FISH OPERATIONS PLAN IMPLEMENTATION REPORT

July 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 July. 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 July 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 July, with hourly spill, target spill, adjusted spill, generation, and total flows. The monthly graphs begin on July 1 and end on July 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 July 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 July 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.

July Operations

The month of July was characterized by below average precipitation and flows for the lower Snake and lower Columbia rivers. The observed precipitation was 78% of average on the Snake

[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.

River above Ice Harbor and 50% of average on the Columbia River above The Dalles.[4] The NOAA Northwest River Forecast Center runoff summary for July indicated that the adjusted runoff for the Snake River at Lower Granite was 69% of the 30-year average (1991-2020) with a volume of 1.5 MAF (Million acre-feet). The adjusted runoff for the Columbia River at The Dalles was 80% of the 30-year average (1991-2020) with a volume of 11.3 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 August 5, 2024: https://www.nwrfc.noaa.gov/water_supply/wy_summary/wy_summary.php?tab=5
[5] Retrieved August 5, 2024: https://www.nwrfc.noaa.gov/runoff/runoff_summary.php

F. From June 16-July 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 July, 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).[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 – July 2024 (7/1 to 7/31)

Project	Parameter	Date	Time	# of Hours	Type	Reason
Little Goose	Additional Spill	7/7	1700-1800	2	Maintenance	Hourly spill increased to 32% (greater than adjusted spill target of 30%) due to malfunction of spillway gate 2.
Little Goose	Additional Spill	7/10	1500	1	Program Error	Hourly spill increased to 33% (greater than adjusted spill target of 30%) due to the malfunction of the electronic controls for spillway gates 5 and 7.
Little Goose	Reduced Spill	7/19	0400-0600, 2300-2400	5	Human Error	Hourly spill was between 7 and 8 kcfs (less than adjusted spill target of 11 kcfs) due to implementation of incorrect spill target.[7]
Little Goose	Additional Spill	7/19	1600-2200	7	Human Error	Hourly spill was 15 kcfs (greater than adjusted spill target of 11 kcfs) due to implementation of incorrect spill target.[7]
The Dalles	Additional Spill	7/24	0800	1	Program Error	Hourly spill increased to 42% (greater than adjusted spill target of 40%) when the project did not follow the requested basepoint.

[6] See 2024 FOP, Section 2.2

[7] Per the 2024 FOP section 8.2.3, during the 30% spill operation when project outflows are 32 kcfs, the spill operation will transition from 30% to a constant spill level of approximately 7-11 kcfs to help stabilize project outflow, meet Lower Monumental target spill levels, and maintain MOP elevation at Little Goose. The constant spill level will be based on the previous day's average total project outflow, as follows: 11 kcfs when total outflow is 28.0 to 32.0 kcfs, 9 kcfs when total outflow is 24.0 to 27.9 kcfs, and 7 kcfs when total outflow is = 23.9 kcfs. Actual spill may range up to ±1 kcfs from the target spill level. Spill remained at 30% through the July 19, when the actual target should have been 11 kcfs.

Table 3: Pre-Coordinated Operations – July 2024 (7/1 to 7/31)

