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GROWTH, SURVIVAL, PRODUCTION AND DIET OF HATCHERY-REARED RAINBOW AND BROOK TROUT STOCKED IN EAST FISH LAKE, UNDER DIFFERENT STOCK DENSITIES, CROPPING REGIMES, AND COMPETITION LEVELS[1]

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ABSTRACT

Hatchery-reared brook and rainbow trout were stocked in East Fish Lake in mid-October during the falls of 1958-1968 and 1972. No trout were stocked during 1969-1971. All plants of trout were size-selected for an average length of 8.9 inches (range 8.5-9.5). The various plants were fin-clipped for identification. The trout population size, survival rate, growth rate, production, angler cropping, and diet were monitored. The standing crop of invertebrate benthos was also monitored.

Rainbow trout survival averaged 86%, compared to 41% for brook trout, from mid-October planting until mid-April just prior to the opening of the trout fishing season. Survival was low for both rainbow trout and brook trout from mid-April to mid-October, mainly because of successful angler exploitation or experimental cropping by research personnel. Anglers were responsible for 76% of the loss of rainbow trout, and 80% of the brook trout, during this period. During seasons of public fishing, only 3 to 10% of the rainbow trout and less than 1% of the brook trout survived for more than 1 year in the lake.

The proportion of trout dying of natural causes increased substantially with an increase in the stocking rate, particularly for rainbow trout the first 6 months after stocking. Further, during the first 2 years of no public fishing, total mortality was less, resulting in high standing crops of trout. Survival was much less with the advent of a white sucker population to the lake.

Trout growth was excellent during early years of the study, with rainbow trout attaining average sizes of 16.5 inches (1.75 pounds) after 1 year's growth and 19.9 inches (3.07 pounds) after 2 year's growth. Brook trout growth was good, but not so good as that of rainbows. A few surviving brook trout grew to 13.6 inches (1.06 pounds) in 1 year, and to 14.8 inches (1.36 pounds) after 2 years. Rate of growth of trout deteriorated badly with the increase of a white sucker population, and with an increase in the biomass of standing crop of the trout themselves. Trout condition "C" also decreased

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[1] Contribution from Dingell-Johnson Project F-35-R, Michigan.

proportionally with the decline in trout growth. Flesh color and fat content of trout decreased with loss in condition factor.

Production of trout flesh in the lake varied from a high of 37.2 pounds per acre per year to a low of only 4.6 pounds per acre per year. High production resulted when angler cropping was reduced and when the lake was relatively free of suckers. Better than 80% of the production was made by rainbow trout, compared to 20% by brook trout. Trout production in 1973, following a 3-year period of no trout stocking in the lake, did not improve, apparently because of sucker competition.

The average quantity of food found in trout stomachs was strongly correlated with rate of trout growth. Rainbow trout ate more food per day than did brook trout. Rainbow trout in their second year after planting ate more food per day than did first-year rainbows, but they were poorer converters of food into trout flesh. Crayfish, cladocerans, midges, mayflies and forage fish comprised most of the rainbow trout diet; crustaceans were the most important. Brook trout diet was more varied than that of the rainbow, but was mainly composed of forage fish, crustaceans, mayflies and dipterans, in that order of importance. Suckers were rarely eaten by either rainbow trout or brook trout. Food composition stayed relatively stable during the study, but amount of food per trout stomach was much reduced when suckers entered the lake.

Trout food conditions were reflected in the benthos populations. When benthos populations were high, trout growth was good. Benthos populations declined considerably when suckers entered the lake, and also when high stocks (biomass) of trout were being maintained. Benthos populations were lowest during the year after the lake was treated with rotenone to eradicate sucker and minnow populations.

Introduction

Planting of hatchery-reared trout in inland lakes in Michigan is an important management procedure used to generate desirable fisheries. This study was undertaken to better understand the relationships between trout production in these lakes and stocking practices, competition from other fish species, cropping regimes, diet, and the benthos.

Plantings of brook trout and rainbow trout were made in East Fish Lake each October for several years (1958-1968) and again in 1972 following 3 years (1969-1971) of no trout stocking. Mark-and-recapture population estimates were made in winter, spring, and fall to determine trout survival.

Trout growth, diet, benthic food supply, and competition from other fish species were monitored. Cropping of the trout population was done by public angling from 1958 to 1965. During the period 1966-1973 the cropping was much reduced, was regulated seasonally, and was carried out by the research personnel using nets, electrofishing, and angling.

The Study Site

East Fish Lake, located in Section 35, T 29 N., R 2 E., Montmorency County, is 16 acres in area. More than half of the basin is deeper than 20 feet; the maximum depth is 40 feet; shallow water (5 feet or less) occupies about 3 acres of area along the north shore, and a 10-yard strip around the remainder of the lake. One small tributary stream enters the lake, along with numerous springs. A weir at the lake's outlet, with fish-trapping facilities, confines the trout population. Stratification of lake water occurs in mid-summer, but oxygen and temperature regimes are satisfactory for trout from top to bottom throughout the year. The water is clear and hard (alkalinity 175 ppm). Aquatic vegetation is sparse and generally confined to water less than 10 feet deep.

Methods

Trout stocking

Hatchery brook trout and rainbow trout were stocked in East Fish Lake in mid-October each year, during the falls 1958-1962 and 1972; 300 of each species were stocked, for a total planting rate of 38 trout per acre. During 1963-1968 the planting was increased to 58 trout per acre, and was composed of 300 brook trout and 600 rainbow trout. No trout were stocked during 1969-1971. All plants of trout were size-selected, for a mean total length of 8.9 inches (range, 8.5-9.5). The fish were fin-clipped for identification.

Estimates of trout population

Trout were captured initially either by angling or electrofishing (Latta and Myers, 1961), and recoveries to calculate population estimates came from anglers' catches (Johnson and Hasler, 1954) or from gill netting

and angling by research personnel. Growth measurements were made on fish collected by these several methods.

Production

Trout production during a period was computed as a product of the average weight of the standing crop and the instantaneous growth rate of trout during the following period (Ricker, 1958). Production here means all flesh growth during the period, including growth of trout that died during the period.

Trout cropping

During years of public fishing (1959-1965) the total anglers' catch of trout was measured by a creel census operated under a permit system (Shetter and Alexander, 1962). Fishing seasons extended from the last Saturday in April to the second Sunday in September. There was a daily creel limit of five trout and a minimum size limit of 10 inches, and both artificial and natural lures other than bait fish were permitted. Most stocked trout had attained the legal length by opening day; thus mortality from hooking sublegal fish was minimal.

Cropping of trout during the years 1966-1972, when the lake was closed to public fishing, was intentionally reduced. Trout were taken systematically and on a quota basis over the summer, by use of gill nets and angling by research personnel.

Trout diet

The diet of trout was assessed from an analysis of stomach contents. All trout in fresh condition, that were taken by public angling or by research personnel, were analyzed for mean volume of food per stomach and diet composition. Organisms found in the stomachs were counted, and volumes of the various taxonomic groups were determined by fluid displacement.

Benthos

Ekman dredge samples of lake bottom materials containing invertebrates were taken from 1955 to 1972 with the exception of years 1960, 1963 and 1964. From 1955 to 1965 sampling was done at two stations, and from 1966 to 1972 sampling was at six stations. Ten samples were taken at each station on each sampling date. Sampling dates per year varied from four to eleven.

Results

Mortality

Estimated levels of rainbow and brook trout populations surviving to various mid-month dates are given in Tables 1-14. Generally, hatchery-reared trout planted in inland lakes experience a rather high rate of natural mortality. In this study, only natural mortality was operating from planting time in mid-October to mid-April. During the period mid-April to mid-October, both natural and fishing mortality were operating to reduce the populations.

During the first 6 months following planting (mid-October to mid-April) the average survival of rainbow trout for fall trout plantings in 1958-1962 was 98%, compared to only 49% for brook trout. For the 1963-64 plants, rainbow trout survival was 92% compared to 46% for brook trout. Survival of rainbow trout for planting years 1965, 1966, 1967, and 1968 was 94%, 99%, 84%, and 58%, respectively, compared to brook trout survivals of 51%, 28%, 23%, and 17%. Only the 1972 plant of rainbow trout, with a 25% survival, faired more poorly than brook trout which had a 39% survival that year.

