A STUDY OF FACTORS AFFECTING THE CATCHING OF LARGEMOUTH BASS, (MICROPTERUS SALMOIDES) AND SMALLMOUTH BASS, (MICROPTERUS DOLOMIEUI) WITH HOOK AND LINE

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By

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Approved

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ABSTRACT

A STUDY OF FACTORS AFFECTING THE CATCHING OF LARGEMOUTH BASS, (MICROPTERUS SALMOIDES) AND SMALLMOUTH BASS, (MICROPTERUS DOLOMIEUI) WITH HOOK AND LINE

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For three summers, records were kept on largemouth bass, Micropterus salmoides, and smallmouth bass, Micropterus dolomieui, caught by hook and line to determine under what conditions bass strike. On each fishing trip, data were collected on the phase of the moon, wind direction, barometric pressure, air temperature, water temperature, water-surface disturbance, color of bait, and sky condition. Most of the data were collected in Diamond Lake, Cass County, Michigan, trolling an underwater lure at night.

Over 1500 bass were caught during the period of study. Of the bass taken in Diamond Lake, 319 were tagged and released to check their movement. Ninety-four were sacrificed for stomach analysis.

No one stimulus was found to be the controlling factor in causing bass to strike a lure. Tagging experiments showed most bass confined their movements to small areas in the lake.

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INTRODUCTION

Many explanations for bass behavior by fishermen and professional sports writers are found in numerous publications. Their findings and reasons for the findings often vary to the point of being contradictory. However, many of these explanations are based on limited observations, hunch, or faulty interpretation rather than on scientific research.

The older methods and ideas of bass fishing have been so widely accepted that few challenged or questioned them enough to try otherwise. For example, many experts have said that evening, night, and early morning are the times bass strike best, so most bass fishing takes place during these periods. We did challenge the old ideas and sayings by fishing at various times and under varied conditions to see which if any of the older ideas had any validity.

The field work was conducted during the months of May through September in 1959 and 1960, and June through the first part of August in 1961. Only limited fishing was conducted in May and September.

The majority of our research was conducted in Diamond Lake and Barron Lake, Cass County, Michigan. Since most of our data were taken in Diamond Lake, the following information about the lake is included from an unpublished survey report prepared by the Michigan Conservation Department, Fish Division, in November of 1958:

"The area of Diamond Lake is 1021 acres. The maximum depth at the time of mapping was 64 feet. Shoal (water less than 15 feet deep) comprises about 60 percent of the area. The bottom soil on most of the shoal is marl, but there are extensive deposits of sand, gravel, and rocks adjacent to to the shoreline; patches of peat bottom occur close to the small bay at the south end of the lake and in the small bay at the south-east corner. Marl is the bottom soil in the deeper parts of the basin."

"---A thermocline (zone in which the temperature drops abruptly at successive depth levels toward the bottom) occured between 32 and 40 feet. ---Dissolved oxygen in sufficient quantity to meet the need of fish occurred from the surface to 30 feet. The supply was sharply reduced at 34 feet, and at 40 feet there was only a trace."

"As is characteristic of marl-bottom lakes, the water of Diamond Lake is fairly hard. The methyl orange test for alkalinity gave values that ranged from 135 to 165 parts per million of dissolved mineral salts (mainly lime)."

"On the whole, acquatic vegetation is not plentiful in this lake. Floating and emergent types of plants are sparse, while submergents are sparse to medium. Water milfoil (Myriophyllum) wild celery (Vallisneria), and two muskgrasses (Chara and Nitella) are the more prevalent plants."

"---The results show that growth of largemouth bass, northern pike, and perch in Diamond Lake is above average; growth of 2-year-old bluegills and rock bass is average,

while that of age classes above 2-year-olds in both species is above average. Good evaluations could not be made for smallmouth bass, crappies, or warmouths because of insufficient samples, but indications are that the growth rates of these fish are also above average. The two 6-year-old walleyes were average."

