Bureau of Fisheries Technical Brief (#tbm1357 and 1360)

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

Water Chemistry Surveys for Multiple Waters

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Brook trout have been described as an obligate groundwater spawning species in both stream and lake environments (Webster and Eriksdottir, 1976). In the 1980s, the Adirondack Lakes Survey Corporation (ALSC) collected detailed chemical, biological and physical information on 1,469 lakes in the Adirondackecological zone. As part of the analysis of that information, the relationships between habitat characteristics and the reproductive status of brook trout populations were explored (Schofield, 1993). That analysis found a relationship between the levels of silica (SiO2) and sodium (Na), which are thoughtto be groundwater indicators, and the reproductive status of brook trout populations.

It was noted in the analysis that survey timing and the vulnerability of young of year brook trout to the sampling gear complicated the reproductive assessments and limited the sample size of waters identifiedas having self-sustaining or Natural Spawning Adequate (NSA) brook trout populations.

2019 was the second year of a multi-year project in which NYSDEC and ALSC staff collected water samples from lakes specifically to determine the current silica and sodium levels as determined by the ALSC lab (Table 1). The NSA status of all of the waters in this brief is unknown. All of the samples collected were surface samples. Additionally, in many lakes in which fish surveys were performed in 2019, the sodium and silica levels were measured as part of the survey and that chemical information willbe included in the analysis of those surveys.

Table 1. Selected water chemistry variables and brook trout spawning status, 2019.

Pond Number	Survey Number	Pond Name	Date	SiO2 mg L^{-1}	Na mg L^{-1}	NSA Status
UH-P465	519051	Challis Pond	7/9	4.6	2.70	Yes
UH-P410	519111	Crab Pond	8/26	2.3	0.73	Yes
C-P407	519103	Fishbrook Pond	7/25	2.0	0.60	Yes
C-P155	519099	Ledge Pond	8/12	1.1	0.50	Partial
UH-P427	519113	Oxshoe Pond	8/8	4.0	0.71	No
UH-P431	519114	Horseshoe Pond	8/8	1.9	0.61	No
UH-P281C	519119	Little Joe Pond	8/5	1.9	0.55	No
UH-P426	519112	Burge Pond	8/8	1.7	0.63	No
UH-P484	519049	Lower Twin Pond	7/9	1.6	0.78	No
UH-P485	519048	Upper Twin Pond	7/9	1.1	0.90	No
UH-P418	519054	Gull Pond	7/9	0.8	0.70	No
C-P182	519014	Mud Pond	5/14	5.2	0.73	Unknown
UH-P705	519116	Livingston Pond	8/20	3.4	0.52	Unknown
C-P58	519098	Little Hope Pond	9/10	3.4	0.56	Unknown
UH-P467	519053	Moose Mountain Pond	7/9	3.2	0.86	Unknown
UH-P464	519052	Bass Lake	7/9	3.0	1.04	Unknown

SPORT FISH RESTORATION

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C-P373	519101	Upper Black Mt. Pond	7/16	2.8	0.66	Unknown
UH-P213	519026	Murphy Lake	5/22	2.7	0.62	Unknown
M-P908	519073	Spruce Lake	8/14	2.6	0.50	Unknown
UH-P182	519056	Bennett Lake	7/10	2.6	0.81	Unknown
B-P778	519106	Chub Lake	7/15	2.5	0.49	Unknown
C-P406	519102	Greenland Pond	7/25	1.6	0.58	Unknown
R-P247A	519120	Owls Head Pond	8/22	1.4	0.57	Unknown
UH-P477	519050	Bloody Pond	7/9	1.2	3.41	Unknown
UH-P539	519115	Brown Pond	8/5	1.1	0.63	Unknown

Over a period of years NYSDEC has evaluated a number of waters for the reproductive status of brook trout. These evaluations were done in waters in which fin clipped brook trout were stocked for a numberof years, then surveyed to determine the relative percentages of clipped (stocked) and unclipped (naturally spawned) fish. If the percentage of naturally spawned, unclipped, fish reached an acceptable level the pond was thought to be NSA and stocking was deemed unnecessary. However, in some evaluated populations, brook trout appear to have little (or no) spawning success, while in other populations there is an intermediate level of spawning success. These evaluations have primarily beenperformed after reclamations using fin-clipped, heritage strain brook trout.

However, most Adirondack waters are stocked by the DEC with the Temiscamie x Domestic (TxD) hybridstrain of brook trout. Some of these TxD stocked waters have been stocked annually for many decades. The difficulty in assessing NSA status of this strain in individual waters is considerable. Fish, once clipped, must be kept separate making hatchery and stocking logistics difficult and a large number of TxD brook trout are stocked each year, more than 90,000 in Hamilton County alone.

The limited data set currently supports no conclusions. However, if updated silica and sodium values canbe correlated with solid spawning success, evaluating that information could prove quite enlightening. The correlation could provide one important piece of information to help identify waters, with currently unknown NSA status, where the probability of brook trout spawning success is high. These waters couldthen be prioritized for evaluation of the reproductive success of those brook trout populations. If such waters can be positively identified as NSA, stocking would cease. This would lead to the removal of hatchery influence on the genetics of the brook trout populations and could conceivably result in a savings of time, manpower and money by eliminating unwarranted stocking.

Webster, D.A. and G. Eriksdottir 1976. Upwelling water as a factor in the choice of spawning sites byBrook trout (*Salvelinus fontinalis*) Trans. Am. Fish. Soc., 105(3), 5 pp.

Schofield, C. L. 1993. Habitat suitability for brook trout (*Salvelinus fontinalis*) reproduction in AdirondackLakes. Water Resources Research., 29, 4 pp.