

TENNESSEE VALLEY AUTHORITY

Office of Natural Resources and Economic Development  
Division of Air and Water Resources

CHICKAMAUGA RESERVOIR 1987 FISHERIES MONITORING,  
COVE ROTENONE RESULTS

May 1988

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Office of Natural Resources and Economic Development  
Division of Services and Field Operations  
Chattanooga, Tennessee

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COVE ROTENONE RESULTS

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## 1.0 INTRODUCTION

### 1.1 Purpose and History

TVA is required by its National Pollutant Discharge Elimination System (NPDES) Permit for Sequoyah Nuclear Plant (SQN) to conduct and report annually on operational nonradiological monitoring to evaluate potential effects of SQN on Chickamauga Reservoir. The monitoring program was initially designed to identify major changes in water quality and biological communities in Chickamauga Reservoir resulting from operation of SQN. Results of monitoring conducted in 1980-1986 (reported in TVA, 1982, 1983a, 1984, 1985, 1986b, and 1987) identified few significant changes in Chickamauga Reservoir considered to be related to operation of SQN. Based on absence of plant-induced effects and fulfillment of the minimum period required by the NPDES permit, some components of the program were recommended to be terminated and others recommended to be continued (some with specific alterations).

Cove rotenone studies were continued because they remain the best overall fish sampling method for determining reservoir-wide quantitative and qualitative changes in fish populations. The cove rotenone studies conducted on Chickamauga Reservoir as part of SQN monitoring are also conducted as part of the monitoring program for WBN. These studies will be useful in evaluating the combined effects of operating both nuclear facilities on the reservoir, once both plants become operational.

The purpose of this report is to present results of cove rotenone studies conducted on Chickamauga Reservoir in 1987. SQN began

operation in 1980 but was taken offline in August 1985. SQN continued offline throughout the period reported here. WBN is under construction with operation not expected until the 1990s.

### 1.2 Watts Bar Nuclear Plant

Watts Bar Nuclear Plant is under construction on the west bank of Chickamauga Reservoir near Tennessee River Mile (TRM) 528.0 (figure 1-1). This two-unit nuclear generating plant is designed for an electrical output of about 2,540 megawatts (MWe). WBN is situated approximately two miles downstream of Watts Bar Dam (TRM 529.9) and one mile downstream from the four-unit Watts Bar Fossil Plant (WBF) that is also on the west bank of Chickamauga Reservoir (TRM 529). WBF has not operated since 1981 and was decommissioned on March 29, 1983.

WBN will be operated in closed cycle cooling mode, using two natural draft cooling towers for heat dissipation. Blowdown from the cooling towers will be discharged through multiport diffusers located in the main channel at TRM 527.8. Makeup water and other water supply requirements will be pumped from an intake channel located at TRM 528.0. Maximum intake pumping flowrate is approximately  $4.5 \text{ m}^3/(160 \text{ cfs})$ , which represents about 0.6 percent of the long-term average flow past WBN of  $767 \text{ m}^3/\text{s}$  (27,100 cfs).

### 1.3 Sequoyah Nuclear Plant

Sequoyah Nuclear Plant is about 29 km (18 mi) northeast of Chattanooga, Tennessee, on the west shore of Chickamauga Reservoir at TRM 484.5 (figure 1-1). It has two pressurized water reactors with a total

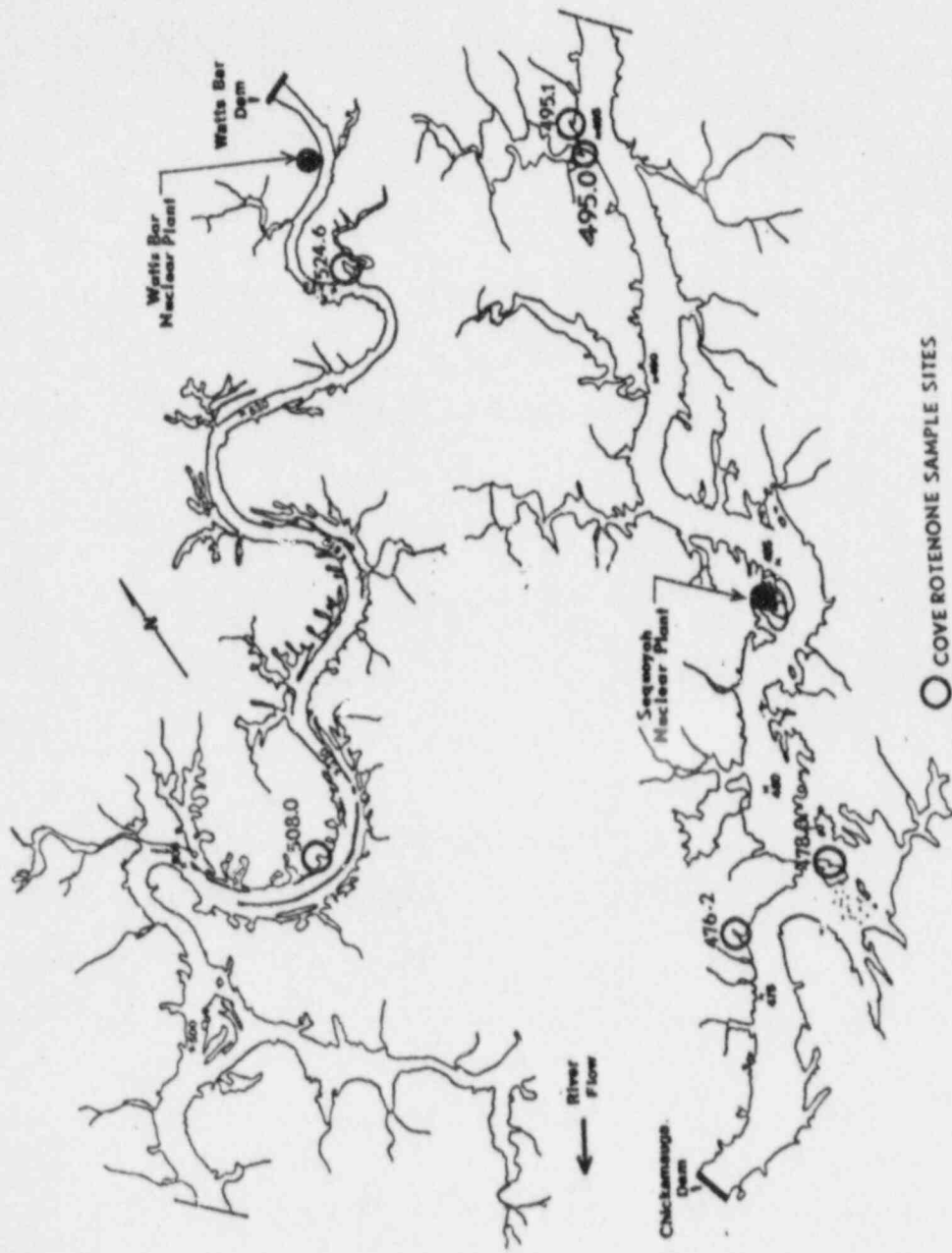


Figure 1-1. Location of Cove Rotenone Sample Sites in Chickamauga Reservoir, 1970 through 1987.

nameplate rating of 2,441 MWe. The plant was initially designed in the mid-1960s to use open mode (once-through) cooling to comply with then existing thermal criteria. More stringent thermal criteria were proposed by the State of Tennessee and approved by EPA in 1972. To meet the more stringent criteria, natural draft cooling towers were constructed to enable the plant to operate in open, helper, or closed modes.

Condenser cooling water (CCW) is withdrawn from lower strata of Chickamauga Reservoir under a deep skimmer wall. The skimmer wall has an opening length of 165 m, an opening height of approximately 3 m, and is situated near the river channel where water depth is approximately 13 m. Because of the deep opening of the skimmer wall, water temperature in the intake channel may be lower than reservoir surface water temperature.

Water leaving the condensers can be routed in one of three ways: (1) to the diffuser pond and out the diffuser pipes (open mode); (2) through the cooling towers, then to the diffuser pond and out diffuser pipes (helper mode); or (3) through the cooling towers and recirculated to the intake (closed mode) with only blowdown discharged through the diffuser pipes.

An underwater dam crosses the river channel approximately 75 m upstream from the diffuser. This dam "impounds" cooler water in lower strata of the reservoir near the plant, making this water available for plant intake. The dam is about 25 m wide by 275 m long with the crest at elevation 199.3 m msl.

#### 1.4 Reservoir Description

Chickamauga Reservoir is formed by Chickamauga Dam, situated at TRM 471.0. Water elevation normally varies from 205.7 m (675 ft.) msl in winter to 208.0 m (682.5 ft.) msl in summer. At elevation 208 m msl, the reservoir is 94.8 km (58.9 mi) long on the Tennessee River and extends 51.5 km (31 mi) up the Hiwassee River. Water depth is approximately 5 m at WBN, 15 m at SQN, and 20 m near Chickamauga Dam. The reservoir volume is  $465 \times 10^6 \text{ m}^3$  ( $375 \times 10^3$  acre feet) at elevation 205.7 m during winter ;  $735 \times 10^6 \text{ m}^3$  ( $600 \times 10^3$  acre feet) at elevation 208 m during summer. Mean annual travel time through the reservoir is approximately seven days. Monthly average travel times range between four days (February) and 11 days (May).

Average streamflows in Chickamauga Reservoir can be segmented into three regions as follows: (1) upstream of the Hiwassee River confluence, where Chickamauga Reservoir volume is  $160 \times 10^6 \text{ m}^3$  at elevation 208 m (22 percent of total); (2) the Hiwassee segment of the reservoir which has a volume of  $50 \times 10^6 \text{ m}^3$  (7 percent of total); and (3) the downstream segment from Hiwassee River confluence to Chickamauga Dam with a volume of  $525 \times 10^6 \text{ m}^3$  (71 percent of total). According to current operating guidelines which have been in effect since July 22, 1975, TVA attempts to maintain a minimum daily average discharge of  $170 \text{ m}^3/\text{s}$  (6,000 cfs) from Chickamauga Reservoir.

#### 2.0 MATERIALS AND METHODS

Cove rotenone sampling is a quantitative, active sampling method. Fish in a cove are isolated from the reservoir by a block net. Toxicant



(rotenone) is then applied and all fish are collected, yielding quantitative estimates of fish populations in coves. These estimates are not necessarily equivalent to standing stocks in the entire reservoir, nor are they true population estimates because fish species are not distributed evenly throughout the reservoir. Effective estimates are possible for species which orient more toward shoreline or structure than open water habitat during all or part of their life cycle. Considering these limitations, cove rotenone sampling is the best overall quantitative method for estimates of relative abundance of many fish species in southeastern reservoirs. As such, rotenone data are useful in providing estimates of reproductive success, year-class strengths, and fish stock sizes in a given year and in determining long-term trends in these parameters for various species in a reservoir.

Fish sampling with rotenone was initiated in Chickamauga Reservoir in 1947 to determine standing stock (numbers/ha and kg/ha) of game, prey, and commercial fish species. Samples were taken at various locations, primarily in coves, annually through 1959 (except for 1948 and 1953). In addition to standing stock information, these data provided species occurrence and composition information and characterized the fish community of the reservoir. Sampling was discontinued after 1959, but was resumed in 1970 to collect preoperational data for monitoring possible impacts from the operation of SQN.

Rotenone sampling procedures in TVA were standardized after 1960 to include use of block nets and standard survey techniques. Sampling in Chickamauga Reservoir from 1947 through 1959 was characterized by the

use of varying techniques for determining area and volume of the sample site and varying or undescribed sampling and subsampling techniques.

## 2.1 Field

Cove rotenone sampling since 1970 was designed to eliminate certain biases through establishment of criteria for sample sites and standardization of field techniques. Criteria for an acceptable rotenone site are: (1) surface area at least 0.4 ha; (2) depth not more than 7.5 m where block net is set; (3) location not adjacent to or within the same cove as housing developments, boat docks, or other recreation areas; (4) absence of sensitive habitats; and (5) easy access by boat. Some changes in cove sites were made after 1970; however, from 1980 to 1986 the same five coves were sampled each year in Chickamauga Reservoir. These coves were located at TRM 476.2, 478.0, 495.0, 508.0, and 524.6. Because of housing development in the area, the cove at TRM 495.0 was permanently replaced by another cove at TRM 495.1 prior to the 1987 sampling period. Descriptions of sample sites (1947-1987) are in table 2-1.

Standardized field techniques for rotenone sampling (TVA, 1983) include: (1) sampling when water temperature is  $>20^{\circ}\text{C}$ ; (2) accurate surveying of surface area one day prior to conducting sample; (3) block net set on the afternoon prior to sampling; (4) scuba diver check of block net to ensure isolation of sample area; (5) determination of certain water quality and depth parameters in the sample area; (6) application of rotenone to attain a 1.0 mg/L concentration of toxicant; (7) pickup of all visible fish on two consecutive days; and

(8) specified sorting, counting, weighing, subsampling, and data recording procedures.

