INSTITUTE FOR FISHERIES RESEARCH
DIVISION OF FISHERIES
MICHIGAN DEPARTMENT OF CONSERVATION
COOPERATING WITH THE
UNIVERSITY OF MICHIGAN

ALBERT S. HAZZARD, PH.D.
DIRECTOR

ADDRESS
UNIVERSITY MUSEUMS ANNEX
ANN ARBOR, MICHIGAN

March 26, 1945

REPORT NO. 1003

A FISHERIES SURVEY OF THE HURON RIVER, ITS TRIBUTARIES AND IMPOUNDED WATERS

by

C. J. D. Brown

with Part III on

IMPOUNDMENTS ON THE RIVER

by

John L. Funk

NOTE: This report has been edited slightly by G. P. Cooper, without altering any of the conclusions and recommendations of Messrs. Brown and Funk.

March 26, 1945

REPORT NO. 1003

A FISHERIES SURVEY OF THE HURON RIVER, ITS TRIBUTARIES AND IMPOUNDED WATERS

by

C. J. D. Brown

INTRODUCTION

During the summer of 1938, the Institute for Fisheries Research initiated its first fisheries survey of an entire stream system. The Huron River was chosen for this study; first, because it is fairly representative of southern Michigan streams and the need for a better understanding of warm-water streams in Michigan has been paramount for some time; second, because the Huron River traverses a densely populated area of the state and consequently its fisheries have a high potential value; and third, this stream system is near at hand to the Institute's headquarters making possible more careful supervision and subsequent studies as needed.

The summers of 1938, 1939 and 1943 were required to complete the inventory. A much longer period would have been required had all of the nearly 500 natural lakes in the drainage been included. However, we limited our study to the main river, its tributaries and impoundments.

Studies of the lakes in the drainage are going forward as fast as facilities will permit and reports covering these lakes will appear from time to time as they are completed.

This study of the Huron River takes on new significance with the creation of the Huron-Clinton Authority designed to improve the recreational facilities of these two stream systems. The Department of Conservation has recently stepped up its program of land acquisition in this general area. There is perhaps information in this survey which will help in the development of the Huron recreational area and improve the fisheries of the drainage.

Acknowledgment

A considerable number of the Institute staff has aided one way or another in this survey. The personnel of the 1938 survey party was as follows: Dr. M. R. Raymond, party leader; O. H. Clark, John Greenbank and L. D. Wesley, assistants. Joseph Bailey, W. C. Beckman and Floyd Ames also assisted this party the latter part of the season. The 1939 party included the following: Dr. James Moffett, leader; K. E. Goellner, L. D. Wesley and Frank Lydell, assistants. The impoundments were partially studied in 1938 by a party headed by R. C. Ball with Walter Crowe and Paul Eschmeyer as assistants. The main study of the impoundments, however, was carried out in 1943 by Mr. L. E. Perry, leader; Robert Stout, Myron Means and Bruce Ross, assistants.

We are indebted to a large number of land owners along the banks of this stream for camp sites and the right to trespass over private land.

The accompanying map was prepared by Mr. William Cristanelli from the field copies. Some of the information on lake maps, particularly the outlines of the impounded waters, was secured from the Detroit Edison Company, the Ford Motor Company and from the firm of Ayres, Lewis, Norris and May. The Detroit Edison and Ford Companies furnished us with considerable drainage and flow information and gave full cooperation in this survey.

Dr. James Moffett made most of the tabulations for the streams and parts of this report are direct quotations from his notes. Mr. Milton Trautman gave considerable time to the collection and identification of fish on the upper Huron.

Survey Methods

Appropriate methods for this stream survey were adapted from similar studies made elsewhere. However, no fixed or standard system is in general use and we found it necessary to make certain changes in our routine as the study progressed. In spite of these changes, we are confident that data throughout the survey are fairly comparable except for seasonal differences. Water temperatures, vegetation and other such factors known to change greatly throughout the season were checked several times in order to give us a picture of their maxima and minima.

The Huron River, with its tributaries and impoundments, is far too large and complex to be treated as a whole, hence it will be discussed as three major units; the main river, the tributaries and the impoundments. A numbering system has been applied to the tributaries similar to that used in the New York stream survey. Tributaries are numbered consecutively from the mouth upstream. One may ask why the proper names of each tributary are not used in place of numbers and this is a legitimate question which can be answered best by looking at the most reliable map of the stream in question. Only a very few of the tributaries have established names and one finds it quite impossible even with careful field checking to discover names for some of the smaller streams. In a few instances, several names of equal status are shown for the same stream. In view of this condition, the only safe reference to a given stream is by number, although the name of the stream may be used in addition where such a name is reliable. There are five categories of tributaries recognized in this report as follows:

primary, secondary, tertiary, quaternary and quintan. The primary tributaries are those which empty directly into the Huron River; the secondary tributaries are branches of the primary tributaries; the tertiary tributaries are branches of the secondaries; and so on. This numbering system may be better understood by referring to the inserted map of the Huron River system. Let us take, for example, primary tributary 18 of the Huron River which is usually known as Honey Creek. This has 7 secondary tributaries and secondary tributary No. 3 has two (tertiary) tributaries. Tertiary-tributary-one of this system has two (quaternary) tributaries. Now suppose we want to make reference to the second quaternary tributary. This can be done by actual numbers of these tributaries as follows: 18-3-1-2, which means that the stream in question is tributary 2 of tributary 1 of tributary 3 of tributary 18 of the Huron River. One will find this system quite usable after a few trials.

The main river and the tributaries were divided into sections. The criteria used for these divisions were mostly physical in nature. The entrance of tributary streams, abrupt change in bottom type and change of gradient were the main factors selected although length alone was used in some instances. The main stream was divided into 20 sections. These were numbered consecutively from the mouth upstream. The sections on each tributary were numbered independently beginning at the mouth of the stream. The limits of these sections on the river and its tributaries are shown by cross lines on the accompanying map of the river system.

From one to four stations were established at definite points within each section (indicated by dark triangles on the map) as conditions warranted. The average of conditions at these stations is taken to represent the general conditions for each section. The stations are not numbered on the accompanying map but may easily be determined by counting from the mouth up stream. It should be kept in mind that the first station on the down-stream part of a section is always No. 1 and if only one stations exists, it is always No. 1.

Physical, chemical and biological conditions for each station were determined by intensive sampling and analyses. A careful sketch map was made of the stream at each place where stations were established enabling the investigator to return to the exact spot, if necessary, for subsequent studies. Unfortunately the sketch maps cannot be included in this report. Physical data include: temperature of air and water, average width and depth of stream, current velocity, volume of flow, color and turbidity, bottom type, quality and quantity of pools and riffles, abundance of shade and cover, nature of immediate drainage, degree of flooding, and location and nature of drains, diversions and dams. Chemical analyses were made to determine the quantity of dissolved oxygen, carbon dioxide, pH, and methyl orange alkalinity (hardness). Biological observations included a qualitative and quantitative study of bottom fish-food organisms, quantitative plankton, and qualitative and quantitative estimates of the plant and fish populations. An attempt has been made to integrate this information in such a way as to deduce from it a better understanding of the fisheries and their management.

PHYSICAL CHARACTERISTICS OF THE HURON RIVER SYSTEM

The Huron River system drains a part of the southeastern corner of Michigan. Its drainage includes parts of six counties; namely, Monroe, Wayne, Washtenaw, Livingston, Ingham and Oakland. About two-thirds of Washtenaw County and one-fourth of each of Oakland, Livingston and Wayne counties fall within the Huron drainage. Only a few square miles of Monroe and Ingham counties are drained by this stream system. The total drainage area of the Huron River system is approximately 1,040 square miles. It is shaped something like a conventional doorknob with a large rounded collecting basin representing the knob, and a long, narrow valley extending through eastern Washtenaw, Wayne and Monroe counties to Lake Erie at a point near the mouth of the Detroit River, simulating the stem.

The Huron River system includes approximately 420 linear miles of streams. Aside from the main river, Mill Creek and Portage Creek contribute most to this total. The other primary tributaries are relatively small. The approximately 450 lakes in the drainage range in size from an acre or so to 1,400 acres. Sixteen natural lakes lie directly in the main river basin, besides the nine artificial impoundments. Many other natural lakes are found as basins along the tributary streams.

Geological History

The Huron River system originated in the area between the Michigan and Huron-Erie ice lobes as the large glacial sheet which covered Michigan began to recede.[+] At first it drained westward through Pinckney channel, through Portage swamp to the Grand River and down to Eaton Rapids. From there it coursed westward to Battle Creek, thence to the Kalamazoo River and into Lake Dowagiac which then occupied the valleys of the St. Joseph, Dowagiac and Paw Paw rivers. Lake Dowagiac drained via the Kankakee River to the Illinois River and thence to the Mississippi. With further recession of the ice sheet, the Huron changed its course at Eaton Rapids and flowed down the Grand River channel nearly to Lansing, thence westward to Thornapple River, the course which it followed until it reached Middleville. There it turned southward and led past Gun Lake through Gun River marsh to the Kalamazoo River, thence southward from the Kalamazoo at Otsego through the Paw Paw River down to Hartford where it entered glacial Lake Chicago, forerunner of Lake Michigan, which drained into the Mississippi.

[+] This account of geological history of the Huron River was adapted from the Ann Arbor Folio, U. S. Geological Survey, Ann Arbor Folio Reprint No. 155, after revision of 1915, by I. C. Russell and Frank Leverett.

As the ice sheet receded still further, the Huron abandoned its westward drainage and flowed southward, picking up the Raisin River as a tributary, and entered Lake Maumee, the predecessor of Lake Erie. This lake was much higher than the present Lake Erie and drained out the Maumee River, through the Wabash River in Indiana and thence to the Gulf of Mexico. Lake Maumee became larger as the ice receded and finally drained westward across the middle of Michigan from the vicinity of Imlay City to the Grand River and thence into old Lake Chicago. The Maumee and Wabash River outlet was abandoned. During this stage, the Huron met Lake Maumee near the present city of Ann Arbor. As the thumb of Michigan was exposed, the old Lake Maumee spread into Saginaw Bay with a consequent lowering of the lake level, however, the Grand River outlet was still retained. Following this stage, the ice advanced closing Saginaw Bay and raising the lake level once again. The outlet shifted from Imlay City to the present Cass River channel and thence to the Grand River outlet. During this time the Huron River, not much altered, built the delta on which most of the city of Ypsilanti now stands.

Further recession of the ice sheet opened an outlet eastward down the Mohawk valley into the Hudson River. However, this drainage was rather short-lived since the Ontario ice lobe readvanced and closed it. The general lake level was raised again and the outlet again flowed westward through the Grand River channel. But melting of the ice sheet opened the Mohawk valley drainage again and the Great Lakes drainage flowed past Syracuse and Rome, New York into the Hudson River for a long time. With the ultimate opening of the St. Lawrence valley, the drainage shifted to its present form and the Hudson River outlet was abandoned. During this time the lake levels were gradually being lowered and the Huron River began cutting its present channel through the lake beaches and plains which constitute the lower third of its drainage. The river has abandoned two channels in its upper reaches in the past; one which flowed southward up

the present Mill Creek channel at Dexter and then eastward to its present channel at Foster near the mouth of Honey Creek, and another which flowed southward from what is now Argo Dam, through the western part of the city of Ann Arbor along a course now followed by the Ann Arbor Railroad for about 4 miles where it turned eastward and then northeastward just west of Platt entering the present channel about midway between the two ends of Geddes Pond. In the lower part of the river, several of its abandoned channels have been described by geologists.

Recent History

The Huron River has been a rather important factor in the industrial development of this portion of the state. Its water power potential has been utilized to a considerable extent not only for electricity production but also for the operation of several industries. As early as 1900, and even before that, dams in the river furnished power for pioneer industries such as flour mills, lumber mills and paper mills. In 1914 dams at several locations (Geddes, Argo, Papermill, Ypsilanti water works, Barton and Superior) were operating and several others were in disuse. Development on tributaries to the Huron has been quite extensive. Some of the dams and mills have operated since 1880. There were in operation in 1914 dams at Rushton, Pettysville, Hamburg, Pinckney, Dexter, Lima and Fleming Creek. In recent years additional structures have been built on the Huron. Some of the more important dams installed are listed as follows: French Landing Dam which forms Belleville reservoir (1918); Ford Dam which forms Ford reservoir below Ypsilanti (1932); Flatrock Dam which forms a pond near that city, and Milford dams near Milford. Existing structures have been rebuilt and enlarged. Geddes was rebuilt in 1916; Superior and Paper-mill in 1918. All of the water power potential of this river system has not been developed, but within the next few years additional units for

power generation may be constructed on the river north of Dexter, and with this construction the majority of the stream will have been pressed into service.

The river has also had other uses. Since the establishment of communities in the area, it has received domestic sewage and has also served as an auxiliary culinary water supply. Only very recently has this pollution been diverted from the river by most of the communities along its course. Pollution and its effects will be discussed more fully as each section of the river is described.

The river has served the geology, zoology, botany and other departments of the University of Michigan and Michigan State Normal College as a study area and outdoor laboratory. There is a rather impressive bibliography of works from breeding habits of fishes and parasitological studies to geological observations on deltas, terraces and beaches of former lakes and moraines, eskers and other phenomena of glacial action. Some of the classical examples of research in several fields of biological science have been done on the waters of this river system.

Rather extensive recreational facilities including boating, swimming, canoeing, scenic drives, cottage developments, golfing and winter sports have been developed throughout the valley. Several outdoor camps for boys and girls are located on lakes of this drainage. County parks and private resorts afford considerable recreation for people in the southeastern part of the state. The river is indeed important as a recreational feature of this portion of the state and will no doubt become more so in the future.

The fishing history of the Huron system is rather obscure, but reports on fishing during early years all agree that the fishing was better in the past than at present. No commercial fishing enterprises of consequence have ever appeared. Some of the early stocking records show plantings of practically every kind of game fish, including salmon. Since urbanization

of the drainage, fisheries have been sorely neglected and practically exterminated in the lower reaches of the river by pollution, land clearing and damming. The original fish fauna must certainly have been altered and, in certain localities, changed completely by these developments.

PART I

THE HURON RIVER PROPER

The Huron River heads in Big Lake, Oakland County and empties into Lake Erie near the mouth of the Detroit River. The meandered distance of the main stream is approximately 120 miles. However, only about 85 miles of the stream is actually being considered here since the remainder is covered by natural or artificial lakes. For the purpose of this study the stream is divided into 20 sections (see map). The following table gives a rough description of the locations of these sections and the locations of stations at which survey observations were made.

Table 1

Designated Sections and Survey Stations on the Huron River

River Section Number	Location of Section	Length: Miles	Station Number	Location of Station
1	Mouth of river to dam at French Landing	24	1	At end of road near Pt. Mouillee.
			2	100 yds. below South Rockwood Bridge.
			3	200 yds. below French Landing Dam.
2	Bartom Lake to bridge on Joy Road, Dexter	5	1	Park, 400 ft. below Joy Road at Dexter.
3	From bridge on Joy Rd. to North Territorial Rd.	5.5	1	300 ft. below Boy Scout camp, Dexter.
			2	End of lane on Ernst farm.
4	Bridge on North Territorial Road to outlet from Portage Lake	2	1	At North Territorial Road.
			2	At Bell Road bridge.
			3	300 ft. below outlet of Portage Lake.
5	Baseline Lake to Whitewood Lake	.5	1	1,000 ft. above Baseline Lake inlet.
			2	500 ft. below outlet of Whitewood Lake.
6	Little Whitewood Lake to Lower Gallagher Lake	.5	1	About half way between Little Whitewood and Lower Gallagher lakes.
7	Gallagher Lake to Strawberry Lake	1	1	1,200 ft. above Gallagher Lake.
			2	600 ft. below outlet of Strawberry Lake.
8	Strawberry Lake to 100 ft. below bridge on highway U.S. 23	6.75	1	100 ft. upstream from highway M. 36.
			2	50 ft. upstream from Pleasant Lake Road.
			3	100 ft. upstream from Pickett Road.
9	100 ft. below highway U.S. 23 to Kent Lake	8.5	1	50 ft. west of highway U.S. 23.
			2	50 ft. east of bridge on Placeway Road.
			3	100 ft. S.W. of bridge on highway U.S. 16.
10	Kent Lake to Buno Road	3.5	1	SE 1/4 of SE 1/4 of Sec. 31.
			2	SE 1/4 of NE 1/4 of Sec. 32.
			3	Just west of Maple Road.

Table I (Con't.)

Designated Sections and Survey Stations on the Huron River

River Section Number	Location of Section	Length: Miles	Station Number	Location of Station
11	Buno Road to Milford Lake	4	1	Just north of bridge on Buno Road.
			2	Bridge on Dawson Road.
			3	Bridge on Reinke property.
12	Milford Lake to Proud Lake	3.75	1	Bridge on Garden Road.
			2	Bridge on Wixom Road.
			3	Bridge on Montclair Hunt Club.
13	Proud Lake to Commerce Lake	1.25	1	100 ft. east of Proud Lake.
			2	Old unused arch bridge on Sec. line of 16 and 21.
			3	800 ft. west of Commerce Lake.
14	Commerce Lake to intersection of east and west branches of Huron River near Commerce	1	1	130 ft. north of canal to subdivisior, Sec. 10.
15	Dam at Commerce to Fox Lake	1.75	1	200 ft. below Forest St.
			2	6 ft. north of Wise Road.
			3	600 ft. west of Beech Dr.
16	Fox Lake to Long (Brendel) Lake	2.50	1	6 ft. north of Cooley Lake Road.
			2	6 ft. south of Cedar Island Lake Road.
			3	1,400 ft. southeast of Long Lake.
17	Long Lake to Cedar Island Lake	1	1	100 ft. above Long Lake.
			2	6 ft. south of bridge, Sec. 27.
			3	Bridge on Oxbow Lake Rd.
18	Cedar Island Lake to Oxbow Lake	1	1	6 ft. west of bridge on Lake View Road.
			2	6 ft. west of bridge on Oak Knoll Road.
			3	100 ft. east of dam below Oxbow Lake.
19	Oxbow Lake to Pontiac Lake	3	1	6 ft. west of bridge on Shotwell Road.
			2	20 ft. west of curve south of Twin Lakes golf course.
			3	6 ft. south of bridge on Pontiac Road.
20	Pontiac Lake to Big Lake	6	1	6 ft. west of bridge on Tegerdine Road.
			2	6 ft. west of bridge on White Lake Road.
			3	6 ft. west of bridge on Hillsboro Road.

While the names of lakes, roads, etc. which are cited in the above table are mostly not given on the accompanying map, the map does show the limits of the various sections. The survey results are given in the following pages for each separate section starting with section 1.

Section 1
(From Mouth of River to Dam at Belleville Lake)
T.3, 4, 5S., R.8, 9, 10E.

The lower part of the Huron River from the mouth upstream to French Landing comprises section 1. This portion of the river meanders slightly through rather flat lake plains and beaches -- remnants of the geological stages in the recession of what is now Lake Erie. The course of the river is in an almost straight southeast direction. There are no hills or depressions in this area which might have altered its course. The river channel is deeply cut throughout this section with banks varying in height from 5 to 20 feet, except at the mouth and about one mile upstream where a comparatively small section stands only slightly above the level of Lake Erie and is covered with extensive patches of bulrush and cattails. Three municipalities and two parks are located along the river banks. Many cottages, picnic grounds and private estates border the river. Near the town of Flatrock a dam has been built by the Ford Motor Company which creates Flatrock Lake discussed in the latter part of this report. From this impoundment the town of Flatrock gets its culinary water supply. Locks were built in the dam, probably to satisfy legal requirements, but they are not functional. So far as is known, no boats requiring such facilities travel the river. A fishway of very questionable merit was also installed in the dam, but there is no question that this dam at the present time is a barrier to fish migration. Two abandoned wooden dams which do not obstruct fish movement were observed in the vicinity of New Boston. These impound little, if any, water and have created deep holes which are favorite spots for fishing.

The lower Huron River has been a dumping ground for junk, refuse and sewage. All along this section these by-products of habitation litter the

stream, its banks and parts of the countryside. The survey party in 1939 reported the presence of an abandoned garbage disposal plant of the City of Detroit. This plant operated until 1937 and was still emitting small quantities of polluted water in 1939. During the period this plant operated, there was reported to be no fish of consequence in the river below. Since it ceased to operate, some improvement has been reported, but conditions are still far from what they were originally.

There are but six tributaries in this section of the river. The watershed is narrow, averaging no more than a mile in width, and the tributaries, except for possibly two, are not of any great significance to fisheries.

In 1939 the survey party made a trip down the river by rowboat from French Landing to the mouth. In order to see what conditions were like during the low stages and still make the trip by boat, it was necessary to ride the front of the crest of water released from the power dam at Flatrock. The stream at low water was observed to have extensive gravel riffles alternating with large, deep, well-covered pools from French Landing to just above South Rockwood, a distance of about 18 miles. The bottoms of the pools were either sand, silt, or clay or combinations of these. The banks of the stream are heavily wooded, thus affording adequate shade. During the high-water stage in this same part of the stream, pools and riffles were indistinguishable and the water became turbid where it was ordinarily fairly clear.

Downstream from South Rockwood to Lake Erie there is practically no shade or cover. No pools or riffles could be distinguished. The river is rather deep, sluggish and wide throughout this 6-mile stretch. The stream bottom is predominantly sand and clay with gravel occurring very infrequently.

Throughout section 1 the river is quite wide, averaging approximately 150 feet. The current velocity at the upper two stations was

about 1 foot per second. At the lower station there was no perceptible current.

The oxygen content of the water was low at stations 1 and 3 and about normal at the middle station (2). At station 3 the water is low in oxygen because it is drawn from the bottom of Belleville Lake and has not had sufficient time or agitation for it to be aerated. At the lower end of the river, pollution is severe enough to reduce the oxygen, but in no place did the survey parties report oxygen conditions as being critical for fish except possibly in the tailrace below the power house at French Landing. However, there probably are occasional short periods when oxygen conditions become unbearable for certain of the game fish, although our analyses were not made at such times. A summary of physical and chemical data taken on this section of the Huron River is shown in Table 2.

There is very little aquatic vegetation in the river below Belleville Lake. The extensive marshy flats near the mouth of the river are not considered in any detail in this report because their nature makes them of little value to game fish, except that they do furnish spawning grounds for carp and possibly for pike.

Fish-food conditions did not appear to be very good in section 1 of the Huron River in spite of certain rather favorable physical and chemical conditions aside from regular water fluctuation and pollution. As shown in Table 4, the plankton is average or better, but only midges and tubificid worms were taken in bottom samples. The limitation of bottom species to these two forms is clear evidence of pollution. Both midges and tubificids thrive under conditions resulting from pollution. The intermittent water flow throughout this section and transitory sand bars are prohibitive factors for many food organisms. Snails, caddisflies, stoneflies, etc. are much too sensitive to changing water levels and pollution to survive here in significant numbers. The backwaters away from the main stream were well supplied with invertebrate fauna, but these waters are probably

not accessible to fish much of the time.

The fishes taken by the survey party from this section of the Huron are listed in Table 5. Eight species of game fish, one coarse fish, four obnoxious fish and nine forage fish were collected or reported. Of these species found in section 1, the white crappie, gizzard shad and lake emerald shiner are found nowhere else in the drainage. It is very probable that the sheepshead and other typical Lake Erie species are found in the lower part of the river at times. Our fishing operations were only extensive or intensive enough to insure the collection of the more common species.

The yellow perch was reported to be the most abundant game fish near the mouth of the river. However, none were taken by the survey parties. Northern pike were common in this section. Largemouth and smallmouth bass were taken in the upper part of the section from Belleville Lake to Rockwood. They did not seem to be very numerous, but only careful netting and creel census over a period of two or three years would give an accurate estimate of the numbers of these species. Carp and goldfish were numerous. Long-nosed gar and dogfish were also taken. The most abundant forage fishes were the gizzard shad and blunt-nosed minnow. Lake emerald shiners, steel-colored shiners and johnny darters were very common.

Too few specimens of the game fish were taken to learn much about their growth rates. Scales were studied from six northern pike, three largemouth bass, one pumpkinseed sunfish and one white crappie captured in the Huron River near the mouth of tributary 1 (Silver Creek). The growth rate was considerably above the state average for all of these species. Two 6-inch largemouth bass had no annuli and had attained that length during the current summer. One fish 12-1/4 inches long and weighing 1-1/8 pounds was in its third summer. One pumpkinseed sunfish (6-1/4 inches) and one white crappie (6-1/2 inches) of legal length were just in their third summer of

life. Two northern pike, 12-1/2 and 13 inches respectively, were without annuli and in their first growing season; four other specimens (17-1/2 - 18-1/2 inches in length) were all in their second year.

There has been no stocking in the lower section of the Huron River, at least for the last 5 years and probably for a much longer time, for conditions resulting from drastic water fluctuation and pollution have placed this section in more or less disrepute.

Management Suggestions

The most serious fisheries problem in section 1 of the Huron River is that of water fluctuation resulting from storage of water for power. A stabilized water level below Belleville Lake would be very desirable from a fisheries point of view but practically out of the question from the point of view of electric power companies. Except in the spring of the year during runoff, the river below Belleville Lake is either at flood stage, i.e., when the power plant is operating or practically shut off, i.e., when the gates are closed and the plant ceases to operate. Power engineers claim that continuous operation on a small flow would not be profitable. There is no remedy in sight which would be practical. The construction of a series of holding dams below Belleville Lake, it is believed, would solve the problem, but the value of the fisheries probably could not justify this expense. The problem then seems to be one of putting up with the present physical handicap.

The matter of pollution is quite a different story, however. It is believed that more strict control of sewage disposal by Flatrock, Rockwood and other communities on the lower river should be put into force. In addition to the possible damage done to the fish present, few people, if any, find pleasure in seeking recreation or eating the fish taken in such filth.

There is no valid reason for stocking fish in this section of the river. It is very probable that under present conditions there are

about as many fish already present as the section will support. If conditions improve with respect to a stable water level and reduction in pollution, a natural increase in the population can be expected. Spawning facilities are adequate for both smallmouth and largemouth bass, pan fish and pike.

Although some fish predators were observed along this part of the river, it is believed that their presence is not detrimental to the production of game fish. No severe parasite infestations were noted, and none of the parasites found are harmful to man.

The only stream improvement structures which would be favorable to this part of the river are the check dams already mentioned. These would be for the purpose of giving a more constant flow of water below Belleville. It is doubted, however, if these could be built at a cost commensurate with the improved fishing they would provide. There are good riffles and deep pools along all except the extreme lower end of the river.

More information on the fish population and extent of fish removal from this section would be very desirable. The information gained in this survey indicates very light fishing.

Note

The Huron River between the dam at Belleville and the head of Barton Lake consists at present of a series of impoundments. Nowhere in this area is there any typical stream conditions save for a short section between the headwaters of Geddes Pond and the Argo Dam. Even here there is such drastic fluctuation in flow that the stream is no longer of great consequence for fishing. Some pike, bass, walleyes and carp are taken, however. No separate section was indicated for this portion of the river because it was felt the limited area and altered condition of the stream make it of no great use for fisheries. It should be stated, however, that along this portion of the stream there have been developed a beautiful park, playgrounds and golf course by the city of Ann Arbor.

Section 2
(From Barton Lake to Bridge on Joy Road at Dexter)
T.2S, R.5E., Sec. 2, 4, 5, 9, 10, 11, 12.

Section 2 of the Huron River, between the Barton impoundment and Dexter, traverses an area of steep moraines in contrast to the flood plain of section 1. In many places the banks are steep and the course of the river has been strongly influenced by hills and depressions. Most of the shore is high and dry, and in only a few places is the shore low enough to be marshy or inundated during periods of flood water. The surrounding country is rolling pasture lands, cultivated fields and woodlots. There are no obstructions in this part of the river. Two springs and one tributary were found to augment the water supply. The springs are clear and cold and have been developed for use in county parks which are spread along the north bank throughout the western part of this section. The village of Delhi is the only populated place in this section. Some private homes and private parks occupy the river banks. The scenic Huron River drive skirts the river bank for most of its length.

The stream is much frequented for picnicking, camping, boating, swimming and fishing. One private bath house is operated at Delhi.

Reports of past fishing have been good. Smallmouth bass and pike as well as numerous rock bass are the principal game fish taken.

The stream in this section has an average width of approximately 85 feet and an average depth of about 2 feet. During the survey (September 13, 1938), the velocity at the station just below Dexter was 1.6 feet per second and the volume about 200 cubic feet per second. The water was colorless and there was little or no turbidity. During flood periods considerable silt and clay are commonly in suspension.

The water temperature was 71°F. and the air temperature was 74°F. on the date of the survey. In midsummer the water temperature here may reach 80°F. or more for short periods. Oxygen is abundant, as might be

expected with the extensive riffle areas and not too frequent pools. The water is distinctly alkaline and hard.

Shade is fairly abundant but there is little good cover in the stream.

A summary of the general physical and chemical conditions in this section is given in Table 2.

Seven species of aquatic plants were collected from this part of the river. These are listed and their abundance indicated in Table 3. Water weeds, sago pondweed, bushy pond-weed and white star grass were the most numerous. Algae and mosses were abundant in the less turbulent parts of the stream.

Fish-food organisms were varied and abundant. Stoneflies, caddisflies, midges and snails were the most numerous (Table 4).

Rock bass was the most abundant game fish present, smallmouth bass were common, and northern pike are occasionally taken although the survey party did not collect this species. The hog sucker, mullet and mud pickerel were common. Carp are reported to be present but not very numerous. The common shiner was the most abundant forage fish. Blunt-nosed minnow, silver shiner, rosy-faced shiner and stonecat were also numerous. A list of the fish and their estimated abundance is shown in Table 5. Only very limited information on growth rate is available for the game fish of this section. This, however, indicates good growth. One rock bass in its fifth growing season was 7.1 inches. Four smallmouth bass of a sample taken by casting on August 10 were of the following lengths and ages:

Total Length (Inches)	Number of Annuli (For Growing Seasons, Add 1)
11.2	3
13.1	5
15.7	6
17.0	6

Stocking records show the planting of 500 smallmouth bass in the Huron somewhere in Dexter Township in 1939. They may have been planted in either of our sections 2 or 3. There are no other records of stocking in this part of the river during the past 5 years. There have been plantings made in Barton Lake immediately below this section, and undoubtedly the fisheries of the impoundment below affect conditions above, e.g., most of the pike found in this more rapid part of the river almost surely are migrants from the lake below.

Conditions for the spawning of smallmouth bass, largemouth bass and rock bass are favorable in this section.

No predators or parasites of consequence were reported for this section.

Management Suggestions

It is believed that section 2 of the river has adequate spawning facilities for smallmouth and largemouth bass. Pike probably spawn in Barton Lake and in the slow water above Delhi Falls. Rock bass have proven their ability to maintain themselves. No stocking is recommended.

The most paramount need through much of this section is for adequate pools and cover. A considerable number of devices to create or deepen pools between Dexter and Scio would undoubtedly improve conditions for bass. Most of the stream is wide riffles and cover is almost nonexistent.

Section 3
(From Mouth of Mill Creek at Dexter to North Territorial Road)
T.1S., R.4E., Sec. 24, 25 and T.1S., R.5E., Sec. 30, 31.

Seotion 3 is about 5.5 miles in length and is similar in character to section 2. The river valley is narrow and deeply cut. The immediate stream banks are solid, dry and covered with woods. The drainage area on either side of the river has rolling topography. Some of the land is cultivated but there are numerous tracts of wooded and pastured land. There are eight tributaries entering this portion of the river. Only

two of these, however, are large enough to be of significance to fisheries. These are tributary 21 (Mill Creek) and tributary 27.

An 18-inch dam which backs the water up about 0.5 mile is located in the vicinity of the Boy Scout camp near the lower end of this section. This obstruction is not a barrier to fish movements and creates a nice pool.

There is a road on either side of the river coming near enough so that the stream may be viewed in places. Practically all of the land adjacent to the river is privately owned and access is somewhat restricted except by boat from either up or down stream. This portion of the river is used for fishing, swimming and boating and offers fine home sites. Fishing is reported to be fair at times for smallmouth bass, bluegills and rock bass.

Physical and Chemical Characteristics

The average width throughout this section is approximately 120 feet and the depth about 1.25 feet. The current velocity in the riffles varied between 1 and 1.4 feet per second. Estimates of volume were between 160 and 200 cubic feet per second. The water is colorless and without noticeable turbidity, except during flood periods. The water temperature on the date of the survey (August 23, 1938) was 75°F. while the air temperature was 80°F at noon.

Except right at the lower end of this section near the dam, there are no pools of consequence. More than three-fourths of the section is riffles over gravel and rubble. Although there is some shade along the banks, there is very little effective cover for fish.

Oxygen was plentiful throughout this section but more so in the upstream part of the section (7.5 p.p.m.) than below the dam (6.8 p.p.m.). There was no carbon dioxide recorded at either station. The water is strongly alkaline (pH 8.0 - 8.2) and moderately hard (192 p.p.m., methyl orange alkalinity). There was no pollution observed or reported. A

summary of physical and chemical conditions in this section is shown in Table 2.

Both physical and chemical conditions in this part of the river are very favorable for fish, with the exception of poor pools and cover. The high summer temperatures make the water only suitable for warm-water fish.

Biological Characteristics

No plant collections were made from this section. Algae and mosses were comparatively scarce, submerged aquatic plants were common in the slower parts of the stream, while emergent species were comparatively rare. Plankton was very limited as is to be expected in a stream with a fairly fast current.

Fish-food samples taken in the gravel-rubble bottom of the riffle areas showed stoneflies, caddisflies and snails to be the most abundant organisms. Numerous other less abundant species were found (Table 4). Food conditions in general were good throughout the whole section.

Of the game fish present, bluegills, rock bass and long-eared sunfish were abundant. Bluegills and long-eared sunfish were most abundant in the impoundment at the lower end of the section and rock bass in the riffle areas above. Although no smallmouth bass were taken by the survey party, they are known to be common throughout the section. Chub-suckers were abundant and a few yellow bullhead and mud pickerel were taken. While traversing this section, about 200 large suckers (12 - 15 inches in length) were seen. They were of two genera, Hypentelium and Moxostoma. Rainbow darters, horny-headed chub, black-banded top-minnow, common shiner and blunt-nosed minnow were the most common forage fishes (Table 5).

Growth rate information is almost nil from this section. No game fish of any size were taken in spite of considerable effort. One rock bass in August of its third summer had reached 3.6 inches in total length. A smallmouth bass 2.6 inches long was still in its first growing season, as was a largemouth bass 2.7 inches long.

According to available records, no stocking has been done in this section during the last 5 years. Conditions are favorable for the natural propogation of rock bass, largemouth and smallmouth bass, bluegills and pumpkinseed sunfish. It is believed that natural propogation is adequate to supply this section without stocking.

No parasites or predators of consequence were observed along this part of the stream.

Management Suggestions

There seems to be no good reason for changing the status of this part of the Huron River. Stocking should not be necessary. Smallmouth bass and rock bass should be encouraged by pool improvement. Some bluegills may find conditions suitable in the impounded part at the lower end. Their present scarcity in this region indicates unfavorable conditions for their growth.

Some well constructed cover devices and structures for creating pools in the upper two-thirds of section 2 would undoubtedly prove of benefit and increase the number of large fish in this part of the river.

Section 4
(From Bridge on North Territorial Road to Inlet from Portage Lake)
T.1S., R.4E., Sec. 12, 13

This two-mile section of the river and the topography of the surrounding country are not much different from section 3 in general physical features. Only one small tributary (No. 29) and the outlet of Portage Lake (tributary No. 30) enter this section. Good roads skirt either side of the river, but there is only one road which crosses the river. Public access can be had from this road crossing as well as from Portage Lake above and from the North Territorial Road bridge or the river below. Fishing is reported to be fair for rock bass and smallmouth bass.

The average width throughout this section was somewhat less than for the section below, being about 80 feet and the average depth was

approximately 1.7 feet. The average current velocity was about the same as for the previous section and there was not much difference in estimated volume. Comparisons can be made by looking at Table 2. Water temperatures for this section were between 73° and 76° F. on the date of the survey (August 23, 1938), while air temperatures were between 68° and 74°F. The water was colorless and very clear. Oxygen (6.5 - 7.3 p.p.m.) was plentiful although not abundant. Total alkalinity was moderately high (methyl orange, 190 p.p.m.).

Pools are not very numerous, there being only one or two of any appreciable depth. Large boulders strewn along the river bed act as deflectors and small pools are created on the down stream side of each. In several places the water is quite rapid. The bottom in general was composed of rubble, gravel, sand and some marl. During the summer there are quite a number of places too shallow to float a rowboat.

There is some shade along the banks but not enough to provide good cover for the stream. Cover is poor in general. As was true in section 3, physical factors are favorable for fish in this section, with the exception of pools and cover.

There is very little vegetation in this part of the river. No collections were made.

Fish-food organisms were fairly numerous. Water beetles, caddis flies, fly larvae and snails were the most abundant (Table 4). Some plankton was found, but it was not very abundant as is to be expected in a stream with so much current.

Fish collections made in this section showed rock bass and long-eared sunfish to be abundant with smallmouth bass and bluegills common. A few largemouth bass were also taken. Common suckers and mullet were the only coarse fish taken. Forage fishes were very scarce (Table 5) except for rainbow darters and a few horny-headed chub and black-banded top-minnows. Very few adult game fish were captured and we consequently do not have any

information on their growth rate.

There is no record of stocking in this section during the past 5 years.

Management Suggestions

Management of section 4 of the Huron River should be the same as for section 3. Adequate spawning facilities are available for smallmouth bass and rock bass, therefore, no stocking is recommended.

Section 5
(From Baseline Lake to Whitewood Lake)
T. 1N., R. 5E., Sec. 32

Section 6
(From Whitewood Lake to Gallagher Lake)
T. 1N., R. 5E., Sec. 32

Section 7
(From Gallagher Lake to Strawberry Lake)
T. 1N., R. 5E., Sec. 28, 33

Sections 5, 6 and 7 of the Huron River are so similar in general character that they have been treated together in this report. That part of the river found within the boundaries of these three sections is quite in contrast to the two sections below Baseline Lake. The stream is sluggish and more lake-like in its physical characteristics. The adjacent shore is marshy (often inundated) with dense growths of semiaquatic plants such as cattails and bulrushes. Low, marshy woods are common on the banks and extend back quite some distance in places. Several lakes lie directly in the river basin and appear as "broads" or wide portions of the stream. The surrounding country is low with occasional depressions and hills. Most of it is fairly heavily wooded.

There is not a too abundant cottage development although numerous summer homes have been built on the higher ground near the stream and on the shores of the river lakes. The stream through this part is passable by rowboats for most of the season and its scenic values attract many people to the area.

There is only one tributary (No. 31), known as Arms Creek, and that enters the lower end of section 5 from the south.

No main roads are near these sections, but Strawberry Lake Road skirts the entire length of this part of the river at a distance of about one-half mile to the south. Small dirt roads, mostly private or semi-private, lead off from the county and township roads to the river and river lakes. Public access is somewhat limited except via the stream above and below.

This area of the stream is used for fishing, boating and swimming. The species of fish taken here were essentially the same as those taken in the intervening lakes. Bluegills, perch, northern pike, rock bass, pumpkinseed sunfish and bullheads are the most common species.

Physical and Chemical Characteristics

The physical and chemical characteristics of these sections are summarized in Table 2. The width varies from 33 feet to 127 feet, and the depth from 1.4 feet to 3.2 feet at the stations where measurements were taken. The average estimated volume for this part of the stream is about 100 cubic feet per second. The current velocity varied from 0.4 to 1.8 feet per second at the stations sampled. The water was colorless and there was no visible turbidity at the time of the survey. The range of air temperatures for the stations in these sections was 77° - 81°F. and the water temperatures 76° - 79°F. The bottom of the stream throughout this entire area is predominantly marl and sand. Shade and cover are not very plentiful.

Water analyses showed oxygen to be abundant (7.0 - 10.0 p.p.m.). The water is strongly alkaline (pH, 8.2) and hard (methyl orange, 195 - 198 p.p.m.). No pollution was observed and all chemical factors favor high productivity.

Biological Characteristics

Algae was common to abundant throughout these three sections, with chara being abundant in sections 6 and 7. A considerable area of water mosses was also observed. The higher aquatic plants were almost entirely of the emergent type and occupied a dense zone all along the margin of the stream. Wild rice, cattails and pickerel weed were the most abundant. No collections of plants were made in sections 5 and 6, but a complete analysis of those collected in section 7 is given in Table 3.

Caddisflies, snails, clams and crayfish were the most abundant food organisms present (Table 4). The quantities of aquatic insects were not as great as in the rubble riffles in the sections below but good for this type of habitat. Plankton was fairly abundant.

The bluegill is the predominant game fish throughout these sections. Rock bass were common in sections 6 and 7, and yellow perch and largemouth bass were fairly common in section 7 (Table 5). The common sucker, yellow bullhead and mud pickerel were the most abundant coarse fish. No obnoxious fish were reported, but there is no doubt that dogfish, gar and carp may be found in these sections. Log perch, tadpole cat, common shiner and mud minnow are the most numerous forage fish (Table 5). None of the forage fishes seemed to be abundant, however.

Since no very large specimens of any of the game fish were collected, it is impossible to tell much about the growth rate of these species. However, the few scales studied indicate average or better growth for the younger fish. Yellow perch reached legal length in their third growing season, and rock bass in their fourth. None of the other fish collected were of legal length.

We are not able to find any records of stocking during the last 5 years in the river proper, but bass and bluegills have been planted in the river lakes and there is no reason why some of these fish might not have moved into the sections under consideration. It is believed, however,

that these plantings have had little, if any, influence in improving or reducing the legal fish population in the river.

There are adequate spawning facilities for largemouth bass, bluegills, pumpkinseed sunfish, perch and probably pike, and the stocking of these species should not be necessary.

The few fish predators and obnoxious species of fish observed are probably of no consequence in the reduction of the game fish population.

Management Suggestions

No stocking of any species is recommended. This part of the stream has large numbers of the young of largemouth bass, rock bass, yellow perch, bluegills and pumpkinseed sunfish.

The lack of good cover in this part of the river is probably responsible for the small number of legal game fish. Improvements devised to correct this condition would undoubtedly increase the number of legal game fish in these sections.

Section 8
(From Strawberry Lake to Point 100 Feet Below Bridge on Highway U. S. 23)
T.1N., R.5E., Sec. 13, 23, 24, 27 - T.1N., R.6E., Sec. 17, 18, 20.

Section 9
(From Bridge on Highway U. S. 23 to Kent Lake)
T.1N., R. 6E., Sec. 1, 2, 3, 9, 10, 16, 17, 20.

These two sections, 8 and 9, of the main Huron River are alike in many respects. The gradient of this part of the river is somewhat greater than anywhere above or immediately below. There are no river lakes between Strawberry and Kent Lakes. The stream banks are fairly high, particularly in section 8. The immediate shore is about 40 per cent marsh in section 8 and 85 per cent marsh in section 9. The remaining part is mostly pasture with some scattered woodlots. The surrounding country is rolling with cultivated fields, pastures and woodlots.

There are six tributaries (33, 34, 35, 36, 37, 38) which enter these two sections of the Huron River. Only four of these are large enough to be of any significance to fisheries, however.

There are at least eight places in these sections where public roads cross the river, and public access is confined to these places and via the stream above and below. The stream throughout this portion still has much of its original beauty. There has been no dredging or impoundment.

The fishing history of these sections has been poor for bass and pike and fair for rock bass.

Physical and Chemical Characteristics

The average width of the river in section 8 was 69 feet, and in section 9, 47 feet. The approximate average depths for these sections were 2.0 feet and 1.5 feet, respectively. The current velocity was less than 1 foot per second in section 8 and slightly over 1 foot per second in section 9, while the volumes were approximately 80 and 70 cubic feet per second, respectively. The water was colorless but somewhat murky. In the lower half of section 8, the current is slow and the river is lake-like. In the upper part of this section and in all of section 9, the current is faster and pools are few and of poor quality.

The stream bottom is composed of sand, gravel, and silt. Local areas of marl exist, particularly in the slow-moving lower part of section 8. While some trees are present along the bank of this part of the river, these sections in general can best be described as mostly open with a few patches of shade. Cover is very poor, being limited to the aquatic plants which are not very abundant.

There was adequate oxygen at the time of the survey (July 22, 1938), and there is every reason to believe there is an abundant supply the year around. The water is distinctly alkaline (pH, 8.0) and hard (methyl orange, 193 - 205 p.p.m.).

Water temperatures varied between 72° and 76°F., while the air temperatures were between 74° and 80°F. These temperatures probably do not represent the summer maxima.

Biological Characteristics

Aquatic vegetation was fairly abundant in this part of the river. Algae and moss were sparse, but sago pondweeds were abundant. Patches of arrow arum and wild rice were common along section 8, while cattails and bur reed were predominant near the water's edge throughout section 9. A summary of all the aquatic plants collected is given in Table 3.

Caddis flies, midges and snails were the most abundant bottom food organisms found in sections 8 and 9. Scuds and may flies were also quite common (Table 4). Plankton was fairly abundant for stream conditions.

Largemouth bass, smallmouth bass, rock bass, bluegills and pumpkinseed sunfish were all common throughout sections 8 and 9 (Table 4). Of the black bass, the largemouth seemed to be the most numerous in section 8, while smallmouth predominated in section 9. The long-eared sunfish was very abundant in section 8. Mullet and yellow bullhead were the most common coarse fish, while the horny-headed chub, common shiner, log perch and johnny darter were the most abundant forage fishes collected.

Too few adult game fish were taken to make a growth rate study. However, all specimens seemed to be in good condition and no evidence of stunting was observed.

Spawning conditions were favorable for all of the game fish found in these two sections. There is every reason to believe that the great majority of game fish present came from natural spawn. As a matter of fact, no plantings of any species have been made in this part of the river during the last 5 years. The plants made in the lakes above and below this area may, however, have contributed some to the fish population.

Management Suggestions

The results of this survey do not suggest any need for changing the present status of this part of the river. It is believed that natural reproduction by the fish already present will stock the area to its carrying capacity. Largemouth and smallmouth bass, bluegills, sunfish and rock bass are most suited to this type of environment.

The rather poor cover condition in this area, like the sections below, might be improved by the installation of appropriate devices throughout both these sections. Increased cover and the creation of some deep pools will undoubtedly make room for more large bass.

Section 10
(From Kent Lake to Buno Road)
T.2N., R.7E., Sec. 28, 31, 32, 33

Section 11
(From Buno Road to Dam at Milford)
T.2N., R.7E., Sec. 9, 10, 16, 21

Sections 10 and 11 of the Huron River are treated together because of their many similarities. However, the immediate shore of the lower section (10) is somewhat marshy, except in two places, while the upper section (11) has a much narrower valley with high solid banks on either side. The surrounding country of both sections is rolling with intermingling woodlots, pastures and cultivated fields.

There are two insignificant tributaries (39, 40) entering section 10 and three very small tributaries (41, 42, 43) in section 11. None of these were given any special study because they were of little importance as fishing waters and because none exercised any significant influence on the main river.

The Martindale County road skirts the river throughout most of both of these sections. There are at least 5 stream crossings by public highways. No special public access is present, however.

The only obstruction in the stream is the Ford Dam at Milford at the head of section 11. There is some water fluctuation due to the operation of a power station at this dam. It is reported that fishing below the dam has been impaired subsequent to repairs on the dam a few years ago.

Fair fishing is reported for largemouth and smallmouth bass, rock bass, perch and bluegills. This area of the river has been exploited for bait minnows and large numbers have been removed. There seems to be no serious depletion of the stock, however.

Physical and Chemical Characteristics

The average width of the river throughout these two sections is approximately 50 feet and the depth about 1.5 feet. The current velocity was slightly less than 1 foot per second in section 10 and the lower part of section 11, and about 1.5 feet per second in the upper part of section 11.

Pools were frequent, almost every bend of the stream having a fair pool. There were no riffles worth mentioning in this part of the river.

The stream bottom is composed of sand and gravel with small amounts of marl and silt at the lower end of section 10. There is some fair shade in section 11, but a good part of this section and all of section 10 are open and without adequate shade or cover.

Water temperatures on June 14 - 15, 1938, taken about noon, ranged from 72° to 78°F., while the air temperatures at the same time were about 71° - 84°F.

