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**A Fourteen-Year Summary of Commercial Fishing
For Carp, Buffalo, Freshwater Drum, Catfish, and
Bullhead on the Wisconsin Portion of the Miss-
issippi River, 1960-1973.**

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ACKNOWLEDGEMENTS

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INTRODUCTION

Successful management of a fishery resource often relies on an understanding of long-term trends in the fishery. These trends are not evident from either current catches or from annual statistical reports. From time to time it is, therefore, desirable to review the annual statistics and to note the consistencies or inconsistencies of the data.

This report makes extractions from the commercial fishing statistics of 14 years, 1960-73 inclusive, for the Wisconsin portion of the Mississippi River. By means of figures, visual evidence of the nature of the fishery and trends in the fishery are made readily available for comparison and interpretation. Only the five most important species are included: carp, buffalo, freshwater drum, catfish, and bullhead. These species comprised 98.0 percent of the 69,277,324 pounds taken during the period 1960 through 1973. The value of these species to Wisconsin commercial fishermen during that period was approximately \$5,005,044.

DISCUSSION

Carp

A total of 44,622,942 pounds of carp were harvested in this 14-year period (Figure 1). Annual carp harvest ranged between 2,522,510 and 4,105,450 pounds over this survey. Significant increases in harvest occurred in 1964 and 1971. The greatest increase in harvest occurred in Pool 4A (Lake Pepin) for both years (36.1 and 33 percent above the average fluctuation, respectively). Seine haul harvests in June showed the most significant increase during these years. Amount of seine fished increased 51.5 percent during 1964. Seine effort decreased 5.5 percent in 1971 but improved in efficiency (47.1 percent). Low harvests occurring in 1960, 1965, and 1969 had similar characteristics. Once again the harvest with seine in Pool 4A (Lake Pepin) showed the greatest fluctuation. Harvest in June showed the most significant decrease in 1960 and 1965, while in 1969 September's harvest signified the important decrease.

Average price per pound varied between \$.030 and \$.045 (Figure 2). Carp commanded the second highest total value (29.6 percent) for this 14-year period (Figure 3). Two significant increases in total value occurred in 1964 and 1971 (23.2 and 15.7 percent, respectively, from the previous year) (Figure 4). These increases were correlated with increases in the catch. The increase in total value observed in 1973 is probably due to an increase in the average price per pound.

Pool 4A (Lake Pepin) was by far the greatest carp-producing area, accounting for 48 percent of the total 14-year harvest (Figure 5). Pools 9 and 8 were next in carp production (15 and 13 percent, respectively).

Summer months (June, July, and August) contributed 36.7 percent of the total catch for 14 years (Figure 6). August had the highest average catch in pounds for all months (414,368 pounds per year).

Seines and gill nets accounted for nearly the total catch of carp (66.4 and 29.5 percent, respectively) (Figure 7). Linear feet of seine and gill net fished decreased (25.1 and 30.2 percent, respectively) during the last 7 years of this survey (Figures 8c and 9c). Efficiency with seine increased 47.8 percent while efficiency with gill net increased by 23.3 percent over the last 7 years (Figures 8b and 9b).

Buffalo

The 14-year period produced 8,355,269 pounds of buffalo averaging 596,804 pounds per year (Figure 10). Above average increases occurred in 1962, 1968, and 1970 (9.6, 14.9, and 15.1 percent above the average fluctuation, respectively). The pools accounting for the largest fluctuation varied for each year: 1962, Pool 7; 1968, Pool 10; 1970, Pool 8. Harvest in April showed the greatest increase in 1962 and 1970, while in 1968 the harvest in March was up by 56,000 pounds. Buffalo harvest with seine in 1968 and 1970 and with gill net in 1962 showed the most significant fluctuations. Both years, 1968 and 1970, indicated only a slight increase in seining effort, however, a significant increase in efficiency was observed (45.5 and 98.5 percent, respectively). In the 1962 buffalo harvest, effort with gill nets increased by 71.8 percent. After the record harvest in 1970 a 184 percent drop occurred in the buffalo harvest. Once again the greatest fluctuations in catch were observed during March with seine. Pool 7's most significant catch decrease was 27,000 pounds in 1970.

Average price per pound increased from \$.100 in 1960 to \$.170 in 1973 (Figure 2). Total value of buffalo has doubled since 1960 (Figure 4).

Pool 9 contributed the most significant portion (20 percent) of the total catch of buffalo, followed closely by Pool 11 (19.5 percent) (Figure 11). Pools 7, 8, and 10 were productive, all yielding over 12 percent.

The most productive months for buffalo were March and April yielding 13.7 and 13.8 percent, respectively, of the total catch for the 14-year period (Figure 12). Winter months (December, January, and February) comprised the most significant catch (27.3 percent) of all seasons.

Gill nets were the most effective gear for taking buffalo, capturing 45.8 percent of the total catch during the 14-year period (Figure 13). Utilization of gill nets has decreased since 1962 with only one significant increase in 1969 (Figure 14c). Buffalo catch with gill nets fluctuated between 187,602 and 349,285 pounds (Figure 14b). Efficiency of gill nets doubled between 1962 and 1971, however, a 36.5 percent decrease occurred over the last two years (Figure 14a).

Freshwater Drum

Freshwater drum catch increased significantly between 1960 and 1973 (Figure 16). A 39.1 percent increase above the average fluctuation occurred in 1967, followed by a 38.4 percent decrease in 1969 and 30.6 percent increase in 1970. Harvest was down in Pool 9 during 1967, but it increased 130 percent in Pool 4A. The greatest increase in catch during 1967 was in February. Catch with seine, the number one gear for drum, increased 57.4 percent this year. Two years later (1969) the harvest dropped below average in every month. Amount of seine used in 1969 decreased below the average fluctuation by 39 percent. The following year, 1970, a record harvest was recorded, 957,955 pounds of drum. Harvest in Pool 7 doubled and catch with seine increased 76.7 percent. Effort with seine increased only 5.1 percent, but efficiency increased (49.5 percent above average).

Average price per pound ranged from \$.050 to \$.080 with the total value comprising 10.9 percent of the total commercial harvest during the 14-year period (Figures 2 and 3). Total value has doubled from 1960 to 1973 (Figure 4).

Pool 9 was the most important source of freshwater drum producing 33.9 percent of the harvest with an average of 200,957 pounds per year (Figure 17). Pool 8 was second in production (26.7 percent).

March was the most productive month (14.1 percent) (Figure 19). Winter months (December, January, and February) had the most significant catch (33.4 percent) of all seasons.

The seine was the most effective gear, accounting for 79.7 percent of the harvest (Figure 19). Catch with seine increased 125 percent during the last 7 years. Though effort with seine has decreased, efficiency has nearly doubled (Figures 20a and 20b).

Catfish

During this 14-year period the catfish catch has fluctuated between 420,000 and 62,000 pounds (Figure 21). Above average fluctuations occurred quite frequently in the catfish harvest: decreases in 1961, 1965, 1966, and 1969; increases in 1964, 1967, and 1970. Examination of the harvest from individual pools and gear types during these years indicates the major changes occurred in 3 pools and 3 gear types. Catfish harvest in Pools 8, 9, and 11 accounted for the greater portion of the changes in these years. Greatest fluctuations with gear occurred with slat nets, secondly with bait nets, and thirdly with setlines.

Significant harvest increases of 10,000 to 45,000 pounds were observed in the summer months of 1964, 1967, and 1970. Downward fluctuations in 1961 and 1969 were likewise observed in the summer harvests. Spring months of the 1965 and 1966 catfish harvest showed the greatest decreases in catch. Utilization of slat nets increased in 1964 and 1967 (17.8 and 17.3 percent above average, respectively), while bait net numbers increased 58.7 percent above average in 1970. There were corresponding decreases in bait net use in 1961 and 1965 (64.5 and 38.3 percent below average, respectively). Though these fluctuations in amount of effort correspond to the changes in harvest, there are other years the inverse occurred.

Catfish had the highest total value (37.2 percent of total) during this 14-year period (Figure 3). Average price per pound increased from \$.19 in 1960 to \$.40 in 1973 resulting in a 37.9 percent increase in total value since 1960 (Figures 2 and 4).

Pool 9 had the highest catch (22.0 percent of the total catfish catch) averaging 112,092 pounds per year. Pools 8 and 11 followed closely (21.7 and 20.1 percent, respectively) (Figure 22).

Summer (June through August) was the most productive season (63.4 percent of the total catch) with July contributing the greatest catch (21.8 percent) of all months during the 14-year period (Figure 23).

Setlines were the most important gear, accounting for over 50 percent of the total 14-year catch (Figure 24). Setline effort decreased significantly between 1960 and 1965 (Figure 25). By 1973 an all time low was observed of 20,421 linear feet utilized, even though a 12.8 percent increase occurred in the number of licensed setliners.

The catch and the units of slat nets have decreased (44.0 and 64.7 percent, respectively) during the last 7 years of this survey (Figures 26b and 26c). A corresponding decrease occurred with slat net efficiency (Figure 26a).

The last 7 years of this survey indicated a 135 percent increase in bait net effort, and a 32.6 percent increase in catch (Figures 27b and 27c).

Bullhead

Annual bullhead harvest increased significantly (54.0 percent) between 1965 and 1966 and decreased 33.5 percent between 1966 and 1967 (Figure 28). In 1966 and 1967 the above average changes were mainly observed in either an increase or decrease in the Pool 9 catch and the harvest with bait nets. October's harvest in both years fluctuated the greatest, a 69.5 percent increase in 1966 and 25.4 percent decrease in 1967. Once again October's harvest in Pool 9 was the principal factor for the record low catch in 1970. Catch with setline decreased most significantly as compared to bait net that year.

During the 14-year period the average price per pound increased by \$.075 (Figure 2). Bullhead, however, comprised only 1.5 percent of the total commercial value (Figure 3).

Pools 8 and 9 were outstanding producers of bullheads yielding 33.8 and 49.9 percent, respectively (Figure 29).

October yielded the highest catch of bullheads, followed closely by May (Figure 30). These two months accounted for over 60 percent of the harvest during the 14-year period.

Setlines were the most efficient gear, accounting for 53.7 percent of the total catch (Figure 31). A slight decrease has occurred in the setline catch in the last 7 years (Figure 32b).

Bait nets were next in effectiveness comprising 26.8 percent of the total catch (Figure 31). Catch with bait nets has increased (42.5 percent) likely corresponding to the increase in effort (135 percent) with bait nets within the last 7 years (Figures 33b and 33c). Efficiency of bait nets has decreased significantly (48.2 percent) (Figure 33a).

Influences on the Harvest

There are many factors influencing the upper Mississippi River commercial fishery. Markets, floods, and differences in state regulations are some of the major influences. Determining the cause of fluctuations in the total harvest of the different species is difficult. Briefly citing and examining some of the influencing factors will assist in the interpretation of the figures and graphs.

Examination of the commercial markets is significant because of their regulating power. These markets may determine when and what fish will be bought from fishermen by the local Mississippi River wholesale dealers.

Sullivan (1971) indicated that most species of fish have relatively narrow markets which are strongly identified with particular cities, regions, races or ethnic groups. Information was collected on 4 or 5 major fish species based on several wholesale market surveys conducted by the United States Bureau of Fisheries and Bureau of Labor Statistics.

Market surveys of the early 1900's indicated that the primary demand for carp existed in the Jewish communities of New York, Philadelphia, Boston, Pittsburgh, and Chicago. In more recent times the decreased use of fresh carp in the kosher manner and the dispersal of urban Jewish neighborhoods have reduced the demand in these major city concentrations. Increased income has permitted substitution of northern pike, walleye, and whitefish for carp in gefilte fish.

Buffalo had no particular racial or ethnic identification prior to the early 1900's. These fish, however, were widely consumed in most of the major river valleys of the Midwest and in the South. Since the 1900's utilization of this fish by the general population has declined although utilization has increased in the northern urban areas of Chicago and St. Louis.

Early market surveys described freshwater drum as unpopular except with the Blacks and Jews. During the 1920's and 1930's, prices began to rise and were nearly equal to buffalo prices. By the late 1960's, however, drum were considered a low-valued panfish in the Midwest and the primary consumers were in the Chicago area.

Early market surveys and later surveys in the 1960's suggested catfish were relatively important in cities and towns of the principal midwest and south-central river valleys. In the 1960's a Wisconsin market owner established a local market of restaurants within a seventy-five mile radius of Lynxville, Wisconsin. This market sells approximately 75,000 pounds of catfish to these local establishments annually.

Population redistribution of certain races and ethnic groups and per capita income have had the most influence on the river fishery. However, other factors such as floods, state regulations, and numbers of licensed fishermen are also important.

Data from the flood years of 1965 and 1969 indicate that most of the species declined in harvest, but not always below the 14-year average. Major harvest of buffalo and freshwater drum occur in March and April. March harvest of buffalo indicated a decline in 1965 and 1969, but not in April of these years. Freshwater drum catch did not decline in March or April in 1965, but did in 1969. Examination of the monthly harvest of the other species did not always show a drop in the spring. Extreme flood conditions appear to affect the harvest, but whether it is the main influence throughout the entire year is difficult to determine.

While examining the catches from the various pools, the differences in state regulations should be considered. Present commercial fishing regulations for catfish are as follows:

Wisconsin-Minnesota Boundary Waters

- Setlines: Size limit 15 inches. Open season May 1 through October 31. Four lines with 100 hooks per line may be used. \$1.00 per license and \$.25 per tag.
- Gill nets: Size limit 20 inches. Continuous season. Minimum mesh size 7-inch stretch measure. \$10.00 for first 2,000 feet; \$1.00 for each additional 100 feet; \$.25 per tag per 2,000 feet.
- Seines: Continuous open season. Size limit 20 inches except during the period August 1 to September 30, when size limit is 15 inches and harvest limit is 200 pounds per day. \$20.00 for first 500 feet; \$10.00 second 500 feet; \$2.00 for each additional 100 feet; 1 tag for each 500 feet; \$.25 per tag.

Wisconsin-Iowa Boundary Waters: (size limit 13 inches for all gear).

- Setlines: Continuous open season. Eight lines with a maximum of 50 hooks per line may be used. \$1.00 per license and \$.25 per tag.
- Gill nets: Continuous open season. Minimum mesh size 7-inch stretch measure. \$10.00 for first 2,000 feet; \$1.00 for each additional 100 feet; \$.25 per tag per 2,000 feet.
- Seines: Continuous open season. No gear or mesh restrictions. \$20.00 for first 500 feet; \$10.00 second 500 feet; \$2.00 for each additional 100 feet; one tag for each 500 feet; \$.25 per tag.
- Buffalo nets: Continuous open season. No gear or mesh restrictions. \$10.00 license; \$.50 per tag per net.

- Bait nets: Continuous open season. Four foot hoop front required. No restriction on mesh size. \$20.00 license; \$.25 per tag per net.
- Frame nets: Closed season May 15 to September 15 inclusive. Four by eight-foot hoop front maximum dimensions, with only a single lead. No restrictions on mesh size. Same cost as buffalo net.
- Slat nets: Open season Saturday nearest May 1 to October 31. Net not to exceed six feet in length and 72 inches in circumference, one end closed with mesh not less than 1¼-inch bar measure. \$20.00 license; \$.50 per tag per net.
- Trammel nets: Continuous open season. Maximum length 300 feet. No restrictions on mesh size. Net must be drifted. \$20.00 per net.

Not listed above are the special regulations governing Wisconsin fishermen in Lake Onalaska, Pool 7. Commercial fishing is excluded from the eastern half of the lake due to intensive sport fishing. A wider range of gear types and a lower size limit on catfish observed in the Wisconsin-Iowa water (Pools 9 through 12) may affect the harvest more than the Wisconsin-Minnesota regulations.

No significant trends were observed in numbers of licensed fishermen for gill nets, seines, bait nets, buffalo nets, frame nets, slat nets and trammel nets. Licensed setlines dropped 57.6 percent between 1961 and 1965. There has been, however, a steady increase since 1966 (64.3 percent). Number of licensed setliners does not necessarily reflect the amount of effort. The majority of commercial fishermen are part-time; consequently, local economic conditions affecting unemployment may regulate the number of fishermen and effort expended.

In addition to the five major species, over a dozen others entered into the commercial harvest. Among these were the redhorse, suckers, carpsuckers and sturgeon. Mooneye and goldeye are occasionally important in the upper portion of the Mississippi River. Bowfin and gar are common in the river, but their value is so low that only a few thousand pounds are harvested each year. A few hundred American eel are taken annually while fishing for catfish. This species is widespread, but not common in the Mississippi River. Four to eight thousand pounds of turtle are captured annually with no significant trends observed over the past 14 years. However, records are not available on the total pounds captured by turtle trappers. The value per pound has increased from \$.080 in 1960 to \$.250 per pound in 1973.

CONCLUSIONS

1. Annual harvest reports of the five major commercial fish species over the 14-year period 1960-1973 fluctuated without any downward trends. Carp, buffalo, freshwater drum and bullheads had four above-average fluctuations within this time period. Freshwater drum harvest has increased over 90 percent in the last seven years of this survey, even though the effort declined during the same period.

2. Over 50 percent of the catfish catches fluctuated above average. Abrupt changes in harvest occurred with the slat net and bait net. The greatest fluctuations occurred in Pools 9 and 11 and it is suspected that the wide range of gear types and lower size limit in effect in these Wisconsin-Iowa waters may be partly responsible for the fluctuations.
3. Carp continue to dominate the upper Mississippi River fishery, comprising 64.4 percent of the total commercial harvest. The annual total value of catfish consistently exceeded the total value for any other single species.
4. Catfish and buffalo have significantly increased in total value.
5. Average price per pound for catfish, buffalo and bullhead has generally increased over this 14-year period and has remained about the same for carp and freshwater drum.
6. Annual carp harvest of Pool 4A dominated the harvest. The 14-year harvest total of buffalo, freshwater drum, catfish and bullhead from Pool 9 indicates that this pool was first in fishing success.
7. Effort with the major gear for each species has decreased: seine for carp and freshwater drum, gill net for buffalo, and setline for catfish and bullhead. This was accompanied, however, by an increase in efficiency of each major gear, except for setlines for bullheads.
8. Utilization of bait nets increased significantly (135 percent).

Figure 1. Pounds of carp harvested by year for the 14-year period 1960-1973.

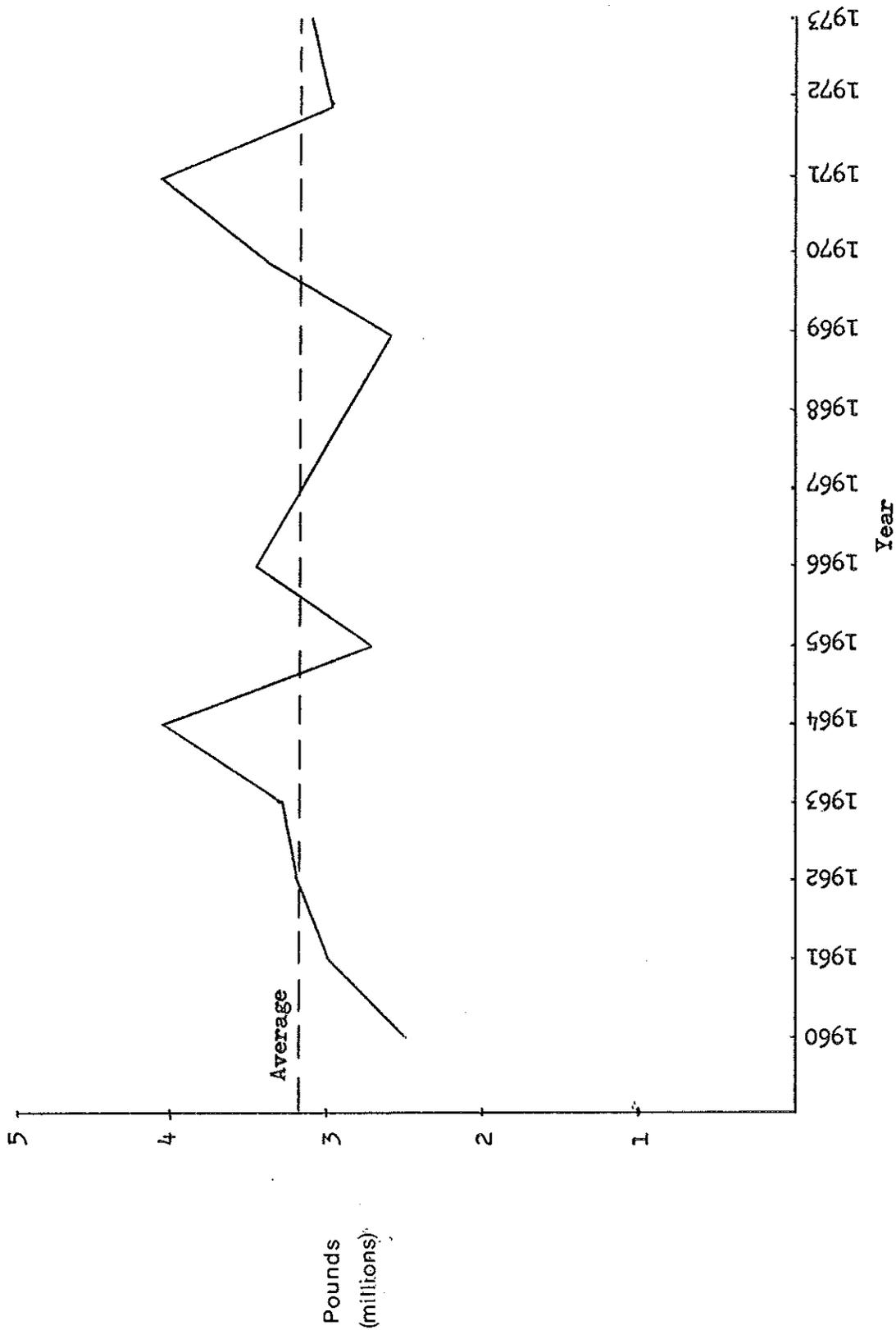


Figure 2. Average price per pound (round weight) for five commercial species by year, 1960-1973.