Cause of the differential mortality between species is believed due to a much greater susceptibility of brook trout in lakes to natural predators (Alexander and Shetter, 1962). Average mid-October to mid-April survival over the 15-year span of study was 86% for rainbow trout and 41% for brook trout. The survival of rainbow trout in particular, but also of brook trout,

was substantially less after 1965--the year that white suckers were first observed in the lake. Suckers increased rapidly after 1965.

Natural and fishing mortality occurred during the mid-April to mid-October period. Survival during this period was low; however, much of the mortality can be explained by angling. For planting years 1958-1962, anglers' harvest of first-year rainbow trout accounted for 87% of the mortality, leaving only 13% dying of natural causes. The anglers' catch of rainbow trout was 48% of the loss for the 1963-64 period, leaving 52% dying of natural factors. Rainbow trout deaths in 1965, 1966, 1967, 1968, and 1972, due to experimental cropping, amounted to 99%, 79%, 66%, 61% and 75% of the losses, respectively. Thus natural losses for these years amounted to 1%, 21%, 34%, 39%, and 25%.

In general, during the years of public angling, the fishermen were successful in accounting for 76% of the mid-April to mid-October rainbow kill on the average. Looking at the angler kill in terms of return to anglers from trout planted, the anglers took 62% of the rainbow planted during the year following stocking. Rainbow trout, surviving the first year to become "carryover" trout, varied from 10% to 3% during the years of public angling. Anglers cropped nearly all of these carryover fish the second year of availability. Thus the final return to anglers of planted trout was about 68%.

The harvest of brook trout by anglers during 1958 to 1962 accounted for 80% of the mortality during the mid-April to mid-October period. Thus only 20% of the brook trout died of natural causes. During the 1963-64 period anglers tallied 61% of the brook trout loss, with natural causes taking 39%. In 1965, 1966, 1967, 1968 and 1972, experimental cropping by research personnel took 45%, 85%, 57%, 88%, and 83% of the trout lost, leaving 55%, 15%, 43%, 12%, and 17% dying from natural mortality.

Most of the mortality of both species of trout was the result of angler harvest during the period of public fishing. A related conclusion is that the proportion of trout dying of natural causes increased substantially with an increase in stocking rate, particularly for rainbow trout in the first 6 months after stocking. During the 1965-1972 period, which were years with no public fishing and a reduced cropping level, natural mortality took

a much greater share of the rainbow trout; on the other hand, little change was noted for brook trout when compared to the period of public fishing.

The higher natural mortality rate of trout after 1965 can be associated with the buildup of a competing sucker population. It is also associated with a much reduced growth rate, as will be shown in the next section on growth.

Growth

Average length and weight of rainbow and brook trout attained at various mid-month dates are given in Tables 1-14. Rainbow trout grew exceptionally well during the 1958-1962 period. Average length was 8.9 inches (0.23 pound) at planting in mid-October. These trout grew to 10.5 inches (0.45 pound) by mid-April and to 16.5 inches (1.75 pound) by mid-October, 1 year after planting. Survivors continued to grow well their second season in the lake, and lengths averaging 19.9 inches (3.07 pounds) were attained by the end of the growing season.

Growth for the planting years 1963-1964 was slightly slower for rainbow trout their first 6 months in the lake, but by the end of the first year, growth was similar to that for earlier plantings. The slower growth the first 6 months was associated with higher trout population levels in the lake, due to higher stocking levels. However, anglers cropped the trout populations heavily, early in the trout season; thus trout population levels present during the second 6 months were not much different from populations present the previous 5 years (of lower stocking), and trout growth rate accelerated with average size attained at the end of the first and second 12 months, similar to growth of earlier plantings.

Rainbow trout of the 1965 planting grew from 8.9 inches (0.23 pound) at planting time to 10.7 inches (0.45 pound) by mid-April. This growth was in line with that measured for earlier plantings. However, growth the second 6 months was much slower, with trout attaining only 14.3 inches (1.08 pounds) at the end of their first growing season, and carryover fish averaging only 15.6 inches (1.41 pounds) upon completion of their second growing season. This poorer growth was associated with much higher

trout densities in the lake, which in turn were due to the cessation of public angling and the lowered cropping rate of fish by research personnel. Another factor of consequence was the buildup of a white sucker population in the lake.

Growth of the 1966, 1967 and 1968 plantings of rainbow trout continued to decline. Average lengths attained after one season of growth were 12.8 inches (0.72 pound), 12.0 inches (0.54 pound) and 11.2 inches (0.44 pound) for these years, respectively. Carryover trout, upon completion of the second growing season, averaged only 13.8 inches (0.90 pound), 12.7 inches (0.63 pound), and 11.6 inches (0.48 pound) for the same years. Growth of rainbow trout improved for the 1972 planting, which was made after 3 years of no trout stocking. Fish attained a length of 13.9 inches (1.02 pounds) at the end of their first growing season. No carryover trout were obtained for measurement, because of low population levels due to the very poor survival of this planting. The improved growth of the 1972 planting cannot be attributed to the no-stocking policy, because the planting had very poor survival. Lower trout density probably was the main factor contributing to better growth. The deterioration of growth after 1965 is believed to have been due to the competition offered to trout by the population of white suckers.

Brook trout growth was good, but not so good as that of rainbow trout. Brook trout of the 1958-1962 plantings grew from 8.9 inches (0.25 pound) in mid-October to 10.4 inches (0.47 pound) by mid-April; and then to 13.6 inches (1.06 pounds) by the following mid-October. Carryover brook trout were few in number, but those observed averaged 14.8 inches (1.36 pounds) at the end of their second growing season. Growth of brook trout of the 1963-1964 plantings was similar to that in 1958-1962. Growth of brook trout showed a progressive decline from 1965 to 1968, similar to that experienced by rainbow trout for this time period. Brook trout growth improved somewhat by the 1972 plant, after the 3-year moratorium on trout planting, but trout did not grow so well as during the first 7 years of study. Decrease in growth of brook trout was associated with the buildup in the white sucker population.

Trout condition

The average condition factors ("C") of summer-sampled rainbow and brook trout are shown in Table 15. Rainbow condition factors varied from 39 to 41 the first 7 years of study, 1958-1964. There was then a progressive decline in condition, from 1965 to 1968, with "C" values reaching 31 by 1967. Condition improved for the 1972 plant to 38, after 3 years of no trout planting in the lake.

Brook trout condition factors were consistently higher than those for rainbow trout during any given year. This was undoubtedly due to the brook trout being, on the average, a more robust fish than the rainbow. The change in brook trout condition over the years of study showed the same general pattern as did that of rainbow trout. Condition decreased for both rainbow and brook trout under higher stocking densities, and in the presence of suckers.

No quantitative measurements were made of the relative fat content or flesh color of trout over the study period. However it was quite obvious that the flesh color changed from a bright red-orange the first years of the study, to a pinkish white color by the end of the study. The amount of fat around the viscera, and oiliness of the flesh both decreased. These changes were correlated with decreases in growth rate, condition factor, and mean stomach content of food, but not with diet composition.

Production

Monthly estimates of production of brook trout, first-year rainbow trout, and carryover rainbow trout are given in Tables 1-14. Population levels of carryover brook trout were too low to allow production estimates. Production changed during the study, depending on stocking rate, cropping regime, and degree of competition from white suckers. Average yearly production of all trout for the 1958-1962 planting period was 263 pounds for the lake (16.4 pounds per acre). Seventy-nine percent of this production was composed of rainbow trout (74% first-year trout and 5% carryover trout) and 21% brook trout. For the 1963-1964 period, total trout production averaged 387 pounds per year for the lake (24.2 pounds per acre). The

increase in production from the years 1958-1962 to the years 1963-1964 was due to higher numbers of rainbow trout stocked. Production by species during the latter period was 81% rainbow and 19% brook trout, or nearly the same as that noted for the previous 5-year period. A substantial increase in production occurred among the trout stocked in 1965. A total production of 596 pounds of trout was accrued (37.2 pounds per acre) and was composed of 92% rainbow trout and 8% brook trout. This was the highest production measured during the study, and it came about because reduced cropping allowed more trout to take advantage of the summer high-growth period. Furthermore, white suckers had just appeared in the lake, and their population level was low.