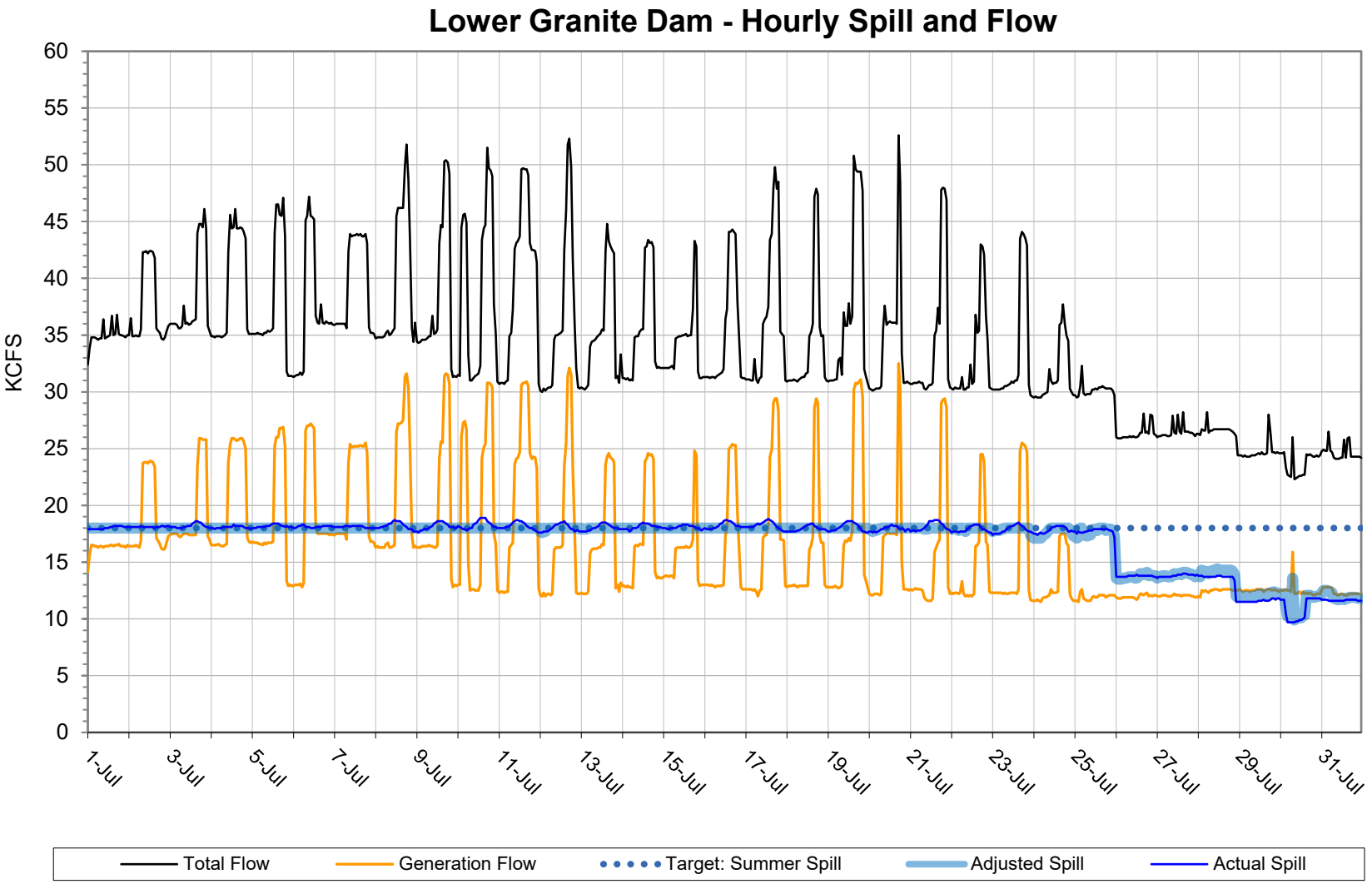
Project	Parameter	Date	Time	# of Hours	Type	Reason
Lower Granite	Reduced Spill	7/30	0800	1	Maintenance	Hourly spill was 10 kcfs (less than adjusted spill target of 14 kcfs) due to pre-annual testing of Unit 2. Regionally coordinated via the 2024 FOP Section 4.5.
Little Goose	Reduced Spill	7/1 7/2 7/4 7/5 7/11 7/14 7/18 7/21 7/22	0600 2000 0100 0400 0200 1600 0300 1200 0100	1 1 1 1 1 1 1 1 1	Navigation	Hourly spill decreased to 28% (less than adjusted spill target of 30%) for navigation. Regionally coordinated via 2024 FOP, Sections 4.1 and 4.6.
Ice Harbor	Reduced Spill	7/7 7/10 7/11 7/13 7/16 7/24 7/27 7/28 7/30	2300 0500, 1100-1200 0900 0900 1300 1000, 1500 0400, 1000 0800 0500, 0700, 1400-1500, 1900	1 3 1 1 1 2 2 1 5	Navigation	Hourly spill decreased to between 26 and 28% (less than adjusted spill target of 30%) for navigation. Regionally coordinated via 2024 FOP, Sections 4.1 and 4.6.

