8SA/TSB-20

MERCURY CONCENTRATIONS IN FISH IN LAKE OAHE, SOUTH DAKOTA

APRIL 16 to SEPTEMBER 27, 1972

TECHNICAL SUPPORT BRANCH

SURVEILLANCE AND ANALYSIS DIVISION

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION VIII

June, 1973

ACKNOWLEDGEMENT

This report is the final product of a joint state and federal endeavor involving the Environmental Protection Agency, Food and Drug Administration, Bureau of Sport Fisheries and Wildlife, South Dakota State Health Department and South Dakota Department of Game Fish and Parks. The assistance of the following personnel is also acknowledged: Mr. Marv Allum, State Health Department, coordination of state imput; Mr. Bob Hanten and staff, State Game Fish and Parks, assistance in survey planning and collection of control fish from Lake Enemy Swim; Mr. Fred June and staff, Bureau Sport Fisheries and Wildlife, assistance in survey planning and fish collection; Messrs Gerald Kaiser, Lee Ischinger and Tom Nelapa NFIC-Cincinnati, EPA, assistance in fish collection and Messrs Ron Eddy, Wayne Swallow, Mike Fillinger and Bill Warner, Region VIII EPA, assistance in fish collection and data preparation; Mr. Tom Entzminger, EPA, Region VIII, computer programming and statistical analysis. Mr. Loys Parrish, EPA Region VIII coordinated the study and prepared the final report.

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INTRODUCTION

This report presents the results of intensive surveys conducted during the period of April 16 to September 27, 1972, to determine the mercury content of sports fish in Oahe Reservoir, South Dakota. The survey was initiated at the recommendation of the conferees to the Enforcement Conference in the Matter of Pollution of the Navigable Waters of Western South Dakota, convened on October 19, 1971 in Rapid City, South Dakota.

Mercury contamination of the environment was discovered to be an important problem in the United States in the early part of 1970. Subsequent to the initial identification of the problem, State and Federal Governments conducted industrial surveys to identify mercury users, to determine their impact on the environment and to initiate waste controls. These surveys revealed gold mining operations as one of the significant producers of mercury laden wastes. The Homestake Mining Company, Lead-Deadwood mill in South Dakota, used mercury in its gold mining processes from the latter part of the nineteenth century to early 1971. Wastes from the mining operation are discharged to Whitewood Creek which is tributary to the Cheyenne River system which enters Oahe Reservoir. The company ceased the discharge of mercury in 1970 but a residual stream bed load remains in the tributary system (Division of Field Investigations-Denver, 1971).

Several studies were conducted by State and U.S. Bureau of Sport Fisheries and Wildlife personnel during May, 1970; late July and early August, 1970; and October 13 and 14, 1970 to determine the mercury levels of fish in the Cheyenne Arm of Oahe Reservoir. Tissue analyses of the collected samples revealed fish with mercury concentrations greater than 0.5 parts per million (ppm) mercury. This level is in comparison to the Food and Drug Administration recommendation that fish containing 0.5 ppm or greater mercury "should" not be eaten. On April 23, 1971 Governor Richard F. Kneip, of South Dakota, requested that the Environmental Protection Agency call a conference to consider the problem of actual or potential mercury toxicity to humans from the consumption of fish flesh and water from the Cheyenne River System including the Cheyenne Arm of Oahe Reservoir (Environmental Protection Agency, 1971a). Held on October 19 through 21, 1971 the Conference produced the recommendation that EPA, the State of South Dakota and the U.S. Food and Drug Administration develop a study plan to provide the quantitative data necessary for a definitive assessment of the health hazard posed by mercury in Oahe fish and sediments in Oahe Reservoir. The study plan, as implemented, represented the consensus of representatives of the South Dakota State Health Department and Department of Game, Fish and Parks, the U.S. Bureau of Sport Fisheries and Wildlife, EPA, and the U.S. Food and Drug Administration.

In this report all total mercury concentrations equal to or greater than 0.5 ppm are considered significant. This is in agreement with an EPA position document (EPA, 1971b) which stated: "EPA will consider that when a range

of fish species in an inland or estuarine body of water have residue levels of mercury equal to or greater than 0.5 ppm that there is an indication of gross mercury pollution and that consumption of fish from such a body of water would represent a hazard to health." This is consistent with the FDA guidance.

Recent reports have indicated a concern about the fact that the amount of methylmercury present in fish flesh may be considerably less than the total mercury measured (Anon., 1973). Other forms of mercury, less toxic than methylmercury, occur in the aquatic environment and if present in fish would also be measured as total mercury. However, a report by Gavis, et.al. (1972) indicates that at least 90 per cent of the mercury in fish analyzed was in the form of methylmercury. Fimreite, et.al. (1971) tested five specimens of walleye which had an average of 95 per cent of total mercury as methylmercury. In a more recent study Henderson et.al (1972) analyzed composite fish samples from selected waters of the United States, compared total and methylmercury results, and concluded that at least 90 per cent and possibly more of the mercury in fish is methylmercury. The Food and Drug Administration still considers all mercury in fish flesh to be toxic until disproven by future studies (Personal Communication, 1973). All mercury levels reported herein will be considered conservatively, methylmercury.

METHODS

The fish sampling program involved the six locations listed below and shown in Figure I.

1. The Cheyenne-Upper Arm (Foster Bay and Upstream).
2. The Cheyenne-Middle Arm (Minnconjou-Fish Gut).
3. The Cheyenne-Lower Arm (Oak Creek-Rosseau Creek).
4. Whitlock Bay.
5. Tailrace of Oahe (Stilling Basin)-control station.
6. Lake Enemy Swim, Day County, South Dakota-control station.

State and Federal authorities have speculated that mercury deposits in the Black Hills and in marine shales throughout Western South Dakota may cause natural mercury pollution in Oahe Reservoir. As a check on this possibility, Lake Enemy Swim, in the North Eastern section of the state was selected by the Department of Game, Fish and Parks as a control outside the influence of marine shales or man-made contamination.

Dates for the specific sampling periods were as follows: Spring 4/16 - 4/26 and 5/17 - 5/22, Summer 6/21 - 6/28, and Fall 9/19 - 9/27. Since sport fishing pressure was judged by the Department of Game, Fish and Parks to be twice as heavy during the spring season as compared to summer or fall, the spring season was divided into two sampling periods.

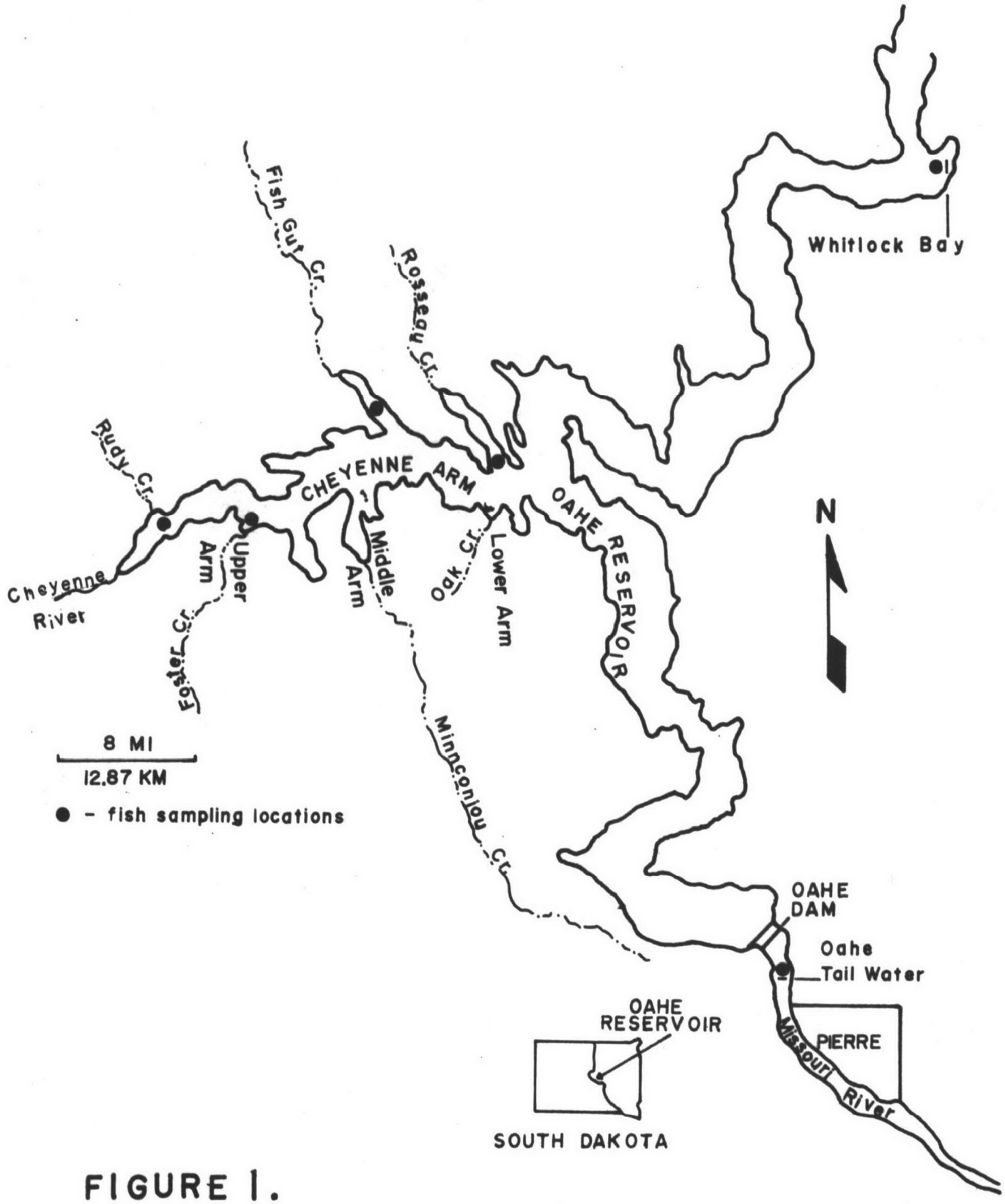

FIGURE 1.
OAHE RESERVOIR - fish sampling locations, 1972

Primary sport fish sampled from Oahe Reservoir and the total number of each species per sampling period are listed in Table 1. A three day sampling period was sufficient to collect most species of fish. If less than the required number of fish was collected in any three day period the number collected represented the sample. Fish were randomly selected from the nets to insure the adequate collection of all sizes. The minimum length of each species was determined by observing the sizes of fishes retained by sportsmen fishing the reservoir. Each fish was identified, weighed, measured, and sexed. Scale samples were collected for age determination (to be accomplished at a future date). A randomly selected fillet from each fish was packaged individually, tagged, frozen and transported to the Regional Lab in Denver for disposition

All fish were collected with either experimental sinking gill nets or frame nets set for approximately 24 hours. Detailed descriptions of the nets are in the Appendix.

CHEMICAL ANALYSES

Fish samples were analyzed by the Ute Research Laboratories, Fort Duchesne, Utah and by the National Field Investigations Center-Cincinnati Office of Enforcement and General Counsel, EPA. Brief descriptions of the methods used are in the Appendix.

RESULTS AND DISCUSSION

The concentrations of mercury found in sport fishes, collected from Oahe Reservoir during the survey periods, are listed in Table 1, Appendix. The length, weight and sampling location for each fish are also listed in the same Table. The results of statistical analyses on mercury concentrations in fish samples are listed in Table 2, Appendix. Total mercury concentrations are listed as reported by each testing laboratory. The National Field Investigations Center-Cincinnati reported values to the nearest 0.1 mg of mercury (Hg) per kilogram (Kg.) wet weight of flesh. The Ute Research Laboratories reported concentrations to the nearest 0.01 mg Hg/Kg. Although the Ute Research Laboratory data are reported to the nearest 0.01 mg Hg/Kg in Table 1, Appendix, comparative analysis of the data considered values rounded to the nearest 0.1.

A total of 1032 sport fishes from Oahe Reservoir and its tailwaters were analyzed for mercury content. Twenty-eight per cent (286) contained mercury concentrations equal to or greater than the FDA guideline of 0.5 ppm. This compares with approximately 76 out of 295 or 26 per cent of the fish collected from the same areas in 1971 (Division of Field Investigations-Denver, 1971). Thirty-six per cent or 234 out 651 fish netted from the Cheyenne Arm contained amounts of mercury equal to or greater than 0.5 ppm.

TABLE 1. Total number of each species of sport fish sampled per sampling period.

Fish	Sample number
Walleye *Stizostedion vitreum vitreum*	8
Northern Pike *Esox lucius*	6
Channel Catfish *Ictalurus punctatus*	10
White Bass *Morone chrysops*	10
Sauger *Stizostedion canadense*	8
*Crappie (Black & White) *Pomoxis nigromaculatus* and *P. annularis*	10
*Yellow Perch *Perca flavescens*	10

* These species were to be sampled and information from them used when any of the first five were not available.

Figure 2 shows a comparison of the total numbers of fish caught to the number containing 0.5 ppm mercury or greater for each sampling area. The largest percentage of fish containing high mercury concentrations were collected from the upper arm (Foster Bay) area (122 of 258 or 47%). The middle arm (Minnconjou-Fish Gut) area yielded 69 of 217 or 32% of the fish contaminated with mercury at 0.5 ppm or greater mercury. Oak Creek or the lower arm yielded a smaller number of fish contaminated by mercury with 24% being at or above the 0.5 ppm concentration The number of fish from Whitlocks Bay containing hazardous levels of mercury were comparable in quantity to the Oak Creek area of the Cheyenne Arm. Since there are no known industrial sources of mercury discharging to the area, the elevated concentrations in Whitlocks Bay appear to be caused by natural sources. However, there is insufficient data to support such a conclusion. Fish from the tailrace area of Oahe were relatively free from mercury with only 8 of 138 or 6% containing 0.5 ppm or greater. The control lake Enemy Swim had only one fish in the 0.5 ppm or greater range.

Figure 3 shows the percentages of fish at or above 0.5 ppm at each sampling station for each sampling period. From April to September 1972 there was a general decline in the percentages of fish with hazardous mercury concentrations. The upper arm (Foster Bay) contained the highest percentages followed by the middle (Minnconjou) and lower arm (Oak Creek) areas. The general decline of high mercury concentrations from the upper arm to the lower arm agrees with the findings of DFIC-Denver (1971). The lower arm (Oak Creek) area shows an increase in fish containing mercury in September which was attributed to white bass that had moved into the area during the sampling period. Fish in Whitlock Bay increased in percentage of contaminated individuals during June. If the source is natural, the increase at Whitlock may have resulted from the rains and runoff that occurred in early June before the sampling period.

Figures 4 through 8 depict the total number of each type of sport fish sampled and the number of fish containing 0.5 ppm mercury or greater for each sampling location, during each sampling period. Figures 9 through 13 depict the mean mercury concentration for each species and the 99 per cent confidence limits at each sampling location, during each sampling period.

