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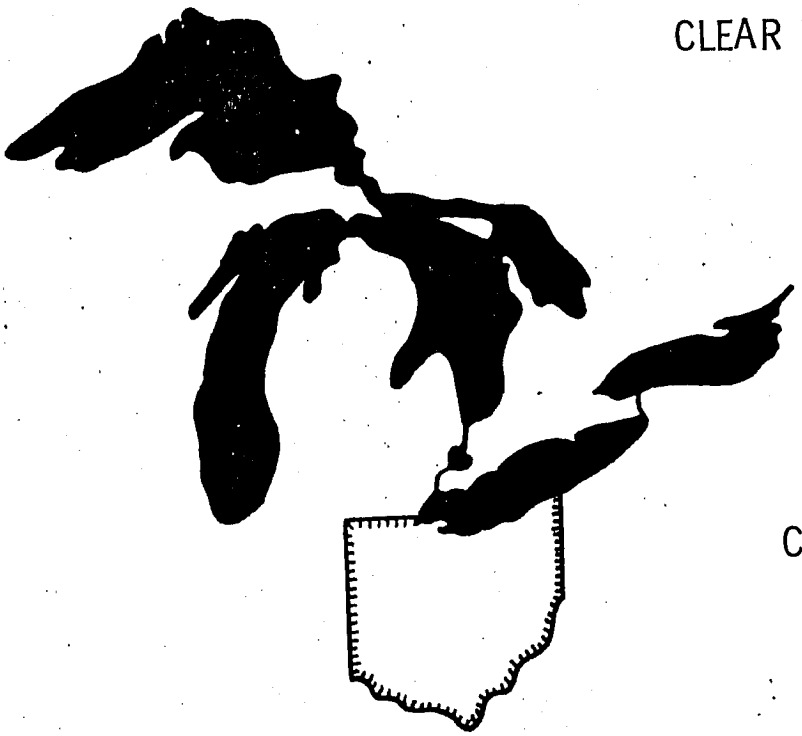

COMMERCIAL FISHING: GEAR MORTALITY

Prepared by

Kenneth R. Fritz
Steven J. VanFleet
David L. Johnson, Ph.D.
School of Natural Resources
and
Jeffrey M. Reutter, Ph.D.
Center for Lake Erie Area Research

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THE OHIO STATE UNIVERSITY
CENTER FOR LAKE ERIE AREA RESEARCH
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INDUCED MORTALITY OF UNMARKETABLE FISHES DUE TO CAPTURE IN OHIO COMMERCIAL FISHING GEAR*

Kenneth R. Fritz
Steven J. VanFleet
David L. Johnson, Ph.D.
School of Natural Resources
The Ohio State University
and
Jeffrey M. Reutter, Ph.D.
Center for Lake Erie Area Research
The Ohio State University
Columbus, Ohio
June, 1980

ABSTRACT

Fourteen composition samples were taken at two shore seine sites. The catch at both sites was dominated by five species: freshwater drum (Aplodinotus grunniens), gizzard shad (Dorosoma cepedianum), white bass (Morone chrysops), carp (Cyprinus carpio), and channel catfish (Ictalurus punctatus).

Eleven mortality samples, three at one seine site and eight at the other, were collected. The stress reaction of fish captured by seines appears similar at both locations. Channel catfish and carp showed the lowest mortality and/or stress. Freshwater drum and gizzard shad were highly stressed by capture. Walleye and white bass showed a variable stress response to capture. A positive relationship between catch size and mortality of white bass, walleye, and freshwater drum was indicated.

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Thirteen samples from a total of 98 traps were taken at two trap net sites. White bass, freshwater drum, and gizzard shad made up more than 90 percent of the catch for all samples through June 13. The July 3 sample included another major species, the quillback carpsucker (Carpiodes cyprinus) and the four species together represented 88.68 percent of this sample.

Yellow perch (Perca flavescens) was the target species in August as the market value of white bass declined. While total catch percentage only declined 0.42 percent (21.80 to 21.38 percent) from July to August, white bass less than 9 inches comprised 80.86 percent of the August catch. Yellow perch composed 64.91, 46.18 and 37.25 percent of the catch for August 7, August 22 and September 4, respectively. Yellow perch were less important in the September 20 (0.93 percent) and November 2 (14.78 percent) catches. Walleye (Stizostedion vitreum) catch percentages remained relatively constant throughout all sample dates (4.86 percent or less), except on September 4, when they comprised 9.56 percent of the total catch.

Sixteen gill net samples from a total of 536 nets were taken at two locations in the Central Basin. Two species of fish, yellow perch and freshwater drum, accounted for more than 90 percent of the total catch for all samples. Walleye catches were consistently low at both locations, never constituting more than 1.86 percent of any total catch.

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BACKGROUND

The Ohio Department of Natural Resources' Division of Wildlife manages the fishery resources of Lake Erie for the good of the people of Ohio. The Division through its commercial fishing regulations controls the species, sizes and numbers of fish harvested by commercial fishermen. This study was designed to determine if the existing regulations were effective or if changes were necessary to prevent the capture of large numbers of unwanted or illegal fish. The study was also designed to provide information on the mortality of unwanted or illegal fish released from commercial gear.

STUDY OBJECTIVE

To estimate the immediate mortality of Ohio commercial fishing gear induced on unmarketable fishes, evaluate commercial fishing laws as to their effectiveness and develop management recommendations designed to further minimize the loss of unmarketable fishes.

PROCEDURES

Shore Seines

Shore seines were sampled twice per month at two sites (Figure 1) in Sandusky Bay when cooperating fishermen were fishing. The two cooperating fishermen were Mr. Luther Gowitzga and the Port Clinton Fish Company. The third planned site was eliminated when the fishermen went out of business. The commercial fishing season opened 1 March, but sampling did not begin until April for catch composition and May for

induced mortality of released fish because of sporadic fishing effort caused by inclement weather and fluctuating market demand for fish products. After July 1, L. Gowitzga suspended operations for the season. Water and air temperatures, dissolved oxygen and secchi disc readings were monitored before (ambient) and during each shore seine pull in an effort to determine factors affecting mortality. On occasions when commercial fishermen had markets for all the rough fish in the seine, a sample of these fish (e.g. carp, goldfish, shad, and drum) was taken before the net was emptied. Even though these fish were not, on those particular days, "unmarketable", we believed this data on mortality ratios would be useful in situations where the fish were not harvested.

Catch Composition

Catch composition was initially to be estimated by securing three dip nets full of fish, one each from the front, center, and side of the bagged seine. This procedure was rejected after discussions with Ohio Division of Wildlife (ODW) personnel. It was believed that 1 dip net full of fish from 3 areas would not adequately describe the composition due to species segregation in the bagged seine. The technique for photographing dip nets full of fish on the sorting trough at regular intervals, originally designed to determine catch size, was considered as a possible way of determining catch composition, also. This technique would overcome the problem of species segregation, but was rejected because it would require too many photographs per sample to estimate catch size and composition accurately, and it would disrupt fishing operations. In addition, identification and enumeration of fish in the photographs would

have been difficult as preliminary attempts indicated the camera would have to be at least 10 feet above and directly over the sorting trough.

The procedure which was finally used is described below. The catch composition was estimated by repeatedly placing a dip net full of fish in a tub and directly identifying and enumerating each fish. The number of dip nets full of fish required to empty the seine bag was also recorded. Although more time consuming, this method was more accurate than either of the 2 above described. This procedure was modified when a cooperator sold fish for live haul. At that time not all fish were dipped from the bagged seine. The float line of the seine was depressed and unwanted fish were forced over this line. When this occurred a small net was placed at the point where the float line was depressed and the escaping fish were collected for a 30-second interval. After the collected fish were identified and counted another 30-second collection was made. This process was repeated as long as the float line was depressed. The total time the float line was depressed was recorded to provide an estimate of the number of fish released in this manner. It should be noted that had the procedure not been modified on these special occasions, all the fish forced over the float line would have been absent in our estimates.

Mortality

The immediate mortality of fishes released from shore seines was estimated 3 times at L. Gowitzga's site, and 8 times at the Port Clinton Fish Company's site. Mortality samples could not be obtained in March and April due to delayed shipment of special-ordered holding nets.

Initially, 3 dip nets full of fish, 1 each from the front, center, and side of the bagged seine were to be collected and placed in holding nets for 1 hour. After discussions with ODW personnel, this technique was

rejected in favor of collecting fish as they were returned to the water from the sorting trough. This procedure was believed to more adequately describe the stress of the capture and sorting process. Approximately 75 fish were to be collected during each of 3 intervals of emptying the bagged seine: beginning, middle, and end. This was modified slightly to allow for less abundant species to enter the mortality samples. Approximately 60 fish were collected in 0.9 m X 1.2 m X 1.0 m deep transport nets of 1.9 cm square mesh knitted nylon netting off the end of the sorting trough during each sampling interval. In addition sublegal fish were placed in the transport net when encountered in the seine emptying process. (Sublegal fish are white bass, channel catfish, bullheads, and yellow perch below legal length. All walleyes were included here). Transport nets were then taken to 4.57 m diameter by 2 m deep circular holding nets with 1.9 cm square mesh knitted nylon netting treated with net coat. The fish were placed in the holding net and held for 1 hour beginning when the last sample was placed in the holding net. The fish were then removed from the holding net, identified, counted, weighed, measured, and condition recorded. Condition was recorded as unstressed, stressed, or dead. The condition of severely stressed (originally proposed) and stressed were combined. This was necessary because a reliable distinction between the 2 could not be made. This entire process was replicated with each seine haul (two holding nets) to more accurately assess the impact.

Trap Nets

Two trap net sites (Figure 2) were selected for sampling during the 1979 commercial fishing season on the basis of catch statistics,

recommendations of ODW personnel and cooperation of 2 commercial fishermen. Larry Davis (East Harbor) and Ed Szuch (Bono) were selected as the commercial fishermen for the project. The third sampling location in the Central Basin was not fished by commercial fishermen during 1979. A planned bi-weekly sampling schedule was modified by weather, termination of fishing or schedule changes. Because of these factors only 9 of a possible 18 samples were obtained from L. Davis while just 2 May samples were taken from E. Szuch.

Composition

Species composition estimation was added to our effort as it was felt that this could influence mortality. Two individuals on each side of the net identified and counted fish from as many dip net samples as possible taken from both sides of the trap nets (Figure 3). The number of dips required to empty the net and the number of days the net had been set were also recorded.

Mortality

The immediate mortality of fish released from trap nets was estimated 3 times at L. Davis' site beginning in August. Mortality samples were not conducted earlier due to shipment delays of the special-ordered holding nets. Immediate mortality estimates were not obtained on 4 September or 2 November due to rough waters.

Initially, samples were collected in 0.9 m x 1.2 m x 1.0 m deep transport nets (1.9 cm square mesh) positioned below trap netters' sorting trays. They were then towed to the holding nets and placed in the nets for 1 hour. This procedure was modified because project personnel felt the fish were subjected to additional stresses as they were towed through the water. The time and effort required to transfer the fish to

the holding nets also eliminated the possibility of collecting additional fish from the same trap net. Transport nets were replaced by 2 121-l plastic cans (32 gal.) filled with lake water. Inner tubes were sewn to the tops of the holding nets so the opening to the net was held above the water. These modifications greatly reduced the time and effort required to obtain the samples and allowed for 2 collections from each trap net or approximately 240 fish. Samples were collected at the beginning and near the end of the trap net emptying process. The fish were placed in 4.57 m diameter by 9.15 m deep circular holding nets. The 1-hour holding period began after the last sample was placed in the 2 holding nets. The fish were then removed from the holding nets, identified, counted, weighed, measured (TL) and condition recorded.

Gill Nets

Two gill net locations (Figure 4) were selected for sampling during the 1979 commercial fishing season on the basis of recommendations from ODW personnel and a willingness by commercial fishermen to cooperate with the study. Dan Schmidt (Conneaut) and Robert Jaycox (Lorain) were the fishermen selected. A planned bi-weekly sampling schedule was modified only by weather or commercial fishing schedule changes. Two project personnel accompanied the fishermen.

Initially, only the unmarketable fish in 2 nets per site were to be identified, enumerated, weighed, and measured. However, after meetings with ODW and project personnel, the number of nets sampled per site was increased to a minimum of 5 to increase the reliability of the results. Mortality of released fishes was assumed to be 100 percent. All fish in a net were identified, counted, and measured. Following meetings with ODW

personnel, it was determined that the Division had sufficient data to project weight from the lengths and consequently, avoid the inaccuracies associated with obtaining weights on a rocking boat. Legal fish were also examined to determine if they were culls (legal fish which had died and decomposed in the net). This parameter was added when ODW meetings indicated that these data were necessary for successful evaluation of gill net catches. Water temperature, water depth, and net set times were also monitored. Water temperature and net set time data were added because of their suspected effect on the cull ratio.

Evaluation Of Fishery Regulations

Termination of the present study did not permit the present objective to be addressed. Several meetings with Ohio Division of Wildlife personnel resulted in an agreement to compile all commercial fishing laws into "A Synopsis of Commercial Fishing Regulations". It was intended to integrate the various sources of commercial fishing regulations (The Ohio Revised Code and The Wildlife Orders) into a single document. Regulations concerning a single topic are addressed in 1 section rather than in 2 or more places, while the language used is easily understood by a non-attorney. The synopsis was not intended as a legal document.

FINDINGS

Shore Seine

Composition

A total of 14 composition samples at 2 sites were obtained. A complete summary can be found in Appendices A and B. The majority of the

catch at both sites consisted of 5 species: freshwater drum, gizzard shad, white bass, carp, and channel catfish. Species composition of the remainder of the catch was variable. The estimated seasonal catch of major species and/or species of interest is plotted in Figure 5. Freshwater drum and gizzard shad dominated the catch. Differences in numbers of fish caught during May and June at each site can be observed in Figure 5. The number of walleyes caught at both sites was similar and the same general trends were observed in white bass, channel catfish, gizzard shad and freshwater drum. The numbers of walleye and white bass captured declined as the season progressed, indicating higher abundance or vulnerability during May for walleye and June for white bass. No clear pattern emerged in the channel catfish catch with peaks occurring throughout the year. High variability in numbers caught characterized freshwater drum through July with numbers declining late in the season. The catch of adult gizzard shad was high in April and June but steadily decreased thereafter. Young-of-year gizzard shad were captured in the seine in October and accounted for the late peak in catch.

A comparison of the numbers of legal length to below legal length (BLL) white bass at Port Clinton Fish Company's site indicated that typically less than 15 percent of the white bass catch was below legal length except on June 26, August 6 and September 26. On those dates, increases in the percent of BLL white bass were due to low numbers of legal length white bass and not increases in the numbers of BLL fish captured. Below legal length white bass at L. Gowitzga's site were approximately 10 percent of the white bass catch. Below legal length channel catfish were 75 to 100 percent of the channel catfish catch at both sites except for the June 26, June 27, and July 10 sampling dates. On those dates they ranged from 26 to 58 percent of the catch.

The estimated catch numbers for both sites were used in favor of percentages of total catch in Figure 5. Catch numbers more clearly describe the fishery; percentage of catch tends to obscure true trends.

Mortality

A total of 11 mortality samples were collected at two sites from May through October, 1979. A complete summary of the results can be found in the Appendices C and D. The reactions of fishes observed to capture in shore seines was similar at both sites. Their reactions can be classified into 3 distinct groups. One group is composed of species which are relatively unaffected by capture represented by channel catfish and carp. One hundred and sixty of 164 carp observed (97.6 percent) were live after the holding period as were 1047 of 1060 channel catfish (98.8 percent). Freshwater drum and gizzard shad characterized the second group of fish. These species are highly affected by capture. Four hundred and eighty-eight of 499 drum observed (97.8 percent) were stressed (362 or 72.5 percent) or dead (126 or 25.2 percent) after 1 hour of holding, while 356 of 377 gizzard shad (94.4 percent) were stressed (161 or 42.7 percent) or dead (195 or 51.7 percent) after 1 hour. The final group of fishes exhibit variable reaction to capture in shore seines. The species in this category are white bass and walleye. Of the 217 white bass observed, 116 were live (53.5 percent), 40 stressed (18.4 percent), and 61 dead (28.1 percent) after the 1-hour holding period. A total of 156 walleye was observed with 67 live (42.9 percent), 35 stressed (22.4 percent), and 54 dead (34.6 percent) after the 1-hour holding period.

