Relicensing Study 3.3.12

EVALUATE FREQUENCY AND IMPACT OF EMERGENCY WATER CONTROL GATE DISCHARGE EVENTS AND BYPASS FLUME EVENTS ON SHORTNOSE STURGEON SPAWNING AND REARING HABITAT IN THE TAILRACE AND DOWNSTREAM FROM CABOT STATION

Initial Study Report Summary

Northfield Mountain Pumped Storage Project (No. 2485)

and Turners Falls Hydroelectric Project (No. 1889)

Prepared for:

FirstLight™

GDF SUEZ

Prepared by:

GOMEZ AND SULLIVAN ENGINEERS

SEPTEMBER 2014

1.1 Study Summary

The purpose of this study is to determine the frequency of spill events during shortnose sturgeon spawning duration and, if deemed necessary, determine appropriate protocols for sufficient protection of shortnose spawning and rearing. Federal Energy Regulatory Commission's (FERC) Study Plan Determination Letter (SPDL) dated February 21, 2014 approved the Revised Study Plan (RSP) for this study without modification. In the RSP, FirstLight proposed to conduct this study incrementally. The first step is a desktop exercise to obtain and analyze existing data in order to understand the operation of the emergency spill gates and bypass flume (Task 1). A report describing the results of this analysis is attached as Appendix A.

The results of the desktop analysis will be presented at the Initial Study Report (ISR) meeting.

There has been no stakeholder consultation required for this study since the RSP was filed.

1.2 Study Progress Summary

Task 1: Analysis of Existing Data

A report summarizing the analysis of existing data is attached to this Initial Study Report as Appendix A.

The summary report of existing data demonstrated the operation of the emergency spill gates and log sluice/bypass flume. The data show that 0.6% of the time, more than two spill gates were open to some degree. The reason appears to be related to operational procedures to keep debris off the log boom. Two short-duration events occurred during the period analyzed when the spill gates opened automatically in response to high canal forebay water levels.

With regard to the sluice gate releases, most of the time the gate is open is related to downstream fish passage requirements. Less than 4% of the time, the gate is opened to more than 7 feet for operational reasons (i.e., to pass trashrack debris downstream).

Task 2: Scenario Development

This task is contingent on whether additional field study is required.

Task 3: Field Verification of Conditions (if necessary)

If a field component of the study is necessary, field measurements will be collected in accordance with the methods detailed in the RSP, subject to modification based on agency consultation.

Task 4: Data Analysis and Reporting

This task is contingent on whether additional field study is required. As such, at this juncture, a reporting due date is not provided.

1.3 Variances from Study Plan and Schedule

The study schedule in the RSP targeted Spring 2014 for distribution of a summary report and a meeting with stakeholders to determine the need for field study and targeted Summer 2014 to perform field investigation outside of the sturgeon spawning season, if necessary. The summary report is attached to this ISR summary as Appendix A. The schedule was extended due to the unanticipated delay in receiving the SPDL for this study in February 2014.

The potential next steps would occur in 2015, if necessary.

1.4 Remaining Activities

As demonstrated in the summary report, the emergency spillway/log sluice gate discharge events during the sturgeon spawning period are infrequent and generally of low intensity in relation to river flow. FirstLight's position is that the field data collection aspect of this study is not necessary. As stated in the RSP, a mutual agreement will be reached in consultation with interested stakeholders to determine whether additional study is necessary.

Appendix A
Data Summary Report: Evaluation of Emergency Gate and Bypass Flume Discharges

Relicensing Study 3.3.12

EVALUATION OF EMERGENCY GATE AND BYPASS FLUME DISCHARGES

Initial Study Report

Northfield Mountain Pumped Storage Project (No. 2485)
and Turners Falls Hydroelectric Project (No. 1889)

Prepared for:

FirstLight Power Resources
GDF SUEZ

Prepared by:

GOMEZ AND SULLIVAN ENGINEERS

SEPTEMBER 2014

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LIST OF ABBREVIATIONS

cfs	cubic feet per second
Conte Lab	S.O. Conte Anadromous Fish Research Center
FERC	Federal Energy Regulatory Commission
FirstLight	FirstLight Hydro Generating Company
ILP	Integrated Licensing Process
PAD	Pre-Application Document
PSP	Proposed Study Plan
RSP	Revised Study Plan
SD1	Scoping Document 1
SD2	Scoping Document 2
SPDL	Study Plan Determination Letter
VY	Vermont Yankee Nuclear Power Plant

1 INTRODUCTION

FirstLight Hydro Generating Company (FirstLight), a subsidiary of GDF SUEZ North America, Inc., is the current licensee of the Northfield Mountain Pumped Storage Project (FERC No. 2485) and the Turners Falls Hydroelectric Project (FERC No. 1889). FirstLight has initiated with the Federal Energy Regulatory Commission (FERC, the Commission) the process of relicensing the two Projects using the FERC's Integrated Licensing Process (ILP). The current licenses for Northfield Mountain and Turners Falls Projects were issued on May 14, 1968 and May 5, 1980, respectively, with both set to expire on April 30, 2018.

As part of the ILP, FERC conducted a public scoping process during which various resource issues were identified. On October 31, 2012, FirstLight filed its Pre-Application Document (PAD) and Notice of Intent with the FERC. The PAD included FirstLight's preliminary list of proposed studies. On December 21, 2012, FERC issued Scoping Document 1 (SD1) and preliminarily identified resource issues and concerns. On January 30 and 31, 2013, FERC held scoping meetings for the two Projects. FERC issued Scoping Document 2 (SD2) on April 15, 2013.

FirstLight filed its Proposed Study Plan (PSP) on April 15, 2013 and, per the Commission regulations, held a PSP meeting at the Northfield Visitors Center on May 14, 2013. Thereafter, FirstLight held ten[1] resource-specific study plan meetings to allow for more detailed discussions on each PSP and on studies not being proposed. On June 28, 2013, FirstLight filed with the Commission an Updated PSP to reflect further changes to the PSP based on comments received at the meetings. On or before July 15, 2013, stakeholders filed written comments on the Updated PSP. FirstLight filed a Revised Study Plan (RSP) on August 14, 2013 with FERC addressing stakeholder comments.

On August 27, 2013 Entergy Corp. announced that the Vermont Yankee Nuclear Power Plant (VY), located on the downstream end of the Vernon Impoundment on the Connecticut River and upstream of the two Projects, will be closing no later than December 29, 2014. With the closure of VY, certain environmental baseline conditions will change during the relicensing study period. On September 13, 2013, FERC issued its first Study Plan Determination Letter (SPDL) in which many of the studies were approved or approved with FERC modification. However, due to the impending closure of VY, FERC did not act on 19 proposed or requested studies pertaining to aquatic resources. The SPDL for these 19 studies was deferred until after FERC held a technical meeting with stakeholders on November 25, 2013 regarding any necessary adjustments to the proposed and requested study designs and/or schedules due to the impending VY closure. FERC issued its second SPDL on the remaining 19 studies on February 21, 2014, approving the RSP with certain modifications.

The SPDL required FirstLight to conduct a study to evaluate the frequency and impact of water releases from the emergency spill gates and bypass flume on shortnose sturgeon spawning and rearing habitat in the tailrace and downstream from Cabot Station.

FirstLight is conducting this study incrementally, in accordance with the approved RSP. First, existing data are analyzed to understand the operation of the emergency spill gates and bypass flume which is the subject of this report. Then, the analysis is being shared with the resource agencies and a meeting will be held to discuss the results to determine if a field component of the study is necessary.

[1] The ten meetings were held on May 14, 15, 21, and 22, and June 4, 5, 11, 12, and 14 and August 8.

The objectives of this report are to:

1. Determine the frequency with which the emergency water control gates are operated to discharge large quantities of water.

2. Describe the use of the bypass flume to pass water, fish, and any debris raked off the intake racks downstream.

The shortnose sturgeon is a federally listed endangered species under the Endangered Species Act. There is a population of shortnose sturgeon residing in the river reach between Turners Falls and Holyoke Dams. Spawning habitat for these fish occurs between a natural rock formation locally known as "Rock Dam" (within the Turners Falls bypassed reach) and a point approximately 650 feet downstream of the Cabot Station tailrace. Sturgeon spawning in this area typically occurs from April to mid-May and the egg incubation period is about two weeks when water temperatures are between 8 and 12 degrees Celsius (°C). Upon hatching, larval shortnose sturgeon hide for about 12 days under available cover at the spawning site while absorbing the yolk-sac, before migrating downstream to deeper water between the mouth of the Deerfield River and Holyoke Dam[2].

This report will provide data and analysis describing the use of the emergency water control gates and bypass flume during the last 8 years (2005-2012) to determine potential impacts on shortnose sturgeon spawning and rearing activities.

[2] National Marine Fisheries Service. 1998. Final Recovery Plan for the shortnose sturgeon (*Acipenser brevirostrum*). Prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. December 1998.

2 DESCRIPTION OF GATES AND THEIR OPERATION

The principal components of the Turners Falls Project include the Turners Falls Dam, gatehouse, power canal, Station No. 1 and Cabot Station, located at the downstream end of the power canal. Water can be released from the power canal via Station No. 1 and Cabot Station generation, through the Cabot spillway gates (upstream of Cabot Station), and from the log sluice just downstream from the Cabot Station intakes (see Figure 2-1). Emphasis of this study is on the spillway gates and log sluice. Water can also be released through the fishways at Cabot Station and Turners Falls Dam, as well as from other water users along the canal.

2.1 Turners Falls Power Canal Spillway Gates

The canal spillway adjacent to and upstream of Cabot Station contains 10 vertical, downward-opening slide gates that are 12 feet wide x 12 feet high with individually driven rack and pinion operators. Eight of the gates are used to discharge canal flows and two of the gates supply attraction water to the Cabot fish ladder. In this report, these eight gates are referred to as the "spill gates." The spill gates (shown in Figure 2-2) are used to rapidly draw down the power canal in the event of a Cabot Station load rejection or canal dike breach or to sluice ice and debris downstream.

The discharge capacity of these eight spill gates is approximately 12,000 cfs at the normal canal level of 173.5 feet above mean sea level (NGVD 1929 datum). The maximum Cabot fish ladder attraction water provided through the other two gates is approximately 335 cfs.

The canal level at Cabot Station is constantly monitored. For safety reasons, the spill gates automatically open and the gates at the Turners Falls Gatehouse automatically close in the event an abnormal high or low canal level is detected, or when there is a load rejection at Cabot Station. An abnormally low canal level could indicate a dike breach which is an emergency situation that could inundate houses along Montague City Road. A load rejection at Cabot Station could cause the canal level to rise and overflow, inundating surrounding areas. During such events, when the gates are operated automatically, the canal level will drop rapidly and the duration of excess water flowing through the spill gates will be short, just minutes.

The gates are used for operational reasons as well. During periods of high river flows, at least one spillway gate will be opened to allow river debris entering the canal to be discharged back to the river to prevent obstructions at the Cabot Station intake racks. Likewise in the winter and spring, when there is excess ice in the canal, gates will be opened to route ice down the spillway. Operators will also routinely open one or more gates when necessary to help remove debris from the trash boom. During these periods, operators may also temporarily reduce generation - the load reduction allows for debris to be moved off the log boom. The gates discharge back to the river just upstream of Cabot Station.

2.2 Bypass Flume/Log Sluice Gate

Past the Cabot Station intake and trashracks is a gated log sluice that has been enhanced to provide downstream fish passage past Cabot Station. In this report, the gate controlling water passage through this opening is referred to as the "sluice gate." The sluice has been resurfaced to provide a passage route,

and above-water lighting and a fish sampling facility have been added. Although the sluice gate is approximately 16 feet wide, there is an 8 foot wide weir that is inserted in the sluice opening during downstream fish passage periods. The weir has an elliptical floor, and was developed specifically to enhance fish passage. The gate is downward-opening. The sluice discharges to the river just downstream of Cabot Station as shown in Figure 2-3.

The bypass flume is utilized as a downstream fish passage facility at Cabot Station and is generally open for fish passage from April through mid-November in accordance with a schedule provided by the Connecticut River Atlantic Salmon Commission (CRASC). The schedule for the downstream fish passage facility at the Turners Falls Project in 2014 is as follows:

- Atlantic salmon smolts — April 1 – June 15
- Atlantic salmon adults — October 15 – December 15[3]
- American shad adults — April 7 – July 31
- American shad juveniles — August 1 – November 15
- American eel adults — September 1 – November 15

During this time a continuous flow of approximately 200 cfs is maintained through the log sluice and the fish passage weir is in place, except for brief periods of sampler deployment or rack maintenance and longer periods when high river flow would pose an erosion threat at the sluice discharge if the gate were left open. This opening can also be used to pass debris downstream; the fish passage weir may be removed at times to facilitate clearing the intake racks of debris. Gate openings greater than 7 feet usually indicate a period of intake rack cleaning.

[3] Downstream passage operation for adult salmon will only be required if 50 or more adults are documented as passing upstream at this facility. For this study, the status of the salmon passage effort is not relevant, because the downstream fish passage facility will be open during the sturgeon spawning period for adult American shad.

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RELICENSING STUDY 3.3.12
EVALUATION OF EMERGENCY GATE AND BYPASS FLUME DISCHARGES

0 100 200 400 Feet

Figure 2-1:
Overhead View of Gate Locations

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Figure 2-2: Photographs of Cabot Station Emergency Spill Gates

Upstream View of Spill Gate discharge location (no spill)

Figure 2-3: Photographs of Cabot Station Sluice Gate

View of Sluice Gate discharge (approximately 210 cfs) from top of downstream fishway

Upstream View of Sluice Gate discharge location

3 DATA ANALYSIS METHODS

Gate opening data from 2005 through 2012 were obtained from FirstLight's operations records on a 10-minute time step, April 1 – June 30 annually. In addition to the gate openings, additional operations data obtained from FirstLight included the canal forebay elevation, Cabot Station generation in megawatts - converted to discharge, and approximate bypass reach discharge calculated from Turners Falls Dam and Station No. 1 releases (Figure 3-1).

Emergency Spill Gates

The crest elevation of the eight spill gates varies between about 174.1 and 174.7 feet. FirstLight's system records the gate opening relative to its fully closed position. For example, if the gate crest is fully closed at elevation 174.2 feet and at a particular time the crest is at 170.2 feet, the system reports the gate level as 4.0 feet. The normal water surface elevation in the canal is 173.5 feet[4]. A gate was defined as open if the value was > 1.2 feet (this accounts for the difference between a gate crest elevation of 174.7 feet and normal canal level of 173.5 feet).

The number of Cabot spill gates open at each 10-min interval was computed, and then the frequency of times when 0 through 8 gates were open was calculated. The results were tabulated to show frequency of spill gate and sluice gate openings per year (during the period of interest). For the spill gates, duration analysis tabulation simply stated if the gates were open or closed and did not include magnitude (i.e., how open each gate was).

Sluice Gate

The sluice gate crest is at elevation 175.1 feet (approximately) when the gate is closed, and normal canal forebay elevation equals 173.5 feet, so no water would typically be flowing over the gate at gate openings up to about 1.6 feet. For this analysis, reported gate opening values < 1.5 feet open indicate the period when this gate was closed.

The frequency of sluice gate opening was separated into categories based on the magnitude of the opening.

Flow Calculations

Flow over each gate was calculated based on the head atop each gate using the standard weir equation:

$Q = C*L*H^{1.5}$ where,

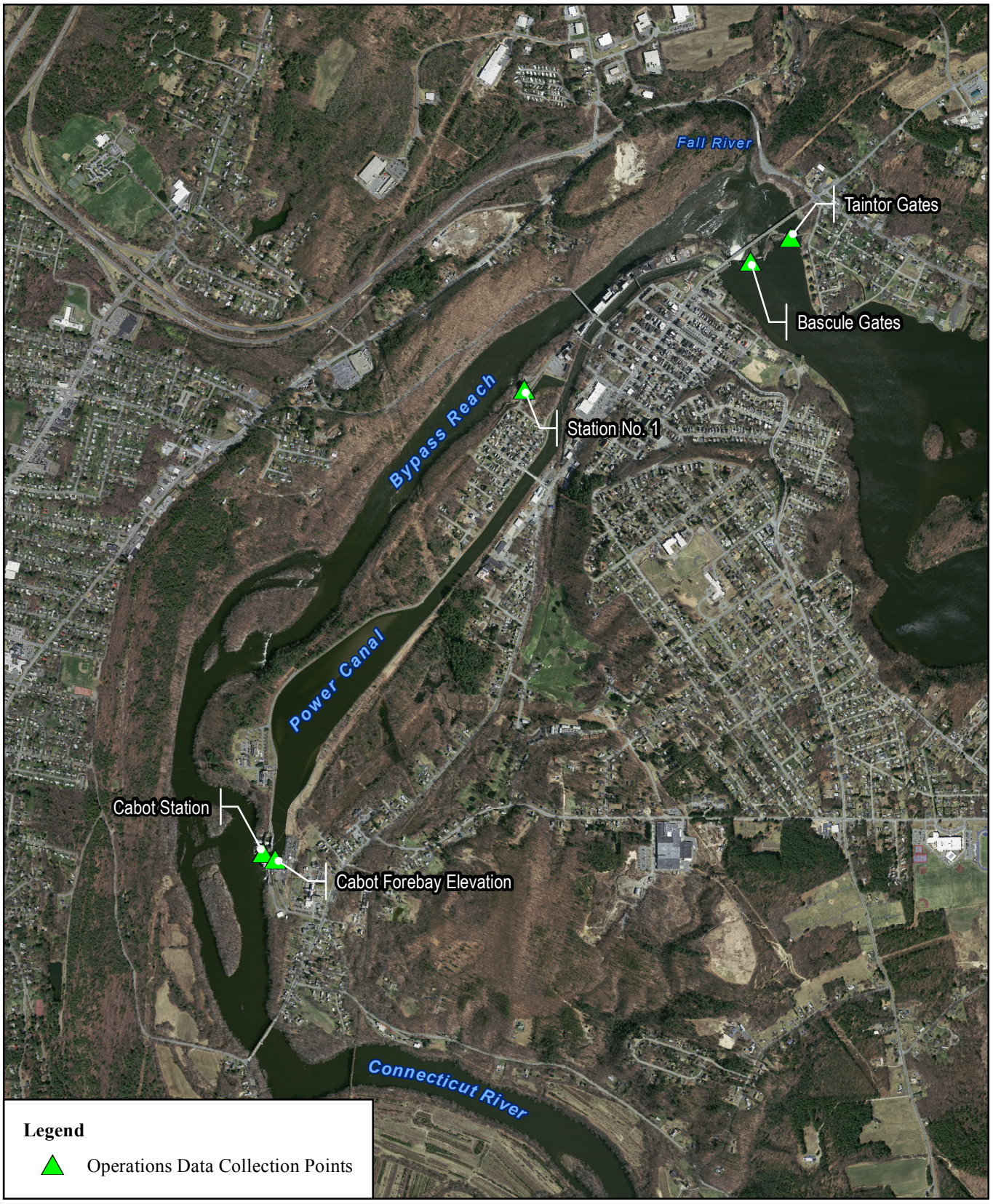
Q is discharge (in cfs)
C is the weir coefficient (unitless)
L is the length of each gate (in feet)
H is the head or depth of water atop the gate crest (in feet).

When calculating head over the spill gates, an average crest elevation of 174.4 feet was used for all the spill gates. A coefficient of 3.3 was used for the spill gates and a coefficient of 3.1 was used for the sluice gate.

[4] Note that all FirstLight gages which measure the water surface elevation are based on the same mean sea level datum (specifically NGVD 1929 datum).

Time-series plots were developed on a biweekly time step showing the magnitude of gate releases in cfs versus river flow. River flow was calculated by converting generation output at Cabot Station and Station No. 1 to cfs, and adding these values to flow releases at the Turners Falls Dam.

It should be noted that this river flow calculation does not include: inputs from Fall River (ungaged, 34 square mile drainage area); flows provided through the Cabot fishway (maximum attraction flow = 335 cfs) or Spillway fishway (maximum attraction flow = 300 cfs); or any inputs from the other water users along the canal (i.e., Southworth Paper Hydro (capacity = 113 cfs) and Turners Falls Hydro LLC (capacity =288 cfs), which operate only after Cabot and Station No. 1 are operating at full hydraulic capacity, and Conte Lab (capacity = 200 cfs)).



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RELICENSING STUDY 3.3.12
EVALUATION OF EMERGENCY GATE AND BYPASS FLUME DISCHARGES

0 1,000 2,000 4,000 Feet

Figure 3-1:
Location of FirstLight Operations Data Collection Points

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4 RESULTS AND DISCUSSION

Cabot Emergency Spill Gates

As noted above, FirstLight provided spill gate opening data every 10 minutes from April 1 to June 30 for the years 2005 through 2012. Thus, the spill gate opening was recorded 144 times/day for 91 days (April 1 to June 30), which is equivalent to 13,104 records/year during the target period. All of the gates were in a closed position 40.5% of the time (Table 4.1). One gate is often left partially open to help route debris from the boom in the canal through the spill gate; one gate is open 57.4% of time (thus over 97.8% of the time, none or one gate is open to some degree). More than two gates were open at 0.6% of the intervals (Table 4-1).

Within the period of interest, there were a total of 26 occurrences when at least five gates were open to some degree (Table 4-2). These occurrences lasted for periods ranging from 10 minutes (the minimum interval examined) to 2 hours, when on April 26, 2006, 5 to 6 gates were open continuously from 7:20 am to 9:20 am. Table 4-2 depicts these events. The only interval when all gates were fully open occurred at 2:40 am on June 14th, 2010.

Periods when more than two gates are opened are generally related to high debris load in the river that accumulated on the log boom. Biweekly plots showing the spill gate opening compared to Cabot Station generation are shown in Appendix A. Periods of increased spill gate opening are usually concomitant with short-term reductions in generation. The load reduction allows for debris to be moved off the log boom. Once the gates are closed, generation levels resume.

Biweekly plots showing the magnitude of flow through the spill gates compared to river flow are shown in Appendix B. The flow inputs are plotted on the same scale to show the relative effect of the gate release in the context of the flow from Cabot Station and in the bypass reach.

The largest spill event occurred on June 14th, 2010 during which approximately 8,653 cfs of spill was recorded for one 10-minute interval (2:40); this event occurred during a time when bypass flows increased considerably (from 400 to 7,410 cfs during the hour) as a result of spill at Turners Falls Dam and when discharge through Cabot Station was reduced (9,077 to 3,764 cfs during the hour). Another large magnitude spill event occurred on June 4th, 2007 during which approximately 8,168 cfs of spill was recorded during a time when bypass flows were low (400 cfs) but discharge through Cabot Station was high (12,620 cfs). This event lasted for 20 minutes (two 10-minute intervals). Both of these events occurred as an automated response due to the canal forebay elevation being above the emergency threshold of 174.3 feet for a short period (<10 minutes).

Sluice Gate

Table 4-3 shows the frequency and magnitude that the sluice gate was open during the period April 1-June 30 from 2005-2012. 23% of the time, the gate was closed. Typically, the sluice gate is opened 5-7 feet when the fish sampler is deployed. This occurred 70% of the time over the period of interest. The gate was open > 7 feet less than 4% of the time. Gate openings >7 feet usually indicate a period of intake rack cleaning. Similar to the spill gates, periods of increased opening at the sluice gate are usually concomitant with short-term reductions in generation. The load reduction allows for debris to be moved off the trashracks and sluiced downstream.

Biweekly plots showing the sluice gate opening compared to Cabot Station generation are shown in Appendix C. The gate is closed briefly to put the downstream fish sampler into service (usually around 15:30-16:00) and to take it out (22:00).

Biweekly plots showing the magnitude of flow through the sluice gate compared to river flow are contained in Appendix D. The maximum capacity of the sluice gate is approximately 800 cfs, which is usually substantially lower than total river flow.

Previous Observations from Conte Lab

As stated in the RSP, sturgeon researchers at the S.O. Conte Anadromous Fish Research Center (Conte Lab) have observed spillage at the emergency water control gate and the bypass flume that appeared to increase velocity over the shortnose sturgeon spawning and rearing area downstream of Cabot Station and may have resulted in a debris plume.

To further understand the operational conditions related to these observations, the Conte Lab was contacted. Dates of the spillage observations were provided from Conte Lab (pers. com., M. Kieffer, March 21, 2013).

Four occurrences were noted within the date range parameters of this report (2005-2012), including:

- 04/19/05 10:04
- 05/06/05 13:00
- 04/26/06 9:10
- 05/05/06 13:00

In addition to the figures in the Appendices, the magnitude and duration of these events observed by Conte Lab are presented in Figures 4-1 through 4-4. Data from three out of four of these dates (5 gates open) is also included in Table 4-2 (during the occurrence noted on 4/19/05, only three spill gates were open).

In the context of the overall analysis, the conditions observed on 4/19/2005 (three spill gates open) occur 0.3% of the time, and the conditions observed on 5/6/2005, 4/26/2006, and 5/5/2006 (five spill gates open) occur 0.1% of the time (see Table 4-1). This suggests that if any impacts to the sturgeon spawning area occur as a result of the spill gate operation (e.g., increased velocities or sediment transport), any such impacts would be very infrequent. Furthermore, Kieffer and Kynard (2007)[5] also note that spill events at Cabot Station usually caused no identifiable increase in discharge at the USGS Montague City gage, because there was only a shift in release location, rather than a shift in discharge volume.

Summary

The data provided herein demonstrate the operation of the emergency spill gates and log sluice/bypass flume. The data show that 0.6% of the time, more than two spill gates were open to some degree. The reason appears to be related to operational procedures to keep debris of the log boom. Two short-duration events occurred during the period analyzed when the spill gates opened automatically in response to high canal forebay water levels.

[5] Kieffer, Micah & Kynard, Boyd. (2007). Effects of Water Manipulations by Turners Falls Dam Hydroelectric Complex on Rearing Conditions for Connecticut River Shortnose Sturgeon Early Life Stages. S.O. Conte Anadromous Fish Research Center. Turners Falls. MA.

With regard to the sluice gate releases, most of the time the gate is open is related to downstream fish passage requirements. Less than 4% of the time (Table 4-3), the gate is opened to more than 7 feet for operational reasons (i.e., to pass trashrack debris downstream).

The discharge events through the emergency spill gates during the sturgeon spawning period are infrequent and of low intensity in relation to river flow. FirstLight's position is that the field data collection aspect of this study is not necessary.

Consultation

As stated in the RSP, the results of these analyses are being presented to interested stakeholders before proceeding further with this study; a mutual agreement will be reached in consultation with interested stakeholders to determine whether additional study is necessary.

Table 4-1: Frequency of Emergency Spill Gate Openings from April 1-June 30, 2005-2012.

Number of gates open	Occurrences per year (10-minute intervals)									Frequency
	2005	2006	2007	2008	2009	2010	2011	2012	Total	
0 (no gates open)	4,742	4,121	5,437	6,057	2,320	6,145	4,001	9,589	42,412	40.5%
1	7,915	8,749	7,278	6,981	9,821	6,930	9,032	3,455	60,161	57.4%
2	190	80	302	31	951	16	41	13	1,624	1.5%
3	156	42	53	11	3	4	29	32	330	0.3%
4	55	80	30	16	7	0	1	15	204	0.2%
5	42	28	0	8	0	1	0	0	79	0.1%
6	4	4	2	0	0	4	0	0	14	0.0%
7	0	0	0	0	2	0	0	0	2	0.0%
8	0	0	2	0	0	4	0	0	6	0.0%
Total Readings	13,104	13,104	13,104	13,104	13,104	13,104	13,104	13,104	104,832	

Note: As an example of how to read the table, the value of 4,742 means that from April 1 to June 30, 2005, there were 4,742 readings (based on a 10-minute interval) out of 13,104 when no spill gates were open.

Table 4-2: Periods When More Than Four Spill Gates Were Open From April 1-June 30, 2005-2012.

Time	Gate Opening (feet)								Number of gates open	Spill Gate Discharge (cfs)
	SG03	SG04	SG05	SG06	SG07	SG08	SG09	SG10		
4/2/2005 19:10	0.00	9.31	0.38	0.40	6.12	9.90	10.00	8.50	5	4,473
4/2/2005 19:20	0.00	9.31	0.38	0.40	6.12	9.90	10.00	8.50	5	4,474
4/2/2005 19:30	0.00	9.32	0.38	0.40	6.12	9.90	10.00	8.50	5	4,474
4/2/2005 19:40	0.00	9.32	0.38	0.40	6.12	9.90	10.00	8.50	5	4,474
4/2/2005 19:50	0.00	9.32	0.38	0.40	6.12	9.91	10.00	8.50	5	4,475
4/2/2005 20:00	0.00	9.32	0.38	0.40	6.12	9.91	10.00	8.50	5	4,475
4/2/2005 20:10	0.00	9.32	0.38	0.40	6.13	9.91	10.00	8.50	5	4,476
4/2/2005 20:20	0.00	9.32	0.38	0.40	6.12	9.91	10.00	8.50	5	4,476
4/2/2005 20:30	0.00	9.32	0.38	0.40	6.12	9.91	10.00	8.50	5	4,475
4/3/2005 18:00	0.00	9.32	0.02	4.04	10.00	3.77	10.00	8.49	6	4,435
4/3/2005 18:10	0.00	9.33	0.02	5.21	9.04	2.98	10.00	8.49	6	4,329
4/5/2005 5:30	0.00	9.31	0.02	0.03	4.11	10.00	10.00	8.50	5	4,244
4/7/2005 13:50	0.00	9.34	0.33	7.01	10.00	10.00	10.00	0.09	5	4,881
4/7/2005 14:00	0.00	9.34	0.33	10.00	10.00	10.00	10.00	0.09	5	5,372
4/8/2005 12:40	0.00	9.35	2.64	0.04	10.00	10.00	10.00	0.09	5	4,371
4/8/2005 12:50	0.00	9.35	8.02	0.04	10.00	10.00	10.00	0.09	5	5,037
4/8/2005 13:00	0.00	9.35	6.02	0.04	10.00	10.00	10.00	0.09	5	4,742
4/8/2005 13:10	0.00	9.35	3.94	0.04	10.00	10.00	10.00	0.09	5	4,491
4/8/2005 13:20	0.00	9.35	3.94	0.04	10.00	10.00	10.00	0.09	5	4,492
4/8/2005 13:30	0.00	9.35	3.94	0.04	10.00	10.00	10.00	0.10	5	4,491
4/8/2005 13:40	0.00	9.35	3.94	0.04	10.00	10.00	10.00	0.09	5	4,492
4/17/2005 6:00	0.00	9.31	5.58	4.71	10.00	10.00	10.00	0.09	6	4,979
4/17/2005 6:10	0.00	9.31	5.58	4.71	10.00	10.00	10.00	0.09	6	4,979
4/26/2005 12:40	0.00	5.38	0.00	9.90	4.96	10.00	10.00	0.09	5	3,990
4/26/2005 12:50	0.00	5.38	0.00	9.91	7.01	10.00	10.00	0.09	5	4,266
4/26/2005 13:00	0.00	5.38	0.00	9.91	7.01	10.00	10.00	0.09	5	4,266
4/26/2005 13:10	0.00	5.38	0.00	9.91	7.01	10.00	10.00	0.09	5	4,266
4/26/2005 13:20	0.00	5.38	0.00	9.91	5.86	10.00	10.00	0.09	5	4,104
4/26/2005 13:30	0.00	5.38	0.00	9.91	5.86	10.00	10.00	0.09	5	4,104
4/26/2005 13:40	0.00	5.38	0.00	9.91	5.86	10.00	10.00	0.09	5	4,104
4/26/2005 13:50	0.00	5.38	0.00	9.91	3.88	10.00	10.00	0.09	5	3,869
5/6/2005 13:00	0.00	9.35	9.77	10.00	0.05	10.00	10.00	0.09	5	5,331
5/6/2005 13:10	0.00	9.35	9.77	10.00	0.05	10.00	10.00	0.09	5	5,332
5/6/2005 13:20	0.00	9.35	9.77	10.00	0.05	10.00	10.00	0.09	5	5,332
5/6/2005 13:30	0.00	9.35	9.77	10.00	0.05	10.00	10.00	0.09	5	5,332
5/6/2005 13:40	0.00	9.35	9.77	10.00	0.05	10.00	7.92	0.09	5	4,980
5/6/2005 13:50	0.00	9.35	9.77	10.00	0.05	10.00	7.92	0.09	5	4,980
5/6/2005 14:00	0.00	9.35	9.77	10.00	0.04	10.00	7.92	0.09	5	4,980
5/6/2005 14:10	0.00	9.35	9.77	10.00	0.04	10.00	7.01	0.09	5	4,841

Time	Gate Opening (feet)								Number of gates open	Spill Gate Discharge (cfs)
	SG03	SG04	SG05	SG06	SG07	SG08	SG09	SG10		
6/2/2005 12:40	0.00	9.37	4.86	10.00	0.05	10.00	10.00	0.09	5	4,598
6/2/2005 12:50	0.00	9.37	4.86	10.00	0.05	10.00	10.00	0.09	5	4,598
6/2/2005 13:00	0.00	9.37	4.86	10.00	0.05	10.00	10.00	0.09	5	4,598
6/2/2005 13:10	0.00	9.37	4.86	10.00	0.05	10.00	10.00	0.09	5	4,599
6/2/2005 13:20	0.00	9.37	4.86	10.00	0.05	10.00	10.00	0.09	5	4,599
6/2/2005 13:30	0.00	9.37	4.86	10.00	0.05	10.00	10.00	0.09	5	4,599
6/2/2005 13:40	0.00	9.37	4.86	10.00	0.05	10.00	10.00	0.09	5	4,599
4/1/2006 13:30	4.26	2.42	2.23	0.26	0.23	0.18	2.23	2.48	5	539
4/26/2006 7:20	0.00	9.31	9.74	0.04	0.04	2.97	8.77	8.47	5	3,863
4/26/2006 7:30	0.00	9.31	9.74	0.04	0.04	7.09	8.77	8.48	5	4,360
4/26/2006 7:40	0.00	9.31	9.74	0.04	0.04	10.00	8.77	8.48	5	4,840
4/26/2006 7:50	0.00	9.31	9.74	0.04	5.09	10.00	8.80	8.48	6	5,193
4/26/2006 8:00	0.00	9.31	9.74	0.04	5.09	10.00	8.79	8.48	6	5,191
4/26/2006 8:10	0.00	9.31	9.75	0.04	5.09	10.00	8.79	8.48	6	5,192
4/26/2006 8:20	0.00	9.31	9.75	0.04	5.09	10.00	8.80	8.49	6	5,194
4/26/2006 9:00	0.00	9.31	9.75	0.04	0.04	10.00	9.50	8.49	5	4,968
4/26/2006 9:10	0.00	9.31	9.75	0.04	0.04	10.00	9.49	8.49	5	4,968
4/26/2006 9:20	0.00	4.86	9.75	0.04	0.04	10.00	9.49	8.49	5	4,312
5/5/2006 12:50	0.00	8.06	0.03	0.04	5.09	7.71	9.58	8.52	5	3,690
5/5/2006 13:00	0.00	8.06	0.03	0.04	5.09	7.72	9.57	8.52	5	3,690
5/14/2006 11:40	0.00	9.32	0.01	0.04	3.97	10.00	9.60	8.50	5	4,158
5/14/2006 11:50	0.00	9.33	0.01	0.04	3.97	10.00	9.60	8.50	5	4,159
5/14/2006 12:00	0.00	9.33	0.01	0.04	3.97	10.00	9.60	8.50	5	4,159
5/14/2006 12:10	0.00	9.33	0.01	0.04	3.97	10.00	9.60	8.50	5	4,159
5/14/2006 12:20	0.00	9.33	0.01	0.04	3.97	10.00	9.60	8.50	5	4,159
5/14/2006 12:30	0.00	9.33	0.01	0.04	3.97	10.00	9.60	8.50	5	4,159
5/14/2006 12:40	0.00	9.33	0.01	0.04	3.97	10.00	9.60	8.50	5	4,158
5/14/2006 12:50	0.00	9.33	0.01	0.04	3.97	10.00	9.60	8.50	5	4,158
6/11/2006 7:50	0.00	9.13	3.84	0.04	0.00	10.00	9.86	8.51	5	4,158
6/11/2006 8:00	0.00	9.33	2.91	0.04	0.00	10.00	9.86	8.51	5	4,104
6/11/2006 8:10	0.00	9.33	2.91	0.04	0.00	10.00	9.86	8.51	5	4,105
6/11/2006 8:20	0.00	9.33	2.91	0.04	0.00	10.00	9.86	8.51	5	4,105
6/12/2006 3:40	0.00	9.17	9.76	0.04	5.14	10.00	0.00	8.51	5	4,294
6/29/2006 15:20	0.00	9.36	9.79	4.98	0.00	0.02	10.00	8.53	5	4,316
6/29/2006 15:30	0.00	9.36	9.79	7.28	0.00	0.02	10.00	8.53	5	4,630
6/29/2006 15:40	0.00	9.36	9.79	10.00	0.00	0.02	10.00	8.53	5	5,080
6/29/2006 15:50	0.00	9.36	9.79	10.00	0.00	0.02	10.00	8.53	5	5,080
6/29/2006 16:00	0.00	9.36	9.79	10.00	0.00	0.02	10.00	8.53	5	5,079
6/29/2006 16:10	0.00	9.36	9.79	10.00	0.00	0.02	10.00	8.53	5	5,079
6/4/2007 8:00	9.81	9.92	9.74	9.99	10.00	10.00	8.70	8.44	8	8,168
6/4/2007 8:10	9.81	9.87	9.74	10.00	10.00	10.00	0.00	0.09	6	6,465

Time	Gate Opening (feet)								Number of gates open	Spill Gate Discharge (cfs)
	SG03	SG04	SG05	SG06	SG07	SG08	SG09	SG10		
6/27/2007 18:20	9.81	9.89	9.76	10.00	10.00	10.00	7.48	6.56	8	7,686
6/27/2007 18:30	3.86	7.03	7.41	10.00	4.86	2.73	0.00	0.09	6	2,992
5/7/2008 4:20	0.0	9.2	1.1	0.0	4.1	10.0	10.0	8.4	5	4,179
5/7/2008 4:30	0.0	9.2	1.1	0.0	4.1	10.0	10.0	8.4	5	4,184
5/7/2008 4:40	0.0	9.3	1.1	0.0	4.1	10.0	10.0	8.4	5	4,193
5/7/2008 4:50	0.0	9.4	1.1	0.0	4.1	10.0	10.0	8.4	5	4,210
5/7/2008 5:00	0.0	9.5	1.1	0.0	4.1	10.0	10.0	8.4	5	4,223
5/7/2008 5:10	0.0	9.3	1.1	0.0	4.1	10.0	10.0	8.4	5	4,195
5/7/2008 5:20	0.0	9.3	1.1	0.0	4.1	10.0	10.0	8.4	5	4,198
6/8/2008 23:40	4.1	2.5	1.1	3.8	3.3	3.4	0.0	0.1	5	827
6/2/2009 23:00	5.90	7.03	0.01	5.83	5.51	5.83	4.82	5.03	7	2,950
6/15/2009 4:30	5.89	6.19	0.01	5.81	5.49	5.80	4.84	1.92	7	2,531
5/4/2010 2:40	6.57	10.00	6.42	6.46	6.38	6.94	6.14	6.80	8	4,850
5/4/2010 2:50	0.00	4.49	0.00	4.54	5.47	10.00	10.00	3.98	6	3,359
5/4/2010 4:00	2.76	7.58	3.08	3.30	3.20	3.62	3.13	3.87	8	1,746
5/4/2010 4:10	2.76	10.00	5.97	3.30	3.20	3.62	3.13	3.96	8	2,487
5/26/2010 23:20	5.57	5.85	5.42	0.30	5.02	0.27	4.39	3.16	6	1,974
5/26/2010 23:30	9.79	10.00	3.75	0.31	9.83	0.27	9.99	9.81	6	5,571
5/26/2010 23:40	9.79	10.00	3.75	0.31	9.83	0.27	9.99	9.81	6	5,568
5/26/2010 23:50	9.79	10.00	3.75	0.31	9.83	0.27	4.11	0.19	5	3,648
6/14/2010 2:40	9.78	10.00	9.88	10.00	9.88	10.00	10.00	9.83	8	8,653

Note: There were no occurrences when >4 spill gates were open during the period April 1-June 30, in 2011 or 2012.

Table 4-3: Frequency of Sluice Gate Opening from April-June, 2005-2012.

Gate Opening (feet)	Intervals	Percent
<1.50 (closed)	24,131	23.0%
1.50-4.99	2,948	2.8%
5.00-7.00	73,367	70.0%
7.01-12.00	4,041	3.9%
Data records	104,487	99.7%
No data (null)	345	0.3%
Total readings	104,832	100%

Note: Gate openings >7 feet usually indicate a period of intake rack cleaning.

Figure 4-1: Spill Gate Release and River Flow on April 19, 2005.

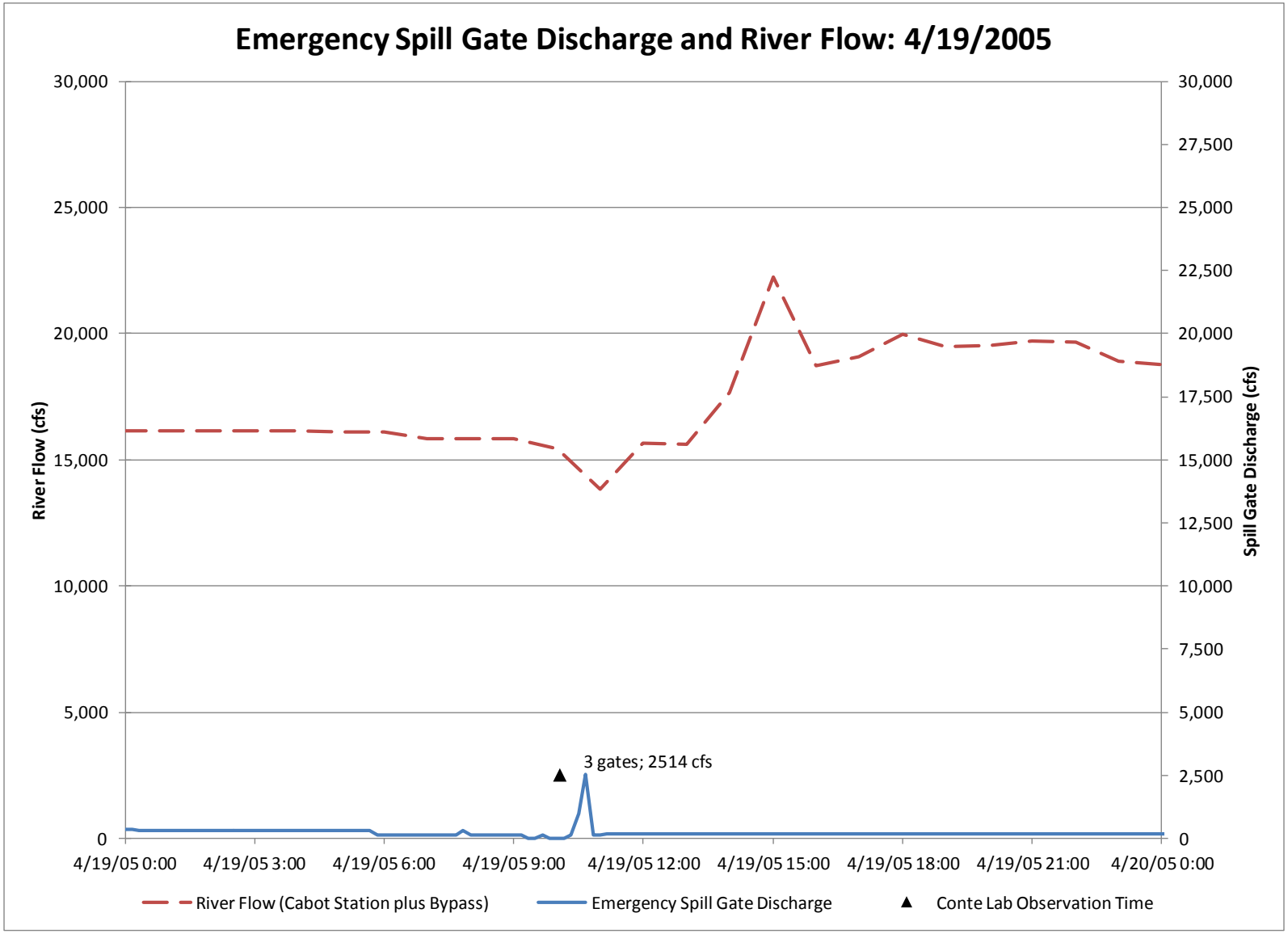


Figure 4-2: Spill Gate Release and River Flow on May 6, 2005.

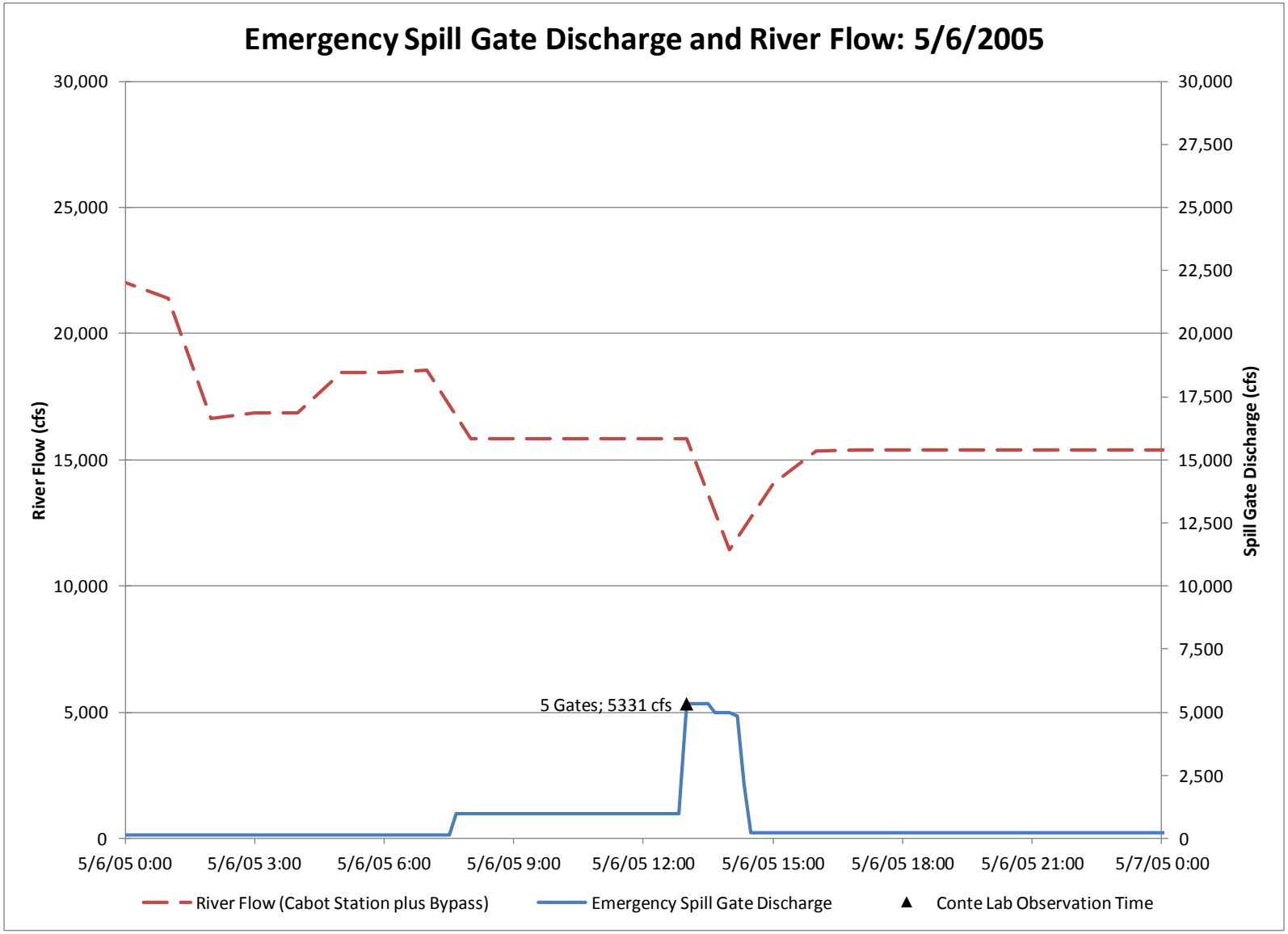


Figure 4-3: Spill Gate Release and River Flow on April 26, 2006.

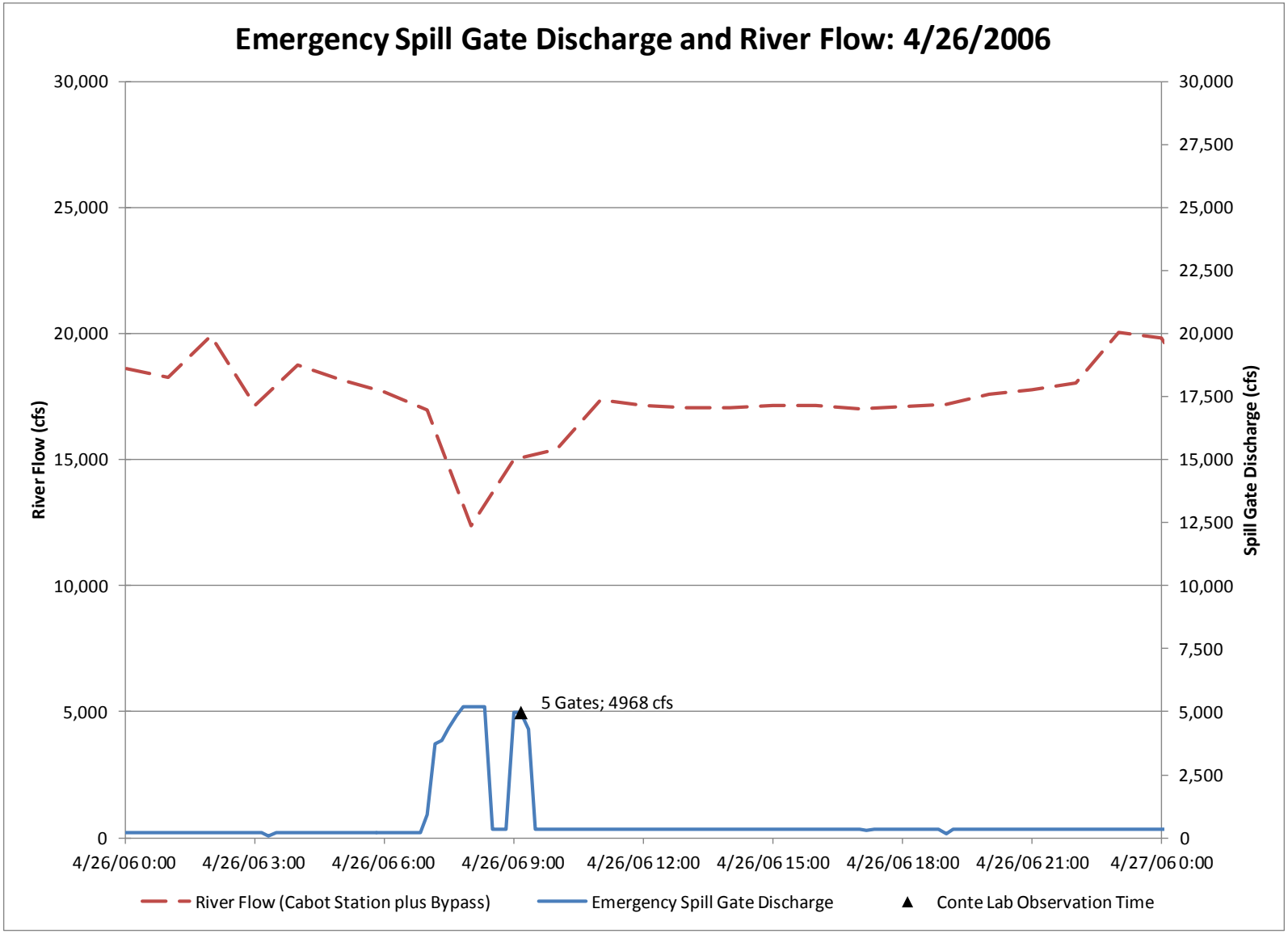
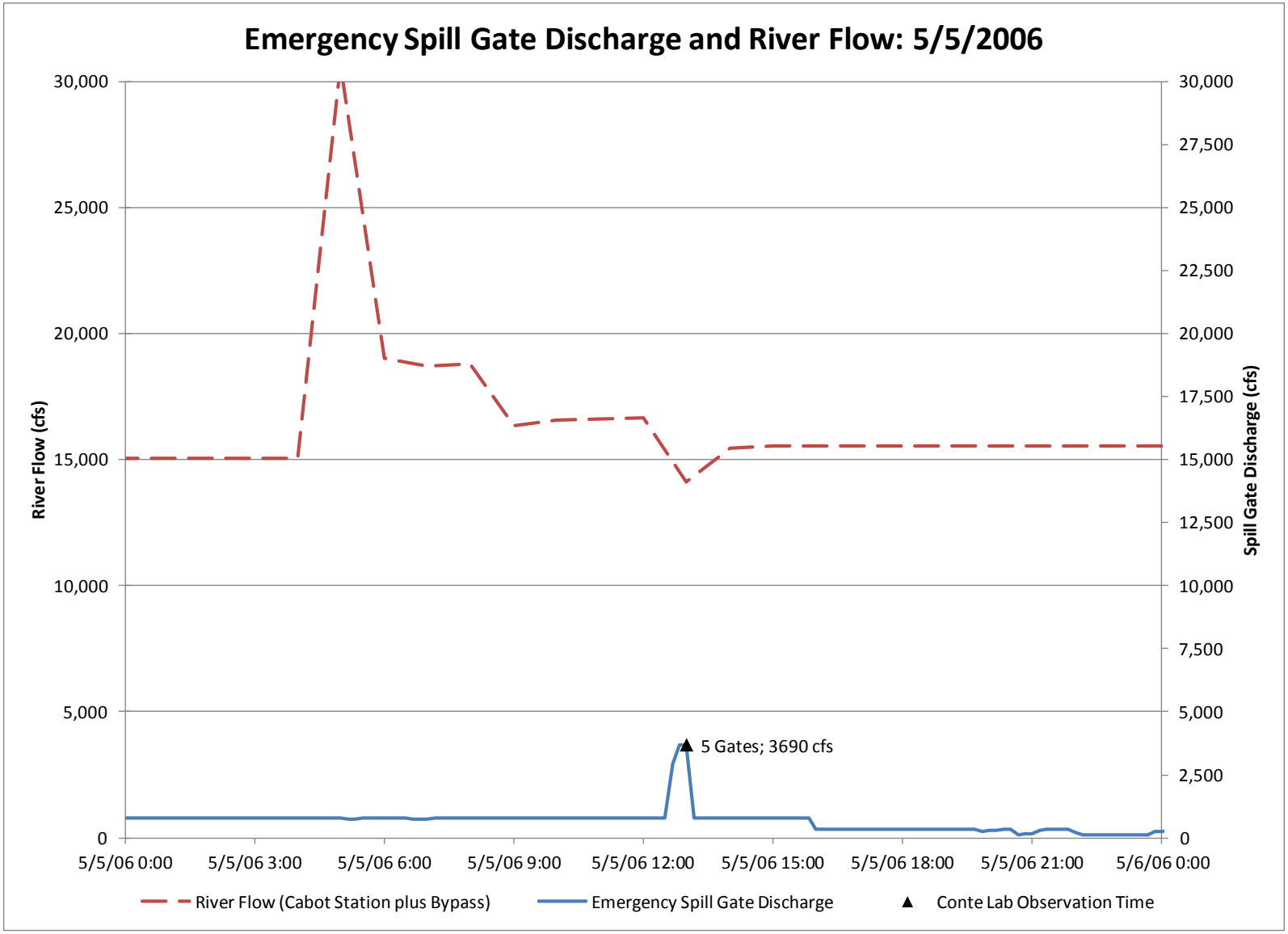
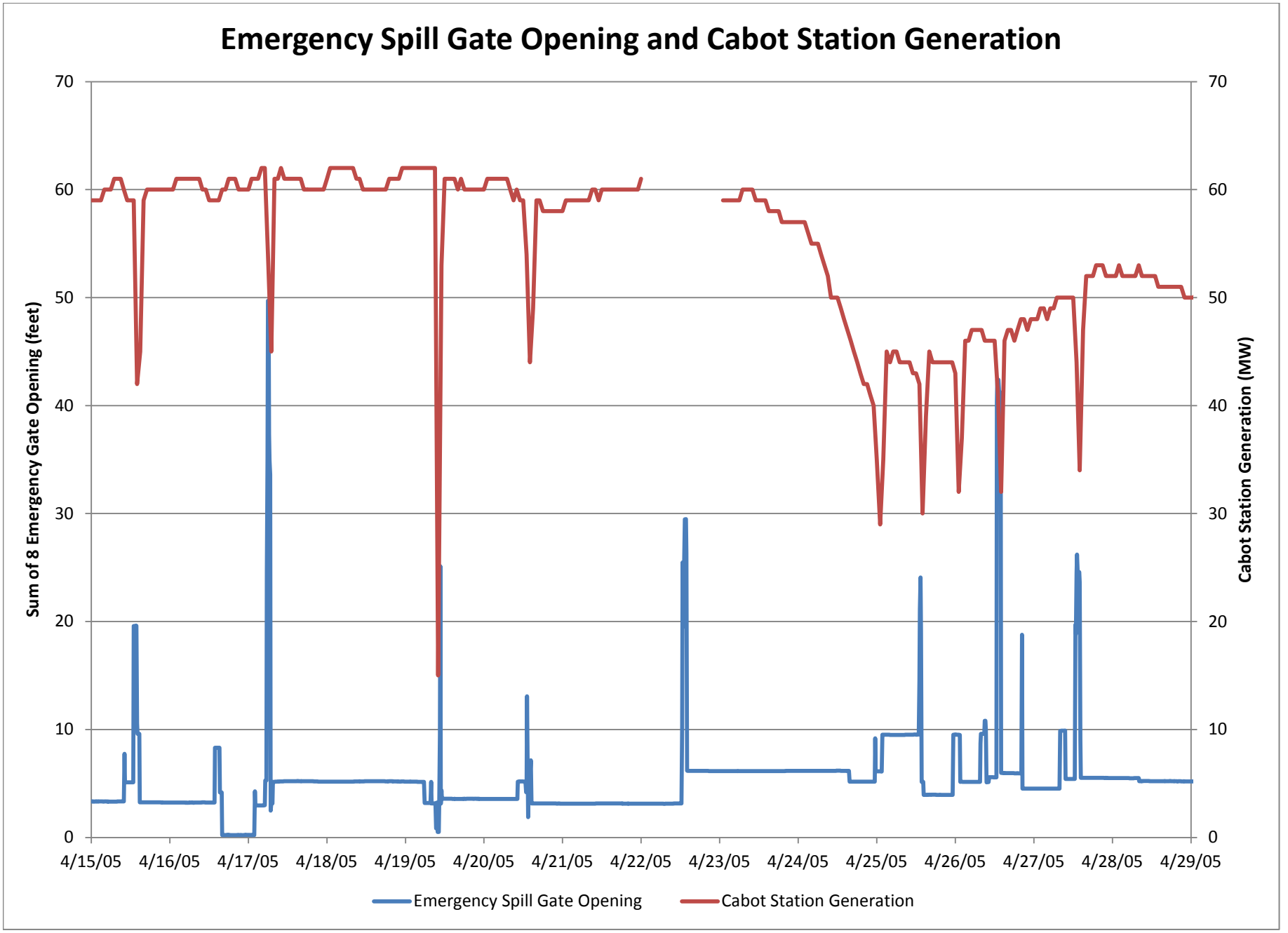
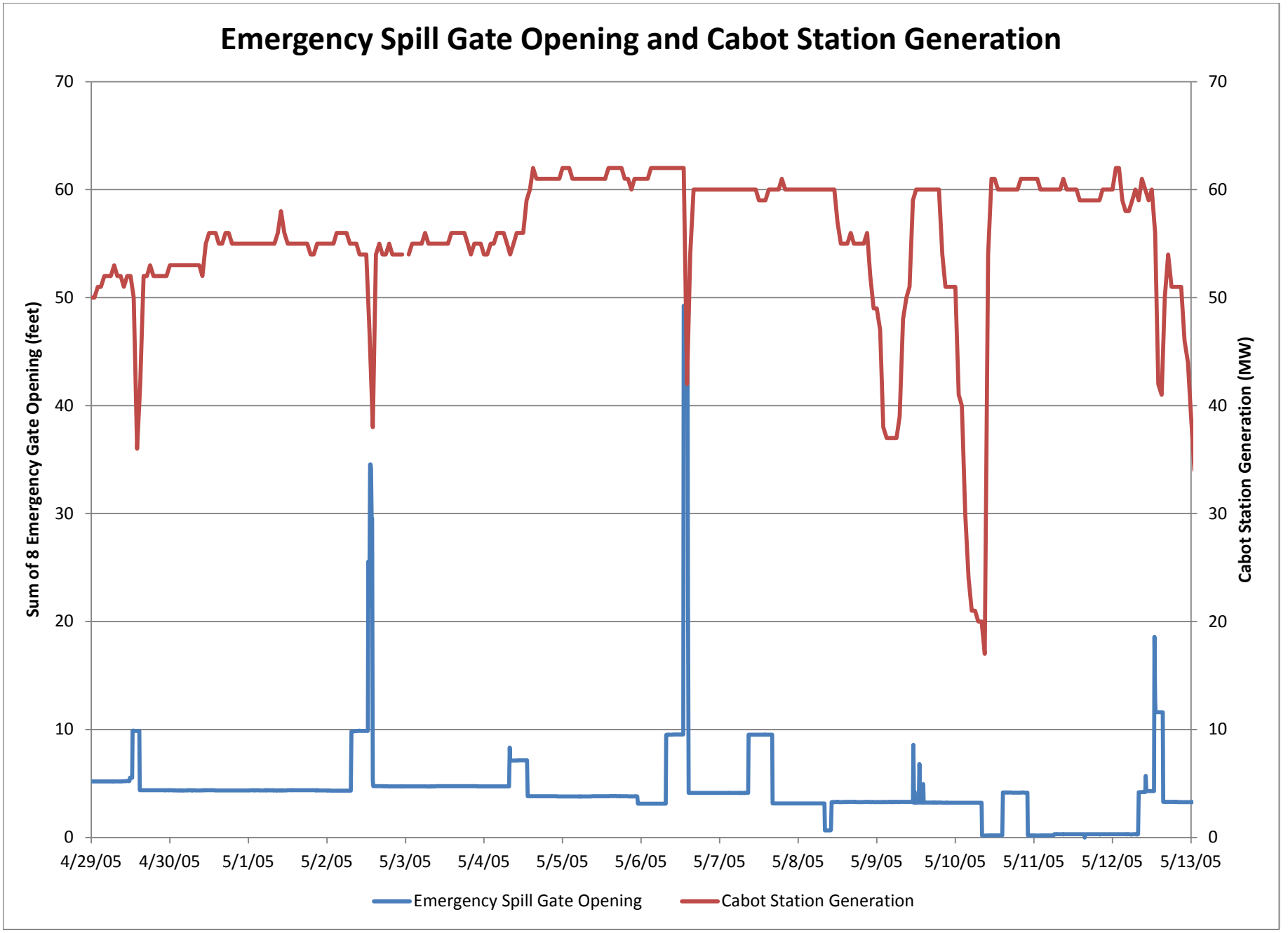


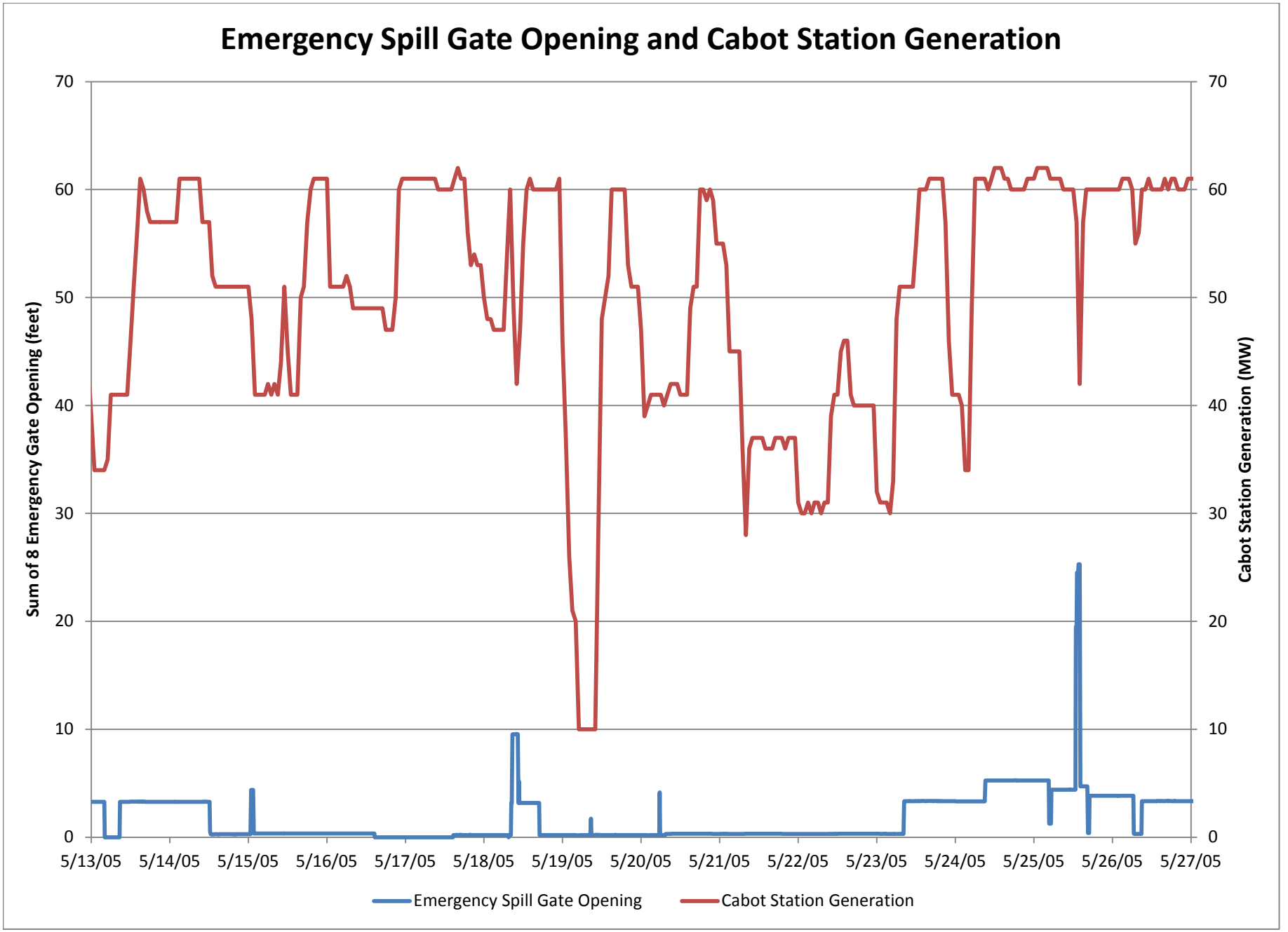
Figure 4-4: Spill Gate Release and River Flow on May 5, 2006.

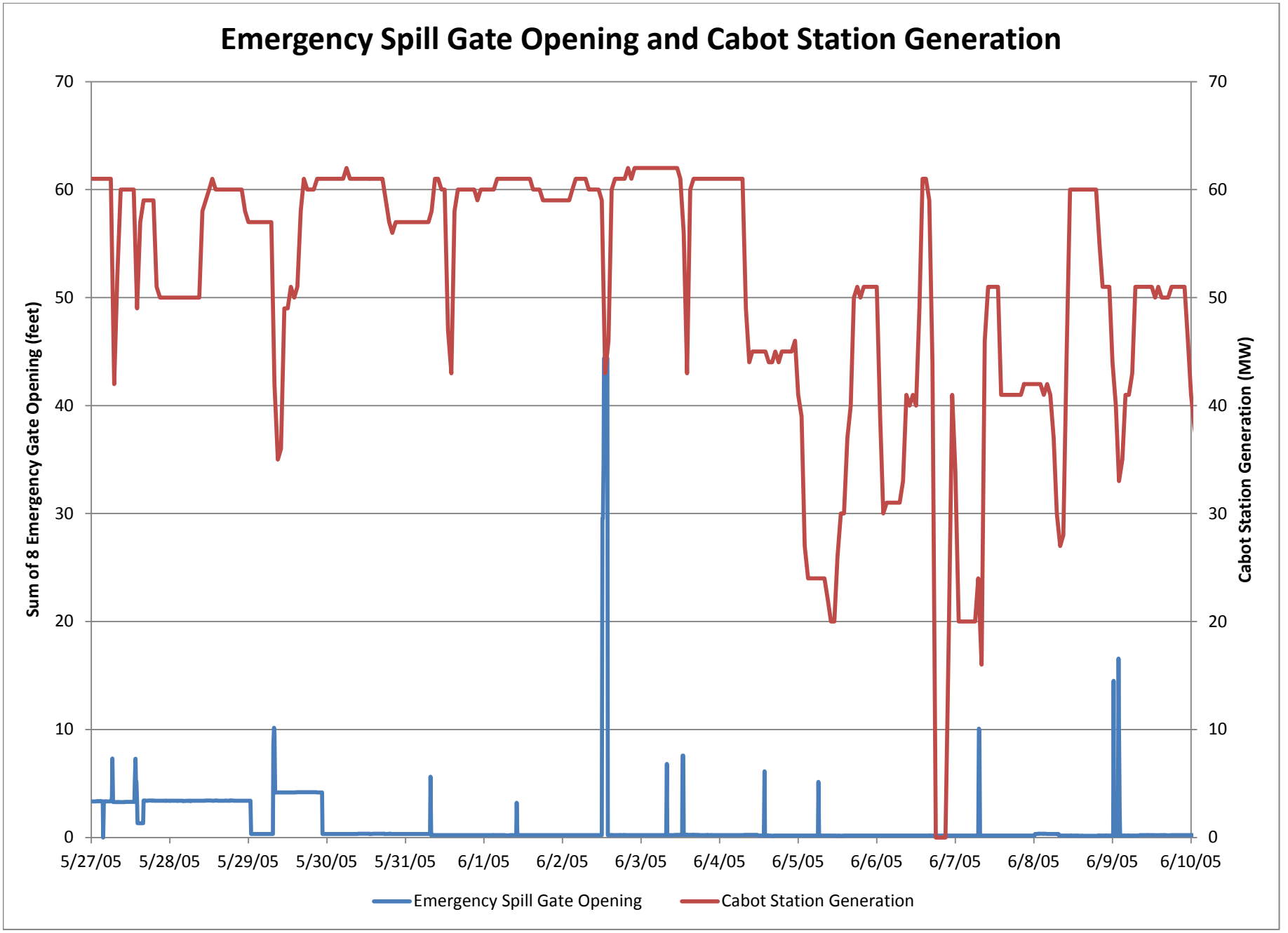


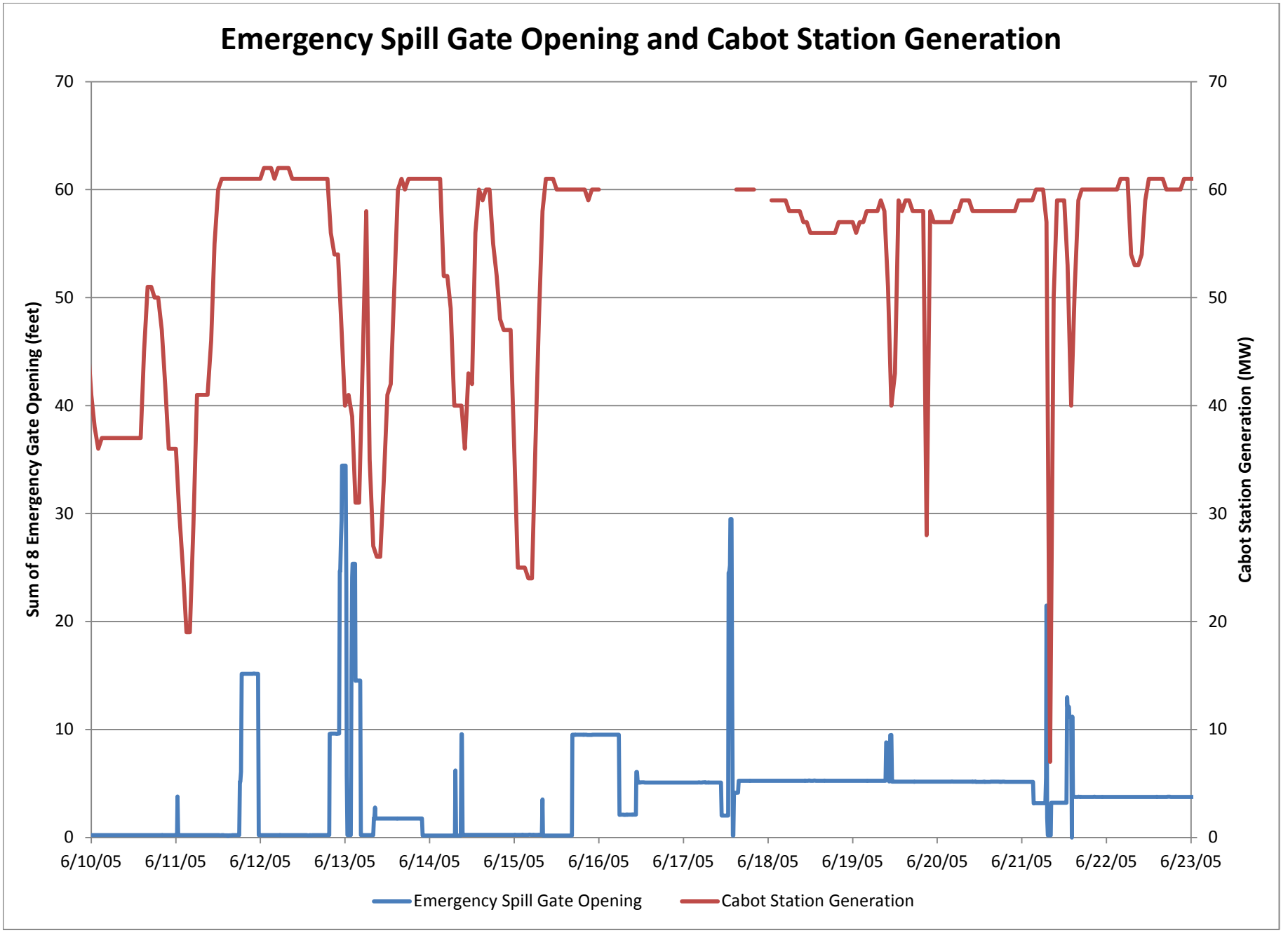
APPENDIX A – BI-WEEKLY CHARTS OF SPILL GATE OPENING VS. CABOT STATION GENERATION

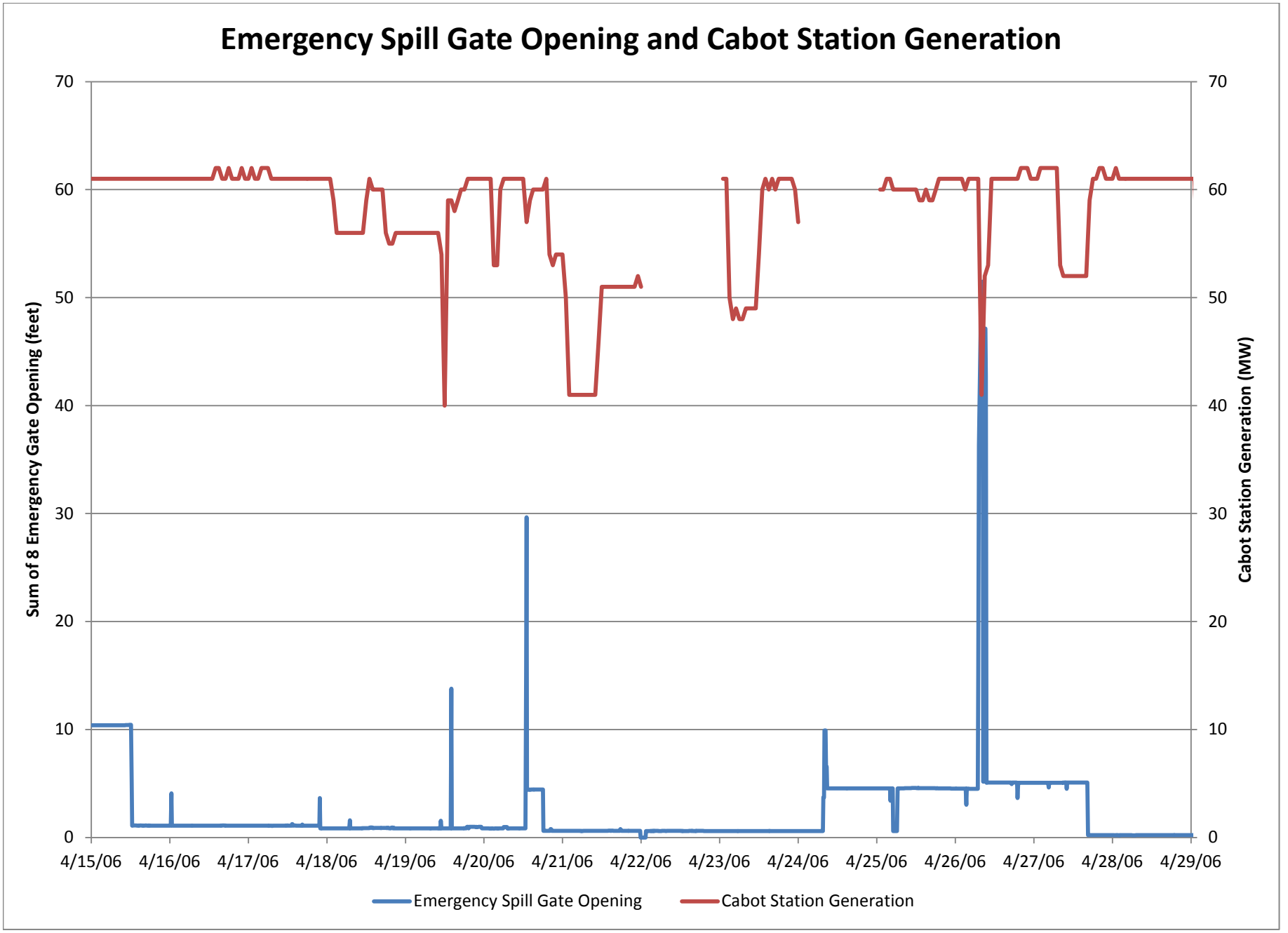

Emergency Spill Gate Opening and Cabot Station Generation
Sum of 8 Emergency Gate Opening (feet)
Cabot Station Generation (MW)
70
60
50
40
30
20
10
0
4/15/05
4/16/05
4/17/05
4/18/05
4/19/05
4/20/05
4/21/05
4/22/05
4/23/05
4/24/05
4/25/05
4/26/05
4/27/05
4/28/05
4/29/05
Emergency Spill Gate Opening
Cabot Station Generation

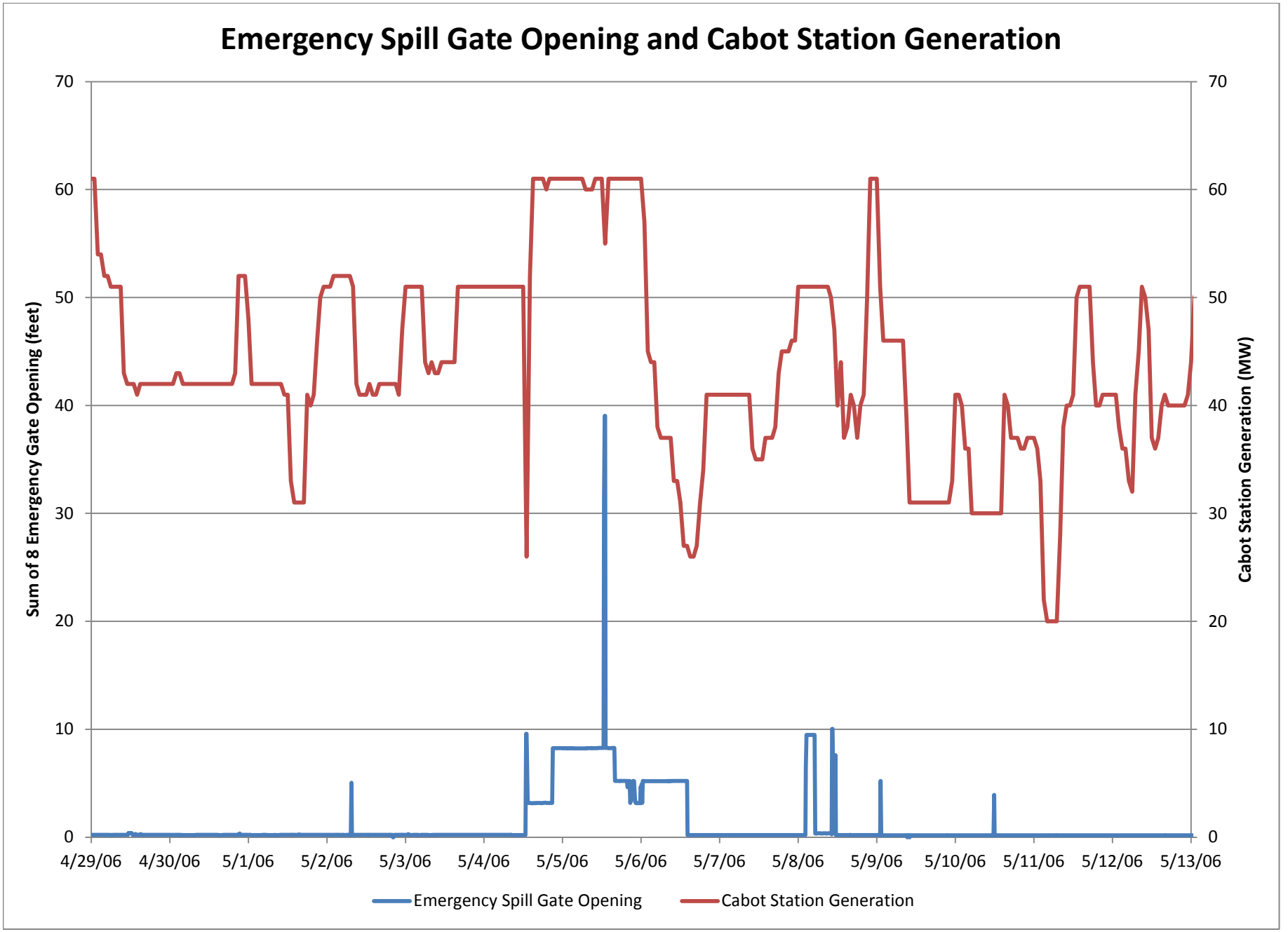

Emergency Spill Gate Opening and Cabot Station Generation
Sum of 8 Emergency Gate Opening (feet)
Cabot Station Generation (MW)
70
60
50
40
30
20
10
0
4/29/05
4/30/05
5/1/05
5/2/05
5/3/05
5/4/05
5/5/05
5/6/05
5/7/05
5/8/05
5/9/05
5/10/05
5/11/05
5/12/05
5/13/05
Emergency Spill Gate Opening
Cabot Station Generation

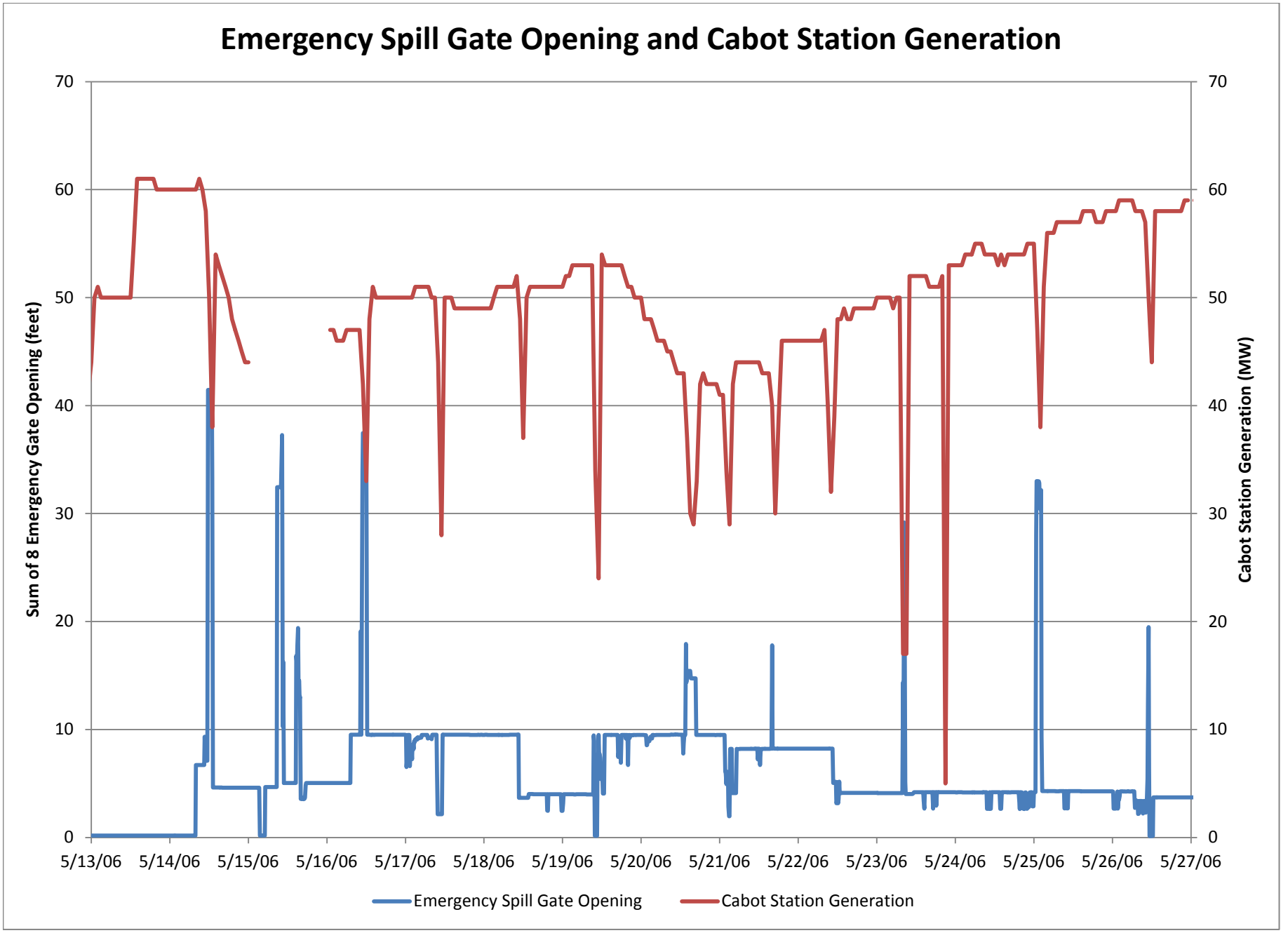

Emergency Spill Gate Opening and Cabot Station Generation
Sum of 8 Emergency Gate Opening (feet)
Cabot Station Generation (MW)
70
60
50
40
30
20
10
0
5/13/05
5/14/05
5/15/05
5/16/05
5/17/05
5/18/05
5/19/05
5/20/05
5/21/05
5/22/05
5/23/05
5/24/05
5/25/05
5/26/05
5/27/05
Emergency Spill Gate Opening
Cabot Station Generation

