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STUDIES ON THE BENTHOS OF LAKE ST.LUCIA
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Studies on the Benthos of Lake St. Lucia by the Late

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ABSTRACT.

Published work by Dr. R.E. Boltt showed that most benthic species in St. Lucia tolerate salinities up to about 55‰. Following a period of extremely high salinity, recolonisation of North Lake and False Bay occurred initially by those species which have planktonic larvae capable of distribution by wind-induced seiches. The reservoir for recolonisation is in South Lake and any management scheme should therefore limit salinities in this area below 50‰. A series of monthly samples was taken from July 1974 and analysis is available for samples taken until February 1975. A decline in the quantity of benthic fauna was found from winter to summer. In spring (September/October) there was an increase in the mass of benthos at all stations, the cause is unknown. It is recommended that the program be continued, that it be expanded to include the macrobenthos and that stations be marked by stakes or buoys.

INTRODUCTION.

Dr. R.E. Boltt's work on St. Lucia commenced in January 1972 when salinities in the system were between 45 and 80 ‰. He carried out 3 consecutive surveys at 6 monthly intervals covering 67 sites in the lake. The results of this part of the work have been published (Bolt 1975). The most significant findings will be discussed below. In July 1973, Boltt commenced a study which aimed at following changes which occurred at monthly intervals at 6 stations in the lake. At the time of his death, analysis of samples taken until February 1974 (inclusive) had been carried out. Unfortunately therefore, a complete year's analysis is not available. I have studied the records of the benthic fauna and have been able to draw some conclusions. The incompleteness of the record however greatly detracts from the value of the data. Sampling was continued until about June 1975 and if worked up would give a picture of the benthos for a period of 2 years of near sea water salinity.

METHODS

Samples were collected by means of a Van Veen grab which sampled an area of 150mm by 150mm to a depth of about 50mm on sand and 100mm on mud. Samples were washed through a 0,25mm mesh shortly after collection, and all the material obtained by the mesh was preserved. In the laboratory the material was sorted, identified, counted, and ash-free dry weights obtained. This work was extremely tedious, despite the small area sampled many samples contained thousands of nematodes and small gastropods.

RESULTS I

I will firstly summarise what I regard as the most significant results reported on in Bolt (1975).

1. Most species were found in salinities up to about 55‰. At higher salinities only chironomids and ostracods occurred.
2. When salinities dropped from 30 to 40‰ rapid recolonisation of the system by certain elements of the benthic fauna occurred.
3. This initial recolonisation was by those species which have short life cycles and planktonic larvae.
4. Distribution of the planktonic larvae was through mass water movements or seiches induced by wind action.
5. The main reservoir of benthic fauna was in the South Lake.

6. Since the general movement of water in the narrows is seawards when dilution of the system occurs, planktonic larvae from this area were not involved in recolonisation of the lake.
7. Possibly because of the distance from South Lake, the benthos of False Bay was the slowest to recover from a period of high salinity.
8. The most abundant benthic species by weight was the small gastropod Assiminea, this is probably one of the most important food items in the benthos being eaten by a wide variety of animals from birds to fish to crabs.

RESULTS II

The position of the 6 stations is shown in Fig. 1. Station 3 was in an area which has sand in some places and mud in others. The results from this station were extremely erratic with respect to Assiminea and samples contained between nil and over 20,000 animals. I believe this may reflect the patchy nature of the bottom.

The dominance of Assiminea obscured changes in other faunal components. If the mass of Assiminea is excluded from the analysis a very striking picture emerges from the analysis (Fig.2). At all stations there was a marked increase in biomass in September/October. The increase occurred in widely different forms such as polychaetes, copepods and nematodes. The increase in biomass appears to follow a bloom of foraminifera and diatoms in August (see paper by I. Johnson in this report).

The spring increase occurred in the middle of what was an apparent decline in biomass from July through November/December. This has confirmed a trend previously noted by Boltt(1975) that in summer, standing stocks (but not necessarily production) are lower than they are in winter. This may be a result of predation pressure in summer.

RECOMMENDATIONS

1. The program should if possible be continued since the seven month series has not been adequate to show annual changes. Samples were collected for the full two years and merely require analysis.
2. A limited sampling program on the same 6 stations should be carried out in order to establish the effects of the current low salinity regime on the benthos.
3. An attempt must be made to include the macrobenthos - e.g. small crabs and the larger bivalves. These animals are not collected by a small Van Veen grab and will require a different technique.

