FINAL LICENSE APPLICATION
EXHIBIT B
PROJECT OPERATIONS AND RESOURCE UTILIZATION

SKAGIT RIVER HYDROELECTRIC PROJECT
FERC NO. 553

Seattle City Light

April 2023

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cfs...............................cubic feet per second
CIG.............................Climate Impact Group
City Light...................Seattle City Light
CoSD..........................City Light Seattle datum
DHSVM.....................Distributed Hydrology Soil Vegetation Model
DLA...........................Draft License Application
ELC............................Environmental Learning Center
EMAMP.....................Ecosystem Monitoring and Adaptive Management Program
ESA............................Endangered Species Act
FCC............................Flow Plan Coordinating Committee
FERC..........................Federal Energy Regulatory Commission
FIRO..........................Forecast-Informed Reservoir Operations
FLA............................Final License Application
FMP............................Flow Management Program
FSA............................Fisheries Settlement Agreement
ft.................................feet/foot
GCM..........................Global Climate Model
GHG...........................greenhouse gas
hp................................horsepower
IRP.............................Integrated Resource Plan
kV...............................kilovolt
kW..............................kilowatt
LP...............................licensing participant
MACA........................multivariate adaptive constructed analog
MW............................megawatt
MWh..........................megawatt hour
NAVD 88...................North American Vertical Datum of 1988
NCAR........................National Center of Atmospheric Research
NWRFC.....................Northwest River Forecast Center
NWS...........................National Weather Service
OFCN.........................Official Flood Control Notice

PAD............................Pre-Application Document
PME ....protection, mitigation, and enhancement
POR............................period of record
PRM ....Project River Mile
REP ....Skagit River Riverscape Ecosystem Plan
RM ....river mile
ROW ....right-of-way
RPM ....rotations per minute
SCC ....System Control Center
SGRS..........................Special Gate Regulation Schedule
SOC............................System Operating Center
SR...............................State Route
SRCC ....Skagit Resource Coordinating Committee
STJ ....stream-type juvenile
Project ....Skagit River Hydroelectric Project
USACE ......................U.S. Army Corp of Engineers
USGS .........................U.S. Geological Survey
USR............................Update Study Report
WDFW.......................Washington Department of Fish and Wildlife
WRF ....Weather Research and Forecasting
WSE ....water surface elevation

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EXHIBIT B: PROJECT OPERATIONS AND RESOURCE UTILIZATION

1.0 CONTENTS AND PURPOSES OF THIS EXHIBIT

The Skagit River Hydroelectric Project (Skagit River Project or Project) is licensed by the Federal Energy Regulatory Commission (FERC) as FERC Project No. 553. The current FERC license expires on April 30, 2025.

This Exhibit B, that is being filed as part of the Final License Application (FLA), describes the operations of the Skagit River Project, water availability and use, and production and use of Project generation under the current license. Comments filed on Exhibit B of the Draft License Application (DLA; filed November 30, 2022) have been addressed herein and responses to all DLA comments are included in Appendix B of Exhibit E of this FLA.

2.0 GENERAL DESCRIPTION OF PROJECT OPERATIONS

The Skagit River Project, owned and operated by the City of Seattle, Washington, through its City Light Department (City Light), is located in northern Washington State, in the traditional territory of several Indian Tribes and Canadian First Nations. The Project consists of three power generating developments on the Skagit River—Ross, Diablo, and Gorge—and associated lands and facilities. The Project generating developments are in the Cascade Mountains of the upper Skagit River watershed, between Project River Miles (PRM)[1] 94.5 and 127.9 (U.S. Geological Survey [USGS] river miles [RM] 94 and 127). Power from the Project is transmitted via two 230-kilovolt (kV) powerlines that span over 100 miles and end just north of Seattle at the Bothell Substation. The Project also includes two City Light-owned towns (Newhalem and Diablo), the North Cascades Environmental Learning Center (ELC), a variety of recreation facilities, and multiple parcels of fish and wildlife mitigation lands.

The Project developments are all located in Whatcom County, although Ross Lake, the most upstream reservoir, crosses the U.S.-Canada border and extends for about one mile into British Columbia at normal maximum water surface elevation. Gorge Development, the most downstream of the three Project developments, is approximately 120 miles northeast of Seattle and 60 miles east of Sedro-Woolley, the nearest large town. The closest town is Newhalem, which is part of the Project and just downstream of the Gorge Development. The three Project developments are hydraulically coordinated to operate as a single project. Project operation under the current license is designed to meet and prioritize four objectives: (1) flood risk management; (2) salmon and steelhead protection flows downstream of Gorge Powerhouse; (3) recreation; and (4) power generation. To achieve these objectives, City Light complies with applicable current license articles for Ross Lake levels and for streamflows and ramping rates downstream of Gorge Powerhouse.

2.1 General Reservoir Operations

Ross Lake is the primary storage for the Project and is drawn down in winter to capture water from spring runoff and for downstream flood risk management. Ross Lake also provides instream flows to protect anadromous fishery resources downstream of the Gorge Powerhouse, recreation, and hydropower generation. Reservoir operations include a number of compliance requirements that are outlined in detail in the current Project license and described in Exhibit E of this FLA.

Diablo Lake provides generation flexibility and reregulates flows between the Ross and Gorge developments. The lake typically fluctuates 4-5 feet daily although drawdowns of 10-12 feet occur occasionally as needed for construction projects or maintenance.

The main purpose of Gorge Lake is to regulate downstream flows for fish protection. Flows from the Gorge Development are critical for fish protection in the Skagit River. To comply with the license requirements that incorporate the Revised Fisheries Settlement Agreement (FSA; City Light 2011) Flow Plan, City Light operates Gorge Lake and Powerhouse in coordination with Ross

[1] City Light has developed a standard Project centerline and river mile system to be used throughout the relicensing process, including the study program, to replace the outdated USGS RM system. Given the long-standing use of the USGS RM system, both it and the PRM system are provided throughout this document. For further details see Appendix C in Exhibit E of this FLA

and Diablo lakes to provide a continuous, stable flow regime in the upper Skagit River with minimum and maximum flows into the mainstem Skagit River downstream of Gorge Powerhouse as outlined in the FSA.

2.2 General River Operations

Flows in the mainstem Skagit River downstream of Gorge Powerhouse are defined in the current Project license issued by FERC in 1995[2] which fully incorporated the measures included in the Flow Plan of the original FSA (City Light 1991). The intent of the Flow Plan was to minimize the effects of Project operations on salmon and steelhead. The Project license was amended in 2013[3] to incorporate a Revised Flow Plan (City Light 2011), which included four additional measures City Light had been implementing voluntarily since 1995 to further reduce Project effects on steelhead and salmon. The specific flow measures and ramping rate restrictions included in the current Project license as amended and Revised FSA Flow Plan (City Light 2011) are described in Section 2.6 of this Exhibit B.

2.3 Historic Flow Data

The Ross Development is the furthest upstream of the three Skagit River Project developments with a drainage area of approximately 1,008 square miles. Most of the water used for the Skagit River Project originates in high mountain basins surrounding Ross Lake and upstream along the Skagit River in British Columbia. At nearly 23 miles long, Ross Lake is the largest reservoir in western Washington. It extends into Canada approximately another mile (24 miles total) with about 500 acres in British Columbia. The Ross Lake sub-basin includes several tributaries including Lightning Creek, Ruby Creek, and Big Beaver Creek.

The Diablo Development is between the Ross and Gorge developments and in addition to generating power, reregulates flows between the two other developments. The Diablo Lake sub-basin, which accounts for approximately 127 square miles between the Ross and Diablo developments, includes Thunder Creek and other small tributaries.

The Gorge Development is the furthest downstream development and in addition to generating power, is responsible for regulating flows to the river downstream of the Project. Additional runoff from the small intermediate drainage area below the Diablo Development is conveyed into the Gorge Development. The Gorge Lake sub-basin accounts for approximately 37 square miles between the Diablo and Gorge developments.

City Light maintains extensive operational data for its facilities, which dates back several decades. However, due to differing data platforms, data gaps and flow calculation methods that have changed or evolved over time, an alternate approach to defining composite historical flows has been developed as part of the current relicensing process. This approach represents a sound and consistent method of defining inflow and outflow at each Project development and for the Project as a whole. This approach is summarized with flow data provided below, and a detailed discussion of the development of the flow data for the Skagit River Hydroelectric Project is included in

2 Order Accepting Settlement Agreement, Issuing New License and Terminating Proceeding, Project No. 553-005, 71 FERC ¶ 61,159 (1995).
3 Order Amending License and Revising Annual Charges, Project No. 553-221 (144 FERC ¶ 62,044 (2013).

Appendix 1 of the Skagit Operations Model Logic and Validation Report (as filed with the Updated Study Report [USR]; City Light 2023).

A hydrologic dataset of mean daily flows in the mainstem Skagit River upstream of Newhalem was developed for the period January 1, 1988 through December 31, 2021, utilizing available hydrologic data from USGS gage flow records in the vicinity of the Project and Skagit River Project operations records. Because mainstem Skagit River flows are influenced by Project operations, the hydrologic dataset was developed from historical USGS stream gage flow records for surrogate or reference basins by applying one of two methodologies: (1) the proration method, which is a "straight line" or linear proration method based on drainage area; or (2) the summation method, which utilizes a regression relation and Project operations as reported by USGS reservoir elevation gages for each of the Project reservoirs.

The hydrology for the Project vicinity was developed starting at the USGS Skagit River at Newhalem gage (USGS 12178000) and working upstream through the Project.

- The incremental flow for the area between USGS Skagit River at Newhalem gage and Gorge Dam was calculated utilizing the proration method. The USGS Newhalem Creek near Newhalem gage (USGS 12178100) flow was prorated by a factor of 0.45, which is based on a drainage area proration and calculated using the 12 square miles for the area between USGS Skagit River at Newhalem gage and Gorge Dam divided by the 26.9-square mile drainage area of the USGS Newhalem Creek near Newhalem gage.
- The Gorge Lake sub-basin (area between Gorge and Diablo dams) includes Stetattle Creek and other small tributaries. A USGS gage does exist for Stetattle Creek (USGS 12177500 Stetattle Creek near Newhalem); however, records ended in 1983. Given the lack of recent site-specific data, incremental inflows for the area between Gorge and Diablo dams were estimated utilizing the proration method and a linear trend fit. Three comparisons were completed against the discontinued USGS Stetattle Creek near Newhalem gage to identify the best reference dataset for the Gorge Lake sub-basin.

  Given the correlation comparisons, incremental flows between the Gorge and Diablo dams (Gorge Lake sub-basin) were estimated by applying a monthly linear based proration to the USGS Newhalem Creek near Newhalem gage data. Monthly linear equations were developed by comparing the USGS Newhalem Creek near Newhalem gage data with the discontinued USGS Stetattle Creek near Newhalem gage data for the period September 1, 1943 through November 23, 1983, where: y = USGS Stetattle Creek near Newhalem gage flows, and x = USGS Newhalem Creek near Newhalem gage flows.

  These linear relationships provided estimated flows at USGS Stetattle Creek near Newhalem gage, which has a drainage area of 22 square miles. These estimated flows were then prorated by a factor of approximately 1.68, which is based on a drainage area proration determined by dividing the 37 square mile watershed for the area between Gorge and Diablo dams by the 22 square mile watershed area of the USGS Stetattle Creek near Newhalem gage.
- The Diablo Lake sub-basin includes Thunder Creek and other small tributaries. The incremental flow for the area between Diablo and Ross dams (Diablo Lake sub-basin) was calculated utilizing the proration method. Flow records for the USGS gage, Thunder Creek

near Newhalem (USGS 12175500), were prorated by a factor of 1.21, which is based on a drainage area proration and was determined by dividing the 127 square mile watershed for the area between Diablo and Ross dams by the 105 square mile watershed area of the USGS Thunder Creek near Newhalem gage.

- The Ross Lake sub-basin includes several tributaries, including three that were historically gaged by the USGS (Lightning Creek, Ruby Creek, and Big Beaver Creek). However, none of these gages included records for the full period of record (POR).

  Given the lack of site-specific gaged flows for the POR, the inflow to Ross Lake was calculated with the summation method utilizing data from the Skagit River at Newhalem gage, the calculated downstream incremental inflows, and the change in storage of the three reservoirs.

For the three reservoirs, the summation method incorporates the determination of inflows using the hydrologic water budget equation:

$$Qi = Qo + \Delta S$$

Where the inflow (Qi) equals outflow (Qo) plus the change in storage (ΔS).

The change in storage relies on historical reservoir elevations and the storage-elevation relationships for each reservoir. USGS data of reservoir water-surface elevations were used, except for the periods of missing Diablo data which were filled in with Project operations records. The USGS gages recording for the daily reservoir levels are: Gorge Reservoir near Newhalem, Diablo Reservoir near Newhalem, and Ross Reservoir near Newhalem.

The inflow to Ross Lake was calculated by subtracting the sum of the calculated incremental flow between USGS Skagit River at Newhalem gage (including the estimated lake evaporation, as previously noted) and Gorge Dam, the calculated incremental flow for the area between Gorge and Diablo dams, the calculated incremental flow for the area between Diablo and Ross dams, and the change in storage for the three reservoirs from the USGS Skagit River at Newhalem gage flow.

The historical evaporative losses and any leakage that may have occurred are embedded in the streamflows reported by the utilized USGS Skagit River gages and therefore accounted for within the hydrologic dataset. An approximation of the average monthly historical evaporative losses was added into the mainstem Skagit gage flows to account for the historical evaporative losses. The monthly average losses were estimated utilizing the March 1984 through October 2015 TerraClimate estimated evaporation rates for Ross and Diablo from the study by Gang Zhao and Huilin Gao entitled Estimating Reservoir Evaporation Losses for the United States: Fusing Remote Sensing and Modeling Approaches (Zhao and Gao 2019). Monthly average evaporative loss rates were calculated by averaging the available TerraClimate data and applying the monthly average loss rate to the reported historical daily reservoir surface area. The estimated reservoir evaporation varies from 0 to 1 cubic feet per second (cfs) for Gorge, 1 to 5 cfs for Diablo, and 4 to 56 cfs for Ross.

The overall summation method, which includes change in storage, resulted in 184 days of calculated negative outflow (releases) in the 12,054-day period of analysis, or approximately 1.6 percent of the records. These 184 days were removed from the data presented in this Exhibit B.

2.3.1 Project Flow Data

The average monthly and annual inflows into and releases from Ross, Diablo and Gorge lakes are summarized in Tables 2.3-1 through 2.3-6 for the five-year period 2017 through 2021, based on the calculation methods described above. Average monthly and annual inflows into, and releases from each lake based on the calculation methods described above are provided in Appendix A of this Exhibit B for the period 1988 through 2021. Average monthly release follows the same trend for each development and reflects the generation data, with high outflow in the winter months and low in the late summer.

Table 2.3-1. Monthly minimum, average, and maximum inflows (cfs) into Ross Lake (2017-2021).

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2017	Maximum	3,434	6,107	7,566	4,641	17,390	15,191	6,049	2,242	1,608	7,540	30,719	5,080	30,719
	Average	1,638	2,467	4,027	3,986	9,906	8,099	3,468	1,548	1,122	2,020	4,904	2,715	3,828
	Minimum	1,057	1,139	1,621	3,346	3,497	5,645	2,191	858	819	645	1,166	1,584	645
2018	Maximum	4,932	7,153	2,692	9,418	16,875	7,413	3,896	2,141	2,374	3,249	9,250	4,539	16,875
	Average	2,688	4,040	1,953	3,824	11,527	5,574	2,810	1,348	1,233	1,598	3,735	2,903	3,599
	Minimum	1,337	2,390	1,458	1,534	6,830	3,622	1,973	818	622	721	1,609	1,825	622
2019	Maximum	6,093	2,684	2,608	8,567	10,487	8,400	2,909	1,581	2,490	3,053	2,119	2,945	10,487
	Average	2,832	1,705	1,658	3,924	7,197	4,289	2,020	1,089	1,309	1,621	1,416	1,508	2,552
	Minimum	1,858	1,225	957	2,203	3,337	2,639	1,225	786	797	771	970	1,016	771
2020	Maximum	4,216	18,590	2,491	7,146	19,725	13,129	6,663	2,398	4,901	3,859	17,156	4,565	19,725
	Average	2,488	3,788	1,734	3,346	9,630	8,237	3,954	1,550	1,488	2,201	4,128	2,491	3,747
	Minimum	1,452	1,728	1,349	1,365	5,609	6,137	2,426	831	745	1,038	2,000	1,562	745
2021	Maximum	6,967	2,922	2,146	6,130	12,104	16,145	6,925	2,171	7,006	8,646	59,777	18,958	59,777
	Average	3,054	1,816	1,667	3,534	7,208	9,133	2,814	1,384	1,756	2,337	10,059	5,220	4,163
	Minimum	1,727	1,192	1,356	1,485	4,777	5,064	1,491	688	749	1,198	2,517	1,627	688
5-Year Summary	Maximum	6,967	18,590	7,566	9,418	19,725	16,145	6,925	2,398	7,006	8,646	59,777	18,958	59,777
	Average	2,540	2,770	2,208	3,723	9,094	7,066	3,013	1,384	1,382	1,955	4,848	2,968	3,578
	Minimum	1,057	1,139	957	1,365	3,337	2,639	1,225	688	622	645	970	1,016	622

Table 2.3-2. Monthly minimum, average, and maximum inflows (cfs) into Diablo Lake (2017-2021).

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2017	Maximum	7,930	4,242	7,644	6,030	6,980	10,805	6,185	4,713	5,616	5,208	10,750	12,805	12,805
	Average	5,534	3,123	4,591	4,954	5,312	6,681	4,614	3,012	3,749	3,589	4,843	5,344	4,620
	Minimum	2,596	1,930	2,819	3,564	3,815	4,296	3,219	1,512	1,892	1,341	3,090	3,270	1,341
2018	Maximum	6,908	12,473	12,590	4,305	4,325	4,703	5,239	4,758	4,964	5,221	4,781	4,882	12,590
	Average	5,617	8,359	7,315	3,177	3,135	3,545	3,590	3,093	4,105	4,223	3,883	4,132	4,542
	Minimum	3,955	5,004	3,461	2,124	1,729	2,511	2,104	1,893	1,587	3,301	2,422	3,126	1,587
2019	Maximum	7,158	6,973	5,851	5,222	4,826	4,674	3,588	3,810	4,010	3,462	3,428	3,941	7,158
	Average	5,833	5,945	4,838	3,845	3,184	3,012	2,585	2,261	3,047	2,749	2,799	2,605	3,550
	Minimum	3,382	5,020	3,063	2,733	1,973	1,685	2,058	1,479	2,090	1,549	1,523	1,805	1,479
2020	Maximum	3,932	6,877	7,589	4,558	3,998	8,937	7,555	3,750	5,810	8,571	10,161	4,796	10,161
	Average	2,609	5,485	5,215	3,561	2,552	4,954	4,931	2,610	3,654	4,460	4,780	4,033	4,065
	Minimum	1,118	2,431	3,434	2,750	1,602	2,918	2,977	1,692	1,792	2,379	2,650	2,383	1,118
2021	Maximum	7,392	7,717	7,373	4,679	2,681	10,743	8,683	3,776	4,457	8,726	27,358	20,687	27,358
	Average	5,879	6,688	5,358	3,253	2,026	4,174	4,192	2,772	3,459	4,389	12,204	6,503	5,054
	Minimum	2,497	5,953	3,030	1,584	1,403	1,664	2,318	1,475	2,025	2,789	2,546	2,788	1,403
5-Year Summary	Maximum	7,930	12,473	12,590	6,030	6,980	10,805	8,683	4,758	5,810	8,726	27,358	20,687	27,358
	Average	5,095	5,917	5,463	3,757	3,255	4,479	4,013	2,750	3,603	3,882	5,714	4,523	4,366
	Minimum	1,118	1,930	2,819	1,584	1,403	1,664	2,058	1,475	1,587	1,341	1,523	1,805	1,118

Table 2.3-3. Monthly minimum, average, and maximum inflows (cfs) into Gorge Lake (2017-2021).

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2017	Maximum	7,517	4,347	7,578	6,336	6,533	10,711	6,752	4,479	4,674	6,739	13,671	12,797	13,671
	Average	5,623	3,554	5,026	5,292	6,107	7,320	4,972	3,213	3,727	3,930	5,405	5,479	4,977
	Minimum	2,975	2,731	3,406	4,047	5,430	5,297	3,630	1,835	1,644	3,488	3,623	4,100	1,644
2018	Maximum	7,280	12,323	12,286	4,205	4,821	4,534	5,712	4,687	4,549	4,633	5,855	4,940	12,323
	Average	5,958	8,718	7,427	3,626	3,960	4,039	3,903	3,196	4,166	4,388	4,419	4,338	4,854
	Minimum	4,476	6,675	4,003	3,306	2,465	2,855	2,672	2,108	1,772	4,200	3,982	4,060	1,772
2019	Maximum	6,882	7,072	5,749	5,711	4,773	4,264	2,953	2,692	3,383	3,266	3,317	3,100	7,072
	Average	6,081	6,071	4,946	4,206	3,803	3,371	2,688	2,323	3,181	3,098	2,977	2,806	3,789
	Minimum	4,572	5,165	4,241	3,078	3,363	2,588	2,278	2,170	3,025	2,922	2,726	2,295	2,170
2020	Maximum	3,664	7,051	6,521	4,026	4,546	9,364	7,532	4,169	4,432	8,840	10,543	4,859	10,543
	Average	3,028	5,829	5,321	3,856	3,245	5,539	5,332	2,788	3,799	4,843	5,180	4,254	4,411
	Minimum	2,326	3,195	4,170	3,536	2,681	3,673	3,396	2,233	1,923	3,736	3,607	3,635	1,923
2021	Maximum	7,008	7,077	6,850	3,855	3,080	11,814	9,665	3,595	4,522	9,675	28,248	22,102	28,248
	Average	6,195	6,815	5,471	3,584	2,621	4,903	4,492	2,906	3,640	4,791	13,490	6,851	5,459
	Minimum	3,401	6,490	4,041	3,342	2,289	2,469	2,778	2,131	2,138	3,631	4,095	3,620	2,131
5-Year Summary	Maximum	7,517	12,323	12,286	6,336	6,533	11,814	9,665	4,687	4,674	9,675	28,248	22,102	28,248
	Average	5,377	6,195	5,638	4,112	3,951	5,041	4,311	2,885	3,703	4,210	6,307	4,746	4,699
	Minimum	2,326	2,731	3,406	3,078	2,289	2,469	2,278	1,835	1,644	2,922	2,726	2,295	1,644

Table 2.3-4. Monthly minimum, average, and maximum outflows (cfs) from Ross Lake (2017-2021).

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2017	Maximum	7,780	3,891	7,405	5,546	5,994	9,350	4,730	3,246	5,221	4,539	10,071	12,255	12,255
	Average	5,356	2,723	4,070	4,480	3,732	4,690	3,073	1,896	3,091	2,991	3,964	5,003	3,761
	Minimum	2,430	245	1,670	3,005	703	2,269	1,910	618	668	591	549	2,917	245
2018	Maximum	6,381	12,218	12,377	3,626	2,907	3,903	3,336	3,541	4,379	5,022	4,439	4,523	12,377
	Average	5,261	7,835	7,085	2,662	1,360	2,097	1,903	1,936	3,566	3,797	3,166	3,806	3,765
	Minimum	3,641	3,895	3,220	863	119	14	443	881	1,012	1,628	102	2,814	14
2019	Maximum	6,922	6,808	5,714	4,903	4,428	3,726	2,646	2,782	3,201	3,135	3,156	3,671	6,922
	Average	5,535	5,770	4,671	3,330	2,089	1,946	1,568	1,251	2,178	2,091	2,405	2,275	2,917
	Minimum	2,509	4,875	2,791	1,047	574	611	961	593	936	19	517	1,227	19
2020	Maximum	3,693	6,677	7,423	4,387	3,009	7,179	6,614	2,477	4,416	7,994	8,986	4,460	8,986
	Average	2,046	4,956	5,039	3,128	1,146	3,459	3,544	1,649	2,789	3,587	3,967	3,570	3,235
	Minimum	312	1,649	3,224	1,501	65	1,048	1,548	741	964	682	1,299	1,441	65
2021	Maximum	7,123	7,473	7,202	4,041	1,999	6,755	5,422	2,184	3,641	7,659	25,976	18,370	25,976
	Average	5,434	6,469	5,171	2,772	978	2,076	2,571	1,573	2,581	3,766	10,579	5,817	4,126
	Minimum	1,248	5,775	2,845	792	320	315	900	732	955	1,749	1,814	2,193	315
5-Year Summary	Maximum	7,780	12,218	12,377	5,546	5,994	9,350	6,614	3,541	5,221	7,994	25,976	18,370	25,976
	Average	4,726	5,546	5,207	3,274	1,904	2,859	2,555	1,661	2,841	3,246	4,828	4,094	3,561
	Minimum	312	245	1,670	792	65	14	443	593	668	19	102	1,227	14

Table 2.3-5. Monthly minimum, average, and maximum outflows (cfs) from Diablo Lake (2017-2021).

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2017	Maximum	7,456	4,102	7,424	6,077	6,202	10,256	6,259	4,336	4,628	5,057	10,293	12,570	12,570
	Average	5,511	3,150	4,590	4,951	5,295	6,652	4,630	3,106	3,684	3,576	4,812	5,369	4,618
	Minimum	2,873	1,514	2,772	3,689	3,804	4,617	3,400	1,756	1,596	1,936	2,918	3,986	1,514
2018	Maximum	6,863	12,217	12,185	3,574	4,324	4,218	5,344	4,566	4,479	4,497	5,064	4,496	12,217
	Average	5,642	8,312	7,318	3,198	3,020	3,518	3,584	3,103	4,083	4,245	3,875	4,120	4,532
	Minimum	4,017	5,008	3,878	2,547	1,592	2,535	2,179	2,049	1,720	3,645	2,112	3,781	1,592
2019	Maximum	6,664	6,944	5,686	4,804	4,594	3,976	2,795	2,584	3,273	3,125	3,206	2,974	6,944
	Average	5,829	5,944	4,840	3,865	3,173	3,039	2,519	2,238	3,046	2,766	2,789	2,602	3,546
	Minimum	3,551	5,079	4,062	2,577	2,243	2,354	2,045	2,074	2,636	1,236	1,597	1,728	1,236
2020	Maximum	3,370	6,510	6,431	3,832	3,247	8,863	6,864	3,930	4,372	8,581	10,191	4,710	10,191
	Average	2,614	5,468	5,210	3,559	2,503	4,945	4,905	2,623	3,643	4,460	4,798	4,012	4,056
	Minimum	1,440	3,062	4,082	2,574	1,632	3,176	3,097	2,089	1,841	3,021	3,168	3,091	1,440
2021	Maximum	6,875	6,939	6,742	3,674	2,408	10,759	8,923	3,271	4,469	8,942	27,440	21,027	27,440
	Average	5,873	6,682	5,351	3,252	2,066	4,124	4,198	2,782	3,433	4,386	12,215	6,492	5,051
	Minimum	1,769	6,396	3,906	2,751	1,549	1,698	2,632	2,065	2,073	3,297	3,534	3,307	1,549
5-Year Summary	Maximum	7,456	12,217	12,185	6,077	6,202	10,759	8,923	4,566	4,628	8,942	27,440	21,027	27,440
	Average	5,094	5,908	5,462	3,764	3,231	4,462	3,998	2,771	3,578	3,887	5,710	4,519	4,361
	Minimum	1,440	1,514	2,772	2,547	1,549	1,698	2,045	1,756	1,596	1,236	1,597	1,728	1,236

Table 2.3-6. Monthly minimum, average, and maximum outflows (cfs) from Gorge Lake (2017-2021).

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2017	Maximum	7,625	4,408	7,575	6,125	6,398	10,678	6,765	4,445	4,529	7,191	13,922	12,745	13,922
	Average	5,618	3,556	5,026	5,298	6,106	7,310	4,976	3,212	3,724	3,937	5,402	5,474	4,977
	Minimum	2,923	2,901	3,612	4,064	5,461	5,318	3,762	1,788	1,659	3,517	3,573	4,217	1,659
2018	Maximum	7,034	12,378	12,272	4,115	4,783	4,375	5,692	4,642	4,545	4,523	5,658	5,107	12,378
	Average	5,960	8,716	7,424	3,631	3,952	4,032	3,904	3,188	4,171	4,386	4,422	4,336	4,854
	Minimum	4,533	6,753	3,990	3,406	2,492	2,854	2,825	2,194	1,798	4,259	3,968	4,081	1,798
2019	Maximum	6,874	6,862	5,705	5,844	4,688	4,236	3,053	2,585	3,243	3,222	3,333	3,044	6,874
	Average	6,080	6,070	4,948	4,205	3,803	3,365	2,698	2,322	3,179	3,099	2,976	2,808	3,789
	Minimum	4,572	5,200	4,317	3,123	3,402	2,617	2,381	2,222	3,095	2,770	2,755	2,408	2,222
2020	Maximum	3,553	6,856	6,474	3,974	4,364	9,266	7,570	4,125	4,472	8,849	10,614	4,526	10,614
	Average	3,032	5,821	5,320	3,859	3,234	5,535	5,327	2,792	3,797	4,843	5,179	4,254	4,410
	Minimum	2,354	3,641	4,299	3,705	2,695	3,637	3,384	2,292	1,931	3,773	3,693	3,739	1,931
2021	Maximum	6,882	6,967	6,788	3,826	3,162	12,117	9,692	3,517	4,457	9,626	28,219	22,224	28,219
	Average	6,191	6,819	5,469	3,580	2,625	4,898	4,497	2,901	3,642	4,786	13,495	6,844	5,458
	Minimum	3,324	6,624	4,117	3,364	2,501	2,516	2,915	2,235	2,235	3,711	4,030	3,678	2,235
5-Year Summary	Maximum	7,625	12,378	12,272	6,125	6,398	12,117	9,692	4,642	4,545	9,626	28,219	22,224	28,219
	Average	5,376	6,194	5,638	4,114	3,948	5,035	4,315	2,883	3,702	4,210	6,307	4,743	4,698
	Minimum	2,354	2,901	3,612	3,123	2,492	2,516	2,381	1,788	1,659	2,770	2,755	2,408	1,659

Significant spills over the dams from each development for the five years 2017 through 2021 are shown in Tables 2.3-7 through 2.3-9.

Spills over Ross Dam are infrequent (relative to Diablo and Gorge developments) due to the large reservoir storage capacity. Spill is typically associated with gate testing, is usually short in duration, and averages only a few cfs of flow per event (Table 2.3-7). Over the five years 2017 through 2021, Ross Dam has spilled 55 times; 8 of these occurred between October 28 and November 9, 2020 and were associated with Units 41 and 42 being offline and a high inflow event on November 5, 2020. Another 33 days of spill occurred in the fall of 2021 corresponding to a high inflow event.

Table 2.3-7. Ross Dam spill events (2017-2021).

Year	Number of Days with Spill	Average Flow per Spill Day (cfs)
2017	1	<1
2018	2	<1
2019	0	0
2020	12	2,147
2021	40	3,872

The Diablo Development spills (Table 2.3-8) much more frequently than the Ross Development (Table 2.3-7). Spill can occur any time inflow to the reservoir exceeds plant capacity, typically during periods of high runoff. Diablo Dam also spills when the powerhouse units are offline or additional flow is needed to meet fish protection flows downstream of the Gorge Powerhouse. Under typical operations, represented by 2019, 2020 and 2021, Diablo Dam spills an average of 62 days per year. However, in years when unit maintenance occurs at Diablo Powerhouse, such as 2017 and 2018, spill events are significantly more frequent and of longer duration but lower in magnitude.

Table 2.3-8. Diablo Dam spill events (2017-2021).

Year	Number of Days with Spill	Average Flow per Spill Day (cfs)
2017	224	1,364
2018	274	1,393
2019	80	1,482
2020	60	2,474
2021	46	5,149

Over the five-year period 2017 through 2021, Gorge Dam has spilled between 9 and 56 days annually, with an average flow of 2,570 cfs (Table 2.3-9).

Table 2.3-9. Gorge Dam spill events (2017-2021).

Year	Number of Days with Spill	Average Flow per Spill Day (cfs)
2017	37	2,006
2018	42	2,934
2019	9	589
2020	20	1,374
2021	56	5,946

2.3.2 Storage Capacity

2.3.2.1 Ross Lake

Ross Lake is drawn down in the winter to capture water from spring runoff and to provide for downstream flood risk management. Storage capacity at a normal maximum water surface elevation of 1,608.76 feet North American Vertical Datum of 1988 (NAVD 88; 1,602.5 feet City of Seattle datum [CoSD])[4] is approximately 1,432,000 acre-feet. The usable storage is approximately 1,063,000 acre-feet based on the volume between the normal maximum water surface elevation and the normal minimum operating water surface elevation of 1,480.76 feet NAVD 88 (1,474.5 feet CoSD). The drawdown typically begins the Tuesday after Labor Day and continues until the lake reaches its lowest level in late March or early April. Article 301 of the existing Project license requires City Light to draw down Ross Lake to a level that provides 60,000 acre-feet of usable storage or approximately elevation 1,603.78 feet NAVD 88 (1,597.52 feet CoSD) for flood risk management by November 15 and 120,000 acre-feet by December 1 or approximately elevation 1,598.65 feet NAVD 88 (1,592.39 feet CoSD) and to maintain this available storage through March 15. If needed, the reservoir can be surcharged by up to a maximum of 5.5 feet to the top of the spillway gates to absorb approximately an additional 69,000 acre-feet (United States Army Corps of Engineers [USACE] 2002). The storage-area-volume curve for Ross Lake is shown in Figure 2.3-1 and the accompanying data is provided in Table 2.3-10. The seasonal operations of Ross Lake are discussed in more detail in the Rule Curve section of this Exhibit B (Section 3.4).

4 City Light is in the process of converting Project information from its older vertical elevation datum (CoSD) to the more current and standardized elevation datum (NAVD 88). As such, elevations are provided relative to both data throughout this FLA. The conversion factor between CoSD and NAVD 88 varies depending on location. A table converting elevation values of common benchmarks, staff gages, and key Project features from CoSD to NAVD 88 and a map of the same features are appended to this FLA (Appendix C in Exhibit E), both of which have been updated since first being provided in the Pre-Application Document (PAD).

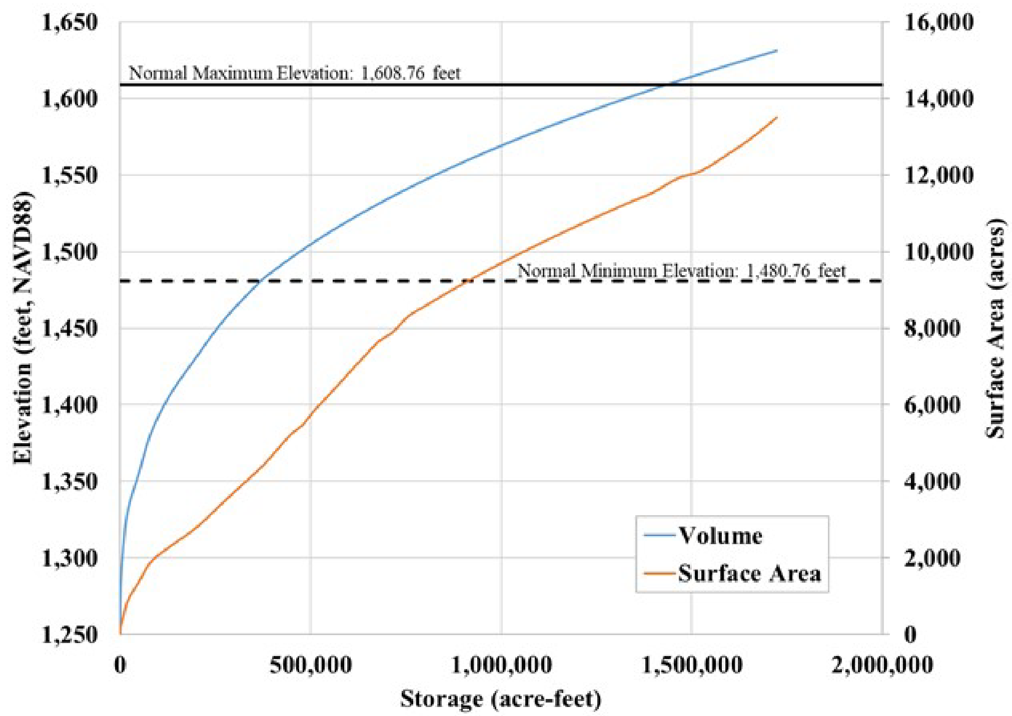

Figure 2.3-1. Ross Lake storage-area-volume curve.

Table 2.3-10. Ross Lake storage-area-volume tabulated data.

Elevation (feet, NAVD 88)	Surface Area (acre)	Volume (acre-feet)	Elevation (feet, NAVD 88)	Surface Area (acre)	Volume (acre-feet)
1,256.3	0	0	1,536.3	7,900	715,913
1,281.3	200	1,000	1,541.3	8,300	755,075
1,306.3	450	7,500	1,546.3	8,550	795,641
1,331.3	900	20,000	1,551.3	8,800	837,638
1,356.3	1,400	50,000	1,556.3	9,050	881,089
1,381.3	1,900	80,000	1,561.3	9,300	926,019
1,406.3	2,300	130,000	1,566.3	9,550	972,454
1,431.3	2,800	200,000	1,571.3	9,800	1,020,418
1,456.3	3,500	275,000	1,576.3	10,050	1,069,936
1,480.76[1]	**3,790**	**368,833**	1,581.3	10,300	1,121,034
1,481.3	4,375	370,748	1,586.3	10,550	1,173,735
1,486.3	4,650	396,096	1,591.3	10,800	1,228,065
1,491.3	4,950	422,576	1,596.3	11,050	1,284,049
1,496.3	5,250	450,212	1,601.3	11,300	1,341,712
1,501.3	5,475	479,030	1,606.3	11,550	1,401,078
1,506.3	5,850	509,053	**1,608.76**[2]	**11,725**	**1,431,626**
1,511.3	6,175	540,308	1,611.3	11,900	1,462,173
1,516.3	6,525	572,818	1,616.3	12,100	1,525,021

Elevation (feet, NAVD 88)	Surface Area (acre)	Volume (acre-feet)	Elevation (feet, NAVD 88)	Surface Area (acre)	Volume (acre-feet)
1,521.3	6,900	606,609	1,621.3	12,500	1,589,648
1,526.3	7,275	641,705	1,626.3	12,950	1,656,078
1,531.3	7,650	678,131	1,631.3	13,500	1,724,336

1 Normal operating minimum water surface elevation.
2 Normal maximum water surface elevation.

2.3.2.2 Diablo Lake

The storage capacity of Diablo Lake is approximately 88,800 acre-feet at a normal maximum water surface elevation of about 1,211.36 feet NAVD 88 (1,205 feet CoSD). The usable storage is approximately 6,200 acre-feet based on the volume between the normal maximum water surface elevation and the normal minimum operating water surface elevation of 1,204.36 feet NAVD 88 (1,198 feet CoSD). Diablo Lake can be lowered through spill or generation to provide some additional usable storage in advance of a predicted flood. The storage-area-volume curve for Diablo Lake is shown in Figure 2.3-2 and the accompanying data is provided in Table 2.3-11.

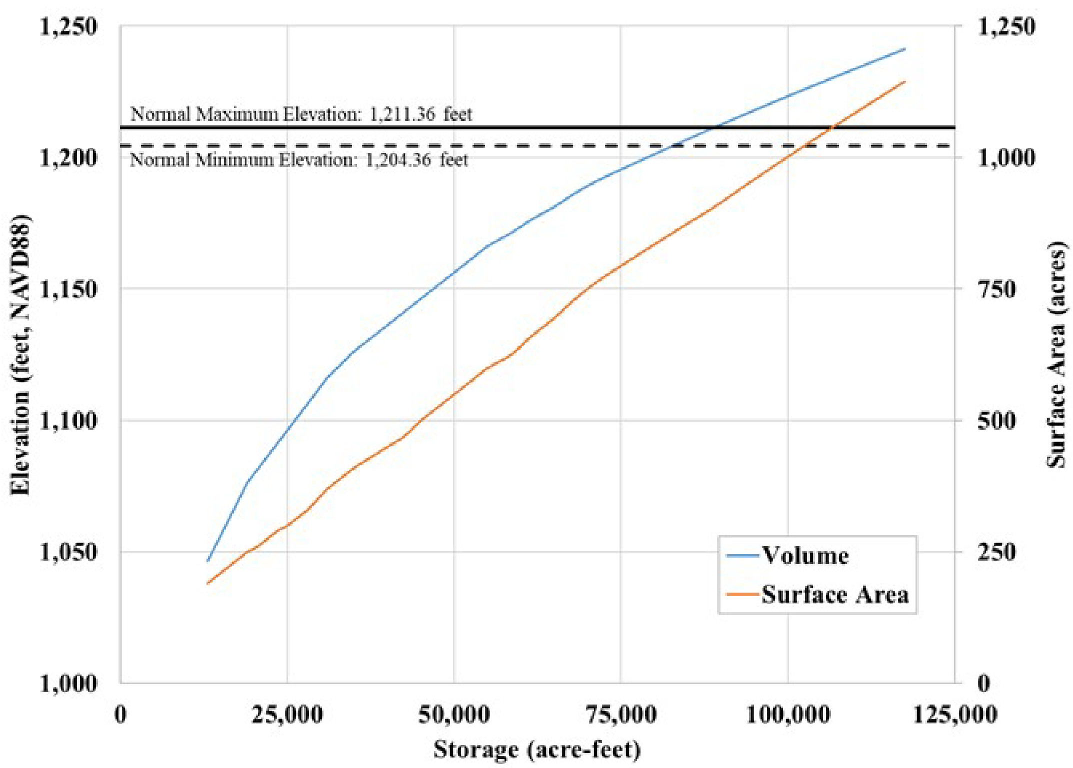

Figure 2.3-2. Diablo Lake storage-area-volume curve.

Table 2.3-11. Diablo Lake storage-area-volume tabulated data.

Elevation (feet, NAVD 88)	Surface Area (acre)	Volume (acre-feet)	Elevation (feet, NAVD 88)	Surface Area (acre)	Volume (acre-feet)
1,046.4	190	13,000	1,151.4	525	47,500
1,051.4	200	14,000	1,156.4	550	50,000
1,056.4	210	15,000	1,161.4	575	52,500
1,061.4	220	16,000	1,166.4	600	55,000
1,066.4	230	17,000	1,171.4	625	58,500
1,071.4	240	18,000	1,176.4	660	61,500
1,076.4	250	19,000	1,181.4	695	65,000
1,081.4	260	20,500	1,186.4	730	68,000
1,086.4	275	22,000	1,191.4	765	71,521
1,091.4	290	23,500	1,196.4	800	75,702
1,096.4	300	25,000	1,201.4	835	79,979
1,101.4	315	26,500	**1,204.4**[1]	**856**	**82,602**
1,106.4	330	28,000	1,206.4	870	84,350
1,111.4	350	29,500	**1,211.4**[2]	**905**	**88,814**
1,116.4	370	31,000	1,216.4	945	93,371
1,121.4	390	33,000	1,221.4	985	98,019
1,126.4	410	35,000	1,226.4	1,025	102,758
1,131.4	430	37,500	1,231.4	1,065	107,587
1,136.4	450	40,000	1,236.4	1,105	112,505
1,141.4	470	42,500	1,241.4	1,145	117,511
1,146.4	500	45,000			

1 Normal operating minimum water surface elevation.
2 Normal maximum water surface elevation.

2.3.2.3 Gorge Lake

The gross storage capacity of Gorge Lake is approximately 8,200 acre-feet at normal maximum water surface elevation of 881.51 feet NAVD 88 (875 feet CoSD). The usable storage is approximately 1,600 acre-feet based on the volume between the normal maximum water surface elevation and the normal minimum operating water surface elevation of 873.51 feet NAVD 88 (867 feet CoSD). The storage-area-volume curve for Gorge Lake is shown in Figure 2.3-3 and the accompanying data is provided in Table 2.3-12.

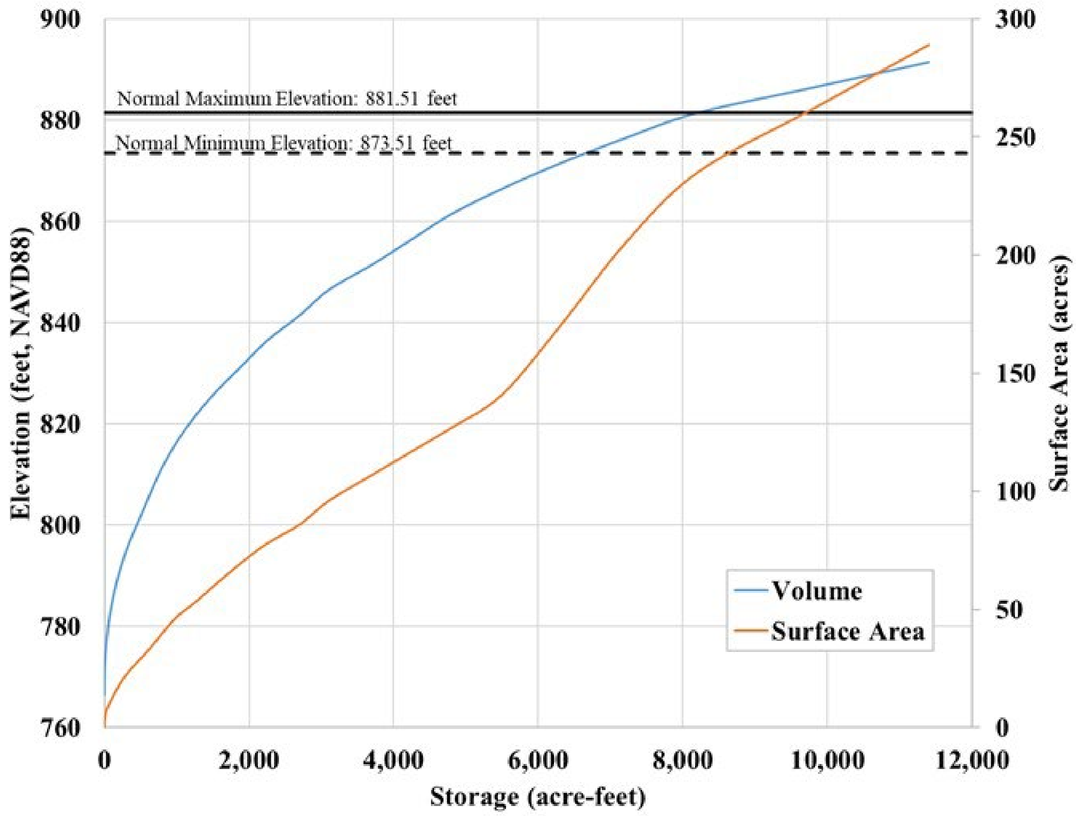

Figure 2.3-3. Gorge Lake storage-area-volume curve.

Table 2.3-12. Gorge Lake storage-area-volume tabulated data.

Elevation (feet, NAVD 88)	Surface Area (acre)	Volume (acre-feet)	Elevation (feet, NAVD 88)	Surface Area (acre)	Volume (acre-feet)
766.5	0	0	836.5	78	2,250
771.5	3	5	841.5	86	2,700
776.5	7	25	846.5	96	3,100
781.5	10	66	851.5	107	3,700
786.5	14	131	856.5	117	4,250
791.5	19	222	861.5	127	4,800
796.5	24	341	866.5	141	5,500
801.5	29	492	871.5	170	6,300
806.5	34	640	**873.5**[1]	**184**	**6,600**
811.5	40	800	876.5	205	7,200
816.5	47	1,000	**881.5**[2]	**235**	**8,200**
821.5	53	1,250	886.5	262	9,800
826.5	61	1,550	891.5	289	11,400
831.5	70	1,900			

1 Normal operating minimum water surface elevation.
2 Normal maximum water surface elevation.

2.3.3 Flood Conditions

Under existing operations, Ross Lake is drawn down on a yearly basis during winter to capture flows from spring runoff and to provide for downstream flood risk management. The drawdown typically begins the Tuesday after Labor Day and continues until the lake reaches its lowest level in late March or early April. Article 301 of the current license requires City Light to draw down Ross Lake to a level that provides 60,000 acre-feet of storage for flood risk management by November 15 and 120,000 acre-feet by December 1, and to maintain this available storage through March 15. City Light must also comply with Details of Regulation for Use of Storage Allocated for Flood Control in Ross Reservoir, Skagit River, WA (USACE 1967), which is incorporated into the Project license by reference. This document was updated in 2002 and provides the current guidance for Project operations for flood risk management and is commonly referred to as the Skagit River Project Water Control Manual (USACE 2002).

Flood risk management operations are initiated by the Seattle District, USACE, Reservoir Control Center whenever it receives a flood forecast from the National Weather Service (NWS), Northwest River Forecast Center (NWRFC), or a flood forecast prepared internally indicating that natural flows at Concrete will reach 90,000 cfs in 8 hours on a rising flood. The Reservoir Control Center notifies City Light and initiates an official flood risk management operation at that time. This flood notification is referred to as an "Official Flood Control Notice (OFCN)." The OFCN is logged by the Reservoir Control Center and City Light at the time it is issued/received. The Reservoir Control Center also notifies the System Control Center (SCC) and cancels the OFCN when the flood risk management operation is ended. During the flood period through which the Reservoir Control Center controls operations of the Project, City Light retains the right to discharge up to 5,000 cfs from Ross (plus or minus 20 percent allowances for operational latitude) as such flows are necessary for normal generation at the other two Project developments. Additionally, Ross Lake may be surcharged if the water surface elevation reaches 1,608.76 feet NAVD 88 (1,602.5 feet CoSD) before flood recession occurs to provide the additional reduction of release downstream.

The Skagit River Project Water Control Manual (USACE 2002) describes the USACE water control plan for the Skagit River Project, which is the maximum beneficial use of flood risk management storage at Ross to reduce flooding in the lower Skagit Valley during the October-March flood season. During flood events, both Ross and Upper Baker are coordinated concurrently by the Reservoir Control Center to optimize their combined flood risk management storage. According to the Skagit River Project Water Control Manual (USACE 2002), the following tasks are performed by the Reservoir Control Center during the initial phase of a flood regulation:

- Monitor and collect river and weather data to help establish the flood potential.
- Brief the Seattle District Engineer, District staff, and Emergency Operations field crews on weather and flood conditions.
- Maintain the Reservoir Control Center hourly computer spreadsheet for the Skagit flood event.
- Provide NWRFC with present and projected reservoir conditions (release and storage contents).
- Be alert to special requirements such as the Special Gate Regulation Schedule (SGRS), and the surcharge storage operation.

If the Ross Lake water surface elevation reaches 1,608.76 feet NAVD 88 (1,602.5 feet CoSD) before the flood recession occurs, the gates are operated to produce surcharge storage to gain a reduction of release downstream. If surcharge storage is produced, it is maintained as long as possible, or until flood recession occurs. After flood recession starts, releases from Ross Lake are increased until release equals inflow. Storage is evacuated as rapidly as possible without endangering downstream installations as soon as the release at Concrete recedes to 90,000 cfs and a falling trend is predicted.

Maximum regulated releases normally occur at Ross during the flood storage evacuation. These releases are limited to 25,000 cfs between Ross and Newhalem to avoid damages to facilities. When releases are expected to exceed the values listed above, Seattle District, USACE, Reservoir Control Center and City Light should station observers in each reach to monitor conditions and warn of any problems. According to the Skagit River Project Water Control Manual (USACE 2002), the maximum releases listed above may be exceeded if the SGRS is required. The Reservoir Control Center must avoid regulated releases at Ross and Upper Baker that cause the Skagit River to exceed the flood crest previously experienced unless renewed flooding or the SGRS require higher regulated releases.

According to the Skagit River Project Water Control Manual (USACE 2002), during very large floods, continued regulation according to the normal flood risk management procedure could result in premature filling of Ross Lake. A sudden rapid increase in releases would result when normal maximum water surface elevation is reached, possibly causing a higher peak in the lower Valley than would have occurred under pre-Project conditions. The SGRS provides an orderly procedure for reservoir filling to help prevent sudden releases when normal maximum water surface elevation is reached. The SGRS, which expresses release in terms of either hourly reservoir elevation rise or reservoir inflow, is utilized by the USACE to determine the maximum release rate during large floods. Although the SGRS is primarily designed to guide the reservoir releases during large floods, it is also routinely checked for guidance during medium and large floods.

The SGRS computation determines the minimum release on an hourly basis. The SGRS uses the current reservoir elevation and either the estimated inflow or the increase in reservoir elevation during the previous hour to determine the release for the current hour. The schedule based upon inflow is the primary schedule. The schedule based upon increase in reservoir elevation is only used if no reliable estimate of inflow is available.

Diablo and Gorge developments do not contribute to the 120,000 acre-feet of flood storage in the Skagit River Project. Although no flood storage is provided, both of these developments operate to support the flood risk management at Ross Development including, at times, preemptive drawdown of Diablo and Gorge lakes to provide additional storage. City Light operates to avoid drafting storage at Diablo and Gorge during a flood event to avoid increasing Skagit River flood releases unnecessarily. When Diablo and/or Gorge reservoirs approach normal maximum water surface due to local inflow or Ross outflow, City Light coordinates with the Reservoir Control Center to establish a release schedule.

2.3.4 Critical Flow Months

The lowest average inflows to the Project occur in the months of August, September, and October; however, the dependable capacity at the Project is not limited by critical streamflow, as the Skagit

River Project is operated pursuant to the terms of the current Project license and the parameters set forth in the FSA Flow Plan with water supplied by the storage in Ross Lake.

2.4 Project Operation During Adverse, Average and High Inflow Years

In general, City Light proposes to continue operating the Project in a manner similar to the aforementioned current operations under the existing license during adverse, mean, and high flow water years. City Light monitors current and forecasted load demands, reservoir elevations, available storage, and weather/inflow data to determine effective operation of the generating stations and to balance the resource interests associated with the Project. City Light operates the Project pursuant to the terms of the existing Project license and the parameters set forth in the FSA Flow Plan, and to comply with Details of Regulation for Use of Storage Allocated for Flood Control in Ross Reservoir, Skagit River, WA (USACE 1967), which is incorporated into the Project license by reference. This document was updated in 2002 and provides the current guidance for Project operations for flood risk management. The FSA is one of eight settlement agreements the Commission approved when it issued a new license for the Skagit River Project on May 16, 1995. The FSA Flow Plan establishes requirements for flows downstream of Gorge Powerhouse; flow releases and limits protect salmon and steelhead spawning, egg incubation and juvenile rearing; operations during dry water (adverse) years and periods of flooding (high water); advance scheduling of hourly generation; field monitoring; and measures for steelhead production, Chinook Salmon research, Chum Salmon habitat, sediment reduction, and trout protection and production.

Figures 2.4-1 through 2.4-3[5] show the minimum, average, maximum and the high inflow year 2003 historical water surface elevations, total inflow, and total release for Ross, Diablo and Gorge developments.

[5] If the water surface elevation of Gorge Lake is drawn down below the normal minimum operating water surface elevation of 873.51 feet NAVD 88 (867 feet CoSD), City Light's Project Fish Biologists will be contacted within 48 hours to conduct a stranding/entrapment assessment.

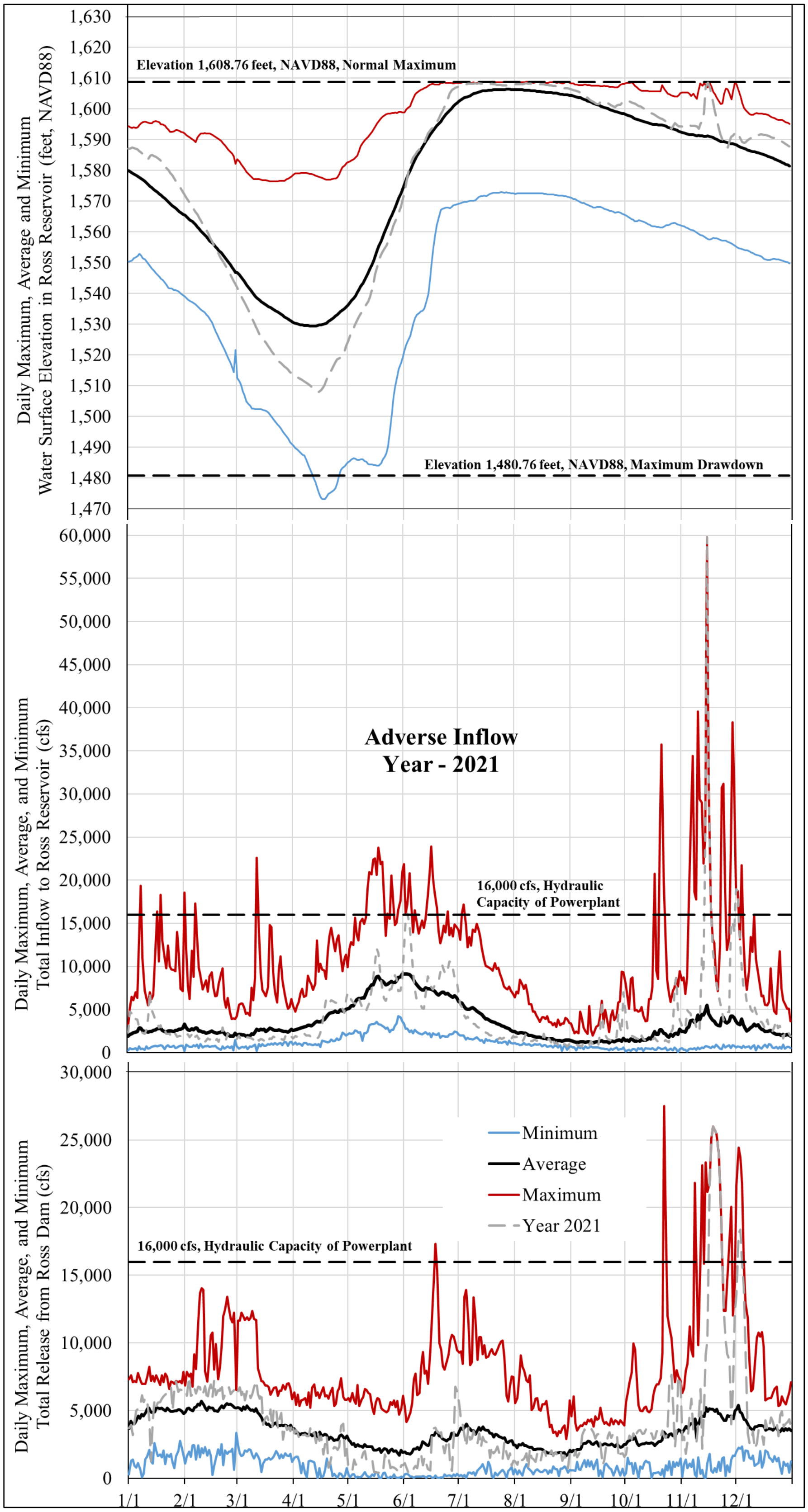

Figure 2.4-1. Ross Lake operations (1988-2021).

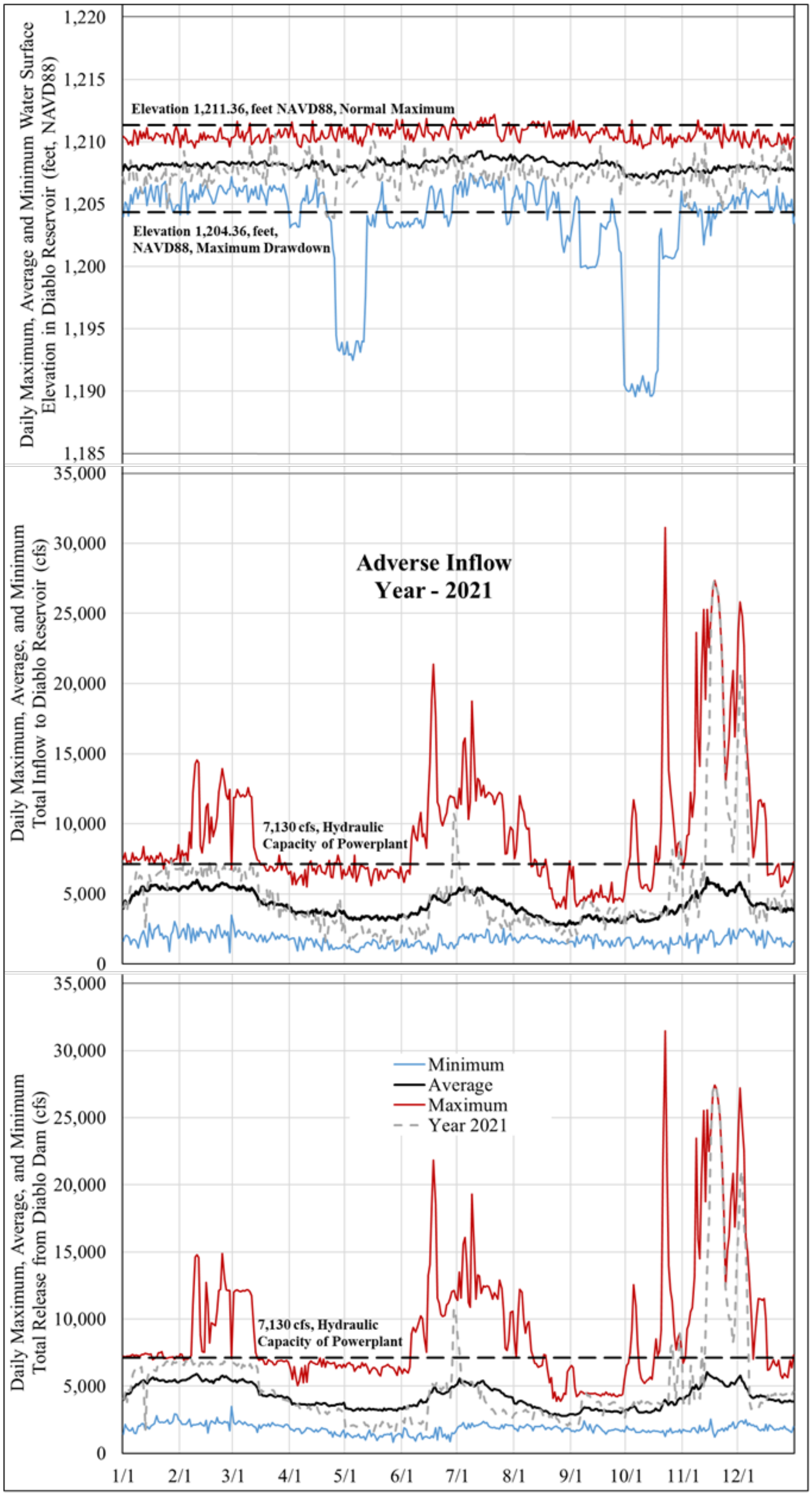

Figure 2.4-2. Diablo Lake operations (1988-2021).

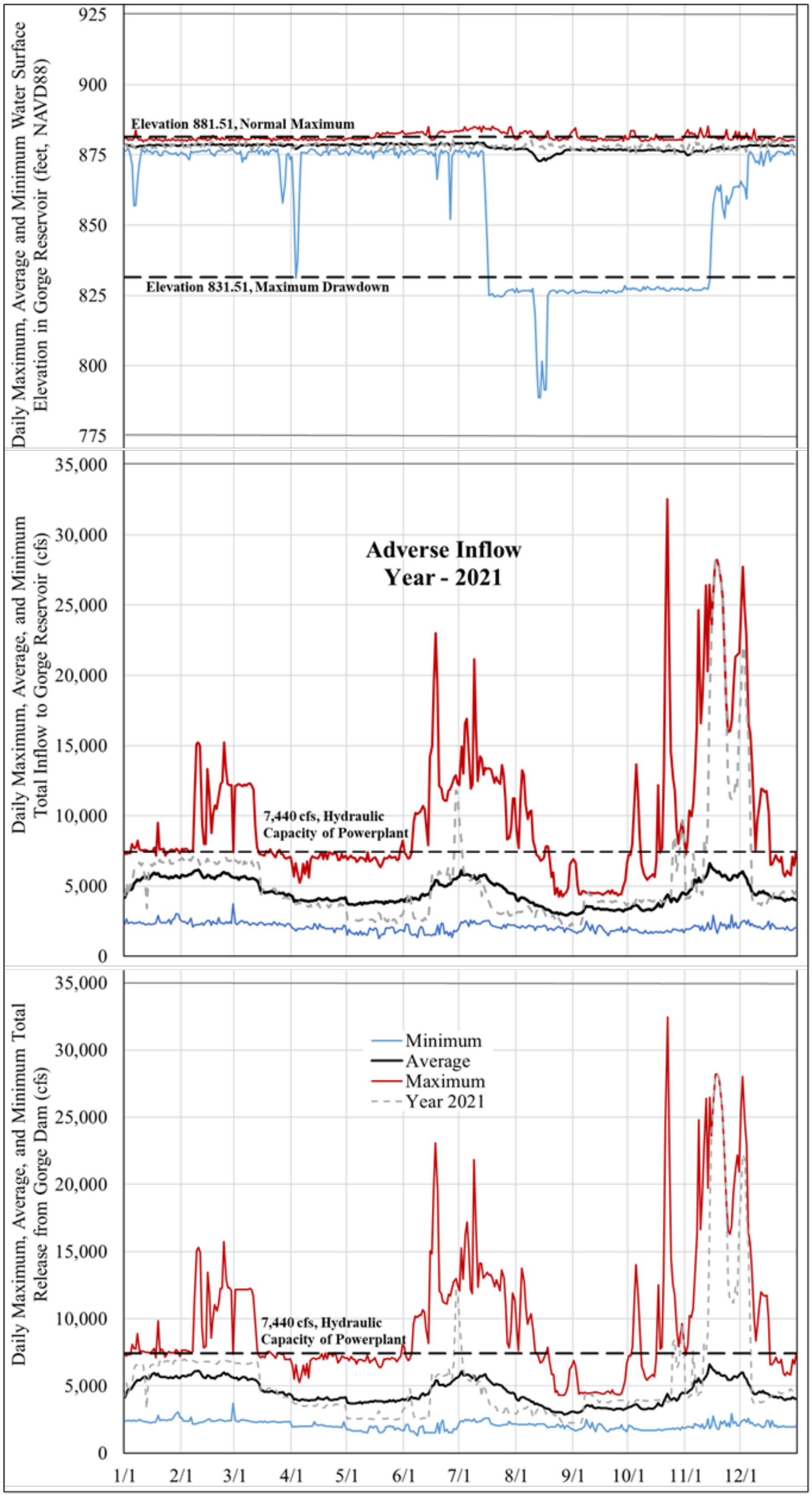

Figure 2.4-3. Gorge Lake operations (1988-2021).

