



International Columbia River Board of Control
2022 Report to the International Joint Commission





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 km²) and is the largest lake in Washington State.

(credit: U.S. Bureau of Reclamation)



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UNIT CONVERSION FACTORS

Customary (Imperial) to Système International (Metric)

Multiply	By	To obtain
<i>Length</i>		
inch (in)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
<i>Area</i>		
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)
<i>Volume</i>		
acre-feet (ac-ft)	1,233	cubic meter (m ³)
Thousand acre-feet (Kac-ft)	1.233	thousand cubic decameters (kdam ³)
<i>Flow Rate</i>		
cubic foot per second (cfs)	0.02832	cubic meter per second (cms)

Système International (Metric) to Customary (Imperial)

Multiply	By	To obtain
<i>Length</i>		
millimeter (mm)	0.03937	inch (in)
meter (m)	3.281	foot (ft)
kilometer (km)	0.6214	mile (mi)
<i>Area</i>		
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)
<i>Volume</i>		
cubic meter (m ³)	0.0008107	acre-feet (ac-ft)
thousand cubic decameters (kdam ³)	0.8107	Thousand acre-feet (Kac-ft)
<i>Flow rate</i>		
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:

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

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

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



LIST OF ACRONYMS

IJC	International Joint Commission
ICRBC	International Columbia River Board of Control
ECCC	Environment and Climate Change Canada
WSC	Water Survey of Canada
USGS	United States Geological Services
CRT	Columbia River Treaty
cfs	cubic feet per second
cms	cubic meters per second
SWE	Snow water equivalent



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BOARD MEMBERSHIP

In 2022, the size of the Board remained the same at four total members with equal representation from Canada and the U.S. In 2022, Evan Friesenhan replaced Dave Hutchinson as Canadian Co-Chair of the Columbia Board.

Canadian Section		U.S. Section	
	<u>Evan Friesenhan</u> (Co-Chair) Manager – Engineering Services West and North National Hydrological Services Environment & Climate Change Canada		<u>Cindi Barton</u> (Co-Chair) Director, Retired U.S. Geological Survey – Washington Water Science Center
	<u>Martin Suchy</u> (Secretary) Water Management Scientist National Hydrological Services Environment & Climate Change Canada		<u>Andrew Gendaszek</u> (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 feet (393 m) above mean sea level, the increase in water level at the boundary due to backwater must not exceed about 2.5 feet (0.76 m) when Columbia River discharge at the boundary is 20,000 cubic feet per second (cfs) (570 cubic meters per second [cms]), or about 1.0 feet (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, with respective Canadian and U.S. Entities having 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 2022 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 IN 2022

During 2022, the U.S. Geological Survey continued the collection of information concerning 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. 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 annual flow of the Columbia River at Grand Coulee Dam for calendar year 2022 totaled 83.4 million acre-feet (102.8 cubic kilometers), or 107 percent of the mean annual volume for the 93-year period of record of 77.6 million acre-feet (95.5 cubic kilometers). The instantaneous maximum (peak) discharge of the Columbia River at the international boundary was 264,000 cfs (7,480 cms) on June 26, which is 102 percent of the mean annual peak discharge for the 86-year period of record of 259,000 cfs (7,300 cms).



Daily mean discharge for the Columbia River at the international boundary for 2022 is shown in Figure 1, and discharge for the period 2018-2022 is shown in Figure 2A.

Extremes of instantaneous stage recorded on Lake Roosevelt in 2022 varied between elevations 1,248.39 feet (380.51 m) on April 21 at 11:00 PDT and 1,289.90 feet (393.16 m) on July 10 at 06:00 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, 2022, was 1,283.14 feet (391.10 m). Water-level elevation in Franklin D. Roosevelt Lake for 2022 is shown in Figure 3, while Figure 2B shows elevation for the period 2018-2022.

