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FIELD TRIALS OF NEW AQUATIC HERBICIDES, 1960

by

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It is well known that the effectiveness of an aquatic herbicide may depend upon a host of environmental conditions such as turbidity, water color, pH, and water hardness, and upon the physiological state of the plant. Various species of the rooted aquatic plants differ in their susceptibility to a given chemical. Because of these variables considerable field testing is necessary in waters of different types before the usefulness of a new herbicide can be ascertained. The purpose of this paper is to review tests of two formulations of sodium endothal carried on in two southern Michigan lakes in 1960. We also describe a single trial with a granulated 2,4-D preparation.

The products tested were as follows: (1) Penco Endothal Aquatic Weed Killer (Pennsalt Chemical Corporation), a liquid product containing 2 pounds of Disodium 3,6-endoxohexohydrophthalate per gallon; (2) Penco 5 percent Endothal Granular Aquatic Weed Killer (clay particles impregnated with 5 percent by weight of Disodium 3,6-endoxohexohydrophthalate); and

(3) 20 Percent Aqua-Granular (Diamond Alkali Chemical Company), a product consisting of clay granules impregnated with 2-ethyl-hexyl ester of 2,4 Dichlorophenoxyacetic acid. The latter contains 20 percent by weight of the active ingredient.

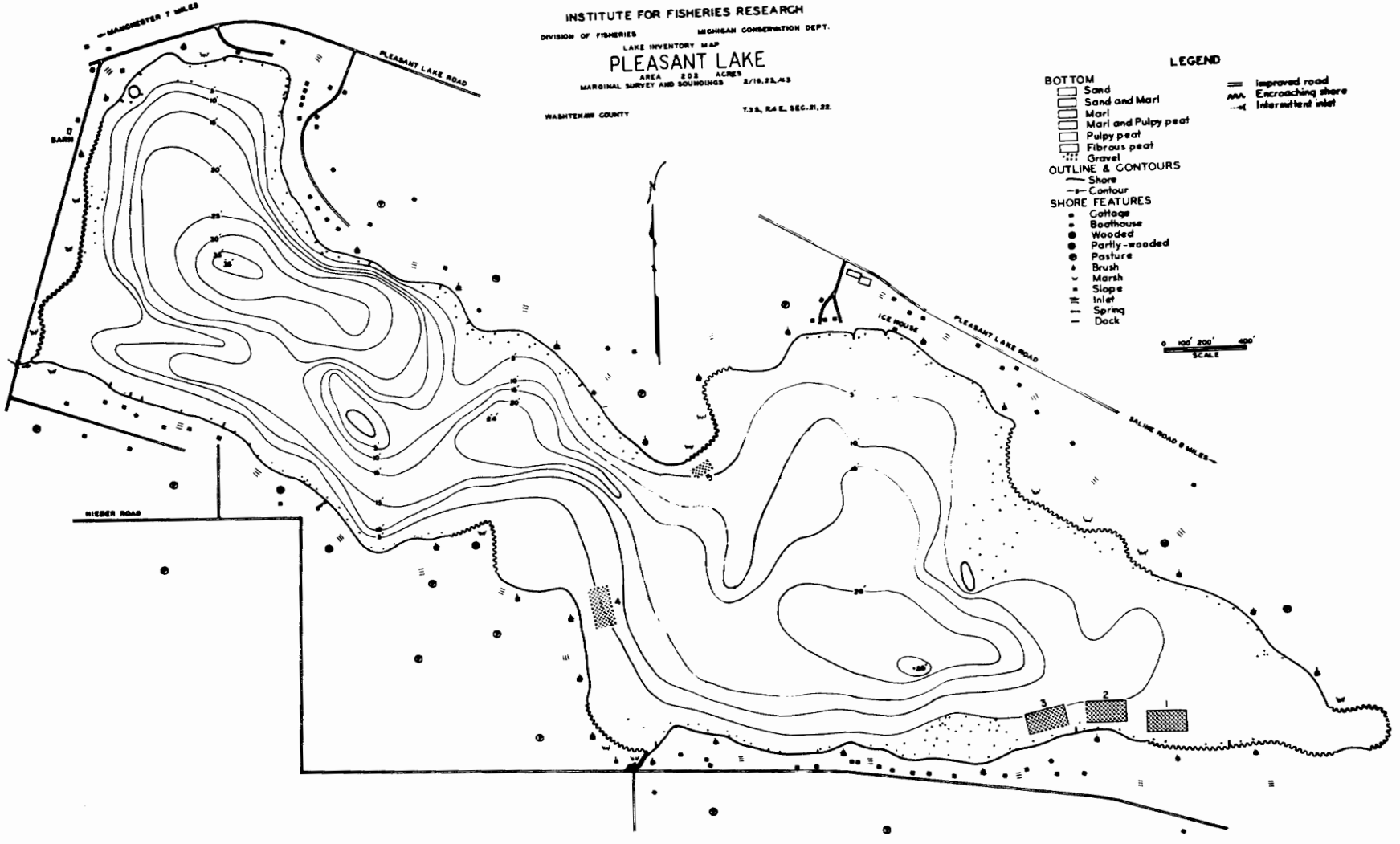
Tests were carried out in Pleasant Lake, Washtenaw County, T 3 S, R 4 E, Sections 21 and 22, and in Wildwing Lake, Livingston County, T 2 N, R 6 E, Section 31 (Figs. 1 and 2). Test plots were approximately 1/2 acre in area except that the single plot in which 2,4-D granules were used was 1/4 acre in area. Both Pleasant and Wildwing lakes are of the hard-water type. Pleasant Lake has a methyl orange alkalinity of 95 ppm and Wildwing Lake has an alkalinity of 112 ppm. Liquid herbicides were diluted approximately tenfold with lake water and sprayed over the plots from a boat. Pelleted herbicides were spread with an electric cyclone-spreader.

