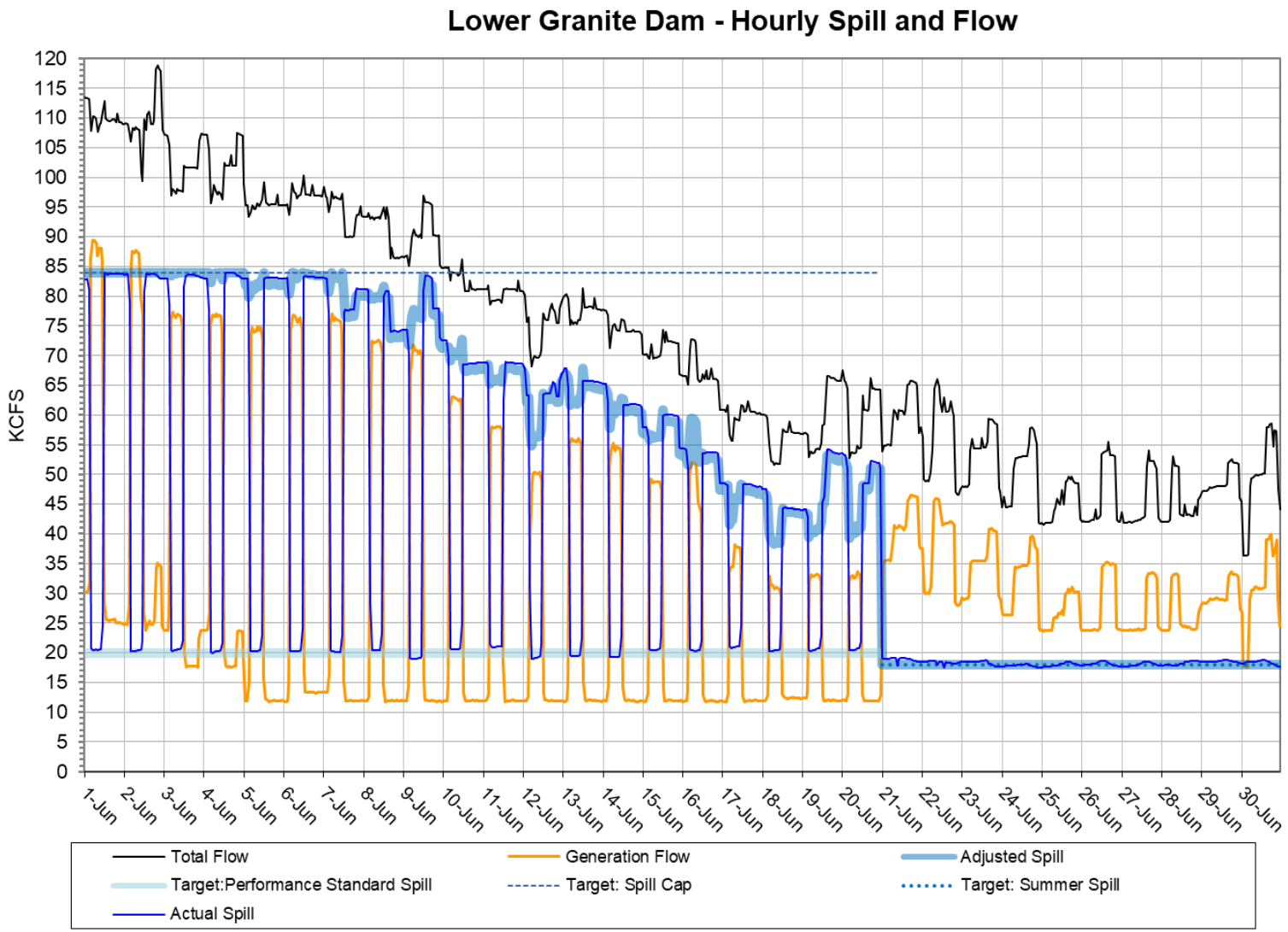
[15] Note: Data collected for reporting spill variances is reported using hourly-averaged data. Therefore, while spill may be increased or decreased for only a portion of an hour, it is represented in the Pre-Coordinated Operations Table as an hour.