Mean depth (obtained through a systematic series of depth soundings) and surface area were used to determine the volume of the cove, and thereby the amount of toxicant necessary to achieve a concentration of 1.0 mg/L.

Rotenone was applied with a pump using a weighted, perforated hose to distribute the toxicant evenly at all depths. Initially, a curtain of rotenone was applied adjacent to the block net to prevent small fish from escaping. Following this, rotenone was distributed by operating the boat in a zigzag pattern throughout the cove. Finally, shallow shoreline areas were surface-sprayed with rotenone to ensure complete coverage. Visible fish were picked up the day of application and sorted by species. Each species was then sorted into groups by 25 mm length increments. Small fish (e.g., Notropis sp.) that were not readily identifiable in the field were preserved in 10 percent formalin and sent to the laboratory for identification. Each size group was counted and the aggregate weight recorded. Occasionally, some length groups were so numerous that it was not practical to count each fish. In those cases, a subsample of that length group was counted and weighed. The remainder of the size class was then weighed collectively and numbers estimated by the relationship:

$$\begin{array}{rclclcl} \text{Numbers in} & & \text{Weight of} & = & \text{Numbers in} & & \text{Weight of} \\ \text{subsample} & : & \text{subsample} & & \text{remainder} & : & \text{remainder} \end{array}$$

Since 1982, a modified subsampling procedure has been used to process large numbers of young centrarchids (Lepomis sp.). Small centrarchids (<76 mm total length) were separated from the remaining cove sample, and a one kg subsample was processed. Fish in the subsample were sorted to species, separated into 25 mm length groups, then counted and weighed. The remainder of the sample was weighed collectively. Numbers of each species and size group were then determined by using a relationship similar to that described above. Fish collected the second day were processed in the same way, except that numbers only were recorded for each size class of each species. Weights of second-day fish were calculated from length-weight relationships derived from first-day fish. Rotenone procedures may be reviewed in more detail in the Field Operations Biological Resources Procedures Manual (TVA, 1983).

## 2.2 Data Analyses

Standing stocks of each species were calculated by size class. Fish were grouped into game, commercial, and prey species and classified as young, intermediate and adults, based on total length. Standing stocks of young, intermediate, and adult size classes of important species were analyzed using a linear regression model to determine statistically significant trends over the period 1970 through 1987.

Important species were determined by using the following criteria:

1. Must occur in at least 50 percent of samples since 1970; and
2. Must comprise one percent of either the total number or total biomass collected.

In addition to species meeting the above criteria, certain species of special interest were included for analysis because of their importance as sport or commercial species. For each important species, or species of special interest, Kruskal-Wallis rank sums analyses as modified by Dunn (Hollander and Wolfe, 1973) were used to determine significant standing stock differences among three areas of Chickamauga Reservoir for the period from 1970 through 1987. Areas of the reservoir were defined as: (1) downstream area (TRM 471.0 to TRM 484.5), two coves; (2) middle area (TRM 484.5 to TRM 500.0), one cove; and (3) upstream area (TRM 500.0 to 529.9), two coves.

### 2.3 Results and Discussion

In 1987, 37 species representing 12 families were collected in cove rotenone samples in Chickamauga Reservoir (table 2-3). All species collected in 1987 previously had occurred in cove rotenone samples from 1970 through 1986 in this reservoir (table 2-4). Numerically, bluegill was the most abundant species (31 percent), followed by threadfin shad (27 percent), gizzard shad (20 percent), and redear sunfish (12 percent) (table 2-3). Gizzard shad comprised 57 percent of the total biomass sampled, whereas biomass of bluegill, threadfin shad, and redear sunfish were 11 percent, five percent, and three percent, respectively. Freshwater drum made up about six percent of the biomass, but comprised only 0.5 percent of the total number.

Total standing stock of young, intermediate, and harvestable size classes of fish in Chickamauga Reservoir in 1987 was 46,644 fish/ha, with a biomass of 350.7 kg/ha (table 2-5). Young-of-year fish

represented 93 percent of standing stock by number and 26 percent of the biomass. Harvestable and intermediate size fish comprised 67 percent and eight percent of the biomass, and four percent and three percent of the number, respectively.

Forage species dominated biomass again in 1987 (228 kg/ha, 65 percent, table 2-6). Game and commercial fish comprised about 21 percent (75 kg/ha) and 14 percent (48 kg/ha) of the biomass, respectively. Forty four percent of the fish population by number were young-of-year game fish, primarily bluegill, redear sunfish, warmouth, and longear sunfish. These four young-of-year fish species comprised 7.9 percent of the total biomass. Threadfin shad and gizzard shad young-of-year comprised 45 percent of the fish population by number and 14.6 percent of the total biomass.

Cove rotenone samples in Chickamauga Reservoir from 1970 through 1987 yielded 71 species belonging to 15 families (table 2-4). Bluegill was the predominant species, comprising 40 percent of the total number of fish collected (table 2-7). Only three species (gizzard shad, bluegill and freshwater drum) were present in all cove samples from 1970 through 1987 (table 2-7). Gizzard shad has comprised 46 percent of the total biomass in Chickamauga Reservoir cove rotenone samples from 1970 through 1987.

Numbers of young-of-year fish were highest in 1981, and biomass of harvestable fish were highest in 1983, 1984, and 1985 (table 2-5). The highest biomass for young-of-year fish also occurred in 1985.

Table 2-6 shows a general increase in numbers and biomass of game fish from 1970 through 1983, with no distinct trend for either commercial or forage fish groups. Game fish biomass remained relatively stable from 1977 through 1987, except for an unusually high peak in 1981.

Detailed presentation of spatial and temporal data from Chickamauga Reservoir cove rotenone samples during 1970 through 1986 are in Appendices A through F. These include mean numbers (A) and biomass (B) per hectare by species for each cove sampled; percentage composition (no./ha) by species and cove (C); percentage occurrence by species and cove (D); mean annual number (E) and biomass (F) per hectare for all coves combined.

#### Important Species

Nineteen species were classified as important or of special interest in cove rotenone samples from 1970 through 1987 (table 2-7). Results of linear regression analyses (table 2-8) and numerical abundance and biomass of young, intermediate, and adult size classes of each species through time are discussed below. Spatial differences among the three areas of the reservoir (tables 2-9 and 2-10) are also discussed.

Gizzard Shad--Adult gizzard shad biomass was highest in 1984 and showed a gradual decline through 1987 (table 2-13). However, from 1970 through 1987 no statistically significant trends were found for either numbers or biomass of adult gizzard shad in Chickamauga Reservoir. Number and biomass of young-of-year gizzard shad (table 2-8) continued

to show a significant increasing trend, approaching 7800/ha and 33 kg/ha, respectively, in 1987.

Spatial distribution analyses during monitoring (1970-1987) indicated greater numerical abundance in the upstream area of Chickamauga Reservoir than in either middle or downstream areas (table 2-9). Statistically significant differences in biomass were not found between the three areas during rotenone monitoring operations.

Threadfin Shad--Over the period 1970 through 1987, numbers and biomass of young-of-year threadfin shad showed wide variation. Extremely cold winters in 1977-78, 1978-79, and 1983-84 were apparently contributors to declines observed during these periods. Threadfin shad frequently experience extensive winter kill during severely cold weather. Following an abrupt increase in biomass in 1985 (92 kg/ha), standing stocks in 1986 were nearnormal levels (9 kg/ha) while 1987 shows an increase (18 kg/ha) over the previous year. No significant differences in numbers or biomass were found among the three areas of Chickamauga Reservoir during monitoring. Estimated numbers of threadfin shad in 1986 were about 5000/ha compared to about 12,000/ha in 1987 (table 2-14).

Although other environmental/compensatory mechanisms may have influenced the dramatic increase in threadfin shad in 1985, more open water along shorelines and coves in 1985 than in other recent years likely contributed to the record high stock estimate of this species. Increased open water habitat was the direct result of an experimental



summer drawdown of Chickamauga approximately one month before cove areas were sampled. Houser and Bryant (1968) indicated that in the absence of aquatic weeds, cove standing stocks of threadfin shad were equal to open water stocks in two Arkansas reservoirs. The strong resurgence of aquatic weeds in 1986 apparently restricted threadfin shad from reservoir cove areas. Coves on Chickamauga have been sprayed at least once each year for weed control prior to the rotenone surveys since 1982. Beginning in 1985, coves were sprayed twice each year because a single spraying did not always result in adequate weed control. This procedure was notably more successful in eliminating weeds in 1985 and 1987 than in 1986.

Carp--Young-of-year carp increased significantly (both numbers and biomass) in Chickamauga Reservoir over the period of study (1970 through 1987), but no statistically significant trend was observed for numbers or biomass of intermediate or adult carp (table 2-8). In previous analyses (TVA, 1978; 1980), no significant trends were observed. However, in these reports it was noted that cove rotenone probably does not provide a representative sample of smaller size classes of this species (table 2-15), and statistically significant increasing or decreasing trends should be qualified.

Both numbers (table 2-9) and biomass (table 2-10) of carp were significantly higher in the upstream portion of Chickamauga Reservoir (TRM 500 to TRM 529.9) than in the other two areas during monitoring (table 2-9).

Bullhead Minnow--Bullhead minnow occurrence prior to 1971 was sporadic, but this observation may have been due to misidentification of this species. Results of linear regression analyses show that numbers of bullhead minnows have exhibited a significant increase (table 2-8). In 1985 and 1986 (TVA, 1986a; 1987), this species comprised 2.44 percent and 0.71 percent, respectively, of the total number of fish in cove rotenone samples. In 1987, this figure dropped to 0.10 percent (table 2-3). Table 2-16 shows numbers and biomass per hectare of each size group for this species in cove rotenone samples. No significant differences in standing stocks were found among the three areas of the reservoir during monitoring studies.

Smallmouth Buffalo--Over the period 1970 through 1986, both numbers and biomass of intermediate and adult size classes of this species have declined significantly (table 2-8). However, total numbers (40/ha) of smallmouth buffalo increased in 1983 and were similar to levels observed in 1971 and 1972 (table 2-17). No significant differences in standing stocks (numbers and biomass) of this species among the three areas of Chickamauga Reservoir have been observed.

Spotted Sucker--Biomass and numbers of young-of-year spotted sucker show a significant decreasing trend (table 2-8). Spotted sucker was not identified in rotenone samples in Chickamauga Reservoir prior to 1959. As noted in a previous report (TVA, 1982), this species may have ended an expansion phase in Chickamauga about 1979. However, after total biomass increased slightly in 1985, it decreased in 1986 and again in 1987 to the lowest level since 1970, when monitoring studies

were first conducted (table 2-18). The numbers were significantly greater in the upper area than in the lower area (table 2-9).

Channel Catfish--In 1987, total number of this species was found to be at its lowest level since starting the rotenone monitoring program. A declining trend (both numbers and biomass) (table 2-8) was also noted for intermediate size channel catfish in previous reports (TVA, 1978; 1980; and 1983a). Except for 1981, estimated total biomass of channel catfish has been less than 15 kg/ha (Table 2-19). No significant differences were noted among the three reservoir areas during the period from 1970 until 1987.

Flathead Catfish--Total biomass estimates for flathead catfish since 1970 have seldom exceeded 1.0 kg/ha, except for 1972, 1973, and 1974 (table 2-20). Through 1983, no significant trend for biomass or numbers of any size class of this species was determined, but in 1984 no fish of this species were collected, indicating a significant decline. Since 1983, no intermediate flathead catfish have been collected. A declining trend in numbers of young-of-year, intermediate and adult fish is shown (table 2-8), along with a decline in biomass of intermediate and adult fish. Although few were collected, numbers and biomass of this species were highest in the reservoir midsection during monitoring studies conducted from 1970 through 1987 (table 2-9 and 2-10).

White Bass--Total numbers and biomass of white bass in 1987 showed a significant decline when compared to 1985 and 1985 data (table 2-21).

Young white bass, absent in 1983 and 1984 samples, recovered strongly in 1985 and 1986 when biomass was higher than that observed in any other year since monitoring began. However, in 1987 young white bass showed a drop in both number and biomass from the previous two years and young-of-year numbers showed a significant decreasing trend from 1970 through 1987 (table 2-8). Intermediate size white bass numbers and biomass had increased dramatically in 1986 (172/ha and 12 kg/ha, respectively), but showed a substantial drop in 1987. No significant stock differences were found among the three reservoir areas since rotenone monitoring began in 1970.

Yellow Bass--All size classes of this species have increased significantly (both numbers and biomass) since 1970 (table 2-8). Because yellow bass did not meet criteria for important species in the preoperational analyses for SQN, this trend was first documented in the WBN preoperational monitoring report (TVA, 1980). Total biomass for this species was highest (10 kg/ha) in 1981, and total numbers were highest (276/ha) in 1982 (table 2-22). During rotenone monitoring (1970-1987), significant differences were noted between upper and middle areas of the reservoir, with the upper area supporting greater numbers (table 2-9).