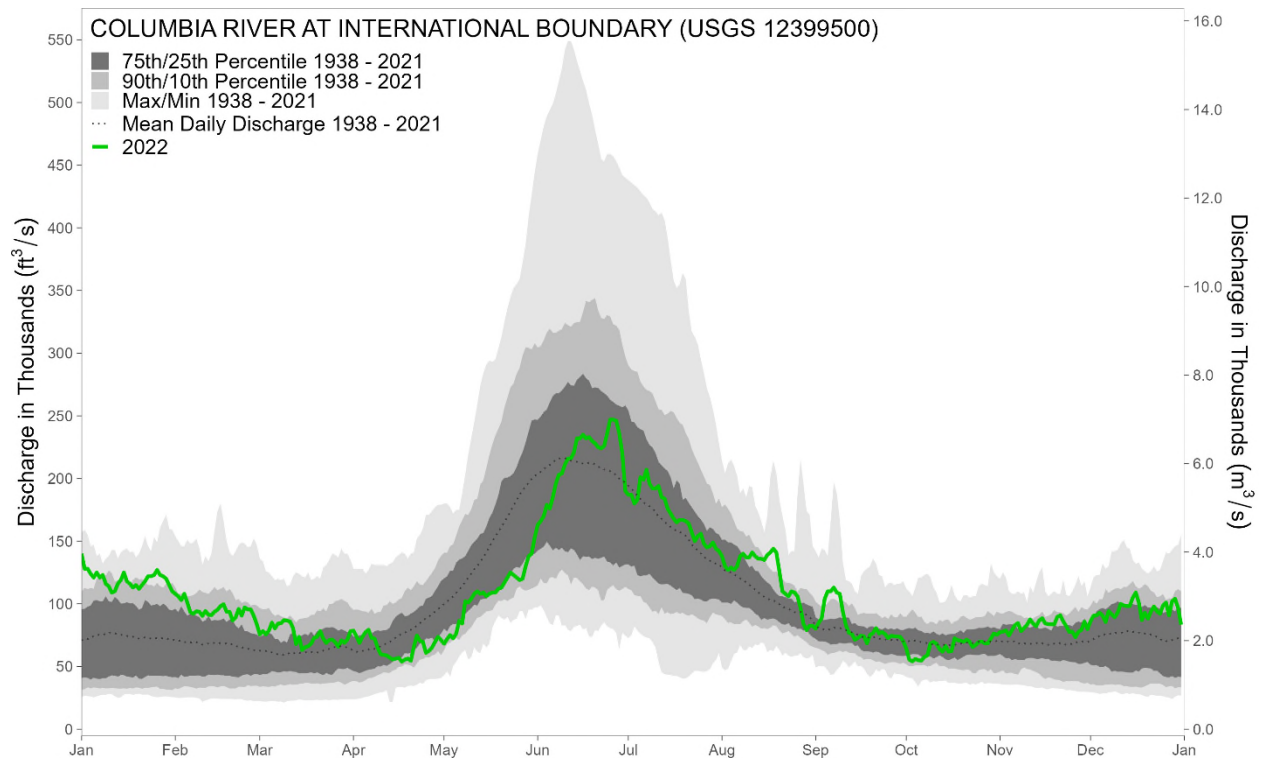


Figure 1. Columbia River at the International Boundary (USGS Station 12399500). Historical range (1938 -2021): maximum, 90th/10th, 75th/25th percentiles, minimum, and 2022 daily mean discharge (U.S. Geological Survey, 2023).