The percent of the fish which died in mortality samples from both sites is compared with catch size for 3 species (Figure 6). Simple linear regressions and correlation coefficients were calculated for freshwater

drum (R=0.66), white bass (R=0.80). Correlation coefficients were calculated for the 3 species listed above comparing percent mortality to water temperature, dissolved oxygen, secchi depth, season and catch composition. No significant relationships were found. A negative correlation was found between mortality and dissolved oxygen and ranged between -0.58 to -0.57 for the 3 species. A complete listing of catch size and limnological parameters measured can be found in Table 1.

Trap Nets

Composition

A total of 13 samples were taken from 2 sites observing 98 trap net catches between 25 April and 2 November 1979. A summary for all species can be found in Tables 2 and 3. The catch for both sites through the 13 June sample was composed primarily of 3 species: white bass, gizzard shad, and freshwater drum ($\geq$ 90.81 percent). Yellow perch and walleye did not contribute significantly to the catch (< 5 percent) during the same period. Ed Szuch discontinued fishing operations in June, consequently no additional samples were obtained from the Bono site. Larry Davis' July sample was dominated by white bass, quillback carpsucker, gizzard shad and freshwater drum (89.31 percent). However, white bass, less than 9 inches, represented 80.86 percent of the total white bass catch for this sample. Because of the high percentage of illegal white bass, Davis moved his operation east of Cedar Point and fished for yellow perch. Perch dominated the catch for the 7 and 22 August and 4 September samples, 64.91, 46.18, and 37.25 percent, respectively. With declining yellow perch catches, Davis returned to East Harbor and resumed fishing for white bass. The catch for the last 2 samples was again dominated by white bass,

gizzard shad and freshwater drum (76.72 and 74.55 percent). The walleye catch statistics remained relatively constant throughout the entire season, exceeding 4.86 percent of the total catch only once on 4 September (9.56 percent). Numbers of fish per trap net per 24 hours were compared with sampling date to detect any seasonal trends for the 4 most numerous species and walleyes for L. Davis' fishery (Figures 7 and 8). White bass catches had a major peak in June and a lesser peak during September. White bass comprised a maximum of 79.87 percent and a minimum of 21.80 percent of all catches. Yellow perch were insignificant to the catch ($\leq$ 3 percent) until they became the target species in August. Perch peaked on the 7 August sample and demonstrated a general decline for the rest of the season. Yellow perch catches ranged from 64.91 to 0.00 percent. Walleye catches demonstrated slight peaks in June and September and ranged from 9.56 to 0.04 percent of the total catch. Freshwater drum dominated the catch with a major peak in April and had minor peaks during June and September samples. Drum catches ranged from 55.56 to 1.75 percent for the fishing season. Gizzard shad catches peaked twice during the season, in June and October. Total catch percentages ranged from 34.57 to 3.40. The remainder of the catch in all samples for a given species was variable with percentage composition never exceeding 6.90 and often less than 1.0 for most other species.

Mortality

A total of 3 samples was collected at L. Davis' site in August and September 1979. A complete summary for all species can be found in Table 4. The reactions of trap net captured fish were classified into 3 groups: (1) least affected; (2) highly affected; (3) variably affected. Those species least affected by capture are represented by carp and brown bull-

head (Ictalurus nebulosus). All carp (6) and bullhead (9) observed were alive at the end of the holding period. Species that were highly affected by capture were freshwater drum, gizzard shad, and alewife (Pomolobus pseudoharengus). After a 1-hour holding period, 90 (89.1 percent) freshwater drum were stressed and 10 (10.0 percent) were dead out of the 101 sampled. Thirty-four gizzard shad (79.1 percent) were stressed and 9 (20.9 percent) dead out of 43. All alewife (6) were dead after holding. Yellow perch, white bass and walleye were variably affected by capture. Out of 69 yellow perch, 23 (33.3 percent) were live, 45 (65.2 percent) stressed, and 1 (1.4 percent) dead. A total of 87 white bass were sampled, of these 41 (47.1 percent) were live, 43 (49.4 percent) stressed and 3 (3.4 percent) dead. Only 7 walleye were sampled with 4 (57.1 percent) live, 2 (28.6 percent) stressed and 1 (14.3 percent) dead.

No regressions or correlations were calculated for these mortality samples due to the small sample size.

Gill Nets

A total of 16 samples was taken from 2 sites observing 536 gill nets between 19 April and 8 November 1979. Samples could not be collected in June, July and September from 1 or both sites due to inclement weather and sporadic fishing by commercial fishermen because of poor catches. The catch composition for both sample locations was primarily yellow perch and freshwater drum (Tables 5 and 6). The number of fish per gill net per 24 hours was compared with the sampling date to detect any seasonal trends for yellow perch (Figures 9 and 10). No general trends were discernible for yellow perch. Robert Jaycox's perch catch peaked in late September at 51.3 per net per 24 hours and then declined to 10.10 by November. Dan

Schmidt's perch catch peaked in mid-September at 48.5 per net per 24 hours. Mean percent composition of yellow perch for all sample dates was 72.80 for R. Jaycox and 72.55 for D. Schmidt. No parallel trends between fisheries were observed for freshwater drum, white bass, or walleye. Walleye catches never exceeded 2.0 percent of the total catch for any of the 16 sample dates. Remaining catch statistics for other species were variable with a maximum percent composition of 14.12 for rainbow smelt (Osmerus mordax) and the majority of other species well below 1.0.

No culls were recorded in April at either site. A summary of the gill net cull ratio for yellow perch for both sites can be found in Table 7. Culls began to appear in the May samples and continued to appear sporadically throughout the season. It appears that this cull phenomena is related to water temperature and net set time. A cull ratio experiment was designed to evaluate the affect of net set time. Ten gill nets (identical to those used by R. Jaycox) were set off Vermilion Harbor. Results for the 6 species captured are listed in Table 8. Precise net set times are difficult to obtain from the commercial gill netters. This problem was eliminated by setting our own nets and recording set times. Two nets were lifted after 24 hours, all fish were counted and condition noted. No culls were observed. Twenty-four hours later, the initial 2 nets and an additional 2 nets were lifted. All fish in these 4 nets were dead and judged to be culls. Because all fish observed in the first nets were culls, the remaining 6 nets were lifted. All these fish (except 1 live yellow perch) were dead and judged to be culls. The water temperature was 24.3^{o}C.

Evaluation of Fishery Regulations

A "Synopsis of Commercial Fishing Regulations" was prepared (Appendix E).

ANALYSIS

Shore Seine

Variability in composition between L. Gowitzga's and Port Clinton Fish Company's seine catch is reflected in Figure 4. Contributing to this variability could be differences in the area encompassed by the seine, problems encountered on a given day, e.g., lifting the lead line to free a snagged seine or wind direction. Wind direction was suggested by the fishermen as having a strong effect on their catch. Differences in species composition between the 2 sites could also reflect migration patterns of fish species or differences in species composition in the western and eastern section of Sandusky Bay. Similarities were observed in catch numbers between the 2 sites for walleye and channel catfish. The number of walleye and white bass in the catch peaked early and then decreased rapidly because of their spring spawning run and is indicative of their seasonal abundance.

Mortality of BLL white bass averaged 28 percent. This probably does not represent a significant loss. The percentage of the BLL white bass population recruited to the seines is probably very low. Although 28 percent of actual number impounded in seines appear to die as a result of capture, this would represent an extremely low percentage of their

population. The estimated number that dies per seine haul averaged 156 fish with a range of 29 to 336. The large numbers of BLL channel catfish (74 percent of the channel catfish catch) impounded appear unaffected by capture, causing no harm to the population. 35 percent of the walleyes observed were dead after being held 1 hour. Because of the low numbers of walleye observed in the catch during the sampling period (an average of 53.6 per seine haul at L. Gowitzga's Danbury site and 29 per seine haul at Port Clinton Fish Company's Celotex site) these findings were not considered biologically significant. It should be noted that higher numbers of walleyes might have been taken had we been able to sample earlier in April. Although large numbers (occasionally 80-100 percent) of freshwater drum and gizzard shad would have died due to capture in shore seines if released, all these fish were harvested for rendering except when catches were small. In addition, when catches were small, observed mortalities were considerably less.

It was assumed that there were no site differences in fish survival because at both sites the reaction of species after capture and the physical parameters monitored appeared similar. Catch size appears to have an effect on the observed mortality in several species (Figure 5). Significant relationships were found for white bass, freshwater drum and walleye. This finding would agree with the conclusions of Harman (1978). It must be noted that catch size is confounded with bag time (i.e. time the fish are confined in the bagged seine). The larger the catch the longer individuals of all species will remain in the seine bag and exposed to the deteriorated environmental conditions. The stable but nonsignificant negative relationship between percent mortality and dissolved oxygen can be attributed to a correlation between catch size and dissolved

oxygen. The level of ambient dissolved oxygen should have less effect on water quality in the seine bag than the weight of fish confined in the bag.

Water temperature did not appear to be significant in predicting fish survival. Variable catch sizes could be masking this relationship. Commercial fishermen have suggested high numbers of gizzard shad cause higher mortality rates. Unusually high mortalities of freshwater drum and walleye occurred on 6 August at a low catch size (2.8 tons), but gizzard shad were 45 percent of the catch. This relationship was not significant in the present analysis but merits further research.

Trap Nets

Differences and/or similarities between L. Davis's and E. Szuch's catch probably reflect day to day variability in fish movement and concentrations although an accurate estimate of day to day variability has not been made (Figures 6 and 7). Migration patterns of different fish species could also be contributing to this variability. The white bass catch peaked for E. Szuch during May and for L. Davis during June. This may be indicative of the seasonal abundance of white bass during their spawning period. Observed trap net catches of walleye exceeded 4.86 percent of the total catch only once (9.56 percent on 4 September) during the season. However, communications with trap net fishermen prior to sampling suggests that earlier catches contained significantly higher numbers of walleye.

The results of the mortality samples conducted during August and September are tentative due to the small number of samples and low numbers of fish evaluated. Preliminary observations suggest that mortality for

three important species is low: white bass (4 percent); yellow perch (2 percent); and walleye (14 percent). However, the fate of stressed white bass (49 percent), yellow perch (65 percent) and walleye (29 percent) is unknown.

Gill Nets

Differences in composition between R. Jaycox's and D. Schmidt's catch were probably a reflection of day to day variability in fish movement and concentrations although an accurate assessment of the magnitude of day to day variability has not been made (Figures 9 and 10). Fish migration patterns and fish composition of the western and eastern sections of the Central Basin could also be contributing factors for this variability between gill net catches. Yellow perch catches did peak in the same time period, September, for the 2 fisheries. These peaks could be indicative of seasonal abundance of yellow perch during this time period.

No fish culls were observed in April gill net catches with set times of up to 72 hours but began to appear in later catches as lake water temperature increased. Cull ratios became more significant in the catches taken in warmer water at a set time of 48 hours. Results from the Vermilion gill net experiment suggest that cull ratios can be extremely high for gill nets set for longer than 24 hours at a given water temperature of 24.3^{o}C. It is probable this occurs lake-wide but could be altered by site-specific variables. A shift in fishing techniques used by commercial fishermen can be observed as water temperature increases. Set times decrease as temperature increases with a daylight set of 2-7 hours being the most extreme example. Fishermen readily admit this is done to

reduce the number of culls in their catch. These changes in fishing techniques further indicate a relationship between water temperature and cull rate.

The number of walleye taken by commercial gill net fishermen was very low for all samples. Although no large-mesh gill nets were sampled and samples were not collected during every month of the fishing season, these catch data do not suggest any major impact by cooperating gill net fishermen on walleye populations located in the Central Basin.

Evaluation of Fishery Regulations

A synopsis of commercial laws is included as Appendix E.

RECOMMENDATIONS

Specific recommendations are presented below for each of the components of the study.

Shore Seines

Sampling should be re-initiated to adequately describe the composition and mortality in the seine fishery. In the future, wind direction should be monitored for its effect on the catch. Sampling should also be initiated earlier in the spring to evaluate the effect on the walleye spawning run. Future mortality sampling should attempt to identify factors that contribute to mortality so that techniques to minimize mortality can be developed. The significance of delayed mortality should be investigated as Metcalf (1978) has shown that it can be quite significant. Finally, the job procedures should move in the future toward fishing our own gear or paying fishermen to follow specific guidelines. Fishermen differ in their handling of fish and 1 fisherman's

techniques can vary with daily objectives (e.g. live hauling requiring that the seine be bagged in a loose fashion). More control over the handling procedures could clarify mortality relationships. These guidelines could include, but not be limited to, varying the time required to empty a shore seine, vary the "tightness" of the bagged seine, and requiring all seined fish to be removed by dipping.

Trap Nets

Composition sampling should be re-initiated at previous levels (subsampling all trap nets lifted on a given day) to more adequately describe general trends in the fishery. In addition, sampling should be initiated earlier in the spring to more accurately assess the effect on walleye.

Preliminary mortality observations for trap nets indicate that additional research is needed to better assess the effect capture has on specific species. The 1-hour holding period was inadequate for most species examined. Longer holding periods are necessary to determine its effects on the number of stressed fish observed. The significance of delayed mortality and future job procedures should address possible payment to the trap netters to enable the researcher to set specific fishing techniques. This would minimize handling variability between fishermen.

Gill Nets

Composition sampling should be re-initiated as described by these procedures. Additional catch records will enable project personnel to more adequately characterize the gill net fishery.

The assumption of 100 percent mortality in gill nets may not be valid. Walleyes released, as a gill net is being pulled, appear to be in

good condition. A mortality study should be initiated to test the 100 percent mortality assumption. The cull ratio and water parameters accompanying gill net samples should be used in a computer analysis package to evaluate present fishery regulations pertaining to net set times after 1 complete year of data has been collected.

An independent gill net study, with nets purchased from commercial gill netters, should be continued by project personnel to better evaluate the cull phenomena. Ten gill nets, in strings of two, should be set off of Vermilion. The first string of 2 nets will be lifted, but not pulled, after 24 hours and legal fishes will be identified, counted, and condition noted (marketable or unmarketable) but not removed from the nets. After 48 hours the first 2 strings of nets will be lifted, fishes will be processed, and condition noted. The first string of 2 nets will be used as a replicate for the second string of 2 nets (48 hour sample). This process will continue through 72 hours, the maximum legal set time for commercial gill net fishermen. Water temperature and dissolved oxygen profiles should also be taken each day. Consideration should also be given to monitoring currents.

Project personnel should also attempt to isolate significant variables associated with the cull ratio with a laboratory cull ratio study initiated at The Ohio State University, Put-in-Bay research facilities. Water temperature, current, and turbidity parameters can be isolated and their effects observed. With 3 sources of information, personnel should be better able to describe this cull phenomena.

Evaluation of Fishery Regulations

Further effort is needed to determine the rationale for implementing present commercial fishing regulations. Also, once more information is available regarding the immediate mortality of commercial gear, present regulations should be evaluated.

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LITERATURE CITED

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TABLES

TABLE 1

ESTIMATE CATCH SIZE AND LIMNOLOGICAL MEASUREMENTS FOR SHORE SEINE, L. GOWITZGA'S DANBURY SITE AND THE PORT CLINTON FISH COMPANY'S CELOTEX SITE FOR 1979

L. Gowitzga

Date	Air Temp (°C)	Water Temp (°C)	Dissolved Oxygen (ppm)	Secchi Depth (cm)	Estimated total Catch (tons)[1]
May 21	16.0	15.5	N/A[2]	N/A	11.5
June 11	17.0	21.5	8.4	18.0	3.5
June 25	17.0	20.0	8.4	13.0	2.7

The Port Clinton Fish Company

May 30	16.0	17.0	9.9	20.0	5.5
June 12	20.0	22.2	7.3	15.0	20.2
June 26	17.0	19.0	9.9	15.0	7.0
July 10	21.0	22.0	8.8	30.0	5.7
August 6	22.5	24.5	9.0	23.0	2.8
September 5	24.0	24.5	10.8	19.0	0.9
September 26	15.5	16.5	N/A	30.0	1.0
October 9	9.0	11.0	10.8	28.0	1.3

[1]Estimated catch size = No. dip nets-full required to empty the seine bag x 38 lbs./net. The estimated weight of one dip net was derived from on-site measurements.

[2]Not available.