Warmouth--Warmouth did not meet criteria for "important species" status when analyses were made on the SQN preoperational studies (TVA, 1978b). Subsequent data analyses for the WBN preoperational report (1970-79) showed warmouth abundance had increased to meet these criteria. Linear regression analyses show that numbers and biomass for

all size groups of this species exhibited a significant increasing trend from 1970 through 1987 (table 2-8). Number and biomass (down in 1985) increased in 1986 and 1987, and for seven of the past eight years, total numbers have exceeded 1,000/ha (table 2-23). No significant differences in numbers or biomass were found among the three areas of the reservoir during rotenone studies conducted from 1970 through 1987.

Bluegill--Numbers and biomass of young-of-year of this species have increased significantly through time (table 2-8). Estimated total biomass for this species has been in the range of 20-40 kg/ha (table 2-24) for 12 of the 18 years that rotenone studies have been conducted on the reservoir. Significant differences were found among the three areas of the reservoir since rotenone monitoring began in 1970. Numbers were significantly lower in the upper area than either the downstream and middle areas. Biomass was significantly lower in the upper area than in the downstream area.

Longear Sunfish--No significant trends were observed for this species. Total numbers and biomass has not exceeded 5 kg/ha for the 1970-87 period (table 2-25). Previous analyses (TVA, 1978; 1980) showed increases for young and intermediate sizes, although adults exhibited no trend. Both numbers and biomass of this species were significantly lower upstream than in either of the other two reservoir areas for the rotenone sample period (1970-87).

Redear Sunfish--This species has exceeded 12 percent and 3 percent, respectively, of the number and biomass of all fishes collected in 18 years of rotenone sampling (table 2-7). As in previous analyses, biomass and numbers of young and intermediate redear sunfish showed a significant increasing trend (table 2-8). This general increasing trend is probably related to increased aquatic macrophytes in Chickamauga Reservoir. Zone comparisons did not show any significant differences among the three areas of the reservoir.

Largemouth Bass--This species has occurred in 99 percent of all rotenone samples since 1970 and has made up over one percent of the number and three percent of the biomass of all fish collected during this period (table 2-7). The significant increasing trend in biomass of young-of-year and numbers of intermediates documented from 1984 through 1986 continued in 1987 (table 2-8). A significant increasing trend for numbers and biomass of adults was documented through 1985, but this trend has not been evident the past two years. Total biomass increased from 5 kg/ha in 1986, (the lowest since 1974) to over 11 kg/ha in 1987 (table 2-27). There are significantly fewer largemouth bass in the upper area of the reservoir than in the middle and downstream areas (table 2-9). No significant zone differences were noted for biomass of this species. Abundance of all size classes of largemouth bass may be directly related to increases in young bluegill and other sunfish, as well as to aquatic macrophyte coverage. In 1986, deteriorating water quality in backwater cove areas due to drought conditions may have contributed to reduced largemouth bass stocks in coves; however, these stocks appeared to have recovered in 1987.

White Crappie--No adult white crappie were collected in cove rotenone samples in 1987 (table 2-28). A declining trend in numbers and biomass of adults had been previously reported (TVA, 1978b), and that trend continues through 1987 (table 2-8). Biomass of the intermediate size class also continued to show a decreasing trend through 1987 (table 2-28). No long-term trends were detected for either numbers or biomass of young white crappie; however, young white crappie increased dramatically in 1987 to much higher levels than previously seen. Since 1970, total biomass of white crappie as estimated by cove rotenone samples, has not exceeded 5 kg/ha and has shown a gradual drop (table 2-28). White crappie were significantly more abundant in the upstream and middle areas of Chickamauga Reservoir than in the downstream area. Biomass was significantly larger in the upstream area than the downstream area of the reservoir (table 2-10).

Sauger--No sauger were collected in Chickamauga Reservoir cove rotenone samples from 1980 through 1984, or in 1987 (table 2-29). No significant differences were found among the three areas of the reservoir during preoperational or operational monitoring.

Yellow Perch--This species apparently became established in Chickamauga Reservoir some time after 1959. Young yellow perch first appeared in cove rotenone samples in 1970. Numbers of adults have shown a statistically significant increase (table 2-8) since rotenone studies began in 1970 (table 2-30). Since 1970, yellow perch appeared in 77 percent of the 92 rotenone samples. Most recent results confirm that this species has become established in Chickamauga Reservoir and

the population is expanding. although total biomass has not exceeded 5 kg/ha (table 2-30). During rotenone monitoring, both biomass and numbers were higher in the middle and downstream areas than in the upstream area (tables 2-9 and 2-10).

Freshwater Drum--Linear regression analyses (1970 through 1987) revealed neither significant increasing nor decreasing trends in adult stocks (table 2-8). Similar analyses revealed that both numbers and biomass of young and intermediate size freshwater drum have declined in Chickamauga Reservoir. Mean annual numbers and biomass (table 2-31) show a possible cyclic pattern for these two size groups; stocks were high in the early- to mid-1970s, decreased through the late 1970s and early 1980s, and subsequently increased through 1985 with a decrease in 1986 and 1987. Young-of-year numbers in 1985 were the highest since 1973, while intermediate numbers in 1985 were the highest since 1977. Total numbers (all sizes combined) of freshwater drum in 1986 were the lowest observed since 1970, although numbers recovered in 1987. In zone comparisons (tables 2-9 and 2-10) numbers and biomass were observed to be higher in the upper area than either the middle or downstream areas.

#### 2.4 Summary

Changes and trends have been noted among the various fish species ranked dominant and/or important in Chickamauga Reservoir, but total fish biomass has remained relatively stable. Some species (e.g., flathead catfish, sauger and white crappie) that have shown decreases in numbers and/or biomass for one or more size classes are those for



which cove rotenone often does not provide a representative sample. On the other hand, species that have shown increasing trends (e.g., bluegill, gizzard shad, and largemouth bass) are those for which cove rotenone usually provides better estimates of relative abundances.

The overriding influence on standing stock estimates for many of the important fish species in Chickamauga Reservoir appears to be associated with habitat alteration, specifically the seven-fold increase in area occupied by aquatic vegetation since 1976. This has resulted in higher standing stock estimates for various centrarchids, particularly warmouth, redear sunfish, bluegill, and largemouth bass. Whether aquatic vegetation has resulted in a decrease in biomass or numbers of some fish species (e.g., threadfin shad, smallmouth buffalo, white crappie, white bass, and freshwater drum) is not clear. The experimental summer drawdown of Chickamauga Reservoir in 1985 produced conditions that support previous assumptions regarding avoidance of densely vegetated coves by freshwater drum and threadfin shad. This premise was further supported in 1986 with the return of aquatic macrophytes in cove areas and corresponding decreases of freshwater drum and threadfin shad standing stocks in cove rotenone surveys.

### 3.0 CONCLUSIONS AND RECOMMENDATIONS

Based on cove rotenone sampling from 1970 through 1987, total fish biomass in Chickamauga Reservoir has remained relatively stable. Although changes in species abundance have been documented, these changes appear related to aquatic macrophyte increases rather than to

operation of SQN. WBN had not gone into operation as of the 1987 sampling.

Fish sampling using rotenone in coves should continue as presently being conducted, with two exceptions. Sampling should be discontinued at the uppermost cove in Chickamauga Reservoir (Sewee Creek). It is questionable whether data from this location are representative of reservoir fish populations because the sample area is entirely within the drawdown zone of Chickamauga Reservoir precluding establishment of a resident community. Also, because year-to-year variability is relatively small, sampling should be conducted on alternate years rather than annually until both SQN and WBN are operational.

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APPENDIX A. MEAN ANNUAL NUMBER PER HECTARE OF EACH FISH SPECIES COLLECTED IN COVE ROTENONE SAMPLES FROM CHICKAMAUGA RESERVOIR, 1970-87

SPECIES	TRM 475.2 (1 Sample Collected)	TRM 475.7 (7 Samples Collected)	TRM 476.2 (11 Samples Collected)	TRM 478.0 (18 Samples Collected)	TRM 484.7 (1 Sample Collected)	TRM 492.6 (1 Sample Collected)	TRM 495.0 (17 Samples Collected)	TRM 0.1 (1 Sample Collected)	TRM 1.2 (1 Sample Collected)
Chestnut lamprey	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00
Paddlefish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Spotted gar	0.00	3.12	2.49	2.22	0.00	0.00	1.18	4.65	0.00
Longnose gar	2.22	0.87	5.06	0.94	0.00	14.29	2.51	0.00	0.00
Shortnose gar	0.00	0.00	0.00	0.13	0.00	0.00	0.00	13.95	0.00
Skipjack herring	0.00	1.90	3.18	6.74	0.00	17.86	8.66	0.00	10.91
Unidentified shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gizzard shad	5,981.11	732.33	3,940.15	2,234.83	832.65	585.71	2,738.60	20,790.70	758.18
Threadfin shad	1,286.67	2,895.48	10,268.35	3,174.05	277.55	2,875.00	3,721.47	13,781.40	427.27
Mixed shad	0.00	558.75	0.00	9.14	0.00	0.00	0.00	0.00	0.00
Mooneye	0.00	0.32	0.00	0.10	0.00	0.00	0.13	0.00	3.64
Minnow, carp	0.00	26.19	0.00	8.43	0.00	0.00	46.76	0.00	0.00
Central stoneroller	0.00	0.27	0.31	1.16	0.00	0.00	5.99	0.00	0.00
Goldfish	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00
Carp	0.00	13.58	18.15	8.94	4.08	0.00	6.68	0.00	1.82
Silver chub	0.00	0.48	0.00	0.52	0.00	0.00	1.77	0.00	0.00
Golden shiner	0.00	20.91	329.44	177.75	0.00	0.00	478.23	2,213.95	0.00
Unidentified shiner	0.00	0.00	0.65	0.29	0.00	0.00	13.83	0.00	0.00
Emerald shiner	0.00	66.54	1,107.97	154.85	0.00	0.00	166.71	104.65	0.00
Ghost shiner	0.00	0.00	0.43	0.25	0.00	0.00	1.37	0.00	0.00
Common shiner	0.00	0.00	0.00	3.17	0.00	0.00	11.12	0.00	0.00
Spotfin shiner	0.00	5.09	409.01	271.16	0.00	0.00	63.99	27.91	0.00
Mimic shiner	0.00	7.83	0.00	0.74	0.00	0.00	0.88	0.00	0.00
Steelcolor shiner	0.00	0.00	75.10	19.61	0.00	0.00	0.50	0.00	0.00
Pugnose minnow	0.00	0.21	0.22	3.28	0.00	0.00	5.79	2.33	0.00
Striped shiner	0.00	0.00	0.43	0.00	0.00	0.00	2.06	0.00	0.00
Unidentified minnow	0.00	35.03	0.00	89.40	0.00	0.00	0.00	0.00	0.00
Bluntnose minnow	0.00	53.07	0.00	87.35	0.00	0.00	126.50	0.00	0.00
Fathead minnow	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00

## APPENDIX A. Continued

SPECIES	TRM 475.2 (1 Sample Collected)	TRM 475.7 (7 Samples Collected)	TRM 476.2 (11 Samples Collected)	TRM 478.0 (18 Samples Collected)	TRM 484.7 (1 Sample Collected)	TRM 492.6 (1 Sample Collected)	TRM 495.0 (17 Samples Collected)	TRM 0.1 (1 Sample Collected)	TRM 1.2 (1 Sample Collected)
Bullhead minnow	0.00	393.05	194.94	1,230.71	0.00	0.00	419.95	86.05	0.00
River carp sucker	0.00	0.23	0.00	0.13	0.00	0.00	0.00	0.00	0.00
Quillback carp sucker	0.00	0.00	0.00	0.00	2.04	0.00	0.29	0.00	1.82
White sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00
Northern hog sucker	0.00	1.18	0.47	0.57	0.00	0.00	0.80	0.00	0.00
Unidentified buffalo	0.00	0.00	0.00	0.00	0.00	3.57	2.99	0.00	0.00
Smallmouth buffalo	63.33	15.29	2.42	8.84	34.69	0.00	9.15	0.00	14.55
Bigmouth buffalo	1.11	9.26	0.00	0.00	0.00	0.00	0.00	0.00	30.91
Black buffalo	0.00	0.11	0.00	0.00	2.04	0.00	0.00	0.00	0.00
Spotted sucker	1.11	31.54	4.72	13.55	0.00	175.00	19.08	2.33	1.82
Unidentified redborse	0.00	0.00	0.00	0.00	0.00	0.00	2.85	0.00	10.91
Shorthorn redborse	0.00	0.11	0.00	0.00	0.00	3.57	0.88	0.00	0.00
River redborse	0.00	0.11	0.00	0.06	0.00	0.00	0.13	0.00	0.00
Black redborse	0.00	0.31	0.00	0.00	0.00	32.14	3.29	0.00	0.00
Golden redborse	5.56	2.00	0.14	1.40	0.00	85.71	3.34	0.00	0.00
Blue catfish	0.00	0.00	0.42	1.43	0.00	0.00	0.36	0.00	10.91
Black bullhead	0.00	0.00	0.12	1.00	0.00	0.00	1.80	0.00	0.00
Yellow bullhead	0.00	0.00	3.03	1.78	0.00	0.00	24.78	462.79	0.00
Brown bullhead	0.00	0.00	11.47	3.21	0.00	0.00	0.40	74.42	0.00
Channel catfish	7.78	27.45	7.59	19.20	0.00	0.00	28.95	0.00	3.64
Flathead catfish	1.11	1.29	1.36	2.97	2.04	17.86	10.56	0.00	5.45
Killifish	0.00	0.00	0.00	0.00	0.00	0.00	36.37	0.00	0.00
Blackstripe topminnow	0.00	0.00	0.00	0.00	0.00	0.00	4.64	0.00	0.00
Blackspotted topminnow	0.00	1.13	0.00	1.68	0.00	0.00	10.54	0.00	0.00
Mosquitofish	0.00	0.15	4.55	2.36	0.00	0.00	10.42	200.00	0.00
Unidentified temperate bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
White bass	15.56	2.19	9.13	4.49	8.16	3.57	79.15	0.00	0.00
Yellow bass	0.00	51.68	53.89	133.76	0.00	0.00	45.22	6.98	0.00
Rock bass	0.00	0.00	0.00	1.09	2.04	0.00	0.00	0.00	0.00