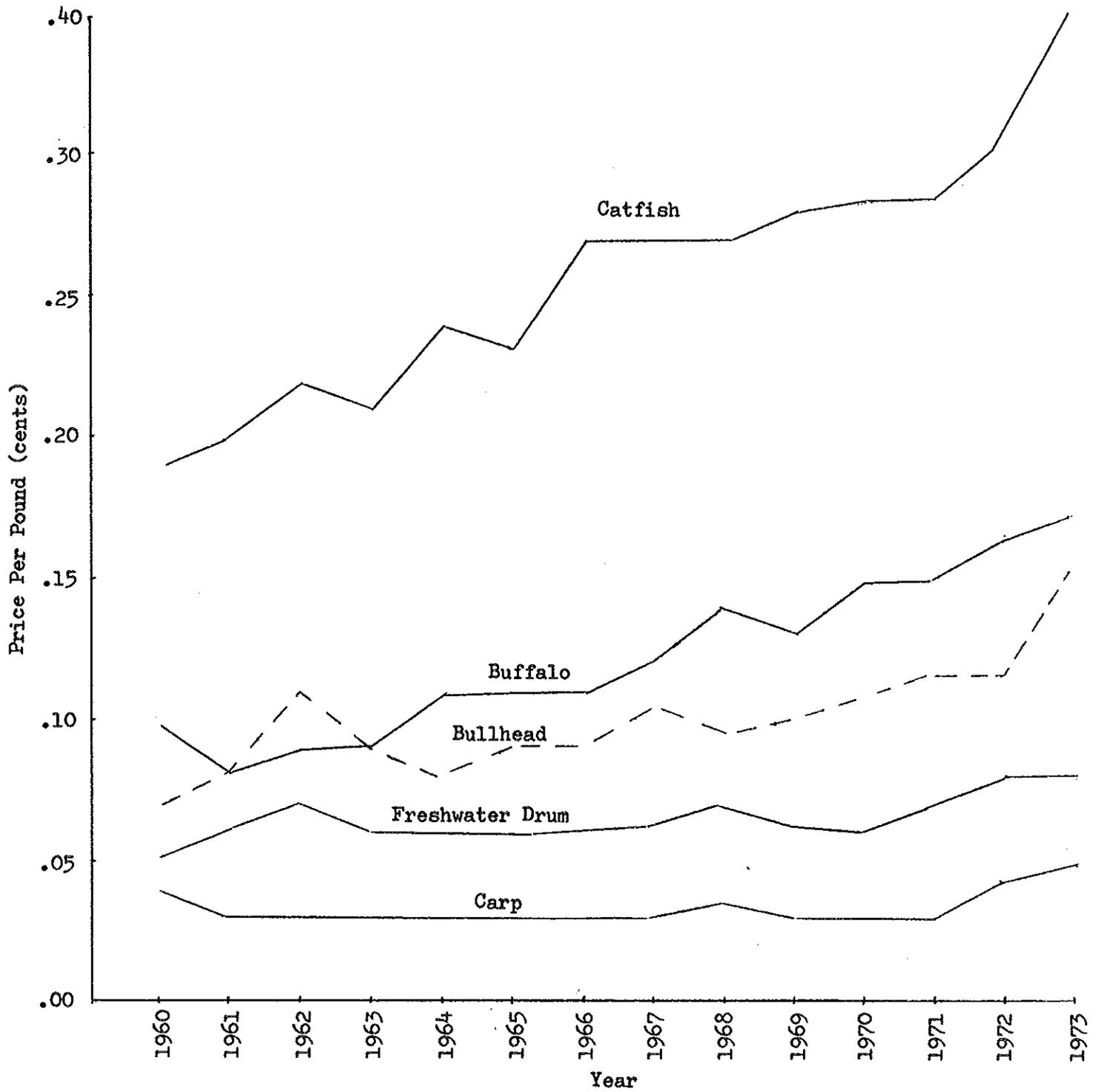


Figure 3. Total value and percent of total value by species for the 14-year period, 1960-1973.

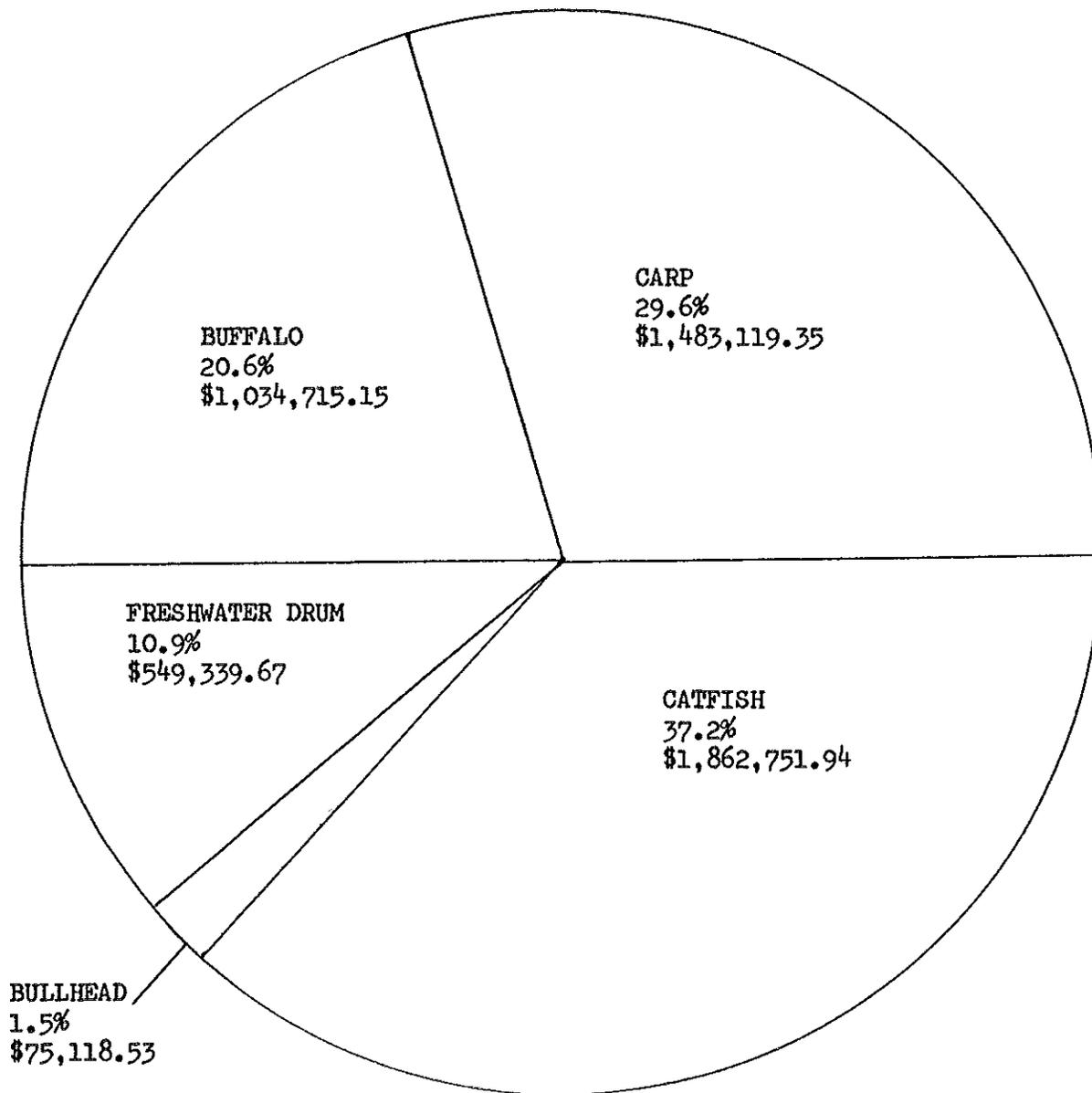


Figure 4. Total value of the commercial fish catch by year and species.

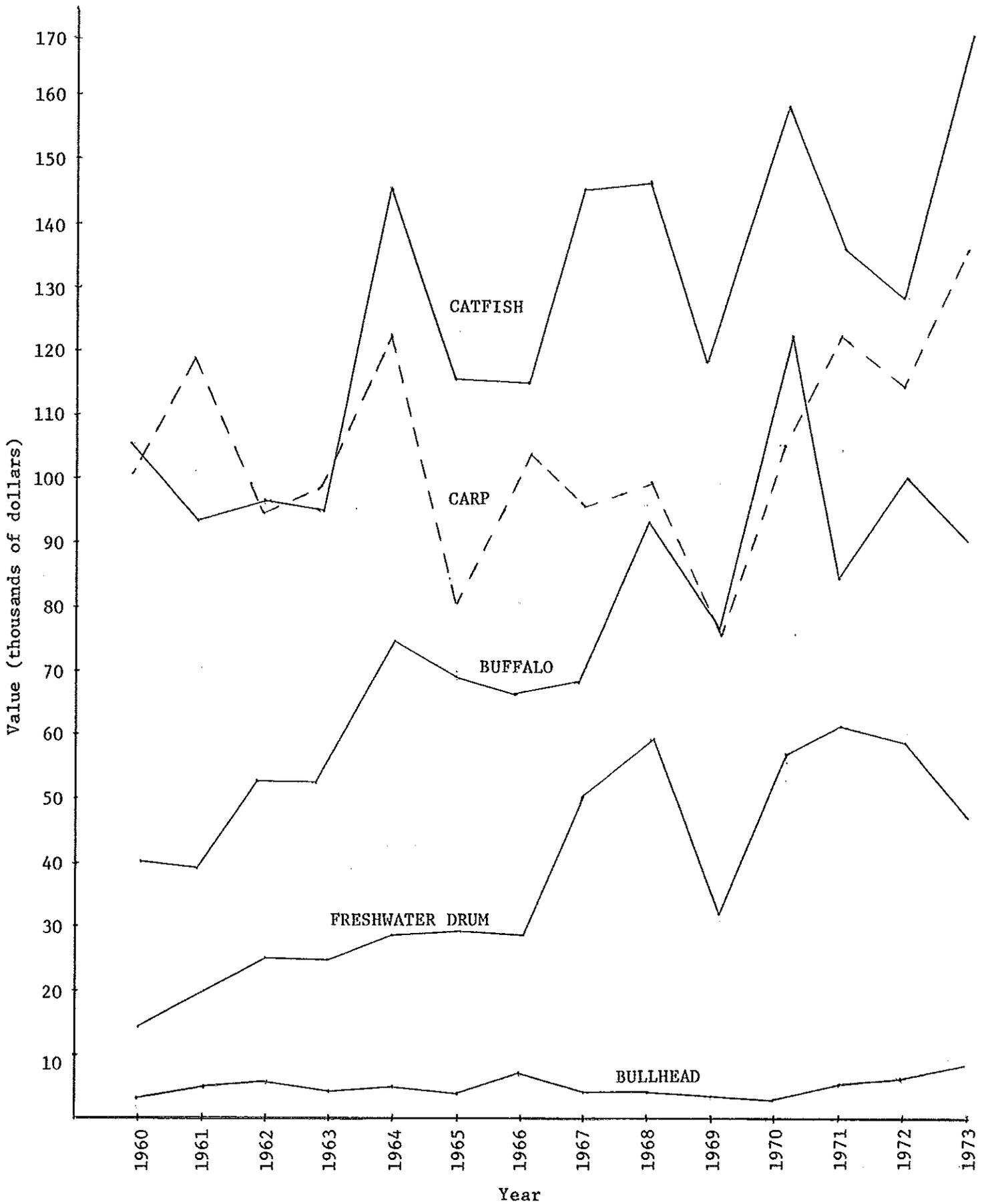


Figure 5. Average catch (pounds) of carp and percent of total by pool for the 14-year period, 1960-1973.

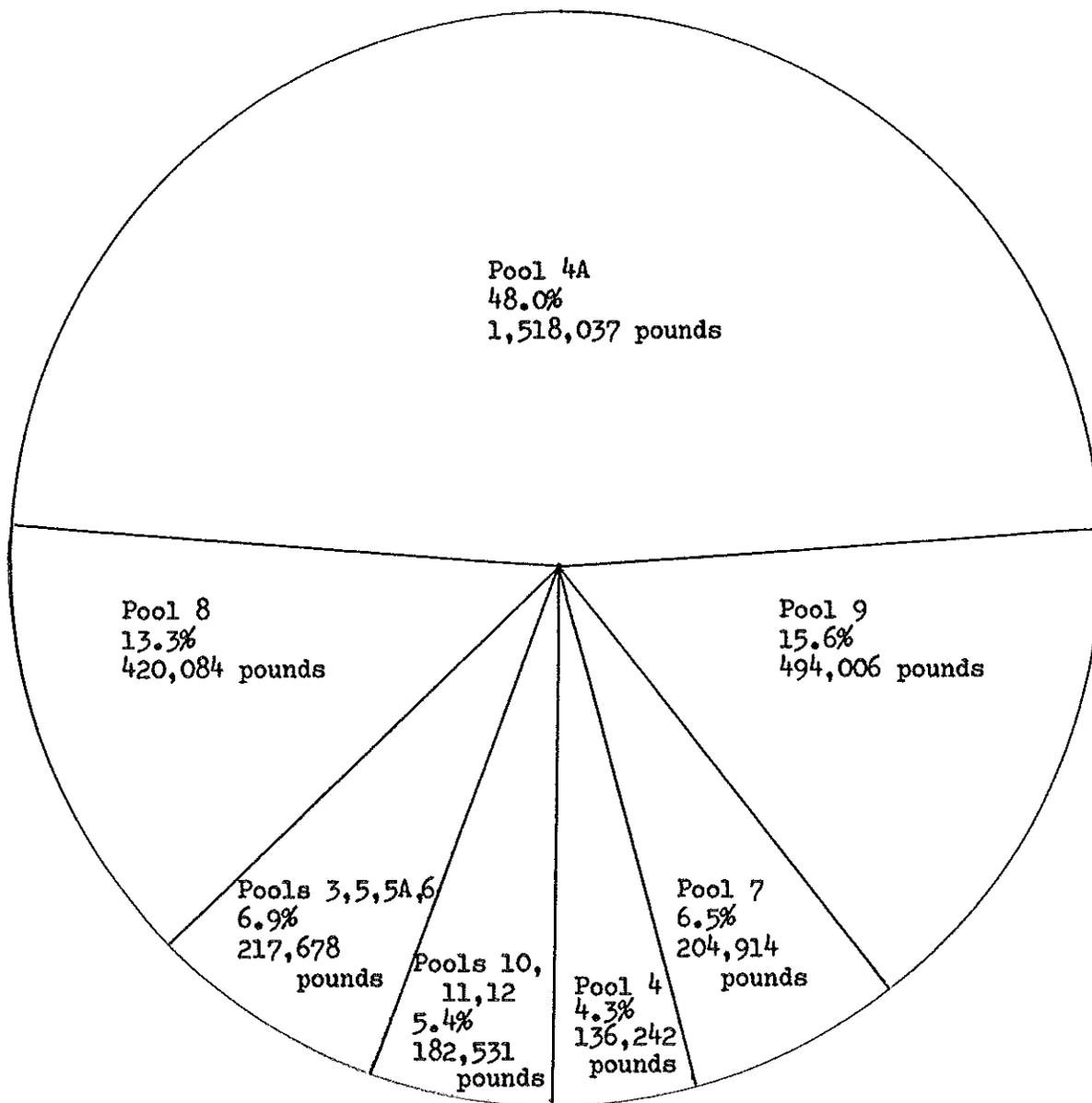


Figure 6. Average catch (pounds) of carp and percent of total by month for the 14-year period, 1960-1973.

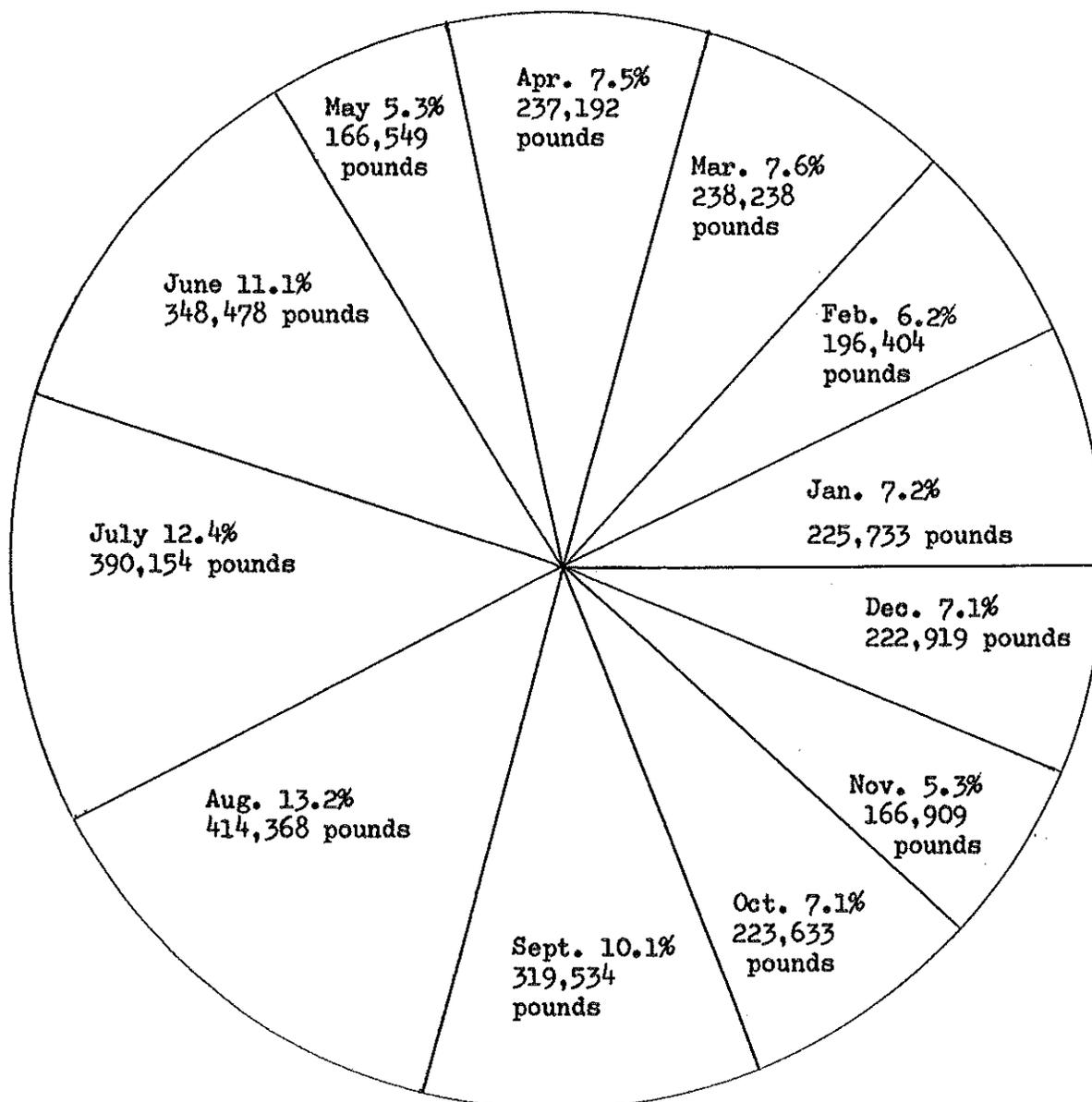


Figure 7. Average catch (pounds) of carp and percent of total by gear for the 14-year period, 1960-1973.

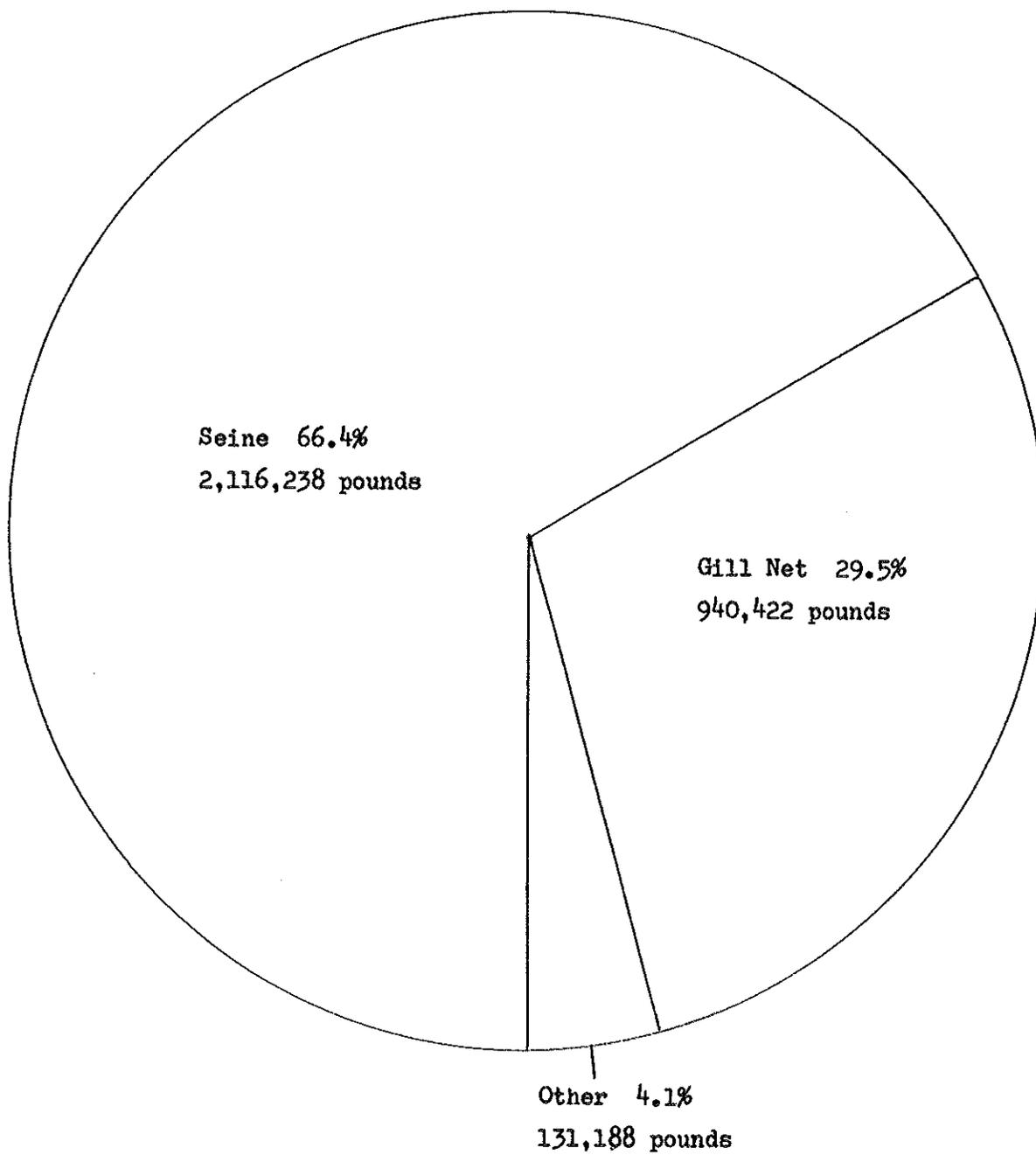


Figure 8a. Efficiency of seine for carp by year.