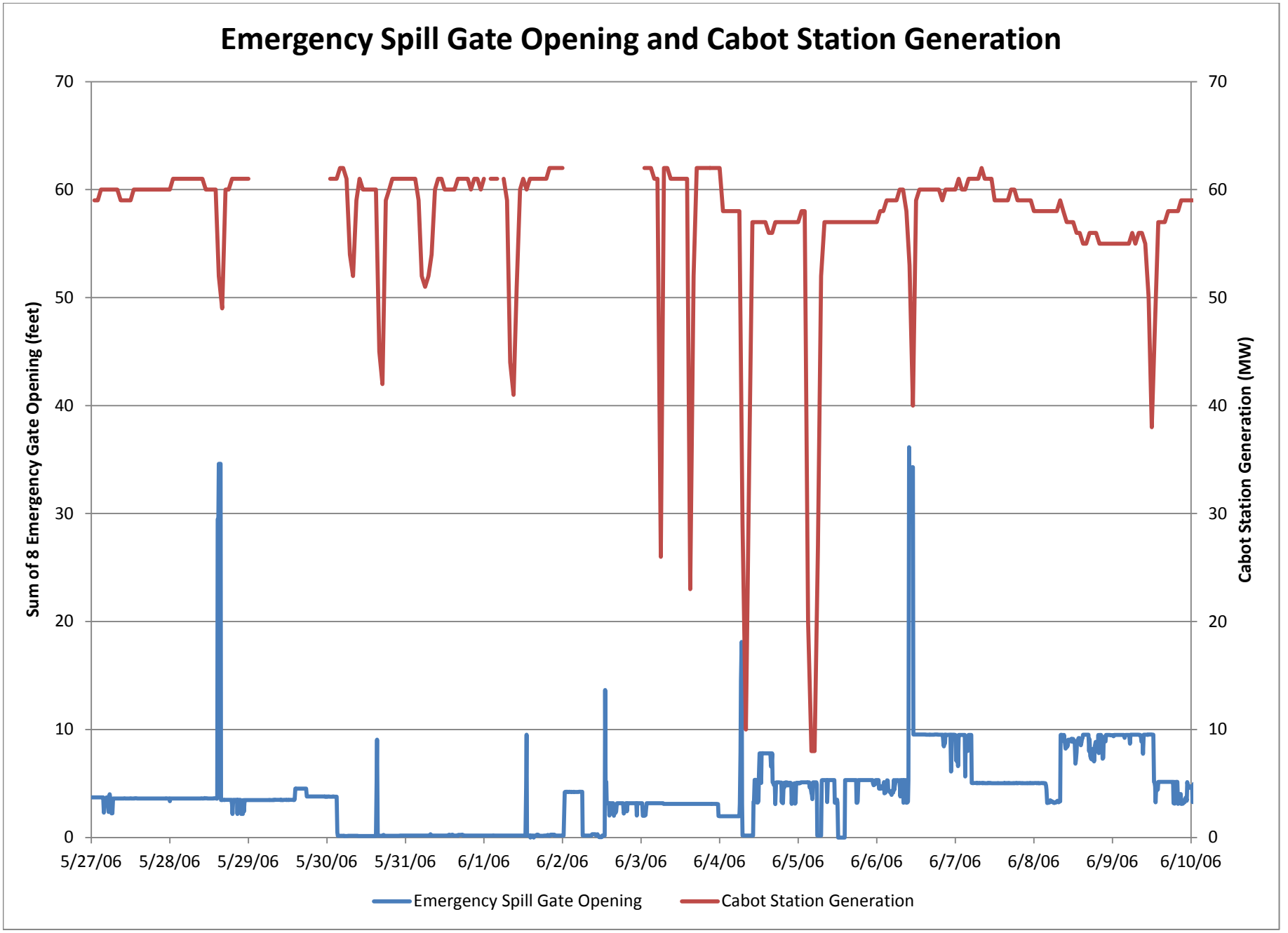

Emergency Spill Gate Opening and Cabot Station Generation
Sum of 8 Emergency Gate Opening (feet)
Cabot Station Generation (MW)
70
60
50
40
30
20
10
0
5/27/05
5/28/05
5/29/05
5/30/05
5/31/05
6/1/05
6/2/05
6/3/05
6/4/05
6/5/05
6/6/05
6/7/05
6/8/05
6/9/05
6/10/05
Emergency Spill Gate Opening
Cabot Station Generation

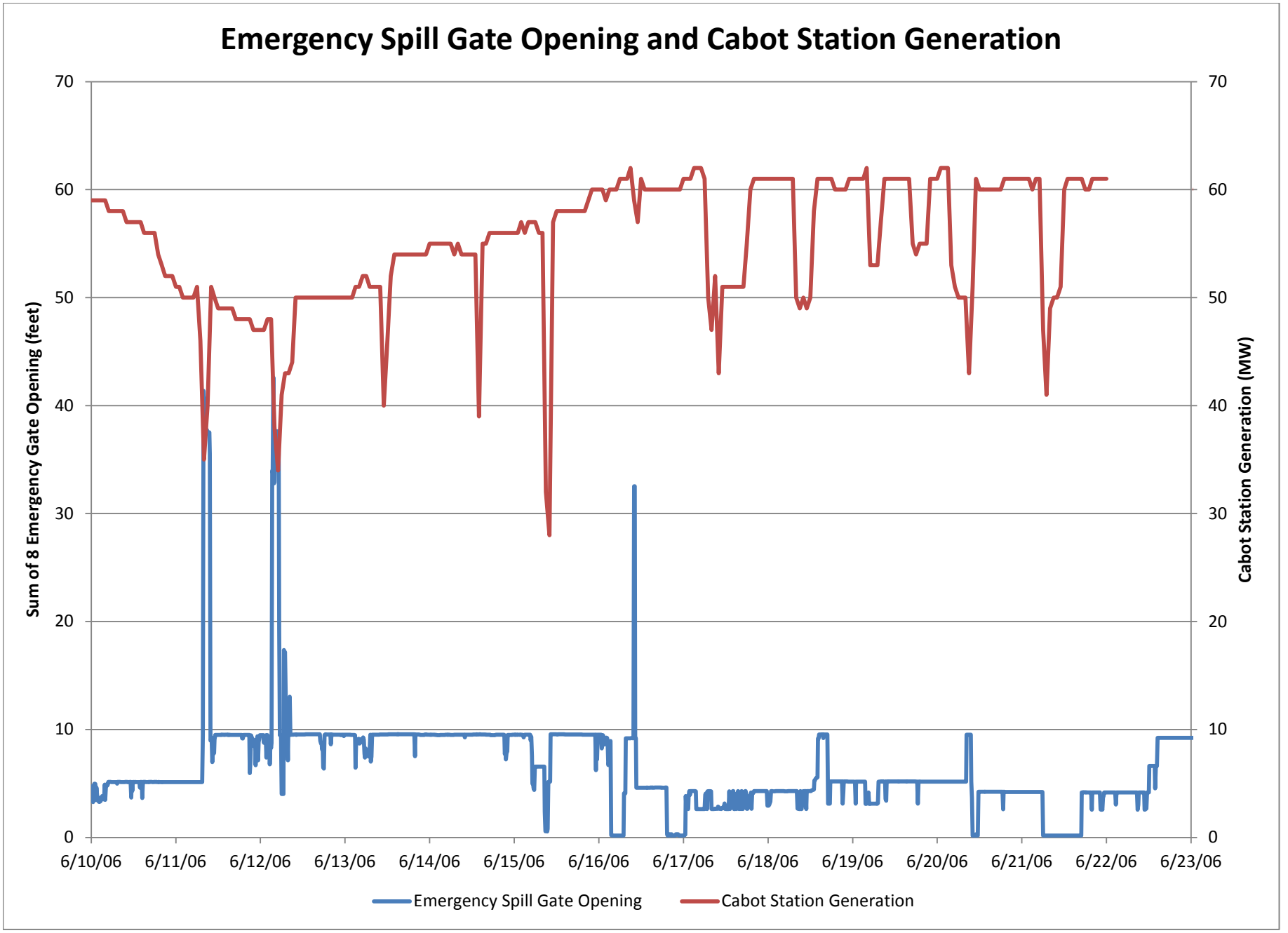

Emergency Spill Gate Opening and Cabot Station Generation
Sum of 8 Emergency Gate Opening (feet)
Cabot Station Generation (MW)
70
60
50
40
30
20
10
0
6/10/05
6/11/05
6/12/05
6/13/05
6/14/05
6/15/05
6/16/05
6/17/05
6/18/05
6/19/05
6/20/05
6/21/05
6/22/05
6/23/05
Emergency Spill Gate Opening
Cabot Station Generation

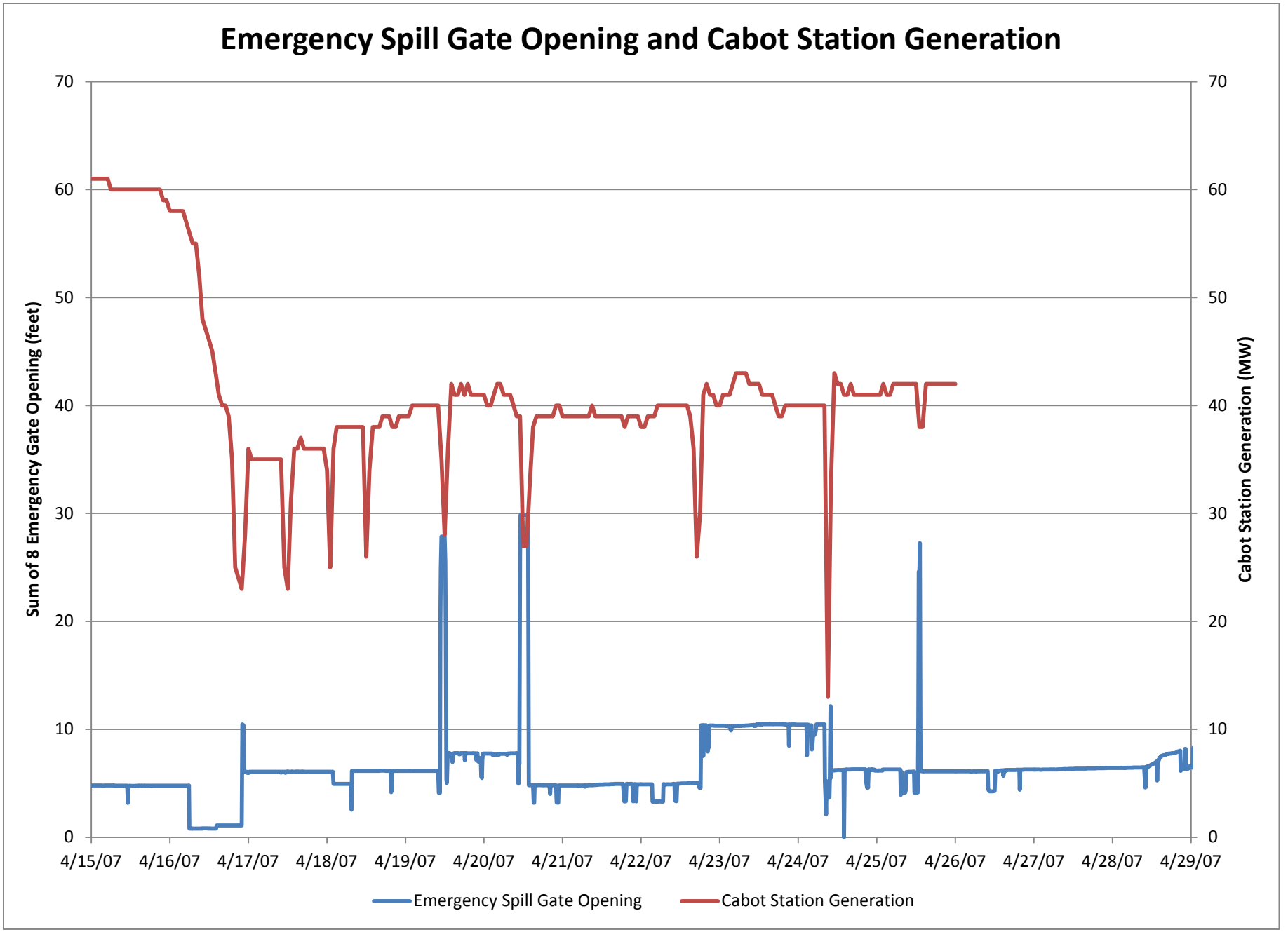

Emergency Spill Gate Opening and Cabot Station Generation
Sum of 8 Emergency Gate Opening (feet)
Cabot Station Generation (MW)
70
60
50
40
30
20
10
0
4/15/06
4/16/06
4/17/06
4/18/06
4/19/06
4/20/06
4/21/06
4/22/06
4/23/06
4/24/06
4/25/06
4/26/06
4/27/06
4/28/06
4/29/06
Emergency Spill Gate Opening
Cabot Station Generation

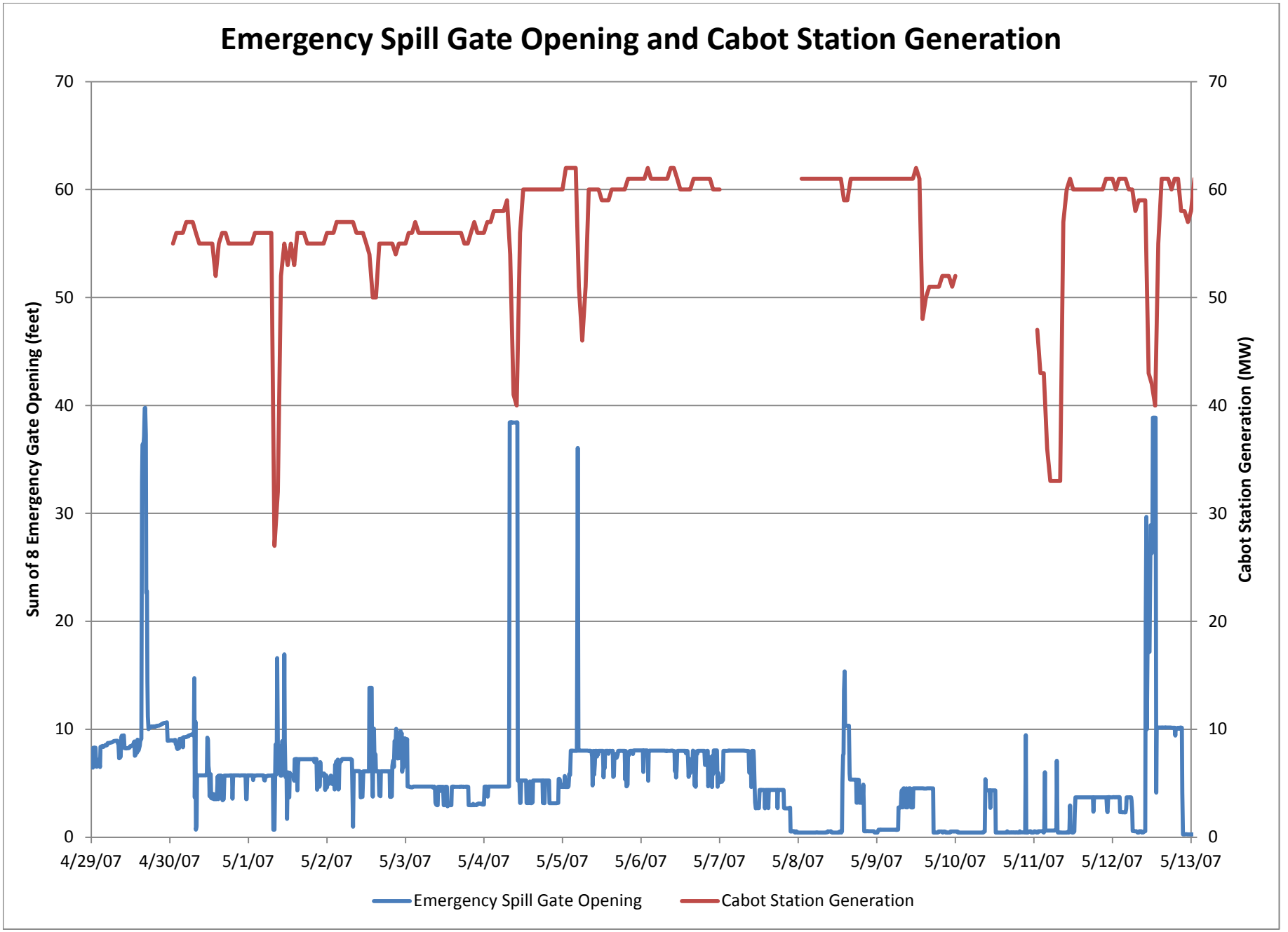

Emergency Spill Gate Opening and Cabot Station Generation
Sum of 8 Emergency Gate Opening (feet)
Cabot Station Generation (MW)
70
60
50
40
30
20
10
0
4/29/06
4/30/06
5/1/06
5/2/06
5/3/06
5/4/06
5/5/06
5/6/06
5/7/06
5/8/06
5/9/06
5/10/06
5/11/06
5/12/06
5/13/06
Emergency Spill Gate Opening
Cabot Station Generation


Emergency Spill Gate Opening and Cabot Station Generation
Sum of 8 Emergency Gate Opening (feet)
Cabot Station Generation (MW)
70
60
50
40
30
20
10
0
5/13/06
5/14/06
5/15/06
5/16/06
5/17/06
5/18/06
5/19/06
5/20/06
5/21/06
5/22/06
5/23/06
5/24/06
5/25/06
5/26/06
5/27/06
Emergency Spill Gate Opening
Cabot Station Generation


Emergency Spill Gate Opening and Cabot Station Generation
Sum of 8 Emergency Gate Opening (feet)
Cabot Station Generation (MW)
70
60
50
40
30
20
10
0
5/27/06
5/28/06
5/29/06
5/30/06
5/31/06
6/1/06
6/2/06
6/3/06
6/4/06
6/5/06
6/6/06
6/7/06
6/8/06
6/9/06
6/10/06
Emergency Spill Gate Opening
Cabot Station Generation


Emergency Spill Gate Opening and Cabot Station Generation
Sum of 8 Emergency Gate Opening (feet)
Cabot Station Generation (MW)
70
60
50
40
30
20
10
0
6/10/06
6/11/06
6/12/06
6/13/06
6/14/06
6/15/06
6/16/06
6/17/06
6/18/06
6/19/06
6/20/06
6/21/06
6/22/06
6/23/06
Emergency Spill Gate Opening
Cabot Station Generation


Emergency Spill Gate Opening and Cabot Station Generation
Sum of 8 Emergency Gate Opening (feet)
Cabot Station Generation (MW)
70
60
50
40
30
20
10
0
4/15/07
4/16/07
4/17/07
4/18/07
4/19/07
4/20/07
4/21/07
4/22/07
4/23/07
4/24/07
4/25/07
4/26/07
4/27/07
4/28/07
4/29/07
Emergency Spill Gate Opening
Cabot Station Generation


Emergency Spill Gate Opening and Cabot Station Generation
Sum of 8 Emergency Gate Opening (feet)
Cabot Station Generation (MW)
70
60
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20
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4/29/07
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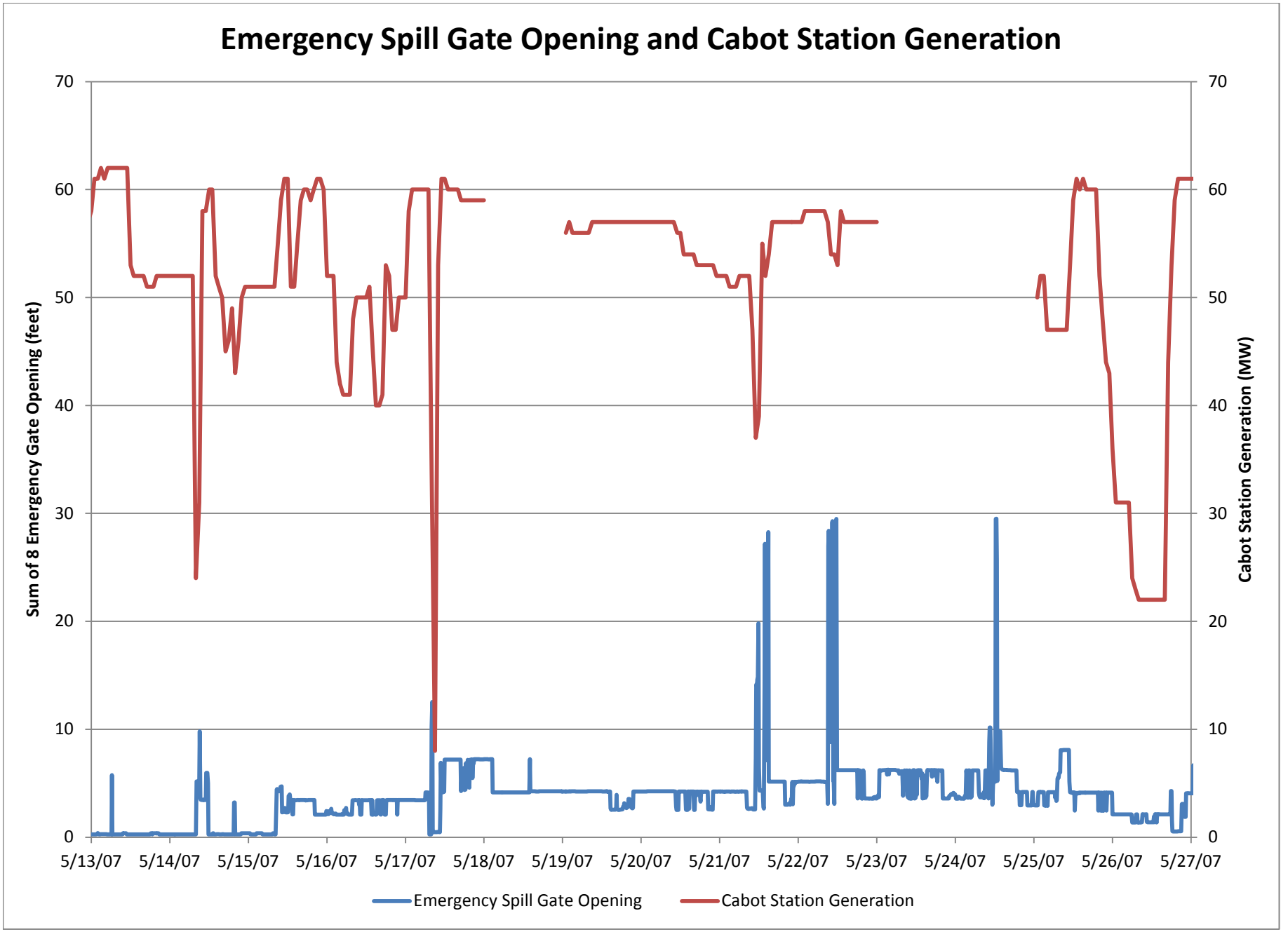
Emergency Spill Gate Opening
Cabot Station Generation


Emergency Spill Gate Opening and Cabot Station Generation
Sum of 8 Emergency Gate Opening (feet)
Cabot Station Generation (MW)
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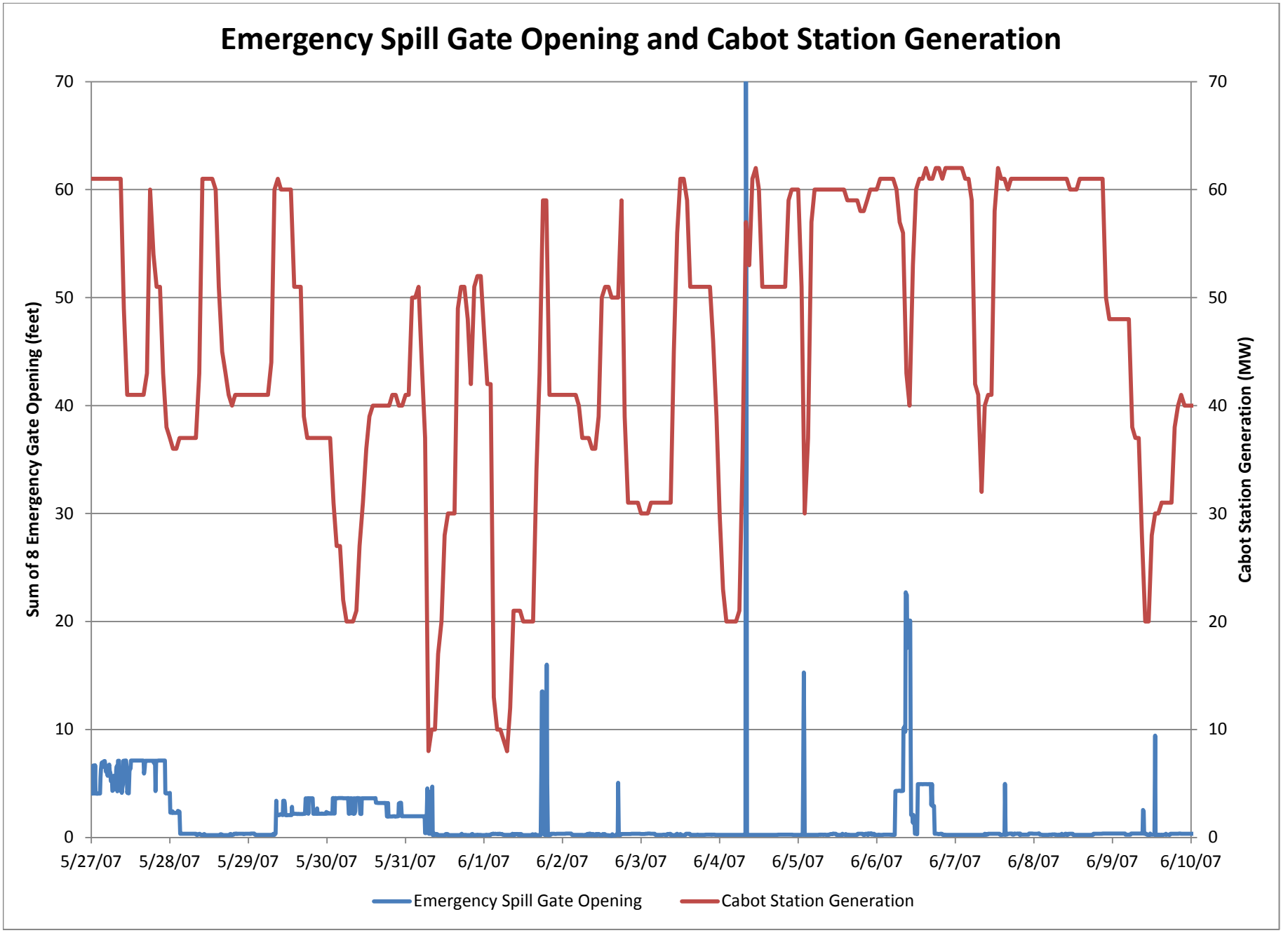
Emergency Spill Gate Opening
Cabot Station Generation


Emergency Spill Gate Opening and Cabot Station Generation
Sum of 8 Emergency Gate Opening (feet)
Cabot Station Generation (MW)
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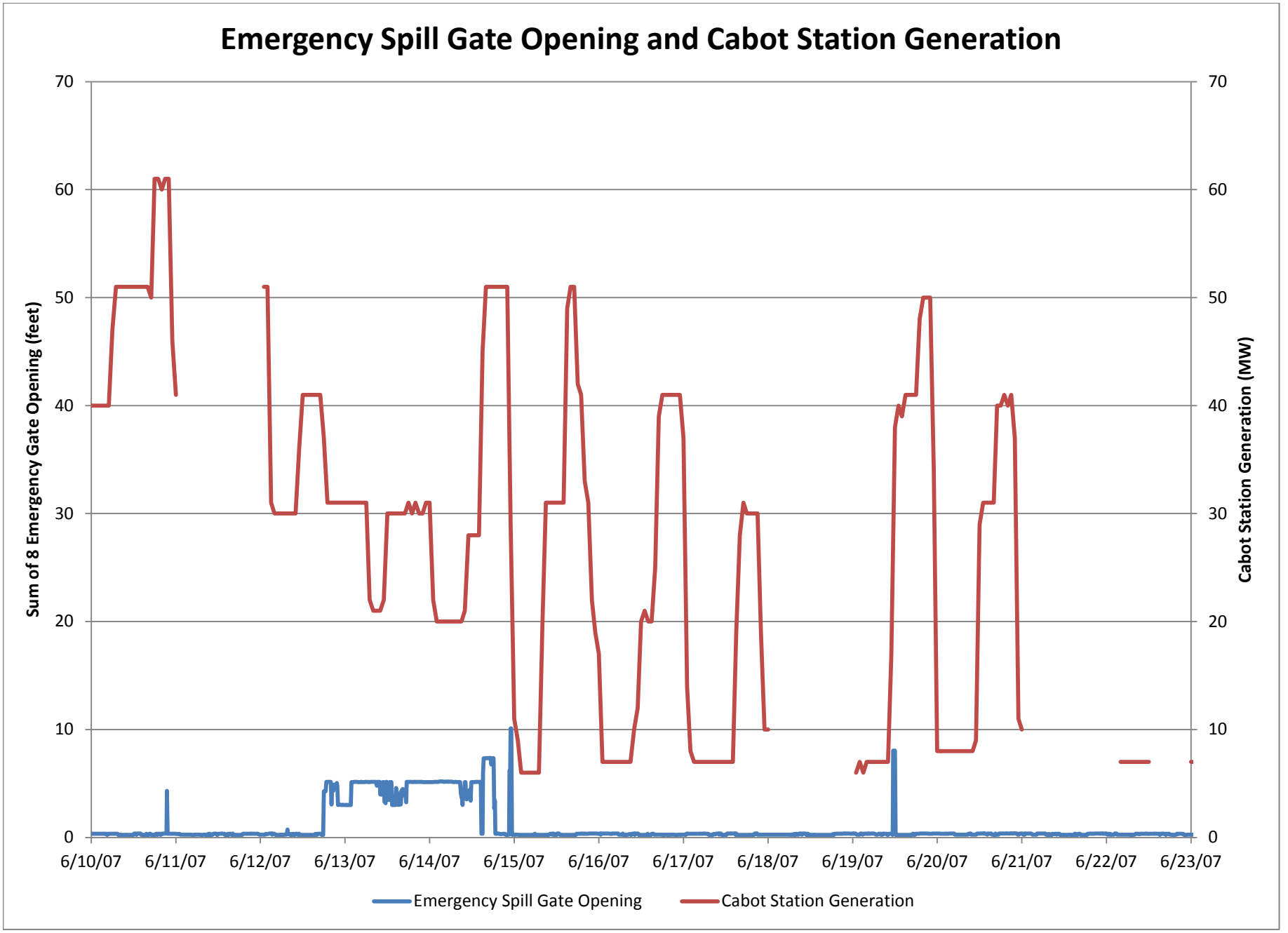
Emergency Spill Gate Opening
Cabot Station Generation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Cabot Station Generation (MW)
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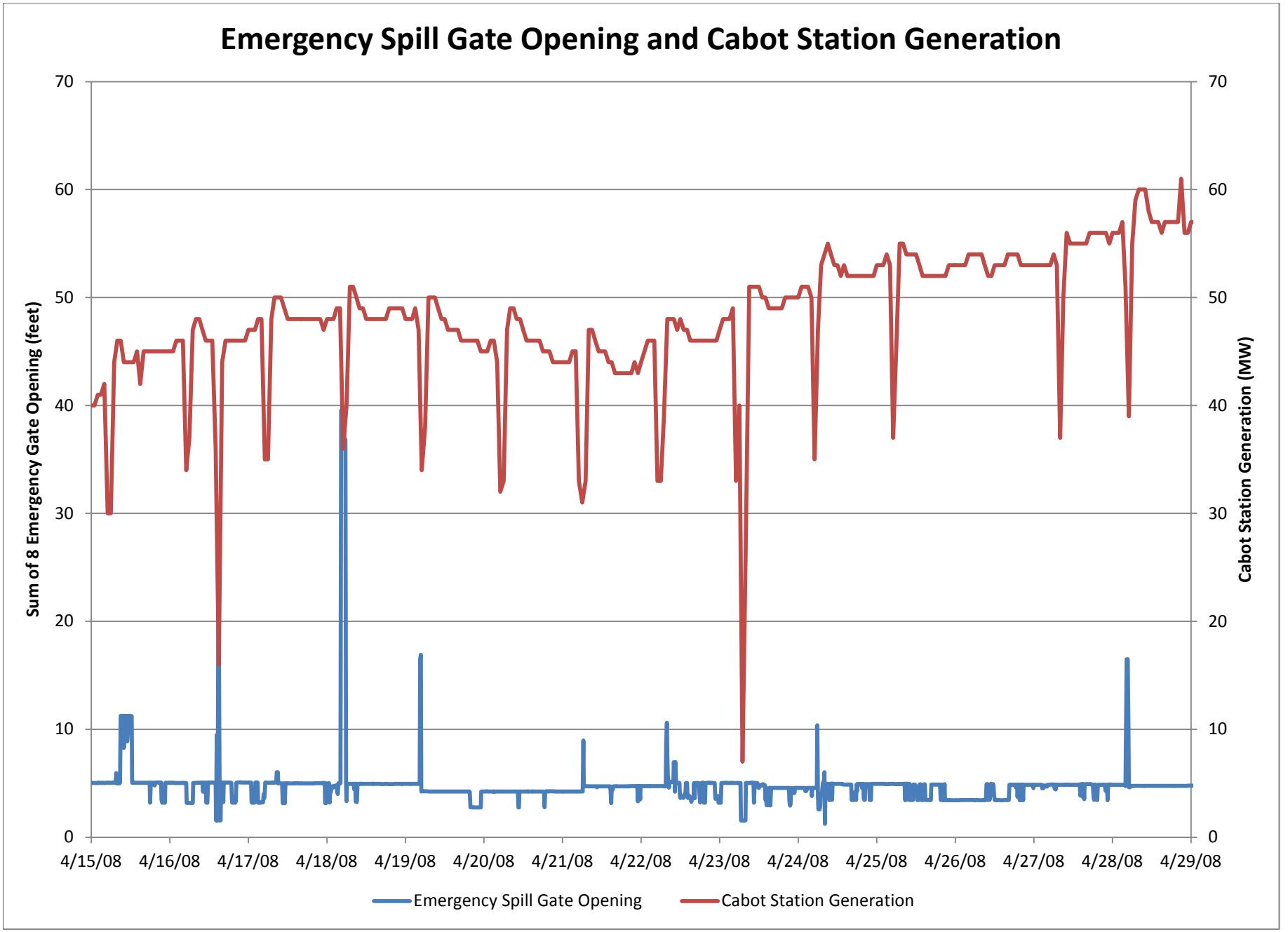
Emergency Spill Gate Opening
Cabot Station Generation


Emergency Spill Gate Opening and Cabot Station Generation
Sum of 8 Emergency Gate Opening (feet)
Cabot Station Generation (MW)
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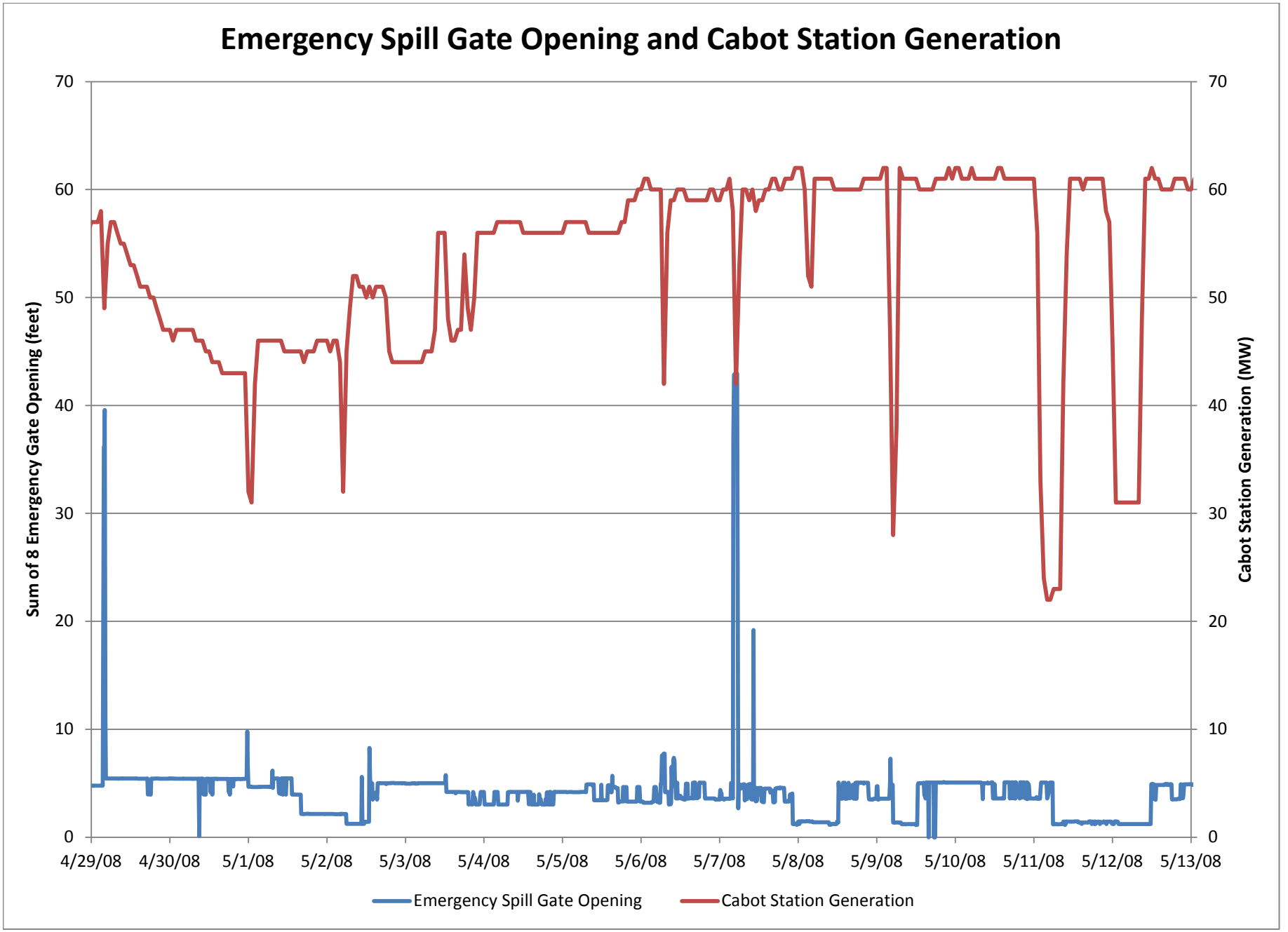
Emergency Spill Gate Opening
Cabot Station Generation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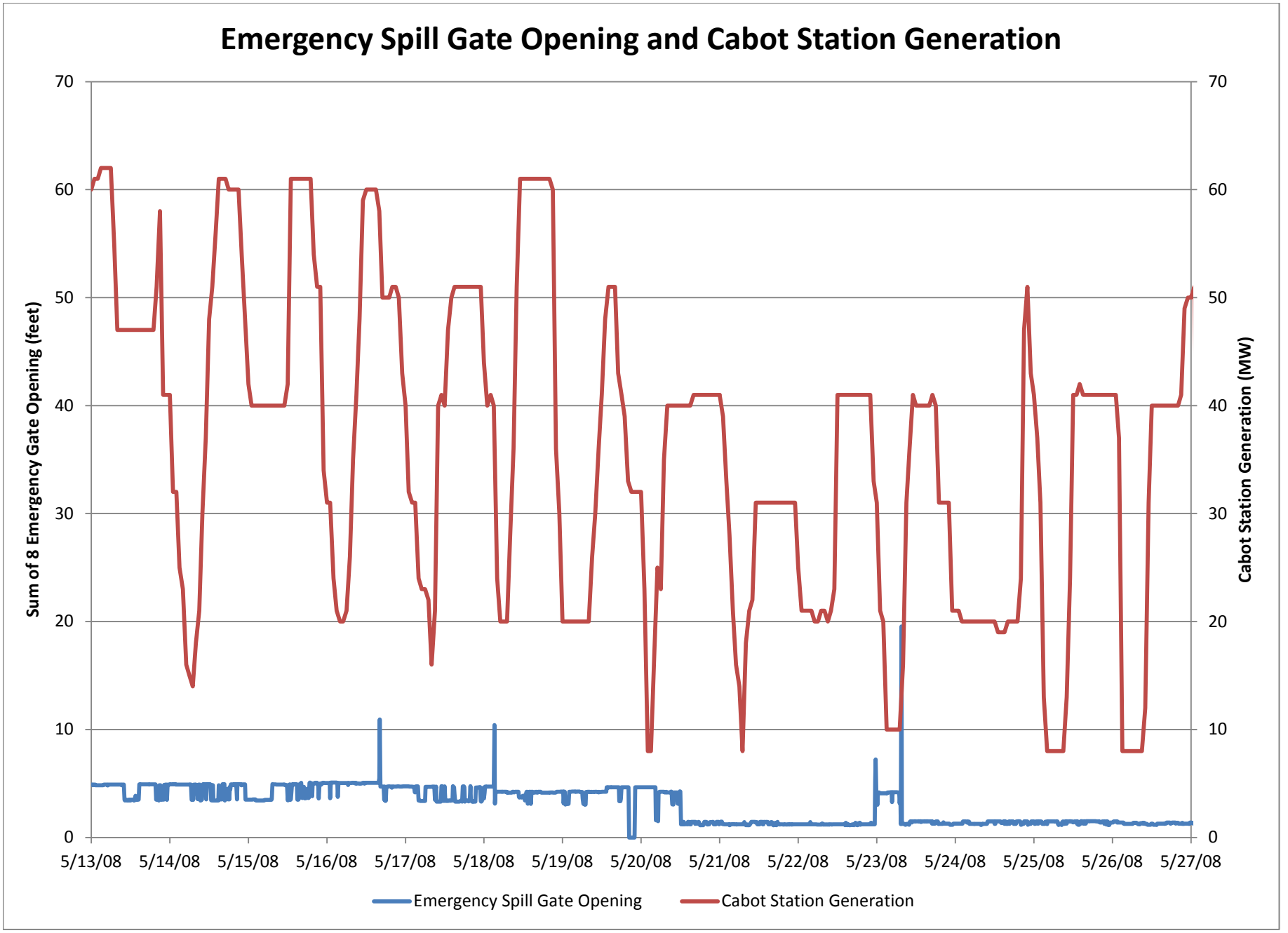
Emergency Spill Gate Opening
Cabot Station Generation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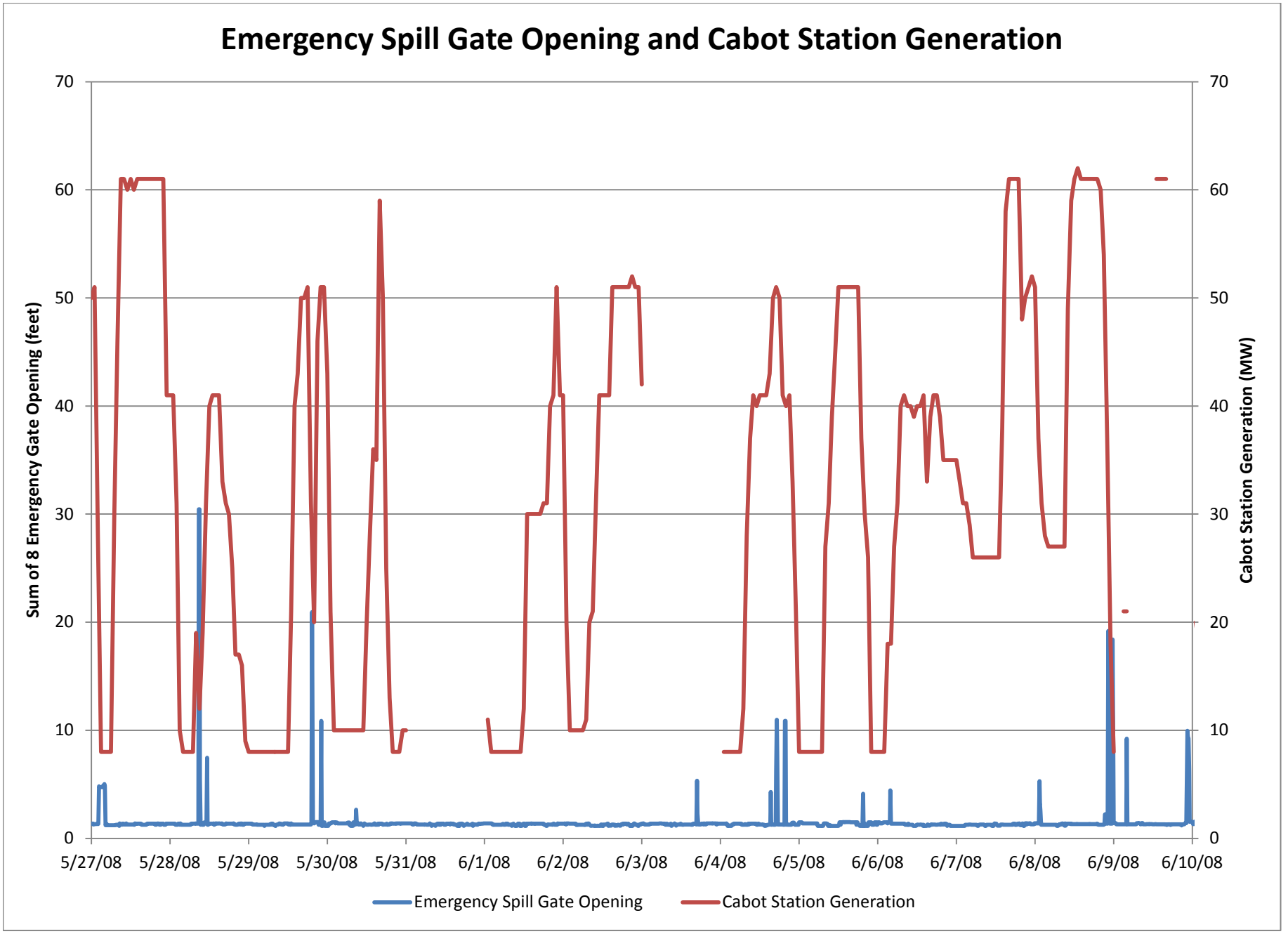
Emergency Spill Gate Opening
Cabot Station Generation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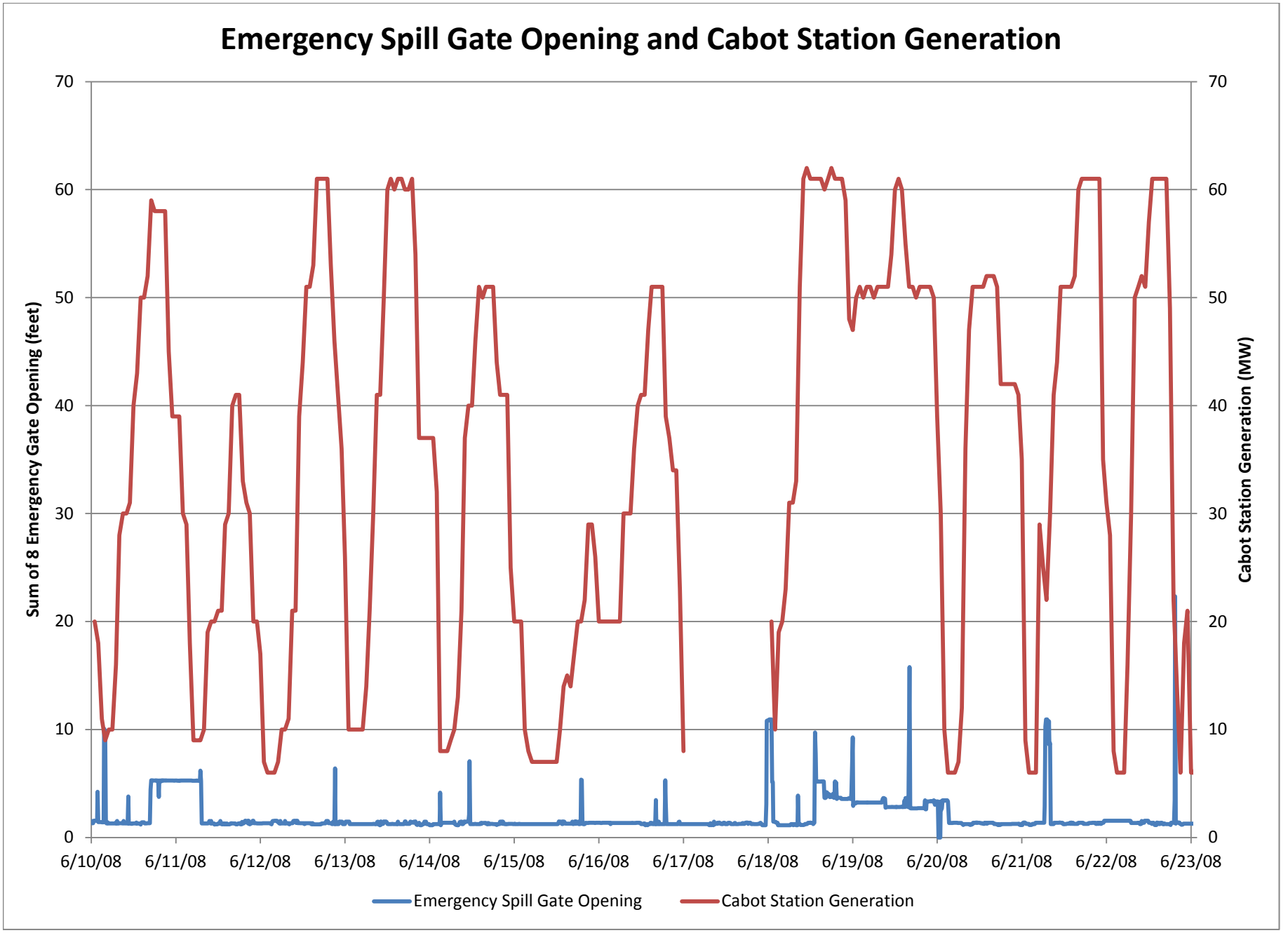
Emergency Spill Gate Opening
Cabot Station Generation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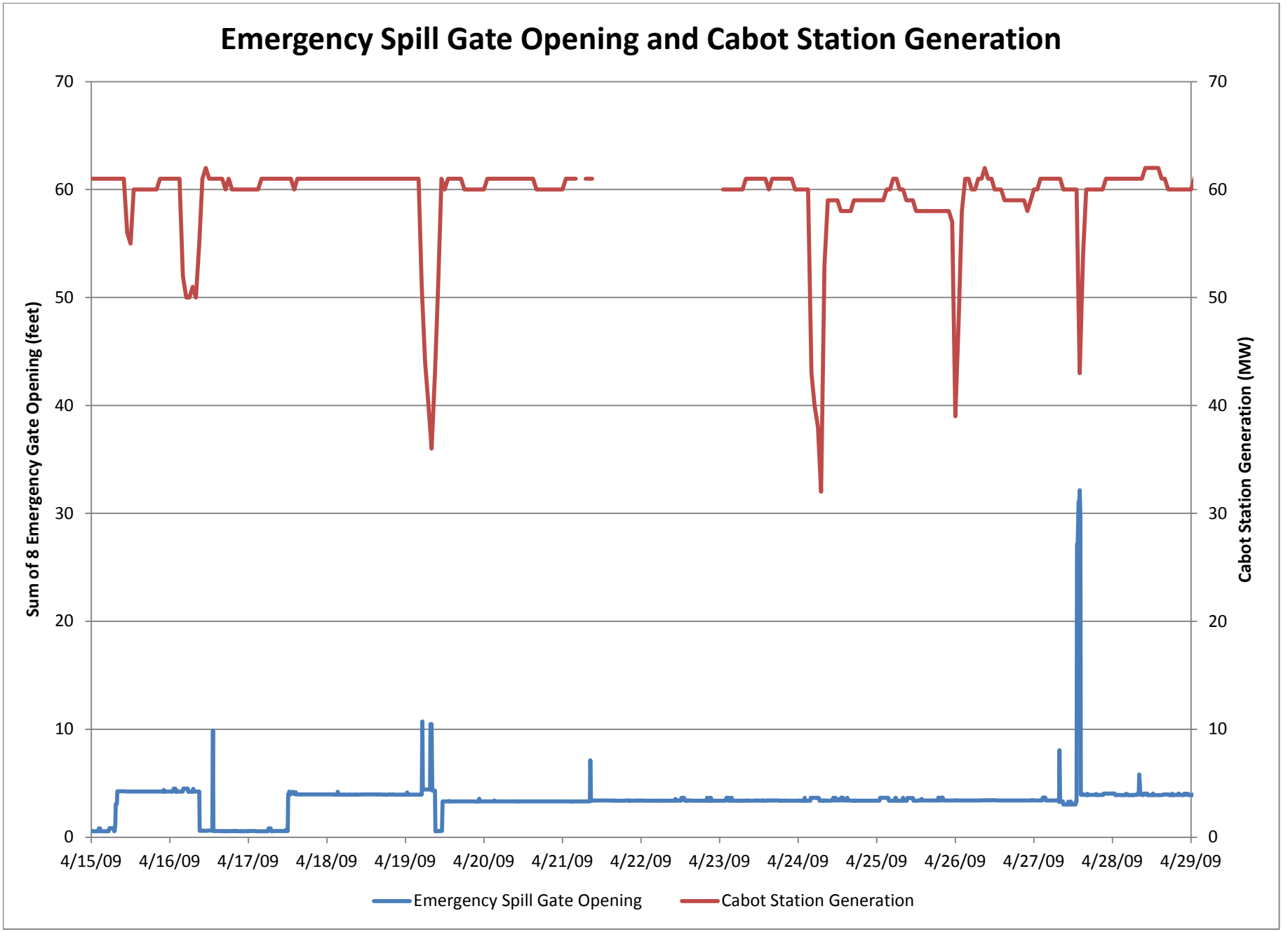
Emergency Spill Gate Opening
Cabot Station Generation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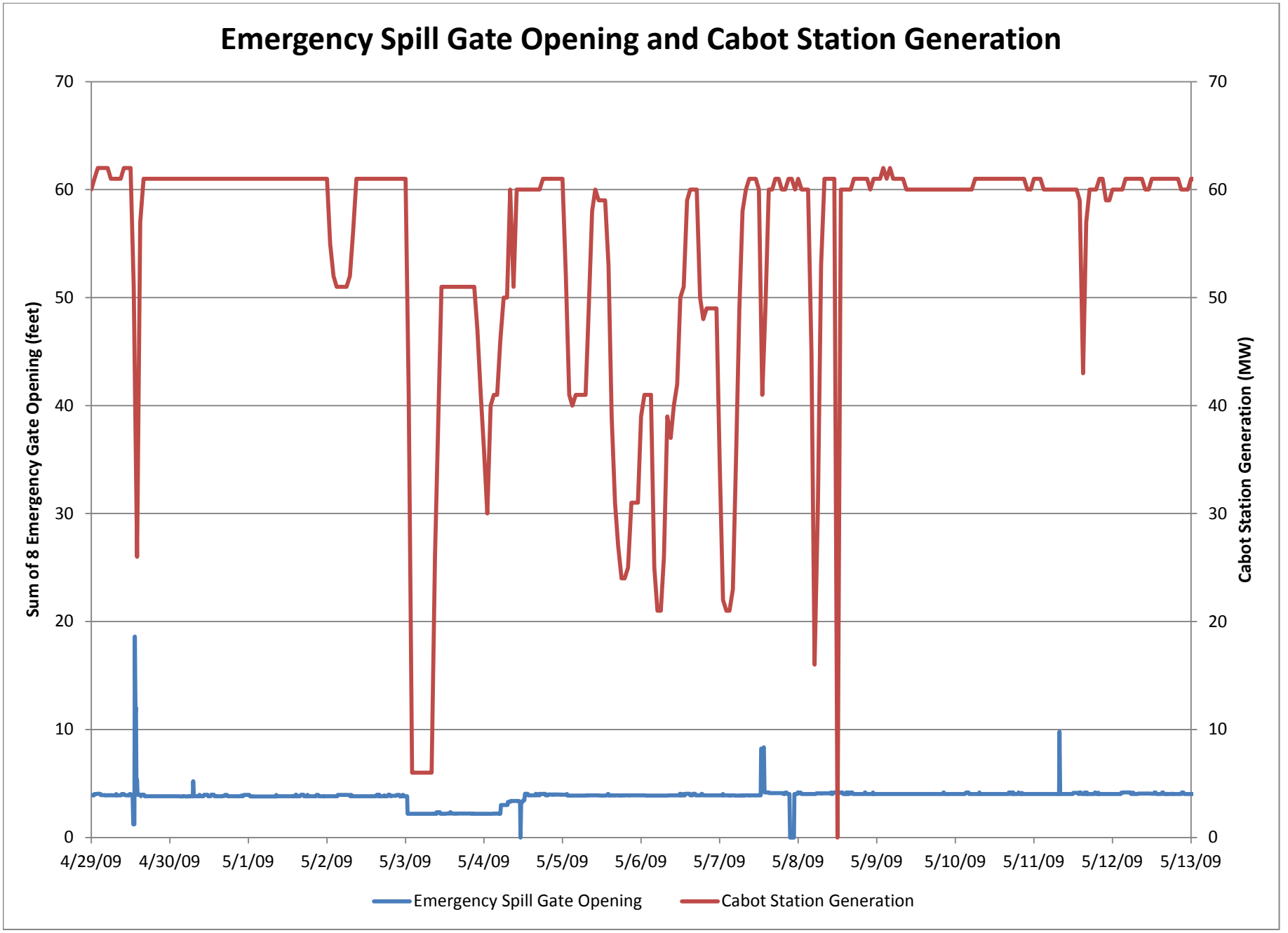
Emergency Spill Gate Opening
Cabot Station Generation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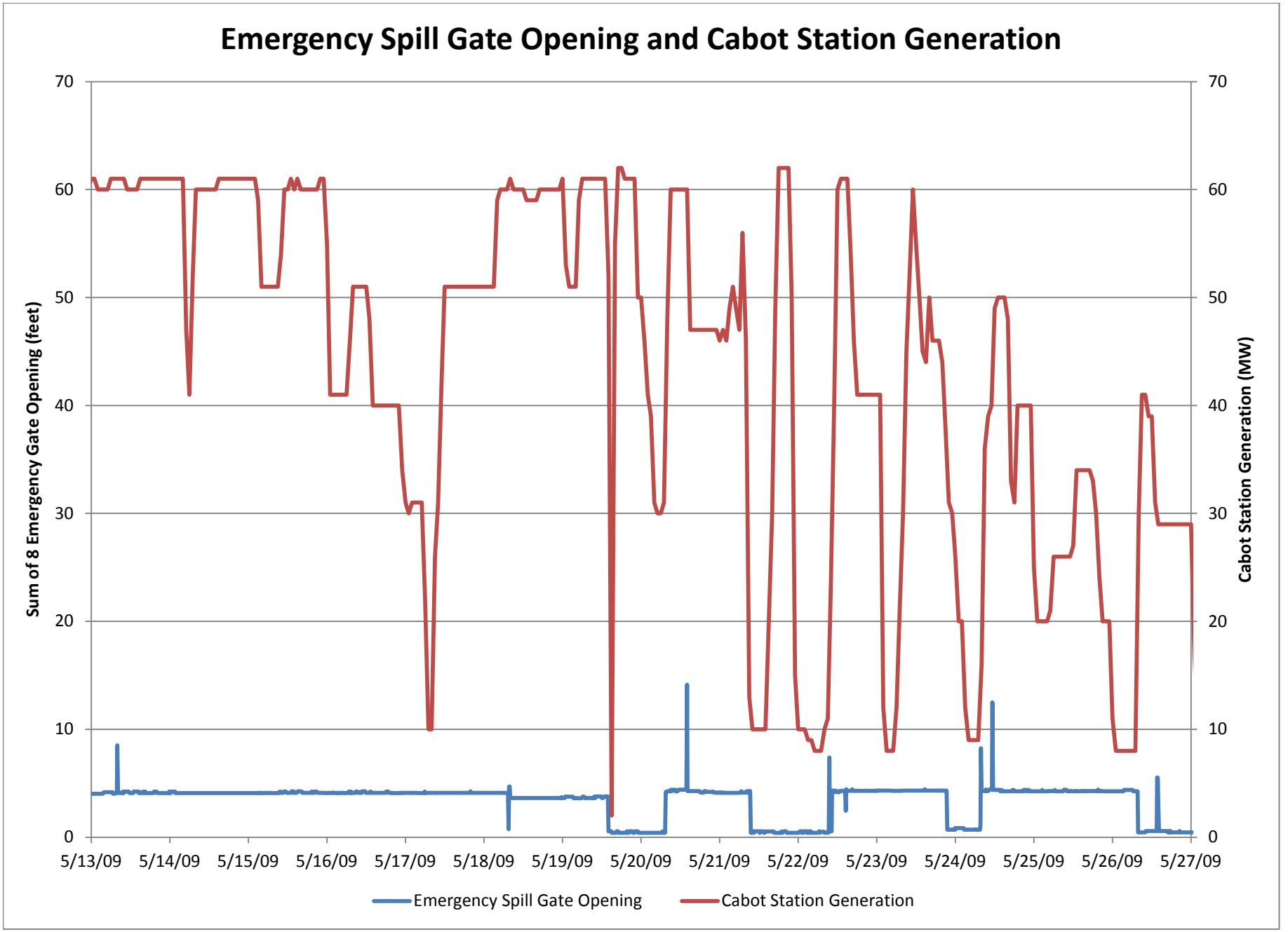
Emergency Spill Gate Opening
Cabot Station Generation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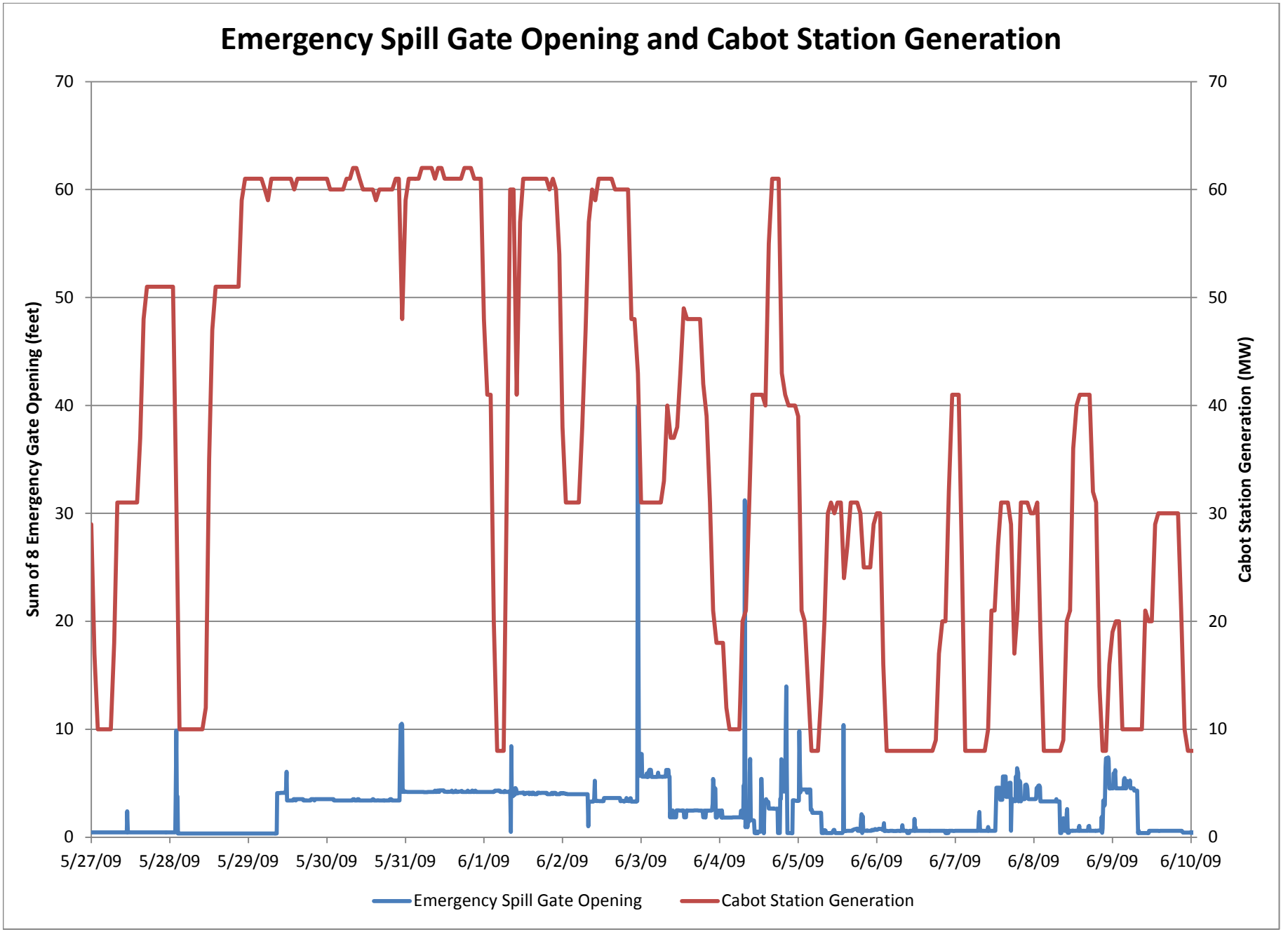
Emergency Spill Gate Opening
Cabot Station Generation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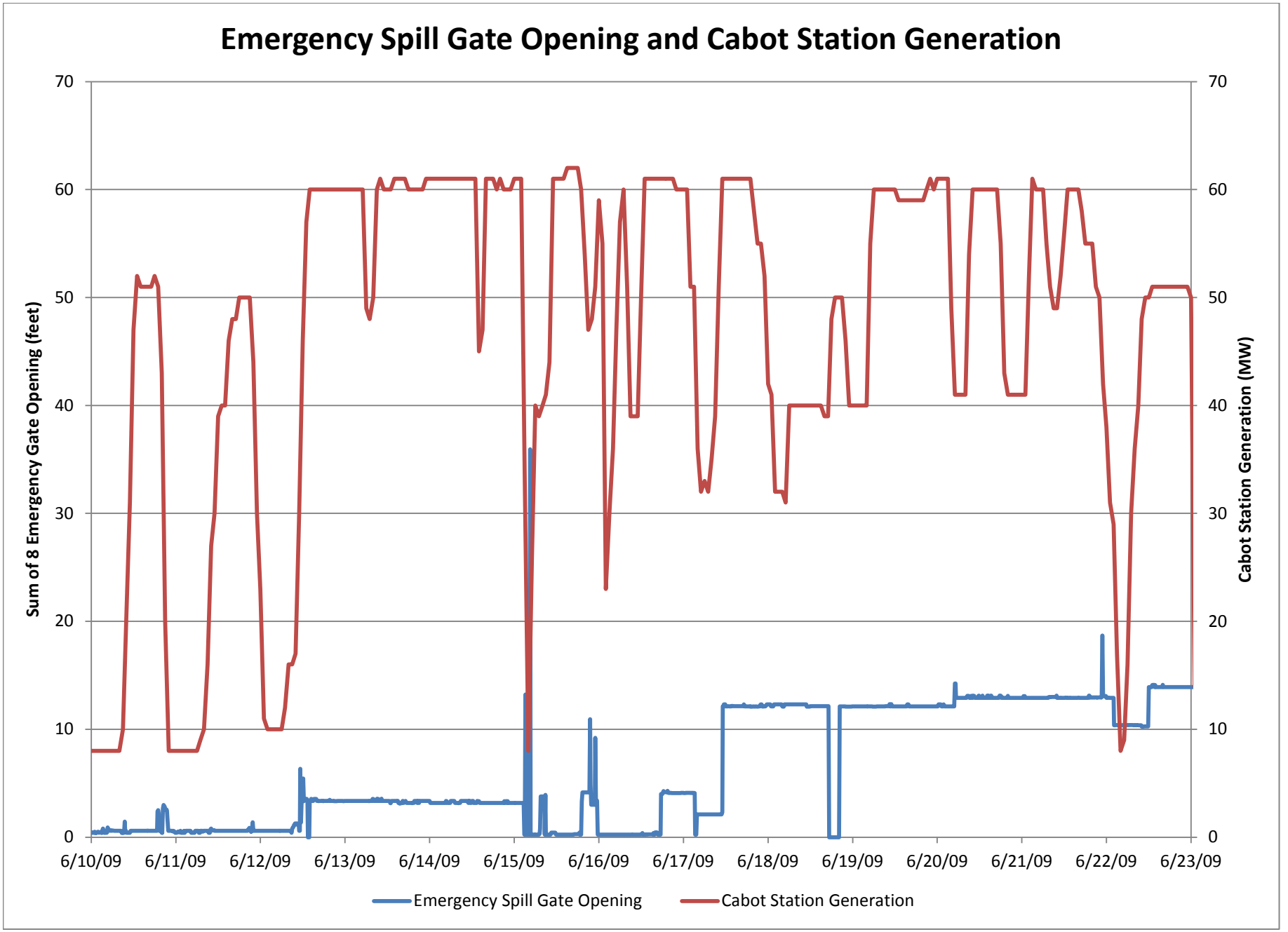
Cabot Station Generation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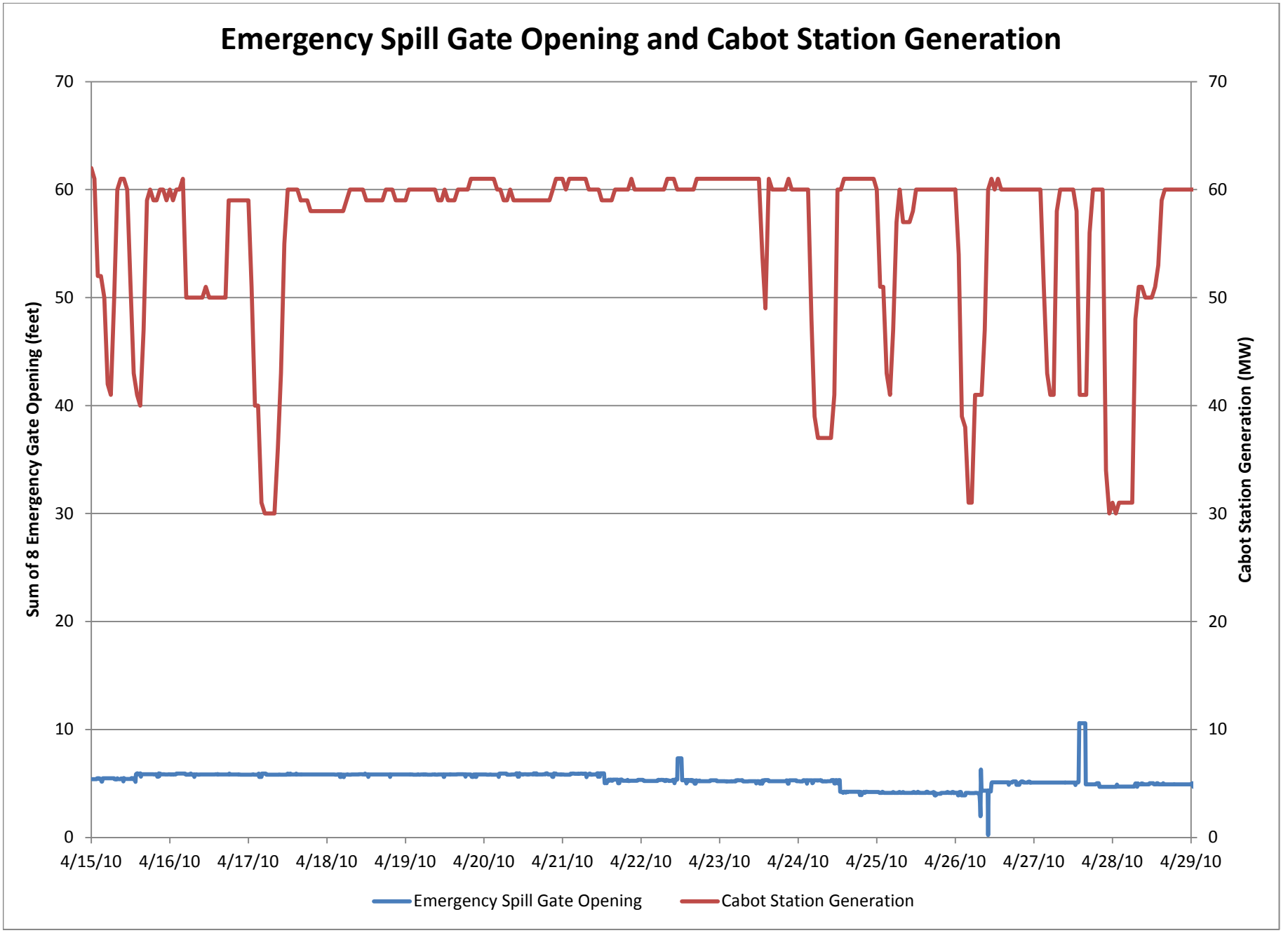
Emergency Spill Gate Opening
Cabot Station Generation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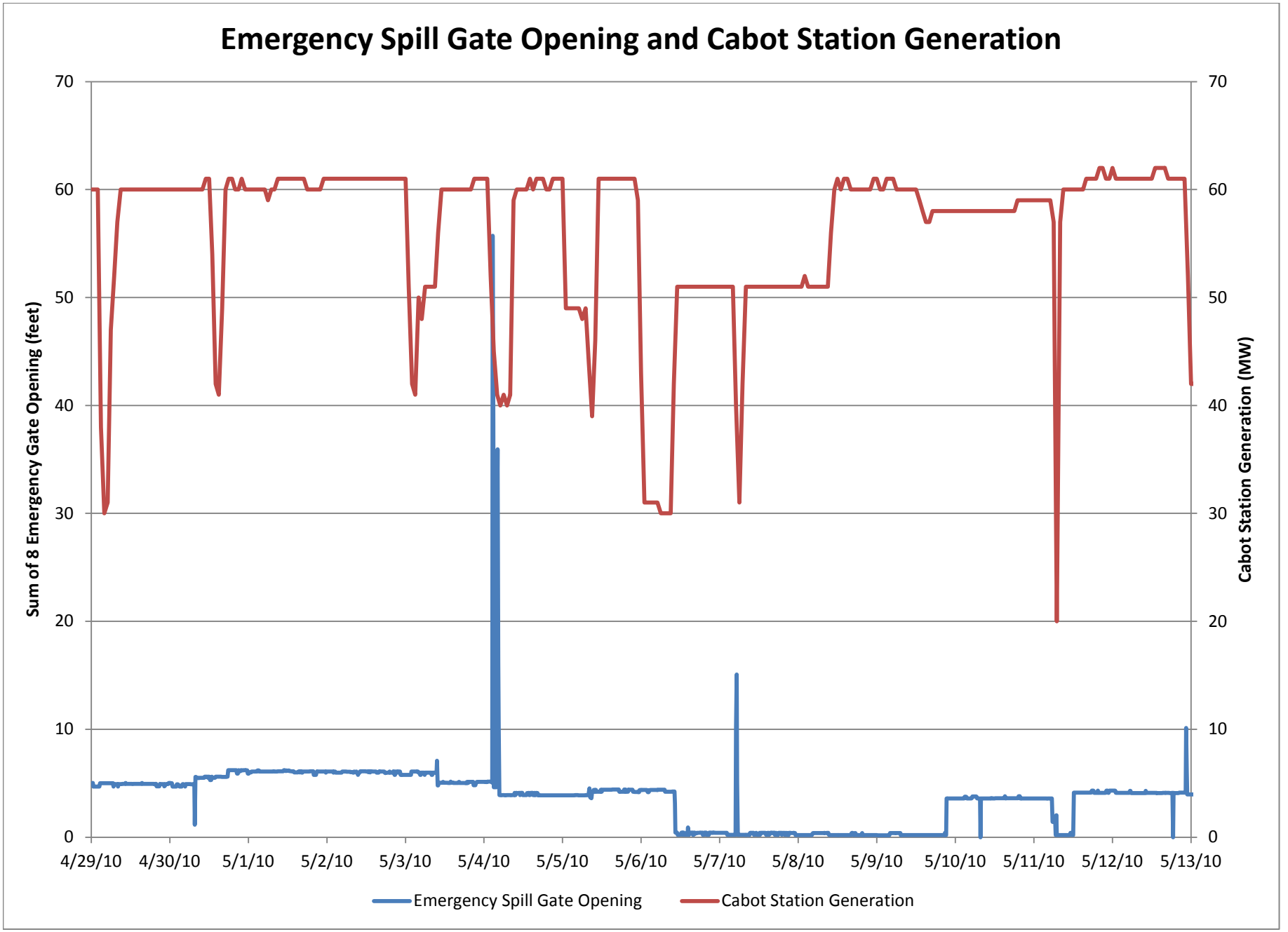
Emergency Spill Gate Opening
Cabot Station Generation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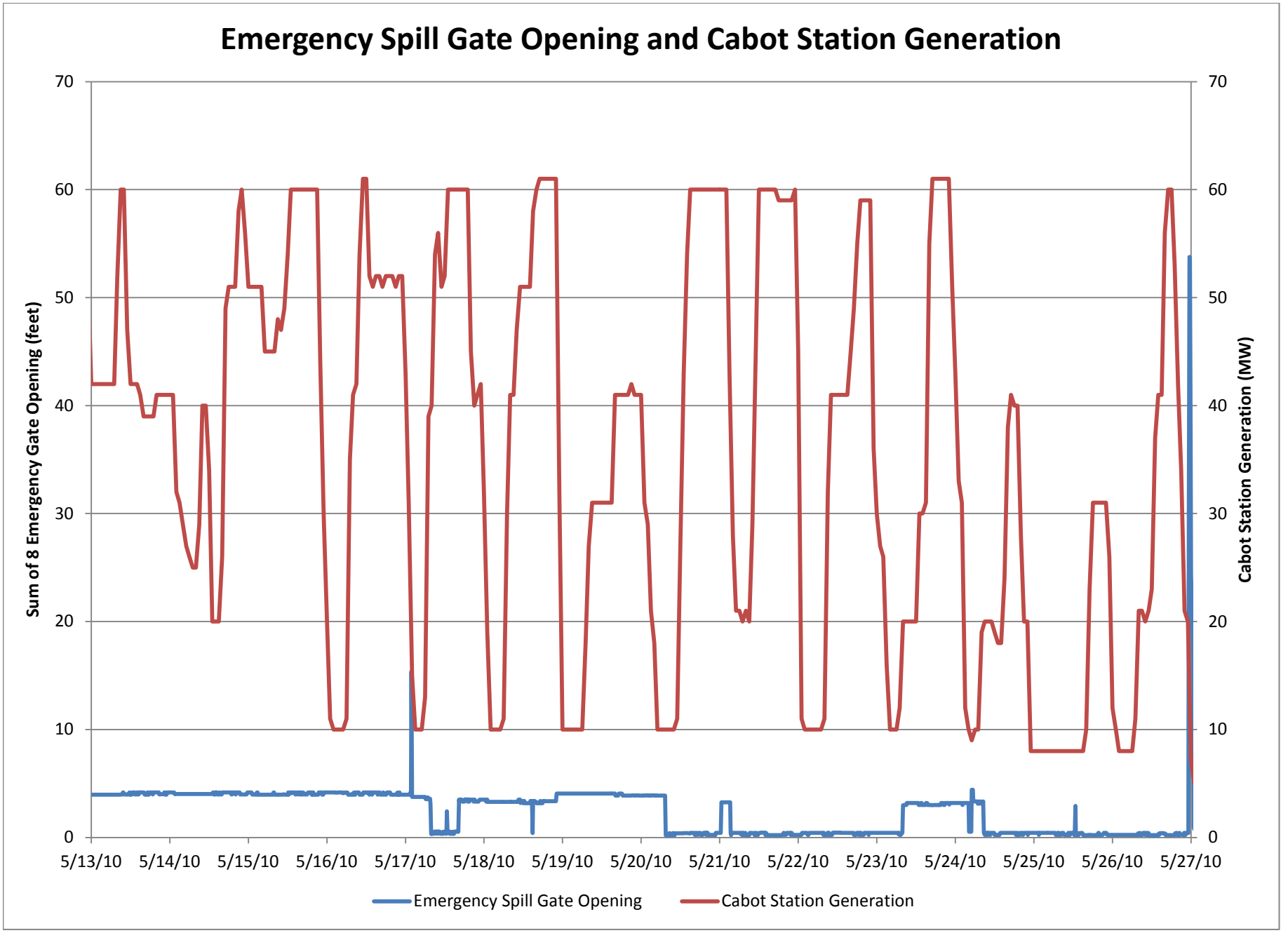
Emergency Spill Gate Opening
Cabot Station Generation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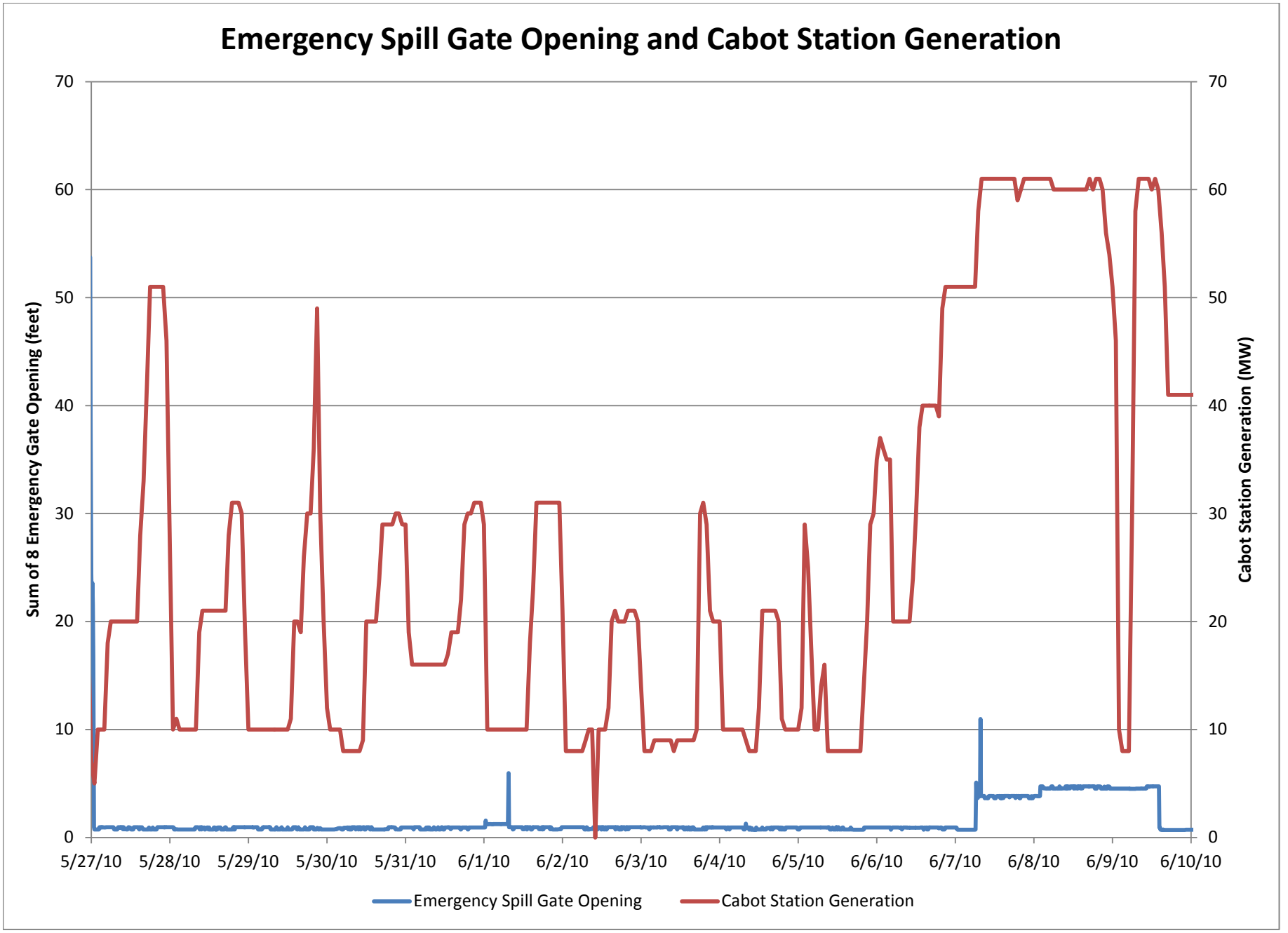
Emergency Spill Gate Opening
Cabot Station Generation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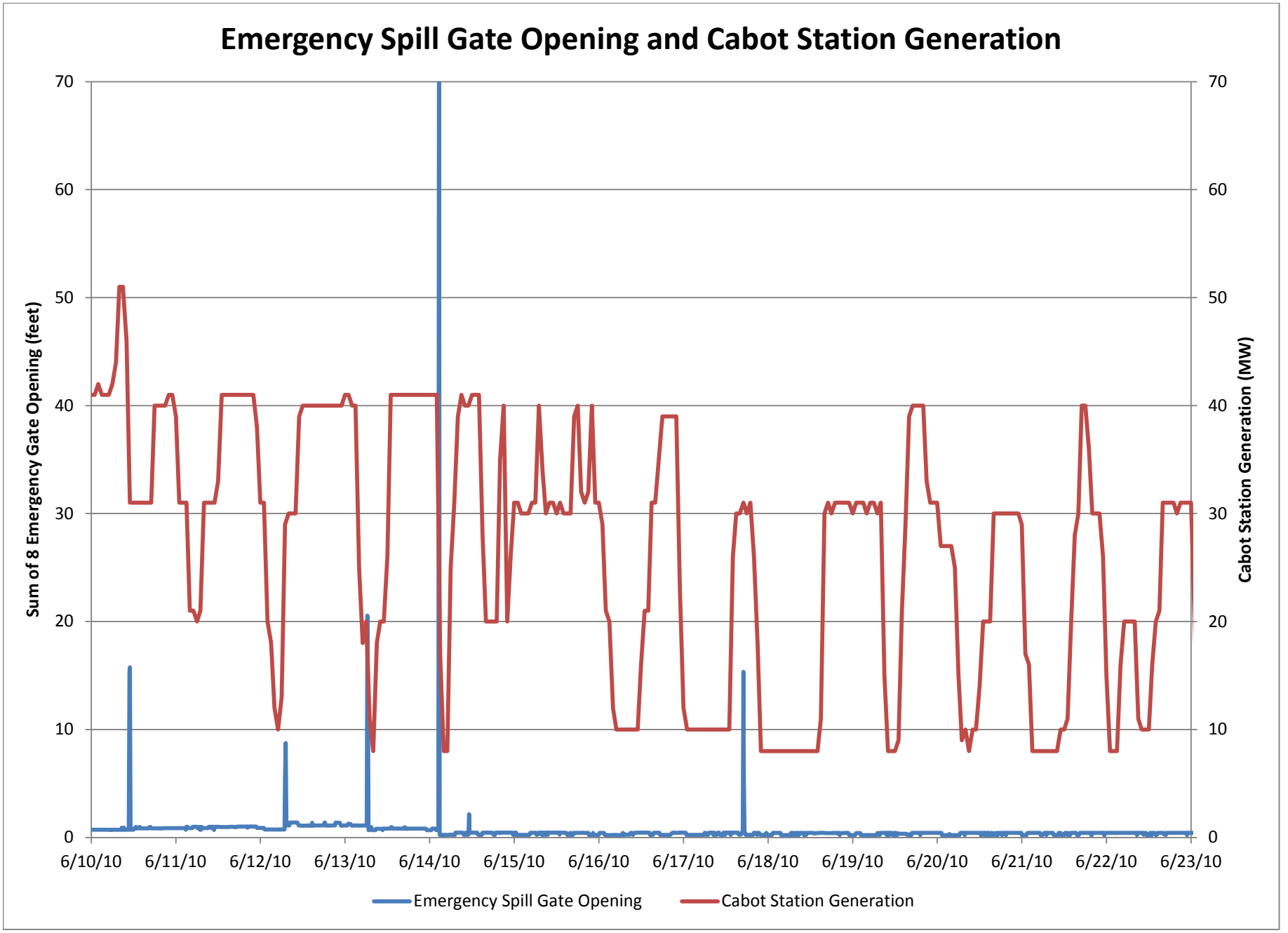
Emergency Spill Gate Opening
Cabot Station Generation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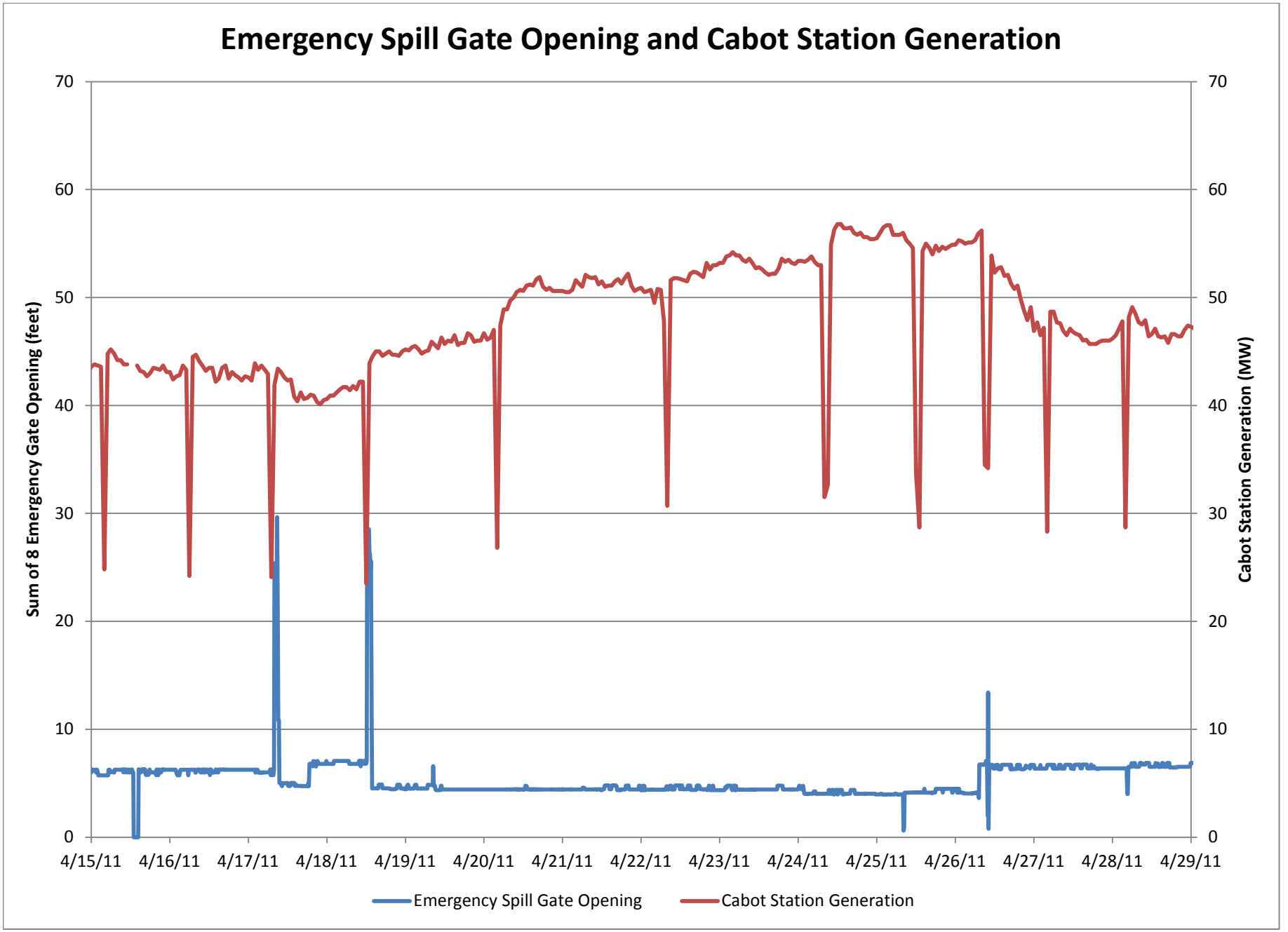
Emergency Spill Gate Opening
Cabot Station Generation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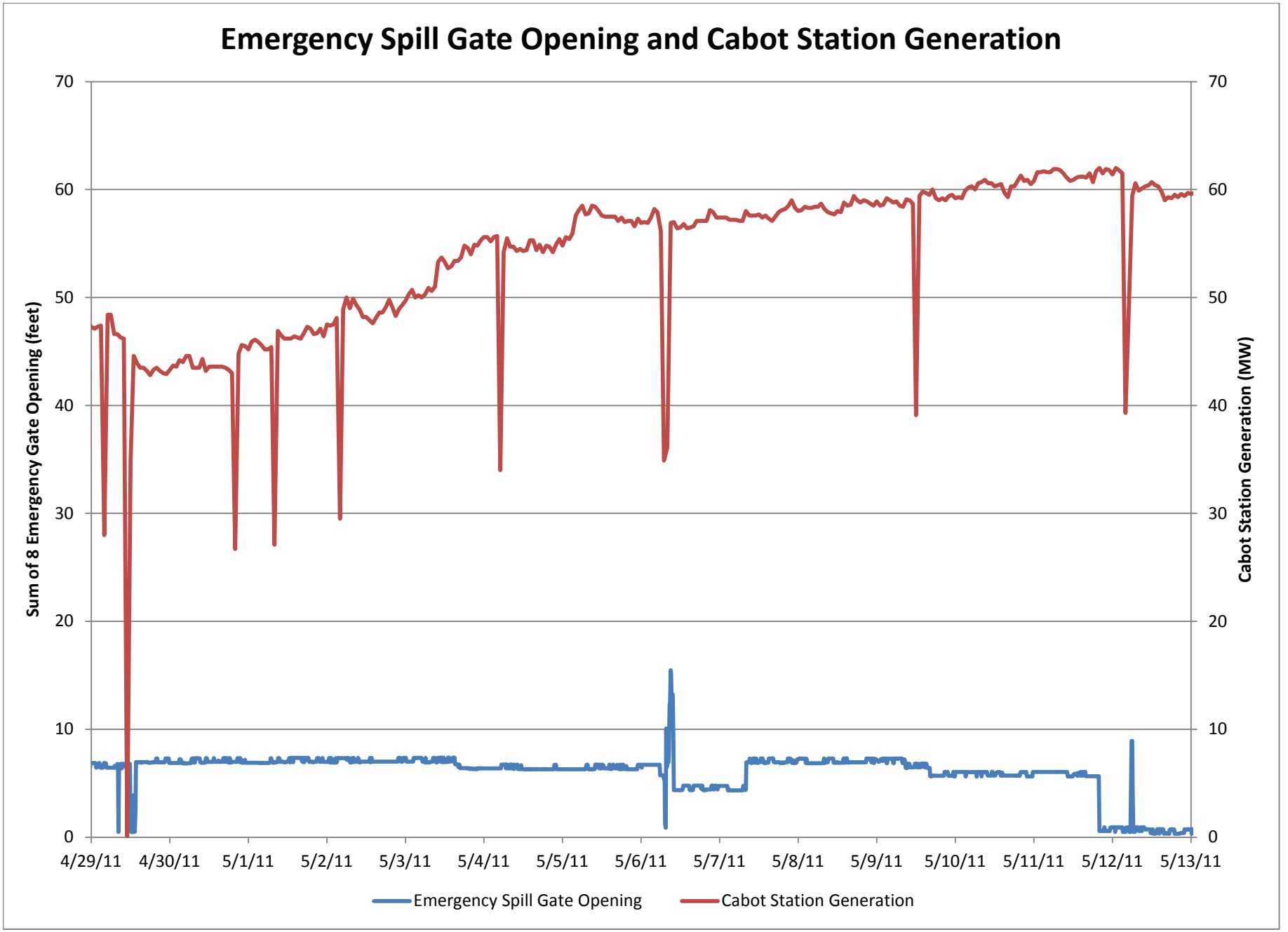
Emergency Spill Gate Opening
Cabot Station Generation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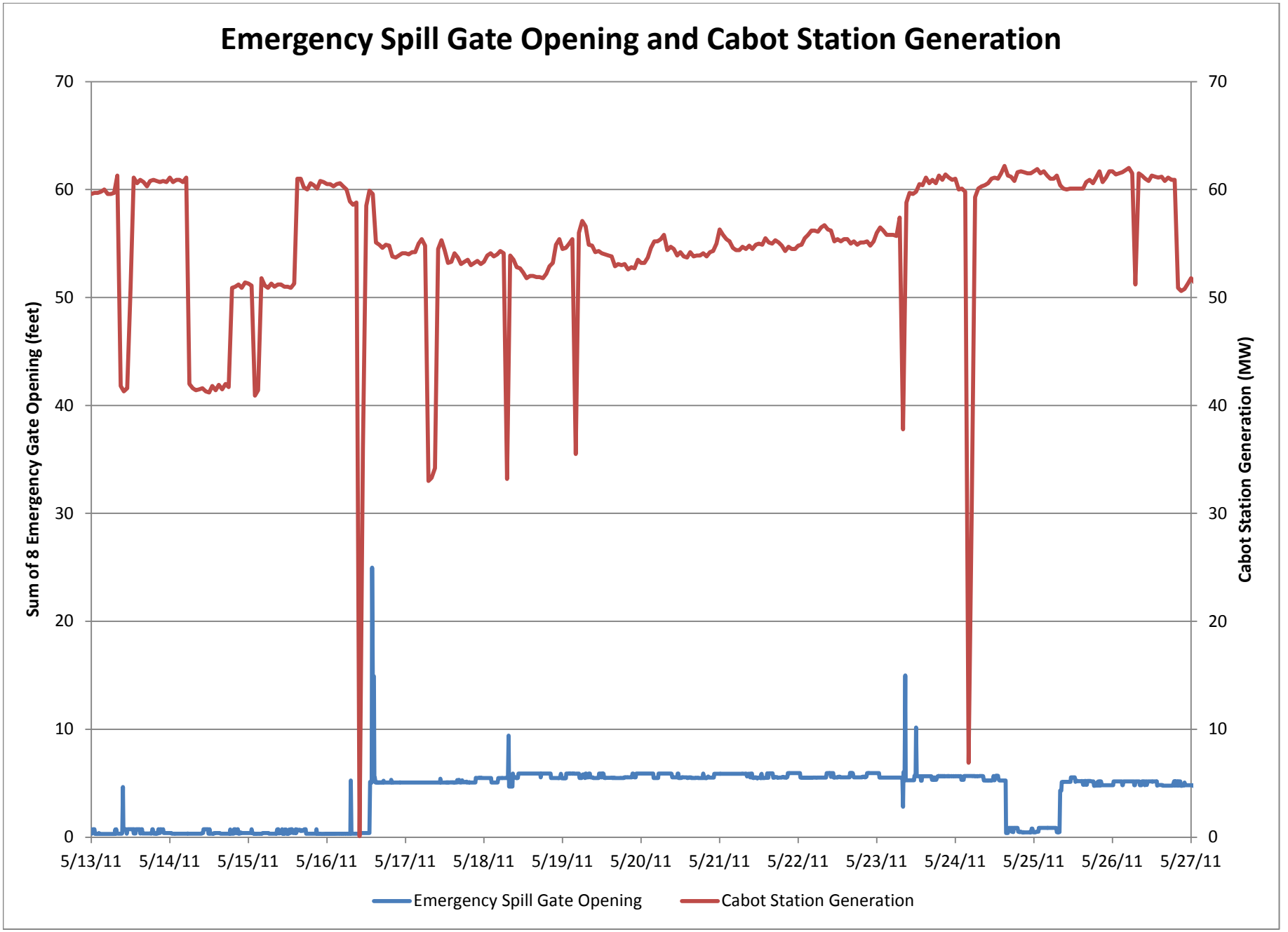
Emergency Spill Gate Opening
Cabot Station Generation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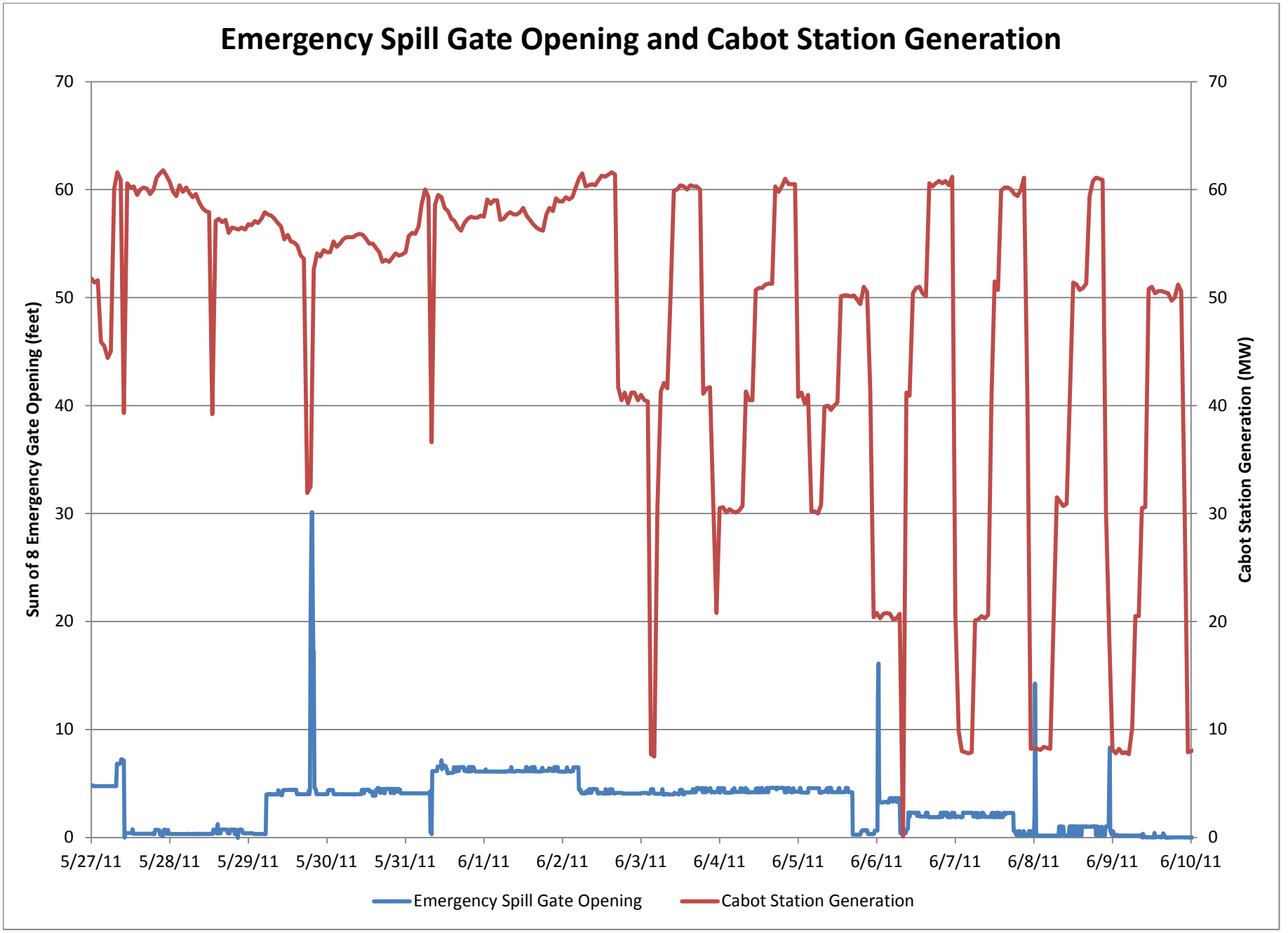
Emergency Spill Gate Opening
Cabot Station Generation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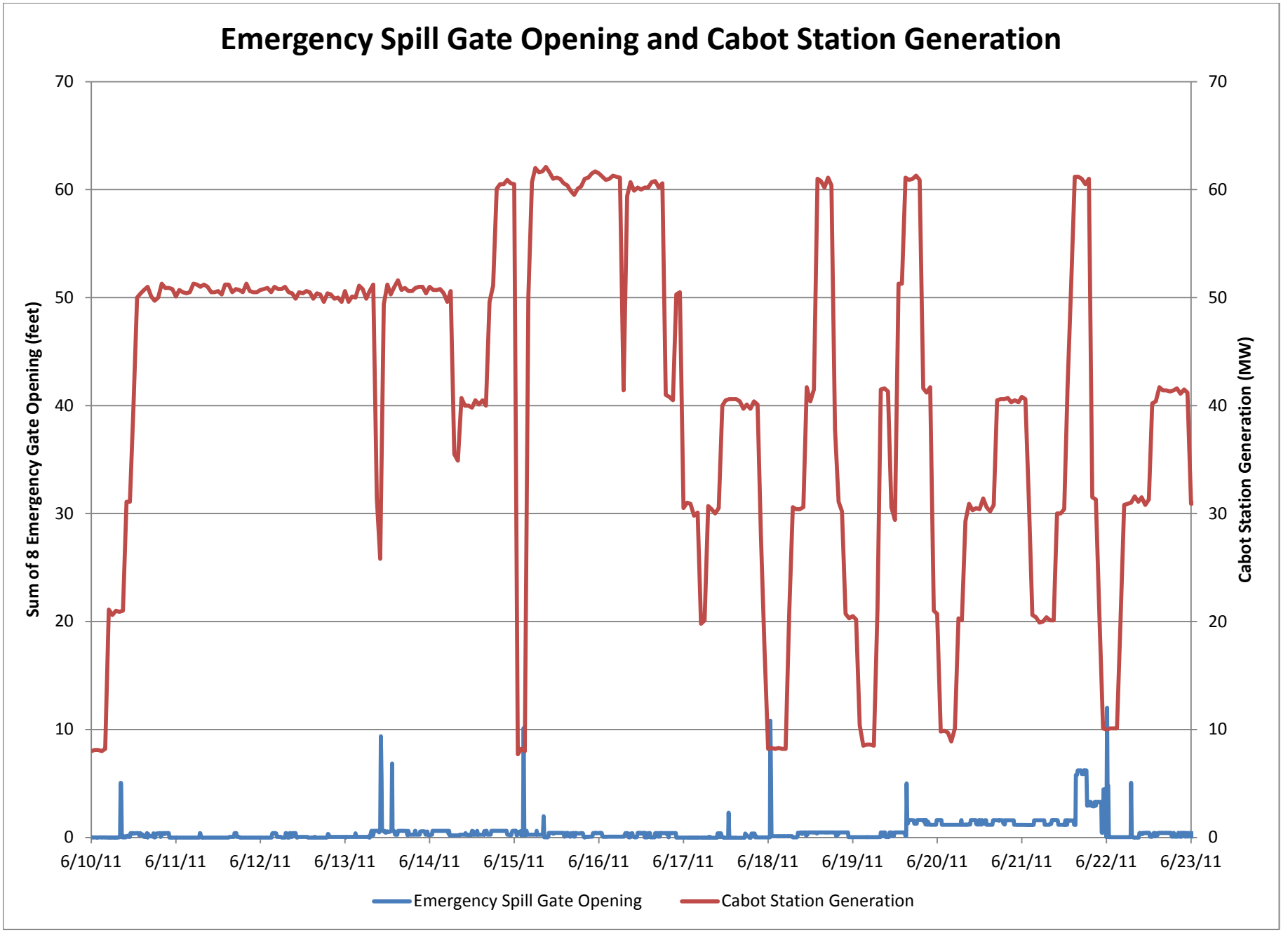
Emergency Spill Gate Opening
Cabot Station Generation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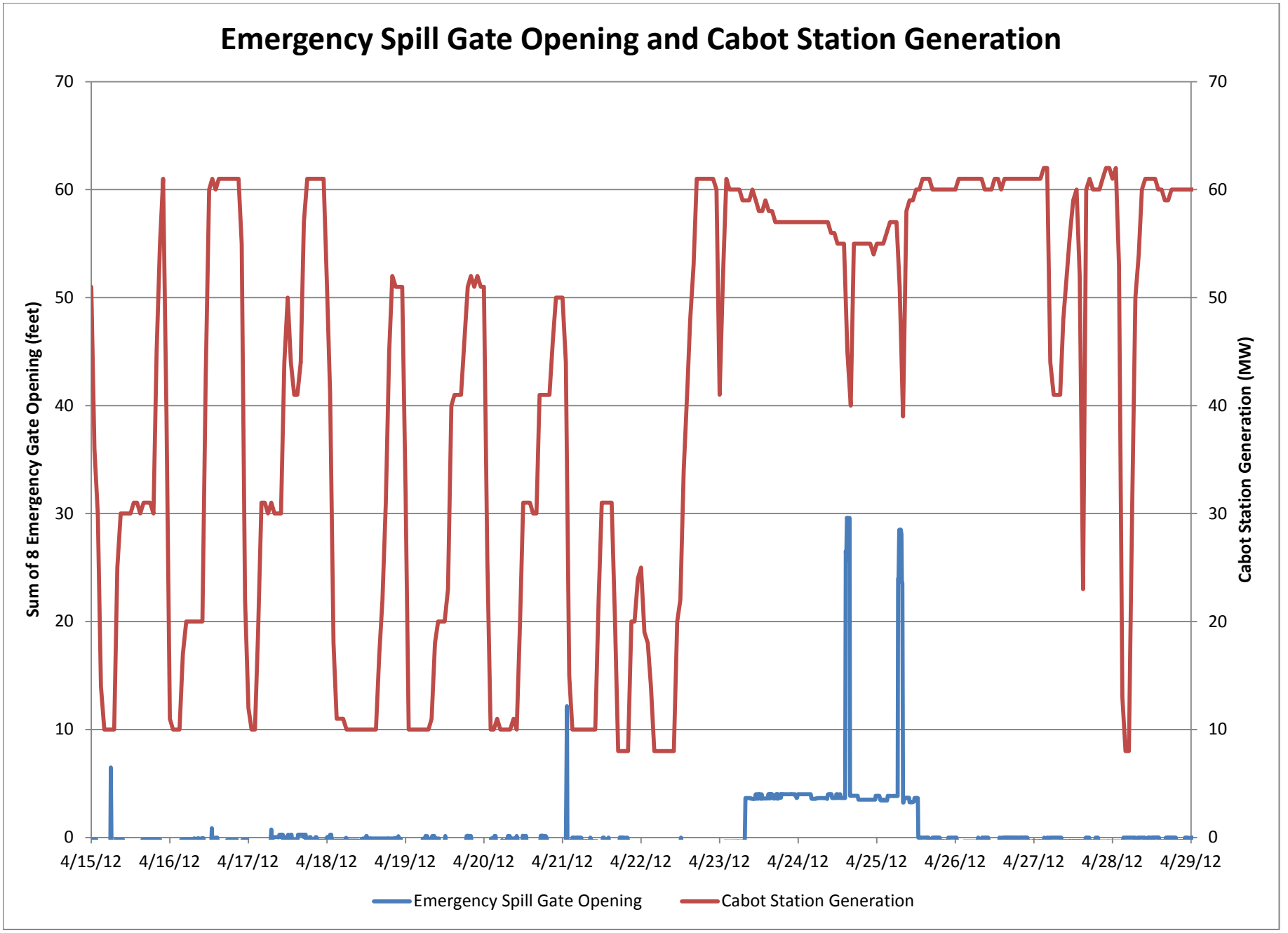
Emergency Spill Gate Opening
Cabot Station Generation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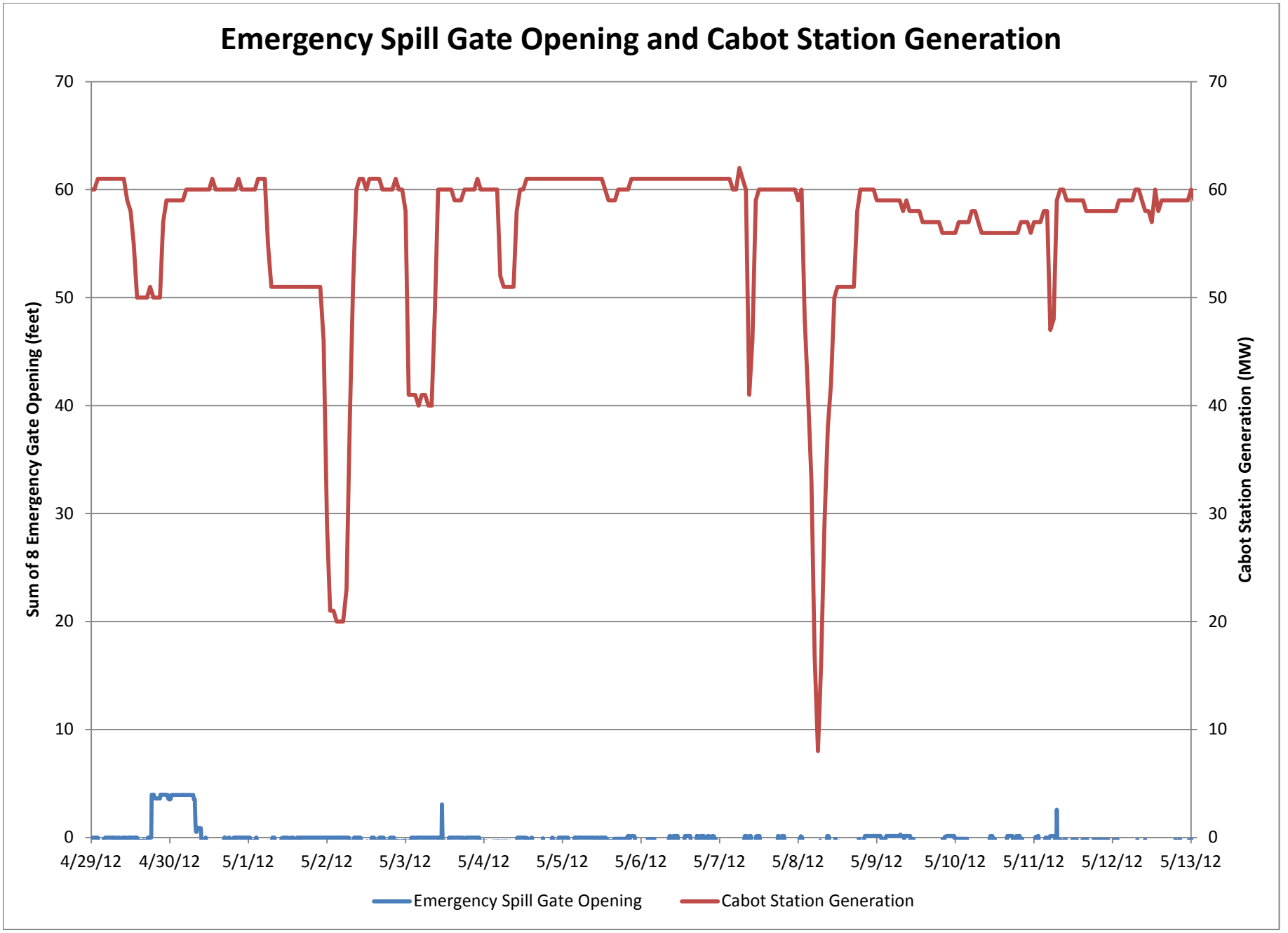
Emergency Spill Gate Opening
Cabot Station Generation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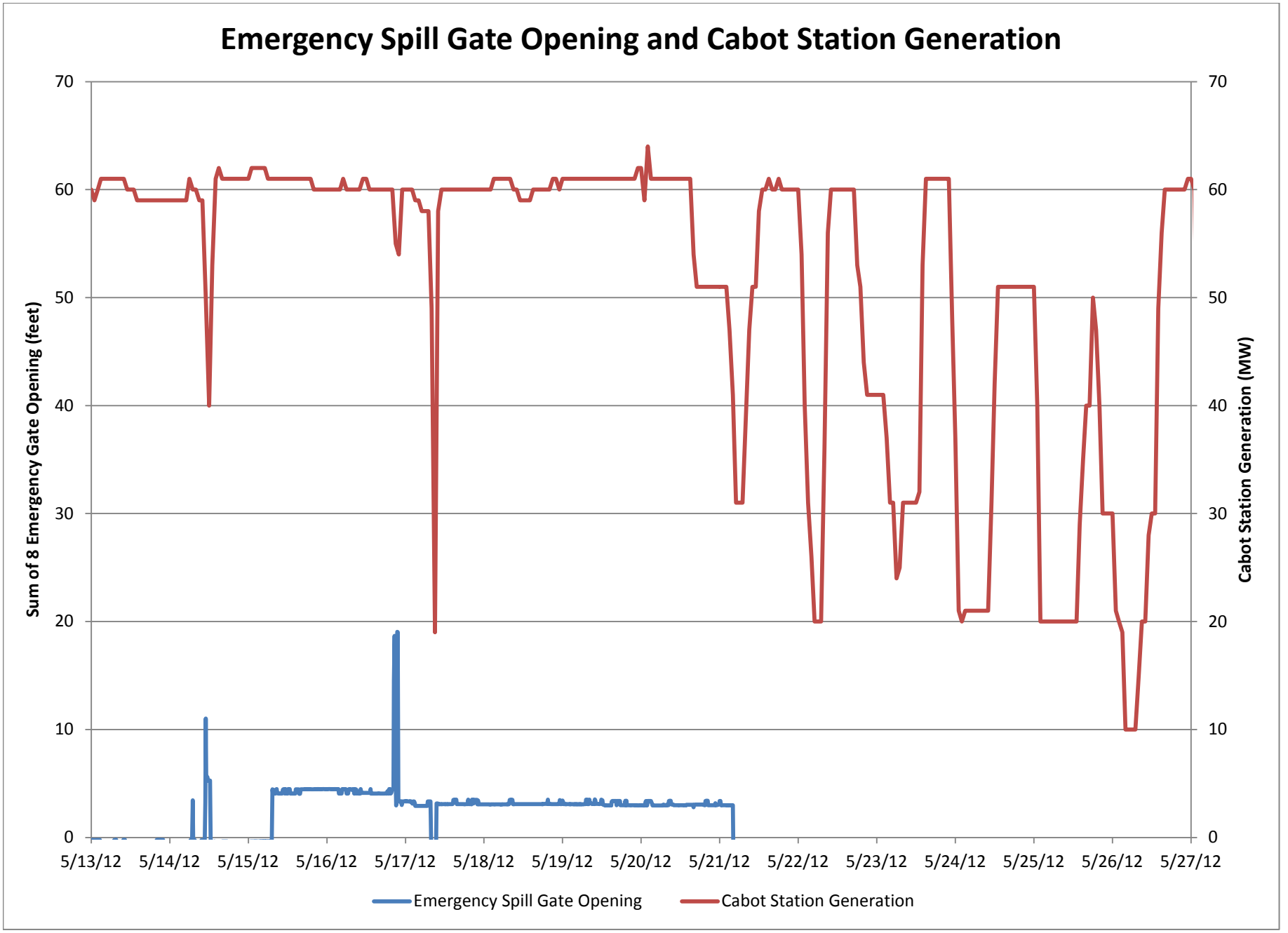
Emergency Spill Gate Opening
Cabot Station Generation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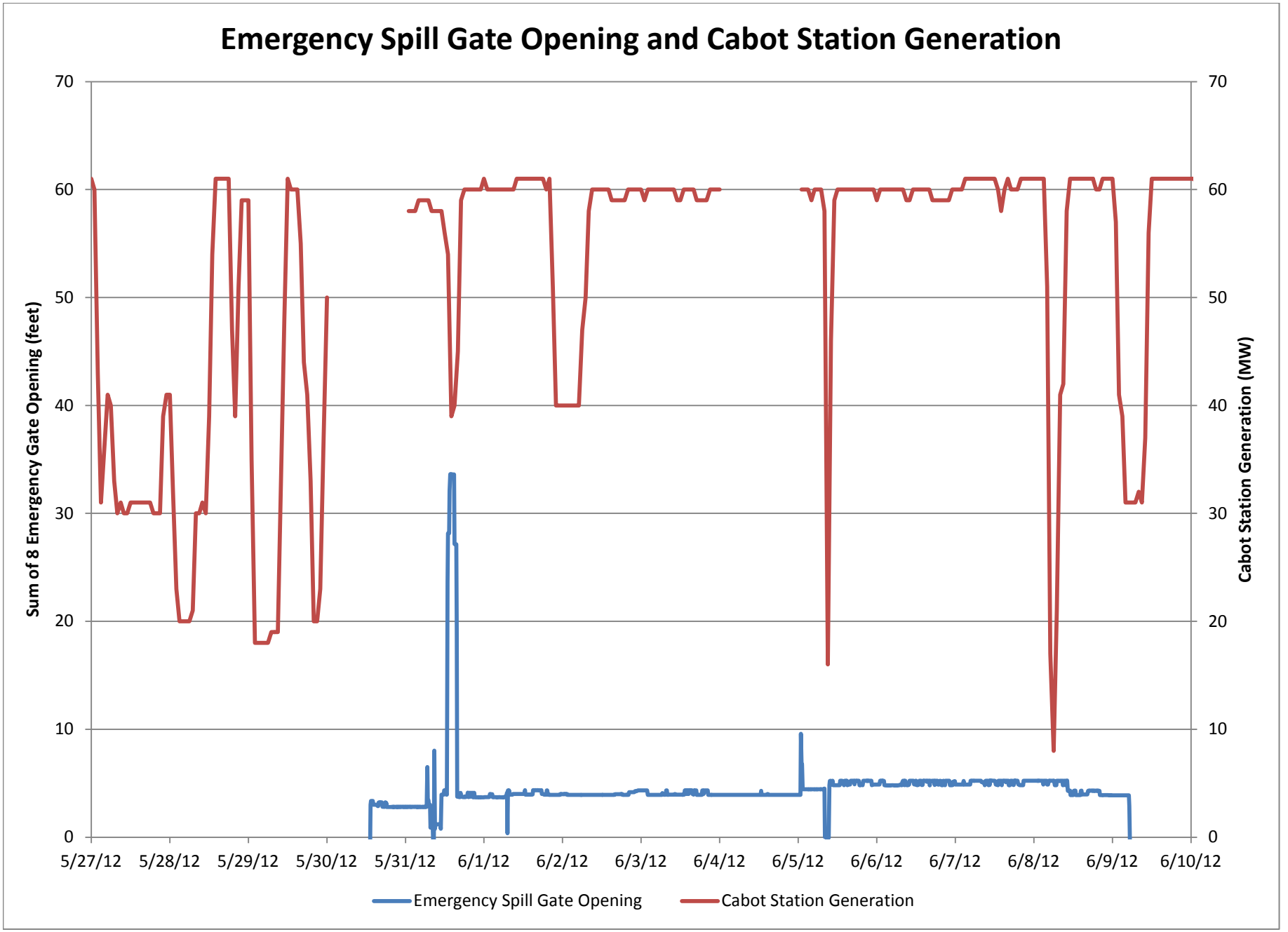
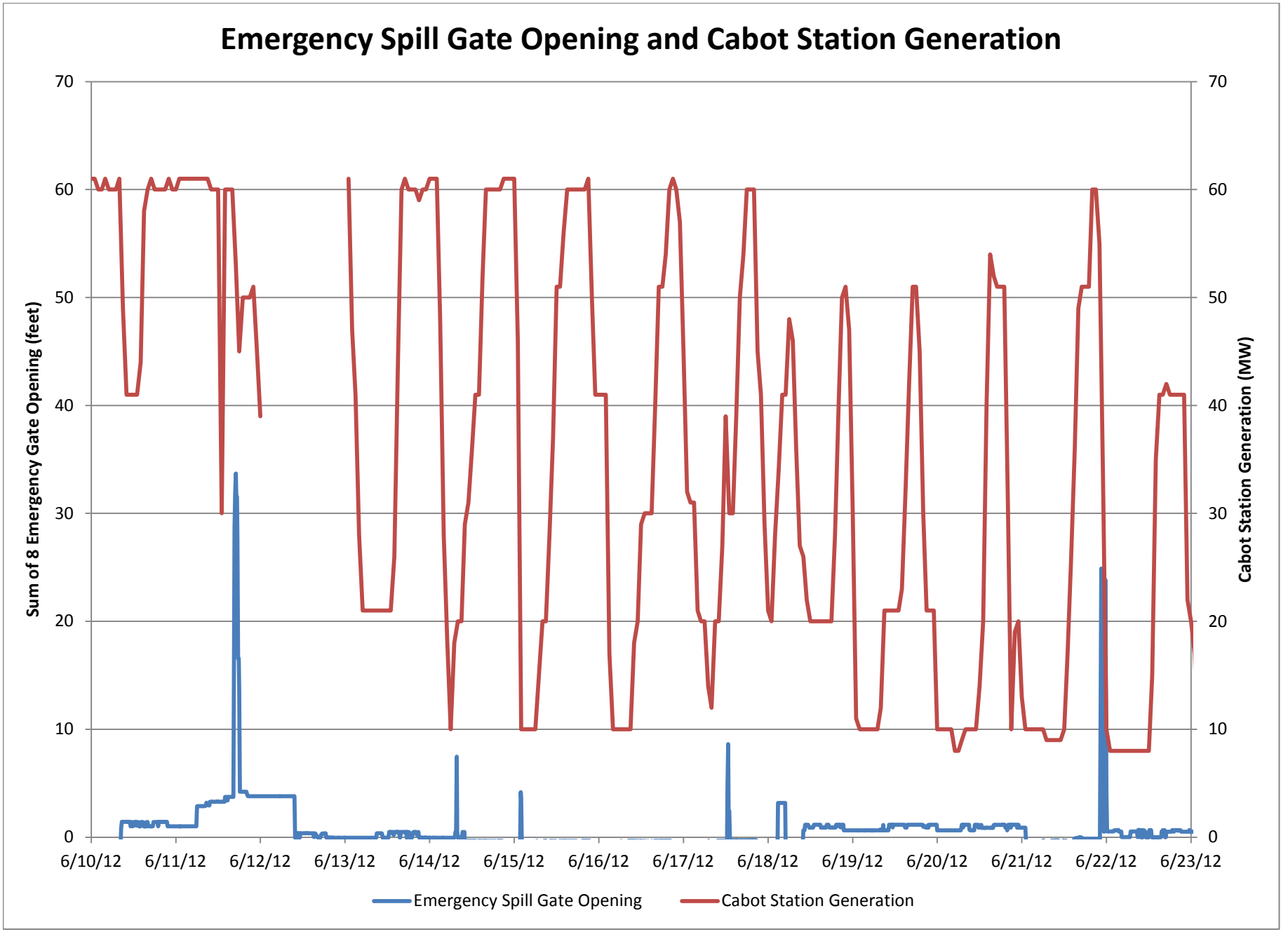
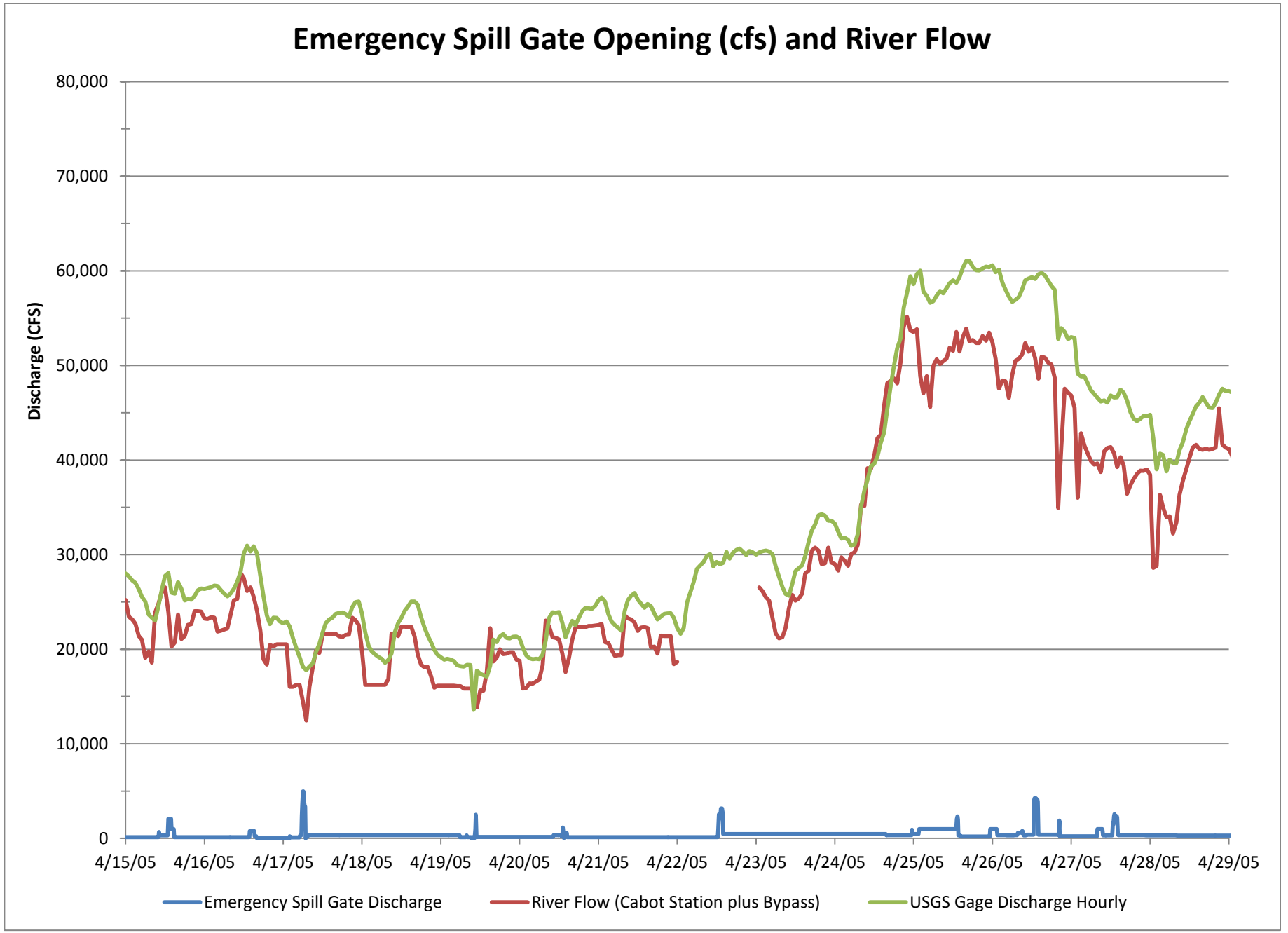
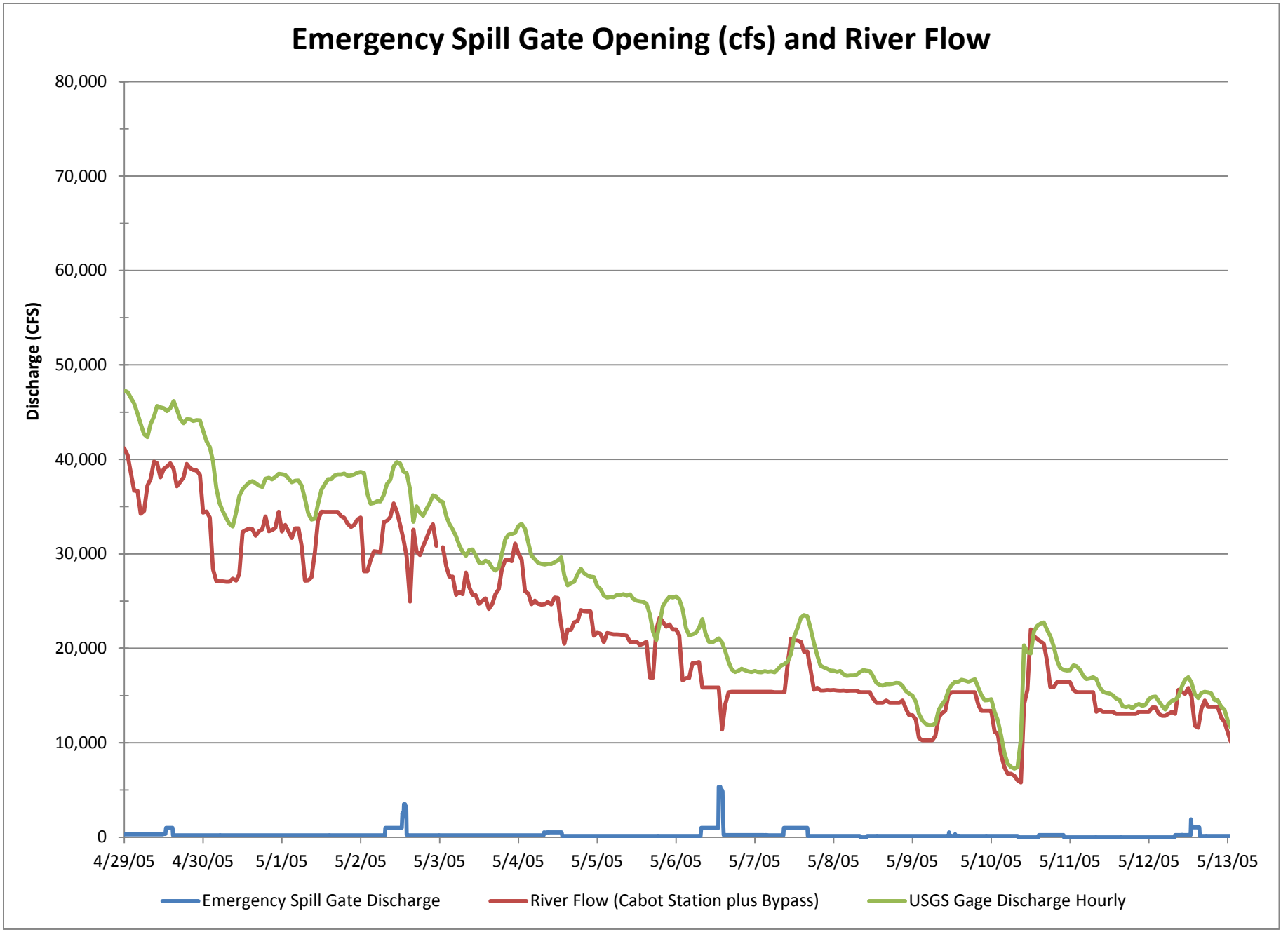
Emergency Spill Gate Opening
Cabot Station Generation