Trout production progressively declined in the lake for the 1966, 1967, and 1968 plants of fish. Production for these years was 378, 168, and 73 pounds, respectively (or 23.6, 10.5, and 4.6 pounds per acre). Rainbow trout still made up most of the production over these years (78 to 93%). Our study objective called for building up the trout biomass in the lake, through increased stocking rates and lower cropping rates, to determine if production would decline after an initial period of high production. As one can note from the previous data, a significant decline did occur. Unfortunately we are confronted with a double variable, higher stock biomass of trout being present, and the buildup of a white sucker population in the lake. Thus we could not determine the relative importance of the two factors in causing the decrease in trout production.

To try to sort out the effects of suckers and high trout populations (biomass), we discontinued stocking the lake in 1969, 1970, and 1971. We also removed most residual trout from the lake in late 1968 and early 1969.

In 1972, we again stocked the lake at the original stocking rates for rainbow and brook trout, and their production was monitored. The idea was that if these fish grew, survived, and produced comparably to their performance in the years 1958-1962, then the white sucker population had little effect. If however, the trout faired poorly while competing with the white sucker population, but not with a large trout population, then one would conclude that white suckers were a major factor in reducing trout production.

The 1972 plant of trout produced only 105 pounds of trout flesh (6.6 pounds per acre). Production was composed of 62% rainbow and 38% brook trout. Growth rate of trout did improve, but was not so good as during the 1958-1962 period. Survival was also down for brook trout. It was obvious at this point that production levels achieved by trout in East Fish Lake from 1958 to 1965 could not be maintained in the face of white sucker competition, and therefore the study was terminated.

Diet

An aspect of the study, in addition to production, was the relation of trout diet to growth. A total of 2,559 trout stomachs were analyzed for mean stomach content and diet composition. By species, the study involved 727 brook trout, 1,360 first-year rainbow trout, and 472 carryover rainbow trout. Calculations of mean stomach volume of food, and average volume for various taxonomic groups, were based on samples collected over the entire growing season; the analysis was "weighted" so that each of the time periods during the summer growing season was of equal importance.

There existed a fairly good correlation within age groups between the growth increment made by a trout during the year and the mean volume of food in the stomach (Fig. 1). First-year rainbow trout and brook trout each grew about a pound a year, with a mean stomach content of 5.4 ml. By contrast, carryover rainbow grew a pound but the mean stomach content was nearly 16 ml, some three times as much as for the yearlings. As for reasons for the difference, we can only speculate. The smaller trout were more efficient in food conversion. Possibly they were less active, or it may be that they eat more digestible food. The stomach contents of first-year, and carryover rainbow trout both contained about 50% crustaceans; however, small trout ate mostly cladocerans, whereas large trout ate mostly crayfish which are digested at a much slower rate.

Analysis of stomach contents is given in Tables 16, 17, and 18 for first-year rainbow trout, carryover rainbow trout, and brook trout, respectively. The mean stomach content decreased considerably for all three groups of trout during the course of the study period. This reduction

was greatest for carry-over rainbow trout, and least for brook trout. These changes in stomach content were closely related to trout growth.

In general the crustaceans (crayfish, cladocerans, and a few scuds) made up about 50% of the food of rainbow trout. About 20% of the diet of rainbows was composed of diptera (mostly pupae and larvae of Chironomus). Ephemeroptera and forage fish each comprised about 15% of the rainbow diet. Suckers were rarely eaten. Other types of foods were of minor importance.

The total amount of food eaten by rainbow trout decreased after 1965, with the increased stock densities of trout (biomass) present, and with the buildup of the white sucker population. Food conditions improved a little after a 3-year period of no trout stocking, but suckers apparently prevented full recovery. The only major changes in the diet composition of rainbow trout were in the proportions of cladocerans and dipterans. Cladocera made up a greater proportion, and diptera less after 1965.

Brook trout diet was somewhat more diverse than that of rainbow trout. In general, the same forms were of major importance. Forage fish (sticklebacks, muddlers, and minnows) comprised about one-third of the diet. Suckers were rarely eaten. Another 25% of their diet was composed of crustaceans, 15% ephemeropterans, and about 15% dipterans. All other forms of food made up relatively small portions of the diet.

Brook trout did not eat so much food as rainbow trout, and of course they did not grow so much, even though food availability was presumably the same for both groups of fish in the rather small East Fish Lake. I believe that the behavioral tendency of brook trout (at least Michigan domestic) to frequent the shallower water of the lake, combined with their being more territorial than the rainbow trout, results in their food supply being self-limited. The characteristic of brook trout to frequent shallow water also makes them more vulnerable to predators, which results in a lower survival rate (Alexander and Shetter, 1969).

Benthos

Lake bottom samples were taken throughout the study, starting 3 years prior to the study of the trout, to determine the relationship between invertebrate benthos and trout diet, growth, and production. The average standing crop of invertebrate benthos over the years is shown in Figure 2. The benthos population was lowest in 1957, prior to the start of the study of trout production. The years 1955 and 1956 can be considered as the baseline for benthic invertebrates in the presence of a minnow and sucker population. During these years the lake was being planted only with hatchery brook trout, which were cropped early in each fishing season; because of this early cropping, the trout biomass was at a relatively low level during the summer growing season. The lake also had a population of white suckers and various species of minnow. These were removed by rotenone treatment in the fall of 1956. The benthos was at a low level during 1957, after chemical treatment of the lake. Benthic populations increased in 1958 and 1959, even though normal trout stocking was done in 1957 and 1958. This increase in benthos resulted mostly from the removal of suckers and minnows. Benthic populations remained at higher levels from 1959 through 1966, which were years of good trout growth and production. Forage fish populations composed of redbelly dace, fatheads, sticklebacks, mudminnows, and muddlers appeared in the lake around 1962. These species may have lowered the benthos standing crops somewhat, during 1962-1966. A single white sucker was observed in 1965; the population of this species increased rapidly and was very evident by the fall of 1966. Benthic populations dropped after suckers increased to levels comparable to those present prior to chemical treatment of the lake. Only slight increases in benthos were noted in 1970, 1971, and 1972, as a result of no trout stocking of the lake.

The benthos by volume was composed mostly of Ephemeroptera (Ephemera and Hexagenia), Diptera (Chironomus), and Annelida (Oligochaeta). Crayfish (Orconectes propinquus and O. virilis) are other benthic animals which are abundant in East Fish Lake, but they were not sampled satisfactorily by the Ekman dredge and thus are not included in this analysis.

The benthos in deeper water (5-40 feet) was mostly dipterans (Fig. 3); they increased considerably following chemical treatment of the lake. Ephemeroptera also increased substantially. Both of these forms were used extensively by fish for food. Declines of both dipterans and ephemeropterans occurred after 1965, coinciding with increases in the sucker population. Populations of annelids showed little change; deep-water annelids are seldom found in trout stomachs. Benthos of shallow water (Fig. 4), composed mostly of Ephemeroptera, showed major improvement in standing crop, following chemical treatment of the lake, but it declined with the increase in the sucker population. Annelids and dipterans showed no significant change.

In general the growth, production, and volume of stomach content were highest when the standing crop of benthos was highest.

Conclusions

Hatchery-reared rainbow trout (average size, 8.9 inches at planting) grow, survive, produce, and yield better than do hatchery-reared brook trout of comparable size, whether existing under conditions of either high or low trout densities or with or without competition from other fish species. Competition from other fish species, particularly suckers, reduces trout production, growth, survival, food supply, and yield to the angler.

Rotenone treatment to remove competition from other fish species reduces the invertebrate benthos populations for about 1 year, but then benthos populations attain levels much higher than before the rotenone treatment.

Average volume of stomach content and condition factor ("C") of trout are good indicators of trout growth rate, more so than abundance of benthos or the species composition in the trouts' diet.

It is postulated that a much higher production, and a maximum sustained yield of fish of "desirable" size could be obtained from inland trout lakes by eliminating all competition from non-trout species, by stocking rainbow trout at fairly low rates (30 to 50 trout per acre), and

finally by delaying the normal cropping season until mid-summer. Maximum sustained yield would undoubtedly be attained with high stocking rates, but the trout produced would be small as shown by Gowing (1974).