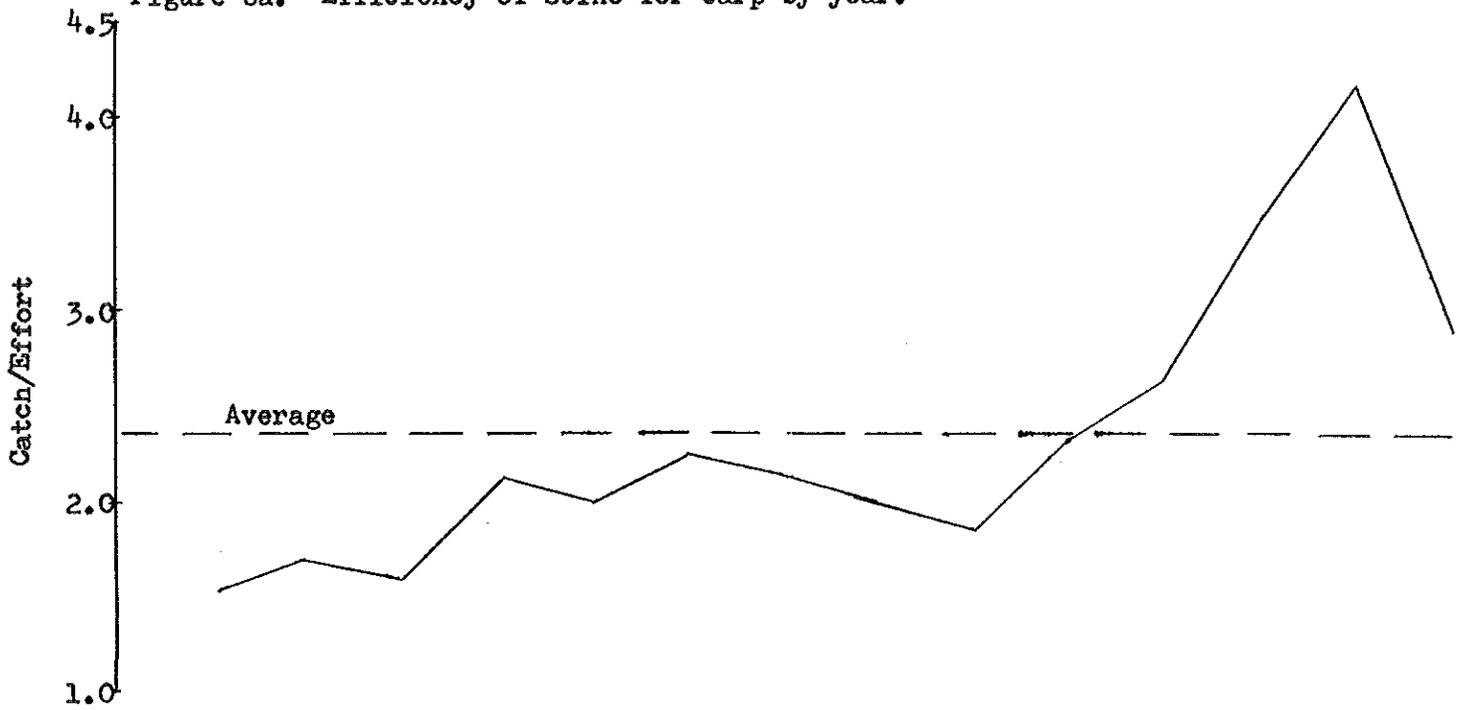


Figure 8b. Catch of carp with seine by year.

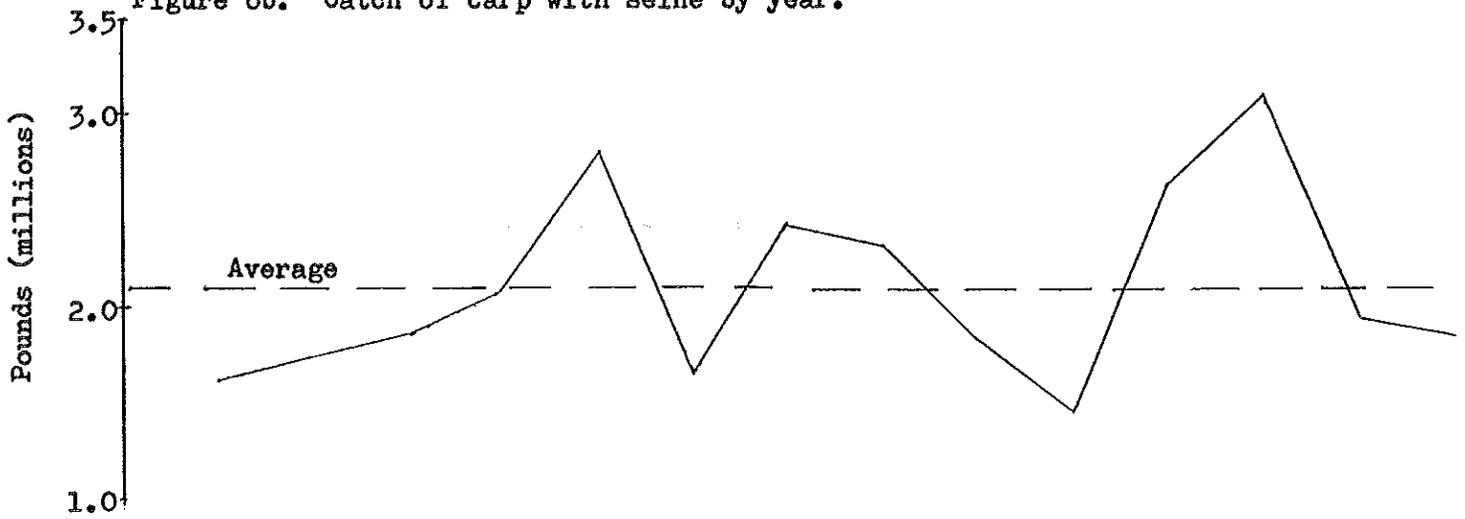


Figure 8c. Linear feet of seine utilized by year.

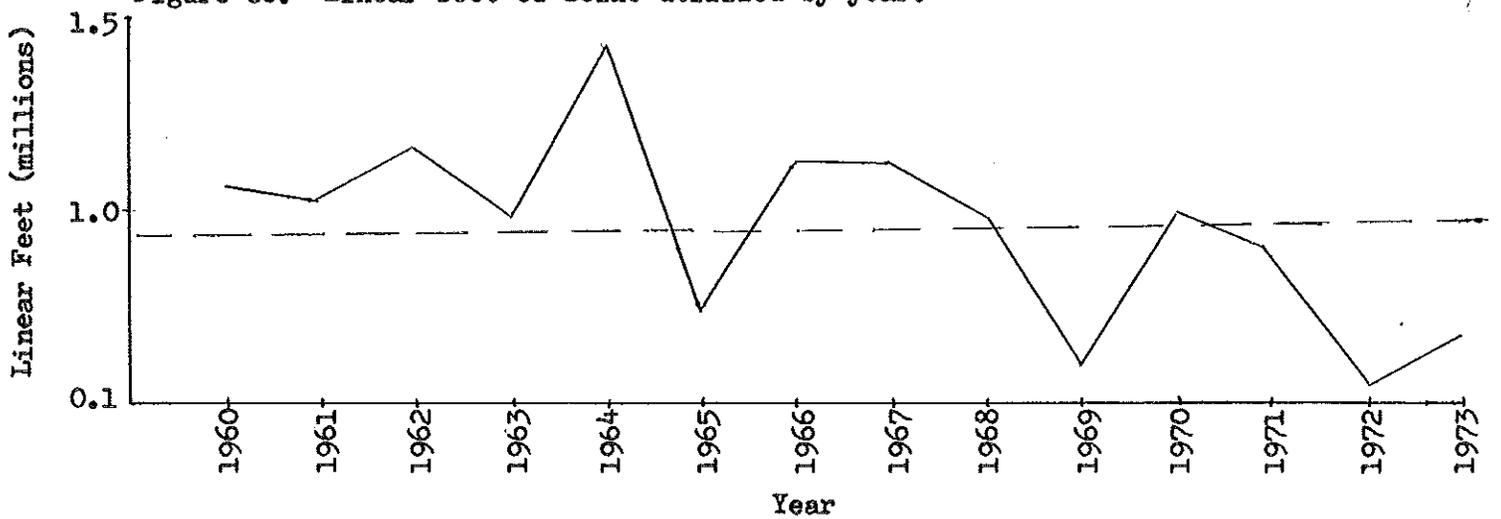


Figure 9a. Efficiency of gill net for carp by year.

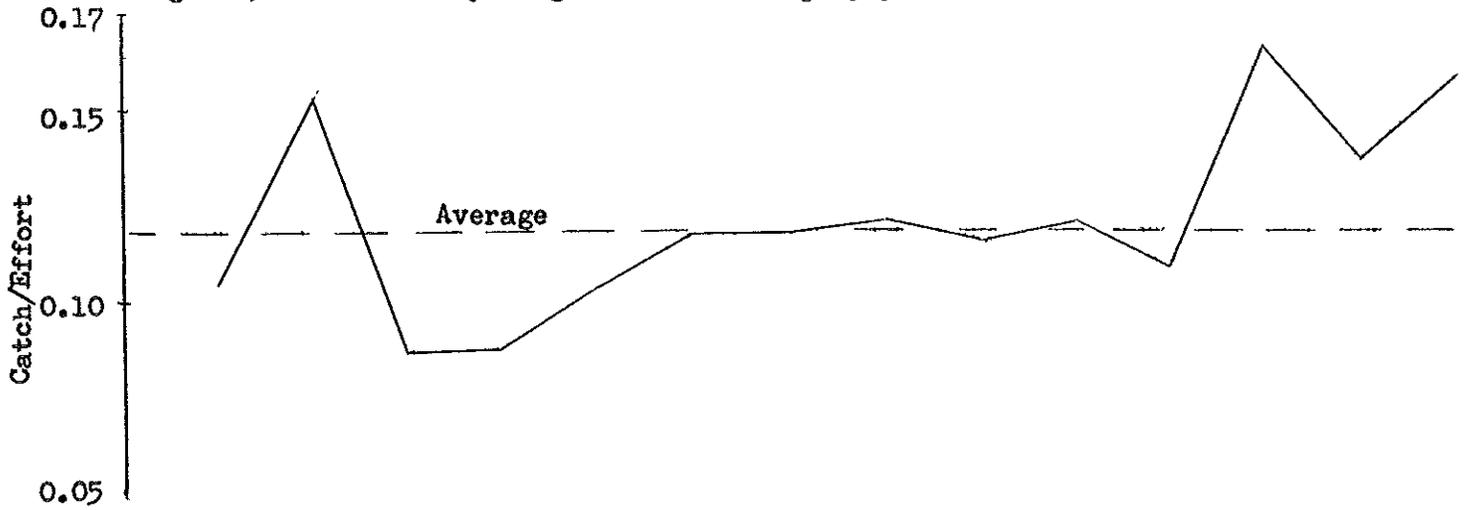


Figure 9b. Catch of carp with gill net by year.

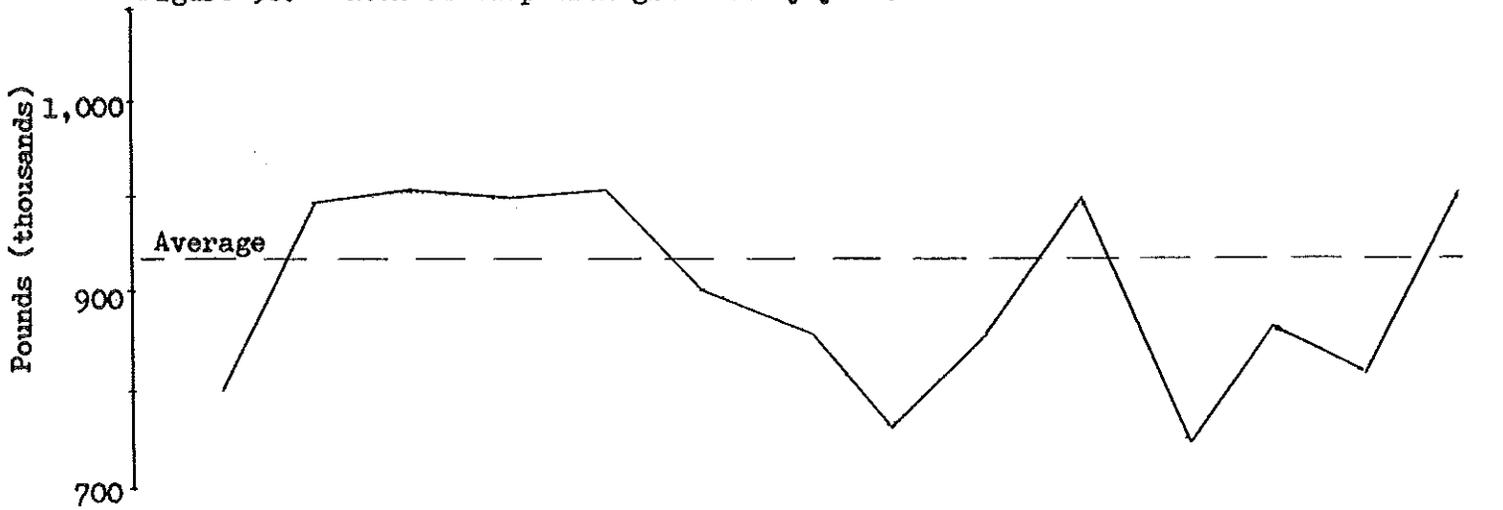


Figure 9c. Linear feet of gill net utilized by year.

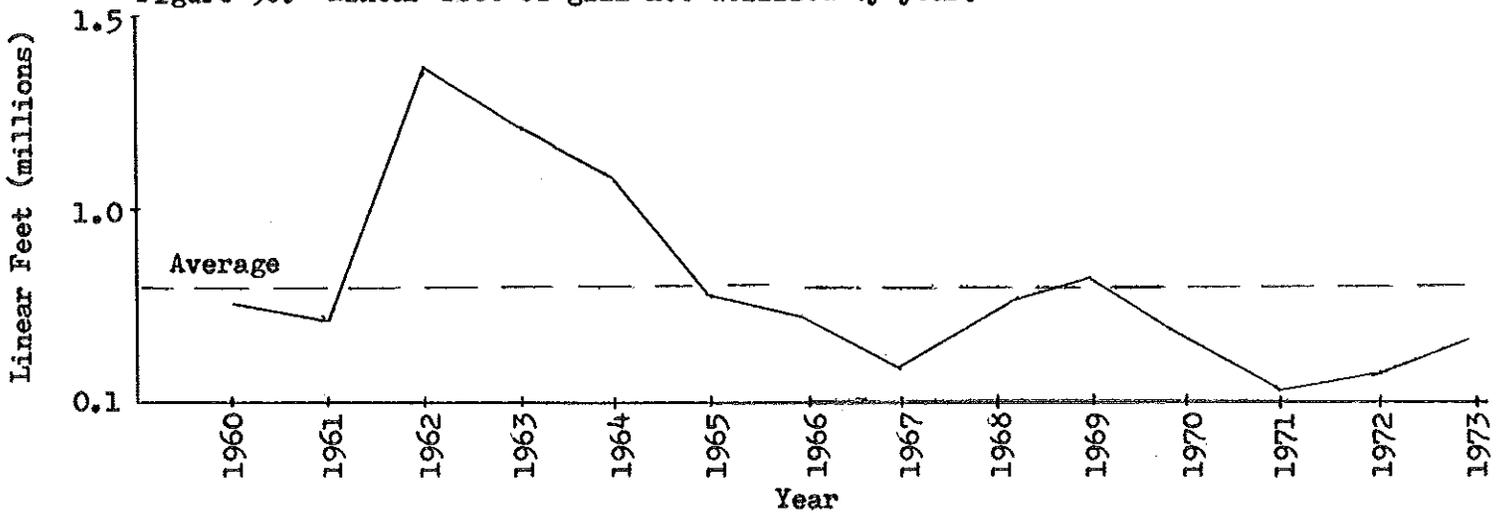


Figure 10. Pounds of buffalo harvested by year for the 14-year period, 1960-1973.

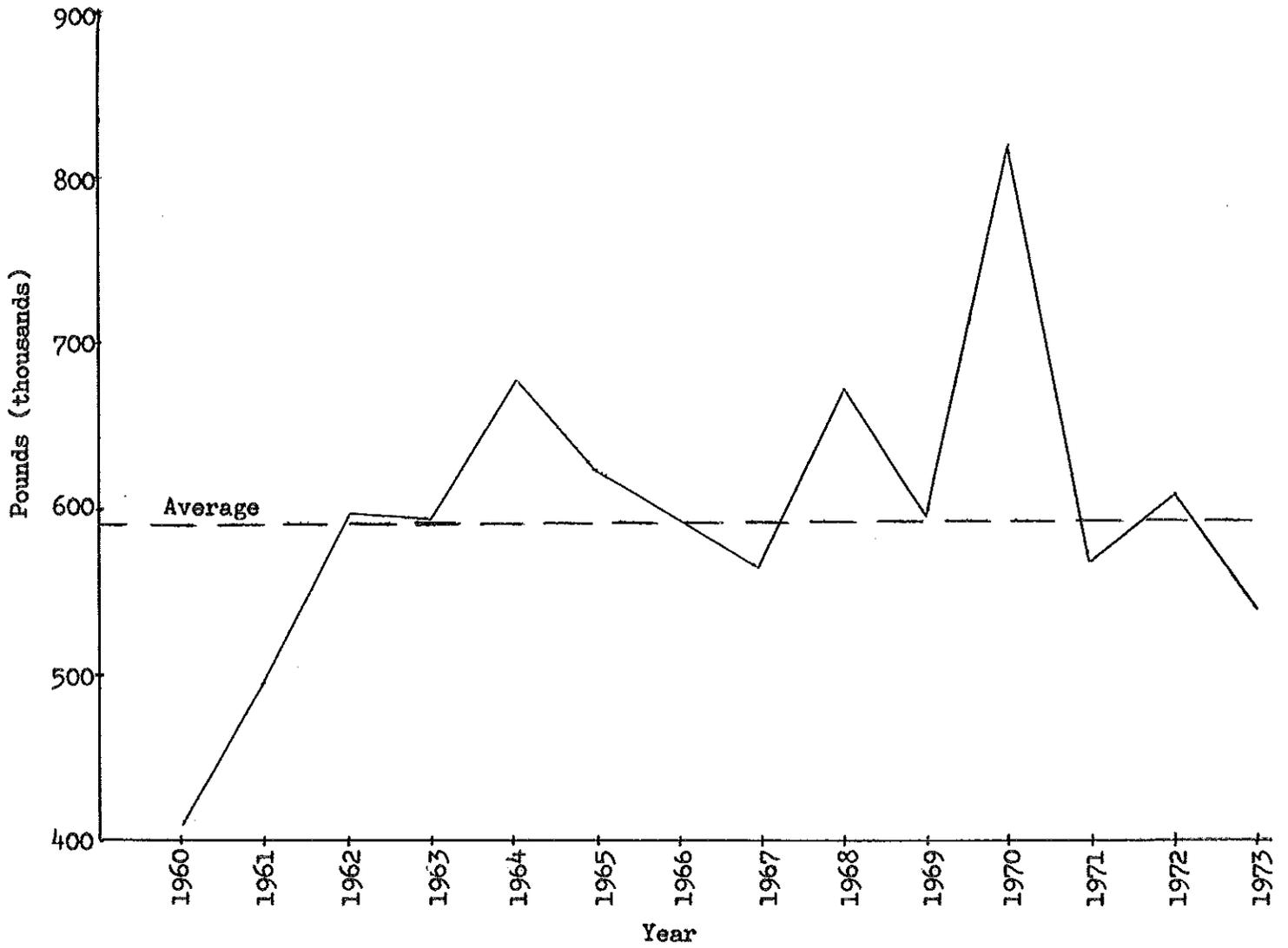


Figure 11. Average catch of buffalo and percent of total by pool for the 14-year period, 1960-1973.

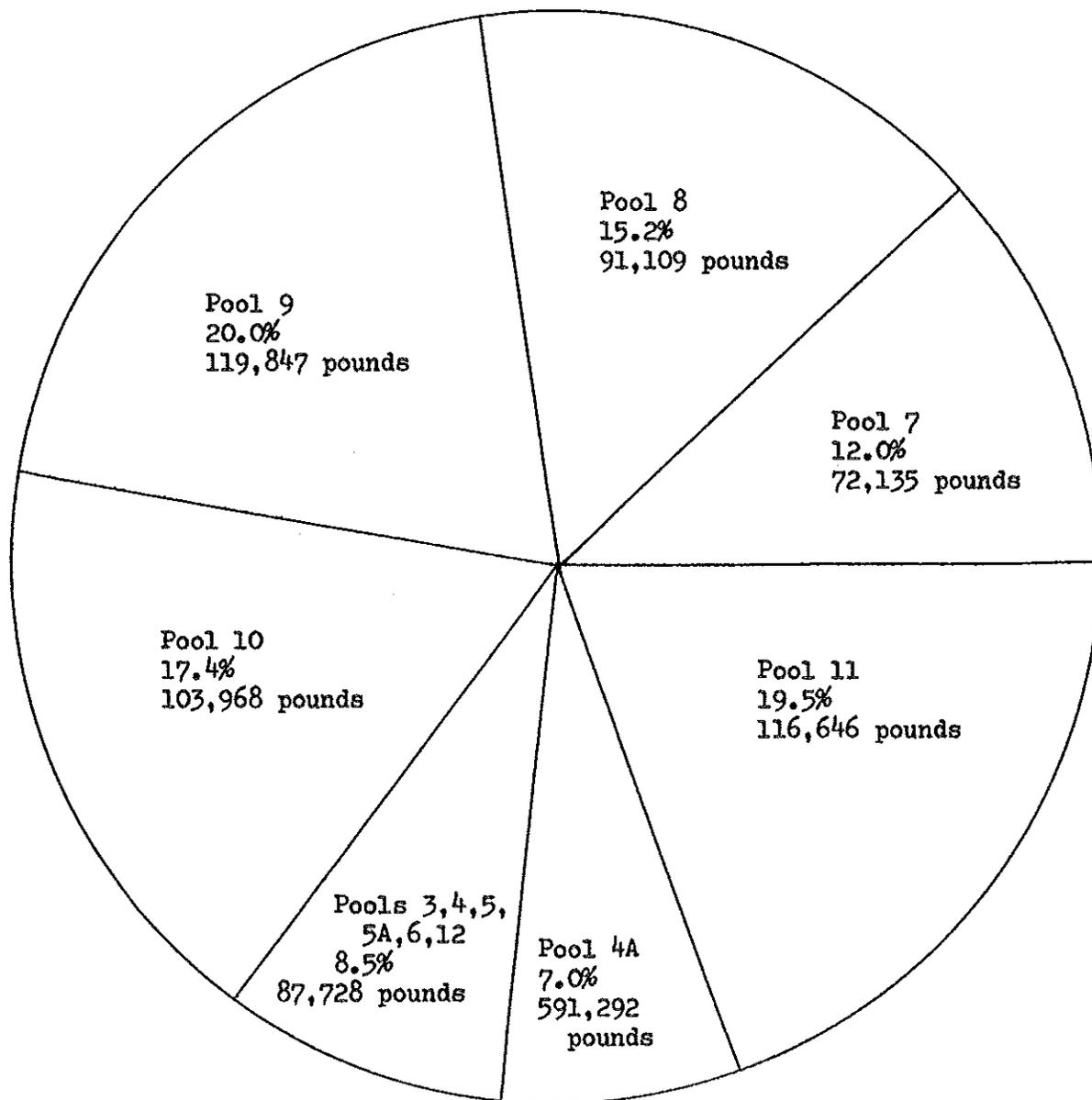


Figure 12. Average catch (pounds) of buffalo and percent of total by month for the 14-year period, 1960-1973.