Dissolved oxygen was abundant (7.2 - 10.0 p.p.m.) except at station 2 of section 10 where there was but 5.2 p.p.m. This, of course, is adequate to support normal fish life. We have no explanation for the reduced amount of oxygen at this station unless it was the accumulation of organic material there.

All water samples had a high alkalinity (pH, 7.8 - 8.2) and were hard (methyl orange, 190 - 195 p.p.m.).

Biological Characteristics

There was only a very little algae and moss in sections 10 and 11. Submerged vegetation, composed of several species of pondweeds, eel grass and coontail, was dense throughout nearly all of these sections. Emergent vegetation was sparse, except at station 2 of section 10 where a fair amount was present. A complete list of the vegetation collected from this area is given in Table 3.

Fish-food organisms were quite numerous (Table 4). Caddis larvae, midge larvae and clams were the most abundant. Scuds were seen in several places. Plankton was fairly abundant for streams of this character.

Rock bass was the most abundant game fish observed. Perch, largemouth and smallmouth bass were fairly common. Bluegills were taken in very small numbers. The hog sucker, yellow bullhead and common sucker were the only coarse fish. No obnoxious fish were found although carp are probably there at certain times of the year. The horny-headed chub, common shiner and stone-roller minnow were abundant, while at least 10 other forage species were taken in smaller numbers.

We have no records of any fish having been planted in these sections of the Huron River during the past 5 years. Fish stocked in Milford Lake immediately above may have entered this section.

Because of the small number of adult fish taken in the upper Huron River, growth rate analyses cannot be very significant. An indication of growth, however, may be had from Table 6 which includes data on all the game fish collected in the Oakland County part of the Huron River. There seems to be fair growth by the young of these game fish. Bluegills reach legal length in about average time. We do not know about the rest because no larger fish were taken.

Spawning grounds for bass, rock bass, bluegills, pumpkinseed sunfish and perch are abundant throughout this area. The numerous young of game fish found at all stations is indicative of the success of natural reproduction.

However, there seems to be very few large fish of any species. This may be the result of poor cover.

While a few predators were noticed in the vicinity of these sections, they were not of serious proportions. Parasites are not abundant, and no control is needed.

Management Suggestions

It is believed that conditions are favorable enough for natural reproduction of largemouth and smallmouth bass, rock bass, bluegills, pumpkinseed sunfish and perch so that no stocking is needed to maintain an adequate population. The water throughout these sections, as in other parts of the river, gets too warm for trout during July and August and so must be considered exclusively for warm-water species.

The lack of cover may be a limiting factor in the number of large game fish in this area, although this problem is not as acute as in the sections below.

Section 12
(From Milford Lake to Proud Lake)
T.2N., R.7,8E., Sec. 11, 13, 14, 18

Section 13
(From Proud Lake to Commerce Lake)
T.2N., R.8E., Sec. 16

Sections 12 and 13 are similar in that they both have low, marshy banks. The lower portion of section 12 was dredged about 15 years ago. This dredging seemed to cause no appreciable damage to the fisheries in so far as could be determined by the survey party (1938).

The surrounding country is mostly cultivated and slightly rolling terrain with very few woodlots and many cottages and homes in the vicinity of the stream and lakes.

Three tributaries enter section 12. Pettibone Creek (tributary No. 44) and Teeple Creek (tributary No. 46) enter the river from the north, while Norton Creek (tributary No. 45), also called Norton Drain, comes

in from the south. One small tributary (No. 47) enters section 13 from the north. These tributaries will be discussed in part of this report.

There are about seven public roads crossing the river in this area. The longest piece of stream without access by public highways is the 3-mile portion between Wexom and Bernstine roads. The stream is used principally for boating and fishing but there is limited swimming in section 12.

Fair fishing for pan fish is reported in this part of the river. Sunfish and rock bass are the predominant species, and some pike and largemouth and smallmouth bass are taken. Section 12 is used some by private fishermen as a source of bait minnows.

Physical and Chemical Characteristics

The average width of the river in section 12 is about 33 feet and the average depth 2 feet. In section 13 the average width was approximately 22 feet and the depth 1.5 feet. The current velocity through these two sections averages about 1 foot per second or less. Pools were few and of poor quality, and there are no riffle areas in this part of the stream.

The stream bottom is somewhat varied in character. Coarse gravel and sand predominate in the lower section, while marl, silt and sand are most common in section 13.

Water temperatures taken June 28 to July 1, 1938, in the afternoon, ranged from 68° - 73°F., with air temperatures of 72° to 78°F. These temperatures are certainly not the summer maxima.

There was plenty of dissolved oxygen (5.0 - 8.7 p.p.m.) in this part of the river. Oxygen was more abundant in section 13 than in section 12. The pH varied from 7.6 - 8.4 and the water was moderately hard (methyl orange alkalinity, 168 - 190 p.p.m.), but slightly less so than in the sections below.

Biological Characteristics

Algae was abundant in this part of the river. It occurred in dense patches in the quieter parts of these sections. Chara and sago pondweed were the most abundant plants (Table 3), and the variable pondweed was quite common. In general, it might be said that both submerged and emergent aquatic plants were quite common, particularly in section 12.

Fish-food organisms (Table 4) were numerous and varied. Midge larvae were very abundant, while scuds, leeches and snails were very common.

Rock bass and long-eared sunfish were the most abundant game fish. Bluegills, pumpkinseed sunfish, largemouth bass and smallmouth bass were common. Northern pike, perch and black crappies were present in limited numbers. Chub-suckers were very numerous. Other coarse fish included brown bullhead, yellow bullhead and mud pickerel. The horny-headed chub and common shiner were the predominant forage fishes. (See Table 5).

The very limited growth rate information secured is given in Table 6. There was no evidence of stunting reported by the survey party and the numerous young game fish collected appeared normal in every way.

The presence of large numbers of young game fish, considered along with the fact of no recent artificial stocking, is evidence that spawning facilities are adequate for all of the species present. Some of the fish planted in Milford Lake and Proud Lake may have found their way into the river, but these would not account for the large numbers observed.

No concern need be felt regarding the predators or parasites in this part of the river. It is seriously doubted that either is significantly harmful to the fish in this area. It is believed that the lack of good cover for the larger game fish is responsible for their being sparse, rather than overfishing or predation.

Management Suggestions

No stocking of any species is recommended in view of the apparent success of natural reproduction. This part of the stream is too warm for trout or other cold-water fish, at least for a period each summer. Largemouth bass, smallmouth bass, bluegills, pumpkinseed sunfish and yellow perch are well suited to the type of habitat afforded. Some northern pike will also find conditions favorable. Black crappies are on the increase and may well be an important game fish here in future years.

It is believed that the improvement of cover conditions would increase the number of larger fish in these sections. A more careful study with this in mind would give an indication of the type and frequency most desirable.

Section 14
(From Commerce Lake to Intersection of East and West Branches of River)
T.2N., R.8E., Sec. 10

Section 15W
(From Dam at Commerce to Fox Lake)
T.2N., R.8E., Sec. 3, 10

Section 15E
(From Intersection of East and West Branches to Carroll Lake)
T.2N., R.8E., Sec. 2, 10, 11

Section 14 is scarcely a mile in length, extending from Commerce Lake to the northeast. Section 15 has two parts - an east and a west branch - each of which originates as a separate outlet from Fox Lake. In other words, the main river divides at Fox Lake into two arms which join again about 1-3/4 miles down stream. The west branch is shortest and quite direct in its general course. The east branch flows east out of Fox Lake for about 1/8 mile to enter Carroll Lake; from Carroll Lake it flows due south approximately 1 mile, where it joins with Hayes Creek (tributary No. 52), thence southwest 1/3 mile to join the west branch.

There has been some dredging in this part of the river. In section 14, the lower 25 rods were dredged about 15 years ago. A canal was constructed in 1938 off the east side of the stream for the purpose of diverting water through a subdivision development. Now the water from the river enters Commerce Lake through both the old river channel and the new canal. About 1/2 mile of the lower part of section 15W has been dredged, but this was done about 75 years ago according to reports. There has been some dredging in the east branch of this section (15E) also. Nearly 1/4 mile was dredged by a real estate firm about 1929. The course of the river at this point was changed considerably by dredging. The new channel created was through the site of a subdivision which had not been built up at the time of the survey (June, 1938).

The surrounding country is either pretty much cultivated or subdivided and built up. In the immediate vicinity of the river, there are fairly high wooded banks throughout most of section 14 and in the lower part of both sections 15E and 15W. The upper part of sections 15E and 15W is low and swampy. One tributary (No. 51) enters section 14 from the Straits Lake chain to the east. Another (No. 52, Hayes Creek) enters section 15E from the east. These tributaries will be discussed in another section of this report.

There are four low-head dams in this part of the river. One, with a 9-foot head, is situated at the lower part of section 15W. This was probably used as a source of power for a mill but is no longer in use. It is a barrier to fish movement up stream, but it creates a small impoundment which is advantageous to fish production. Another dam of similar height is located in this same section just below station 2 in the town of Commerce. In times past this dam served a mill which at the present time is not functioning. The third dam is situated in section 15E about 1/4 mile south of station 2. It has a head of about 10 feet and was built for the purpose of improving a real estate project owned by a Mr. Pelletiere. When filled to capacity,

the impoundment created by this dam is about 200 acres. A small dam with an 8-foot head is located a short distance down stream from Carroll Lake. Its purpose and effect on the river is not known.

Access to these parts of the river may be had from at least 6 public road crossings and through some private properties where the public is not excluded. On the other hand, certain parts of these sections are entirely private and without good public access.

The river in this area is not used extensively. There is some swimming, fishing and boating. Fishing is reported to be very poor, and as a result most fishermen seek the numerous lakes in the area rather than the river.

Physical and Chemical Characteristics

Certain physical and chemical characteristics are given in Table 2. The average width of the river in sections 14 and 15W was about 19 feet and in section 15E about 9 feet. Except in the impoundments the depth varied from an inch or so to about 3 feet. The average depth is probably less than 1 foot. Volume and current velocity measurements are shown in Table 2.

The water is colorless in this part of the river and was without noticeable turbidity at the time of the survey.

The temperature of the water on June 22 and 23, 1938 was 78°F. in section 14, 75° - 80°F. in section 15W and 73° - 75°F. in section 15E, with air temperatures of 79° - 86°F.

This area of the stream is almost devoid of pools, and there were no riffle areas except at station 1 of section 15W.

Gravel and rubble were the predominant bottom types with some sand and silt. There is considerable shade from bank foliage but no satisfactory cover for fish within the stream.

Oxygen conditions were satisfactory. The water is alkaline and moderately hard (Table 2).

Biological Characteristics

Algae was rather sparse except at the upper end of section 15W and the upper two-thirds of section 15E. Only a small amount of musk grass was found in these sections and this was at station 2 of section 15E. Bur reed was the most common emergent aquatic plant in these sections, and the sago pondweed was the most common submerged type. A complete list of the plants collected with an indication of their abundance is shown in Table 3.

Amphipods, midges, caddis and may flies were the most abundant food organisms collected. A summary of the food organisms is shown in Table 4. Food conditions were good throughout these sections.

Rock bass were the most abundant game fish. Perch, largemouth bass and pumpkinseed sunfish were common. As was true in the major part of the river below, long-eared sunfish were extremely numerous. The hog sucker, chub-sucker, yellow bullhead and mud pickerel were all common in this part of the river. The common shiner, rosy-faced shiner, creek chub, rainbow darter, log perch and horny-headed chub were the most numerous forage fish.

No good growth rate studies of the game fish were possible because hardly any adult fish were taken. Table 6 gives a summary of the growth rate of all the adult game fish collected in the Huron in Oakland County.

There are no records of fish having been stocked in this part of the river during the past 5 years. Plantings made in the river lakes are not considered here although some of these fish may find their way into the stream above and below.

Spawning facilities seem good for rock bass and largemouth and smallmouth bass as well as for perch, sunfish and bluegills. Very few parasites and predators were observed.

Management Suggestions

The present status of this portion of the Huron River seems to be satisfactory. The policy of no stocking should be continued. Spawning facilities are very satisfactory and all of the game fish in this part of the river are reproducing by natural propogation. Largemouth and smallmouth bass, bluegills, pumpkinseed sunfish and perch are well suited to this part of the Huron. The argument by some, that section 15E (east branch) is suitable for trout, was not borne out by our survey, although a part of it probably could carry a few trout except during unusually hot spells in mid summer.

Some stream improvement devices which would give cover to larger fish would undoubtedly improve conditions here. The abundance of small fish and small number of large or adult fish is evidence of the lack of good shelter.

Still further development by impoundments could increase the game fish production. Such impoundments create good spawning facilities for pike which, in turn, are a check on the less predacious pan fish.

Section 16
(From Fox Lake to Long Lake)
T.2, 3N., R.8E., Sec. 3, 27, 34

Section 17
(From Long Lake to Cedar Island Lake)
T.3N., R.8E., Sec. 27

Section 18
(From Cedar Island Lake to Oxbow Lake)
T.3N., R.8E., Sec. 26

The length of stream in section 16 is about 2.5 miles, in section 17 about 1 mile, and in section 18 approximately 1 mile. One glance at the map will show the alternate lake-stream type of situation which exists in most of the upper Huron. Beginning at Proud Lake above Milford up stream to the origin of the main river at Big Lake, there are 9 large lakes which lie directly in the river valley and through which the river must flow.

About one-third of the lineal distance of the stream is through these lakes. We know that these lakes should not be ignored in a consideration of the river since they are as much a part of it as the connections between. However, as mentioned earlier in this report, the complexity of a study involving the lakes as well as the stream forced us to restrict our considerations to these isolated bits of stream between the lakes. From the fisheries point of view, there can be little doubt that the lakes are of much greater importance than the stream which passes through them.

The stream in sections 16, 17 and 18 is quite similar in general character. The immediate shore is marshy and flooded. Sedges, cattails, swamp loosestrife, poison sumac, etc., are the main plants of the swampy area. Back from the narrow river valley, the moraines are mostly cultivated, with some wood lots and considerable cottage and home development.

The stream itself is sufficiently open to be fished, and public access was not a problem at the time of the survey although practically all of the stream banks are privately owned. There are at least five public roads crossing the river in these sections which gives access, and some private owners permit trespass.

Tributary No. 54, which is a small stream from Sugden Lake, enters section 16 between stations 1 and 2. Tributary No. 55 is the outlet from Long Lake which enters the lower end of section 17.

This part of the river is used very little. Fishing is extremely light and reports indicate that fishing has always been poor. What fishing is done is either from boats or by wading.

Physical and Chemical Characteristics

The size of the Huron River in these sections and those beyond is not much greater than some of the tributary streams. In other words, this part of the river is definitely in the headwaters area. The average width is about 17 feet and the average depth a little less than 2 feet. The current velocity varies from 0.3 to 0.9 feet per second, and at no

place was the current swift enough to form a riffle. The estimated volume at the time of the survey averaged about 18 cubic feet per second. The water at all stations in these sections was found to be colorless and without noticeable turbidity at the time of the survey.

There were no pools in the lower two sections. Here the stream was more lake-like in character. In the upper section (18), a few small pools were seen but these were mostly of poor quality. The stream bottom was mostly fine gravel covered by marl and detritus. The stream in section 18 was partly shaded but the other sections were open. There was no cover to speak of except the aquatic vegetation which is fairly adequate in this part of the river.

The water temperatures at the time of the survey (June 21, 1938) averaged 75°F. in section 16, 69°F. in section 17 and 68°F. in section 18. These temperatures followed closely the air temperatures which averaged 82°F., 66°F., and 66°F., respectively, for the three sections.

Dissolved oxygen was abundant (6.6 - 8.9 p.p.m.) in this part of the Huron, while the water was distinctly alkaline (pH, 7.8 - 8.2) and moderately hard (methyl orange, 168 - 180 p.p.m.).

Biological Characteristics

Musk grass was quite common through all these sections but reached its greatest density in section 19 where it was decidedly the predominant plant. Submerged vegetation, including waterweed, milfoil and several pondweeds, was abundant in sections 16 and 18. Cattails, bulrush, pickerel weed and bur reed were the more important emergent forms. None of these was considered abundant, however. Scattered patches of duck weed were commonly found in the more protected places. A summary of all the aquatic plants found is given in Table 3.

Fish-food organisms were moderately abundant; midge larvae and scuds were the two most numerous forms. A more complete analysis of the food

organisms is found in Table 4. It should be noted that even plankton was fairly abundant in this part of the river, indicating physical characteristics more akin to lake than to stream conditions.

As was true for most of the river below, rock bass was probably the predominant game fish in these sections. Largemouth bass, pumpkinseed sunfish and bluegills were quite numerous as was the ever present long-eared sunfish. Perch were quite common in the upper section (18), and green sunfish were fairly numerous in sections 17 and 18.

The fairly numerous yellow bullhead and mud pickerel along with a few chub-suckers made up the coarse fish population. One dogfish was taken in section 18.

Mud minnow and common shiner were the most numerous forage fishes. The horny-headed chub was fairly abundant, and a few lake chubs and darters were collected. (See Table 5).

Since practically all of the game fish taken were subadult, no growth rate study was possible.

The relatively large number of young game fish is evidence of the adequacy of facilities for natural reproduction.

No unusual inevidence of parasites or predators was observed. The presence of numerous turtles and an occasional heron is no cause for alarm. They probably do not have any detrimental effect on the fish population.

Management Suggestions

There is not much of a practical nature that can be done to improve the fishing in this part of the river. As shown from actual collections, there are sufficient numbers of small game fish to keep the population to its maximum carrying capacity. No stocking of any kind is recommended. The temperature of the water, although reported to be cold enough for trout, fluctuates within a few degress of the air temperature making the stream unsuitable for cold-water species. The presence of large numbers

of long-eared sunfish is no asset, but no practical means of eradicating undesirable species has been found.

In this part of the river, much of the stream's banks are grassy and overhang the stream. Aquatic vegetation is fairly abundant and some trash and deadheads are present. Cover is sufficient without improvement. The impounding of low swampy areas would almost surely improve the fisheries. However, it is very doubtful if such improvements would be important enough to justify the expenditures.

Section 19
(From Oxbow Lake to Pontiac Lake)
T.3N., R.8E., Sec. 13, 23, 24

Section 20
(From Pontiac Lake to Big Lake)
T.3, 4N., R.8E., Sec. 3, 10, 14, 15, 28, 33, 34

Sections 19 and 20 are the headwaters of the main Huron. In size and general physical features this part of the river is no different from the larger tributaries. The stream valley is narrow and shallow in section 20 but fairly wide in section 19. The immediate shore is overgrown with brush of the usual marsh varieties. The surrounding country is partially cultivated with some wood lots and considerable marsh land.

Pontiac Lake is actually an impoundment formed when the level of Lime Lake was raised by a dam in 1924. This impoundment was created to improve real estate and is not used for power. Since the present lake is simply an expansion of Lime Lake, we have not included it in the section on impoundments.

The only dam in this part of the river of consequence is the one just mentioned at the outlet of Pontiac Lake. This has a head of about 18 feet and is not passable to fish.

There are no tributaries in section 19 and only three small and insignificant streams less than a foot in width entering section 20. There are many springs and seepages, particularly in the region immediately below Pontiac Lake.

Highway M-59 runs along the river for the entire length of section 19. There are two or three public road crossings on this section of the stream, while in section 20 there are five public road crossings. Public access is fairly good on this part of the river; but due to the brushy and swampy nature of the shore, the lower section (19) can be successfully fished only from boats, while the upper (20) is practically inaccessible.

Fishing has always been poor in this part of the river, according to local reports. A few fishermen use section 19, but practically no one fishes the river between Pontiac Lake and Big Lake. This part of the stream is not much used for swimming or boating. It does have fair possibilities as a bait minnow stream.

Physical and Chemical Characteristics

The stream in section 19 has an average width of about 20 feet, while in section 20 the average width is about 12 feet. The average depth in the former is about 1.6 feet and about 0.8 feet in the latter. The water is more sluggish in the lower section with an average current velocity of about 0.5 feet per second, as compared to a little less than 1 foot per second in section 20. The volume estimates varied from 2.3 to 23.0 cubic feet per second. However, these measurements probably do not have much value since difficult conditions prevented accurate measurements.

The water temperature at the time of the survey (June 14, 1938) ranged from 66° to 74°F. in section 19 and from 61° to 70°F. in section 20, with air temperatures of 71° to 82°F.

Except for the lower one-half of section 19, the stream had dense cover provided by the brush that hung over the river. Aquatic plants, trash, brush and overhanging banks provided abundant shelter for fish.

The predominant bottom types in this part of the stream were gravel and detritus. A few small patches of large rubble were observed. The water depth is fairly constant throughout the lower two-thirds of section 19. The only pool worth mentioning is that created below the

dam on Pontiac Lake. The upper section (20) is without pools or riffles.

The water below Pontiac Lake is quite colorless while that above, in section 20, had a very distinct brownish cast. There was no noticeable turbidity in either section.

Dissolved oxygen was quite abundant in the water of section 19 (6.4 - 11.8 p.p.m.) but not so in section 20 (2.2 - 6.7 p.p.m.). The low oxygen content at station 3 of this latter section would probably rule out all but the most tolerant fish species. The water was alkaline and moderately hard - almost the same as for the sections below. No pollution of any kind was reported by the survey party.

Biological Characteristics

Aquatic vegetation was very abundant throughout most of these sections. Algae was abundant in parts of section 19 but sparse in section 20. Submerged aquatic plants were dense in section 19 but only sparse to medium in section 20. Emergent vegetation of the marginal types was very abundant over most of these two sections. A complete summary of the species is given in Table 3.

Fish foods were abundant, as would be expected in a stream with such luxuriant plant beds. Midge larvae, scuds, leeches and snails were the predominant forms. A summary of the different kinds and the numbers per square foot sample is given in Table 4.

Yellow perch were the most numerous game fish reported. Rock bass, pumpkinseed sunfish, bluegills and largemouth bass were the only other game fish present. Yellow bullhead and mud pickerel were the most common rough fish. Dogfish were also taken. Of the forage fishes, the common shiner and mud minnow were the most abundant. Seven other species of forage fish were collected.

Most of the game fish taken were all small and too young to yield any significant information on game fish growth rate.

All of the game fish present are very probably reproducing by natural means since there are no recent stocking records for this part of the stream. Spawning facilities are adequate for the game fish present.

There was no evidence of predation, and parasites were not abundant enough to warrant any control measures.

Management Suggestions

Very little can be done to improve the fisheries of this part of the river. Present natural reproduction is sufficient to keep the stream supplied with a maximum fish population. No stocking of any species should be made. Food and shelter are good and should not be changed. A stream of this type is not constituted to produce many big fish and a fair number of pan fish is about the most that can be expected from it. The creation of impoundments is about the only means of increasing fish production. The practicability of such measures can only be determined by more careful studies.

Table 2

Summary of Physical and Chemical Conditions at the Various

Stations and Sections of the Main Huron River

River Sec. No.	Sta. No.	Date	Time of Day	Air Temp. °F.	Water Temp. °F.	Weather	Av. Width Ft.	Av. Depth Ft.	Velocity ft./sec.	Est. Volume C.F.S.	Color	Turbidity	Oxygen p.p.m.	CO_2 p.p.m.	M.O. Alkalinity p.p.m.	pH-th Alkalinity p.p.m.	pH
1	1	7/5/39	10:00 AM	79	79	Clear	175	...	0.25	...	Colorless	Murky	4.8	0.0	180	2.0	8.0
	2	7/6/39	10:00 AM	84.5	80	Overcast	112	3.5	1.0	352	"	Murky	6.1	0.0	177	5.0	8.0
	3	7/6/39	4:30 PM	89	76	Clear	200	...	1.0	...	"	Murky	3.8	0.0	185	2.0	8.0
2	1	9/13/38	1:00 PM	74	71	Clear	87	1.86	1.60	208.8	"	Clear	7.7	0.0	198	...	8.0
3	1	8/23/38	2:00 PM	81	75	Clear	125	1.00	1.40	161.0	"	"	6.8	0.0	192	5.0	8.0
	2	8/23/38	12:00 M	80	75	Clear	120	1.55	1.20	204.0	"	"	7.5	0.0	194	9.0	8.2
4	1	8/23/38	10:00 AM	74	73	Overcast	90	1.80	0.90	135.0	"	"	6.5	0.0	190	9.0	8.2
	2	8/23/38	9:00 AM	70	74	Overcast	80	1.40	1.30	133.0	"	"	6.7	0.0	191	10.0	8.2
	3	8/23/38	8:30 AM	68	76	Overcast	80	1.90	1.67	238.0	"	"	7.3	0.0	191	10.0	8.2
5	1	8/22/38	2:00 PM	82	79	Clear	85	3.20	0.40	104.0	"	"	10.2	0.0	198	11.0	8.2
	2	8/22/38	1:30 PM	80	78	Clear	33	1.40	1.60	65.0	"	"	7.0	0.0	196	11.0	8.2
6	1	8/22/38	12:30 PM	81	77	Clear	127	1.50	0.90	155.0	"	"	7.5	0.0	195	8.0	8.2
7	1	8/22/38	11:30 AM	79	77	Clear	38	2.20	1.10	87.4	"	"	7.0	0.0	198	10.0	8.2
	2	8/22/38	10:00 AM	77	76	Clear	21.8	2.00	1.80	72.6	"	"	7.8	0.0	198	0.0	8.2
8	1	7/22/38	12:00 M	77	76	Pt. Cloudy	48.6	2.01	0.90	86.6	"	Murky	8.3	0.0	198	5.0	8.0
	2	7/22/38	10:30 AM	76	74	Pt. Cloudy	87.6	1.90	0.40	79.6	"	"	6.6	0.0	205	6.0	8.0
	3	7/22/38	9:45 AM	76	72	Pt. Cloudy	55.5	1.70	0.80	68.4	"	"	5.6	2.0	202	0.0	8.0
9	1	7/20/38	2:00 PM	80	76	Cloudy	59.5	1.50	0.80	66.9	"	"	7.8	0.0	200	7.0	8.0
	2	7/20/38	10:00 AM	74	74	Pt. Cloudy	35.9	1.80	1.20	69.2	"	"	7.7	0.0	198	9.0	8.0
	3	7/20/38	9:00 AM	77	75	Pt. Cloudy	45.0	1.50	1.30	78.3	"	"	7.1	0.0	193	3.0	8.0
10	1	7/15/38	12:00 M	71	72	Clear	47.7	2.20	0.70	70.4	"	Clear	7.2	0.0	195	2.0	8.2
	2	7/15/38	9:00 AM	62	68	Cloudy	49.2	1.90	0.80	68.9	"	Murky	5.3	3.0	190	0.0	7.8
	3	7/14/38	3:00 PM	80	78	Pt. Cloudy	45.1	1.20	0.90	45.1	"	Clear	9.4	0.0	190	9.0	8.2
11	1	7/14/38	2:00 PM	79	77	Pt. Cloudy	38.8	1.80	0.80	51.0	"	"	9.5	0.0	187	9.0	8.2
	2	7/14/38	1:00 PM	84	78	Pt. Cloudy	37.3	1.10	1.30	48.1	"	"	10.0	0.0	185	10.0	8.4
	3	7/14/38	12:00 M	83	77	Clear	31.7	1.30	1.50	53.6	"	"	7.6	0.0	180	6.0	8.2
12	1	7/1/38	1:30 PM	75	68	Overcast	36.7	3.20	0.54	56.0	"	"	5.0	5.0	190	0.0	7.6
	2	7/1/38	3:00 PM	73	71	Overcast	30.6	1.50	1.10	45.9	"	"	7.7	2.0	168	0.0	8.0
	3	7/1/38	4:00 PM	75	71	Overcast	29.7	1.40	1.10	43.5	"	"	7.1	0.0	165	5.0	8.0
13	1	6/28/38	5:30 PM	75	73	Clear	24.4	1.70	0.80	29.8	"	"	8.5	0.0	168	10.0	8.4
	2	6/28/38	4:00 PM	72	72	Pt. Cloudy	22.4	1.36	1.20	32.6	"	"	8.8	0.0	168	11.0	8.4
	3	6/28/38	3:00 PM	78	72	Pt. Cloudy	19.9	1.32	1.50	35.8	"	"	8.7	0.0	170	11.0	8.4
14	1	6/23/38	2:30 PM	83	78	Cloudy	16.7	1.10	2.20	37.5	"	"	5.2	0.0	172	2.0	8.0
15W	1	6/22/38	2:00 PM	81	80	Clear	17.3	0.5	2.10	15.0	"	"	6.2	0.0	173	3.0	8.0
	2	6/22/38	12:00 M	81	79	Clear	15.5	1.60	0.82	18.2	"	"	6.1	0.0	167	2.0	8.0
	3	6/22/38	11:00 AM	82	77	Clear	19.3	1.50	0.83	21.7	"	"	7.2	1.0	167	0.0	7.8
	4	6/22/38	9:00 AM	75	75	Clear	22.3	1.20	0.59	14.3	"	"	8.5	3.5	167	0.0	7.8
15E	1	6/23/38	1:00 PM	86	75	Cloudy	12.3	1.4	0.82	12.7	"	"	5.0	5.0	190	0.0	7.8
	2	6/23/38	11:00 AM	83	73	Clear	6.9	0.4	1.50	3.9	"	"	8.5	0.0	186	0.0	8.0
	3	6/23/38	9:30 AM	80	73	Clear	6.6	0.6	0.70	2.5	"	"	5.0	6.0	185	0.0	7.6
16	1	6/21/38	1:30 PM	83	77	Clear	21.0	2.40	0.32	14.8	"	"	7.8	2.5	180	0.0	7.8
	2	6/21/38	11:00 AM	84	76	Clear	16.1	2.20	0.72	23.2	"	"	7.4	1.0	173	0.0	8.0
	3	6/21/38	10:00 AM	78	73	Clear	13.8	1.70	0.90	19.1	"	"	6.9	2.0	173	0.0	8.0
17	1	6/18/38	10:00 AM	67	68	Cloudy	15.8	1.90	0.48	12.9	"	"	7.2	2.5	170	0.0	7.8
	2	6/18/38	11:30 AM	69	71	Overcast	16.0	1.70	0.85	21.0	"	"	8.9	0.0	168	6.0	8.0
	3	6/18/38	1:15 PM	63	68	Overcast	17.3	1.80	0.77	21.5	"	"	8.3	0.0	165	1.5	8.2
18	1	6/17/38	2:15 PM	67	67	Overcast	24.8	1.50	0.51	17.4	"	"	6.6	0.0	166	0.0	7.8
	2	6/17/38	11:00 AM	67	69	Overcast	25.1	1.30	0.73	23.1	"	"	7.5	0.0	155	2.0	8.0
	3	6/17/38	9:30 AM	64	69	Overcast	22.3	2.00	0.38	15.6	"	"	7.2	0.0	150	5.0	8.2
19	1	6/14/38	3:30 PM	75	74	Pt. Cloudy	24.6	1.35	0.63	20.3	"	"	11.8	0.0	178	7.0	8.2
	2	6/15/38	10:30 AM	82	66	Clear	24.3	1.50	0.52	17.3	"	"	6.4	3.0	186	0.0	7.8
	3	6/14/38	10:30 AM	71	67	Clear	13.3	0.98	0.47	5.5	"	"	8.2	0.0	164	3.0	8.2
20	1	6/13/38	1:30 PM	74	61	Clear	14.2	1.08	1.20	23.0	Lt. Brown	Murky	6.7	14.0	280	0.0	7.8
	2	6/11/38	1:30 PM	73	65	Overcast	15.5	0.87	0.93	11.3	Lt. Brown	Murky	5.9	7.5	270	0.0	7.8
	3	6/11/38	10:30 AM	75	70	Overcast	6.6	0.58	0.65	2.3	Lt. Brown	Clear	2.2	11.0	157	0.0	7.2

TABLE 3

River Section No.	Field Station No.	Water Depth in Feet	Bottom Soil Type	Nitella sp. Muskgrass	Chara sp. Muskgrass	Typha latifolia Common Cattail	Sparganium sp. Bur Reed	Sparganium eurycarpum Bur Reed	Potamogeton pectinatus Sago Pondweed	Potamogeton americanus Pondweed	Potamogeton vaginatus Pondweed	Potamogeton zosteriformis Flat-stemmed Pondweed	Potamogeton filiformis Pondweed	Potamogeton amplifolius
2	1	?	SG	...	S	...	S	...	M	...	...	...	...	...
7	1	3.0	SM	...	M	...	S	...	M	M	...	...	...	...
	2	3.0	MS	...	M	D	...	...	D	M	...	...	...	...
8	1-3	0.50-2.5	StGS	...	S	...	...	...	D	S	M	S	...	...
9	1-3	1.00-1.75	StSG	...	S	S	S	...	D	S	M	...	...	...
10	1-3	0.50-2.5	StGS	...	...	...	D	...	D	D	...	D	D	...
11	1-3	0.25-1.75	StGS	...	...	...	M	...	...	D	D	...	D	...
12	1	0.25-2.5	StGS	...	...	...	...	...	...	...	...	...	...	...
	2	0.25-2.5	StGD	S	M	...	...	...	M	...	...	S	...	...
	3	0.50-1.6	StM	...	...	...	M	...	M	...	...	...	...	...
13	1	0.25-2.5	StD	...	D	...	...	...	M	S	...	S	...	...
	2	1.00-2.3	StD	...	D	...	...	...	M	S	...	2M	...	...
	3	1.00-1.6	GM	...	D	...	...	...	M	...	...	...	...	...
14	1	1.0	GR	...	...	...	S	...	S	...	...	...	...	...
15W	1	0.00-0.8	G	...	...	...	S	...	...	...	...	...	...	...
	2	0.16	GD	...	...	...	...	...	...	...	...	...	...	...
	3	0.50-2.5	GD	...	S	...	DS	...	D	...	...	...	...	...
	4	0.25-2.5	GS	...	D	...	...	...	D	SM	...	M	...	...
15E	1	0.25-1.5	GD	...	...	...	M	...	...	...	...	...	...	...
	2	0.16-0.5	GD	...	S	...	...	...	...	...	...	...	...	...
	3	0.25-0.8	GD	...	...	S	M	...	...	...	...	...	...	...
16	1	0.50-3.0	DG	...	...	...	...	...	...	...	...	M	...	...
	2	0.08-1.6	DG	...	...	...	D	S	...	...	...	...	...	...
	3	0.08-2.2	GD	...	D	D	...	...	M	S	...	...	...	...
17	1	0.08-1.5	MkD	...	...	D	...	S	M	...	...	...	...	...
	2	0.16-1.5	MkGD	...	D	...	...	S	...	...	...	...	...	...
	3	0.25-1.5	GD	...	D	...	...	...	...	D	...	...	...	...
18	1	0.60-1.6	GD	...	...	...	...	...	...	...	...	...	...	...
	2	0.25-2.3	MkGD	...	M	...	...	...	S	...	...	...	...	...
	3	1.60-2.5	GD	...	D	...	...	...	M	...	...	M	...	...
19	1	0.08-2.5	Mk	...	M	...	...	S	...	...	...	...	...	...
	3	0.16-1.25	G	...	...	...	...	...	M	...	...	...	...	...
20	1	0.25	Mk	...	...	...	...	...	...	...	...	...	...	...
	2	0.08-2.5	Mk	...	...	...	D	...	...	...	M	...	...	...
	3	0.16-1.0	MkGD	...	...	...	D	...	...	...	...	...	...	...

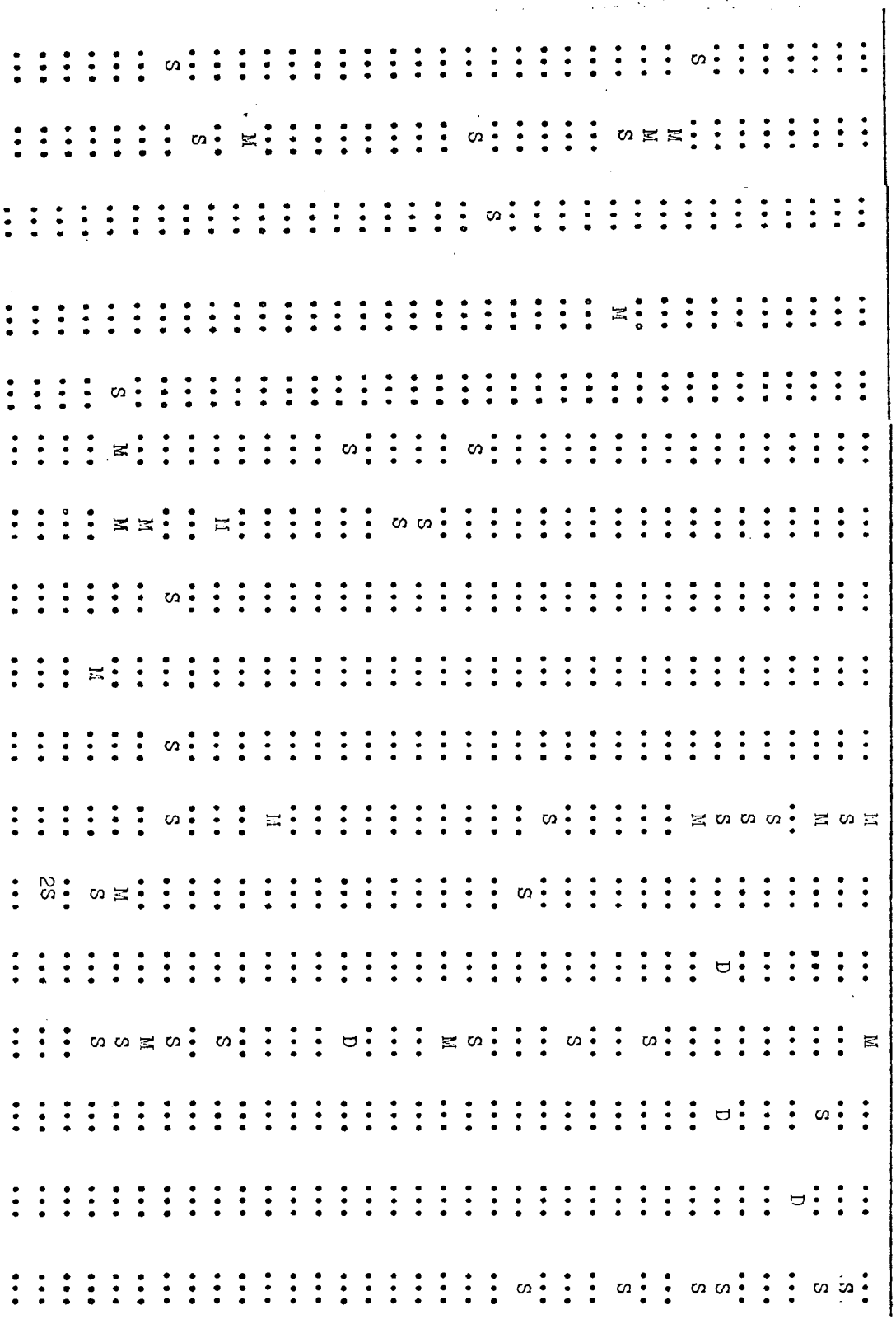

Potamogeton amplifolius
Large-leafed Pondweed
Potamogeton gramineus
Variable Pondweed
Drepanocladus aduncus var. aquaticus
A moss
Decodon verticillatus
Swamp Loosestrife
Campanula sp.
Bellflower
Potamogeton natans
Floating-leaf Pondweed
Potamogeton Friesii
Pondweed
Potamogeton praelongus
Whitestem Pondweed
Potamogeton crispus
Pondweed
Potamogeton angustifolius
Pondweed
Najas flexilis
Bushy Pondweed
Sagittaria sp.
Arrow Head
Sagittaria rigida
Stiff Wapato
Anacharis canadensis
Waterweed
Vallisneria americana
Wild Celery
Zizania aquatica var. angustifolia
Wild Rice
Scirpus validus
Softstem Bulrush

Table 3

Distribution and Abundance of Aquatic Plants Collected at Stations on the Main Hurc

Symbols indicate that species were found to be present as follows: S=sparse
in abundance; M=medium abundance; D=dense or very abundant.

For bottom soil types: S=sand, St=silt, M=marl, G=gravel, D=detritus, R=rubble, M

Scirpus validus Softstem Bulrush	Scirpus acutus Hardstem Bulrush	Carex substricata Sedge	Carex comosa Sedge	Carex sp. Sedge	Peltandra virginica Arrow Arum	Pontederia cordata Pickerel Weed	Heteranthera dubia Water Star Grass	Polygonum sp. Smartweed	Polygonum setaceum Smartweed	Polygonum natans f. genuinum Smartweed	Ceratophyllum demersum Coontail	Nymphaea odorata White Water Lily	Nymphaea tuberosa White Water Lily	Nuphar rubrodiscum Yellow Water Lily	Nuphar variegatum Yellow Water Lily	Nasturtium officinale Water Cress	Ludwigia palustris False Loosestrife
..	...	...	...	...	S	...	M	...	...	...	...	...	S	...	...	...	...
S	...	...	...	...	...	D	...	...	S	...	D	...	...	...	...	...	...
S	...	...	...	...	...	D	...	...	...	...	...	...	...	...	...	...	...
..	...	...	...	...	M	...	...	...	...	...	S	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	S	...	...	...	...	...
..	...	...	...	...	...	...	...	...	...	...	M	...	S	...	...	...	...
S	...	...	...	...	...	...	...	...	...	...	S	...	...	...	...	...	...
S	...	...	...	...	...	S	...	...	...	...	M	...	S	S	...	...	...
...	S	...	...	...	...	S	...	...	...	S	...	...	S	...	...	...	...
..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
S	...	...	...	...	...	S	...	...	...	...	S	...	S	...	...	...	...
..	...	...	...	...	...	...	...	...	...	...	S	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
S	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	S
...	...	...	...	...	...	...	...	...	...	...	...	...	S	...	...	S	...
...	...	...	...	...	...	M	...	...	...	...	D	...	S	...	S	...	...
...	M	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	M	...	...	...	...	...	...	S	...	...	...	...
...	M	...	...	...	...	...	...	...	...	S	...	...	M	...	S	...	...
...	...	...	...	...	...	...	...	S	...	...	S	...	...	...	...	...	...
...	...	...	...	...	...	S	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	M	...	...	...	...	...	S	...	...	...	...	...
...	M	...	...	...	...	S	...	...	...	...	...	...	S	...	...	...	...
...	...	M	...	...	...	...	...	...	...	...	S	...	...	...	...	...	...
...	M	...	S	D	...	...	...	...	...	...	M	M	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	M	...
...	...	...	...	S	...	...	...	...	...	...	...	...	S	...	...	M	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	M	...

n Huron River

sparse

ble, Mk=muck

Ludwigia palustris False Loosestrife	Myriophyllum sp. Water Milfoil	Myosotis scorpioides Forget-Me-Not	Equisetum fluviatile Horsetail	Eleocharis acicularis inundata Needle Rush	Eleocharis calva Spike Rush	Utricularia vulgaris var. americanus Bladderwort	Phragmites maximus var. Berlandieri Reed Grass	Asclepias sp. Milkweed	Ranunculus flabellaris Buttercup	Ranunculus subrigidus Buttercup	Caltha palustris Marsh Marigold	Phalaris arundinacea Reed Canary Grass	Cicuta maculata Spotted Cowbane	Lemna trisulca Star Duckweed	Aster puniceus Aster
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	S	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	M	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	S	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	S	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	S	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	S	...	...	...	...	...	...	...	...	...	...	...	...
...	S	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
S	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	M	...	...	...	...	...	...	...	...	...	...	...
...	D	...	...	M	...	S	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	D	...	...	...
...	M	...	...	...	...	...	S	M	...	...	...	M	...	...	...
...	M	...	...	...	...	S	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	M	...	...	...	...	...	...	M	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	M	...	...	...	...	...
...	M	...	...	...	...	M	...	S	...	...	...	...	...	D	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	S	...	M	...	...	...	S	...	...	...	S	...	...
...	...	...	...	...	...	...	...	...	...	...	S	...	...	...	S

Table 4

Fish-food Organisms in Samples Taken at Survey Station on the Main Huron River
(Number and volume of bottom organisms per square foot)

Bottom soil types include: Mk=muck, S=sand, G=gravel, R=rubble, M=marl,
St=silt and D=detritus