## APPENDIX A. Continued

	TRM 475.2 (1 Sample Collected)	TRM 475.7 (7 Samples Collected)	TRM 476.2 (11 Samples Collected)	TRM 478.0 (18 Samples Collected)	TRM 484.7 (1 Sample Collected)	TRM 492.6 (1 Sample Collected)	TRM 495.0 (17 Samples Collected)	TRM 0.1 (1 Sample Collected)	TRM 1.2 (1 Sample Collected)
SPECIES									
Unidentified sunfish	0.00	45.62	0.70	7.17	0.00	0.00	0.63	0.00	0.00
Warmouth	0.00	7.63	853.81	793.49	0.00	35.71	1,592.14	5,201.92	32.73
Redbreast sunfish	0.00	7.99	803.22	165.05	0.00	0.00	784.60	2.33	0.00
Green sunfish	0.00	2.60	115.72	85.55	2.04	39.29	52.77	172.77	30.91
Orangespotted sunfish	0.00	0.11	0.00	1.19	0.00	0.00	0.67	0.00	0.00
Bluegill	642.22	3,472.44	16,482.99	20,932.80	487.76	596.43	14,870.44	38,138.86	2,647.27
Longear sunfish	81.11	484.50	612.53	848.42	110.20	167.86	432.08	2,709.69	0.00
Redear sunfish	27.78	73.59	8,572.95	5,772.09	2.04	7.14	3,961.85	4,872.11	23.64
Hybrid sunfish	0.00	0.64	0.00	0.00	0.00	0.00	0.25	0.00	0.00
Smallmouth bass	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00
Spotted bass	32.22	182.44	86.78	47.09	151.02	235.71	144.88	0.00	45.45
Largemouth bass	182.22	112.25	785.73	418.08	275.51	578.57	462.39	600.00	249.09
White crappie	1.11	41.59	18.68	44.40	4.08	3.57	87.89	918.60	16.36
Black crappie	0.00	1.68	4.60	4.45	0.00	10.71	2.49	0.00	0.00
Unidentified darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified darter	0.00	0.00	0.00	0.06	0.00	0.00	0.13	0.00	0.00
Mud darter	0.00	7.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rainbow darter	0.00	4.76	0.51	0.27	0.00	0.00	0.34	0.00	0.00
Stripetail darter	0.00	0.15	0.82	0.16	0.00	0.00	0.00	0.00	0.00
Orangethroat darter	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellow perch	34.44	21.04	110.54	67.13	6.12	82.14	217.36	39.53	0.00
Logperch	0.00	35.32	131.82	29.50	0.00	0.00	101.82	25.58	0.00
Sauger	0.00	0.26	0.19	0.43	0.00	0.00	3.13	0.00	3.64
Freshwater drum	194.44	349.02	133.67	183.17	177.55	317.86	209.00	132.56	192.73
Brook silverside	0.00	18.38	472.55	271.65	0.00	0.00	183.99	186.05	0.00
Mixed & unid minnows	1,168.89	177.06	29.54	217.46	522.45	332.14	174.23	497.67	394.55
TOTAL	9,730.00	10,005.91	45,672.55	37,673.42	2,904.08	6,221.43	31,404.24	91,269.77	4,918.18





APPENDIX A - PART TWO. (Continued)

	TRM 2.5 TRM 524.6 (1 Sample Collected)	TRM 3.5 (1 Sample Collected)	TRM 505.4 (1 Sample Collected)	TRM 506.0 (1 Sample Collected)	TRM 507.3 (17 Samples Collected)	TRM 508.0 (12 Samples Collected)
SPECIES						
Bullhead minnow	0.00	0.00	0.00	0.00	654.34	97.21
River carpsucker	0.00	0.00	0.00	0.00	1.68	0.00
Quillback carpsucker	0.00	0.00	0.00	0.00	0.00	1.30
White sucker	0.00	0.00	0.00	0.00	0.27	0.00
Northern hogsucker	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified buffalo	0.00	0.00	0.00	32.14	0.00	0.00
Smallmouth buffalo	51.04	42.03	72.22	0.00	11.08	26.62
Bigmouth buffalo	0.00	0.00	0.00	0.00	0.00	0.29
Black buffalo	0.00	0.00	0.00	0.00	0.14	0.19
Spotted sucker	21.87	8.70	5.56	0.00	120.58	10.03
Unidentified redborse	0.00	1.45	0.00	0.00	9.52	0.00
Shorthead redborse	0.00	0.00	0.00	0.00	0.00	0.00
River redborse	0.00	0.00	0.00	0.00	1.14	0.00
Black redborse	0.00	0.00	0.00	0.00	0.81	0.22
Golden redborse	7.29	0.00	0.00	7.14	12.45	1.48
Blue catfish	57.29	0.00	0.00	0.00	1.54	1.78
Black bullhead	0.00	0.00	0.00	0.00	3.10	4.26
Yellow bullhead	0.00	0.00	0.00	0.00	69.85	1.10
Brown bullhead	0.00	0.00	0.00	0.00	1.28	1.92
Channel catfish	17.71	44.93	16.67	10.71	28.86	18.08
Flathead catfish	3.12	4.35	0.00	3.57	2.28	0.76
Killifish	0.00	0.00	0.00	0.00	0.00	0.00
Blackstripe topminnow	0.00	0.00	0.00	0.00	7.66	0.00
Blackspotted topminnow	0.00	0.00	0.00	0.00	0.00	0.00
Mosquitofish	0.00	0.00	0.00	0.00	16.20	55.92
Unidentified temperate bass	0.00	0.00	0.00	0.00	0.27	0.00
White bass	26.04	43.48	38.89	307.14	4.94	21.96
Yellow bass	0.00	0.00	0.00	0.00	74.26	290
Rock bass	0.00	0.00	0.00	0.00	0.00	0

APPENDIX A - PART TWO. (Continued)

SPECIES	TRM 2.5 (1 Sample Collected)	TRM 3.5 (1 Sample Collected)	TRM 505.4 (1 Sample Collected)	TRM 506.0 (1 Sample Collected)	TRM 507.3 (1 Sample Collected)	TRM 508.0 (17 Samples Collected)	TRM 524.6 (12 Samples Collected)
Unidentified sunfish	0.00	0.00	0.00	0.00	0.00	4.65	0.00
Warmouth	22.92	20.29	5.56	3.57	29.63	1,278.20	217.12
Redbreast sunfish	0.00	0.00	0.00	0.00	0.00	161.59	1.79
Green sunfish	54.17	0.00	0.00	0.00	3.70	17.95	7.76
Orangespotted sunfish	10.42	2.90	16.67	3.57	7.41	11.43	0.00
Bluegill	4,467.71	3,539.13	1,372.22	832.14	1,133.33	7,304.17	810.87
Longear sunfish	0.00	0.00	0.00	10.71	0.00	14.63	0.38
Redear sunfish	32.29	68.12	38.89	42.86	66.67	2,049.83	98.40
Hybrid sunfish	0.00	0.00	0.00	0.00	0.00	0.37	0.00
Smallmouth bass	0.00	0.00	0.00	0.00	0.00	0.27	0.00
Spotted bass	23.96	5.80	111.11	128.57	233.33	88.07	13.08
Largemouth bass	360.42	230.43	155.56	407.14	359.26	319.58	45.73
White crappie	120.83	91.30	1,038.89	39.29	111.11	90.29	126.65
Black crappie	0.00	0.00	0.00	0.00	0.00	0.97	2.79
Unidentified darter	0.00	0.00	0.00	0.00	0.00	0.14	0.00
Unidentified darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mud darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rainbow darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stripetail darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Orangethroat darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellow perch	3.12	1.45	5.56	0.00	0.00	44.48	0.00
Logperch	0.00	0.00	0.00	0.00	0.00	37.26	0.19
Sauger	0.00	0.00	0.00	0.00	3.70	3.26	0.00
Freshwater drum	725.00	755.07	400.00	235.71	788.89	399.17	470.78
Brook silverside	0.00	0.00	0.00	0.00	0.00	30.09	21.45
Mixed & unid minnows	2,657.29	872.46	311.11	525.00	185.19	12.18	2.52
TOTAL	13,488.54	17,194.20	18,072.22	8,964.29	7,877.78	22,267.74	17,583.08



APPENDIX B. Continued

SPECIES	TRM 475.7 (1 Sample Collected)	TRM 476.2 (11 Samples Collected)	TRM 478.0 (18 Samples Collected)	TRM 484.7 (1 Sample Collected)	TRM 492.6 (1 Sample Collected)	TRM 495.0 (17 Samples Collected)	TRM 1.0 (1 Sample Collected)	TRM 1.2 (1 Sample Collected)
Bullhead minnow	0.00	0.21	9.98	0.00	0.00	0.43	0.03	0.00
River carpsucker	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Quillback carpsucker	0.00	0.00	0.00	2.41	0.00	0.30	0.00	1.87
White sucker	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
Northern hogsucker	0.00	0.09	0.07	0.00	0.00	0.11	0.00	0.00
Unidentified buffalo	0.00	0.00	0.00	0.00	6.07	4.75	0.00	0.00
Smallmouth buffalo	109.46	6.35	17.05	51.70	0.00	9.93	0.00	20.73
Bignmouth buffalo	4.26	0.00	0.00	0.00	0.00	0.00	0.00	54.21
Black buffalo	0.00	0.00	0.00	3.15	0.00	0.00	0.00	0.00
Spotted sucker	0.11	3.07	6.28	0.00	1.81	5.39	2.91	0.11
Unidentified redhorse	0.00	0.00	0.00	0.00	0.00	0.87	0.00	5.90
Snorthead redhorse	0.00	0.13	0.00	0.00	0.39	0.03	0.00	0.00
River redhorse	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00
Black redhorse	0.00	0.13	0.00	0.00	0.00	1.10	0.00	0.00
Golden redhorse	1.28	0.07	0.73	0.00	12.54	1.12	0.00	0.00
Blue catfish	0.00	0.27	0.78	0.00	19.99	0.24	0.00	9.86
Black bullhead	0.00	0.01	0.00	0.00	0.00	0.08	0.00	0.00
Yellow bullhead	0.00	0.02	0.06	0.00	0.00	0.16	5.03	0.00
Brown bullhead	0.00	0.07	0.01	0.00	0.00	0.00	0.27	0.00
Channel catfish	0.75	6.15	8.99	0.00	0.00	11.38	0.00	1.02
Flathead catfish	1.11	0.27	0.44	0.46	0.06	0.84	0.40	0.65
Killifish	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00
Blackstripe topminnow	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00
Blackspotted topminnow	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Mosquitofish	0.00	0.00	0.00	0.00	0.00	0.01	0.20	0.00
Unidentified temperate bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
White bass	0.12	0.01	0.72	0.02	0.00	4.12	0.00	0.00
Yellow bass	0.00	1.95	4.81	0.00	0.00	2.09	0.44	0.00