Table 4: July 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**
7/1/2024	100	111	108	112	111	117	113	113	109	117	107	115	108	115	110	117
7/2/2024	101	111	109	112	111	117	114	113	109	117	106	115	107	114	108	117
7/3/2024	100	111	109	112	110	•[8]	113	113	108	117	105	115	107	114	107	116
7/4/2024	101	111	109	113	110	117	113	113	109	117	108	115	110	116	109	117
7/5/2024	101	111	109	113	111	117	114	113	109	117	110	115	112	117	113	117
7/6/2024	101	111	109	113	112	117	115	114	110	117	112	115	112	117	115	117
7/7/2024	102	111	110	113	113	117	**116**	114	111	117	113	116	112	117	115	117
7/8/2024	102	111	111	113	113	117	**116**	114	112	117	115	117	113	118	114	117
7/9/2024	103	111	111	113	113	117	**117**	114	113	117	**118**	116	114	118	115	117
7/10/2024	103	112	111	113	113	117	**117**	114	112	117	**117**	116	114	117	113	117
7/11/2024	103	111	111	113	112	117	115	113	111	117	114	116	110	115	109	117
7/12/2024	103	112	112	113	112	117	115	113	111	117	112	116	111	116	108	117
7/13/2024	104	111	110	113	112	117	115	113	111	117	113	116	113	117	109	117
7/14/2024	103	111	110	113	111	117	114	113	110	117	112	117	112	116	109	117
7/15/2024	102	111	109	113	112	117	114	113	110	117	110	116	110	115	108	117
7/16/2024	102	112	110	113	112	117	114	113	109	118	110	•	111	116	110	117
7/17/2024	103	112	109	112	111	117	114	113	109	117	110	•	112	117	110	117
7/18/2024	102	112	109	113	110	117	113	113	109	117	109	•	110	115	109	117
7/19/2024	101	112	109	113	110	117	113	113	109	117	108	116	109	114	109	117
7/20/2024	101	112	109	113	110	117	113	113	109	117	108	116	110	115	111	117
7/21/2024	102	113	110	113	111	117	113	113	109	117	109	116	112	115	111	117
7/22/2024	103	112	110	113	111	117	113	113	109	117	108	115	108	113	106	116
7/23/2024	103	112	109	113	110	117	111	113	108	117	107	115	106	113	104	116
7/24/2024	104	112	111	114	111	117	111	112	107	117	107	115	108	113	105	117
7/25/2024	103	112	109	113	110	116	110	111	106	118	105	114	106	111	105	115
7/26/2024	103	116	109	114	109	115	110	112	106	**121**	105	115	107	114	106	114
7/27/2024	103	112	109	113	110	113	110	109	107	**121**	106	115	110	115	106	116
7/28/2024	101	111	109	113	110	112	110	108	107	119	105	116	107	114	106	117
7/29/2024	100	111	108	113	109	110	109	107	107	117	104	115	106	113	105	117
7/30/2024	100	111	107	113	108	111	109	108	106	119	104	115	107	113	106	116
7/31/2024	100	111	107	112	108	114	108	108	105	119	104	115	108	113	107	114
Exceedances:							**4**			**2**	**2**					

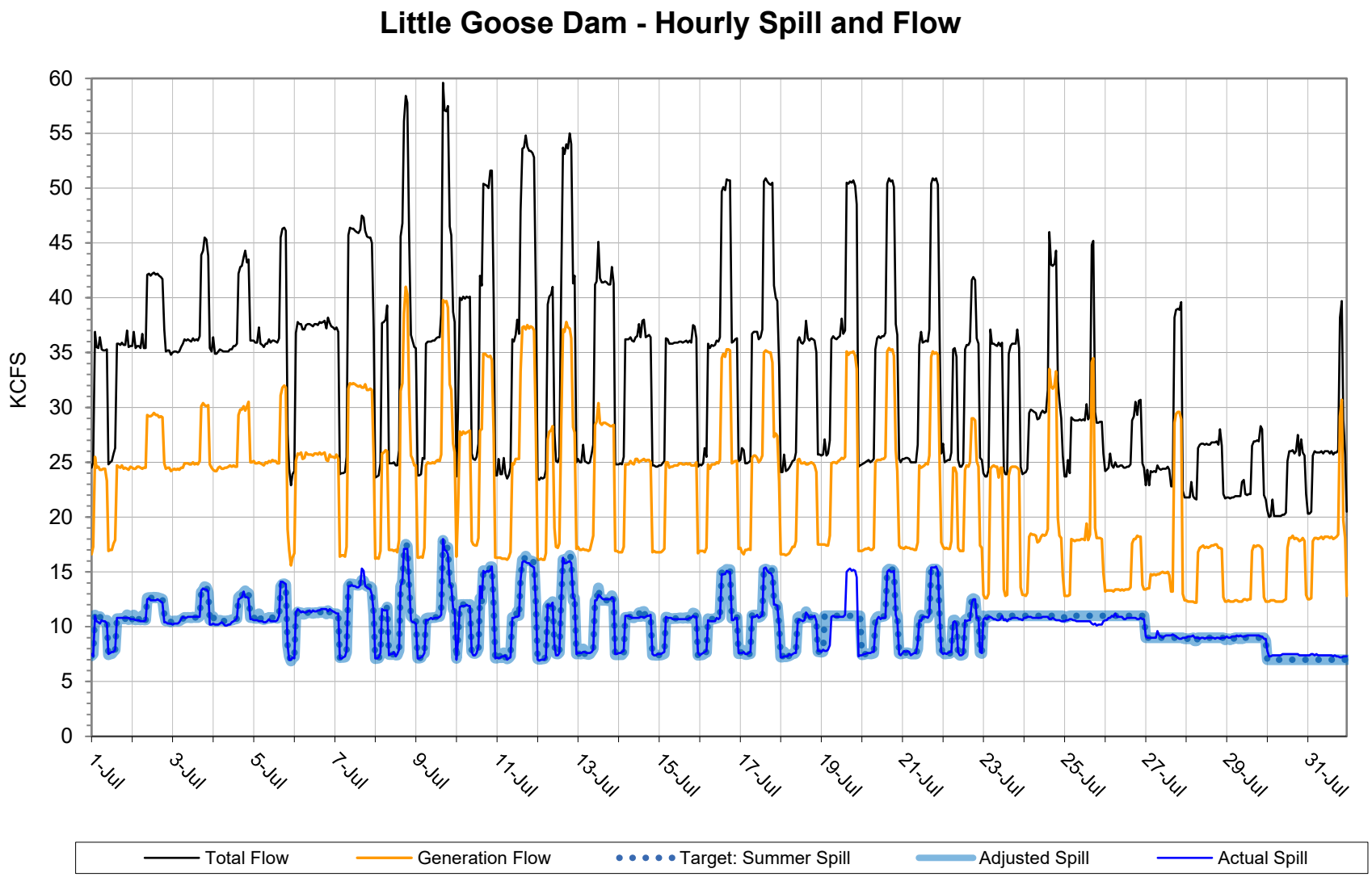
[8] Indicates missing or erroneous data.

