55961 Intake
R5·IL·Newton

1986 NEWTON LAKE IMPINGEMENT MONITORING

PROGRESS REPORT

BY

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CONTENTS

	PAGE
List of Figures	ii
List of Tables	iii
Introduction	1
1983-84 316(b) Report Summary	1
IEPA Decision	1
CIPS Monitoring Program and Additional Studies	2
Impingement Monitoring	9
Creel Survey	17
Crappie Assessment Study	21
Summary	24
Final Sampling and Report Schedule	25
References	26

Appendix A (Impingement Data)

Appendix B (Creek Data)

LIST OF FIGURES

		PAGE
Figure 1	Monthly Bluegill Impingement at the Newton Power Station March, 1983 - February, 1984	6
Figure 2	Monthly White Crappie Impingement at the Newton Power Station, March, 1983 - February, 1984	7
Figure 3	Location of Oil Spill - April 27, 1985	8
Figure 4	Length-Frequency Diagram of Bluegill Impinged in 1986	14
Figure 5	Length-Frequency Diagram of White Crappie Impinged in 1986	15
Figure 6	Length-Frequency diagram of Largemouth Bass Impinged in 1986	16
Figure 7	October, 1985 Trap Net locations	22
Figure 8	April, 1986 Trap Net Locations	23

LIST OF TABLES

		PAGE
Table 1	Total Number, Weight and Percent Composition of all Fish Taxa Collected During the Newton Power Station Impingement Study - March, 1983 Through February, 1984	3
Table 2	Monthly Estimated Impingement (By Number) - March, 1983 February, 1984	4
Table 3	Monthly Estimates Impingement (By Weight, Kg) - March, 1983 - February, 1984	5
Table 4	Estimated Numbers of Fish Impinged From January 1 Through June 30, 1986	12
Table 5	Estimated Numbers of Fish Impinged in March, April, May, June 1983 and in January and February, 1984	13
Table 6	Projected Number of Fish Harvested From January 1 Through July 12, 1986	19
Table 7	Number of Fish Harvested in the First Seven Creel Survey Periods in 1980, 1981 and 1986	20

INTRODUCTION

Section 316(b) of the 1972 Federal Water Pollution Control Act Amendments requires that cooling water intakes reflect the best technology available to minimize adverse environmental impact. To evaluate the impact of the Newton Power Station intake (NPDES Permit No. IL0049191), Central Illinois Public Service Company (CIPS) contracted EA Engineering, Science and Technology to monitor impingement and entrainment from March 1, 1983 through March 1, 1984.

1983-84 316(b) Report Summary

The entrainment portion of the study consisted of collecting ichthyoplankton samples at the station's discharge on 39 dates from March through August, 1983. Twenty-four hour composite samples were collected twice a week from April through July, and once a week in March and August. These samples yielded a total of 3,101 larve and one (1) egg, distributed among ten (10) taxa. Gizzard shad (81.2 percent) and Sunfishes (18.3 percent) dominated the collections. Entrainment densities were low until the end of May, increased greater in June, and then steadily declined during the remainder of the sampling period. Gizzard shad dominated the catch in June, while Lepomis sp. dominated for the remainder of the study. Based on the densities recorded it was estimated that during the period April through August, 1983, the Newton Power Station entrained 10.8 million Gizzard shad larvae, 4.3 million Lepomis sp. larvae, and 0.3 million Crappie larvae. Based on the standing crops of these groups estimated to be in the lake (September, 1983), these losses were considered to be negligible.

The impingement portion of the study was conducted for one (1) year from March 1, 1983 through March 1, 1984 and resulted in the collection of 71 twenty-four hour samples. These samples were collected at weekly intervals from May through November and twice weekly from December through April. A total of 379,264 fish (weighing 4,067 kg) distributed among 17 species were collected during the year (Table 1). The catch was dominated by Gizzard Shad (92.1 percent numerically), followed by Bluegill (5.6 percent), and White crappie (2 percent). Impingement was high in March, April, October, and December through February, moderate in May, September, and November, and negligible during the summer (June through August). For the year, 1,506,338 Gizzard shad, 80,191 Bluegill, and 27,232 White crappie were estimated to be impinged (Table 2, Table 3). Based on the standing crops estimated to be in the lake (September, 1983), these losses were not considered significant, except, possibly for White crappie.

IEPA Decision

In a letter dated June 4, 1985, the Illinois Environmental Protection Agency (IEPA) denied approval of CIPS' 316(b) demonstration. They expressed concern over the high impingement numbers of fish.

In addition, IEPA requested that two (2) actions be taken by CIPS:

(1) Demonstrate efforts to eliminate the high impingement numbers of fish and submit a progress report by June, 1986.

(2) Initiate an impingement monitoring program beginning in November, 1985 for an indefinite period of time.

CIPS Monitoring Program and Additional Lake Studies

IEPA and CIPS personnel met on June 24, 1985 to discuss the requested actions. It was decided that the main concern with the CIPS 316(b) demonstration was the high impingement numbers of game species, particularly Bluegill and Crappie.

Analysis of the 1983-84 data did not indicate that there was a seasonal trend in the impingement of Bluegill and White crappie (Figures 1 and 2). The high impingement of these species had only occurred in March and April, 1983. Analysis of plant records showed that the lake level had been rapidly lowered three (3) feet in February, 1983, just prior to the monitoring program.

Also, since the 316(b) demonstration had been submitted, Newton lake had experienced a major oil spill on the east arm near the plant intake (Figure 3). On April 27, 1985, a Marathon Oil Pipeline had broken and leaked almost 500,000 gallons of crude oil onto the lake. Cleanup operations were still in progress and the impact on the lake's ecosystem was unknown.

Because of these unusual events and the lack of clear-cut impingement trends, CIPS proposed an alternative impingement monitoring program. The monitoring program would be initiated in January, 1986 and continued through June 30, 1986. This program would determine if there was an impingement problem, before CIPS tried to employ measures to eliminate the high impingement numbers. In addition, CIPS would fund a one (1) year creel survey and assist the Illinois Department of Conservation with a Crappie assessment study to help assess the impact of the impingement on the lake's fishery.

IEPA granted approval for CIPS' proposed monitoring program and additional studies in a letter dated October 4, 1985. This progress report is being submitted as a condition of the aforementioned letter. A final report incorporating data from all studies including an impact assessment of the oil spill will be submitted in February, 1987.

TABLE 1 TOTAL NUMBER, WEIGHT AND PERCENT COMPOSITION OF ALL FISH TAXA COLLECTED DURING THE NEWTON POWER STATION IMPINGEMENT STUDY MARCH 1983 THROUGH FEBRUARY 1984.

SPECIES NAME	SIZE GROUP	NUMBER	% OF TOTAL #	TOTAL WEIGHT(g)	% OF TOTAL WEIGHT	AVERAGE WEIGHT
Gizzard shad	small	276,682	73.0	1,740,198	42.8	6.3
	medium	71,952	19.0	1,709,092	42.0	23.8
	large	639	0.2	51,508	1.3	80.6
total		349,273	92.1	3,500,798	86.1	10.0
Bluegill	small	7,882	2.1	27,394.5	0.7	3.5
	medium	12,788	3.4	277,102	6.8	21.7
	large	715	0.2	42,238.5	1.0	59.1
total		21,385	5.6	346,735	8.5	16.2
White crappie	small	6,831	1.8	52,973	1.3	7.8
	medium	477	0.1	29,121	0.7	61.2
	large	270	0.1	69,098	1.7	255.9
total		7,578	2.0	151,192	3.7	20.0
Channel catfish	NA[a]	360	0.1	8,535.5[b]	0.2	23.7
Longear sunfish	NA	223	0.1	5,057.5	0.1	22.7
Largemouth bass	NA	125	<0.1	19,252	0.5	154.0
Green sunfish	NA	122	<0.1	1,606.5	<0.1	13.2
Black bullhead	NA	75	<0.1	5,961.5	0.1	79.5
Golden shiner	NA	40	<0.1	622	<0.1	15.6
Black crappie	NA	35	<0.1	2,446	0.1	69.9
Warmouth	NA	20	<0.1	1,347.5[b]	<0.1	67.4
Sunfish hybrid	NA	9	<0.1	139	<0.1	15.4
Carp	NA	7	<0.1	1,499	<0.1	214.1
Tadpole madtom	NA	7	<0.1	21[c]	<0.1	3.0
Bowfin	NA	6	<0.1	20,945	0.5	3,490.8
Yellow bullhead	NA	4	<0.1	394	<0.1	98.5
Bluntnose minnow	NA	1	<0.1	5	<0.1	5.0
Orangespotted sunfish	NA	1	<0.1	1	<0.1	1.0
TOTAL		379,264		4,066,557.5		

[a]NA - Not Applicable; all fish individually processed.
[b] Partial remains of 1 specimen precluded length and weight measurements for all individuals.
[c] Partial remains of 2 specimens precluded length and weight measurements for all individuals.