2.5 Flow Duration Curves

The monthly total inflow and outflow duration curves for the three Project developments are provided in Appendix B of this Exhibit B, tabular data of the monthly and annual total inflow and outflow summaries for the Project are provided in Tables 2.3-1 through 2.3-6. These curves are based on the estimated inflow and outflow from January 1, 1988 through December 31, 2021 as described in Section 2.3 of this Exhibit B.

Utilizing this hydrology for the period January 1, 1988 through December 31, 2021, the maximum estimated daily average total inflow to Ross Lake was approximately 59,800 cfs on November 15, 2021, and the minimum daily average total inflow was approximately 60 cfs on October 30, 1991 (Table 2.5-1). The maximum estimated daily average total outflow from Ross Lake was approximately 27,500 cfs on October 22, 2003, and the minimum daily average total outflow was associated with days of no powerhouse release (Table 2.5-2).

Table 2.5-1. Ross Lake total inflow data (1988-2021).

Month	Average (cfs)	Minimum (cfs)	90% Exceedance (cfs)	10% Exceedance (cfs)	Maximum (cfs)
January	2,515	242	1,128	4,400	19,333
February	2,420	199	1,142	4,423	18,590
March	2,413	199	1,218	3,923	22,596
April	3,769	672	1,647	6,344	14,487
May	7,406	1,410	3,555	12,296	23,746
June	7,460	1,729	3,452	12,278	23,900
July	4,118	931	1,720	8,026	17,146
August	1,780	218	979	2,895	8,465
September	1,276	263	698	1,906	9,347
October	1,835	60	611	3,368	35,717
November	3,714	151	986	7,239	59,777
December	2,653	249	1,039	4,660	21,715
Annual	***3,448***	***60***	***1,003***	***7,558***	***59,777***

Table 2.5-2. Ross Lake total outflow data (1988-2021).

Month	Average (cfs)	Minimum (cfs)	90% Exceedance (cfs)	10% Exceedance (cfs)	Maximum (cfs)
January	4,810	69	2,707	6,630	8,246
February	5,235	245	2,925	6,841	14,052
March	4,429	469	2,177	6,558	12,377
April	3,167	5	1,545	4,904	7,376
May	2,219	2	527	4,362	6,892
June	2,662	13	455	5,581	17,336
July	3,321	18	1,193	6,211	13,933
August	2,093	174	992	3,204	9,086
September	2,416	56	1,381	3,482	6,047

Month	Average (cfs)	Minimum (cfs)	90% Exceedance (cfs)	10% Exceedance (cfs)	Maximum (cfs)
October	2,861	14	1,441	4,306	27,494
November	4,454	53	1,962	7,270	25,976
December	3,902	329	2,297	5,066	24,445
Annual	***3,466***	***2***	***1,251***	***6,094***	***27,494***

Utilizing this hydrology for the period January 1, 1988 through December 31, 2021, the maximum estimated daily average total inflow to Diablo Lake was approximately 31,100 cfs on October 22, 2003, and the minimum daily average total inflow was approximately 700 cfs on June 17, 2001 (Table 2.5-3). The maximum estimated daily average total outflow from Ross Lake was approximately 31,500 cfs on October 22, 2003, and the minimum daily average total outflow was approximately 810 cfs on May 27, 1993 (Table 2.5-4).

Table 2.5-3. Diablo Lake total inflow data (1988-2021).

Month	Average (cfs)	Minimum (cfs)	90% Exceedance (cfs)	10% Exceedance (cfs)	Maximum (cfs)
January	5,185	888	3,116	6,909	8,486
February	5,553	805	3,330	7,129	14,549
March	4,733	1,542	2,441	6,837	12,590
April	3,665	920	2,037	5,332	7,740
May	3,297	847	1,729	5,310	7,759
June	4,185	714	1,871	7,138	21,373
July	4,904	1,370	2,489	8,060	18,758
August	3,272	1,428	2,064	4,507	11,983
September	3,147	1,096	2,157	4,157	6,944
October	3,449	744	2,012	4,916	31,131
November	5,131	757	2,576	8,233	27,358
December	4,275	1,135	2,600	5,403	25,839
Annual	***4,230***	***714***	***2,197***	***6,637***	***31,131***

Table 2.5-4. Diablo Lake total outflow data (1988-2021).

Month	Average (cfs)	Minimum (cfs)	90% Exceedance (cfs)	10% Exceedance (cfs)	Maximum (cfs)
January	5,179	1,440	3,133	6,863	7,569
February	5,553	1,514	3,286	6,979	14,857
March	4,737	1,544	2,407	6,737	12,185
April	3,661	1,220	2,081	5,199	7,109
May	3,269	814	1,762	5,214	6,759
June	4,154	887	1,890	6,878	21,831
July	4,901	1,794	2,520	7,927	19,297
August	3,270	1,593	2,129	4,390	12,199

Month	Average (cfs)	Minimum (cfs)	90% Exceedance (cfs)	10% Exceedance (cfs)	Maximum (cfs)
September	3,149	1,417	2,200	4,130	6,528
October	3,436	1,236	2,140	4,636	31,471
November	5,122	1,215	2,657	8,257	27,440
December	4,280	1,563	2,702	5,281	27,201
Annual	***4,224***	***814***	***2,222***	***6,590***	***31,471***

Utilizing this hydrology for the period January 1, 1988 through December 31, 2021, the maximum estimated daily average total inflow to Gorge Lake was approximately 32,500 cfs on October 22, 2003, and the minimum daily average total inflow was approximately 1,300 cfs on May 18, 2001 (Table 2.5-5). The maximum estimated daily average total outflow from Gorge Lake was approximately 32,500 cfs on October 22, 2003 cfs, and the minimum daily average total outflow was approximately 1,300 cfs on June 8, 1988 (Table 2.5-6).

Table 2.5-5. Gorge Lake total inflow data (1988-2021).

Month	Average (cfs)	Minimum (cfs)	90% Exceedance (cfs)	10% Exceedance (cfs)	Maximum (cfs)
January	5,453	2,254	3,411	7,048	9,526
February	5,801	2,084	3,563	7,234	15,231
March	4,959	2,118	2,627	6,991	12,286
April	4,012	1,668	2,402	5,499	7,416
May	3,815	1,268	2,247	5,871	8,241
June	4,704	1,324	2,329	7,576	23,005
July	5,307	1,961	2,824	8,574	21,152
August	3,466	1,721	2,233	4,635	13,264
September	3,294	1,474	2,348	4,283	6,922
October	3,714	1,620	2,343	5,080	32,542
November	5,567	1,619	2,960	9,593	28,248
December	4,502	1,848	2,915	5,505	27,716
Annual	***4,545***	***1,268***	***2,490***	***6,922***	***32,542***

Table 2.5-6. Gorge Lake total outflow data (1988-2021).

Month	Average (cfs)	Minimum (cfs)	90% Exceedance (cfs)	10% Exceedance (cfs)	Maximum (cfs)
January	5,452	2,230	3,412	7,043	9,872
February	5,800	2,176	3,601	7,247	15,719
March	4,959	2,272	2,597	6,999	12,272
April	4,012	1,920	2,382	5,522	7,484
May	3,812	1,499	2,268	5,861	8,103
June	4,703	1,316	2,317	7,504	23,085
July	5,311	2,044	2,807	8,513	21,829

Month	Average (cfs)	Minimum (cfs)	90% Exceedance (cfs)	10% Exceedance (cfs)	Maximum (cfs)
August	3,465	1,788	2,220	4,658	13,754
September	3,294	1,587	2,362	4,285	6,867
October	3,713	1,678	2,324	5,015	32,446
November	5,563	1,756	2,956	9,434	28,219
December	4,502	1,897	2,974	5,507	28,047
Annual	***4,544***	***1,316***	***2,478***	***6,895***	***32,446***

2.6 Additional Relevant Operational Requirements

In addition to the descriptions in Sections 2.3.3 and 2.4 of this Exhibit B, there are a number of additional requirements/details on Skagit River Project operations. Flows in the Skagit River downstream of Gorge Powerhouse are determined by the Revised FSA Flow Plan as amended in 2011. The primary purpose of the Flow Plan was to minimize the effects of Project operations on salmon and steelhead. The measures included in the Flow Plan were developed based on extensive research on the effects of Project operations on fish and by hydrological and operational modeling (Pflug and Mobrand 1989). The Flow Plan also established a Flow Plan Coordinating Committee (FCC), which consists of representatives from the Indian Tribes and Washington Department of Fish and Wildlife (WDFW), to address and approve any deviations from the planned flow measures needed to respond to changing conditions (i.e., flow insufficiency or flood flows). The revised Flow Plan in the FSA included four measures that City Light had been implementing voluntarily since 1995 to reduce Project effects on steelhead and salmon. The four flow measures implemented in the revised Project license are as follows:

- Chum Salmon spawning default start date of November 1.
- Salmon fry stranding protection will start on January 1 instead of February 1.
- Down-ramping rates below the Gorge Dam are limited to under 3,000 cfs per hour from October 16 to December 31 each year.
- November/December Chum Salmon minimum incubation flows will be increased.

The specific flow measures in the Project license are described below in detail by species and life stage.

2.6.1 Salmon Spawning and Redd Protection

The primary means of protecting spawning salmon and redds downstream of the Project are to: (1) limit maximum flow levels during spawning to minimize redd building along the edges of the river in areas exposed by daily load following generation; and (2) maintain minimum flows throughout the incubation period to keep redds covered until the fry emerge.

The Revised FSA Flow Plan identifies anticipated spawning periods for each species which are based on historic habitat use data collected by resource agencies and Indian Tribes. The spawning periods and maximum average daily flows for each species as identified in the Revised FSA Flow Plan are as follows:

- Chinook Salmon – August 20 through October 15, each year.
- Pink Salmon – September 12 through October 31, odd years.
- Chum Salmon – November 1 through January 6, each year.

During the spawning period of each salmon species, daily average flows may not exceed 4,500 cfs for Chinook Salmon, 4,000 cfs for Pink Salmon, and 4,600 cfs for Chum Salmon unless: (1) the flow forecast made by City Light shows a sufficient volume of water will be available to sustain a higher incubation flow, thereby permitting a higher spawning flow; or (2) uncontrollable flow conditions are present. The seasonal spawning flow for each species is defined as the average of the highest ten daily spawning flows at the Newhalem gage (USGS 12178000) during the spawning period of that species.

In addition, the current Project license requires City Light to provide minimum flows, which are dependent on spawning flows, during the salmon incubation period. For purposes of this requirement, incubation is presumed to begin on the first day of the spawning period identified for each species and end on April 30 for Chinook and Pink Salmon, and May 31 for Chum Salmon. As a result, instantaneous minimum flows are provided from August 20 through May 31 each year (see Appendix C of the Revised FSA; City Light 2011). Incubation and spawning periods can be reduced or extended based on field monitoring results, in coordination with the Flow Plan Coordinating Committee.

2.6.2 Salmon Fry Protection

The salmon fry protection period specified in the Revised FSA Flow Plan is January 1 through May 31, which is when salmon fry are emerging from redds and may be subject to stranding on gravel bars (Pflug and Mobrand 1989). Stranding refers to entrapment and death of juvenile salmonids on gravel bars that become exposed (dry) when the river drops rapidly in response to operational changes from a hydroelectric project. The vulnerability of salmonid fry to stranding depends on several biological, temporal, and physical factors, in addition to hydroelectric project operational factors. Streamflow properties include the river's height (stage) in relation to a specific habitat and the rate at which the stage changes in response to streamflow changes. Operational factors control changes in streamflow, which reflect electrical power requirements.

To minimize fry stranding, the Project license requires City Light to limit daily down-ramp amplitude; maintain minimum flows throughout the salmon fry protection period that are adequate to cover gravel bar areas commonly inhabited by salmon fry; and limit down-ramping to nighttime hours except in periods of high flow, as follows:

- Down-ramp Amplitude –The down-ramp amplitude will not exceed 3,000 cfs from January 1 through January 31 and 4,000 cfs from February 1 through May 31.
- Down-ramping Rate – Maximum down-ramping rate as measured at Newhalem gage is restricted to the following two conditions:
  - Daytime – Between six and a half hours prior to sunrise and sunset, no down-ramping is allowed from the moment when the flow at Marblemount gage (USGS 12181000) is predicted to be ≤ 4,700 cfs. Down-ramping may proceed at a rate of up to 1,500 cfs per hour as long as the flow at Marblemount is predicted to be > 4,700 cfs.

- Nighttime – During periods other than daytime as specified above, down-ramping is allowed at a rate up to 3,000 cfs per hour.

- Salmon Fry Protection Release – To maintain a predicted Marblemount gage flow of 3,000 cfs during the salmon fry protection period, the Project must release up to 2,600 cfs as measured at the Newhalem gage.

2.6.3 Steelhead Spawning and Redd Protection

As is done for salmon, the primary means of protecting spawning steelhead and redds downstream of the Project are to: (1) limit maximum flow levels during spawning to minimize redd building along the edges of the river in areas exposed by daily load following generation; and (2) maintain minimum flows throughout the incubation period to keep redds covered until the fry emerge.

Measures to protect spawning steelhead and redds downstream of the Project include limiting maximum flow levels during spawning, shaping daily flows for uniformity over the extended spawning period, and maintaining minimum flows through the incubation period adequate to keep redds covered until fry emerge from the gravel. To protect eggs and embryos from dewatering, the measures in the Revised FSA Flow Plan substantially reduce the difference between spawning and incubation flows, thus decreasing the area of river channel subjected to dewatering.

The steelhead spawning period specified in the Revised FSA Flow Plan is from March 15 – June 15 each year. This spawning period is divided into three sub-periods: March 15 – 31, April 1 – 30, and May 1 – June 15. Each sub-period is treated separately for the purpose of determining succeeding steelhead spawning and incubation flows. Planned flows may not exceed 5,000 cfs for March steelhead, 5,000 cfs for April steelhead, and 4,000 cfs for May – June 15 steelhead, unless the forecasted inflow and storage is great enough to provide incubation flows that are at least as high as required by the spawning flows. As stipulated in the Revised FSA Flow Plan, any planned spawning flows greater than these flow ranges are not to be implemented without prior discussion with the FCC. The actual spawning flow for each sub-period is defined as the average of the ten highest daily spawning flows at the Newhalem gage during that sub-period.

The incubation periods for each steelhead spawning group starts on the first day of the spawning sub-periods and ends on June 30 for March steelhead and July 31 for both April steelhead and May – June 15 steelhead. An instantaneous minimum incubation flow for each day of the incubation period is provided as follows:

- Incubation flows during the first ten days of each spawning sub-period are based on the planned spawning flow.
- Thereafter, daily incubation flows are based on the average of the highest ten daily spawning flows that have occurred up to that day. Appropriate incubation flows for any given day are determined by the season spawning flows in Appendix G of the Revised FSA Flow Plan (City Light 2011).
- During the month of August, the instantaneous daily minimum flow at Newhalem gage is 2,000 cfs, though this is reduced to 1,500 cfs when flow insufficiency provisions are in effect (see Revised FSA Flow Plan, Section 6.4; City Light 2011).

2.6.4 Steelhead Fry Protection

Newly emerged steelhead fry are protected from potential stranding by limiting daily down-ramp amplitudes and rates and by maintaining minimum flows from June 1 – October 15 adequate to cover gravel bar areas commonly inhabited by steelhead fry. Implementation details include:

- Down-ramp Amplitude – The maximum 24-hour, down-ramp amplitude is limited to 3,000 cfs when natural flows at the Newhalem gage are > 4,000 cfs. When natural flows at Newhalem gage are ≤ 4,000 cfs, the down-ramp amplitude is limited to 2,000 cfs per day from June 1 – August 31 and to 2,500 in September and October. During the month of August, down-ramp amplitude is further restricted to 500 cfs per day when flow insufficiency provisions are in effect (see Revised FSA Flow Plan, Section 6.4; City Light 2011).
- Down-ramping Rate – When the Newhalem instantaneous natural flow is ≤ 4,000 cfs, the allowed down-ramp rate is up to 500 cfs per hour. When the Newhalem instantaneous flow remains >4,000 cfs, a down-ramp rate of up to 1,000 cfs per hour is allowed.
- Steelhead Fry Protection Flow – Minimum instantaneous flows at the Newhalem gage must be the higher of flows specified in Appendix I of the Revised FSA Flow Plan (City Light 2011; Table 2.6-1) or by required steelhead incubation flows. During the portions of June and October excluded from the steelhead fry protection period, minimum flows are determined by required salmon incubation flows.

Table 2.6-1. Fry protection at Newhalem gage.

Month	Minimum Sufficient Instantaneous Flow (cfs)[1]
January	[2]
February	1,800
March	1,800
April	1,800
May	1,500
June	1,500
July	1,500
August	2,000
September	1,500
October	1,500
November	[2]
December	[2]

1 Minimum flow may be reduced to 1,500 cfs when natural flow on the inflow day is less than 2,300 cfs (Section 6.3.3.2 (3) of the Revised FSA Flow Plan).

2 Minimum flows in these months are determined by incubation flow requirements.

2.6.5 Steelhead and Chinook Salmon Yearling Protection

To protect steelhead and Chinook Salmon yearlings from stranding and to minimize local displacement from foraging habitats, down-ramp rates are limited to <3,000 cfs per hour from October 16 through December 31 each year.

2.6.6 Other Flow Management Measures

The Revised FSA Flow Plan recognizes that some impact to anadromous fish spawning, incubation, and rearing may occur notwithstanding the protection measures described above, particularly when uncontrollable flow events occur (City Light 2011). In addition to the downstream flow requirements, it was recognized that specific voluntary actions may be needed to better protect salmon and steelhead spawning areas, redds, and fry as a result of new information on the effects of flows on spawning, incubation, and fry survival. These voluntary actions are cooperatively developed through the FCC, which considers Project system flexibility, economic ramifications, and potential effects to all anadromous species and life stages at a given time. Critical data considered include tributary inflows between Newhalem and Marblemount and field monitoring of redd locations. Implementation of voluntary actions typically involves development of a proposed action by City Light during or at the end of the spawning season for each species (or spawning group in the case of steelhead) and whenever uncontrollable flow events occur during the spawning, incubation, and rearing periods. The proposal is then presented to the FCC for review and discussion to reach consensus on a plan of action.

2.7 Transmission of Generated Electricity

The Project Boundary includes 312.93 circuit miles of primary transmission lines connecting the Project to the bulk electrical grid. The lines terminate at Bothell Substation, just north of Seattle, in Snohomish County; the substation is located partially within the Project Boundary. The other substation associated with the lines is North Mountain, outside of the town of Darrington, which is jointly owned by City Light and Snohomish Public Utility District and began operations in 1991. This substation gives City Light the ability to interconnect with other utilities to balance regional supply and demand, if needed. While the North Mountain Substation is not a Project facility and is not within the current Project Boundary, City Light is proposing to adjust the Project Boundary under the new license to include a spur and point of interconnection at the North Mountain Substation.

The Project transmission lines are primarily on double-circuit steel lattice towers, although a few towers have been replaced with monopoles. From Ross Powerhouse to Bothell Substation, the right-of-way (ROW) is approximately 100 miles long and ranges from 150 to 400 feet wide. The various components of this system are described below and shown in the single-line diagram included with Exhibit F of this FLA (F-14 through F-19).

- From Ross Powerhouse, two 230-kV transmission lines (R1 and R2) run for 3.84 and 3.87 miles, respectively, along the west side of Diablo Lake, down the hillside past Diablo Dam to Diablo Switchyard.
- The 230-kV Diablo Switchyard is adjacent to Diablo Powerhouse and serves to connect the Ross, Diablo, and Gorge developments into the Skagit transmission system. The R1 and R2 lines from Ross terminate at the switchyard.
- From Diablo Switchyard, one 230-kV line (D4) runs for 5.81 miles and terminates at Gorge Switchyard, located just across the river from Gorge Powerhouse. The other three lines (D1, D2, and D3) run 87.58, 87.61, and 87.54 miles, respectively, to the Bothell Switching Substation.

- From the Gorge Switchyard, a single 230-kV line (GO-NM) runs 36.77 miles to the North Mountain Substation.

From Gorge Switchyard to North Mountain Substation, the D1, D2, D3, and GO-NM lines are mostly within the same ROW, although there are a few sections where the ROW splits, with two lines in each, due to topographical constraints.

3.0 EXISTING RESOURCE UTILIZATION

The Ross Development's generating Units 42, 43 and 44 each have a turbine rated at 120,000 horsepower (hp; 91,875 kilowatt [kW]) connected to a generator rated at 112,500 kW, and Unit 41 has a turbine rated at 120,000 hp (76,875 kW) connected to a generator rated at 112,500 kW. The Diablo Development's generating Units 31 and 32 each have a turbine rated at 117,200 hp (78,035 kW) connected to a generator rated at 90,000 kW, and Units 35 and 36 each have a turbine rated at 2,200 hp (1,200 kW) connected to a generator rated at 1,200 kW. Gorge Development's generating Units 21 and 22 each have a turbine rated at 51,850 hp (31,500 kW) connected to a generator rated at 36,860 kW, Unit 23 has a turbine rated at 45,000 hp (30,200 kW) connected to a generator rated at 36,860 kW, and Unit 24 has a turbine rated at 147,500 hp (96,100 kW) connected to a generator rated at 97,000 kW. The Project's total authorized installed capacity is 700,270 kW (700.27 megawatt [MW]), based on current turbine ratings and total generating installed capacity of approximately 839,980 kW (840 MW).[6]

To provide a consistent comparison among existing and alternate operations, hourly energy production (megawatt hours [MWh]) was simulated by the Skagit Operations Model. The Skagit Operations Model describes and simulates existing Project operations for purposes of relicensing, which can be used to simulate potential future operations under a variety of operating scenarios.

Utilizing a daily average inflow as primary input, the Skagit River Project Operations Model simulates operations to allocate water between reservoir storage and required outflow constraints (physical, environmental, and operational) while permitting generation. The Skagit Operations Model encompasses an inflow dataset, including streamflows into Ross Lake, incremental inflows to Diablo and Gorge lakes, as well as incremental flows to nodes along the Skagit River downstream of the Gorge Development. The Gorge Development includes Gorge Powerhouse as well as the Gorge spillway, so the analysis is inclusive of flows through both. Flows from the Gorge spillway flow into the Gorge bypass reach. The Skagit Operations Model includes characteristics of the three Project reservoirs' powerhouses and water conveyance structures, as well as incremental tributary flows and hydraulic relationships at select nodes along the Skagit River. The Skagit Operations Model is intended to be used as a tool to assist in evaluating water quantity distribution between the available water conveyances due to changes in model inputs, including various operational modifications and physical plant modifications.

The estimated total average annual energy produced at the Project based on simulated operations for the period January 1, 2012 through December 31, 2021, which is the period since the implementation of the Revised FSA Flow Plan (City Light 2011), is approximately 2,848,300 MWh (Table 3.0-1). The actual average annual energy produced by the Project for the same period was approximately 2,493,200 MWh, which is a 14.2-percent difference relative to the estimated total average annual generation. Because the Skagit Operations Model is consistent in applying logic and unit optimization to historical inflows, the Operations Model does not exactly reproduce the historic day-to-day energy production due to variations in load demand, weather, operation and maintenance activities, emergency operations, and other operational decisions. As outlined in the

6 Project specification values presented herein are those approved by the February 2, 2021 Order Amending License, Approving Revised Exhibits K and M, and Revising Annual Charges (174 FERC ¶ 62,066), and updated, as appropriate.

Skagit Operations Model Logic and Validation Report (City Light 2023), the simulated baseline (BaselineR3) scenario, which will be the basis for comparison of subsequent Skagit Operations Model scenarios, varies more from historical generation than the Verification scenarios, as this Baseline scenario assumes default unit dispatching and does not include historical unit outages.

Table 3.0-1. Skagit River Project average monthly and total annual generation (in MWh), modeled and actual (2012-2021).

Month	Historical Average	Simulated Average
January	265,051	309,936
February	259,974	303,602
March	247,319	301,308
April	180,492	203,370
May	162,036	162,281
June	208,849	259,807
July	213,799	259,446
August	131,994	138,303
September	169,587	171,773
October	194,147	205,508
November	228,165	269,323
December	231,823	263,641
Total	2,493,235	2,848,297

The simulated total average annual generation for the baseline scenario (BaselineR3) for the full period of record (1988-2021) is 2,633,456 MWh.

3.1 Description of Plant Control

The three Skagit generating developments – Ross, Diablo and Gorge – are hydraulically coordinated to act as a single project. Routine operation of the Project is controlled remotely by City Light's System Operating Center (SOC) in Seattle, but during high flow events some spillway gates must be operated manually.

The Skagit River Project employs a large and diverse staff, which varies over time due to hiring, retirements, and seasonal variations; there are currently 92 full time staff positions on site. The senior operations manager is assisted by an operations generation supervisor, electrical generation supervisor, mechanical generation supervisor, and maintenance manager; additionally, there is a broad support staff for administration, safety, engineering, hospitality, groundskeeping, etc. The Project generation plants are typically staffed one shift per day (6:00 a.m. to 4:30 p.m.), seven days a week by hydroelectric operators. Generation Supervisors are available 24/7 and are called out by the SOC when needed. Technical personnel working on the Project in different categories are as follows:

- Hydroelectric operators 10, including generation supervisor
- Hydroelectric maintenance machinists 9, including supervisor

- Electrical constructors 11, plus 3 communication electricians
- Structural iron workers 3
- Structural painters 4
- Power structures mechanics/truck drivers 4
- Others who may support plant work 20+

For holidays, one hydroelectric operator may cover all three plants.

3.2 Estimate of Annual Plant Factor

The estimated annual plant factor based on the historical average annual gross energy produced during 2012 through 2021 and the authorized installed capacity of each Project is provided in Table 3.2-1. The annual plant factor was estimated based on the total average annual energy production divided by the plant installed capacity divided by the number of hours per year (8,760 hours).

Table 3.2-1. Estimated annual plant factor during 2012 through 2021.

	Ross	Diablo	Gorge	Project Total
Average Annual Gross Energy (MWh)	737,448	774,780	981,008	2,493,235
Total authorized installed capacity (MW)	352.5	158.47	189.3	700.27
Plant Factor	0.24	0.56	0.59	0.41

3.3 Estimate of Dependable Capacity

The dependable capacity at the Project is not limited by critical streamflow as the Skagit River Project is operated pursuant to the terms of the current Project license and the parameters set forth in the FSA with water supplied by the storage in Ross Lake. The Skagit River Project's dependable capacity is 805.4 MW.

3.4 Rule Curve

3.4.1 Ross Development

Ross Lake is the primary storage for the Project and is drawn down in winter to capture water from spring runoff and to provide for downstream flood risk management, instream flows to protect anadromous fishery resources downstream of the Gorge Powerhouse, recreation, and hydropower generation. Ross Lake operations include a number of compliance requirements outlined in detail in the existing Project license and also included in Exhibit E of this FLA. This includes operating to the flood control curve and the Ross Lake Spawning Control Curve as specified in Appendix E of the FSA Flow Plan (City Light 2011). Under existing operations, Ross Lake is drawn down on a yearly basis during winter in order to capture flows from spring runoff and to provide for downstream flood risk management as described by the flood control curve (USACE 2002). The drawdown typically begins the Tuesday after Labor Day and continues until the lake reaches its lowest level in late March or early April. Article 301 of the existing Project license requires City

Light to draw down Ross Lake to a level that provides 60,000 acre-feet of storage for flood risk management by November 15 and 120,000 acre-feet by December 1 and to maintain this available storage through March 15. The reservoir fluctuates between elevation 1,608.76 feet NAVD 88 (1,602.5 feet CoSD) in the summer and elevation 1,535 feet NAVD 88 (1,528.74 feet CoSD) in late March/early April. Figure 3.4-1 show the historical Ross Lake elevations as reported by the USGS gage at Ross Reservoir near Newhalem as well as the current flood risk management elevations which are defined by the flood control curve (USACE 2002).

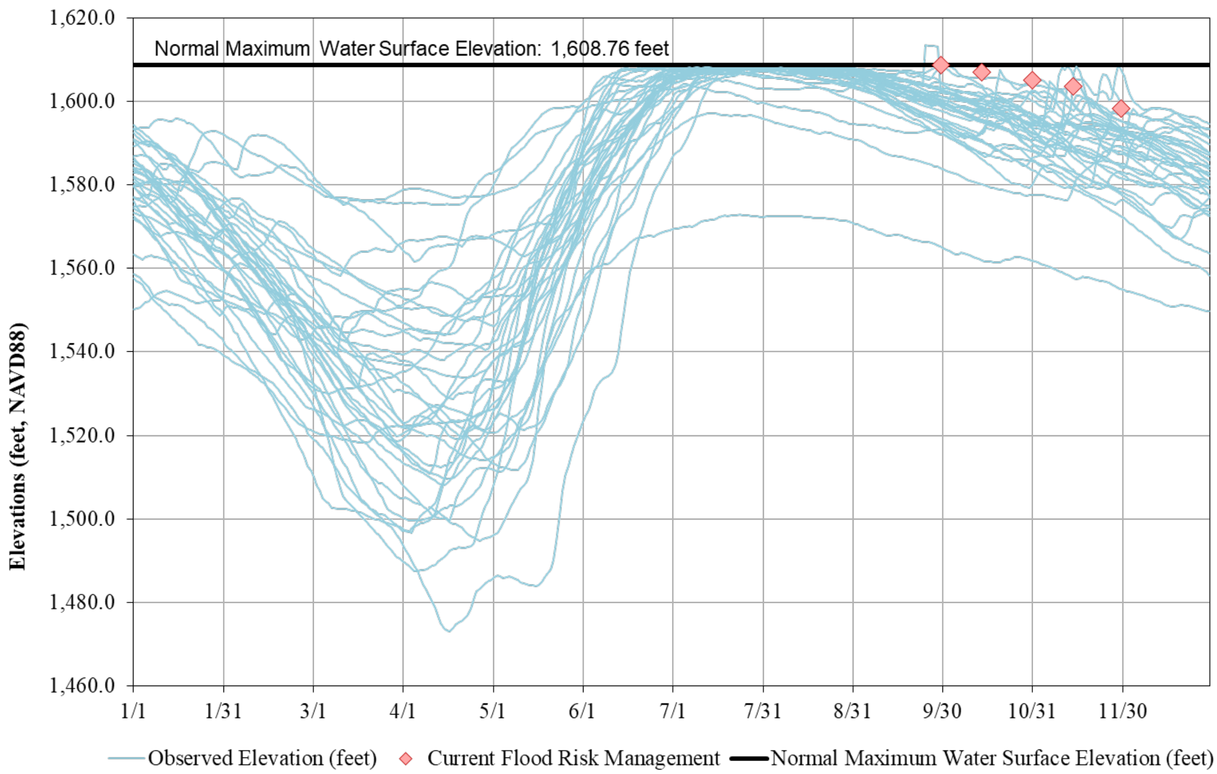

Figure 3.4-1. Ross Lake observed elevations (1988-2021).

3.4.2 Diablo Development

The primary function of Diablo Lake is to reregulate flows between the Ross and Gorge developments. The lake typically fluctuates 4-5 feet daily although drawdowns of 10-12 feet occur occasionally as needed for construction projects or maintenance. The reservoir typically fluctuates between elevation 1,211.36 feet NAVD 88 (1,205 feet CoSD) and elevation 1,204.36 feet NAVD 88 (1,198 feet CoSD).

3.4.3 Gorge Development

The primary function of Gorge Lake is to regulate downstream flows for fish protection. The reservoir typically fluctuates roughly between elevation 881.51 feet NAVD 88 (875 feet CoSD) and elevation 831.51 feet NAVD 88 (825 feet CoSD). Flows from the Gorge Development are critical for fish protection in the Skagit River. To comply with the requirements of the FSA Flow

Plan (City Light 2011), City Light operates Gorge Lake and Powerhouse in coordination with Ross and Diablo lakes to provide a continuous, stable flow regime in the upper Skagit River with minimum and maximum flows into the mainstem Skagit River downstream of Gorge Powerhouse as outlined in the FSA Flow Plan (City Light 2011).

3.5 Tailwater Rating Curve

3.5.1 Ross Development

The tailwater of the Ross Powerhouse is controlled by the water surface elevation of Diablo Lake. A tailwater curve was estimated from City Light hourly operations records for use within the Skagit Operations Model and documented in the Skagit Operations Model and Logic Validation Report (City Light 2023). The tailwater rating curve relates the powerhouse tailrace water surface elevation to the powerhouse and river outflow. The Ross Powerhouse tailwater curve estimated based on City Light hourly operations records is shown in Figure 3.5-1.

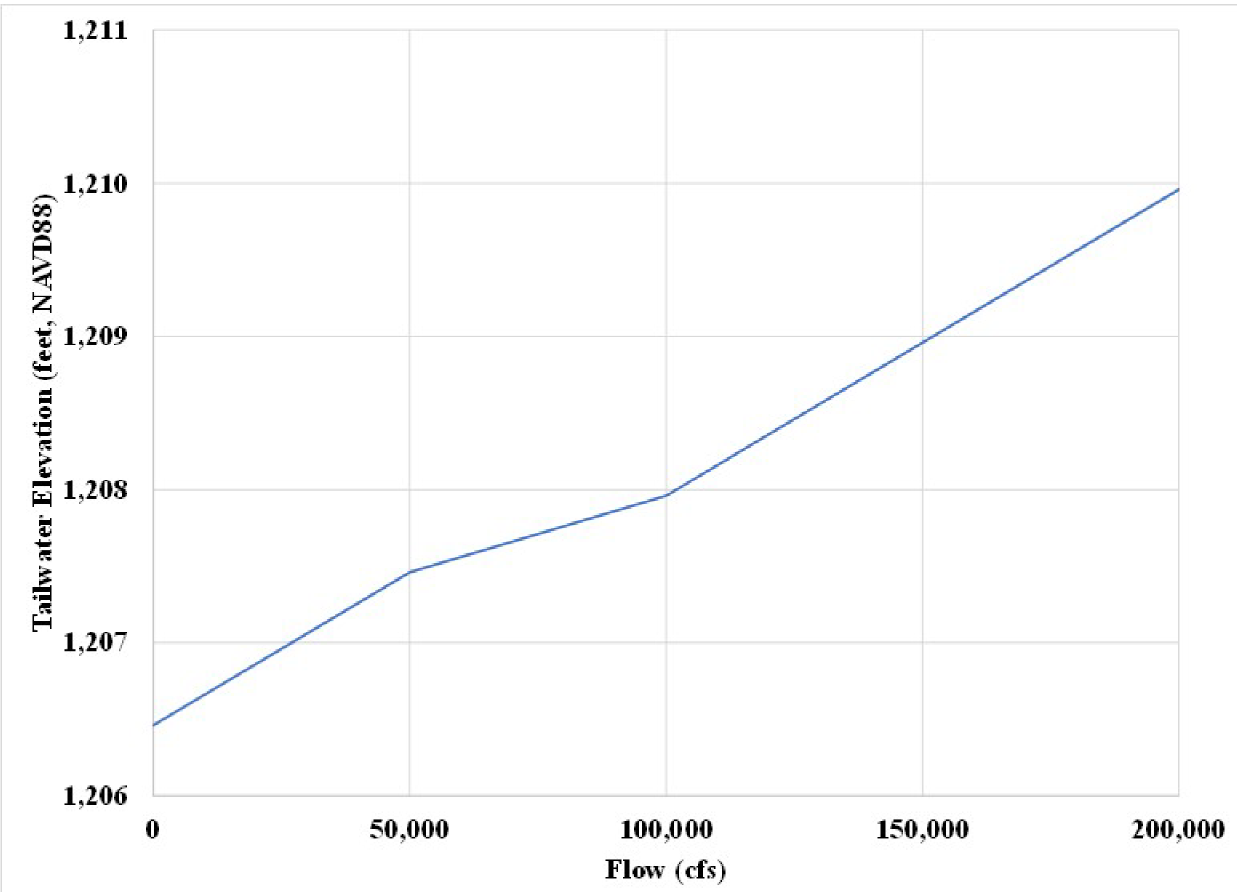

Figure 3.5-1. Ross Powerhouse tailwater curve.

3.5.2 Diablo Development

The tailwater of Diablo Powerhouse during lower flows is controlled by a gravel bar at the mouth of Stetattle Creek. The tailwater varies significantly, depending on the size of the gravel bar.

A tailwater curve was estimated from City Light hourly operations records for use within the Skagit Operations Model and documented in the Skagit Operations Model and Logic Validation Report (City Light 2023). The tailwater rating curve relates the powerhouse tailrace water surface elevation to the powerhouse and river outflow. The Diablo Powerhouse tailwater curve estimated based on hourly City Light operations records is shown in Figure 3.5-2. The tailwater during lesser flows is controlled by the gravel bar at the mouth of Stetattle Creek.

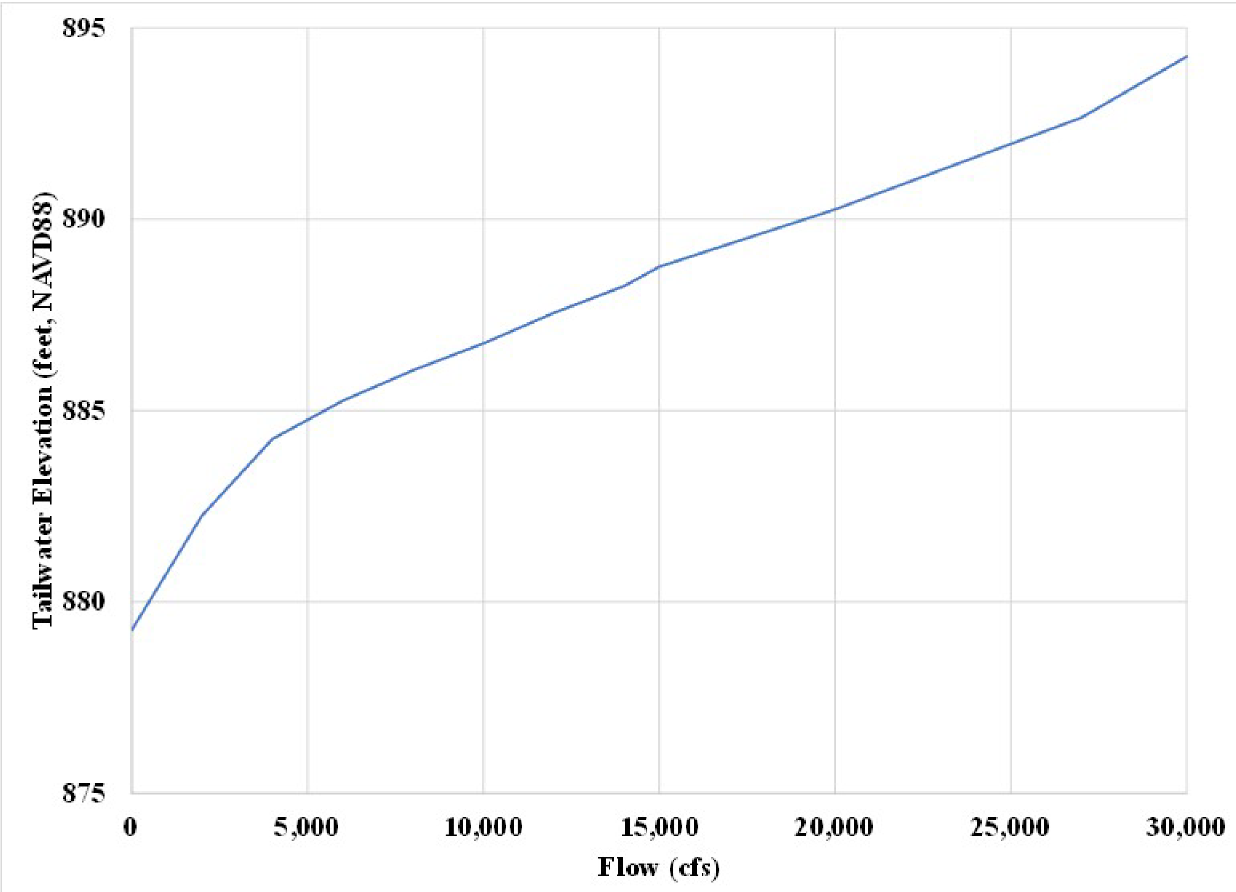

Figure 3.5-2. Diablo Powerhouse tailwater curve.

3.5.3 Gorge Development

A tailwater curve was estimated from City Light hourly operations records for use within the Skagit Operations Model and documented in the Skagit Operations Model and Logic Validation Report (City Light 2023). The tailwater rating curve relates the powerhouse tailrace water surface elevation to the powerhouse and river outflow. At the Gorge Development, limited elevation data was available for flows below approximately 2,000 cfs. The Gorge Powerhouse tailwater curve estimated based on hourly City Light operations records is shown in Figure 3.5-3.

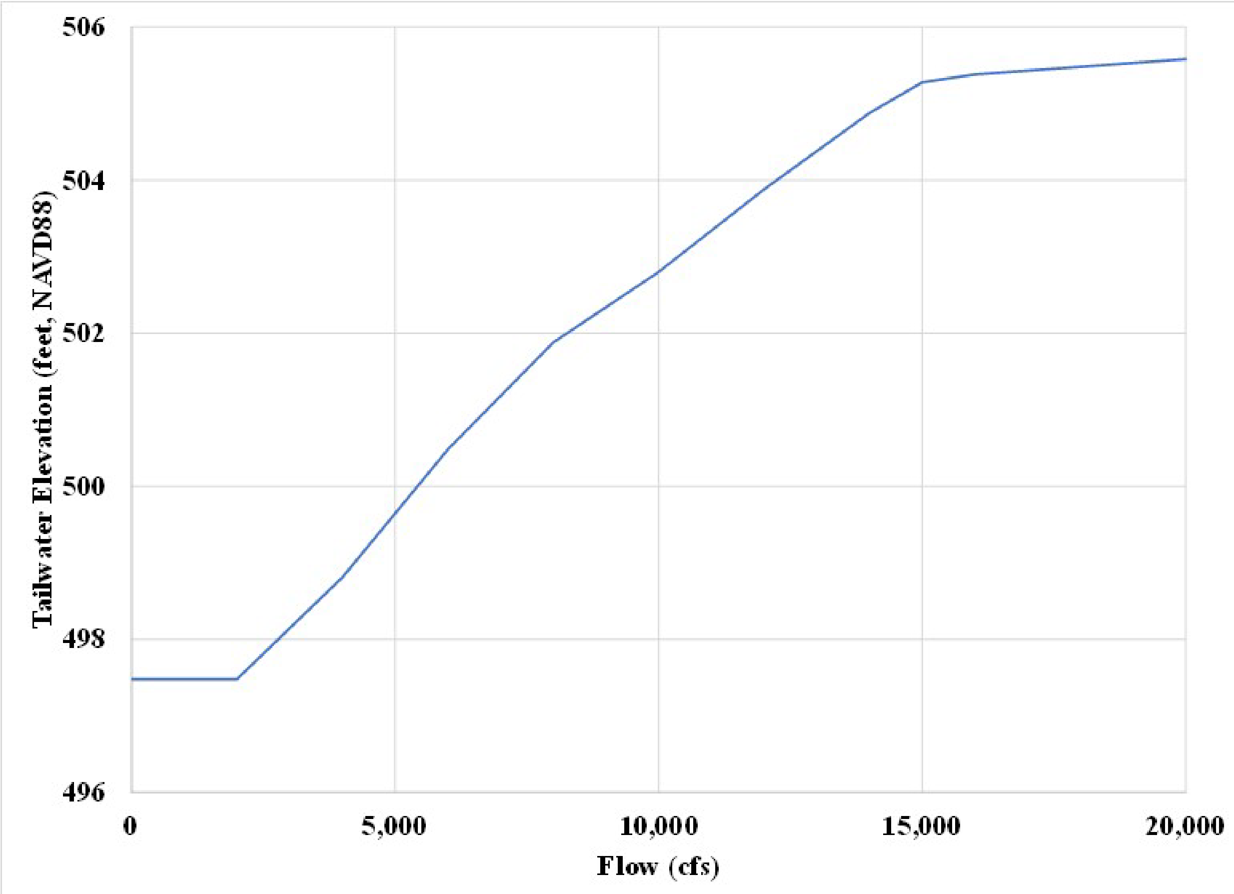

Figure 3.5-3. Gorge Powerhouse tailwater curve.

3.6 Estimated Power Plant Hydraulic Capacities and Capabilities

In April 2020, City Light filed an updated Exhibit M, as modified August 2020, to reflect increased generation capabilities and capacities resulting from turbine and generator upgrades at the three developments during the current Project license term. This updated Exhibit M was approved by FERC on February 2, 2021. The increased authorized installed capacity is 700.27 MW, and the generation capability is nearly 840 MW (Table 3.6-1). The previous Exhibit M listed the total authorized installed capacity of 650.25 MW.[7] The three Project powerhouses have four generators each, with capacities that currently range from 1.2 MW for the small house units at the Diablo Development to 112.5 MW for the units at the Ross Development.

Specifications for each development are summarized in Table 3.6-1.

7 Per July 23, 1997 Order Approving Revised Exhibit M and Revising Annual Charges (80 FERC ¶ 62,056).

Table 3.6-1. Estimated capacities and generator output for the three powerhouses of the Skagit River Project.

	Ross	Diablo	Gorge
Total plant capability	450 MW	182.4 MW	207.58 MW
Total authorized installed capacity	352.5 MW	158.47 MW	189.3 MW
Estimated Minimum Hydraulic capacity (at minimum output one unit generating and estimated unit leakage for other units)	130 cfs	70 cfs	170 cfs
Hydraulic capacity (at maximum plant output)[1]	16,000 cfs	8,250 cfs	7,440 cfs
Turbines: Type Number of units Ratings (hp; rotations per minute [RPM])	 Francis vertical 4 120,000 hp at 355 ft net head, 150 RPM	 Francis vertical 4 Units 31, 32: 117,200 hp at 318 ft net head, 171.5 RPM Units 35, 36: 2,200 hp at 306 ft net head, 720 RPM	 Francis vertical 4 Units 21, 22: 51,850 hp at 325 ft net head, 257 RPM Unit 23: 45,000 hp at 325 ft net head, 257 RPM Unit 24: 147,500 hp at 354 ft net head, 163.7 RPM
Generators Manufacturer Ratings	 Westinghouse U41 112.5 MW U42 112.5 MW U43 112.5 MW U44 112.5 MW	 Westinghouse U31 90 MW U32 90 MW U35 1.2 MW U36 1.2 MW	 Westinghouse U21 36.86 MW U22 36.86 MW U23 36.86 MW U24 97.00 MW

1 Maximum output at Ross is limited to 9,500 cfs and 7,200 cfs at Diablo, consistent with existing water rights for power production. An application for an additional 6,500 cfs at Ross is pending; the need for additional water rights at Diablo is being evaluated. The value previously cited for in relicensing documents for Diablo was 7,130 cfs.

Curves displaying Ross, Diablo, and Gorge powerhouse maximum capability as a function of operating head range for each powerhouse are provided as Figures 3.6-1 through 3.6-3. Given the fluctuation that occurs within each of the lakes (Ross, Diablo, and Gorge), as discussed in Section 3.4 of this Exhibit B, there is not a normal or typical head associated with these three powerhouses.

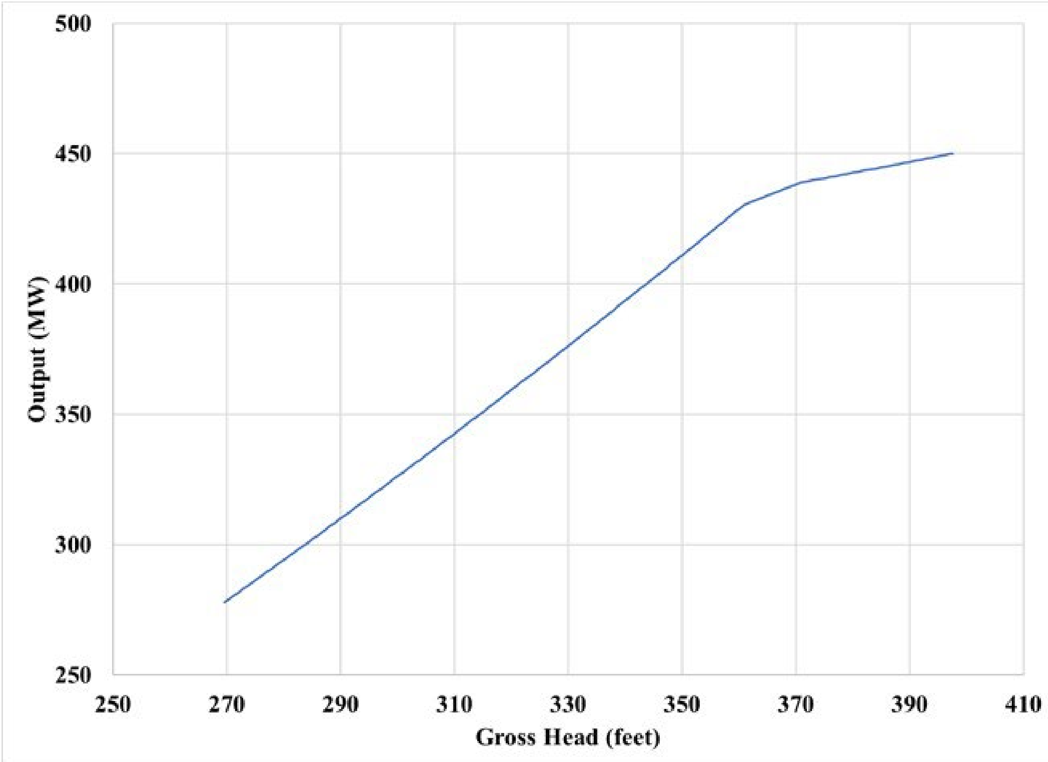

Figure 3.6-1. Ross Powerplant capability as a function of head.

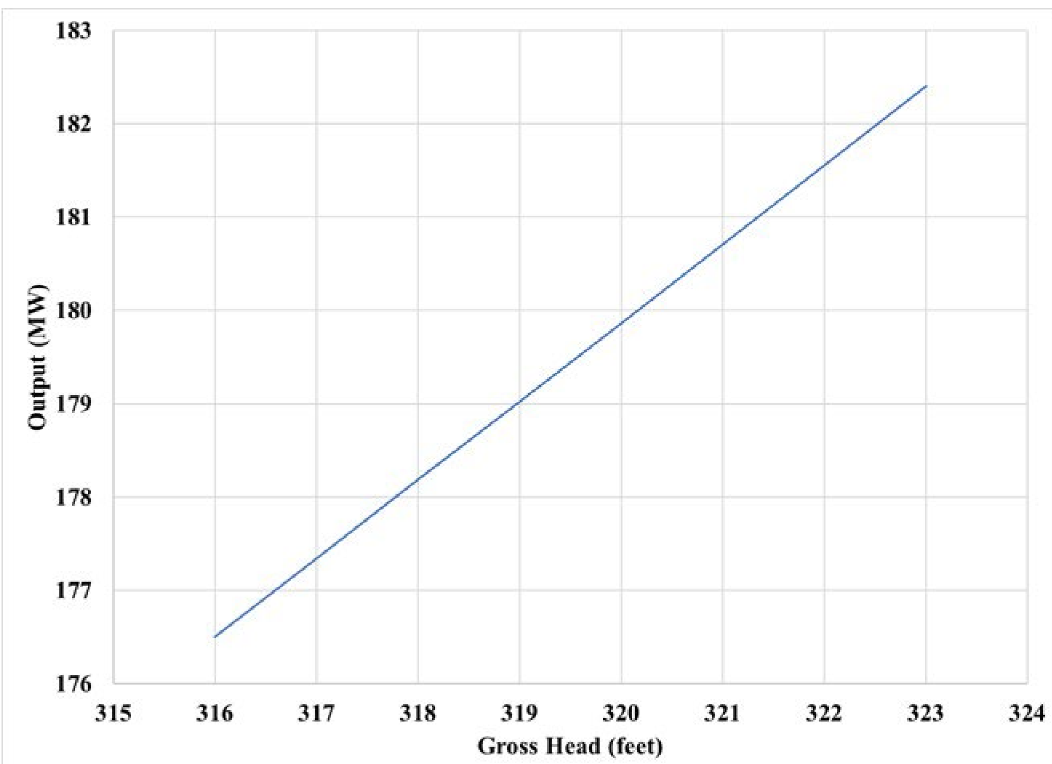

Figure 3.6-2. Diablo Powerplant capability as a function of head.

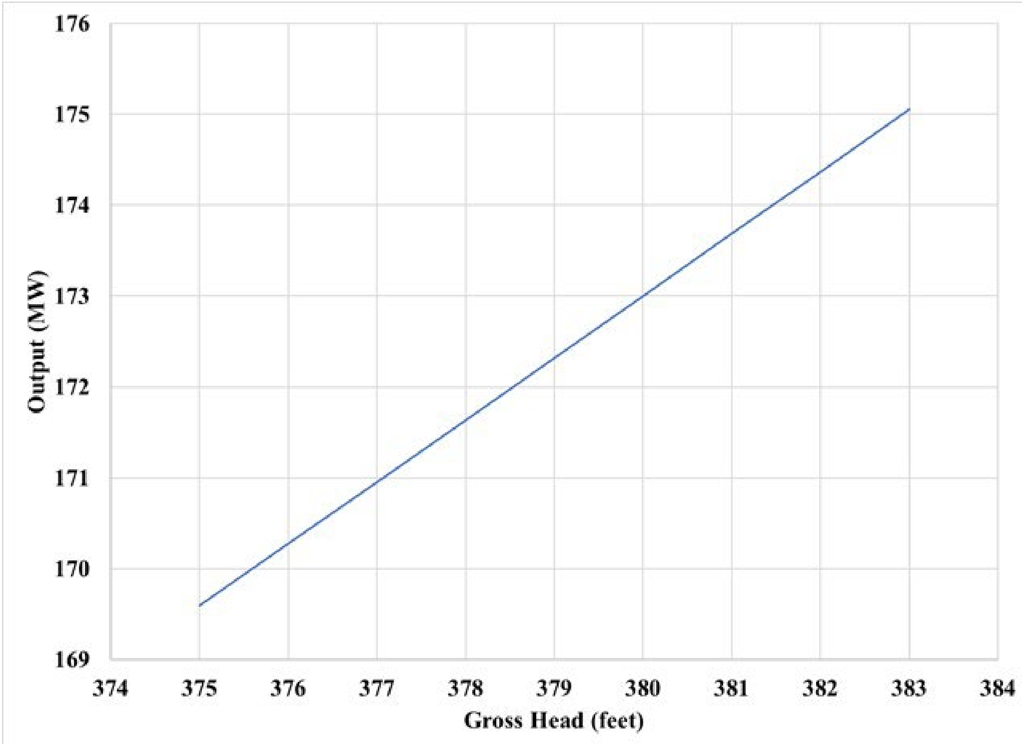

Figure 3.6-3. Gorge Powerplant capability as a function of head.

4.0 USE OF PROJECT POWER

The three Skagit generating developments supply approximately 20 percent of City Light's power requirements. The Project is an important load-following resource for City Light and is used to meet within-hour load following needs. City Light uses the output to serve retail load. The Project's power needs were approximately 5,550 MWh in 2021. This is a de minimis amount compared to overall generation (approximately 2.66 million MWh in 2021).

Output in excess of retail load needs is sold on the secondary market. There are no fixed purchasers of non-firm power from the Project, which varies by month and year. City Light does not typically identify a specific resource in its portfolio when transacting with counterparties in the short-term markets. Additionally, the Project plays a significant role in the regional energy market by integrating renewable resources and providing generation reserves.

5.0 FUTURE RESOURCE UTILIZATION

City Light is not proposing any increase in capacity as part of this relicensing. Planned activities are limited to the continuation of the life-extension program to maintain, repair, modify, or replace the civil, mechanical, or electrical components of the Project on an as-needed basis. City Light reserves the right to reevaluate the potential for unit upgrades or capacity additions in the future.

City Light proposes to modify existing Project operations as described in Section 5.4 of this Exhibit B. Exhibit E of this FLA includes a list of proposed protection, mitigation, and enhancement (PME) measures to be included in the new license (see Section 3.3.3 for a comprehensive list and Proposed Resource Measures subsections for each resource area in Section 4.2). Many of these PME measures have been developed in coordination with licensing participants (LPs). City Light continues to engage LPs regarding the operational proposal and PME measures that will ultimately be included in the new license. This engagement will continue following submission of this FLA. In the event this engagement results in revisions to the Proposed Action, City Light will supplement its FLA at a later date to incorporate the revisions.

5.1 Operations Modeling

City Light developed a suite of models and post-processing analyses to support the evaluation of existing and alternate operations (described in greater detail in Exhibit E, Section 4.2 of this FLA). One of the models, the Operations Model, is tailored to the requirements of relicensing for the Project. Using an hourly time step, the Operations Model simulates Project energy production using as input existing turbine efficiency curves, current storage capacity, and historic hydrologic data under specific operational constraints. For each alternate operation (scenario), output from the Operations Model consists of an hourly time series of Project energy production (MWh), release (cfs), and forebay water surface elevations (feet) to serve as input and supporting information to the other Project licensing models as described in Exhibit E of this FLA.

5.2 Potential Impacts on Operations from Climate Change

Historical inflows described in Section 2.3 of this Exhibit B are expected to shift over time as warming global temperatures alter the climate within the Skagit River watershed. The changes in climate are expected to alter temperature and precipitation amount and type, which will result in shifts in hydrology. Future hydrology cannot be observed, but simulations of future streamflows can be provided through computer modeling. Simulated or modeled future streamflow data are created through a series of steps that begin with Global Climate Models (GCM), which simulate temperature and precipitation based on physical processes coded into the computer models. Multiple plausible future climates are simulated by GCMs driven by a range of future greenhouse gas (GHG) concentrations in the atmosphere, which affect heat balance. Temperature and precipitation projected by GCMs are at coarse spatial scales (~50 to 100-mile grids), so downscaling techniques are used to reduce projected meteorology to smaller scales to represent local-scale climate and weather patterns. These downscaled data are used as input into hydrology models that represent how water moves over and through the landscape and generates streamflows.

The hydrology model used to simulate future hydrology for the Skagit River watershed is the Distributed Hydrology Soil Vegetation Model (DHSVM), version 3.1.2. (Wigmosta et al. 1994; 2002). This is a physically-based, fine-scale, distributed hydrology-vegetation model suitable for complex terrain such as the Cascade Mountains. Streamflow modeling was performed for the Skagit Water Supply and Demand Synthesis by the University of Washington Climate Impact Group (CIG), which provides the most rigorous and comprehensive Pacific Northwest climate change information for use in applications like river management. The model includes canopy interception of precipitation, evaporation, transpiration, and snow accumulation and melt as well as runoff generation via saturation excess (i.e., soil already saturated). In the model, water is routed through the watershed following subsurface and surface flow modeling schemes. The advantages of the DHSVM model over other hydrology models are finer grid resolution (150-50 m) and independent grid cells, which means that water can move from cell to cell in different (physics-based) ways.

Several steps were used to translate the future distributed meteorology (e.g., temperature, precipitation, wind) into simulated streamflow. Future meteorology was acquired from data products developed by the Integrated Scenarios of the Future Northwest Environment project (Taylor et al. 2011), which was based on the World Climate Research Programme's Coupled Model Intercomparison Project (CMIP5). CMIP5 represents a collaborative effort of more than 20 climate modeling groups from around the world, using the same experimental setup, to provide the best available climate modeling. Among these models, a core set of ten GCMs were selected as the best-performing models based on their simulation of 20th century climate in the Pacific Northwest (Rupp et al. 2013). These ten GCMs included: bcc-csm1-1-m, CanESM2, CCSM4, CNRM-CM5, CSIRO-Mk3-6-0, HadGEM2-CC, HadGEM2-ES, IPSL-CM5A-MR, MIROC5, and NorESM1-M. Meteorology from these ten GCMs and two GHG scenarios (RCP8.5, high and RCP4.5, low)[8] were downscaled using the multivariate adaptive constructed analog (MACA) method (Abatzoglou and Brown 2012). Correction of the downscaled data was further performed using the Weather Research and Forecasting (WRF) model (Salathé et al. 2014), and corrected daily data was disaggregated into 3-hour time steps using MTCLIM (Liang et al. 1994) for use as input to DHSVM. A glacier dynamics model (Clarke et al. 2015) was coupled to DHSVM to resolve glacier thickness and area over time in response to accumulation, ablation, and gravitational processes, which is important for capturing the low flows more accurately in a changing climate, especially in the heavily glaciated Skagit River watershed.

The DHSVM output is simulated daily average streamflow in cfs, covering the historic years 1988 to 2010 and future years 2011 to 2099. Twenty future simulations of streamflow were created from the ten GCMs and two GHG scenarios. Simulated hydrology datasets are formatted to allow easy application to the operations model as: Date [M/D/YR], Julian [date], Total Inflow to Ross (cfs), Incremental Inflow Between Ross and Diablo (cfs), Incremental Inflow Between Diablo and Gorge (cfs), Incremental Inflow Between Gorge and Newhalem (cfs), Incremental Inflow Between Newhalem and Marblemount (cfs). Each GCM simulation represents an equally likely and valid depiction of the future climate and subsequently derived hydrology. However, climate change projections from GCMs and streamflow simulations by DHSVM should not be interpreted as

8 RCP represent the magnitude of the greenhouse effect corresponding to the amount of energy in watts per square meter (W/m^2) that is absorbed across the globe by 2100 given possible future emissions, population growth, technological advance, etc. RCP 4.5 represents a lower-end stabilizing scenario that assumes that emissions mitigating policies are invoked to limit emissions and radiative forcing such that emissions stabilize by mid-century and fall sharply thereafter, while RCP 8.5 represents a higher-end scenario where emissions continue to increase until the end of the 21st century. RCP 8.5 tracks closest to historical emissions.

forecasts of weather and streamflow (e.g., daily streamflow simulated for 2030 will not match flows experienced in that year).

Long-range planning was recently completed using this DHSVM streamflow dataset for the Skagit River watershed. City Light's Integrated Resource Plan (IRP) published in September 2022 provides a long-term strategy to meet anticipated energy needs over the next 20 years (City Light 2022). The IRP included climate change scenarios as part of City Light's assessment of energy resource adequacy. Due to limitations in available computational capacity, City Light selected a limited number of climate change scenarios to evaluate in the IRP, although many future simulations were examined. The selection of models to assess resource adequacy under climate change was based on a scoring scheme that identified models with a broad range of variability in future streamflow compared to historic streamflow, to capture impacts from more extreme situations. The top three models identified for the Skagit River watershed were CanESM2, CCSM4 and NorESM1-M. CanESM2 is from the Canadian Center for Climate Modeling and Analysis, and CCSM4 is the National Center of Atmospheric Research (NCAR), USA, model. The NorESM1-M model showed more variation in flows in certain months relative to history compared to other models for the Skagit River watershed, but unfortunately the geographic span of this model did not overlap with City Light's other hydroelectric projects. Thus, it was not selected for use in the IRP climate change scenarios.

Compared to the 40-year historical period (1981-2019) for inflows into Ross Reservoir, CanESM2 and CCSM4 both showed higher median flows from February through May, with earlier peak flows, as well as during September and October, However, CCSM4 is generally wetter in January through March than CanESM2. During June and July, mean annual flows are lower in the future scenarios than historically. Results from these two climate change scenarios are consistent with regional predictions of potential energy shortfalls in summer as energy demand increases and hydro resources are less abundant; however, continued analysis is needed to more fully understand and plan for uncertainties due to changing climate.

5.3 Facility Enhancements

Scheduled generator rewinds and turbine runner replacements will occur at all three Project developments over the course of the new license (see Exhibit C of this FLA for approximate timeframes of implementation after license issuance). These projects are proposed as part of the Proposed Action. If, and how much, this standard work will impact generation capacity is currently unknown.

There are no specific facility enhancement projects planned that would impact generation capacity at any of the three Skagit River Project developments. There are, however, projects involving dredging proposed as part of the Proposed Action that are expected to affect generation capacity at the Diablo and Gorge developments (Figure 5.3-1):

- Diablo Tailwater Restoration Project and River Maintenance – This project would lower the Diablo tailwater elevation and restore hydraulic head and associated hydroelectric generating capacity at Diablo Powerhouse, which has been reduced since Project construction due to the accumulation of sediment, including boulder, cobble, gravel, and sand, deposits from Stetattle Creek. These deposits causing the increased backwater effects are located from approximately 250 feet upstream of the mouth of Stetattle Creek to approximately the State Route (SR) 20 bridge (Figure 5.3-1, Conceptual Dredge Area C). The increased water surface elevations at the tailrace results in head loss and reduced generation output of up to 2 percent since the construction of Gorge High Dam. The higher water levels also restrict maintenance access by inundating the walkways to the scroll cases on the generating units and limit the ability to inspect the tailrace and bridge.

The proposed Diablo Tailwater Restoration Project would involve dredging portions of the main channel in the vicinity of the confluence of Stetattle Creek down into the delta areas downstream of Gorge Campground (Figure 5.3-1, Conceptual Dredge Area B). In addition to restoring up to approximately 1 percent of the hydraulic head and generation output, the project would reduce the difficulty of performing inspections and maintenance at the powerhouse and the tailrace bridge and structure. Lastly, the project would reduce the extent of flooding at the powerhouse and vicinity during high flow events. Since material from Stetattle Creek will continue to accumulate, maintenance dredging will be needed every few years following the initial work. An option is to preventatively dredge a location to more frequently collect and haul out sediments, which could reduce the frequency of widespread dredging and isolate impacts of dredging to one area.

- Upper End of Gorge Lake Grading Project – The upper end of Gorge Lake, from the mouth of Stetattle Creek to approximately 1,000 feet downstream of the SR 20 bridge crossing, contains underwater features associated with fish stranding and trapping at certain lake levels. To improve generating operational flexibility and reduce the potential for fish stranding and trapping City Light proposes dredging and/or re-grading high-risk underwater features, filling depressions, creating detached wetland to prevent fish access, and/or creating egress channels (Figure 5.3-1, Conceptual Dredge Area A). Periodic maintenance dredging may be required to reduce the risk of fish stranding and trapping.

As a result of the proposed Diablo Tailwater Restoration Project and River Maintenance, the estimated total average annual energy produced by the Project may increase approximately 9,500 MWh, or approximately 1 percent. Cost estimates for these efforts are detailed in Exhibit D of this FLA.

