International Columbia River Board of Control

2023 Report to the International Joint Commission

FINAL Report - March 18, 2024

Cover Photo:

Grand Coulee Dam in Washington State. The dam was completed in 1941 and created Franklin D. Roosevelt Lake. The lake is about 150 miles (240 km) long and extends to within about 15 miles (24 km) south of the international boundary, with a transitional reach that extends upstream of the boundary due to backwater effects. The lake covers an area of about 80,000 acres (320 km^2) and is the largest lake in Washington State.

(credit: U.S. Bureau of Reclamation)

TABLE OF CONTENTS

LIST OF ACRONYMS

CRT	Columbia River Treaty
ECCC	Environment and Climate Change Canada
ICRBC	International Columbia River Board of Control
IJC	International Joint Commission
SWE	Snow water equivalent
USGS	United States Geological Survey
WSC	Water Survey of Canada

UNIT CONVERSION FACTORS

Customary (Imperial) to Système International (Metric)

Multiply	By	To obtain
	Length	
inch (in)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
acre	4,407	square meter (m^2)
acre	0.4047	hectare (ha)
square mile (mi^2)	259.0	hectare (ha)
square mile (mi^2)	2.590	square kilometer (km^2)
	Volume	
acre-feet (ac-ft)	1,233	cubic meter (m^3)
Thousand acre-feet (Kac-ft)	1.233	thousand cubic decameters ($kdam^3$)
	Flow Rate	
cubic foot per second (cfs)	0.02832	cubic meter per second (cms)

Système International (Metric) to Customary (Imperial)

Multiply	By	To obtain
	Length	
millimeter (mm)	0.03937	inch (in)
meter (m)	3.281	foot (ft)
kilometer (km)	0.6214	mile (mi)
	Area	
square meter (m^2)	0.0002471	acre
hectare (ha)	2.471	acre
hectare (ha)	0.003861	square mile (mi^2)
square kilometer (km^2)	0.3861	square mile (mi^2)
	Volume	
cubic meter (m^3)	0.0008107	acre-feet (ac-ft)
thousand cubic decameters ($kdam^3$)	0.8107	Thousand acre-feet (Kac-ft)
	Flow rate	
cubic meter per second (cms)	35.31	cubic foot per second (cfs)

Temperature in degrees Celsius (˚C) may be converted to degrees Fahrenheit (˚F) as follows:

$$\text{˚F} = (1.8 \times \text{˚C}) + 32$$

Temperature in degrees Fahrenheit (˚F) may be converted to degrees Celsius (˚C) as follows:

$$\text{˚C} = \frac{(\text{˚F} - 32)}{1.8}$$

Page intentionally left blank.

International Columbia River Board of Control

2023 Annual Report to the International Joint Commission

BOARD MEMBERSHIP

In 2023, the size of the Board remained the same at two total members with equal representation from Canada and the U.S. In 2023, Andrew Long replaced Cameron Marshall, who was only in the position for less than six months, having replaced Andrew Gendaszek as US Secretary in early 2023. Evan Friesenhan resigned from the Board in December 2023; a nomination to fill this co-chair position is expected in early 2024. Cindi Barton retired from the Board at the end of the calendar year; Scott VanderKooi, Director of the USGS Washington Water Science Center, will be the US Co-Chair for the Board beginning in 2024.

	Canadian Section		**U.S. Section**
	Evan Friesenhan (Co-Chair) Manager – Engineering Services West and North National Hydrological Services Environment & Climate Change Canada		Cindi Barton (Co-Chair) Director, Retired U.S. Geological Survey – Washington Water Science Center
	Martin Suchy (Secretary) Water Management Scientist National Hydrological Services Environment & Climate Change Canada		Andrew Long (Secretary) U.S. Geological Survey – Washington Water Science Center

ORDER OF APPROVAL FOR THE COLUMBIA RIVER

The Order of the International Joint Commission (IJC) dated December 15, 1941, in the matter of the application of the United States for approval of the construction and operation of the Grand Coulee Dam and reservoir (Franklin D. Roosevelt Lake) provided for the creation of an engineering board to be known as the International Columbia River Board of Control. The Order provides that the Board shall conduct studies under the supervision of the Commission as to the effect of the operation of Grand Coulee Dam and Franklin D. Roosevelt Lake on water levels at and upstream of the international boundary and shall submit a report to the Commission annually. The Board's studies are currently limited to the monitoring and reporting of the lake elevation at Grand Coulee Dam and discharge and backwater of the Columbia River at the international boundary.

The monitoring function of the Board is intended to ensure compliance with the terms of the IJC Order, which specifies that the operation of Grand Coulee Dam must comply with the following conditions with respect to the backwater effect across the international boundary:

- When the lake elevation at Grand Coulee Dam is 1,290 ft (393 m) above mean sea level, the increase in water level at the boundary due to backwater must not exceed about 2.5 ft (0.76 m) when Columbia River discharge at the boundary is 20,000 cfs (570 cms), or about 1.0 ft (0.31 m)

when the discharge is 50,000 cfs (1,400 cms), and there must be no effect on the water level at the boundary when Columbia River discharge at the boundary is 400,000 cfs (11,000 cms).