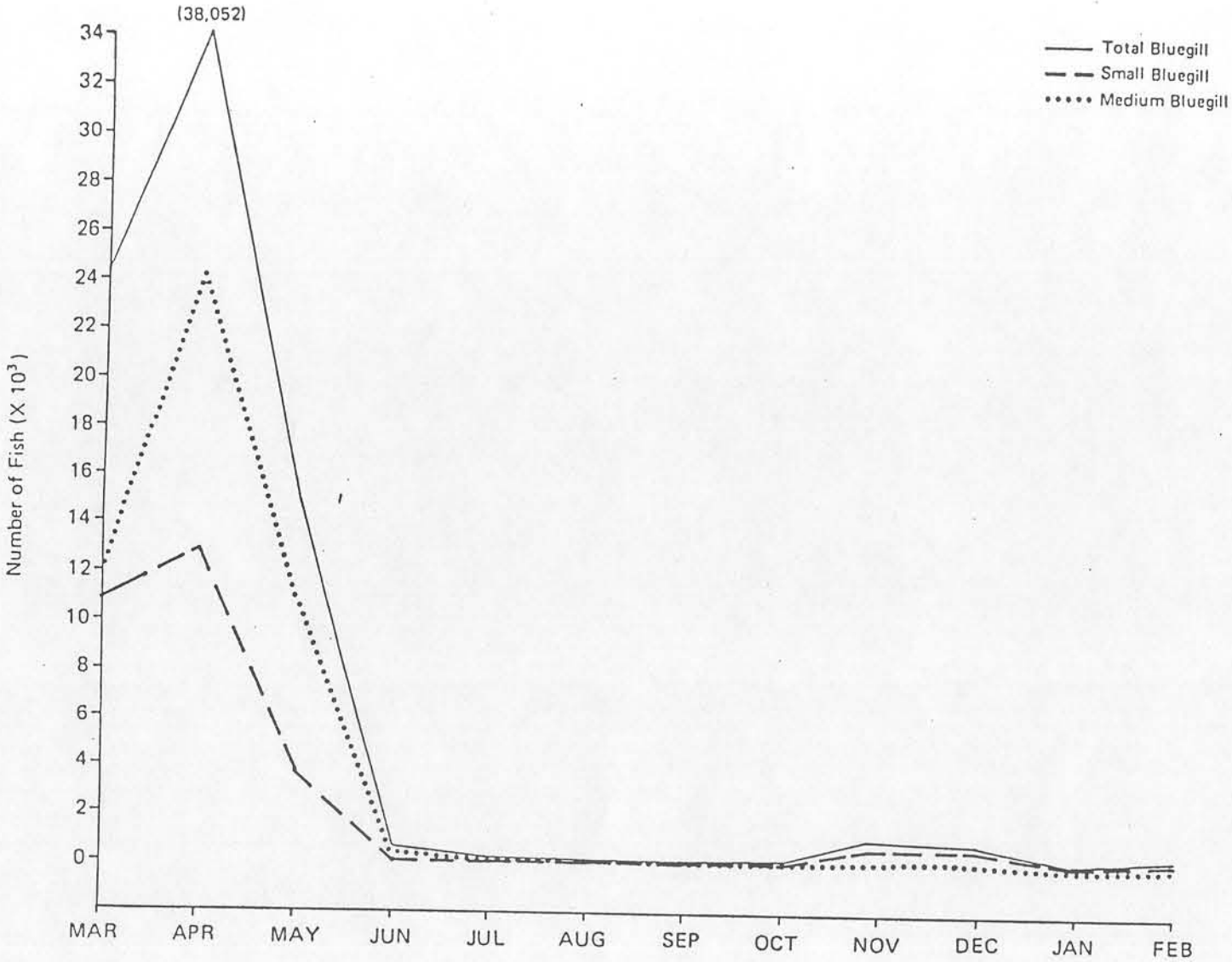
TABLE 2 MONTHLY ESTIMATED IMPINGEMENT (BY NUMBER) MARCH 1983 - FEBRUARY 1984

SPECIES	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	TOTAL
Gizzard Shad	163,737	261,794	7,105	240	78	6	20,708	321,137	47,565	204,343	232,307	247,408	1,506,338
Bluegill	24,201	38,052	14,992	443	70	37	247	125	877	780	55	313	80,191
White Crappie	13,128	10,423	1,656	367	217	236	150	54	173	439	175	214	27,232
Channel Catfish	96	167	56	7	16	124	60	15	315	780	83	73	1,792
Longear Sunfish	248	293	260	7	---	---	---	---	23	40	3	30	904
Largemouth Bass	93	87	25	7	---	6	23	31	75	182	21	9	559
Green Sunfish	145	147	87	---	---	---	---	31	60	31	10	---	511
Black Bullhed	93	53	25	---	31	---	7	8	7	58	7	26	315
Golden Shiner	52	67	19	---	---	---	---	---	---	9	---	---	147
Black Crappie	24	50	19	60	8	---	---	8	---	---	---	---	169
Warmouth	17	23	12	7	---	---	---	8	7	---	3	4	81
Sunfish Hybrid	3	---	6	---	---	---	7	23	23	---	---	---	62
Carp	3	---	6	---	---	---	---	---	---	13	---	9	31
Tadpole Madtom	10	7	12	---	---	---	---	---	---	---	---	---	29
Bowfin	14	---	---	---	---	---	---	8	---	4	---	---	26
Yellow Bullhead	---	---	---	7	---	---	---	---	---	4	3	4	18
Bluntnose Minnow	3	---	---	---	---	---	---	---	---	---	---	---	3
Orangespotted Sunfish	---	---	---	---	---	---	7	---	---	---	---	---	7
TOTAL	**201,867**	**311,163**	**24,280**	**1,145**	**420**	**409**	**21,209**	**321,448**	**49,125**	**206,687**	**232,667**	**248,090**	**1,618,415**

TABLE 3 MONTHLY ESTIMATED IMPINGEMENT (BY WEIGHT, KG) MARCH 1983 - FEBRUARY 1984

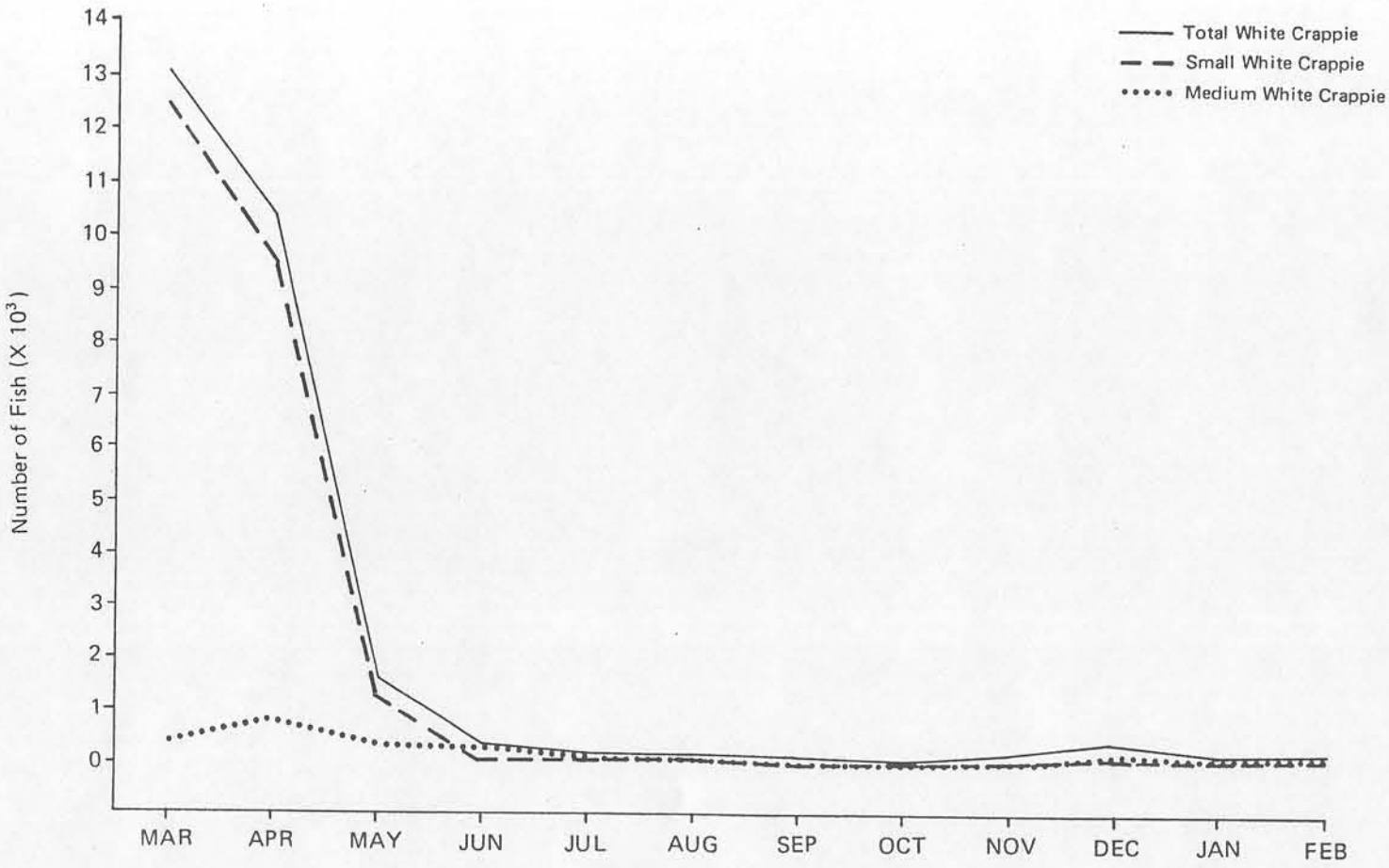
SPECIES	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	TOTAL
Gizzard Shad	2,493.3	4,375.6	173.4	2.7	0.1	<0.1	70.4	2,053.1	334.5	1,356.8	1,584.3	1,492.6	13,936.8
Bluegill	370.3	636.2	226.1	7.1	1.9	1.5	10.7	2.8	12.2	15.6	1.8	11.5	1,297.7
White Crappie	150.5	135.2	45.4	19.3	7.5	3.9	25.9	11.5	9.7	101.1	37.2	66.4	613.6
Channel Catfish	2.1	2.1	0.4	-	3.6	4.9	1.0	2.1	10.0	15.6	1.4	1.4	44.6
Longear Sunfish	5.5	6.6	5.1	0.3	-	-	-	-	0.8	1.4	0.1	0.8	20.6
Largemouth Bass	12.0	11.4	0.4	1.8	-	2.8	16.7	7.1	2.5	22.8	10.3	0.1	87.9
Green Sunfish	2.5	1.6	0.9	-	-	-	-	0.2	0.4	0.3	0.3	-	6.2
Black Bullhead	2.3	3.7	1.5	-	5.6	-	<0.1	1.0	0.1	9.3	0.2	3.9	27.6
Golden Shiner	1.0	0.8	0.4	-	-	-	-	--	-	0.1	-	-	2.3
Black Crappie	1.9	4.4	1.1	2.9	<0.1	-	-	<0.1	-	-	-	-	10.3
Warmouth	0.6	1.0	0.4	-	-	-	-	0.1	0.3	<0.1	2.1	0.6	5.1
Sunfish Hybrid	<0.1	-	<0.1	-	-	-	0.2	0.1	0.6	-	-	-	0.9
Carp	0.4	-	0.6	-	-	-	-	-	-	2.6	-	3.0	6.6
Tadpole Madtom	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	<0.1
Bowfin	56.9	-	-	-	-	-	-	14.5	-	11.2	-	-	82.6
Yellow Bullhead	-	-	-	0.2	-	-	-	-	-	0.7	0.5	0.3	1.7
Bluntnose Minnow	<0.1	-	-	-	-	-	-	-	-	-	-	-	<0.1
Orangespotted Sunfish	-	-	-	-	-	-	<0.1	-	-	-	-	-	0.1
TOTAL	**3,009.3**	**5,178.6**	**455.7**	**34.3**	**18.7**	**13.1**	**124.9**	**2,092.5**	**371.1**	**1,537.5**	**1,638.2**	**1,580.6**	**16,144.5**

FIGURE 1



Monthly bluegill impingement at the Newton Power Station, March 1983 – February 1984.

