

# **International Osoyoos Lake Board of Control**

## **2013 Annual Report to the International Joint Commission**



**TABLE OF CONTENTS**

ACTIVITIES OF THE BOARD ..... 1

HYDROLOGIC CONDITIONS IN 2013 ..... 2

    Drought Criteria ..... 2

    Osoyoos Lake Levels ..... 3

    River Discharges..... 4

2013 OSOYOOS LAKE LEVELS, INFLOWS, AND OUTFLOWS ..... 6

Cover: Zosel Dam on the Okanogan River (September 2013).

# **International Osoyoos Lake Board of Control**

## **2013 Annual Report to the International Joint Commission**

The International Osoyoos Lake Board of Control (IOLBC or Board) was established on September 12, 1946, by the International Joint Commission (IJC or Commission) to carry out the provisions of the Commission's Order. In 2013 the Board operated under the authority of the Commission's new Supplementary Order dated January 29, 2013.

### **ACTIVITIES OF THE BOARD**

On January 29<sup>th</sup>, 2013, the IJC issued a new Supplementary Order of Approval for Zosel Dam, resulting in some new operating conditions and changes to seasonal water level targets on Osoyoos Lake.

On March 7<sup>th</sup>, the IOLBC revised the Frequently Asked Questions in the IOLBC section of the IJC's website.

From late March through July, the Board corresponded with various concerned parties about the high water levels in the Okanagan River system and Osoyoos Lake that resulted from the large water supply. The Board confirmed with the Washington State Department of Ecology that Zosel Dam was operated so that all gates were out of the water during the high-water periods in mid-May and June-early July until the lake level declined to within the limits set by the new (2013) Supplementary Order of Approval.

On April 10<sup>th</sup>, the Board announced that drought criteria were not met and that the Board did not plan to issue a drought declaration for 2013.

On April 17<sup>th</sup>, the IOLBC presented to the IJC during its semi-annual meeting in Washington, DC. Presentation topics included the implementation of the new Supplementary Order of Approval and associated rule curve, related public reaction and communication responses by the Board, as well as the Board's work with the Commission on the development of a consolidated Order. An overview of hydrologic conditions and Applicant compliance was provided for the past year, as well as an initiative undertaken by the Board to improve website information about lake level changes and a summary of current Board membership. The Board also reported on general reluctance by British Columbia and Washington State on the possible application of the International Watershed Initiative (IWI) model for the Osoyoos Board.

On May 5<sup>th</sup> and May 23<sup>rd</sup>, the Board responded to public enquiries regarding high water levels on Osoyoos Lake. The Board explained the hydrologic situation and confirmed Zosel Dam compliance with the IJC Order.

On June 6<sup>th</sup>, the Board received a new Board Directive from the Commission, outlining a Board mandate and duties, including the requirement for a formal work plan.

On June 19<sup>th</sup>, the Board met by conference call for a preliminary discussion on development of a formal IOLBC work plan.

On June 21<sup>st</sup>, The Board secretaries issued lake level updates on a new "Lake Level Status and Trends" page in the IOLBC section of the IJC's website. Additional updates were added to explain current and upcoming changes in lake level elevations on July 2<sup>nd</sup>, July 22<sup>nd</sup> and October 1<sup>st</sup>.

On July 18<sup>th</sup>, the Commission requested Board review of a draft of a document that consolidates all Orders of Approval and Supplementary Orders of Approval for Osoyoos Lake from 1946 through 2013. This new document is referred to as the "Consolidated Orders." The Board provided review comments on August 2<sup>nd</sup> and the IJC approved the Consolidated Orders on December 10, 2013.

On July 26<sup>th</sup>, the Board received documentation on the IJC's International Watersheds Initiative (IWI) special projects initiative and information on the process for obtaining IJC funding for special projects.

