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Institute for Fisheries
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June 2, 1952

Report No. 1334

OBSERVATIONS ON PIKE SPAWNING AT WHITMORE LAKE, LIVINGSTON AND WASHTENAW
COUNTIES, DURING THE SPRING OF 1952

by

John E. Williams and Charles A. Pfitzmaier

Abstract

During the past winter it was brought to the attention of the Fish Division that the owners of a marshy peninsula on the south side of Whitmore Lake (T. 1 N., R. 6 E., Sec. 32, Livingston County, and T. 1 S., R. 6 E., Sec. 5, Washtenaw County) were contemplating extensive dredging and filling of their property for the purpose of real estate development. The Institute for Fisheries Research was asked to conduct observations to determine what effect, if any, this operation would have on the fish in Whitmore Lake. Since the principal result of such an operation might be on spawning of pike, intensive observations were made this spring during the period of spawning of these fish.

Whitmore Lake is one of the better-known pike lakes in the southeast section of the state and, since it has no active inlet or outlet, pike must find suitable spawning habitat within the lake. All locations where spawning was known to occur in the past, and

all other possible areas, were thoroughly checked and the only location used or usable was on the marsh adjoining the peninsula in question. Spawning was evident at this location on bright sunny days from March 20 to March 30. Many pike were seen and a few pike photographed during this period. The water level maintained itself for at least a month following spawning and advanced pike fry were collected at various locations in the marsh on April 30 and May 8. These pike ranged from 0.4 to 1.3 inches in total length.

The peninsula and marsh were also noted to offer habitat for muskrats, nesting ducks, spawning bowfin (dogfish), largemouth bass and certain members of the sunfish family.

It is concluded that destruction of this marsh by dredging and filling could have no other result than to indirectly cause the serious depletion of the pike population of Whitmore Lake within a few years. Since no spawning area would be available for pike, there could be no spawning. The reduction in numbers of pike and bowfin could have serious results on the balance of the lake and quite possibly could cause general deterioration of the fishing. This in turn would effect the economy of the community.

Recommendations, as a result of these observations, are that the owners of this marsh be prevailed upon to allow this area to remain in its natural state, and that the Fish Division consider the purchase of this area in order that the lake may retain its productive balance.

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During the past winter it was brought to the attention of the Fish Division that the owners of a marshy peninsula on the south side of Whitmore Lake (T. 1 N., R. 6 E., Sec. 33, Livingston County, and T. 1 S., R. 6 E., Sec. 5, Washtenaw County) were contemplating extensive dredging and filling of their property for the purpose of real estate development. The Institute for Fisheries Research was asked to conduct observations to determine what effect, if any, this operation would have on the fish in Whitmore Lake. Since the principal result of such an operation might be on spawning of certain species of fish, it was planned to conduct observations during the spawning season of these species to find out to what extent, and how successfully, spawning occurs on the area in question. Because Whitmore Lake has no active inlet or outlet, it was suspected that filling in of this marsh might especially affect the production of pike in the lake. The spawning and fry-hatching period of pike this year have now been completed, and our observations have also been terminated.

Description of the Lake and its Fishing History

Whitmore Lake is a sand- and peat-bottomed lake of 677 acres, with a maximum depth of 69 feet although 80 percent of the lake is shoal under 15 feet in depth. Most margins of the lake are sand and gravel bottom with a gradual slope so that the lake is ideal for swimming. With so much shoal area, weed production is high and the lake can be classed as a productive one. At the time of the fisheries survey of Whitmore Lake in 1940 (C. J. D. Brown, 1941, I. F. R. Report No. 681) the most abundant sport fishes present were bluegill, yellow perch, largemouth and small-mouth bass, rock bass, pumpkinseed sunfish and black crappie. Pike were not considered abundant at that time. Since that time black crappies and pike have become more abundant while the catch of bluegills has declined (K. E. Christensen and G. P. Cooper, 1951, I. F. R. Report No. 1275). From creel census records for the past 5 years it is estimated that an average of 20,000 fishing trips are made annually on the lake and that the catch of pike annually amounts to over 1,000 (K. E. Christensen, 1952, I. F. R. Report No. 1328). Whitmore Lake, while subjected to heavy fishing pressure, furnishes average fishing success and is one of the better known and more popular pike lakes in this section of the state. Therefore, because of the recreation afforded to anglers and the influence of fishing on the economy of the local areas, anything that may be harmful to the fishing in Whitmore Lake should be avoided if at all possible.

