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FISH/AMP/REP

TROUT HABITAT SURVEY

OF

THE TARN

TOWN OF

BAR HARBOR

HANCOCK COUNTY, MAINE

Nina Zabinski
August-November
1975

INTRODUCTION

The Tarn is a shallow pond of approximately eight acres found within Acadia National Park lying between Dorr Mountain and Huguenot Head with Route 3 bordering the latter side. Reports of trout taken from the Tarn by local fishermen have led to interest in possibly stocking the pond although an earlier survey did not recommend doing so. This study however, will be more in depth to result in more comprehensive data to base management recommendations upon. Parameters covered in the report will be limiting factors of trout survival, growth, and reproduction. Specifically, these factors are dissolved oxygen concentrations, temperatures, depth, pH, benthic macroinvertebrates, vegetation, and spawning grounds. Independently and collectively they are important criteria in judging the suitability of the Tarn for an increased trout population.

DISSOLVED OXYGEN / TEMPERATURE PROFILE

Late August is a "critical" time. A dissolved oxygen (DO) / temperature profile was done at this time not to reflect average conditions of the Tarn, but to determine one of the extremes that the trout would have to endure.

At sixty-four different stations on the Tarn (see map) readings were taken at various depths using a probe on a calibrated line. The meter itself was initially calibrated (showing DO in parts per million) according to titrations using the azide modification of the Winkler method in the field. The probe also registered temperature in degrees Celsius.

Refer to DO/temperature data on next page.

The maximum depth of the Tarn is 1.3 meters. Being this shallow it is subject to quite thorough heating in the summer with an almost negligible thermocline developing. The general temperature range can be seen on the table to be from 19.5° to 22.1°C. Dissolved oxygen often dropped below 3 ppm near the bottom in the weed choked areas and seldom exceeded 4 ppm anywhere below the surface. It should be noted that in the afternoon the surface was aerated by a strong breeze. Trout survival is possible in as low concentrations of dissolved oxygen as 4-5 ppm but the accompanying high temperatures would cause additional stress because of speeded up metabolic rate due to heat. The DO / temperature profile suggest that while trout life could be maintained in the Tarn, conditions are not conducive to growth and optimum activity.

DISSOLVED OXYGEN / TEMPERATURE
DATA

NOTE: These data were collected over a period of two days. The first day was hot and sunny, the next day cloudy and windy. Surface temperature on the first day was 22°C at all stations, 21.5°C on the second day. Dissolved oxygen was quite stable on the surface as well; 7.5 ppm at 22°C and 8.0 at 21.5°C.

<u>STATIONS</u>	<u>DEPTH</u>	<u>TEMPERATURE°C</u>	<u>DISSOLVED OXYGEN PARTS PER MILLION</u>
1-42	surface	22.0	7.5
42-64	surface	21.5	8.0
2,5,8, 9,13, 14,19,20, 24,25,29, 30,04,37, 42,52,56,64	.5	21.0	3.0
4,7,12,17 18,23,28, 33,36,39, 41,44,46, 48,50,58, 60,62,63,64	.5	21.0	3.4
1,3,6,10 11,15,16, 21,22,26, 27,31,32, 35,38,40, 43,45,47, 49,51,53, 54,55,57, 59,61	.5	21.0	5.1
4,6,7,10, 11,15,16, 17,21,22, 26,27,31, 32,35,38, 40,53,45 47,51,55,	.75	21.0	4.3
1,3,19,23, 28,33,36, 49,53,57	.75	21.0	3.5
4,6,7,17 23,28,32,36	1.0	21.0	2.8

DISSOLVED OXYGEN / TEMPERATURE DATA (con't)

<u>STATIONS</u>	<u>DEPTH</u>	<u>TEMPERATURE °C</u>	<u>DISSOLVED OXYGEN PARTS PER MILLION</u>
11,38,40 43,45,47, 49,51,53 55	1.0	21.0	4.2
4,7,17,23	1.3	20.8	2.6
11,32,38, 40,47	1.3	2	3.9

II

VEGETATION, BOTTOM TYPE AND pH

The bottom of the Tarn is very soft mud with much organic detritus especially in the weed choked areas. On the Dorr Mountain side the bottom is thick with logs, branches and algae growth. During the summer months more than half of the Tarn is covered with pond lilies, Nuphar advena and Nymphaea odorata. One thousand water lilies were in fact planted in the Tarn by Mt. Desert Nurseries in 1939. A map is included showing the extent of their growth.

A pH of 5.0 reflects the low oxygen content of the Tarn and is considered to be near the lower limit for trout.

The bottom of the Tarn is of course unsuitable for spawning ground, for trout require well aerated, gravel beds of even temperature. These conditions could possibly be afforded in certain areas of the inlet and outlet, but without stream improvements, production would be quite limited. The flow of the streams into and out of the Tarn varies considerably also. Again, conditions in the Tarn are of survival rather than of growth quality.

