International Osoyoos Lake Board of Control

2011 Annual Report to the International Joint Commission

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Cover: Zosel Dam, Oroville, Washington

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The International Osoyoos Lake Board of Control was established on September 12, 1946, by the International Joint Commission (IJC) to carry out the provisions of the Commission's Order. The present Board operates under the authority of the Commission's Order dated December 9, 1982, and the Supplementary Order of Approval dated October 17, 1985.

ACTIVITIES OF THE BOARD

On February 9, 2011, Board members attended an IJC Executive Meeting in Vancouver, B.C.

Board members attended the Osoyoos Lake Water Science Forum in Osoyoos, B.C., on September 18-20, 2011 http://www.obwb.ca/olwsf. At the forum, presentations were given on each of the eight studies conducted for the IJC's process of renewing the Osoyoos Lake Orders (the eight studies are listed in the appendix).

On September 21, 2011, the Board held its annual Board meeting in Osoyoos.

On October 18, 2011, the Board participated by videoconference in the Commission's Fall Semi-Annual meeting in Ottawa.

On December 12-13, 2011, Board members met in Seattle, WA to discuss the renewal of the Osoyoos Lake Orders which is scheduled to occur in 2013.

On July 29, 2011, Colonel Bruce Estok replaced Colonel Anthony Wright as a U.S. Board member. In December 2011, Daniel Millar ended his term as Secretary of the Canadian Section of the Osoyoos Lake Board of Control concurrent with his retirement from Environment Canada.

HYDROLOGIC CONDITIONS IN 2011

Drought Criteria

Condition 8 of the Commission's Order of Approval dated December 9, 1982, provides three criteria for declaring a year of drought (table 1). In a year of drought, the level of Osoyoos Lake during summer may be managed within a wider range as compared to non-drought years (drought year water-level ranges are discussed in the next section). Drought conditions were not in effect in 2011 as indicated by the actual values for the drought criteria presented in table 1.

Table 1. Summary of drought criteria and actual values in 2011. [ac-ft, acre-feet; ft, feet]

Criteria for declaring a drought	Actual value in 2011	Drought criteria met?
Condition 8(a) - Volume of flow in the Similkameen River at Nighthawk, WA, for the period April through July is less than 1 million acre-feet	1,810,600 ac-ft	No
Condition 8(b) - Net inflow to Okanagan Lake for the period April through July is less than 195,000 acre-feet	509,750 ac-ft	No
Condition 8(c) - Level of Okanagan Lake in June or July is less than 1,122.80 feet (Canadian Geodetic Survey Datum)	1,124.19 feet	No

Osoyoos Lake Levels

Throughout any given year, the level of Osoyoos Lake may fluctuate in accordance with criteria specified in the IJC's Order of Approval dated December 9, 1982. Lake levels are influenced naturally by discharge in the Okanagan and Similkameen Rivers and by the operation of Zosel Dam, situated at the outlet of the lake. The Oroville-Tonasket Irrigation District operates Zosel Dam under authority from the State of Washington, Department of Ecology.

The blue area in figure 1 shows the authorized range of normal operating elevations, 909.0 to 911.5 feet (277.06 to 277.83 meters) in the winter months and 911.0 to 911.5 feet (277.67 to 277.83 meters) in summer. The area contained within the dotted line in figure 1 shows the authorized range of elevations, 910.5 to 913.0 feet (277.52 to 278.28 meters) that may be used to manage storage from April 1 to October 31 if at least one of the drought criterion listed in table 1 is declared in effect by the Board. Condition 9 of the 1982 Order recognizes that backwater from high flow in the Similkameen River and (or) excessive flow in the Okanagan River may cause Osoyoos Lake levels to rise above the authorized range.