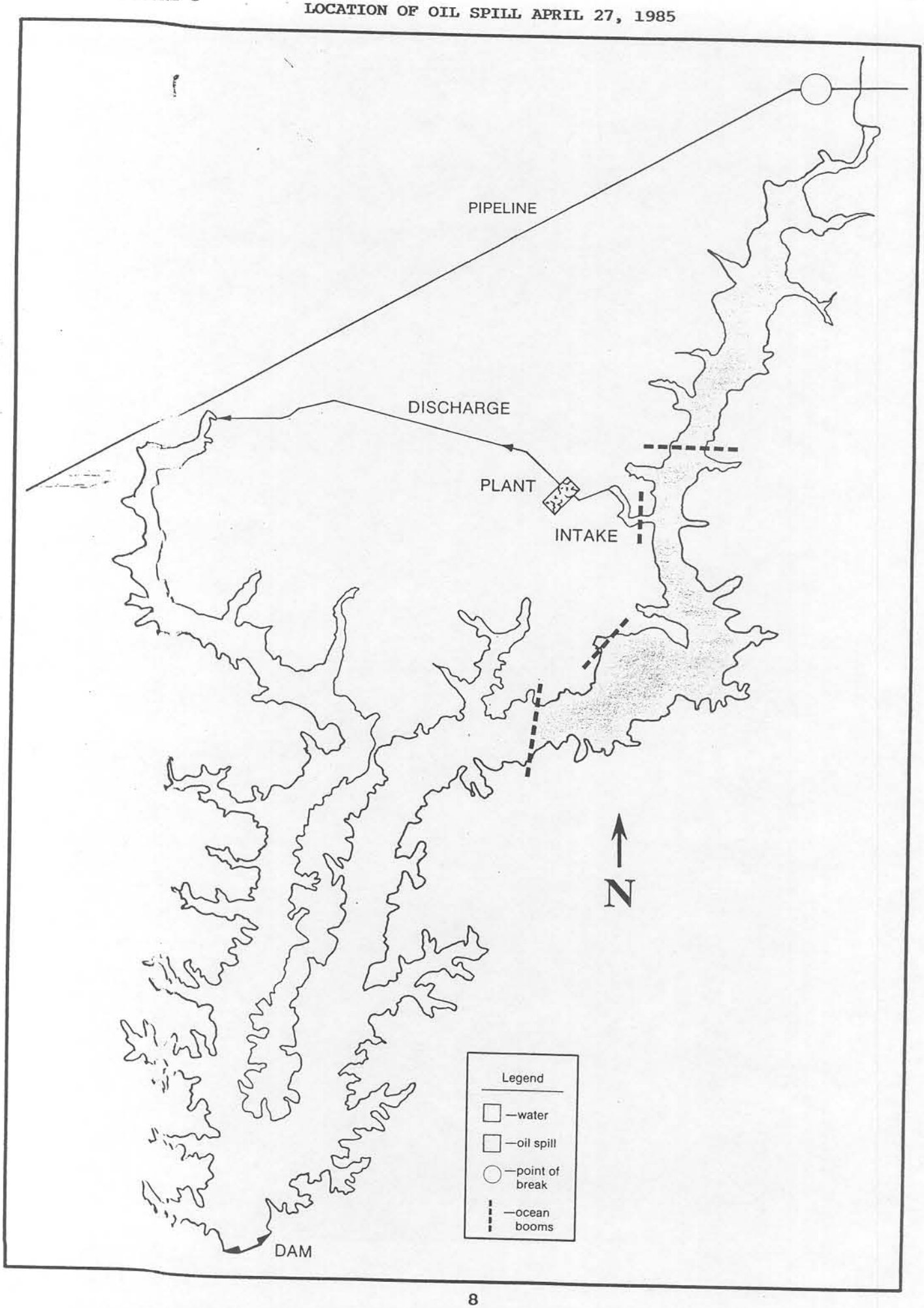
FIGURE 2



Monthly white crappie impingement at the Newton Power Station, March 1983 – February 1984.

FIGURE 3

LOCATION OF OIL SPILL APRIL 27, 1985



IMPINGEMENT MONITORING

Methodology

Impingement monitoring began on January 3, 1986 and used a similar methodology to that in the 1983-84 monitoring study. Samples were collected twice weekly from January through June. Since one sample could not be collected in mid-May, another sample was collected on July 2nd. In all a total of 51 twenty-four hour samples were analyzed.

The impinged fish were flushed from the vertical traveling screens (3/8 inch mesh) and concentrated in a collection basket (1/2 inch mesh) at the intake. At the beginning of each sampling period, all the screens were rotated and backflushed to remove any debris, and a clean collection basket was set in place. At the end of the twenty-four hour sampling period, the screens were again rotated and backflushed to remove all impinged fish. To insure consistent sampling periods, the time at the beginning and end of each sample was recorded by station personnel.

All fish were identified to species. For each species, except minnows, a minimum of 30 individuals was measured for total length (millimeters) and weight (grams). when more than 30 individuals of a species were collected, fish were divided into three (3) size groups (small, medium, and large) and ten (10) individuals per size group were measured and weighed. The remaining individuals in each group were enumerated and weighed. When the number of Gizzard shad was exceptionally large, an estimated number was calculated by weighing 100 individuals and obtaining an average weight of these fish. The remaining portion was batch weighed and the number calculated by dividing the batch weight by the average weight.

Data Analysis

Daily impingement results are reported as total number, total weight, average weight, size group, and length range for each species (Appendix A). A monthly summary of these data and station operational data were also prepared (Appendix A). Estimates of the total number and weight of each fish species impinged were calculated by month and for the study period based on the assumption that the number of fish impinged on non-sampling dates in a month was equal to the average number impinged on the dates that were sampled that month.

$$\text{Estimated Monthly Impingement} = \frac{\text{Number of Fish in Monthly Samples}}{\text{Number of Samples Per Month}} \times \text{Days in Month}$$

The estimate for the study period is the sum of the monthly estimates.

Results and Discussion

A total of 189,146 fish weighing 2,036.8 Kg were collected in the 51 impingement samples (Appendix A, Table A-51) collected January 3, 1986 through July 2, 1986. Fifteen species representing eleven families were collected in the samples. Gizzard shad comprised 98.7 percent of the total impingement sample. Other percentages are as follows: Bluegill -

.9 percent, White Crappie - .2 percent, Largemouth Bass - .04 percent, Channel Catfish - .03 percent, all others - .058 percent (Tables A-1 through A-51).

The 1983-84 impingement study resulted in the collection of 17 species. The same species were collected in 1986, except Bowfin and Black Crappie were absent in the 1986 samples, Gizzard Shad was the dominant species in the 1983-84 catch (92.1 percent numerically) followed by Bluegill (5.6 percent) and White Crappie (2 percent). Together these three (3) species comprised 99.7 percent of the impinged fish. All other species comprised 0.3 percent of the total.

The estimated numbers of fish during January through June, 1986 are listed in Table 4. No fish were collected in the July 2, 1986 sample. These numbers can be compared to those estimated for the same months in the 1983-84 study listed in Table 5.

Overall, the total estimated number of fish impinged during the 1986 study has been reduced 35 percent from comparable months in the 1983-84 study. This is primarily due to the reduction in the numbers of Gizzard Shad, Bluegill and White Crappie impinged.

The Gizzard Shad impingement was high January through April, 1986. This is the same seasonal pattern that was seen in the 1983-84 collections. The Gizzard Shad impingement rates are cyclic and clearly associated with low water temperatures (Appendix A, Table A-52). The highest rates of impingement occurred when water temperatures were below 5.6°C (42°F) The size ranges of Gizzard Shad impinged in both studies were comparable, with over 90 percent measuring 90 mm to 120 mm.

The number of Bluegill impinged in the 1986 impingement monitoring was estimated to be 6,350 fish. This is a significant reduction from the 78,056 fish estimated to have been impinged during the comparable period in the 1983-84 program. The size ranges collected in 1986 (Figure 4) are similar to those found in the previous samples, with medium sized Bluegill being impinged most frequently. The months of March and April showed the highest Bluegill impingement rates for both studies.

The number of White Crappie impinged during the first six (6) months of 1986 was estimated to be 1,584 fish. The estimated number in the previous study was 25,963. Not only was there a significant reduction in numbers, but the size impinged was greatly different than that in the previous study.

In the 1983-84 study, 90.2 percent of White Crappie impinged measured between 44 mm to 112 mm. In 1986, only 6.9 percent of the total White Crappie impinged measured between 105 mm and 120 mm. No White Crappie under 105 mm were impinged in 1986.

Figure 5 depicts the length frequency relationship of the White Crappie in the recent study. This graph is very similar to that from the Srping Crappie Assessment (IDOC). The peak from both the Spring impingement and crappie assessment is around 190 mm. No White Crappie under 100 mm were found in the Spring Crappie Assessment Study, either.

In fact, no small White Crappie have been found by any sampling method (electrofishing, trap nets, gill nets, trawling, impingement) in 1985 or 1986. There is no evidence, as yet, of a 1985 or 1986 year class. The reason for this anomaly is not known, but is being studied.

The number and size (Figure 6) of Largemouth Bass impinged remained about the same in both studies. The numbers of all other species impinged in 1986 declined slightly with the exception of Orangespotted Sunfish and Sunfish Hybrids. The numbers of Orangespotted Sunfish and Sunfish Hybrids increased slightly from the 1983-84 samples. However, the numbers of those impinged is so small, that the increase is negligible.

Using coefficient of condition (k) information and relative weights (Wr) calculated on fish captured by gill net, trap nets and electrofishing during the Summer of 1985 and Spring of 1986, the fish impinged are in comparably poor condition. Eighty-five percent of the fish impinged had a poor coefficient of condition, and eighty-three percent of the White Crappie had a relative weight well below average.

TABLE 4 ESTIMATED NUMBERS OF FISH

IMPINGED FROM JANUARY 1 THROUGH JUNE 30, 1986

SPECIES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	TOTAL
Gizzard Shad	395,182	161,885	85,718	11,556	357	12	654,710
Bluegill	639	442	2,396	2,790	59	24	6,350
White Crappie	648	235	198	351	140	12	1,584
Largemouth Bass	118	42	43	36	19	8	266
Channel Catfish	124	14	25	24	16	3	206
Green Sunfish	68	28	19	3			118
Longear Sunfish	34		16	18			68
Warmouth	6	3	34	9			52
Sunfish Hybrid	22	14	6				42
Orangespotted Sunfish	19	14					33
Carp	6	3	3	3			15
Black Bullhead	3	3	9	3			18
Yellow Bullhead	6		9				15
Tadpole Madtom	6						6
Golden Shiner		3		3			6
Bluntnose Minnow	3						3
GRAND TOTAL	**396,884**	**162,686**	**88,476**	**14,796**	**591**	**59**	**663,492**

TABLE 5 ESTIMATED NUMBERS OF FISH IMPINGED IN MARCH, APRIL, MAY, JUNE, 1983 AND IN JANUARY AND FEBRUARY, 1984

SPECIES	MARCH 1983	APRIL 1983	MAY 1983	JUNE 1983	JANUARY 1984	FEBRUARY 1984	TOTAL
Gizzard Shad	163,737	261,794	7,105	240	232,307	247,408	912,591
Bluegill	24,201	38,052	14,992	443	55	313	78,056
White Crappie	13,128	10,423	1,656	367	175	214	25,963
Largemouth Bass	93	87	25	7	21	9	242
Channel Catfish	96	167	56	7	83	73	482
Green Sunfish	145	147	87		10		389
Longear Sunfish	248	293	260	7	3	30	841
Warmouth	17	23	12	7	3	4	66
Sunfish Hybrid	3		6				9
Orangedspotted Sunfish							
Carp	3		6			9	18
Black Bullhead	93	53	25		7	26	204
Yellow Bullhead				7	3	4	14
Tadpole Madtom	10	7	12				29
Golden Shiner	52	67	19				138
Bluntnose Minnow	3						3
Black Crappie	24	50	19	60			153
Bowfin	14						14
GRAND TOTAL	**201,867**	**311,163**	**24,280**	**1,145**	**232,667**	**248,090**	**1,019,212**

