

Cusheon Lake Hydrometric and Water Quality Reports

2016

Salt Spring I., B.C.

Presented at monthly meetings of Salt Spring Island
Watershed Protection Alliance.

By Doreen Hewitt, SSIWPA Member, Beddis Water Service
Area Commissioner and President of Cusheon Lake
Stewardship Committee

Report re Cusheon Lake for SSIWPA March 18 2016

1. Secchi Disk measurement on Jan. 18 was 3.4 metres
on March 6 was 2.7 metres
on March 14 was 1.35 metres - lake is turbid.
on March 16 was 1.9 metres - this is a bit better but not as good as earlier in the year.

The measurement historically is not usually this low unless there is a flood. During the flood, on Jan. 25, 2005 the secchi disk measurement was .74 M but on April 10 2005, it was up to 2.75 metres.

2. The corrected Lake gauge measurement on Jan. 18 was 1.406 metres.
on Mar. 06 was 1.358 metres.
on Mar. 14 was 1.496 metres.
on Mar. 14 was 1.386 metres.

The lake is flushing well but the colour is a very brownish green.

This information was passed on to Jennifer Blaney at the CRD. It was reported to me on Mar.16 by Kristi Wilson that NSSWW staff took a field turbidity measurement on Cusheon Lake, Mar.15 and reported turbidity in the raw water was 4.7 NTU (definitely higher than in the last two months - January: 1.16 NTU & February: 1.34 NTU) (CDWS=1) but that the plant wasn't having any operational issues with the raw water. An algae sample came in on Mar.16 and our Aquatic Ecologist looked at it. She said there was almost no algal presence in the water. It appears that it was likely silt and sediment from the storm on the weekend that caused the turbidity spike. Raw water colour value exceeded the (CDWS) limit of 15 in both Jan (25) and Feb (22).

3. There is an ongoing concern about the old landfill site located on Blackburn road. There are monitoring wells but no results have been given since 2001. During the past 15 years, old equipment and items may have deteriorated and could be leaching contaminants that pose a threat to water quality. The CLSC is planning to write a letter to the ministers and members of the Federal and provincial government as they feel this situation is a threat to our drinking water.

This was an action objective under the 2007 Cusheon Watershed Management Plan and the committee feels they have waited long enough to see some results. So they are planning this letter and wanted me to ask for the endorsement of the SSIWPA SC or assistance in this matter. They do not feel that covering the landfill site with only 60 cm (about 2 feet) of soil is adequate especially since the wells have not been monitored.

4. Restoration work is needed on Blackburn Creek and at the public dock area to prevent erosion. Is there any money set aside for this type of activity? The plants cost money but I have the people willing to work. What kind of permits would be required? Blackburn Creek actually has made a new braided stream about 1/3 from the lake. There is much erosion taking place.

"Corrected" Measurement is calculated by taking the measurement from the lake gauge stick near Cusheon Lake Resort and subtracting .134 m. This gives the corrected measurement. Polaris surveyed the gauge stick in the fall of 2015 as the recorded measurements did not correspond directly with the historical data from Water Survey Canada.

Report re Cusheon Lake for SSIWPA April 22 2016

1. Secchi Disk measurement on Mar. 28 was 3.75 metres.
 on Apr. 1 was 3.74 metres
 on Apr. 8 was 5 metres
 on Apr. 14 was 4.9 metres
 on Apr. 20 was 5.09 metres.

The lake is very clear right now and this is what we like to see.

2. The uncorrected Lake gauge measurement on Mar. 28 was 1.32 metres.
 on Apr. 1 was 1.298 metres.
 on Apr. 8 was 1.25 metres.
 on Apr. 14 was 1.268 metres.
 on Apr. 20 was 1.284 metres

The lake is down .036 metres from March 28, 2016.

Rain received at Salt Spring Elementary by April 21 2016 - 15.7mm
 April 30 2015 - 35.3 mm
 April 30 2014 - 55.9 mm

Blackburn Creek is flowing into and out of Blackburn Lake.
 Blackburn Creek is still slowly flowing a very small amount into Cusheon Lake
 Cusheon Creek has only a small flow out of the lake.

The beavers started making a beaver dam just after April 8.

3. The lake temperature is rising and the oxygen at the bottom is getting lower.

Date/Time		0.5	1	2	3	4	5	6	7	8	9
28-Mar	temp C	10.1	9.6	9.4	9	8.3	8	7.9	7.8	7.8	7.7
1:50pm	DOmg/L	10.53	10.37	10.31	10.21	9.45	8.99	8.63	8.55	8.46	7.88
20-Apr	temp C	16.9	16.1	14.4	13.3	11.7	10.4	9.2	8.6	8.3	8.2
11:00 AM	DOmg/L	9.86	9.82	9.71	9.34	7.97	6.5	5.37	4.33	3.5	3

It looks like Cusheon Lake is stratifying and the oxygen near the lake bottom is already at only 3 mg / litre.

