

A LIMNOLOGICAL AND FISHERIES SURVEY OF RUNYAN LAKE

WITH RECOMMENDATIONS AND A MANAGEMENT (to be submitted
in late November 7

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Report to be submitted to: Al Luchenbill

INTRODUCTION

Because of concerns about present conditions and future problems in Runyan Lake we were asked to conduct a physical, chemical and biological survey of Runyan Lake and summarize any problems observed, identify causes and suggest solutions. Runyan Lake is about a 200 acre lake located in Livingston county near Fenton Michigan. It is a deep lake with three basins, some as deep as 55 ft. The present recreational uses on the lake include: water skiing, fishing, sailing, Scuba and snowmobiling in the winter. Many just enjoy the aesthetics of the lake. We studied the lake during the winter and summer of 1979. We collected water chemistry samples and biological samples and are presently compiling these data into a final report. We set up 12 stations in the creeks and major basins of the lake from which our collections were made. To follow is a brief summary of the salient features of the data collected along with some comments on significant findings and our preliminary recommendations.

RESULTS - SOME SELECTED COMMENTS

There is a lagoon associated with an apartment complex on Denton Creek which can discharge effluent into the creek. To date information from the Michigan Dept. Of Natural Resources states that no discharges have been made from this lagoon.

Benthos - These are the animals that live in the bottom and we found them scarce in the deep areas of the lake because of the anoxic condition (no dissolved oxygen) which exists there. They were abundant in the weedy embayment (station L) on the south end of the lake.

Aquatic Plants - There are very few aquatic plants in Runyan Lake except for the station L area.

Sediments - Sediments were as expected in most areas. However in the weedy embayment (L) sediments are very thick and a problem. Dredging may have to be attempted sometime in the future. Much of this buildup is probably due to the chemical treatment of plants which we understand has gone on their regularly. This small bay is good for the whole lake in that it is acting as a treatment basin for the nutrients that enter it both from the houses around it and from the creek (station D) that enters there. However it is unacceptable to the people who reside there. There are only two options: continue the chemical treatments as required to maintain boat movement and consider dredging in the future. This area should be a good bass and pike spawning ground, however the thick sediments and anoxic conditions that exist may kill some or all of the eggs of these species.

Water chemistry

We identified 6 creeks that enter Runyan lake and they were sampled twice during 1979. Secchi disc reading were not as good as we expected. Algae was not the reason, however there could have been a bloom at the 17 to 25 ft depth as indicated by dissolved oxygen data.

Water temperature - Temperatures were as expected. Stratification was observed during the summer.

Dissolved oxygen - There was no lack of dissolved oxygen in the lower parts of the lake in winter as expected. During the summer however there was no oxygen present in the lower parts of the lake making a large part of the lake off limits to fish during the summer. In addition very toxic conditions existed there. There was high levels of ammonia, hydrogen sulfide and low pH, all potentially toxic to fish.

Total alkalinity - Alkalinity was low in the 100-150 ppm range. This means the lake will also be low in productivity.

Hardness - Hardness was also low in the 130-200 ppm range.

Chlorides - They were very low in the well sample collected (4 ppm) while in the lake they were somewhat higher in the 20 ppm range. However these values are still very low compared to other lakes in the county. The increase in chlorides however does indicate that nutrients and possible septic tank effluent is entering Runyan Lake causing a buildup of this indicator ion.

Ammonia - High in two creek samples and on the bottom of the lake,

Nitrates - plant nutrient-is low in the lake.

Soluble Phosphorus - low in the lake

Total Phosphorus - Some high values in creek samples in winter; low the rest of the year in the creeks and in the lake. Some high values at station A in the winter.

Hydrogen sulfide -- High values on the bottom in the deep basins- this compound is toxic to fish.

Zooplankton - Good species diversity, there are many Daphnia in the main part of the lake indicating low predation by fish; in the lagoon (L) no Daphnia were found indicating high fish predation on this group.

