FISH OPERATIONS PLAN IMPLEMENTATION REPORT

August 2024

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

Introduction

The 2024 Fish Operations Plan (2024 FOP) describes the U.S. Army Corps of Engineers' (Corps) planned operations for fish[1] passage at its four lower Snake River and four lower Columbia River dams during the 2024 surface spill operations in March through early April, spring and summer fish migration seasons, generally April 3 through August 31, and surface spill operations September through mid-November. The 2024 FOP is consistent with spill operations for 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) and U.S. Fish and Wildlife Service (USFWS) Columbia River System (CRS) Biological Opinions (2020 CRS BiOps)[2], the Extensions of the 2008 Columbia Basin Fish Accords (Accord Extensions), the Corps' requirements under the Endangered Species Act (ESA), and the ongoing communication with the relevant wildlife agencies to ensure consistency with the Act. The 2024 FOP also incorporates operations outlined in Appendix B of the "U.S. Government Commitments in Support of the Columbia Basin Restoration Initiative" (USG Commitments). The USG Commitments were agreed to as part of the 2023 Memorandum of Understanding (collectively named the "Resilient Columbia Basin Agreement"). Other project operations and water management actions not specifically addressed in this document will be consistent with other guiding operative documents, including the 2024 Water Management Plan (WMP), seasonal WMP updates, and the 2024 Fish Passage Plan (FPP).

The FOP Implementation Reports are produced to reflect implementation of the 2024 FOP for spring and summer fish passage spill. This report describes the Corps' implementation of the 2024 FOP during the month of August. 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

[1] ESA-listed salmon and steelhead.
[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.

subject to routine operational adjustments that limit the ability to spill to the target spill (see 2024 FOP, Section 4.1);
- actual spill: the hourly flow over the spillway; and,
- resultant 12-hour average total dissolved gas (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 2024 FOP in August 2024.

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 August, with hourly spill, target spill, adjusted spill, generation, and total flows. The monthly graphs begin on August 1 and end on August 31 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 dotted blue line represents the summer target spill level.
- The thick dark blue line represents the 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 (2024 FOP section 4.1).

II. The average daily %TDG for the 12 highest hourly TDG measurements in a calendar day for all projects is shown in the August 2024 Average Percent TDG Values Table (Table 4). Red numbers indicate that the project exceeded the %TDG cap.

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 August 2024 Spill Variance Table (Table 2).[3] 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 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 2024 FOP, 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 or over a spillway weir crest). 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.

August Operations

The month of August was characterized by below average flows for the lower Snake and lower Columbia rivers. The observed precipitation was 87% of average on the Snake River above Ice

[3] 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.

Harbor and 159% of average on the Columbia River above The Dalles.[4] The NOAA Northwest River Forecast Center runoff summary for August indicated that the adjusted runoff for the Snake River at Lower Granite was 76% of the 30-year average (1991-2020) with a volume of 0.9 MAF (Million acre-feet). The adjusted runoff for the Columbia River at The Dalles was 82% of the 30-year average (1991-2020) with a volume of 6.0 MAF.[5]

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 2024 at each project are defined in Table 1.

Table 1: Summary of 2024 summer target spill levels at lower Snake River and lower Columbia River projects.

PROJECT	SUMMER SPILL[A] (June 21/16 –July 31) (24 hrs/day)	SUMMER SPILL[A] (August 1 – 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
Lower Monumental [B, D]	17 kcfs	SW flow or 8 kcfs
Ice Harbor [B, E]	30%	SW flow or 9 kcfs
McNary [F]	57%	SW flow or 20 kcfs
John Day	35% [G]	SW flow [H] or 20 kcfs
The Dalles	40% [G]	30% [G]
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 1-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 Little Goose 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 Lower Monumental forebay elevation of 538.5 feet, the mid-point of the forebay range from 537-540 feet.
E. Flow corresponds to an Ice Harbor forebay elevation of 438.5 feet, the mid-point of the forebay range from 437-440 feet.

[4] Retrieved September 5, 2024: https://www.nwrfc.noaa.gov/water_supply/wy_summary/wy_summary.php?tab=5
[5] Retrieved September 5, 2024: https://www.nwrfc.noaa.gov/runoff/runoff_summary.php

F. From June 16-August 31, 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).
G. Hourly spill percentage target of river flow with ±5% flexibility of river flow for balancing reserves, consistent with current target spill level calculations.
H. John Day will also spill from bay 2 open 1 stop (approximately 1.6 kcfs) during daylight hours when spill is through the SWs only to maintain attraction flow to the north adult ladder, per FPP Chapter 4 (JDA), section 2.2.3.

In its implementation of the 2024 FOP in August, 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).[6] 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).

Operational Adjustments

None.

Table 2: Spill Variance Table – August 2024 (8/1 to 8/31)

Project	Parameter	Date	Time[7]	# of Hours	Type	Reason
McNary	Additional Spill	8/1	0100-0900	9	Maintenance	Hourly spill increased to between 38 and 39 kcfs (greater than adjusted spill target of 20 kcfs) as staff were required on site during engineer lift to close bays 1,2, and gantry crane operation to close bay 6.
McNary	Additional Spill	8/28 8/29 8/30	1500-2400 0100-2400 0100-0200	10 24 2	Maintenance	Hourly spill increased to between 29 and 110 kcfs (greater than adjusted spill target of 20 kcfs) due to a tripped bus causing the project to cease powerhouse operations followed by generation restrictions. Regionally reported to FPOM via MFR 24MCN09.[8]
The Dalles	Reduced Spill	8/27	1400	28%	Program Error	Hourly spill decreased to 28% (lower than spill target of 30%) due to malfunction of the GDACS program.
The Dalles	Reduced Spill	8/28	1300	27%	Human Error	Hourly spill decreased to 27% (lower than spill target of 30%) due to a delayed update to the spill control software program.