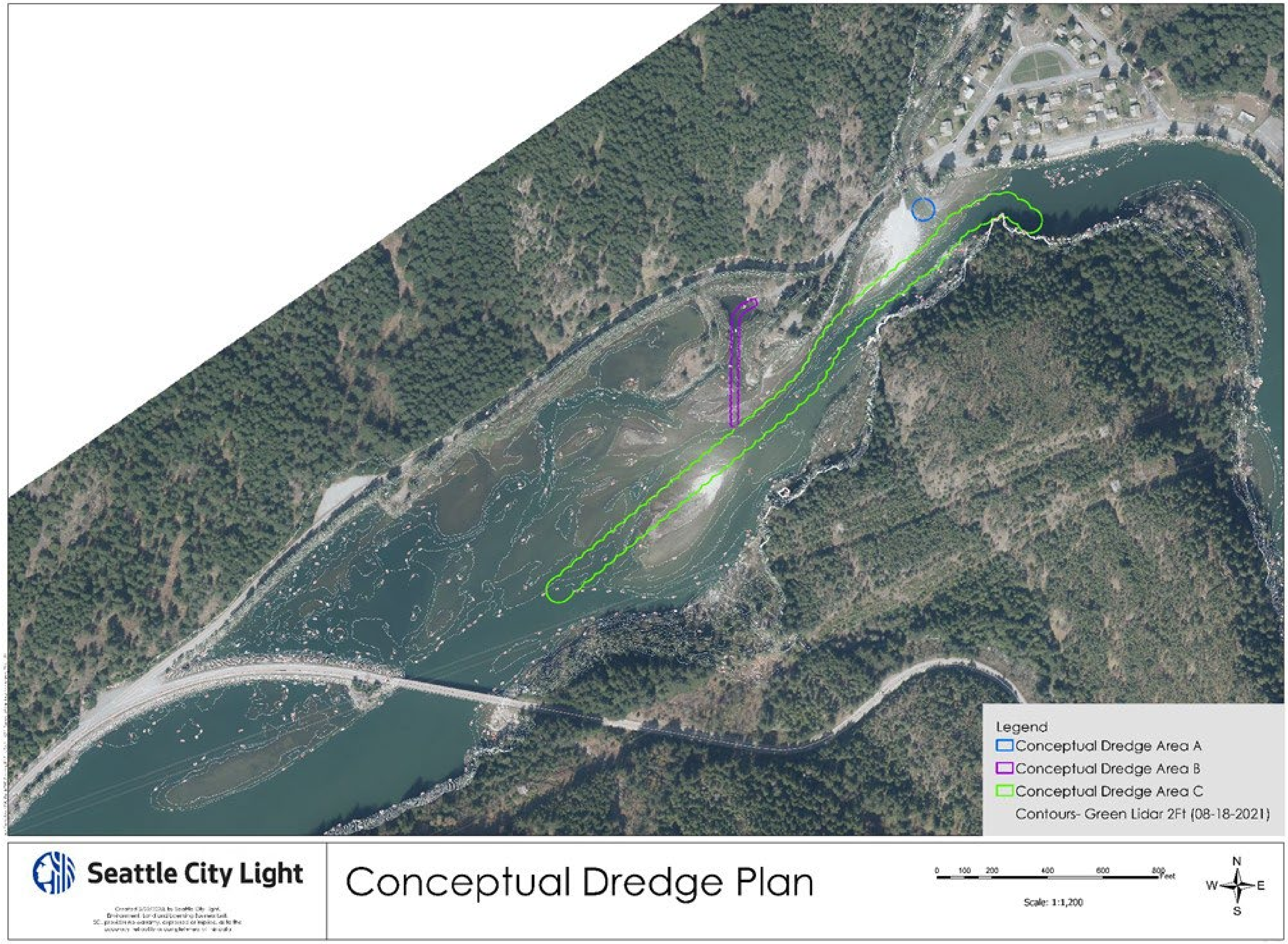

Figure 5.3-1. Conceptual dredge plan.

5.4 Proposed Changes to Project Operations

City Light proposes to modify existing Project operations with the changes described below.

Modifications to Ross Lake Operations

Summer Variable Reservoir Operations Zone

City Light proposes to operate Ross Lake within a Summer Variable Reservoir Operations Zone, i.e., within a water surface elevation (WSE) range between 1,600.76-1,608.76 feet NAVD 88 (1,594.5-1,602.5 feet CoSD) from July 31 through the Tuesday after Labor Day, upon which Ross Lake shall be drawn down consistent with the flood risk management measures.

Subject to the availability of adequate runoff to refill Ross Lake and meet firm power generation needs, targeted WSEs within this zone will be informed by the Annual Flow Plan Forecast and identified in coordination with the Skagit Resource Coordinating Committee (SRCC)[9] to adaptively manage the competing resource objectives listed below:

- Provide fish protection flows downstream of the Project, including process flows.
- Provide recreational access to Ross Lake facilities.
- Reduce reservoir fish stranding and trapping.
- Promote reservoir fish tributary access.
- Promote littoral habitat and native vegetation development.
- Reduce erosion and impacts to sensitive (cultural) resources.
- Protect water quality and minimizing spill.

Annual Flow Plan Forecast

The Skagit River Riverscape Ecosystem Plan (REP) will describe the development and implementation of an Annual Flow Plan Forecast. The Annual Flow Plan Forecast will be developed no later than March 15 each year, prior to initiation of the spring refill, and will consider instream flows necessary for spawning and incubation, identify existing and projected hydrological conditions, and projections for timing associated with refilling Ross Lake to inform management of the Summer Variable Reservoir Operations Zone.

City Light will provide the SRCC the forecast and coordinate on the release (timing, magnitude, and duration) of process flows and management of Ross Lake WSEs within the Summer Variable Reservoir Operations Zone in consideration of the flows necessary to meet compliance obligations related to downstream flows and Ross Lake WSEs.

Modifications to Flood Risk Management Operations

Article 301 of the current Project license requires City Light to draw down Ross Lake to a level that provides 60,000 acre-feet of storage (approximate elevation 1,603.78 feet NAVD 88 [1,597.52 feet CoSD]) for flood risk management by November 15 and 120,000 acre-feet (approximate

9 City Light anticipates that the SRCC will be composed of Indian Tribes, state and federal agencies, and City Light to coordinate the implementation of the proposed PMEs (see Exhibit E, Section 3.3, of this FLA for details).

elevation 1,598.65 feet NAVD 88 [1,592.39 feet CoSD]) by December 1, and to maintain this available storage through March 15. City Light must also comply with Details of Regulation for Use of Storage Allocated for Flood Control in Ross Reservoir, Skagit River, WA (USACE 1967), which is incorporated into the Project license by reference. This document was updated in 2002 and provides the current guidance for Project operations for flood risk management and is commonly referred to as the Skagit River Project Water Control Manual (USACE 2002).

As part of the new license, City Light proposes to develop a Flood Risk Management Implementation Plan, for FERC approval, in consultation with the USACE and other LPs. The purpose of the Flood Risk Management Implementation Plan is to further assess the implications of Flood Risk Management modifications and to assess the viability of developing an operational strategy that uses enhanced hydrometeorological monitoring networks and improved weather and streamflow forecast information to inform flood risk management decisions to retain or release water by integrating additional flexibility in operational policies and rules to achieve water management objectives, commonly referred to as Forecast-Informed Reservoir Operations (FIRO).

FIRO is a water management approach that uses data from watershed monitoring and improved weather and hydrologic forecasting to help water managers selectively retain or release water from reservoirs in a manner that can adapt to weather extremes and that leverages advancements in the science of meteorological and hydrologic forecasting. FIRO represents an innovative use of emerging science and technology to optimize limited resources and adapt to changing climate conditions without costly reservoir infrastructure improvements. FIRO offers the potential to inform reservoir management decisions at Ross Lake with improved awareness and forecasting of atmospheric rivers, which may lead to floods. The goal of FIRO at Ross Lake is to enhance and achieve flood risk management objectives without negatively impacting downstream flows critical for Endangered Species Act (ESA)-listed salmonids.

In order to provide for the operational flexibility to incorporate FIRO and other management objectives to be identified in the Flood Risk Management Implementation Plan, City Light is proposing to modify the FERC required flood risk management rule curve at Ross Lake to a level that provides for: (1) a minimum of 60,000 acre-feet (1,603.78 feet NAVD 88 [1,597.52 feet CoSD) and a maximum of 120,000 acre-feet (1,598.65 feet NAVD 88 [1,592.39 feet CoSD]) of storage by October 15 through November 14; and (2) a minimum of 120,000 acre-feet (1,598.65 feet NAVD 88 [1,592.39 feet CoSD] and a maximum of 200,000 acre-feet (1,591.56 feet NAVD 88 [1,585.3 feet CoSD]) by November 15, and to maintain this available storage through March 15. City Light anticipates that the Initially Proposed FIRO Pool, identified in Figure 5.4-1 below, will be further refined within the Flood Risk Management Implementation Plan and will inform subsequent modifications to the Ross Lake Water Control Manual.

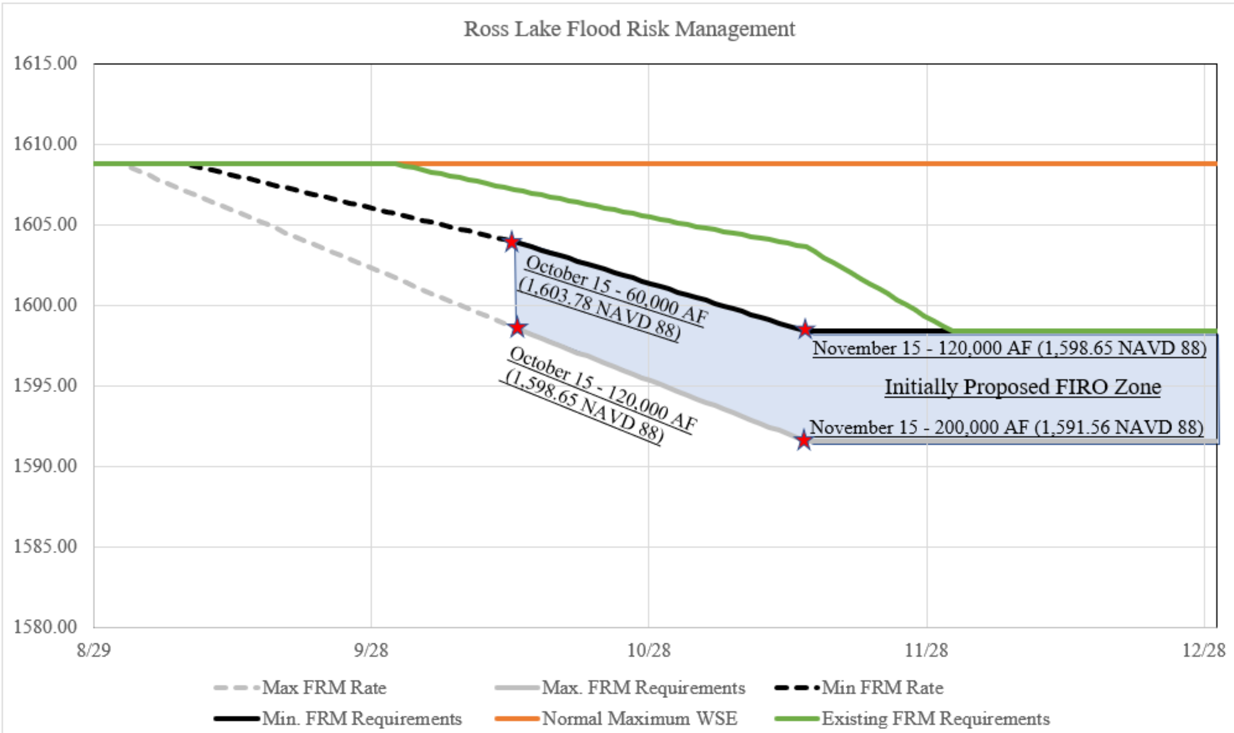

Figure 5.4-1. Ross Lake proposed flood risk management.

Management of Ross Lake elevations within the Initially Proposed FIRO Zone (see Figure 5.4-1) will utilize FIRO strategies, guided by a decision support system, to be developed in consultation with the USACE and described in the Flood Risk Management Implementation Plan. City Light envisions that the development of the Flood Risk Management Implementation Plan will include the following steps:

- Identify a FIRO Work Group and develop a FIRO workplan;
- Define FIRO goals, objectives, constraints, operational considerations, and performance metrics collaboratively;
- Evaluate data sufficiency, existing forecasting tools, and modeling requirements;
- Identify simulation plan and proof-of-concept analyses;
- Develop hydrologic dataset, including historical observations and appropriate forecast information;
- Develop flood risk management release alternatives that use forecast information to make release decisions;
- Simulate alternatives over range of scenarios and hydrological inputs (include climate change hydrological datasets);
- Develop/refine operations model and decision support tools;
- Report FIRO viability assessment results;

- Finalize Flood Risk Management Implementation Plan and file for FERC review and approval; and
- Upon FERC approval, provide for modifications to the Ross Lake Water Control Manual.

The required storage space identified above, if not previously obtained through power withdrawals or other reservoir management purposes, shall be provided by drawing down the reservoir at a rate equaling or exceeding a uniform drawdown rate from zero on the Tuesday after Labor Day to a rate that provides a minimum of 60,000 and a maximum of 120,000 acre-feet on October 15 and similarly drawing down to provide a minimum of 120,000 and a maximum of 200,000 acre-feet on November 15, with the reservoir level at or below elevation 1,598.65 feet NAVD 88 (1,592.39 ft CoSD), subject to consultation with the SRCC.

In a situation when the NWS, Northwest River Forecast Center forecasts that the natural flow at the gaging station near Concrete, Washington will equal or exceed 90,000 cubic feet per second (cfs) in 8 hours on a rising stage of a flood, City Light shall comply with requests for operational changes at Ross Dam (specified outflows) as directed by the USACE. During the flood period through which the USACE directs operations of the Project, City Light retains the right to discharge up to 5,000 cfs from Ross (plus or minus 20 percent allowances for operational latitude) as such flows are necessary for downstream resource protection and generation at the other two Project developments.

If the reservoir WSE should reach the elevation of 1,608.76 feet NAVD 88 (1,602.5 ft CoSD) before the flood recession occurs, the gates shall be operated to produce maximum surcharge storage to gain the maximum reduction of discharge downstream. If surcharge storage is produced, it shall be maintained as long as possible or until flood recession occurs.

After a flood recession starts (defined as discharge at Concrete receding to 90,000 cfs with a falling trend predicted), City Light will coordinate with the USACE on flows necessary to evacuate Ross Lake utilizing weather forecasts and other strategies to minimize the effects on downstream anadromous fish resources and downstream developments or levees without risking renewed flooding prior to total storage evacuation.

City Light proposes to seek an agreement with the USACE to update and modernize the Skagit River Project Water Control Manual (2002) to incorporate relevant parameters of the agreed upon Flood Risk Management Implementation Plan.

Until the Flood Risk Management Implementation Plan is finalized and approved by FERC, City Light will continue to adhere to the flood risk management requirements from the existing license.

Minimum Instream Flows in the Gorge Bypass Reach

City Light proposes to establish a minimum instream flow of at least 100 cfs for the Gorge bypass reach. This minimum instream flow will commence after the installation of a low flow control structure is installed at Gorge Dam (see Section 5.3 in Exhibit A of this FLA). The low flow control structure's engineering design and installation will be subject to FERC review and approval. Water releases from the Gorge Dam spillway in excess of the minimum instream flow will continue to be routed through the Gorge bypass reach during maintenance or emergency shutdown periods, and when river flows exceed the capacity of the Gorge Powerhouse.

Side and Off-Channel Connectivity and Process Flow Releases

Building upon the foundation of the existing Fisheries Settlement Agreement, as amended in 2011 (City Light 2011), City Light is proposing the Flow Management Program (FMP), integrated as part of the REP, to describe the flows and ramping rate restrictions to minimize the effects of Project operations on salmon and steelhead and to provide the following benefits: (1) salmon spawning and redd protection; (2) salmonid fry protection; (3) steelhead spawning and redd protection; (4) steelhead fry protection; (5) salmonid fry outmigration; and (6) salmonid stream-type juvenile (STJ) protection. It also describes proposed flow releases designed to promote geomorphic processes (i.e., process flows) that maintain aquatic, riparian, and floodplain habitats and increase the connectivity of side channels and off-channel habitats to the main channel, further described below.

No less than two times per year (if not already provided by Project operation requirements or flood risk management protocols), City Light will release water from the Project to ensure flows of not less than 5,734 cfs and not more than 7,440 cfs as measured at the Newhalem gage for a period of 48 hours. The purpose of the release will be to promote connectivity to side and off-channel fish habitat and improve gravel quality for spawning and incubation by providing flushing flows. Releases, which would be subject to the conditions identified below, would likely occur around the following approximate dates: April 1, April 15, and May 1. The timing of these flow releases will be coordinated with the SRCC and will be adaptively managed to promote connectivity and improve gravel quality.

No less than once every five years and no more than once every two years, City Light will release water from the Project to achieve a target flow of 26,400 cfs as measured at the Newhalem gage for a period of 24 hours to promote geomorphic processes and mobilize sediment (provide channel maintenance flows). These flow releases are subject to the conditions below and will be released in coordination with the SRCC. Initial releases of the channel maintenance flows will evaluate safety (both dam safety and downstream flood risk management) and may result in modifications to the release (timing, duration and magnitude) of channel maintenance flows in order to adhere to the conditions described below.

Conditions associated with process flow releases:

- City Light's process flows releases are subject to having adequate runoff to refill Ross Lake in order to maintain its ability to provide for anadromous fisheries protection flows, recreation, and firm power generation needs. City Light will rely upon forecasts to determine whether the projected refill will maintain or exceed Ross Lake target elevations identified in the Annual Flow Plan Forecast after process flow releases. Modification to the timing, duration, and magnitude of the process flow releases can be adaptively managed subject to the approval of the SRCC.
- City Light's process flow releases will be planned to avoid flooding (to the extent possible) of the Skagit River, which is currently defined[10] for purposes of this PME measure as exceeding

[10] Release of process flows may identify flooding considerations beyond the criteria listed above. If such instances are identified, this provision may be modified accordingly.

the NWS threshold of 28 feet (approximately 62,500 cfs) at the USGS Skagit River flow gaging station near Concrete, Washington.

- City Light's process flow releases are subject to complying with dam safety requirements and other regulatory conditions (e.g., Section 401 Water Quality Certificate conditions).
- City Light's process flow releases will not be subject to the FMP down-ramp amplitude requirements. City Light will rely upon a 1,000 cfs/hour down-ramping rate (unless modified as a result of field monitoring and in coordination with the SRCC) for process flow releases.
- The magnitude, duration, timing and frequency of the process flow components may be achieved through any combination of controlled and uncontrolled flow releases (i.e., Gorge Powerhouse discharge, Gorge Dam spill) and accretion flow.

As a result of the proposed operations, the estimated total average annual energy produced by the Project would decrease by 30,252 MWh. This decrease combined with the estimated increase in average annual generation from the proposed Diablo tailwater project (9,464 MWh) would result in a net decrease of 21,983 MWh, to a total of 2,611,473 MWh for the Project.

Cost estimates for this effort are detailed in Exhibit D of this FLA.

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FINAL LICENSE APPLICATION
EXHIBIT B

APPENDICES

FINAL LICENSE APPLICATION
EXHIBIT B

APPENDIX A

MONTHLY MINIMUM, AVERAGE, AND MAXIMUM INFLOWS AND OUTFLOWS (CFS) (1988-2021)

Table A-1. Monthly minimum, average, and maximum inflows (cfs) into Ross Lake (1988-2021).

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1988	Maximum	2,035	1,795	3,143	10,323	18,324	10,980	6,100	2,508	2,259	7,681	10,804	4,965	18,324
	Average	823	1,153	1,804	5,289	7,479	7,001	3,524	1,514	1,082	1,825	2,961	2,103	3,046
	Minimum	242	199	896	1,544	3,225	4,388	2,097	958	419	646	636	478	199
1989	Maximum	4,537	2,361	1,982	7,366	12,767	13,778	4,094	2,593	1,295	1,749	24,716	21,715	24,716
	Average	1,805	1,360	1,233	4,375	7,126	8,072	2,910	1,573	852	966	4,698	4,259	3,271
	Minimum	717	828	442	931	3,853	3,996	1,653	891	434	290	639	1,464	290
1990	Maximum	4,657	4,064	3,285	8,628	9,597	11,495	7,087	2,891	2,130	7,728	39,566	6,634	39,566
	Average	2,116	1,811	2,205	5,433	5,712	8,063	4,431	1,821	1,077	2,737	11,282	3,649	4,190
	Minimum	1,121	920	1,304	2,438	3,792	5,807	2,370	800	587	133	2,406	1,295	133
1991	Maximum	3,687	11,809	3,761	8,467	16,679	16,370	17,146	4,768	3,324	1,742	3,688	4,001	17,146
	Average	2,067	5,420	2,374	4,555	8,385	10,580	9,150	3,661	1,673	1,005	1,836	1,909	4,373
	Minimum	1,155	2,604	1,198	2,203	4,657	6,690	4,316	2,033	263	60	151	923	60
1992	Maximum	7,137	10,963	5,308	11,382	10,034	6,630	3,228	2,073	1,988	3,377	2,702	1,585	11,382
	Average	2,383	3,334	3,322	3,946	5,434	4,113	2,209	1,345	1,008	1,334	1,589	1,009	2,581
	Minimum	726	296	908	2,183	3,071	3,176	1,565	705	439	363	600	612	296
1993	Maximum	1,753	1,624	5,780	3,067	16,882	7,728	4,004	2,574	1,717	2,957	1,907	3,995	16,882
	Average	998	1,224	2,044	2,246	8,096	4,331	2,534	1,870	1,059	1,134	998	1,652	2,360
	Minimum	326	647	558	1,470	1,410	2,345	1,816	1,087	674	523	468	806	326
1994	Maximum	2,646	1,939	5,689	9,201	10,998	5,542	4,361	2,158	1,468	2,528	6,866	9,798	10,998
	Average	1,801	1,340	3,203	4,935	6,256	4,048	2,705	1,260	953	873	1,071	2,748	2,608
	Minimum	1,063	723	1,791	2,675	3,631	2,979	1,439	784	271	398	513	818	271
1995	Maximum	6,691	9,131	3,219	4,714	12,821	11,138	6,321	2,977	1,414	3,781	38,297	17,021	38,297
	Average	1,753	4,524	2,780	2,735	8,000	7,242	3,633	1,709	1,057	1,716	9,617	5,499	4,176
	Minimum	1,061	2,084	2,157	1,626	4,499	5,258	1,695	1,009	675	755	608	2,048	608
1996	Maximum	6,667	7,616	3,624	7,632	7,905	12,936	8,250	2,552	1,633	2,938	4,300	2,499	12,936
	Average	3,531	3,382	2,333	4,443	4,550	7,488	4,997	1,646	868	1,187	2,065	1,356	3,146
	Minimum	1,242	1,417	1,506	1,358	2,242	4,702	2,905	850	345	363	1,041	607	345

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1997	Maximum	6,174	4,885	14,769	9,343	22,537	21,870	14,278	3,431	3,289	8,710	5,552	4,136	22,537
	Average	2,912	2,548	4,140	4,636	11,802	11,668	6,291	2,202	1,554	2,827	2,576	1,709	4,583
	Minimum	1,264	1,816	1,726	2,529	5,116	6,863	3,244	1,209	784	730	415	562	415
1998	Maximum	3,982	2,283	4,053	6,790	12,803	8,398	4,465	1,868	1,102	1,156	4,793	7,597	12,803
	Average	2,065	1,537	2,056	2,700	7,973	5,635	2,793	1,228	765	629	1,670	2,577	2,644
	Minimum	817	653	827	949	4,555	3,357	1,946	737	481	206	319	1,016	206
1999	Maximum	6,185	2,995	2,566	7,226	20,521	23,900	14,948	8,465	2,735	4,051	28,997	5,486	28,997
	Average	2,581	1,744	1,587	2,941	6,923	12,066	9,973	4,647	1,634	1,689	6,068	3,225	4,601
	Minimum	1,363	989	888	896	3,321	6,769	6,794	2,678	946	703	1,824	2,113	703
2000	Maximum	2,990	2,534	2,098	6,550	9,686	10,666	6,010	3,421	2,177	5,079	1,965	2,000	10,666
	Average	1,785	1,423	1,560	4,290	5,752	7,925	4,034	1,800	1,259	1,346	966	794	2,742
	Minimum	1,070	1,081	1,113	1,439	3,153	6,401	2,561	1,086	746	605	551	249	249
2001	Maximum	3,278	1,613	1,657	4,686	11,383	5,761	2,949	2,594	1,390	2,693	10,879	5,540	11,383
	Average	1,104	753	1,095	1,669	4,934	3,842	1,892	1,316	798	843	2,934	1,949	1,933
	Minimum	521	270	402	672	2,322	2,744	1,287	847	445	203	682	925	203
2002	Maximum	19,333	9,761	3,170	13,013	16,114	18,935	9,740	2,538	1,659	875	1,783	2,494	19,333
	Average	3,732	2,274	1,883	4,087	7,538	12,953	6,214	1,875	1,005	618	909	1,103	3,683
	Minimum	750	1,086	1,389	1,493	3,304	7,542	2,924	1,367	539	383	351	484	351
2003	Maximum	9,542	4,818	7,664	5,438	11,671	11,880	4,025	1,803	1,050	35,717	12,666	3,760	35,717
	Average	2,554	1,959	2,945	3,456	5,397	6,623	2,342	1,097	763	6,307	3,477	2,257	3,272
	Minimum	854	764	797	2,504	2,976	3,395	1,502	678	343	537	1,353	1,458	343
2004	Maximum	4,462	2,658	3,749	8,000	9,740	8,080	3,745	2,537	5,395	1,716	8,044	16,005	16,005
	Average	1,960	1,785	2,598	4,745	6,778	5,678	2,193	1,478	2,066	1,294	3,040	4,191	3,150
	Minimum	951	1,406	1,242	2,884	4,816	3,812	1,405	1,119	1,149	918	1,713	1,972	918
2005	Maximum	18,279	4,069	2,654	6,503	5,283	3,345	2,692	1,435	1,560	3,160	3,017	11,761	18,279
	Average	5,012	2,432	1,644	2,674	3,826	2,404	1,687	943	742	1,411	1,955	2,825	2,299
	Minimum	1,152	1,318	1,097	1,245	2,355	1,766	931	218	299	443	1,329	808	218
2006	Maximum	6,974	3,412	1,827	6,897	19,126	12,021	5,049	1,411	1,058	1,109	34,383	4,651	34,383
	Average	3,690	1,975	1,329	2,917	7,965	7,700	2,904	1,032	767	558	6,933	2,528	3,356
	Minimum	2,197	974	900	1,262	3,962	4,808	1,381	690	591	212	439	1,498	212

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2007	Maximum	6,470	3,675	22,596	7,662	12,011	20,830	7,532	1,908	1,474	4,035	3,562	21,563	22,596
	Average	2,709	2,314	6,222	4,458	7,609	8,552	4,617	1,363	1,018	1,944	1,958	3,764	3,889
	Minimum	1,472	1,386	1,575	3,169	3,984	4,934	1,862	756	696	795	1,221	1,118	696
2008	Maximum	2,172	2,178	2,712	3,328	23,746	12,375	11,222	3,071	1,700	2,584	10,173	2,678	23,746
	Average	1,596	1,546	1,882	1,650	10,174	7,803	4,509	2,069	1,228	1,342	2,995	1,566	3,203
	Minimum	1,244	1,066	1,313	774	2,626	5,454	1,919	1,671	911	841	984	894	774
2009	Maximum	5,829	1,818	1,756	5,821	13,890	13,143	3,977	2,588	2,219	8,177	11,453	4,728	13,890
	Average	1,875	1,246	1,166	2,653	6,568	7,897	2,858	1,403	1,092	1,995	5,035	2,526	3,028
	Minimum	559	771	199	985	2,746	3,704	1,999	745	547	426	2,461	1,665	199
2010	Maximum	5,115	2,273	2,653	5,450	10,502	11,027	7,804	3,769	5,512	5,302	3,550	8,812	11,027
	Average	2,801	1,596	1,619	2,842	5,322	8,386	4,903	2,089	2,098	1,888	2,138	2,635	3,199
	Minimum	1,638	1,203	1,098	1,392	2,386	6,492	2,884	996	950	1,073	1,199	963	950
2011	Maximum	16,396	4,687	4,245	4,676	9,965	16,498	13,375	5,678	5,814	3,657	9,338	5,058	16,498
	Average	4,120	3,101	2,291	2,384	6,358	12,025	8,849	3,443	1,920	1,984	2,463	2,096	4,257
	Minimum	1,349	1,681	1,806	1,595	2,087	8,653	5,738	1,836	1,131	1,172	1,086	1,087	1,086
2012	Maximum	6,966	3,550	3,254	13,625	14,436	14,757	14,193	4,162	1,617	9,411	7,258	4,208	14,757
	Average	2,851	2,216	2,267	5,006	8,620	10,886	9,029	2,510	1,127	2,419	4,081	2,374	4,452
	Minimum	1,432	1,559	1,207	1,870	5,047	6,442	3,883	1,182	899	771	2,378	1,242	771
2013	Maximum	3,929	2,145	4,678	7,403	20,921	10,254	8,877	3,293	9,347	8,020	3,822	3,150	20,921
	Average	1,815	1,684	2,795	4,375	9,598	7,620	4,161	2,133	2,820	3,131	2,021	1,749	3,669
	Minimum	1,174	1,328	1,841	2,955	3,554	5,657	2,163	1,352	1,198	1,408	1,428	1,237	1,174
2014	Maximum	5,706	2,676	7,504	5,014	15,752	12,790	9,003	2,902	2,810	6,298	23,350	13,221	23,350
	Average	2,438	1,804	3,679	3,756	9,901	9,573	5,375	2,014	1,423	2,431	4,830	5,483	4,408
	Minimum	1,152	1,249	1,569	2,373	5,417	7,613	2,590	1,308	826	913	1,597	2,527	826
2015	Maximum	9,638	17,308	5,570	4,722	7,292	5,488	2,101	2,965	3,371	7,558	13,406	13,437	17,308
	Average	4,650	5,959	3,520	2,998	5,004	3,111	1,511	1,156	1,548	1,740	5,398	3,963	3,360
	Minimum	2,538	2,551	2,047	2,062	2,963	1,729	1,084	686	811	839	2,417	1,865	686
2016	Maximum	13,980	9,304	4,677	14,487	10,753	9,725	4,069	1,895	2,204	7,131	7,236	2,860	14,487
	Average	3,288	4,972	3,436	7,334	7,255	5,021	2,715	1,398	1,228	3,440	4,483	1,852	3,855
	Minimum	1,665	3,242	2,386	3,604	4,990	2,840	2,017	831	806	845	2,884	1,119	806

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2017	Maximum	3,434	6,107	7,566	4,641	17,390	15,191	6,049	2,242	1,608	7,540	30,719	5,080	30,719
	Average	1,638	2,467	4,027	3,986	9,906	8,099	3,468	1,548	1,122	2,020	4,904	2,715	3,828
	Minimum	1,057	1,139	1,621	3,346	3,497	5,645	2,191	858	819	645	1,166	1,584	645
2018	Maximum	4,932	7,153	2,692	9,418	16,875	7,413	3,896	2,141	2,374	3,249	9,250	4,539	16,875
	Average	2,688	4,040	1,953	3,824	11,527	5,574	2,810	1,348	1,233	1,598	3,735	2,903	3,599
	Minimum	1,337	2,390	1,458	1,534	6,830	3,622	1,973	818	622	721	1,609	1,825	622
2019	Maximum	6,093	2,684	2,608	8,567	10,487	8,400	2,909	1,581	2,490	3,053	2,119	2,945	10,487
	Average	2,832	1,705	1,658	3,924	7,197	4,289	2,020	1,089	1,309	1,621	1,416	1,508	2,552
	Minimum	1,858	1,225	957	2,203	3,337	2,639	1,225	786	797	771	970	1,016	771
2020	Maximum	4,216	18,590	2,491	7,146	19,725	13,129	6,663	2,398	4,901	3,859	17,156	4,565	19,725
	Average	2,488	3,788	1,734	3,346	9,630	8,237	3,954	1,550	1,488	2,201	4,128	2,491	3,747
	Minimum	1,452	1,728	1,349	1,365	5,609	6,137	2,426	831	745	1,038	2,000	1,562	745
2021	Maximum	6,967	2,922	2,146	6,130	12,104	16,145	6,925	2,171	7,006	8,646	59,777	18,958	59,777
	Average	3,054	1,816	1,667	3,534	7,208	9,133	2,814	1,384	1,756	2,337	10,059	5,220	4,163
	Minimum	1,727	1,192	1,356	1,485	4,777	5,064	1,491	688	749	1,198	2,517	1,627	688
34-Year Summary	Maximum	19,333	18,590	22,596	14,487	23,746	23,900	17,146	8,465	9,347	35,717	59,777	21,715	59,777
	Average	2,515	2,420	2,413	3,769	7,406	7,460	4,118	1,780	1,276	1,835	3,714	2,653	3,448
	Minimum	242	199	199	672	1,410	1,729	931	218	263	60	151	249	60

Table A-2. Monthly minimum, average, and maximum inflows (cfs) into Diablo Lake (1988-2021).

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1988	Maximum	5,730	6,033	6,060	4,427	4,964	5,826	5,524	4,345	4,120	7,156	6,405	4,592	7,156
	Average	3,185	4,100	4,451	2,666	2,434	3,584	4,029	3,381	3,320	3,832	4,664	3,784	3,635
	Minimum	1,239	2,062	3,319	1,038	1,278	1,228	2,143	2,590	1,875	2,295	3,021	2,364	1,038
1989	Maximum	8,486	9,390	7,019	3,665	4,105	4,763	7,344	4,398	3,911	3,244	7,978	14,764	14,764
	Average	5,879	6,253	3,018	2,088	2,220	3,278	3,878	3,182	2,741	2,540	5,416	5,103	3,802
	Minimum	3,686	4,377	1,542	951	936	2,205	1,370	1,844	1,980	1,511	2,765	2,885	936
1990	Maximum	7,351	8,236	7,510	4,837	4,365	6,928	9,079	6,133	4,646	6,234	25,297	13,645	25,297
	Average	5,542	6,551	5,612	3,488	2,848	2,758	5,478	3,290	3,523	3,070	13,274	5,475	5,066
	Minimum	2,265	4,563	3,158	2,373	1,426	1,074	2,344	1,851	1,665	1,288	5,791	1,619	1,074
1991	Maximum	7,653	14,549	7,437	7,740	6,283	6,370	16,115	7,343	6,944	3,782	4,931	4,642	16,115
	Average	5,854	9,442	6,400	5,410	5,268	4,264	8,861	5,196	3,361	2,843	2,916	3,434	5,250
	Minimum	4,167	5,572	3,297	3,243	4,033	1,878	4,414	1,849	1,191	1,514	757	2,134	757
1992	Maximum	6,940	7,355	7,499	4,832	2,710	2,791	5,549	4,304	2,972	7,561	6,558	4,799	7,561
	Average	5,567	6,466	5,244	3,161	1,901	2,298	4,286	3,439	1,948	2,908	4,188	3,407	3,829
	Minimum	3,459	5,159	3,492	1,098	1,455	1,749	1,958	1,431	1,096	1,419	2,710	1,416	1,096
1993	Maximum	5,709	4,840	2,730	3,178	2,300	2,337	4,974	4,509	3,571	3,034	5,926	4,366	5,926
	Average	3,723	3,700	2,243	2,122	1,590	1,560	2,934	2,716	2,594	2,545	3,951	3,222	2,863
	Minimum	2,006	2,148	1,711	1,692	977	1,083	1,507	1,522	1,706	1,911	1,376	1,989	977
1994	Maximum	6,414	6,115	4,765	4,793	3,627	3,559	4,866	4,307	3,895	3,375	4,786	4,867	6,414
	Average	4,175	4,013	3,449	3,826	2,521	2,258	3,181	3,164	3,137	2,251	2,966	3,475	3,204
	Minimum	2,166	805	2,435	2,886	1,398	1,692	1,903	2,008	2,424	1,066	1,438	1,922	805
1995	Maximum	7,526	6,537	6,989	6,477	5,288	4,955	3,930	4,417	3,786	3,492	18,902	25,839	25,839
	Average	5,470	5,475	5,957	4,249	3,446	3,028	2,816	3,050	2,623	2,463	9,983	8,978	4,817
	Minimum	3,840	3,994	4,643	1,762	1,675	1,839	1,786	1,801	1,861	1,627	2,863	1,836	1,627
1996	Maximum	7,452	8,102	6,385	6,161	5,548	6,002	6,802	4,342	4,479	4,914	5,157	4,967	8,102
	Average	5,263	4,771	5,279	4,795	4,556	4,149	4,577	2,782	2,668	2,734	3,549	3,610	4,059
	Minimum	2,699	2,219	3,829	2,616	3,449	2,963	2,209	1,692	1,942	1,497	2,101	2,137	1,497

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1997	Maximum	7,405	7,047	7,762	7,364	7,759	21,373	18,758	5,878	4,007	11,719	10,495	5,388	21,373
	Average	5,013	5,908	6,404	5,970	6,107	8,889	8,226	3,700	2,573	4,201	5,274	3,868	5,506
	Minimum	1,640	4,554	3,472	3,426	4,531	5,045	4,358	2,099	1,292	1,954	2,251	2,763	1,292
1998	Maximum	7,806	4,892	5,902	5,584	2,687	2,733	5,801	5,418	4,387	3,822	4,045	6,114	7,806
	Average	5,004	4,106	4,592	4,209	2,006	2,027	3,558	3,126	3,102	2,920	2,858	3,373	3,421
	Minimum	3,114	3,372	3,497	2,144	1,477	1,287	1,937	1,892	2,101	1,777	1,758	1,357	1,287
1999	Maximum	6,845	7,118	7,349	5,673	5,737	6,458	12,239	11,983	4,590	4,252	14,476	5,385	14,476
	Average	5,682	6,354	5,423	4,363	4,437	4,701	7,425	6,579	3,578	3,391	6,628	4,082	5,214
	Minimum	2,759	5,182	3,300	2,371	2,592	3,038	4,837	3,018	2,712	1,889	2,829	2,163	1,889
2000	Maximum	7,202	6,213	5,578	4,542	4,539	5,582	6,285	5,438	4,914	4,220	6,793	5,445	7,202
	Average	6,187	5,470	4,589	3,319	2,665	3,088	4,979	3,510	3,287	3,039	3,697	3,286	3,937
	Minimum	4,857	4,635	3,490	2,403	1,380	1,663	3,454	1,588	2,229	1,750	2,394	1,761	1,380
2001	Maximum	4,258	3,415	2,972	2,463	2,460	2,286	3,190	5,034	3,701	2,916	3,288	4,284	5,034
	Average	2,662	2,313	2,265	1,806	1,466	1,426	2,726	3,552	2,682	2,281	2,278	2,988	2,432
	Minimum	888	1,390	1,764	1,130	1,040	714	1,887	2,726	1,701	1,539	1,133	1,237	714
2002	Maximum	7,469	7,339	7,564	6,265	6,976	8,312	13,212	4,190	3,911	3,726	3,295	3,398	13,212
	Average	6,036	5,845	6,227	4,284	5,293	5,398	7,605	3,194	2,416	2,174	2,438	2,103	4,415
	Minimum	1,826	3,318	4,653	1,627	3,271	2,484	3,464	1,685	1,289	1,365	1,371	1,135	1,135
2003	Maximum	6,075	6,460	5,355	4,950	4,753	7,161	5,596	4,265	4,249	31,131	7,886	7,230	31,131
	Average	4,540	4,121	3,234	3,611	3,498	4,308	3,692	3,165	3,081	6,797	5,647	3,932	4,130
	Minimum	1,690	1,958	1,594	2,355	2,325	2,166	2,490	2,231	2,261	1,732	1,756	2,911	1,594
2004	Maximum	7,138	7,356	4,365	3,387	2,454	9,790	5,364	5,035	4,556	6,341	7,310	6,365	9,790
	Average	5,760	6,528	2,668	2,468	1,683	3,902	3,557	3,316	3,051	3,508	5,165	4,264	3,809
	Minimum	2,237	3,491	1,843	1,557	1,066	1,124	2,080	2,342	1,623	2,153	2,257	2,400	1,066
2005	Maximum	6,951	7,606	4,255	2,836	3,588	2,793	2,990	2,636	3,647	4,654	7,139	4,835	7,606
	Average	5,728	5,070	2,674	2,042	2,082	1,960	2,141	2,081	2,866	2,934	5,311	3,867	3,237
	Minimum	3,000	3,046	1,711	1,037	847	903	1,399	1,514	2,105	1,106	3,525	1,553	847
2006	Maximum	7,478	7,181	7,671	3,093	2,932	3,376	5,875	2,633	3,181	2,550	23,660	4,637	23,660
	Average	5,417	6,396	5,866	2,242	2,134	2,645	3,586	2,115	2,630	1,832	8,099	3,818	3,897
	Minimum	2,238	4,005	2,079	920	1,393	2,110	1,816	1,721	1,805	744	1,352	2,495	744

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2007	Maximum	7,625	7,676	7,164	6,666	4,950	8,916	10,265	4,499	3,968	7,246	4,749	6,185	10,265
	Average	6,067	6,399	6,001	5,193	3,290	6,251	6,495	2,590	2,822	3,765	3,536	4,080	4,696
	Minimum	3,897	5,350	3,095	3,673	2,145	3,582	3,176	1,428	1,212	1,861	1,965	3,092	1,212
2008	Maximum	7,637	7,835	6,638	4,791	3,863	5,451	12,621	4,740	4,607	4,111	4,699	4,845	12,621
	Average	5,845	5,500	4,739	3,335	2,307	2,680	5,895	3,401	3,424	3,290	3,242	3,813	3,958
	Minimum	4,167	2,817	2,944	1,439	1,248	1,268	2,552	1,760	2,543	1,814	1,423	2,549	1,248
2009	Maximum	4,757	5,080	3,504	5,152	2,700	8,949	5,777	5,556	4,215	6,118	9,495	6,748	9,495
	Average	3,587	4,084	2,831	2,939	2,051	5,019	4,116	2,856	2,639	2,871	6,868	4,896	3,720
	Minimum	2,351	2,754	2,012	1,870	1,287	2,237	2,404	1,848	1,795	1,730	3,281	3,685	1,287
2010	Maximum	5,584	5,891	3,881	4,126	3,856	7,225	7,726	5,231	5,272	8,265	4,787	5,552	8,265
	Average	4,388	3,976	3,189	3,211	2,960	3,870	6,092	3,164	3,321	5,270	3,252	3,536	3,856
	Minimum	3,441	2,558	2,223	2,330	1,840	1,855	4,237	1,902	1,533	2,158	2,065	2,657	1,533
2011	Maximum	7,569	7,577	7,927	5,595	6,649	7,551	10,144	7,142	4,799	4,110	6,952	4,441	10,144
	Average	5,469	6,765	6,203	4,566	4,103	5,312	7,640	5,000	3,659	3,458	4,383	3,943	5,034
	Minimum	3,782	5,383	3,991	3,209	2,696	2,587	5,261	3,147	2,533	2,737	2,616	2,541	2,533
2012	Maximum	6,131	7,321	7,662	4,947	5,971	12,016	12,741	6,358	4,254	4,051	10,444	5,564	12,741
	Average	5,015	6,510	5,360	3,552	4,949	7,814	9,004	4,082	2,954	3,013	6,546	4,814	5,302
	Minimum	3,234	5,908	3,337	2,013	3,822	3,799	4,337	2,287	2,071	1,571	3,752	4,294	1,571
2013	Maximum	7,905	7,005	5,193	5,045	4,724	6,441	5,938	5,060	5,022	8,044	4,828	4,966	8,044
	Average	6,286	5,479	4,054	4,051	3,644	4,687	4,353	3,469	3,829	5,485	4,050	4,442	4,481
	Minimum	4,909	4,795	3,468	3,221	2,599	3,380	2,619	2,053	2,470	2,731	3,570	3,540	2,053
2014	Maximum	4,751	5,821	5,465	6,022	5,699	11,924	11,316	5,379	4,839	5,958	11,295	14,393	14,393
	Average	4,060	4,452	4,550	4,938	4,324	6,729	7,437	3,366	3,528	3,551	5,734	6,923	4,967
	Minimum	3,360	3,460	2,591	4,319	3,441	3,811	3,393	2,340	2,242	2,230	2,543	4,305	2,230
2015	Maximum	7,917	8,255	7,593	4,443	3,423	5,254	4,228	3,011	4,769	5,648	6,978	6,357	8,255
	Average	6,735	7,062	5,092	3,503	2,544	3,326	3,149	2,241	3,764	4,105	4,769	5,509	4,301
	Minimum	4,639	4,087	2,563	2,736	1,911	2,387	2,403	1,510	2,168	2,543	3,040	4,253	1,510
2016	Maximum	8,360	7,449	7,699	5,737	6,921	6,976	5,982	3,454	4,982	7,006	12,242	7,268	12,242
	Average	6,684	6,098	6,001	4,140	4,670	4,550	3,928	2,782	3,786	4,865	5,102	4,746	4,776
	Minimum	5,073	2,197	4,455	2,037	2,923	2,814	2,499	1,928	2,283	2,488	2,672	3,484	1,928

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2017	Maximum	7,930	4,242	7,644	6,030	6,980	10,805	6,185	4,713	5,616	5,208	10,750	12,805	12,805
	Average	5,534	3,123	4,591	4,954	5,312	6,681	4,614	3,012	3,749	3,589	4,843	5,344	4,620
	Minimum	2,596	1,930	2,819	3,564	3,815	4,296	3,219	1,512	1,892	1,341	3,090	3,270	1,341
2018	Maximum	6,908	12,473	12,590	4,305	4,325	4,703	5,239	4,758	4,964	5,221	4,781	4,882	12,590
	Average	5,617	8,359	7,315	3,177	3,135	3,545	3,590	3,093	4,105	4,223	3,883	4,132	4,542
	Minimum	3,955	5,004	3,461	2,124	1,729	2,511	2,104	1,893	1,587	3,301	2,422	3,126	1,587
2019	Maximum	7,158	6,973	5,851	5,222	4,826	4,674	3,588	3,810	4,010	3,462	3,428	3,941	7,158
	Average	5,833	5,945	4,838	3,845	3,184	3,012	2,585	2,261	3,047	2,749	2,799	2,605	3,550
	Minimum	3,382	5,020	3,063	2,733	1,973	1,685	2,058	1,479	2,090	1,549	1,523	1,805	1,479
2020	Maximum	3,932	6,877	7,589	4,558	3,998	8,937	7,555	3,750	5,810	8,571	10,161	4,796	10,161
	Average	2,609	5,485	5,215	3,561	2,552	4,954	4,931	2,610	3,654	4,460	4,780	4,033	4,065
	Minimum	1,118	2,431	3,434	2,750	1,602	2,918	2,977	1,692	1,792	2,379	2,650	2,383	1,118
2021	Maximum	7,392	7,717	7,373	4,679	2,681	10,743	8,683	3,776	4,457	8,726	27,358	20,687	27,358
	Average	5,879	6,688	5,358	3,253	2,026	4,174	4,192	2,772	3,459	4,389	12,204	6,503	5,054
	Minimum	2,497	5,953	3,030	1,584	1,403	1,664	2,318	1,475	2,025	2,789	2,546	2,788	1,403
34-Year Summary	Maximum	7,930	12,473	12,590	6,030	6,980	10,805	8,683	4,758	5,810	8,726	27,358	20,687	27,358
	Average	5,095	5,917	5,463	3,757	3,255	4,479	4,013	2,750	3,603	3,882	5,714	4,523	4,366
	Minimum	1,118	1,930	2,819	1,584	1,403	1,664	2,058	1,475	1,587	1,341	1,523	1,805	1,118

Table A-3. Monthly minimum, average, and maximum inflows (cfs) into Gorge Lake (1988-2021).

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1988	Maximum	5,351	6,062	6,202	4,169	4,843	5,950	6,005	4,606	3,761	5,735	6,101	4,558	6,202
	Average	3,306	4,280	4,698	3,341	2,650	4,123	4,456	3,566	3,487	4,093	4,932	4,011	3,923
	Minimum	2,254	3,059	3,264	2,402	1,716	1,349	2,871	3,002	2,718	2,710	3,326	3,195	1,349
1989	Maximum	6,899	7,208	6,540	4,319	4,820	4,353	7,948	4,248	3,402	3,279	9,396	15,851	15,851
	Average	6,018	6,432	3,186	2,638	2,742	3,805	4,255	3,392	2,851	2,678	6,004	5,433	4,116
	Minimum	3,681	5,128	2,220	1,668	1,638	2,831	2,412	1,994	1,831	1,941	3,766	3,240	1,638
1990	Maximum	7,145	7,327	7,069	4,500	3,683	5,903	10,046	5,855	4,087	6,523	26,456	13,828	26,456
	Average	5,789	6,688	5,781	4,054	3,185	3,383	5,958	3,472	3,591	3,470	14,280	5,802	5,446
	Minimum	3,461	5,979	3,449	3,476	2,011	1,861	3,177	1,846	2,503	2,397	6,572	3,230	1,846
1991	Maximum	7,197	15,231	7,116	7,416	6,102	6,259	16,909	7,229	6,922	3,458	5,441	4,258	16,909
	Average	6,044	10,053	6,605	5,798	5,746	4,777	9,522	5,540	3,585	2,906	3,289	3,605	5,600
	Minimum	4,034	6,848	3,755	3,558	5,448	3,022	5,532	2,917	2,755	2,044	1,830	2,615	1,830
1992	Maximum	6,583	7,414	7,302	4,946	3,217	2,971	5,703	4,570	3,210	5,091	5,296	4,325	7,414
	Average	5,841	6,758	5,462	3,479	2,201	2,573	4,455	3,579	2,178	2,810	4,347	3,560	4,025
	Minimum	3,883	5,831	3,820	2,012	1,915	2,220	2,432	2,202	1,574	1,740	3,344	1,967	1,574
1993	Maximum	5,628	5,076	3,117	2,764	2,928	2,346	5,158	3,840	3,703	3,147	5,881	4,394	5,881
	Average	3,807	3,884	2,440	2,329	2,033	1,890	3,196	2,883	2,653	2,703	4,068	3,436	3,044
	Minimum	2,430	2,337	2,223	2,200	1,612	1,513	2,355	1,912	1,837	2,318	2,669	2,283	1,513
1994	Maximum	5,930	5,954	5,023	4,706	3,505	3,470	4,036	3,786	3,593	3,230	4,607	4,874	5,954
	Average	4,497	4,261	3,797	4,191	3,031	2,559	3,441	3,265	3,276	2,416	3,117	3,719	3,467
	Minimum	2,819	2,597	2,737	3,647	2,441	2,166	2,355	2,403	2,837	1,707	2,054	2,366	1,707
1995	Maximum	6,924	6,913	6,993	6,611	5,411	5,199	4,107	4,168	3,332	3,540	21,593	27,716	27,716
	Average	5,689	6,070	6,223	4,371	4,168	3,462	3,133	3,304	2,698	2,879	11,054	9,332	5,218
	Minimum	3,893	5,349	5,000	3,367	2,551	2,470	2,472	1,721	1,801	1,757	3,582	2,541	1,721
1996	Maximum	7,156	7,138	6,449	5,855	5,480	5,286	6,876	4,643	3,419	3,681	5,370	4,418	7,156
	Average	5,613	5,239	5,499	5,195	4,887	4,583	4,953	2,937	2,851	3,004	3,903	3,738	4,363
	Minimum	3,320	2,470	4,176	4,575	4,373	3,458	2,683	2,009	2,044	2,132	2,458	2,523	2,009

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1997	Maximum	7,328	7,037	7,267	7,303	8,241	23,005	21,152	6,938	3,314	13,683	11,404	4,503	23,005
	Average	5,440	6,137	6,823	6,417	6,944	9,654	8,891	4,013	2,835	4,688	5,646	4,024	5,956
	Minimum	2,410	4,673	4,374	3,823	6,189	6,452	4,910	2,175	2,259	2,596	3,137	3,134	2,175
1998	Maximum	6,680	5,221	5,841	5,467	3,058	3,027	6,317	4,608	4,272	3,537	4,004	5,292	6,680
	Average	5,204	4,315	4,753	4,445	2,480	2,516	3,824	3,206	3,183	3,040	3,188	3,688	3,665
	Minimum	3,712	3,539	4,163	2,950	2,202	2,186	2,392	2,305	1,474	2,422	2,020	2,227	1,474
1999	Maximum	6,924	6,811	6,649	5,465	6,546	6,761	13,631	13,264	4,440	4,154	14,910	5,983	14,910
	Average	5,957	6,552	5,629	4,668	4,878	5,366	8,225	7,080	3,781	3,705	7,121	4,432	5,610
	Minimum	3,198	6,231	4,313	3,599	3,807	3,992	5,615	3,999	3,246	3,470	3,382	2,936	2,936
2000	Maximum	7,105	6,482	5,624	4,466	3,835	6,778	6,722	5,816	4,168	4,385	5,702	4,912	7,105
	Average	6,268	5,603	4,750	3,754	3,123	3,703	5,421	3,796	3,426	3,250	3,816	3,380	4,197
	Minimum	5,099	5,007	4,218	3,191	2,373	2,389	4,027	2,243	2,272	1,895	3,058	2,297	1,895
2001	Maximum	4,543	2,745	2,570	2,489	2,381	2,277	3,277	4,352	3,670	3,126	4,765	4,327	4,765
	Average	2,835	2,396	2,398	2,018	1,671	1,615	2,986	3,721	2,773	2,534	2,683	3,156	2,624
	Minimum	2,278	2,084	2,118	1,800	1,268	1,324	2,795	3,268	1,669	1,722	1,619	2,283	1,268
2002	Maximum	8,248	7,135	7,069	6,164	6,954	9,103	14,220	4,384	4,015	3,344	3,301	3,277	14,220
	Average	6,426	6,131	6,410	4,745	5,872	6,205	8,228	3,437	2,545	2,236	2,644	2,213	4,754
	Minimum	2,596	5,416	4,794	2,816	3,684	3,392	3,769	2,655	1,676	1,652	1,898	1,848	1,652
2003	Maximum	6,305	6,611	4,850	4,563	4,389	7,131	6,082	4,126	3,801	32,542	8,013	7,759	32,542
	Average	4,946	4,295	3,577	3,928	3,876	4,807	3,990	3,272	3,146	7,502	5,958	4,122	4,446
	Minimum	2,308	2,525	2,367	3,249	3,095	2,731	3,001	2,263	2,434	2,467	3,157	3,287	2,263
2004	Maximum	7,272	7,191	4,872	3,137	2,547	10,539	6,662	4,951	4,173	6,305	7,238	7,091	10,539
	Average	5,998	6,716	2,888	2,864	2,270	4,324	3,840	3,484	3,468	3,712	5,627	4,672	4,142
	Minimum	3,654	4,019	2,581	2,538	1,983	1,908	2,651	2,255	2,360	2,588	3,951	3,747	1,908
2005	Maximum	9,526	7,175	4,060	2,597	2,902	2,630	2,880	2,459	3,344	4,879	7,075	4,579	9,526
	Average	6,268	5,260	2,863	2,381	2,479	2,202	2,314	2,196	2,904	3,273	5,590	4,173	3,499
	Minimum	3,616	4,043	2,314	2,162	2,021	1,922	1,961	2,028	2,326	1,763	4,222	2,752	1,763
2006	Maximum	7,569	7,192	7,178	3,087	4,871	3,955	5,935	2,654	3,020	2,427	24,634	4,559	24,634
	Average	5,829	6,592	5,971	2,554	2,646	3,275	3,958	2,205	2,704	1,898	8,820	4,022	4,199
	Minimum	2,620	3,877	2,846	2,240	2,106	2,768	2,615	2,073	2,106	1,620	2,027	3,189	1,620

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2007	Maximum	7,206	7,030	9,077	6,206	5,108	9,750	11,323	3,509	3,274	7,075	4,511	7,272	11,323
	Average	6,301	6,637	6,582	5,547	3,869	6,908	7,080	2,776	2,925	4,145	3,826	4,342	5,068
	Minimum	4,523	5,540	3,444	4,445	3,284	4,472	3,540	2,167	2,320	2,965	3,517	3,640	2,167
2008	Maximum	7,643	7,386	6,969	4,068	6,156	6,776	14,920	5,081	4,446	3,811	4,879	4,523	14,920
	Average	5,936	5,588	4,932	3,543	3,250	3,270	6,563	3,724	3,594	3,469	3,776	3,930	4,300
	Minimum	4,407	3,268	3,491	2,999	2,091	1,895	3,018	2,002	3,179	1,674	1,938	2,977	1,674
2009	Maximum	5,385	5,380	3,384	3,737	3,839	9,669	5,962	5,381	4,397	7,522	10,989	7,040	10,989
	Average	4,008	4,199	2,954	3,149	2,523	5,528	4,387	2,972	2,775	3,181	7,345	5,054	3,997
	Minimum	2,744	2,837	2,723	2,637	1,996	2,821	2,683	2,173	2,253	2,607	4,573	4,079	1,996
2010	Maximum	5,505	5,801	3,638	3,563	3,491	7,464	8,233	4,500	4,452	7,913	4,440	5,210	8,233
	Average	4,620	4,084	3,289	3,367	3,256	4,384	6,431	3,274	3,513	5,426	3,674	3,841	4,101
	Minimum	3,539	2,877	2,968	3,131	2,563	2,899	4,485	2,266	1,740	2,269	2,756	2,959	1,740
2011	Maximum	7,728	7,661	7,381	5,692	5,186	7,758	10,943	8,553	4,443	4,242	6,595	4,563	10,943
	Average	5,828	7,032	6,392	4,758	4,437	5,854	8,318	5,464	3,892	3,709	4,656	4,174	5,369
	Minimum	4,112	5,862	5,174	3,010	3,159	3,618	5,824	3,575	3,192	3,086	3,376	3,471	3,010
2012	Maximum	6,073	7,230	7,186	4,863	6,121	12,875	13,414	6,695	3,427	5,867	10,539	5,282	13,414
	Average	5,320	6,772	5,509	3,977	5,444	8,480	9,812	4,481	3,073	3,593	7,095	4,955	5,710
	Minimum	3,372	6,268	3,339	2,465	4,550	5,397	4,734	2,697	2,145	3,015	4,674	4,601	2,145
2013	Maximum	7,614	7,104	5,141	4,989	5,365	7,014	6,350	5,046	6,622	8,377	4,866	4,975	8,377
	Average	6,413	5,610	4,344	4,430	4,217	5,252	4,737	3,617	4,124	5,686	4,253	4,570	4,767
	Minimum	5,209	4,968	3,820	3,569	3,555	4,402	2,990	2,401	2,883	3,888	3,709	4,184	2,401
2014	Maximum	4,598	5,794	5,515	5,691	5,621	12,838	12,171	4,708	3,789	6,029	12,141	14,866	14,866
	Average	4,303	4,574	4,948	5,234	5,046	7,379	8,049	3,574	3,626	3,905	6,435	7,278	5,366
	Minimum	3,972	4,067	4,031	4,374	4,356	5,100	4,078	2,553	2,987	3,406	4,137	4,787	2,553
2015	Maximum	8,003	8,195	7,518	4,084	3,150	4,464	3,484	3,644	4,486	5,316	6,164	6,841	8,195
	Average	7,089	7,502	5,378	3,794	2,937	3,468	3,231	2,336	4,043	4,202	5,132	5,871	4,564
	Minimum	4,910	6,484	4,313	3,092	2,703	2,660	2,952	1,994	3,216	3,632	4,095	5,337	1,994
2016	Maximum	7,659	7,410	7,588	5,021	6,490	6,539	6,137	3,478	4,613	7,328	10,928	7,371	10,928
	Average	6,913	6,592	6,321	4,632	5,061	4,942	4,118	2,852	3,901	5,243	5,392	4,845	5,063
	Minimum	5,681	3,592	4,454	3,294	3,895	3,613	3,461	2,129	2,393	4,074	3,834	4,166	2,129

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2017	Maximum	7,517	4,347	7,578	6,336	6,533	10,711	6,752	4,479	4,674	6,739	13,671	12,797	13,671
	Average	5,623	3,554	5,026	5,292	6,107	7,320	4,972	3,213	3,727	3,930	5,405	5,479	4,977
	Minimum	2,975	2,731	3,406	4,047	5,430	5,297	3,630	1,835	1,644	3,488	3,623	4,100	1,644
2018	Maximum	7,280	12,323	12,286	4,205	4,821	4,534	5,712	4,687	4,549	4,633	5,855	4,940	12,323
	Average	5,958	8,718	7,427	3,626	3,960	4,039	3,903	3,196	4,166	4,388	4,419	4,338	4,854
	Minimum	4,476	6,675	4,003	3,306	2,465	2,855	2,672	2,108	1,772	4,200	3,982	4,060	1,772
2019	Maximum	6,882	7,072	5,749	5,711	4,773	4,264	2,953	2,692	3,383	3,266	3,317	3,100	7,072
	Average	6,081	6,071	4,946	4,206	3,803	3,371	2,688	2,323	3,181	3,098	2,977	2,806	3,789
	Minimum	4,572	5,165	4,241	3,078	3,363	2,588	2,278	2,170	3,025	2,922	2,726	2,295	2,170
2020	Maximum	3,664	7,051	6,521	4,026	4,546	9,364	7,532	4,169	4,432	8,840	10,543	4,859	10,543
	Average	3,028	5,829	5,321	3,856	3,245	5,539	5,332	2,788	3,799	4,843	5,180	4,254	4,411
	Minimum	2,326	3,195	4,170	3,536	2,681	3,673	3,396	2,233	1,923	3,736	3,607	3,635	1,923
2021	Maximum	7,008	7,077	6,850	3,855	3,080	11,814	9,665	3,595	4,522	9,675	28,248	22,102	28,248
	Average	6,195	6,815	5,471	3,584	2,621	4,903	4,492	2,906	3,640	4,791	13,490	6,851	5,459
	Minimum	3,401	6,490	4,041	3,342	2,289	2,469	2,778	2,131	2,138	3,631	4,095	3,620	2,131
34-Year Summary	Maximum	7,517	12,323	12,286	6,336	6,533	11,814	9,665	4,687	4,674	9,675	28,248	22,102	28,248
	Average	5,377	6,195	5,638	4,112	3,951	5,041	4,311	2,885	3,703	4,210	6,307	4,746	4,699
	Minimum	2,326	2,731	3,406	3,078	2,289	2,469	2,278	1,835	1,644	2,922	2,726	2,295	1,644

Table A-4. Monthly minimum, average, and maximum outflows (cfs) from Ross Lake (1988-2021).