Four out of five species of sports fish from the upper arm of the Cheyenne had significant percentages of individual fish containing 0.5 ppm mercury or greater during the April sampling period (Figure 4). The mean concentration of mercury for each species except sauger was at or above 0.5 ppm (Figure 9), with walleye and northern pike containing the highest mean concentrations of mercury. In May percentages of fish with hazardous levels of mercury ranged from 25% to 100% (Figure 8). Walleye, pike, white bass and crappie had the highest mean levels of mercury. Channel catfish and sauger were lower than 0.5 ppm in mean concentrations but the confidence limits for the means reached or exceeded 0.5 ppm (Figure 9). In June walleye, white bass and sauger still contained significant amounts of mercury. Mean concentrations for these fish were

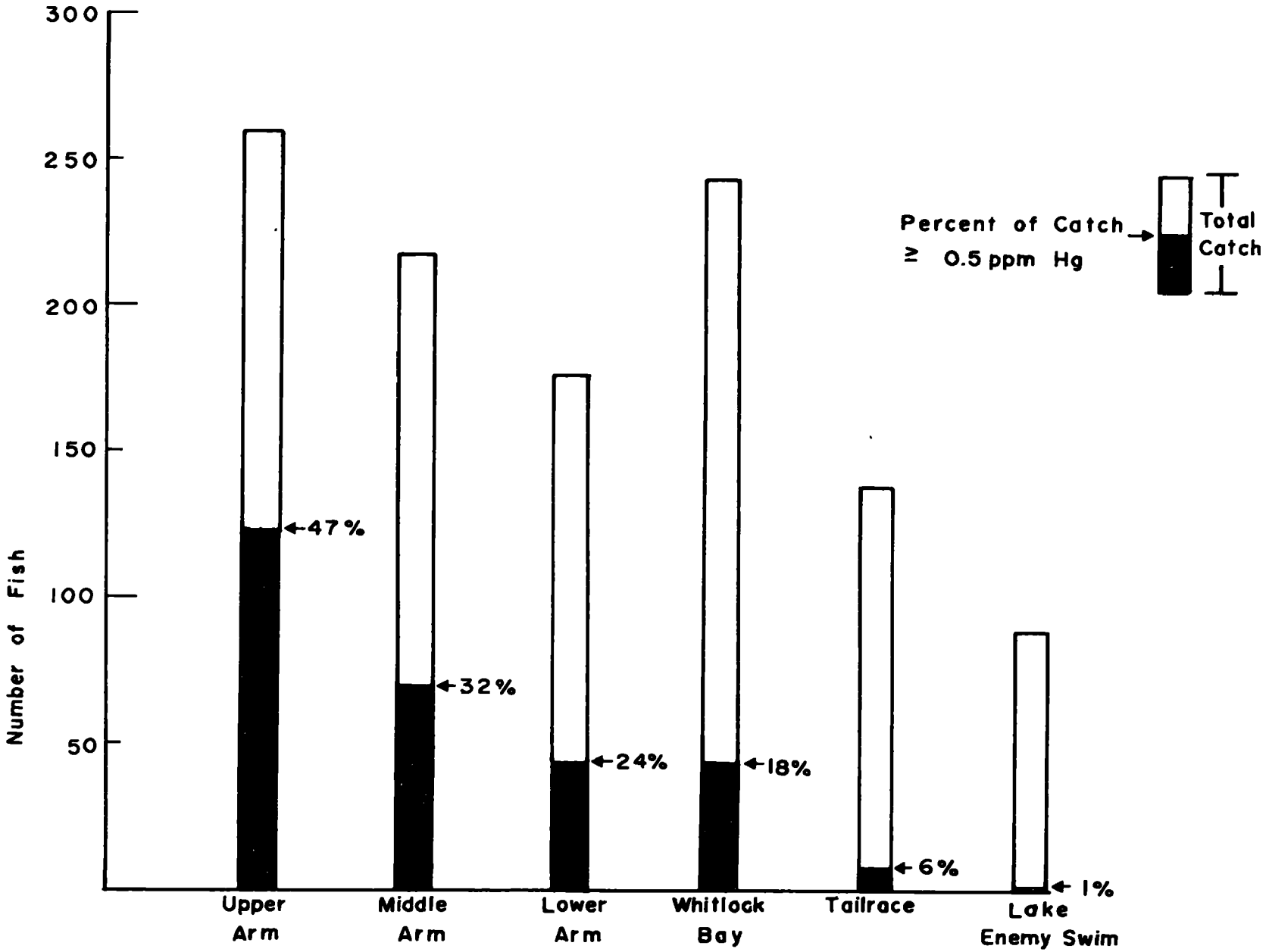

Figure 2. Percentage of the total catch at each station equal to or greater than 0.5 ppm mercury.

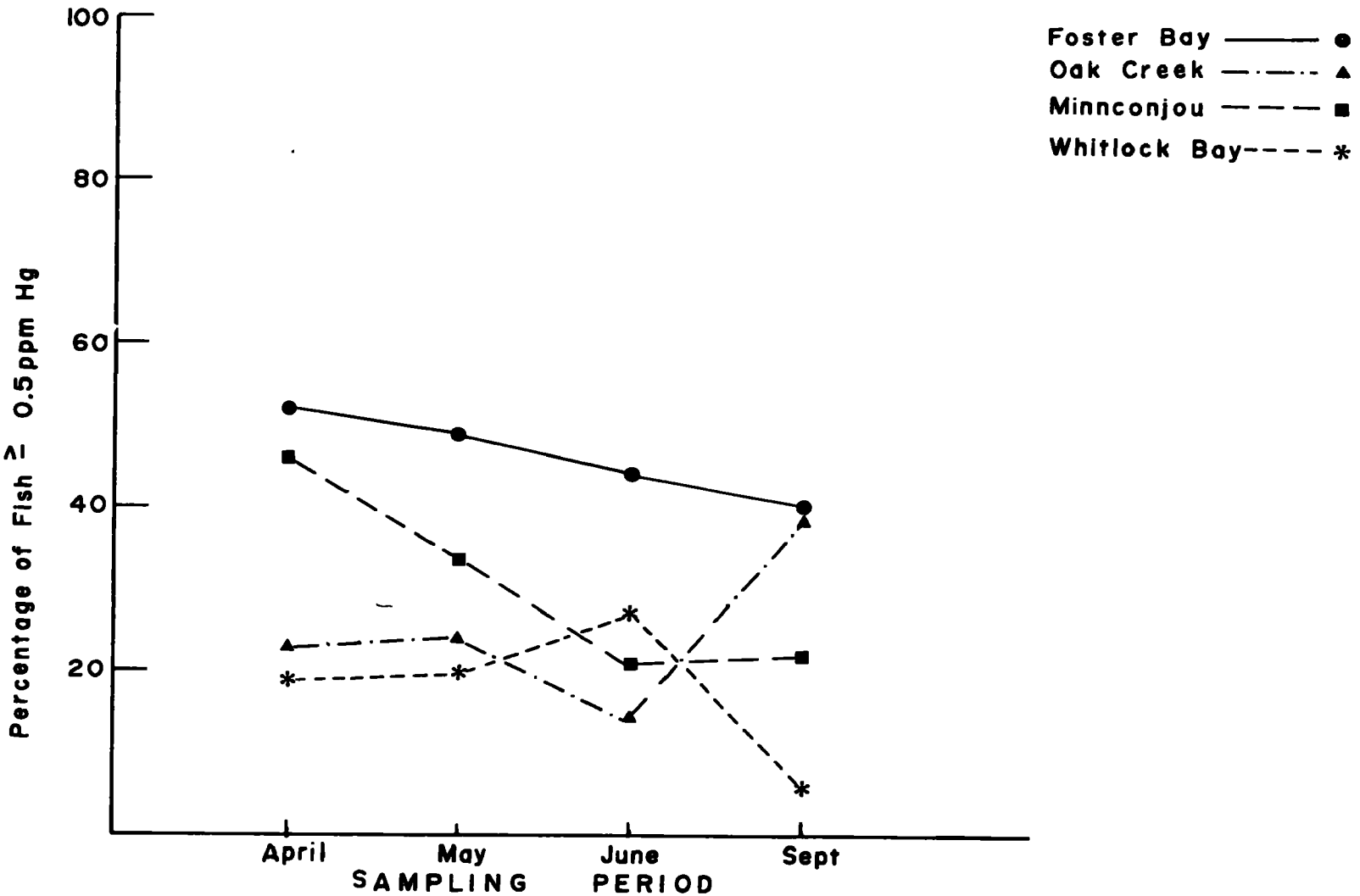

Figure 3. Percentage of fish equal to or greater than 0.5ppm mercury, at each sampling location, during each sampling period.

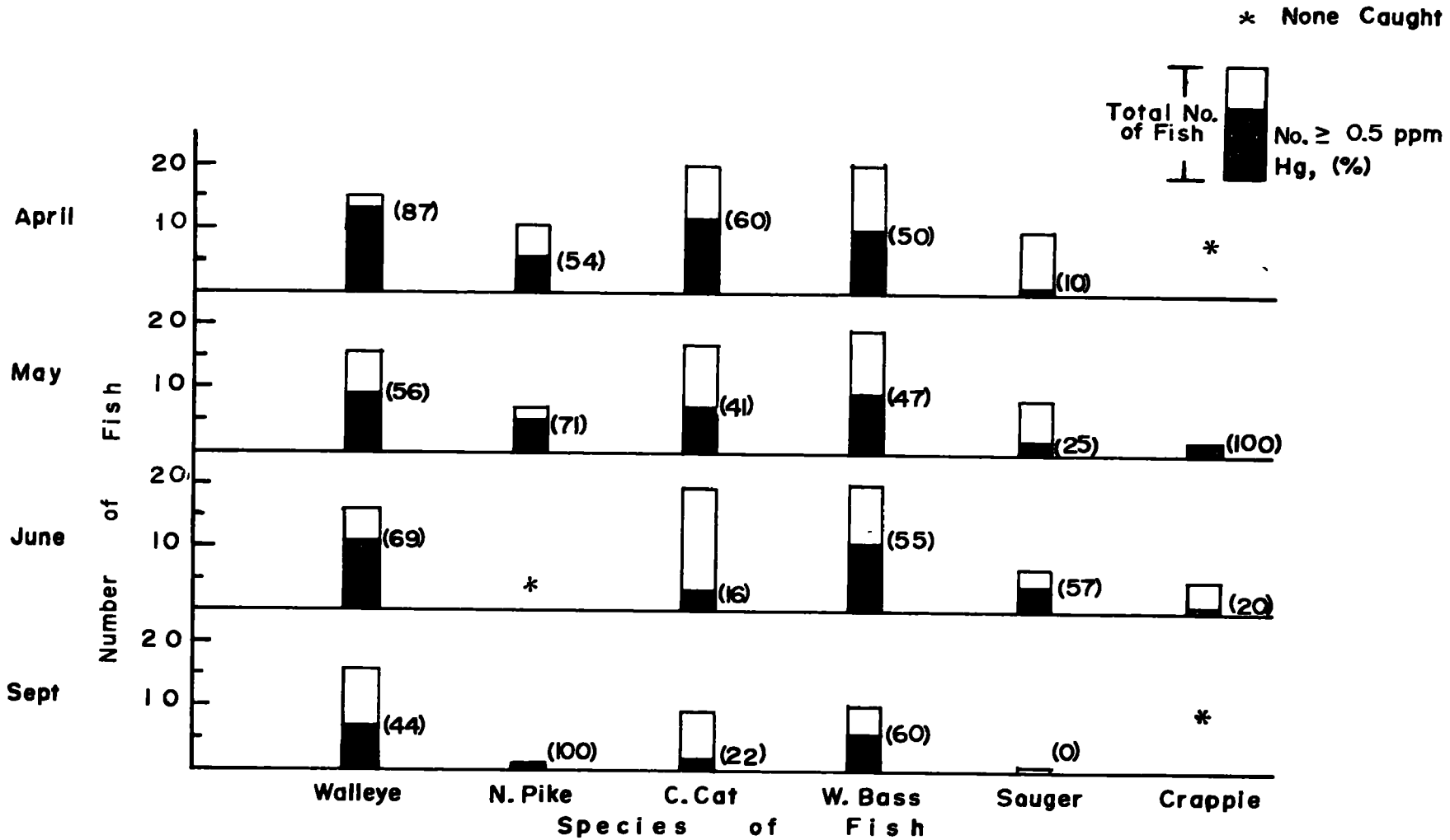

Figure 4. Number and percentage of the total catch of each species ≥ 0.5ppm mercury from the Cheyenne - upper arm (Foster Bay) area during each sampling period in 1972.

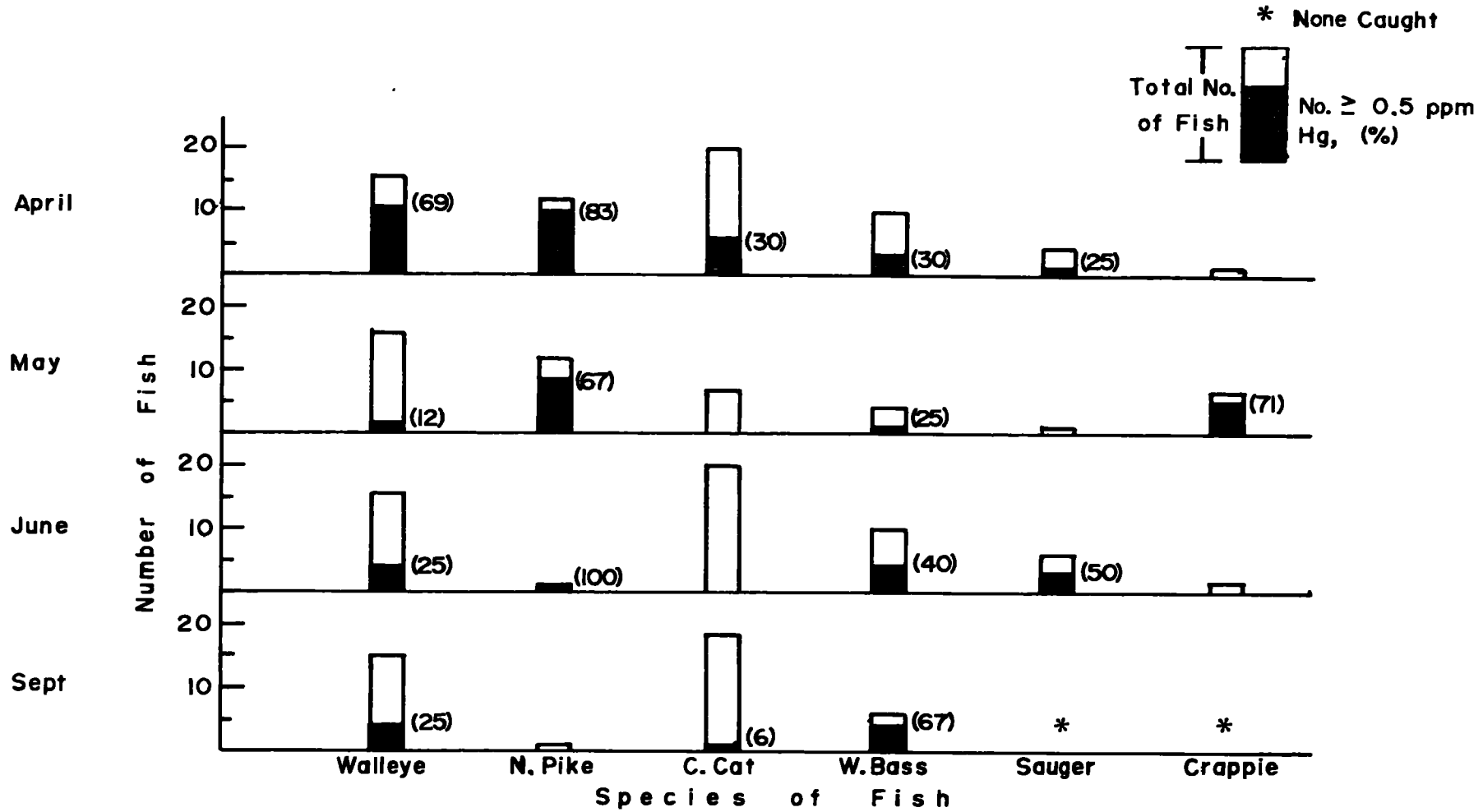

Figure 5. Number and percentage of the total catch of each species ≥ 0.5 ppm mercury from the Cheyenne – middle arm (Fish Gut, Minnconjou) area during each sampling period in 1972.

