2015 Washington Lakes Water Quality Report

Prepared 10/2015

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Special Thanks to Garrison Beck of
Damariscotta Lake Watershed Association

Executive Summary

In 2015, Washington Lakes Watershed Association (WLWA) embarked upon its most exhaustive year of sampling to date as part of a new data collection regime. If maintained, this data will provide a more comprehensive picture of trends in water quality on both Washington Pond and Crystal Pond.

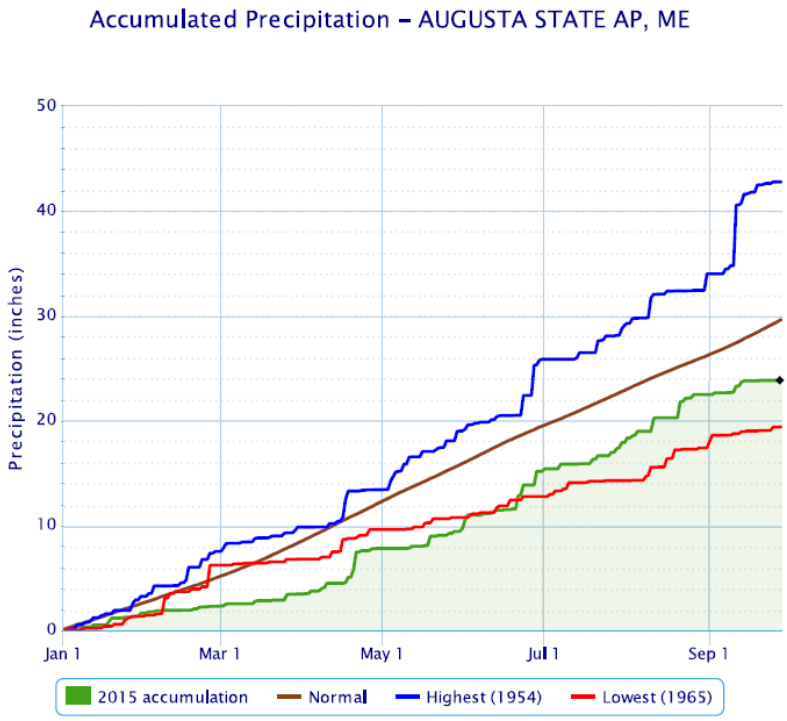
2015 should thus be considered somewhat of a baseline data collection year. Many past years have featured only a few data points, if any, especially on Crystal Pond, and so comparison and trend analysis over the entire open water season as a whole is difficult except on a grand scale.

In general, however, 2015 shows that both Washington Pond and Crystal Pond maintain somewhat above average water quality, with water quality indicators maintained at a constant level or possible improving in some parameters, although annual weather variations make long-term trend analysis difficult in this regard. Based on this limited data, phosphorus levels seem to be lower than average this year in both water bodies, however bottom samples indicate excess phosphorus may be released from bottom sediments and that phosphorus levels will be an important parameter to continue to monitor and address.

Dissolved oxygen depletion in the lower, colder regions of both water bodies is significant in the later summer weeks until "turnover" in mid- to late-September. This oxygen depletion has been observed historically in both water bodies and is also somewhat normal for shallow lakes.

However, oxygen levels below 5ppm can also stress fish populations, according to Inland Fisheries and Wildlife biologist Scott Davis, who presented at the 2015 annual meeting of WLWA. The observed lack of any cold water regions containing oxygen levels above this threshold is a concern for the viability of cold water fish stocking programs on Washington Pond, but Davis has recorded population "holdover" from one year to the next on this lake in the past, and cold water species such as trout have also been caught in Crystal Pond. It is possible that springs on the bottom of both lakes are providing "holdover havens" for cold water fish species during the end of the summer.

2015 was a particularly dry summer, with rainfall levels averaging several inches below normal for most of the season. This may have contributed to generally good water quality due to low run-off into local water bodies (see chart below from http://w2.weather.gov/climate/xmacis.php?wfo=gyx).



Both ponds were also inspected by a trained plant identification volunteer in and around the public access points. No evidence of invasive aquatic plants was noted in the species found present.