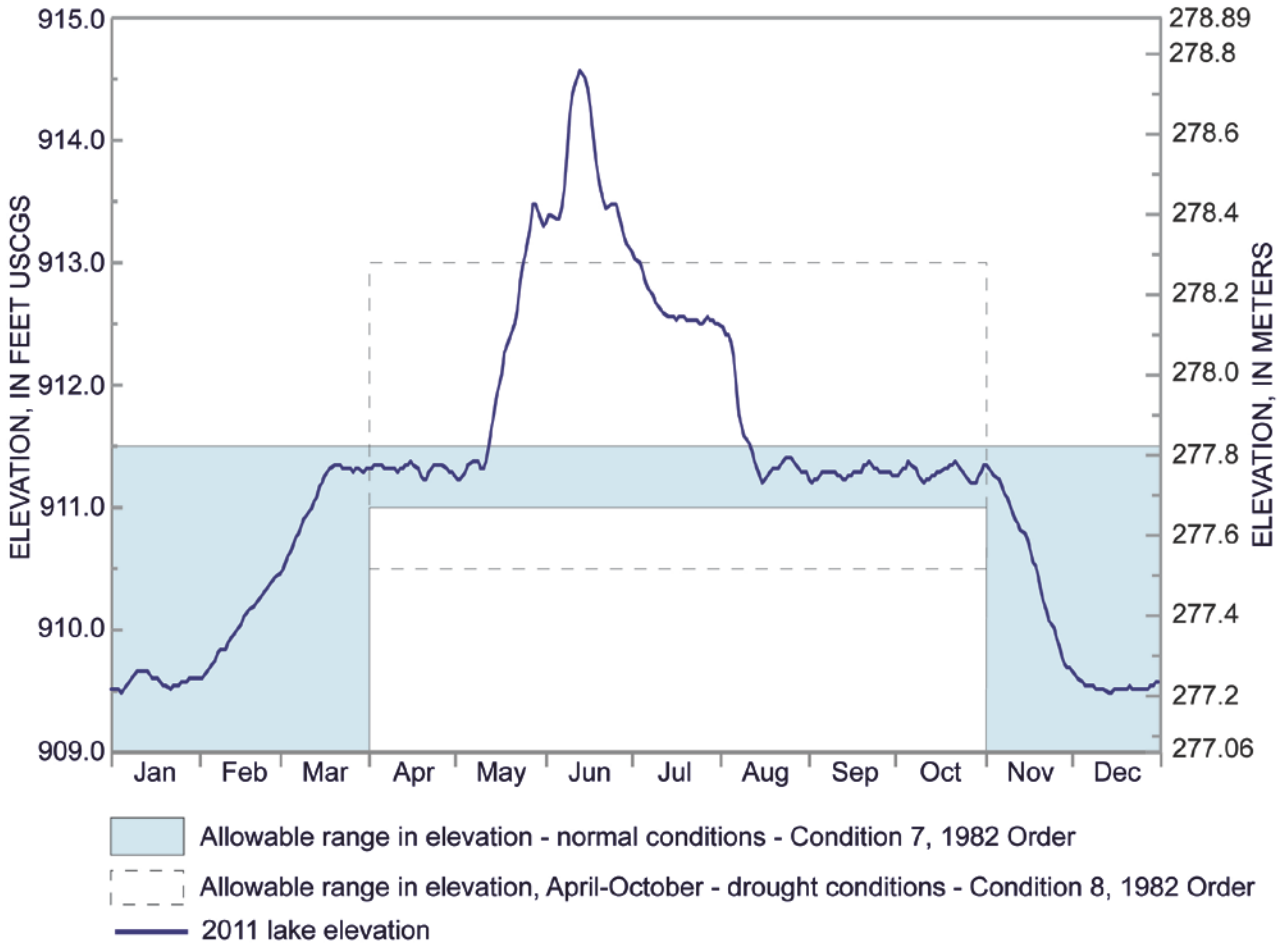

Figure 1. Osoyoos Lake elevation in 2011 and the range of lake levels permitted under the IJC Order of Approval dated December 9, 1982.

