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INSTITUTE FOR FISHERIES RESEARCH
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MICHIGAN DEPARTMENT OF CONSERVATION
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August 18, 1950

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Report No. 1263

VARIATION IN FISHING PRESSURE AND CATCH
DURING VARIOUS PORTIONS OF THE TROUT
SEASON ON SOME MICHIGAN TROUT WATERS

By

David S. Shetter

ABSTRACT

Intensive creel census data collected between 1939 and 1949 for several trout waters in Michigan were examined to determine the distribution of the angling pressure and the catch throughout the average trout season. These records involved observations on a catch of 31,164 trout in 95,512 hours. It was found that where there were concentrations of adult trout of greater than average size (such as the rainbow trout populations of Guiley Pond, brook trout of East Fish Lake), the majority of the angling pressure and the majority of the catch was noted in the first four weeks of the trout season.

Trout waters closed to the metropolitan centers also (as are the streams of the Rifle River Area) appear to have heavier-than-average percentages of angling pressure during the first four weeks, but the percentage of the total catch removed may or may not be greatest at that time.

Trout waters more remote geographically and of more normal character as regards numbers and size of fish appear to be fished at a more consistent rate after the first four-week period, and the removal pattern also roughly parallels this percentage distribution.

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The presence of the Decoration Day week end contributes heavily to the trout-water angling pressure within the first eight weeks, whereas, the bass season opening on June 25 reduces trout stream angling pressure noticeably after this date.

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In the course of examining certain trout management proposals for the East Branch of the Au Gres River in Iosco County, Michigan, the question was raised as to what proportion of the angling pressure and what proportion of the total catch occurred in the several months of the trout season. To answer this question, intensive creel census data obtained in past years from several different trout waters in both the Lower and Upper Peninsulas of Michigan were examined.

The comparative material is provided by the intensive creel census records taken on: Guiley Pond (1940-1949 inclusive), a 1 3/4-acre trout pond on Guiley Creek where adult rainbow trout are confined after spawning, and which also contains a population of brook trout; on the trout streams located within the boundaries of the Rifle River Area (1945-1949 inclusive), where brown trout are the dominant species, but all species are present; on the headwaters of Hunt Creek and on East Fish Lake (1940-1949 inclusive), where only brook trout are found; and on portions of six Lower Peninsula trout streams (see tabular footnotes

for streams and locations) during the 1939 trout season. The latter streams were variable as to the species of trout present, and all species were represented in the total catch. The Upper Peninsula streams for which we have information are the Fish Dam River (Delta County), and the East Branch of the Tahquamenon River (Chippewa County), in 1940. The only species in the East Branch is brook trout. Brook trout and brown trout both entered the 1940 catch on the Fish Dam River.

For each trout water, and for the indicated years the total pressure and the total catch observed has been divided into four four-week periods, and a shorter period of from 16 to 24 days which is left over at the end of each season. For Guiley Pond only the catch was separated by species.

The numbers and percentage of the total pressure and of the total catch occurring in each of the arbitrary periods of the trout season are given in Tables 1 and 2 for each of the waters in question. For the sake of brevity, only total figures are tabulated and combined into two main tables, inasmuch as the total figures yield the information sought. The sub-tables from which they were derived are filed in the offices of the Institute for Fisheries Research.

The length of the average trout season during the past ten years must be considered in this study, and it was found that there were 1,323 days in the seasons, 1940 to 1949 inclusive, or an average season length of 132.3 days. Thus the first four four-week periods made up 21.16 per cent each, and the last 16 to 24 days 15.3 per cent (four periods of an average length of 28 days, one period of an average length of 20.3 days). The 1939 and 1940 seasons were only 129 days in length, but inasmuch as the percentages would be changed only slightly they have been regarded as 132.3 days in the tables and the histogram (Figure 1). The latter figure presents in pictorial manner the results embodied in the tables.