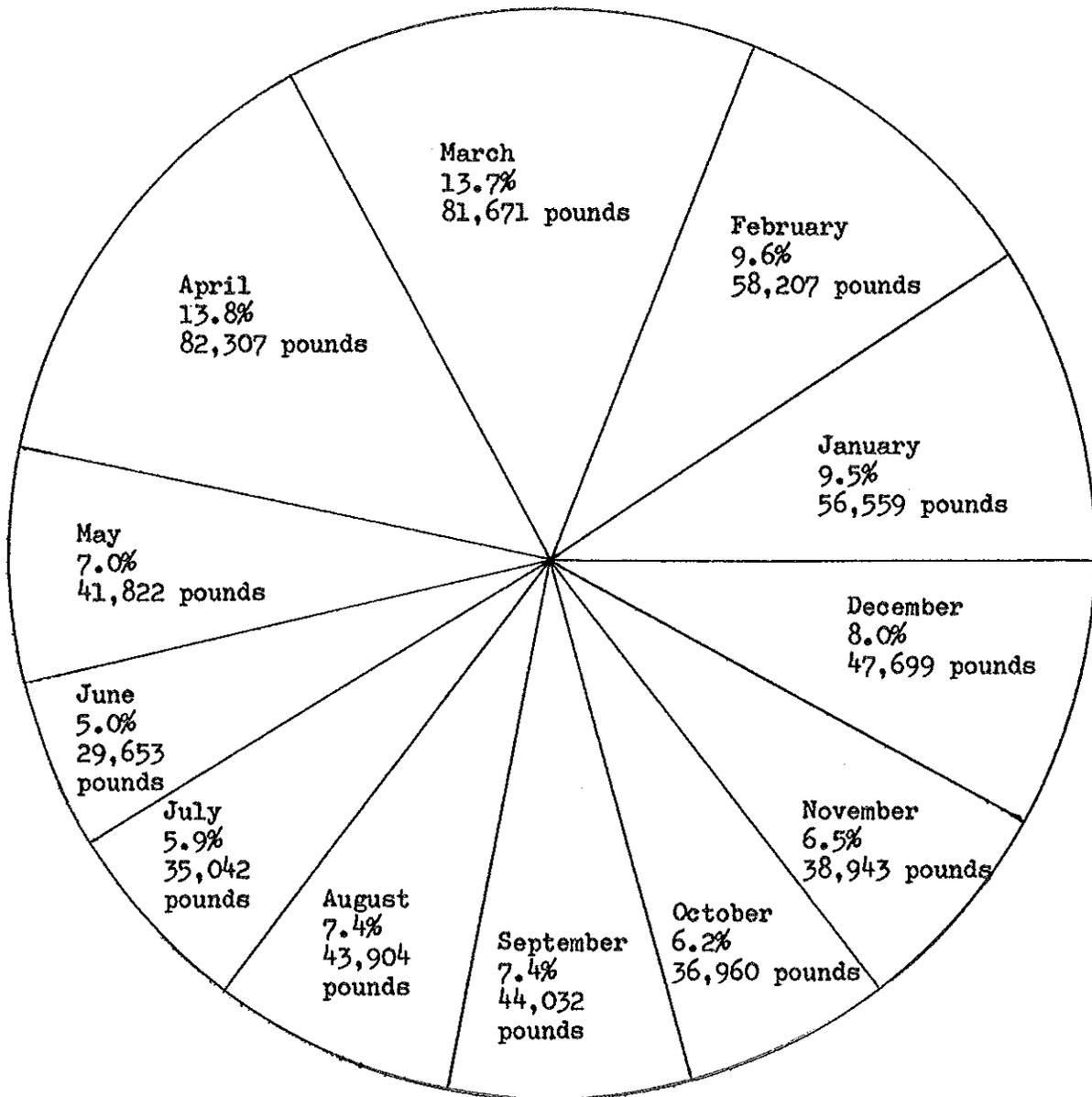


Figure 13. Average catch (pounds) of buffalo and percent of total by gear for the 14-year period, 1960-1973.

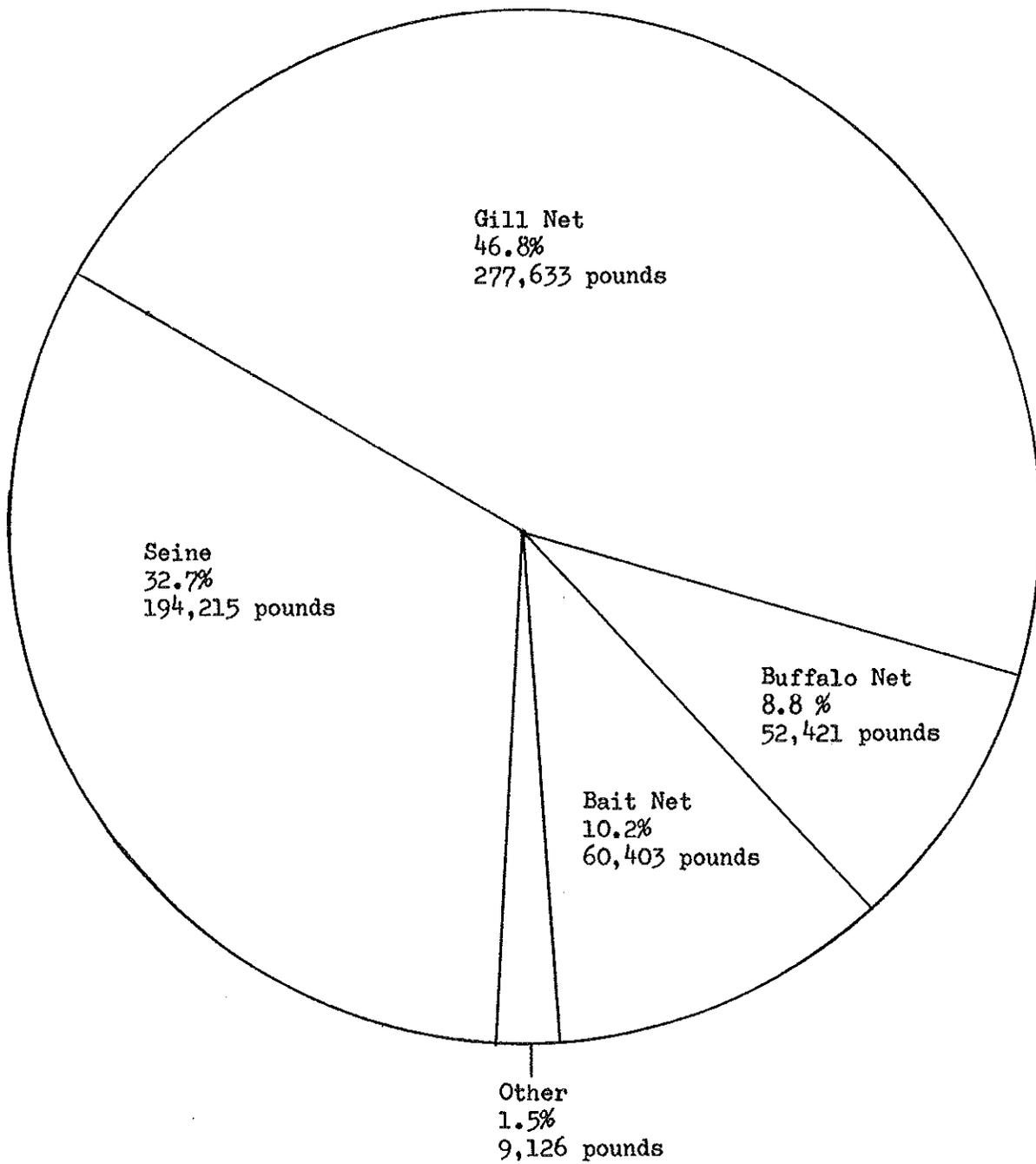


Figure 14a. Efficiency of gill net for buffalo by year.

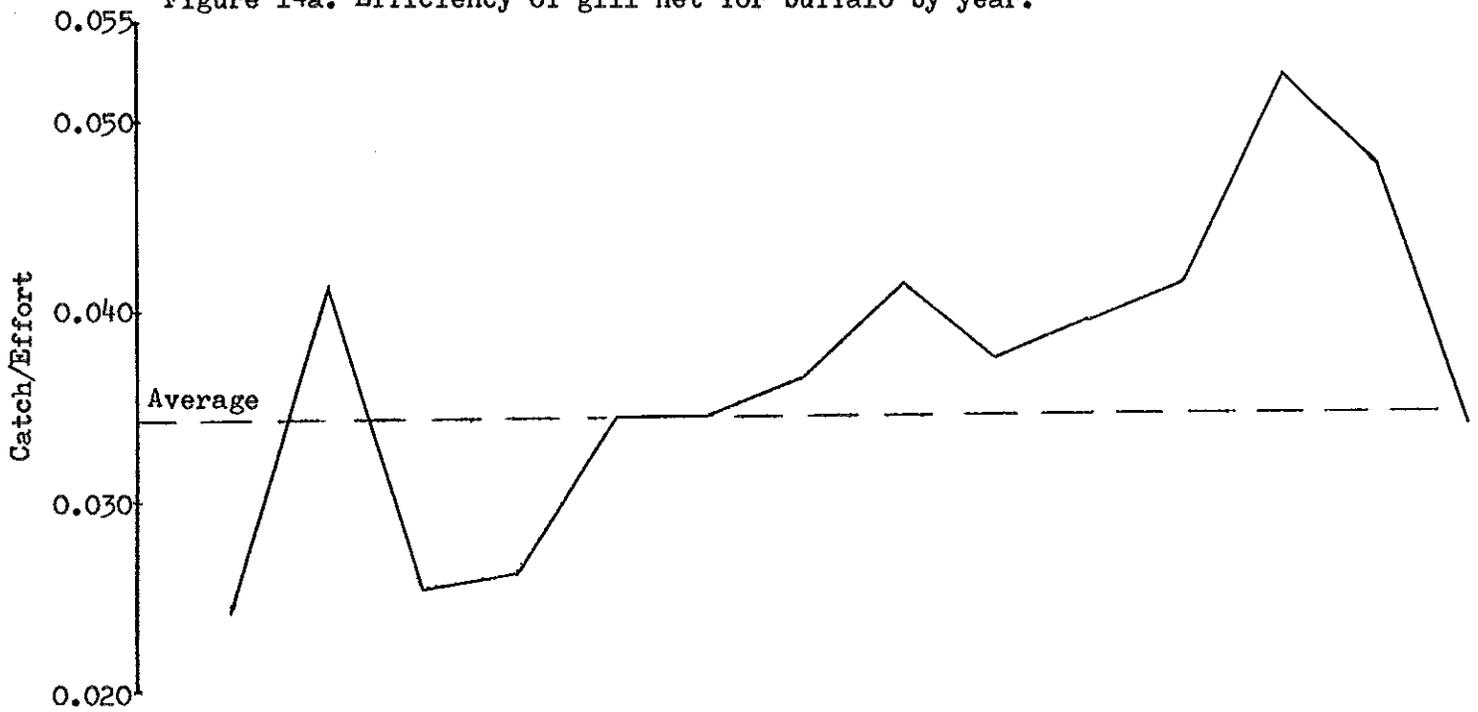


Figure 14b. Catch of buffalo with gill net by year.

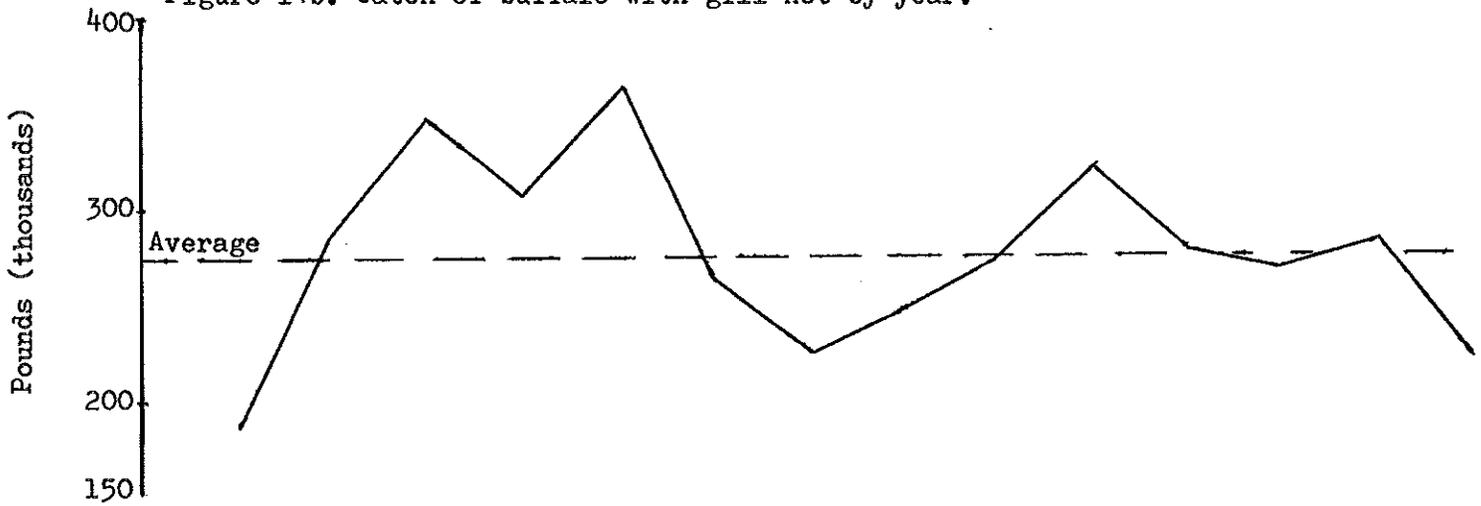
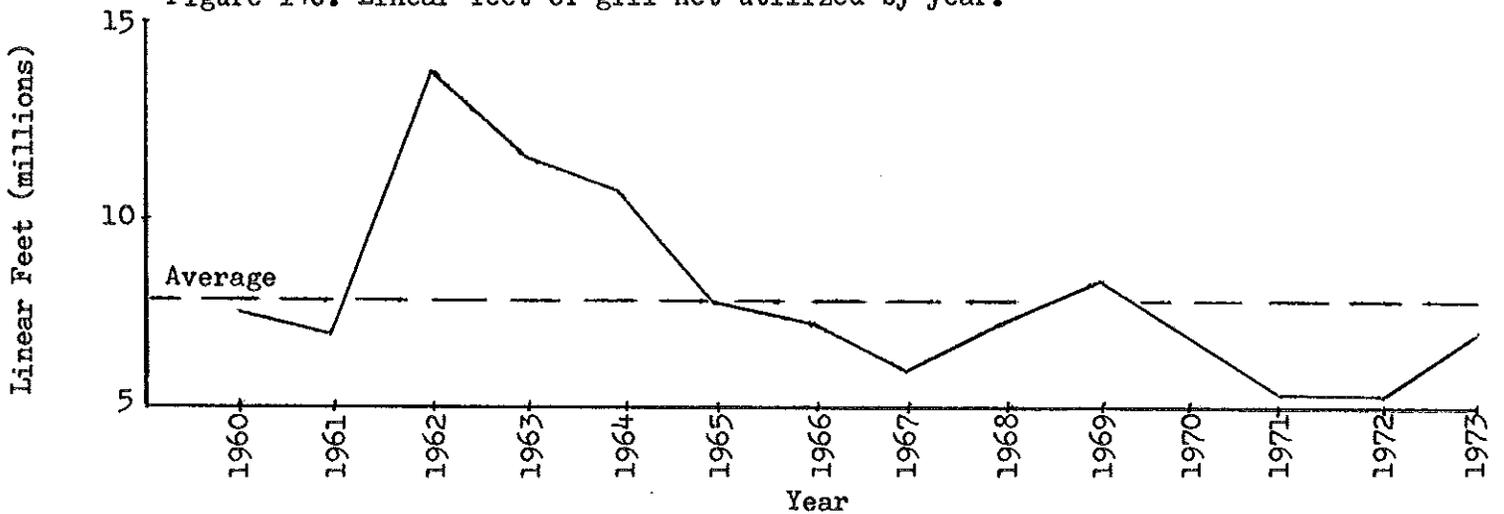


Figure 14c. Linear feet of gill net utilized by year.



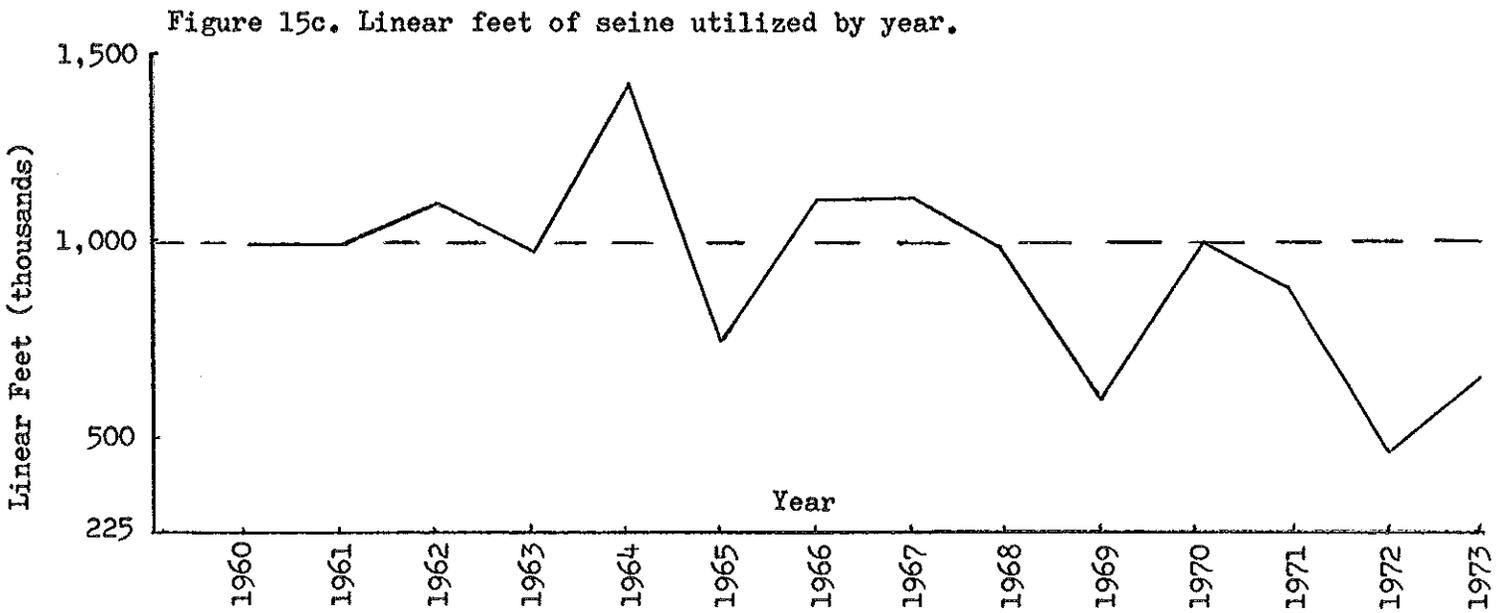
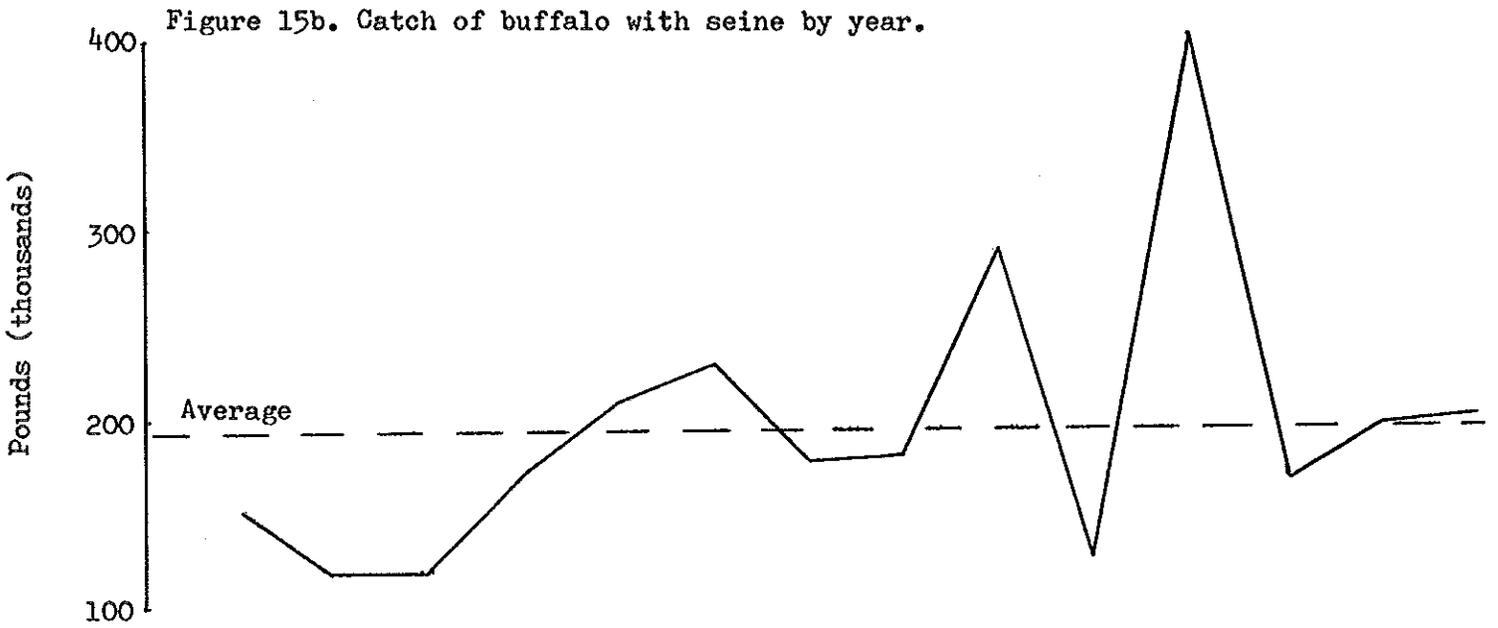
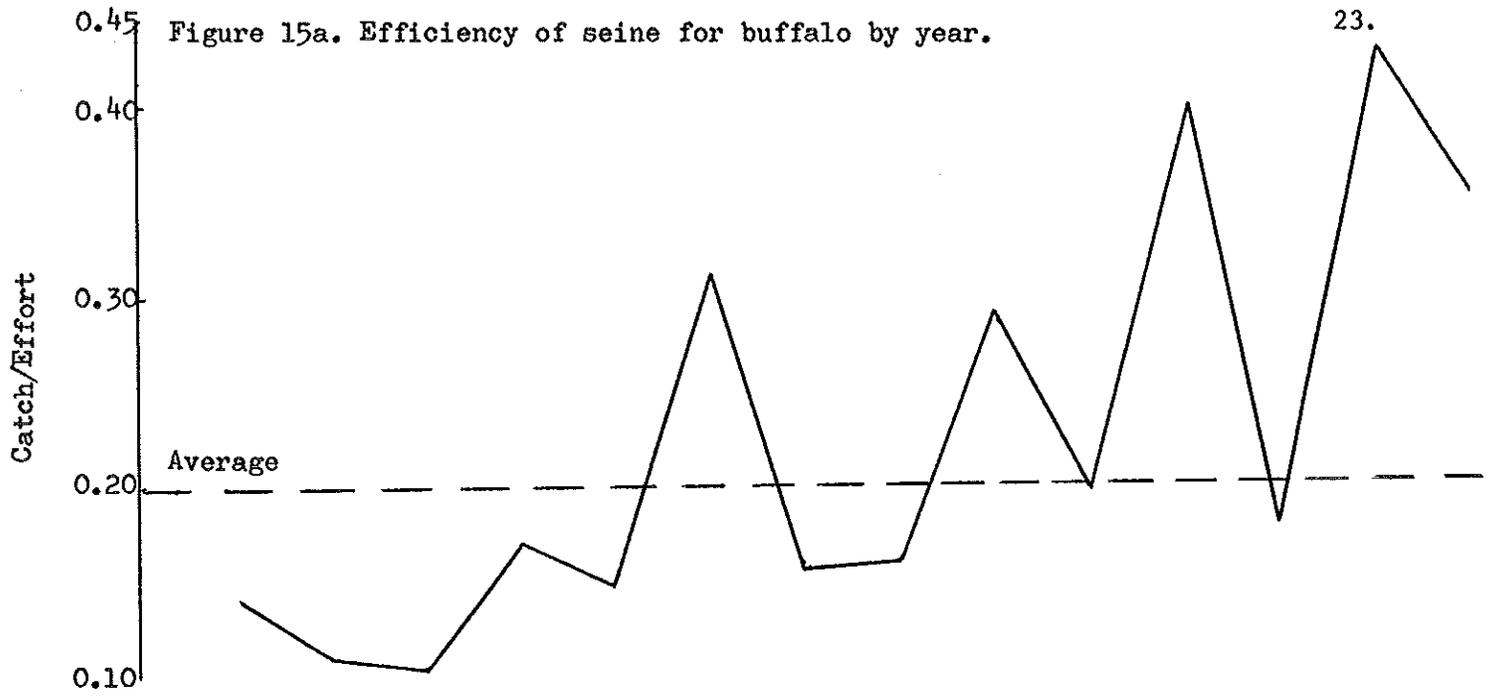


Figure 16. Pounds of freshwater drum harvested by year for the 14-year period, 1960-1973.

