FIVE-YEAR SUMMARY OF MISSISSIPPI RIVER SPECIAL TAILWATER CREEL CENSUSES IN POOL 7, 1969-1973.

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INTRODUCTION

A creel census was conducted in the tailwaters of Pool 7 during March and April for five consecutive years (1969-1973) to evaluate the fishing pressure and harvest during a two-month period previously closed to fishing for large game fish.[1] The five censuses were conducted under the auspices of the Fish Technical Section of the Upper Mississippi River Conservation Committee as part of a plan to maintain a continuing evaluation of the sport fishery.[2]

DESCRIPTION OF THE AREA

Pool 7 is one of 26 navigation pools created by the construction of locks and dams on the Mississippi River in the 1930's between Hastings, Minnesota and Alton, Illinois--a distance of approximately 928 miles. Pool 7 is impounded by Lock and Dam No. 7 at Dresbach, Minnesota. It is 12 miles long and contains 11,031 acres.

The upper boundary of the pool is Lock and Dam No. 6 which is located at Trempealeau, Wisconsin. The rapid passage of water through the gates of the dam influences the navigation channel for a distance of approximately one-half mile downstream depending upon the volume of water passed. This area is classified as tailwater and is known to provide excellent angling for the larger game fish species. It was in this tailwater area that the 1973 sport fishery creel census was conducted. Just below Lock and Dam No. 6 is a permanently moored fishing barge from which the public can fish for a small daily fee.

Towns found along Pool 7 are Trempealeau and Onalaska, Wisconsin and Dresbach and Dakota, Minnesota. La Crosse, Wisconsin is the largest city in the area with a population of over 50,000 and is located just below Pool 7.

METHODS

One man was stationed at the Trempealeau landing which is the only public boat landing located within the tailwater area of Pool 7. In addition to completing creel census forms, lengths of every walleye and sauger in the catch were recorded. Weights were taken from a representative sample of walleye and sauger in the catch. Aging data used to compile the tables were obtained from scales collected from walleye and sauger in 1969, 1970, and 1971.

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[1] Large game fish include walleye, sauger, northern pike, largemouth bass and smallmouth bass.

[2] The U.M.R.C.C. is an organization consisting of representatives from Minnesota, Wisconsin, Iowa, Illinois, and Missouri whose objectives are to facilitate cooperation between the states for studies and management of the natural resources of the river, to exchange information about the river and its problems at regular meetings, and to promote cooperation in resource management of interstate waters.

To insure a uniform and random census, a work schedule was established which utilized a combination of two consecutive census days followed by one day off, plus a rotation between "early" days (7:00 - 11:00 a.m.), "mid" days (11:00 - 3:00 p.m.), and "late" days (3:00 - 7:00 p.m.). By following this prearranged schedule without deviation throughout the two-month study period each year, the requisite randomness and uniformity were achieved.

The use of a bait with the trade name "Sonar" manufactured by Heddon has been criticized by a number of anglers and conservationists. Their concerns are (1) that the Sonar may be exceedingly effective in harvesting large spawning walleye and sauger; (2) that the Sonar may be responsible for much of the foul hooking occurring on the river. Sonar catch data have been analyzed separately, and average lengths and weights of walleye and sauger caught on sonars have been compared to those taken by other methods.

The creel census was designed to evaluate the fishing pressure and harvest during a two-month period previously closed to fishing for large game fish. It presents information on the angler and the catch, and discusses how various factors may influence changes observed in the fishery.

RESULTS

THE ANGLER

Early spring fishing in the tailwaters of Pool 7 was almost entirely a man's sport, with 93 to 96 percent of the fishermen males. The anglers spanned an age range of 2 to 88 years. The greatest concentration of anglers occurred between 25 to 35 years of age, with those in their early to middle 60's next in importance (Figure 1).

Fishermen from Wisconsin dominated the early spring tailwater fishery in Pool 7, ranging from 82 percent of those contacted in 1972 to 95 percent in 1969, with an average of 88 percent for all five censuses combined (Table 1). Most of the remaining anglers came from Illinois in 1969 and 1973, and from Minnesota for the three surveys in between. The fishery was primarily local, with 70 to 80 percent of all contacted fishermen residing within 25 miles, and 80 to 86 percent within 50 miles (Table 2).

From 2,600 to 6,600 fishermen spent 8,800 to 19,000 hours annually fishing the Pool 7 tailwaters in March and April during the five-year census period, for an average of 4,700 fishermen and 14,900 hours of angling per early spring season (Table 3, Figure 2). Effort was highest in 1970 and lowest in 1969. Considerably more of the early spring fishing was done in April than March, ranging from two-thirds to five-sixths of the effort in both months combined (Table 4). April effort averaged three-fourths of the fishing done in the two months over the five-year study period.

Four methods of fishing were used: boat, bank, barge, and, in early March, ice fishing (Table 5). Flood waters delayed barge angling until May in 1969, and barge anglers were not contacted in the next two seasons, with a resulting underestimate of total effort and catch in 1970 and 1971.

Boat fishing was the most popular method in all five surveys, accounting for half to two-thirds of the fishermen and a slightly higher proportion of the fishing time, up to nearly three-fourths in 1970. A five-year average of 60 percent of the fishermen did 65 percent of the fishing from boats. From 20 to 40 percent of the anglers fished from the bank, where the proportion of fishing time was slightly lower, 20 to 30 percent. A five-year average of 30 percent of the anglers fished 25 percent of the total hours from the bank. Both barge and ice fishing were minor compared to boat and bank angling, ranging from a low of 3 percent of all anglers up to 10 percent for barge anglers and 20 percent for ice anglers. Weather conditions determine the time of spring break-up and water levels, which influence the amount of barge and ice fishing done during the months of March and April.

The most popular method of lure presentation was still fishing, preferred over casting 2 to 1 for all years combined (Table 6). Preference ranged from casting slightly more popular than still fishing in 1971 to almost entirely still fishing in 1970. The type of lure preferred varied considerably between surveys. Live bait, chiefly minnows, was most popular lure in three of five years, used by about three-fourths of the fishermen in 1970 and 1973 and just over half of those in 1972. In 1969, three-fourths of the anglers used artificials with live bait attached. The remainder of the fishermen in that year used artificials slightly more than live bait, with jigs and minnows the two most popular specific lures. Artificial lures, live bait, and the two combined shared similar popularity in 1971. The live bait used most was minnows, and sonar, the chief artificial. The sonar lure was the predominant artificial in the last four surveys. Separate data were not collected on it in the first census in 1969. Instead, it was included with other artificials, which were of low significance in that year.

THE CATCH - GENERAL

A wide variety of fish appeared in the creel of Pool 7 tailwater anglers in March and April (Tables 3 and 4). However, over 90 percent of the fish taken were of four species. Walleye and sauger were most consistently significant in all five surveys. The primary purpose of the censuses was to assess the impact of a March and April fishery on walleye and sauger, as these months were closed to fishing prior to 1969.

White bass were the most numerous species in the catch in 1969, but were not important in the four following surveys. The large white bass catch in 1969 coincided with unusually high water levels that spring, which apparently made this species more susceptible to capture. The yellow perch catch was comparable to that of sauger and walleye in the last three censuses, 1971 through 1973. Perch were caught primarily from the bank, but both boat and bank catches showed substantial and consistent increases over the last three years of study. Low perch catches in the first two surveys probably reflect the censusing method, which failed to contact bank anglers adequately.

The sauger catch ranged from 1,500 fish in 1969 to 5,300 in 1970. Walleye catches were similar, ranging from 2,000 in 1970 to 5,600 in 1973 (Figures 3 and 4). The five-year mean catch for each species was nearly identical, at 3,300 fish per species.

CATCH DISTRIBUTION BY MONTH AND FISHING METHOD

Both walleye and sauger catches were considerably greater in April than March, with the exception of the 1969 census when the March sauger catch was more than double that in April (Table 4). In the rest of the surveys, April sauger catches were about double those in March, except for 1972 when the April catch was 3.5 times that in March. April walleye catches ranged from double to five times those in March.

Over the five surveys, three-fourths of both the walleye and sauger were caught from boats (Table 3). The contribution from boats was quite constant for walleye, and ranged from half to nearly the entire catch for sauger. The sauger catch through the ice ranked next in importance, ranging from 10 to 50 percent, and averaging about 20 percent. Sauger catches from the bank were recorded in the last three surveys only, and barge catches in the last two.

Similar to ice fishing catches, bank and barge catches varied considerably between surveys, but on a smaller scale. They ranged from insignificant to 15 to 20 percent of the total catch. The second most important method for catching walleye was from the bank, ranging from 7 to 20 percent of the total catch. The bank catch of walleye was most significant in the first two censuses, when no sauger were taken from the bank. In the last three surveys bank fishing was of similar importance for both species. As for sauger, barge catches of walleye were recorded only in the last two surveys, and were much more significant in 1973 than in 1972. Walleye catches through the ice were less significant than those for sauger, 12 percent of the total catch or less.

Boat fishing accounted for a larger part of the walleye catch than the fraction of fishing effort from boats in all five surveys. This was also the case for sauger in three of five censuses. Bank catches ranged from comparable to the effort expended to considerably less, reflecting that many bank anglers were pursuing other species, primarily panfish. Catch and effort were similar for the fishing barge. Sauger catches through the ice were greater than the effort expended, while walleye catches were smaller.

ANNUAL CATCH TRENDS

The sauger catch increased in 1970 to over 3.5 times the 1969 level, while walleye remained stable. Walleye catch then doubled in 1971, dropped to an intermediate level the next year, and doubled again in the last survey. During the same three-year period, the sauger catch dropped to a level intermediate to the first two surveys, and remained stable there. The dominant species in the catch alternated between walleye and sauger over the five censuses.

CATCH RATES

Walleye and sauger catch rates were inversely related (Figure 5). Fishermen may select for walleye because they attain a larger size than sauger. Therefore, sauger catch rates could be lower than their actual availability to the creel during periods when large walleye are being taken. The average fishing time required to catch a walleye and to catch a sauger were the same, 4.5 hours. Catch rates ranged from one walleye per 3 hours in 1973, up to 9 hours 20 minutes in 1970. Rates for sauger were narrower, from 3.5 hours per fish in 1970, to 6 hours in 1969.

The highest walleye catch rate occurred in the last census when boat, barge, and ice angling each yielded a fish to the creel for 2.5 hours of effort (Table 7a). The catch rate from the bank in 1973 was one walleye per 7.5 hours, about average for this angling method over the five study years. In contrast, the low 1970 catch rate resulted from a range of 8.5 hours to catch a walleye from a boat to 15.3 hours through the ice. Over the five-year study, the average barge catch rate of one walleye for 3 hours fishing and the boat rate of a walleye every 4 hours exceeded ice and bank fishing at 5.5 and 7.5 hours, respectively. It should be noted that the average barge rate was determined from only the last two years of data. Boat catch rates in these two years were nearly the same as those for barge fishing. The highest bank catch rate was identical to the average rate for all methods over all years, 1 walleye for 4.5 hours of fishing. In summary, barge and boat fishing were generally more efficient than ice and bank angling for producing walleye.

The lowest sauger catch rate was followed by the highest in the first two survey years. Sauger catches were recorded only from boat and ice fishing in these years (Table 7b). Boat catch rates ranged from 7 hours per fish to 3 hours per fish. Catch rates through the ice were considerably higher, from 2 to 1 hour per fish. Sauger catch rates from the bank were recorded for the last three surveys only. In 1971 a sauger was taken in 4.5 hours of bank fishing, comparable to the walleye rate for that year. In the last two survey years, sauger catch rates were only half those of walleye, ranging from 16 to 31 hours of fishing per sauger. Barge catch rates were also much lower for sauger than walleye, ranging from 5 to 14 hours per sauger in the last two surveys. In summary, ice fishing yielded a higher sauger catch rate than the best walleye rate by any of the four methods. Boat catch rates for the two species averaged the same over the five-year period, while bank and barge rates for sauger were less than half those for walleye.

Combining walleye and sauger catches stabilizes catch rates considerably, indicating an inverse relationship between the two catches. Combined rates only varied from 2 to 2.5 hours per fish over the five study years (Figures 6a, Table 7c). Ranges in effort per fish for the four fishing methods were: ice, 1 to 2 hours; boat, 1.5 to 2.5 hours; barge, 2 to 3.5 hours; and bank, 1 to 11.5 hours.

There was little variation in walleye catch rates between March and April fishing in three of five study years (Table 8). Exceptions included 1971, when it took 2 hours longer to catch a walleye in March than in April, and 1973, when anglers had to fish an hour longer in April than in March to produce a walleye.

Lowest catch rates for both March and April occurred in the 1970 census, when it took just over 9 hours to catch a walleye. The highest rate for March walleye fishing was a fish per 2.5 hours in 1973, and best rate for April

was 3 hours per walleye in 1971. The March catch rate averaged slightly better than the April rate over the five years, 4.2 hours per walleye in March compared to 4.6 hours in April.

Catch rates for sauger were better in March than April in all five censuses. Best rates for both months occurred in 1970, 2.2 hours of fishing per sauger in March and 4.3 hours in April. The lowest April rate of 12.2 hours per fish in 1969.

The catch rate for walleye and sauger combined were also consistently better in March than April. March rates ranged from 1.6 hours per fish in 1973 to 2.2 hours per fish in 1972. The best April rate was 2.0 hours per fish in 1971, and the lowest 3.2 hours in 1969. On the average, it took 1.8 hours to catch a walleye or sauger in March and 2.5 hours in April for the five-year period.

The most productive lures and methods of lure presentation were evaluated (Table 9). Despite the popularity of minnows for bait, the walleye and sauger catch rates on them were intermediate to low compared to certain artificials. The most effective artificial lure varied over the surveys. In general, jigs were the most consistent producer for both walleye and sauger, with the highest catch rate for walleye and second highest rate for sauger in four of five surveys. Other lures that were highly productive in one or two surveys, and much less so in others, included the sonar, flies, and the jig-minnow combination.