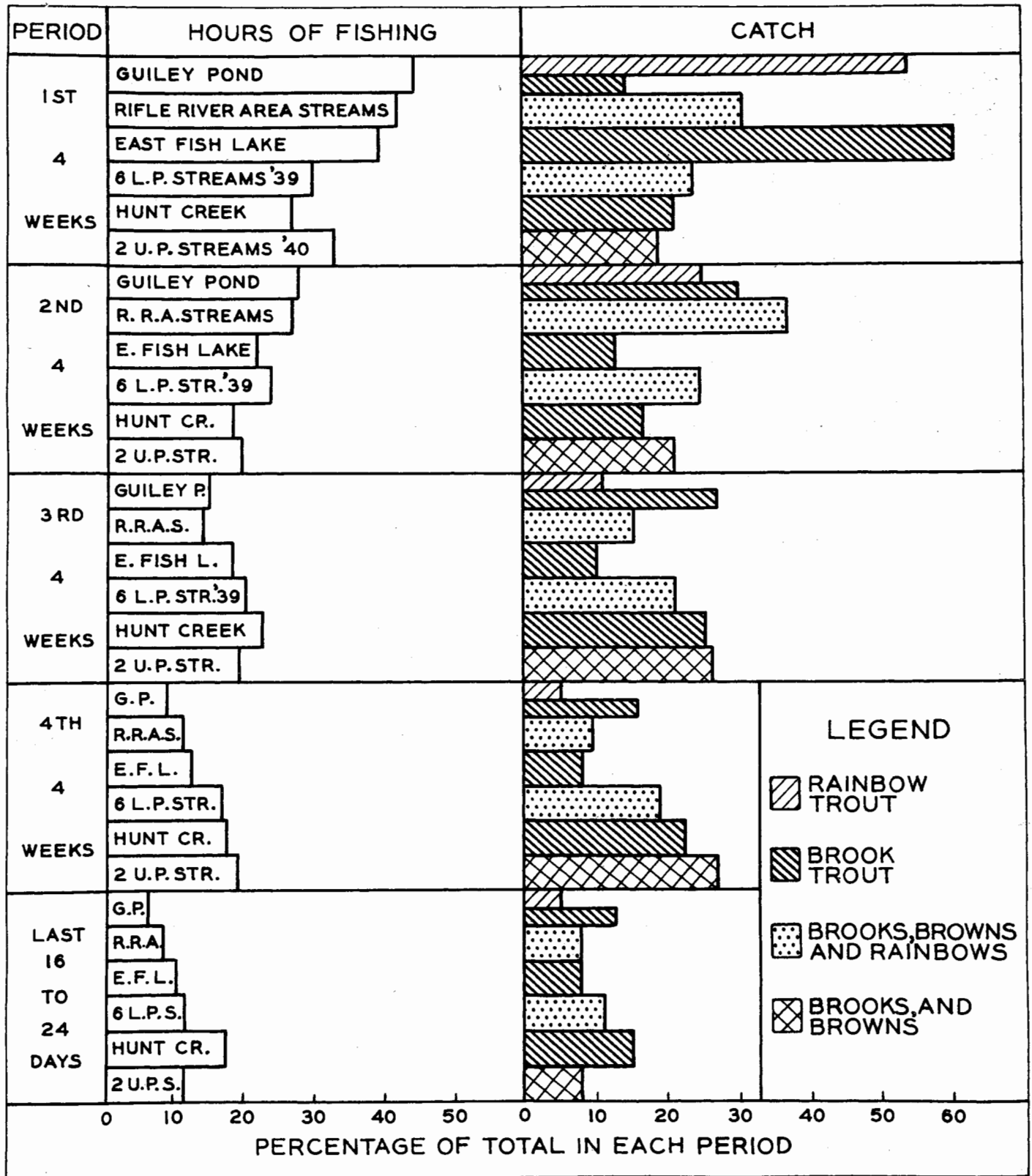


Figure 1. Percentage of total angling pressure and percentage of total catch during various periods of the average trout season. Vertical lines represent the average per cent of the trout season represented by the various periods. Data taken from Tables 1 and 2.