FIGURE 4

1986 IMPINGEMENT SAMPLE BG

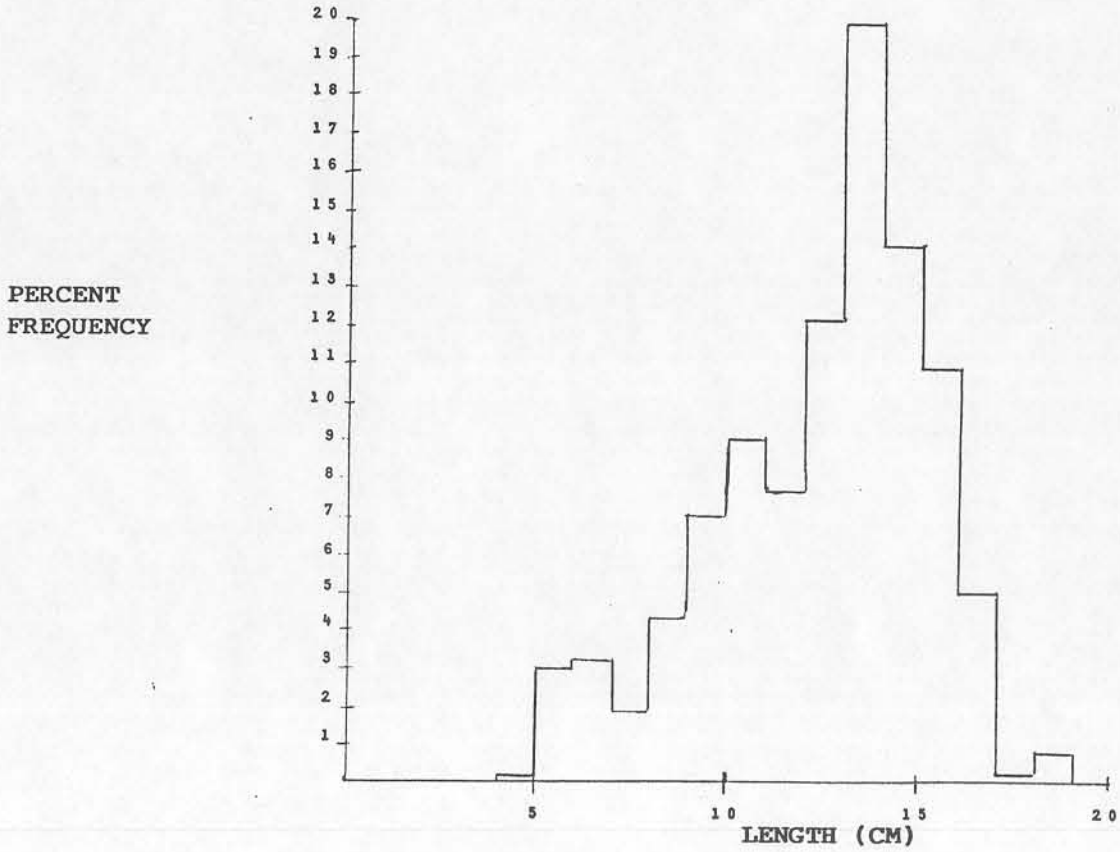


FIGURE 5

1986 IMPINGEMENT SAMPLE WHC

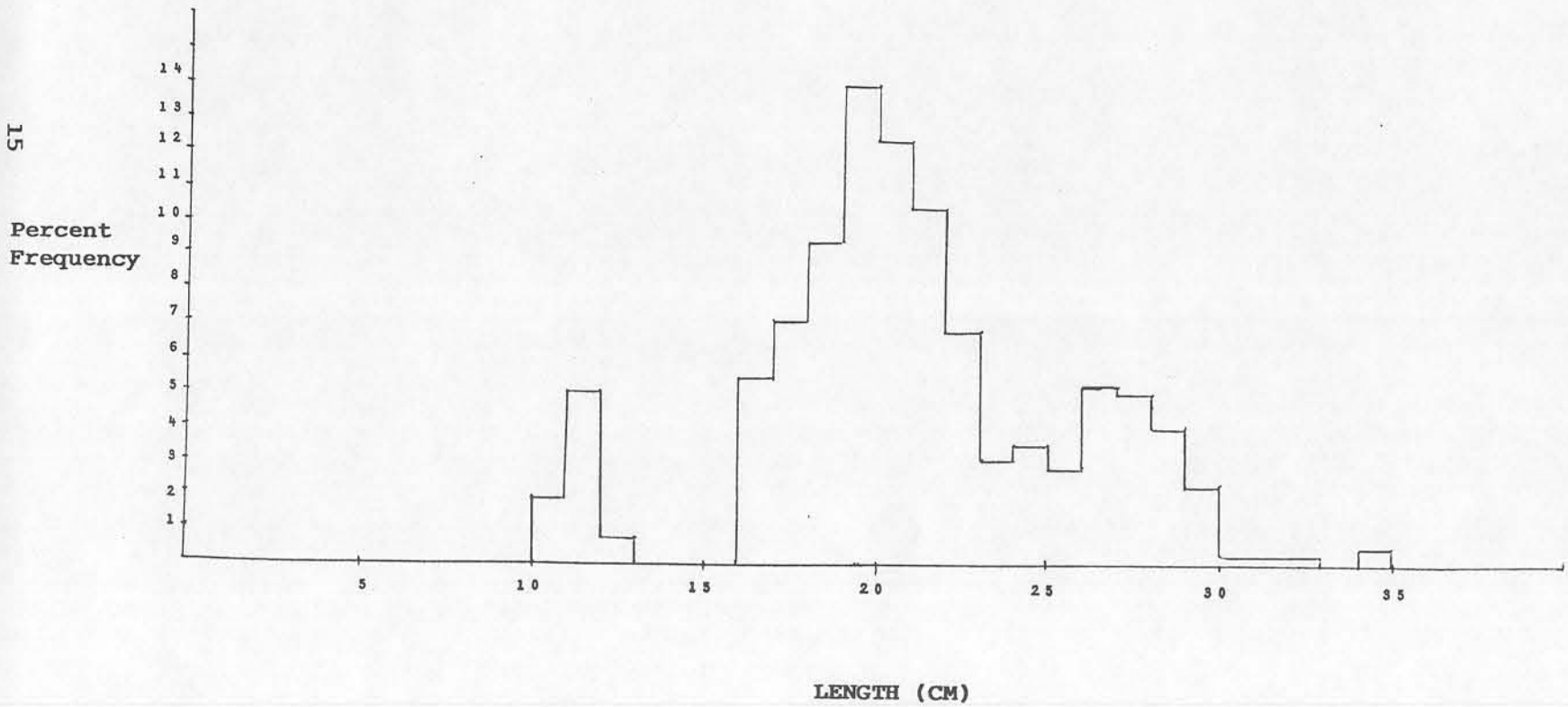
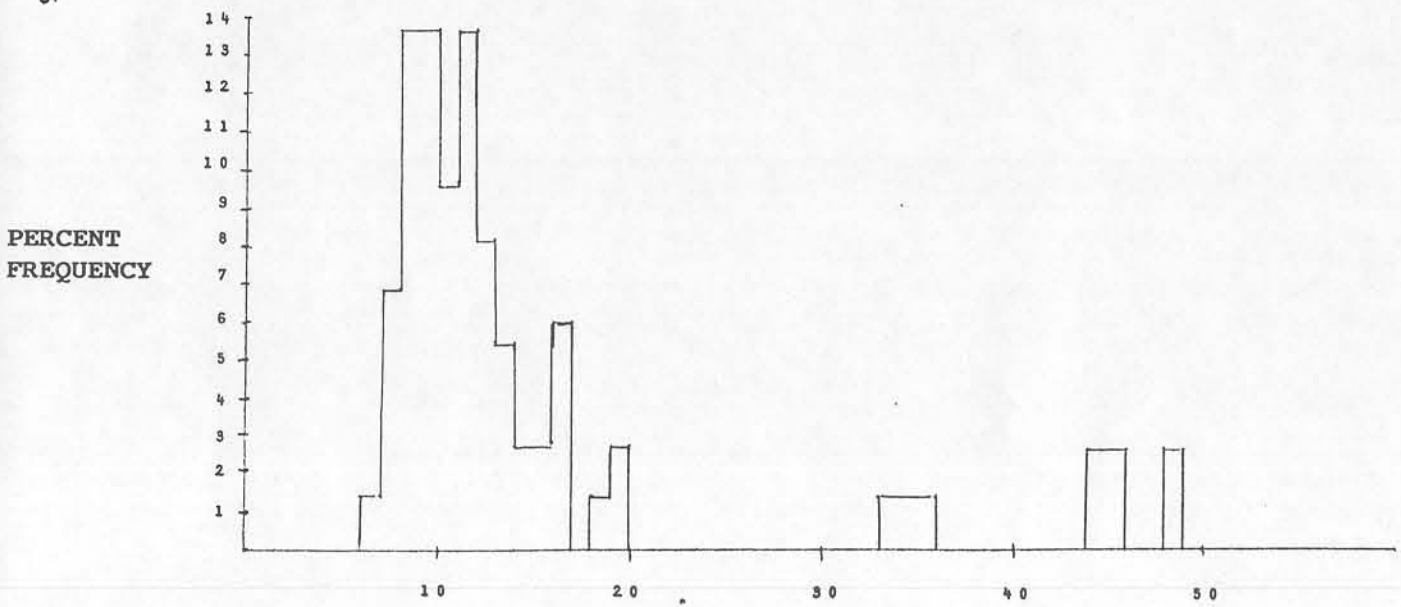


FIGURE 6

1986 IMPINGEMENT SAMPLE LMB



CREEL SURVEY

Methodology

This Creel Survey is an Access Point Survey that began on January 1, 1986 and will continue through December 31, 1986. The method of sampling is the same as that used for all IDOC State Lake Creel Surveys. The schedule was provided by IDOC with the dates and times at which angler interviews and instantaneous counts are to be conducted.

Each angler party that has completed one-half (1/2) hour or more fishing on the lake is interviewed. When there are too many anglers to be interviewed, the clerk systematically interviews every second, third or fourth angler, etc., depending on the numbers present. The number of anglers in each party, the number of hours fished, distance traveled and fishing preference is recorded. The fish harvested are identified, weighed (g) and measured (mm).

Data Analysis

The data (Appendix B) presented in this progress report for the 1986 Creel Survey was expanded for the total harvest for the first seven (7) periods based on the following formulas:

(1) Projected Total Effort In Angler Hours = Average Trailer Count x Average Number Anglers x Number of Type of Days x Hours Available to Anglers Per Day

(2) Projected Angler Preference Effort = Sample Percentages of Effort Expended for Each Species x Total Effort

(3) Catch Per Unit Effort = $\frac{\text{Measured Harvest}}{\text{Measured Effort}}$

(4) Harvest by Species = Catch Per Unit Effort of Species x Total Estimated Effort for Species

Preliminary Results and Discussion

The Creel Survey began January 1, 1986 and will continue through December 31, 1986. The preliminary harvest results (Appendix B) covers the first seven (7) creel periods from January 1 through July 12, 1986. During that time, a total of 58,962 fish were harvested from Newton Lake. Table 6 lists the harvest by period totals and the total for each species during the first seven (7) periods.