"We have no new fisheries management recommendations to offer for this lake. The water contains goodly numbers of a wide variety of fish with good growth rates. ---It is not known why smallmouth bass are not more plentiful. Spawning facilities appear to be excellent. Possibly this species suffers from competition by other fish."

Over 1500 bass bere caught during the period of study. Less than 100 of the bass were smallmouth. With five exceptions, all bass included in this data were legal size, 10 inches or more.

METHODS

Our basic fishing technique was trolling a Shannon Twin Spinner with an Uncle Josh Pork Frog in Diamond Lake at night. The depth trolled ranged between five and fifteen feet of water, close to bottom, or just over weeds if they covered the bottom.

At the beginning of each fishing trip, air temperature, barometric pressure, water temperature, phase of moon, wind direction, degree of surface distrubance, turbidity, lake and location, date, personnel, and time were recorded. At the end of each fishing trip, time, hours fished, bass caught, bass lost, number of strikes, species of bass (largemouth or smallmouth), method of fishing, air temperature, barometric pressure, and additional comments on technique used were recorded.

Since many of the conditions, wind, barometer, etc. often vary during the fishing period, it is important to fill out another card, in addition to the starting and ending card. Each time a bass was caught, a card was filled out with the following data; lake and location, date, personnel, species of bass, length of fish, bait, method of fishing, time, wind direction, water surface disturbance, sky condition, phase of moon, barometric pressure, location in lake, tag number, and an estimate of stomach fullness, along with additional comments.

When figuring time required to catch a bass, time was deducted for tagging, data recording, or other reasons for having the bait out of water.

Other methods include casting and spinning with a variety of lures in lakes in the vicinity of Diamond Lake.

BAROMETRIC PRESSURE

A change of .01 inches of mercury per hour either up or down was chosen to indicate barometric movement. Barometric movement of less than .01 inches per hour was listed as steady.

The only data used in the statistical treatment were those taken when the barometric pressure was increasing, decreasing, or remaining steady during the entire time it took to catch the fish. For example, bass might be taken throughout several hours of a falling barometer. Then the barometer failed to continue its .01 inch-per-hour drop. The first fish caught after the barometer failed to continue its downward trend would not be used in the statistical treatment for this factor, as we could not be sure at what time the barometer changed in its movement.

The number of bass taken under the three barometric conditions (steady, rising, and falling) are listed in Table 1.

Table 1. Number of bass caught under rising, falling, or steady barometer.

Barometric pressure	Number of bass	Total time (minutes)	Minutes to catch one bass
Steady	154	6604	43
Rising	15	600	40
Falling	72	3386	47
Total	241	10590	43.92

Analysis of variance (Table 2) shows no difference in catch rate associated with the barometric condition studied.

Table 2. Analysis of variance for data in Table 1.

Source of variation	Sum of squares	Degrees of freedom	Mean square	Variance ratio
Barometric pressure	1091	2	545.5	.4242
Residual	308611	240	1285.9	

MOON PHASE

The phase of the moon was recorded as 1/4, 1/2, etc. even when the moon was completely covered by clouds and no light appeared in the sky. Notations were then made on the cards that the moon was present but no light could be detected. Bass caught under these conditions (less than 20) were not included in the data in Table 3. If the light from the moon illuminated the sky to any degree, the bass caught were listed in Table 3 under the corresponding moon phase.

Bass caught following a change in the visibility of the moon are not included in the data for that particular condition. For example; Several bass were caught with no moon. An hour later a bass was caught after a 1/2 moon had risen. This bass was not included in the calculations, inasmuch as the time at which the moon rose was not recorded. All bass taken later were recorded as taken under 1/2 moon condition.

Table 3. Number of bass caught under different phases of the moon.

Moon phase	Number of bass	Total time (minutes)	Minutes to catch one bass
No moon	192	8452	44
1/4	17	612	36
1/2	29	1554	54
3/4	19	904	48
Full	92	4592	50
Total	349	16114	46.17

Analysis of variance (Table 4) indicates that the moon phase has some effect on bass fishing success. A variance ratio of 2.37 is significant at the 5% level and 3.32 at the 1% level.

