International Kootenay Lake Board of Control

2009 Annual Report to the International Joint Commission

Kootenay Canal gates

Kootenay Board members, IJC Engineers and BC Hydro staff discuss the two massive gates that can shut down the Kootenay Canal. BC Hydro's Kootenay Canal hydroelectric plant was constructed subsequent to Libby Dam, which created upstream storage and made additional hydroelectric production on the lower Kootenay River practical and economical. The four kilometre canal begins here at the forebay of Corra Linn Dam near the outlet of Kootenay Lake. The gates are designed for emergency closure of the canal or to facilitate repair to the canal or canal powerhouse. A Canal Plant Agreement and provincial water licences determine the proportion of the Kootenay that flows through the Canal Plant and Corra Linn Dam.

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Kootenay Lake 2009 Summary

Throughout 2009, FortisBC (the Applicant) regulated the level of Kootenay Lake below the maximum limits prescribed by the 1938 Kootenay Lake Order. The maximum instantaneous water level for the lake at Queens Bay was observed at 07:15 PST on June 19th at elevation 532.750 metres[1] (1747.87 feet). The minimum instantaneous water level was observed at 03:00 PST on April 8th at elevation 529.856 metres (1738.37 feet). Kootenay Lake discharged 18.1 cubic kilometres (14.7 million acre-feet) of water in 2009, with an average flow of 575 cubic metres per second (20,300 cubic feet per second).

The Board and the Applicant jointly determined the date of the commencement of the spring rise as April 8th.

2009 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 2009 were as follows:

for the United States,

Colonel Anthony Wright, 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, to January 2;

Mr. Stephen Lipscomb, Director, Idaho Water Science Center, United States Geological Survey, Boise, Idaho, from July 17;

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.

In 2009, Steve Lipscomb joined the Board of Control as a US member.

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

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

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

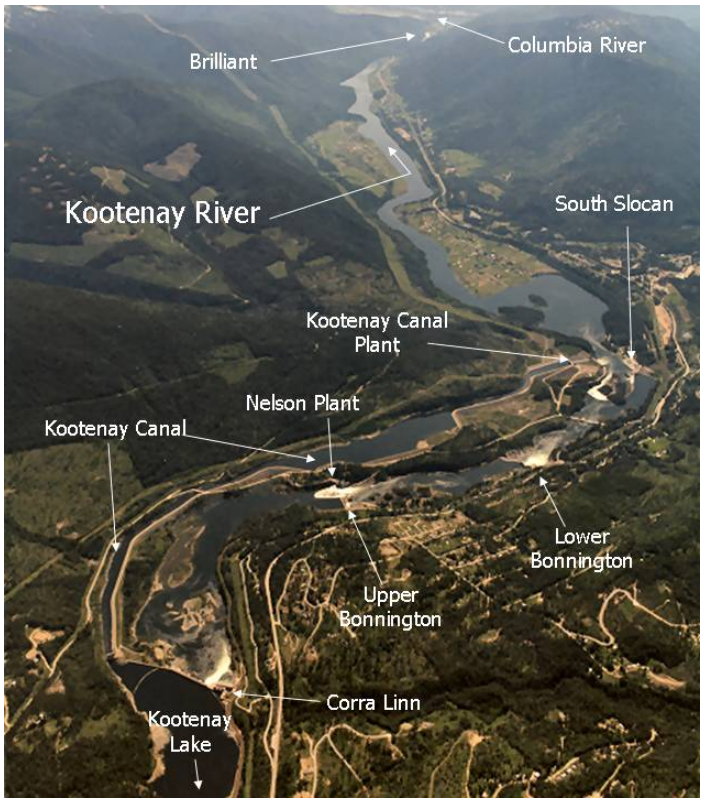
2(4) …the Applicant shall be permitted to store water in the main body of Kootenay Lake to a maximum elevation of 1745.32, Geodetic Survey of Canada datum, 1928 adjustment (i.e. six feet above zero of the Nelson gauge), in accordance with the rule curve detailed in Sub-section (5).

(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*



The Kootenay Canal parallels the main channel of the lower Kootenay River for four kilometres. Six hydroelectric plants mark this section of the river.