Section Number	Station Number	Date	Bottom Type	Plankton in cc. per liter	Mayflies	Stoneflies	Odonata	Beetles	Caddisflies	Midges	Other Diptera	Tubificid Worms	Clams	Snails	Crustacea	Hydrachnids	Leech	Misc.	Total No. of Organisms	Vol. of Sample in cc.
1	1	7/5/39	MkS	1.34	....	...	...	...	...	34.0	...	10.0	...	...	...	...	...	...	44.0	0.10
	2	7/6/39	...	2.01	....	...	...	...	...	14.0	...	8.0	...	...	...	...	...	...	22.0	0.05
2	1	9/13/38	G	...	1.0	12.0	...	5.0	14.0	2.0	11.0	5.0	5.0	20.0	1.0	...	...	1.0	77.0	3.10
3	1	8/23/38	GR	0.1	13.0	...	0.5	1.0	5.0	1.5	...	...	33.0	1.0	1.0	...	...	...	56.0	2.50
	2	8/23/38	SG	0.1	13.0	...	0.5	2.0	3.5	...	...	0.5	15.0	8.5	...	0.5	...	...	43.5	1.40
4	1	8/23/38	...	0.1	4.0	...	...	2.5	4.0	3.0	...	...	...	4.5	...	...	...	1.0	19.0	0.70
	2	8/23/38	RS	0.1	0.5	...	0.5	8.5	2.5	...	2.5	...	1.5	10.0	...	0.5	...	...	26.5	0.40
	3	8/23/38	MG	0.3	4.0	...	2.5	13.0	38.0	1.0	18.0	...	2.0	0.5	...	...	...	...	79.0	0.90
5	1	8/22/38	MS	0.1	....	...	...	...	...	2.0	...	...	...	...	...	...	...	...	2.0	Trace
	2	8/22/38	MS	0.2	1.0	...	...	...	12.0	...	...	...	(4 lg. 5 sm.	...	1.0	...	...	...	17.0	0.65
6	1	8/22/38	MS	0.1	....	...	1.0	...	...	1.0	...	1.0	4.0	2.0	1.0	...	1.0	...	11.0	0.80
7	1	8/22/38	MS	0.1	....	...	...	...	2.0	...	...	...	...	...	...	...	...	...	2.0	Trace
	2	8/22/38	MS	0.2	....	...	...	...	11.5	...	...	1.5	...	...	...	...	...	...	13.0	0.10
8	1	7/22/38	SSt	0.1	1.0	...	...	1.0	0.5	5.0	...	...	0.5	1.5	...	...	...	...	9.5	0.62
	2	7/22/38	SSt	0.1	1.0	...	...	0.5	4.0	2.0	...	...	0.5	13.5	1.5	...	1.5	...	24.5	1.55
	3	7/22/38	SSt	0.3	10.5	...	...	1.5	0.5	5.0	...	...	0.5	...	0.5	0.5	...	...	19.0	0.25
9	1	7/20/38	SSt	0.3	....	...	...	...	...	3.5	...	0.5	(1 lg. 1.0	0.5	...	...	...	...	5.5	0.10
	2	7/20/38	GS	0.2	2.5	...	...	...	0.5	1.5	1.0	...	...	2.5	1.0	...	...	...	9.0	0.55
	3	7/20/38	GS	0.2	....	...	...	4.5	20.0	3.0	4.0	...	6.5	42.0	20.0	...	...	...	100.0	3.00
10	1	7/15/38	SM	0.1	....	...	...	...	2.0	84.0	...	2.0	...	...	2.0	...	...	1.0	91.0	0.40
	2	7/15/38	SG	0.2	1.0	...	...	...	1.0	60.0	2.0	...	4.0	...	...	5.0	...	...	73.0	0.30
	3	7/14/38	SSt	0.2	4.5	...	...	2.5	11.5	7.0	...	...	1.0	...	0.5	...	...	...	27.0	0.10
11	1	7/14/38	SG	0.1	5.5	...	...	2.5	7.0	5.0	...	...	10.0	...	4.0	...	...	...	34.0	0.85
	2	7/14/38	SG	0.1	2.0	...	...	8.0	10.0	72.0	...	1.0	108.0	0.5	1.0	1.0	...	...	203.5	6.20
	3	7/14/38	SG	0.1	7.0	...	...	5.0	38.0	6.0	...	0.5	11.0	1.0	1.0	...	8.0	...	77.5	0.80
12	1	7/1/38	G	0.2	....	...	10.0	...	...	200.0	...	1.0	1.0	...	121.0	1.0	1.0	...	335.0	0.80
	2	7/1/38	GS	0.3	8.0	...	...	3.0	15.0	7.5	...	...	13.5	...	3.0	...	...	...	50.0	1.10
	3	7/1/38	GMS	0.6	....	...	...	...	30.0	3.0	...	...	1.0	1.0	0.5	...	...	...	35.5	0.85
13	1	6/28/38	StD	0.3	....	...	0.5	0.5	0.5	7.5	...	1.5	...	...	11.5	...	16.0	...	38.0	0.25
	2	6/28/38	GM	0.5	1.5	...	...	...	1.5	9.5	1.5	...	14.5	1.0	18.5	...	...	...	48.0	1.00
	3	6/28/38	MG	0.4	1.0	...	...	...	2.5	40.5	...	...	3.5	0.5	5.0	...	...	...	53.0	0.65
14	1	6/23/38	GR	0.6	....	...	...	1.0	1.5	...	1.0	...	0.5	0.5	...	...	...	...	4.5	0.20
15W	1	6/22/38	GS	0.1	3.5	...	...	5.5	95.0	6.0	4.0	1.0	...	...	...	...	0.5	...	115.5	1.30
	2	6/22/38	RG	0.1	12.5	...	...	1.5	3.0	1.0	8.0	2.5	...	...	16.5	...	1.5	...	46.5	0.40
	3	6/22/38	GS	0.15	4.0	...	...	0.5	3.5	2.5	...	...	1.0	...	8.5	...	3.0	...	23.0	0.35
	4	6/22/38	GSt	0.40	2.5	...	...	0.5	1.0	0.5	...	...	1.0	...	12.0	...	0.5	...	18.0	0.35
15E	1	6/23/38	G	0.4	2.5	...	1.0	2.5	1.5	35.0	...	1.0	7.0	...	1.5	...	0.5	3.5	56.0	2.20
	2	6/23/38	GS	0.4	2.0	...	...	...	...	10.5	...	...	1.5	...	0.5	...	...	1.0	15.5	0.40
	3	6/23/38	GD	0.4	....	...	0.5	...	...	38.0	...	...	10.0	...	7.5	...	5.5	...	61.5	2.70
16	1	6/21/38	GD	0.15	20.0	...	...	...	4.0	152.0	...	4.0	16.0	...	80.0+	...	8.0	...	284.0	0.80
	2	6/21/38	GD	0.40	2.0	...	2.0	...	1.0	20.0	...	...	13.0	2.0	36.0+	...	...	...	76.0	2.00
	3	6/21/38	GM	0.70	12.0	...	...	...	15.0	2.0	...	...	5.0	...	36.0+	...	...	...	70.0	0.20
17	1	6/18/38	DGM	0.30	2.0	...	...	...	...	28.0	...	4.0	...	...	32.0	...	...	...	66.0	0.25
	2	6/18/38	DGM	0.20	2.0	...	...	...	...	10.0	...	26.0	...	2.0	4.0	...	6.0	...	50.0	0.40
	3	6/18/38	GD	0.10	....	...	2.0	...	2.0	108.0	...	42.0	30.0	4.0	26.0	...	...	...	214.0	2.60
18	1	6/17/38	G	0.40	6.5	...	...	...	2.0	38.0	3.0	0.5	3.0	2.0	20.0	...	0.5	...	75.5	0.70
	2	6/17/38	DG	0.70	2.5	...	2.5	...	...	52.5	...	2.5	2.5	1.5	23.0	1.0	5.5	...	93.5	0.20
	3	6/17/38	DG	0.50	....	...	...	...	...	[illegible]	...	100.0	...	1.0	...	...	...	...	251.0	2.00
19	1	6/14/38	DGS	0.30	1.0	...	1.0	...	1.0	7.5	...	0.5	...	4.0	4.5	0.5	3.0	...	23.0	0.32
	2	6/14/38	D	0.30	18.5	...	...	...	1.5	76.5	...	...	...	23.5	45.5	...	28.5	...	194.0	1.50
	3	6/14/38	RDG	0.45	5.0	...	...	...	...	90.0	...	11.5	...	14.0	...	...	...	1.0	121.5	0.50
20	1	6/11/38	DGS	0.50	....	...	...	...	2.0	12.0	2.0	4.0	...	2.0	...	2.0	...	...	24.0	0.60
	2	6/11/38	DG	1.85	....	...	...	...	4.5	8.5	1.0	17.0	...	4.0	17.0	...	...	...	52.0	2.25
	3	6/11/38	DG	0.35	0.5	0.5	0.5	1.0	...	47.5	...	22.5	...	82.5	...	0.5	...	...	155.5	2.05

Table 5

Summary of Fish Collected or Reported from the Main Huron River

A=Abundant, C=Common, F=Few
R=Reported (not actually collected by Institute for Fisheries Research)

Kind of Fish	River Section Numbers																			
GAME SPECIES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15E 15W	16	17	18	19	20
Northern pike	C	R	..	..	..	..	..	F	R	..	..	F	..	..	..	..	..	..	..	..
Yellow perch	A	..	..	..	..	F	C	F	..	F	C	..	C	F	C	..	..	C	A	..
Walleye pike	R	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Smallmouth bass	F	C	R	C	..	..	F	F	C	F	C	..	F	..	F	..	..	..	..	..
Largemouth bass	F	..	..	F	F	C	C	C	R	C	F	C	F	..	C	F	F	F	F	F
Green sunfish	..	..	..	..	..	..	..	..	..	..	..	..	..	F	F	..	F	F	F	..
Pumpkinseed sunfish	F	..	..	..	..	C	..	C	..	..	..	..	C	..	C	C	F	C	C	C
Bluegill	R	..	A	C	C	A	A	C	..	F	F	C	C	..	F	C	C	A	C	..
Longear sunfish	..	C	A	A	F	C	C	A	F	..	C	A	A	C	A	F	C	C	..	..
Rock bass	..	A	A	A	F	C	C	C	C	C	C	C	A	A	A	C	F	C	C	..
White crappie	C	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Black crappie	..	..	..	..	..	..	..	..	..	..	F	F	..	..	..	..	..	..	..	..
COARSE SPECIES																				
Common Sucker	F	..	..	F	..	..	A	..	..	F	..	..	..	..	..	..	..	..	..	..
Hog sucker	..	C	..	..	..	..	..	F	..	F	C	..	..	F	..	..	..	..	..	..
Chub sucker	..	..	C	..	..	F	..	F	F	..	..	A	F	F	C	F	..	..	F	..
Mullet (erythrurum)	..	C	..	C	..	..	..	C	..	..	..	..	..	..	..	..	..	..	..	..
Mullet (duquesnii)	..	F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Brown bullhead	..	..	..	..	..	..	..	..	..	..	..	F	..	..	..	..	..	..	F	..
Yellow bullhead	..	..	F	..	..	C	..	F	C	F	..	F	C	C	..	C	F	F	C	F
Mud pickerel	..	F	F	..	F	F	..	F	F	..	..	F	..	C	F	F	C	F	F	F
OBNOXIOUS SPECIES																				
Longnose gar	F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Dogfish	F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F	F	..
Carp	C	R	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Goldfish	C	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
FORAGE SPECIES																				
Gizzard shad	A	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Lake chub	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	C	..	..
Horny-headed chub	..	F	C	F	..	..	..	F	C	A	A	A	C	A	C	F	..	C	F	..
Creek chub	..	..	..	..	..	..	..	..	F	F	C	F	..	C	C	..	..	..	..	C
Golden shiner	C	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F	..
Black-chinned shiner	..	..	..	..	..	..	..	..	..	..	..	..	..	F	C	..	..	..	..	..

Table 5 (Con't.)

Summary of Fish Collected or Reported from the Main Huron River

A=Abundant, C=Common, F=Few
R=Reported (not actually collected by Institute for Fisheries Research)

Kind of Fish	River Section Numbers																			
FORAGE SPECIES (Con't)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15E 15W	16	17	18	19	20
Black-nosed shiner	..	..	..	..	..	..	..	..	..	..	..	F	F	..	C	..	..	..	..	..
Pugnose shiner	..	..	F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Straw-colored shiner	..	..	..	..	..	..	..	..	..	..	..	..	..	..	C	..	..	..	..	..
Mimic shiner	..	..	..	..	..	..	..	..	F	..	..	..	..	..	..	..	..	..	..	..
Spot-tailed shiner	..	..	..	..	..	..	..	..	..	..	..	..	..	F	..	..	..	..	..	..
Steel-colored shiner	C	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Lake emerald shiner	C	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Silver shiner	..	C	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Rosy-faced shiner	..	C	..	..	..	..	..	F	..	..	..	..	..	A	..	..	..	..	..	..
Common shiner	..	A	C	..	F	F	..	A	A	A	A	A	A	A	A	C	F	F	A	C
Blunt-nosed minnow	A	C	C	..	..	..	..	F	F	..	F	..	..	..	C	..	..	F	C	..
Stone-roller minnow	..	..	..	..	..	..	..	..	..	C	C	..	..	F	..	..	..	..	F	..
Stonecat	..	C	..	..	F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Tadpole cat	..	F	..	..	..	A	..	F	F	..	..	..	F	..	..	..	C	..	..	..
Brindled stonecat	..	..	F	..	..	..	..	F	F	F	C	..	..	..	..	..	..	..	..	..
Mud minnow	..	..	F	..	..	C	..	F	F	..	..	C	C	C	F	F	C	C	F	A
Black-banded topminnow	..	..	C	F	F	F	..	C	..	..	..	F	..	F	C	..	..	..	..	..
Black-sided darter	..	..	..	..	F	F	F	F	F	F	F	..	F	C	F	..	..	F	C	..
Log perch	F	F	..	..	C	C	..	C	F	C	..	..	C	A	F	..	..	..	..	..
Johnny darter	C	..	..	..	..	..	..	F	C	C	F	..	..	..	..	..	..	..	..	..
Rainbow darter	..	F	C	C	F	F	..	..	F	F	F	F	C	A	C	F	..	F	..	..
Iowa darter	..	..	..	..	..	F	..	..	..	..	..	F	..	..	F	F	F	..	F	..
Fantail darter	..	F	F	..	F	..	..	..	..	F	F	..	..	A	F	..	..	..	..	..
Least darter	..	..	F	..	F	..	..	..	..	..	..	C	A	F	F	..	C	F	..	..
Green-sided darter	F	F	F	..	..	..	..	F	F	F	F	..	..	..	..	..	..	F	..	..
Silversides	F	F	..	..	..	..	..	F	..	..	..	..	..	..	..	..	..	..	..	..
Muddler	..	..	..	..	..	..	..	..	..	..	F	..	..	C	..	..	..	..	..	..
Brook lamprey	..	..	..	..	..	..	..	..	..	..	..	..	..	F	..	..	..	..	..	..

Table 6

Data on Age and Growth of Game Fish Taken

From Various Places in the Huron River in Oakland County

Species	Age Group	No. of Specimens	Av. Total Length in Inches	Av. Weight in Ounces
Yellow perch	I	1	3.3	0.4
	II	1	4.7	...
Largemouth bass	0	5	2.3	...
	IV	1	...	10.2
Rock bass	0	3	1.1	...
	I	1	3.1	...
	III	1	...	1.4
Bluegill	0	5	1.5	...
	I	1	3.2	...
	II	1	...	...
	III	1	4.3	0.8
	IV	1	6.3	3.0
	V	2	...	...
Pumpkinseed sunfish	I	1	2.3	0.1
	II	1	...	0.4
Green sunfish	II	1	...	0.3
Long-eared sunfish	II	1	2.7	...

PART II — I.F.F.R. No. 1003

TRIBUTARIES OF THE HURON RIVER

While 58 primary tributaries of the Huron River have been recognized in this report, only 25 are of sufficient size and year-round volume to have any appreciable significance to fisheries. Each of these more important tributary systems, i.e., each primary tributary with its secondary, tertiary, etc. tributaries, is discussed in order beginning with No. 1 (Silver Creek) and progressing upstream. Tributary numbers, sections and stations are shown on the map accompanying this report.

Careful measurements of all the tributaries of the Huron River made from U. S. G. S. topographic sheets show a total of 484 lineal miles. Table 7 gives the mileage of each tributary.

Portage Creek (Tributary No. 30) has a greater length (89 miles) than any other. This is followed closely by Mill Creek which has a total length of about 84 miles. Only six others have more than 20 miles of stream. As can be noted from the map, a majority of the tributaries are very short and most of these are not very important to fisheries.

Tributary No. 1 (Silver Creek)
T.4, 5S., R.9, 10E

Silver Creek enters the Huron River about 1-1/2 miles from Lake Erie. Its entire drainage is within the lake plain formed by higher stages of Lake Erie. The stream almost parallels the northeast bank of the Huron

and drains the flat almost swampy lands adjacent to it for a distance of about 12 miles. It has only two tributaries of a permanent nature. The stream is accessible from county and township roads. Many cottages line its banks, especially in its lower reaches. Its broad and fairly deep channel serves as an ideal place for docking boats and so is extensively used. The stream is not fished a great deal although it probably supports a fairly good population of the warm-water species. The polluted condition of the water is probably the main reason why fishing is not more popular here.

One station was established a short distance up from where the creek enters the Huron. The average width at this point was 52 feet and the average depth 2 feet. The stream velocity was very slow, there being no riffles over its entire course. The water temperature was 80°F. at the time of the survey (7/5/39), and this is certainly not the summer maximum. The water was turbid and remains that way throughout most of the year. The oxygen content was fairly high (7.1 p.p.m.) considering the quantity of sewage which reaches this stream from Rockwood and the cottages along shore. The water is distinctly alkaline and hard and resembled the Huron River in these and other characteristics. A summary of the physical and chemical conditions is given in Table 8.

Blood worms and tubificids were the only bottom organisms found, which is further evidence of pollution. Aquatic plants were confined to a narrow band of pond weeds and bulrush along the banks.

The game fish reported to be most abundant were bullheads, perch and largemouth bass. No fish collections were made but all the species found in the lower Huron are probably present here. Spawning facilities are poor for those species requiring gravel, since the stream bottom is almost entirely of muck except in the extreme headwaters. Perch, northern pike, largemouth bass and bullheads have adequate spawning facilities.

Management Suggestions

About the only practical improvement which could be carried out to improve the fishing in this stream would be to eliminate pollution. This would be almost certain to decrease turbidity and in turn increase the fish food supply. At present the unsanitary condition of the stream does more to discourage fishing than anything else. It is believed that natural propagation is adequate to keep the stream stocked and therefore no artificial stocking is recommended. Cover is satisfactory and no improvement devices are needed because the water has sufficient depth in most places to afford protection for fish. The upper part of this creek offers a good bait minnow supply.

Tributary No. 6 (Kiskaden Creek) T.3S., R.8E

Kiskaden Creek with its tributaries is less than four miles in length. It enters the Huron from the west just south of the town of Belleville and drains the hilly, cultivated and low pasture lands of the adjacent region. Almost the entire stream is private. A dam 8 feet high blocks the stream at the point where it crosses Savage Road and forms a pond of about one acre. This small pond has abundant vegetation and supports a good stock of largemouth bass. The pond is closed to the public. The water temperature at station 1, near the mouth of the stream, was 81°F. at the time of the survey. The water was clear and the oxygen supply abundant. A summary of the physical and chemical conditions is given in Table 8.

Food organisms were abundant, with caddisflies being the predominant form.

The game fish (Table 11) collected included yellow perch, largemouth bass, bluegills and pumpkinseed sunfish. Common suckers and mud pickerel were the only coarse fish found. The creek chub was the most numerous of the six species of forage fishes taken.

Management Suggestions

There is little to be said about the management of this stream since it is almost entirely private. However, it does have some importance in that it acts as a rearing pond for bass, many of which undoubtedly reach the river below.

Tributary No. 14 (Fleming Creek)
T.1, 2S., R6, 7E

Fleming Creek enters the Huron River from the north side about midway between Ypsilanti and Ann Arbor. It has a total length of about 24 miles of which 8 miles are secondary and 3 miles are tertiary tributaries. It has a drainage area of approximately 30 square miles which consists of morainic cultivated and pasture lands.

There is one dam on the main creek. It is situated at the Geddes Road crossing and furnishes water power for the Parker flour mill located there. This dam has a 14-foot head and creates a small pond of an acre or so. The dam is not passable to fish. Another dam is found on secondary tributary 3 just north of Plymouth Road. This has a 10-foot head and creates a pond of about 1/4 acre. It is not passable to fish.

Fleming Creek is crossed by about 6 state and county roads but it is practically all strictly private. It is fished very little and is used more as a bait minnow stream than for angling. At one time this stream was colder than at present, judging from the fact that it supported some trout. The stream is very subject to flooding, as are most of the other tributaries on the lower Huron. Many intermittent drains lead to it, and during heavy rains and also during the spring runoff it overflows its banks. Considerable erosion has resulted in places because the gradient is steep. There is more than a 125 foot drop from the headwaters to the mouth.

For the purpose of the survey, this stream was divided into three sections (see map), two on the main creek (14) and one on secondary tributary three (14-3). Four stations were established, two in section 1 (14) and one in each of section two (14) and section 1 (14-3). Conditions at these stations are taken to be representative of the stream.

The main creek averaged about 20 feet in width and 8 inches deep near its mouth (station 1 of section 1). This decreased to 8.5 feet in width and 3 inches in depth at station 2 of section 1. It became wider (11 feet) and deeper (6 inches) at station 1 of section 2. Tributary 14-3 (section 1, station 1) had a width of 9 feet and a depth of 5 inches.

The estimated volume of Fleming Creek at its mouth (station 1 of section 1) was 13.6 cubic feet per second on June 13, 1939. The water temperatures at all stations during the two-day period of the survey (June 12-13, 1939) varied between 54°F. and 68°F. Mid-summer water temperatures taken by A. S. Hazzard, D. S. Shetter and E. L. Cooper on August 30, 1938 ranged from 72° to 86°F. The check at that time gave conclusive evidence that the stream in its present state is not suited to trout.

The water is colorless, but often muddy from the silt load it carries following each rain. A good share of the stream bottom is covered with boulders, rubble and gravel. Some clay and muck are present but never predominant. Pools are frequent and of fair quality, and long stretches of riffles exist.

The water is distinctly alkaline and very hard. Oxygen is abundant everywhere. A summary of the physical and chemical data taken on this stream is given in Table 8.

Midges, mayflies and caddisflies were the most numerous in the food samples taken (Table 10). However, many other kinds of invertebrate food organisms were found in relatively large numbers. On the whole, fish-food conditions are very good. Water cress and the leafy pondweed were

the only aquatic plants observed and these were not especially abundant (Table 9).

Bluegills and pumpkinseed sunfish were the only game fish taken. A few green sunfish and mud pickerel were found and common suckers were abundant. Forage fishes were abundant. Creek chubs, rainbow darters and muddlers were the most numerous of the 11 species found (Table 11).

Management Suggestions

Fleming Creek (14) has a peculiar combination of characteristics. Its physical (with the exception of temperature), chemical and a good share of its biological characteristics are typical of trout streams. The fact that water temperatures reach 80°F. or more during the short period of maximum summer temperatures nullifies all the other favorable characteristics for trout.

At present very few game fish are found in the stream. Legal-length bluegills and sunfish are rare and no bass are reported. This stream is more or less private over the better part of its course, and we have no records of fish plantings during the period since 1935. It is doubtful whether the present status of the creek would justify any state plantings. However, if public access were granted, an experimental planting of 400 good-sized smallmouth bass might be worth-while.

An alternate plan for the improvement of this stream would be an attempt to convert it back to a trout stream by increasing the bank cover and installing devices for the prevention of erosion and to increase the depth of pools. It is quite possible that much of this stream could be made suitable for trout with proper improvements. On the other hand, such a project might be entirely unpractical in the light of more careful studies.

Tributary No. 16 (no name)
T.2, 3S., R.6E

This stream is of such a small size, except during periods of runoff, that it has little value as a fishing stream. Its stable water supply

is from very cold springs. A summary of the information secured by the survey party on July 7, 1939 is given in Tables 8, 9, 10 and 11.

Tributary No. 18 (Honey Creek)
T2, 3S., R.5E

Honey Creek enters the Huron River from the south side of Barton Lake about 3 miles up stream from Ann Arbor. It drains an area of about 20 square miles and has a total length of about 27 miles. The main portion of this drainage area is low, marshy pasture lands. Fairly high ground which is partially wooded lines the banks at its lower end. Nearly all of this creek has been dredged at one time or another and it now has more the look of a drain than a natural creek. This dredging has more or less spoiled what fisheries value this stream originally possessed.

There are no dams on the stream. The gradient and width of the stream valley is of such a nature as to make power dams impractical.

Very little information could be secured regarding the early fishing history of this stream. However, it is known that during the past 40 years it has had little value as a game fish stream but was important as a source of minnows. This was recognized by the late Professor Jacob Reighard in some of his classical studies of minnow life histories. At the present time some fishing is done at the extreme lower end which is actually a part of the Barton Lake impoundment.

The tributaries of Honey Creek consist of 11-1/2 miles of secondary, 5-1/2 miles of tertiary and 2 miles of quaternary streams (Table 7). Tributary 18-3 was the only one sampled. A total of 4 stations were sampled on the main stream; 3 in section 1, and 1 in section 2 (see map). On the main creek the stream width decreases from about 20 feet at its mouth to 5 feet at Jackson Road, a distance of about 4 miles. The volume of Honey Creek at its mouth was estimated to be approximately 13 cubic feet per second.

At the time of the survey (June 7-8, 1939) the water temperature at the 5 stations varied between 68° and 78°F. The temperature of this stream no doubt has a maximum well over 80°F. during the height of the summer.

The oxygen supply was ample for fish life at all stations and the water was distinctly alkaline and hard. A summary of the physical and chemical conditions is given in Table 8.

Very little aquatic vegetation was found (Table 9). Spike rush, bur reeds and water speedwell were the most common species. The creek banks, in the swampy areas, were covered by a variety of sedges and grasses.

Fish-food organisms (Table 10) were fairly abundant. Midges, mayflies, and caddisflies were the most numerous forms found.

Game fish found near the mouth of the main stream included bluegills, pumpkinseed sunfish and rock bass. Common suckers were found at station 1 of the main stream and at station 1 of Tributary 18-3. Creek chubs and muddlers were the most numerous of the 16 species of forage fish collected (Table 11).

Our records show no plantings of fish in Honey Creek in recent years.

Management Suggestions

Little can be done to improve or develop fishing in Honey Creek so long as it is used as a drain. Its water fluctuation is great, and the dredging of the channel has destroyed most of the pools.

No stocking is recommended except that an experimental planting of 200 six-inch smallmouth bass be made between stations 1 and 2 of section 1 on the main creek. The stream bottom is suitable for smallmouth spawning and there is a fair chance that this species might furnish limited fishing in the lower 2 miles of this stream.

Tributary No. 19 (Delhi Creek)
T.1, 2S., R.5E

Delhi Creek enters the Huron River from the north side at the head of the little pond of Delhi Mills. It has a total length of about 5 miles and

a drainage area of about 6 square miles. There are 4 secondary tributaries in this creek system.

One station was established (see map) up stream about 50 yards from its confluence with the Huron River.

This stream has significance to fisheries only in so far as it connects the small artificial ponds on the Loch Alpine golf course with the Huron and allows free movement of fishes. A large number of small game fish, including bluegills, pumpkinseed sunfish, rock bass and largemouth bass, were found in the lower part of this stream and it may have importance as a feeder stream to the Huron. A summary of physical, chemical and biological characteristics is found in Tables 8, 9, 10 and 11.

Management Suggestions

The present status of this creek should be maintained. No stocking is necessary.

Tributary No. 21 (Mill Creek)
T.1, 2S., R.3, 4, 5E

Mill Creek enters the Huron River from the southwest in the village of Dexter. It drains approximately 110 square miles to the south and west. This drainage area is predominantly farm lands and woodlots of rolling topography. Pastures and swampy ground are more common in the headwaters of the tributaries but do not constitute a very large percentage of the total drainage area.

This stream system is subject to considerable fluctuation. During periods of heavy runoff, there is a rather high degree of flooding except in the headwater tributaries.

Almost every mile of the entire tributary system has been dredged at one time or another. Most of the dredging is reported to have been done between the years of 1903 and 1913.

Not a great deal was learned about the history of fishing on this stream. However, one reliable report indicates that northern pike fishing was

good prior to dredging operations. At the present time, save for the mill pond near the mouth, there is not a great deal of fishing any place in the system. Sunfish and rock bass are the predominant game fish.

Almost all of the stream is privately owned but the public is allowed to fish the greater part of it. Other recreational uses are swimming and picnicking, but these are very limited.

There is a total of 84 miles of stream in the Mill Creek system (Table 7). This is divided as follows: 15 miles of primary tributaries, 14 miles of secondary tributaries, 40 miles of tertiary tributaries, and 5 miles of quaternary tributaries.

Primary Tributary 21

Mill Creek proper was divided into 4 sections, each of which is represented by one station (see map). The average width of the stream in section 1, station 1 was 22 feet; in section 2, 30 feet; in section 3, 15 feet; and in section 4, 8 feet. The stream velocity varied between 0.4 and 1.0 foot per second.

The volume of the main stream was about 20 cubic feet per second at station 1, section 1 (i.e., about 2 miles above its confluence with the Huron River).

Water temperatures taken at the time of the survey (9/9-12/38) varied from 60° to 66°F. These temperatures are about 20°F. colder than maximum summer temperatures.

A good share of the stream bottom was sand, gravel and rubble. There were practically no pools of consequence in the whole stream due, of course, to dredging. The water was colorless and clear. A rather heavy silt load is carried by this stream during periods of heavy runoff.

Oxygen was abundant throughout the stream. The water was distinctly alkaline and hard, as is practically all of the water in the Huron River drainage. A summary of the physical and chemical conditions is given in Table 8.

Aquatic vegetation was found to be sparse. In sections 1 and 3 there were small amounts of algae and mosses. Water weed, water cress and pondweeds were the most abundant higher aquatics encountered (Table 9).

Rock bass and pumpkinseed sunfish were the only game fish collected or reported for Mill Creek above the mill pond at Dexter which is reported to furnish fair bluegill and largemouth bass fishing. A few common suckers and hog suckers were found in this stream, while the horny-headed chub and common shiner were the most numerous of the 14 species of forage fishes taken. See Table 11 for a complete summary of the fish present.

Management Suggestions

Very few practical suggestions can be made regarding the management of this stream. The dredged-out channel is a very poor place for fishes other than minnows. There are no pools of sufficient size to encourage game fish production, and to make proper improvements would probably require more money than the stream is worth. Even if improvements were practicable, it is doubtful if changes would be permitted since the requirements for game fish are diametrically opposite those of a good drain. About all that can be said is to let the stream alone. It does offer a good source for bait minnows. No stocking of any nature could be justified.

Tributary 21-5

This stream is a county drain which was cleaned in 1936. Its physical, chemical and biological characteristics are shown in Tables 7, 8, 9, 10 and 11.

Only forage fishes were found in this small stream, and it is doubted that any attempt at improvement would be practical. No stocking is recommended.

Tributary 21-6 (North Branch of Mill Creek)

The north branch of Mill Creek heads in Mill Lake on the Waterloo Project Area. It is the most important branch of the Mill Creek system, but still does not afford much fishing. It has been dredged for almost its entire length, and the portion below Chelsea (sections 1, 2, 3) is somewhat polluted.

The drainage area is varied, with rolling cultivated lands in the lower part of the drainage and swamp to rolling woodlots in the upper part.

Its reputation as a fishing stream is generally poor, although a few short stretches are fished some.

In the fisheries survey this tributary was divided into 5 sections, each being represented by one sampling station. This stream is of fair size (Tables 7, 8), having at the time of the survey (9/6-9/38) an average width of about 16 feet and a volume of about 5 cubic feet per second at station 1 near its confluence with the main creek.

Water temperatures on the dates of the survey ranged from 54° - 79°F. at the various stations. There is no doubt of great fluctuations in the water temperatures. Maximum summer temperatures are probably between 80° and 90°F.

As in most dredged streams, there are no desirable pools in this stream. The bottom is almost entirely of sand and gravel. The water is clear except during periods of heavy runoff. Water fluctuations are considerable but less so than in the other tributaries already discussed.

The water is alkaline and hard, with abundant oxygen even in the partially polluted area (Table 8).

Pond weeds and water weeds were the most abundant plants (Table 9) but aquatic vegetation was not very abundant anywhere. Fish-food organisms were varied and abundant. Snails, shrimp and midges were especially abundant (Table 10).

Fish collections revealed that rock bass, northern pike, largemouth bass, pumpkinseed sunfish, bluegills and bullheads are present in parts of this stream. Suckers were numerous as were a large number of forage fishes (Table 11).

Management Suggestions

The north branch of Mill Creek is similar in most respects to the main creek already discussed. Improvements seem impractical in view of

this stream's present status as a drain. Perhaps the upper portion will come into state ownership and then measures can be taken to restore it to natural conditions, i.e., if the project has merit in the light of changed conditions.

No fish have been planted in this stream in recent years, and this policy should persist as long as the stream keeps its present status.

Tributary 21-6-1

This is a small spring-fed stream that has been dredged. It is under private ownership and contains no game fish. It is too small to be considered as a public fishing water. Conditions at the station established on this stream are summarized in Tables 7 to 11, inclusive.

Tributary 21-6-3

This tributary is the connection between West and Four-Mile Lakes. It has about 0.3 cubic foot per second flow during normal runoff. Ownership is private and the stream has been dredged and improved as a drain. A few yellow bullheads are present, but there are no pools of any merit and consequently no place for game fish. See Tables 7 - 11 for a summary of conditions at the station established on this creek.

Tributary 21-6-8 (Letts Creek)

Letts Creek is tributary to the north branch of Mill Creek. Near its mouth it has a width of about 9 feet and a volume slightly less than 0.5 cubic foot per second. It has been dredged but not in recent years. Flooding is rather severe during periods of heavy runoff.

The entire stream is privately owned but fishermen are not excluded. Fishing, however, is very limited and of poor quality. The stream is used considerably as a source of bait minnows and has good qualities as a bait minnow stream.

Two stations were established on this creek by the survey party. A complete summary of conditions at these stations is found in Tables 8 to 11, inclusive.

This stream is not of sufficient size and suitable character to afford a place for game fish. It should not be stocked. As mentioned above, its chief value is as a bait minnow stream. No improvements are recommended.

Tributary 21-6-10 (Outlet of Long Lake)

This small tributary does not merit much consideration. It could not support enough game fish to be of any consequence. Minnows are abundant. A summary of conditions at the one station established on this creek is given in Tables 8 to 11.

Tributary 21-10

This small tributary is highly developed as a drain. It is about 8 miles in length and 11 feet in width at station 1. It has no great value as a fishing stream, but does produce a considerable number of minnows. One small rock bass was the only game fish taken. See Tables 8 to 11 for more information.

This stream does not merit improvements and stocking probably would not improve the fishing.

Tributary 21-12

This small headwater tributary is no more than a mile long. It has been dredged and it drains hilly cultivated fields. A few minnows and small pumpkinseed sunfish were found. A summary of the physical, chemical and biological conditions is given in Tables 8 to 11. The stream has no fisheries value.

Tributary No. 22 (Brass Creek)
T.1S., R.5E

Brass Creek is about 2 miles in length and has a drainage area of about 2 square miles of slightly rolling farm lands. It is privately owned and controlled. It is used at present only for stock watering, but the owner indicated his ambitions to improve the stream for fishing. It is believed that this stream might prove to be suitable for trout if properly improved.

Since Brass Creek is strictly private and of such a small size, it is not important from a fisheries viewpoint. A general summary of conditions found at the sampling station on this creek (see map) is given in Tables 8 to 11, inclusive.

Tributary No. 26 (Boyden's Creek)
T.1S., R.4, 5E

This creek is even smaller than Tributary 22; it drains an area of no more than a square mile. Its banks are dry and shaded. It is privately owned, but public fishing is tolerated. However, no game fish were found and it is doubtful if game fish are ever present in sufficient numbers to make fishing worth-while.

No improvements are suggested, and stocking with fish would not improve the fishing. More information on this stream is found in Tables 8 to 11.

Tributary No. 27
T.1S., R.4E

This stream enters the Huron River from the west at a point about 2 miles up stream from Dexter. It has a length of about 5 miles and drains some 5 to 6 square miles of rolling pasture and cultivated lands. The immediate shores are marshy, particularly in the upstream portion. The permanent water supply is from springs and seepage. Runoff is moderate. Only about 1/4 mile of the stream has been dredged.

There is a low dam (4-foot head) near the mouth of this stream. It was placed there to create a muskrat pond. No use is being made of the pond at present.

This entire stream is privately owned and there is no public fishing. Pumpkinseed sunfish, rock bass and yellow bullheads were caught in this stream, and long-eared sunfish and mud pickerel were also taken. Creek chubs and common shiners were the most abundant of the 5 species of forage fish collected. Physical, chemical and biological data are summarized in Tables 8 to 11.

No management suggestions are presented for this small stream. Its small size and private ownership make all improvements impractical.

Tributary No. 28 (Beaver Creek)
T.1S., R.4E

Beaver Creek is a very small stream and has very little value as a fishing stream. For information on this stream see Tables 8 to 11. No improvements are practical.

Tributary No. 30 (Portage Creek)
T1S., 1, 2N., R.2, 3, 4E

Portage Creek enters the Huron River from the west as a short outlet from Big Portage Lake. The main creek enters Little Portage Lake from the west. It heads in the northwest part of Washtenaw County, the southeast corner of Ingham County and the southwest portion of Livingston County. It has a total length of about 90 miles, including tributaries. Twenty-three miles of this are in the primary tributary, 43 miles secondary, 17 miles tertiary, 4 miles quaternary and 2 miles quintan tributaries. The drainage area includes approximately 100 square miles.

The main creek (Tributary 30) was divided into 6 sections for the purposes of survey. One sampling station was established (see map) on each of sections 1, 3 and 5 while two stations were made on sections 2, 4 and 6.

In the lower two sections of this stream, the banks were fairly high and dry; while in the sections above, the immediate shores were mostly marsh or low pasture lands. The surrounding country throughout the drainage is hilly to slightly rolling. It is mostly cultivated tracts interspersed with woods and some low pasture lands.

A low (1-foot head) rock dam was located at the outlet of Big Portage Lake. This was created for the purpose of raising the water level. It was no impediment to fish. Another dam is situated in section 2. This has an 18-foot head and has created Hiland Lake. Its purpose was to enhance real

estate values in the immediate vicinity. It is not passable to fish. The upper part of the stream is without obstructions.

Evidence of dredging was noted only in section 4 and section 6. This was probably done 20 to 30 years ago. There was practically no evidence of flooding; the creek as a whole seemed very stable.

Most of this stream is privately owned, but public fishing is allowed. It is fairly popular and furnishes good catches of rock bass, bluegills, pumpkinseed sunfish and largemouth bass. Some black crappie, perch and yellow bullheads were also taken.

Portage Creek has an average width of about 30 feet in section 1 and a width of about 10 feet in sections 5 and 6. The estimated volume of water at the time of the survey was approximately 35 cubic feet per second in section 1 and 2 cubic feet per second in section 6.

The water was a very light brown in color in the upper three sections, but near the mouth of the creek it appeared colorless.

The water temperature ranged from 70° to 83°F. at the various sampling stations. This was probably near the summer maximum.

Pools were infrequent. However, much of the stream was slow and deep, being more typical of lake than of stream conditions.

The stream bottom was sand and gravel for most of its length. However, some silting over gravel was noted as well as patches of marl. In section 6 the bottom was silt and detritus. A summary of the physical factors at all stations is given in Table 8.

Oxygen was adequate at all stations but quite low in sections 5 and 6. All water samples were alkaline and moderately hard. No pollution was observed anywhere on this tributary. See Table 8 for a summary of chemical conditions.

Eighteen species of higher aquatic plants were found in Portage Creek (Tributary 30). The pond weeds (Potamogeton) were the most abundant (a complete list is given in Table 9). Algae was fairly abundant at some

stations, and moss was generally sparse. In general, the aquatic vegetation was sparse except in a few limited places.

Fish-food organisms (Table 10) were abundant. Caddisflies were particularly abundant. Scuds were numerous at certain stations.

The game fish collected included largemouth bass, smallmouth bass, rock bass, perch, bluegills, black crappies and pumpkinseed sunfish. Mud pickerel, warmouth bass, green sunfish and long-eared sunfish were also present. Yellow bullheads and hog suckers were common. Carp were seen but not collected. Creek chubs and black-banded topminnows were the most numerous of the 16 forage fishes taken. A summary of the fish collections and the relative abundance of each species are given in Table 11.

Management Suggestions

Portage Creek affords fairly good fishing at the present time. Most of it is well suited to pan fish and largemouth bass. At the time of the survey this stream seemed to be well s tocked with the more suitable species, and since spawning facilities are quite ideal throughout most of the creek, it is safe to assume that no artificial stocking is necessary or desirable. We have no records of stocking in recent years.

The two impoundments in sections 1 and 2 and the sluggish nature of the stream above, takes care of the need for pools. It is doubtful if stream improvement would actually improve present conditions. As a matter of fact, the present status of this creek seems to be all right.

Tributary 30-1
T.1S., R.4E

This small tributary enters Little Portage Lake from the south. It is scarcely more than 2 miles in length and has a width of about 4 feet except during heavy runoff. It drains hilly cultivated fields and some marsh. It is too small to be important as a fishing water although it may offer spawning facilities for certain of the game fish species of Little Portage Lake. A complete summary of conditions at the one station established on this creek is given in Tables 8 to 11, inclusive.

Tributary 30-2 (Outlet of Silver Lake)
T.1N., R.4E

This is a tiny tributary approximately 1 mile long and 2 feet wide at its mouth. It enters the southwest bay of Little Portage Lake. The mudminnow was the only fish taken or reported. This stream has little value to fisheries. See Tables 8 to 11 for physical, chemical and biological information on this stream.

Tributary 30-4 (Honey Creek)
T.1N., R.4E

Honey Creek (not to be confused with the Honey Creek which empties into Barton Lake) has a length of about 6 miles. It enters Big Portage Lake from the northwest, and with its 4 small tributaries drains the area in the vicinity of Pinckney.

The immediate shore of this creek is marshy, particularly in the upper section. The surrounding country is rolling cultivated lands with fairly extensive patches of woods and pasture lands.

One dam has been built on this stream. This is at the town of Pinckney. It created the Pinckney Pond. This dam is owned by the Ford Motor Company but was not being used for power at the time of the survey. Section 2 of this creek was dredged out about 25 years ago, but section 1 is pretty much unmolested. No pollution of any nature was observed.

This creek has been fished some down stream from Pinckney. Rock bass, bluegills and largemouth bass were the species reported to be most abundant. Some of this stream is publicly owned and fishing is allowed over the desirable areas. The upper section (2) of this creek is too small to be inhabited by adult game fish.

At station 1 of section 1 the stream width was approximately 11 feet and the volume 11 cubic feet per second on the date of the survey. In section 2 the width was less than 3 feet and the volume about 0.1 cubic foot per second.

The stream bottom is sand and gravel in section 1, while in section 2 silt and detritus predominate. There were no pools of consequence any

where on this tributary. The water was colorless and clear. Water temperatures were 72° - 75°F. in section 1 and 67°F. in section 2 on August 12-13, 1938.

Oxygen was abundant and the water was alkaline and moderately hard at all stations. A complete summary of physical and chemical conditions is given in Table 8.

Algae was common and moss sparse in this tributary. Of the higher aquatics (Table 9), submerged types were moderate in abundance while the emergent varieties were sparse.

Caddisflies and midges were predominant in the fairly abundant fish-food population (Table 10).

Rock bass, largemouth bass, perch, bluegills and pumpkinseed sunfish were the only game fish taken. Yellow bullheads and chub suckers were common. Creek chubs and common shiners were the most numerous of the 9 species of forage fish encountered (Table 11).

Management Suggestions

This tributary is reported to have been inhabited by trout at one time. Temperatures show that at present section 1 gets too warm. Section 2 is probably suitable for trout as far as temperature is concerned, but its small size would hardly make the stocking of trout worth-while. The lower part of this stream might be improved for warm-water species by devices that would create pools. Further investigations would have to be made, however, to see if such improvement would be practical and for the good of public fishing.

No stocking should be made in this creek. The young of game fish were numerous and the space for adult game fish very limited.

Tributary 30-4-1 (County drain)
T.1N., R.4E

Tributary 30-4-2 (Outlet of Bentley Lake)
T.1N., R.4E

Tributary 30-4-4 (West Branch of Honey Creek)
T.1N., R.4E

Of these three tertiary tributaries of Honey Creek, none is large enough to support adult game fish in significant numbers. Their general characteristics are similar to Honey Creek and are summarized in Tables 7 to 11, inclusive. Tributary 30-4-4 is probably cold enough to support trout, but its small size makes the planting of trout impractical.

Tributary 30-9 (Livermore Creek)
T.1N., R.3E

Livermore Creek heads in Sheets Lake and reaches the main Portage Creek through Bass Lake (see map). This tributary is about 5 miles long and averages 3 feet in width below station 1. A summary of the physical, chemical and biological data taken at station 1 is given in Tables 8 to 11.

The small size of this creek makes stocking or improvements impractical.

Tributary 30-10 (Outlet of Joslin Lake)
T.1S., 1N., R.3E

This tributary is about 6 miles in length. It drains the area including North, South and Island lakes and enters Portage Creek at the Village of Unadilla. Three sections, each with one station, were established by the survey party. Section 1 extends from Portage Creek to Joslin Lake, section 2 from Joslin Lake to South Lake and section 3 from South Lake to North Lake.

Most of the immediate shore is marsh with high dry banks in the lower part of section 1. The surrounding country is rolling cultivated land with a fair number of woodlots and a little pasture land.

Only a small part of section 2 has been dredged and the remainder of this stream is pretty much in a natural state except for a dam at Unadilla (section 1). The old dam at this point washed out just prior to the survey, and, according to plans as reported to the survey party, this dam was to be rebuilt within the year (1938). No subsequent check has been made, but the

dam is presumed to be present. The old dam had a 9-foot head, and the new one would probably be about the same height. This dam was used as a source of water power for a large cider mill owned by a Mr. Gorton.

Most of this tributary is open to public fishing. Fishing for bass, pike and perch is fair in section 1. A limited amount of bass fishing is reported for section 2. Section 3 is not fished at all because there are few or no game fish in this portion of the stream.

The average width of the stream is about 5 feet in sections 1 and 2, and 3 feet in section 3. The estimated volume near its mouth (section 1, station 1) on the survey date (August 19, 1938) was less than 3 cubic feet per second.

There were no pools worth mentioning. The stream bottom was mostly gravel and sand in section 1. In sections 2 and 3 it was almost entirely silt and detritus. Water temperatures ranged from 72° to 74°F. on the survey date. This is probably near the summer maximum. See Table 8 for a summary of physical and chemical conditions.

Oxygen was abundant in section 1 but just barely adequate for fish life in sections 2 and 3. The cause of low oxygen is not known, but it certainly was not from pollution. The water was alkaline and moderately hard, and very hard at station 1 of section 3.

Algae was sparse except in section 1, and the submerged higher aquatic plants were common to dense, while emergent species were moderately abundant. A complete summary of plant species collected is given in Table 9.

Fish foods were abundant, especially mayflies, caddisflies, and midges. (Table 10).

Fish collections showed the following game species: largemouth bass, bluegills and pumpkinseed sunfish. Yellow bullheads, chub suckers, mud pickerel and long-eared sunfish were very common. Forage fish were not very abundant - the black-banded topminnow was the most numerous of the 9 species collected. The mudminnow was the only forage fish found in section 3.

Management Suggestions

The presence of large numbers of small bass and pan fish is evidence that this tributary is adequately stocked by natural means, since no plantings have been made in recent years.

Stream improvement in the form of devices to create pools would undoubtedly improve this stream. It is doubted though that the cost of such work could be justified by the increased fishing which would result. An examination of the stream by the improvement supervisor would settle this question.

Tributary 30-10-2-2
T.1S., R.3E

This little tributary runs from Green Lake to Snyder Lake. It has a length of about 3 miles and a width of approximately 4 feet at station 1. The estimated volume was less than 1 cubic foot per second on the survey date (August 16, 1938). It has not been dredged. There is one dam, a small structure with a 5-foot head constructed by a Mr. Cassel for the purpose of maintaining a fish pond. This dam is located on the south side of North Territorial Road. The pond created by this dam is said to have contained trout, but in 1938 the water temperature of the stream immediately below this pond was 77°F. and this was following a period of showers and overcast weather. We have reports that this pond and creek have been stocked during 1943 with trout supplied by the federal hatchery. We do not know of the success of these plantings. At any rate, the stream and pond are privately owned and of too small an area to have much importance to public fishing. A summary of conditions found at station 1 on this tributary is given in Tables 8 to 11.

No special management is recommended. Largemouth bass, bluegills and pumpkinseed sunfish were found in this stream and it presumably has adequate stock.

Tributary 30-14
T.1N., R.3E

This small tributary empties into Williamsville Lake from the north. It is about 5 miles in length and only 3 to 4 feet wide at most places. While a few small largemouth bass and pumpkinseed sunfish were found, this stream is too small to support adult game fish. It has a fair minnow population and is probably more suited to bait minnow production than for any other fisheries purpose. A summary of the physical, chemical and biological data taken at the 2 stations on this creek by the fisheries survey party are summarized in Tables 8 to 11.

Tributary No. 31 (Arms Creek)
T.1S., R.5E

Arms Creek drains the hill and marsh area in the big bend of the Huron River in the northcentral part of Washtenaw County. It enters the Huron just a short distance up stream from Base Line Lake. This creek has a length of about 7-1/2 miles, and about two-thirds of this length has been dredged. The immediate shore consists of a series of wide marsh lands which is much narrower where the stream course passes between the hills.

The entire stream is privately owned and there is little or no fishing. Small perch, rock bass and pumpkinseed sunfish were the only game fish collected.

For more information on this tributary see Tables 8 to 11. No management suggestions are in order since the private status of this creek and its present use as a drain make improvements impractical.

Tributary 31-3 (Outlet of Independence Lake)
T.1S., R.5E

This very small tributary with a total length of less than 1/2 mile has no significant fisheries value. Data taken at the station established here are summarized in Tables 8 to 11.

Tributary No. 32 (Carpenter Creek)
T.1N., R.5E

The lower end (section 1) of this creek is actually the outlet of Bass Lake. It is more like a marsh than a stream. One station was established and a partial set of data was taken (Tables 8 to 11). This outlet is more lake-like in character than stream-like, and its management and fish population would be similar to that of Bass Lake.

Section 2 consists of approximately 2-1/2 miles of stream between Bass Lake and Carpenter Lake, and section 3 has reference to 3-1/4 miles of stream between Carpenter and Crooked lakes.

The only dredged part of this stream reported is about 100 yds. below the Pettysville dam. This dam was the only obstruction on the stream at the time of the survey. This has a head of about 18 feet and forms about a 10-acre lake. The dam is privately owned by a Mr. Otwell and is used as a source of water power. It is not passable to fish.

The immediate shore of this creek is almost entirely marsh except for a short stretch near station 2 of section 2 (see map). The surrounding country is rolling cultivated lands and woodlots with some pasture in the headwater area. Some of this stream is publicly owned. Public fishing is allowed but practically no fishing is done except for a limited amount of bait minnow collecting.

The stream is really too small to have any appreciable value for public fishing. Its width ranged from 5 to 8 feet and its volume from 1 to 2 cubic feet per second in section 2. In section 3 the average width was less than 4 feet and the volume under 1 cubic foot per second on the date of the survey (August 4-5, 1938).

Largemouth bass, bluegills and rock bass were the only game fish taken and these were all of a small size. Section 3 was posted as a trout stream, but no trout were found or reported. The water temperature in this section on August 4, 1938 was 71°F. at station 1 and 67°F. at station 2, and these

were probably not the daily or summer maxima. Water temperatures in section 2 ranged from 76° to 80°F. on August 5, 1938. (See Tables 8 to 11)..