Sampling Methodology

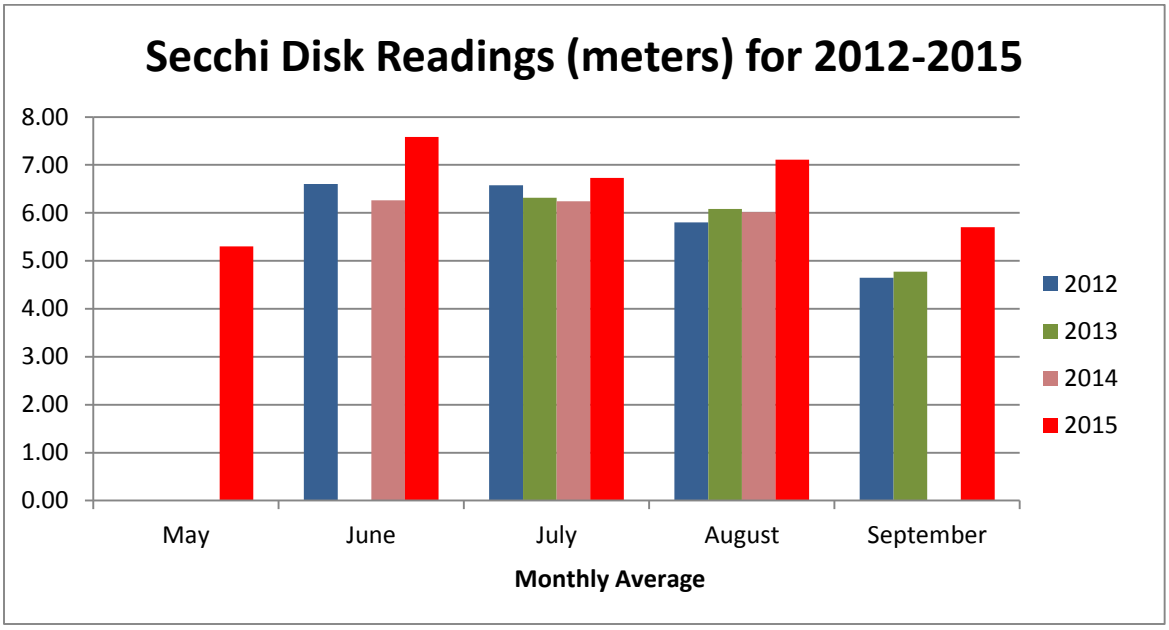
During the 2015 summer season, Washington Lakes Watershed Association (WLWA) volunteers took water clarity readings at least every two weeks on Washington Pond and every month on Crystal Pond. Regular surface grabs for phosphorus levels were also taken on Washington Pond. 2015 saw WLWA embark on a collaborative equipment loan arrangement with the Damariscotta Lake Watershed Association (DLWA) in an effort to engage in regular dissolved oxygen monitoring of both Washington and Crystal Ponds. In August, WLWA contracted with DLWA to test for regular and historical baseline water quality parameters.

All water quality monitoring and sampling was completed by certified volunteer lake monitors and was completed in accordance with standard procedures for the monitoring of Maine lakes and ponds established by the Maine Department of Environmental Protection and the Maine Volunteer Lake Monitoring Program. The 2015 sampling was done in a manner consistent with the historical sampling of these bodies of water, and the results are comparable.

Washington Pond

Water Clarity

Water clarity readings using a Secchi disk and monitoring scope were taken multiple times times during the 2015 season and prior years on Washington Pond. The following graph indicates monthly averages for the past four years. 2015 shows some increase in water clarity with consistently high readings. Water clarity is an important measure of lake quality.