- There must be no appreciable or measurable increase in the water level at Columbia Gardens, British Columbia (located 4.5 miles [7.2 km] from the boundary), when Columbia River discharge at the boundary is less than 50,000 cfs (1,400 cms), and no appreciable or measurable increase in water level at Trail, British Columbia (located 10.5 miles [16.9 km] from the boundary), regardless of Columbia River discharge or lake elevation at Grand Coulee Dam up to 1,290 feet (393 m) above mean sea level.

OTHER CONSIDERATIONS

Grand Coulee Dam, completed in 1942, pre-dates the Columbia River Treaty (CRT). It is not a Treaty Dam in this context, but it operates as part of the Columbia River System, in coordination with other hydro-electric dams, some of which were constructed as part of the CRT. The 1964 Treaty is an agreement between Canada and the United States for the cooperative development and operation of water resource regulation for the upper Columbia River. The Treaty has no specified termination date; however, either Canada or the United States can terminate the Treaty any time on or after September 16, 2024, with a minimum 10 years written notice. Because either country may give notice to terminate the Treaty, government agencies in Canada and the United States have been in the process of evaluating future options regarding the Treaty. Canadian and U.S. entities provided recommendations to their respective governments prior to September 2014 (earliest date for 10-year termination notice). The respective recommendations did not promote Treaty termination. Through 2023 there was no announcement by either country of intent to terminate or seek changes to the Treaty; however, Treaty modernization discussions between the two countries have been taking place.

HYDROLOGIC CONDITIONS

During 2023, the U.S. Geological Survey continued monitoring the water level of Franklin D. Roosevelt Lake at Grand Coulee Dam (USGS gaging station 12436000), the Columbia River at Grand Coulee Dam (USGS gaging station 12436500) and, in cooperation with the Water Survey of Canada (Environment and Climate Change Canada), the water level and discharge of the Columbia River at the international boundary (USGS gaging station 12399500). Discharge is computed for the Columbia River at the international boundary using a stage-discharge rating during non-backwater conditions. During backwater conditions, discharge is computed using a slope rating from the water-surface slope measured between the base and auxiliary gages.

The annual flow of the Columbia River at Grand Coulee Dam for calendar year 2023 totaled 56.96 million acre-feet (70.3 cubic kilometers), or 73 percent of the mean annual volume for the 94-year period of record of 77.7 million acre-feet (95.8 cubic kilometers). The instantaneous maximum (peak) discharge of the Columbia River at the international boundary was 213,000 cfs (6,031 cms) on May 22, which is 82 percent of the mean annual peak discharge for the 87-year period of record of 259,060 cfs (7,335 cms). Daily mean discharge for the Columbia River at the international boundary for 2023 is shown in Figure 1, and discharge for the period 2019-2023 is shown in figure 2A.

Extremes of instantaneous stage recorded on Lake Roosevelt in 2023 varied between elevations 1,239.49 feet (377.8 m) on April 21 at 17:00 PDT and 1,289.48 feet (393.0 m) on July 9 at 21:00 PDT and Jul 10 at 04:00 PDT. Elevations reported are above mean sea level, with respect to a U.S. Bureau of Reclamation datum adjusted in 1937. This datum is 1.425 feet (0.434 m) above the U.S. National Geodetic Vertical Datum of 1929 (NGVD 29). The stage at midnight on January 1, 2023, was 1,283.34 feet (391.16 m). Water-level elevation in Franklin D. Roosevelt Lake for 2023 is shown in Figure 3, while Figure 2B shows elevation for the period 2018-2023.

