UNITED STATES OF AMERICA

BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

FINAL APPLICATION FOR NEW LICENSE FOR MAJOR PROJECT – EXISTING DAM

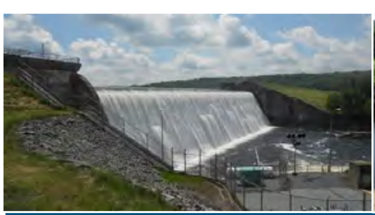
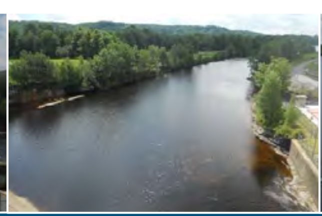
EXHIBIT B – PROJECT OPERATION AND RESOURCE UTILIZATION

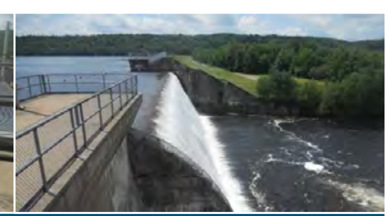
Prepared by: Gomez and Sullivan Engineers

July 2020

GREGORY B. JARVIS PROJECT RELICENSING

FERC NO. 3211



NEW YORK STATE OF OPPORTUNITY | NY Power Authority

Table of Contents

List of Figures

List of Tables

1 Introduction

The Gregory B. Jarvis Power Project (Project) is located on West Canada Creek, a tributary to the Mohawk River, approximately ½ mile upstream of the Hamlet of Hinckley, in the Towns of Remsen, Russia, Ohio, and Trenton, in the counties of Oneida and Herkimer, New York. The 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) Section 4.51(c). The information provided herein covers the specifics prescribed for Exhibit B and serves the purpose of providing a statement of operation and resource utilization.

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

2.1 Operational Control

The Project is operated remotely from the Power Authority's Blenheim-Gilboa Pumped Storage Power Project in Gilboa, NY, and is maintained and inspected weekly by Power Authority staff from the nearby Clark Energy Control Center in Marcy, NY.

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 28,863 megawatt-hours (MWh) per year (2010-2019) and an annual plant factor of approximately 37% based on its current FERC-authorized capacity of 9-MW.

2.3 Existing and Proposed Power Plant Operations

2.3.1 Relevant Background Information

In 1915, the New York State (NYS) Department of Public Works completed the Hinckley Dam and Reservoir for the purpose of supplying water to the New York State canal system. Hinckley Reservoir is owned by the People of the State of New York, under the jurisdiction of the New York State Canal Corporation (NYSCC). Outflows from the reservoir are governed by a 2012 Operating Diagram (Operating Diagram), a product of legally binding operating agreements between the NYSCC, State of New York, Mohawk Valley Water Authority (MVWA), New York State Thruway Authority (NYSTA), and Erie Boulevard Hydropower, L.P. (Erie Boulevard).

In 1986, the Power Authority constructed the Project at the Hinckley Dam to capture hydropower generation from NYSCC's reservoir releases. Construction of the Project entailed reconfiguring discharge outlets at the dam to install turbine generators capable of producing hydropower from the existing releases. After completion of the construction of Hinckley Dam in 1915, various lawsuits and subsequent agreements resulted over water rights. One result of this litigation was the development of the 1920 Operating Diagram to establish the release of water from Hinckley Reservoir based on varying water levels throughout the year. Both the MVWA and Erie Boulevard have water rights based on the 1920 Operating Diagram that was incorporated into two separate settlement agreements: the 1917 Settlement Agreement between New York State and Consolidated Water Company of Utica, and the 1921 Settlement Agreement between New York

State and the Utica Gas & Electric Company.[1] The 1920 Operating Diagram was used until it was superseded by the 2012 Operating Diagram[2] (Figure 2.3.1-1). In comparison to the 1920 Operating Diagram, the 2012 Operating Diagram generally has a higher reservoir elevation associated with lower flows and less of a drawdown in the early spring.

Today, pursuant to the 2012 Operating Diagram, the NYSCC maintains Hinckley Reservoir water levels within a normal operating range of elevation (El.)[3] 1195 feet or above, except during adverse conditions. Releases through the powerhouse are determined by the time of year and Hinckley Reservoir elevation, as plotted in the Operating Diagram. Reservoir releases are adjusted on a twice-weekly basis in accordance with the Operating Diagram. The Power Authority does not have the authority or the rights to deviate from these releases and if the Project were not to exist, the same reservoir water levels and discharges would still occur in accordance with the Operating Diagram. In other words, the Project simply redirects reservoir outflow (as determined by the Operating Diagram) through the Project's power generating equipment, which is released by the NYSCC for purposes other than generation at the Project and which would be made even in the absence of the Project. NYSCC does not manage Hinckley Reservoir water levels or releases to promote generation at the Project.

The NYSCC authorizes deviations from the Operating Diagram on a case-by-case basis, taking into consideration a number of different factors, including, but not limited to, the following:

- ensuring public safety;
- in cases of emergency or infrastructure problems (transmission outages, turbine issues, water main breaks, etc.);
- serving canal uses and/or purposes;
- mitigating unusual hydrologic or weather conditions;
- correcting any discrepancies between actual releases and the releases dictated by the 2012 Operating Diagram; and
- providing compensating flow to Erie Boulevard under the terms of a January 13, 2015 Settlement Agreement and Mutual Release.

NYSCC bases the deviation rate(s) and durations on the desired outcome and existing conditions, such as reservoir elevation levels, rate of elevation change, current and forecasted reservoir

[1] MVWA is the successor in interest to Consolidated Water Company of Utica, while Erie Boulevard is the successor in interest to Utica Gas & Electric Company.
[2] The 2012 Operating Diagram replaced the 1920 Operating Diagram in its entirety in 2013 and was accepted by MVWA and Erie Boulevard pursuant to two agreements: an agreement between NYSCC, NYS and MVWA dated February 1, 2013, and an agreement between NYSCC, NYS, NYSTA, and Erie Boulevard dated January 13, 2015.
[3] All elevations referenced throughout this report refer to the Barge Canal Datum (BCD). Elevations referenced to the BCD are 1.04 feet higher than elevations referenced to the National Geodetic Vertical Datum of 1929 (NGVD29 or Mean Sea Level (msl)); thus, El. 1225.0 BCD = 1223.96 NGVD29.

inflow rates, and the time of year.

In addition to the Operating Diagram, the 2013 Settlement Agreement between NYSCC, NYS and the MVWA allows the MVWA to withdraw up to 75 cfs, although the current monthly average withdrawal amount is 30-35 cfs.

2.3.2 Current Project Operations

As previously noted, the Project uses the releases determined by NYSCC in accordance with the Operating Diagram to generate power. Releases are determined by the time of year and Hinckley Reservoir elevation in accordance with the Operating Diagram (Figure 2.3.1-1). Reservoir releases are adjusted on a twice-weekly basis. Reservoir levels are usually maintained between El. 1195 and El. 1225 (the elevation of the spillway crest); however, reservoir water levels can fall below El. 1195 when prolonged dry conditions occur. The Project does not operate when reservoir levels are below El. 1195. Consistent with the 2012 Operating Diagram, during the winter months, the reservoir is generally drawn down and then allowed to refill during the spring melt.

The Project has two horizontal Kaplan units which are each capable of operating between 300 and 900 cfs for a total hydraulic capacity of 1,800 cfs under normal operating conditions. At flows within the operating range of the units (300 to 1,800 cfs), the Project provides outflow via generation. At flows below 300 cfs, or when the reservoir water surface elevation is below El. 1195, the Project does not operate. For these conditions, the low-level sluice gate no. 4 is used to pass the minimum flow. At flows greater than 1,800 cfs, and when the reservoir water surface elevation is greater than El. 1225, downstream releases are passed via a combination of generation, Gate 4, penstock bypass valve, and spillage.

The current FERC license allows for the Project to operate in a peaking generation during peak energy demand periods. Peaking also enables the Project to demonstrate to the New York Independent System Operator (NYISO) the ability to generate at its installed capacity (ICAP)[4]. ICAP is a service that the NYISO relies on to help maintain system stability during periods of high demand or fluctuating supply from intermittent energy sources such as wind and solar. When the Power Authority is peaking it will average the outflow required by the Operating Diagram over the course of the day. When operated in this manner, the Project will generate with a lower outflow during non-peak demand periods and then generate with a higher outflow during peak demand periods such that the total daily average flow is equal to the daily outflow prescribed by the Operating Diagram.

[4] The installed capacity market value of a small hydro project is based on its generation during the 20 peak energy load hours for the NYISO capability period. In general, peaking during higher energy demand periods may coincide with the peak energy load hours that NYISO uses to determine the Project's ICAP value.

Minimum Flow Requirement

In accordance with the current FERC license, a continuous minimum flow of 160 cfs must be maintained in West Canada Creek, as measured downstream of the NYSCC diversion weir at the Nine Mile Creek Feeder Dam. During the Canal's operating season, the minimum flow below Trenton Falls must equal the sum of the FERC required minimum flow of 160 cfs, as measured below the Nine Mile Creek Feeder Dam structure, plus the amount diverted into the Nine Mile Feeder Canal by the NYSCC.

The Power Authority proposes to continue operating the Project in the same manner as under the current license.

2.3.3 Operation during Adverse, Mean, and High Water Years

The Project is operated in accordance with the Operating Diagram (Figure 2.3.1-1). Reservoir outflow is determined by the water surface elevation on a given date. Reservoir outflows are adjusted on a twice-weekly basis. Deviations from the Operating Diagram may occur as discussed in Section 2.3.1.