Management Suggestions

This stream is not of any great consequence as a public fishing water. Brook trout were stocked in this stream in 1933, 1934 and 1935. None were taken or reported, and it is doubtful if any are present now. No stocking or improvement could be justified.

Tributary 32-3 (Hay Creek)
T.1N., R.5E

This stream is about 4 feet in width at its mouth and has an estimated volume of 1.7 cubic feet per second at the lower station. A small dam (3-foot head) was located at a point 100 feet north of the Swarthout Road crossing. This forms about a 1-acre pond. Its use is unknown. While a few fair-sized game fish were found in this creek, it is not considered of any appreciable value as a public fishing water. No stocking or improvements would be justified. See Tables 8 to 11 for more information.

Tributary No. 33 (Outlet of Horseshoe Lake)
T.1N., 1S., R.6E

This tributary enters the main Huron River from the south just above Strawberry Lake. It drains the area to the west of Whitmore Lake. The creek is small, having a volume of about 2 cubic feet per second during August. The entire stream has been dredged and its primary value at present is that of a drain. A dam with a 5-foot head forms a small pond at Hamburg. This is the only obstruction on the stream. The immediate shore of this stream is exclusively of high brushy banks and the surrounding country is slightly rolling cultivated lands and woods. Public fishing is allowed and the stream is easily fished but it is little used except for early season pike fishing.

Largemouth bass, rock bass, bluegills, sunfish, perch, northern pike and bullheads were taken or reliably reported. Most of the fish were small. Minnows were quite numerous over the entire course of this stream.

A summary of all the data taken at the three stations established on this stream is given in Tables 8 to 11.

Management Suggestions

Little can be done to improve the fishing in this stream so long as its primary use is that of a drain. It is believed that stream improvements designed to create pools would make this a good little fishing stream. However, such improvements could not be justified unless the present status of the creek is changed. Its small size, of course, never would justify a great deal of expense. No stocking of any nature is needed.

Tributary No. 34 (Ore Creek)
T.1, 2N., R.5E

Ore Creek enters the Huron River from the north through Ore Lake. It drains the area almost due north for a distance of approximately 10 miles. The drainage includes Ore, Brighton, Boetcke, Appleton, Woodland and a dozen or more other small lakes.

The only part of Ore Creek proper which has been dredged is a portion about 1200 feet long in section 4, i.e., Woodland Lake and Long Lake.

There were four dams on this creek recorded by the survey party in 1938. The lower one, found near the upper end of section 1, has a head of 12 feet and is owned by the Boy Scouts. Its purpose is to create a small lake for recreational uses. An 8-foot dam owned by a Mr. Joles, but not in use at the time of the survey, was found in section 2 near Brighton. A third dam with a head of 18 feet is located at the upper end of section 3. The owner is Mr. Treadeau, and the use is to create the present Woodland Lake. A short distance below Long Lake (section 4) there is an 18-inch dam placed there by the Pleasant Valley Golf Club. The dam is used to impound water for use on the golf course and to raise the level of Long Lake.

The immediate shore of Ore Creek is mostly low and marshy. There is, however, a mile or so of high wooded banks in section 2. The surrounding

country is rolling, partly cultivated and partly wooded. The City of Brighton and considerable other real estate development exist in the vicinity of this tributary.

In general, the fishing reputation of this creek is very poor. Of course the natural and artificial lakes through which it passes are fished a good deal with fair success. The only part of the stream which was reported to be regularly fished is the lower end of section 4, i.e., the portion immediately up stream from Woodland Lake. Largemouth bass, rock bass and bluegills are the main game species taken.

This stream averages about 13 feet in width. It has almost as great an average width in section 4 as in section 1. Its estimated volume at station 1, section 1, just up stream from Ore Lake, was 11 cubic feet per second. This decreased to 8 cubic feet per second in section 2, to 5 cubic feet per second in section 3, and to 3 cubic feet per second in section 4. The stream current was fairly rapid in the lower two sections but sluggish in sections 3 and 4.

Water temperatures, taken on the survey dates of August 1 to 3, 1938, ranged from a low of 64°F. at station 1, section 4 to a high of 84°F. at station 2, section 1. Maximum summer temperatures are very probably too high in this tributary to be suitable for trout.

The water of Ore Creek is colorless and clear. Turbid water exists only during periods of heavy runoff and flooding is not severe. There are practically no pools. The stream bottom is sand, gravel and rubble with considerable silting. The upper part of the stream has a soft silty bottom. Shade is rather scarce except in the lower part of sections 1 and 4.

Oxygen was adequate for fish life at all stations. At station 1 of section 3 it was just barely so, however. The water was moderately hard and distinctly alkaline. Some pollution, presumed to be of a domestic nature, was observed in the mill race below Brighton. This, however, was probably of no consequence to fisheries. A summary of physical and chemical conditions is given in Table 8.

Algae was moderately abundant in most of this tributary. The submerged higher aquatic plants were dense, while the emergent growths were sparse except in sections 3 and 4 where they were moderate. A list of the plant species found is given in Table 9.

Fish foods were plentiful. Samples showed large numbers of caddisflies, midges and scuds (See table 10 for details).

The game fish collected or reported included the following: perch, largemouth bass, rock bass, bluegills and pumpkinseed sunfish. The yellow bullhead was the most common coarse fish. Nine species of forage fish were found but none was very numerous (Table 11).

Management Suggestions

Ore Creek was well stocked with suitable species of game fish at the time of the survey. There is no doubt that natural propagation will continue to stock this stream to capacity. The complete lack of good pools makes much of the stream of little value to the larger game fish. Stream improvement devices for the purpose of creating pools would be an asset to the stream. On the other hand, such work may not be justified or practical. An investigation by the stream improvement supervisor would settle this question.

Tributary 34-2
T.1, 2N., R.5E

This small tributary of Ore Creek is about 2-1/2 miles in length. It drains about a dozen small lakes including Boetcke, Cunningham and Appleton. Its small size makes it impractical to manage as a public fishing stream. Small pumpkinseed sunfish and rock bass were the only game fish found, but other warm-water game fish are probably present. See Tables 8 to 11 for a summary of the data taken on this stream.

Tributary No. 35 (South Branch of Huron River)
T.1N., R.6, 7E

The tributary system of the South Branch of the Huron River has a total length of about 35 miles of which 9-1/2 miles are in the primary tributary, 14-1/2 miles are secondary tributaries and 11 miles are tertiary tributaries.

The primary tributary enters the Huron River from the south at a point 2-1/4 miles north of Whitmore Lake. This stream drains an area of approximately 45 square miles to the east of Whitmore Lake and in the vicinity of South Lyon. The drainage area is rather low and somewhat rolling. About half of it is cultivated and the rest is pasture, swamp land and woods. The immediate shore of the main tributary is low and swampy except for a small portion of the upper end of section 3. Some of the shore is wooded, especially in section 1. More than one-half of section 3 has been dredged but the stream below has not been molested. There are no dams on this tributary, probably because the gradient is unfavorable. Six secondary tributaries are recognized (see map).

Section 1 of this stream is fished quite a good deal with fair success for smallmouth, largemouth and rock bass. The stream above is seldom fished except by a few individuals as a source of bait minnows.

This tributary averages about 25 feet in width in section 1, i.e., between the point of its confluence with the Huron River and Sandy Bottom Lake. It averages about 30 feet wide in section 2 (between Sandy Bottom and Crooked lakes), and about 10 feet wide in section 3.

The volume of this stream near its mouth was estimated to be approximately 18 cubic feet per second at the time of the survey (July 29, 1938). Water temperatures on the survey dates (July 25-29, 1938) ranged from 69° to 82°F. The lowest temperature was at station 3 of section 3, as would be expected.

Pools are scarce and of poor quality. The stream bottom is sand and gravel down stream from Crooked Lake and sand with silt and detritus up stream from this lake. A complete summary of all physical data is given in Table 8.

Oxygen was quite low at stations 1 and 2 of section 1 but abundant at all other stations. There is no place where there was insufficient oxygen to support fish life. The water in this stream is alkaline and hard (Table 8).

Algae was sparse in this stream, while submerged higher aquatic plants were fairly abundant. Emergent vegetation was not very abundant except at station 3 of section 3. A complete list of the aquatic plants is given in Table 9.

Fish-food organisms (Table 10) were abundant. Caddisflies, midges and scuds were the most abundant forms.

Fish collections included the following game fish: largemouth bass, smallmouth bass, bluegills, pumpkinseed sunfish, rock bass, black crappie, northern pike and perch. Suckers and bullheads were common, but forage fishes were not very numerous. A summary of all fish information is given in Table 11.

Management Suggestions

The south branch of the Huron River seems to be well stocked with all species well suited to it. Spawning grounds are of good quality and quantity and no artificial stocking is needed.

There is a lack of good pools in this stream, and it is suspected that stream improvement devices are not only needed but could be justified.

Tributary 35-1
T.1N., 1S., R.6E

This small tributary empties into the south branch of the Huron River a short distance down stream from Sandy Bottom Lake. It has a length of about 2-1/2 miles and an average width of approximately 4 feet near its mouth. Its flow at the time of the survey was less than 1 cubic foot per second.

Its banks are entirely low and marshy and it has no dams. It is too small to have any significance as a public fishing water. Some small game fish are present and minnows are fairly numerous, especially the mudminnow. The stream is not used for fishing or as a bait minnow stream. A summary of conditions as found by the survey party is given in Tables 8 to 11.

Tributary 35-3
T.1N., 1S., R.6, 7E

This secondary tributary has a total length of about 5 miles. It heads in a small lake in section 9 of Salem Township, Washtenaw County, and flows northwest to Nichwagh Lake, thence to Lime Kiln Lake, and finally to Sandy Bottom Lake to join the primary tributary.

The stream banks are wooded and swampy in section 1 and high wooded or brushy in most of sections 2 and 3. The surrounding country is rolling sand hills, partly cultivated and partly wooded. Only a part of section 3 has been dredged. A dam with a 14-foot head is located at the upper end of section 2. This was owned by Mr. Bush and was used to impound water for power purposes. The power was used to operate a radio factory at the time of the survey (July 28, 1938).

Although the public is allowed to fish this stream, it is little used. It is actually too small to carry adult game fish except at the extreme down-stream end.

Largemouth bass, black crappie and perch were collected but these were all small. Tiny sunfishes were especially abundant. Forage fishes were moderately numerous, and the stream is reported to be used a little as a source of bait minnows.

Since the stream is too small to be of much value to public fishing, no suggestions for its future management are given. A complete summary of the data taken is given in Tables 8 to 11.

Tributary 35-3-1 (Maurer Ditch)
T.1N., 1S., R.6E

This stream serves as a drain. It has been dredged twice in about the past 15 years. It has very little value from the fisheries viewpoint. Some small game fish were found and forage fishes were fairly numerous. A summary of the physical, chemical and biological data taken on this stream is given in Tables 8 to 11. No management for fisheries is practical as long as the stream is used primarily for a drain.

Tributary 35-3-2 (Vernes Drain)
T.1N., R.6,7E

This stream has no fisheries value since it has been converted into a drain. The mudminnow was the only fish found. A summary of conditions at the one station established here is given in Tables 8 to 11.

Tributary 35-3-3
T.1N., R.6,7E

The three miles of this small creek were dredged about 20 years ago. It is actually too small to have any significant value as a public fishing stream. Small perch and largemouth bass were taken and mudminnows were very abundant. Several other forage fishes were numerous.

About 10 years ago this creek was stocked with trout, and at the time of the survey (July 26, 1938) it was posted. No trout were seen and no one in the vicinity had heard of a trout being caught. While the water temperature at the time of the survey was 67°F., it is most probable that this is not the summer maximum. At any rate, the small size of the stream makes it of no significant value as a public fishing water. See Tables 8 to 11 for summary of conditions.

Tributary 35-4. - T.1N., R.6E
Tributary 35-5. - T.1N., R.6E
Tributary 35-6. - T.1N., R.7E

These three tributaries represent a total of about 3-1/4 miles of stream. They are all very small and the first two are probably intermittent. Tributary 35-6 is reported to have been a fine bait minnow stream before dredging, but at the time of the survey it was little used for that purpose. One station was established on each of these creeks and the findings are given in Tables 8 to 11.

Tributary No. 38 (Woodruff Creek)
T.1,2N., R.6E

The primary tributary (Woodruff Creek) has a length of about 8 miles. It enters the Huron River from the north and drains an area in southeastern Livingston County including Sears, Beach, School, Woodruff and several other

smaller lakes. The entire length of this stream was free from dredging at the time of the survey and only one man-made dam was reported. This was a makeshift brush dam with a 28-inch head on Fuller's farm just north of highway U.S. 16. The dam was constructed for the purpose of creating a pool. Two beaver dams were found by the survey party.

Three secondary tributaries exist and will be discussed below.

A great proportion of this stream has low swampy banks while the surrounding country is low rolling hills, partly cultivated and partially wooded. Part of this stream is open to public fishing but part of it is posted. The reason for posting was to protect trout planted there years ago. No trout were found or reported, however.

Three stations were established on this stream (see map). At the lower station the stream averages more than 10 feet in width. The estimated volume of flow at station 1 (just above the mouth) was 7 cubic feet per second on the date of the survey (July 19, 1938). At station 2, the width averaged about 7 feet and the volume about 1 cubic foot per second.

The water in the lower two sections is fairly rapid. Pools were scarce. The predominant bottom soil was sand and gravel.

Water temperatures on the survey date (July 19, 1938) ranged from a low of 64°F. at station 3 to 74°F. at station 2. These temperatures do not represent the summer maxima.

Oxygen was adequate but not abundant, and the water was slightly alkaline and very hard. Physical and chemical analyses are summarized in Table 8.

Algae was only moderately abundant in this stream. The submerged higher aquatic plants were sparse throughout, while the emergent varieties were fairly common (Table 9).

Fish foods were abundant with caddisflies, midges and scuds being the most common forms (Table 10).

Bluegills and pumpkinseed sunfish were the only game fish found, but there are some reports of brook trout. Green sunfish, chub suckers, yellow

bullheads and mud pickerel were very common. Five species of forage fish were collected; the common shiner was the most abundant species (Table 11).

Management Suggestions

Woodruff Creek is partially spring-fed and certain portions of it are probably suitable for trout as far as the temperature is concerned. The almost complete lack of pools is certainly unfavorable to trout or any other game fish production. Some improvement here might be justified if public access could be assured.

The present practice of no stocking is recommended to be continued unless pool improvements are undertaken and the stream is able to carry trout. About the best that can be expected from it at present is a limited production of warm-water pan fish. There are no records of fish planting for this stream in recent years.

Tributary 38-1 ("Foote Stream")
T.2N., R.6E

This small tributary to Woodruff Creek has a length of less than 3 miles and a summer volume of about 2 cubic feet per second. It is strictly private; and although trout have been stocked here in recent years, none was taken by the survey party and none was reported at the time of the survey (See Institute for Fisheries Research Report No. 556).

The suitability of this stream for trout is certainly open to question. Fair pools exist and the bottom is fair in places but the temperature is not satisfactory. The temperature taken by the survey party was 71°F. (Table 8) on July 19, 1938, and this certainly does not represent the summer maximum. A summary of the data taken on this stream is given in Tables 8 to 11.

Sunfishes were numerous and almost all of sub-legal size. No attempt to improve fishing in this stream by stocking or improvement devices could be justified.

Tributary 38-3 (Mann Creek)
T.2N., R.6,7E

Mann Creek is a fair-sized secondary tributary to Woodruff Creek. It

has a length of about 8 miles and a summer volume of about 3-1/2 cubic feet per second. A 12-foot dam situated on the General Motors Proving Ground is the only obstruction on its course. This was constructed for the purpose of creating a lake. Most of the immediate shore is low and swampy making the entire stream difficult to fish. Trout are reported to have been caught although fishing operations at three stations failed to show any game fish other than one rock bass. Suckers were abundant and muddlers very abundant.

Midges and scuds were the most numerous fish foods found.

Temperatures ranged from 72° to 74°F. except at spring inlets. Moffett (Institute for Fisheries Research Report No. 556) indicates that the stream might support brown trout. It is obvious, however, that only a small portion of this stream may be suitable for trout. The remainder gets too warm during the height of the summer. The plantings of brook trout in 1936 apparently failed to establish this species.

The complete lack of good pools is characteristic of this and most other tributary streams in the Woodruff Creek drainage. This paucity of refuges for larger game fish determines no doubt, as much as does high temperature, the fish producing capacity of a stream.

Some improvement devices to create pools may be justified, but a more detailed examination should be made to determine the practicability of such work. A summary of physical, chemical and biological conditions found at the three stations established on this tributary is given in Tables 8 to 11.

Tributary 38-5
T.2N., R.6E

This tiny tributary connecting School Lake and Woodruff Creek is of insufficient size to have any appreciable value. See Tables 8 to 11 for a summary of conditions on this creek.

Tributary No. 41 (County drain)
T.2N., R.7E

This tributary is about 2 miles in length and has a volume of about 0.3 cubic foot per second at its mouth. It has been dredged for its entire length and has all the characteristics of a typical drain.

No game fish were found in the stream, and certainly in its present state none should be planted. Water temperatures appear suitable for trout, but even if this is true for the entire year, the stream is too small to have any significance as a public fishing water. A summary of the data taken at the three stations established on this stream is given in Tables 8 to 11.

Tributary 43 (Sherwood Creek)
T.2N., R.7E

Sherwood Creek has a total length of about 1-1/2 miles. It enters the Huron River from the north and drains about 2 square miles west of the town of Milford. The stream is free from dredging but there is one dam with an 8-foot head. All of the development on this stream is private and the public is excluded. Of course, its small size makes it of little value as a public fishing water.

Brook trout were collected here - the only stream in the Huron River system where trout were taken by the survey. There are no records in recent years of trout having been stocked, although plantings may have been made from private sources. Conditions appear suitable for natural reproduction, and it is entirely possible that the present trout population came from stock put there many years ago.

Tributary No. 44 (Pettibone Creek)
T.2,3N., R.7,8E

Pettibone Creek has a total length of about 8 miles. It enters the main Huron from the north right in the town of Milford. It drains about a dozen lakes, of which at least six lie directly in the primary system as stream lakes or "broads".

The immediate shore is high and dry in section 1 but very low and swampy in the other 8 sections above. The surrounding country has rolling topography, and the principal real estate developments are the towns of Milford and Highland. One state park exists in the vicinity of section 5. A considerable portion of the hilly highlands are wooded, but some of the area is cultivated.

Section 1, between the lower mill pond and upper Ford pond, is the only part of the stream that had been dredged prior to 1938. Three dams were recorded by the survey party in 1938. These were as follows: Ford dam in section 1 with a 12-foot head, used for power purposes by its owner, Henry Ford. A second dam, with a 6-foot head, in section 5 owned by J. Kinney was not in use at the time of the survey. A third dam is located in section 6; it has a head of 12 to 15 feet and furnishes water power for a mill run by its owner, John Maugh.

The lower four sections of Pettibone Creek are fished very little, although largemouth bass, rock bass, bluegills and pumpkinseed sunfish were present in fair numbers. Trout were reported for section 5, but it is doubtful whether trout really thrive there in any significant numbers. Fishing is not allowed in section 6, and sections 7, 8 and 9 were too small for game fish production. Parts of this stream are used by bait dealers, especially sections 5 and 6.

Other than fishing, this stream has little recreational use. A limited amount of swimming was found to take place in section 5 but not in any other section.

This stream has an average width of about 12 feet in section 1. This decreases to 6 feet at the upper end of section 5 and to 4 feet in section 9. The estimated volume varied considerably at the different stations in the lower portion of the stream, due no doubt to the effect of the dams (Table 8).

Pools were few and of poor quality. Several of the sections were without pools whatsoever. Sand and gravel were the predominant bottom types. Some marl, silt and detritus were present, particularly in sections 3, 4 and 5.

The water temperature on the date of the survey (July 13, 1938) varied between 71° and 82°F. There is no doubt about the summer temperature being too high for trout, except that certain very limited areas in the vicinity of springs are undoubtedly cold enough for trout throughout the summer.

The water is moderately alkaline and hard. A summary of the chemical analyses taken at each station is given in Table 8.

Algae was sparse, except in sections 2, 3 and 4 where it was dense. The higher aquatic plants were most abundant in section 4 and were moderately abundant at nearly all stations. The different kinds are listed in Table 9 along with their relative abundance.

Fish-food organisms were abundant at nearly all sampling stations. Midges, caddisflies, water beetles and scuds were the predominant kinds. See Table 10 for a more complete summary.

Fish collections were made in sections 3 and 6. Largemouth bass, rock bass, bluegills and pumpkinseed sunfish were fairly abundant. Large adult specimens were scarce, however. The upper reaches of this tributary is too small for game fish and has no fisheries value except possibly for minnow production. The common shiner and horny-headed chub were the most common forage fishes found. Suckers and bullheads were common. See Table 11 for a summary of all the fishes collected or reported.

Management Suggestions

Part of this tributary seems to be fairly well adapted for bass and pan fish but not on a very large scale. The impounded waters and lakes in this drainage are much more attractive to the fishermen, and as a result the stream is fished very little.

Temperature data do not give credence to certain reports that the stream is suitable for trout. The cold limited areas adjacent to springs are probably satisfactory for trout, but these small patches of cold water have little value when considering public fishing.

It is doubted that stream improvements could be justified.

Tributary 44-1 (First Creek)
T.3N., R.7E

This small creek is little more than 1/2 mile in length. It extends from Beeche's Pond to Pickerel Lake and has an average width of about 4 feet. Some very small largemouth bass, bluegills and pumpkinseed sunfish were found, and trout were reported. A water temperature of 72°F. early in July (Table 8) does not indicate favorable summer temperatures for trout, and it is most probable that the trout reported were those escaping from Beeche's Pond above.

This tributary has very little fisheries value. A summary of conditions found at the station established is given in Tables 8 to 11.

Tributary 44-3
T.3N., R.7E

Two sections were established on this small tributary as follows: section 1 from Alderman Lake to Mud Lake; section 2 from Mud Lake to Grass Lake. The total length of the stream is about 3/4 of a mile, and its average width in section 1 is no more than 2 feet. No game fish were found or reported. Mud minnows were abundant. The water is warm and suitable only for warm-water fish. Its only value is that of a bait minnow stream. No special management could be justified. See Tables 8 to 11 for a summary of data.

Tributary 45-1 (Norton Creek)
T.1,2N., R.7,8E

Norton Creek has a total length of about 7 miles. It enters the Huron River from the southeast at a point 2 miles up stream from Milford. Practically the entire stream has been dredged, and it has more the

characteristics of a drain than a natural creek. Most of the immediate shore is high but there is some swamp. The surrounding country is mostly cultivated lands with scattered woodlots. There are no dams on this creek, and public fishing is allowed. However, no use is made of the stream except a very small amount of fishing at its mouth. Some bluegills, pumpkinseed sunfish and rock bass are taken. The bottom of this creek is very soft and mucky. Aquatic vegetation is sparse above but rather dense near its mouth. A complete summary of the physical, chemical and biological characteristics found at the two stations is given in Tables 8 to 11.

With its present status as a farm drain, fisheries management of this stream is not practical. Its use as a bait minnow stream is doubtful since minnows were very scarce at the time of the survey.

Tributary 45-1
T.2N., R.8E
Tributary 45-2 (Holden Creek)
T.2N., R.7,8E

Tributary 45-1, the outlet from Loon Lake, has a length of 1-1/4 miles. It is probably intermittent. Tributary 45-2, or Holden Creek, is the outlet of Child's Lake. It likewise is probably intermittent for part of its length. Neither of these streams has any significant importance to fisheries. A summary of the physical, chemical and biological conditions is given in Tables 8 to 11.

Tributary 46-1 (Teeple Creek)
T.2,3N., R.8E

Teeple Creek enters the Huron River from the north at a point about 2-1/2 miles up stream from Milford. It has a length of about 4 miles and an average width of approximately 8 feet. It drains an area of about 10 square miles to the east of Milford.

The immediate shore is marsh for most of its length, and the surrounding country is mostly cultivated with occasional woodlots.

There was no evidence of dredging and no dams existed at the time of the survey (July 5, 1938).

The stream is practically never fished even though there are some northern pike and pan fish present. The reason for this is probably the nature of the stream banks which prevents easy access.

This creek is typical of the other headwater streams of the Huron. Its temperatures, generally speaking, are too high for trout during the critical summer period, except for certain areas in the vicinity of springs. The physical, chemical and biological conditions as found by the survey party in July, 1938 are given in Tables 8 to 11. No special management of this stream is suggested.

Tributary No. 48
T.2N., R.8E

Tributary No. 48-1
T.2N., R.8E

Tributary No. 52 (Hayes Creek)
T.2N., R.8E

Tributaries 48, 48-1 and 52 are all small streams without much fisheries significance. Each is less than two miles in length and each is seldom fished. A few small pan fish were the only game fish found in these streams. Hayes Creek is reported to be a good bait minnow stream and was used moderately for that purpose.

A 9-foot dam existed on Tributary 48 at the outlet of, and creating, Wolverine Lake. Another dam with a 10-foot head on Hayes Creek creates a small lake - the purpose of this dam was to improve real estate owned by Mr. Pelletiere.

A summery of the physical, chemical and biological conditions at the stations established on these streams is found in Tables 8 to 11. In the light of this information, it seems doubtful whether these streams have any fisheries significance which would justify special management. Their only value seems to be as a source of bait minnows.

Table 7

The Lengths of Huron River Tributaries

Tributaries marked by an asterisk (+) are those on which field data were taken

Primary Number	Tributary Name	Approximate Length of Tributaries in Miles					Total
		Primary	Secondary	Tertiary	Quaternary	Quintan	
+1	Silver Cr.	11.50	4.50	...	...	...	16.00
2	...	1.00	...	...	...	...	1.00
3	...	1.50	...	...	...	...	1.50
4	...	.75	...	...	...	...	.75
5	...	1.00	...	...	...	...	1.00
+6	Kiskaden Cr.	2.25	1.50	...	...	...	3.75
7	...	1.00	...	...	...	...	1.00
8	...	5.00	...	...	...	...	5.00
9	...	1.25	...	...	...	...	1.25
10	...	.25	...	...	...	...	.25
11	...	.75	...	...	...	...	.75
12	...	3.00	...	...	...	...	3.00
13	...	3.50	...	...	...	...	3.50
+14	Fleming Cr.	12.00	8.50	3.0	...	...	23.50
15	...	1.00	...	...	...	...	1.00
+16	...	1.00	...	...	...	...	1.00
17	...	3.50	...	...	...	...	3.50
+18	Honey Cr.	7.50	11.50	5.5	2	...	26.50
+19	Delhi Cr.	3.50	2.00	...	...	...	5.50
20	...	.50	...	...	...	...	.50
+21	Mill Creek	15.00	24.00	40.0	5	...	84.00
+22	Brass Cr.	2.00	...	...	...	...	2.00
23	...	.50	...	...	...	...	.50
24	...	.75	...	...	...	...	.75
25	...	.50	...	...	...	...	.50
+26	Boyden Cr.	.75	...	...	...	...	.75
+27	...	5.50	1.50	...	...	...	7.00
+28	...	1.00	...	...	...	...	1.00
29	...	1.00	...	...	...	...	1.00
+30	Portage Cr.	23.50	43.00	17.00	4	2	89.50
+31	Arms Cr.	7.50	4.00	...	...	...	11.50
+32	Carpenter Cr.	7.50	12.00	2.50	...	...	22.00
+33	...	9.00	5.25	1.50	...	...	15.75
+34	Ore Cr.	14.50	10.00	2.00	1	...	27.50
+35	So. Branch Huron R.	9.50	14.50	11.50	...	...	35.50
36	...	4.00	.75	...	...	...	4.75
37	...	.50	...	...	...	...	.50
+38	Woodruff Cr.	7.75	13.50	2.00	...	...	23.25
39	...	.50	...	...	...	...	.50
40	...	1.25	...	...	...	...	1.25
+41	...	2.00	...	...	...	...	2.00
42	...	.75	...	...	...	...	.75
+43	Sherwood Cr.	1.50	.50	...	...	...	2.00
+44	Pettibone Cr.	6.00	1.75	...	...	...	7.75
+45	Norton Cr.	5.00	2.00	...	...	...	7.00
+46	Teeple	5.00	3.00	...	...	...	8.00
47	...	2.00	.75	...	...	...	2.75
+48	...	1.25	1.00	...	...	...	2.25
49	...	.50	...	...	...	...	.50
50	...	.75	...	...	...	...	.75
51	...	4.00	...	...	...	...	4.00
+52	Hayes Cr.	3.00	...	...	...	...	3.00
53	...	1.00	...	...	...	...	1.00
54	...	.50	...	...	...	...	.50
55	...	4.75	6.50	...	...	...	11.25
56	...	.50	...	...	...	...	.50
57	...	.50	...	...	...	...	.50
58	...	.25	...	...	...	...	.25
Total		213.50	172.00	85.00	12	2	484.50

Table 8

Summary of Physical and Chemical Conditions for the

Tributaries of the Huron River System

Tributary Number	Sec. No.	Sta. No.	Date	Time of Day	Air Temp. °F.	Water Temp. °F.	Weather	Av. Width Feet	Av. Depth Feet	Velocity: ft./sec.	Est. Volume c.f.s.	Color	Turbidity	O_2 p.p.m.	CO_2 p.p.m.	M.O. Alkalinity p.p.m.	pH
1	1	1	7/5/39	2:30 P.M.	82	80	Clear	52	2.00	...	...	Absent	Muddy	7.1	0.0	175	8.0
6	1	1	7/6/39	2:45 P.M.	87	81	Clear	6	0.25	1.0	1.2	Absent	Clear	8.0	0.0	132	8.0
14	1	1	6/13/39	3:00 P.M.	66	63	Cloudy	21	0.68	1.2	13.6	Absent	Muddy	10.5	0.0	264	8.2
14	1	2	6/13/39	9:30 A.M.	56	55	Cloudy	9	0.25	1.9	3.3	Absent	Murky	7.5	7.0	258	7.8
14	2	1	6/12/39	1:30 P.M.	68	65	Cloudy	11	0.50	1.2	5.3	Lt. Brown	Clear	10.2	4.0	251	8.0
14-3	1	1	6/12/39	9:15 A.M.	54	58	Clear	9	0.40	0.6	2.0	Absent	Muddy	8.5	6.0	254	8.0
16	1	1	7/7/39	2:00 P.M.	89	70	Clear	8	0.25	1.7	3.1	Absent	Murky	7.8	0.0	301	8.0
18	1	1	6/8/39	5:45 P.M.	77	75	Clear	20	1.00	0.8	13.2	Absent	Murky	5.5	4.0	231	8.0
18	1	2	6/8/39	2:30 P.M.	84	77	Clear	16	0.80	0.6	6.8	Absent	Murky	6.2	6.0	247	8.0
18	1	3	6/8/39	11:00 A.M.	76	68	Clear	10	0.75	0.8	5.3	Absent	Murky	6.8	4.5	224	7.6
18	2	1	6/7/39	1:35 P.M.	85	78	Clear	5	0.50	...	...	Absent	Clear	8.2	0.0	235	8.0
18-3	1	1	6/7/39	11:45 A.M.	83	69	Clear	1.5	0.25	...	...	Absent	Clear	9.8	0.1	270	7.9
19	1	1	9/13/38	9:15 A.M.	70	69	Clear	8.0	0.71	1.5	6.8	Absent	Clear	7.7	0.0	161	7.8
21	1	1	9/12/38	10:10 A.M.	78	66	Clear	24.0	1.2	0.7	21.7	Absent	Clear	6.6	0.0	265	7.8
21	2	1	9/9/38	2:15 P.M.	66	61	Rain	30.0	1.2	0.4	12.6	Absent	Clear	10.9	0.0	276	8.0
21	3	1	9/10/38	12:45 P.M.	68	60	Cloudy	14.7	0.6	1.0	6.6	Absent	Clear	8.7	0.0	250	7.9
21	4	1	9/10/38	9:05 A.M.	66	61	Cloudy	8.3	0.3	0.7	2.9	Absent	Clear	7.8	0.0	282	7.9
21-5	1	1	9/12/38	9:00 A.M.	75	67	Rain	2.7	0.2	1.4	2.7	Absent	Clear	3.8	0.0	261	7.6
21-6	1	1	9/9/38	12:45 P.M.	67	62	Cloudy	16.6	1.0	0.4	5.2	Absent	Clear	12.8	0.0	278	8.0
21-6	2	1	9/9/38	9:00 A.M.	61	54	Pt. Cloudy	20.8	0.6	0.7	7.9	Absent	Clear	4.5	5.0	270	7.4
21-6	3	1	9/8/38	4:00 P.M.	74	79	Clear	21.6	0.9	0.3	4.7	Absent	Clear	14.4	0.0	294	8.0
21-6	4	1	9/7/38	2:15 P.M.	66	67	Rain	4.0	1.8	0.2	2.0	Absent	Clear	8.3	0.0	254	6.8
21-6	5	1	9/6/38	11:30 A.M.	63	63	Cloudy	2.0	...	...	...	Absent	Clear	7.1	7.0	210	7.7
21-6-1	1	1	9/9/38	1:00 P.M.	69	59	Cloudy	2.3	0.3	0.5	0.3	Absent	Clear	7.5	4.5	263	7.6
21-6-3	1	1	9/8/38	12:30 P.M.	68	64	Cloudy	4.0	0.1	0.8	0.3	Absent	Clear	12.2	0.0	260	8.0
21-6-8	1	1	9/8/38	8:30 A.M.	58	66	Cloudy	9.3	0.7	0.8	0.5	Lt. Brown	Clear	8.2	4.5	259	7.8
21-6-8	1	2	9/8/38	9:45 A.M.	57	61	Cloudy	4.2	0.4	0.2	0.2	Absent	Clear	11.1	3.0	244	7.8
21-6-10	1	1	9/6/38	1:30 P.M.	64	58	Cloudy	4.0	0.6	...	...	Absent	Clear	1.7	7.0	255	7.2
21-10	1	1	9/10/38	11:00 A.M.	64	63	Rain	11.0	0.4	0.3	1.8	Absent	Clear	11.8	0.0	283	8.2
21-12	1	1	9/10/38	10:00 A.M.	69	60	Cloudy	4.8	0.3	0.1	0.1	Absent	Clear	7.5	0.0	355	7.8
22	1	1	9/13/38	8:00 A.M.	68	58	Clear	3.3	0.7	0.2	0.5	Absent	Clear	8.3	0.0	311	7.9
26	1	1	9/12/38	3:45 P.M.	74	75	Pt. Cloudy	2.0	0.3	...	...	Absent	Clear	5.8	3.0	297	7.8
27	1	1	8/27/38	9:30 A.M.	69	61	Clear	4.0	0.3	0.2	0.6	Absent	Clear	2.6	15.0	306	7.4
28	1	1	9/12/38	2:25 P.M.	82	72	Pt. Cloudy	2.5	0.6	1.0	2.5	Absent	Clear	3.8	8.0	250	7.7
30	1	1	8/20/38	10:30 A.M.	81	77	Clear	33.0	1.6	0.7	34.4	Absent	Clear	7.3	0.0	178	8.4
30	2	1	8/19/38	8:30 A.M.	74	71	Clear	17.3	0.5	1.0	7.6	Absent	Murky	5.8	3.0	185	7.8
30	2	2	8/19/38	2:00 P.M.	86	83	Clear	16.6	0.8	0.5	5.9	Absent	Clear	5.8	0.0	155	8.0
30	3	1	8/19/38	1:00 P.M.	80	78	Clear	25.5	2.5	0.1	9.0	Absent	Clear	6.0	0.0	187	8.2
30	4	1	8/17/38	2:00 P.M.	69	70	Cloudy	12.8	1.2	0.4	5.8	Lt. Brown	Clear	7.1	3.0	210	8.0
30	4	2	8/17/38	1:00 P.M.	71	73	Cloudy	17.5	1.3	0.5	9.0	Lt. Brown	Clear	7.7	0.0	205	8.2
30	5	1	8/16/38	11:00 A.M.	77	77	Rain	9.0	0.4	0.8	3.0	Lt. Brown	Murky	4.1	7.0	176	7.6
30	6	1	8/16/38	10:00 A.M.	77	71	Rain	10.7	0.9	0.2	1.9	Lt. Brown	Murky	5.4	7.0	220	7.6
30	6	2	8/16/38	9:30 A.M.	79	76	Rain	4.5	0.3	0.4	0.5	Lt. Brown	Murky	4.1	12.0	184	7.4
30-1	1	1	8/20/38	9:30 A.M.	76	59	Clear	4.2	0.3	0.3	0.2	Absent	Murky	6.9	5.0	285	7.8
30-2	1	1	8/20/38	9:00 A.M.	81	60	Clear	1.5	0.1	0.5	...	Absent	Clear	7.7	3.0	194	7.8
30-4	1	1	8/13/38	11:00 A.M.	78	72	Clear	11.3	1.1	1.0	11.3	Absent	Clear	8.6	0.0	200	8.0
30-4	1	2	8/13/38	8:30 A.M.	71	75	Clear	6.7	0.8	1.5	7.3	Absent	Clear	5.9	4.0	187	7.8
30-4	2	1	8/12/38	11:00 A.M.	74	67	Clear	2.5	0.1	0.4	0.1	Absent	Clear	8.7	4.0	230	8.0

Table 8 (Cont'd.)

Summary of Physical and Chemical Conditions for the

Tributaries of the Huron River System

Tributary Number	Sec. No.	Sta. No.	Date	Time of Day	Air Temp. °F.	Water Temp. °F.	Weather	Av. Width Feet	Av. Depth Feet	Velocity: ft./sec.	Est. Volume c.f.s.	Color	Turbidity	O_2 p.p.m.	CO_2 p.p.m.	M.O. Alkalinity p.p.m.	pH
30-4-1	1	1	8/13/38	10:00 A.M.	77	67	Clear	4.8	0.2	0.4	0.4	Absent	Clear	6.5	4.0	237	7.8
30-4-2	1	1	8/12/38	10:30 A.M.	74	70	Clear	4.6	0.2	1.5	1.2	Absent	Clear	6.9	2.0	205	8.0
30-4-2	1	2	8/12/38	9:30 A.M.	75	63	Clear	2.5	0.2	0.8	0.4	Absent	Clear	7.6	2.0	290	8.0
30-4-4	1	1	8/12/38	11:30 A.M.	74	64	Clear	4.5	0.6	0.4	1.0	Absent	Clear	5.8	12.0	258	7.6
30-9	1	1	8/17/38	9:30 A.M.	66	68	Rain	2.3	0.2	0.9	0.4	Absent	Murky	7.3	5.0	255	7.8
30-10	1	1	8/19/38	11:00 A.M.	81	73	Clear	5.2	0.3	1.5	2.2	Absent	Murky	7.4	2.0	128	8.0
30-10	2	1	8/19/38	10:00 A.M.	80	74	Clear	6.5	0.9	0.6	3.2	Absent	Murky	4.9	4.0	172	9.8
30-10	3	1	8/19/38	8:30 A.M.	78	72	Clear	3.2	0.6	0.2	0.1	Absent	Murky	3.4	12.0	245	7.4
30-10-2-2	1	1	8/16/38	1:30 P.M.	80	77	Cloudy	4.1	0.4	0.6	0.8	Absent	Clear	6.6	0.0	230	8.0
30-14	1	1	8/17/38	11:00 A.M.	68	65	Cloudy	4.9	0.2	0.7	0.7	Absent	Murky	10.5	0.0	298	8.0
30-14	1	2	8/17/38	10:30 A.M.	69	67	Cloudy	3.3	0.3	0.3	0.3	Lt. Brown	Murky	6.4	4.0	220	7.8
31	1	1	8/27/38	11:00 A.M.	73	62	Pt. Cloudy	12.0	0.5	0.8	4.2	Absent	Clear	8.3	0.0	257	8.0
31-3	1	1	8/27/38	10:30 A.M.	73	62	Pt. Cloudy	3.2	0.2	...	...	Lt. Brown	Clear	1.5	15.0	250	7.4
32	1	1	8/5/38	3:00 P.M.	84	86	Clear	...	...	0.3	1.4	Absent	Murky	3.5	5.0	190	7.8
32	2	1	8/5/38	11:00 A.M.	88	76	Clear	6.9	0.7	0.3	1.3	Absent	Murky	5.0	5.0	206	7.8
32	2	2	8/5/38	10:00 A.M.	81	78	Clear	5.5	0.2	1.7	1.7	Absent	Clear	6.4	0.0	180	8.2
32	2	3	8/4/38	10:30 A.M.	86	80	Cloudy	8.3	0.9	0.3	2.1	Absent	Clear	5.6	0.0	200	8.0
32	3	1	8/4/38	10:00 A.M.	81	71	Cloudy	4.4	0.2	1.4	1.1	Absent	Murky	6.4	0.0	270	8.0
32	3	2	8/4/38	9:00 A.M.	79	67	Cloudy	4.3	0.1	1.0	0.6	Absent	Clear	6.2	5.0	270	7.8
32-3	1	1	8/5/38	2:00 P.M.	85	74	Clear	4.8	0.5	0.8	1.7	Absent	Clear	6.9	0.0	215	8.0
32-3	1	2	8/5/38	1:30 P.M.	86	77	Clear	4.8	0.3	0.8	0.9	Absent	Murky	5.7	2.0	250	8.0
33	1	1	8/6/38	11:00 A.M.	82	72	Cloudy	7.8	0.6	0.4	2.1	Absent	Murky	5.6	7.0	251	7.8
33	1	2	8/6/38	10:00 A.M.	81	73	Cloudy	12.1	0.2	0.3	0.9	Absent	Clear	6.9	5.0	202	7.8
33	2	1	8/6/38	9:30 A.M.	78	72	Pt. Cloudy	4.6	0.2	0.6	0.4	Absent	Clear	6.3	3.0	230	7.8
34	1	1	8/3/38	9:00 A.M.	80	72	Clear	15.5	0.9	0.8	11.0	Absent	Clear	6.5	2.0	151	7.8
34	1	2	8/1/38	3:30 P.M.	85	84	Pt. Cloudy	8.5	0.8	1.1	6.9	Absent	Clear	7.4	0.0	124	8.8
34	2	1	8/1/38	12:30 P.M.	79	79	Pt. Cloudy	14.9	0.6	1.0	8.0	Absent	Clear	6.6	3.0	175	7.8
34	3	1	8/1/38	10:00 A.M.	76	74	Pt. Cloudy	13.0	1.8	0.2	4.7	Absent	Clear	4.2	10.0	190	7.4
34	4	1	7/30/38	10:00 A.M.	73	64	Pt. Cloudy	9.9	1.5	0.2	2.6	Absent	Clear	5.2	8.0	240	7.6
34	4	2	7/30/38	9:00 A.M.	77	75	Clear	20.0	1.3	...	...	Absent	Clear	8.9	0.0	140	8.2
34-2	1	1	8/1/38	2:30 P.M.	85	87	Pt. Cloudy	4.7	0.6	0.8	2.1	Absent	Clear	7.3	0.0	172	8.0
35	1	1	7/28/38	9:30 A.M.	67	70	Pt. Cloudy	21.3	1.4	0.6	17.9	Absent	Clear	4.2	4.0	220	8.0
35	1	2	7/29/38	8:30 A.M.	66	71	Pt. Cloudy	24.8	1.7	0.5	19.0	Absent	Clear	4.0	4.0	218	7.8
35	1	3	7/29/38	3:00 P.M.	83	82	Pt. Cloudy	27.5	0.8	1.1	22.0	Lt. Brown	Murky	7.4	0.0	210	8.4
35	2	1	7/29/38	1:30 P.M.	80	82	Clear	34.0	1.1	0.3	11.5	Absent	Clear	8.7	0.0	215	8.2
35	3	1	7/25/38	2:30 P.M.	86	76	Clear	9.6	0.9	0.6	5.2	Absent	Murky	9.4	0.0	246	8.0
35	3	2	7/25/38	1:00 P.M.	87	75	Clear	13.3	0.7	0.4	3.4	Absent	Clear	8.3	0.0	250	7.8
35	3	3	7/25/38	11:30 A.M.	83	69	Clear	8.7	0.7	0.3	1.5	Absent	Murky	12.7	4.0	263	7.8
35-1	1	1	7/28/38	2:00 P.M.	84	83	Pt. Cloudy	4.2	0.4	0.6	0.9	Absent	Murky	3.9	3.0	180	7.8
35-3	1	1	7/29/38	3:00 P.M.	78	84	Clear	45.2	0.8	0.2	6.5	Absent	Clear	8.4	0.0	180	8.4
35-3	2	1	7/28/38	11:00 A.M.	86	79	Clear	10.7	0.4	1.3	3.9	Absent	Clear	5.7	0.0	189	8.2
35-3	3	1	7/26/38	11:30 A.M.	80	74	Clear	3.0	0.5	0.8	1.0	Lt. Brown	Murky	6.1	5.0	242	7.8
35-3-1	1	1	7/26/38	2:00 P.M.	86	76	Pt. Cloudy	12.0	0.7	0.3	2.8	Absent	Murky	8.1	0.0	273	8.0
35-3-1	1	2	7/26/38	1:30 P.M.	77	74	Pt. Cloudy	3.6	1.1	0.4	1.6	Absent	Murky	7.8	3.0	291	7.8
35-3-2	1	1	7/26/38	9:00 A.M.	76	59	Pt. Cloudy	6.6	0.9	0.9	3.4	Absent	Muddy	4.3	25.0	230	7.2
35-3-3	1	1	7/26/38	10:30 A.M.	76	67	Clear	4.8	1.3	0.9	1.3	Absent	Clear	7.6	7.0	234	7.8
35-4	1	1	7/29/38	10:30 A.M.	73	76	Clear	1.9	0.1	0.9	0.2	Absent	Clear	7.3	0.0	128	8.6
35-5	1	1	7/25/38	1:30 P.M.	85	85	Clear	1.6	0.1	0.6	0.1	Absent	Murky	9.5	0.0	274	8.0

Table 8 (Cont'd.)