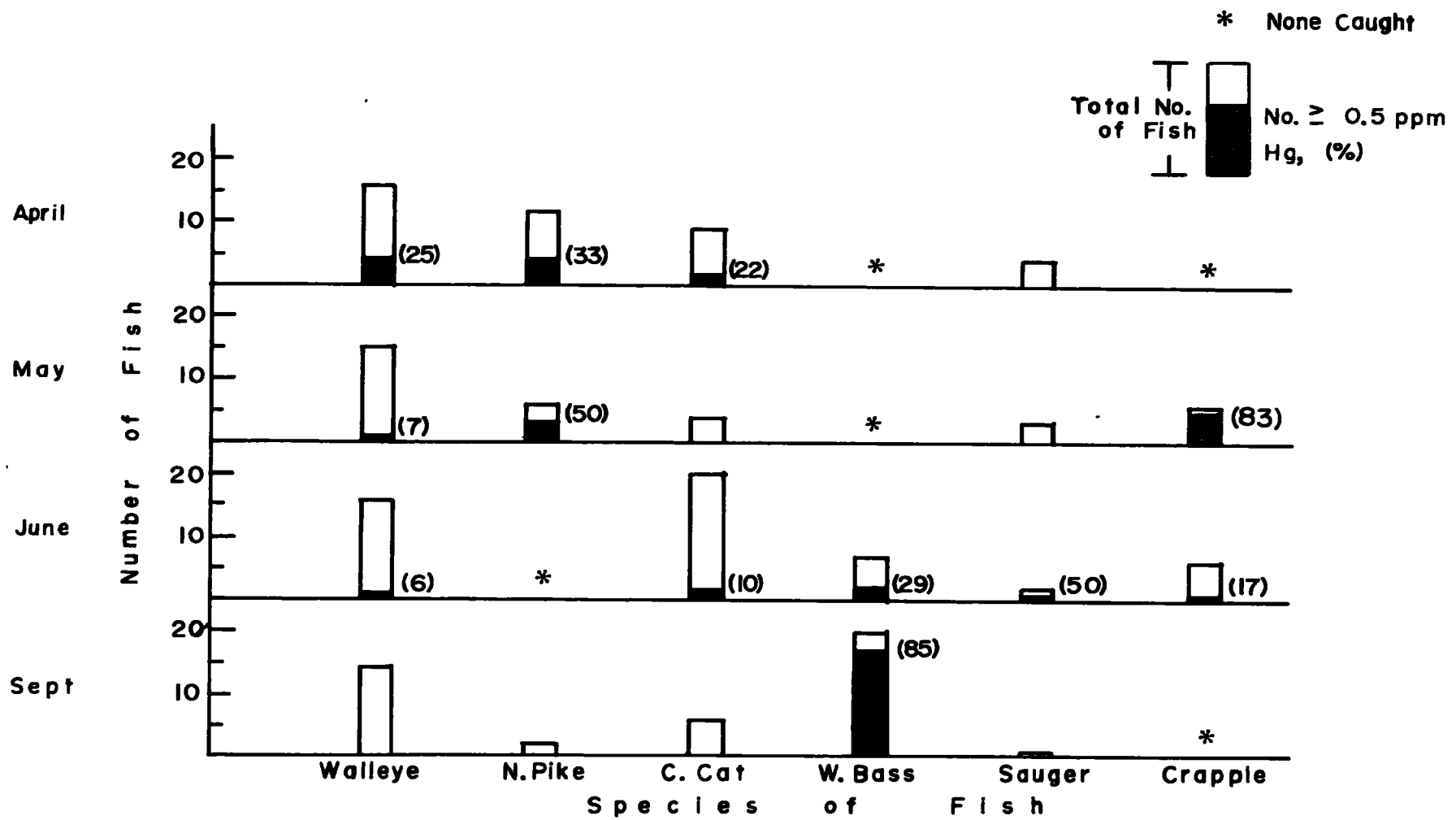

Figure 6. Number and percentage of the total catch of each species ≥ 0.5 ppm mercury from the Cheyenne – lower arm (Oak Creek) area during each sampling period in 1972.

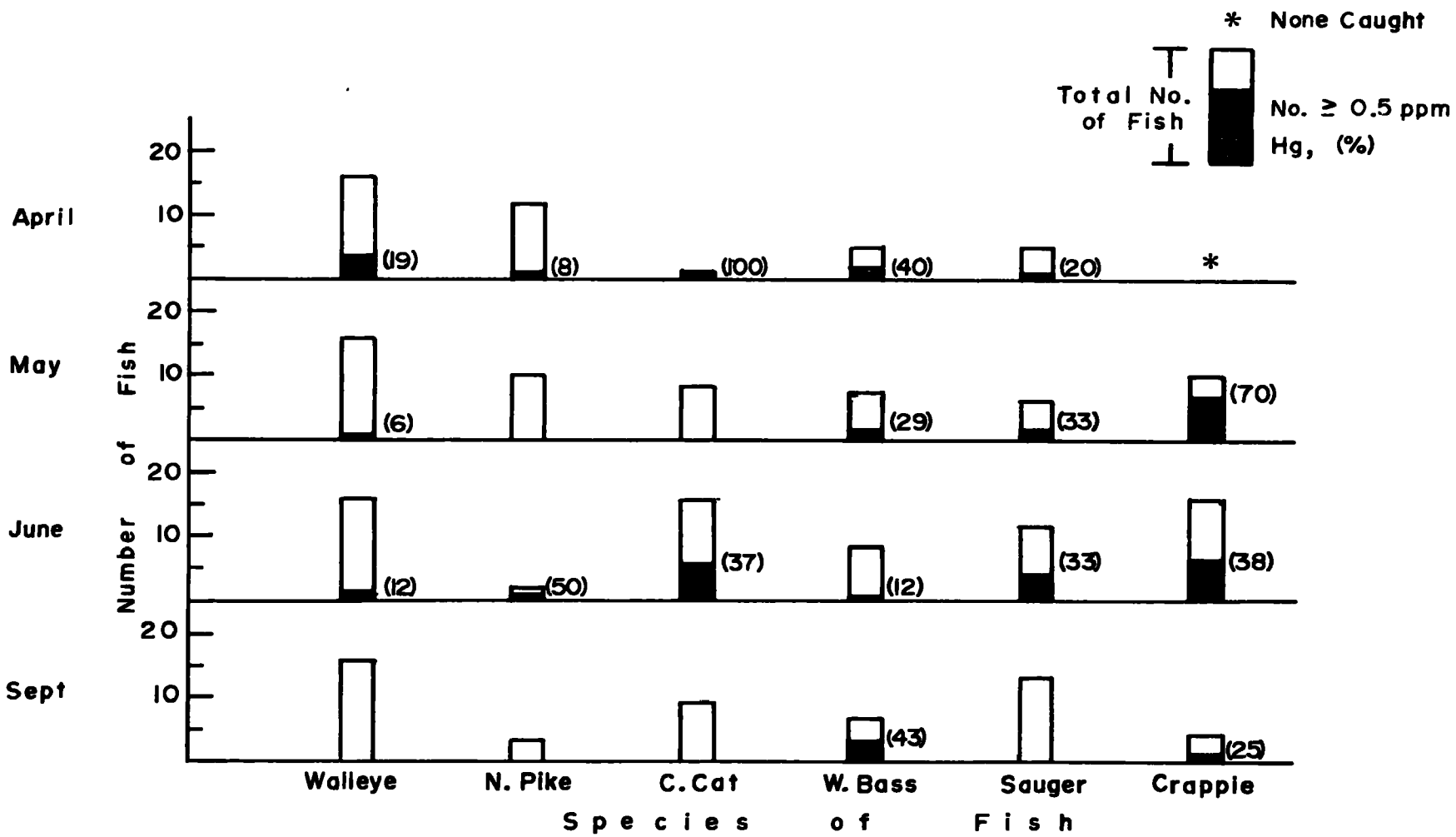

Figure 7. Number and percentage of the total catch of each species ≥ 0.5 ppm mercury from Whitlock Bay during each sampling period in 1972.

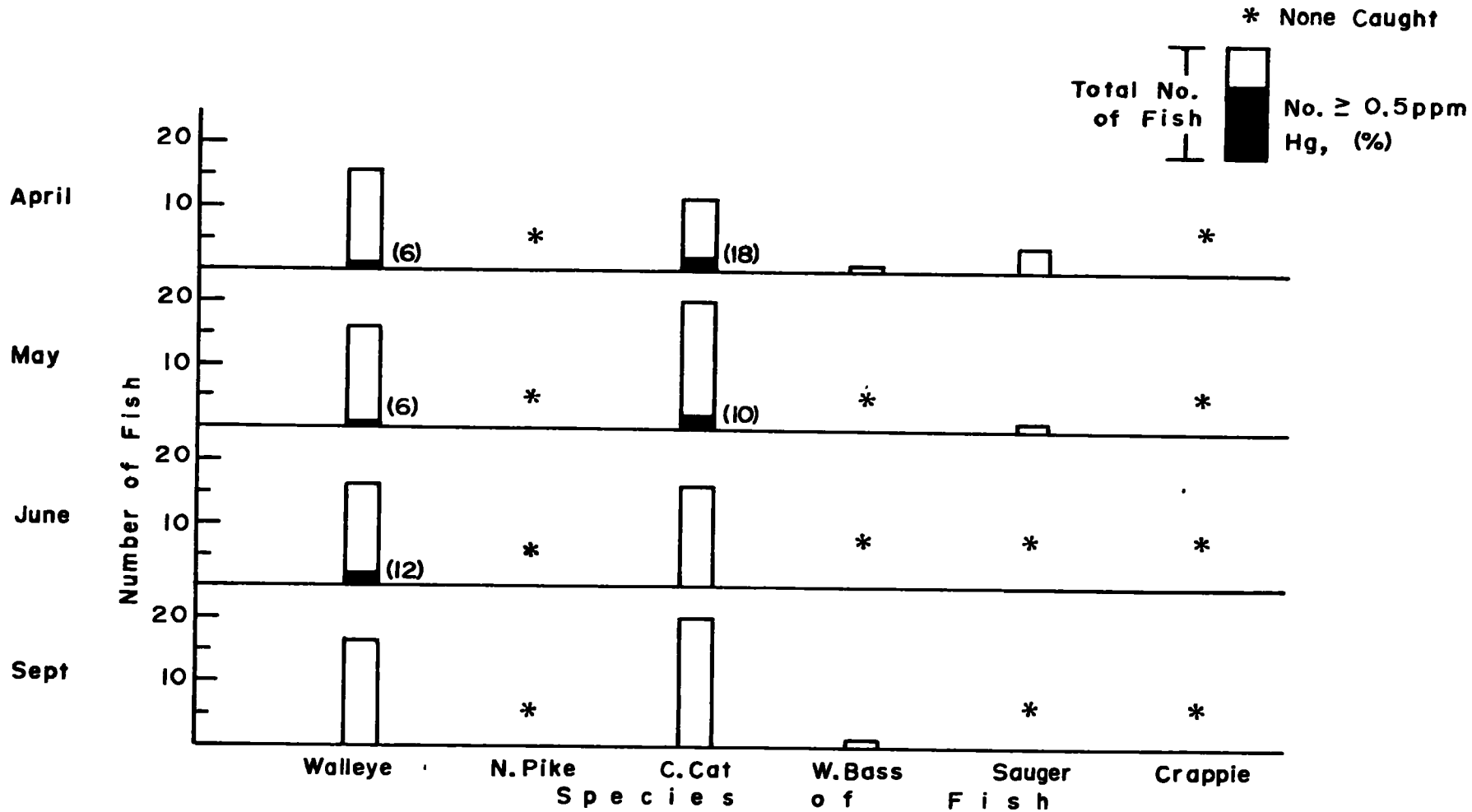

Figure 8. Number and percentage of the total catch of each species ≥ 0.5ppm mercury from the Oahe Dam tailrace area during each sampling period in 1972.

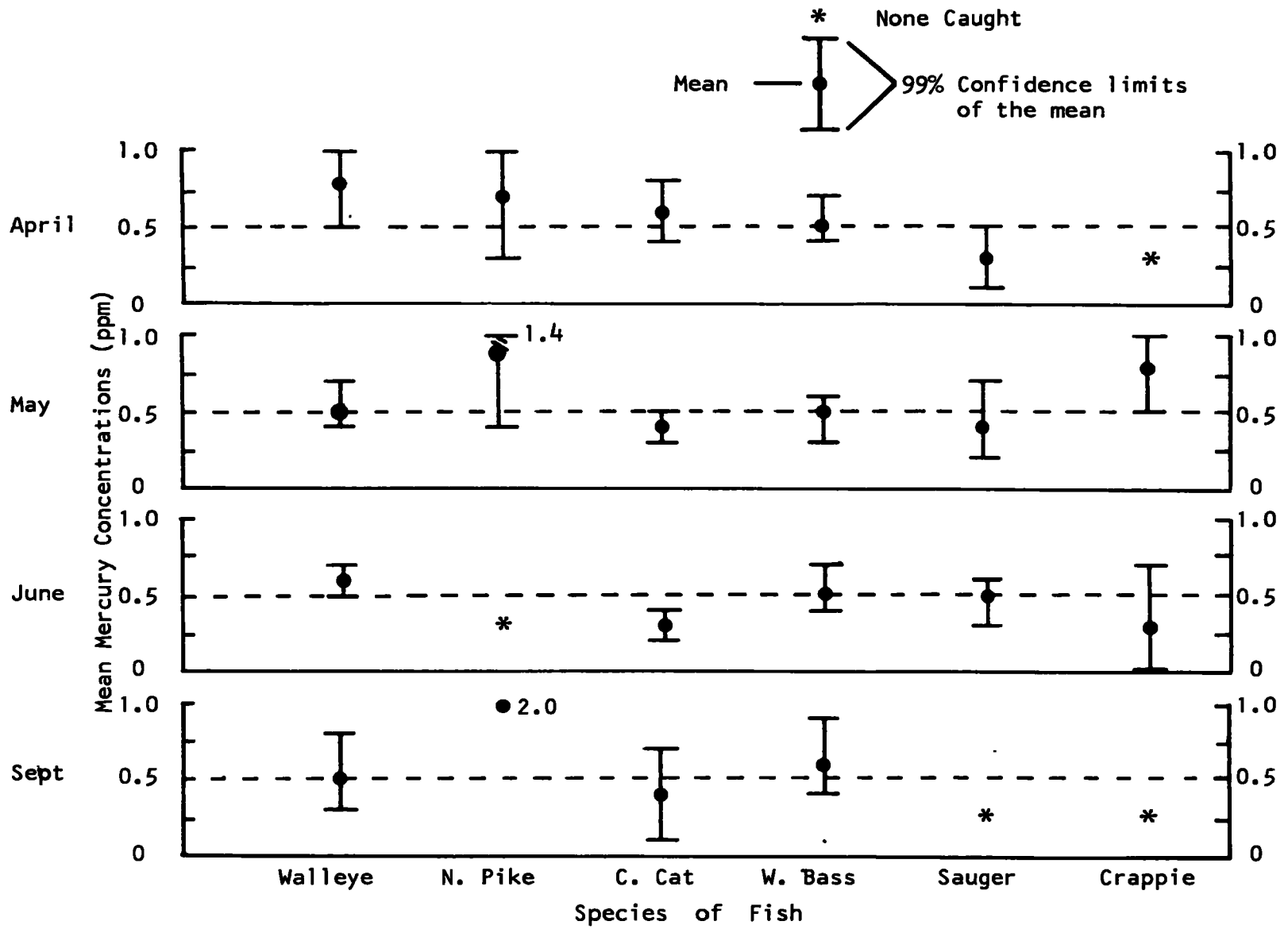

Figure 9. The mean mercury concentrations (ppm) and 99% confidence limits of the means for each species sampled from the Cheyenne -- upper arm (Foster Bay) during each sampling period in 1972.