TABLE 2
CATCH STATISTICS[1] FOR TRAP NETS, B. SZUCH'S
BONO SITE THROUGH JUNE 30, 1979

Species	May 9	May 23	Mean
White Bass	69.71 (39823)	38.77 (7227)	56.80 (23525)
White Bass (BLL)[2]	N/A	0.70	
Gizzard Shad	25.16 (16234)	47.43 (8684)	30.08 (12459)
Freshwater Drum	8.09 (5222)	7.09 (1298)	7.87 (3360)
Walleye	2.14 (1382)	4.88 (893)	2.75 (1138)
Quillback Carpsucker	1.07 (691)	0.44 (80)	0.93 (386)
Carp	0.43 (274)	0.30 (55)	0.40 (165)
Goldfish	0.47 (305)	0.08 (14)	0.39 (160)
White Sucker	0.21 (132)	0.05 (10)	0.17 (71)
Channel Catfish	0.17 (112)	0.08 (14)	0.15 (63)
Brown Bullhead	0.17 (112)		0.14 (56)
Smallmouth Bass	0.09 (61)	0.08 (14)	0.09 (38)
Yellow Perch (BLL)[2]	N/A	N/A	
Yellow Perch	0.09 (61)		0.07 (31)
Black Crappie	0.08 (51)		0.06 (26)
Longnose Gar	0.05 (30)		0.04 (15)
Coho Salmon	0.03 (20)		0.02 (10)
Golden Redhorse		0.08 (14)	0.02 (7)
Rock Bass	0.02 (10)		0.01 (5)
Lake Sturgeon	0.02 (10)		0.01 (5)
White Perch		0.01 (3)	0.01 (2)
Northern Hog Sucker		0.01 (3)	0.01 (2)
TOTAL	100.00 (64530)	100.00 (18309)	100.00 (41420)

[1]The first figure indicates the percent of the total catch for the designated species on the date indicated. The figure in parentheses indicates the estimated number of that species in the total catch on that date.

[2]BLL = Below legal length; Yellow Perch 8"; White Bass 9".

TABLE 3

CATCH STATISTICS[1] FOR TRAP NETS AT L. DAVIS' EAST HARBOR AND MARBLEHEAD SITES FOR 1979

Species	April 25	May 15	June 13	July 3	August 7
Freshwater Drum	55.56 (17183)	1.75 (138)	19.56 (952)	15.25 (976)	3.35 (335)
White Bass	24.28 (7509)	79.87 (6294)	56.57 (2753)	34.28 (2193)	21.80 (2311)
White Bass (BLL)[2]	N/A	N/A	N/A	N/A	N/A
Gizzard Shad	10.97 (3394)	12.40 (977)	18.91 (920)	17.77 (1137)	3.40 (361)
Channel Catfish	3.25 (1006)	0.42 (33)	N/A	0.16 (10)	0.16 (17)
Yellow Perch	1.59 (493)	N/A	1.87 (91)	2.67 (171)	64.91 (6879)
Yellow Perch (BLL)[2]	N/A	N/A	N/A	N/A	N/A
Quillback Carpsucker	1.08 (333)	2.58 (203)	0.32 (16)	21.38 (1368)	0.05 (6)
Walleye	1.19 (368)	0.04 (3)	2.60 (126)	0.63 (40)	3.13 (332)
Carp	1.08 (333)	1.08 (85)	N/A	3.46 (221)	2.14 (227)
White Perch	0.36 (111)	N/A	N/A	N/A	N/A
Goldfish	N/A	0.83 (66)	N/A	1.42 (91)	0.05 (6)
Brown Bullhead	0.15 (49)	0.17 (13)	0.08 (4)	2.36 (151)	0.38 (41)
Smallmouth Bass	N/A	0.58 (46)	0.08 (4)	N/A	0.05 (6)
White Sucker	0.15 (49)	N/A		0.16 (10)	0.22 (23)
Coho Salmon	0.11 (35)	N/A		N/A	
White Crappie	0.02 (7)	0.12 (10)		0.16 (10)	
Black Crappie	N/A	0.08 (7)		0.16 (10)	
Whitefish	0.02 (7)	N/A		N/A	

[1]The first figure indicates the percent of the total catch of the designated species on that date. The figure in parentheses indicates the estimated number of that species in the total catch on that date.

[2]BLL = Below legal length: White Bass 9"; Yellow Perch 8".

TABLE 3 (con't)

CATCH STATISTICS[1] FOR TRAP NETS AT L. DAVIS' EAST HARBOR AND MARBLEHEAD SITES FOR 1979

Species	April 25	May 15	June 13	July 3	August 7
Sauger	0.02 (7)	N/A		N/A	
Spotted Sucker	0.02 (7)	N/A		N/A	
Golden Redhorse	0.02 (7)	N/A		0.16 (10)	0.22 (23)
Bluegill		0.04 (3)		N/A	
Rock Bass		0.04 (3)		N/A	
Burbot				N/A	0.05 (6)
Rainbow Trout				0.16 (10)	
Alewife					0.05 (6)
Chinook Salmon					
Lake Trout					
Bowfine					
Shorthead Redhorse					
Largemouth Bass					
Mooneye					
TOTALS	100.00 (30898)	100.00 (7881)	100.00 (4866)	100.00 (6398)	100.00 (10599)

[1]The first figure indicates the percent of the total catch of the designated species on that date. The figure in parentheses indicates the estimated number of that species in the total catch on that date.

[2]BLL = Below legal length: White Bass 9"; Yellow Perch 8".

TABLE 3 (con't)

CATCH STATISTICS[1] FOR TRAP NETS AT L. DAVIS' EAST HARBOR AND MARBLEHEAD SITES FOR 1979

Species	August 22	September 4	September 20	November 2
Freshwater Drum	4.51 (187)	2.45 (51)	11.93 (1239)	5.48 (658)
White Bass	25.17 (1044)	25.25 (524)	32.11 (3336)	20.58 (2469)
White Bass (BLL)[2]	N/A	N/A	22.56 (2343)	13.92 (1670)
Gizzard Shad	8.16 (338)	18.14 (376)	10.13 (1052)	34.57 (4146)
Channel Catfish	2.43 (101)	0.49 (10)	0.72 (75)	0.55 (67)
Yellow Perch	46.18 (1915)	28.43 (590)	0.93 (97)	5.85 (702)
Yellow Perch (BLL)[2]	N/A	8.82 (183)	6.90 (716)	8.93 (1072)
Quillback Carpsucker	0.69 (29)			1.05 (126)
Walleye	4.86 (202)	9.56 (198)	0.29 (30)	2.46 (296)
Carp	6.77 (281)	6.62 (137)	3.88 (403)	3.51 (421)
White Perch	N/A	N/A	N/A	1.11 (133)
Goldfish	0.87 (36)	N/A	0.86 (90)	N/A
Brown Bullhead		0.25 (5)	3.16 (328)	0.37 (44)
Smallmouth Bass			0.36 (37)	N/A
White Sucker			0.14 (15)	0.55 (67)
Coho Salmon			1.94 (201)	N/A
White Crappie	0.17 (7)		0.57 (60)	0.06 (7)
Black Crappie			1.29 (134)	0.25 (30)
Whitefish				

[1]The first figure indicates the percent of the total catch of the designated species on that date. The figure in parentheses indicates the estimated number of that species in the total catch on that date.

[2]BLL = Below legal length: White Bass 9"; Yellow Perch 8".

TABLE 3 (con't)

CATCH STATISTICS[1] FOR TRAP NETS AT L. DAVIS' EAST HARBOR AND MARBLEHEAD SITES FOR 1979

Species	August 22	September 4	September 20	November 2
Sauger				
Spotted Sucker				0.12 (15)
Golden Redhorse				
Bluegill				
Rock Bass	0.17 (7)			0.06 (7)
Burbot			0.07 (7)	0.06 (7)
Rainbow Trout			1.52 (172)	
Alewife			0.29 (30)	0.06 (7)
Chinook Salmon			0.07 (7)	
Lake Trout			0.07 (7)	
Bowfin			0.07 (7)	
Shorthead Redhorse				0.06 (7)
Largemouth Bass				0.06 (7)
Mooneye				100.00 (11958)
TOTALS	100.00 (4147)	100.00 (2074)	100.00 (10386)	

[1]The first figure indicates the percent of the total catch of the designated species on that date. The figure in parentheses indicates the estimated number of that species in the total catch on that date.

[2]BLL = Below legal length: White Bass 9"; Yellow Perch 8".

TABLE 4

SUMMARY OF THE THREE MORTALITY SAMPLES FROM L. DAVIS' MARBLEHEAD SITE ON 7 AND 22 AUGUST AND 20 SEPTEMBER 1979

Species	# Sampled	# Live	% Stressed	% Dead
Freshwater Drum	101	0.01 (1)	0.89 (90)	0.10 (10)
White Bass	87	0.47 (41)	0.49 (43)	0.04 (3)
Yellow Perch	69	0.33 (23)	0.65 (45)	0.02 (1)
Gizzard Shad	43	0.00 (0)	0.79 (34)	0.21 (9)
Quillback Carpsucker	13	0.31 (4)	0.69 (9)	0.00 (0)
Brown Bullhead	9	100.00 (9)	0.00 (0)	0.00 (0)
Walleye	7	0.57 (4)	0.29 (2)	0.14 (1)
Coho Salmon	7	0.14 (1)	0.43 (3)	0.43 (3)
Carp	6	100.00 (6)	0.00 (0)	0.00 (0)
Alewife	6	0.00 (0)	0.00 (0)	100.00 (6)
White Crappie	3	0.00 (0)	0.67 (2)	0.33 (1)
Channel Catfish	1	100.00 (1)	0.00 (0)	0.00 (0)
Smallmouth Bass	1	100.00 (1)	0.00 (0)	0.00 (0)
Goldfish	1	100.00 (1)	0.00 (0)	0.00 (0)
Golden Redhorse	1	0.00 (0)	0.00 (0)	100.00 (1)
Shorthead Redhorse	1	0.00 (0)	100.00 (1)	0.00 (0)
TOTAL	356			

TABLE 5

CATCH STATISTICS[1] FOR GILL NETS,
D. SCHMIDT'S ASHTABULA SITE FOR 1979

Species	April 19	May 2	May 14	July 18	July 31	August 2	September 12	Mean
Yellow Perch (LL)	80.01 (2314)	63.94 (3204)	75.22 (1238)	56.32 (498)	53.76 (940)	54.40 (1037)	67.99 (1957)	72.55 (1736)
Yellow Perch (BLL)[2]	4.91 (142)	20.13 (1009)	6.80 (112)				24.39 (702)	
Freshwater Drum	5.78 (167)	4.99 (250)	11.61 (191)	28.68 (254)	44.69 (780)	43.84 (836)	0.95 (27)	20.07 (358)
Rainbow Smelt	6.33 (183)	5.98 (300)	4.37 (72)	14.2 (125)			5.02 (144)	5.12 (118)
White Bass	2.94 (85)	2.45 (123)	1.03 (17)			0.14 (3)	0.26 (7)	1.23 (44)
White Bass (BLL)[2]	0.03 (1)	1.20 (60)	0.61 (10)					
White Sucker		0.86 (40)		0.88 (8)	0.84 (15)	1.22 (23)	0.78 (22)	0.65 (15)
Lake Trout		0.20 (10)						0.03 (2)
Burbot		0.05 (3)	0.18 (3)					0.03 (1)
Walleye		0.05 (3)			0.26 (5)		0.17 (5)	0.07 (2)
Brown Bullhead		0.05 (3)						0.01 (1)
Emerald Shiner		0.05 (3)						0.01 (1)
Trout-Perch		0.05 (3)				0.14 (3)		0.03 (1)
Lake Sturgeon			0.18 (3)					0.03 (1)
Golden Redhorse					0.19 (3)	0.14 (3)		0.17 (1)
Gizzard Shad					0.26 (5)	0.14 (3)		0.05 (1)
Smallmouth Bass							0.43 (12)	0.06 (2)
TOTAL	100.00 (2892)	100.00 (5011)	100.00 (1646)	100.00 (885)	100.00 (1748)	100.00 (1908)	100.00 (2876)	100.00 (2284)

[1]The first figure indicates the percent of the total catch on the date indicated for the designated species. The figure in parentheses indicates the estimated number of that species in the total catch on the designated date.

[2]BLL = Below legal length; yellow perch 8"; white bass 9".

TABLE 6

CATCH STATISTICS[1] FROM GILL NETS
R. JAYCOX'S LORAIN SITE FOR 1979

Species	April 20	May 3	May 16	August 24	September 10	September 27	October 2	October 19	November 8	Mean
Yellow Perch	70.15 (7238)	60.13 (4995)	23.29 (335)	45.63 (726)	71.51 (1654)	61.03 (1228)	46.51 (4034)	67.89 (1833)	70.46 (977)	72.80 (3085)
Yellow Perch (BLL)[2]	10.15 (1065)	17.10 (1409)	41.00 (590)	25.33 (403)	12.11 (280)	11.38 (229)	4.76 (412)	9.31 (251)	7.47 (104)	18.06 (965)
Freshwater Drum	18.09 (1866)	17.66 (1455)	23.42 (495)	26.08 (415)	1.12 (26)	9.83 (198)	42.41 (3678)	16.62 (449)	7.31 (101)	0.86 (37)
Stonecat Madtom		2.21 (182)	2.84 (60)	0.44 (7)	0.56 (13)		0.65 (57)	0.09 (2)	0.97 (14)	1.29 (44)
White Bass	0.55 (67)	0.55 (68)	4.17 (94)		1.56 (36)	2.24 (45)	0.13 (11)	1.22 (33)	0.49 (7)	
White Bass (BLL)[2]	0.10 (10)	0.28 (23)	0.28 (6)					0.96 (26)		0.62 (26)
Walleye	0.50 (52)	1.10 (91)	0.14 (3)		1.82 (42)	1.03 (21)		0.09 (2)	0.32 (5)	0.76 (37)
White Sucker	0.14 (15)	0.97 (80)	0.52 (11)	0.44 (7)	1.82 (42)	0.69 (14)	1.82 (158)	0.61 (16)	12.87 (178)	1.82 (29)
Rainbow Smelt			2.22 (47)			0.52 (10)	0.13 (11)			0.16 (3)
Trout-Perch			1.47 (31)							0.04 (1)
Emerald Shiner	0.05 (5)		0.33 (7)							0.05 (2)
White Perch	0.05 (5)				0.09 (2)	0.17 (3)	0.07 (6)	0.09 (2)		0.02 (4)
Coho Salmon	0.05 (5)				0.26 (6)					0.09 (4)
Channel Catfish			0.10 (2)		0.09 (2)		0.33 (28)	0.09 (2)	0.16 (2)	<0.02 (1)
Golden Redhorse			0.01 (2)		0.17 (4)					<0.01 (1)
Carp			0.04 (1)		0.09 (2)					<0.01 (1)
Northern Hog Sucker			0.04 (1)							<0.01 (1)
Rock Bass			0.04 (1)							3.27 (92)
Gizzard Shad				1.89 (30)	8.65 (200)	12.93 (260)	2.93 (254)	3.05 (82)		<0.02 (1)
Rainbow Trout				0.19 (3)						<0.02 (1)
Smallmouth Bass					0.17 (4)					0.03 (1)
Alewife						0.17 (3)	0.07 (6)			0.01 (1)
Northern Pike							0.13 (11)			
TOTAL	100.00 (10318)	100.00 (8240)	100.00 (2114)	100.00 (1591)	100.00 (2313)	100.00 (2011)	100.00 (8672)	100.00 (2698)	100.00 (1395)	100.00 (4332)

[1]The first figure indicates the percent of the total catch on the date indicated for the designated species. The figure in parentheses indicates the estimated number of that species in the total catch on the designated date.

[2]BLL = Below legal length; yellow perch 8"; white bass 9".

TABLE 7

YELLOW PERCH CULL RATIO FOR R. JAYCOX'S LORAIN SITE AND D. SCHMIDT'S CONNEAUT SITE FOR 1979

	Estimated # of Culls	% of Total Yellow Perch Catch	Net Set Time (hrs.)
R. Jaycox			
May 3	45	0.70	120
May 16	28	3.03	120
August 24	17	1.51	24
October 2	6	0.13	24
November 8	23	2.13	24
D. Schmidt			
May 14	31	1.31	96
July 31	9	0.96	24
August 2	21	2.02	24

TABLE 8

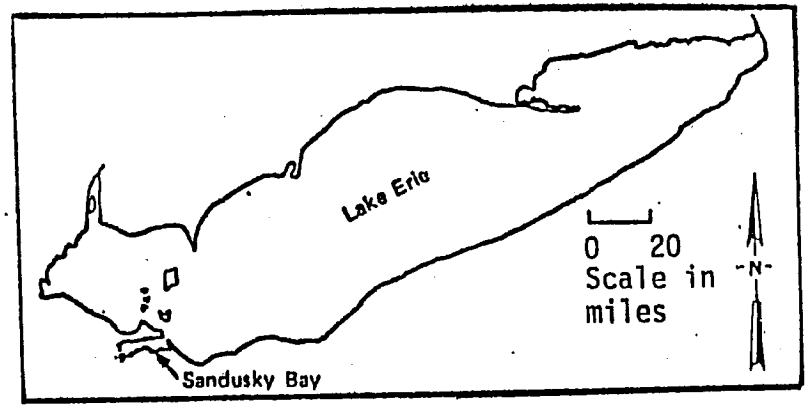
GILL NET CULL RATIO RESULTS FOR 23 JULY OFF VERMILION HARBOR

Species	Net 1 (Offshore)	Net 2 (Inshore)
	24-Hour Set[1] - Two Nets	
Freshwater Drum	5	5
White Sucker	1	1
Golden Redhorse	3	5
Yellow Perch	0	2
TOTAL	9	13
	48-Hour Set[2] - Eight Nets	
Freshwater Drum	19	21
White Sucker	17	24
Golden Redhorse	1	2
Yellow Perch	7	8
Carp	1	0
Walleye	0	1
TOTAL	45	56

[1]No culls were recorded, all fish but one were dead.

