Trego Hydroelectric Project
FERC Project No. 2711

Exhibit A
Description of Project

Draft License Application

Prepared for

Northern States Power Company
a Wisconsin Corporation

Prepared by

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TABLES

APPENDICES

LIST OF ABBREVIATIONS

Applicant	Northern States Power Company, a Wisconsin corporation
cfs	cubic feet per second
DSM	demand side management
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
FOE	Focus on Energy
kV	Kilovolt
kVA	Kilovolt-Ampere
kW	Kilowatt
MSL	mean sea level
MWh	Megawatt-hours
NGVD	National Geodetic Vertical Datum, 1929
NSPW	Northern States Power Company, a Wisconsin corporation
O&M	Operation and management
Project	Trego Hydroelectric Project
PURPA	Public Utility Regulatory Policies Act
USGS	United States Geological Survey

1. Project Description

The Trego Hydroelectric Project (Project) is owned and operated by Northern States Power Company, a Wisconsin Corporation (NSPW, Applicant, or Licensee). The Project is located on the Namekagon River in the Town of Trego, Washburn County, Wisconsin approximately 100 miles northeast of the City of Minneapolis, Minnesota. **Appendix A-1** includes a map depicting the general location of the Project. **Appendix A-2** includes an aerial photograph showing the Project's primary facilities. The Project has an authorized capacity of 1,200 kilowatts (kW) and includes a reservoir, dam, powerhouse, tailrace or tailwater, transmission equipment, and appurtenant equipment. These features are described in the following paragraphs.[1]

2. Description of Dam Structures

The dam is approximately 638 feet long[2] and 43 feet high.[3] From left to right looking downstream, the main structures of the dam consist of a left earth embankment, powerhouse, sluice gate spillway, radial gate spillway, and a right earth embankment.

2.1 Earth Embankments

The dam features two earth embankments. From a perspective looking downstream, there is the left earth embankment and the right earth embankment. The powerhouse, sluice gate spillway, and radial gate spillway separate the left and right embankments.

2.1.1 Left Earth Embankment

The left earth embankment extends 110 feet from the left bank to the left abutment of the powerhouse. It is 150 feet wide at its base[4] and 25 feet high.[5] It has a top elevation of approximately 1,040.0 feet National Geodetic Vertical Datum (NGVD).[6] The embankment has a 12-foot wide top with a 2:1 slope on the downstream side and a 3:1 slope on the upstream side.

The earth embankment is vegetated with grass and weeds and is constructed of sandy fill material with a concrete core wall. The upstream side is protected with riprap. The core wall extends from the powerhouse about 95 feet and has a top elevation of 1,036 feet NGVD. Steel sheet pile cutoff walls extend through the foundation sediments to the hardpan layer below a portion of the core walls closest to the powerhouse. Beyond the sheet pile cutoff, the core walls are founded on sand and gravel.

2.1.2 Right Earth Embankment

The right earth embankment extends approximately 200 feet from the right abutment of the powerhouse to the right bank. It is approximately 162 feet wide at its base[7] and 30 feet high.[8] It has a top elevation of

[1] Unless otherwise cited, all facility description attributes are from the Supporting Technical Information Document dated March 2017 (NSPW, 2017).
[2] Left earth embankment 110 feet, powerhouse 60 feet, sluice gate spillway 6 feet, radial gate spillway 82 feet, and right earth embankment 380 feet.
[3] The top of the operator deck on the radial gate spillway is 1,042.0 feet NGVD and the river bottom downstream is 999.0 feet NGVD per Exhibit F-1. For the purposes of this application mean sea level (MSL) and NGVD are considered the same datum.
[4] The width is scaled from Exhibit F-2.
[5] The height is scaled from Exhibit F-2 and corresponds to the height listed in the current license.
[6] The top elevation is shown on Exhibit F-2.
[7] The width is scaled from Exhibit F-1.
[8] The height is scaled from Exhibit F-1 and corresponds to the height listed in the current license.

approximately 1,040.0 feet NGVD.[9] The top width is 12 feet with a 2:1 slope on the downstream side and a 3:1 slope on the upstream side.

The earth embankment is vegetated with grass and weeds and is constructed of sandy fill material with a concrete core wall. The upstream is protected with riprap and the downstream side is protected with articulated concrete. The core wall extends from the powerhouse about 200 feet and has a top elevation of 1,036 feet NGVD. Steel sheet pile cutoff walls extend through the foundation sediments to the hardpan layer below a portion of the core walls closest to the spillway. Beyond the sheet pile cutoff, the core walls are founded on sand and gravel.

2.2 Powerhouse

The powerhouse is approximately 59.5 feet long (left to right) and extends 99 feet downstream from its upstream foundation wall to the downstream end of the tailrace apron (58 feet for the powerhouse substructure and 41 feet for the tailrace apron) (NSPW, 1991). The overall height of the powerhouse is 70 feet (NSPW, 1991). The substructure is concrete and the superstructure is brick masonry that extends approximately 32 feet from the generator floor to the roof. The top of the concrete substructure is the generator floor which has an elevation of 1,037.0 feet NGVD and the approximate elevation of the foundation and discharge flume invert is 995.0 feet NGVD giving it a height of 38 feet.

A 16.5-foot-long partial extension of the upper portions of the powerhouse substructure extends southwestward and into the left earth embankment. The extension increases the overall length of the affected portion of the substructure to 59.5 feet. This partial extension is 30 feet higher than the foundation for the water passage section of the substructure. The top of the extension is at elevation 1,037.0 feet NGVD. The southwest wall of this extension is supported by driven bearing piles. This extension provides an approximate 15-foot by 27-foot basement area for the powerhouse which contains a boiler room for the heating system, storage room, and restroom (NSPW, 1991).

The powerhouse is founded on hardpan located approximately 8 feet below the river bottom. This hardpan layer is approximately 15 feet thick. Sand and gravel underlie the hardpan. Steel sheet piling is driven 13 feet into the hardpan along the entire length of the powerhouse and from 2 to 13 feet beneath the core walls extending beyond each end of the powerhouse (NSPW, 1991).

The powerhouse also contains an integral intake structure, turbines, and generators and forms a tailwater or tailrace downstream.

2.2.1 Intake Structure

The integral intake structure is vertically separated into two intake and discharge flumes. The left passage is 13.5 feet wide, and the other passage is 21 feet wide (NSPW, 1991). It has a total width of 36 feet. The top of the intake section is at elevation 1,036.0 feet NGVD. The bottom sills of both intakes are at an elevation of 1,016.0 feet NGVD, while the trash rack sills are two feet lower at elevation of 1,014.0 feet NGVD (NSPW, 1991).

[9] The top elevation is shown on Exhibit F-1.

The top of the trashracks in both bays are angled downstream 15° from vertical to facilitate cleaning. Their height as measured along the angled axis is 17.75 feet with a flow height of 17.5 feet.[10] The trashracks are submerged at all times under the required reservoir operating elevations and have a clear spacing of 1.5 inches.

The trashrack is raked manually as needed during normal working hours. Trash is removed and disposed of with other trash generated at the facility. The remaining debris cleaned from the trashrack is passed downstream. Raking is not required during the winter season.

2.2.2 Turbines

The Project contains two J. Leffel Company vertical Francis-Type turbines (NSPW, 1991). Unit #1 has a 56-inch runner and a rated capacity of 1,095 horsepower at 164 revolutions per minute with a minimum discharge capacity of 140 cfs and a maximum discharge capacity of 385 cfs (NSPW, 1991). Unit #2 has a 47.5-inch runner and a rated capacity of 785 horsepower at 180 revolutions per minute with a minimum discharge capacity of 100 cfs and a maximum discharge capacity of 278 cfs (NSPW, 1991).

The powerhouse has a minimum hydraulic capacity of 100 cfs and a maximum hydraulic capacity of 663 cfs (NSPW, 1991). The average head at the Project is 31 feet.

2.2.3 Generators

The Project contains two generators manufactured by Electric Machinery Manufacturing Company. Unit 1 consists of an 875 kilovolt-Ampere (kVA), 700 kilowatt (kW) at 80% power factor, 2.4 kilovolt (kV), 60 cycle, 164 rpm alternator. The unit is controlled by an oil pressure governor (NSPW, 1991). Unit 2 consists of a 625 kVA, 500 kW at 80% power factor, 2.4 kV, 60 cycle, 180 rpm alternator. The unit is controlled by an oil pressure governor (NSPW, 1991).

2.2.4 Tailwater

The tailrace or tailwater is approximately 125 feet wide and extends downstream from the dam for approximately 160 feet. Both the powerhouse and spillway discharge directly to the Namekagon River. The tailrace has a depth of approximately 9 feet at the downstream edge of the powerhouse under a normal tailwater elevation of 1,004.0 feet NGVD.

2.3 Sluice Gate Spillway

The sluice gate spillway section separates the concrete spillway section from the powerhouse and is six feet long and 40 feet high from the bottom of the sluice foundation at 997.0 feet NGVD to the top of the gate at an elevation of 1,037.0 feet NGVD. In cross-section width, the section extends about 99 feet from its upstream foundation wall to the end of its downstream apron, which includes 73 feet for the sluice gate spillway and 26 feet for the apron.

The section is an Ambursen dam spillway that contains one 6-foot wide by 8-foot high vertical bottom hinge Obermeyer sluice gate with a capacity of 320 cfs at elevation 1,187.5 feet NGVD. The gate is heated for winter operation. The sill crest is at elevation 1,028.0 feet and is 31 feet above the sluiceway

[10] The height is scaled from Exhibit F-2.

foundation bottom elevation of 997.0 feet[11] (NSPW, 1991). The top of the downstream sluice apron is at elevation 998.5 feet (NSPW, 1991).

2.4 Radial Gate Spillway

The radial gate spillway section is an Ambursen dam spillway that is 86 feet long, 112 feet wide (upstream foundation wall to downstream end of stilling basin), and 45 feet high from the bottom of the foundation's elevation of 997.0 feet NGVD to the top of the operating platform at elevation 1,042.0 feet NGVD.[12] The section contains three steel radial gates that are each 25.5-feet wide by 10-feet high separated by concrete piers. The gate sill elevation is 1,026 feet and top of gate elevation is 1,036.0 feet when closed. The gates are lifted by a traveling gate hoist. A sloping 28-foot-long concrete apron with end sill basin is located downstream of the spillway (NSPW, 1991).

3. Description of Reservoir

The reservoir encompasses approximately 453 acres with a gross storage capacity of approximately 43,520 acre-feet at the maximum reservoir elevation of 1,035.2 feet NGVD. It has a maximum depth of 35 feet at the dam and an estimated average depth of 10 feet. The substrate consists of 95% sand and 5% muck (WI Department of Natural Resources, n.d.). The drainage area at the Project is 488 square miles (NSPW, 1991).

