

## Black Pond Snowmelt Water Chemistry Survey #519105: Jonathan Fieroh, Region 5 Fisheries

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Black Pond (SC-P256) has a long history of fisheries management and is an extremely popular 73-acre roadside brook trout pond in Franklin County near Paul Smiths, NY. While the pond is on private land, a cooperative agreement between the Adirondack Park Agency, DEC, and Paul Smith's College permits public use and DEC management of the fishery. Black Pond has been reclaimed 5 times, most recently in 1997. Following the reclamation, Windfall Pond heritage strain brook trout were established by multiple stockings over a 5-year period. Black Pond was first used as an egg source for the Windfall strain in 2009 and multiple fish surveys have been conducted, most recently in 2017 (#517094). Black Pond is a "natural spawning adequate" (NSA) brook trout fishery. Angler use or possession of baitfish is prohibited per special regulation (6 NYCRR §10.6 (e) (4)).

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 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 Adirondack Lakes Survey Corporation. Weekly chemistry samples on five waters were collected, including Black Pond, to analyze selected chemical metrics (Table1.).

Table 1. Spring 2019 Black Pond selected water chemistry variables, snowmelt sampling.

Date	Air Equilibrated pH (pH units)	Acid Neutralizing Capacity ( $\mu$ eq/L)	Inorganic Monomeric "toxic" Aluminum ( $\mu$ M/L)	Base Cation Surplus ( $\mu$ eq/L)	BC/ RCOOs-	Conductivity ( $\mu$ mhos/cm)	Silica mg/L	Sodium mg/L
3/6/19	7.51	198.8	0.07	213.1	14.6	32.5	9.7	1.04
3/14/19	7.50	221.3	-0.04	232.9	16.6	32.1	9.7	1.07
3/21/19	7.57	225.1	0.07	226.2	16.4	33.9	10.0	1.06
3/28/19	7.54	228.8	-0.33	229.8	17.6	34.8	10.0	1.10
4/5/19	7.55	229.9	0.00	232.0	19.1	34.3	10.0	1.07
4/12/19	7.56	209.6	-0.19	220.3	17.6	33.4	9.5	1.07
4/19/19	7.42	170.9	0.22	178.5	12.7	27.6	8.0	0.88
4/26/19	7.37	189.0	-0.04	205.2	16.7	29.0	7.9	0.90
5/3/19	7.46	200.3	-0.04	214.7	17.7	29.8	8.7	0.93
5/10/19	7.51	194.7	-0.07	201.0	16.6	28.0	8.2	0.91
5/17/19	7.50	197.5	-0.19	206.5	16.9	28.0	8.1	0.93

Black Pond was chosen as a high pH, NSA brook trout water in which acidity has not been an issue, with an abundance of available chemistry information. Silica and sodium values which can be indicative of groundwater influence were also collected, and were, as one might expect, quite high in this NSA water.

The values for pH were above 7, with correspondingly high ANC (acid neutralizing capacity) values throughout the snowmelt period in Black Pond. Additional chemical metrics, the Base Cation Surplus (BCS) and the ratio of Base Cations to Strong Organic anions (BC/RCOOs), were calculated and give a deeper understanding regarding the ability of this water 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 and levels below 2  $\mu\text{M/L}$  are desirable in summer samples. Higher “toxic aluminum” values would generally be expected in spring samples, but these values remained exceptionally low even throughout the spring period in Black 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 ratio should be above 1.5. However, these thresholds were calculated for use with summer samples. These thresholds for brook trout survival were easily met even in the spring samples in Black Pond.

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 to 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