[2]All fish were culls but one yellow perch.

FIGURES



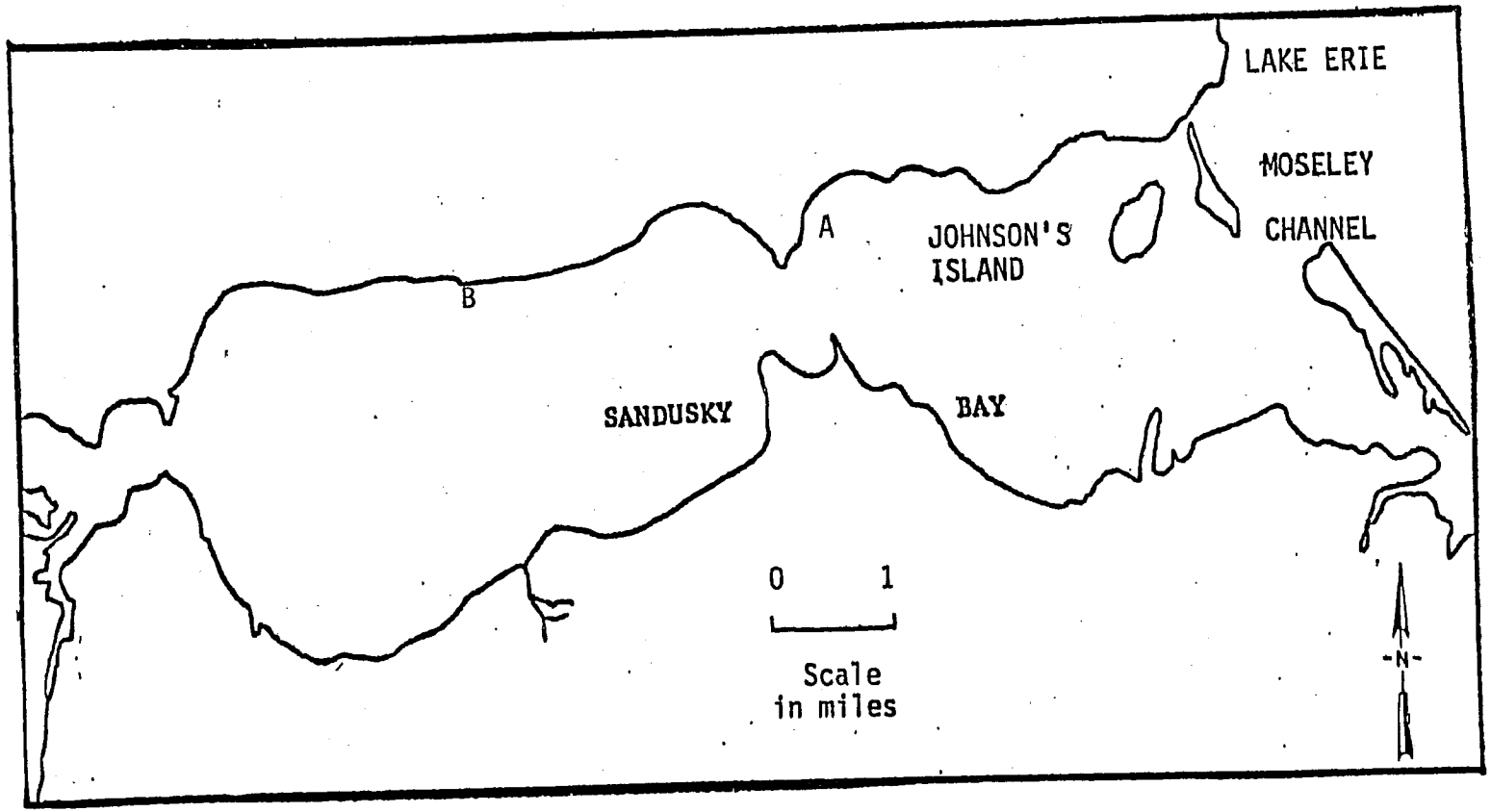


FIGURE 1. Location of shore seine sampling sites:

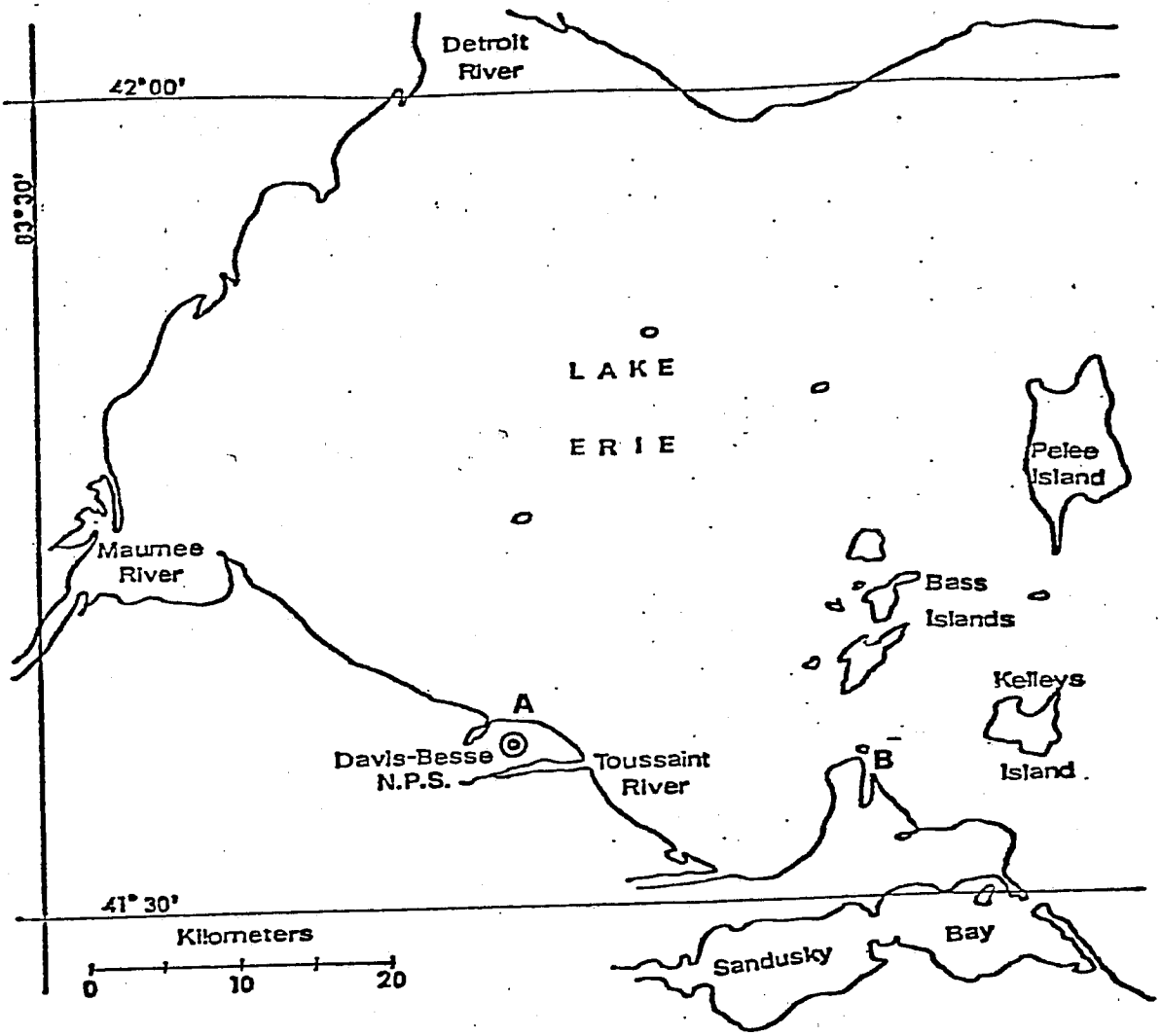


FIGURE 2. Location of trap net sites:
A. Ed Szuch, B. Larry Davis.

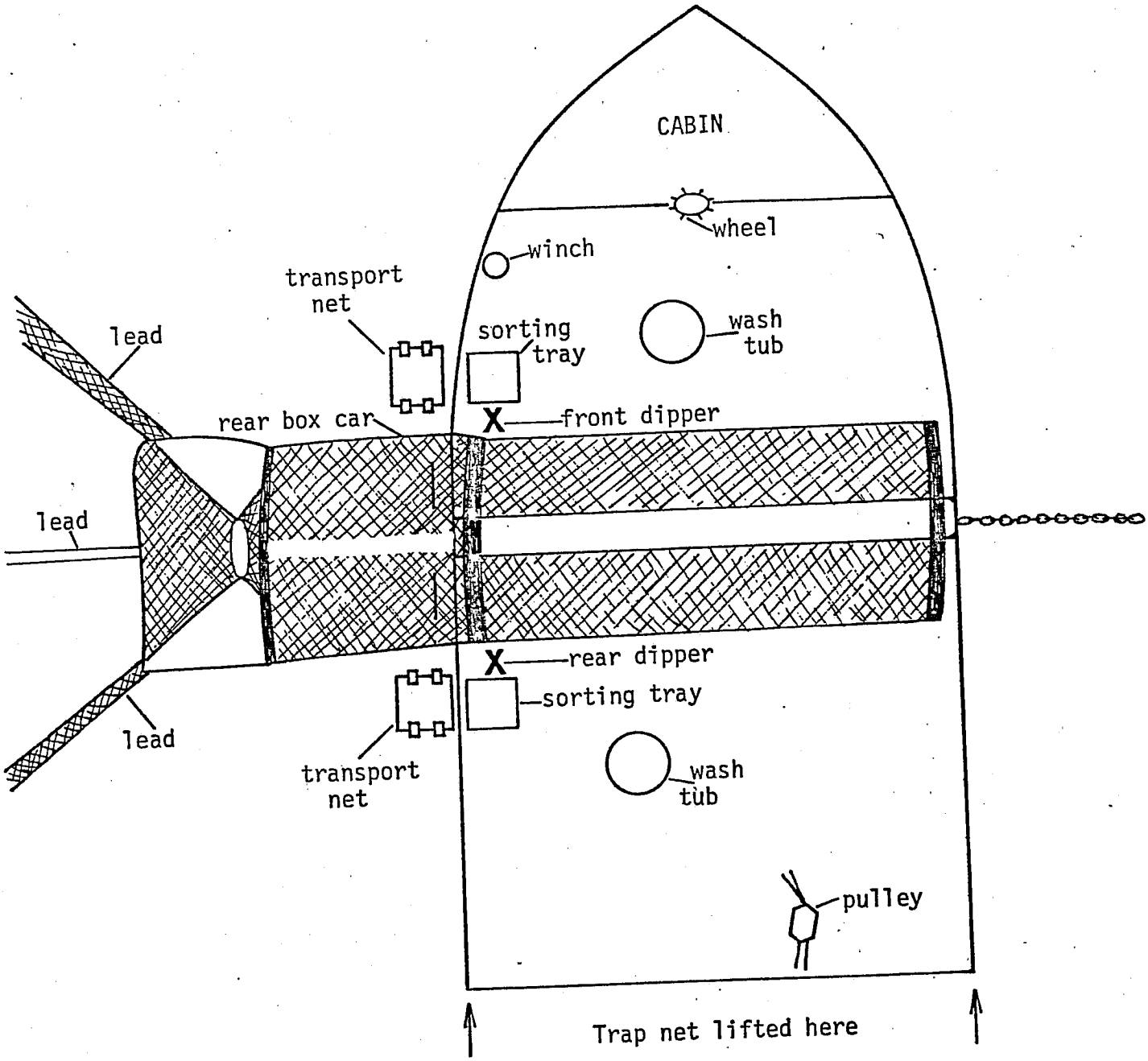


FIGURE 3. Orientation of a Lake Erie trap net in place for emptying.

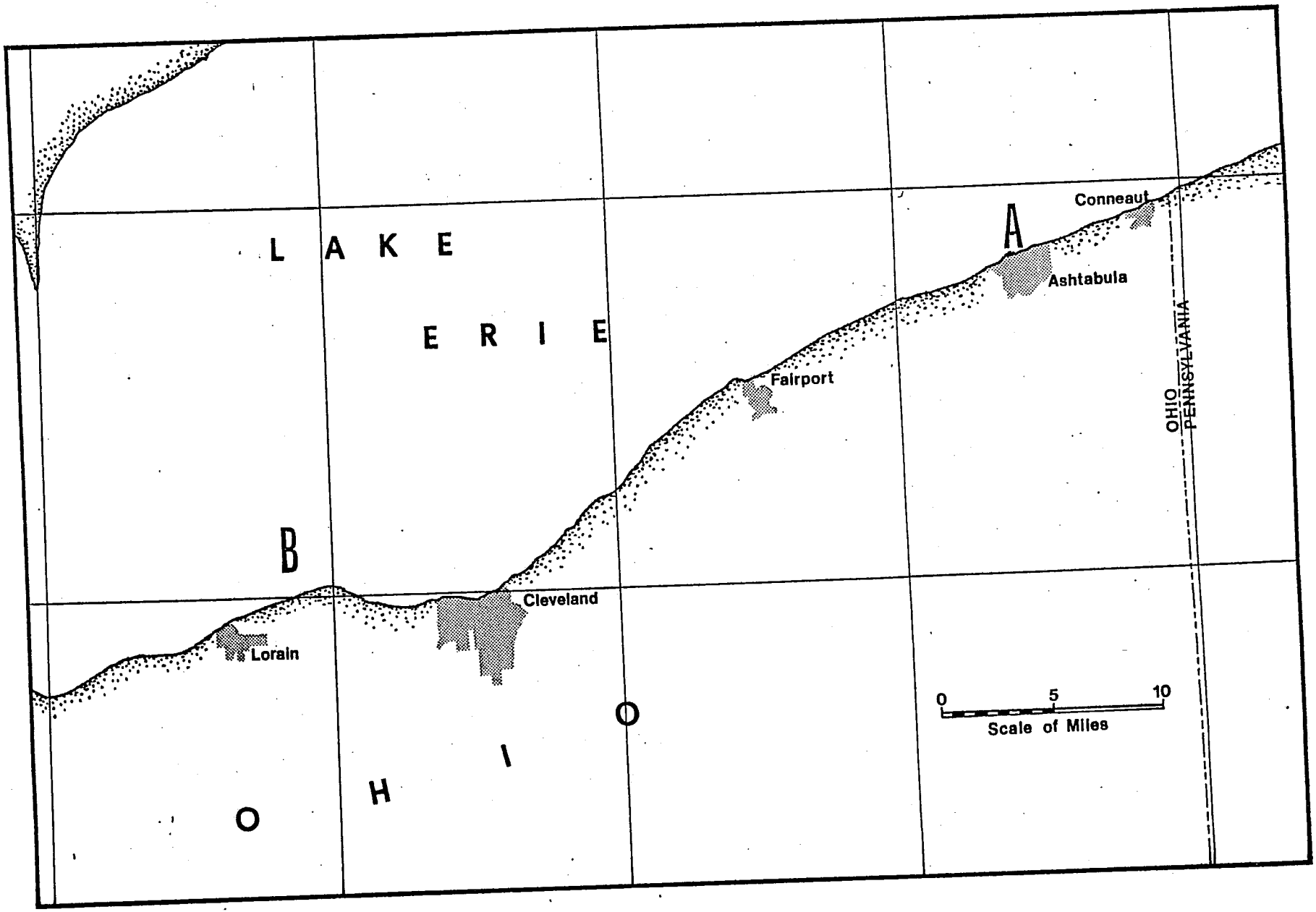


FIGURE 4. Gill net sampling sites; D. Schmidt - A, R. Jaycox - B, April through May, 1979.