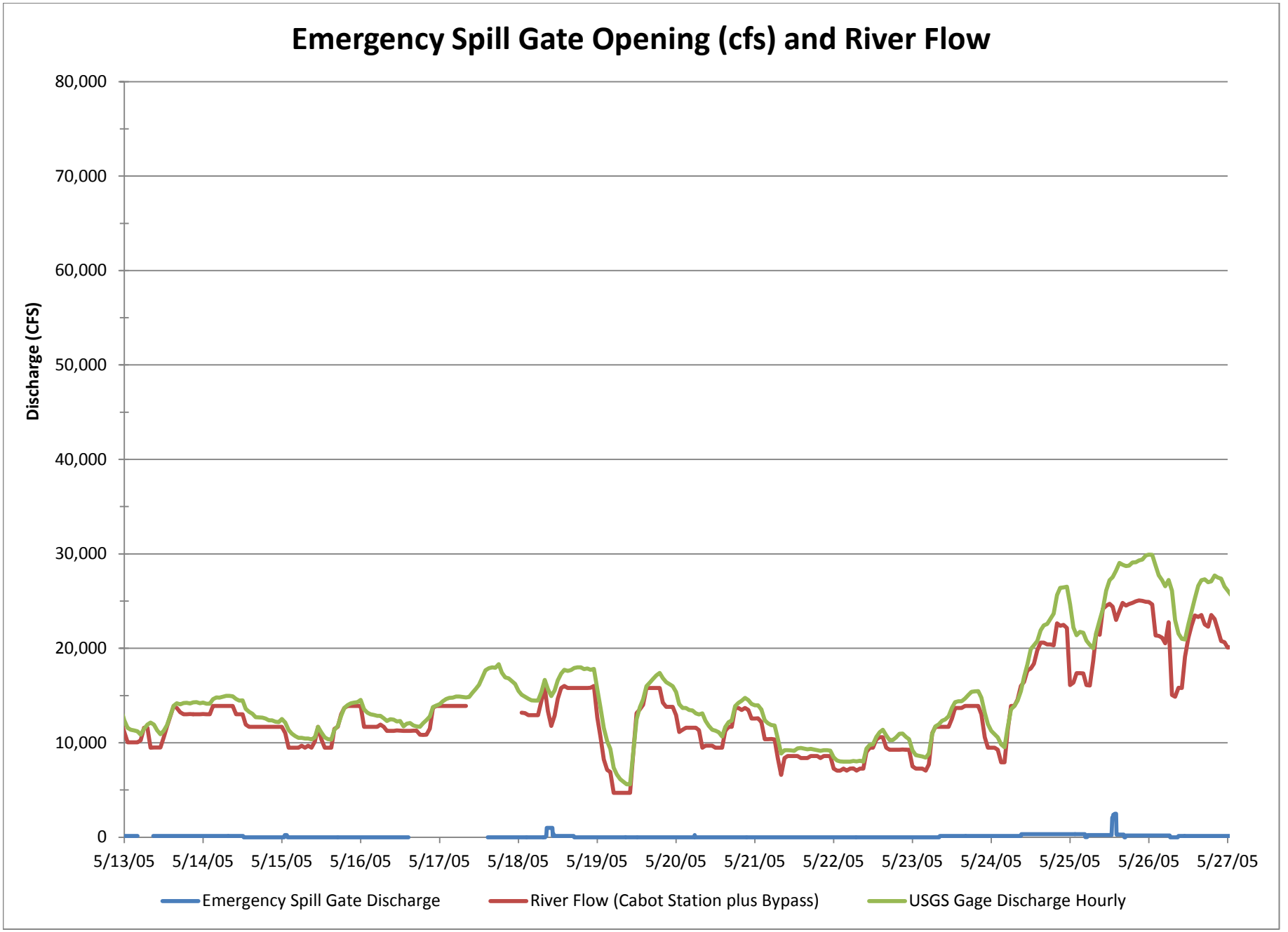

Emergency Spill Gate Opening and Cabot Station Generation
Sum of 8 Emergency Gate Opening (feet)
Cabot Station Generation (MW)
70
60
50
40
30
20
10
0
5/27/12
5/28/12
5/29/12
5/30/12
5/31/12
6/1/12
6/2/12
6/3/12
6/4/12
6/5/12
6/6/12
6/7/12
6/8/12
6/9/12
6/10/12
Emergency Spill Gate Opening
Cabot Station Generation

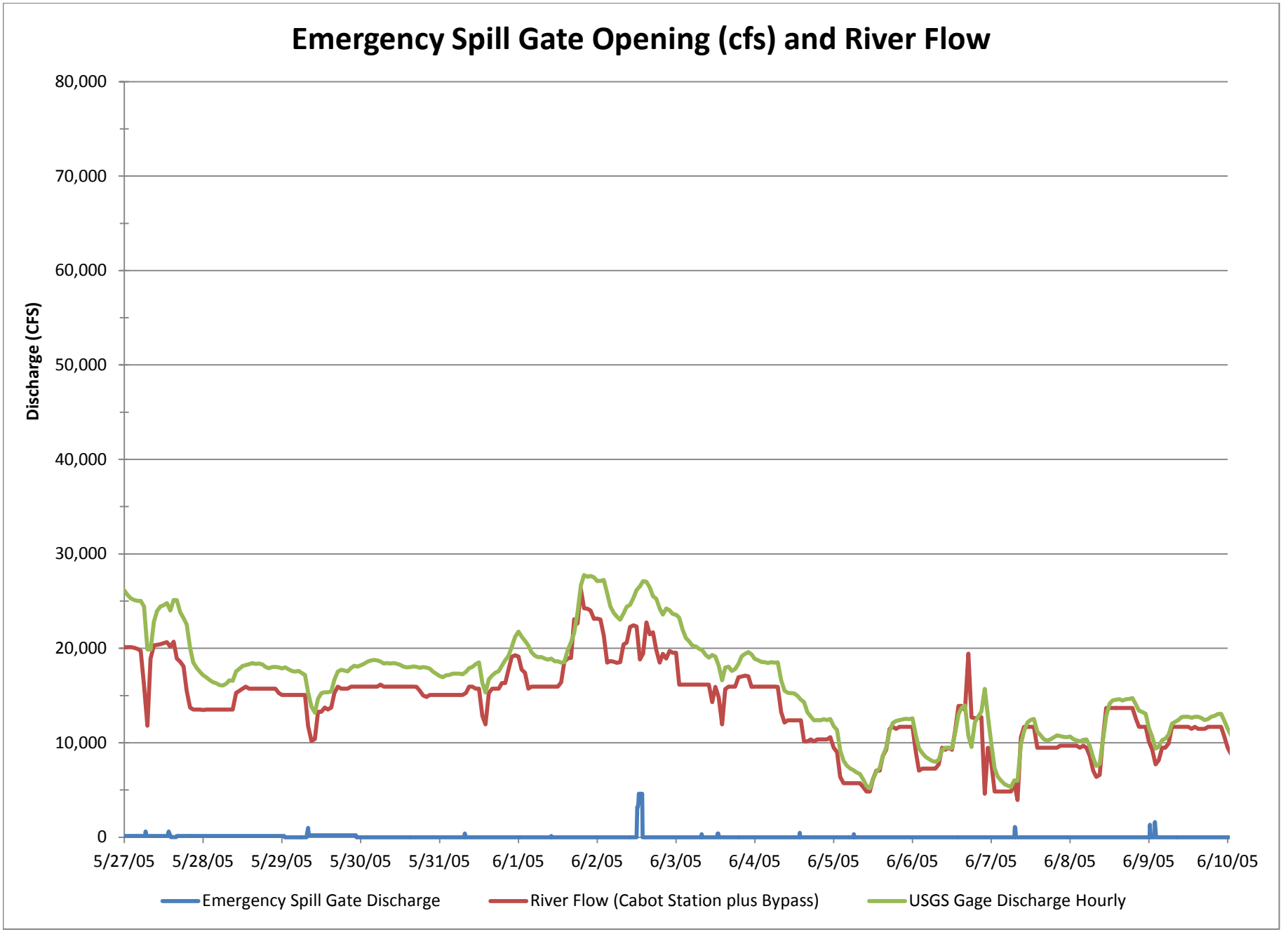

Emergency Spill Gate Opening and Cabot Station Generation
Sum of 8 Emergency Gate Opening (feet)
Cabot Station Generation (MW)
70
60
50
40
30
20
10
0
6/10/12
6/11/12
6/12/12
6/13/12
6/14/12
6/15/12
6/16/12
6/17/12
6/18/12
6/19/12
6/20/12
6/21/12
6/22/12
6/23/12
Emergency Spill Gate Opening
Cabot Station Generation

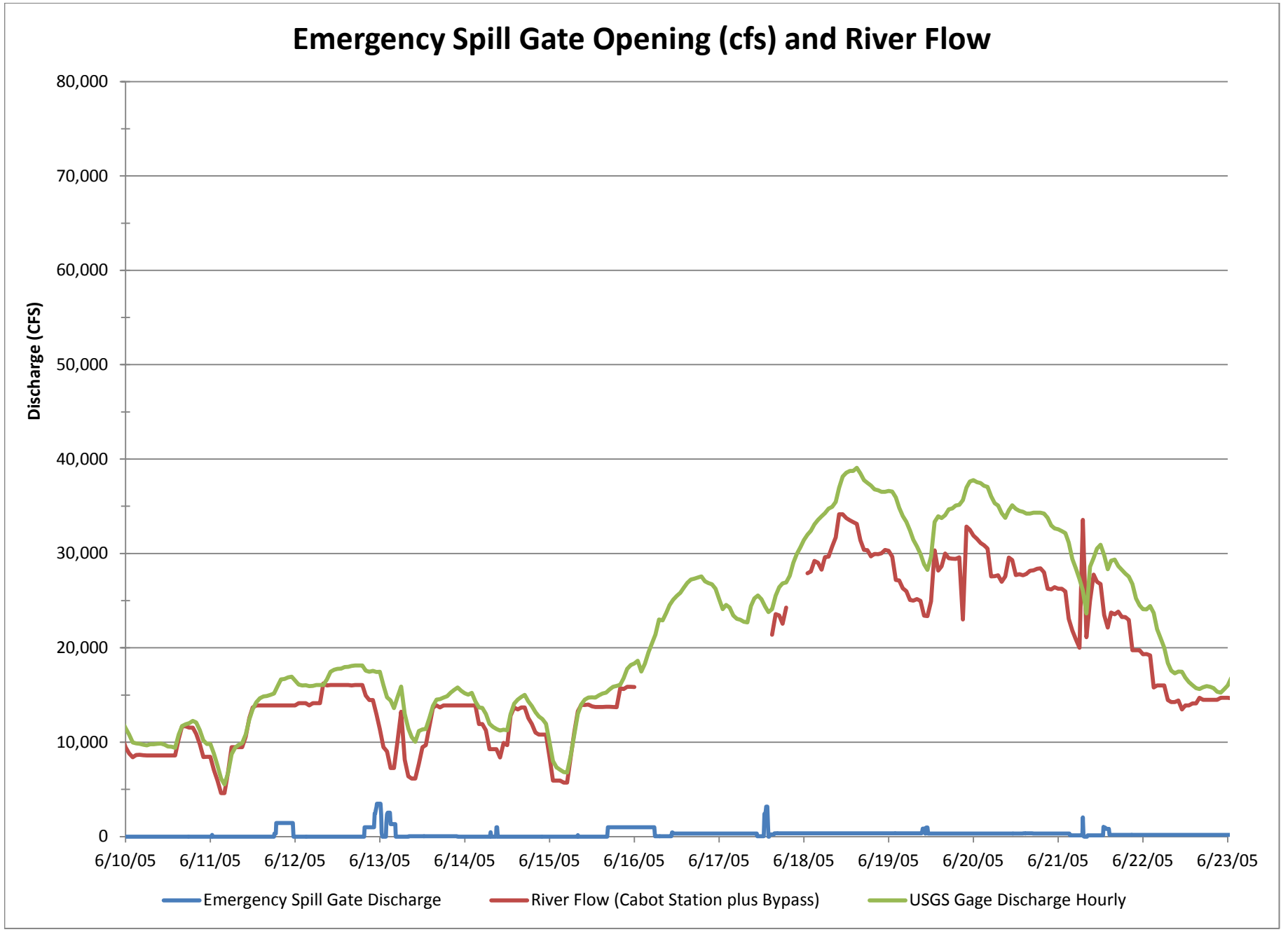
APPENDIX B – BI-WEEKLY CHARTS OF SPILL GATE DISCHARGE VS. RIVER DISCHARGE

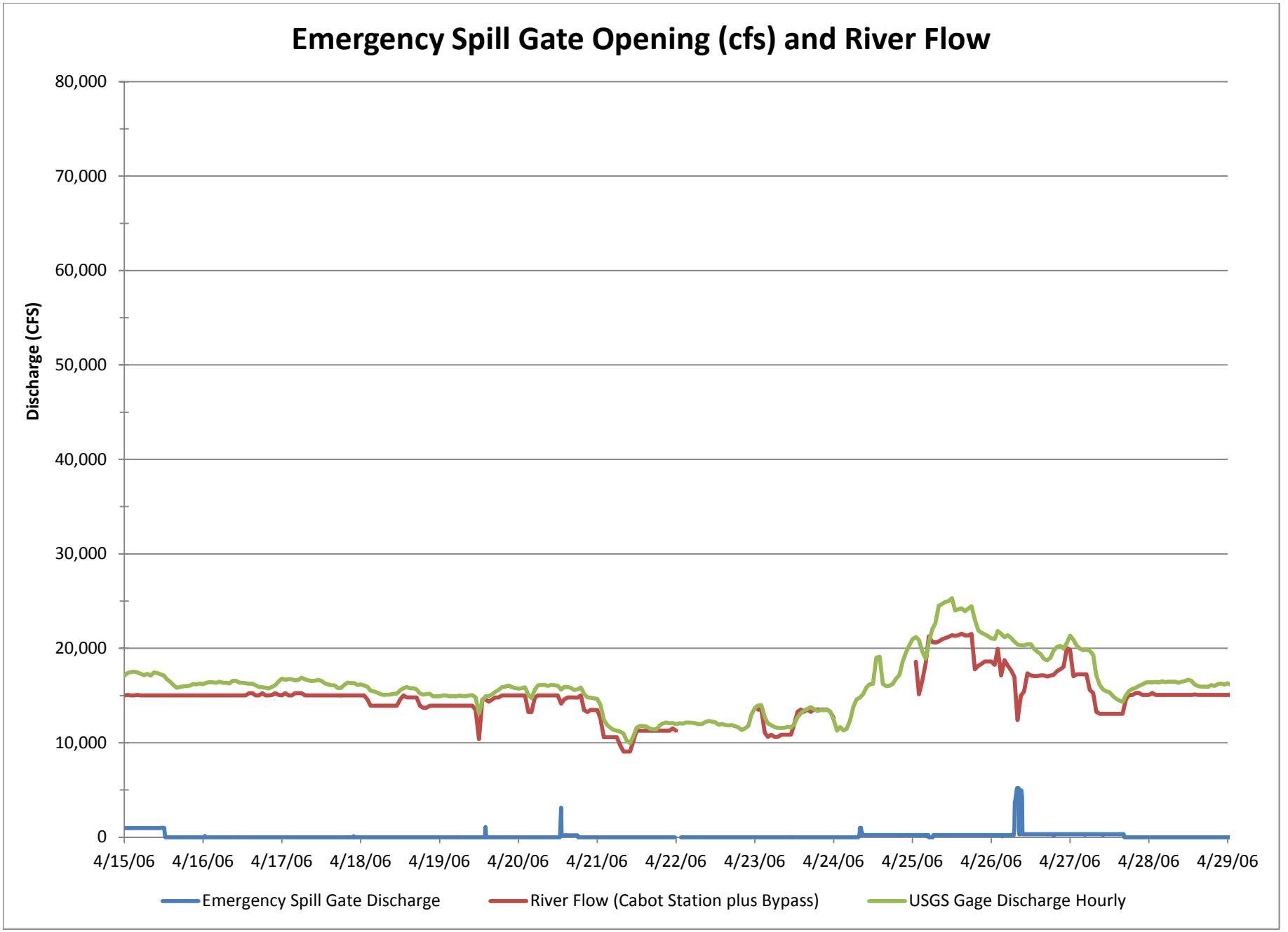

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/15/05
4/16/05
4/17/05
4/18/05
4/19/05
4/20/05
4/21/05
4/22/05
4/23/05
4/24/05
4/25/05
4/26/05
4/27/05
4/28/05
4/29/05
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge Hourly

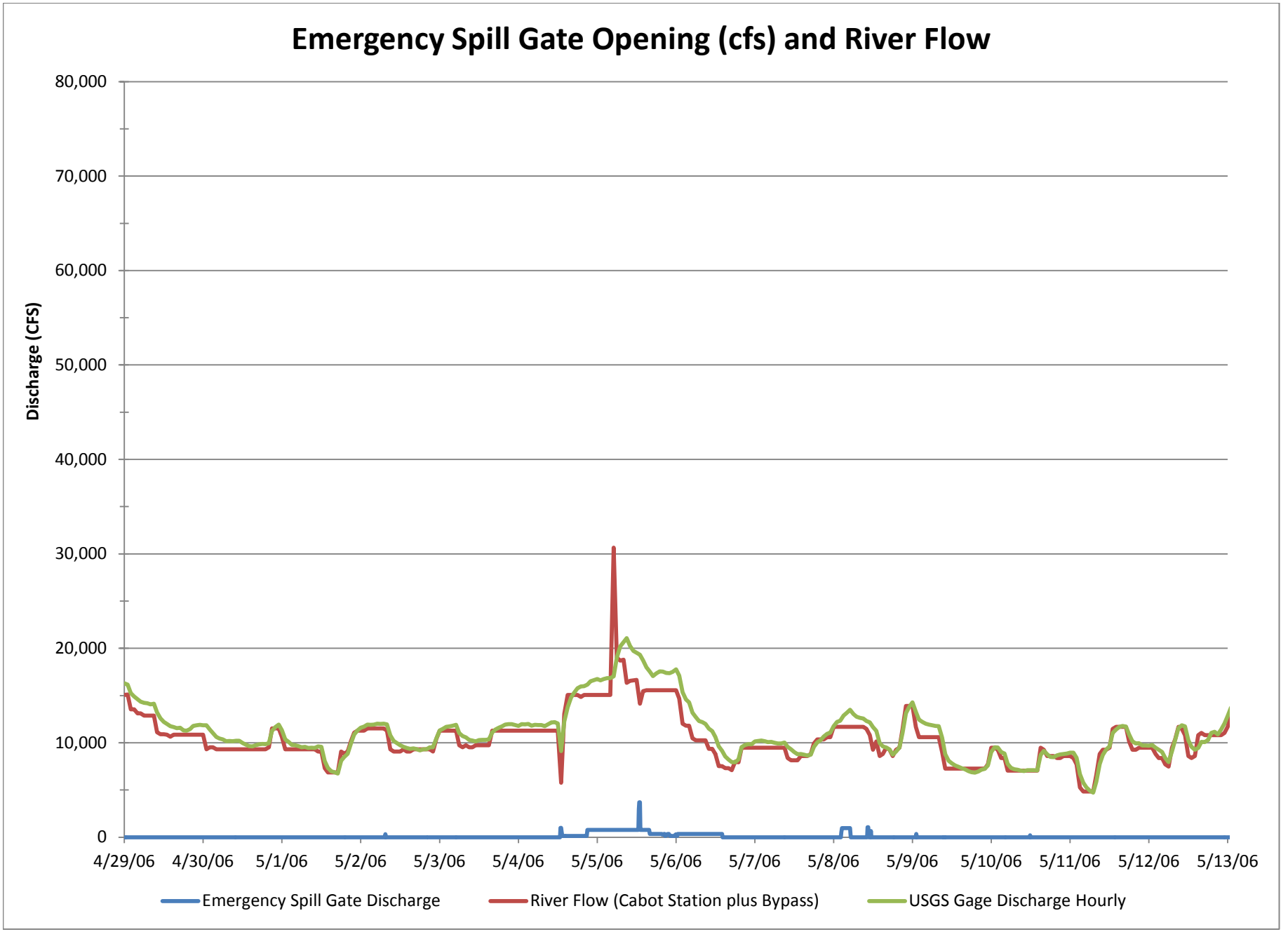

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/29/05
4/30/05
5/1/05
5/2/05
5/3/05
5/4/05
5/5/05
5/6/05
5/7/05
5/8/05
5/9/05
5/10/05
5/11/05
5/12/05
5/13/05
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge Hourly

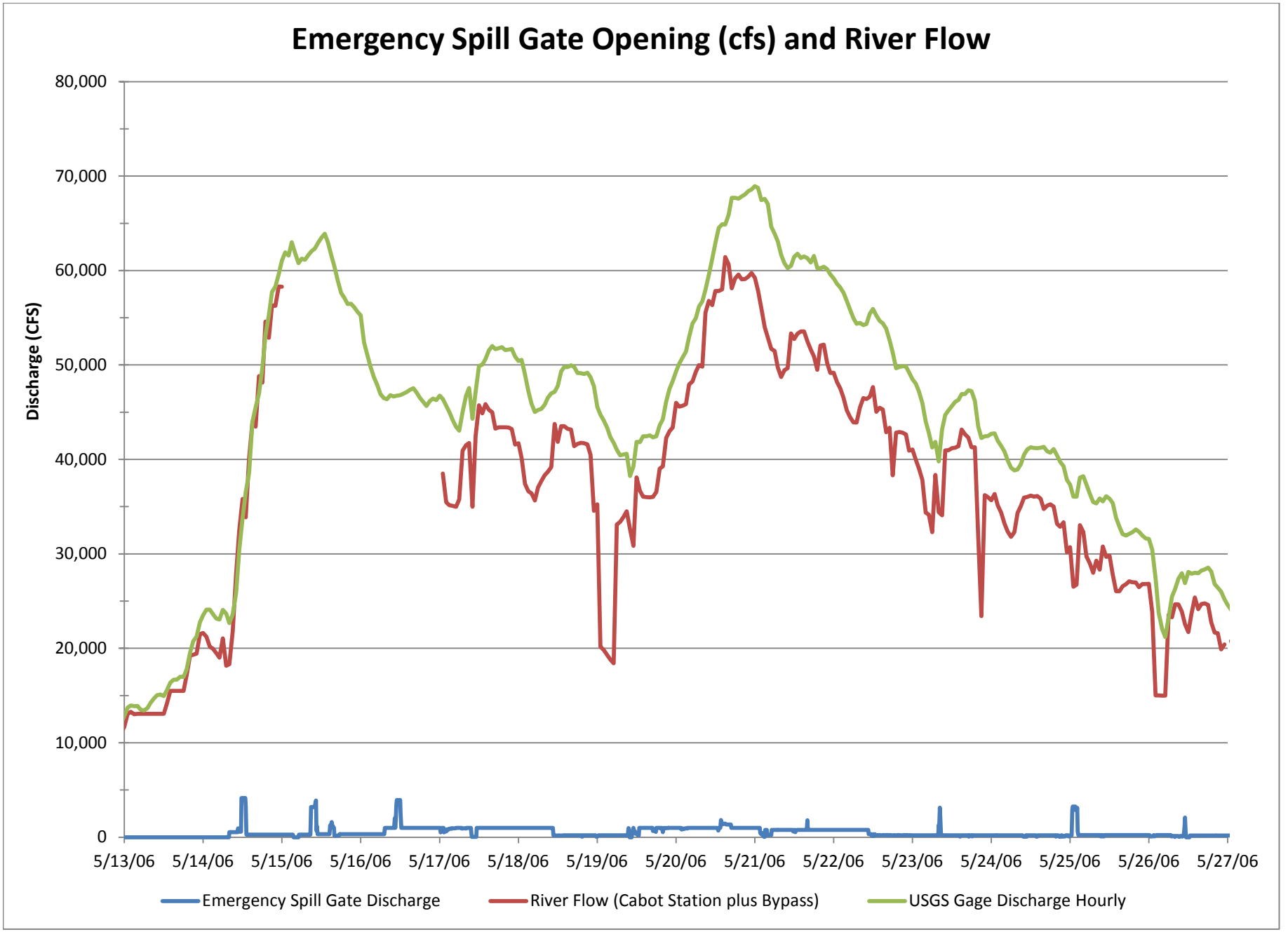

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/13/05
5/14/05
5/15/05
5/16/05
5/17/05
5/18/05
5/19/05
5/20/05
5/21/05
5/22/05
5/23/05
5/24/05
5/25/05
5/26/05
5/27/05
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge Hourly

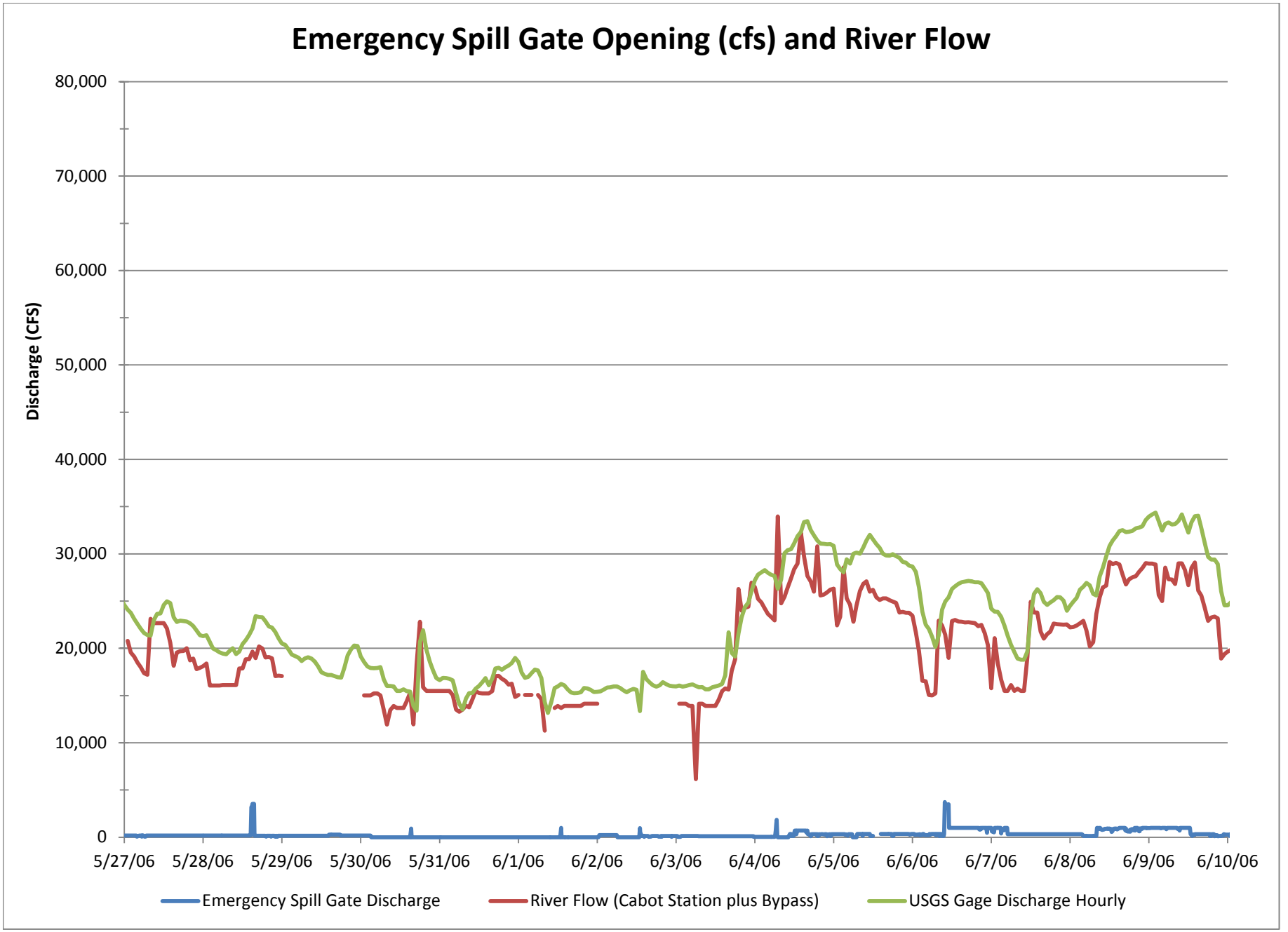

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/27/05
5/28/05
5/29/05
5/30/05
5/31/05
6/1/05
6/2/05
6/3/05
6/4/05
6/5/05
6/6/05
6/7/05
6/8/05
6/9/05
6/10/05
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge Hourly

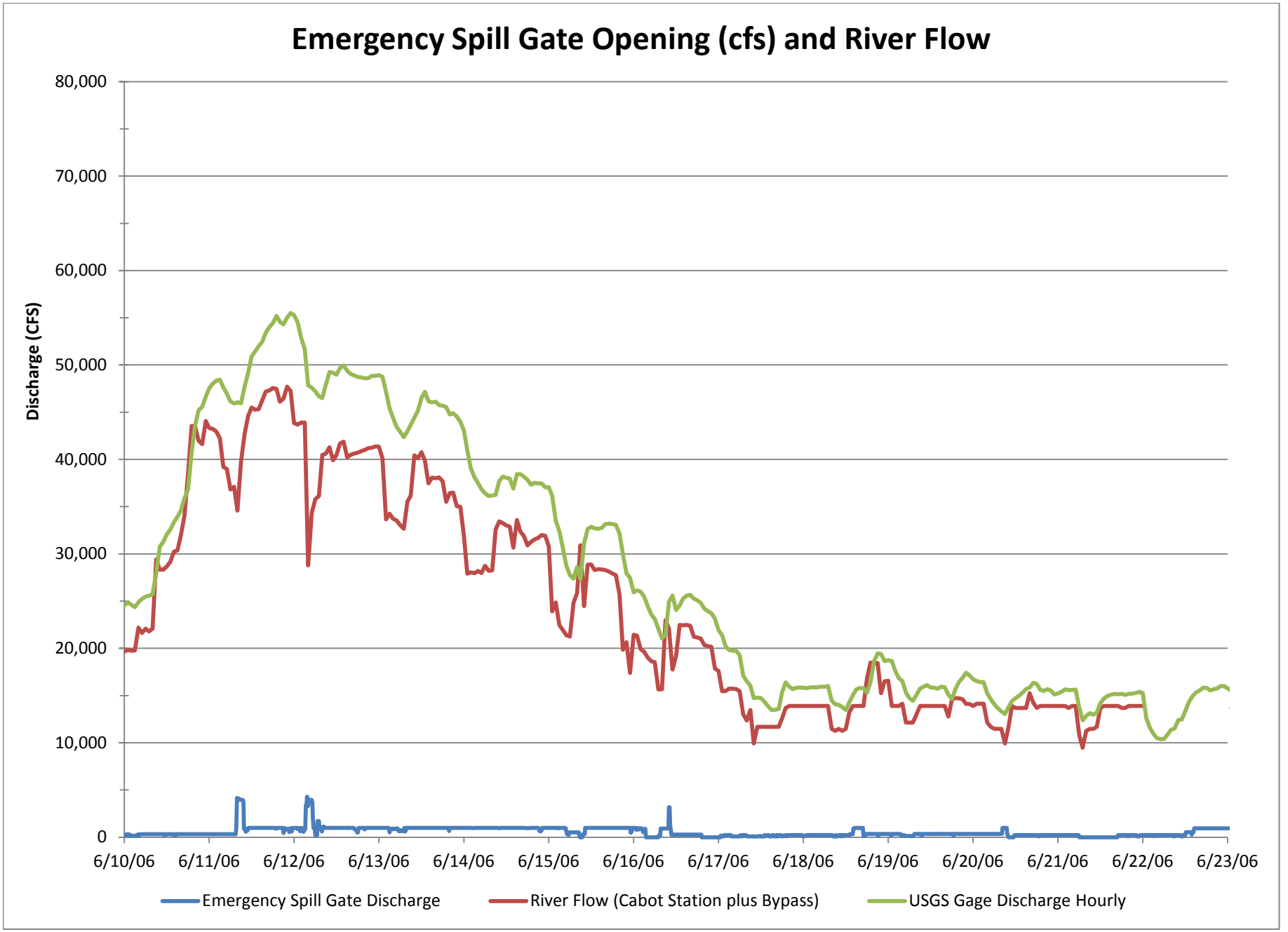

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
6/10/05
6/11/05
6/12/05
6/13/05
6/14/05
6/15/05
6/16/05
6/17/05
6/18/05
6/19/05
6/20/05
6/21/05
6/22/05
6/23/05
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge Hourly

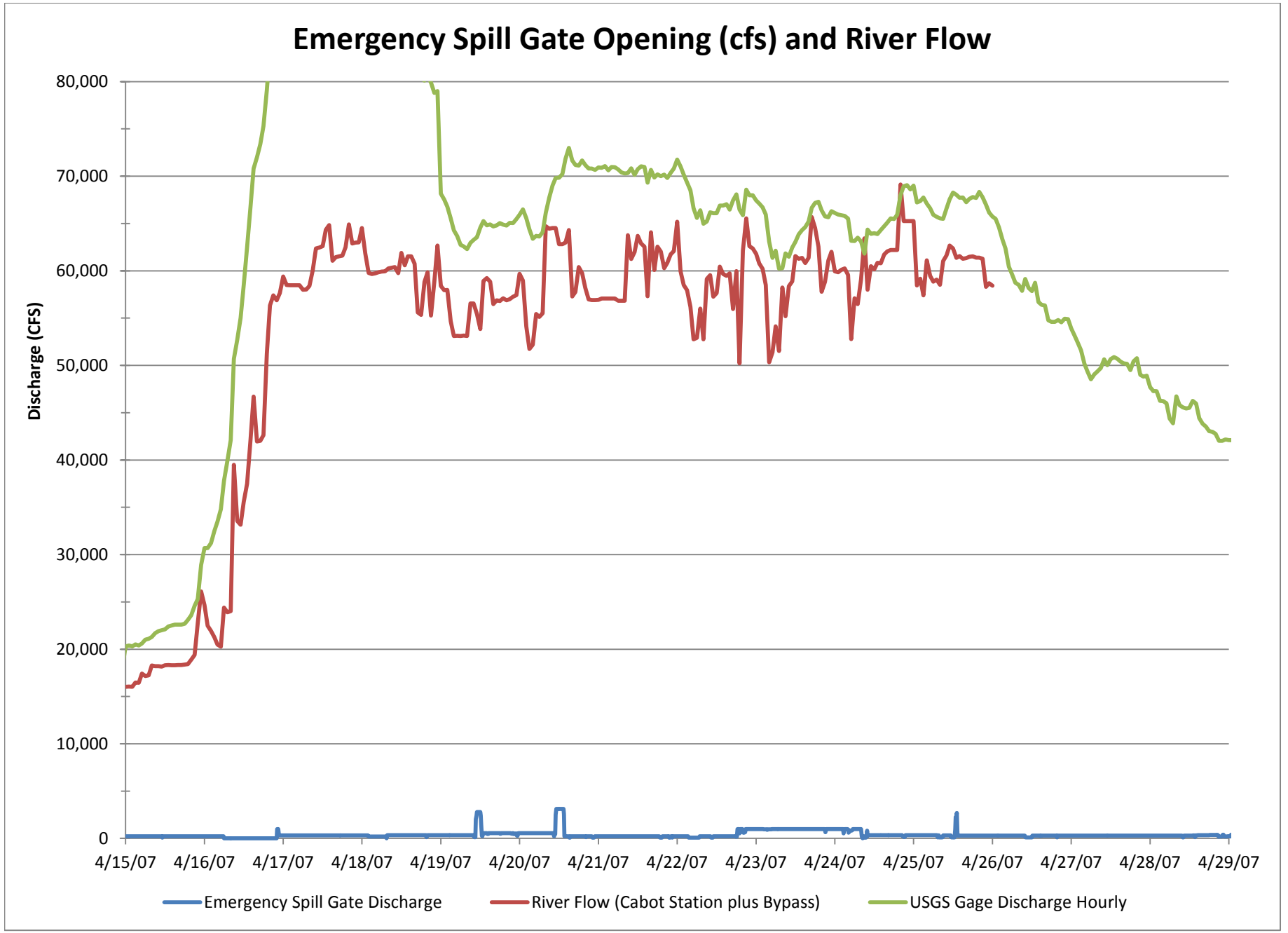

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/15/06
4/16/06
4/17/06
4/18/06
4/19/06
4/20/06
4/21/06
4/22/06
4/23/06
4/24/06
4/25/06
4/26/06
4/27/06
4/28/06
4/29/06
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge Hourly