On September 9<sup>th</sup>, the Board received a copy of the 2<sup>nd</sup> Periodic Dam Safety Inspection report for Zosel Dam from Washington State Department of Ecology (Dam Safety Office). The report indicated that the dam is well maintained and operated and that the project meets structural and hydrologic criteria for dam safety. The report recommended a complete evaluation of the gate system and that the Operation and Maintenance Plan be separated from the Operating Procedures Plan and be updated with gate repair procedures and current operator contact information.

On September 10<sup>th</sup>, the annual Board and public meetings were held in Osoyoos. Minutes of both meetings are available in the IOLBC section of the IJC's website. At the public meeting, the Board provided an overview of the Board mandate and activities, and a summary of changes brought about by the Supplementary Order of 2013, including changes to the rule curve. The Board visited Zosel Dam on September 11<sup>th</sup> and received a tour of the facility led by operational staff of the Oroville-Tonasket Irrigation District and Washington State Department of Ecology.

On December 10<sup>th</sup>, The Canadian Board co-chair, Bruno Tassone, provided an IOLBC presentation in person at the 2013 Fall semi-annual IJC meeting in Ottawa. The IJC acknowledged the Board's efforts to improve communication with the public and access to information on changes to lake levels. The IJC also requested that the Board finalize its workplan for the next year.

## **HYDROLOGIC CONDITIONS IN 2013**

### **Drought Criteria**

Condition 8 of the Commission's Supplemental Order of Approval dated January 29, 2013, 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 2013 as indicated by the actual values for the drought criteria presented in table 1.

**Table 1.** Summary of drought criteria and actual values in 2013. [ac-ft, acre-feet; ft, feet]

Criteria for declaring a drought	Actual value in 2013	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	1,504,701 ac-ft	No
Condition 8(b i) - Net inflow to Okanagan Lake for the period April through July is less than 195,000 acre-feet	567,540 ac-ft	No
Condition 8(b ii) - Level of Okanagan Lake in June or July is less than 1,122.60 feet (Canadian Geodetic Survey Datum)	1123.90 ft (max. lake level)	No