The State of Washington operated Zosel Dam consistent with the Commission's 1982 Order of Approval for normal conditions (non-drought years). Natural conditions (i.e. high flow in the Okanagan and Similkameen Rivers) caused the level of the lake to rise above the maximum authorized level of 911.5 feet from May 12 to August 10, 2011. During this time, the outlet gates on Zosel Dam were pulled completely out of the water.

The maximum instantaneous elevation on Osoyoos Lake of 914.58 feet (278.764 meters) occurred on June 13, 2011. The maximum daily-mean elevation of 914.57 feet (278.761 meters) also occurred on June 13. The minimum instantaneous elevation of 909.51 ft (277.219 meters) occurred on January 4 and 5.

River Discharges

The maximum instantaneous discharge of the Okanogan River at Oroville (downstream from Zosel Dam) occurred on May 29 and June 17, 2011, and was 3,020 cubic feet per second (85.5 cubic meters per second). The peak flow exceeded 2,500 cubic feet per second (70.8 cubic meters per second); thus, the capacity of the outlet channel was verified in accordance with Condition 3 of the 1985 Order. The previous occurrence of an instantaneous discharge in the Okanogan River at Oroville greater than 2,500 cubic feet per second was on June 16, 2006 (2,690 cubic feet per second). In November 2007, the State of Washington submitted HEC-RAS model results to the Board, thus completing the 2006 channel capacity analysis. The results verified the conveyance of the Okanogan River above Zosel Dam is at least 2,500 cubic feet per second at a lake elevation of 913 feet. The assurance of conveyance upstream of the dam is included in condition 4 of the 1985 Supplementary Order of Approval and is in accord with the Board's requirements for step-backwater hydraulic analysis as approved in their September 16, 1998 meeting.

The maximum instantaneous discharge of the Similkameen River occurred on June 9 and 10, 2011, and was 20,500 cubic feet per second (580 cubic meters per second). The maximum daily-mean discharge of 20,300 cubic feet per second (575 cubic meters per second) occurred on June 10. High flow in the Similkameen River created variable backwater at the Okanogan River at Oroville gaging station from May 15 – July 20. The total volume of flow in the Similkameen River for 2011 (2.206 million acre-feet, 2,720 hectometers) was 133 percent of average and ranked as the sixteenth highest runoff volume in 83 years of record.

Data on Osoyoos Lake elevation and relevant river flows for 2011 are summarized in the appendix and river hydrographs are depicted in figure 2.