TABLE 1

Number (and percentage of total) of angling hours recorded in various parts of the trout season for various trout waters of Michigan, 1939 to 1949

Stream or Lake and years of intensive creel census	Hours of angling during the					Total hours of angling
	1st-4th week	5th-8th week	9th-12th week	13th-16th week	Last 16 to 24 days	
Guiley Pond, 1940-1949	10,510.25 (43.5+)	6,607.00 (27.3+)	3,493.25 (14.5+)	2,088.75 (8.6+)	1,458.50 (6.0+)	24,157.75
Rifle River Area, 1945-1949	8,478.50 (41.1)	5,433.50 (26.3)	2,848.50 (13.8)	2,229.00 (10.8)	1,662.50 (8.0)	20,652.00
East Fish Lake, 1940-1949	2,431.25 (38.6+)	1,362.50 (21.6+)	1,129.00 (17.9+)	745.75 (11.8+)	632.00 (10.0+)	6,300.50
Six L. P. streams, 1939 ¹	9,714.50 (29.2+)	7,791.50 (23.4+)	6,530.25 (19.6+)	5,463.50 (16.4+)	3,749.75 (11.3+)	33,249.50
Hunt Creek, 1940-1949	2,580.25 (26.0)	1,796.00 (18.1)	2,180.50 (22.0)	1,688.00 (17.0)	1,670.50 (16.8)	9,915.25
Two U. P. streams, 1940 ²	397.75 (32.2)	236.25 (19.1)	232.50 (18.8)	233.75 (18.9)	136.75 (11.0)	1,237.00
Per cent of trout season in various periods ³	21.2	21.2	21.2	21.2	15.3	- - - -

¹ These data were obtained from the intensive creel censuses of 1939 on portions of the Pine River (Lake County), Pigeon River (Otsego County), North Branch Au Sable (Crawford County), Little Manistee (Lake County), Canada Creek (Presque Isle County), and the White River (Newaygo County).

² Intensive creel census data from portions of the Fish Dam River (Delta County) and the East Branch of the Tahquamenon River (Chippewa County).

³ Percentage based on an average trout season of 132.3 days, which was the average for 1940-1949. In 1939 and 1940, the percentage was slightly different as the season in those years was only 129 days long, and the four four-week periods each represents 21.7 per cent of the season and the last 17 days represents 13.2 per cent of the season. Because this variance is slight and does not appear to change any trends or conclusions, no adjustments have been made.

TABLE 2

Number (and percentage of total) of trout caught in various parts
of the trout season for various trout waters
of Michigan, 1939 to 1949

Stream or Lake and years of intensive creel census	Species trout taken	Number of trout caught during					Total trout caught
		1st-4th week	5th-8th week	9th-12th week	13th-16th week	Last 16 to 24 days	
Guiley Pond, 1940-1949	rainbow	946 (54.3)	436 (25.0)	184 (10.6)	87 (5.0)	88 (5.1)	1,741
	brook	223 (14.1)	472 (29.8)	425 (26.9)	256 (16.2)	206 (13.0)	1,582
Rifle River Area, 1945-1949	all	1,515 (30.7)	1,829 (37.0)	745 (15.1)	464 (9.4)	384 (7.8)	4,937
East Fish Lake, 1940-1949	brook	933 (61.3)	197 (13.0)	152 (10.0)	121 (7.9)	118 (7.8)	1,521
Six L. P. streams, 1939 ¹	all	3,756 (23.9)	3,912 (24.9)	3,291 (21.0)	2,993 (19.1)	1,741 (11.1)	15,693
Hunt Creek, 1940-1949	brook	926 (20.3)	752 (16.5)	1,153 (25.3)	1,029 (22.6)	699 (15.3)	4,559
Two U. P. streams, 1940 ²	brook, brown	212 (18.7)	234 (20.7)	295 (26.1)	301 (26.6)	89 (7.9)	1,131
Per cent of trout season in various periods ³		21.2	21.2	21.2	21.2	15.3	- - - -

¹ These data were obtained from the intensive creel censuses of 1939 on portions of the Pine River (Lake County), Pigeon River (Otsego County), North Branch Au Sable (Crawford County), Little Manistee (Lake County), Canada Creek (Presque Isle County), and the White River (Newaygo County).

