Original: Fish Division
cc: Education-Game
Mr. Hans Peterson
Hunt Creek Experiment Station
Dr. Shetter
Institute for Fisheries Resear

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

May 5, 1944

REPORT NO. 943

INTENSIVE CREEL CENSUS RESULTS ON THE HUNT CREEK FISHERIES EXPERIMENTAL AREA, 1943 TROUT SEASON.

by

David S. Shetter and Pat Galvin

During the 1943 trout-fishing season an intensive creel census was operated for the fifth consecutive year on the various experimental waters of the Hunt Creek drainage in south-central Montmorency County. These data were collected on the experimental sections A,B,C,D,E, of Hunt Creek proper, also "Below A" which is immediately downstream from the experimental sections, Tributary #2, Tributary #2 Beaver Pond, Fuller Creek and East Fish Lake Outlet, Fuller Creek, Beaver Pond, Sutton's Pond, and East Fish Lake (See map). The angling results on these waters is summarized and discussed in the pages to follow. A separate report was written summarizing the fishing results for East Fish Lake for the 1941 and 1942 seasons, but this year due to the small amount of fishing it received, and for convenience, angling results on East Fish Lake during 1943 will be included in this report. Special sections further downstream on Hunt Creek were not covered in 1943 because of gasoline restrictions and lack of man-power.

There are also included in this report a discussion of the relationship between angling pressure, yield, and angling quality (as determined

from the 5 years of data now available on the experimental sections of Hunt Creek); evidence concerning the role of the tributary streams in contributing to the anglers' catch is presented; and the pertinent facts concerning the improvement in angling since the installation of stream improvement devices in Section B are also placed on record here.

METHODS

As in the past, the five habitat sections of Hunt Creek were marked at their beginning and terminal ends, and creel census clerks were stationed where they were most likely to contact fishermen leaving the stream. Upon contacting a fisherman the clerks obtained, through the fisherman's cooperation, lengths and weights of legal fish taken, and from which experimental section or specially designated pool the fish were caught, the type of lure used, the time expended, number of sub-legal trout returned, and data on any marked trout taken or released. This information has been compiled by two-week periods by stream section or area for the entire trout season and is presented in that form (with the exception of several of the waters which were fished so little that the data at hand were compiled for the whole season instead of the two-week period).

ANGLING RESULTS (Tables 1-5, 13, 14, 15)

A total of 311 angling days[1] was spent on the five experimental sections of Hunt Creek, a decrease over 1942 of 54.4 per cent. This amount of time was expended by 147 individual fishermen (134 males, 13 females)

[1] Actually there were 313 angling days expended by 135 males, 14 females. One male and one female angler in Section C were not contacted during the period of June 5-18. If the census figures are altered to include their probable catch, the total results would be as follows:

313 angling days, 542 hours of angling, catch of 380 legal brook trout, catch of 2,595 sub-legal brook trout; catch per hour of legal fish, 0.70; catch per hour of sub-legal fish, 4.80; total weight of fish removed, 27041 grams or 59.61 lbs.

These figures were obtained by using the data from Section C for the period June 5-18 and applying it to the two anglers not contacted.

who fished a total of 540.00 hours (the average angling day was 1.7 hours long). Slightly more than half, 53 per cent of these fishermen, took no fish. The 1943 anglers caught 378 legal trout, or 0.70 legal trout per hour. A total of 2,591 sublegal trout was caught and released at the rate of 4.8 fish per hour. The catch per hour of both legal and sublegal trout was better (63% for legal trout, 71% for sublegal trout) than for the 1942 season.

Fishermen through angling removed 372 brook trout weighing 59.34[2] pounds from the experimental sections at the rate of 0.11 pounds of fish per hour. Although the total weight of legal fish removed was somewhat lower than that for the '42 season, the average weight of fish caught per hour angling increased 68 per cent in 1943 over 1942.

Section C yielded the largest number and the most pounds of trout per acre (18.9 lbs. and 127 fish) and aside from Section A it was the most heavily fished. (Section C- 78 angling days, 135 hours; Section A- 73 angling days and 162.5 hours). For pounds and numbers of legal fish per acre, Sections B, A, D, and E followed in that order (Section B- 17.3 lbs., 105 fish; Section A- 14.1 lbs., 94 fish; Section D- 11.3 lbs., 66 fish; Section E- 3.3 lbs., 19 fish).

The quality of fishing was good from May 8th thru August 13th. For the two week period July 31--August 13th at which time fishing was best, the catch per hour was 1.19 and the pounds per hour 0.18. For individual

---

[2] Weights were obtained on 327 brook trout. Weights were estimated as follows on fish which were either cleaned, or not seen:

Sections A, D--Weights of 13 fish determined from weight length curves for month of capture. The curves were made up from 1943 brook trout both measured and weighed.

Sections B, C--Thirty-two fish were removed from these sections which were neither measured or weighed. The average weight of fish which were weighed over the particular two-week period of removal was arbitrarily assigned to the specimens not weighed.

The weight of the 6 legal fish caught and returned to the water has not been included.

sections fishermen experienced the best fishing in Section B during the same period when the number of fish caught per hour was 1.7 and the number of pounds caught per hour was 0.28. Section B showed the greatest improvement in fishing quality (catch per hour 1942, 0.51; for 1943, 0.91). There also was an increase in the yield, which was 57 per cent better than the mean yield for the five-year period '39-'43.

Yield to the anglers, pounds of legal brook trout and numbers of legal brook trout per acre removed by angling.

A brief summary by sections of the calculated yields in pounds per acre and number of legal fish per acre is shown in Table 6.

The per acre yield for Section A decreased very little over the 1942 season and the per acre yield for Section B was the same as in 1942, while the remaining sections (C, D, and E) showed a marked decrease in pounds and numbers of fish per acre removed. Compared with the five-year average, Section A remained close to the normal; Section B increased both in pounds and number; while Sections C, D, and E decreased in yield of pounds and numbers of legal fish per acre.

The fishing pressure for all of the sections dropped in the 1943 season, with Sections E, D, and C in that order suffering the greatest decreases in fishing pressure and corresponding decreases in the yield.

Number of marked brook trout from experimental plantings entering the catch of legal brook trout during the 1943 trout season. (Table 7)

Creel census clerks are instructed to watch carefully for marked fish in the fisherman's catch. Marked fish, either jaw tagged or fin-clipped, continually play an important role in various experiments in progress. The recovery of such fish furnishes valuable information concerning the movements into and out of tributaries, growth and survival of wild and

hatchery trout under normal stream conditions, etc.

During the 1943 trout season 17 marked fish (4.4 per cent of total catch) were recovered by fishermen in the experimental sections; twelve of these were wild brook trout which were jaw-tagged at one of the tributary weirs, and the remaining five were fin-clipped. Four of the latter were marked wild fish from the 1939 and 1940 experiments (2 recoveries from each experiment). The fifth fin-clipped fish of legal size was a legal brook trout with the dorsal and right pectoral fins missing. This was one of 269 wild brook trout of all sizes seined from Section A in 1941 and marked to determine possible migration upstream into Section B. It was recaptured during the 1943 season in Section A. No marked hatchery fish of legal size were recovered during the trout fishing season. Hence the entire catch for the season consisted of wild trout and 1 per cent of the catch consisted of wild marked trout from the 1939 and 1940 survival experiments.

The only marked, hatchery-reared fingerling to be noted during the 1943 season was an undersized brook trout caught and released in Section B. This fish was from the 1940 planting of 464 right pelvic-marked hatchery fingerlings in Section C. For the 1939 experiment, 2.60 per cent of 1,000 wild fingerlings marked in Section C have been recovered to date as legal trout, as compared to 0.3 per cent recovery of the 1,000 marked hatchery fingerlings released in Section C at the same time.

There was a slightly better percentage of recovery from fish marked for a similar survival experiment in 1940; 4.6 per cent of 500 wild marked fingerlings have been recovered as legal trout to date, as compared to 1.29 per cent recovery of 464 marked hatchery trout of like size planted at the same time (Table 7). The relative return of hatchery vs. wild fingerlings from the 1940 planting was considerably better. In the 1939

experiment 8.7 times as many wild fingerlings made trout for the creel than hatchery fingerlings; from the 1940 experiment wild fingerlings were only 3.6 times as successful as the hatchery fingerlings.

From the recovery data for the 1939 and 1940 experiments it would appear that the wild trout have fared better than the hatchery trout under conditions in Hunt Creek. There is a possibility (suggested by the fact that 4 out of 9 of the marked hatchery fish were caught downstream from the point of release) that migration downstream out of the census area might be more pronounced in planted than in native fish. This cannot be definitely determined until a weir is established at the lower end of the experimental waters.

Yield of specially designated water areas (Table 8).

Pools 1 and 2 lie in the upper half of Section A. For the last 4 years these pools have been intensively censused and a record kept of the number and pounds of trout caught from each pool. In this way we are able to ascertain what per cent of the total yield is contributed by a limited area of stream.

Since the time that Pools 1 and 2 were specially designated, marked, and intensively censused (since 1940) they have contributed the following average percentages of the total yield for Section A; Pool 1 - 11.45 per cent of the total poundage and 11.1 per cent of the total number of legal trout caught; Pool 2 - 5.95 per cent of the total pounds and 5.82 per cent of the total number of legal trout.

The percentage of the total yield which each of these pools contributed in the 1943 season was below the 4-year average. The cause for this is rather uncertain because the quality of the fishing for Section A as a whole was better this season than last. Why then should there be such a decrease

in yield for Pools 1 and 2 which are a part of Section A?

Although no numerical data are available from the creel census record sheets (heretofore records of the measurements of the fish taken from Pools 1 and 2 have been merely indicated on the fishermen's sheets for Section A) as to the amount of time spent on these two pools, it may be inferred that because of better fishing throughout all parts of Section A, less time was spent in fishing these particular habitats than in former years. It is not unreasonable to assume that more fish might have been removed from all special pools under study had more fishing been prosecuted on these special waters.

Size of legal brook trout taken by anglers
in the census sections on Hunt Creek, 1943 season.

Clerks through the season measured 343 out of 379 (90.5 per cent) of the fish taken and weighed 330 out of 379 (87 per cent) of them. However, the clerks are deserving of more merit than the figures would indicate, since 30 weights and measurements are missing because of non-cooperation on the part of two individuals whose fishing records were later given to us verbally. Lack of cocperation on the part of these fishermen and not the inefficiency of the clerks may be blamed for an incomplete set of data.

The average size (length and weight) of the fish taken in the individual sections (A,B,C,D and E) will be found in Table 9. The average size of trout taken from all of the sections was 7.5 inches, and the weight, 2.6 ounces. The fish caught this season were slightly shorter than those taken in 1941 and 1942 but the average weight was greater.

AVERAGE SIZE FOR ALL SECTIONS

1941		1942		1943	
L	W	L	W	L	W
7.7	2.5	7.6	2.48	7.5	2.6

The average size of fish captured in the various experimental sections was as follows.

SECTION	AVERAGE TOTAL LENGTH	AVERAGE WEIGHT
A	7.4	2.4
B	7.6	2.7
C	7.6	2.5
D)	7.7	2.8
E)		

Relationship between angling pressure and fish yield in the experimental sections of Hunt Creek

In previous reports (Reports No. 644, 801, 889), the changes in fishing pressure and yield have been determined by comparing the results of the current season with the previous seasons because of the limited amount of data available on the subject for Hunt Creek. However, now that angling data for five consecutive seasons are available, representing five years of varying pressure and yield, these data have been combined to derive the average pressure and yield on the experimental waters of Hunt Creek. The 1943 data will be compared with the 5-year averages so obtained, and will be a more valid comparison than that obtained in past years. In previous reports, the calculated differences in pressure and yield between years were greatly magnified if either year was very far from average.