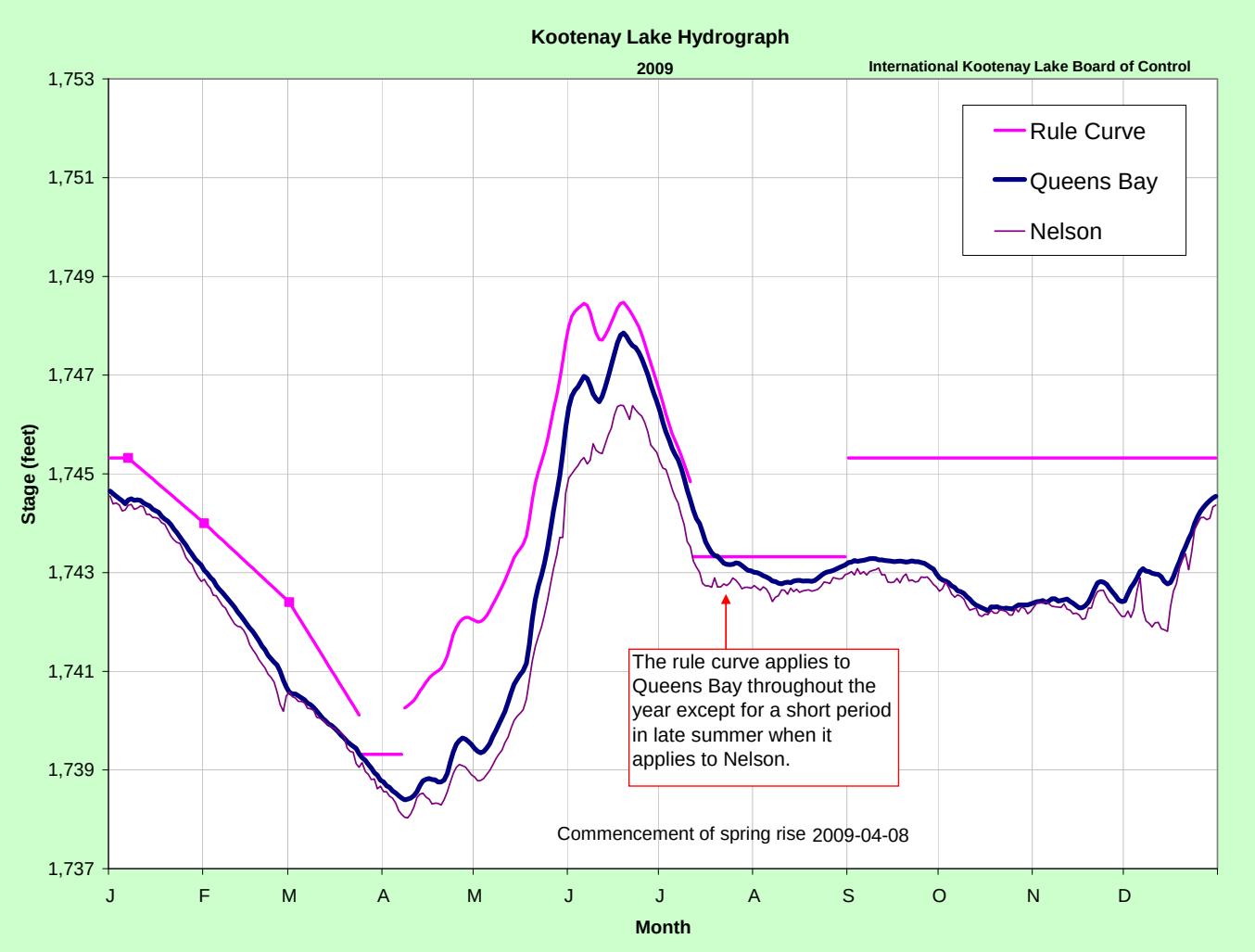
Lake Regulation

The level of Kootenay Lake was maintained in accordance with the 1938 Order throughout 2009.