Availability of Spawning Habitat for Pike in Whitmore Lake

It is obvious that, in order to have a good population of pike in a lake, without stocking, there must be adequate spawning habitat available. For spawning purposes pike require grassy marshes or meadows that

are flooded during the spring of the year. After spawning it is necessary that these shallow areas not dry up too soon, but remain covered with water for at least a month and preferably for 6 weeks. This is to allow the eggs to hatch and the fry to gain a length of approximately 1 inch, at which time they usually begin their migration to the lake proper (Carbine, 1942). Pike will travel long distances to reach the proper spawning habitat and often migrate up inlets and down outlets to those areas. If areas are present in the lake that are satisfactory and there is no inlet or outlet, they will then spawn in the lake at these suitable locations. Since Whitmore Lake has a good natural population of pike, the pike must find adequate areas for reproduction. There are no natural inlets or outlets to the lake, but there is an underground tile connection at the southwest corner of the lake which connects a creek flowing out of Horseshoe Lake to the south with Whitmore Lake. This creek flows northwest to the Huron River. The tile was installed in 1936 with the belief that it would serve to raise the level of Whitmore Lake in late summer by drawing off water from Horseshoe Lake via this creek. Actually the tile has been a nuisance, because if opened during the spring it floods Whitmore Lake and if opened in late summer there is too little water in the creek to help Whitmore Lake. In the late 1940's Whitmore Lake was flooded in the spring by the opening of the gate at the creek end of the tile. Since that time the gate has been kept closed the year around. There is strong feeling among the residents of Whitmore Lake, especially those with cottages on lower ground, that this tile should be sealed off permanently. In years when the gate has been kept closed in the spring it has been noticed that there is a run of northern pike attempting to get through the gate. Therefore it is quite possible that, in years when the gate has been open in the spring, pike may have left Whitmore Lake to spawn near Horseshoe Lake. If this occurred, it is extremely

doubtful if many of these pike or their newly hatched offspring would return to Whitmore Lake, because of the improbability of their following the small flow from the creek to the tile. The gate remained closed this year and, while there was some flow of water under the gate, no pike were observed running up this tile. Therefore, it is felt that pike must be reproducing very well within the lake. According to the map (Figure 1), made in 1940, there are several likely looking places around the shore of the lake where pike might reproduce. However, upon actual examination it was found that most of these areas are no longer suited to pike spawning. Area A (Figure 1) now contains only scattered clumps of cattails, but according to a resident there (Mr. Al Marquardt) pike used to spawn in nearby marshy areas along the lake shore which have been filled in by cottagers attempting to make their beaches more usable. Areas B, C and D along the north side of the lake are indicated on the map as being (i.e., in 1940) encroaching shore. Area B (on Todd's Point) has now become completely dry land down to a sand and gravel shore. Area C has been recently dredged offshore and the marshland filled in. Area D has been filled in to the shoreline by cottagers. Area E, which is indicated on the map as marshy, is actually just a sand and gravel shore containing a few reeds. The marsh at F has, in recent years, been extensively dredged and filled and is now occupied by a deep boat channel. Area G is a small marsh; however, it is not connected to Whitmore Lake. All other shorelines of the lake are also completely lacking in pike spawning habitat, excepting the peninsula (H) at the south end.