Figure 1[9]



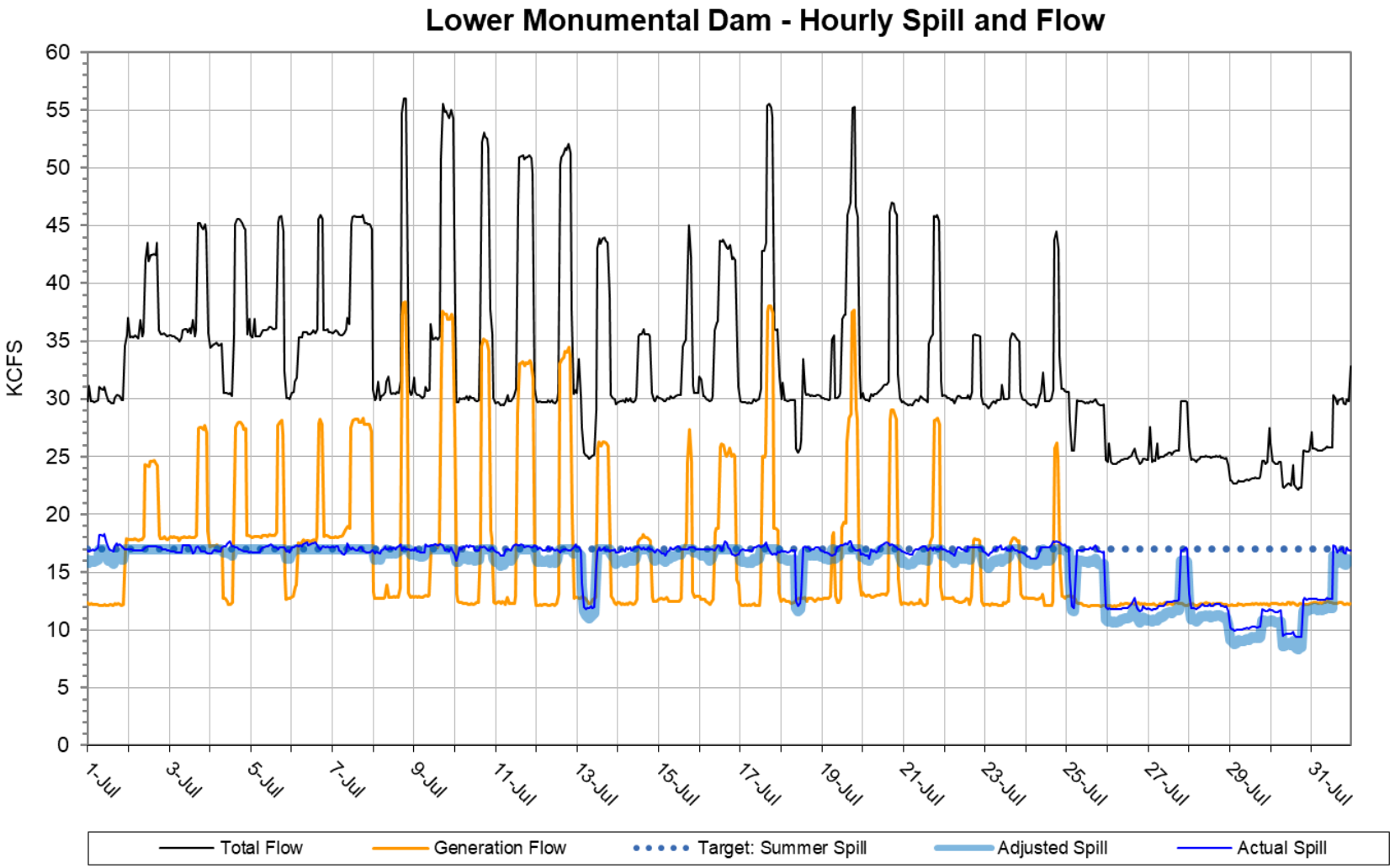
[9] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 2[10]