The anglers interviewed in 1986 only sought three (3) species of fish: Largemouth Bass, White Crappie and Channel Catfish. However, a total of eleven species were harvested (Table 6, Appendix B).

Table 7 compares creel data over the same period of time for 1980, 1981 and 1986. The total numbers of fish harvested each year are comparable. However, the species being harvested have changed, reflecting the changes in the fishery since the lake opened to public fishing pressure January 1, 1980. These changes are primarily due to the lake fishery changing from a stream fishery to an impoundment fishery, the reservoir aging, and heavy fishing pressure.

In 1980, the most sought after fish was Largemouth Bass. The lake has an 18 inch minimum length, three (3) bass limit. As the numbers of large bass were reduced and the newness of bass fishing ebbed, the fishing pressure changed to a crappie type fishing pressure (Price, 1983).

Bullheads comprised the majority of the catch in 1980. That fishery was the result of fish present in the watershed prior impoundment. It has since declined due to heavy fishing pressure and Largemouth Bass predation. The elimination of this fishery was predicted in 1983 (Price) due to the continuance of an outstanding Largemouth Bass population.

As seen in the 1986 data, the Catfish population has flourished since the early years of impoundment. Channel Catfish are now one of the most sought after and most heavily harvested species in the lake.

The numbers of fish impinged in 1986 (Table 4) is small in comparison to the number of fish harvested by anglers (Table 6) during the same period of time. Unfortunately, there are no harvest numbers to compare to the 1983-84 data. However, from the data in Table 7 it would appear that power station impingement has had little, if any, impact on fish available to anglers.

In 1980, anglers expended 80,843 hours of effort to catch 47,101 fish resulting in a total catch per unit effort of 0.5826 fish per hour. In 1986, anglers expended 87,171 hours (Appendix B) to catch 58,962 fish resulting in a total catch per unit effort of .6764 fish per hour.

It also appears from the creel data that the 1985 oil spill had little impact on the adult fish propulation. However, the impact to larval and juvenile fishes is still under study. Due to sample bias, fish are usually not found in sample collections in great number until they reach the age of 2+. Therefore, any decline in population possibly due to the oil spill would not be noted before 1987 or 1988 sample collections.

TABLE 6 PROJECTED NUMBER OF FISH HARVESTED FROM JANUARY 1 THROUGH JULY 12, 1986

SPECIES	PERIOD 1 JANUARY 1- JANUARY 28	PERIOD 2 FEBRUARY 29- FEBRUARY 22	PERIOD 3 FEBRUARY 23- MARCH 22	PERIOD 4 MARCH 23- APRIL 19	PERIOD 5 APRIL 20- MAY 17	PERIOD 6 MAY 18- JUNE 14	PERIOD 7 JUNE 15- JULY 12	TOTAL HARVEST BY SPECIES
Largemouth Bass	0	12	13	92	485	533	151	1,287
White Crappie	2,473	5,207	2,253	3,751	9,539	8,483	5,961	37,667
Channel Catfish	691	2,440	1,662	947	3,113	5,681	4,190	18,724
Walleye	0	67	7	5	59	165	18	321
Bluegill	27	29	21	58	175	105	34	449
Green sunfish	0	0	6	15	109	16	0	146
Longear Sunfish	27	0	7	0	26	16	0	76
Warmouth	0	4	0	0	0	6		10
Sunfish Hybrid	0	8	0	0	0	0		8
Carp	0	0	0	21	25	27	17	90
Yellow Bullhead	0	0	6	5	11	0	108	130
Black Bullhead	27	4	6	0	0	17		54
GRAND TOTAL	**3,245**	**7,771**	**3,981**	**4,894**	**13,542**	**15,049**	**10,479**	**58,962**

TABLE 7 NUMBER OF FISH HARVESTED IN THE FIRST SEVEN CREEL SURVEY PERIODS IN 1980, 1981, AND 1986

	1980	1981	1986
Largemouth Bass	6,002	1,255	1,287
White Crappie	7,497*	41,470	37,667
Black Crappie		1,336	0
Channel Catfish	3,611	669	18,724
Walleye	149	24	321
Bluegill	743	613	449
Green Sunfish		14	146
Longear Sunfish		0	76
Warmouth		3	10
Sunfish Hybrid			8
Carp		16	90
Yellow Bullhead	42,813**	732**	130
Black Bullhead			54
Miscellaneous	690	969	---
TOTAL	**61,505**	**47,101**	**58,962**

* White Crappie and Black Crappie numbers combined

** Bullhead sp. - data not broken into Yellow Bullheads and Black Bullheads

CRAPPIE ASSESSMENT STUDY

The Crappie Assessment Study began in October, 1985, and will continue in the Fall of 1986. In addition, a Supplemental Crappie Survey was conducted in April, 1986.

Trap nets (1/2-inch, 1-inch, 1 1/2-inch) were set in various locations throughout the lake in October, 1985, and April, 1986 (Figures 7 and 8).

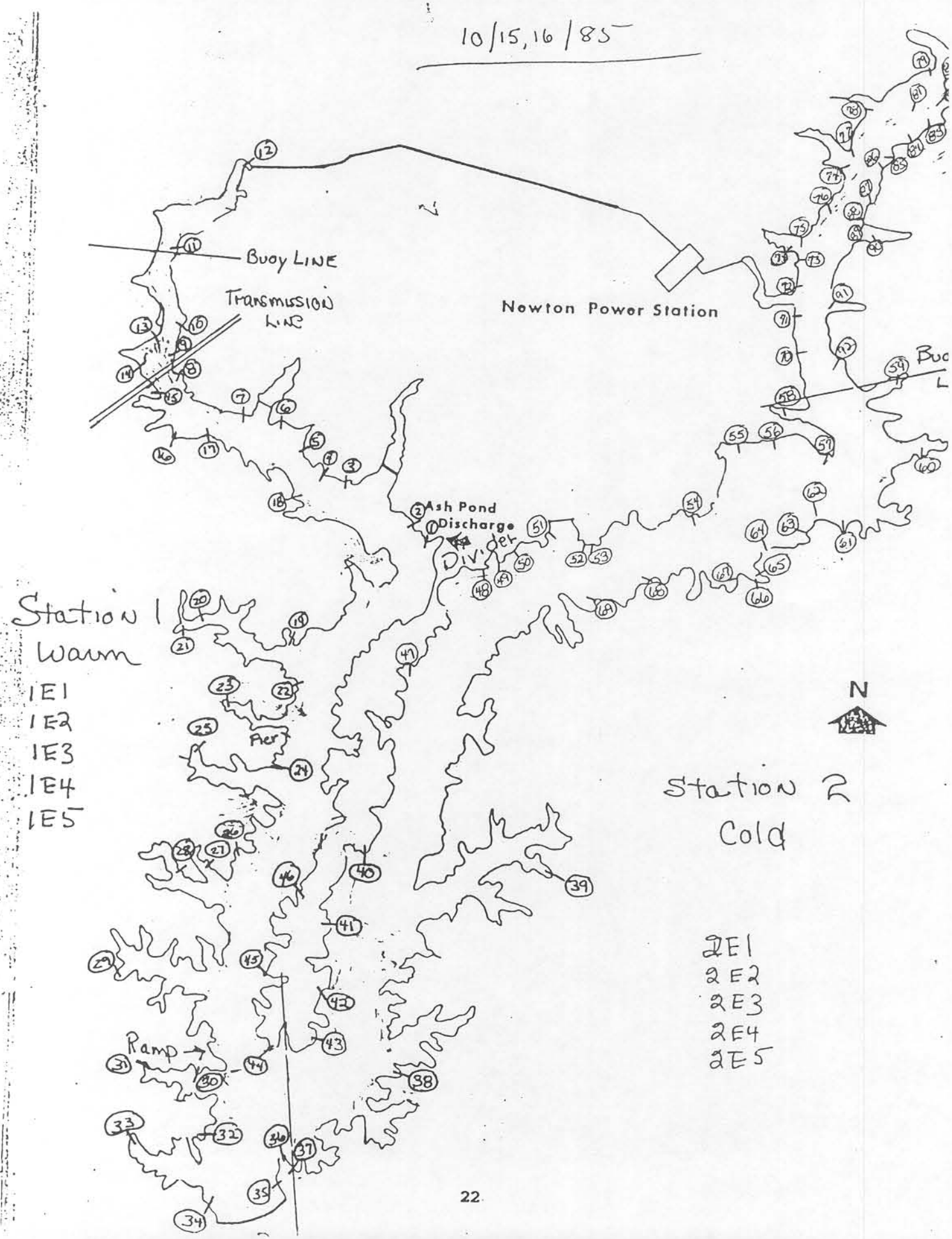
In October, 1985, 668 White Crappie were caught in 92 nets nights. They ranged in size from 16 cm to 33 cm. The relative weights (Wr) for all were below average except for one individual (33 cm) which was above average.

In April, 1986, 439 White Crappie were caught in 30 net nights. They ranged in size from ten (10) cm to 30 cm. The size peak was at 19 cm which is the same as that found in the impingement sampling (Figure 4).

The White Crappie collected in both the fall and spring were aged by otoliths. Both sample collections were dominated by the 1982 and 1983 year classes. Only a few 1981 and 1984 fish were found in either sample and no 1985 or 1986 crappie were found.

Trawling was done in July, 1986 at several lake locations. Once again, no 1985 or 1986 crappie were found. This may possibly be the result of sampling bias, since crappie have never been found in any sample collections since 1976 until they reach a 2+ age. However, the situation is being studied and additional trawing is planned for August, 1986.