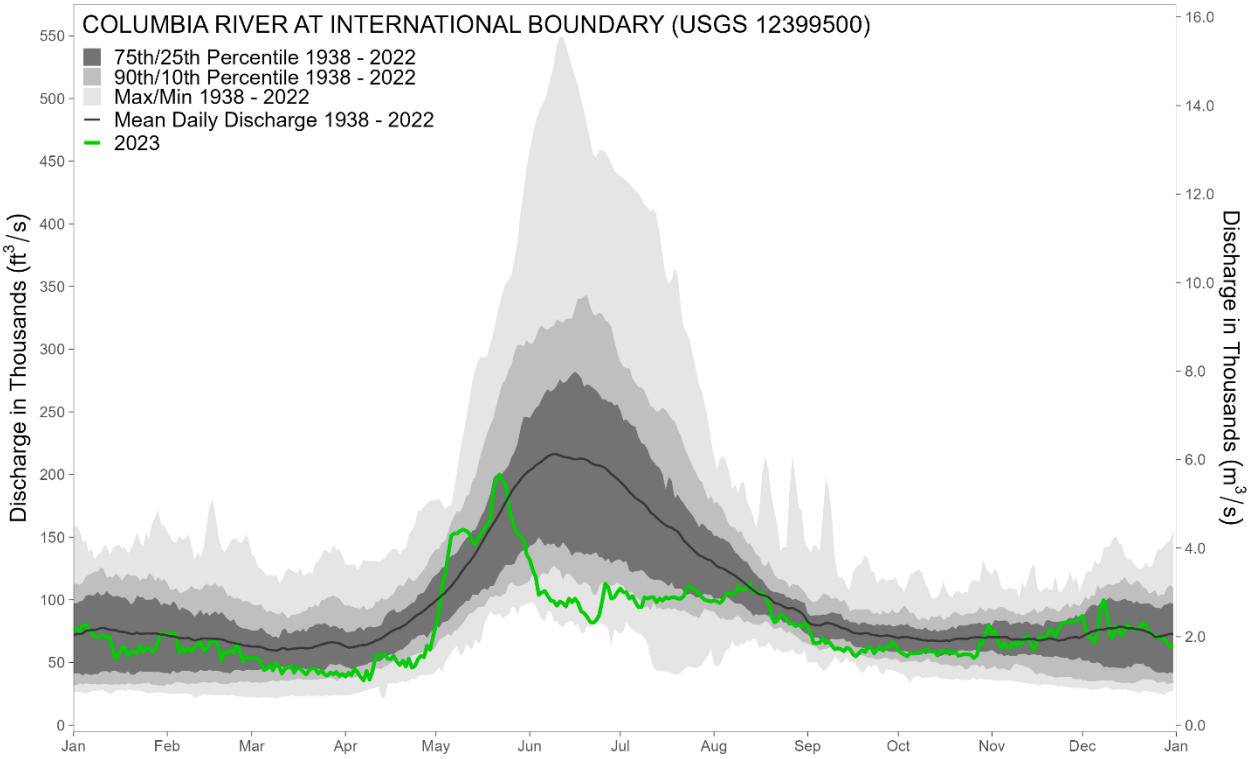

Figure 1. Columbia River at the International Boundary (USGS Station 12399500). Historical range (1938 -2022): maximum, 90th/10th, 75th/25th percentiles, minimum, and 2023 daily mean discharge (U.S. Geological Survey, 2023).

ORDER COMPLIANCE

Backwater at the international boundary was estimated by the U.S. Geological Survey by computing the difference between the gage height measured at the Columbia River at the international boundary and the equivalent gage height using the stage-discharge rating for the reported discharge. The measured backwater level remained below the allowable backwater levels throughout 2023 (figure 2C). The Board determined that in 2023, the Applicant remained in compliance with the IJC Order, as described in the section above on Order of Approval.