Description, Planned Development and Value to Wildlife (Other than Pike)
of the Peninsula

This peninsula, in the general shape of the letter S extends northwest for approximately 1,500 feet. The peninsula varies in width from 25 to 50 feet, is from 1 to 3 feet above the water, and is thickly covered with brush and trees in the area 500 to 1,000 feet from shore. The area immediately to the south and west of the peninsula is open water to a depth of 5 feet and contains aquatic plants. To the north of the peninsula is a marshy area of approximately 8 to 10 acres with shallow water up to 1 1/2 feet deep, with a bottom of sand, covered with muck and peat and with a dense growth of marsh grass. This area, which is mostly dry by late summer, contains many bushes such as red osier and small willows, several trees (willows), and numerous patches of cattail. It is this peninsula with its accompanying marsh which the owners (Mrs. Grace Brown and Mr. Clenard McLaughlin) propose to develop. The development is planned to include the dredging of a lagoon down the center of this area (roughly east by west) which would be 6 to 9 feet deep. The dirt removed in dredging this lagoon would be used to raise the land on either side by 3 feet and thus bring the marshy area out of high water. This fringe of land around the lagoon would be approximately 120 feet wide. When completed, the area would then be a long dry peninsula nearly 300 feet wide with a deep lagoon down its center. There would then be no marshy area available either here or anywhere else in the lake.

The peninsula has long been an excellent location to observe wildlife and for many years has been used as a study area for ecology and natural history by classes from the Zoology Department of the University

of Michigan. The senior author prepared a paper (unpublished) on the ecology of the peninsula based on observations made during the month of May, 1947. At that time many animals were present in this area of which the most important were blackbirds, nesting ducks, muskrats, and spawning bowfin (dogfish) and largemouth bass. At that time there were perhaps 20 to 30 large male bowfin present guarding their nests in the marsh. Eggs from bowfin nests in this area have furnished material for a doctoral thesis on the embryology of the bowfin by a graduate student at the University of Michigan. While most fishermen detest the bowfin and urge its removal from lakes this fish serves a very important and useful purpose in nature's plan. It is fairly well agreed among both game and fish biologists that predators are necessary in order to prevent overpopulation by the prey species. Eradication or serious depletion of foxes, hawks and owls would result in terrific overabundance of rabbits and mice. Similarly in lakes, reduction in the number of predators such as pike, bass, walleye, bowfin and garpike may result in a very high population of their food species, such as bluegill and perch. Since an acre of lake will support only so many pounds of these species, if the numbers present are extremely high, the individual size of the fish will be small. In other words, too many fish for the available food supply will cause stunting. Reduction in the number of these prolific species by predator fish will result in their being fewer fish which can then grow to a larger, more enjoyable size. The production by this area of ducklings and muskrats could add to the recreation of sportsmen and the harvest of these resources.

Observations on Pike Spawning

Because the junior author is the creel census clerk operating on Whitmore Lake, it was decided that he should keep a close check on the

lake as pike-spawning time approached. Since pike spawn very early in the spring, usually about the time the ice melts in the shallower water, it is necessary to observe a lake carefully because most of the spawning may occur during the first few warm, sunny days.

Observations were begun on March 7, 1952, which was a bright, sunny day. A cold wind, however, kept the air temperature down and very little melting of the ice occurred. Scattered checks on the area did not reveal any further melting until March 17 when the air temperature of 47° F. and a bright sun caused ice in less than 3 inches of water to melt. The next two days were rainy, and when, on March 20, the weather turned very mild and bright, observations were intensified on Whitmore Lake. The senior author spent the afternoon at the lake and was joined for a short period by the junior author. The ice in the marsh south of the peninsula had entirely melted, although the remainder of the lake, except for the shoreline, was still ice-bound. Pike were numerous in the marsh and their locations are indicated by orange X's on the aerial photograph (Figure 2). Three or 4 pair of pike were observed lying side by side, the female being easily distinguished because of her larger size and more distended abdomen. Spawning was observed at several places (indicated by circled orange X's on Figure 2) and was accomplished by two fish lying side by side, and accompanied by violent thrashings of the tails. Many unpaired pike were present, these probably representing extra males and fish not yet ripe enough to spawn. It was possible to approach within 5 feet of the pike, providing one was careful not to move fast or splash the water. The fact that the pike would lie completely quiet for long periods of time made many close observations of spawning acts impossible in the limited time available. When