FIGURE 5. Estimated Number of Fish of Representative Species in Shore Seines for L. Gowitzga's Danbury site and the Port Clinton Fish Company's Celotex site during 1979.

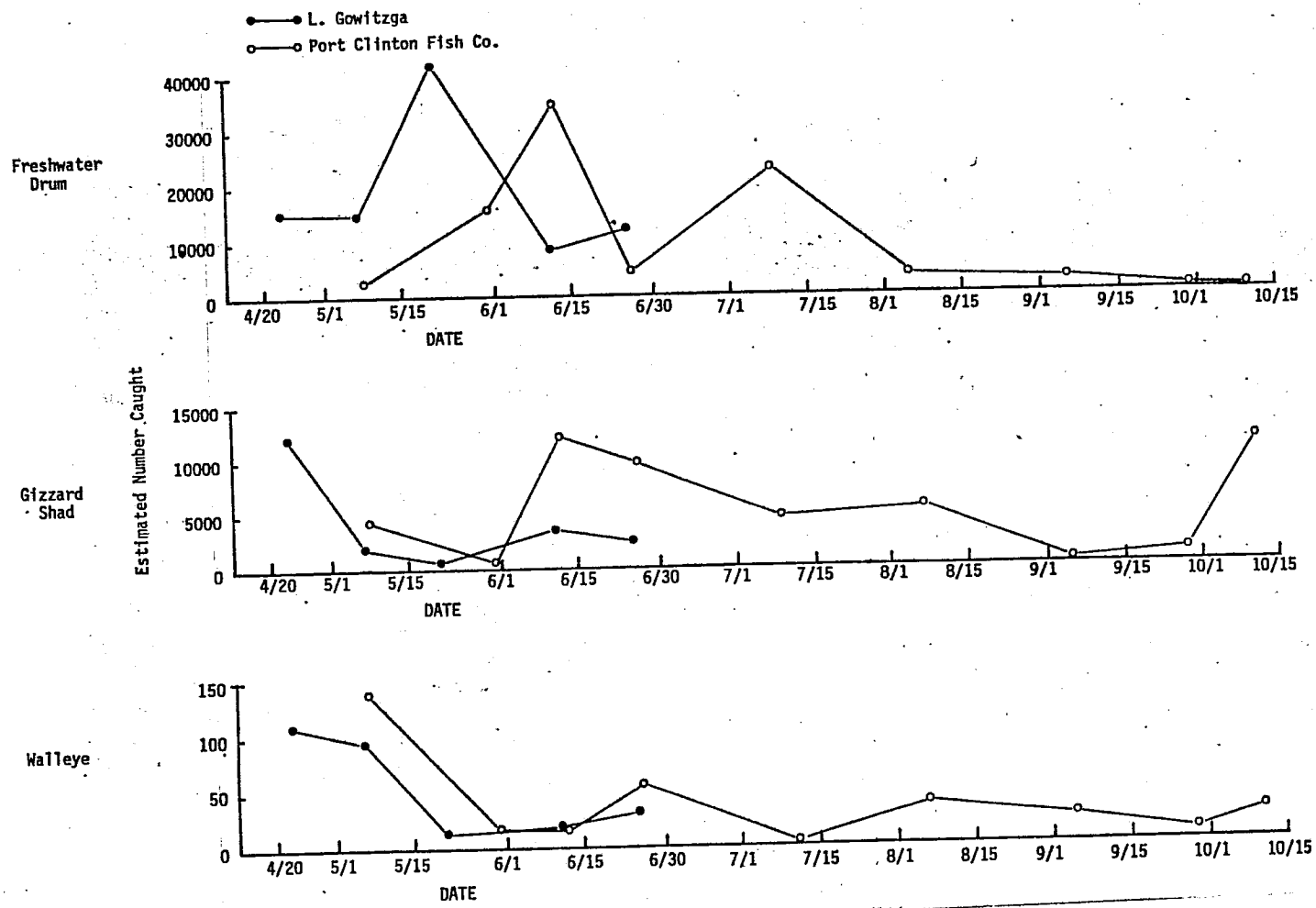
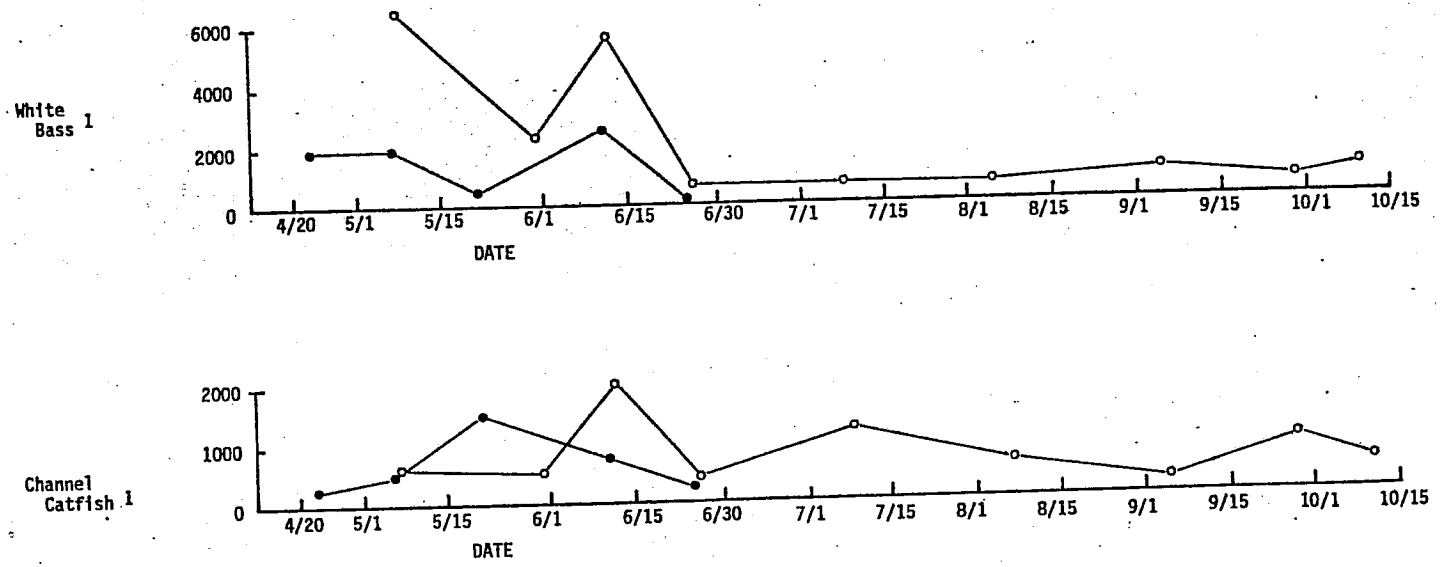
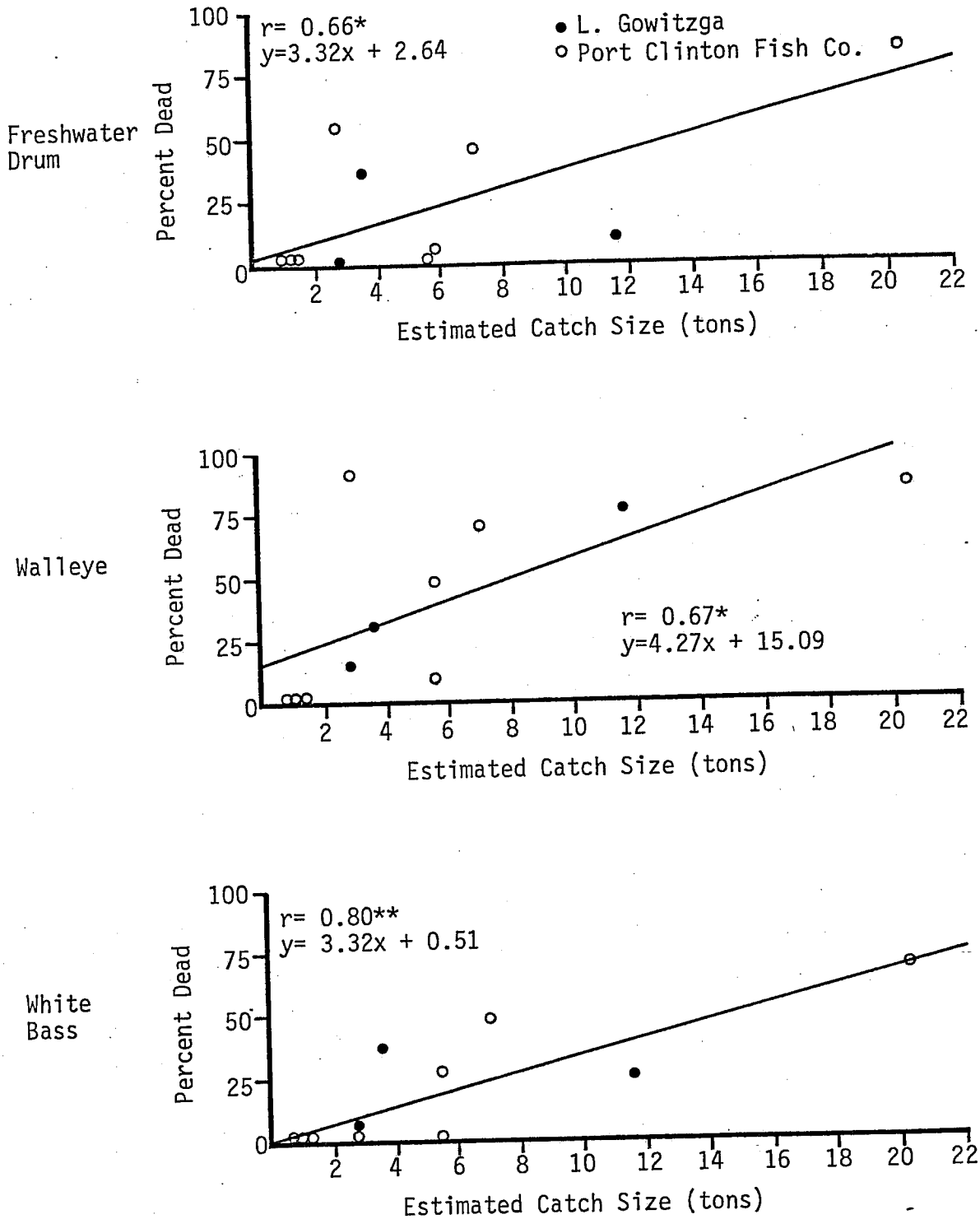


FIGURE 5. (continued) Estimated Number of Fish of Representative Species in Shore Seines for L. Gowitzga's Danbury site and the Port Clinton Fish Company's Celotex site during 1979.



1 Combined value of legal length fish and those below legal length.

FIGURE 6. Percent Mortality Plotted Against Estimated Catch Size for 3 Species of Fish Released from Shore Seines in 1979 for L. Gowitzga's Danbury Site and Port Clinton Fish Company's Celotex Site.



[1] Estimated catch size = No. dip nets full required to empty the seine bag X 36 lbs./net. The estimated weight of one dip net was derived from on site measurements.

* significant ($P<0.05$, df=9) ** significant ($P<0.01$, df=9)

FIGURE 7. Estimated Number of Fish/Trap Net/24 Hours of Three Important Species. L. Davis' East Harbor Site; April-November, 1979.

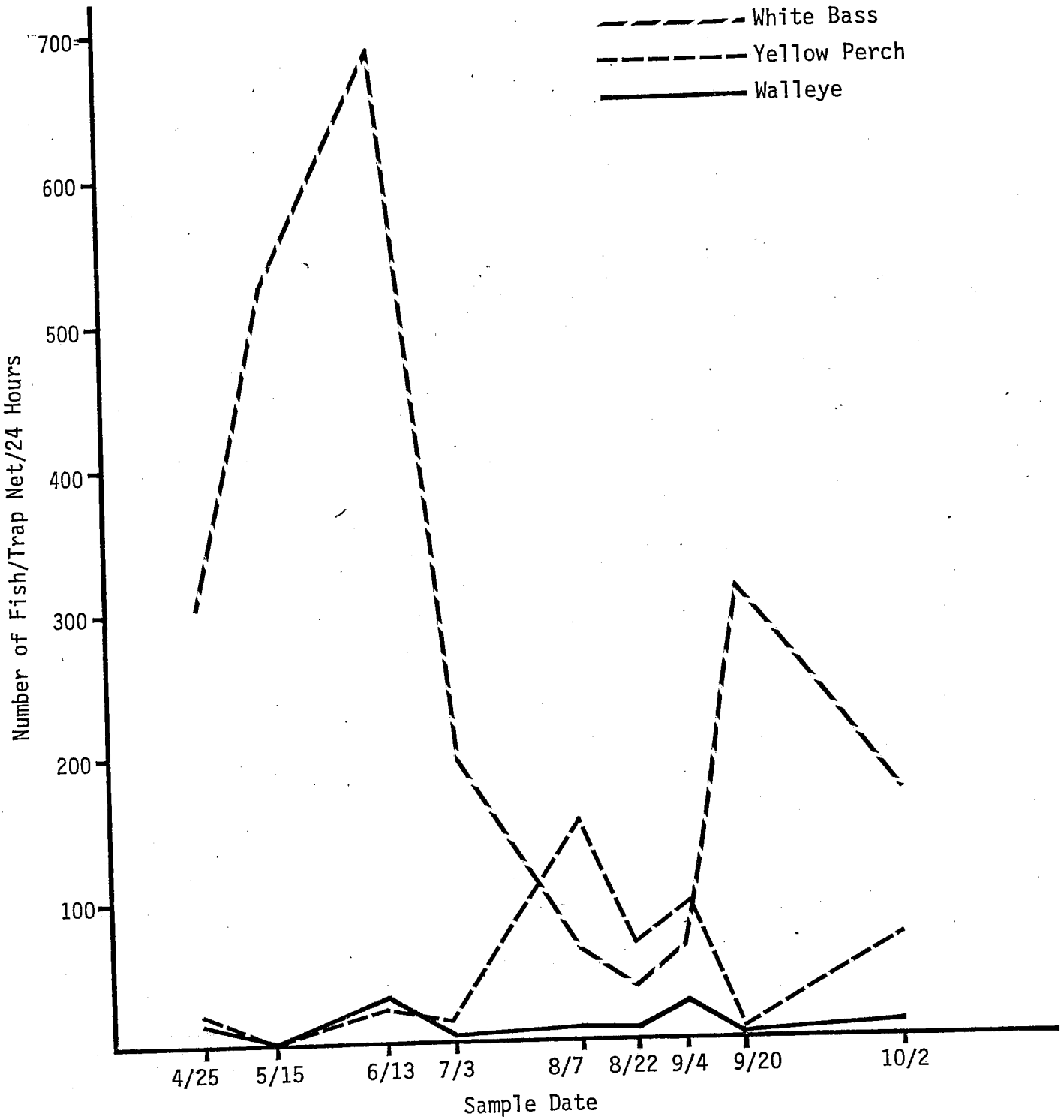


FIGURE 8. Estimated Number of Fish/Trap Net/24 Hours of Gizzard Shad and Freshwater Drum. L. Davis' East Harbor Site; April-November, 1979.