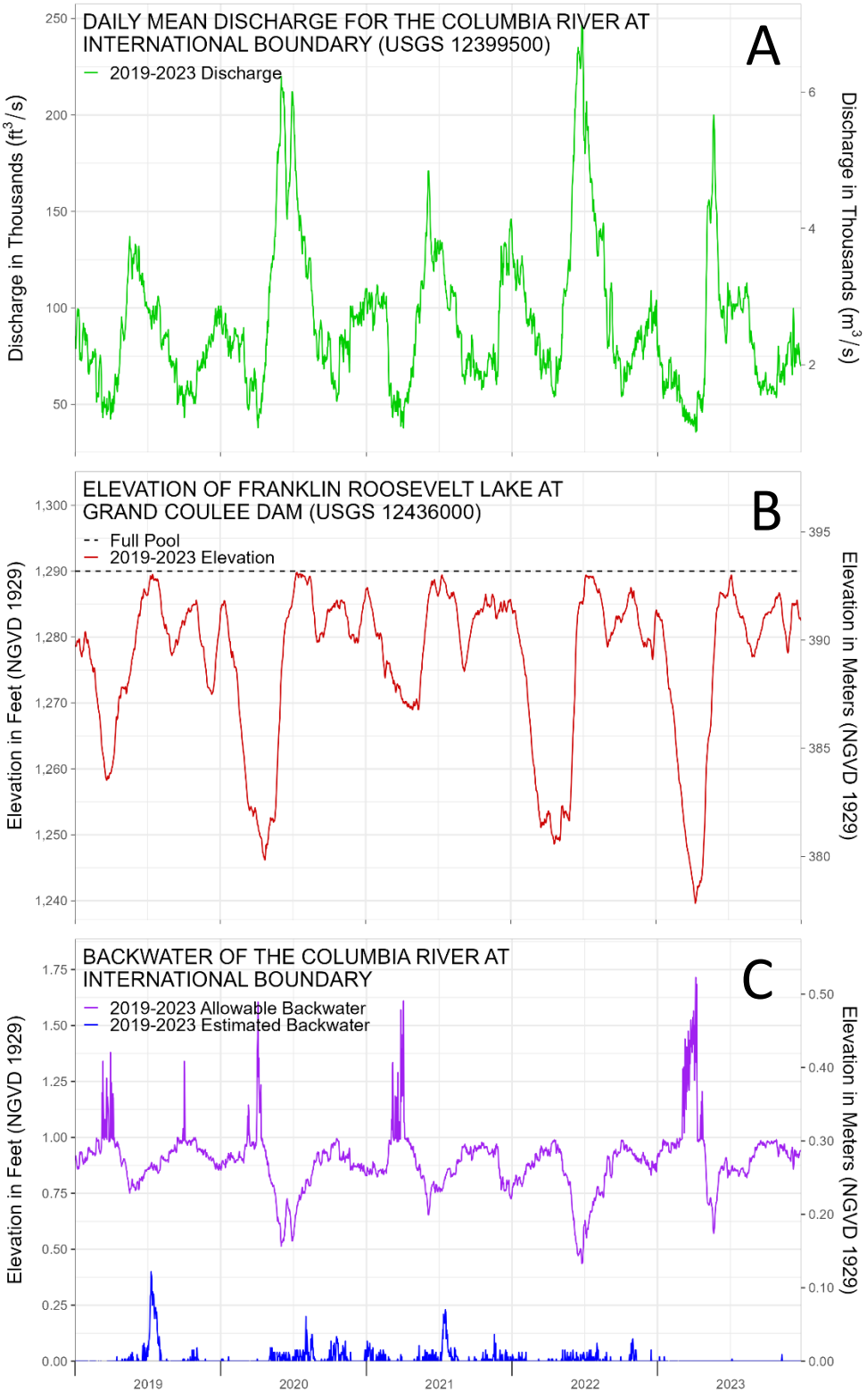

Figure 2. Hydrographs of A) daily mean discharge for the Columbia River at the international boundary, B) elevation of Franklin D. Roosevelt Lake, and C) backwater in the Columbia River at the international boundary.

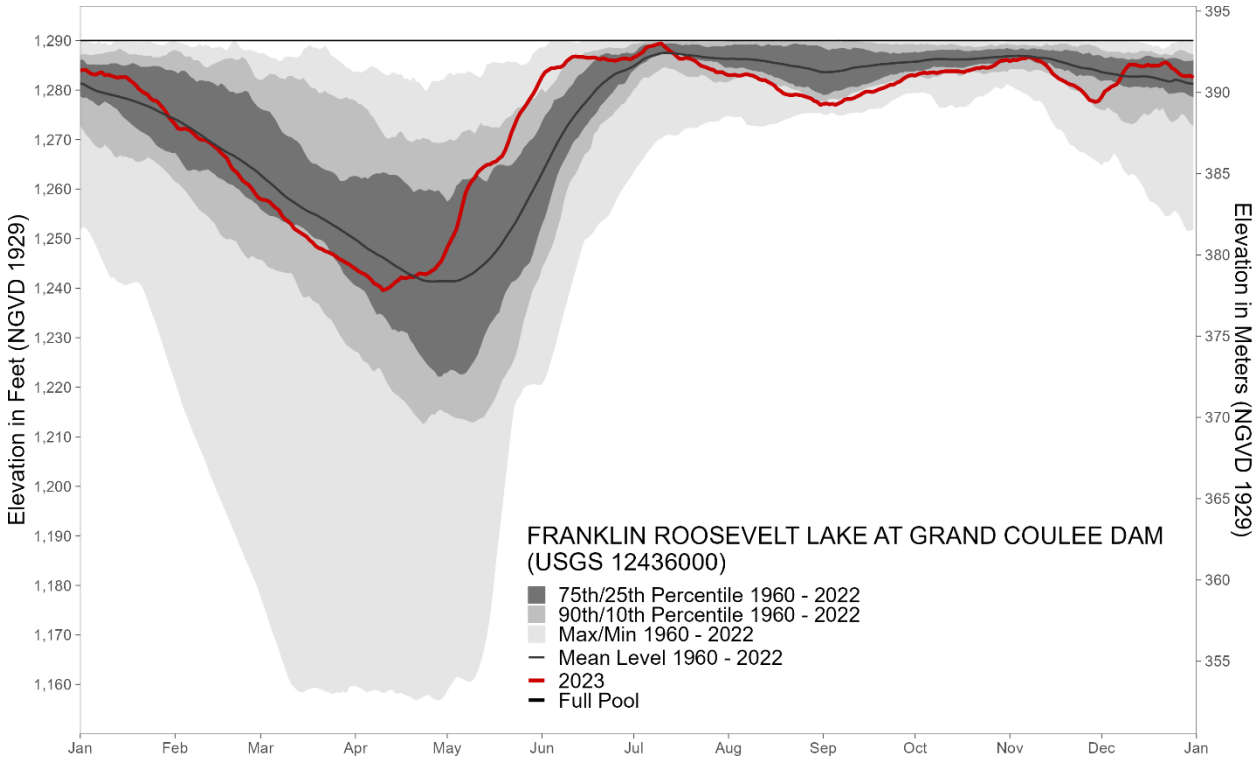

Figure 3. Franklin D. Roosevelt Lake (USGS Station 12436000). Historical range (1960-2022): maximum, 90th/10th and 75th/25th percentiles, minimum, and 2023 daily mean water-surface elevation (U.S. Geological Survey, 2023).

BOARD ACTIVITIES

IJC Semi-Annual Appearances

The Board presented a progress report during the spring semi-annual IJC meeting on April 24, 2023, in Washington D.C., and at the fall semi-annual IJC meeting on October 16, 2023, in Ottawa. The April meeting was attended by the Canadian and U.S. section Co-chairs Evan Friesenhan and Dr. Cindi Barton, respectively, and was supported by the secretary of the Canadian and U.S. sections. The Canadian Section Co-Chair and Secretary both attended the Ottawa appearances in person, while US Section Co-Chair and Secretary attended the October appearance remotely via teleconference. At each meeting, the Board presented an overview of basin hydrologic conditions along with how the Applicant remained in compliance in 2023.