Summary of Physical and Chemical Conditions for the

Tributaries of the Huron River System

Tributary Number	Sec. No.	Sta. No.	Date	Time of Day	Air Temp. °F.	Water Temp. °F.	Weather	Av. Width Feet	Av. Depth Feet	Velocity: ft./sec.	Est. Volume c.f.s.	Color	Turbidity	O_2 p.p.m.	CO_2 p.p.m.	M.O. Alkalinity p.p.m.	pH
35-6	1	1	7/25/38	10:00 A.M.	79	64	Clear	7.3	0.3	1.0	1.6	Absent	Clear	7.7	3.0	247	7.8
38	1	1	7/19/38	1:00 P.M.	84	71	Clear	10.9	0.3	2.4	7.0	Absent	Clear	4.7	6.0	251	7.6
38	1	2	7/19/38	11:30 A.M.	82	74	Clear	7.5	0.2	0.8	1.0	Lt. Brown	Clear	6.0	8.0	260	7.8
38	1	3	7/19/38	9:30 A.M.	78	64	Clear	1.6	0.6	0.5	0.5	Absent	Clear	5.9	5.0	304	8.0
38-1	1	1	7/19/38	2:00 P.M.	86	71	Clear	5.8	0.9	0.7	2.0	Absent	Clear	7.6	0.0	270	8.2
38-3	1	1	7/18/38	2:30 P.M.	88	72	Clear	10.5	0.5	0.7	3.4	Absent	Clear	7.4	0.0	233	8.2
38-3	1	2	7/18/38	2:00 P.M.	80	69	Pt. Cloudy	7.5	0.3	0.8	2.9	Absent	Clear	8.0	0.0	196	8.0
38-3	1	3	7/18/38	12:00 M	79	74	Cloudy	5.9	0.2	1.4	1.3	Absent	Clear	7.3	3.0	208	7.8
38-5	1	1	7/19/38	10:30 A.M.	79	69	Clear	3.4	0.1	0.3	0.1	Absent	Clear	4.8	4.0	172	7.6
41	1	1	7/16/38	11:00 A.M.	78	68	Pt. Cloudy	2.4	0.1	2.1	0.3	Absent	Clear	8.0	0.0	222	8.0
41	1	2	7/16/38	10:00 A.M.	86	69	Clear	2.2	0.2	1.2	0.3	Absent	Clear	8.2	3.0	235	8.0
41	1	3	7/16/38	9:00 A.M.	71	59	Clear	3.4	0.3	1.0	0.4	Absent	Clear	10.0	5.0	202	7.8
43	1	1	7/16/38	12:30 P.M.	78	59	Cloudy	3.3	0.5	0.9	1.4	Absent	Clear	8.1	2.0	218	8.0
44	1	1	7/13/38	1:30 P.M.	82	80	Cloudy	11.9	0.8	0.7	5.9	Absent	Clear	7.5	0.0	173	8.2
44	2	1	7/13/38	12:30 P.M.	85	82	Cloudy	11.1	0.9	2.0	17.8	Absent	Clear	8.5	0.0	170	8.2
44	3	1	7/13/38	10:30 A.M.	81	77	Clear	11.2	1.6	0.6	9.1	Absent	Clear	6.5	0.0	155	8.2
44	4	1	7/13/38	9:30 A.M.	77	74	Cloudy	14.7	1.3	0.4	7.7	Absent	Clear	7.3	3.0	197	7.8
44	5	1	7/11/38	2:30 P.M.	82	77	Cloudy	9.2	0.7	0.6	3.8	Absent	Clear	6.8	4.0	184	7.8
44	5	2	7/11/38	10:30 A.M.	75	71	Cloudy	6.2	0.6	1.8	6.0	Absent	Clear	6.7	2.0	174	7.8
44	6	1	7/11/38	12:00 M	78	71	Pt. Cloudy	4.7	0.4	0.9	1.6	Absent	Clear	5.8	4.0	204	7.6
44	7	1	7/8/38	11:00 A.M.	84	77	Cloudy	1.8	0.5	1.0	0.8	Absent	Clear	8.4	0.0	155	8.2
44	8	1	7/8/38	10:00 A.M.	82	78	Cloudy	5.9	0.4	0.8	1.8	Absent	Clear	8.4	0.0	155	8.2
44	9	1	7/8/38	9:00 A.M.	87	78	Cloudy	4.0	0.3	1.4	1.5	Absent	Clear	7.6	0.0	160	8.2
44-1	1	1	7/11/38	1:30 P.M.	79	72	Cloudy	3.7	0.3	1.0	0.9	Absent	Clear	8.6	2.0	203	7.8
44-3	1	1	7/8/38	1:00 P.M.	84	76	Cloudy	2.0	0.1	1.0	0.2	Lt. Brown	Murky	4.3	18.0	233	7.4
44-3	2	1	7/8/38	2:00 P.M.	82	82	Cloudy	1.4	0.1	1.2	0.02	Absent	Clear	6.5	0.0	110	8.0
45	1	1	7/2/38	1:30 P.M.	78	66	Cloudy	26.3	2.3	0.4	23.6	Absent	Murky	8.4	2.0	250	7.8
45	1	2	7/2/38	9:00 A.M.	69	61	Cloudy	8.3	0.4	0.7	2.0	Lt. Brown	Clear	5.3	10.0	262	7.6
45-1	1	1	7/2/38	12:30 P.M.	74	71	Cloudy	3.0	0.4	0.7	0.8	Absent	Clear	8.9	0.0	153	8.4
45-2	1	1	7/2/38	11:00 A.M.	70	61	Cloudy	5.6	0.1	1.3	0.8	Absent	Clear	7.2	9.0	275	7.8
46	1	1	7/5/38	4:00 P.M.	82	75	Clear	9.0	1.0	0.3	2.0	Absent	Murky	5.0	16.0	190	7.8
46	1	2	7/5/38	3:00 P.M.	84	67	Clear	12.1	0.5	0.1	0.7	Absent	Murky	6.0	3.0	255	7.8
46	1	3	7/5/38	2:00 P.M.	82	79	Clear	5.5	0.2	0.8	0.06	Absent	Murky	1.2	15.0	192	7.2
48	1	1	6/28/38	10:00 A.M.	71	61	Clear	27.4	0.9	0.5	16.4	Absent	Clear	8.9	4.0	195	7.8
48	1	2	6/28/38	8:30 A.M.	68	64	Clear	0.9	0.1	0.8	0.03	Absent	Clear	1.6	13.0	180	7.2
48-1	1	1	6/28/38	1:00 P.M.	72	64	Cloudy	28.8	2.6	0.2	14.1	Absent	Clear	8.9	3.0	202	7.8
48-1	1	2	6/28/38	9:00 A.M.	71	58	Clear	2.0	0.6	0.5	0.6	Absent	Clear	4.7	7.0	205	7.4
52	1	1	6/24/38	1:00 P.M.	90	78	Clear	10.2	0.8	0.8	5.8	Absent	Murky	5.5	3.0	181	7.8
52	1	2	6/24/38	9:00 A.M.	83	74	Clear	8.4	0.6	1.5	6.3	Absent	Clear-	4.9	3.0	165	7.8
52	1	3	6/24/38	11:00 A.M.	84	79	Clear	8.5	0.7	0.6	3.3	Absent	Clear	7.6	0.0	136	8.4

Table 9

Distribution and Abundance of Aquatic Plants in Tributaries of the Huron River

Symbols indicate that species were found to be present at survey stations as follows: S=sparse in abundance; M=medium abundance; D=dense or very abundant.
For bottom soil types, G=gravel; S=sand; St=silt; M=marl; D=detritus; Mk=muck; C=clay

Tributary Number	Section Number	Station Number	Water Depth (Feet)	Bottom Soil	Chara sp. Muskgrass	Nitella sp. Muskgrass	Riccia sp. Liverwort	Equisetum fluviatile Horsetail	Typha latifolia Common Cattail	Sparganium americanum Bur Reed	Sparganium chlorocarpum Bur Reed	Sparganium eurycarpum Bur Reed	Sparganium sp. Bur Reed	Potamogeton americanus
14	1	1	0.25	G	S	...	...	...	...	...	...	...	...	..
14	2	1	0.25	G-S	...	...	...	...	...	...	...	...	...	..
14-3	1	1	0.25	G-S	M	...	...	...	...	...	...	...	...	..
18	1	1	0.00-0.5	G-S	...	...	...	...	...	...	...	...	M	..
18	1	2	0.50-1.0	G	...	...	...	...	...	...	...	...	S	..
18	2	1	0.5	S	...	...	...	...	...	...	...	...	...	..
18	3	1	0.25	G-C	S	...	...	...	...	...	...	...	...	..
19	1	1	...	G-S	...	...	...	...	...	...	...	...	...	..
21	1	1	...	G-S	...	...	...	...	...	...	...	...	S	..
21	2	1	...	G-S	...	...	...	...	...	...	...	...	S	..
21	3	1	...	G-S	...	...	...	...	...	...	...	...	...	..
21	4	1	...	G-S	...	...	...	S	...	...	...	...	...	..
21-5	1	1	...	St	...	...	...	...	...	...	...	...	M	..
21-6	1	1	...	G-S	...	...	...	...	...	...	...	...	S	..
21-6	2	1	...	G-S	...	...	...	...	...	...	...	...	M	..
21-6	3	1	...	G-S	...	...	...	...	...	...	...	...	S	..
21-6	4	1	...	S	...	...	...	...	...	...	...	...	...	..
21-6	5	1	...	S	...	...	...	...	...	...	...	...	...	..
21-6-1	1	1	...	G-S	...	...	...	...	...	...	...	...	...	..
21-6-3	1	1	...	G-S	...	...	...	...	...	...	...	...	S	..
21-6-8	1	1	...	G-S	...	...	...	...	...	...	...	...	S	..
21-6-8	1	2	...	G-S	...	...	...	...	...	...	...	...	...	..
21-6-10	1	1	...	St	...	...	D	...	D	M	...	...	...	S
21-10	1	1	...	G-S	...	...	...	...	...	...	...	...	S	..
21-12	1	1	...	G-S	M	...	...	...	...	...	...	...	...	..
22	1	1	...	G-S	...	...	...	...	...	...	...	...	...	..
26	1	1	...	G	...	...	...	...	...	...	...	...	...	..
28	1	1	...	G-S	S	...	...	...	...	...	...	...	...	..
30	1	1	0.25-1.0	G	...	...	...	...	...	...	...	...	...	M
30	2	1	0.25	G-S	...	...	...	...	...	...	...	...	M	S
30	2	2	0.5	G	...	...	...	...	...	...	...	...	...	S
30	3	1	0.50-2.0	G-S-St	...	...	...	...	...	...	...	...	...	S
30	4	1	1.75	G-S	...	...	...	...	...	...	...	...	M	S
30	4	2	1.75	G-S	...	...	...	...	...	...	...	...	...	S
30	5	1	1.0	S-M	...	...	...	...	...	...	...	...	...	I

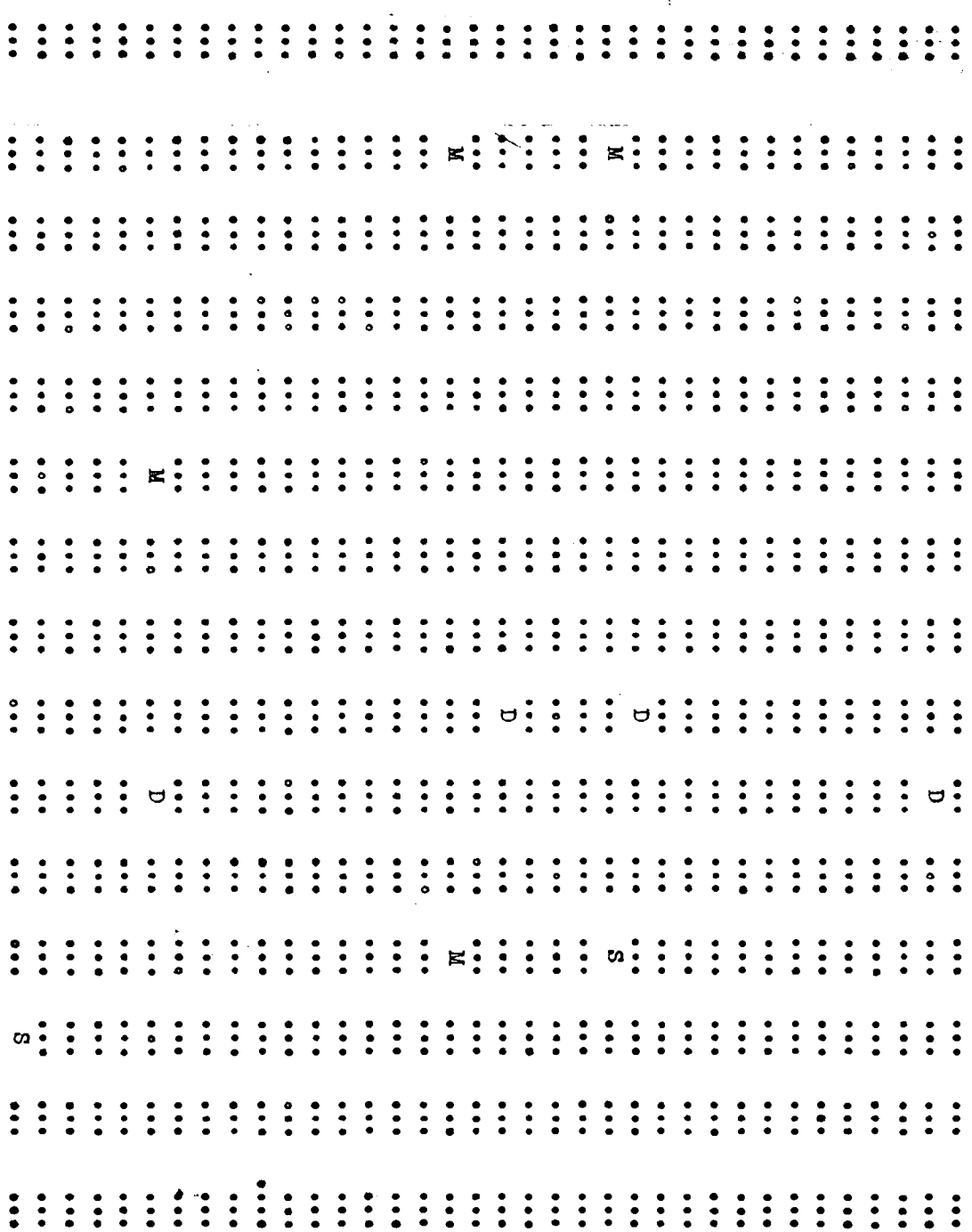
r

ows:

clay

--- ---	Sparganium sp. Bur Reed	Potamogeton americanus Pondweed	Potamogeton amplifolius Large-leafed Pondweed	Potamogeton foliosus Leafy Pondweed	Potamogeton foliosus var. macellus Pondweed	Potamogeton Friesii Pondweed	Potamogeton gramineus Variable Pondweed	Potamogeton natans Floating-leaf Pondweed	Potamogeton pectinatus Sago Pondweed	Potamogeton praelongus Whitestem Pondweed	Potamogeton pusillus Pondweed	Potamogeton Richardsonii Clasping-leaf Pondweed	Potamogeton vaginatus Pondweed	Potamogeton zosteriformis Flat-stemmed Pondweed	Potamogeton sp. Pondweed	Najas flexilis Bushy Pondweed
.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
.	...	...	...	S	...	...	...	...	...	...	...	...	...	...	...	...
.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
.	M	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
.	S	...	S	...	...	...	...	...	...	...	...	...	...	...	...	...
.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
.	...	...	...	M	...	...	...	...	...	...	...	...	...	...	...	S
.	S	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
.	S	...	M	...	...	...	...	...	...	...	...	...	...	...	M	...
.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
.	M	...	...	S	...	...	...	...	...	...	...	...	...	...	...	...
.	S	...	M	M	...	...	...	S	...	...	...	...	...	...	...	...
.	M	...	S	M	...	...	...	...	...	...	...	...	...	...	...	...
.	S	...	...	...	...	...	...	M	D	...	...	...	...	...	...	...
.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
.	...	...	...	...	S	...	...	...	...	...	...	...	...	...	...	...
.	...	...	...	M	...	...	...	...	...	...	...	...	...	...	...	D
.	S	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
.	S	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
.	...	S	...	S	...	...	...	...	S	...	...	...	...	...	...	...
.	S	...	...	...	...	...	...	M	...	...	...	...	...	...	M	...
.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
.	...	M	...	...	...	...	...	...	M	...	...	...	...	...	...	...
.	M	S	...	...	...	...	...	...	M	...	...	...	...	...	...	...
.	...	S	...	...	...	...	...	...	S	...	...	...	...	S	...	...
.	...	S	...	...	...	...	...	...	...	...	...	...	...	...	...	S
.	M	S	...	...	...	...	...	...	D	...	...	...	...	S	...	M
.	...	S	...	...	...	...	...	...	D	...	...	...	...	S	...	D
.	...	D	...	...	...	...	...	...	...	...	...	...	...	...	...	...

S S S	Flat-stemmed Pondweed
M M	Potamogeton sp. Pondweed
D M S D S	Najas flexilis Bushy Pondweed
S	Sagittaria cuneata Duck Potato
M M M W M	Sagittaria latifolia Wapato
	Sagittaria latifolia f. gracilis Wapato
M S S S	Sagittaria sp. Arrowhead
	Alisma Plantago-aquatica Water Plantain
S D M D M	Anacharis canadensis Waterweed
	Vallisneria americana Wild Celery
D	Zizania aquatica var. angustifolia Wild Rice
	Leersia oryzoides Rice Cutgrass
	Eleocharis calva Spike Rush
	Eleocharis sp. Spike Rush
	Scirpus americanus Three-square Bulrush
W M	Scirpus acutus Hardstem Bulrush
	Scirpus atrovirens


Scirpus americanus
Three-square Bulrush
Scirpus acutus
Hardstem Bulrush
Scirpus atrovirens
Bulrush
Scirpus subterminalis
Water Bulrush
Scirpus sp.
Bulrush
Carex comosa
Sedge
Carex diandra
Sedge
Carex sp.
Sedge
Peltandra virginica
Arrow Arum
Spirodela polyrhiza
Big Duckweed
Lemna minor
Lesser Duckweed
Pontederia cordata
Pickerel Weed
Heteranthera dubia
Water Star Grass
Juncus effusus
Soft Rush
Juncus Torreyi
Rush

	Soft Rush
	Juncus Torreyi Rush
S	Iris versicolor Iris
S	Iris virginica Iris
	Polygonum hydropiperoides Mild Water Pepper
	Polygonum Hydropiper var. projectum Water Pepper
S	Polygonum natans f. genuinum Smartweed
	Polygonum pensylvanicum Smartweed
	Polygonum setaceum Smartweed
S	Polygonum sp. Smartweed
D M S S	Ceratophyllum demersum Coontail
M S	Nymphaea odorata White Water Lily
S S S S	Nymphaea tuberosa White Water Lily
S S	Nuphar advena Yellow Water Lily
S	Nuphar rubrodiscum Yellow Water Lily
S	Nuphar variegatum Yellow Water Lily

Nuphar rubrodiscum Yellow Water Lily	Nuphar variegatum Yellow Water Lily	Nasturtium officinale Water Cress	Decodon verticillatus Swamp Loosestrife	Ludwigia alternifolia Seedbox	Ludwigia palustris False Loosestrife	Myriophyllum sp. Water Milfoil	Solanum Dulcamara Nightshade	Veronica connata Water Speedwell	Veronica sp. Speedwell	Utricularia vulgaris var. americanus Bladderwort	Bidens cernua Stick-tight	Aster sp. Aster
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	M	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	S	...	...	...	...	...	...	...	...	...	...
...	...	D	...	...	...	...	...	...	...	...	...	...
...	...	D	...	D	...	...	...	...	...	...	...	...
...	...	S	...	...	...	...	...	...	...	...	S	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	D	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	S	...	...	...	...	...	...	...	...	...	...
...	...	S	...	...	...	...	...	...	...	...	...	...
...	...	...	M	...	...	...	...	...	...	...	...	...
...	S	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	S	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	M	...	...	...	...	...
S	...	...	...	...	...	...	...	...	...	...	...	...
...	...	D	...	...	...	...	...	...	...	...	...	...
...	...	S	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	S	...	...	S	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	S	...	...	...	S	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	S	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...

Table 9 (Cont'd.)

Distribution and Abundance of Aquatic Plants in Tributaries of the Huron River

Symbols indicate that species were found to be present at survey stations as follows:
S=sparse in abundance; M=medium abundance; D=dense or very abundant.
For bottom soil types, G=gravel; S=sand; St=silt; M=marl; D=detritus; Mk=muck; C=clay

Tributary Number	Section Number	Station Number	Water Depth (Feet)	Bottom Soil	Chara sp. Muskgrass	Nitella sp. Muskgrass	Riccia sp. Liverwort	Equisetum fluviatile Horsetail	Typha latifolia Common Cattail	Sparganium americanum Bur Reed	Sparganium chlorocarpum Bur Reed	Sparganium eryoarpum Bur Reed	Sparganium sp. Bur Reed	Potamogeton amer
30	6	1	1.0	St-D	...	...	...	...	...	...	...	...	...	.
30	6	2	0.5	St-D	...	...	...	...	...	...	M	...	...	.
30-1	1	1	0.5	St-D	...	...	...	...	...	...	...	...	S	.
30-4	1	1	1.0	G	...	...	...	...	...	...	...	...	...	
30-4	1	2	0.25	G	...	...	...	...	...	...	...	...	...	.
30-4	2	1	0.5	St-D	...	...	...	...	...	...	...	...	S	.
30-4-1	1	1	0.5	St-D	...	...	...	...	...	...	...	...	M	.
30-4-2	1	1	0.25	G-S	...	...	...	...	...	...	...	...	S	.
30-4-2	1	2	0.5	S-St	...	...	...	...	...	...	...	...	S	.
30-4-4	1	1	0.5	St-D	...	...	...	...	...	...	D	...	...	.
30-7	1	1	0.25	St-D	...	...	...	...	...	...	...	...	...	.
30-8	1	1	0.5	G-S	...	...	...	...	...	...	...	...	S	
30-8	2	1	1.0	St-D	...	...	...	...	...	....	...	...	...	
30-8	3	1	0.5	St-D	...	...	...	...	...	...	...	...	...	.
30-8-2	1	1	0.5	G-St	M	...	...	...	...	...	...	...	D	.
30-12	1	1	0.25	S-St-D	...	...	...	...	...	...	...	...	S	.
30-12	1	2	0.25	St-D	...	...	...	...	...	...	...	...	S	.
32	1	1	1.0	St-D	...	...	...	...	D	...	...	...	...	.
32	2	1	0.5	St-D	...	...	...	...	...	...	...	...	...	.
32	2	3	1.5	G-D	...	...	...	...	...	...	...	...	...	.
32	3	1	0.25	G	...	...	...	...	...	...	...	...	...	.
32	3	2	0.25	G	...	...	...	...	...	...	...	...	...	.
32-3	1	1	0.5	S-D	...	...	...	...	...	...	...	...	...	.
32-3	1	2	0.5	St-D	...	...	...	...	...	...	...	...	...	.
33	1	1	1.0	G-St	...	...	...	...	...	...	...	...	S	.
33	1	2	0.25	G	...	...	...	...	...	...	...	...	...	.
33	2	1	0.3	G-St	...	...	...	...	...	...	...	...	...	.
34	1	1	0.5	G-St	...	...	...	...	...	...	...	...	...	
34	1	2	1.0	G	...	...	...	...	...	...	...	...	...	
34	2	1	0.5	G	...	...	...	...	...	...	...	...	...	
34	3	1	0.50-1.75	S-D	D	...	...	...	...	...	...	D	...	.
34	4	1	0.25-0.5	D	...	...	...	...	...	...	...	...	M	.
34	4	2	0.60-1.25	M	D	...	...	...	...	...	...	...	...	
34-2	1	1	0.5	G	S	...	...	...	...	...	...	...	...	.
35	1	1	0.5	G-S	...	...	...	...	...	...	...	...	...	.
35	1	2	1.00-1.75	G-St	...	...	...	...	...	...	...	...	...	

r

ows:

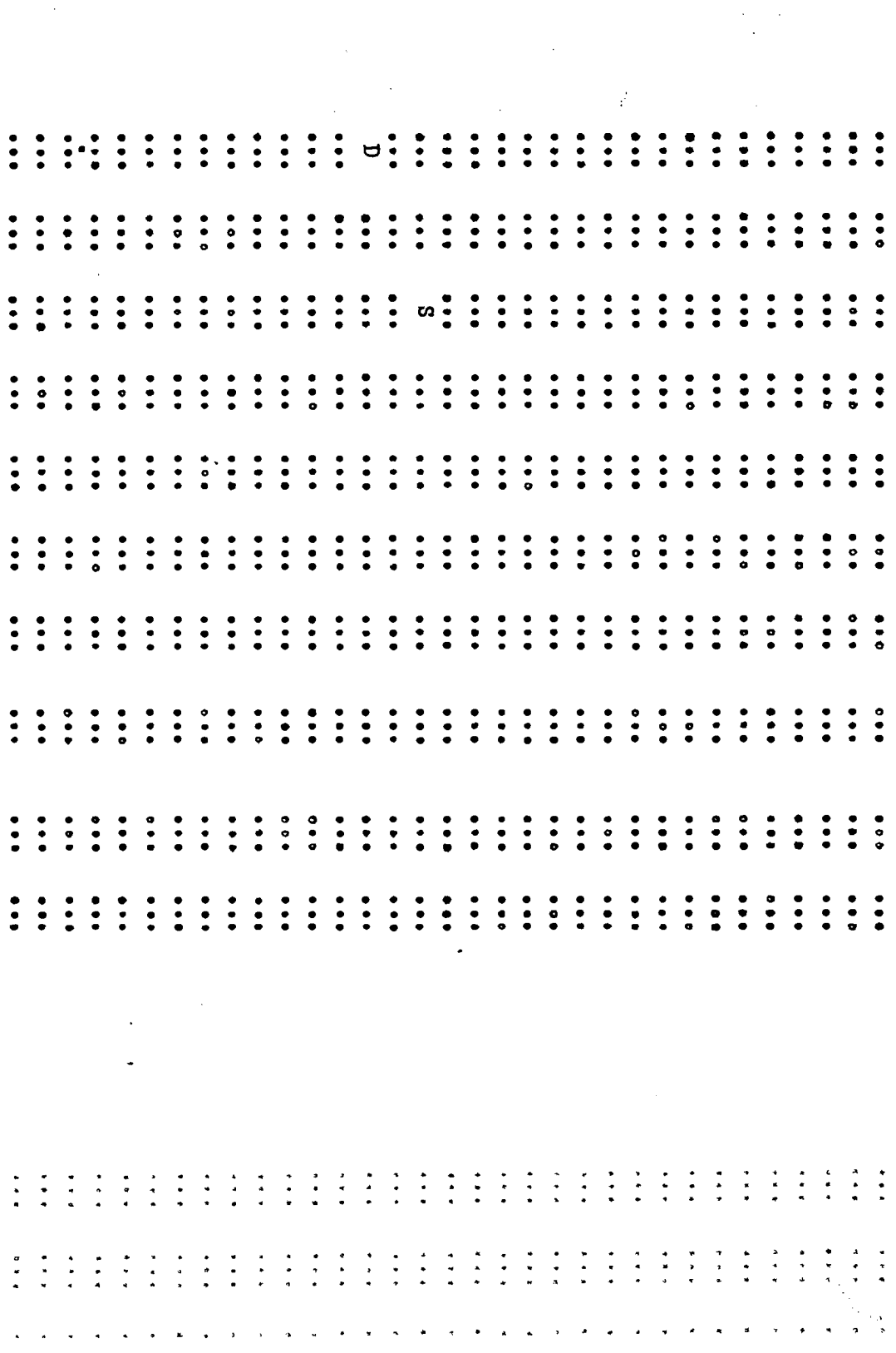
clay

Sparganium sp. Bur Reed	Potamogeton americanus Pondweed	Potamogeton amplifolius Large-leafed Pondweed	Potamogeton foliosus Leafy Pondweed	Potamogeton foliosus var. macellus Pondweed	Potamogeton Friesii Pondweed	Potamogeton gramineus Variable Pondweed	Potamogeton natans Floating-leaf Pondweed	Potamogeton pectinatus Sago Pondweed	Potamogeton praelongus Whitestem Pondweed.	Potamogeton pusillus Pondweed	Potamogeton Richardsonii Clasping-leaf Pondweed	Potamogeton vaginatus Pondweed	Potamogeton zosteriformis Flat-stemmed Pondweed	Potamogeton sp. Pondweed	Najas flexilis
...	...	...	...	...	...	...	...	S	...	...	...	...	S	...	D
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	D
S	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	M	...	...	...	...	...	...	D	...	...	...	...	...	...	...
...	...	...	...	...	...	D	...	...	...	...	...	...	...	...	D
S	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
M	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
S	...	...	M	...	...	...	...	...	...	...	...	...	...	...	...
S	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	S
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
S	M	...	...	...	...	...	...	D	...	...	...	...	...	...	S
...	M	...	...	...	...	...	...	D	...	...	...	...	...	...	S
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
D	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
S	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
S	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	M	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	S
...	...	...	...	...	...	...	...	...	...	...	...	S	...	...	...
S	...	...	...	...	...	...	...	...	...	...	...	...	...	...	S
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	S	...	...	...	...	...	...	S	...	...	...	...	...	...	...
...	M	...	...	...	...	...	...	D	...	...	...	...	...	...	...
...	D	...	...	...	...	...	...	M	...	...	D	...	...	...	...
...	...	...	...	...	...	...	...	D	...	...	...	...	S	...	...
M	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	S	...	...	...	...	...	...	M	...	...	...	...	S	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	S
...	...	...	...	...	...	...	...	M	...	...	...	...	...	...	...
...	S	...	...	...	...	...	...	D	...	...	...	...	...	...	...

	Potamogeton sp. Pondweed	Najas flexilis Bushy Pondweed	Sagittaria cuneata Duck Potato	Sagittaria latifolia Wapato	Sagittaria latifolia f. gracilis Wapato	Sagittaria sp. Arrowhead	Alisma Plantago-aquatica Water Plantain	Anacharis canadensis Waterweed	Vallisneria americana Wild Celery	Zizania aquatica var. angustifolia Wild Rice	Leersia oryzoides Rice Cutgrass	Eleocharis calva Spike Rush	Eleocharis sp. Spike Rush	Scirpus americanus Three-square Bulrush
		D												
		D												
		D				S		S						
		S				S								
		S												
			D					M		S	D			
		S						S		M				
		S												
				S										
						S								
		S										S		
													M	
														S

Scirpus americanus Three-square Bulrush	Scirpus acutus Hardstem Bulrush	Scirpus atrovirens Bulrush	Scirpus subterminalis Water Bulrush	Scirpus sp. Bulrush	Carex comosa Sedge	Carex diandra Sedge	Carex sp. Sedge	Peltandra virginica Arrow Arum	Spirodela polyrhiza Big Duckweed	Lemna minor Lesser Duckweed	Pontederia cordata Pickerel Weed	Heteranthera dubia Water Star Grass	Juncus effusus Soft Rush	Juncus Torreyi Rush	Iris versicolor Iris	Iris virginica Iris	Polygonum hydropiperoides Mild Water Pepper
S	S																
	M																
							M										
	M																
	S																
							D										
									M								
										S							
	S																
S																	

Iris virginica Iris	Polygonum hydropiperoides Mild Water Pepper	Polygonum Hydropiper var. projectum Water Pepper	Polygonum natans f. genuinum Smartweed	Polygonum pensylvanicum Smartweed	Polygonum setaceum Smartweed	Polygonum sp. Smartweed	Ceratophyllum demersum Coontail	Nymphaea odorata White Water Lily	Nymphaea tuberosa White Water Lily	Nuphar advena Yellow Water Lily	Nuphar rubrodiscum Yellow Water Lily	Nuphar variegatum Yellow Water Lily	Nasturtium officinale Water Cress	Decodon verticillatus Swamp Loosestrife
...	...	...	...	...	...	...	S	...	...	...	...	...	...	...
...	...	M	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	S	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	D	...
...	...	...	...	...	...	...	S	...	...	...	...	...	S	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	D	...
...	...	...	...	...	...	...	...	...	...	D	...	...	...	...
...	...	...	...	...	...	...	S	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	S	...	...	...	...	...	...
...	...	...	...	...	S	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	M	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	S	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	D
...	...	...	...	...	...	...	...	...	...	...	...	...	S	...
...	...	...	...	...	...	...	...	...	...	...	...	...	S	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	S	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	S	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	S	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	D	...	M	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	S	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...



Decodon verticillatus
Swamp Loosestrife

Ludwigia alternifolia
Seedbox

Ludwigia palustris
False Loosestrife

Myriophyllus sp.
Water Milfoil

Solanum Dulcamara
Nightshade

Veronica connata
Water Speedwell

Veronica sp.
Speedwell

Utricularia vulgaris var. americanus
Bladderwort

Bidens cernua
Stick-tight

Aster sp.
Aster

Table 9 (Cont'd.)

Distribution and Abundance of Aquatic Plants in Tributaries of the Huron River

Symbols indicate that species were found to be present at survey stations as follows: S=sparse in abundance; M=medium abundance; D=dense or very abundant. For bottom soil types, G=gravel; S=sand; St=silt; M=marl; D=detritus; Mk=muck; C=clay

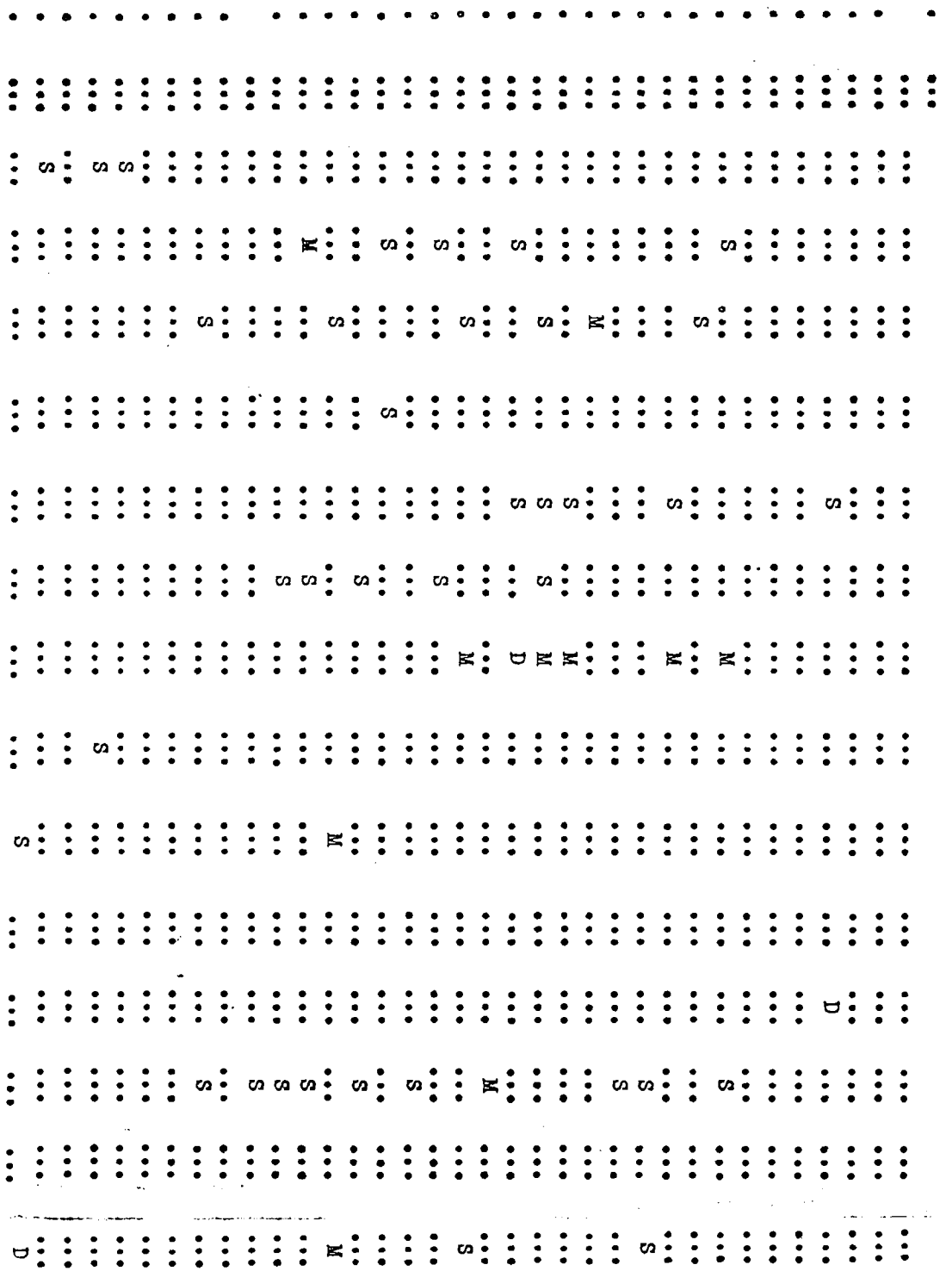
Tributary Number	Section Number	Station Number	Water Depth (Feet)	Bottom Soil	Chara sp. Muskgrass	Nitella sp. Muskgrass	Riccia sp. Liverwort	Equisetum fluviatile Horsetail	Typha latifolia Common Cattail	Sparganium americanum Bur Reed	Sparganium chlorocarpum Bur Reed	Sparganium euryoarpum Bur Reed	Sparganium sp. Bur Reed
35	1	3	0.50-1.0	G-S	...	...	...	...	...	...	...	...	...
35	2	1	1.0	S-M	...	...	...	...	...	...	...	...	...
35	3	1,2,3	0.5	G-St	D	...	...	...	M	...	...	...	S
35-1	1	1	0.25	St-D	...	...	...	...	...	...	...	...	S
35-3	1	1	1.0	S-M	S	...	...	...	...	...	...	...	...
35-3	3	1	0.25-0.5	S-St	...	...	...	...	...	...	...	...	S
35-3-1	1	1,2	1.0	G-St	...	...	...	...	...	...	...	...	S
35-3-2	1	1	1.5	D	...	...	...	...	S	...	...	...	...
35-3-3	1	1	0.6	S	...	...	...	...	...	...	...	...	S
35-4	1	1	0.5	G	S	S	...	...	...	...	...	...	...
35-6	1	1	0.25	G-St	...	...	...	...	...	...	...	...	S
38	1	1.2.3	0.50-1.0	G-S-St	...	...	...	...	...	...	...	...	S
38-3	1	1,2,3	0.25-1.2	G-D	...	...	...	...	...	...	...	...	S
41	1	1,2,3	0.25	G-S-St	D	...	...	...	...	...	...	...	...
44	2	1	0.50-0.8	G-S-St	...	...	...	...	...	...	...	...	M
44	3	1	0.30-1.6	G-St	D	...	...	...	M	...	...	...	...
44	4	1	0.25-2.0	G-S-M	D	...	...	...	M	...	...	...	...
44	5	1	0.16	G	...	...	...	...	S	...	...	...	...
44	5	2	0.25-0.5	G-S	...	...	...	...	...	...	...	...	M
44	6	1	0.08-0.4	G	...	...	...	...	...	...	...	...	M
44	7	1	0.25-0.5	G-St	...	...	...	...	S	...	...	...	...
44	8	1	0.25-0.5	G-S-St	...	...	...	...	...	...	...	...	...
44	9	1	0.25	G-S	...	...	...	...	...	...	...	...	...
44-1	1	1	0.3	G	...	...	...	...	...	...	...	...	...
44-3	1	1	0.25	G-St	S	...	...	...	...	...	...	...	...
44-3	2	1	0.16-0.25	D	...	...	...	...	M	...	...	...	...
45	1	1	1.60-2.5	Mk	...	...	...	...	...	...	...	...	...
45	1	2	0.00-0.5	D-S	...	...	...	...	...	...	...	...	...
46	1	1	0.25	D	...	...	...	...	...	...	...	...	S
46	1	3	0.08	G-D	...	...	...	...	S	...	...	...	...
48	1	1	0.25-3.0	St	D	...	...	...	...	...	...	...	S
48	1	2	0.16-1.0	G-St	...	...	...	...	S	...	...	...	...
48-1	1	1	1.3	St-D	D	...	...	...	...	...	...	...	...
52	1	1	1.0	St-D	S	...	...	...	...	...	...	...	...
52	1	2	0.00-0.25	G-St	...	...	...	...	...	...	...	...	S
52	1	3	0.16-0.18	G-M-St	...	...	...	...	S	...	...	...	...

er

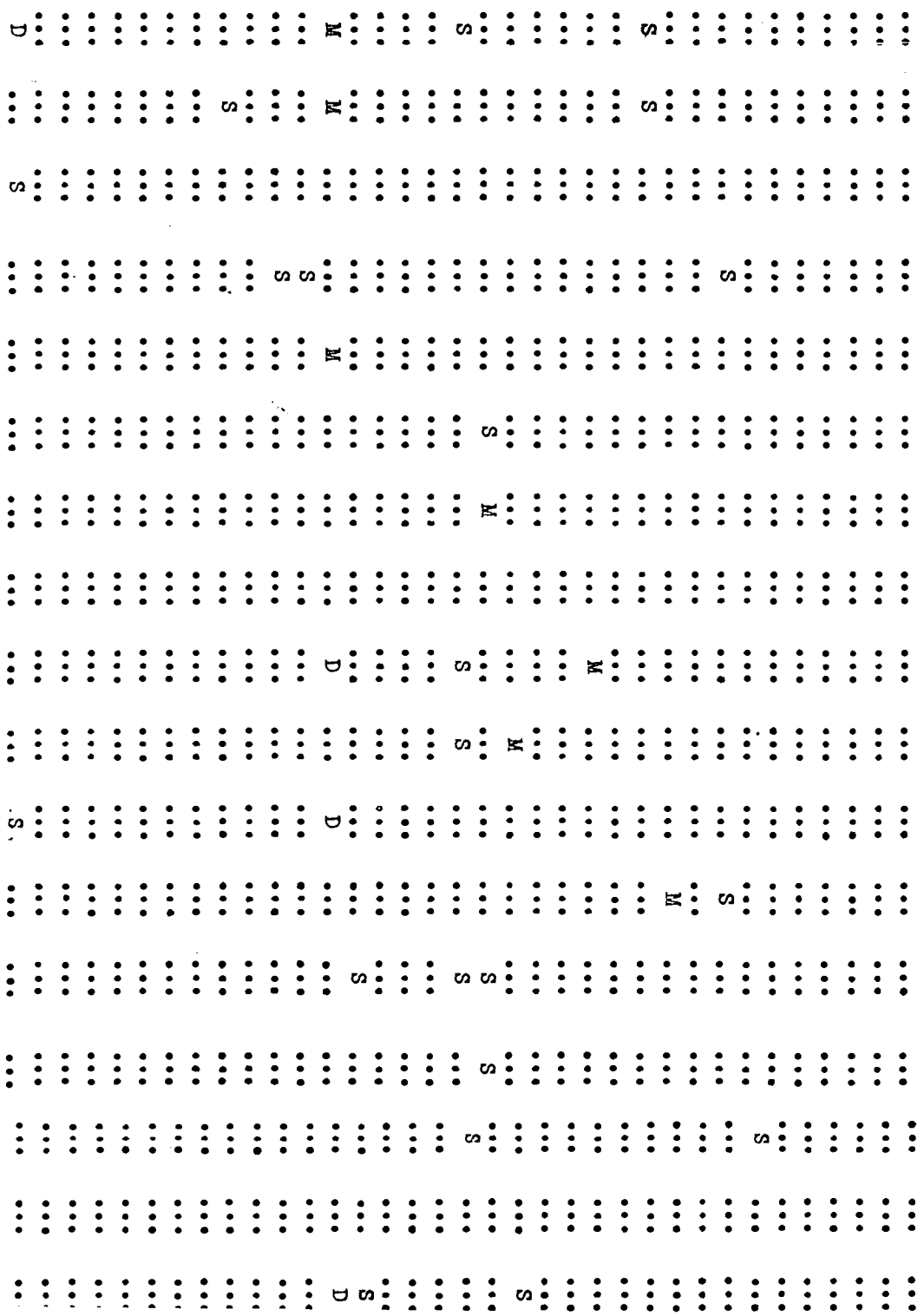
lows:

-olay

Sparganium sp. Bur Reed	Potamogeton americanus Pondweed	Potamogeton amplifolius Large-leafed Pondweed	Potamogeton foliosus Leafy Pondweed	Potamogeton foliosus var. macellus Pondweed	Potamogeton Friesii Pondweed	Potamogeton gramineus Variable Pondweed	Potamogeton natans Floating-leaf Pondweed	Potamogeton pectinatus Sago Pondweed	Potamogeton praelongus Whitestem Pondweed	Potamogeton pusillus Pondweed	Potamogeton Richardsonii Clasping-leaf Pondweed	Potamogeton vaginatus Pondweed	Potamogeton zosteriformis Flat-stemmed Pondweed	Potamogeton sp. Pondweed
...	S	...	...	...	...	...	...	D	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	M	...
S	...	S	...	...	...	...	...	...	...	...	...	...	...	...
S	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	S	...	...	...	...	...	...	...	...	...	...	...	...
S	...	...	...	...	...	...	...	...	...	...	...	...	...	...
S	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
S	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	S	...	...	...	S	...	...	...	...	...
S	...	...	...	...	...	...	...	...	...	...	...	...	...	...
S	M	...	...	...	...	...	...	...	...	...	...	...	...	...
S	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
M	M	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	S	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	M	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
M	...	...	...	...	...	...	...	...	...	...	...	...	...	...
M	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	S	...	...	...	...	...	D	...	...	...	...	S	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
S	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
S	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	S	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	S	...	S	...	S	...	...
S	...	...	...	...	...	...	...	S	...	...	...	...	...	...
...	...	...	...	...	...	S	...	...	...	...	...	...	...	...



	Flat-stemmed Pondweed
	Potamogeton sp. Pondweed
	Najas flexilis Bushy Pondweed
	Sagittaria cuneata Duck Potato
	Sagittaria latifolia Wapato
	Sagittaria latifolia f. gracilis Wapato
	Sagittaria sp. Arrowhead
	Alisma Plantago-aquatica Water Plantain
	Anacharis canadensis Waterweed
	Vallisneria americana Wild Celery
	Zizania aquatica var. angustifolia Wild Rice
	Leersia oryzoides Rice Cutgrass
	Eleocharis calva Spike Rush
	Eleocharis sp. Spike Rush
	Scirpus americanus Three-square Bulrush
	Scirpus acutus Hardstem Bulrush



Scirpus acutus
Hardstem Bulrush

Scirpus atrovirens
Bulrush

Scirpus subterminalis
Water Bulrush

Scirpus sp.
Bulrush

Carex comosa
Sedge

Carex diandra
Sedge

Carex sp.
Sedge

Peltandra virginica
Arrow Arum

Spirodela polyrhiza
Big Duckweed

Lemna minor
Lesser Duckweed

Pontederia cordata
Pickerel Weed

Heteranthera dubia
Water Star Grass

Juncus effusus
Soft Rush

Juncus Torreyi
Rush

Iris versicolor
Iris

Iris virginica
Iris

Polygonum hydropiperoides
Mild Water Pepper

Iris	Iris virginica Iris	Polygonum hydropiperoides Mild Water Pepper	Polygonum Hydropiper var. projectum Water Pepper	Polygonum natans f. genuinum Smartweed	Polygonum pensylvanicum Smartweed	Polygonum setaceum Smartweed	Polygonum sp. Smartweed	Ceratophyllum demersum Coontail	Nymphaea odorata White Water Lily	Nymphaea tuberosa White Water Lily	Nuphar advena Yellow Water Lily	Nuphar rubrodisoum Yellow Water Lily	Nuphar variegatum Yellow Water Lily	Nasturtium officinale Water Cress	Decodon verticillatus Swamp Loosestrife
:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:	:	:	:	:	M	:
:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:	:	:	:	:	S	:
S	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	S	:	:	:	:	:	M	:
:	:	:	:	:	:	:	:	:	:	:	:	:	:	S	:
:	:	:	:	:	:	:	S	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	M	:	:	:	:	:	:	:
:	:	S	:	:	:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	S	:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	M	:	:	:	:	:	S	:
:	:	:	:	:	:	:	:	:	:	:	:	:	:	S	:
:	:	S	:	:	:	:	:	S	:	:	:	:	:	:	:
:	:	D	:	:	:	:	:	D	:	S	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:	:	:	:	:	S	:
:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:	:	:	:	:	M	:
:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	D

Nasturtium officinale Water Cress	Decodon verticillatus Swamp Loosestrife	Ludwigia alternifolia Seedbox	Ludwigia palustris False Loosestrife	Myriophyllus sp. Water Milfoil	Solanum Dulcamara Nightshade	Veronica connata Water Speedwell	Veronica sp. Speedwell	Utricularia vulgaris var. americanus Bladderwort	Bidens cernua Stick-tight	Aster sp. Aster
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
M	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
S	...	...	...	...	...	...	M	...	...	...
...	...	...	...	...	...	...	...	...	...	S
M	...	...	...	...	...	...	...	...	...	...
S	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	S	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
S	...	...	...	...	...	...	S	...	...	...
S	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	S	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
S	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
M	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	S	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	D	...	...	...	...	...	...	...	...	...