Table 4. Analysis of variance for data in Table 3.

Source of variation	Sum of squares	Degrees of freedom	Mean square	Variance ratio
Moon phase	26743	4	6685.8	4.1174
Residual	565074	348	1623.8	

Wright (1943) found from his study on Fish Lake, Utah, that the phase of the moon had no apparent influence on fishing success when trolling for rainbow and mackinaw trout. However, fly fishing success decreased significantly at times of first quarter moon when moonlight reached the fishing area during the normal fishing hours. At times of full moon, a mountain ridge protected the fishing area during the hours when most of the sport fishing occurred. His conclusions, then, were that moonlight had some influence on fly fishing success, but had no effect on trolling success.

It is difficult to understand the results of our study. If light were the essential factor in determining fishing success, a trend in fishing success from lower to higher light intensity would be expected. Such a trend is lacking in our data.

WIND DIRECTION

The number of bass caught under different wind directions are listed in Table 5.

Table 5. Number of bass caught under different wind directions.

Wind direction	Number of bass	Total time (minutes)	Minutes to catch one bass
West	53	2468	47
Southwest	16	746	46
South	104	4124	40
East	34	1674	49
North	61	3236	53
None (nil)	52	2722	52
Total	320	14970	46.78

Analysis of variance (Table 6) shows no significant difference in wind direction. A difference of 2.21 would be necessary to indicate that wind direction had a significant effect on catching bass. The observed variance ratio was only 1.0306.

Table 6. Analysis of variance for data in Table 5.

Source of variation	Sum of squares	Degrees of freedom	Mean Square	Variance ratio
Wind	9497	5	1899.4	1.0306
Residual	587905	319	1843.0	

WIND (SURFACE) DISTURBANCE

When each bass was caught, the wave height was estimated (Table 7). No data are included for waves over one foot as the lake became too rough to troll.

Table 7. Number of bass caught under different degrees of surface disturbance.

Wind (surface) disturbance	Number of bass	Total time (minutes)	Minutes to catch one bass
Less than 2"	150	6770	45
2" to 5" wave	80	3460	43
5" to 12" wave	27	1002	37
Total	257	11232	43.70

As Table 8 points out, no significant difference in catch rate can be associated with surface disturbance.

Table 8. Analysis of variance for data in Table 7.

Source of variation	Sum of squares	Degrees of freedom	Mean square	Variance ratio
Wind (surface) disturbance	1497	2	748.5	.4602
Residual	416346	256	1626.3	

WATER TEMPERATURE

Table 9 lists the number of bass caught during different water temperature conditions.

Table 9. Number of bass caught under different water temperatures.

Water temperature	Number of bass	Total time (minutes)	Minutes to catch one bass
80° - 85° F.	98	4728	48
75° - 79.5° F.	203	9954	49
70° - 74.5° F.	44	2314	53
65° - 69.5° F.	24	1104	46
Total	369	18100	49.05

Water temperature by itself did not show any significant effect on bass fishing (Table 10).

Table 10. Analysis of variance for data in Table 9.

Source of variation	Sum of squares	Degrees of freedom	Mean square	Variance ratio
Water temperature	1238	3	412.7	.2326
Residual	653032	368	1774.5	

According to Bardach and Bjorklund (1957) who studied several species of freshwater fish, a change in water temperature of at least .05°C./minute was necessary for the fish to detect. Because of the slow change in a body of water as large as Diamond Lake (the greatest temperature change for a twenty-four hour period was 2°F.), it is doubtful that any changes occured rapidly enough for a fish to detect

immediately, and therefore rapid changes in their position or behavior pattern in the lake due to temperature changes seem unlikely.

AIR TEMPERATURE

The air temperature was recorded at the beginning and end of each fishing trip and the difference between the temperatures was adjusted to give the effect of a steadily changing temperature for the nights fishing (Table 11). The air temperature was then assigned for the time the bass was caught.

Table 11. Number of bass caught at different air temperatures.