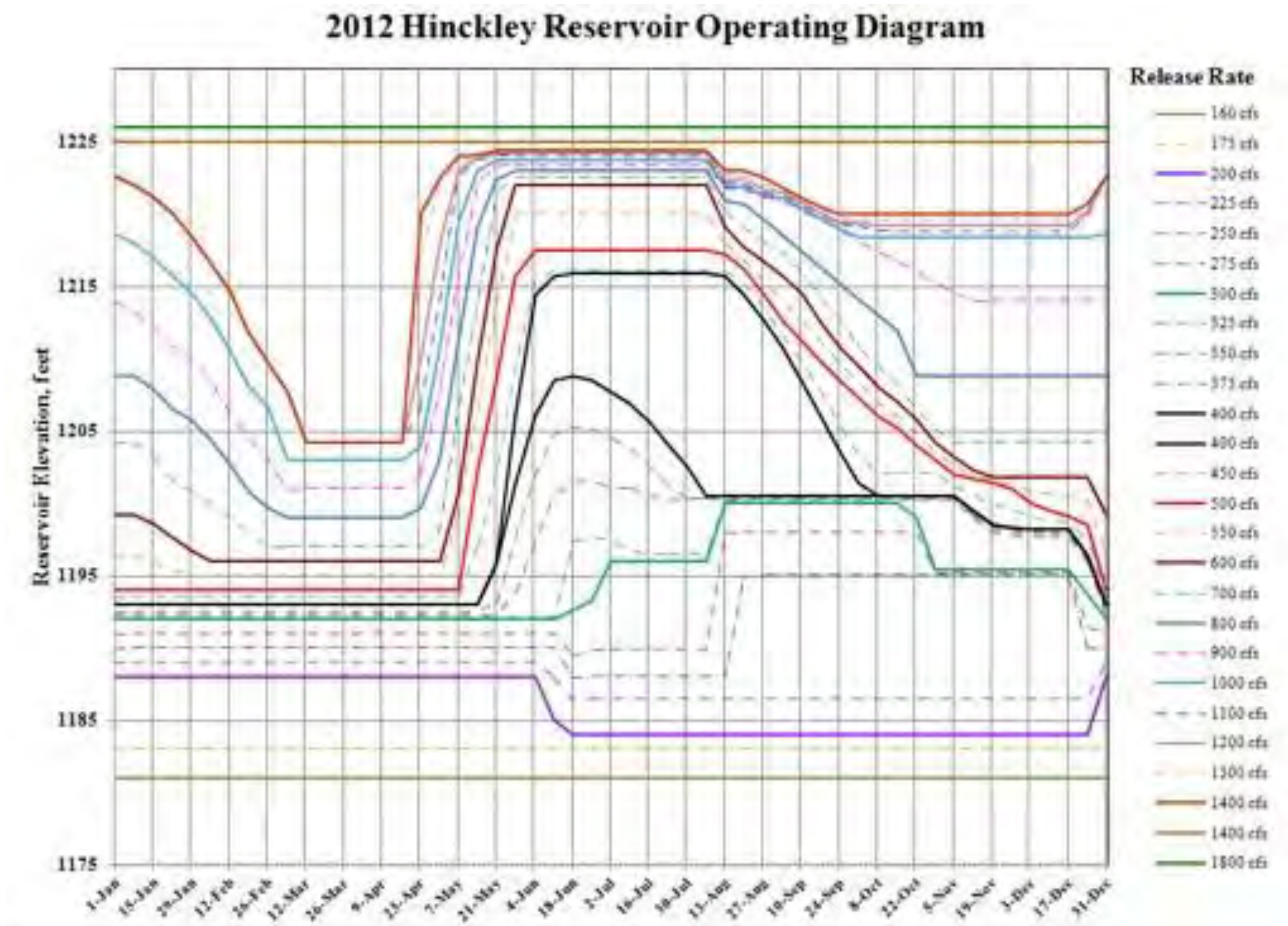


Figure 2.3.1-1. 2012 Hinckley Reservoir Operating Diagram

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. Each capability period applies a five-year rolling average from the previous summer or winter capability periods respectively. For the most recent periods, the Project's dependable capacity amount was 3.7-MW for the summer period and 4.3-MW for the winter period. These lower amounts are based on the fact that one turbine was out of service for repairs from June 2012 through November 2015 and from November 2017 through August 2018. Based on the rolling average calculation, the Power Authority forecasts its dependable capacity to gradually increase to 4.6-MW for the summer period and 5.8-MW for the 2021-2022 winter period.

3.2 Average Annual Energy Generation

Table 3.2-1 lists the annual and monthly gross generation (megawatt hours (MWh)) at the Project for the past 10 years.

Table 3.2-1. Annual and Monthly Gross Generation (MWh)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2010	2,313	1,683	1,522	3,629	2,475	1,379	2,027	1,470	2,421	3,120	3,244	3,460	28,743
2011	2,394	577	2,273	3,865	3,608	2,075	2,538	1,955	2,901	3,144	3,177	3,495	32,002
2012	3,548	2,970	2,939	2,938	3,069	2000	737	625	0	1,628	1,680	1,712	23,846
2013	2,044	2,024	1,030	2,368	2,689	2,767	2,560	1,435	1,268	397	2,702	2,604	23,888
2014	2,916	1,794	240	2,523	3,240	2,420	2,424	2,154	2,124	2,067	2,159	2,391	26,452
2015	2,876	900	55	2,325	2,675	2,457	2,450	633	237	1,470	2,409	2,513	21,000
2016	3,730	2,729	4,968	4,669	2,135	836	1,395	1,248	1,475	1,274	2,090	2,570	29,119
2017	2,024	3,875	5,199	5,842	3,908	2,935	2,722	2,272	1,836	1,123	2,903	2,601	37,240
2018	2,514	2,330	2,327	2,537	2,882	1,412	11	307	1,274	2,697	3,869	3,527	25,687
2019	4,150	3,304	2,179	4,967	5,281	3,981	1,716	1,424	2,050	3,357	4,221	4,022	40,652
Average	2,850	2,219	2,273	3,566	3,196	2,226	1,858	1,352	1,559	2,028	2,845	2,889	28,863

Note: Unit No. 2 was out of service from June 2012 through November 2015, while Unit No. 1 was out of service from November 2017 through August 2018. A complete list of unit outages is provided in Exhibit H.

3.3 Project Hydrology

Approximately 95% of inflow to Hinckley Reservoir is provided by West Canada Creek and Black Creek. The U.S. Geological Survey (USGS) operates streamflow gaging stations on both of these tributaries. The gaging station on West Canada Creek (No. 01343060) is located in Wilmurt, approximately 3 miles upstream of the reservoir. This gage has a drainage area of 238 mi^2 and has been in operation since 2001. The gaging station on Black Creek (No. 01433403) has a drainage area of 60.9 mi^2, is located about 6 miles southeast of the reservoir, and has only been in operation since 2014. The Power Authority records hourly outflow from the Project.

The monthly flow statistics for inflow and outflow to the reservoir are presented in Table 3.3-1 and Table 3.3-2, respectively. Flow from the Wilmurt gage[5] was prorated[6] to represent inflow. The outflow (which includes turbine flow, spillway flow, sluice gate no. 4 flow, and penstock bypass flow) was calculated by the Power Authority based on reservoir water level, power generation, turbine efficiency, and gate openings. A comparison of flows between the two tables indicates that reservoir operations consistent with the Operating Diagram redistribute high inflows during spring freshet to supplement inflow for the remainder of the year. The inflow to the reservoir must be supplemented by reservoir storage to meet the minimum release of 160 cfs fairly often over the summer months. In July, August, and September flows are supplemented 18%, 29%, and 24% of the time, respectively, to meet the 160 cfs minimum flow requirement. Monthly and annual flow duration curves for the period of record (July 2001 – December 2019) were calculated using daily flows from these same sources, and are presented in Figures 3.3-1 through 3.3-13.

Analysis of the data used to develop the annual flow duration curve (Figure 3.3-1) shows that inflows exceed 300 cfs (the minimum hydraulic capacity of the Project) approximately 80% of the time. Additionally, the data also showed that when inflow is approximately 300 cfs or less, the reservoir outflow exceeds the inflow, indicating that the Project supplements outflow by redistributing high inflows utilizing the reservoir storage. This is the result of Hinckley Reservoir operating as a seasonal storage reservoir (as defined by the Operating Diagram), with water levels at their peak after the spring freshet and then drawn down through the summer and fall months to supplement downstream flows. The reservoir then partially refills during the late fall and winter but is lowered during March and April in anticipation of spring snowmelt.

[5] Flow data from USGS Gage 01343060 is provisional from 10/1/2019 to 12/31/2019, meaning that values are subject to revision until they have been thoroughly reviewed and received final approval.

[6] The proration factor is 1.56 as a result of the drainage area of Hinckley Reservoir (372 mi^2) divided by the drainage area of the gage (238 mi^2). Reservoir inflows calculated by proration of flow data at the gage are higher than those calculated by the Power Authority by balancing the daily change in reservoir storage, the reservoir release, the MVWA withdrawal for public drinking water supply, evaporation, and precipitation (i.e. reverse routing).