[6] See 2024 FOP, Section 2.2
[7] 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 table as an hour.
[8] https://pweb.crohms.org/tmt/documents/FPOM/2010/NWW%20Memos%20of%20Coordination%20and%20Notification/MCN%20MOC%20and%20MFR/

Table 3: Pre-Coordinated Operations – August 2024 (8/1 to 8/31)

Project	Parameter	Date	Time	# of Hours	Type	Reason
Lower Granite	Additional Spill	8/12 8/14 8/15 8/16	0700-1700 0700-1900 0700-1800 0700-1800	11 13 12 12	Maintenance	Hourly spill was between 10 and 19 kcfs (greater than adjusted spill target of 7 kcfs) while generation was reduced to station service to perform transformer maintenance. Regionally coordinated via FPOM, the 2024 FPP LWG Section 4.3.10 and Appendix A.
Little Goose	Additional Spill	8/5	0600-1900	14	Maintenance	Hourly spill was between 9 and 16 kcfs (greater than adjusted spill target of 7 kcfs) during repair of Transformer 1 MOD. Regionally coordinated with FPOM via MOC 24LGS06[9].
Lower Monumental	Additional Spill	8/27 8/28 8/29	1500-2400 0100-2400 0100-1200	10 24 12	Maintenance	Hourly spill increased to between 10 and 11 kcfs (greater than adjusted spill target of 8 kcfs) during a powerhouse outage to reinstall the roof top bus and return T2 to service. Regionally coordinated with FPOM via MOC 24LMN02. [10]
McNary	Additional Spill	8/1 8/2 8/3 8/4 8/5 8/6 8/7 8/8 8/9 8/10 8/12 8/13 8/14 8/15 8/22 8/23	0900-1600 2100-2400 0100-2400 0100-0800 0100-2400 0100-2400 0100-2400 0100-2400 0100-2400 0100-1900 0800-2400 0100-2400 0100-2400 0100-1300 0700-1500 0900-1000	7 4 24 8 24 24 24 24 24 19 17 24 24 13 9 2	Maintenance	Hourly spill was between 24 and 55 kcfs (greater than adjusted spill target of 20 kcfs) during unit outages. Regionally coordinated via FPP App A- 5.1.3 (McQuad project), App A 5.1.5 (transformer regasket), and FPP MCN 4.4.3 (annual maintenance).
McNary	Reduced Spill	8/24 8/25 8/26 8/27	1400 0900, 1500 0500 0700, 2400	1 2 1 2	Navigation	Hourly spill decreased to between 11 and 16 kcfs (less than adjusted spill target 20 kcfs) for navigation. Regionally coordinated via 2024 FOP, Sections 4.1 and 4.6, and FPOM MFR 24MCN08[11].

[9]https://pweb.crohms.org/tmt/documents/FPOM/2010/NWW%20Memos%20of%20Coordination%20and%20Notification/LGS_MOC_and_MFR/

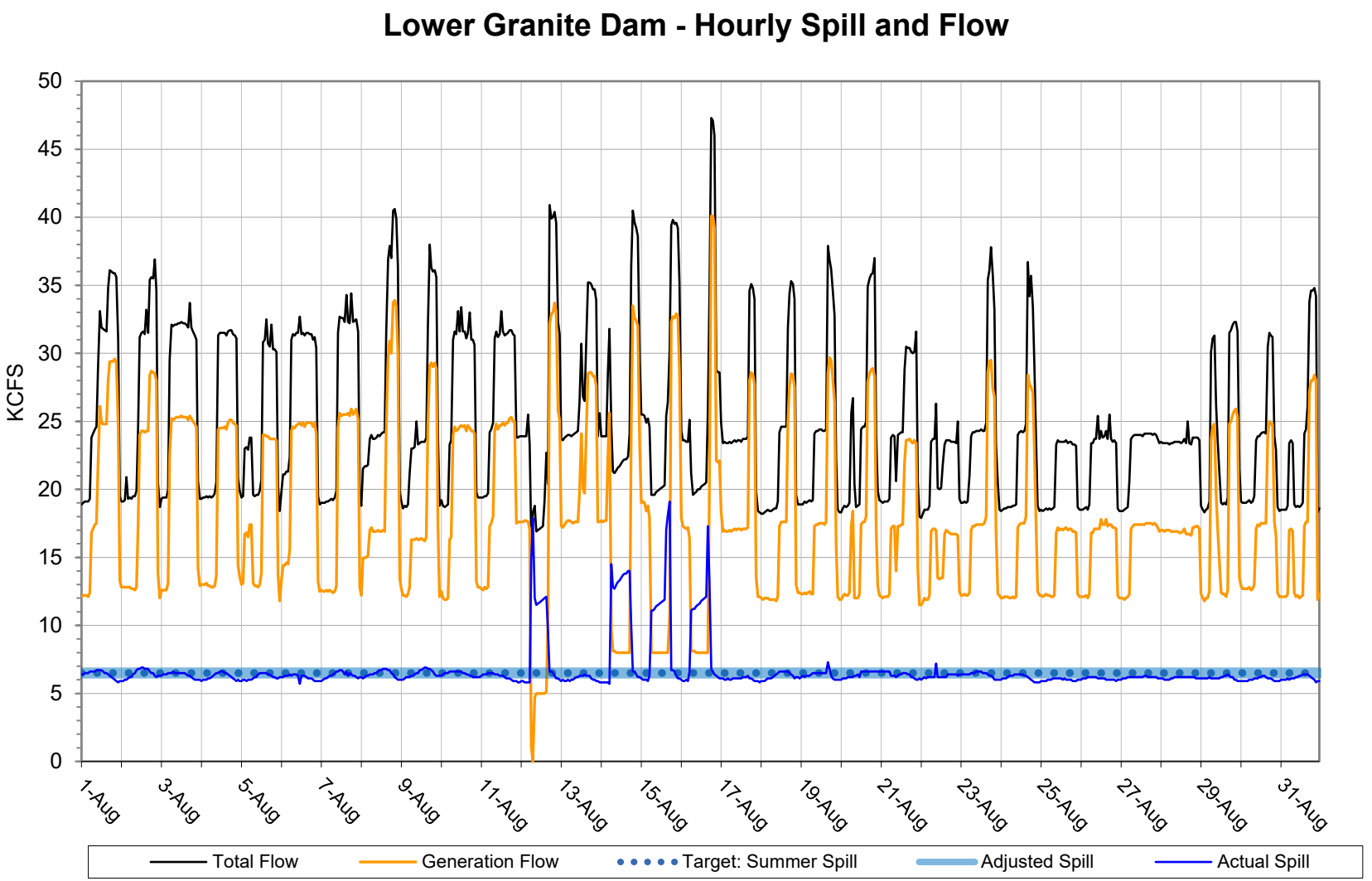
[10]https://pweb.crohms.org/tmt/documents/FPOM/2010/NWW%20Memos%20of%20Coordination%20and%20Notification/LMN_MOC_and_MFR/

