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Lower Mitchell Pond Brook Trout Survey (Survey #: 517041)

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Lower Mitchell Pond (UH-P646) is a remote water located in the Blue Ridge Wilderness of Hamilton County. Because the pond's location within a Wilderness area, use or possession of baitfish is prohibited per 6 NYCRR 10.6 (g) (1). It has a surface area of 2 acres and a maximum depth of 16 feet. A waterfall on the outlet forms an effective fish barrier. Lower Mitchell Pond has an interesting history in that a 1957 survey found the pond to be fishless, while a 1992 survey (#592014) collected 12 brook trout, some of which were fin-clipped, and ranging in length from 11.5 - 14 in. There is no record of stocking for this water, however previous sampling upstream in the Mitchell Ponds watershed indicated brook trout survival is unlikely. Thus, it seems the most plausible explanation for the brook trout presence in Lower Mitchell is an unintentional air-stocking; both nearby Cascade and Wilson ponds are air-stocked.

In 2017, water samples were drawn from 15 selected waters including Lower Mitchell Pond, and advanced chemical analyses were performed by the Adirondack Lakes Survey Corporation to identify waters recovering from the effects of acid precipitation that can once again support native fish communities. 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.

Two water samples were drawn from Lower Mitchell Pond in mid-July to better define chemical differences in the water column. Values for pH and Acid Neutralizing Capacity (ANC) improved slightly in the shallow sample from 1992, but ANC in the deep sample was noticeably reduced (Table 1). There appears to be some difference in the chemistry through the water column, but both samples had levels of inorganic monomeric or "toxic" aluminum above the critical threshold of 2 μML^{-1} for brook trout survival.

Table 1. Lower Mitchell Pond water chemistry variables from 1957 to 2017.

Year	Depth (feet)	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)
2017	5	4.91	-4.9	2.88	-10.4	1.5	13.0
	10	5.04	3.7	2.48	-11.9	1.7	13.3
1992	3	4.76	-9.3	-	-	-	22.4
	12	4.99	15.9	-	-	-	-
1957	5	5.20	-	-	-	-	-

We also conducted a standard fisheries survey; a single Swedish experimental gill net (150 feet), a 30-foot minnow net, and a minnow trap were set overnight. No fish were collected,

which was not surprising given the lack of recent stocking. However, it must be noted that as far back as 1992 there was documented brook trout survival of what were presumably fall fingerling-stocked brook trout under similar chemical conditions.

Two advanced metrics, the Base Cation Surplus (BCS) and the ratio of Base Cations to Strong Organic anions (BC/RCOOs), were also 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 alone, and the BC/RCOOs helps to quantify the strength of "naturally acidic conditions" found in some Adirondack waters. Preliminarily, it appears that for a water to support brook trout, BCS values should be above -15 μeq/L, and the BC/RCOOs ratio should be above 1.5. In 2017 the BCS values were -10 and -12 μeq/L, and the BC/RCOOs ratios were 1.5 and 1.7.

While the traditional chemistry metrics for this water are relatively poor, the advanced metrics are less so and brook trout survival has been documented in the recent past. Consequently, the pond will be experimentally stocked with 100 fall fingerling brook trout annually. This will allow us to document the presence of a refuge or further clarify our use of the chemical metrics. Angler reports and/or a follow-up survey will be used to evaluate the success of the stocking. As we improve our understanding of how the advanced chemical metrics influence brook trout survival, that information will be used to further refine our metric thresholds and to adjust our fisheries management strategy.