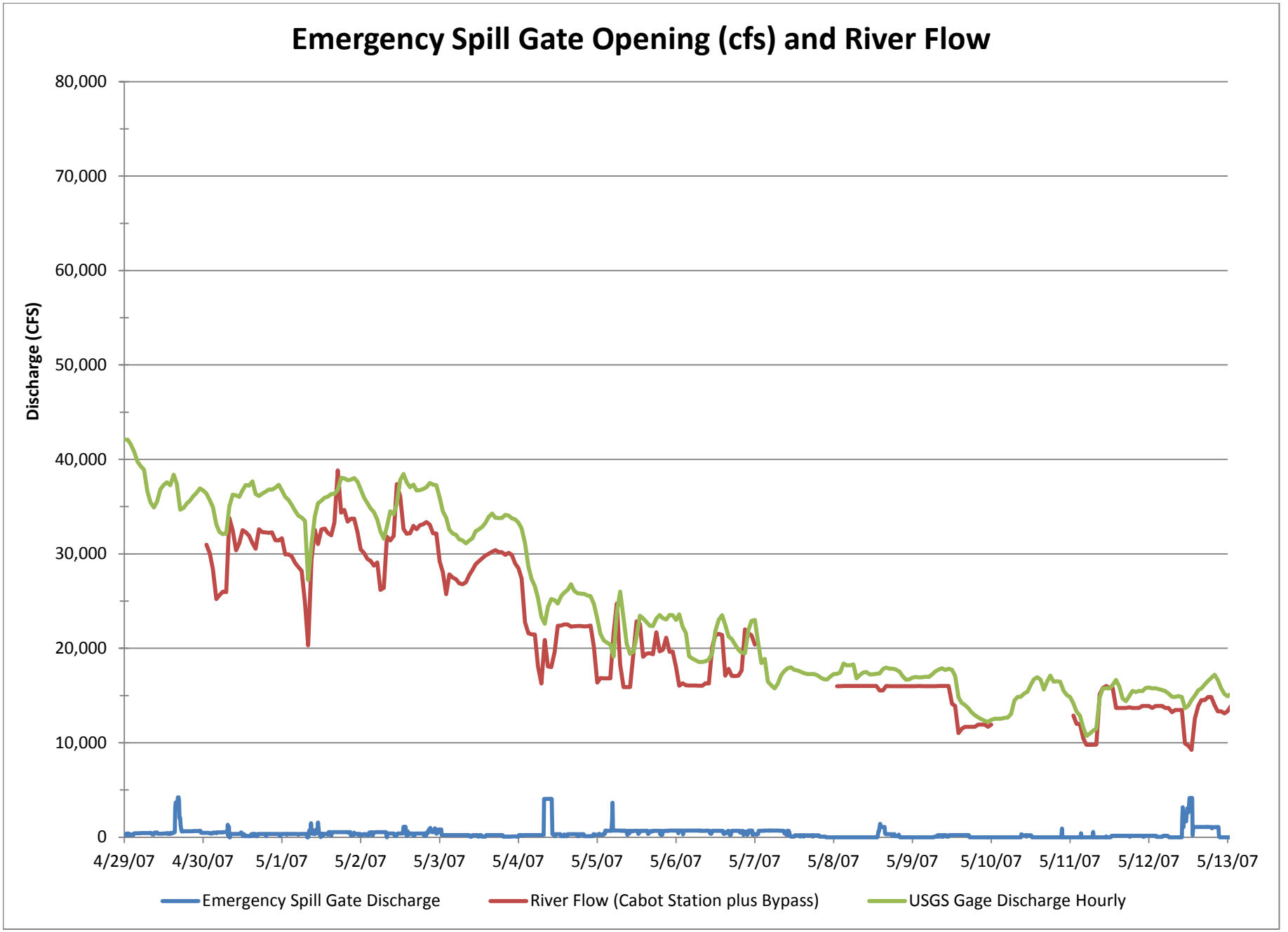

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/29/06
4/30/06
5/1/06
5/2/06
5/3/06
5/4/06
5/5/06
5/6/06
5/7/06
5/8/06
5/9/06
5/10/06
5/11/06
5/12/06
5/13/06
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge Hourly

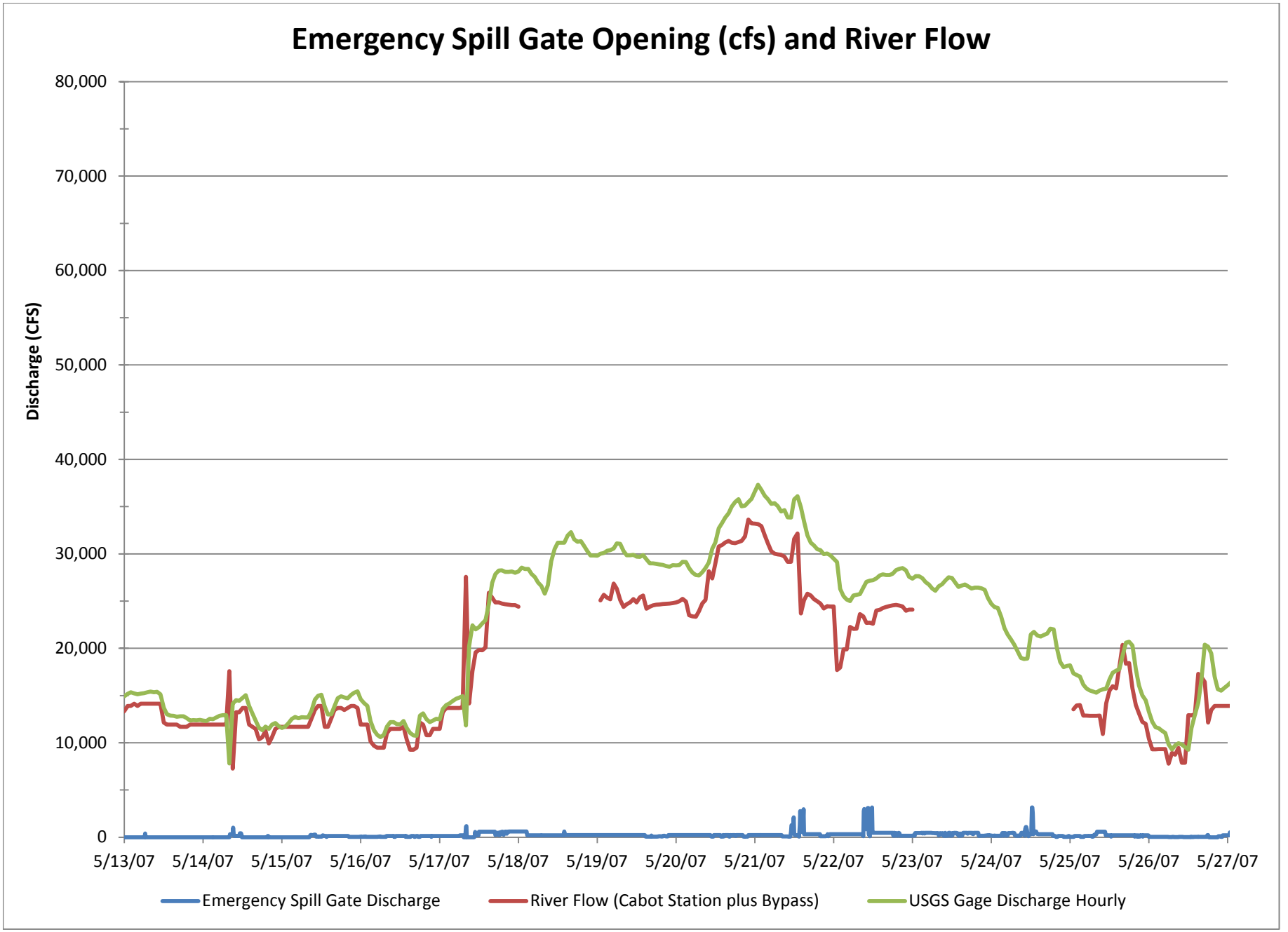

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/13/06
5/14/06
5/15/06
5/16/06
5/17/06
5/18/06
5/19/06
5/20/06
5/21/06
5/22/06
5/23/06
5/24/06
5/25/06
5/26/06
5/27/06
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge Hourly

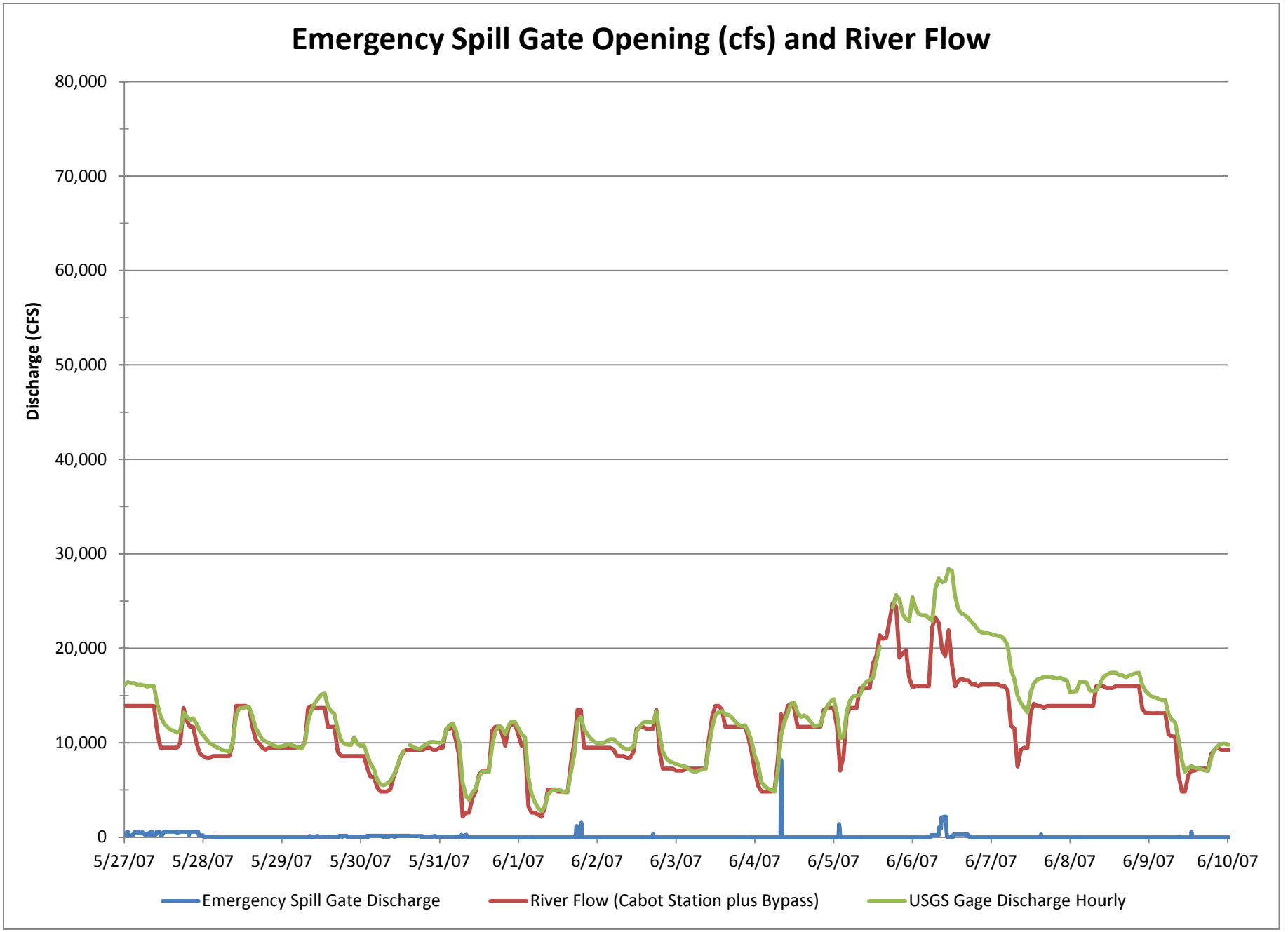

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/27/06
5/28/06
5/29/06
5/30/06
5/31/06
6/1/06
6/2/06
6/3/06
6/4/06
6/5/06
6/6/06
6/7/06
6/8/06
6/9/06
6/10/06
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge Hourly

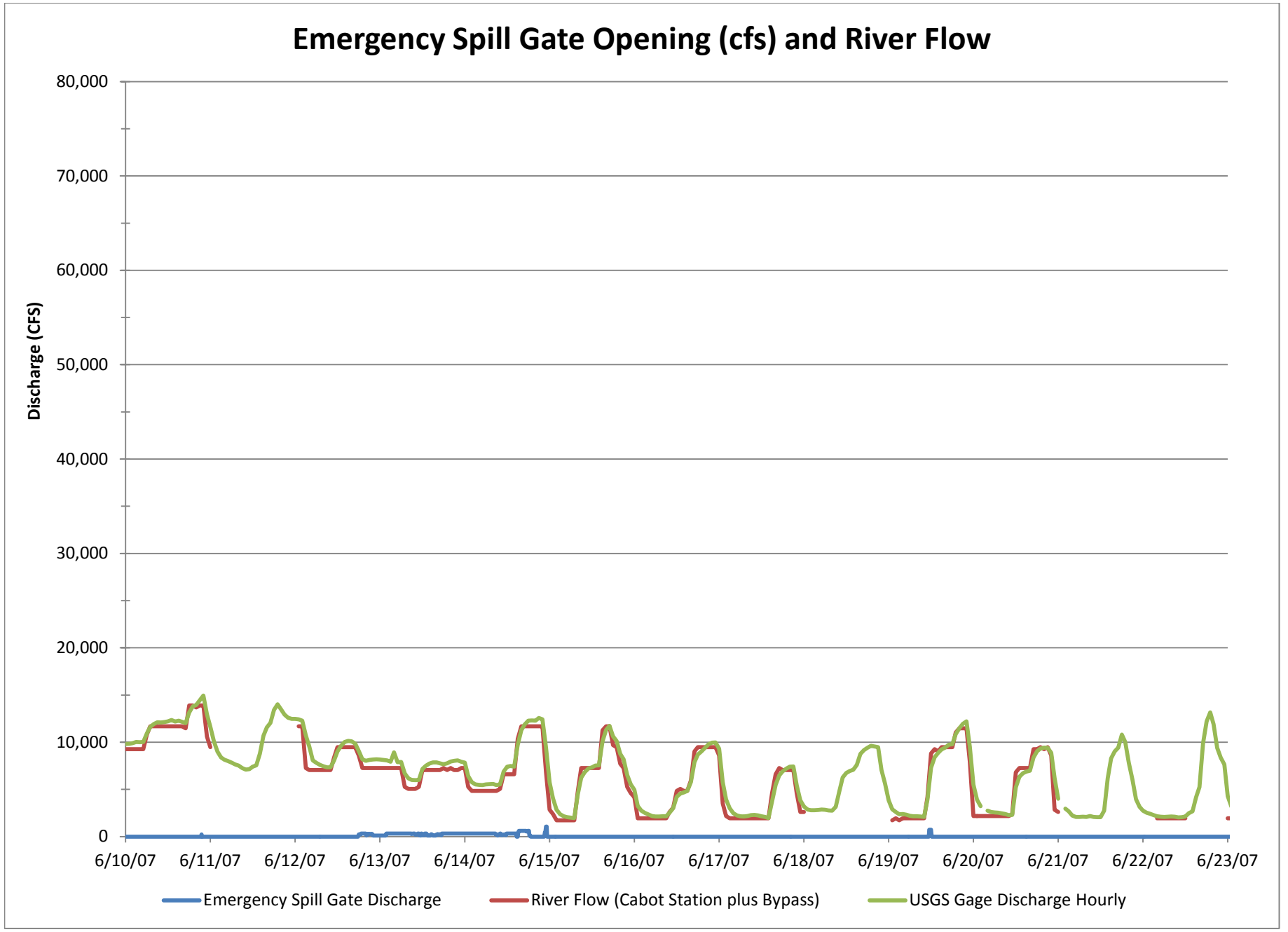

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
6/10/06
6/11/06
6/12/06
6/13/06
6/14/06
6/15/06
6/16/06
6/17/06
6/18/06
6/19/06
6/20/06
6/21/06
6/22/06
6/23/06
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge Hourly

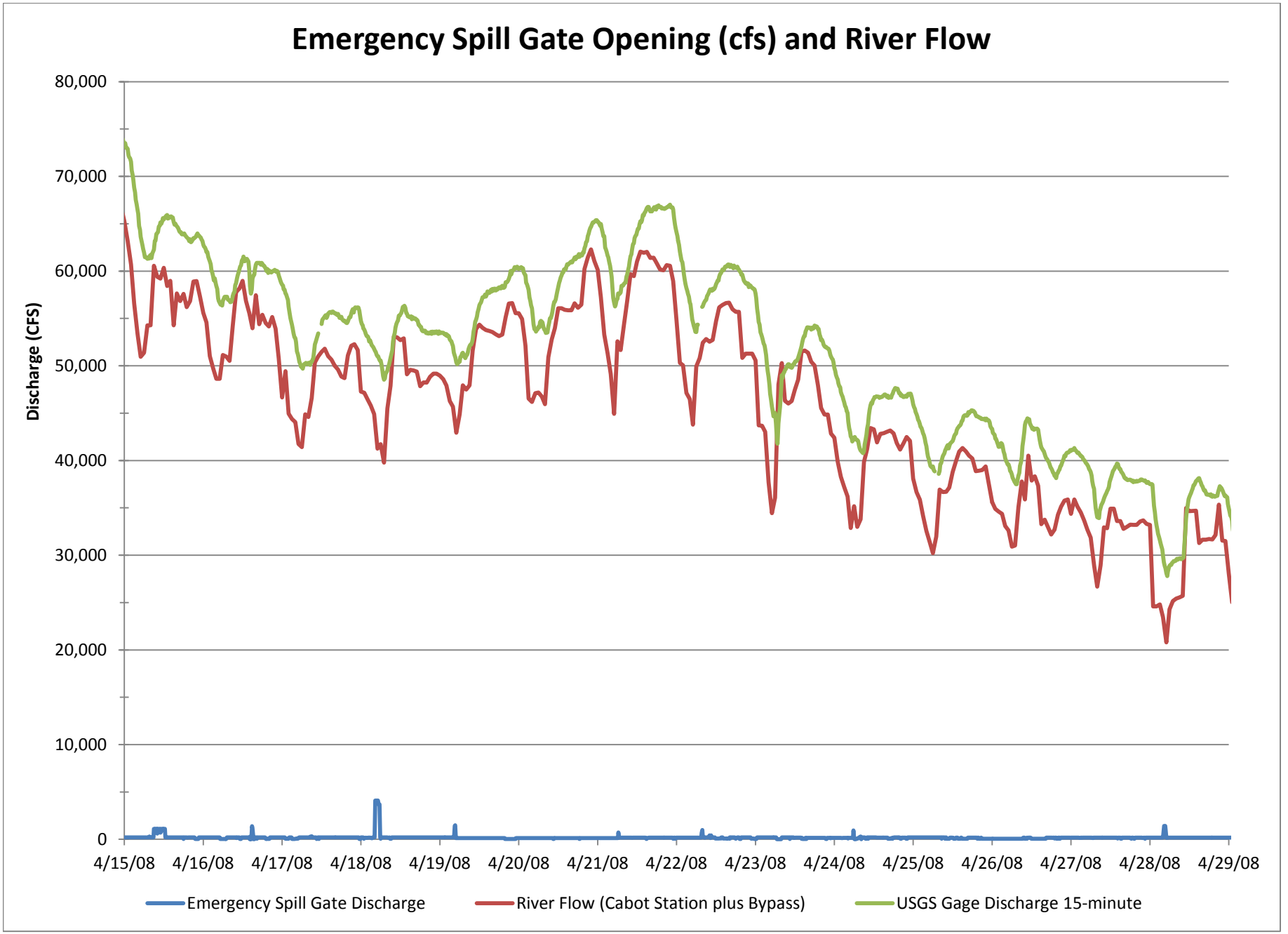

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/15/07
4/16/07
4/17/07
4/18/07
4/19/07
4/20/07
4/21/07
4/22/07
4/23/07
4/24/07
4/25/07
4/26/07
4/27/07
4/28/07
4/29/07
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge Hourly

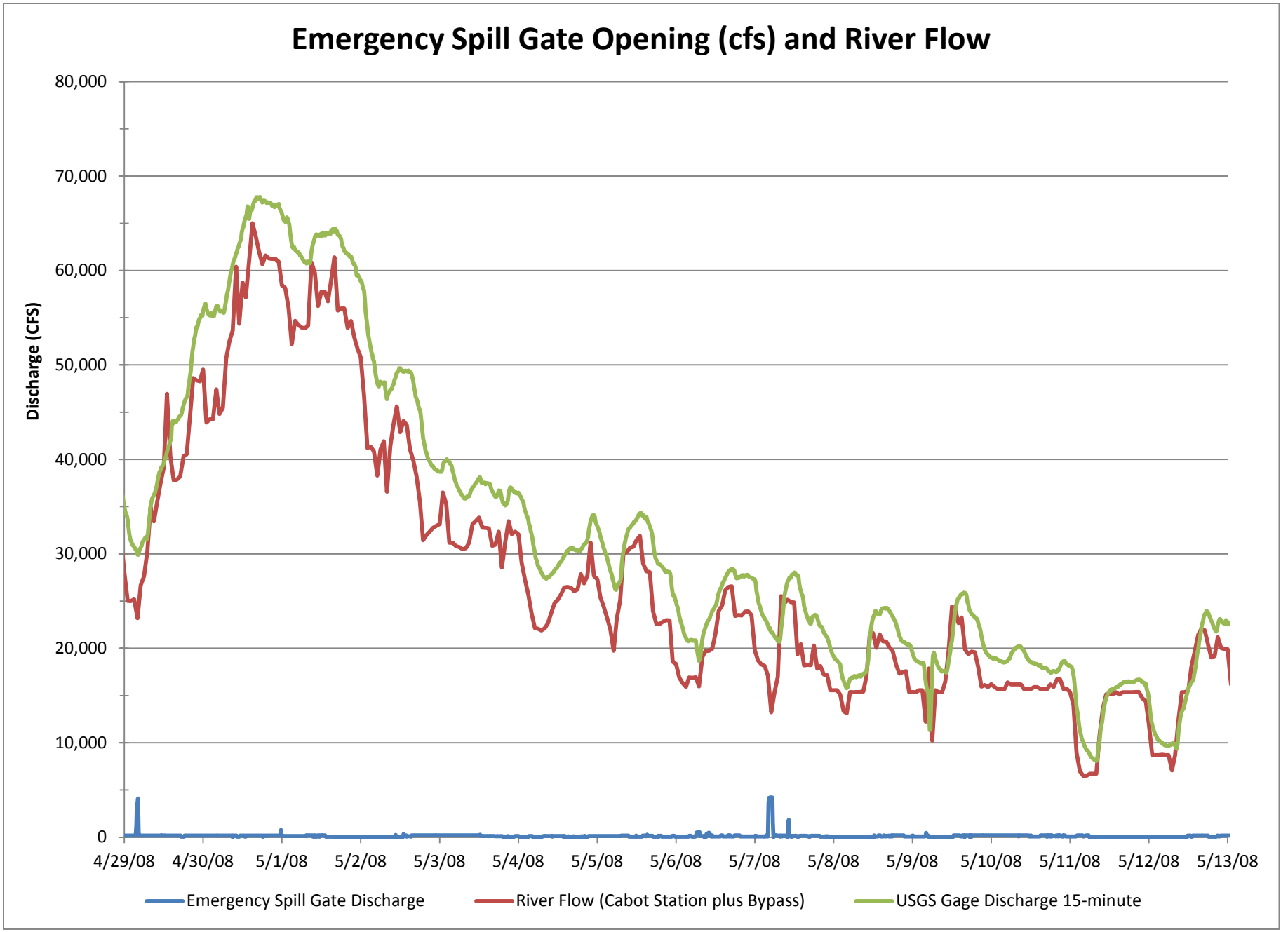

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/29/07
4/30/07
5/1/07
5/2/07
5/3/07
5/4/07
5/5/07
5/6/07
5/7/07
5/8/07
5/9/07
5/10/07
5/11/07
5/12/07
5/13/07
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge Hourly

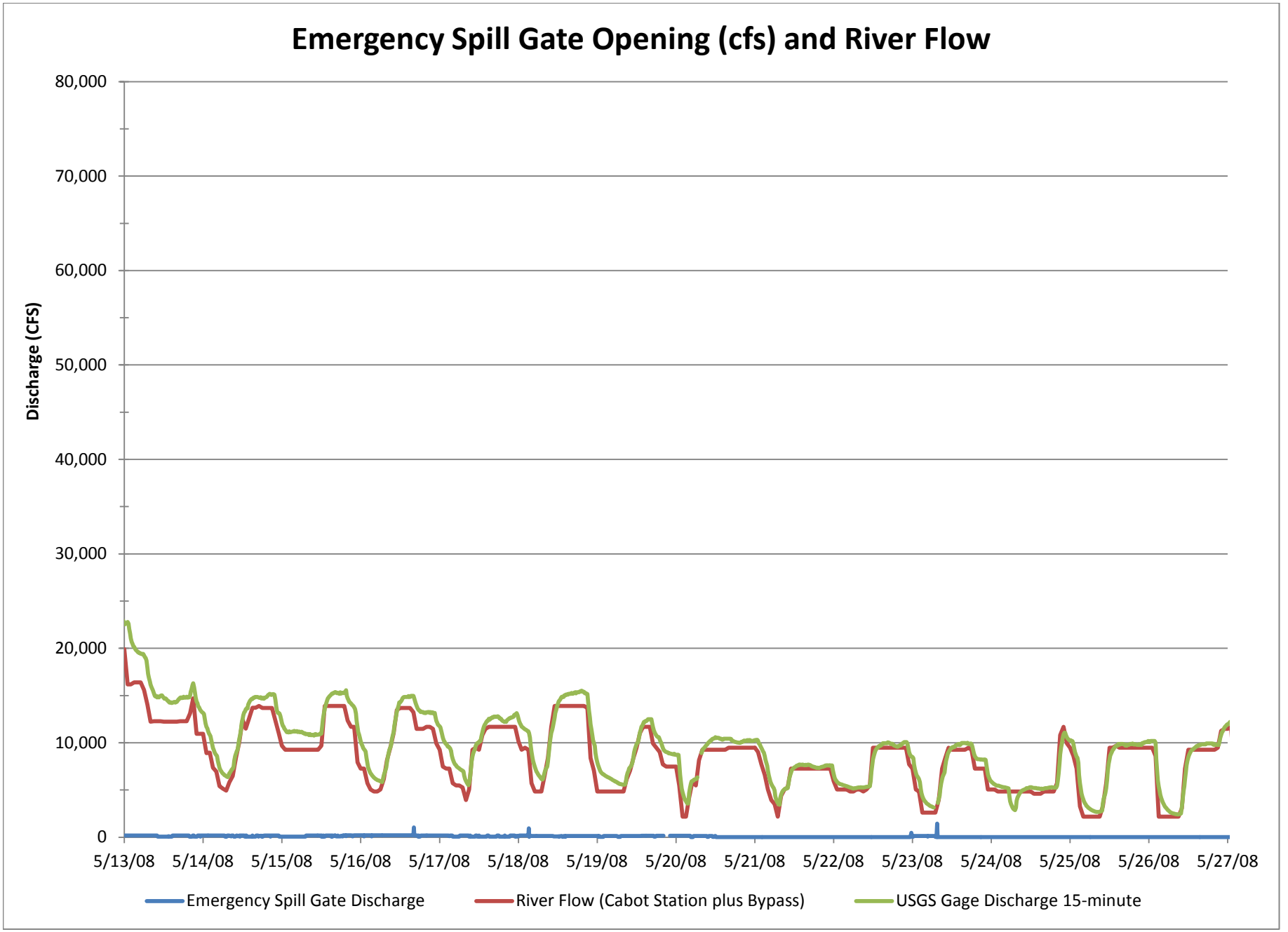

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/13/07
5/14/07
5/15/07
5/16/07
5/17/07
5/18/07
5/19/07
5/20/07
5/21/07
5/22/07
5/23/07
5/24/07
5/25/07
5/26/07
5/27/07
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge Hourly

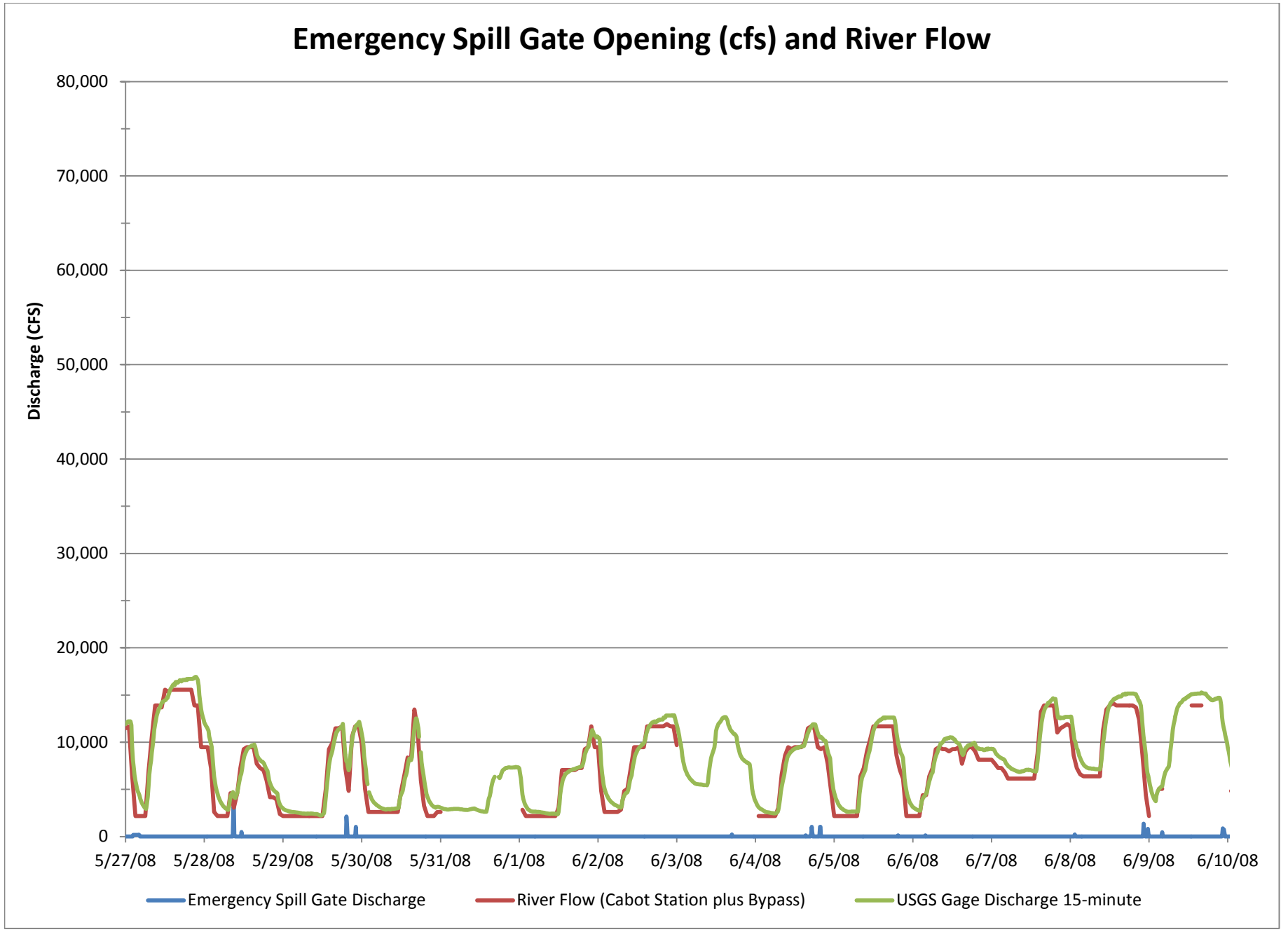

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/27/07
5/28/07
5/29/07
5/30/07
5/31/07
6/1/07
6/2/07
6/3/07
6/4/07
6/5/07
6/6/07
6/7/07
6/8/07
6/9/07
6/10/07
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge Hourly

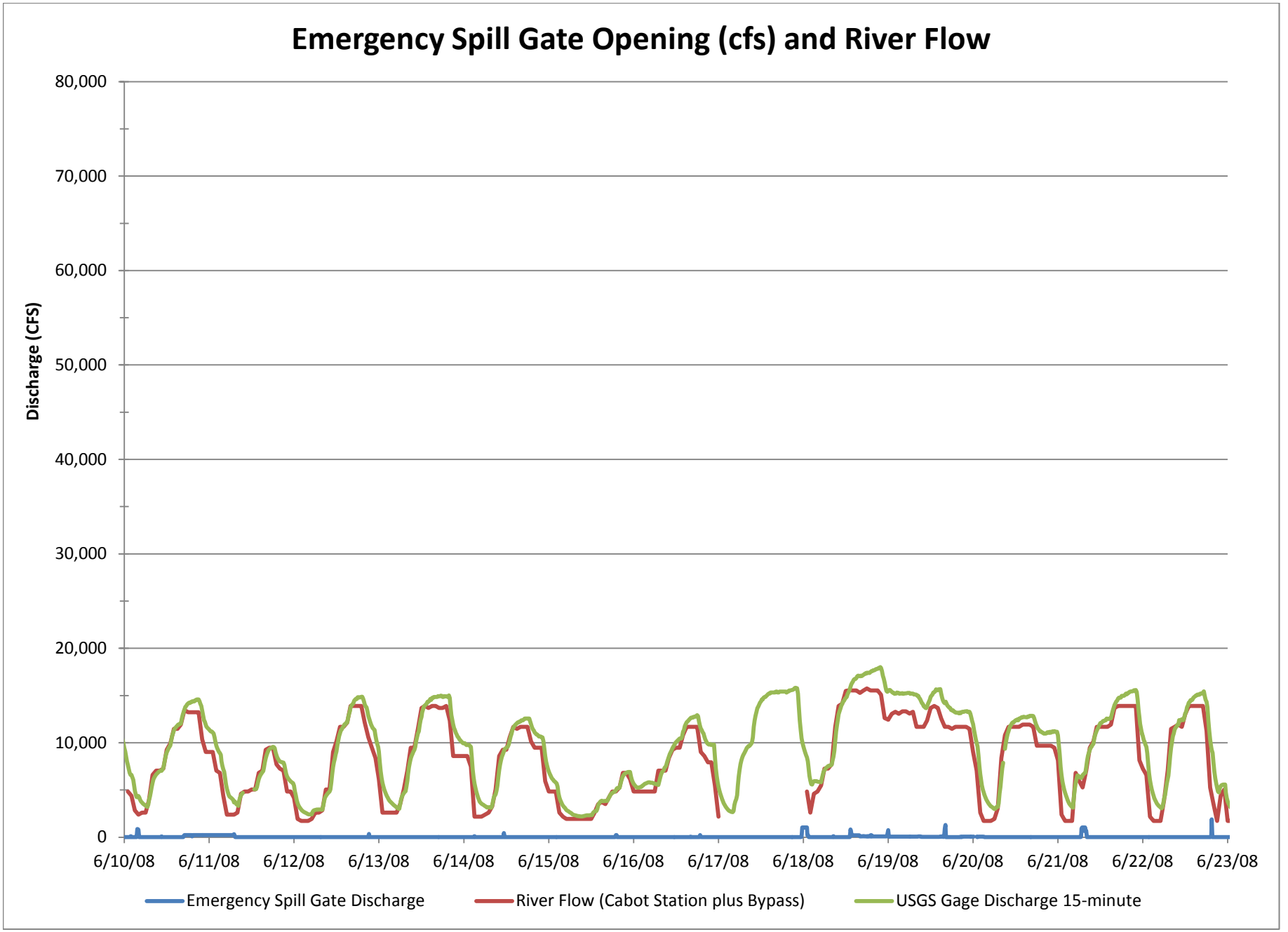

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
6/10/07
6/11/07
6/12/07
6/13/07
6/14/07
6/15/07
6/16/07
6/17/07
6/18/07
6/19/07
6/20/07
6/21/07
6/22/07
6/23/07
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge Hourly

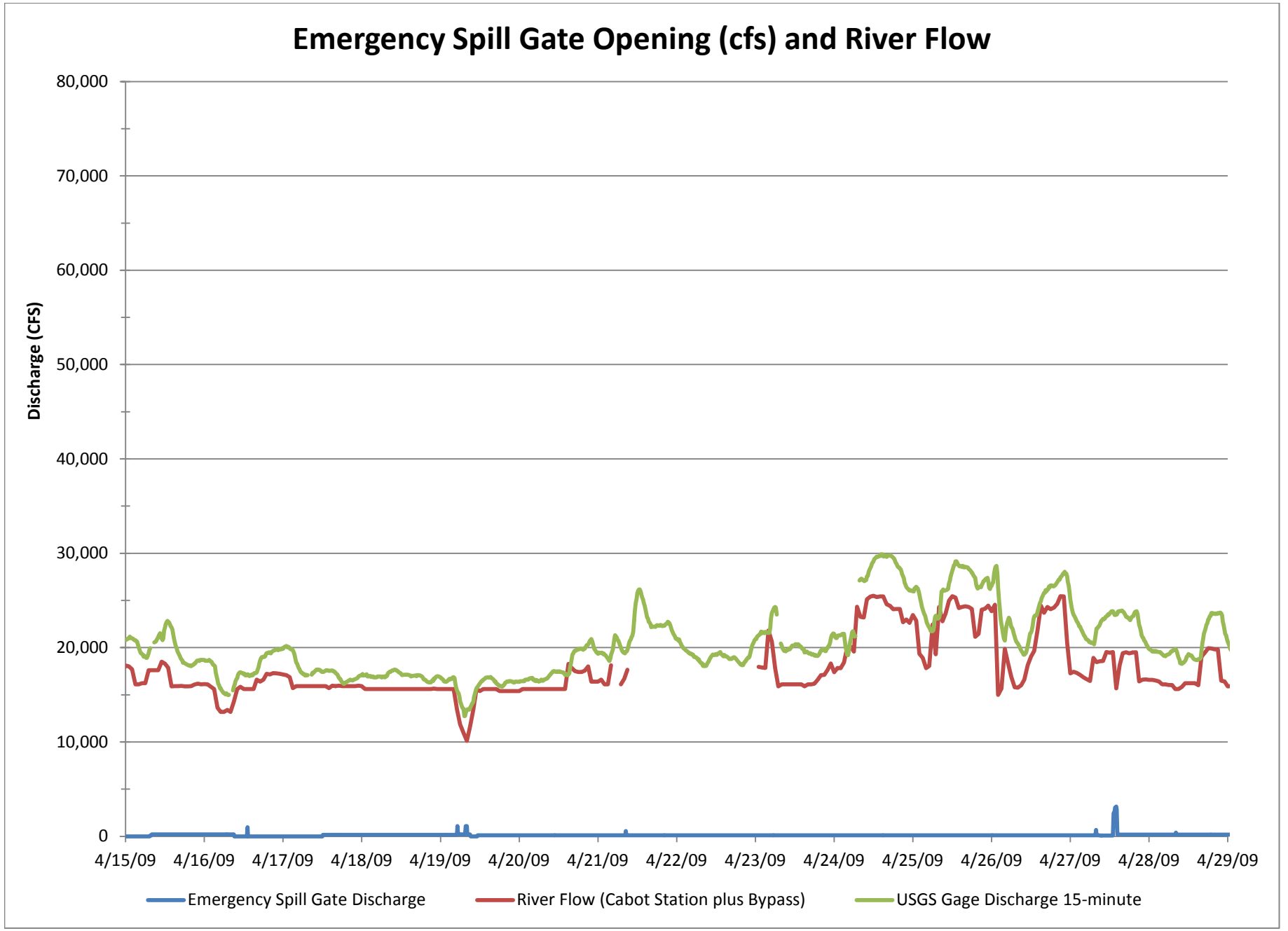

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/15/08
4/16/08
4/17/08
4/18/08
4/19/08
4/20/08
4/21/08
4/22/08
4/23/08
4/24/08
4/25/08
4/26/08
4/27/08
4/28/08
4/29/08
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

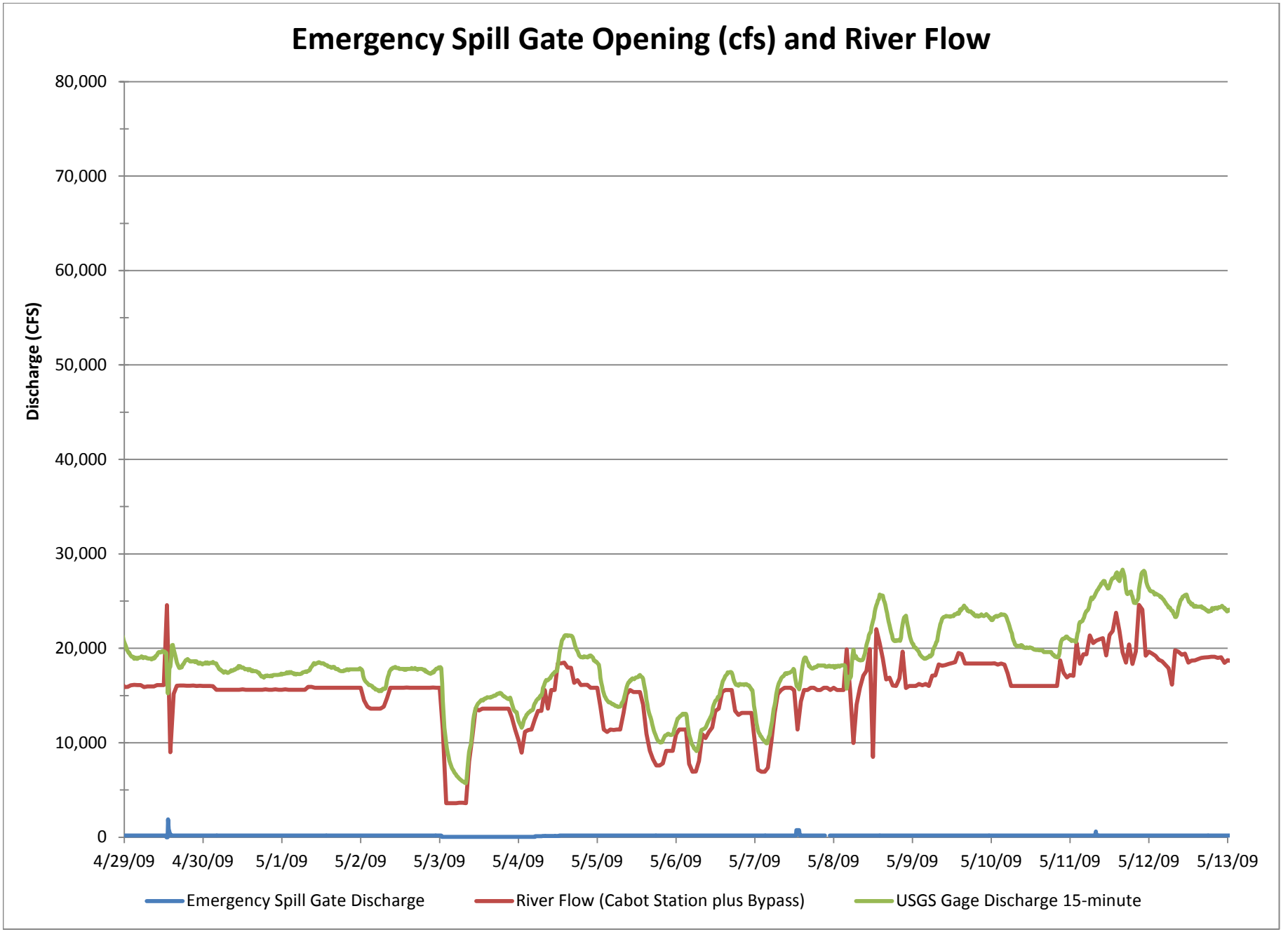

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/29/08
4/30/08
5/1/08
5/2/08
5/3/08
5/4/08
5/5/08
5/6/08
5/7/08
5/8/08
5/9/08
5/10/08
5/11/08
5/12/08
5/13/08
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

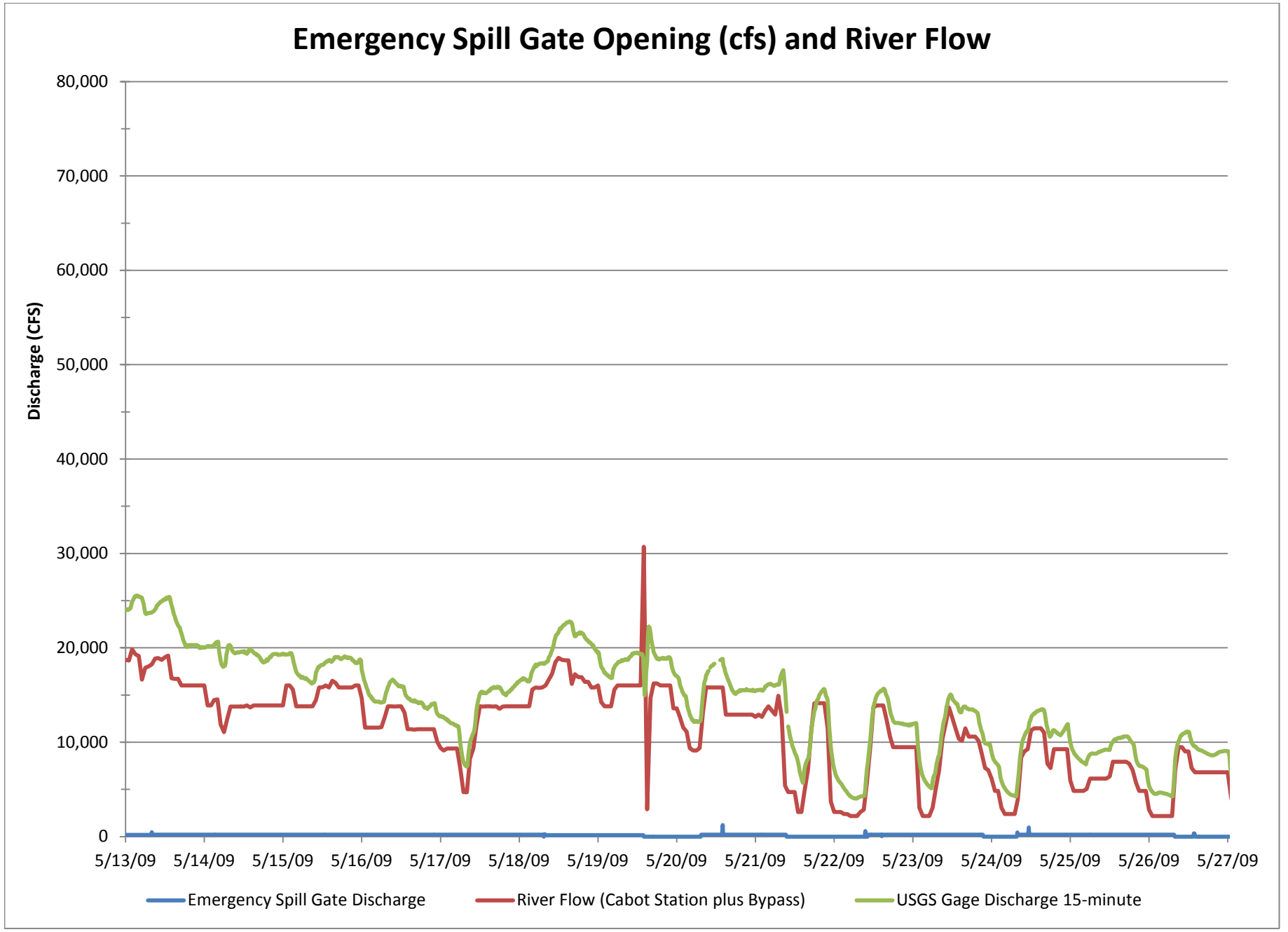

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/13/08
5/14/08
5/15/08
5/16/08
5/17/08
5/18/08
5/19/08
5/20/08
5/21/08
5/22/08
5/23/08
5/24/08
5/25/08
5/26/08
5/27/08
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

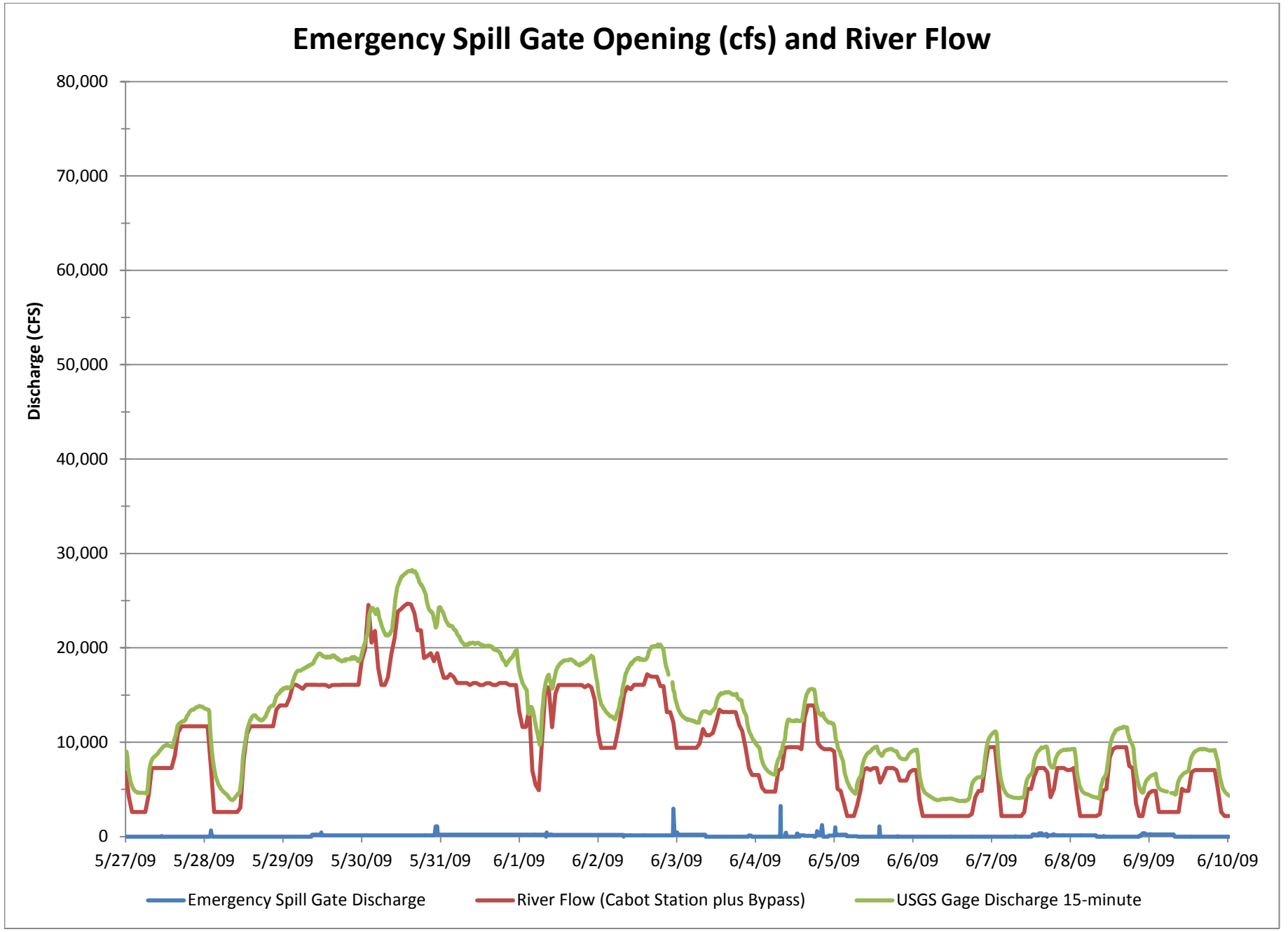

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/27/08
5/28/08
5/29/08
5/30/08
5/31/08
6/1/08
6/2/08
6/3/08
6/4/08
6/5/08
6/6/08
6/7/08
6/8/08
6/9/08
6/10/08
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

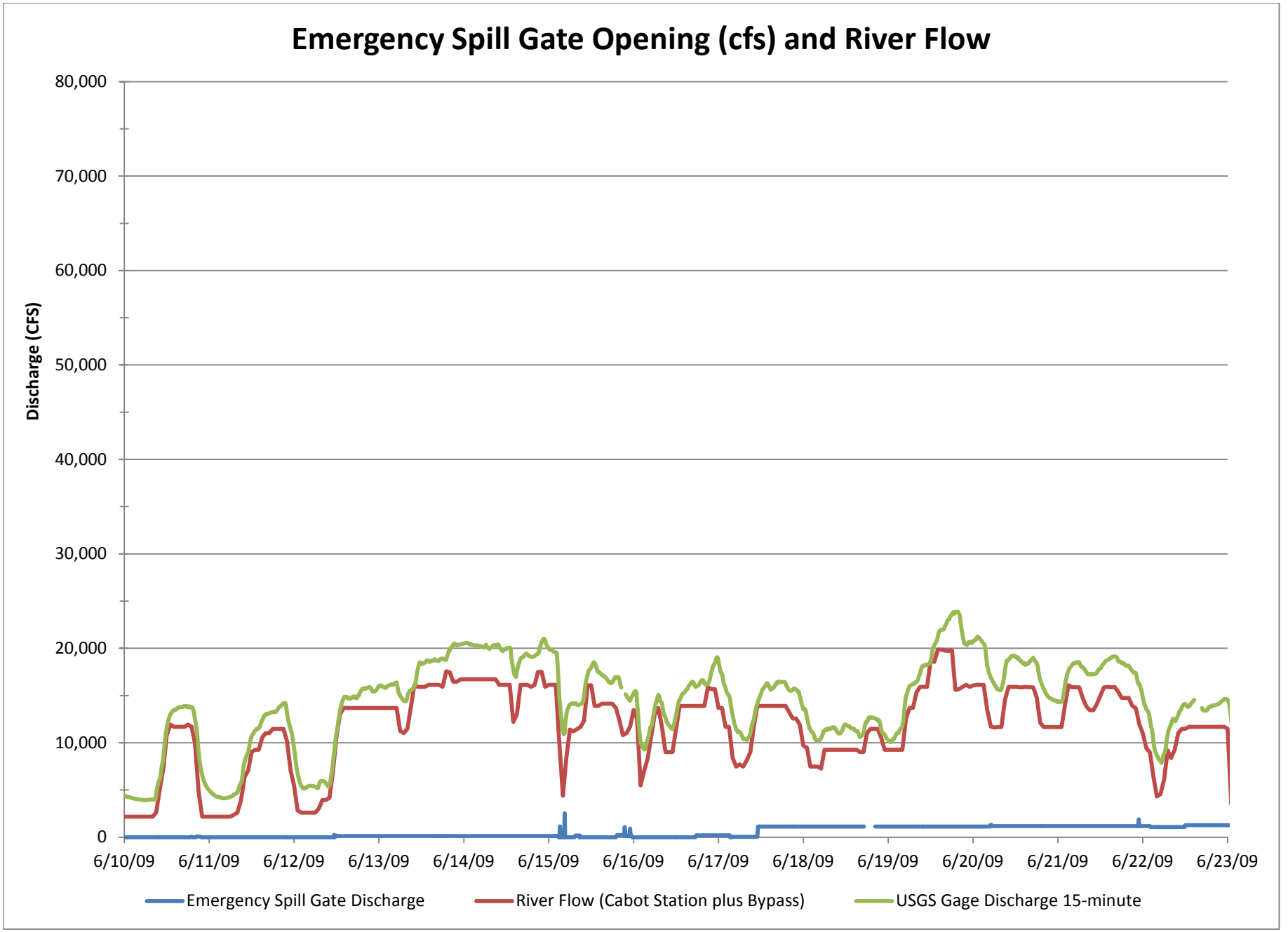

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
6/10/08
6/11/08
6/12/08
6/13/08
6/14/08
6/15/08
6/16/08
6/17/08
6/18/08
6/19/08
6/20/08
6/21/08
6/22/08
6/23/08
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

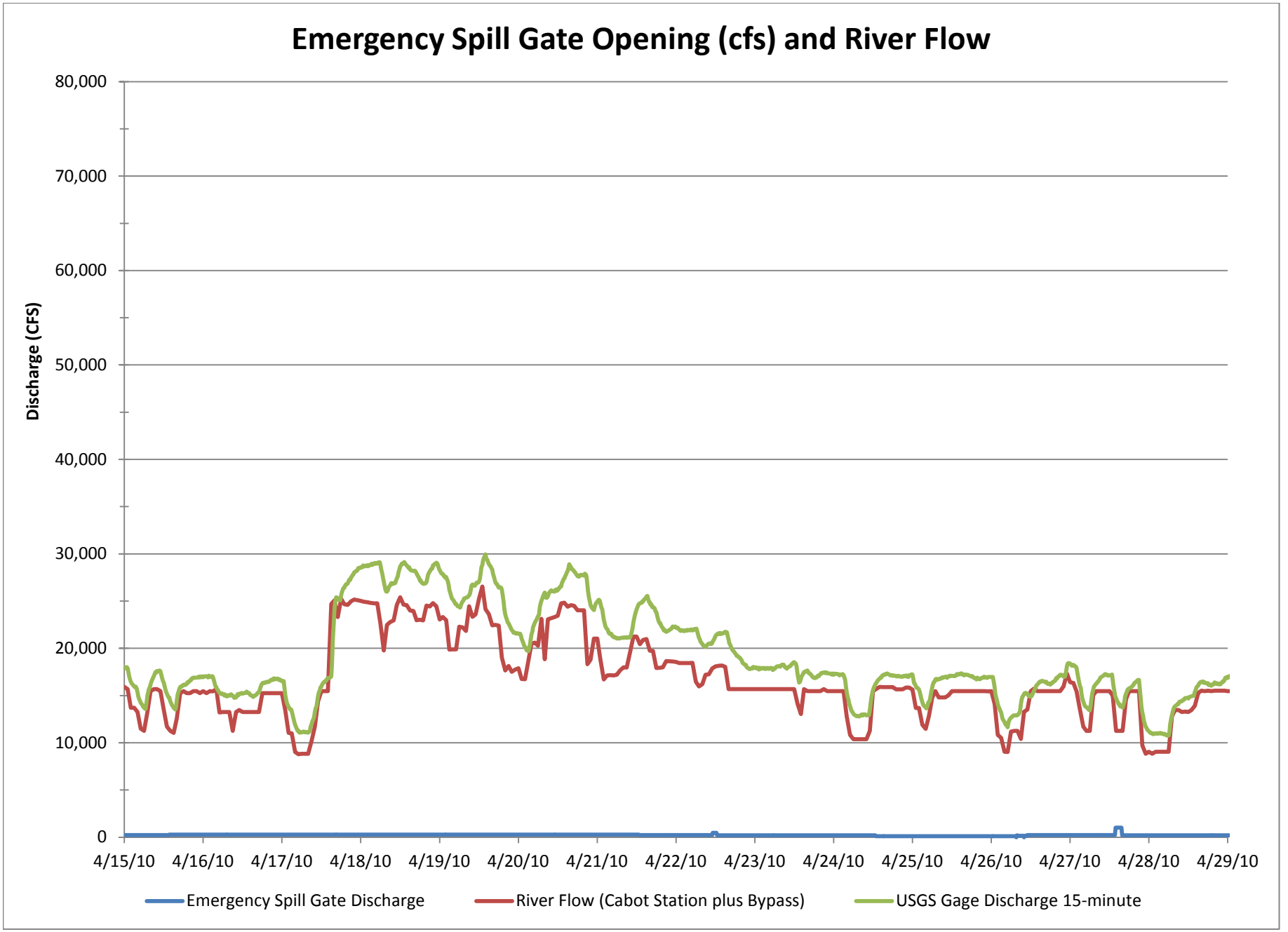

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/15/09
4/16/09
4/17/09
4/18/09
4/19/09
4/20/09
4/21/09
4/22/09
4/23/09
4/24/09
4/25/09
4/26/09
4/27/09
4/28/09
4/29/09
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

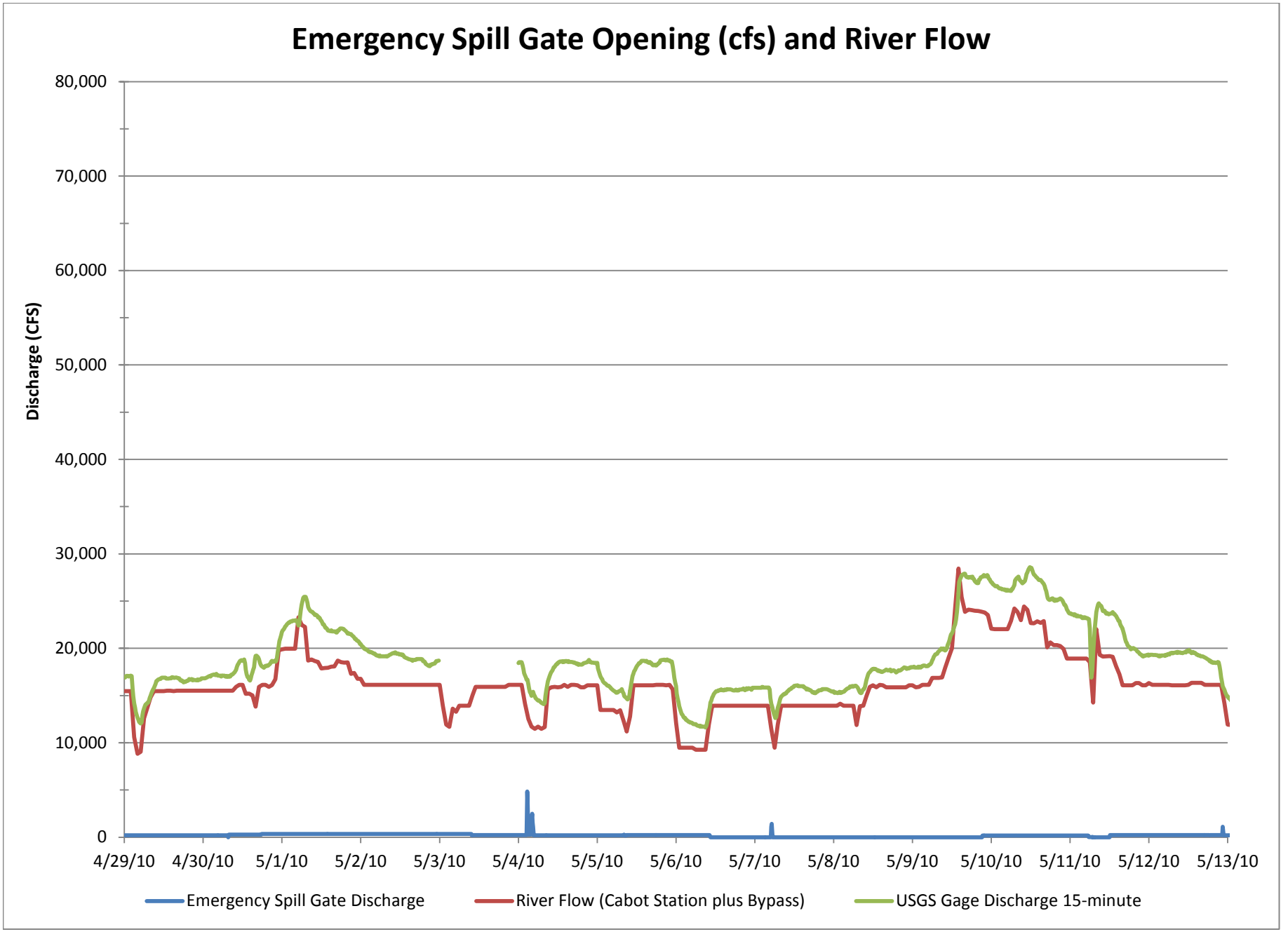

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/29/09
4/30/09
5/1/09
5/2/09
5/3/09
5/4/09
5/5/09
5/6/09
5/7/09
5/8/09
5/9/09
5/10/09
5/11/09
5/12/09
5/13/09
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

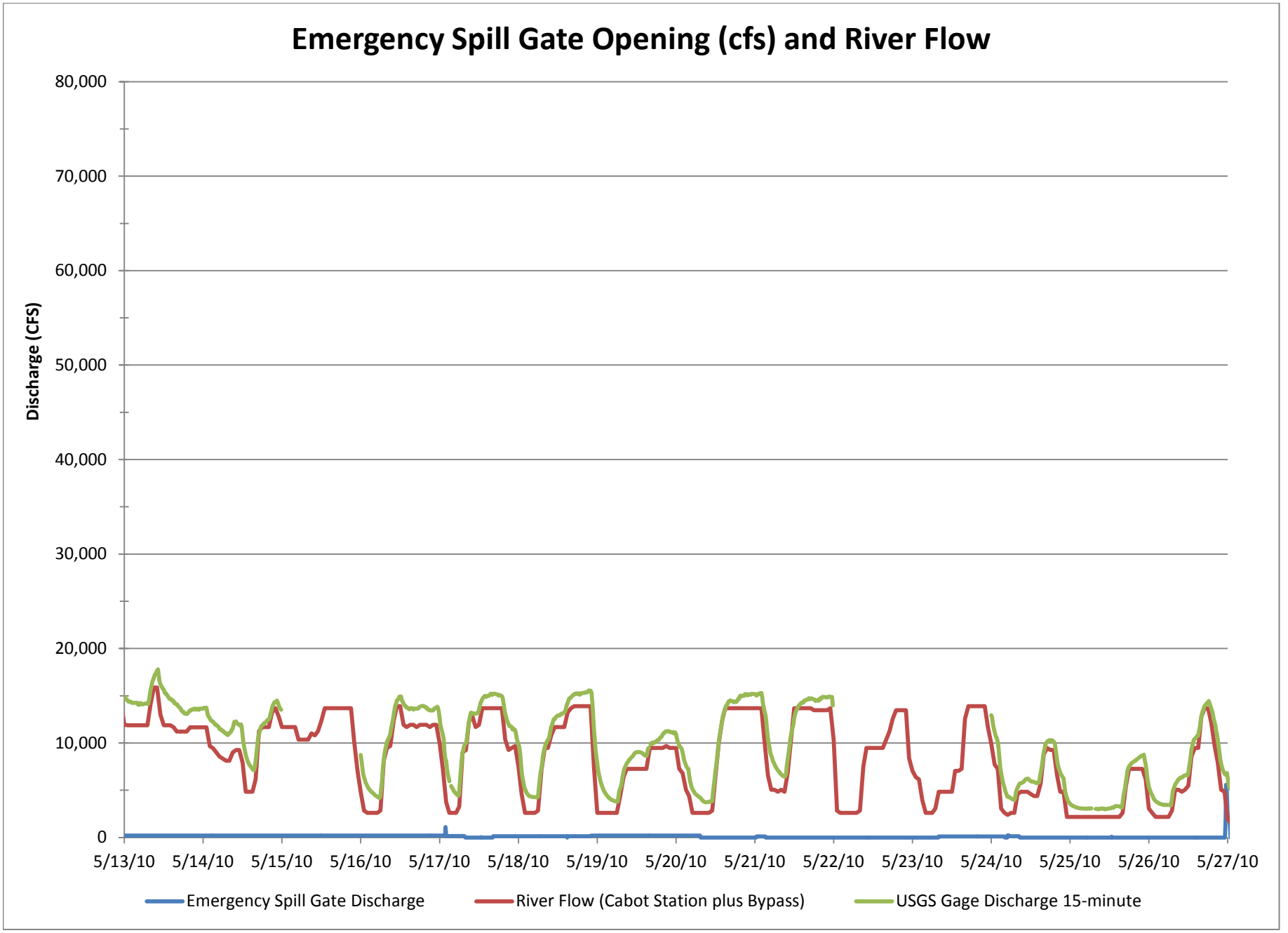

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/13/09
5/14/09
5/15/09
5/16/09
5/17/09
5/18/09
5/19/09
5/20/09
5/21/09
5/22/09
5/23/09
5/24/09
5/25/09
5/26/09
5/27/09
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

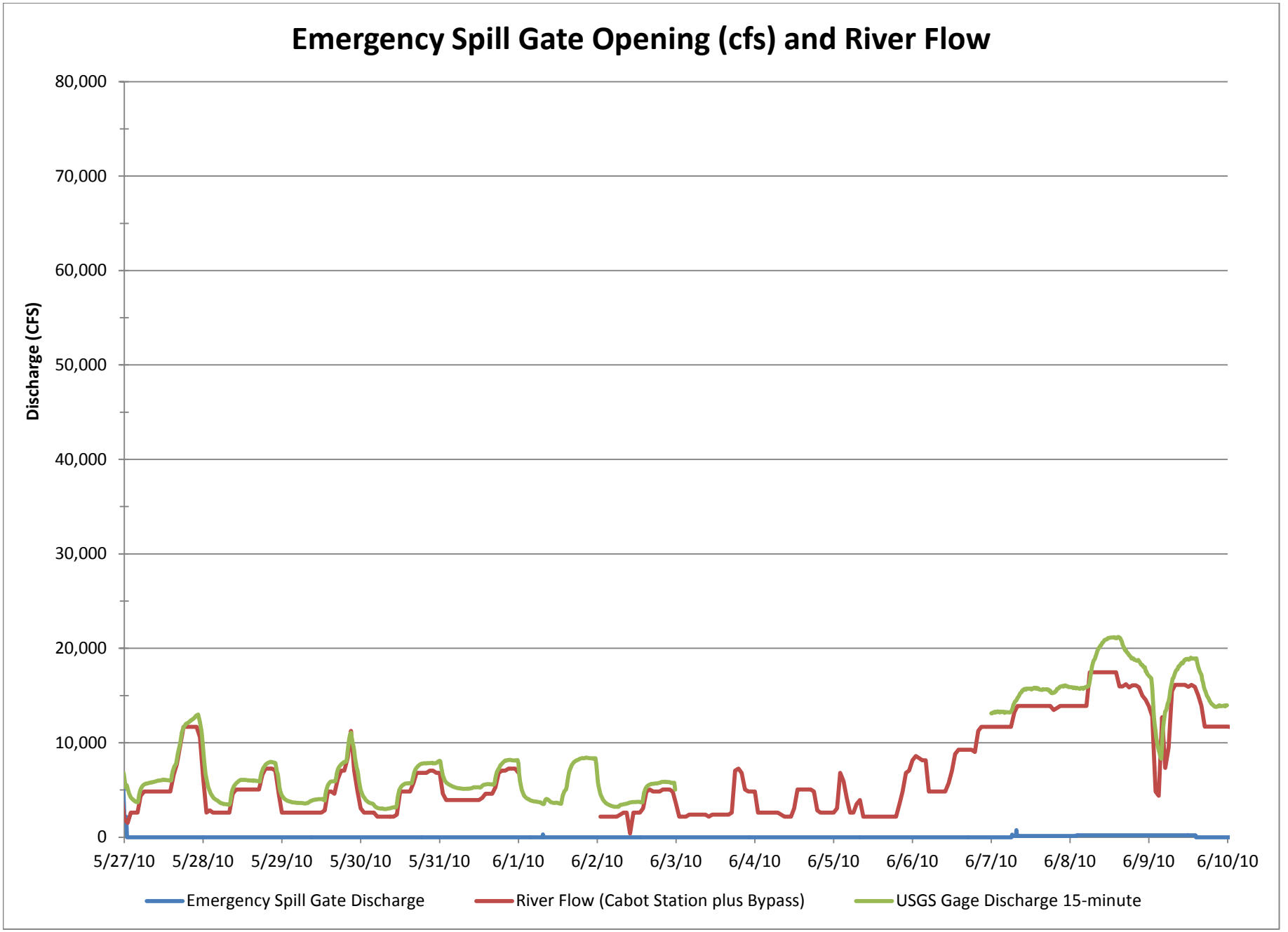

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/27/09
5/28/09
5/29/09
5/30/09
5/31/09
6/1/09
6/2/09
6/3/09
6/4/09
6/5/09
6/6/09
6/7/09
6/8/09
6/9/09
6/10/09
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

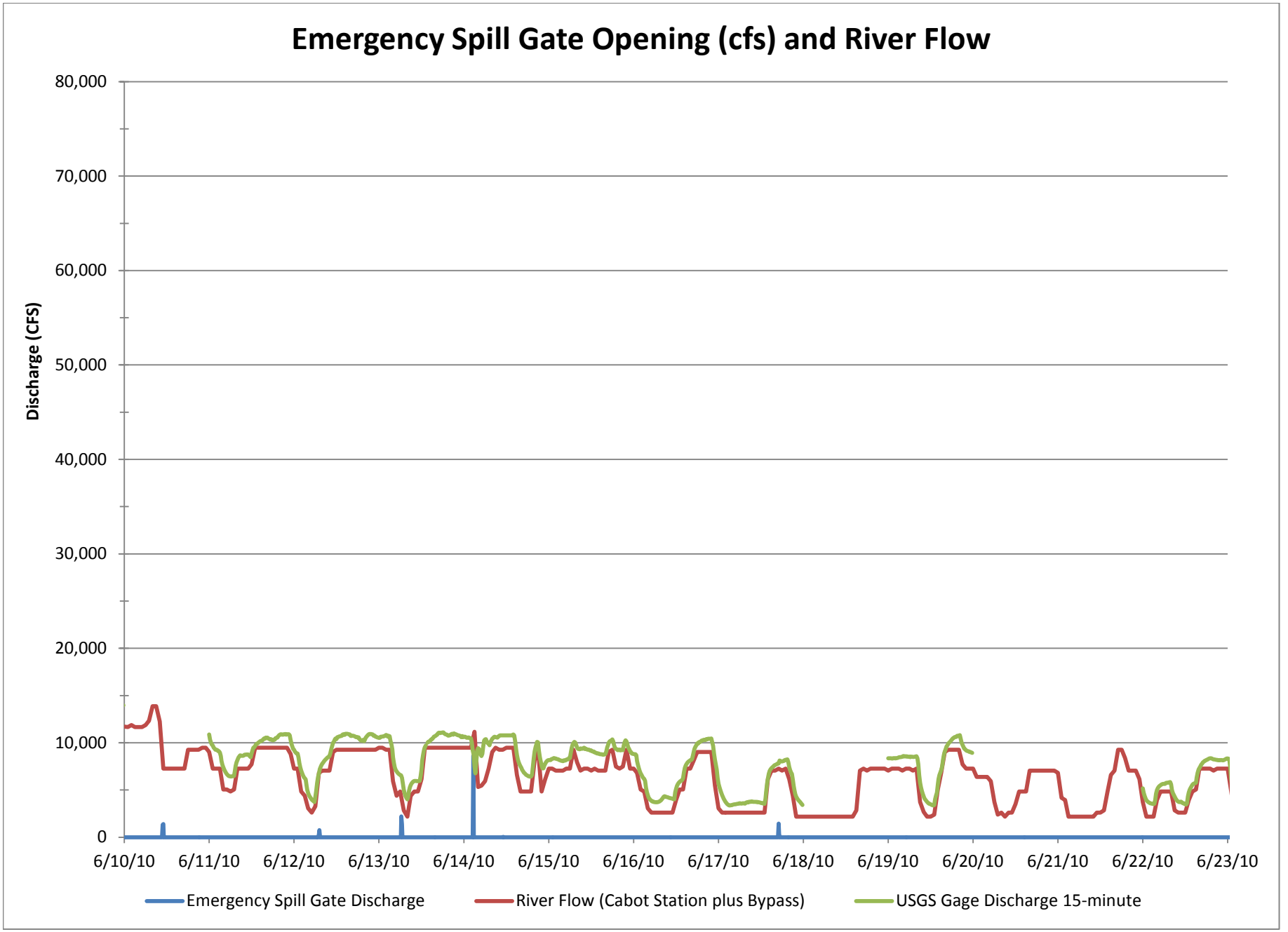

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
6/10/09
6/11/09
6/12/09
6/13/09
6/14/09
6/15/09
6/16/09
6/17/09
6/18/09
6/19/09
6/20/09
6/21/09
6/22/09
6/23/09
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

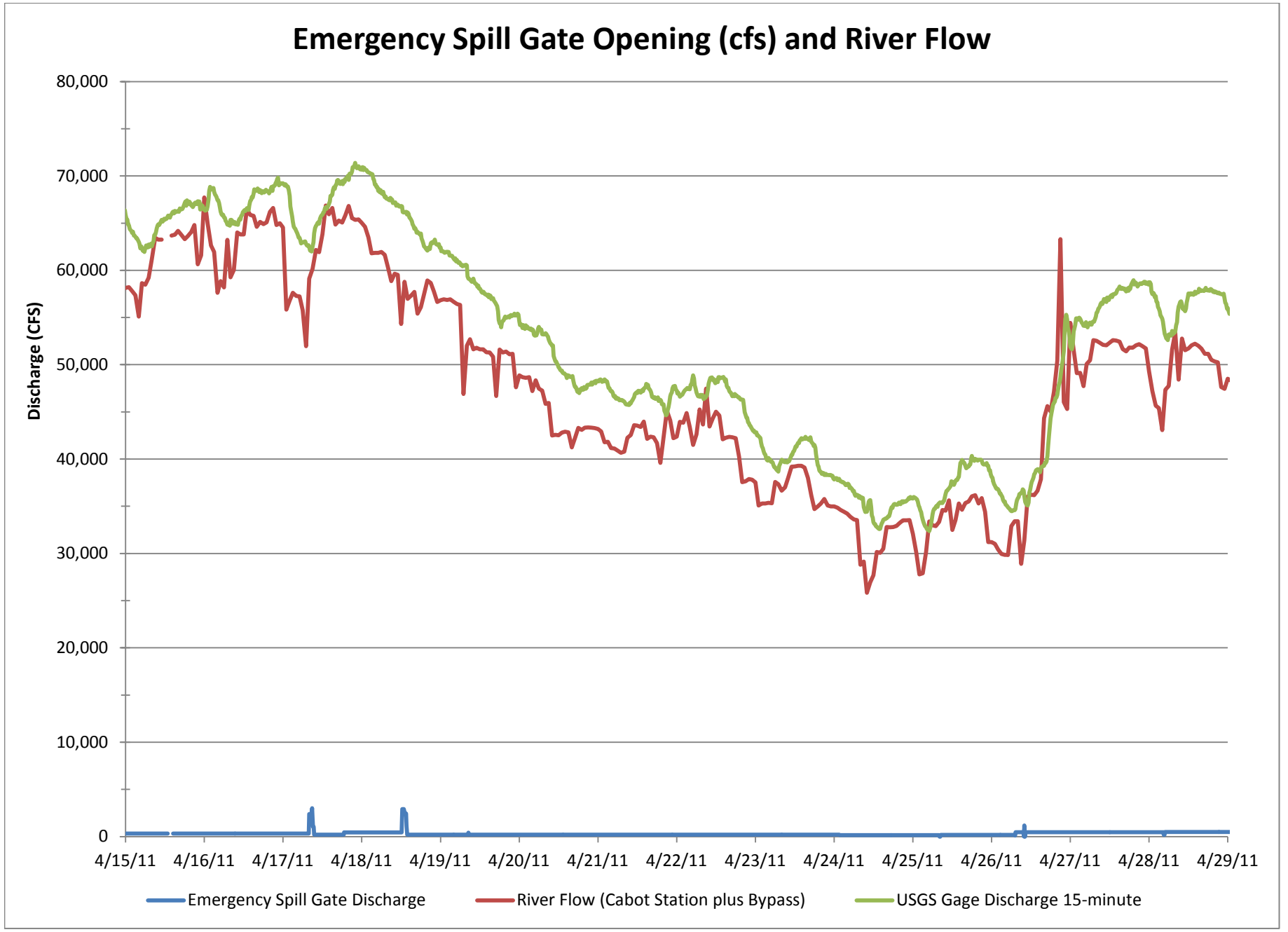

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/15/10
4/16/10
4/17/10
4/18/10
4/19/10
4/20/10
4/21/10
4/22/10
4/23/10
4/24/10
4/25/10
4/26/10
4/27/10
4/28/10
4/29/10
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

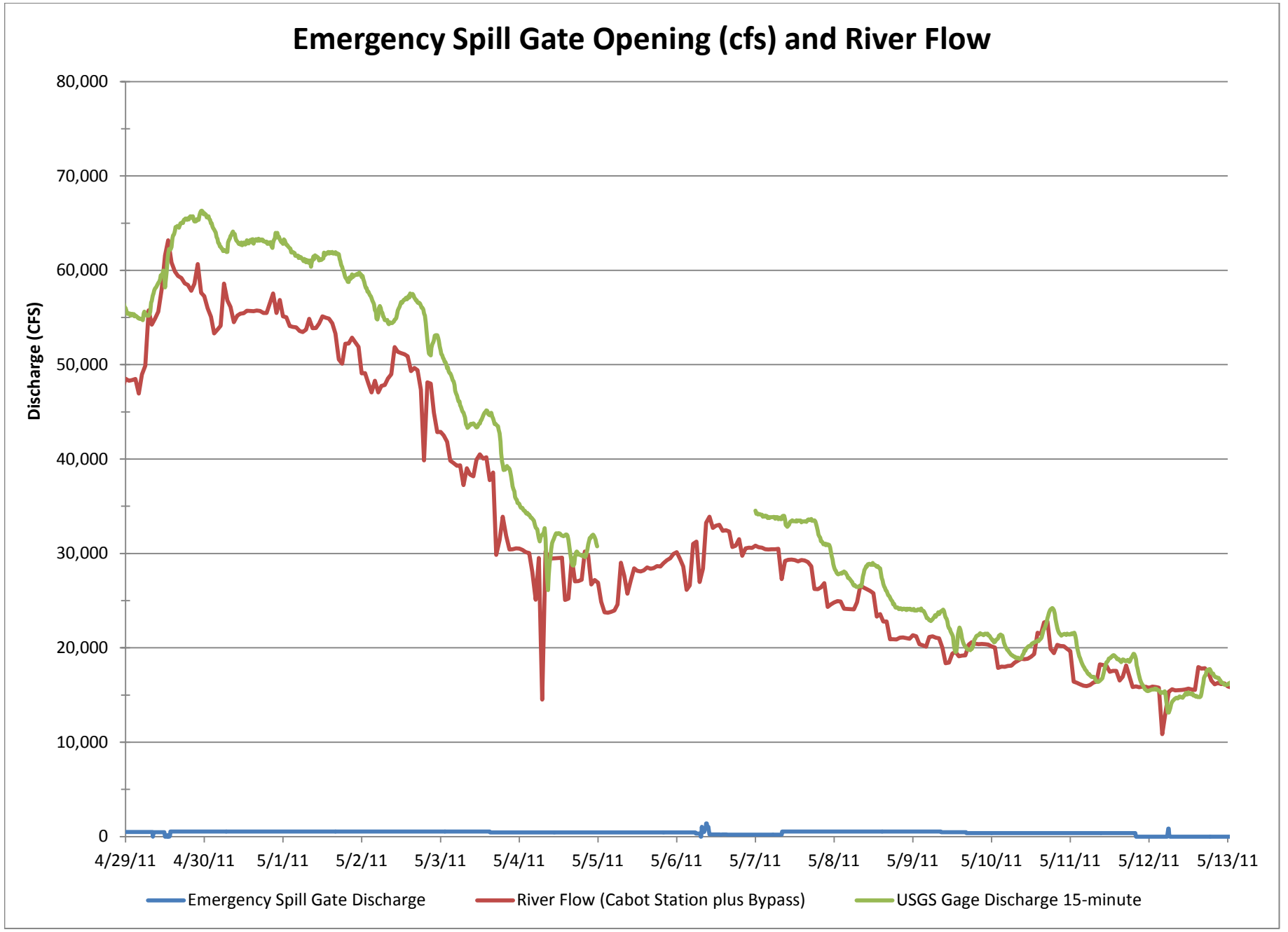

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/29/10
4/30/10
5/1/10
5/2/10
5/3/10
5/4/10
5/5/10
5/6/10
5/7/10
5/8/10
5/9/10
5/10/10
5/11/10
5/12/10
5/13/10
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

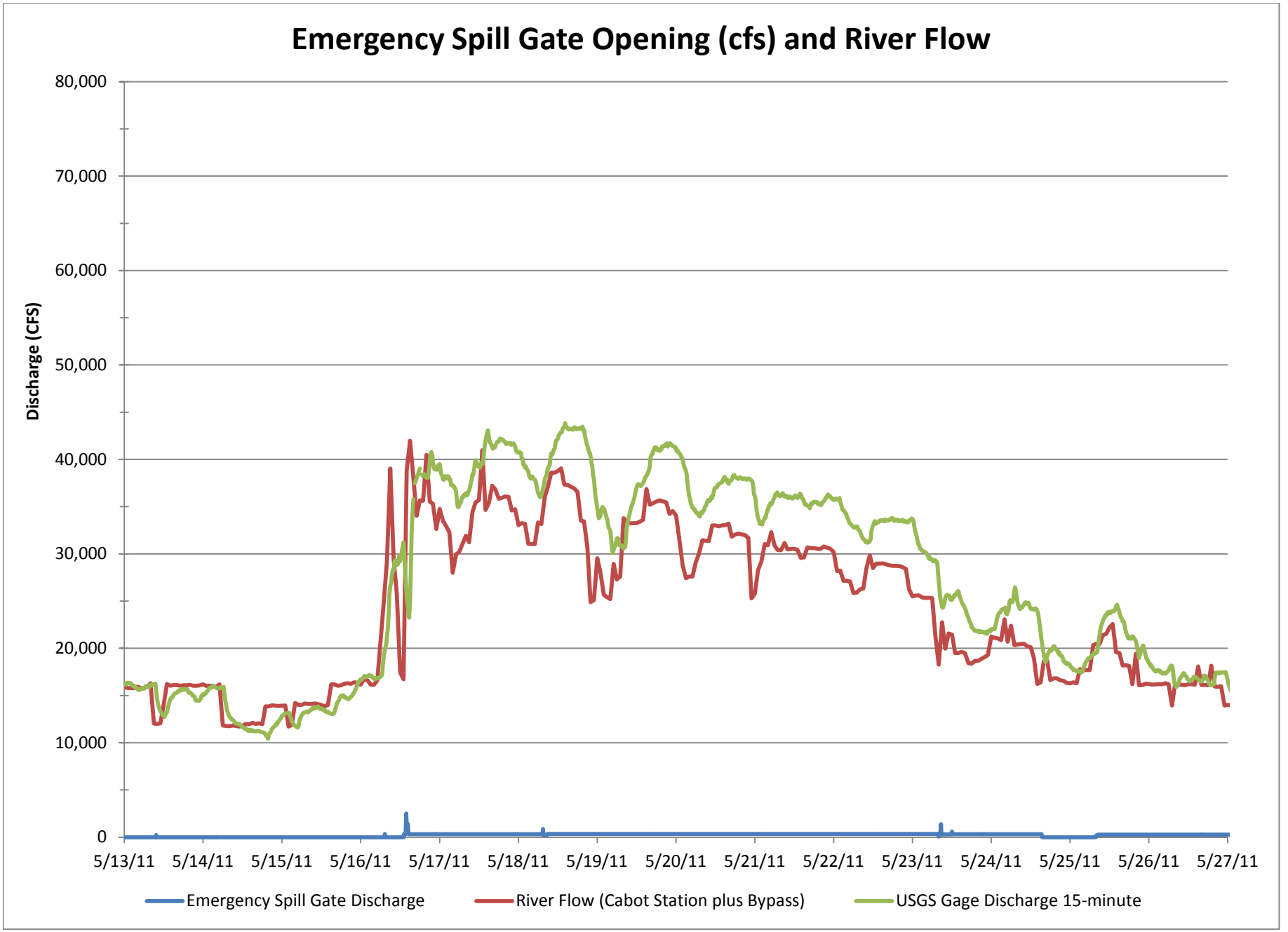

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/13/10
5/14/10
5/15/10
5/16/10
5/17/10
5/18/10
5/19/10
5/20/10
5/21/10
5/22/10
5/23/10
5/24/10
5/25/10
5/26/10
5/27/10
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

