For Michigan Conservation

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INSTITUTE FOR FISHERIES RESEARCH
DIVISION OF FISHERIES
MICHIGAN DEPARTMENT OF CONSERVATION
COOPERATING WITH THE
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LAKE MAPPING IN MICHIGAN

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Only a few of the approximately 5000 lakes in Michigan had been accurately mapped prior to 1930 when the first active fisheries research program was inaugurated by the Conservation Department. Most of the earlier surveys were made by the United States War Department which confined itself to the navigable waters of the Great Lakes and their connecting passage ways. Some very excellent contour maps of a few selected lakes were prepared by university groups engaged in intensive research. The few other available maps made previous to this time were the results of civic and real estate surveys and were for the most part very inaccurate, particularly with reference to depth contours.

Since 1930 the Institute For Fisheries Research has been responsible for the mapping of more than 400 lakes. About half of this number were surveyed by the CCC and the ECW organizations under the general direction of the Institute. Some 335 more have been mapped by the United States Forest Service. These of course, included only lakes on the national forests in the state.

The preparation of lake contour maps is in no way a project by itself, but one part of the fisheries research program involving the general inventory of lakes throughout the state. The actual need for accurate contour, bottom-type maps has been clearly demonstrated in fisheries management practices. A good map not only gives evidence of the suitability of waters for game fish but helps

in the selection of species to be encouraged. It shows the extent of spawning areas and vegetation beds and is useful as a base for plotting other significant information. These maps should also be useful to the fish culturist who has the responsibility of stocking the numerous lakes, because they show the most favorable places for the introduction of fry and fingerlings.

The methods used in lake survey have varied somewhat as circumstances required. The plane table and simple alidade have been found most practical when the lakes to be mapped were small. Large lakes required the use of transits or telescopic alidades. Before the time when federal aid became available all lake surveys were conducted during the summer by traverse or triangulation and the soundings made from a boat. It was found, however, that mapping during the period of ice cover was not only possible but more reliable. The position of the sounding could naturally be located more accurately from a fixed point on the ice than from a boat drifting before the wind. The CCC and ECW have confined their mapping activities to the winter months.

While it will be necessary in the future to map certain lakes during the summer, we are convinced that time can be saved and expences reduced if maps are made during the winter. The following methods are now being practiced in our lake survey program.

Preparing the Shore Outline

Aerial photographic prints are now available for all of the Lower and much of the Upper Peninsula of Michigan. Each print covers an area of approximately 2 x 3 miles and has a scale of between 1000-2000 feet per inch.

Our method is to copy each lake individually on 35 mm film by means of a Leica camera. The resulting negatives are then projected to a desirable size and outline tracings made. To date, we have not been able to get satisfactory projection prints. So much detail is lost in the required 15-30 diameter

enlargements that these prints are of little value. We have found however that tracings are very usable when the significant shore line features are included. Considerable difficulty was experienced at first in the interpretation of these projections. This has been quite well mastered by careful field checks and reference to the aerial prints.

Many of the lake features, aside from the shore line, such as weed beds, encroaching shore, deep and shallow water areas, marl patches and tributary streams, can be seen on these projections. Besides these features, landmarks on and adjacent to the shore such as docks, lone trees, fences, cottages, roads etc. are copied (see Fig. 1). These facilitate running lines for the soundings.

Tracings are made on "Helios" paper which is not only flexible but quite waterproof and can be used satisfactorily in the field.

Sounding the Lake

With the lake outline showing the pertinent shore line features at hand, the field party is able to establish lines between known points without a transit or alidade.

A line is drawn between two known points on the map and with the scale already established from the original print, soundings can be made at any desired interval along the corresponding line on the lake. It is simply a matter of chaining the distance, cutting a hole through the ice and making the sounding.

The task of cutting holes requires considerable time and effort, especially during periods of thick ice. This problem has been solved by the development of an electric drill shown in figure 2.

By means of this drill one man can make as many as 300 holes through 15-30 inch ice at measured positions in one day. This apparatus will bore through 2-3 inches of ice per second. Our limited experience has shown that a battery

will remain charged for two or three days with ordinary use. An alternate battery is used during the period of recharging.

The type of bottom is determined in addition to taking the depth at measured intervals. This is accomplished by means of a combination sounding lead and bottom sampler (Fig. 3). A small sample of the bottom is brought up with each sounding operation. The sounding line is a calibrated, 1/8 inch twisted steel cable with a cord center. It does not "cake" with ice and is easily manipulated from a hand reel.

All of this equipment when mounted on a toboggan does not exceed 60 pounds in weight and can be transported over snow or ice and across country without much difficulty.

When using the above method a crew of three men can adequately sound and complete the maps for a 100-200 acre lake each day. The completed field maps are drafted and blue line prints prepared. These prints are used as a basis for more intensive fisheries studies and lake inventory and are available to the general public at cost plus postage. Address - Institute for Fisheries Research, Museums Building, Ann Arbor, Michigan.

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please
photo all
figure pages
(even if they are
incomplete)

Fig. 1 - Projection print of a lake taken from aerial photograph.
(Honeywell Lake, Oakland County)

Fig. 2 - Ice drill used in winter mapping.

Specifications:

Motor - 1928 Studebaker starting motor (only one which turns to the right)

Starting switch - Universal starting motor switch

Battery cables - 4 foot flexible battery cables

Drill bit - $1\frac{3}{4}$ inch wood bit

Shaft - 9/16 inch diameter steel rod - length determined by maximum depth of ice

Battery - regular 19 plate car battery

Approximate Total Cost with one battery including labor $25.

Fig. 3 - Combination sounding lead and bottom sampler

Cylinder - $1\frac{1}{4}$ inch diameter pipe (outside dimension
4 inches in length - filled with lead.

Rod - 5/8 inch diameter brass rod
$2\frac{1}{4}$ inches between lead and cone

Valve - brass with leather face

Cone - 2 inches deep (hard brass)

Total cost including labor $3.50.

Fig. 4 - Ice drill in operation

Photo by Robert Ball

Fig. 5 - Taking the sounding and bottom sample

Photo by Robert Ball

Fig. 6 - Survey crew in action

Photo by Robert Ball