The walleye catch rate was higher on artificial lures than with live bait in all but the first census, when live bait was slightly more productive. The efficiency of artificial lures over live bait ranged from nearly twice as great in 1970 to only slightly higher in 1972. At their best, both live bait and artificial lures yielded a walleye per 2 hours of fishing. However, the poorest rate for artificials was 5 hours per walleye, while live bait ranged as high as 11.5 hours.

The most effective type of lure for sauger alternated between artificials and live bait, with artificials leading in three of the five years. The only survey with a large difference in catch rate between artificials and live bait was the first one, when artificials were twice as effective as live bait. Similar to walleyes, top efficiency for both live bait and artificials in taking sauger was the same, 3 hours per fish. Also, the lowest rate for artificial lures of 5 hours per sauger was better than the low rate for live bait, 7.5 hours.

Casting was a more effective means of lure presentation for walleye than still fishing was in all but the last census, when both methods produced one walleye per 3 hours of fishing. Casting catch rates ranged from 2.5 to 4.5 hours per walleye, compared to 4 to 9 hours for still fishing. In 1973, still fishing through the ice was slightly more effective than the best casting rate in 1969. However, in the four preceding surveys, ice fishing was the least effective method, taking a walleye per 5 to 15.5 hours of effort.

Still fishing was more effective than casting for sauger in all five surveys. This was largely influenced by an ice fishing catch rate considerably higher than the rate for other still fishing. It took from 3.5 to 8.5 hours of casting, 2.5 to 5 hours of still fishing, and 1 to 3 hours of ice fishing to catch a sauger.

SIZE OF FISH IN THE CATCH

A general decrease in the size of walleye in the catch occurred over the five study years (Table 10, Figure 7). Walleye under 12 inches long which made up 10 percent or less of the catches in the first two censuses, increased to about one-third of the 1971 and 1972 catches, and over half of the catch in the last survey. Similarly, walleye 14 inches long and larger accounted for nearly half the catch in 1969 and over three-fourths of it in 1970. In the next two surveys, fish of this size made up only one-quarter of the catch, down to less than one-fifth by 1973. The actual numbers of small walleye increased drastically from 100 to 200 fish in the first two surveys to about 1,000 fish in the two following, and 3,000 in the last survey. However, large walleye did not consistently decrease as small ones became more numerous. The fewest large walleye were taken in 1972, when less than 400 of those 16 inches and larger were taken. However, the last year produced more large walleye than did the first, except for fish over 20 inches in length. The 1970 census had the greatest number of walleye from 14 to 17 inches, and the 1971 the largest number between 17 and 22 inches.

A trend toward an increasing proportion of small fish was not as evident for sauger as for walleye (Table 11, Figure 8). Small sauger were generally more prevalent in the first and last census, and larger ones in the three years in between. The highest proportion of large fish were taken in 1970. The trend in actual numbers of small sauger caught was more similar to walleye than their proportion in the catches. In the first two surveys 300 to 500 sauger under 11 inches were taken. This increased to 800 to 900 in the following two censuses, and reached 1,300 in 1973. Sauger showed a decline in the proportion of large sized fish very similar to that for walleye over the last four surveys. However, the smallest proportion of large sauger occurred in 1969, when large walleye were at their second highest level. Actual numbers of large sauger varied more drastically than walleye did. The 1969 census had the fewest large sauger, with only 200 fish 13 inches long and larger, followed by 1973 with just over 500. However, the best years for large sauger coincided with the best ones for walleye. The 1970 census yielded by far the largest numbers of sauger 12 to 14 inches and 19 to 21 inches while 1971 had the most 15 to 18 inches. The 1970 catch included 3,400 sauger 13 inches and larger, and the 1971 catch 500 sauger 15 inches and larger. This was over ten times the numbers taken in these respective size ranges in the 1969. Intermediate numbers of large sauger appeared in 1972, the year when the catch of large walleye was poorest.

A particular type of artificial lure called a "sonar" was found to be highly effective for walleye and sauger, and has become quite popular in the early spring fishery, as cited earlier. The nature of the lure and the manner it is fished make it quite effective for foul hooking fish, as well as attracting them to strike. Concern has been expressed that use of this lure was resulting in the snagging of such excessive numbers of large spawning fish that the quality of fishing was being lowered. The size distribution of walleye and sauger taken with sonars and with other lures was examined in the last four surveys (Tables 12 and 13, Figures 9 and 10).

While it is not possible to project the fraction of the total catch made with a particular lure, the fraction of the catch of interviewed anglers taken on sonars can probably be considered somewhat representative. The significance of sonars declined from producing about one-third of the catch in the 1970 and 1971 surveys to less than one-fifth in 1972 and 1973. The sonar catch had a consistantly higher percentage of large walleye than did the catch on other lures; about double that for other lures 1970 through 1972, but only slightly higher in the last survey. The fraction of the walleye catch made with sonars that were fish 16 inches and larger ranged from 59 percent in 1970 to 12 percent in 1973. Actual numbers of these large walleye ranged from about 400 in the first two surveys to 100 in the last two. Other lures took more large walleye than sonars in all years except 1971, ranging from 470 in 1970 to 270 in 1972.

Sonars were of less significance in taking sauger than walleye, ranging from just under one-fourth of the 1971 catch, to less than one-tenth of the 1972 catch. The number of sauger 13 inches and larger was similar for the catches with sonars and with other artificial lures. Apparently, sonars were not more effective than other lures for large sauger, as they were for large walleye. The incidence of large fish in the catch dropped from about two-thirds in 1970 to one-fifth in 1973 for both sonars and other lures. The overall impact of sonars on large sauger was slight compared to other lures which took from 4 to 10 times as many large saugers as did sonars over the five surveys.

AGE DISTRIBUTION OF CATCH

In four of the five years of census, three-fourths of the walleye in the catch were in two-year classes, two and three-year-olds (Figure 11). The 1970 census was the exception, with half of the catch in these year classes. A shift toward a higher proportion of younger fish occurred over the five-year period. The age distribution in the catch during the first census was half three-year-old and one-fourth two-year-old fish. This was reversed by the last survey. This trend was also evident through changes in the proportion of one-year-old walleye, which increased from only 1 percent of the catch in 1970 and 1971 to 11 percent in 1973. The 1970 catch differed appreciably from the other surveys, in that the proportion of walleye in the four, five, and six-year-old year classes was at least double that in any other survey, together accounting for nearly half the catch. Similarly, the significance of two-year old-fish in 1970 was less than half of what it was in 1969 and only one-quarter of that in the last three surveys. Walleye over six-years-old did not provide more than 5 percent of the catch in any of the surveys.

Sauger in the catch came almost entirely from three-year classes, two through four-year-olds (Figure 12). The three-year-olds made up over half the catch in all surveys, and up to nearly two-thirds in 1969. Most of the remainder of the catch came from two-year old fish in 1969 and 1973, and four-year olds in 1970. The rest of the catch in 1971 and 1972 was about equally divided between two and four-year-old fish.

CONCLUSIONS AND MANAGEMENT IMPLICATIONS

Analysis of the creel census data collected for this report did not clearly indicate a need for more restrictive regulation of the spring walleye-sauger fishery. Declines were observed in the catch rate for large fish, but not in a consistent trend over the five years of study. A similar creel census of the fall tailwater fishery (October - November) in Pool 7 in 1971 through 1973 revealed the fall catch was inversely related to the spring one. Combined spring and fall catches of walleye showed a consistent increase from 1971 through 1973. The numbers of large walleye taken in the combined spring and fall fisheries in 1971 and 1973 were identical. A steady decline in the proportion of large fish in the spring catch coincided with a comparable increase for the fall catch, so that the two combined were constant over the three-year period.

A number of variables unrelated to fishing regulations have considerable potential for altering catch rates, so that an attempt to improve the fishery through a regulation change based on sport catch data would be largely a trial-and-error proposition. Improving the ability to predict the effectiveness of a regulation for influencing the fishery would require in-depth study of the significance of the sport catch and other factors on the population dynamics of walleye and sauger. Areas for additional investigation would include establishing an effective means of collecting representative samples of the population to determine if catch fluctuations were correlated with changes in actual abundance of fish. Estimates of natural and fishing mortality through mark-and-recapture studies would indicate the potential for delaying the harvest of small fish until they attain greater size.

The most productive angling for large walleye is generally associated with specific sites and habitat types rather than being randomly scattered over the tailwater area. A low-pressure fishery composed largely of experienced local anglers is likely to fish such areas effectively. As the fishery expands and the most productive areas are filled, an increasing proportion of anglers will locate in areas with low catch rates for large fish. Also, an increasing proportion of the fishermen come from outside the local area, traveling long distances for an occasional fishing trip. These anglers may generally be less efficient in taking large fish than local fishermen who have more fishing opportunities and experience. A fisherman making a long trip or two per season may be more inclined to keep a limit of small fish than a local who can fish almost any day of the week.

If the above assumptions are valid, hypothetically the catch of large walleye and sauger is limited by their distribution and availability in a particular season. Fishing pressure above that which can be effectively directed toward large fish results in creeling either small fish or none. Anglers taking large fish may also take considerable numbers of small fish which are released rather than appearing in the catch. Thus, increased fishing pressure could result in the changes in the size composition of the catch observed over the five-year study. The increased harvest of small fish could be due exclusively to the nature of the fishery, without any significant change in the size distribution of fish in the population.

However, the variations in fish size in the catch and fishing pressure were not consistently correlated in the study years. In the first three surveys the catch rate for large walleye and the amount of fishing pressure were directly correlated. This could indicate either that good fishing attracted more anglers, or that heavy pressure resulted in a better success rate for large fish, possibly through increased ability in locating them. The exact opposite was true the last two years when the season with more effort had a lower catch rate. The catch rate for large sauger was practically stable during the largest effort fluctuations, and took its greatest drop between the years when effort changed the least.

Some hypothetical explanations for the changes in the catch structure observed may be given, although the information available from this study is not sufficient to assess their validity. It may be a correct assumption that changes in the size structure of fish in the population were responsible for the proportionate increase in small fish in the latter surveys. The amount of influence the sport harvest and environmental variables independent of the fishery had on year class strength remain to be determined. The availability of fish to the anglers may be affected by the timing and extent of water level and water temperature fluctuations, and result in substantial catch variations without appreciable changes in population levels. A definite increase in the proportion of anglers traveling over 150 miles to fish and a decrease in those residing within 25 miles of the tailwater was evident in the last two censuses compared to the first two. While this change in angler composition is probably not substantial enough to account entirely for the increase observed in small fish, it may be a contributing factor.

Three approaches to the management of the walleye-sauger fishery are evident for the immediate future: (1) In addition to continued catch monitoring through creel census, initiate research studies to determine if appreciable year class fluctuations occur. If evident, evaluate their correlation with changes in the size of the catch and the size distribution of fish in it. Determine both fishing and natural mortality rates for catchable size walleye and sauger. (2) Continue creel census for evaluating fishing success only, with no investigation into the relationship between the fishery and population dynamics of walleye and sauger. (3) Base management of the fishery on the information in this study.

The first alternative is necessary to predict with reasonable certainty the anticipated value of a regulation change. While catch information is an essential part of evaluating the status of the fishery, it cannot adequately meet this objective alone. Changing regulations on a trial-and-error basis in response to an undesirable change in the catch presents problems because of the likelihood that factors other than sport fishing harvest are influencing the catch. If the impact of the existing fishery on the population is negligible, stricter regulations would serve no function. If small fish released do not make an appreciable contribution to the catch later, a size limit would only result in an unnecessary reduction in fishing success.

The impact of a regulation change could be misinterpreted if changes in the catch attributed to it were actually due to independent variables in the environment. For example, an ineffectual regulation could appear successful if an exceptionally large year class or good fishing conditions made large fish more available than usual. Similarly, a regulation with potential to improve the fishery might fail to do so because of poor year classes or unfavorable angling conditions. It would appear inadvisable to institute a regulation change without knowledge needed to satisfactorily evaluate its impact.

Assuming additional investigations are needed to determine whether or not the walleye-sauger fishery is likely to benefit from a regulation change, the question remains as to what fishing conditions provide sufficient justification for the considerable effort and expense involved in making the determination and evaluating the results if action is taken. The results could indicate no effective means for improving catches are apparent. If size of the walleye in the catch is not an important consideration, substantial increases in the total catch and harvest rate have occurred over the five-year study. The catch fluctuations observed may be cyclic, and revert to the situation in the early study years without a regulation change. Long-term evaluations of commercial fish catches have shown this characteristic. There is little question that a better knowledge of factors influencing the walleye-sauger fishery would improve the capability of satisfying concerned sportsmen that the fishery was being managed in the most effective feasible manner. In this sense, additional studies would be valuable as soon as they could be made.

Under current budgetary and manpower limitations, priorities may require that a greater need for action be demonstrated than presently exists. If continuing catch evaluation through creel census revealed a persistent low or further declining proportion of large fish, funding for additional studies may be justified. While the origins and probable duration of observed changes in the walleye-sauger fishery remain uncertain, continued catch monitoring to evaluate the status of the fishery appears desirable.

SUMMARY

The early spring tailwater fishery in Pool 7 attracted mainly local males near the ages of 30 and 60. Most were local Wisconsin residents, although numbers of anglers traveling long distances to fish increased in the last two surveys. Fishing pressure varied widely over the five years investigated, with no consistent trend. April was a considerably more popular fishing month than March, probably due to the spawning run and warmer weather in April. Most fishing was done from boats, followed by bank angling. Barge and ice fishing were subject to limitation by weather conditions, and less important. Most fishermen preferred still fishing with minnows as bait. The most widely used artificial lure was the sonar, followed by jigs. The jig-minnow combination was also popular.

The chief purpose of the censuses was to evaluate the walleye-sauger fishery, following removal of a closed season restriction. Other fish taken in considerable numbers included yellow perch and white bass. Both walleye and sauger catches varied considerably, from lows of 1,500 to 2,000 fish per species, to highs of 5,300 to 5,600. Most of the catch of both species was made in April, and from boats. The catches and catch rates of the two species were generally inversely related, and walleye may be preferentially selected when both species are available. An average of 4.5 hours of fishing was required to catch a walleye and to catch a sauger. In the best season, 3 hours of angling yielded a walleye or a sauger, while in the poorest seasons it took two or three times this long. Highest walleye catch rates were 2.5 hours per fish, the same for boat, barge, and ice fishing. The best sauger catch rate was one fish per hour, through the ice. Both walleye and sauger catch rates alternately increased and declined over the five-year period, with no consistent trends in either direction. The average trend was upward for walleye and slightly downward for sauger. In each of the four fluctuations, the change was in opposite directions for the two species. This resulted in a stable catch rate for both species combined, varying only one-half hour per fish over the five-year period.