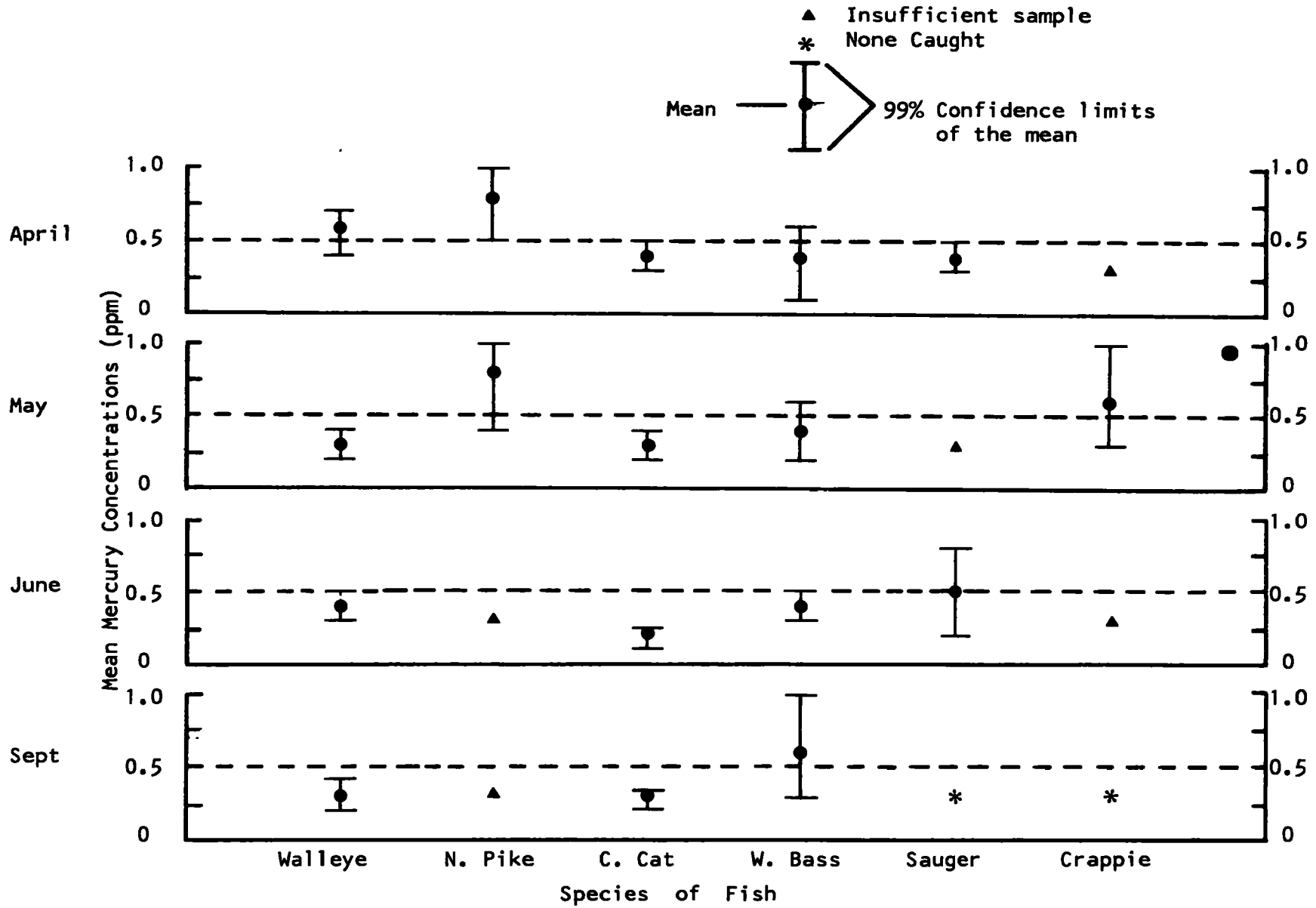

Figure 10. The mean mercury concentrations (ppm) and 99% confidence limits of the means for each species sampled from the Cheyenne -- middle arm (Minnconjou, Fish Gut) during each sampling period in 1972.

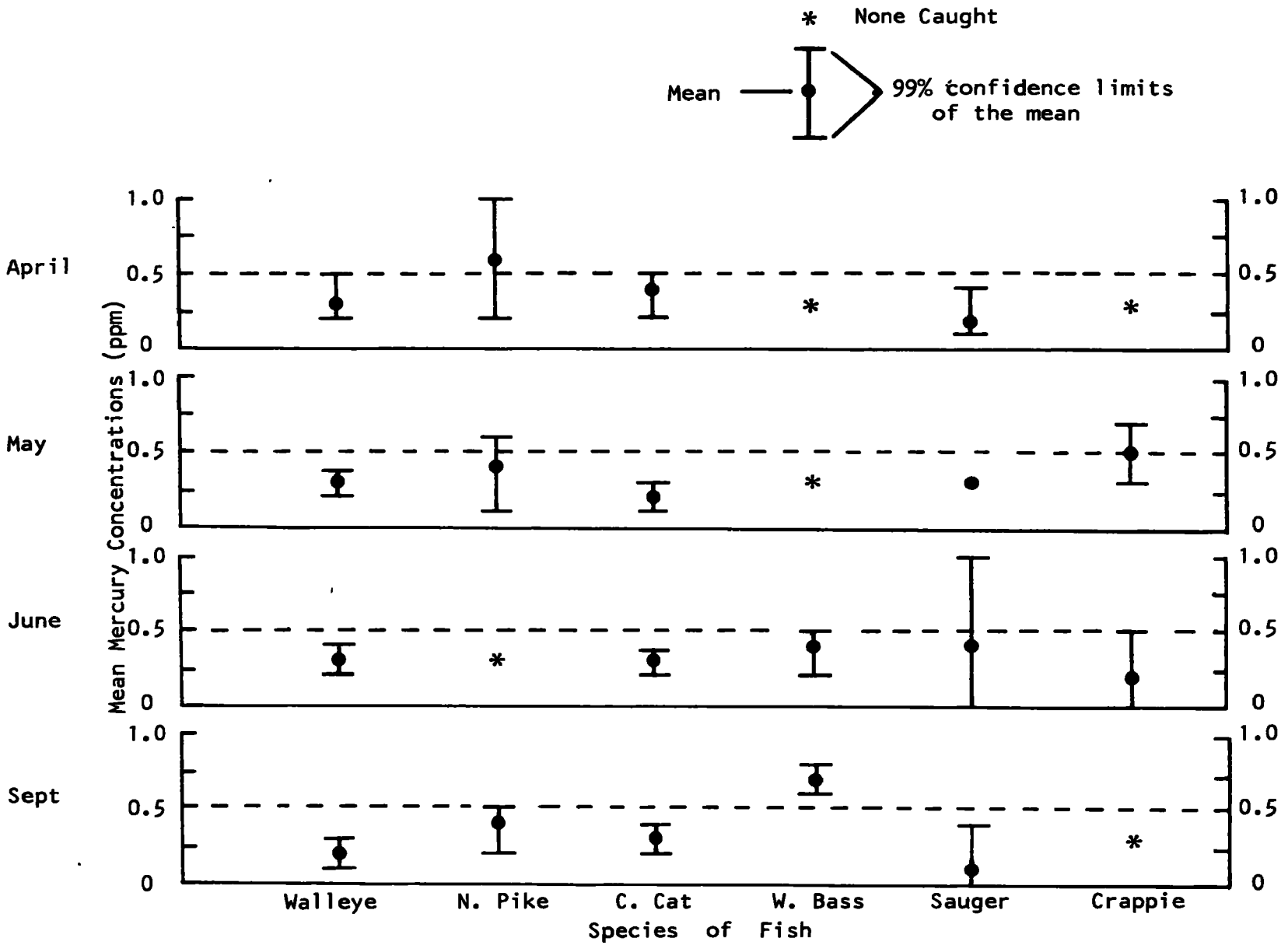

Figure 11. The mean mercury concentrations (ppm) and 99% confidence limits of the means for each species sampled from the Cheyenne -- lower arm (Oak Creek) during each sampling period in 1972.

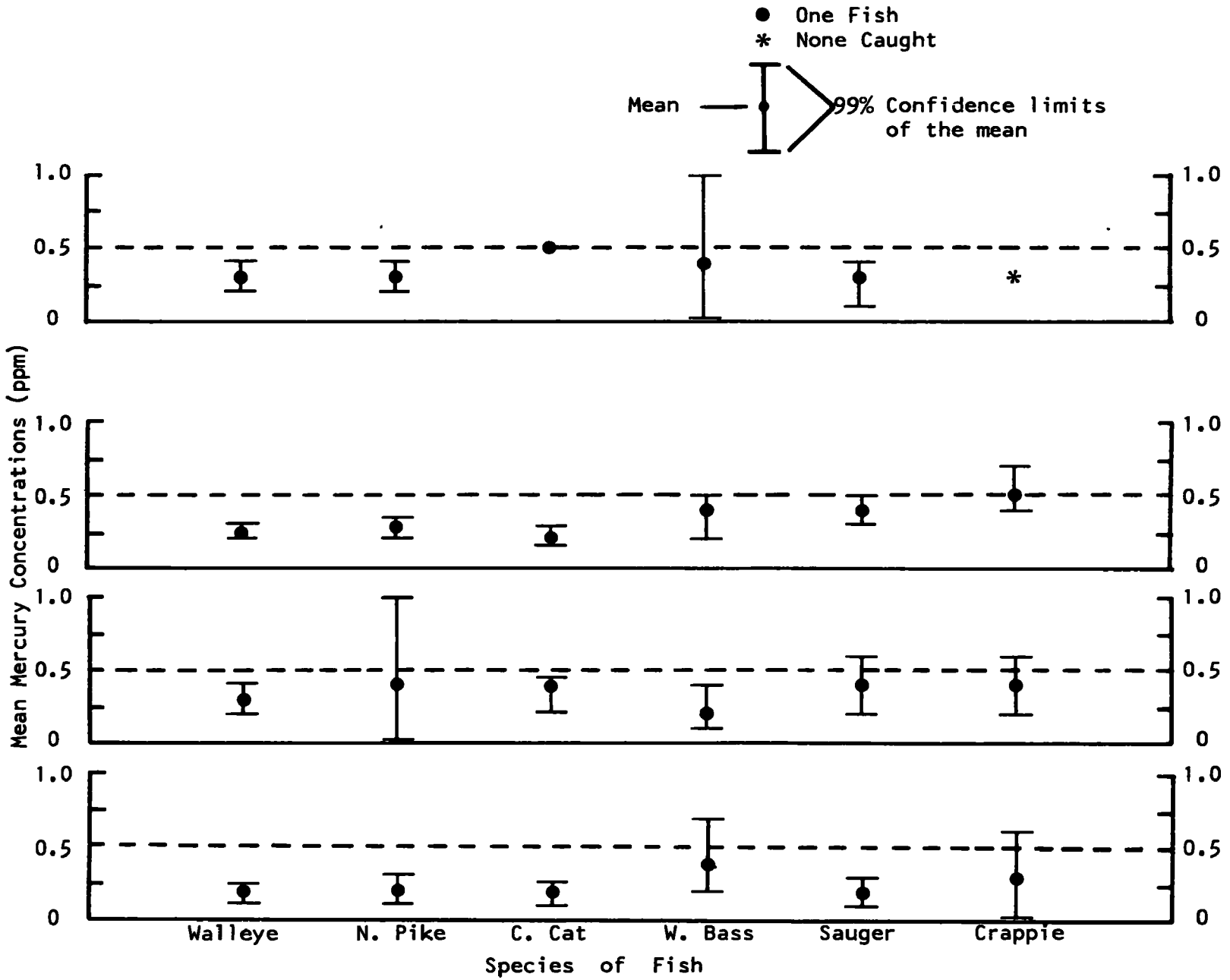

Figure 12. The mean mercury concentrations (ppm) and 99% confidence limits of the means for each species sampled from Whitlock Bay during each sampling period in 1972.

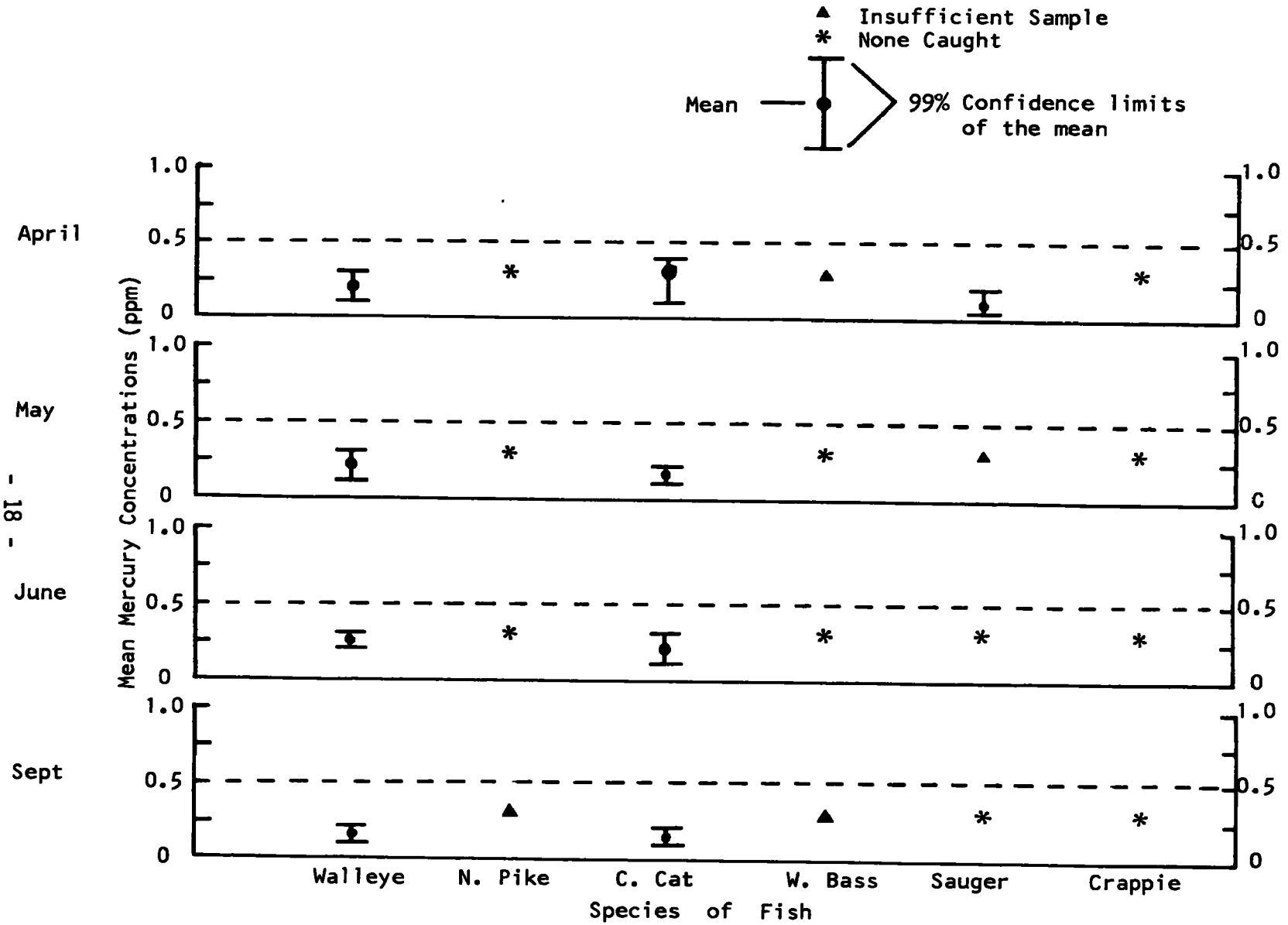

Figure 13. The mean mercury concentrations (ppm) and 99% confidence limits of the means for each species sampled from the Oahe Dam tailrace area during each sampling period in 1972.

at or above the 0.5 ppm guideline. Channel cat and crappie had lower mean concentrations of mercury, with the confidence limits for the mean concentration in crappie extending over the 0.5 ppm level. Conditions appeared to have improved in September with most percentages of affected fish smaller than those in the other sampling periods (Figure 4). Walleye and white bass contained significant amounts of mercury, with white bass being higher in percentage of fish over the guideline and in mean mercury concentration than in any other sampling period. Only one northern pike was captured and it contained 2.0 ppm mercury. The mean concentration of mercury in channel cat increased from 0.3 to 0.4 ppm with the confidence limits extending over 0.5 ppm mercury.

Fish from the middle arm (Fish-Gut-Minnconjou) of the Cheyenne contained less mercury than those from the upper arm; even though concentrations of mercury were still significantly high. In comparison to fish in the upper arm, percentages of contaminated fish in the middle arm were generally lower in number except for pike and sauger which were higher in number during the April sampling period and white bass which were higher in number in September (Figure 5). Numbers of contaminated walleye, northern pike and channel cat were highest in April. The highest percentages of crappie, sauger and white bass equal to or greater than 0.5 ppm mercury occurred during the same sampling periods in both the upper and middle arm areas (Figures 4 and 5). Mean mercury concentrations were at or above 0.5 ppm for walleye and pike in April, pike and crappie in May, sauger in June and white bass in September. At any one sampling period at least two out of six primary sport fishes collected had 25 per cent or more of their respective populations at or over the 0.5 ppm guideline.

The lower arm of the Cheyenne contained smaller percentages of mercury laden fish as compared to the upper or middle arm (Figure 6). One notable exception is white bass with 85% of the population at or over the 0.5 ppm guideline in September. Comparison of percentages of mercury contaminated white bass in the Cheyenne Arm reveals a gradual increase in the percentage of fish at or over 0.5 ppm from April to September at each sampling location. Significant percentages of northern pike in the lower arm exceeded the 0.5 ppm guideline in April and May. In May the mean concentration of mercury in pike was less than 0.5 ppm but the confidence limits of the mean extended above the 0.5 level. Crappie contained significant amounts of mercury in May throughout the entire Cheyenne Arm, while sauger were higher in mercury content in June than in other periods of the year.

