



International Kootenay Lake Board of Control

2007 Annual Report to the International Joint Commission

Grohman Narrows



Viewed looking downstream from high above the City of Nelson, BC, Grohman Narrows (centre) throttles the West Arm of Kootenay Lake into the lower Kootenay River. The feature was named after William Adolph Baillie-Grohman, who, late in the 19th century, attempted to deepen the narrows in an early effort to reclaim the farmlands of the Creston Valley and Kootenai Flats. With his attempt no match for river bed, the narrows remained relatively intact until the West Kootenay Power and Light Company dredged the constriction as a condition of the International Joint Commission's 1938 Order for Kootenay Lake. For more information on Bill Grohman, see the BC Historical Quarterly, Vol. XX, 1956.

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Kootenay Lake 2007 Summary

In general, throughout 2007, FortisBC regulated the level of Kootenay Lake below the maximum limits prescribed by the 1938 Kootenay Lake Order. However, for a considerable period prior to spring rise, the lake level exceeded the prescribed limit primarily due to extraordinary natural high inflow conditions. The maximum instantaneous water level for the lake at Queens Bay was observed at 07:00 PST on June 7th at elevation 533.481 metres¹ (1750.27 feet). The minimum instantaneous water level was observed at 02:05 PST on March 12th at elevation 530.435 metres (1740.27 feet). Kootenay Lake discharged 25.5 cubic kilometres (20.7 million acre-feet) of water in 2007, with an average flow of 810 cubic metres per second (28,600 cubic feet per second).

The Board and the Applicant jointly determined the date of the commencement of the spring rise as April 17th.

2007 Annual Report

This Annual Report covers the operations of FortisBC with respect to their management of the water level of Kootenay Lake by controlling discharge through and around Corra Linn Dam in accordance with requirements of the Order of the International Joint Commission dated November 11, 1938. [FortisBC cooperates with BC Hydro, which also manages a lake level control structure—the Kootenay Canal Plant—at the lake's outlet.]

Board Membership

The Board members during 2007 were as follows:

for the United States,

Colonel Michael McCormick, District Engineer, Seattle District, United States Army, Corps of Engineers, Seattle, Washington;

Ms. Kathy Peter, Director, USGS Idaho Science Center, United States Geological Survey, Boise, Idaho;

and for Canada,

Mr. Kirk Johnstone, Chief, Pacific Storm Prediction Centre, Environment Canada, Vancouver, British Columbia;

Mr. Glen Davidson, Director, Water Stewardship, BC Ministry of Environment, Victoria, British Columbia.

Mr. Larry Merkle and Mr. Daniel Millar provide secretariat support to the US and Canadian sections, respectively.



Tom McAuley and Mark Colosimo provide engineering advice to the Board on behalf of the IJC.

¹ All elevations are referred to G.S.C. 1928 datum.

1938 Kootenay Lake Order Sections 2(4) 2(5) and 2(6)

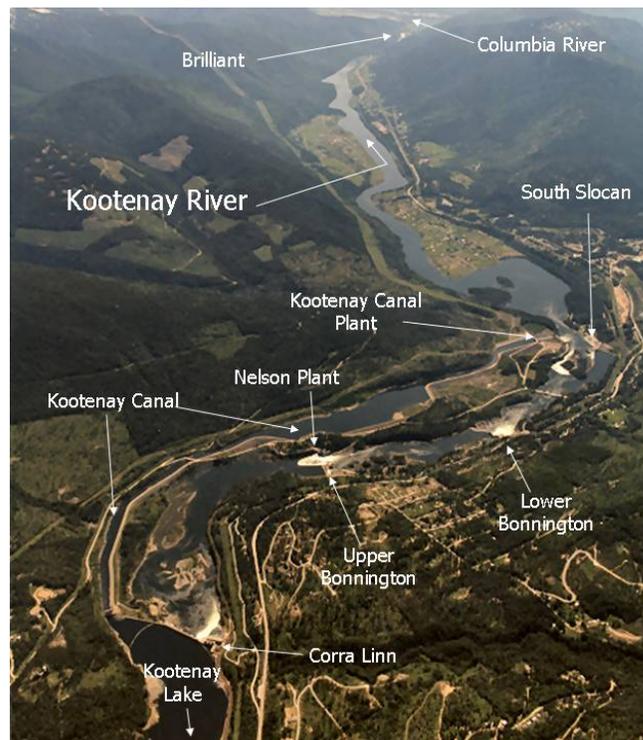
2(4) ...the Applicant shall be permitted to store water in the main body of Kootenay Lake to a maximum elevation of 1745.32, Geodetic Survey of Canada datum, 1928 adjustment (i.e. six feet above zero of the Nelson gauge), in accordance with the rule curve detailed in Sub-section (5).