Communications

In the summer of 2023, the board was contacted by a group called Save Record Ridge Action Committee, who was concerned about proposed mining development project about 4 km from the Canada/US border near Rossland, BC. The main issue was how the mine was to be categorized and that it could avoid an environmental assessment. Board co-chairs agreed the proposed mining issue was outside the boards mandate and referred the issue to the IJC advisors to be raised with IJC Commissioners.

APPENDIX A: KEY BASIN VALUES AND STATISTICS IN 2023

A. Columbia River at International Boundary (USGS Station no. 12399500)

Maximum instantaneous discharge	213,000 cfs (6,031 cms)	May 22 00:00
Minimum instantaneous discharge	30,200 cfs (855 cms)	Apr 5 07:30
Maximum daily mean discharge	200,000 cfs (5,663 cms)	May 22
Minimum daily mean discharge	35,700 cfs (1,011 cms)	Apr 7
Annual mean discharge	78,872 cfs (2,233 cms)	
Total annual discharge	57.1 million ac-ft (70.4 km^3)	
Daily discharge at time of maximum backwater effect	63,200 cfs (1,789.6 cms)	Nov 9

The annual mean discharge was 79 percent of the 84-year (1939-2022) average of 99,528 cfs (2,818 cms). The total annual discharge is ranked 78th out of 85 years.

B. Franklin Roosevelt Lake at Grand Coulee Dam (USGS station no. 12436000)

Maximum instantaneous elevation	1,289.48 ft (393.0 m)	Jul 9 21:00 & Jul 10 04:00
Minimum instantaneous elevation	1,239.49 ft (377.8 m)	Apr 11 17:00
Maximum daily mean elevation	1,289.4 ft (393.0 m)	Jul 10
Minimum daily mean elevation	1,239.60 ft (378.83 m)	Apr 10
Annual mean elevation	1,274.25 ft (388.39 m)	

C. Calculated Backwater at International Boundary

Maximum backwater	0.10 ft (0.030 m)	Nov 9
Minimum backwater	0.00 ft (0.000 m)	Multiple days
Annual mean backwater	0.001 ft (0.0002 m)	