4. Transmission and Substation Equipment

There is a 40-foot-long, 2.4 kV, three phase xx conductor transmission line extending from the powerhouse to a 2,000 kVA, 2.4 kV to 23.9 kV transformer housed in the 16-foot by 32-foot substation attached to the east side of the powerhouse.[13] The high voltage side of the transformer is the point of interconnect with NSPW's non-project distribution system and NSPW is the entity receiving the Project generation.

5. Appurtenant Equipment

Appurtenant equipment includes, but is not limited to, bearing lubrication systems, powerhouse ventilation systems, spillway gate lifting equipment, protective devices, and metering devices.

6. Project Operation

The Project currently operates in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resources. NSPW maintains a target reservoir elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 feet and 1,035.2 feet NGVD).

Under the proposed operation, just prior to spring runoff or for emergency operations, the Applicant may deviate from the maximum reservoir elevation by no more than 0.5 feet to remove ice from the spillway for

[11] Elevation taken from Exhibit F-2.
[12] Elevations taken from Exhibit F-2.
[13] Size of conductor to be provided in FLA.

dam safety purposes. The duration of the deviation shall be no longer than necessary (typically less than a few days) to remove the ice and will be conducted as a planned deviation under the requirements outlined in Section 5.5 of Exhibit E.

NSPW is not proposing any material changes to operations under the subsequent license.[14]

An operator is assigned to oversee the daily operation and routine maintenance of both the Trego and Hayward Projects. Eight-hour coverage is provided five days a week, Monday-Friday. The operator for the facility is on call 24 hours per day, seven days per week. The plant is manually operated with controls installed for automatic shutdown in case of operational emergencies. Whenever a unit or plant shutdown occurs, or if there is a high or low water alarm, the continually staffed control center at the Licensee's Wissota Hydroelectric Project is automatically notified.

For emergency operation of the facility, an operator is available 24 hours a day and can also be supported by the operator from White River Hydro, local line crews, the Ashland Bay Front Plant maintenance staff, and personnel from NSPW's Hydro Maintenance Department in Chippewa Falls, Wisconsin.

7. Safe Management, Operation, and Maintenance

NSPW has a robust Owners Dam Safety Program (ODSP) that incorporates all dam safety inspection requirements, monitoring responsibilities, and communications as required by the Federal Energy Regulatory Commission (FERC) for a dam of this classification. NSPW also ensures that adequate resources are available to fulfill all the requirements and obligations under the ODSP. The ODSP was revised and submitted to FERC on June 28, 2019 (NSPW, 2019).

NSPW developed a public safety plan in consultation with the FERC. The plan is reviewed on an annual basis to determine if changes are necessary. The plan was last updated in 2015 (NSPW, 2015).

8. Average Annual Generation

Average annual generation for the Trego Project averaged approximately 6,867 Megawatt-hours (MWh) for the five-year period ending in 2022.

9. River Flow Characteristics

The Trego Dam has a drainage area of 488 square miles. Monthly flow duration curves for the Trego Project were developed based on NSPW's operational data. While there is a USGS gage in the vicinity of the Trego Project, it does not record the daily flow data necessary to develop flow duration curves. The USGS Gage No. 05331833 at Leonards, Wisconsin, which does provide daily flow data, is not located close enough to the Project to provide statistically accurate flow information. Based on NSPW's data for the period of January 2017 to December 2022, the mean flow at the Project was 588 cfs. The maximum annual calendar year flow at the Project was 722 cfs in 2019 and the minimum annual calendar year flow was 463 cfs in 2022.

[14] Due to the short duration of the ice removal events, and their timing during high-inflow periods (which matches the natural hydrologic cycle), the proposed planned deviations for ice removal are not considered a material change in operations.

Streamflow duration data refers to the percentage of time a given flow is equaled or exceeded. Monthly flow duration curves and the annual exceedance table are based on data collected for the period of record from January 2017 to December 2022 and are included in **Appendix A-3**.

NSPW is not proposing any material changes in Project operations.[15]

10. Purpose of the Project

The purpose of the Project is to generate renewable hydroelectric energy. NSPW is a public utility that produces, purchases, transmits, and distributes power to retail customers. The power generated by the Trego Hydroelectric Project is delivered to NSPW's system for sale to customers.

11. Estimated Project Cost

The Project is an existing FERC licensed facility. As of December 31, 2022 the net book value (net investment) was calculated at $xx,xxx and the gross book value was calculated at $xxx,xxx.[16] These figures will include the land and land rights, structures and improvements, waterway improvements, generating equipment, accessories, and miscellaneous equipment.

12. Estimated Costs of Proposed Environmental Measures[17]

The estimated capital and additional annual Operation and Maintenance (O&M) costs for proposed environmental measures are outlined in **Table A-1**.

Table A-1 Estimated Capital and Additional O&M Costs for Proposed Environmental Measures at the Trego Project

Item	Capital Cost	O&M Cost
Develop Aquatic and Terrestrial Species Plan and conduct biennial invasive surveys.	$40,000	$35,000[18]
Conduct shoreline erosion surveys every 10 years.	$0	N/A[19]
Develop Historic Properties Management Plan in consultation with the Wisconsin SHPO and interested Native American Nations to follow requirements outlined in the Programmatic Agreement.	$20,000	$25,000[20]
Provide a one-time payment not to exceed $75,000 to the TLD to cost-share up to 75% of the total cost towards the purchase of a weed harvester. This one-time commitment would be in lieu of the annual reimbursement NSPW currently provides TLD for aquatic vegetation harvesting.	$75,000[21]	$0

[15] Due to the short duration of the ice removal events, and their timing during high-inflow periods (which coincides with the natural hydrologic cycle), the proposed planned deviations for ice removal are not considered a material change in operations.
[16] Figures will be provided in the FLA.
[17] The costs included in this section are new costs to the Project for the environmental measures and do not include the previous costs for similar measures implemented under the current license. The costs for the similar measures implemented under the current license are included in the historical O&M costs outlined in Section 17.
[18] $35,000 is the cost per survey event every other year.
[19] Cost for shoreline erosion survey is listed with the cost for the HPMP survey every 10 years.
[20] $20,00 is the additional cost per survey event every 10 years. $5,000 is the annual cost to implement the HPMP.
[21] Assumes issuance of a 40-year license.

Item		Capital Cost	O&M Cost
Develop an Operation Monitoring Plan including deviation reporting and agency consultation requirements		$30,000	$5,000
Recreational Measures	Review and maintain or improve signage, including a Part 8 sign, at the South Tailwater Access site to meet current standards.	$5,000	$0
	Review and maintain or improve signage, including Part 8 signage, at the North Tailwater Access/Canoe Portage site.	$5,000	$0
	Continue to maintain the existing portable restroom facilities at the North Tailwater Access/Canoe Portage site during the open water recreation season during the term of the license.	$0	$0
	Conduct routine maintenance of NSPW's FERC-approved recreation sites over term of license.	$0	$2,000
	Implement the Cave Bat BITP/A for any routine vegetation maintenance at NSPW's FERC-approved recreation sites.	$0	$1,000
	Implement Wood Turtle BITP/A for maintenance work at NSPW's FERC-approved recreation sites as long as the turtle remains a listed species.	$0	$1,000
Total Cost		**$175,000**	**$N/A[22]**

*cost per survey event

13. License Application Development Costs

The costs for NSPW to relicense under the Traditional Licensing Process through the filing of the Final License Application (FLA) are estimated to be $xxx,xxx.[23]

14. Estimated Value of On-Peak and Off-Peak Power

The Project operates in a run-of-river mode of operation; therefore, this section is not applicable.

15. Average Annual Increase or Decrease in Project Generation and Value of Power Due to Changes in Project Operations

NSPW is not proposing a change in Project operation. Therefore, no changes in generation are expected and the average annual amount and value of project power for the term of the new license is projected to remain the same.

[22] The total O&M costs are not listed here because not all the costs are incurred annually.
[23] This cost will be provided in the final license application.

16. Remaining Undepreciated Net Investment, or Book Value, of the Project

The undepreciated net investment of the Project is $xx,xxx (book cost of $x,xxx,xxx less accumulated depreciation of $x,xxx,xxx).[24]

17. Annual Operation and Management Costs

The average annual cost to operate and maintain the Trego Project for the period 2018-2022 is $xxx,xxx. These costs are outlined in **Table A-2** and include general O&M expenses, insurance, taxes, and depreciation. A breakdown of the individual components of the general O&M expense category is shown in **Table A-3**.[25]

Table A-2 Annual Operation and Management Costs for the Trego Project

Item	Cost
General O & M Expenses (5-year average)	$xxx,xxx
Insurance	N/A[26]
2021 Property Taxes	$xx,xxx
2021 Depreciation	$xx,xxx
Average Annual O & M Cost	**$xxx,xxx**

Table A-3 Cost Breakdown of General O&M Expense Category[27] (2018 to 2022)[28]

Cost	2018	2019	2020	2021	2022	2018-2022 Mean
Employee Expenses						
Labor						
Materials & Commodities						
IT Costs						
Miscellaneous						
Outside Services						
Total General O&M Costs	**$xxx,xxx**	**$xxx,xxx**	**$xxx,xxx**	**$xxx,xxx**	**$xxx,xxx**	**$xxx,xxx**

18. One-Line Diagram of Electrical Circuits

The One-line Diagram of Electrical Circuits is shown in **Appendix A-4**.

[24] Figures will be provided in the FLA.
[25] Figures for Tables A-2 and A-3 will be provided in the FLA.
[26] NSPW pays a lump sum for insurance costs per operating company (i.e., NSPW, NSPM), therefore there are no insurance costs specific to the Trego Project.
[27] Includes administrative costs.
[28] Figures will be provided in the FLA.

19. Lands of the United States

The Trego Project is located within the Wild and Scenic Rivers System as part of the St. Croix National Scenic Riverway, which was established as a result of the enactment by Congress of the Wild and Scenic Rivers Act in 1968 (National Park Service, n.d.). However, there are no federal land reservations within the current or proposed Project boundaries.

20. Public Utilities Regulatory Policy Act

The Licensee reserves any future rights it may have under the Public Utility Regulatory Policies Act (PURPA) as it pertains to the Project.

21. Supporting Design Report

A supporting design report for the Trego Project, considered Critical Energy Infrastructure Information, is already on file with the Commission for this Project.

22. Applicant's Electricity Consumption Efficiency Improvement Programs

The Applicant is committed to energy conservation by using demand side management (DSM) measures as a means to meet customer energy needs. Cost-effective DSM resources, in the form of capacity and energy savings, are in essence "purchased" from the customer through incentives, subsidies, rate structures, or other means needed to meet system DSM goals and commitments. NSPW offers programs for its residential, business, and agricultural customers. Specific options in these programs include but are not limited to:

Residential Programs

- Residential Rate Plans
  - Time of Day Service
  - Optional Off-Peak Service
  - Savers Switch Credit
- Residential Rewards {Focus on Energy (FOE)[29]}
  - Energy Saving Tips
  - Home rebates
    - Home Performance
    - Simple Energy Efficiency
    - New Homes
- Renewable Choices
  - Renewable Connect
  - Solar Connect Community
  - Net metering

[29] Funded through the Focus on Energy® program. Focus on Energy® is Wisconsin's energy efficiency and renewable resource program. It is funded by Wisconsin's investor-owned utilities and participating municipal and electric cooperative utilities, including NSPW's parent company, Xcel Energy.