FIGURE 7 OCTOBER 1985 TRAP NET LOCATIONS



30 Nets = 18% of [illegible]

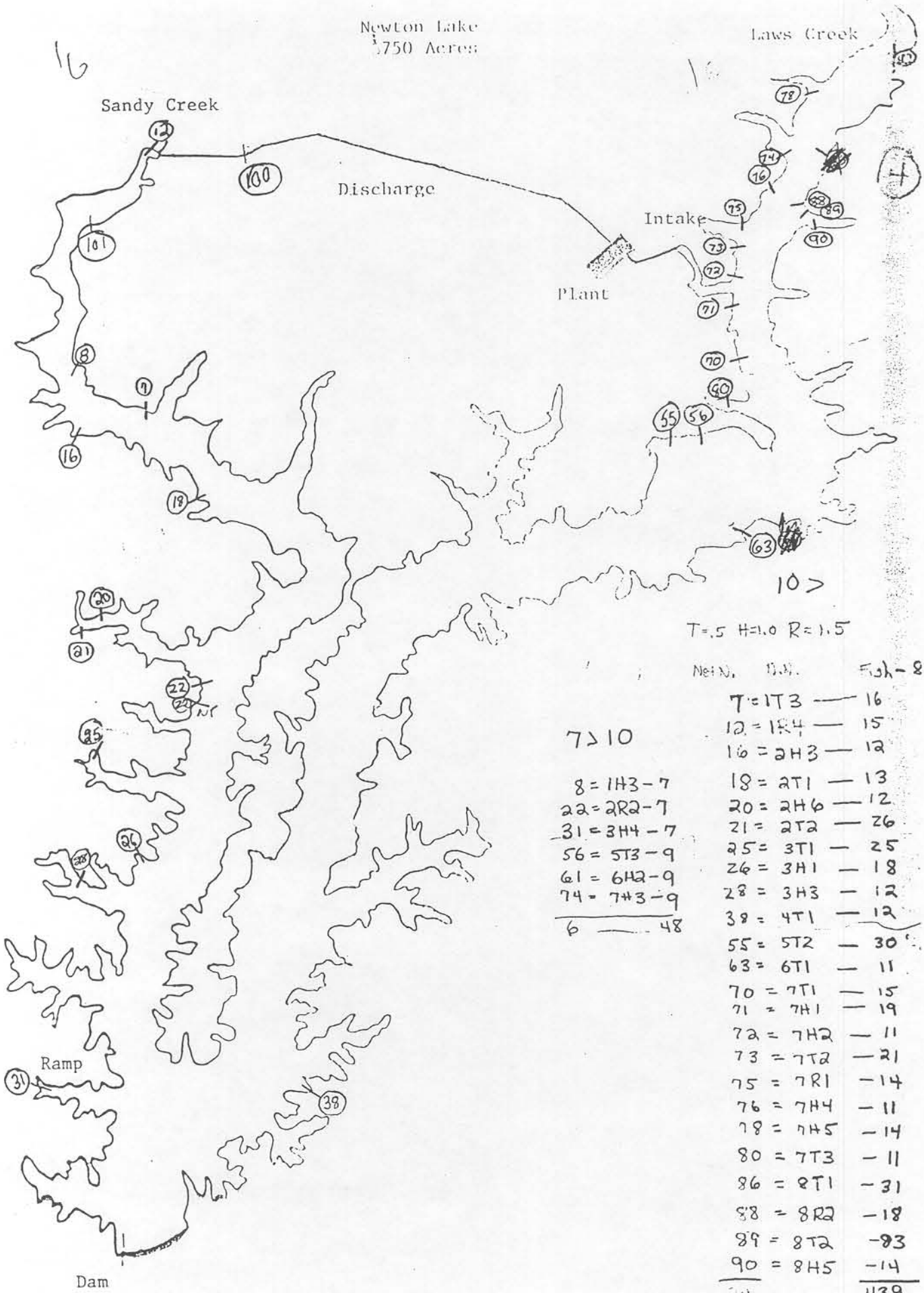


FIGURE 8
APRIL 1986 TRAP NET LOCATIONS

SUMMARY

1) The 1986 numbers of impinged Bluegill and White Crappie are significantly lower than those impinged in 1983-84.

2) Impingement of Bluegill and White Crappie does not appear to be cyclic or related to water temperatures alone.

3) The numbers of fish harvested in 1986 by anglers, particularly the number of White Crappie, is comparable to the numbers harvested in 1981.

4) Based on the creel data, the impingement of fish in 1983-84 and in 1986 has had little, if any, impact on the recreational fishery.

5) To date, the Crappie Assessment Survey shows that the crappie population is dominated by 1982 and 1983 year classes.

6) No 1985 or 1986 White Crappie have been found by any sampling method (electrofishing, trapnets, trawling, impingement, or seining).

7) The oil spill appears to have had little effect upon the adult fish population.

8) The effects of the oil spill, particularly upon the larval and juvenile fishes is still unknown and being studied.

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Price, O.M., 1983. Fisheries Status: 1982-Newton CIPS Lake, IDOC, Unpublished.

APPENDIX A

IMPINGEMENT MONITORING DATA

Daily Impingement Results	Tables A-1 Through A-50
Monthly Impingement Results	Table A-51
Summary of Operational Data	Table A-52

TABLE A-2 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

January 8, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	3,860	38,598	10.0	90	110
	Medium	256	10,962	42.8	145	200
	Large	29	2,330	80.3	200	311
Total		4,145	51,890	12.5	90	311
White Crappie	NA[a]	9	1,365	151.7	176	273
Bluegill	NA	6	144	24.0	66	157
Channel Catfish	NA	4	388	97.0	141	280
Green Sunfish	NA	3	62	20.7	105	122
Largemouth Bass	NA	2	20	10.0	95	98
Carp	NA	1	1,390	695.0	390	408
Longear Sunfish	NA	1	56	56.0	148	148
Total		4,17	55,315			

[a]NA - Not applicable; all specimens individually processed.

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TABLE A-3 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

January 10, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	8,946	52,308	5.8	97	108
	Medium	387	12,624	32.6	144	189
	Large	51	3,494	68.5	180	284
Total		9,384	68,426	7.3	97	284
Bluegill	NA[a]	10	153	15.3	56	156
White Crappie	NA	10	1,810	181.0	175	346
Largemouth Bass	NA	4	18	4.5	81	120
Orangespot Sunfish	NA	2	5	2.5	70	74
Channel Catfish	NA	1	100	100.0	245	245
Tadpole Madtom	NA	1	2	2.5	75	75
Green Sunfish	NA	1	20	20.0	113	113
Hybrid Sunfish	NA	1	56	56.0	152	152
Total		9,414	70,590			

[a]NA - Not applicable; all specimens individually processed.

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TABLE A-4 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

January 15, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard shad	Small	31,003	241,950	7.8	92	111
	Medium	816	32,406	39.7	141	188
	Large	42	4,132	98.4	240	335
Total		31,861	278,488	8.7	92	335
White Crappie	NA[a]	28	5,920	211.4	110	319
Bluegill	NA	18	420	23.3	60	140
Channel Catfish	NA	10	1,202	120.2	110	287
Largemouth Bass	NA	5	2,546	509.2	115	484
Longear Sunfish	NA	4	204	51.0	140	155
Sunfish	NA	3	3	1.0	57	65
Green Sunfish	NA	1	4	4.0	85	85
Tadpole Madtom	NA	1	4	4.0	85	85
Total		31,931	288,791			

[a]NA - Not applicable; all specimens individually processed.

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TABLE A-5 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

January 17, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	7,260	72,584	9.9	94	119
	Medium	344	12,885	37.5	145	208
	Large	13	1,016	78.2	195	287
Total		7,617	86,485	11.4	94	287
Bluegill	NA[a]	19	469	24.7	56	153
White Crappie	NA	9	1,236	137.3	196	288
Largemouth Bass	NA	5	87	17.4	70	198
Channel Catfish	NA	4	504	126.0	215	290
Longear Sunfish	NA	2	60	30.0	110	140
Hybrid Sunfish	NA	1	98	98.0	186	186
Black Bullhead	NA	1	20	20.0	102	102
Total		7,658	88,959			

[a]NA - Not applicable; all specimens individually processed.

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TABLE A-6 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

January 22, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	1,110	13,888	12.5	100	120
	Medium	92	3,420	37.2	140	205
	Large	4	426	106.5	200	258
Total		1,206	17,734	14.7	100	258
White Crappie	NA[a]	18	2,734	151.9	171	293
Bluegill	NA	14	618	44.1	50	166
Green Sunfish	NA	4	272	68.0	146	166
Hybrid Sunfish	NA	1	90	90.0	164	164
Largemouth Bass	NA	1	1,500	1500.0	445	445
Total		1,244	22,948			

[a]NA - Not applicable; all specimens individually processed.

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TABLE A-7 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION
January 24, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard shad	Small	1,866	15,834	8.5	96	110
	Medium	261	9,864	37.8	153	194
	large	6	546	91.0	203	249
Total		2,133	26,244	12.3	96	249
Bluegill	NA[a]	35	1,366	39.0	95	160
White Crappie	NA	28	3,508	125.3	100	288
Green Sunfish	NA	4	196	49.0	115	153
Orange Spot Sunfish	NA	2	14	7.0	78	80
Channel Catfish	NA	2	400	200.0	255	330
Long Ear Sunfish	NA	1	90	90.0	171	171
Total		2,205	31,181			

[a]Not applicable; all specimens individually processed.

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TABLE A-8 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

January 29, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	38,707	294,456	7.6	95	110
	Medium	1,343	59,372	44.2	175	210
	Large	37	5,078	137.2	260	308
Total		40,087	358,906	8.9	95	308
White Crappie	Small	20	1,474	73.7	113	195
	Medium	32	3,089	96.5	200	226
	Large	12	2,510	209.2	255	288
Total		64	7,073	110.5	113	288
Bluegill	Small	20	336	16.8	74	115
	Medium	17	584	34.4	120	139
	Large	11	630	57.3	140	158
Total		48	1,550	32.3		
Largemouth Bass	NA[a]	7	198	28.3	70	195
Channel Catfish	NA	7	452	64.6	135	280
Green Sunfish	NA	4	354	88.5	161	181
Warmouth	NA	1	74	74.0	160	160
Longear Sunfish	NA	1	38	38.0	133	133
Total		40,219	368,645			

[a]NA - Not applicable; all specimens individually processed.

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TABLE A-9 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

January 31, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	10,173	81,830	8.0	96	106
	Medium	494	23,470	47.5	167	209
	Large	24	3,580	149.1	256	295
Total		10,691	108,880	10.2	96	295
Bluegill	NA[a]	24	676	28.1	52	165
White Crappie	NA	15	940	62.7	104	235
Largemouth Bass	NA	5	102	20.4	83	168
Green Sunfish	NA	3	142	47.3	132	146
Warmouth	NA	1	20	20.0	105	105
Total		10,739	110,760			

[a]NA - Not applicable; all specimens individually processed.

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TABLE A-10 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

February 5, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	9,209	79,436	8.6	94	110
	Medium	610	21,344	35.0	143	188
	Large	16	1,566	97.9	220	288
Total		9,835	102,346	10.4	94	288
Bluegill	NA[a]	18	856	47.6	62	173
White Crappie	NA	11	1,070	97.3	182	264
Largemouth Bass	NA	4	100	25.0	107	164
Total		9,868	104,372			

[a]NA - Not applicable; all specimens individually processed.

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TABLE A-11 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION
February 7, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	2,432	17,320	7.1	95	123
	Medium	170	6,352	37.4	150	193
	Large	2	234	117.0	216	284
Total		2,451	23,906	9.8		
Bluegill	NA[a]	13	476	36.6	97	163
White Crappie	NA	8	518	64.8	163	215
Green Sunfish	NA	3	152	50.7	125	164
Hybrid Sunfish	NA	2	90	45.0	106	156
Total		2,477	25,142			

[a]NA - Not applicable; all specimens individually processed.