III

SIZE / DEPTH AND OXYGEN

The late summer DO/temperature profile expressed one extreme. Another critical time of year is the winter. Because of its small size, its shallowness and the large amount of oxygen consuming activities, ice formation in the winter could well seal off any oxygen renewal while serious depletion of the present oxygen was taking place along with a build-up of carbon dioxide. "Winterkill" would ^{occur} and most if not all of the fish remaining in the Tarn would be found dead in the spring thaw. Winter temperatures could become prohibitively low as well.

BENTHIC MACROINVERTEBRATES

<u>TYPES OF ORGANISMS</u>	<u>NUMBER OF ORGANISMS IN</u> *		
	<u>INLET</u>	<u>OUTLET</u>	<u>TARN</u>
Decapods (Crayfish)	11	0	0
Tipuloidea (Craneflies)	4	5	0
Chironomidae (Midge larvae and pupae)	3	2	34
Tricoptera (Caddisfly larvae)	23	31	4
Hirudenea (leeches)	0	0	1
Anisoptera (Dragonfly larvae)	0	0	2
Coleoptera (Beetles)	16	15	14
Turbellaria (Flatworms)	2	0	13
Nematoda (Roundworms)	0	0	24
Hemiptera (True bugs)	8	6	0

*Numbers taken from 5 samples in each of the streams and from 10 samples of the Tarn's bottom. All samples were taken with a 9X9 Eckman dredge, or samples of .5625 square feet each.

BENTHIC MACROINVERTEBRATES

<u>AREA</u>	<u>NO. OF SAMPLES</u>	<u>TOTAL ORGANISMS</u>	
		<u>VOLUME</u>	<u>NUMBER</u>
Tarn	10	36 ml	114
Inlet	5	21 ml	66
Outlet	5	24 ml	76

<u>AREA</u>	<u>ORGANISMS PER SAMPLE</u>				<u>ORGANISMS PER SQUARE FOOT</u>	
	<u>VOLUME</u>		<u>NUMBER</u>		<u>VOLUME</u>	<u>NUMBER</u>
	<u>Mean</u>	<u>SD</u> *	<u>Mean</u>	<u>SD</u>		
Tarn	4 ml	.2	10.1	3.0	7.0 ml	17.9
Inlet	3 ml	.1	12.2	3.0	5.3 ml	21.3
Outlet	5 ml	.2	13.1	4.2	8.0 ml	23.3

* SD=Standard Deviation

A comparison of the benthic macroinvertebrate populations of the Tarn and its inlet and outlet shows markedly higher productivity in the streams, particularly of one favorite trout food, the caddisfly larvae. Most of the insects found in the Tarn were indigenous to a pond lily habitat. Feeding in the weed choked areas of the Tarn would be stressful to trout and during the drier months there is not always access to the streams. While trout feeding in one of the streams might often easily find its way right into the Tarn, it may not always find it easy to find its way out of the unfavorable pond.

Again, some trout life could be supported in the Tarn, but on a subsistence level alone suggest these data. Trout food distribution might be more closely studied by taking into account seasonal abundance and drift foods, but in view of other limiting factors this would be an extraordinary

measure.

RECOMMENDATIONS

The occurrence of trout in the Tarn is explainable as the inlet often flows freely into the pond during periods of rain. Existing conditions in the Tarn however, are not conducive to trout growth or activity.

A result of a dam on Richardson Brook, the Tarn is basically too shallow and too eutrophic to support any artificially introduced trout population. Improvement of the Tarn to make it more suitable would be a major project involving near destruction and re-building of the pond. A more worthwhile recommendation for this pond would be to turn interests to fish such as the small-mouthed bass suited to a warm, shallow pond environment.