[16] https://pweb.crohms.org/tmt/documents/FPOM/2010/NWW%20Memos%20of%20Coordination%20and%20Notification/IHR%20MOC%20and%20MFR/23%20IHR%2004%20MOC%20-%20Unit%203%20commissioning.pdf
[17] https://pweb.crohms.org/tmt/documents/FPOM/2010/NWW%20Memos%20of%20Coordination%20and%20Notification/MCN%20MOC%20and%20MFR/23%20MCN%2006%20MOC%20Delay%20Removing%20TSWs.pdf

Table 5: June 2023 Average Percent TDG Values Table

Station:	LWG	LGNW	LGSA	LGSW	LMNA	LMNW	IHRA	IDSW	MCNA	MCPW	JDY	JHAW	TDA	TDDO	BON	CCIW
Gas Cap %:	125 115	125 120	125 115	125 120	125 115	125 120	125 115	125 120	125 115	125 120	125 115	125 120	125 115	125 120	125 115	125 120
6/1/2023	104	125	117	117[18]	122	119	121	121	111	121	113	121	120	121	112	121
6/2/2023	104	125	117	117	119	118	119	120	112	119	113	119	120	122	114	121
6/3/2023	105	125	119	117	118	116	119	120	113	120	113	119	119	120	116	121
6/4/2023	105	125	119	117	118	116	118	120	113	119	113	118	118	120	113	120
6/5/2023	105	124	120	117	119	116	118	119	114	119	116	119	119	120	114	120
6/6/2023	106	124	120	117	119	116	119	119	115	120	119	119	122	122	117	121
6/7/2023	105	123	121	122	119	119	119	118	115	119	120	120	122	122	120	121
6/8/2023	105	123	119	124	119	121	118	118	113	118	119	120	119	121	115	120
6/9/2023	104	123	118	124	122	121	118	117	113	118	118	119	117	120	112	120
6/10/2023	103	122	118	122	122	121	119	117	110	116	115	118	114	118	111	120
6/11/2023	103	121	118	122	123	120	120	116	111	116	114	117	115	118	112	120
6/12/2023	104	121	118	123	123	121	121	117	112	116	114	117	116	119	113	119
6/13/2023	105	121	118	122	123	120	121	117	113	116	113	117	114	117	112	121
