

A CLASSIFICATION OF LAKES BELLAIRE, CLAM AND
TORCH USING ALGAL ORGANISMS AS INDICATORS
OF THE STATE OF EUTROPHICATION -- ALSO
A PREDICTION OF THE LAKES TROPHIC STATE IN
THE YEAR 1976

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Introduction

The purpose of this report is to evaluate the present condition of lakes Bellaire, Clam and Torch using secured algal data (Figure 1) as a basis for judgement. A prediction of the water quality in the year 1971 will also here-in be contained.

Methods

Certain methods may be employed as a means of determining the present state of eutrophication of the above mentioned lakes. First is a comparison of the standing crop or plankton abundance of each lake (Curry, 1971). This may be accomplished by selecting the two most productive sampling stations from each lake and obtaining a total of the number of algal individuals from these selected samples. The results obtained should allow us to separate the 3 lakes as to productivity and establish an order as to the state of deterioration.

The second method involves the use of certain indicator species. Certain algal species associations are indicative of certain water qualities (Curry, 1971).

Finally is the method which involves a comparison of the number of species present with the number of individuals of these certain species present. Few species containing many individuals is indicative of eutrophic environments whereas many species with few individuals is characteristic of an oligotrophic environment.

Discussion and Conclusion

From the data supplied (Table 1), stations 1A and 6 from

Lake Bellaire appear to be the most productive with stations 7 and 8 being selected from Clam Lake, and stations 9 and 10 from Torch Lake. An assessment of the productivity of both stations from each lake indicates Lake Bellaire to be the most productive followed by Clam lake and finally Torch Lake.

Rawson (1956) states that "Asterionella sp., Tabellaria sp., and Melosira islandica, often associated with Dinobryon are the most usual phytoplankters in the oligotrophic waters of North America" (Curry, 1971). Dinobryon and Asterionella sp. were obtained in samples from all three lakes. Rawson (1956) further states that "highly productive lakes are dominated by plankton populations, at least at certain seasons, by Asterionella spp., Fragilaria crotonensis, Synedra spp., Steppanodiscus spp., and Melosira spp. in the temperate regions of the world (Curry, 1971). Fragilaria spp. was obtained from samples taken in all three lakes, however it was found in greatest quantity in Lake Bellaire. Synedra sp. according to Standard Methods (1966), is a taste and odor algae and this particular genus was found in greatest quantity in Lake Bellaire. There is some reason for doubt however, as to the reliability of indicator species. Asterionella sp. according to Rawson (1956) is an indicator of both oligotrophic and eutrophic waters, however Standard Methods (1966) refers to it as a wholly eutrophic genus. This particular method of classification does offer some assistance however. By securing Dinobryon sp. in all three lakes we must refrain from classifying any one as being eutrophic. Finally the evidence obtained from species indications substantiates our order of states of eutrophication of the 3 lakes. That is Torch Lake appears to be the most

Not necessarily
what frequency?
chemistry
or season?

oligotrophic followed by lakes Clam and Bellaire.

Our final method of classification involves numbers of species and individuals found in each lake. Table 1 indicates Lake Bellaire as having the most individuals in relation to the number of species. Clam Lake follows with Torch Lake being last. This adds further support to the order of eutrophication of the three lakes.

From the evidence obtained it seems appropriate to classify Torch Lake as a very near oligotrophic lake, followed by Clam Lake which we must term oligo-mesotrophic, with Lake Bellaire being classified as a near mesotrophic lake.

Future (1976)

The land area or drainage basin of which the Chain O' Lakes are an integral part offer a recreational resource inferior to few. The lake shores of most of the lakes are still comparatively undeveloped. Economically this area shows great potential, and since it is man's nature to consider only immediate gain, it is my prediction that an enormous recreational population increase will occur. Man also characteristically gives recreational spending priority over necessities such as adequate sewage treatment facilities.

On the basis of the above prediction, a prediction as to the water quality in the year 1976 is somewhat gloomy. I would have to predict an increased rate of eutrophication with Torch Lake becoming an oligo-mesotrophic lake (only because of its size and depth) with Clam Lake becoming somewhat less than mesotrophic, and Lake Bellaire rapidly approaching a eutrophic condition.

STATION SPECIES	1A	1B	2	3	4	5	6	7	8	9	10	11	12
ASTERIONELLA sp.	+	++	++	++	++		++	++		++	++	++	0
DIATOMS spp.	++												
DINOBRYON sp.	+			++				+	++	++	0	+	0
FILAMENTOUS ALGAE sp.	+++			0		0		++				++	
FRAGILLARIA spp.	+++	++++	+++	++++	(highest) ++++	+++	++++	+++	+++	+++	++	++	
SYNECDRA spp.	++									+	0	+	+
ANABAENA planctonica		+	0	+									
CERATIUM hirudinella		+	+		+	0	+	+	+		0	+	
DINOBRYON sertularia		0	++				++						
SYNURA uvella		0	0				0	0					
SYNURA sp.									++	+			
ANACYSTIS sp.				0									
ANABRYON Cyclops					0						0		
MICROCYSTIS sp.						0	0						
ANABAENA sp.							++						
ELTODINA sp.								++					
PRODUCTIVITY:	24	18	18	20	16	10	24	23	16	18	13	18	4
	Bellaire Lake						Clam Lake			TORCH LAKE			

KEY:	PRODUCTIVITY	NO./LITER
0 = Rare	0 = 1	1 - 8,000 = Rare
+ = few	+ = 2	8,000 - 93,000 = Few
++ = common		93,000 - 1,312,000 = common
+++ = many		1,312,000 - 3,000,000 = many
++++ = very large population		over 3,000,000 = very large population

Based on totals of samples taken 9-5-70, 10-4-70, and 11-1-70

TABLE 1. A comparison of the various number of individuals of certain species at SAMPLING STATIONS IN LAKES BELLAIRE, CLAM AND TORCH.

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