Table 10

Fish-food Organisms in Samples Taken at Survey Stations on Tributaries of the Huron River
(Number and volume of organisms per square foot)

Bottom soil types include: G=gravel, S=sand, St=silt, M=marl, D=detritus, Mk=muck, C=clay, R=rubble, B=boulder

Tributary Number	Sec. No.	Sta. No.	Date	Bottom Type	Plankton cc/liter	May-flies	Stone-flies	Beetles	Caddis-flies	Damsel and Dragon-flies	Midges	Other Diptera	Tubi-ficid Worms	Leeches	Clams	Snails	Crustacea	Water Mites	Miscell.	Total Number of Organisms	Volume of Sample (cc)
14	1	1	6/13/39	B-G	...	16.0	...	15.0	25.0	...	46.0	3.0	2.0	...	2.0	...	8.0	...	1.0	118.0	4.1
14	1	2	6/13/39	G-Mk	...	62.0	24.0	128.0	14.0	...	15.0	5.0	2.0	...	3.0	...	...	...	...	253.0	1.3
14	2	1	6/12/39	Mk-S	...	11.0	...	...	1.0	...	754.0	...	38.0	6.0	9.0	2.0	4.0	...	...	825.0	5.5
14-3	1	1	6/12/39	C-G	...	2.0	...	1.0	1.0	...	351.0	1.0	...	...	1.0	...	1.0	...	...	358.0	0.7
16	1	1	7/7/39	G-S	...	...	...	...	...	...	10.0	...	47.0	1.0	1.0	...	...	...	...	59.0	0.2
18	1	1	6/8/39	G-R	...	8.0	...	...	4.0	...	419.0	4.0	4.0	...	2.0	...	3.0	...	...	444.0	0.4
18	1	2	6/8/39	G-S-St	...	5.5	4.5	4.5	8.5	...	223.5	0.5	8.0	...	1.0	...	...	...	...	256.0	1.0
18	1	3	6/8/39	S-St	...	8.0	2.0	1.0	12.0	...	84.0	7.0	11.0	...	6.0	...	4.0	...	...	135.0	1.4
18	2	1	6/7/39	S-St	...	...	...	2.0	...	...	204.0	...	8.0	...	10.0	1.0	1.0	...	1.0	227.0	1.5
18-3	1	1	6/7/39	C	...	...	2.0	1.0	8.0	...	18.0	17.0	15.0	...	...	...	...	1.0	...	62.0	0.4
19	1	1	9/13/38	...	...	5.0	...	2.0	88.0	2.0	41.0	23.0	56.0	11.0	...	...	3.0	...	2.0	233.0	2.1
21	1	1	9/12/38	R-G-S	...	4.0	...	...	...	...	7.0	5.0	...	...	12.0	...	2.0	...	...	30.0	1.7
21	2	1	9/9/38	R-S-St	...	...	...	...	...	...	83.0	14.0	1.0	...	...	...	2.0	...	...	100.0	0.3
21	3	1	9/10/38	G-S	...	1.0	2.0	1.0	3.0	...	8.0	8.0	...	...	...	...	...	...	...	23.0	0.2
21	4	1	9/10/38	G-S	...	...	...	2.0	36.0	...	11.0	13.0	...	2.0	...	...	...	...	4.0	68.0	0.6
21-5	1	1	9/12/38	G-C	...	...	1.0	3.0	2.0	1.0	573.0	2.0	3.0	4.0	3.0	...	4.0	...	...	596.0	5.1
21-6	1	1	9/9/38	G-S	...	...	...	1.0	...	...	55.0	2.0	5.0	...	...	...	...	1.0	...	64.0	0.2
21-6	2	1	9/8/38	S-C	...	...	...	...	...	4.0	11.0	1.0	46.0	...	2.0	9.0	...	...	1.0	74.0	3.8
21-6	3	1	9/7/38	G-S-D	...	11.0	...	12.0	...	1.0	101.0	7.0	...	1.0	...	...	...	...	...	133.0	4.6
21-6	4	1	9/6/38	S-St	...	...	...	1.0	1.0	6.0	39.0	6.0	6.0	1.0	36.0	4.0	2.0	...	1.0	103.0	9.2
21-6-1	1	1	9/9/38	G-S	...	11.0	...	5.0	2.0	1.0	6.0	4.0	2.0	...	...	...	1.0	...	5.0	37.0	1.5
21-6-3	1	1	9/8/38	G-S	...	...	...	...	...	...	1.0	...	...	...	...	1.0	2.0	...	4.0	4.0	...
21-6-8	1	1	9/8/38	G-S	...	1.0	...	...	1.0	...	3.0	...	3.0	...	1.0	...	...	...	1.0	10.0	0.3
21-6-8	1	2	9/8/38	G-S	...	1.0	...	...	...	...	39.0	5.0	6.0	...	1.0	...	...	...	...	52.0	0.9
21-6-10	1	1	9/6/38	St-D	...	...	1.0	...	1.0	1.0	8.0	1.0	51.0	3.0	15.0	9.0	2.0	...	3.0	95.0	7.8
21-10	1	1	9/10/38	S-St	...	...	1.0	1.0	3.0	3.0	85.0	4.0	67.0	...	8.0	...	...	...	2.0	174.0	1.0
21-12	1	1	9/10/38	G-S	...	1.0	...	...	...	...	2.0	17.0	5.0	...	1.0	...	...	...	...	26.0	0.1
22	1	1	9/13/38	G-S	...	...	...	1.0	...	...	17.0	3.0	4.0	...	5.0	1.0	1.0	...	...	32.0	0.8
26	1	1	9/12/38	G-S	...	...	...	1.0	...	...	...	3.0	4.0	...	...	...	1.0	...	1.0	10.0	0.3
27	1	1	8/27/38	G	...	1.0	...	...	90.0	2.0	...	10.0	...	1.0	1.0	...	...	...	...	105.0	0.9
28	1	1	9/12/38	G-S	...	2.0	...	2.0	...	...	1.0	1.0	...	1.0	...	1.0	2.0	...	1.0	11.0	0.4
30	1	1	8/20/38	R-G	0.3	5.5	...	5.0	206.0	4.0	4.0	...	...	0.5	0.5	...	4.5	...	...	230.0	3.7
30	2	1	8/19/38	G-S	...	5.5	0.5	3.0	6.0	...	4.5	4.0	0.5	...	0.5	...	1.5	...	1.0	27.0	0.6
30	2	2	8/19/38	G	0.2	22.0	...	2.0	14.5	...	6.0	...	...	...	1.0	...	0.5	...	...	46.0	0.1
30	3	1	8/19/38	G-St-D	0.5	5.5	...	...	0.5	1.5	65.0	...	...	...	0.5	...	5.5	...	...	78.0	0.4
30	4	1	8/17/38	G-St	0.2	0.5	...	0.5	...	...	19.0	...	...	...	...	...	0.5	...	...	20.5	0.02
30	4	2	8/17/38	G-S-St	0.1	9.0	...	1.0	...	5.0	4.0	4.0	1.5	...	...	...	2.0	...	...	26.5	0.4
30	5	1	8/16/38	G-S-M	0.1	1.5	...	1.5	10.0	...	13.0	...	...	...	...	1.0	20.0	...	...	47.0	0.15
30	6	1	8/16/38	St-D	0.2	6.0	...	16.0	...	16.0	10.0	1.0	10.0	15.0	20.0	10.0	...	...	1.0	105.0	7.1
30	6	2	8/16/38	St-D	...	...	...	4.0	...	5.0	3.0	1.0	...	88.0	10.0	...	...	...	1.0	112.0	2.3
30-1	1	1	8/20/38	St-D	...	...	...	...	...	...	19.0	...	...	...	1.0	...	...	...	...	20.0	0.1
30-2	1	1	8/20/38	S-St-D	...	...	...	...	1.0	...	11.0	...	...	1.0	41.0	1.0	4.0	...	...	59.0	0.4
30-4	1	1	8/13/38	G-S	0.2	...	...	2.0	3.5	1.0	5.0	1.5	...	...	38.0	...	0.5	...	...	51.5	4.6
30-4	1	2	8/13/38	G-S	0.4	1.5	...	16.0	162.0	3.0	100.0	7.0	...	0.5	16.0	0.5	2.5	...	...	309.0	5.15

Table 10 (Cont'd.)

Fish-food Organisms in Samples Taken at Survey Stations on Tributaries of the Huron River
(Number and volume of organisms per square foot)

Bottom soil types include: G=gravel, S=sand, St=silt, M=marl, D=detritus, Mk=muck, C=clay, R=rubble, B=boulder

Tributary Number	Sec. No.	Sta. No.	Date	Bottom Type	Plankton cc/liter	May-flies	Stone-flies	Beetles	Caddis-flies	Damsel and Dragon-flies	Midges	Other Diptera	Tubi-ficid Worms	Leeches	Clams	Snails	Crustacea	Water Mites	Miscell.	Total Number of Organisms	Volume of Sample (cc)
30-4	2	1	8/12/38	St-D	...	1.0	...	...	3.0	1.0	480.0	1.0	3.0	...	5.0	3.0	19.0	1.0	...	517.0	4.1
30-4-1	1	1	8/3/38	St-D	...	1.0	...	1.0	3.0	...	29.0	...	2.0	...	...	1.0	...	...	...	37.0	0.4
30-4-2	1	1	8/12/38	G-S	0.1	10.0	...	23.0	120.0	...	45.0	40.0	2.0	2.0	12.0	...	1.0	...	2.0	257.0	2.4
30-4-2	1	2	8/12/38	G-S-St	...	...	...	1.0	...	...	4.0	6.0	4.0	...	1.0	...	...	...	...	16.0	0.9
30-4-4	1	1	8/12/38	S-D	0.3	...	...	...	1.0	...	45.0	3.0	1.0	...	2.0	...	9.0	...	...	61.0	0.1
30-7	1	1	8/17/38	S-St-D	...	2.0	...	...	...	...	1.0	...	...	3.0	...	1.0	12.0	...	...	19.0	0.2
30-8	1	1	8/19/38	G-S	0.2	2.5	...	...	18.0	0.5	12.0	4.0	...	...	...	...	0.5	...	...	37.5	1.35
30-8	2	1	8/19/38	St-D	0.3	17.0	...	...	...	3.0	12.0	2.0	...	5.0	2.0	20.0	1.0	2.0	...	64.0	2.8
30-8	3	1	8/19/38	St-D	...	...	...	0.5	...	1.0	19.0	1.0	...	0.5	51.0	5.5	0.5	...	...	79.0	8.2
30-8-2	1	1	8/16/38	G-St	0.2	40.0	...	5.0	3.0	2.5	26.0	1.5	0.5	...	1.5	...	...	...	0.5	80.5	0.5
30-12	1	1	8/17/38	S-D	0.1	...	...	...	...	0.5	86.0	12.0	1.0	...	5.0	...	4.5	...	...	109.0	1.6
30-12	1	2	8/17/38	St-D	...	...	...	...	...	1.0	2.0	1.0	...	1.0	4.0	...	1.0	...	...	10.0	0.3
31	1	1	8/27/38	S-St	...	1.5	...	4.0	12.0	1.5	4.0	1.0	...	...	34.0	...	...	1.5	...	59.5	2.6
31-3	1	1	8/27/38	S-D	...	1.0	...	2.0	1.0	...	...	...	...	...	80.1	...	...	...	...	84.0	4.5
32	1	1	8/5/38	St-D	0.3	...	...	...	...	1.0	...	...	...	...	...	...	...	...	...	1.0	0.2
32	2	1	8/5/38	St-D	0.6	...	...	0.5	12.5	1.0	2.5	...	...	...	...	0.5	24.0	...	...	41.0	0.3
32	2	2	8/5/38	R-G	0.2	6.0	...	38.5	210.0	...	1.5	3.5	...	...	...	...	...	...	...	259.0	1.4
32	2	3	8/4/38	G-St-D	0.1	10.0	...	0.5	...	4.0	3.0	...	...	0.5	2.5	1.0	11.5	0.5	...	33.5	1.9
32	3	1	8/4/38	G-S-St	2.2	1.5	...	40.0	26.0	0.5	4.0	6.0	...	5.0	4.0	...	5.0	0.5	...	92.5	1.0
32	3	2	8/4/38	G-S-D	0.2	2.0	...	...	...	...	3.0	0.5	0.5	0.5	1.0	...	14.5	...	...	22.0	0.35
32-3	1	1	8/5/38	S-St-D	0.3	1.0	...	0.5	2.5	...	3.0	1.0	...	...	0.5	1.0	...	...	...	9.5	0.40
32-3	1	2	8/5/38	St-D	...	1.0	...	...	...	1.0	...	...	...	...	...	2.0	6.0	...	...	10.0	0.9
33	1	1	8/6/38	S-St-D	1.0	...	...	2.0	1.0	...	12.0	...	...	1.0	1.0	...	...	...	...	17.0	0.8
33	1	2	8/6/38	G-S	0.2	4.5	...	3.0	110.0	...	105.0	...	...	2.0	...	...	20.5	...	1.0	246.0	2.15
33	2	1	8/6/38	G-S	...	0.5	...	0.5	1.0	3.0	24.0	2.5	0.5	...	2.0	...	0.5	...	...	34.5	0.5
34	1	1	8/3/38	G-S	0.1	5.0	...	3.0	42.0	0.5	4.0	2.5	...	...	0.5	1.0	8.0	...	...	66.5	1.1
34	1	2	8/1/38	G-St	0.2	2.0	...	2.5	32.0	0.5	15.0	2.0	1.0	0.5	1.0	3.0	65.0	...	...	124.0	1.5
34	2	1	8/1/38	G-S-St	0.8	1.0	...	...	32.0	...	18.0	4.0	3.0	...	2.0	...	6.5	...	1.0	67.0	1.6
34	3	1	8/1/38	St-D	0.2	...	...	...	...	...	34.0	...	...	40.0	24.0	...	...	2.0	...	100.0	1.4
34	4	1	7/30/38	St-D	0.1	3.5	...	...	0.5	...	75.0	...	...	1.0	...	...	6.0	...	1.0	87.0	0.6
34	4	2	7/30/38	S-M-D	0.05	15.0	...	...	...	2.5	10.0	1.0	50.0	0.5	1.0	9.0	1.0	0.5	2.5	93.0	1.0
34-2	1	1	8/1/38	G-S	0.5	44.0	...	3.0	3.0	1.0	12.0	1.0	...	...	9.0	...	3.0	...	...	36.0	1.8
35	1	1	7/29/38	G-S	0.3	3.0	...	0.5	16.0	0.5	50.0	0.5	...	...	3.0	...	2.5	...	1.0	77.0	1.4
35	1	2	7/29/38	G-S-St	0.4	3.5	...	1.0	1.5	0.5	10.5	...	...	1.0	...	...	6.5	...	...	24.5	0.2
35	1	3	7/28/38	G-S-St-M	0.3	0.5	...	1.5	30.0	...	...	...	...	1.0	1.0	...	...	...	...	34.0	0.2
35	2	1	7/29/38	S-M-D	0.3	4.0	...	...	...	...	16.0	...	...	...	...	...	2.0	...	...	22.0	...
35	3	1	7/25/38	S-St-D	1.8	1.0	...	...	2.0	...	3.0	...	...	...	...	...	...	...	...	6.0	0.2
35	3	2	7/25/38	G-St	0.1	4.0	...	...	4.0	1.0	54.0	...	...	...	9.0	...	1.0	...	...	73.0	0.8
35	3	3	7/25/38	G-St-D	0.1	3.0	...	...	...	1.0	38.0	2.0	...	...	...	...	1.0	...	...	45.0	0.3
35-1	1	1	7/28/38	S-D	...	3.0	...	...	...	1.5	1.5	1.0	1.5	1.0	8.5	1.0	3.0	...	...	21.0	3.7
35-3	1	1	7/29/38	S-M-D	0.1	4.0	...	...	1.0	...	250.0	...	...	...	1.0	...	3.0	...	...	259.0	0.4
35-3	2	1	7/28/38	R-G-S	0.1	5.0	...	6.0	40.0	...	6.0	0.5	1.0	2.0	15.0	...	1.0	...	...	76.5	2.6
35-3	3	1	7/26/38	S-D	0.6	13.0	...	...	...	0.5	9.0	0.5	1.0	7.0	3.5	...	5.5	...	...	40.0	1.4
35-3-1	1	1	7/26/38	St-D	0.6	35.0	...	...	...	...	100.0	...	...	...	6.0	...	10.0	...	38.0	189.0	0.6

Table 10 (Cont'd.)

Fish-food Organisms in Samples Taken at Survey Stations on Tributaries of the Huron River
(Number and volume of organisms per square foot)

Bottom soil types include: G=gravel, S=sand, St=silt, M=marl, D=detritus, Mk=muck, C=clay, R=rubble, B=boulder

Tributary Number	Sec. No.	Sta. No.	Date	Bottom Type	Plankton cc/liter	May-flies	Stone-flies	Beetles	Caddis-flies	Damsel and Dragon-flies	Midges	Other Diptera	Tubi-ficid Worms	Leeches	Clams	Snails	Crustacea	Water Mites	Miscell.	Total Number of Organisms	Volume of Sample (cc)
35-3-1	1	2	7/26/38	G-St	...	4.0	...	...	1.0	...	85.0	...	...	2.0	...	0.5	2.0	...	2.0	96.5	0.65
35-3-2	1	1	7/26/38	G-S-D	0.1	...	...	...	...	...	...	...	2.0	...	...	...	...	...	3.0	5.0	...
35-3-3	1	1	7/26/38	G-S	0.5	0.5	...	...	5.0	0.5	21.0	6.0	...	...	0.5	0.5	2.5	...	0.5	37.0	0.2
35-4	1	1	7/29/38	G-S	...	1.0	...	1.0	7.0	2.0	10.0	...	...	...	2.0	...	5.0	1.0	...	29.0	0.2
35-5	1	1	7/25/38	S-St-D	...	5.0	...	1.0	12.0	...	8.0	25.0	...	1.0	2.0	1.0	68.0	...	...	123.0	0.5
35-6	1	1	7/25/38	G-St-D	0.2	...	...	...	...	...	60.0	...	8.0	...	...	...	...	...	...	68.0	0.1
38	1	1	7/19/38	G-S	0.2	1.0	...	1.5	4.5	...	10.0	4.0	...	...	3.5	2.5	1.0	...	...	27.0	0.85
38	1	2	7/19/38	G-S-St	0.2	0.4	...	1.5	68.0	...	22.0	11.0	...	0.5	2.0	6.5	4.5	...	...	120.0	2.6
38	1	3	7/19/38	S-St-D	0.3	1.0	...	...	1.0	...	7.0	1.0	2.0	...	...	1.0	10.0	...	...	23.0	1.3
38-1	1	1	7/19/38	S-St-C	0.8	...	...	...	0.5	...	5.0	0.5	...	0.5	2.0	...	75.0	...	...	83.5	0.45
38-3	1	1	7/18/38	S-M	1.0	...	0.5	2.5	1.0	...	...	1.0	...	...	0.5	0.5	...	...	...	6.0	0.65
38-3	1	2	7/18/38	S-St-D	0.2	1.5	...	2.0	2.0	...	33.0	2.0	0.5	1.0	5.0	3.0	1.5	...	1.0	52.5	0.45
38-3	1	3	7/18/38	G-S-D	0.8	...	...	1.0	26.0	1.0	13.0	...	...	...	1.5	...	32.0	...	...	74.5	1.25
38-5	1	1	7/19/38	St-D	...	12.0	...	...	...	1.0	20.0	...	6.0	1.0	1.0	5.0	...	...	1.0	47.0	1.1
41	1	1	7/16/38	G-S-St	0.4	...	...	...	...	2.0	1.0	8.0	...	...	...	...	...	...	...	11.0	1.4
41	1	2	7/16/38	G-S-D	0.3	33.0	...	...	12.0	7.5	30.0	...	...	...	2.0	30.0	54.5	...	...	169.0	1.15
41	1	3	7/16/38	G-S-St	0.1	2.5	...	0.5	5.0	1.0	20.0	2.0	...	1.5	0.5	0.5	61.0	...	2.0	96.5	1.0
42	1	1	7/16/38	R-G-S	1.6	...	...	...	...	...	35.0	...	...	3.0	5.0	...	21.0	...	1.0	65.0	0.6
44	1	1	7/13/38	R-G-S	1.0	9.0	...	12.5	170.0	...	10.0	2.0	1.0	0.5	5.0	0.5	...	...	...	210.5	...
44	2	1	7/13/38	G-S-St	0.3	6.0	...	...	2.0	1.0	60.0	...	6.0	...	19.0	7.0	...	...	...	101.0	1.1
44	3	1	7/13/38	St-M-D	0.3	4.5	...	1.0	52.5	...	15.5	1.5	...	1.5	13.0	...	18.5	...	...	108.0	1.1
44	4	1	7/13/38	S-M	0.4	...	...	...	7.0	...	20.0	...	...	...	57.0	...	7.0	...	...	91.0	9.8
44	5	1	7/11/38	G-S-St	0.2	...	...	3.5	38.5	2.0	13.5	50.5	...	5.0	3.0	0.5	0.5	...	...	117.0	0.9
44	5	2	7/11/38	R-G	0.2	0.5	...	10.0	27.5	...	48.0	5.0	...	3.0	3.0	...	...	...	...	97.0	0.5
44	6	1	7/11/38	G-S	0.2	...	...	1.0	4.0	...	28.0	9.0	3.5	0.5	...	...	...	...	...	46.0	0.2
44	7	1	7/8/38	G-S	0.2	1.5	...	30.0	189.0	...	3.0	22.5	...	1.0	...	0.5	...	...	...	247.5	2.3
44	8	1	7/8/38	G-S	0.05	...	...	1.0	40.0	...	...	16.0	0.5	...	22.0	...	0.5	...	0.5	80.5	1.4
44	9	1	7/8/38	G-S	0.25	1.0	...	6.5	90.0	...	35.0	0.5	...	3.0	58.0	...	0.5	...	...	194.5	1.3
44-1	1	1	7/11/38	G-S	1.2	1.0	...	...	70.0	...	72.5	7.5	0.5	...	1.0	...	...	...	...	152.5	1.0
44-3	1	1	7/8/38	G-S	1.2	1.0	...	1.0	184.0	...	45.0	3.5	1.0	1.5	4.5	...	11.0	...	...	252.5	2.5
44-3	2	1	7/8/38	D	...	5.0	...	1.0	...	3.0	18.0	2.0	...	1.0	7.0	...	12.0	...	1.0	50.0	0.7
45	1	1	7/2/38	Mk-D	0.1	5.0	...	...	...	12.0	40.0	...	6.0	16.0	3.0	...	37.0	3.0	...	122.0	1.3
45	1	2	7/2/38	G-S	1.0	1.0	...	1.5	...	...	65.0	1.0	3.0	...	...	...	1.0	...	...	72.5	0.9
45-1	1	1	7/2/38	St-D	...	1.5	...	1.5	15.0	0.5	13.0	...	3.0	23.0	27.5	...	10.0	...	...	94.0	1.45
45-2	1	1	7/2/38	G-S	...	...	...	...	...	...	0.5	...	0.5	...	1.0	...	...	...	...	2.0	...
46	1	1	7/5/38	G-D	0.3	3.0	...	...	5.0	...	140.0	...	6.0	2.0	1.0	...	6.0	...	...	163.0	0.7
46	1	2	7/5/38	G-D	0.8	6.0	...	...	1.0	...	25.0	...	6.5	...	...	...	0.5	...	1.5	40.5	0.7
46	1	3	7/5/38	D	...	...	...	1.0	13.0	...	2.0	...	...	8.0	4.0	...	1.0	...	...	29.0	0.8
48	1	1	6/28/38	S-D	0.4	1.0	...	...	0.5	1.5	8.0	...	...	...	...	...	13.0	3.0	1.0	28.5	0.25
48	1	2	6/28/38	G-S-D	0.2	...	...	...	...	...	2.0	...	312.0	71.0	1.0	...	...	...	...	386.0	0.60
52	1	1	6/24/38	G-St	2.0	9.0	...	...	91.0	...	...	...	...	...	...	...	2.0	...	...	102.0	0.2
52	1	2	6/24/38	G-S	2.2	2.0	...	0.5	7.0	...	...	...	...	...	...	...	2.5	...	...	14.5	0.1
52	1	3	6/24/38	S-St-M	0.1	2.0	...	1.0	3.0	...	...	...	1.0	...	1.5	...	17.5	...	...	26.5	0.2

Table 11

Fish Collected or Reported for the Tributaries of the Huron River

A=abundant, C=common, F=few,
R=reported (not actually collected by Institute for Fisheries Research)

Kind of Fish	Tributary Number														
	1	6	14	14	14-3	16	18	18-3	19	21	21	21	21	21-5	21-6
Sec. No.	1	1	1	2	1	1	1	1	1	1	2	3	4	1	1
GAME SPECIES															
Brook trout	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Northern pike	R	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Yellow perch	R	C	..	..	..	..	..	..	..	..	..	..	..	..	..
Smallmouth bass	R	..	..	..	..	..	..	..	R	..	..	..	..	..	..
Largemouth bass	R	C	..	..	..	..	..	..	C	..	..	..	..	..	..
Rock bass	..	..	..	..	..	..	C	..	C	F	C	..	..	..	C
Warmouth bass	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Bluegill	..	F	C	..	F	..	C	..	A	..	..	..	..	..	..
Pumpkinseed sunfish	R	C	C	..	F	..	C	..	C	..	..	F	F	..	..
Green sunfish	..	..	..	..	F	..	..	..	..	..	..	..	F	..	..
Longear sunfish	..	..	..	..	..	..	C	..	F	..	..	..	C	..	..
Hybrid sunfish	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
White crappie	R	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Black crappie	..	..	..	..	..	..	..	..	F	..	..	..	..	..	..
COARSE SPECIES															
Common sucker	..	C	C	..	A	C	C	A	F	..	..	F	F	..	..
Hog sucker	..	..	..	..	..	..	F	..	..	..	F	C	F	..	F
Chub sucker	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mullet (erythrurum)	..	..	..	..	..	..	..	..	A	..	..	..	..	..	..
Black bullhead	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Yellow bullhead	..	..	..	..	..	..	..	..	F	..	..	..	..	..	..
Mud pickerel	..	F	F	..	F	..	F	..	F	..	..	F	..	..	F
OBNOXIOUS SPECIES															
Dogfish	..	..	..	..	..	..	..	..	F	..	..	..	..	..	..
Carp	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

		Tributary Number																	
21-5	21-6	21-6	21-6	21-6	21-6	21-6-1	21-6-3	21-6-8	21-6-10	21-10	21-12	22	26	27	28	30	30	30	30
1	1	2	3	4	5	1	1	1	1	1	1	1	1	1	1	1	2	3	4
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F	..	..
..	..	..	F	C	..	..	..	F	F	..	..	..	..	..	..	C	F	C	C
..	C	C	..	..	..	..	..	..	..	F	..	..	..	C	..	C	F	..	A
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F	..
..	..	..	..	C	C	..	..	..	..	..	..	..	..	..	..	A	A	A	A
..	..	..	F	..	C	..	..	..	..	..	F	..	..	C	..	..	C	C	F
..	..	..	..	..	..	..	..	..	F	..	..	..	..	..	..	..	..	..	F
..	..	..	..	..	..	..	..	..	..	..	..	..	..	C	..	A	C	F	A
..	..	..	F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F	..	..	..
..	..	F	C	..	..	..	..	F	F	..	..	..	..	..	..	..	..	..	..
..	F	F	..	F	..	..	..	..	..	..	..	..	..	..	..	..	F	..	..
..	..	..	F	..	F	F	..	..	F	..	..	..	..	F	..	..	..	F	A
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	A	F	A	..	F	..	F	..	..	..	..	F	..	F	F	..	A
..	F	F	F	C	C	F	F	..	C	..	..	..	..	F	..	..	F	..	(
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F	..	..

	Tributary Number																		
30	30	30	30-1	30-2	30-4	30-4	30-4-1	30-4-2	30-4-4	30-9	30-10	30-10	30-10	30-10-2-2	30-14	31	31-3	32	3
4	5	6	1	1	1	2	1	1	1	1	1	2	3	1	1	1	1	2	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	..	..	..	..	F	..	..	..	F	..	..	..	..	..	..	F	..	..	.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
C	F	A	..	..	F	..	..	C	F	..	A	C	..	A	A	..	..	..	
A	..	..	..	..	A	..	F	F	..	..	F	..	..	..	..	F	..	F	.
..	F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
A	A	A	..	..	F	..	..	A	F	F	F	C	F	F	F	..	..	F	.
F	F	C	..	..	F	..	F	C	C	F	F	A	F	F	A	F	F	..	
F	..	A	..	..	F	F	F	F	F	..	..	F	F	C	C	..	..	..	
A	A	F	..	..	..	..	..	F	..	..	C	A	A	F	C	F	..	C	.
...	F	F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
A	..	F	..	..	F	..	..	..	F	F	F	C	..	..	F	..	..	F	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
A	A	C	..	..	C	..	..	C	..	..	A	A	F	A	..	C	..	C	
C	..	F	F	..	C	F	F	C	C	C	F	F	F	F	F	F	..	C	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.

Tributary Number																			
31-3	32	32	32-3	33	33	34	34	34	34	34-2	35	35	35	35-1	35-3	35-3	35-3	35-3-1	35-3-2
1	2	3	1	1	2	1	2	3	4	1	1	2	3	1	1	2	3	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	F	..	..	..	..	..	..	..	..	..	F	..	..	F	..	..	..
..	..	..	F	C	..	C	..	..	..	..	C	F	F	..	C	A	C	C	..
..	..	..	..	..	..	..	..	..	..	..	F	..	..	..	..	..	..	..	..
..	..	C	..	F	C	C	C	F	C	..	F	F	C	C	C	A	C	F	..
..	F	..	C	C	..	F	C	F	F	F	F	C	C	..	C	..	..	F	..
..	..	..	..	..	..	..	..	F	..	..	..	..	..	..	..	..	..	..	..
..	F	..	F	C	A	F	A	F	A	..	A	A	C	..	C	..	..	A	..
F	..	F	F	..	A	F	C	F	C	F	F	C	C	..	C	C	..	F	..
..	..	C	..	..	..	F	C	F	F	F	..	F	..	F	F	..	..	..	..
..	C	..	C	C	A	C	..	..	C	F	A	F	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	F	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	F	..	..	C	..	..	..	..
..	..	F	C	..	..	..	..	..	..	..	..	..	C	..	..	..	..	F	..
..	..	..	..	..	..	F	..	..	..	..	..	..	C	..	..	..	..	..	..
..	F	F	F	..	..	..	..	C	F	..	F	..	F	..	F	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	C	F	C	C	F	A	A	F	..	C	C	..	F	F	F	..	F	F	..
..	C	F	C	F	A	F	..	..	..	F	F	F	F	..	F	..	F	F	..
..	..	..	..	..	..	F	..	..	..	..	..	..	..	..	..	..	..	F	..
..	..	..	..	F	..	..	..	..	..	..	..	..	..	..	..	..	..	F	..

Tributary Number																		
35-3-1	35-3-2	35-3-3	35-5	35-6	38	38-1	38-3	38-5	41	43	44	44	44-1	44-3	45	46	48	52
1	1	1	1	1	1	1	1	1	1	1	3	5	1	1	1	1	1	1
..	..	..	..	..	..	..	..	..	..	F	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F	..	..
C	..	C	..	..	..	..	..	..	..	..	C	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
F	..	C	..	..	..	..	..	..	..	..	A	A	C	..	..	..	..	..
F	..	..	..	..	..	..	F	..	..	..	A	A	..	..	F	..	F	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
A	..	..	..	..	F	..	..	F	..	..	F	A	F	..	C	..	..	F
F	..	..	..	F	C	C	..	..	..	..	C	F	A	..	F	F	..	A
..	..	..	..	..	A	A	F	C	..	..	..	F	A	..	..	..	F	F
..	..	..	..	..	..	..	..	..	..	..	C	A	..	..	C	..	C	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
F	..	..	..	C	..	..	C	..	..	..	..	..	..	..	..	F	..	..
..	..	..	..	F	..	..	C	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	F	..	..	F	..	..	A	F	C	F	..	C	F	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
F	..	..	..	..	C	C	F	C	..	..	F	F	..	..	F	..	..	F
F	..	C	..	..	F	F	F	..	F	..	C	F	F	F	..	F	A	F
F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Table 11 (Cont'd.)

Fish Collected or Reported for the Tributaries of the Huron River

A=abundant, C=common, F=few,
R=reported (not actually collected by Institute for Fisheries Research)

Kind of Fish	Tributary Number													
	1	6	14	14	14-3	16	18	18-3	19	21	21	21	21	21-5	2
Sec. No.	1	1	1	2	1	1	1	1	1	1	2	3	4	1	
FORAGE SPECIES															
Creek chub		A	A	A	A	C	F	A	F	F	F	F	C	A	
Horny-headed chub									A	C	A	C			
Red-bellied dace								C							
Black-nosed dace		F	C		C		F	C			C	C	C	A	
Golden shiner							F								
Black-chinned shiner															
Black-nosed shiner									F						
Mimic shiner							F								
Lake emerald shiner		F													
Rosy-faced shiner										F					
Common shiner			F	F	C			F		A	A	A	F		
Straw-colored shiner															
Blunt-nosed minnow		F	F		C	F	C		F		F	C		A	
Stone-roller minnow		C			C		F	F	F	F	F	F	F		
Mudminnow				F	F		C					F		F	
Black-banded topminnow									F						
Tadpole cat															
Brindled stonecat											C				
Black-sided darter		C					F								
Johnny darter				F	F		C			F		C		F	
Rainbow darter			C	A	A		F	F	C	C	C	A	F		
Iowa darter				F				F							
Fantail darter										F	C	F			
Least darter					F										
Green-sided darter		C					F			C	C	F			
Log perch							F								
Silversides															
Muddler (bairdii)			F	C	C		A	C	C	C	F	A	C	A	
Brook stickleback						F									
Menona killifish															

Tributary Number																		
21-5	21-6	21-6	21-6	21-6	21-6	21-6-1	21-6-3	21-6-8	21-6-10	21-10	21-12	22	26	27	28	30	30	30	3
1	1	2	3	4	5	1	1	1	1	1	1	1	1	1	1	1	2	3	
A	C	C	..	C	C	C	C	A	A	A	A	A	C	C	F	..	C	..	.
..	A	A	..	..	..	..	..	..	..	..	..	..	..	..	..	F	..	..	
..	..	..	..	..	..	..	..	F	..	..	..	..	..	..	..	..	..	..	.
A	..	..	..	..	..	..	..	A	..	F	A	A	A	..	A	..	..	..	.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	..	F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	A	A	A	..	..	..	..	..	F	..	..	..	..	C	..	C	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
A	..	F	..	..	..	..	..	F	..	A	..	..	..	..	..	..	..	..	
..	F	C	..	..	..	..	..	..	..	..	F	..	..	F	..	..	..	..	.
F	F	..	A	..	A	A	C	A	A	A	C	..	F	F	F	..	..	..	.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F	C	
..	..	..	F	..	..	..	..	..	..	..	..	..	..	..	..	F	..	..	
..	A	F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F	..	.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F	F	..	
F	F	C	..	..	..	..	..	..	..	A	..	..	..	..	..	..	..	..	.
..	C	C	..	..	..	..	..	F	..	..	..	..	..	..	..	F	C	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	C	C	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F	..	
..	F	F	..	..	..	F	..	..	..	..	..	..	..	..	..	..	..	..	.
..	A	C	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F	..	.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	A	.
A	A	F	..	A	F	A	..	A	..	..	C	C	F	C	C	..	..	..	.
..	..	..	..	..	..	..	..	..	..	A	C	..	..	..	..	..	..	..	.
..	..	F	..	..	..	..	..	A	..	..	..	..	..	..	..	..	..	..	.

			Tributary Number																
30	30	30	30	30-1	30-2	30-4	30-4	30-4-1	30-4-2	30-4-4	30-9	30-10	30-10	30-10	30-10-2-2	30-14	31	31-3	32
3	4	5	6	1	1	1	2	1	1	1	1	1	2	3	1	1	1	1	2
			C			F	A	C	C	C	F					C	C		F
	F					C			A								C		
													C			F			
													F						
	F											C							
	F		F			A			C		F								F
	F															C			
		C	A	A	A	F	C	F	F	A	F				F	F	F	F	
C	A	A	F				F					F	A	F				C	
	F	C																	
	F					F						F				F			
			F													A			
	F					F						C				F	A		F
	F							F	C			F							
		F											F						
						C													
A												F							
				F			C		C	A							A		

•

Tributary Number																			
31-3	32	32	32-3	33	33	34	34	34	34	34-2	35	35	35	35-1	35-3	35-3	35-3	35-3-1	35-3-2
1	2	3	1	1	2	1	2	3	4	1	1	2	3	1	1	2	3	1	1
..	F	A	F	C	A	..	..	..	..	..	..	..	A	C	..	..	A	..	..
..	..	..	..	..	..	F	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	F	..	..	..	..	..	..	..	..	..	..	F	..	..	..	..	..	..
..	..	..	..	..	..	..	F	F	..	..	..	..	..	..	..	..	..	..	..
..	..	..	F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	F	C	..	F	..	F	F	F	..	..	A	..	..	F	..	A	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	F	..	..	..	..	..
F	..	C	C	..	A	F	..	F	F	F	F	F	C	C	..	..	A	A	F
C	..	..	..	..	..	F	..	..	..	..	F	..	..	..	..	..	..	..	..
..	..	..	..	..	F	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	F	..	..	..	..	F	..	..	..	..	..	..	..	..
..	..	F	C	C	..	C	..	..	..	..	F	F	C	..	F	..	..	..	..
..	..	C	..	C	..	..	..	..	..	..	..	F	A	..	F	..	..	F	..
..	F	A	C	..	..	..	..	..	..	C	C	..	A	..	..	..	C	F	..
..	..	..	..	..	..	F	F	F	..	..	..	F	..	..	F	C	..	..	..
..	..	A	..	F	..	..	..	..	F	..	C	..	C	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	C	..
..	..	..	..	..	..	..	..	..	..	F	F	..	F	..	..	..	..	..	..
..	..	..	..	F	..	..	..	..	..	..	F	..	..	..	..	F	..	..	..
..	..	..	..	..	..	..	..	..	..	..	F	..	..	..	..	F	..	..	..
..	..	F	..	..	..	..	..	..	..	..	..	..	..	..	..	..	C	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Tributary Number																			
35-3-1	35-3-2	35-3-3	35-5	35-6	38	38-1	38-3	38-5	41	43	44	44	44-1	44-3	45	46	48	52
1	1	1	1	1	1	1	1	1	1	1	3	5	1	1	1	1	1	1
..	..	A	F	A	F	A	A	..	C	F	..	C	C	C	..	A	..	A
..	..	..	..	..	..	F	..	..	F	..	A	A	..	..	..	..	F	C
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	C	..	..	..	..	A	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	F	..	..	..	..	..
..	..	..	..	..	..	..	F	..	..	..	A	..	F	..	..	..	..	F
..	..	..	..	..	..	..	..	..	..	..	C	..	..	..	..	..	..	F
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	C	C	C	F	..	..	A	A	..	..	F	A	C	A
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F
..	..	..	..	..	..	..	..	..	..	..	F	F	..	..	..	..	..	F
..	..	..	..	..	..	..	..	..	..	..	..	F	..	..	..	..	..	F
A	F	A	A	C	C	F	F	F	C	C	F	..	A	C	F	C	A	C
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	F	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	F	..	..	..	..	..	..
F	..	..	..	C	..	..	..	..	..	..	..	..	..	..	..	..	..	..
F	..	A	..	A	F	..	..	..	..	..	F	F	..	..	..	..	A	C
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	F	..	..	..	..	..	..	..	..	..	..	..	..	..	C
C	..	..	..	..	..	..	..	..	..	..	F	F	..	..	..	..	F	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	F	..	..	..	A	A	..	F	C	..	F	..	..	..	C	..	C
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

PART III — I.F.F.R. No. 1003

IMPOUNDMENTS ON THE HURON RIVER

by

John L. Funk

There are nine major impoundments in the Huron River.[1] The lower most is located at Flat Rock about nine miles above the mouth of the river. The next reservoir is at Belleville, 15 miles upstream from Flat Rock. In the 35 miles of stream above Belleville there are seven dams, and the river is simply a series of reservoirs with very little unimpounded water in between. The lakes in this area, in order going upstream, are: Belleville, near the town of Belleville; Ford, Papermill, and Superior, near Ypsilanti; and Geddes, Argo, and Barton in the vicinity of Ann Arbor. Milford, the uppermost and last lake, is located at the town of Milford. More detailed information as to the location of these impoundments is given in Table 12.

Good roads make all of these lakes rather easily accessible. The Huron River Drive follows rather closely the course of the lower river and touches most of the lower eight impoundments, while Milford can be reached by several good county roads.

The maps used in the surveys of the Huron River Impoundments are modifications of previous maps from other sources. The shoreline and certain marginal features of Belleville, Papermill, Superior,

---

[1] This does not include Pontiac Lake which was formed by raising the level of natural lakes in order to improve real estate on the margins.

Geddes, Argo, and Barton lakes were obtained directly from earlier surveys made for the Detroit Edison Company by Gardiner Williams in 1905-11. Because many of these surveys were made before the dams were installed and the proposed shorelines were shown at predetermined levels, several changes were necessary to fit them to actual conditions. Aerial photographs were used to obtain the shorelines of the Ford and Flat Rock lake maps. These photographs were relatively recent (1940), and the outlines taken from them were accurate and required few corrections. Milford Lake was entirely mapped by the Institute party in the summer of 1938. Depth contours, bottom soil types, and shore features for all lakes were plotted by the Institute parties. Maps loaned by the Ford Motor Company were used in some preliminary work but were not the basis for the final copies.

All of these waters have been impounded for the purpose of generating electrical power. The dams at Flat Rock, Ford, and Milford lakes are owned by the Ford Motor Company, and the power they produce is used to run nearby parts factories of that organization. The town of Flat Rock also uses the reservoir there as a source of its water supply. All of the other dams are owned by the Detroit Edison Company, and the electricity produced helps to supply the surrounding communities. Papermill Lake receives its name from the fact that the dam there was built by the Peninsula Paper Company, and long furnished power for their factory, but in recent years it has been taken over by the Detroit Edison. The Huron River has probably been harnessed to provide power since the earliest settlements were made in this region. Many local residents recall that grist and paper mills, whose water wheels were turned by the dammed up waters of the stream, were once numerous. The remains of these dams and parts of the ponds can still be observed in some places. In most cases, however, the present

dams were built on or near the sites of the earlier ones and all traces of the earlier dams have been obliterated.

In general these lakes have a reputation for furnishing rather poor fishing. In Barton and Milford, good catches of pan fish are frequently made, and bass and northern pike are taken occassionally. In all of the lower lakes coarse fish are prevalent. Belleville sometimes provides good catches of game fish, but the others are fished mostly for carp and bullheads, although game fish occassionally are taken.

Resort development in this group of lakes is rather limited, possibly due to the fact that they were formed primarily for industrial uses. Several of them are unattractive for swimming or boating due to turbid water, muddy bottom, or excessive amounts of weeds and deadheads. Fishing does not seem to be popular enough in some to create much demand for better facilities. However, their proximity to large centers of population makes it seem probable that they would be used much more if their possibilities were developed to a fuller extent. A system of parkways which would involve all of these lakes has been proposed by the Huron-Clinton Metropolitan Authority and seems worthy of public support.

Belleville Lake shows the greatest resort development with 6 resorts, 5 boat liveries, and approximately 150 cottages as well as many permanent residences. In addition, property owners along the margin rent space to campers and trailer owners, and many permit fishermen to cross their land for a small fee. This development is chiefly on the south shore. The north shore is largely unimproved except for a large park and recreation center which the Detroit Edison Company maintains for its employees. None of the other lakes show nearly so much improvement for recreational use. There is one bathing beach and a canoe livery on Argo Lake. This impoundment,

being near Ann Arbor, is much frequented by the residents. All of the few dwellings on its shores are permanent residences. The northeast side of Barton Lake is built up as a suburban district with some private development for boating and swimming. The public has access to the lake from the highway and railroad property. Fishing is quite popular. One boat livery is available on Milford Lake. Fishermen also have access to the water through private property or at the road bridge. There are a few permanent homes around the east end of the reservoir, but most of the land is owned by the Ford Motor Company.

There are no special facilities for swimming, boating, or fishing on any of the five remaining impoundments. Flat Rock and Ford lakes are surrounded almost entirely by farm land and farm homes. A few local residents permit fishermen to cross their property for a small fee. Trespassing is not permitted on most of the property owned by the Ford Motor Company. Public access to Ford Lake is also possible from the road at the dam and from the nearly completed Willow Run Expressway. The margins of Papermill, Superior, and Geddes Lakes are owned by the Detroit Edison Company or by private individuals. The public can enter Papermill and Geddes from highway bridges, but since no roads touch Superior, the only possible means of public access is by the river. Most of the shore of Superior is taken up by two large summer estates. The few dwellings on the other lakes are all permanent homes. The above information on resort development is summarized in Table 12.

Physical Characteristics

Since all of these lakes were formed by impounding the waters of the Huron River, the basins are all quite long and narrow and more or less irregular in outline. The deeper water is found in the old river channel, especially at the lower end of the lakes near the dams,

with shoal areas formed by the flooding of low-lying portions of the old river valley. The Huron valley through most of this region is rather narrow and bordered by hills elevated 200-300 feet above the valley floor. In many cases the lakes fill the entire valley and the hills rise directly from the lake shore. The surrounding country is rolling and is mostly moderately productive farm land. The Huron River forms the most important inlet in all of the lakes; and, since other sections of this report deal with the main river and its triubtaries, no discussion of the drainage will be undertaken here. Details of the physical characteristics of all the lakes are given in Table 13.

Flat Rock Lake is over 2 miles long, and at its widest part less than 1/4 mile in width. The lower 1/3 of the lake makes up the main basin, the upper part contains many islands and is very irregular in shape due to the flooding of old oxbow loops. It is oriented in a generally northwest-southeasterly direction. The fact that its long axis is parallel to the direction of the prevailing winds may account, in part at least, for the high turbidity of the water as shown by the secchi disc readings of 1.0-1.2 feet. The fact that most of the shoreline is high and, at the western end at least, wooded should protect the lake to some extent from excessive wind action. However, the high turbidity is due without doubt chiefly to erosion of the clay banks on the margin by run-off or the action of waves. The shore development of 5.6 is important for it indicates that the lake has a shoreline 5.6 times as long as that of a perfectly round lake of the same area. Since the shoal areas near shore are usually the most productive parts of a lake, it is generally true that the higher the shore development the greater the productivity of the lake. In the same way, the fact that the lake is shallow (maximum depth 8.75 feet)

and might be considered to be all shoal would point toward high production. These factors are largely counteracted, however, by the high turbidity which probably limits all life dependent upon light, such as plants, to the upper two or three feet of water. Another factor which undoubtedly has a limiting effect on productivity is the fluctuating water level. Although the variation in level averages only about 1 foot, in a shallow lake of this type this means that large areas of potentially productive shoal are alternately submerged and exposed and the life they might produce largely destroyed.

Belleville Lake is the largest of the nine reservoirs. It consists of two distinct basins separated by the fill and bridge on M-56. The eastern basin is over 3 miles long and about 1/2 mile wide at its widest point. The west basin is slightly less than 3 miles in length but considerably wider and more irregular in outline than the east basin. The long axis of the lake extends, in a general way, directly east and west, although, due to the irregular shape no where would the wind have an uninterrupted sweep for more than a rather small fraction of the length. However, considerable wave action is certain to occur. This is the deepest lake of the series, with water over 40 feet in depth found in the eastern end of the east basin. Most of this basin is over 20 feet deep, and the drop-off is near shore and quite steep. The west basin is shallower but a large part of it is within the 10 foot contour and much of the slope is abrupt. The lake margins are generally high and steep and composed mostly of clay and glacial till. Due, no doubt, chiefly to the recent formation of the lake, erosion of these banks by wave action and run-off is quite extensive, and a high degree of turbidity of the lake water (secchi disc 1.9-4.0) results. The shore development of 5.4 is quite high and, as pointed out above, should be indicative of a high degree of

productivity. This is limited, however, by the amount of the lake which is actually productive shoal. The figure of 75% given in Table 13 is not significant since it was obtained by considering all bottom above the 20 foot contour as shoal. In as much as turbidity prevents effective light penetration below 8 feet at the most, the figure indicating possible productive shoal would be much smaller, probably less than 20%. The bottom soil consists of a mixture of mud and clay with considerable gravel in the shallow areas and a sort of muck in the deep water. The muck found in the bottoms of all these lakes is not typical muck such as is usually found in natural lakes (i.e., chiefly decaying plant material) but a sedimentary material containing just enough organic matter to give it the dark grey or black color and decaying odor of typical muck. The country around the lake is fairly level, cultivated land. A considerable portion of the lake margins is wooded. In addition to the main river, a number of small streams enter the lake. Willow Run, Apple Run, and the outlet of Susterka Lake are the most important. In all cases the flow is intermittent and probably has little effect on the economy of the lake. Water level fluctuation due to power demands is reported to be not more than 0.5 foot.