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Table 1.--Estimated monthly and annual production in pounds of rainbow trout in East Fish Lake, average for 1958-1962, with data on length, weight and standing crop

Mid-month	Average length (inches)	Average weight (pounds)	Estimated number	Standing crop (pounds)	Production (pounds)
First growing season:					
October	8.9	0.23	300	69.0	....
November	9.2	0.30	299	89.7	20.9
December	9.9	0.38	298	113.2	23.8
January	10.1	0.40	297	118.8	5.9
February	10.2	0.41	296	121.4	3.0
March	10.3	0.43	295	126.8	5.8
April	10.5	0.45	295	132.8	6.0
May	11.3	0.56	186	104.2	26.0
June	13.1	0.88	136	119.2	50.3
July	14.1	1.09	84	91.6	22.4
August	15.1	1.35	49	66.2	16.8
September	15.9	1.58	30	47.4	8.8
October	16.5	1.75	30	52.5	5.1
Season total	....	....	...	.....	194.8
Second growing season:					
October	16.5	1.75	30	52.5	....
November	17.1	1.95	30	58.5	6.0
December	17.2	1.98	30	59.4	0.9
January	17.2	1.98	30	59.4	0.0
February	16.8	1.85	30	55.5	-3.9
March	16.4	1.72	30	51.6	-3.9
April	16.6	1.78	30	53.4	1.8
May	17.0	1.92	14	26.9	3.0
June	18.3	2.39	11	26.3	5.8
July	18.6	2.51	8	20.1	1.1
August	19.6	2.94	5	14.7	2.7
September	19.8	3.03	3	9.1	0.4
October	19.9	3.07	3	9.2	0.1
Season total	....	....	...	.....	14.0

Table 2.--Estimated monthly and annual production in pounds of rainbow trout in East Fish Lake, average for 1963-1964, with data on length, weight and standing crop

Mid-month	Average length (inches)	Average weight (pounds)	Estimated number	Standing crop (pounds)	Production (pounds)
First growing season:					
October	8.9	0.23	600	138.0	....
November	9.4	0.34	592	201.3	65.5
December	9.7	0.37	584	216.1	15.0
January	9.8	0.39	576	224.6	11.7
February	9.9	0.40	568	227.2	5.4
March	10.0	0.41	560	229.6	5.5
April	10.0	0.41	552	226.3	0.0
May	10.7	0.50	314	157.0	37.6
June	12.7	0.84	179	150.4	79.8
July	14.0	1.12	102	114.2	37.6
August	14.9	1.35	58	78.3	17.8
September	16.4	1.81	33	59.7	20.0
October	16.9	1.98	19	37.6	4.4
Season total	....	....	...	.....	300.3
Second growing season:					
October	16.9	1.98	19	37.6	....
November	17.4	2.16	19	41.0	3.4
December	17.3	2.12	19	40.3	-0.7
January	17.3	2.12	19	40.3	0.0
February	17.4	2.16	19	41.0	0.8
March	17.5	2.20	19	41.8	0.8
April	17.5	2.20	19	41.8	0.0
May	17.7	2.27	15	34.0	1.1
June	18.5	2.60	12	31.2	4.5
July	19.4	2.99	9	26.9	4.0
August	19.4	2.99	6	17.9	-0.1
September	19.5	3.04	4	12.2	0.3
October	19.7	3.13	2	6.3	0.3
Season total	....	....	...	.....	14.4

Table 3.--Estimated monthly and annual production in pounds of rainbow trout in East Fish Lake for 1965, with data on length, weight and standing crop

Mid-month	Average length (inches)	Average weight (pounds)	Estimated number	Standing crop (pounds)	Production (pounds)
First growing season:					
October	8.9	0.23	600	138.0	....
November	9.7	0.34	591	200.9	66.5
December	9.9	0.36	583	209.9	10.9
January	10.1	0.38	573	219.6	12.4
February	10.3	0.40	570	228.0	11.9
March	10.4	0.42	565	237.3	11.2
April	10.7	0.45	561	252.4	15.9
May	11.6	0.57	536	305.5	65.8
June	12.3	0.69	514	354.7	63.1
July	13.1	0.84	493	414.1	75.0
August	13.8	0.97	474	459.8	62.9
September	14.1	1.04	457	475.3	30.9
October	14.3	1.08	438	473.0	18.0
Season total	....	....	...	.....	444.5
Second growing season:					
October	14.3	1.08	438	473.0	....
November	14.4	1.10	422	464.2	8.7
December	14.4	1.10	406	446.6	0.0
January	14.5	1.13	389	439.6	11.9
February	14.5	1.13	376	424.9	0.0
March	14.5	1.13	361	407.9	0.0
April	14.5	1.13	347	392.1	0.0
May	14.6	1.15	334	384.1	6.8
June	14.7	1.17	321	375.6	6.6
July	14.9	1.21	308	372.7	12.3
August	15.3	1.33	297	395.0	36.4
September	15.6	1.41	286	403.3	22.9
October	15.6	1.41	275	387.8	0.0
Season total	....	....	...	.....	105.6

Table 4.--Estimated monthly and annual production in pounds of rainbow trout in East Fish Lake for 1966, with data on length, weight and standing crop

Mid-month	Average length (inches)	Average weight (pounds)	Estimated number	Standing crop (pounds)	Production (pounds)
First growing season:					
October	8.9	0.23	600	138.0	....
November	9.3	0.28	599	167.7	30.0
December	9.6	0.30	598	179.4	12.1
January	9.8	0.32	597	191.0	11.2
February	9.9	0.33	596	196.7	6.1
March	10.0	0.34	595	202.3	6.3
April	10.2	0.36	594	213.8	12.5
May	10.5	0.39	563	219.6	17.9
June	11.1	0.47	538	252.9	44.1
July	11.7	0.55	513	282.2	41.5
August	12.2	0.61	488	297.7	57.5
September	12.5	0.66	465	306.9	23.5
October	12.8	0.72	443	319.0	27.3
Season total	....	....	...	.....	290.0
Second growing season:					
October	12.8	0.72	443	319.0	....
November	13.0	0.74	423	313.0	8.5
December	13.1	0.76	405	307.8	8.3
January	13.2	0.78	386	301.1	7.9
February	13.2	0.78	369	287.8	0.0
March	13.2	0.78	353	275.3	0.0
April	13.2	0.78	336	262.1	0.0
May	13.2	0.78	321	250.4	0.0
June	13.5	0.84	307	257.9	18.9
July	13.6	0.86	294	252.8	5.8
August	13.7	0.88	278	244.6	5.7
September	13.8	0.90	266	239.4	5.5
October	13.8	0.90	254	228.6	0.0
Season total	....	....	...	.....	60.6

Table 5.--Estimated monthly and annual production in pounds of rainbow trout in East Fish Lake for 1967, with data on length, weight and standing crop

Mid-month	Average length (inches)	Average weight (pounds)	Estimated number	Standing crop (pounds)	Production (pounds)
First growing season:					
October	8.9	0.23	600	138.0	....
November	9.1	0.24	584	140.2	6.6
December	9.4	0.26	567	147.4	11.2
January	9.5	0.27	551	148.8	5.7
February	9.6	0.28	534	149.5	6.2
March	9.6	0.28	517	144.8	0.2
April	9.6	0.28	505	141.4	0.0
May	9.9	0.30	466	139.8	9.7
June	10.7	0.38	435	165.3	35.7
July	11.2	0.44	404	177.8	25.8
August	11.7	0.49	376	184.2	20.0
September	11.9	0.53	350	185.5	15.0
October	12.0	0.54	326	176.0	3.5
Season total	....	....	...	.....	139.5
Second growing season:					
October	12.0	0.54	326	176.0	....
November	12.0	0.54	303	163.6	0.2
December	12.0	0.54	283	152.8	0.0
January	12.0	0.54	264	142.6	0.0
February	12.0	0.54	246	132.8	-0.2
March	11.9	0.53	228	120.8	-2.4
April	11.9	0.53	214	113.4	0.0
May	12.0	0.54	198	106.9	2.1
June	12.1	0.55	185	101.8	2.0
July	12.4	0.59	174	102.7	7.3
August	12.6	0.62	161	99.8	5.0
September	12.7	0.63	149	93.9	1.7
October	12.7	0.63	138	86.9	-0.1
Season total	....	....	...	.....	15.6