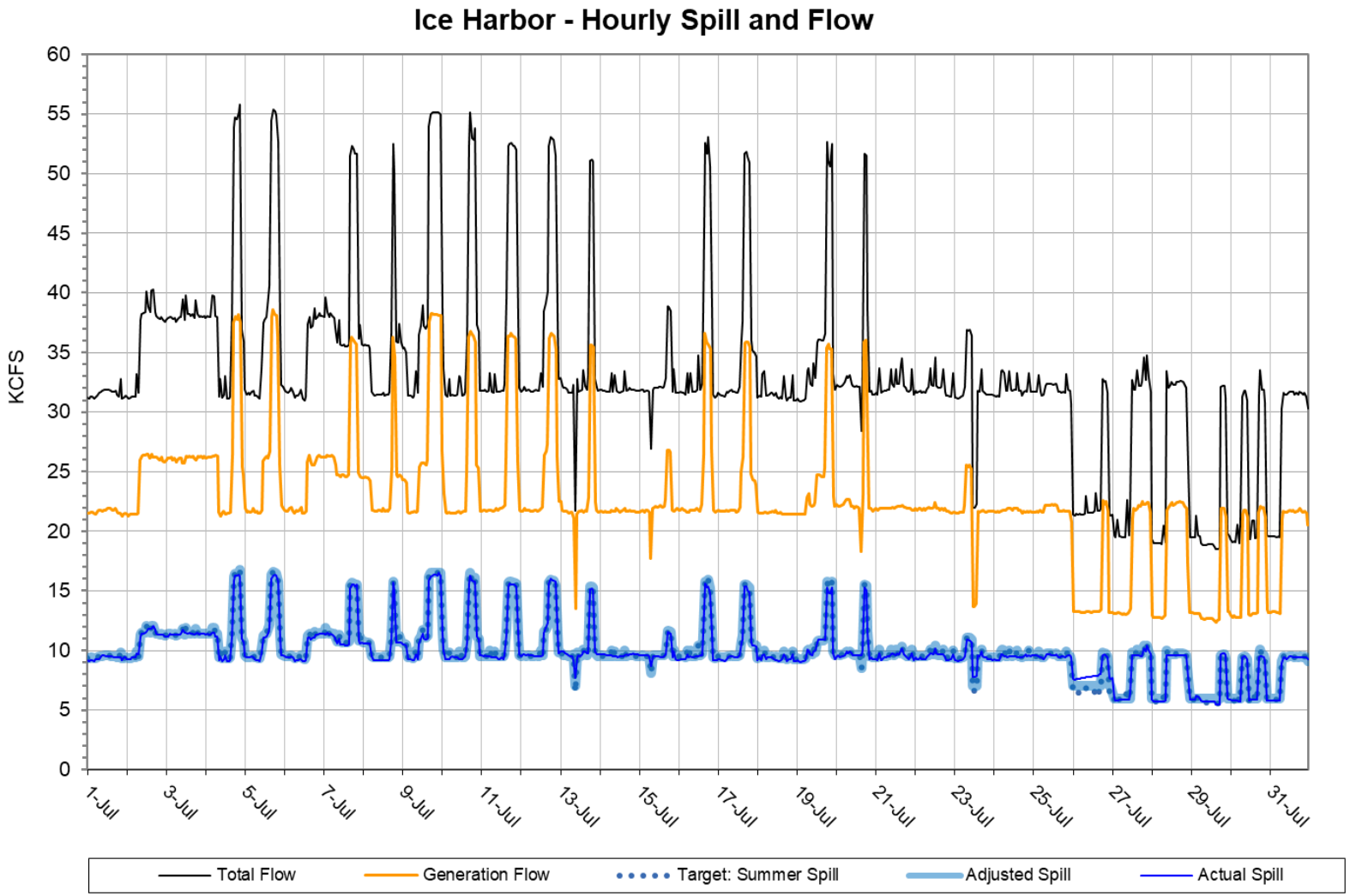
[10] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 3[11]