[11]https://pweb.crohms.org/tmt/documents/FPOM/2010/NWW%20Memos%20of%20Coordination%20and%20Notification/MCN%20MOC%20and%20MFR/

Table 4: August 2024 Average Percent TDG Values

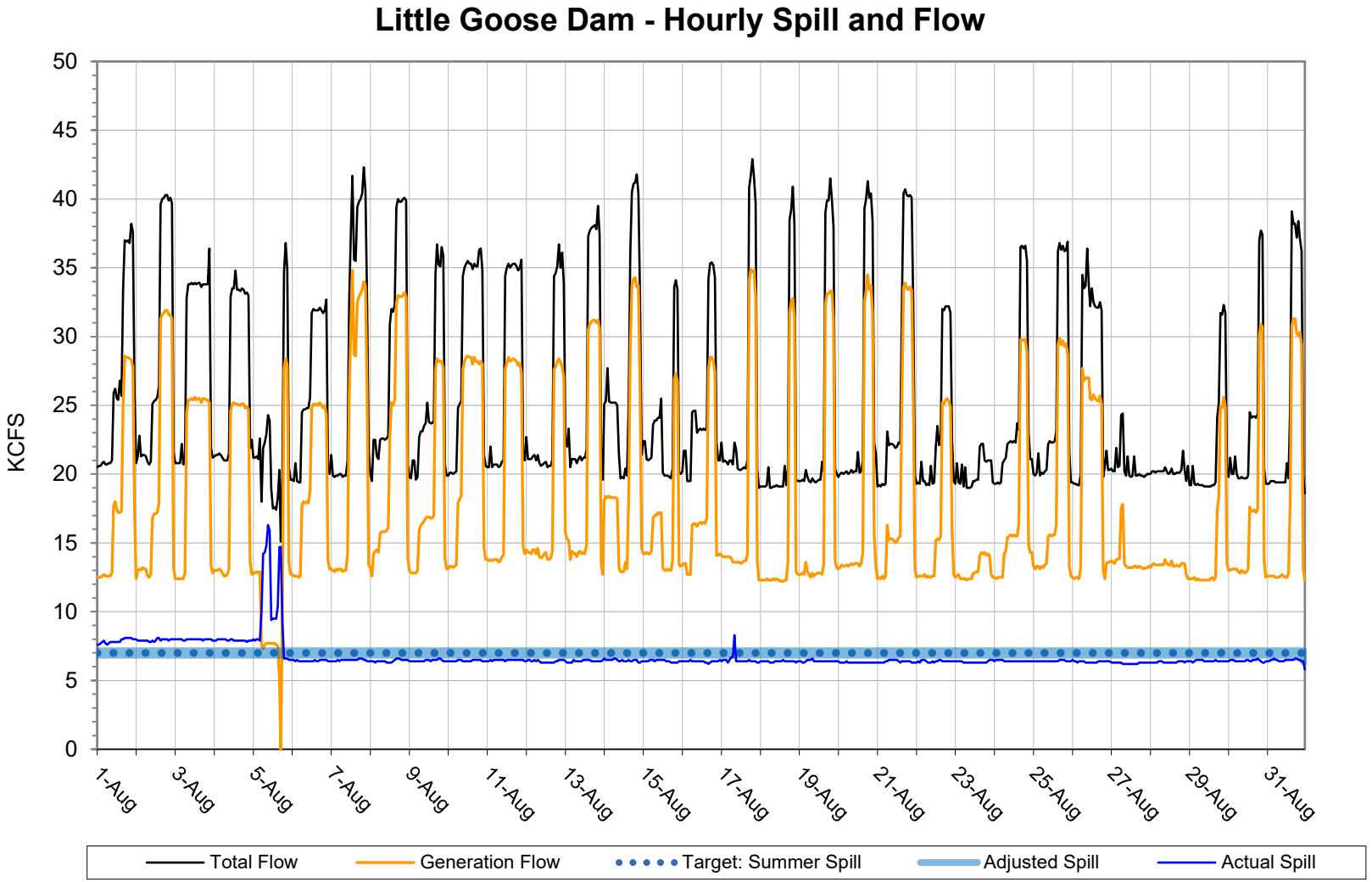
Station:	LWG	LGNW	LGSA	LGSW	LMNA	LMNW	IHRA	IDSW	MCNA	MCPW	JDY	JHAW	TDA	TDDO	BON	CCIW
Gas Cap %:	115	120	115	120	115	120	115	120	115	120	115	120	115	120	115	120
8/1/2024	100	110	107	110	108	110	108	108	106	117	104	113	110	113	108	113
8/2/2024	100	109	107	110	108	110	107	108	107	116	106	113	109	112	109	113
8/3/2024	100	109	106	109	109	109	107	107	108	**121**	106	112	107	111	108	113
8/4/2024	100	109	107	109	109	110	108	108	109	120	106	113	107	111	107	113
8/5/2024	103	110	108	115	109	110	109	108	108	122	106	113	108	111	106	113
8/6/2024	104	109	105	109	108	109	108	108	108	120	106	112	106	109	105	113
8/7/2024	101	110	107	109	107	109	107	108	107	119	106	113	106	109	105	112
8/8/2024	102	110	108	109	108	109	106	108	108	**121**	108	114	110	111	106	113
8/9/2024	102	110	108	109	108	109	106	108	108	117	108	114	111	111	109	113
8/10/2024	101	110	107	109	107	109	105	108	108	117	107	113	110	111	108	113
8/11/2024	101	110	107	109	107	109	104	107	108	116	107	113	108	109	106	113
8/12/2024	102	115	107	109	107	109	104	107	108	117	107	113	106	108	105	112
8/13/2024	102	111	106	108	106	109	103	107	106	119	105	112	104	106	103	112
8/14/2024	102	117	106	109	105	109	102	107	104	**121**	104	112	105	107	102	113
8/15/2024	102	116	106	108	105	109	101	106	104	120	104	112	107	108	103	113
8/16/2024	102	115	105	108	104	109	100	107	103	114	103	112	105	107	104	113
8/17/2024	102	111	106	109	107	110	101	107	106	115	104	112	108	108	105	113
8/18/2024	101	109	106	109	105	109	100	107	104	114	103	111	106	107	106	112
8/19/2024	101	110	105	109	104	109	101	107	104	114	102	111	106	106	105	112
8/20/2024	101	110	105	108	103	109	100	106	104	114	101	110	105	107	105	113
8/21/2024	101	110	105	109	103	109	102	107	103	114	102	110	106	107	105	112
8/22/2024	102	110	107	110	105	110	104	107	104	117	103	111	106	107	106	112
8/23/2024	102	110	106	108	105	109	104	106	104	115	103	109	105	106	105	112
8/24/2024	100	110	105	108	103	109	101	106	102	114	101	109	103	104	104	112
8/25/2024	99	109	103	108	102	110	100	106	100	114	101	108	105	105	104	112
8/26/2024	100	110	104	108	103	110	99	106	101	113	101	109	107	105	105	112
8/27/2024	100	110	104	107	103	111	101	106	100	113	101	109	107	108	104	112
8/28/2024	99	110	103	108	103	113	102	107	101	118	101	110	104	110	106	112
8/29/2024	100	109	104	109	103	112	103	107	102	120	103	111	107	111	105	113
8/30/2024	100	109	104	108	103	109	104	108	102	113	103	110	107	112	107	113
8/31/2024	101	110	105	108	104	110	104	107	102	112	103	110	105	111	107	113
Exceedances:										**3**						

Figure 1[12]