So that the reader may be able to see how the yield (in terms of pounds of legal fish removed per acre) has varied from the 1939-1943 average, and also to demonstrate the variation in angling pressure (as measured by angling hours per acre per season) from the '39-'43 average, Table 10 has been drawn up. Both yield and pressure have been reduced to percentage figures which indicate what per cent above or below the 1939-1943 mean that the yield or pressure figure for any year represents. For example, the average pressure for Section A for the period 1939-1943 was 161 hours per acre per season; in 1939 this section was fished at the

rate of 138 hours per acre per season, or 14 per cent below the five-year average. Percentages of variation from the 5-year average yields, and also the per cent variation from the 5-year average angling quality (as measured by pounds of fish caught per hour), were obtained in the same manner. The pertinent data listed in tabular form[3] in Table 10a are graphically shown in Figures 1-4 for each section of the experimental stream, and for the experimental stream as a whole.

An increased yield with an increased pressure is to be expected regardless of the stock present; that is, unless the stock is very badly depleted. Over-fishing should result eventually in a decline in the yield but it might not be immediately apparent. Over-fishing should result in: (a) A decrease in the catch per unit of effort, (b) A decrease in the average size of the fish.

Before discussing the figures it would be well to clarify certain assumptions which must be kept in mind in the course of the following discussion. If one assumes (a) that the stock of legal-sized brook trout is unlimited, then an increased yield can be expected with an increased angling pressure. Under such a condition one might also expect that the quality of the fishing--as measured by the number or the pounds of fish caught per hour--might remain constant or rise over the period of time studied. On the other hand, if one assumes (b) there is a limit to the stock of catchable fish (which we have every reason to assume), then we might expect that increases in pressure will bring about increases in the yield only up to a certain point, and after angling pressures go beyond that point, yields will continue at their optimum level, or if the pressure is too great; would start to decline. Under the latter conditions, the quality of the fishing can be expected to decline with an increase in

[3] The entire data are contained in Table 10, which is extremely lengthy. Table 10 is filed with the Institute copy of this report in the Ann Arbor office.

angling pressure, since more hours are being spent to remove a limited number or pounds of fish.

Section A (Figure 1) furnishes an example of the conditions just laid down (Condition (b)). Increases in pressure brought increases in yield until 1941, when despite a greater increase in pressure, the yield dropped below the 1939-1943 average. A marked decrease in pressure in 1942 resulted in an increased yield in the same year, and in 1943 with a continued decrease in pressure the 1943 yield decreased slightly. It should be called to the readers' attention that in Section A every increase in angling pressure brought about a decrease in the quality of the fishing, and every time the pressure decreased, the angling quality increased.

In Section B (Figure 1), the fishing pressure was apparently so light during 1939, 1940, and 1941 in relation to the stock of fish present, that for practical purposes, the assumption outlined in (a) was in operation. In those years, changes in the quality of the catch per hour and in the yield were similar to the changes in the angling pressure. Such conditions also carried through into the 1942 season, which had higher pressure, higher yield, and higher angling quality. The striking feature of the Section B data is the fact that, although the 1943 angling pressure dropped very markedly, the yield increased slightly in 1943, and the quality of fishing continued to be well above normal. This improvement in angling quality and yield was very likely brought about by the environmental improvement described at greater length elsewhere in the report.

In Sections C, D, E, interpretation of the data is complicated by the probable addition of legal brook trout to the normal stock of the experimental sections in 1941, caused by a break in the Flint Club beaver dam. This dam on the extreme headwaters broke through in May, 1941. The fact that there was a slight increase in size in the catches of Sections C, D, and E after

the break, and also the fact that the catch per hour increased, first in Section E, then in Section D, and then in Section C lends weight to the postulated enlargement of the normal brook trout population of Sections C, D, and E.

A study of the pressure, yield, angling quality relationships for Section C (Figure 2) also bears out the postulated population increase. The pressure on Section C in 1939 and 1940 was the same; yield and angling quality varied only slightly. In 1941, pressure increased from 30 per cent below average to about 78 per cent above average, and the yield increased from about 27 per cent below average to 95 per cent above average. Under such conditions, had the stock of fish in Section C not been increased, we might have expected a sharp decline in the angling quality, yet angling quality increased about 4 per cent over the preceding year. In 1942, pressure decreased and so did the yield, although both were still above the 1939-1943 average. Angling quality reached its lowest point in this year (27 per cent below average); apparently the effect of the recruitment of the additional stock from the Flint Club dam in the previous year failed to have any effect on the 1942 angling. In 1943, a vastly lowered pressure was responsible for the lowered yield and an increase in the angling quality.

In Section D (Figure 2), despite only a slight decrease in angling pressure in 1940 as compared with 1939, there was a tremendous decrease in yield and quality between those two years. A possible explanation for this decrease is that the Section D Beaver Dam lost considerable water area between the two seasons, and many fish which might ordinarily have stayed there, probably left Section D for more favorable habitats. This may also explain why there was a slight increase in the 1940 yield of Section C with exactly the same pressure as in the preceding year. In 1941, pressure and yield in Section D showed the very noticeable increases

common to all sections in that year. However, angling quality, instead of decreasing (as might have been expected under such an increase in pressure), increased, probably as the result of the increase in the stock of legal brook trout from the Flint Club Beaver Dam. In 1942, as in Section C, pressure, yield, and angling quality decreased, probably for the same reasons as in Section C. In 1943, the Section D data indicate that a pressure of about 55 per cent below average resulted in a yield of 45 per cent below average, and while the angling quality increased over 1942 it failed to go as far above the 5-year average as it did in Sections A, B, or C.

The interpretation of the data pertaining to Section E is complicated by the following facts: (1) Only four years of data are available; (2) In 1940 and 1943 only 8 hours of fishing were recorded there, and (3) The probable influx of fish from the Flint Club Beaver Dam affected the natural trend of angling results. In 1940, the extremely low pressure produced a comparably low yield, and angling quality was above average. In 1941, with the very extreme increase in pressure there was a comparable rise in the yield, and although angling quality did decrease, it may be surmised it would have decreased even more had not additional fish been available from the Flint Club Beaver Dam. In 1942, pressure dropped back slightly below average and so did the yield, and the angling quality decreased although theoretically it should have increased. In 1943, both pressure and yield were about 80 per cent below the 4-year average, and angling quality returned to slightly above average under the lessened angling pressure.

When the combined data from all sections are considered (Figure 4), they appear to agree with the conditions laid down in assumption (b) previously outlined except for the years 1940 and 1941. In 1940, with an

increase in pressure, an increase in yield might have been logically expected, but instead, the yield (and also the quality of the angling) suffered a noticeable decrease. The reasons for these decreases are not apparent, but it may be mentioned that most of this decrease in yield occurred in Section D. The marked increase in pressure in all sections in 1941 brought about a similar increase in the yield. The fact that the angling quality increased even under severe pressure lends support to the contention that there was an enlargement of the normal population of legal fish as the result of the breaking of the Fuller Creek Beaver Dam (already discussed). Had the normal population not received some additional stock, the angling quality could be expected to decline more or less in proportion to the increase in pressure. The relationships between pressure, yield, and angling quality in 1942 and 1943 agree rather well with assumption (b).

One fact which may be noted from a study of the graphical data is that very often percentage increases in the yield are coincidental with percentage decreases in angling quality as represented by the catch per hour. In other words, the yield, as far as total number of pounds of fish removed, might be considered excellent; yet for the individual angler, the quality of the fishing might be comparatively poor. Conversely, average angling quality may be very good in years when the yield and the pressure are comparatively low, as witness the 1943 data for all sections.

The problem which now confronts us is one of determining the size of the stock of legal-sized fish over which angling is prosecuted--in other words conducting population studies before and after the close of the fishing season so that we may learn more accurately the relationship between angling pressure, yield in pounds to the anglers, quality of the fishing, the brook trout population present through several years, and the affects on the stream biology of various pressures and removals. Such studies

are now in progress in Section B, and others are planned for the future in the other experimental sections.

Contribution of the tributary streams to the total catch of the experimental sections

The presence of the fish traps on the four main tributary streams within the experimental area, and the marking of almost all fish handled which are larger than 4 inches, is beginning to yield information on the number of fish which move out of the tributaries to be later caught by anglers in the experimental waters of the main stream. The weirs did not begin to contribute to our knowledge of the catch of fish in the main stream until the 1942 season, by which time over a thousand fish of all sizes had been marked.

The catch of fish originating in the tributaries has been comparatively small, as will be noted in Table 11. The fish listed in this table are those which, as far as can be determined from the tagging and recovery records, originated in the respective tributaries. Marked fish which were originally tagged moving upstream into the tributaries, and which later had moved back into the main stream to be captured by angling, were excluded. Tributary #3 has contributed the most fish to the angling in the main stream; a total of 15 were taken during the past two seasons. Tributary #2 has yielded 6, and Tributary #4 produced 2 specimens. Of these 23 fish which were recovered, 9 were taken at points downstream from the experimental area (Below Section A), emphasizing again the need for a counting weir at the lower end of the experimental waters. Tributary #5 has contributed no fish to the legal catch of the main stream.

The percentage of the total catch made up by migrants out of the tributaries into the experimental waters in 1942 was 0.7 per cent (4 of 543 fish); in 1943 it was 2.9 per cent (10 of 379 fish). In the waters

below A in 1942, downstream migrants from the tributaries made up 0.8 per cent of the total catch (3 of 352 fish); and in 1943 tributary migrants made up 2.5 per cent of the total catch (6 of 233 fish).

Of the 23 recoveries listed in the table, 2 were tagged as fingerlings (less than 4 inches long and had been free 223 and 404 days; 17 were tagged as sub-legal fish (4 - 6 7/8 inches) and grew to legal size in periods varying between 18 and 517 days; and 4 were of legal size (7 inches or larger) when tagged, and had been free 5 to 94 days.

As pointed out elsewhere in the report, four legal, tagged brook trout entered the 1943 catch of 69 fish in East Fish Lake. All four of these fish had been tagged as sub-legal fish (one in the fall of 1942, three in the spring and early summer of 1943) as they entered the upstream trap in the East Fish Lake Outlet weir. Thus 5.8 per cent of the season's catch (4 of 69) was composed of fingerlings which migrated into the lake.

At some time in the future a more detailed analysis of the tagging activities on the tributaries and the recoveries resulting from them will be made, but complete data are too lengthy to be presented here.

The effect of stream improvement in Section B on the fishing.

Immediately after the close of the 1941 trout season stream improvement devices were installed in Section B, which is 1605 feet in length (area 0.64 acres) flowing through a more or less open cedar-spruce-tamarack swamp. Through the intensive creel census, the anglers' catch for the three previous seasons was known. Bottom food studies and population studies also were made before the habitat was changed. Two complete fishing seasons have passed since the installment of the devices and it is of interest to consider the changes in the fishing. The general changes that

have taken place will be noted in Table 12, which gives the catch data for the 5 years of intensive creel census.