Whitlock Bay was sampled as a potential problem area, outside the influence of the Cheyenne Arm. Previous surveys had reported fish that contained concentrations of mercury over 0.5 ppm. In April and June all of the fish species netted contained percentages of fish with mercury concentrations equal to or greater than 0.5 ppm. In May white bass, sauger and crappie had 29%, 33% and 70% of their respective numbers high in mercury. Crappie contained the highest mean concentration of mercury of any species captured from Whitlock Bay. During the September sampling period a greater percentage of white bass were high in mercury

concentrations similar to the same species in the Cheyenne Arm. Crappie also tended to follow the same patterns of mercury concentration in Whitlock and the Cheyenne Arm.

The tailrace area of Oahe Reservoir represented a control station. The highest percentage of contaminated fish was 18 per cent of the catfish caught in April (Figure 8). Only 6 to 12 per cent of the walleye sampled had mercury concentrations at or above 0.5 ppm. None of the species taken from the tailwaters had mean concentrations of mercury at or above 0.5 ppm and the confidence limits for the mean concentrations did not extend to or above 0.5 ppm (Figure 13).

In Lake Enemy Swim most of the fish sampled contained 0.3 ppm or less mercury. Only one fish, a white bass, contained a higher amount of mercury (0.6 ppm) than the 0.5 ppm guideline.

CONCLUSIONS

Thirty-six per cent of the fish sampled from the Cheyenne Arm of Oahe Reservoir contained mercury at a concentration equal to or greater than 0.5 ppm. Fish with the highest concentrations of mercury were found in the upper arm or Foster Bay area with 50 per cent or more of each specie containing hazardous levels of mercury during at least one sampling period.

Fish from the middle arm did not contain concentrations of mercury as high as those in the upper arm and the lower arm supported fish with generally lower mercury concentrations than the middle arm, a pattern noted by the Division of Field Investigations-Denver in an earlier report. Both the middle and lower areas contained fishes with sufficient concentrations of mercury to represent potential health hazards. In the Cheyenne Arm white bass increased in percentage of affected fish as the year progressed. Other species contained their highest concentrations of mercury at different times of the year; walleye, and channel cat in April, sauger in June and crappie in May. Pike were significantly high in mercury concentrations during the entire survey. During the September survey most fish except white bass had mercury levels less than 0.5 ppm.

Whitlock Bay contained contaminated fish, notably white bass, crappie and sauger. White bass contained more mercury in September while crappie concentrated more mercury in May; a pattern followed by the same species in the Cheyenne Arm. More species of fish contained 0.5 ppm or greater mercury during the months of April and June, than in May and September.

Fishes from the control areas (tailrace and Lake Enemy Swim) contained small amounts of mercury and were not viewed as potential sources of mercury contamination to man.

A report by Katz (1972) cites an international committee that considers an intake of 1 mg/day of methylmercury as a toxic dose for healthy adults, excluding pregnant women or other vulnerable groups.

This is approximately 1/5 lb. of fish at 10ppm or 2 lb. at 1ppm. In the same report it was noted that a Swedish toxicological committee recommends a maximum acceptable intake of 0.03 mg/day for a 70 kg (154 lb.) male, which is less than ½ lb of fish at 1ppm per week without any other intake of mercury from other food sources. With the above values as a comparison, most species of sport fishes from the Cheyenne Arm of Oahe Reservoir could pose a threat to the health of anyone consuming them, especially during the spring season when fishing pressure is twice as heavy as the rest of the year. The consumption of white bass, crappie and sauger from Whitlock Bay could also represent a health hazard. Fishermen who camp on the shores of the reservoir and catch and eat fish from the reservoir during their stay may be subjecting themselves to large doses of mercury from contaminated fish.

Accordingly, it is recommended that the Cheyenne Arm of Oahe Reservoir be posted at all accessible locations to warn the general public of the potential health hazard from consuming fish taken from this body of water. Similar posting may also be necessary at Whitlock Bay advising fishermen to release selected species of fish. As a follow-up to the posting of the Cheyenne Arm, investigatory studies should be pursued to achieve a basic understanding of the mechanisms governing the dynamic transport and cycling of mercury from sediment to fish in this area of the reservoir. From these studies an assessment should evolve of the feasibility and practicality of undertaking specific actions, if any, to curtail the chain of transmission. Concurrent with these studies, periodic monitoring of mercury levels in fish should be conducted to verify the need for continued posting. It is possible that a certain mitigation of the problem could result from the coverage of the mercury-bearing material with sediment carried into the reservoir from upstream locations. However, the time response of this natural process in terms of substantially decreased mercury levels is an unknown and, perhaps, quite slow.

APPENDIX

Fish Nets

Gill nets were single strand monofilament 106.7 meters (350 ft.) long with seven panels measuring 1.8 meters (6 ft.) by 15.2 meters (50 ft.). Mesh sizes of the panels were as follows: 1.91 cm (3/4 in.), 2.54 cm (1 in.), 3.17 cm (1 1/4 in.), 3.81 cm (1 1/2 in.), 5.08 cm. (2 in.), 6.35 cm (2 1/2 in.) and 7.62 cm (3.0 in.).

The frame nets had 0.91 meter (3 ft.) by 1.83 meters (6 ft.) frames with 1.27 cm (1/2 in.) mesh netting. Each net had a 15.2 meter (50 ft.) lead.

Chemical Procedures

Fish samples were analyzed by two different laboratories. Part of the samples were analyzed by the Ute Research Laboratories, Fort Duchesne, Utah with the following method:

1. The fillet is masserated using a high speed blender.
2. 1.000 gram (net weight) of fish tissue is weighed into a 0.118 l. (4 oz.) polyethylene bottle.
3. 15 ml. of a 1:2 $HClO_4^-$ - HNO_3 mixture is added and the bottle closed tightly.
4. The mixture is swirled to disperse the sample and placed in a water bath at 60^0 C for 8 hours.
5. 4 ml of DIH_2O are added and the sample is heated an additional 2 hours to drive off NO_x fumes.
6. The sample is cooled and diluted to 50 ml with DIH_2O.
7. (a) 5 ml of NaCl - Hydroxylamine Hydrochloride solution (120g NaCl + 120g $NH_2OH \cdot HCl$/l) is added - wait 1 minute.
   (b) 5 ml of stannous chloride solution (113g $5nCl_2 \cdot 2H_2O$ + 170 ml HCl/l) is added and the aerator is immediately inserted into the sample.
8. The sample is analyzed with a Perkin-Elmer 403 Atomic Absorption Spectrophotometer* with a cold vapor mercury atomization attachment and an automatic electronic recorder. Strict quality control was maintained (Ruckman, 1972).

The National Field Investigations Center-Cincinnati used the cold vapor procedure basic to the Hatch and Ott method (1968) with the following changes. Preliminary combustion of the sample at approximately 850^0 C in a closed tube-type furnace with collection of the liberated mercury in an acid permanganate trap is followed by reduction of the mercury to the metalic form and measurement with a Perkin-Elmer-Coleman mercury vapor meter. All phases of the analysis were carried out under the strictest quality control surveillance (Sanning, 1973).

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* Mention of trade names or commercial products does not constitute endorsement by Region VIII, Environmental Protection Agency.

List of References

Anon., 1973. Mercury-in-fish standard. Sport Fishing Institute Bul. No. 242, 8pp

Division of Field Investigations-Denver, 1971. Report on pollution affecting water quality of the Cheyenne River system Western South Dakota. Division of Field Investigations-Denver, EPA, Office of Enforcement. 89pp.

Environmental Protection Agency, 1971,a. Conference in the matter of pollution of the navigable waters of Western South Dakota. Proceeding. US-EPA, 596pp.

_____1971.b Proposed Environmental Protection Agency Position Document-Mercury. US-EPA, 123pp.

Fimreite, N., W.N. Halsworth, J.A. Keith, P.A. Pearce and I.M. Gruchy. 1971. Mercury in fish and fish eating birds near sites of industrial contamination in Canada. Canadian Field-Naturalist, vol. 85, pp211-220.

Gavis, Jerome and John F. Ferguson. 1972. The cycling of mercury through the environment. Water Research, vol.6, pp989-1008.

Henderson, Croswell, Anthony Inglis, and Wendell L. Johnson. 1972. Mercury residues in fish, 1969-1970. National Pesticide Monitoring Program. Pesticides Monitoring Journal 6 (3):144-159.

Katz, Arthur. 1972. Mercury pollution: The making of an environmental crisis. CRC Critical Reviews in Environmental Control. January pp517-534.

Roy, Caesar, Assistant to the Director, Division of Regulatory Guidance, U.S. Food and Drug Administration. 1973. Personal communication on March 9, 1973.

Ruckman, Jack, Director, Ute Research Laboratories, Fort Duchesne, Utah. Letter dated November 15, 1972.

Sanning, Donald E., Chemist, Chemistry Section, Water Science Branch, National Field Investigation Center-Cincinnati, Office of Enforcement and General Counsel, EPA. Memo dated March 27, 1973.

Hatch, W. R., and W. L. Ott. 1968. Determination of sub-microgram quantities of mercury by atomic absorption spectrophotometry, Anal. Chem. 40, 2085.

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location.

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (ppm)*
Upper Arm	No. Pike	4/18	708	2211	1.7
"	"	"	690	3118	0.3
"	"	"	875	369	0.9
"	"	"	775	3289	0.6
"	"	"	545	1588	0.3
"	"	"	620	1588	0.4
"	"	4/19	980	7031	1.2
"	"	"	685	3062	0.7
"	"	"	566	1474	0.4
"	"	"	523	1049	0.6
"	"	"	612	1588	0.4
Upper Arm	C. Cat	4/18	417	794	0.2
"	"	"	388	624	0.1
"	"	"	410	367	0.3
"	"	"	540	1814	0.8
"	"	"	415	907	0.7
"	"	"	425	879	1.0
"	"	"	750	1984	1.3
"	"	"	490	1361	0.6
"	"	"	390	680	0.5
"	"	"	385	567	0.8
"	"	"	350	454	0.4
"	"	"	390	595	0.4
"	"	"	358	510	0.6
"	"	"	790	3118	1.0
"	"	"	381	624	1.1
"	"	"	345	510	0.3
"	"	"	310	340	0.5
"	"	4/19	583	2778	0.2
"	"	"	373	567	0.6
"	"	"	357	510	0.4
Upper Arm	Y. Perch	4/18	160	113	0.1
"	"	4/19	229	284	0.3
"	"	"	191	113	0.1
"	"	"	165	85	0.2
"	"	"	200	113	0.1

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (ppm)*
Upper Arm	W. Bass	4/18	265	312	0.2
"	"	"	275	340	0.9
"	"	"	290	454	0.7
"	"	"	308	510	0.9
"	"	"	310	510	0.8
"	"	"	300	454	1.1
"	"	"	260	312	0.3
"	"	"	270	369	0.3
"	"	"	265	312	0.6
"	"	"	260	312	0.4
"	"	"	258	312	0.2
"	"	"	279	369	0.2
"	"	"	260	312	0.2
"	"	"	255	255	0.7
"	"	"	250	227	0.6
"	"	"	260	284	0.3
"	"	"	215	142	0.3
"	"	"	242	227	0.3
"	"	"	265	312	0.5
"	"	"	250	255	1.2
Upper Arm	Walleye	4/18	535	1049	0.4
"	"	"	425	907	0.7
"	"	"	515	1588	1.4
"	"	"	400	709	1.1
"	"	"	360	539	0.7
"	"	"	310	369	0.7
"	"	"	320	369	0.5
"	"	"	445	1021	0.6
"	"	"	435	907	0.3
"	"	"	455	1162	0.7
"	"	"	428	879	0.5
"	"	"	504	1474	1.4
"	"	"	393	709	1.0
"	"	"	410	850	1.3
"	"	"	420	964	0.5
Upper Arm	Sauger	4/18	340	340	0.3
"	"	"	320	227	0.2
"	"	"	260	142	<0.1
"	"	"	250	142	0.2
"	"	"	320	255	0.4
"	"	"	246	113	0.2
"	"	4/19	255	142	0.2
"	"	"	221	85	0.2
"	"	"	345	340	0.4
"	"	"	458	822	0.9

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (ppm)*
Middle Arm	Y. Perch	4/20	187	113	0.2
"	"	"	185	85	0.1
"	"	4/22	134	85	0.1
"	"	4/26	180	85	0.2
"	"	"	191	85	0.1
Middle Arm	Sauger	4/20	345	397	0.3
"	"	"	340	340	0.4
"	"	4/21	351	397	0.5
"	"	"	330	340	0.4
Middle Arm	No. Pike	4/20	576	1361	0.7
"	"	"	659	2211	0.5
"	"	"	720	2948	1.0
"	"	"	895	5897	1.4
"	"	4/21	920	4876	1.5
"	"	"	582	1531	0.6
"	"	4/24	600	1758	0.5
"	"	4/26	867	5897	0.8
"	"	"	673	2296	1.1
"	"	"	752	3289	0.4
"	"	"	785	3856	1.0
"	"	"	511	1021	0.3
Middle Arm	C. Cat	4/20	370	567	0.3
"	"	"	420	794	0.4
"	"	"	339	454	0.3
"	"	"	320	340	0.3
"	"	"	379	567	0.4
"	"	4/21	411	907	0.6
"	"	"	350	482	0.5
"	"	"	519	1758	0.8
"	"	"	325	397	0.3
"	"	"	415	850	0.5
"	"	"	340	397	0.4
"	"	"	415	907	0.6
"	"	4/22	346	510	0.4
"	"	"	310	340	0.4
"	"	"	276	227	0.1
"	"	"	325	397	0.2
"	"	"	365	539	0.4
"	"	4/25	570	1276	0.8
"	"	"	341	454	0.3
"	"	"	375	567	0.4
Middle Arm	B. Crappie	4/24	292	454	0.4

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Lenght (mm)	Weight (gms)	Hg (ppm)*
Middle Arm	W.Bass	4/21	275	397	0.2
"	"	"	270	340	0.2
"	"	"	210	142	0.2
"	"	4/25	313	425	0.2
"	"	"	269	368	1.0
"	"	"	220	142	0.2
"	"	"	259	255	0.5
"	"	"	210	113	0.2
"	"	"	212	142	0.3
"	"	4/26	268	170	0.5
Lower Arm	No. Pike	4/22	680	1928	0.5
"	"	"	606	1644	0.3
"	"	"	580	1531	0.3
"	"	"	824	4649	2.3
"	"	"	640	2155	0.4
"	"	"	582	1418	0.4
"	"	"	627	1707	0.4
"	"	4/26	961	5897	1.4
"	"	"	671	2438	0.4
"	"	"	588	1361	0.2
"	"	"	699	2523	0.8
"	"	"	582	1616	0.4
Lower Arm	Walleye	4/22	531	1814	0.5
"	"	"	448	1162	0.7
"	"	"	374	539	0.3
"	"	"	360	454	0.2
"	"	"	330	340	0.2
"	"	"	340	454	0.3
"	"	"	322	284	0.2
"	"	"	304	284	0.2
"	"	"	562	2155	0.5
"	"	"	316	368	0.3
"	"	"	318	397	0.3
"	"	"	435	992	0.8
"	"	"	392	680	0.3
"	"	"	345	425	0.2
"	"	"	342	397	0.3
"	"	"	278	227	0.2
Lower Arm	C. Cat	4/22	370	624	0.5
"	"	"	412	737	0.4
"	"	"	335	397	0.2
"	"	"	380	684	0.3

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Lenght (mm)	Weight (gms)	Hg (ppm)*
Lower Arm	C. Cat	4/22	334	397	0.2
"	"	"	358	539	0.3
"	"	"	369	595	0.7
"	"	"	392	680	0.4
"	"	"	466	1332	0.3
Lower Arm	Y. Perch	4/22	244	255	0.2
"	"	"	193	113	0.1
"	"	4/26	186	85	0.2
Lower Arm	Sauger	4/22	313	255	0.3
"	"	4/26	338	340	0.3
"	"	"	266	170	0.3
"	"	"	260	142	0.1
Tail Race	C. Cat	4/16	458	950	0.3
"	"	"	410	690	<0.1
"	"	"	351	440	0.1
"	"	"	340	330	<0.1
"	"	"	570	2250	0.7
"	"	"	361	450	0.3
"	"	"	491	1250	<0.1
"	"	"	372	490	0.3
"	"	"	358	410	0.2
"	"	"	404	590	0.5
"	"	"	385	560	0.3
Tail Race	Walleye	4/16	375	567	0.2
"	"	"	458	992	0.2
"	"	"	330	340	0.2
"	"	"	345	454	0.4
"	"	"	365	567	<0.1
"	"	"	345	397	0.1
"	"	"	471	1134	0.4
"	"	4/25	481	1304	<0.1
"	"	"	352	400	<0.1
"	"	"	351	425	0.4
"	"	"	351	425	0.1
"	"	"	351	454	0.1
"	"	"	439	1021	<0.1
"	"	"	315	284	<0.1
"	"	"	352	397	0.6
"	"	"	415	879	0.2