6/14/2023	103	120	115	122	120	118	119	116	111	116	109	118	108	114	108	120
6/15/2023	102	120	112	122	116	120	114	117	108	117	107	118	111	115	106	120
6/16/2023	102	119	111	121	116	118	114	117	108	117	107	114	115	118	109	117
6/17/2023	102	118	112	119	119	117	116	115	110	117	107	113	109	115	109	117
6/18/2023	102	118	112	118	118	117	116	115	109	116	105	113	107	113	109	117
6/19/2023	102	119	111	120	116	118	114	114	107	116	104	114	106	112	107	117
6/20/2023	100	118	108	120	112	117	110	115	105	117	102	114	105	112	106	117
6/21/2023	99	109	108	113	112	118	110	113	104	118	104	114	108	114	109	117
6/22/2023	101	110	110	112	116	119	113	115	108	117	105	114	110	116	112	117
6/23/2023	103	110	112	113	118	119	115	114	109	116	105	114	110	115	113	117
6/24/2023	104	111	113	114	115	117	115	114	110	117	104	115	108	114	112	117
6/25/2023	105	111	114	114	113	117	115	113	111	117	104	115	108	114	110	117
6/26/2023	104	112	111	113	113	118	116	113	111	117	106	115	109	115	109	117
6/27/2023	103	112	110	113	114	117	116	115	111	116	109	116	109	115	108	117
6/28/2023	103	112	111	113	114	117	116	114	111	115	110	116	109	115	108	117
6/29/2023	103	111	112	114	113	115	115	113	110	115	111	116	111	116	109	117
6/30/2023	103	111	111	113	113	114	115	115	111	115	110	116	111	116	110	117
Exceedances:					8		9									

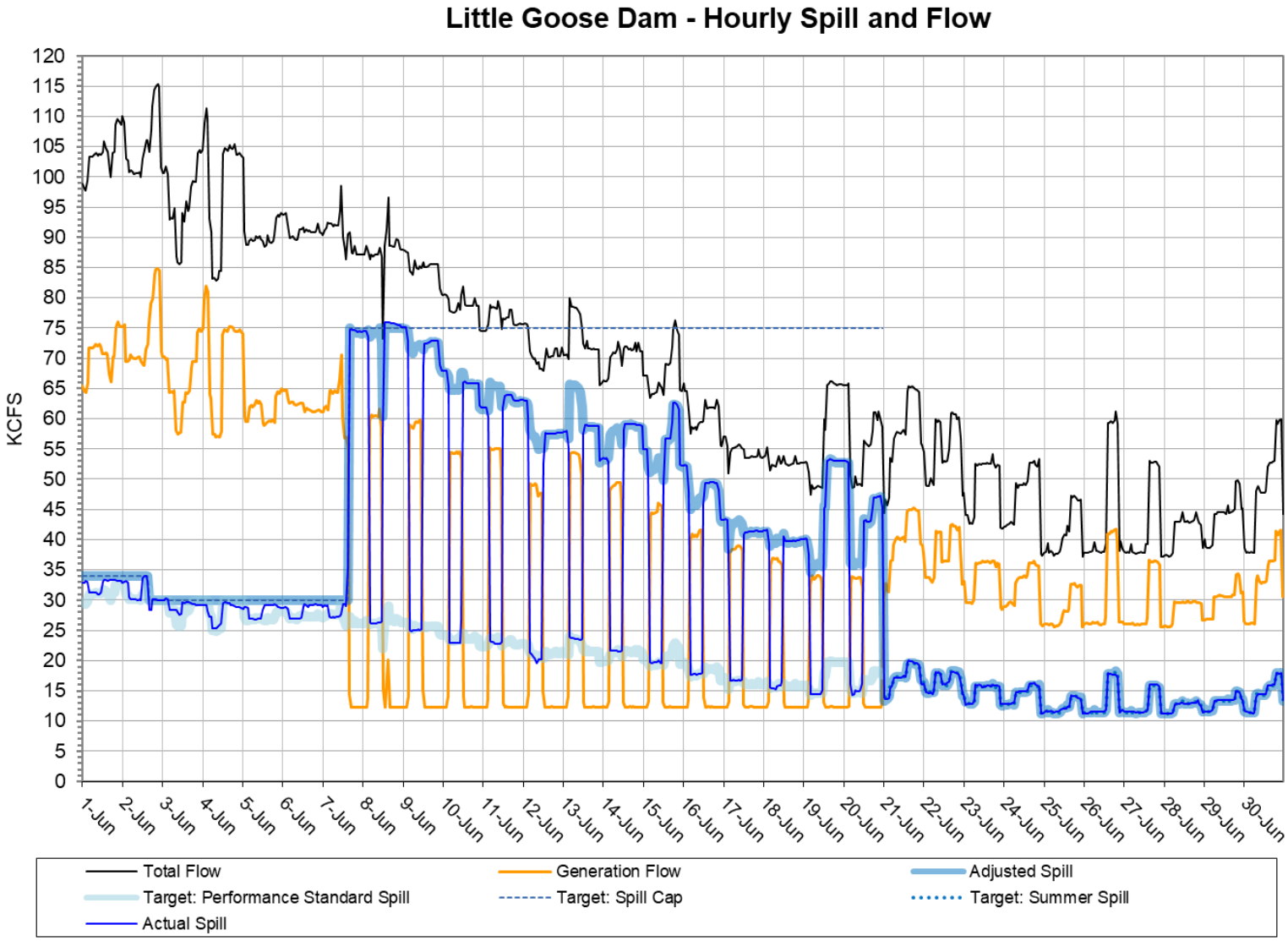
[18]Grey shading indicates that the WQS was reduced to 120% TDG in the project tailrace, 115% TDG in the next downstream forebay, due to GBT exceedance. Due to logistical constraints, spill cap changes occur once a day at 1600, which does not align with a daily metric calculation. Blue shading indicates the summer WQS.