## APPENDIX B. Continued

SPECIES	TRM 475.2 (1 Sample Collected)	TRM 475.7 (1 Sample Collected)	TRM 476.2 (11 Samples Collected)	TRM 478.0 (18 Samples Collected)	TRM 484.7 (1 Sample Collected)	TRM 492.6 (1 Sample Collected)	TRM 495.0 (17 Samples Collected)	TRM 1.0 (1 Sample Collected)	TRM 1.2 (1 Sample Collected)
Rock bass	0.00	0.00	0.00	0.01	0.19	0.00	0.00	0.00	0.00
Unidentified sunfish	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Warmouth	0.00	0.35	2.91	2.51	0.00	0.39	3.01	13.31	0.15
Redbreast sunfish	0.00	0.02	1.07	0.16	0.00	0.00	0.86	0.03	0.00
Green sunfish	0.00	0.03	0.39	0.47	0.01	0.60	0.13	0.79	0.63
Orangespotted sunfish	0.00	0.00	9.00	0.01	0.00	0.00	0.00	0.00	0.00
Bluegill	8.13	21.46	39.91	43.75	4.18	9.98	29.32	63.58	9.47
Longear sunfish	1.00	3.67	3.25	3.08	1.46	2.18	2.51	4.65	0.00
Redear sunfish	2.77	4.84	13.24	13.11	0.09	1.07	13.64	8.76	1.89
Hybrid sunfish	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Smallmouth bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Spotted bass	0.24	1.52	0.62	0.58	1.10	0.90	0.80	0.00	0.16
Largemouth bass	4.15	4.65	13.50	12.50	9.38	2.13	8.31	24.04	2.35
White crappie	0.00	1.43	0.53	1.02	0.68	0.00	1.67	2.24	1.17
Black crappie	0.00	0.13	0.11	0.15	0.00	1.15	0.24	0.00	0.00
Unidentified darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mud darter	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rainbow darter	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stripetail darter	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Orangethroat darter	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellow perch	0.25	0.49	1.48	1.22	0.02	0.33	2.53	1.38	0.00
Logperch	0.00	0.36	0.88	0.21	0.00	0.00	0.65	0.14	0.00
Sauger	0.00	0.07	0.01	0.07	0.00	0.00	0.33	0.00	1.40
Freshwater drum	16.48	16.49	11.10	17.35	17.05	29.22	18.80	17.20	10.48
Brook silverside	0.00	0.03	0.44	0.32	0.00	0.00	0.20	0.18	0.00
Mixed & unid minnows	1.17	0.29	0.04	0.44	0.73	0.71	0.20	1.29	0.39
TOTAL	210.71	272.18	447.72	360.01	133.99	182.67	270.29	406.91	169.88



APPENDIX B - PART TWO. (Continued)

SPECIES	TRM 2.5 (1 Sample Collected)	TRM 3.5 (1 Sample Collected)	TRM 505.4 (1 Sample Collected)	TRM 506.0 (1 Sample Collected)	TRM 507.3 (1 Sample Collected)	TRM 508.0 (17 Samples Collected)	TRM 524.6 (12 Samples Collected)
Fathead minnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bullhead minnow	0.00	0.00	0.00	0.00	0.00	0.73	0.06
River carpsucker	0.00	0.00	0.00	0.00	0.00	0.07	0.00
Quillback carpsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.02
White sucker	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Northern hogsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified buffalo	0.00	0.00	0.00	25.71	0.00	0.00	0.00
Smallmouth buffalo	39.50	51.22	82.71	0.00	49.01	12.52	19.75
Bigmouth buffalo	0.00	0.00	0.00	0.00	0.00	0.00	3.79
Black buffalo	0.00	0.00	0.00	0.00	0.00	0.43	1.95
Spotted sucker	2.36	0.39	0.02	0.00	0.04	15.48	5.47
Unidentified redhorse	0.00	0.43	0.00	0.00	0.00	0.13	0.00
Shorthead redhorse	0.00	0.00	0.00	0.00	0.00	0.00	0.00
River redhorse	0.00	0.00	0.00	0.00	0.00	0.60	0.00
Black redhorse	0.00	0.00	0.00	0.00	0.00	0.43	0.16
Golden redhorse	3.20	0.00	0.00	5.07	10.92	3.40	1.05
Blue catfish	7.33	0.00	0.00	0.00	0.00	1.13	0.21
Black bullhead	0.00	0.00	0.00	0.00	0.00	0.17	0.10
Yellow bullhead	0.00	0.00	0.00	0.00	0.00	0.58	0.00
Brown bullhead	0.00	0.00	0.00	0.00	0.00	0.23	0.49
Channel catfish	4.39	12.38	1.57	0.24	7.20	20.63	6.34
Flathead catfish	1.23	1.04	0.00	0.00	2.36	0.84	0.44
Killifish	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blackstripe topminnow	0.00	0.00	0.00	0.00	0.00	0.04	0.00
Blackspotted topminnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mosquitofish	0.00	0.00	0.00	0.00	0.00	0.02	0.05
Unidentified temperate bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00
White bass	0.17	0.46	0.10	1.47	0.03	0.26	0.23
Yellow bass	0.00	0.00	0.00	0.00	0.00	1.17	2.33

APPENDIX B - PART TWO. (Continued)

SPECIES	TRM 2.5 (1 Sample Collected)	TRM 3.5 (1 Sample Collected)	TRM 505.4 (1 Sample Collected)	TRM 506.0 (1 Sample Collected)	TRM 507.3 (1 Sample Collected)	TRM 508.0 (17 Samples Collected)	TRM 524.6 (12 Samples Collected)
Rock bass	0.00	6.00	0.00	0.00	0.00	0.00	0.00
Unidentified sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Warmouth	0.42	0.67	0.20	0.06	1.11	3.15	0.52
Redbreast sunfish	0.00	0.00	0.00	0.00	0.00	0.43	0.02
Green sunfish	0.30	0.00	0.00	0.00	0.07	0.26	0.08
Orangespotted sunfish	0.09	0.02	0.19	0.02	0.04	0.04	0.00
Bluegill	25.44	17.27	23.11	8.94	26.81	33.08	4.78
Longear sunfish	0.00	0.00	0.00	0.06	0.06	0.19	0.01
Redear sunfish	2.10	4.31	2.06	1.62	2.74	12.68	2.12
Hybrid sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Smallmouth bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Spotted bass	0.11	0.01	0.17	0.16	0.28	0.29	0.05
Largemouth bass	6.10	8.40	6.29	9.28	14.28	13.31	3.44
White crappie	5.00	4.92	29.59	0.61	4.10	3.27	1.34
Black crappie	0.00	0.00	0.00	0.00	0.00	0.01	0.05
Unidentified darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mud darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rainbow darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stripetail darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Orangethroat darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellow perch	0.10	0.07	0.02	0.00	0.00	0.43	0.00
Logperch	0.00	0.00	0.00	0.00	0.00	0.17	0.00
Sauger	0.00	0.00	0.00	0.00	0.79	0.50	0.00
Freshwater drum	44.93	79.95	31.69	10.75	50.51	28.52	49.81
Brook silverside	0.00	0.00	0.00	0.00	0.00	0.03	0.02
Mixed & unid minnows	2.66	0.87	0.29	1.12	0.19	0.04	0.00
TOTAL	202.54	243.59	431.49	186.60	305.68	371.51	257.79



APPENDIX C. PERCENTAGE COMPOSITION (BASED ON MEAN NUMBER PER HECTARE) OF FISH SPECIES COLLECTED IN ROTENONE SAMPLES FROM CHICKAMAUGA RESERVOIR 1970-87

SPECIES	TRM 475.2 (1 Sample Collected)	TRM 475.7 (1 Sample Collected)	TRM 476.2 (11 Samples Collected)	TRM 478.0 (18 Samples Collected)	TRM 484.7 (1 Sample Collected)	TRM 492.6 (1 Sample Collected)	TRM 495.0 (17 Samples Collected)	TRM 0.1 (1 Sample Collected)	TRM 1.2 (1 Sample Collected)
Chestnut lamprey	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paddlefish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Spotted gar	0.00	0.03	0.01	0.01	0.00	0.00	0.00	0.01	0.00
Longnose gar	0.02	0.01	0.01	0.00	0.00	0.23	0.01	0.00	0.00
Shortnose gar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
Skipjack herring	0.00	0.02	0.01	0.02	0.00	0.29	0.03	0.00	0.22
Unidentified shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gizzard shad	61.47	7.32	8.63	5.93	28.67	9.41	8.72	22.78	15.42
Threadfin shad	13.22	28.94	22.48	8.43	9.56	46.21	11.85	15.10	8.69
Mixed shad	0.00	5.58	0.00	0.02	0.00	0.00	0.00	0.00	0.00
Mooneye	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Minnow, carp	0.00	0.26	0.00	0.02	0.00	0.00	0.15	0.00	0.00
Central stoneroller	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Goldfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carp	0.00	0.14	0.04	0.02	0.14	0.00	0.02	0.00	0.04
Silver chub	0.00	0.00	0.00	0.00	0.10	0.00	0.01	0.00	0.00
Golden shiner	0.00	0.21	0.72	0.47	0.00	0.00	1.52	2.43	0.00
Unidentified shiner	0.00	0.00	0.00	0.00	0.30	0.00	0.04	0.00	0.00
Emerald shiner	0.00	0.66	2.43	0.41	0.00	0.00	0.53	0.11	0.00
Ghost shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Common shiner	0.00	0.00	0.00	0.01	0.00	0.00	0.04	0.00	0.00
Spotfin shiner	0.00	0.05	0.90	0.72	0.00	0.00	0.20	0.03	0.00
Mimic shiner	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Steelcolor shiner	0.00	0.00	0.16	0.05	0.00	0.00	0.00	0.00	0.00
Pugnose minnow	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00
Striped shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Unidentified minnow	0.00	0.35	0.00	0.50	0.00	0.00	0.00	0.00	0.00
Bluntnose minnow	0.00	0.53	0.00	0.23	0.00	0.00	0.40	0.00	0.00

APPENDIX C. Continued

SPECIES	TRM 475.2 (1 Sample Collected)	TRM 475.7 (1 Sample Collected)	TRM 476.2 (11 Samples Collected)	TRM 478.0 (18 Samples Collected)	TRM 484.7 (1 Sample Collected)	TRM 492.6 (1 Sample Collected)	TRM 495.0 (17 Samples Collected)	TRM 0.1 (1 Sample Collected)	TRM 1.2 (1 Sample Collected)
Fathead minnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bullhead minnow	0.00	3.93	0.43	3.27	0.00	0.00	1.34	0.09	0.00
River carpsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Quillback carpsucker	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.04
White sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Northern hogsucker	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified buffalo	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.00	0.00
Smallmouth buffalo	0.65	0.15	0.01	0.02	1.19	0.00	0.03	0.00	0.30
Bigmouth buffalo	0.01	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.63
Black buffalo	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00
Spotted sucker	0.01	0.32	0.01	0.04	0.00	2.81	0.06	0.00	0.04
Unidentified redborse	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.22
Shorthead redborse	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00
River redborse	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Black redborse	0.00	0.00	0.00	0.00	0.00	0.52	0.01	0.00	0.00
Golden redborse	0.06	0.02	0.00	0.00	0.00	1.38	0.01	0.00	0.00
Blue catfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22
Black bullhead	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Yellow bullhead	0.00	0.00	0.01	0.00	0.00	0.00	0.08	0.51	0.00
Brown bullhead	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.08	0.00
Channel catfish	0.08	0.27	0.02	0.05	0.00	0.00	0.09	0.00	0.07
Flathead catfish	0.01	0.01	0.00	0.01	0.00	0.29	0.03	0.00	0.11
Killifish	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00
Blackstripe topminnow	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Blackspotted topminnow	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.00	0.00
Mosquitofish	0.00	0.00	0.01	0.01	0.00	0.00	0.03	0.22	0.00
Unidentified temperate bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
White bass	0.16	0.02	0.02	0.01	0.28	0.06	0.25	0.00	0.00
Yellow bass	0.00	0.52	0.12	0.36	0.00	0.00	0.14	0.01	0.00





APPENDIX C - PART TWO. Continued

SPECIES	TRM 2.5 (1 Sample Collected)	TRM 3.5 (1 Sample Collected)	TRM 505.4 (1 Sample Collected)	TRM 506.0 (1 Sample Collected)	TRM 507.3 (1 Sample Collected)	TRM 508.0 (17 Samples Collected)	TRM 524.6 (12 Samples Collected)
Bluntnose minnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fathead minnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bullhead minnow	0.00	0.00	0.00	0.00	0.00	2.94	0.55
River carpsucker	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Quillback carpsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.01
White sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Northern hogsucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified buffalo	0.00	0.00	0.00	0.36	0.00	0.00	0.00
Smallmouth buffalo	0.38	0.24	0.40	0.00	0.61	0.05	0.15
Bigmouth buffalo	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Black buffalo	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Spotted sucker	0.16	0.05	0.03	0.00	0.14	0.54	0.06
Unidentified redbhorse	0.00	0.01	0.00	0.00	0.00	0.04	0.00
Shorthead redbhorse	0.00	0.00	0.00	0.00	0.00	0.00	0.00
River redbhorse	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Black redbhorse	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Golden redbhorse	0.05	0.00	0.00	0.08	0.28	0.06	0.01
Blue catfish	0.42	0.00	0.00	0.00	0.00	0.01	0.01
Black bullhead	0.00	0.00	0.00	0.00	0.00	0.01	0.02
Yellow bullhead	0.00	0.00	0.00	0.00	0.00	0.31	0.01
Brown bullhead	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Channel catfish	0.13	0.26	0.09	0.12	0.38	0.13	0.10
Flathead catfish	0.02	0.03	0.00	0.04	0.09	0.01	0.00
Killifish	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blackstripe topminnow	0.00	0.00	0.00	0.00	0.00	0.03	0.00
Blackspotted topminnow	0.00	0.00	0.00	0.06	0.00	0.00	0.00
Mosquitofish	0.00	0.00	0.00	0.00	0.00	0.07	0.32
Unidentified temperate bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00
White bass	0.19	0.25	0.22	3.43	0.09	0.02	0.12