In spite of a much more intensive fishery in April than March, walleye catch rates were about the same for both months, and sauger catch rates consistently higher in March. Similarily, artificial lures generally produced walleye and sauger at a higher rate than minnows, although minnows were a considerably more popular lure. The highest catch rates for artificials and live bait were about the same for both walleye and sauger. Still fishing was the most popular method of lure presentation. It was most effective for taking sauger, particularly through the ice, but less productive than casting for walleye.

An examination of the size distribution of walleye and sauger in the catch found the numbers of small fish of both species increased considerably over the five-year study period. The numbers of large fish did not follow a consistent trend, as for small fish. In general, the greatest number of large walleye and sauger appeared in 1970 and 1971 catches. Medium-large fish were most numerous in 1970, and very large fish in 1971. Smallest numbers of large fish were taken in 1969 and 1972. The proportion of large fish in the catch was evaluated as well as the actual numbers. The walleye catches in the first three censuses had higher proportions of large fish than those in the last two surveys. Highest proportion of medium-large fish were taken in 1970, and very large fish in 1969 and 1971. Higher proportions of medium-large sauger were taken in 1970 through 1972 surveys than in the first and last ones. Exceptionally large saugers made up considerably more of the 1971 catch than any other one.

The sonar was more effective than other lures in taking large walleye, particularly in the years when the greatest catches of large fish were made. There was no apparent difference in the effectiveness of sonars and other lures for large sauger. The numbers of large walleye taken on sonars was generally less than with other lures, although the proportion of large fish in the sonar catch was greater. The impact of sonars on large sauger was minimal.

The walleye fishery was composed chiefly of two year classes, fish two and three years old. The most significant year class shifted from age three to age two over the five surveys, with the exception of 1970, when significant numbers of four to six-year-old fish were present. Most of the sauger taken were age three in all censuses. Two-year-olds were of greatest significance in the years when the catch was predominantly small fish, and four-year-olds when large fish were most numerous.

Determining the potential for improved management of the walleye-sauger fishery of the Mississippi River requires information on population dynamics and mortality rates not presently available. Creel census studies function as a useful barometer of the catch and its composition, but cannot define the causes of observed changes. The relative significance of the catch and environmental factors on fishing success need evaluation to determine the potential impact of fishing regulations.

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Figure 1. Age distribution of fishermen contacted in the Pool 7 tailwaters during March and April of 1969 through 1973.

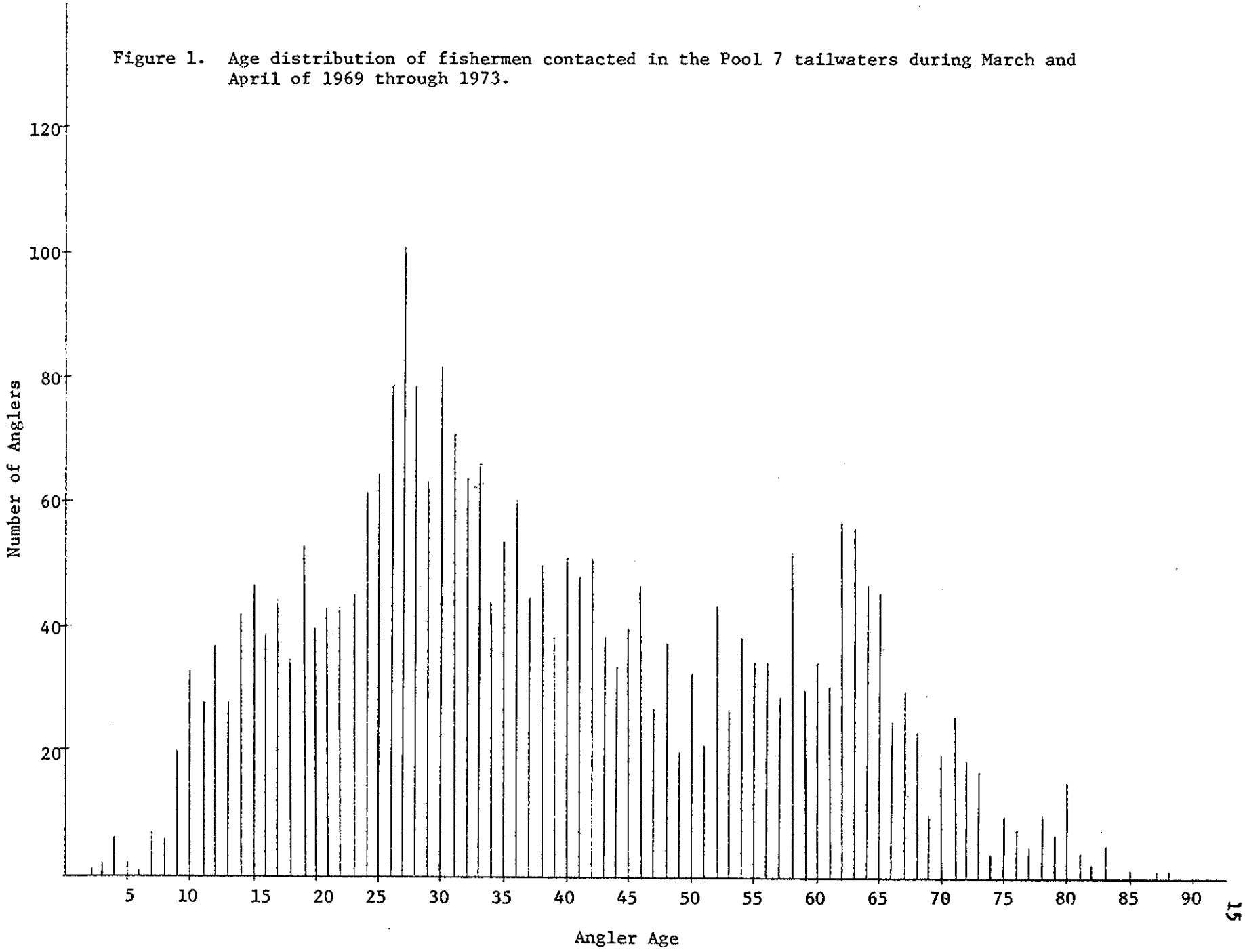


Figure 2. Fishing effort.

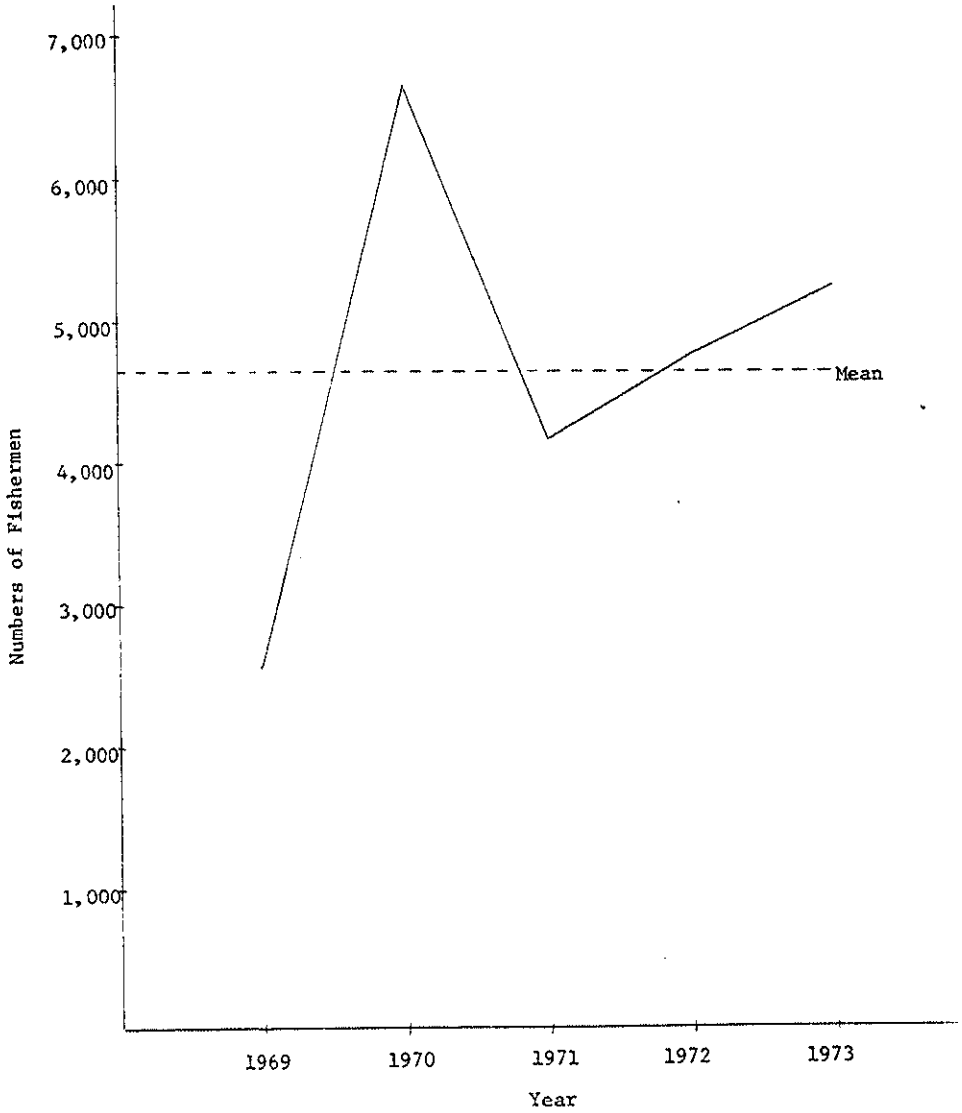


Figure 2. (continued) Fishing effort.

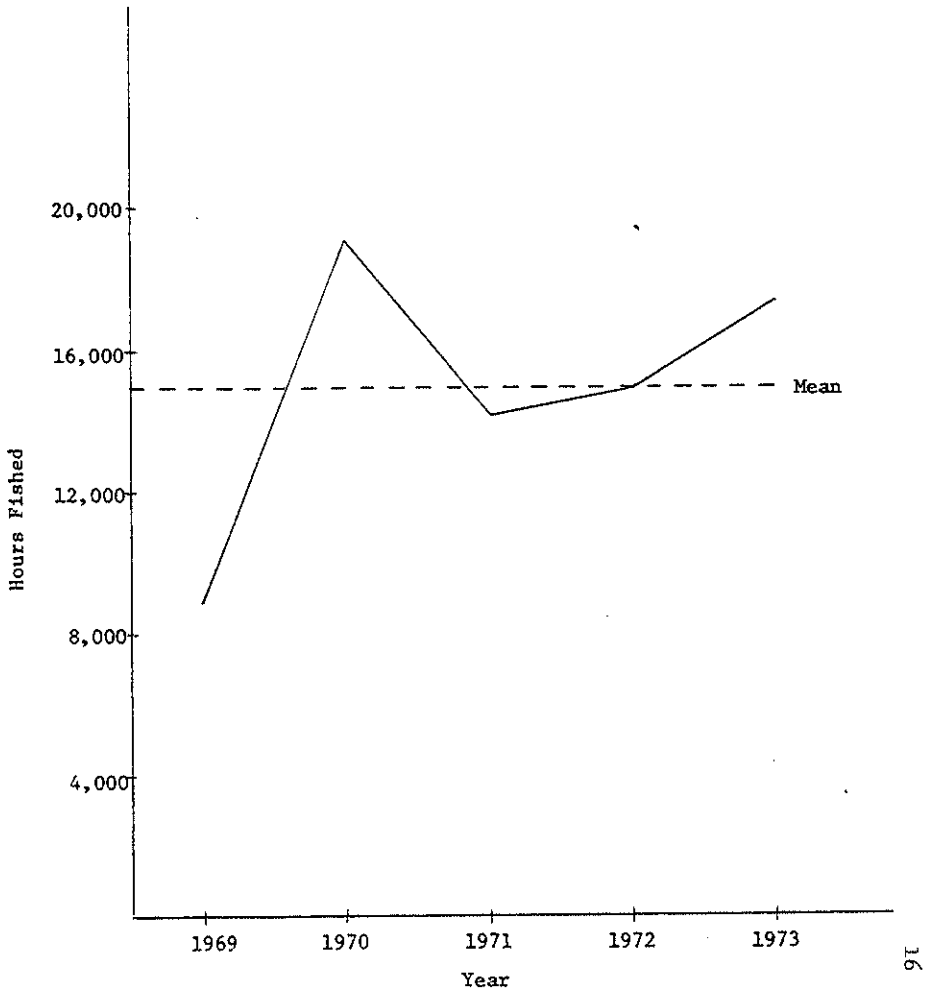


TABLE 1 STATE OF ORIGIN FOR ANGLERS FISHING POOL 7 TAILWATERS

YEAR	WISCONSIN		MINNESOTA		OTHER STATES	
	Number	Percent	Number	Percent	Number	Percent
1969	269	95.1	4	1.4	10	3.5
1970	406	92.5	25	5.7	8	1.8
1971	610	88.3	53	7.7	28	4.0
1972	635	81.7	96	12.4	45	5.8
1973	633	90.0	23	3.3	47	6.7
TOTAL	2,553	88.3	201	6.9	138	4.8

