UNITED STATES OF AMERICA

BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

FINAL APPLICATION FOR NEW LICENSE FOR MAJOR PROJECT - EXISTING DAM

EXHIBIT B – PROJECT OPERATION AND RESOURCE UTILIZATION

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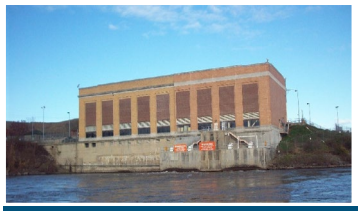
VISCHER FERRY HYDROELECTRIC PROJECT RELICENSING

FERC NO. 4679




NEW YORK STATE OF OPPORTUNITY. | NY Power Authority

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1 Introduction

The Vischer Ferry Hydroelectric Project (Project) (FERC No. 4679) is an 11.8 MW hydroelectric project located on the Mohawk River in Saratoga and Schenectady Counties, New York, and in the Towns of Clifton Park and Niskayuna and the City of Schenectady. The Vischer Ferry Project and Crescent Project (FERC No. 4678) are located adjacent to one another on the Mohawk River in New York at river miles 14 and 4, respectively. The downstream project boundary of the Vischer Ferry Project is the upstream project boundary of the Crescent Project. The FERC-licensed Little Falls Project (FERC No. 3509) owned by Little Falls Hydroelectric Associates, L.P. is the closest upstream hydroelectric project (approximately 65 miles upstream) of the Vischer Ferry Project. The Vischer Ferry Project generally consists of a dam, powerhouse, impoundment, and appurtenant facilities. The Vischer Ferry Project dam was originally constructed as part of the New York State Barge Canal System[1] (Barge Canal System[2]) to 'canalize' the Mohawk River from Scotia to Crescent, providing navigable conditions for barges and vessels and facilitating water level control and lock operations. To this day, the first priority for operation of the Vischer Ferry Project is to provide adequate water levels for operation of the New York State Barge Canal, with power generation being the second priority. The Vischer Ferry Project is owned and operated by the Power Authority of the State of New York (d/b/a "New York Power Authority" and referred to as "the Power Authority").

This exhibit is required under the Federal Energy Regulatory Commission (FERC) regulations which can be found in Title 18 of the Code of Federal Regulations (CFR) Sections 4.51(c) and 5.18(a)(5)(iii). The information provided herein covers the specifics prescribed for Exhibit B and serves the purpose of providing a statement of operation and resource utilization.

[1] The existing Barge Canal System was created following the passage of the Barge Canal Act in 1903. However, some portion of the original Erie Canal built between 1817 and 1825 still exists. For the purposes of this document, the Licensee will consistently refer to the portions of the Barge Canal or Erie Canal adjacent to the Projects as the Barge Canal System.

[2] The Barge Canal System is owned by the People of the State of New York and operated by the New York State Canal Corporation (NYSCC), which was created by the New York State Legislature in 1992 as a subsidiary of the New York State Thruway Authority (NYSTA). Prior to 1992, the operations of the Barge Canal System fell under the New York State Department of Transportation. On January 1, 2017, the NYSCC became a subsidiary of the Power Authority (N.Y. Public Authorities Law § 1005-b).

2 Project Operation (18 CFR Section 4.51(c)(1))

2.1 Operational Control

The Vischer Ferry hydropower plant can be operated remotely and manually. The plant is generally staffed Monday-Friday, during business hours, but the Project is typically operated remotely from the Power Authority's Blenheim-Gilboa Pumped Storage Project (FERC Project No. P-2685) control room. The Project utilizes a programmable logic controller (PLC) system to monitor impoundment water levels and plant output. Many safeguards are in place for monitoring Project operations at all times.

2.2 Annual Plant Factor

The average annual plant factor is determined using the following equation:

$$\frac{\text{Average Annual Output}}{\text{Nameplate Capacity x 8,760 hrs./yr.}} = \text{Avg. Annual Plant Factor}$$

The Project has a gross average annual energy production of approximately 56,323 megawatt-hours (MWh) per year (2012-2021) and an annual plant factor of approximately 54.0% based on its current FERC-authorized capacity of 11.8 MW.

2.3 Existing and Proposed Power Plant Operations

2.3.1 Relevant Background Information

The Vischer Ferry Project dam was designed in 1907 and construction of the dam was completed in 1913 as part of the extensive modifications made to upgrade the original Erie Canal. These modifications allowed canal traffic to navigate on the Mohawk River, except where channels were constructed to bypass natural barriers. There is a single canal lock at the Vischer Ferry Dam, Lock E-7, which is operated by the New York State Canal Corporation (NYSCC).

The current powerhouse was constructed in 1925 and expanded in 1990. It houses the two original 2.8 MW Francis turbines with an installed capacity of 5.6 MW and the two newer 3.0 MW Kaplan turbines, for a total capacity of 11.6 MW. On April 8, 1991, FERC issued an Order amending the license to an installed capacity of 11.8 MW based on actual performance.

2.3.2 Current Project Operations

The Vischer Ferry Project is operated on a run-of-river basis. The original purpose of the Vischer Ferry Dam was to impound water to support navigation on the Barge Canal; this remains true today. In 1983, the State of New York and the Power Authority entered into a Development Agreement whereby the State agreed to grant a perpetual hydroelectric easement to the Power Authority to develop and operate hydropower facilities at both the Vischer Ferry and Crescent project sites. The Development Agreement contains certain protocols for standard operation and maintenance of both the Project and the Barge Canal System. Barge Canal System levels take priority over the operations of the Projects for generation. The Power Authority proposes to continue operating the Project in the same manner as under the current license.

Vischer Ferry Project operations are performed in a manner to maintain the normal full pool elevation of the impoundment. Flow through the Project is through the powerhouse or over the dam. A minimum flow of 200 cfs (or inflow, whichever is less) is required to be passed at the Vischer Ferry Dam. Once Project minimum flows and any diversion required for canal operations are met, the remaining flow is available for power generation.

Flashboards are installed along the spillway crests of the Vischer Ferry Dam seasonally for the navigation season. The flashboards are 27 inches high and are installed in sockets spaced 4 ft. apart. When the flashboards are installed the elevation of the spillway is El. 213.25 ft. Barge Canal Datum (BCD). The flashboards are set to fail when the headpond level overtops the flashboards by between 1-3 feet, depending on the dam section.

The Project operators monitor available water level and weather forecasting information (i.e., USGS webpage) for severe weather predictions. The USGS maintains a streamflow gage upstream of the Crescent and Vischer Ferry Projects at Little Falls (USGS Gage No. 01347000), and downstream of the Crescent Project at Cohoes Falls (USGS Gage No. 01357500). The USGS also has streamflow gages in between the Projects and the Little Falls USGS gage, however, these gages have limited periods of records. The Little Falls USGS gage has a period of record extending back to 1927. The Cohoes USGS gage has a period of record extending back to 1917.

2.3.3 Operation During Adverse, Mean, and High Water Years

During normal water conditions, the Project is operated run of river. The Vischer Ferry units are generally operated to maintain the impoundment elevation between 1 to 4 tenths of a foot below crest. Without flashboards the Vischer Ferry impoundment is maintained between 210.9 (max) and 210.6 (min), with a target elevation of 210.8 ft. BCD. With flashboards the impoundment is maintained between 213.1 (max) and 212.8 (min), with a target elevation of 213.0 ft. BCD. The newer Kaplan units are used first. As flow rises, one of the Francis units is brought on at full load, and the remaining load is balanced between the new units to maintain the required impoundment elevation. As the flow rises, output of new units is increased, and once all four units are operating at full output, water is spilled over the dam crest.

During high river flows the Project is operated no differently than under normal flow conditions. River flows are used for generation until flows in the river exceed the hydraulic capacity of the generating units. Excess flow is released through gates or is spilled at the dams. Forebay indicators at the Project are designed to alert operators of changing river conditions. Additionally, operators monitor USGS gages along the Mohawk River. The spillway at the Vischer Ferry Project is 1,919 ft. long and has ample capacity for passing the higher flow events on the Mohawk River. On occasion a plant may have to be taken off-line due to debris build up on the units' trash racks. Once the operator clears the debris, the unit(s) can be brought back on line.

During both scheduled and unscheduled maintenance and unit shutdown events, the Licensee will continue to pass inflow downstream through operation of the remaining units, through the gates or over the crest of the spillway, as necessary. Order of operation or shutdown of any of the units is based on flow conditions and what specific event is taking place.

3 Resource Utilization (18 CFR Section 4.51(c)(2))

3.1 Dependable Capacity

There are two capability periods: summer (May 1 – October 31) and winter (November 1 – April 30). For each capability period, the New York Independent System Operator (NYISO) calculates the dependable capacity ("Unforced Capacity") for small hydro projects according to Market Services Tariff 5.12.6.2. The calculation is based on the amount of generation the Project produced during the NYISO's 20 peak load hours for each capability period. The dependable maximum net capability (DMNC) values for the limited control run of river projects are not supported by seasonal testing, but instead are representative of their nameplate installed capacity, and are not expected to change. The DMNC for the Vischer Ferry Project is 11.6 MW for the summer period and 11.6 MW for the winter period.