Business Programs

- Equipment Rebates
- Energy Audits
- Renewable Programs
    - Renewable Connect
    - Solar
    - Working with Third Party Providers
- Energy Efficient Buildings
    - Multi-Family Building Efficiency (FOE)
    - Custom Efficiency
    - Efficient Facilities (FOE)
    - Energy Benchmarking
- Rate Programs
    - Electric Rate Savings
    - Savers Switch for Business

Farm Programs

- Farm Rewiring
- Agriculture and Farm Rebates

NSPW's conservation programs have been approved by the Public Service Commission of Wisconsin.

23. Works Cited

National Park Service. (n.d.). *Nationwide Rivers Inventory*. Retrieved April 18, 2023, from National Park Service: https://www.nps.gov/maps/full.html?mapId=8adbe798-0d7e-40fb-bd48-225513d64977

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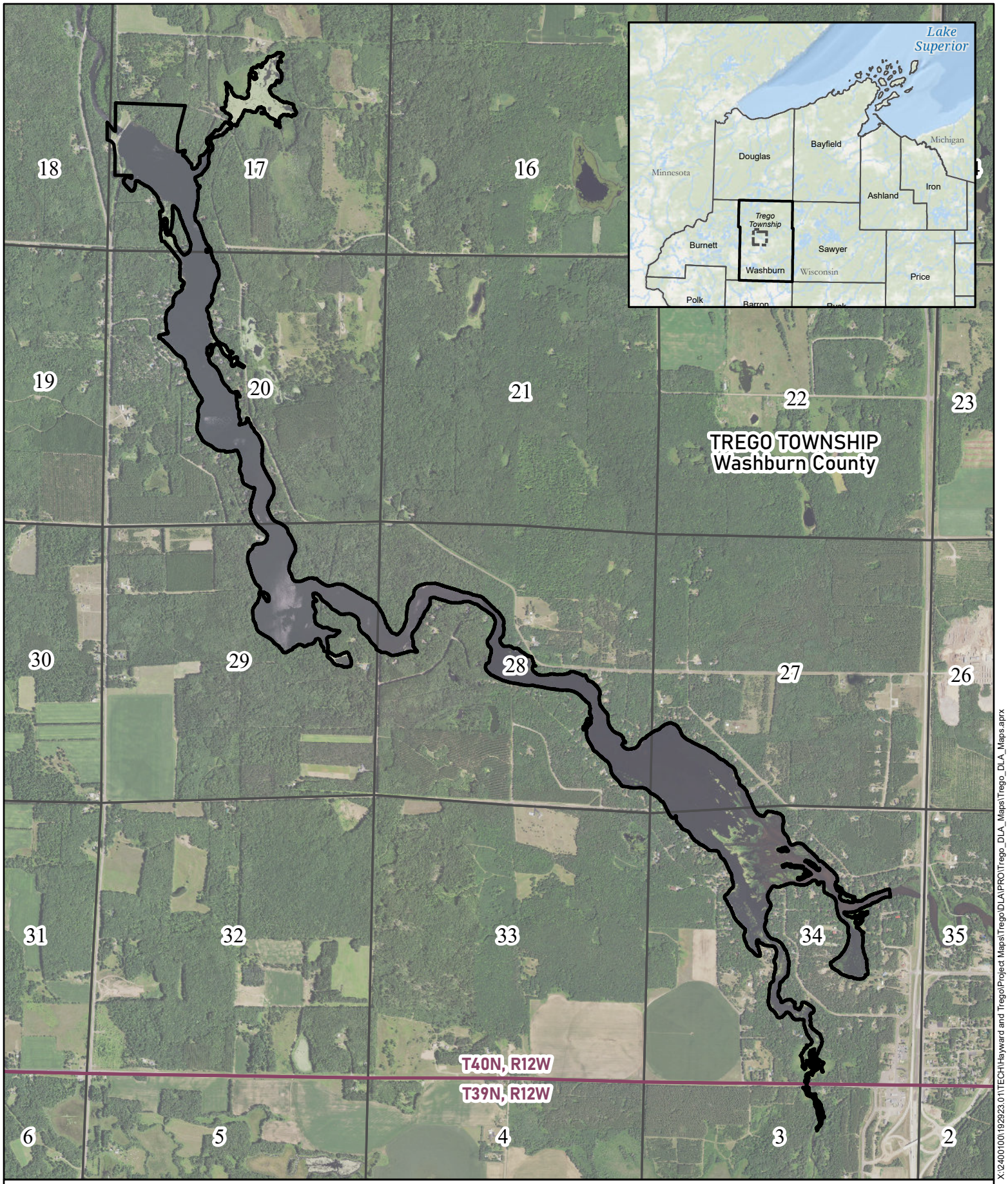
APPENDIX A-1 General Location of the Trego Project



Proposed Project Boundary

Township Range

Section

N

0 1,000 2,000 Feet

Note: the impounded Proposed Project Boundary is established at elevation 1,035.2 feet NGVD 1929.

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Trego Hydroelectric Project
Orthophotographic Map

FERC No. 2711

Source Layer: WI 2022 NAIP (natural color, 0.6-meter resolution); Wisconsin Department of Natural Resources GIS Open Data Portal

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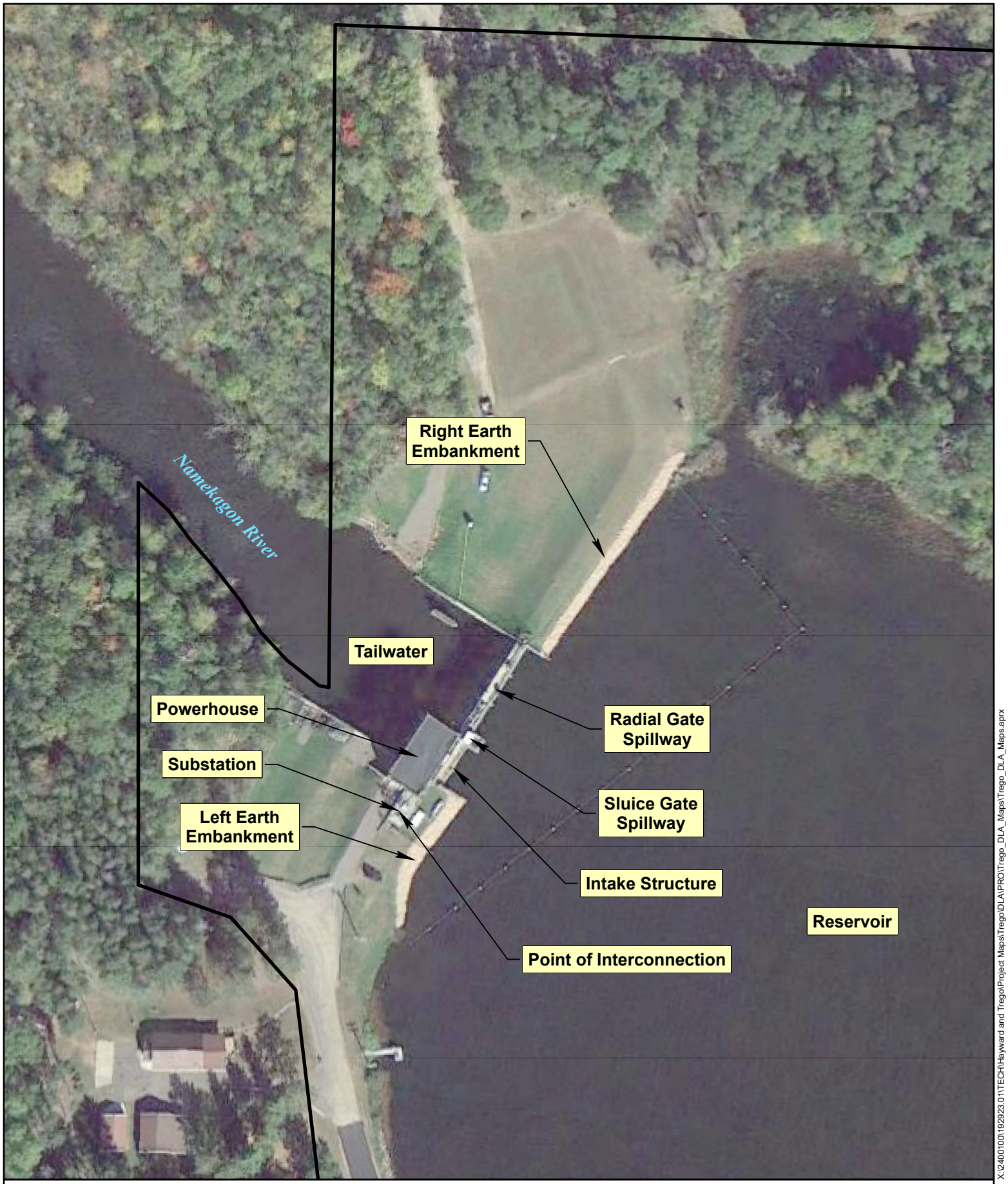
APPENDIX A-2 Trego Project Facilities



Proposed Project Boundary

N

0 50 100 Feet

Note: the impounded Proposed Project Boundary is established at elevation 1,035.2 feet NGVD 1929.