Table 6.--Estimated monthly and annual production in pounds of rainbow trout in East Fish Lake for 1968, with data on length, weight and standing crop

Mid-month	Average length (inches)	Average weight (pounds)	Estimated number	Standing crop (pounds)	Production (pounds)
First growing season:					
October	8.9	0.23	600	138.0	....
November	9.1	0.24	548	131.5	5.8
December	9.2	0.24	501	120.2	0.0
January	9.3	0.25	458	114.5	4.9
February	9.3	0.25	416	104.0	0.5
March	9.3	0.25	381	95.2	-0.1
April	9.3	0.25	349	87.2	0.0
May	9.5	0.26	300	78.0	3.2
June	9.9	0.31	262	81.2	13.9
July	10.4	0.35	226	79.1	9.7
August	10.9	0.40	196	78.4	10.5
September	11.2	0.44	172	75.7	7.4
October	11.2	0.44	147	64.7	0.0
Season total	....	....	...	.....	55.8
Second growing season:					
October	11.2	0.44	147	64.7	....
November	11.2	0.44	128	56.3	-0.1
December	11.2	0.44	113	49.7	0.0
January	11.2	0.44	97	42.7	0.0
February	11.2	0.44	84	37.0	0.0
March	11.2	0.44	73	32.1	0.0
April	11.2	0.44	63	27.7	0.0
May	11.2	0.44	54	23.8	0.1
June	11.2	0.44	47	20.7	0.0
July	11.3	0.45	41	18.4	0.4
August	11.5	0.47	35	16.4	0.7
September	11.6	0.48	31	14.9	0.4
October	11.6	0.48	26	12.5	0.0
Season total	....	....	...	.....	1.5

Table 7.--Estimated monthly and annual production in pounds of rainbow trout in East Fish Lake for 1972, with data on length, weight and standing crop

Mid-month	Average length (inches)	Average weight (pounds)	Estimated number	Standing crop (pounds)	Production (pounds)
First growing season:					
October	8.9	0.23	300	69.0	....
November	9.5	0.32	236	75.5	23.5
December	9.8	0.36	186	67.0	8.4
January	10.0	0.38	148	56.2	3.2
February	10.1	0.39	117	45.6	1.3
March	10.3	0.42	94	39.5	3.2
April	10.6	0.45	75	33.8	2.6
May	10.9	0.49	59	28.9	2.6
June	11.7	0.61	47	28.7	6.3
July	12.4	0.72	37	26.6	4.5
August	13.2	0.88	30	26.4	5.3
September	13.7	0.98	24	23.5	2.7
October	13.9	1.02	19	19.4	0.9
Season total	....	....	...	....	64.5

Table 8.--Estimated monthly and annual production in pounds of brook trout in East Fish Lake, average for 1958-1962, with data on length, weight and standing crop

Mid-month	Average length (inches)	Average weight (pounds)	Estimated number	Standing crop (pounds)	Production (pounds)
First growing season:					
October	8.9	0.25	300	75.0	....
November	9.2	0.33	300	96.0	21.0
December	9.6	0.37	200	70.0	7.3
January	9.8	0.40	181	69.0	5.7
February	10.0	0.42	170	68.0	3.5
March	10.1	0.43	160	66.0	1.7
April	10.4	0.47	148	65.1	4.6
May	10.7	0.52	37	18.0	3.2
June	11.4	0.62	18	11.0	3.1
July	11.9	0.71	8	6.0	1.8
August	13.2	0.96	3	3.0	1.2
September	13.5	1.04	1	1.2	0.4
October	13.6	1.06	1	1.2	0.0
Season total	....	....	...	....	53.5

Table 9.--Estimated monthly and annual production in pounds of brook trout in East Fish Lake, average for 1963-1964, with data on length, weight and standing crop

Mid-month	Average length (inches)	Average weight (pounds)	Estimated number	Standing crop (pounds)	Production (pounds)
First growing season:					
October	8.9	0.25	300	75.0	....
November	9.4	0.35	256	89.6	28.0
December	9.7	0.38	255	96.9	7.5
January	9.9	0.40	255	102.0	4.8
February	10.1	0.44	221	97.2	9.4
March	10.3	0.47	195	91.7	6.4
April	10.6	0.50	139	69.5	4.9
May	10.9	0.55	61	33.6	5.4
June	11.4	0.65	26	16.9	4.2
July	12.1	0.76	11	8.4	2.0
August	12.4	0.83	5	4.2	0.6
September	12.6	0.85	2	1.7	0.0
October	12.8	0.90	1	0.9	0.1
Season total	....	....	...	.....	73.3

Table 10.--Estimated monthly and annual production in pounds of brook trout in East Fish Lake for 1965, with data on length, weight and standing crop

Mid-month	Average length (inches)	Average weight (pounds)	Estimated number	Standing crop (pounds)	Production (pounds)
First growing season:					
October	8.9	0.25	300	75.0	....
November	9.2	0.28	274	76.7	8.4
December	9.4	0.31	270	83.7	8.1
January	9.6	0.33	265	87.4	5.0
February	9.8	0.34	217	73.8	2.4
March	10.0	0.37	180	66.6	5.9
April	10.2	0.39	152	59.3	3.3
May	10.5	0.43	90	38.7	4.8
June	10.9	0.48	52	25.0	3.6
July	11.3	0.53	30	15.9	2.0
August	11.6	0.58	18	10.4	1.1
September	11.8	0.61	10	6.1	0.4
October	11.8	0.61	6	3.7	0.6
Season total	....	....	...	....	45.6

Table 11.--Estimated monthly and annual production in pounds of brook trout in East Fish Lake for 1966, with data on length, weight and standing crop

Mid-month	Average length (inches)	Average weight (pounds)	Estimated number	Standing crop (pounds)	Production (pounds)
First growing season:					
October	8.9	0.25	300	75.0	....
November	9.2	0.27	234	63.2	5.4
December	9.4	0.29	180	52.2	4.1
January	9.6	0.31	138	42.8	3.2
February	9.8	0.33	117	38.6	2.5
March	10.0	0.35	98	34.3	2.2
April	10.2	0.37	85	31.4	1.8
May	10.5	0.41	57	23.4	2.9
June	10.9	0.45	37	16.6	1.8
July	11.2	0.49	24	11.8	1.3
August	11.2	0.49	16	7.8	0.9
September	11.2	0.49	11	5.4	0.4
October	11.2	0.49	7	3.4	0.4
Season total	....	....	...	....	26.9

Table 12.--Estimated monthly and annual production in pounds of brook trout in East Fish Lake for 1967, with data on length, weight and standing crop

Mid-month	Average length (inches)	Average weight (pounds)	Estimated number	Standing crop (pounds)	Production (pounds)
First growing season:					
October	8.9	0.25	300	75.0	....
November	9.2	0.25	248	62.0	0.0
December	9.5	0.26	190	49.4	2.2
January	9.7	0.28	152	42.6	3.4
February	9.8	0.29	117	33.9	1.3
March	9.8	0.29	91	26.4	0.4
April	9.9	0.30	70	21.0	0.8
May	10.2	0.33	45	14.8	1.6
June	10.5	0.36	29	10.4	1.1
July	10.7	0.38	19	7.2	0.5
August	10.8	0.39	12	4.7	0.2
September	10.9	0.40	8	3.2	0.1
October	10.9	0.40	5	2.0	0.0
Season total	....	....	...	....	11.6

Table 13.--Estimated monthly and annual production in pounds of brook trout in East Fish Lake for 1968, with data on length, weight and standing crop

Mid-month	Average length (inches)	Average weight (pounds)	Estimated number	Standing crop (pounds)	Production (pounds)
First growing season:					
October	8.9	0.25	300	75.0	....
November	9.2	0.26	248	64.5	2.7
December	9.4	0.28	189	52.9	4.3
January	9.6	0.30	151	45.3	3.4
February	9.8	0.32	104	33.3	2.5
March	9.9	0.33	72	23.8	0.9
April	10.0	0.34	52	17.7	0.6
May	10.1	0.35	36	12.6	0.4
June	10.3	0.37	22	8.1	0.5
July	10.5	0.39	14	5.5	0.4
August	10.6	0.41	9	3.7	0.2
September	10.6	0.41	6	2.5	0.0
October	10.6	0.41	4	1.6	-0.1
Season total	....	....	...	....	15.8