3.2 Average Annual Energy Generation

Table 3-1 lists the annual and monthly gross generation (kilowatt hours [KWh]) at the Project for the past 10 years, 2012-2021.

Table 3-1 Vischer Ferry Project Annual and Monthly Gross Generation (KWh) 2012-2021

Month	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	10-year Avg
Jan	6,659,216	5,786,267	5,743,267	4,410,776	2,999,383	7,399,358	6,572,113	5,960,585	6,278,712	5,458,686	5,726,836
Feb	5,597,242	4,755,445	4,057,144	2,190,906	4,963,518	6,310,469	5,466,748	6,893,606	5,589,678	3,192,570	4,901,733
Mar	6,477,868	7,119,745	5,383,796	4,339,441	6,099,470	6,743,293	8,743,765	6,857,369	6,218,955	7,251,439	6,523,514
Apr	2,858,699	8,081,444	6,471,051	6,285,016	5,067,682	8,309,467	8,713,577	7,502,390	6,035,940	6,694,415	6,601,968
May	6,289,441	4,996,102	6,444,119	2,656,903	3,648,423	7,844,314	5,948,478	7,852,857	5,459,009	4,997,935	5,613,758
Jun	3,229,858	7,576,288	4,563,368	4,613,766	1,867,788	5,876,281	1,734,598	6,136,016	1,892,492	3,564,675	4,105,513
Jul	996,258	4,743,195	2,768,745	3,226,400	1,358,785	5,318,376	1,339,048	2,779,378	615,865	6,475,337	2,962,139
Aug	1,243,008	1,380,893	2,306,751	491,683	2,111,553	2,291,916	3,877,257	2,992,414	1,374,911	4,264,418	2,233,480
Sep	1,242,087	2,448,687	1,620,467	494,404	887,073	1,986,053	3,966,087	2,353,696	749,551	4,498,479	2,024,658
Oct	3,187,896	3,179,426	2,921,539	2,378,832	2,144,888	2,923,227	6,694,901	6,697,548	2,571,478	7,131,905	3,983,164
Nov	3,429,066	5,459,618	3,766,834	3,618,259	3,960,238	7,597,116	8,918,264	6,457,579	4,397,375	6,793,202	5,439,755
Dec	6,849,811	5,943,388	6,667,841	4,132,313	6,679,262	5,203,132	8,625,758	4,721,407	5,405,391	7,834,646	6,206,295
Total	**48,060,450**	**61,470,498**	**52,714,922**	**38,838,699**	**41,788,063**	**67,803,002**	**70,600,594**	**67,204,845**	**46,589,357**	**68,157,707**	**56,322,814**

Generation statistics are based on hourly generation data.

3.3 Project Hydrology

There are several methods and indicators available to monitor the flow rates on the Mohawk River. Since 2011, the Power Authority has collected and electronically recorded hourly outflow data for the Projects, calculated based on unit discharge and impoundment elevation. These values were used to produce flow statistics and flow duration curves provided in the Pre-Application Document. A longer period flow record is available from the USGS located downstream of the Crescent Project at Cohoes Falls (USGS Gage No. 01357500). The USGS also operates gages upstream of the Vischer Ferry Project at Little Falls (USGS Gage No. 01347000) and at Vischer Ferry. However, these other gages have limited periods of records. The Cohoes USGS gage has a period of record extending back to 1917.

Flow duration curves and flow statistics for the Project were developed from the USGS gage data at Cohoes Falls for the period 1992-2021, using a proration factor of 0.9715, based on the drainage area above the Vischer Ferry dam, and the drainage factor at the USGS gage.

The annual and monthly minimum, median, mean, and maximum flows in cfs at the Vischer Ferry Project for the period January 1, 1992 through December 31, 2021 are provided in Table 3-2. Annual flow duration curves for the Vischer Ferry Project for the same period of record (January 1, 1992 through December 31, 2021) are shown in Figure 3-1. Monthly flow duration curves are provided in Figure 3-2 through Figure 3-13.

Table 3-2 Flow Statistics* (in cfs) for the Vischer Ferry Project

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Period of Record: 30 years (January 1, 1992 - December 31, 2021)													
Min	1,380	1,516	1,360	190	125	237	175	237	170	528	570	1,263	**125**
Median	4,930	4,425	7,869	11,172	4,595	2,812	1,943	1,710	1,608	2,905	5,596	6,174	**4,119**
Mean	7,149	6,029	10,913	13,724	6,435	4,867	3,407	2,736	2,621	4,984	6,808	7,715	**6,446**
Max	89,961	51,295	62,759	76,749	41,580	87,144	33,517	94,138	79,857	50,032	61,787	53,918	**94,138**

Source: New York Power Authority
* Based on prorated flow from USGS gage 01357500 Mohawk River at Cohoes.