Table 3.3-1. Daily Inflow (cfs) Statistics for Hinckley Reservoir

Period of Record July 2001 – December 2019

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min	249	202	219	253	177	96	87	58	55	102	294	256
Max	10,332	10,207	10,191	26,884	13,676	23,914	8,800	11,035	12,395	15,943	11,051	7,002
Mean	976	760	1,368	3,146	1,382	1,002	573	491	465	1,264	1,264	1,200
Median	565	438	781	2,360	1,043	606	322	277	254	780	891	800

Table 3.3-2. Daily Outflow (cfs) Statistics for Hinckley Reservoir

Period of Record July 2001 to December 2019

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min	298	106	104	246	298	245	178	234	119	120	298	223
Max	6,381	2,261	4,449	15,820	7,912	13,062	7,696	2,311	3,744	4,942	16,803	4,156
Mean	1,088	944	1,044	2,085	1,251	868	697	569	590	829	1,176	1,068
Median	1,025	908	994	1,599	1,080	602	561	495	600	721	976	972

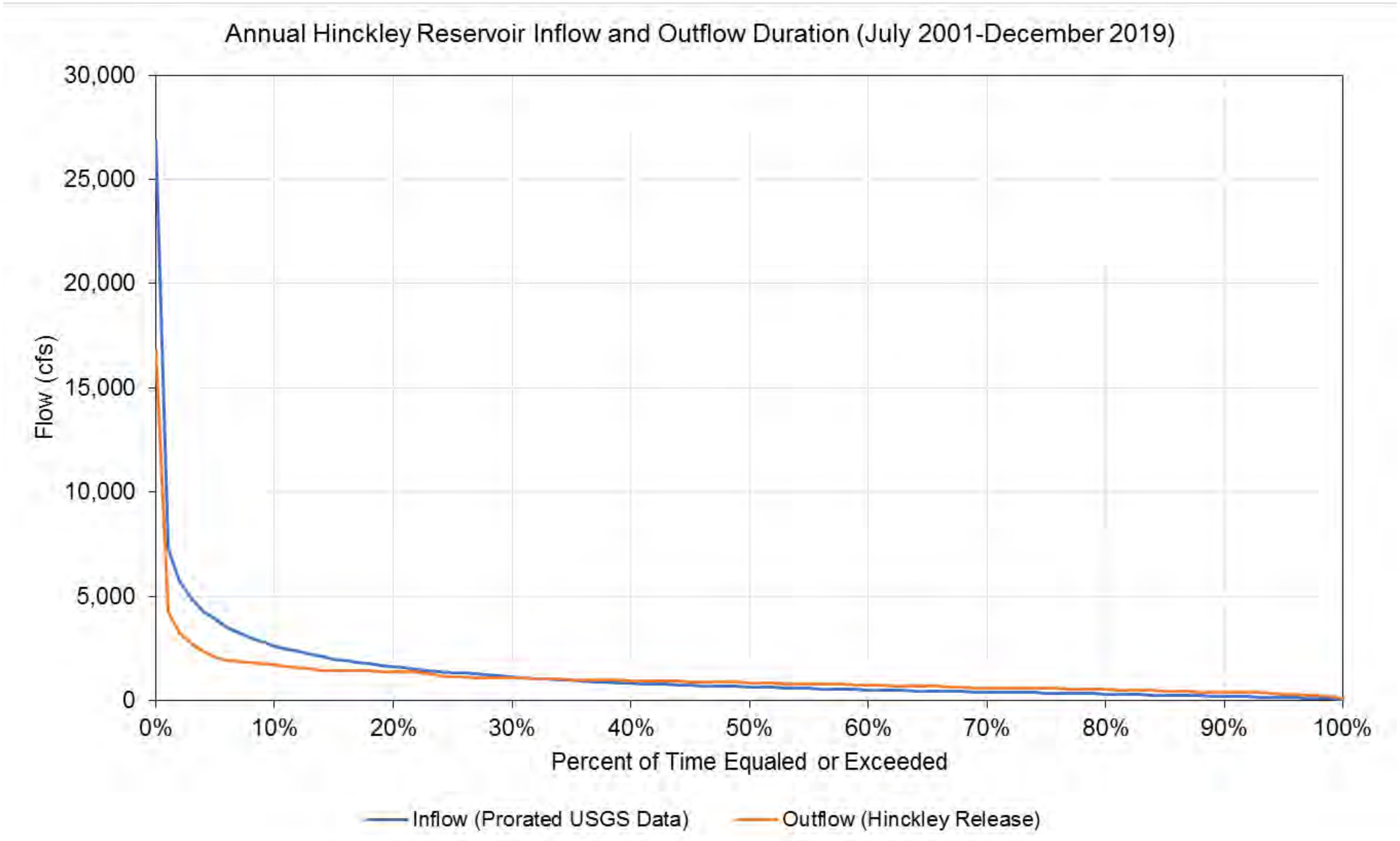


Figure 3.3-1. Annual Inflow and Outflow Duration Curves

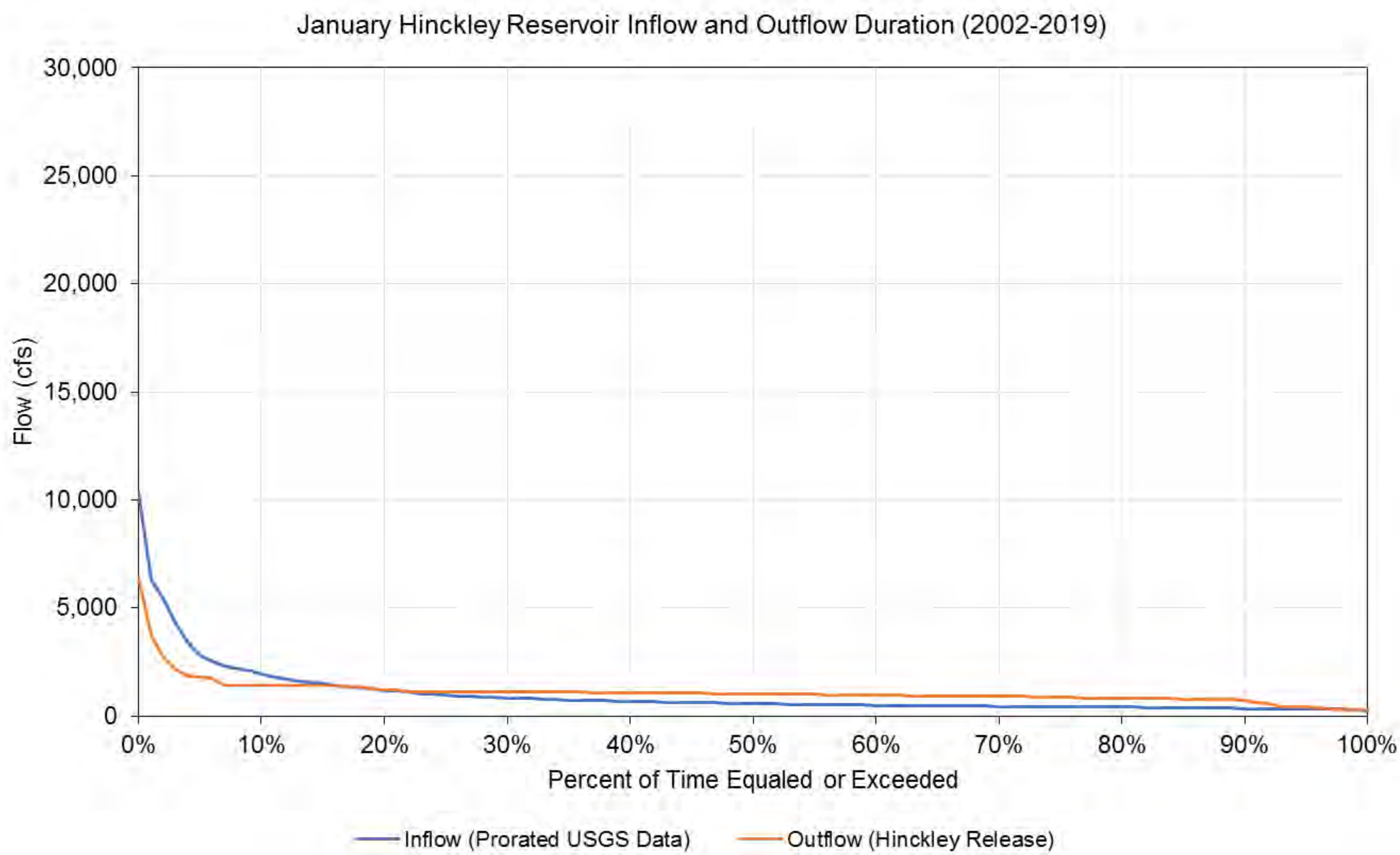


Figure 3.3-2. Monthly Inflow and Outflow Duration Curves - January

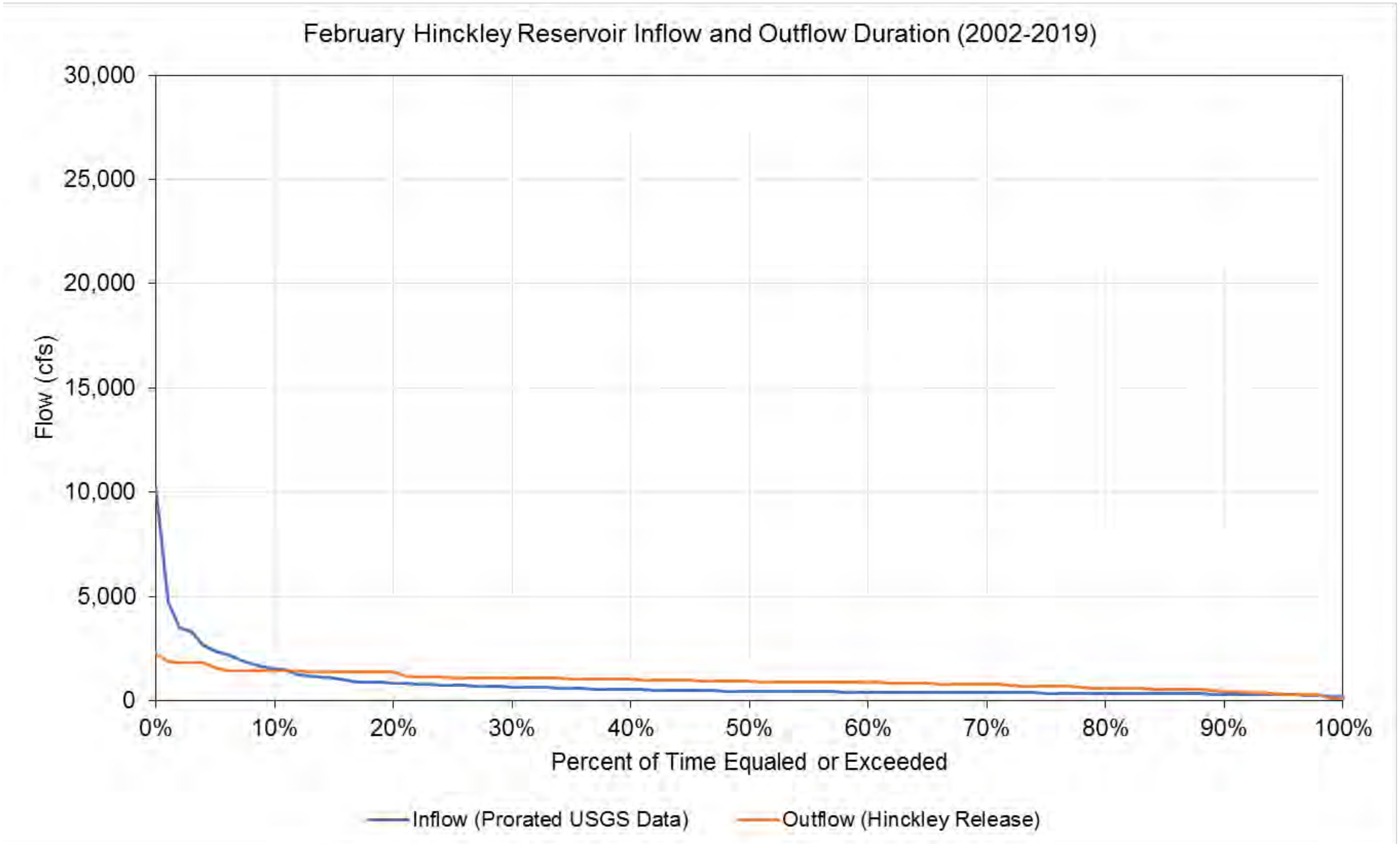


Figure 3.3-3. Monthly Inflow and Outflow Duration Curves - February

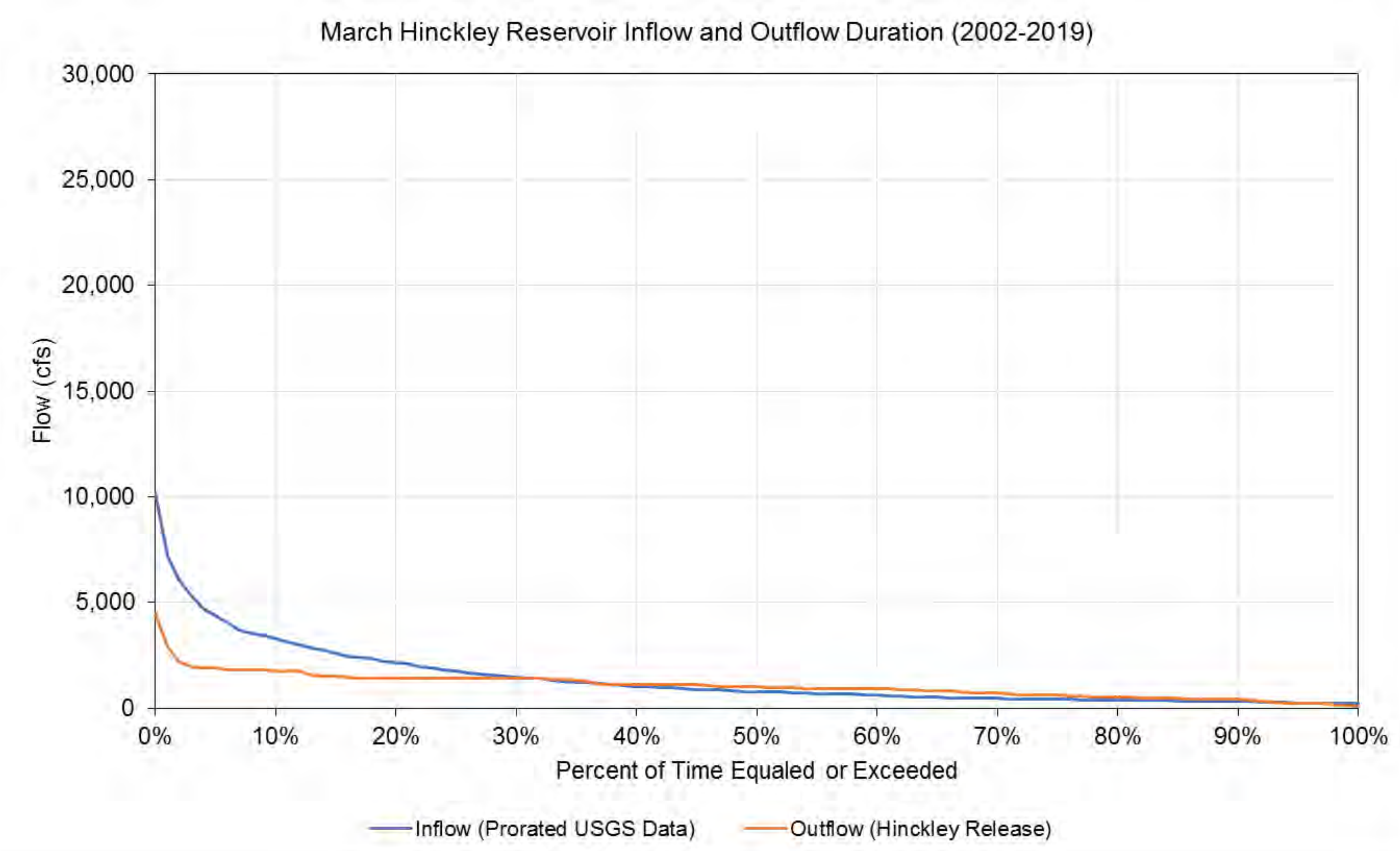


Figure 3.3-4. Monthly Inflow and Outflow Duration Curves - March