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Lenght (mm)	Weight (gms)	Hg (ppm)*
Tailrace	Sauger	4/25	332	368	0.2
"	"	"	343	340	<0.1
"	"	"	283	170	0.1
Tailrace	W. Bass	4/25	299	482	0.2
Whitlocks	Walleye	4/17	390	684	0.5
"	"	"	390	567	0.2
"	"	"	360	482	0.2
"	"	"	368	510	0.3
"	"	"	395	680	0.3
"	"	"	366	510	0.7
"	"	"	425	850	0.2
"	"	"	335	454	0.2
"	"	4/18	421	850	0.6
"	"	"	352	482	0.1
"	"	"	353	482	0.4
"	"	"	330	368	0.4
"	"	"	414	794	0.3
"	"	"	361	510	0.2
"	"	"	339	397	0.4
"	"	"	340	397	0.3
Whitlocks	No. Pike	4/18	550	1304	0.3
"	"	4/20	590	1729	0.3
"	"	"	590	1729	0.4
"	"	"	560	1361	0.2
"	"	"	600	1701	0.3
"	"	"	570	1361	0.2
"	"	"	590	1446	0.3
"	"	"	660	1928	0.4
"	"	"	590	1616	0.2
"	"	"	610	1871	0.3
"	"	"	570	1361	0.3
"	"	"	525	1134	0.7
Whitlocks	C. Cat	4/18	410	765	0.5
Whitlocks	W. Bass	4/17	222	113	0.1
"	"	4/18	308	510	0.5
"	"	"	234	170	0.2
"	"	4/20	350	907	1.2
"	"	"	200	142	0.1

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (ppm)*
Whitlocks	Sauger	4/18	342	425	0.2
"	"	"	333	284	0.5
"	"	"	313	227	0.2
"	"	"	337	312	0.3
"	"	4/20	350	340	0.2
Whitlocks	Y. Perch	4/17	200	0.113	0.1
"	"	"	180	0.142	0.2
"	"	"	238	0.142	0.1
Upper Arm	No. Pike	5/17	700	2495	1.35
"	"	"	930	4990	1.38
"	"	"	647	1814	0.95
"	"	"	664	2268	0.48
"	"	"	755	2977	1.57
"	"	"	540	1077	0.30
"	"	"	570	1307	0.41
Upper Arm	Walleye	5/17	395	850	0.43
"	"	"	370	624	0.40
"	"	"	365	567	0.22
"	"	"	380	624	0.48
"	"	"	400	737	0.27
"	"	"	460	1134	0.43
"	"	"	400	737	0.29
"	"	"	335	454	0.95
"	"	"	450	964	0.75
"	"	"	432	794	0.95
"	"	"	480	1162	0.68
"	"	"	429	907	0.55
"	"	"	421	709	0.84
"	"	"	416	794	0.50
"	"	"	375	595	0.54
"	"	"	422	822	0.34
Upper Arm	C.Cat	5/17	440	1134	0.55
"	"	"	454	1361	0.65
"	"	"	389	709	0.31
"	"	"	450	1049	0.58
"	"	"	310	397	0.27
"	"	"	400	850	0.15
"	"	"	340	567	0.48
"	"	"	285	284	0.31
"	"	"	320	454	0.62
"	"	"	250	198	0.23
"	"	"	365	624	0.56

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (ppm)*
Upper Arm	C. Cat	5/17	335	539	0.31
"	"	"	285	312	0.39
"	"	"	340	539	0.22
"	"	"	315	397	0.40
"	"	"	260	227	0.60
"	"	"	240	227	0.21
Upper Arm	Sauger	5/17	270	142	0.29
"	"	5/19	305	227	0.28
"	"	"	465	680	0.98
"	"	"	290	198	0.36
"	"	""	285	170	0.19
"	"	"	435	284	0.56
"	"	"	260	113	0.44
"	"	"	285	198	0.21
Upper Arm	W. Bass	5/17	220	170	0.30
"	"	"	205	142	0.10
"	"	"	200	113	0.26
"	"	"	210	170	0.06
"	"	"	319	964	0.62
"	"	"	325	567	0.68
"	"	"	294	454	0.66
"	"	"	316	567	0.60
"	"	"	283	397	0.43
"	"	"	306	510	0.31
"	"	"	305	454	0.75
"	"	"	260	312	0.23
"	"	"	275	312	0.60
"	"	"	280	340	0.42
"	"	"	315	510	0.73
"	"	"	264	284	0.49
"	"	"	242	227	0.67
"	"	"	305	510	0.40
"	"	"	279	368	0.45
Upper Arm	W. Crappie	5/17	315	510	0.74
"	"	"	325	567	1.02
Middle Arm	N. Pike	5/20	695	2438	1.49
"	"	"	590	1418	0.61
"	"	"	1040	8278	0.81
"	"	"	730	2438	0.89
"	"	"	1090	8392	1.07
"	"	"	745	3204	1.09
"	"	"	640	1588	0.38

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (ppm)*
Middle Arm	N. Pike	5/22	590	1474	0.25
"	"	"	800	3600	0.58
"	"	"	605	1474	0.33
"	"	"	527	1219	0.26
"	"	"	795	1474	0.80
Middle Arm	Walleye	5/20	425	737	0.42
"	"	"	295	227	0.32
"	"	"	450	964	0.39
"	"	"	320	340	0.32
"	"	"	395	624	0.48
"	"	"	332	397	0.35
"	"	"	195	255	0.55
"	"	"	332	312	0.19
"	"	"	320	340	0.11
"	"	"	300	284	0.18
"	"	"	450	964	0.33
"	"	"	295	255	0.26
"	"	"	340	454	0.33
"	"	"	359	454	0.20
"	"	"	290	255	0.30
"	"	"	330	284	0.30
Middle Arm	C. Cat	5/20	250	482	0.21
"	"	"	305	340	0.11
"	"	5/21	344	425	0.45
"	"	"	420	822	0.38
"	"	"	352	454	0.31
"	"	5/22	481	1474	0.32
"	"	"	365	539	0.31
Middle Arm	Sauger	5/21	375	454	0.40
Middle Arm	W. Crappie	5/20	329	567	0.90
"	"	5/21	320	510	0.24
"	B. Crappie	5/20	319	567	0.23
"	"	"	290	397	0.56
"	"	5/21	275	255	0.70
"	"	5/22	290	255	0.76
"	"	"	303	454	1.12
Middle Arm	W. Bass	5/22	272	312	0.45
"	"	"	277	340	0.28
"	"	"	314	454	0.23
"	"	"	306	397	0.62

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (ppm)*
Lower Arm	N. Pike	5/20	640	1616	0.50
"	"	"	700	2608	0.54
"	"	"	550	1304	0.24
"	"	"	605	1474	0.30
"	"	5/21	542	1247	0.21
"	"	5/22	736	2466	0.53
Lower Arm	Walleye	5/20	450	1021	0.25
"	"	"	450	1021	0.35
"	"	"	340	454	0.52
"	"	"	365	482	0.21
"	"	"	369	652	0.45
"	"	"	312	312	0.18
"	"	"	339	425	0.26
"	"	"	359	510	0.32
"	"	"	342	425	0.18
"	"	"	302	312	0.38
"	"	"	305	312	0.21
"	"	"	413	709	0.22
"	"	"	273	198	0.18
"	"	"	280	227	0.19
"	"	"	309	340	0.24
Lower Arm	C. Cat	5/20	385	539	0.19
"	"	5/21	320	454	0.21
"	"	"	340	454	0.30
"	"	"	318	340	0.25
Lower Arm	Y. Perch	5/20	180	85	0.14
"	"	"	176	85	0.25
"	"	"	175	85	0.25
"	"	5/21	210	113	0.24
Lower Arm	Sauger	5/21	250	113	0.28
"	"	"	280	170	0.31
"	"	5/22	335	368	0.32
Lower Arm	W. Crappie	5/20	360	794	0.58
"	"	5/22	350	680	0.52
"	"	"	302	368	0.54
"	B. Crappie	"	315	482	0.64
"	"	"	305	425	0.81
"	"	"	300	425	0.25
Tail Race	Walleye	5/19	355	510	0.32
"	"	"	310	284	0.30
"	"	"	295	284	0.16

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (ppm)*
Tail Race	Walleye	5/19	281	227	0.12
"	"	"	368	510	0.06
"	"	"	325	397	0.21
"	"	"	455	1134	0.23
"	"	"	308	255	0.20
"	"	"	310	284	0.45
"	"	"	292	284	0.06
"	"	"	290	227	0.12
"	"	"	280	255	0.12
"	"	"	310	283	0.04
"	"	"	310	340	0.79
"	"	"	321	340	0.17
"	"	"	330	312	0.20
Tail Race	Sauger	5/19	430	794	0.20
Tail Race	C. Cat	5/19	285	227	0.23
"	"	"	335	454	0.24
"	"	"	430	1021	0.54
"	"	"	350	454	0.48
"	"	"	288	227	0.17
"	"	"	350	454	0.36
"	"	"	390	680	0.12
"	"	"	630	3572	0.45
"	"	"	510	1588	0.24
"	"	"	350	284	0.16
"	"	"	380	567	0.35
"	"	"	360	510	0.25
"	"	"	450	964	0.21
"	"	"	335	397	0.20
"	"	"	435	1021	0.28
"	"	"	355	510	0.07
"	"	"	455	1077	0.12
"	"	"	470	1247	0.34
"	"	"	335	397	0.25
"	"	"	310	340	0.26
Whitlocks	Walleye	5/17	445	794	0.21
"	"	"	535	1588	0.26
"	"	"	370	425	0.38
"	"	"	357	425	0.67
"	"	"	354	369	0.18
"	"	"	457	879	0.18
"	"	"	439	737	0.25
"	"	"	321	340	0.25
"	"	"	347	397	0.15

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (ppm)*
Whitlocks	Walleye	5/17	420	737	0.30
"	"	"	345	397	0.13
"	"	"	471	1162	0.32
"	"	"	310	312	0.12
"	"	"	319	369	0.23
"	"	"	339	454	0.35
"	"	"	321	340	0.28
Whitlocks	N. Pike	5/17	610	1786	0.24
"	"	"	590	1389	0.25
"	"	"	631	1928	0.30
"	"	"	600	1474	0.42
"	"	"	610	1588	0.32
"	"	"	580	1389	0.21
"	"	"	760	2948	0.35
"	"	"	578	1361	0.25
"	"	"	600	1673	0.20
"	"	"	665	2098	0.41
"	"	"			
Whitlocks	C. Cat	5/17	320	397	0.32
"	"	"	410	822	0.25
"	"	"	390	680	0.21
"	"	"	328	454	0.21
"	"	"	458	794	0.33
"	"	"	314	340	0.32
"	"	5/18	318	368	0.12
"	"	"	323	340	0.30
Whitlocks	W. Bass	5/17	280	397	0.52
"	"	"	300	454	0.33
"	"	"	294	454	0.65
"	"	"	340	680	0.29
"	"	"	315	454	0.33
"	"	"	326	198	0.30
"	"	"	203	113	0.18
Whitlocks	Sauger	5/17	312	227	0.33
"	"	"	310	198	0.44
"	"	"	285	198	0.40
"	"	5/18	440	850	0.51
"	"	"	422	652	0.40
"	"	"	335	340	0.47
Whitlocks	B. Crappie	5/17	300	482	0.60
"	"	"	295	454	0.45
"	"	"	300	454	0.60

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (ppm)*
Whitlocks	B. Crappie	5/17	318	595	0.62
"	"	"	295	454	0.80
"	"	"	291	454	0.71
"	"	"	285	454	0.20
"	"	"	310	539	0.52
"	"	"	290	454	0.18
"	"	"	304	510	0.72
Whitlocks	Y. Perch	5/17	180	85	0.21
"	"	"	188	85	0.11
"	"	"	181	85	0.18
Upper Arm	Walleye	6/21	389	623	0.62
"	"	"	214	284	0.38
"	"	"	449	879	0.87
"	"	"	374	567	0.56
"	"	"	386	567	0.46
"	"	"	379	595	0.50
"	"	"	276	198	0.40
"	"	"	299	255	0.39
"	"	"	345	454	0.67
"	"	"	346	397	0.74
"	"	"	418	822	0.54
"	"	"	362	454	0.78
"	"	"	320	340	0.45
"	"	"	414	765	0.70
"	"	"	292	227	0.38
"	"	"	470	1049	0.87
Upper Arm	C. Cat	6/21	351	454	0.40
"	"	"	399	652	0.49
"	"	"	333	425	0.28
"	"	"	309	340	0.20
"	"	"	342	454	0.27
"	"	"	350	454	0.28
"	"	"	330	397	0.31
"	"	"	393	680	0.32
"	"	"	400	822	0.37
"	"	"	386	765	0.24
"	"	"	378	538	0.32
"	"	"	342	454	0.40
"	"	"	342	482	0.39
"	"	"	295	255	0.54
"	"	"	290	255	0.15
"	"	"	394	595	0.20
"	"	"	300	284	0.20
"	"	"	485	680	0.31
"	"	"	475	595	0.55

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (ppm)*
Upper Arm	Y. Perch	6/21	225	142	0.30
Upper Arm	W. Bass	6/22	294	368	0.45
"	"	"	304	368	1.08
"	"	"	332	482	0.79
"	"	"	287	368	0.50
"	"	"	282	340	0.62
"	"	"	291	340	0.55
"	"	"	270	284	0.42
"	"	"	275	340	0.82
"	"	"	290	368	0.95
"	"	"	281	340	0.87
"	"	"	255	255	0.35
"	"	6/23	280	368	0.37
"	"	"	255	284	0.18
"	"	"	279	368	0.33
"	"	"	280	368	0.63
"	"	"	245	255	0.10
"	"	"	271	340	0.90
"	"	"	294	425	0.53
"	"	"	284	397	0.24
"	"	"	215	170	0.21
Upper Arm	Sauger	6/21	232	255	0.50
"	"	"	392	482	0.55
"	"	6/22	408	567	0.79
"	"	"	340	284	0.38
"	"	"	332	284	0.50
"	"	"	255	113	0.37
"	"	"	232	85	0.23
Upper Arm	W. Crappie	6/21	207	113	0.24
"	"	"	213	142	0.27
"	"	"	325	482	0.90
"	"	"	211	142	0.14
"	B. Crappie	"	175	85	0.12
Middle Arm	Walleye	6/25	485	1134	0.65
"	"	"	360	454	0.35
"	"	"	315	255	0.25
"	"	"	342	425	0.32
"	"	"	360	454	0.23
"	"	"	490	595	0.36
"	"	"	315	255	0.30
"	"	"	380	482	0.55
"	"	"	322	340	0.26
"	"	"	342	368	0.43

TABLE1A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (ppm)*
Middle Arm	Walleye	6/25	475	1021	0.50
"	"	"	358	454	0.24
"	"	"	360	454	0.34
"	"	"	330	284	0.88
"	"	"	357	425	0.40
"	"	"	439	850	0.35
Middle Arm	C. Cat	6/25	370	595	0.29
"	"	"	304	340	0.13
"	"	"	412	907	0.19
"	"	"	358	482	0.20
"	"	"	340	454	0.21
"	"	"	471	1247	0.42
"	"	"	277	255	0.18
"	"	"	278	284	0.20
"	"	"	320	368	0.09
"	"	"	309	340	0.22
"	"	"	450	1219	0.08
"	"	"	328	284	0.14
"	"	"	438	680	0.30
"	"	"	340	454	0.23
"	"	"	533	2013	0.18
"	"	"	290	340	0.08
"	"	"	252	198	0.21
"	"	"	280	255	0.24
"	"	"	325	454	0.11
"	"	"	321	368	0.19
Middle Arm	N. Pike	6/25	728	2722	0.80
Middle Arm	W. Bass	6/25	290	340	0.50
"	"	"	310	454	0.60
"	"	"	300	340	0.29
"	"	"	272	340	0.52
"	"	"	223	142	0.26
"	"	"	228	142	0.10
"	"	"	285	368	0.37
"	"	6/26	300	425	0.29
"	"	"	293	397	0.28
"	"	"	305	425	0.50
Middle Arm	Y. Perch	6/25	221	142	0.41
"	"	"	223	142	0.18
Middle Arm	Sauger	6/25	418	680	0.39
"	"	"	300	227	0.58