TABLE 2 DISTANCE TRAVELED BY ANGLERS BASED ON ZONE

ZONE	MILES	1969		1970		1971		1972		1973		OVERALL	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	0-25	202	71.4	349	79.5	528	76.4	546	70.4	476	67.7	2101	72.6
2	26-50	21	7.4	29	6.6	40	5.8	74	9.5	77	11.0	241	8.3
3	51-75	9	3.2	9	2.1	26	3.8	8	1.0	25	3.6	77	2.7
4	76-100	-	-	4	0.9	-	-	1	0.1	2	0.3	7	0.2
5	101-125	2	0.7	7	1.6	20	3.0	25	3.2	16	2.3	70	2.4
6	126-150	6	2.1	20	4.6	19	2.7	20	2.6	10	1.4	75	2.6
7	151-250	26	9.2	17	3.9	56	8.1	96	12.4	95	13.5	290	10.0
8	251-500	17	6.0	4	0.9	1	0.1	6	0.8	-	-	28	1.0
9	over 500	-	-	-	-	1	0.1	-	-	2	0.3	3	0.1

TABLE 3

PROJECTED CATCH OF FISH BY TYPE OF FISHING FOR EACH YEAR

SPECIES	1969				1970				1971				
	BOAT	BANK	ICE	TOTAL	BOAT	BANK	ICE	TOTAL	BOAT	BANK	BARGE	ICE	TOTAL
Northern Pike	24	50	-	74	55	122	-	177	-	-	-	-	-
White Bass	1,159	1,129	-	2,288	136	15	-	151	279	32	-	-	311
Yellow Perch	32	-	9	41	83	-	-	83	62	1,788	-	-	1,850
Sauger	782	-	706	1,488	4,892	-	401	5,293	1,691	606	-	806	3,103
Walleye	1,525	344	209	2,078	1,597	416	30	2,043	3,001	623	-	475	4,099
Smallmouth Bass	6	-	-	6	10	-	-	10	7	-	-	-	7
Largemouth Bass	-	-	-	-	10	-	-	10	12	13	-	-	25
Bluegill	-	-	-	-	-	-	-	-	-	6	-	-	6
Rock Bass	-	-	-	-	-	-	-	-	-	114	-	-	114
White Crappie	-	-	-	-	-	-	-	-	-	-	-	-	-
Black Crappie	64	-	-	64	18	-	-	18	322	251	-	-	573
Freshwater Drum	6	-	-	6	-	-	-	-	-	-	-	-	-
Projected No. of Fishermen	1,302	777	495	2,574	3,779	2,691	148	6,618	2,632	846	-	701	4,179
Projected No. of Fish	3,636	1,523	924	6,045	6,801	553	431	7,785	5,374	3,433	-	1,281	10,088
Projected Hours Fished	5,606	1,708	1,535	8,849	13,796	4,844	460	19,100	9,119	2,730	-	2,257	14,106

SPECIES	1972					1973					OVERALL				
	BOAT	BANK	BARGE	ICE	TOTAL	BOAT	BANK	BARGE	ICE	TOTAL	BOAT	BANK	BARGE	ICE	TOTAL
Northern Pike	47	-	-	4	51	18	91	-	-	109	144	263	-	4	411
White Bass	56	-	-	-	56	109	-	-	-	109	1,739	1,176	-	-	2,915
Yellow Perch	352	2,975	-	-	3,327	495	3,485	-	-	3,980	1,024	8,248	-	9	9,281
Sauger	2,585	89	47	610	3,331	2,126	316	456	251	3,149	12,076	1,011	503	2,774	16,364
Walleye	2,210	207	142	248	2,807	3,794	671	976	144	5,585	12,127	2,261	1,118	1,106	16,612
Smallmouth Bass	-	-	-	-	-	12	10	-	-	22	35	10	-	-	45
Largemouth Bass	54	-	-	-	54	-	21	-	-	21	76	34	-	-	110
Bluegill	-	-	-	-	-	7	94	-	-	101	7	100	-	-	107
Rock Bass	-	20	-	-	20	7	7	-	-	14	7	141	-	-	148
White Crappie	13	-	-	-	13	27	49	-	-	76	40	49	-	-	89
Black Crappie	205	29	-	-	234	159	497	-	-	656	768	777	-	-	1,545
Freshwater Drum	-	-	-	-	-	42	-	-	-	42	48	-	-	-	48
Projected No. of Fishermen	3,025	1,160	142	397	4,724	2,819	1,592	720	107	5,238	13,557	7,066	862	1,848	23,333
Projected No. of Fish	5,522	3,320	189	862	9,893	7,011	5,268	1,627	395	13,864	28,344	14,097	1,816	3,893	48,150
Projected Hours Fished	10,038	2,786	670	1,442	14,936	9,587	5,094	2,375	341	17,397	48,146	17,162	3,045	6,035	74,388

* Some species such as carp, suckers, redhorse, bullheads, catfish, bowfin, and mooneye were not included in the tables because of their minor importance in the overall catch.

TABLE 4

PROJECTED CATCH OF SPECIES BY YEAR AND MONTH

	1969		1970		1971		1972		1973		ALL YEARS COMBINED	
	MARCH	APRIL	MARCH	APRIL	MARCH	APRIL	MARCH	APRIL	MARCH	APRIL	MARCH	APRIL
Bowfin	-	-	-	-	-	-	-	-	4	-	4	-
Mooneye	-	-	-	-	-	-	-	-	-	22	-	22
Golden Redhorse	-	-	-	-	-	-	-	-	-	45	-	45
Northern Redhorse	-	-	-	-	-	-	-	-	-	31	-	31
Spotted Sucker	-	-	-	-	-	-	-	-	-	7	-	7
Carp	-	19	-	-	-	-	-	-	-	45	-	45
Channel Catfish	-	-	-	-	-	-	-	-	-	38	-	38
Bullhead Specks	-	19	-	-	-	-	-	-	7	238	7	257
Northern Pike	19	55	-	177	-	-	20	31	25	84	64	347
White Bass	2	2,286	18	133	-	311	-	56	7	102	27	2,888
Yellow Perch	15	26	-	83	75	1,775	5	3,322	1,879	2,101	1,974	7,307
Sauger	1,024	464	1,811	3,485	1,104	1,999	745	2,586	1,070	2,079	5,754	10,613
Walleye	763	1,315	431	1,612	700	3,399	461	2,346	1,925	3,660	4,280	12,332
Smallmouth Bass	-	6	-	10	-	7	-	-	-	22	-	45
Largemouth Bass	-	-	-	10	-	25	16	38	-	21	16	94
Bluegill	-	-	-	-	-	6	-	-	-	101	-	107
Rockbass	-	-	-	-	4	110	-	20	7	7	11	137
White Crappie	-	-	-	-	-	-	-	13	22	54	22	67
Black Crappie	-	64	-	18	-	573	-	234	7	649	7	1,538
Freshwater Drum	-	6	-	-	-	-	-	-	4	38	4	44
Projected Number of Fishermen	923	1,651	1,318	5,300	1,057	3,122	782	3,937	1,467	3,771	5,547	17,781
Projected Number of Fish	1,823	4,260	2,260	5,528	1,883	8,205	1,247	8,646	4,957	9,344	12,170	35,983
Projected Hours Fished	3,189	5,660	3,996.5	15,103.5	3,458	10,936	2,620	12,316	4,872	12,525	18,135.5	56,540.5
Projected Fish Per Hour	0.5717	0.7527	0.5654	0.3658	0.5700	0.7564	0.4760	0.7020	1.0174	0.7460	0.6711	0.6364

TABLE 5

TOTAL PROJECTED NUMBER OF HOURS SPENT FISHING BY TYPE OF FISHING

YEAR	TYPE OF FISHING										TOTAL
	BOAT		BANK OR WADING		BARGE		TOTAL OPEN WATER		ICE		
	Number Hours	Percent	Number Hours	Percent	Number Hours	Percent	Number Hours	Percent	Number Hours	Percent	
1969	5,606	63.4	1,708	19.3	-	-	7,314	82.7	1,535	17.3	8,849
1970	13,769	72.2	4,844	25.4	-	-	18,640	97.6	460	2.4	19,100
1971	9,119	63.4	2,730	19.0	288	2.0	12,137	84.3	2,257	15.7	14,394
1972	10,038	67.2	2,786	18.7	670	4.5	13,494	90.3	1,442	9.7	14,936
1973	9,587	55.1	5,094	29.3	2,375	13.7	17,056	98.0	341	2.0	17,397
TOTAL	48,119	64.4	17,162	22.9	3,333	4.5	68,641	91.9	6,035	8.1	74,676

TABLE 6

ACTUAL NUMBER OF ANGLERS BY FISHING METHOD AND LURE USED

FISHING METHOD	1969		1970		1971		1972		1973		TOTAL	
	Number Anglers	Percent	Number Anglers	Percent	Number Anglers	Percent	Number Anglers	Percent	Number Anglers	Percent	Number Anglers	Percent
Casting	74	26.1	8	1.8	366	53.0	283	36.5	118	16.8	849	29.40
Still Fishing[1/]	86	30.4	430	97.9	322	46.6	493	63.5	585	83.2	1,916	66.30
Trolling	-	-	-	-	2	0.3	-	-	-	-	2	0.06
Multiple	123	43.5	1	0.2	1	0.1	-	-	-	-	125	4.30
TOTAL	283		439		691		776		703		2,892	
FISHING LURE												
Worms	1	0.4	1	0.2	34	4.9	10	1.3	44	6.3	90	3.1
Minnows	27	9.5	321	73.1	186	26.9	420	54.1	503	71.6	1,457	50.4
Multiple Live Bait	5	1.8	-	-	11	1.6	-	-	-	-	16	0.5
TOTAL LIVE BAIT	33	11.7	322	73.3	231	33.4	430	55.4	547	77.8	1,563	54.0
Jigs	33	11.7	29	6.6	59	8.5	33	4.3	20	2.8	174	6.0
Flies	-	-	3	0.7	14	2.0	7	0.9	5	0.7	29	1.0
Sonar[2/]	-	-	84	19.1	162	23.4	132	17.0	87	12.4	465	16.1
Other Artificials	7	2.5	-	-	21	3.0	15	1.9	7	1.0	50	1.7
TOTAL ARTIFICIALS	40	14.1	116	26.4	256	37.0	187	24.1	119	16.9	718	24.8
Artificial with live bait attached	210	74.2	1	0.2	204	29.5	159	20.5	37	5.3	611	21.2

1/ Still fishing includes ice fishing

2/ Separate data were not collected on sonar in 1969, included with other artificials

Figure 3a. Numbers of walleye and sauger in catch.

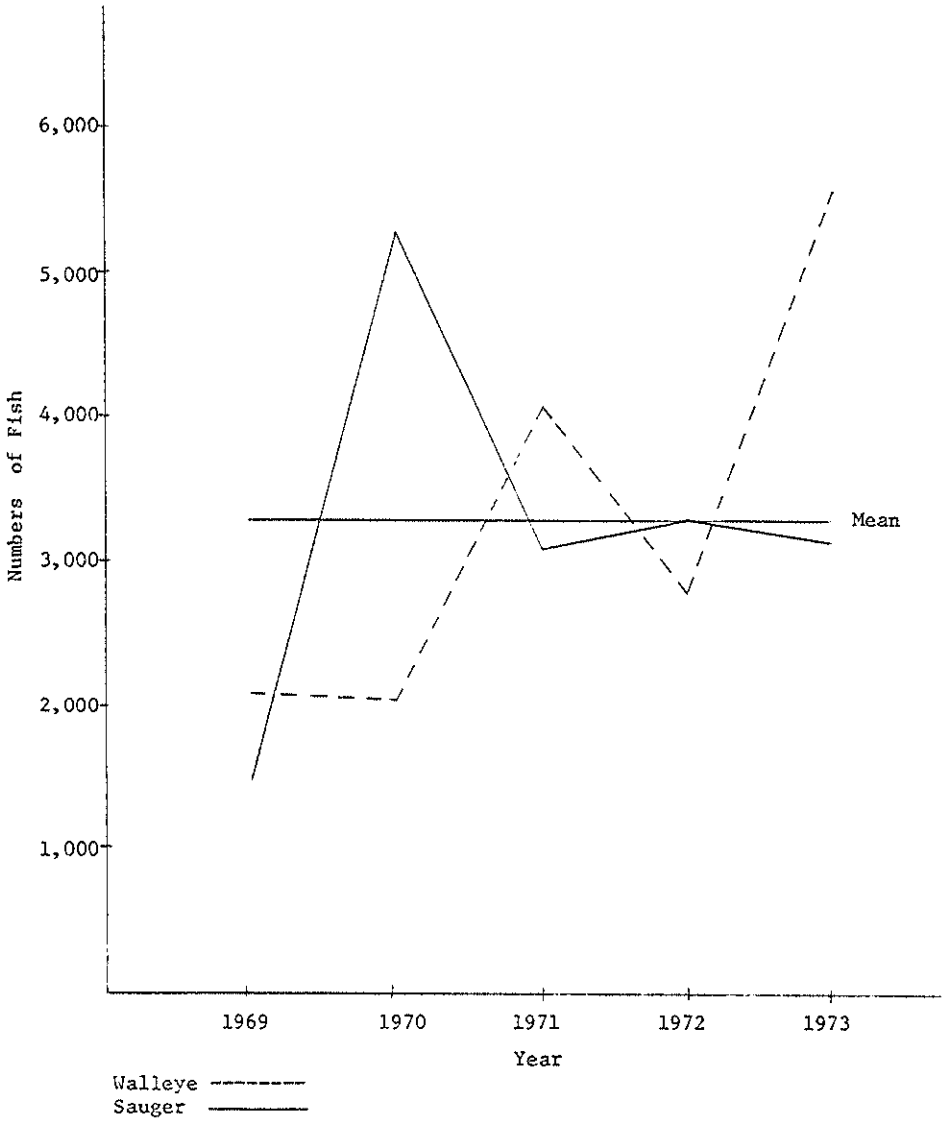


Figure 3b. Numbers of walleye 16.0 inches and larger and sauger 14.0 inches and larger in catch.