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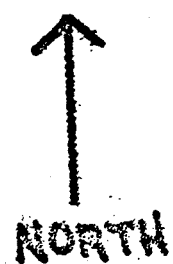
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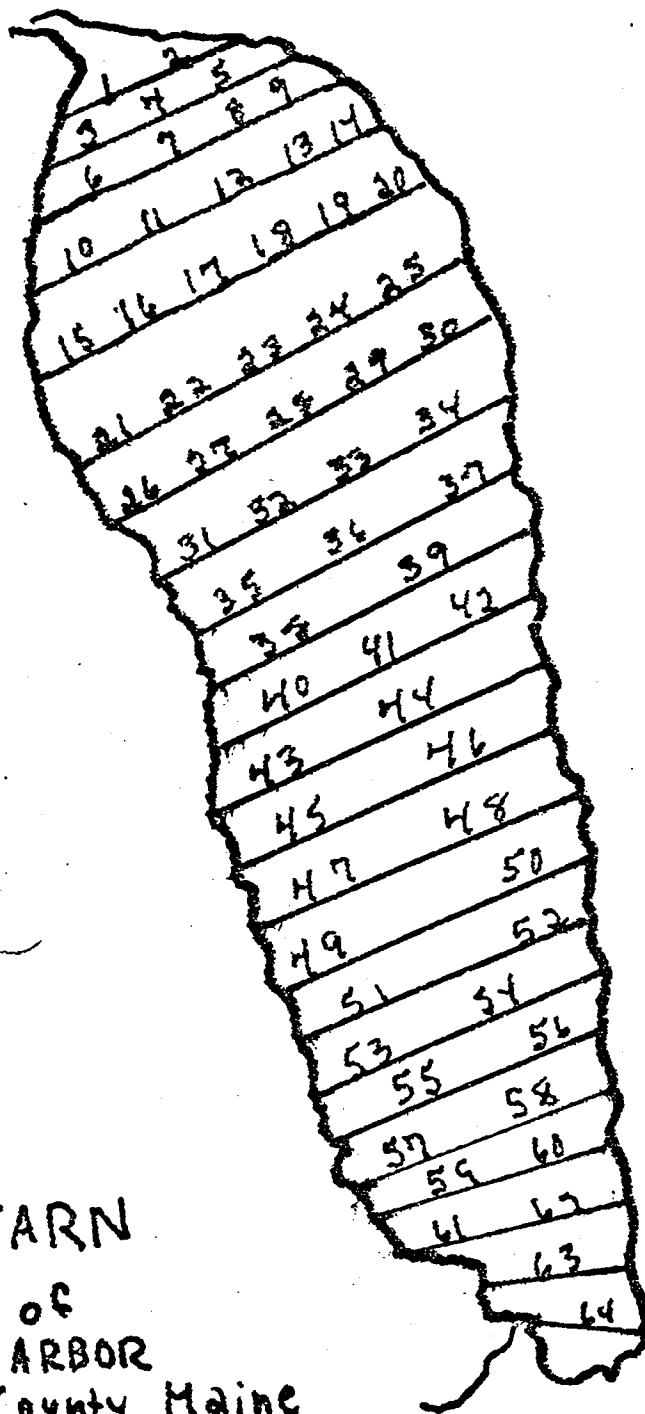
THE TARN
Town of
BAR HARBOR
Hancock County, Maine



Extent
of
Tarn Lake



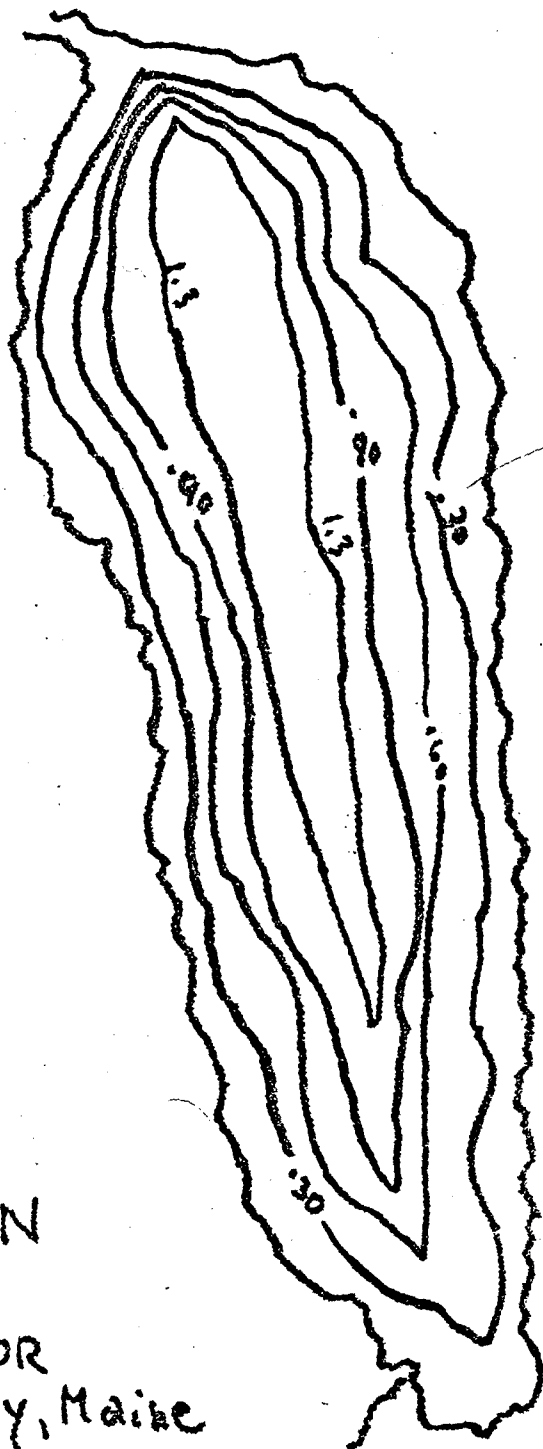
1 inch = 260 feet



THE TARN
 Town of
 BAR HARBOR
 Hancock County, Maine

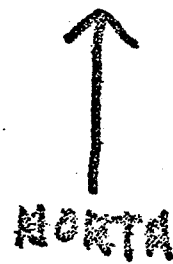
↑
 NORTH

1 inch = 260 feet



Depth in
meters

THE TARN
Town of
BAR HARBOR
Hancock County, Maine



1 inch = 200 feet