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Trego Hydroelectric Project
Project Facilities

FERC No. 2711

Source Layer: Google Earth, image date 09/28/2015

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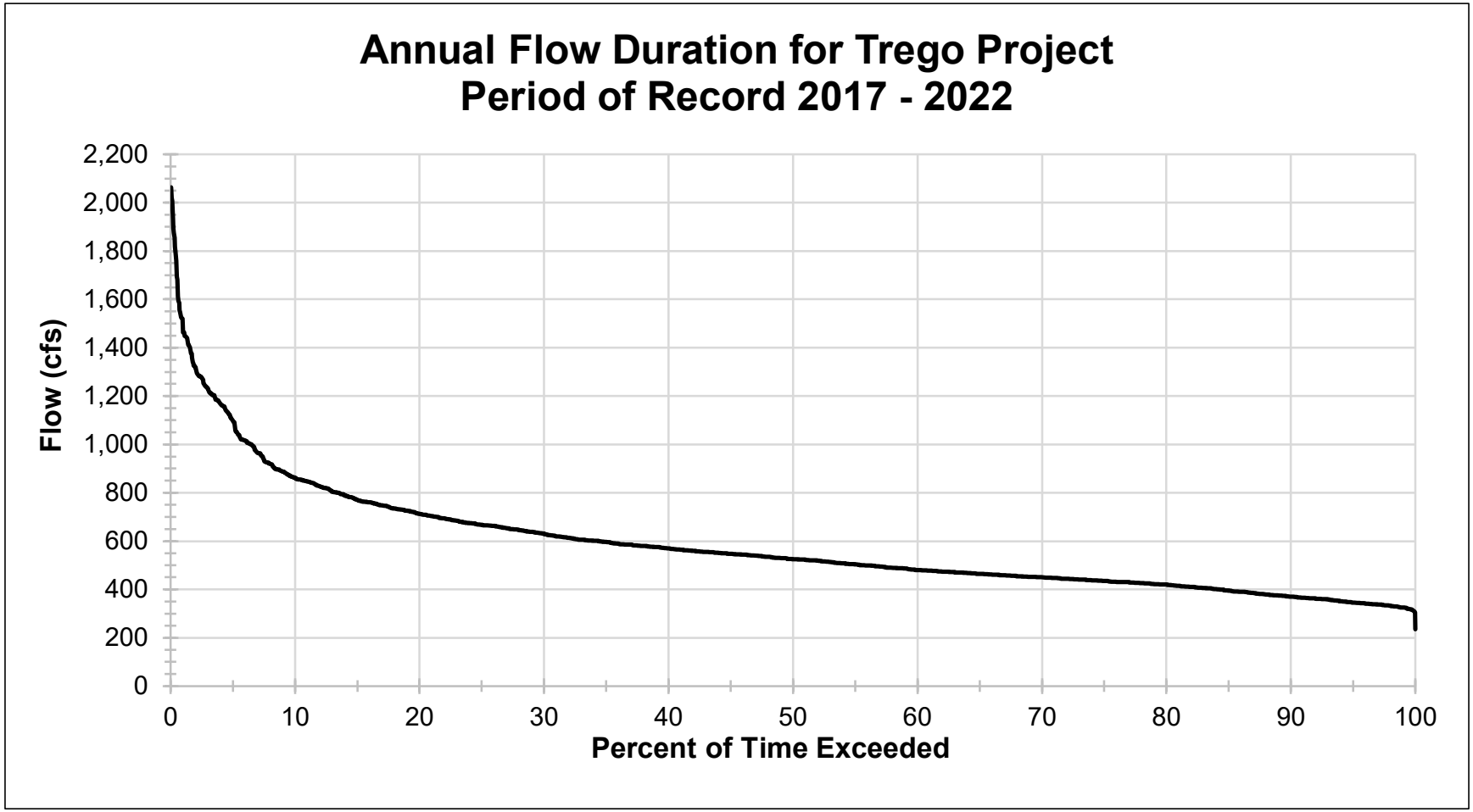