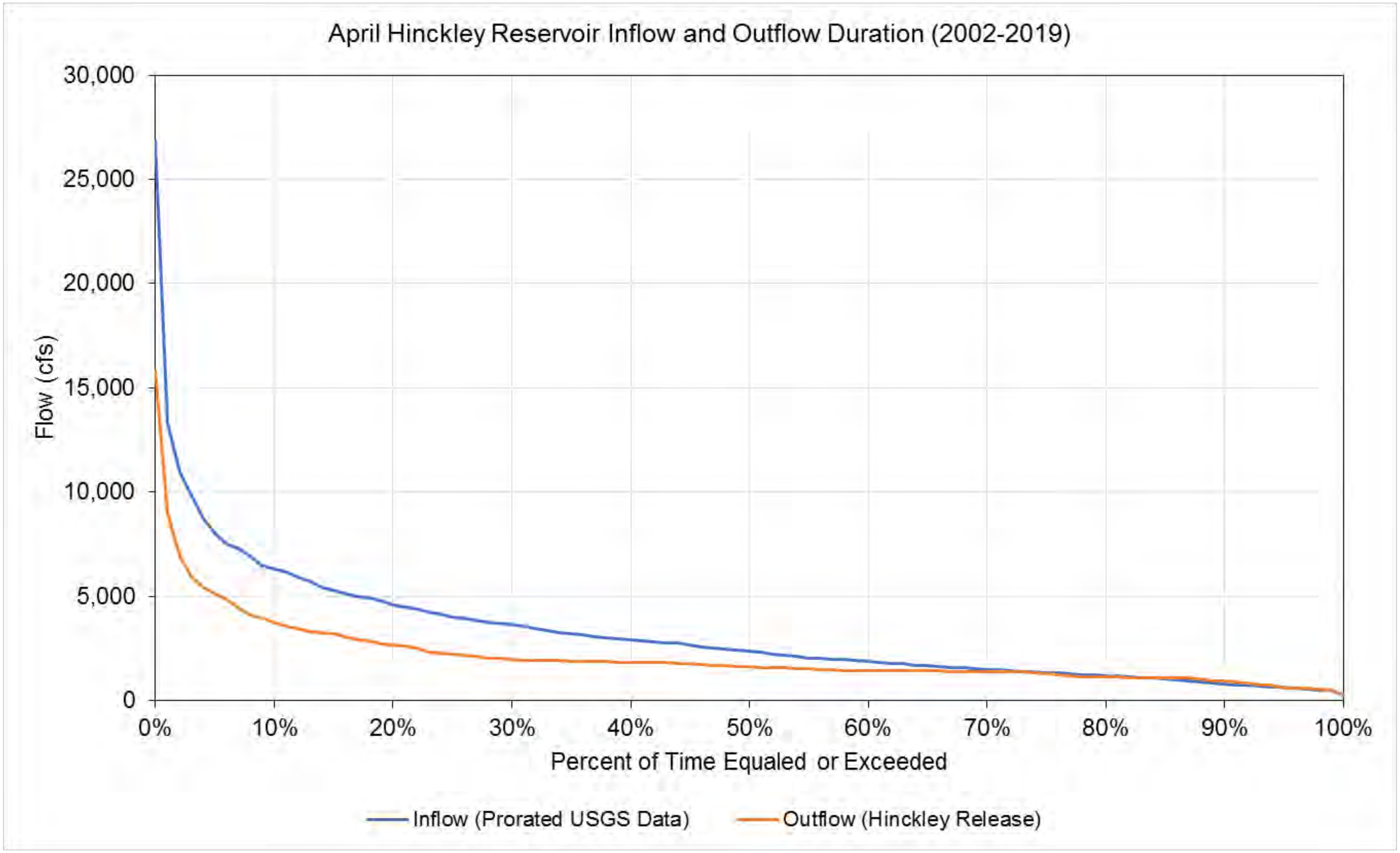


Figure 3.3-5. Monthly Inflow and Outflow Duration Curves - April

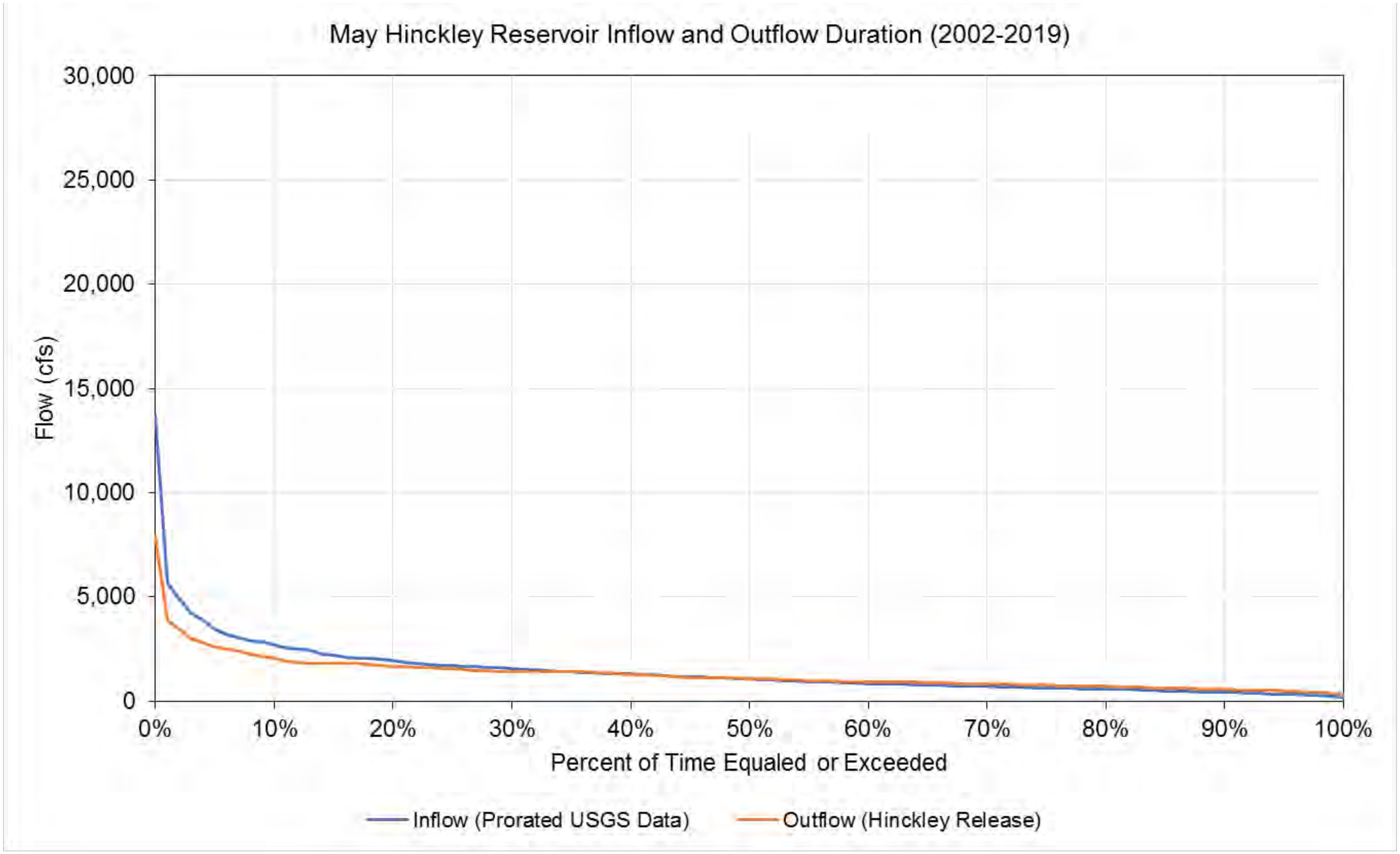


Figure 3.3-6. Monthly Inflow and Outflow Duration Curves - May

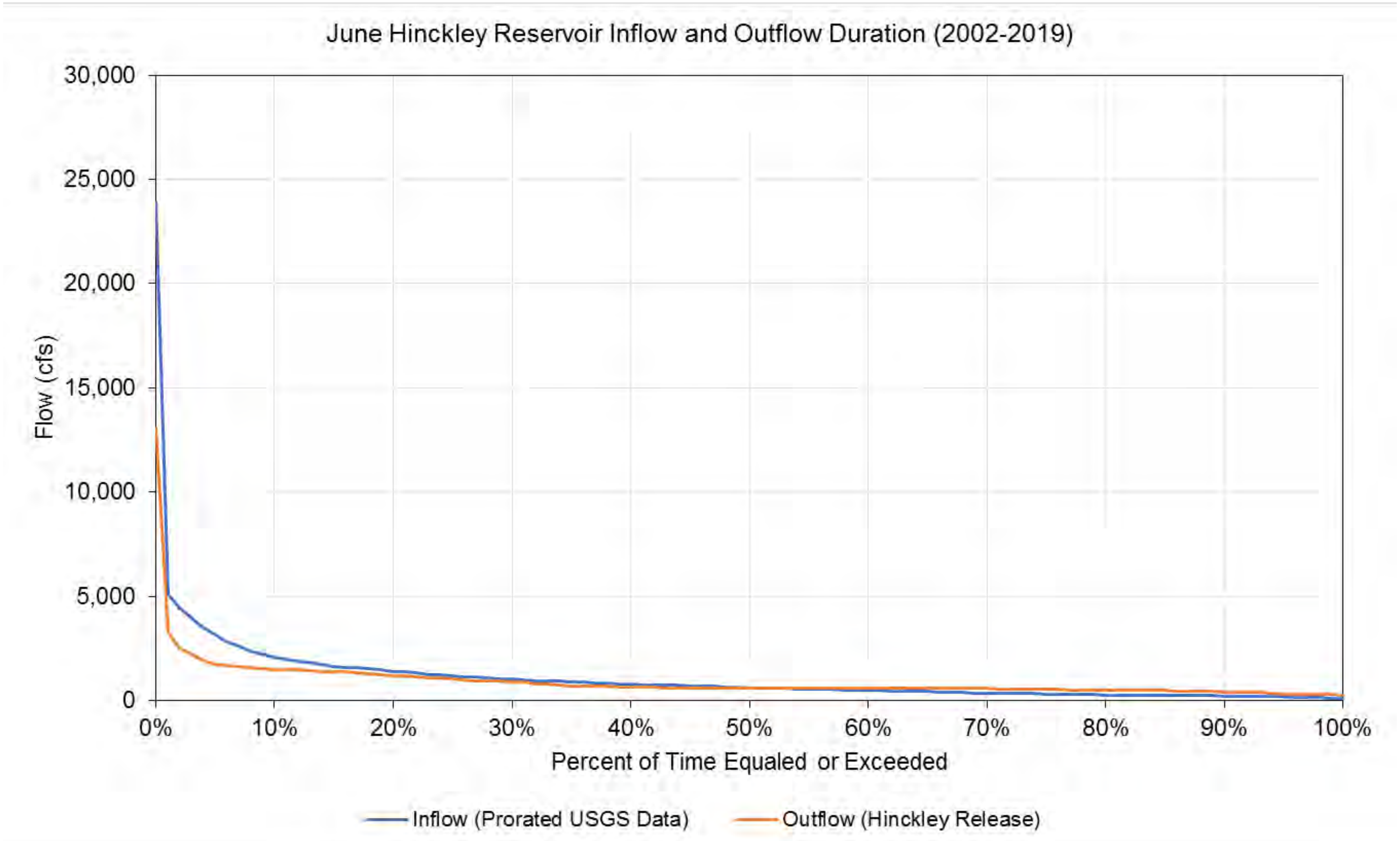


Figure 3.3-7. Monthly Inflow and Outflow Duration Curves - June

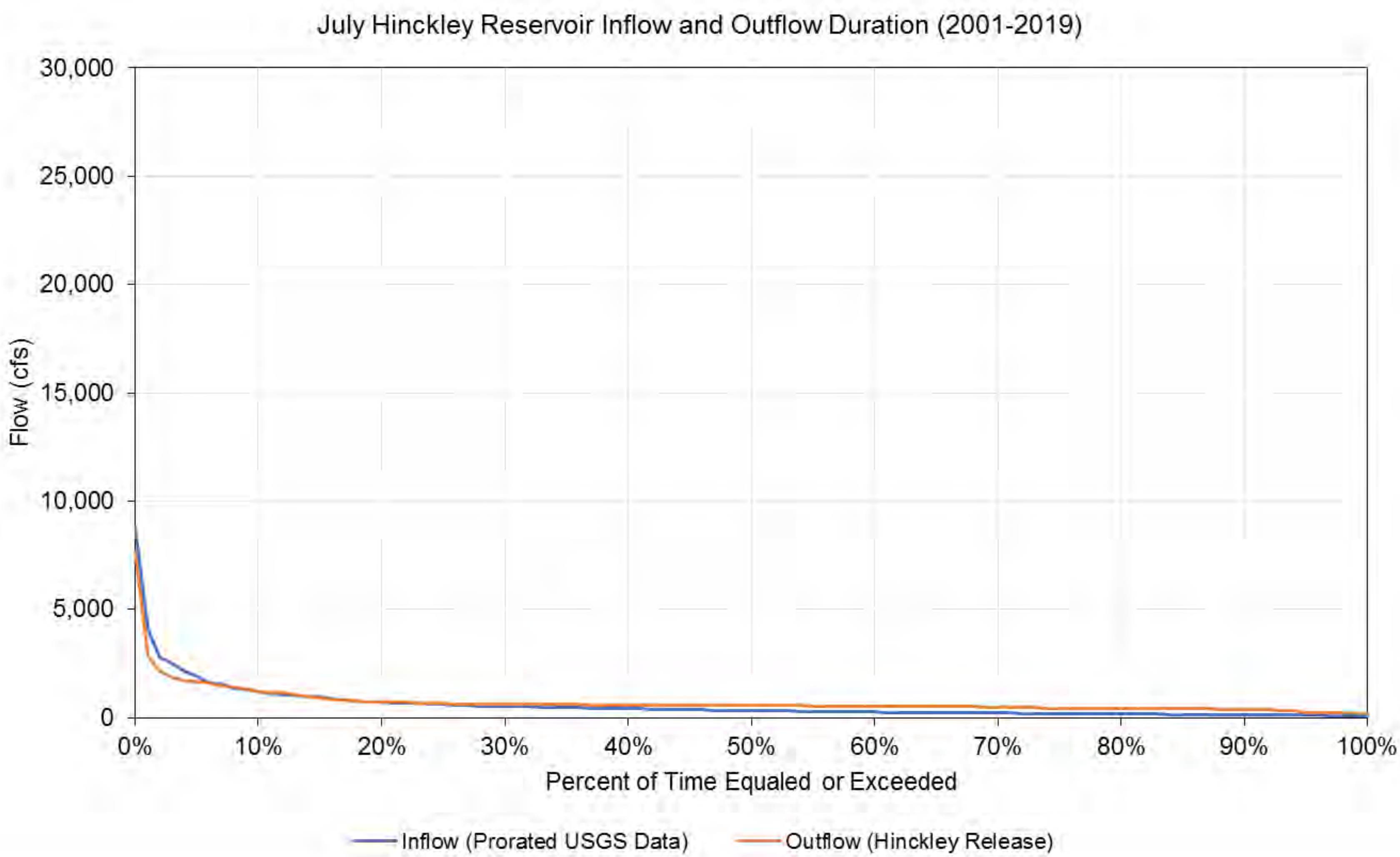


Figure 3.3-8. Monthly Inflow and Outflow Duration Curves - July

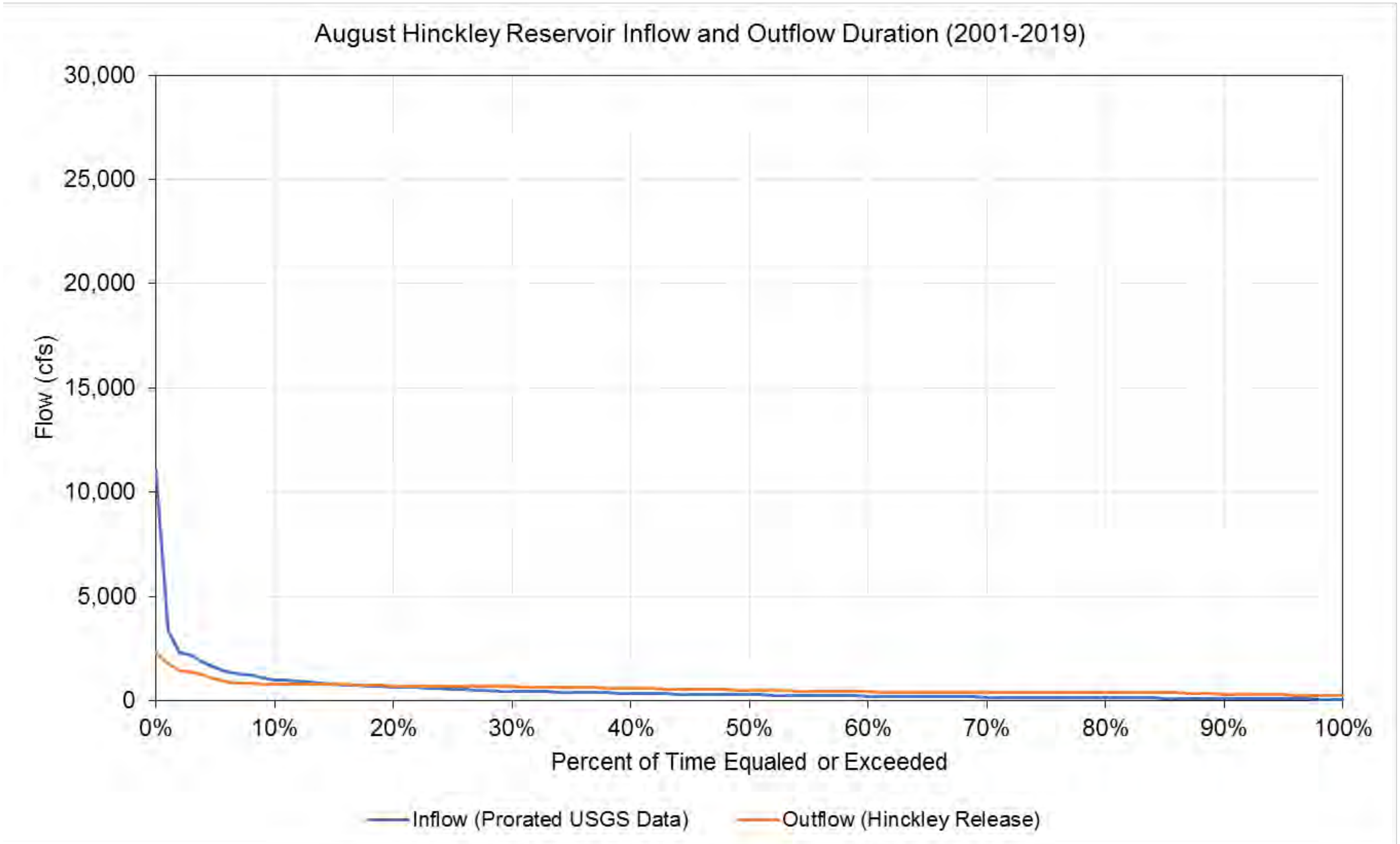


Figure 3.3-9. Monthly Inflow and Outflow Duration Curves - August

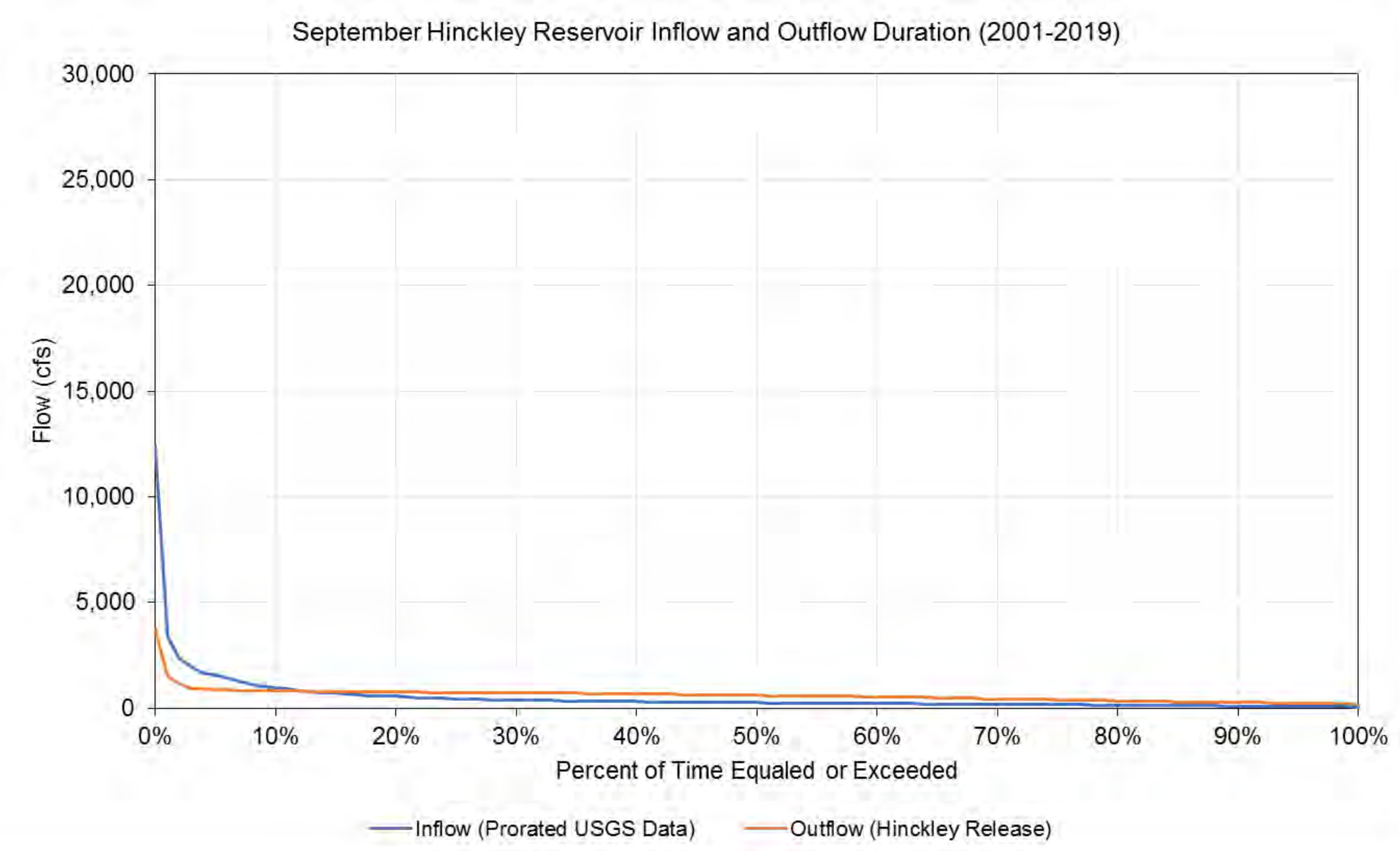


Figure 3.3-10. Monthly Inflow and Outflow Duration Curves - September