Figure 3-1 Annual Flow Duration Curve for the Vischer Ferry Project

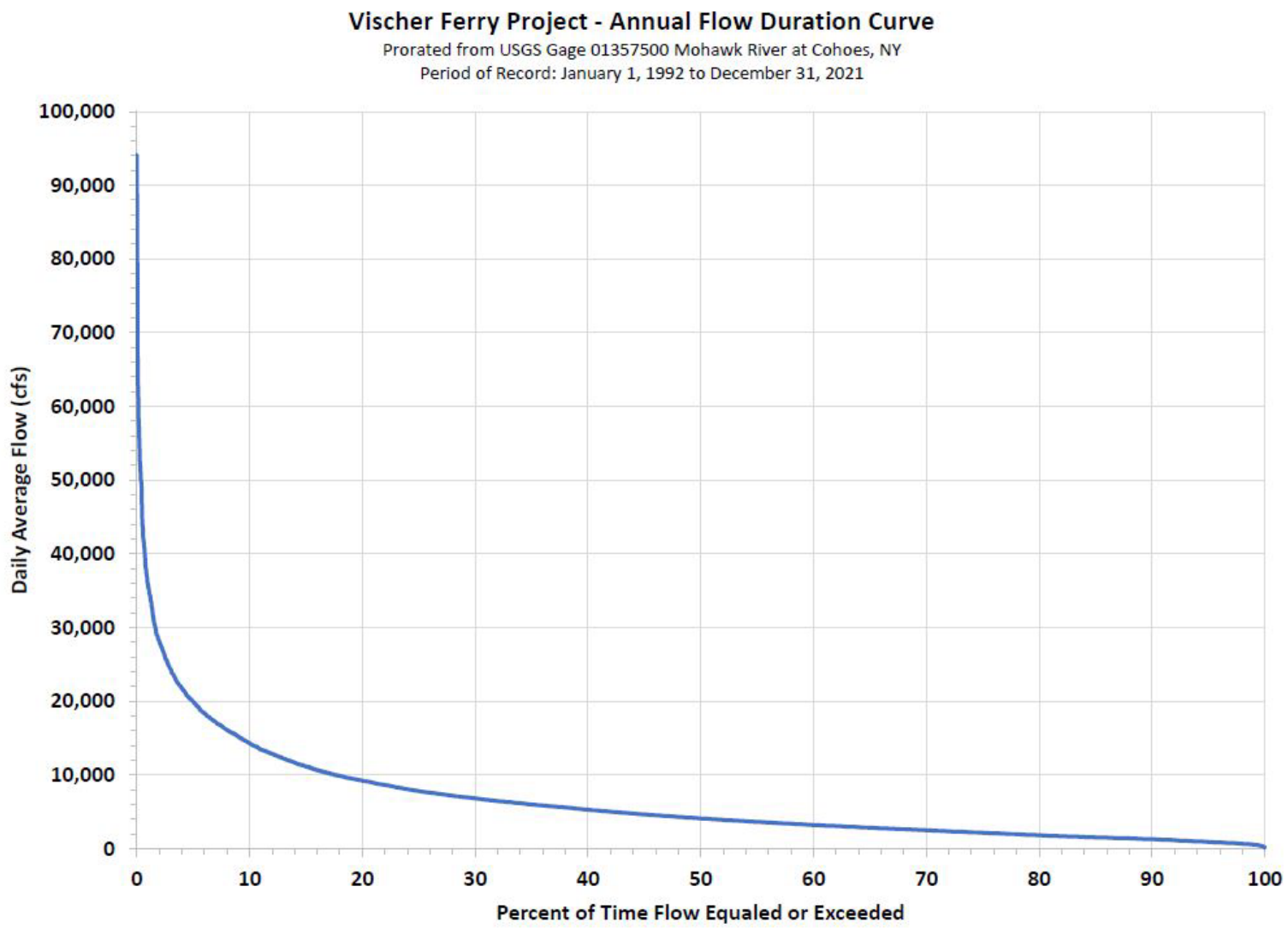


Figure 3-2 Monthly Flow Duration Curve for the Vischer Ferry Project - January

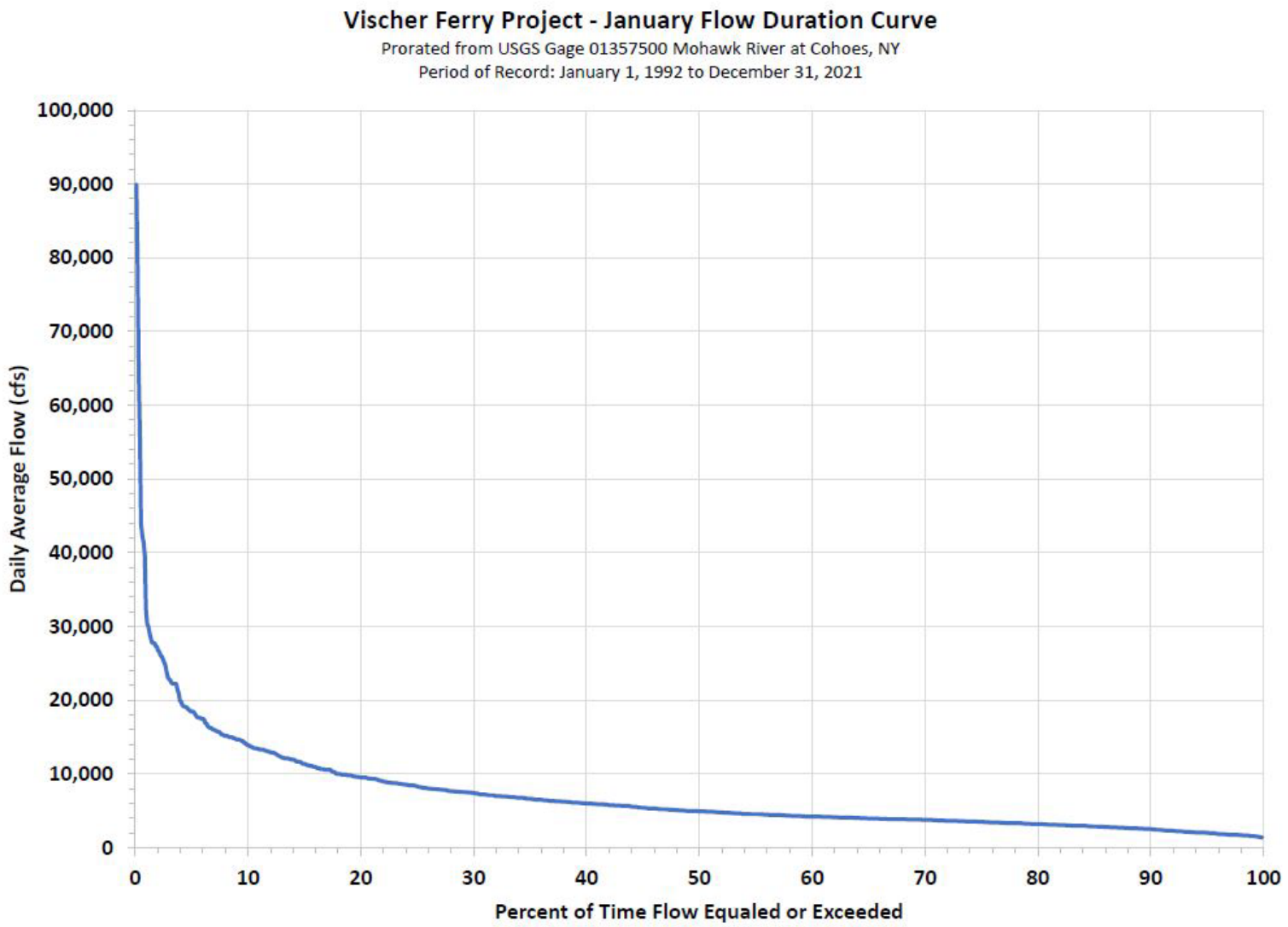


Figure 3-3 Monthly Flow Duration Curve for the Vischer Ferry Project - February