TABLE 1A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (ppm)*
Middle Arm	Sauger	6/25	348	368	0.30
"	"	"	318	312	1.00
"	"	"	232	113	0.07
"	"	6/26	320	227	0.47
Middle Arm	W. Crappie	6/25	203	113	0.10
"	"	"	224	142	0.07
Lower Arm	Walleye	6/25	500	1304	0.43
"	"	"	323	340	0.32
"	"	"	380	567	0.24
"	"	"	380	567	0.63
"	"	"	429	737	0.30
"	"	"	343	340	0.24
"	"	"	358	454	0.30
"	"	"	290	227	0.15
"	"	"	410	567	0.40
"	"	"	365	482	0.10
"	"	"	344	454	0.29
"	"	"	455	964	0.25
"	"	"	342	425	0.33
"	"	"	446	992	0.40
"	"	"	405	680	0.29
"	"	"	396	652	0.13
Lower Arm	C. Cat	6/25	372	680	0.19
"	"	"	420	907	0.30
"	"	"	412	794	0.24
"	"	"	402	680	0.35
"	"	"	310	340	0.23
"	"	"	359	567	0.42
"	"	"	432	907	0.32
"	"	"	322	397	0.24
"	"	6/26	300	340	0.20
"	"	"	335	454	0.25
"	"	"	329	397	0.20
"	"	"	323	397	0.25
"	"	"	420	850	0.71
"	"	"	334	454	0.13
"	"	"	422	907	0.29
"	"	"	372	680	0.22
"	"	"	326	397	0.32
"	"	"	417	850	0.54
"	"	"	240	454	0.25
"	"	"	330	454	0.20
Lower Arm	W. Bass	6/25	289	340	0.45
"	"	"	282	340	0.48

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (ppm)*
Lower Arm	W. Bass	6/25	318	482	0.54
"	"	"	296	454	0.40
"	"	6/26	269	340	0.24
"	"	"	276	340	0.43
"	"	6/27	264	284	0.23
Lower Arm	W. Crappie	6/25	165	85	0.18
"	"	"	314	425	0.68
"	"	6/26	183	85	0.06
"	"	"	202	85	0.08
"	"	6/27	200	113	0.13
"	B. Crappie	6/26	246	225	0.20
Lower Arm	Sauger	6/26	279	170	0.13
"	"	"	424	482	0.62
Tail Race	Walleye	6/27	250	142	0.18
"	"	"	260	170	0.17
"	"	"	270	170	0.18
"	"	"	345	425	0.08
"	"	"	314	312	0.19
"	"	"	300	255	0.15
"	"	"	290	255	0.47
"	"	6/28	277	227	0.26
"	"	"	257	194	0.15
"	"	"	319	340	0.30
"	"	"	280	227	0.33
"	"	"	543	1928	0.33
"	"	"	253	142	0.22
"	"	"	275	227	0.51
"	"	"	283	227	0.30
"	"	"	322	312	0.17
Tail Race	C. Cat	6/27	353	454	0.20
"	"	"	375	538	0.14
"	"	"	380	567	0.22
"	"	"	492	1814	0.07
"	"	"	295	283	0.18
"	"	"	285	227	0.13
"	"	"	332	397	0.16
"	"	"	360	510	0.31
"	"	"	301	283	0.21
"	"	"	340	397	0.09
"	"	"	323	340	0.18
"	"	6/28	370	567	0.15
"	"	"	321	454	0.17
"	"	"	381	794	0.44

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (ppm)*
Tail Race	C. Cat	6/28	412	737	0.44
"	"	"	345	194	0.30
Tail Race	Y. Perch	6/27	180	85	0.16
Whitlocks	Walleye	6/21	418	709	0.20
"	"	"	400	684	0.42
"	"	"	345	425	0.51
"	"	"	314	284	0.24
"	"	"	335	368	0.26
"	"	"	330	340	0.45
"	"	"	310	255	0.40
"	"	"	525	1559	0.31
"	"	"	348	425	0.72
"	"	"	352	482	0.36
"	"	"	260	170	0.33
"	"	"	461	1021	0.32
"	"	"	291	255	0.20
"	"	"	456	907	0.34
"	"	"	293	255	0.13
"	"	"	347	425	0.25
Whitlocks	N. Pike	6/22	705	3090	0.70
"	"	6/23	390	454	0.22
Whitlocks	C. Cat	6/21	400	737	0.43
"	"	"	400	794	0.52
"	"	"	368	680	0.52
"	"	"	405	907	0.36
"	"	6/22	264	255	0.18
"	"	"	299	284	0.13
"	"	"	410	794	0.65
"	"	"	390	680	0.50
"	"	"	390	709	0.49
"	"	"	370	765	0.50
"	"	"	275	255	0.32
"	"	"	348	425	0.30
"	"	6/23	370	567	0.23
"	"	"	276	227	0.14
"	"	"	361	567	0.29
"	"	"	318	425	0.25
Whitlocks	W. Bass	6/22	299	425	0.37
"	"	"	321	510	0.54
"	"	"	219	142	0.20
"	"	"	309	425	0.14

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (ppm)*
Whitlocks	W. Bass	6/22	208	142	0.32
"	"	"	203	113	0.21
"	"	"	100	113	0.12
"	"	"	200	142	0.19
Whitlocks	Sauger	6/21	380	454	0.76
"	"	"	368	425	0.83
"	"	"	423	539	0.35
"	"	"	330	284	0.48
"	"	"	431	737	0.60
"	"	"	345	284	0.38
"	"	6/22	322	255	0.18
"	"	"	224	85	0.49
"	"	6/23	365	454	0.22
"	"	"	311	227	0.21
"	"	"	210	113	0.14
"	"	"	308	198	0.36
Whitlocks	B. Crappie	6/21	296	454	0.99
"	"	"	220	170	0.48
"	"	"	260	284	0.25
"	"	"	280	397	0.52
"	"	"	230	198	0.10
"	"	"	300	340	0.38
"	"	"	310	482	0.81
"	"	"	290	425	1.12
"	"	6/22	215	170	0.18
"	"	6/23	330	454	0.70
"	W. Crappie	6/21	215	142	0.10
"	"	"	180	85	0.18
"	"	"	186	85	0.17
"	"	6/22	197	85	0.29
"	"	6/23	235	170	0.18
"	"	"	240	198	0.10
Whitlocks	Y. Perch	6/21	180	85	0.38
"	"	"	180	57	0.36
"	"	6/23	240	198	0.18
"	"	"	220	198	0.11

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (ppm)*
Upper Arm	Walleye	9/20	405	907	0.3
"	"	"	424	709	0.7
"	"	"	373	539	0.8
"	"	"	383	425	0.3
"	"	"	335	368	1.7
"	"	"	300	227	0.3
"	"	"	295	255	0.3
"	"	"	258	170	0.2
"	"	9/21	294	255	0.3
"	"	"	365	539	0.5
"	"	"	324	340	0.3
"	"	"	390	567	0.7
"	"	"	369	567	0.6
"	"	"	332	397	0.2
"	"	"	229	284	0.2
"	"	"	428	907	0.6
Upper Arm	N. Pike	9/20	737	2495	2.01
Upper Arm	C. Cat	9/20	360	510	0.2
"	"	"	532	1673	1.2
"	"	9/21	347	482	0.2
"	"	"	332	454	0.2
"	"	9/22	395	709	0.3
"	"	"	400	709	0.2
"	"	"	336	454	0.3
"	"	"	394	595	0.6
"	"	"	318	340	0.2
"					
Upper Arm	Y. Perch	9/20	192	113	0.3
"	"	9/22	189	113	0.1
"	"	"	158	57	<0.1
Upper Arm	W. Bass	9/20	248	227	0.2
"	"	"	260	284	0.5
"	"	"	291	425	0.3
"	"	9/21	295	454	1.0
"	"	"	255	284	0.5
"	"	"	244	227	1.2
"	"	"	295	397	0.4
"	"	9/22	296	454	0.4
"	"	"	299	454	0.9
"	"	"	300	482	0.9
Upper Arm	Sauger	9/20	236	113	0.1

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (pp)*
Middle Arm	Walleye	9/25	368	454	0.4
"	"	"	244	113	0.2
"	"	"	330	312	0.2
"	"	"	460	879	0.5
"	"	"	304	227	0.2
"	"	"	417	684	0.5
"	"	"	323	340	0.2
"	"	"	434	652	0.7
"	"	"	323	340	0.27
"	"	"	259	198	0.21
"	"	"	358	425	0.48
"	"	"	385	539	0.40
"	"	"	439	737	0.40
"	"	"	410	652	0.3
"	"	"	384	510	0.2
Middle Arm	N. Pike	9/26	600	1361	0.46
Middle Arm	C. Cat	9/25	305	312	0.3
"	"	"	288	255	0.3
"	"	"	300	284	0.1
"	"	""	425	822	0.3
"	"	"	355	482	0.2
"	"	"	381	567	0.2
"	"	"	437	907	0.4
"	"	"	294	227	0.2
"	"	9/26	355	454	0.3
"	"	"	619	850	0.5
"	"	"	365	454	0.1
"	"	"	341	425	0.3
"	"	"	354	454	0.2
"	"	"	324	368	0.3
"	"	9/27	375	567	0.3
"	"	"	375	567	0.3
"	"	"	289	227	0.2
"	"	"	295	255	0.3
Middle Arm	W. Bass	9/25	265	340	0.7
"	"	"	297	425	0.2
"	"	"	215	170	0.7
"	"	"	295	425	1.0
"	"	"	280	368	0.9
"	"	9/27	205	142	0.2
Middle Arm	Y. Perch	9/25	180	85	<0.1
"	"	"	180	85	<0.1
"	"	9/26	210	113	0.1
"	"	"	192	113	<0.1
"	"	9/27	190	113	<0.1

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (pp)*
Lower Arm	Walleye	9/25	332	340	0.2
"	"	"	320	312	0.2
"	"	"	365	454	0.4
"	"	"	270	170	0.1
"	"	"	292	227	0.3
"	"	"	344	425	0.2
"	"	"	374	454	0.2
"	"	"	271	198	0.2
"	"	"	338	340	0.1
"	"	"	285	227	<0.1
"	"	"	408	567	0.2
"	"	"	405	652	0.2
"	"	"	345	454	0.3
"	"	"	486	1191	0.3
Lower Arm	C. Cat	9/25	352	482	0.2
"	"	"	300	284	0.3
"	"	9/26	334	454	0.3
"	"	"	373	539	0.3
"	"	"	344	425	0.4
"	"	9/27	382	567	0.2
Lower Arm	W. Bass	9/25	218	198	0.2
"	"	"	281	425	0.4
"	"	"	318	482	0.6
"	"	"	310	482	0.6
"	"	""	314	482	0.8
"	"	"	320	482	0.7
"	"	"	315	454	0.6
"	"	"	230	198	0.2
"	"	"	305	425	0.8
"	"	"	304	482	0.9
"	"	9/26	307	454	0.7
"	"	"	313	454	0.8
"	"	"	314	510	1.0
"	"	"	310	510	0.7
"	"	"	323	567	0.8
"	"	9/27	321	482	0.8
"	"	"	286	368	0.8
"	"	"	310	425	0.8
"	"	"	318	539	0.9
"	"	"	248	284	0.7
Lower Arm	N. Pike	9/25	660	1588	0.31
"	"	"	621	1446	0.37
Lower Arm	Sauger	9/26	307	255	0.2

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (pp)*
Tail Race	Walleye	9/19	338	397	0.1
"	"	"	345	454	<0.1
"	"	"	324	340	<0.1
"	"	"	325	340	<0.1
"	"	"	425	794	0.3
"	"	"	324	368	0.2
"	"	"	350	425	0.1
"	"	"	305	227	0.1
"	"	"	290	284	<0.1
"	"	"	230	368	0.1
"	"	"	332	397	0.1
"	"	"	334	368	0.1
"	"	"	305	312	0.1
"	"	"	302	255	<0.1
"	"	"	320	397	0.1
"	"	"	254	170	<0.1
Tail Race	C. Cat	9/19	330	368	<0.1
"	"	"	305	340	0.1
"	"	"	270	227	<0.1
"	"	"	250	198	<0.1
"	"	"	230	142	0.1
"	"	"	270	227	<0.1
"	"	"	240	170	0.1
"	"	"	230	142	<0.1
"	"	"	242	142	0.1
"	"	"	239	142	<0.1
"	"	"	280	255	0.1
"	"	"	242	142	0.2
"	"	"	250	142	0.2
"	"	"	205	113	0.1
"	"	"	260	198	<0.1
"	"	"	242	142	<0.1
"	"	"	290	255	0.4
"	"	"	250	170	<0.1
"	"	"	252	142	0.1
"	"	"	250	198	<0.1
Tail Race	W. Bass	9/19	330	652	0.1
Whitlocks	Walleye	9/21	230	113	0.1
"	"	"	307	284	0.2
"	"	"	378	510	0.3
"	"	"	295	255	0.2
"	"	"	236	113	0.1
"	"	"	270	170	0.2
"	"	"	303	284	0.2

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (pp)*
Whitlocks	Walleye	9/21	238	113	<0.1
"	"	"	288	255	<0.1
"	"	"	319	255	0.2
"	"	"	379	510	0.2
"	"	"	370	482	0.1
"	"	"	490	1049	0.2
"	"	"	317	284	0.1
"	"	"	333	368	0.2
"	"	"	313	284	0.1
Whitlocks	N. Pike	9/21	488	794	0.18
"	"	"	413	510	0.21
"	"	9/22	660	1843	0.32
Whitlocks	C. Cat	9/22	322	425	0.3
"	"	"	300	340	0.1
"	"	"	278	227	0.1
"	"	"	420	737	0.2
"	"	"	305	284	0.1
"	"	"	371	454	0.3
"	"	"	374	567	0.2
"	"	"	392	595	0.2
"	"	"	308	312	0.2
Whitlocks	W. Bass	9/20	314	537	0.7
"	"	"	315	454	0.7
"	"	"	253	255	0.2
"	"	9/21	290	454	0.3
"	"	"	250	284	0.2
"	"	9/22	244	255	0.2
"	"	"	390	794	0.8
Whitlocks	Sauger	9/20	243	113	<0.1
"	"	9/21	365	368	0.2
"	"	"	420	567	0.4
"	"	"	276	170	0.1
"	"	"	335	284	0.2
"	"	"	347	340	0.4
"	"	"	306	227	0.3
"	"	"	271	142	<0.1
"	"	"	250	113	<0.1
"	"	"	301	227	<0.1
"	"	"	256	142	0.1
"	"	9/22	320	312	0.2
"	"	"	215	85	<0.1

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (pp)*
Whitlocks	Y. Perch	9/21	201	113	0.1
"	"	"	224	170	<0.1
"	"	"	196	113	0.1
"	"	9/22	193	113	<0.1
"	"	"	216	170	0.1
"	"	"	164	113	<0.1
"	"	"	235	170	0.2
"	"	"	190	113	0.1
"	"	"	190	113	0.1
"	"	"	194	113	<0.1
"	"	"	205	113	0.1
"	"	"	182	85	0.1
"	"	"	182	85	0.1
"	"	"	203	113	0.1
"	"	"	187	85	<0.1
"	"	"	207	113	<0.1
Whitlocks	B. Crappie	9/20	317	537	0.6
"	"	9/21	298	482	0.3
"	W. Crappie	9/20	218	170	<0.1
"	"	9/21	243	255	<0.1
E. Swim	Walleye	April	419	794	0.29
"	"	"	330	822	0.22
"	"	"	267	227	0.22
"	"	"	317	368	0.18
"	"	"	546	1616	0.31
"	"	"	317	340	0.20
"	"	"	254	170	0.21
E. Swim	N. Pike	April	521	765	0.23
"	"	"	571	936	0.23
"	"	"	597	1418	0.30
"	"	"	648	1758	0.30
"	"	"	571	1191	0.27
"	"	"	571	1247	0.29
E. Swim	B. Crappie	April	305	510	0.22
"	"	"	241	340	0.14
"	"	"	254	340	0.19
"	"	"	254	284	0.20
"	"	"	254	284	0.17
"	"	"	229	227	0.12
"	"	"	190	142	0.11
E. Swim	Y. Perch	April	254	198	0.27
"	"	"	241	227	0.22