From 1939 to 1941 inclusive, Section B was fished from 33½ to 86½ hours each year, and yielded from 15 to 41 fish and from 1.11 to 6.69 pounds of fish to the anglers. The catch per hour varied from 0.43 to 0.47 fish per hour, and the pounds of fish removed per hour ranged from 0.033 pounds to 0.077 pounds. Since the placement of the improvement devices in the fall of 1941, the hours of angling during 1942 and 1943 have been somewhat higher, and the yield has been much greater also. In 1942, a total of 126½ hours of fishing yielded 65 brook trout weighing 11.04 pounds, and in 1943, 73 1/4 hours of fishing yielded 67 brook trout weighing 11.00 pounds. The number caught per hour and the pounds of fish removed per hour of angling in those years was, respectively; 1942, 0.51 and 0.087; 1943, 0.91 and 0.151, very noticeably higher than in the three years previous to the installation of the stream improvement devices. The average yield has more than doubled in number and pounds, and the catch per hour improved by 58% in number and 100% in pounds.

It is possible that the increase in yield and in fishing quality has reflected a natural fluctuation in the brook trout population, but it should be pointed out that very often a decrease in angling pressure is accompanied by a decrease in yield. Such a drop did not occur in Section B in 1943 despite a marked decrease in angling pressure, (as has already been pointed out on page 10). In the other experimental sections, the 1943 angling pressure decreased to various points below the 5-year average, and in all instances this resulted in an increase in the quality of the fishing, but a decrease in the yield. However, in Section B in 1943, despite the decrease in pressure the yield remained constant at the 1942 level and the quality of the fishing improved almost 70 per cent over 1942. This situation

would indicate that a larger number of legal brook trout were available to the anglers of Section B as a result of the stream improvement conducted there in the fall of 1941.

That the increased catch was not due simply to attracting and concentrating fish from the stream above and below is indicated by the results from the following experiment. In September, 1941, Sections A and C were seined, and wild brook trout of all sizes were fin-clipped, using a distinctive mark for each section; 249 fish were marked in Section C and 261 were marked in Section A. The fish from this experimental marking which have entered the catch of legal brook trout have been captured chiefly in the Sections where they were marked. Those fish which were captured by anglers in Section B (2 fish) or other sections have been few. Detailed mathematical analysis of these recoveries (involving the number of marked fish available, the hours of angling prosecuted in the various stream areas, and the number of recoveries made) indicate that Section B has received a very minor percentage of its present population from Sections A and C through migration. The increased yield is therefore believed to be due largely to an increased survival of young fish of which there has always been an excess.

Without discussing the results of the population studies in detail, it should, however, be mentioned here that the 1943 studies indicate a larger brook trout population for Section B than for any year previously. Population studies were made on approximately the same dates in the fall of each year from 1941 to 1943 (in late August). If the quality of the fishing, as measured by the number of legal fish caught per hour and the number of pounds of legal fish removed per hour, continues to increase or hold the general 1942 and 1943 level during the next few years, we may justifiably conclude that the habitat improvements as wrought by the stream improvement devices, have been responsible for the change. The data at

hand favor this conclusion, but at least one more year of census data will make possible a more positive assertion.

Angling results on other waters in the experimental area.

Hunt Creek below Section A

In Table #13 are listed the data obtained from fishermen who fished the 3/4 mile section of stream below Halberg's Bridge, which is the downstream limit of Section A. Only fishermen who entered and left or who entered elsewhere and left in the vicinity of Halberg's Bridge were contacted, and for this reason the data are probably incomplete.

This section in 1943 was fished by 173 fishermen, 55 per cent of whom were unsuccessful. These fishermen caught 233 legal trout at the rate of 0.55 fish per hour which averaged 7.4 inches and weighed 2.24 ounces. Anglers here caught an average of 0.07 pounds of legal fish per hour, or a total of 28.9 pounds in 425.25 hours of angling. They also caught and released 1,526 sublegal brook trout at the rate of 3.6 sublegal trout per hour.

The quality of fishing was variable. During the two-week period May 8th-21st. fishermen caught legal trout at the rate of 0.94 trout per hour; however, towards the end of the season fishing dropped off and during the period August 28th to September 6th the rate of capture was 0.21 fish per hour. No marked hatchery fish were in the catches recorded for this stream area. Six wild tagged trout were recorded, however, which had been tagged in the tributary weirs.

East Fish Lake Outlet and Fuller Creek (Table 14).

In the 1943 season, 19 fishermen, 47 per cent of whom were unsuccessful, fished these waters. They caught 19 legal brook trout in 25 hours angling or 0.76 legal fish per hour or 0.10 pounds of legal fish per hour. These fish

averaged 7.45 inches in length and 2.24 ounces in weight.

Fishermen reported catching and releasing 165 sublegal trout at the rate of 6.6 undersized fish per hour.

The number of fishermen fishing these waters in 1943 make up only approximately two-thirds the number who fished the same area in 1942.

Although the quality of fishing (1942- 0.28 fish per hour; 1943- 0.76 fish per hour) was better this season than last, the fish taken were shorter and lighter. All fish caught were wild fish.

Fuller Creek Beaver Pond (Table 14).

This beaver pond, now inactive, lies a short distance above the East Fish Lake outlet on Fuller Creek. It is situated in a cedar-tamarack-spruce swamp. Several years ago the dam was broken and the water level was lowered about three feet. Since that time the pond has been less inviting to anglers.

This season, four fishermen, all of whom were successful, spent 7.75 hours fishing this water, and they caught 14 legal fish or a rate of capture of 1.8 legal fish per hour. These fish averaged 7.6 inches and weighed 2.24 ounces.

Fishermen also reported capturing and releasing 21 undersized trout at the rate of 2.7 fish per hour.

Trib. #2 and Trib. #2 Beaver Pond (Table 14).

This tributary was visited by one fisherman during the entire season. His total catch consisted of 2 undersized trout.

Tributary #2 is rather remotely situated entering Hunt Creek at the upper end of Section A. For the greater part of its length it flows through a dense cedar swamp and in places it descends rapidly. The beaver pond has been abandoned and largely removed. It is water that could be

fished only with bait and even the bait fishermen would find it difficult to present his lure favorably. This fact and the fact that this water has never produced good catches may be in part responsible for the small amount of fishing it receives.

Sutton's Pond (Table 14).

This body of water lies to the west of the experimental area. It is on the headwaters of Trib. #3. Data for this body of water are tabulated and presented in Table #14. The data are incomplete for Sutton's Pond. It was not intensively censused because of its remote location.

East Fish Lake

In 1941 and 1942 a separate report was written for discussion of the census data for East Fish Lake. This year because of the relatively small number of fishermen a discussion of the fishing results will be included here.

A total of 121 anglers, 81 per cent of whom were unsuccessful, spent a total of 199.50 hours on East Fish Lake. They caught 69 legal trout at the rate of 0.29 legal fish per hour. They caught and released 23 sub-legal fish at the rate of 0.12 fish per hour.

Anglers removed a total of 26.04 pounds of legal trout in 199.5 hours of fishing, or an average of 0.130 pounds of legal fish per hour.

The yield was much lower this season than last (1942--97.06 pounds, 1943--26.04 pounds). There was a drop from a yield of 6.1 pounds per acre in 1942 to 1.63 pounds per acre for the 1943 fishing season.

The decrease in yield is attributed to two factors, a decrease in fishing pressure and the fact that the lake was populated with fewer legal hatchery trout at the opening of the 1943 season. This spring there should have been present a total of 168 legal hatchery fish[1] if all fish caught were

[1] 117 from the fall planting of 1941, and 51 from the spring planting of 1942. No plantings have been made since the spring planting of 1942.

reported and no natural mortality occurred after planting.

In view of the large number (theoretical) of hatchery fish supposedly present, it is surprising that no marked hatchery trout were taken by anglers. Such results would indicate that the carry-over through more than one winter and one complete year was a negligible fraction of the total number planted in the lake.

One can only conjecture as to the fate of the 168 hatchery fish, some of which might have been expected to enter the 1943 catch. Undoubtedly some did die, since the larger percentage of them would have had to survive through two winters. It is possible, however, that some were still present, during the 1943 season but anglers failed to entice them with lures they used, or lost them after hooking (several large fish were lost during the season). The fact remains that they were not recorded as being caught and we do not know whether they are, or whether they are not, present in the lake. None could have left the lake by the outlet since a very efficient weir has been functioning here since the fall of 1941.

If the quality of the fishing in 1943, as judged by the number of fish caught per hour, the 1943 season was the poorest on record (only 0.29 fish per hour). However, because the brook trout taken in 1943 were of the greatest average weight (6 ounces) of any year on record, the quality, as measured by the pounds of fish caught per hour, was second only to the 1942 season. Early-season fishing was poorer than usual because, as was said previously, gullible hatchery trout were not to be caught. Only 19 fish were removed up to July 2.

The quality of fishing was best from July 3rd through July 30th when the rate of capture was 0.74 legal fish per hour and 0.205 pounds per hour. At this time excellent fly-fishing could be enjoyed in the evening hours when the large May flies emerged from the shallower waters. This is without

precedent as in the past early-season fishing has always given better yields.

In the two-week period that followed (July 31-August 13) fishing took a slump, probably because of high surface temperatures, and didn't reach average quality until the last week of the season.

Five marked fish, all of which were jaw tagged, were recovered in the catch. One of these fish was one of several which moved into the outlet weir, was tagged, and placed between the weir and dam to determine whether or not fish were able to move over the dam and into the lake. This fish, when captured (on 5-25-43) in the upstream trap of the weir was 110 mm. (or 4.3 inches) long. It was caught 46 days later in the lake and had grown 47 mm. or 1.85 inches. This recovery would indicate that for trout of this size, the dam is no barrier if they desire to move upstream into the lake.

The other four tagged trout recovered by angling in the lake showed corresponding increases in growth. One tagged fish 111 mm. long or 4.4 inches (marked in the Fuller Creek Weir in Sept. 1942) was recovered at the weir at the East Fish Lake outlet on October 18, 1942 and after being measured and a scale sample taken it was placed in the lake. When it was caught 251 days later (May 26, 1942), it was 257 mm. (10.1 inches) long and had grown 146 mm (5.7 inches), an increase in length of 131.5 per cent.

The other 3 fish were tagged at the weir on 5-16-1943 and placed in the lake. They were all taken by an angler on July 9, 1943. When tagged these fish measured 120, 106 and 131 mm. and when captured they measured 206, 184 and 214 mm. respectively or an increase in length of 86, 78 and 83 mm. in 54 days.

The average size of the trout in the legal catch measured 9.3 inches and weighed 5.99 ounces, as compared with the average size of wild fish taken in 1942 whose measurements were: Average length 8.9 inches, weight

4.7 ounces. The entire catch consisted of wild fish. During 1943, brook trout weighing more than a pound were taken from East Fish Lake for the first time since the studies on the lake were started.

Angling pressure in relation to the yield on East Fish Lake (Table 16, Figure 5).

Anglers spent 199.5 hours on East Fish Lake in 1943, a decrease of 31 per cent over the previous season. There also was a 32 per cent decrease in pressure (1943--12.4 angling hours per acre) as compared to the average pressure of 18.0 angling hours per acre for the five-year period 1939 to 1943 inclusive. There were comparable decreases in the yield; 4.47 fewer pounds of legal fish per acre were caught in 1943 than during the 1942 season (a 52 per cent change in yield as compared to the average), a decrease of 73 per cent in pounds of legal fish per acre removed over that of the previous season. Such decreases in yield cannot be attributed to over-fishing but to a decrease in pressure and a decrease in the potential number of legal trout (there was no fall planting in 1942 nor spring planting in 1943 and there is evidence that previously planted hatchery trout did not survive the winter).

It is planned to continue the census on this lake for at least two more years without stocking or improvement in order to determine the natural yield. At the end of this time experiment in improvement of spawning conditions and later stocking with different numbers and sizes of trout may be attempted to learn how the yield may best be increased.