TABLE A-12 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

February 12, 1986 *

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	10,210	102,100	10.0	99	115
	Medium	541	21,656	40.0	145	218
	Large	11	1,124	102.2	205	265
Total		10,762	124,880	11.6		
Bluegill	NA[a]	25	796	31.8	82	165
White Crappie	NA	7	836	119.4	120	268
Largemouth Bass	NA	1	1,750	1750.0	453	453
Channel Catfish	NA	1	244	244.0	320	320
Carp	NA	1	74	74.0	157	157
Golden Shiner	NA	1	36	36.0	155	155
Orangespot Sunfish	NA	1	8	8.0	80	80
Hybrid Sunfish	NA	1	20	20.0	105	105
Total		10,800	128644			

[a]NA - Not applicable; all specimens individually processed.
*All Fish Frozen

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TABLE A-13 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

February 14, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	12,144	104,836	8.6	98	114
	Medium	623	24,898	40.0	155	202
	Large	15	1,854	123.6	225	296
Total		12,782	131,588	10.2	98	296
Bluegill	NA[a]	14	440	31.4	55	158
White Crappie	NA	10	1,018	101.8	109	275
Channel Catfish	NA	3	402	134.0	141	296
Orangespot Sunfish	NA	2	12	6.0	50	80
Largemouth Bass	NA	1	48	48.0	167	167
Green sunfish	NA	1	4	4.0	56	56
Total		12,813	133,512			

[a] NA - Not applicable; all specimens individually processed.

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TABLE A-14 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION
February 19, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	2,673	21,580	8.1	96	113
	Medium	317	11,958	37.7	174	210
	Large	14	1,772	126.6	225	308
Total		3,004	35,310	11.8	96	308
White Crappie	NA[a]	12	1,772	148.0	167	290
Bluegill	NA	10	442	42.2	85	170
Largemouth Bass	NA	2	12	6.0	90	92
Total		3,028	37,516			

[a]NA - Not applicable; all specimens individually processed.

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TABLE A-15 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

February 21, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	2,439	21,588	8.9	92	116
	Medium	241	9,664	40.1	143	194
	Large	10	1,308	130.8	215	300
Total		2,690	32,560	12.1	92	300
Bluegill	NA[a]	16	778	48.6	100	170
White Crappie	NA	5	936	187.2	115	278
Largemouth Bass	NA	1	14	14.0	120	120
Green Sunfish	NA	1	46	46.0	159	159
Warmouth	NA	1	24	24.0	105	105
Total		2 714	34,358			

[a]NA - Not applicable; all specimens individually processed.

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TABLE A-16 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION FEBRUARY 26, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	1,315	14,456	11.0	99	140
	Medium	93	3,696	39.7	182	198
	Large	8	874	190.2	220	304
Total		1,416	19,026	13.4	99	304
Bluegill	NA[a]	19	862	45.4	73	180
White Crappie	NA	11	1,812	164.7	186	295
Largemouth Bass	NA	1	34	34.0	158	158
Black Bullhead	NA	1	60	60.0	173	173
TOTAL		1,447	21,794			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
2/86

TABLE A-17 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION FEBUARY 28, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	3,110	31,100	10.0	94	140
	Medium	197	7,706	39.1	140	216
	Large	6	770	128.3	251	311
Total		3,313	39,576	11.9	94	311
Bluegill	NA[a]	11	308	28.0	60	145
White Crappie	NA	3	298	99.3	198	240
Green Sunfish	NA	3	224	74.6	151	166
Largemouth Bass	NA	2	30	15.0	97	126
Orangespot Sunfish	NA	1	8	8.0	76	76
Hybrid Sunfish	NA	1	64	64.0	164	164
Total		3,334	40,508			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
2/86

TABLE A-18 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

March 5 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	2,638	23,338	8.8	97	107
	Medium	238	9,794	41.2	150	209
	Large	3	338	112.7	256	260
Total		2,879	33,470	11.6	97	260
Bluegill	NA[a]	19	574	30.2	80	166
White Crappie	NA	2	126	63.0	184	196
Warmouth	NA	1	20	20.0	100	100
Total		2,901	34,190			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
3/86

TABLE A-19 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

March 7 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	2,742	21,076	7.7	95	112
	Medium	210	7,974	38.0	151	201
	Large	10	1,128	112.8	214	288
Total		2,962	30,178	10.2	95	288
Bluegill	NA[a]	11	274	24.9	63	151
White Crappie	NA	6	1,178	196.3	195	270
Warmouth	NA	2	132	66.0	103	180
Largemouth Bass	NA	1	4	4.0	79	79
Channel Catfish	NA	1	100	100.0	240	240
Yellow Bullhead	NA	1	168	168.0	240	240
Carp	NA	1	32	32.0	130	130
Green Sunfish	NA	1	126	126.0	185	185
Hybrid Sunfish	NA	1	88	88.0	175	175
total		2,987	32,280			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
3/86

TABLE A-20 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION
March 12, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	310	3,104	10.0	100	115
	Medium	81	3,140	38.8	148	210
	Large	1	132	132.0	261	261
Total		392	6,376	16.3	100	261
Bluegill	NA[a]	26	1,076	41.4	75	158
White Crappie	NA	4	766	191.5	193	293
Warmouth	NA	2	54	27.0	108	125
Yellow Bullhead	NA	1	62	62.0	176	176
Green Sunfish	NA	1	96	96.0	175	175
Total		426	8,430			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
3/86

TABLE A-21 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

March 14 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	115	1,100	9.6	95	115
	Medium	126	4,600	36.5	130	192
	Large	6	624	104.0	220	280
Total		247	6,324	25.6	95	280
Bluegill	Small	17	236	13.9	60	120
	Medium	13	496	38.2	115	140
	Large	14	902	64.4	150	170
Total		44	1,634	37.1	60	170
White Crappie	NA[a]	4	586	146.5	184	260
Channel Catfish	NA	2	208	104.0	240	240
Longear Sunfish	NA	1	34	34.0	125	125
Total		298	8,786			

[a]Not applicable; all specimens individually processed.

DSB:gjj
3/86

TABLE A-22 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION MARCH 19 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	7,373	54,824	7.4	100	120
	Medium	525	17,072	32.5	155	193
	Large	7	644	92.0	209	282
Total		7,905	72,540	9.2	100	282
Bluegill	Small	68	828	12.2	50	135
	Medium	70	2,924	41.8	135	148
	Large	23	1,400	60.9	149	161
Total		161	5,152	32.0	50	161
White Crappie	NA[a]	11	1,270	115.0	115	340
Largemouth Bass	NA	4	14	3.5	74	87
Warmouth	NA	3	44	14.7	67	117
Largeear Sunfish	NA	1	38	38.0	135	135
Hybrid Sunfish	NA	1	66	66.0	159	159
Green Sunfish	NA	1	60	60.0	153	153
Channel Catfish	NA	1	120	120.0	270	270
Total		8,088	79,304			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
3/86

TABLE A-23 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

March 21, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	5,310	39,844	7.5	95	115
	Medium	1,268	38,182	30.1	155	199
	Large	4	432	108.0	226	281
Total		6,582	78,458	11.9	95	281
Bluegill	Small	97	1,257	13.0	50	125
	Medium	10	436	43.6	126	147
	Large	7	522	74.6	226	281
Total		114	2,215	19.4	50	281
White Crappie	NA[a]	13	1,856	142.8	110	285
Largemouth Bass	NA	3	34	11.3	67	104
Green Sunfish	NA	2	14	7.0	61	92
Black Bullhead	NA	2	152	76.0	165	220
Channel Catfish	NA	2	156	78.0	210	230
Long Ear Sunfish	NA	1	50	50.0	141	141
Warmouth	NA	1	20	20.0	100	100
Total		6,720	82,955			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
3/86

TABLE A-24 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION
March 26, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	546	4,584	8.4	100	120
	Medium	190	5,084	26.8	145	188
	Large	9	502	55.8	190	221
Total		745	10,170	13.7	100	221
Bluegill	A	20	206	10.3	47	120
	B	37	1,230	33.2	127	140
	C	8	446	55.8	143	158
	D	6	502	83.7	160	185
Total		71	2,384	33.6	47	185
White Crappie	NA[a]	7	402	57.4	105	215
Total		823	12,956			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
4/86

TABLE A-25 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

March 28 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	243	1,804	7.4	99	111
	Medium	164	4,762	29.0	141	185
	Large	2	182	91.0	204	270
Total		409	6,784	16.5	99	270
Bluegill	Small	53	848	16.0	55	112
	Medium	108	3,594	33.3	123	145
	Large	11	638	58.0	145	185
Total		172	5,080	29.5	55	185
White Crappie	NA[a]	4	224	56.0	118	205
Largemouth Bass	NA	2	18	9.0	80	123
Long Ear Sunfish	NA	1	52	52.0	150	150
Total		588	12,122			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
4/86

TABLE A-26 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

April 2 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	843	6,332	7.5	99	114
	Medium	268	8,011	29.9	141	204
	Large	4	404	101.0	209	305
Total		1,115	14,747	13.2	99	305
Bluegill	Small	14	130	9.2	53	105
	Medium	81	2,558	31.6	109	145
	Large	4	238	59.5	152	155
Total		99	2,926	29.5	53	155
White Crappie	NA[a]	20	830	41.5	109	245
Largemouth Bass	NA	4	54	13.5	109	142
Longear Sunfish	NA	2	80	40.0	122	139
Total		1,240	18,637			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
4/86

TABLE A-27 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

April 4 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	510	3,821	7.5	99	106
	Medium	310	7,767	25.0	120	193
	Large	8	736	92.0	205	285
Total		828	12,324	14.9	99	285
Bluegill	Small	18	186	10.3	53	95
	Medium	48	1,580	32.9	107	145
	Large	17	932	54.8	145	168
White Crappie	NA[a]	23	2,032	88.3	105	292
Longear Sunfish	NA	1	44	44.0	135	135
Largemouth Bass	NA	1	10	10.0	100	100
Warmouth	NA	1	30	30.0	115	115
Green Sunfish	NA	1	88	88.0	161	161
Total		938	17,226			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
4/86

TABLE A-28 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

April 9 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard	Small	277	2,088	7.5	100	122
	Medium	87	2,002	23.0	145	187
	Large	5	370	74.0	195	266
Total		369	4,460	12.0	100	266
Bluegill	Small	35	358	10.2	50	113
	Medium	50	1,552	31.0	119	140
	Large	6	262	43.7	142	157
Total		91	2,172	23.9	50	157
White Crappie	NA[a]	17	1,064	62 6	111	265
Largemouth Bass	NA	2	16	8.0	80	114
Channel Catfish	NA	2	24	12.0	81	146
Warmouth	NA	1	24	24.0	110	110
Total		482	7,760			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
4/86

TABLE A-29 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

April 11, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	118	974	8.2	102	117
	Medium	10	226	22.6	141	178
	Large	16	706	44.1	187	212
Total		144	1,906	13.2	102	212
Bluegill	Small	8	98	12.3	53	111
	Medium	41	1,120	27.3	117	132
	Large	4	164	41.0	135	146
Total		53	1,382	26.0	53	146
White Crappie	NA[a]	13	922	70.9	170	215
Black Bullhead	NA	1	60	60.0	178	178
Largemouth Bass	NA	1	12	12.0	113	113
Warmouth	NA	1	26	26.0	112	112
Total		213	4,308			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
4/86

TABLE A-30 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION
April 16, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	184	1,834	10.0	93	120
	Medium	200	5,022	25.1	143	188
	Large	5	350	70.0	207	244
Total		389	7,206	18.5	93	244
Bluegill	Small	54	950	17.6	58	122
	Medium	156	4,816	30.9	118	136
	Large	17	684	40.2	130	156
Total		227	6,450	28.4	58	156
White Crappie	NA[a]	11	530	48.2	117	226
Largemouth Bass	NA	2	20	10.0	98	113
Long Ear Sunfish	NA	1	80	80.0	171	171
Carp	NA	1	724	724.0	404	404
Total		631	15,010			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
4/86

TABLE A-31 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

April 18 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	192	1,838	9.6	98	126
	Medium	147	4,034	27.4	140	200
	Large	1	108	108.0	268	268
Total		340	5,980	17.6	98	268
Bluegill	Small	70	1,152	16.5	89	112
	Medium	124	3,542	28.6	116	135
	Large	8	340	42.5	133	150
Total		202	5,034	24.9	89	150
White Crappie	NA [a]	5	306	61.2	178	220
Long Ear Sunfish	NA	1	42	42.0	134	134
Total		548	11,362			

[a] NA - Not applicable; all specimens individually procjessed.