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (pp)*
E. Swim	Y. Perch	April	216	198	0.32
"	"	"	241	170	0.30
E. Swim	W. Crappie	May	254	312	0.19
"	"	"	317	624	0.27
"	"	"	267	340	0.24
"	"	"	272	368	0.20
"	"	"	254	312	0.17
"	"	"	221	255	0.18
"	B. Crappie	"	234	227	0.16
"	"	"	254	255	0.17
"	"	"	267	340	0.20
"	"	"	272	368	0.17
E. Swim	W. Bass	May	387	1049	0.55
E. Swim	N. Pike	May	483	850	0.26
		June -			
E. Swim	B. Crappie	July	335	680	0.27
"	W. Crappie	"	254	284	0.16
"	"	"	241	255	0.19
"	"	"	267	312	0.18
"	"	"	241	227	0.20
E. Swim	N. Pike	July	462	680	0.21
E. Swim	Y. Perch	July	178	85	0.30
"	"	"	157	57	0.20
"	"	"	178	85	0.18
"	"	"	157	57	0.23
"	"	"	157	57	0.19
"	"	"	178	85	0.15
"	"	"	152	85	0.18
"	"	"	157	85	0.16
"	"	"	171	85	0.22
"	"	"	140	57	0.14
E. Swim	Walleye	July	330	368	0.23
E. Swim	Crappie	July	241	284	0.16
"	"	"	267	312	0.19
"	"	"	254	312	0.26
E. Swim	Y. Perch	July	221	227	0.22
"	"	"	241	284	0.21

TABLE 1-A Length (mm), weight (grams), mercury content (ppm) and type of fish caught during each sampling period, at each sampling location. (continued)

Area	Fish	Date	Length (mm)	Weight (gms)	Hg (pp)*
E. Swim	Y. Perch	July	216	170	0.19
"	"	"	216	170	0.30
"	"	"	203	170	0.18
"	"	"	216	142	0.22
E. Swim	Walleye	Sept.	335	397	0.24
"	"	"	317	340	0.19
"	"	"	310	312	0.19
"	"	"	330	368	0.22
"	"	"	305	312	0.27
"	"	"	267	198	0.21
E. Swim	Crappie	Sept.	279	368	0.24
"	"	"	284	397	0.21
"	" "	"	241	255	0.19
"	"	"	343	822	0.40
"	"	"	229	255	0.16
"	"	"	284	482	0.30
"	"	"	279	368	0.26
"	"	"	259	340	0.17
"	"	"	248	284	0.16
"	"	"	267	340	0.19
E. Swim	Y. Perch	Sept.	229	142	0.22
"	"	"	190	85	0.21
"	"	"	221	142	0.19
"	"	"	190	85	0.40
"	"	"	216	85	0.14
"	"	"	196	85	0.32
"	"	"	178	85	0.22
"	"	"	183	85	0.20
"	"	"	165	57	0.17
"	"	"	241	170	0.25

TABLE 2A - Results of Statistical Analyses on Mercury Concentrations in Fish Samples

Cheyenne - Upper Arm

Month	Species	Mean Mercury Conc.(ppm)	Total No. Sampled	Standard Deviation	Max.	Min.	99% Confidence limits of mean	
April	Walleye	0.8	15	0.4	1.4	0.3	0.5	1.0
May	"	0.5	16	0.2	0.9	0.2	0.4	0.7
June	"	0.6	16	0.2	0.9	0.4	0.5	0.7
Sept.	"	0.5	15	0.4	1.7	0.2	0.3	0.8
Total		0.6	62	0.3	1.7	0.2	0.5	0.7
April	No. Pike	0.7	11	0.4	1.7	0.3	0.3	1.0
May	"	0.9	7	0.5	1.6	0.3	0.4	1.4
Sept.	"	2.0	1	0.0	2.0	2.0	2.0	2.0
Total		0.8	19	0.5	2.0	0.3	0.5	1.2
April	C. Catfish	0.6	20	0.3	1.3	0.1	0.4	0.8
May	"	0.4	17	0.2	0.6	0.1	0.3	0.5
June	"	0.3	19	0.1	0.5	0.1	0.3	0.4
Sept.	"	0.4	9	0.3	1.2	0.2	0.1	0.7
Total		0.4	65	0.3	1.3	0.1	0.3	0.5
April	W. Bass	0.5	20	0.3	1.2	0.2	0.4	0.7
May	"	0.5	19	0.2	0.7	0.1	0.3	0.6
June	"	0.5	20	0.3	1.1	0.1	0.4	0.7
Sept.	"	0.6	10	0.3	1.2	0.2	0.4	0.9
Total		0.5	69	0.3	1.2	0.1	0.4	0.6
April	Sauger	0.3	10.0	0.2	0.9	0.1	0.1	0.5
May	"	0.4	8.0	0.3	1.0	0.2	0.2	0.7
June	"	0.5	7.0	0.2	0.8	0.2	0.3	0.6
Total		0.4	25.0	0.2	1.0	0.1	0.3	0.5
May	Crappie	0.8	2.0	0.2	1.0	0.7	0.5	1.2
June	"	0.3	5.0	0.3	0.9	0.1	0.0	0.7
Total		0.5	7.0	0.4	1.0	0.1	0.1	0.8
April	Yellow Perch	0.2	5.0	0.1	0.3	0.1	0.1	0.3
Sept.	"	0.2	3.0	0.1	0.3	0.1	0.0	0.3
Total		0.2	8.0	0.1	0.3	0.1	0.1	0.2
GRAND TOTAL		0.5	255.0	0.3	2.0	0.1	0.5	0.6

TABLE 2A - Continued

Cheyenne - Middle Arm

Month	Species	Mean Mercury Conc.(ppm)	Total No. Sampled	Standard Deviation	Max.	Min.	99% Confidence limits of mean	
April	Walleye	0.6	16	0.3	1.4	0.3	0.4	0.7
May	"	0.3	16	0.1	0.5	0.1	0.2	0.4
June	"	0.4	16	0.2	0.9	0.2	0.3	0.5
Sept.	"	0.3	16	0.2	0.7	0.0	0.2	0.4
Total		0.4	64	0.2	1.4	0.0	0.3	0.5
April	No. Pike	0.8	12	0.4	1.5	0.3	0.5	1.1
May	"	0.8	11	0.4	1.5	0.2	0.4	1.0
Total		0.8	23	0.4	1.5	0.2	0.6	1.0
April	C. Catfish	0.4	20	0.2	0.8	0.1	0.3	0.5
May	"	0.3	7	0.1	0.4	0.1	0.2	0.4
June	"	0.2	20	0.1	0.4	0.1	0.1	0.2
Sept.	"	0.3	18	0.1	0.5	0.1	0.2	0.3
Total		0.3	65	0.2	0.8	0.1	0.2	0.3
April	W. Bass	0.4	10	0.3	1.0	0.2	0.1	0.6
May	"	0.4	4	0.2	0.6	0.2	0.2	0.6
June	"	0.4	10	0.2	0.6	0.1	0.3	0.5
Sept.	"	0.6	6	0.3	1.0	0.2	0.3	1.0
Total		0.4	30	0.2	1.0	0.1	0.3	0.5
April	Sauger	0.4	4	0.1	0.5	0.3	0.3	0.5
June	"	0.5	6	0.3	1.0	0.1	0.2	0.8
Total		0.4	10	0.2	1.0	0.1	0.3	0.6
May	Crappie	0.6	7	0.3	1.1	0.2	0.3	1.0
June	"	0.1	2	0.0	0.1	0.1	0.1	0.1
Total		0.5	9	0.4	1.1	0.1	0.2	0.8
April	Yellow Perch	0.1	5	0.1	0.2	0.1	0.1	0.2
June	"	0.3	2	0.1	0.4	0.2	0.1	0.6
Sept.	"	0.1	5	0.0	0.1	0.1	0.1	0.1
Total		0.2	12	0.1	0.4	0.1	0.1	0.2
GRAND TOTAL		0.4	213	0.3	1.5	0.0	0.4	0.4

TABLE 2-A- continued

Cheyenne - Lower Arm

Month	Species	Mean Mercury Conc.(ppm)	Total No. Sampled	Standard Deviation	Max.	Min.	99% Confidence limits of mean	
April	Walleye	0.3	16	0.2	0.8	0.2	0.2	0.5
May	"	0.3	15	0.1	0.5	0.2	0.2	0.3
June	"	0.3	16	0.1	0.6	0.1	0.2	0.4
Sept.	"	0.2	16	0.1	0.4	0.0	0.1	0.3
Total		0.3	63	0.1	0.8	0.0	0.2	0.3
April	No. Pike	0.6	12	0.6	2.3	0.2	0.2	1.1
May	"	0.4	3	0.2	0.5	0.2	0.1	0.7
Sept.	"	0.4	2	0.1	0.4	0.3	0.2	0.5
Total		0.6	17	0.5	2.3	0.2	0.2	0.9
April	C. Catfish	0.4	9	0.2	0.7	0.2	0.2	0.5
May	"	0.2	3	0.1	0.3	0.2	0.2	0.3
June	"	0.3	20	0.1	0.7	0.1	0.2	0.4
Sept.	"	0.3	6	0.1	0.4	0.2	0.2	0.4
Total		0.3	38	0.1	0.7	0.1	0.2	0.3
June	W. Bass	0.4	7	0.1	0.5	0.2	0.2	0.5
Sept.	"	0.7	20	0.2	1.0	0.2	0.6	0.8
Total		0.6	27	0.2	1.0	0.2	0.5	0.7
April	Sauger	0.2	4	0.1	0.3	0.1	0.1	0.4
May	"	0.3	3	0.0	0.3	0.3	0.3	0.3
June	"	0.4	2	0.4	0.6	0.1	0.0	1.0
Sept.	"	0.1	2	0.1	0.2	0.0	0.0	0.4
Total		0.2	11	0.2	0.6	0.0	0.1	0.4
May	Crappie	0.5	6	0.2	0.8	0.2	0.3	0.7
June	"	0.2	6	0.2	0.7	0.1	0.0	0.5
Total		0.4	12	0.3	0.8	0.1	0.2	0.6
April	Yellow Perch	0.2	3	0.1	0.2	0.1	0.1	0.3
May	"	0.2	4	0.1	0.2	0.1	0.1	0.2
Total		0.2	7	0.1	0.2	0.1	0.1	0.2
GRAND TOTAL		0.4	175	0.3	2.3	0.0	0.3	0.4

TABLE 2-A- continued

Whitlock Bay

Month	Species	Mean Mercury Conc.(ppm)	Total No. Sampled	Standard Deviation	Max.	Min.	99% Confidence limits of mean	
April	Walleye	0.3	16	0.2	0.7	0.1	0.2	0.4
May	"	0.2	16	0.2	0.7	0.1	0.2	0.3
June	"	0.3	16	0.1	0.7	0.1	0.2	0.4
Sept.	"	0.2	16	0.1	0.3	0.1	0.1	0.2
Total		0.3	64	0.2	0.7	0.1	0.2	0.3
April	No. Pike	0.3	12	0.1	0.7	0.2	0.2	0.4
May	"	0.3	10	0.1	0.4	0.2	0.2	0.3
June	"	0.4	2	0.4	0.7	0.2	0.0	1.1
Sept.	"	0.2	3	0.1	0.3	0.2	0.2	0.3
Total		0.3	27	0.1	0.7	0.2	0.2	0.4
May	C. Catfish	0.2	8	0.1	0.3	0.1	0.2	0.3
June	"	0.4	16	0.2	0.6	0.1	0.2	0.4
Sept.	"	0.2	9	0.1	0.3	0.1	0.1	0.3
Total		0.3	33	0.1	0.6	0.1	0.2	0.3
April	W. Bass	0.4	5	0.5	1.2	0.1	0.0	1.0
May	"	0.4	7	0.1	0.6	0.2	0.2	0.5
June	"	0.2	8	0.1	0.5	0.1	0.1	0.4
Sept.	"	0.4	7	0.3	0.8	0.2	0.2	0.7
Total		0.4	27	0.3	1.2	0.1	0.2	0.5
April	Sauger	0.3	5	0.1	0.5	0.2	0.1	0.4
May	"	0.4	6	0.1	0.5	0.3	0.3	0.5
June	"	0.4	12	0.2	0.8	0.1	0.2	0.6
Sept.	"	0.2	13	0.1	0.4	0.1	0.1	0.3
Total		0.3	36	0.2	0.8	0.1	0.2	0.4
May	Crappie	0.5	10	0.2	0.8	0.2	0.4	0.7
June	"	0.4	16	0.3	1.1	0.1	0.2	0.6
Sept.	"	0.3	4	0.2	0.6	0.1	0.0	0.6
Total		0.4	30	0.3	1.1	0.1	0.3	0.6
April	Yellow Perch	0.1	3	0.1	0.2	0.1	0.1	0.2
May	"	0.2	3	0.1	0.2	0.1	0.1	0.2
June	"	0.3	4	0.2	0.4	0.1	0.1	0.5
Sept.	"	0.1	15	0.1	0.2	0.1	0.1	0.1
Total		0.1	25	0.1	0.4	0.1	0.1	0.2
GRAND TOTAL		0.3	242	0.2	1.2	0.1	0.3	0.3

TABLE 2-A- continued

Tailrace - Control

Month	Species	Mean Mercury Conc.(ppm)	Total No. Sampled	Standard Deviation	Max.	Min.	99% Confidence limits of mean	
April	Walleye	0.2	16	0.2	0.6	0.1	0.1	0.3
May	"	0.2	16	0.2	0.8	0.0	0.1	0.3
June	"	0.2	16	0.1	0.5	0.1	0.2	0.3
Sept.	"	0.1	16	0.1	0.3	0.1	0.1	0.2
Total		0.2	64	0.1	0.8	0.0	0.2	0.2
April	C. Catfish	0.3	11	0.2	0.7	0.1	0.1	0.4
May	"	0.2	20	0.1	0.5	0.1	0.2	0.3
June	"	0.2	16	0.1	0.4	0.1	0.1	0.3
Sept.	"	0.1	20	0.1	0.4	0.1	0.1	0.2
Total		0.2	67	0.1	0.7	0.1	0.2	0.2
April	Sauger	0.1	3	0.1	0.2	0.1	0.1	0.2
Total	"	0.1	3	0.1	0.2	0.1	0.1	0.2
GRAND TOTAL		0.2	134	0.1	0.8	0.0	0.2	0.2

TABLE 2-A- continued

Lake Enemy Swim - Control

Month	Species	Mean Mercury Conc.(ppm)	Total No. Sampled	Standard Deviation	Max.	Min.	99% Confidence limits of mean	
April	Walleye	0.2	7	0.1	0.3	0.2	0.2	0.3
Sept.	"	0.2	6	0.1	0.3	0.2	0.2	0.3
Total		0.2	13	0.1	0.3	0.2	0.2	0.2
April	No. Pike	0.3	6	0.1	0.3	0.2	0.2	0.3
Total	"	0.3	6	0.1	0.3	0.2	0.2	0.3
April	Crappie	0.2	7	0.1	0.2	0.1	0.1	0.2
May	"	0.2	10	0.1	0.3	0.2	0.2	0.2
June	"	0.2	6	0.1	0.3	0.2	0.2	0.3
Sept.	"	0.2	10	0.1	0.4	0.2	0.2	0.3
Total		0.2	33	0.1	0.4	0.1	0.2	0.2
April	Yellow Perch	0.3	4	0.1	0.3	0.2	0.2	0.3
June	"	0.2	16	0.1	0.3	0.1	0.2	0.2
Sept.	"	0.2	10	0.1	0.4	0.1	0.2	0.3
Total		0.2	30	0.1	0.4	0.1	0.2	0.2
GRAND TOTAL		0.2	82	0.1	0.4	0.1	0.2	0.2