APPENDIX D. PERCENTAGE OCCURRENCE (FREQUENCY) SPECIES COLLECTED IN COVE ROTENONE SAMPLES FROM  
CHICKAMAUGA RESERVOIR 1970-87

SPECIES	TRM 475.2 (1 Sample Collected)	TRM 475.7 (1 Sample Collected)	TRM 476.2 (11 Samples Collected)	TRM 478.0 (18 Samples Collected)	TRM 484.7 (1 Sample Collected)	TRM 492.6 (1 Sample Collected)	TRM 495.0 (17 Samples Collected)	TRM 0.1 (1 Sample Collected)	TRM 1.2 (1 Sample Collected)
Chestnut lamprey	0.00	0.00	0.00	0.00	0.00	0.00	5.88	0.00	0.00
Paddlefish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Spotted gar	0.00	42.86	36.36	33.33	0.00	0.00	29.41	100.00	0.00
Longnose gar	100.00	57.14	54.55	33.33	0.00	100.00	35.29	0.00	0.00
Shortnose gar	0.00	0.00	0.00	5.56	0.00	0.00	0.00	100.00	0.00
Skipjack herring	0.00	57.14	45.45	55.56	0.00	100.00	70.59	0.00	100.00
Unidentified shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gizzard shad	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Threadfin shad	100.00	100.00	90.91	100.00	100.00	100.00	88.24	100.00	100.00
Mixed shad	0.00	14.29	0.00	5.56	0.00	0.00	0.00	0.00	0.00
Mooneye	0.00	14.29	0.00	5.56	0.00	0.00	11.76	0.00	100.00
Minnow, carp	0.00	14.29	0.00	11.11	0.00	0.00	17.65	0.00	0.00
Central stoneroller	0.00	28.57	9.09	22.22	0.00	0.00	47.06	0.00	0.00
Goldfish	0.00	0.00	0.00	0.00	0.00	0.00	5.88	0.00	0.00
Carp	0.00	100.00	72.73	66.67	100.00	0.00	82.35	0.00	100.00
Silver chub	0.00	28.57	0.00	5.56	0.00	0.00	23.53	0.00	0.00
Golden shiner	0.00	42.86	100.00	72.22	0.00	0.00	64.71	100.00	0.00
Unidentified shiner	0.00	0.00	9.09	11.11	0.00	0.00	11.76	0.00	0.00
Emerald shiner	0.00	71.43	90.91	66.67	0.00	0.00	70.59	100.00	0.00
Ghost shiner	0.00	0.00	9.09	5.56	0.00	0.00	11.76	0.00	0.00
Common shiner	0.00	0.00	0.00	5.56	0.00	0.00	23.53	0.00	0.00
Spotfin shiner	0.00	28.57	72.73	72.22	0.00	0.00	64.71	100.00	0.00
Mimic shiner	0.00	14.29	0.00	16.67	0.00	0.00	5.88	0.00	0.00
Steelcolor shiner	0.00	0.00	18.18	16.67	0.00	0.00	5.88	0.00	0.00
Pugnose minnow	0.00	14.29	9.09	5.56	0.00	0.00	23.53	100.00	0.00
Striped shiner	0.00	0.00	9.09	0.00	0.00	0.00	17.65	0.00	0.00
Unidentified minnow	0.00	14.29	0.00	5.56	0.00	0.00	0.00	0.00	0.00
Bluntnose minnow	0.00	28.57	0.00	16.67	0.00	0.00	5.88	0.00	0.00

APPENDIX D. Continued

SPECIES	TRM 475.2 (1 Sample Collected)	TRM 475.7 (1 Sample Collected)	TRM 476.2 (11 Samples Collected)	TRM 478.0 (18 Samples Collected)	TRM 484.7 (1 Sample Collected)	TRM 492.6 (1 Sample Collected)	TRM 495.0 (17 Samples Collected)	TRM 0.1 (1 Sample Collected)	TRM 1.2 (1 Sample Collected)
Fathead minnow	0.00	0.00	0.00	0.00	0.00	0.00	5.88	0.00	0.00
Bullhead minnow	0.00	71.43	90.91	83.33	0.00	0.00	70.59	100.00	0.00
River carpsucker	0.00	28.57	0.00	5.56	0.00	0.00	0.00	0.00	0.00
Quillback carpsucker	0.00	0.00	0.00	0.00	100.00	0.00	5.88	0.00	100.00
White sucker	0.00	0.00	0.00	0.00	0.00	0.00	5.88	0.00	0.00
Northern hogsucker	0.00	42.86	27.27	27.78	0.00	0.00	23.53	0.00	0.00
Unidentified buffalo	0.00	0.00	0.00	0.00	0.00	100.00	5.88	0.00	0.00
Smallmouth buffalo	100.00	85.71	63.64	61.11	100.00	0.00	70.59	0.00	100.00
Bigmouth buffalo	100.00	28.57	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Black buffalo	0.00	14.29	0.00	0.00	100.00	0.00	0.00	0.00	0.00
Spotted sucker	100.00	85.71	54.55	77.78	0.00	100.00	94.12	100.00	100.00
Unidentified redhorse	0.00	0.00	0.00	0.00	0.00	0.00	29.41	0.00	100.00
Shorthead redhorse	0.00	14.29	0.00	0.00	0.00	100.00	11.76	0.00	0.00
River redhorse	9.00	14.29	0.00	5.56	0.00	0.00	5.88	0.00	0.00
Black redhorse	0.00	14.29	0.00	0.00	0.00	100.00	35.29	0.00	0.00
Golden redhorse	109.00	85.71	9.09	50.00	0.00	100.00	35.29	0.00	0.00
Blue catfish	0.00	0.00	9.09	22.22	0.00	0.00	11.76	0.00	100.00
Black bullhead	0.00	0.00	9.09	5.56	0.00	0.00	11.76	0.00	0.00
Yellow bullhead	0.00	0.00	18.18	27.78	0.00	0.00	52.94	100.00	0.00
Brown bullhead	0.00	0.00	27.27	22.22	0.00	0.00	11.76	100.00	0.00
Channel catfish	100.00	100.00	81.82	100.00	0.00	0.00	94.12	0.00	100.00
Flathead catfish	100.00	85.71	36.36	66.67	100.00	100.00	82.35	0.00	100.00
Killifish	0.00	0.00	0.00	0.00	0.00	0.00	5.88	0.00	0.00
Blackstripe topminnow	0.00	0.00	0.00	0.00	0.00	0.00	11.76	0.00	0.00
Blackspotted topminnow	0.00	28.57	0.00	11.11	0.00	0.00	70.59	0.00	0.00
Mosquitofish	0.00	14.29	9.09	16.67	0.00	0.00	17.65	100.00	0.00
Unidentified temperate bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
White bass	100.00	42.86	27.27	33.33	100.00	100.00	41.18	0.00	0.00
Yellow bass	0.00	85.71	81.82	77.78	0.00	0.00	88.24	100.00	0.00
Rock bass	0.00	0.00	0.00	5.56	100.00	0.00	0.00	0.00	0.00



## APPENDIX D. Continued

	TRM 475.2 (1 Sample Collected)	TRM 475.7 (1 Sample Collected)	TRM 476.2 (11 Samples Collected)	TRM 478.0 (18 Samples Collected)	TRM 484.7 (1 Sample Collected)	TRM 492.6 (1 Sample Collected)	TRM 495.0 (17 Samples Collected)	TRM 0.1 (1 Sample Collected)	TRM 1.2 (1 Sample Collected)
SPECIES									
Unidentified sunfish	0.00	14.29	9.09	27.78	0.00	0.00	17.65	0.00	0.00
Warmouth	0.00	100.00	100.00	100.00	0.00	100.00	100.00	100.00	100.00
Redbreast sunfish	0.00	14.29	54.55	22.22	0.00	0.00	41.18	100.00	0.00
Green sunfish	0.00	57.14	81.82	88.89	100.00	100.00	70.59	100.00	100.00
Orangespotted sunfish	0.00	14.29	0.00	22.22	0.00	0.00	23.53	0.00	0.00
Bluegill	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Longear sunfish	100.00	100.00	100.00	100.00	100.00	100.00	94.12	100.00	0.00
Redear sunfish	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Hybrid sunfish	0.00	14.29	0.00	0.00	0.00	0.00	11.76	0.00	0.00
Smallmouth bass	0.00	0.00	0.00	16.67	0.00	0.00	0.00	0.00	0.00
Spotted bass	100.00	100.00	100.00	83.33	100.00	100.00	94.12	0.00	100.00
Largemouth bass	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
White crappie	100.00	100.00	72.73	88.89	100.00	100.00	100.00	100.00	100.00
Black crappie	0.00	28.57	36.36	33.33	0.00	100.00	29.41	0.00	0.00
Unidentified darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified darter	0.00	0.00	0.00	5.56	0.00	0.00	5.88	0.00	0.00
Mud darter	0.00	14.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rainbow darter	0.00	14.29	18.18	11.11	0.00	0.00	5.88	0.00	0.00
Stripetail darter	0.00	14.29	27.27	5.56	0.00	0.00	0.00	0.00	0.00
Orangethroat darter	0.00	14.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellow perch	100.00	100.00	100.00	88.89	100.00	100.00	100.00	100.00	0.00
Logperch	0.00	85.71	100.00	77.78	0.00	0.00	100.00	100.00	0.00
Sauger	0.00	28.57	9.09	22.22	0.00	0.00	52.94	0.00	100.00
Freshwater drum	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Brook silverside	0.00	85.71	100.00	83.33	0.00	0.00	94.12	100.00	0.00
Mixed & unid minnows	100.00	28.57	27.27	44.44	100.00	100.00	29.41	100.00	100.00
TOTAL	1,900.00	2,942.86	2,609.09	2,761.11	1,900.00	2,300.00	3,094.12	2,700.00	2,300.00





APPENDIX D - PART TWO. Continued

SPECIES	TRM 2.5 (1 Sample Collected)	TRM 3.5 (1 Sample Collected)	TRM 505.4 (1 Sample Collected)	TRM 506.0 (1 Sample Collected)	TRM 507.3 (1 Sample Collected)	TRM 508.0 (17 Samples Collected)	TRM 524.6 (12 Samples Collected)
Unidentified sunfish	0.00	0.00	0.00	0.00	0.00	5.88	0.00
Warmouth	100.00	100.00	100.00	100.00	100.00	100.00	83.33
Redbreast sunfish	0.00	0.00	0.00	0.00	0.00	52.94	16.67
Green sunfish	100.00	0.00	0.00	0.00	100.00	76.47	66.67
Orangespotted sunfish	100.00	100.00	100.00	100.00	100.00	29.41	0.00
Bluegill	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Longear sunfish	0.00	0.00	0.00	100.00	0.00	58.82	16.67
Redear sunfish	100.00	100.00	100.00	100.00	100.00	100.00	83.33
Hybrid sunfish	0.00	0.00	0.00	0.00	0.00	11.76	0.00
Smallmouth bass	0.00	0.00	0.00	0.00	0.00	5.88	0.00
Spotted bass	100.00	100.00	100.00	100.00	100.00	88.24	41.67
Largemouth bass	100.00	100.00	100.00	100.00	100.00	100.00	91.67
White crappie	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Black crappie	0.00	0.00	0.00	0.00	0.00	17.65	16.67
Unidentified darter	0.00	0.00	0.00	0.00	0.00	5.88	0.00
Unidentified darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mud darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rainbow darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stripetail darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Orangethroat darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellow perch	100.00	100.00	100.00	0.00	0.00	76.47	0.00
Logperch	0.00	0.00	0.00	0.00	0.00	58.82	8.33
Saugey	0.00	0.00	0.00	0.00	100.00	41.18	0.00
Freshwater drum	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Brook silverside	0.00	0.00	0.00	0.00	0.00	94.12	66.67
Mixed & unid minnows	100.00	100.00	100.00	100.00	100.00	5.88	8.33
TOTAL	2,400.00	2,100.00	1,800.00	1,900.00	2,200.00	2,735.29	2,241.67