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1988	Maximum	5,643	5,902	5,753	4,082	4,451	4,176	4,440	3,410	3,608	6,797	5,984	4,270	6,797
	Average	3,057	3,946	4,165	1,873	1,411	2,180	2,688	2,391	2,611	3,083	4,148	3,432	2,946
	Minimum	1,069	1,909	2,930	88	2	103	507	1,808	1,059	865	1,191	1,791	2
1989	Maximum	7,848	9,143	6,877	2,707	2,934	3,631	5,223	3,168	3,323	2,944	7,493	12,946	12,946
	Average	5,629	6,046	2,838	1,320	1,307	1,772	2,614	2,178	2,236	2,202	4,524	4,492	3,118
	Minimum	3,464	4,114	1,364	59	70	302	37	714	1,449	1,172	341	2,162	37
1990	Maximum	7,099	8,064	7,292	3,871	3,902	5,401	6,109	4,375	3,797	5,664	23,326	13,084	23,326
	Average	5,174	6,318	5,318	2,688	2,086	1,246	3,657	1,920	2,741	2,348	11,471	5,031	4,156
	Minimum	2,060	4,351	2,910	1,367	504	116	635	215	816	231	4,517	1,489	116
1991	Maximum	7,301	14,052	7,206	7,376	5,944	5,526	13,933	5,767	6,047	3,617	4,350	4,450	14,052
	Average	5,470	8,614	6,158	5,003	4,314	3,008	7,026	3,695	2,671	2,525	2,400	3,071	4,476
	Minimum	3,250	2,420	3,127	2,637	2,845	545	3,044	1,118	750	1,318	256	1,516	256
1992	Maximum	6,723	7,097	7,053	4,516	1,409	1,336	4,092	3,457	2,377	6,903	6,351	4,569	7,097
	Average	5,010	6,047	4,877	2,630	718	553	2,811	2,200	1,313	2,507	3,915	3,219	3,117
	Minimum	3,169	3,862	3,153	207	19	26	18	562	198	1,144	1,767	1,228	18
1993	Maximum	5,604	4,704	2,622	2,930	1,315	1,297	3,775	3,442	2,649	2,687	5,770	4,193	5,770
	Average	3,558	3,533	2,007	1,827	486	520	1,984	1,863	2,052	2,144	3,781	3,006	2,410
	Minimum	1,676	2,039	1,448	1,213	28	13	40	932	770	765	1,214	1,834	13
1994	Maximum	6,209	5,962	4,321	4,423	2,986	2,723	3,387	3,695	3,262	3,142	4,626	4,423	6,209
	Average	3,941	3,856	3,009	3,266	1,505	1,265	1,777	2,219	2,484	1,982	2,776	3,224	2,611
	Minimum	1,994	603	1,651	1,965	270	533	614	1,138	1,720	908	1,303	1,697	270
1995	Maximum	7,314	5,994	6,641	6,184	4,476	3,920	3,000	3,506	2,759	3,071	17,666	24,445	24,445
	Average	5,255	4,780	5,633	3,936	2,241	1,518	1,105	2,140	1,898	1,793	7,980	8,311	3,915
	Minimum	3,693	2,261	4,380	1,476	533	206	116	1,134	1,105	553	988	1,514	116
1996	Maximum	7,190	7,873	6,089	5,802	5,193	4,831	4,856	3,230	4,033	4,547	4,706	4,796	7,873
	Average	4,778	4,203	4,916	4,185	3,927	2,900	2,989	1,683	1,966	2,145	3,062	3,347	3,341
	Minimum	1,725	1,484	3,388	2,146	2,545	1,620	1,213	667	983	591	1,646	1,857	591

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1997	Maximum	7,166	6,791	7,051	6,932	6,892	17,336	13,376	4,204	3,158	9,949	9,465	5,068	17,336
	Average	4,478	5,541	5,804	5,286	4,503	6,853	6,271	2,214	1,474	3,364	4,727	3,580	4,499
	Minimum	307	3,819	2,284	2,916	1,522	1,921	2,897	991	56	903	1,919	2,522	56
1998	Maximum	7,598	4,710	5,758	5,322	2,015	1,629	3,946	4,342	3,346	3,512	3,467	5,829	7,598
	Average	4,747	3,909	4,364	3,838	902	588	1,923	1,960	2,361	2,629	2,483	2,926	2,735
	Minimum	2,886	3,161	3,184	1,343	42	51	228	304	1,409	1,356	1,132	416	42
1999	Maximum	6,377	6,962	7,159	5,467	5,196	5,568	10,173	9,086	4,065	3,809	13,557	5,002	13,557
	Average	5,188	6,136	5,181	3,978	3,580	2,996	5,343	4,759	2,927	2,897	5,694	3,620	4,352
	Minimum	2,092	4,924	2,957	1,644	616	371	2,409	1,466	2,127	349	1,798	1,490	349
2000	Maximum	7,036	6,037	5,351	4,018	3,871	2,884	4,648	3,692	3,905	3,366	6,615	5,320	7,036
	Average	5,959	5,283	4,312	2,697	1,660	1,129	3,250	2,266	2,480	2,488	3,501	3,139	3,204
	Minimum	4,519	4,441	3,204	1,841	28	164	1,775	703	200	366	2,178	1,642	28
2001	Maximum	4,125	3,316	2,874	2,233	1,392	1,344	2,457	3,676	3,103	2,677	2,934	4,060	4,125
	Average	2,440	2,199	2,093	1,500	811	524	1,517	2,250	1,951	1,945	1,701	2,651	1,888
	Minimum	747	1,291	1,496	55	165	34	547	648	735	1,288	53	970	34
2002	Maximum	7,172	7,144	7,290	5,856	6,577	5,585	10,424	2,920	3,287	3,587	3,107	3,225	10,424
	Average	5,412	5,456	5,979	3,684	4,261	3,157	5,549	2,034	1,735	1,941	2,183	1,935	3,605
	Minimum	69	942	4,437	5	990	544	1,549	370	904	1,126	468	797	5
2003	Maximum	5,916	6,167	5,191	4,540	4,296	5,452	4,360	3,227	3,644	27,494	7,583	6,939	27,494
	Average	4,069	3,807	2,817	3,147	2,610	2,543	2,068	1,931	2,254	4,943	5,287	3,701	3,263
	Minimum	1,071	1,068	469	1,885	95	137	296	992	1,280	262	1,586	2,547	95
2004	Maximum	6,988	7,150	4,246	3,072	1,610	7,366	3,794	3,859	3,592	6,061	6,503	6,063	7,366
	Average	5,507	6,326	2,414	2,038	783	2,475	2,139	1,844	2,203	3,024	4,460	3,579	3,053
	Minimum	2,140	3,346	1,517	849	12	15	812	174	144	793	148	929	12
2005	Maximum	6,730	7,109	4,039	2,573	2,970	1,861	2,008	1,967	3,167	4,048	6,727	4,646	7,109
	Average	4,831	4,737	2,411	1,638	1,219	1,104	910	1,013	2,375	2,341	4,787	3,387	2,567
	Minimum	1,060	2,719	1,455	48	59	179	155	478	692	801	2,943	329	48
2006	Maximum	6,966	6,951	7,479	2,808	2,103	1,930	4,251	1,849	2,715	2,379	21,842	4,359	21,842
	Average	4,905	6,140	5,690	1,888	1,152	936	2,024	1,208	2,033	1,586	7,017	3,555	3,185
	Minimum	1,768	3,810	1,891	640	23	117	215	745	1,052	565	828	2,111	23

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2007	Maximum	7,391	7,538	6,485	6,085	4,362	7,583	7,877	3,202	3,471	6,687	4,538	4,821	7,877
	Average	5,776	6,170	5,219	4,604	1,955	4,822	4,670	1,557	2,384	3,297	3,226	3,546	3,919
	Minimum	2,922	5,138	2,935	2,849	521	1,139	1,649	375	533	1,328	1,532	1,286	375
2008	Maximum	7,516	7,711	6,441	4,644	2,428	2,844	9,918	3,237	4,293	3,564	4,387	4,644	9,918
	Average	5,705	5,368	4,539	3,109	874	1,300	4,184	1,998	2,878	2,838	2,489	3,567	3,237
	Minimum	3,997	2,693	2,754	1,129	241	249	1,122	614	1,840	1,437	60	2,374	60
2009	Maximum	4,433	4,902	3,361	4,662	1,861	7,372	4,494	3,762	3,426	3,633	8,958	6,308	8,958
	Average	3,164	3,914	2,678	2,552	1,073	3,419	2,658	1,696	1,732	2,169	6,230	4,601	2,978
	Minimum	1,366	2,605	1,854	1,329	356	312	986	393	593	421	1,960	3,383	312
2010	Maximum	5,328	5,699	3,719	3,958	3,491	5,701	6,341	3,922	4,368	7,995	4,537	5,183	7,995
	Average	4,059	3,819	3,033	2,913	2,213	2,350	4,698	2,150	2,433	4,730	2,829	3,113	3,196
	Minimum	3,239	2,415	2,035	1,841	618	437	2,855	1,322	994	698	1,376	2,042	437
2011	Maximum	7,104	7,335	7,708	5,326	5,984	5,903	8,338	5,663	4,160	3,458	6,626	4,198	8,338
	Average	4,852	6,387	5,959	4,247	3,257	3,745	5,870	3,698	2,742	2,866	3,939	3,657	4,257
	Minimum	1,961	4,995	3,306	2,906	1,847	1,344	3,673	1,854	1,200	1,696	1,367	2,357	1,200
2012	Maximum	5,804	6,995	7,446	4,708	5,144	10,598	9,832	5,025	3,713	3,249	9,829	5,382	10,598
	Average	4,687	6,255	5,149	2,931	3,854	6,192	6,699	2,747	2,312	2,065	5,779	4,515	4,430
	Minimum	2,884	5,643	3,165	560	2,404	1,350	2,640	843	1,507	14	3,145	3,908	14
2013	Maximum	7,746	6,849	4,926	4,632	3,815	4,853	4,668	3,678	3,882	7,507	4,612	4,767	7,746
	Average	6,103	5,332	3,741	3,528	2,325	3,187	2,980	2,207	2,602	5,101	3,794	4,239	3,754
	Minimum	4,756	4,653	2,950	2,244	635	1,708	709	1,087	1,221	2,449	3,294	3,085	635
2014	Maximum	4,566	5,650	5,066	5,610	5,010	9,671	9,276	3,973	4,234	5,043	10,128	13,690	13,690
	Average	3,764	4,262	4,020	4,463	3,170	5,199	5,471	2,105	2,775	2,761	4,756	6,243	4,079
	Minimum	2,793	3,231	1,481	3,703	1,414	2,308	1,817	645	1,525	1,361	955	3,729	645
2015	Maximum	7,614	7,782	7,315	4,104	2,799	4,198	3,212	1,589	4,404	4,868	6,674	6,045	7,782
	Average	6,075	6,426	4,598	3,074	1,473	1,781	1,763	1,078	3,038	3,446	3,906	4,998	3,456
	Minimum	2,312	2,172	1,694	2,143	103	345	434	335	592	1,366	2,284	2,477	103
2016	Maximum	8,246	6,969	7,252	4,952	6,112	5,839	4,706	2,631	4,584	6,330	11,229	7,101	11,229
	Average	6,310	5,452	5,642	3,196	3,501	3,206	2,621	1,839	3,216	3,914	4,334	4,524	3,977
	Minimum	2,764	1,002	4,165	316	1,409	703	826	784	1,533	880	1,778	3,209	316

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2017	Maximum	7,780	3,891	7,405	5,546	5,994	9,350	4,730	3,246	5,221	4,539	10,071	12,255	12,255
	Average	5,356	2,723	4,070	4,480	3,732	4,690	3,073	1,896	3,091	2,991	3,964	5,003	3,761
	Minimum	2,430	245	1,670	3,005	703	2,269	1,910	618	668	591	549	2,917	245
2018	Maximum	6,381	12,218	12,377	3,626	2,907	3,903	3,336	3,541	4,379	5,022	4,439	4,523	12,377
	Average	5,261	7,835	7,085	2,662	1,360	2,097	1,903	1,936	3,566	3,797	3,166	3,806	3,765
	Minimum	3,641	3,895	3,220	863	119	14	443	881	1,012	1,628	102	2,814	14
2019	Maximum	6,922	6,808	5,714	4,903	4,428	3,726	2,646	2,782	3,201	3,135	3,156	3,671	6,922
	Average	5,535	5,770	4,671	3,330	2,089	1,946	1,568	1,251	2,178	2,091	2,405	2,275	2,917
	Minimum	2,509	4,875	2,791	1,047	574	611	961	593	936	19	517	1,227	19
2020	Maximum	3,693	6,677	7,423	4,387	3,009	7,179	6,614	2,477	4,416	7,994	8,986	4,460	8,986
	Average	2,046	4,956	5,039	3,128	1,146	3,459	3,544	1,649	2,789	3,587	3,967	3,570	3,235
	Minimum	312	1,649	3,224	1,501	65	1,048	1,548	741	964	682	1,299	1,441	65
2021	Maximum	7,123	7,473	7,202	4,041	1,999	6,755	5,422	2,184	3,641	7,659	25,976	18,370	25,976
	Average	5,434	6,469	5,171	2,772	978	2,076	2,571	1,573	2,581	3,766	10,579	5,817	4,126
	Minimum	1,248	5,775	2,845	792	320	315	900	732	955	1,749	1,814	2,193	315
34-Year Summary	Maximum	8,246	14,052	12,377	7,376	6,892	17,336	13,933	9,086	6,047	27,494	25,976	24,445	27,494
	Average	4,810	5,235	4,429	3,167	2,219	2,662	3,321	2,093	2,416	2,861	4,454	3,902	3,466
	Minimum	69	245	469	5	2	13	18	174	56	14	53	329	2

Table A-5. Monthly minimum, average, and maximum outflows (cfs) from Diablo Lake (1988-2021).

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1988	Maximum	5,295	5,911	5,937	3,946	4,550	5,265	5,579	4,340	3,679	5,535	5,870	4,391	5,937
	Average	3,181	4,101	4,452	2,790	2,106	3,579	4,000	3,379	3,314	3,837	4,597	3,798	3,614
	Minimum	1,821	2,827	3,095	1,869	1,177	924	2,344	2,857	2,616	2,559	1,961	3,066	924
1989	Maximum	6,769	7,008	6,444	3,482	3,828	3,896	7,444	4,073	3,279	3,168	6,741	15,002	15,002
	Average	5,829	6,280	3,014	2,089	2,206	3,199	3,897	3,183	2,758	2,524	5,360	5,140	3,794
	Minimum	3,547	5,000	1,941	1,220	1,265	2,037	2,147	1,835	1,734	1,877	3,399	3,134	1,220
1990	Maximum	7,032	7,042	6,843	3,862	3,264	5,395	9,346	5,615	4,013	6,068	25,587	13,517	25,587
	Average	5,576	6,546	5,579	3,528	2,783	2,795	5,472	3,295	3,513	3,027	13,276	5,549	5,069
	Minimum	3,218	5,800	3,275	3,188	1,497	1,263	2,615	1,697	2,441	1,965	6,164	3,142	1,263
1991	Maximum	7,013	14,857	6,934	7,109	5,599	5,840	16,061	6,696	6,528	3,394	5,063	4,144	16,061
	Average	5,807	9,414	6,409	5,419	5,222	4,269	8,892	5,130	3,430	2,823	2,908	3,421	5,241
	Minimum	3,928	4,810	3,616	3,312	4,763	2,452	4,931	2,704	2,649	1,972	1,526	2,307	1,526
1992	Maximum	6,225	7,016	7,000	4,636	2,791	2,596	5,470	4,444	3,030	4,997	5,126	4,205	7,016
	Average	5,542	6,466	5,268	3,135	1,863	2,245	4,250	3,462	2,043	2,679	4,137	3,444	3,806
	Minimum	3,760	5,440	3,659	1,489	1,537	1,944	1,960	2,128	1,476	1,663	2,809	1,789	1,476
1993	Maximum	5,568	4,937	2,672	2,554	1,879	1,757	4,813	3,603	3,605	2,888	5,772	4,258	5,772
	Average	3,702	3,698	2,241	2,094	1,452	1,463	2,913	2,722	2,566	2,550	3,946	3,220	2,845
	Minimum	2,244	2,241	1,982	1,902	814	1,054	1,887	1,801	1,733	2,160	2,531	2,162	814
1994	Maximum	5,680	5,811	4,734	4,432	3,225	2,644	3,672	3,689	3,460	3,164	4,279	4,348	5,811
	Average	4,175	4,059	3,437	3,796	2,545	2,161	3,158	3,155	3,152	2,263	2,969	3,423	3,194
	Minimum	2,485	1,680	2,459	2,934	2,135	1,774	2,026	2,283	2,582	1,513	1,973	2,037	1,513
1995	Maximum	6,750	6,495	6,819	6,441	4,636	4,724	3,785	3,780	3,215	3,169	19,196	27,201	27,201
	Average	5,490	5,499	5,994	4,164	3,443	2,951	2,798	3,084	2,597	2,485	9,968	8,973	4,810
	Minimum	3,763	4,469	4,844	3,218	1,809	2,073	2,183	1,593	1,731	1,538	2,470	2,306	1,538
1996	Maximum	7,024	6,837	6,288	5,667	5,208	4,789	6,489	4,333	3,290	3,335	4,746	4,323	7,024
	Average	5,262	4,779	5,290	4,787	4,533	4,136	4,550	2,761	2,690	2,727	3,565	3,608	4,055
	Minimum	2,829	2,032	3,935	3,884	4,108	3,086	2,407	1,887	1,923	1,918	2,224	2,438	1,887

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1997	Maximum	7,126	6,811	7,025	6,867	6,759	21,831	19,297	6,511	3,183	12,564	10,842	4,138	21,831
	Average	5,018	5,859	6,410	5,961	6,098	8,861	8,247	3,722	2,551	4,214	5,312	3,834	5,503
	Minimum	1,768	4,394	4,014	3,573	5,208	5,775	4,463	1,997	1,714	1,944	2,916	3,020	1,714
1998	Maximum	6,562	5,048	5,720	5,273	2,303	2,588	6,144	4,534	4,198	3,416	3,437	5,142	6,562
	Average	4,995	4,115	4,553	4,196	1,968	2,021	3,552	3,102	3,122	2,921	2,855	3,389	3,413
	Minimum	3,427	3,368	3,922	2,424	1,573	1,618	1,969	2,200	1,417	2,200	1,634	1,563	1,417
1999	Maximum	6,619	6,631	6,475	5,299	5,750	5,934	12,885	12,199	4,211	3,966	14,464	5,739	14,464
	Average	5,659	6,368	5,426	4,367	4,404	4,685	7,435	6,543	3,577	3,400	6,608	4,124	5,210
	Minimum	2,798	5,956	4,024	3,166	3,191	3,165	4,657	3,586	3,045	2,627	2,263	2,528	2,263
2000	Maximum	6,987	6,284	5,502	4,291	3,336	5,912	6,263	5,451	3,926	3,434	5,612	4,848	6,987
	Average	6,149	5,465	4,601	3,337	2,629	3,036	4,937	3,559	3,229	3,040	3,713	3,289	3,926
	Minimum	4,953	4,887	4,074	2,871	1,771	1,697	3,603	2,063	2,143	1,804	2,958	2,215	1,697
2001	Maximum	4,459	2,670	2,491	2,373	1,641	1,873	3,093	4,183	3,579	2,942	3,258	4,210	4,459
	Average	2,671	2,305	2,252	1,797	1,312	1,233	2,742	3,544	2,671	2,286	2,258	2,963	2,406
	Minimum	1,703	1,974	1,931	1,277	942	887	2,440	2,932	1,588	1,566	1,215	2,162	887
2002	Maximum	7,086	6,984	6,891	5,880	6,746	8,301	13,308	4,095	3,822	3,301	3,229	3,195	13,308
	Average	6,035	5,830	6,254	4,269	5,330	5,333	7,615	3,196	2,425	2,172	2,450	2,082	4,413
	Minimum	2,467	4,096	4,648	1,698	3,294	2,662	3,424	2,463	1,534	1,571	1,642	1,678	1,534
2003	Maximum	5,817	6,501	4,770	4,235	3,966	6,606	5,799	3,998	3,721	31,471	7,433	7,517	31,471
	Average	4,554	4,106	3,240	3,602	3,459	4,308	3,705	3,152	3,061	6,765	5,624	3,937	4,121
	Minimum	2,227	2,176	1,544	2,857	2,257	2,279	2,743	2,189	2,353	2,401	3,039	3,108	1,544
2004	Maximum	7,120	7,050	4,779	2,847	2,011	9,894	6,252	4,832	3,721	6,094	6,987	6,918	9,894
	Average	5,759	6,557	2,634	2,494	1,707	3,801	3,585	3,273	3,088	3,507	5,144	4,272	3,805
	Minimum	3,566	3,907	2,250	2,042	1,368	1,287	2,397	1,867	1,981	2,191	2,906	3,074	1,287
2005	Maximum	7,062	6,796	3,946	2,323	2,484	2,320	2,626	2,372	3,278	4,488	6,786	4,492	7,062
	Average	5,732	5,056	2,693	2,032	2,051	1,909	2,105	2,094	2,822	2,963	5,282	3,874	3,225
	Minimum	2,347	3,918	2,149	1,411	1,402	1,636	1,794	1,916	2,253	1,559	3,926	2,098	1,402
2006	Maximum	7,000	7,081	7,071	2,730	3,377	3,419	5,566	2,502	2,934	2,375	23,478	4,442	23,478
	Average	5,418	6,393	5,855	2,237	2,119	2,590	3,610	2,082	2,617	1,822	8,105	3,813	3,888
	Minimum	2,282	3,748	2,705	1,551	1,767	2,047	2,396	1,928	2,024	1,570	1,657	2,693	1,551

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2007	Maximum	7,071	6,912	6,958	5,982	4,763	9,161	10,420	3,293	3,206	6,861	4,370	5,393	10,420
	Average	6,063	6,388	6,011	5,167	3,307	6,213	6,505	2,606	2,831	3,767	3,539	4,060	4,694
	Minimum	3,944	5,273	3,337	4,055	2,544	3,409	3,300	1,999	2,200	1,983	3,279	3,504	1,983
2008	Maximum	7,569	7,276	6,828	3,967	3,910	5,237	13,517	4,815	4,343	3,599	4,601	4,343	13,517
	Average	5,846	5,480	4,754	3,346	2,312	2,648	5,942	3,355	3,453	3,260	3,269	3,801	3,957
	Minimum	4,314	3,135	3,218	2,841	1,402	1,388	2,543	1,657	2,984	1,514	1,696	2,900	1,388
2009	Maximum	5,176	5,272	3,298	3,447	2,979	9,195	5,699	5,174	4,245	5,817	10,434	6,784	10,434
	Average	3,608	4,076	2,852	2,897	2,053	5,028	4,113	2,832	2,657	2,850	6,878	4,912	3,720
	Minimum	2,216	2,711	2,632	2,067	1,417	2,147	2,430	2,075	1,914	2,070	3,188	3,840	1,417
2010	Maximum	5,378	5,706	3,531	3,439	3,260	7,070	7,763	4,375	4,342	7,779	4,202	4,381	7,779
	Average	4,376	3,983	3,195	3,194	2,949	3,874	6,103	3,145	3,315	5,277	3,230	3,551	3,853
	Minimum	3,434	2,767	2,896	2,897	2,392	2,301	4,220	2,155	1,624	2,172	2,230	2,740	1,624
2011	Maximum	7,235	7,416	7,282	5,458	4,830	7,316	10,282	7,958	4,227	4,049	6,429	4,381	10,282
	Average	5,443	6,783	6,238	4,540	4,064	5,322	7,626	5,026	3,658	3,456	4,379	3,953	5,033
	Minimum	3,618	5,620	4,693	2,850	2,748	3,198	5,294	3,032	2,921	2,950	3,020	3,323	2,748
2012	Maximum	5,735	6,935	7,082	4,613	5,765	12,128	12,488	6,247	3,317	3,788	10,252	5,204	12,488
	Average	5,010	6,501	5,363	3,554	4,921	7,810	9,003	4,108	2,939	2,970	6,558	4,803	5,296
	Minimum	3,001	5,844	3,231	2,139	4,146	4,491	4,142	2,493	1,959	1,707	4,274	4,322	1,707
2013	Maximum	7,495	6,941	4,950	4,751	4,345	6,510	5,887	4,894	5,475	8,088	4,434	4,878	8,088
	Average	6,280	5,474	4,062	4,042	3,632	4,697	4,354	3,447	3,838	5,479	4,048	4,444	4,478
	Minimum	5,101	4,857	3,430	3,167	2,800	3,776	2,640	2,279	2,739	3,792	3,561	3,793	2,279
2014	Maximum	4,435	5,704	5,291	5,392	5,198	11,860	11,392	4,473	3,720	5,417	11,496	14,575	14,575
	Average	4,064	4,452	4,568	4,892	4,359	6,688	7,437	3,377	3,514	3,554	5,705	6,952	4,965
	Minimum	3,664	3,943	2,836	4,143	3,739	4,293	3,740	2,353	2,904	2,949	2,089	4,446	2,089
2015	Maximum	7,325	7,700	7,398	3,782	2,848	4,285	3,419	2,786	4,410	4,323	5,644	6,415	7,700
	Average	6,714	7,119	5,084	3,519	2,552	3,238	3,148	2,238	3,866	4,000	4,736	5,577	4,300
	Minimum	4,664	5,009	3,761	2,755	2,244	2,322	2,883	1,923	2,459	3,517	3,640	3,892	1,923
2016	Maximum	7,264	7,096	7,167	4,585	6,144	6,229	5,835	3,345	4,550	6,831	10,526	7,306	10,526
	Average	6,650	6,103	6,004	4,136	4,640	4,581	3,913	2,760	3,811	4,880	5,074	4,749	4,772
	Minimum	5,174	2,938	4,176	2,932	3,414	3,208	3,214	2,027	2,316	3,514	3,520	4,079	2,027

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2017	Maximum	7,456	4,102	7,424	6,077	6,202	10,256	6,259	4,336	4,628	5,057	10,293	12,570	12,570
	Average	5,511	3,150	4,590	4,951	5,295	6,652	4,630	3,106	3,684	3,576	4,812	5,369	4,618
	Minimum	2,873	1,514	2,772	3,689	3,804	4,617	3,400	1,756	1,596	1,936	2,918	3,986	1,514
2018	Maximum	6,863	12,217	12,185	3,574	4,324	4,218	5,344	4,566	4,479	4,497	5,064	4,496	12,217
	Average	5,642	8,312	7,318	3,198	3,020	3,518	3,584	3,103	4,083	4,245	3,875	4,120	4,532
	Minimum	4,017	5,008	3,878	2,547	1,592	2,535	2,179	2,049	1,720	3,645	2,112	3,781	1,592
2019	Maximum	6,664	6,944	5,686	4,804	4,594	3,976	2,795	2,584	3,273	3,125	3,206	2,974	6,944
	Average	5,829	5,944	4,840	3,865	3,173	3,039	2,519	2,238	3,046	2,766	2,789	2,602	3,546
	Minimum	3,551	5,079	4,062	2,577	2,243	2,354	2,045	2,074	2,636	1,236	1,597	1,728	1,236
2020	Maximum	3,370	6,510	6,431	3,832	3,247	8,863	6,864	3,930	4,372	8,581	10,191	4,710	10,191
	Average	2,614	5,468	5,210	3,559	2,503	4,945	4,905	2,623	3,643	4,460	4,798	4,012	4,056
	Minimum	1,440	3,062	4,082	2,574	1,632	3,176	3,097	2,089	1,841	3,021	3,168	3,091	1,440
2021	Maximum	6,875	6,939	6,742	3,674	2,408	10,759	8,923	3,271	4,469	8,942	27,440	21,027	27,440
	Average	5,873	6,682	5,351	3,252	2,066	4,124	4,198	2,782	3,433	4,386	12,215	6,492	5,051
	Minimum	1,769	6,396	3,906	2,751	1,549	1,698	2,632	2,065	2,073	3,297	3,534	3,307	1,549
34-Year Summary	Maximum	7,569	14,857	12,185	7,109	6,759	21,831	19,297	12,199	6,528	31,471	27,440	27,201	31,471
	Average	5,179	5,553	4,737	3,661	3,269	4,154	4,901	3,270	3,149	3,436	5,122	4,280	4,224
	Minimum	1,440	1,514	1,544	1,220	814	887	1,794	1,593	1,417	1,236	1,215	1,563	814

Table A-6. Monthly minimum, average, and maximum outflows (cfs) from Gorge Lake (1988-2021).

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1988	Maximum	5,266	6,147	6,203	4,112	4,761	5,927	5,852	4,599	3,771	5,675	6,078	4,711	6,203
	Average	3,304	4,281	4,698	3,346	2,627	4,123	4,454	3,562	3,483	4,095	4,932	4,008	3,921
	Minimum	2,230	3,201	3,289	2,421	1,722	1,316	2,886	2,916	2,559	2,676	3,406	3,212	1,316
1989	Maximum	6,950	7,286	6,617	4,411	4,857	4,367	8,072	4,230	3,331	3,234	9,599	15,649	15,649
	Average	6,023	6,426	3,184	2,626	2,743	3,813	4,258	3,390	2,853	2,675	6,000	5,447	4,116
	Minimum	3,666	5,312	2,272	1,934	1,637	2,977	2,602	2,023	1,867	2,035	3,751	3,280	1,637
1990	Maximum	7,171	7,457	6,892	4,302	3,474	5,852	10,422	5,824	4,075	6,542	26,489	13,808	26,489
	Average	5,791	6,684	5,777	4,068	3,172	3,391	5,953	3,470	3,591	3,461	14,283	5,804	5,445
	Minimum	3,328	5,901	3,418	3,209	2,139	1,858	3,187	2,035	2,495	2,444	6,731	3,164	1,858
1991	Maximum	7,200	15,719	7,175	7,484	6,047	6,277	17,185	7,132	6,867	3,575	5,638	4,326	17,185
	Average	6,040	10,050	6,606	5,807	5,723	4,791	9,524	5,520	3,607	2,901	3,294	3,600	5,599
	Minimum	4,023	6,812	3,766	3,728	5,489	3,094	5,067	3,181	2,782	2,093	1,853	2,589	1,853
1992	Maximum	6,409	7,333	7,237	4,817	3,249	3,019	5,771	4,600	3,162	5,098	5,299	4,213	7,333
	Average	5,842	6,753	5,465	3,480	2,182	2,575	4,452	3,584	2,173	2,811	4,338	3,563	4,023
	Minimum	3,899	5,864	3,741	1,986	1,968	2,136	2,520	2,223	1,587	1,683	3,530	1,963	1,587
1993	Maximum	5,565	4,939	3,202	2,655	2,773	2,532	5,113	4,729	3,677	3,014	5,934	4,450	5,934
	Average	3,808	3,891	2,434	2,326	2,029	1,883	3,191	2,890	2,645	2,704	4,066	3,434	3,043
	Minimum	2,567	2,429	2,310	2,294	1,700	1,457	2,318	2,031	1,775	2,275	2,616	2,284	1,457
1994	Maximum	5,966	6,009	4,960	4,692	3,531	3,539	4,122	3,704	3,604	3,304	4,610	4,804	6,009
	Average	4,499	4,268	3,786	4,194	3,033	2,561	3,439	3,264	3,272	2,418	3,120	3,713	3,467
	Minimum	2,825	2,596	2,634	3,679	2,488	2,225	2,317	2,352	2,773	1,792	2,148	2,355	1,792
1995	Maximum	6,866	6,996	7,008	6,604	5,457	5,221	4,228	4,518	3,362	3,620	22,178	28,047	28,047
	Average	5,688	6,075	6,216	4,370	4,161	3,466	3,135	3,305	2,699	2,871	11,043	9,349	5,218
	Minimum	3,877	5,319	5,072	3,454	2,555	2,495	2,557	1,820	1,763	1,738	3,553	2,430	1,738
1996	Maximum	7,236	7,111	6,251	5,822	5,381	5,467	6,802	4,458	3,449	3,828	5,526	4,362	7,236
	Average	5,616	5,242	5,492	5,194	4,883	4,582	4,960	2,942	2,842	3,004	3,906	3,739	4,363
	Minimum	3,241	2,504	4,044	4,435	4,358	3,440	2,730	1,922	2,018	2,199	2,547	2,525	1,922

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1997	Maximum	7,438	7,097	7,377	7,248	8,103	23,085	21,829	6,881	3,369	14,034	11,363	4,412	23,085
	Average	5,445	6,132	6,819	6,415	6,929	9,655	8,905	4,017	2,829	4,694	5,640	4,025	5,955
	Minimum	2,391	4,699	4,303	3,777	6,306	6,309	4,816	2,084	2,196	2,622	3,306	3,086	2,084
1998	Maximum	6,690	5,172	5,861	5,319	3,136	2,991	6,406	4,603	4,283	3,539	4,071	5,287	6,690
	Average	5,203	4,309	4,754	4,444	2,475	2,520	3,827	3,199	3,183	3,042	3,186	3,688	3,663
	Minimum	3,657	3,642	4,168	3,078	2,288	2,256	2,417	2,256	1,797	2,403	2,045	2,231	1,797
1999	Maximum	6,822	6,771	6,708	5,465	6,297	6,619	13,611	13,754	4,382	4,037	14,891	6,118	14,891
	Average	5,959	6,546	5,632	4,668	4,881	5,366	8,224	7,078	3,790	3,698	7,114	4,437	5,610
	Minimum	3,298	6,329	4,290	3,730	3,963	4,167	5,637	4,084	3,396	3,368	3,288	3,197	3,197
2000	Maximum	7,070	6,446	5,510	4,526	3,602	6,677	6,683	5,796	4,303	4,404	5,768	5,011	7,070
	Average	6,267	5,601	4,750	3,753	3,122	3,704	5,412	3,799	3,427	3,249	3,816	3,378	4,196
	Minimum	5,133	4,974	4,254	3,101	2,348	2,494	4,216	2,218	2,388	1,858	2,926	2,306	1,858
2001	Maximum	4,568	2,692	2,570	2,465	1,955	2,052	3,152	4,201	3,628	3,022	4,873	4,115	4,873
	Average	2,835	2,392	2,401	2,014	1,665	1,608	2,986	3,721	2,770	2,529	2,680	3,157	2,622
	Minimum	2,369	2,176	2,360	1,920	1,499	1,482	2,655	3,343	1,621	1,745	1,756	2,305	1,482
2002	Maximum	8,890	7,095	7,126	5,999	6,908	9,655	14,168	4,553	4,054	3,516	3,306	3,288	14,168
	Average	6,427	6,124	6,424	4,734	5,875	6,197	8,223	3,440	2,549	2,238	2,641	2,210	4,754
	Minimum	2,588	5,350	5,005	2,869	3,748	3,378	3,443	2,570	1,736	1,788	1,800	1,897	1,736
2003	Maximum	6,483	6,516	4,861	4,480	4,202	7,046	6,318	4,179	3,791	32,446	8,138	7,598	32,446
	Average	4,950	4,285	3,589	3,917	3,880	4,795	3,989	3,279	3,142	7,494	6,001	4,085	4,445
	Minimum	2,429	2,510	2,305	3,218	3,173	2,759	2,984	2,313	2,391	2,564	2,428	3,397	2,305
2004	Maximum	7,353	7,259	4,738	3,071	2,539	10,527	6,516	4,903	4,047	6,269	7,229	6,989	10,527
	Average	5,990	6,714	2,889	2,871	2,267	4,310	3,847	3,472	3,479	3,711	5,619	4,679	4,140
	Minimum	3,643	3,985	2,668	2,700	2,052	1,949	2,695	2,260	2,267	2,692	3,810	3,820	1,949
2005	Maximum	9,872	7,101	4,013	2,500	2,794	2,617	2,678	2,470	3,364	4,727	7,127	4,603	9,872
	Average	6,264	5,254	2,872	2,383	2,465	2,206	2,315	2,195	2,890	3,271	5,595	4,178	3,498
	Minimum	3,456	4,142	2,453	2,295	1,930	2,037	2,044	2,113	2,363	2,089	4,262	2,717	1,930
2006	Maximum	7,515	7,136	7,223	2,941	5,268	3,542	5,956	2,775	2,995	2,407	24,819	4,545	24,819
	Average	5,824	6,585	5,976	2,552	2,651	3,251	3,979	2,203	2,703	1,893	8,813	4,023	4,197
	Minimum	2,694	3,992	2,816	2,329	2,162	2,788	2,657	2,123	1,951	1,678	2,150	3,103	1,678

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2007	Maximum	7,126	7,014	9,313	6,124	5,163	9,842	11,271	3,481	3,292	6,999	4,436	7,464	11,271
	Average	6,298	6,635	6,586	5,541	3,874	6,898	7,091	2,771	2,928	4,140	3,832	4,339	5,068
	Minimum	4,328	5,561	3,714	4,384	3,415	4,655	3,579	2,244	2,384	2,984	3,446	3,678	2,244
2008	Maximum	7,571	7,316	6,885	4,138	6,151	6,598	15,244	5,168	4,316	3,668	4,552	4,513	15,244
	Average	5,929	5,590	4,928	3,549	3,255	3,262	6,570	3,718	3,599	3,465	3,780	3,932	4,300
	Minimum	4,436	3,359	3,584	3,066	2,293	2,194	2,959	2,104	2,982	1,842	1,871	3,048	1,842
2009	Maximum	6,273	5,456	3,469	3,647	3,997	9,563	6,013	5,852	4,404	6,505	11,165	7,254	11,165
	Average	4,012	4,199	2,957	3,140	2,526	5,527	4,381	2,978	2,780	3,183	7,332	5,063	3,997
	Minimum	2,745	2,953	2,811	2,691	1,945	2,671	2,786	2,247	2,228	2,558	4,568	4,079	1,945
2010	Maximum	5,515	5,789	3,664	3,528	3,401	7,475	8,251	4,451	4,376	7,888	4,514	5,797	8,251
	Average	4,612	4,092	3,287	3,368	3,248	4,389	6,432	3,274	3,515	5,427	3,665	3,843	4,100
	Minimum	3,501	3,107	3,008	3,092	2,720	2,880	4,543	2,254	1,752	2,237	2,615	2,899	1,752
2011	Maximum	7,771	7,676	7,479	5,592	4,899	7,752	10,932	8,542	4,439	4,264	6,770	4,506	10,932
	Average	5,826	7,035	6,404	4,740	4,435	5,857	8,318	5,464	3,894	3,707	4,653	4,174	5,368
	Minimum	4,026	6,017	5,086	3,016	2,983	3,579	5,776	3,773	3,272	2,868	3,288	3,388	2,868
2012	Maximum	6,145	7,220	7,305	4,838	6,046	13,000	13,468	6,726	3,347	5,726	10,445	5,247	13,468
	Average	5,321	6,771	5,511	3,972	5,442	8,485	9,806	4,485	3,068	3,590	7,092	4,953	5,709
	Minimum	3,255	6,337	3,384	2,700	4,495	5,307	4,770	2,652	2,136	3,075	4,773	4,617	2,136
2013	Maximum	7,740	7,084	5,184	4,862	5,250	6,925	6,202	5,045	6,668	8,391	4,372	4,841	8,391
	Average	6,414	5,611	4,344	4,432	4,216	5,245	4,838	3,617	4,124	5,686	4,157	4,566	4,767
	Minimum	5,192	5,036	3,764	3,701	3,638	4,439	2,981	2,403	2,876	3,887	3,564	4,288	2,403
2014	Maximum	4,545	5,760	5,566	5,621	5,480	12,938	12,102	4,689	3,744	6,063	12,243	14,991	14,991
	Average	4,304	4,574	4,943	5,236	5,051	7,378	8,045	3,572	3,624	3,908	6,428	7,284	5,365
	Minimum	3,972	4,091	4,208	4,515	4,368	5,185	4,134	2,504	3,000	3,442	4,338	4,769	2,504
2015	Maximum	8,082	8,207	7,532	3,940	3,212	4,382	3,316	3,588	4,387	5,325	6,269	6,804	8,207
	Average	7,084	7,512	5,377	3,791	2,937	3,472	3,228	2,332	4,049	4,200	5,131	5,875	4,564
	Minimum	4,883	6,608	4,312	3,028	2,732	2,839	3,086	2,178	3,299	3,616	4,053	5,365	2,178
2016	Maximum	7,711	7,404	7,561	4,952	6,318	6,577	6,194	3,483	4,538	7,662	10,702	7,371	10,702
	Average	6,907	6,591	6,320	4,632	5,059	4,946	4,117	2,848	3,903	5,253	5,376	4,850	5,062
	Minimum	5,751	3,726	4,403	3,445	3,857	3,714	3,520	2,176	2,392	3,998	3,944	4,256	2,176

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2017	Maximum	7,625	4,408	7,575	6,125	6,398	10,678	6,765	4,445	4,529	7,191	13,922	12,745	13,922
	Average	5,618	3,556	5,026	5,298	6,106	7,310	4,976	3,212	3,724	3,937	5,402	5,474	4,977
	Minimum	2,923	2,901	3,612	4,064	5,461	5,318	3,762	1,788	1,659	3,517	3,573	4,217	1,659
2018	Maximum	7,034	12,378	12,272	4,115	4,783	4,375	5,692	4,642	4,545	4,523	5,658	5,107	12,378
	Average	5,960	8,716	7,424	3,631	3,952	4,032	3,904	3,188	4,171	4,386	4,422	4,336	4,854
	Minimum	4,533	6,753	3,990	3,406	2,492	2,854	2,825	2,194	1,798	4,259	3,968	4,081	1,798
2019	Maximum	6,874	6,862	5,705	5,844	4,688	4,236	3,053	2,585	3,243	3,222	3,333	3,044	6,874
	Average	6,080	6,070	4,948	4,205	3,803	3,365	2,698	2,322	3,179	3,099	2,976	2,808	3,789
	Minimum	4,572	5,200	4,317	3,123	3,402	2,617	2,381	2,222	3,095	2,770	2,755	2,408	2,222
2020	Maximum	3,553	6,856	6,474	3,974	4,364	9,266	7,570	4,125	4,472	8,849	10,614	4,526	10,614
	Average	3,032	5,821	5,320	3,859	3,234	5,535	5,327	2,792	3,797	4,843	5,179	4,254	4,410
	Minimum	2,354	3,641	4,299	3,705	2,695	3,637	3,384	2,292	1,931	3,773	3,693	3,739	1,931
2021	Maximum	6,882	6,967	6,788	3,826	3,162	12,117	9,692	3,517	4,457	9,626	28,219	22,224	28,219
	Average	6,191	6,819	5,469	3,580	2,625	4,898	4,497	2,901	3,642	4,786	13,495	6,844	5,458
	Minimum	3,324	6,624	4,117	3,364	2,501	2,516	2,915	2,235	2,235	3,711	4,030	3,678	2,235
34-Year Summary	Maximum	9,872	15,719	12,272	7,484	8,103	23,085	21,829	13,754	6,867	32,446	28,219	28,047	32,446
	Average	5,452	5,800	4,959	4,012	3,812	4,703	5,311	3,465	3,294	3,713	5,563	4,502	4,544
	Minimum	2,230	2,176	2,272	1,920	1,499	1,316	2,044	1,788	1,587	1,678	1,756	1,897	1,316

FINAL LICENSE APPLICATION
EXHIBIT B

APPENDIX B

ANNUAL AND MONTHLY INFLOW AND OUTFLOW DURATION CURVES

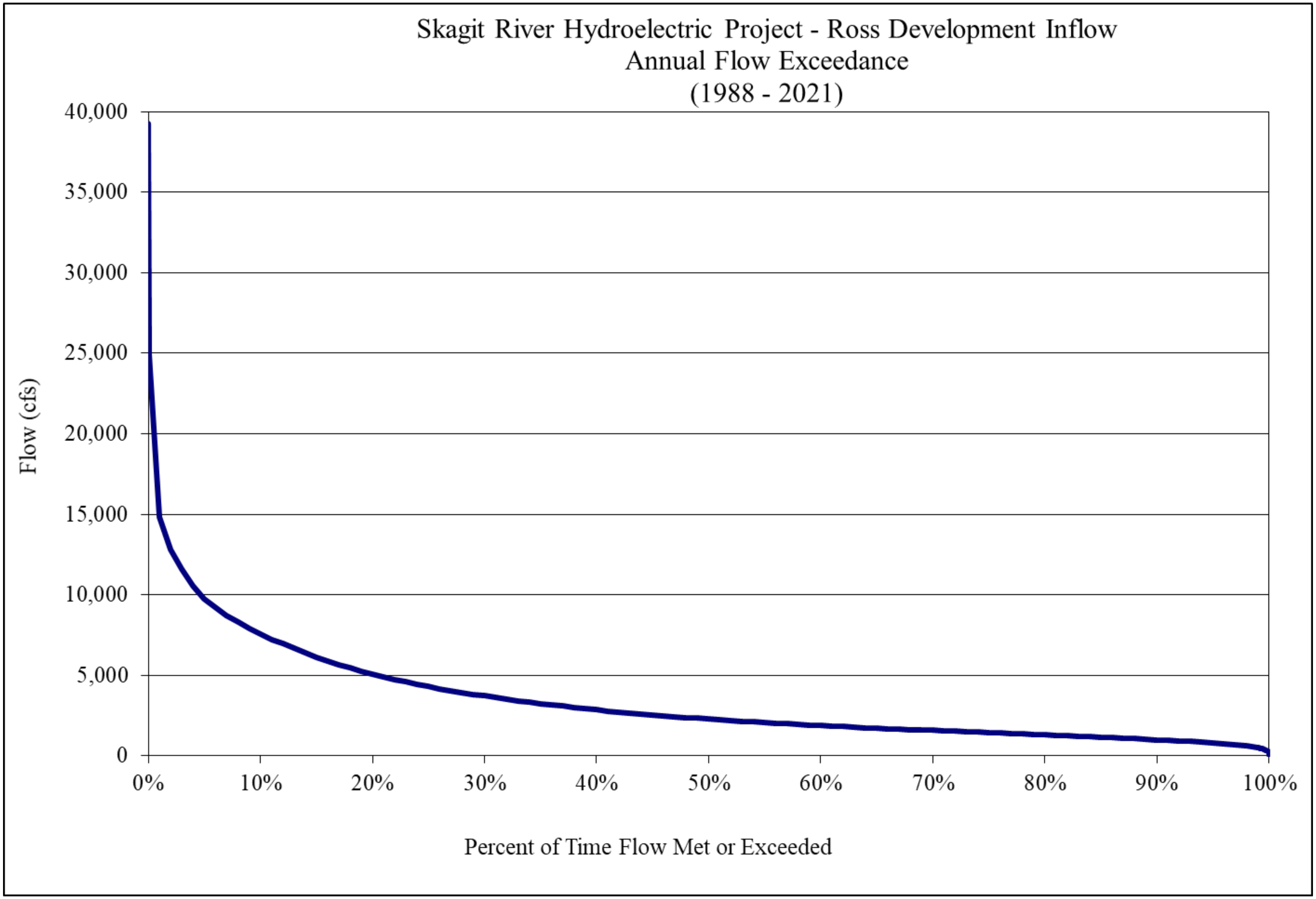

Figure B-1. Ross Lake Annual inflow duration curve.

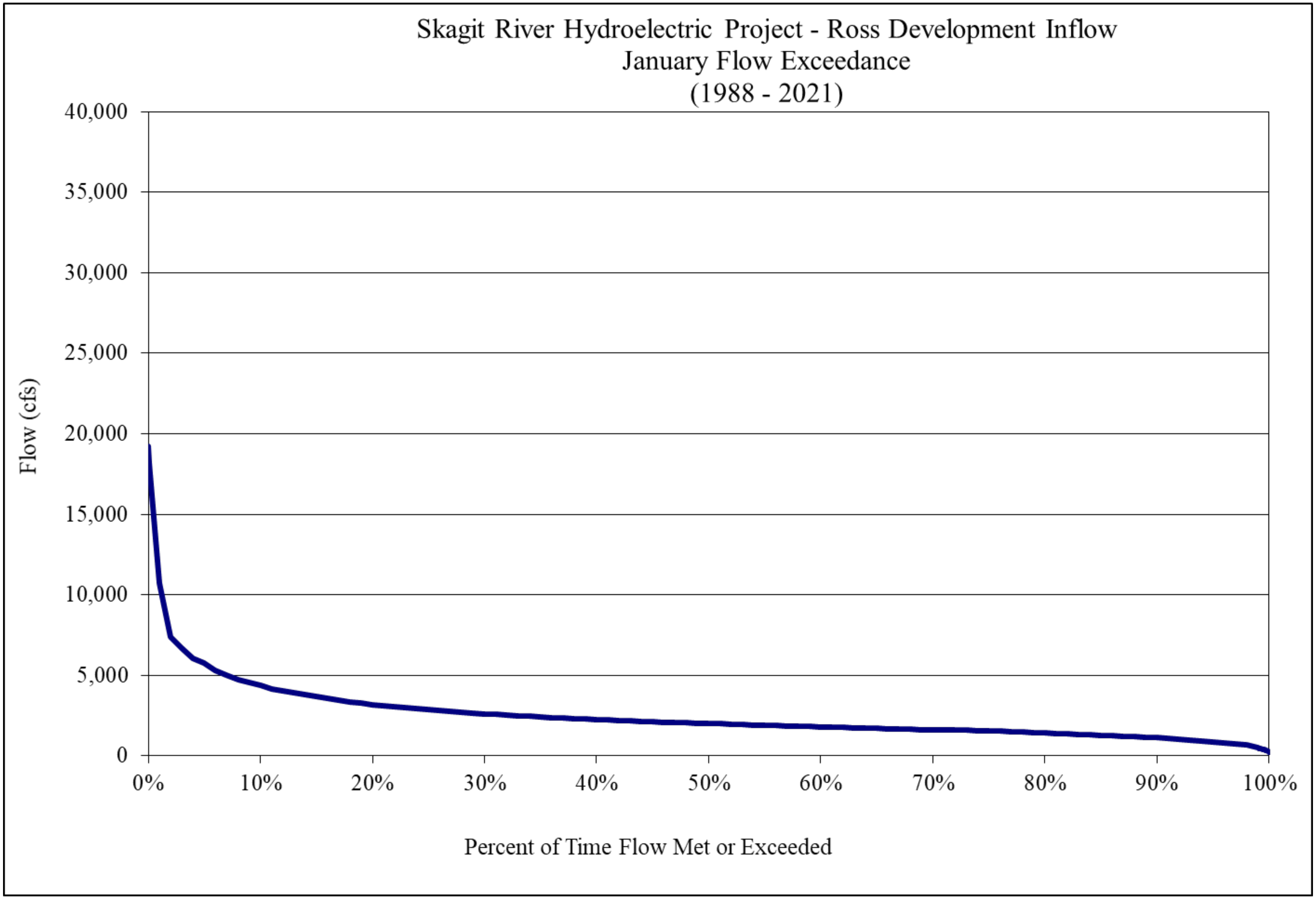

Figure B-2. Ross Lake January inflow duration curve.

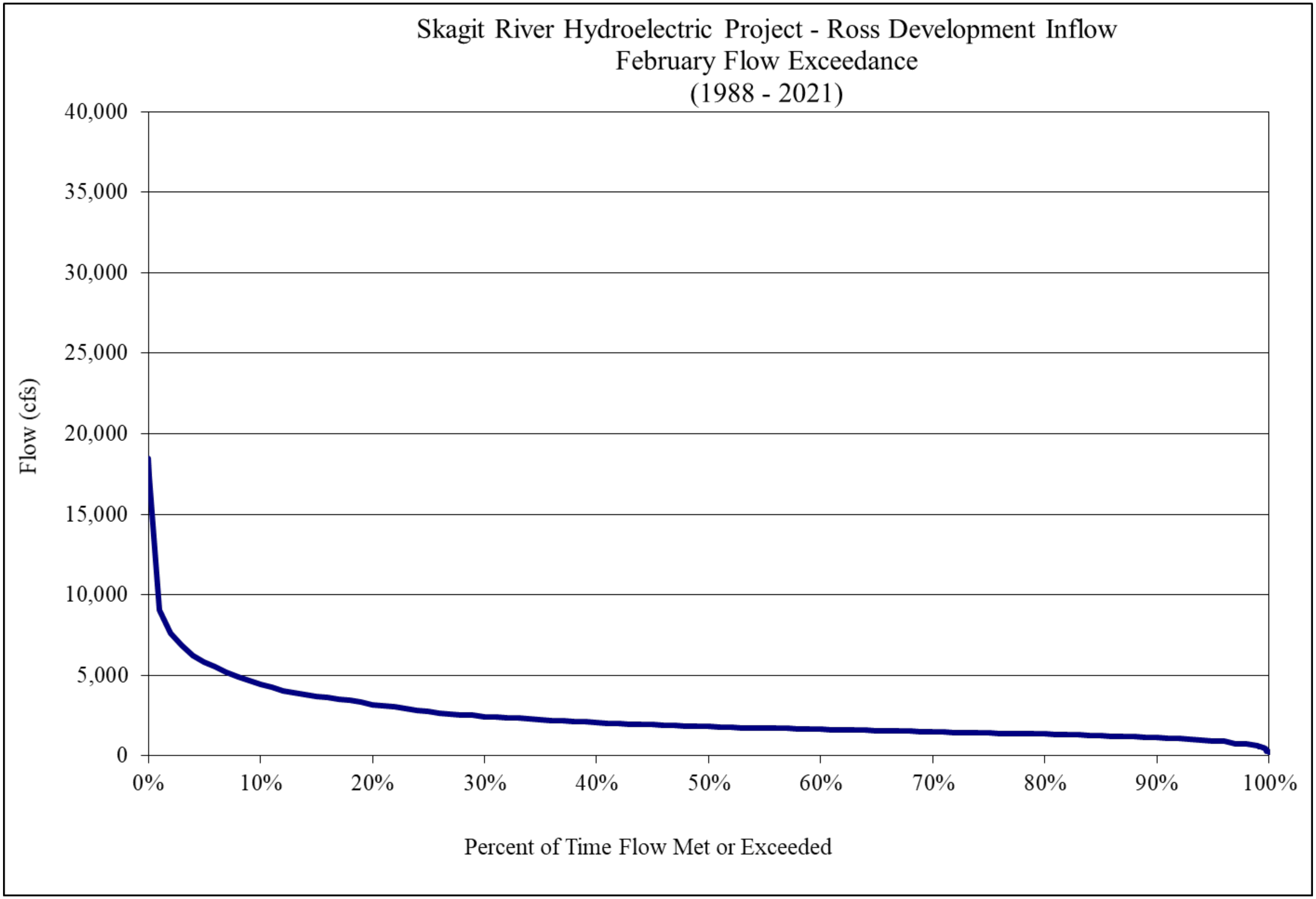

Figure B-3. Ross Lake February inflow duration curve.

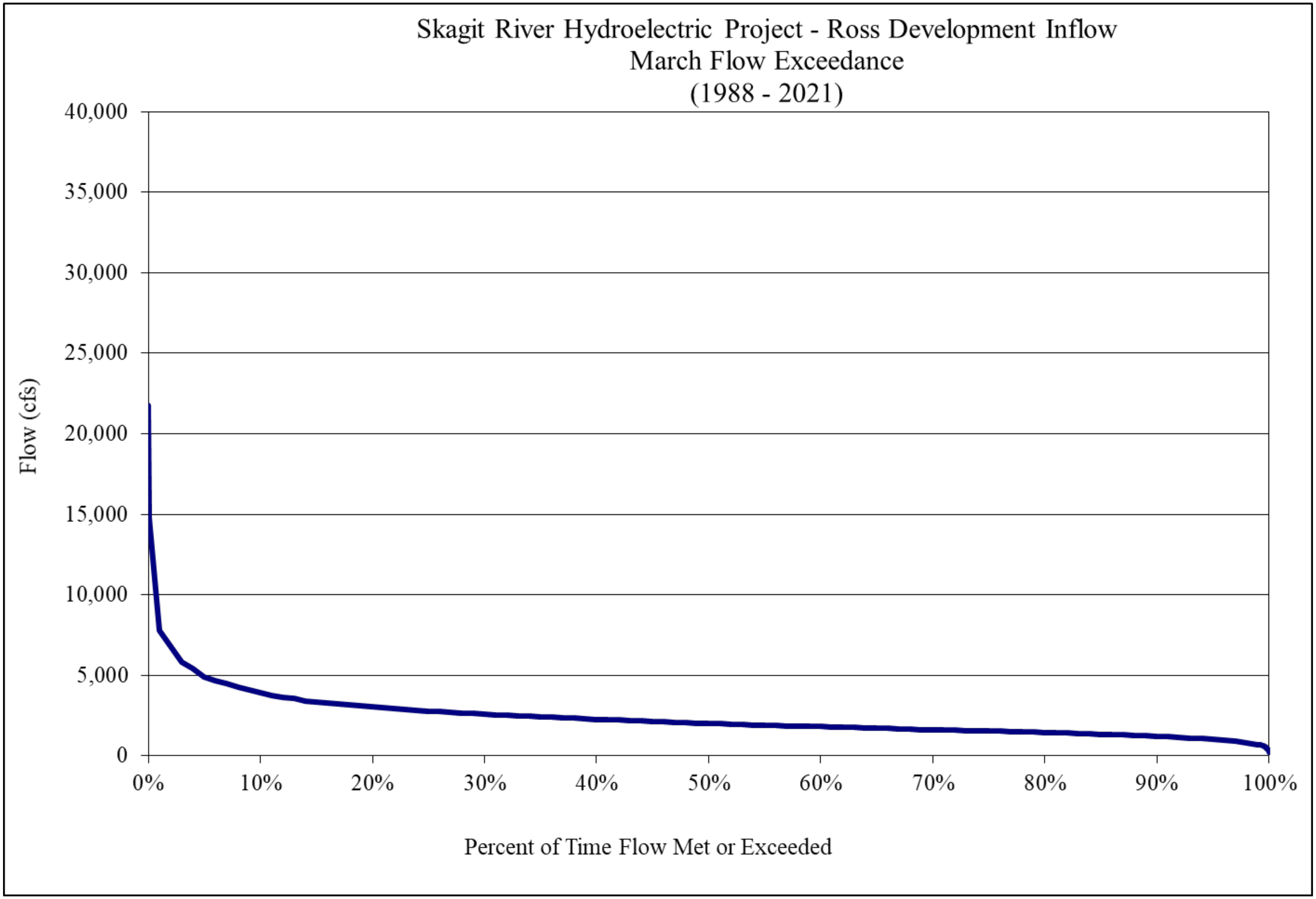

Figure B-4. Ross Lake March inflow duration curve.

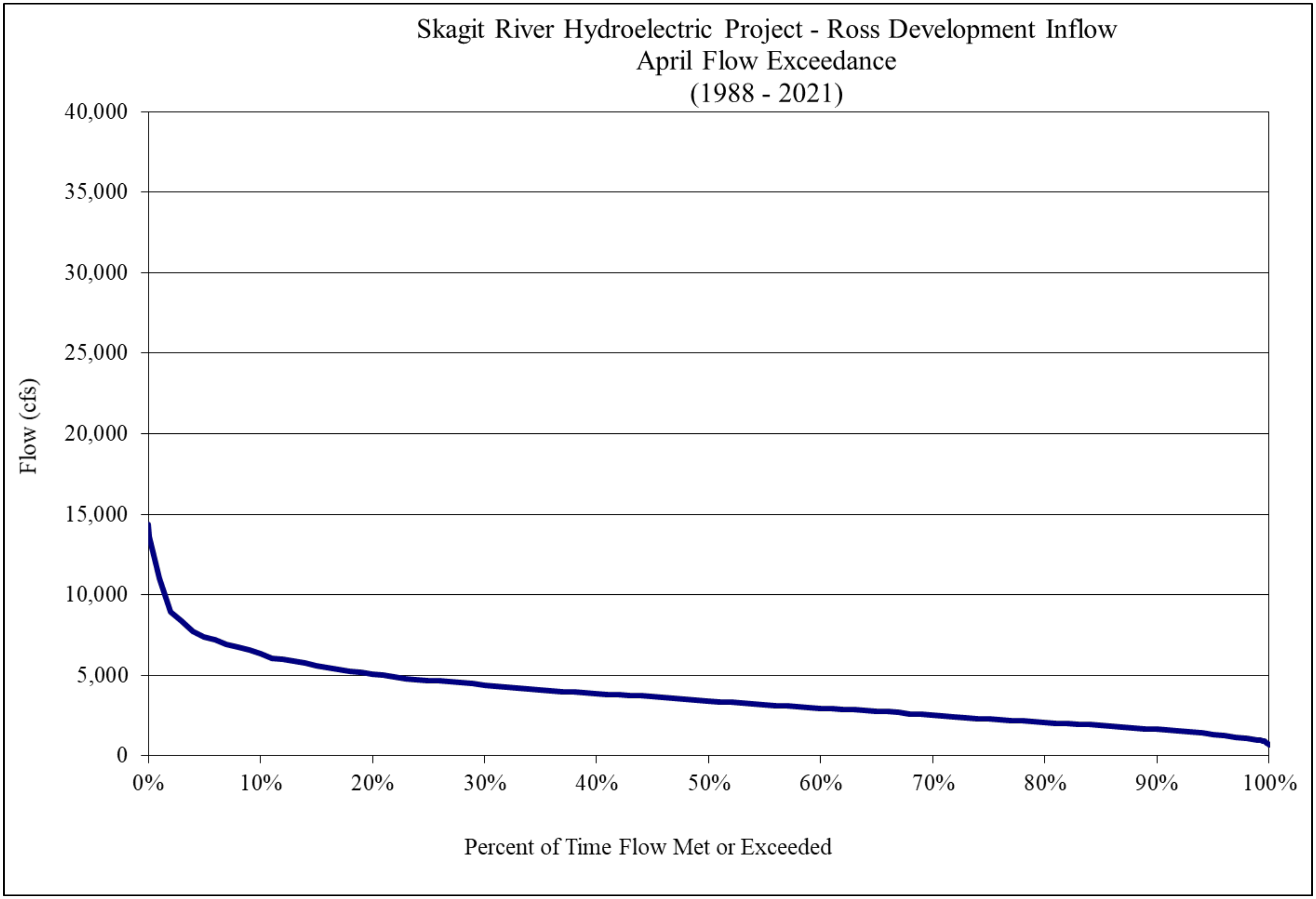

Figure B-5. Ross Lake April inflow duration curve.

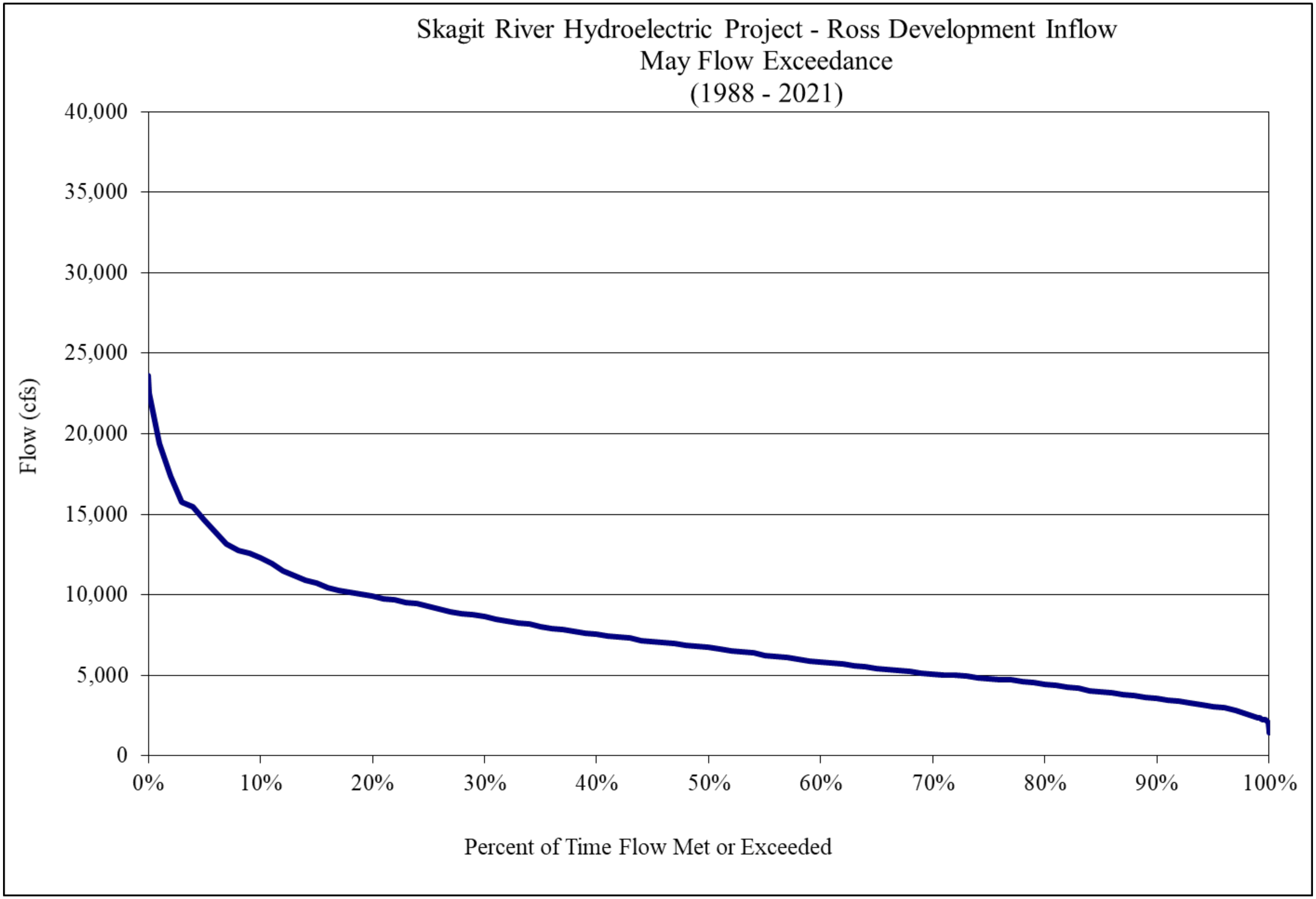

Figure B-6. Ross Lake May inflow duration curve.

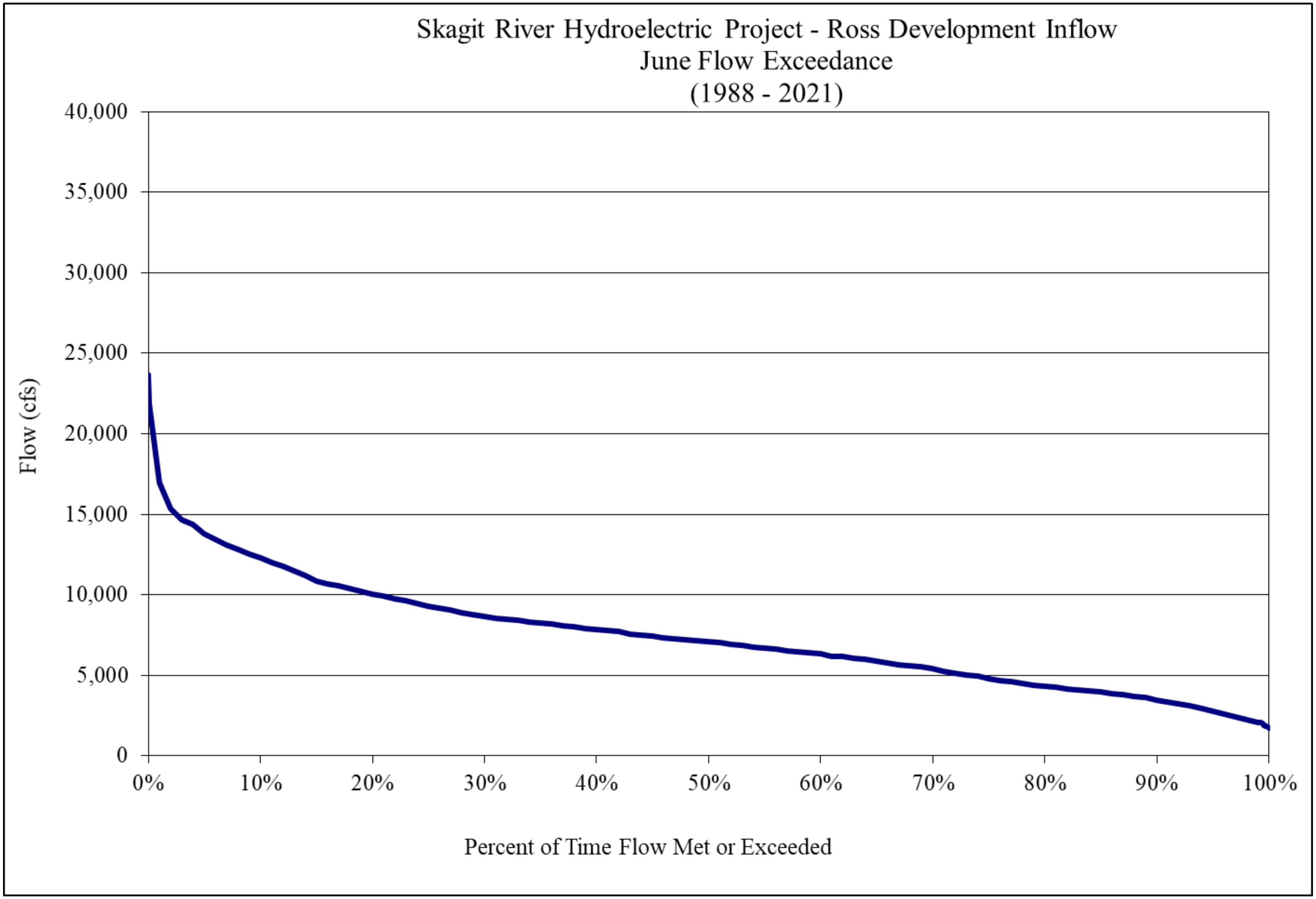

Figure B-7. Ross Lake June inflow duration curve.

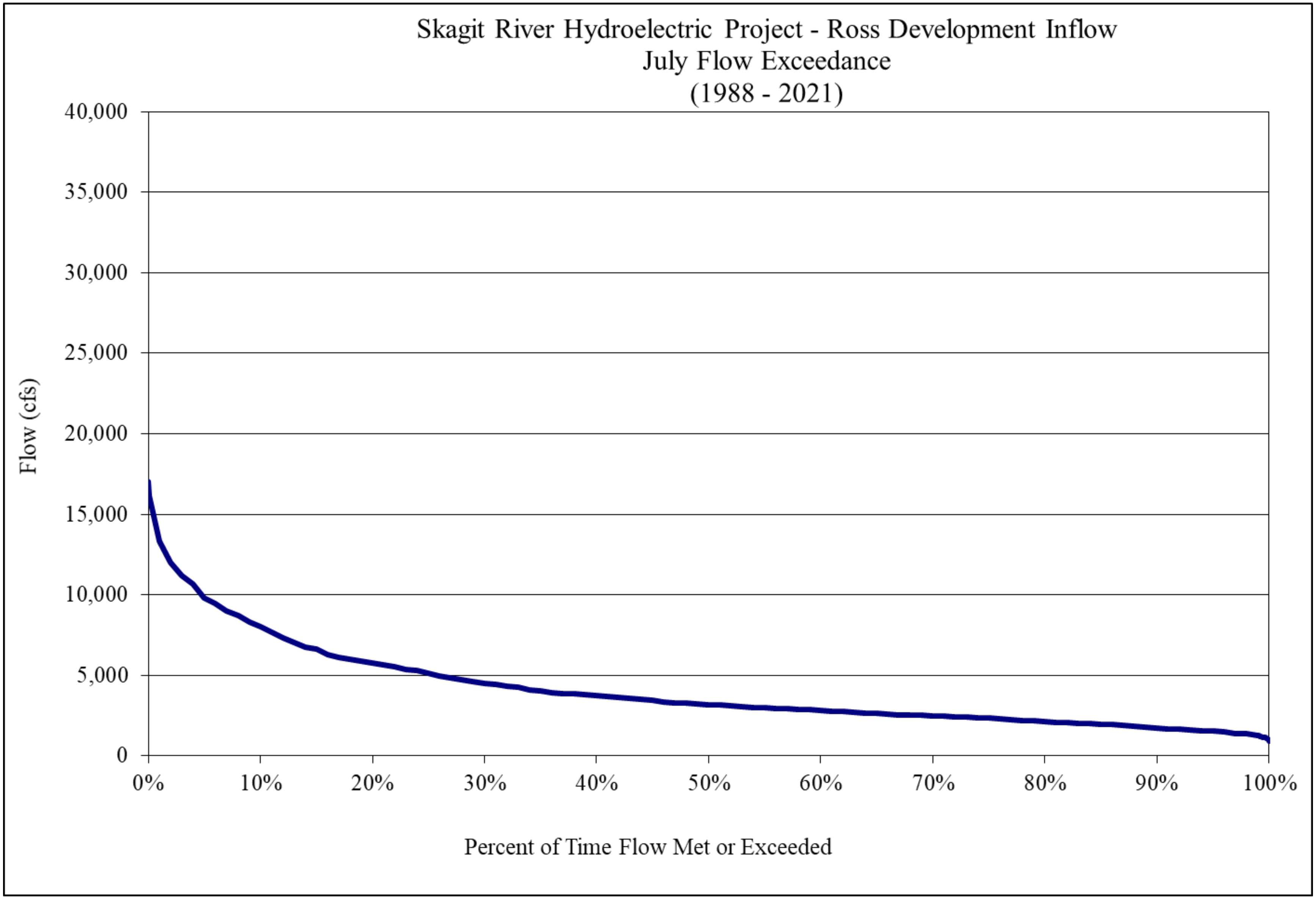

Figure B-8. Ross Lake July inflow duration curve.