frightened, the pike would move rapidly through the shallow water and often move long distances, sometimes back to the lake itself. It was possible to follow their movements due to the wakes caused by their passage through the shallow water. Several pictures were taken of pike both singly and paired, but due to surface reflection these photographs were not too satisfactory. Air temperature rose to 50° F. by 3 p.m. and water temperatures at that time varied from 51° F. to 61° F. in the shallow water. Nearly all activity had ceased by 6 p.m. as it grew darker and cooler.

March 21 was again a warm, sunny day and pike were active all a.m. In the p.m., besides the authors, Mr. William Cristanelli and Mr. Howard Tait of the Institute for Fisheries Research were present to observe the pike and assist in taking pictures. Figures 3 through 7 were taken during the p.m. and Figures 6 and 7 represent the best of numerous pictures taken of the pike. Both pictures were taken by the junior author with an Argus C-3 and show pike in the act of spawning. Figure 6 shows 3 pike together, the nearer two being males and the farther one a female, while Figure 7 shows 2 spawning pike. The splashing of their tails was clearly visible as they moved slowly over the bottom. This sculling action of the tails evidently helps emit the sex products and also distributes them over a wide area of bottom. Pike and spawning seen on March 21 are indicated on Figure 2 by red X's and red circled X's, respectively. The air temperature reached 47° F. and the water temperature 59° F. by 3 p.m. Several dogs were active in the marsh most of the day chasing pike and one was seen to capture a pike in his teeth, but lose it after a short struggle. The dogs obviously interfered with the spawning.

March 22 to 24 were cold days, and the marsh water remained close to freezing temperature. No activity was observed on these days.

March 25 was again sunny and extensive observations were made on that date. Pike which were seen and spawning which was noted are indicated on Figure 2 by green X's and green circled X's, respectively. At 9 a.m. there was a thin film of ice over the entire marsh but the ice melted and the water warmed so rapidly that pike were seen active in the marsh by 11 a.m. The two dogs were again active chasing fish and some time was spent driving the dogs out of the marsh. Pike activity reached a peak by 4 p.m. when there were at least 15 pike in the marsh. At 2 p.m. water temperatures ranged from 60° F. at 1 inch in depth to 47° F. at 1 foot in depth.

Most spawning occurred on all days in water from 4 inches to 10 inches in depth. Ice was still present in the lagoon on the opposite side of the peninsula and in an extensive area in the north and north-east end of the lake on March 25.

March 26 and 27 were cool and little activity was evident. March 28 to 30 were fairly bright days, and an attempt was made on all three days to secure moving pictures of the pike spawning, but not enough pike were present in the marsh to make it worth-while. The air temperature reached 59° on March 30 and, since the water temperature at 3:30 p.m. ranged from 62° in shallow water to 45° at 16 inches in depth, there should have been more activity if spawning was still at its height. Only 2 fish were found in the entire marsh on this date and, being widely separated, it was concluded that spawning was about over.

During the spawning period the only other fish seen present were mud pickerel which were probably spawning in the same area although no instances of their spawning was observed.

Collections made of Advanced Pike Fry

On April 30, a month from the completion of spawning and nearly 6 weeks from its beginning, a fine-mesh scap net was used to search areas where spawning had occurred (which had been marked by stakes) for evidence of hatched pike fry. In several of these areas advanced fry were found and in 2 hours work 6 were collected ranging in length from 10 to 20 mm. These pike probably ranged from a few days to 10 days old. All pike captured were preserved. The water level of the marsh at this time was approximately 1 inch above the level at spawning time which was unexpected as the past month had been unusually dry. At the time of this collection, one male bowfin was seen on its nest in the eastern part of the marsh.