(5) That after the high water of the spring and early summer flood and when the lake level at Nelson on its falling stage recedes to elevation 1743.32, Geodetic Survey of Canada datum, 1928 adjustment, the gates of the dam may be so operated as to retain it at said level until August 31st, and after said date, the level of the main body of the lake may be raised to elevation 1745.32, which shall be the maximum storage level until January 7, and thereafter it shall be lowered so that it shall not exceed elevation 1744 on February 1, elevation 1742.4 on March 1, and elevation 1739.32 (i.e. zero of the Nelson gauge) on or about April 1, except under extraordinary natural high inflow conditions, when sufficient gates shall be opened and remain open throughout such period of excess so as to lower the level of the main body of Kootenay Lake to the storage level at that time obtaining as above defined.

(6) ...throughout the period of flood flow in each and every year, (i.e. from the commencement of the spring rise in March or April until the level of the lake at Nelson returns to elevation 1743.32, Geodetic Survey of Canada, 1928 adjustment, on the falling stage), a sufficient number of gates and sluiceways of the dam shall be opened to provide, in conjunction with the flow through the turbines, for the lowering of the main body of Kootenay Lake ... by at least the amounts ... as follows:

Discharge from Kootenay Lake under original conditions (in second feet) [vs.] Amount of lowering to be affected on the main body of Kootenay Lake (in feet)

10,000	1.0
25,000	1.3
50,000	1.7
75,000	2.1
100,000.....	2.6
125,000.....	3.0
150,000.....	3.2
175,000.....	3.5
200,000.....	3.8
225,000.....	4.0



Lower Kootenay River projects

Lake Regulation

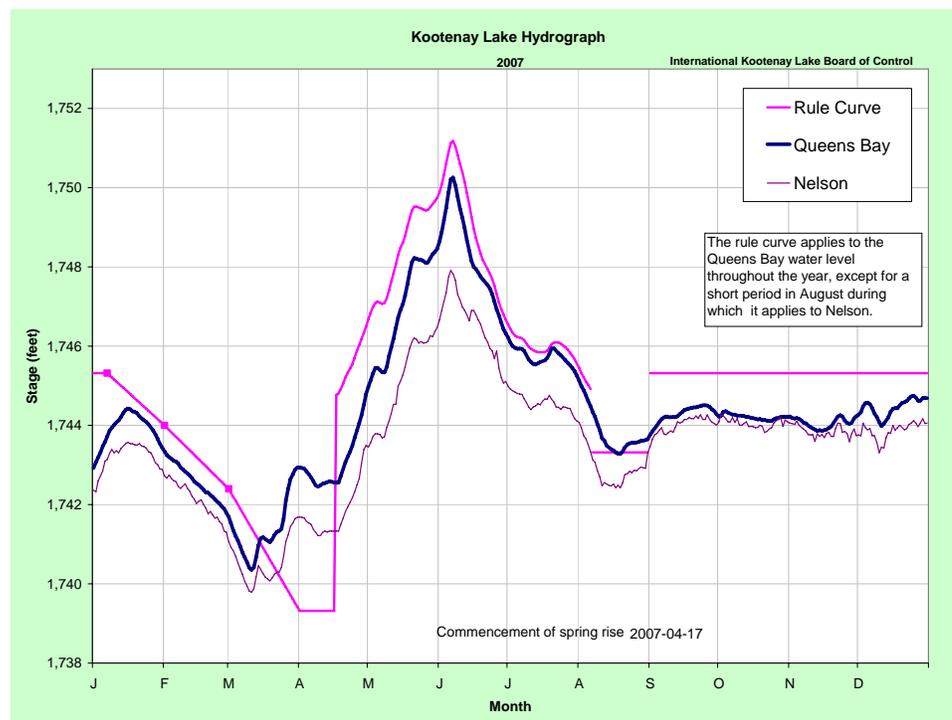
The level of Kootenay Lake was in accordance with the 1938 Order throughout 2007, except during a period in March and April when the rule curve was significantly exceeded. This is discussed on the following page.