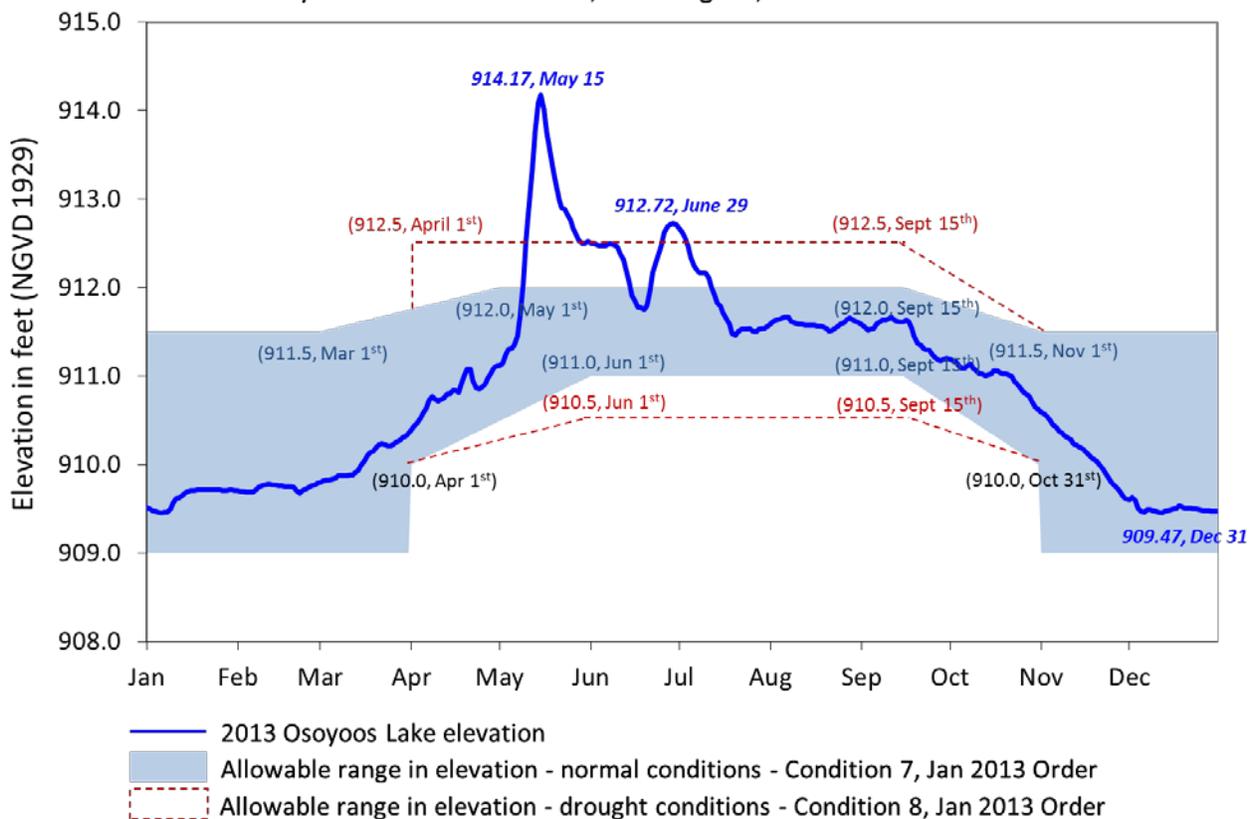
### Osoyoos Lake Levels

Throughout any given year, the level of Osoyoos Lake may fluctuate in accordance with criteria specified in the IJC’s Supplemental Order of Approval dated January 29, 2013. Lake levels are influenced naturally by discharge in the Okanagan and Similkameen Rivers and by the operation of Zosel Dam, situated about 1.6 mi (2.6 km) downstream from the outlet of Osoyoos Lake. The Oroville-Tonasket Irrigation District operates Zosel Dam under authority of the Washington State Department of Ecology.

The blue area in Figure 1 shows the authorized range of normal operating elevations: an upper range of 911.5 feet (277.8 meters) on 1 January; 911.5 feet (277.8 meters) on 1 March; 912 feet (278.0 meters) on 1 May; 912 feet (278.0 meters) on 15 September; 911.5 feet (277.8 meters) on 1 November and 911.5 feet (277.8 meters) on 31 December; and to the extent possible the elevation of Osoyoos Lake does not fall below the NGVD 1929 elevation of 909.0 feet (277.0 meters) on 1 January; 909.0 feet (277.0 meters) on 31 March; 910.0 feet (277.4 meters) on 1 April; 911 feet (277.7 meters) on 1 June; 911 feet (277.7 meters) on 15 September; 910.0 feet (277.4 meters) on 31 October; 909.0 feet (277.0 meters) on 1 November and 909.0 feet (277.0 meters) on 31 December. Elevation limits are linearly interpolated between dates.

The area contained between the red dashed lines in Figure 1 shows the IJC’s authorized range of elevations that may be used to manage water storage from April 1 to October 31 if criterion 8(a) and either 8(b i) or 8(b ii) of the drought criteria listed in table 1 are declared in effect by the Board. During such conditions, the elevation of Osoyoos Lake may be raised to 912.5 feet (278.1 meters) from 1 April to 15 September, after which the lake level shall be decreased to reach an elevation 911.5 feet (277.8 meters) by 1 November. To the extent possible, the elevation of Osoyoos Lake should not fall below 909.0 feet (277.1 meters) on 1 January; 909.0 feet (277.1 meters) on 31 March; 910.0 feet (277.4 meters) on 1 April; 910.5 feet (277.5 meters) on 1 June; 910.5 feet (277.5 meters) on 15 September; 910.0 feet (277.4 meters) on 31 October; 909.0 feet (277.1 meters) on 1 November and 909.0 feet (277.1 meters) on 31 December. Between dates, elevation limits are to be linearly interpolated. 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.