On May 8, known spawning areas were seined with a 10-foot common sense minnow seine in order to capture a sample of small fish present and determine whether any were preying on the young pike. Fishes captured, in order of abundance, were blackchin shiner, northern blacknose shiner, blackstripe top minnow, northern least darter, blunt-nose minnow, and yearling carp and largemouth bass. Stomach analysis of these fishes has yet to be done. Advanced pike fry were captured incidentally to the fish collections and were preserved ranging from 14 to 33 mm. in length. The pike averaged about 19 mm. ($\frac{4}{5}$ inch) long and were probably about 10 days old. The largest (33 mm.) was probably 2 $\frac{1}{2}$ to 3 weeks old. It was felt that, should water levels drop fairly rapidly from that time on, the majority of the fry would find their way into the lake.

Conclusions

At the same time as observations were being made during the latter part of March at the peninsula, the rest of the lake was examined for possible spawning places. Two intensive searches around the shoreline failed to reveal a single pike, although mud pickerel were seen several times in shallow water. Therefore it was concluded by the authors that the great majority of and indeed probably the entire spawning of northern pike at Whitmore Lake, is now being done at the peninsula. If the marshy area of this peninsula is destroyed, there can be no other result than that the pike population of Whitmore Lake (and probably the bowfin population also) will be seriously depleted in a very few years. The absence of these two predators in the lake would very possibly allow the panfish population to become stunted and the carp population to increase. Thus the lake could easily become almost worthless for fishing and a very noticeable effect would be forthcoming on the economy of the village. A very valuable asset and source of recreation to the community would be lost and would be almost impossible to restore. Continuous restocking of Whitmore Lake with artificially propagated pike would of course be impractical since the number of pike required would render the cost exorbitant.

Recommendations

The authors wish to urge and recommend most strongly that the owners of this productive marsh be prevailed upon to recognize the significance of this area to the lake as a whole and to allow it to remain as it is. It is also highly recommended that the Fish Division consider purchasing this marsh so that the lake may continue to be as productive in the future as in the past.

