International Kootenay Lake Board of Control

2012 Annual Report to the International Joint Commission

Kootenai Flats

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Kootenay Lake Board of Control members toured Kootenai Flats between Bonners Ferry, Idaho and Copeland, Idaho on September 26th, 2012. This three-mile wide valley is prime agricultural land in Northern Idaho. The 1938 IJC Order of Approval limits the water level in Kootenay Lake and hence the backwater up the Kootenai River into Idaho. In addition, the Order calls for limited reimbursement to be paid to farmers on the Flats to counter increased pumping costs related to higher river levels caused by water storage behind Corra Linn Dam.

2012 Annual Report

This Annual Report covers the operations of Corra Linn Dam by FortisBC (Fortis) (the Applicant) and the associated effects on the water level of Kootenay Lake. Fortis operates Corra Linn Dam on the Kootenay River approximately 22 kilometres upstream from its confluence with the Columbia River, and downstream from the West Arm of Kootenay Lake. Fortis controls discharge through and around Corra Linn Dam in accordance with requirements of the Order of the International Joint Commission (IJC) dated November 11, 1938. Fortis co-operates with BC Hydro, which also manages a lake level control structure, the Kootenay Canal Project, next to Corra Linn Dam.

Kootenay Lake 2012 Summary

Throughout 2012, Fortis operated Corra Linn Dam in a manner consistent with that prescribed by the 1938 Kootenay Lake Order.

The minimum instantaneous water level was observed at 03:01 PST on March 27th at elevation 530.23 metres (1739.61 feet). Kootenay Lake levels did not lower to the elevation of 1739.32 feet specified for April 1 in condition 6 of the 1938 Order because of high inflow conditions resulting primarily from the operation of upstream dams in late March and April. During this time, Fortis lowered the level of the Corra Linn Dam forebay sufficiently to move the control of outflow from the lake upstream from the Dam to Grohman Narrows, maximizing the lake's discharge. Agricultural impacts related to reduced gravity drainage of fields and associated higher pumping/drainage costs were reported to the Kootenay Lake Board of Control (KLBOC or the Board), as well as difficulties in conducting annual repairs and other work around the lakeshore.

Kootenay Lake discharged 33.4 cubic kilometres (27.1 million acre-feet) of water in 2012, with an average flow of 1056 cubic metres per second (37,300 cubic feet per second). Relative to the 75 years of available discharge data, the annual volume of flow out of the lake was 3rd highest over this period of record.

The maximum instantaneous water level for the lake at Queens Bay was observed at 20:01 PST on July 3rd at elevation 534.55 metres[1] (1753.78 feet). Relative to the 82-year period of record (1931 to 2012, with two years missing), this year's maximum water level ranked 27th highest.

The Board and the Applicant jointly determined the date of the commencement of the spring rise as April 20th, 2012.

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

Board Membership

The Board members during 2012 were as follows:

For the United States:,

Colonel Bruce Estok, District Engineer, Seattle District,
United States Army, Corps of Engineers, Seattle, Washington;

Mr. Michael Lewis, Director, Idaho Water Science Center,
United States Geological Survey, Boise, Idaho;

For Canada:

Mr. Kirk Johnstone, Chief, Pacific Storm Prediction Centre
Environment Canada, Vancouver, British Columbia through October 22, 2012

Mr. Bruno Tassone, Manager, Water Survey
Environment Canada, Vancouver, British Columbia October 22, 2012 through December 31, 2012.

Mr. Glen Davidson, Director, Water Management Branch,
BC Ministry of Lands, Forests and Natural Resource Operations,
Victoria, British Columbia.

Board Secretariat:

Ms. Amy Reese and Mr. Gwyn Graham provided secretariat support to the US and Canadian sections, respectively.

Notes on changes to Board Membership:

Mr. Kirk Johnstone retired from Environment Canada in June of 2012. Mr. Johnstone was Chair of the Canadian Section from 1998 to 2012. The Canadian Board Chair duties have transferred to Mr. Bruno Tassone (Environment Canada).

Mr. Bruno Tassone assumed the position of Chair, Canadian Section of the Board on October 22nd
Mr. Michael Lewis assumed the position of US Section Board Member on September 1st.