4. I investigated a possible cause of the high turbidity last month. MOTi did some ditching in March. It was disappointing that no mitigating measures were put in place to prevent silting. I sent photos to Shannon.

Travis Tormala was contacted about the ditching and will be investigating.

Travis Tormala is the Roads Area Manager- Saanich Office

240-4460 Chatterton Way, Victoria BC V8X 5J2, Telephone: 250-952-4481

Report re Cusheon Lake for SSIWPA May 20, 2016

1. Secchi Disk measurement on May 2 was 4.9 metres.
on May 14 was 4.5 metres
on May 19 was 4.5 metres

The lake is still very clear right now and this is a good thing.

2. The corrected Lake gauge measurement on Apr 29 was 1.206 metres.
on May 2 was 1.226 metres.
on May 14 was 1.206 metres.
on May 19 was 1.194 metres

The lake gained some water during the month likely due to the beaver dam not letting as much out of the lake. But the lake is now dropping.

Rain received at Salt Spring Elementary to May 19 2016 - 5.6 mm
May 30 2015 - 5.3 mm
May 30 2014 - 43.2 mm

Remember April rainfall was only 29.7 mm and this was much lower than previous years. It looks like this reduction in rainfall is continuing.

Blackburn Creek is flowing into and out of Blackburn Lake.
Blackburn Creek is still slowly flowing a very small amount into Cusheon Lake
Cusheon Creek has only a very small flow out of the lake.

3. The lake temperature is rising and the oxygen at the bottom is absent.

Date/Time		0.5	1	2	3	4	5	6	7	8	9
20-Apr	temp C	16.9	16.1	14.4	13.3	11.7	10.4	9.2	8.6	8.3	8.2
11:00 AM	DOmg/L	9.86	9.82	9.71	9.34	7.97	6.5	5.37	4.33	3.5	3
19-May	temp C	18.9	19	18.9	18.8	15	12.4	10.8	9.4	9.1	8.9
11:40am	DOmg/L	9.57	9.54	9.52	9.42	7.75	5.06	2.84	0.5	-0.28	-0.43

Cusheon Lake has stratified and the oxygen near the lake bottom is giving a negative number. This may indicate that hydrogen sulfide is being released from the lake bottom.

4. Travis Tormala the Roads Area Manager- Saanich Office
240-4460 Chatterton Way, Victoria BC V8X 5J2, Telephone: 250-952-4481
has not responded to me about the ditching.

5. I received a few calls about the tree cutting that BC Hydro is doing. The trees play a very important role in the watershed. I called BC Hydro Stakeholder Relations and spoke with Ted Olynyk 250- 755 -7180. It was explained that Capital Tree - 250-415-7244 has a contract for 6 months and they will be severely pruning the trees on Salt Spring Island, in site specific locations, around the wires. It is hoped that and they will not need to be back for 4 years. A notice was placed in the Driftwood about this action. Some of the practices are questionable. Oil or other fluid was found on the road left by the equipment. Debris was left in the ditches and could be fuel for a wildfire when it is dry.

Report re: Cusheon Lake for SSIWPA Sept 26, 2016

1. On Sept 14 Secchi Disk measurement was 2.2 metres and last month it was 4.65 metres. Since the clarity had been greatly reduced, the secchi disk and level levels were sent to Christoph Moch at the CRD. It was obvious that a bloom was taking place but we did not know the genera.

His reply is below:

"There is a cyanobacterial bloom happening in Cusheon Lake consisting of species belonging to the genera Gloeotrichia and Anabaena. The sample smelled like licorice when I opened it as both are Taste/Odour producers. Both are also potential cyanotoxin producers so I'll do the cyanotoxin test first thing in the morning." The cyanotoxin test came back "below detection limits".

The cynaobacteria bloom is still continuing on Cusheon Lake. It started about 1 month earlier than last year. We don't know the cause as the lake had good flushing. However, there are septic fields and tanks along Cusheon Lake Road that are very close to the lake. Not all of the property owners purchased land on the opposite side of the road for their septic field. It was also a very hot dry summer.

2. The corrected Lake gauge measurement

on Aug 25	was 0.836 metres
on Aug 29	was 0.82 metres
on Sept 3	was 0.82 metres
on Sept 5	was 0.802 metres
on Sept 8	was 0.812 metres
on Sept 14	was 0.78 metres
on Sept 16	was 0.774 metres
on Sept 20	was 0.782 metres

The lake level was lower that it was last year in Sept.

It did not get to .774 in 2015, it only got as low as 0.806 on Oct 5. 2015.

More water conservation needs to be done in the watershed.