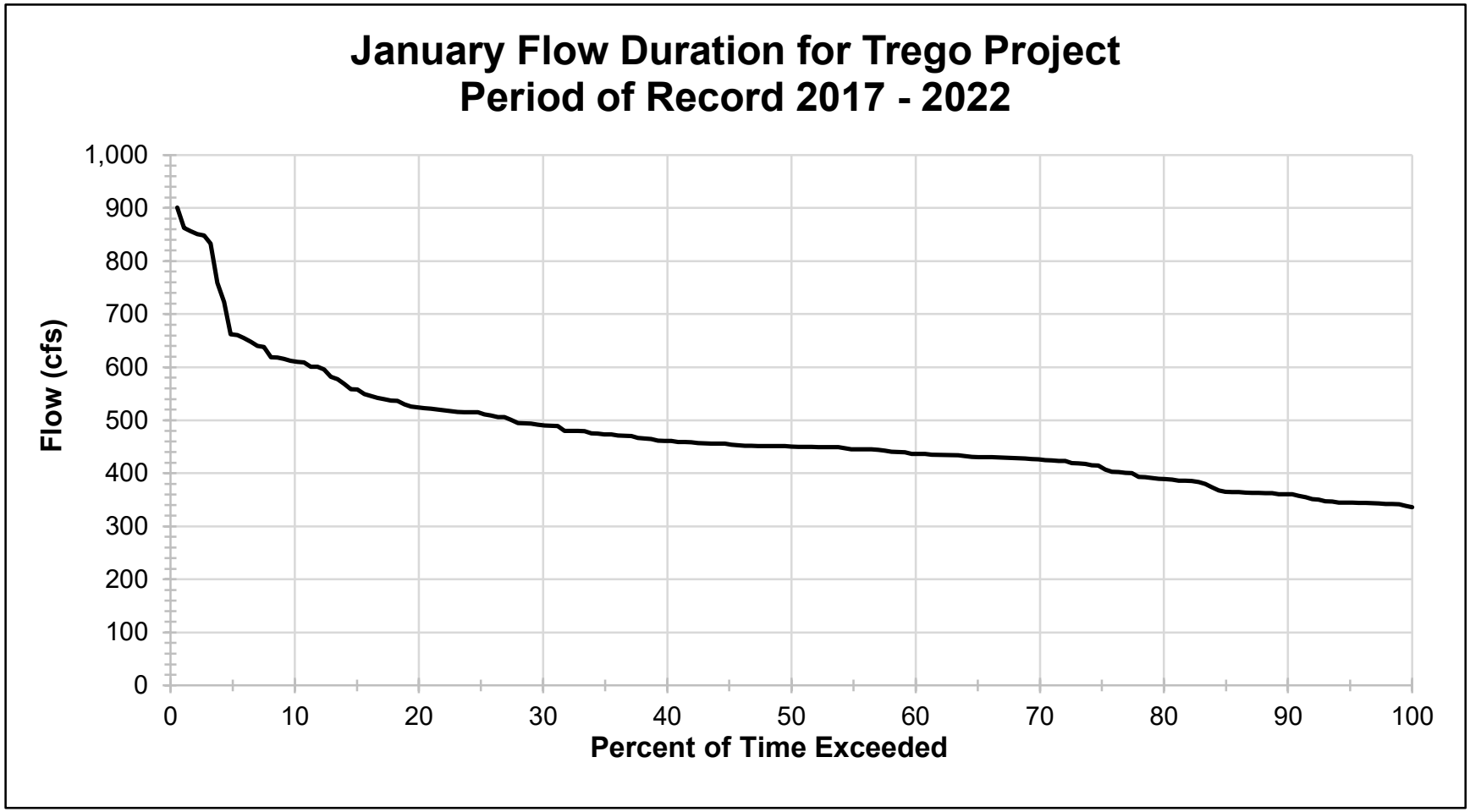
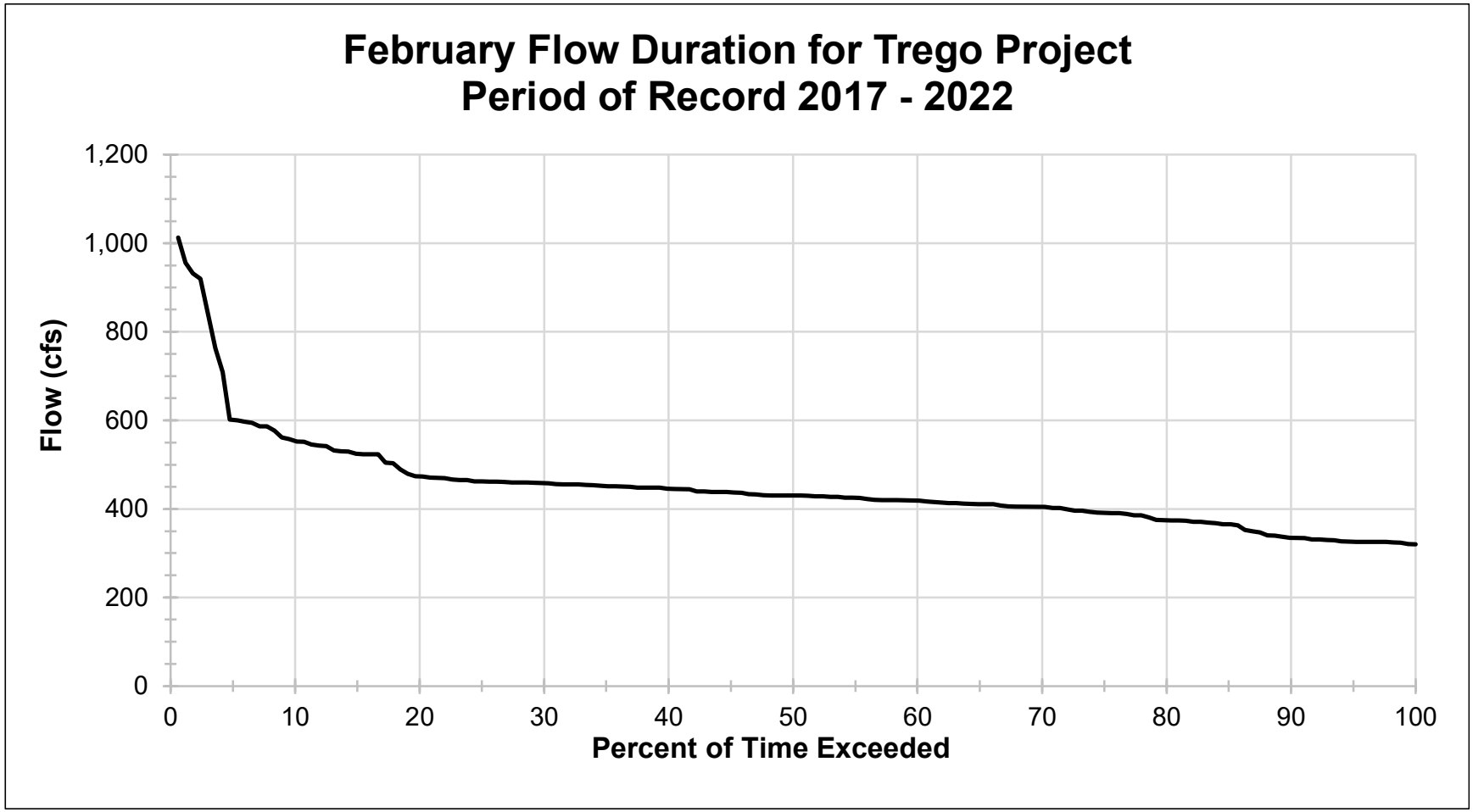
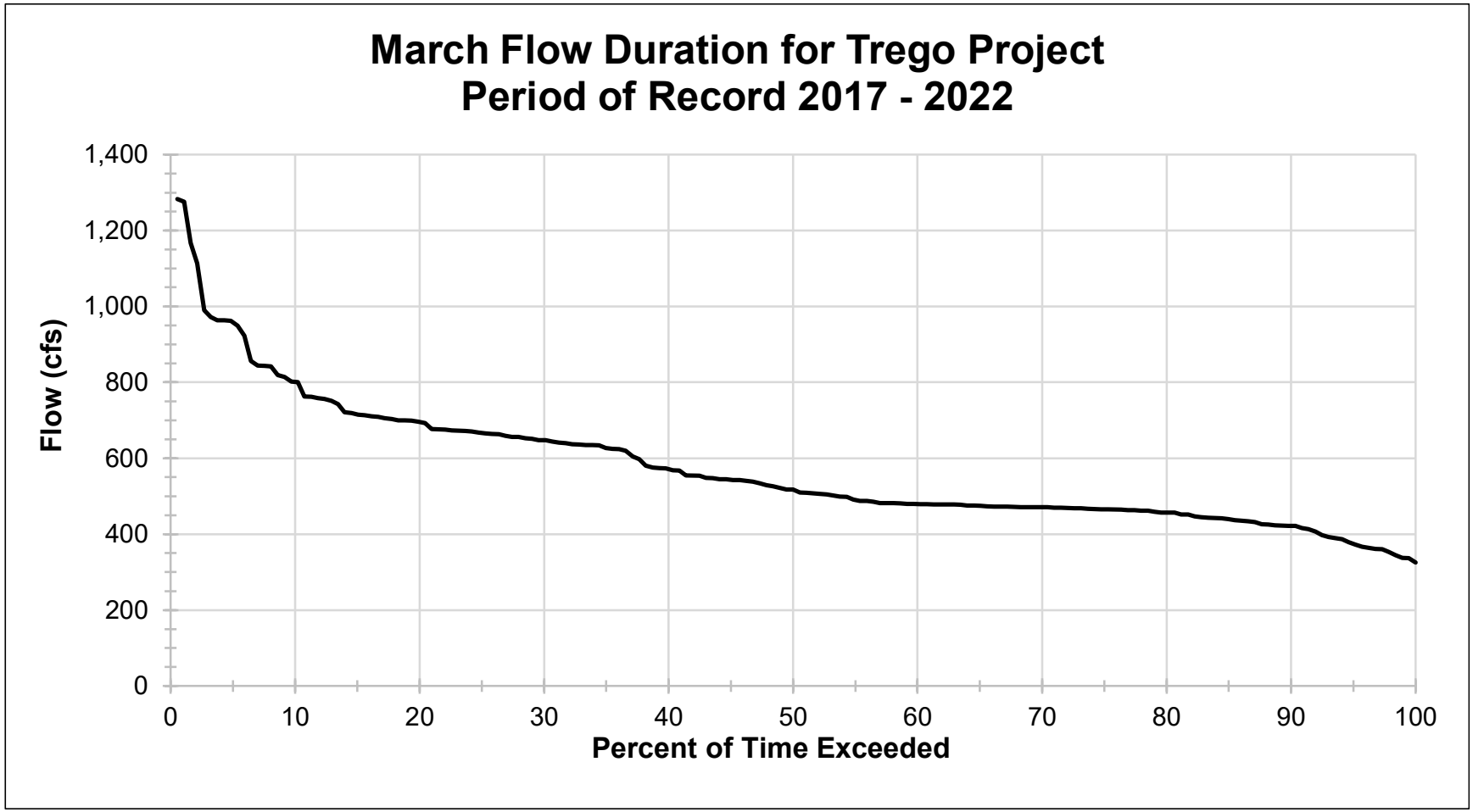
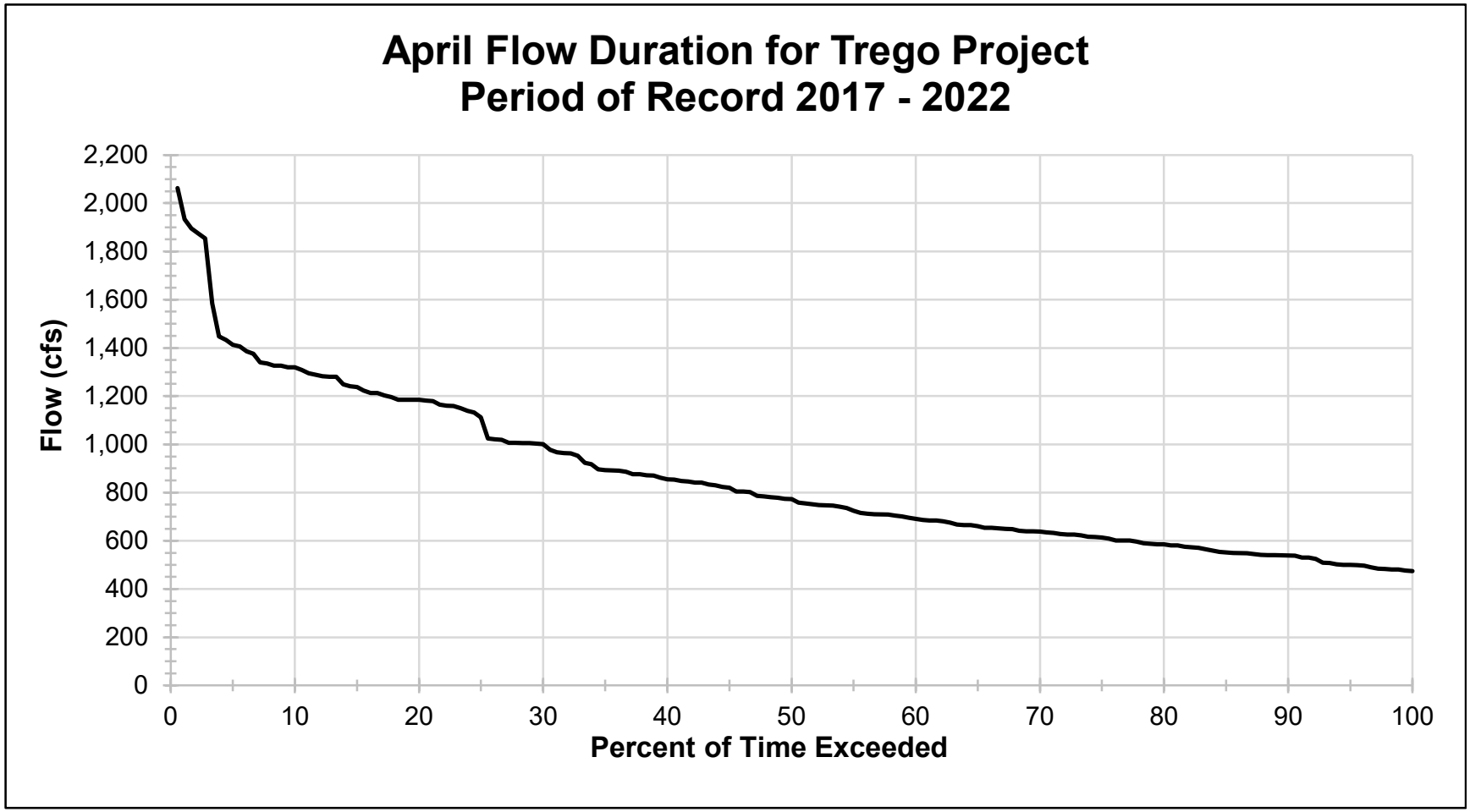
APPENDIX A-3 Trego Project Annual Flow Duration Curves and Exceedance Table