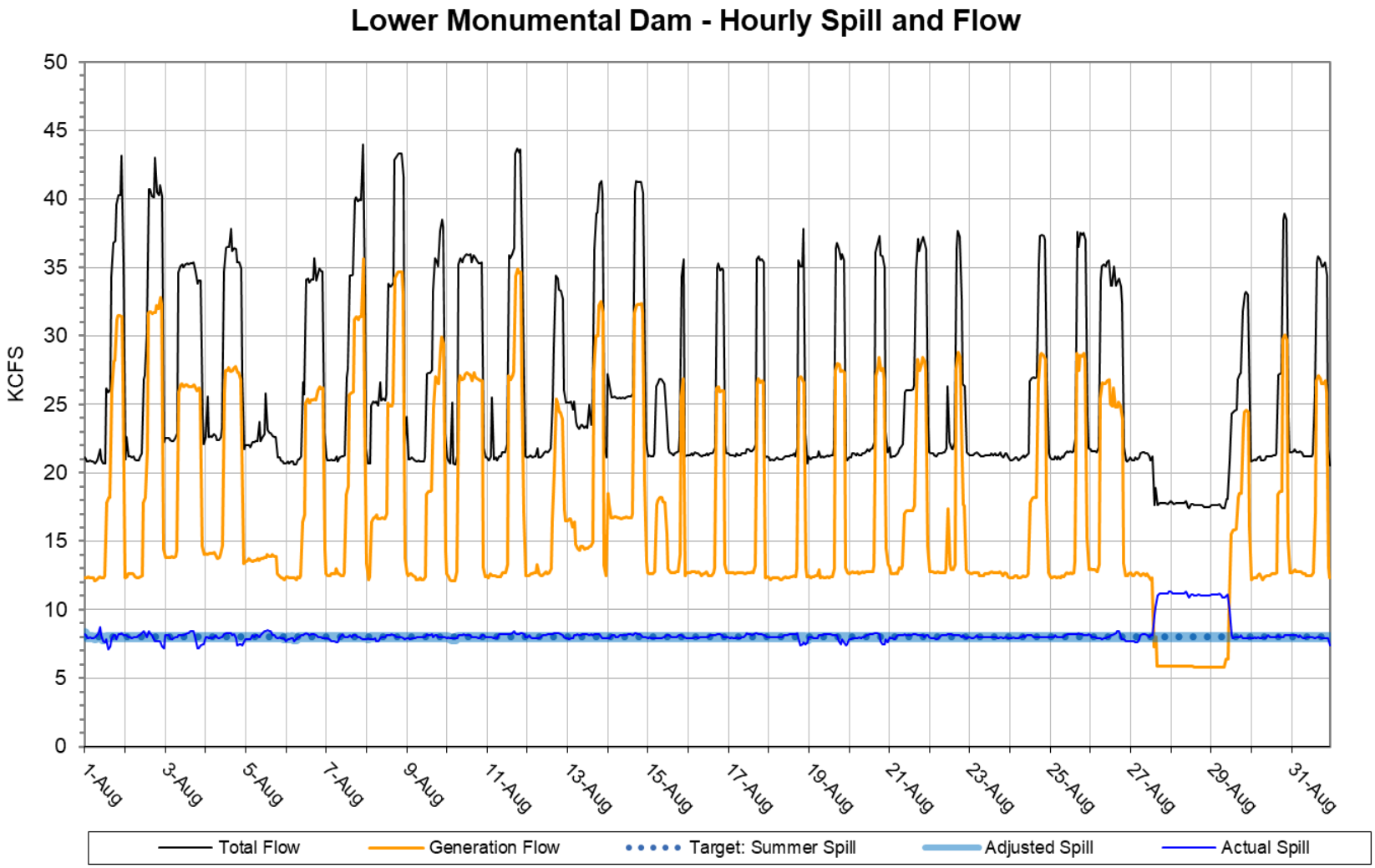
[12] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 2[13]



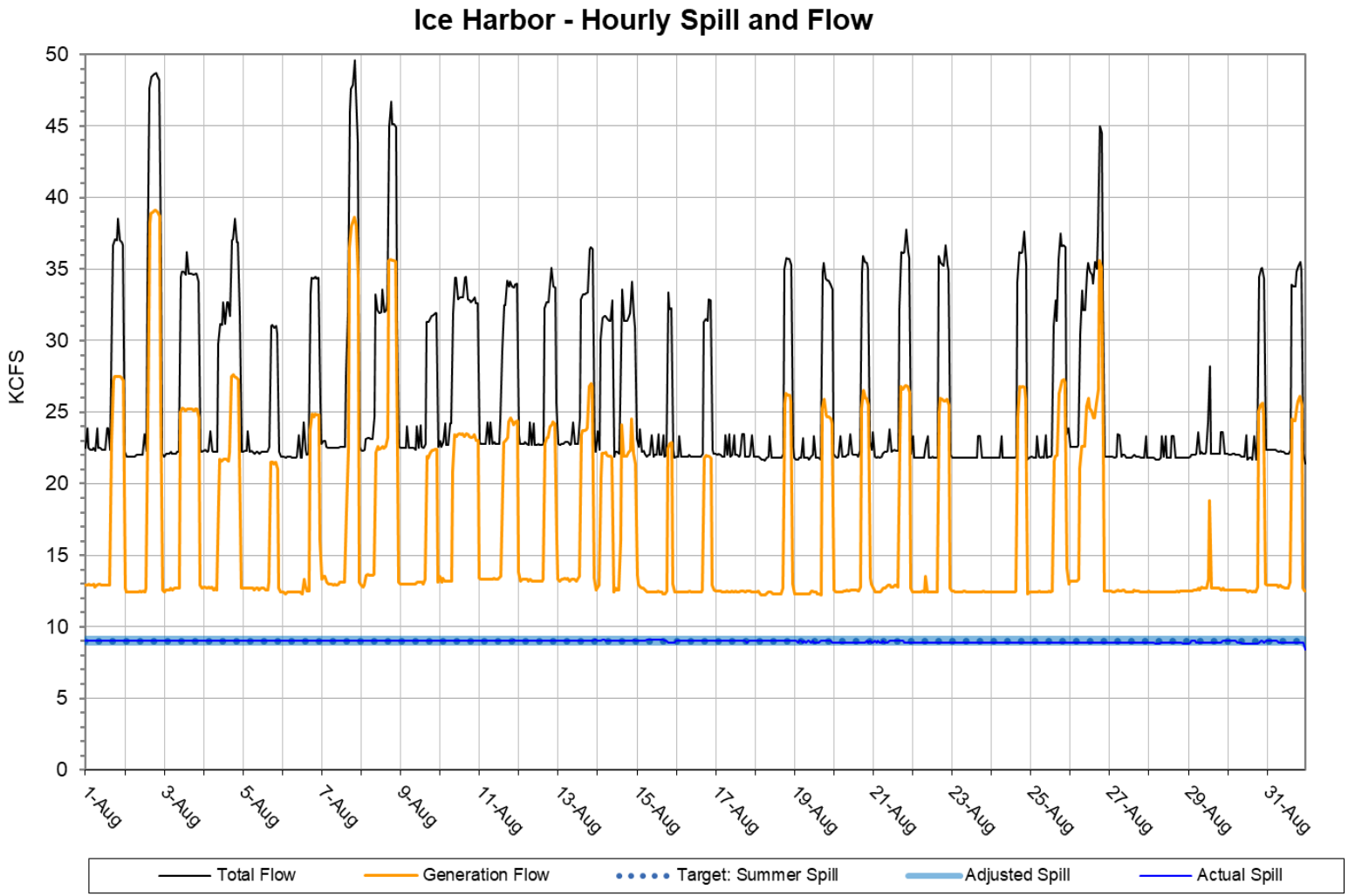
[13] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 3[14]



