

As part of the detailed design of the Bass Lake Outlet Structure, the water surface elevation must be finalized.

The Township and the BLPOA had previously engaged Jp2g Consultants Inc. to examine possible water levels and control options. Their report (Jp2g, August 29, 2019) generally concluded the following:

1. 79 % of respondents thought that water levels should be maintained per the existing condition or raised higher;
2. Correspondingly, 21 % of respondents indicated a desire for lower average water levels;
3. Over 80 % of survey respondents have experienced negative impacts from low water levels;
4. About 25% respondents indicated a concern over high water levels;
5. 21% indicated a concern with high water causing shoreline erosion;
6. 4% had a concern with private road flooding; and,
7. 5% had a concern with inundation of private property.

Based on this, there is a strong support to maintain or even raise the water level. The BLPOA is planning to poll the community again (using a Referendum) on this topic and hopes to receive greater response on their survey from all landowners on Bass Lake, even beyond the BLPOA. The results of that survey will hopefully be available soon and perhaps before the Public Open House scheduled for July 28, 2020.

The question then is: What is a “normal” water level?

First of all, we need to consider the seasonal variations in water surface elevations. Spring freshet levels will be very different than that of mid-summer lake levels. Bass Lake has a limited contributing watershed. There are no rivers that supply water to it during the year. The water in the lake is generally dependant on runoff due to precipitation in the watershed and local groundwater levels. As such, once July 1st rolls around, the lake levels are entirely dependant on local runoff and evaporation from the lake. This typically will result in lower water levels during the summer. As such, we have a Spring “normal”, Summer “normal” and Fall “normal”.

Furthermore, Bass Lake may have historically been a depressional storage feature with a natural overflow and water levels during that time are unknown or, if available, come with caveats. However, since the placement of the outlet berm, water levels have somewhat been “controlled” by this berm. Furthermore, beaver activity is certainly present at the existing berm and continues to impact water levels. As we all know, beavers have an excellent ability to plug the flow of water and can also raise water levels. The Jp2g report noted that the top of berm elevation in August 2018 was approximately 134.23 metres (based on survey data provided by the RVCA). We note that the dam breach occurred in May 2018 which predates the survey, so this survey was performed after the repairs were completed. However, in our survey of April 22, 2020, the top of the berm, while it varies somewhat, was approximately 134.60 metres (with some water spilling over in sections). Those beavers have been busy!

What is important to understand is that a new control structure will generally “set” the long-term water surface elevation. We are targeting this to be the July 1 elevation. After July 1st, water levels would then be dependant on rain and groundwater levels. In spite of a “set” elevation, wet years would still have higher water levels and dry years may result in lower levels. It is recommended that July 1st be used as that is the time that most people would be on the lake and enjoying its amenities.

Table 1 presents the water surface elevations over the past decade. The record is not complete and various people and organizations have provided their input to the data. However, the data does provide a generally good idea of what the lake levels have been over the past decade.

Based on **Table 1**, we can observe the following:

1. There is plenty of missing data and we really can’t do much about that;
2. The data is only from 2010 and on. There is no long-term or historic data to glean from;
3. Data continues to be collected for 2020;
4. From 2010 to 2015, water levels appear to be relatively stable at the July 1st point and range from 134.40 to 134.50 metres;
5. From 2016 to 2018, the lake seems to be experiencing a drought period. During the summer period the lake levels are down 15 to 20 centimetres from the previous years;

6. Based on limited data, it seems that 2018 was setting record lows;
7. Water levels in 2019 seem to have rebounded to previous levels earlier in the decade;
8. Water levels in 2020 are generally at a decadal high and every recorded water surface elevation is setting a new record;
9. The long-term average July 1st water surface elevation is 134.45 metres (2nd last column);
10. The change from July 1st to September 1st ranges from 19 (2019) to 3 centimetres (2015). 2010 to 2014 consistently ranged from 15 to 16 centimetres. The average is 13 cm (5");
11. If the highest and lowest observed water surface elevations were removed from the calculation, the adjusted average elevation would still be 134.45 metres (last column);
12. The average and adjusted values are presented for all recording dates during the year; and,
13. The removal of extreme values does not impact the average water level values substantially.

Table 1: Recorded water surface elevations from 2010 to 2020

DATE	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	AVERAGE	AVERAGE	ADJUSTED AVERAGE
												2010-2016	2010-2020	2010-2020
01-May					134.50	134.50	134.50				134.61	134.50	134.53	134.50
15-May				134.40	134.49	134.43	134.47				134.62	134.45	134.48	134.46
01-Jun		134.42	134.52	134.45	134.50	134.40	134.42		134.33		134.61	134.45	134.46	134.47
15-Jun		134.40	134.47	134.53	134.55	134.48	134.35			134.45	134.59	134.46	134.48	134.48
01-Jul	134.50	134.40	134.40	134.50	134.50	134.47	134.32			134.40	134.55	134.44	134.45	134.45
15-Jul	134.48	134.43	134.37	134.48	134.44	134.46	134.28			134.35		134.42	134.41	134.42
01-Aug	134.45	134.38	134.30	134.45	134.43	134.44	134.25			134.30		134.38	134.38	134.38
15-Aug	134.40	134.32	134.28	134.40	134.43	134.45			134.17	134.24		134.38	134.34	134.35
01-Sep	134.35	134.25	134.24	134.34	134.42	134.44				134.21		134.34	134.32	134.32
15-Sep	134.32	134.20	134.20	134.31						134.17		134.26	134.24	134.24

Based on results of the Jp2g survey and the long-term data of **Table 1**, we recommend that the July 1st water level be “set” at 134.45 metres. This represents an increase of 5 centimetres from the 2019 elevation and a decrease of 10 centimetres (4”) from this year’s record-high July 1st elevation.

The Jp2g survey also noted that the preferred solution for managing the Bass Lake outlet was to rehabilitate the existing berm or the construction of a typical structural weir out of concrete or similar material. Their preferred solution was Option 3 (Rocky Ramp Weir). Our current design alternatives have taken this a step forward since a very wide rocky ramp weir would be unnecessary. The three options we are proposing include:

- a) Rocky Riffle Control Structure.
- b) Cross Vane Structure
- c) Concrete Control Structure

In each case, an earthen berm would be constructed with each control structure option being constructed within the berm and the crest of the structure would be set at the July 1st water level. Winter/spring lake levels would slowly be drawn down to the July 1st elevation at a rate similar to that of current conditions where flows leaving the lake at a rate of about 5 to 6 m³/s during ice off conditions in late spring. Please refer to the details provided elsewhere.

We look forward to discussing this further at the Public Open House.

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