Fish - We collected 16 species of fish in our nets; this is a high number of species of fish. Included were pike, perch, many different sunfish, lake herring (a coldwater species), darters, banded killifish and reports of gar and bowfin also in the lake. The problem with the fish is that the low productivity in the lake causes few fish to be able to survive. There is a small littoral zone (shallow weedy area) in the lake and most of the lake is deep where there is little food and toxic conditions for fish. A hypolimnetic aerator (aerates the bottom half of the lake only) may increase the production of fish. Most fish examined were eating well; food supply is diverse.

Algae - Very, very few present. Low nutrient conditions may be keeping the algae in control. It is thus important to maintain conditions as they now are and curtail any further inputs of nutrients into the lake to prevent significant algae blooms from occurring with regularity.

PROBLEMS, CAUSES AND SOLUTIONS

Nutrient input - Reduce all phosphorus entering the lake from residents (lawn fertilification, pipes, geese, etc.), support the proposed sewer, discourage any new developments along the lake, fight any more major developments in the watershed creeks which feed Runyan Lake that wish to dump effluents (industrial or domestic) into these creeks. Preserve and support the maintenance of all wetlands in the watersheds of Runyan Lake.

Few fish - Inherent to this low productivity lake. There is a small littoral zone, few plants, low amounts of food for fish. One could aerate the hypolimnion in the summer to open up more of the lake - costly alternative however.

Abundant macrophytes and thick sediments in the small embayment - Result of having a creek enter there which contains sustained levels of nutrients and the shallow nature of this lagoon. Chemical treatment will probably have to be continued, even though such practice has caused high sediment buildup. Some dredging (constly) may have to be done eventually. This area is now acting as a treatment basin for the whole lake - removes nutrients via plant and algae uptake.

PRELIMINARY RECOMMENDATIONS

1. Recognize that you have a beautiful , unique lake here, with relatively few plants, deep, usually clear water and appreciate its esthetic appeal. Understand that because of the character of the lake, productivity (amount of animals and plants) will be low and as a result there are few fish in the lake.

2. Regarding maintaining the long-term good water quality of the lake you must :

a. Curtail use of nutrients - reduce lawn fertilization, discourage geese, don't run evaes or other effluent pipes into the lake, plant a greenbelt, etc.

b. Support sewers; All septic tank nutrients gradually leach into the lake and because the lake has low levels now, it won't take much to make the lake worse and curtailment will improve water quality immensely.

c. Discourage any more development on the lake

d. Fight any source of pollution in any stream in the watershed that enters Runyan Lake

e. Support the preservation of all wetlands

3. Fish

Populations are low, they could be increased by aerating the lake in the summer(hypolimnetic aeration only). This is costly and is not a strong recommendation. Northern pike spawning is not understood. No young of the year were collected indicating poor reproduction. Some recommendations to improve habitat or perhaps stock some pike may be made. More data or information on this point are required.

4. The shallow, plant-choked embayment

Chemical treatment of plants will probably have to continue to maintain open channels. No wholesale treatment of the whole bay should be performed. Some dredging may have to be done.

YOUR INTEREST, CONCERN AND SUPPORT ARE REQUIRED TO PURSUE THESE RECOMMENDATIONS AND PUT INTO EFFECT THOSE WHICH YOU FEEL ARE THE MOST FEASIBLE. THERE ARE NO PANACEAS: ALL SOLUTIONS WILL REQUIRE VOLUNTEER TIME, COMMITMENT, LEADERSHIP AND MONEY TO MAINTAIN RUNYAN LAKE AS A HEALTHY AQUATIC RESOURCE.