² Intensive creel census data from portions of the Fish Dam River (Delta County) and the East Branch of the Tahquamenon River (Chippewa County).

³ Percentage based on an average trout season of 132.3 days, which was the average for 1940-1949. In 1939 and 1940, the percentage was slightly different as the season in those years was only 129 days long, and the four four-week periods each represents 21.7 per cent of the season and the last 17 days represents 13.2 per cent of the season. Because this variance is slight and does not appear to change any trends or conclusions, no adjustments have been made.

Guiley Pond (1940-1949)

Total seasonal angling pressures at Guiley Pond ranged from 582.50 hours (1948) to 7,009.25 hours (1949), and total catches varied from 47 to 580 trout in those years. The great variation was the result of the failure of the dam until after the spawning run was over in 1948, and relatively few large rainbow trout were available. In 1949, the advertised transfer of approximately 1,000 adult rainbow trout from all parts of the Au Gres drainage attracted extremely large numbers of anglers. The 24,157.75 hours and total catch of 1,741 rainbow trout and 1,582 brook trout recorded in the Guiley Pond census during the last ten years had a percentage distribution by periods as follows:

	<u>Pressure</u>	<u>Rainbow trout catch</u>	<u>Brook trout catch</u>
1st period	43.5+ per cent	54.3 per cent	14.1 per cent
2nd period	27.3+ per cent	25.0 per cent	29.8 per cent
3rd period	14.5+ per cent	10.6 per cent	26.9 per cent
4th period	8.6+ per cent	5.0 per cent	16.2 per cent
Last 16 to 24 days	6.0+ per cent	5.1 per cent	13.0 per cent

Based on the ten-year totals and the division of these totals into the arbitrary time periods, 70.8+ per cent of the total pressure was exerted during the first 8 weeks (42.2 per cent) of the trout season, and was responsible for the removal of 79.3 per cent of the total rainbow trout catch and 43.9 per cent of the total brook trout catch.

Note that the percentage of the total rainbow trout catch taken diminished as the season progressed, while the percentage of the total brook trout catch was more steady with a peak during the second and third periods, and followed more closely the percentage distribution of the various time periods within the average trout season.

Rifle River Area Trout Streams (1945-1949)

In the five years since the establishment of intensive creel census operations on six trout streams of the Rifle River Area, a total of 20,652.00 hours of trout fishing have been noted to yield a total trout catch of 4,937 trout of all species (but mainly brown trout). Yearly total catches have varied from 418 (1945) to 1,547 (1947), and total angling hours have ranged between 3,397.50 (1945) and 5,061.00 (1948). The percentage distribution of the total catch and total pressure within the various time periods are as follows:

	<u>Pressure</u>	<u>Total Catch</u>
1st period	41.1 per cent	30.7 per cent
2nd period	26.3 per cent	37.0 per cent
3rd period	13.8 per cent	15.1 per cent
4th period	10.8 per cent	9.4 per cent
Last 16 to 24 days	8.0 per cent	7.8 per cent

From the tabular material and from the histogram it will be observed that the pressure pattern on the Rifle River Area streams follows closely that of Guiley Pond, particularly for the first three periods. The pattern of the removal of the total catch differs, however, in that the peak of the removal was found to be in the second month of the season, rather than in the first four-week period, followed by a noticeable drop in the third four-week period and gradual declines after that to the season's end.

In the first eight weeks (42.2 per cent) of the average season, 67.4 per cent of the total angling pressure had removed 67.7 per cent of the total catch from the Rifle River Area trout streams.