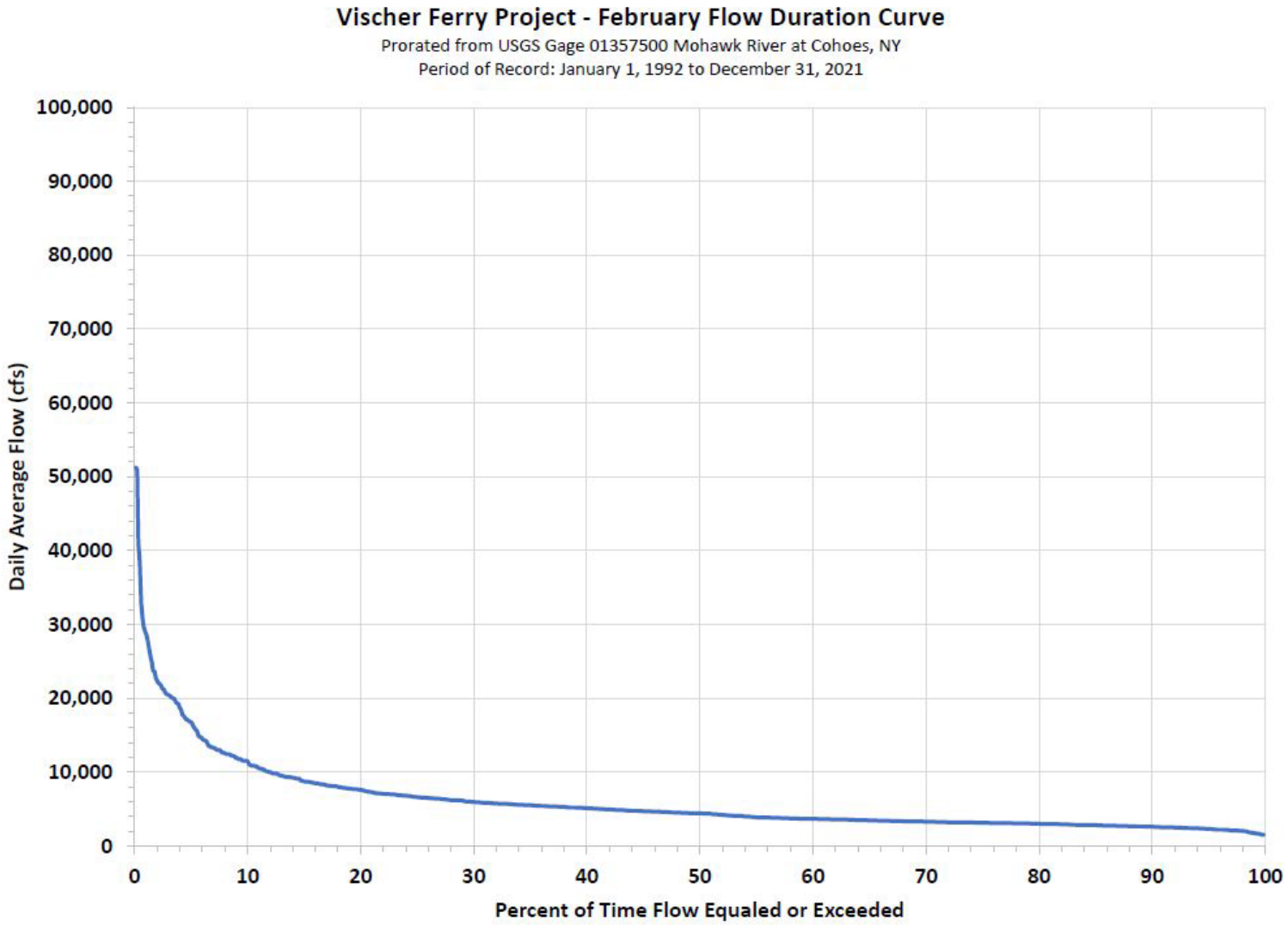


Figure 3-4 Monthly Flow Duration Curve for the Vischer Ferry Project - March

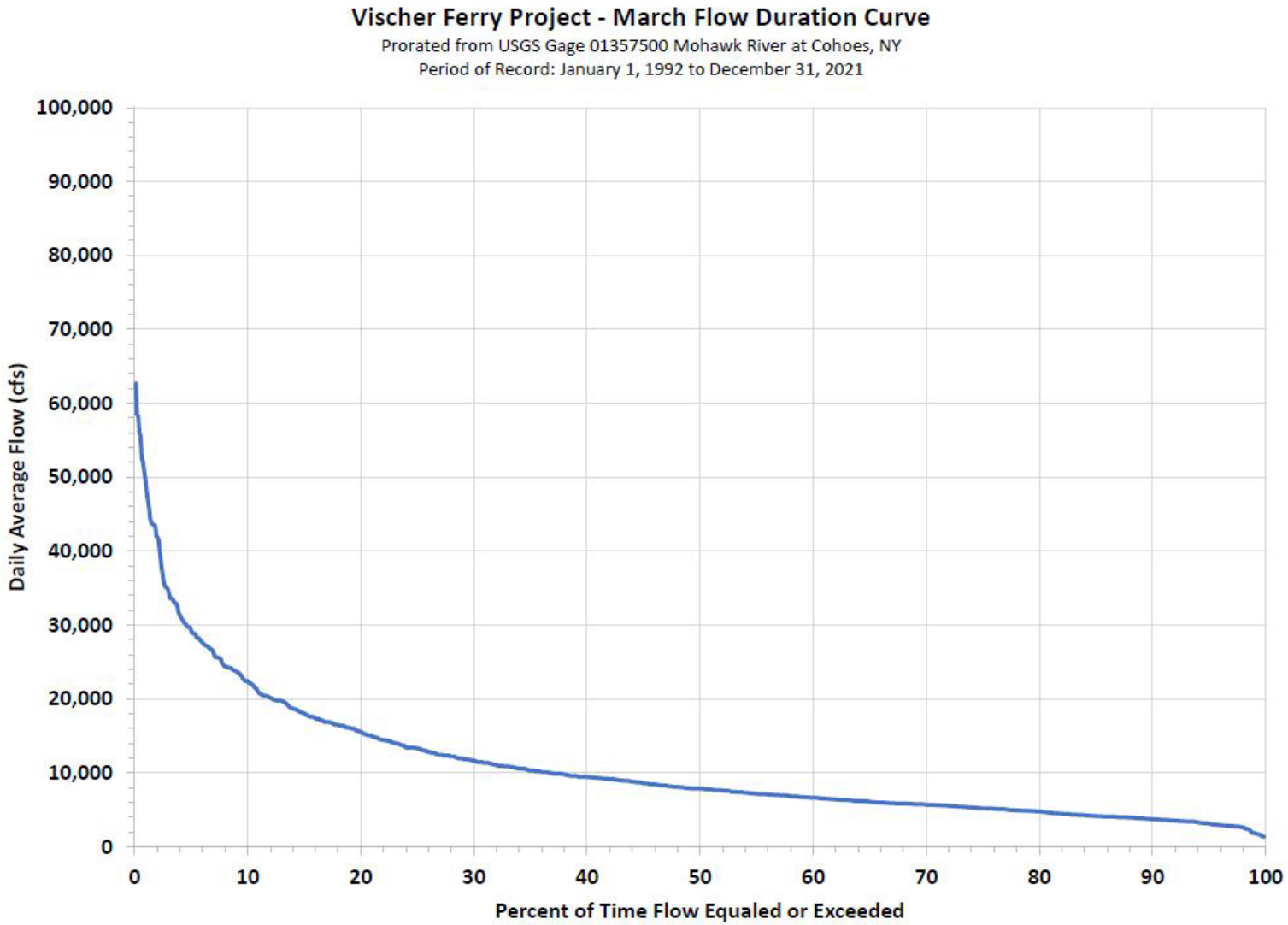


Figure 3-5 Monthly Flow Duration Curve for the Vischer Ferry Project - April

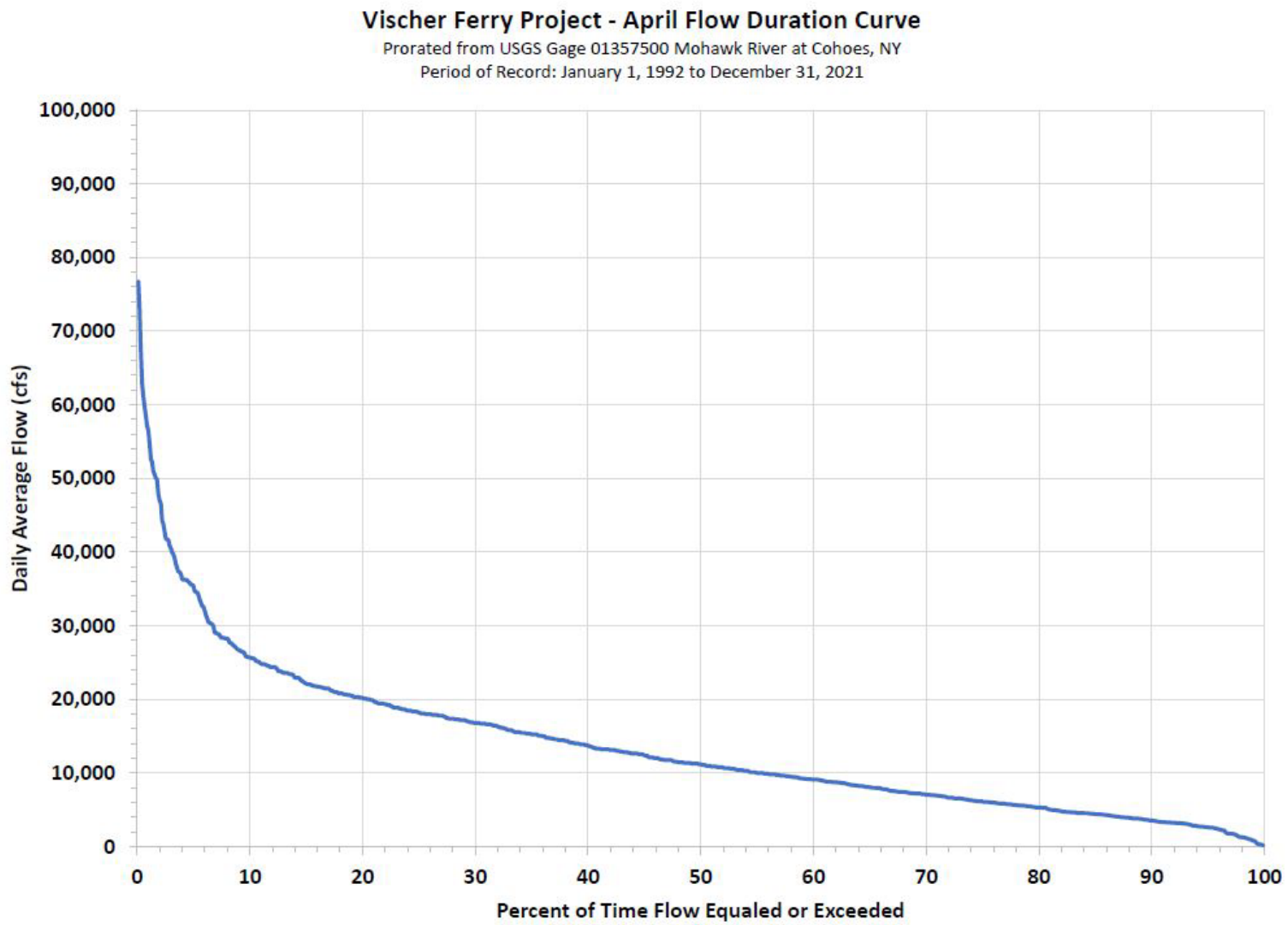