Actual and Allowable Lake Elevations per IJC Orders of Approval,  
Osoyoos Lake near Oroville, Washington, USGS Station 12439000



**Figure 1** – Osoyoos Lake elevation in 2013 and the range of lake levels permitted under the IJC Supplemental Order of Approval dated January 29, 2013.

The State of Washington operated Zosel Dam consistent with the Commission's 2013 Supplemental Order of Approval for normal conditions (non-drought years). Natural conditions caused the level of the lake to rise above the maximum authorized level of 911.5 feet over two distinct periods in 2013. High flow in the Similkameen River due to low- to mid-elevation snowmelt and a possible backwater effect on Osoyoos Lake outflow at the confluence of the Similkameen and Okanogan Rivers likely contributed to the first water level exceedance from May 5 to June 15. Later high-elevation snowmelt in addition to sustained rainfall in June resulted in high outflow from Okanogan Lake and contributed to the second exceedance from June 17 to July 4, 2013. During these events, the outlet gates on Zosel Dam were pulled completely out of the water.

The maximum instantaneous elevation on Osoyoos Lake of 914.19 feet (278.65 meters) occurred on May 15, 2013 at 02:30 PDT. The maximum daily mean elevation on Osoyoos Lake of 914.17 feet (278.64 meters) also occurred on May 15, 2013. The minimum instantaneous elevation of 909.44 feet (277.20 meters) occurred on January 6 and 7, and December 12. The minimum daily mean elevation of 909.45 feet (277.20 meters) occurred on January 6 and December 12, 2013.