RUNYAN LAKE

TOWNSHIP 4N
RANGE 6E
SECTION 9
LIVINGSTON COUNTY
MICHIGAN
NOVEMBER 6, 1970

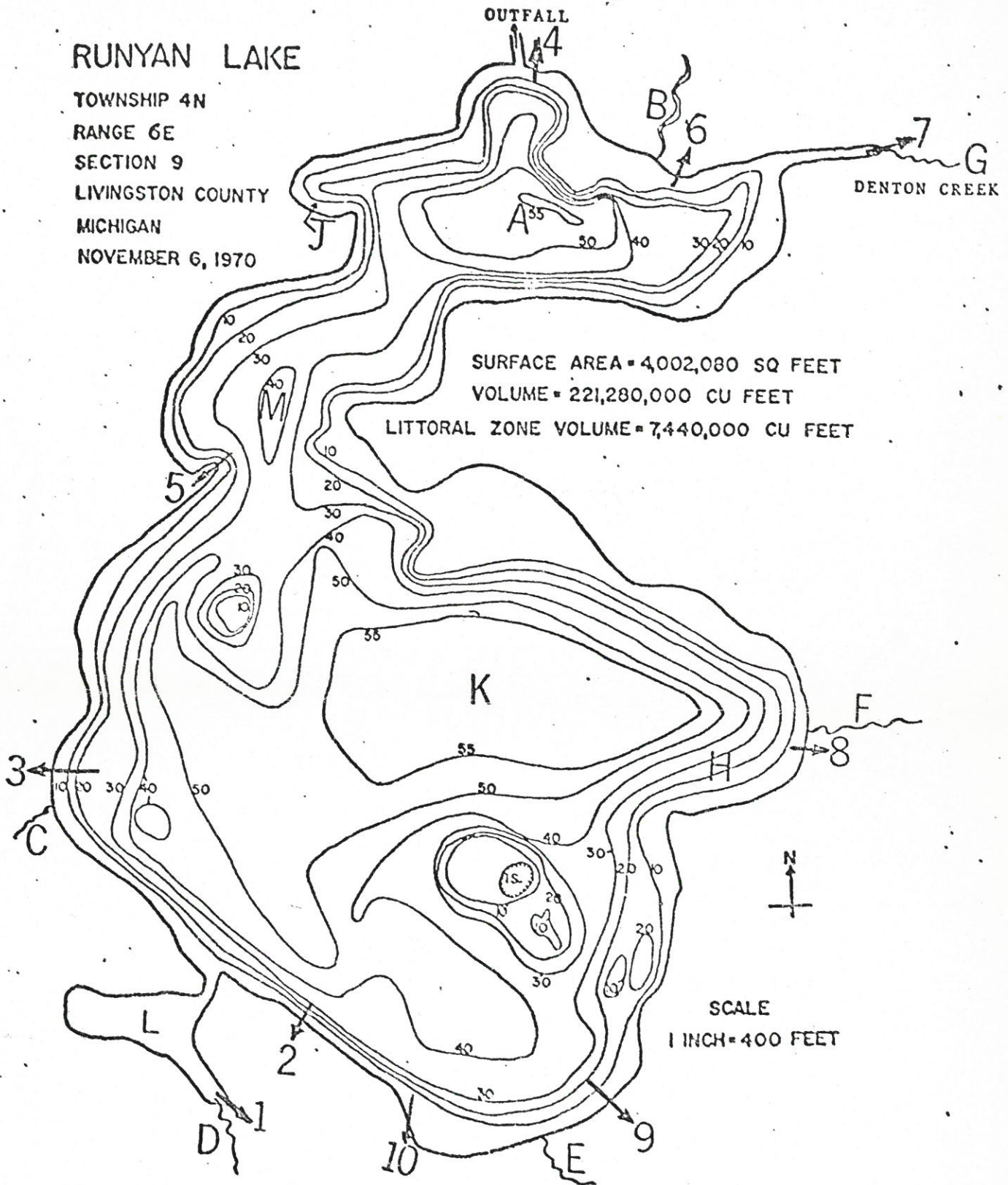


Figure 1. Map of Runyan Lake (T4N R6E S9), Livingston County, near Fenton, Michigan showing stream inlets, the outlet, sampling stations for a former survey (large numerals) and our sampling stations (large letters) during 1977. See Table 1 for a detailed description of each station sampled.