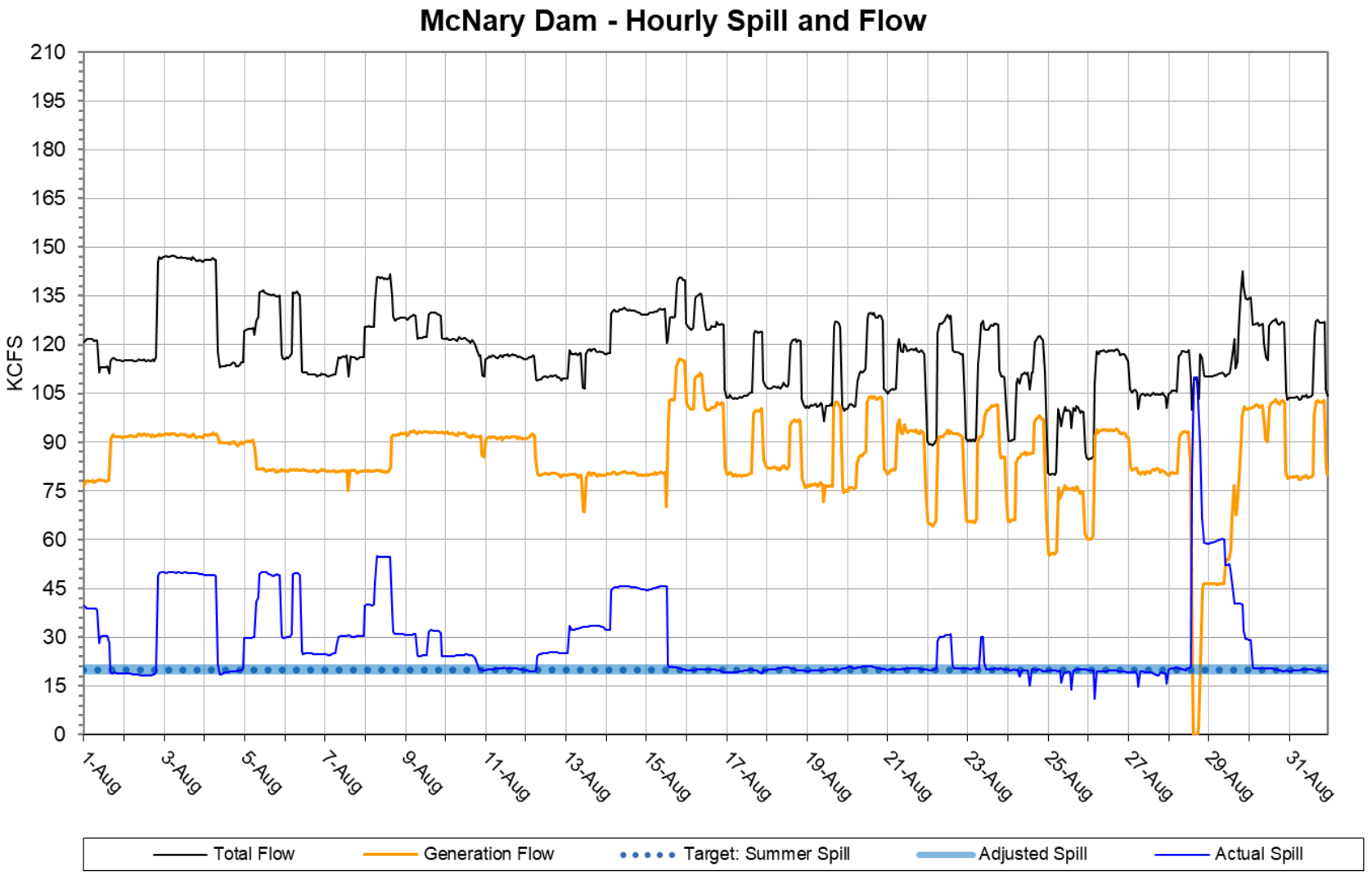
[14] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 4[15]