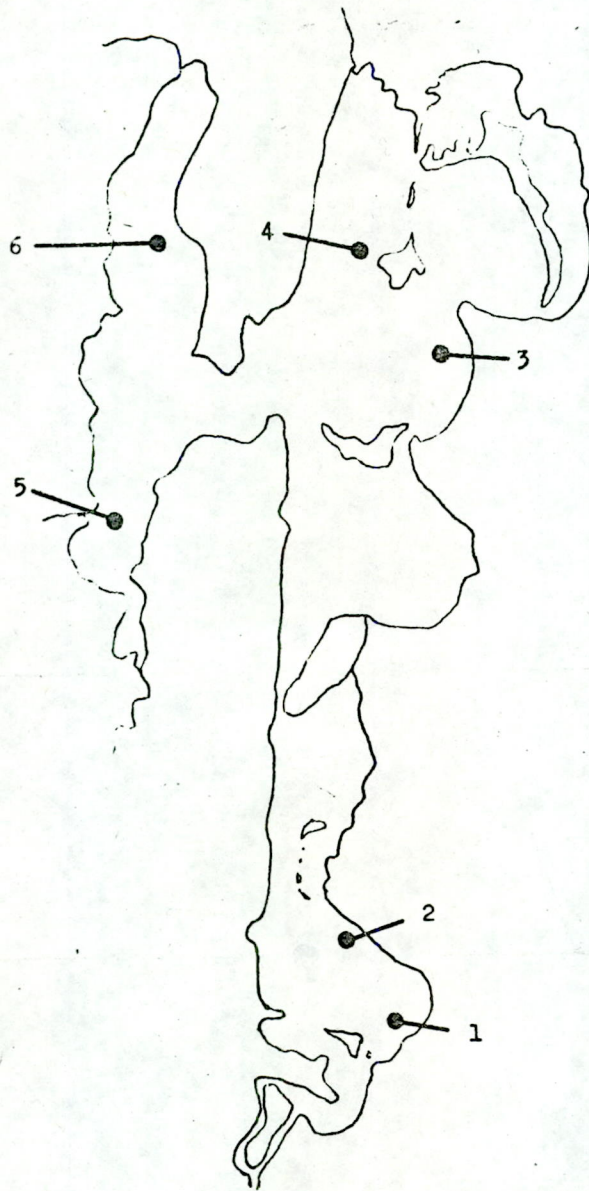


Fig. 1. St Lucia: Position of stations which were sampled for benthos at monthly intervals.

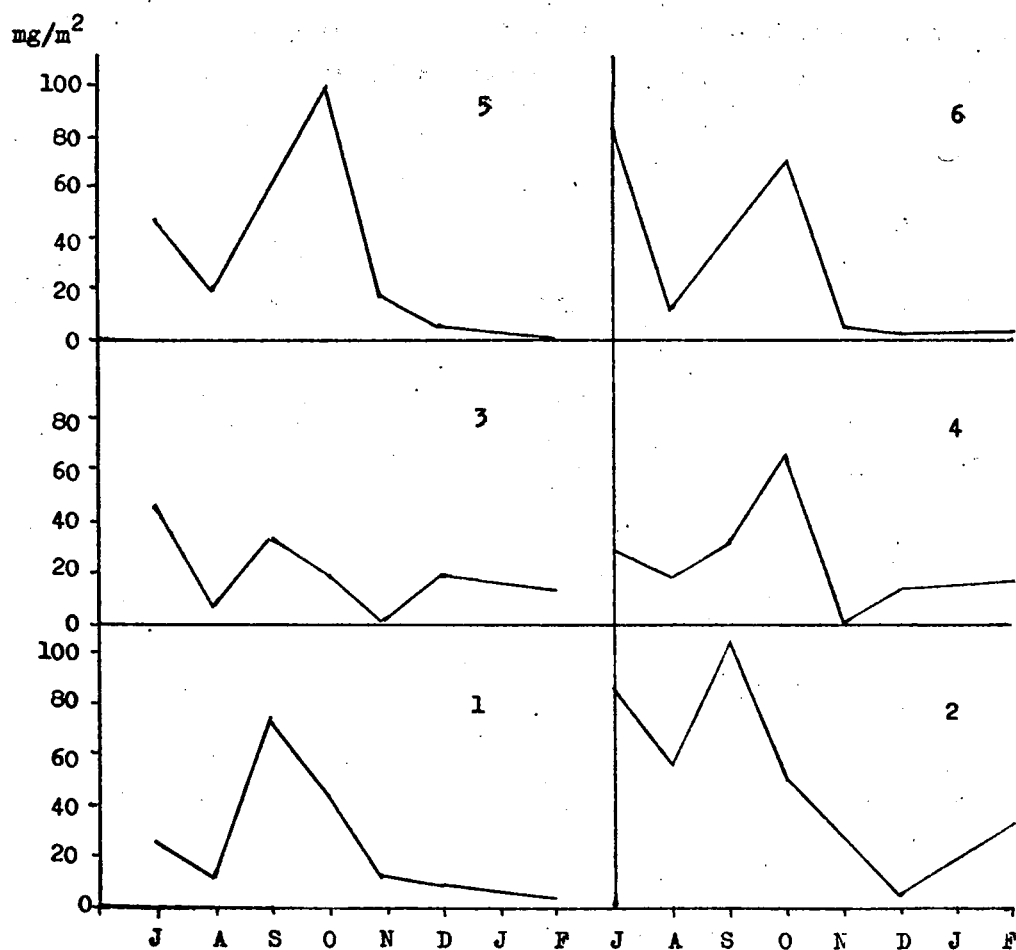


Fig.2. Ash-free dry weight of benthos (excluding Assiinea) at six stations in St Lucia in 1974/75.

The Van Veen grabs would have to be run in conjunction in order to maintain continuity and because large samples would be impractical to process for small benthos.

4. Studies should be extended to define exact position of elements of benthos in or on the substrate and the depth to which they penetrate.
5. The food of the various components should be identified and in the case of detritus the source should be defined.
6. Data on benthic species should be used to compile turnover rates and secondary productivity of the St. Lucia benthos.

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REFERENCE

BOLTT, R.E. 1975. The recovery of the benthic fauna of St. Lucia Lake following a period of excessively high salinity. Trans. roy. Soc. S. Afr. 41 : 295-323.