## APPENDIX E. Continued

SPECIES	1970 (12 Samples Collected)	1971 (4 Samples Collected)	1972 (4 Samples Collected)	1973 (4 Samples Collected)	1974 (4 Samples Collected)	1975 (4 Samples Collected)	1976 (5 Samples Collected)	1977 (5 Samples Collected)	1978 (5 Samples Collected)
Bullhead minnow	0.00	1.05	72.67	0.65	734.76	3,397.45	1,974.17	418.03	148.19
River carpsucker	0.00	0.00	0.20	0.20	0.00	0.00	2.79	0.00	0.00
Quillback carpsucker	0.73	0.00	0.00	0.00	6.00	0.00	0.00	0.00	0.00
White sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.44	0.00
Northern hogsucker	0.00	0.54	0.99	0.79	0.00	0.26	2.07	1.03	0.34
Unidentified buffalo	7.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Smallmouth buffalo	28.28	36.63	37.69	24.34	6.40	8.96	13.02	11.64	0.35
Bigmouth buffalo	8.01	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.69
Black buffalo	0.17	0.78	9.00	0.00	9.00	0.00	0.00	0.00	0.00
Spotted sucker	19.17	29.92	59.85	187.14	88.97	41.42	53.55	44.26	26.33
Unidentified redhorse	1.03	4.30	2.69	2.15	0.00	42.90	0.00	0.00	0.00
Shorthead redhorse	0.30	0.20	0.00	0.54	0.00	0.00	0.00	2.56	0.00
River redhorse	0.00	0.00	0.74	0.00	0.26	0.00	0.00	0.00	3.86
Black redhorse	4.18	0.00	2.55	0.00	0.00	0.00	5.47	1.03	0.00
Golden redhorse	12.13	12.28	5.19	5.30	13.73	1.51	3.50	12.16	0.69
Blue catfish	5.68	0.00	3.75	0.52	0.00	1.80	3.03	0.00	3.33
Black bullhead	0.00	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.00
Yellow bullhead	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	1.57
Brown bullhead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Channel catfish	19.07	33.91	36.57	42.98	12.14	13.69	25.56	19.44	15.18
Flathead catfish	5.30	5.27	3.49	5.91	3.14	3.20	2.70	5.70	4.08
Killifish	0.00	0.00	0.00	154.57	0.00	0.00	0.00	0.00	0.00
Blackstripe topminnow	0.00	0.00	32.56	0.00	0.00	0.00	14.47	0.00	0.00
Blackspotted topminnow	0.00	0.00	0.00	0.20	4.21	1.08	6.81	7.25	1.65
Mosquitofish	0.00	0.00	1.74	2.33	0.00	0.00	16.85	0.61	0.00
Unidentified temperate bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
White bass	47.42	4.07	3.57	16.42	3.46	0.27	5.72	38.27	11.03
Yellow bass	0.00	1.18	22.70	21.70	8.55	0.00	0.00	0.00	0.00
Rock bass	0.17	0.00	0.00	4.90	0.00	0.00	0.00	0.00	0.00
Unidentified sunfish	0.00	0.00	0.00	0.27	0.00	6.73	78.36	2.29	0.34
Warmouth	13.92	48.27	55.18	213.51	13.68	45.77	72.57	249.60	348.87

## APPENDIX E. Continued

SPECIES	1970 (12 Samples Collected)	1971 (4 Samples Collected)	1972 (4 Samples Collected)	1973 (4 Samples Collected)	1974 (4 Samples Collected)	1975 (4 Samples Collected)	1976 (5 Samples Collected)	1977 (5 Samples Collected)	1978 (5 Samples Collected)
Redbreast sunfish	0.00	0.00	0.00	0.00	0.00	0.00	17.90	1.82	16.79
Green sunfish	12.73	8.75	5.17	22.38	2.50	0.60	2.61	9.01	3.72
Orangespotted sunfish	3.41	5.70	10.17	35.27	0.58	0.26	0.00	0.00	0.00
Bluegill	1,506.60	2,110.00	2,962.87	2,775.94	1,849.74	4,119.62	6,674.38	19,668.26	15,974.88
Longear sunfish	74.21	186.37	254.34	374.69	398.92	537.07	1,061.16	569.96	274.31
Redear sunfish	40.97	139.14	149.09	694.98	190.86	240.66	344.09	979.08	464.89
Hybrid sunfish	0.00	0.00	0.00	0.00	0.00	1.13	0.00	0.00	0.35
Smallmouth bass	0.00	0.00	0.00	0.00	0.00	0.00	0.36	1.14	0.00
Spotted bass	151.86	86.65	123.28	55.87	82.34	76.91	135.17	41.84	62.78
Largemouth bass	295.09	121.20	96.68	162.46	67.08	106.74	86.92	399.64	581.58
White crappie	126.66	39.54	55.68	55.90	9.88	13.25	48.88	90.75	155.50
Black crappie	0.89	0.00	2.18	0.00	0.00	0.75	0.00	3.08	0.00
Unidentified darter	0.00	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified darter	0.00	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00
Mud darter	0.00	0.00	12.90	0.00	0.00	0.00	0.00	0.00	0.00
Rainbow darter	0.00	0.00	0.00	0.00	0.77	0.00	7.02	0.82	0.00
Stripetail darter	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.98	0.00
Orangethroat darter	0.00	0.00	0.00	0.00	0.00	0.75	0.00	0.00	0.00
Yellow perch	16.94	33.03	32.25	23.41	8.30	4.36	32.19	147.65	328.31
Logperch	0.27	1.05	45.25	94.99	23.13	19.70	47.79	161.67	75.13
Sauger	0.75	0.00	1.61	5.40	2.50	1.92	3.39	6.93	1.46
Freshwater drum	417.99	269.77	586.05	661.45	254.72	139.26	323.34	306.90	156.54
Brook silverside	0.00	1.05	14.78	184.75	12.57	73.02	216.55	352.35	119.40
Mixed & unid minnows	699.40	1,152.54	400.06	11.08	0.26	0.00	0.00	0.00	0.00
TOTAL	8,818.64	8,604.35	15,148.9	15,619.49	11,672.90	14,490.65	17,240.91	35,726.55	23,428.00

APPENDIX E - PART TWO. MEAN ANNUAL NUMBER PER HECTARE OF EACH FISH SPECIES COLLECTED IN COVE ROTENONE SAMPLES FROM CHICKAMAUGA RESERVOIR 1970-87

SPECIES	1979 (5 Samples Collected)	1980 (5 Samples Collected)	1981 (5 Samples Collected)	1982 (5 Samples Collected)	1983 (5 Samples Collected)	1984 (5 Samples Collected)	1985 (5 Samples Collected)	1986 (5 Samples Collected)	1987 (5 Samples Collected)
Chestnut lamprey	0.00	0.00	0.43	0.00	0.00	0.49	0.00	0.00	0.00
Paddlefish	0.53	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00
Spotted gar	14.18	0.42	8.43	0.00	12.67	1.95	15.32	8.94	1.82
Longnose gar	3.51	4.77	1.74	3.12	5.08	7.28	2.73	0.00	6.19
Shortnose gar	0.47	0.00	1.88	0.91	0.93	0.00	0.00	1.82	2.79
Skipjack herring	0.00	2.77	0.00	8.07	18.70	12.90	12.73	5.00	3.16
Unidentified shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gizzard shad	2,369.73	1,456.32	1,991.61	9,443.80	3,975.31	6,798.33	5,771.81	6,732.10	9,121.76
Threadfin shad	364.06	448.09	3,294.25	370.40	8,838.26	866.60	22,913.52	4,912.88	12,457.17
Mixed shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mooneye	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
Minnow, carp	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Central stoneroller	10.00	1.92	0.00	0.43	0.49	1.46	0.00	0.00	0.00
Goldfish	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carp	17.47	12.49	42.35	12.41	13.78	2.92	19.14	6.70	10.09
Silver chub	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Golden shiner	352.64	661.97	337.37	187.65	518.18	335.79	280.62	374.98	658.99
Unidentified shiner	0.00	0.00	0.00	5.00	0.00	0.00	50.24	0.00	0.00
Emerald shiner	12.04	1.87	1.78	162.30	1,037.32	1,039.00	441.03	591.58	177.19
Ghost shiner	0.00	0.00	0.00	0.95	0.00	0.00	0.00	50.28	0.89
Common shiner	1.23	0.69	0.00	0.43	0.98	0.00	0.00	0.00	0.00
Spotfin shiner	1.40	0.00	13.76	187.77	163.12	375.00	289.54	498.92	223.31
Mimic shiner	0.00	0.00	0.00	0.00	0.00	0.44	0.00	0.00	0.00
Steelcolor shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	170.69	57.65
Pugnose minnow	3.85	0.00	0.00	0.00	0.00	24.98	2.73	2.22	0.47
Striped shiner	0.00	0.00	0.00	0.00	0.00	1.93	0.00	0.00	0.00
Unidentified minnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bluntnose minnow	0.00	0.00	7.54	0.00	0.00	1.36	0.00	0.00	0.00
Fathead minnow	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bullhead minnow	118.98	65.01	20.46	554.76	684.88	527.09	1,133.06	257.62	45.22



APPENDIX E - PART TWO. Continued

SPECIES	1979	1980	1981	1982	1983	1984	1985	1986	1987
	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)
River carpucker	0.00	0.00	0.00	0.00	0.00	3.38	0.00	0.00	0.00
Quillback carpucker	0.00	0.00	0.00	0.00	0.00	3.11	0.00	0.00	0.00
White sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Northern hogsucker	1.20	0.31	0.00	0.00	0.00	0.00	0.00	0.47	0.00
Unidentified buffalo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Smallmouth buffalo	3.31	1.97	2.01	7.31	40.07	0.48	10.23	4.09	2.86
Bigmouth buffalo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Black buffalo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.00
Spotted sucker	26.23	14.01	12.47	6.70	12.09	39.85	21.36	9.05	10.01
Unidentified redhorse	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.00
Shorthead redhorse	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
River redhorse	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Black redhorse	0.53	0.34	0.00	0.43	0.00	0.00	0.00	0.45	0.00
Golden redhorse	1.76	1.09	0.83	0.00	0.44	0.98	0.45	9.55	0.00
Blue catfish	0.00	5.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Black bullhead	2.69	0.00	4.29	0.87	22.43	0.00	0.00	0.00	0.00
Yellow bullhead	7.34	19.86	19.55	179.13	29.25	45.46	6.31	20.87	100.48
Brown bullhead	0.00	0.00	0.00	0.48	7.16	0.45	6.46	8.46	39.01
Channel catfish	24.80	14.65	77.60	7.12	11.22	10.25	16.16	7.56	3.69
Flathead catfish	1.39	0.34	21.23	1.74	0.49	0.00	0.44	1.35	0.44
Killifish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blackstripe topminnow	0.00	0.00	1.30	0.00	0.00	0.00	0.00	0.00	0.00
Blackspotted topminnow	7.31	0.69	0.00	0.87	5.37	7.80	0.45	0.91	0.00
Mosquitofish	1.56	10.42	0.42	0.43	7.18	14.61	8.83	80.19	139.07
Unidentified temperate bass	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
White bass	3.16	11.25	0.00	2.38	1.46	1.82	43.63	195.41	17.82
Yellow bass	4.61	127.85	267.37	276.05	124.79	111.65	125.92	166.66	79.17
Rock bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified sunfish	15.81	6.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Warmouth	896.53	1,304.00	2,822.21	1,768.28	3,526.8F	1,660.22	336.27	1,084.28	1,692.08

## APPENDIX E - PART TWO. Continued

SPECIES	1979 (5 Samples Collected)	1980 (5 Samples Collected)	1981 (5 Samples Collected)	1982 (5 Samples Collected)	1983 (5 Samples Collected)	1984 (5 Samples Collected)	1985 (5 Samples Collected)	1986 (5 Samples Collected)	1987 (5 Samples Collected)
Redbreast sunfish	0.47	0.00	92.17	2,697.45	1,933.69	156.89	0.00	657.95	19.16
Green sunfish	29.03	19.73	60.30	239.22	153.89	129.79	15.71	34.17	126.60
Orangespotted sunfish	1.78	2.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bluegill	14,288.25	27,264.54	24,879.80	13,680.82	16,917.70	12,247.35	10,661.56	13,094.68	14,330.66
Longear sunfish	1,130.45	369.40	116.27	99.27	126.03	781.71	246.72	238.00	603.31
Redear sunfish	1,160.45	2,712.38	27,963.89	5,020.22	10,458.48	2,801.73	2,910.31	5,973.27	5,436.35
Hybrid sunfish	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Smallmouth bass	0.93	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Spotted bass	38.77	6.39	3.22	116.28	158.99	102.49	18.50	3.66	40.15
Largemouth bass	834.42	976.84	715.53	442.69	361.67	430.92	303.81	199.35	354.05
White crappie	111.67	30.59	30.16	126.79	115.62	87.61	78.86	44.18	273.96
Black crappie	2.13	4.09	3.09	0.00	0.00	0.91	13.86	9.37	8.05
Unidentified darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mud darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rainbow darter	1.15	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stripetail darter	0.00	0.92	0.00	0.00	0.00	0.00	0.48	0.00	0.90
Orangethroat darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellow perch	70.25	192.76	120.50	65.12	105.14	62.90	88.70	50.92	52.86
Logperch	16.14	7.46	11.04	61.62	126.23	126.69	92.02	28.93	21.40
Sauger	1.86	0.00	0.00	0.00	0.00	0.00	0.44	0.45	0.00
Freshwater drum	175.47	146.50	310.97	223.10	312.44	230.17	361.73	119.15	225.26
Brook silverside	85.39	70.17	125.31	388.66	251.07	224.78	94.74	515.28	187.25
Mixed & unid minnows	0.00	0.00	0.00	0.00	143.24	14.61	13.33	14.67	113.34
TOTAL	22,219.51	35,980.06	57,383.74	36,551.05	50,222.67	29,296.17	46,410.67	36,187.51	46,643.74