Figure 1[19]



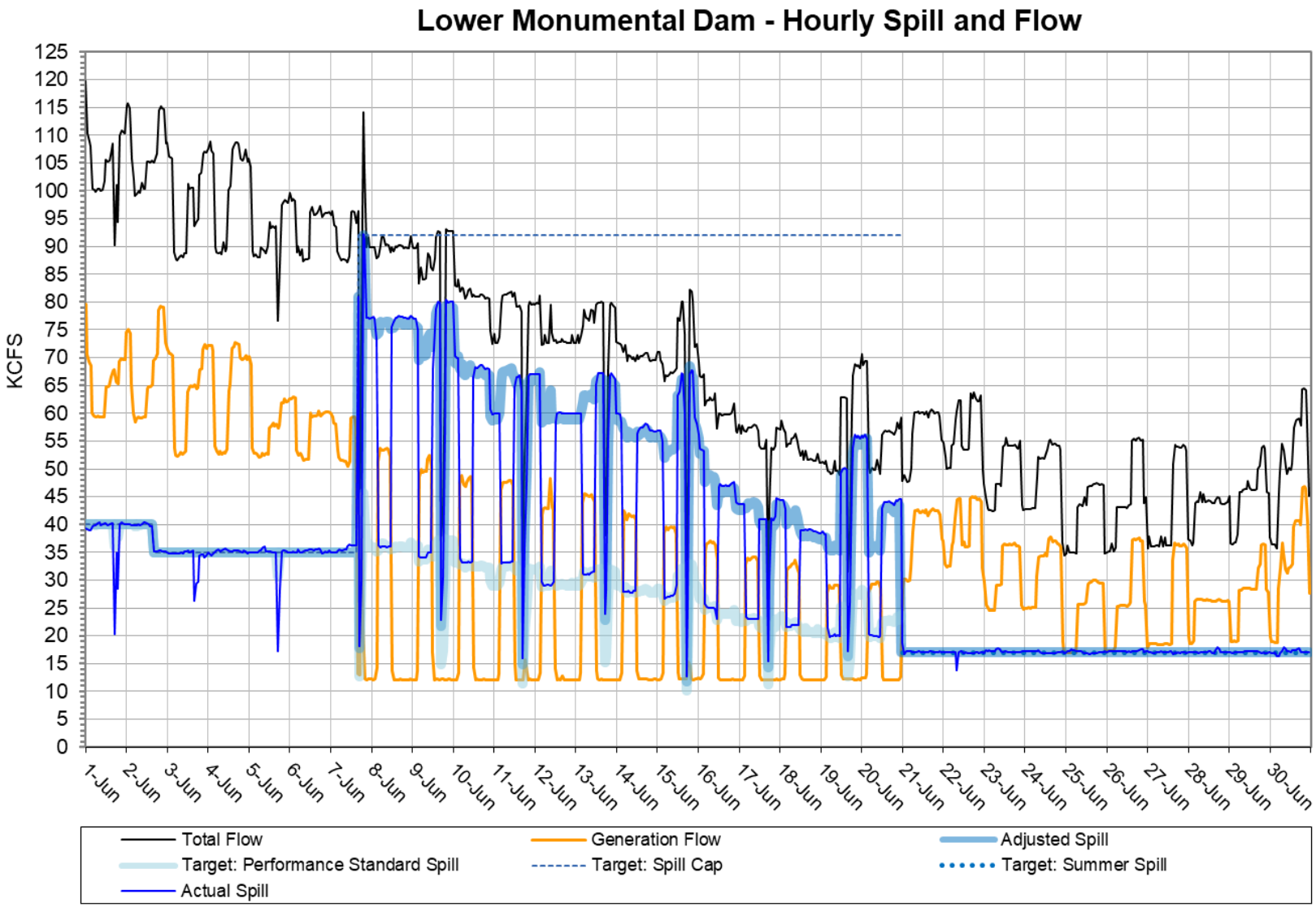
[19] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 2[20]



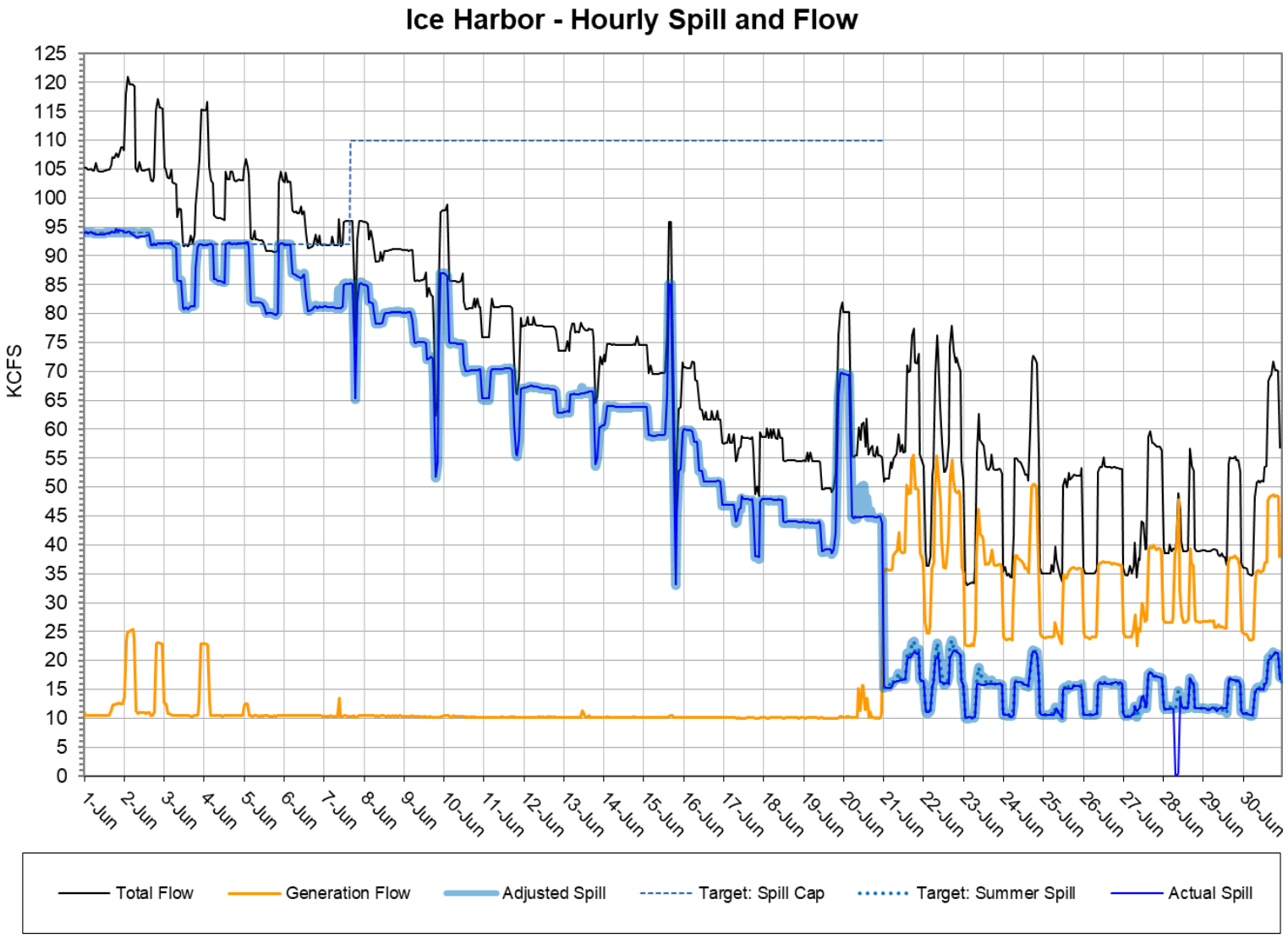
