

## Lost Pond Snowmelt Water Chemistry (Survey: 519104)

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Lost Pond (SC-P200) is a popular 6-acre, brook trout pond in Franklin County near Paul Smiths, NY with relatively easy access. It is found in the Debar Mountain Wildforest. Lost Pond had a critically low pH (4.98) and negative Acid Neutralizing Capacity (ANC) values in a 1984 Adirondack Lakes Survey Corporation survey. However, the pond quickly recovered, and the pH climbed to 6 by the 2006 DEC survey (#506056), and 6.31 in a 2016 DEC survey (#516057). Lost Pond has been reclaimed twice, in 1969 and most recently in 2016. Recent fisheries surveys were performed in 2017 (#517007) and 2019 (#519042). It is currently stocked with fin-clipped Windfall strain brook trout.

Decreases in pH and increases in the concentration of Al and NO<sub>3</sub><sup>-</sup> have been documented in surface waters draining acid-sensitive regions like the Adirondacks during periods of snowmelt, and these inputs may contribute to chronic as well as episodic acidification (Rascher, 1987). However, relatively recent improvements in the acid/base chemistry of some Adirondack waters have already been documented, and some of these waters, such as Brooktrout Lake (B-P874), now contain self-sustaining brook trout populations. In an effort to assess the effects of this "spring pulse" of acidity during a period of generally improving acid/base chemistry, a multi-year project was undertaken by NYSDEC and ALSC to collect weekly chemistry samples on 5 waters, including Lost Pond, to analyzing selected chemical metrics.

Table 1. Selected water chemistry variables, snowmelt sampling Lost Pond, 2019.

Date	Air Equilibrated pH (pH units)	Acid Neutralizing Capacity (µeq/L)	Inorganic Monomeric "toxic" Aluminum (µM/L)	Base Cation Surplus (µeq/L)	BC/RCOOs-	Conductivity (µmhos/cm)	Silica mg L <sup>-1</sup>	Sodium mg L <sup>-1</sup>
3/14/19	6.32	20.2	0.63	24.0	6.6	12.1	2.9	0.45
3/21/19	6.24	23.0	0.63	15.4	6.7	12.5	3.9	0.49
3/28/19	6.32	24.8	0.41	17.7	6.7	12.8	3.8	0.49
4/5/19	6.17	20.8	0.74	9.8	6.0	12.0	3.9	0.50
4/12/19	5.96	12.5	0.33	10.0	5.3	11.8	3.8	0.48
4/19/19	5.67	5.6	0.56	6.0	5.2	9.3	2.5	0.35
4/26/19	6.04	10.9	0.15	13.8	5.0	9.3	2.0	0.33
5/3/19	6.15	14.0	0.00	15.6	5.1	9.8	2.1	0.39
5/10/19	6.38	19.0	0.19	17.2	5.1	9.2	1.8	0.38
5/17/19	6.31	18.6	0.07	18.1	5.0	9.5	1.6	0.39

Lost Pond was chosen as a recently reclaimed brook trout water in which acidity has, been problematic in the past, but is not currently. Silica and sodium values which can be indicative of groundwater influence were also collected, and the reproductive status of the Lost Pond brook trout population will be evaluated in the future.

The pH was near or above 6 throughout the snowmelt period at Lost Pond with correspondingly reasonable ANC values. Additional chemical metrics, Base Cation Surplus (BCS) and the ratio of Base Cations to Strong Organic anions (BC/RCOOs<sup>-</sup>), were calculated and give a deeper understanding regarding the ability of Lost Pond to sustain a brook trout population. The BCS may be a more useful tool for the evaluation of recovery from acidification in the presence of increasing dissolved organic carbon (DOC) than ANC does, and the BC/RCOOs helps to quantify the strength of “naturally acidic conditions”, relative to base cations, found in some Adirondack waters. Inorganic monomeric or “toxic” aluminum is directly toxic to fish, levels below 2  $\mu\text{M L}^{-1}$  are desirable in summer samples. Higher “toxic aluminum” values would generally be expected in spring samples, but these values remained relatively low throughout the spring period in Lost Pond. Preliminarily, it appears that for a water to support brook trout, BCS values should be above -15  $\mu\text{eq/L}$ , and the BC/RCOOs<sup>-</sup> ratio should be above 1.5. However, these thresholds for brook trout survival were calculated for use with summer samples, not spring snowmelt samples. Spring samples at Lost Pond easily met the summer thresholds.

These measurements may allow us to better understand the relationship between the “spring snowmelt” and summer sample values in a variety of Adirondack waters and help illuminate the relationships between the spring pulse of acidity and brook trout survival.

#### Literature Cited:

Rascher, C.M., C.T. Driscoll, and N.E. Peters 1987. Concentration and flux of solutes from snow and forest floor during snowmelt in the West\_Central Adirondack region of New York. *Biogeochemistry*. 3:209-224