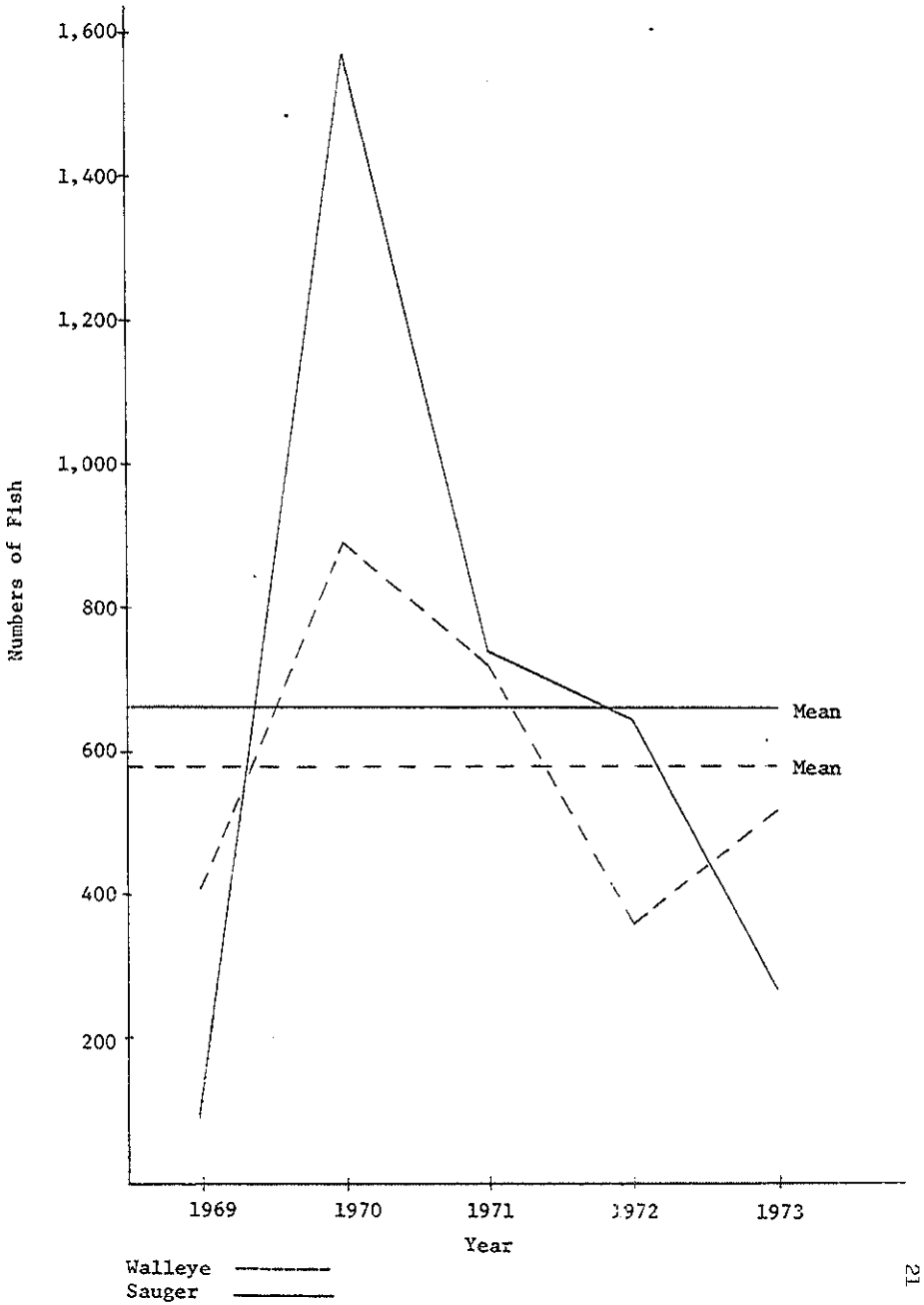


Figure 4a. Catch of walleye and sauger combined.

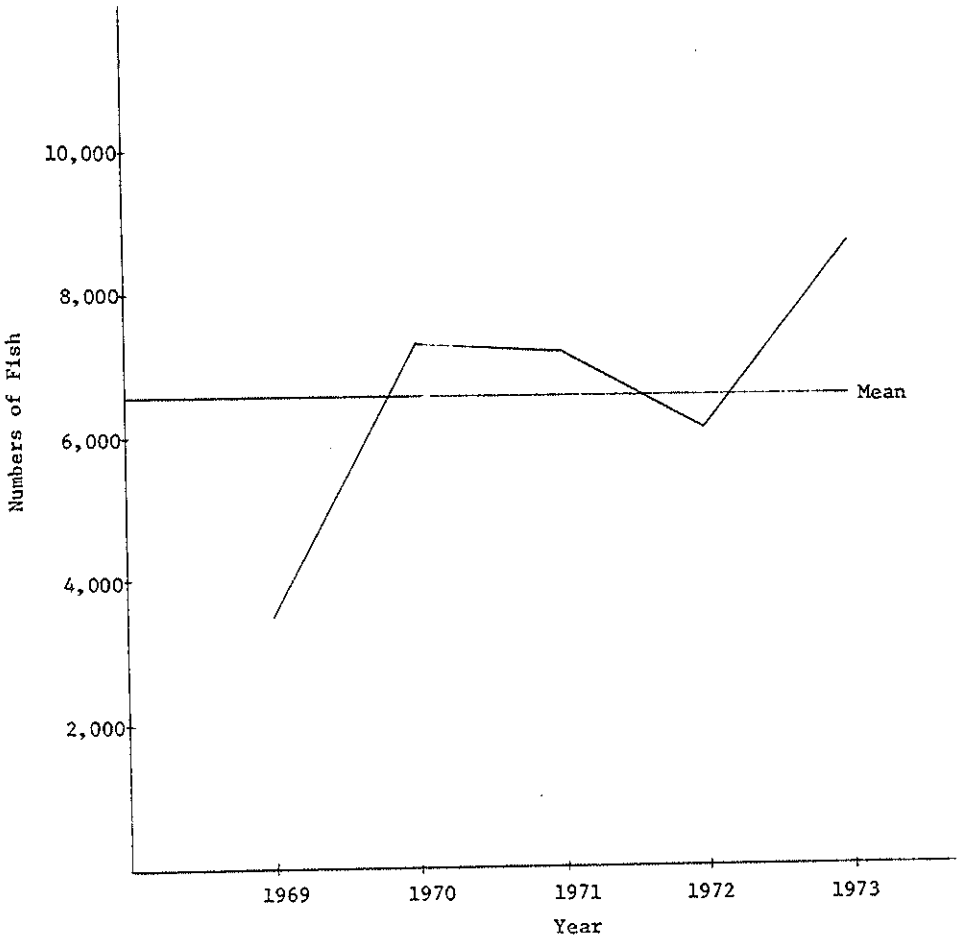


Figure 4b. Walleye 16.0 inches and larger and sauger 14.0 inches and larger, combined.

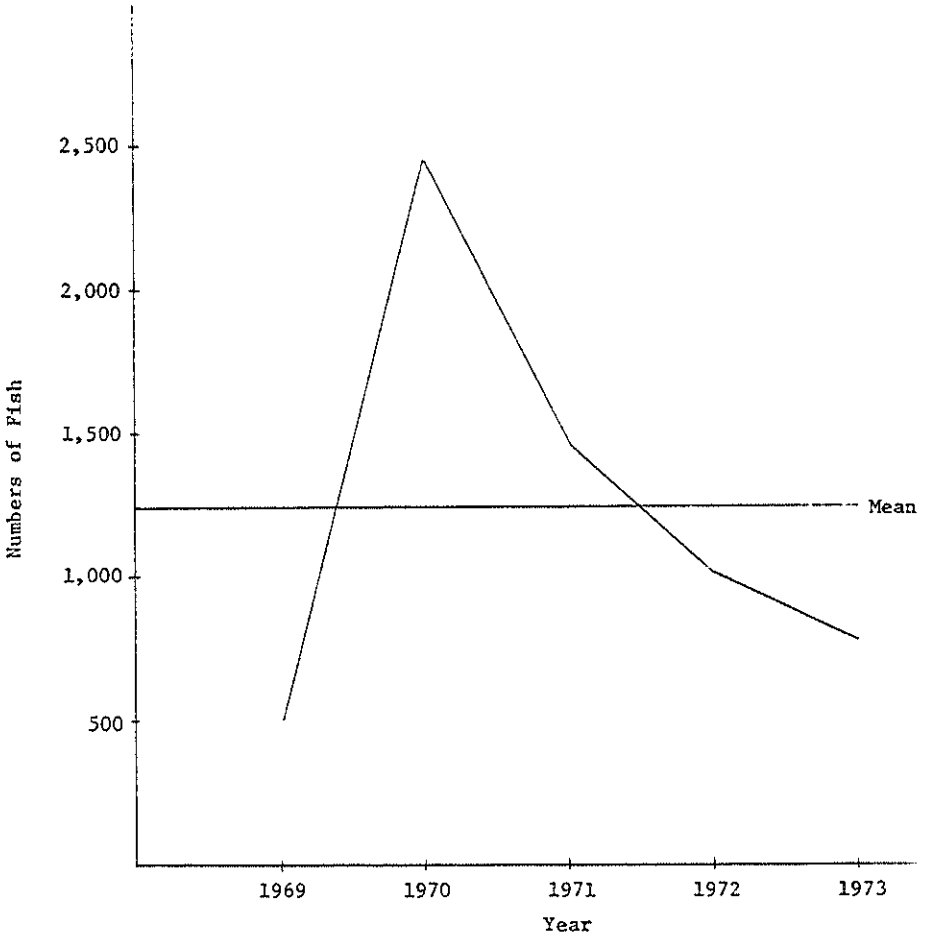


Figure 5a. Walleye and sauger catch rates for entire catch.

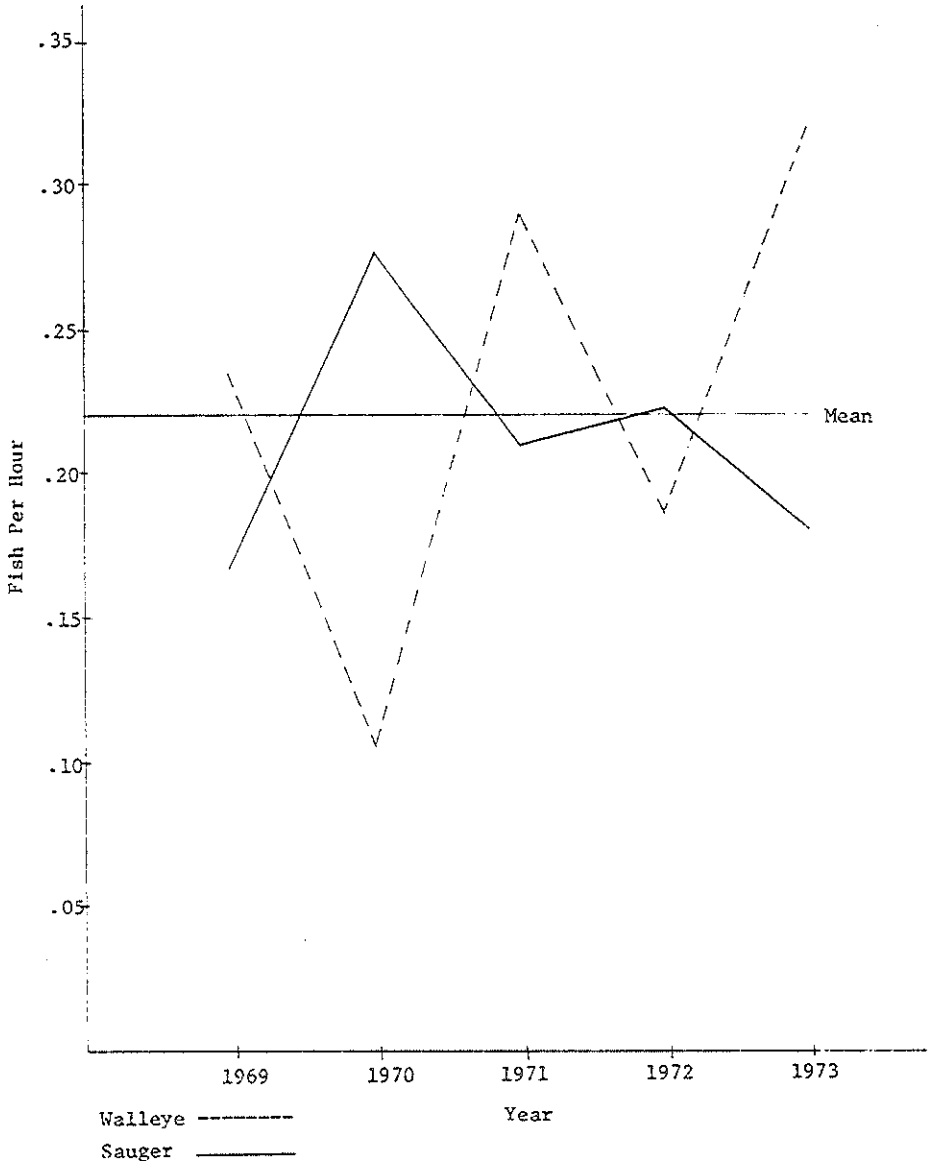


Figure 5b. Walleye 16.0 inches and larger and sauger 14.0 inches and larger catch rates.