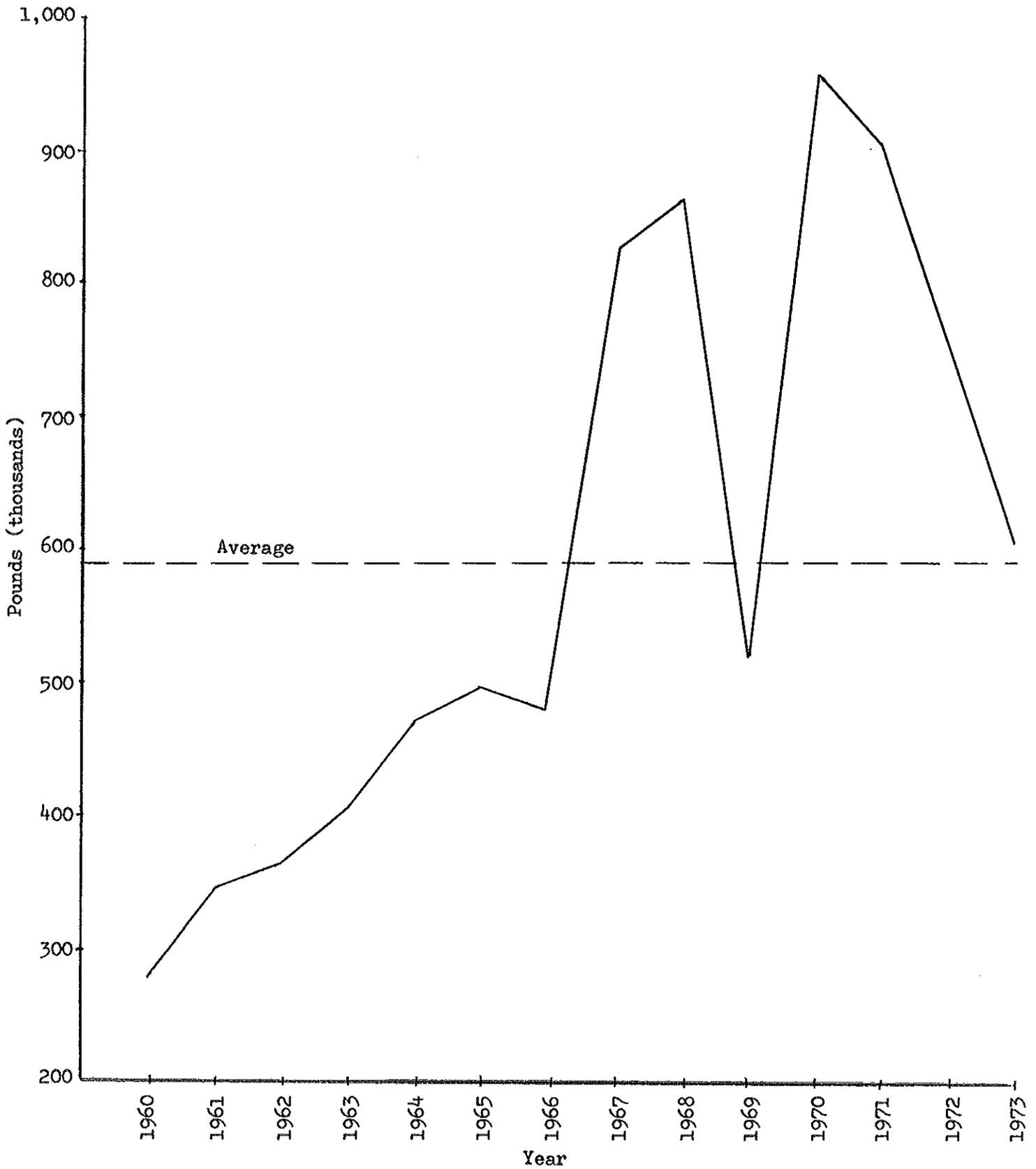


Figure 17. Average catch (pounds) of freshwater drum and percent total by pool for the 14-year period, 1960-1973.

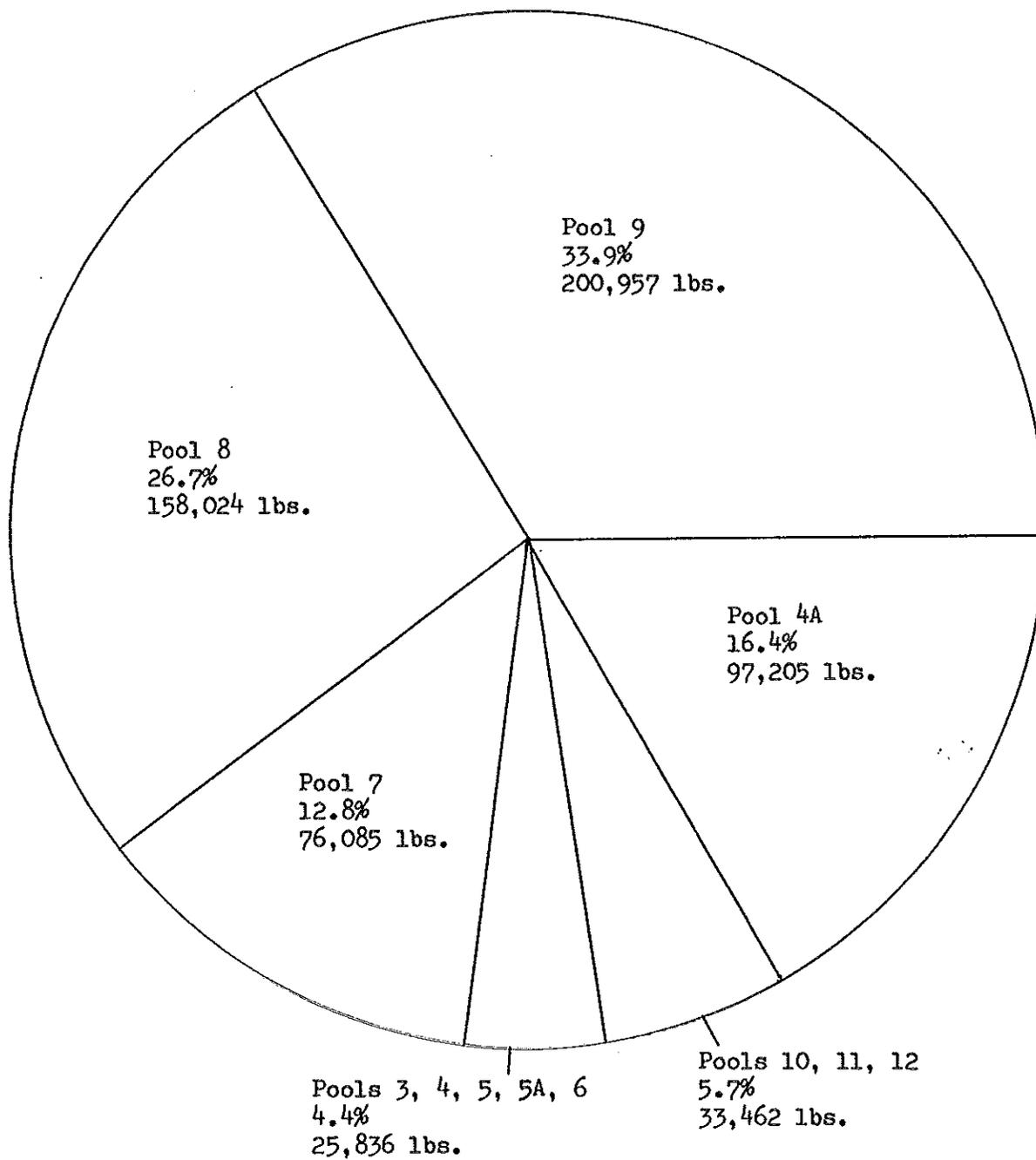


Figure 18. Average catch (pounds) of freshwater drum and percent of total by month for the 14-year period, 1960-1973.

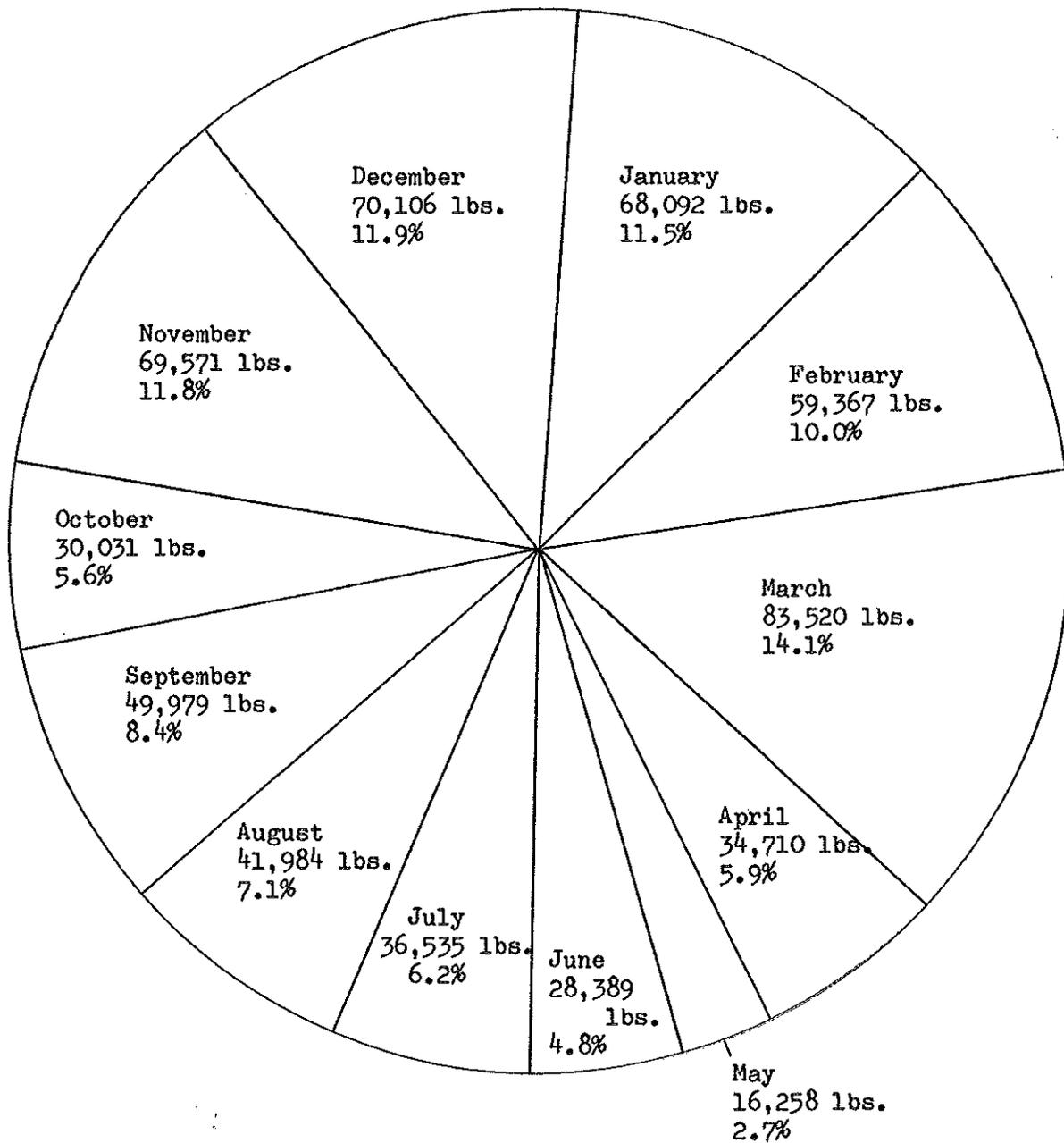


Figure 19. Average catch (pounds) of freshwater drum and percent of total by gear for the 14-year period, 1960-1973.

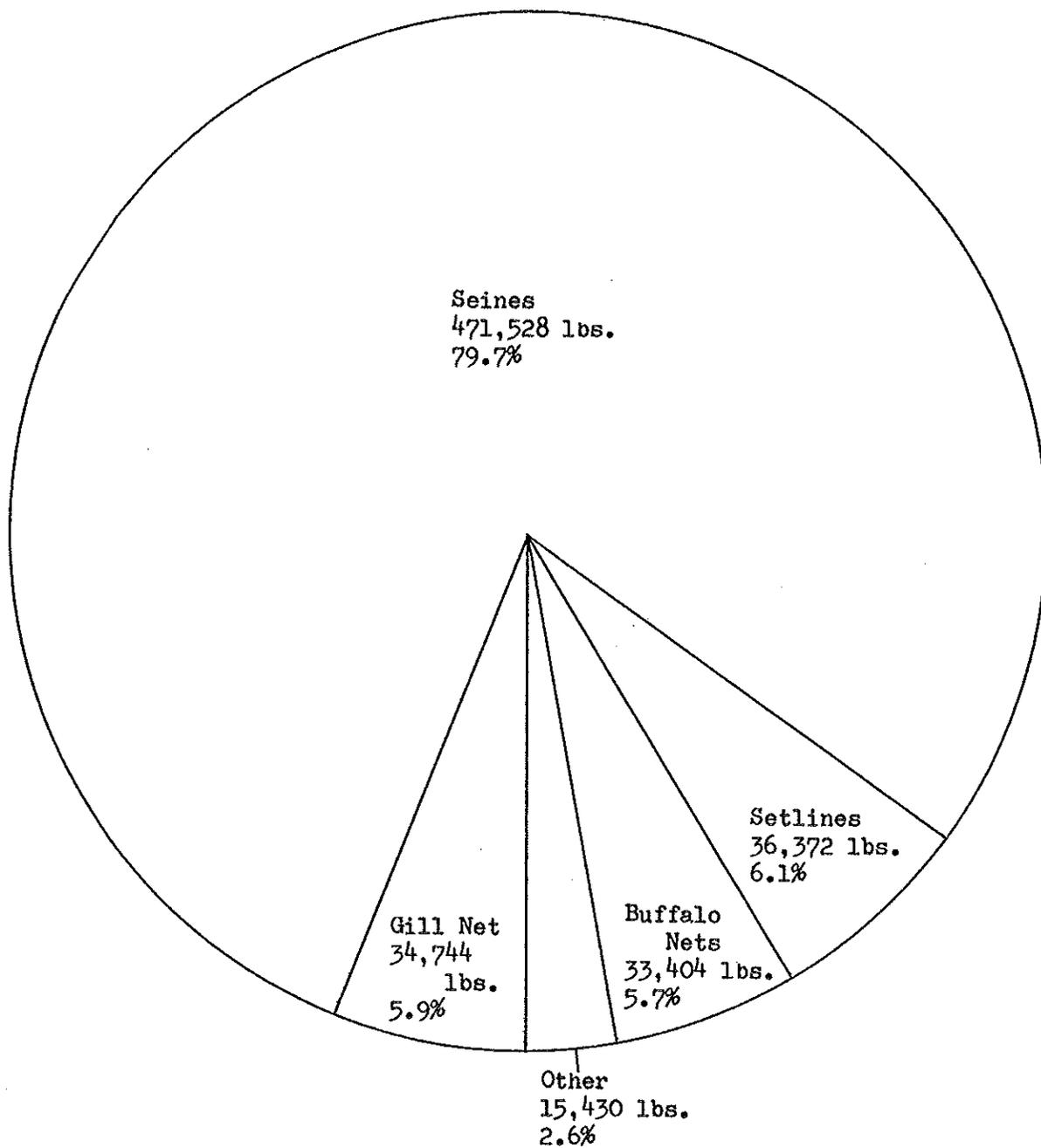


Figure 20a. Efficiency of seine for freshwater drum by year.

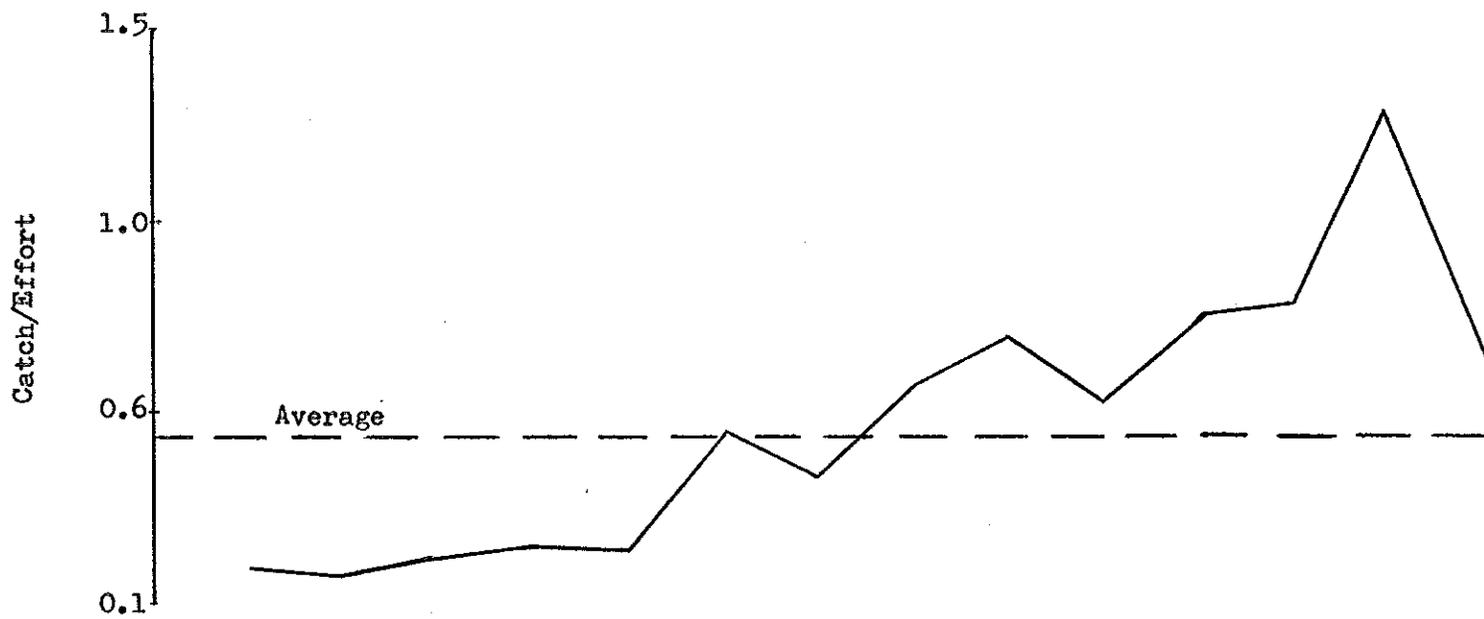


Figure 20b. Catch of freshwater drum with seine by year.

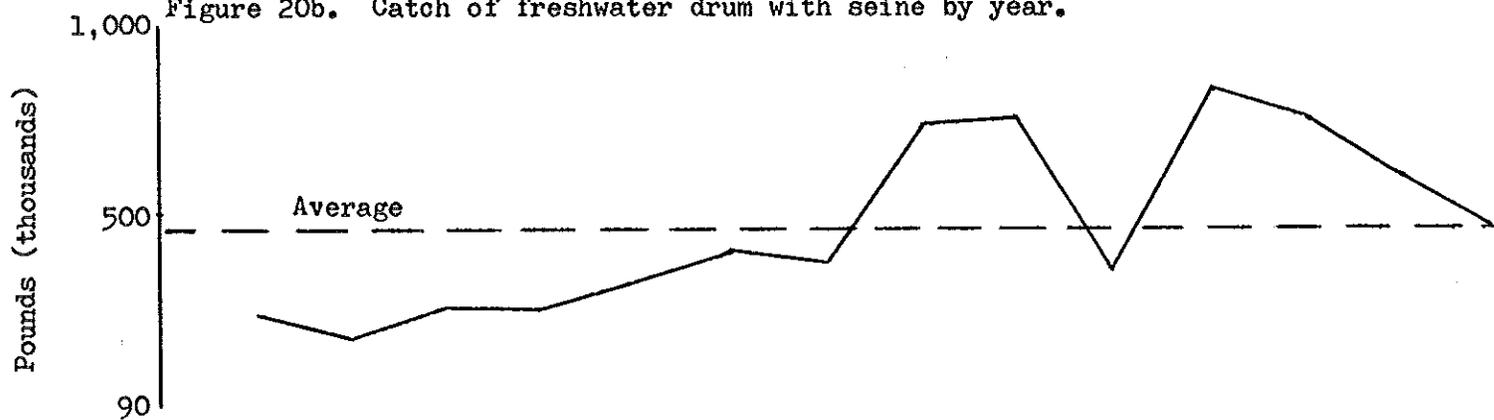


Figure 20c. Linear feet of seine utilized by year.