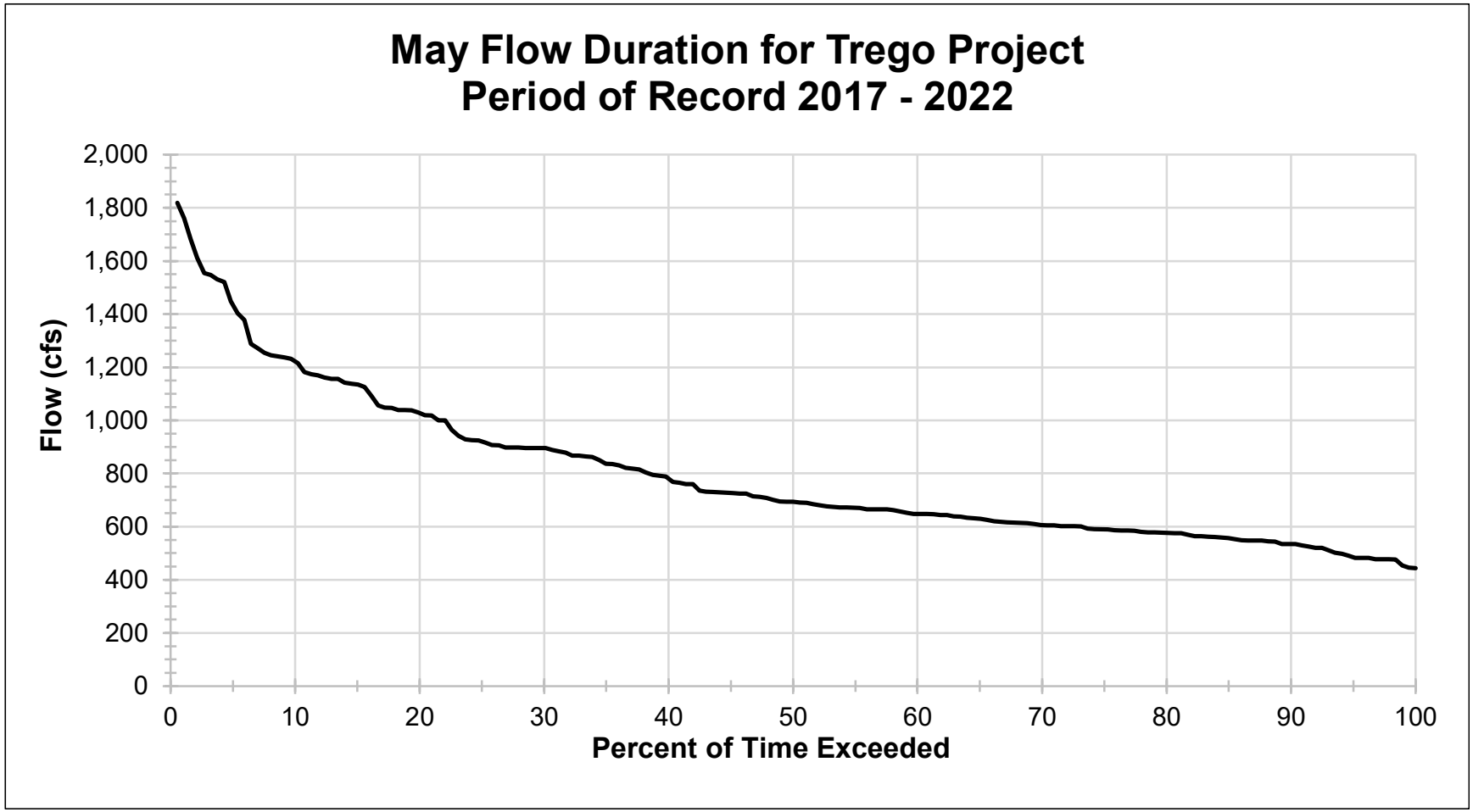

Annual Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

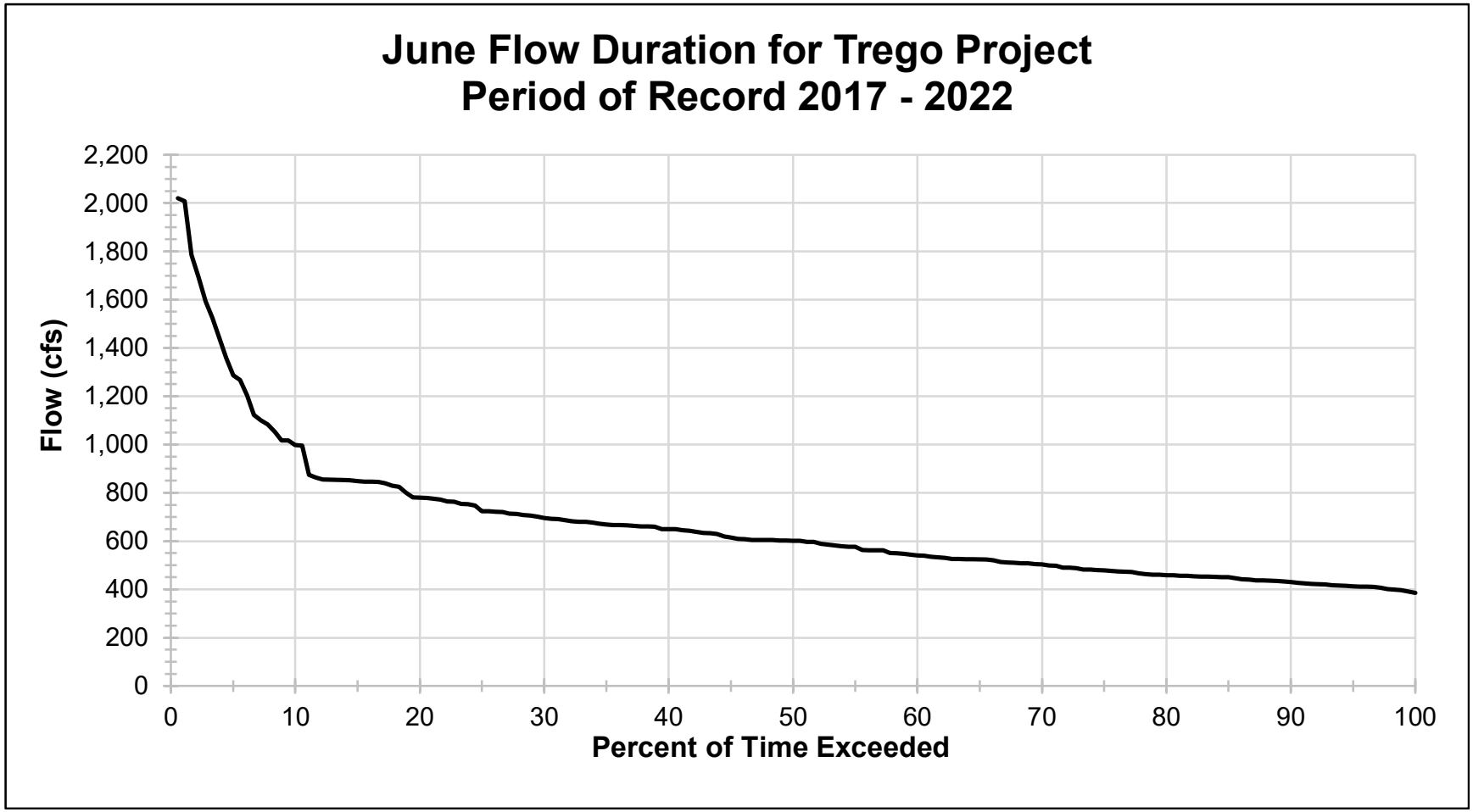

January Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
1,000
900
800
700
600
500
400
300
200
100
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

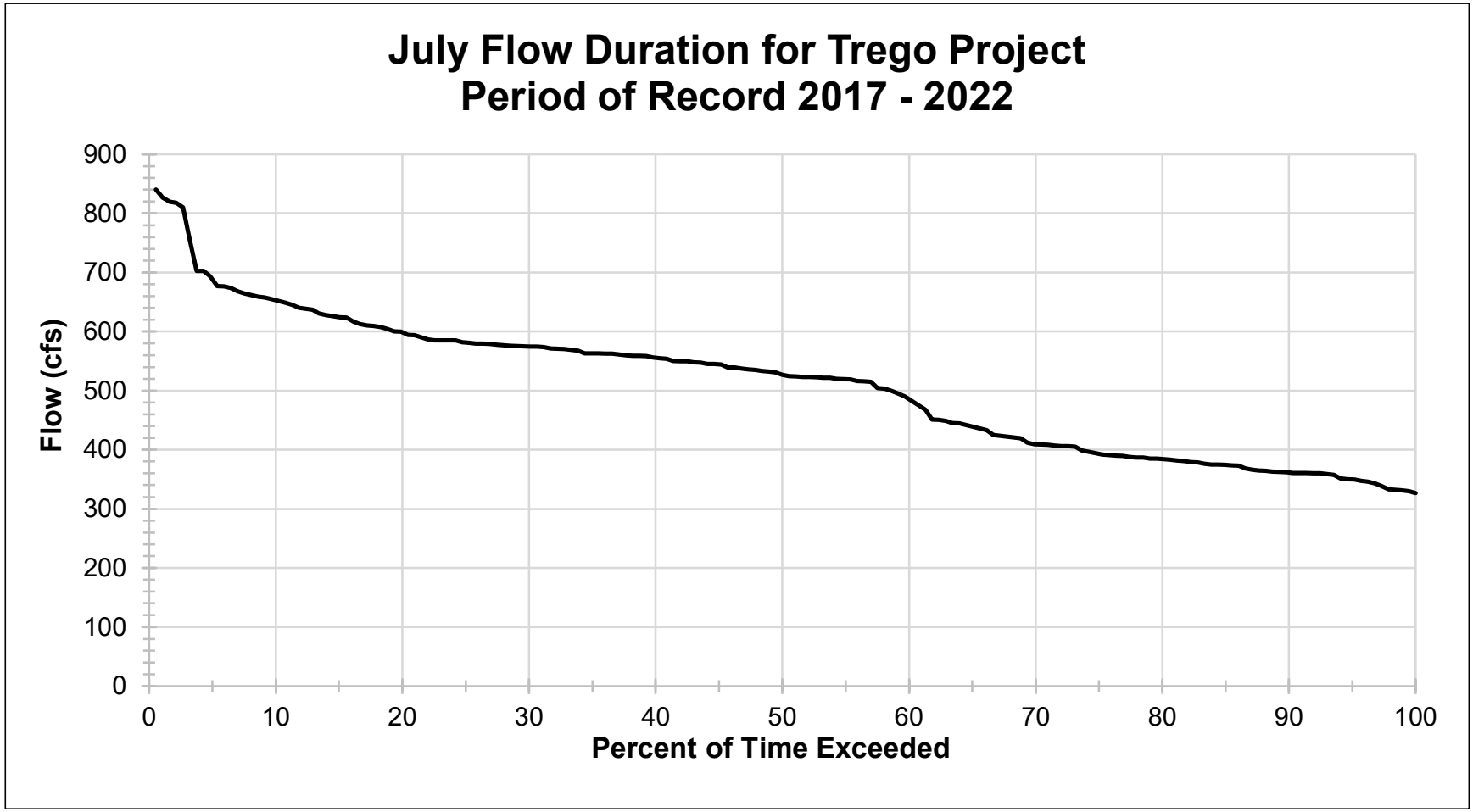

February Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

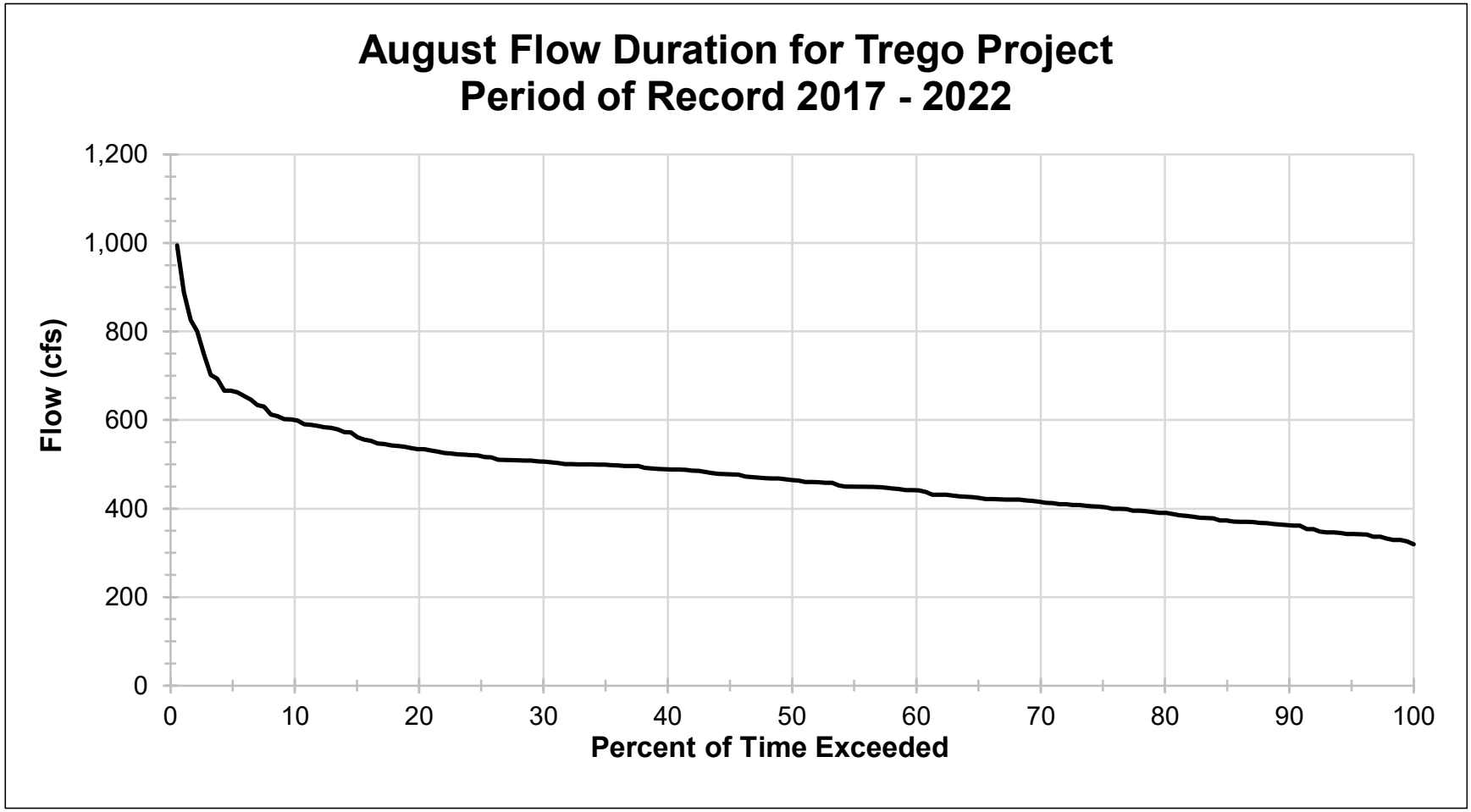

March Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
1,400
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