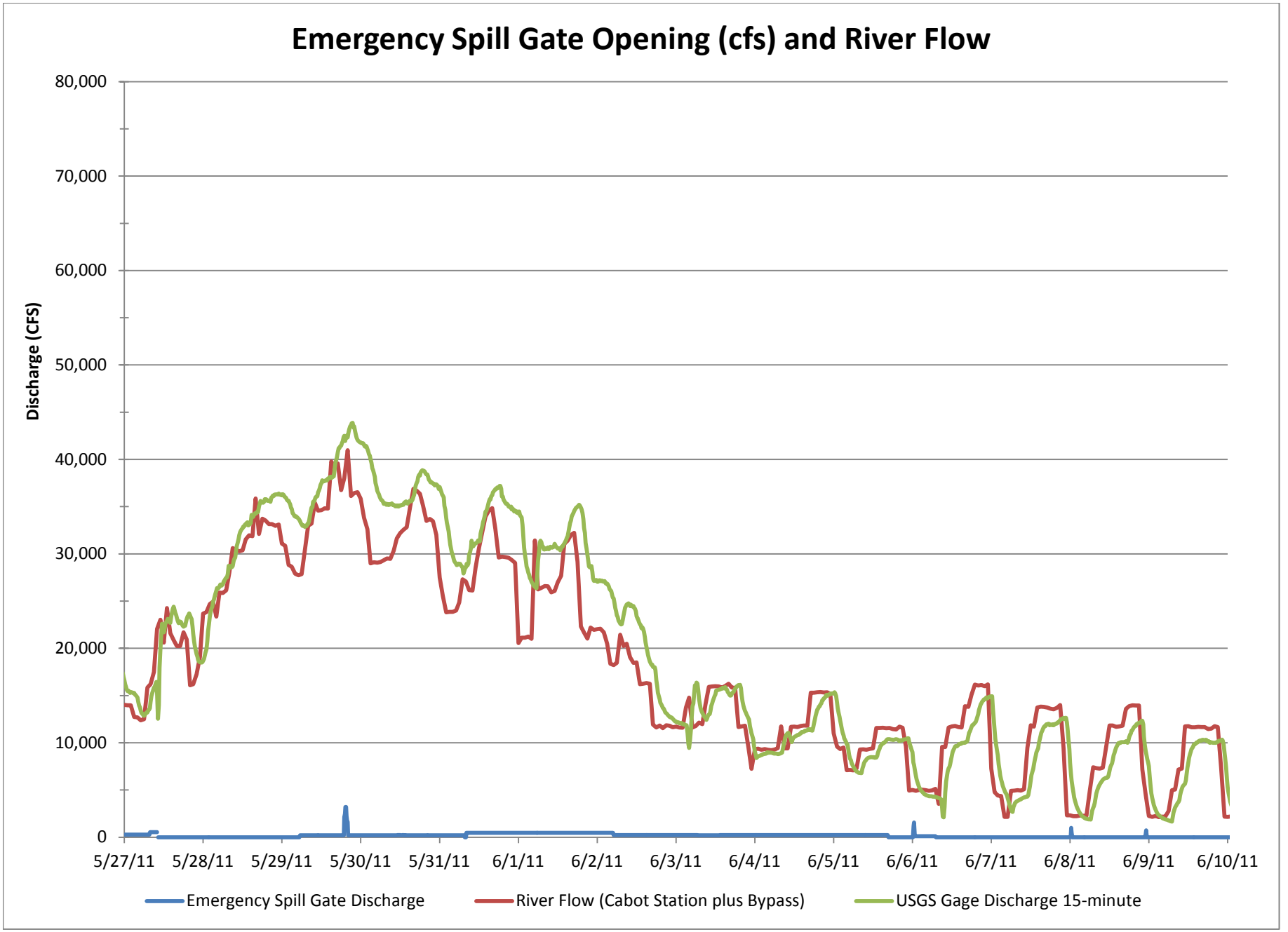

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/27/10
5/28/10
5/29/10
5/30/10
5/31/10
6/1/10
6/2/10
6/3/10
6/4/10
6/5/10
6/6/10
6/7/10
6/8/10
6/9/10
6/10/10
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

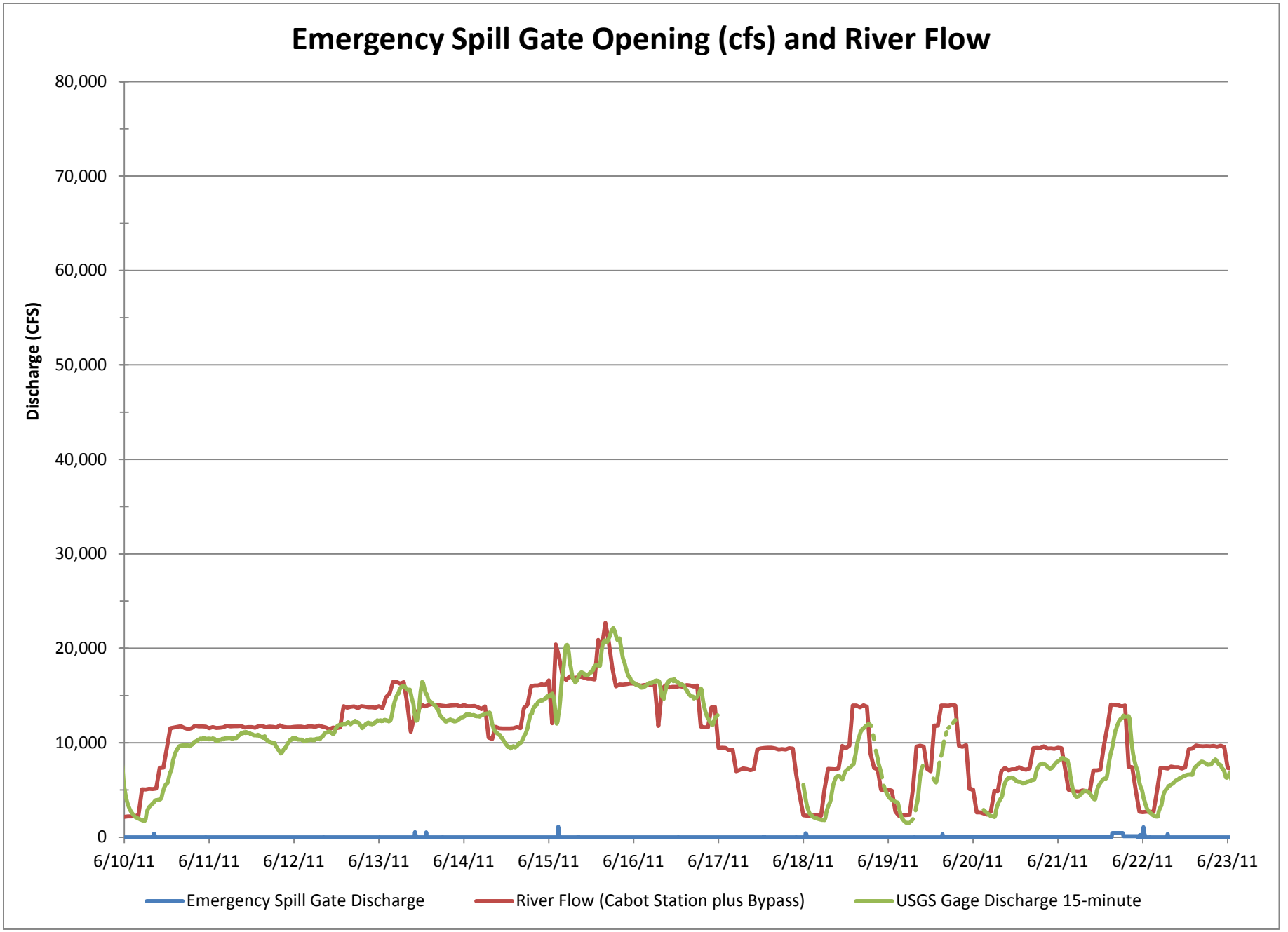

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
6/10/10
6/11/10
6/12/10
6/13/10
6/14/10
6/15/10
6/16/10
6/17/10
6/18/10
6/19/10
6/20/10
6/21/10
6/22/10
6/23/10
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

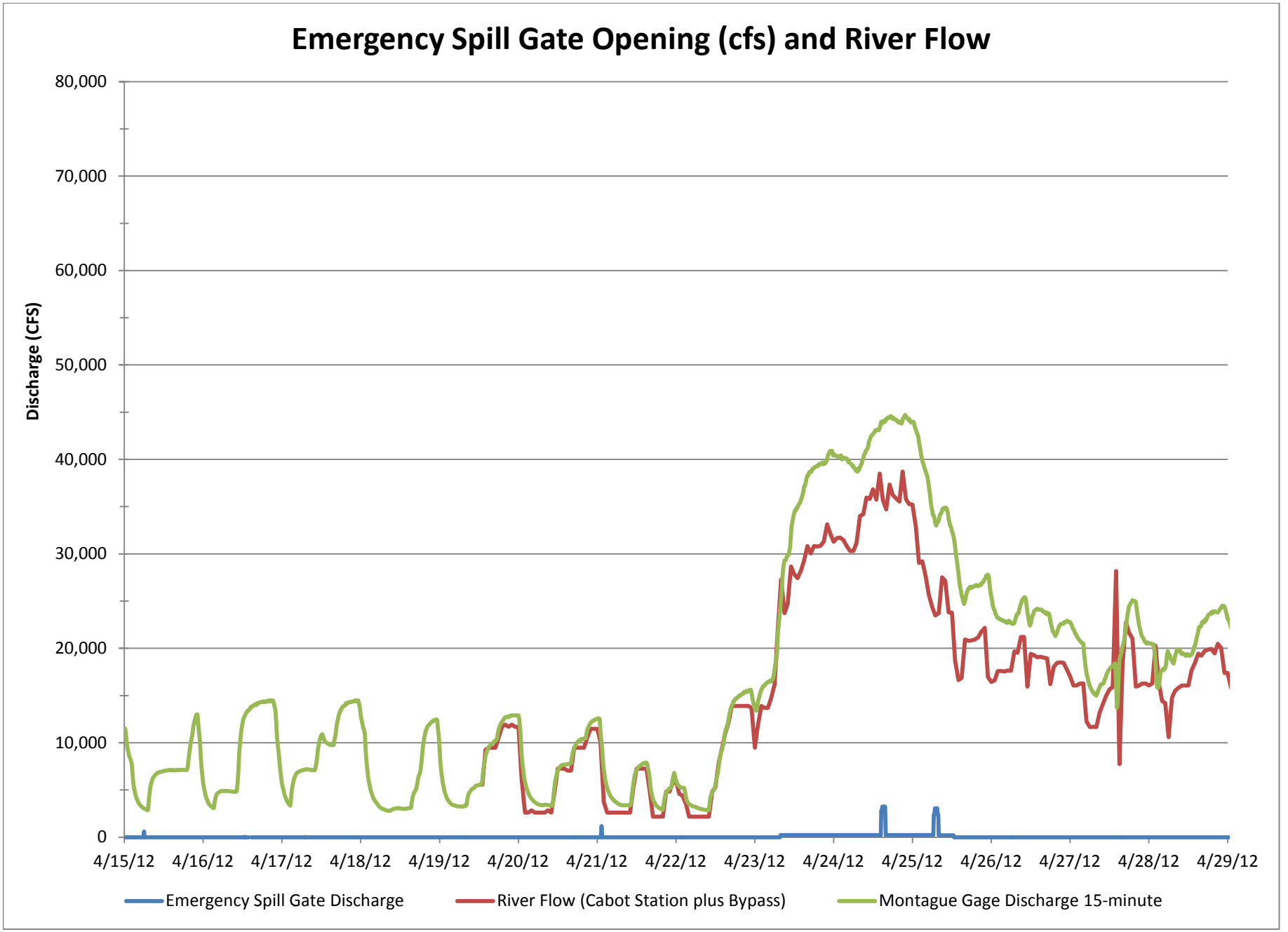

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/15/11
4/16/11
4/17/11
4/18/11
4/19/11
4/20/11
4/21/11
4/22/11
4/23/11
4/24/11
4/25/11
4/26/11
4/27/11
4/28/11
4/29/11
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

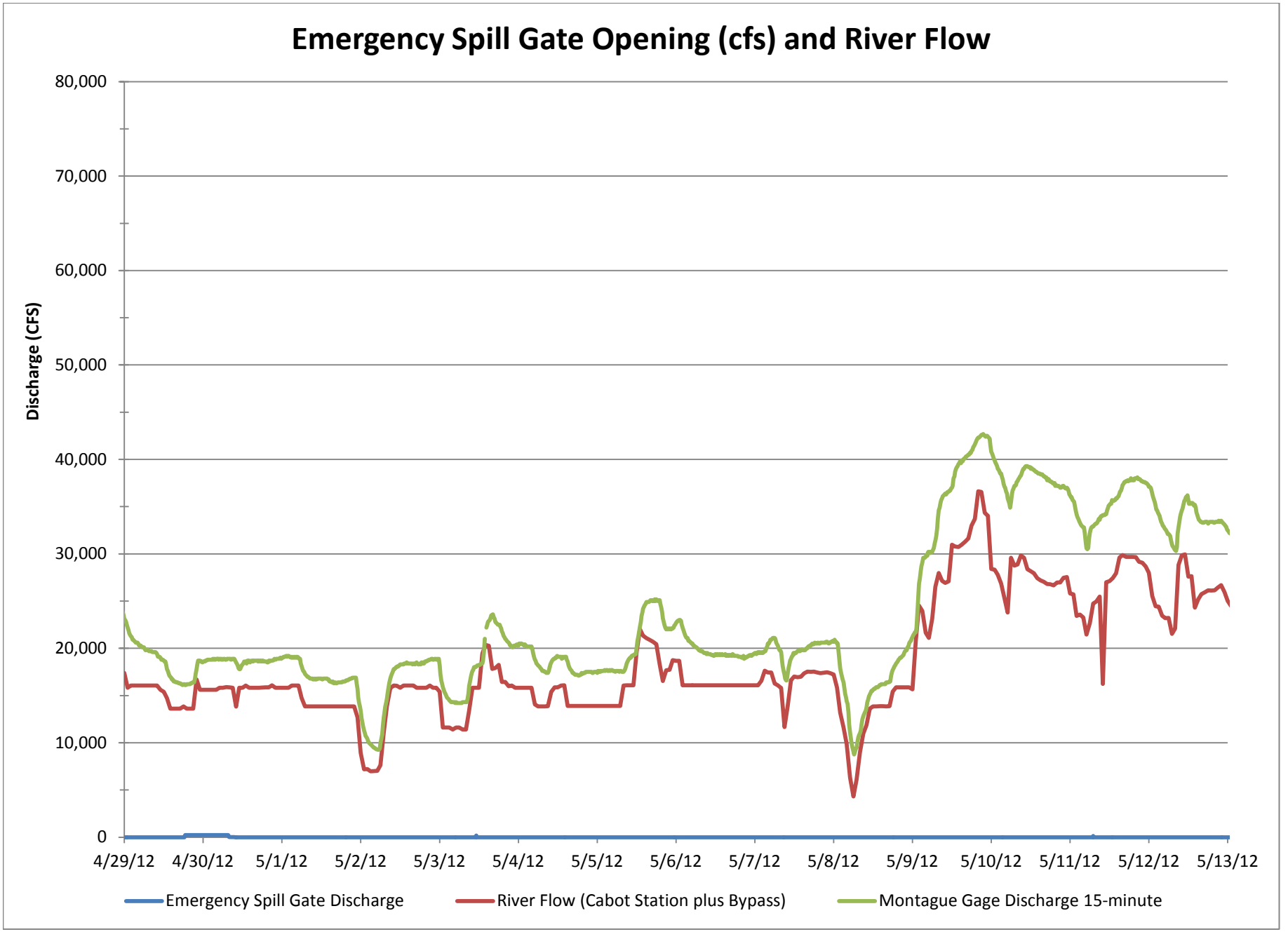

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/29/11
4/30/11
5/1/11
5/2/11
5/3/11
5/4/11
5/5/11
5/6/11
5/7/11
5/8/11
5/9/11
5/10/11
5/11/11
5/12/11
5/13/11
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

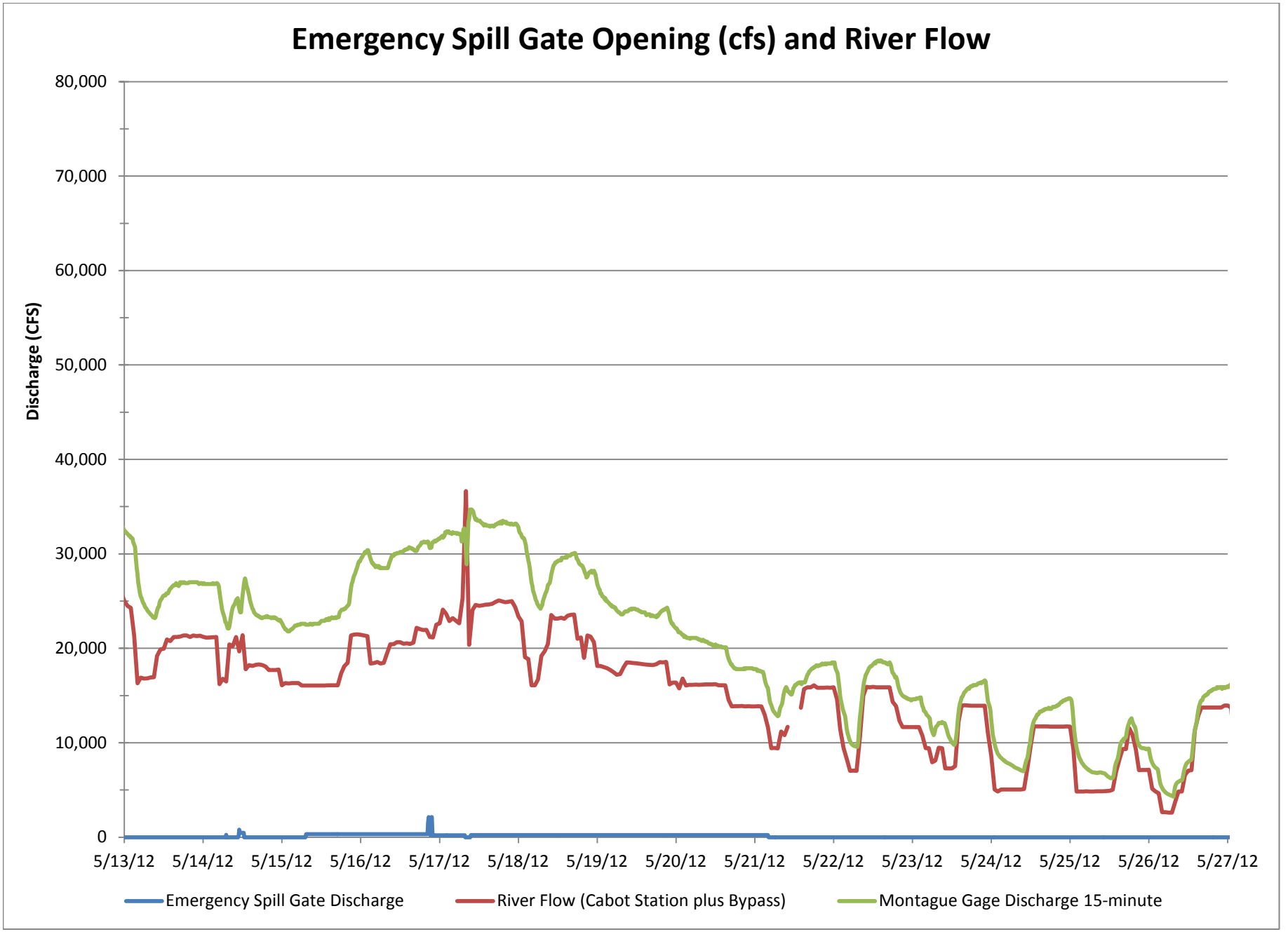

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/13/11
5/14/11
5/15/11
5/16/11
5/17/11
5/18/11
5/19/11
5/20/11
5/21/11
5/22/11
5/23/11
5/24/11
5/25/11
5/26/11
5/27/11
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

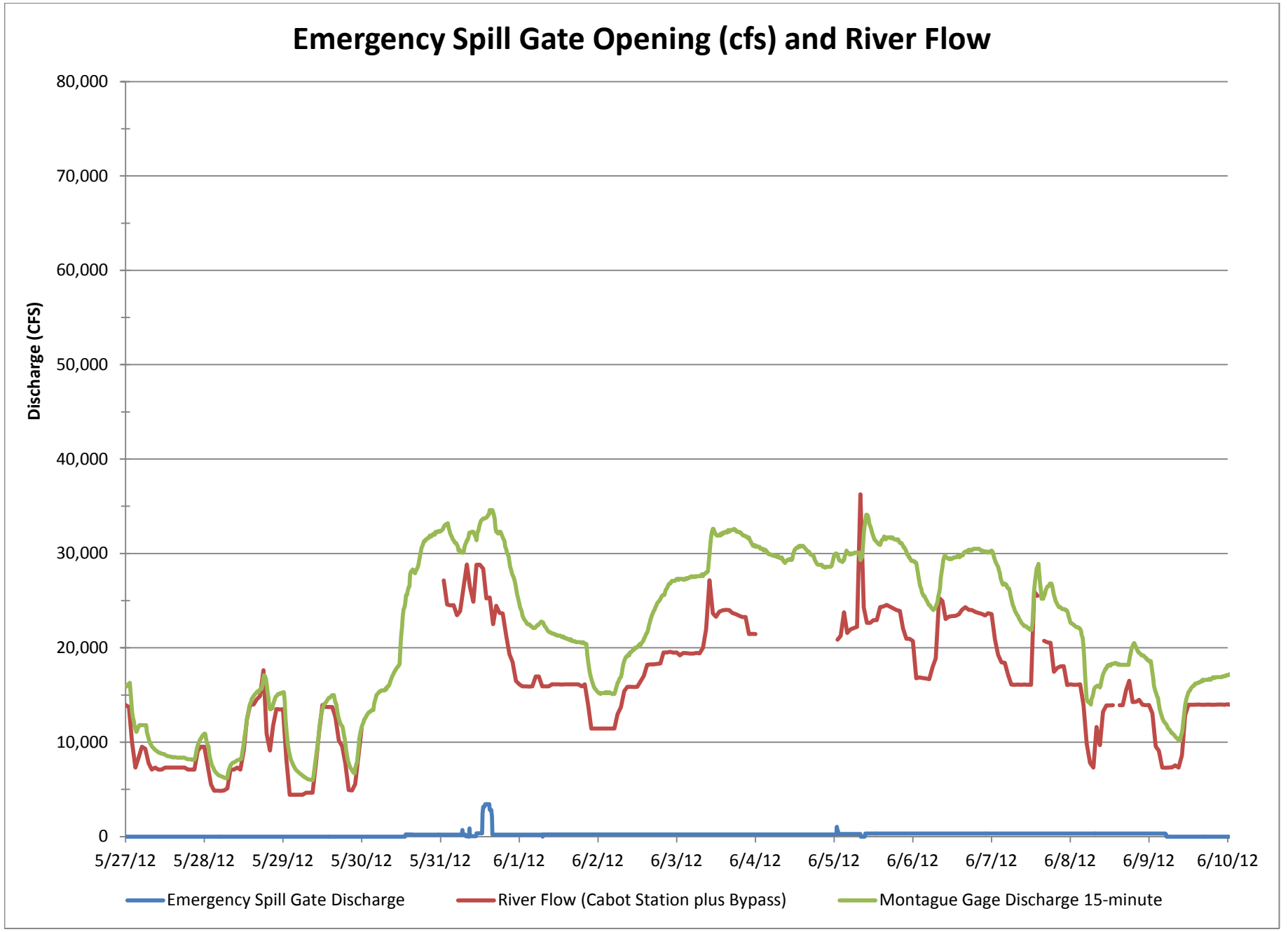

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/27/11
5/28/11
5/29/11
5/30/11
5/31/11
6/1/11
6/2/11
6/3/11
6/4/11
6/5/11
6/6/11
6/7/11
6/8/11
6/9/11
6/10/11
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute

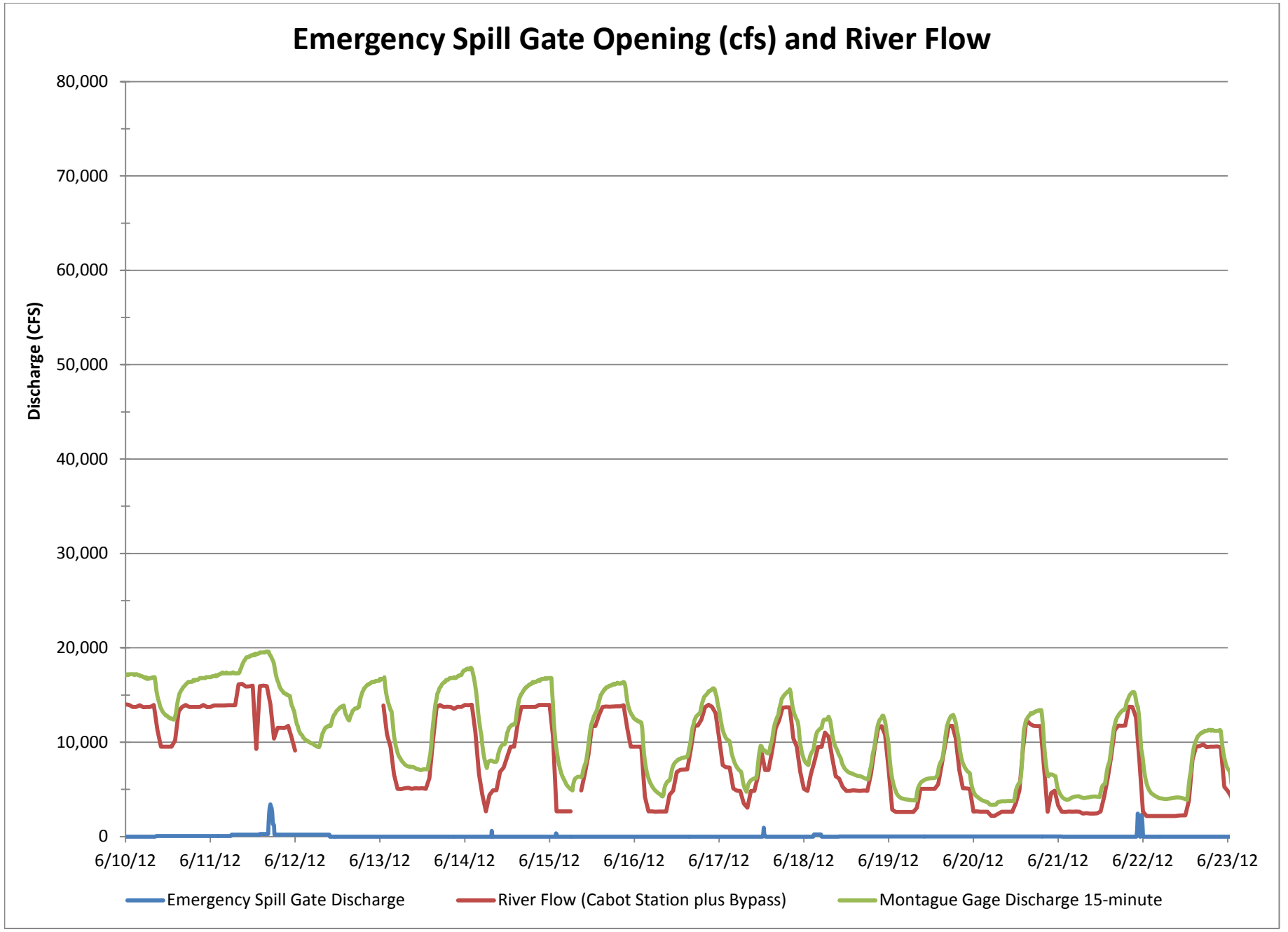

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
6/10/11
6/11/11
6/12/11
6/13/11
6/14/11
6/15/11
6/16/11
6/17/11
6/18/11
6/19/11
6/20/11
6/21/11
6/22/11
6/23/11
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
USGS Gage Discharge 15-minute


Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/15/12
4/16/12
4/17/12
4/18/12
4/19/12
4/20/12
4/21/12
4/22/12
4/23/12
4/24/12
4/25/12
4/26/12
4/27/12
4/28/12
4/29/12
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
Montague Gage Discharge 15-minute

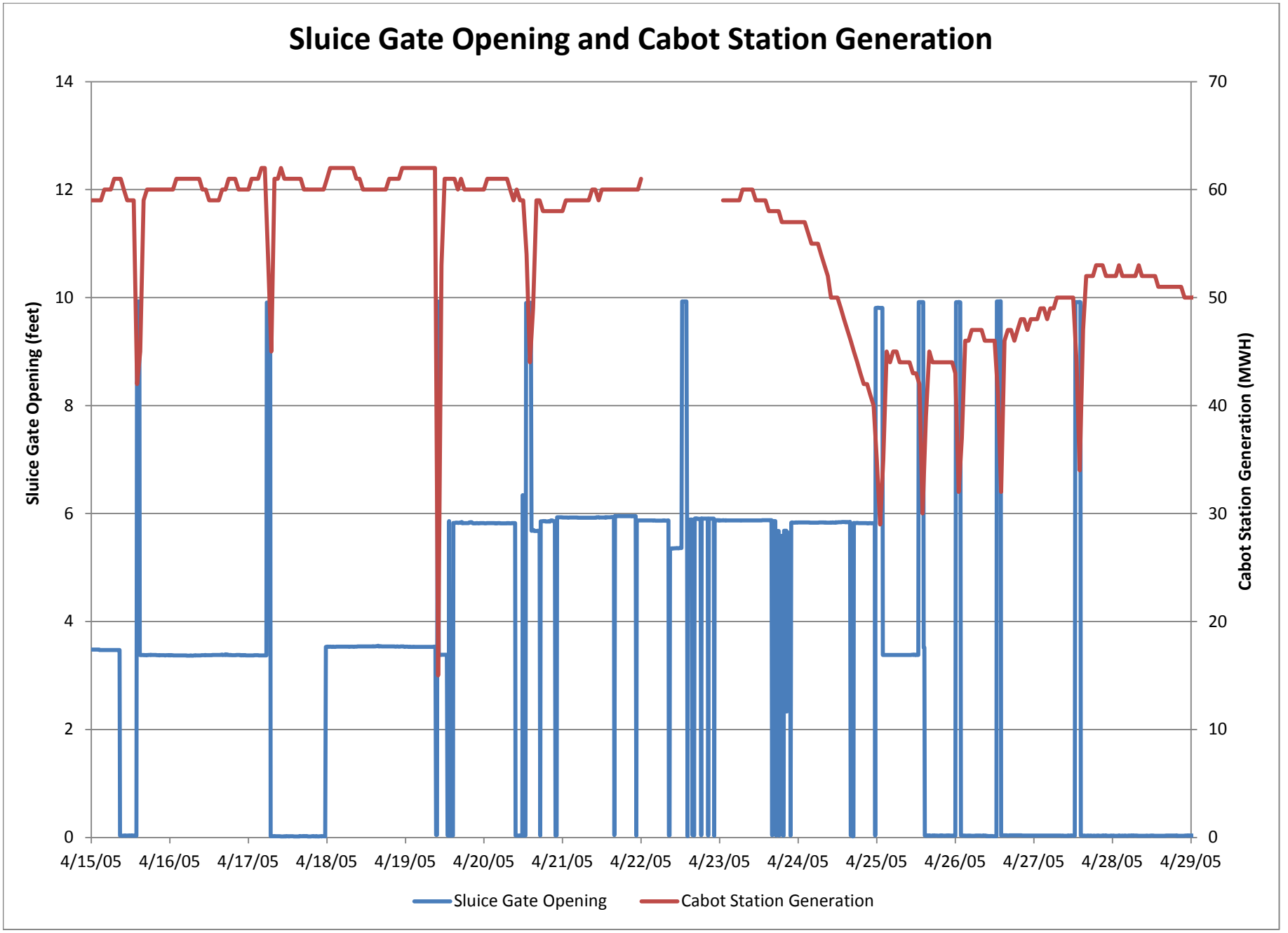

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/29/12
4/30/12
5/1/12
5/2/12
5/3/12
5/4/12
5/5/12
5/6/12
5/7/12
5/8/12
5/9/12
5/10/12
5/11/12
5/12/12
5/13/12
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
Montague Gage Discharge 15-minute

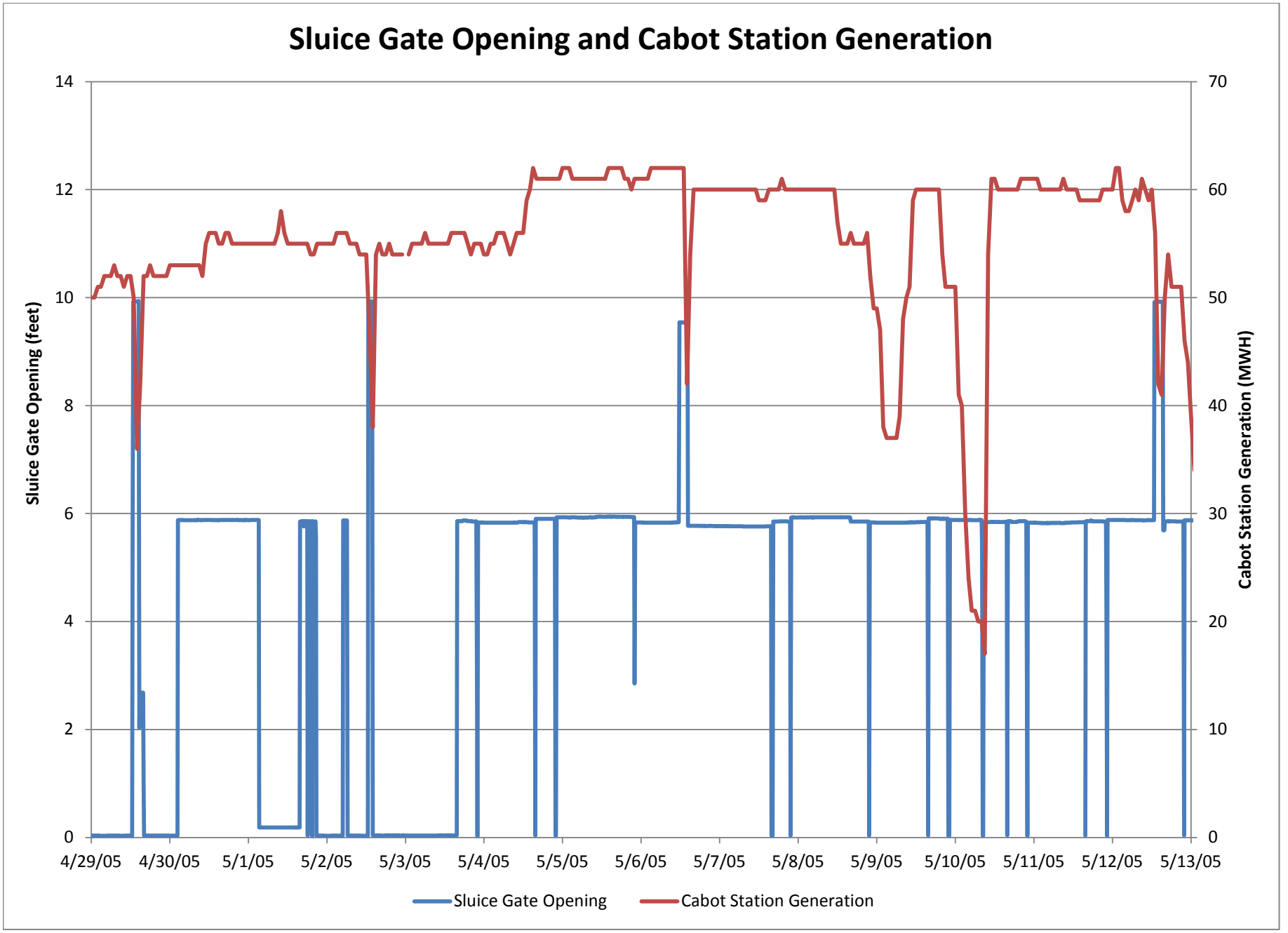

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/13/12
5/14/12
5/15/12
5/16/12
5/17/12
5/18/12
5/19/12
5/20/12
5/21/12
5/22/12
5/23/12
5/24/12
5/25/12
5/26/12
5/27/12
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
Montague Gage Discharge 15-minute

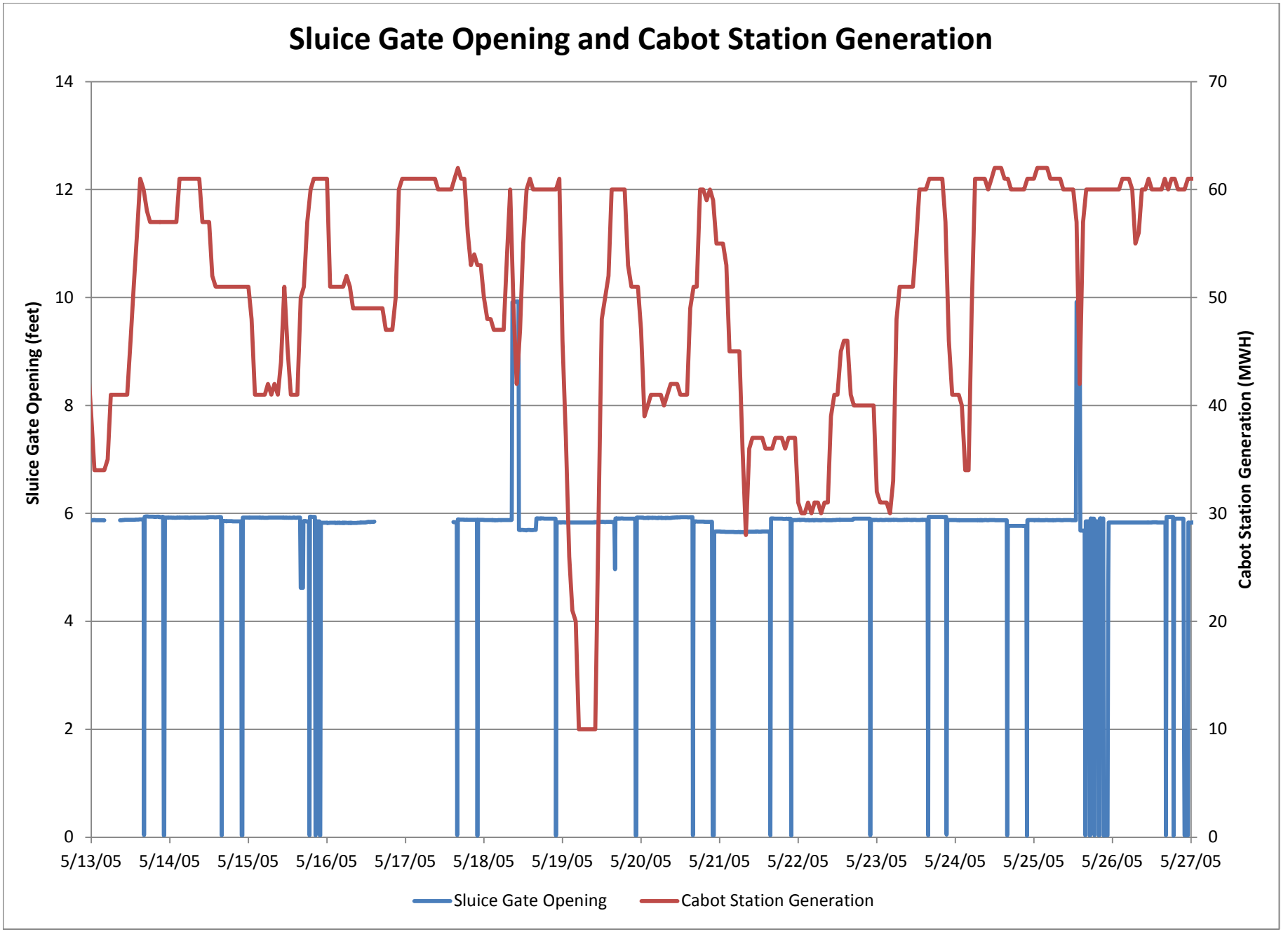

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/27/12
5/28/12
5/29/12
5/30/12
5/31/12
6/1/12
6/2/12
6/3/12
6/4/12
6/5/12
6/6/12
6/7/12
6/8/12
6/9/12
6/10/12
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
Montague Gage Discharge 15-minute

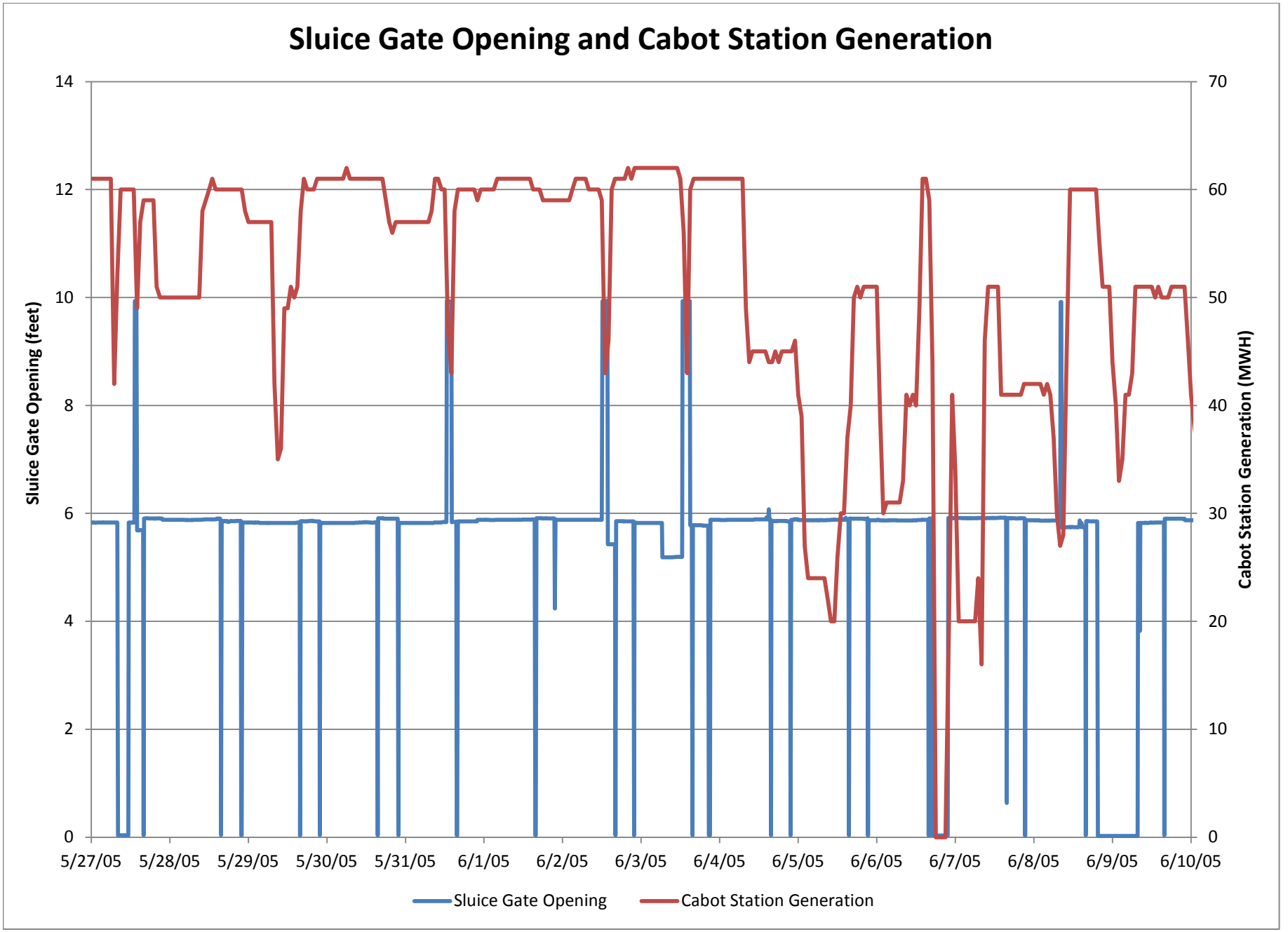

Emergency Spill Gate Opening (cfs) and River Flow
Discharge (CFS)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
6/10/12
6/11/12
6/12/12
6/13/12
6/14/12
6/15/12
6/16/12
6/17/12
6/18/12
6/19/12
6/20/12
6/21/12
6/22/12
6/23/12
Emergency Spill Gate Discharge
River Flow (Cabot Station plus Bypass)
Montague Gage Discharge 15-minute

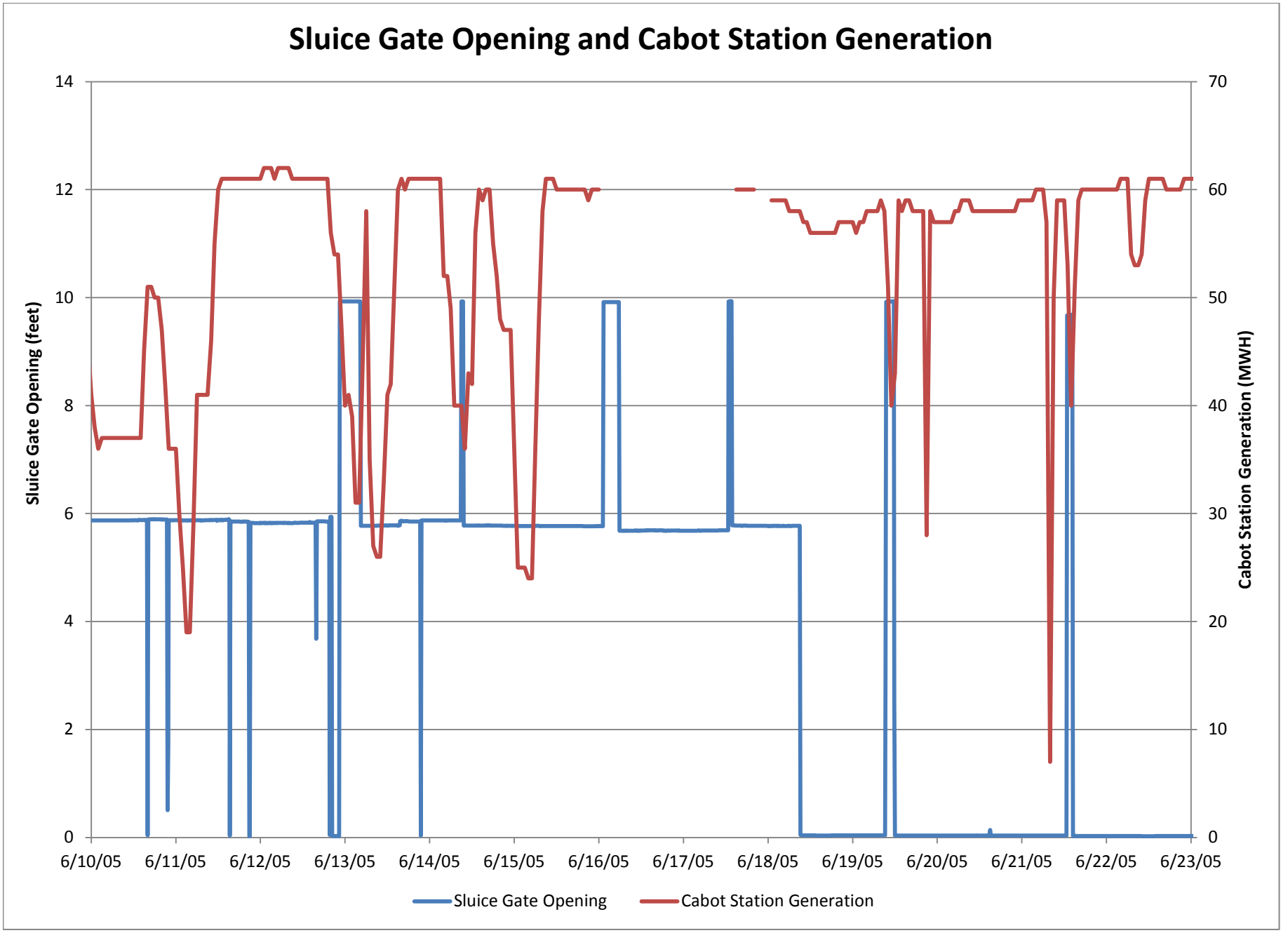
APPENDIX C – BI-WEEKLY CHARTS OF SLUICE GATE OPENING VS. CABOT STATION GENERATION

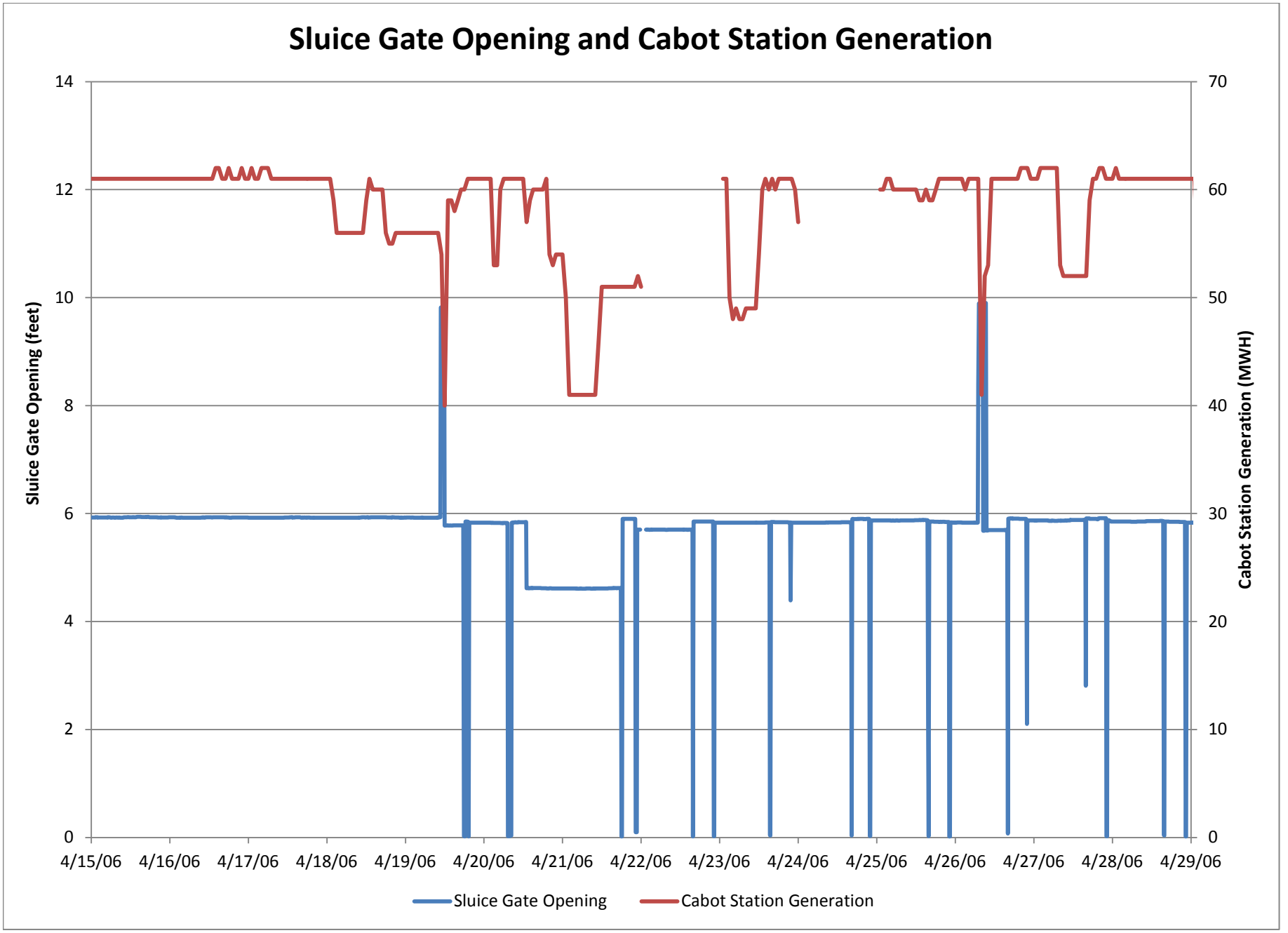

Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
0
2
4
6
8
10
12
14
0
10
20
30
40
50
60
70
4/15/05
4/16/05
4/17/05
4/18/05
4/19/05
4/20/05
4/21/05
4/22/05
4/23/05
4/24/05
4/25/05
4/26/05
4/27/05
4/28/05
4/29/05
Sluice Gate Opening
Cabot Station Generation

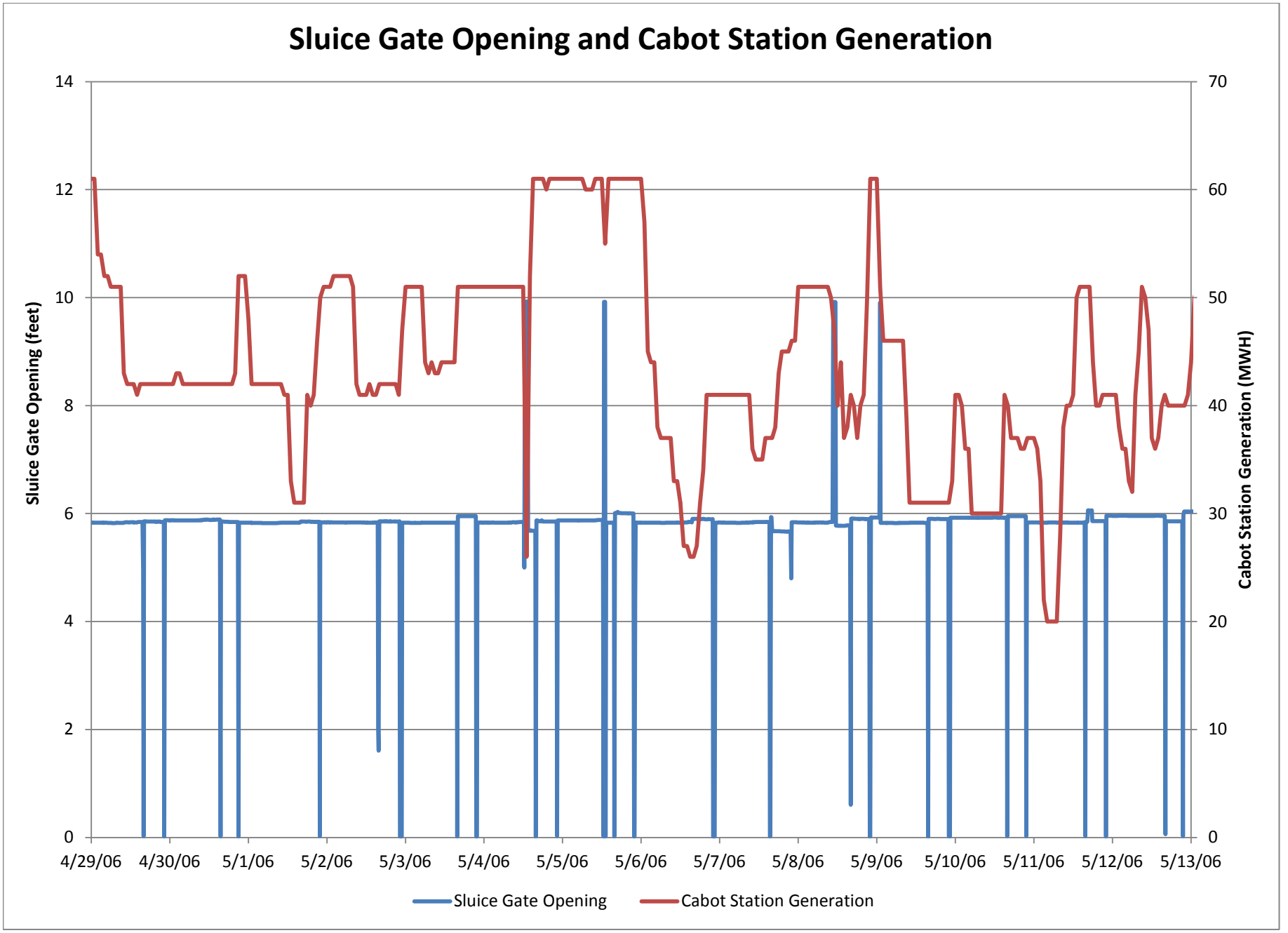

Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
0
2
4
6
8
10
12
14
0
10
20
30
40
50
60
70
4/29/05
4/30/05
5/1/05
5/2/05
5/3/05
5/4/05
5/5/05
5/6/05
5/7/05
5/8/05
5/9/05
5/10/05
5/11/05
5/12/05
5/13/05
Sluice Gate Opening
Cabot Station Generation