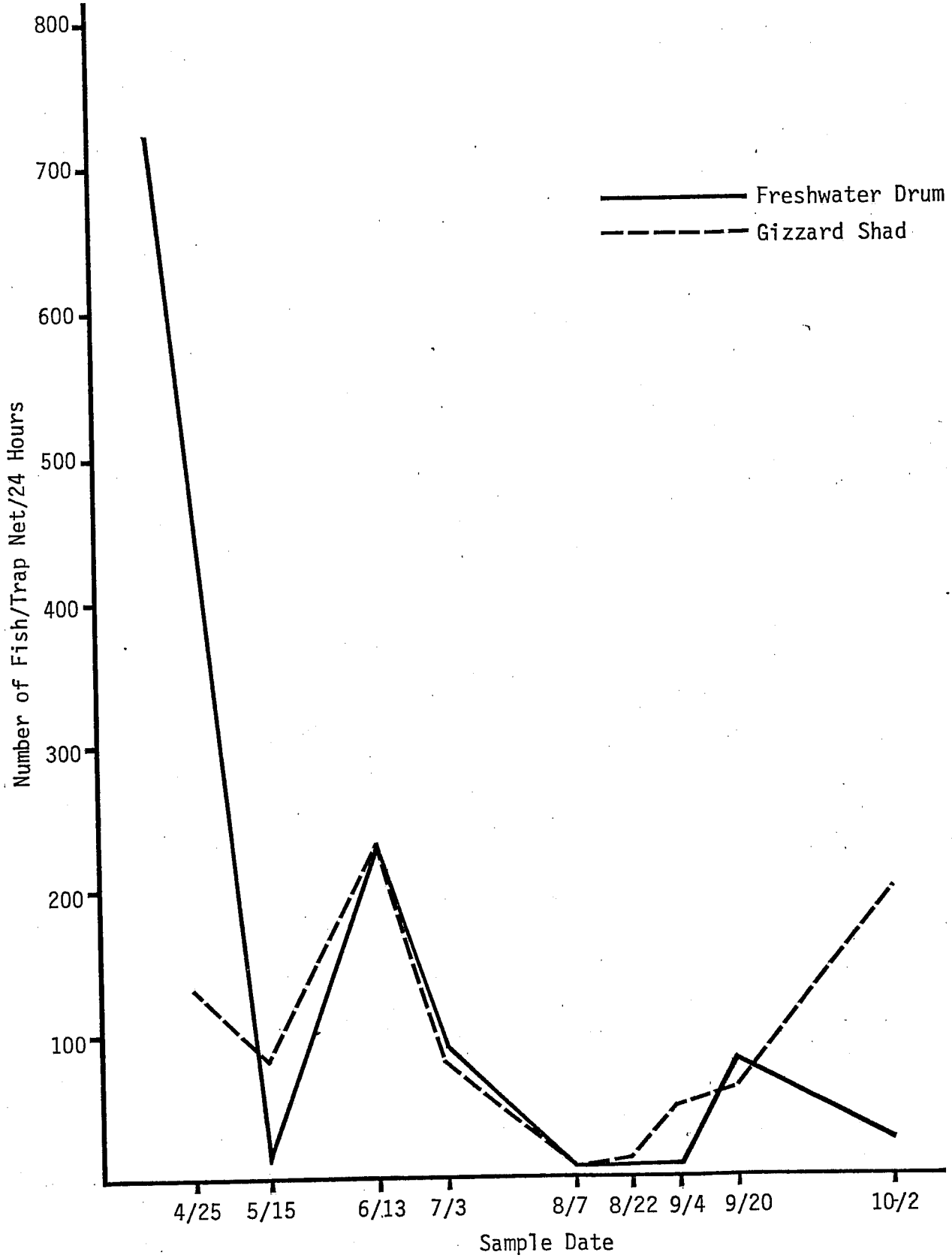


FIGURE 9. Estimated Number of Fish/Gill Net/24 Hours of Yellow Perch. D. Schmidt's Ashtabula Site; April-September, 1979.

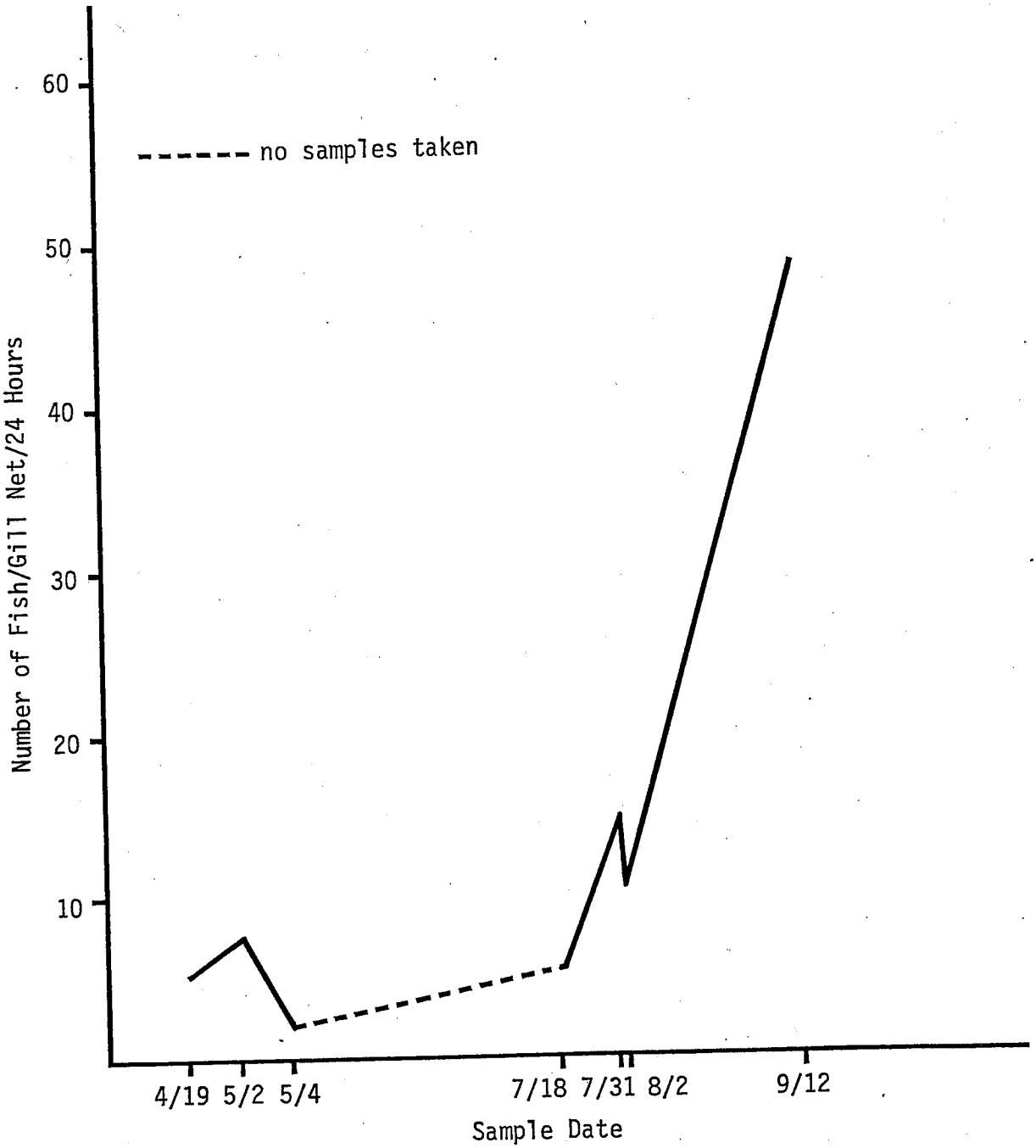
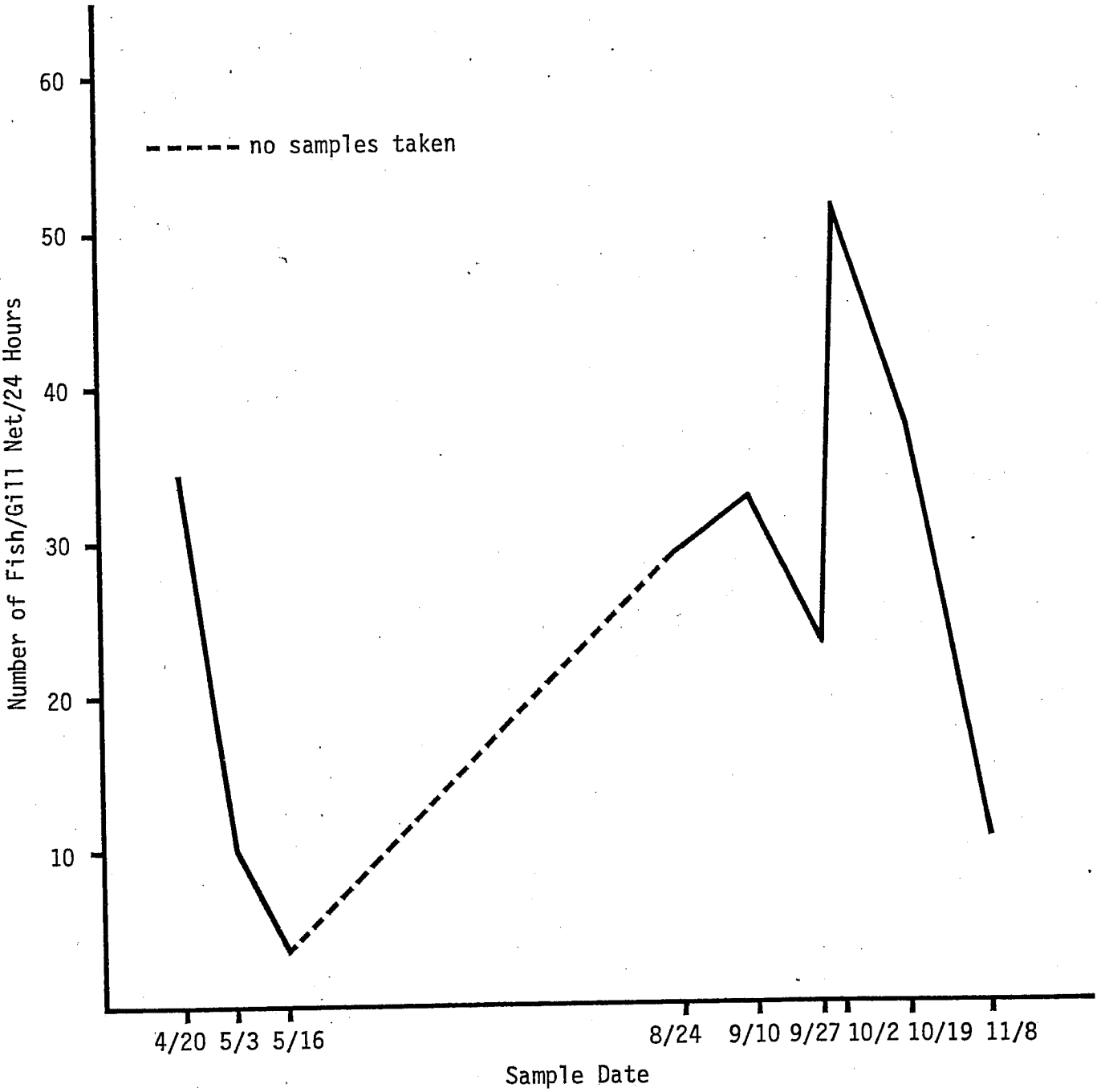


FIGURE 10. Estimated Number of Fish/Gill Net/24 Hours of Yellow Perch. R. Jaycox's Lorain Site; April-November, 1979.



APPENDICES

APPENDIX A

Catch Statistics[1] For Shore Seines at L. Gowitzga's Danbury Site
April Through June 30, 1979

Date / Species	April 23	May 7	May 21	June 11	June 25
Freshwater Drum	50.99 (15385)	77.33 (15772)	92.17 (42643)	52.51 (8432)	78.53 (12560)
Gizzard Shad	39.61 (11950)	9.70 (1978)	1.70 (785)	23.95 (3845)	15.19 (2429)
White Bass	N/A[3]	N/A	N/A	13.99 (2247)	0.73 (118)
White Bass (BLL)[2]	N/A	N/A	N/A	1.39 (222)	0.18 (29)
Channel Catfish	N/A	N/A	N/A	0.80 (129)	0.54 (86)
Channel Catfish (BLL)	N/A	N/A	N/A	4.26 (684)	0.35 (57)
Carp	0.93 (280)	0.29 (59)	1.43 (663)	1.96 (314)	3.40 (543)
Quillback Carpsucker	0.03 (10)	0.08 (17)	0.32 (149)	0.69 (111)	0.18 (29)
Walleye	0.35 (110)	0.48 (97)	0.03 (14)	0.11 (18)	0.18 (29)
Goldfish	0.40 (120)	0.09 (18)	0.06 (27)	0.23 (37)	0.18 (29)
Yellow Perch	0.51 (155)	0.04 (9)	0.03 (14)	N/A	N/A
Brown Bullhead	0.17 (50)	N/A	N/A	0.11 (18)	0.54 (86)
Black Crappie	0.07 (20)	N/A	0.03 (14)	N/A	N/A
White Crappie	0.03 (10)	0.04 (9)	N/A	N/A	N/A
Northern Pike	0.03 (10)	N/A	N/A	N/A	N/A
Coho Salmon	0.03 (10)	N/A	N/A	N/A	N/A
White Sucker	0.03 (10)	N/A	N/A	N/A	N/A
White Perch	0.03 (10)	N/A	N/A	N/A	N/A
TOTAL 16 Species	100.00 (30175)	100.00 (20397)	100.00 (46270)	100.00 (16057)	100.00 (15995)

[1]The first number indicates the percent of total catch represented by the designated species on the date indicated. The figure in parentheses indicates the estimated number of the designated species in the total catch on the day indicated.

[2]BLL - Below legal length; White Bass - 9"; Channel Catfish 0 15".

[3]Not available on that date.

APPENDIX B

Catch Statistics For Shore Seines at Port Clinton Fish Company's Celotex Site for 1979

Date / Species	May 8	May 30	June 12	June 26	July 10	August 6	September 5	September 26	October 9
Freshwater Drum	19.55 (2977)	80.11 (16527)	60.91 (34891)	27.90 (4971)	73.45 (23287)	30.61 (3805)	62.39 (3173)	20.72 (750)	6.53 (925)
Gizzard Shad	30.82 (4695)	3.93 (810)	21.19 (12140)	54.99 (9798)	15.10 (4789)	45.78 (5691)	1.04 (53)	22.74 (823)	79.06 (11193)
White Bass	42.28 (6439)	10.45 (2155)	9.79 (5609)	1.27 (228)	2.05 (651)	4.47 (556)	13.92 (708)	5.84 (211)	5.28 (748)
White Bass (BLL)[2]	N/A[3]	1.07 (22)	0.23 (131)	1.89 (336)	0.34 (106)	1.58 (196)	2.52 (128)	2.62 (95)	0.67 (95)
Carp	1.50 (229)	0.78 (160)	3.68 (2111)	6.58 (1172)	4.00 (1267)	4.88 (606)	3.24 (165)	1.00 (36)	1.06 (150)
Channel Catfish	3.42 (521)	0.36 (76)	0.38 (218)	1.77 (315)	1.63 (515)	1.09 (136)	1.34 (68)	0.80 (29)	N/A[3]
Channel Catfish (BLL)	N/A	2.19 (451)	3.18 (1820)	0.61 (109)	2.22 (702)	4.47 (555)	3.99 (203)	24.15 (874)	3.55 (503)
Quillback Carpsucker	0.22 (33)	0.48 (99)	0.08 (44)	3.23 (575)	0.71 (222)	5.39 (670)	1.18 (60)	0.20 (7)	0.10 (14)
Goldfish	0.45 (68)	0.15 (31)	0.20 (116)	1.28 (228)	0.31 (96)	0.89 (111)	2.52 (128)	4.23 (153)	2.22 (313)
Brown Bullhead	0.30 (46)	0.07 (15)	0.33 (189)	0.18 (33)	0.15 (43)	0.35 (43)	1.47 (75)	3.42 (124)	0.38 (54)
Yellow Perch	0.45 (68)	0.30 (61)	N/A	0.30 (54)	N/A	0.07 (9)	3.83 (195)	2.82 (102)	0.19 (27)
Yellow Perch (BLL)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9.46 (342)	0.48 (68)
Walleye	0.90 (138)	0.07 (15)	0.03 (15)	N/A	N/A	0.28 (34)	0.45 (23)	0.20 (7)	0.19 (27)
White Crappie	0.08 (13)	N/A	N/A	N/A	N/A	0.07 (9)	1.34 (68)	0.80 (29)	0.19 (27)
Shorthead Redhorse	N/A	0.04 (8)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Black Crappie	0.02 (3)	N/A	N/A	N/A	N/A	N/A	0.29 (15)	N/A	N/A
Rock Bass	0.01 (1)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Smallmouth Buffalo	N/A	N/A	N/A	N/A	N/A	0.07 (9)	N/A	0.20 (7)	N/A
White Perch	N/A	N/A	N/A	N/A	N/A	N/A	0.16 (8)	N/A	0.10 (14)
White Sucker	N/A	N/A	N/A	N/A	N/A	N/A	0.16 (8)	0.60 (22)	N/A
Black Bullhead	N/A	N/A	N/A	N/A	0.04 (11)	N/A	N/A	N/A	N/A
Chinook	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.20 (7)	N/A
Total 19 Species	100.00 (15231)	100.00 (20630)	100.00 (57284)	100.00 (17819)	100.00 (31710)	100.00 (12430)	100.00 (5086)	100.00 (3618)	100.00 (14158)

[1]The first number indicates the percent of the total catch for that species on that date, the figure in parentheses indicates the estimated number of that species in the total catch.