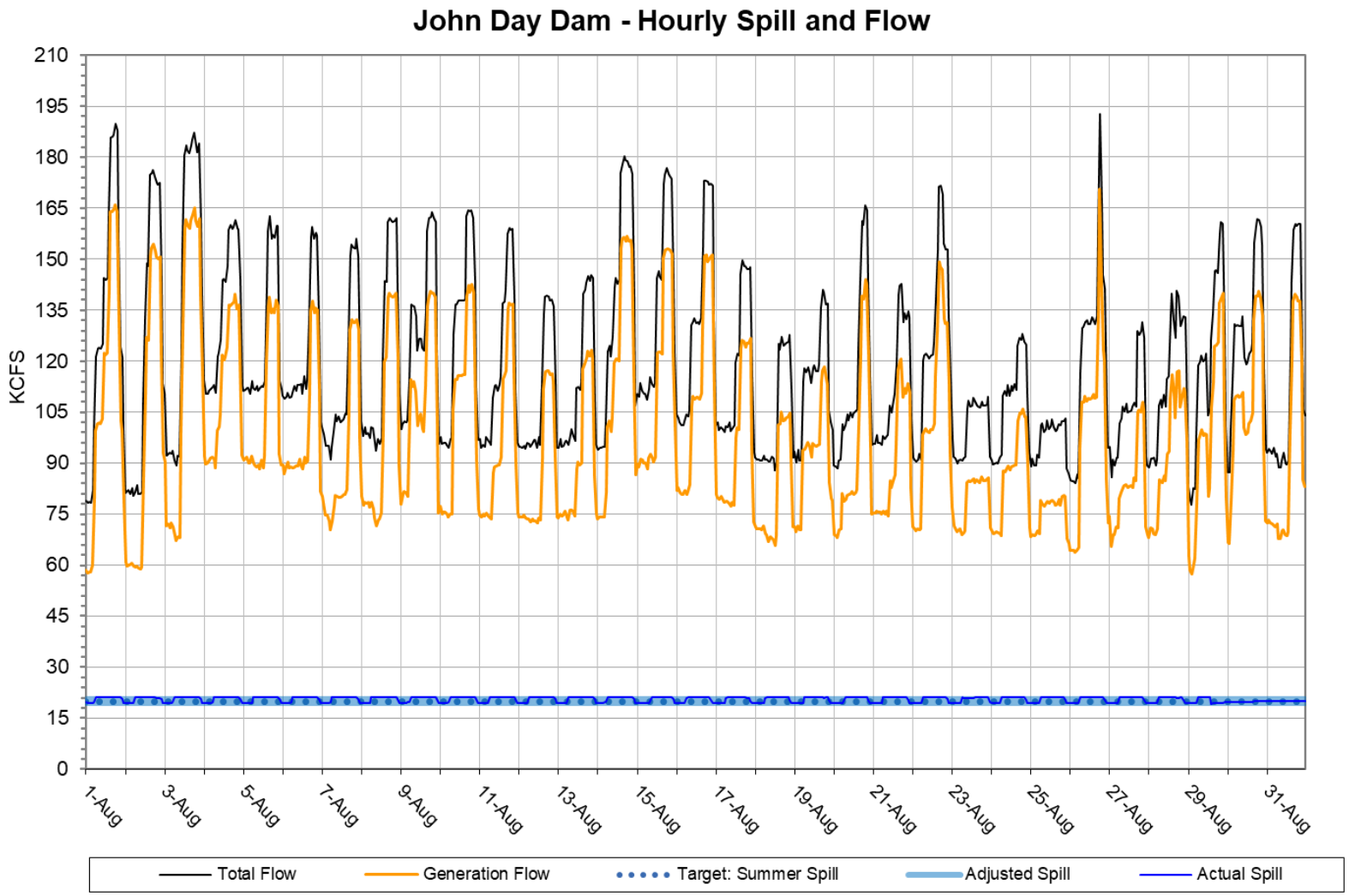
[15] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 5[16]



