## pH Levels and the Loons

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There has been concern recently that pH levels are affecting the reproductive success of Lake Temagami’s loons. While this is difficult to verify, loons generally return to a similar area to nest each year, and this is a valid concern. Our TLA summer staff were asked to do some pH sampling while conducting the water sampling programs. For that purpose, a digital pH probe using an optical sensor was purchased from Hanna Instruments, which simply requires placing the probe in water, and gently swirling it to obtain a reading. However, as the spring was already well over, this was incorporated into the summer sampling only. While this round of sampling was being conducted we took pH measurements at each location. Before use of the probe it had to be calibrated each day and was perfectly accurate for the standard buffer solutions (pH of 4, 7, and 10). The lake itself yielded pH readings with an average of 7.8.

While this may seem to be somewhat high, especially given concerns in the last couple decades over acid rain, Temagami is not the only lake in the Sudbury region to report pH levels that have risen in recent years (Alvo 2009). Measures were taken to limit the effects of Sudbury smelters on the nearby regions, such as scrubbers and taller stacks. The current pH levels in Lake Temagami should not be considered cause for concern, as we only have summer data. Despite a common expectation that the lake would have a neutral pH, the optimal range of pH for freshwater ecosystems is anywhere between 6.0 and 8.0 (Adirondack Watershed Institute 2010). A possible explanation for an alkaline pH in the summer is the action of phytoplankton (like algae and diatoms), found in the thermocline region of the lake. The thermocline is that area where the temperature drops rapidly, from about 22.5°C to 8.8°C in Temagami’s case. This is also a region high in oxygen due to the phytoplankton. Since Temagami’s water is highly oxygenated in the thermocline, it is reasonable to expect a great level of phytoplankton to be acting in the water. Phytoplankton act like tiny plants, performing photosynthesis. One key point to note is that photosynthesis involves the transformation of hydrogen atoms (more properly, hydronium atoms in solution [H­3O+]) into water atoms. The more hydronium atoms (which are acidic in solution) that are converted into water, the less acidic and, conversely, more basic the lake becomes.

Thus, the lake seems to be healthy at the present, and loon chicks should not be endangered by the water pH in Lake Temagami. It is also important to note that a lack of reproduction in a year or two is not cause for concern, as a generally accepted reproductive success rate for stable loon populations is 0.50 fledged young per territorial pair (McIntyre 1994). However, a lack of immediate danger is not an excuse for complacency. It is important to keep in mind that other factors may play a role in the success of loons. These factors include weather, water-level fluctuations, predation, and human activities (Timmermans *et al.* 2005). Even lake area is correlated with breeding success (Weeber 1999), perhaps because larger lakes offer more abundant food sources. It is advisable while enjoying time on the lake each year that you boat carefully, slow down near loons, and avoid nearing loon nests if you happen to discover their locations. You may also want to get involved by exploring volunteer options with the Canadian Lakes Loon Survey program, which attempts to compile data for a clear picture of loon successfulness on Canadian lakes. Their website is <http://www.birdscanada.org/volunteer/clls/>, or you can email [volunteer@bsc-eoc.org](mailto:volunteer@bsc-eoc.org) for more information. The TLA also supplies CLLS brochures for interested parties. Thank you for helping to protect Temagami’s loons!

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Sources:

Alvo R (2009) Common Loon, *Gavia immer*, breeding success in relation to lake pH and lake size over 25 years. Canadian Field-Naturalist 123(2):146-156.

De Angelo M (2010) Adirondack Lake Assessment Program: Great Sacandaga Lake. Accessed at <http://www.protectadks.org/wp-content/uploads/2011/03/Great-Sacandaga-Lake-2010.pdf>

McIntyre JW (1994) Loons in freshwater lakes. Hydrobiologia 279:393-413.

Timmermans STA, Badzinski SS, Champoux L (2005) Factors influencing productivity of common loons (*Gavia immer*) breeding on inland freshwater lakes in Quebec, Canada. Accessed at <http://www.birdscanada.org/download/CLLSQuebecreport2005.pdf>

Weeber RC (1999) Temporal patterns in breeding success of Common Loons in Ontario, 1981-1997. Accessed at <http://www.birdscanada.org/download/cllstrndrpt.pdf>