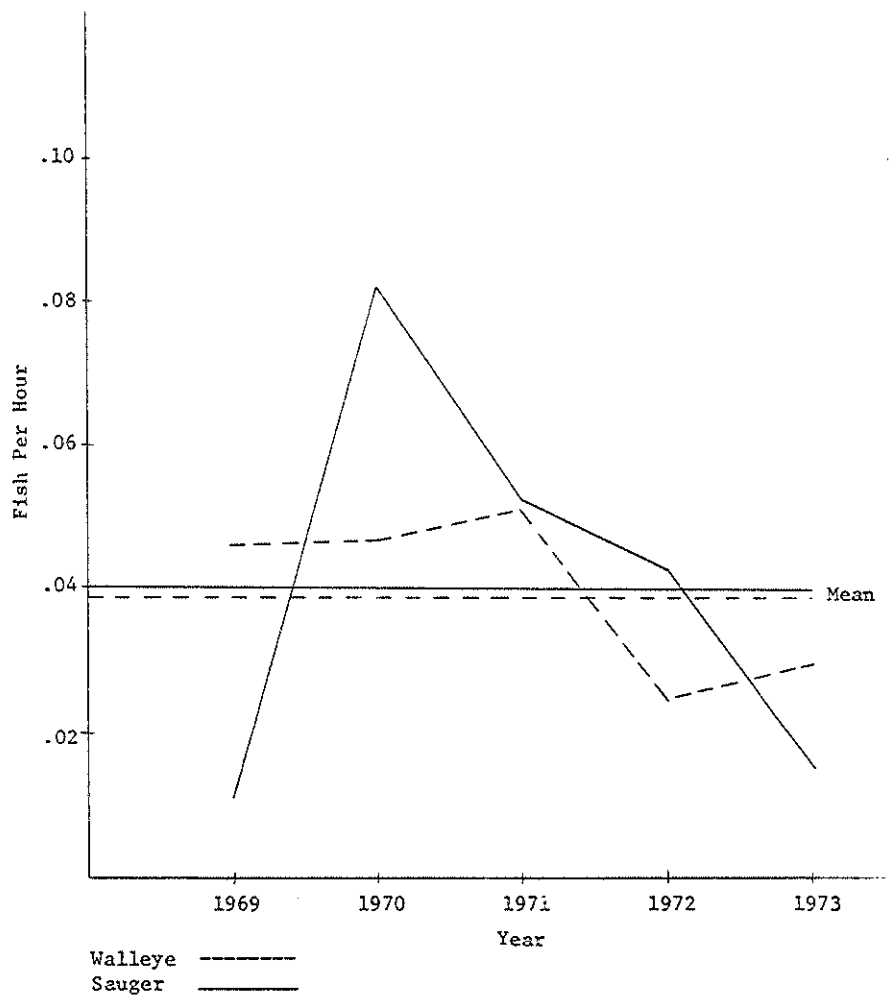


Figure 6a. Catch rate for all walleye and sauger combined.

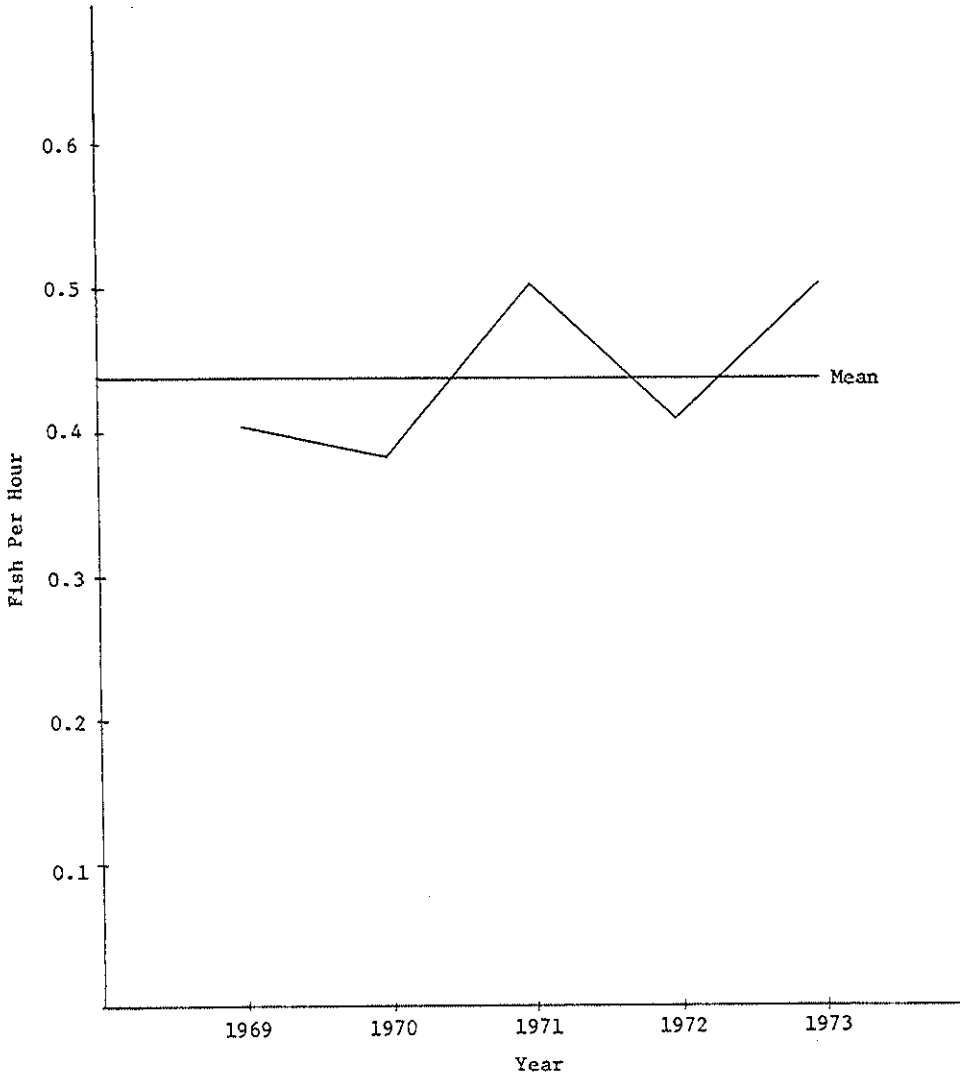


Figure 6b. Catch rate for walleye 16.0 inches and larger and sauger 14.0 inches and larger combined.

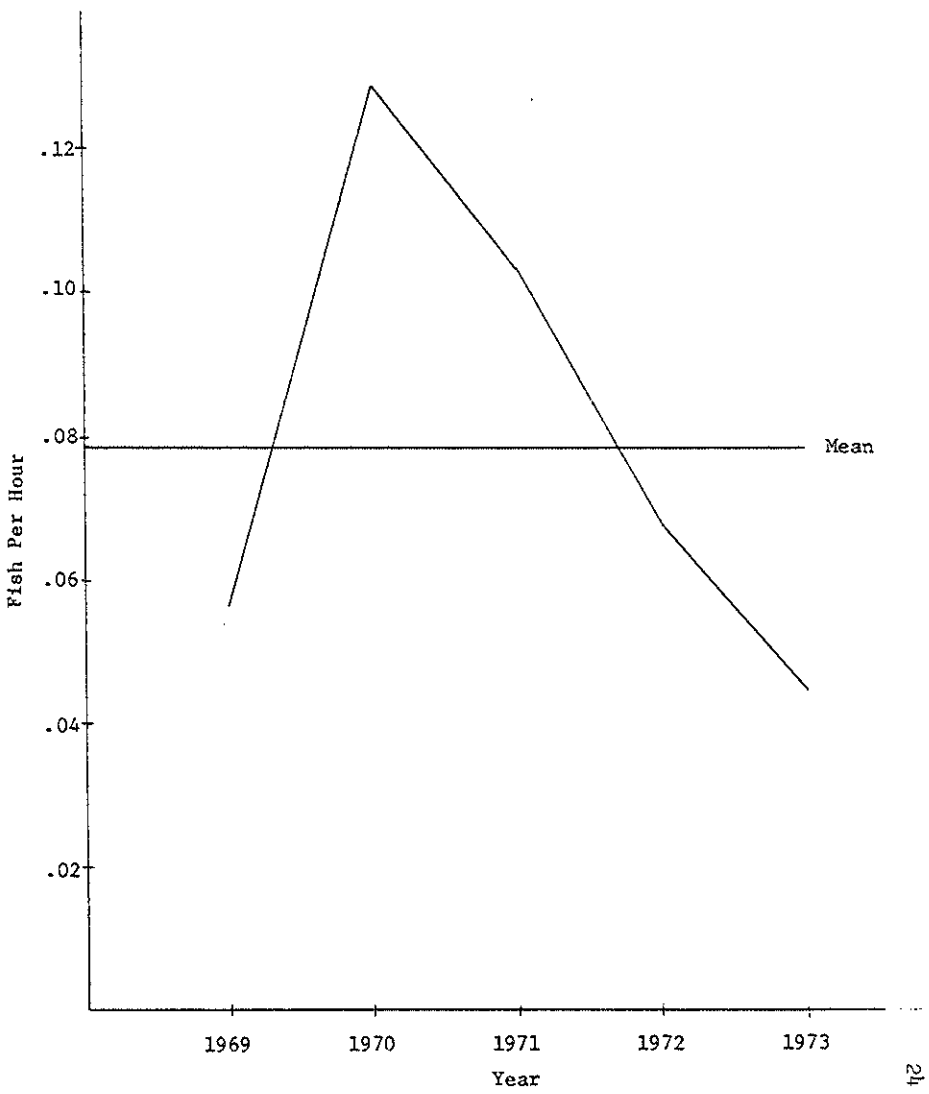


TABLE 7a WALLEYE CATCH RATES BY TYPE OF FISHING

	BOAT	BANK	BARGE	ICE	TOTAL
1969	0.2720	0.2014	-	0.1362	0.2348
1970	0.1158	0.0859	-	0.0652	0.1070
1971	0.3291	0.2282	-	0.2105	0.2906
1972	0.2202	0.0743	0.2119	0.1720	0.1879
1973	0.3957	0.1317	0.4109	0.4223	0.3210
All years combined	0.2519	0.1317	0.3672	0.1833	0.2233

TABLE 7b SAUGER CATCH RATES BY TYPE OF FISHING

	BOAT	BANK	BARGE	ICE	TOTAL
1969	0.1359	-	-	0.4599	0.1682
1970	0.3546	-	-	0.8717	0.2771
1971	0.1854	0.2220	-	0.3571	0.2120
1972	0.2575	0.0319	0.0701	0.4230	0.2230
1973	0.2218	0.0620	0.1920	0.7361	0.1810
All years combined	0.2508	0.0589	0.1652	0.4597	0.2200

TABLE 7c CATCH RATES FOR WALLEYE AND SAUGER COMBINED

	BOAT	BANK	BARGE	ICE	TOTAL
1969	0.4115	0.2014	-	0.5961	0.4030
1970	0.4740	0.0859	-	0.9369	0.3841
1971	0.5145	0.4502	-	0.5676	0.5026
1972	0.4777	0.1062	0.2820	0.5950	0.4109
1973	0.6175	0.1937	0.6029	1.1584	0.5020
All years combined	0.5027	0.1906	0.5324	0.6430	0.4433

TABLE 8

WALLEYE AND SAUGER CATCH RATES (FISH PER HOUR) BY MONTH

	WALLEYE		SAUGER		WALLEYE AND SAUGER	
	MARCH	APRIL	MARCH	APRIL	MARCH	APRIL
1969	0.2393	0.2323	0.3211	0.0820	0.5604	0.3143
1970	0.1078	0.1067	0.4531	0.2307	0.05610	0.3374
1971	0.2024	0.3108	0.3193	0.1828	0.5217	0.4936
1972	0.1760	0.1905	0.2844	0.2100	0.4603	0.4005
1973	0.3951	0.2922	0.2196	0.1660	0.6147	0.4582
5-year average	0.2360	0.2181	0.3173	0.1877	0.5533	0.4058

TABLE 9a

CATCH RATE IN FISH PER MAN-HOUR OF WALLEYE
WITH VARIOUS METHODS AND LURES

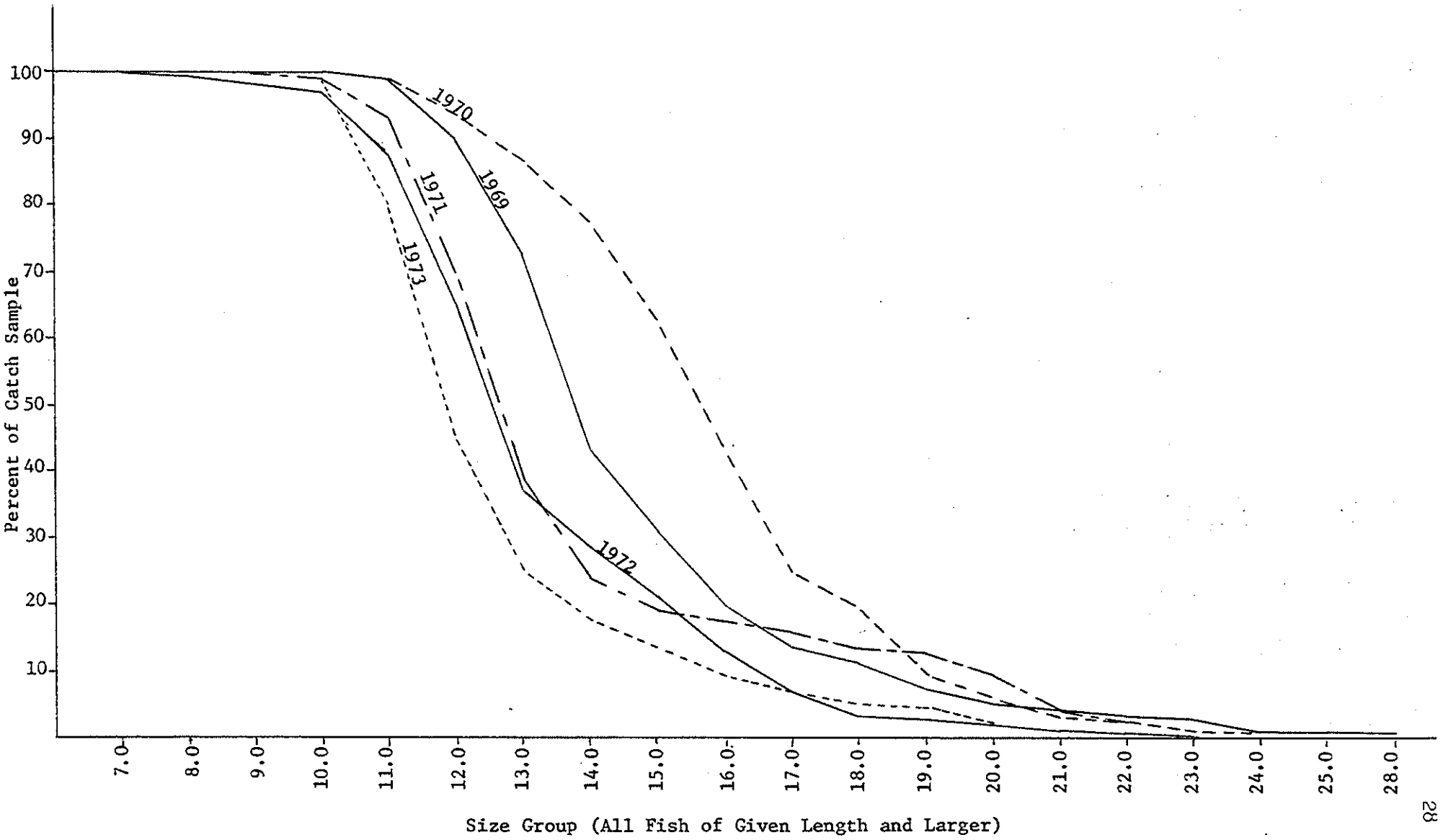
FISHING METHODS	1969	1970	1971	1972	1973
Casting	0.3675	0.2247	0.3372	0.2371	0.3534
Still fishing	0.1960	0.1118	0.2342	0.1683	0.3539
Ice Fishing	0.1364	0.0645	0.2105	0.1723	0.4211
Trolling	-	-	0.2500	-	-
LURES					
Minnows	0.1758	0.0875	0.2919	0.1753	0.3462
Minnows and Artificial Combination	-	-	0.2147	0.2298	0.3563
Jig	0.2571	0.2307	0.2028	0.2460	0.5666
Fly	-	0.1052	0.3225	0.1395	0.5581
Sonar	-	0.1911	0.4825	0.2190	0.4603
Other Artificial	0.2222	-	0.2729	0.0987	0.1538