[20] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 3[21]



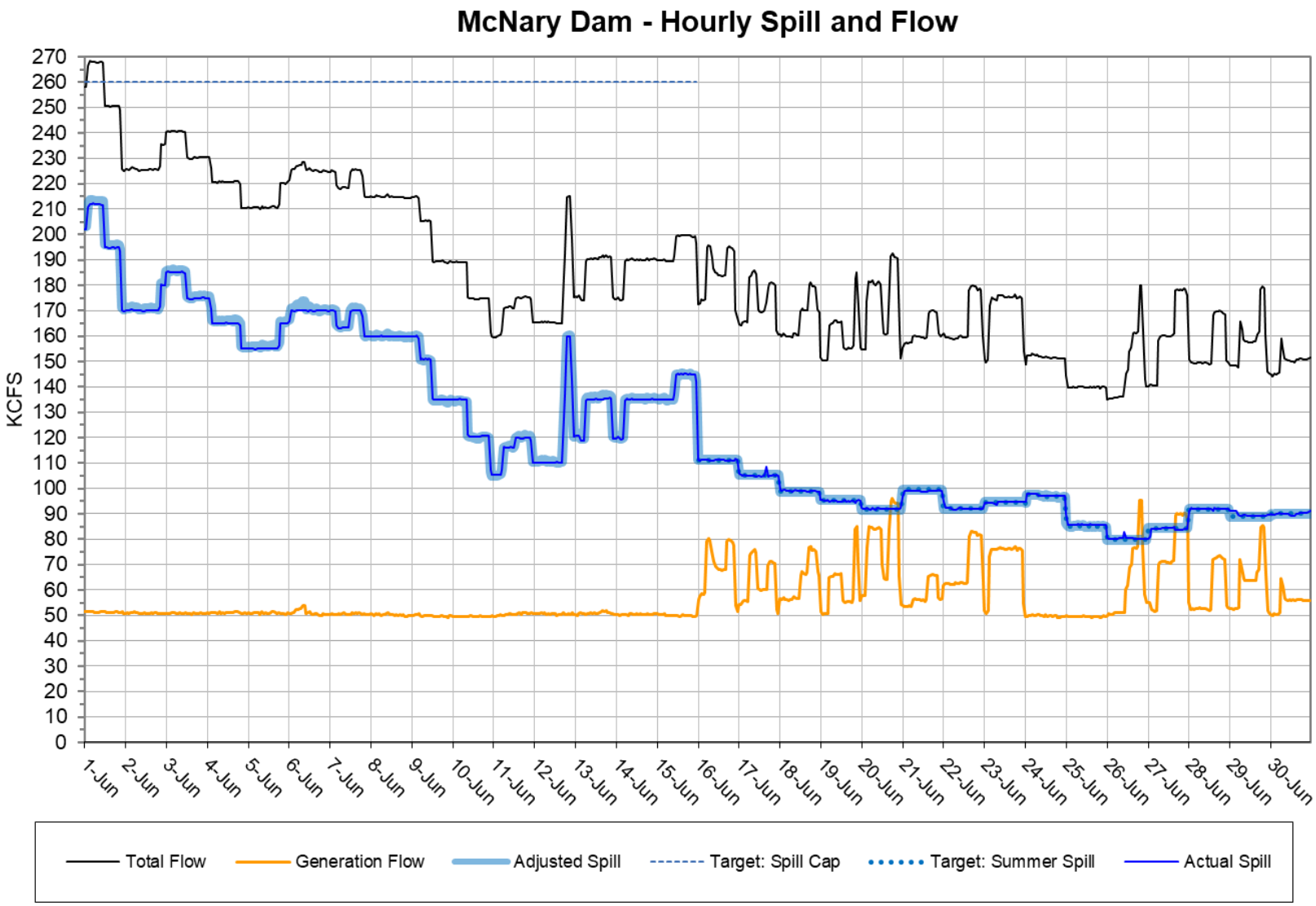
[21] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 