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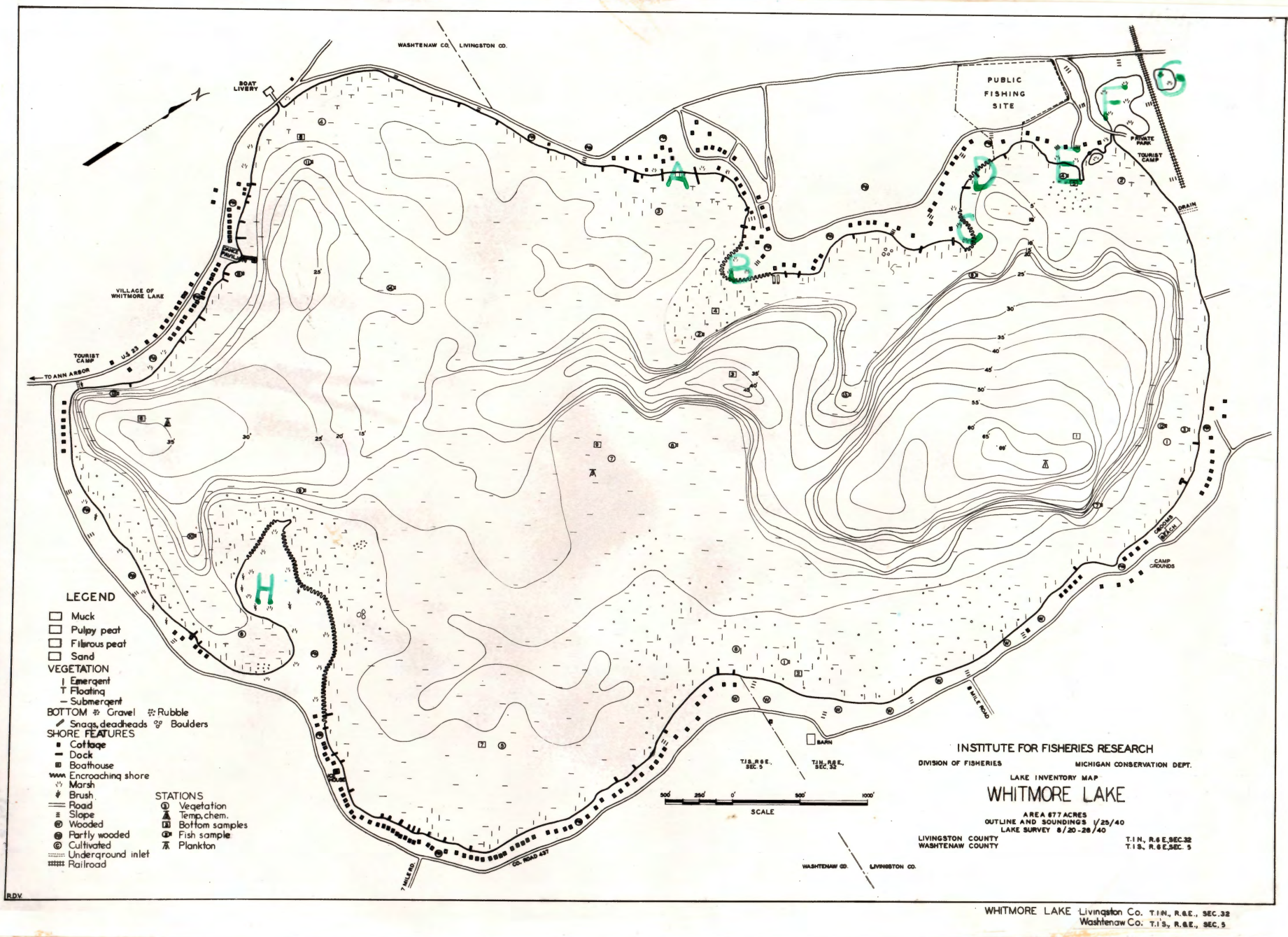


Figure 1. Map of Whitmore Lake, Livingston and Washtenaw Counties, indicating at H the area shown in Figure 2 and showing the location of areas A-G, described in the text.