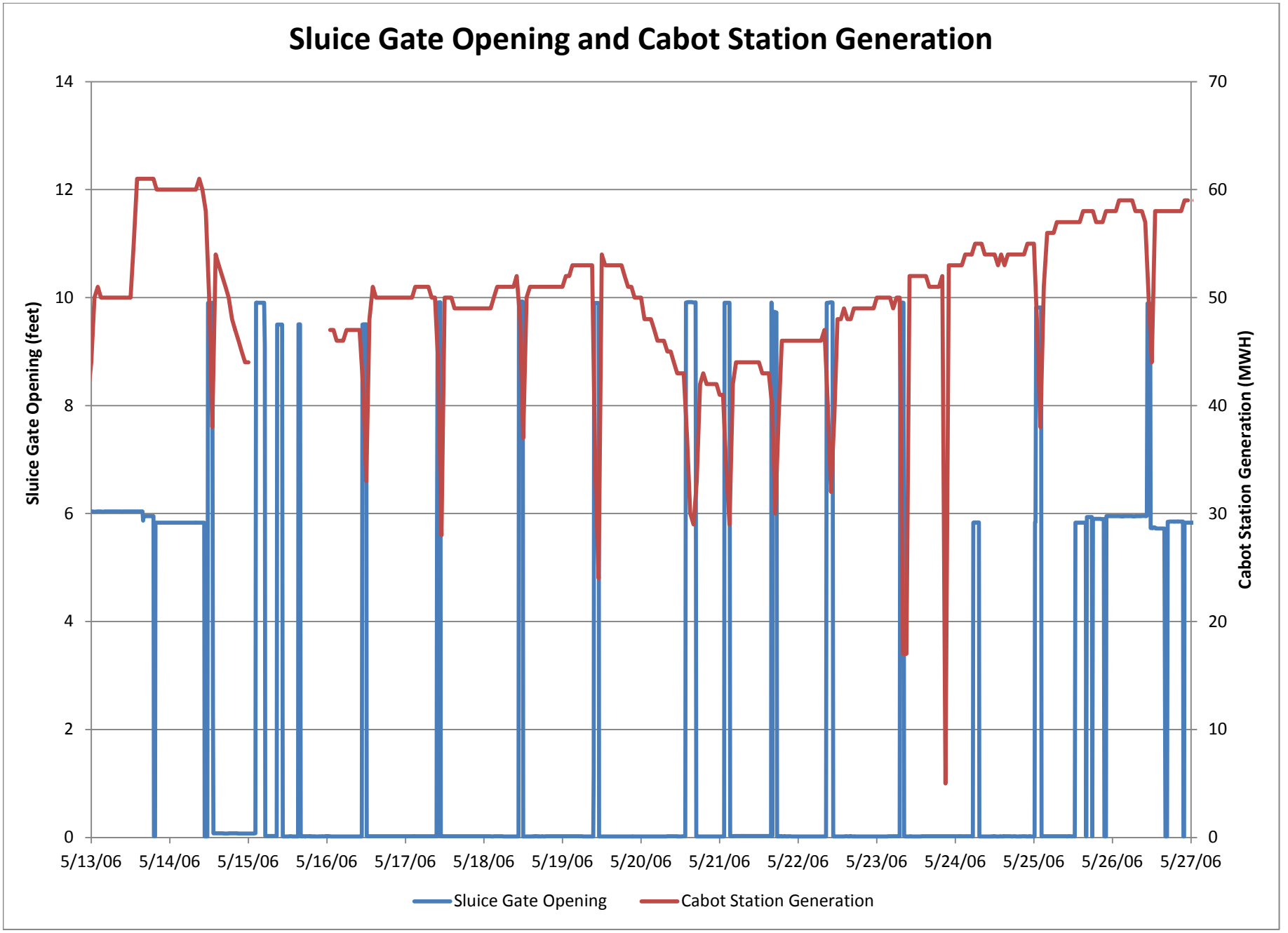

Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
14
12
10
8
6
4
2
0
70
60
50
40
30
20
10
0
5/13/05
5/14/05
5/15/05
5/16/05
5/17/05
5/18/05
5/19/05
5/20/05
5/21/05
5/22/05
5/23/05
5/24/05
5/25/05
5/26/05
5/27/05
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
14
12
10
8
6
4
2
0
70
60
50
40
30
20
10
0
5/27/05
5/28/05
5/29/05
5/30/05
5/31/05
6/1/05
6/2/05
6/3/05
6/4/05
6/5/05
6/6/05
6/7/05
6/8/05
6/9/05
6/10/05
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
14
12
10
8
6
4
2
0
70
60
50
40
30
20
10
0
6/10/05
6/11/05
6/12/05
6/13/05
6/14/05
6/15/05
6/16/05
6/17/05
6/18/05
6/19/05
6/20/05
6/21/05
6/22/05
6/23/05
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
14
12
10
8
6
4
2
0
70
60
50
40
30
20
10
0
4/15/06
4/16/06
4/17/06
4/18/06
4/19/06
4/20/06
4/21/06
4/22/06
4/23/06
4/24/06
4/25/06
4/26/06
4/27/06
4/28/06
4/29/06
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
14
12
10
8
6
4
2
0
70
60
50
40
30
20
10
0
4/29/06
4/30/06
5/1/06
5/2/06
5/3/06
5/4/06
5/5/06
5/6/06
5/7/06
5/8/06
5/9/06
5/10/06
5/11/06
5/12/06
5/13/06
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
14
12
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6
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2
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70
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30
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10
0
5/13/06
5/14/06
5/15/06
5/16/06
5/17/06
5/18/06
5/19/06
5/20/06
5/21/06
5/22/06
5/23/06
5/24/06
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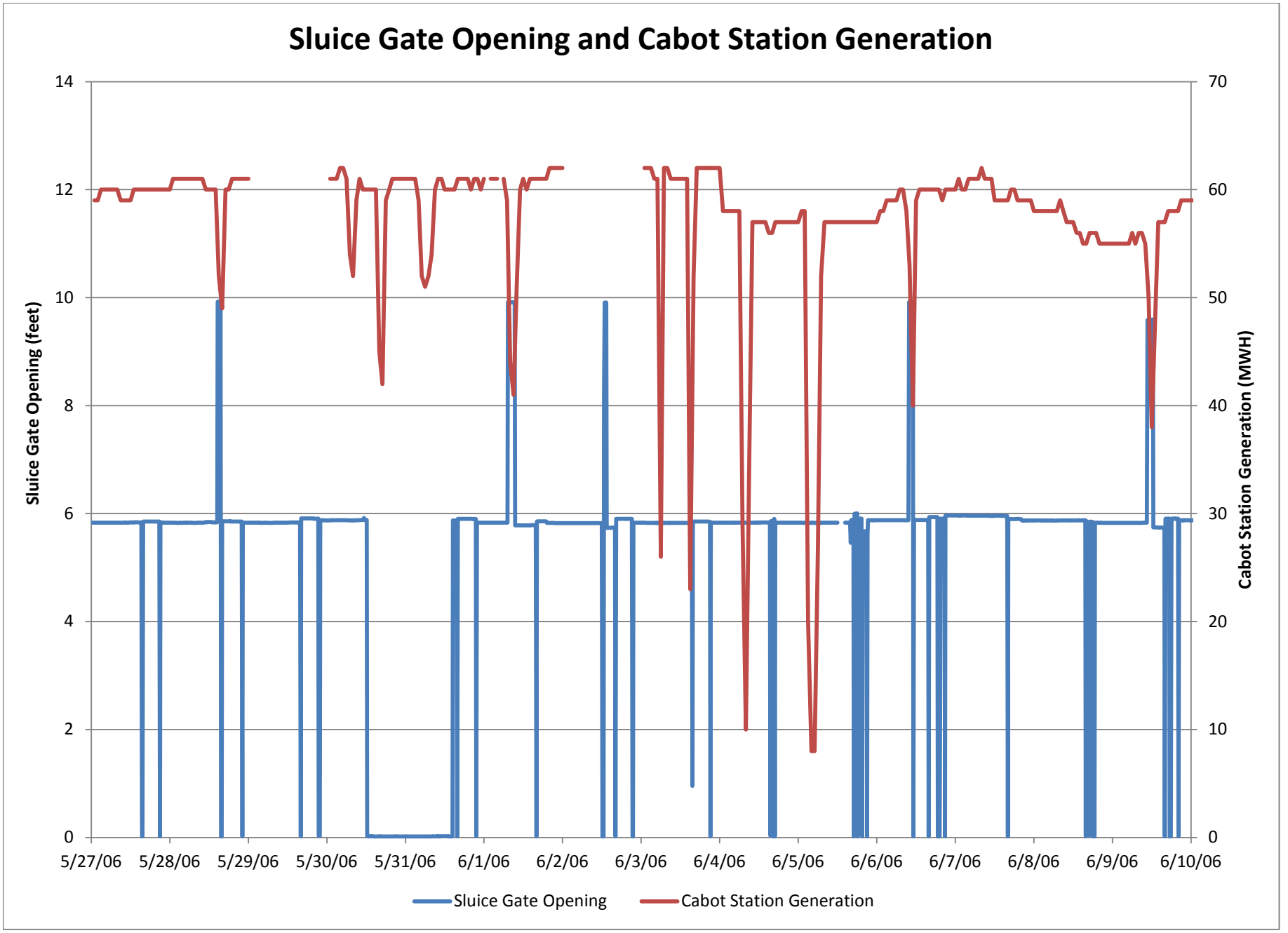
5/26/06
5/27/06
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
14
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70
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5/27/06
5/28/06
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5/30/06
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6/1/06
6/2/06
6/3/06
6/4/06
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6/6/06
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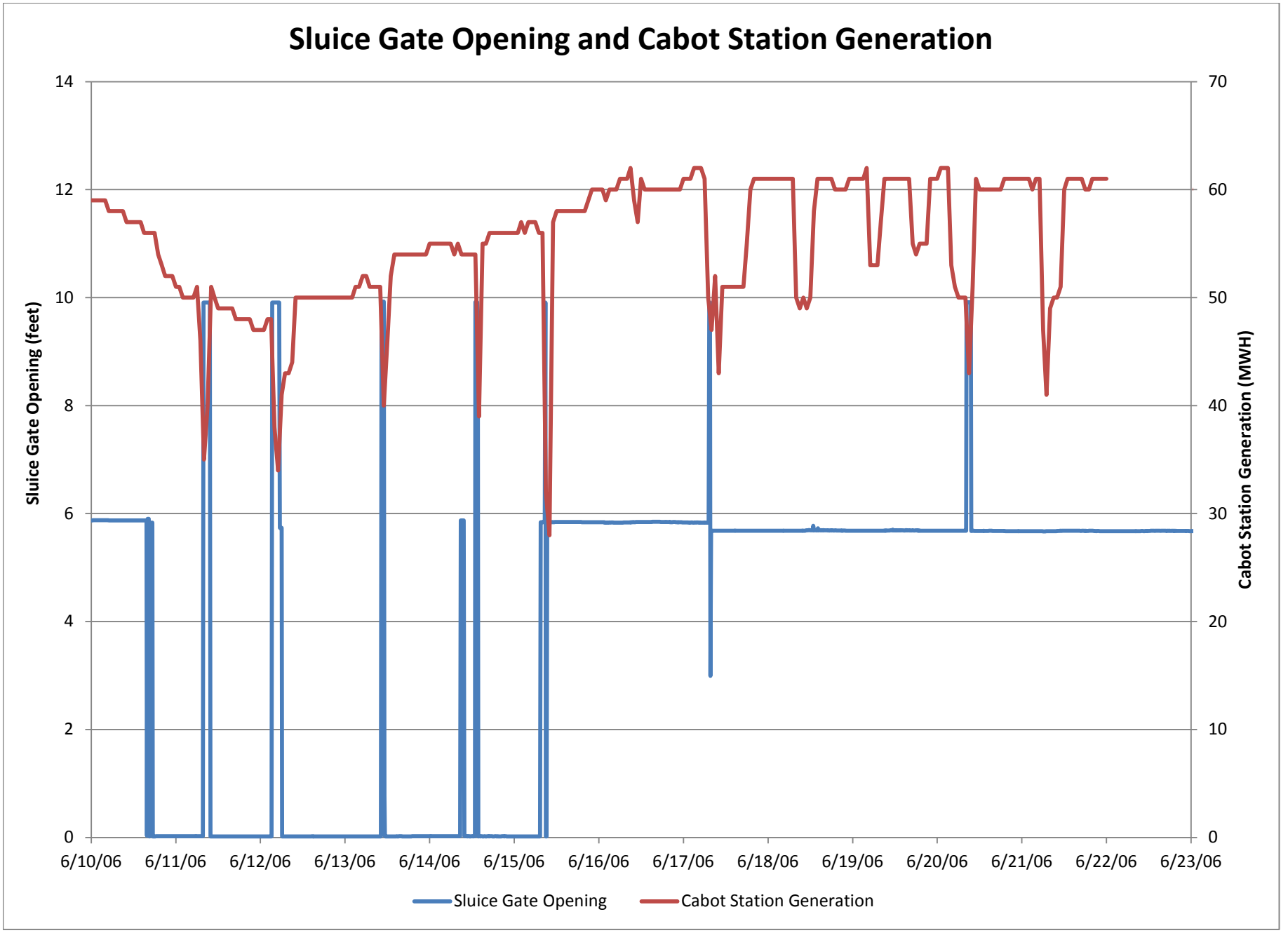
6/10/06
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
0
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6/15/06
6/16/06
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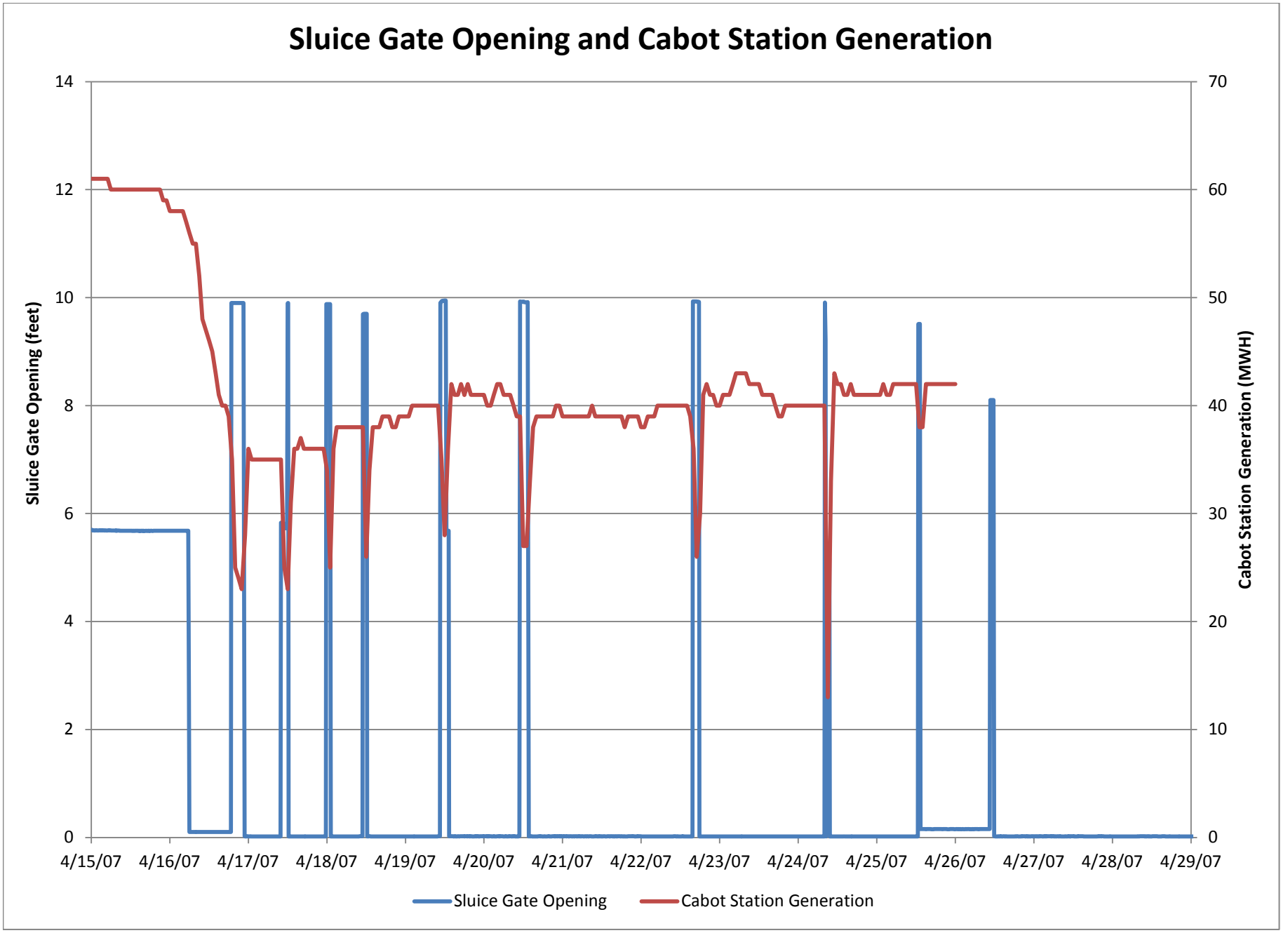
6/23/06
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
14
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4/21/07
4/22/07
4/23/07
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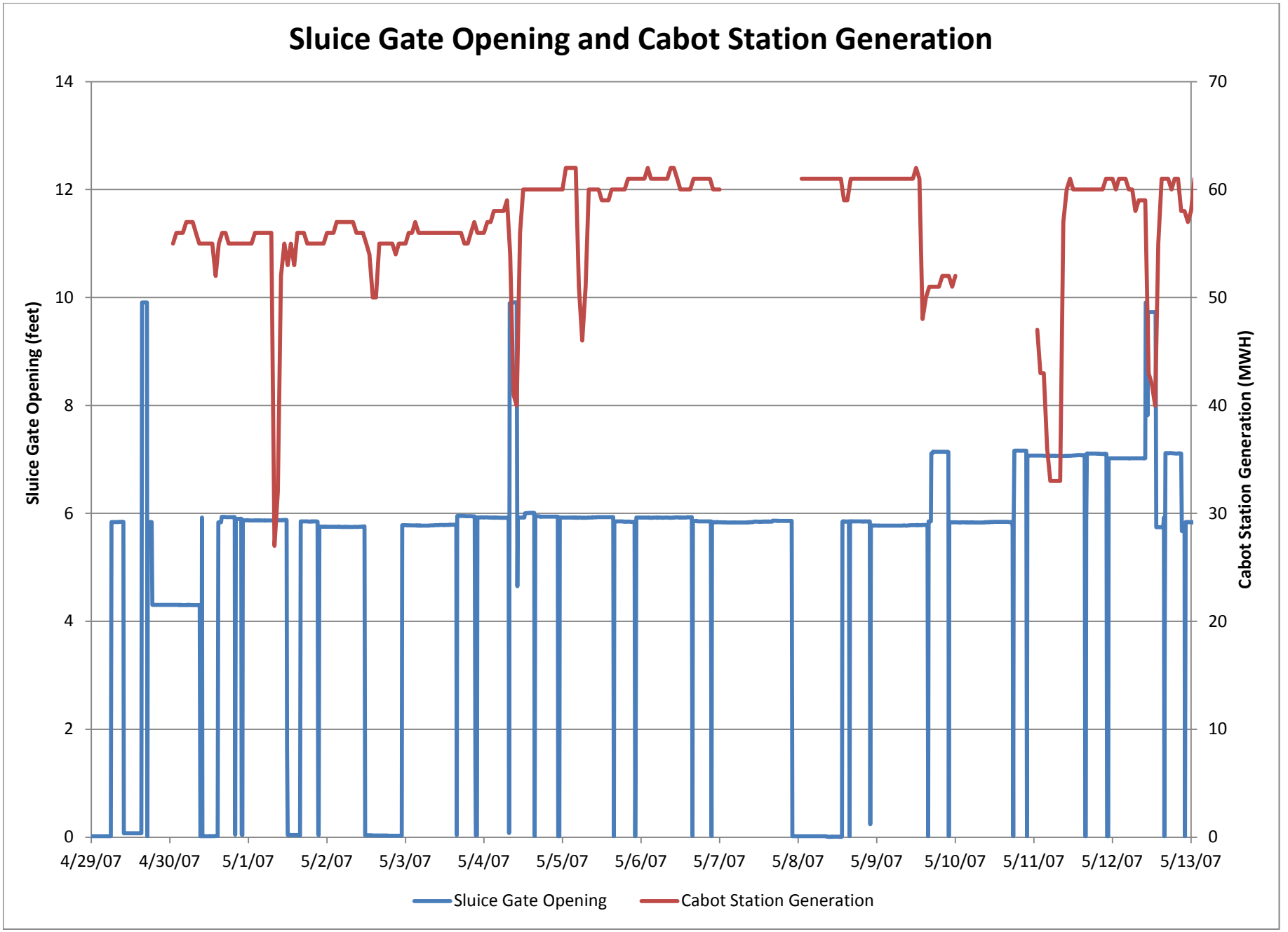
4/29/07
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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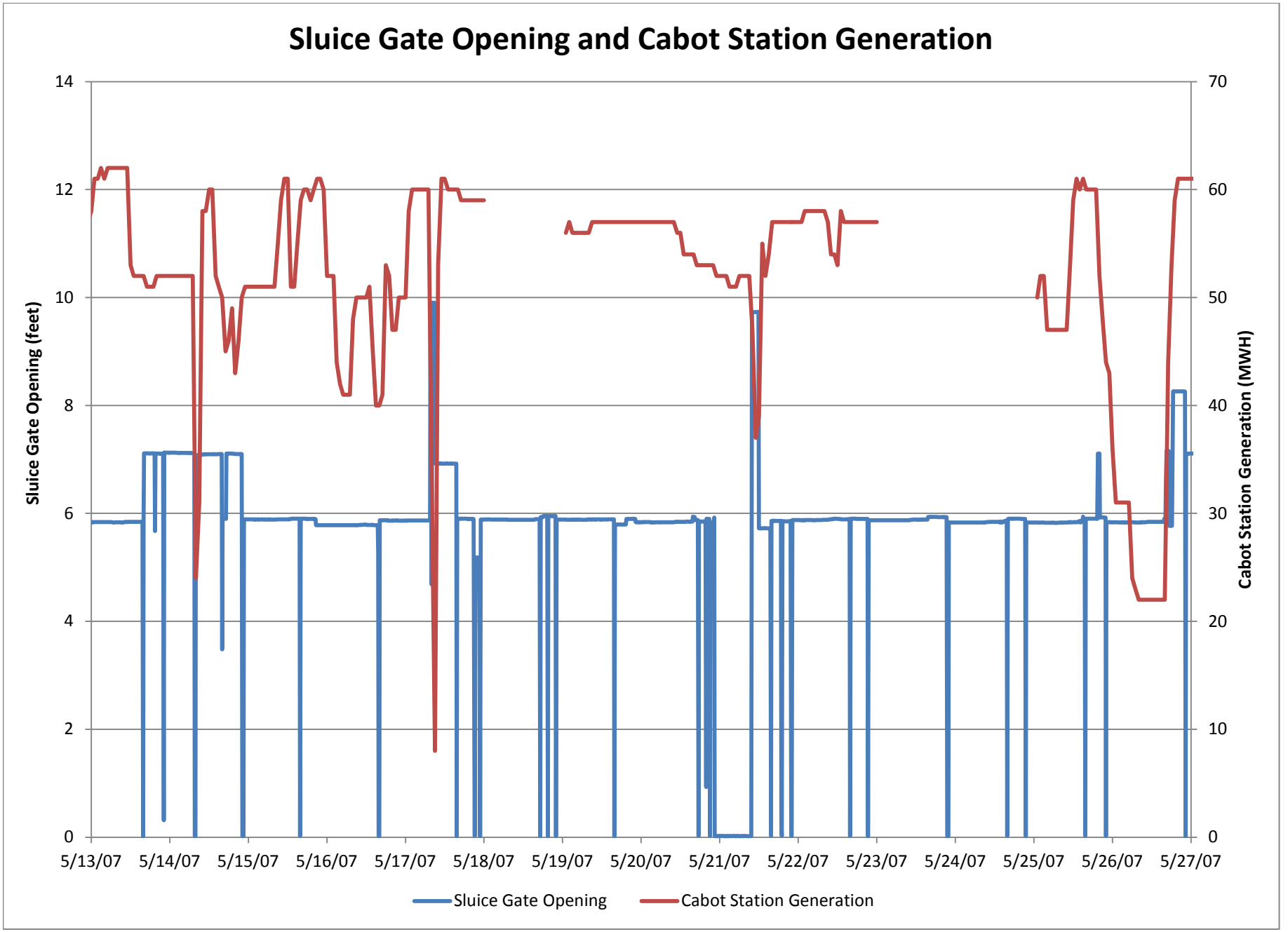
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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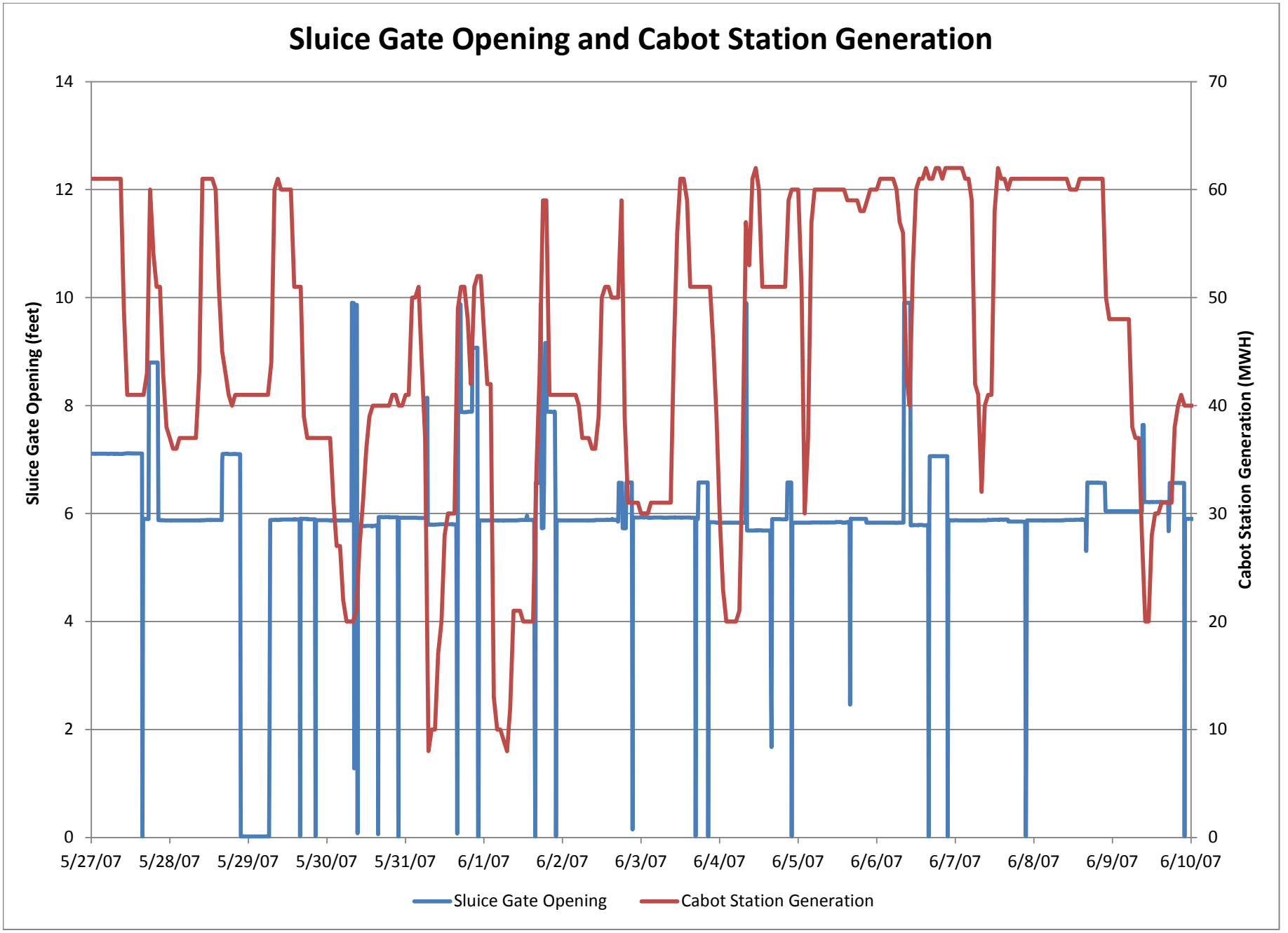
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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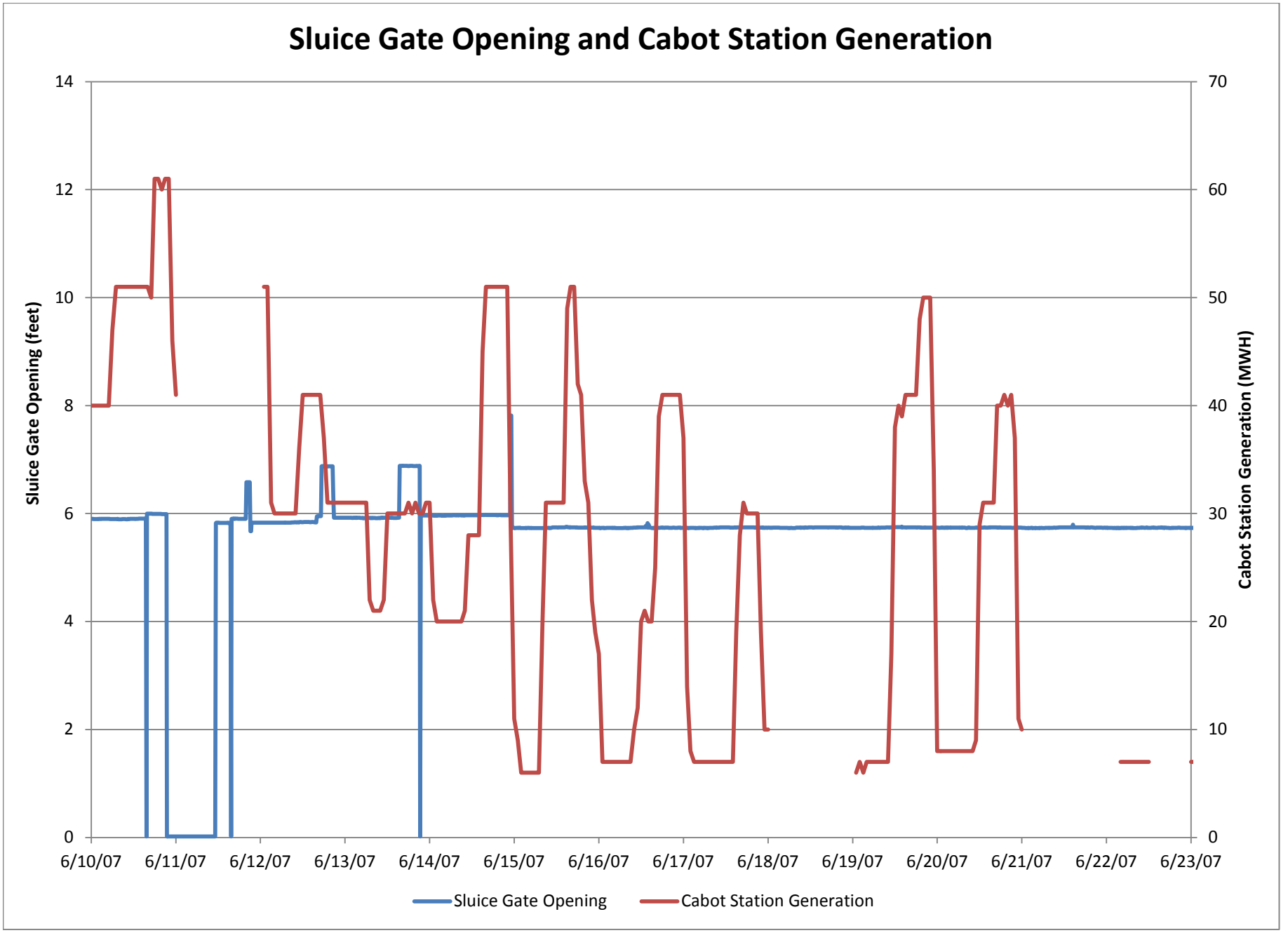
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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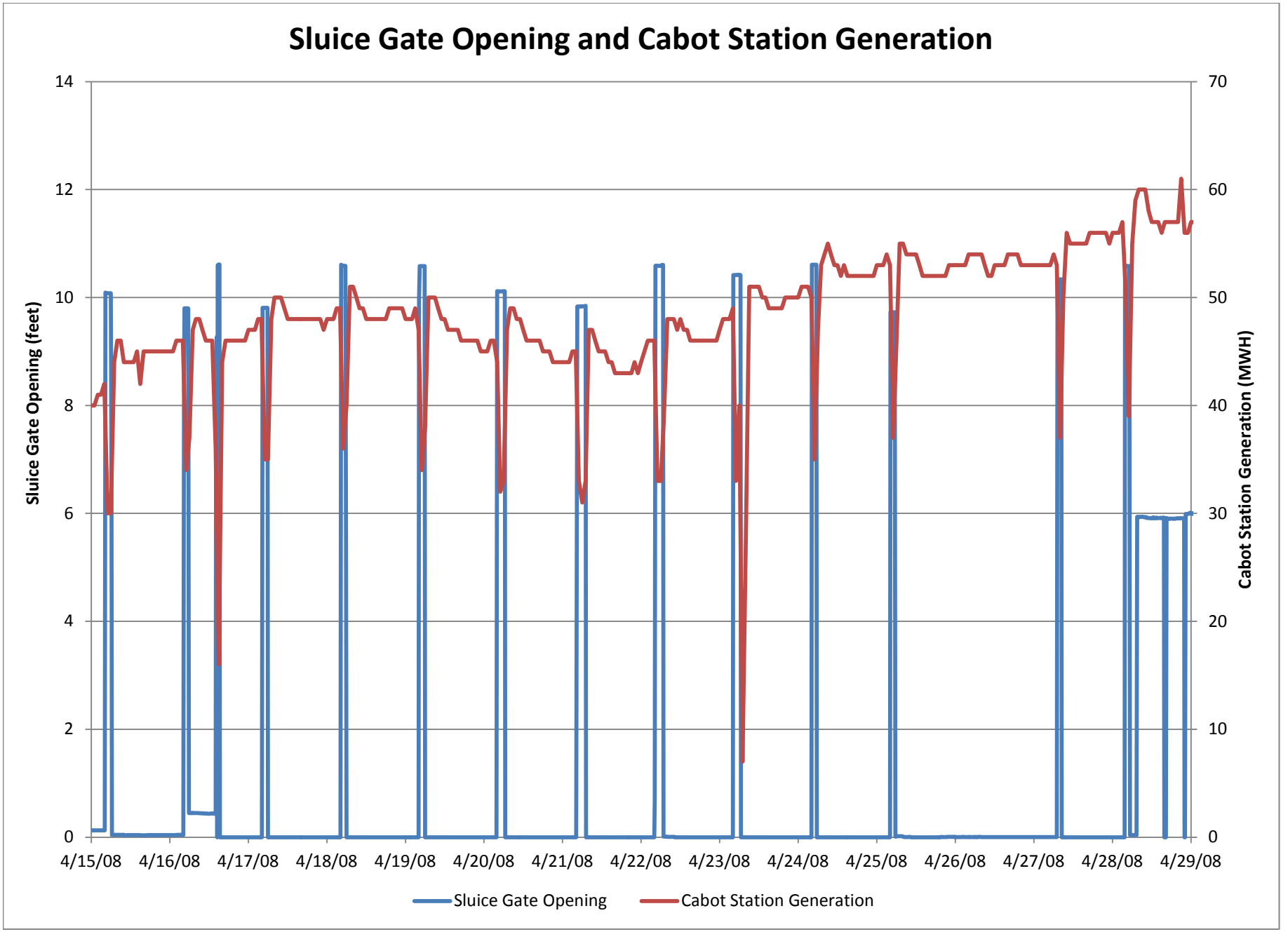
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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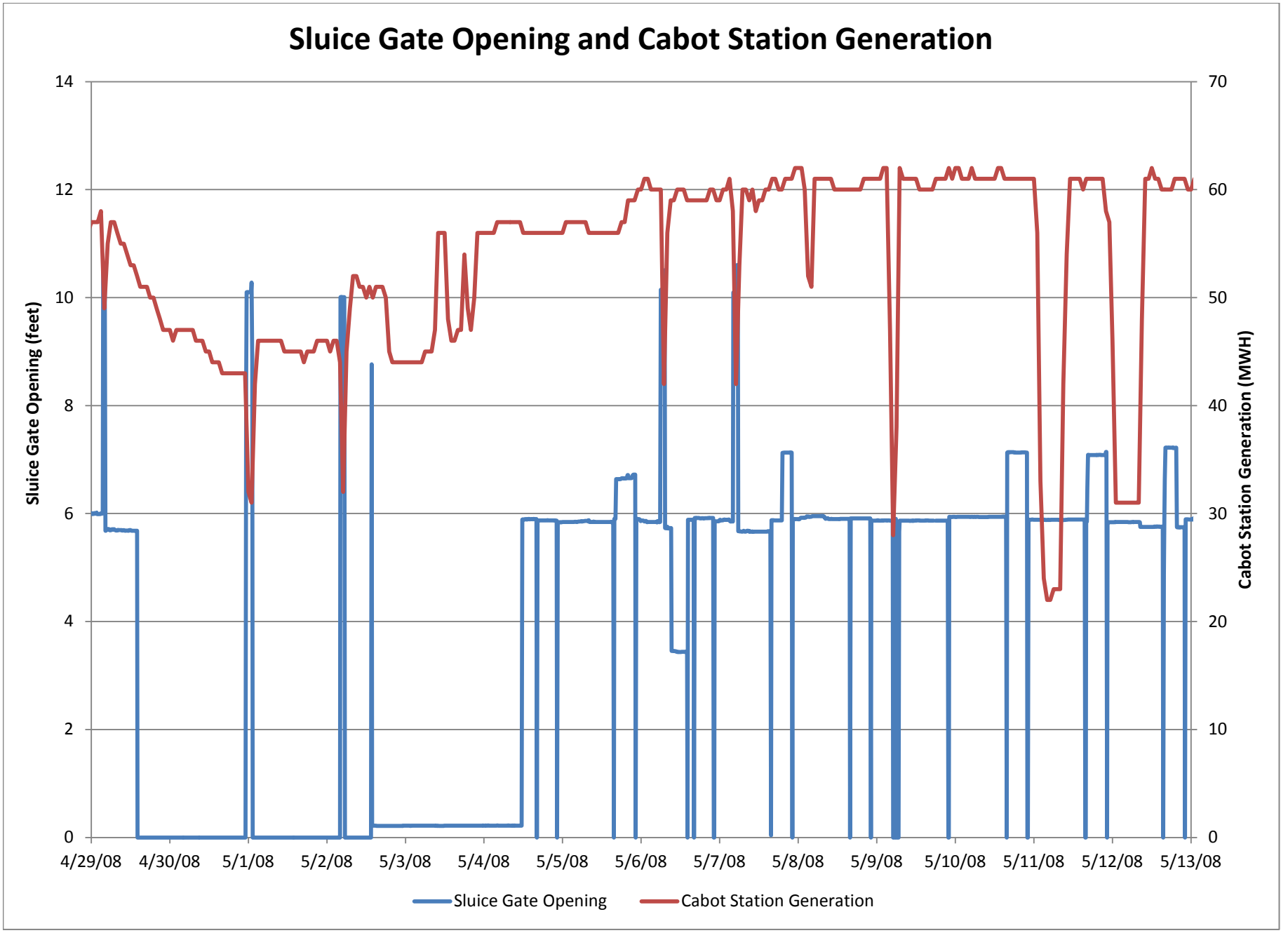
4/29/08
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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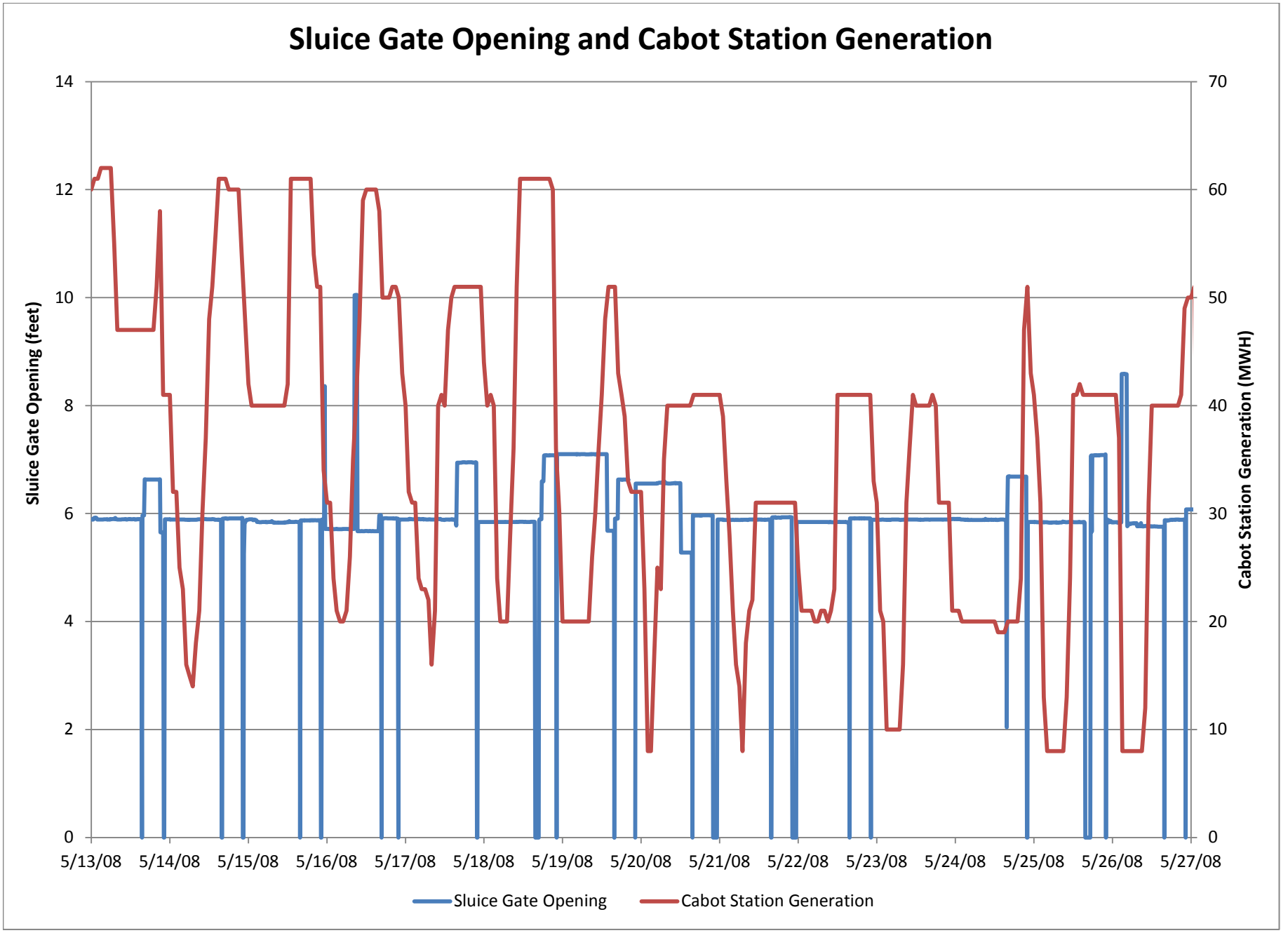
5/13/08
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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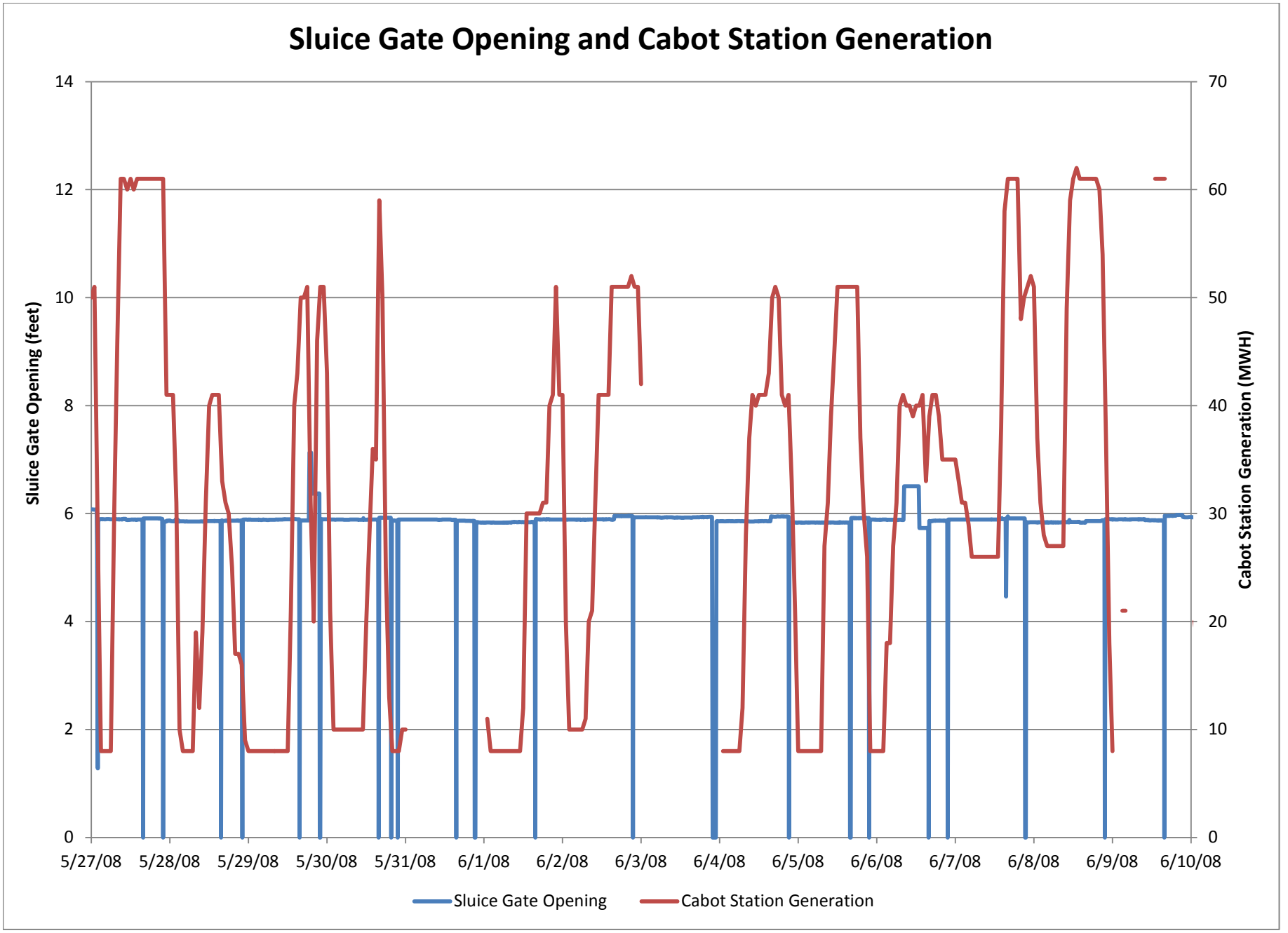
5/27/08
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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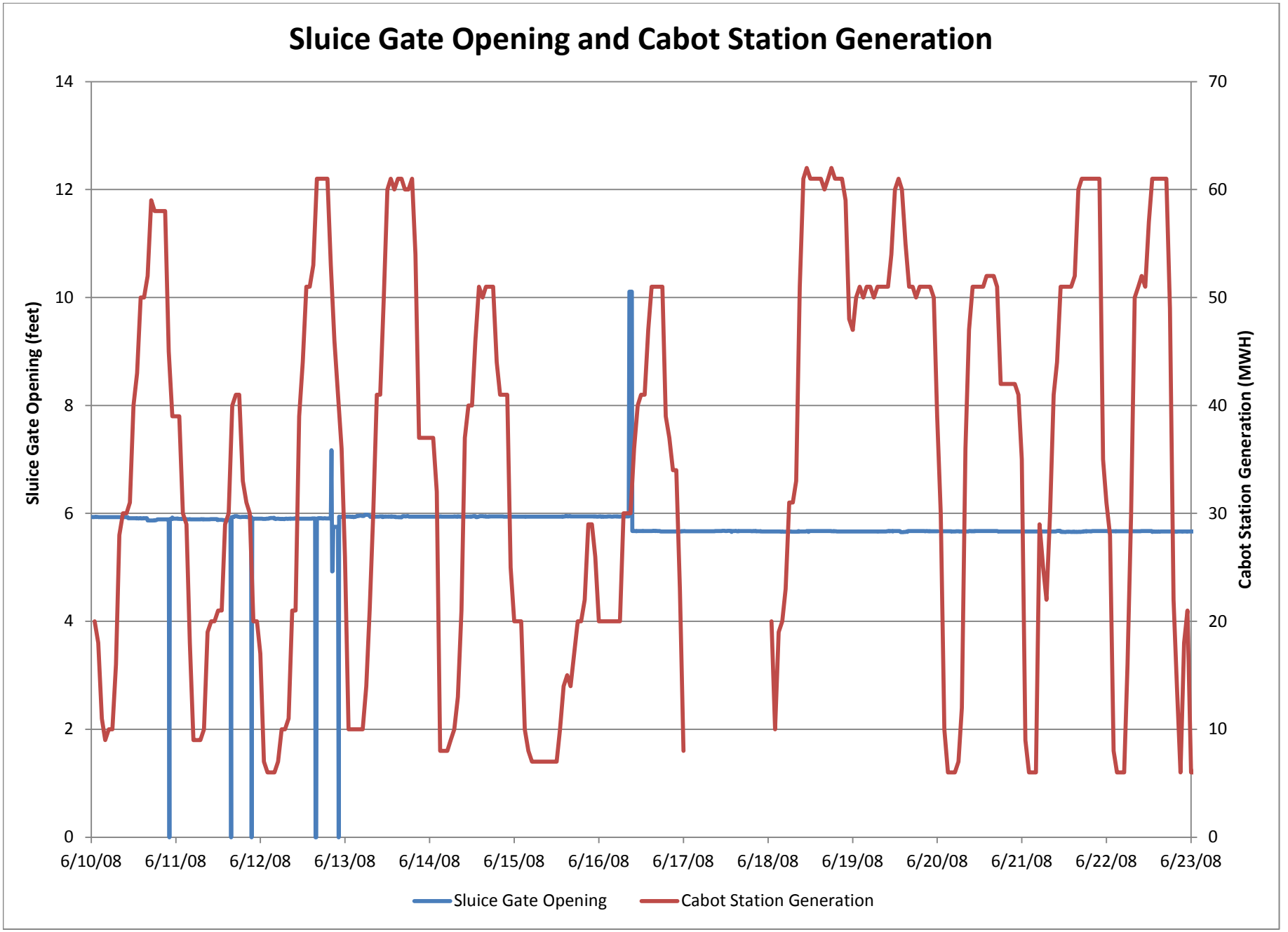
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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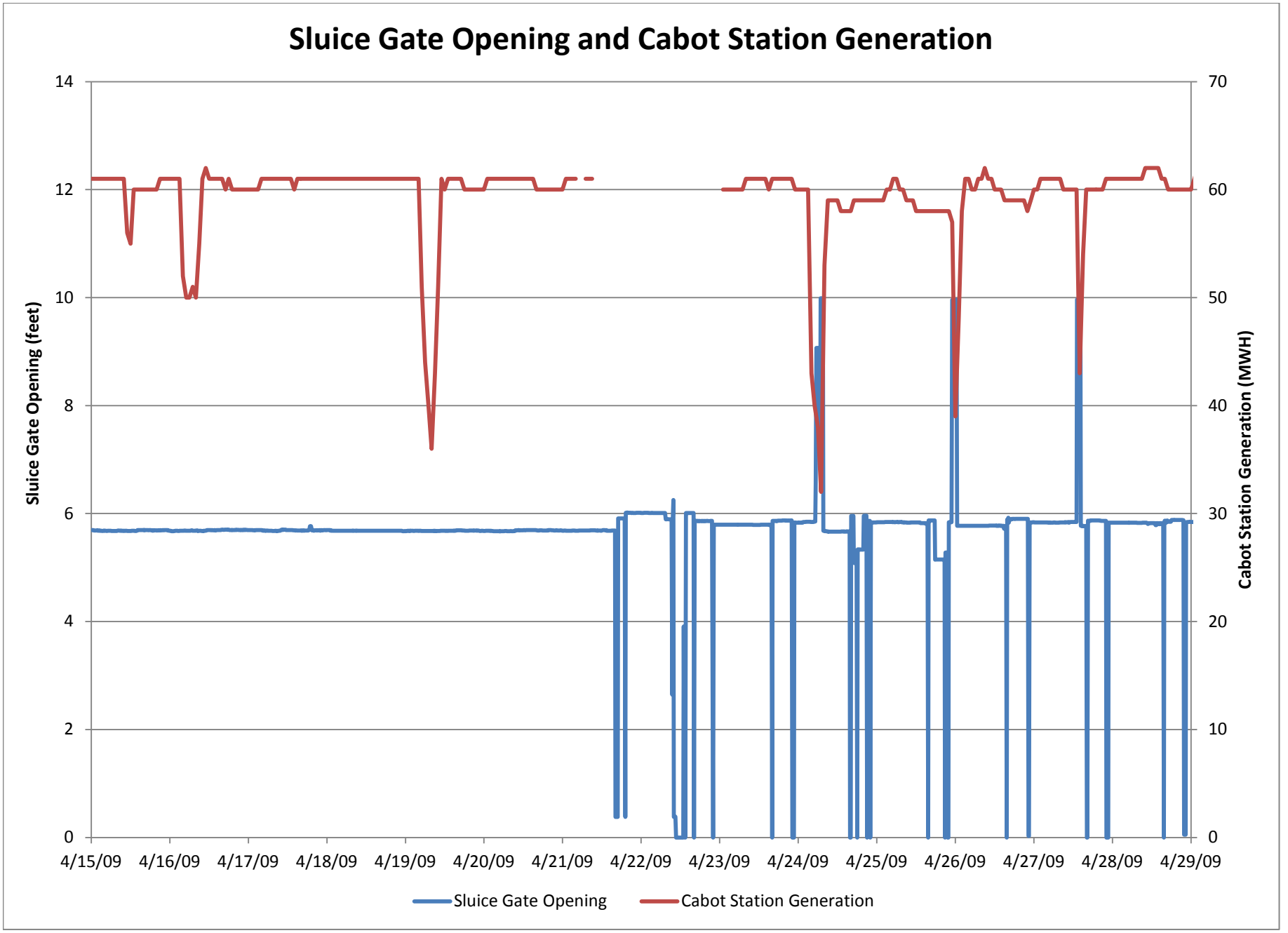
6/23/08
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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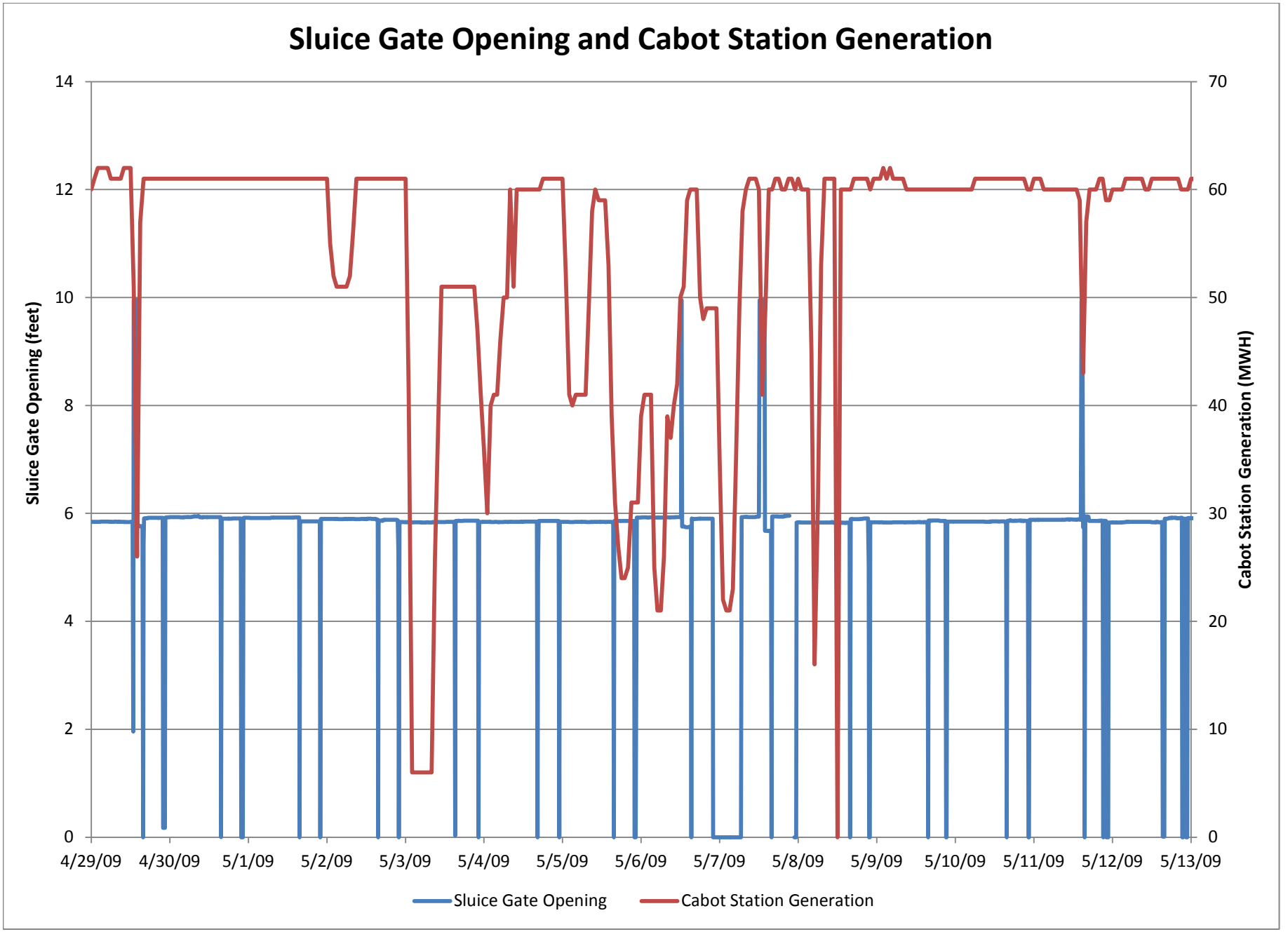
4/29/09
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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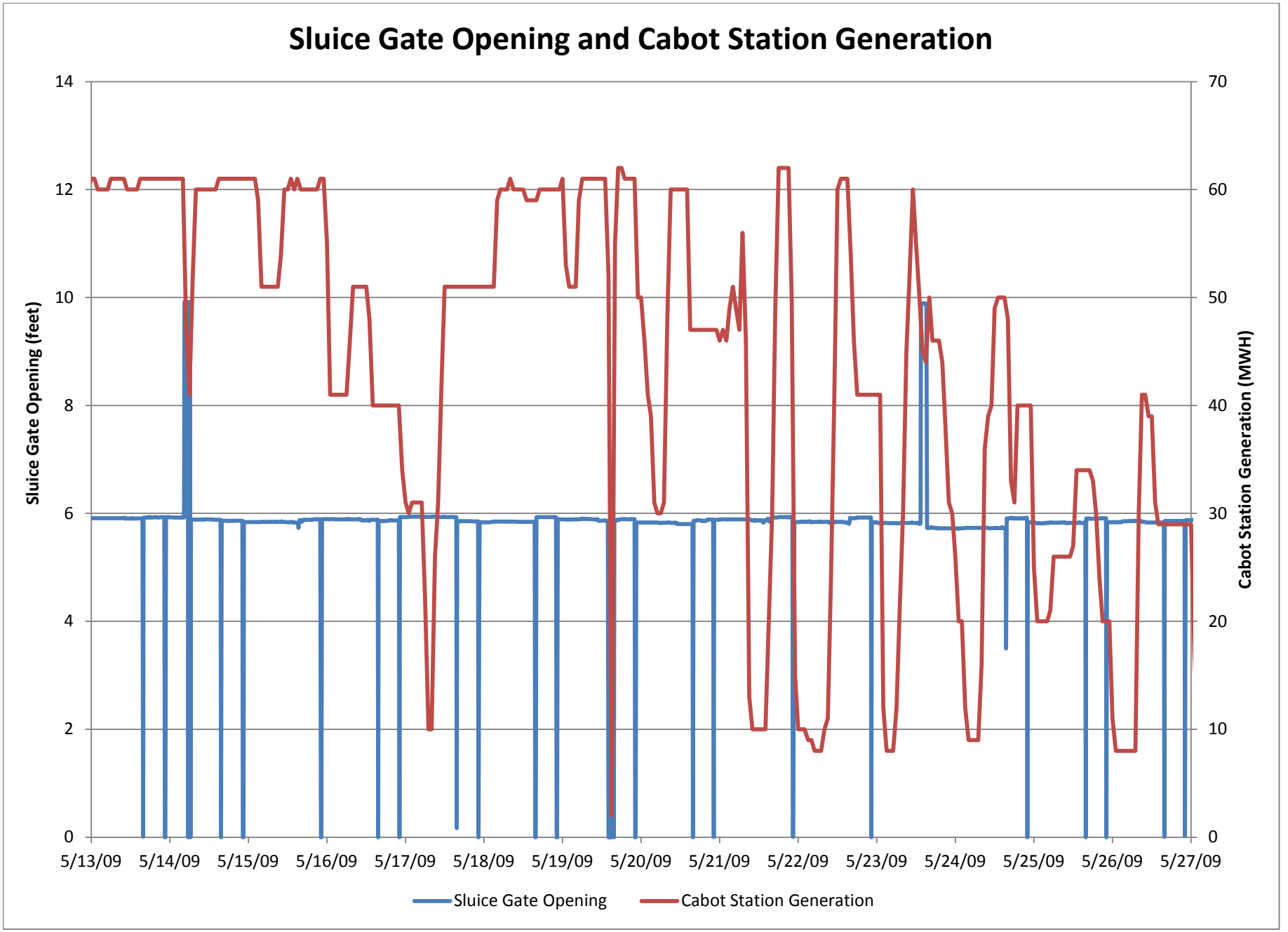
5/13/09
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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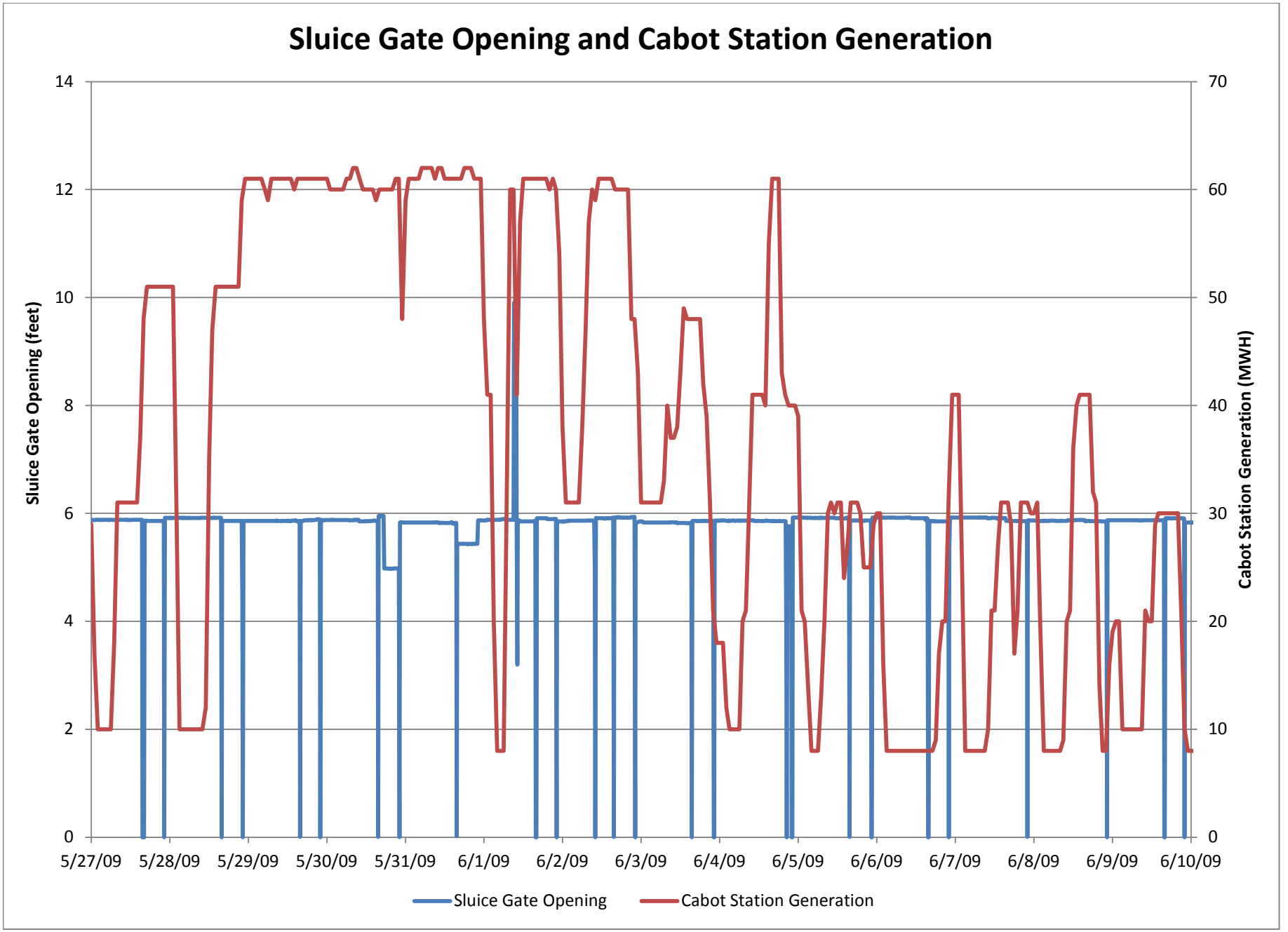
5/27/09
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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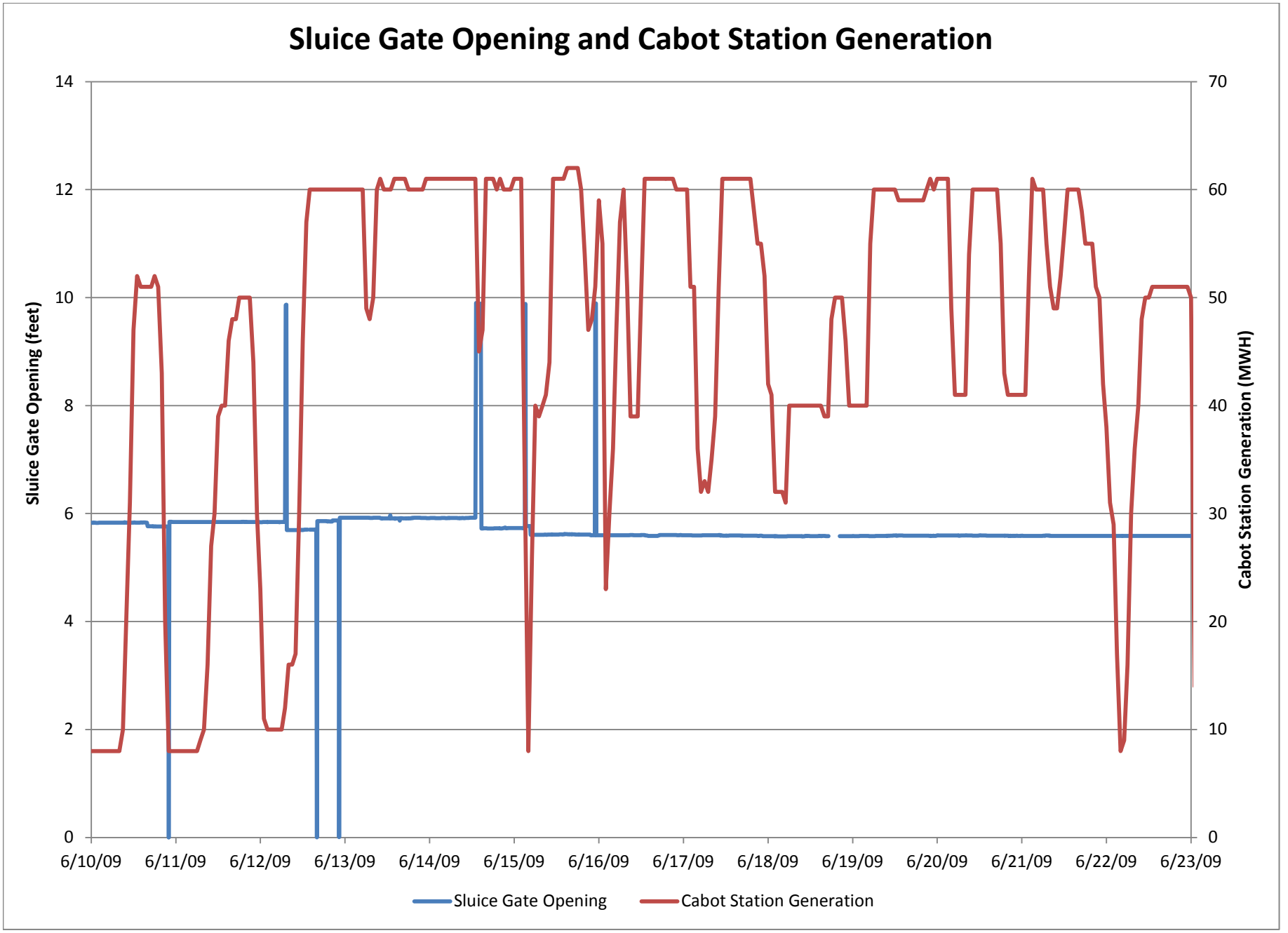
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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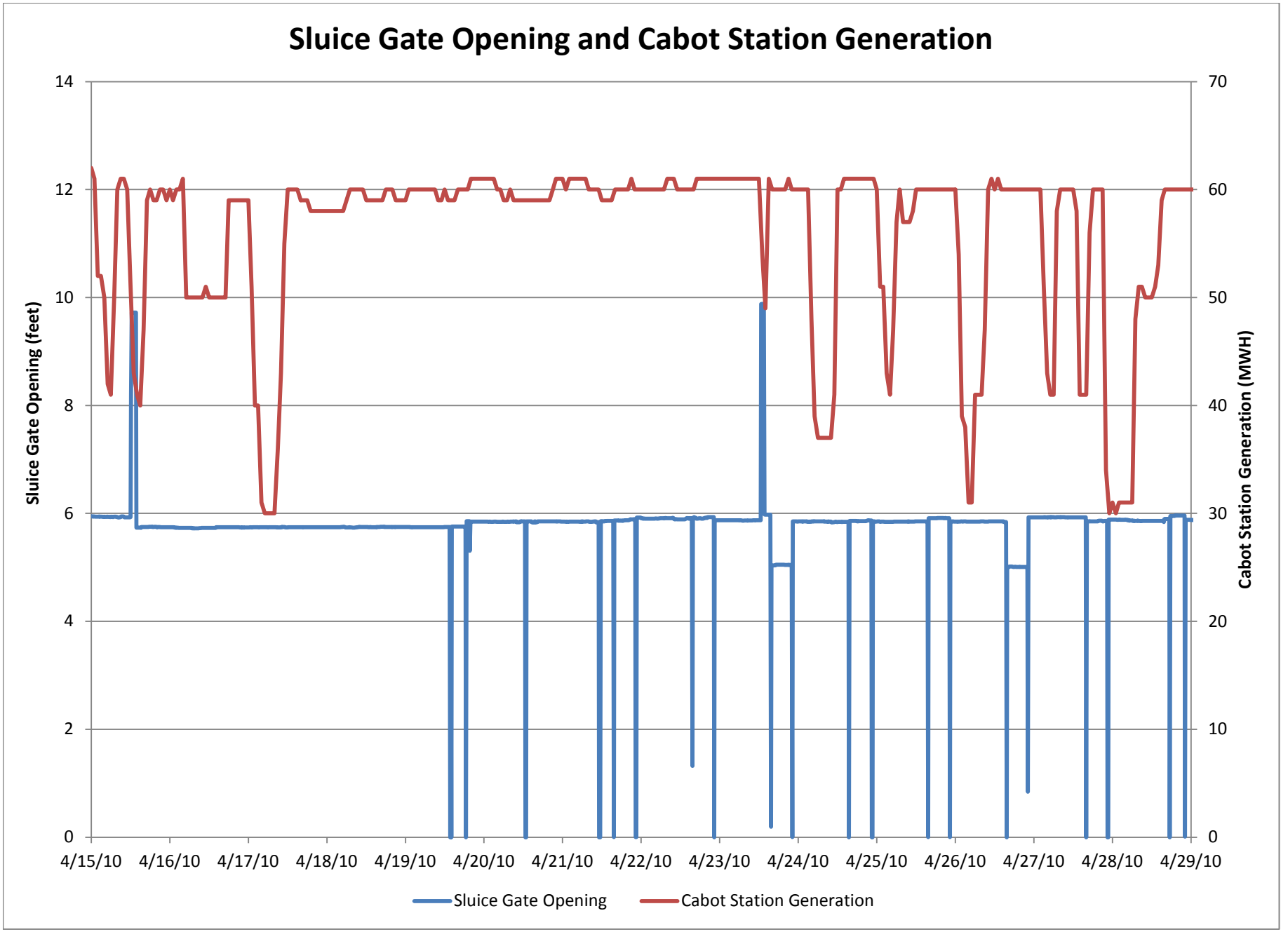
6/23/09
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
14
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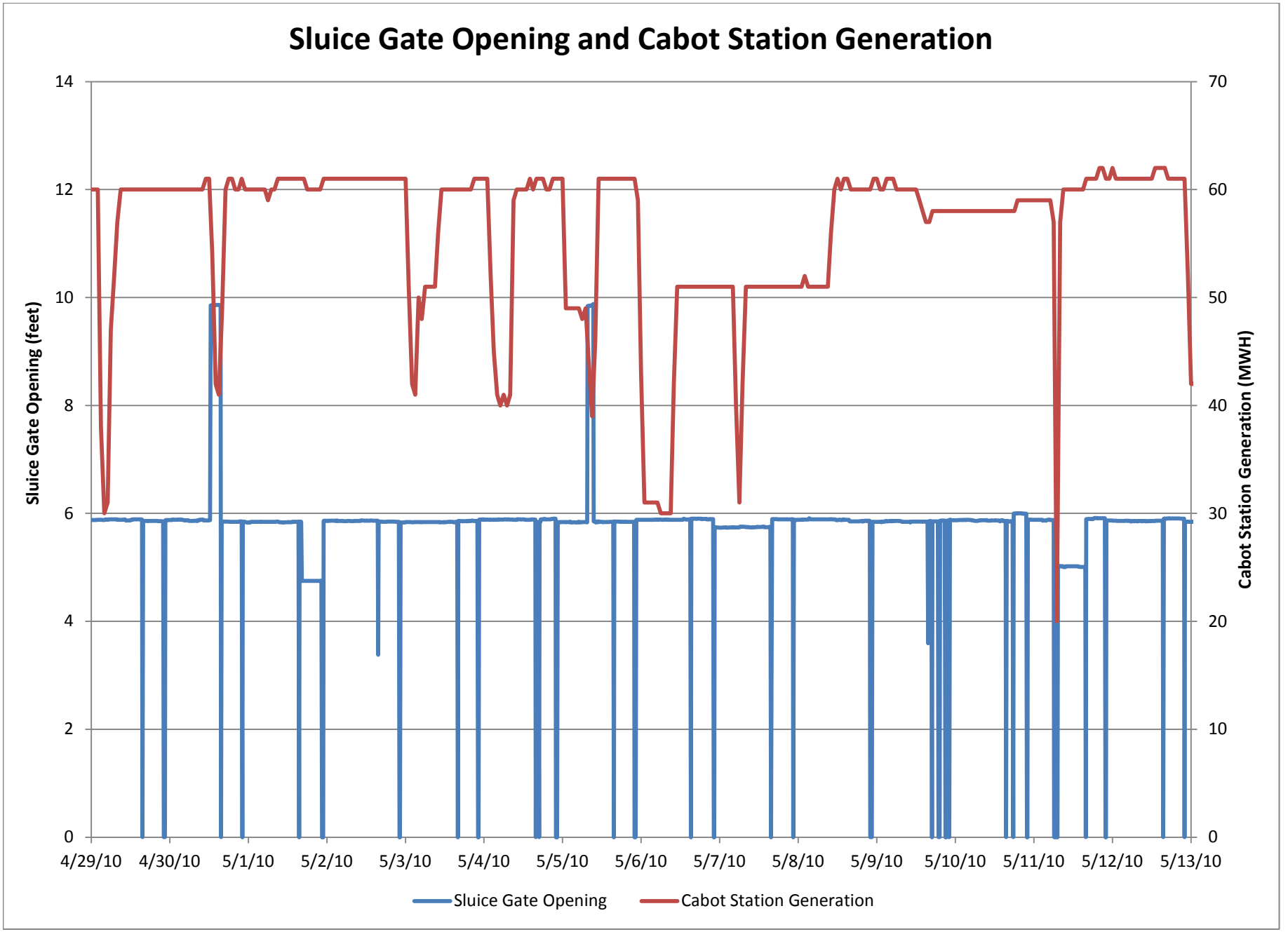
4/29/10
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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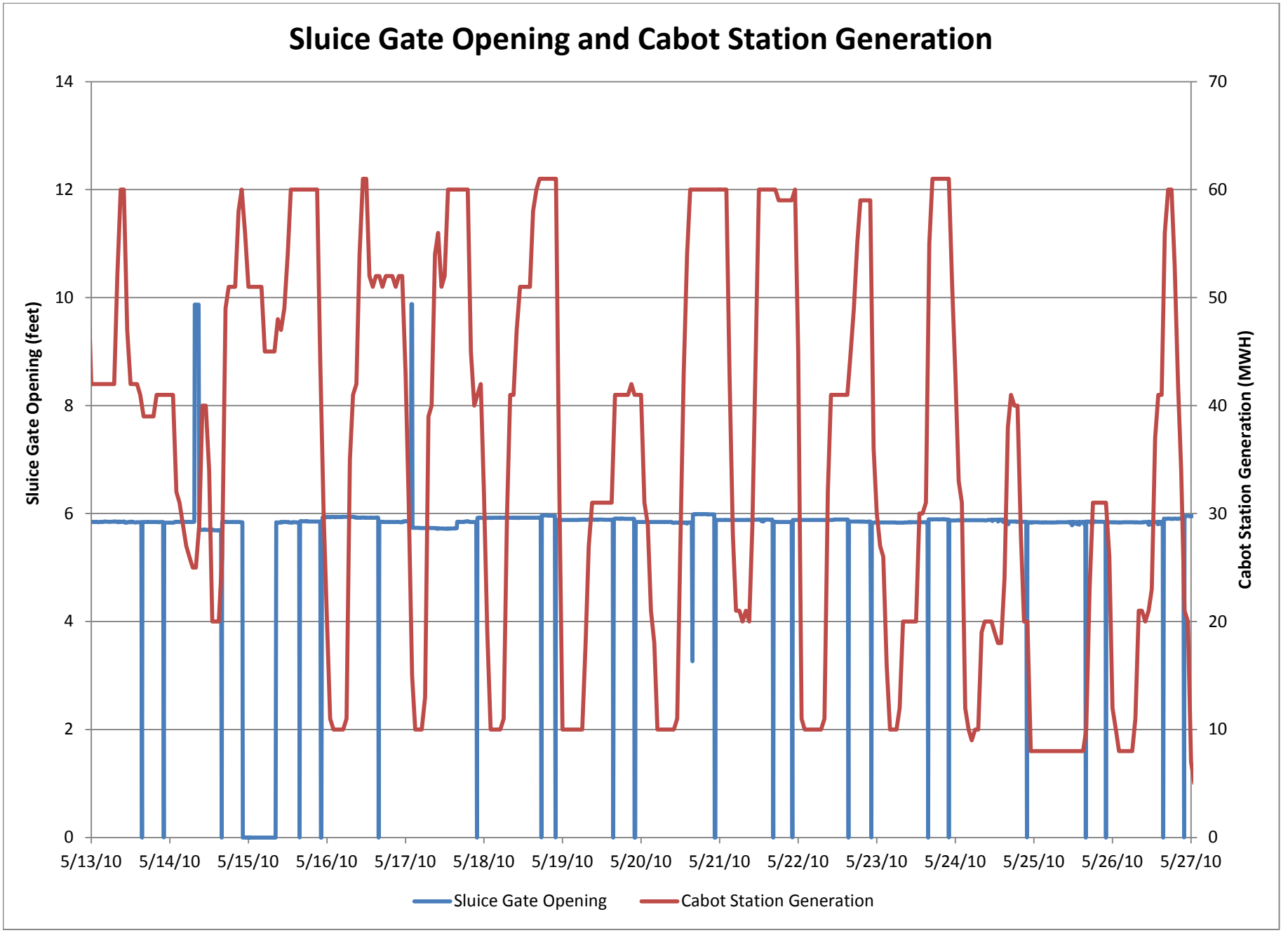
5/13/10
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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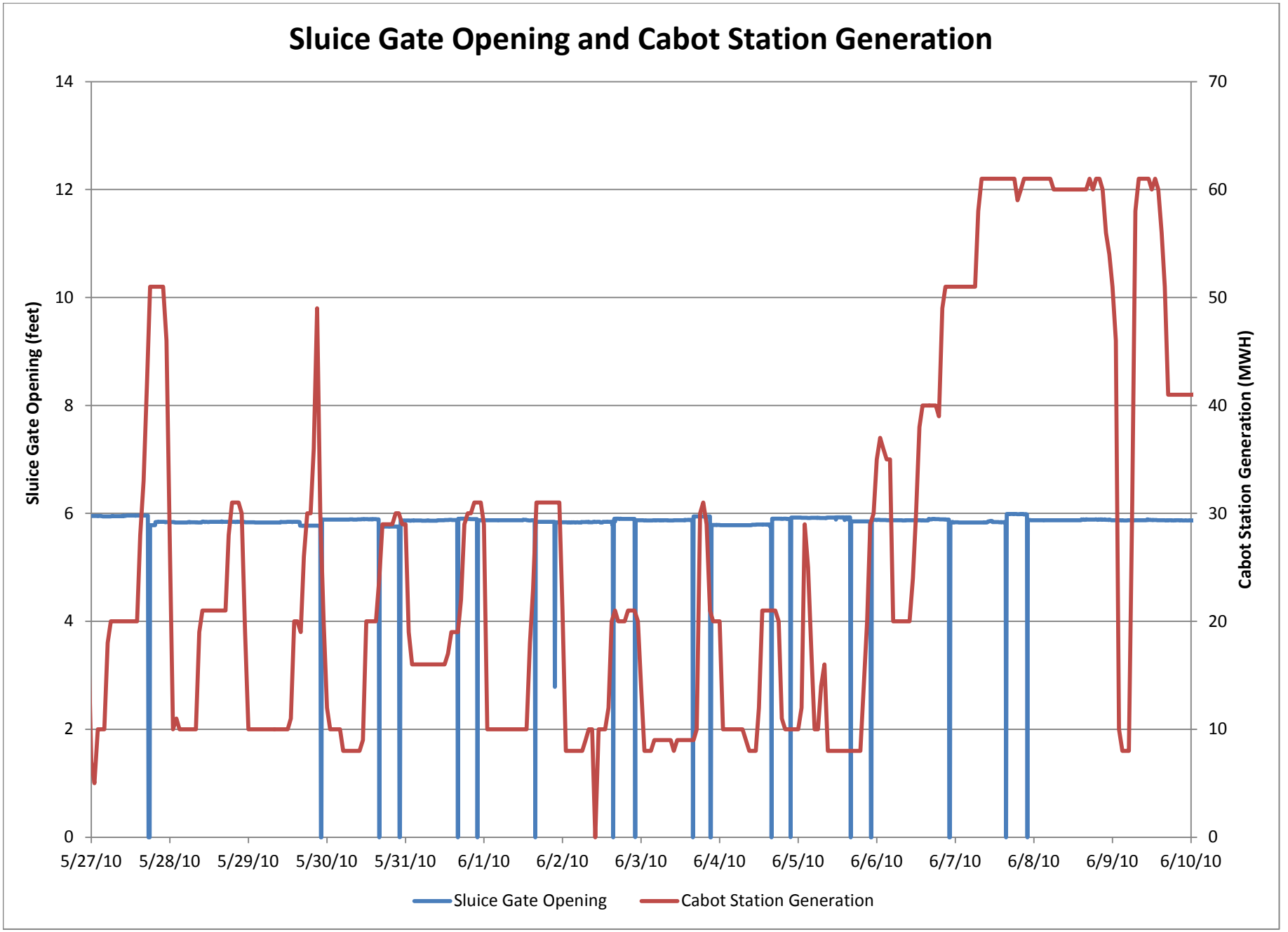
5/27/10
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
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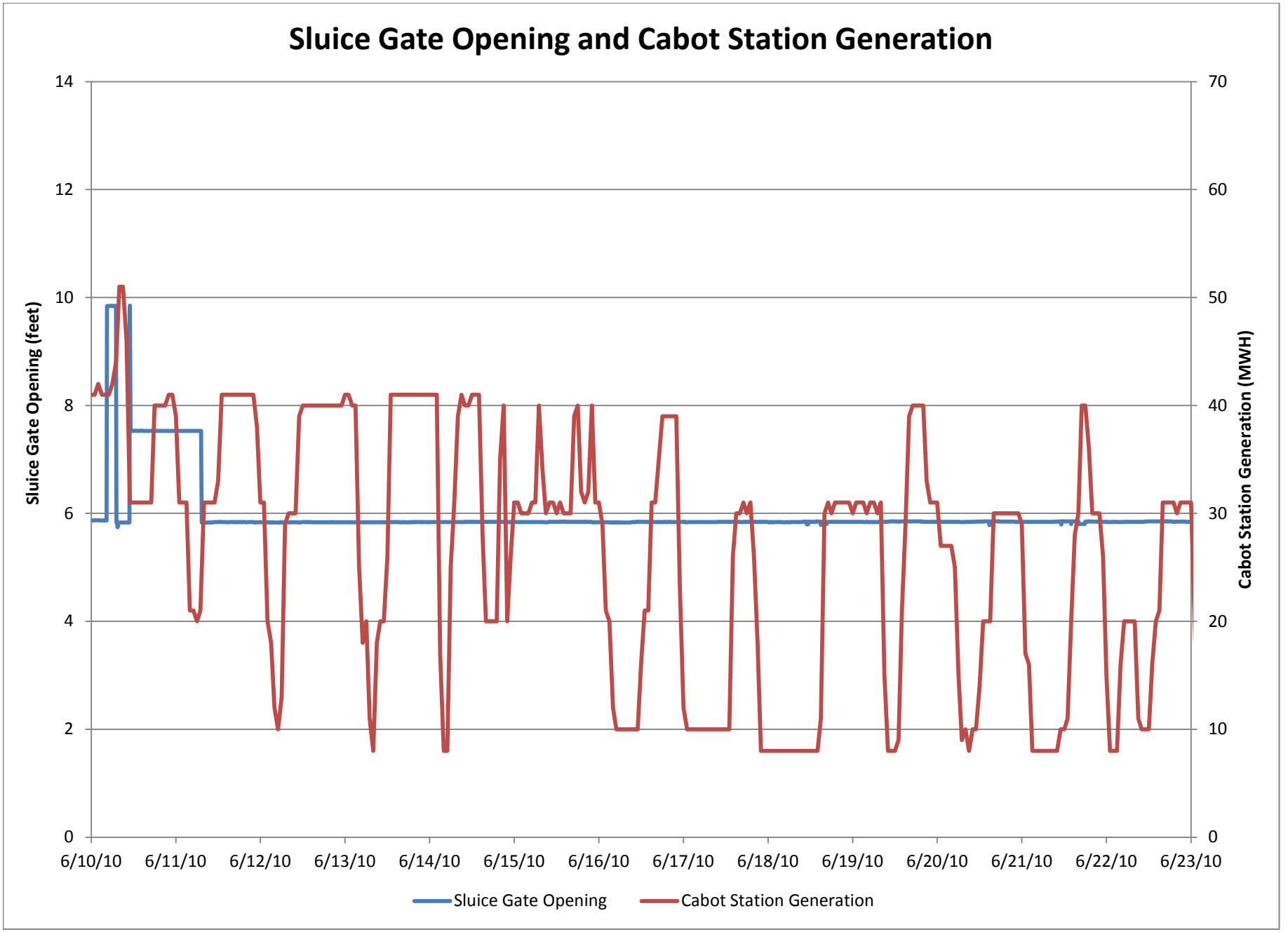
6/10/10
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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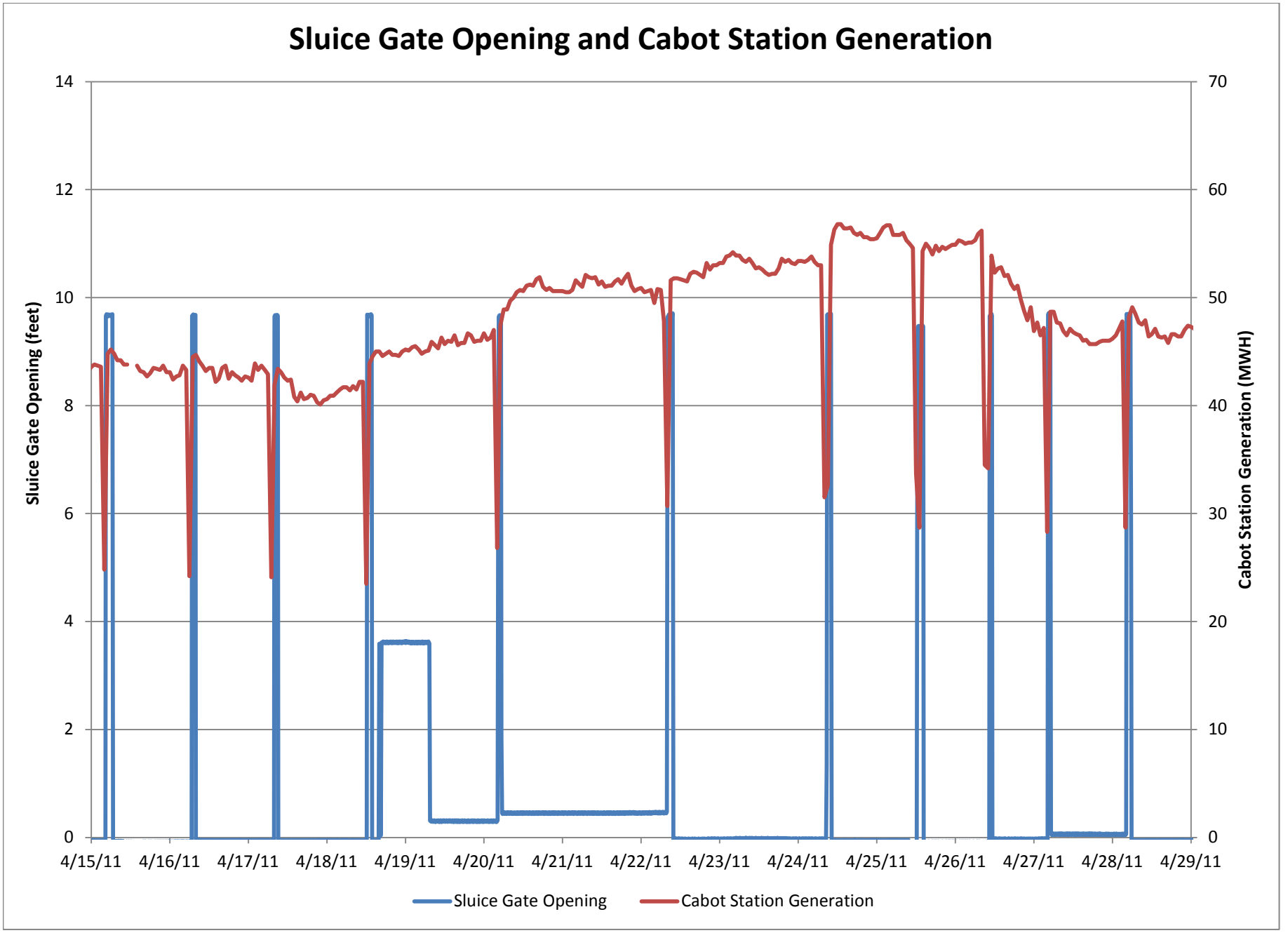
6/23/10
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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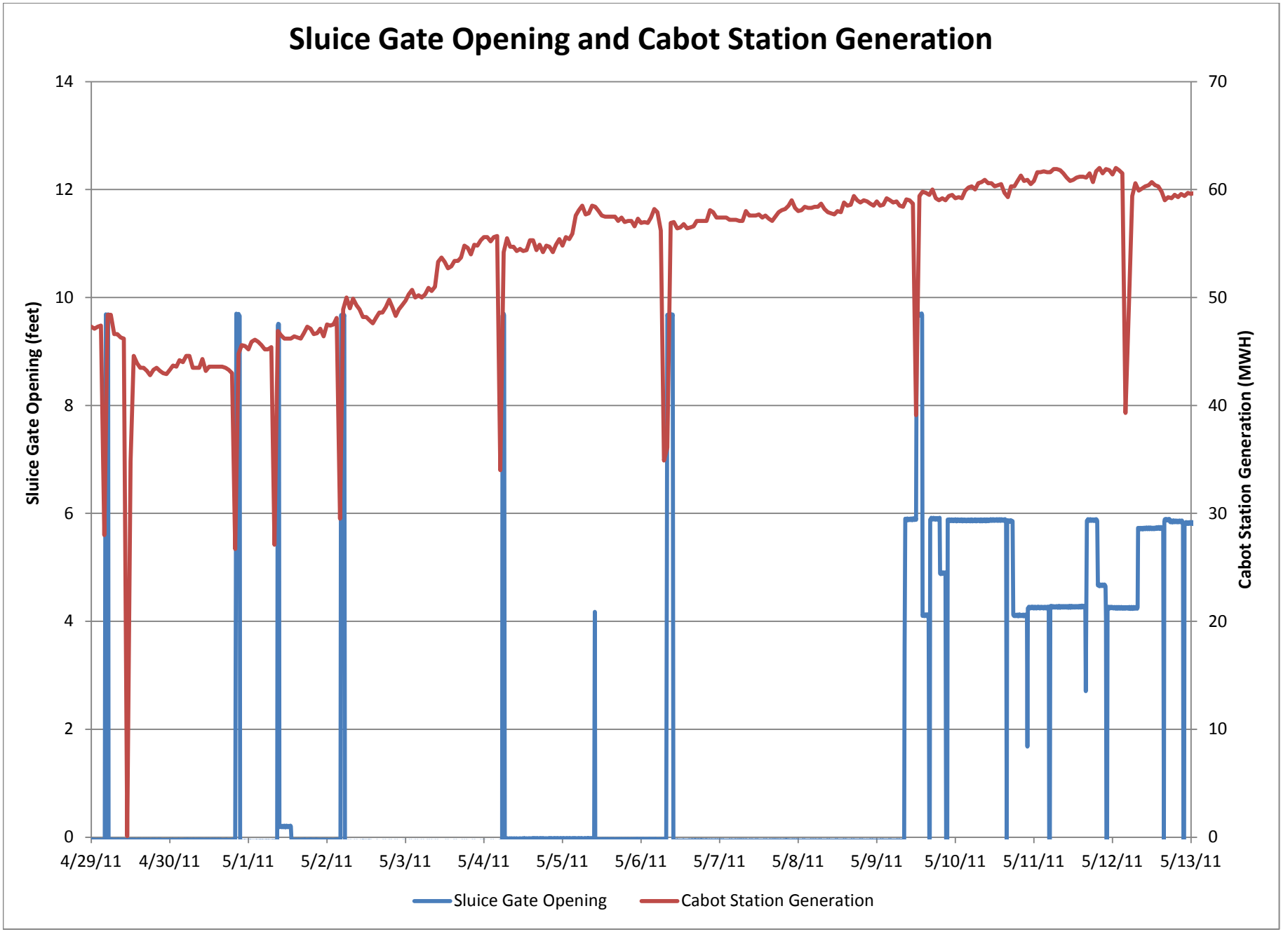
4/29/11
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
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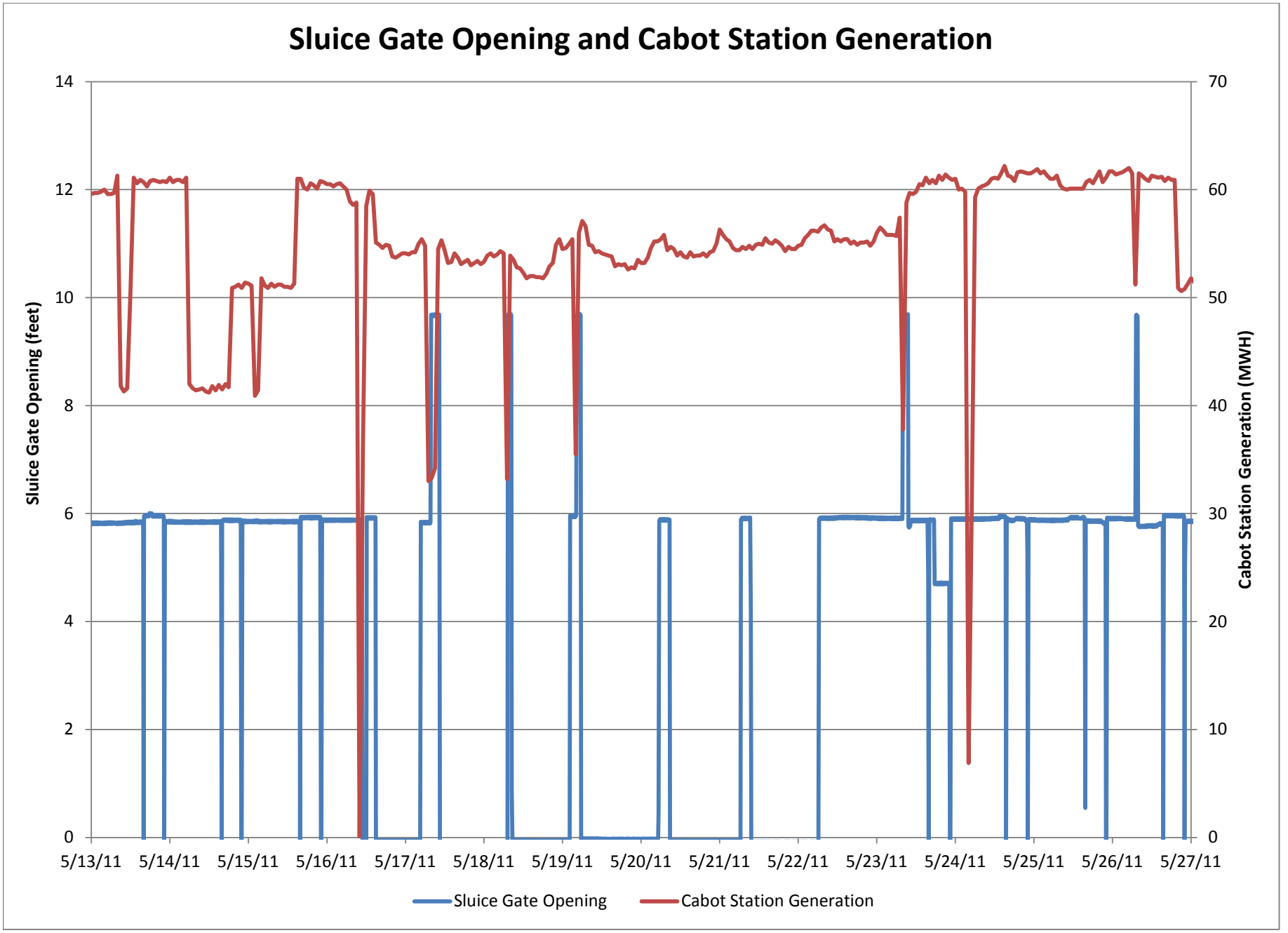
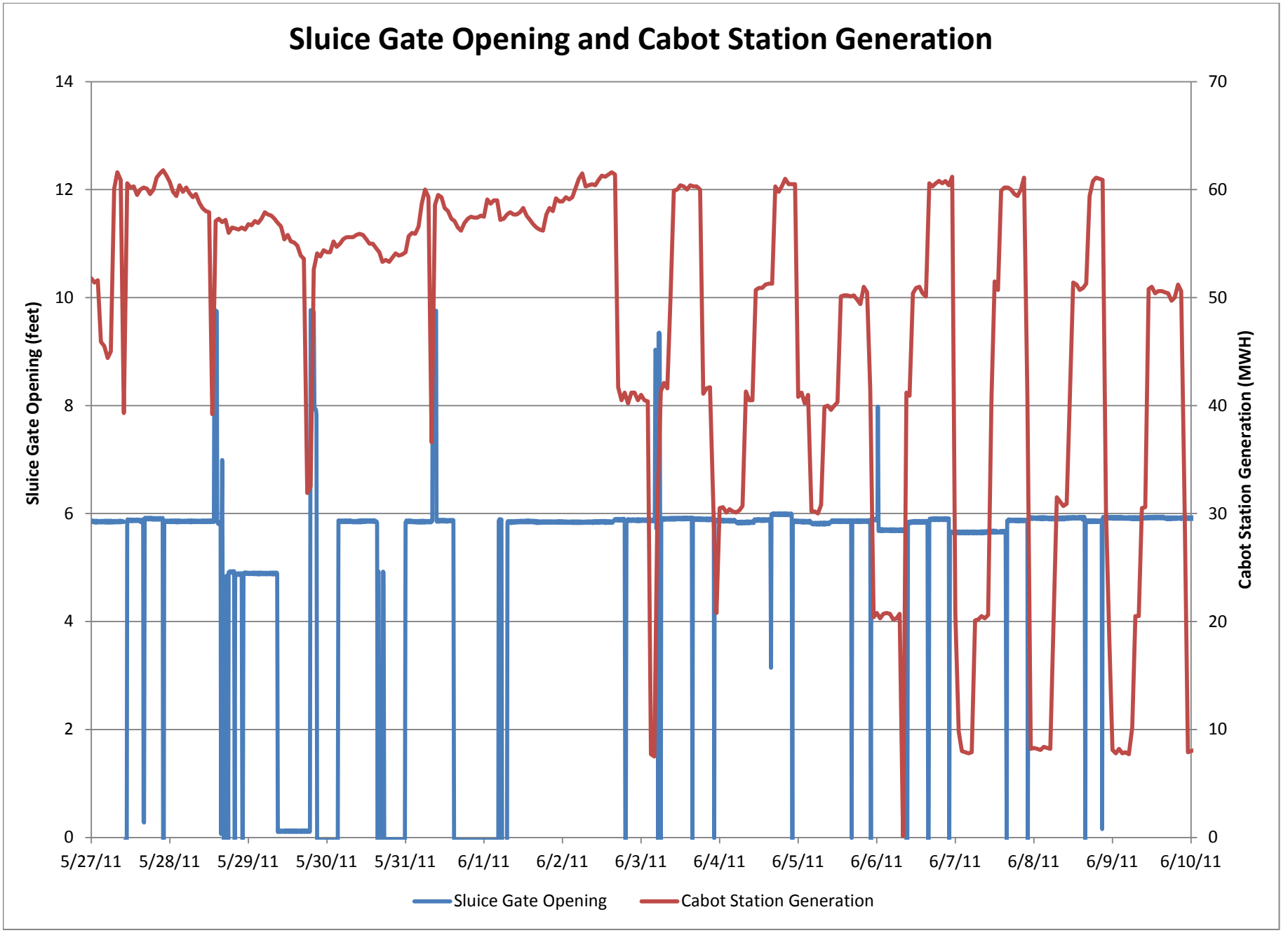
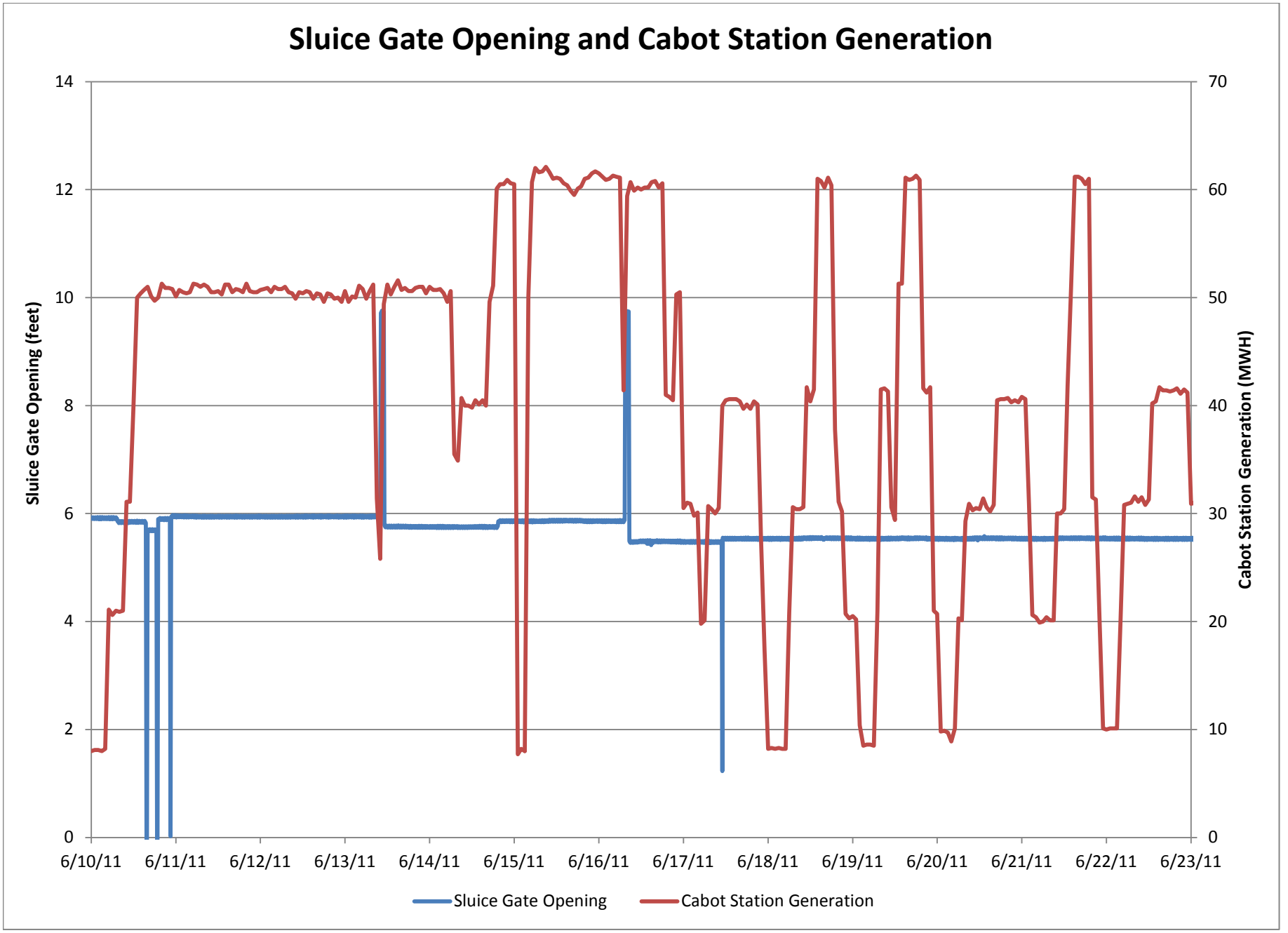
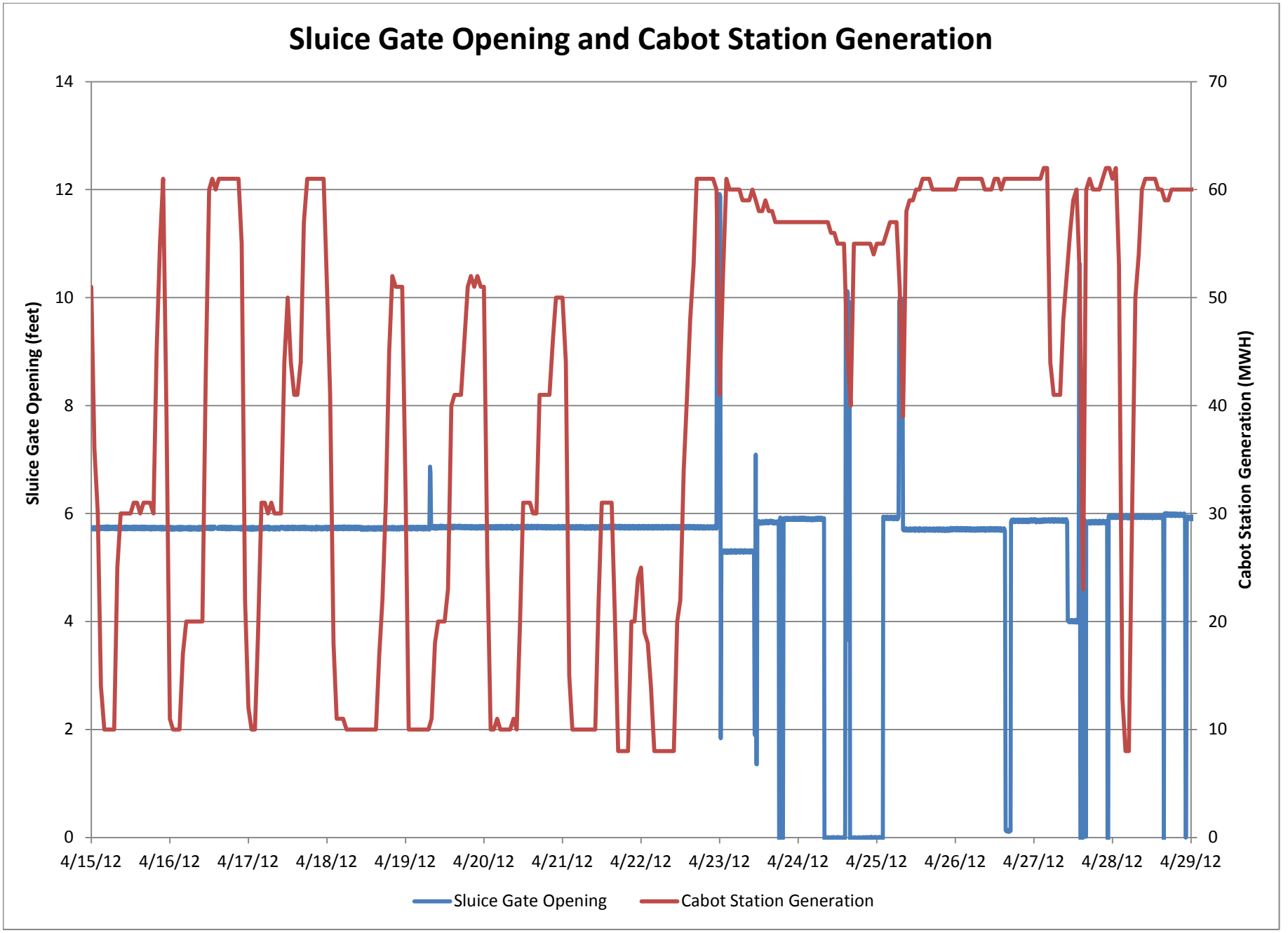
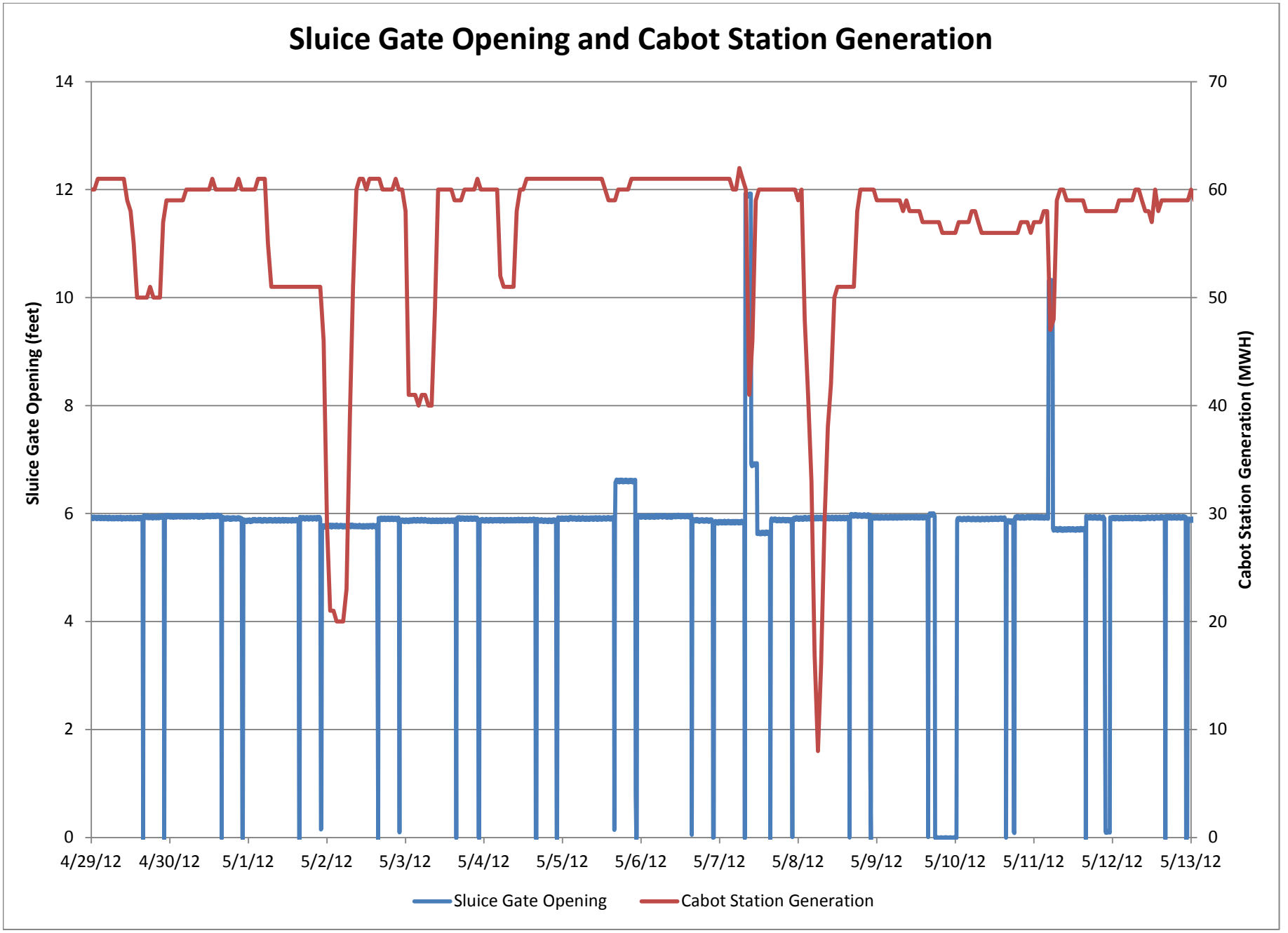
5/10/11
5/11/11
5/12/11
5/13/11
Sluice Gate Opening
Cabot Station Generation