East Fish Lake (1940-1949)

This 16.0-acre brook trout lake, lying in south-central Montmorency County, has been under intensive creel census operations during the identical span of years as Guiley Pond. It differs from Guiley Pond in that it is larger, lies farther from Michigan's population centers, and is a natural trout lake and not an impoundment midway in a stream system. It is similar to Guiley Pond in that it has a limited population of large trout (brook trout) which have much the same attraction for brook trout anglers as Guiley Pond has for rainbow trout fishermen.

Over the years 1940-1949, this lake yielded 1,521 brook trout in 6,300.50 hours of angling. Season catches have ranged between 69 (1943) and 367 fish (1942), while seasonal angling pressures have varied between 199.50 (1943) and 1,039.75 hours (1949). These 10-year totals were distributed among the several periods of the average trout season as follows:

	<u>Pressure</u>	<u>Total Catch</u>
1st period	38.6+ per cent	61.3 per cent
2nd period	21.6+ per cent	13.0 per cent
3rd period	17.9+ per cent	10.0 per cent
4th period	11.8+ per cent	7.9 per cent
Last 16 to 24 days	10.0+ per cent	7.8 per cent

The pressure pattern for East Fish Lake is generally similar to that noted for Guiley Pond, and the removal pattern is also similar in character in that the majority of the brook trout catch was removed in the first four-week period. The reduction in angling pressure and the catch in periods following the first reflects to some degree the tendency of the brook trout to refuse either fly or bait as the surface waters become warmer. By the end of the first

eight weeks of the average season 60.2 per cent of the total angling pressure has been expended on East Fish Lake and 74.3 per cent of the total catch had been removed.

Experimental Sections, Hunt Creek (1940-1949)

In the years 1940 through 1949 on the experimental sections of Hunt Creek 4,559 brook trout were recorded from 9,915.25 hours of fishing. The pattern of the angling pressure observed in the arbitrarily-established time periods differs noticeably from similar data for trout waters already discussed in that the angling pressure follows closely the percentage of the total time in the trout season within the various time periods. The same is true of the pattern of the catch. The distribution of the angling pressure and the total catch for Hunt Creek within the various periods was as follows:

	<u>Pressure</u>	<u>Total Catch</u>
1st period	26.0 per cent	20.3 per cent
2nd period	18.1 per cent	16.5 per cent
3rd period	22.0 per cent	25.3 per cent
4th period	17.0 per cent	22.6 per cent
Last 16 to 24 days	16.8 per cent	15.3 per cent

Whereas in the other waters a majority of the angling pressure and a majority of the total catch was noted in the first eight weeks of the season, on Hunt Creek 44.1 per cent of the total angling pressure removed only 36.8 per cent of the total catch, during the first eight weeks.

Six Lower Peninsula Trout Streams (1939)

The intensive creel census data for portions of six Lower Peninsula trout streams during the 1939 trout season involve a total catch of 15,693 trout caught during 33,249.50 hours of fishing. The percentage distribution of these

totals among the arbitrary time periods was:

	<u>Total Pressure</u>	<u>Total Catch</u>
1st period	29.2+ per cent	23.9 per cent
2nd period	23.4+ per cent	24.9 per cent
3rd period	19.6+ per cent	21.0 per cent
4th period	16.4+ per cent	19.1 per cent
Last 17 days	11.3+ per cent	11.1 per cent

During the 1939 season on these waters it will be seen that the pressure and removal patterns were similar to that noted for Hunt Creek, and the percentages of the total pressure and total catch removed in the several periods (except the first period) were very close to the percentages of the trout season represented by the periods--in other words they were fished at a rate consistent with the time divisions, and the proportion of the total catch removed in any period was close to the proportion of the season represented by any period.

