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2007 Washington Lakes Water Quality Report

Baseline water quality monitoring of Crystal and Washington Ponds was conducted on August 7, 2007, 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 2007 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 (transparency, or the distance that one can see down into the water, using a Secchi disk and monitoring scope) is used as an indirect indicator of algal growth in lakes. On August 7, transparency measured 7.6 meters (about 25 feet). Because this appears to have been the only water clarity reading that was taken for the lake in 2007, the average for the year was also 7.6 meters, compared to 5.7 meters in 2006 (based on five months of readings), 7.8 meters in 2003 (two months of readings), and 6.7 meters in 2002 (single reading). The historical average for this lake, from 1977 through 2007, is 6.7 meters. The 2007 reading was very clear, and was certainly above average. It was also substantially clearer than the highest reading taken in 2006 (6.5 meters). Water clarity in this lake is substantially higher (better) than the average for Maine lakes.

A surface (epilimnetic) total phosphorus sample measured 6 parts per billion (ppb). Prior to 2007, phosphorus was last sampled in 2003, at which time the result was 7 ppb. The historical average phosphorus concentration for Washington Pond is also 6 ppb. Since 1979, surface phosphorus levels have ranged from a low of 4 ppb to a high of 8 ppb. Phosphorus is the nutrient that most directly influences the growth of algae in lakes and ponds. Phosphorus concentrations in the 12-15 ppb range have been associated with algal blooms in some Maine lakes. The 2007 phosphorus sample is considered to be in the low end of the moderate range, compared to other Maine lakes.

Chlorophyll-a (CHL) is the pigment measured in lake water that is used to determine the concentration of algae in the water. The CHL level in August measured 2.5 ppb compared to a 2003 sample that measured 1.9 ppb, a 2002 sample that measured 2.9 ppb, and the historical average of 2.4 ppb for Washington Pond. Since 1979, the annual average CHL concentration in this lake has ranged from a low of 1.8 ppb in 1982, to a high of 3.5 ppb in 2001. The average of 2.4 ppb, and the 2007 level of 2.5 ppb is considered to be in the "low" (good) range for Maine lakes and ponds. This is consistent with the very good water clarity in Washington Pond.

A temperature and dissolved oxygen profile taken in August, 2007 showed severe oxygen loss in the deepest area of the pond, from a depth of 7 meters to the bottom of the deep sample station at 12.4 meters depth. Similar late summer oxygen profiles have been documented in this pond in past years, although the 2007 results were among the most severe, in terms of the percentage of the volume of water in the lake that was completely devoid of oxygen at the time of sampling on August 7. This phenomenon has the potential to have a negative impact on the overall water quality of Washington Pond over time. The oxygen findings are in stark contrast to the otherwise "above average" conditions in the lake. The low oxygen levels are an indication that the lake is both sensitive and stressed by external factors in the lake ecosystem, which includes the watershed.

When oxygen levels near the bottom of a lake are critically low, there is the potential for phosphorus to be released from the bottom sediments to the overlying water, where it may stimulate the growth of algae under certain circumstances. A phosphorus sample taken near the bottom of the deep station at Washington Pond in August measured nearly three times the concentration (17 ppb) of the sample taken at the surface on the same day. This suggests that phosphorus is being released from the bottom sediments, as a result of low oxygen in the water.

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

Crystal Pond

Water clarity (transparency, or the distance that one can see down into the water, using a Secchi disk and monitoring scope) is used as an indirect indicator of algal growth in lakes. On August 7, transparency measured 6.0 meters (about 20 feet). This was one of two water clarity reading that was taken for the lake in 2007; the average for the year was also 5.4 meters, compared to 7.2 meters in 2003 (based on two months of readings), 5.8 meters in 200 (three months of readings), and 6.9 meters in 1999 (two months readings). The historical average for this lake, from 1977 through 2007, is 5.9 meters. Water clarity in this lake is generally higher than the average for Maine lakes. Substantially less historical data are available for this body of water, compared to Washington Pond.