Pleasant Lake treatments

Plots on Pleasant Lake were treated on June 7, 1960. Weather conditions were highly favorable (bright sun and light to moderate wind). Mixing due to wind action was not judged to be excessive for a shoreline treatment. At the time of treatment submerged plants in Pleasant Lake had not yet grown to the surface. Their development was somewhat retarded compared with other years. Normally by early June pondweeds would have put on a dense growth and would have reached the water surface. In 1960 the water level was unusually high in Pleasant Lake and the water was slightly stained.

Details of treatments are given in Tables 1 and 2. Pleasant Lake plots were inspected at approximately weekly intervals after treatment. No

Figure 1.--Hydrographic map of Pleasant Lake, Washtenaw County, showing locations of test plots.


INSTITUTE FOR FISHERIES RESEARCH
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LAKE INVENTORY MAP
PLEASANT LAKE
AREA 202 ACRES
MARGINAL SURVEY AND SOUNDINGS 2/10,23,43
WASHTENAW COUNTY
T.3S, R.4E., SEC. 21, 22.
LEGEND
BOTTOM
Sand
Sand and Marl
Marl
Marl and Pulpy peat
Pulpy peat
Fibrous peat
Gravel
OUTLINE & CONTOURS
Shore
Contour
SHORE FEATURES
Cottage
Boathouse
Wooded
Partly-wooded
Pasture
Brush
Marsh
Slope
Inlet
Spring
Dock
Improved road
Encroaching shore
Intermittent inlet
SCALE
PLEASANT LAKE ROAD
ICE HOUSE
SALINE ROAD 8 MILES
NIEBER ROAD
BARN
MANCHESTER 7 MILES
N

Figure 1

Figure 2.--Hydrographic map of Wildwing Lake, Livingston County, showing locations of test plots.