Air temperature	Number of bass	Total time (minutes)	Minutes to catch one bass
80^{D} - 84.5^{D} F.	17	752	44
75^{D} - 79.5^{D} F.	94	3594	38
70^{D} - 74.5^{D} F.	129	5964	46
65^{D} - 69.5^{D} F.	83	4578	55
60^{D} - 64.5^{D} F.	25	1384	55
Total	348	16272	46.76

A significant difference is indicated (Table 12), inasmuch as $F_{.95}(4,347) = 2.37$.

Table 12. Analysis of variance for data in Table 11.

Source of variation	Sum of squares	Degrees of freedom	Mean square	Variance ratio
Air temperature	14678	4	3669.5	2.3879
Residual	533232	347	1536.7	

I can see no reason why air temperature should affect fishing unless some unseen factor was operating along with

it indirectly. Perhaps this is one of the 5% of the times that the observed differences are due to chance rather than air temperature. Our method of assigning air temperature to each fish may also be responsible for the variance ratio.

MONTH

Although it only took an average of forty minutes to catch a bass in August (Table 13), analysis of variance shows that month alone is not responsible for bass fishing success (Table 14). A variance ratio of 2.37 would be necessary to be significant at the 5% level.

Table 13. Number of bass caught during the months of May through September.

Month	Number of bass	Total time (minutes)	Minutes to catch one bass
May	9	604	67
June	73	3828	52
July	151	7836	52
August	127	5342	40
September	15	700	47
Total	375	18310	48.90

Table 14. Analysis of variance for data in Table 13.

Source of variation	Sum of squares	Degrees of freedom	Mean square	Variance ratio
Month	11263	4	2815.8	1.4886
Residual	707406	374	1891.5	

I did notice a difference in hooking. More bass were snagged <u>around</u> the mouth instead of <u>in</u> the mouth during late June or early July than any other time of the year.

STOMACH FULLNESS

Some say whenever a bass strikes he is hungry, although most will concede some fish are caught defending their territory.

A total of 94 bass were opened and the degree of fullness was estimated. As table 15 points out, bass were taken with every degree of stomach fullness. It would seem that the degree of fullness alone is not the reason for a bass to strike a lure. Due to the digestive processes, by chance alone you would expect to find more bass with empty stomachs than full stomachs. However, it is interesting to note that over half of the bass examined had empty or nearly empty stomachs, indicating that hunger may be involved.

Table 15. Number of bass with their degree of stomach fullness.

Fullness	Number of bass
Empty	37
Trace	19
1/4 to 1/2	13
1/2 to 3/4	13
Full	12

TIME OF NIGHT

The time of night may have something to do with the success of bass fishing.

It should be pointed out that the Shannon Twin Spinner was not as effective during daylight hours as it was at night; hence, trolling usually didn't start until the sun was down. However, some bass were taken effectively when there was still enough light to land the bass without the use of a flashlight.

Time was not deducted for data recording when determining the number of minutes required to catch one bass in Table 16.

Table 16. Number of bass caught during different hours of the night.

Hours	Number of bass	Total fishing time (minutes)	Minutes to catch one bass
8 p.m. - 9 p.m.	16	1120	70
9 p.m. - 10 p.m.	47	3530	74
10 p.m. - 11 p.m.	74	4225	57
11 p.m. - 12 p.m.	70	4065	58
12 a.m. - 1 a.m.	54	3560	66
1 a.m. - 2 a.m.	40	2860	72
2 a.m. - 3 a.m.	27	2605	96
3 a.m. - 4 a.m.	27	1825	70
4 a.m. - 5 a.m.	13	1150	81
Total	368		

COLOR OF BAIT

Several different colored bucktails were tried on the Shannon and no significant differences in catch were apparent (Table 17).

Table 17. Number of bass caught on different colored Shannons.