In discussing the data on the pressure-yield-angling quality relationship of East Fish Lake the variations in the trends of yield and angling quality from the expected pattern may be explained by the fact that, in all years, except 1943, the wild stock of the lake was augmented by hatchery plantings of legal-sized brook trout (1940- 250 fish; 1941

and 1942- 500 fish yearly). Also, the lake was poisoned in August, 1941, and all the minnows, perch and coarse fish were eliminated. The water level was raised at the same time, making more shoal area. These factors combined to give more fish of a larger average weight for fewer hours of angling in 1942, all of which increased the measure of angling quality. In 1943, although the pressure went some 30 per cent below average, and the yield dropped to the lowest on record for East Fish Lake, the fact that the average weight of the fish taken continued to increase, kept the angling quality from dropping as far as one might have expected.

Number and percentage of fisherman days in which various numbers of legal brook trout were caught in the experimental sections of Hunt Creek (Table 17).

One hundred and sixty-five or 53.0 per cent of a total of 311 fishermen failed to catch a legal trout in 1943 in the five experimental sections. Fifty-eight fishermen (18.7 per cent) caught one legal fish, 38 or 12.3 per cent two fish, and 16, 14, and 8 fishermen constituting 5.2, 4.5 and 2.6 per cent of the total number of anglers caught 3, 4 and 5 legal fish respectively. Twelve fishermen or 3.85 per cent of the fishermen took more than 5 legal trout per angling day.

The largest catch of the season, 12 legal trout, were taken by an angler in Section C. Two other catches of eleven legal fish each were taken by anglers in Section A and B.

Residence of anglers (Table 18).

Fishermen from 21 counties, all in the lower peninsula, and one non-resident fisherman from Ohio spent a total of 311 angling days on the waters included in the experimental sections. Due to the war, which subsequently brought about rationing of tires and gasoline, there were fewer fishermen

than in previous years from outside of the state, or from the metropolitan areas in the southern half of the lower peninsula. Thus the number of angling days spent by local residents (Montmorency County) in the experimental area exceeded that spent by fishermen from Wayne, St. Clair, Genesee, Jackson, Washtenaw, Oakland and 16 other counties in the State.

The experimental area as a whole was fished on 641 angling days during 1943, divided as follows: Experimental sections- 311, Below A- 173, East Fish Lake- 121, miscellaneous- 28. The residence pattern of the anglers using the waters other than the experimental sections was much the same as for the experimental waters. The total number of angling days expended on the area in 1943 was 544 per cent less than the time expended in 1942.

A comparison of the residence patterns is of interest. The five counties with the largest numbers of angling days recorded in each year since 1940, and the non-resident angling days are shown in Table 19. Montmorency or Wayne County has always furnished the greater number of anglers, (except for 1942 when Genesee was second). The remaining counties which have been noted quite consistently among the first five are Washtenaw, St. Clair, and Ingham. The differences between 1942 and 1943 are certainly attributable to war conditions and gasoline rationing.

Among the non-resident anglers, Ohio fishermen are consistently more numerous than those from any other state, usually followed by Indiana, or Pennsylvania.

INSTITUTE FOR FISHERIES RESEARCH

by David S. Shetter and Pat Galvin

Approved by: A. S. Hazzard

Typed by: M. Klaphaak

Table 1

Intensive Creel Census Data For Section A, Hunt Creek,

1943 Trout Season

Two-week periods	Number of anglers	Number taking no fish	Per cent taking no fish	Total hours of angling	Legal brook trout		Sub-legal brook trout		Total wt. of legal fish	Wt. of legal trout caught per hour	
					Number caught	Catch per hour	Number returned	Catch per hour		Grams	Pounds
Apr. 24-May 7	7	4	57	8.50	7	0.82	20	2.35	470	55.2	0.12
May 8-May 21	6	2	33	10.75	8	0.84	32	2.98	536	49.8	0.11
May 22-June 4	16	5	31	30.75	32	1.04	171	5.56	2,050	66.7	0.15
June 5-June 18	3	0	100	11.00	11✓2	1.00	51	4.63	666	60.5	0.13
June 19-July 2	8	1	13	30.50	35	1.15	214	7.02	2,661	87.2	0.19
July 3-July 16	7	6	86	11.75	2✓2	0.17	18	1.53	0	0	0.0
July 17-July 30	7	2	29	24.50	19	0.78	154	6.28	1,338	54.6	0.12
July 31-Aug. 13	4	2	50	5.00	6	1.20	27	5.40	493	98.6	0.22
Aug. 14- Aug. 27	10	6	60	24.00	14	0.58	112	4.67	910	37.9	0.08
Aug. 28-Sept. 6	5	3	60	5.75	2	0.34	26	4.52	114	19.8	0.04
Totals or averages	73	31	42	162.50	136✓4	0.84	825	5.08	9,238	56.8	0.13

✓ - Number in caret indicates number of legal fish caught but returned to stream.

Table 2

Intensive Creel Census Data For Section B, Hunt Creek,

1943 Trout Season

Two-week period	Number of anglers	Number taking no fish	Per cent taking no fish	Total hours of angling	Legal brook trout		Sub-legal brook trout		Total wt. of legal fish	Wt. of legal trout caught per hour	
					Number caught	Catch per hour	Number caught	Catch per hour		Grams	Pounds
Apr. 24-May 7	9	5	55	12.50	6	0.48	38	3.04	490	39.2	.08
May 8- May 21	4	2	50	4.00	2	0.50	27	6.75	120	30.0	.07
May 22-June 4	8	6	75	10.00	2	0.20	186	18.6	201	20.1	.04
June 5-June 18	...	...	...	...	...	...	...	...	...	...	...
June 19-July 2	7	0	0	12.75	17[1]	1.33	104	8.1	1,278	100.0	.22
July 3-July 16	2	1	50	3.50	2	0.57	7	2.0	213	60.8	.13
July 17-July 30	2	2	100	1.00	0	0.00	12	12.0	0	0	0
July 31-Aug. 13	9	0	0	14.75	25	1.70	99	6.7	1,920	130.1	.28
Aug. 14-Aug. 27	8	3	37.5	14.00	12	0.85	112	8.0	738	52.7	.12
Aug. 28-Sept. 6	1	0	0	0.75	1	1.33	5	6.6	59	78.6	.17
Totals or averages	50	19	38	73.25	67[1]	0.91	590	8.05	5,019	68.5	.15

[1] - Number in caret indicates number of legal fish caught but returned to stream.

Table 3

Intensive Creel Census Data For Section C, Hunt Creek,

1943 Trout Season

Two-week period	Number of anglers	Number taking no fish	Per cent taking no fish	Total hours of angling	Legal brook trout		Sub-legal brook trout		Total wt. of legal fish	Wt. of legal trout caught per hour	
					Number caught	Catch per hour	Number caught	Catch per hour		Grams	Pounds
Apr. 24-May 7	8	6	75	13.50	3	0.22	10	.74	184	13.6	0.03
May 8-May 21	5	3	60	8.50	3	0.35	80	.94	210	24.7	0.05
May 22-June 4	3	3	100	3.50	0	0.0	23	6.57	0	0	0
June 5-June 18	5	2	40	5.00	5	1.00	10	2.0	280	56.0	0.12
June 19-July 2	18	7	39	35.50	28	0.79	238	6.7	2,105	59.3	0.13
July 3-July 16	0	...	...	...	...	...	...	...	...	0	0
July 17-July 30	12	5	42	20.25	19	0.94	101	4.98	1,258	62.1	0.14
July 31-Aug. 13	6	1	17	8.25	26	3.10	68	8.24	1,477	179.0	0.39
Aug. 14-Aug. 27	11	7	64	24.00	4	0.16	60	2.50	416	17.3	0.04
Aug. 28-Sept. 6	10	8	80	16.50	2	0.12	39	2.36	165	10.0	0.02
Totals or averages	78	42	54	135.00	90	0.66	629	4.66	6,095	45.1	0.10

Table 4

Intensive Creel Census Data For Sections D and E, Hunt Creek,

1943 Trout Season

Two-week periods	Number of anglers	Number taking no fish	Per cent taking no fish	Total hours of angling	Legal brook trout		Sub-legal brook trout		Total wt. of legal fish	Wt. of legal trout caught per hour	
					Number caught	Catch per hour	Number caught	Catch per hour		Grams	Pounds
Apr. 24-May 7	24	18	75	26.75	12✓1	0.45	62	2.31	832	31.1	0.07
May 8-May 21	5	1	20	6.50	7	1.07	47	7.23	593	91.2	0.20
May 22-June 4	15	8	53	19.50	18	0.92	70	3.59	1,355	69.4	0.15
June 5-June 18	10	5	50	15.75	8	0.51	35	2.22	484	30.7	0.07
June 19-July 2	14	7	50	27.50	13	0.47	157	5.71	1,221	44.4	0.10
July 3-July 16	1	1	100	1.0	0	0.00	3	3.00	0	0.0	0.00
July 17-July 30	1	0	0	1.5	4	2.66	9	6.00	254	169.3	0.37
July 31-Aug. 13	16	14	88	26.5	8	0.30	31	1.16	575	21.7	0.05
Aug. 14-Aug. 27	15	10	67	27.0	15	0.56	89	3.30	1,263	46.8	0.10
Aug. 28-Sept. 6	9	9	100	17.25	0	0.00	44	2.55	0	0.0	0.00
Totals or averages	110	73	66	169.25	85	0.50	547	3.24	6,577	38.6	0.09
Section E	3	0	0	8.00	7	0.88	53	6.63	531	66.4	0.14
Section D	107	73	67	161.25	78	0.48	494	3.06	6,046	37.4	0.08

✓ - Number in caret indicates number of legal fish caught and returned to stream.

Table 5

Intensive Creel Census Data, All Experimental Sections Combined, Hunt Creek,

1943 Trout Season.

Two-week period	Number of anglers	Number taking no fish	Per cent taking no fish	Total hours of angling	Legal brook trout		Sub-legal brook trout		Total wt. of legal fish	Wt. of legal trout caught per hour	
					Number caught	Catch per hour	Number caught	Catch per hour		Grams	Pounds
Apr. 24-May 7	48	33	69	61.25	28✓1	0.46	130	2.12	1,976	32.3	0.07
May 8-May 21	20	8	45	29.75	20	0.67	186	6.25	1,459	49.0	0.11
May 22-June 4	42	22	52	63.75	52	0.82	450	7.05	3,606	56.6	0.12
June 5-June 18	18	7	39	31.75	24✓2	0.76	96	3.02	1,430	44.8	0.10
June 19-July 2	47	15	32	106.25	93✓1	0.87	713	6.71	7,265	68.4	0.15
July 3-July 16	10	8	80	16.25	4✓2	0.24	28	1.72	213	13.1	0.03
July 17-July 30	22	9	41	47.25	42	0.89	276	5.84	2,850	60.3	0.13
July 31-Aug. 13	35	17	49	54.50	65	1.19	225	4.13	4,465	83.6	0.18
Aug. 14-Aug. 27	44	26	59	89.00	45	0.51	373	4.19	3,327	37.4	0.08
Aug. 28-Sept. 6	25	20	80	40.25	5	0.12	114	2.83	338	8.4	0.02
Totals	311	165	53	540.00	378✓6	0.70	2,595	4.80	26,929	49.9	0.11

✓ - Number in caret indicates number of legal fish caught and returned to stream.

Table 6

Tabular Summary of Numbers and Pounds of Fish Per Acre During 1939-1943 (actual numbers and pounds are given below each figure in parentheses) by Angling.