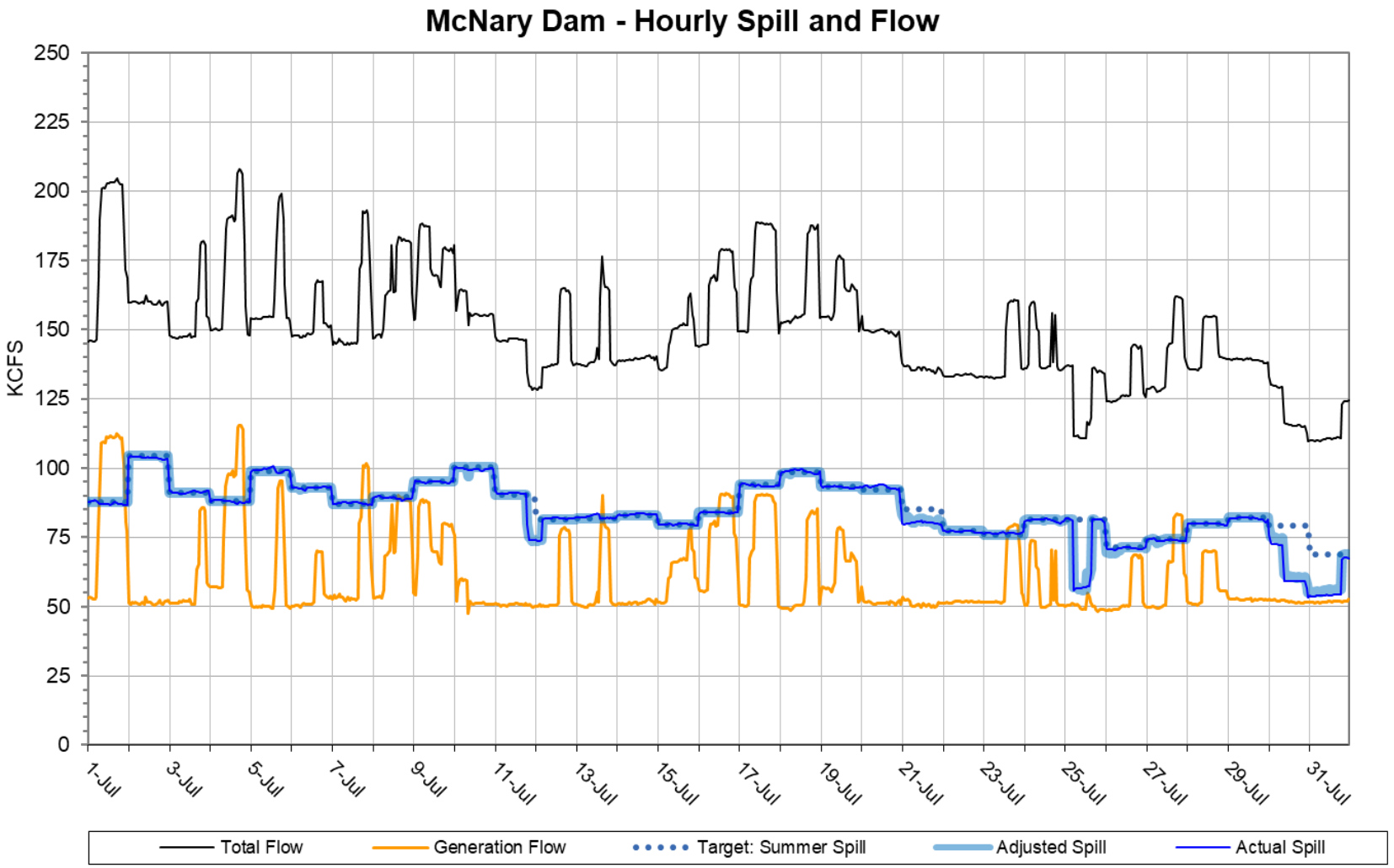
[11] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 4[12]



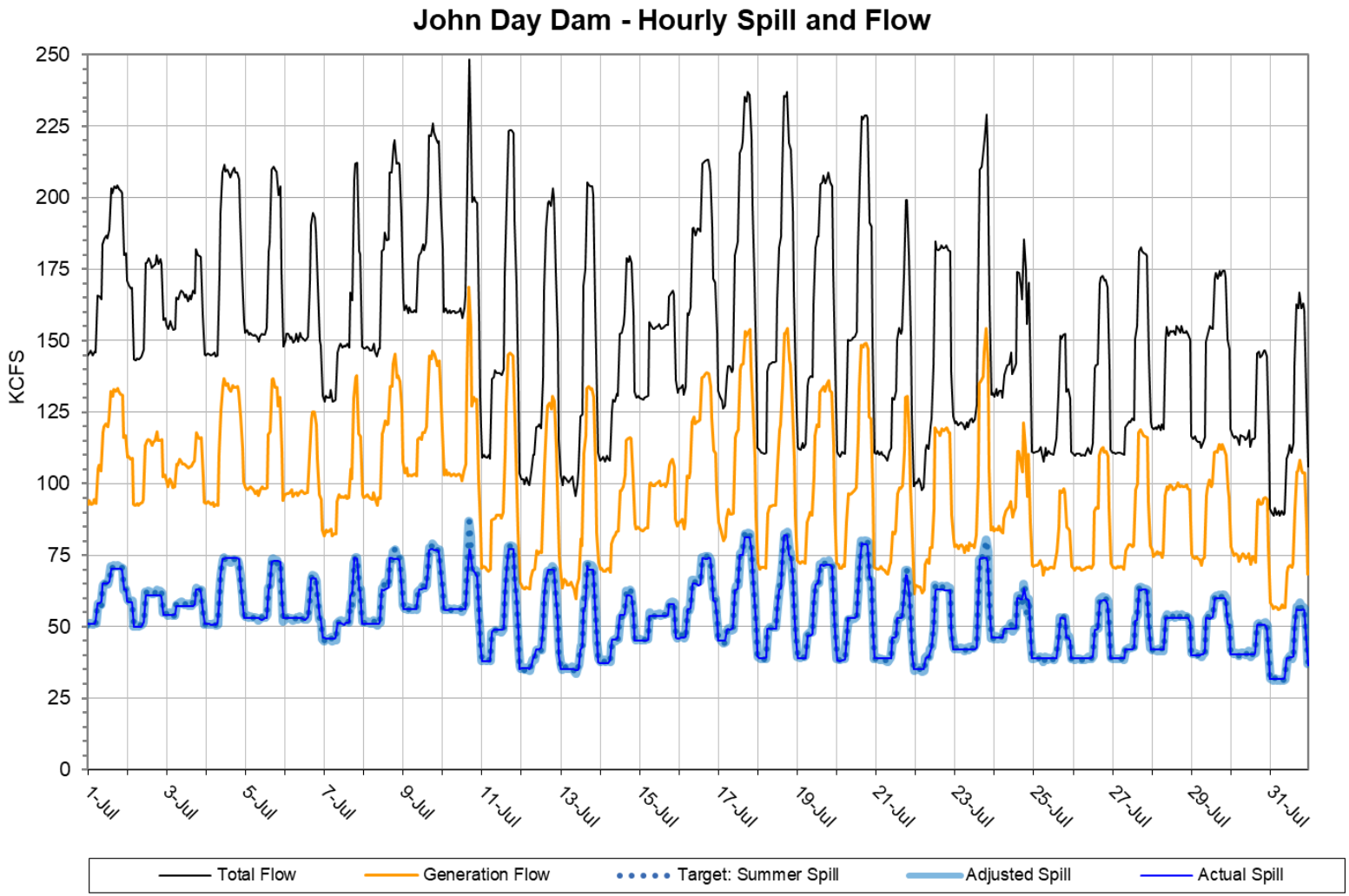
[12] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 5[13]