Figure 3-6 Monthly Flow Duration Curve for the Vischer Ferry Project - May

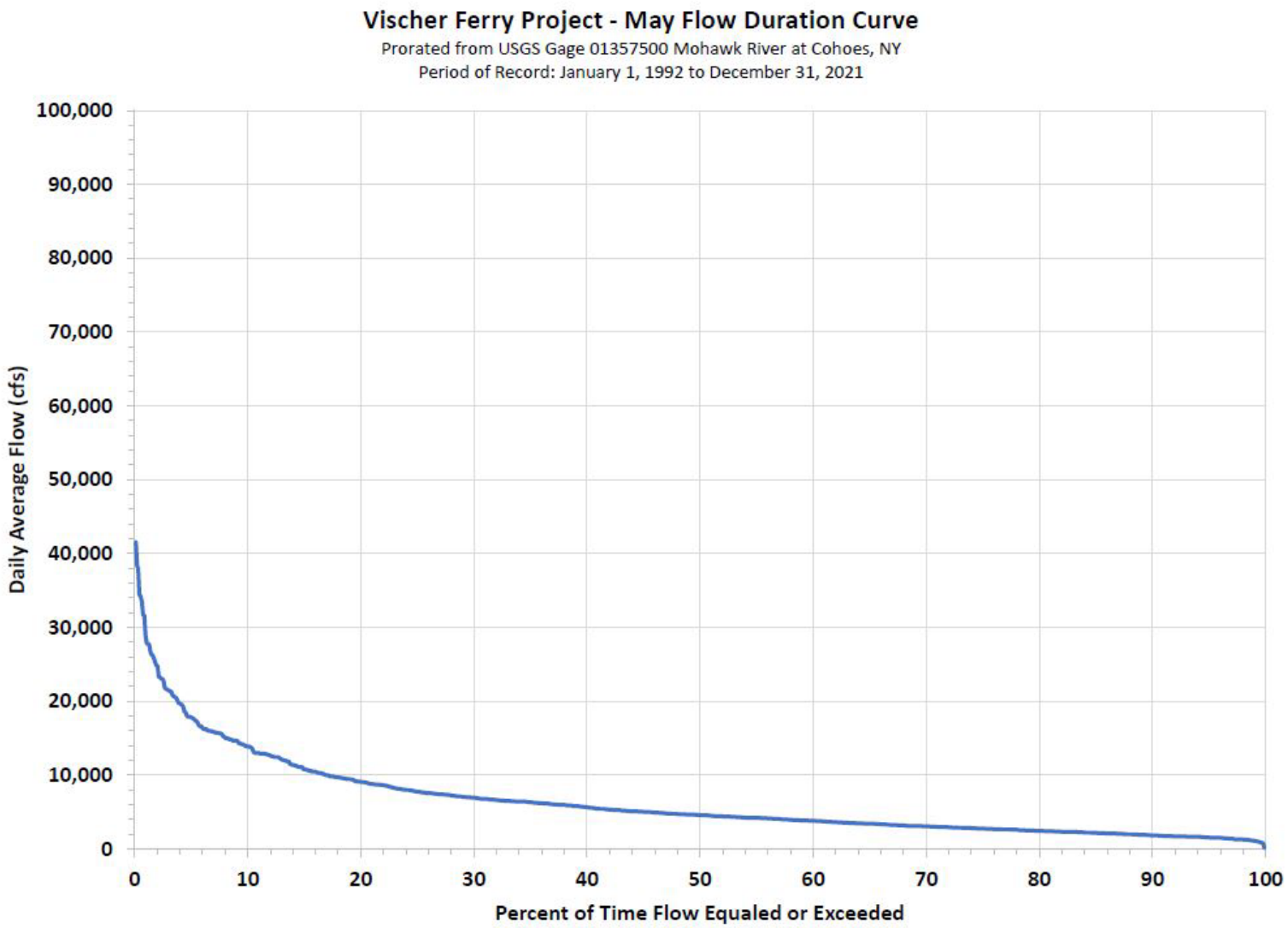


Figure 3-7 Monthly Flow Duration Curve for the Vischer Ferry Project - June

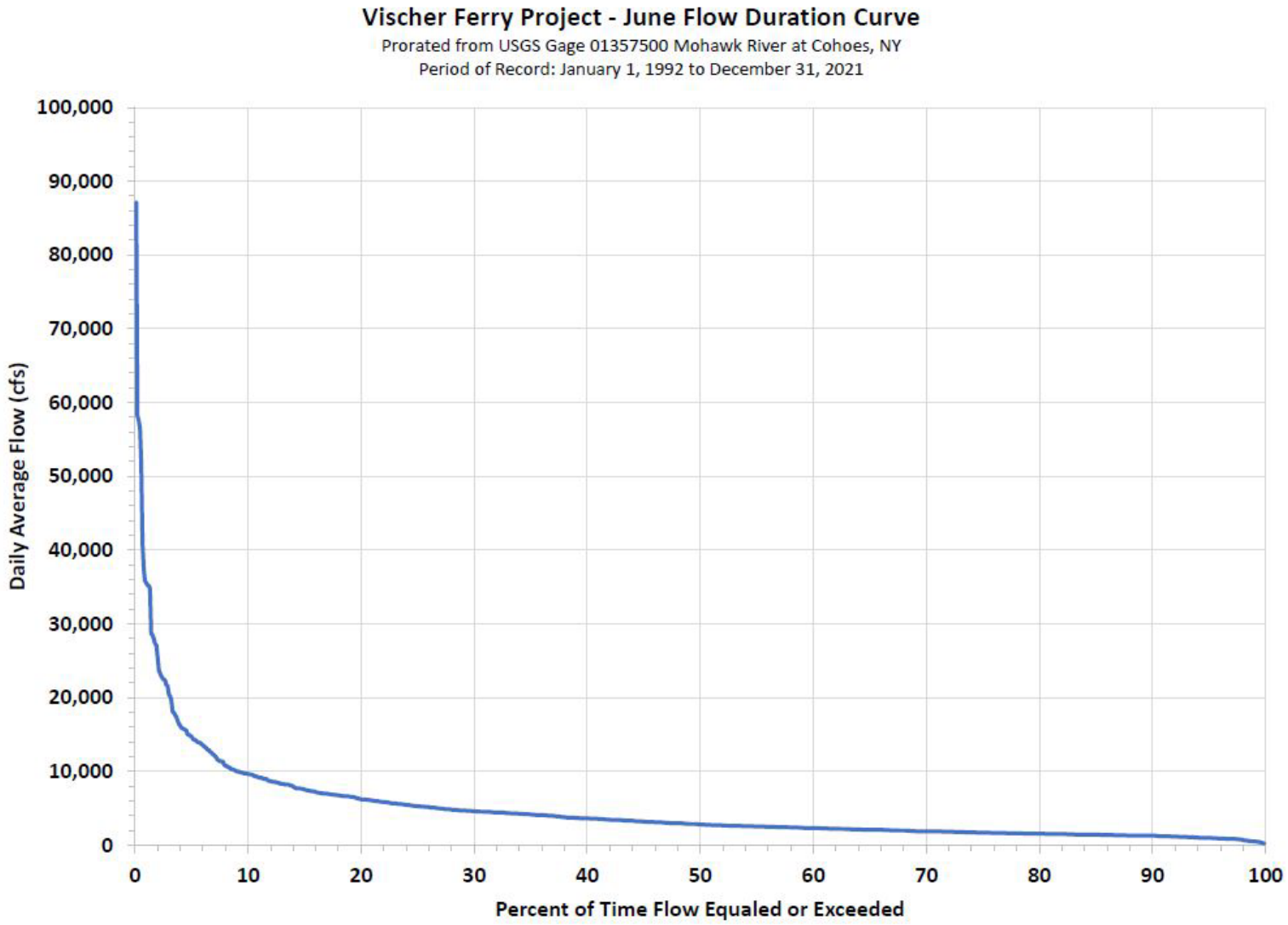