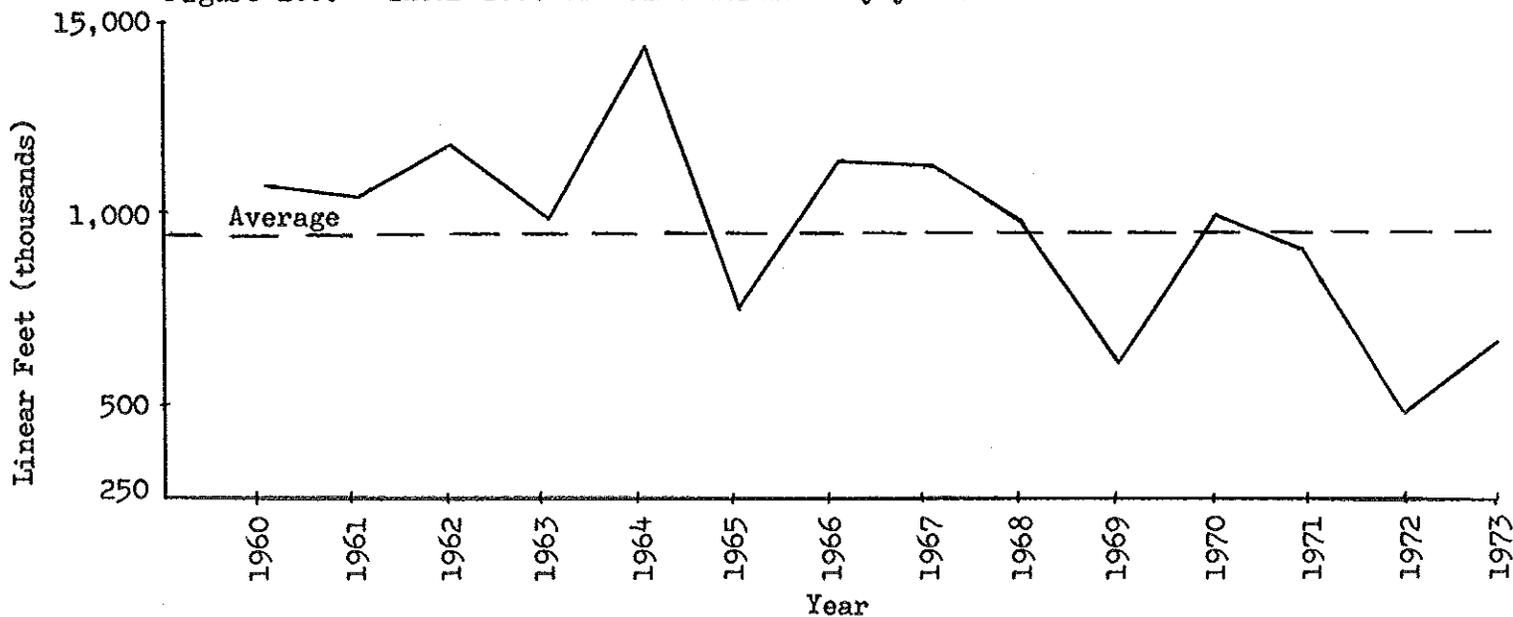


Figure 21. Pounds of catfish harvested by year for the 14-year period, 1960-1973.

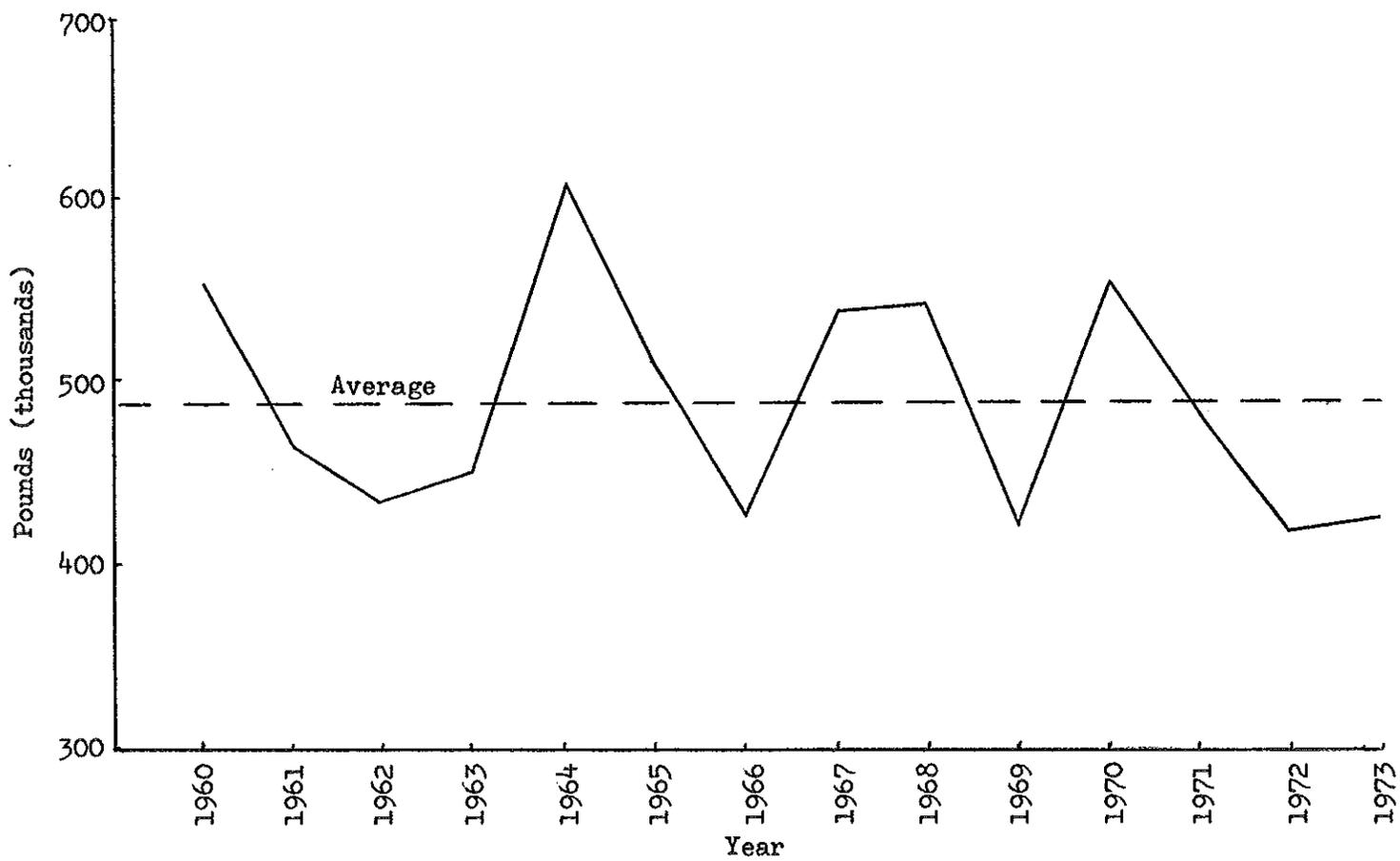


Figure 22. Average catch (pounds) of catfish and percent total by pool for the 14-year period, 1960-1973.

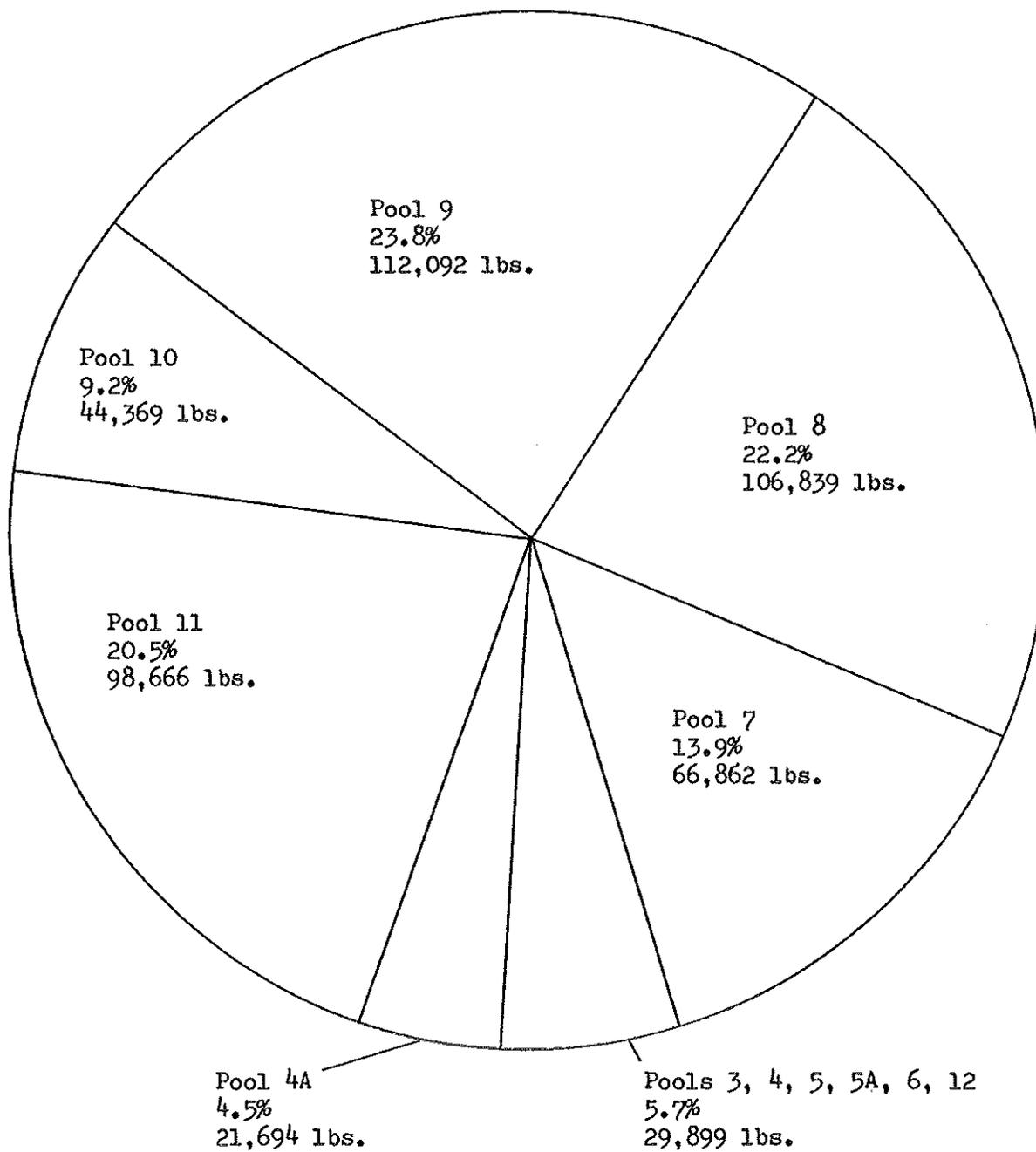


Figure 23. Average catch (pounds) of catfish and percent total by month for the 14-year period, 1960-1973.

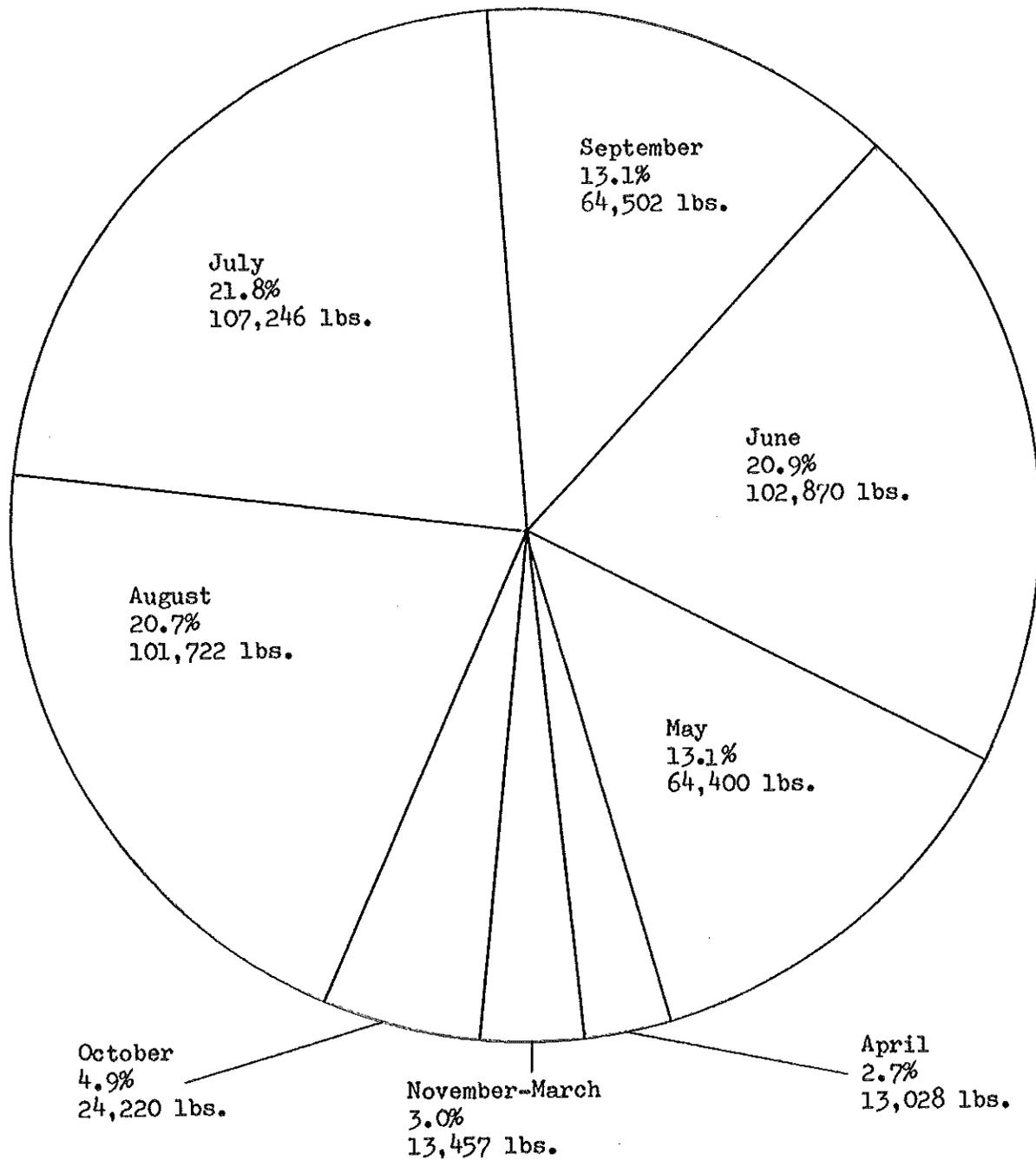


Figure 24. Average catch (pounds) of catfish and percent of total by gear for the 14-year period, 1960-1973.

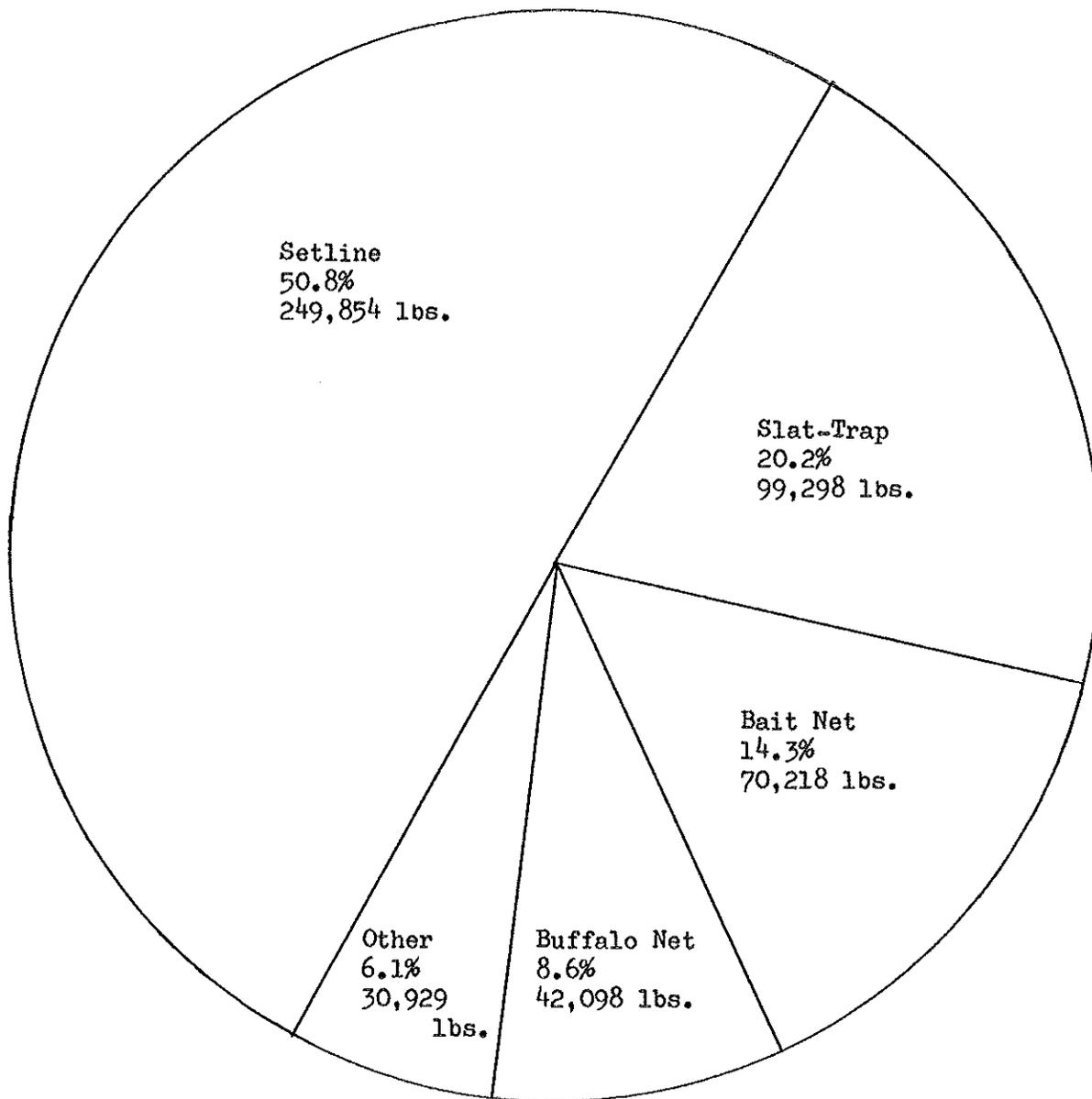


Figure 25a. Efficiency of setline for catfish by year.

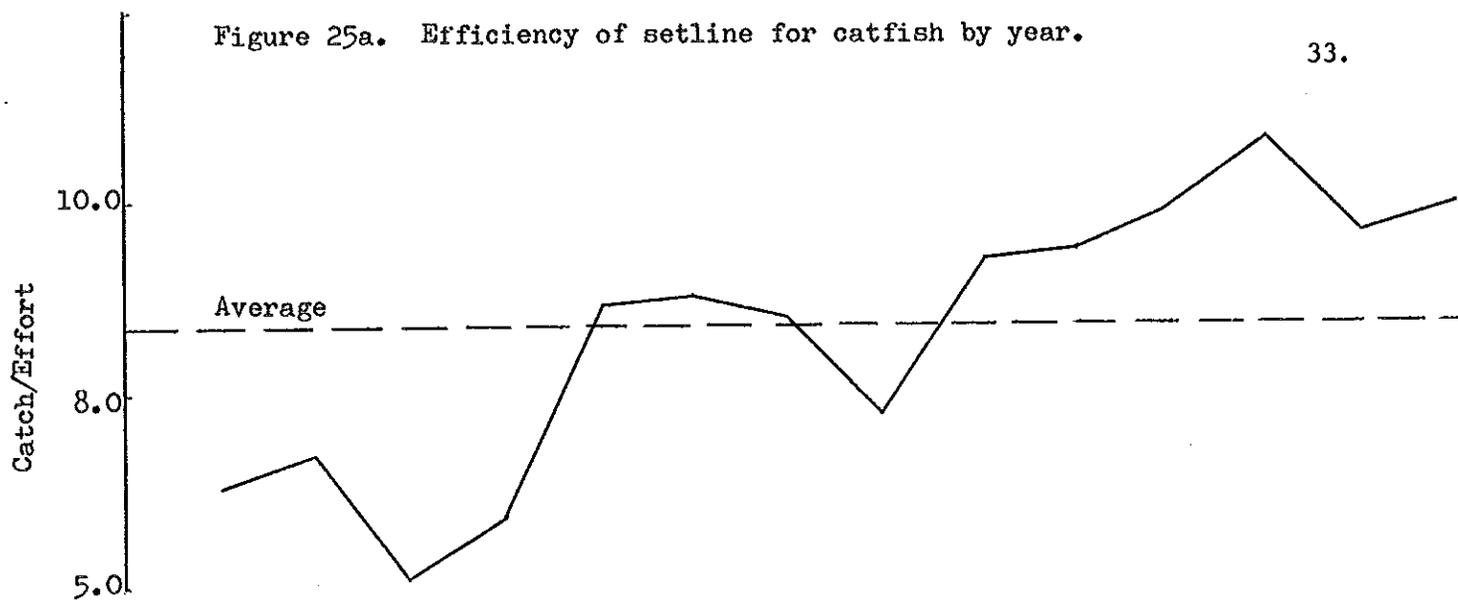


Figure 25b. Catch of catfish with setline by year.

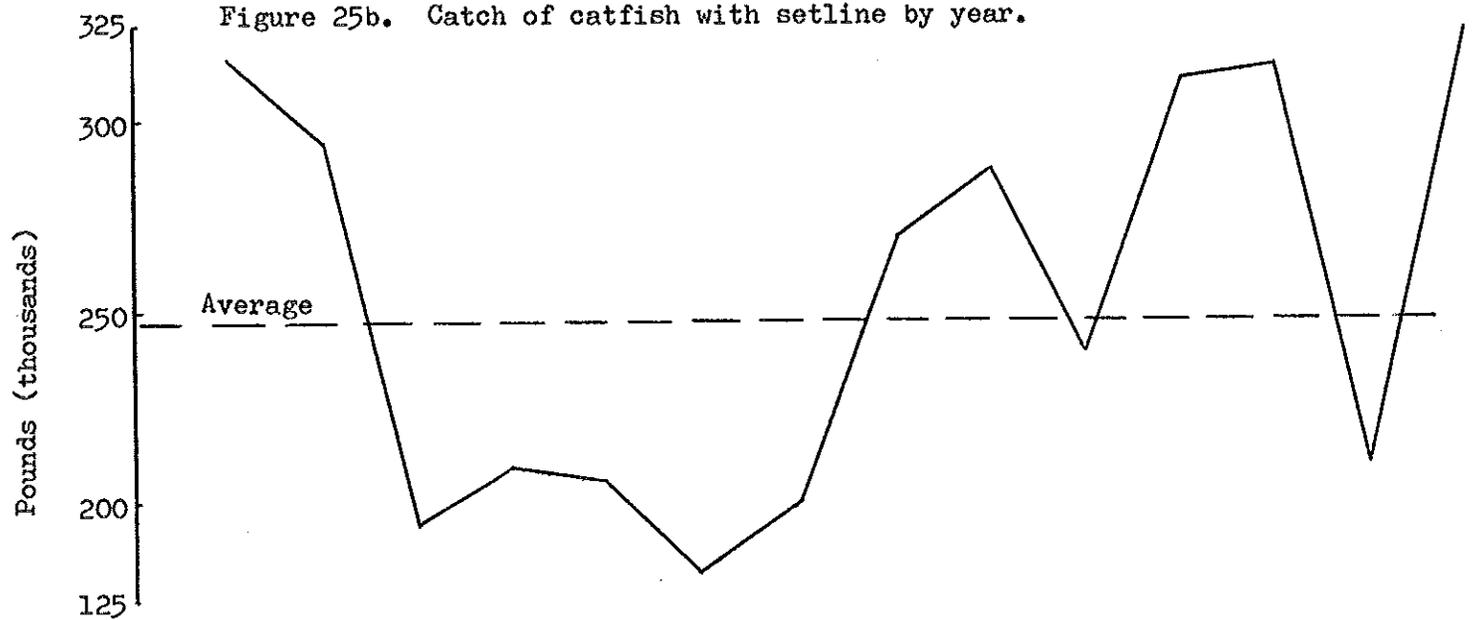


Figure 25c. Number of setlines utilized by year.