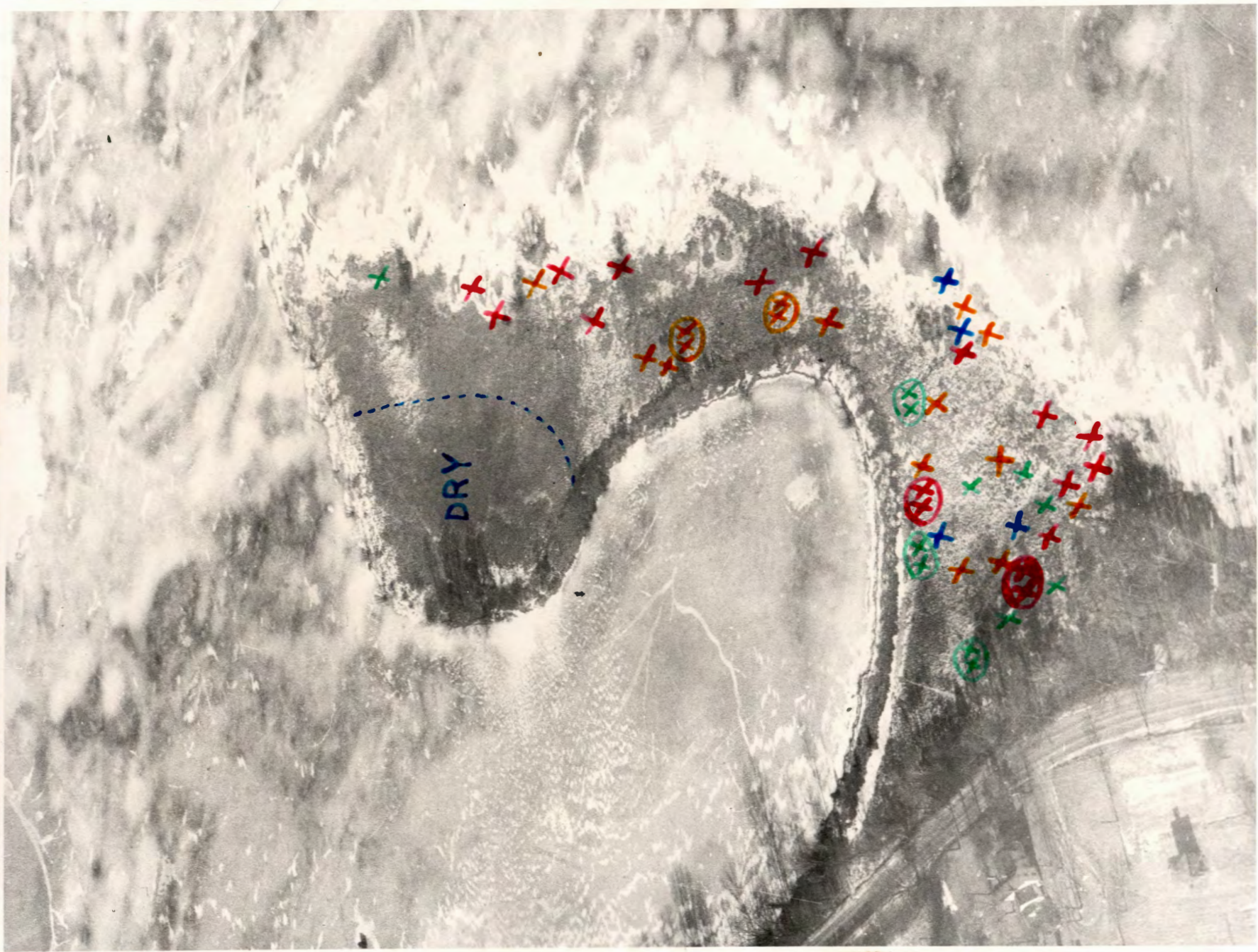


Figure 2. Aerial photograph taken on Jan. 30, 1952 showing the peninsula on which the spawning occurred. The location of pike and spawning seen on various dates is indicated by X's and circles X's respectively. The dates of the observations are indicated by the colors used: orange for March 20, red for March 21, green for March 25 and blue for March 28, 29 and 30.



Figure 3. Photograph taken on March 21, from County Road 437 (South Shore Drive) looking northwest across the marsh and lake. Part of the peninsula is shown at the left and the men in the right center are shown at the approximate time and location of taking Figures 6 and 7.



Figure 4. Photograph taken on March 21, from the location where the peninsula swings sharply westward, looking due west toward the village of Whitmore Lake in the background. Spawning was observed and fry collected from the open, grassy area in the center foreground. Note the ice still present on the lake proper while water temperatures in the marsh were around 60° F.



Figure 5. Photograph taken on March 21, from the extreme northwestern tip of the peninsula, looking southeast or back toward the marsh. The peninsula is indicated by the trees on the right and in the background which on the left side of the picture become a thin line of bushes. The denser grass across the picture in the middle distance was mostly dry on the right side and unsuitable for spawning. (See Figure 2.).



Figure 6. Photograph taken on March 21, in the eastern section of the marsh (See Figure 3.), showing three pike in the act of spawning. The female is the larger fish at the top and she is accompanied by two males nearer the camera. The tails are blurred from their movement during spawning.



Figure 7. Photograph taken on March 21, in the eastern section of the marsh (See Figure 3), showing two pike in the act of spawning. The disturbance of the water to the left of the pike is again caused by the motion of their tails.