APPENDIX B: 2023 GRAND COULEE DATA AND BACKWATER VALUES

	Grand Coulee Elevation (ft)	River Discharge (cfs)	Calculated Backwater (ft)	Allowable (ft)
Jan 1	1283.9	78100	0	0.92
Jan 2	1284.1	76800	0	0.923
Jan 3	1284	74700	0	0.929
Jan 4	1283.5	79700	0	0.915
Jan 5	1283.2	80600	0	0.913
Jan 6	1283.1	76400	0.02	0.925
Jan 7	1283.4	73700	0	0.932
Jan 8	1283.6	70300	0	0.942
Jan 9	1283	70600	0	0.941
Jan 10	1283.1	71300	0	0.939
Jan 11	1282.9	71700	0	0.938
Jan 12	1282.7	69200	0	0.945
Jan 13	1282.5	70700	0	0.941
Jan 14	1282.6	59400	0	0.973
Jan 15	1282.6	53100	0	0.991
Jan 16	1282.6	56700	0	0.981
Jan 17	1282.1	62000	0	0.966
Jan 18	1281.6	62000	0.02	0.966
Jan 19	1281.1	55200	0	0.985
Jan 20	1280.3	58800	0	0.975
Jan 21	1279.8	58900	0	0.975
Jan 22	1279.4	57300	0	0.979
Jan 23	1279.1	63300	0	0.962
Jan 24	1278.3	58600	0	0.975
Jan 25	1277.9	61300	0	0.968
Jan 26	1277.8	61400	0	0.967
Jan 27	1277.1	58500	0	0.976
Jan 28	1276.4	60700	0	0.969
Jan 29	1275.6	66700	NA	0.952
Jan 30	1274.5	73200	NA	0.934
Jan 31	1273.8	72900	0	0.935
Feb 1	1273.1	72700	0	0.935
Feb 2	1272.2	71700	0	0.938
Feb 3	1272.1	74400	0	0.93
Feb 4	1272.2	70000	0	0.943
Feb 5	1272.1	57900	0	0.977
Feb 6	1271.8	61500	0	0.967
Feb 7	1271.2	58700	0	0.975
Feb 8	1270.6	61300	0	0.968
Feb 9	1270.1	58500	0	0.976
Feb 10	1269.9	62300	0	0.965
Feb 11	1269.9	64400	0	0.959
Feb 12	1269.5	67000	0	0.951
Feb 13	1269.1	59300	0	0.973
Feb 14	1268.5	60600	0	0.97
Feb 15	1268.1	66400	0	0.953
Feb 16	1267.3	66000	0	0.954
Feb 17	1266.8	67900	0	0.949
Feb 18	1266.2	62300	0	0.965
Feb 19	1264.9	51700	0	0.995
Feb 20	1263.9	58200	0	0.977
Feb 21	1263.5	57600	0	0.978
Feb 22	1262.7	59800	NA	0.972
Feb 23	1261.8	57400	0	0.979
Feb 24	1261.3	65300	0	0.956
Feb 25	1260.9	59200	0	0.974
Feb 26	1260.2	51000	0	0.997
Feb 27	1259.3	54900	0	0.986
Feb 28	1258.4	53200	0	0.991
Mar 1	1258	53800	0	0.989
Mar 2	1257.8	53300	0	0.991
Mar 3	1257.7	52900	0	0.992
Mar 4	1257.4	50800	0	0.998
Mar 5	1256.7	43900	0	1.305
Mar 6	1256.2	45100	0	1.245
Mar 7	1255.7	48100	0	1.095
Mar 8	1254.6	43700	0	1.315
Mar 9	1253.9	49600	0	1.02
Mar 10	1253.5	46900	0	1.155
Mar 11	1252.9	41200	0	1.44
Mar 12	1252	45100	0	1.245
Mar 13	1251.6	46000	0	1.2
Mar 14	1251.2	47500	0	1.125
Mar 15	1250.8	41900	0	1.405
Mar 16	1250.4	45900	0	1.205
Mar 17	1249.7	45100	0	1.245
Mar 18	1249.2	42700	0	1.365
Mar 19	1248.5	40500	0	1.475
Mar 20	1248.1	43900	0	1.305
Mar 21	1247.9	45800	0	1.21
Mar 22	1247.5	45100	0	1.245
Mar 23	1247.3	41300	0	1.435
Mar 24	1247	43400	0	1.33
Mar 25	1246.7	40600	0	1.47
Mar 26	1246.2	39500	0	1.525
Mar 27	1245.8	41900	0	1.405
Mar 28	1245.5	40600	0	1.47
Mar 29	1245.1	42400	0	1.38
Mar 30	1244.8	39300	0	1.535
Mar 31	1244.3	40900	0	1.455
Apr 1	1243.9	38700	0	1.565
Apr 2	1243.4	41700	0	1.415
Apr 3	1243.1	40000	0	1.5
Apr 4	1242.8	44900	0	1.255
Apr 5	1242.4	42100	0	1.395
Apr 6	1241.8	38400	0	1.58
Apr 7	1241	35700	0	1.715
Apr 8	1240.7	43300	0	1.335
Apr 9	1240.3	36300	0	1.685
Apr 10	1239.6	43400	0	1.33
Apr 11	1239.8	55300	0	0.985
Apr 12	1240.09	56400	0	0.982
Apr 13	1240.6	54100	0	0.988
Apr 14	1241.2	57000	0	0.98
Apr 15	1241.6	53000	0	0.991
Apr 16	1242.2	52700	0	0.992
Apr 17	1242	55100	0	0.985
Apr 18	1242.1	50700	0	0.998
Apr 19	1242.3	48000	0	1.1
Apr 20	1242.2	51400	0	0.996
Apr 21	1242.6	46800	0	1.16
Apr 22	1243	52900	0	0.992
Apr 23	1242.9	45900	0	1.205
Apr 24	1242.8	47200	0	1.14
Apr 25	1243.1	52600	0	0.993
Apr 26	1243.5	55400	0	0.985
Apr 27	1243.9	54200	0	0.988
Apr 28	1244.7	63300	0	0.962
Apr 29	1245.4	60200	0	0.971
Apr 30	1246.7	70600	0	0.941
May 1	1248.2	80100	0	0.914
May 2	1249.4	91800	0	0.881
May 3	1250.6	112000	0	0.823
May 4	1251.9	120000	0	0.8