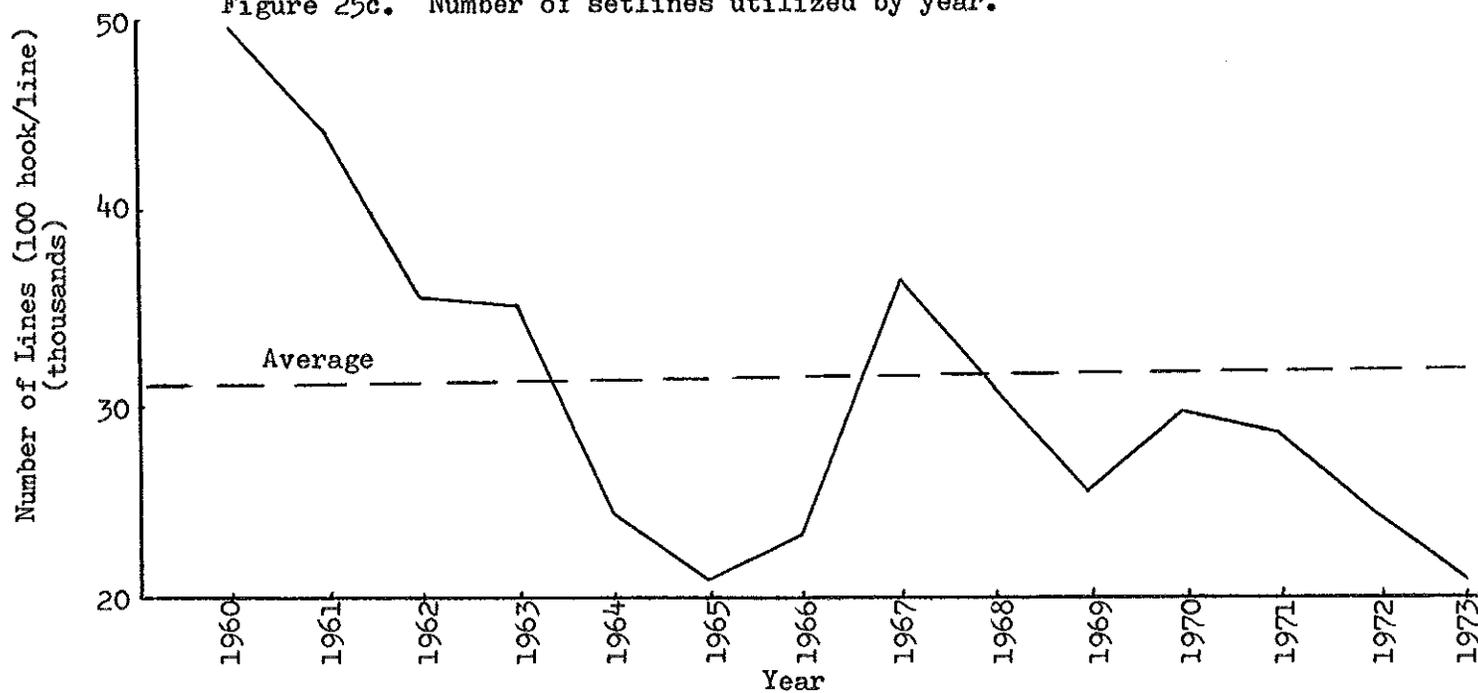


Figure 26a. Efficiency of slat nets for catfish by year.

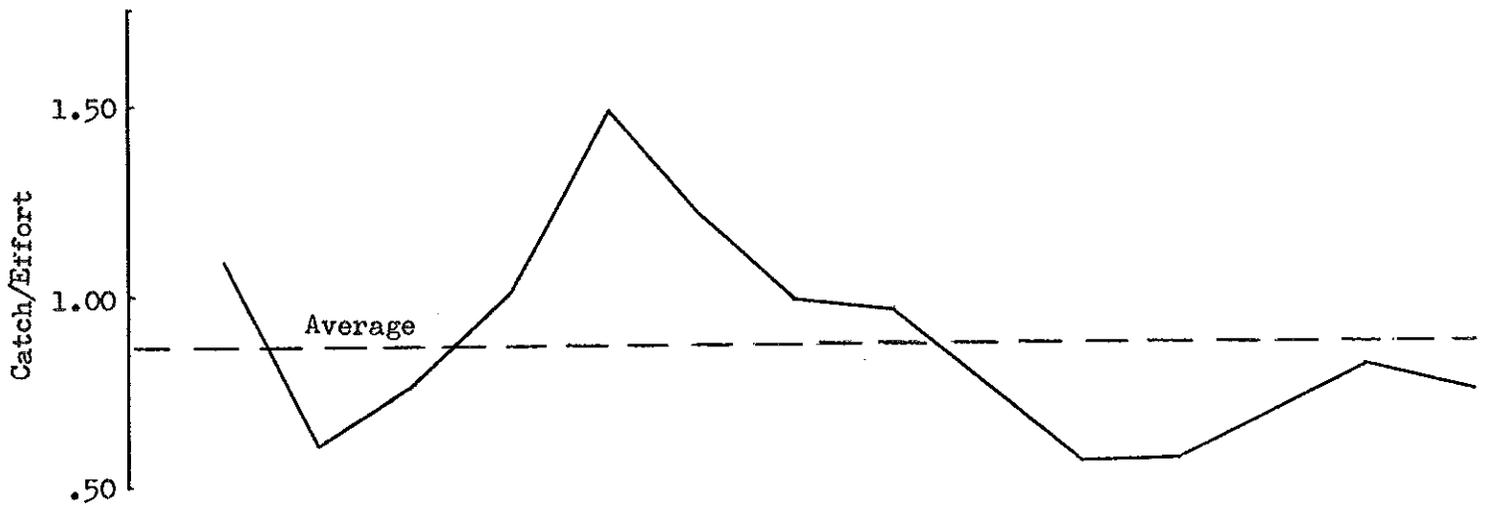


Figure 26b. Catch of catfish with slat nets by year.

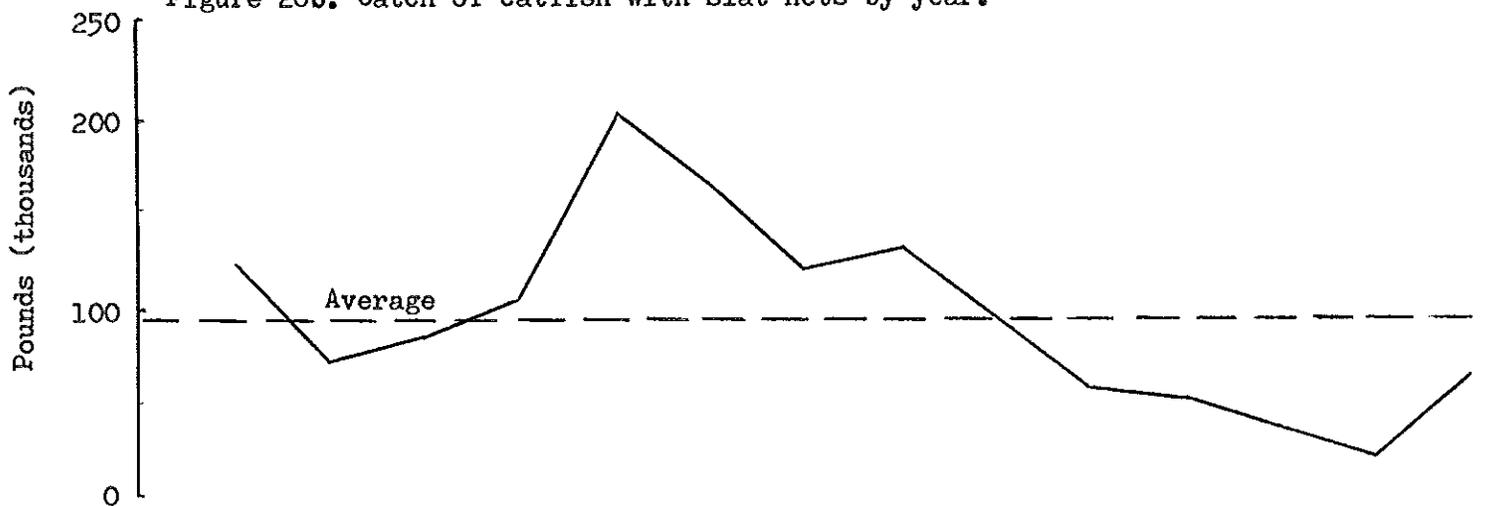


Figure 26c. Number of slat nets utilized.

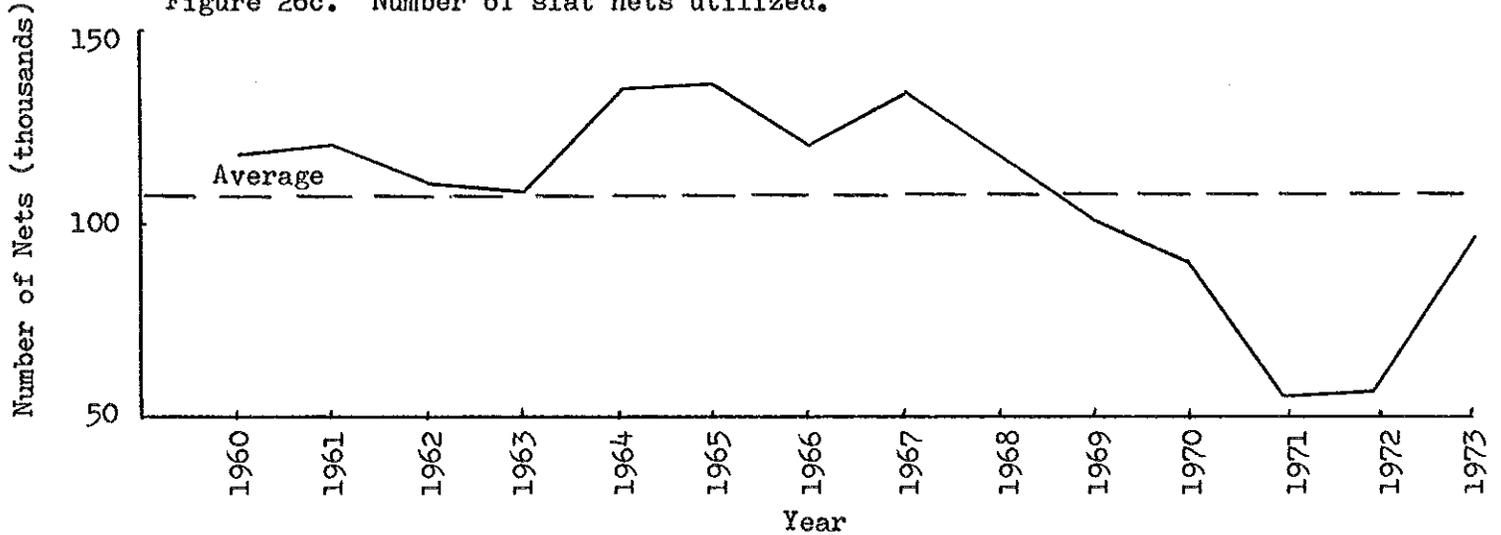


Figure 27a. Efficiency of bait nets for catfish by year.

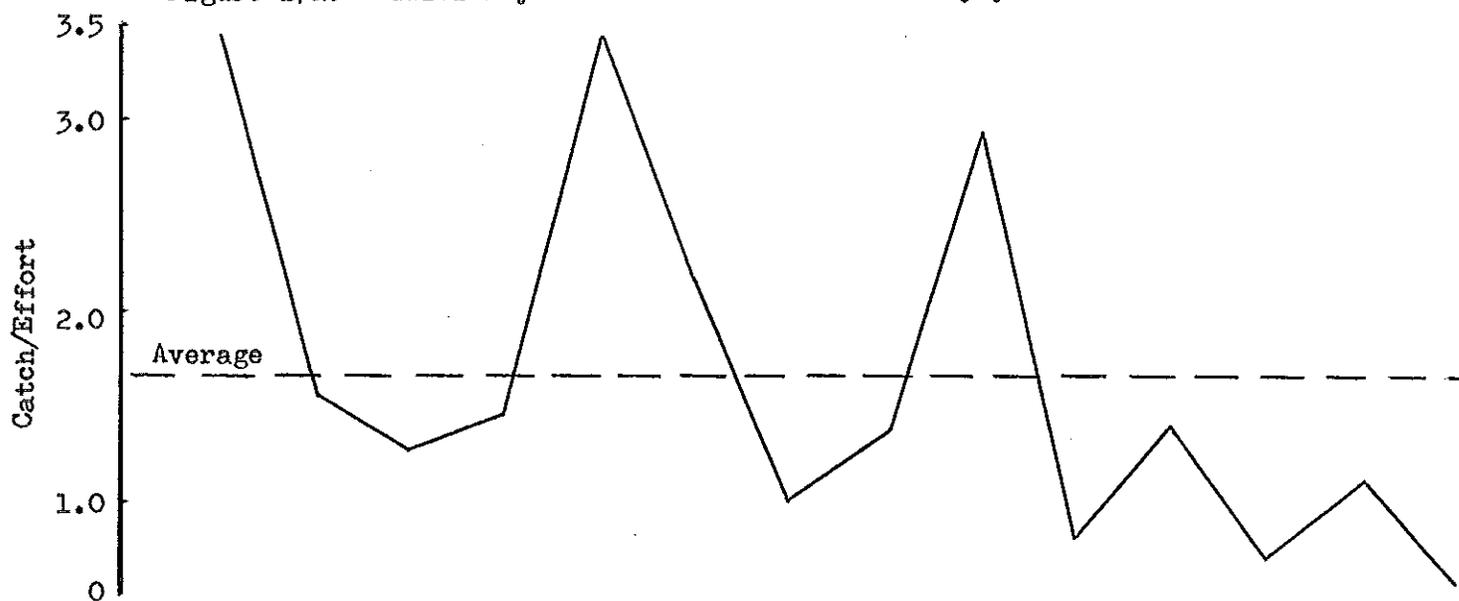


Figure 27b. Catch of catfish with bait nets by year.

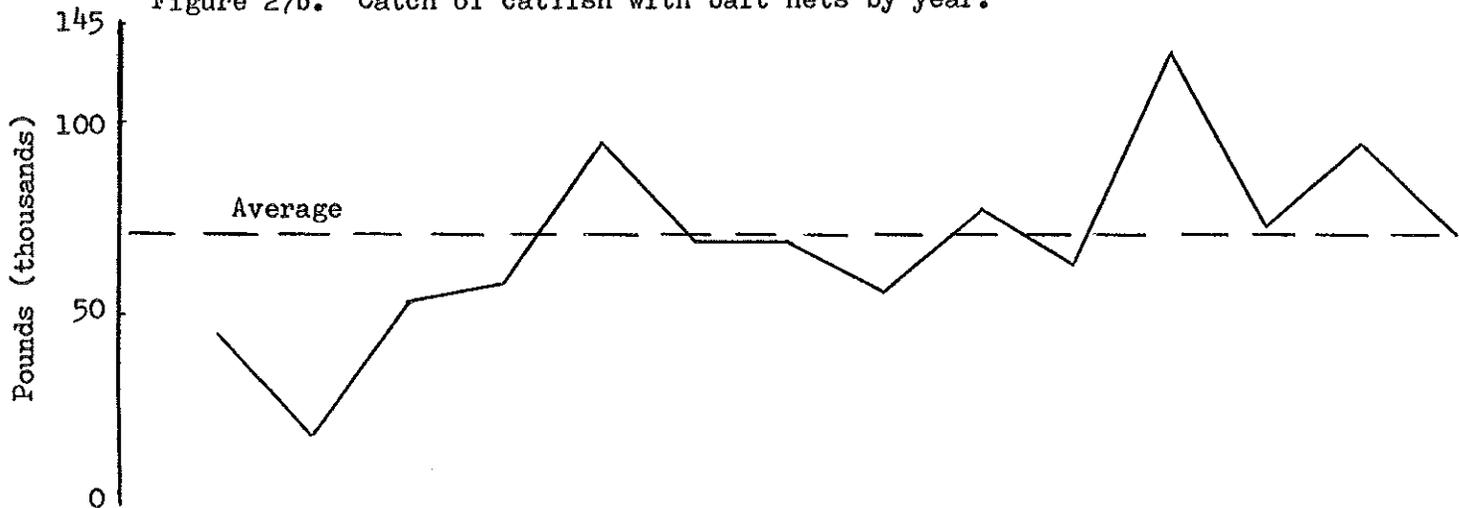


Figure 27c. Number of bait nets utilized by year.

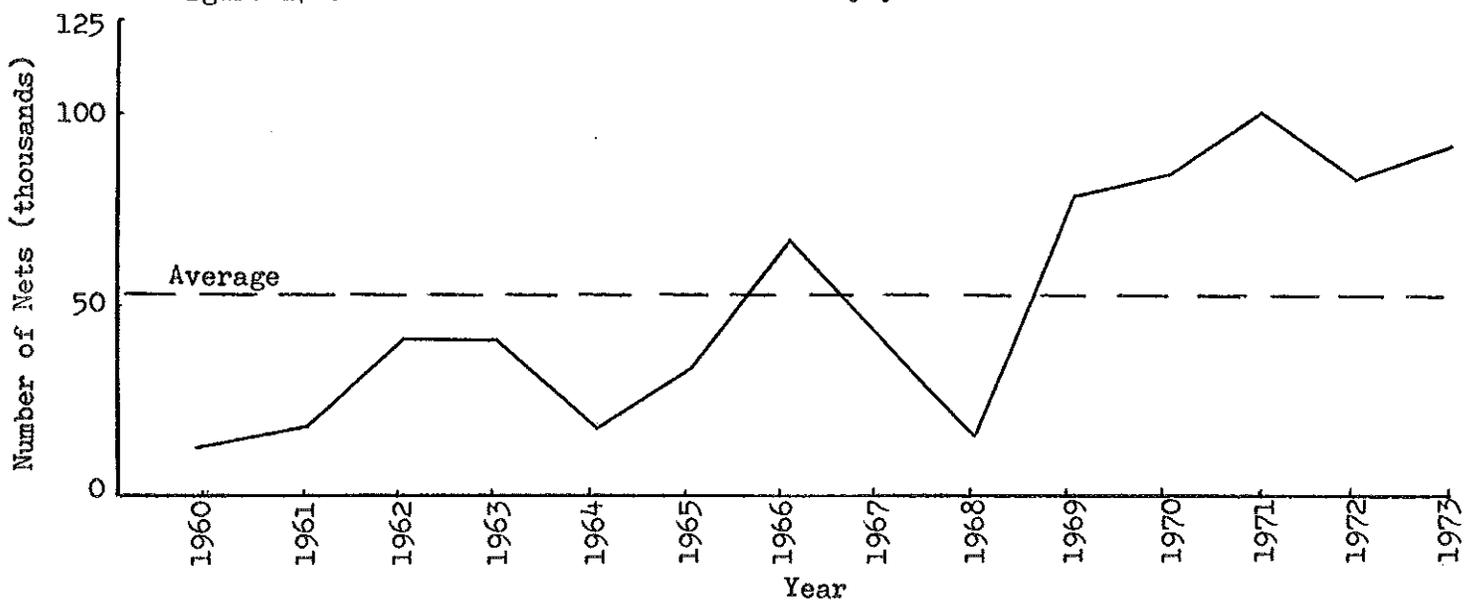


Figure 28. Pounds of bullhead harvested by year for the 14-year period, 1960-1973.

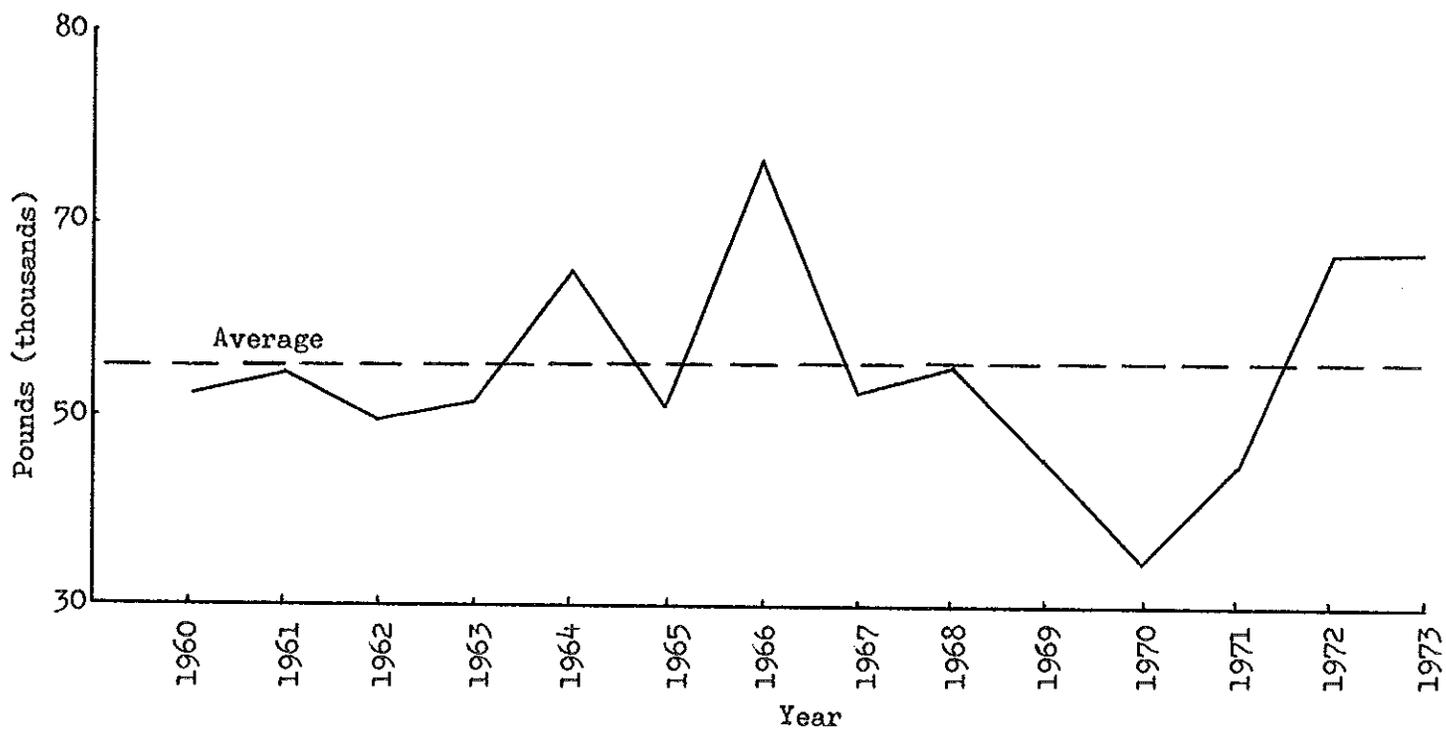


Figure 29. Average catch (pounds) of bullhead and percent of total by pool for the 14-year period, 1960-1973.