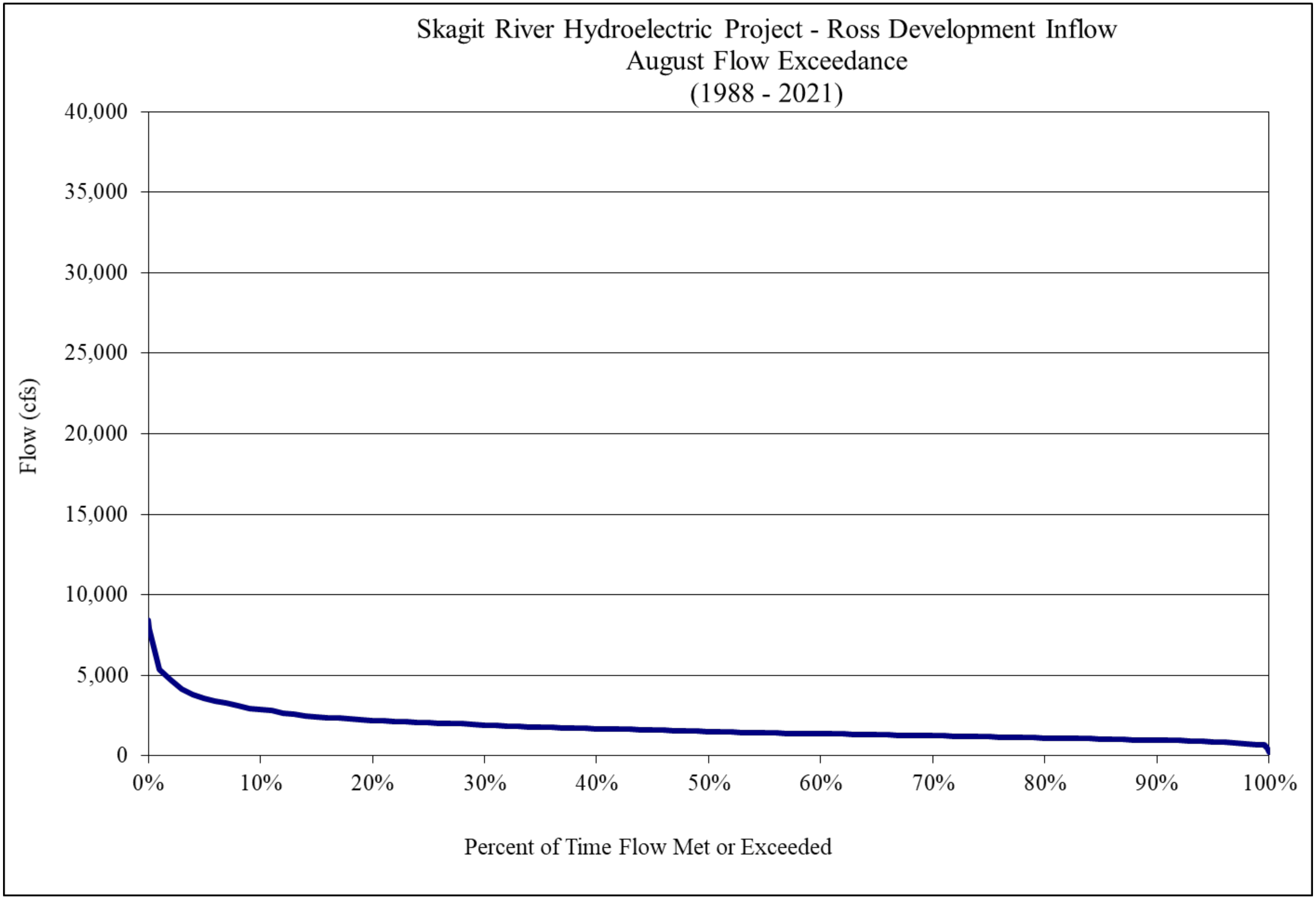

Figure B-9. Ross Lake August inflow duration curve.

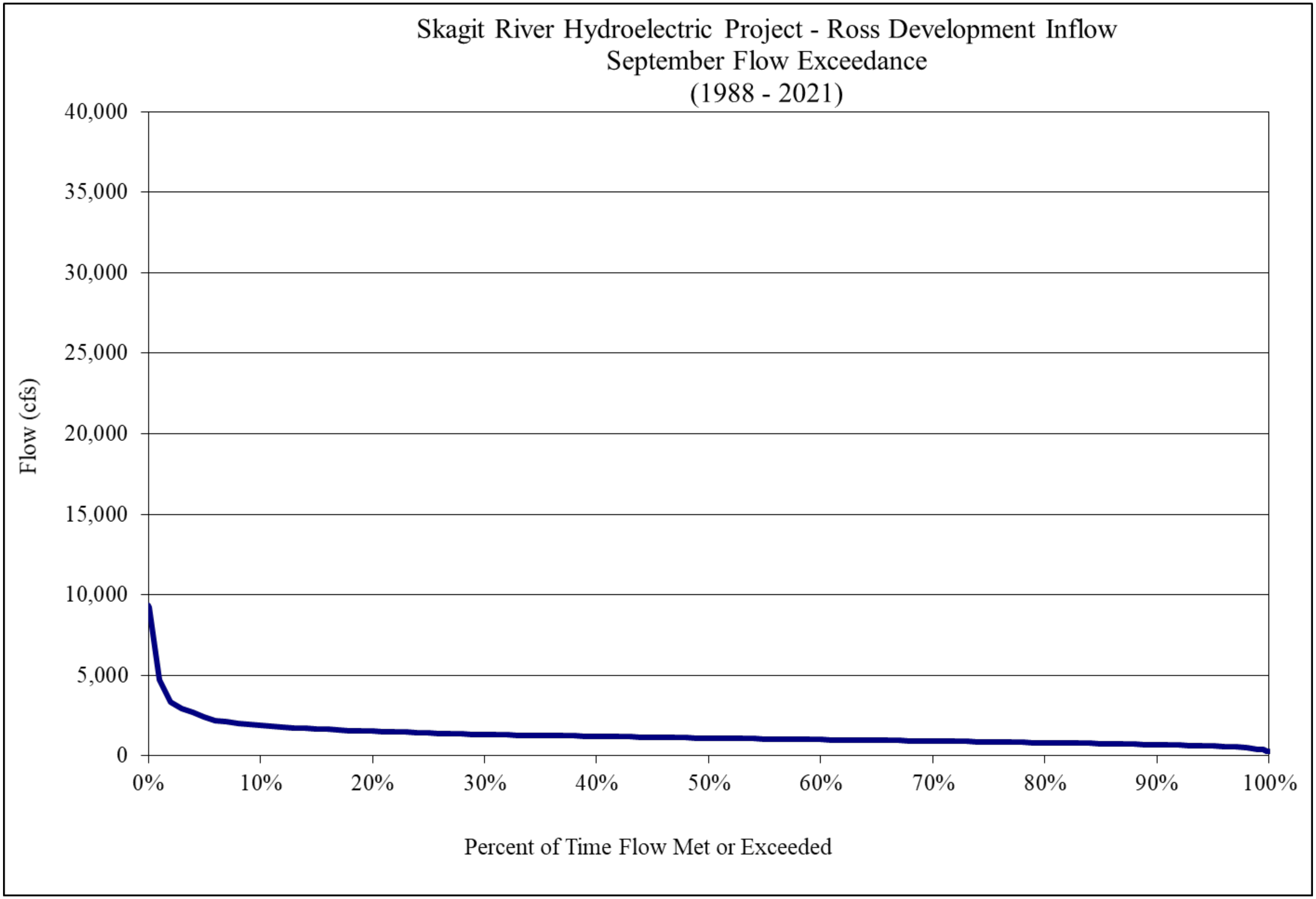

Figure B-10. Ross Lake September inflow duration curve.

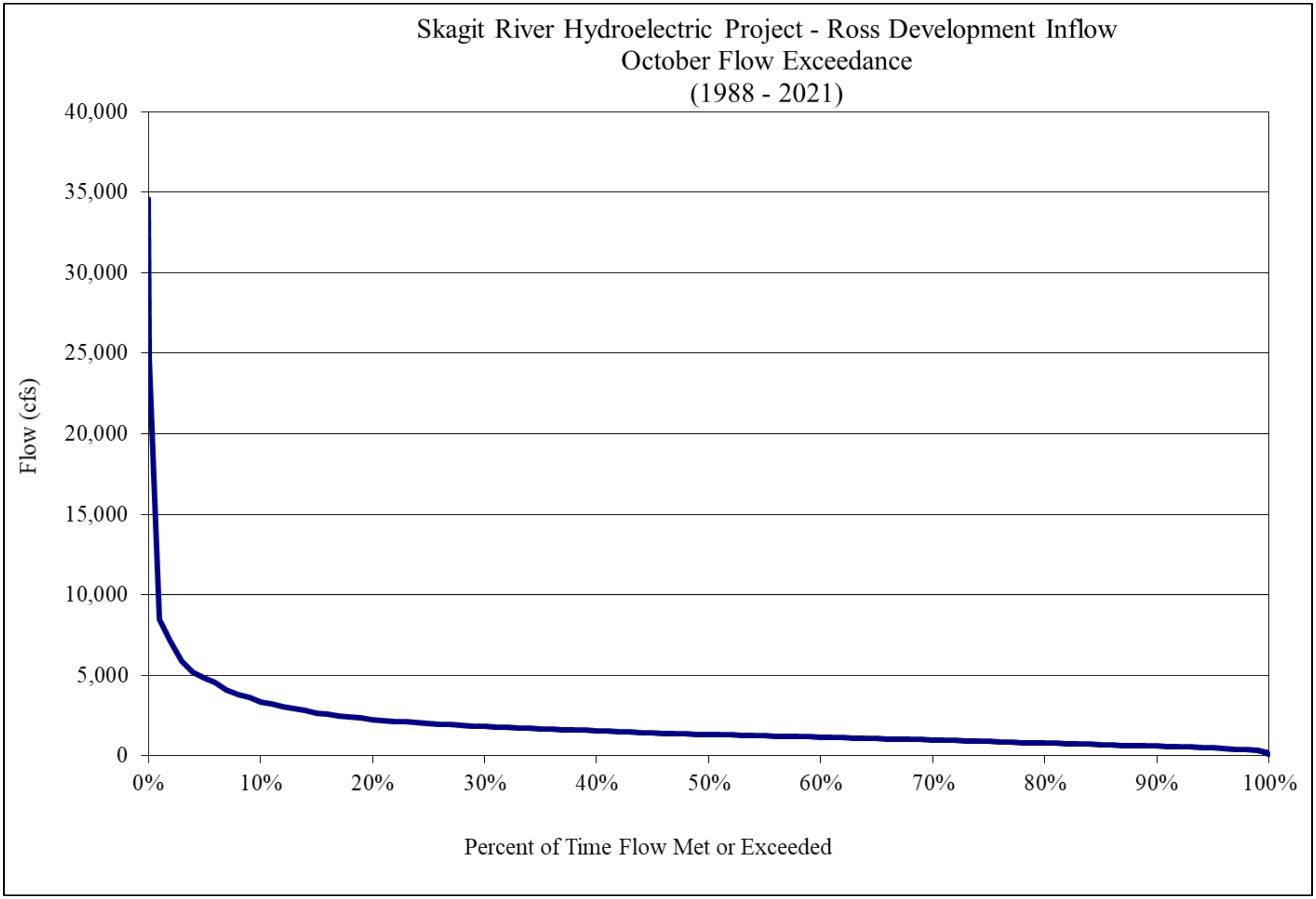

Figure B-11. Ross Lake October inflow duration curve.

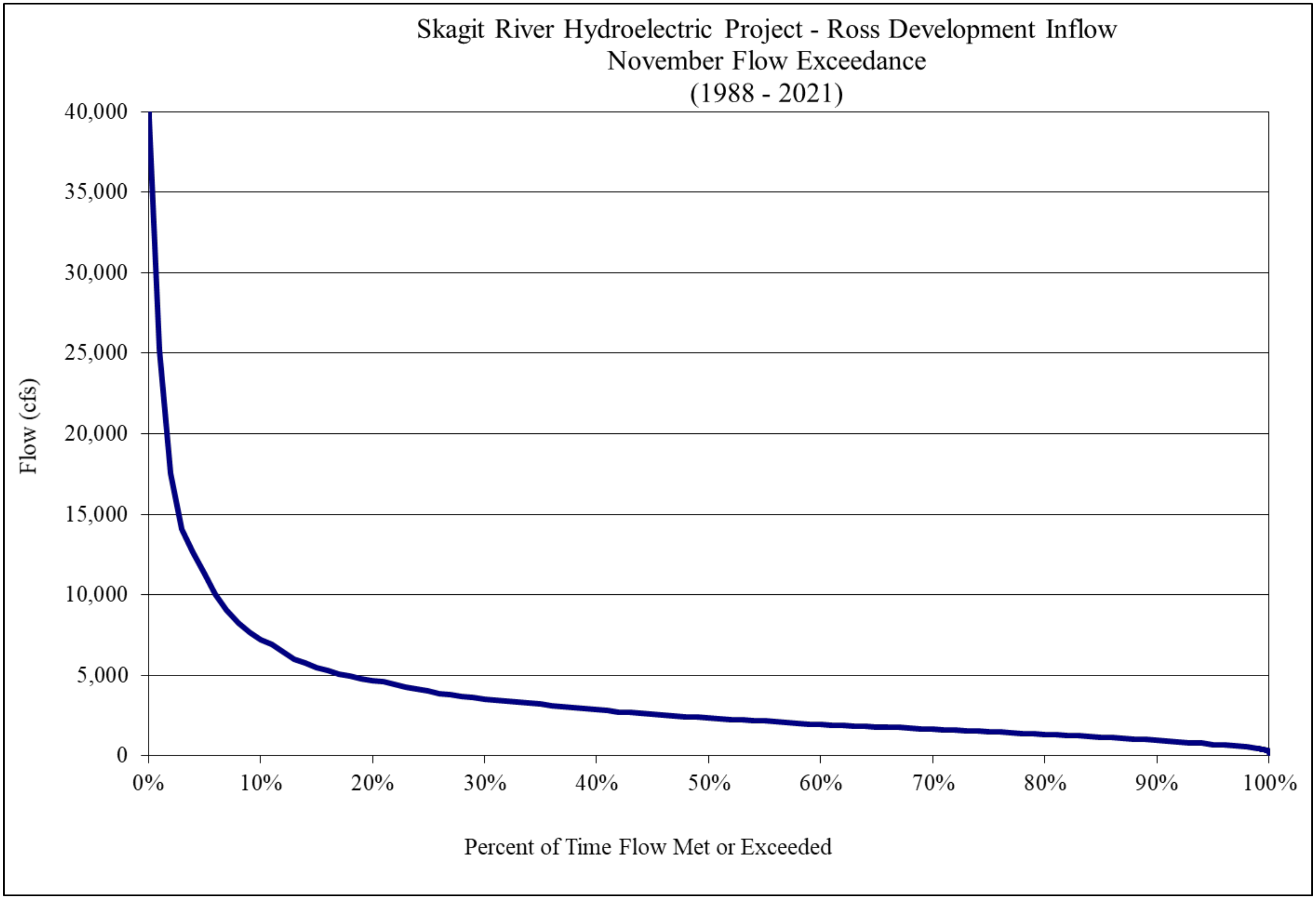

Figure B-12. Ross Lake November inflow duration curve.

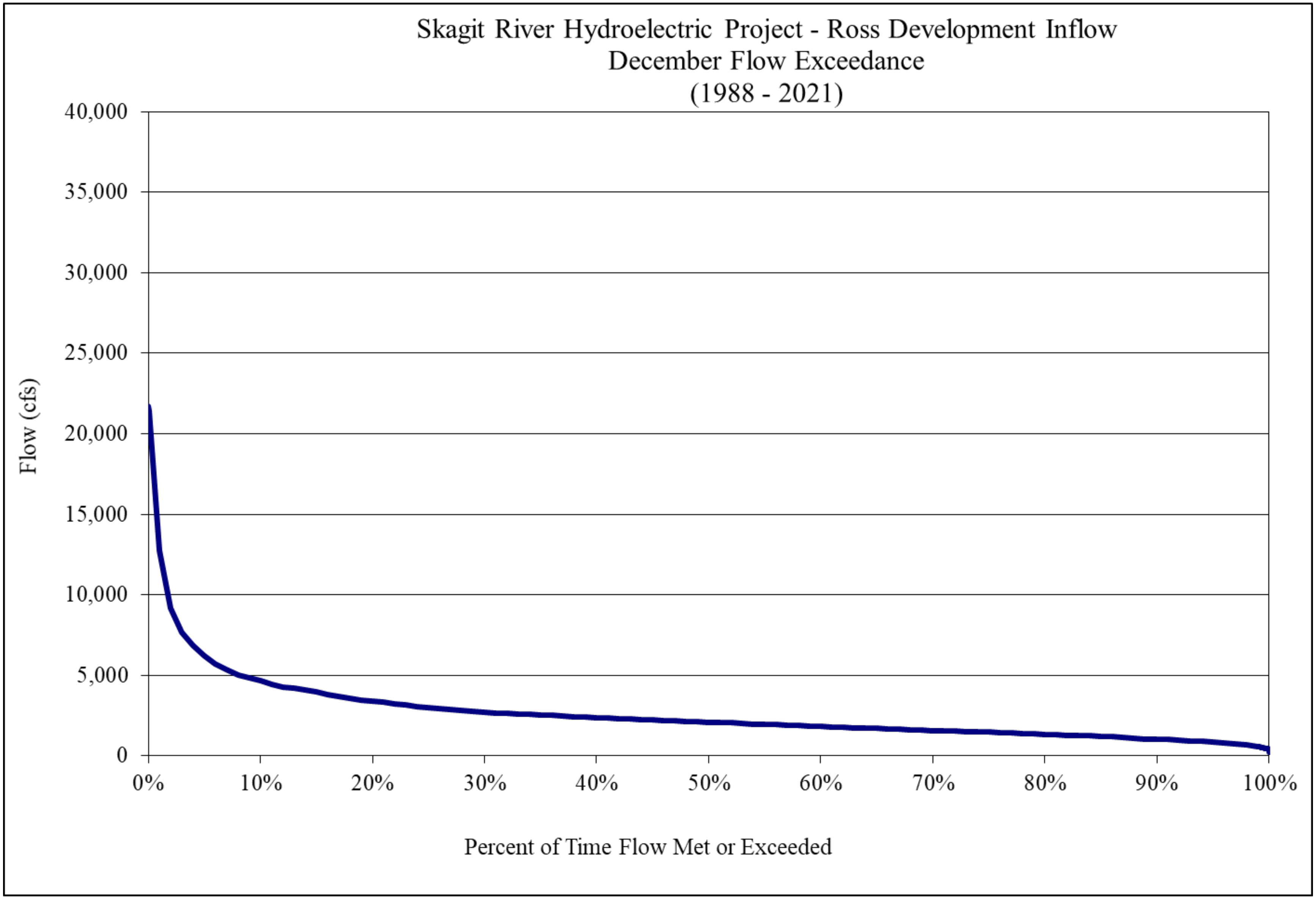

Figure B-13. Ross Lake December inflow duration curve.

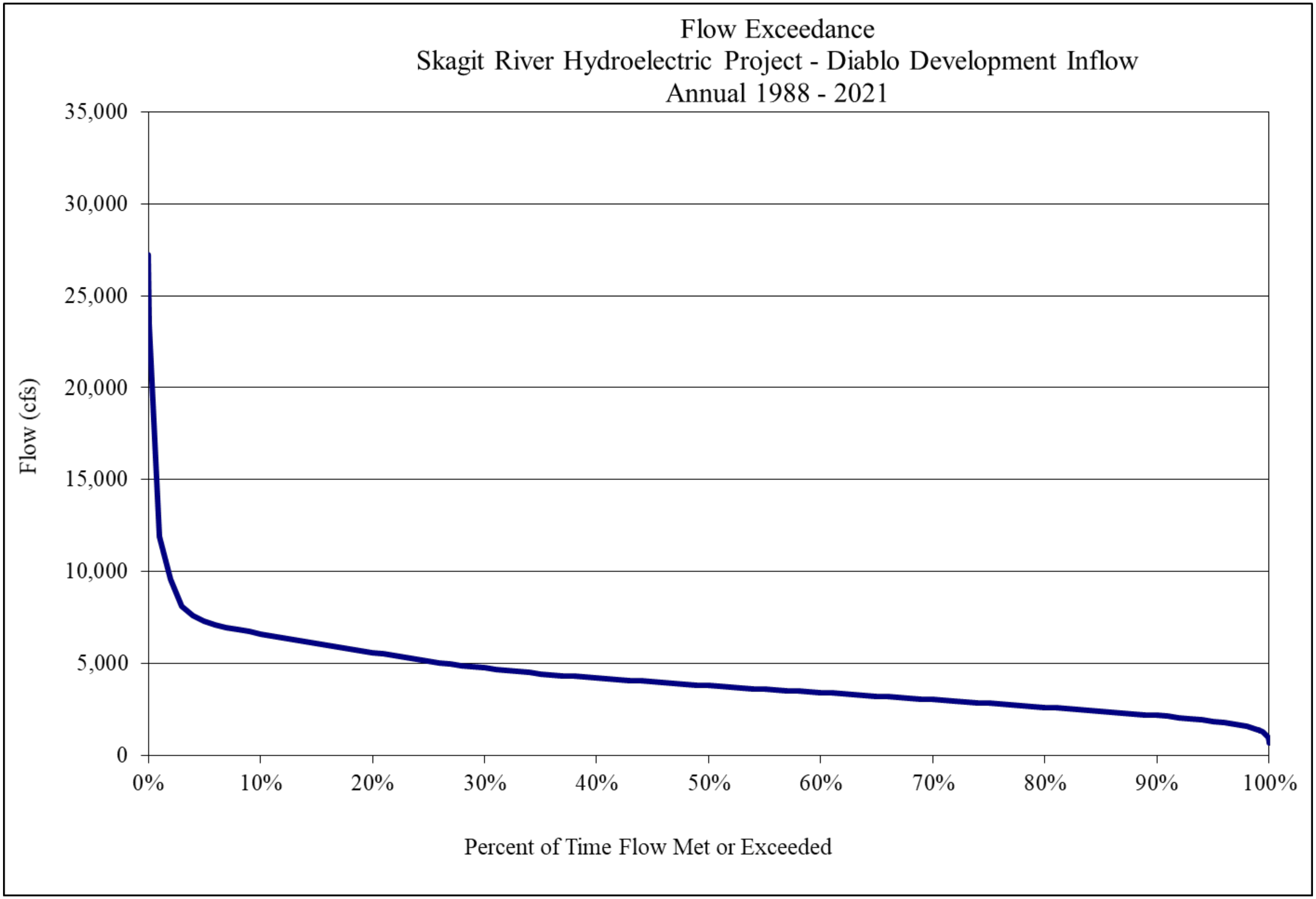

Figure B-14. Diablo Lake annual inflow duration curve.

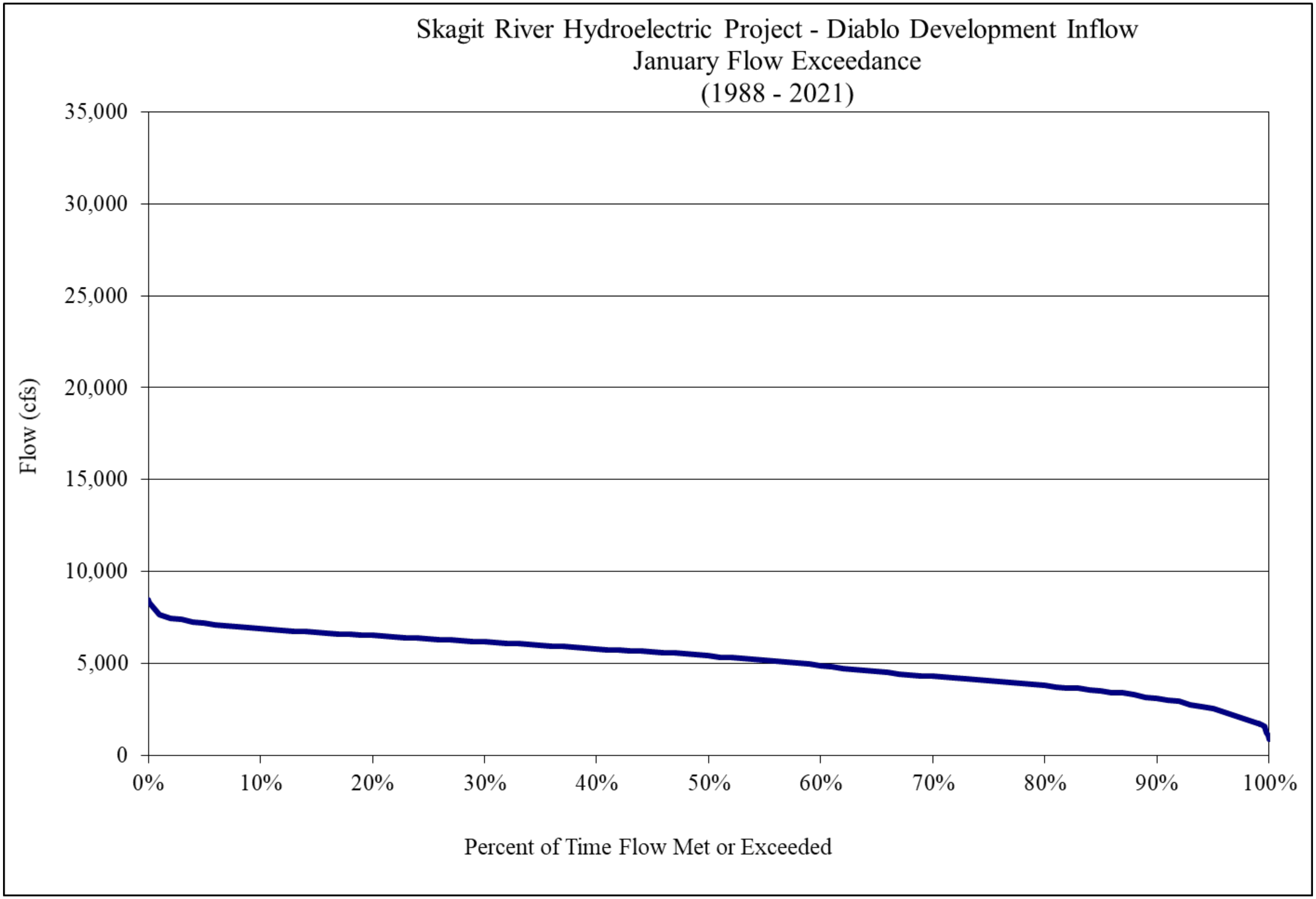

Figure B-15. Diablo Lake January inflow duration curve.

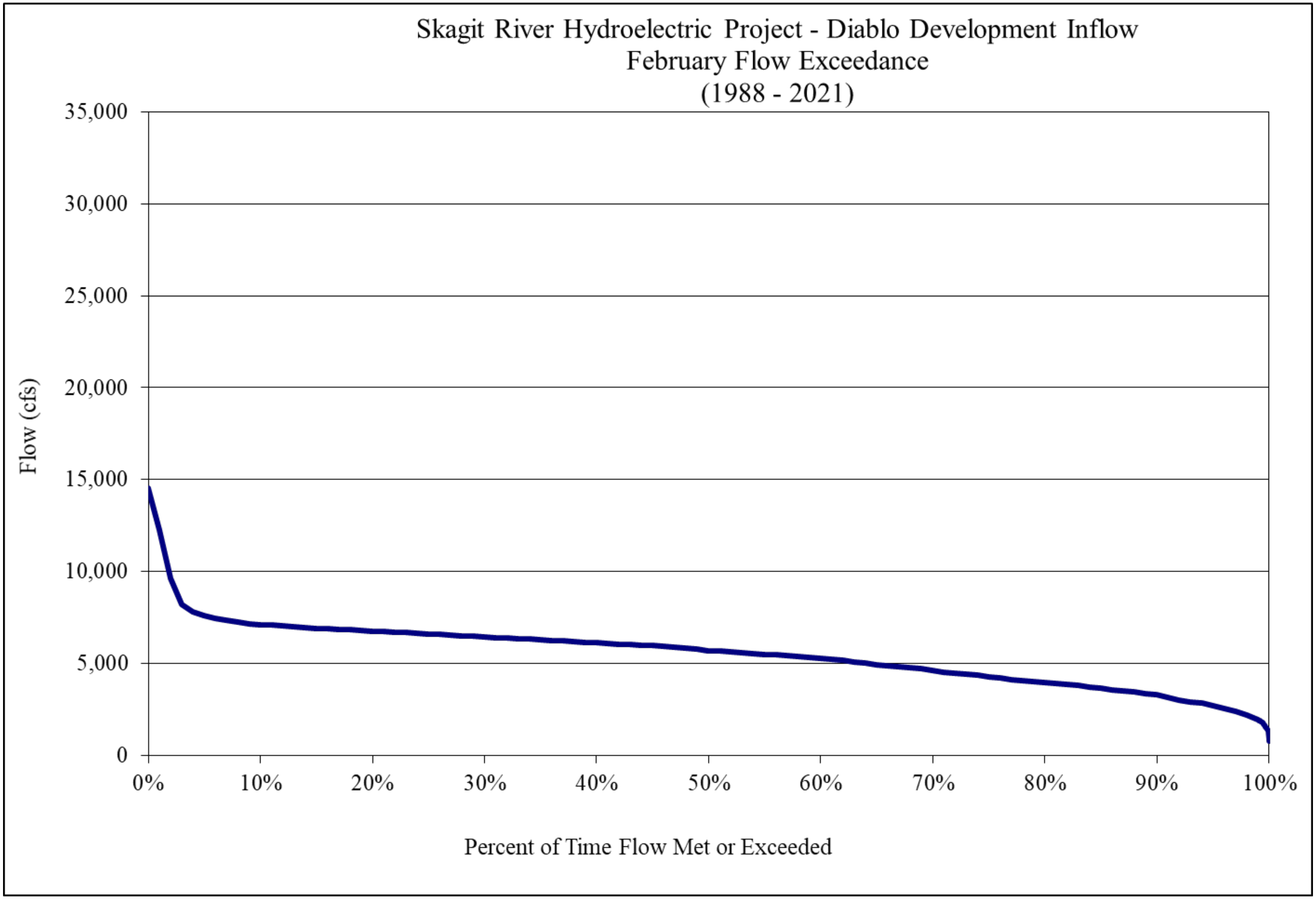

Figure B-16. **Diablo Lake February inflow duration curve.**

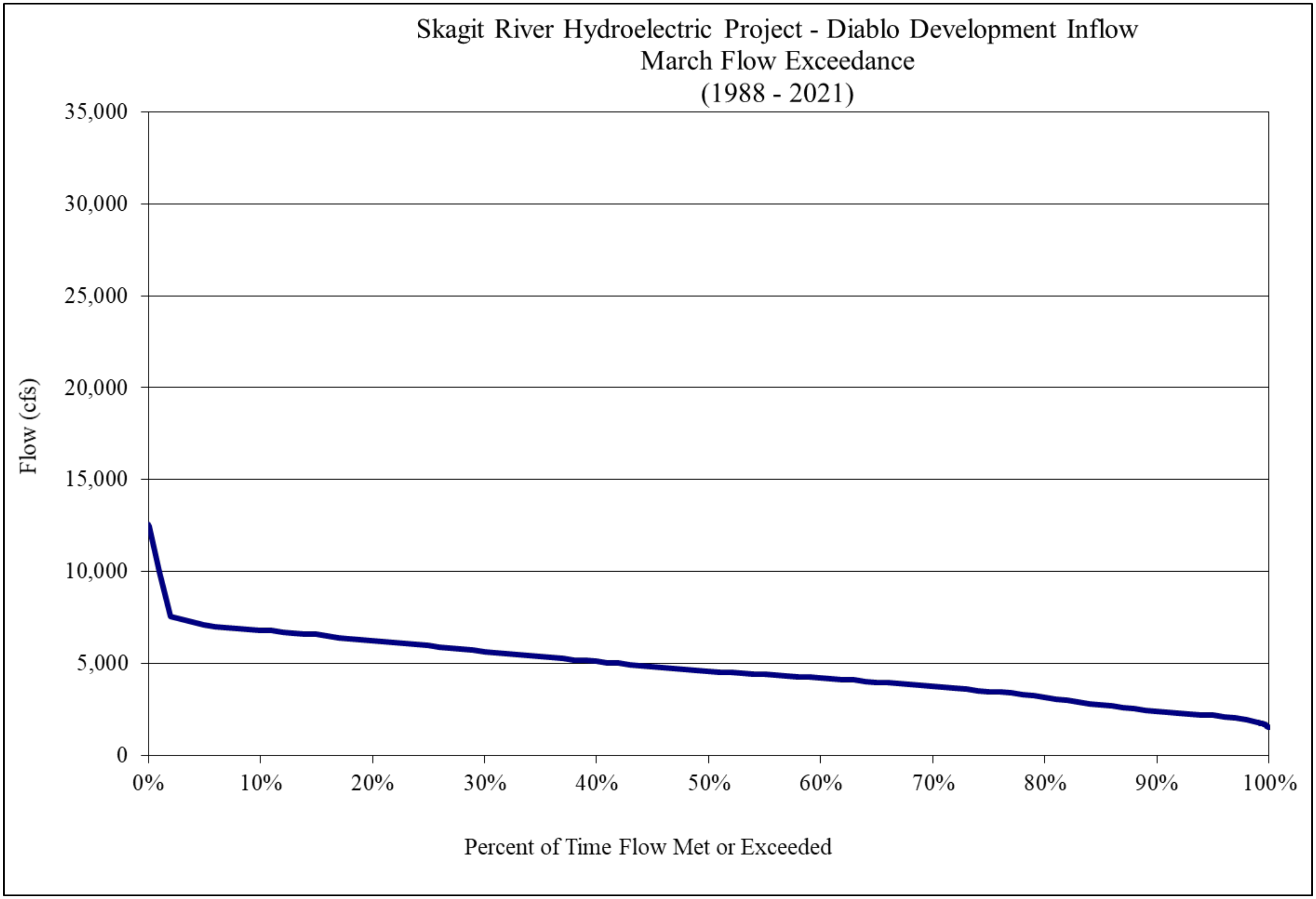

Figure B-17. Diablo Lake March inflow duration curve.

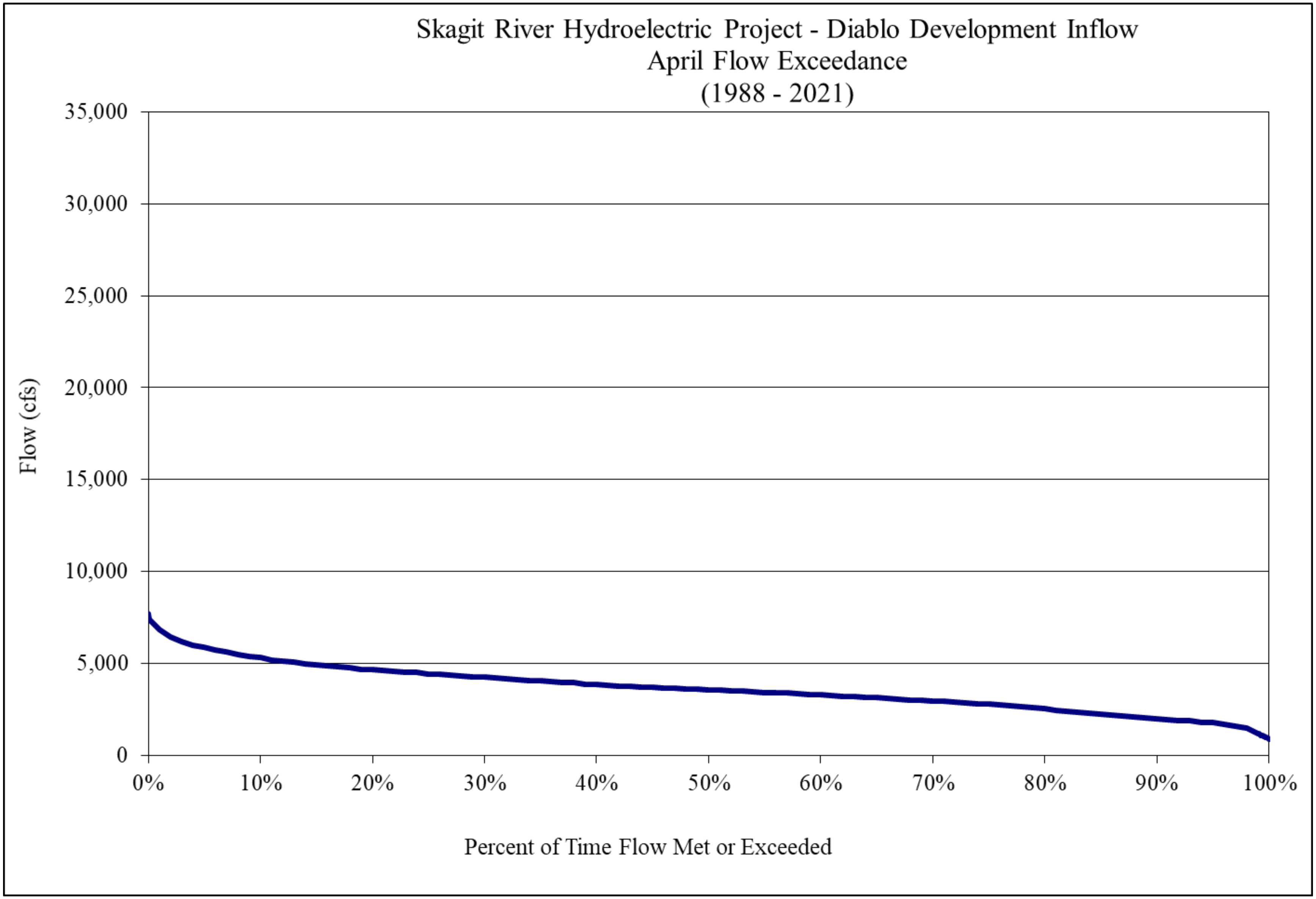

Figure B-18. Diablo Lake April inflow duration curve.

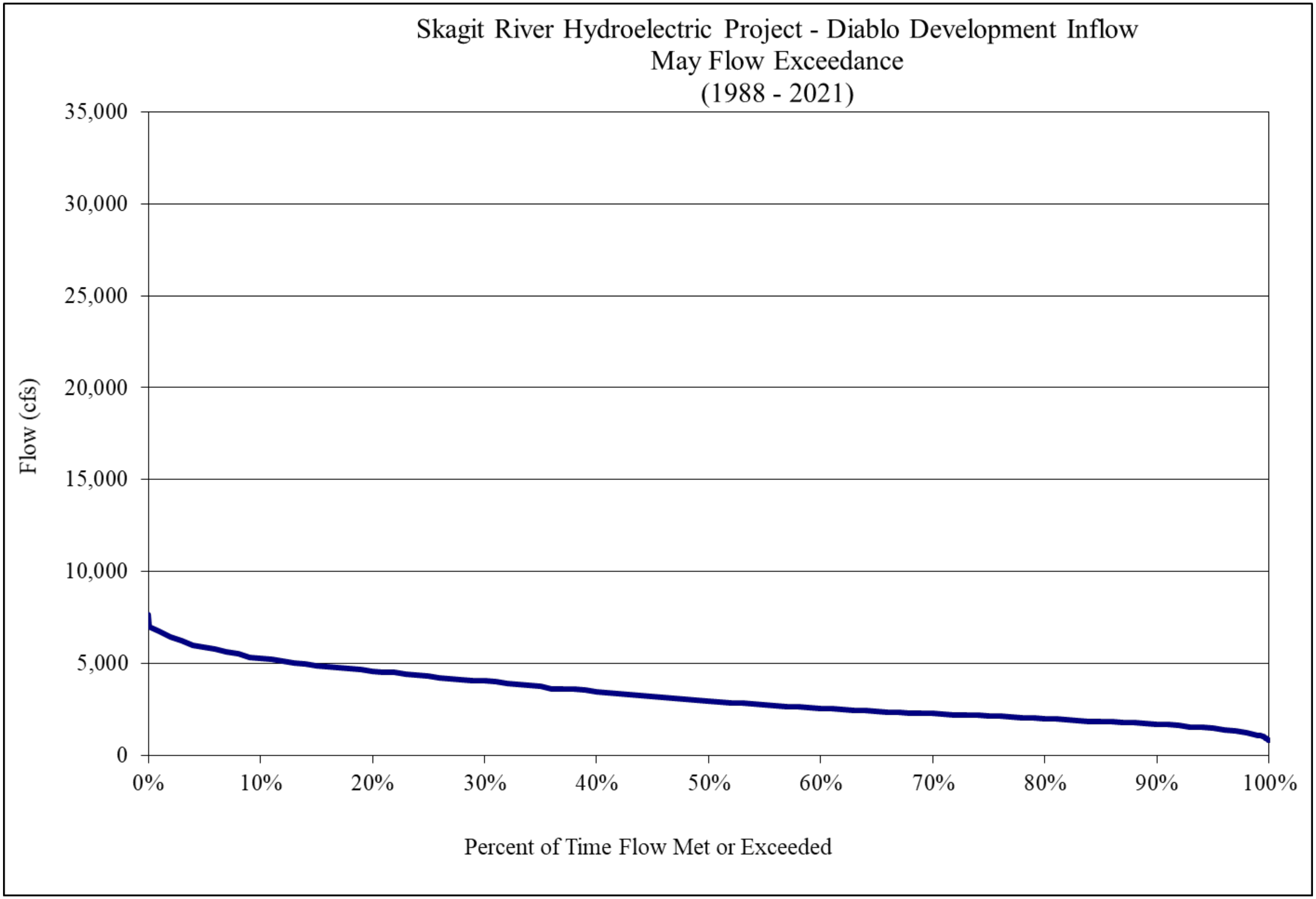

Figure B-19. Diablo Lake May inflow duration curve.

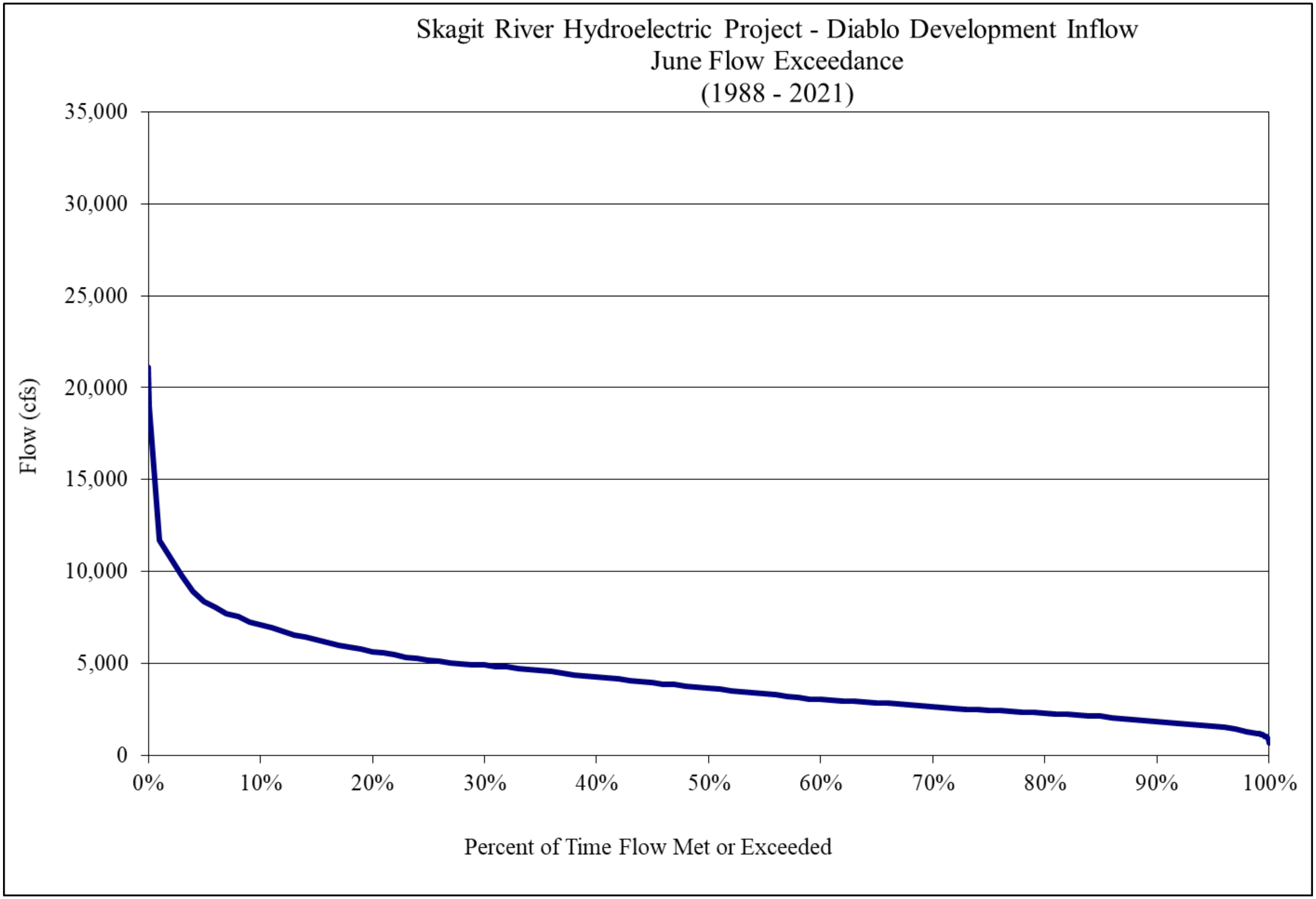

Figure B-20. Diablo Lake June inflow duration curve.

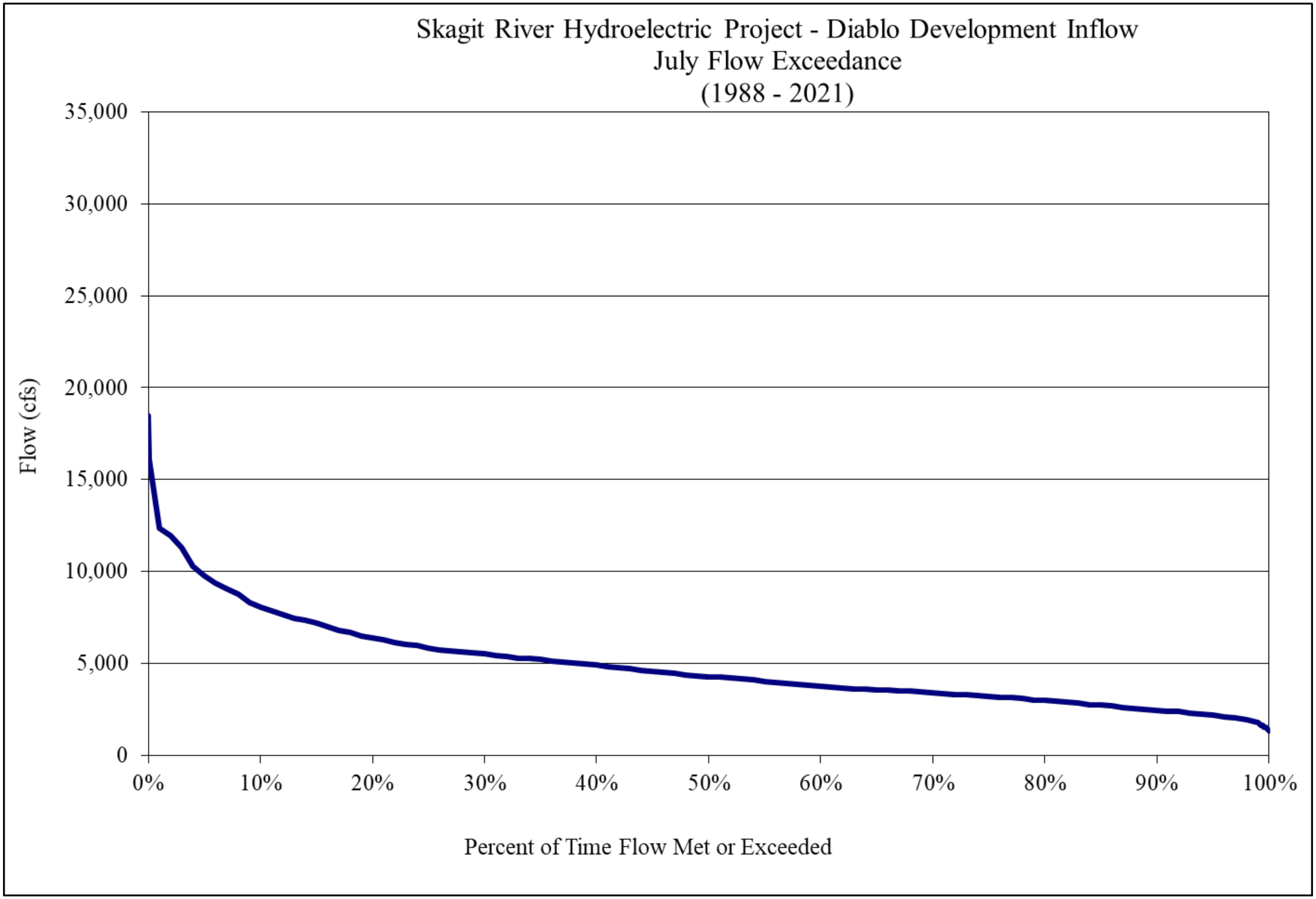

Figure B-21. Diablo Lake July inflow duration curve.

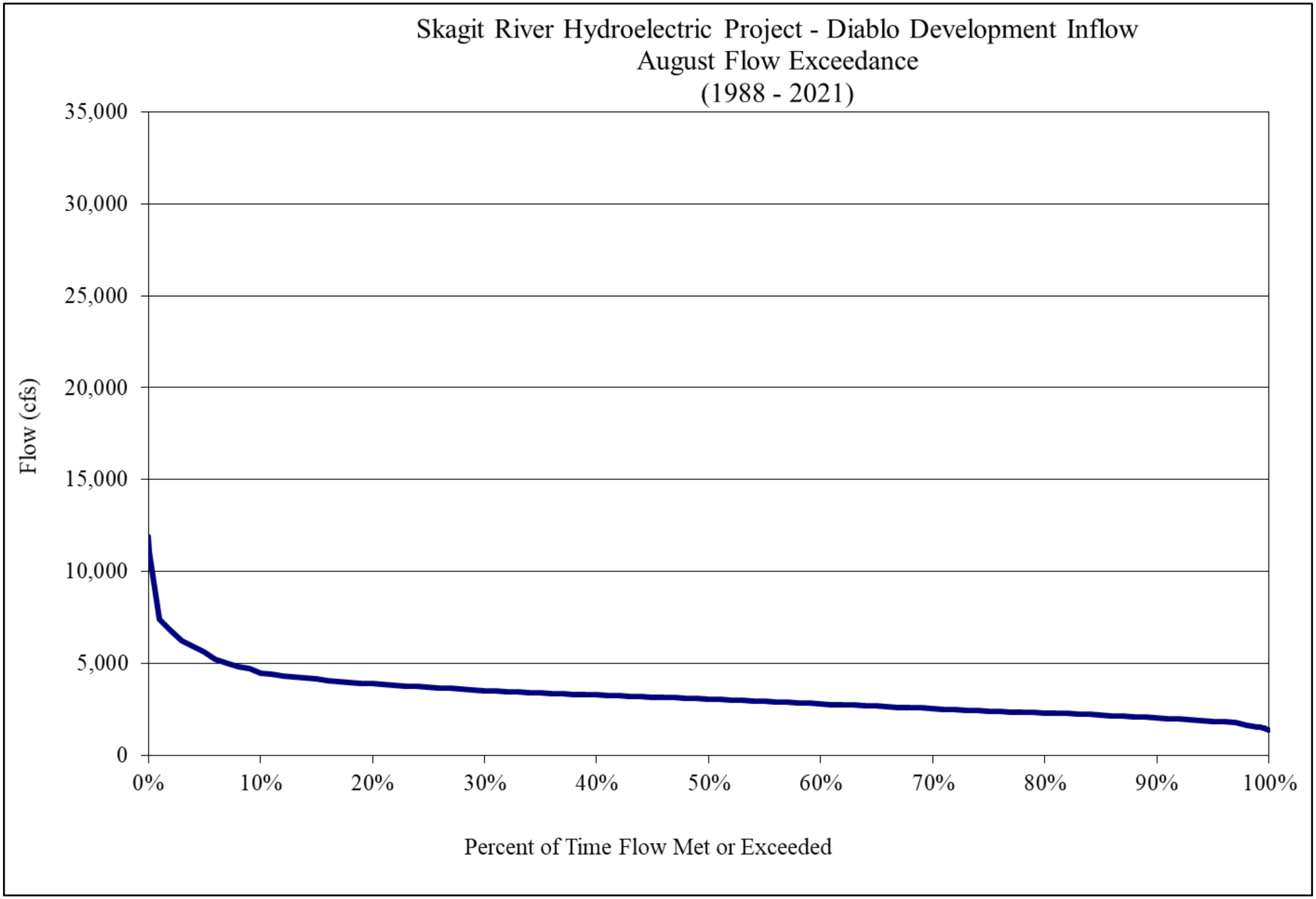

Figure B-22. Diablo Lake August inflow duration curve.

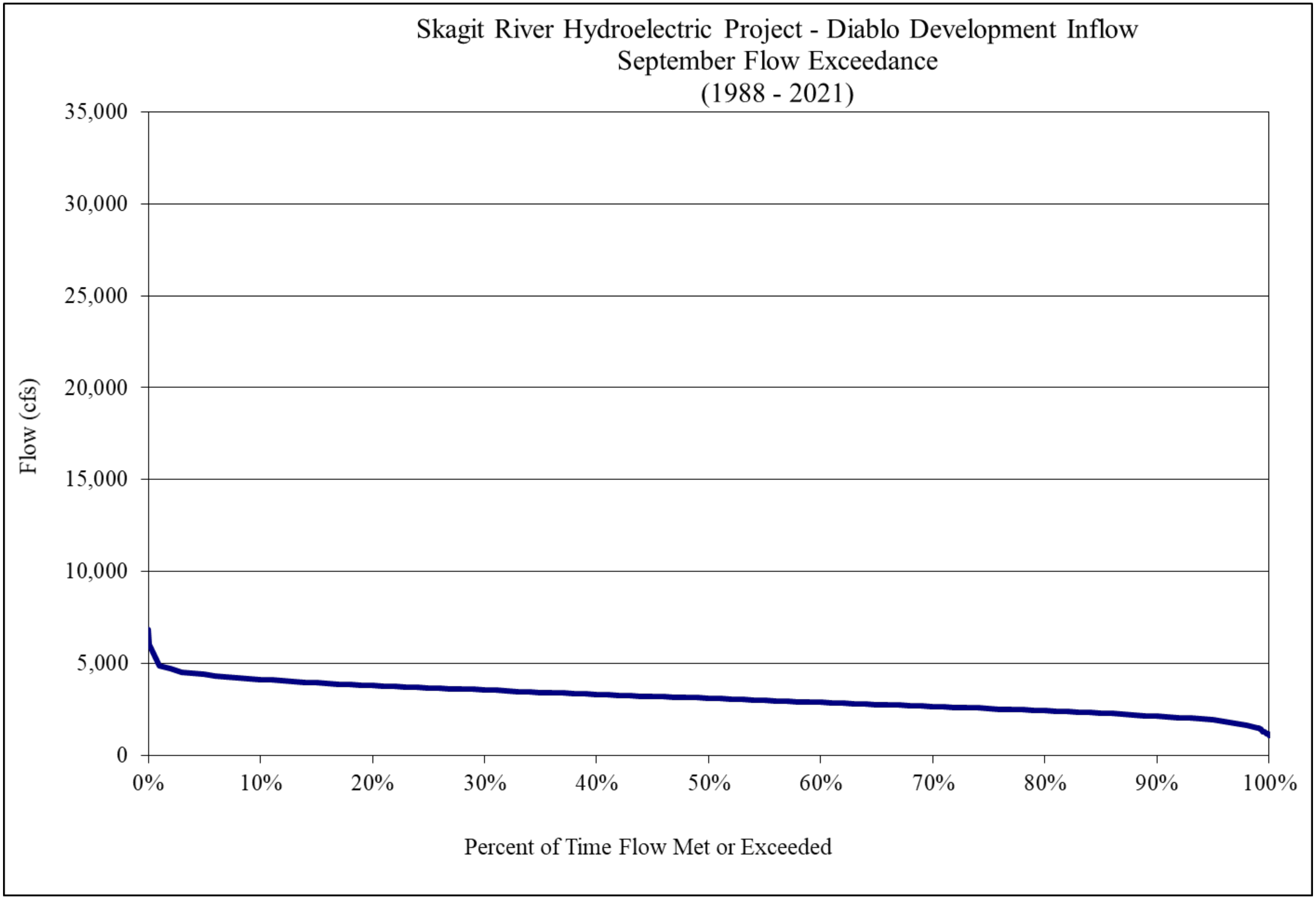

Figure B-23. Diablo Lake September inflow duration curve.

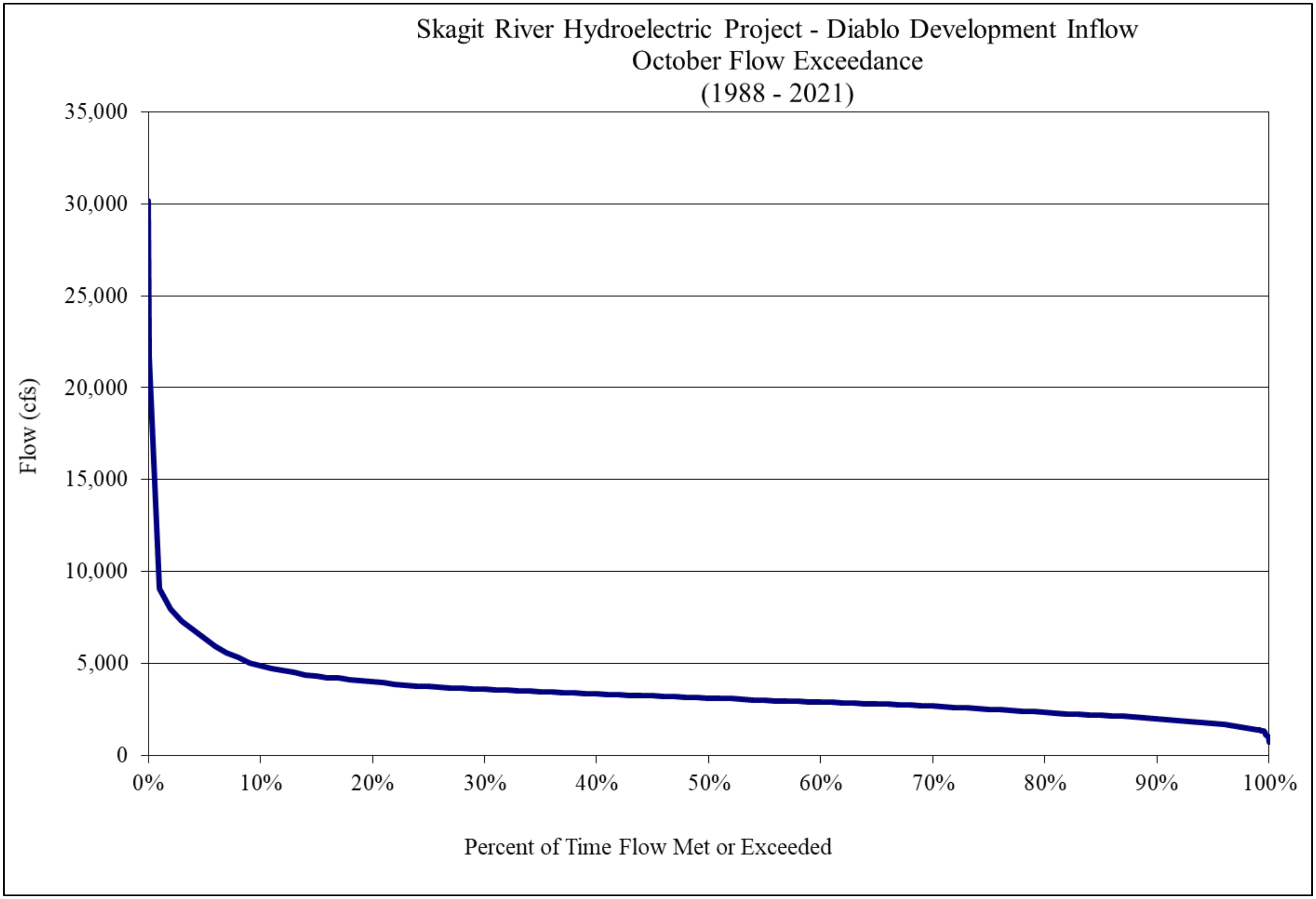

Figure B-24. Diablo Lake October inflow duration curve.

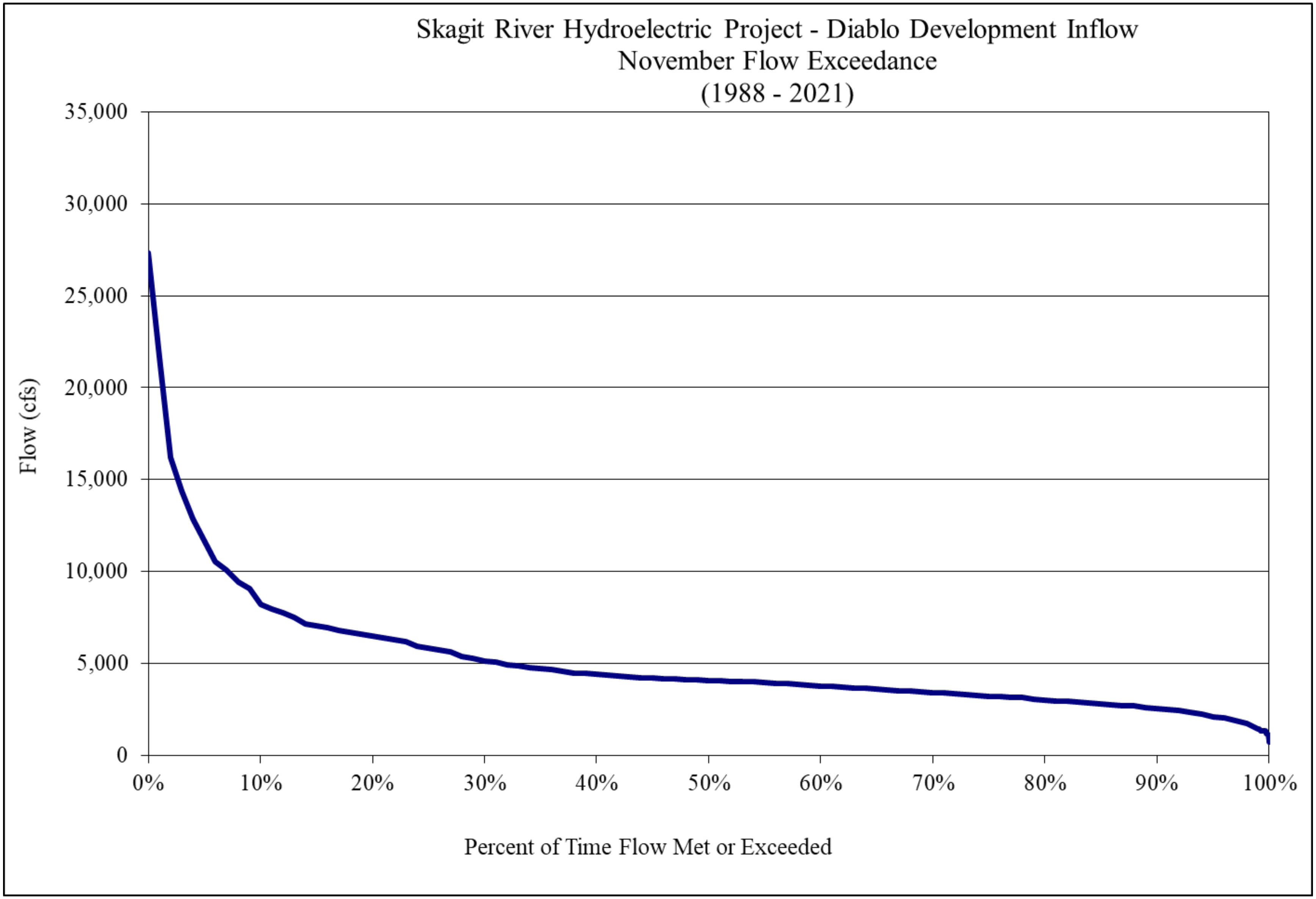

Figure B-25. Diablo Lake November inflow duration curve.

