**Bureau of Fisheries Technical Brief #tb521070**

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

# Jessup Lake Water Chemistry Survey #521070

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Jessup Lake (UH-P610) is a very remote water located in the West Canada Lake Wilderness of Hamilton County. The lake has a surface area of 10 acres, a maximum depth of 20 ft. and a mean depth of 4.3 ft. Brook trout were stocked here between 1950 and 1968 but stocking ceased when a 1969 survey (#569022519) captured no fish. Also, no fish were caught in the last survey, conducted in 1987 by the Adirondack Lakes Survey Corporation (ALSC). In 2017, water samples were drawn from 15 selected waters including Jessup Lake, and advanced chemical analyses were performed by ALSC 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.

A single surface sample was drawn from Jessup Lake in September 2021, and the resulting data shows the changes of pH and Acid Neutralizing Capacity (ANC) since 1969 (Table 1).

Table 1. Jessup Lake water chemistry variables from 1969 to 2021.

| Year | 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) |
|---|---|---|---|---|---|---|
| 2021 | 5.82 | 10.1 | 1.0 | 0.1 | 1.8 | 9.95 |
| 2017 | 5.27 | 4.2 | 1.79 | -18.1 | 1.4 | 9.36 |
| 1987 | 4.77 | -13.5 | - | - | - | 18.6 |
| 1969 | 5.5 | - | - | - | - | - |

The 2021 pH and ANC values were greatly improved when compared to the 1987 values and notably improved when compared to the recent 2017 values. 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. While the thresholds for these two metrics were not met in 2017, they were easily surpassed in 2021. The level of inorganic monomeric or “toxic” aluminum was below the critical threshold of 2 $\mu ML^{-1}$ for brook trout survival. Although, the aluminum concentration was below the critical threshold, the pH and ANC appear just high enough to support a brook trout population. The 2021 advanced metrics now show sufficient base cations, suggesting that Jessup Lake may is now a viable candidate for brook trout stocking. The reduced “toxic” aluminum concentration

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also supports that conclusion. Jessup Lake will be experimentally stocked with 250 fall fingerling brook trout annually for several years. Angler reports and/or a follow-up survey will be used to evaluate the success of the stocking.