TABLE 9b

CATCH RATE IN FISH PER MAN-HOUR OF SAUGER
WITH VARIOUS FISHING METHODS AND LURES

FISHING METHODS	1969	1970	1971	1972	1973
Casting	0.1159	0.2921	0.1870	0.2360	0.1178
Still Fishing	0.3448	0.3706	0.2488	0.2651	0.2045
Ice Fishing	0.4602	0.8710	0.3571	0.4230	0.7368
Trolling	-	-	0.2500	-	-
LURES					
Minnows	0.1099	0.3788	0.2456	0.2415	0.1844
Minnows and Artificial Combination	0.1807	1.0000	0.2001	0.3524	0.2109
Jig	0.2476	0.8076	0.2826	0.4341	0.2166
Fly	-	0.5263	0.4516	0.1395	-
Sonar	-	0.2166	0.2062	0.1372	0.2748
Other Artificial	0.5000	-	0.2097	0.3456	0.0384

Figure 7. Size distribution of walleye in the catch.



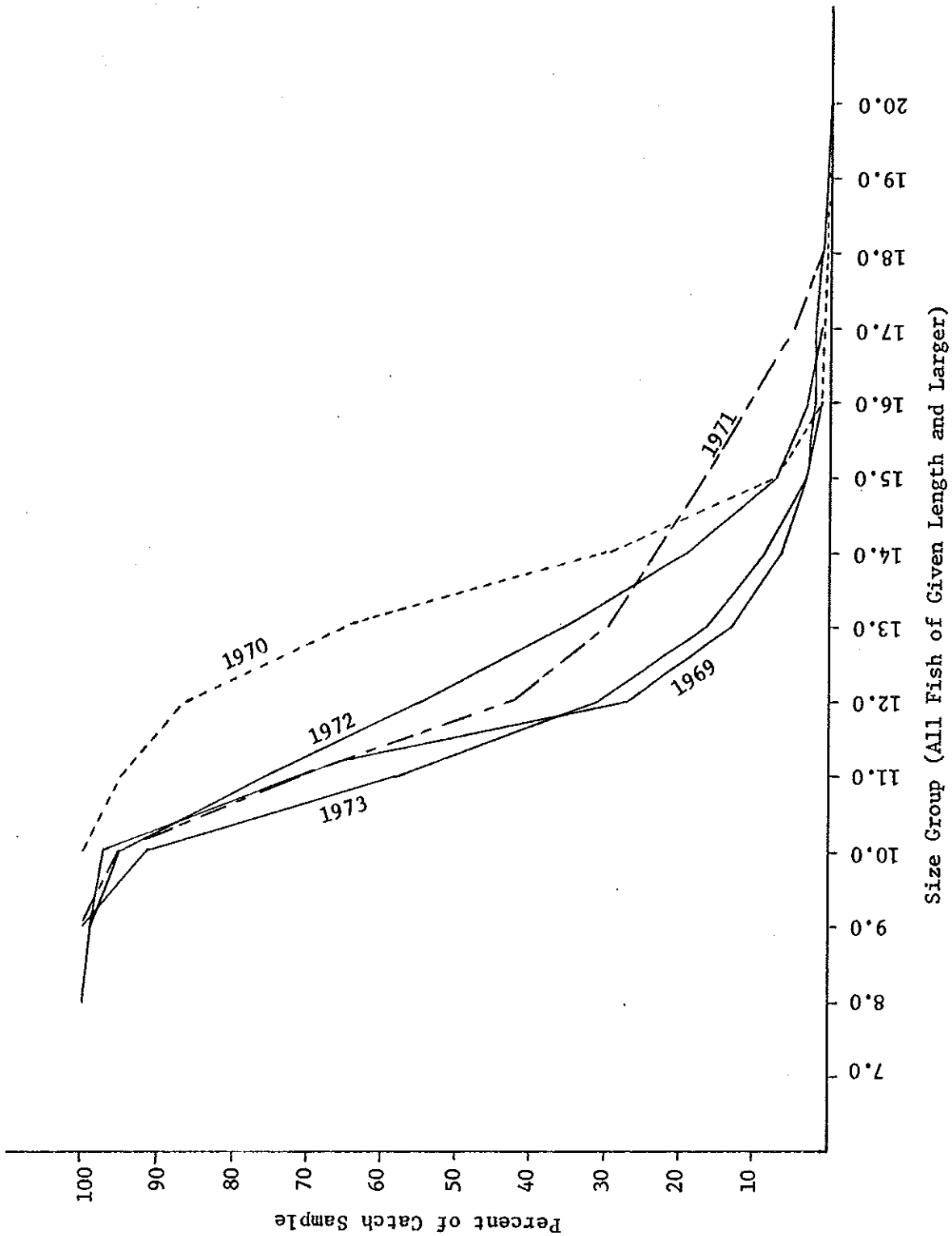


Figure 8. Size distribution of sauger in the catch.

Figure 9. Size distribution of walleye caught on sonars and on other lures.

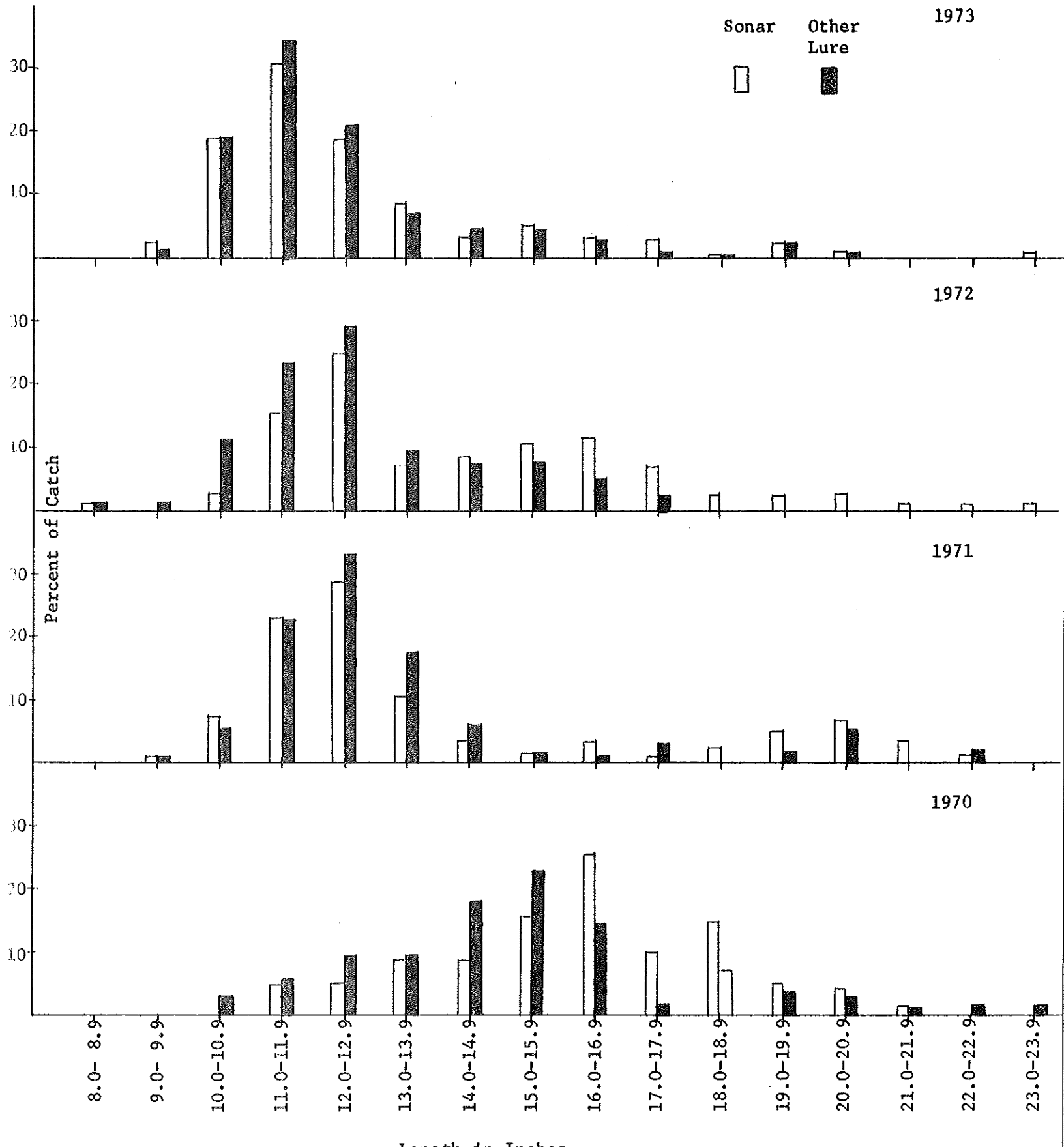


Figure 10. Size distribution of sauger caught on sonars and on other lures.