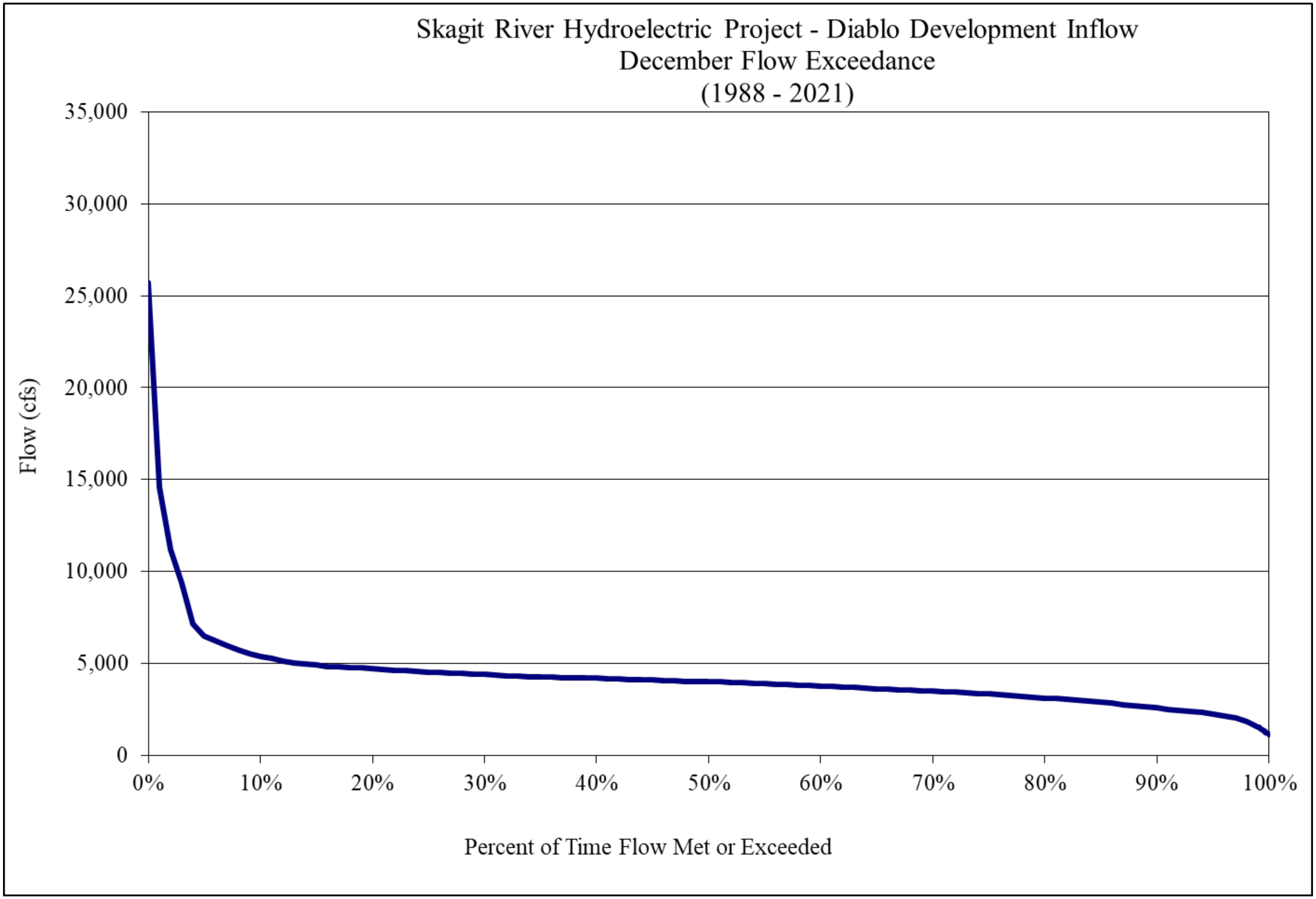

Figure B-26. Diablo Lake December inflow duration curve.

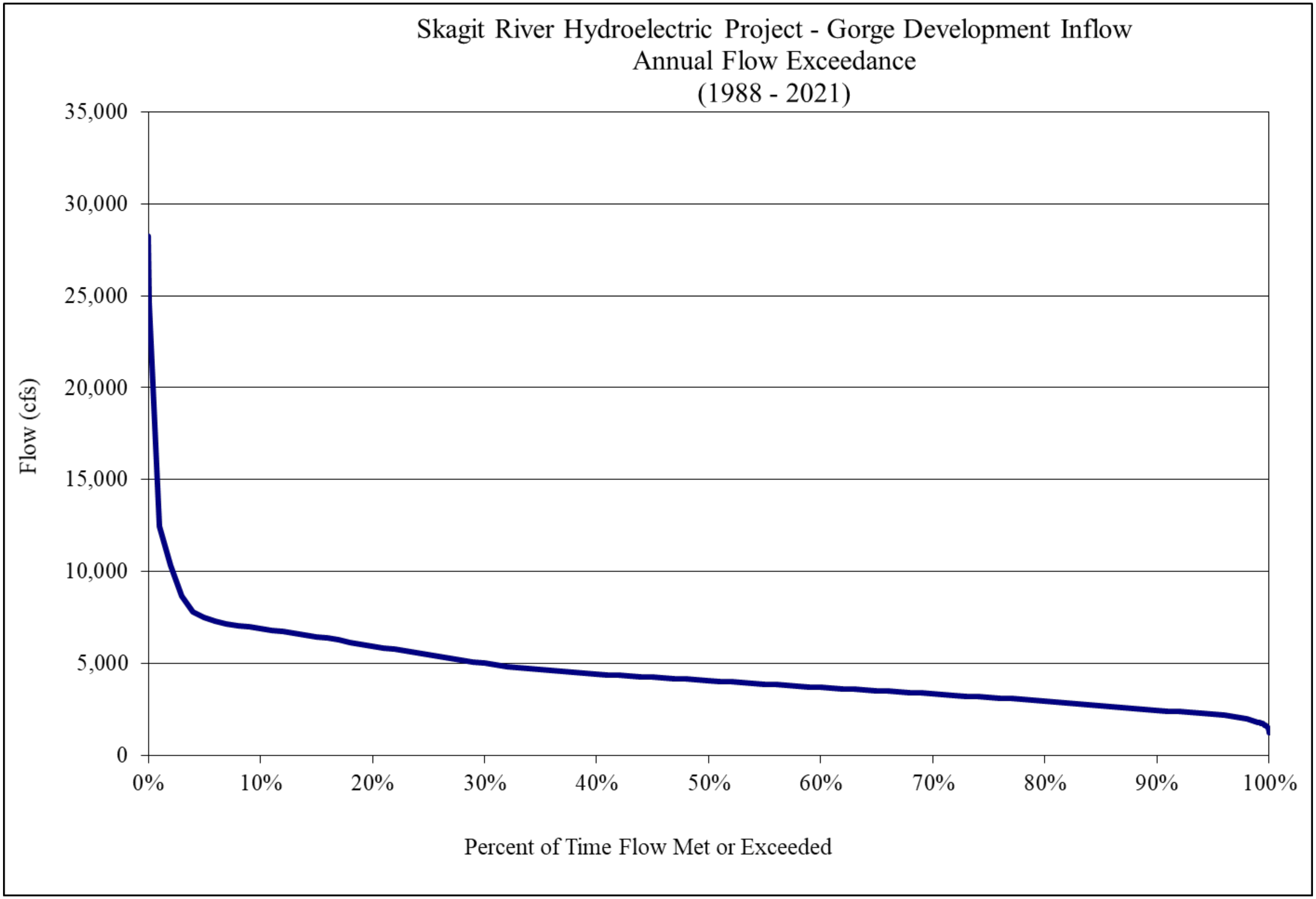

Figure B-27. Gorge Lake annual inflow duration curve.

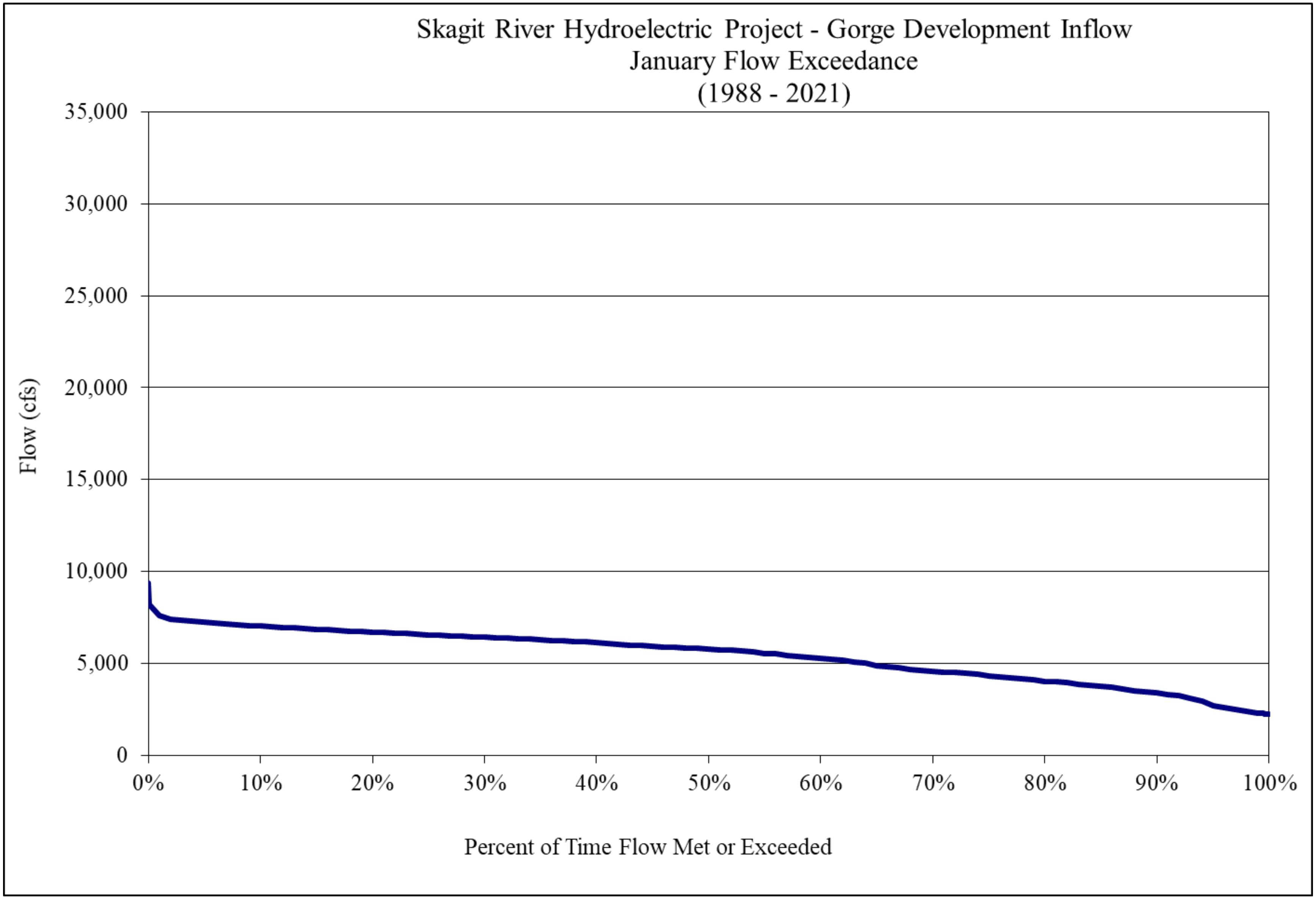

Figure B-28. Gorge Lake January inflow duration curve.

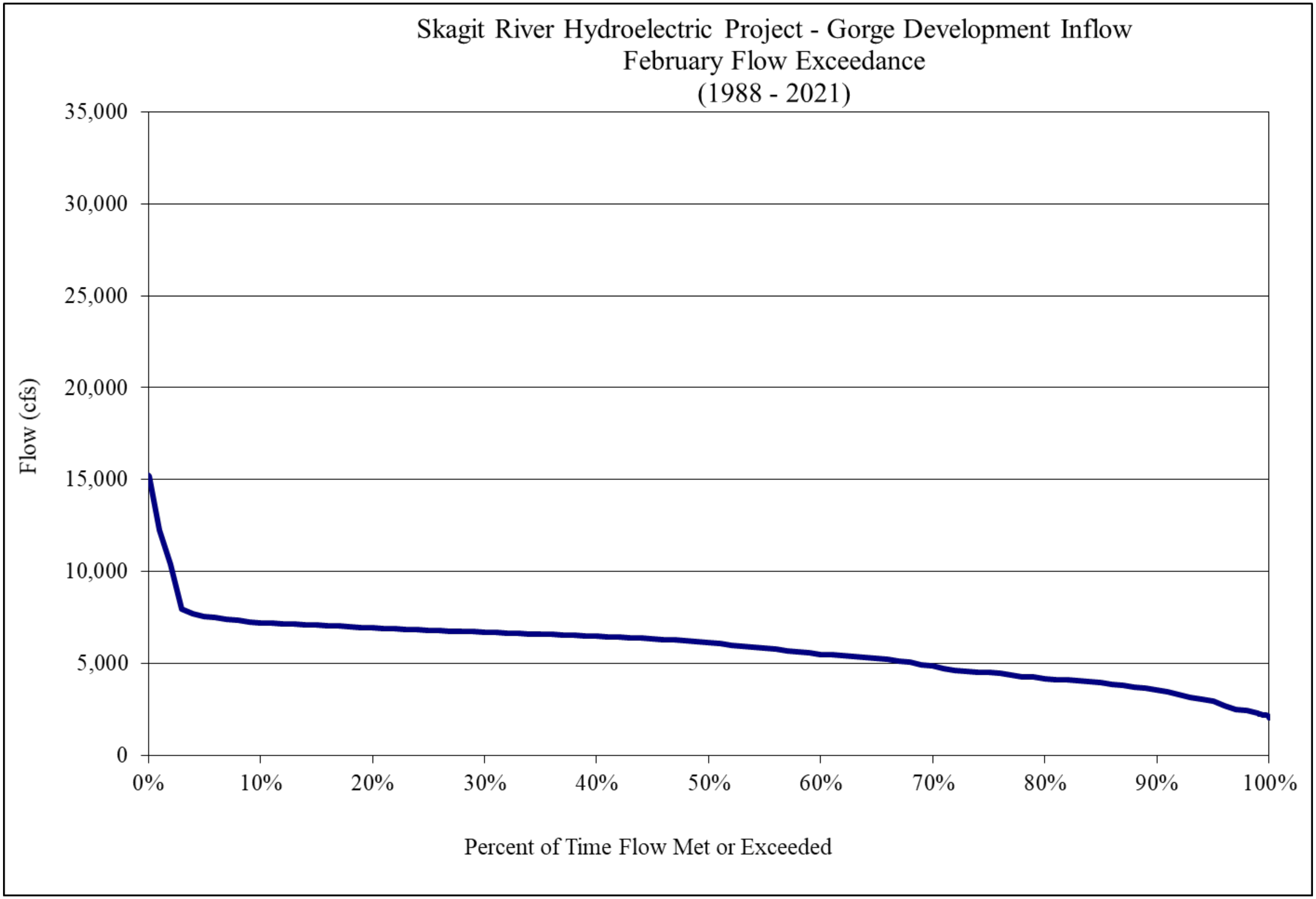

Figure B-29. Gorge Lake February inflow duration curve.

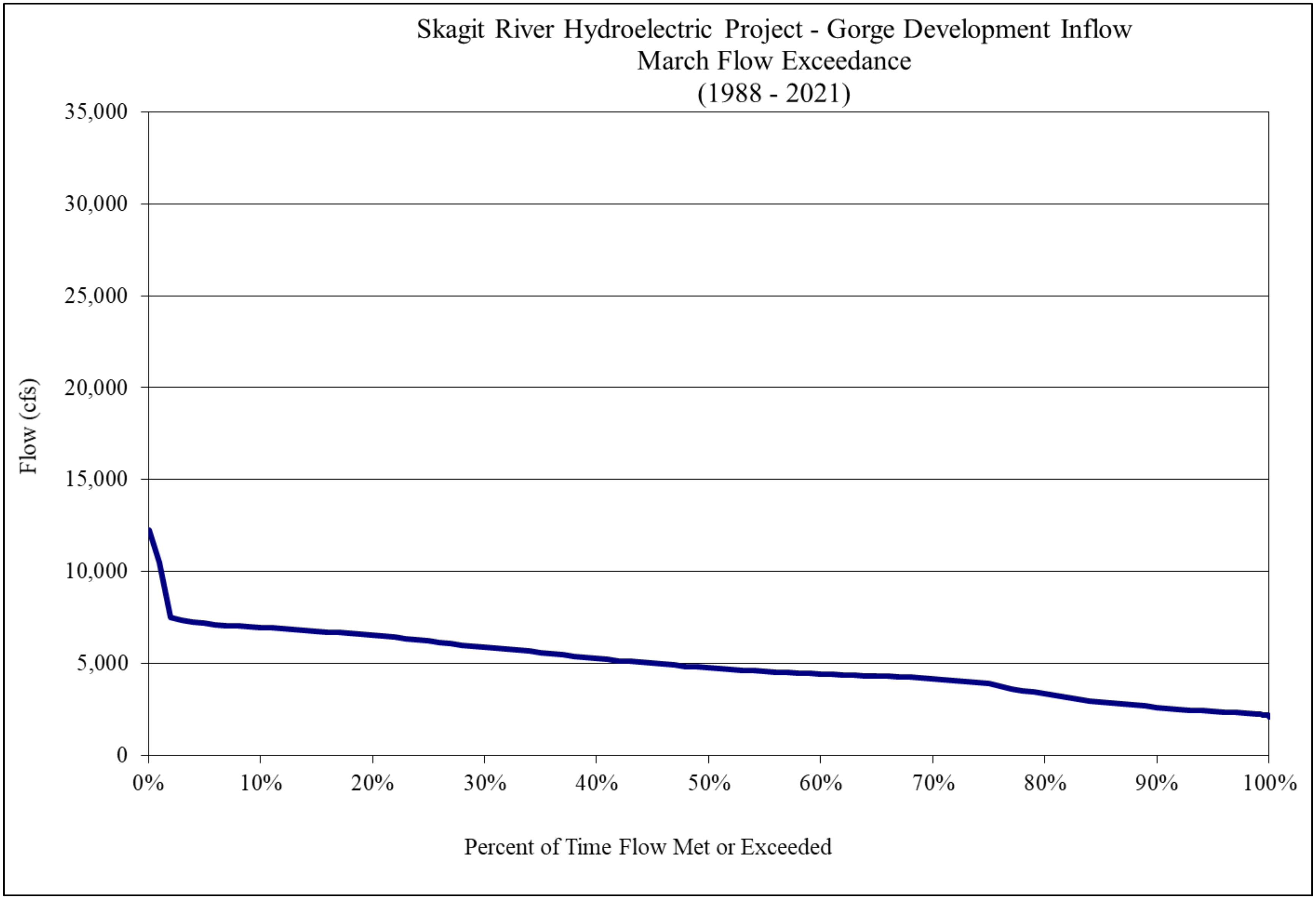

Figure B-30. Gorge Lake March inflow duration curve.

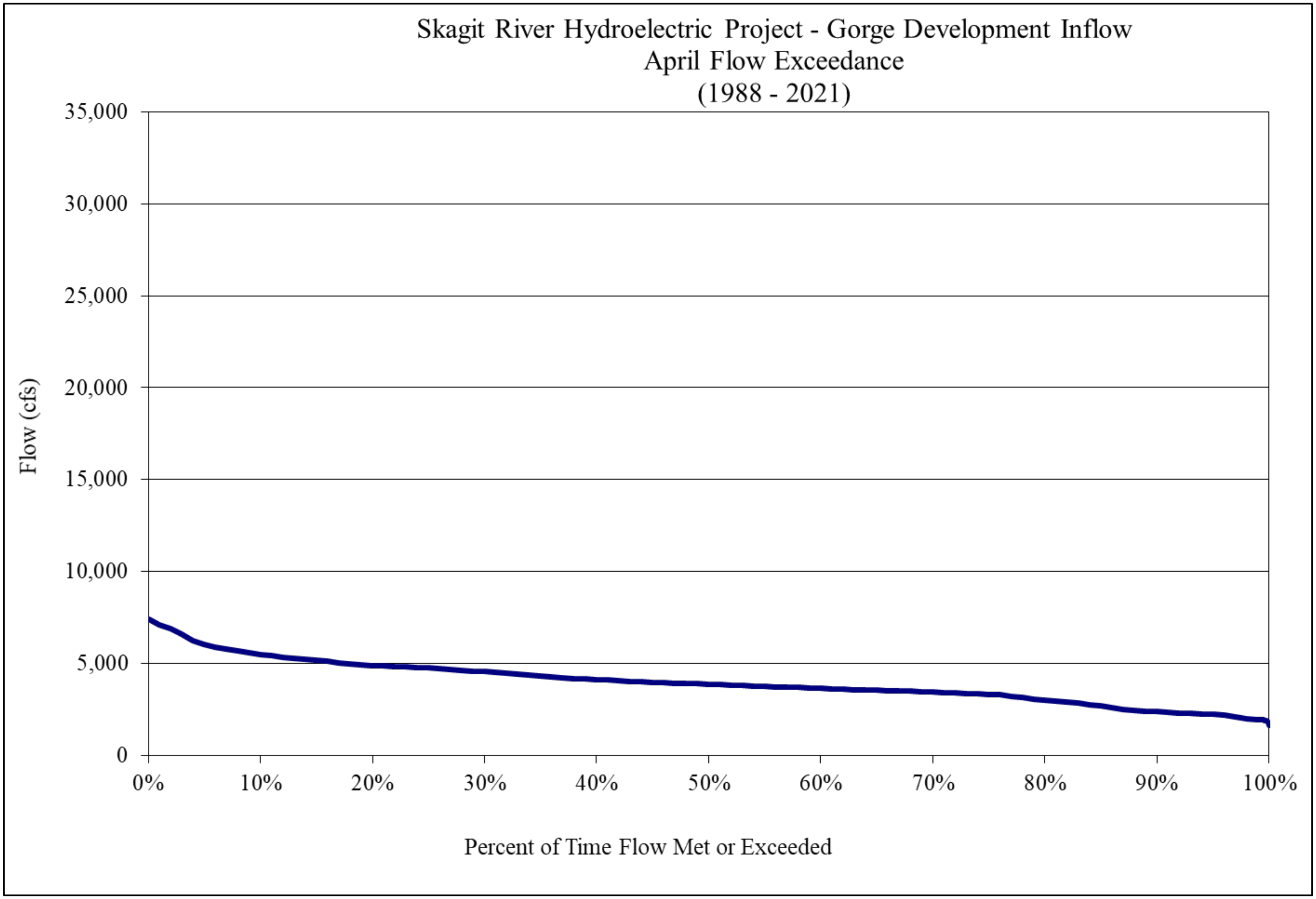

Figure B-31. Gorge Lake April inflow duration curve.

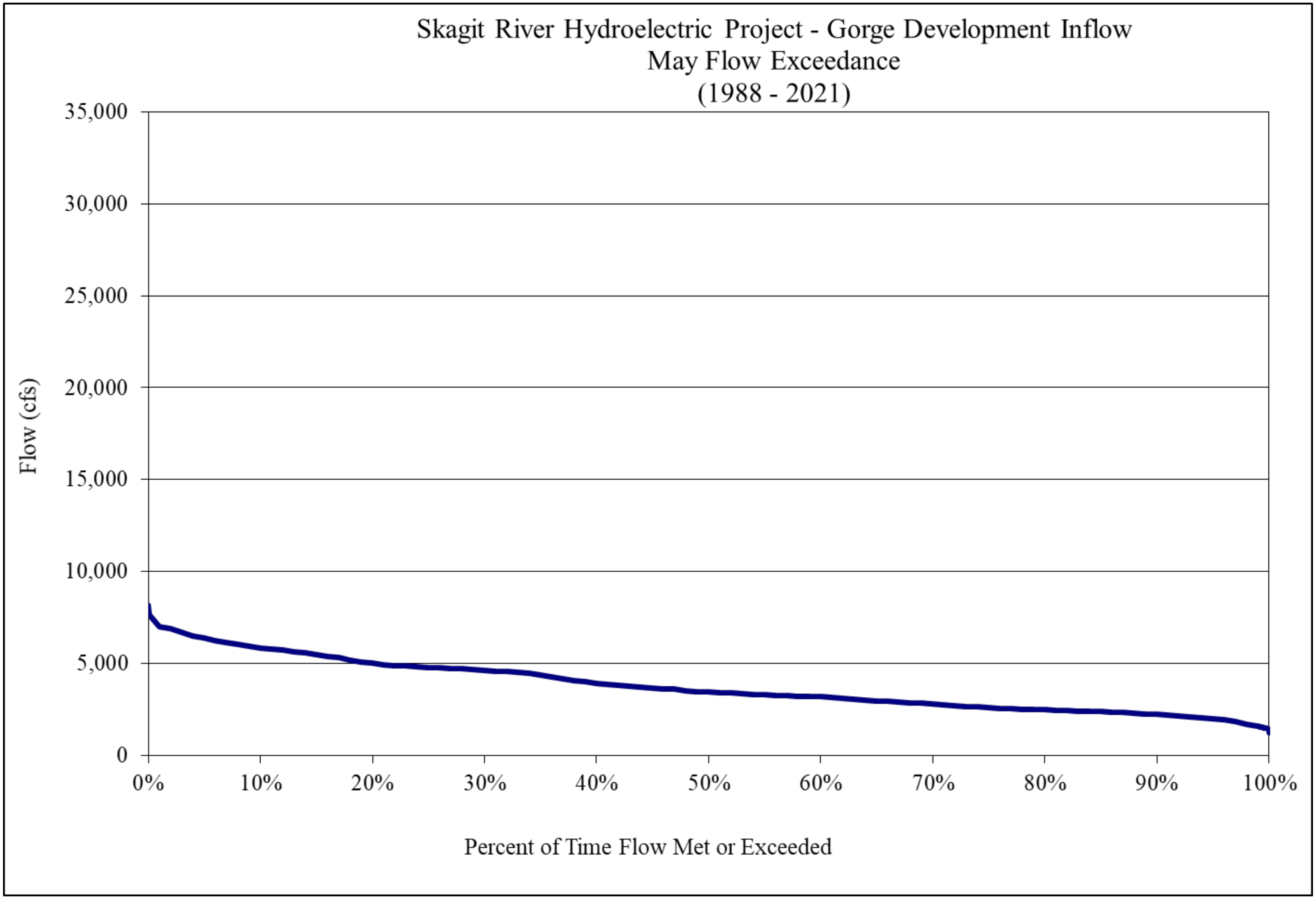

Figure B-32. Gorge Lake May inflow duration curve.

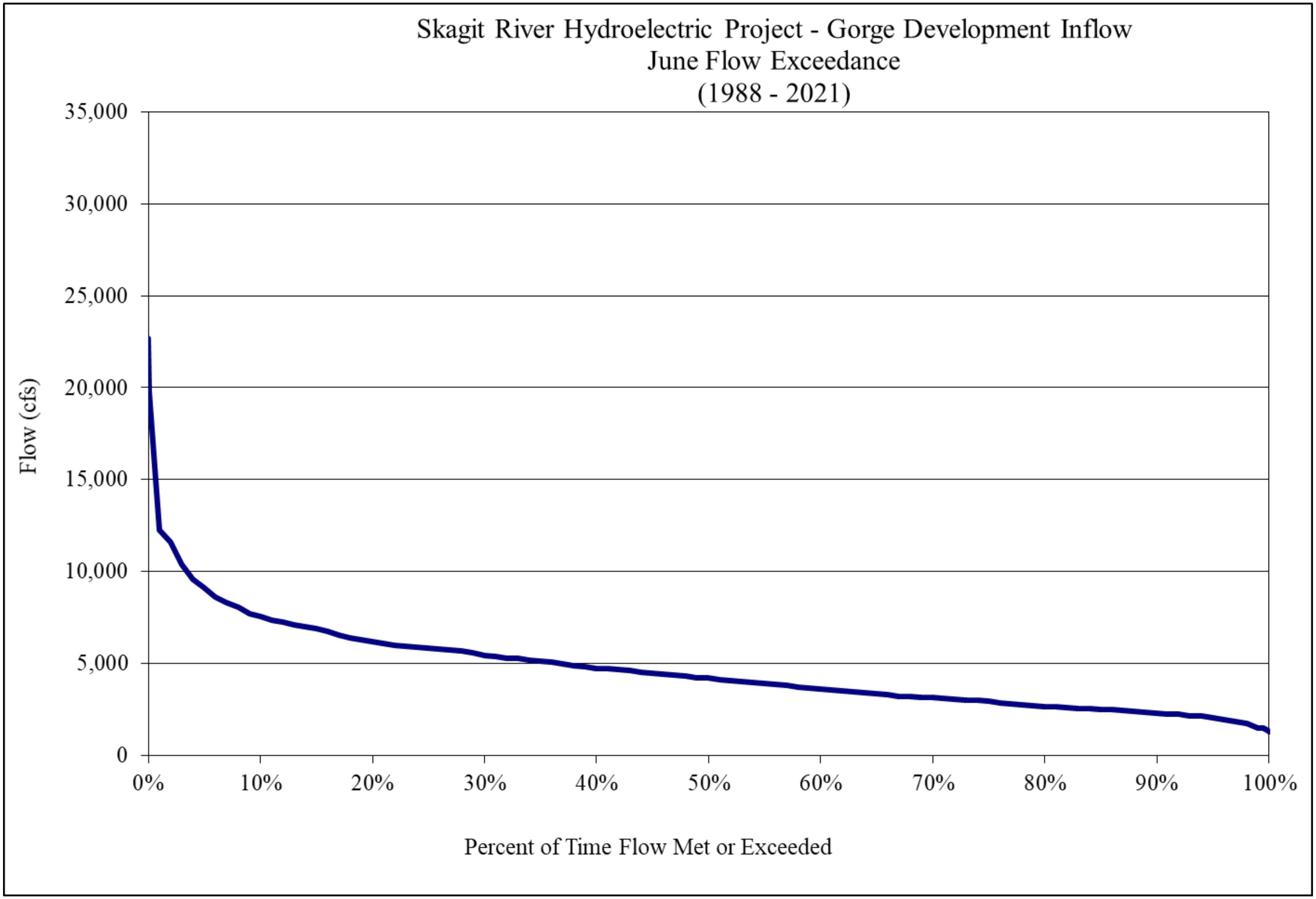

Figure B-33. Gorge Lake June inflow duration curve.

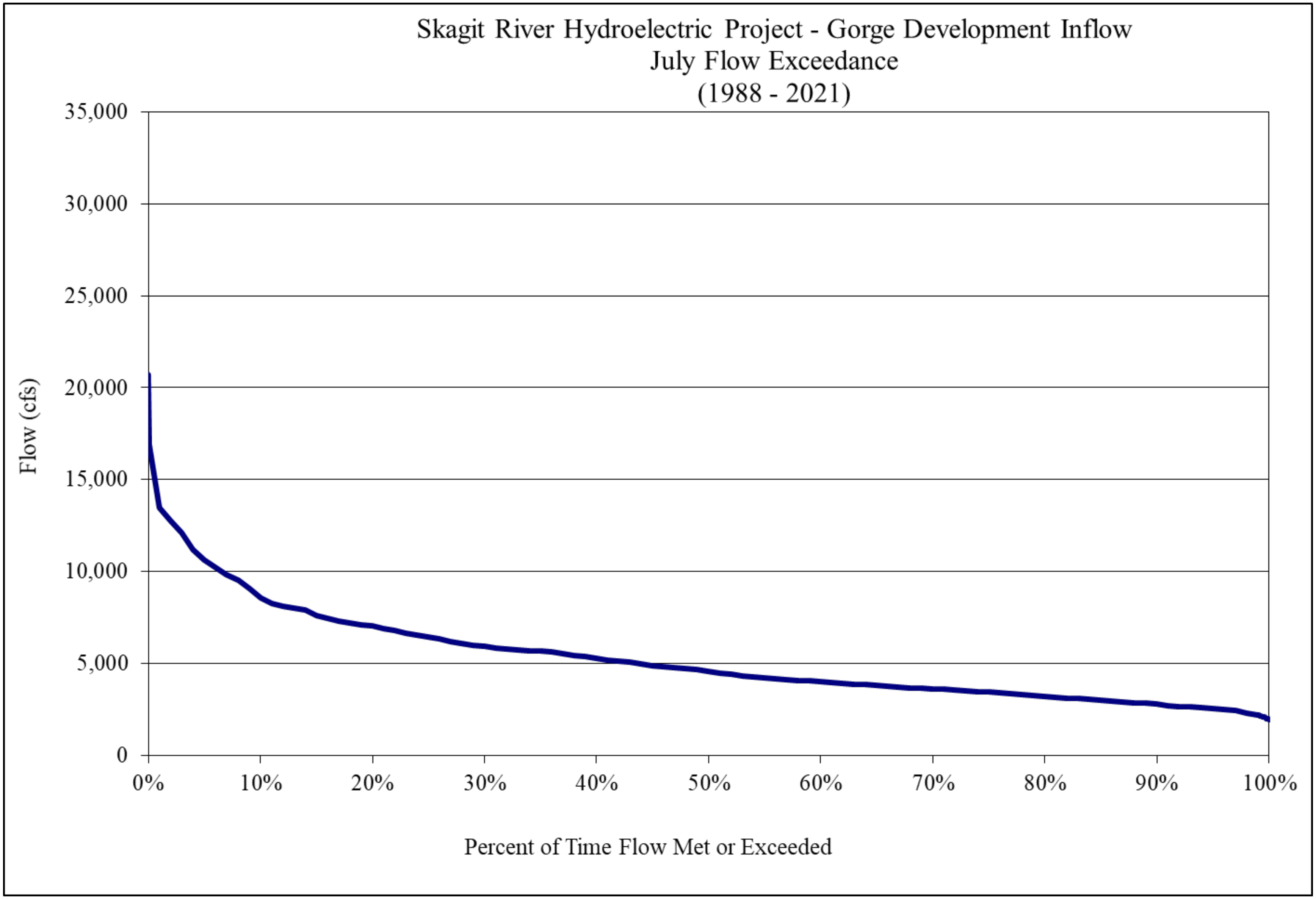

Figure B-34. Gorge Lake July inflow duration curve.

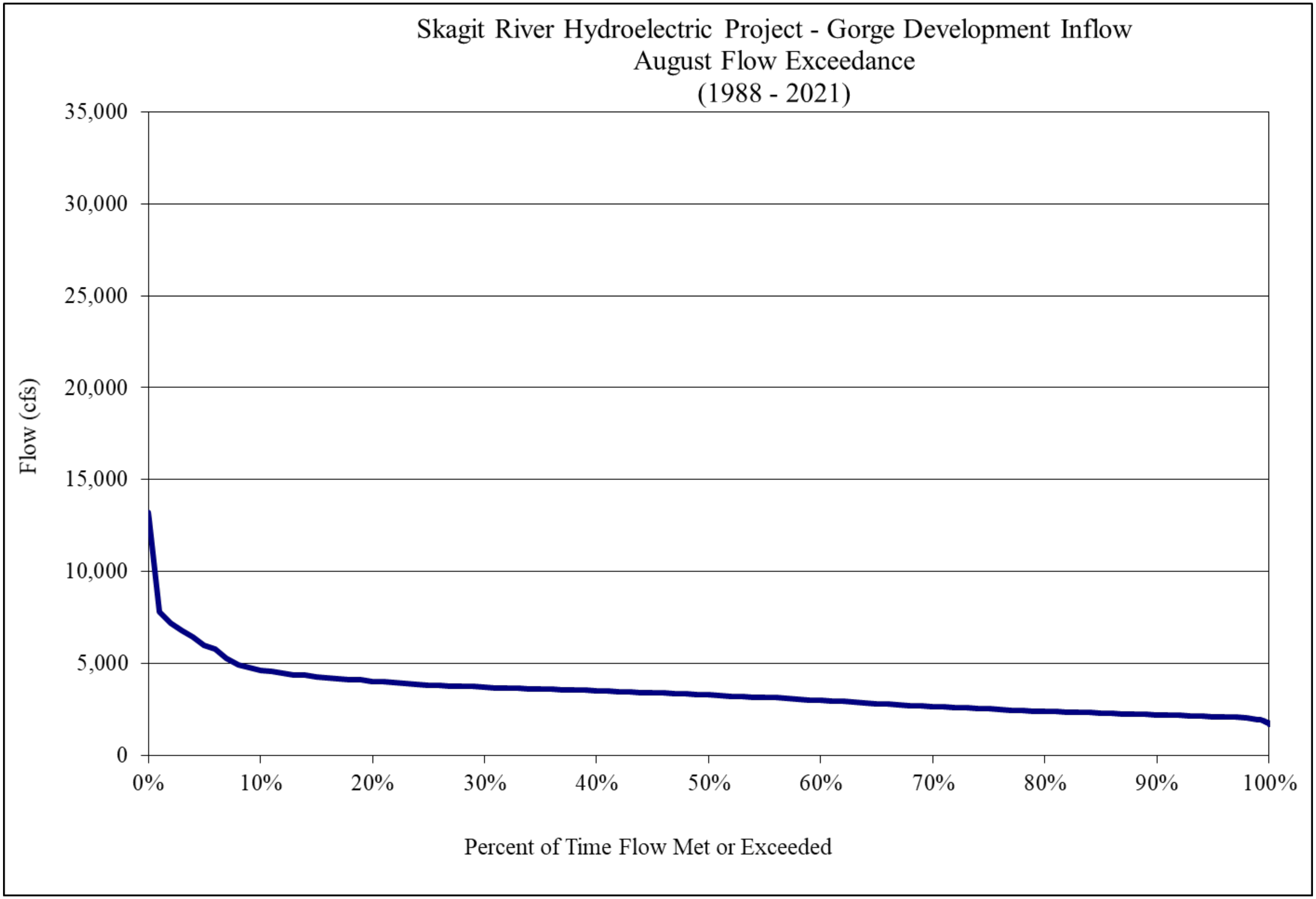

Figure B-35. Gorge Lake August inflow duration curve.

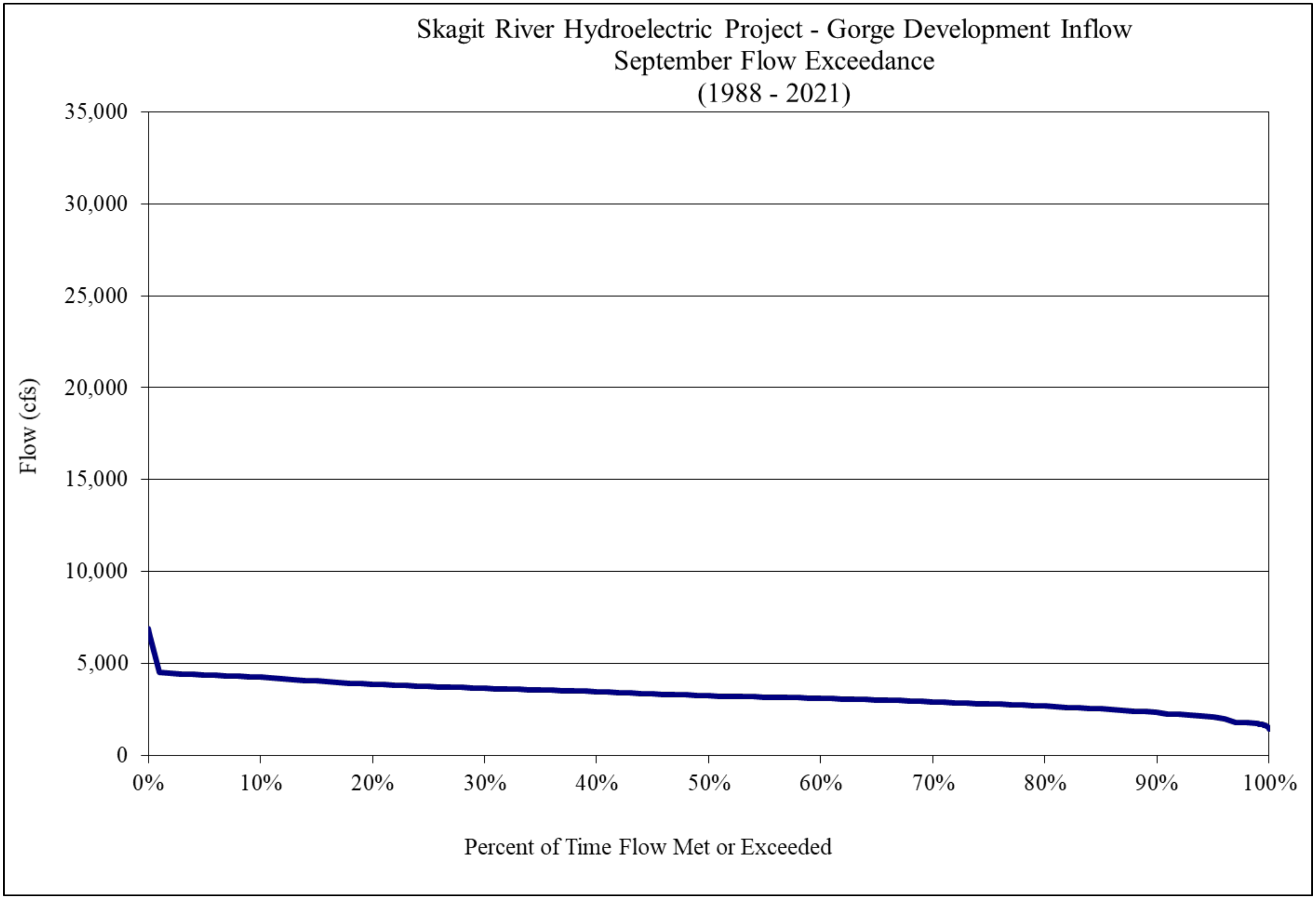

Figure B-36. Gorge Lake September inflow duration curve.

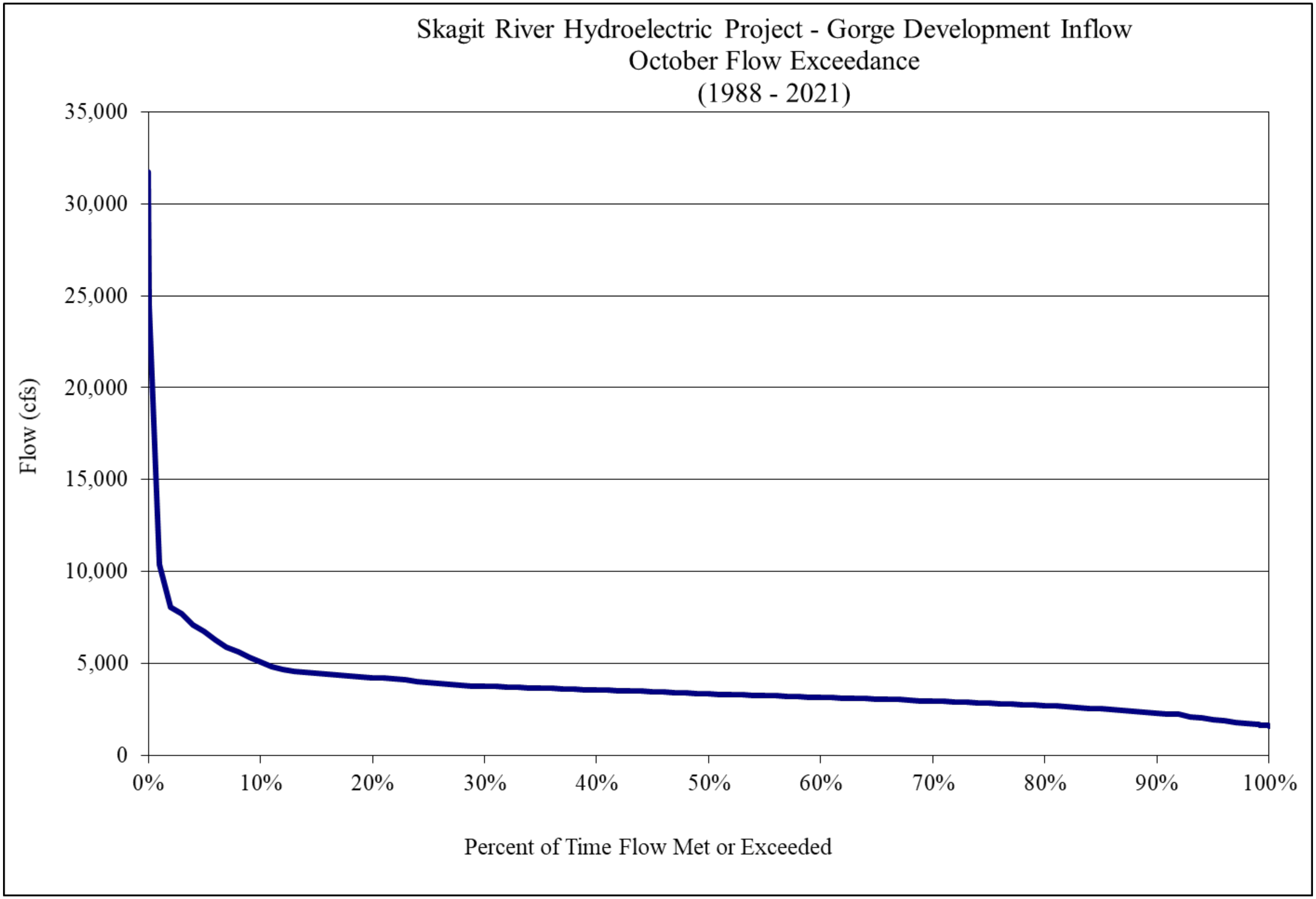

Figure B-37. Gorge Lake October inflow duration curve.

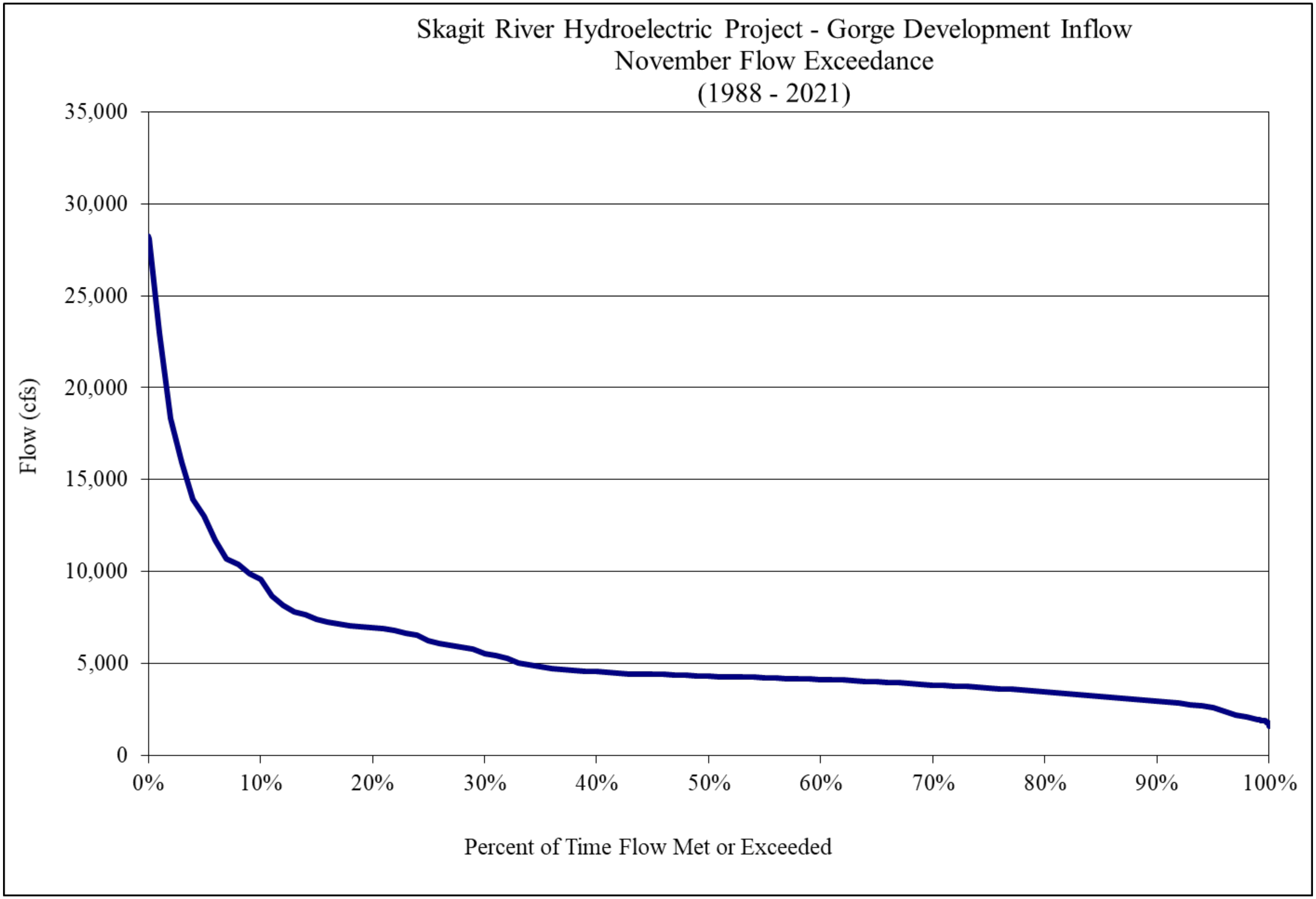

Figure B-38. Gorge Lake November inflow duration curve.

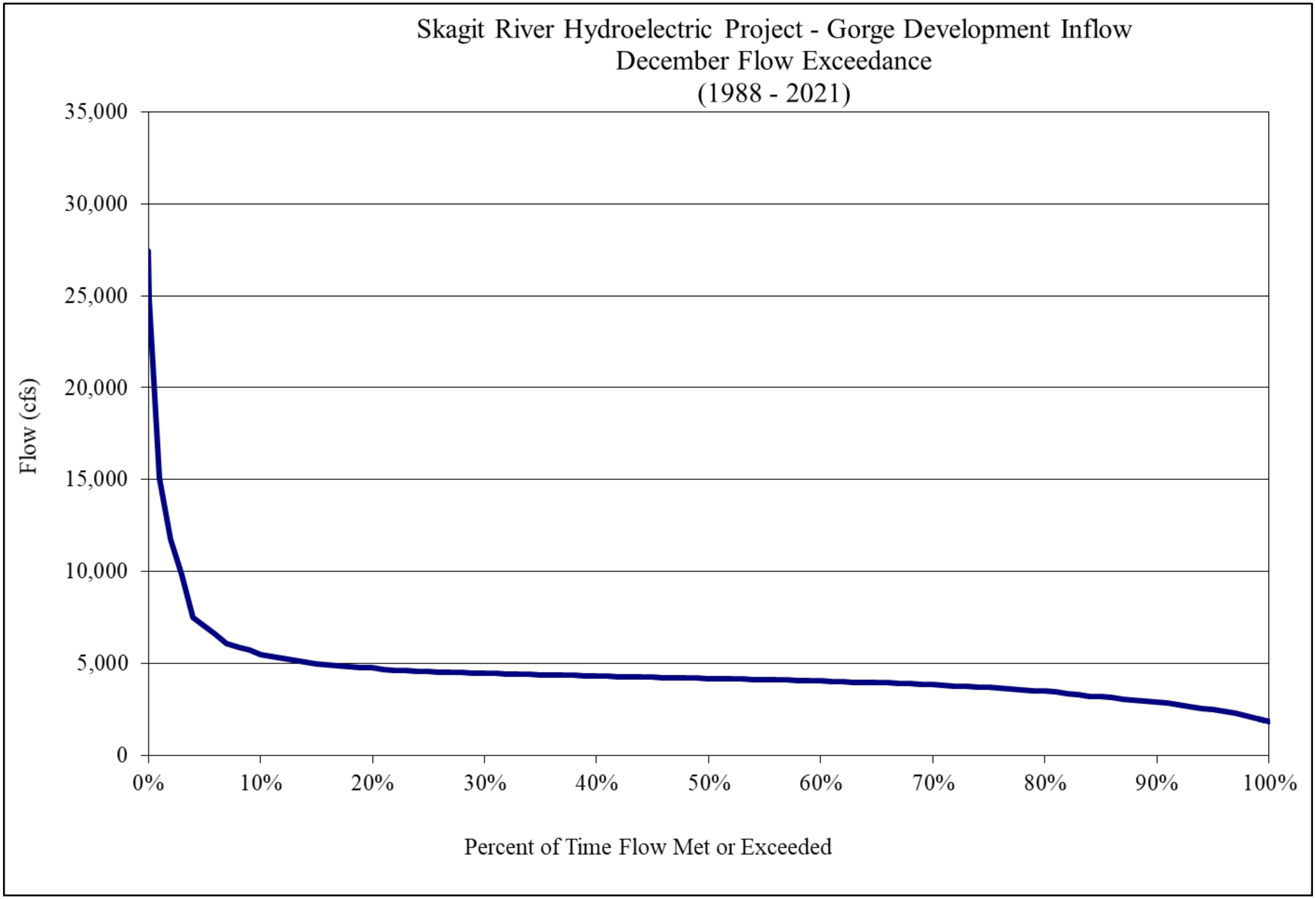

Figure B-39. Gorge Lake December inflow duration curve.

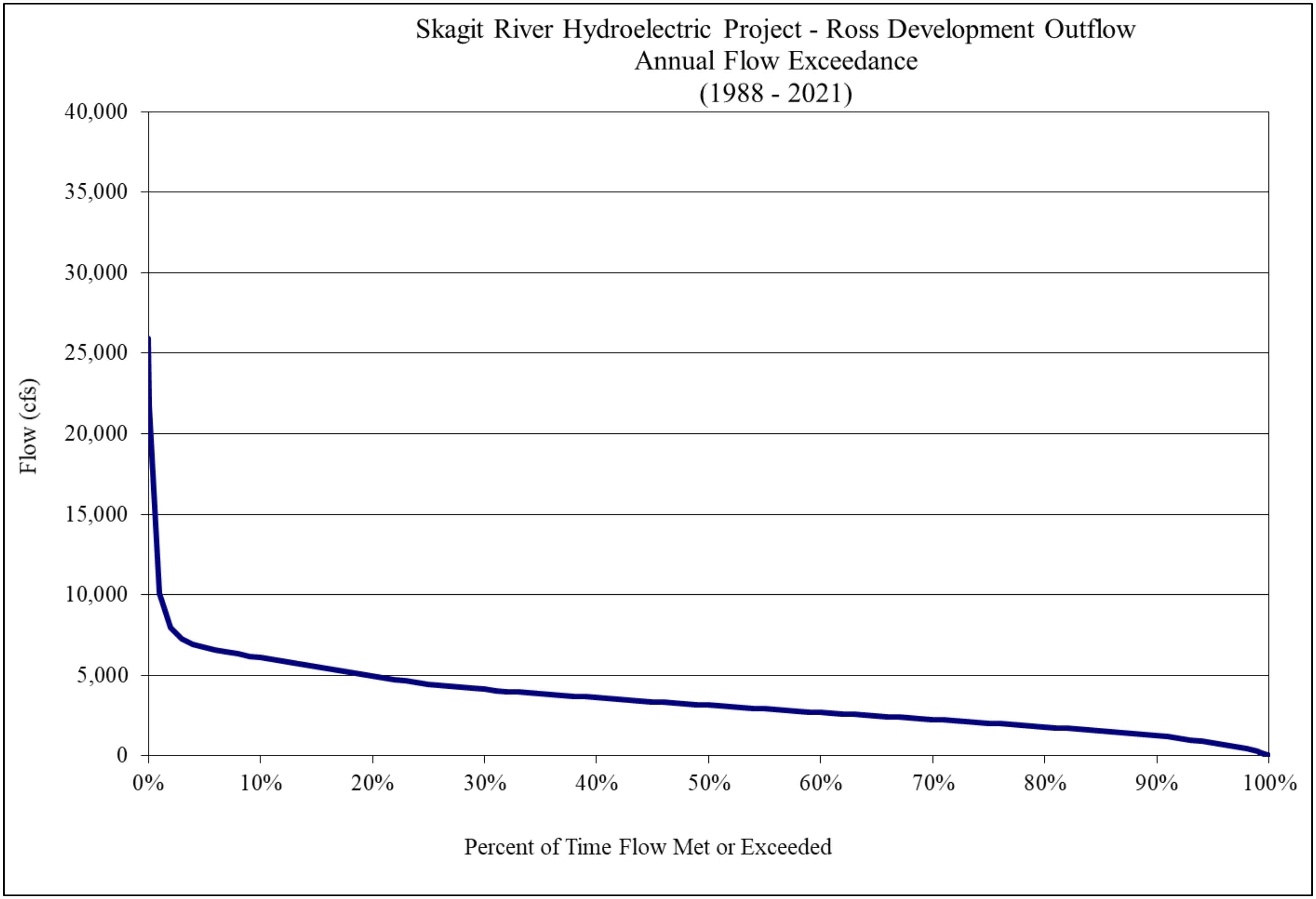

Figure B-40. Ross Lake annual outflow duration curve.

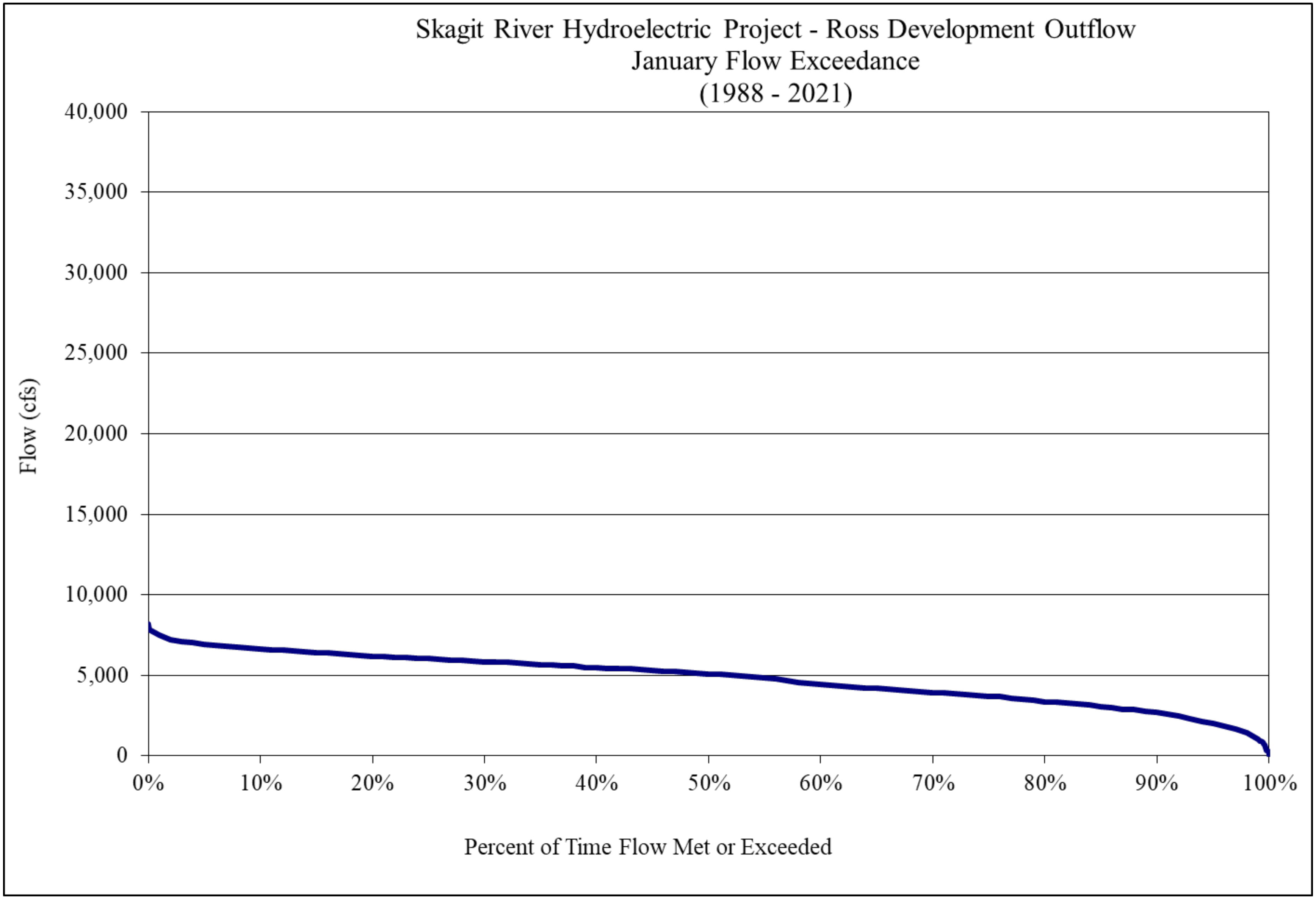

Figure B-41. Ross Lake January outflow duration curve.

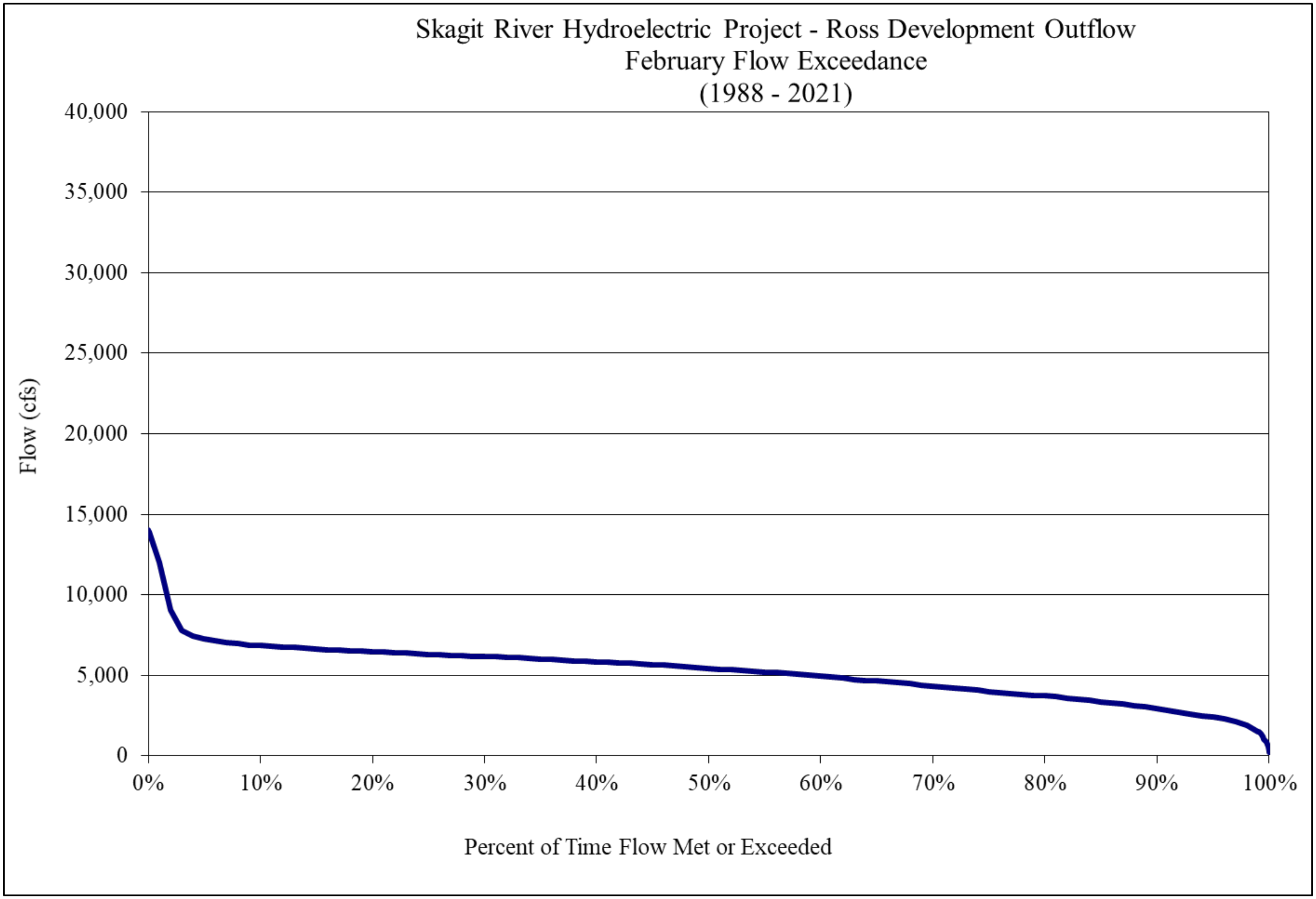

Figure B-42. Ross Lake February outflow duration curve.

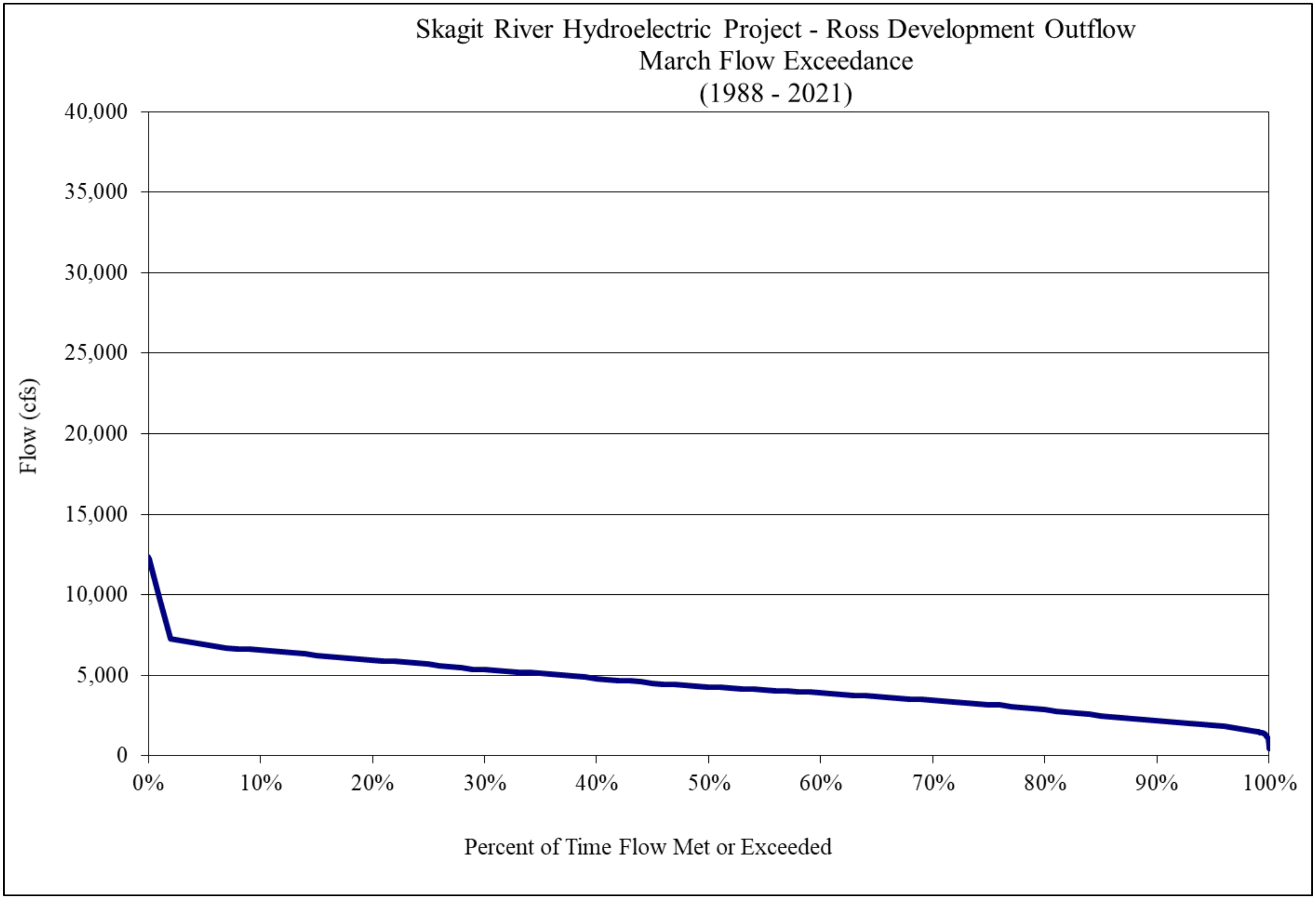

Figure B-43. Ross Lake March outflow duration curve.