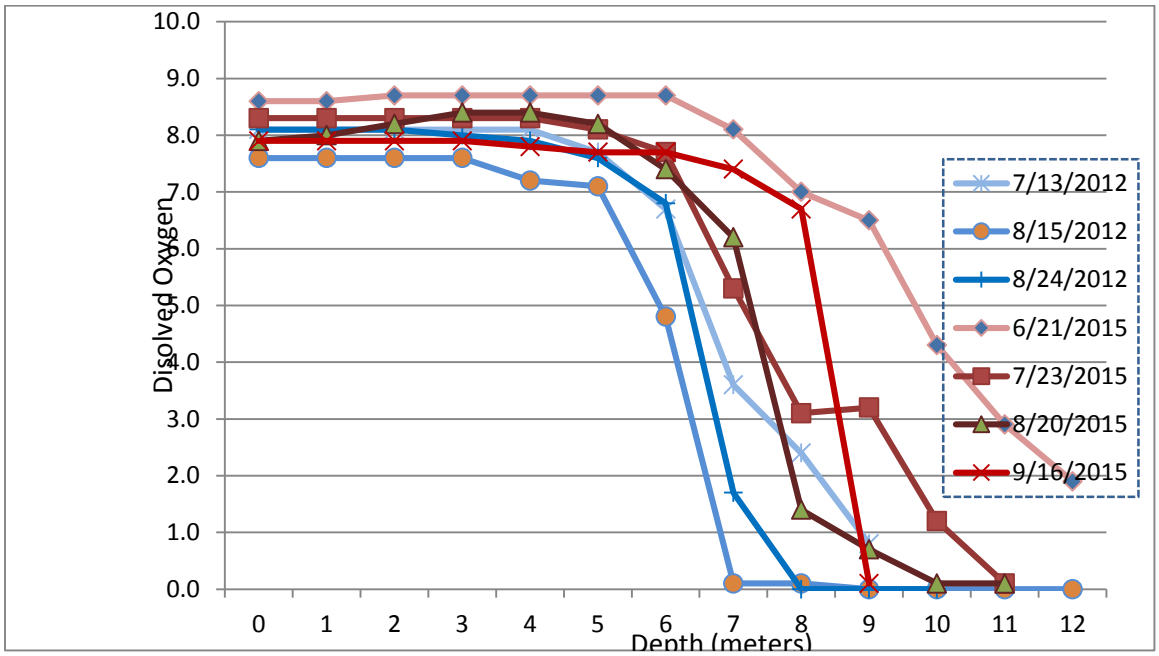
Phosphorus

A phosphorus sample taken from a 7-meter core grab measured 6 parts per billion (ppb), matching historical average of 6 ppb in core grabs 5 meters and above. Surface grab samples for phosphorus average 6 ppb similar to historical data. This should be watched carefully in future years. As phosphorus is the nutrient that most directly influences the growth of algae in lakes and ponds and phosphorus concentrations in the 12-15 ppb range have been associated with algal blooms in some Maine lakes, these lower sample concentrations are a good trend. The bottom sample taken this year was 13 ppb, while the average of past years was 14 ppb. In Washington Pond, phosphorus samples from lower in the water column have traditionally been higher in concentration, indicating that phosphorus release from bottom sediments could be occurring. We will watch this carefully for any change in future years.

Dissolved Oxygen

We have the advantage that dissolved oxygen profiles were taken in 2012 on Washington Pond as well as those taken four times (our new test regimen) the summer of 2015 by the WLWA water quality team. The following graph shows considerably improved dissolved oxygen for 2015 (red family lines) when compared with the 2012 data (blue family lines). That is the good news. The oxygen depletion became significant in the latter part of the summer in waters with temperature of 17 degrees Fahrenheit or lower, the region desired by cold water fish such as trout. This means that these fish are stressed in the latter part of the summer. In general we are

pleased with the profiles taken, as they show somewhat higher oxygen than in 2012. It will be instructive to take a full set of profiles each future summer, as we plan to do.



Other parameters

Samples from a 7 meter core sample in August showed Chlorophyll at 3.2 ug/l versus a historical range of 1.8 to 5 putting it as average. Alkalinity was 5.0, same as historical average. The pH of the sample was 6.4, slightly lower than historical average. Color was also slightly lower than historical average.

Crystal Pond

Water Clarity

Water clarity readings using a Secchi disk and monitoring scope were taken 4 times during the 2015 season on Crystal Pond, ranging from 5.6 to 7 meters of visibility, with an average of 6.45 meters. This is lower than the average in 2012, the last year when readings were taken. However, in 2012 only one reading was taken, and so is not a useful indicator of average conditions. The historical average since 1997, when readings were first taken, is 5.65 meters. Thus water clarity readings were above average in 2015, although substantially less historical data are available for this body of water, compared to Washington Pond.