The maximum instantaneous water level of 533.481 metres (1750.27 feet) for the lake at Queens Bay was reached on June 7th at 07:00 PST. The minimum instantaneous water level was observed on March 12th at 02:05 PST, elevation 530.435 metres (1740.27 feet). The maximum daily mean outflow was 2,081 m³/s (73,500 cfs) on June 7th; the minimum was 280 m³/s (9,900 cfs) on October 25th. Relative to the 77-year period of record (1931 to 2007 with two years missing), this year's maximum water level ranked 44th highest, and the minimum was the highest recorded annual minimum for the lake. Water levels in the lake have ranged from a high of 537.042 metres (1761.95 feet) in 1961 to a low of 529.563 metres (1737.41 feet) in 1944.

Kootenay Lake discharged 25.5 cubic kilometres (20.7 million acre-feet) of water this year through Corra Linn Dam and the Kootenay Canal Plant, with an average flow of 810 m³/s (28,600 cfs). Relative to the 70 years of available discharge data, the annual volume of flow out of the lake was 31st highest. Total lake outflow has ranged from a high of 33.8 km³ (27.4 million acre-feet) in 1954 to a low of 13.8 km³ (11.2 million acre-feet) in 1944.

The Board and the Applicant jointly determined the commencement of the spring rise to be 00:00 PST on April 17th, 2007.

FortisBC has continued to supply the Board with complete records of the regulation of Kootenay Lake as affected by the operations of Corra Linn Dam and the Kootenay Canal Plant. Pictured below is a hydrograph showing observed water levels on Kootenay Lake and allowable elevations specified in the November 11, 1938 Order.



On March 15th, the level of Kootenay Lake surpassed the rule curve prescribed by the IJC Order. By the following day, FortisBC and BC Hydro had increased the Kootenay Lake discharge to maximum possible (limited by Grohman Narrows), but this was insufficient to bring levels down. Due to high inflows, even with maximum discharge from the lake, levels exceeded the rule curve by as much as 1.1 metres (3.6 feet) around the first of April. The lake level remained above the IJC rule curve until April 17th, when the spring rise was declared.

While this exceedence of the rule curve is a situation contemplated under section 2(5) of the Order, it raised two important questions for the Board. First, is the subjective method used to determine the commencement of spring rise still satisfactory? The process presently used is to monitor Kootenay Lake inflow, hydrologic and meteorological conditions and forecasts as a basis for estimating when snowmelt inflow to the lake has increased and is likely to be sustained through the spring/summer runoff period. During the lengthy exceedence, some suggested that a more objective method for determining spring rise might be more appropriate. Second, what operational regimes of the two upstream dams are consistent with the Order? Neither the IJC nor the Board has authority over the operation of Duncan or Libby Dams. However, the Columbia River Treaty and its annual operating plans state that operations should not violate the Kootenay Order. Differences in interpretation during the exceedence period led Libby operators to restrict outflow to equal inflow, while Duncan operators allowed outflow to exceed inflow. The Board will contemplate these questions, and if necessary provide a recommendation to the Commission, over the next year.



Corra Linn Dam



Kootenay Canal Plant



Brilliant Expansion Project

Board Meetings

The Board held its annual and public meetings in Nelson, British Columbia, on September 20th, the minutes of which were delivered to the Commission shortly thereafter. Guests posed questions about the Order's rule curve, how it changes over the year and whether it has been adjusted in the past. There was some concern by farmers in the Creston Valley relayed to the Board about why the lake had not reached its usual low level in early April (the exceedence period). This is a significant concern as the farmers face increased pumping costs to drain their land when the water is high. They similarly questioned how high the lake was forecast to rise over the autumn period.

Prior to the meetings, Board members along with attending IJC staff visited the near-complete Brilliant Expansion Project on the lower Kootenay River. The Project parallels the existing Brilliant Dam, sharing its forebay. Together, they are the lowest projects on the Kootenay River, just upstream of the confluence with the Columbia. The Expansion Project adds 120 megawatts of hydroelectric capacity and should substantially reduce the need to spill water at Brilliant.