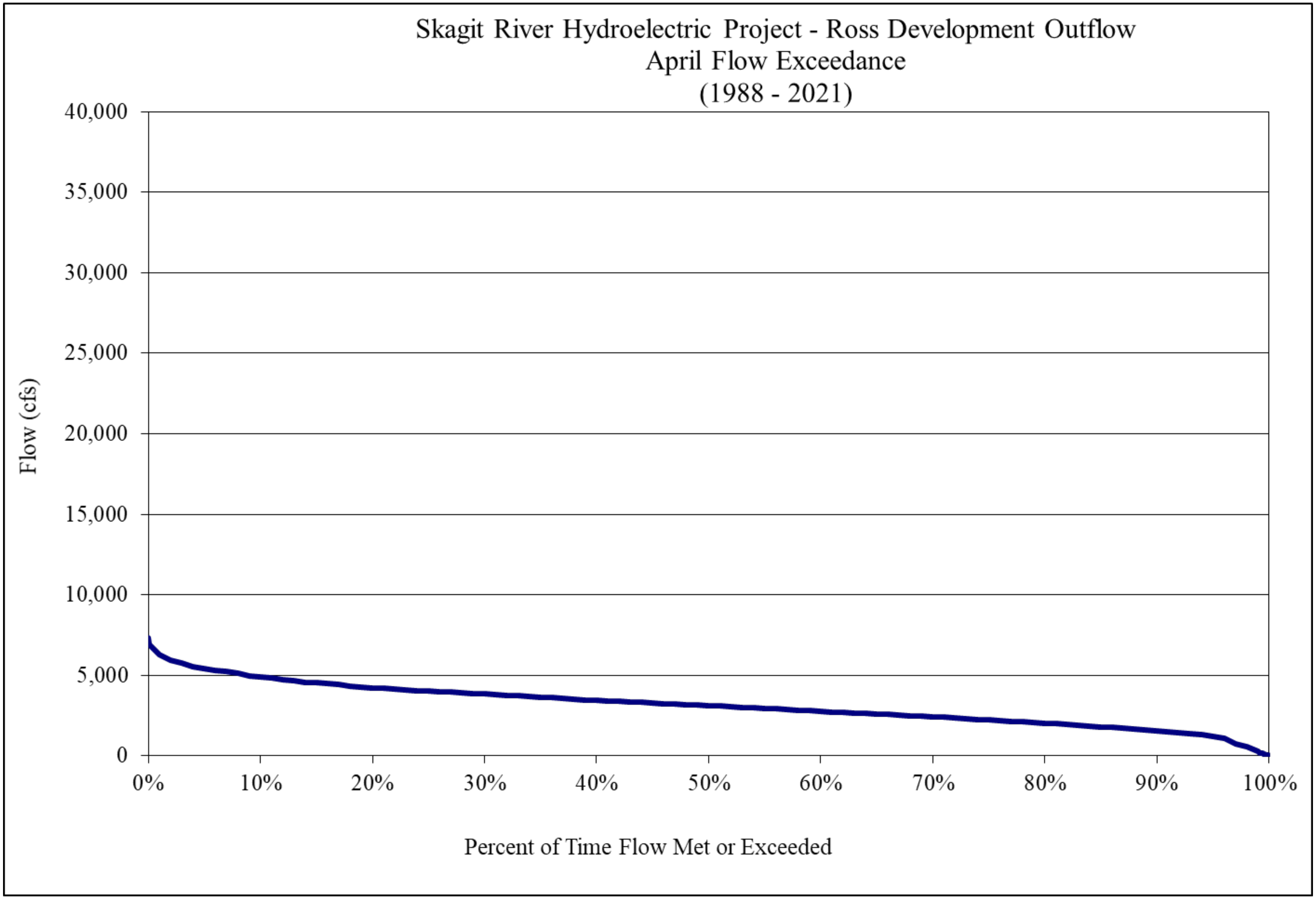

Figure B-44. Ross Lake April outflow duration curve.

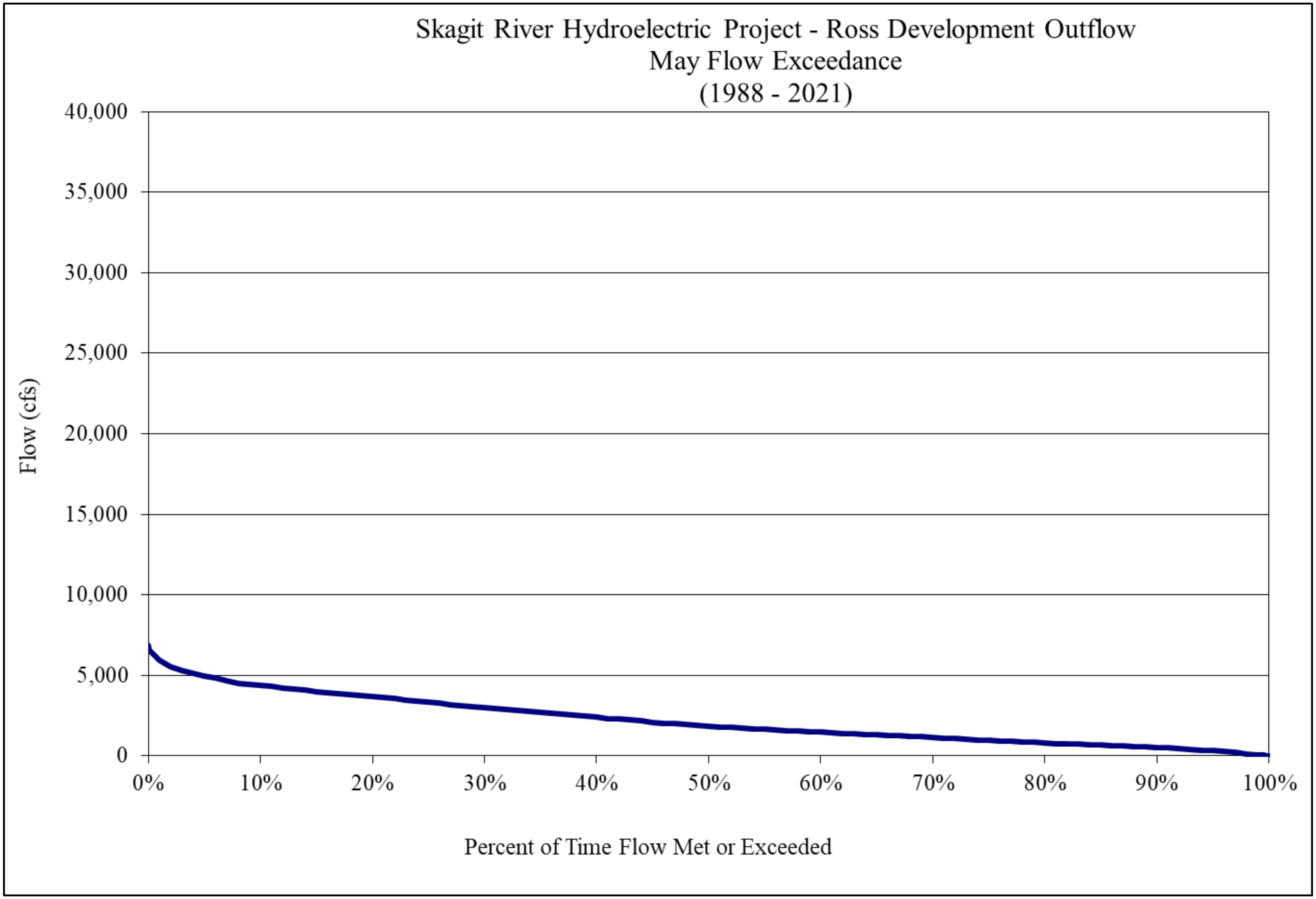

Figure B-45. Ross Lake May outflow duration curve.

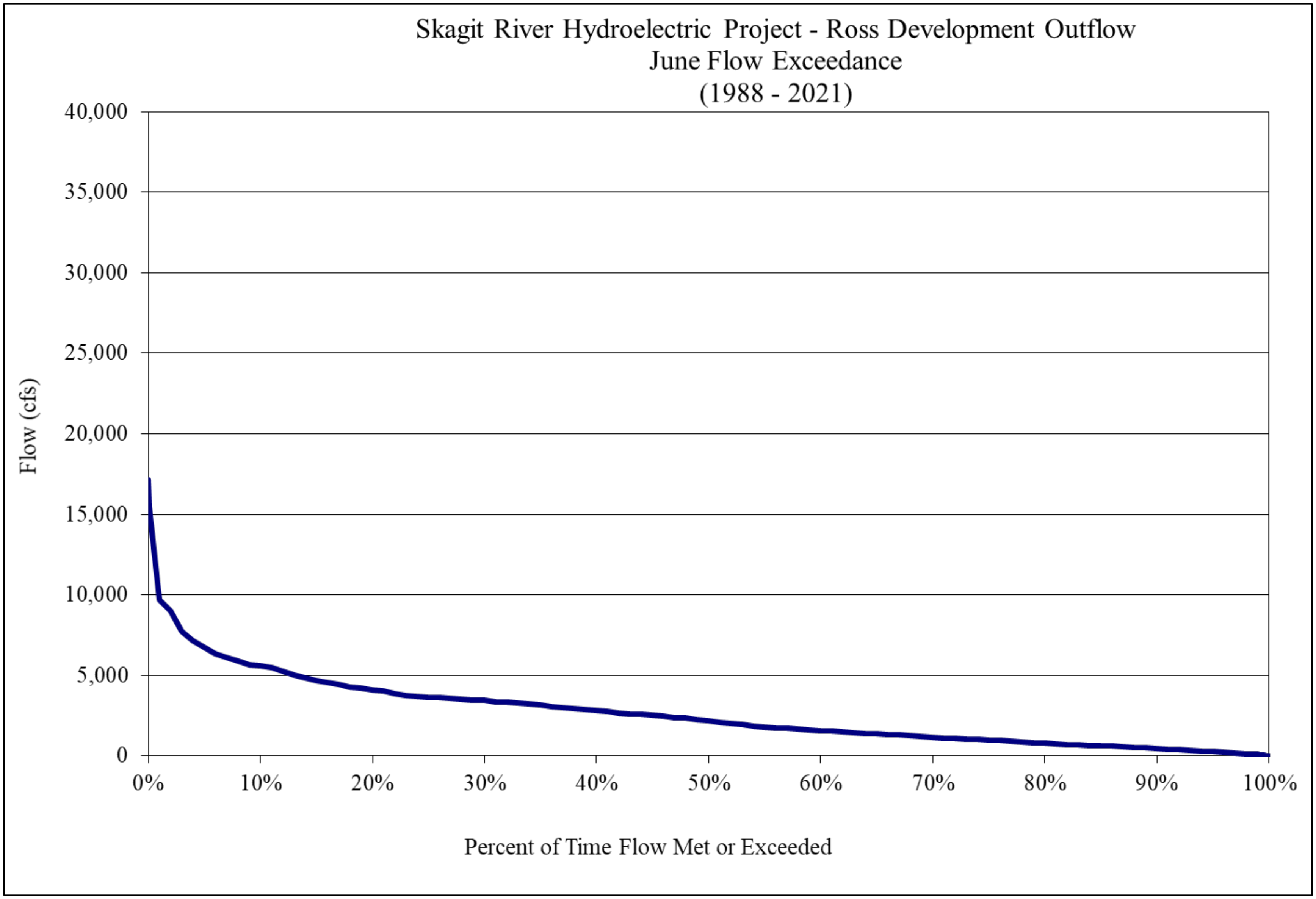

Figure B-46. Ross Lake June outflow duration curve.

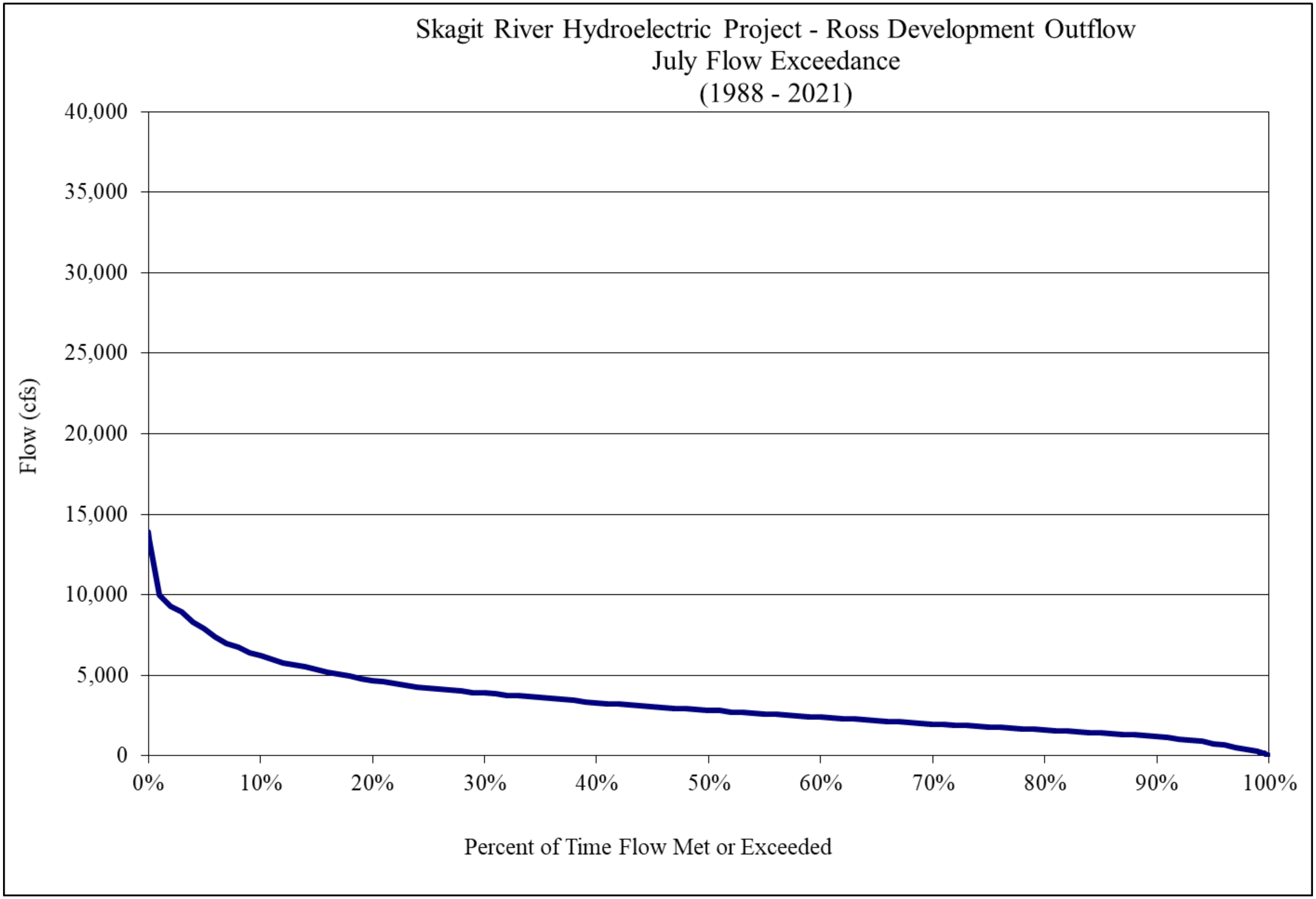

Figure B-47. Ross Lake July outflow duration curve.

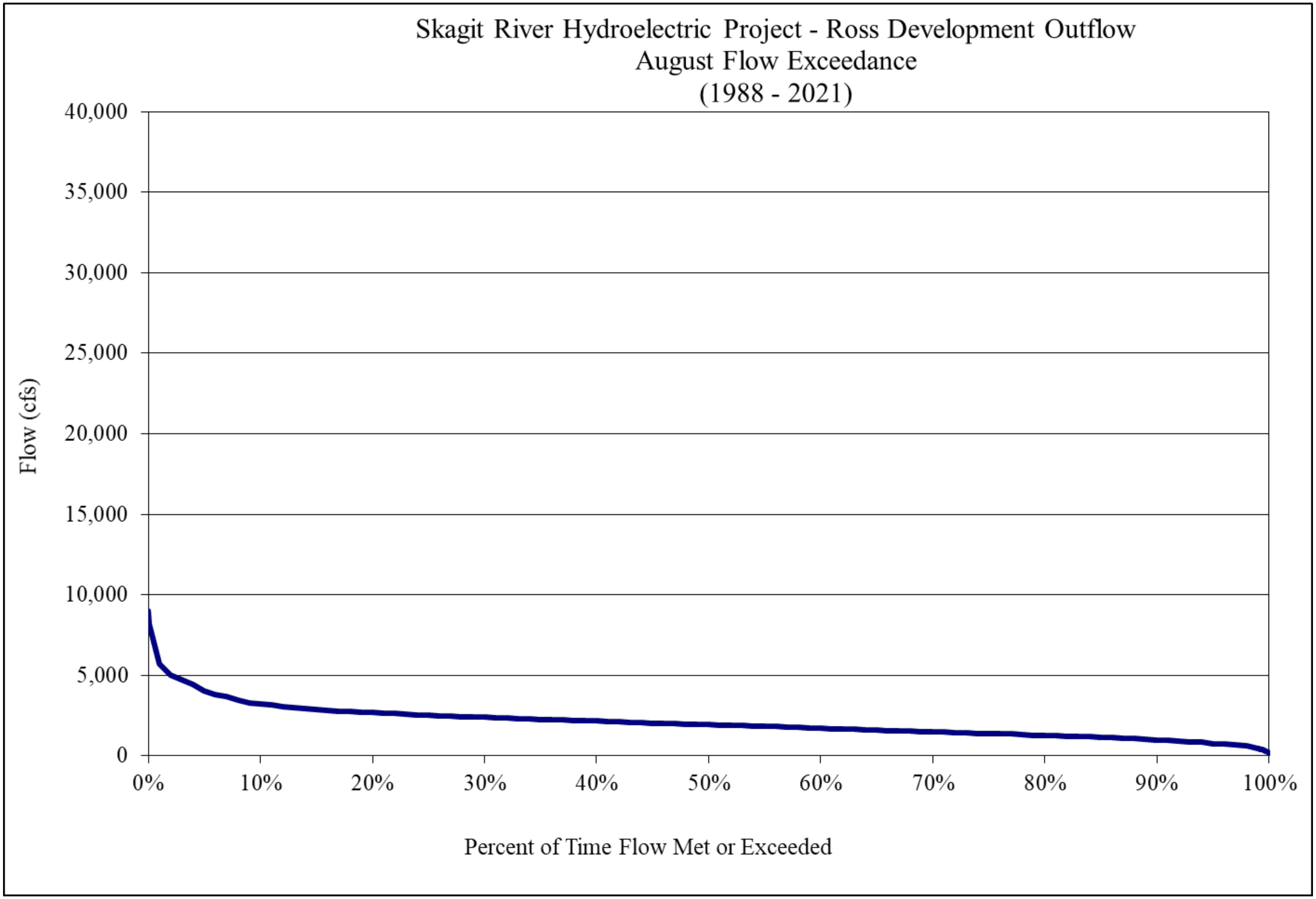

Figure B-48. Ross Lake August outflow duration curve.

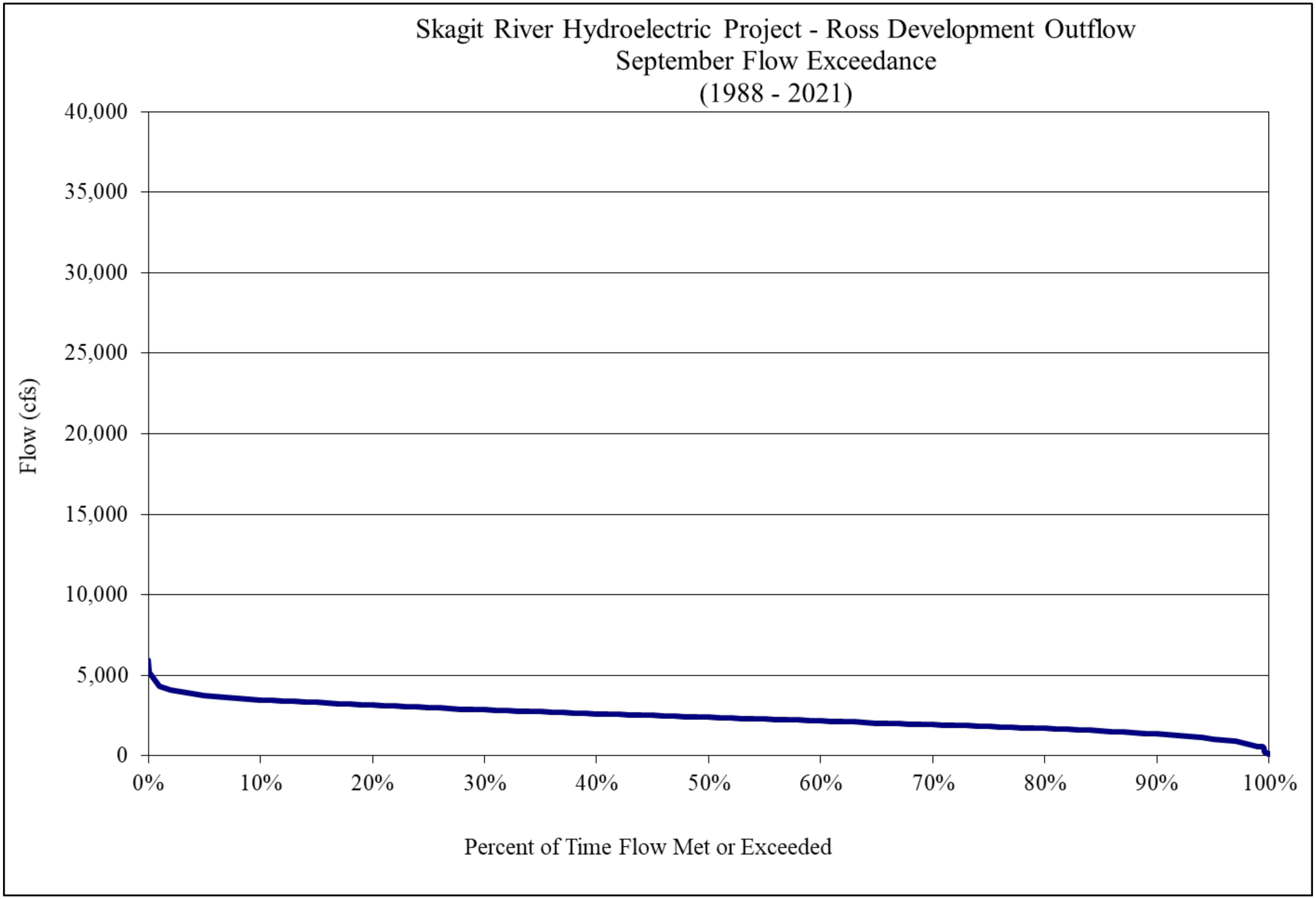

Figure B-49. Ross Lake September outflow duration curve.

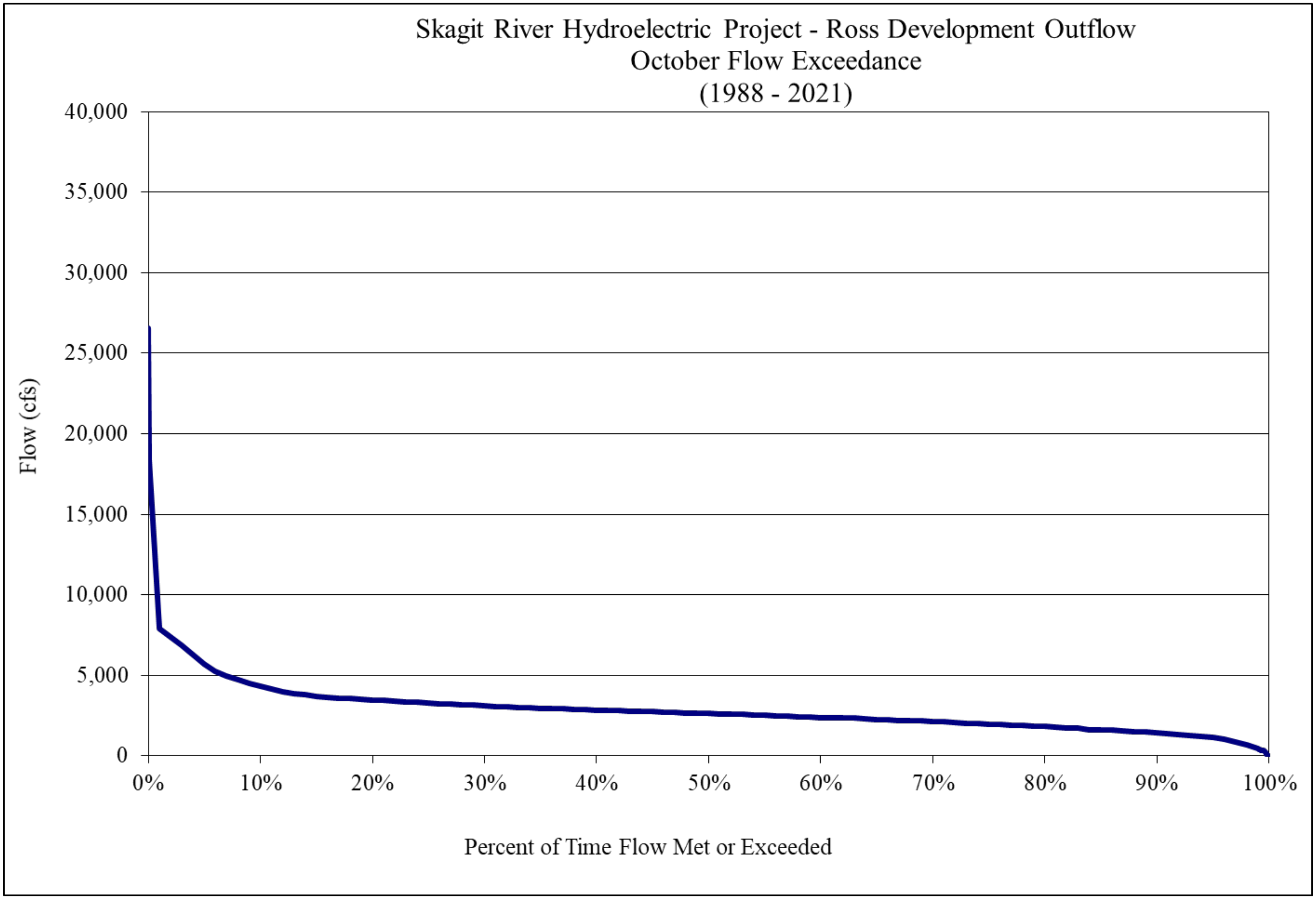

Figure B-50. Ross Lake October outflow duration curve.

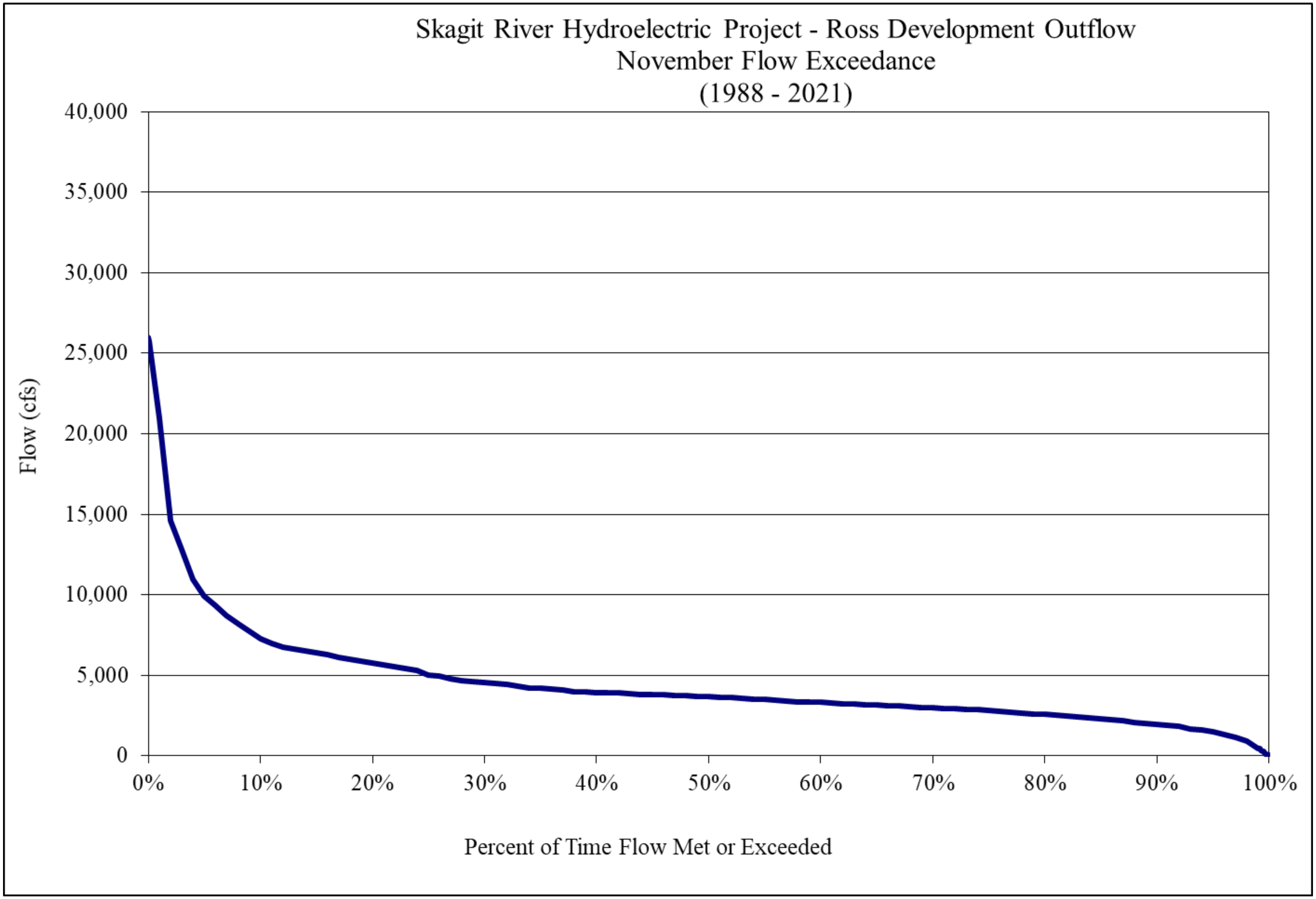

Figure B-51. Ross Lake November outflow duration curve.

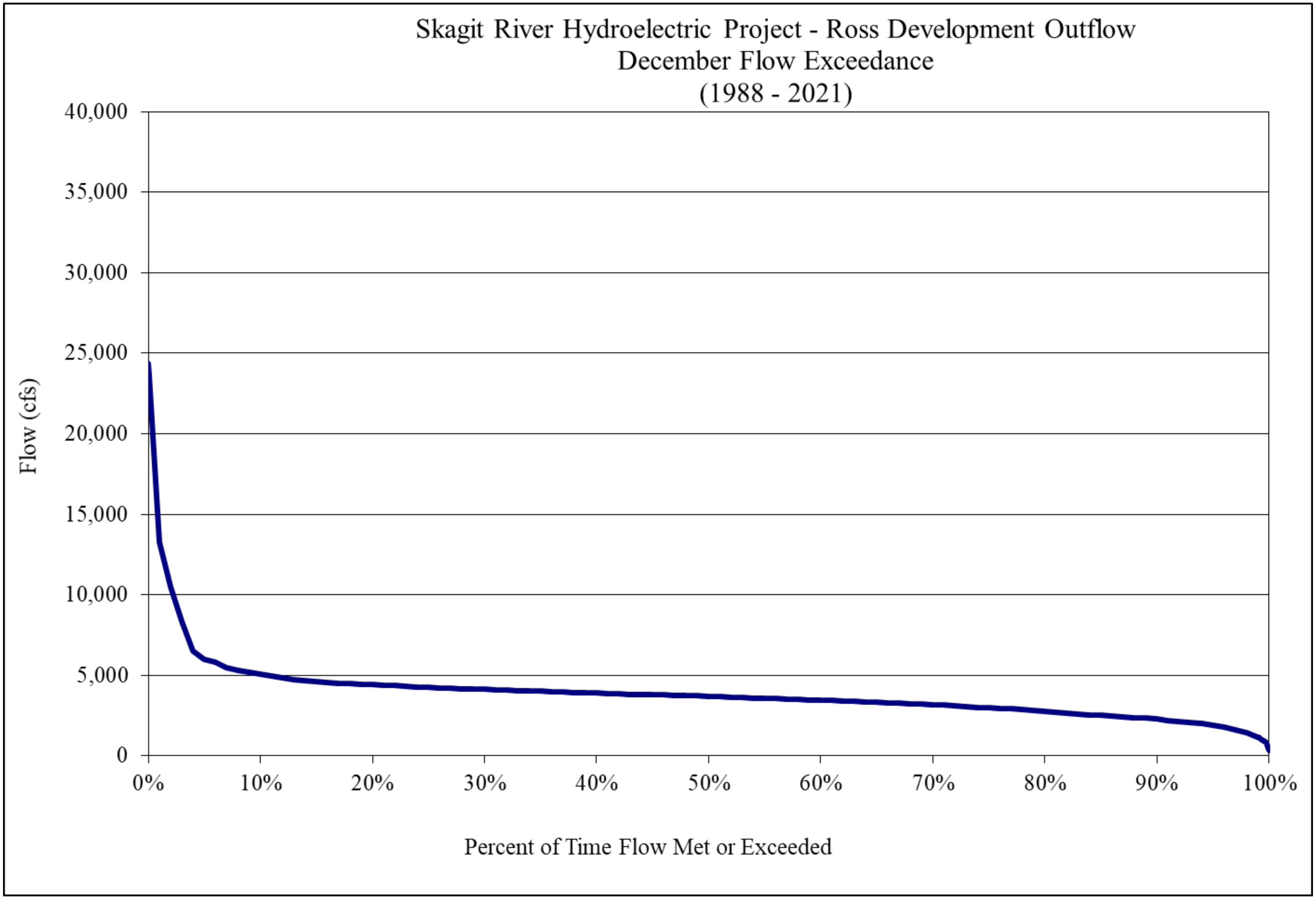

Figure B-52. Ross Lake December outflow duration curve.

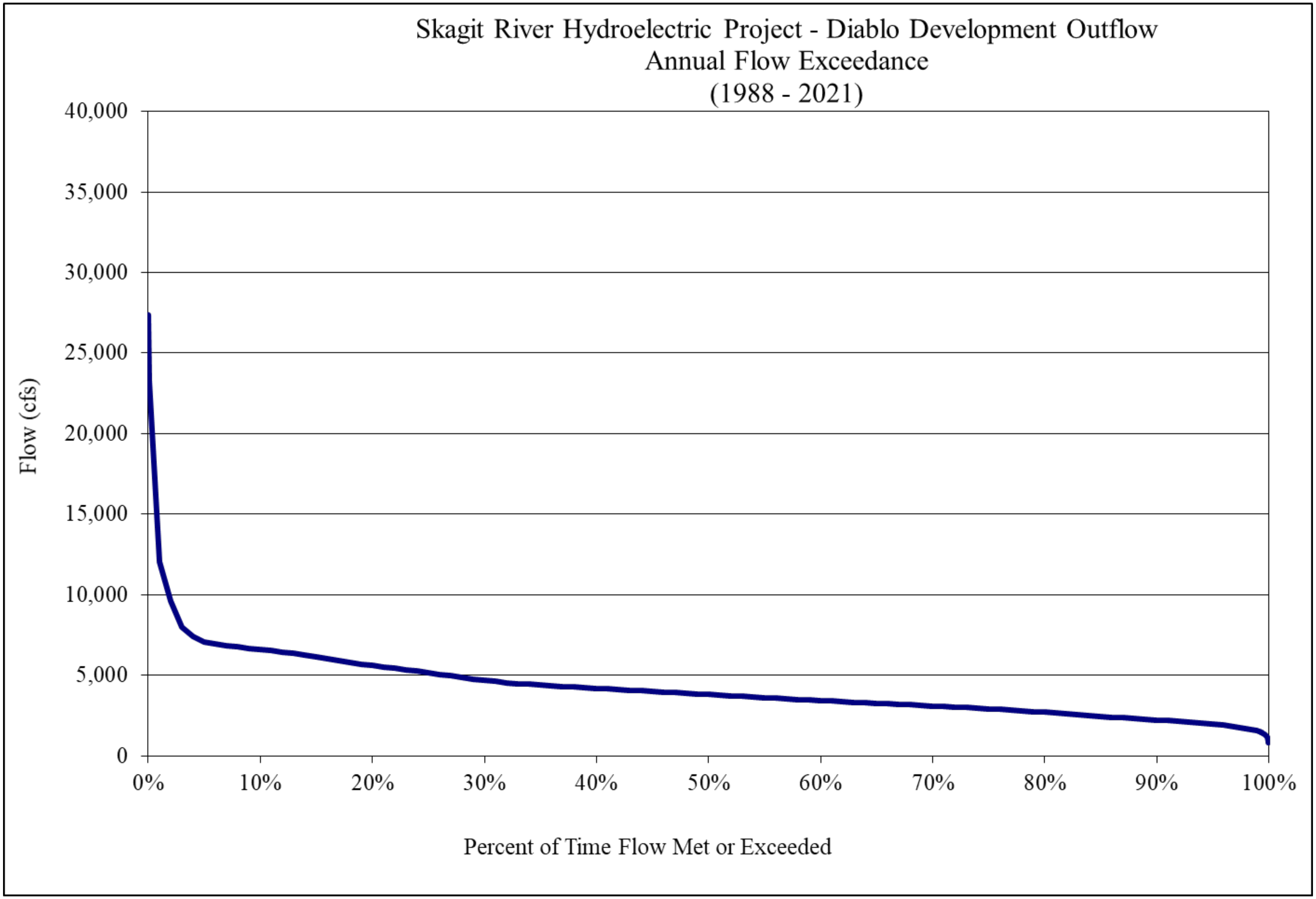

Figure B-53. Diablo Lake annual outflow duration curve.

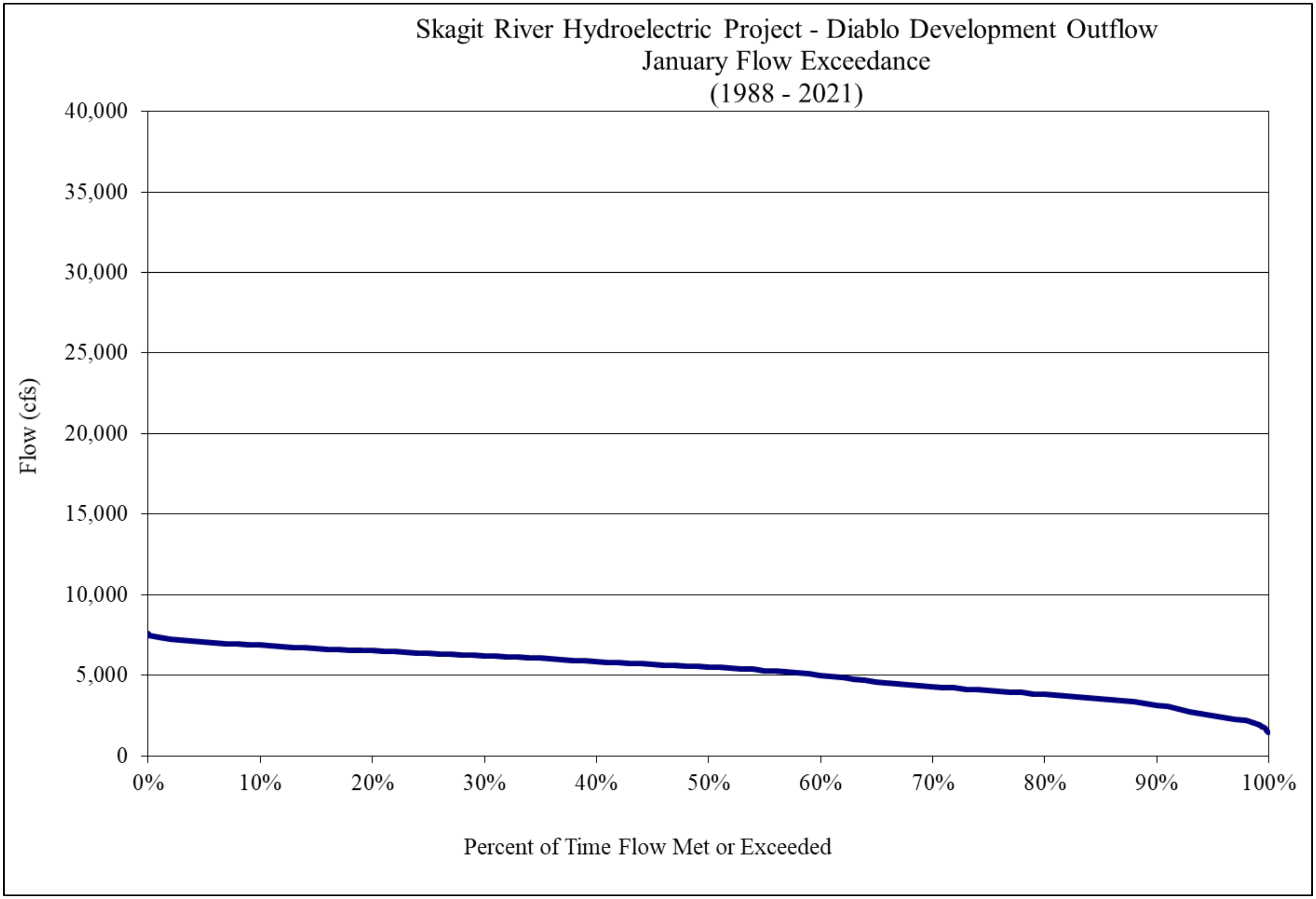

Figure B-54. Diablo Lake January outflow duration curve.

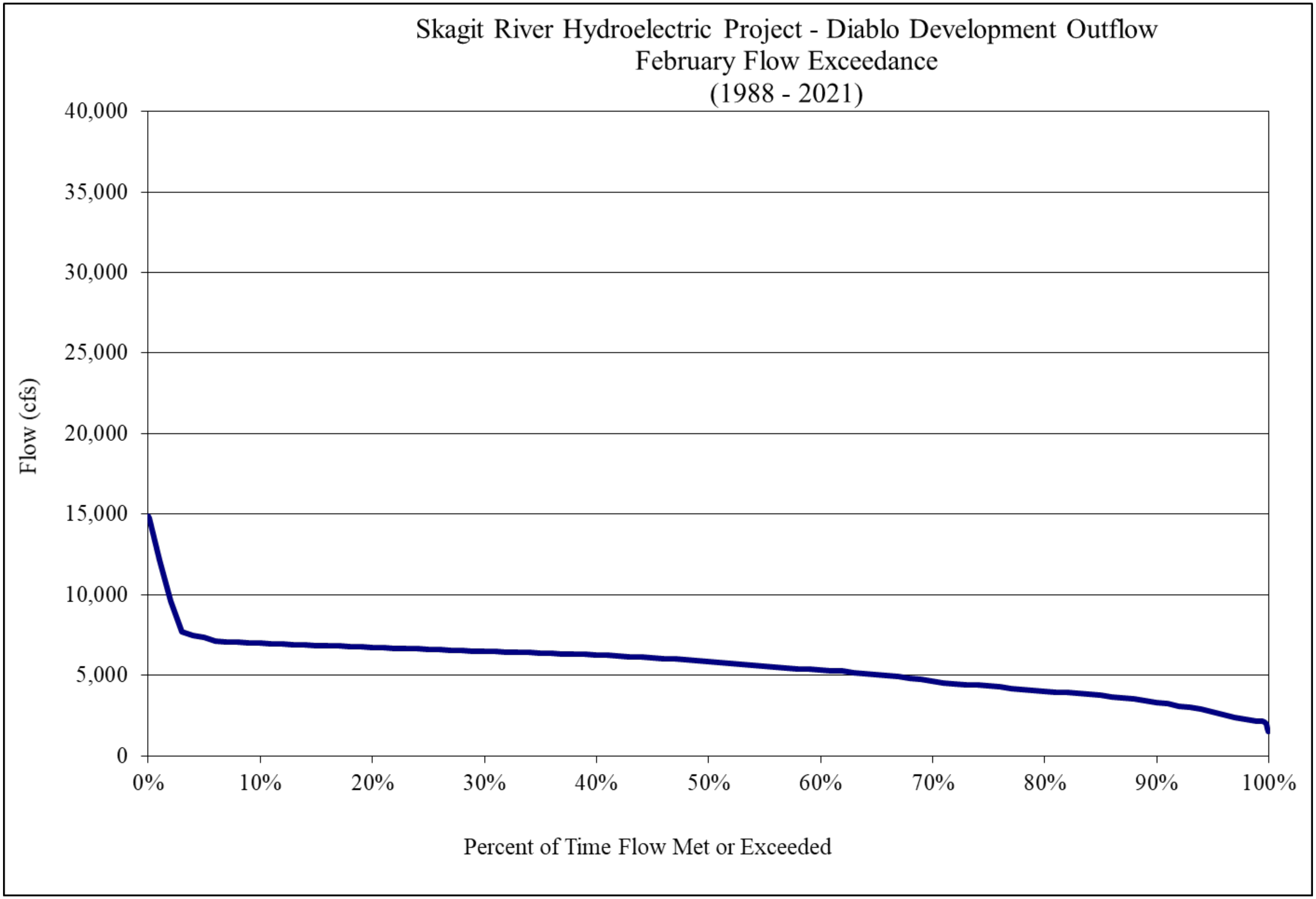

Figure B-55. Diablo Lake February outflow duration curve.

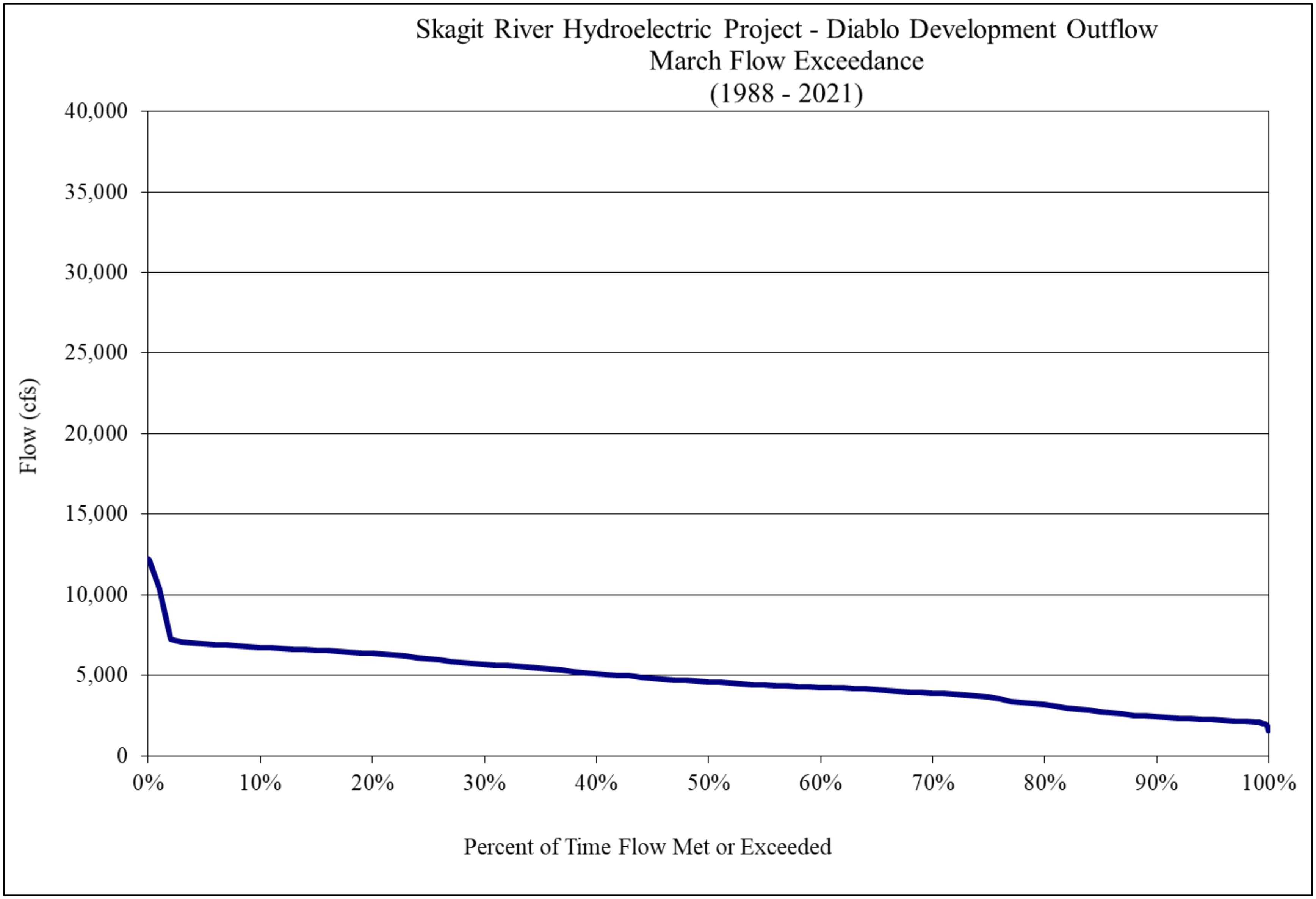

Figure B-56. Diablo Lake March outflow duration curve.

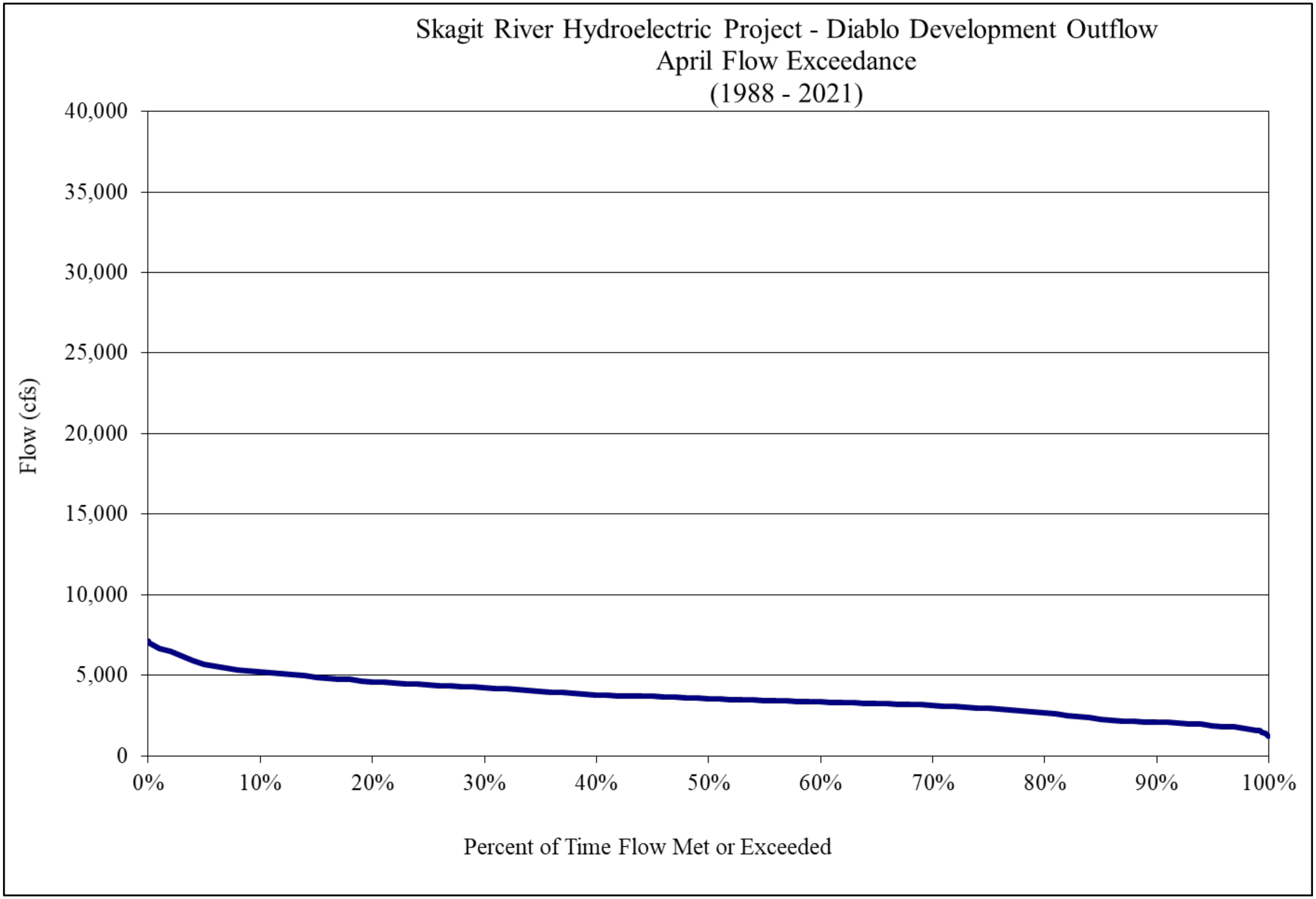

Figure B-57. Diablo Lake April outflow duration curve.

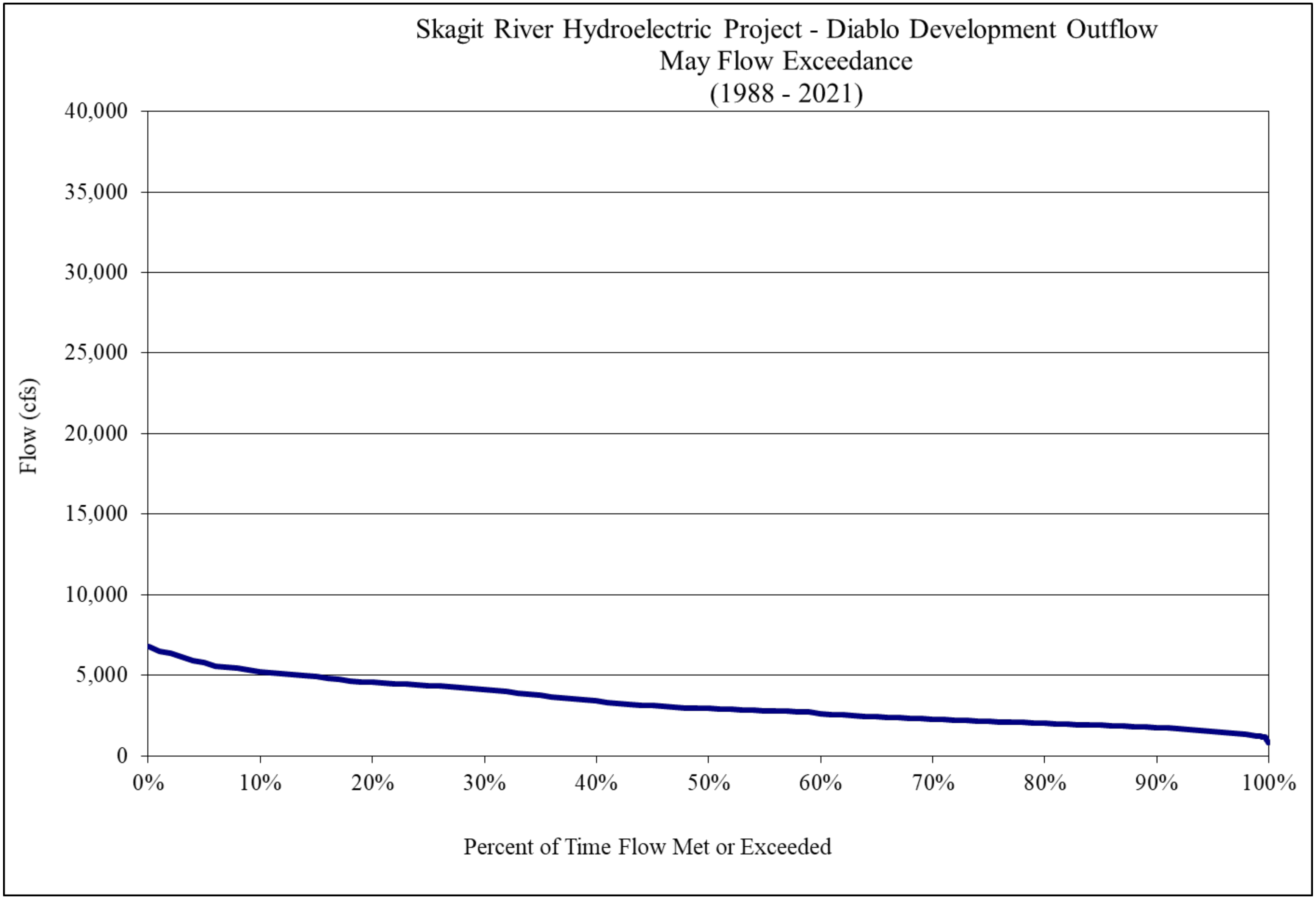

Figure B-58. Diablo Lake May outflow duration curve.

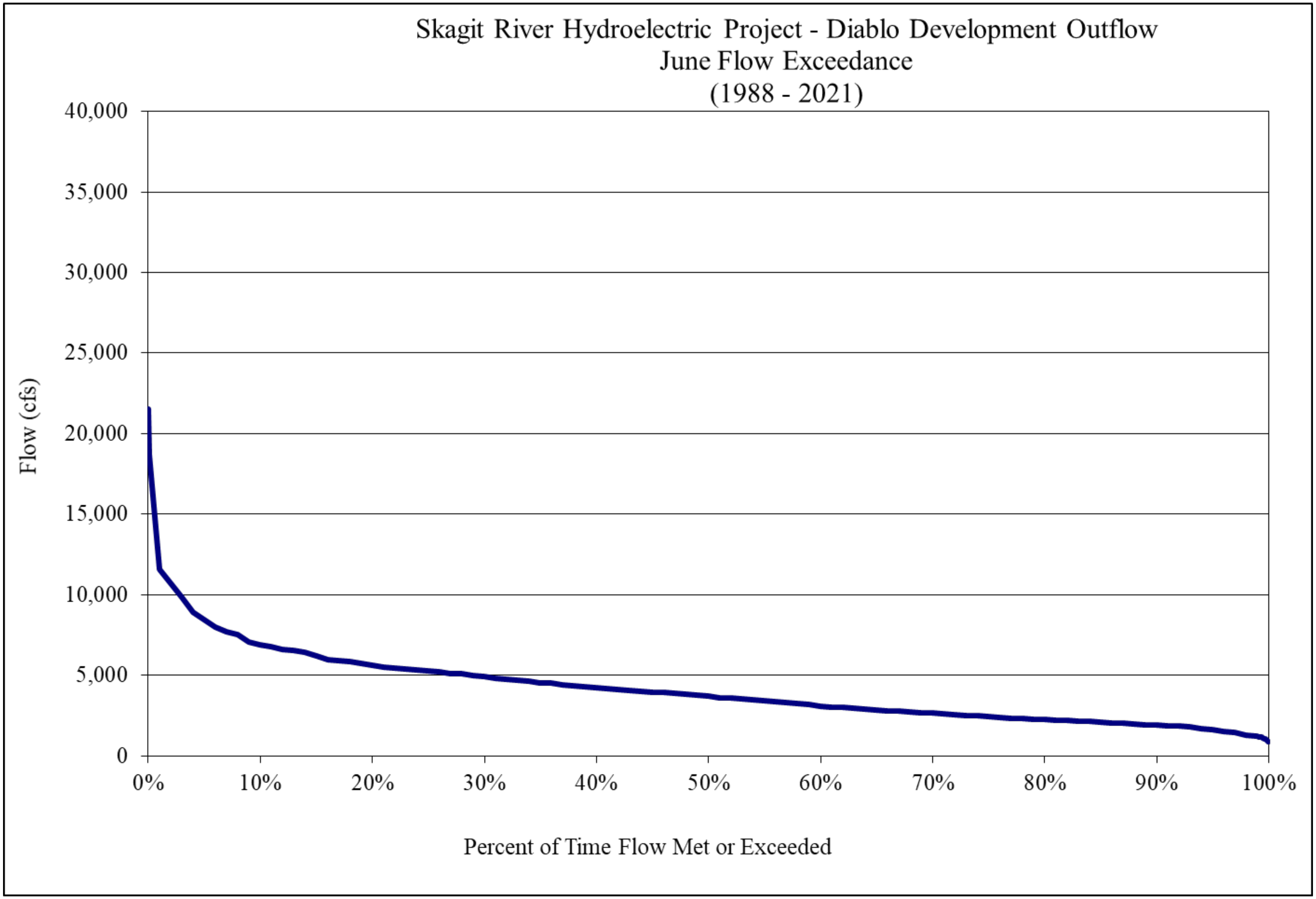

Figure B-59. Diablo Lake June outflow duration curve.

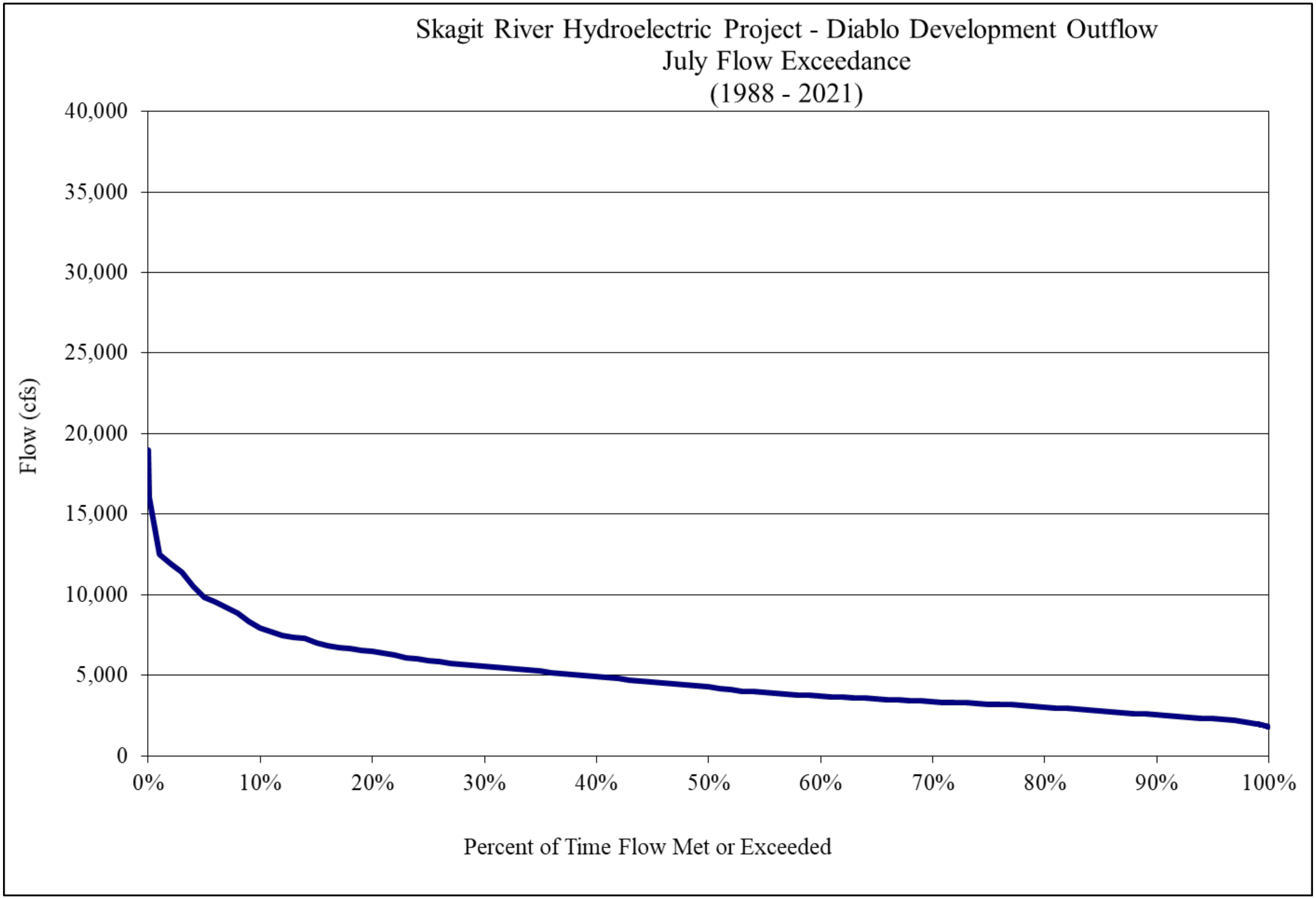

Figure B-60. Diablo Lake July outflow duration curve.