Table 14.--Estimated monthly and annual production in pounds of brook trout in East Fish Lake for 1972, with data on length, weight and standing crop

Mid-month	Average length (inches)	Average weight (pounds)	Estimated number	Standing crop (pounds)	Production (pounds)
First growing season:					
October	8.9	0.25	300	75.0	....
November	9.2	0.30	250	75.0	13.7
December	9.4	0.32	191	61.1	4.3
January	9.7	0.36	155	55.8	6.8
February	9.9	0.38	142	54.0	3.0
March	10.1	0.40	129	51.6	2.7
April	10.4	0.44	117	51.5	4.9
May	10.6	0.47	69	32.4	2.7
June	10.8	0.49	41	20.1	1.1
July	10.9	0.50	24	12.0	0.3
August	11.0	0.52	14	7.3	0.4
September	11.1	0.54	8	4.3	0.2
October	11.1	0.54	5	2.7	0.2
Season total	....	....	...	....	40.3

Table 15.--Average condition factor "C" of rainbow and and brook trout in East Fish Lake, 1958-1972

Year	Rainbow trout	Brook trout
1958-1962	39.2	42.0
1963-1964	40.2	42.6
1965	36.6	37.3
1966	33.8	35.2
1967	30.7	30.9
1968	30.8	34.5
1972	38.2	39.2

Table 16.--Stomach contents of "first-year" rainbow trout from East Fish Lake, 1959-1973

Taxonomic group	1959-1963	1964-1965	1966	1967	1968	1969	1973
Mean volume in ml							
Crayfish	1.318	0.702	0.324	0.110	0.090	0.048	0.839
Cladocera and scuds*	2.590	1.684	2.865	1.926	0.723	0.402	0.021
Annelida	0.013	0.002	0.000	0.000	0.003	0.000	0.000
Mollusca	0.003	0.000	0.006	0.000	0.002	0.005	0.014
Ephemeroptera	1.107	0.586	0.490	0.158	0.073	0.580	1.107
Odonata	0.002	0.006	0.000	0.000	0.001	0.006	0.010
Hemiptera	0.020	0.019	0.001	0.002	0.003	0.004	0.002
Coleoptera	0.011	0.004	0.004	0.006	0.013	0.011	0.012
Trichoptera	0.005	0.000	0.000	tr	0.002	0.000	0.000
Diptera	2.698	2.553	0.726	0.198	0.086	0.123	0.010
Terrestrial	0.010	0.006	0.008	0.023	0.021	0.076	0.152
Fish	0.148	0.675	0.411	0.161	0.031	0.050	3.319
Amphibia	0.002	0.000	0.000	0.000	0.000	0.000	0.000
Others	0.016	0.027	0.000	0.000	0.000	0.000	0.000
Unidentified	0.047	0.132	0.036	0.033	0.056	0.068	0.042
Total volume	7.990	6.396	4.871	2.617	1.104	1.373	5.528
Volume by percent							
Crayfish	16.5	11.0	6.7	4.2	8.2	3.5	15.2
Cladocera and scuds	32.4	26.3	58.8	73.6	65.5	29.3	0.4
Annelida	0.2	tr	0.0	0.0	0.3	0.0	0.0
Mollusca	tr	0.0	0.1	0.0	0.2	0.4	0.3
Ephemeroptera	13.9	9.2	10.1	6.0	6.6	42.2	20.0
Odonata	tr	0.1	0.0	0.0	0.1	0.4	0.2
Hemiptera	0.3	0.3	tr	0.1	0.3	0.3	tr
Coleoptera	0.1	tr	0.1	0.2	1.2	0.8	0.2
Trichoptera	tr	0.0	0.0	tr	0.2	0.0	0.0
Diptera	33.8	39.9	14.9	7.6	7.8	9.0	0.2
Terrestrial	0.1	0.1	0.2	0.9	1.9	5.5	2.7
Fish	1.9	10.6	8.4	6.2	2.8	3.6	60.0
Amphibia	tr	0.0	0.0	0.0	0.0	0.0	0.0
Others	0.2	0.4	0.0	0.0	0.0	0.0	0.0
Unidentified	0.6	2.1	0.7	1.2	4.9	5.0	0.8
Total of percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* Nearly all cladocerans.

Table 17.--Stomach contents of "carryover" (second year) rainbow trout from East Fish Lake, 1960-1970

Taxonomic group	1960 1963	1964-1965	1966	1967	1968	1969	1970
Mean volume in ml							
Crayfish	6.686	5.996	2.088	1.296	0.749	0.557	1.019
Cladocera and scuds*	0.552	0.558	0.650	1.083	0.355	0.495	0.928
Annelida	0.056	0.000	0.000	0.000	0.000	0.000	0.000
Mollusca	0.000	0.008	0.000	0.000	0.017	0.000	0.002
Ephemeroptera	1.037	0.262	0.000	0.423	0.282	0.185	0.902
Odonata	0.004	0.002	0.000	0.000	0.000	0.001	0.002
Hemiptera	0.008	0.001	0.000	0.008	0.002	0.001	0.003
Coleoptera	0.006	0.000	0.000	0.007	0.012	0.003	0.033
Trichoptera	0.000	0.000	0.000	0.000	0.010	0.000	0.000
Diptera	9.781	4.295	0.000	0.559	0.209	0.235	0.548
Terrestrial	0.000	0.000	0.000	0.013	0.080	0.073	0.087
Fish	0.098	0.519	11.200	0.465	0.069	0.033	0.239
Amphibia	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Others	0.000	0.000	0.000	0.001	0.001	0.000	0.002
Unidentified	0.097	0.136	0.000	0.056	0.276	0.185	0.226
Total volume	18.325	11.777	13.938	3.911	2.062	1.768	3.991
Volume by percent							
Crayfish	36.5	50.9	15.0	33.1	36.3	31.5	25.5
Cladocera and scuds*	3.0	4.7	4.7	27.7	17.2	28.0	23.3
Annelida	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Mollusca	0.0	0.1	0.0	0.0	0.8	0.0	0.0
Ephemeroptera	5.7	2.2	0.0	10.8	13.7	10.5	22.6
Odonata	tr	tr	0.0	0.0	0.0	0.0	0.0
Hemiptera	0.1	tr	0.0	0.2	0.1	0.0	0.1
Coleoptera	tr	0.0	0.0	0.2	0.6	0.2	0.8
Trichoptera	0.0	0.0	0.0	0.0	0.5	0.0	0.0
Diptera	53.4	36.5	0.0	14.3	10.1	13.3	13.7
Terrestrial	0.0	0.0	0.0	0.4	3.9	4.1	2.2
Fish	0.5	4.4	80.3	11.9	3.4	1.9	6.0
Amphibia	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Others	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Unidentified	0.5	1.2	0.0	1.4	13.4	10.5	5.7
Total of percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Nearly all cladocerans.

Table 18.--Stomach contents of "first-year" brook trout from East Fish Lake, 1959-1973