Phosphorus

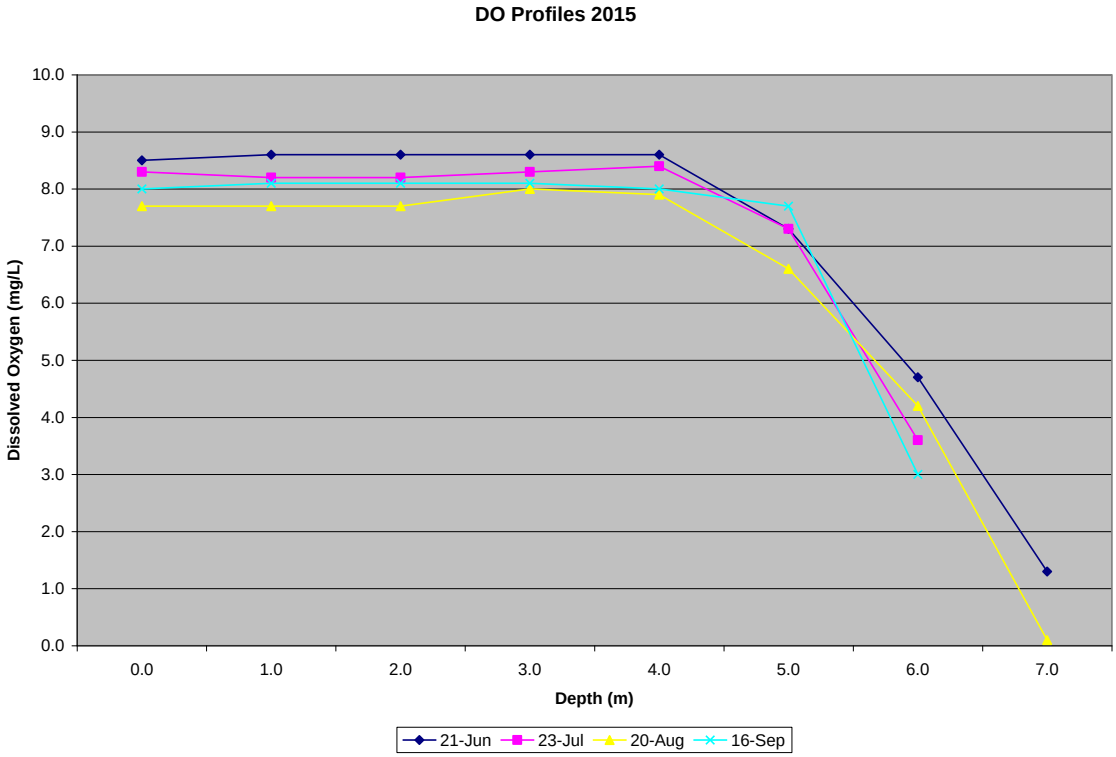
A phosphorus sample taken from a 5-meter core grab measured 4 parts per billion (ppb), compared to a historical average of 9ppb in core grabs 5 meters and above. As in Washington Pond, phosphorus samples from lower in the water column have traditionally been higher in concentration, indicating that phosphorus release from bottom sediments may be occurring. No bottom sample was taken this year. However, both this year's core sample and the last one in 2012 were lower than average. As phosphorus is the nutrient that most directly influences the growth of algae in lakes and ponds and phosphorus concentrations in the 12-15 ppb range have been associated with algal blooms in some Maine lakes, these lower sample concentrations are a good trend.

Chlorophyll

Chlorophyll-a (CHL) is the pigment measured in lake water that is used to determine the concentration of algae in the water. The CHL was measured at 2.3ppb in 2015, within a historical range of 1.5-5.15ppb and an average of 3.16ppb. The 2015 sample is low, suggesting little algal growth this season.

Dissolved Oxygen

2015 marks the first year that more than two dissolved oxygen profiles were taken within the season on Crystal Pond. Consistent with similar shallow lakes and with historical late summer profiles taken in past years, Crystal Pond shows severe oxygen depletion in the deepest area of the pond, from 5 meters down, shown in the graph below.



Low oxygen levels near the bottom of a lake can cause phosphorus to be released into the water column, stimulating the growth of algae. Although 2012 samples of phosphorus near the bottom of the lake suggest that this may be the case, the overall algae levels in 2015 appear to have remained low.

The Volunteer Lake Monitoring Program also cautions that low oxygen levels can lead to a deterioration of other water quality indicators over time, and so despite generally good water clarity, surface phosphorus, and chlorophyll levels, it will be important to continue to monitor the oxygen levels of Crystal Pond.

Other parameters

Water color, pH, and total alkalinity were also measured on August 20. Each was found to be within the range of historical values for this lake.