Stream section	Length (feet)	Width (feet)	Area (acres)	1939 yield per acre in		1940 yield per acre in		1941 yield per acre in		1942 yield per acre		1943 yield per acre		Average yield per acre, 1939-1943.	
				Pounds	Number	Pounds	Number	Pounds	Number	Pounds	Number	Pounds	Number	Pounds	Number
A	2,577	24.3	1.44	13.9 (20.02)	99 (143)	14.4 (20.75)	105 (152)	12.2 (17.61)	85 (126)	14.8 (21.29)	94 (136)	14.1 (20.37)	94 (136)	13.9 (100.04)	96 (693)
B	1,605	17.5	0.64	1.7 (1.09)	23 (15)	10.5 (6.69)	64 (41)	8.1 (5.23)	50 (32)	17.3 (11.04)	102 (65)	17.3 (1.03)	105 (67)	11.0 (35.08)	69 (220)
C	3,970	11.8	1/ 1.07	14.9 (15.97)	105 (112)	16.8 (17.95)	106 (113)	44.7 (31.75)	253 (180)	26.4 (18.72)	165 (117)	18.9 (13.44)	127 (90)	22.9 (97.83)	143 (612)
D	2,386	21.5	1.18	25.3 (29.90)	186 (220)	11.5 (13.62)	77 (91)	34.3 (40.49)	214 (252)	23.9 (28.26)	166 (196)	11.3 (13.33)	66 (78)	21.3 (125.60)	142 (837)
E	1,250	11.8	0.36	Not censused		3.7 (1.34)	25 (9)	58.7 (21.13)	367 (132)	10.6 (3.82)	81 (29)	3.3 (1.17)	19 (7)	19.1 (27.46)	123 (177)
Totals or averages, all sections	11,788	17.4	1/ 4.69	15.4 (66.98)	122 2/ (492)	12.8 (60.35)	84 (406)	26.8 (116.21)	167 (722)	19.2 (83.13)	125 (543)	13.7 (59.34)	87 (378)	17.5 (386.01)	116 (2,541)

1/ The total area of the experimental waters has been as follows:
1939, 4.33 acres; 1940, 4.69 acres; 1941, 1942, 1943, -4.33 acres.
The fluctuation has been caused, first, by the addition of Section E (0.36 acres),
Then by the closing to fishing of 0.36 acres in and around the diversions in Section C in 1941.

2/ From split tickets not assignable to any section in 1939,
2 more legal brook trout than the obvious total have been added which were on such tickets.

Table 7

Summary of Marked Wild and Hatchery-reared Fingerling Brook Trout Released in Section C in 1939 and 1940 and Recovered in the Experimental Sections as Legal Trout in Subsequent Years.

Section where caught	1939 Experiment		1940 Experiment	
	Left pectoral 1,000 wild fish	Right pectoral 1,000 hatchery fish	Left pelvic 500 wild fish	Right pelvic 464 hatchery fish
A	...	...	...	...
B	1	...	...	...
C	1	...	2	...
D	...	...	...	...
E	...	...	...	...
Totals, 1943	2	...	2	...
Totals '40,'41,'42	24 (3)	3	21 (1)	6 (4)
Grand Totals	26 (3)	3	23 (1)	6 (4)
Per cent recovered as legal fish to date	2.60	0.30	4.60	1.29

(n) - Number in caret indicates number of fish recovered outside the experimental sections.

Table 8

Percentage of the Total Catch of Certain Stream Sections from Special Pools, 1940-1943. (Figures in parentheses give actual numbers of fish and pounds of fish, from the pool/from the section.)

Pool and Section	% of total area of section in pool	Per cent of total catch of section in 1940 in		Per cent of total catch of section in 1941 in		Per cent of total catch of section in 1942 in		Per cent of total catch of section in 1943 in	
		Number	Pounds	Number	Pounds	Number	Pounds	Number	Pounds
Pool 1 Sec. A	2.6	1.3 (2/152)	1.3 (0.28/20.75)	17.4 (22/126)	16.4 (2.9/17.61)	18.3 (25/136)	21.2 (4.51/21.29)	7.4 (10/136)	6.9 (1.4/20.37)
Pool 2 Sec. A	2.8	2.0 (3/152)	2.4 (0.5/20.75)	11.1 (14/126)	11.8 (2.1/17.61)	5.8 (8/136)	5.2 (1.12/21.29)	4.4 (6/136)	4.4 (0.9/20.37)
Beaver Dam[1] Sec. D	18.6	18.7 (17/91)	17.6 (2.4/13.62)	16.2 (41/252)	14.6 (5.9/40.49)	12.8 (25/196)	12.5 (3.53/28.26)	0	0

[1] - Not fished by any anglers in 1943

Table 9

The Average Size of Brook Trout Caught by Anglers from the Experimental Waters of Hunt Creek in the 1943 Trout Season, given in Millimeters and Grams. Season Averages also in Inches and Ounces. (Figures in parentheses indicate numbers of specimens from which the averages were determined).

Time period	Section A		Section B		Section C		Section D, E		Totals	
	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight
Apr. 24-May 7	192 (7)	67.1	207 (6)	81.6	209 (3)	61.3	204 (11)	75.6	202 (27)	73.2
May 8-May 21	180 (8)	55.2	182 (2)	60.0	194 (3)	70.0	213 (7)	84.7	194 (20)	68.3
May 22-June 4	190 (32)	64.1	216 (2)	100.5	...	...	194 (18)	75.3	192 (52)	69.3
June 5-June 18	188 (9)	74.0	...	...	182 (5)	56.0 (3)	182 (8)	60.5	185 (22)	64.6
June 19-July 2	190 (35)	76.0	184 (16)	79.8	194 (28)	75.2	182 (13)	93.9	189 (92)	79.0
July 3-July 16	...	...	207 (2)	106.5	...	...	...	...	207 (2)	106.5
July 17-July 30	187 (19)	70.4	...	...	190 (19)	66.2	190 (4)	63.5	189 (42)	67.9
July 31-Aug. 13	195 (6)	82.1	203 (11)	76.8	189 (10)	56.8	191 (3)	65.0	196 (30)	70.0
Aug. 14-Aug. 27	192 (14)	65.0	189 (12)	61.5	211 (4)	104.0	205 (15)	84.2	197 (45)	73.9
Aug. 28-Sept. 6	183 (2)	57.0	180 (1)	59.0	205 (2)	82.5	...	...	191 (5)	67.6
Averages	189 (132)	69.2	194 (52)	75.8	193 (74)	70.0 (72)	196 (79)	78.4	192 (337)	72.6
Averages in inches and ounces	7.4	2.4	7.6	2.7	7.6	2.5	7.7	2.8	7.5	2.6

Table 10a

Summary of the Average Pressure, Yield, and Angling Quality for the Various Experimental Sections of Hunt Creek, and the Percentage Variation of Each from the 1939-1943 average.

Section	Area in acres	1939-1943 Av. pressure per acre	Percentage variation in pressure per acre from 5-year average for season of				
			1939	1940	1941	1942	1943
A	1.44	161	-14	+28	+36	-18	-30
B	0.64	123	-58	+10	- 5	+61	- 7
C	1.07, or 0.71	349	-30	-30	+79	+58	-46
D	1.18	300	-26	-29	+61	+45	-54
E	0.36	142	...	-85	+178	-10	-85
Totals, averages	4.402	229	-21	- 9	+71	+29	-45

Section	Area in acres	Av. yield per acre 1939-1943	Percentage variation in yield per acre from the 5-year average for the season of				
			1939	1940	1941	1942	1943
A	1.44	13.9	0	+ 4	-12	+ 6	+ 1
B	0.64	11.0	-84	- 5	-26	+57	+57
C	1.07, or 0.71	22.9	-35	-27	+95	+15	-18
D	1.18	21.3	+19	-46	+61	+12	-47
E	0.36	19.1	...	-81	+207	-45	-83
Totals, averages	4.402	17.5	-12	-27	+53	+10	-22

Section		Av. lbs./hr. 1939-1943	Percentage variation in pounds of fish caught per hour from 5-year average for season of				
			1939	1940	1941	1942	1943
A	...	0.086	+17	-19	-35	+30	+45
B	...	0.089	-63	-13	-21	- 2	+70
C	...	0.066	- 8	+ 5	+ 9	-27	+52
D	...	0.071	+61	-24	0	-23	+17
E	...	0.134	...	...	+25	+11	-38
Grand Av.	...	0.077	+10	-13	- 3	-14	+43

Table 11

The Contribution of the Tributaries to the Legal Trout Catch of the Anglers in and Below the Experimental Sections of Hunt Creek in the 1942 and 1943 Trout Seasons.

Item	Number of tagged brook trout caught in area in year			
	Experimental waters		Below Section A	
	1942	1943	1942	1943
Trib. #2	1	1	1	3
Trib. #3	3	7	2	3
Trib. #4	...	2	...	...
Trib. #5	...	...	...	...
Totals	4	10	3	6
Anglers' catch	543	379	352	233
Percentage of total catch originating in tributaries.	0.7	2.6	0.8	2.5

Table 12

Creel Census Data for Section B, Hunt Creek,
1939-1943, Inclusive.

Year	Hours of angling	Legal fish caught	Total lbs. of legal fish removed	Average size		Legal fish caught per hour	Lbs. of legal fish removed per hour of angling	
				Length (inches)	Weight (ounces)			
1939	33.50	15 (6)	1.11	7.4	2.47	0.45	0.033	Before Stream Improvement
1940	86.50	41	6.69	8.0	2.84	0.47	0.077	
1941	74.75	32	5.23	7.7	2.68	0.43	0.070	
1942	126.50	65	11.04	7.8	2.85	0.51	0.087	After Stream Improvement
1943	73.25	67 (1)	11.03	7.6	2.70	0.91	0.151	

✓ - Number in caret indicates legal fish caught and returned to stream.
The weight of such fish is not included in the pounds of legal fish removed by angling.

Table 13

Intensive Creel Census Data For "Below A", Hunt Creek, With Average Sizes of Fish,

1943 Trout Season.

Two-week period	Number of anglers	Number taking no fish	Per cent taking no fish	Total hours of angling	Legal brook trout		Sub-legal brook trout		(In grams) Total wt. of legal trout	Wt. of legal trout caught per hour		Total length legal trout (mm.)	Average length of legal trout (mm.)	Average weight of legal trout (grams)
					Number caught	Catch per hour	Number returned	Catch per hour		Grams	Pounds			
Apr. 24-May 7	24	14	58.3	43.5	28	0.64	106	2.4	1,215[1]	27.9	0.06	5364	191.5	60.7
May 8-May 21	21	9	42.8	40.25	38	0.94	195	4.8	2,253	55.2	0.12	7021	184.7	59.3
May 22-June 4	30	17	56.6	54.0	40	0.74	290	5.4	2,881	53.3	0.12	8088	202.2	72.0
June 5-June 18	6	5	83.3	17.75	5	0.28	41	2.3	...	...	...	...	...	...
June 19-July 2	22	7	31.8	68.0	61	0.90	277	4.1	3,236[2]	47.5	0.10	12020	197.0	63.4
July 3-July 16	10	4	40.0	38.25	9	0.24	131	3.4	446	11.6	0.03	1716	190.6	49.5
July 17-July 30	15	11	73.3	34.75	9	0.28	90	2.6	652	18.7	0.04	1700	188.8	72.4
July 31-Aug. 13	10	5	50.0	19.5	12	0.62	83	4.2	983	50.4	0.11	2385	198.7	81.9
Aug. 14-Aug. 27	27	17	62.9	94.75	28	0.30	255	2.6	1,281[3]	13.5	0.03	3580	188.4[4]	67.4
Aug. 28-Sept. 6	8	6	75.0	14.5	3	0.21	58	4.0	181	12.4	0.03	541	180.3	60.3
Totals	173	95	54.9	425.25	233	0.55	1,526	3.6	13,128	30.8	0.07	42,397	189.2	63.7

[1] - Total weight of 20 trout.