4[22]



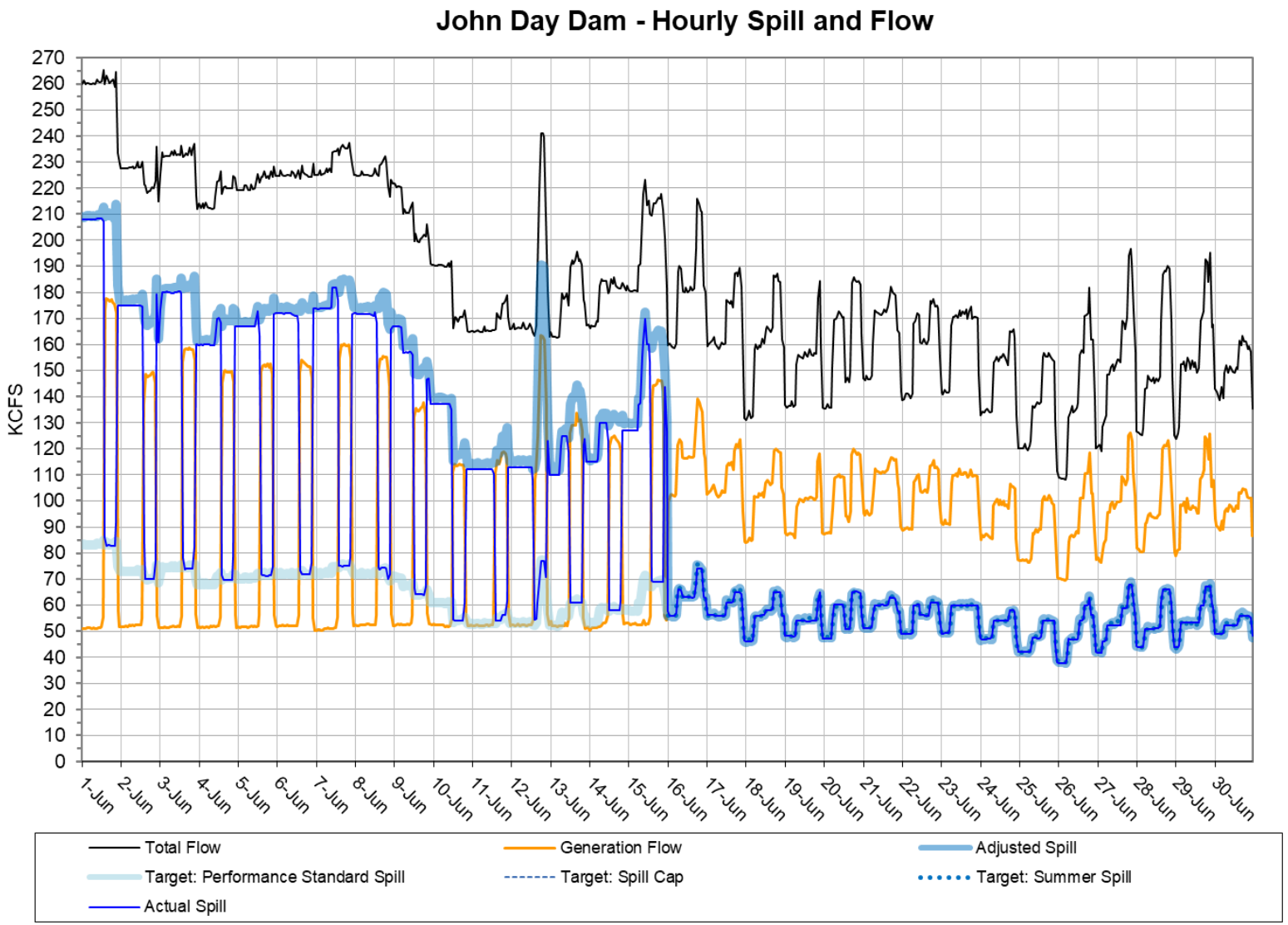
[22] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 5[23]



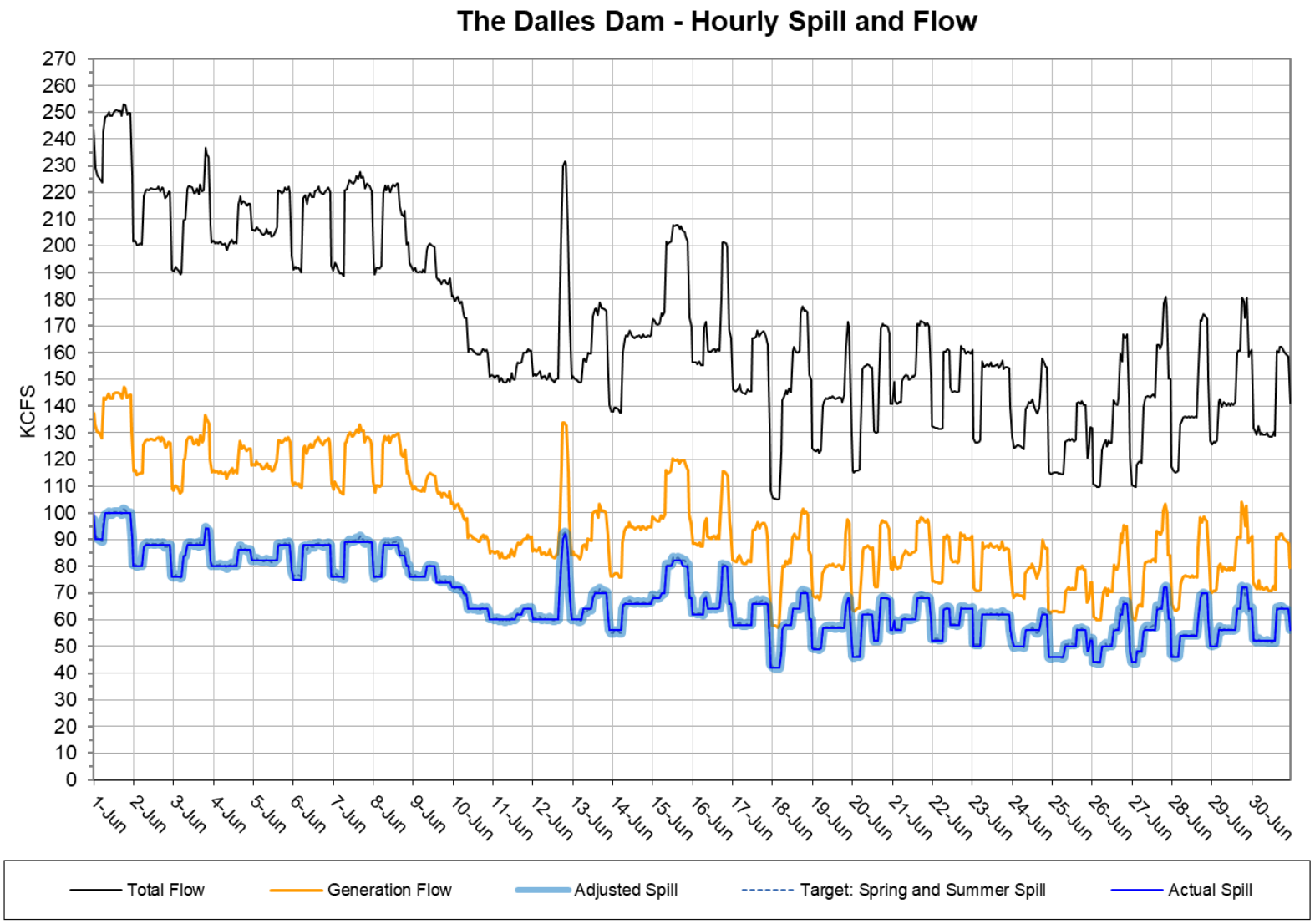