[2]BLL = Below legal length; White Bass - 9"; Channel Catfish - 15½".

[3]Not available on that date.

APPENDIX C

Condition[1] Of Fishes Released From Shore Seines At
L. Gowitzga's Danbury Site, May and June 1979

Species	Condition	Date		
		May 21	June 11	June 25
Carp	Live	98.99 (70)	100.00 (8)	100.00 (2)
	Stressed	1.01 (1)	---	---
	Dead	---	---	---
Channel Catfish	Live	100.00 (197)	100.00 (43)	100.00 (20)
	Stressed	---	---	---
	Dead	---	---	---
Freshwater Drum	Live	---	3.03 (2)	---
	Stressed	91.10 (40)	60.61 (40)	100.00 (22)
	Dead	8.90 (4)	36.36 (24)	---
Gizzard Shad	Live	---	---	---
	Stressed	19.89 (4)	17.24 (15)	100.00 (6)
	Dead	80.11 (15)	82.76 (72)	---
Quillback Carpsucker	Live	---	---	---
	Stressed	---	100.00 (2)	---
	Dead	---	---	---
Walleye	Live	8.34 (1)	41.18 (7)	27.27 (3)
	Stressed	25.00 (3)	29.41 (5)	45.45 (5)
	Dead	66.67 (8)	29.41 (5)	27.27 (3)
White Bass	Live	50.00 (2)	37.93 (11)	61.54 (8)
	Stressed	---	24.14 (7)	30.77 (4)
	Dead	50.00 (2)	37.93 (11)	7.69 (1)
White Crappie	Live	---	---	---
	Stressed	---	---	---
	Dead	100.00 (1)	---	100.00 (2)
Yellow Perch	Live	---	20.00 (1)	---
	Stressed	100.00 (1)	60.00 (3)	---
	Dead	---	20.00 (1)	---

[1]The first number is the percentage of fish observed in that condition.
The figure in parentheses is the number observed in that condition.
The figures shown are combined values for a sample and a replicate.

APPENDIX D

Condition of Fishes[1] Released From Shore Seines At Port Clinton Fish Company's Celotex Site for 1979

Species	Condition	Date							
		May 30	June 12	June 26	July 10	August 6	September 5	September 26	October 9
Black Crappie	Live	0	0	0	0	0	66.7 (2)	58.8 (10)	75.0 (3)
	Stressed	0	0	100.00 (1)	0	0	33.3 (1)	41.2 (7)	25.0 (1)
	Dead	0	0	0	0	0	0	0	0
Brown Bullhead	Live	0	100.00 (3)	100.00 (3)	100.00 (5)	100.0 (4)	0	0	100.0 (6)
	Stressed	0	0	0	0	0	0	0	0
	Dead	0	0	0	0	0	0	0	0
Carp	Live	83.36 (19)	100.00 (14)	100.00 (6)	100.00 (20)	100.0 (9)	100.0 (1)	100.0 (3)	100.0 (9)
	Stressed	13.64 (3)	0	0	0	0	0	0	0
	Dead	0	0	0	0	0	0	0	0
Channel Catfish	Live	95.80 (114)	99.70 (337)	91.30 (63)	100.0 (150)	97.3 (36)	100.0 (7)	10.0 (12)	10.0 (68)
	Stressed	3.36 (4)	0	8.70 (6)	0	2.7 (1)	0	0	0
	Dead	0.84(1)	0.30 (1)	0	0	0	0	0	0
Coho Salmon	Live	0	0	0	0	0	0	0	0
	Stressed	0	0	0	0	0	0	0	0
	Dead	0	0	0	0	0	0	100.0 (1)	0
Freshwater Drum	Live	2.98 (5)	0	0	2.4 (1)	0	0	10.0 (1)	25.0 (2)
	Stressed	96.42 (162)	14.55 (8)	55.00 (11)	92.9 (39)	43.4 (23)	18.2 (2)	90.0 (9)	75.0 (6)
	Dead	0.60 (1)	85.45 (47)	45.00 (9)	4.7 (2)	56.6 (30)	81.8 (9)	0	0
Gizzard Shad	Live	0	0	0	0	0	0	0	21.2 (21)
	Stressed	89.66 (26)	81.82 (9)	80.00 (4)	86.7 (13)	1.0 (1)	100.0 (4)	100.0 (6)	73.7 (73)
	Dead	10.34 (3)	18.18 (2)	20.00 (1)	13.3 (2)	99.0 (95)	0	0	5.1 (5)
Goldfish	Live	0	33.33 (1)	90.00 (9)	100.0 (5)	100.0 (3)	66.7 (2)	80.0 (4)	100.0 (14)
	Stressed	0	0	10.00 (1)	0	0	33.3 (1)	20.0 (1)	0
	Dead	0	66.67 (2)	0	0	0	0	0	0
Longnosed Gar	Live	100.00 (2)	0	0	0	0	0	0	0
	Stressed	0	0	0	0	0	0	0	0
	Dead	0	0	0	0	0	0	0	0
Mooneye	Live	0	0	0	0	0	0	0	100.0 (1)
	Stressed	0	0	0	0	0	0	0	0
	Dead	0	0	0	0	0	0	0	0

[1]The first number is the percentage of fish observed in the indicated condition. The number in parentheses is the actual number observed in that condition. The figures shown are combined values for a sample and a replicate.

APPENDIX D (cont'd.)

Condition of Fishes[1] Released From Shore Seines At Port Clinton Fish Company's Celotex Site for 1979

Northern Pike	Live	0	0	0	0	0	0	0	100.0 (1)
	Stressed	0	0	0	0	0	0	0	0
	Dead	0	0	0	0	0	0	0	0
Quillback Carpsucker	Live	20.00 (2)	0	85.71 (12)	21.4 (3)	87.5 (14)	0	0	100.0 (1)
	Stressed	80.00 (8)	0	14.29 (2)	71.4 (10)	12.5 (2)	100.0 (4)	100.0 (1)	0
	Dead	0	0	0	7.2 (1)	0	0	0	0
Sauger	Live	100.00 (1)	0	0	0	0	0	0	40.0 (2)
	Stressed	0	0	0	0	0	0	0	60.0 (3)
	Dead	0	0	0	0	0	0	0	0
Shorthead Redhorse	Live	100.00 (1)	0	0	0	0	0	0	0
	Stressed	0	0	0	0	0	0	0	0
	Dead	0	0	0	0	0	0	0	0
Smallmouth Buffalo	Live	0	0	0	0	0	50.0 (1)	0	0
	Stressed	0	0	0	0	100.0 (6)	50.0 (1)	100.0 (1)	0
	Dead	0	0	0	0	0	0	0	0
Walleye	Live	48.28 (14)	0	10.53 (2)	16.7 (2)	0	75.0 (6)	88.2 (15)	81.0 (17)
	Stressed	44.82 (13)	20.00 (2)	26.32 (5)	25.0 (3)	10.0 (1)	25.0 (2)	11.8 (2)	19.0 (4)
	Dead	6.90 (2)	80.00 (8)	63.15 (12)	58.3 (7)	90.0 (9)	0	0	0
White Bass	Live	92.00 (23)	28.57 (4)	22.22 (8)	61.0 (47)	77.8 (7)	80.0 (4)	50.0 (1)	33.3 (1)
	Stressed	8.00 (2)	7.14 (1)	25.00 (9)	14.3 (11)	22.2 (2)	20.0 (1)	50.0 (1)	66.7 (2)
	Dead	0	64.29 (9)	52.78 (19)	24.7 (19)	0	0	0	0
White Crappie	Live	0	0	0	0	0	27.6 (8)	47.9 (34)	36.5 (27)
	Stressed	0	0	33.33 (1)	0	16.7 (1)	72.4 (21)	52.1 (37)	63.5 (47)
	Dead	0	100.00 (1)	66.67 (2)	100.0 (2)	83.3 (5)	0	0	0
White Perch	Live	0	0	0	0	0	0	100.0 (1)	50.0 (2)
	Stressed	0	0	0	0	0	0	0	50.0 (2)
	Dead	0	0	0	0	0	0	0	0
White Sucker	Live	100.00 (1)	0	0	0	0	100.0 (1)	66.7 (2)	0
	Stressed	0	0	0	0	0	0	33.3 (1)	0
	Dead	0	0	100.00 (1)	0	0	0	0	0
Yellow Perch	Live	30.00 (6)	66.67 (2)	23.08 (3)	0	0	55.6 (20)	47.4 (27)	31.3 (15)
	Stressed	60.00 (12)	0	53.84 (7)	0	0	38.9 (14)	52.6 (30)	62.5 (30)
	Dead	10.00 (2)	33.33 (1)	23.08 (3)	100.0 (2)	0	5.5 (2)	0	6.2 (3)

[1]The first number is the percentage of fish observed in the indicated condition. The number in parentheses is the actual number observed in that condition. The figures shown are combined values for a sample and a replicate.

APPENDIX E

A SYNOPSIS OF OHIO COMMERCIAL FISHING REGULATIONS

Prepared by:

Kenneth R. Fritz
Steven J. VanFleet
David L. Johnson
Jeffrey M. Reutter

March 1, 1980

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INTRODUCTION

Laymen have almost universally felt that laws are incomprehensible. This can probably be attributed to two problems inherent in a regulation's written form. The way in which a law is worded is frequently confusing when written in a legally acceptable form. Second, the sources of a specific regulation often are contained in several places. Both the Revised Ohio Code and the Wildlife Orders contain commercial fishing laws. The purpose of this journal is to integrate the laws of commercial fishing from all their various sources and to express them in wording which is easily understood by a non-attorney. This journal is not intended to be a legal document, but does contain authoritative information. The sources of the journal are chapter 15 of The Ohio Revised Code and the Division of Wildlife Orders.

To understand the commercial fishing laws, one must be aware that the state of Ohio holds all wild animals in trust for the citizens of Ohio and is, thereby, responsible for management of the wild animals for the benefit of all people of the state (O.R.C. 1531.02). In addition, the Chief of the Division of Wildlife has authority in all matters pertaining to protection, preservation, propagation, possession or management of all wild animals and may issue temporary orders (Ohio Division of Wildlife Orders) for the management of wild animals. All temporary orders concerning season, bag limits, size, species, method of taking, and possession must be approved by the Ohio Wildlife Council before the order can be adopted (O.R.C. 1531.03, 1531.08).

COMMERCIAL FISHING REGULATIONS

I. Licenses

Authority: Ohio Revised Code Chapter 1533 Sections: 34, 342, 35, 36
Ohio Wildlife Orders: 1501:31-3, Section: 03

A. License Regulations

1. A commercial fishing license is required to take fish with seine (other than a minnow seine), trap net, gill net, trotline or carp apron.
2. Requirements to be licensed: 90-day residence, 2 years experience or holder of commercial fishing license, 1000-dollar performance bond or cash deposit. Non-residents may be licensed if a reciprocal agreement with his/her state or county of residence is in force.
3. No new licenses (excluding carp aprons, dip nets, and trotlines) will be issued except conditional licenses. Conditional licenses are permitted to take carp, suckers, quillback, sheepshead, and gizzard shad. The license may be restricted in the amount of fish taken, method of taking fish, type of gear, time and place of taking fish, and duration of license.
4. A license or additional units of trap nets may be placed on reserve for 2 years with no payment if written permission is given by the Chief of the Division of Wildlife. If not renewed in 2 years it will be revoked and either issued to new applicants or withheld from the fishery and the licensee loses the right to renew a license.
5. Renewed licenses will be for no additional gear above the previous year's amount.
6. A licensee may switch gear types with permission from the Chief of the Division of Wildlife.
7. No license is transferable.
8. The Chief of the Division of Wildlife may fix the species, weight, number, or size of fish taken and may designate the home port of the license and up to 2 alternative ports.

B. License Fees

1. Trap nets: the first twenty nets - $800; each additional 10 nets or less - $400.
2. Powerboat 21 feet or less for gill netting - $300.
3. Powerboat greater than 21 feet for gill netting - $600.
4. Lake Erie fishing district seine 150 rods or less - $400.
5. Lake Erie fishing district seine greater than 150 rods - $600.
6. Inland fishing district seine - $100.
7. Carp apron - $100.
8. Trotline with 70 hooks or less - $20.
9. Trotline with more than 70 hooks - $100.
10. Dip net - $100.
11. All fees are paid in full if $100 or less at time of application; otherwise 1/4 of the fee is due at the time of application and the balance due within 90 days.

C. Commercial Harvest Royalty Fees

1. Any allowable fish with quota, $.02 per pound.
2. Any allowable fish without a quota, $.01 per pound on the weight of fish over 1/2 last year's catch of that species.
3. Fees due by the first day of the next fishing season. No license will be issued until the previous year's royalties are paid.

II. Designated Areas for Commercial Fishing
Authority: Ohio Revised Code Chapter 1533, Sections: 45, 47, 48, 50, 55, 62
Ohio Wildlife Orders: 1501:31-3, Sections: 02, 04, 05

A. Restricted Areas by Gear Types
1. Seines, Trap Nets, Gill Nets, Trotlines and Carp Aprons

a. No gear shall be placed in the Camp Perry firing area located in Ottawa County, north of Camp Perry and northwest of Port Clinton, Ohio, beginning at a point north of the mouth of the Toussaint River, located at the southwest corner of Danger Zone II and marked with a United States coast guard buoy (F); thence easterly at 92° for approximately 13,000 yards to buoy (W-or-E) thence northwesterly at 325° for approximately 14,000 yards through buoy (W-or-D) to buoy (W-or-C); thence westerly at 270° for approximately 11,400 yards through buoy (W-or-B) to buoy (W-or-A); thence southeasterly at 164° for approximately 11,800 yards to the point of beginning.

b. No gear shall be set in the Bass Island area located in Ottawa County northeast of Port Clinton, beginning at buoy (R2) FI-6 SEC., south of South Bass Island; thence northeasterly at 25° for approximately 11,650 yards to buoy (1) FI-4 SEC.-BELL; thence northerly at 12° for approximately 2,100 yards to international buoy (W-or-E); thence northwesterly at 302° for approximately 8,050 yards to buoy FI-R-4 SEC.-BELL; thence southwesterly at 203° for approximately 5,225 yards to buoy (RN2); thence southerly at 185° for approximately 8,100 yards to Green Island light (FI-2-1/2 SEC.-80 FI. 8 STM); thence southeasterly at 131° for approximately 6,050 yards to the point of beginning.

c. No gear shall be set in the Kellys Island area located in Erie and Ottawa Counties north of Sandusky, Ohio, beginning at Marblehead light (FI-G-6 SEC.-67 FT. 7 STM); thence northwesterly at 339° for approximately 9,800 yards to buoy (R2) (FI-R-4 SEC.); thence northeasterly at 27° for approximately 10,700 yards to the Canadian-United States International Line at the western tip of Middle Island; thence southeasterly at 129° for approximately 7,100 yards to buoy (1) (FI-4 SEC.); thence southwesterly at 209° for approximately 15,100 yards to the point of beginning.

d. No gear shall be set in the Ruggles reef area located in Erie County between Huron and Vermilion, Ohio, beginning at the east bank of the mouth of the Huron River, located at longitude 82° 32.0' and latitude 41° 23.9'; thence due north at 0° for 2,640 yards to a point located at longitude 82° 32.9' and latitude 41° 25.2'; thence easterly for approximately 19,108 yards, running parallel to and at a distance of 2,640 yards from the shoreline, to a point located at longitude 82° 21.9' and latitude 41° 26.9'; thence due south at 180° for 2,640 yards to the west bank of the mouth of the Vermilion River, located at longitude 82° 21.9' and latitude 41° 25.6'; thence westerly following the shoreline for approximately 19,108 yards, to the point of beginning.

e. No gear may be operated on any reef without permission from the Chief of the Division of Wildlife.

f. No gear may be placed in Lake Erie in any fashion or combination so that more than 1/4 of the distance, between two islands, an island and the mainland or a bay, except Sandusky Bay, is blocked.

g. No gear may be placed within 1/2 mile of West Sister Island.

h. Commercial fishing gear may not be set in any manner so that it will interfere with the free movement of fish in or out of a stream connected to Lake Erie.

i. No gear shall be operated within 1/2 mile of a pier or breakwater built or maintained by the U.S. government, mouth of any river flowing into Lake Erie; or within 1/2 mile of any bridge, dam, or bridge embankment in any bay of Lake Erie except Sandusky Bay west of a line running from Schafer's dock on Marblehead to the north end of Cedar Point jetty.

j. No person shall lay out, pull, lift, draw, set, place, locate or maintain any net or seine, except a minnow seine, in the area of Sandusky Bay bounded by an imaginary line running from a point in the north shore one-half mile west of and parallel to the Sandusky Bay motor vehicle bridge toward the south shore to a point in said line one-half mile west of the north abutment of the southerly opening of said bridge, thence in a southerly direction to a point on the south shore in the middle of the west end of Woodland Trail, Bayview Allotment, and an imaginary line running from the north shore toward the south shore one-half mile east of and parallel to the New York Central railroad bridge to a point in said line one-half mile east of the north abutment of the southerly opening in said railroad bridge, thence in a southerly direction to a point in the New York Central railroad right of way three thousand feet from said railroad bridge abutment. No person shall lay out, pull, lift, draw, set, place, locate, or maintain any net or seine, except a minnow seine, in the Lake Erie fishing district of Sandusky Bay west of a line drawn easterly from the Lake Erie fishing district marker between sections 23 and 24 in Bay township, Ottawa County to the government west end light buoy; thence from the buoy along a line drawn due south for a distance of one-half mile to a point where a marker buoy shall be established by the Division of Wildlife; thence southwesterly along a line drawn straight to the Lake Erie fishing district marker on the south shore of Sandusky Bay. All points so designated where the above so-called imaginary lines touch the shore shall be clearly marked by some suitable marker installed by the Department of Natural Resources.