[2] - Total weight of 51 trout.

[3] - Total weight of 19 trout.

[4] - Length of 19 fish.

Table 14

Summary of Angling Results for the 1943 Trout Season on Water Areas Not Under Intensive Census.

Item	Fuller Creek-East Fish L. Outlet	Fuller Creek Beaver Pond	Trib. 2 and Trib. 2 B. P.	Sutton's Pond
Number of anglers	19	4	1	4
Number taking no fish	9	0	1	0
Percentage taking no fish	47.3	0	100	0
Total hours of angling	25.00	7.75	0.50	6.0
Legal brook trout caught	19	14	0	7
Catch per hour	0.76	1.81	0.00	1.16
Sub-legal brook trout caught	165	21	2	15
Catch per hour	6.6	2.7	4.00	2.50
Total wt. of legal trout	1,187 gr.	510 gr. ↓	...	416 gr.
Wt. of legal trout removed per hour				
Grams	47.4	63.7	...	69.3
Lbs.	0.10	0.14	...	0.15
Total length of legal trout	3,599 mm.	2,701 mm.	...	1,284 mm.
Average length of legal trout	189 mm.	193 mm.	...	183
Average wt. of legal trout	62.4 gr.	63.7 gr.	...	59.4 gr.

↓ Based on weights of 8 fish.

Table 15

Intensive Creel Census Data, East Fish Lake,

1943 Trout Season.

Two-week periods	Number of anglers	Number taking no fish	Per cent taking no fish	Total hours of angling	Legal brook trout		Sub-legal brook trout		Total wt. of legal fish	Wt. of legal trout caught per hour	
					Number caught	Catch per hour	Number caught	Catch per hour		Grams	Pounds
Apr. 24-May 7	30	24	80	35.50	8	0.22	2	0.06	1,237	34.8	0.08
May 8-May 21	4	1	25	3.50	5	1.43	1	0.29	559	159.7	0.35
May 22-June 4	7	6	86	9.00	1	0.11	1	0.11	197	21.8	0.05
June 5-June 18	4	4	100	7.00	0	0.00	2	0.29	0	0.0	0.0
June 19-July 2	12	8	66	27.00	5	0.19	1	0.04	1,167	36.2	0.08
July 3-July 16	10	3	30	21.75	16[1]	0.74	15	0.69	1,970	90.5	0.20
July 17-July 30	9	2	22	21.50	16	0.74	0	0.00	2,089	97.1	0.21
July 31-Aug. 13	18	14	78	38.00	6	0.16	0	0.00	1,792	47.1	0.10
Aug. 14-Aug. 27	18	11	61	24.00	6	0.25	0	0.00	1,782[2]	65.9	0.14
Aug. 28-Sept. 6	9	8	89	12.25	6	0.49	1	0.08	1,020	83.2	0.18
Totals or averages	121	81	67	199.50	69[1]	0.29	23	0.12	11,813	59.1	0.13

[1] - 1 legal fish returned to water after capture.

[2] - Only 3 of these fish were weighed. The average weight of the fish which were weighed was assigned to the unweighed specimens.

Table 16

Summary of Pressure (man hours per acre per season) and Yield (pounds of fish per acre removed by angling) and Quality (pounds of fish removed per hour of angling) on East Fish Lake, 1939-1943 and the Percentage Variation in Pressure and Yield from the 1939-1943 Averages.

Year	Area	Hours angling	Pressure per acre	Per cent variation from 1939-1943 av.	Total pounds of fish	Pounds of fish per acre	Per cent variation from 1939-1943 av.	Pounds of fish caught per hour	Per cent variation from 1940-1943 av.
1939	13.5	125.50	9.3	-48.0	Not known	Not known	Not known	Not known	Not known
1940	13.5	308.00	22.8	+27	27.92	2.07	-39	0.091	-40
1941	13.5	385.50	28.5	+58	47.23	3.50	+ 4	0.122	-18
1942	15.9	289.25	18.2	+ 1	97.06	6.10	+81	0.335	+122
1943	16.0	199.50	12.4	-32	26.04	1.63	-52	0.130	-14
Totals, Averages	72.4	1307.75	18.0	...	198.25	3.37	...	0.151	...

Table 17

Number and Percentage of Angling-days Recorded in the Capture of Various Numbers of Legal Brook Trout in the Experimental Sections of Hunt Creek.

Item	Number (and Percentage) of fishermen-days in which various numbers of legal brook trout were caught.																Totals
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Section A	31 (42.5)	12 (16.3)	10 (13.7)	3 (4.1)	7 (9.6)	4 (5.5)	2 (2.7)	1 (1.4)	1 (1.4)	...	1 (1.4)	1 (1.4)	...	...	...	...	73 (100.0)
Section B	19 (38.0)	16 (32.0)	7 (14.0)	5 (10.0)	1 (2.0)	...	...	1 (2.0)	...	...	...	1 (2.0)	...	...	...	...	50 (100.0)
Section C	42 (53.8)	16 (20.6)	9 (11.6)	3 (3.8)	3 (3.8)	3 (3.8)	...	...	1 (1.3)	...	...	...	1 (1.3)	...	...	...	78 (100.0)
Section D and E	73 (66.4)	14 (12.8)	12 (10.9)	5 (4.5)	3 (2.7)	1 (0.9)	...	1 (0.9)	...	1 (0.9)	...	...	...	...	...	...	110 (100.0)
Totals, Averages, for experimental stream.	165 (53.0)	58 (18.7)	38 (12.3)	16 (5.2)	14 (4.5)	8 (2.6)	2 (0.6)	3 (1.0)	2 (0.6)	1 (0.3)	1 (0.3)	2 (0.6)	1 (0.3)	...	...	...	311 (100.0)

Table 18

Residence of Anglers Using the Hunt Creek Experimental Area, 1943

County	Experimental sections	Below A	East Fish Lake	Others	Totals
Alpena	1	1	1	...	3
Arenac	3	2	...	...	5
Bay	2	1	...	...	3
Clinton	4	2	2	...	8
Crawford	1	2	3	...	6
Emmet	...	2	2	...	4
Genesee	14	7	4	...	25
Hillsdale	3	1	2	...	6
Ingham	5	1	...	...	6
Ionia	2	3	...	...	5
Jackson	12	4	2	...	18
Kent	1	...	...	...	1
Livingston	4	...	...	...	4
Macomb	1	2	2	...	5
Midland	...	4	...	...	4
Missaukee	...	2	...	...	2
Montmorency	131	58	45	17	257
Oakland	9	13	19	3	44
Oscoda	3	...	2	...	5
Otsego	...	1	...	...	1
Saginaw	6	6	...	1	13
Sanilac	...	...	...	1	1
Shiawassee	2	...	3	...	5
St. Clair	17	1	2	...	20
Washtenaw	11	12	7	...	30
Wayne	76	45	19	6	150
Unknown	2	...	2	...	4
Non. Res.--Ohio	1	1	4	...	6
Total	311	173	121	28	641

Table 19

Anglers' Residence by Counties, 1940-1943, Showing the Five Leading Counties, Using the Hunt Creek Experimental Area.

1940 Hunt Creek Area		1941 Experimental Sections		1942 Hunt Creek Area		1943 Hunt Creek Area	
County	Angling days	County	Angling days	County	Angling days	County	Angling days
Montmorency	187	Montmorency	201	Wayne	449	Montmorency	257
Wayne	145	Wayne	139	Genesee	215	Wayne	150
Genesee	145	Genesee	125	Montmorency	204	Oakland	44
Jackson	76	St. Clair	122	Ingham	84	Washtenaw	30
Washtenaw	49	Ingham	72	St. Clair	79	Genesee	25
Ohio	42	Ohio	49	Ohio	37	Ohio	6
Pennsylvania	10	Indiana	33	Indiana	11	...	...
Indiana	5	Pennsylvania	11	New Jersey	3	...	...
Wisconsin	2	...	...	Illinois	3	...	...
				New York	2	...	...
Other Mich.	223	Other Mich.	263	Other Mich.	321	Other Mich.	129
Totals	884		1,015		1,408		641