Figure 3-8 Monthly Flow Duration Curve for the Vischer Ferry Project - July

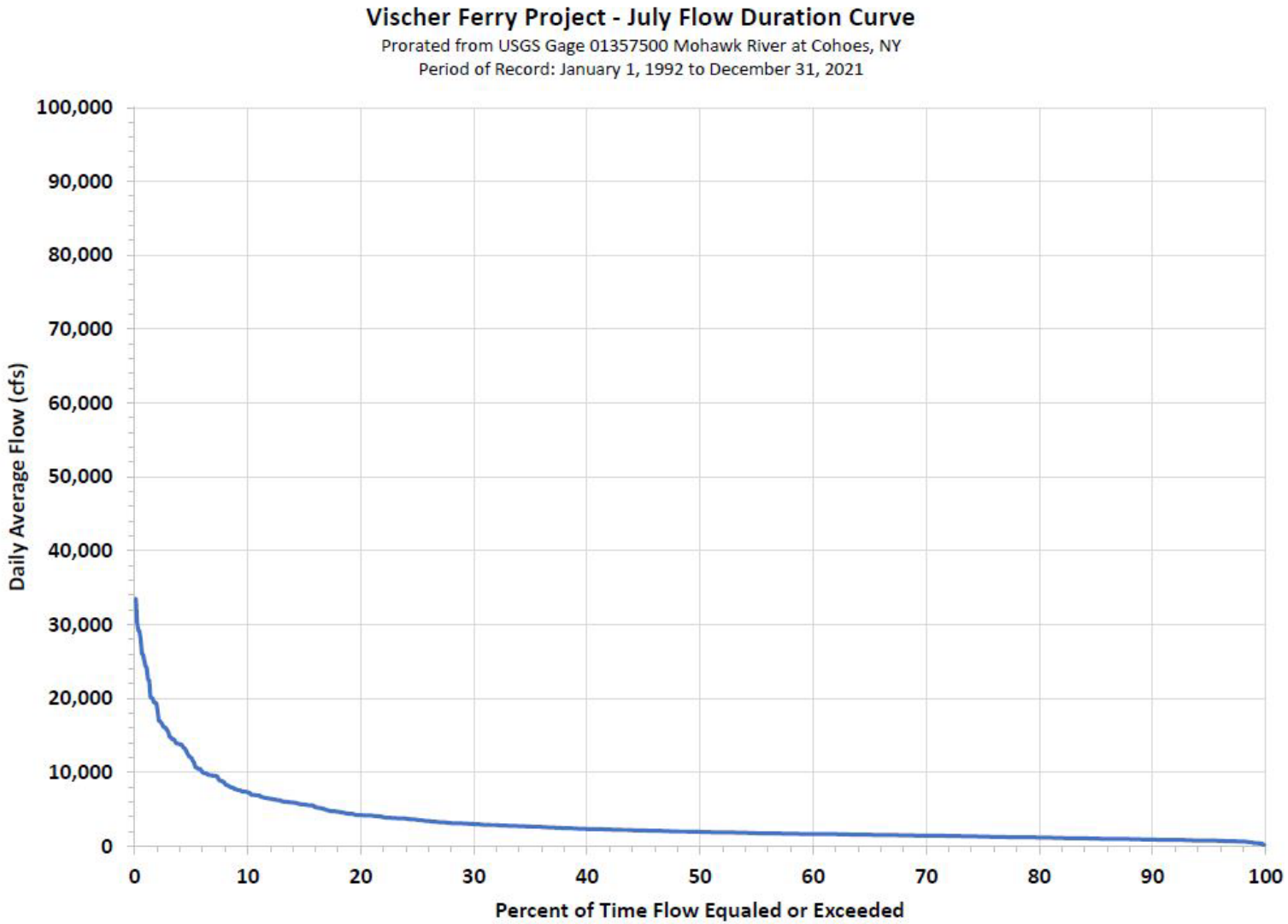


Figure 3-9 Monthly Flow Duration Curve for the Vischer Ferry Project - August

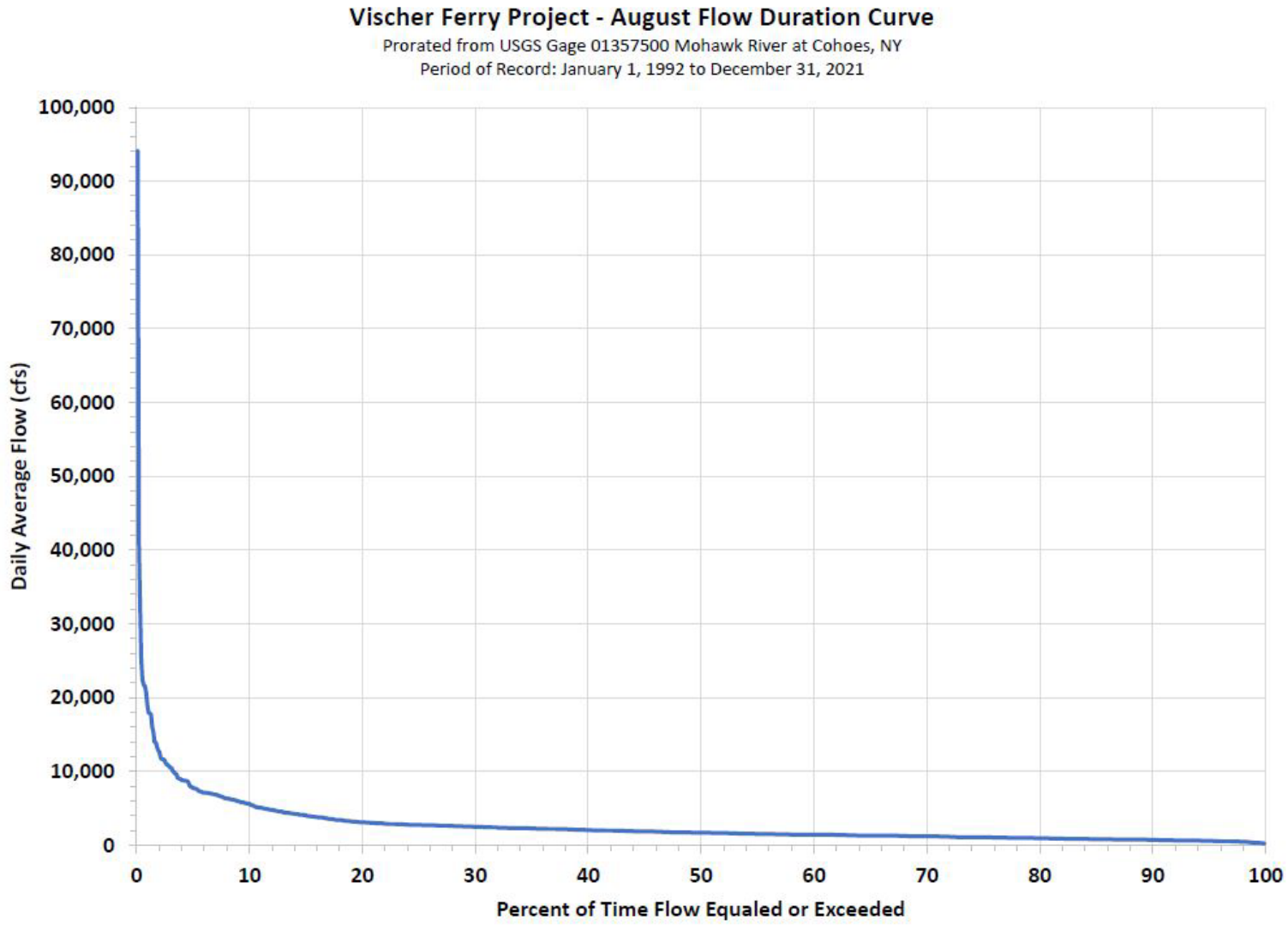


Figure 3-10 Monthly Flow Duration Curve for the Vischer Ferry Project - September