Taxonomic group	1959-1963	1964-1965	1966	1967	1968	1969	1973
Mean volume in ml							
Crayfish	0.356	0.395	0.125	0.180	0.122	0.139	0.207
Cladocera and scuds*	0.691	0.261	0.530	0.502	0.213	0.160	0.014
Annelida	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mollusca	0.002	0.001	0.000	0.000	0.004	0.007	0.001
Ephemeroptera	0.533	0.186	0.195	0.944	0.197	0.173	0.316
Odonata	0.045	0.043	0.001	0.037	0.224	0.018	0.002
Hemiptera	0.004	0.016	0.003	0.006	0.013	0.004	0.003
Coleoptera	0.003	0.000	0.004	0.001	0.036	0.011	0.016
Trichoptera	0.011	0.015	0.031	0.021	0.079	0.012	0.004
Diptera	0.489	1.694	0.256	0.011	0.082	0.048	0.028
Terrestrial	0.003	0.005	0.002	0.229	0.378	0.099	0.082
Fish	0.470	1.612	1.053	0.214	0.520	0.763	2.114
Amphibia	0.043	0.000	0.000	0.000	0.000	0.000	0.001
Others	0.028	0.016	0.000	0.001	0.000	0.000	0.000
Unidentified	0.056	0.063	0.021	0.254	0.078	0.038	0.035
Total volume	2.734	4.307	2.221	2.400	1.946	1.472	2.823
Volume by percent							
Crayfish	13.0	9.2	5.6	7.5	6.3	9.4	7.3
Cladocera and scuds*	25.3	6.1	23.8	20.9	10.9	10.9	0.5
Annelida	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mollusca	tr	tr	0.0	0.0	0.2	0.5	tr
Ephemeroptera	19.5	4.3	8.8	39.3	10.1	11.8	11.2
Odonata	1.7	1.0	0.1	1.6	11.5	1.2	tr
Hemiptera	0.1	0.4	0.1	0.3	0.7	0.3	0.1
Coleoptera	0.1	0.0	0.2	tr	1.9	0.7	0.6
Trichoptera	0.4	0.3	1.4	0.9	4.1	0.8	0.1
Diptera	17.9	39.3	11.5	0.5	4.2	3.3	1.1
Terrestrial	0.1	0.1	0.1	9.5	19.4	6.7	2.9
Fish	17.2	37.4	47.4	8.9	26.7	51.8	74.9
Amphibia	1.6	0.0	0.0	0.0	0.0	0.0	tr
Others	1.0	0.4	0.0	tr	0.0	0.0	0.0
Unidentified	2.1	1.5	1.0	10.6	4.0	2.6	1.3
Total of percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* Nearly all cladocerans.

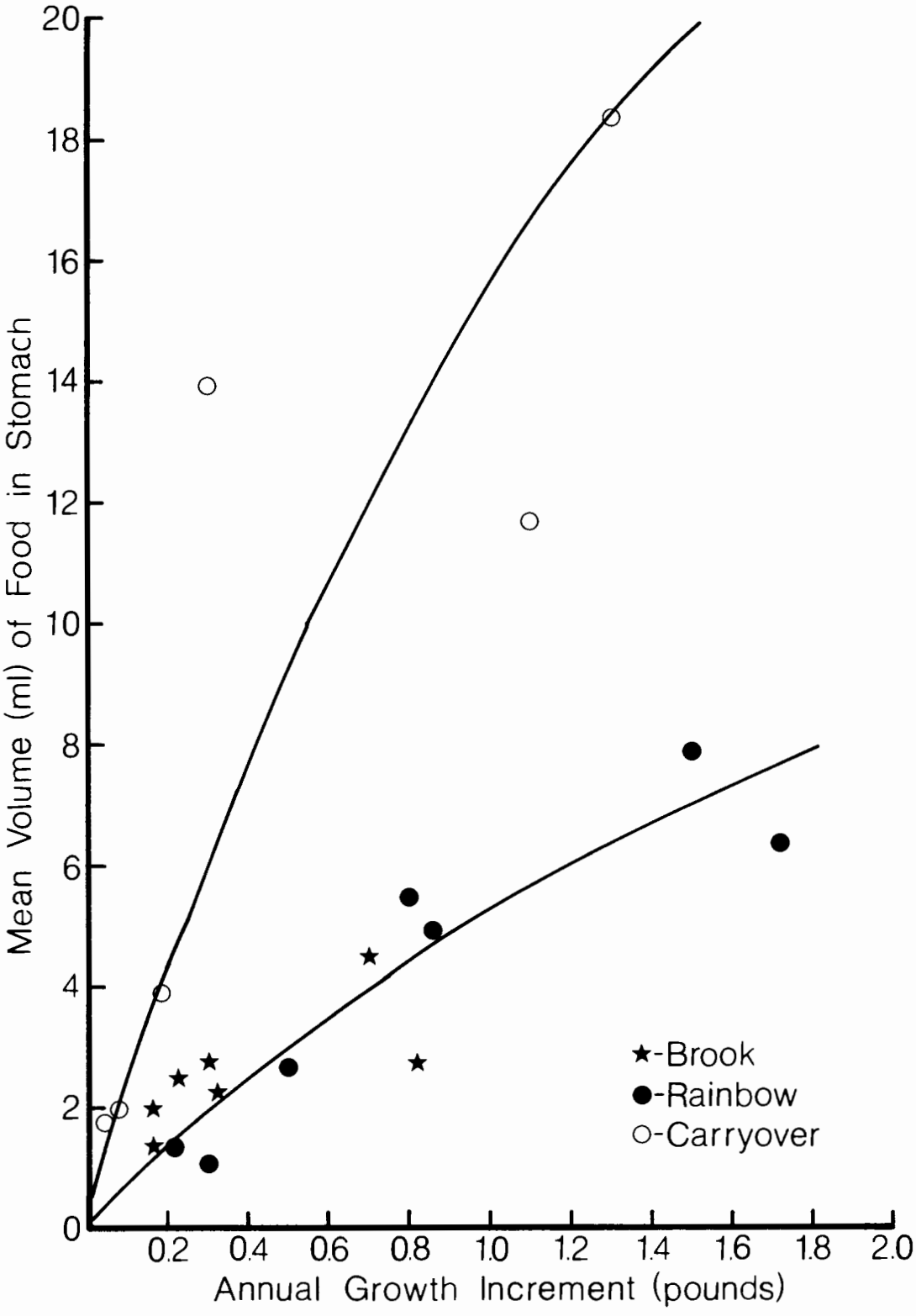

Figure 1.--Relationship between mean volume of food in trout stomach and annual growth increment made by brook, rainbow, and carryover rainbow trout in East Fish Lake.