A surface (epilimnetic) total phosphorus sample measured 6 parts per billion (ppb). Prior to 2007, phosphorus was last sampled in 2003, at which time the result was 9 ppb. The historical average phosphorus concentration for Crystal Pond is 8 ppb. Since 1997, surface phosphorus levels have ranged from a low of 6 ppb to a high of 9 ppb. Phosphorus is the nutrient that most directly influences the growth of algae in lakes and ponds. Phosphorus concentrations in the 12-15 ppb range have been associated with algal blooms in some Maine lakes. The 2007 phosphorus sample is considered to be in the low end of the moderate range, compared to other Maine lakes.

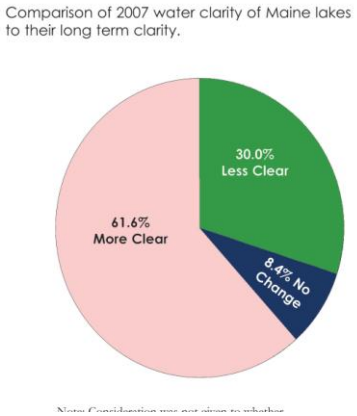
Chlorophyll-a (CHL) is the pigment measured in lake water that is used to determine the concentration of algae in the water. The CHL average in 2007 was 3.7 ppb compared to a 2003 sample that measured 2.2 ppb, a 1999 sample that measured 3.7 ppb, and the historical average of 3.4 ppb for Crystal Pond. Since 1997, the annual average CHL concentration in this lake has ranged from a low of 2.2 ppb in 2003, to a high of 4.2 ppb in 1997. The average of 3.4 ppb, and the 2007 level of 3.7 ppb is considered to be in the "low-moderate" range for Maine lakes and ponds, consistent with the generally good water clarity in Crystal Pond.

A temperature and dissolved oxygen profile taken in August, 2007 showed severe oxygen loss in the deepest area of the pond, from a depth of 5 meters to the bottom of the deep sample station at 7.7 meters depth. Similar late summer oxygen profiles have been documented in this pond in past years. This phenomenon has the potential to have a negative impact on the overall water quality of Crystal Pond over time. The oxygen findings are in stark contrast to the otherwise "good" conditions in the lake. The low oxygen levels are an indication that the lake is both sensitive and stressed by external factors in the lake ecosystem, which includes the watershed.

When oxygen levels near the bottom of a lake are critically low, there is the potential for phosphorus to be released from the bottom sediments to the overlying water, where it may stimulate the growth of algae under certain circumstances. A phosphorus sample taken near the bottom of the deep station at Crystal Pond in August measured twice the concentration (12 ppb) of the sample taken at the surface on the same day. This suggests that phosphorus is being released from the bottom sediments, as a result of low oxygen in the water.

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

To put into perspective the significance of the 2007 water clarity findings, consider that out of 404 Maine lakes that were assessed last year, about 62% were clearer than their historical averages, and about 30 % were less clear than their historical averages. *This represents a significant change from 2006, when substantially fewer than half of Maine lakes assessed were clearer than their historical average.* The improvement in lakes statewide resulted in a higher overall water clarity average for Maine lakes, increasing to 5.65 meters, the fourth clearest year for Maine lakes since the mid 1970's!

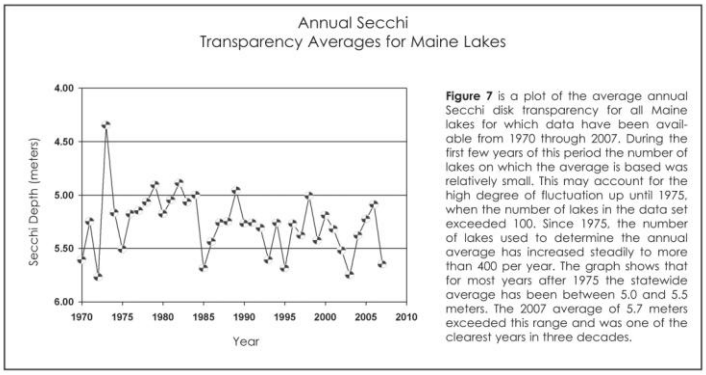


Percentage of Maine Lakes that were clearer, less clear, and the same as their Historical Average in 2007 (Source:Maine Volunteer Lake Monitoring Program)