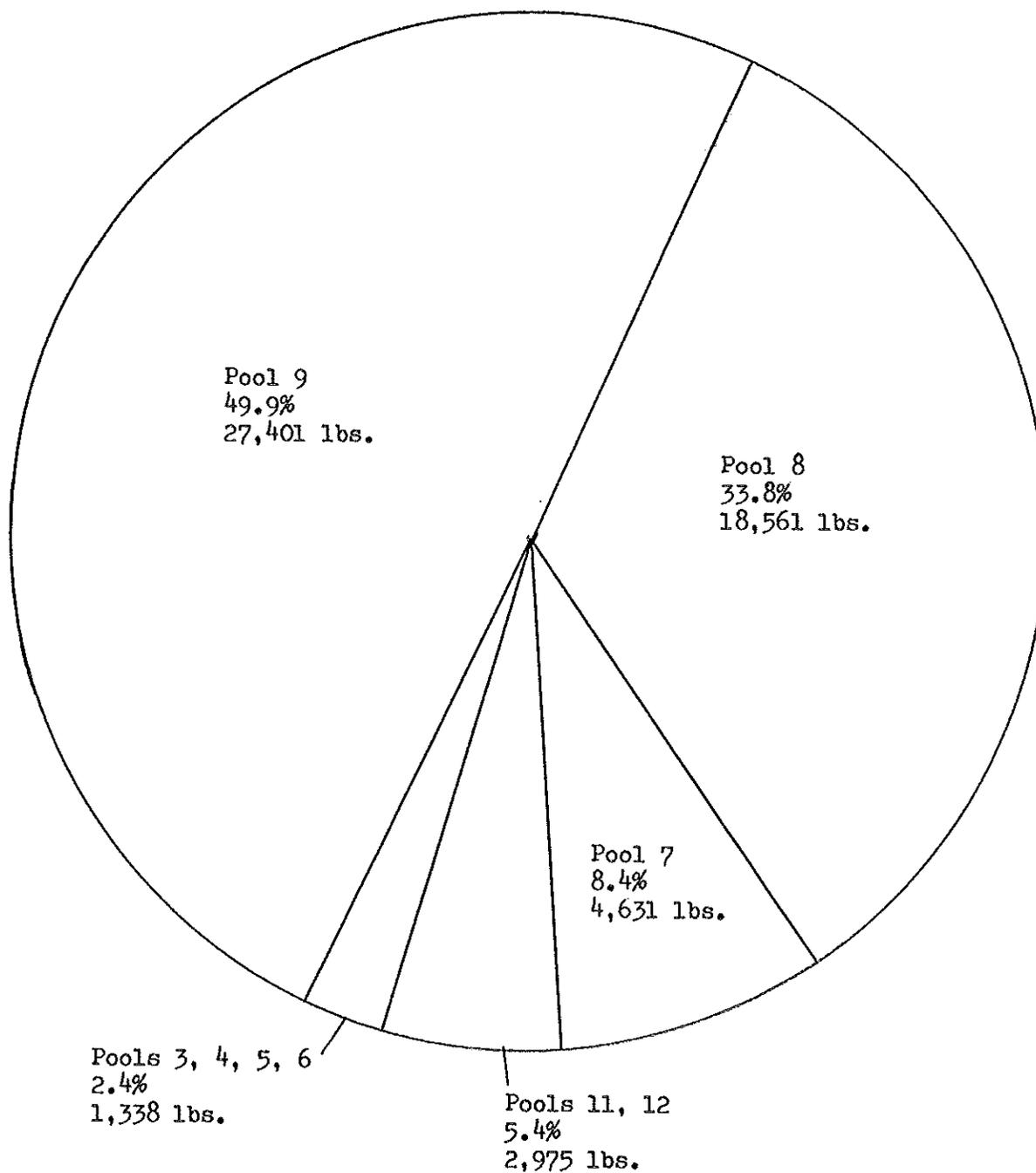


Figure 30. Average catch (pounds) of bullhead and percent of total by month for the 14-year period, 1960-1973.

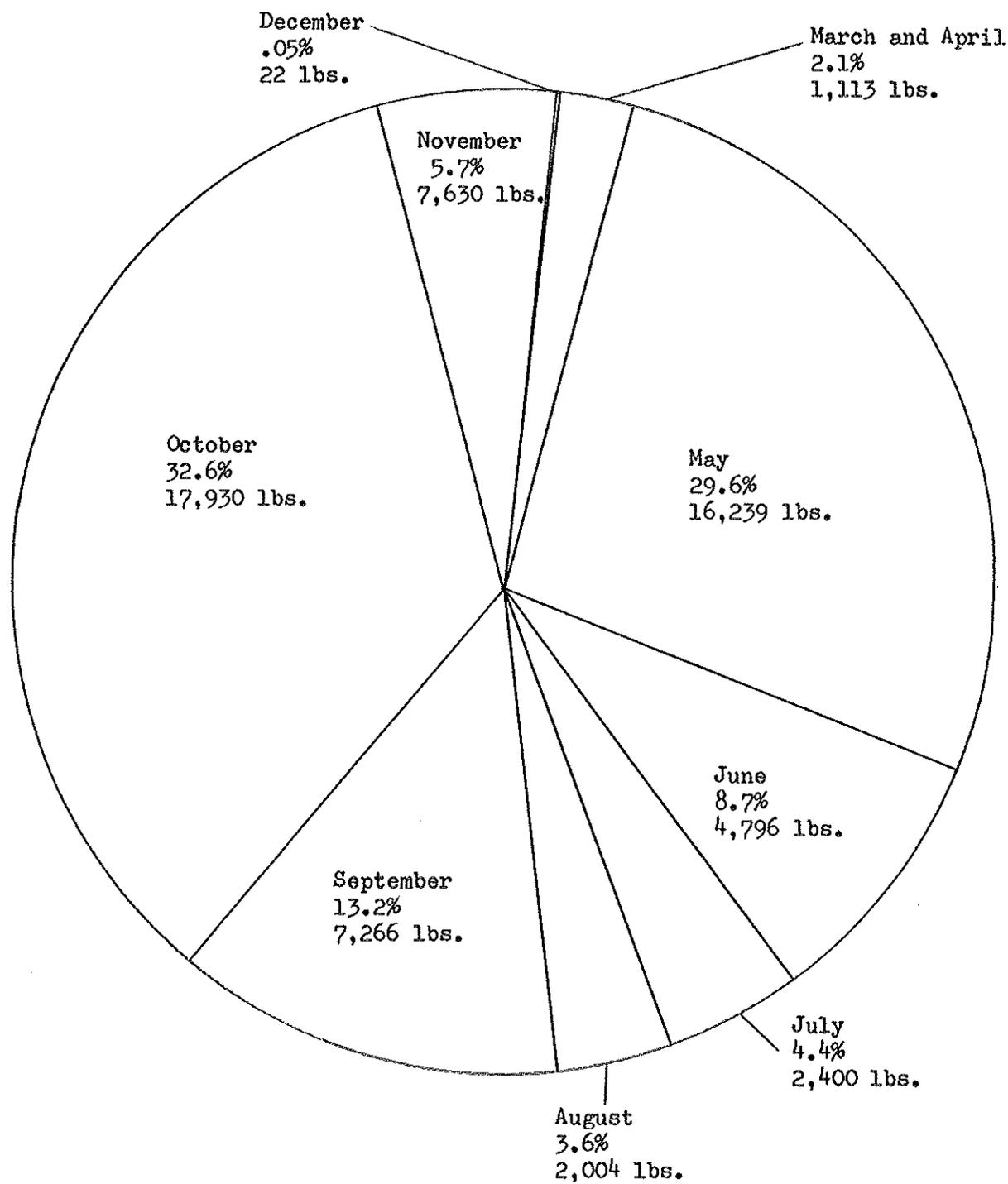


Figure 31. Average catch (pounds) of bullhead and percent of total by gear for the 14-year period, 1960-1973.

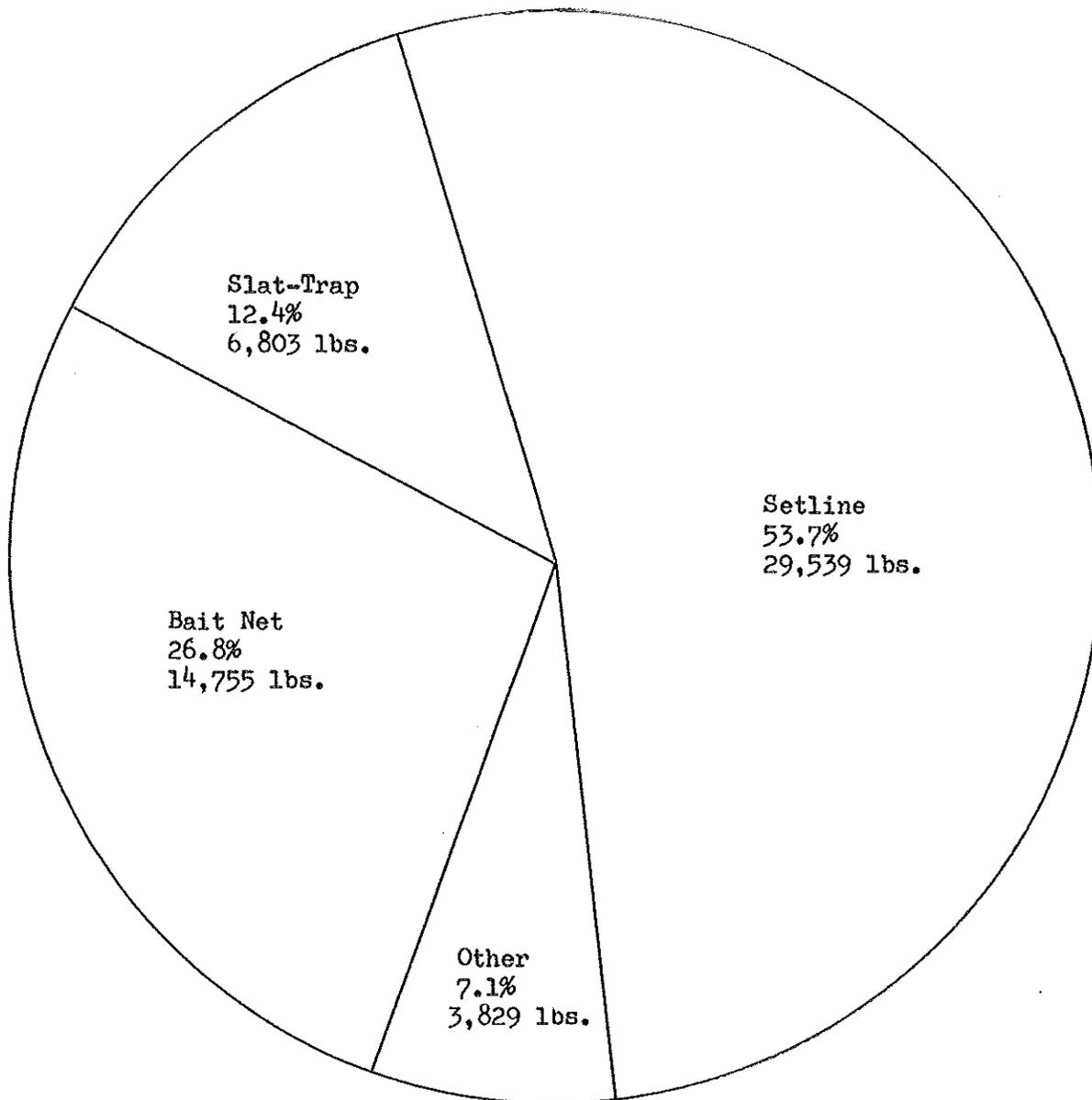


Figure 32a. Efficiency of setlines for bullhead by year.

Catch/Effort

Average

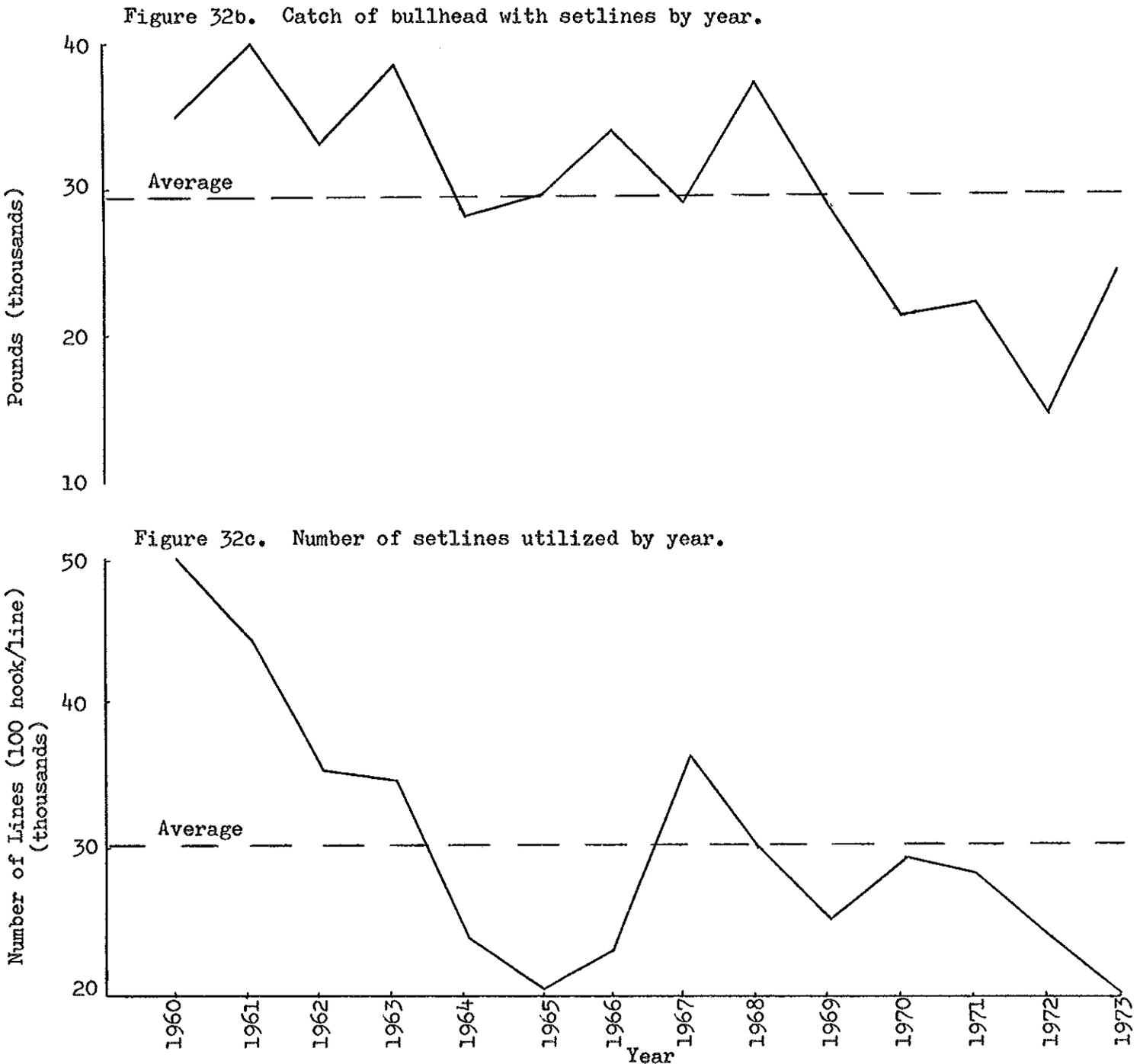


Figure 32b. Catch of bullhead with setlines by year.

Pounds (thousands)

Average



Figure 32c. Number of setlines utilized by year.

Number of Lines (100 hook/line)
(thousands)

Average

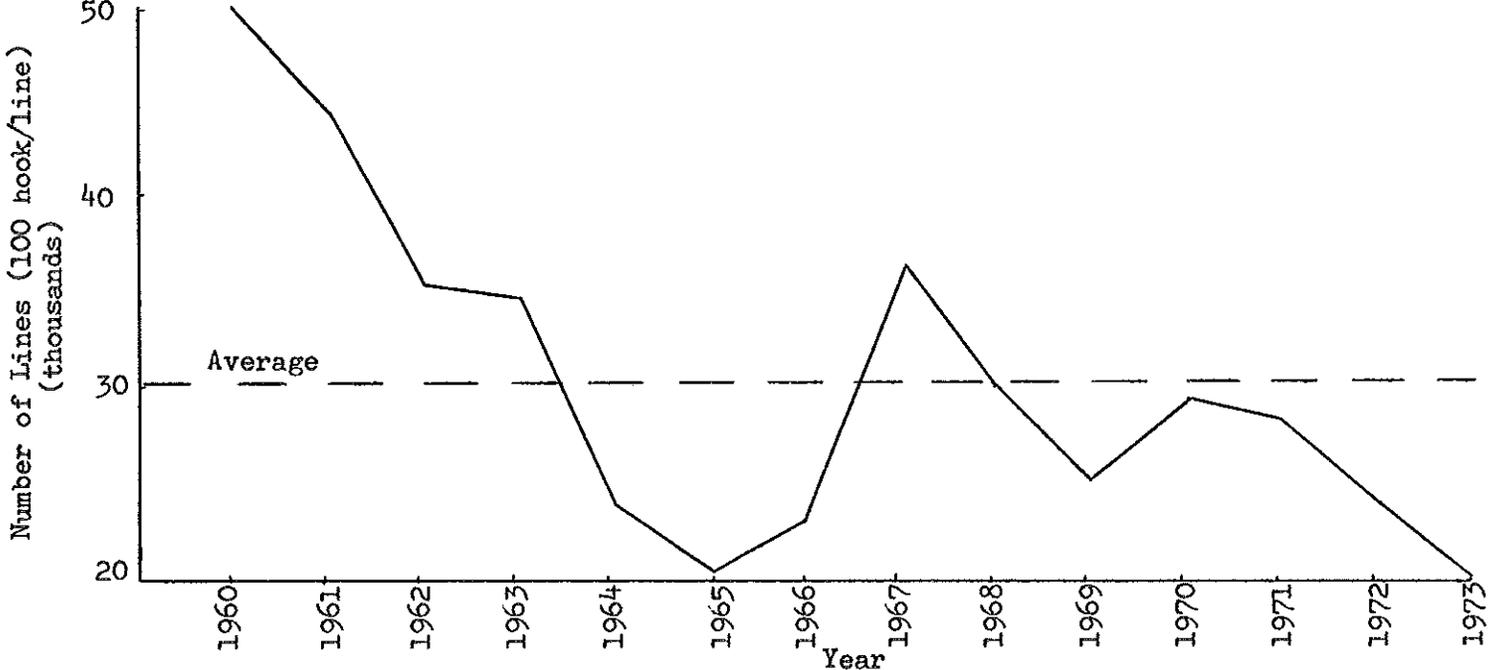


Figure 33a. Efficiency of bait nets for bullheads by year.

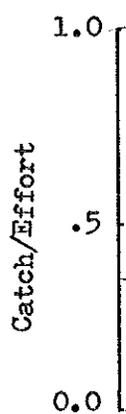


Figure 33b. Bullhead catch, 1960-1973.

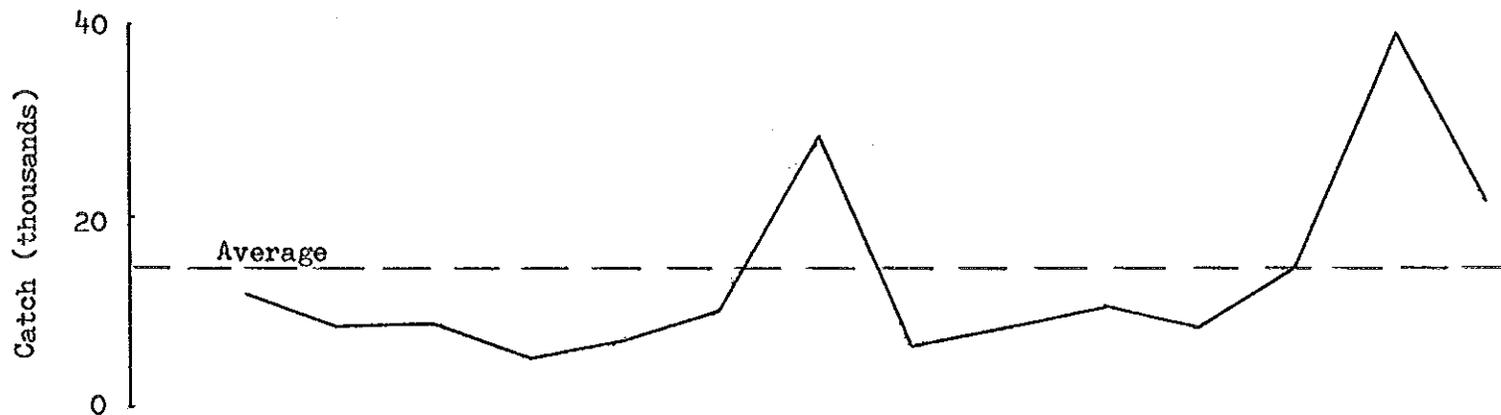
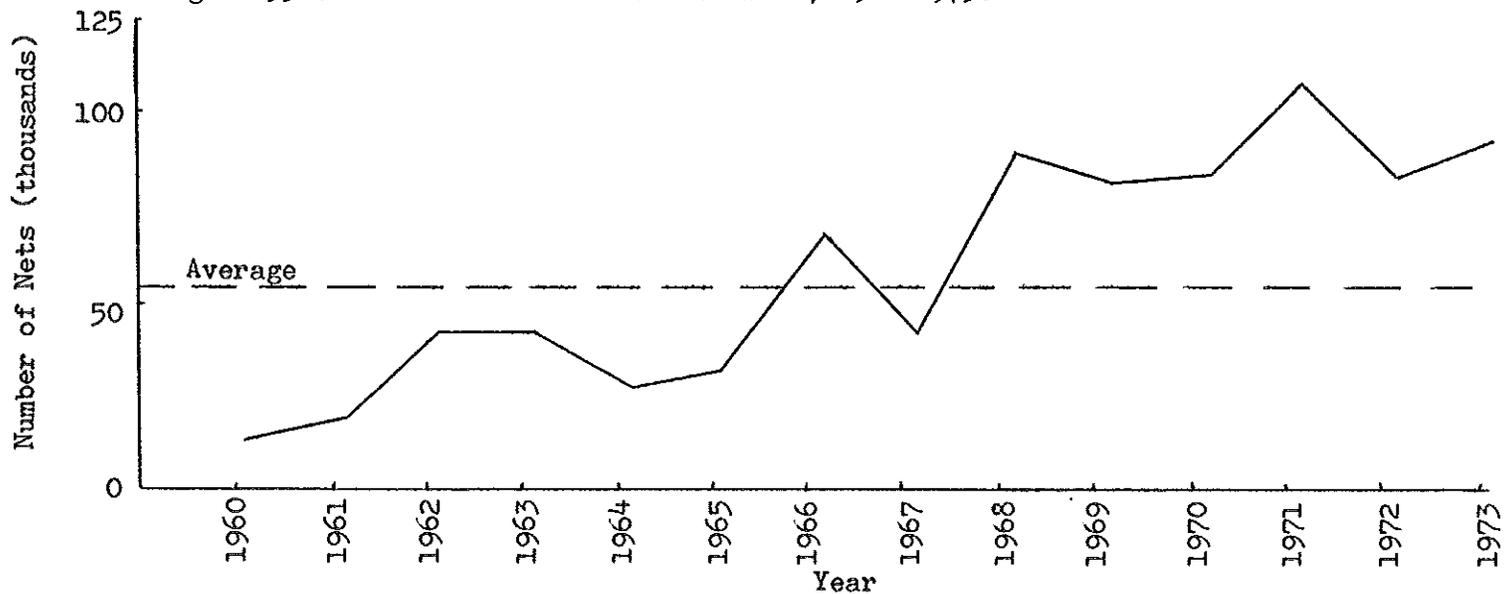


Figure 33c. Number of bait nets utilized, 1960-1973.



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