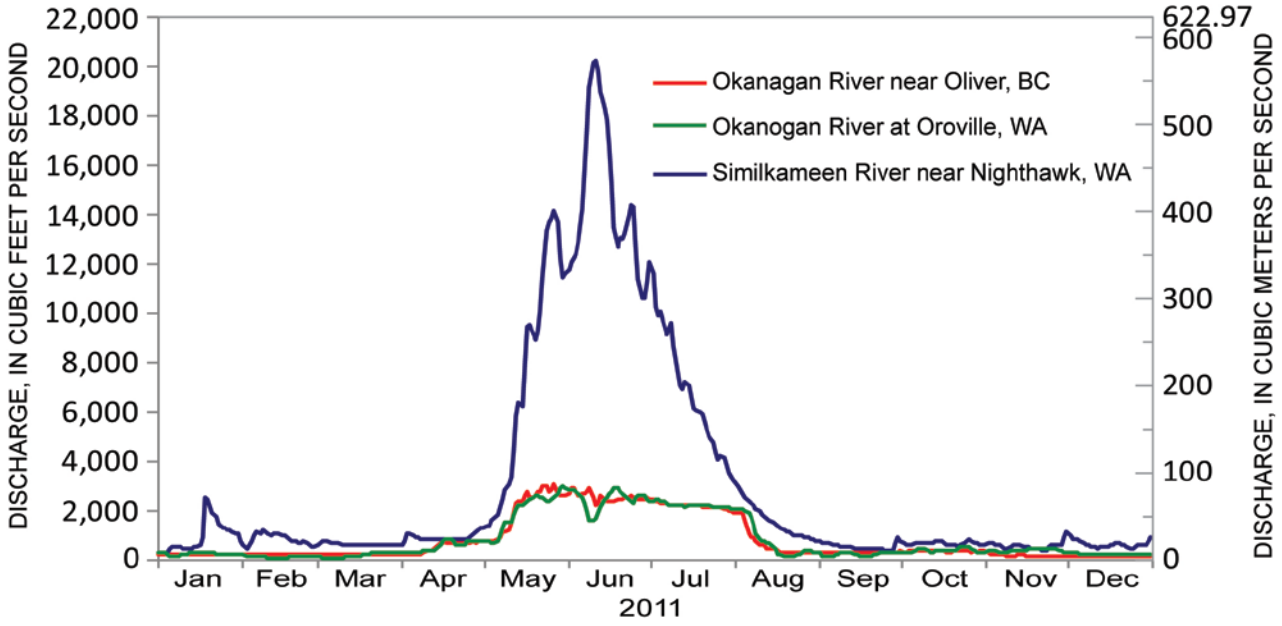

Figure 2. Hydrographs of daily-mean discharge for the Similkameen and Okanogan (Okanagan in Canada) Rivers, 2011.

APPENDIX

STUDIES LISTED IN THE PLAN OF STUDY FOR RENEWAL OF THE OSOYOOS LAKE ORDERS

1. An assessment of the most suitable water levels for Osoyoos Lake during drought years.
2. An evaluation of the criteria used to declare drought.
3. A review of the dates for switching between summer and winter operation.
4. An investigation of the effects, if any, of water regulation on water quality in Osoyoos Lake.
5. An investigation of methods for including ecosystem requirements in Orders of Approval.
6. An investigation of methods for including climate change information in Orders of Approval.
7. A Demonstration of the factors that govern lake levels during floods.
8. An assessment of the methods used to monitor flow capacity in the Okanogan River.

OSOYOOS LAKE LEVELS, INFLOWS, AND OUTFLOWS
[cubic feet per second, cfs; cubic meters per second, cms]

A. International gaging stations in operation throughout the year:

(1) For Stage Records
Osoyoos Lake near Oroville, Washington
Okanogan River at Oroville, Washington (auxiliary gage)

(2) For Discharge Records
Okanagan River near Oliver, British Columbia
Okanogan River at Oroville, Washington (base gage)
Similkameen River near Nighthawk, Washington

(3) Reports
Monthly summary reports of stage and discharge data were forwarded to the International Joint Commission and to the Board of Control members.

B. Compliance with the lake levels specified in the Orders of Approval is measured at the station "Osoyoos Lake near Oroville," where elevations are expressed in terms of USCGS datum.

C. Osoyoos Lake

Maximum daily mean elevation	914.57 feet (278.761 meters)– June 13
Maximum instantaneous elevation	914.58 feet (278.764 meters)– June 13
Minimum instantaneous elevation	909.51 feet (277.219 meters)– January 4, 5
Lake elevation at time of peak flow for Okanogan River at Oroville	913.44 feet (278.417 meters)– May 29, 913.97 feet (278.578 meters)– June 17

D. Okanogan River at Oroville

Maximum instantaneous discharge	3,020 cfs (85.5 cms)– May 29, June 17
Maximum daily mean discharge	2,980 cfs (84.4 cms)– May 29
Annual mean discharge	839 cfs (23.8 cms)

The annual mean discharge was 126 percent of the 69-year average of 667 cfs.

E. Similkameen River near Nighthawk

Maximum instantaneous discharge	20,500 cfs (580 cms)– June 9,10
Maximum daily mean discharge	20,300 cfs (575 cms)– June 10

High Similkameen River discharges created variable backwater at the Okanogan River at Oroville gaging station for the period May 15 – July 20.

INTERNATIONAL OSOYOOS LAKE BOARD OF CONTROL MEMBERSHIP

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