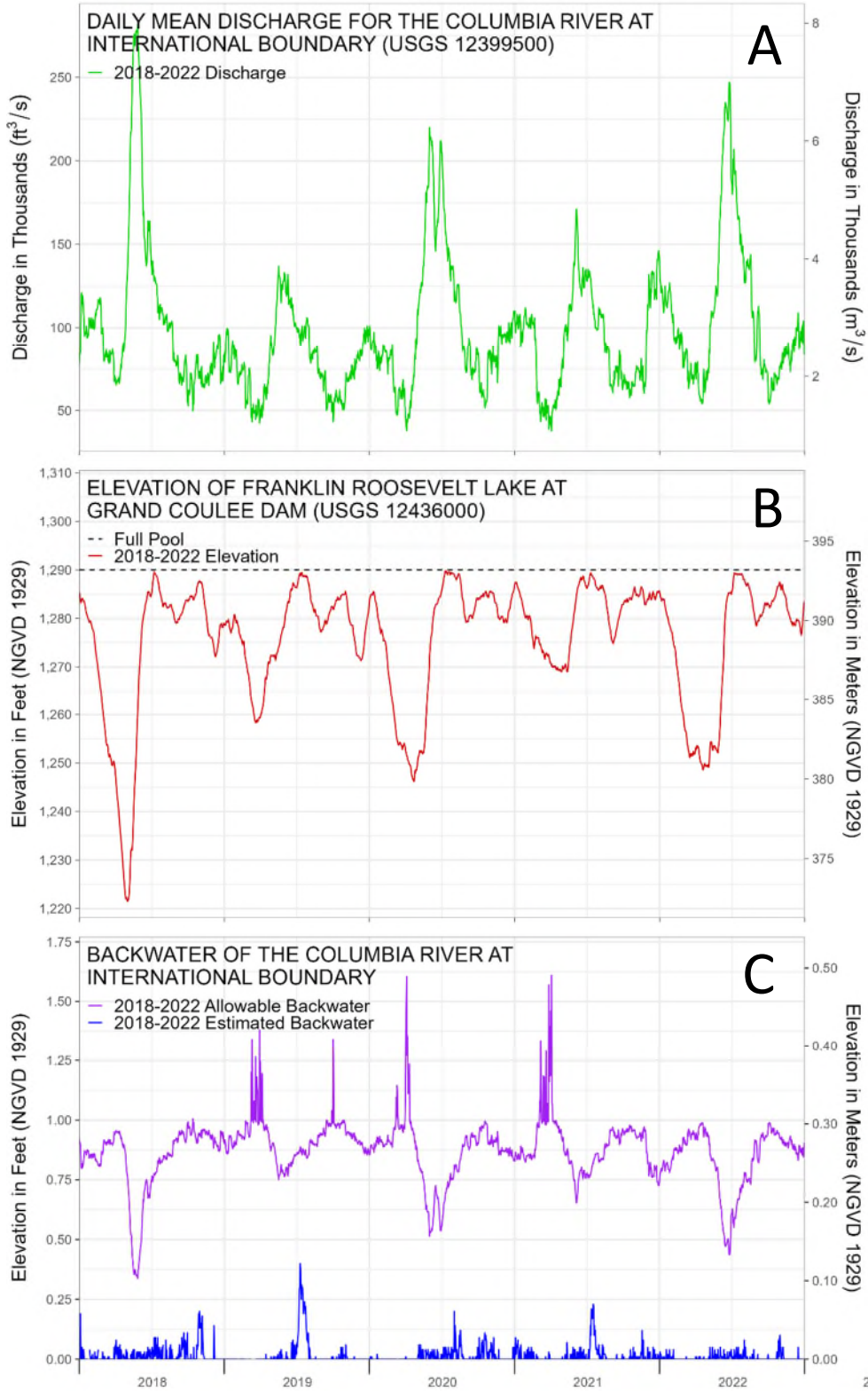


Figure 2. Hydrographs of A) daily mean discharge for the Columbia River at the international boundary, B) elevation of Franklin D. Roosevelt Lake, and C) backwater in the Columbia River at the international boundary.