Kirk Johnstone

Bruno Tassone

Michael Lewis

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*

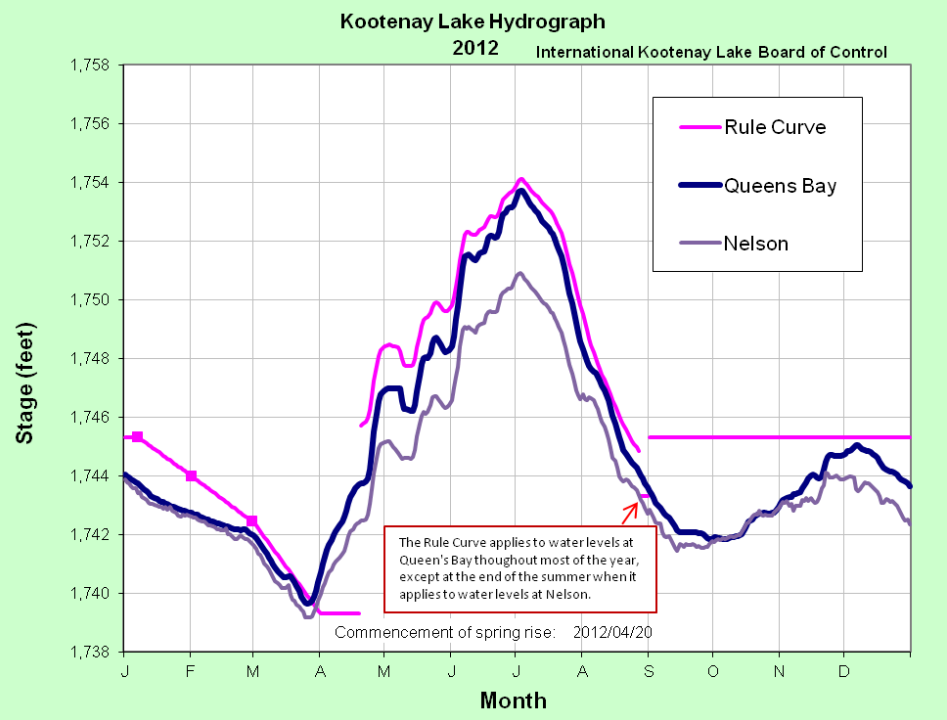
Lake Regulation

Figure 1 presents observed calendar-year 2012 water levels on Kootenay Lake and the elevations specified in the November 11, 1938 IJC Order. The maximum instantaneous water level of 534.55 metres (1753.78 feet) for the lake at Queens Bay was reached on July 3rd at 20:01 PST. The minimum instantaneous water level was observed on March 27th at 03:01 PST, elevation 530.23 metres (1739.61 feet). Relative to the 82-year period of record (1931 to 2012, with two years missing), this year's maximum water level ranked 27th highest, and the minimum was the 70th lowest annual minimum for the lake over the 82 year period of record (there are two years of missing data; 1934 and 1947). Over the period of record, water levels in the lake have ranged from a high of 537.04 metres (1761.95 feet) in 1961 to a low of 529.56 metres (1737.41 feet) in 1944.

The maximum lake elevation in 2012 was the highest since 1974. In almost all years the peak lake elevation is predominantly caused by snowmelt. Although the basin snowpack was large (126 % of average), the peak lake elevation was accentuated by record June rainfall with virtually all stations reporting from 100% to 300% of average.

Kootenay Lake discharged 33.4 cubic kilometres (27.1 million acre-feet) of water this year through Corra Linn Dam and the Kootenay Canal Plant, with an average flow of 1056 m^3/s (37,300 cfs). Relative to the 75 years of available discharge data, the annual volume of flow out of the lake was 3rd highest over this period of record. 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 2,733 m^3/s (96,500cfs) on July 2nd; the minimum was 178 m^3/s (6,300 cfs) on October 16th.

Figure 1



Fortis 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. Fortis attempts to operate the lake within the optimal range of 1738.5 ft to 1749.5 ft, subject to the stipulations of the IJC Order.

In March 2011, Board members received information on a Columbia River Treaty Operating Committee (CRTOC) decision that Treaty facilities would not be required to reduce releases in the event of Kootenay Lake exceeding the IJC rule curve. This CRTOC decision remains in effect for the two upstream dams, Libby and Duncan.

Fortis, the owner of Corra Linn Dam, reported to the Board that Kootenay Lake failed to reach the low water target of 1939.32 ft on April 1st, as per the IJC Order. Exceptionally high run-off inflows and releases from storage at Libby and Duncan projects contributed to high lake levels prior to the declaration of commencement of the spring rise even though the lake was effectively under free-fall conditions where the lake discharge is controlled by Grohman Narrows and not Corra Linn Dam.

The Board and the Applicant jointly determined the commencement of the spring rise to be 12:00 PST on April 20, 2012.

The company undertakes preventative maintenance of its water level recorders twice each year. Fortis is currently working to secure firm access rights to the Queen's Bay water gauge.