[23] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 6[24]



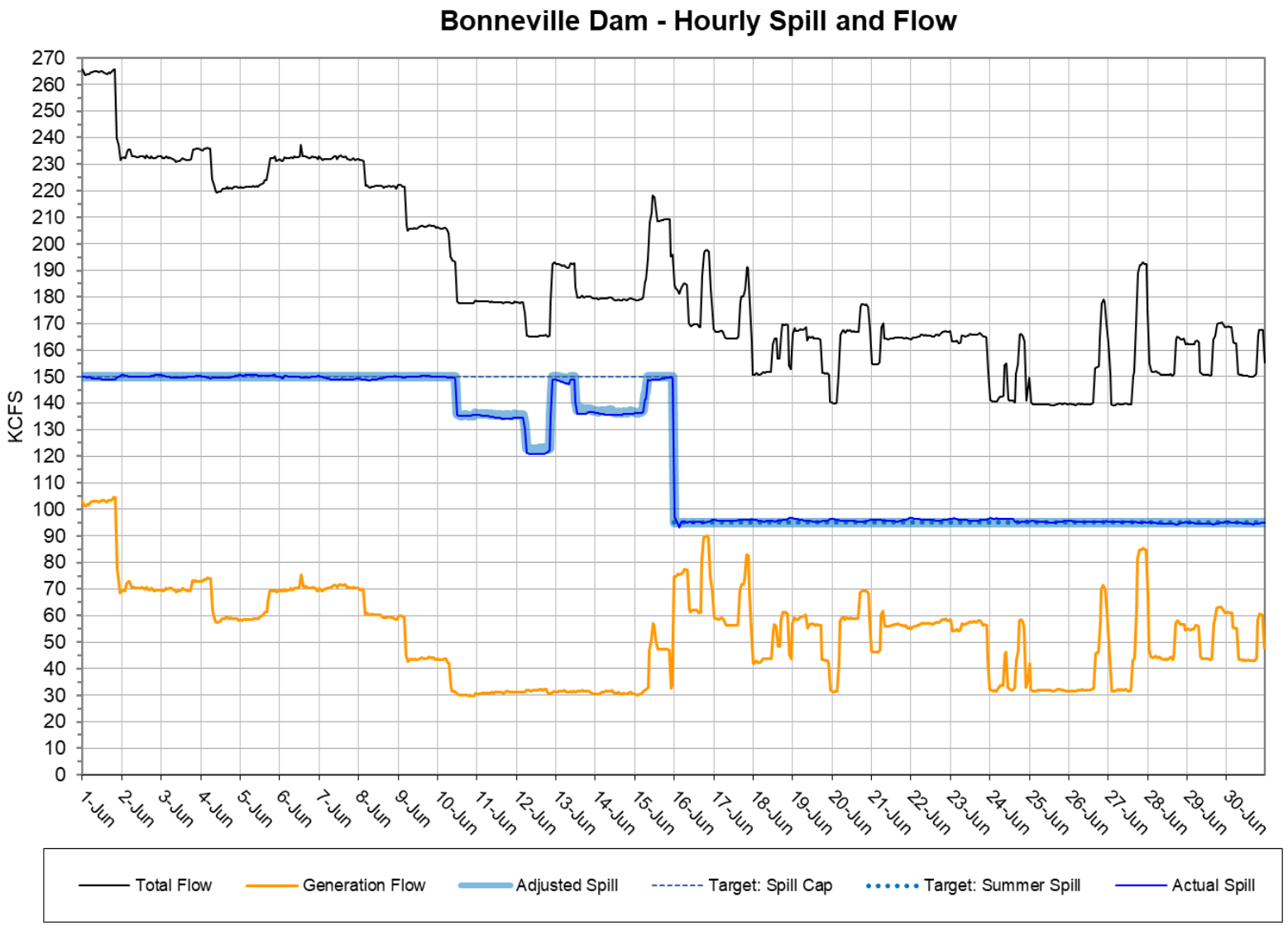
[24] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 7[25]



[25] 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 8[26]



[26] 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.