Ford Lake is second only to Belleville in both size and depth. Its basin is over 3 miles long and, although very irregular in shape, averages about 1/4 mile in width. Orientation is roughly northwest-southeast; once more near optimum conditions for excessive wave action. Again the margins are high and at least partly wooded. This is advantageous in providing some shelter from the wind but,as in the case of the lakes already studied, wave action and run-off are rapidly eroding away the steep sandy clay banks and causing high turbidity of the water.

The deeper water is found in the lower end of the lake where the shallows near shore are quite narrow and drop off abruptly. The upper end of the lake is shallower and has a more gradual slope. About half of the lake is less than 20 feet in depth, but due to the high turbidity (secchi disc 6-8.7 feet) not much water over 10 or 12 feet deep is potentially productive. The shore development, as in all these lakes, is quite high and indicates probable high productivity. The surrounding country is composed of slightly rolling, moderately productive farm land with most of the land near the lake devoted to pasture and partially wooded. Although a few small streams of intermittent character enter the lake the main river is the only inlet of importance. Water level fluctuations depend chiefly on the power requirements at the dam and are reported to be between 1.0 and 2.0 feet.

Papermill Lake is one of the smaller reservoirs of the series. It is somewhat more than a mile in length and its average width is about 500 feet. It is divided into three basins by the fills and bridges of the New York Central Railroad and the highway. Its orientation is roughly west-northwest to east-southeast. The north shore is relatively high and wooded while the south shore is lower and more open. In spite of the fact that its long axis parallels the direction of the prevailing winds, the protection afforded by marginal conditions and the shortness of the individual basins should reduce destructive wave action considerably below that noted for the preceding lakes. The irregular outline gives a shore development of 2.8 which is high and should indicate a productive lake if other conditions are favorable. The eastern most basin is long and narrow and contains the deepest water, but only a small per cent is over 10 feet in depth. The upper basins are broader and more shallow with most of the water less than five feet deep. Judging by depth alone the lake may be

considered to be all shoal as indicated in Table 13. However, the high turbidity (secchi disc 3.0-3.5 feet) probably limits vegetation to water 6 feet or less in depth. The bottom soil consists chiefly of sand in the more shallow portions and of mucky material at greater depths. The surrounding country is hilly and consists mostly of farm land with a considerable portion of it wooded. There are no inlets of importance besides the main stream. The water level fluctuates with the demands of the power plant and is reported to vary from 0.5 to 1.0 foot.

Superior Lake is actually over 2 miles long but it curves around almost in the shape of a letter "U" so that the inlet is only about a mile from the outlet dam and nearly in line with it east and west. Its greatest width is no where more than about 1/8 mile. The lower 1/3 of the reservoir runs directly north and south and contains the only water over 10 feet in depth. Such orientation, coupled with high wooded margins on the north and much of the south shore, should tend to keep destructive wave action to a minimum.

However, turbidity is about as high here (secchi disc 1.3-2.0 feet) as in the lakes already discussed. Thus, although the lake is so shallow as to be considered 100% shoal, only that water less than 5 or 6 feet in depth is potentially productive. The shore development of 4.1 indicates probable high productivity. The bottom soil is chiefly muck, with some sand and gravel along the margins. The bottom slope is gradual and there is no abrupt drop-off. The surrounding country is hilly farm land with numerous wooded tracts. In addition to the main river and a few springs and intermittent drains of no great significance, Fleming's Creek enters the upper end of the lake. This stream is discussed in the section of this report dealing with tributaries. The water level fluctuates with the power demands and is reported to be 0.5 to 1.0 feet.

Geddes Lake is approximately 2 1/4 miles in length. The main basin is relatively quite narrow, but several broad expanses of shallow water are formed by the flooding of low lying land. Its long axis runs in a generally northwest-southeast direction, and in spite of the protection offered by high and partially wooded margins on the north and much of the south shore, wave action might be expected to be fairly severe. Turbidity is quite high (secchi disc 1.2-3.7 feet) and probably due to the same factors as in the other lakes discussed above. Considering the turbidity, it is improbable that any water over 8 to 9 feet in depth is productive of any organism dependent upon light. Approximately 90% of the lake is less than 8 to 9 feet in depth, and consequently can be considered productive shoal. The maximum depth of the lake is only 18 feet and only a small part of the extreme eastern end is over 10 feet in depth. Shore development is 4.7 and should indicate a very productive lake. The bottom soil is largely the sedimentary type of muck found in these lakes with some areas of gravel and sand. Most of the margin is steep and rocky but parts of the south and west shores are low and marshy. The surrounding country is hilly, mostly partially wooded farm land of only moderate fertility. Aside from the main river, only one stream comes into the lake. This enters the eastern part of the south shore, is of intermittent character, and of interest only because it carries the Ann Arbor storm sewer. Water level fluctuations due to power demands are reported to vary from 0.5 to 1.0 feet.

Argo Lake is one of the smaller reservoirs of this series. Although it is actually over two miles in length, the basin curves around in an S shape so that the dam in the outlet is only a little more than a mile from the inlet in a straight line. Such a line would run just a few degrees to the west of North. Just above the dam at its widest part the lake is about 600 feet in width from which it narrows gradually

and fairly uniformly to less than 100 feet at the upstream end. Probable high productivity is suggested by the shore development of 3.4. Only a very small part of the basin is over ten feet in depth so that the lake may be considered to be all shoal. However, the turbidity is so high (secchi disc 2.3-2.7 feet) that water over 5 or 6 feet in depth is probably unproductive of organisms dependent upon light. Taking the depth of 6 feet as the lower limit of productivity, approximately 3/4 of the area is still potentially productive. The bottom soil is chiefly muck with some areas of sand and gravel and others of fibrous peat. The margins are generally steep and high on the outer curves of the S and low and marshy on the inner. The high shores are largely wooded. The surrounding country is hilly and mostly moderately productive farm land. The main river is the only inlet of importance although 4 or 5 small spring drains of more or less intermittent character also enter the lake. Power demand determines the amount the water level fluctuates. It is reported to be not more than 0.5 to 1.0 feet.

Barton Lake, the next reservoir upstream, is about 3 miles in length. It is widest about a quarter mile above the dam, where it is over 600 yards in width. From this it narrows gradually and fairly uniformly to a width of less than 100 feet at the upper end. The long, narrow basin curves sharply twice and less abruptly a third time to produce a lake very irregular in shape. Orientation is difficult to define under such conditions, but in a very general way the long axis of the lake runs from northwest to southeast. The shore development of 3.4 suggests a large extent of shore line conditions and consequent probable high productivity. Turbidity (Secchi disc 7.0-8.0 feet) was not nearly so high as in the other lakes farther downstream and its importance as a limiting factor is reduced in proportion. Water up to 15 feet in depth should be able to support plants if other factors

are favorable. Considered on this basis approximately 60% of the lake is shoal. The deeper water is all in the lower end of the basin near the dam. The slope at the drop-off is quite steep. The bottom soil is mainly muck in the deeper water with considerable sand, gravel, and pulpy peat on the shoals. The margins are largely high, steep, and wooded on the north shore. To the south the shore slopes more gradually and is more open. The surrounding country is hilly, partially wooded farm land. Much of the north shore is occupied by a residential subdivision. Honey Creek is the only inlet of importance in addition to the main river. It is discussed in the section of this report dealing with tributaries. Variation in power demand causes the water level to fluctuate 0.5 to 1.0 foot according to report.

Milford Lake, some 50 miles or more up the stream above Barton, is the last lake to be considered in this study. It is one of the smaller reservoirs of the group, is less than a mile in length, and, except for the large bay on the northwest shore, averages about 500 feet in width. The main axis of the lake runs almost directly east and west. The shore development is high (2.4) and suggests a highly productive body of water. The maximum depth is 18 feet, but very little of the water is more than 15 feet in depth. Since turbidity is only moderate (secchi disc 11.0-11.7 feet) practically all of the bottom should be able to produce plants and the lake is considered to be all shoal. The bottom soil is chiefly muck with some sand and gravel around the margins. Most of the margins are fairly high and grass covered with a few wooded areas. The surrounding country is rolling, partially wooded farm land. The main Huron River, here about 40 feet wide and 2 feet deep, is the only important inlet. The water level is reported to fluctuate 0.5 to 1.0 foot, dependent upon the power demand.

The foregoing discussion of the physical characteristics of the

individual lakes shows that while they differ markedly in some respects they are strikingly similar in others. Due to the long, narrow shape and irregular outline, all have a high shore development. Most have a rather large percentage of shoal. All have deposits of rich bottom soil which should be productive. All of these factors favor high productivity. In opposition two main limiting factors are evident in all the lakes; turbidity and water level fluctuation.

In most of these lakes the water is highly turbid. This is probably due to a number of factors. First, any lake through which a large stream flows is likely to be more turbid than one in which there is very little inflow since the stream is certain to carry a considerable quantity of suspended material. Second, run-off from the immediate shores may greatly increase the turbidity. This factor is especially important for these lakes because much of the land around them is cultivated, the shores are frequently quite steep, and the soil is chiefly glacial till with a large percentage of clay. The third and probably most important factor is that of wave action. The size and shape of the lakes and their orientation with regard to the direction of the prevailing wind make it certain that a considerable amount of wave action will occur on even the most protected of them. All of the lakes are relatively new, the oldest has occupied its present basin only 30 years. The shoreline is still in the process of adjustment. This process goes on continuously, of course, as long as the lake exists. However, it goes on much more rapidly in a newly formed lake, especially if, as in most of these, the margins rise steeply from the waters edge. The greater the exposure to the wind, the more rapid the erosion of the shores and the greater the turbidity.

Even slight fluctuations in water level can be very destructive in lakes. A drop of only a few inches may expose large areas of shoal,

killing the aquatic vegetation and ruining any spawning beds which may be present. In lakes such as most of these where turbidity limits the productive shoal to the upper few feet, the effect of variations in level is likely to be especially harmful. It is probable that these two factors are responsible to a large extent for the poor repute in which the impoundments of the Huron River have been held by fishermen.

Some of the impoundments are reported to be drained entirely at times. The reason for such drainage is not known but it can be easily seen that the effect on all forms of aquatic life would be disastrous. It would probably require several years for the plants and animals to become re-established and for fishing to recover. If these reservoirs are to be maintained as fishing waters such drainings must be kept at an absolute minimum.

Temperature and Chemical Characteristics

The temperature and chemical factors operating in these lakes are summarized in Table 14.

Summer surface temperatures varied from 65.0° F. at Geddes Lake on a cloudy afternoon in July, 1943, to 82.4° at Papermill Lake on a clear morning in August, 1943. The average for the 51 stations on the nine lakes was 73.2° F. Bottom temperatures were only slightly lower, 71.5° F. being the average for 26 stations distributed among the nine lakes. The lowest was 66.0° at a depth of 21 feet in Barton in August, 1939, and the highest 80.8° at 12 feet in Papermill in August, 1943. Thermal stratification was noted at only one station (#20) in Belleville Lake on June 28, 1939. There a thermocline (zone in which water temperature drops very rapidly) was present. The temperature dropped from 73.4° at 16 feet to 68.7 at 26 feet, a decrease of nearly 0.50° per foot. There was no decrease from the 26-foot depth on to the bottom (33-foot). This stratification was not evident when the

same section of Belleville was examined in 1943. The temperatures noted for these lakes are well within the range of toleration for all warm water species of fish and should serve to promote maximum growth.

The surface waters of all the lakes contained adequate amounts of dissolved oxygen (4.6-12.2 p.p.m.) The fact that in several of the lakes the amount of oxygen was less at the bottom, particularly at the greater depths, is evidence of a certain degree of chemical stratification. At station number 20 on Belleville, where a thermocline was present as noted above, oxygen was entirely absent at the bottom and only 0.4 p.p.m. was present at the bottom of the thermocline. Other examples of decreased amounts of dissolved oxygen at the bottom are to be noted in Ford Lake and to a lesser extent in Flat Rock, Papermill, and Superior. Except in the case of the deeper water of Belleville Lake, however, it is unlikely that the oxygen supply was decreased to such an extent as to be a serious limiting factor to aquatic life.

Carbon dioxide was absent from the surface waters of all the lakes. It was present, however, in the deeper water, especially where the amount of dissolved oxygen was decreased. This is further evidence of chemical stratification. In no case is it likely that the concentration was great enough to be harmful to aquatic organisms. The water of all the lakes was hard, with a methyl orange alkalinity averaging about 200 p.p.m. This is favorable since it indicates an abundance in the water of the dissolved substance used by plants. The surface waters were all moderatley alkaline, most showing a pH of near 8.0. In only one case was there any significant difference in the pH of the surface and bottom waters. That was in Belleville Lake where the bottom was considerably less alkaline than the surface. This is to be expected when a lake is thermally and chemically stratified. The general alkaline condition of the lakes is favorable since moderately alkaline

waters are usually most productive.

On the whole, the chemical conditions in the Huron River impoundments are quite satisfactory for fish populations and growth. The lack of oxygen in the deeper water of Belleville Lake would limit the area available to fish. However, it seems evident that this condition exists only on certain years and under certain conditions; probably late in the summer after extended periods of calm weather. It is possible that the same condition may exist here and perhaps in some of the other reservoirs late in the winter also, but since there have been no reports of winterkill from any of the impoundments it must not reach serious proportions.

Pollution is likely to be a problem on any body of water located in a thickly settled region. The Huron River is no exception. At one time it carried the raw sewage from all towns and cities along its banks. Conditions became quite bad, especially in the lower sections of the river below Ann Arbor and Ypsilanti. Some evidence of these polluted conditions is still to be observed in the impoundments, but there has been much improvement since the larger towns installed disposal plants. Effluents from these plants are still emptied into the river. Normally these effluents should be harmless. However, under present wartime conditions many plants like Ann Arbor's are disposing of nearly twice the amount of sewage they were built to handle and the possibility of pollution again becomes imminent. The same is true of the wastes of some of the industrial plants which are dumped directly into the river. Another possible source of severe pollution is from the city storm sewers carrying miscellaneous oily wastes washed up from the streets and emptying unrestrainedly into the water. Some pollutants also enter the lake from individual residences along the shores and suburban subdivisions not connected with the

city sewers. These latter usually consist of the overflow from septic tanks and possibly soapy kitchen wastes. While not considered a menace to public health, their presence in the water is likely to produce results quite harmful to most aquatic organisms. But usually their volume is not sufficient to show any appreciable effect in the lake as a whole. However, many small inlet streams, where the concentration is greater, have been rendered practically barren. It is evident then, that the Huron River is still carrying considerable wastes of one form or another. Since the impoundments check the flow of the stream, they probably act as settling basins and receive a disproportionately large share of the material brought down. The decay of this material may account in part for the decreased amount of dissolved oxygen and the relatively large amounts of carbon dioxide in the deeper waters of the lower lakes. Aside from this no serious effects of pollution were noted at the time of the survey. The pollution problem, however, needs to be constantly born in mind in connection with a system of this kind.

Biological Characteristics

Aquatic plants hold a very important place in the biological economy of a lake. Their photosynthetic activity adds to the supply of dissolved oxygen in the water, they furnish shelter for fish of all sizes, large quantities of fish food organisms live on them, and some fish utilize them for spawning. Every fisherman knows the best fishing spots are near weed beds. The abundance, extent, and composition of its plant beds is probably the best single criterion by which the productivity of a lake may be judged.

Sixty-four species of plants were collected from the nine impoundments. This list includes some marginal and marsh species as well as true aquatics. Table 15 shows the relative abundance of the various plants in the different lakes.

Although the number of species is large, most of them are but sparsely represented and many of the lakes are almost entirely lacking in extensive weed beds. Ford Lake is almost barren of plants, with Belleville, Flat Rock, Superior, and Papermill following in order of increased amounts of vegetation. Milford, Barton, Argo, and Geddes are producing about as many plants as might be expected under present circumstances. As has been suggested before, turbidity and the conditions associated with and resulting from it are probably the most important factors limiting plant development in the reservoirs. It has been pointed out that most other physical and chemical factors are in every way favorable. It is unlikely that anywhere near a maximum possible plant population can be obtained in these lakes until the excessive turbidity is controlled.

The reservoirs vary somewhat in the amount of fish food organisms which they produce. Plankton samples were taken in all the lakes. Plankton consists of free-swimming or floating plants and animals of very small size. They are important because they serve as food for larger fish food organisms and most young fish as well as some game and forage fish. They were found to be moderately abundant in most of the lakes, and in practically all of them animal forms predominated. Since plankton populations are known to vary from day to day and from place to place in a lake, this information is of only general significance.

Insect larvae and other larger fish food organisms varied considerably in abundance. In general, those lakes in which plants were moderately abundant had ample numbers of fish food organisms. This includes the four upper impoundments: Milford, Barton, Argo, and Geddes. Midge larvae were usually most numerous, with aquatic earthworms, water fleas, and mayfly larvae following in order of decreasing abundance. The five lower reservoirs which lacked adequate

plant populations were also deficient in bottom food organisms. Superior Lake showed the most serious deficiency, only a very few midge larvae and aquatic earthworms being found. Flat Rock, Belleville, Ford, and Papermill showed slightly larger numbers of the same animals but in none of them were the organisms abundant enough to support a fish population of reasonable size. It seems probable that this lack of an adequate supply of fish food organisms is due largely to the turbid condition of the water, either directly or indirectly through its limiting effect on aquatic vegetation.

The forty-six species of fish collected and their relative abundance in the individual reservoirs are shown in Table 16. Of the game fish, pumpkinseeds and rock bass were most generally abundant throughout the entire system of impoundments. Perch, bluegills, yellow pikeperch, largemouth bass and smallmouth bass were also rather uniformly distributed through all the reservoirs though in only moderate numbers. Northern pike were quite abundant in the four upper impoundments (Geddes, Argo, Barton, and Milford) but occurred infrequently in the lower impoundments. This correlation with the lack of vegetation in the lower lakes bears out the known preference of this species for weedy waters.

Judging by the collections, common suckers are quite numerous in all the lakes and are rather uniformly distributed. Carp were abundant in the six lower most lakes where their feeding and spawning activities undoubtedly do a great deal to aggravate the turbid conditions of the waters. The blunt-nosed minnow was by far the most abundant and widely distributed forage fish.

Stocking of game fish in these lakes has not been at all consistent. Flat Rock, Papermill, Superior, Geddes, and Argo have received no fish in recent years. During the past five years (1938-1942 inclusive),

for which records are available, Belleville has received 102,500, Ford 10,500, Barton 8,000, and Milford 37,000 bluegill fingerlings. In the same period Belleville also received 8,500, Ford 1,200, Barton 750, and Milford 2,300 largemouth bass fingerlings. Plantings during 1937 of 10,000 yellow perch fingerlings in Ford and 130,000 yellow pikeperch fry in Barton are also of interest.

Scale samples were taken from the game fish collected in order that age determinations might be made. The results of this study are shown in Table 17. Age groups (I, II, etc.) indicate the summers of life completed, thus a fish in age group I is actually in its second growing season. Although the series for each lake and species is too small to warrant the drawing of any definite conclusions, a rough idea of the growth rate may be obtained by comparing the total lengths with the state average total length for each species and age group.

Except in Milford Lake most species of fish showed average or better growth in the lakes. Crappies and rock bass seemed to be doing especially well. In Milford all species were growing slowly. This is evidently a case of over population. The pumpkinseeds from Argo were growing slowly as were also the few collected from Papermill and Geddes. State average total lengths, such as are given in Table 17 for the other species, have not been computed for northern pike and pikeperch. However, it is known that the average northern pike in Michigan reaches legal length (14 inches) in its second summer (Age group I), and the average pikeperch in its third summer (Age group II). From this meager reference point it would seem that northern pike are doing exceptionally well in Geddes and Milford and better than average in Argo and Barton. Pikeperch are probably making about average growth.

Spawning facilities are undoubtedly adequate for all species of fish present in the upper four reservoirs: Geddes, Argo, Barton, and

Milford. They are also probably adequate for the present populations in Papermill and Superior, although neither gravel shoals for centrarchids nor plant beds which are utilized by perch and pike are abundant. In Ford Lake there are adequate gravel shoals but weed beds are very scarce. Weed beds are also inadequate in Belleville, and much of the gravel shoal is spoiled by being covered by sedimentary clay. Flat Rock lacks extensive plant beds and has few shallow areas with gravel bottom. However, all species present there can find ideal facilities within the first mile or two of river above the lake.

Fishways or fish ladders of one sort or another are present at five of the impoundment dams, namely, Flat Rock, Belleville, Papermill, Superior, and Geddes, but none of these were found by survey parties to be functioning. The remaining four dams, namely, Ford, Argo, Barton, and Milford, have no fishways. The question of the usability and the value of fishways is of considerable interest to both dam owners and to fishermen.

Generally speaking, suitable fishways over relatively low dams will be used by migratory fishes, presumably to good advantage. But a dam with a high head is usually an effective barrier to upstream migration even if a fishway is present if the fishway is of the usual type.

The present impoundments, with game species which are essentially non-migratory, should be able to produce adequate fish populations and be independent of migratory species. In fact, fishways which were operating would most likely be used by the least desirable species of fish, such as suckers for example. It is concluded that the satisfactory operation of fish ladders on these impoundment dams would not be an important factor in improving fishing in the impoundments. Therefore the cost of building and maintaining the fishways would not be justified.

Management Suggestions

(1) Fish Regulations.

Although for all practical purposes the impoundments of the Huron River are lakes, they have never been treated as such by law enforcement officers. Rather, they are considered as part of the river, and river fishing regulations are enforced on them. Since river regulations spread the sport of fishing over a much greater part of the year and still give protection to all species needing it (and some which may not need it) during their critical time, no change is suggested in designation.

(2) Artificial Stocking.

Each of the impoundments is believed to have a variety and balance of game species sufficient for a maximum production of fish. The effect of erosion and of the resultant turbidity on the growth of aquatic plants and fish food organisms appears to be the most important factor limiting fish production. Facilities appear to be adequate for the natural reproduction of the game species, and there is no basis for believing that continued artificial stocking would materially increase fish production of the impoundments beyond the limits now fixed by adverse habitat conditions. It is therefore recommended that no further fish stocking be done in these impoundments.

(3) Control of Parasites, Predators, and Obnoxious Fish.

Neither predators nor parasites were unusually abundant or troublesome in any of these waters and no control measures are suggested. Control of carp during periodic drawdowns, and otherwise, would be desirable.

(4) Installation of Brush Shelters.

The three upper impoundments, namely, Argo, Barton, and Milford, have quite adequate shelter furnished by abundant vegetation and numerous

deadheads, etc. Geddes and Papermill are also quite well supplied except in the deeper water where a few brush shelters might prove beneficial. Plants are very scarce in Superior and Ford lakes, and other forms of shelter for fish are not abundant. It is suggested, therefore, that a rather extensive brush shelter program be undertaken in these two lakes. Belleville and Flatrock lakes are fairly adequately supplied with shelter. A number of small brush shelters scattered along shore especially at the lower end of the lakes where plants are scarce should provide some needed protection for young game fish.

(5) Control of water levels.

It has already been pointed out that a fluctuating water level is destructive to the productivity of any lake. Since these lakes were created for the production of power, that purpose may always have first consideration. However, in the interest of fish production, every possible effort should be exerted to keep unavoidable fluctuation at a minimum. It is reported that some of the lakes, notably, Superior, Geddes, Argo, and Barton are drained completely periodically. This is especially destructive since large numbers of fish and other aquatic organisms are stranded. Although some destruction of food and aquatic plants can hardly be avoided when ponds are drained, the loss of larger game and food fish can be minimized by proper precautions. Such draining could be turned to advantage by removing undesirable fish when the ponds are down.

(6) Operation of Fish Ladders on Dams.

Because of the lack of any evidence that fishways on the impoundment dams would materially improve the fishing, the construction and/or maintenance of such fishways is not recommended.

(7) Control of Erosion and Turbidity.

Since the effects of excessive turbidity are definitely very

important limiting factors in the production of weed beds and fish foods, in a majority of the impoundments, a big increase in fish production could be expected to result from a successful program of erosion control. Causes of the turbidity are erosion run-off from surrounding farm lands during rainy weather, and almost continuous wave action in the lakes eroding the steep shores and bottom mud. Conditions of wave action causing turbidity are very severe in Ford and Belleville lakes, and wave action may be an important cause of turbidity in Flat Rock, Papermill, and Superior lakes.

As mentioned previously, the carp, which is abundant in the six lower most impoundments, may be an important contributor to the turbidity of these waters. For it is generally believed that the feeding activities of this species will keep waters almost continuously in a roiled condition, especially on clay soil. There is little doubt that a drastic reduction in the carp populations would greatly benefit sport fishing, but in these large impoundments it would be a difficult task.

The question of wave erosion and turbidity in these reservoirs should be investigated by specialists on the subject to determine the feasibility of installing erosion control devices. It would appear that such installments would be of considerable value in Ford and Belleville lakes and possibly also in Flat Rock, Papermill, and Superior lakes.

INSTITUTE FOR FISHERIES RESEARCH

By C. J. D. Brown and
J. L. Funk

Report approved by: A. S. Hazzard

Report typed by: Mrs. H. Predmore

Part 3: M. Klaphaak

Table 12

Location and Public Use of Huron River Impoundments

Lake	Location				Highways leading to lake	Adjacent towns or cities	Public access	Public parks	Resort picnic ground	Boat liveries	Cottages	Dwellings
	County	T.	R.	Section								
Flat Rock	Wayne	4S.	9,10E.	25,26,31,35,36	Huron R. Dr. U.S. 24-25	Flat Rock	Good	Proposed (DHCMA)*	0	0	0	Several
Belleville	Washtenaw Wayne	3S. 3S.	7E. 8E.	24 14,19-24,28-30	M-56 Huron R. Dr. Textile Rd. Ford Dam Rd.	Belleville	Good	Proposed (DHCMA)	6	5	150	Many
Ford	Washtenaw	3S.	7E.	9,14-16,21-24	Huron R. Dr. Ford Dam Rd.	Ypsilanti	Good	Proposed (DHCMA)	0	0	0	Several
Papermill	Washtenaw	2,3S.	7E.	5,31,32	Huron R. Dr. Superior Rd.	Ypsilanti	Good	Proposed (DHCMA)	0	0	0	Few
Superior	Washtenaw	2S.	7E.	30-32,36	None	Ypsilanti	Limited	Proposed (DHCMA)	0	0	0	3
Geddes	Washtenaw	2S.	6E.	26,27,35,36	Huron R. Dr. Geddes Rd.	Ann Arbor	Good	Proposed (DHCMA)	0	0	0	Few
Argo	Washtenaw	2S.	6E.	16,17,20,21	U.S. 23 Huron R. Dr.	Ann Arbor	Good	Proposed (DHCMA)	1	1	0	Few
Barton	Washtenaw	2S.	6E.	7,8,12,13,17,18	Huron R. Dr. Barton Dr.	Ann Arbor	Excellent	Proposed (DHCMA)	0	2 (?)	0	Several
Milford	Oakland	2N.	7E.	10	County Rds.	Milford	Excellent	Proposed (DHCMA)	0	2 (?)	6	Few

*DHCMA= Detroit-Huron-Clinton Metropolitan Authority

Table 13

Physical Characteristics of Impoundments and Dams on the Huron River

Lake	Area in acres	Maximum depth in feet	Shoreline development	Approximate % of shoal	Bottom types	
					Shoal	Depths
Flat Rock	154	8.75	5.6	100 (70)	Mud, muck, rocks	...
Belleville	1,270	42.6	5.4	75 (20)	Mud, clay, gravel	muck
Ford	975	38	2.8	60 (50)	gravel	sand, muck
Papermill	66	13	2.8	100 (60)	gravel, mud, muck	...
Superior	93	15	4.1	100 (70)	Muck, sand, gravel	...
Geddes	261	16	4.2	100 (90)	Muck, boulders, gravel	gravel, sand, muck
Argo	92	12	3.4	100 (75)	Muck, gravel, boulders	...
Barton	302	33	3.6	(60)	Marl, muck	Marl, muck
Milford	66	18	2.4	100	Fibrous peat, muck	...

Table 13 (Con't.)

Physical Characteristics of Impoundments and Dams on the Huron River

Lake	Color of water	Secchi disc range in feet	Height of dam in feet	Purpose of Dam	Level fluctuation in feet	Year installed
Flat Rock	Colorless	1.0-1.2	7.5	Power, City water	1.0	1922
Belleville	Colorless	1.9-4.0	32	Power	0.5	1924-25
Ford	Green	6.0-8.7	33	Power	1.0-2.0	1932
Papermill	Colorless	3.0-3.5	13	Power	0.5-1.0	1918
Superior	Colorless	1.3-2.0	16	Power	0.5-1.0	1918 (rebuilt)
Geddes	Colorless	1.2-3.7	18	Power	0.5-1.0	1916 (rebuilt)
Argo	Colorless	2.3-2.7	15	Power	0.5-1.0	1914
Barton	Greenish	7.0-8.0	25	Power	0.5-1.0	1913
Milford	Brownish	11.0-11.7	15	Power	0.5-1.0	1938-39 (rebuilt)

Table 14

Temperature and Chemical Characteristics of Huron River Impoundments

Lake	Station	Date	Time	Weather	Surface						Bottom					
					Air temp. (°F.)	Water temp. (°F.)	O_2 p.p.m.	CO_2 p.p.m.	M.O. alk.	pH	Depth (feet)	Water temp. (°F.)	O_2 p.p.m.	CO_2 p.p.m.	M.O. alk.	pH
Flat Rock	1	7-4-39	11:25 A.M.	Overcast	78.0	79.1	7.55	0.0	178	8.2	8	77.7	5.35	0.0	181	8.0
	3	8-25-43	3:30 P.M.	Cloudy	80.0	77.0	8.6	...	194	7.9	9	75.0	5.8	...	183	7.9
	4	8-25-43	2:30 P.M.	Cloudy	79.0	76.0	7.8	...	196	7.9	...	...	...	...	...	...
Belleville	1	6-23-39	3:00 P.M.	Clear	73.0	73.0	9.7	0.0	183	8.5	...	...	...	...	...	...
	3	6-23-39	5:00 P.M.	Clear	73.0	74.0	10.7	0.0	183	8.6	...	...	...	...	...	...
	4	6-24-39	9:00 A.M.	Clear	74.0	73.0	8.0	0.0	191	8.4	...	...	...	...	...	...
	6	6-24-39	11:00 A.M.	Clear	78.0	74.0	8.6	0.0	199	8.4	...	...	...	...	...	...
	8	6-26-39	3:45 P.M.	Clear	79.0	79.0	10.4	0.0	173	8.6	...	...	...	...	...	...
	10	6-27-39	9:45 A.M.	Overcast	80.0	76.0	10.6	0.0	177	8.6	16	70.0	1.1	2.0	193	7.6
	16	6-27-39	4:00 P.M.	Cloudy	84.0	81.0	12.2	0.0	171	8.6	20	73.0	2.3	1.0	182	7.8
	17	6-28-39	11:00 A.M.	Clear	84.0	80.6	10.6	0.0	161	8.4	33	68.7	0.0	6.5	194	7.2
	⁂20	6-28-39	4:15 P.M.	Clear	87.0	80.6	11.8	0.0	160	8.6	33	68.7	0.0	7.5 (?)	181	7.2
	21	8-18-43	3:30 P.M.	Clear	74.0	75.0	7.5	...	190	7.9	25	73.0	7.3	...	190	7.9
	22	8-20-43	10:00 A.M.	Partly cloudy	74.0	74.0	4.8	...	208	7.8	...	...	...	...	...	...
Ford	1	9-15-38	2:30 P.M.	Cloudy	69.8	69.4	7.1	0.0	165	7.9	27	68.0	0.6	4.0	176	7.6
	2	9-15-38	5:30 P.M.	Cloudy	69.3	69.6	6.9	0.0	168	8.0	25	68.9	4.1	5.0	180	7.8
	3	9-15-38	1:00 P.M.	Cloudy	69.8	69.6	5.6	0.0	172	8.0	30	68.4	1.9	6.0	180	7.8
	4	9-15-38	4:00 P.M.	Cloudy	71.6	69.3	7.3	0.0	195	8.0	...	...	...	...	...	...
	5	8-10-43	10:30 A.M.	Clear	80.0	78.8	6.8	...	210	7.9	33	75.4	2.9	...	227	7.6
	6	8-11-43	9:30 A.M.	Clear	71.0	76.0	5.8	...	215	7.7	...	...	...	...	...	...
Papermill	1	6-22-39	10:00 A.M.	Overcast	80.0	73.0	5.7	0.0	202	8.0	...	...	...	...	...	...
	5	6-22-39	1:30 P.M.	Overcast	82.0	76.0	8.5	0.0	199	8.0	13	72.9	6.4	0.0	196	8.0
	6	8-2-43	10:30 A.M.	Clear	78.0	82.4 (?)	6.8	...	210	7.6	12	80.8	7.5	...	...	7.7
Superior	1	7-1-39	11:00 A.M.	Clear	86.2	78.1	7.8	0.0	192	8.0	16	74.3	4.6	4.0	192	7.8
	3	7-1-39	5:00 P.M.	Clear	75.0	74.0	6.4	0.0	191	8.0	...	...	...	...	...	...
	4	7-29-43	3:00 P.M.	Clear	...	...	7.6	...	205	7.9	12	...	5.9	...	209	7.8
	5	8-2-43	4:00 P.M.	Clear	84.0	76.0	7.4	...	205	8.0	...	...	...	...	...	...
	6	8-2-43	4:30 P.M.	Clear	84.0	70.0	9.2	...	240	8.0	...	...	...	...	...	...
Geddes	1	6-19-39	9:30 A.M.	Clear	73.0	70.0	7.3	0.0	198	8.2	...	...	...	...	...	...
	2	6-19-39	11:00 A.M.	Clear	76.0	76.0	8.5	0.0	184	8.2	...	...	...	...	...	...
	8	6-20-39	10:00 A.M.	Clear	78.0	75.0	7.9	0.0	195	8.2	15	74.0	7.9	0.0	195	8.2
	9	6-20-39	3:30 P.M.	Clear	83.0	81.0	9.7	0.0	202	8.3	...	...	...	...	...	...
	10	6-20-39	5:30 P.M.	Clear	81.0	79.0	11.9	0.0	201	8.3	...	...	...	...	...	...
	11	7-3-43	9:00 A.M.	Clear	76.0	70.1	8.4	...	235	7.9	...	...	...	...	...	...
	12	7-6-43	3:30 P.M.	Cloudy	76.0	65.0	7.4	...	315	7.8	...	...	...	...	...	...
	13	7-7-43	8:30 A.M.	Overcast	66.0	73.9	6.8	...	229	7.9	12	73.9	6.6	...	...	7.9
Argo	1	6-14-39	1:30 P.M.	Clear	75.0	68.0	7.2	0.0	200	8.0	...	...	...	...	...	...
	2	6-14-39	3:45 P.M.	...	77.0	68.0	7.0	0.0	203	8.0	...	...	...	...	...	...
	3	6-16-39	5:00 P.M.	Overcast	67.0	68.0	7.3	0.0	200	8.0	...	...	...	...	...	...
	4	6-15-39	10:30 A.M.	Overcast	73.0	66.0	6.9	0.0	197	8.0	...	...	...	...	...	...
	6	6-15-39	2:30 P.M.	Overcast	78.0	67.0	7.4	0.0	198	8.0	...	...	...	...	...	...
	9	6-16-39	9:30 A.M.	Clear	68.0	67.0	7.7	0.0	198	8.0	...	...	...	...	...	...
	10	6-16-39	11:30 A.M.	...	70.0	...	...	...	...	...	10	69.0	7.7	0.0	199	8.0
	11	7-16-43	10:00 A.M.	Clear	79.0	77.5	6.4	...	229	7.7	9	76.8	5.7	...	...	7.8
Barton	1	8-7-38	3:30 P.M.	Cloudy	68.0	68.0	4.6	0.0	179	8.3	21	66.0	4.1	0.0	212	8.1
	2	8-8-38	10:30 A.M.	Clear	67.0	67.0	5.1	0.0	210	8.4	4	68.0	4.6	0.0	200	8.4
	3	8- -38	...	...	...	67.8	8.8	0.0	194	8.0	10	66.6	8.5	0.0	196	8.0
	4	8- -38	...	...	...	67.6	9.0	0.0	191	8.1	12	66.6	8.5	0.0	191	8.1
	10	7-8-43	10:00 A.M.	Partly cloudy	72.0	74.5	6.6	...	225	7.9	26	72.9	2.9	...	256	7.9
Milford	1	8-4-38	1:00 P.M.	Rain	70.0	68.0	9.3	0.0	182	8.0	10	68.0	9.2	0.0	168	8.0
	2	8-4-38	2:00 P.M.	Rain	70.0	68.0	9.3	0.0	180	8.0	10	68.0	8.7	0.0	160	8.0
	3	8- -38	...	...	...	68.0	8.8	0.0	170	8.0	...	...	...	...	...	...
	4	7-22-43	3:30 P.M.	Clear	75.0	76.6	5.7	...	185	7.6	12	75.7	5.6	...	187	7.6

⁂A thermocline was present at this station in Belleville impoundment at the time of the survey. The following facts were noted:

Top of thermocline						Bottom of thermocline					
Depth (ft.)	Water temp. (°F.)	O_2 p.p.m.	CO_2 p.p.m.	M.O. alk.	pH	Depth (ft.)	Water temp. (°F.)	O_2 p.p.m.	CO_2 p.p.m.	M.O. alk.	pH
16	73.4	8.7	0.0	208	8.4	26	68.7	0.4	2.5	168	7.6

Table 15

Kinds and Abundance of Aquatic Plants in the Huron River Impoundments

D=Dense, M=Medium, and S= Sparse, in abundance

Common Name	Scientific Name	Impoundment and year													
		Milford		Barton		Argo		Geddes		Superior		Papermill ✓	Ford ✓	Belleville ✓	Flat Rock ✓
		1938	1943	1938	1943	1939	1943	1939	1943	1939	1943	1943	1943	1943	1943
Muskgrass	Chara sp?	D	M	S	M	...	S	...	...	...	...	...	...	...	...
(Plank)	Marsilea quadrifolia	...	...	...	S	...	...	...	...	...	...	...	...	...	...
Horsetail	Equisetum fluviatile	...	...	S	...	...	...	...	...	...	...	...	...	...	...
Quillwort	Isoetes sp?	...	S	...	S	...	...	...	...	...	...	...	...	...	...
Narrow-leaved cattail	Typha angustifolia	...	...	...	...	S	...	...	S	...	...	...	...	...	...
Common Cattail	Typha latifolia	...	S	S	S	...	S	...	S	...	S	S	S	S	S
Bur Reed	Sparganium eurycarpum	...	...	S	S	...	...	...	...	...	...	...	S	...	...
Bur Reed	Sparganium sp?	S	S	S	...	...	S	...	...	...	...	M	...	...	...
Pondweed	Potamogeton americanus	D	D	M	M	D	D	M	M	D	S	M	...	...	M
Large-leaf pondweed	Potamogeton amplifolius	M	M	M	D	M	M	...	...	D	S	...	...	...	...
Pondweed	Potamogeton angustifolius	...	S	...	...	...	...	...	S	...	...	...	...	...	...
Pondweed	Potamogeton Buchtoldii	...	S	...	...	...	M	...	...	...	...	...	...	S	...
Pondweed	Potamogeton crispus	...	...	...	...	...	...	...	...	...	...	...	...	M	S
Pondweed	Potamogeton foliosus, var. marcellus	...	...	M	...	...	...	...	...	...	...	...	...	...	...
Pondweed	Potamogeton filiformis	...	...	...	...	...	...	...	...	...	S	...	...	...	...
Pondweed	Potamogeton Friesii	...	...	...	...	...	...	...	S	...	...	...	...	...	...
Variable pondweed	Potamogeton gramineus	...	S	...	...	...	...	...	...	...	...	...	...	...	...
Pondweed	Potamogeton gramineus, var. graminifolius, f. myriophyllus	...	M	...	...	...	...	...	...	...	...	...	...	...	...
Floating-leaf pondweed	Potamogeton natans	S	S	...	...	...	...	...	...	...	...	...	...	...	...
Sago pondweed	Potamogeton pectinatus	M	S	M	M	S	S	M	D	D	...	...	S	S	...
Whitestem pondweed	Potamogeton praelongus	...	S	...	...	...	...	...	...	...	...	...	...	...	...
Clasping-leaf pondweed	Potamogeton Richardsonii	...	...	S	S	S	...	M	S	...	...	...	...	...	...
Pondweed	Potamogeton vaginatus	...	...	...	...	...	...	...	...	...	...	...	...	S	S
Flat-stemmed pondweed	Potamogeton zosteriformis	M	D	S	M	D	M	D	M	...	...	...	...	...	...
Bushy pondweed	Najas flexilis	D	M	M	D	...	S	...	...	...	...	...	...	...	...
Arrowhead	Sagittaria cuneata	...	S	...	...	...	...	...	...	...	...	...	...	...	...
Wapato	Sagittaria latifolia	...	...	...	...	...	...	...	...	...	S	S	S	S	S
Wapato	Sagittaria sp?	S	M	S	...	...	...	...	...	...	...	...	...	...	...
Waterweed	Anacharis canadensis	S	M	S	S	M	M	D	M	...	...	...	...	...	...
Wild celery	Vallisneria americana	...	S	M	S	...	S	S	S	...	...	...	...	...	...

✓ No plant collections were made from Papermill, Ford, Belleville, and Flat Rock lakes in the 1938-39 survey. However the following notes were made on the vegetation:
Flat Rock (1939)- Lilies, Potamogetons (pondweeds), and Scirpus (bulrush), not abundant except in upper end.
Belleville (1939)- Vegetation beds are very limited in extent. Broad shoal areas in the upper end of lake^with spotted a few plants, but they are not extensive.
Ford (1938)- No aquatic vegetation was found in the reservoir.
Papermill (1939)- Potamogeton (pondweed), Elodea (Anacharis-waterweed), Myriophyllum (water Milfoil) complex in beds on north shore.

Table 15 (Con't.)

Kinds and Abundance of Aquatic Plants in the Huron River Impoundments

D=Dense, M=Medium, and S=Sparse, in abundance

Common name	Scientific name	Impoundment and year													
		Milford		Barton		Argo		Geddes		Superior		Papermill ✓	Ford ✓	Belleville ✓	Flat Rock ✓
		1938	1943	1938	1943	1939	1943	1939	1943	1939	1943	1943	1943	1943	1943
Northern Wild Rice	Zizania aquatica, var. angustifolia	M	...	S	...	...	...	...	...	...	...	...	...	...	...
Wild rice	Zizania sp?	...	M	...	...	...	...	...	...	...	...	...	...	...	...
Reed canary grass	Phalaris arundinacea	...	...	...	...	...	...	...	...	...	...	...	S	...	...
Spike rush	Eleocharis sp?	...	...	...	...	...	S	...	S	...	S	...	...	S	S
Hardstem bulrush	Scirpus acutus	...	...	S	...	M	...	...	...	...	...	...	...	...	...
Softstem bulrush	Scirpus validus	M	S	...	S	...	M	...	M	...	S	S	S	S	M
Bulrush	Scirpus sp?	...	...	S	...	...	...	...	...	...	...	...	...	...	...
Beak rush	Rynchospora sp?	...	...	...	...	...	...	...	...	...	...	...	S	...	...
Sedge	Carex sp?	...	...	...	...	...	...	...	S	...	...	...	S	S	S
Arrow arum	Peltrandra virginica	...	...	S	S	M	D	...	M	...	D	S	S	S	...
Big Duckweed	Spirodela polyrhiza	S	S	...	...	...	S	...	S	...	...	...	...	...	...
Lesser duckweed	Lemna minor	S	...	...	...	...	...	...	...	...	...	...	...	...	...
Pickerelweed	Pontederia cordata	M	S	S	S	...	S	...	S	...	...	S	...	...	...
Hedge star grass	Heteranthera dubia	...	S	S	S	...	M	...	M	...	...	...	...	...	...
Soft rush	Juncus effusus	...	...	...	...	...	...	...	...	...	...	...	S	...	...
Iris	Iris versicolor	...	S	...	...	...	...	...	S	...	...	...	...	...	S
Smartweed	Polygonum coccineum	...	...	...	...	S	...	...	...	...	...	...	...	...	...
Mild water pepper	Polygonum hydropiperoides	...	...	S	...	...	...	...	...	...	...	...	...	...	...
Smartweed	Polygonum natans forma genuinum	S	...	S	...	...	...	...	...	...	...	...	...	...	...
Smartweed	Polygonum sp?	...	S	...	S	...	M	...	S	...	...	...	...	S	...
Coontail	Ceratophyllum demersum	D	S	S	S	M	M	M	M	...	S	...	S	S	S
White water lily	Nymphaea odorata	S	...	...	M	S	M	S	D	...	...	S	...	...	S
White water lily	Nymphaea tuberosa	...	M	M	...	...	...	...	...	D	D	M	...	S	...
White water lily	Nymphaea sp.	...	...	...	...	...	...	...	...	S	...	...	...	...	...
Yellow water lily	Nuphar advena	S	...	...	...	...	...	...	...	D	...	M	...	S	M
Stiff water crowfoot	Ranunculus longirostris	...	S	...	S	S	...	...	S	...	...	...	...	...	...
Water milfoil	Myriophyllum exalbescens	...	D	...	...	...	...	...	...	...	...	...	...	...	...
Water milfoil	Myriophyllum heterophyllum	...	...	...	S	...	M	...	...	...	...	...	...	...	...
Water milfoil	Myriophyllum sp?	D	...	S	...	...	...	...	...	...	...	...	...	...	...
Swamp milkweed	Asclepias incarnata	...	S	...	...	...	S	...	...	...	S	...	...	S	S
Nightshade	Solanum Dulcamara	...	...	...	...	...	S	...	...	...	...	...	...	...	...
Monkey flower	Mimulus glabratus	...	S	...	...	...	S	...	...	...	...	...	...	...	...
Bladderwort	Utricularia vulgaris	S	M	...	...	...	S	...	...	...	...	...	...	...	...
Marsh bellflower	Campanula aparinoides	...	S	...	...	...	...	...	...	...	...	...	...	...	...

✓ No plant collections were made from Papermill, Ford, Belleville, and Flat Rock lakes in the 1938-39 survey. However the following notes were made on the vegetation:
Flat Rock (1939)- Lilies, Potamogetons (pondweeds), and Scirpus (bulrush), not abundant except in upper end.
Belleville (1939)- Vegetation beds are very limited in extent. Broad shoal areas in the upper end of lake spotted with a few plants, but they are not extensive.
Ford (1938)- No aquatic vegetation was found in the reservoir.
Papermill (1939)- Potamogeton (pondweed), Elodea (Anacharis-waterweed), Myriophyllum (water Milfoil) complex in beds on north shore.

Table 16

Kinds and Abundance of Fishes in the Huron River Impoundments

A=Abundant, C=Common, F=Few, R=Reported
(Not collected by Institute
for Fisheries Research)

Fish	Flat Rock	Belleville	Ford	Papermill	Superior	Geddes	Argo	Barton	Milford
GAME FISH									
Northern pike	F	R	...	F	R	A	C	A	A
Mud pickerel	...	...	...	...	F	F	F	...	...
Yellow perch	...	F	C	C	F	F	F	F	C
Yellow pikeperch	F	F	F	F	F	C	F	C	...
Smallmouth bass	F	F	R	R	...	R	F	C	R
Largemouth bass	F	F	R	R	...	R	F	F	C
Bluegill	R	C	F	F	...	R	C	F	A
Pumpkinseed sunfish	F	C	C	F	F	C	A	...	A
Green sunfish	...	F	...	...	...	...	F	R	F
Long-ear sunfish	...	...	...	F	F	...	F	C	F
Rock bass	R	F	F	C	R	C	A	A	C
Black Crappie	C	C	F	...	...	F	C	F	A
White crappie	C	F	...	...	...	...	...	...	...
COARSE FISH									
Common sucker	F	C	C	C	F	C	C	C	A
Mullet sp.	C	...	...	...	...	...	C	C	...
Hog molly	...	...	...	...	...	...	F	...	...
Channel catfish	R	...	...	...	...	...	...	...	...
Brown bullhead	...	R	C	C	...	C	F	...	...
Yellow bullhead	...	...	...	...	...	F	C	C	C
Black bullhead	R	...	F	...	...	...	...	F	...
OBNOXIOUS FISH									
Long nose gar	...	...	...	F	R	F	F	R	R
Carp	A	C	A	A	C	A	F	...	...
Goldfish	F	F	...	...	...	F	...	...	...
Dogfish (bowfin)	...	...	...	...	...	...	F	R	R

Table 16 (Con't.)