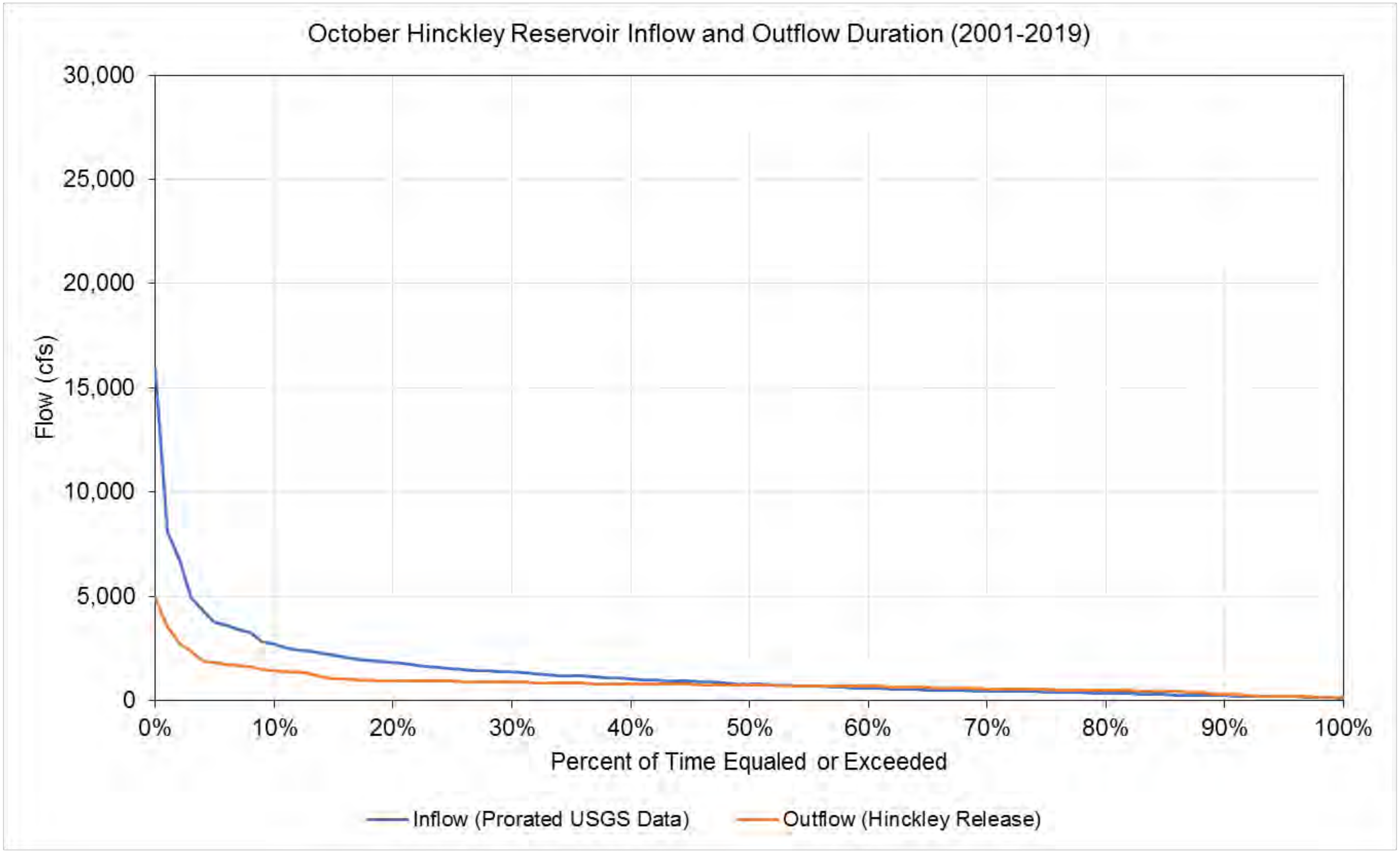


Figure 3.3-11. Monthly Inflow and Outflow Duration Curves - October

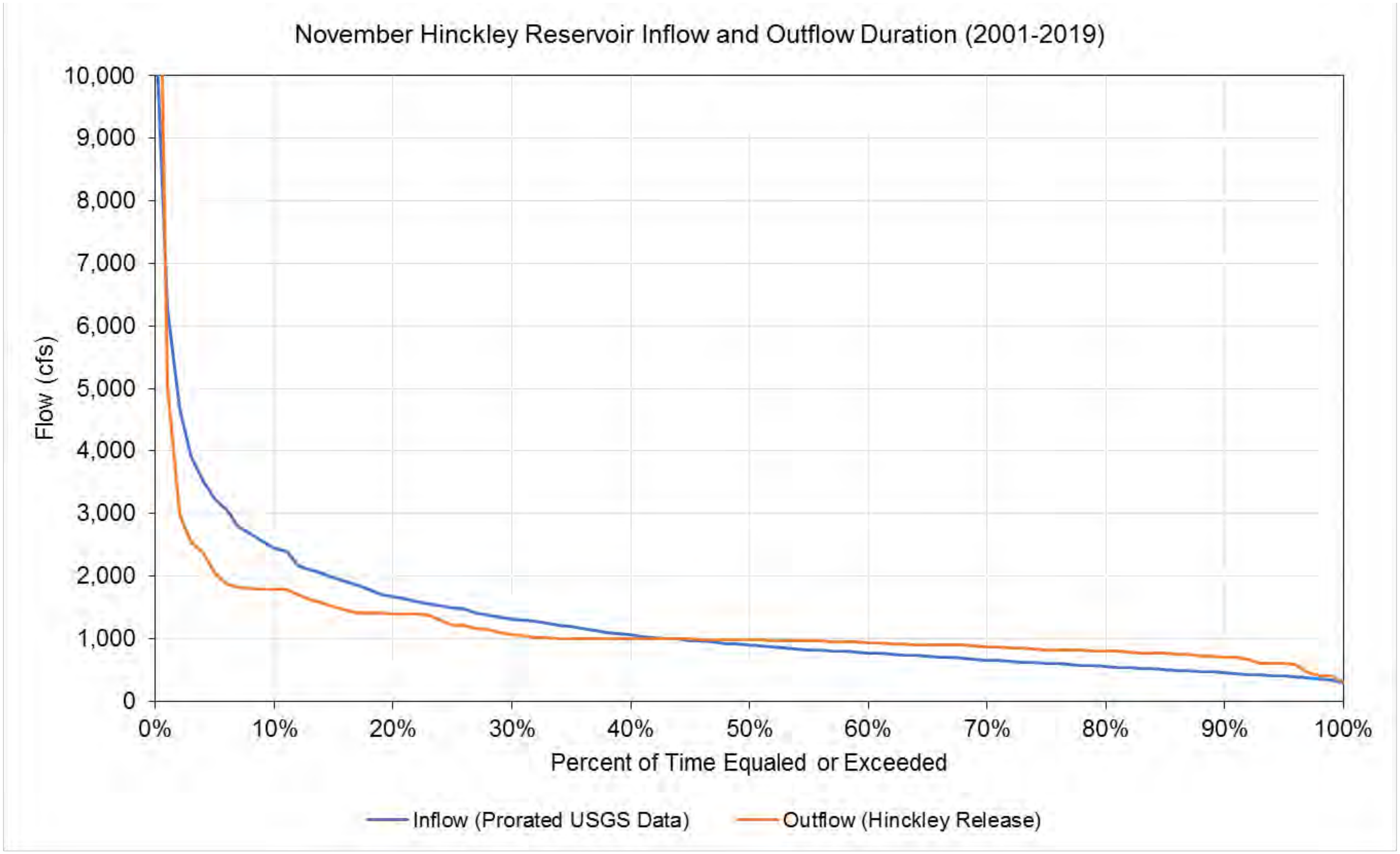


Figure 3.3-12. Monthly Inflow and Outflow Duration Curves - November

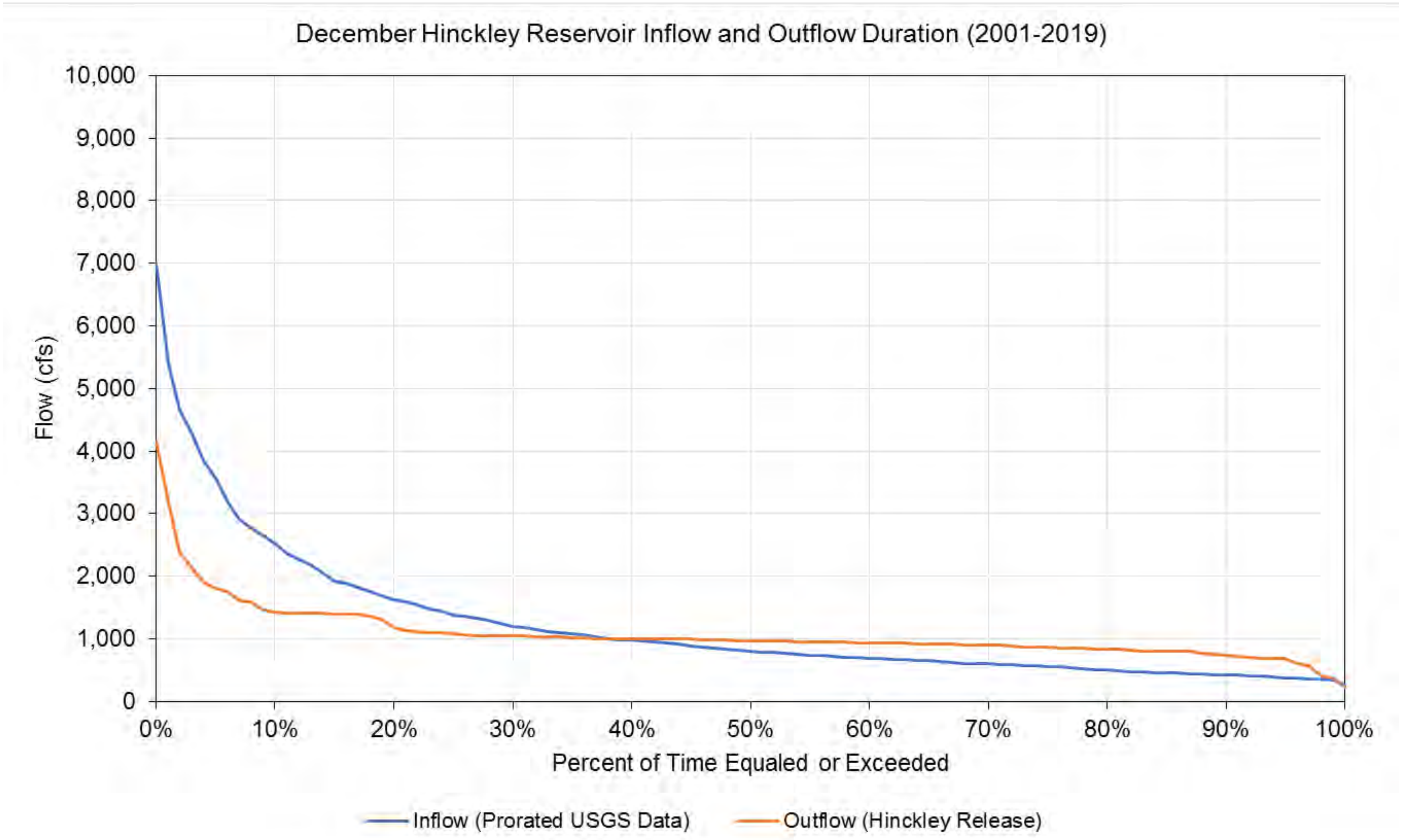


Figure 3.3-13. Monthly Inflow and Outflow Duration Curves - December

3.4 Area Capacity and Rule Curve

The normal operating range of Hinckley Reservoir is between El. 1225 and 1195. At the spillway crest elevation of El. 1225, the reservoir has a total storage capacity of 77,014 acre-feet. The useable storage capacity of the reservoir is 75,417 