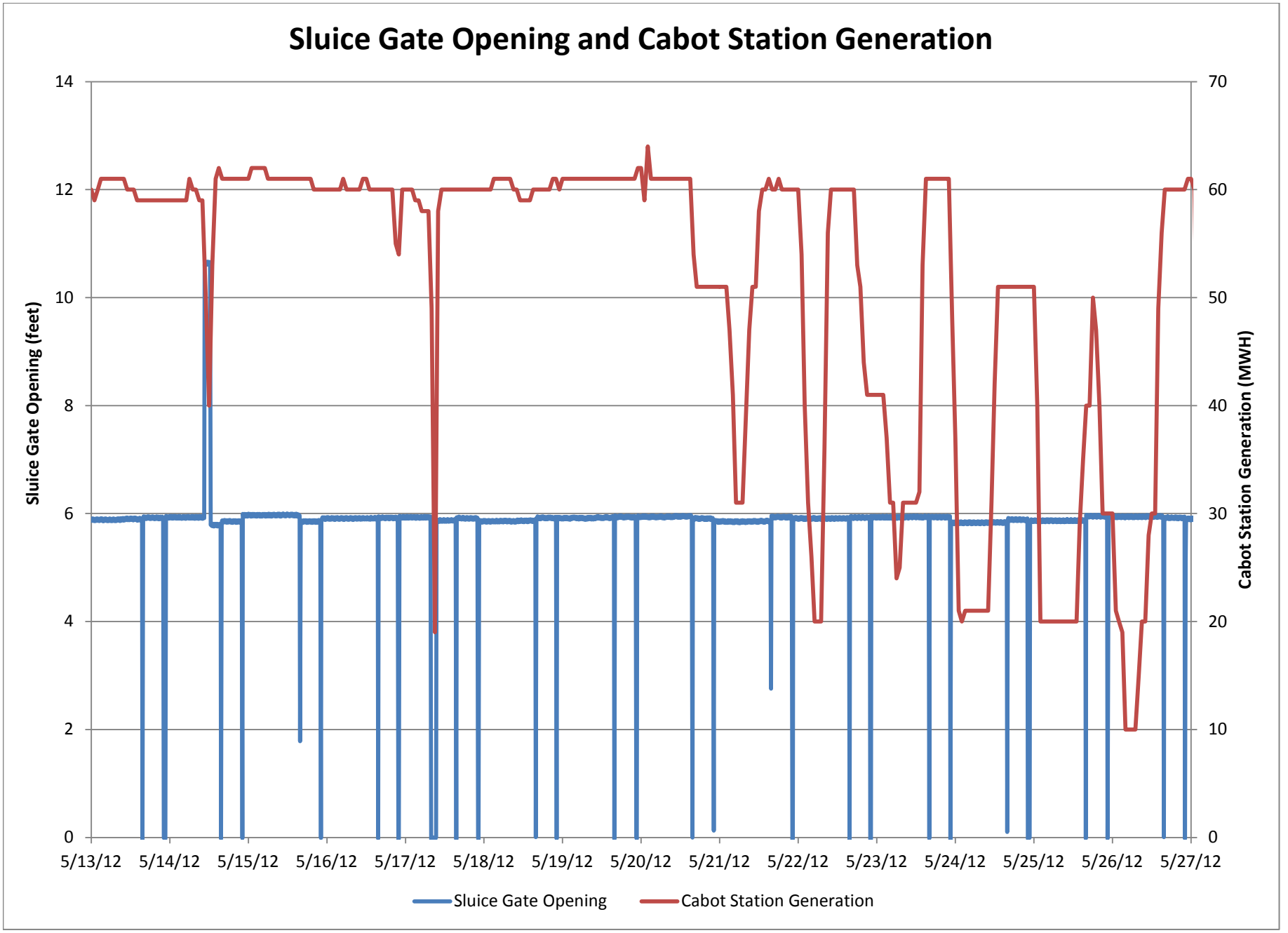

Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
0
2
4
6
8
10
12
14
0
10
20
30
40
50
60
70
5/13/11
5/14/11
5/15/11
5/16/11
5/17/11
5/18/11
5/19/11
5/20/11
5/21/11
5/22/11
5/23/11
5/24/11
5/25/11
5/26/11
5/27/11
Sluice Gate Opening
Cabot Station Generation

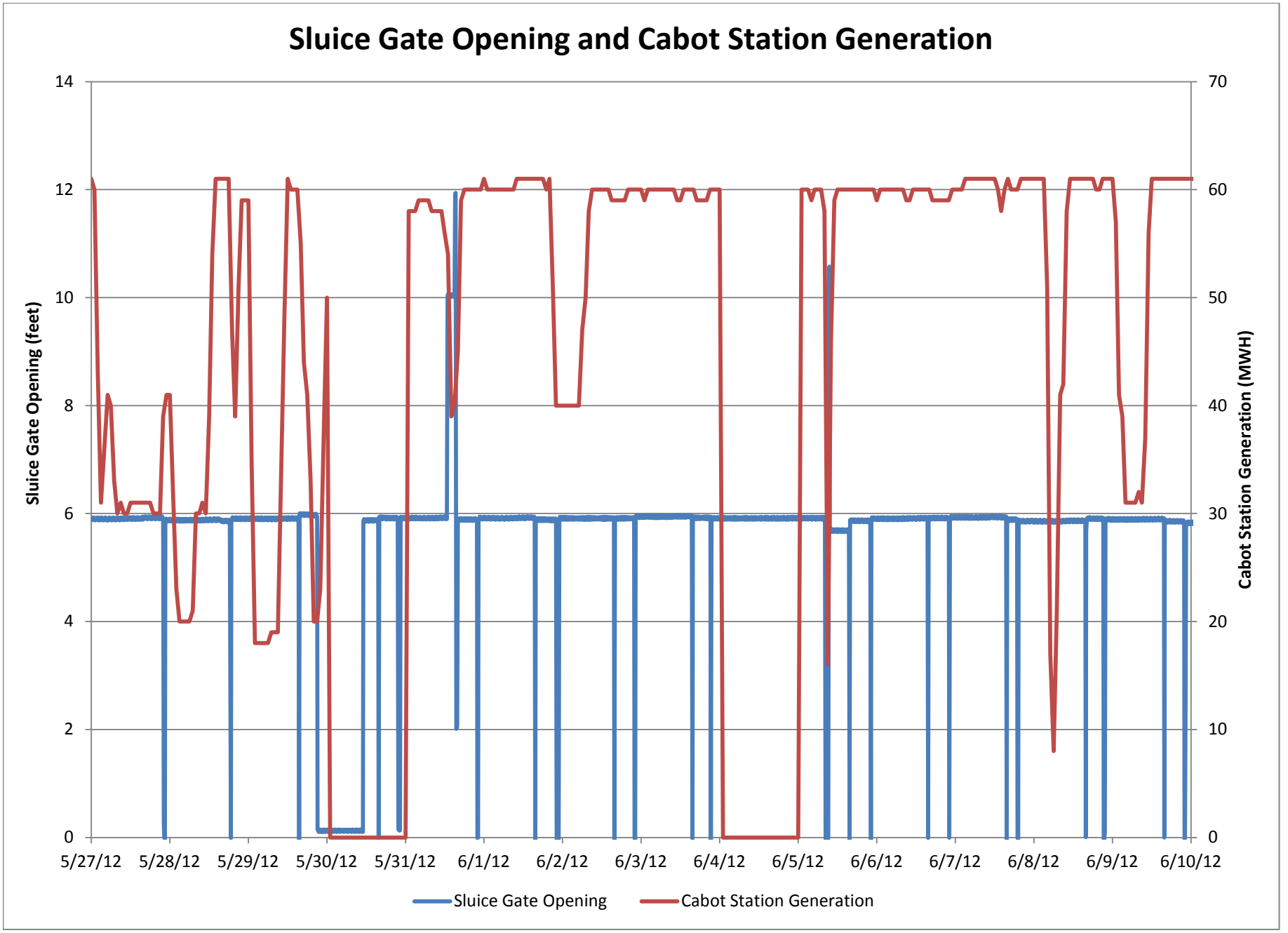

Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
14
12
10
8
6
4
2
0
70
60
50
40
30
20
10
0
5/27/11
5/28/11
5/29/11
5/30/11
5/31/11
6/1/11
6/2/11
6/3/11
6/4/11
6/5/11
6/6/11
6/7/11
6/8/11
6/9/11
6/10/11
Sluice Gate Opening
Cabot Station Generation

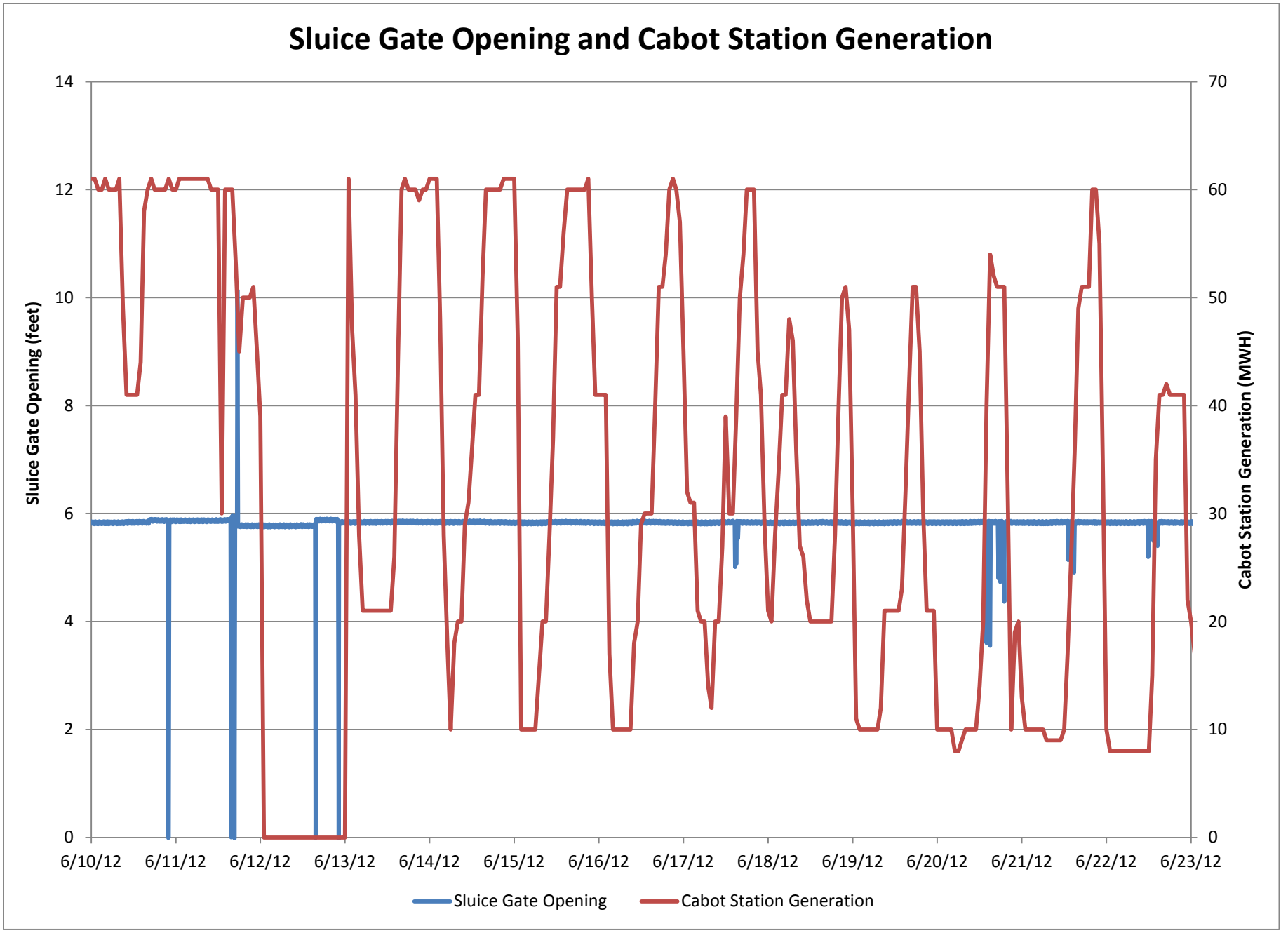

Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
0
2
4
6
8
10
12
14
0
10
20
30
40
50
60
70
6/10/11
6/11/11
6/12/11
6/13/11
6/14/11
6/15/11
6/16/11
6/17/11
6/18/11
6/19/11
6/20/11
6/21/11
6/22/11
6/23/11
Sluice Gate Opening
Cabot Station Generation


Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
0
2
4
6
8
10
12
14
0
10
20
30
40
50
60
70
4/15/12
4/16/12
4/17/12
4/18/12
4/19/12
4/20/12
4/21/12
4/22/12
4/23/12
4/24/12
4/25/12
4/26/12
4/27/12
4/28/12
4/29/12
Sluice Gate Opening
Cabot Station Generation

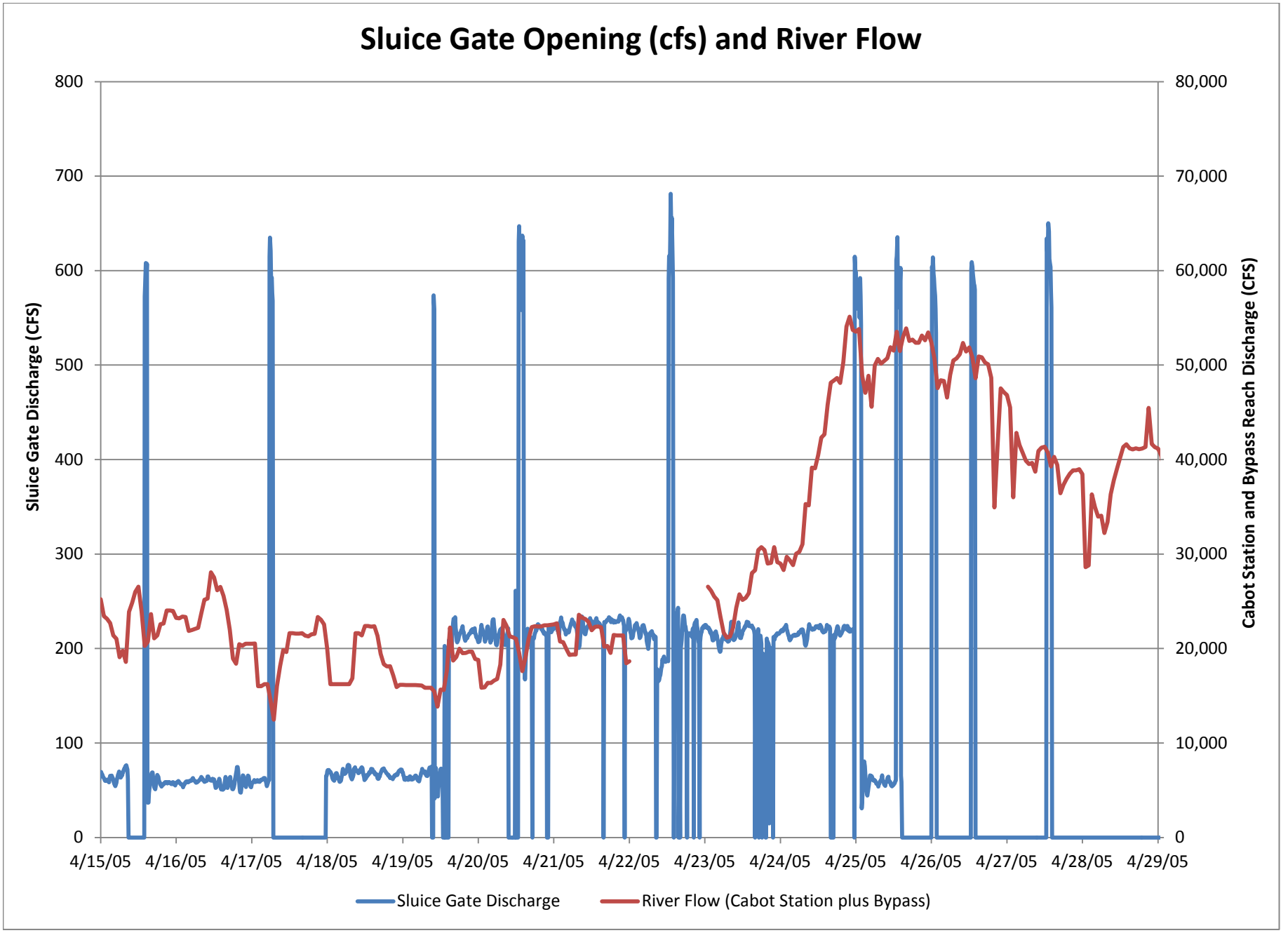

Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
14
12
10
8
6
4
2
0
70
60
50
40
30
20
10
0
4/29/12
4/30/12
5/1/12
5/2/12
5/3/12
5/4/12
5/5/12
5/6/12
5/7/12
5/8/12
5/9/12
5/10/12
5/11/12
5/12/12
5/13/12
Sluice Gate Opening
Cabot Station Generation

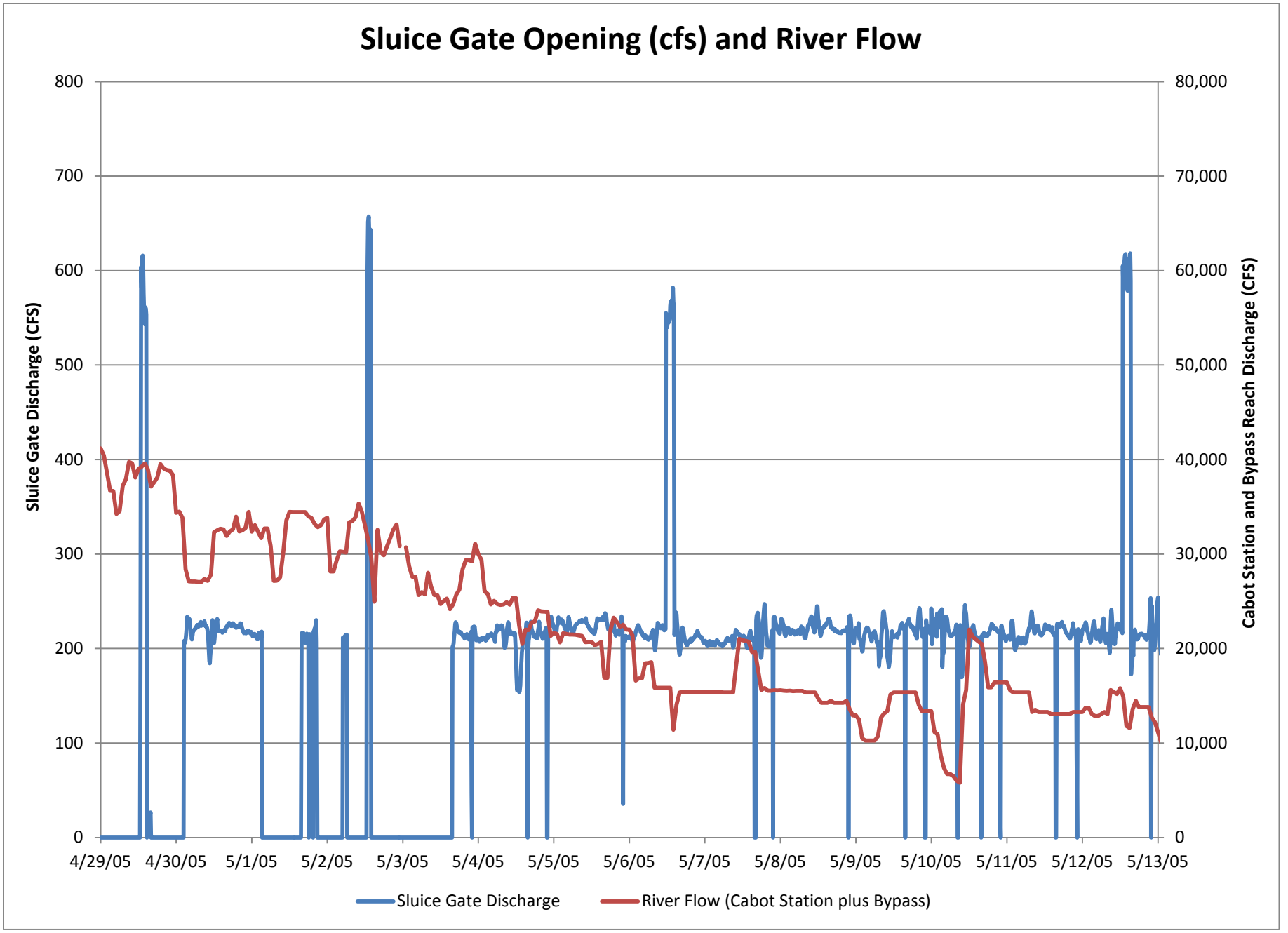

Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
0
2
4
6
8
10
12
14
0
10
20
30
40
50
60
70
5/13/12
5/14/12
5/15/12
5/16/12
5/17/12
5/18/12
5/19/12
5/20/12
5/21/12
5/22/12
5/23/12
5/24/12
5/25/12
5/26/12
5/27/12
Sluice Gate Opening
Cabot Station Generation

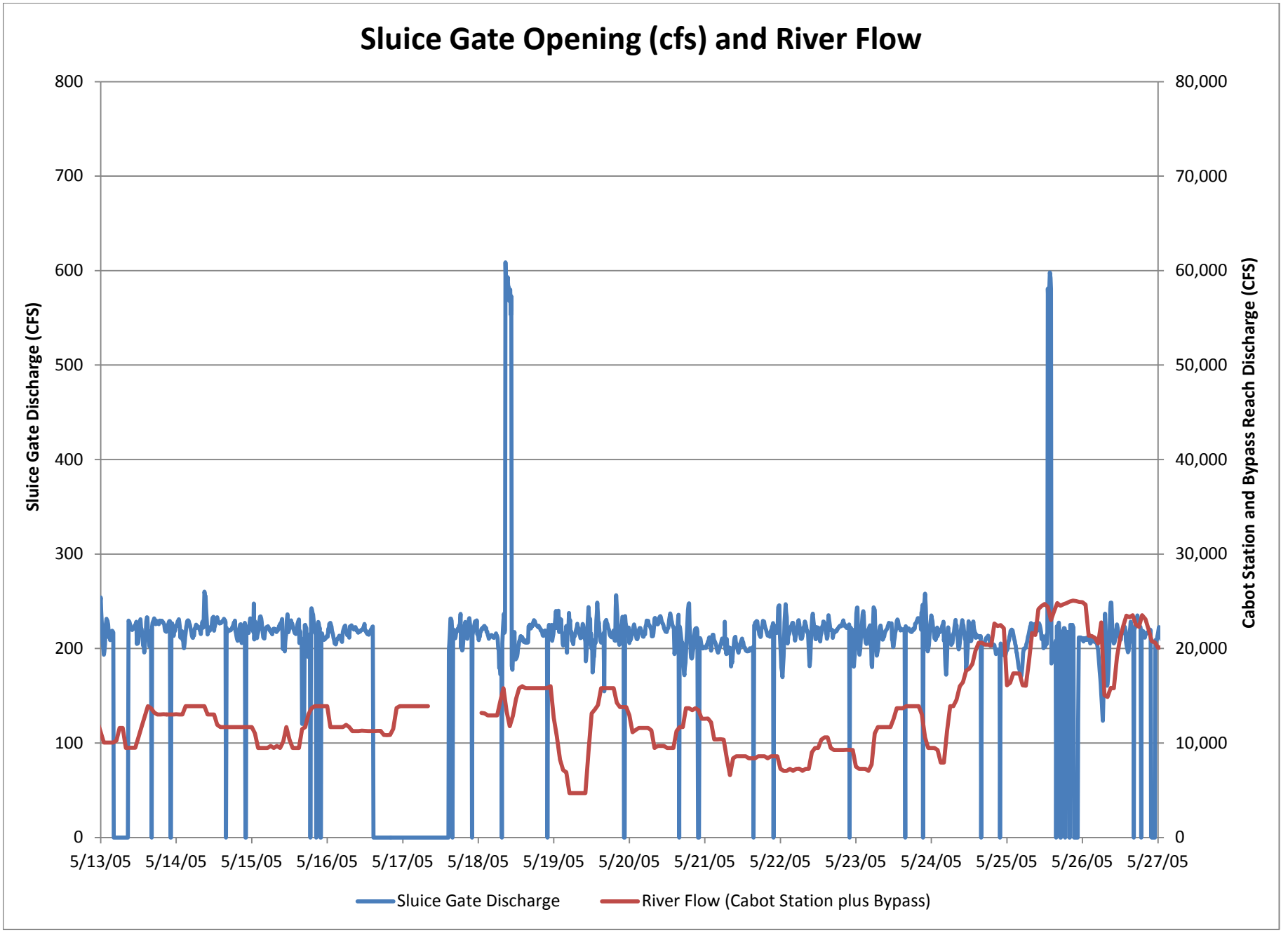

Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
14
12
10
8
6
4
2
0
70
60
50
40
30
20
10
0
5/27/12
5/28/12
5/29/12
5/30/12
5/31/12
6/1/12
6/2/12
6/3/12
6/4/12
6/5/12
6/6/12
6/7/12
6/8/12
6/9/12
6/10/12
Sluice Gate Opening
Cabot Station Generation

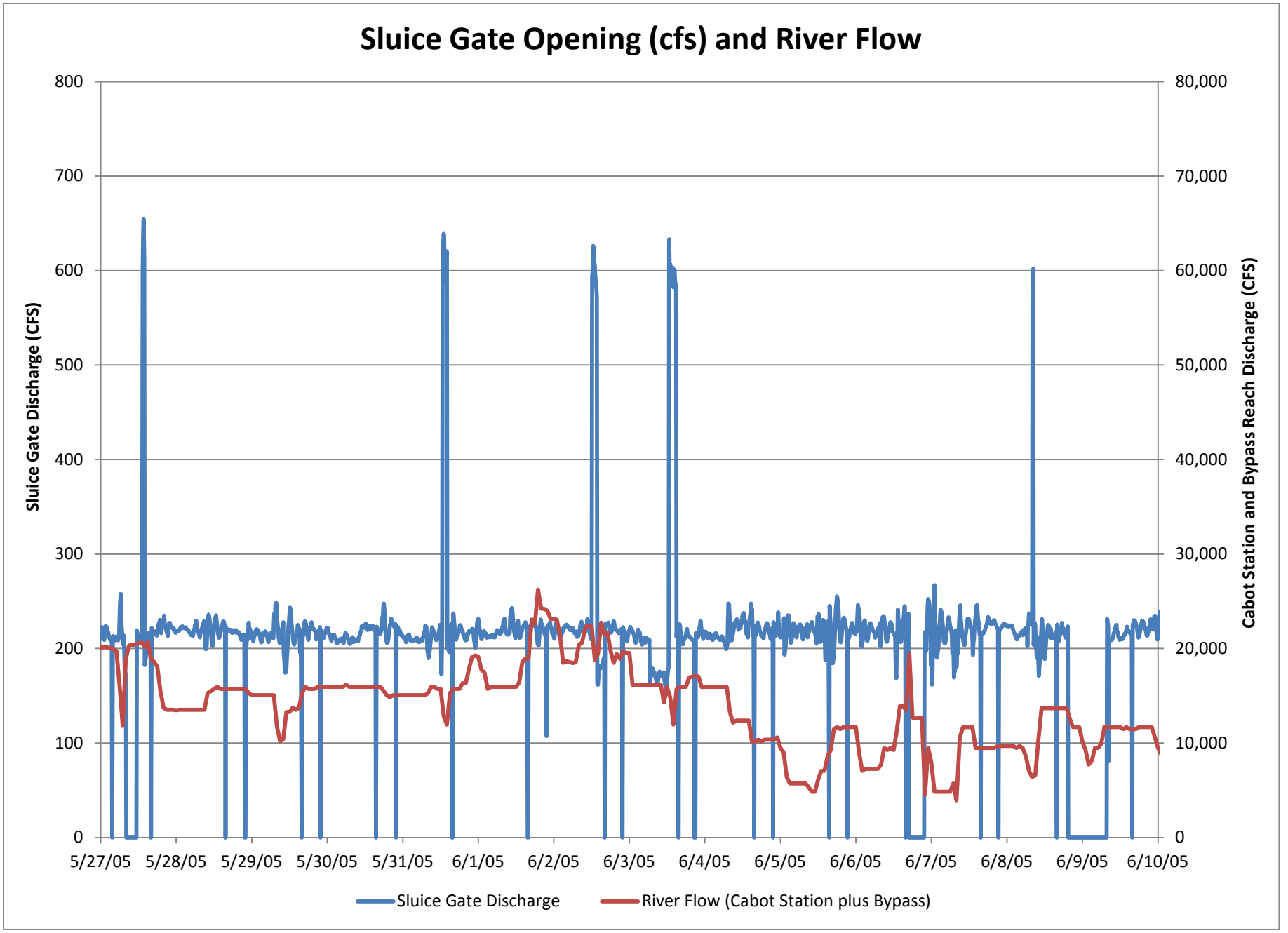

Sluice Gate Opening and Cabot Station Generation
Sluice Gate Opening (feet)
Cabot Station Generation (MWH)
0
2
4
6
8
10
12
14
0
10
20
30
40
50
60
70
6/10/12
6/11/12
6/12/12
6/13/12
6/14/12
6/15/12
6/16/12
6/17/12
6/18/12
6/19/12
6/20/12
6/21/12
6/22/12
6/23/12
Sluice Gate Opening
Cabot Station Generation

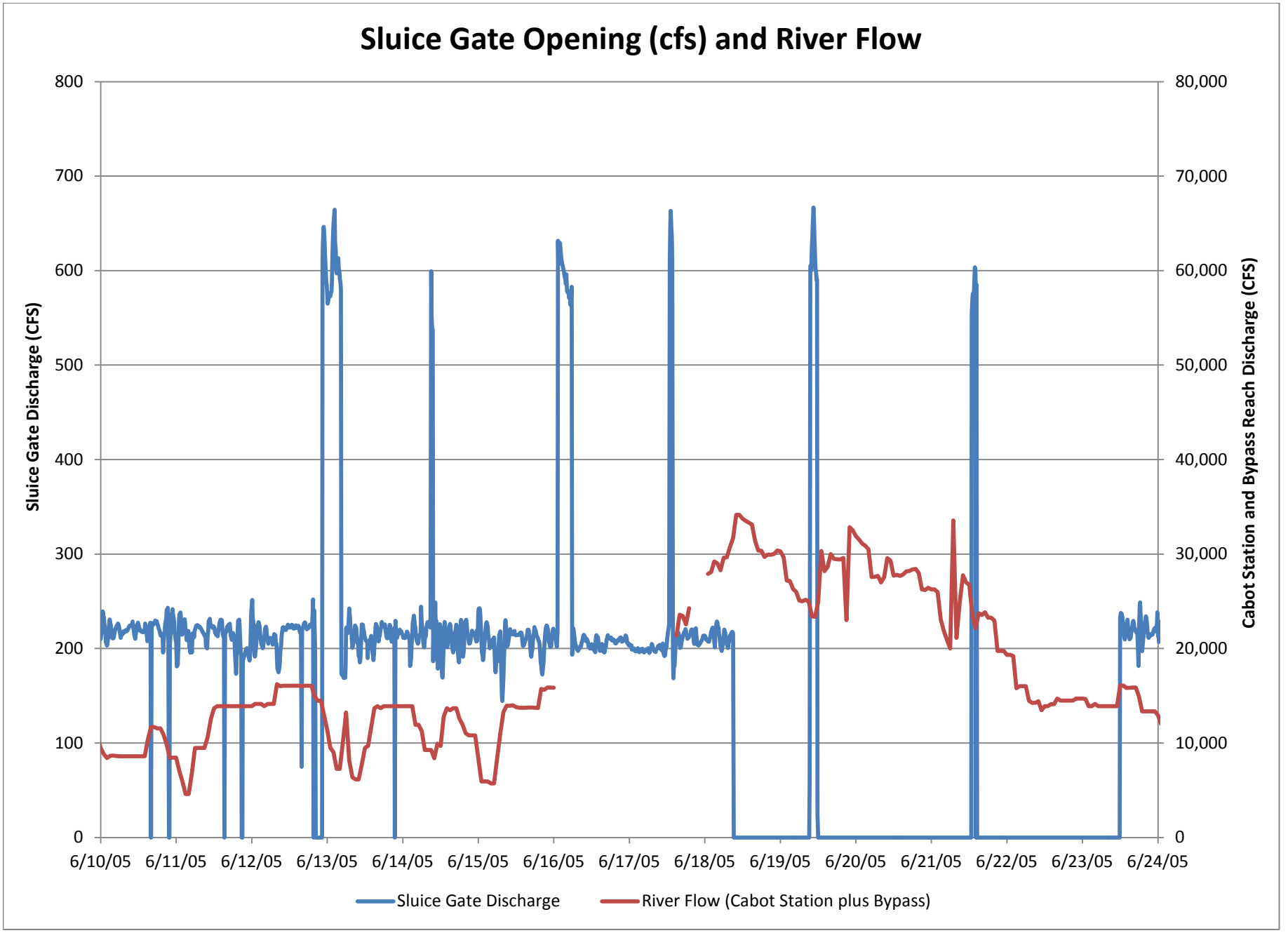
APPENDIX D – BI-WEEKLY CHARTS OF SLUICE GATE DISCHARGE VS. RIVER DISCHARGE

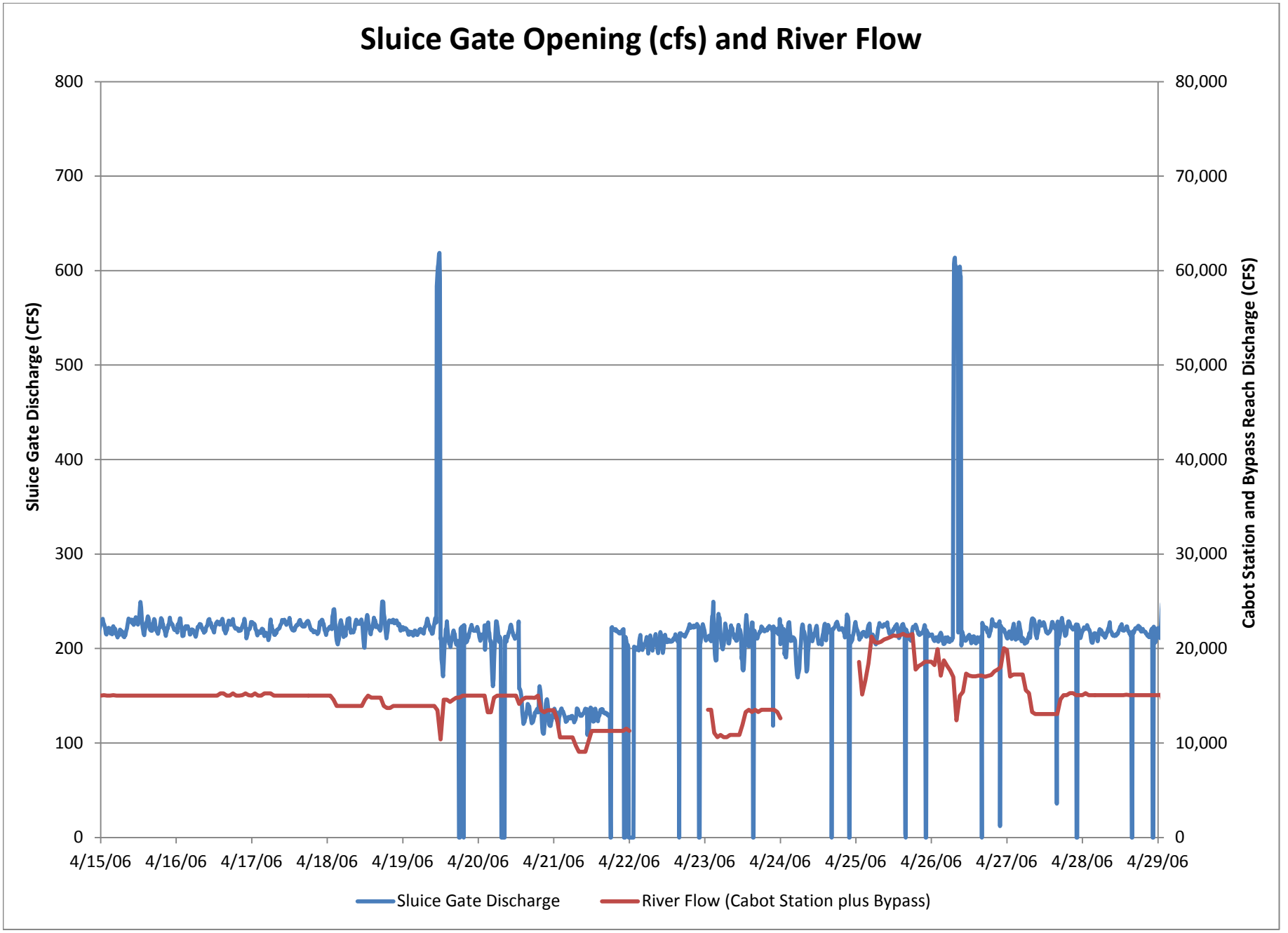

Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
800
700
600
500
400
300
200
100
0
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/15/05
4/16/05
4/17/05
4/18/05
4/19/05
4/20/05
4/21/05
4/22/05
4/23/05
4/24/05
4/25/05
4/26/05
4/27/05
4/28/05
4/29/05
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)

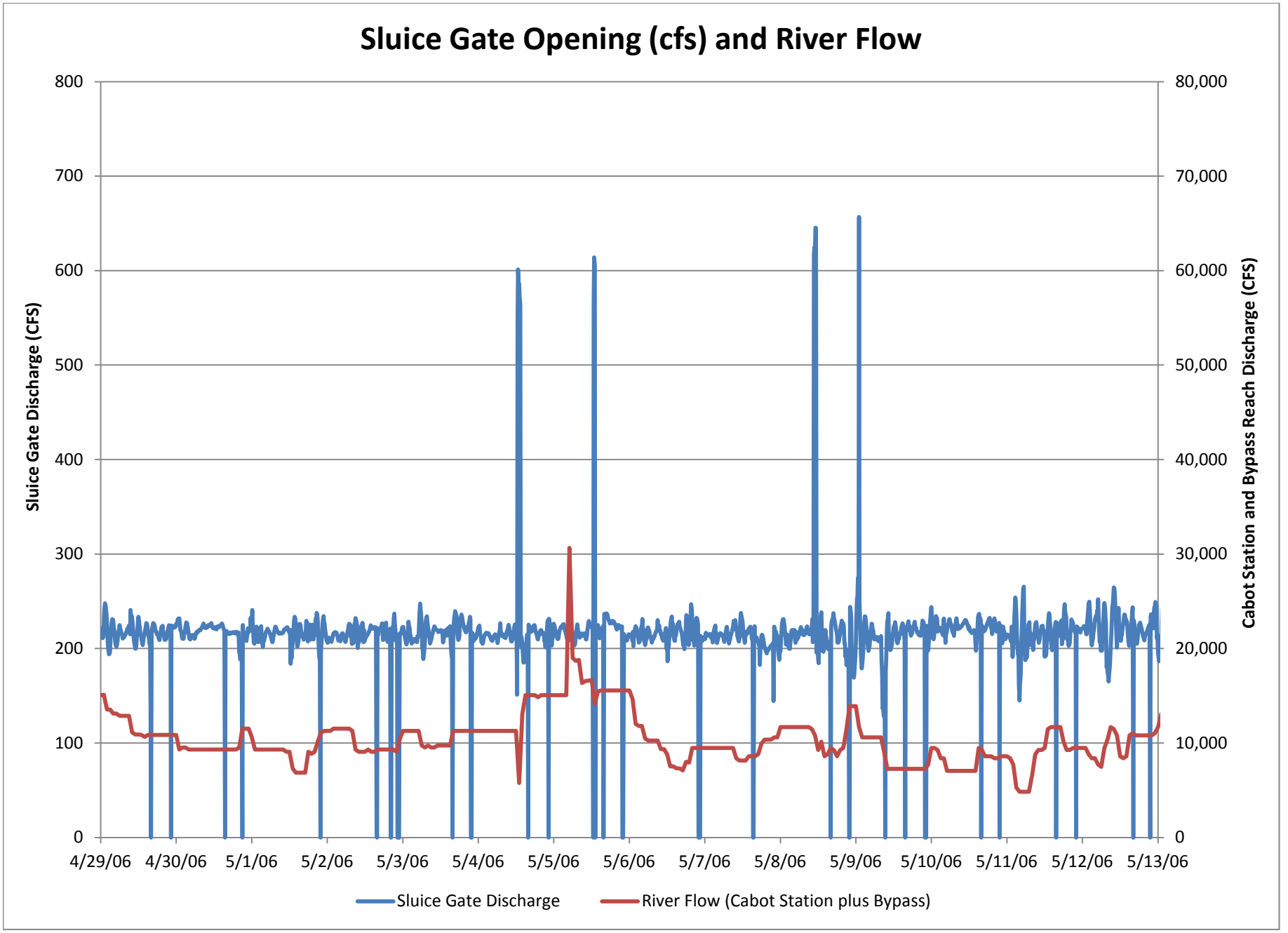

Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
800
700
600
500
400
300
200
100
0
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/29/05
4/30/05
5/1/05
5/2/05
5/3/05
5/4/05
5/5/05
5/6/05
5/7/05
5/8/05
5/9/05
5/10/05
5/11/05
5/12/05
5/13/05
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)

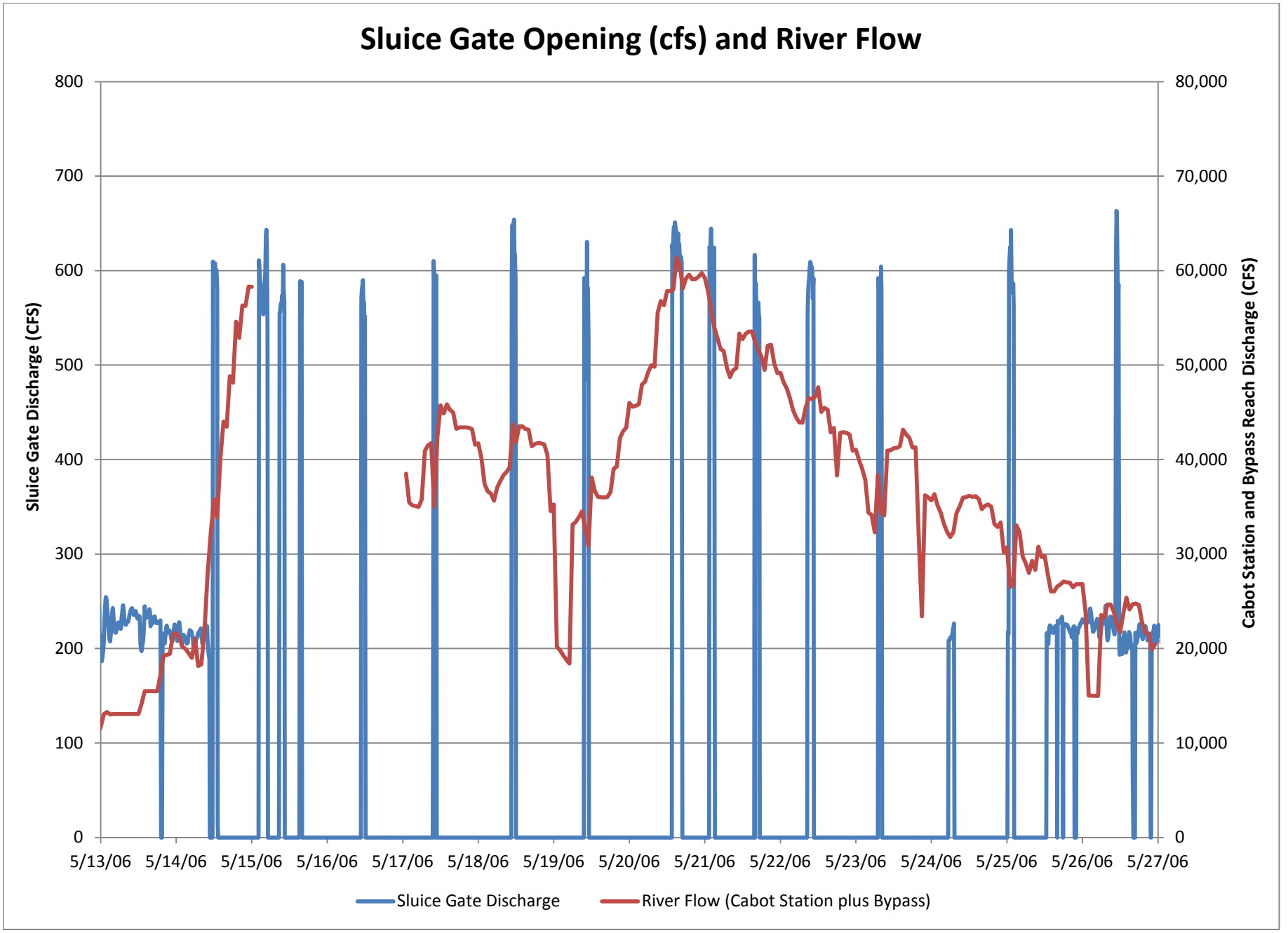

Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
800
700
600
500
400
300
200
100
0
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/13/05
5/14/05
5/15/05
5/16/05
5/17/05
5/18/05
5/19/05
5/20/05
5/21/05
5/22/05
5/23/05
5/24/05
5/25/05
5/26/05
5/27/05
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)

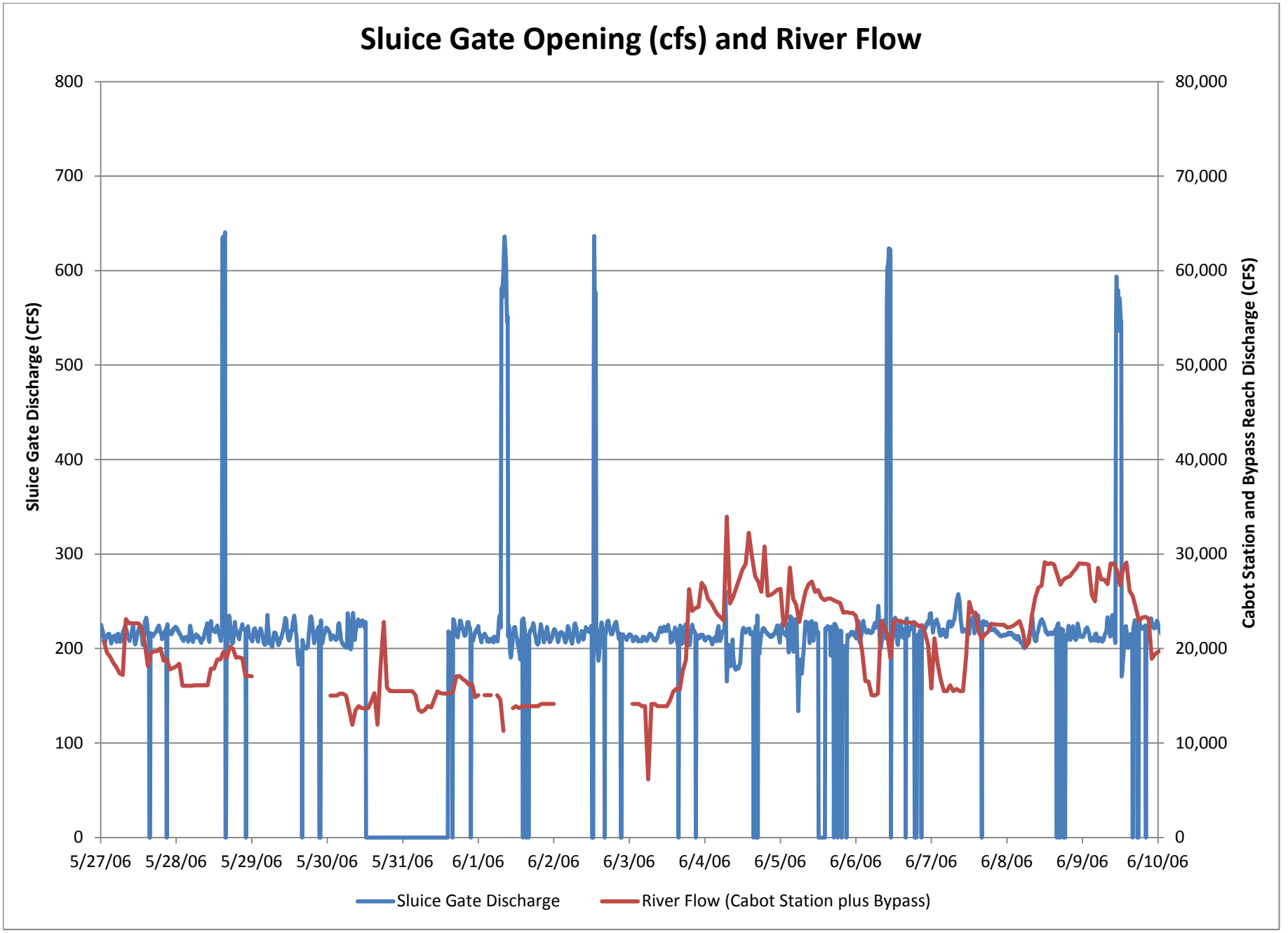

Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
800
700
600
500
400
300
200
100
0
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/27/05
5/28/05
5/29/05
5/30/05
5/31/05
6/1/05
6/2/05
6/3/05
6/4/05
6/5/05
6/6/05
6/7/05
6/8/05
6/9/05
6/10/05
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)

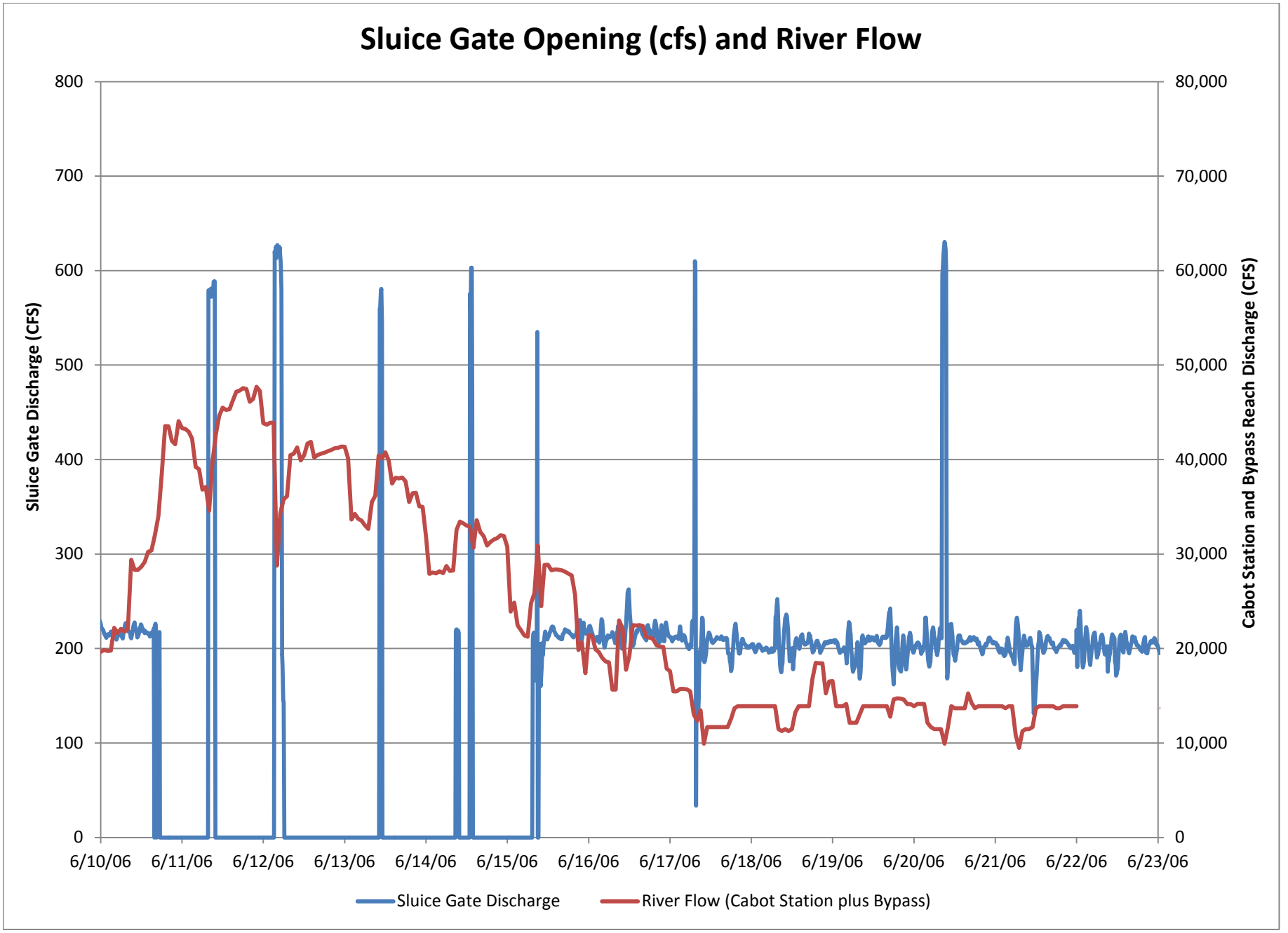

Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
800
700
600
500
400
300
200
100
0
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
6/10/05
6/11/05
6/12/05
6/13/05
6/14/05
6/15/05
6/16/05
6/17/05
6/18/05
6/19/05
6/20/05
6/21/05
6/22/05
6/23/05
6/24/05
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)

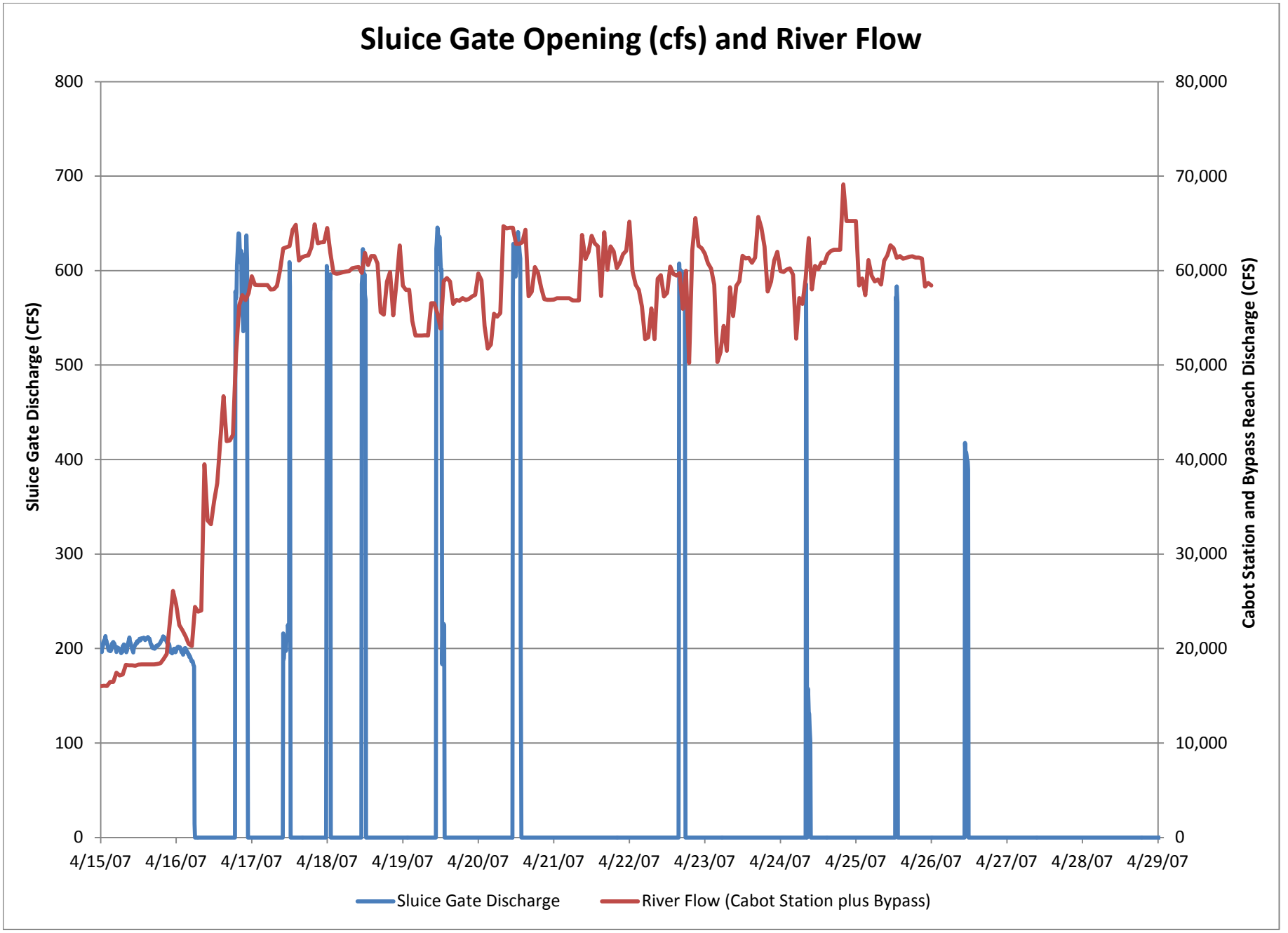

Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
800
700
600
500
400
300
200
100
0
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/15/06
4/16/06
4/17/06
4/18/06
4/19/06
4/20/06
4/21/06
4/22/06
4/23/06
4/24/06
4/25/06
4/26/06
4/27/06
4/28/06
4/29/06
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)