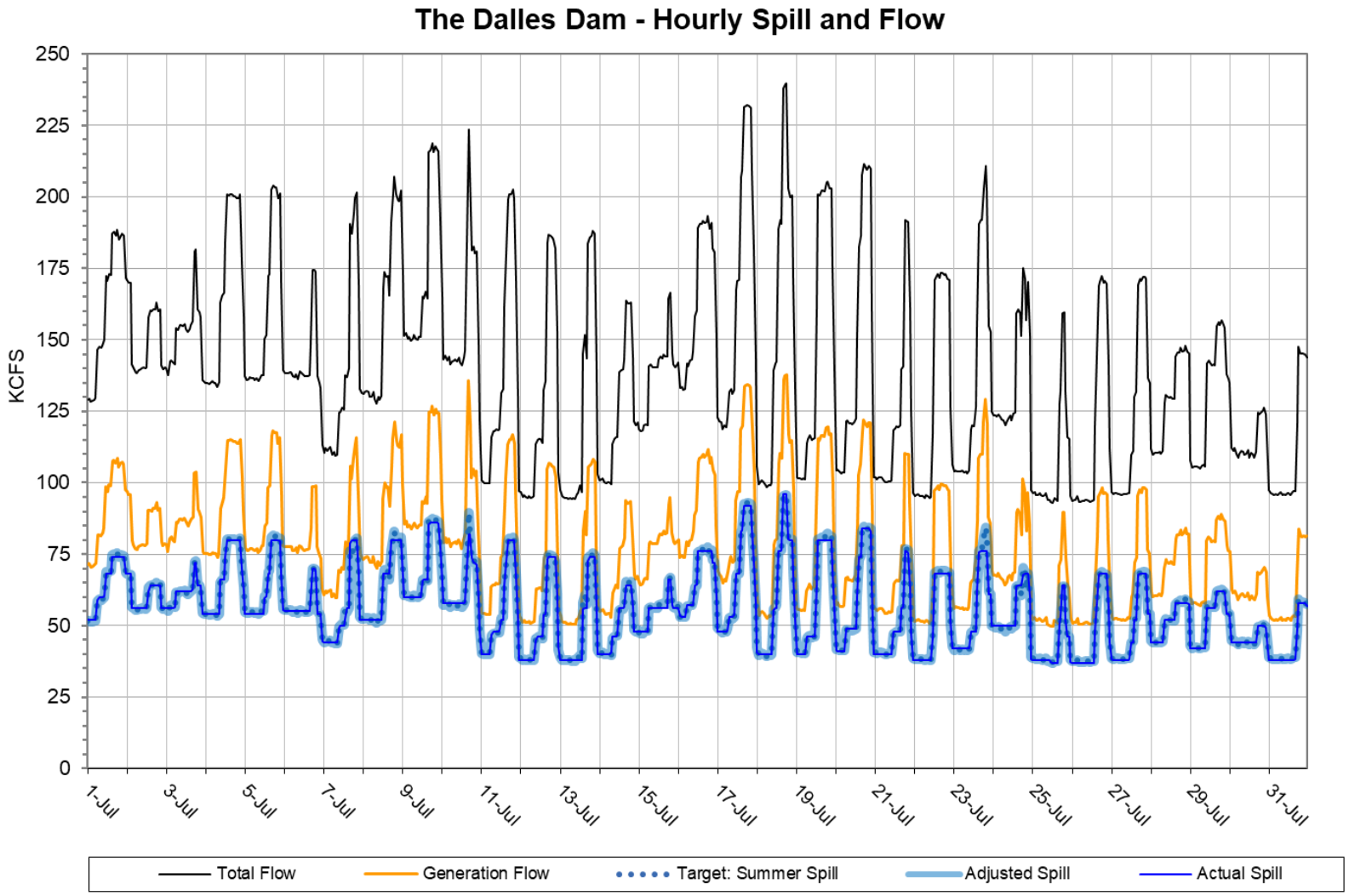
[13] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 6[14]