Color		Bass caught
Black bucktail & Red bucktail 1959 & 1960	Black --------	42
	Red --------	43
Black bucktail & White bucktail 1959 & 1960	Black --------	28
	White --------	33
Black bucktail & White bucktail 1961	Black --------	23
	White --------	17

Only fishermen of equal ability to use the Shannon assisted in this phase of the research. These were friends with whom I have fished for several years, using the Shannon. Even so, the first time out on the study with a new assistant, the data were taken so the assistant might adjust to the study technique but were not used in the analysis.

The black-colored Shannon was used as a control and all colors tested were compared with it, i. e., I used one color and another fisherman used black or vice versa.

Each of us used both Shannon colors during the fishing period. For example: If black and red were the colors being tested, we would exchange baits half-way through the night's fishing period to prevent differences in fishing ability from influencing the results. However, I am certain any difference, if it did exist, would be negligible.

Other Shannon colors and combinations of colors were tried to some extent. Samples taken with other colors were perhaps inadequate, but indications are that color did not play an important part in bass fishing success at night. A chi square analysis did not show a difference between red, black, and white,

These color comparisons were made over an extended time and it might be possible that under any specific condition one color might be better than another; but would even out over the entire fishing period as the data show. When comparing colors, four or five bass might be caught with a bait of one color and none on another, and later just the opposite.

Brown (1957) states that refraction, reflection, and absorption of light in the water operate to reduce the amount of light available to the fish's eye, especially with increasing depth and turbidity. Curtis (1949) points out "---in the clearest water, light travels but a comparatively short distance. The fish's sight is probably as good as ours at close range --- certainly movement plays a very important part in attracting its attention."

According to Curtis (1949), ability of fish to distinguish color varies with the color. He says, "In the end,

the experiment proved that bass could tell red from any other color with the exception of violet, and was almost equally sure of yellow. Green and blues were the hardest for him to distinguish from each other and from black." Brightness was proved to play no part as the bass could tell red from shades of gray. Curtis goes on to say "recent experiments have offered convincing proof that actual color rather than brightness is the determining value for at least one species - the large-mouth black bass."

Inasmuch as the Shannon was used at night on or near the bottom, it seems possible that color discrimination would be more difficult than in the daytime. We therefore tested certain baits during the daylight hours.

Our use of surface baits (mainly a Creek chub Darter) in the daytime, showed that the action given the lure was much more a factor in fishing success than color. It does seem possible that a color resembling a common forage fish in a body of water might be more successful. We did find one indication of this, but I can not draw positive conclusions because of the limited number of lakes in which I have used the Darter.

Personal acquaintances at Heddon Bait Company have noted on several occasions that color in some of their baits made the difference between catching a lot of fish or no fish. In one of the instances, the most effective color or bucktail resembled the color of leech the fish had in their stomachs. Apparently the fish did associate the colors because they were not caught on other colors of

bucktail. Accordingly, it would seem quite apparent that this was a case of the fish making an association with the color of lure and natural food.

Different colors of artificial nightcrawlers were tried and all were essentially equal in effectiveness when given proper action. We tried them on several lakes and could find no color preferences in any of the lakes. I have had many reports about success of some of my fishing associates in other States and sections of Michigan, where they claim color made a difference between successful bass fishing, mediocre fishing, or no bass at all. I have not personally tested their results.

We compared every color of artificial nightcrawler we could find. Most of the color comparisons were made during the afternoon hours as we caught fewer bass in the early morning and late evening than through the middle of the day. The colors used were black, dark red, natural nightcrawler color, light red, black with white spots, yellow, yellow with black spots, and blue. Black was used as a control color in comparing all the colors. When colors of nightcrawler were tested, the same companion and I fished during all the time recorded for that color, and we exchanged nightcrawlers in the middle of the fishing trip. The results are listed in Table 18.

Table 18. Number of bass caught on different colors of artificial nightcrawlers.

Color	Bass caught
Black	35
Red	36
Black	32
Blue	28
Black	21
Yellow with black spots	25
Black	13
Black with white spots	10

Color comparisons in Table 18 were all taken from the same lake (Magician Lake, Cass County) from 1:00 p.m. to 7:00 p.m.