Figure 1

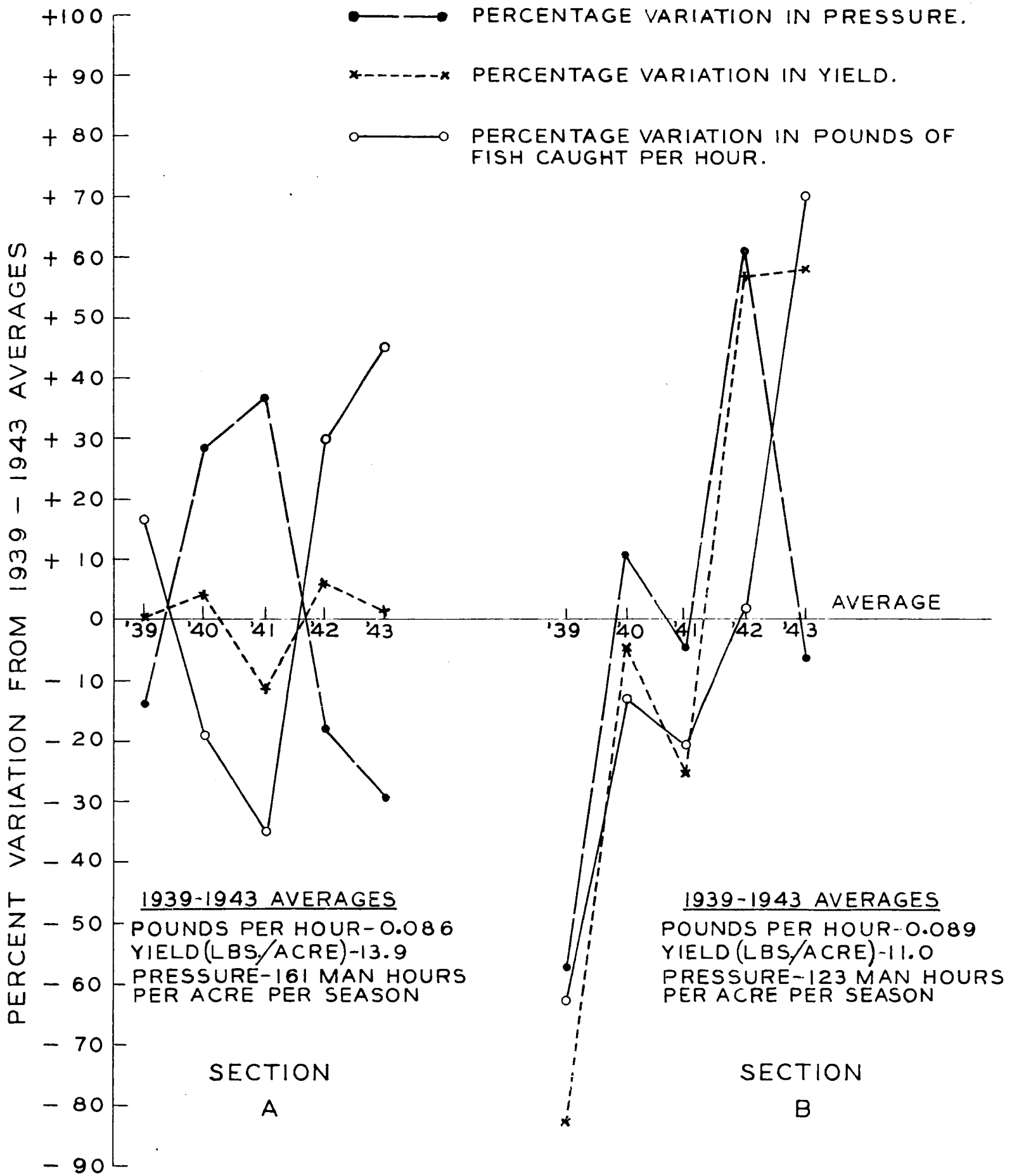
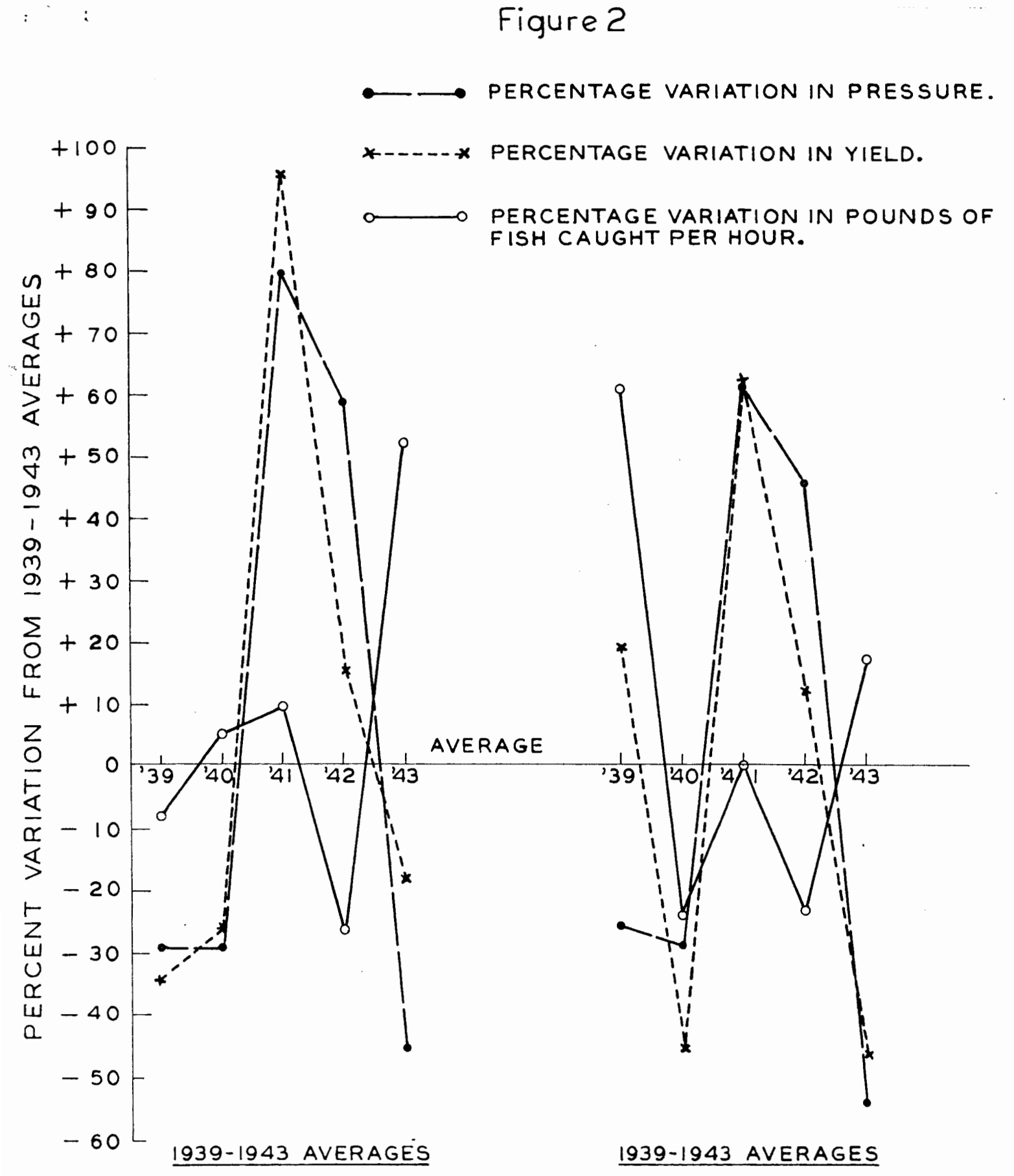

PERCENTAGE VARIATION IN PRESSURE.
PERCENTAGE VARIATION IN YIELD.
PERCENTAGE VARIATION IN POUNDS OF FISH CAUGHT PER HOUR.
PERCENT VARIATION FROM 1939 – 1943 AVERAGES
+100
+ 90
+ 80
+ 70
+ 60
+ 50
+ 40
+ 30
+ 20
+ 10
0
– 10
– 20
– 30
– 40
– 50
– 60
– 70
– 80
– 90
AVERAGE
'39
'40
'41
'42
'43
1939-1943 AVERAGES
POUNDS PER HOUR-0.086
YIELD (LBS./ACRE)-13.9
PRESSURE-161 MAN HOURS PER ACRE PER SEASON
SECTION A
1939-1943 AVERAGES
POUNDS PER HOUR-0.089
YIELD (LBS./ACRE)-11.0
PRESSURE-123 MAN HOURS PER ACRE PER SEASON
SECTION B