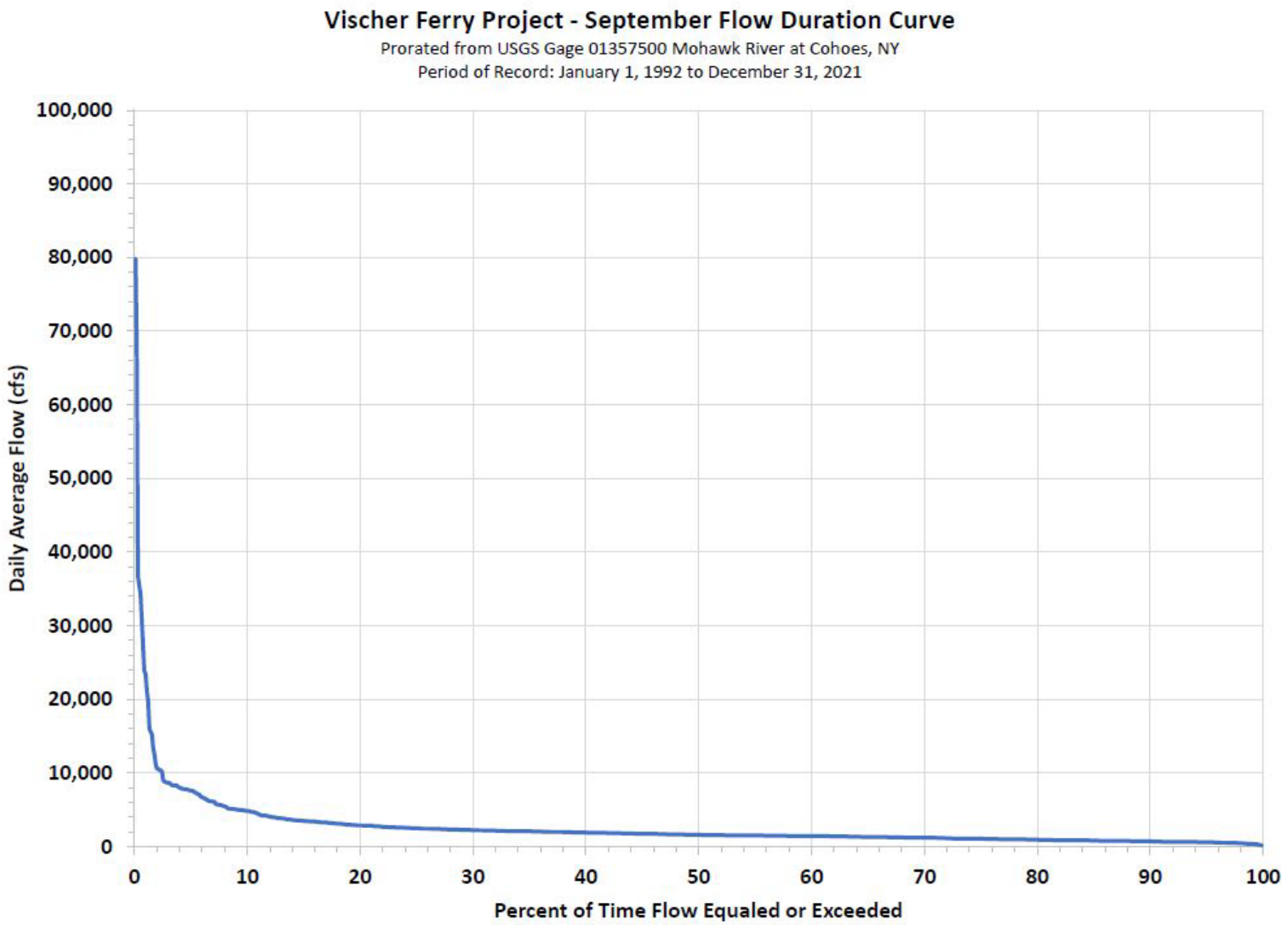


Figure 3-11 Monthly Flow Duration Curve for the Vischer Ferry Project - October

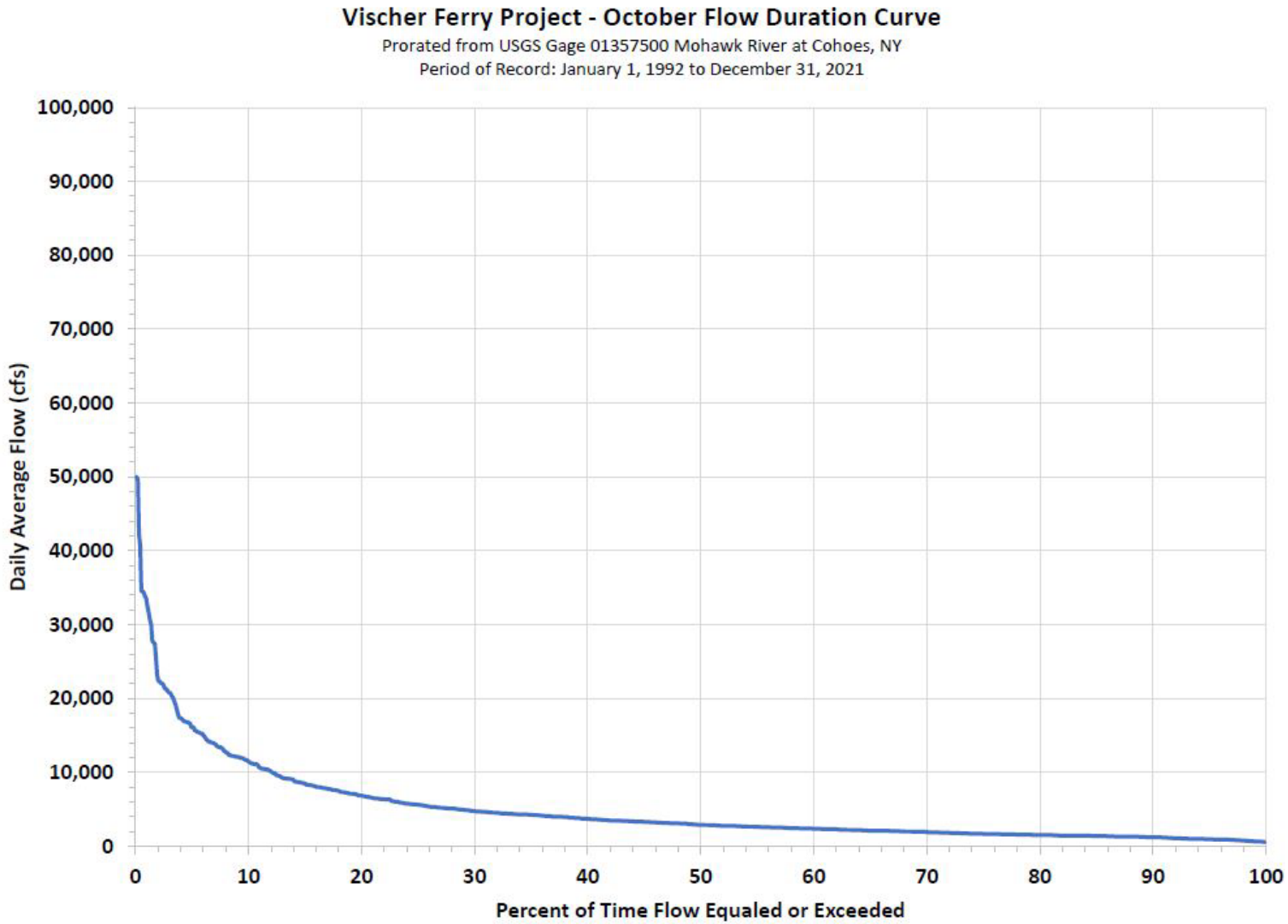


Figure 3-12 Monthly Flow Duration Curve for the Vischer Ferry Project - November

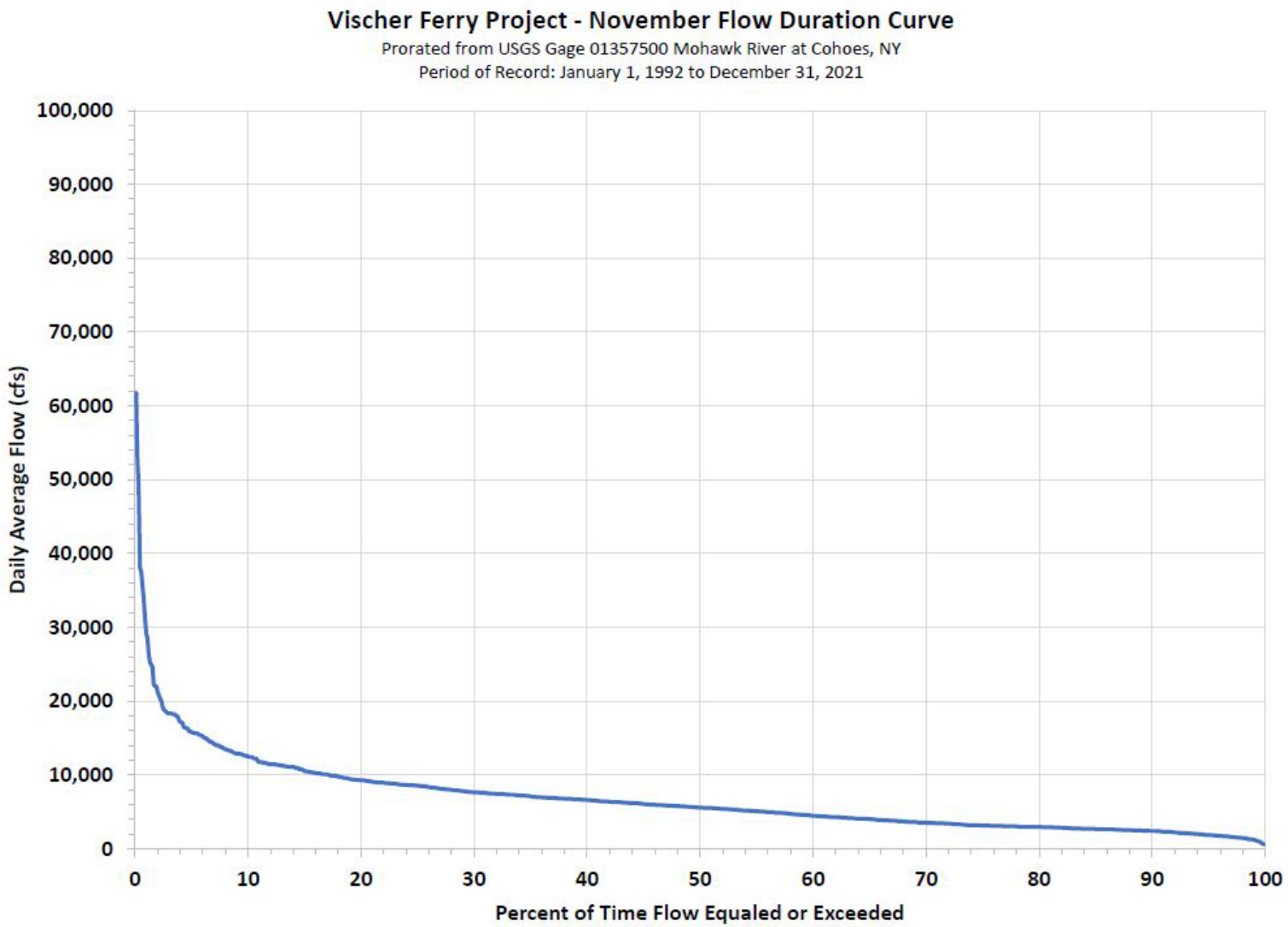
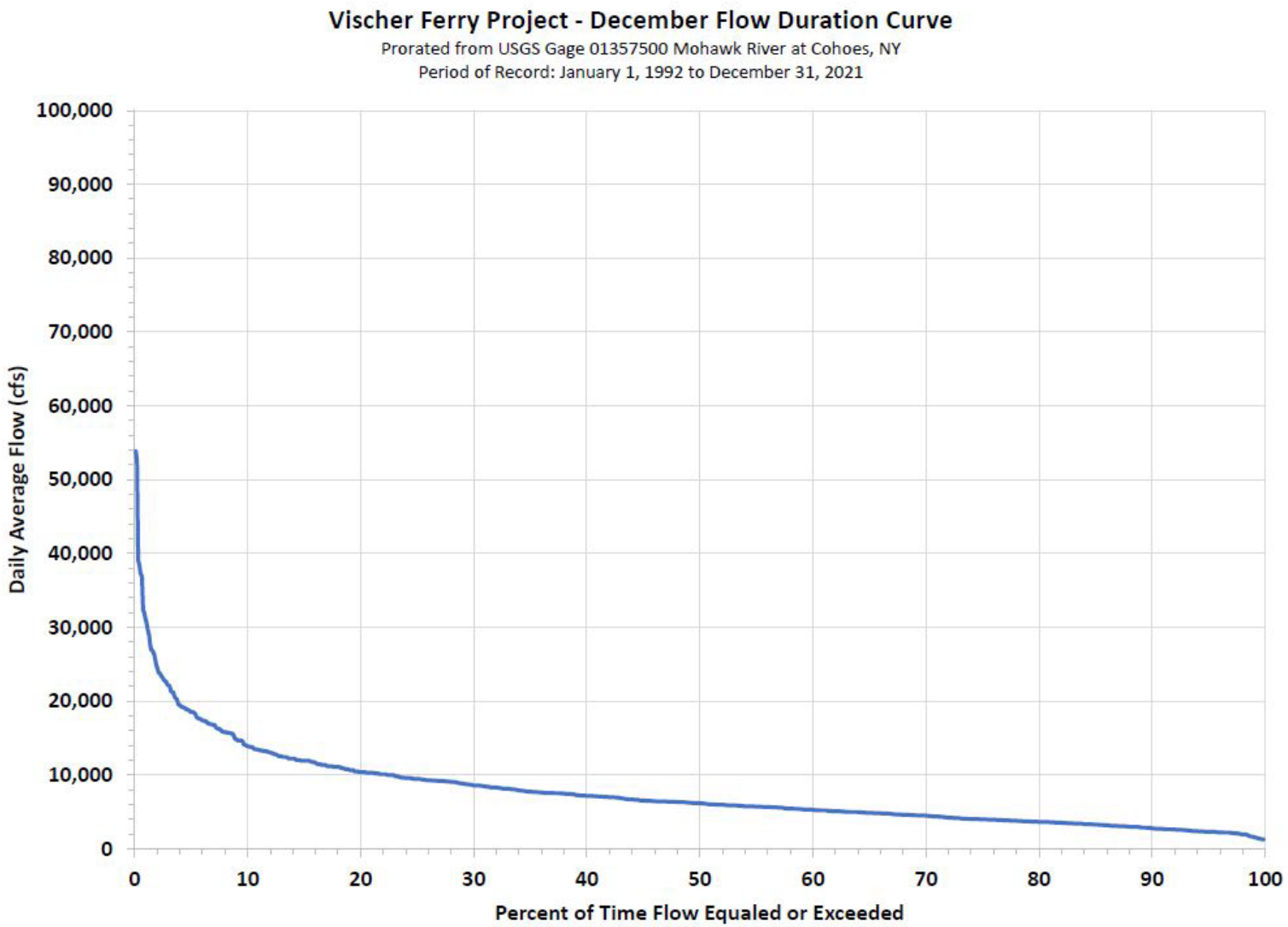