TAGGING

In 1959 and 1960, 319 bass were tagged. Most of our bass were caught and tagged in Diamond Lake. Both Diamond and Barron lakes were marked off in zones. Pluses and minuses were used to designate the ends of zones. (See map of Diamond Lake in insert on back cover.) The distance from shore where the bass were caught was estimated. See Table 19 for tagging data.

The tags were attached by a nylon string just below and behind the dorsal fin in about a quarter of an inch of flesh. The small, one-half by one-quarter-inch red plastic tag had a number on one side and the M. S. U. Fish Department's address on the other side.

Generally speaking, the bass showed very little movement. It is difficult to determine exact movements as the normal area of movement of certain fish might be at the edges of our arbitrary zones. Hence, I estimated the bass's maximum movement. The fish bearing tag number 3102 was recovered five days later at the exact spot I originally caught the fish --- at the base of a cement pier.

I personally know of bass being caught with tags that were not returned, in spite of efforts to get the information on the tag.

Table 19. Summary of bass tagged and recaught in Diamond Lake.

Tag number	Date tagged	Date recaptured	Days out	Area first caught	Area re-caught	Distance of travel
3372	7-10-60	11-6-60	96	Y⁻ to G	G	nil
3379	7-11-60	7-27-60	16	I⁻ (100 yds. from shore)	I⁻ (100 yds. from shore)	nil
3396	7-15-60	7-29-60	14	M (200 yds. from shore)	N+ (15 ft. of water)	less than 150 yds.
3303	6-11-60	7-22-60	41	O+ (100 yds. from shore)	O+ (100 yds. from shore)	nil
3381	7-11-60	7-29-60	18	I⁻ (50 yds. from shore)	I⁻ (20 ft. of water)	nil
3297	6-3-60	7-16-60	43	K⁻ (100 yds. from shore)	K⁻ (25 ft. of water)	nil
3308	6-15-60	7-17-60	22	A+	A+	nil
3287	5-22-60	6-24-60	33	D⁻ (75 yds. from shore)	D⁻ (100 yds. from shore)	nil
3304	6-11-60	6-18-60	7	Z to Z⁻	Z to Z⁻	nil
3246	8-20-59	8-31-59	11	Y⁻	Y⁻	nil
3120	6-20-59	7-28-59	38	Q (75 yds. from shore)	Q	nil
3160	7-8-59	8-15-59	48	Z	Z	nil
3190	7-25-59	7-29-59	4	N+ (50 yds. from shore)	O+ (40 ft. from shore)	less than 250 yds.
3158	7-8-59	7-23-59	15	O⁻ to 1+	O⁻ to 1+	nil
3170	7-11-59	7-15-59	4	W⁻	W⁻	nil
3242	8-18-59	8-24-59	6	2⁻ to Y	2⁻ to Y	nil
3334	6-25-60	7-11-60	16	D+	G+	less than 550 yds.
3230	8-15-59	8-30-59	15	C (75 yds. from shore)	C (75 yds. from shore)	nil
3365	7-10-60	7-31-61	386	1⁻to 1 (100 yds. from shore)	B⁻ (800 ft. at least from shore)	less than 300 yds.
3712	8-8-60	7-8-61	334	A (150 yds. from shore)	A to A⁺ (100 yds. from shore)	nil

Table 20. Summary of bass tagged and recaught in Barron Lake.

Tag number	Date tagged	Date recaptured	Days out	Area first caught	Area re-caught	Distance of travel
3329	6-25-60	6-27-60	2	F+ (200 yds. from shore)	F+ (200 yds. from shore)	nil
3139	6-26-59	7-19-59	23	A- (75 ft. from shore)	A- (100 ft. from shore)	nil
3124	6-23-59	7-20-59	27	N+ (30 yds. from shore)	N+	nil
3102	6-17-59	6-22-59	5	A++ (base of cement pier)	A++ (exact spot tagged)	nil
3103	6-17-59	6-23-59	6	A (75 yds. from shore)	0 (500 ft. from shore)	less than 100 yds.
3123	6-23-59	7-19-59	26	N (75 yds. from shore)	0 (500 ft. from shore)	less than 200 yds.