It is likely that the improvement in many Maine lakes last summer was the result of reduced precipitation during the winter, spring and early summer, during which snow and rainfall amounts were somewhat below average for Maine, even though frequent spring and early summer showers resulted in the perception that precipitation was above average for the period. Spring runoff from melting snow and rain typically carries a high percentage of the annual phosphorus load to lakes from their watersheds.

Water clarity is one of three primary indicators of the overall biological productivity of lake ecosystems, in addition to the nutrient phosphorus (TP) and chlorophyll a (CHL), a pigment that is used to measure the concentration of algae in lake water. The three indicators, along with dissolved oxygen, are considered to be key measures of the water quality, and overall health of Maine lakes.

The chart below shows the extent to which water clarity (Secchi transparency) has varied for Maine lakes over time. The chart shows the average water clarity for all Maine lakes monitored in a given year. Note that this average has, for most years since this information has been tracked, fallen between 5.0-5.5 meters. Variation from one year to the next is influenced by many factors, not the least of which is weather. Maine lakes may be clearer overall during relatively dry years because stormwater runoff from rainfall carries phosphorus and other pollutants from the watershed to the lake.



Source: Maine Volunteer Lake Monitoring Program 2007 Annual Report

The illustration above shows that for the period from 2004-2006, the "average" clarity of Maine lakes dropped substantially. This may have been due to the fact that much of the state experienced above average precipitation during the period. But in 2007, Maine lakes as a whole were significantly clearer, most probably due to reduced precipitation during the winter, spring and early summer months, when a high percentage of watershed phosphorus loading typically occurs for lakes.

This graph shows that a number of similar dramatic changes have occurred historically. Some of the "clearest" years have been those during which drought has recently occurred, such as 1985 and 2002 and 2003, which followed the severe statewide drought of 2001.

Each lake and pond responds in a unique way to the influences of weather, changes in land use in the watershed, and other forces upon the ecosystem. This is because of the wide range of physical, chemical and biological characteristics of each lake basin and its watershed. Most lakes and ponds experience a moderate amount of natural annual variability.

Water clarity (Secchi transparency) is one of four primary indicators of the biological productivity of lake ecosystems, in addition to the nutrient phosphorus (TP), chlorophyll a (CHL), a plant pigment used to measure of the concentration of algae in lake water, and the concentration of dissolved oxygen in deep areas of the lake during the summer months.

Summary

Both Washington and Crystal Ponds exhibited "good" water quality when monitored on August 7, 2007. The water was clear, and phosphorus and chlorophyll levels were low to moderate, consistent with generally good water quality.

However, as has been noted in the past, both ponds experience a severe loss of oxygen during the late summer. This phenomenon is has the potential to depress overall water quality over a period of time. Low oxygen levels may lead other indicators of lake water quality by as much as two decades.

The most effective way to insure that all indicators of lake water quality remain stable – or even improve over time – is through watershed stewardship. This includes raising awareness among landowners about ways in which the effects of development on water quality can be minimized, and developing a community plan to protect and manage the watershed.

At present, the amount of annual water quality data being gathered for Washington and Crystal Ponds is minimal, and for some recent years, there is no information. Without consistent data, it is very difficult to identify and track trends in lake water quality,

because lakes and ponds experience a high degree of seasonal and annual variability. Insuring that data are collected annually is one way of increasing confidence that there will be sufficient information available for the ponds to be able to identify changes in conditions over time.

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