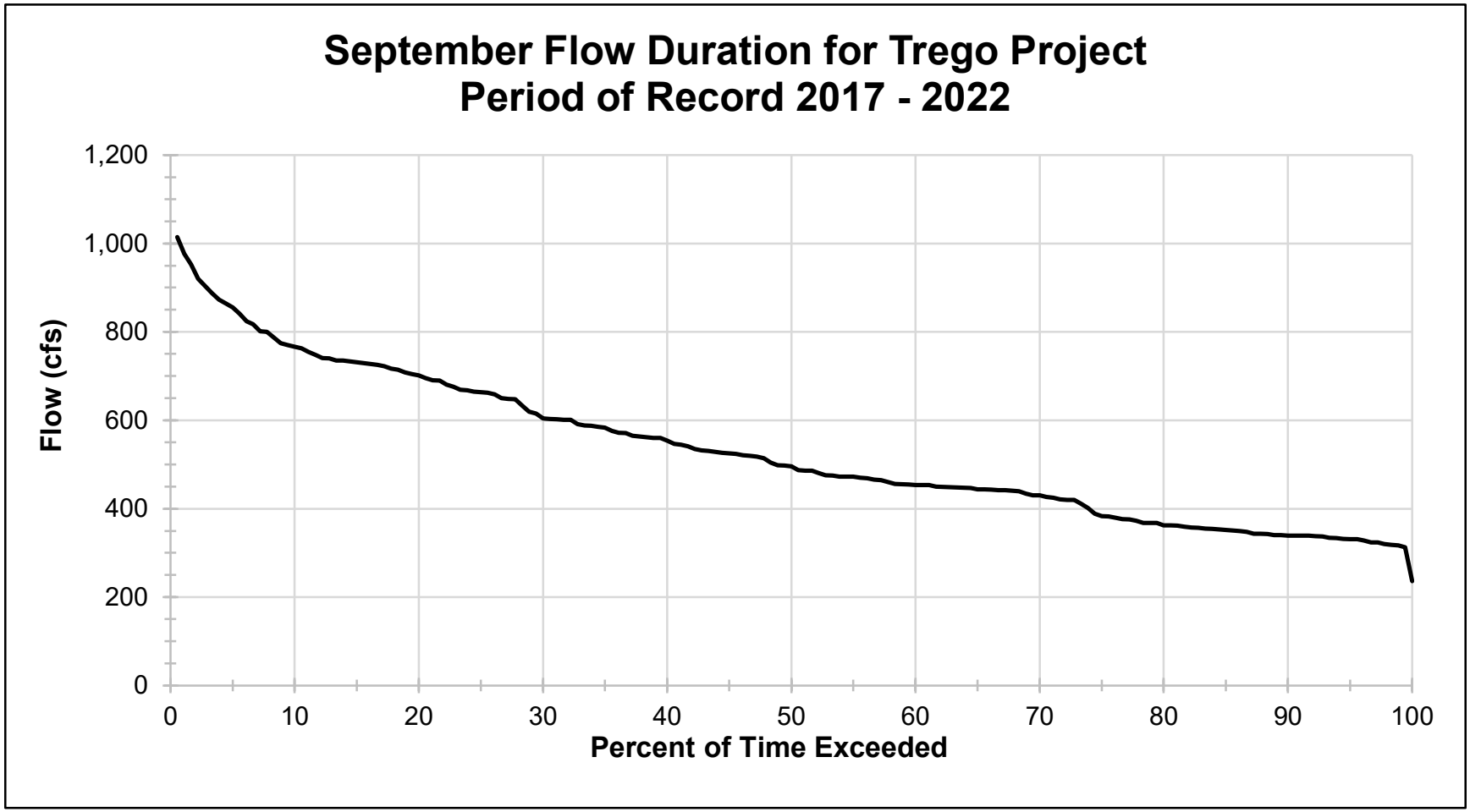

April Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

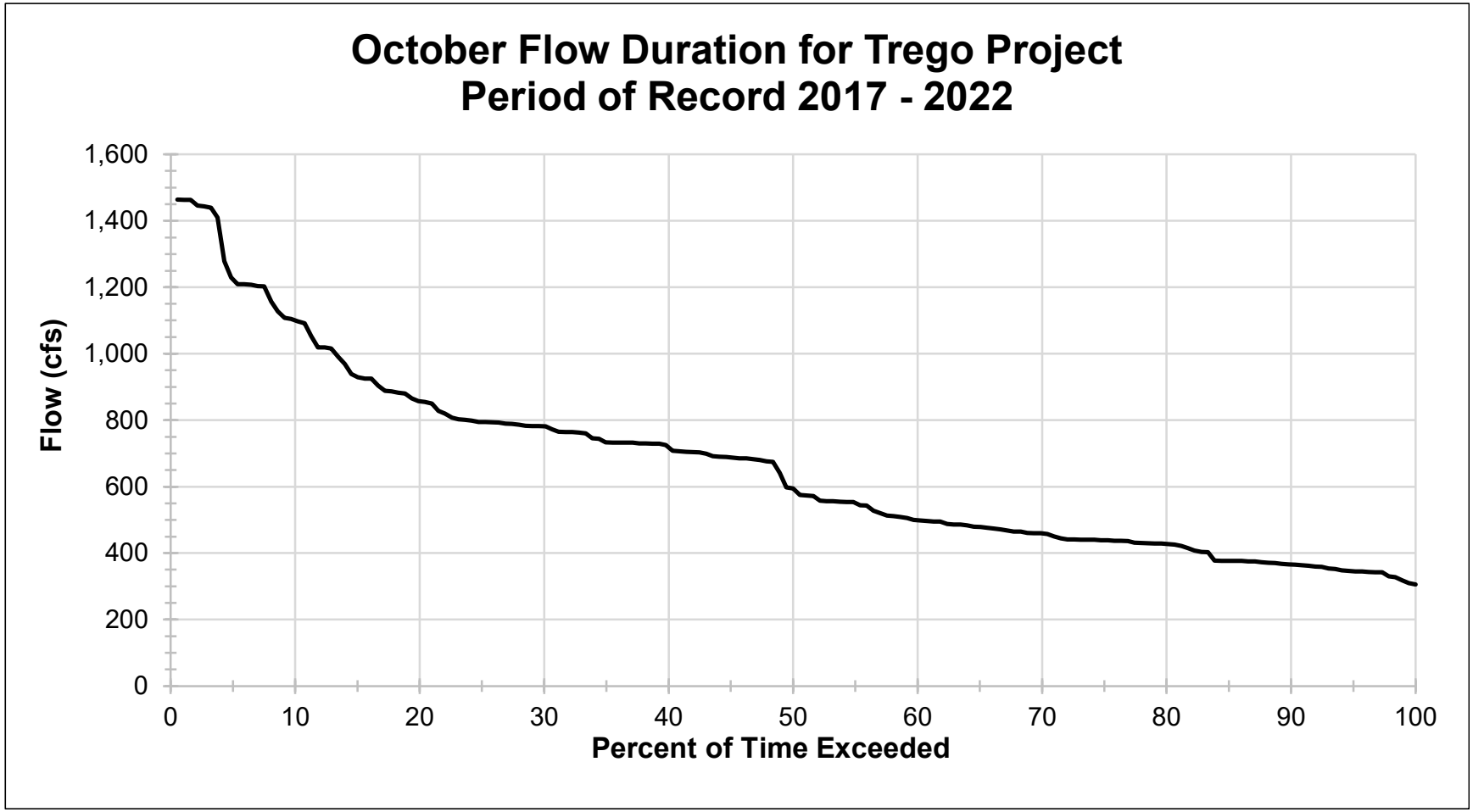

May Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

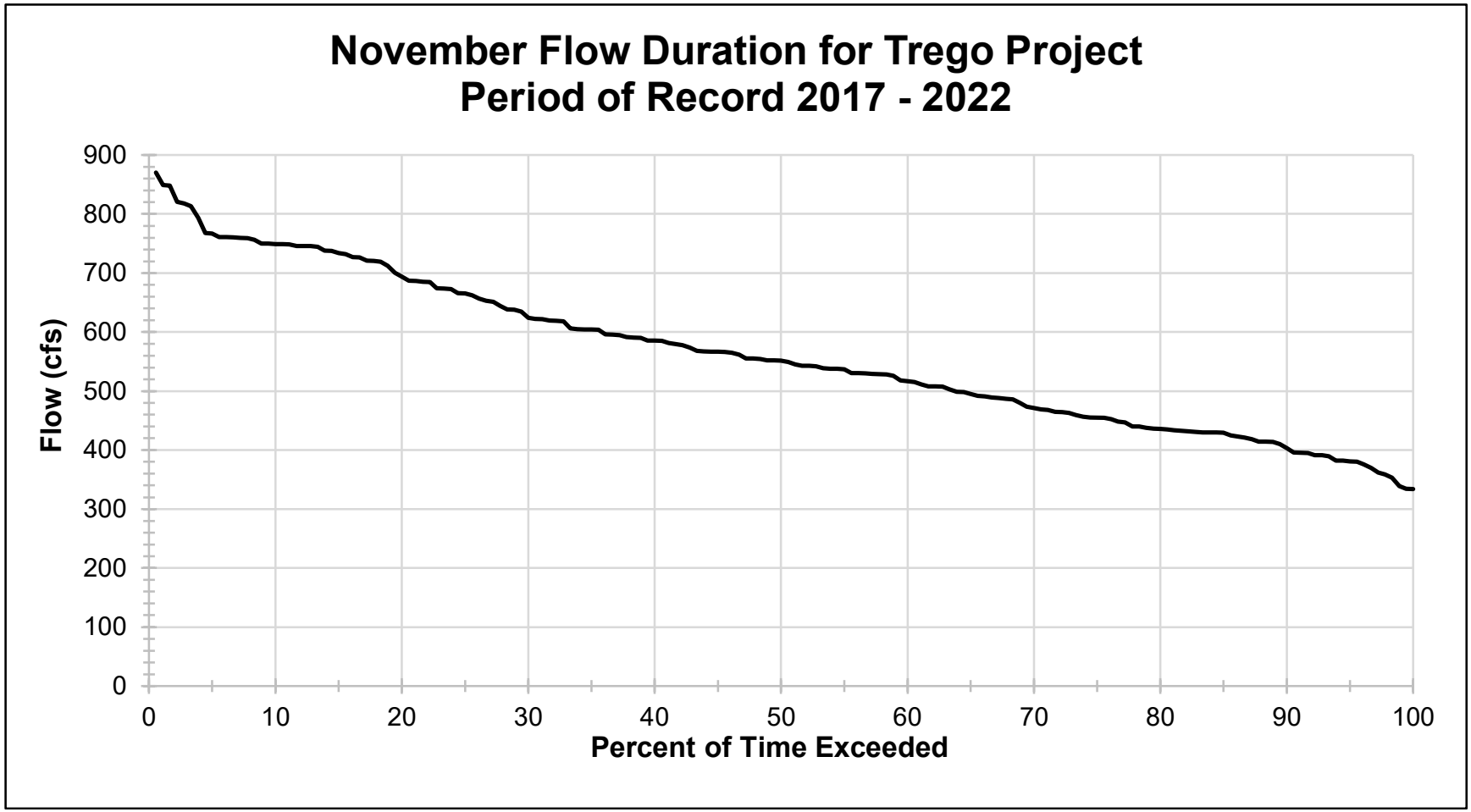

June Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

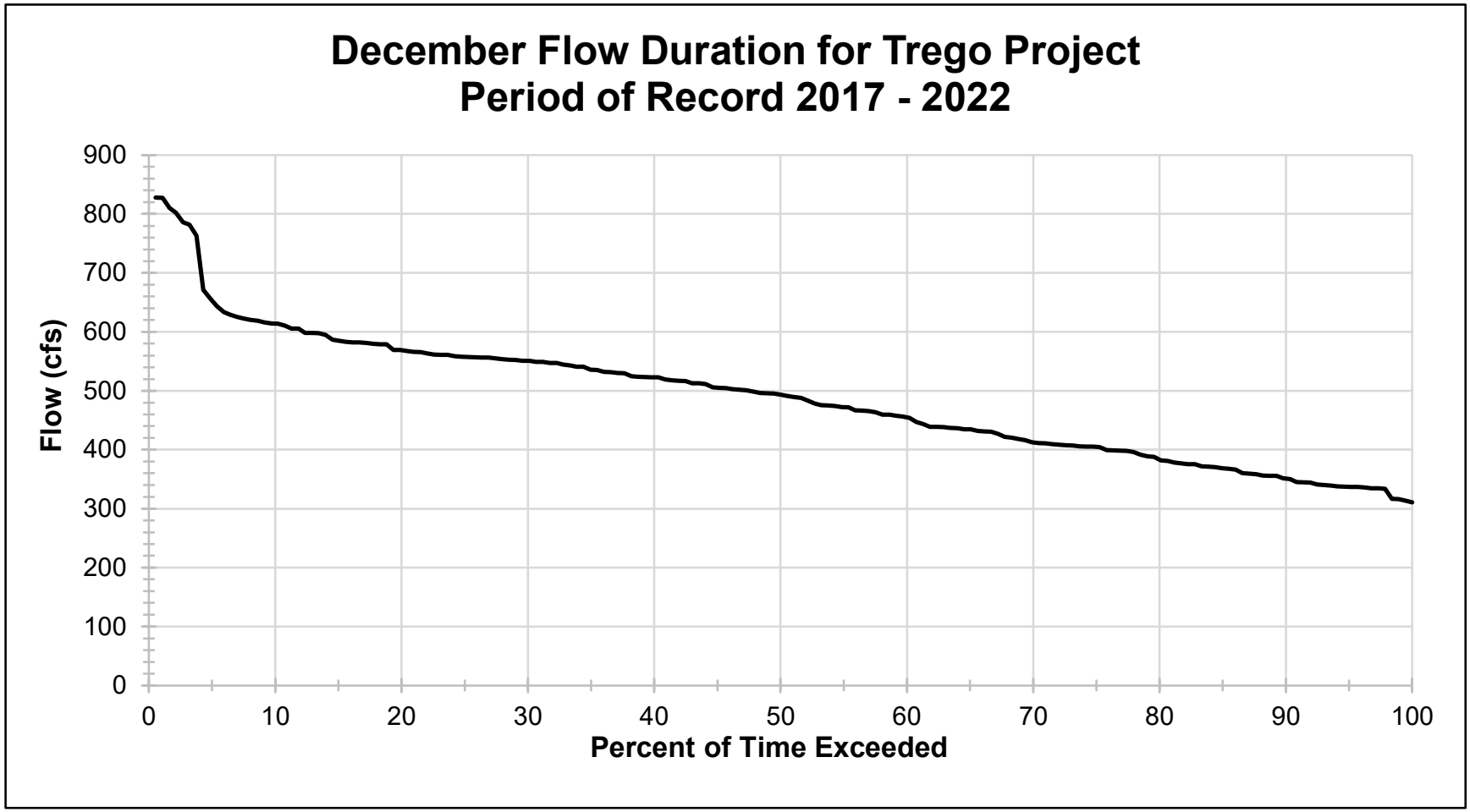

July Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
900
800
700
600
500
400
300
200
100
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


August Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


September Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


October Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
1,600
1,400
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

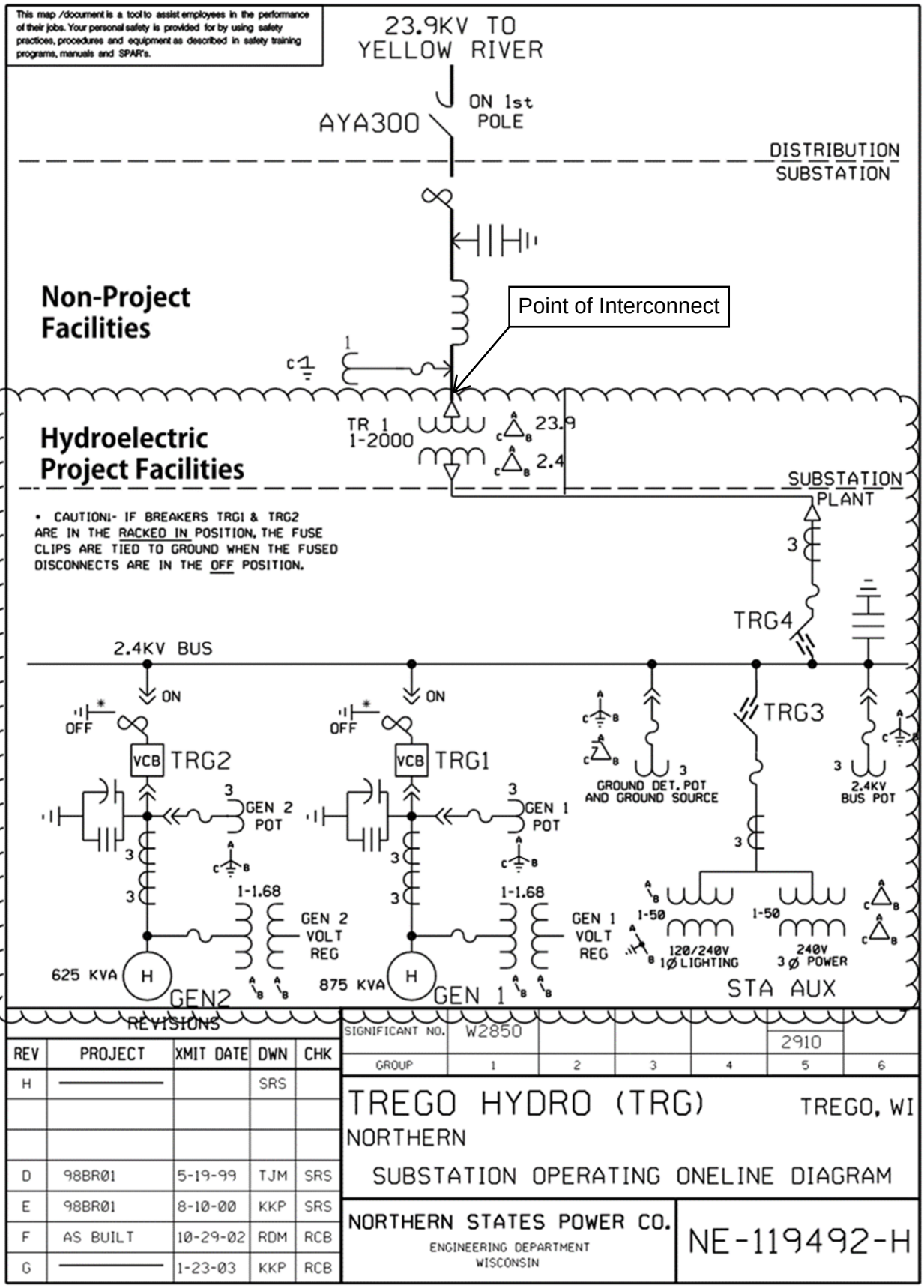

November Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
900
800
700
600
500
400
300
200
100
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


December Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
900
800
700
600
500
400
300
200
100
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

Flow Duration for Trego Project (Period of Record 2017 - 2022)

Percent of Time	January	February	March	April	May	June	July	August	September	October	November	December	Annual
95	345	326	379	501	490	413	350	343	331	347	381	337	345