Although indications are that bass usually confined their movements to small areas in our two lakes, studies with tags on a very small lake by Ball (1944) indicate the bass may be moving over the entire lake. Ball tagged fifty-two bass in a 10-acre lake which had a narrow band around the edge and then dropped down quite rapidly to 55 feet. He concluded, "---seven were returned by hook and line or in nets. The returns indicate that the bass roved over the entire lake and showed no tendency to remain in one location."

From his work in Douglas Lake, Michigan, Rodeheffer (1940) reports very little movement. He set up artificial brush shelters and kept records of the movements between shelters within the lake. Rodeheffer concludes, "The results of three summer's work at Douglas Lake quite definitely indicate that there is little movement of the native game fish from one part of the lake to another. Of all the fish marked at several locations in Douglas Lake and loosed at the point of capture none were retaken in distant parts of the lake. Recaptures were made only in the near vicinity of original capture and release."

DISCUSSION AND CONCLUSIONS

What causes bass to strike is still a partial mystery to me. Each one of the characteristics tested is a study in itself, and our study did not show any one factor to be responsible for fishing success. Probably a combination of stimuli are operating at all times. Fishing success would then depend on the number of stimuli operating in combination at any one time.

I have been fishing and had bass begin to strike as if a signal had been given, and then stop just as quickly. At the same time, this condition was also true of several lakes in the nearby area where some of my companions were fishing. This suggests that some atmospheric or meteorological phenomenon influences bass fishing.

It has been said that bass won't bite during a heavy rain with thunder and lightening. At times this is true, but I have experienced very good bass fishing during a severe electrical storm accompanied by heavy rainfall. I have, however, noticed that bass fishing, trolling the Shannon at night, is generally slower after rains.

There was not enough fishing time during periods when the northern lights were showing to draw any conclusions; but both good and poor bass fishing was experienced during this condition.

The section of the study related to the phase of the moon has left me with many new questions. I plan in the future to look into several possibilities such as how well bass strike various colors of a bait during different phases of the moon, feeding periods in relation to position and fullness of the moon, and others. I would even look more deeply into tides, though, on even the largest inland lakes, they are very small; and rays coming through the clouds at night which are not visible to the eye.

I feel the most important factor in catching bass is the individual angler's skill and understanding in the use of his particular lure. I have found that skill in operating a lure is usually far more important than color, or even its shape.

LITERATURE CITED

Ball, Robert C. 1949. A tagging experiment on the fish population of Third Sister Lake, Michigan. Trans. Am. Fish. Soc., 74: 360 - 369.