acre-feet, while the dead storage is 1,597 acre-feet (below El. 1,173.5). Figure 3.4-1 depicts the stage-storage relationship of the reservoir based on the results of the *2018 Hinckley Reservoir Bathymetric Survey*.

The Project is operated in accordance with the 2012 Hinckley Reservoir Operation Diagram (Figure 2.3.1-1).

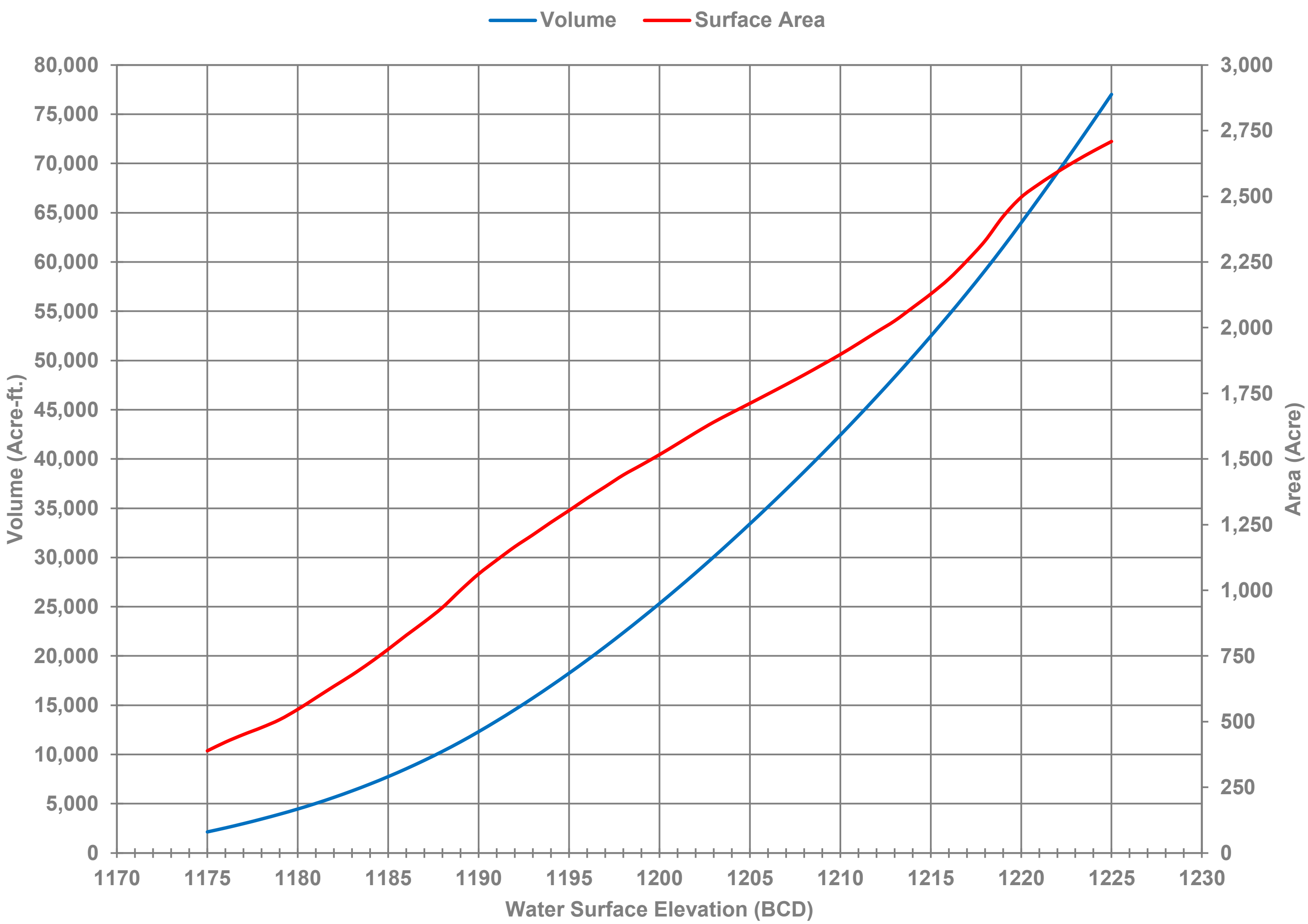


Figure 3.4-1. Hinckley Reservoir Area Capacity Curve

3.5 Hydraulic Capacity

The Project has two horizontal Kaplan units which are each capable of operating between 300 and 900 cfs for a total hydraulic capacity of 1,800 cfs under normal operating conditions.