Kinds and Abundance of Fisher in the Huron River Impoundments

A=Abundant, C=Common, F=Few, R=Reported
(Not collected by Institute
for Fisheries Research)

Fish	Flat Rock	Belleville	Ford	Papermill	Superior	Geddes	Argo	Barton	Milford
FORAGE FISH									
Bigmouth shiner	...	...	...	...	...	...	A	...	...
Mimic shiner	...	...	F	...	...	...	...	...	...
Rosy face shiner	...	...	...	...	...	...	F	...	...
Strawcolor shiner	...	...	F	...	...	...	A	...	...
Steelcolor shiner	F	F	F	F	...	...	...	...	...
Spottail shiner	...	...	...	...	...	...	F	...	...
Silver shiner	...	F	...	...	...	...	...	...	...
Common shiner	...	...	F	...	...	...	...	R	C
Golden shiner	...	C	C	C	F	C	...	...	...
Bluntnose minnow	F	C	C	A	A	A	A	R	A
River chub	...	...	...	...	...	...	C	...	...
Creek chub	...	...	...	...	F	...	...	...	...
Blackband topminnow	...	...	...	...	...	...	...	...	F
Log perch	...	C	...	F	...	...	C	R	C
Johnny darter	F	...	...	...	...	...	...	...	...
Rainbow darter-	...	...	...	...	...	...	F	...	...
Iowa darter	...	...	...	...	...	...	...	...	C
Blackside darter	...	...	...	...	...	...	F	...	...
Greenside darter	...	...	F	...	...	...	...	...	...
Silversides	...	C	...	...	...	...	C	...	A
Stonecat	...	F	...	...	...	...	...	...	...
Muddler (bairdii)	...	...	...	...	...	...	F	...	...

Table 17

Growth Rate of Fish Taken from the Huron River Impoundments

Lake	Species	Age group	Number of specimens	Av. total length in inches	Av. weight in ounces	State av. total length in inches ✓
Flat Rock	Northern pike	0	2	11	5	...
	Yellow pikeperch	III	1	16 3/4	28	...
	Black crappie	I	2	5 5/8	1	5.3
	White crappie	I	3	6	1	...
Belleville	Yellow perch	II	3	7 1/2	3	6.2
		III	2	8 1/2	4	7.1
	Yellow pikeperch	I	1	10 3/4	7	...
		II	1	13 1/2	14	14.0
		III	1	15 3/4	28	...
		IV	1	17 1/8	25	...
	Smallmouth bass	0	1	4 1/8	1/2	3.7
		II	1	8 1/2	4	8.8
	Largemouth bass	0	2	4	1/2	3.6
	Bluegill	I	1	4 5/8	1	3.0
		IV	1	8 3/4	9	6.7
	Pumpkinseed	I	6	3 5/8	1/2	2.7
		II	5	4 5/8	1 1/2	4.4
		III	2	4 5/8	1 1/2	5.8
	Black crappie	I	3	6 3/8	3	5.3
		II	2	7 1/4	4	5.9
		III	1	7 1/2	4	8.7
		V	1	10 1/8	10	9.7
	White crappie	I	3	5 1/4	1	...
Ford	Northern pike	V	1	27 1/2	...	...
		VIII	1	35 1/2	...	...
	Yellow perch	II	1	8 1/2	4	6.2
		III	4	8 3/4	6	7.1
	Pumpkinseed	I	3	3 3/8	1	2.7
		II	5	5 3/8	2	4.4
	Rock bass	II ?	1	4 7/8	1 1/2	4.3
Papermill	Northern pike	I	1	23 1/2	43	...
	Yellow perch	I ?	1	7	2 1/2	4.7
		II	1	7 3/8	2 1/2	6.2
		III ?	1	6 7/8	2	7.1
	Yellow pikeperch	II	1	16 1/8	...	14.0
	Pumpkinseed	II ?	1	4	1	4.4
		III	2	5	1	5.8
	Rock bass	I	1	4 1/4	1	3.2
		II	5	6 1/4	3	4.3
		III	3	5 7/8	2	4.9
Superior	...	...	...	...	...	...

✓ From Institute Report No. 741, "Growth Rate of Some Michigan Game Fishes," by William C. Beckman.

Table 17 (Con't.)
Growth Rate of Fish Taken from the Huron River Impoundments

Lake	Species	Age group	Number of specimens	Av. total length in inches	Av. weight in ounces	State av. total length in inches ✓
Geddes	Northern pike	I	5	17 7/8	18	14.0
		II	7	22 1/8	42	...
		III	6	25	50	...
	Yellow perch	II	1	9 1/4	6	6.2
		III	1	11 1/8	11	7.1
	Yellow pikeperch	I	2	8 3/4	4	...
		II	1	13 5/8	12	14.0
		III	2	19	37	...
	Pumpkinseed	II	3	3 5/8	1/2	4.4
	Rock bass	III	1	5 3/4	2	4.9
	Black crappie	I	1	5 3/4	2	5.3
Argo	Northern pike	I	2	19 3/4	27	14.0
		II	5	19 1/8	22	...
		III	3	21 1/4	30	...
		IV	4	26	59	...
	Yellow pikeperch	?	1	19	32	...
		VI	1	23 1/8	55	...
	Smallmouth bass	?	1	14 3/4	23	...
	Largemouth bass	II	1	9 7/8	9	8.4
	Pumpkinseed	II	4	3 1/2	1/2	4.4
		III	2	4 1/2	1	5.8
		IV	1	5 5/8	2	6.4
		V	2	5	1 1/2	6.8
	Rock bass	II	3	3 7/8	1/2	4.3
		III	6	5 1/4	1 1/2	4.9
		IV	7	6	2	5.6
	Black crappie	II	1	6 5/8	6 1/2	5.9
		III	7	9 7/8	9	8.7
		IV	4	10	10	9.2
Barton	Northern pike	I	7	15 3/8	11	14.0
		II	1	16 1/2	12 1/2	...
		III	1	20 1/4	...	...
	Perch	II	1	5 1/8	...	6.2
		V	1	11 1/8	9	9.4
	Yellow pikeperch	II	2	18	31 1/2	14.0
		III	1	18 5/8	34	...
		V	1	20 1/4	42	...
	Smallmouth bass	II	1	8 1/2	4 1/2	8.8
		III	2	11 7/8	12 1/2	10.7
	Largemouth bass	0	1	5 1/2	1 1/2	3.6
		II	1	10 1/8	8	8.4
		IV	1	13 3/8	19	12.1
	Bluegill	II	3	5 3/8	1 1/2	4.3
	Rock bass	III	8	5 1/2	1 1/2	4.9
		IV	10	7 5/8	3	5.6

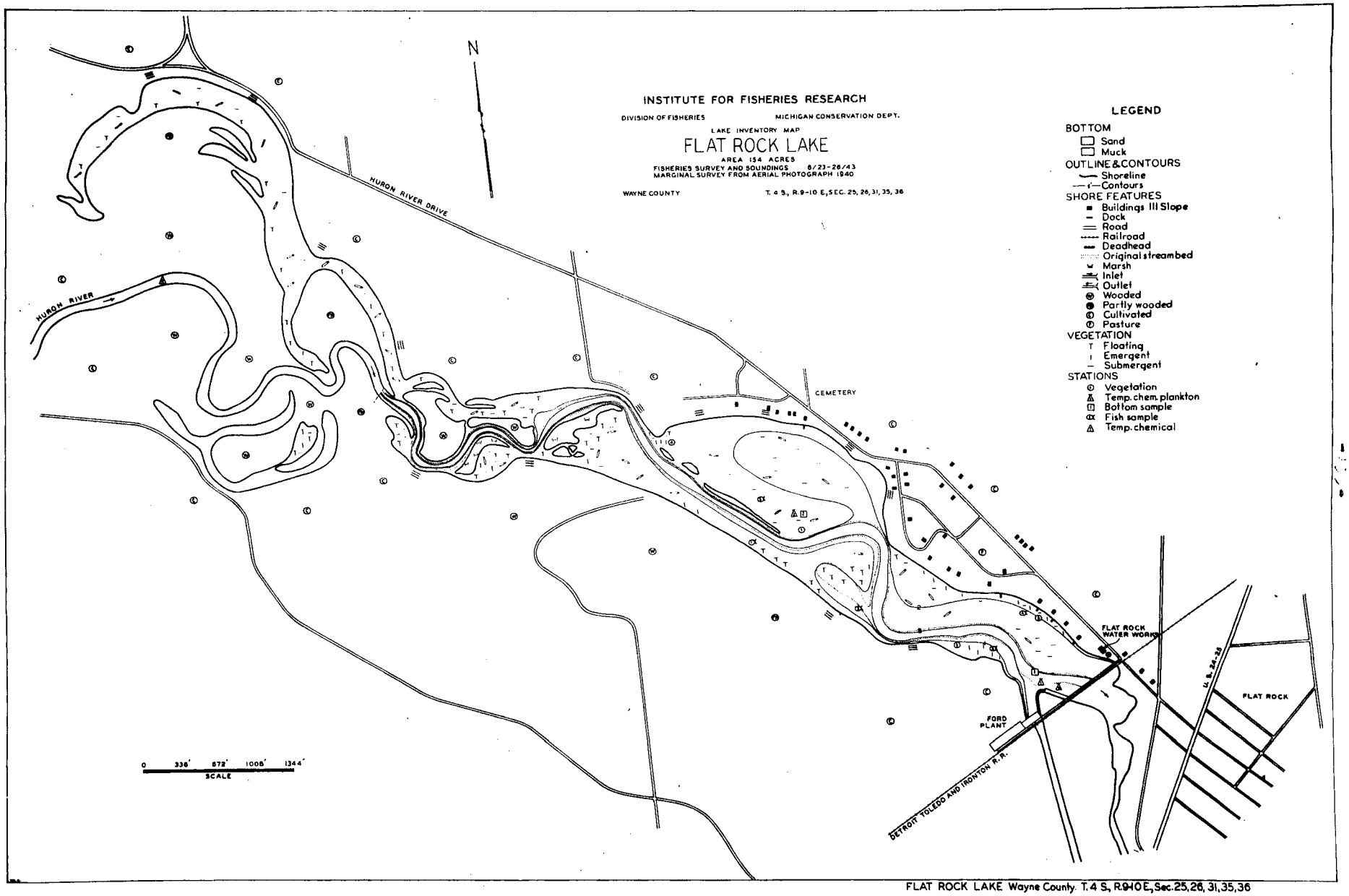
✓ From Institute Report No. 741, "Growth Rate of Some Michigan Game Fishes," by William C. Beckman.

Table 17 (Con't.)

Growth Rate of Fish Taken from the Huron River Impoundments

Lake	Species	Age group	Number of specimens	Av. total length in inches	Av. weight in ounces	State av. total length in inches ✧
(Con't.)						
Barton	Black crappie	I	2	7 7/8	4	5.3
		II	7	8 1/2	5 1/2	5.9
		III	2	10 3/8	10	8.7
		IV	1	11 1/4	13 1/2	9.2
Milford	Northern pike	II	4	19 5/8	21	...
		III	3	22 1/4	36	...
	Perch	III	4	5 3/4	1 1/2	7.1
		IV	1	6 3/8	1 1/2	7.8
	Largemouth bass	0	2	2 1/2	...	3.6
	Bluegills	I	5	2 3/8	...	3.0
		II	5	3 5/8	1/2	4.3
		III	5	4 3/8	1	5.6
		IV	12	5 1/8	1	6.7
		V	14	5 3/4	2	7.4
		VI	2	6 7/8	3 1/2	7.8
	Pumpkinseed	I	1	2 1/4	...	2.7
		II	1	3 7/8	1	4.4
		III	8	4 1/2	1	5.8
		IV	5	4 7/8	1 1/2	6.4
		VI	2	6 1/2	4	7.1
		VII	1	7 1/8	5 1/2	7.8
	Rock bass	II	1	3 3/4	1/2	4.3
		III	1	6 1/8	2 1/2	4.9
	Black crappie	II	12	6 7/8	3	5.9
		III	5	8 3/8	5 1/2	8.7

✧ From Institute Report No. 741, "Growth Rate of Some Michigan Game Fishes," by William C. Beckman.



FLAT ROCK LAKE Wayne County. T. 4 S., R. 9 E., Sec. 25, 26, 31, 35, 36

Figure 1

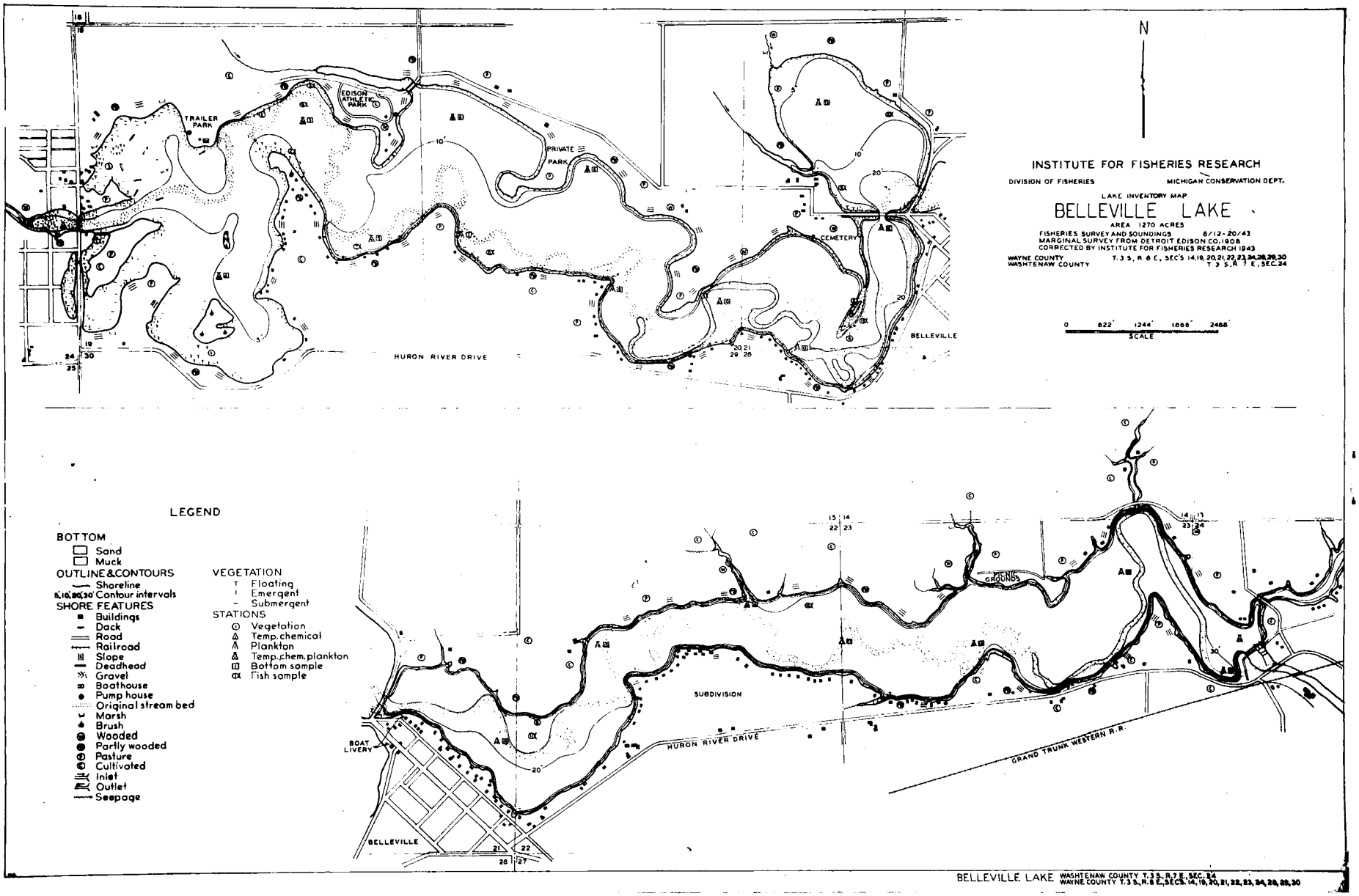
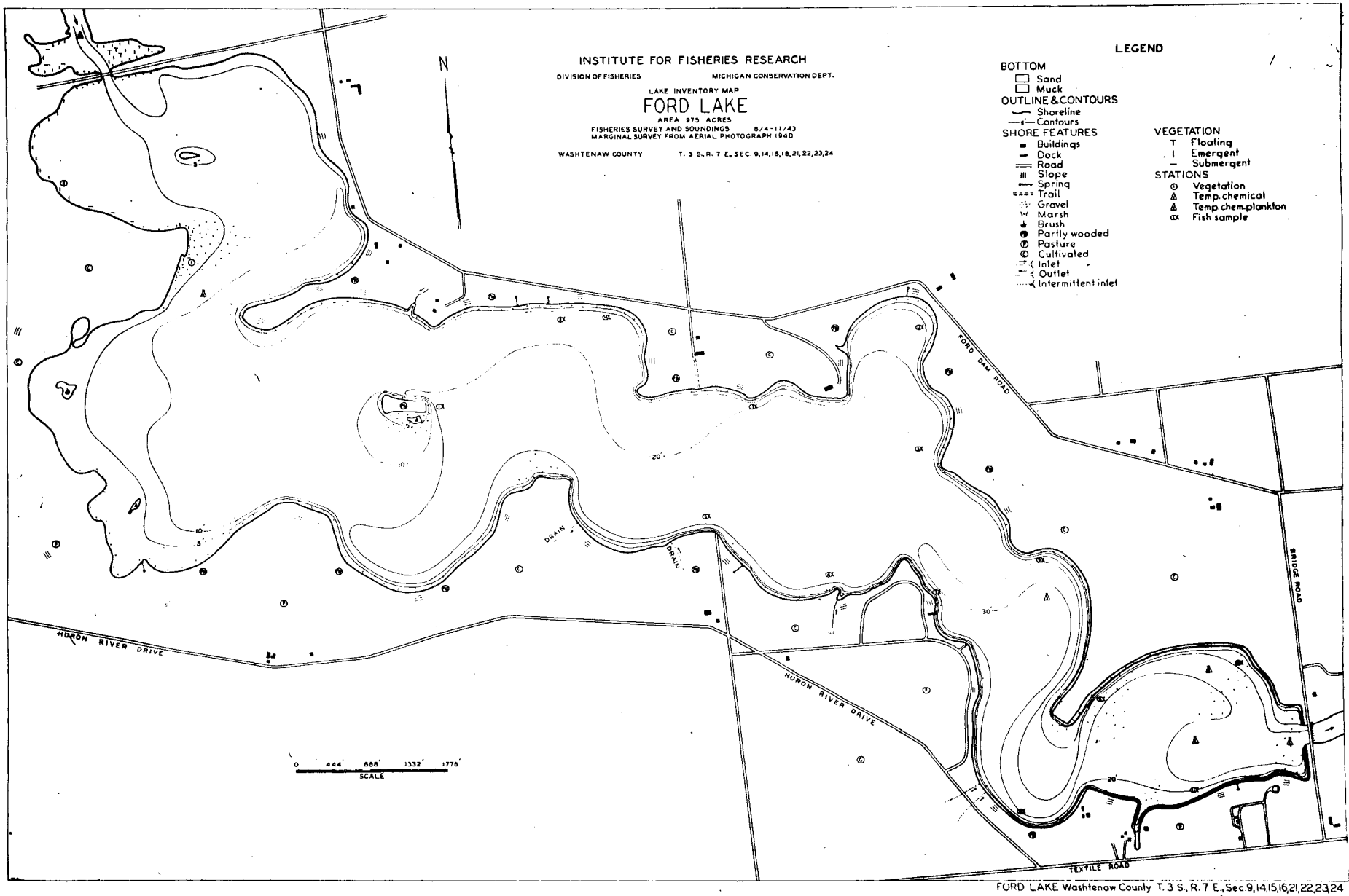
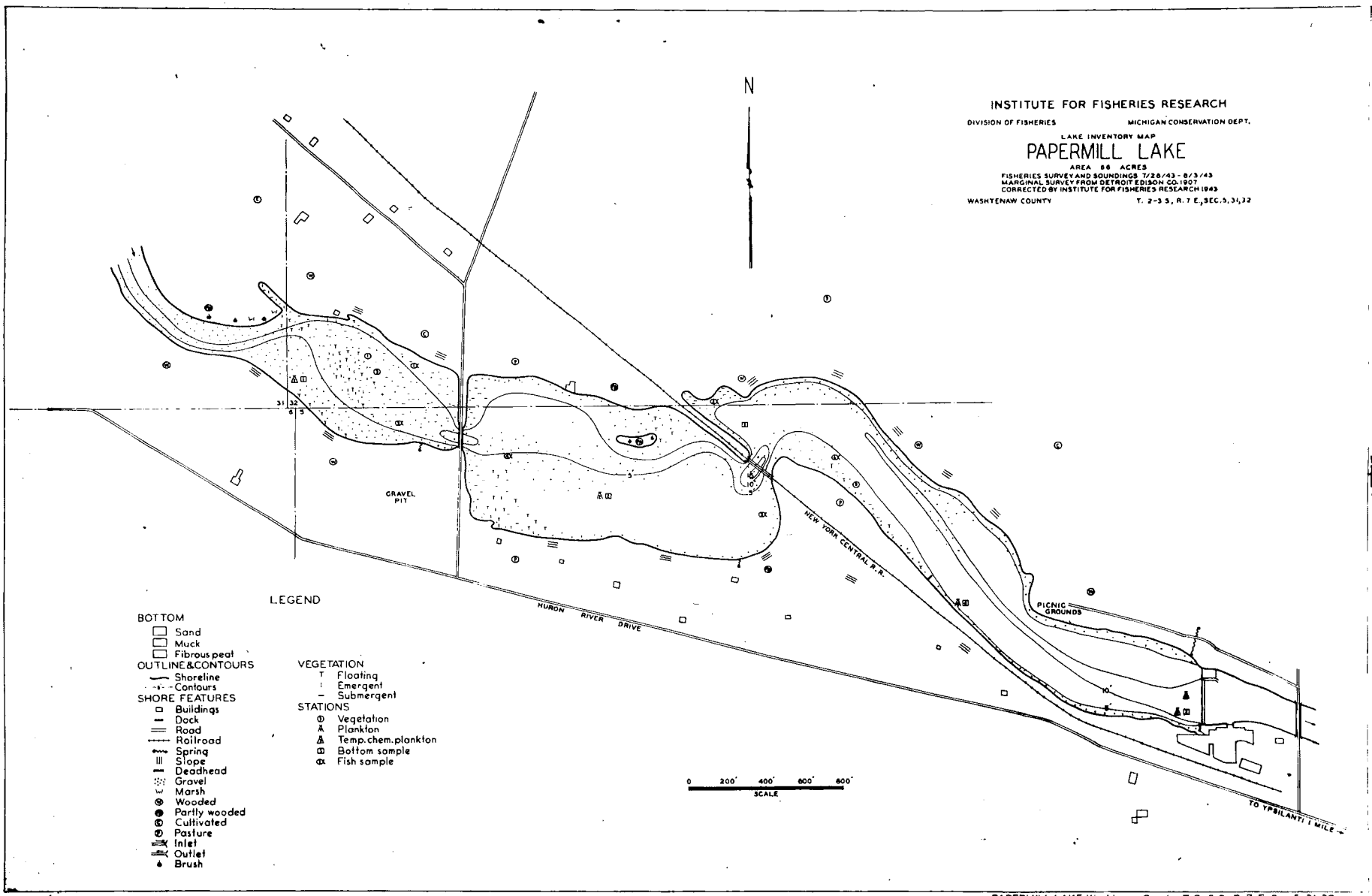

N
INSTITUTE FOR FISHERIES RESEARCH
DIVISION OF FISHERIES
MICHIGAN CONSERVATION DEPT.
LAKE INVENTORY MAP
BELLEVILLE LAKE
AREA 1270 ACRES
FISHERIES SURVEY AND SOUNDINGS 8/12-20/43
MARGINAL SURVEY FROM DETROIT EDISON CO. 1908
CORRECTED BY INSTITUTE FOR FISHERIES RESEARCH 1943
WAYNE COUNTY T. 3 S., R. 8 E., SEC'S 14,18,20,21,22,23,26,28,29,30
WASHTENAW COUNTY T. 3 S., R. 7 E., SEC. 24
0 622' 1244' 1866' 2488'
SCALE
TRAILER PARK
EDISON ATHLETIC PARK
PRIVATE PARK
CEMETERY
HURON RIVER DRIVE
BELLEVILLE
LEGEND
BOTTOM
Sand
Muck
OUTLINE & CONTOURS
Shoreline
Contour intervals
SHORE FEATURES
Buildings
Dock
Road
Railroad
Slope
Deadhead
Gravel
Boathouse
Pump house
Original stream bed
Marsh
Brush
Wooded
Partly wooded
Pasture
Cultivated
Inlet
Outlet
Seepage
VEGETATION
Floating
Emergent
Submergent
STATIONS
Vegetation
Temp. chemical
Plankton
Temp. chem. plankton
Bottom sample
Fish sample
SUBDIVISION
BOAT LIVERY
HURON RIVER DRIVE
GRAND TRUNK WESTERN R.R.
BELLEVILLE
BELLEVILLE LAKE WASHTENAW COUNTY T. 3 S., R. 7 E., SEC. 24
WAYNE COUNTY T. 3 S., R. 8 E., SECS. 14, 18, 20, 21, 22, 23, 24, 26, 28, 30

Figure 2



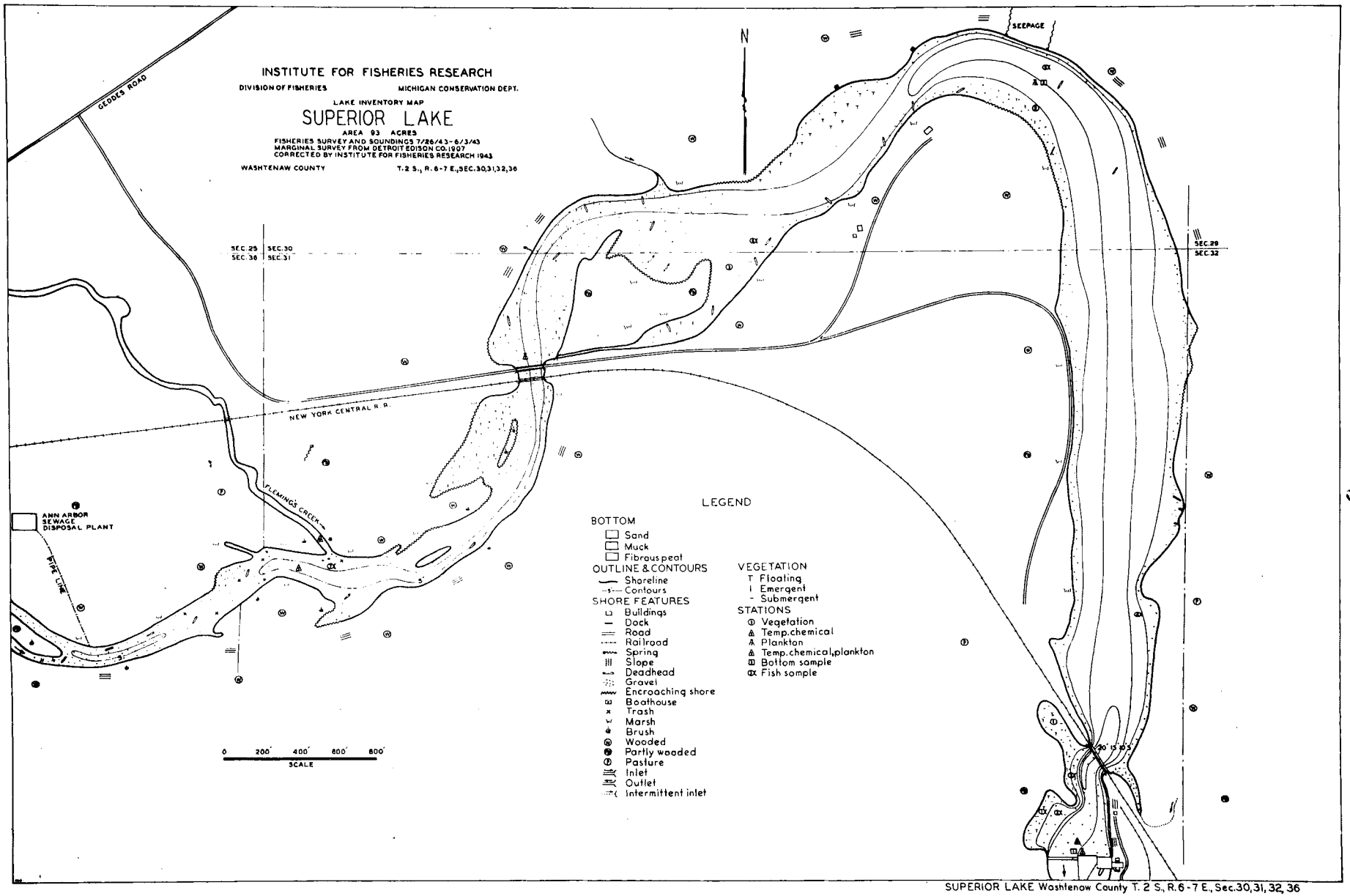
FORD LAKE Washtenaw County T. 3 S., R. 7 E., Sec. 9,14,15,16,21,22,23,24

Figure 3



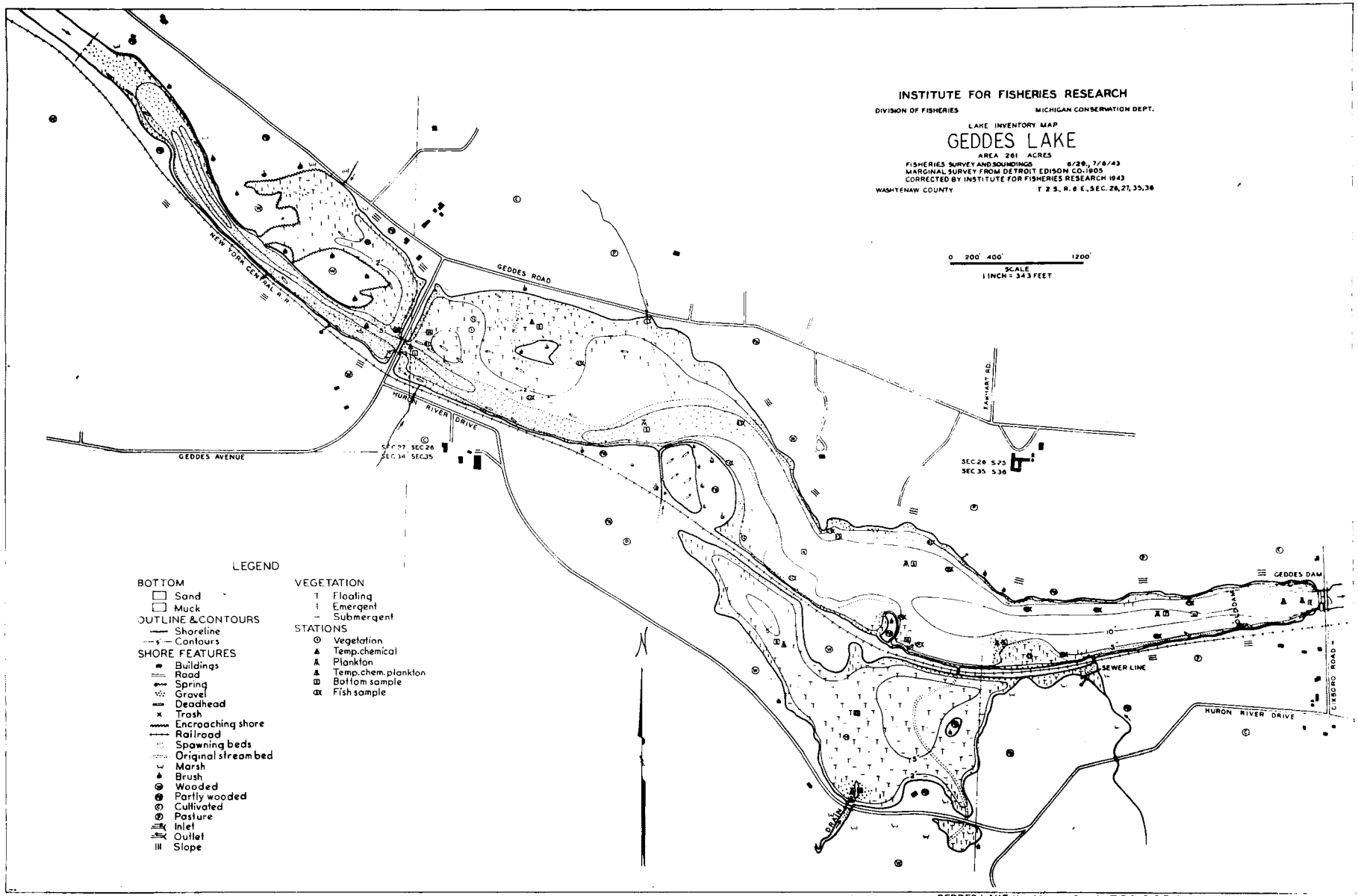
PAPERMILL LAKE Washtenaw County T. 2-3 S., R. 7 E., Sec. 5, 31, 32

Figure 4



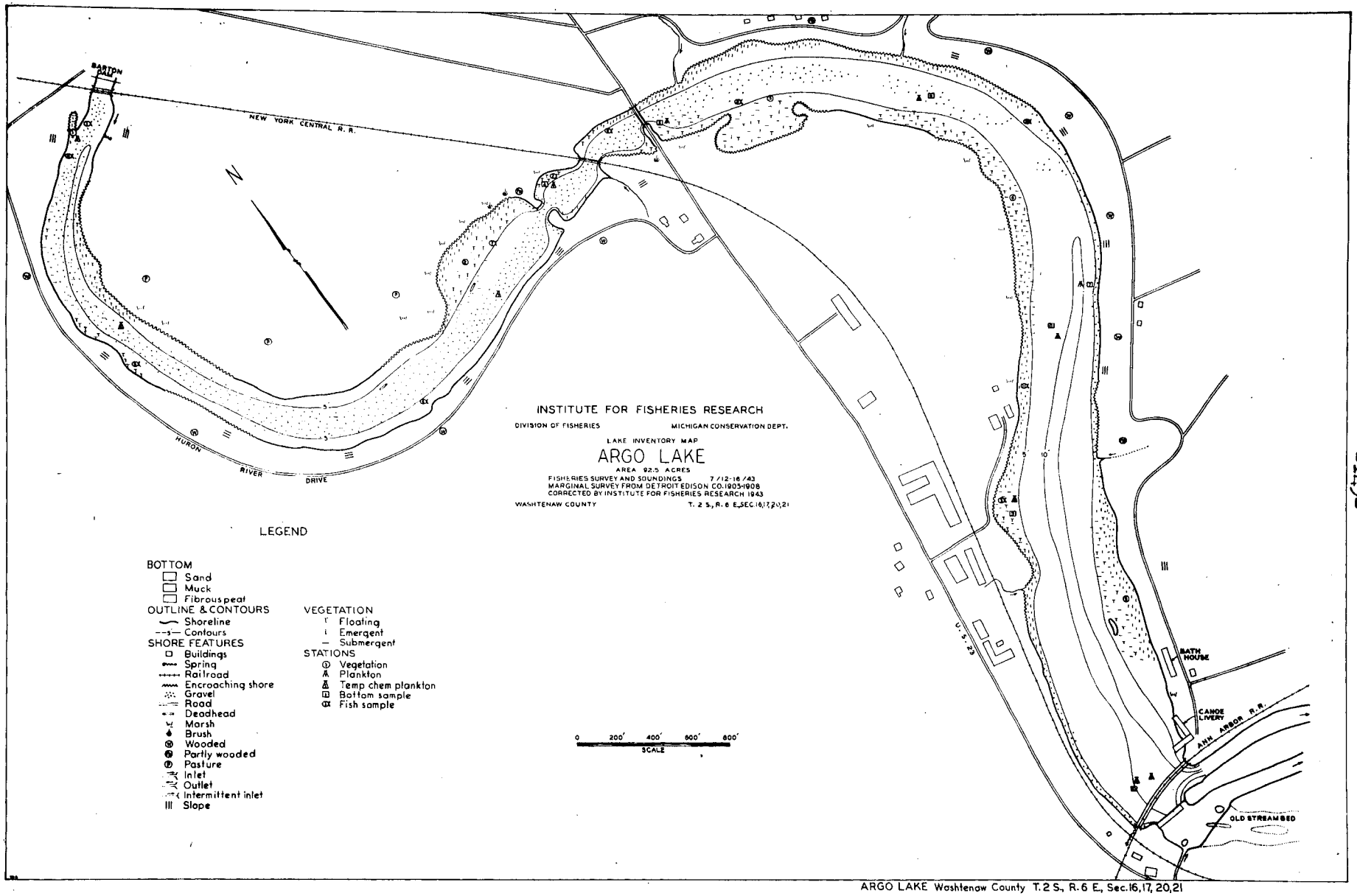
SUPERIOR LAKE Washtenaw County T. 2 S., R. 6-7 E., Sec. 30, 31, 32, 36

Figure 5



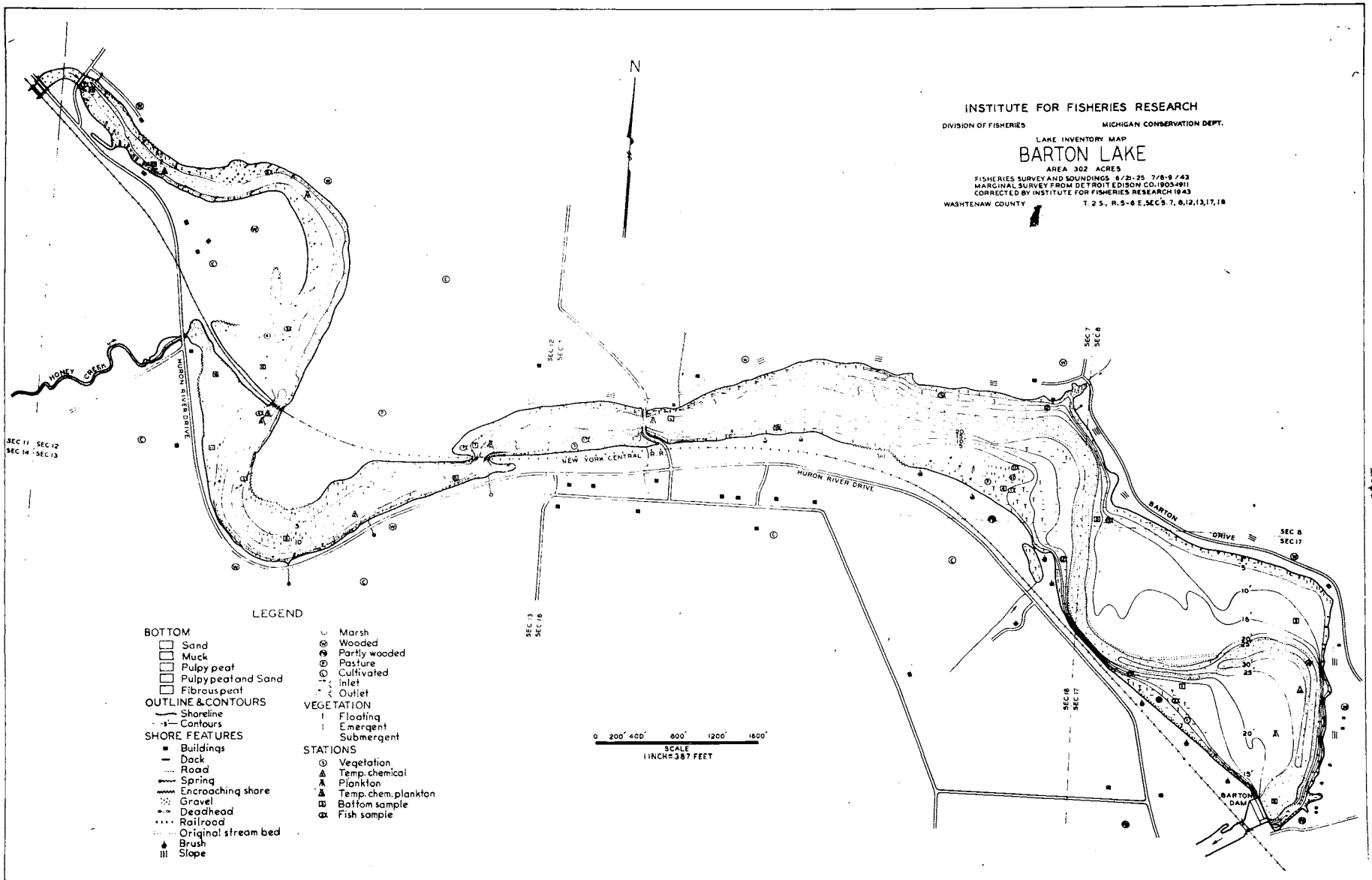
GEDDES LAKE Washtenaw County T. 2 S., R. 6 E., Sec. 26, 27, 35, 36

Figure 6



ARGO LAKE Washtenaw County T. 2 S., R. 6 E., Sec. 16, 17, 20, 21

Figure 7



BARTON LAKE Washtenaw County T. 2 S., R. 5-6 E., Secs. 7, 8, 12, 13, 17, 18

Figure 8

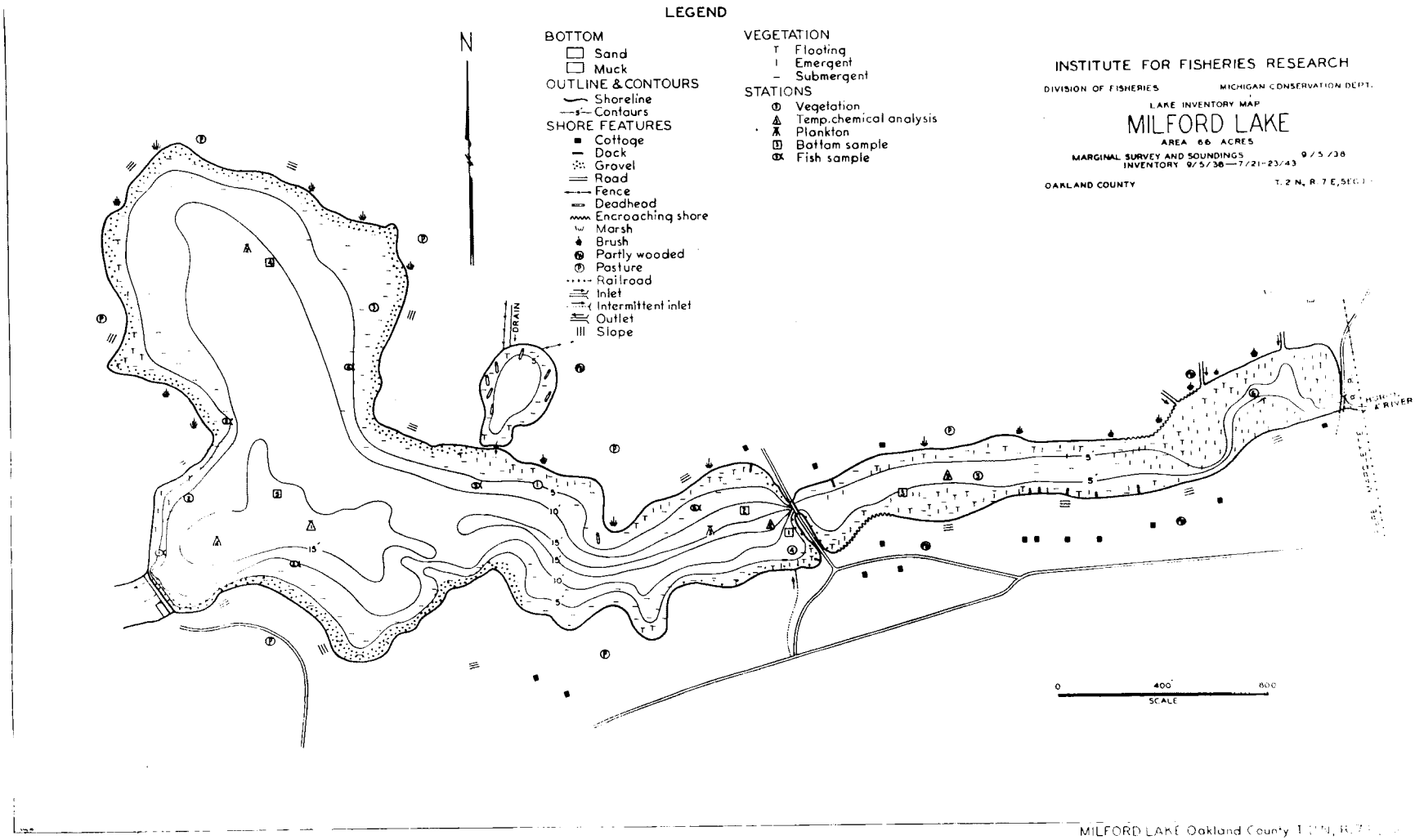

LEGEND
N
BOTTOM
Sand
Muck
OUTLINE & CONTOURS
Shoreline
Contours
SHORE FEATURES
Cottage
Dock
Gravel
Road
Fence
Deadhead
Encroaching shore
Marsh
Brush
Partly wooded
Pasture
Railroad
Inlet
Intermittent inlet
Outlet
Slope
VEGETATION
T Floating
I Emergent
– Submergent
STATIONS
Vegetation
Temp.chemical analysis
Plankton
Bottom sample
Fish sample
INSTITUTE FOR FISHERIES RESEARCH
DIVISION OF FISHERIES MICHIGAN CONSERVATION DEPT.
LAKE INVENTORY MAP
MILFORD LAKE
AREA 66 ACRES
MARGINAL SURVEY AND SOUNDINGS 9/5/38
INVENTORY 9/5/38—7/21-23/43
OAKLAND COUNTY
T. 2 N., R. 7 E., SEC.
DRAIN
HURON RIVER
0 400' 800'
SCALE
MILFORD LAKE Oakland County T. 2 N., R. 7 E.

Figure 9

HURON RIVER SYSTEM

MONROE, WAYNE, WASHTENAW, LIVINGSTON, INGHAM, OAKLAND COUNTIES

T. 1-5 S, 1-4 N R. 2-10 E

MAP FROM U. S. G. S. TOPOGRAPHIC SHEETS WITH CORRECTIONS BY INSTITUTE FOR FISHERIES RESEARCH 1943

0 1 2 3 4 MILES

N

LEGEND

TRIBUTARIES

- (T) PRIMARY TRIBUTARY
- (?) SECONDARY TRIBUTARY
- (?) TERTIARY TRIBUTARY
- (?) QUATERNARY TRIBUTARY
- (?) QUINTAN TRIBUTARY

STATIONS

- ▲ STATION
- ● CHEMICAL STATION
- ■ FISH STATION
- ┼ SECTION BOUNDARY

Sec 1 Sec 2 Sec 3 Sec 4 Sec 5 Sec 6 Sec 7 Sec 8 Sec 9 Sec 10 Sec 11 Sec 12 Sec 13 Sec 14 Sec 15E Sec 15W Sec 16 Sec 17 Sec 18 Sec 19 Sec 20

LIVINGSTON CO.

INGHAM CO.

OAKLAND CO.

JACKSON CO.

WAYNE CO.

WASHTENAW CO.

MONROE CO.

PINCKNEY · GREGORY · UNADILLA · HOWELL · BRIGHTON · MILFORD · MILFORD LAKE · WHITMORE LAKE · SOUTH LYON · DEXTER · CHELSEA · DIXBORO · ANN ARBOR · BARTON LAKE · ARGO LAKE · GEDDES LAKE · SUPERIOR LAKE · PAPERMILL LAKE · YPSILANTI · PLYMOUTH · BELLEVILLE · BELLEVILLE LAKE · RAWSONVILLE · NEW BOSTON · FLATROCK · FLATROCK LAKE · ROCKWOOD · DETROIT RIVER · LAKE ERIE

Figure 10