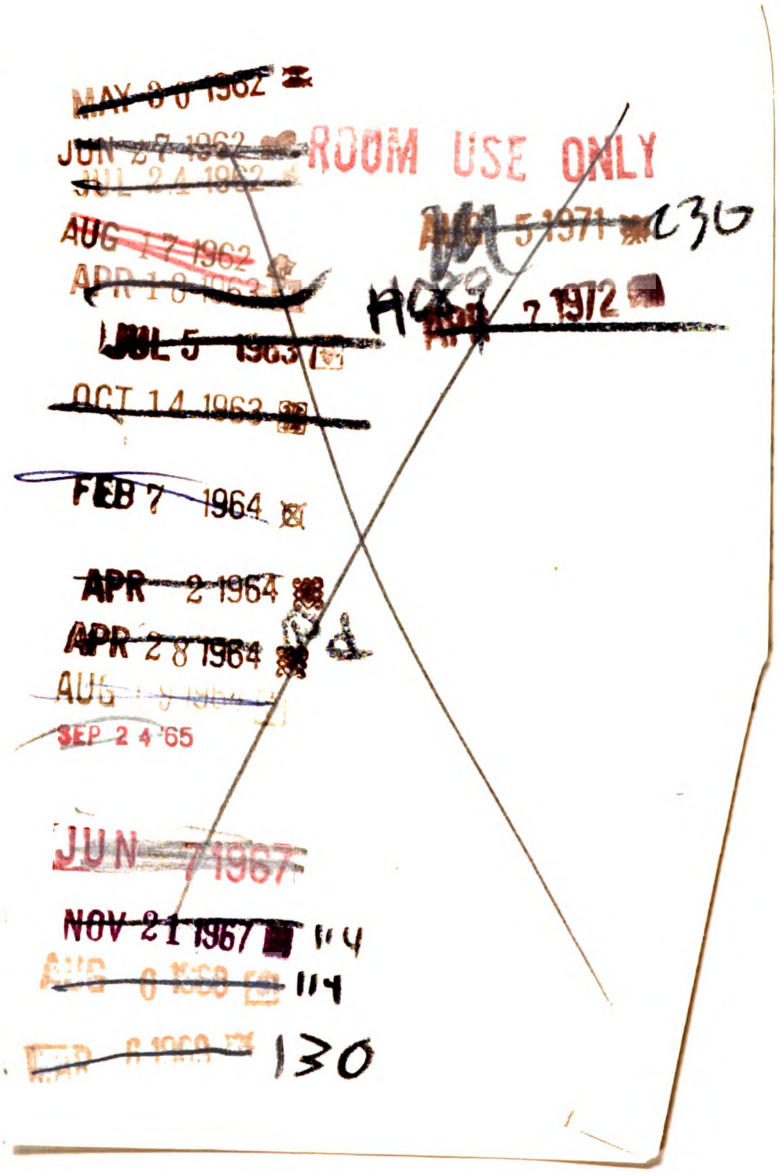
Bardach, John E., and Richard G. Bjorklund. 1957. The temperature sensitivity of some American freshwater fishes. Am. Nat., 91: 233 - 251.

Brown, Margaret E. 1957. The physiology of fishes. Vol. 2. Academic Press Inc., New York. 526 pp.

Curtis, Brian. 1949. The life story of the fish, his morals and manners. Harcourt, Brace and Co. New York. 284 pp.

Rodeheffer, Immanuel A. 1941. The movement of marked fish in Douglas Lake, Michigan. Mich. Acad. Sci., 26: 265 - 280.

Wright, Stillman. 1945. The effect of moonlight on fishing success in Fish Lake, Utah. Trans. Am. Fish. Soc., 73: 52 - 58.



INSTITUTE FOR FISHERIES RESEARCH

DIVISION OF FISHERIES MICHIGAN CONSERVATION DEPT.

LAKE INVENTORY MAP

DIAMOND LAKE

AREA 1020 ACRES

MARGINAL SURVEY AND SOUNDINGS 1/24-31 & 2/1,3,6,7,8,11-14/47

CASS COUNTY T. 6-7 S., R. 14-15, W SEC'S. 1,6,5,31,32,36

LEGEND

OUTLINE & CONTOURS
- Shoreline
- 5' Contours

SHORE FEATURES
- Cottage
- Dock
- Slope
- Spring
- Improved road
- Unimproved road
- Boathouse
- Breakwater
- Marsh
- Brush
- Wooded
- Partly wooded
- Cultivated
- Inlet
- Outlet

B.M.=100.0 - CROSS ON TOP OF CEMENT PILLAR OF CLAPPERS BOAT LOADING PIER. WATER SURFACE ELEV. = 96.5 2/14/47

N

TO M-60

HOTEL

CLAPPERS MARINE HOSPITAL

TO M-60

TO M-60

SANDY BEACH

HOWELL POINT

PRIVATE PARK

WADES ADDITION

DIAMOND ISLE

FERRY LANDING

TO CASSOPOLIS

PARK SHORE SUBDIVISION

FERRY LANDING

DIAMOND SHORES

TO CO. RD. 329

EAGLE POINT

CAMP KOZY ASSN.

TO M-62

DAM

DITCH

BARN

0 400' 800' 1200' 1600'
SCALE

W. C.

DIAMOND LAKE Cass County T. 6-7 S., R.14-15 W., Sec's.1,6,5,31,32,36