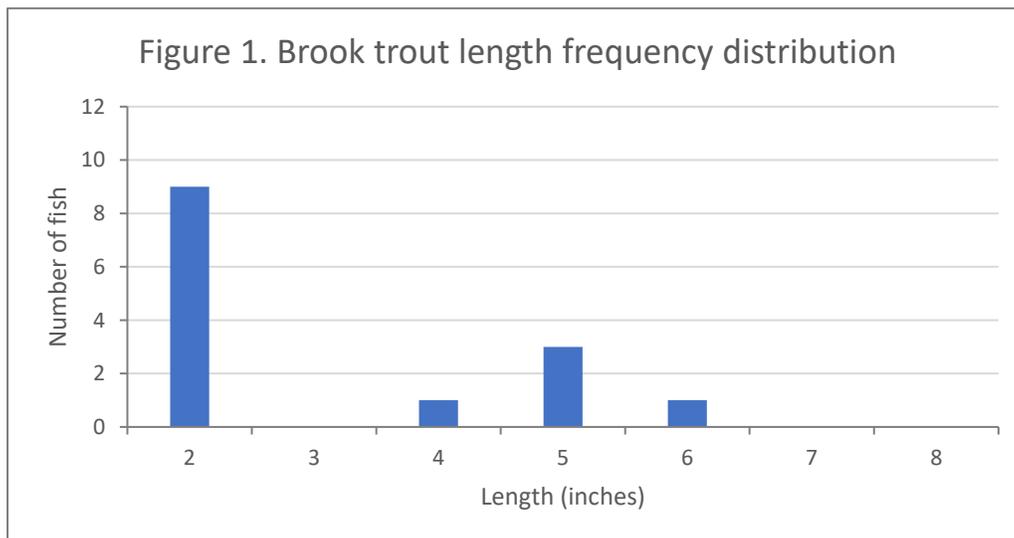


**Cold Brook General Biological Survey #519088, 519124:
Tom Shanahan, Region 5 Fisheries**

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Cold Brook (H-543-P706-1) is a small, high elevation stream located in the midst of some of the tallest summits in the High Peaks Wilderness Area in Essex County. The brook is a tributary to Lake Colden, originating high up in the MacIntyre Range, and is part of the Upper Hudson watershed. Typical access is from the north on marked foot trails starting near Heart Lake. The hike is about five miles and includes an elevation gain in excess of 900 feet. Cold Brook was surveyed as part of a larger effort to assess the recovery from acidification of Lake Colden and its tributaries. Lake Colden was sampled at the same time; see tb519087 for background on Colden's water chemistry and brook trout fishery. The presumption was that Lake Colden (and its inlets) remained fishless, but that was contradicted by an angler report from earlier in 2019 and spurred the current surveys. The purpose of this survey was to look for and document the presence of brook trout in Cold Brook.

We sampled a 350-foot section at a single site, just above the mouth, with a backpack electrofishing unit in September 2019. The brook flows through a dense mixed conifer/deciduous forest and was shaded for most of that section. The width was approximately eight feet wide with very clear water and was largely comprised of gravel/cobble runs interspersed with boulders and step pools. Despite a conductivity value of just 13 $\mu\text{mhos/cm}$, we collected 14 wild brook trout with a size range of two to six inches (Figure 1.); no other species were captured or observed.



The other aspect of our investigation was to examine the water chemistry of Cold Brook. Water samples from the electrofishing site were collected and analyzed by the Adirondack Lakes Survey Corporation during the course of the 2019 field season (Table 1.). Most values were quite favorable for brook trout survival, especially the last three samples following the spring snowmelt period. The most salient metric might be the level of inorganic monomeric aluminum,

the toxic form of aluminum that is a direct cause of mortality in brook trout. Although the June sample was slightly higher, the final three measurements were well below the desired threshold of two $\mu\text{mol/l}$. The remaining measurements associated with recovery from acidification (ANC, BCS and the BC/RCOOs ratio) were equally impressive.

Table 1. Selected water chemistry variables for Cold Brook (Lake Colden tributary) in 2019.

Date	Water Temperature (°F)	Air Equilibrated pH (pH units)	Acid Neutralizing Capacity (ANC) ($\mu\text{eq/l}$)	Inorganic Monomeric "toxic" Aluminum ($\mu\text{mol/l}$)	Base Cation Surplus (BCS) ($\mu\text{eq/l}$)	BC/RCOOs- ratio	Conductivity ($\mu\text{mhos/cm}$)
6/21/2019	49.3	5.5	8.0	2.67	-1.21	3.04	11
7/15/2019	57.9	6.2	17.0	0.30	8.87	4.70	12
8/20/2019	58.3	6.2	18.6	0.26	8.74	5.21	14
9/16/2019	52.0	6.1	15.4	0.48	21.26	7.33	13

Although discovering the presence of self-sustaining brook trout populations in Cold Brook and Lake Colden was extremely gratifying, their origin was a mystery since stocking had not resumed. Tissue samples were collected from the five largest Cold Brook fish for DNA analysis to help answer this question. It was determined that the genetic makeup of the brook trout from Cold Brook is identical to the Temiscamie x Domestic hybrid strain commonly used in our stocking program. But, exactly how and when brook trout became reestablished continues to be unknown. One possibility is that extant fish found refuge in Cold Brook and then seeded Lake Colden once its water chemistry became suitable. We did note that fish should be able to move freely between the brook and lake if beaver dams are not present.

Documenting wild brook trout in Cold Brook and Lake Colden is an extraordinary chapter in the story of recovery from acid deposition in Adirondack lakes and streams. No management is recommended at this time other than to periodically monitor Cold Brook to assess the water chemistry and brook trout population. The brook is governed by Statewide Angling Regulations and that will continue.