	Grand Coulee Elevation (ft)	River Discharge (cfs)	Calculated Backwater (ft)	Allowable (ft)
May 5	1254.2	136000	0	0.754
May 6	1256.8	151000	0	0.711
May 7	1259.2	153000	0	0.706
May 8	1260.6	153000	0	0.706
May 9	1261.6	155000	0	0.7
May 10	1262.3	156000	0	0.697
May 11	1263.4	155000	0	0.7
May 12	1264	153000	0	0.706
May 13	1264.5	146000	0	0.726
May 14	1264.9	144000	0	0.731
May 15	1265	149000	0	0.717
May 16	1265.4	153000	0	0.706
May 17	1265.6	157000	0	0.694
May 18	1266.2	160000	0	0.686
May 19	1266.7	165000	0	0.671
May 20	1267.9	187000	0	0.609
May 21	1269.5	197000	0	0.58
May 22	1271.4	2.00E+05	0	0.571
May 23	1272.9	195000	0	0.586
May 24	1274.4	192000	0	0.594
May 25	1275.5	176000	0	0.64
May 26	1276.3	165000	0	0.671
May 27	1277.2	158000	0	0.691
May 28	1278.2	152000	0	0.709
May 29	1279.1	151000	0	0.711
May 30	1280.2	148000	0	0.72
May 31	1281.5	136000	0	0.754
Jun 1	1282.7	132000	0	0.766
Jun 2	1283.6	124000	0	0.789
Jun 3	1284	118000	0	0.806
Jun 4	1284.4	104000	0	0.846
Jun 5	1284.4	106000	0	0.84
Jun 6	1284.6	107000	0	0.837
Jun 7	1284.6	103000	0	0.849
Jun 8	1285	99400	0	0.859
Jun 9	1285.8	98800	0	0.861
Jun 10	1286.3	95300	0	0.871
Jun 11	1286.7	98700	0	0.861
Jun 12	1286.8	97400	0	0.865
Jun 13	1286.7	94700	0	0.872
Jun 14	1286.7	101000	0	0.854
Jun 15	1286.6	98100	0	0.863
Jun 16	1286.5	101000	0	0.854
Jun 17	1286.5	97600	0	0.864
Jun 18	1286.6	90900	0	0.883
Jun 19	1286.4	89400	0	0.887
Jun 20	1286.2	86400	0	0.896
Jun 21	1286.4	82400	0	0.907
Jun 22	1286.2	81600	0	0.91
Jun 23	1286	83600	0	0.904
Jun 24	1286	87800	0	0.892
Jun 25	1285.9	99100	0	0.86
Jun 26	1286.1	113000	0	0.82
Jun 27	1286.3	110000	0	0.829
Jun 28	1286.4	101000	0	0.854
Jun 29	1286.3	102000	0	0.851
Jun 30	1286.2	106000	0	0.84
Jul 1	1286.6	109000	0	0.831
Jul 2	1286.9	106000	0	0.84
Jul 3	1287.3	106000	0	0.84
Jul 4	1287.7	101000	0	0.854
Jul 5	1288.5	103000	0	0.849
Jul 6	1288.8	98100	0	0.863
Jul 7	1288.9	94100	0.01	0.874
Jul 8	1289.1	94200	0	0.874
Jul 9	1289.3	102000	0	0.851
Jul 10	1289.4	101000	0	0.854
Jul 11	1288.8	102000	0	0.851
Jul 12	1288.3	102000	0	0.851
Jul 13	1287.8	98200	0	0.862
Jul 14	1287.4	101000	0	0.854
Jul 15	1286.8	99400	0	0.859
Jul 16	1286.3	102000	0	0.851
Jul 17	1286.3	101000	0	0.854
Jul 18	1286.5	102000	0	0.851
Jul 19	1286.4	102000	0	0.851
Jul 20	1286.2	101000	0	0.854
Jul 21	1285.9	101000	0	0.854
Jul 22	1285.4	103000	0	0.849
Jul 23	1284.9	109000	0	0.831
Jul 24	1284.7	111000	0	0.826
Jul 25	1284.5	109000	0	0.831
Jul 26	1284.2	107000	0	0.837
Jul 27	1284.1	105000	0	0.843
Jul 28	1283.6	102000	0	0.851
Jul 29	1283.6	1.00E+05	0	0.857
Jul 30	1283.6	99300	0	0.859
Jul 31	1283.2	98700	0	0.861
Aug 1	1283	99400	0	0.859
Aug 2	1283	98600	0	0.861
Aug 3	1283.1	97500	0	0.864
Aug 4	1282.9	99900	0	0.857
Aug 5	1282.9	105000	0	0.843
Aug 6	1283.1	105000	0	0.843
Aug 7	1283.2	105000	0	0.843
Aug 8	1283	105000	0	0.843
Aug 9	1282.9	111000	0	0.826
Aug 10	1282.6	108000	0	0.834
Aug 11	1282.2	108000	0	0.834
Aug 12	1282	109000	0	0.831
Aug 13	1282	113000	0	0.82
Aug 14	1281.6	106000	0	0.84
Aug 15	1281.3	107000	0	0.837
Aug 16	1280.9	105000	0	0.843
Aug 17	1280.2	106000	0	0.84
Aug 18	1279.8	102000	0	0.851
Aug 19	1279.3	98700	0	0.861
Aug 20	1279.1	87300	0	0.893
Aug 21	1279	82000	0	0.909
Aug 22	1279	83400	0	0.905
Aug 23	1279.1	88200	0	0.891
Aug 24	1279	87200	0	0.894
Aug 25	1278.9	84700	0	0.901
Aug 26	1278.7	81000	0	0.911
Aug 27	1278.5	81200	0	0.911
Aug 28	1278.3	79100	0	0.917
Aug 29	1277.8	80000	0	0.914
Aug 30	1277.6	78600	0	0.918
Aug 31	1277	82000	0	0.909
Sept 1	1277.2	78100	0	0.92
Sept 2	1277.3	73800	0	0.932
Sept 3	1277.1	65600	0	0.955
Sept 4	1277.2	65400	0	0.956
Sept 5	1277	65700	0	0.955