APPENDIX F. MEAN BIOMASS (KG/HA) OF EACH FISH SPECIES COLLECTED IN COVE ROTENONE SAMPLES FROM CHICKAMAUGA RESERVOIR 1970-87

SPECIES	1970	1971	1972	1973	1974	1975	1976	1977	1978
	(12 Samples Collected)	(4 Samples Collected)	(4 Samples Collected)	(4 Samples Collected)	(4 Samples Collected)	(4 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)
Chestnut Lamprey	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paddlefish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.86	0.00
Spotted gar	0.52	0.01	0.00	0.02	0.15	0.10	7.41	1.22	0.03
Longnose gar	0.04	0.00	0.71	0.01	0.05	0.04	0.02	0.25	0.29
Shinnose gar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.07	0.00
Skipjack herring	0.44	0.00	1.23	1.47	1.31	0.41	0.60	0.39	0.00
Unidentified shad	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Gizzard shad	77.73	67.78	119.53	127.42	107.69	92.15	115.45	157.17	22.92
Threadfin shad	2.95	7.19	43.18	59.72	28.16	27.12	11.75	17.31	0.34
Blixed shad	1.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mooneye	0.01	0.00	0.00	0.08	0.06	0.00	0.08	0.17	0.00
Minnow, carp	0.00	0.00	0.00	0.27	0.00	0.02	0.00	0.01	0.00
Central stoneroller	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01
Goldfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carp	7.09	53.89	31.59	48.42	20.27	28.93	46.77	31.39	14.86
Silver chub	0.00	0.00	0.00	0.00	0.01	0.02	0.32	0.00	0.01
Golden shiner	0.18	0.00	0.16	0.73	0.27	0.15	1.46	2.05	1.70
Unidentified shiner	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00
Emerald shiner	0.00	0.00	0.18	0.27	0.01	0.14	0.21	0.26	0.69
Ghost shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Common shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00
Spotfin shiner	0.00	0.00	0.00	0.03	0.01	0.03	0.23	0.19	0.03
Mimic shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Steelcolor shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Pugnose minnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Striped shiner	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Unidentified minnow	0.00	0.00	0.00	1.02	0.00	0.00	0.00	0.00	0.00
Bluntnose minnow	0.00	0.00	1.02	0.00	0.00	0.00	0.00	0.00	0.00
Fathead minnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bullhead minnow	0.00	0.00	0.15	0.00	0.81	3.72	1.75	0.67	0.14

APPENDIX F. Continued

SPECIES	1970	1971	1972	1973	1974	1975	1976	1977	1978
	(12 Samples Collected)	(4 Samples Collected)	(4 Samples Collected)	(4 Samples Collected)	(4 Samples Collected)	(4 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)
River carpucker	0.00	0.00	0.23	0.39	0.00	0.00	0.18	0.00	0.00
Quillback carpucker	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
White sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
Northern hog sucker	0.00	0.03	0.25	0.23	0.00	0.03	0.54	0.19	0.04
Unidentified buffalo	9.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Smallmouth buffalo	35.64	71.15	43.14	41.39	12.52	19.17	28.94	10.82	1.84
Bigmouth buffalo	14.63	0.00	0.00	0.00	0.00	1.12	0.00	0.00	1.90
Black buffalo	0.26	2.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Spotted sucker	0.40	3.06	7.82	10.32	16.96	10.42	17.96	12.08	8.21
Unidentified redhorse	0.53	1.75	1.48	0.42	0.00	0.60	0.00	0.00	0.00
Shorthead redhorse	0.03	0.23	0.00	0.05	0.00	0.00	0.00	0.05	0.00
River redhorse	0.00	0.00	0.18	0.00	0.01	0.00	0.00	0.00	2.05
Black redhorse	1.53	0.00	0.99	0.00	0.00	0.00	0.00	0.32	0.00
Golden redhorse	3.77	3.96	2.96	3.45	4.78	0.29	2.16	2.27	0.47
Blue catfish	1.43	0.00	2.32	0.04	0.00	0.00	0.01	0.00	2.16
Black bullhead	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Yellow bullhead	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.01
Brown bullhead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Channel catfish	2.98	10.76	8.12	10.36	4.12	4.25	12.43	7.40	4.18
Flathead catfish	0.60	0.53	1.06	2.26	1.31	0.60	0.81	0.83	0.58
Killifish	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00
Blackstripe topminnow	0.00	0.00	0.16	0.00	0.00	0.00	0.02	0.00	0.00
Blackspeckled topminnow	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
Mosquitofish	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00
Unidentified temperate bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
White bass	0.21	0.08	0.08	0.44	0.20	0.06	0.24	0.54	0.03
Yellow bass	0.00	0.02	0.23	0.47	0.25	1.54	1.26	1.80	1.06
Rock bass	0.02	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
Unidentified sunfish	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.00	0.00
Harmouth	0.30	0.32	0.66	2.00	0.16	0.41	0.74	1.02	1.64
Redbreast sunfish	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.04	0.09

## APPENDIX F. Continued

SPECIES	1970	1971	1972	1973	1974	1975	1976	1977	1978
	(12 Samples Collected)	(4 Samples Collected)	(4 Samples Collected)	(4 Samples Collected)	(4 Samples Collected)	(4 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)
Green sunfish	0.16	0.09	0.10	0.19	0.03	0.00	0.01	0.07	0.04
Orangespotted sunfish	0.03	0.01	0.03	0.13	0.00	0.00	0.00	0.00	0.00
Bluegill	13.01	18.70	32.30	25.91	12.36	14.97	28.09	39.81	30.82
Longear sunfish	1.07	2.03	2.60	2.19	1.84	1.65	4.53	3.95	1.79
Redear sunfish	2.11	5.42	8.30	9.88	8.37	7.79	11.28	12.73	7.54
Hybrid sunfish	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Smallmouth bass	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Spotted bass	0.47	0.90	1.10	0.64	1.42	0.56	1.03	0.33	0.20
Largemouth bass	5.63	8.90	9.18	12.01	6.76	8.23	7.41	8.76	8.69
White crappie	4.02	4.23	3.11	3.70	1.22	1.35	1.55	1.56	2.71
Black crappie	0.10	0.00	0.10	0.00	0.00	0.13	0.00	0.65	0.00
Unidentified darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mud darter	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00
Rainbow darter	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Stripetail darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Orangethroat darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellow perch	0.10	0.57	0.57	0.85	0.44	0.09	0.49	1.25	2.72
Logperch	0.00	0.00	0.59	0.86	0.31	0.17	0.36	0.95	0.34
Sauger	0.23	0.00	0.19	0.82	0.28	0.26	0.78	0.28	0.24
Freshwater drum	29.48	17.54	38.88	39.21	18.22	12.35	26.92	25.28	15.70
Brook silverside	0.00	0.00	0.03	0.25	0.02	0.14	0.24	0.38	0.12
Mixed & unid minnows	0.85	1.58	0.52	0.01	0.76	0.00	0.00	0.00	0.00
TOTAL	219.91	283.26	365.23	399.16	251.13	239.21	336.43	346.56	236.19

APPENDIX F - PART TWO. MEAN BIOMASS (KG/HA) OF EACH FISH SPECIES COLLECTED IN COVE ROTENONE SAMPLES FROM CHICKAMAUGA RESERVOIR 1970-87

SPECIES	1979	1801	1981	1982	1983	1984	1985	1986	1987
	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)
Chestnut lamprey	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00
Paddlefish	0.26	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00
Spotted gar	7.65	0.38	0.32	0.00	6.92	0.28	8.37	2.25	0.30
Longnose gar	0.47	0.19	0.08	0.20	0.35	0.07	0.16	0.00	0.16
Shortnose gar	0.09	0.00	1.14	0.19	0.50	0.00	0.00	0.13	0.28
Skipjack herring	0.00	0.04	0.00	0.21	0.84	0.46	1.27	0.40	0.04
Unidentified shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cizzard shad	92.80	37.36	166.14	161.89	242.39	338.63	269.18	217.64	201.35
Threadfin shad	0.81	0.79	8.29	1.02	23.67	2.13	92.21	8.64	18.07
Mixed shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mooneye	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Minnow, carp	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Central stoneroller	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Goldfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carp	38.04	24.18	14.57	9.16	29.62	3.56	38.09	13.67	13.15
Silver chub	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Golden shiner	3.43	2.11	5.47	1.20	3.65	2.15	1.54	3.16	6.59
Unidentified shiner	0.00	0.00	0.00	0.01	0.00	0.00	0.04	0.00	0.00
Emerald shiner	0.06	0.01	0.00	0.29	0.91	1.05	0.61	0.92	0.33
Ghost shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
Common shiner	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Spotfin shiner	0.00	0.00	0.02	0.22	0.13	0.38	0.30	0.38	0.24
Mimic shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Steelcolor shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.10
Pugnose minnow	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Striped shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified minnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bluntnose minnow	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Fathead minnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bullhead minnow	0.09	0.09	0.01	0.42	0.34	0.44	0.7?	0.22	0.03

APPENDIX F - PART TWO. Continued

SPECIES	1979	1801	1981	1982	1983	1984	1985	1986	1987
	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)
River carpsucker	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00
Quillback carpsucker	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00
White sucker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Northern hogsucker	0.11	0.13	0.00	0.00	0.00	0.00	0.00	0.07	0.00
Unidentified buffalo	0.00	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00
Smallmouth buffalo	4.57	3.35	2.90	11.00	6.41	2.57	4.98	1.66	7.40
Bigmouth buffalo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Black buffalo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.69	0.00
Spotted sucker	6.60	7.31	9.34	3.50	3.05	6.41	7.36	3.03	2.16
Unidentified redborse	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shorthead redborse	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
River redborse	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Black redborse	0.38	0.29	0.00	0.17	0.00	0.00	0.00	0.46	0.00
Golden redborse	1.39	0.81	0.82	0.00	0.11	0.09	0.04	1.18	0.00
Blue catfish	0.00	4.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Black bullhead	0.05	0.00	0.10	0.00	0.94	0.00	0.00	0.00	0.00
Yellow bullhead	0.12	0.22	0.56	1.02	0.06	0.24	0.15	0.18	1.14
Brown bullhead	0.00	0.00	0.00	0.05	1.95	0.00	0.02	0.04	0.17
Channel catfish	14.24	7.73	59.17	6.01	12.69	11.64	9.42	0.79	3.63
Flathead catfish	0.55	0.00	0.26	0.63	0.01	0.00	0.20	0.13	0.24
Killifish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blackstripe topminnow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blackspeckled topminnow	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00
Mosquitofish	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.08	0.13
Unidentified temperate bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
White bass	0.05	0.05	0.00	0.14	0.18	0.32	1.20	12.66	0.35
Yellow bass	0.13	1.13	10.11	4.87	3.94	1.50	4.24	5.54	1.34
Rock bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified sunfish	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Warmouth	3.15	2.64	8.65	3.45	4.13	3.58	0.81	2.24	5.77
Redbreast sunfish	0.01	0.00	0.36	3.30	1.44	0.12	0.00	1.72	0.31

APPENDIX F - PART TWO. Continued

SPECIES	1979	1801	1981	1982	1983	1984	1985	1986	1987
	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)	(5 Samples Collected)
Green sunfish	0.29	0.26	0.51	0.56	0.42	0.87	0.07	0.09	0.70
Orangespotted sunfish	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bluegill	37.16	48.08	51.13	27.39	33.81	34.03	24.44	29.28	39.73
Longear sunfish	3.03	1.62	1.88	1.15	0.36	2.05	1.29	0.55	1.43
Redear sunfish	7.95	10.29	23.73	10.50	18.05	9.26	10.2	12.61	12.10
Hybrid sunfish	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Smallmouth bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Spotted bass	0.13	0.03	0.37	1.15	0.76	0.43	0.28	0.25	0.22
Largemouth bass	11.65	11.68	16.87	12.96	10.95	7.23	18.15	5.28	11.64
White crappie	3.58	1.85	1.17	0.90	0.40	0.41	0.86	0.29	0.71
Black crappie	0.15	0.13	0.11	0.00	0.00	0.00	0.30	0.33	0.06
Unidentified darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mud darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rainbow darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stripetail darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Orangethroat darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellow perch	2.31	3.03	1.64	1.28	1.30	0.98	0.58	0.40	0.61
Logperch	0.14	0.03	0.14	0.32	0.65	0.62	0.44	0.33	0.13
Sauger	0.23	0.00	0.00	0.00	0.00	0.00	0.10	0.25	0.00
Freshwater drum	17.51	17.51	41.78	24.95	30.18	17.44	30.10	13.46	19.58
Brook silverside	0.07	0.07	0.23	0.40	0.23	0.19	0.09	0.46	0.19
Mixed & unid minnows	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.05	0.34
TOTAL	259.36	187.37	428.03	290.53	441.40	449.34	527.91	345.70	350.72