Two Upper Peninsula Trout Streams (1940)

A limited amount of data on the pressure and catch pattern over the trout season are available from the intensive creel censuses on portions of the Fish Dam River (Delta County) and on the East Branch of the Tahquamenon River (Chippewa County) during 1940. In that year the total angling pressure on these streams was 1,237.00 hours and the total trout catch was 1,131 trout (mainly brook trout, a few brown trout), and the percentage distribution over the various periods of the season, which was 129 days long, was as follows:

	<u>Total Pressure</u>	<u>Total Catch</u>
1st period	32.2 per cent	18.7 per cent
2nd period	19.1 per cent	20.7 per cent

3rd period	18.8 per cent	26.1 per cent
4th period	18.9 per cent	26.6 per cent
Last 17 days	11.0 per cent	7.9 per cent

The distribution of the angling pressure throughout the 1940 trout season on these two Upper Peninsula streams follows closely the pattern observed for the six Lower Peninsula trout streams in 1939. In the first four-week period the percentage of the total pressure observed exceeded by about $1/3$ the percentage of the season represented by the first period. In the following periods percentages of total pressure were close to but slightly less than the percentage of the season represented by the respective time divisions. The distribution of the total catch over the 1940 season was very similar to that observed for the Hunt Creek data. The peak of the removal came in the third and fourth four-week periods. This might be expected since brook trout dominated the catch in these two streams, and also are the only species caught in Hunt Creek.

Discussion

Based on the foregoing data, it appears that where there is a concentration of large trout known to be present either through angling experience or published records (such as at Guiley Pond or East Fish Lake) a majority of the angling pressure is going to be expended during the first four weeks of the season, and over 50 per cent of the total season's catch will be made in that time. This is understandable, since it is only logical that the average angler desires to fish over such waters when the concentrations of fish are at their peak numbers. Pre-season plantings of large numbers of hatchery-reared trout also bring about the same pressure pattern on numerous streams not discussed here. As the season progressed the percentage of the total pressure noted to occur in the various time periods decreased noticeably on Guiley Pond and East Fish Lake, as did the percentage of

the total catch. On Guiley Pond, this probably reflects the reaction of the angling public to the availability of a smaller number of fish. On East Fish Lake the same factor probably operated, plus the fact that brook trout lakes are not very productive during the warmer parts of the season.

The geographic location of such waters as Guiley Pond and the Rifle River Area trout streams also is a probable factor encouraging relatively high angling pressures in the opening month of the season. Both are relatively close to the highly populated Flint-Bay City-Midland-Saginaw Area.

Hunt Creek, the six Lower Peninsula trout streams, and the two Upper Peninsula trout streams are all streams where the individual fish and the size of the population is of a more normal character, and also the locations are more removed from population centers. Apparently these factors result in a more uniform distribution of the total pressure and the total catch throughout the season, once the flurry of the initial four-week period is past.

Another factor in the distribution of angling pressure on Michigan trout waters is the presence of the Decoration Day holiday within the first eight weeks. When this falls on Friday or Monday many anglers come north who otherwise would not. Because the Michigan bass season opens on June 25, the July 4 holiday angling pressure tends to be more widely distributed over bass and trout waters, although some increase in trout water angling pressure can be noted around July 4. The same situation appears to hold true for the Labor Day week end.

Conclusions

A review of the data presented here plus general observations suggest the following conclusions:

1. Trout streams, impoundments, or trout lakes with concentrations of large adult trout will receive the majority of their angling pressure and have

the majority of the season's total catch removed during the first four weeks of the trout season. Excellent examples are Guiley Pond, Platte River, East Fish Lake, and the trout lakes of the Pigeon River Forest and of Marquette County.

2. Where trout streams lie close to metropolitan centers, heavy early-season angling pressure may be anticipated. The pattern of the removal during the season will depend to a large degree on the species of trout present and their size. Examples of such streams are those of the Rifle River Area in Ogemaw County, the White River in Newaygo County, and some of the smaller trout streams of Kent County.

3. Trout streams which are located more distant from metropolitan centers and which are also more or less normal as regards their trout population are more likely to be fished at a uniform rate of pressure after the opening four-week period. The percentage distribution of the total catch is usually higher in some four-week period other than the first one. Some examples of streams in this category are Hunt Creek (Montmorency County), Fish Dam River (Delta County), and the East Branch of the Tahquamenon River (Chippewa County), and Pigeon River (Otsego County).

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