Figure 2



1939-1943 AVERAGES

POUNDS PER HOUR-0.066
YIELD (LBS./ACRE)-29.9
PRESSURE-349 MAN HOURS PER ACRE PER SEASON

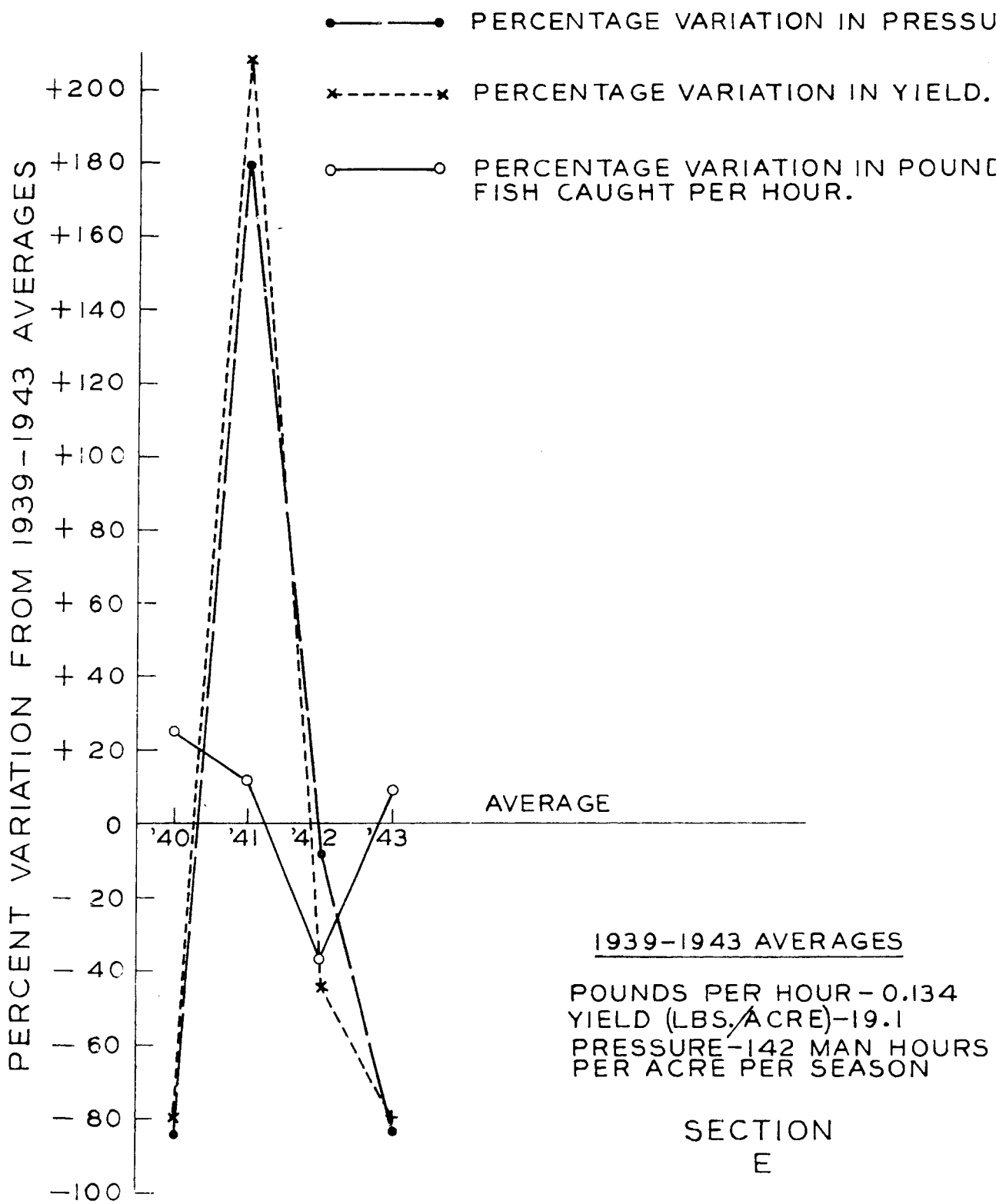
SECTION C

1939-1943 AVERAGES

POUNDS PER HOUR-0.071
YIELD (LBS./ACRE)-21.3
PRESSURE-300 MAN HOURS PER ACRE PER SEASON

SECTION D

Figure 3



1939-1943 AVERAGES

POUNDS PER HOUR - 0.134
YIELD (LBS./ACRE)-19.1
PRESSURE-142 MAN HOURS PER ACRE PER SEASON

SECTION
E

Figure 4

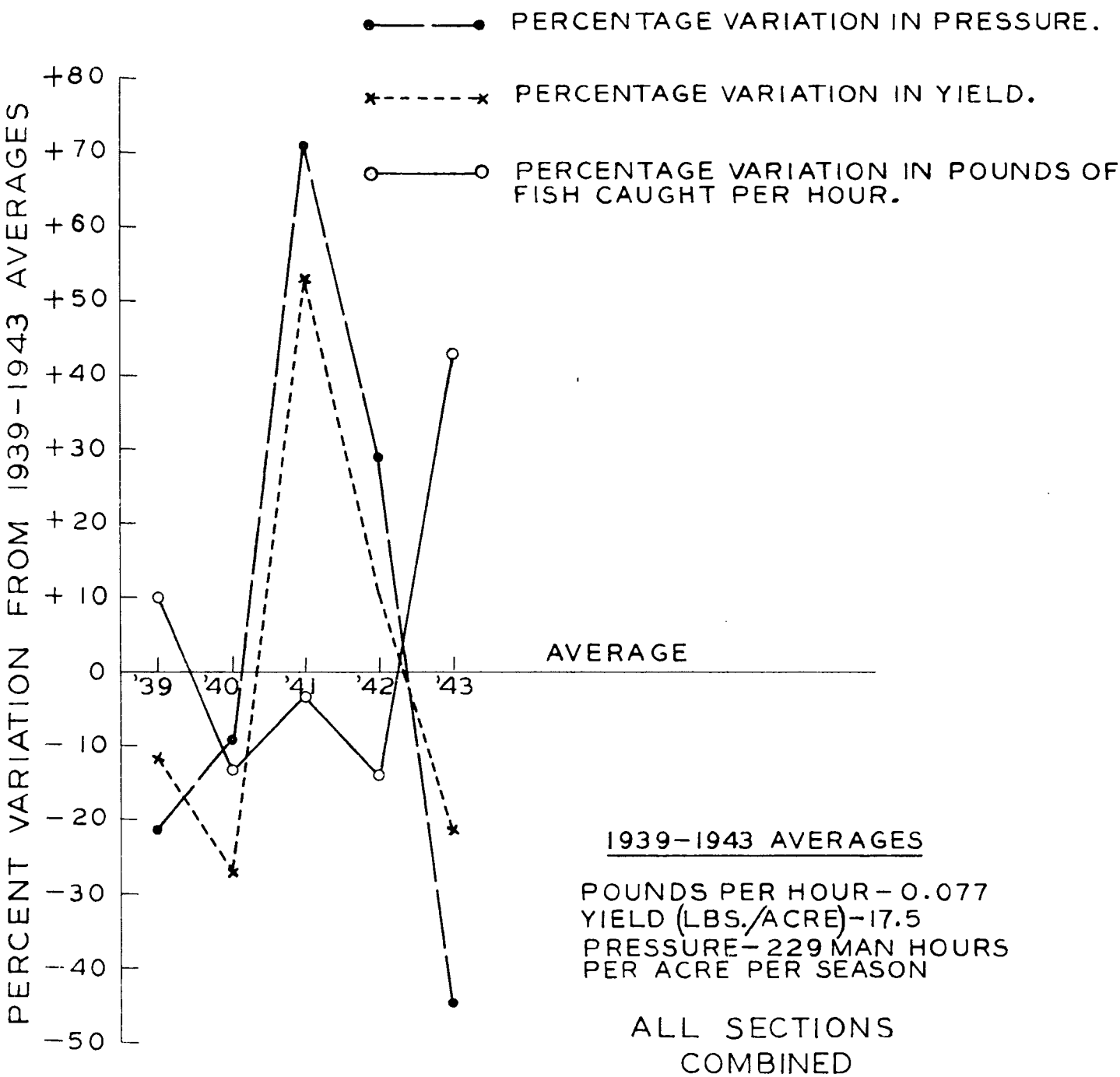
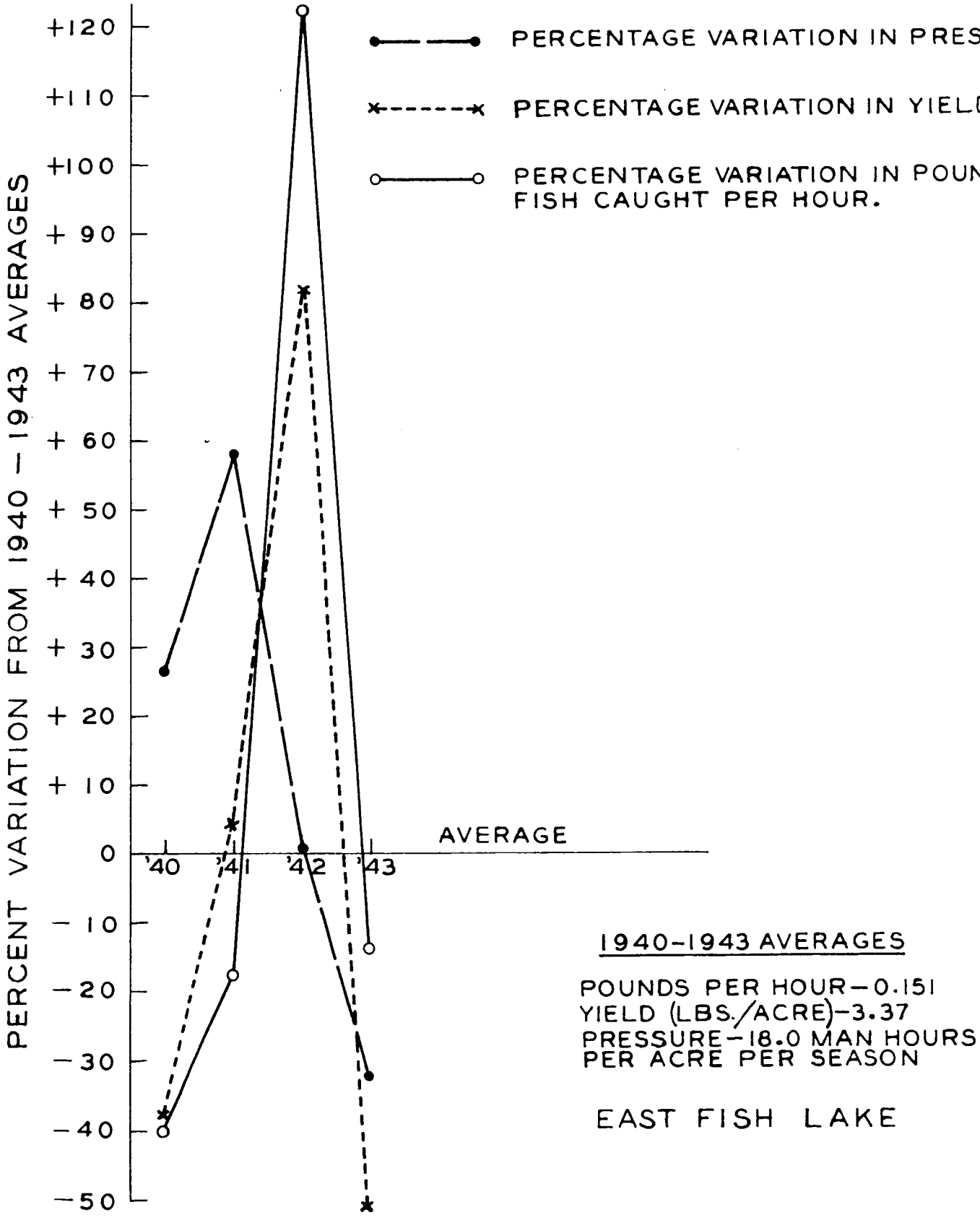
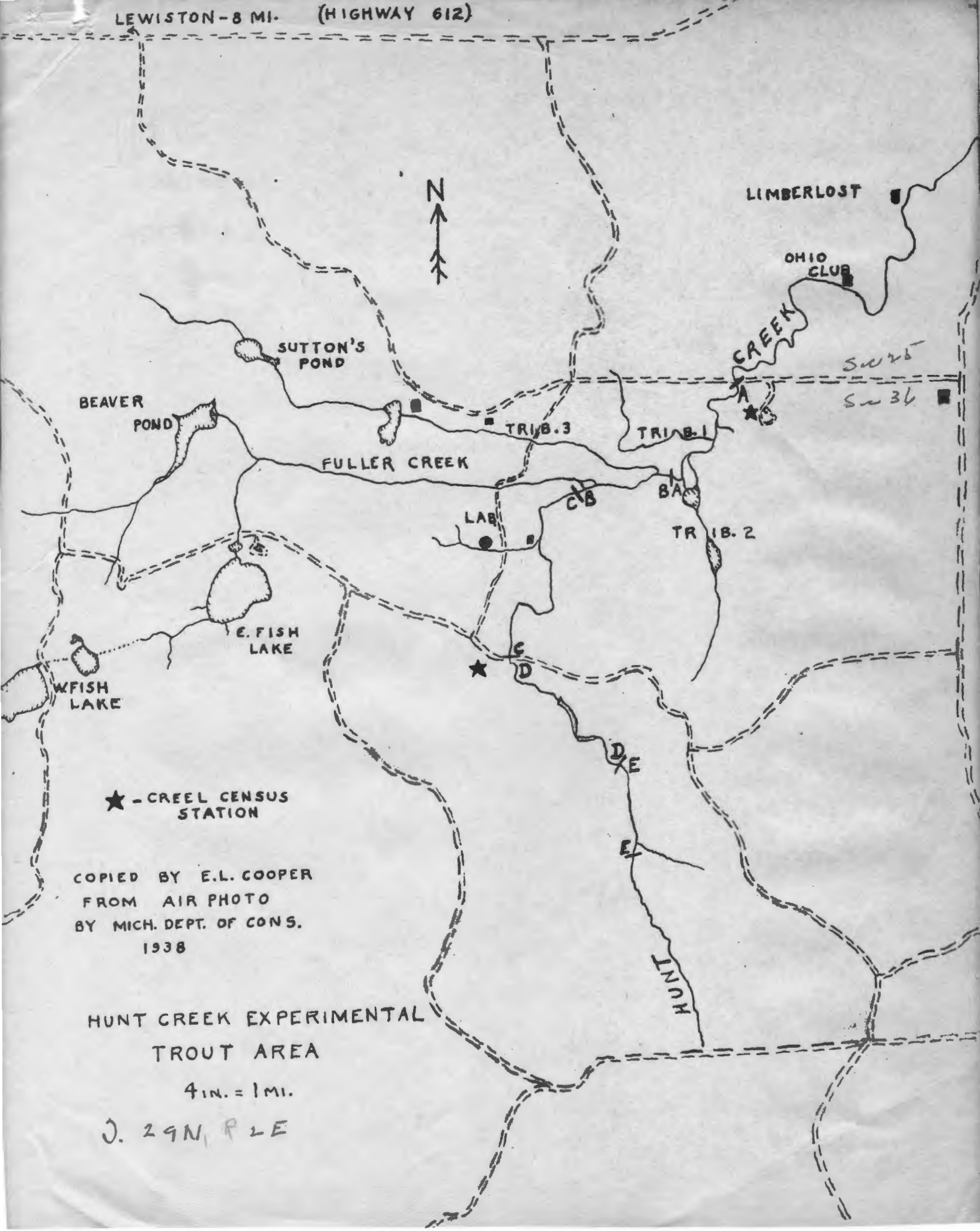

PERCENTAGE VARIATION IN PRESSURE.
PERCENTAGE VARIATION IN YIELD.
PERCENTAGE VARIATION IN POUNDS OF FISH CAUGHT PER HOUR.
PERCENT VARIATION FROM 1939-1943 AVERAGES
+80
+70
+60
+50
+40
+30
+20
+10
0
-10
-20
-30
-40
-50
AVERAGE
'39
'40
'41
'42
'43
1939-1943 AVERAGES
POUNDS PER HOUR - 0.077
YIELD (LBS./ACRE) - 17.5
PRESSURE - 229 MAN HOURS PER ACRE PER SEASON
ALL SECTIONS COMBINED

Figure 5


PERCENTAGE VARIATION IN PRESSURE.
PERCENTAGE VARIATION IN YIELD.
PERCENTAGE VARIATION IN POUNDS OF FISH CAUGHT PER HOUR.
PERCENT VARIATION FROM 1940 – 1943 AVERAGES
+120
+110
+100
+ 90
+ 80
+ 70
+ 60
+ 50
+ 40
+ 30
+ 20
+ 10
0
– 10
–20
–30
–40
–50
AVERAGE
'40
'41
'42
'43
1940–1943 AVERAGES
POUNDS PER HOUR–0.151
YIELD (LBS./ACRE)–3.37
PRESSURE–18.0 MAN HOURS PER ACRE PER SEASON
EAST FISH LAKE


LEWISTON - 8 MI. (HIGHWAY 612)
N
LIMBERLOST
OHIO CLUB
CREEK
SUTTON'S POND
BEAVER POND
TRIB. 3
TRIB. 1
FULLER CREEK
A
B
C
D
E
LAB
TRIB. 2
E. FISH LAKE
W. FISH LAKE
HUNT
★ - CREEL CENSUS STATION
COPIED BY E.L. COOPER
FROM AIR PHOTO
BY MICH. DEPT. OF CONS.
1938
HUNT CREEK EXPERIMENTAL
TROUT AREA
4 IN. = 1 MI.
J. 29N, R 2E