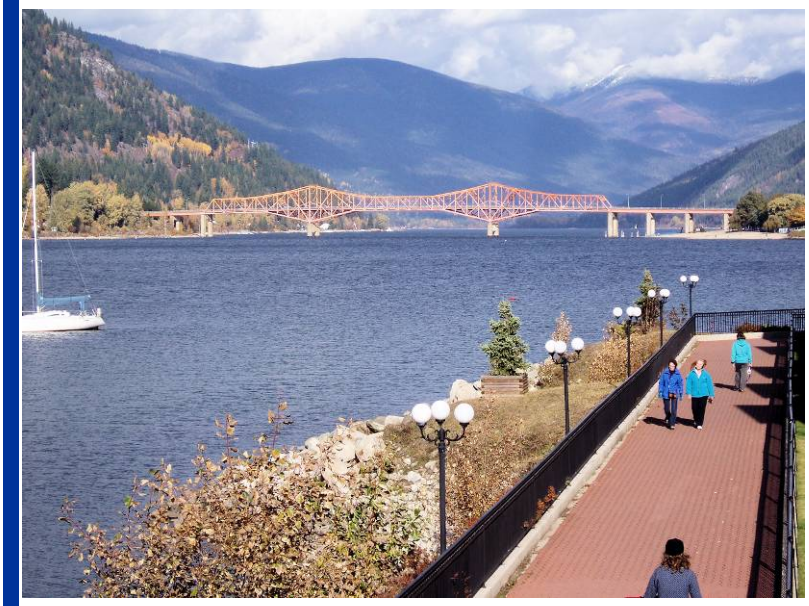
The maximum instantaneous water level of 532.750 metres (1747.87 feet) for the lake at Queens Bay was reached on June 19th at 07:15 PST. The minimum instantaneous water level was observed on April 8th at 03:00 PST, elevation 529.856 metres (1738.37 feet). Relative to the 79-year period of record (1931 to 2009 with two years missing), this year's maximum water level ranked 58th highest, and the minimum was the 12th lowest 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 18.1 cubic kilometres (14.7 million acre-feet) of water this year through Corra Linn Dam and the Kootenay Canal Plant, with an average flow of 575 m^3/s (20,300 cfs). Relative to the 72 years of available discharge data, the annual volume of flow out of the lake was 67th highest. Total lake outflow has ranged from a high of 33.8 km^3 (27.4 million acre-feet) in 1954 to a low of 13.8 km^3 (11.2 million acre-feet) in 1944. The maximum daily mean outflow was 1,515 m^3/s (53,500 cfs) on June 6th; the minimum was 263 m^3/s (9,300 cfs) on October 3rd.

The Board and the Applicant jointly determined the commencement of the spring rise to be 00:00 PST on April 8th, 2009.



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 above is a hydrograph showing observed water levels on Kootenay Lake and allowable elevations specified in the November 11, 1938 Order.



Kootenay Lake at Nelson, BC, approaches its outlet through its West Arm. This view looks east (upstream) at the Highway 3A bridge.

FortisBC, the owner of Corra Linn Dam, has reported to the Board that it is embarking on a spillway rehabilitation project. Stoplogs are normally used in a dam to close the spillway immediately behind the gates so that the gates can be inspected or repaired. At present, the Corra Linn spillway gates do not accept stoplogs, making thorough gate inspection or repair very difficult. The company is proposing to build a spillway isolation system over the next few years, then, beginning in 2012, conduct a detailed assessment of the gates. In 2013-14, they expect to construct the infrastructure required for access to the gates and finally, from 2015 to 2022, refurbish the gates at a rate of two per year. This work plan must first be submitted to the BC Utilities Commission for approval.

Board Meetings

The Board held its annual and public meetings in Nelson, British Columbia, on October 22nd, the minutes of which were delivered to the Commission shortly thereafter. Guests raised a series of questions about lake levels, lake level fluctuations, shoreline erosion, and the Columbia River Treaty. One guest posited that the Order should be reopened in light of its age and the impacts of climate change on the Kootenay system.

Following the annual meeting, the Board met with representatives of the Columbia River Treaty Operating Committee (CRTOC) to consider a model developed by the Committee to predict the commencement of spring rise. (See section 2(6) of the Kootenay Order transcribed above.) While the Board members appreciated the effort, they found the model somewhat inaccurate in that it predicted the beginning of the freshet as opposed to the start of the spring rise in lake level. The Board members offered to have the Secretaries meet again with the CRTOC to further discuss the model.

Prior to the meetings, Board members along with attending IJC staff toured FortisBC's Corra Linn Dam, the subject of the 1938 Order, along with BCHydro's Kootenay Canal Plant.