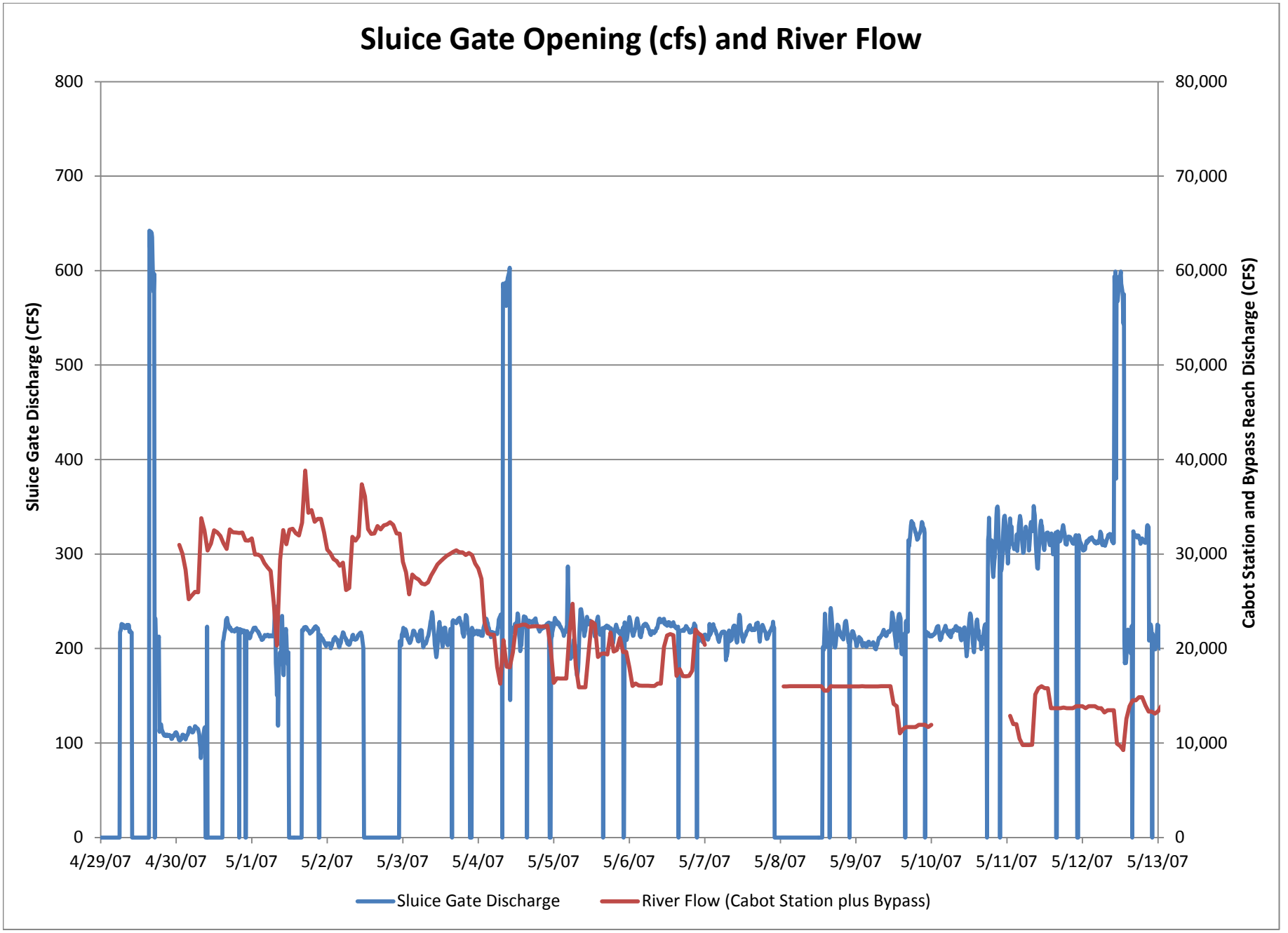

Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
800
700
600
500
400
300
200
100
0
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/29/06
4/30/06
5/1/06
5/2/06
5/3/06
5/4/06
5/5/06
5/6/06
5/7/06
5/8/06
5/9/06
5/10/06
5/11/06
5/12/06
5/13/06
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
800
700
600
500
400
300
200
100
0
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/13/06
5/14/06
5/15/06
5/16/06
5/17/06
5/18/06
5/19/06
5/20/06
5/21/06
5/22/06
5/23/06
5/24/06
5/25/06
5/26/06
5/27/06
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
800
700
600
500
400
300
200
100
0
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/27/06
5/28/06
5/29/06
5/30/06
5/31/06
6/1/06
6/2/06
6/3/06
6/4/06
6/5/06
6/6/06
6/7/06
6/8/06
6/9/06
6/10/06
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
800
700
600
500
400
300
200
100
0
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
6/10/06
6/11/06
6/12/06
6/13/06
6/14/06
6/15/06
6/16/06
6/17/06
6/18/06
6/19/06
6/20/06
6/21/06
6/22/06
6/23/06
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
800
700
600
500
400
300
200
100
0
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
4/15/07
4/16/07
4/17/07
4/18/07
4/19/07
4/20/07
4/21/07
4/22/07
4/23/07
4/24/07
4/25/07
4/26/07
4/27/07
4/28/07
4/29/07
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
800
700
600
500
400
300
200
100
0
80,000
70,000
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50,000
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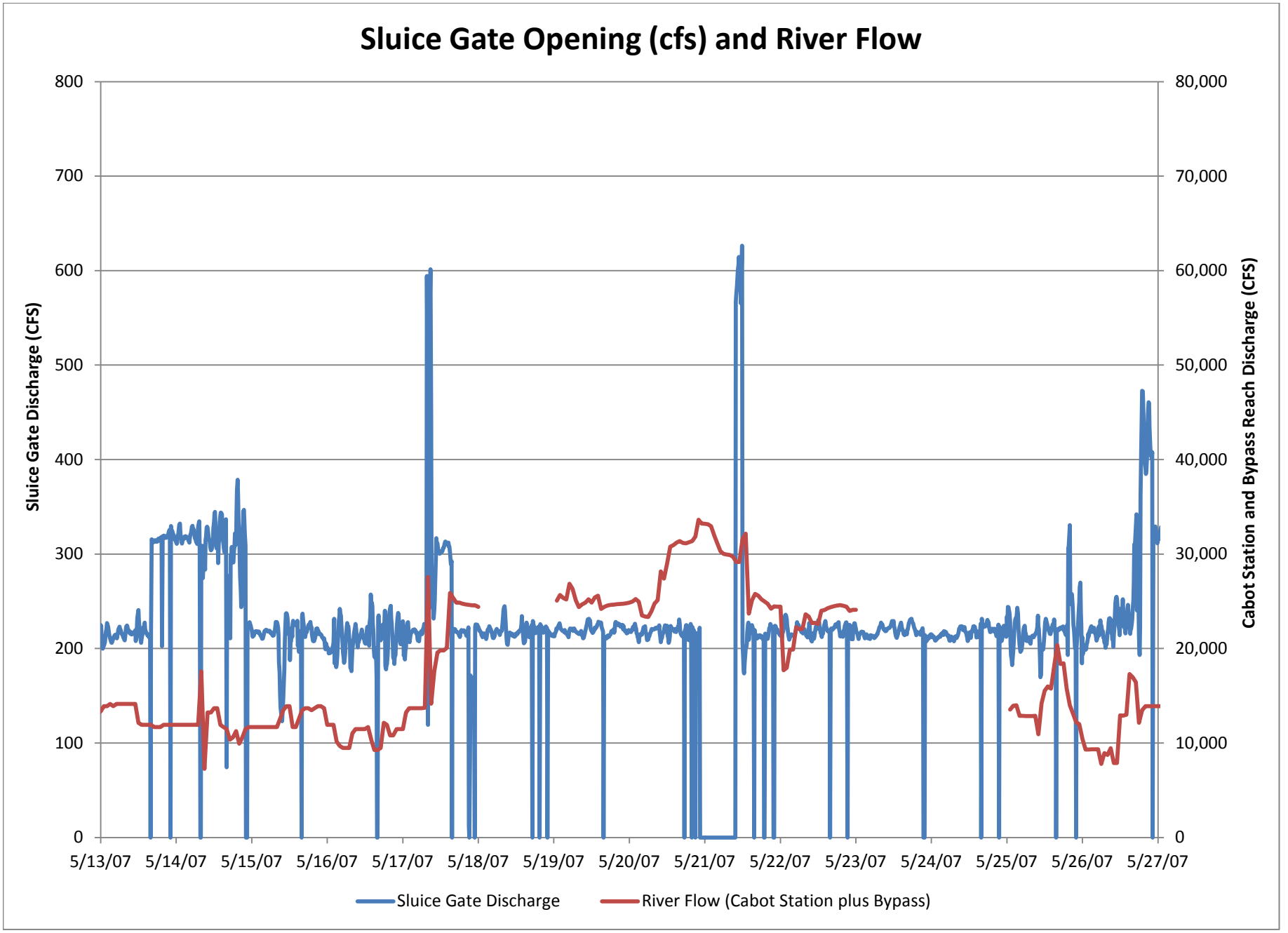
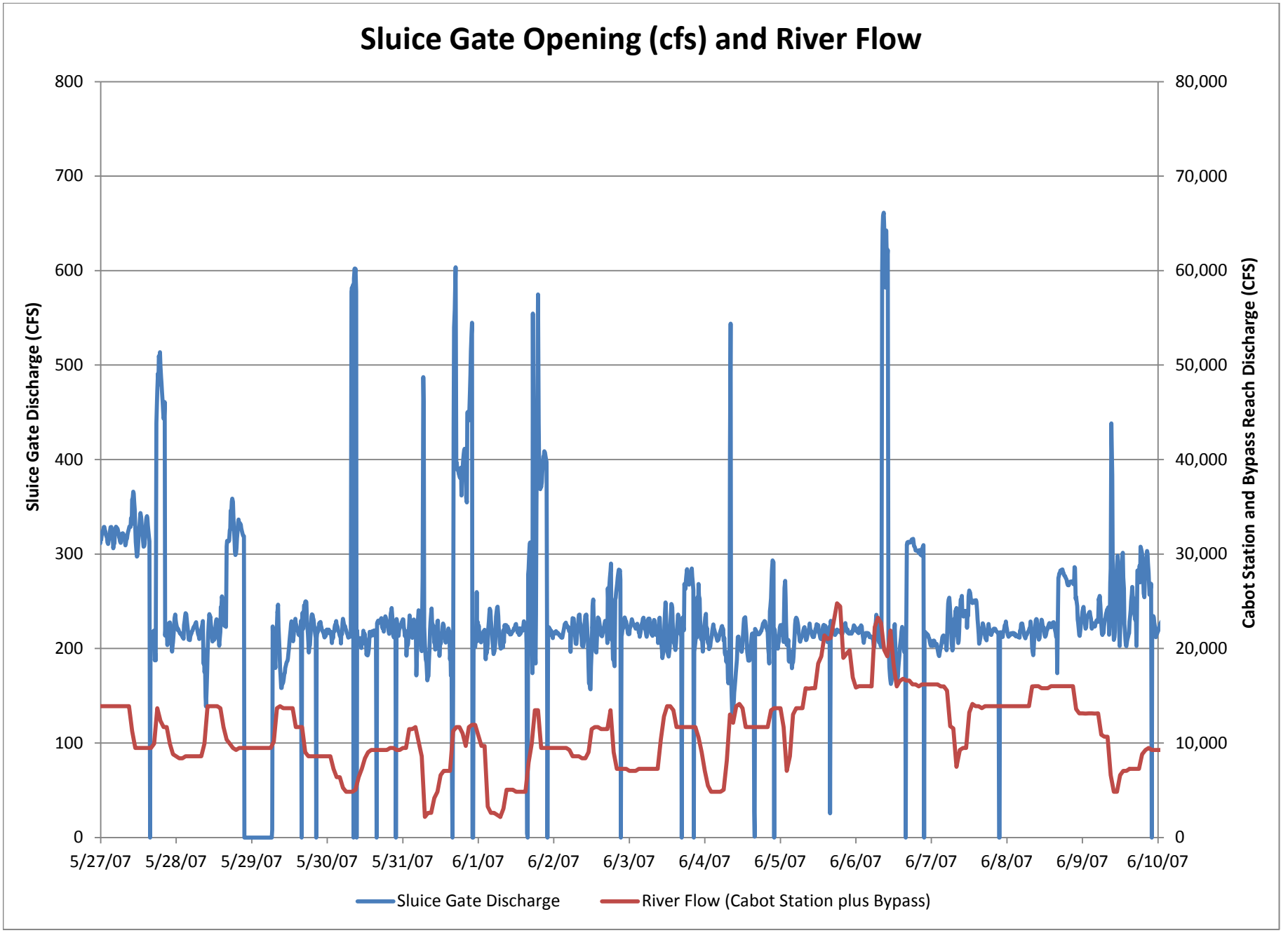
30,000
20,000
10,000
0
4/29/07
4/30/07
5/1/07
5/2/07
5/3/07
5/4/07
5/5/07
5/6/07
5/7/07
5/8/07
5/9/07
5/10/07
5/11/07
5/12/07
5/13/07
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
800
700
600
500
400
300
200
100
0
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/13/07
5/14/07
5/15/07
5/16/07
5/17/07
5/18/07
5/19/07
5/20/07
5/21/07
5/22/07
5/23/07
5/24/07
5/25/07
5/26/07
5/27/07
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
800
700
600
500
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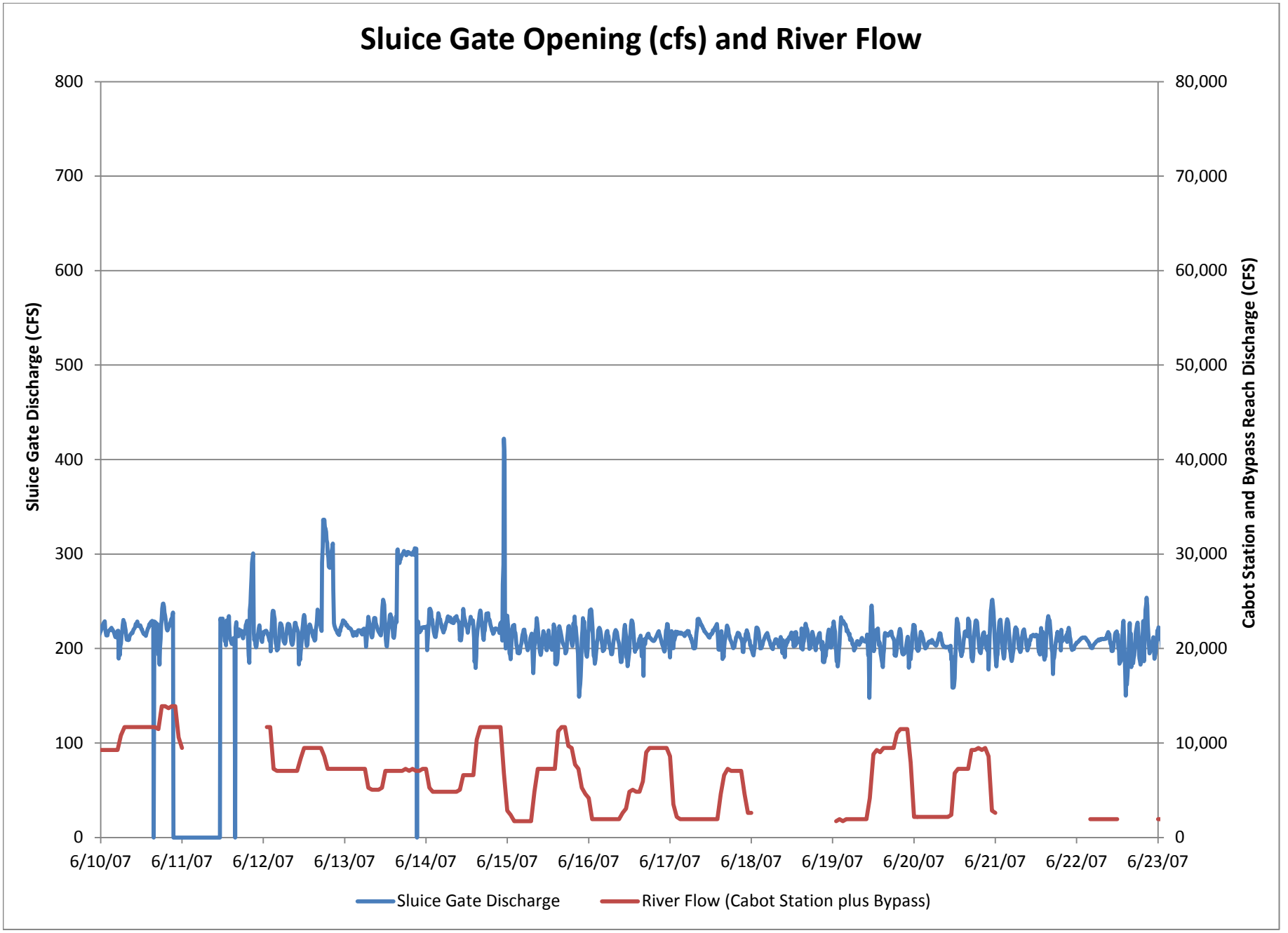
100
0
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5/27/07
5/28/07
5/29/07
5/30/07
5/31/07
6/1/07
6/2/07
6/3/07
6/4/07
6/5/07
6/6/07
6/7/07
6/8/07
6/9/07
6/10/07
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
800
700
600
500
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80,000
70,000
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50,000
40,000
30,000
20,000
10,000
0
6/10/07
6/11/07
6/12/07
6/13/07
6/14/07
6/15/07
6/16/07
6/17/07
6/18/07
6/19/07
6/20/07
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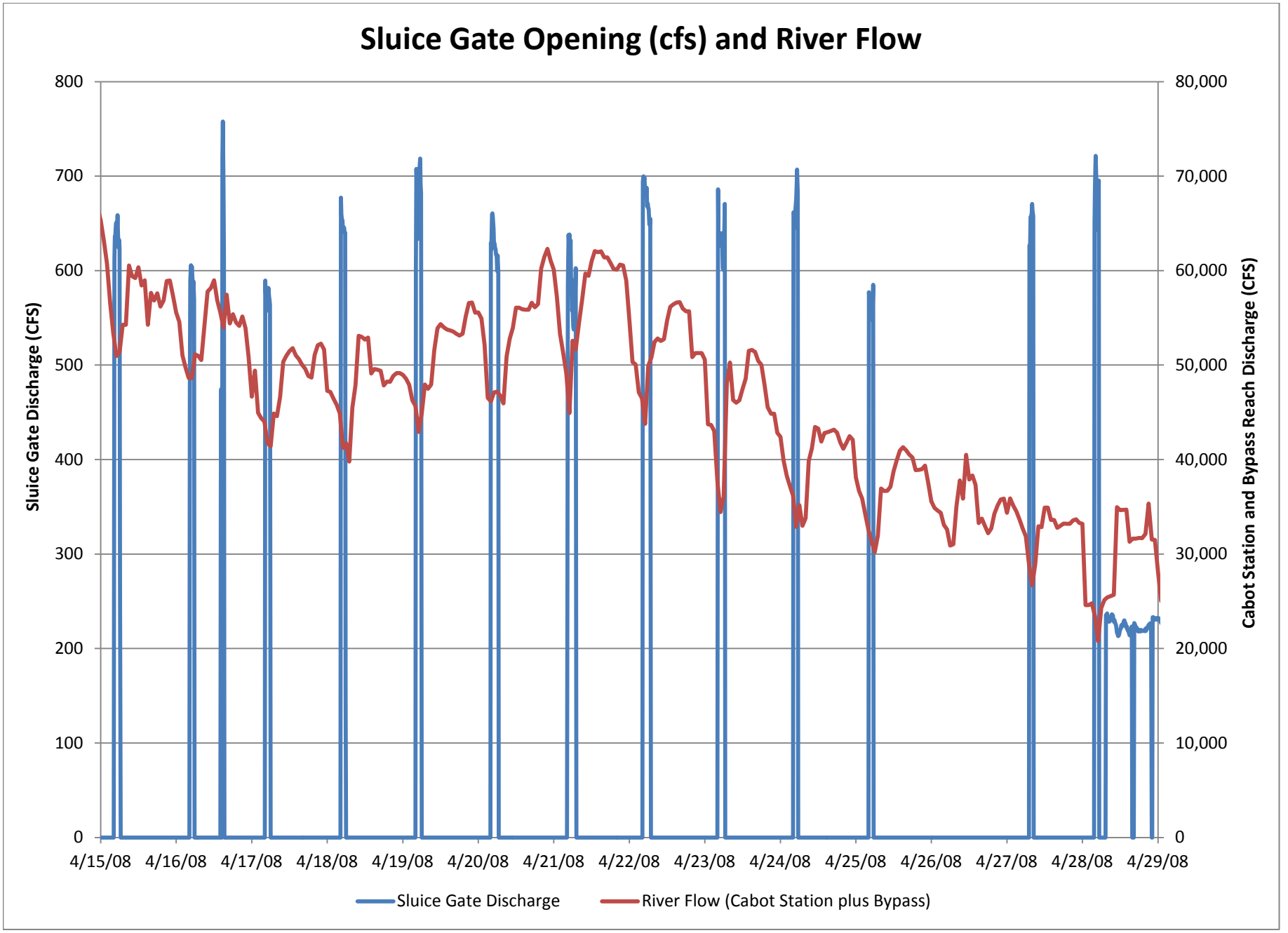
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
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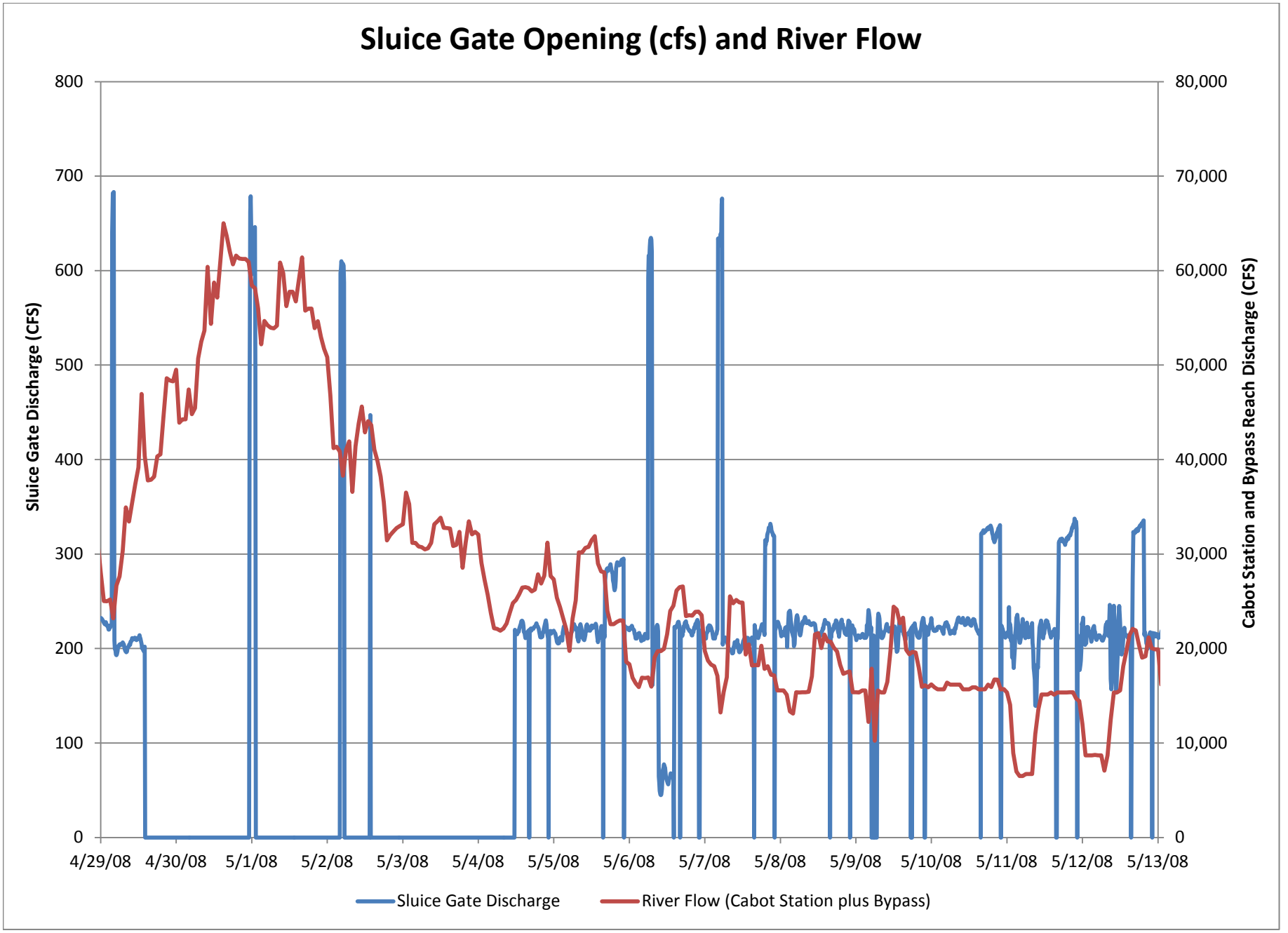
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
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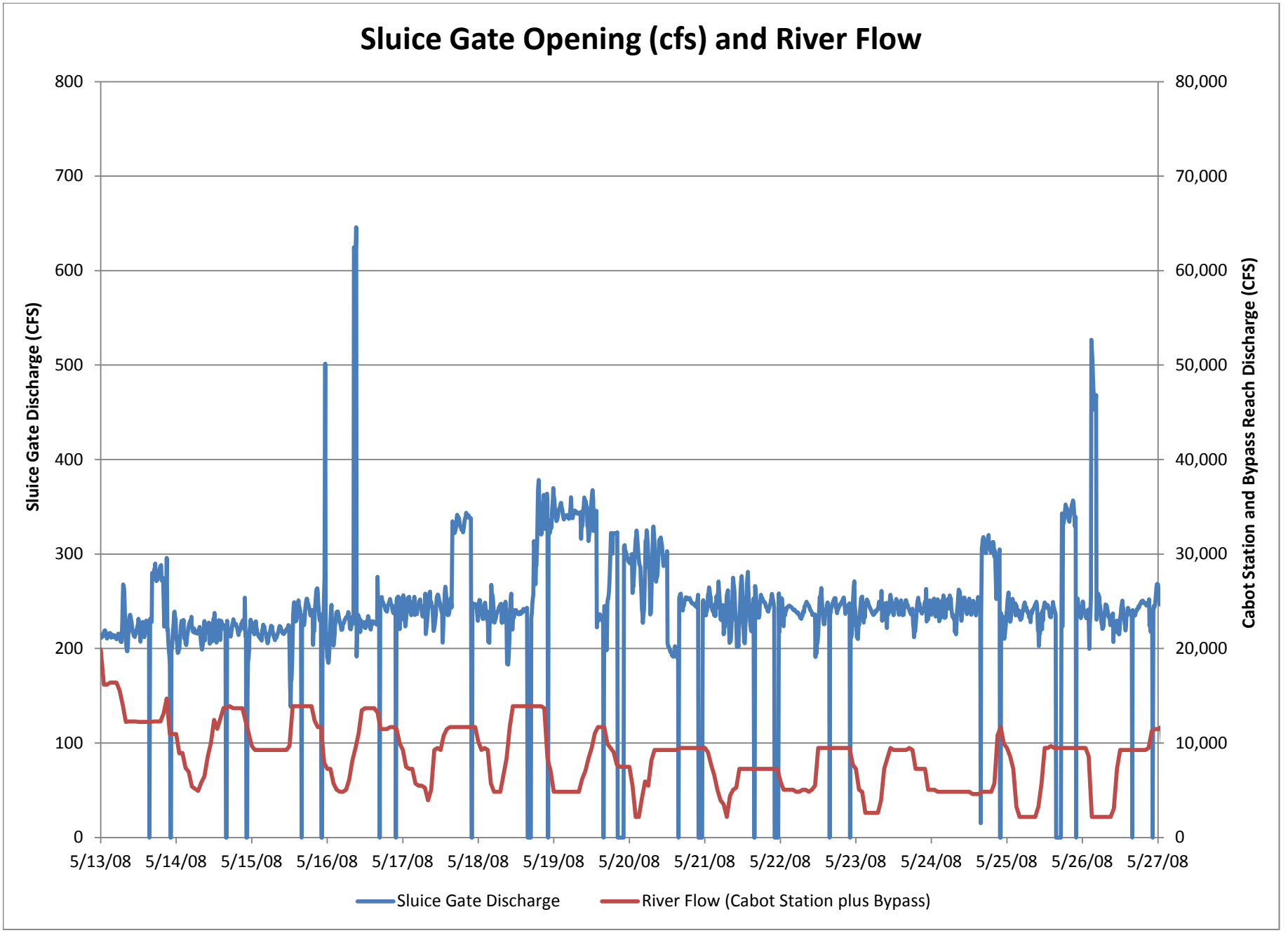
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
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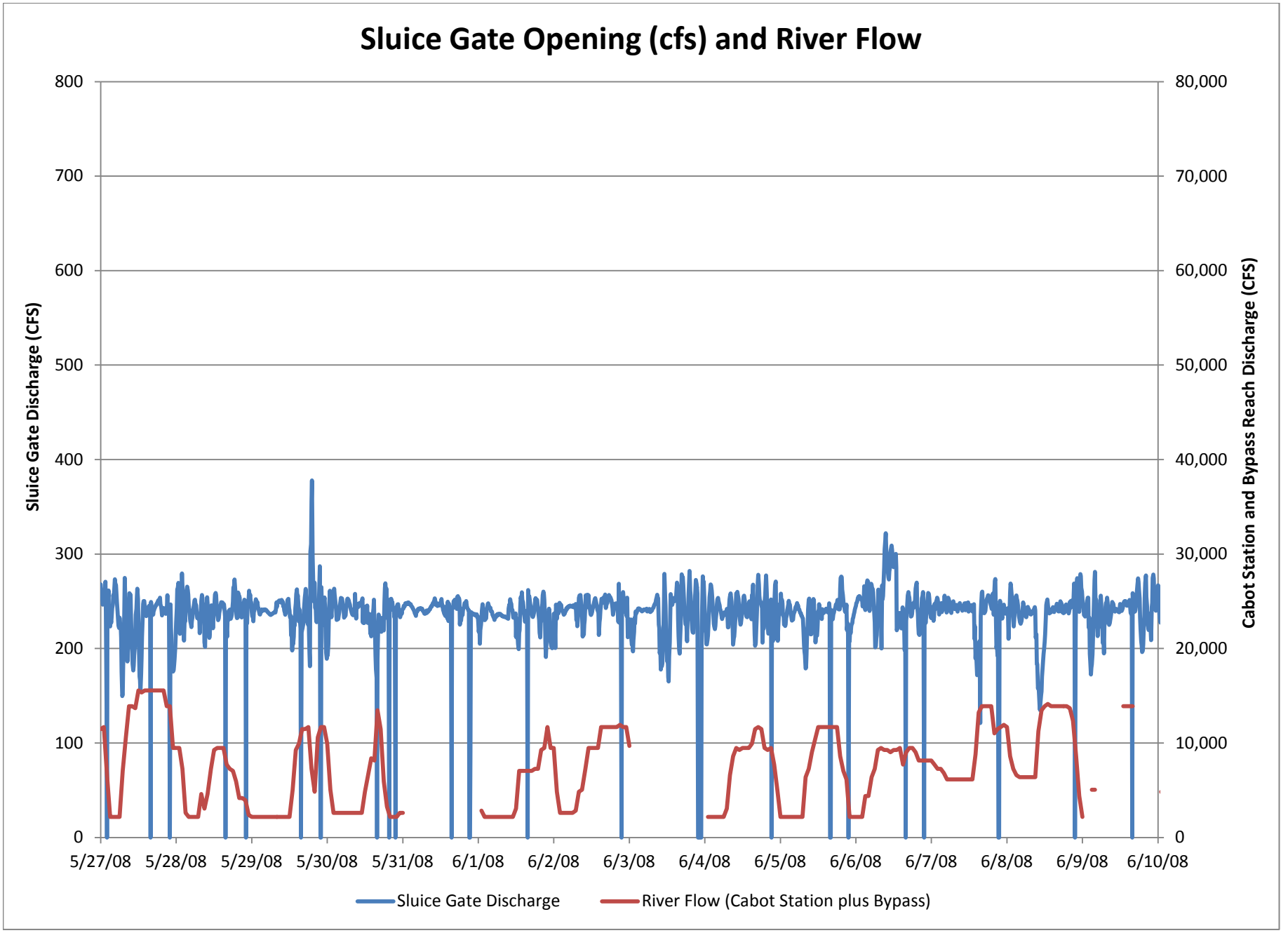
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
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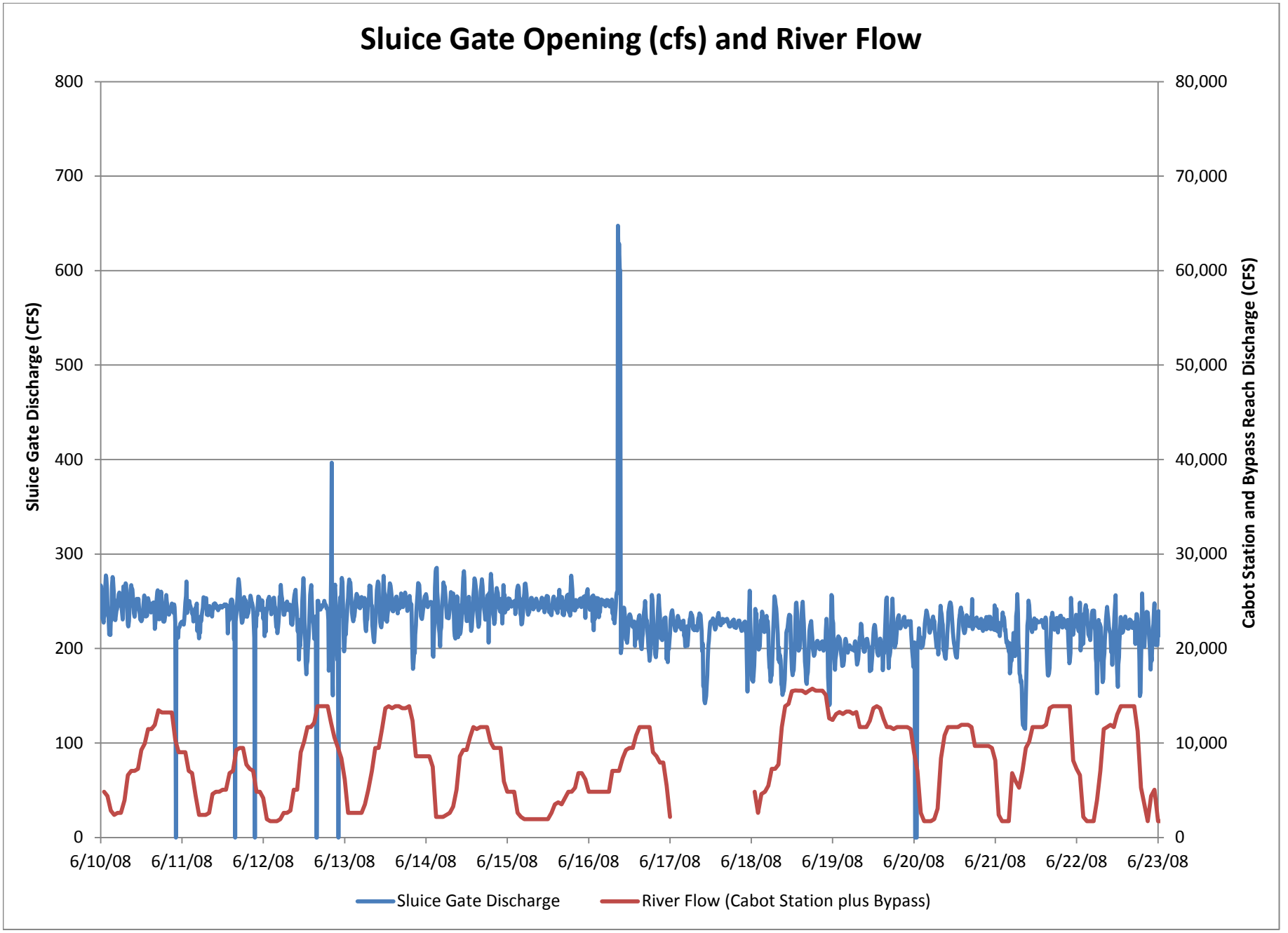
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
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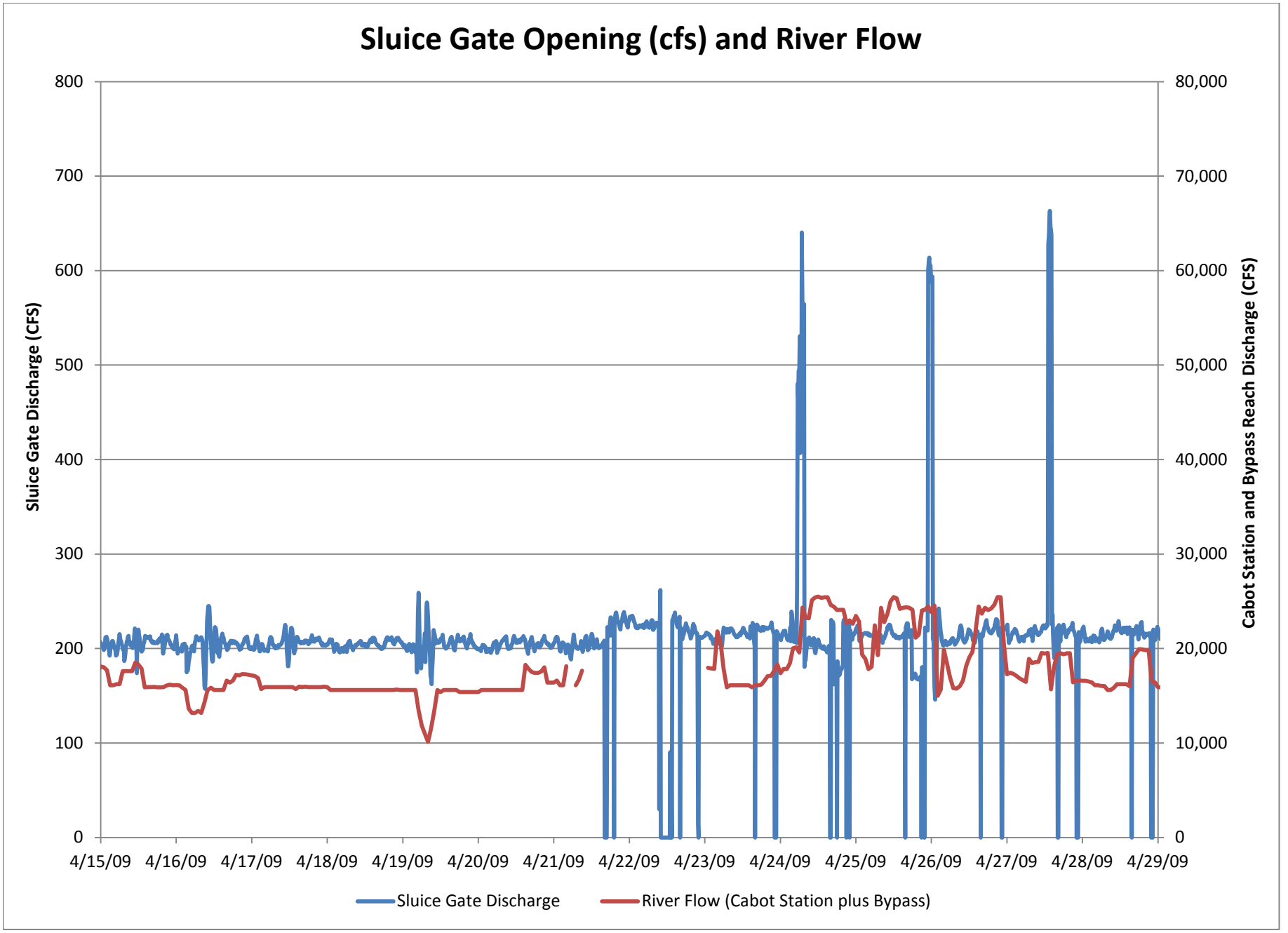
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
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Cabot Station and Bypass Reach Discharge (CFS)
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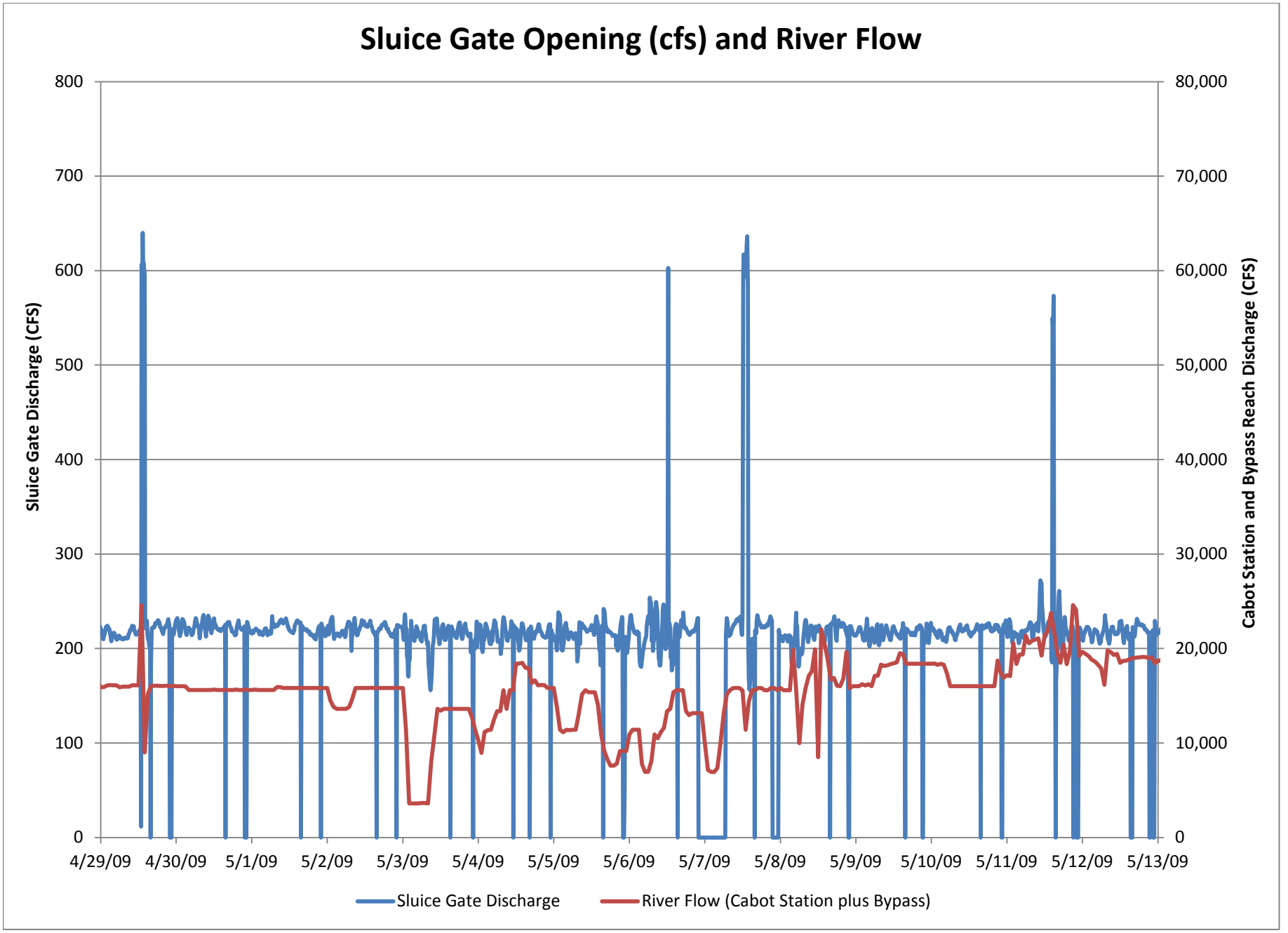
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
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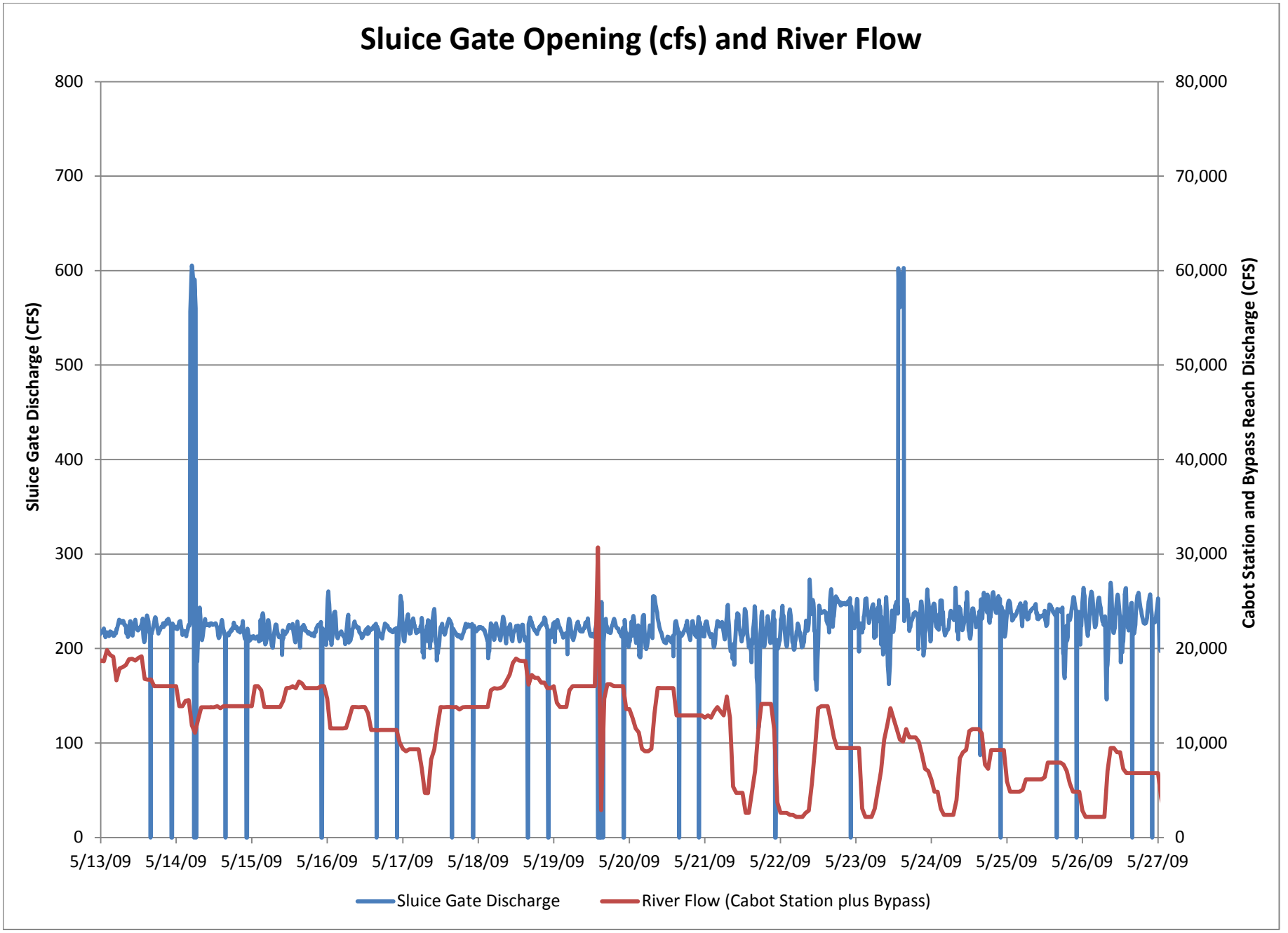
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
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Cabot Station and Bypass Reach Discharge (CFS)
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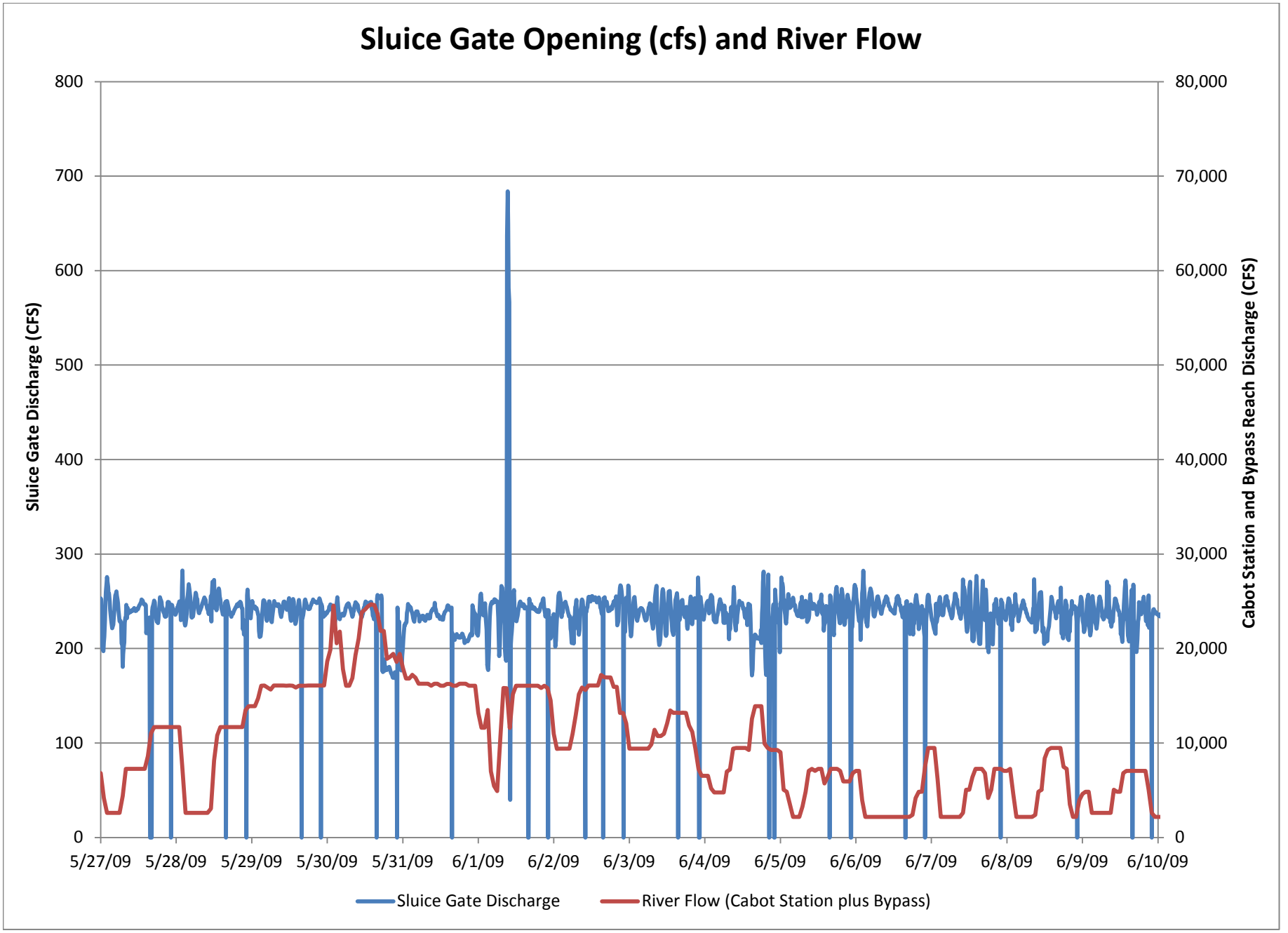
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
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Cabot Station and Bypass Reach Discharge (CFS)
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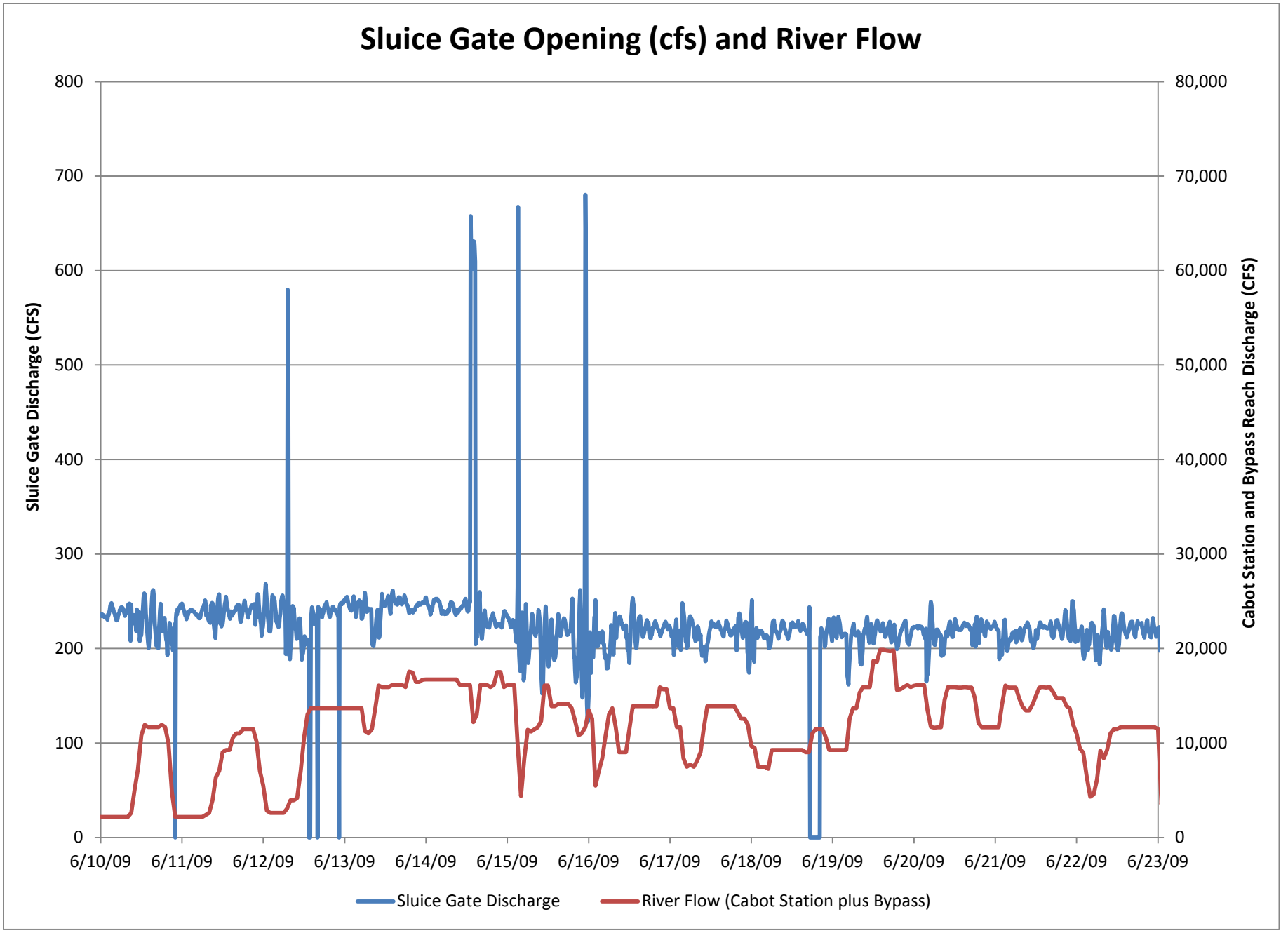
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
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Cabot Station and Bypass Reach Discharge (CFS)
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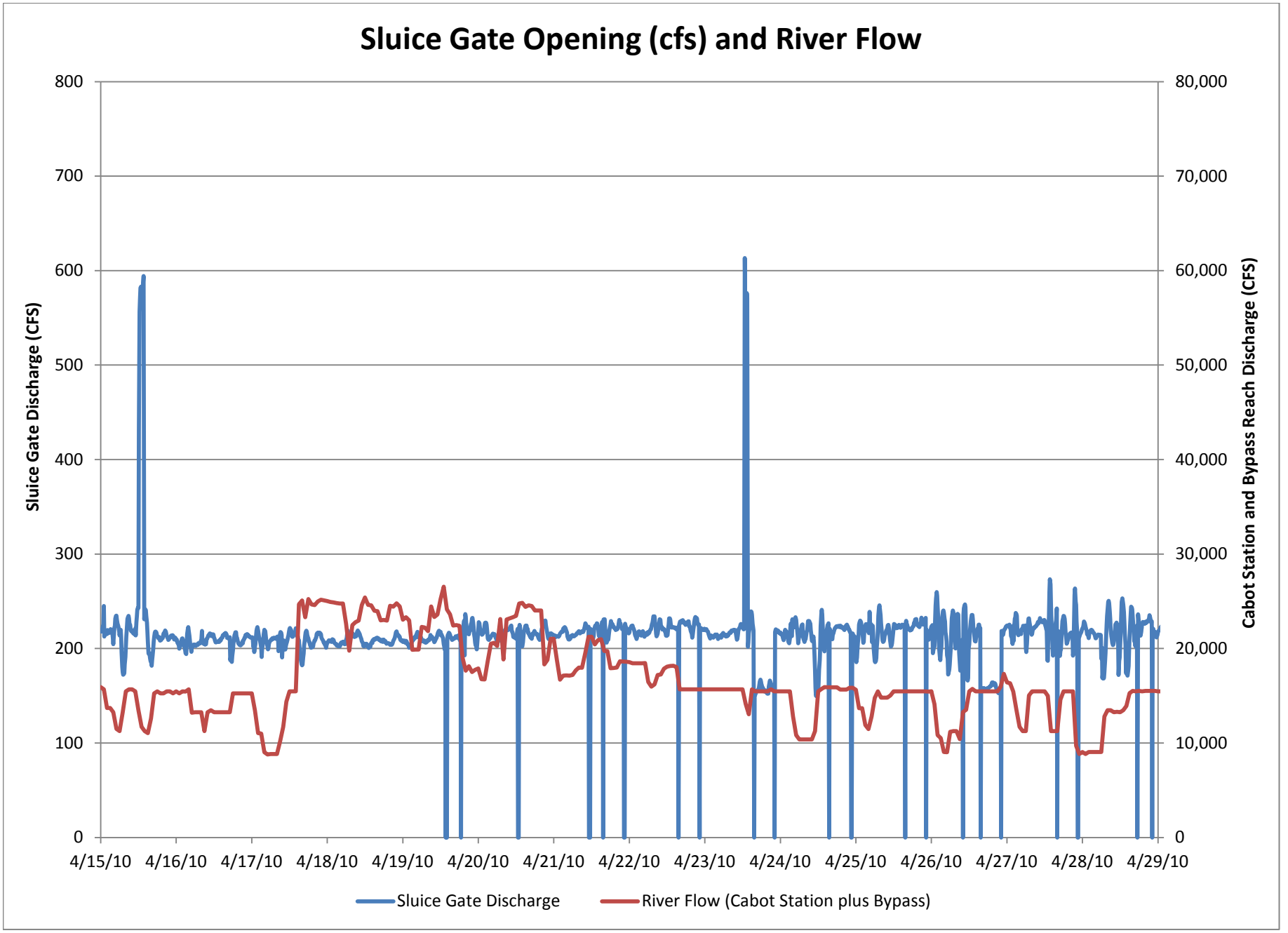
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
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Cabot Station and Bypass Reach Discharge (CFS)
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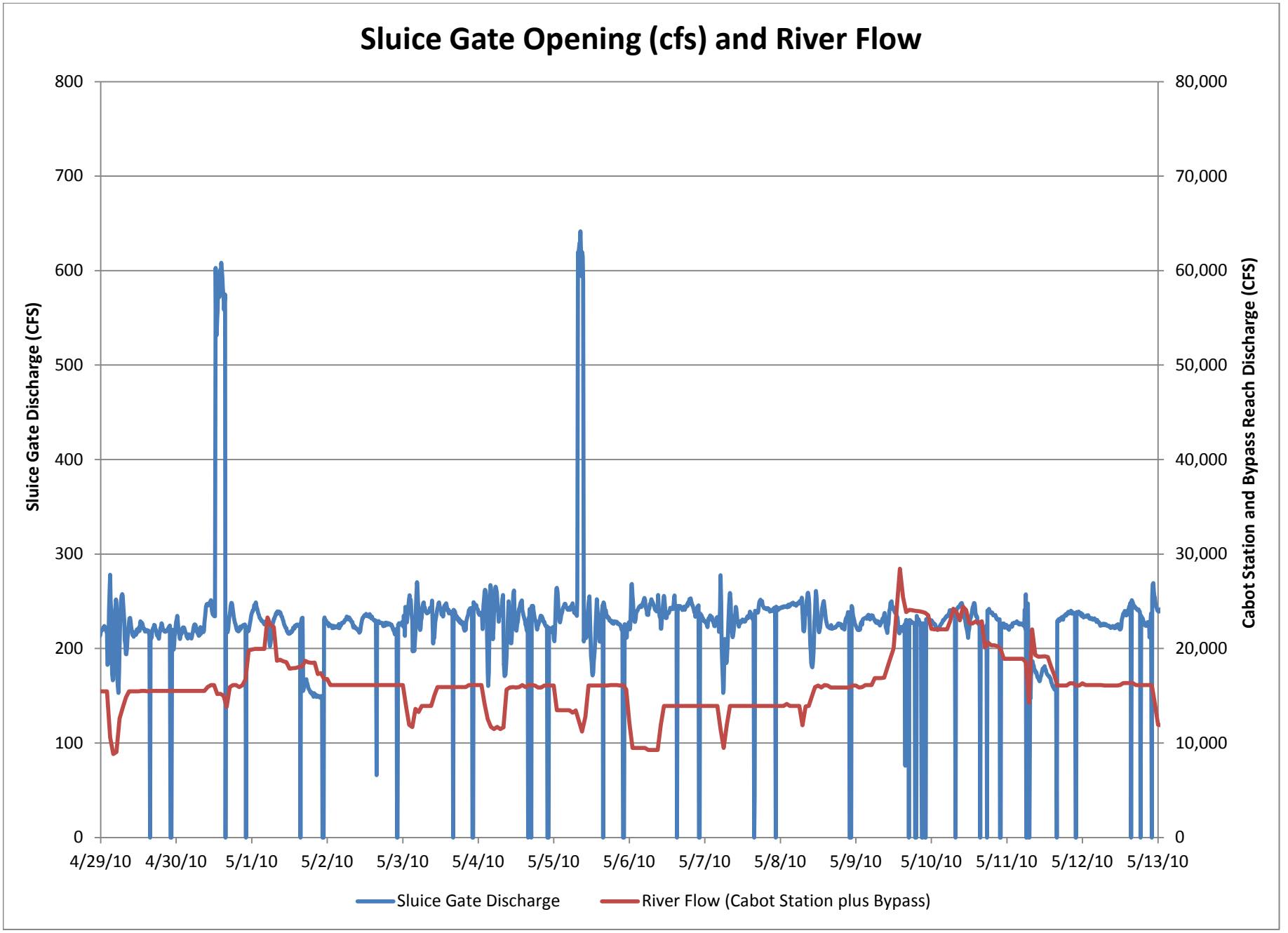
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
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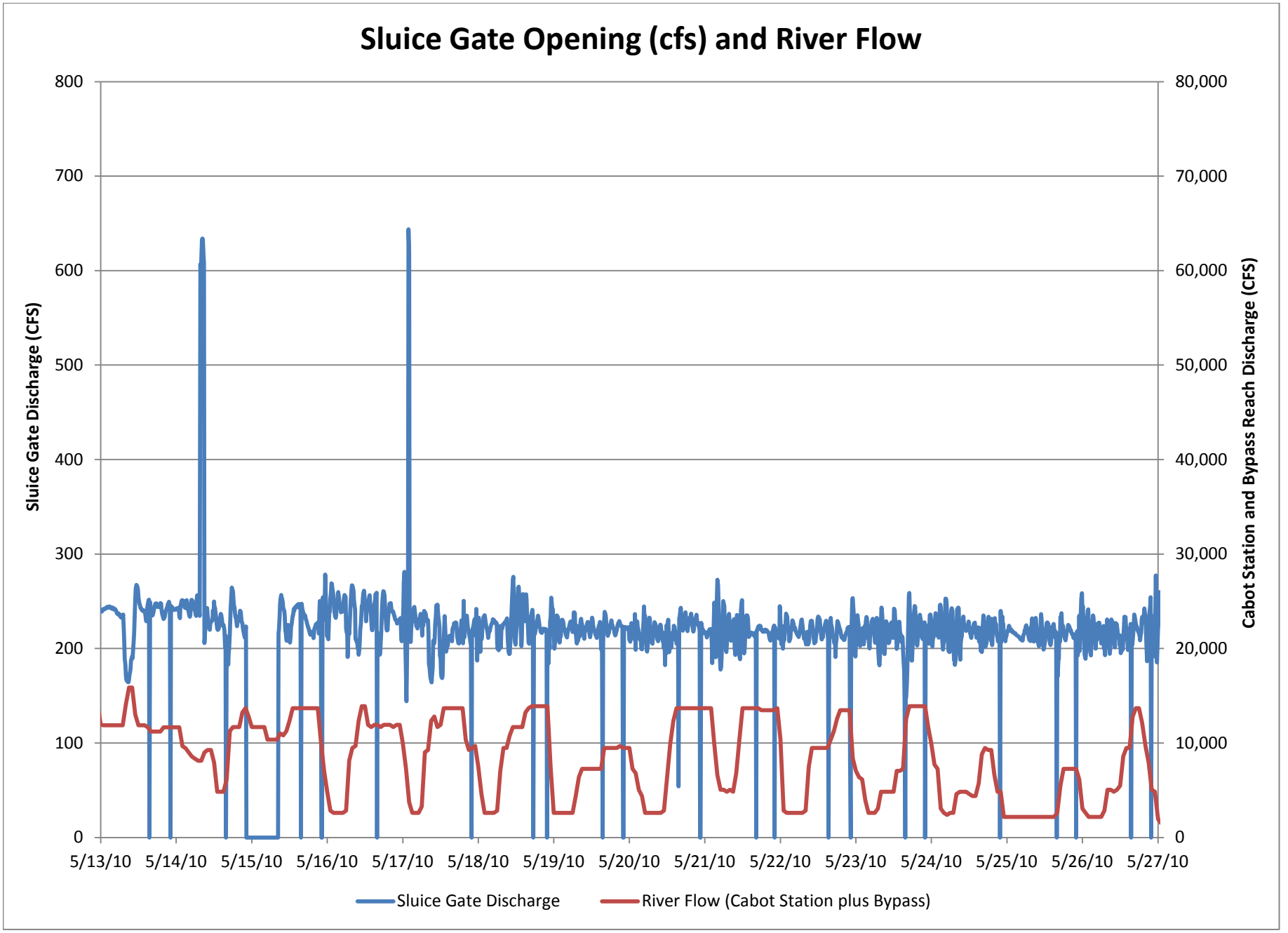
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
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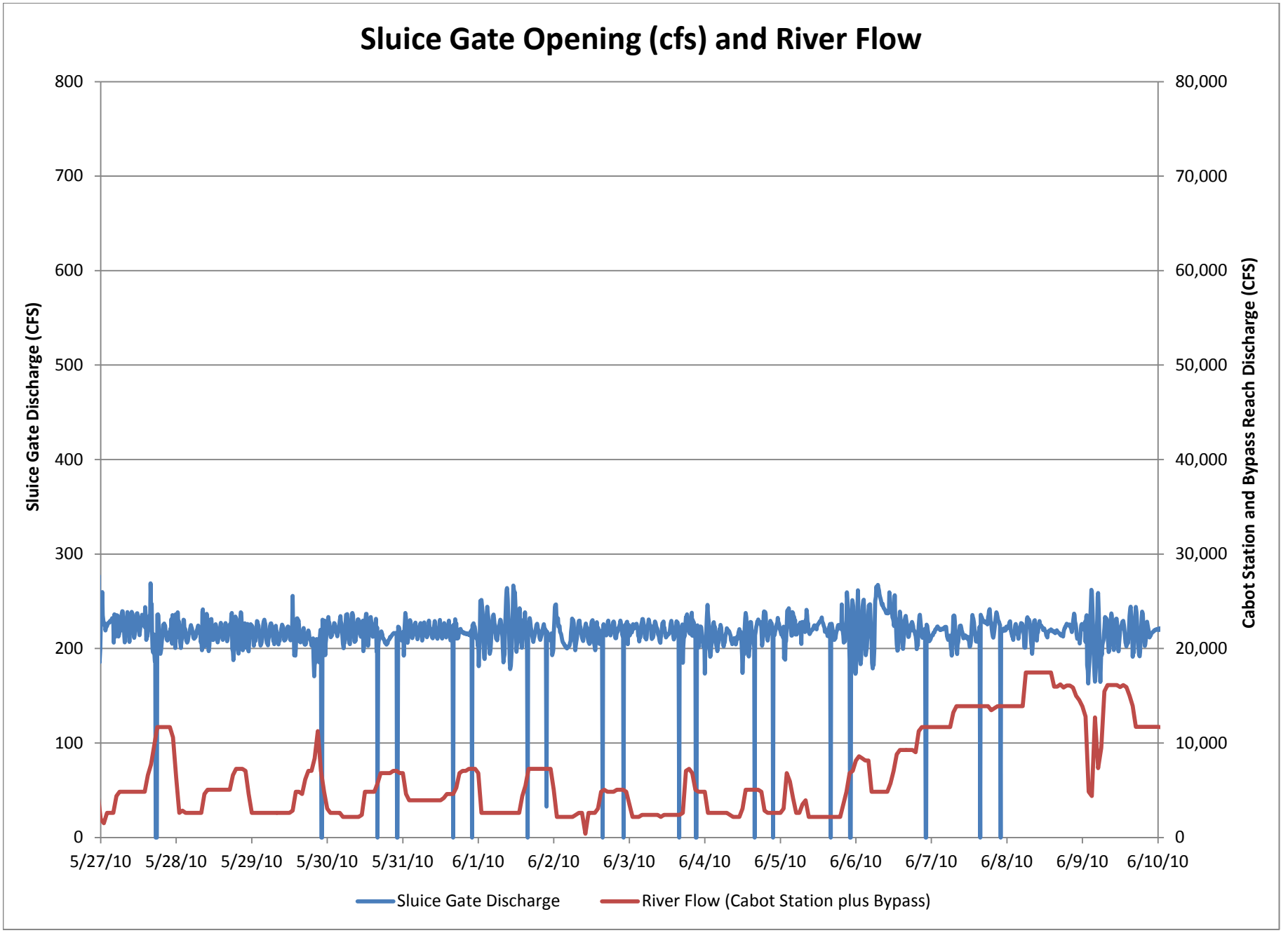
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
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Cabot Station and Bypass Reach Discharge (CFS)
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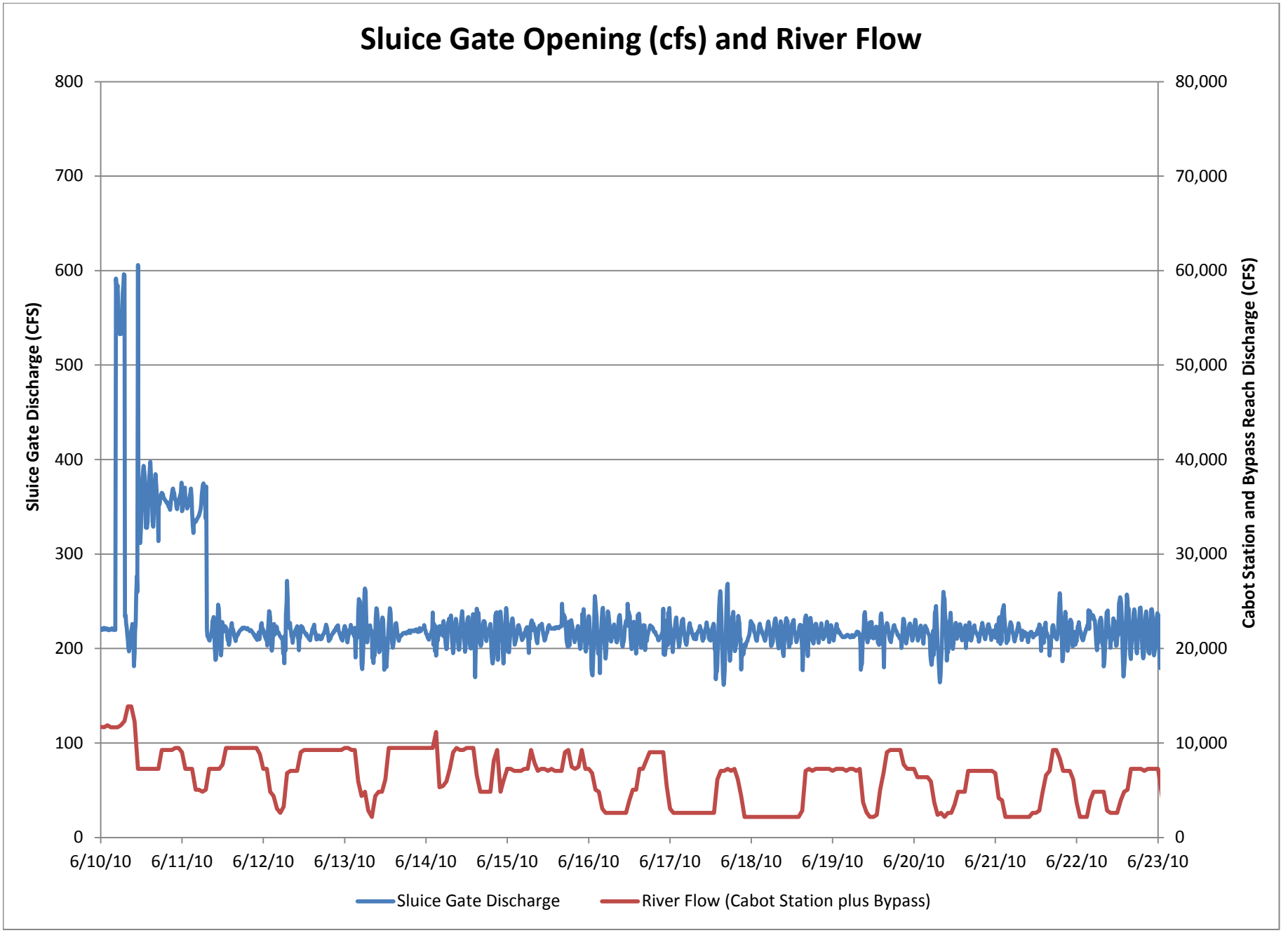
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
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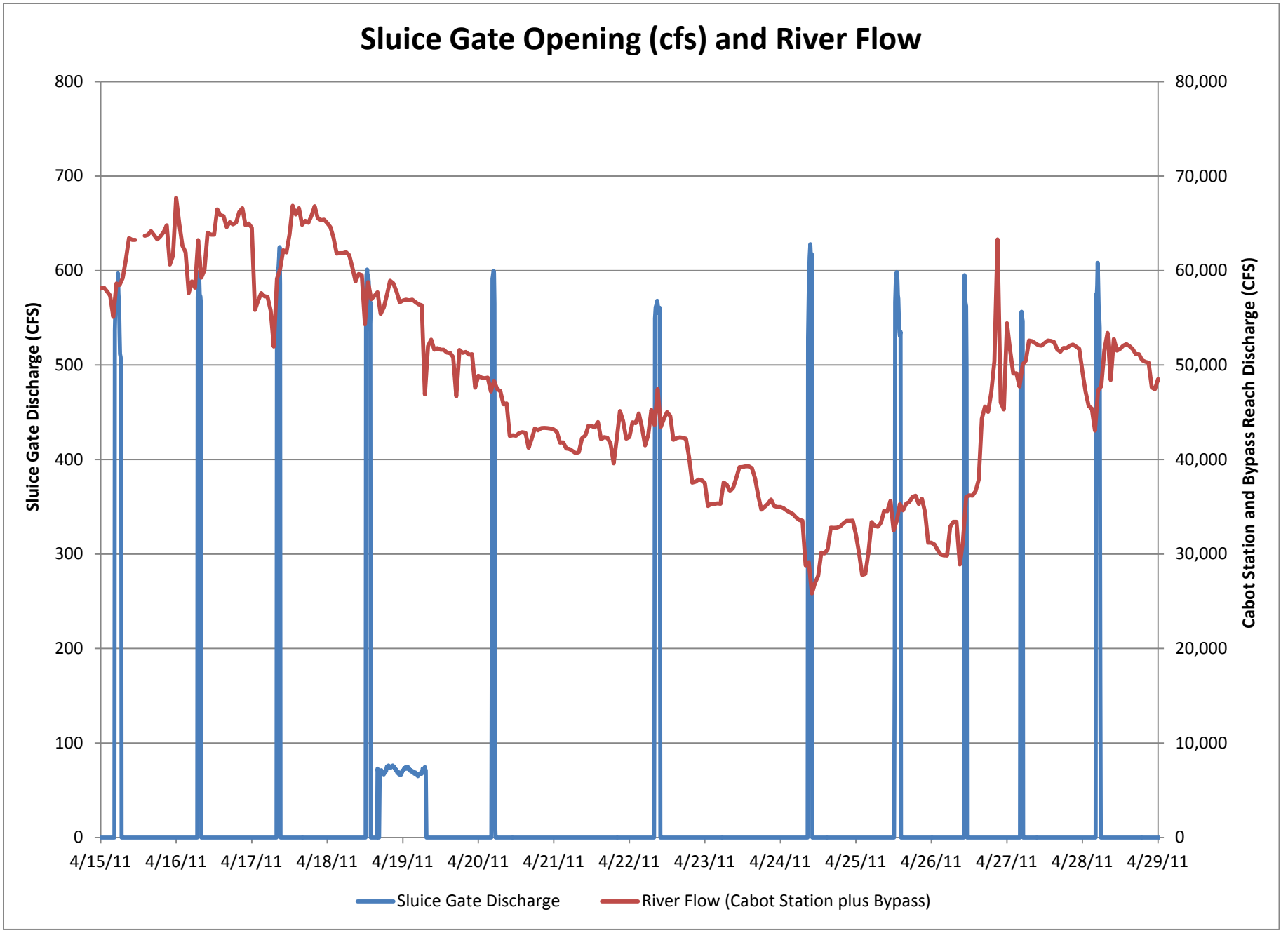
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
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Cabot Station and Bypass Reach Discharge (CFS)
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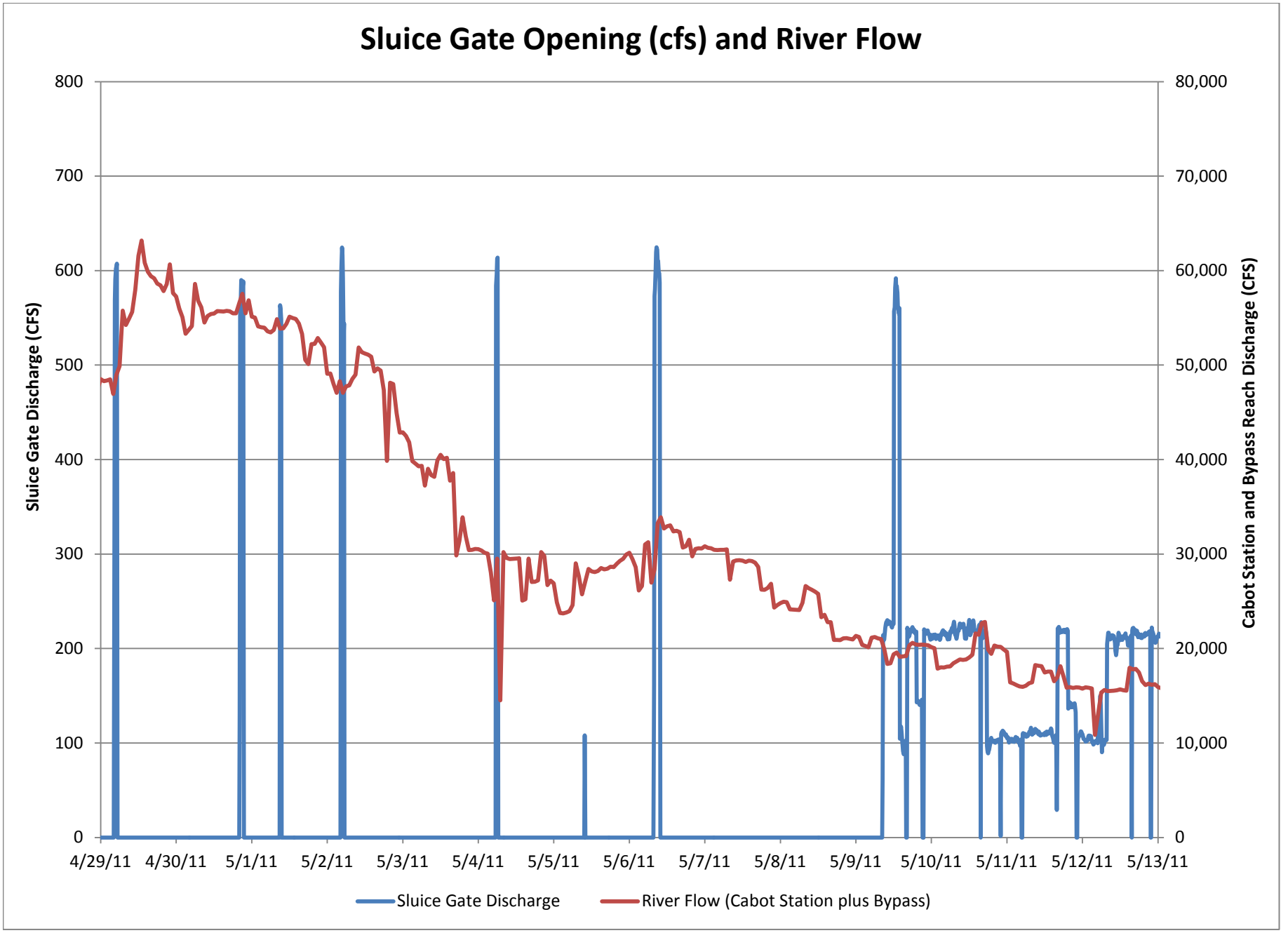
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
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Cabot Station and Bypass Reach Discharge (CFS)
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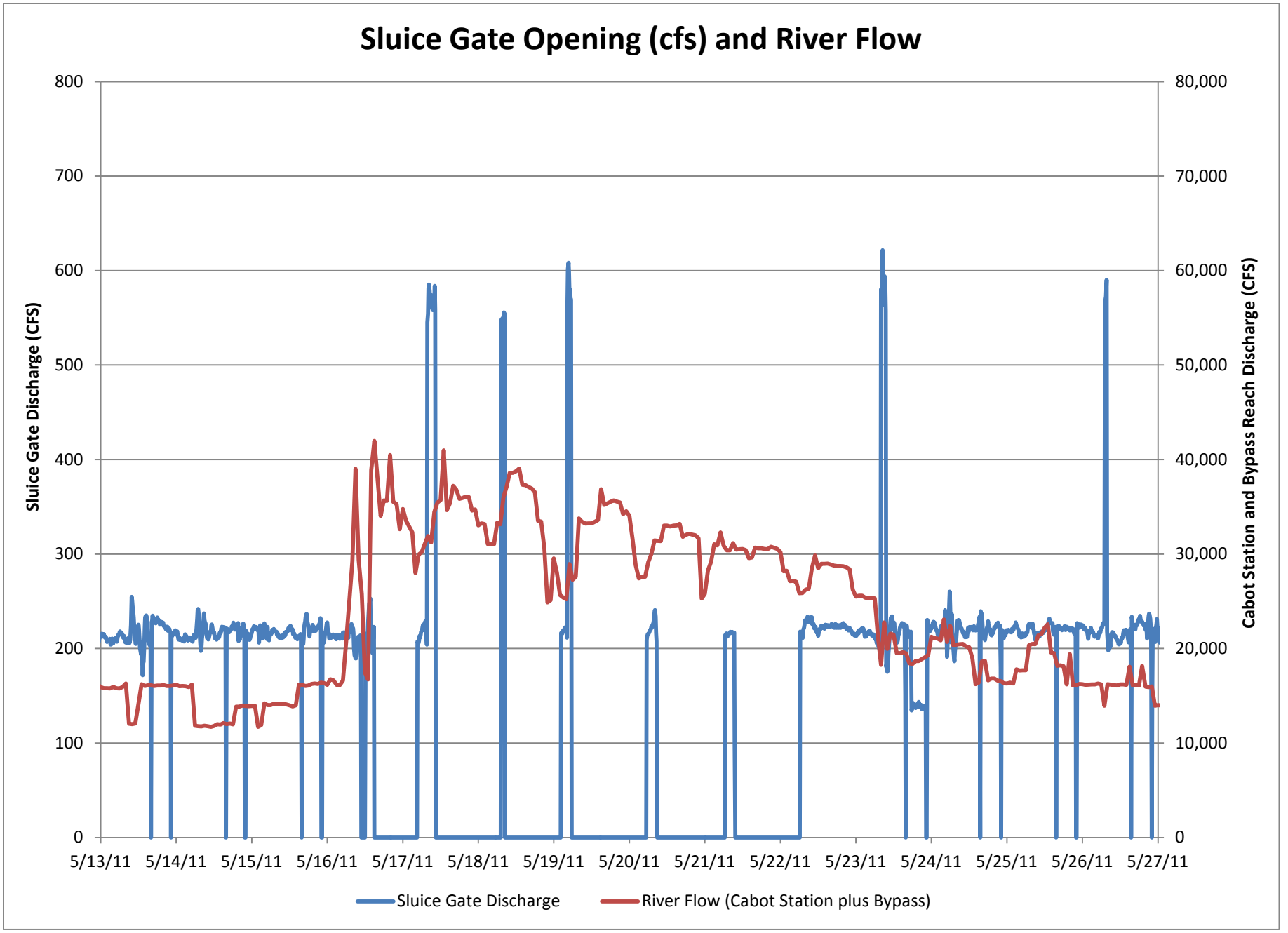
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
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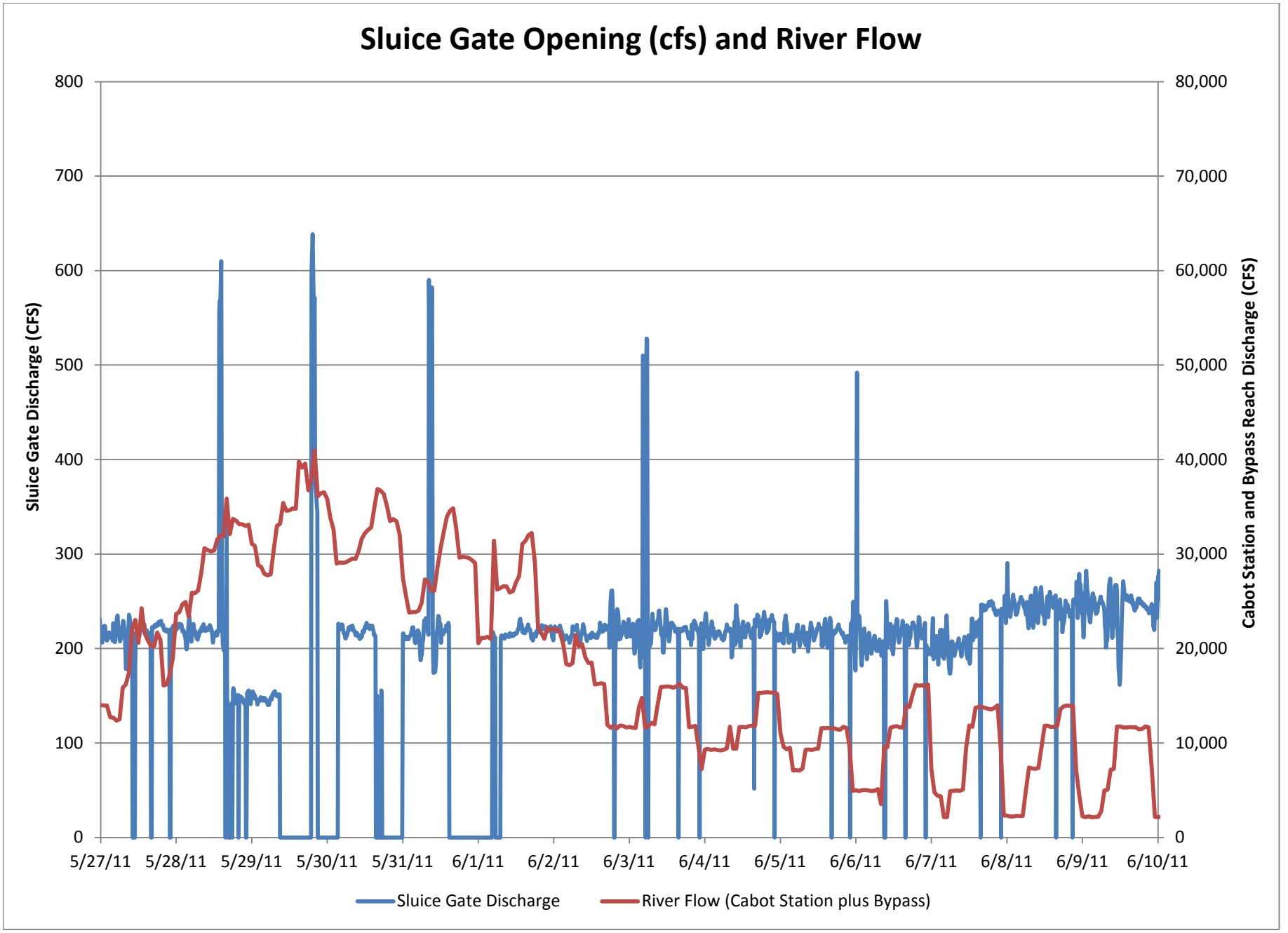
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
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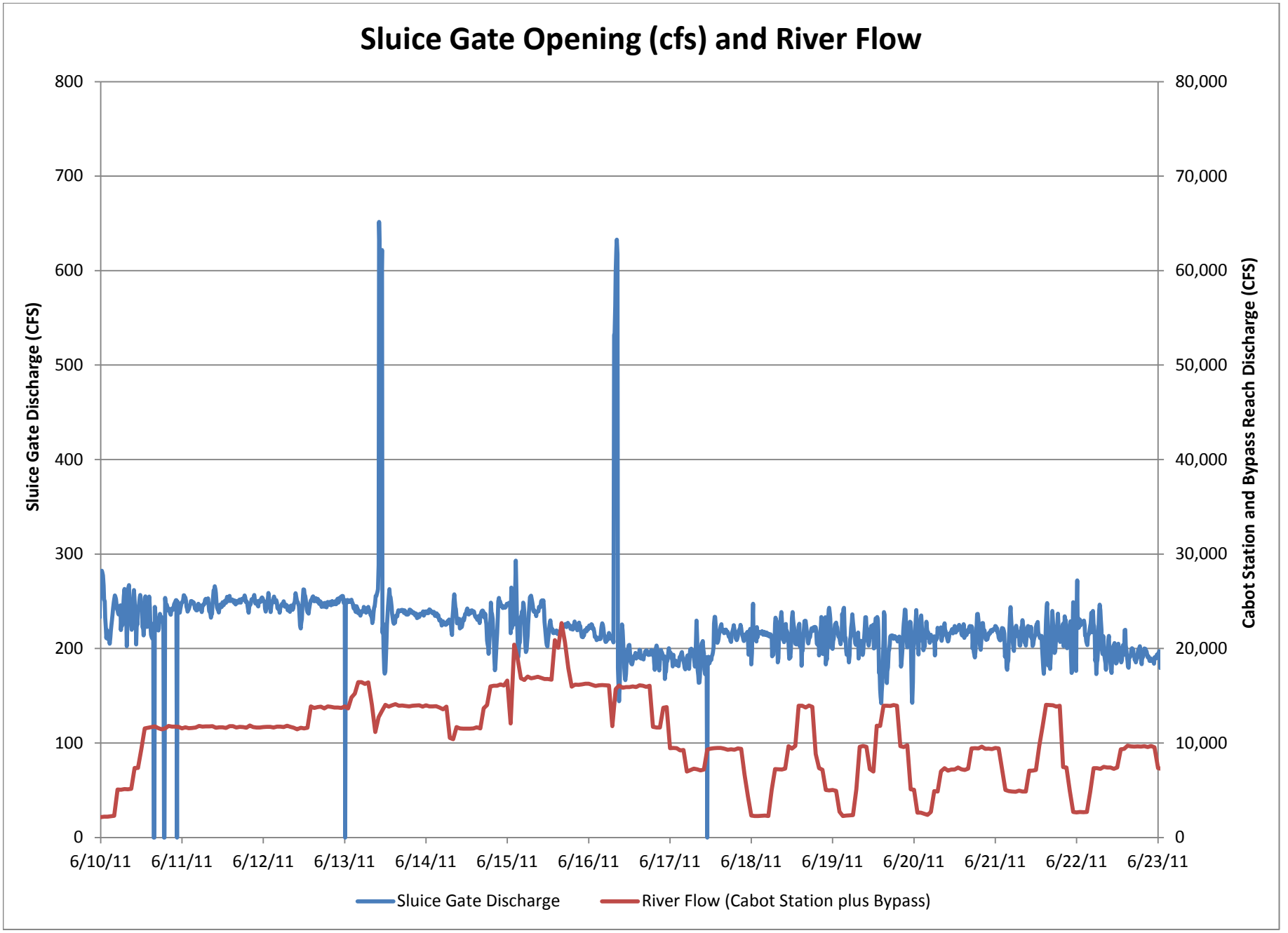
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)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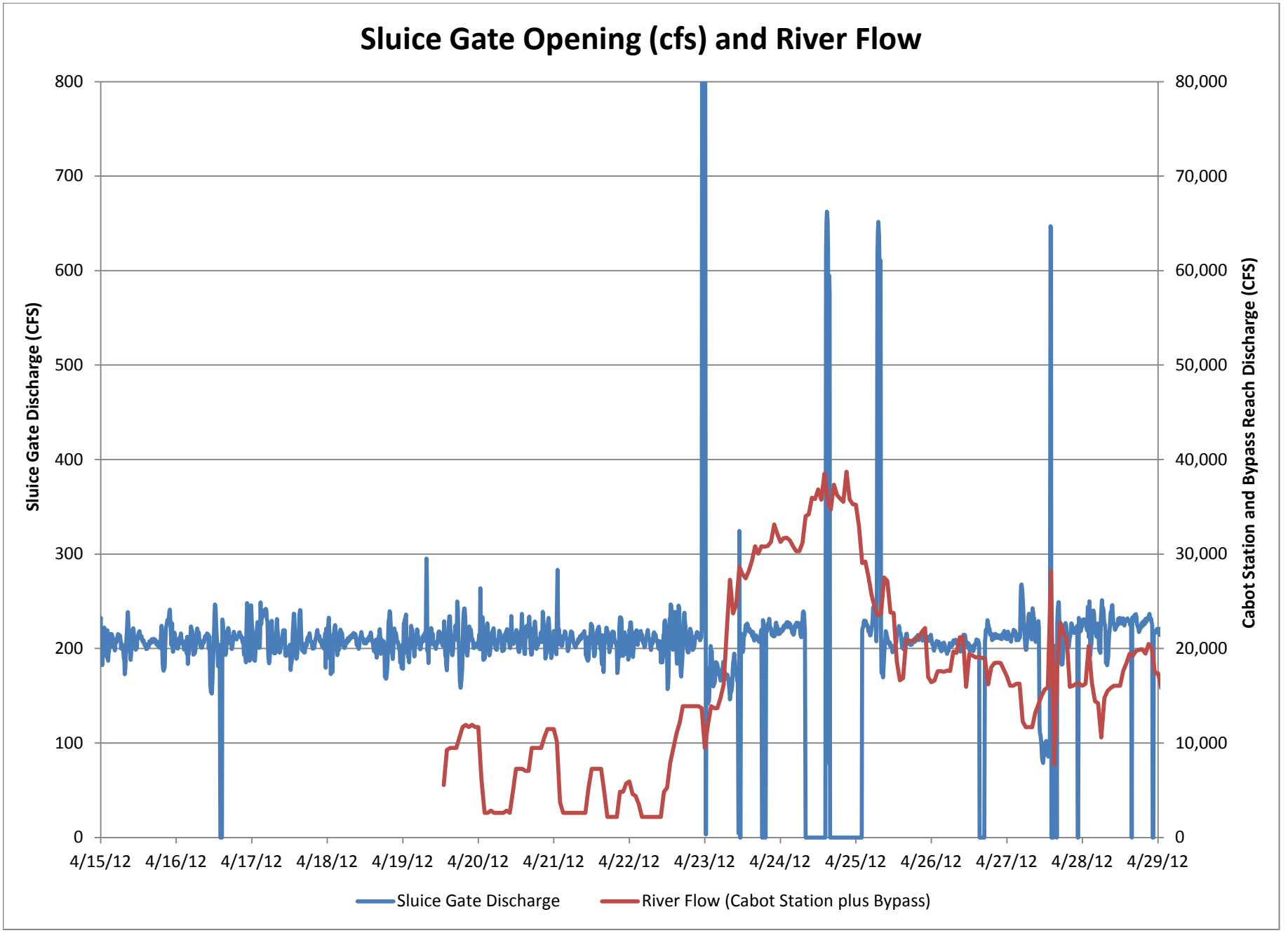
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)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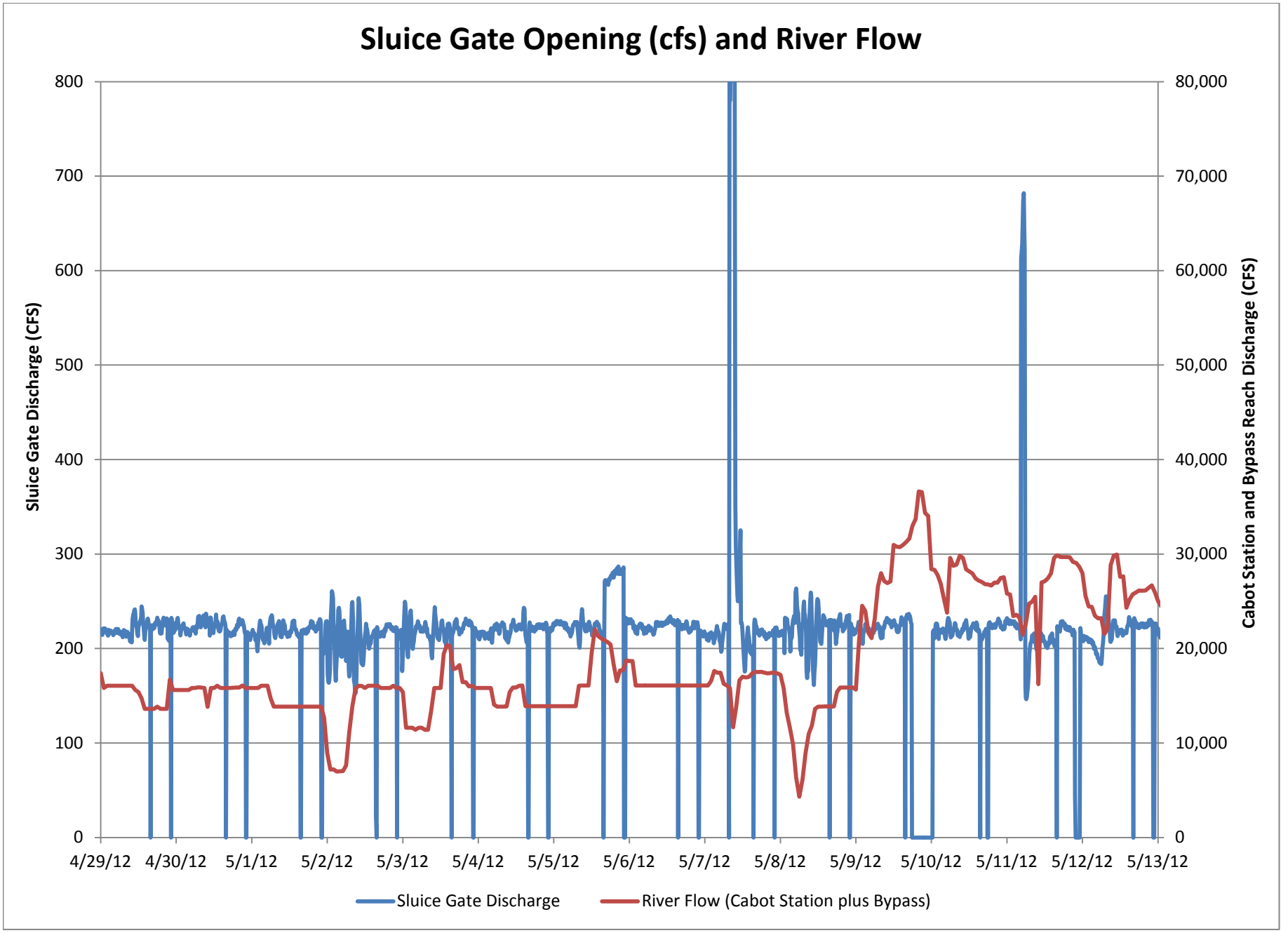
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)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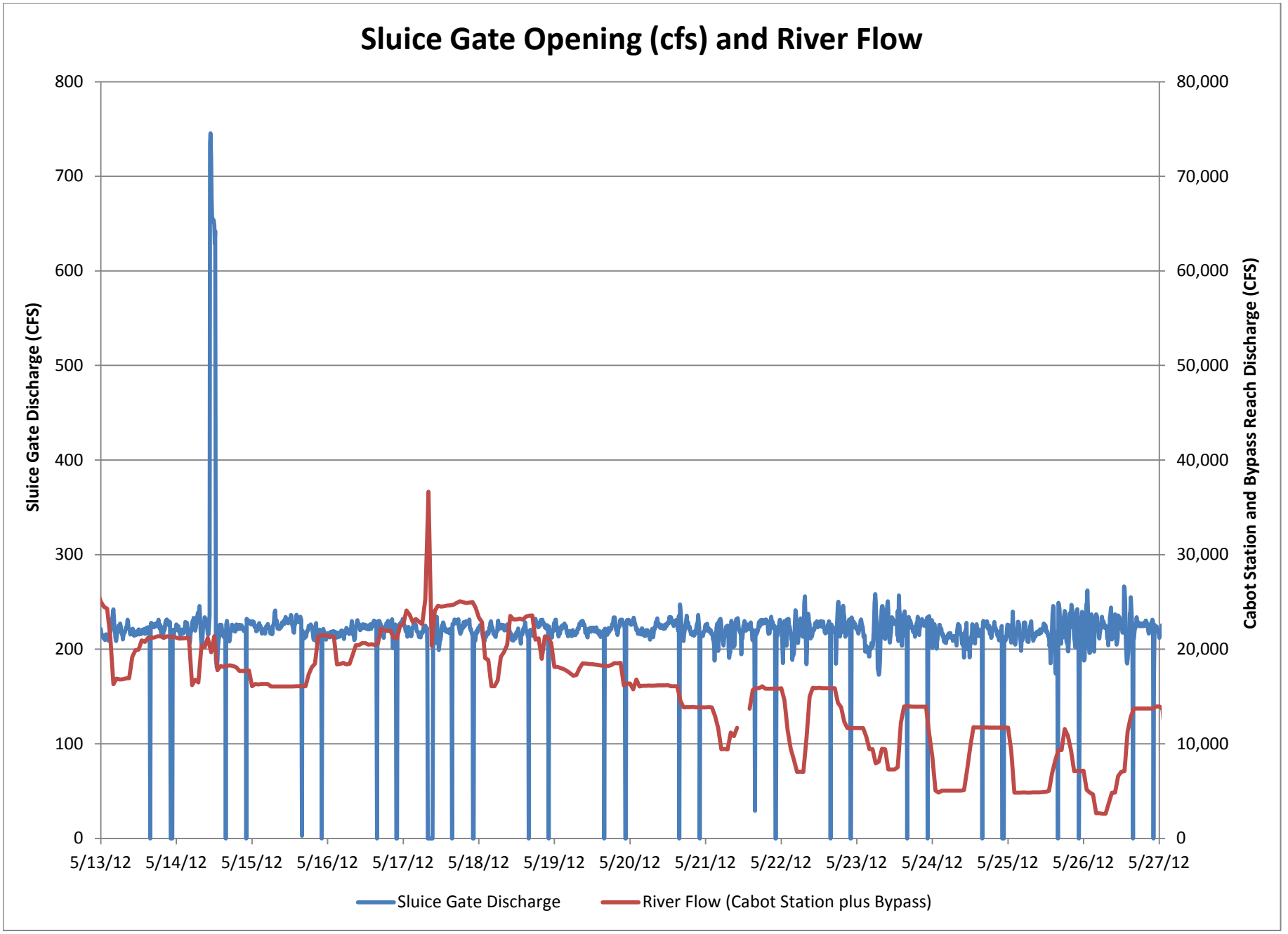
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
800
700
600
500
400
300
200
100
0
80,000
70,000
60,000
50,000
40,000
30,000
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0
5/13/12
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5/17/12
5/18/12
5/19/12
5/20/12
5/21/12
5/22/12
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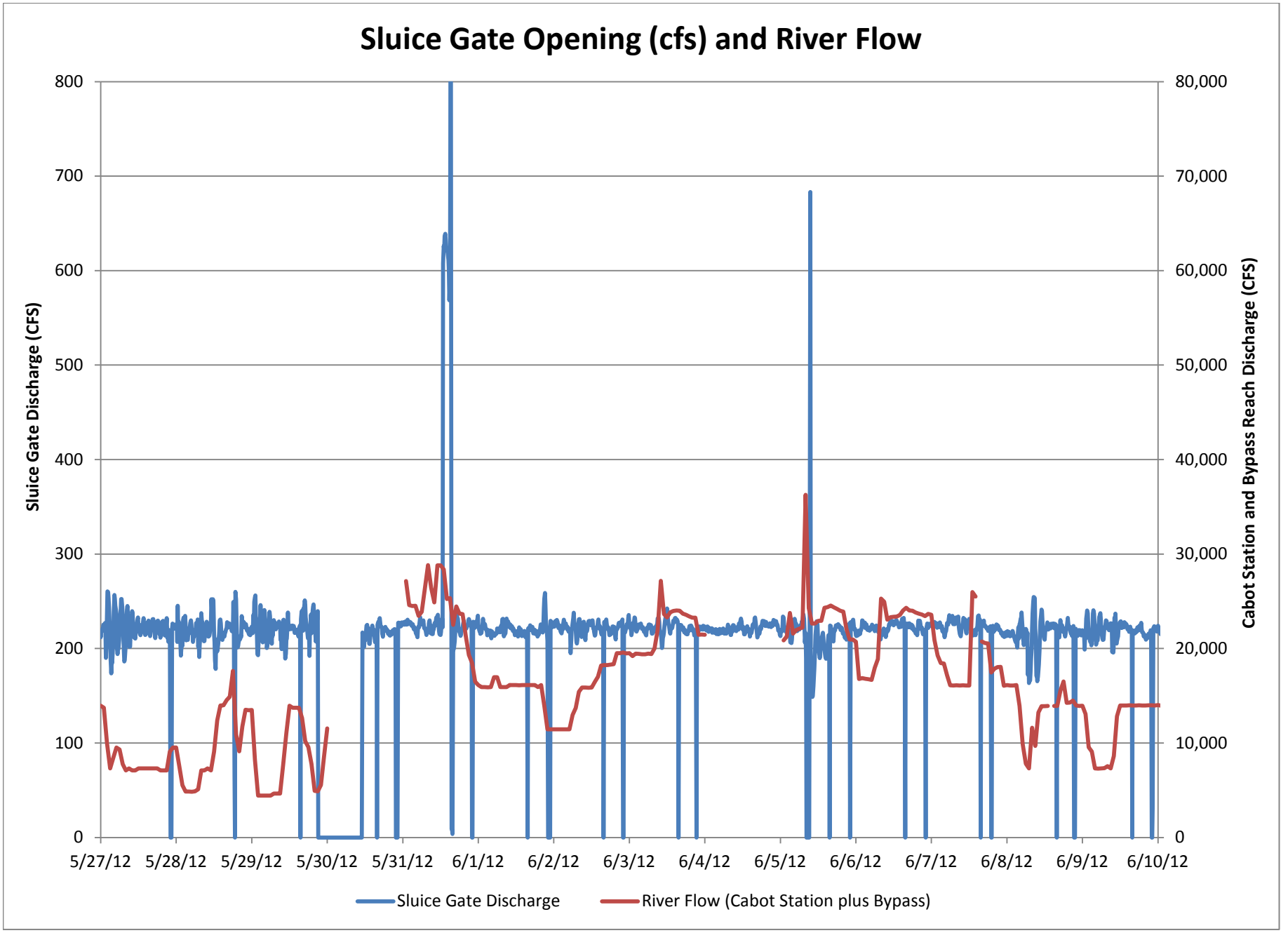
5/24/12
5/25/12
5/26/12
5/27/12
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
Sluice Gate Discharge (CFS)
Cabot Station and Bypass Reach Discharge (CFS)
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5/31/12
6/1/12
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6/3/12
6/4/12
6/5/12
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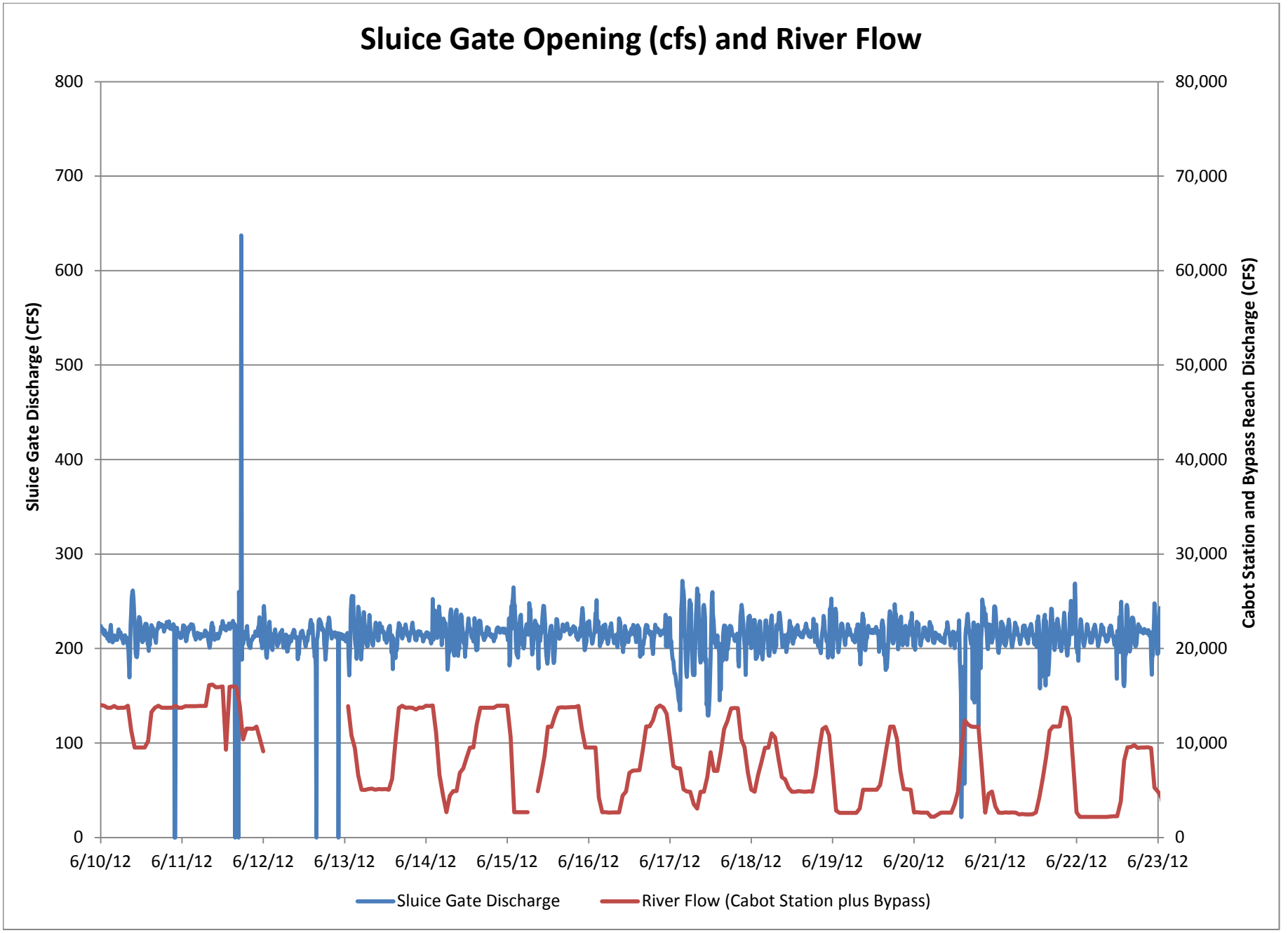
6/7/12
6/8/12
6/9/12
6/10/12
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)


Sluice Gate Opening (cfs) and River Flow
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Cabot Station and Bypass Reach Discharge (CFS)
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6/18/12
6/19/12
6/20/12
6/21/12
6/22/12
6/23/12
Sluice Gate Discharge
River Flow (Cabot Station plus Bypass)