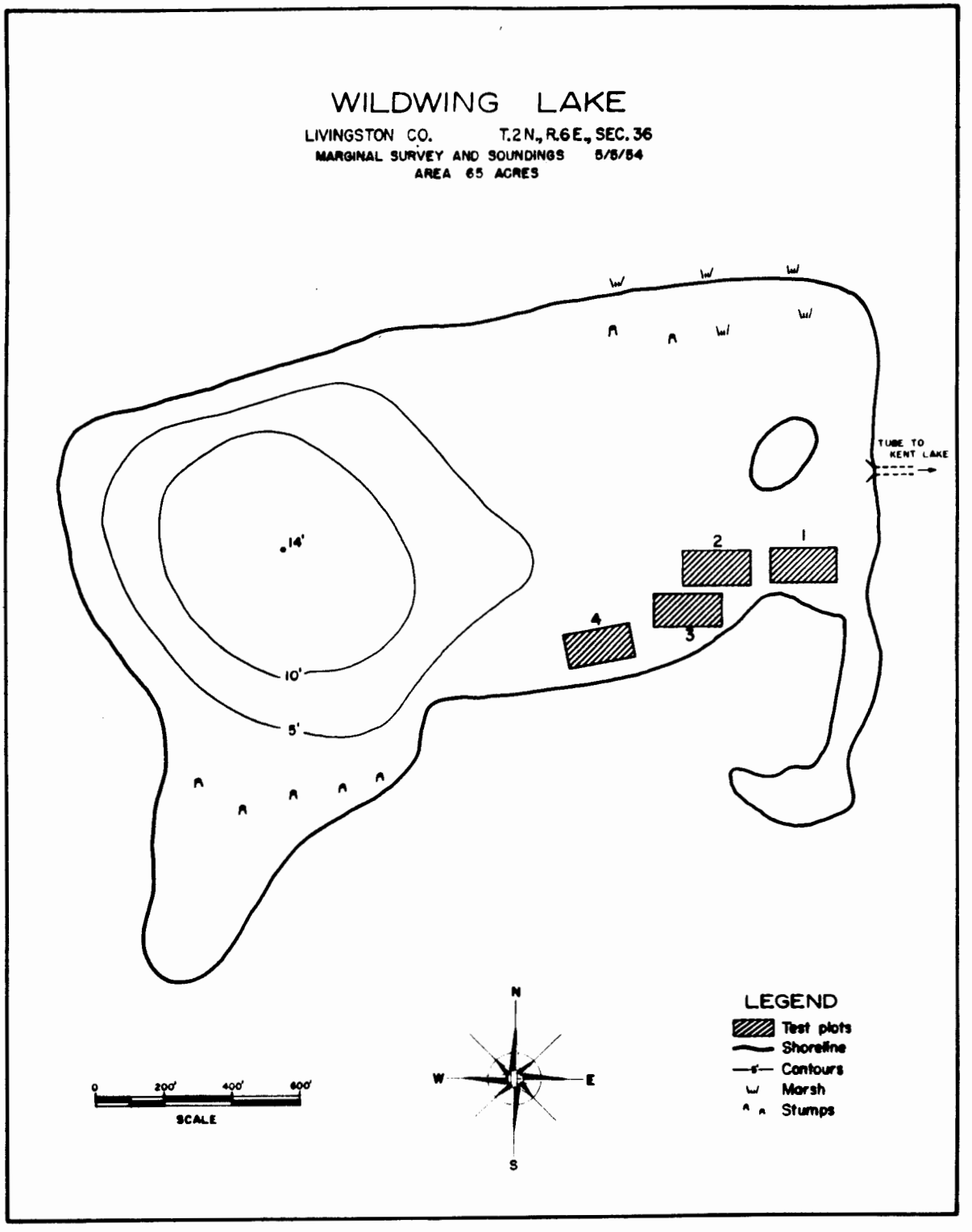
WILDWING LAKE
LIVINGSTON CO. T.2N., R.6E., SEC. 36
MARGINAL SURVEY AND SOUNDINGS 5/6/54
AREA 65 ACRES
TUBE TO KENT LAKE
14'
10'
5'
1
2
3
4
0 200' 400' 600'
SCALE
N
W
E
S
LEGEND
Test plots
Shoreline
Contours
Marsh
Stumps