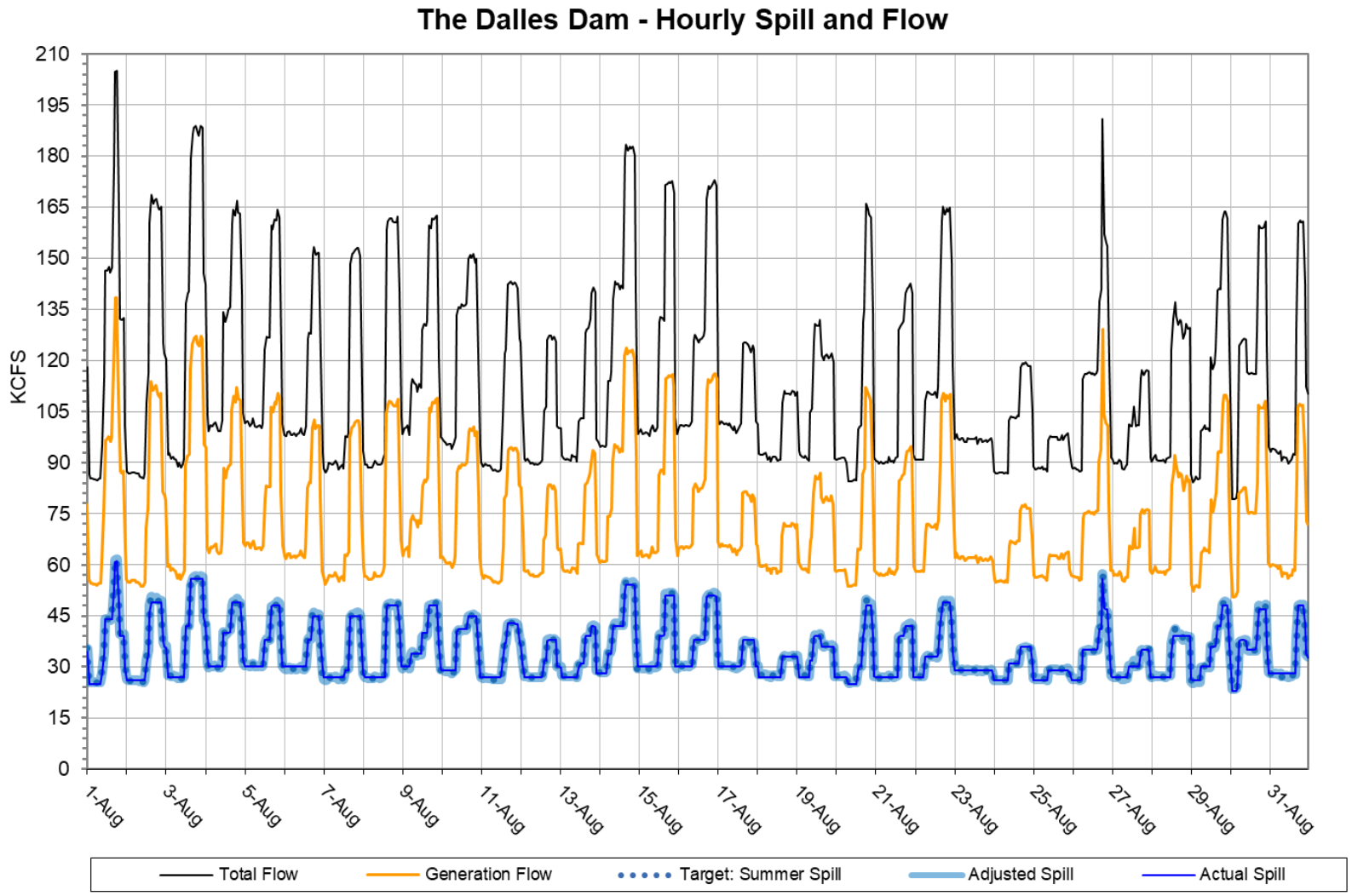
[16] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 6[17]