2. Seines, trap nets, gill nets and carp aprons

   a. No gear shall be placed from May 15 through September 15 within 1 mile of the shoreline east of the Ford Motor Company's water tower in Lorain to the east bank of the Chagrin River.

   b. No gear shall be placed in any stream east of the mouth of Sandusky Bay.

3. Trap nets, gill nets, trotlines and carp aprons
   Seines only may be set in the Maumee Bay waters of the Lake Erie fishing district located in Lucas County north, northeast and east

of Toledo, Ohio, beginning at the west bank of the mouth of the Maumee River; thence northwest and northerly following the Lake Erie shoreline to the Ohio-Michigan boundary line; thence east and northeast following the Ohio-Michigan boundary line in Lake Erie to Turtle Island; thence southeasterly to the northerly tip of Cedar Point Marsh in Jerusalem township; thence southwest and westerly following the Lake Erie shoreline to the east bank of the mouth of the Maumee River; thence westerly across the mouth of the Maumee River; to the point of beginning.

4. Trap nets, gill nets, trotlines and carp aprons
A special inland seine may be used in the Ottawa River, no farther up than the Ann Arbor bridge; in the Maumee River, no farther up than the Toledo Cherry Street Bridge; in the Portage River and in Portage Bay, no farther up than one-half mile west of the junction of the Portage and Little Portage Rivers; in the Sandusky River, no farther up than an imaginary line running from the west point of Squaw Island straight across Sandusky River to Teal Pond Point, thence straight south to the mainland; in Mud Creek and in Mud Creek Bay, no farther up than an imaginary line running straight across Mud Creek at a right angle with the course of the stream one-half mile west of the Mud Creek bridge on Port Clinton road, and in the La Carp Creek, Little Portage River, Toussaint River, Turtle Creek, Crane Creek, and Ward's Canal, no farther up than the water level that Lake Erie extends in these streams.

5. Trap nets and gill nets
No gear shall be placed within 1/4 mile of any reef from March 1 to May 10; and within 1/4 mile of any island or the mainland from June 15 to September 15.

6. Seines
Seines are not permitted in that portion of Sandusky Bay or Lake Erie lying within the area starting at the northeast end of the Cedar Point jetty thence on a line drawn straight from the northeast end of Cedar Point jetty to Shafer's dock on Marblehead; thence to the western extremity of Johnson's Island; thence to the loading dock of the Baltimore and Ohio Railroad and back to the point of origin.

No person shall draw, set, place, locate, or maintain any net except a minnow net in that portion of Sandusky Bay lying between Cedar Point and the mainland and east of an imaginary line running straight across Sandusky Bay from the extreme west point of Cedar Point to the Baltimore and Ohio elevator dock.

7. Trap nets
   a. No trap nets shall be placed west of a line running from Shafer's dock on Marblehead to the north end of Cedar Point jetty.
   b. No trap net shall be set in less than 3 feet of water.

8. Gill nets
   a. No gill nets shall be placed west of Huron pier, or within 1/2 mile of the shoreline east of Huron pier.
   b. No gill net shall be set in less than 3 feet of water or less than 6 feet below the surface.

B. Permitted Areas for Carp Aprons

1. Carp aprons may be used in marshes or ditches constructed to drain or fill a marsh. These marshes or ditches must border the Lake Erie fishing district or empty into a stream or river that drains into the Lake Erie fishing district.

III. Commercial Fishing Seasons and Times

Authority: Ohio Revised Code Chapter 1533, Sections: 41, 55
Ohio Wildlife Orders 1501:31-3, Sections: 01, 02

A. The Commercial fishing season begins March 1 and ends December 10, both dates inclusive.

B. No fish shall be brought ashore 1/2 hour after sunset to 1/2 hour before sunrise. Special permission may be granted to fish during the restricted times with seines.

C. No Seine:
1. may be used in Sandusky Bay from 1 hour after sunset on the day before Sunday, Memorial Day, Independence Day, and Labor Day until 1 hour before sunrise on the following day.
2. may be used in Sandusky Bay on any date from 1 hour after sunset to 1 hour before sunrise. A seine may be operated in the Lake Erie fishing district other than Sandusky Bay at night provided written notification prior to fishing is sent to the Chief of the Division of Wildlife. Notification will be for no longer than 1 week and must include the licensee's name, address, date and time of fishing, and location of fishing.

IV. Gear Specifications and Identification
Authority: Ohio Revised Code Chapter 1533, Sections: 43, 431, 44, 45, 47, 48, 49, 50, 52, 53, 62
Ohio Wildlife Orders: 1502:31-3, Sections: 05, 07

A. Specifications

1. Trap Nets
   a. The twine of the crib or car must be hung on a third so that the meshes hang square. The thread of the crib cannot be heavier than number 18 with a stretched mesh of 2-5/8 inches.
   b. The crib must have a spreader bar to keep the twine hung square when set.
   c. The back of the lifting car cannot be removed when brought ashore.

2. Lake Erie Seines
   a. Seines greater than 300 rods (4950 feet) are not permitted.
   b. The outer 1/3 of the wings next to the brails must consist of twine 5 inches stretched mesh or greater. The second 1/3 of the wings must be 4½ inches stretched mesh or greater. The balance must be of 4 inches stretched mesh or greater except in the bag. The bag can be up to 350 feet long of which 200 feet must be 3 inches stretched mesh. The balance of the bag can be made of twine of any mesh size.
   c. No person shall lay out, pull, lift, draw, set, place, locate, or maintain any seine on the northerly side of Sandusky Bay for a distance of two miles west of the Sandusky Bay motor vehicle bridge measured on a line drawn straight from the north abutment of the long span of the said bridge to Squaw Island; thence at right angles to said line to the north shore, using more than 275 rods or rope as running or hauling line measured between the sheave and the brail on each wing; no person shall lay out, pull, lift, draw, set, place, locate, or maintain any seine on the southerly side of said bay for a distance of two miles easterly from the New York Central railroad bridge measured on a line drawn straight from the north abutment of the longest span of the New York Central railroad bridge to the outer end of the Baltimore and Ohio elevator dock in Sandusky, Ohio, and thence at right angles to said line to the south shore using more than 250 rods of rope as pulling or hauling line measured between the sheave and the brail on each wing. No person shall lay out, pull, lift, draw, set, place, locate, or maintain any seine in said bay west of said Shafer's dock and Cedar Point jetty line hereinbefore described, using more than 320 rods of pulling or hauling line measured between the sheave and the brail on each wing, excepting from said area the restricted areas hereinbefore provided and also provided in section 1533.62 of the Revised Code wherein no seine, except a minnow seine or minnow net or hand-landing net may be used in the areas, hereinbefore described, wherein the length of rope or line to each wing of a seine is restricted to 250 rods, and 275 rods of rope or line. No seine, regardless of rope measurement hereinbefore permitted or provided shall encroach or extend into the restricted areas of Sandusky Bay herein

provided, and described as in section 1533.62 of the Revised Code. Such additional line to the limits hereinbefore specified may be permitted which will extend only from the sheave to the puller. Wherever the sheave on either wing of the seine is located or placed off the shore, the distance from the sheave to the nearest point on shore shall be deducted from the maximum line allowed from the sheave to the brail. The puller of each seine shall be placed and used on the mainland shore or on a barge moored or located immediately adjacent to the mainland shore, except on Presque Isle where the puller may be placed on the island and the distance from each sheave on each wing to the north shore shall be deducted from the 275 rod length of line permitted herein from the sheave to the brail on each wing of the seine. No person shall have in possession a seine and rope or line used or to be used at any certain location in Sandusky Bay, which rope or line when attached to the brail exceeds the length as permitted to be used in such area as herein provided.

3. Inland Seines. An inland seine shall be constructed so that the mesh size of the outer 1/3 of the wings next to the brails must be 5-inch stretched mesh or greater. The next 1/3 of the wing must be 4½-inch stretched mesh or greater and the balance of the seine must be of 4-inch stretch mesh or greater.
4. Gill nets
   a. In 1980 gill nets cannot be greater than 150 feet long. In 1981 gill nets cannot be greater than 120 feet long.
   b. No net can exceed 30 meshes deep.
   c. Gill net twine cannot be less than 2½ inches or greater than 2-7/8 inches stretched mesh.
   d. Boats licensed 21 feet or greater can have no more than 66,000 feet of gill netting in the water and on board at one time. Boats licensed less than 21 feet can have no more than 18,000 feet of gill netting in the water and on board at one time.
5. Trotlines
   a. No wire may be used in any trotline.
   b. Trotlines must be placed so they cannot be pulled from shore.
   c. Type one trotlines can contain no more than 70 single hooks on one line. All buoys must be red and unshatterable.
   d. Type two trotlines can contain more than 70 single hooks on any number of lines. All buoys must be white and unshatterable.
6. Carp aprons. A carp apron can be no larger than 100 by 75 feet and the meshes must be 3½ inches stretched mesh or larger.

B. Identification
   1. Seines, Inland and Lake Erie
      A tag issued by Ohio Division of Wildlife shall be attached on either brail and the owner's or operator's name must be in 1-inch high letters on either brail.

2. Trap nets
An orange uphaul buoy on each net must be identified with a number greater than 2 inches high. The numbers will begin at 1 and proceed to the number of nets licensed to the owner. The owner's or operator's name must also appear on the buoy in 1-inch high letters. The owner's or operator's name must also be stamped or branded on the left side of the top brail, spreader bar, or support bar in 1-inch high letters.

3. Gill nets
Each string of gill nets must have marker buoys at each end and at 3000-foot intervals. The marker buoy must have a black flag at least 12 inches on a side held at least 6 feet above the water surface in white letters at least 2 inches high. Serially numbered tags issued by the Ohio Division of Wildlife must be attached to the top bridle line or head ledge on each end of the gill net where the netting begins. The first three leads at each end of the gill net must be stamped with name of the vessel using those nets. Nets marked for one vessel cannot be onboard another vessel.

4. Carp aprons
A tag issued by the Ohio Division of Wildlife must be attached to the top line and the owner's or operator's name must appear in 1-inch high letters on a board or tag on the top line.

5. Trotlines
The owner's or operator's name must appear in 1-inch high letters on tally buoys at each end of the trotline.

6. Dip nets
A tag issued by the Ohio Division of Wildlife must be attached to the rim line and the owner's or operator's name must appear in 1-inch high letters on the lifting pole.

V. Fish: Restrictions, Quotas, Reports
Authority: Ohio Revised Code Chapter 1533, Sections: 341, 42, 46, 55, 63
Ohio Wildlife Orders 1501:31-3, Sections: 02, 05, 09

A. Designated Species and Sizes
1. The following fishes can be commercially harvested in Ohio waters:
   a. American eel
   b. bowfin
   c. buffalo if at least 15 inches total length
   d. bullheads, if at least 9 inches total length
   e channel catfish, if at least 15½ inches total length
   f. flathead catfish
   g. freshwater drum or sheepshead
   h. gar
   i. gizzard shad
   j. goldfish
   k. smelt
   l. suckers, if at least 10 inches total length
   m. white bass, if at least 11 inches total length, 8-3/4 inches headless or a fillet at least 6½ inches
   n. white perch
   o. yellow perch, if at least 8 inches total length, or a fillet or part fillet at least 5-3/8 inches
   p. alewife
   p. carp
   r. quillback
   s. lamprey
2. It is illegal to commercially harvest, possess, sell or transport any fish in any form other than round, headless or fillets except salmons and whitefishes, which may be sold canned or in steaks.
3. It is illegal to harvest, possess, sell or transport a quantity of any species mentioned above containing more than 10% by weight of undersized fish in any form.
4. None of the above species may be mutilated so that the length, weight or species cannot be determined.
5. All sublegal or illegal species of fish must be released within 1 hour after taken into possession except in seines where they must be released within 1½ hours.
6. The following fishes may be harvested with carp aprons, and inland seines: carp, suckers, freshwater drum, goldfish, bowfin, and gizzard shad.
7. Although illegal to commercially harvest from Ohio waters, these fish can be imported and sold if they meet Ohio's legal size, and are legally obtained:
   a. cisco (except lake herring), if at least 11 inches total length
   b. coho, if at least 21½ inches headless and 25 inches round
   c. sauger, if at least 11 inches total length or a fillet at least 3 ounces or part fillet at least 1½ ounces
   d. sturgeon (except lake sturgeon), if at least 48 inches total length
   e. walleye, if at least 15½ inches in total length
   f. whitefish, if at least 17 inches in total length

B. Fish Removal Regulations
1. All fish must be removed from gill nets once every 72 hours.
2. All fish must be removed from trap nets and trotlines at least once every 5 days, except for trap nets where all fish must be removed from the crib once every 5 days.
3. No gear may be left in the water in an unfishable condition for more than 5 days.

C. Restricted Techniques
It is illegal to splash or make noise to drive fish into fishing gear or assist in their capture.

D. Quotas
The Chief of the Division of Wildlife shall determine harvest quotas for commercial fisheries. The chief will utilize 3 sources of input in determining the quotas:
1. Technical committees from jurisdictions for which a stock is common.
2. The previous 5 years proportional sport and commercial catch and other scientific, economic and social data.
3. The Commercial Fishery Quota Committee consisting of 3 representatives from the Ohio Division of Wildlife and 5 representatives from the commercial fishing industry.

E. Catch Reports
1. All commercial fishing licensees, unless using a trotline with less than 70 hooks, must submit a monthly report by the 15th day of the following month whether they fished or not.
2. Daily records must contain the weight and kind of fish taken, amount of gear lifted, number of nights fished by the net, locality fished or any data required by Division of Wildlife biologists. Daily records must be recorded no later than 12 m. the following day.
3. The form "Daily Catch Report of Commercial Fisheries in Lake Erie" must be carried on the boat or be at the fishing site when fishing. The name of the person in charge, the licensee's name and the date must be on the form before the boat leaves the dock or the seine is laid out. The person in charge must be present when fishing takes place.

VI. Transporting and Holding Freshwater Fishes

Authority: Ohio Revised Code Chapter 1533, Sections: 31, 301
Ohio Wildlife Order 1501-31-3, Section:08

A. Fish Transportation
1. A permit is required to transport fish which are for sale, sold or purchased, except a person hauling fish through the state, a licensed commercial fisherman, a licensed fish wholesaler, a licensed minnow dealer or if the weight of fish is no greater than 500 pounds in one vehicle.
2. Transported fish must be in a container with a label indicating the species, weight, consigner, consignee, point of billing and destination. If not in a container the same information must be on a written statement carried in the vehicle for each compartment in which fish are contained.
3. When hauling fish the word "FISH" must be printed on both sides of the vehicle in 8-inch high letters.

B. Fish Hold Devices
1. Fish in live-holding devices must be taken to the licensee's docking area on the day they were caught and remain there until emptied, or until the next operation of the seine.
2. The licensee's name must be on live-holding devices in 1-inch high letters.

VII. Notification of Trap Net Disposition

Authority: Ohio Revised Code Chapter 1533, Section:431
Ohio Wildlife Order 1501-31-3, Section:06

The Division of Wildlife must be notified in writing the location by grid number and subgrid letter, of each net and its number when it is being placed or removed. The notification must be postmarked no later than the day after the date of placement or removal.

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