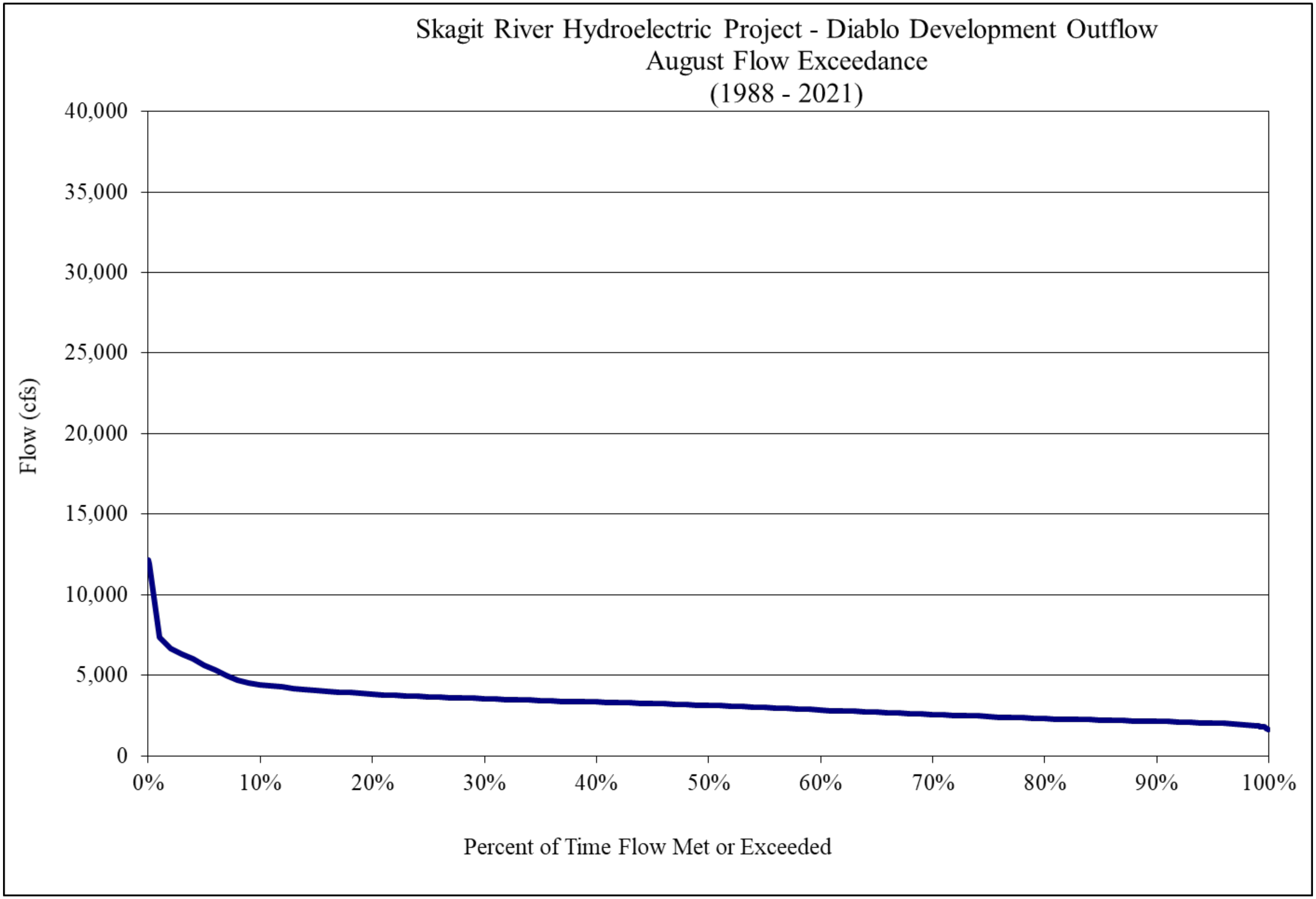

Figure B-61. Diablo Lake August outflow duration curve.

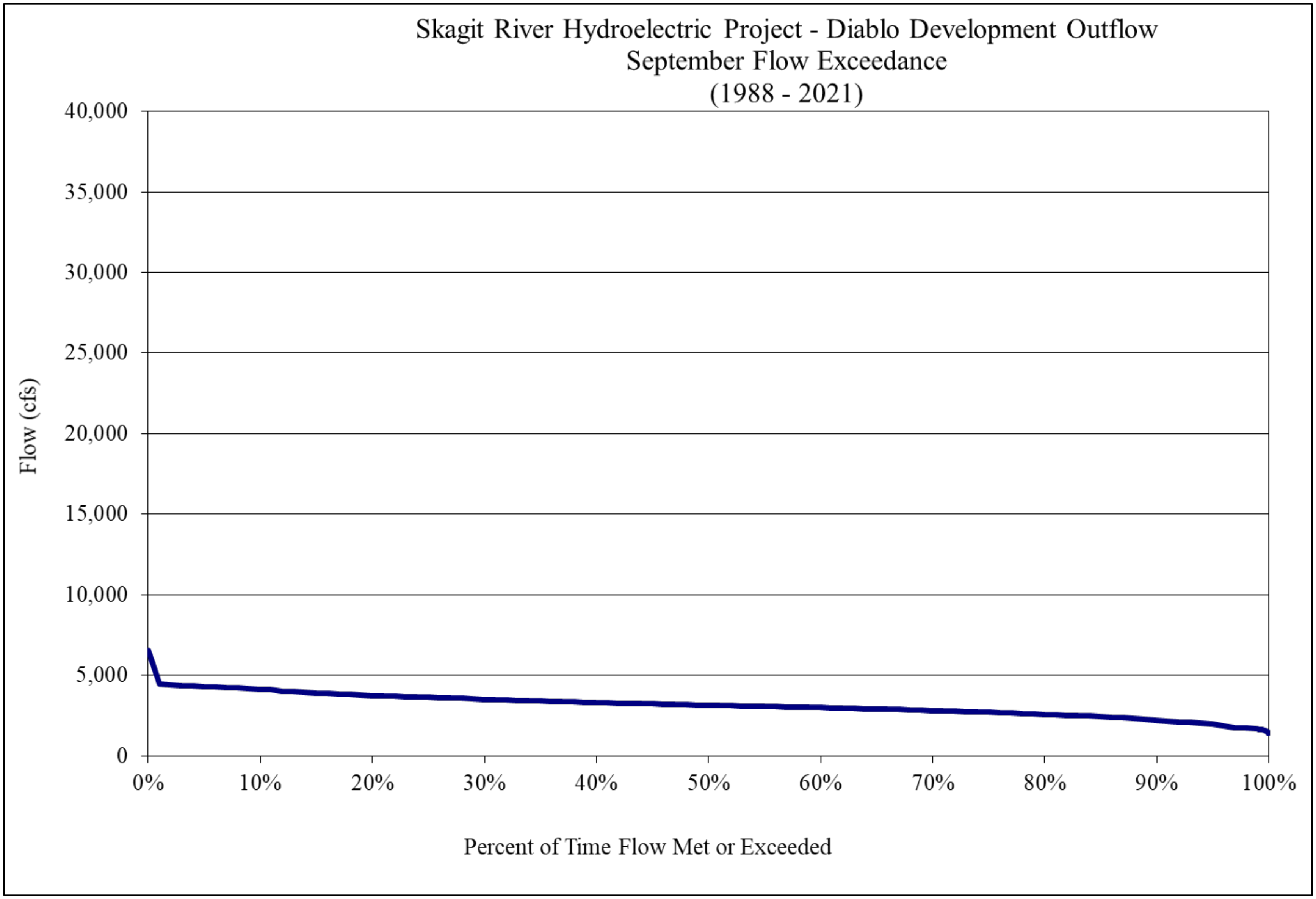

Figure B-62. Diablo Lake September outflow duration curve.

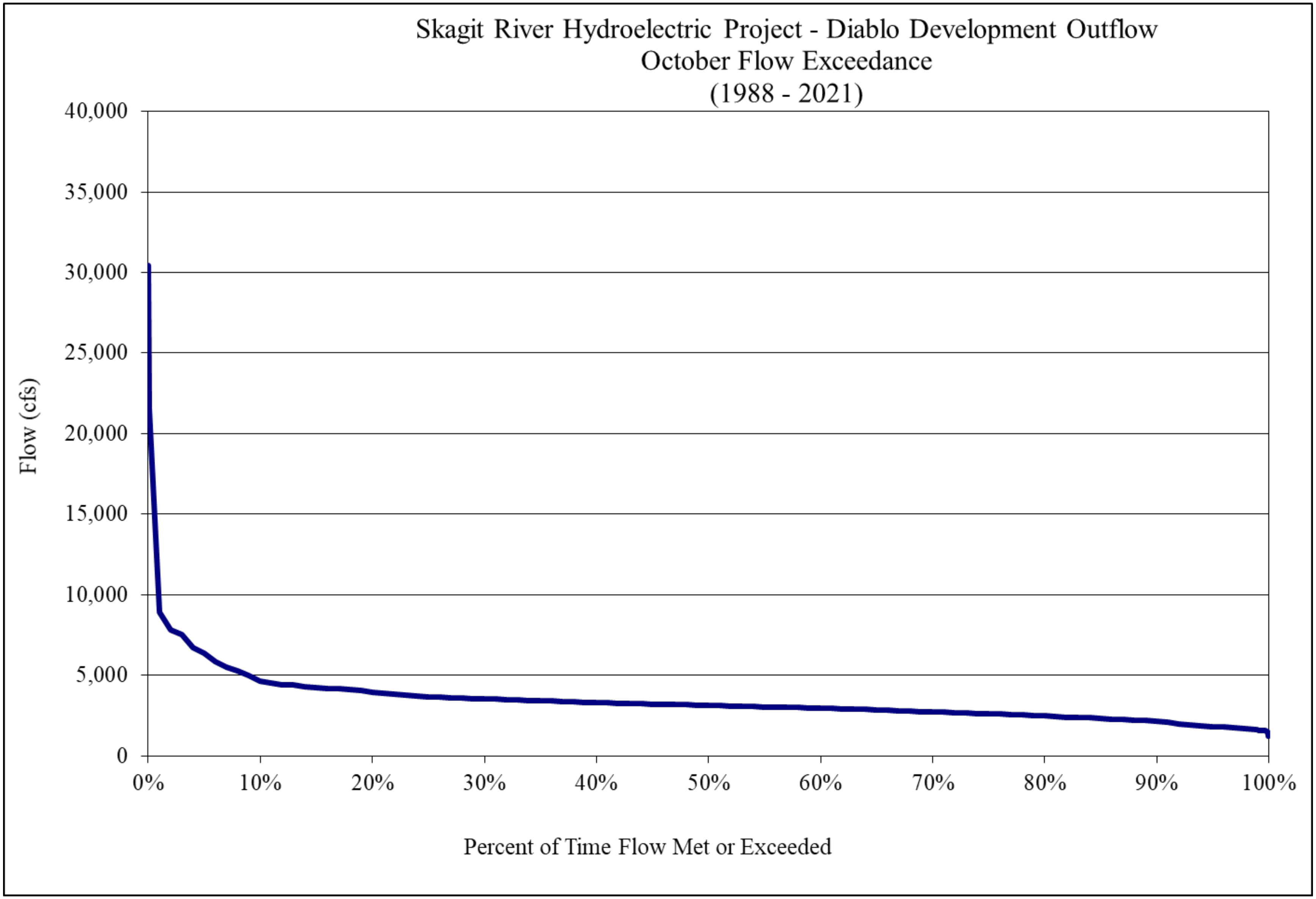

Figure B-63. Diablo Lake October outflow duration curve.

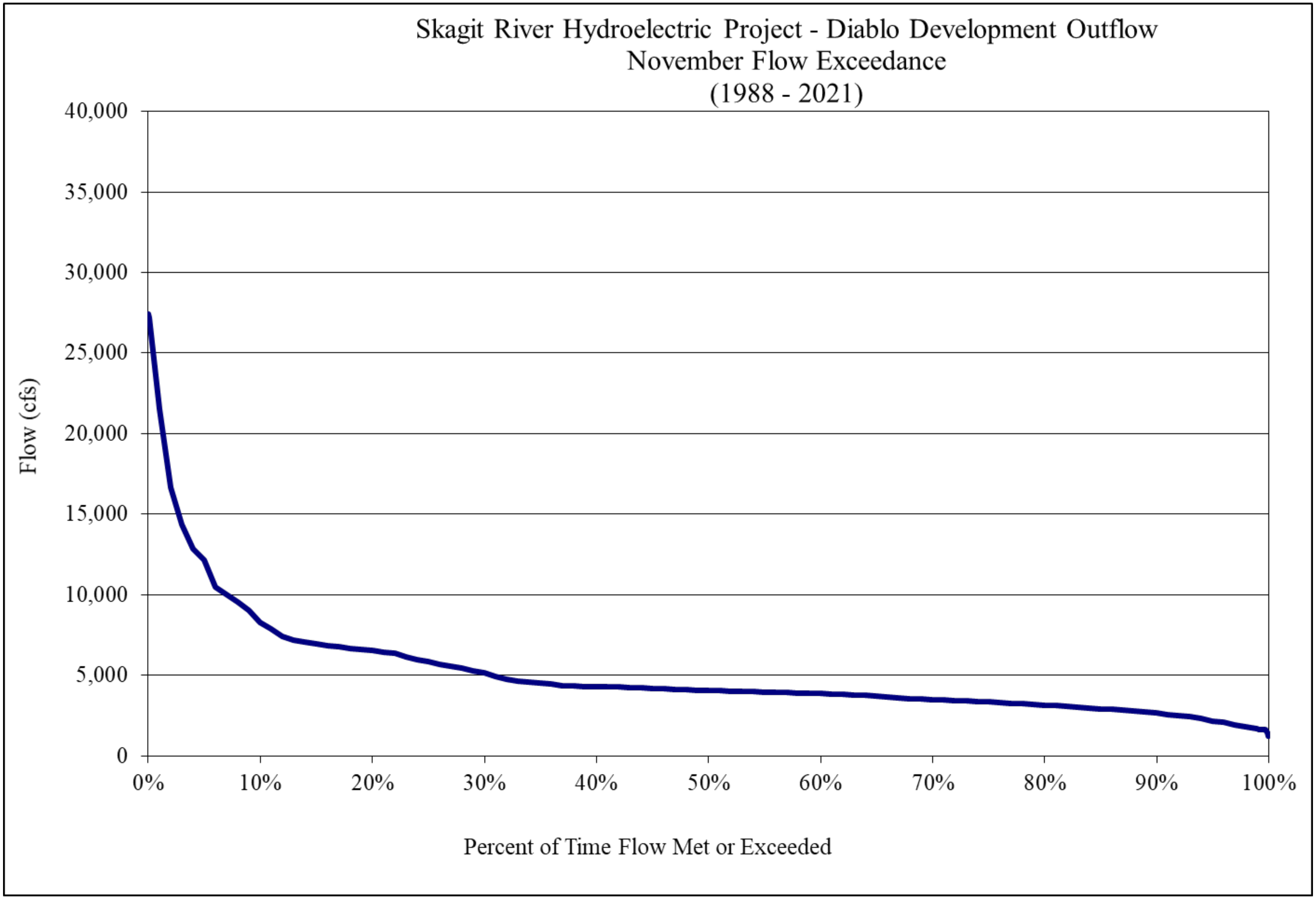

Figure B-64. Diablo Lake November outflow duration curve.

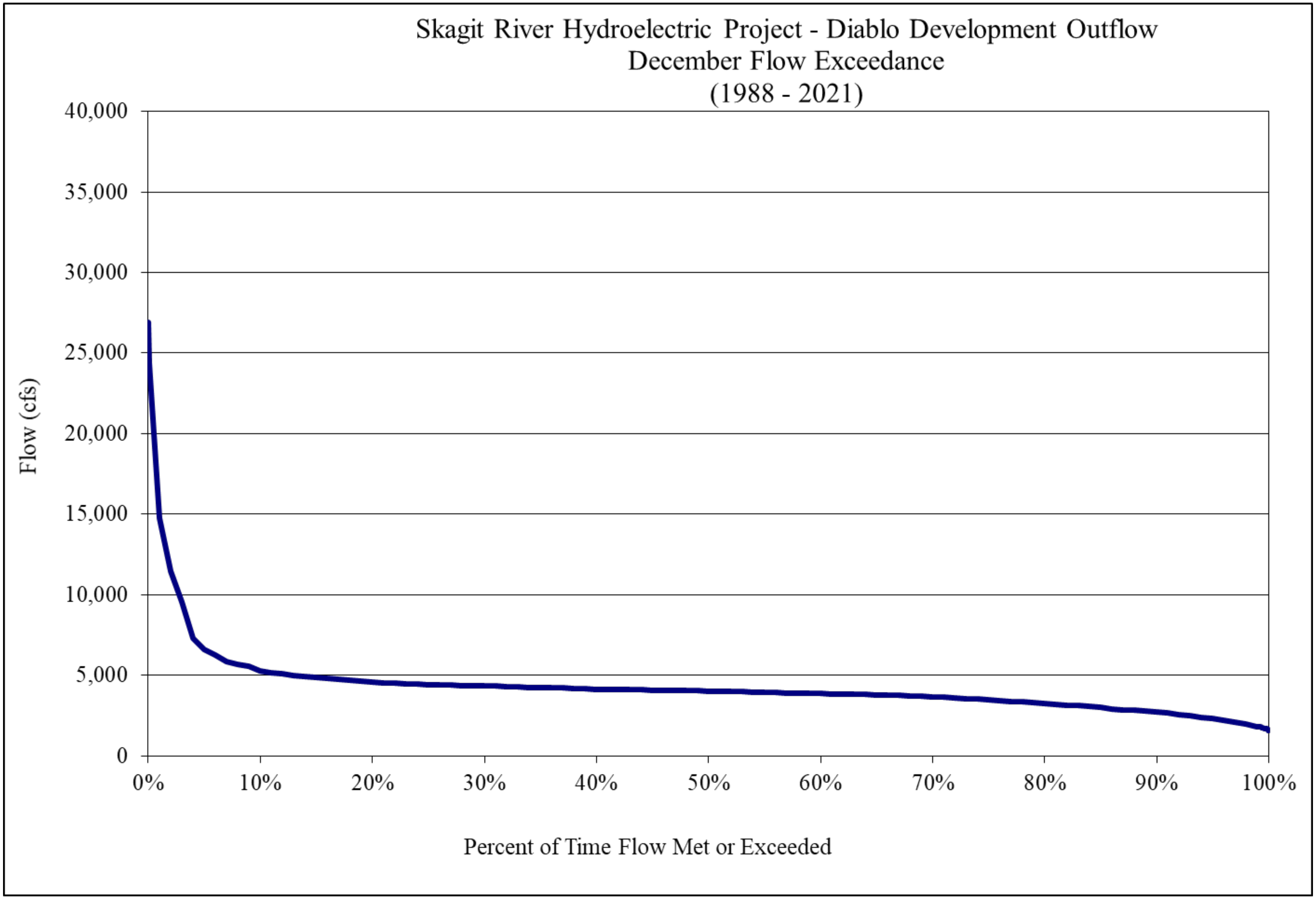

Figure B-65. Diablo Lake December outflow duration curve.

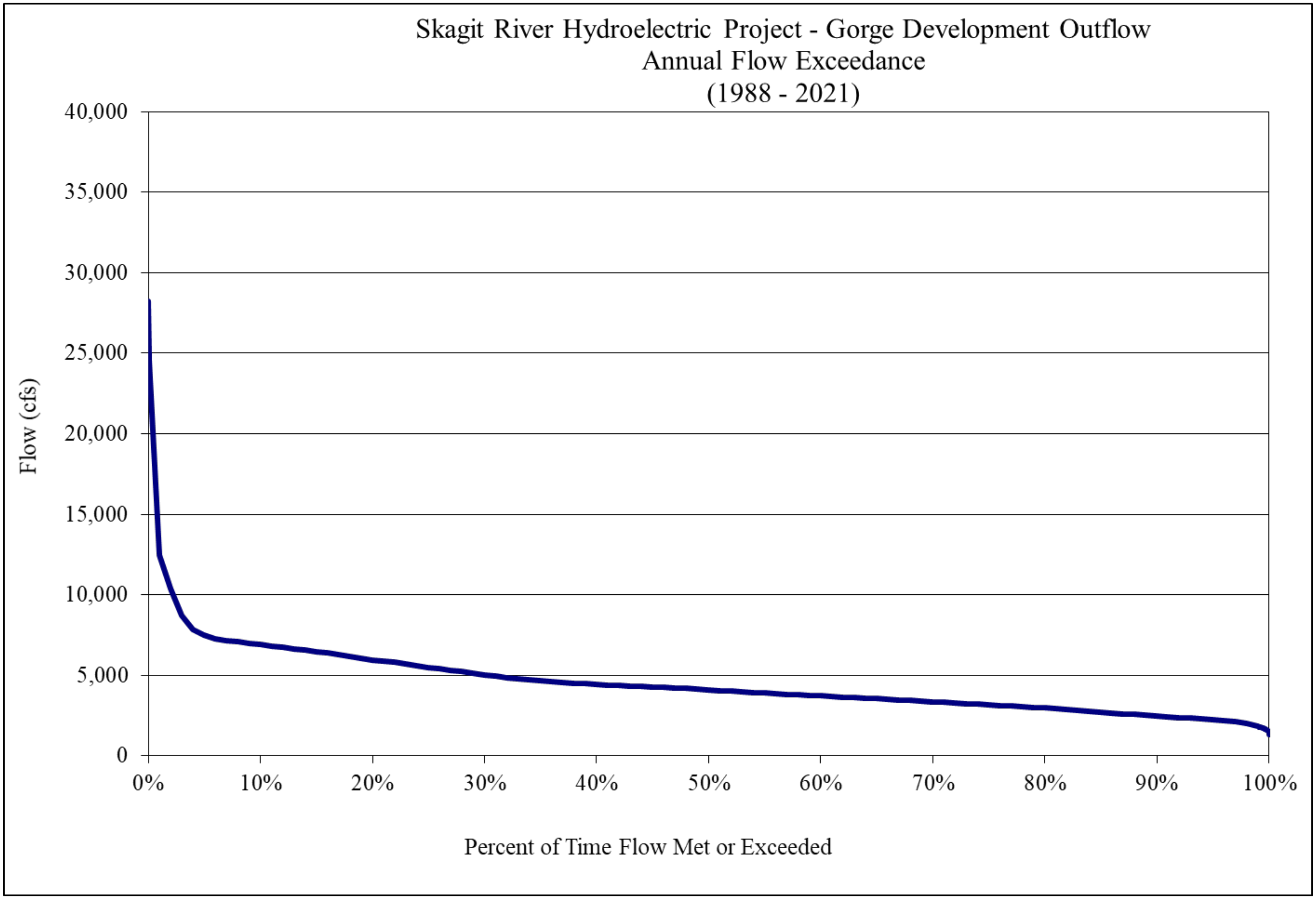

Figure B-66. Gorge Lake annual outflow duration curve.

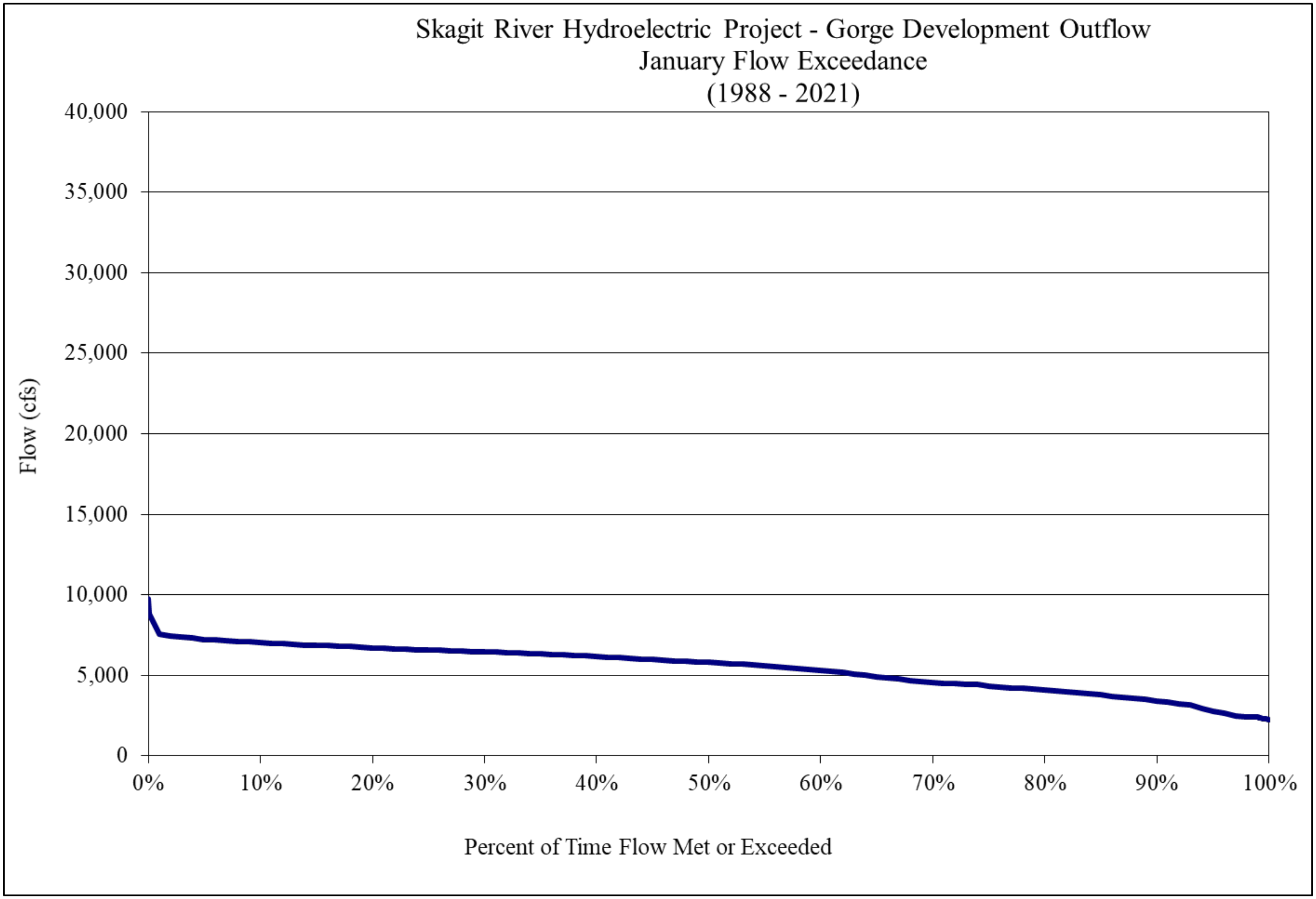

Figure B-67. Gorge Lake January outflow duration curve.

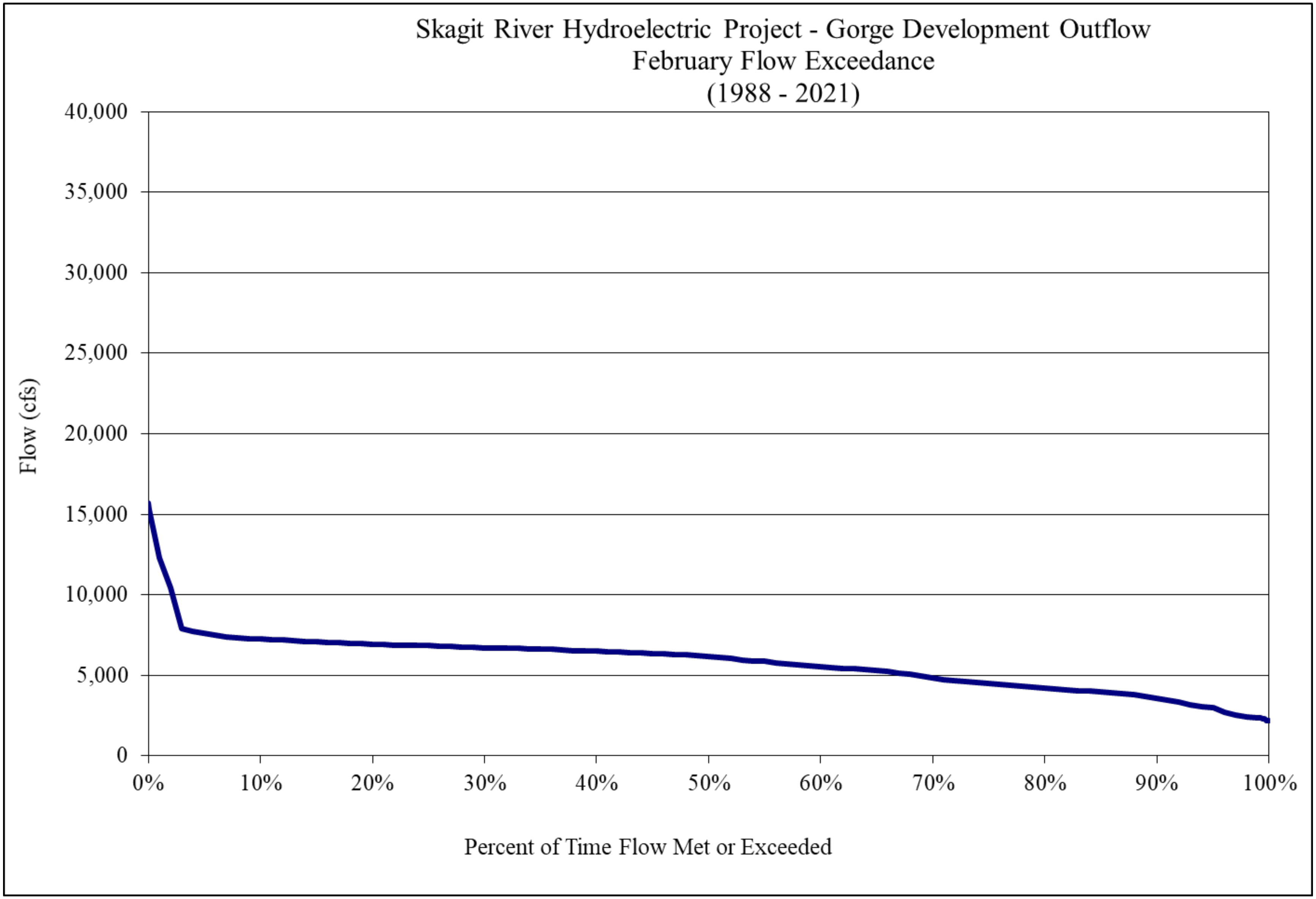

Figure B-68. Gorge Lake February outflow duration curve.

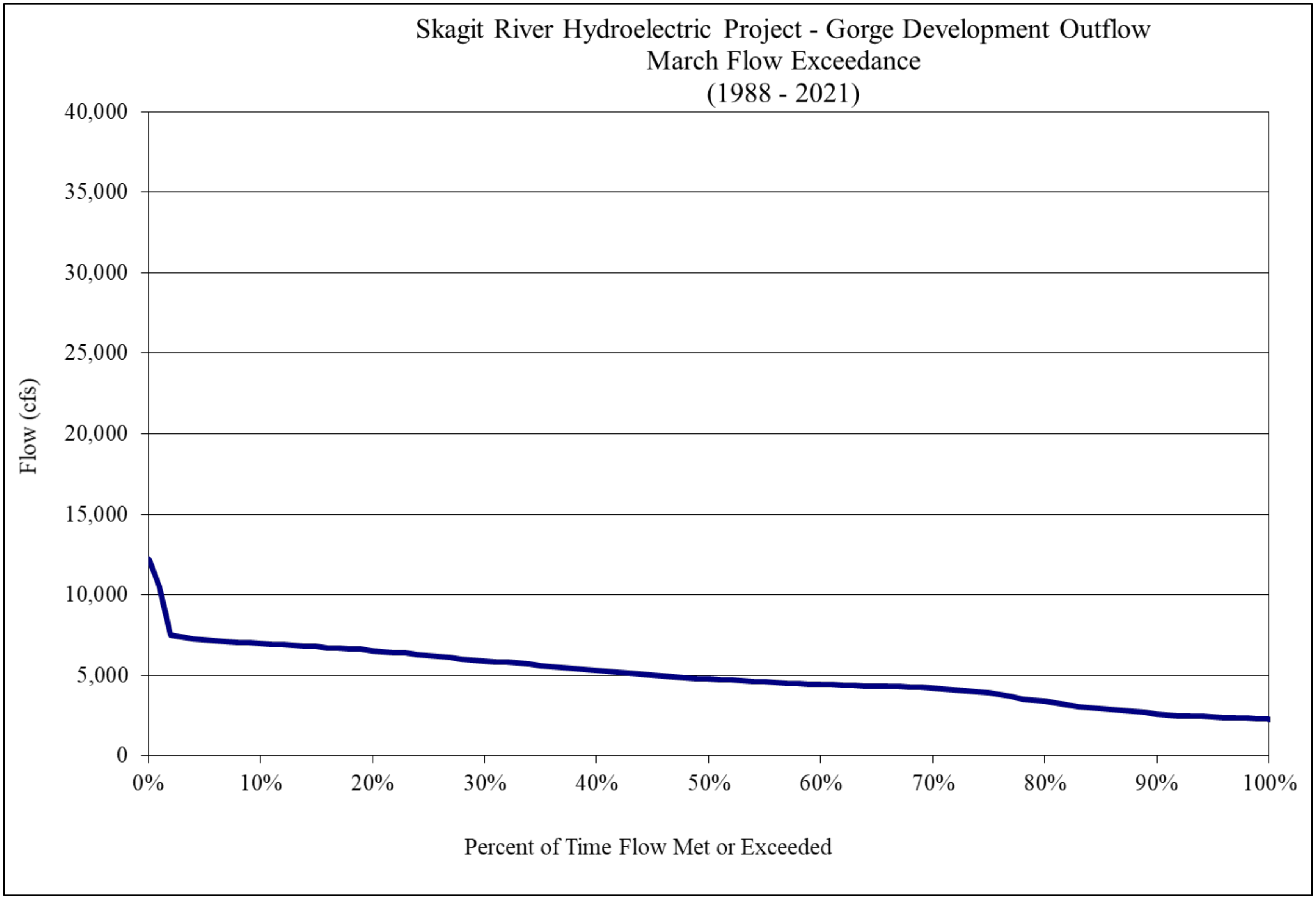

Figure B-69. Gorge Lake March outflow duration curve.

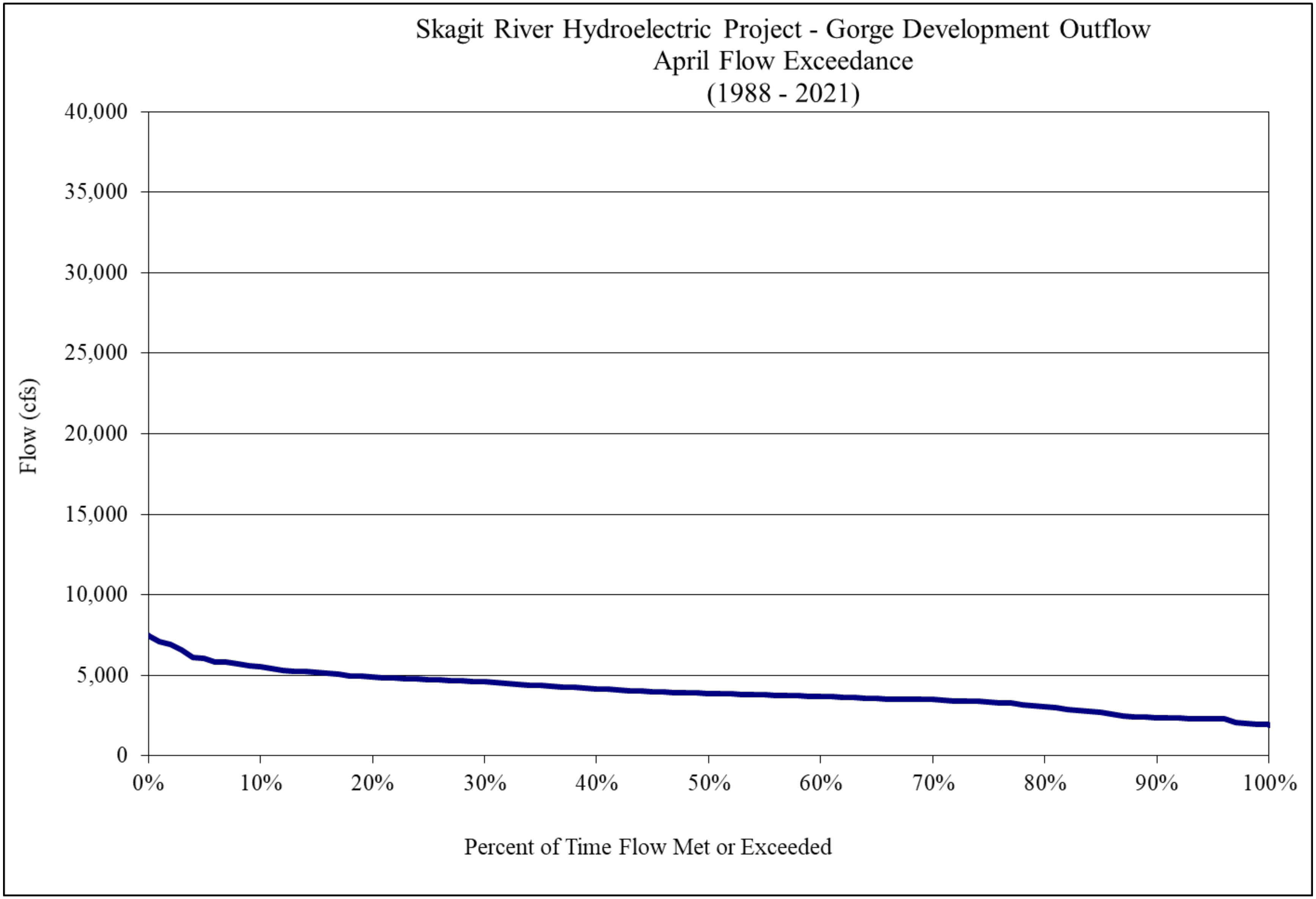

Figure B-70. Gorge Lake April outflow duration curve.

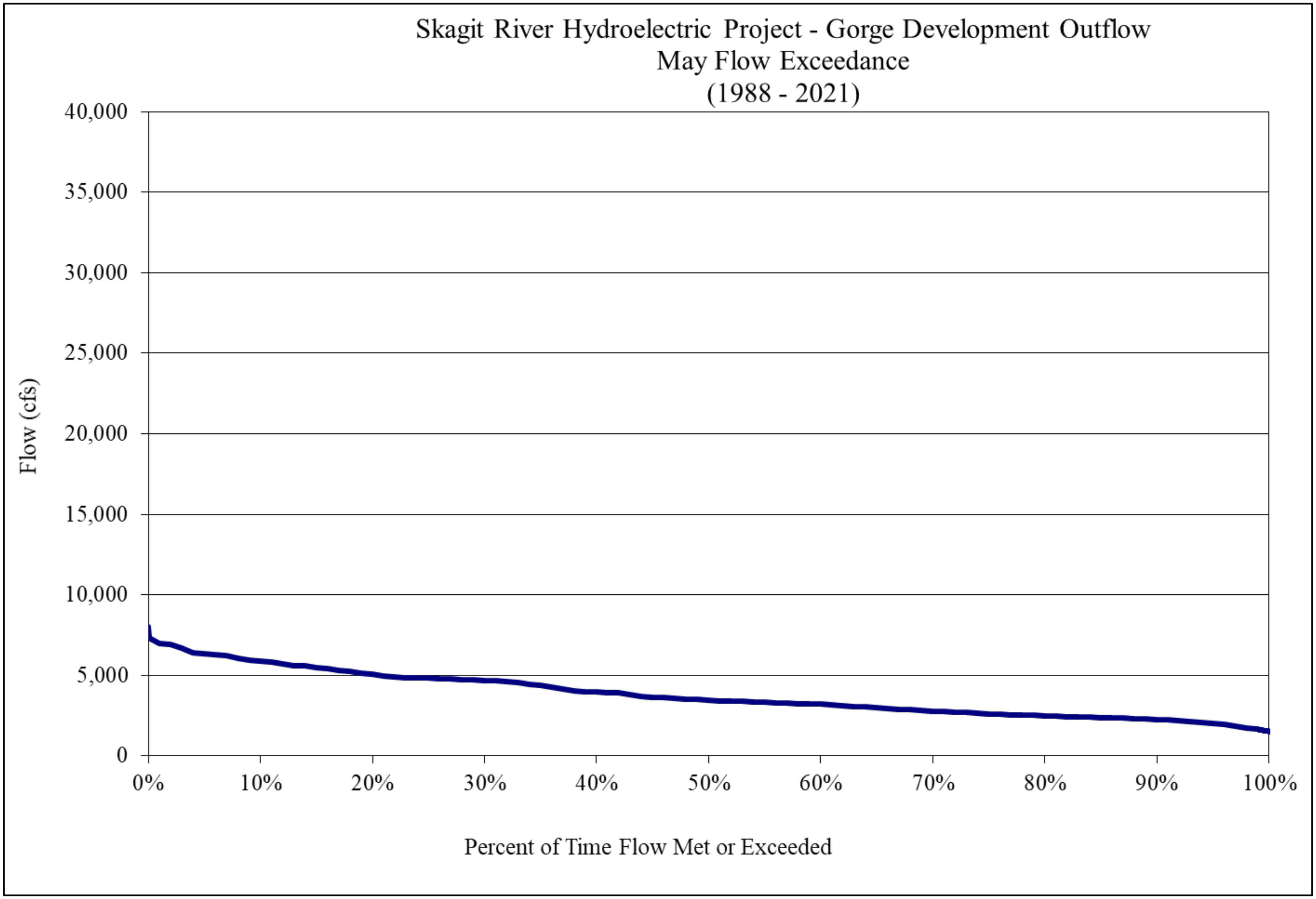

Figure B-71. Gorge Lake May outflow duration curve.

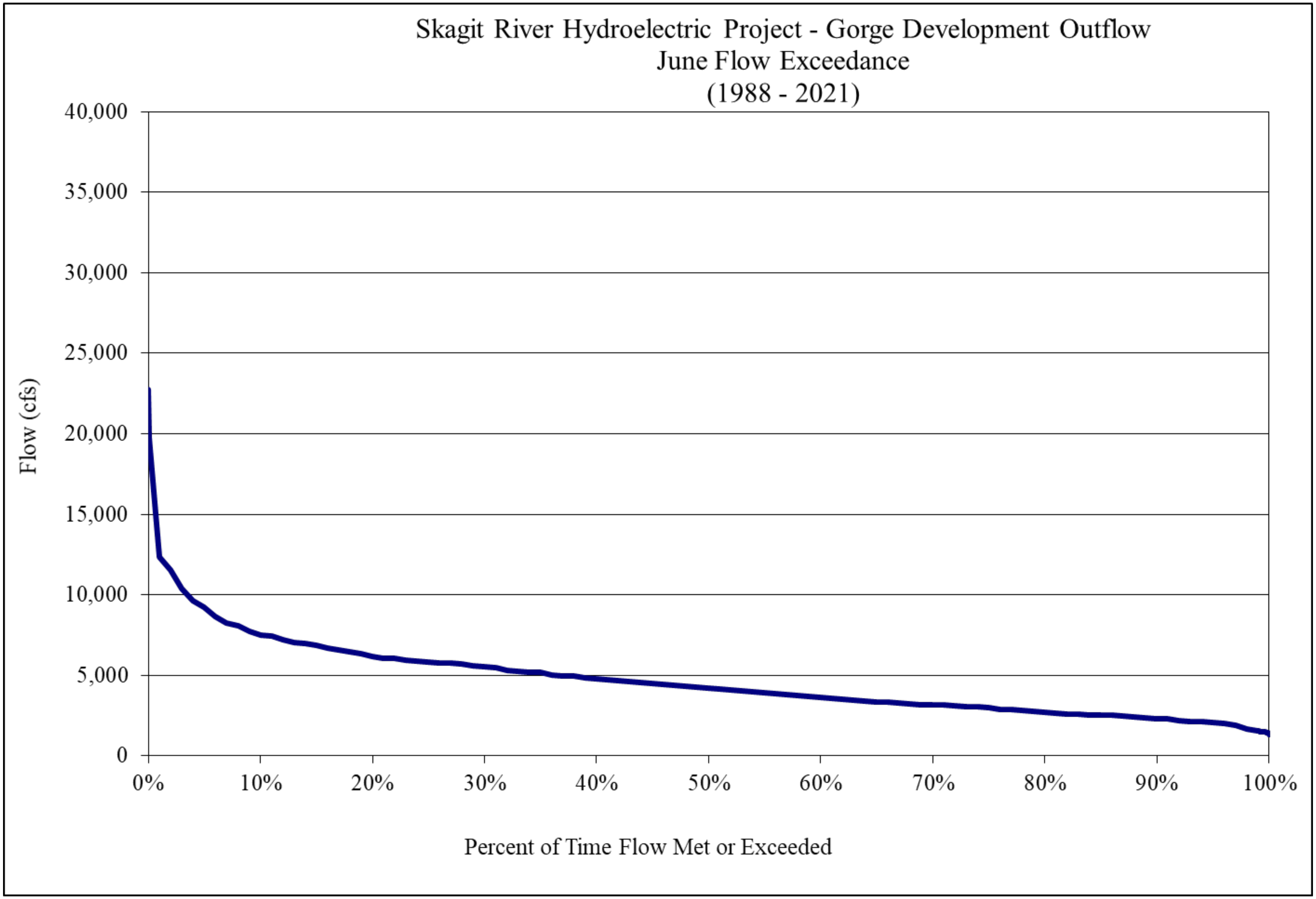

Figure B-72. Gorge Lake June outflow duration curve.

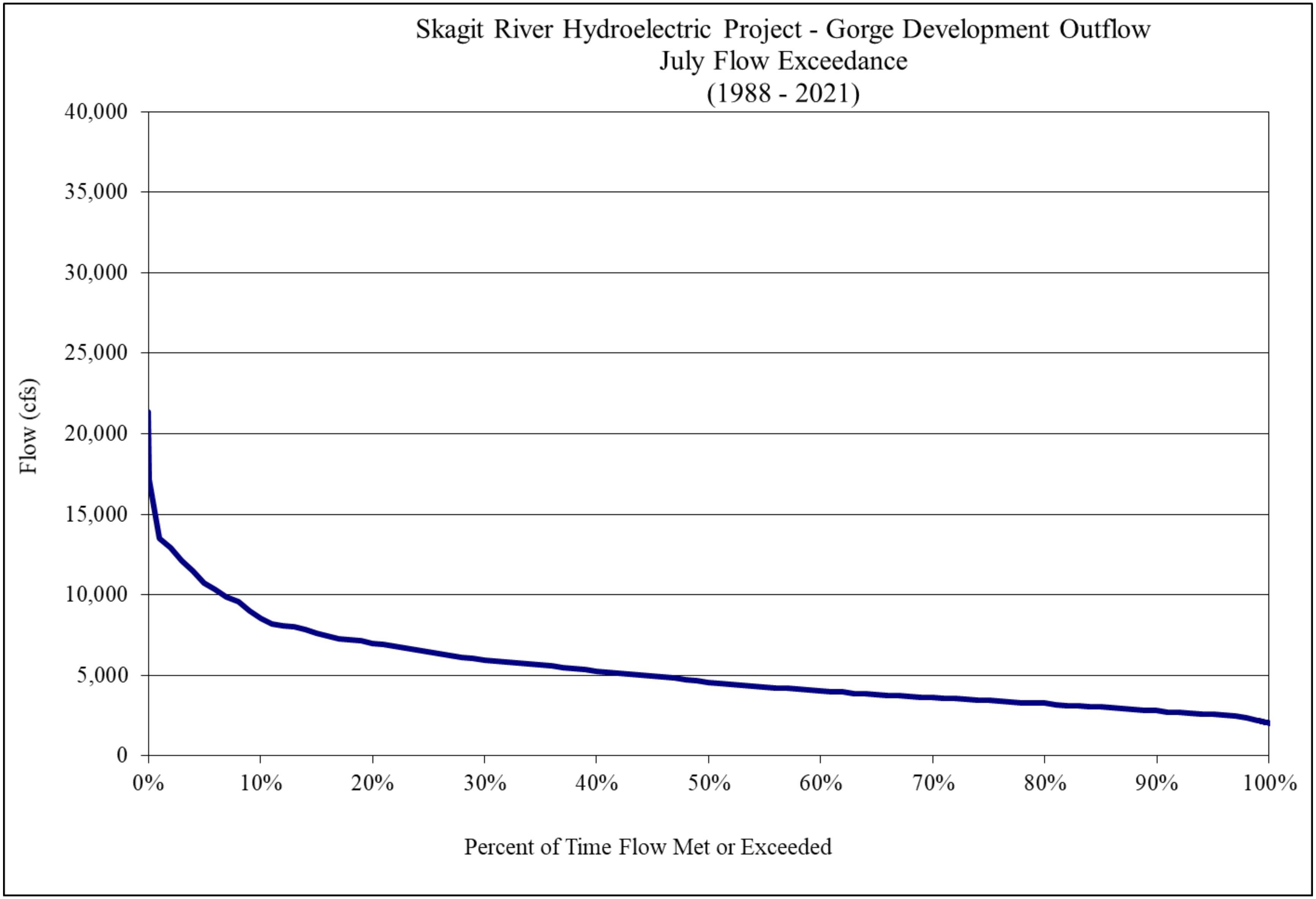

Figure B-73. Gorge Lake July outflow duration curve.

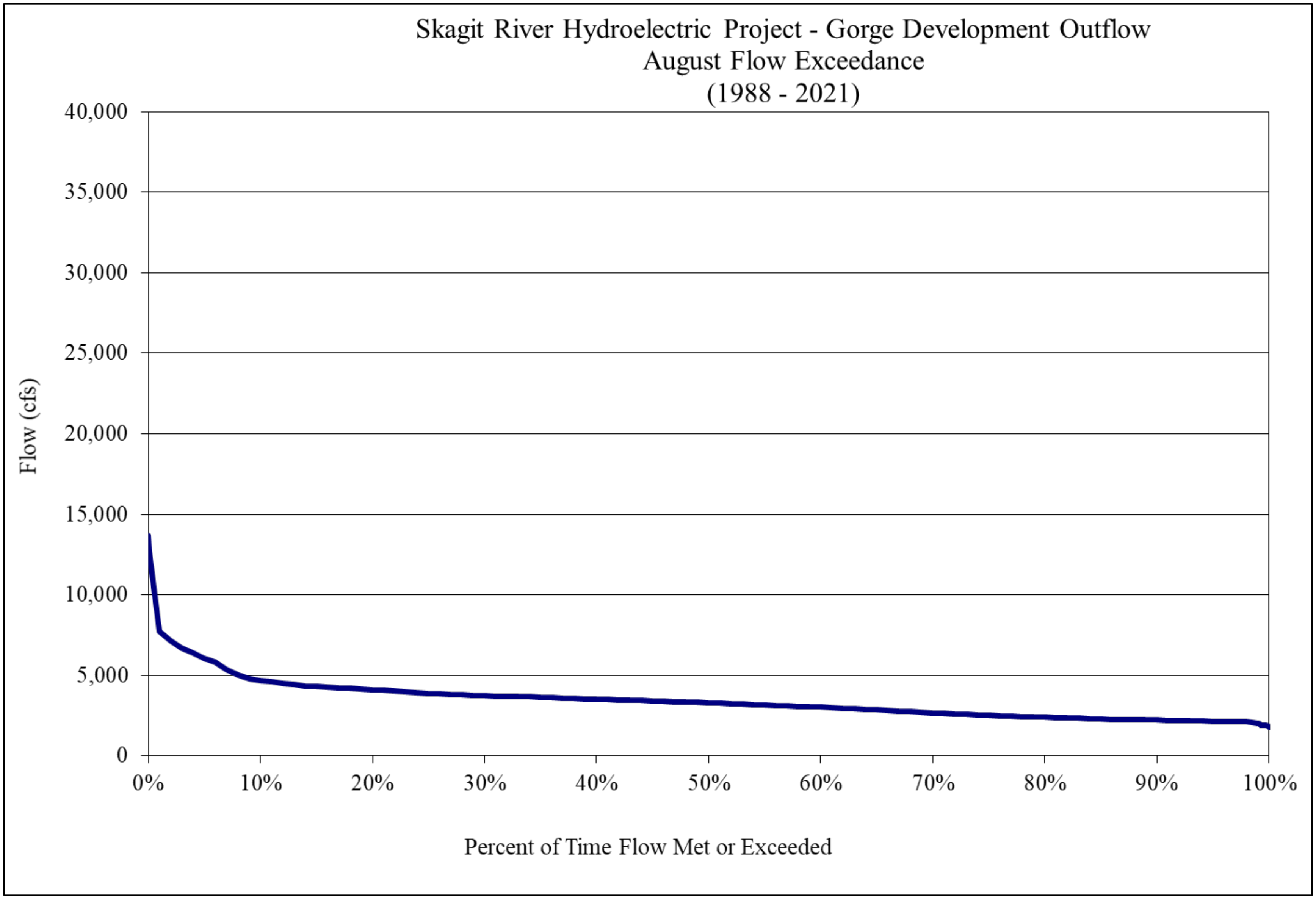

Figure B-74. Gorge Lake August outflow duration curve.

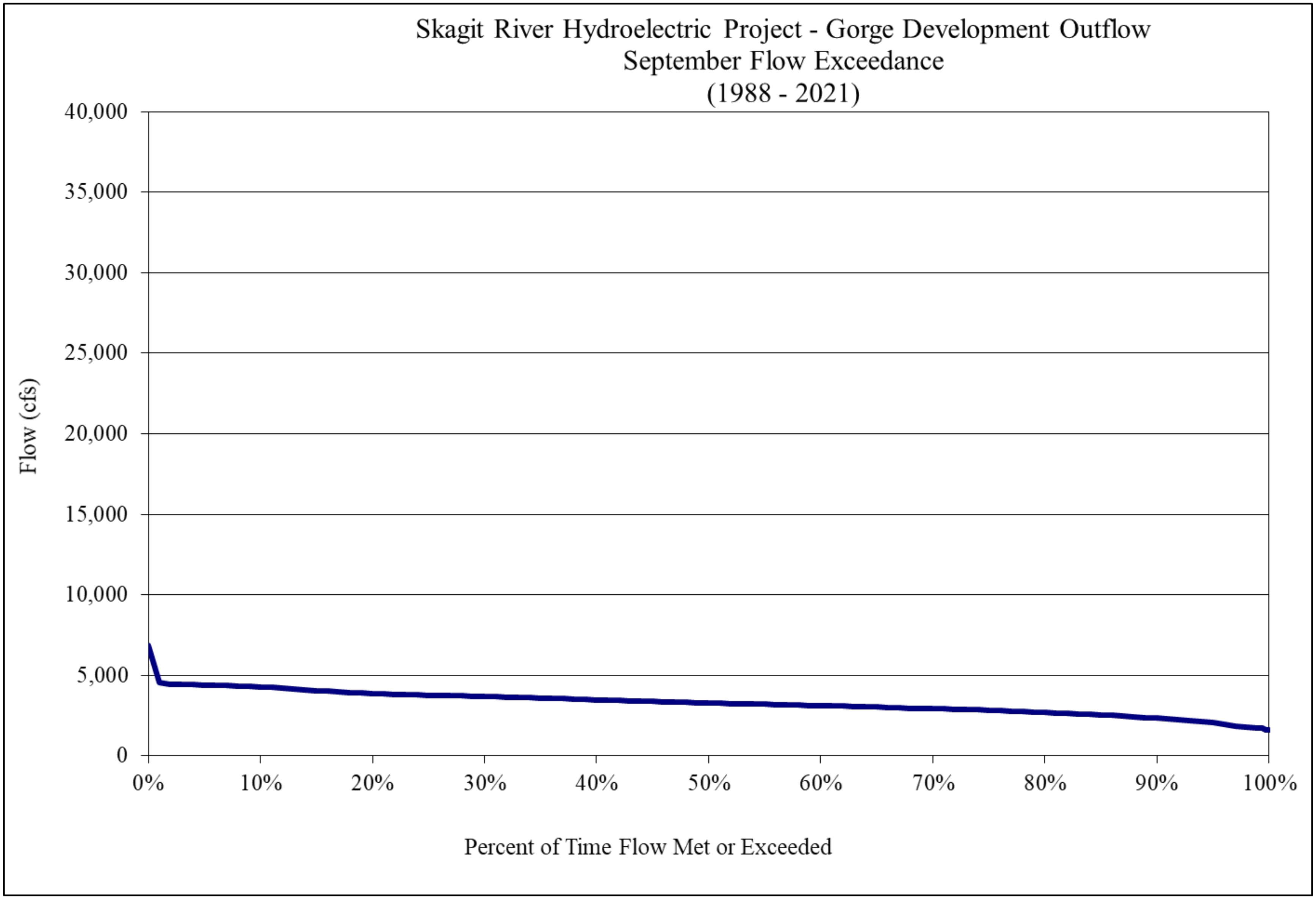

Figure B-75. Gorge Lake September outflow duration curve.

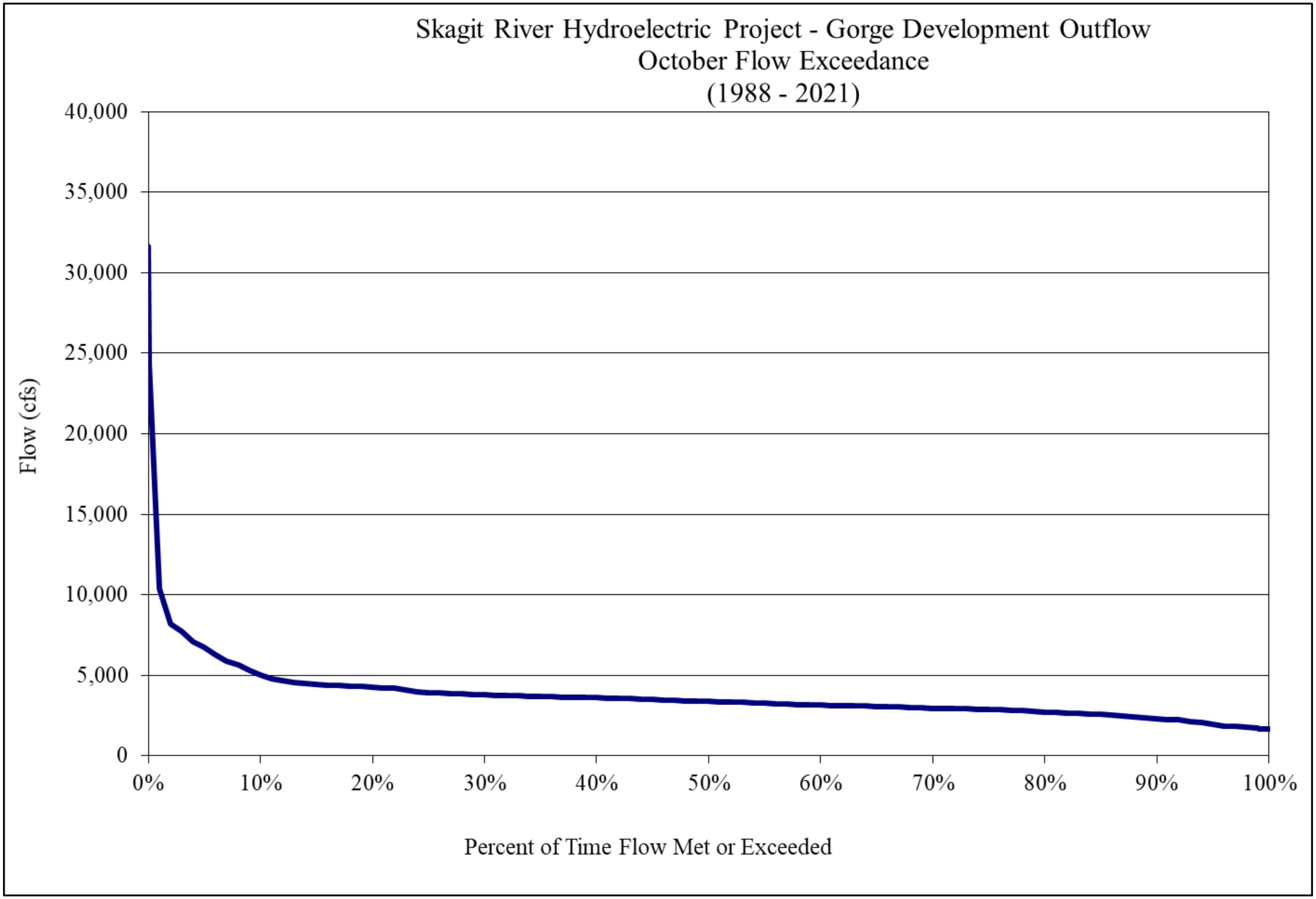

Figure B-76. Gorge Lake October outflow duration curve.

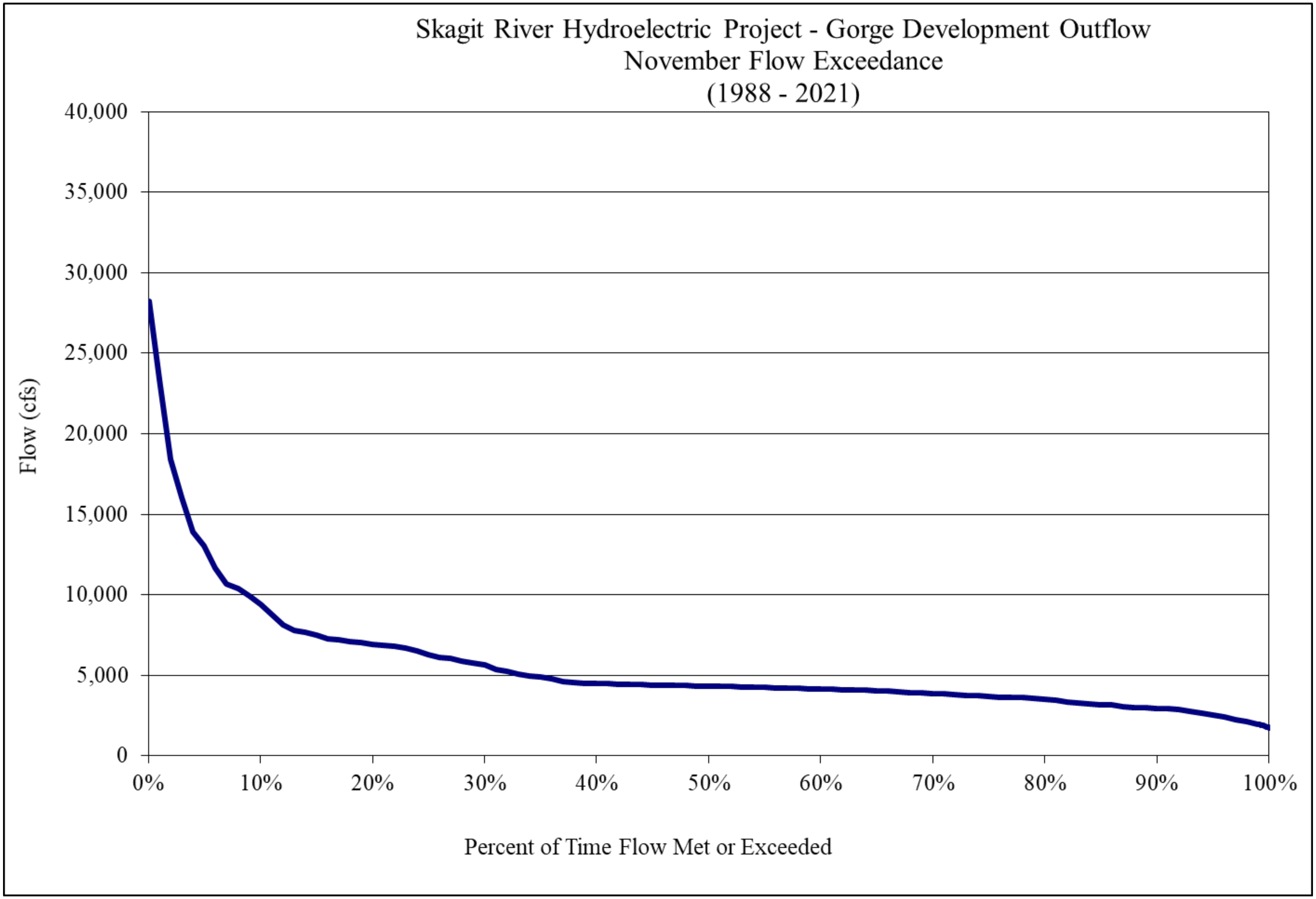

Figure B-77. Gorge Lake November outflow duration curve.

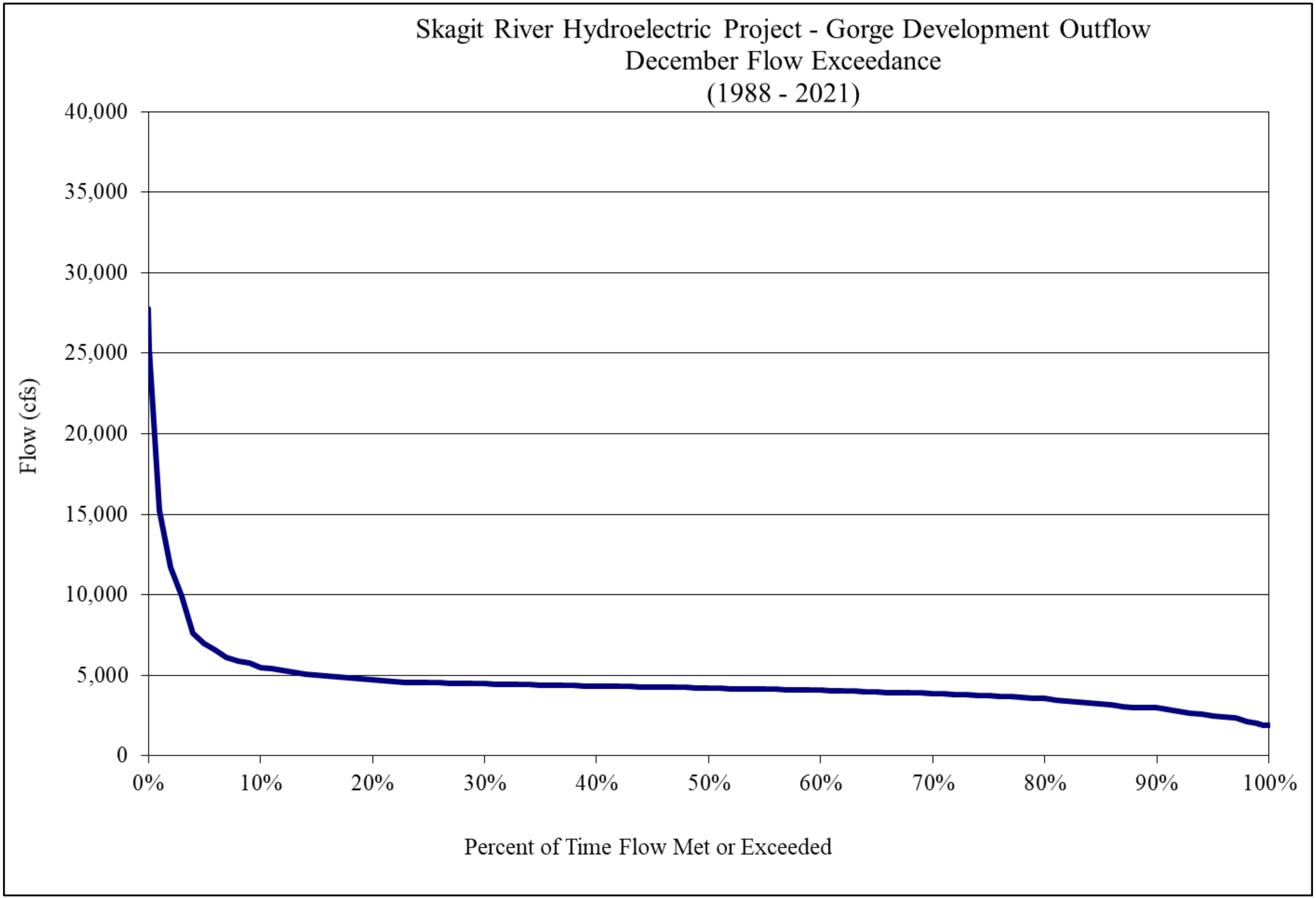

Figure B-78. Gorge Lake December outflow duration curve.

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