3.6 Tailwater Rating Curve

The normal tailwater elevation of the Project is El. 1157.5. Figure 3.6-1 depicts the tailwater rating curve for the Project.

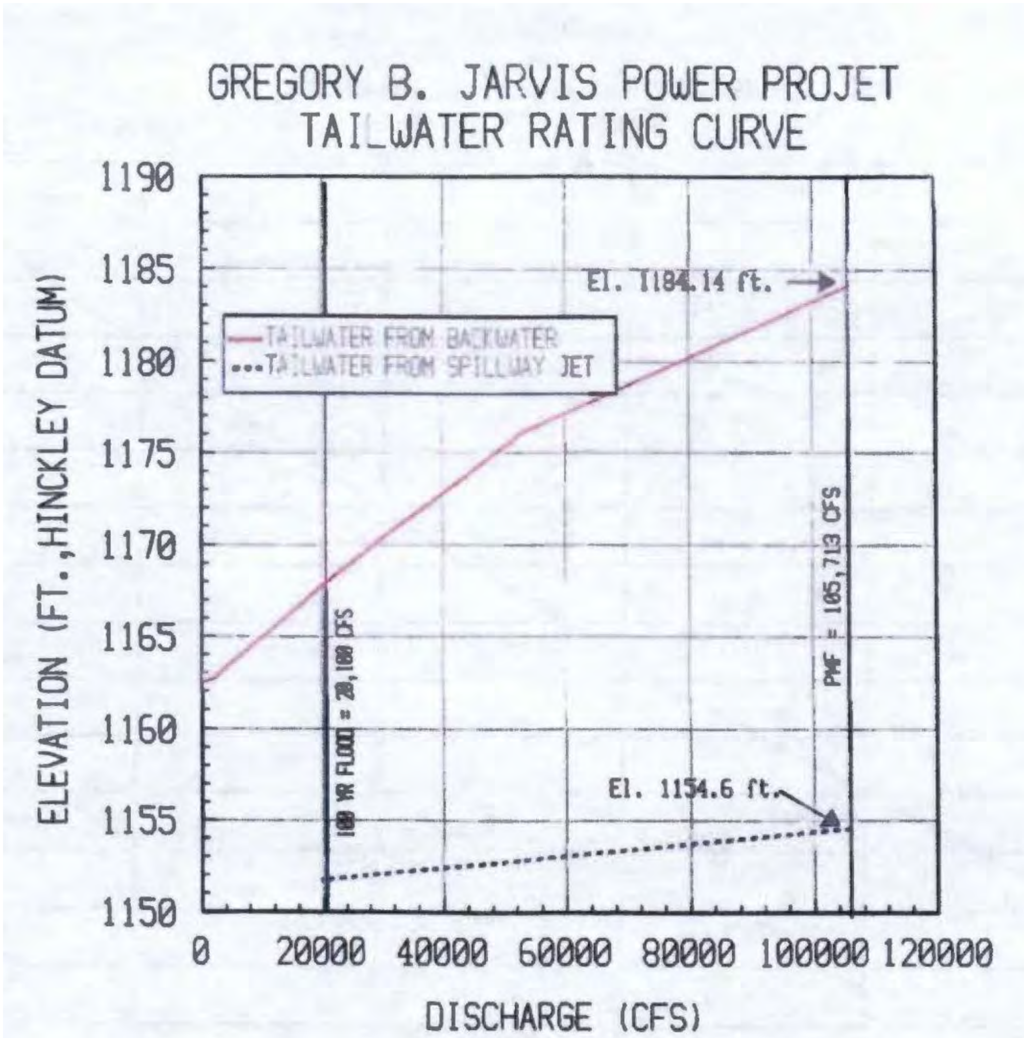


Figure 3.6-1. Tailwater Rating Curve

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

The primary purpose of the Project is 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 power during periods of peak demand for energy. The Project is typically operated to serve two purposes: to provide power at times of high consumer use, and to provide baseload power during non-peak periods.

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.