90	360	335	422	540	535	430	362	363	339	366	403	352	370
85	365	365	440	552	557	450	374	373	352	377	429	368	395
80	390	375	457	585	578	459	385	391	362	429	436	388	420
75	415	391	465	614	590	480	394	404	383	439	455	405	435
70	426	405	471	638	606	503	410	415	430	460	471	412	450
65	431	411	476	662	631	525	445	426	444	480	495	435	465
60	437	420	480	691	648	541	490	442	454	500	517	457	480
55	446	426	491	736	671	576	520	450	472	554	538	473	503
50	451	430	517	773	694	601	527	465	496	595	551	493	525
45	455	438	545	820	730	615	545	478	525	690	567	505	547
40	461	446	573	855	789	650	556	489	554	725	585	523	569
35	473	452	627	894	838	668	563	499	584	733	604	536	596
30	492	460	648	1,001	896	696	575	507	604	782	624	551	630
25	515	462	668	1,112	925	724	582	520	663	795	665	558	667
20	524	474	696	1,184	1,030	780	600	534	702	857	694	569	713
15	559	525	720	1,237	1,138	850	626	572	735	938	734	587	772
10	612	558	802	1,320	1,232	999	655	601	767	1,105	749	614	862

APPENDIX A-4 Hayward Project One-Line Diagram of Electrical Circuits



REVISIONS

REV	PROJECT	XMIT DATE	DWN	CHK
H	———		SRS	
D	98BR01	5-19-99	TJM	SRS
E	98BR01	8-10-00	KKP	SRS
F	AS BUILT	10-29-02	RDM	RCB
G	———	1-23-03	KKP	RCB

SIGNIFICANT NO.	W2850				2910	
GROUP	1	2	3	4	5	6

TREGO HYDRO (TRG)

TREGO, WI

NORTHERN

SUBSTATION OPERATING ONELINE DIAGRAM

NORTHERN STATES POWER CO.
ENGINEERING DEPARTMENT
WISCONSIN

NE-119492-H