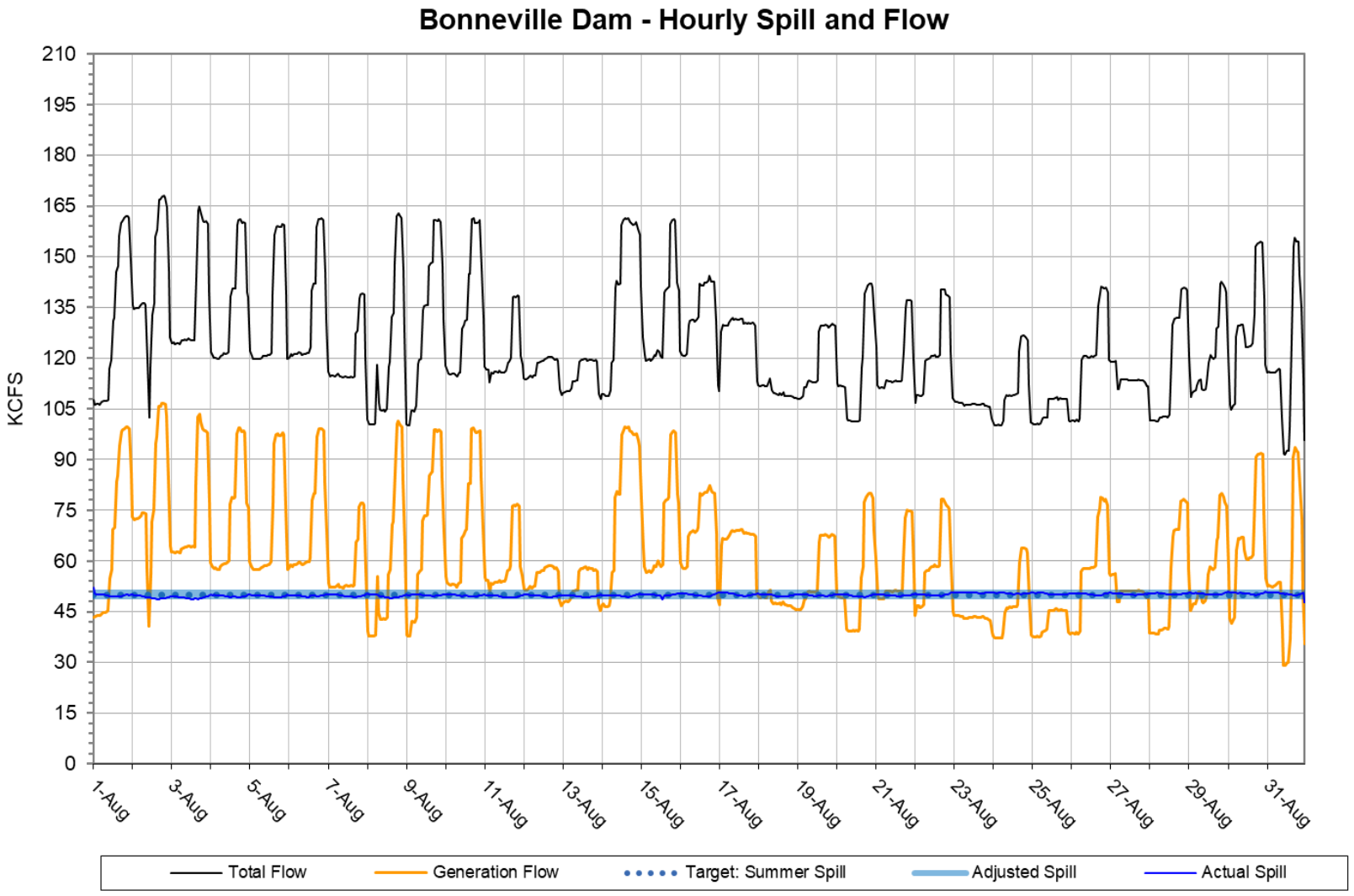
[17] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 7[18]



[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 8[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.