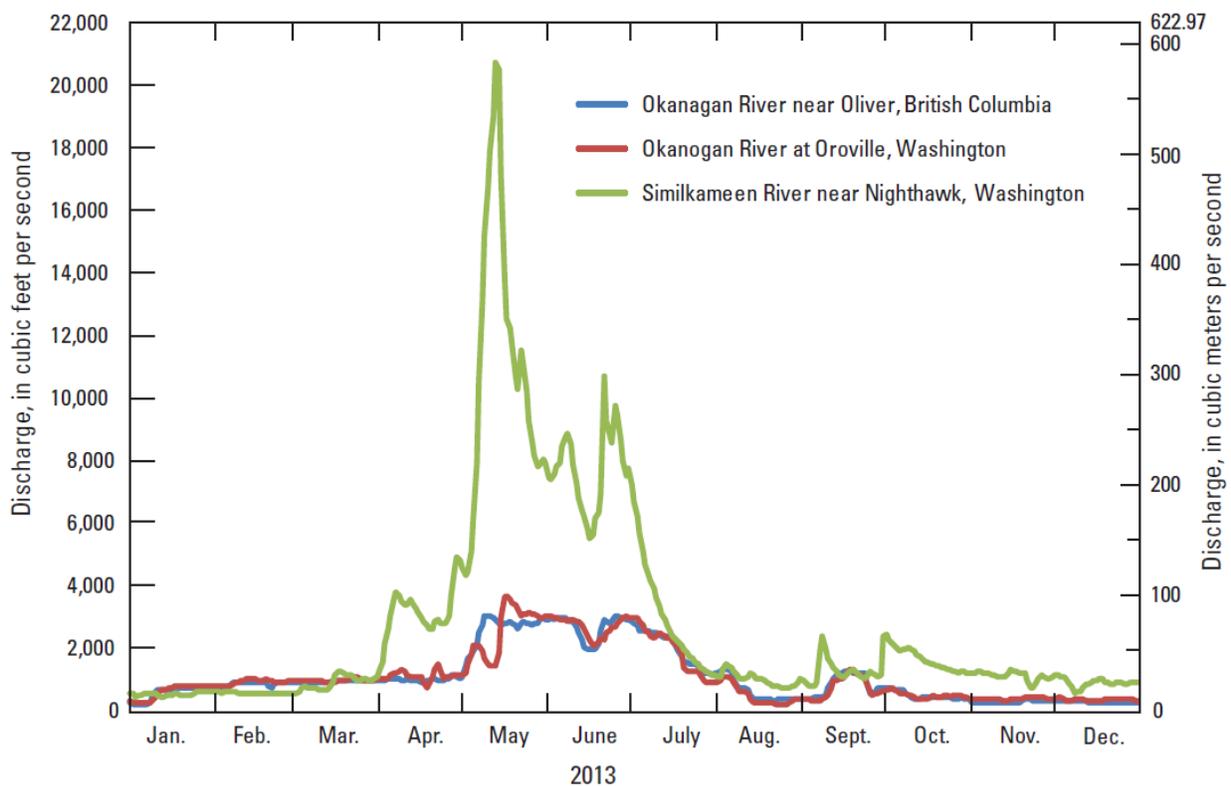
**River Discharges**

The maximum instantaneous discharge of the Okanogan River at Oroville (downstream from Zosel Dam) occurred on May 17, 2013, and was 3,710 cubic feet per second (105 cubic

meters per second) with a corresponding Osoyoos Lake elevation of 913.76 ft (278.5 m). High flow conditions in the Similkameen River during this time resulted in a significant backwater effect making these readings unsuitable for confirmation of compliance with the minimum outlet channel capacity on the Okanogan River at Zosel Dam of at least 2,500 cfs (70.8 cubic meters per second) with an Osoyoos Lake elevation of 913.0 feet, as per Condition 3 of the IJC Order. On May 21, 2013, the Similkameen backwater effect had largely abated and the Okanogan River discharge was 3,250 cfs (92 cubic meters per second) with a corresponding Osoyoos Lake elevation of 913.0 ft (278.3 m). This flow rate and corresponding lake elevation provided verification that the channel capacity exceeded the minimum required capacity of 2,500 cubic feet per second (70.8 cubic meters per second), thus confirming compliance with the criteria in Condition 3 of the IJC Order.

The maximum instantaneous discharge of the Similkameen River occurred on May 13, 2013, and was 21,700 cubic feet per second (615 cubic meters per second). The maximum daily-mean discharge of 20,700 cubic feet per second (586 cubic meters per second) occurred on May 13. High flow in the Similkameen River created variable backwater at the Okanogan River at Oroville gaging station May 5-June 15 and June 17-July 4. The total volume of flow in the Similkameen River for 2013 (1.99 million acre-feet, 2.45 cubic kilometers) was 119 percent of average in 85 years of record.

Data on Osoyoos Lake elevation and relevant river flows for 2013 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 (Okanogan in Canada) Rivers, 2013.

## 2013 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

Okanogan 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 the National Geodetic Vertical Datum of 1929 (NGVD 1929).

### C. Osoyoos Lake

Maximum daily mean elevation	914.17 feet (278.64 meters)– May 15
Maximum instantaneous elevation	914.19 feet (278.65 meters)– May 15
Minimum instantaneous elevation	909.44 feet (277.20 meters)– Jan. 6/7 & Dec. 12
Lake elevation at time of peak flow for Okanogan River at Oroville	913.76 feet (278.51 meters)– May 17

### D. Okanogan River at Oroville

Maximum instantaneous discharge	3,710 cfs (105 cms)– May 17
Maximum daily mean discharge	2,830 cfs (80.1 cms)– July 05
Annual mean discharge	863 cfs (24.4 cms)

The annual mean discharge was 128 percent of the 70-year average of 672 cfs.

### E. Similkameen River near Nighthawk

Maximum instantaneous discharge	21,700 cfs (615 cms)– May 13
Maximum daily mean discharge	20,700 cfs (586 cms)– May 13

High Similkameen River discharges created variable backwater at the Okanogan River at Oroville gaging station for the periods May 5-June 15 and June 17-July 4.