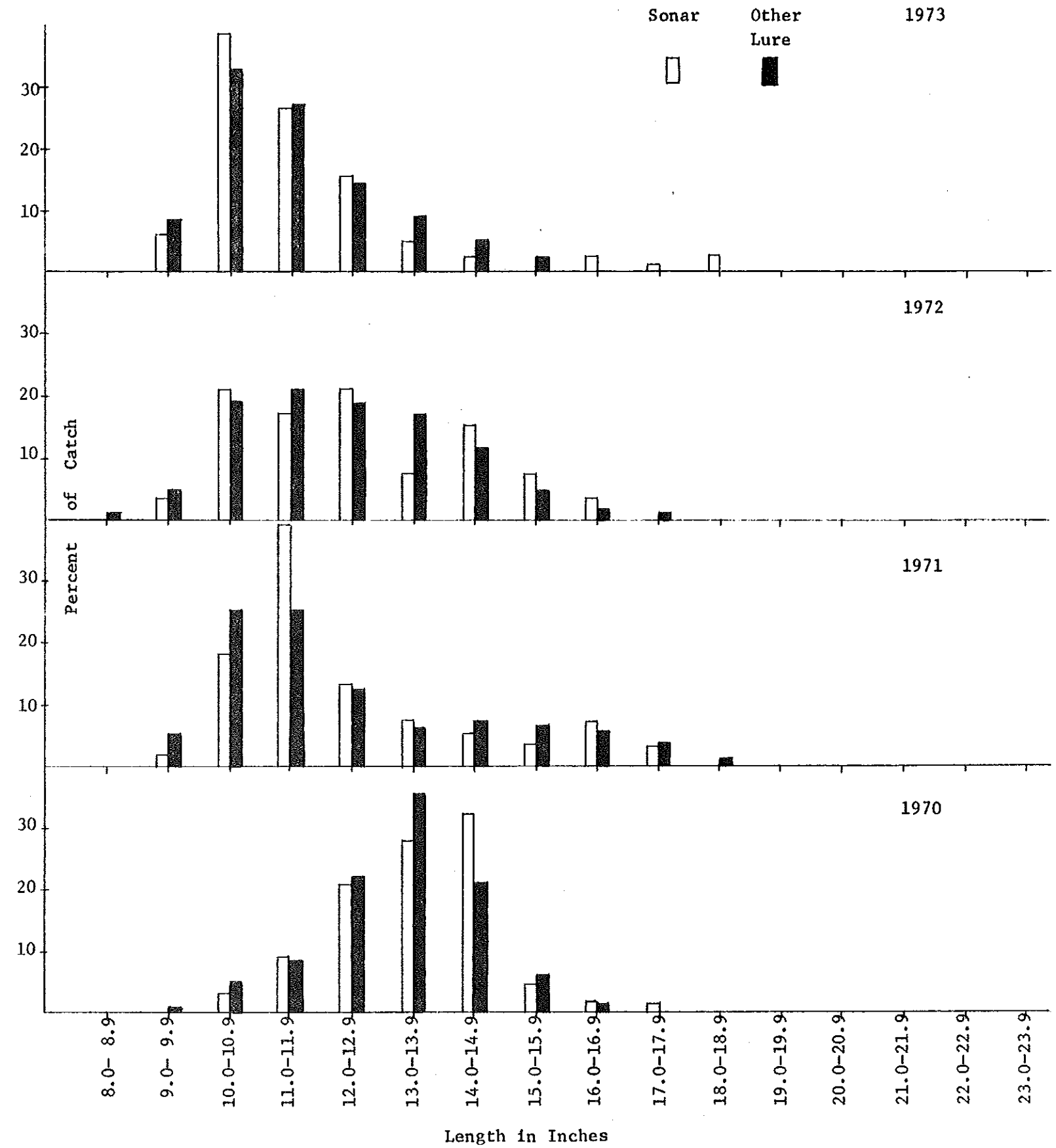


TABLE 10

LENGTH DISTRIBUTION OF WALLEYE IN THE CATCH

SIZE RANGE (INCHES)	1969		1970		1971		1972		1973	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
7.0-7.9	-	-	-	-	3	0.5	2	0.4	-	-
8.0-8.9	-	-	-	-	-	-	6	1.3	-	-
9.0-9.9	-	-	-	-	5	0.8	5	1.1	14	1.6
10.0-10.9	4	1.5	3	1.6	43	6.4	43	9.5	165	18.9
11.0-11.9	24	8.6	9	4.9	146	22.5	99	21.9	294	33.7
12.0-12.9	49	17.7	13	7.2	203	31.1	128	28.2	180	20.6
13.0-13.9	79	28.6	16	9.0	96	14.7	41	9.0	63	7.2
14.0-14.9	35	12.7	26	14.3	33	5.1	34	7.5	36	4.1
15.0-15.9	31	11.1	36	19.7	8	1.2	36	7.9	39	4.5
16.0-16.9	16	6.0	34	18.6	12	1.8	28	6.1	25	2.9
17.0-17.9	6	2.2	9	4.9	14	2.1	16	3.5	12	1.4
18.0-18.9	11	3.9	18	10.0	6	0.9	3	0.7	6	0.7
19.0-19.9	6	2.2	7	3.8	20	3.1	3	0.7	20	2.3
20.0-20.9	4	1.4	5	2.7	38	5.8	3	0.7	10	1.1
21.0-21.9	1	0.4	2	1.1	10	1.5	3	0.7	1	0.1
22.0-22.9	2	0.8	2	1.1	12	1.8	2	0.4	1	0.1
23.0-23.9	6	2.1	-	-	2	0.3	1	0.2	4	0.5
24.0-24.9	-	-	2	1.1	1	0.2	-	-	1	0.1
25.0-25.9	1	0.4	-	-	-	-	-	-	1	0.1
28.0-28.9	1	0.4	-	-	1	0.2	-	-	-	-
TOTAL	276	-	182	-	653	-	453	-	872	-
AVERAGE LENGTH	14.4	-	15.7	-	13.7	-	13.2	-	12.7	-
AVERAGE WEIGHT	1.21	-	1.55	-	1.04	-	0.90	-	0.77	-

TABLE 11

LENGTH DISTRIBUTION OF SAUGER IN THE CATCH

SIZE RANGE (INCHES)	1969		1970		1971		1972		1973	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
7.0-7.9	-	-	-	-	-	-	1	0.2	-	-
8.0-8.9	2	1.0	-	-	-	-	5	0.8	-	-
9.0-9.9	4	1.9	2	0.3	22	4.6	25	4.2	38	8.12
10.0-10.9	65	31.4	29	4.9	116	24.1	112	18.9	157	33.55
11.0-11.9	79	38.2	51	8.6	139	28.8	122	20.6	126	26.92
12.0-12.9	29	14.0	128	21.9	60	12.5	115	19.4	68	14.53
13.0-13.9	15	7.2	204	34.6	30	6.2	97	16.4	39	8.33
14.0-14.9	7	3.4	132	22.4	34	7.1	72	12.1	24	5.13
15.0-15.9	2	1.0	34	5.8	28	5.8	28	4.7	9	1.92
16.0-16.9	-	-	6	1.0	29	6.0	10	1.7	3	0.64
17.0-17.9	2	1.0	1	0.2	18	3.7	5	0.8	1	0.2
18.0-18.9	1	0.5	-	-	5	1.0	-	-	2	0.43
19.0-19.9	1	0.5	-	-	1	0.2	-	-	1	0.2
20.0-20.9	-	-	-	-	-	-	1	0.2	-	-
21.0-21.9	-	-	2	0.3	-	-	-	-	-	-
TOTAL	207	-	589	-	482	-	593	-	468	-
AVERAGE LENGTH	11.5	-	13.3	-	12.5	-	12.4	-	12.6	-
AVERAGE WEIGHT	0.47	-	0.79	-	0.74	-	0.71	-	0.49	-

TABLE 12

LENGTH DISTRIBUTION OF WALLEYE AND SAUGER TAKEN WITH SONAR LURES

LENGTH (INCHES)	1970				1971				1972				1973			
	WALLEYE		SAUGER		WALLEYE		SAUGER		WALLEYE		SAUGER		WALLEYE		SAUGER	
	NO.	PERCENT	NO.	PERCENT	NO.	PERCENT	NO.	PERCENT	NO.	PERCENT	NO.	PERCENT	NO.	PERCENT	NO.	PERCENT
7.0-7.9	-	-	-	-	1	0.4	-	-	-	-	-	-	-	-	-	-
8.0-8.9	-	-	-	-	-	-	-	-	1	1.2	-	-	-	-	-	-
9.0-9.9	-	-	-	-	2	0.8	2	1.8	-	-	2	3.8	3	2.2	5	6.0
10.0-10.9	-	-	2	2.9	20	7.8	20	18.4	2	2.4	11	21.2	26	18.7	32	38.6
11.0-11.9	3	4.3	6	8.8	58	22.7	43	39.5	13	15.5	9	17.3	43	30.9	22	26.5
12.0-12.9	3	4.3	14	20.6	72	28.2	14	12.8	21	25.0	11	21.2	26	18.7	13	15.7
13.0-13.9	6	8.6	19	27.9	26	10.2	8	7.3	6	7.1	4	7.7	12	8.6	4	4.8
14.0-14.9	6	8.6	22	32.4	9	3.5	6	5.5	7	8.3	8	15.4	5	3.6	2	2.4
15.0-15.9	11	15.7	3	4.4	3	1.2	4	3.7	9	10.7	4	7.7	7	5.1	-	-
16.0-16.9	18	25.7	1	1.5	9	3.5	8	7.3	10	11.9	2	3.8	5	3.6	2	2.4
17.0-17.9	7	10.0	1	1.5	3	1.2	4	3.7	6	7.1	-	-	4	2.9	1	1.2
18.0-18.9	10	14.3	-	-	6	2.4	-	-	2	2.4	-	-	1	0.7	2	2.4
19.0-19.9	3	4.3	-	-	13	5.1	-	-	2	2.4	-	-	3	2.2	-	-
20.0-20.9	2	2.8	-	-	16	6.3	-	-	2	2.4	1	1.9	2	1.4	-	-
21.0-21.9	1	1.4	-	-	10	3.9	-	-	1	1.2	-	-	-	-	-	-
22.0-22.9	-	-	-	-	4	1.6	-	-	1	1.2	-	-	-	-	-	-
23.0-23.9	-	-	-	-	1	0.4	-	-	1	1.2	-	-	2	1.4	-	-
24.0-24.9	-	-	-	-	1	0.4	-	-	-	-	-	-	-	-	-	-
28.0-28.9	-	-	-	-	1	0.4	-	-	-	-	-	-	-	-	-	-
TOTAL	70	100.0	68	100.0	255	100.0	109	100.0	84	100.0	52	100.0	139	100.0	83	100.0
AVERAGE SIZE	16.2		13.5		14.1		12.4		14.5		12.6		12.8		11.7	

TABLE 13

LENGTH DISTRIBUTION OF WALLEYE AND SAUGER TAKEN ON LURES OTHER THAN SONAR LURES

LENGTH (INCHES)	1970				1971				1972				1973			
	WALLEYE		SAUGER		WALLEYE		SAUGER		WALLEYE		SAUGER		WALLEYE		SAUGER	
	NO.	PERCENT	NO.	PERCENT	NO.	PERCENT	NO.	PERCENT	NO.	PERCENT	NO.	PERCENT	NO.	PERCENT	NO.	PERCENT
7.0-7.9	-	-	-	-	2	0.5	-	-	2	0.5	1	0.2	-	-	-	-
8.0-8.9	-	-	-	-	-	-	-	-	5	1.4	5	0.9	-	-	-	-
9.0-9.9	-	-	2	0.4	3	0.7	20	5.5	5	1.4	23	4.3	11	1.5	33	8.5
10.0-10.9	3	2.7	27	5.2	23	5.8	96	25.7	41	11.0	101	18.7	139	19.0	125	32.5
11.0-11.9	6	5.4	45	8.6	88	22.1	96	25.7	86	23.3	113	20.9	251	34.2	104	27.0
12.0-12.9	10	8.9	114	21.9	131	32.9	46	12.3	107	29.0	104	19.2	154	21.0	55	14.3
13.0-13.9	10	8.9	185	35.5	70	17.6	22	5.9	35	9.5	93	17.2	51	7.0	35	9.1
14.0-14.9	20	17.8	110	21.0	24	6.0	28	7.5	27	7.3	64	11.8	31	4.2	22	5.7
15.0-15.9	25	22.3	31	6.0	5	1.3	24	6.4	27	7.3	24	4.4	32	4.4	9	2.3
16.0-16.9	16	14.3	5	1.0	3	0.7	21	5.6	18	4.9	8	1.5	20	2.7	1	0.3
17.0-17.9	2	1.8	-	-	11	2.8	14	3.8	10	2.7	5	0.9	8	1.1	-	-
18.0-18.9	8	7.1	-	-	-	-	5	1.3	1	0.3	-	-	5	0.7	-	-
19.0-19.9	4	3.6	-	-	7	1.8	1	0.3	1	0.3	-	-	17	2.3	1	0.3
20.0-20.9	3	2.7	-	-	22	5.5	-	-	1	0.3	-	-	8	1.1	-	-
21.0-21.9	1	0.9	2	0.4	-	-	-	-	2	0.5	-	-	1	0.1	-	-
22.0-22.9	2	1.8	-	-	8	2.0	-	-	1	0.3	-	-	1	0.1	-	-
23.0-23.9	-	-	-	-	1	0.3	-	-	-	-	-	-	2	0.2	-	-
24.0-24.9	2	1.8	-	-	-	-	-	-	-	-	-	-	1	0.1	-	-
25.0-25.9	-	-	-	-	-	-	-	-	-	-	-	-	1	0.1	-	-
TOTAL	112	100.0	521	100.0	398	100.0	373	100.0	369	100.0	541	100.0	733	100.0	385	100.0
AVERAGE SIZE	15.5	-	13.3	-	13.4	-	12.1	-	12.4	-	13.2	-	12.7	-	12.6	-

Figure 11. Age distribution of walleye in the catch.

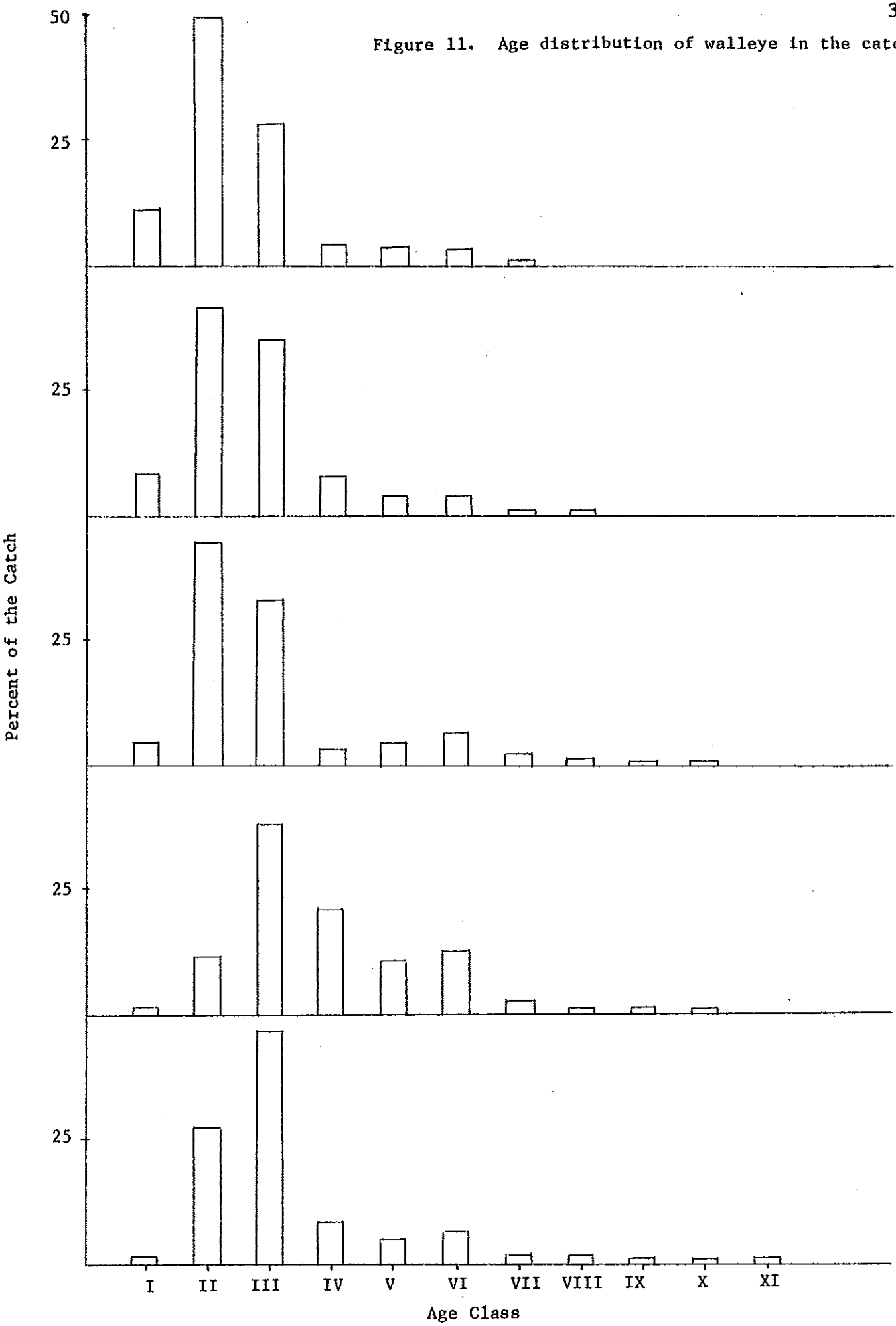


Figure 12. Age distribution of sauger in the catch.