Rain received at Phoenix Elementary and GISS to:

Aug 2016	- 7.4 mm
Aug 2015	- 36.3 mm
Sept 2016	- 37.1 mm
Sept 2015	- 60.5 mm
Sept 2014	- 41.9

August and Sept so far have been much drier. During the past week the lake only went up 8 mm but there was 15.76 mm of rain from Sept 17-19.

3. The lake temperature is very warm for the salmonoid populations. Many people were swimming and bringing their dogs to the beach. There is no CRD sign like there is at the beach area of St. Mary Lake. This is a drinking water source and many people believe that it is not a place to bring pets since toilets and garbage cans are not present all year long. The oxygen at the bottom is absent and disappears at the 7metre mark.

Report re: Cusheon Lake for SSIWPA Oct 28, 2016

1. The algal bloom continues but may be in the final stages.
Kristi Wilson sent the following report yesterday.

"Laura reports that the algae bloom on Cusheon Lake is in strong decline; in fact, there were almost no algae at all (potentially cyanotoxin-producing species or otherwise) in the raw water sample collected yesterday. However, in the interest of safeguarding public health we would like to continue to test for toxins for another two weeks even if the algae numbers remain low. This is because the surface scum observed just last week was very strong, which means the potential risk for toxins to be released into the water as the cells die and lyse is significant. "

The Secchi disk on Oct 25 was only 3.9 m.
2. The corrected Lake gauge measurement

on Sept 26 was 0.772 metres
on Sept 30 was 0.746 metres
on Oct 5 was 0.746 metres
on Oct 7 was 0.77 metres
on Oct 10 was 0.812 metres
on Oct 12 was 0.806 metres
on Oct 16 was 1.016 metres
on Oct 18 was 1.103 metres
on Oct 19 was 1.116 metres
on Oct 20 was 1.164 metres
on Oct 25 was 1.298 metres

The lake level is higher than it was last year on Oct 26 2015 - 0.84 m
This is a difference of 0.45 metres.

In 2015, the current lake level was not reached until around Nov.18 and the secchi disk was 4.5 metres. Usually when the lake is at 1.298 m level the secchi measurement is higher and clarity is good. The lower reading on Oct 25 2016 is likely caused by the rain and increased runoff.

Rain received at Gulf Island Secondary School to:

Oct 2016 - 162 mm
Oct 2015 - 85.3 mm
Oct 2014 - 128.0 mm

3. The lake was mixed from top to bottom on Oct 16 with a temperature of 13 degrees from top to bottom. This could not be determined last year as the meter only had a 7 m cable. Oxygen level was 7.75 mg /L

4. Flow gauge measurement in Cusheon Creek on Oct 25 was 0.29m. This is low.

Report re: Cusheon Lake for SSIWPA Nov. 24, 2016

1. The algal bloom, which we thought was near to being finished continued into Nov. Kristi from the CRD reported on Nov. 3 that a sample on Nov. 2, showed a healthy colony of *Microcystis spp* when placed under higher power for analysis. This is a potential deadly toxin producer. So testing of the raw water was continued. On Nov. 14 Kristie reported that algal activity overall was very low at the qualitative (non-numerical) level and that the sample tested below detection limit for cyanotoxins. Testing will now will revert back to monthly testing. The threat of toxins in our drinking water lasted for approximately 12 weeks. This is of a great concern to the people obtaining their water from Cusheon Lake.

2. The corrected Lake gauge --- on Nov. 4 was 1.696 m. secchi -- 3.7m.
on Nov. 15 was 1.456 m. secchi -- 4.0m.
on Nov. 24 was 1.47 m. secchi --3.16

The flow into the lake is quite large and fast and this could be the cause of the turbidity.

Rain received at Gulf Island Secondary School to:

Nov. 2016 - 106.2 mm
Nov. 2015 - 99 mm
Nov. 2014 - 94.5 mm

3. The lake continues to be mixed with a temperature of 9.2 on Nov. 24

4. Flow gauge measurement in Cusheon Creek on Nov. 23 was 0.436 m. There was low flow from Tyler Brook and Stewart Road.

5. On Nov.4 6:30 pm the flow in Cusheon Creek was 0.55m. The beaver dam was on verge of letting go as a section of dam washing away on the North side.

The next day Nov.5 12:05 pm the creek flow was 0.64m. Beaver dam washed out and nothing left but gravel. The dam washed down the creek sometime during the night. Logs, blocking the flow at the Far East end of the lake, were removed at approx.10:00 am. Algae in this area, was a sea of blue green and gray and needed to be flushed out and off the surface. There was a concern that the wind would blow it back to the west into main area of lake where the Beddis System Water intake is located. Permission was granted to do this work prior to removal of the logs. The Beddis water system did not need to have this further risk.