	Grand Coulee Elevation (ft)	River Discharge (cfs)	Calculated Backwater (ft)	Allowable (ft)
Sept 6	1277.3	69900	0	0.943
Sept 7	1277.6	65400	0	0.956
Sept 8	1278.1	66700	0	0.952
Sept 9	1278.2	63500	0	0.961
Sept 10	1278.2	60500	0	0.97
Sept 11	1278.4	61300	0	0.968
Sept 12	1278.7	60600	0	0.97
Sept 13	1279	59000	0	0.974
Sept 14	1279.4	61800	0	0.966
Sept 15	1279.7	60700	0	0.969
Sept 16	1279.7	56600	0	0.981
Sept 17	1279.6	54800	0	0.986
Sept 18	1279.8	57500	0	0.979
Sept 19	1280.1	59800	0	0.972
Sept 20	1280.3	58400	0	0.976
Sept 21	1280.5	62000	0	0.966
Sept 22	1280.8	62200	0	0.965
Sept 23	1281.1	57400	0	0.979
Sept 24	1281.1	60400	0	0.97
Sept 25	1281.5	62200	0	0.965
Sept 26	1281.7	59400	0	0.973
Sept 27	1282.2	63000	0	0.963
Sept 28	1282.6	62100	0	0.965
Sept 29	1282.9	66600	0	0.953
Sept 30	1283	63600	0	0.961
Oct 1	1282.9	59900	0	0.972
Oct 2	1283.2	57600	0	0.978
Oct 3	1283.4	56300	0	0.982
Oct 4	1283.5	55100	0	0.985
Oct 5	1283.4	57700	0	0.978
Oct 6	1283.5	57100	0	0.98
Oct 7	1283.6	57300	0	0.979
Oct 8	1283.4	57500	0	0.979
Oct 9	1283.6	58400	0	0.976
Oct 10	1283.7	60600	0	0.97
Oct 11	1283.8	59300	0	0.973
Oct 12	1283.8	58600	0	0.975
Oct 13	1283.8	58800	0	0.975
Oct 14	1283.8	55500	0	0.984
Oct 15	1283.8	58600	0	0.975
Oct 16	1283.7	59500	0	0.973
Oct 17	1283.6	57700	0	0.978
Oct 18	1283.9	59300	0	0.973
Oct 19	1284	57400	0	0.979
Oct 20	1284.2	58400	0	0.976
Oct 21	1284.4	55200	0	0.985
Oct 22	1284.4	56100	0	0.983
Oct 23	1284.6	56600	0	0.981
Oct 24	1284.5	56500	0	0.981
Oct 25	1284.5	56200	0	0.982
Oct 26	1284.7	53500	0	0.99
Oct 27	1285	55500	0	0.984
Oct 28	1285.5	65800	0	0.955
Oct 29	1285.9	65000	0	0.957
Oct 30	1286	74100	0	0.931
Oct 31	1286.1	80200	0	0.914
Nov 1	1285.8	72400	0	0.936
Nov 2	1286.1	75500	0	0.927

	Grand Coulee Elevation (ft)	River Discharge (cfs)	Calculated Backwater (ft)	Allowable (ft)
Nov 3	1286	66600	0	0.953
Nov 4	1286.2	61600	0	0.967
Nov 5	1286.4	65400	0	0.956
Nov 6	1286.4	61800	0	0.966
Nov 7	1286.7	61500	0	0.967
Nov 8	1286.6	67300	0	0.951
Nov 9	1286.3	63200	0.03	0.962
Nov 10	1286	65400	0	0.956
Nov 11	1285.8	64900	0	0.957
Nov 12	1285.4	71400	0	0.939
Nov 13	1284.9	70200	0	0.942
Nov 14	1284.2	63300	0	0.962
Nov 15	1283.3	60100	0	0.971
Nov 16	1282.8	66700	0	0.952
Nov 17	1282.3	70900	0	0.94
Nov 18	1282	70300	0	0.942
Nov 19	1281.7	69900	0	0.943
Nov 20	1281.3	75800	0	0.926
Nov 21	1281.1	75900	0	0.926
Nov 22	1280.9	70800	0	0.941
Nov 23	1280.5	76100	0	0.925
Nov 24	1280.1	80700	0	0.912
Nov 25	1279.5	82000	0	0.909
Nov 26	1278.8	82000	0	0.909
Nov 27	1278	82300	0	0.908
Nov 28	1277.8	82300	0	0.908
Nov 29	1277.6	82900	0	0.906
Nov 30	1277.8	85200	0	0.899
Dec 1	1278.6	87300	0	0.893
Dec 2	1279.7	77100	0	0.923
Dec 3	1280.1	70500	0	0.941
Dec 4	1280.6	69700	0	0.944
Dec 5	1280.9	65400	0	0.956
Dec 6	1281.2	75500	0	0.927
Dec 7	1282.2	93800	0	0.875
Dec 8	1283.5	99800	0	0.858
Dec 9	1284.4	91300	0	0.882
Dec 10	1285.1	72400	0	0.936
Dec 11	1285.1	69500	0	0.944
Dec 12	1285.1	79100	0	0.917
Dec 13	1284.9	76800	0	0.923
Dec 14	1284.8	71500	0	0.939
Dec 15	1284.8	76300	0	0.925
Dec 16	1285.1	80900	0	0.912
Dec 17	1284.9	76500	0	0.924
Dec 18	1284.9	77100	0	0.923
Dec 19	1284.9	75900	0	0.926
Dec 20	1285	78300	0	0.919
Dec 21	1285.4	81700	0	0.909
Dec 22	1285.6	79100	0	0.917
Dec 23	1285.2	75100	0	0.928
Dec 24	1284.4	72000	0	0.937
Dec 25	1284.1	71100	0	0.94
Dec 26	1283.5	69800	0	0.943
Dec 27	1283	68800	0	0.946
Dec 28	1282.8	68700	0	0.947
Dec 29	1282.8	66200	0	0.954
Dec 30	1282.9	62600	0	0.964
Dec 31	1282.5	63900	0	0.96