Figure 3-13 Monthly Flow Duration Curve for the Vischer Ferry Project - December



3.4 Area Capacity and Rule Curve

The Vischer Ferry Project is operated as run-of-river. The Project has limitations on impoundment level fluctuations and requirements for minimum flows and does not have the capacity to store or manage flows on a long-term basis.

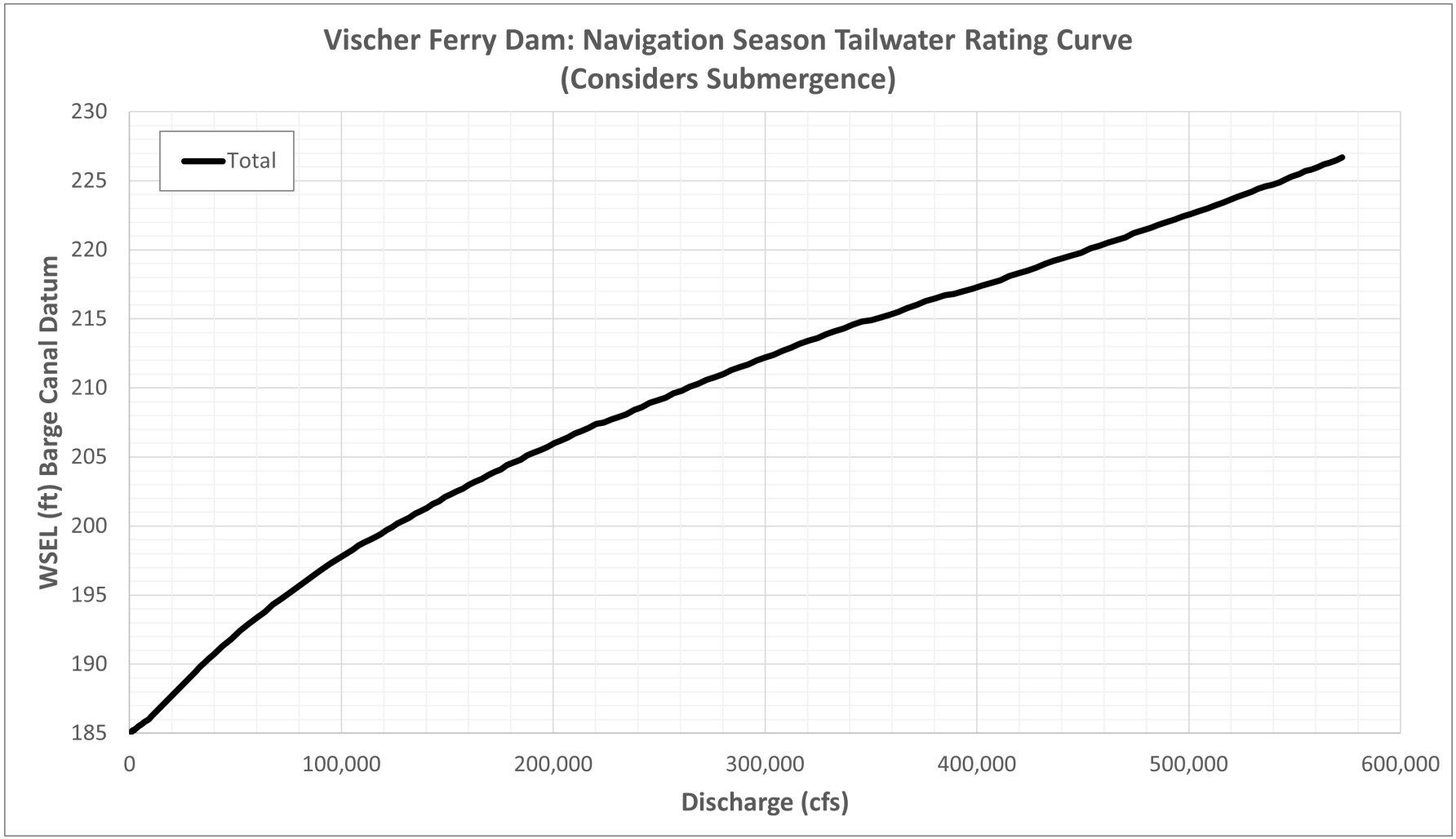
3.5 Hydraulic Capacity

The minimum hydraulic capacity of each of the Project's four turbine units is approximately 350-400 cfs. The maximum hydraulic capacity of each of the Project's four turbine units is approximately 1,500-1,820 cfs.

3.6 Tailwater Rating Curve

The tailwater elevation for the Project is approximately El. 185 ft. BCD. The tailwater rating curve for the Project is shown in Figure 3-14.

Figure 3-14 Vischer Ferry Project Tailwater Rating Curve



4 Utilization of Project Power (18 CFR Section 4.51(c)(3))

The primary purpose of the Project dam is for navigation in support of the operation of the Barge Canal System. The Project's other purpose is for generation of clean, renewable power. Electricity generated at the Project is used to supply energy and capacity to the NYISO, a regional transmission organization that coordinates the generation and transmission of wholesale electricity within the state of New York. The Project plays a role in New York's renewable energy portfolio because it provides low-cost emissions-free, baseload power.

5 Plans for Future Development (18 CFR Section 4.51(c)(4))

The Power Authority has no plans to construct new facilities or to alter operations at the Project. The Power Authority seeks authorization to continue operating the Project in its current configuration and as it is currently licensed to operate.

6 Literature Cited

Gomez and Sullivan Engineers. P.C. May 2013. Crescent and Vischer Ferry Hydroelectric Projects - Flashboard Assessment and Discharge Rating Curve Revisions. Prepared for the Power Authority.