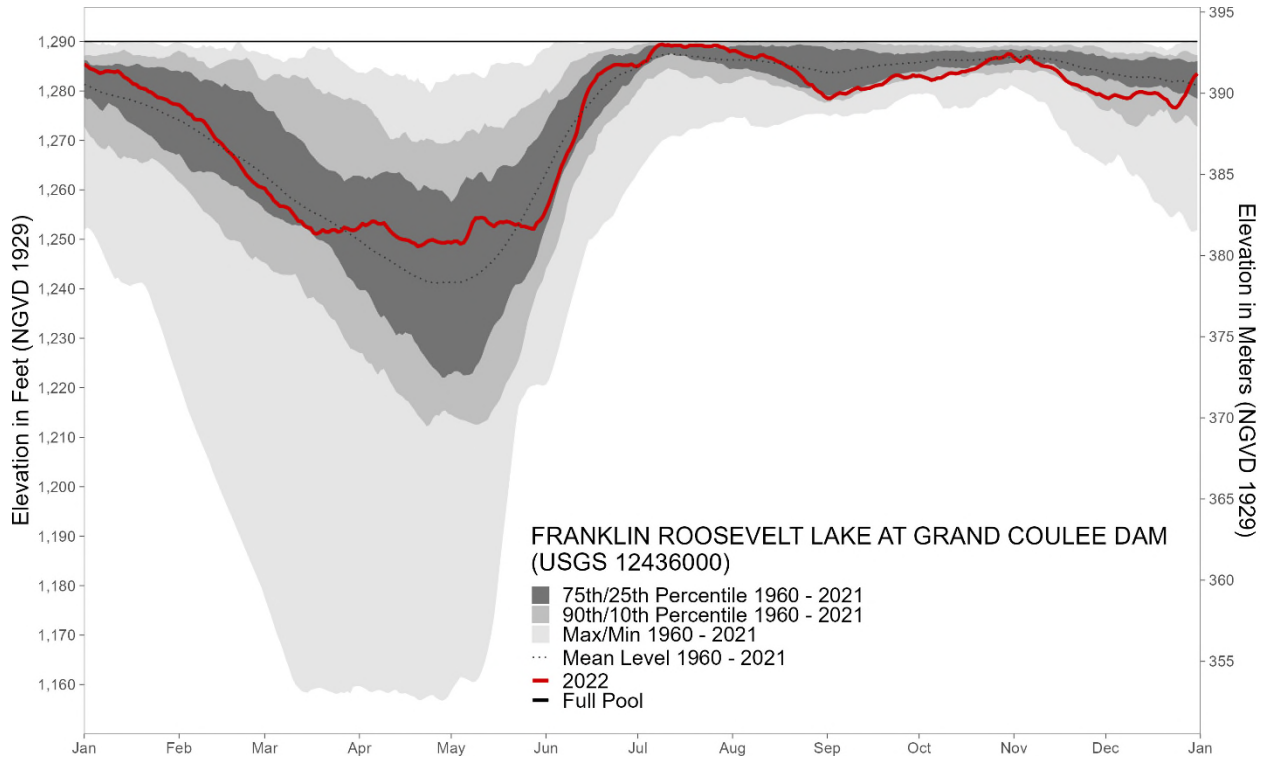


Figure 3. Franklin D. Roosevelt Lake (USGS Station 12436000). Historical range (1960-2021): maximum, 90th/10th and 75th/25th percentiles, minimum, and 2022 daily mean water-surface elevation (U.S. Geological Survey, 2023).

BOARD ACTIVITIES: IJC SEMI-ANNUAL APPEARANCES

The Board determined that the Applicant was in compliance with the IJC Order in 2022.

The Board presented a progress report over teleconference during the spring semi-annual IJC meeting on April 05, 2022 in Washington D.C., and at the fall semi-annual IJC meeting on October 18, 2022 in Ottawa. The April meeting was attended by the Canadian and U.S. section Co-chairs Dave Hutchinson and Cindi Barton, respectively, and was supported by the secretary of the Canadian and U.S. sections. Both Co-chairs and secretaries attended the April meeting remotely via teleconference; Dave Hutchinson and Martin Suchy attended the October meeting in person and Cindi Barton and Andy Gendaszek attended the October meeting remotely via teleconference.



APPENDIX: KEY BASIN VALUES AND STATISTICS IN 2022

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

Maximum instantaneous discharge	264,000 cfs (7,480 cms)	Jun 26 02:15
Minimum instantaneous discharge	35,200 cfs (997 cms)	Oct 8 02:00, 03:45, 04:45, and 05:00
Maximum daily mean discharge	247,000 cfs (6,990 cms)	Jun 25 and 26
Minimum daily mean discharge	53,900 cfs (1,530 cms)	Apr 17
Annual mean discharge	108,000 cfs (3,060 cms)	
Daily discharge at time of maximum backwater effect	75,300 cfs (2,132.3 cms)	Oct 31

The annual mean discharge was 108 percent of the 83-year (1939-2021) average of 99,500 cfs (2,820 cms).

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

Maximum instantaneous elevation	1,289.90 ft (393.16 m)	Jul 10 06:00
Minimum instantaneous elevation	1,248.39 ft (380.51 m)	Apr 21 11:00
Maximum daily mean elevation	1,289.33 ft (392.99 m)	Jul 9
Minimum daily mean elevation	1,248.60 ft (380.57 m)	Apr 21
Annual mean elevation	1,273.77 ft (388.25 m)	

C. Calculated Backwater at International Boundary

Maximum backwater	0.10 ft (0.030 m)	Oct 31
Minimum backwater	0.00 ft (0.000 m)	Multiple days
Annual mean backwater	0.01 ft (0.002 m)	