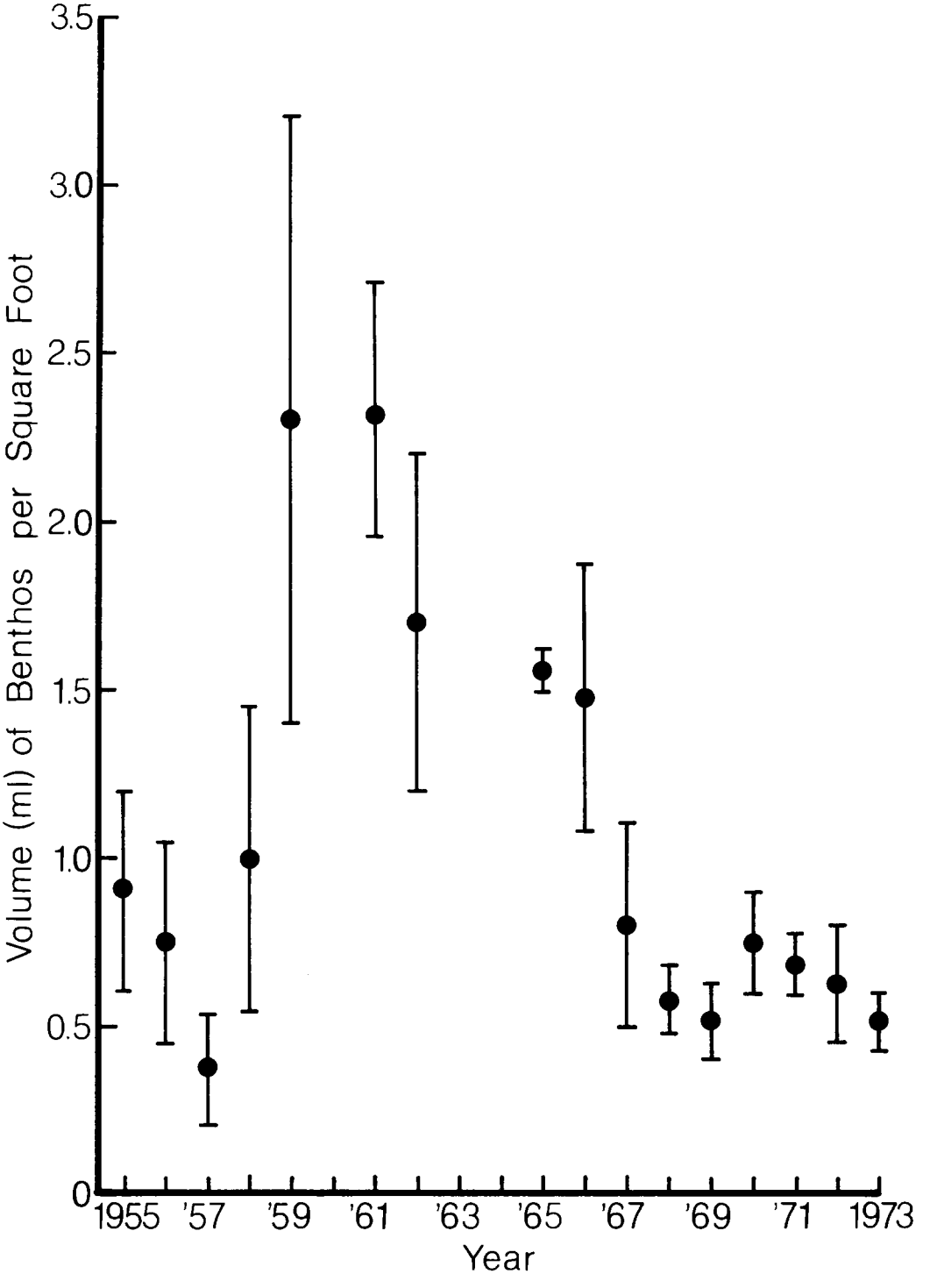

Figure 2.--Average volume of benthos per square foot (with 2 standard errors) in East Fish Lake, 1955-1973.

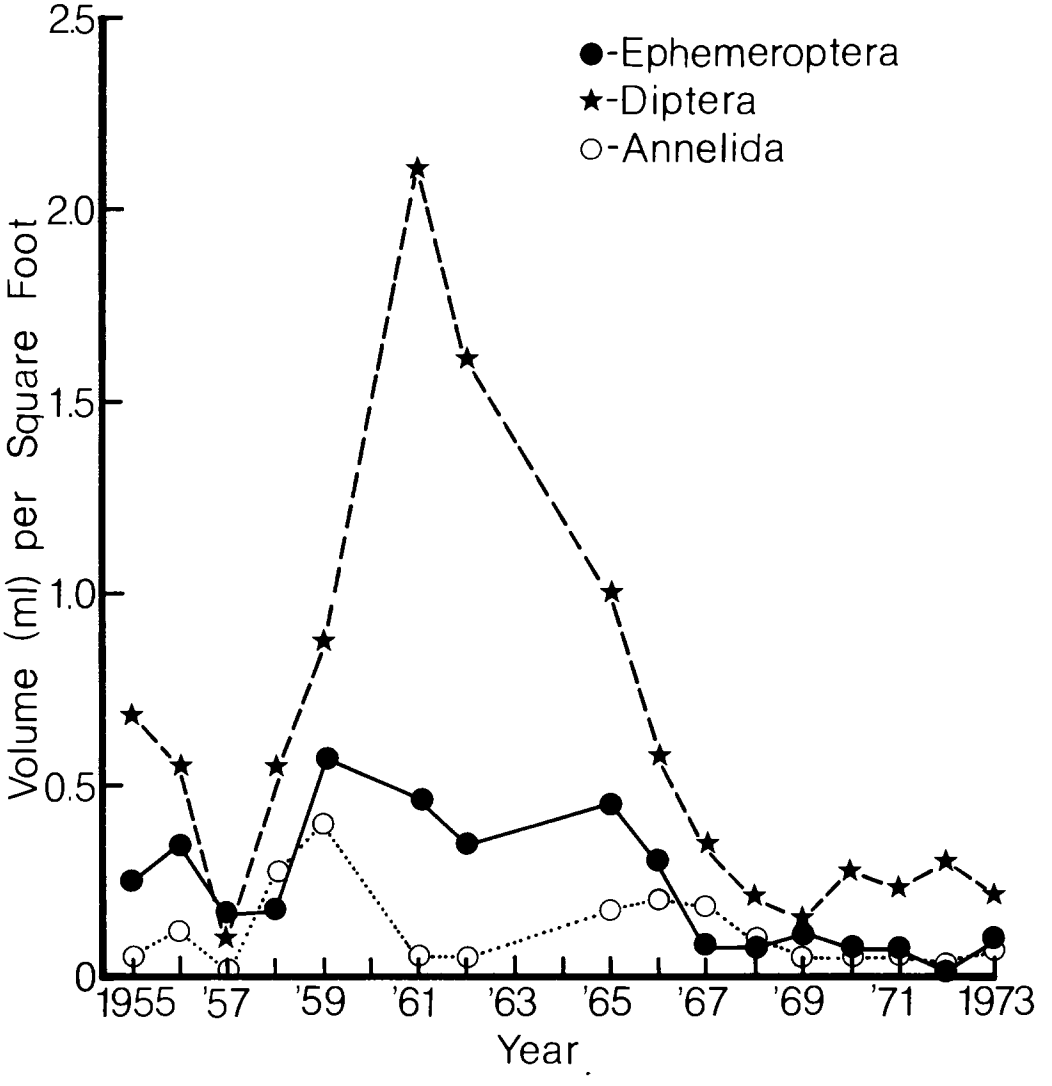

Figure 3.--Average volume of benthic Ephemeroptera, Diptera, and Annelida per square foot in deep water of East Fish Lake, 1955-1973.

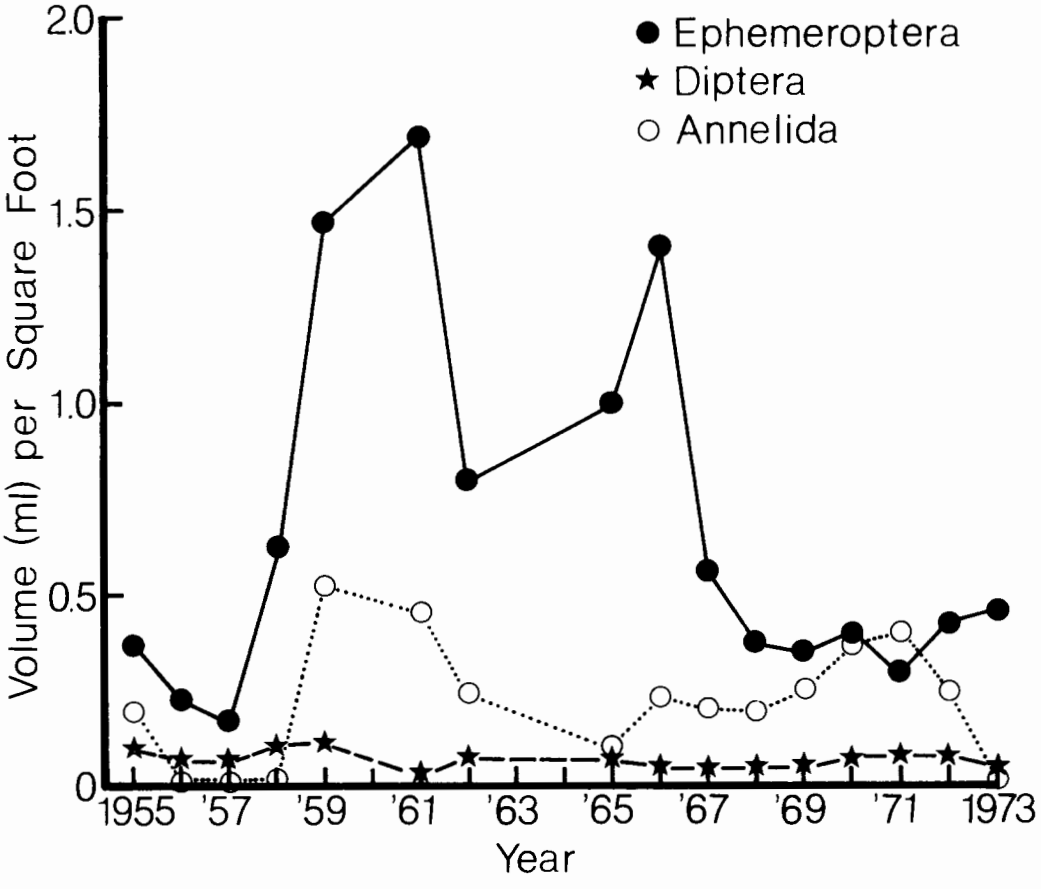

Figure 4.--Average volume of benthic Ephemeroptera, Diptera, and Annelida per square foot in shallow water of East Fish Lake, 1955-1973.

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