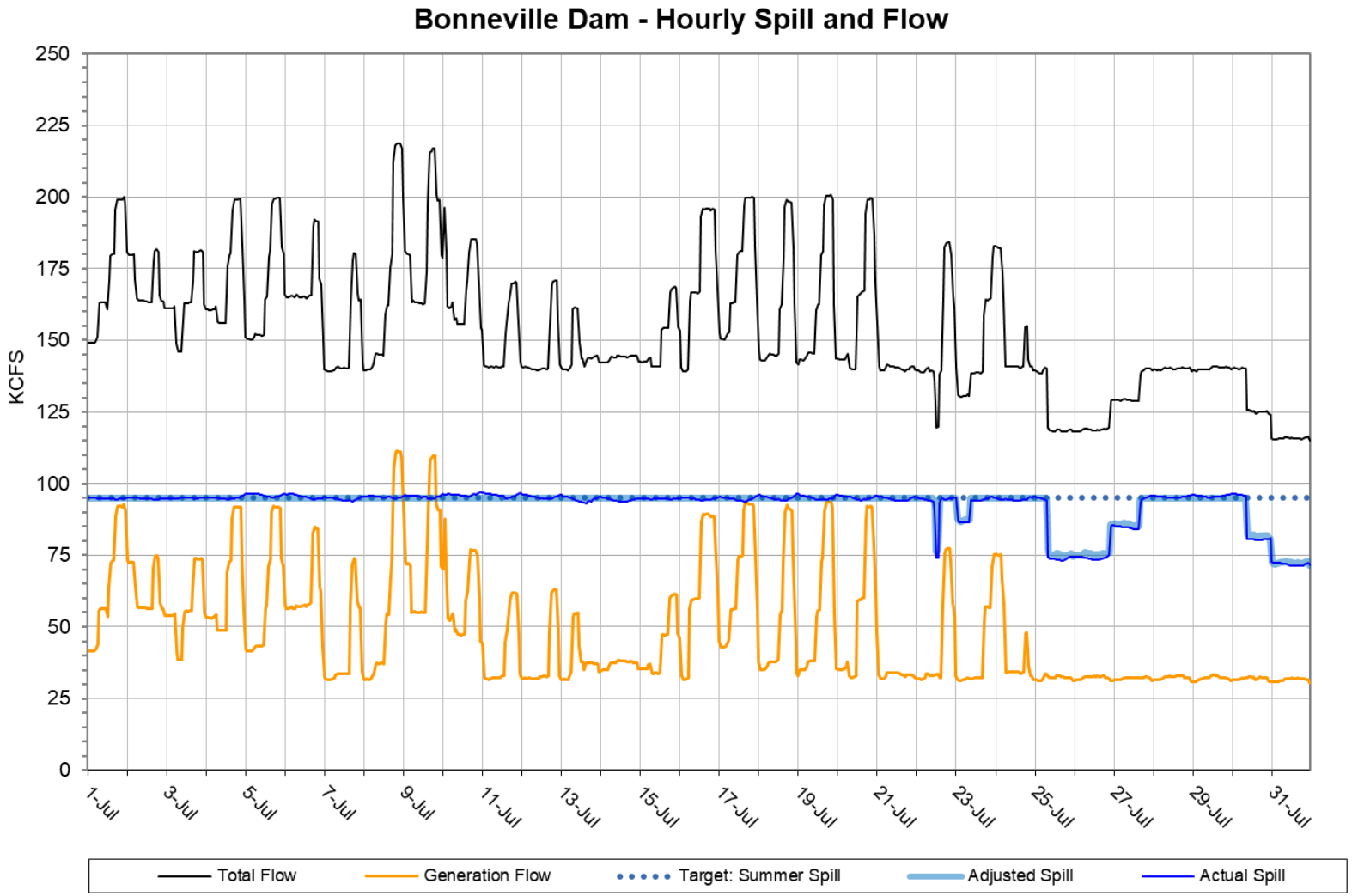
[14] The adjusted spill line is a simplified representation due to limitations of representing a range of minimum generation values. See Tables 2 and 3 for spill variances and pre-coordinated operations.

Figure 7[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 8[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.