Figure 2

Table 1.--Characteristics of test plots treated with aquatic herbicides

Lake and plot	Average depth (feet)	Dimensions (feet)	Bottom type	Density of plants	Species composition and estimated percentage abundance
Pleasant					
1	3.12	109 x 200	Sand Organic	Sparse	Chara sp. 40%, Nuphar variegatum 30%, Potamogeton gramineus 20%, P. pectinatus 10%
2	4.25	109 x 200	Sand Organic	Moderate	P. gramineus 95%, P. pectinatus 5%
3	5.17	109 x 200	Sand Organic	Moderate	P. gramineus 95%, P. pectinatus 5%
4	5.50	109 x 200	Sand Organic	Moderate	Chara sp. 30%, P. gramineus 40%, P. pectinatus 10%, P. Robbinsii 20%
5	4.0	100 x 100	Sand Organic	Moderate	N. variegatum 30%, P. gramineus 70%
Wildwing					
1	3.5	100 x 200	Organic	Moderate	Myriophyllum heterophyllum 50%, Polygonum sp. 50%
2	3.5	100 x 200	Organic	Dense	M. heterophyllum 50%, Ceratophyllum demersum 30%, Elodea canadensis 20%
3	3.0	100 x 200	Organic	Dense	M. heterophyllum 60%, E. canadensis 15%, Polygonum sp. 15%, N. variegatum 10%
4	3.0	100 x 200	Organic	Moderate	M. heterophyllum 50%, N. variegatum 15%, E. canadensis 15%, Nymphaea odorata 20%

Table 2.--Chemicals used to treat test plots and summary of their effects

Lake and plot	Chemical	Total quantity	Concentration (ppm)	Observation on effects
Pleasant 1	liquid endothal	3 gal.	1.5	No detectable effect
2	granular endothal	350 lbs.	3.0	Evidence for partial control (80%)
3	granular endothal	150 lbs.	1.1	Some damage but no clear-cut evidence for control
4	liquid endothal	12 gal.	3.4	No evidence for control
5	Aqua-granular 2,4-D	50 lbs.	3.6	Temporary browning of Nuphar
Wildwing 1	liquid endothal	2.6 gal.	1	No detectable effect
2	granular endothal	55 lbs.	0.5	No detectable effect
3	granular endothal	110 lbs.	1	No detectable effect
4	liquid endothal	7.8 gal.	3.0	Temporary damage to Nuphar and Nymphaea and partial control of milfoil (approx. 60%)

effects that could be attributed to the herbicide were noted for a period of approximately two weeks after treatment. On plot No. 2, where 3 ppm of granular endothal was used, some drooping of the plants was noted during the second week and by the fourth week it was estimated that 80 percent of the vegetation had disappeared. At this time water was murky and it was impossible to inspect the bottom of the lake closely. Weeds remained standing outside the treated area but, outside the area and over the remainder of the lake, most of the submerged plants had turned brown. There appears to have been a general die-off over the entire lake which may have been brought about by the development of an intense plankton bloom. The effects of treatment may have been somewhat obscured by the general die-off. It was believed, however, that the effects noted on plot No. 2 were due to the chemical and not to natural causes, since untreated and treated areas could be easily recognized. There was a sharp line of demarcation between the treated and untreated areas at the lakeward margin of the plot. The effects of the chemicals used in other plots were either nil or were too small to be recognized under the conditions that existed during the spring and summer of 1960.

Wildwing Lake treatments

Treatments were made in Wildwing Lake on July 20, 1960. Weed growth at this time was judged to be about normal. Many of the plants had matured. Weather conditions were again favorable for chemical applications. The locations of the test plots are shown in Figure 2 and other characteristics of test plots are summarized in Table 1. None of the treatments had a detectable influence upon the vegetation except in plot No. 4 (Table 2). Here liquid endothal was used at the 3 ppm rate. One

week after application the leaves and stems of water lilies had turned brown and many of the stems were without leaves. After two weeks a weakening of the stems of milfoil was noted and by three weeks much of the milfoil had disappeared. It was estimated that 60 percent of the milfoil present before treatment was eliminated.

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