According to the 1938 Order, Fortis must pay farmers on the Kootenai Flats in Idaho up to $3,000.00 for additional pumping costs related to dyke seepage from higher water levels during storage periods. A number of years ago, Fortis made a separate agreement with the State for an additional payment. Fortis paid the Idaho farmers $24,681.76 in April 2012 to cover 2011 pumping costs. Payment for 2012 costs is pending.

2012 High Water on Kootenay Lake (Marko Aaltomaa, FortisBC)

Fortis engaged a consulting firm to inspect Corra Linn dam spillgates. The firm found the gates to be in good structural condition, but recommended that all the gates be recoated. Fortis has applied to British Columbia Utilities Commission for approval of the Spillgate Refurbishment project and anticipates that work will begin in 2014.

Board Meetings

The Board held its annual and public meetings in Bonners Ferry, Idaho on September 26th, 2012. The minutes have been delivered to the Commission. Most of the concerns expressed by the guests at the public meeting related to the high water levels experienced in the spring and summer, 2012. Some of the questions and comments related to operation of Libby and Duncan projects that are upstream of Kootenay Lake. The Board stated that the 1938 Order is directed solely to Fortis and the operation of the upstream dams is a matter for the two federal governments to determine. Board members explained that the Applicant, Fortis operated Corra Linn Dam to keep the maximum lake level as low as possible by utilizing the full hydraulic capacity at the lake outlet at Grohman Narrows. High water levels were principally attributable to the fact that the freshet runoff volume was the highest since 1974.

During the Board's annual (business) meeting, several presentations were provided, as follow:

- The Board secretariat, Amy Reese and Gwyn Graham, provided presentations on factors that influenced the 2012 Kootenay Lake hydrograph. The high peak lake level, elevation 1753.8 was principally attributable to a slightly above average snow pack and record level summer rain.

- On behalf of the Columbia River Treaty Operating Committee (CRTOC), Ron Malmgren (United States Army Corps of Engineers) gave a presentation to the Board evaluating a study of the effects of Libby and Duncan dams flood risk management operation on Kootenay Lake. This study was conducted to assess the potential for incomplete flood storage evacuation at Libby and Duncan Dams (a.k.a. trapped storage) that may result from attempts to operate to not exceed maximum elevation limits on Kootenay Lake. In the past, Libby Dam would decrease its draft rate if Kootenay Lake elevation rose above the IJC rule curve. There is concern that "trapped storage" could adversely impact both system and local flood risk management. The Board acknowledged that operation of the upstream dams in 2012 provided flood risk management benefits by reducing the annual peak Kootenay lake level; however, the Board continues to be concerned that early spring drafting at the upstream dams may have adverse impact in the early spring on agricultural lands. Agriculture risk management was a primary consideration in the drafting of the 1938 Order.

- The Columbia River Treaty Operating Committee's report includes a statement that "With the addition of Duncan and Libby Reservoirs upstream, the need to draft Kootenay Lake to elevation 1739.32 ft (measured at Queens Bay) has been reduced". This assertion is reasonable from a flood risk management perspective but may not reflect other needs and interests, especially agricultural, served by the seasonal low-water elevation requirement in the 1938 Order. Current information is sparse and conflicting concerning frequency and magnitude of pumping required by farmers in the Kootenai Flats area in the March-April time frame. The Board notes that three major Kootenai Flats farmers stated incidental to discussions at the 2012 Kootenay

Board Public Meeting that pumping or drainage was not an issue during the 28 March-19 April period in 2012. Kootenai Lake was from 0.1 to 4.3 feet above the rule curve during that period. All stated that period was too early to adversely affect agriculture. On the other hand, four major Canadian farmers, in a February 14, 2008 letter to the Board, had previously stated that gravity drainage and pumping in April is an issue.

- Marko Aaltomaa of Fortis reported that Fortis did a visual damage survey when Kootenay Lake was near its maximum level, 1753.8 feet. Although BCHydro reports have indicated "zero damage level" is about elevation 1750, Fortis's visual survey indicated relatively minor to moderate damage at maximum lake level this year. Some basements were flooded, operations at some marinas were restricted and some docks were damaged or not functional.
- Kelvin Ketchum stated that BCHydro is studying the possibility of increasing hydraulic capacity at Grohman Narrows. The study is in a preliminary stage and the cost of achieving increased capacity, if feasible, has not been determined. Qualitatively, it is likely that increased capacity would provide flood risk reduction benefits on Kootenay Lake and hydropower benefits at downstream projects.