DSB:gjj
4/86

TABLE A-32 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

April 23, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	87	838	8.4	103	125
	Medium	88	2,572	29.2	145	202
	Large	2	210	105.0	264	265
Total		177	3,620	20.5	103	265
Bluegill	Small	22	423	19.2	100	117
	Medium	40	1,136	28.4	120	135
	Large	14	514	36.7	131	141
Total		76	2,073	27.3	100	141
White Crappie	NA [a]	12	1,194	99.5	167	257
Channel Catfish	NA	2	18	9.0	88	110
Largemouth Bass	NA	1	134	116.0	116	116
Total		268	7,039			

[a] NA - Not applicable; all specimens individually processed.

DSB:gjj
4/86

TABLE A-33 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

April 25, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	46	572	12.4	103	112
	Medium	44	1,308	29.7	152	190
Total		90	1,880	20.8	103	190
Bluegill	NA[a]	6	160	26.7	103	146
White Crappie	NA	5	336	67.2	168	212
Channel Catfish	NA	3	14	4.7	70	105
Golden Shiner	NA	1	28	28.0	144	144
Total		105	2,418			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
4/86

TABLE A-34 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

April 30 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	4	30	7.5	102	116
	Medium	10	238	23.8	135	186
	Large	1	86	86.0	230	230
Total		15	354	23.6	102	230
Total		15	354			

DSB:gjj
5/86

TABLE A-35 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

May 2 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	10	66	6.6	100	117
	Medium	15	338	22.5	135	187
Total		25	404	16.2	100	187
Bluegill	NA[a]	2	92	46.0	123	166
White Crappie	NA	1	182	182.0	238	238
Channel Catfish	NA	1	6	6.0	86	86
Total		29	684			

[a]NA - Not pplicable; all specimens individually processed.

DSB:gjj
5/86

TABLE A-36 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

May 7 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	4	28	7.0	105	118
	Medium	19	412	21.7	141	178
	Large	1	50	50.0	222	222
Total		24	490	20.4	105	222
Bluegill	NA[a]	4	78	19.5	94	122
White Crappie	NA	2	278	139.0	168	276
Largemouth Bass	NA	1	388	338.0	335	388
Total		33	1,234			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
5/86

TABLE A-37NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

May 9 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Medium	5	114	22.8	148	179
	Large	1	114	114.0	270	270
Total		6	228			
White Crappie	NA[a]	2	134	67.0	210	220
Total		8	362			

[a]NA - Not Applicable; all specimens individually processed.

DSB:gjj
3/86

TABLE A-38 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

May 14 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	Small	3	28	9.3	106	108
	Medium	22	552	25.0	136	183
Total		25	580	33.3	106	183
White Crappie	NA[2]	7	1,142	163.1	193	258
Largemouth Bass	NA	2	2,010	1005.0	340	450
Bluegill	NA	1	6	6.0	60	60
Total		35	3,738			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
3/86

TABLE A-39 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

May 21 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	NA[a]	4	102	25.5	148	182
Total		4	102			

[a] NA - Not Applicable; all specimens individually processed.

DSB:gjj
3/86

TABLE A-40 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

May 23 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Bluegill	NA[a]	3	100	33.3	113	141
White Crappie	NA	2	378	199.0	243	258
Channel Catfish	NA,	1	168	168.0	312	312
Total		6	666			

[a]NA - Not applicalbe all specimens individually processed.

TABLE A-41 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

May 28 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
White Crappie	NA	15	2,472	164.8	178	320
Gizzard Shad	NA	5	236	47.2	150	255
Largemouth Bass	NA	1	576	576.0	353	353
Bluegill	NA	1	48	48.0	138	138
Channel Catfish	AN	1	86	86.0	231	231
Total		23	3,418			

[a] Not applicable; all specimens individually processed.

DSB:gjj
Enclosure

TABLE A-42 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

May 30 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
White Crappie	NA[a]	7	1,196	170.9	194	277
Bluegill	NA	4	124	31.0	82	146
Gizzard Shad	NA	3	56	18.7	140	156
Channel Catfish	NA	1	70	70.0	220	220
Total		15	1,446			

[a]NA - Not Applicable; all specimens individually processed.

DSB:gjj
3/3/8

TABLE A-43 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

June 4 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
White Crappie	NA[a]	1	220		265	265
Total		1	220			

[a]NA - Not Applicable; all specimens individually processed.

DSB:gjj

6/86

TABLE A-44 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

June 6 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
White Crappie	NA[a]	1	48	48	177	177
Total		1	48			

[a]Not Applicable; all specimens individually processed.

DSB:gjj
6/86

TABLE A-45 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

June 11 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Largemouth Bass	NA[a]	1	1250	1250	444	444
Total		1	1250			

[a]NA - Not applicable; all specimens individually processed.

DSB:gjj
6/8/

TABLE A-46 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

June 13 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	NA[a]	1	34.0	34.0	158	158
Bluegill	NA	1	44.0	44.0	152	152
Channel Catfish	NA	1	60.0	60.0	210	210
Total		3	138			

[a]Not Applicable; all specimens individually processed.

DSB:gjj
6/86

TABLE A-47 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

June 18 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Largemouth Bass	NA[a]	1	1,050	1.050	488	488
Green Sunfish	NA	1	60	60	153	153
Bluegill	NA	2	24	12	84	105
Total		4	1,134			

[a]NA - Not Applicable; all specimens individually processed.

DSB:gjj
6/86

TABLE A-48 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION
June 20 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Bluegill	NA[a]	1	26	26	124	124

[a]NA - Not Applicable; all specimens individually processed.

DSB:gjj
6/86

TABLE A-49 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

June 25 , 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
White Crappie	NA[a]	1	120	120	210	210
Bluegill	NA	1	24	24	115	115
Total		2	144			

[a]NA - Not Applicable; all specimens individually processed.

DSB:gjj
6/86

TABLE A-50 NUMBER, WEIGHT AND LENGTH RANGE OF ALL FISH TAXA COLLECTED DURING IMPINGEMENT SAMPLING AT THE NEWTON POWER STATION

June 27, 1986

SPECIES	SIZE GROUP	NUMBER	TOTAL WEIGHT (g)	AVERAGE WEIGHT (g)	LENGTH RANGE (MM) MINIMUM	MAXIMUM
Gizzard Shad	NA[a]	3	6	2	48	50
Bluegill	NA	1	26	26	130	130
Total		4	32			

[a]NA - Not Applicable; all specimens individually processed

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6/86

EA-3

NEWTON 316(b)

IMPINGEMENT DATA SHEET

RECEIVED
JUL 3 1986
ENVIRONMENTAL AFFAIRS DEPARTMENT

DATE 7/2

COLLECTOR LD

PAGE 1 OF 1

TRAP SET: DATE 7/1 TIME 10

TRAP PICKUP: DATE 7/2 TIME 10

SCREEN WASH SCHEDULE:

1. LAST WASH BEFORE SETTING TRAP
2. LAST WASH BEFORE REMOVING TRAP
3. TOTAL TIME INVOLVED

NUMBER OF PUMPS OPERATING 4, 1

SCREENS OPERATING 5

RECIRCULATING LINE OPERATING

HOW LONG

CONDENSER INLET TEMP. 83

SPECIES	LENGTH (mm)	WEIGHT (g)	SIZE GROUP	ADDITIONAL NUMBER	COMPOSITE WEIGHT (g)
NO FISH					

TABLE A-51 MONTHLY SUMMARY OF NUMBERS OF FISH IMPINGED AND TOTAL WEIGHT (Kg) FROM JANUARY 1 THROUGH JUNE 30, 1986

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	TOTAL
Total Number	115,224	46,482	22,831	4,440	151	17	189,146
Total Weight	1,141,076	525,846	271,023	84,174	11,650	2,992	2,036,761
Gizzard Shad	114,730	46,253	22,121	3,467	92	4	186,667
Bluegill	185	126	618	837	15	6	1,787
White Crappie	188	67	51	106	36	3	453
Largemouth Bass	34	12	10	11	4	2	73
Channel Catfish	36	4	6	7	4	1	58
Green Sunfish	20	8	5	1	0	1	35
Longear Sunfish	10	0	4	5	0	0	19
Warmouth	2	1	9	3	0	0	15
Sunfish Hybrid	6	4	2	0	0	0	10
Orangespotted Sunfish	5	4	0	0	0	0	9
Carp	2	1	1	1	0	0	5
Black Bullhead	1	1	2	1	0	0	5
Yellow Bullhead	2	0	2	0	0	0	4
Tadpole Madtom	2	0	0	0	0	0	2
Golden Shiner	0	1	0	1	0	0	2
Bluntnose Minnow	1	0	0	0	0	0	1

TABLE A-52 SUMMARY OF CONDENSER INLET TEMPERATURES, NUMBER OF CIRCULATING WATER PUMPS, AND TOTAL NUMBER OF FISH IMPINGED DURING 1986 IMPINGEMENT MONITORING

DATE	INLET TEMP (°C)	NUMBER PUMPS	TOTAL FISH	DATE	INLET TEMP (°C)	NUMBER PUMPS	TOTAL FISH
1-3	37.6	4	7,643	4-4	59.0	3	938
1-8	35	4	4,171	4-9	60.9	3	482
1-10	37	3	9,414	4-11	59.0	3	213
1-15	37	4	31,931	4-16	56.0	3	631
1-17	46	3	7,658	4-18	56.0	3	548
1-22	42	3	1,244	4-23	57.0	3	268
1-24	42	3	2,205	4-25	59.7	3	105
1-29	38.1	3	40,219	4-30	65.0	3	15
1-31	38	3	10,739	5-2	65.0	3	29
2-5	43.3	3	9,868	5-7	68.0	3	31
2-7	43	3	2,477	5-9	69.7	3	8
2-12	38.9	3	10,800	5-14	75.6	6	35
2-14	37.5	3	12,813	5-21	68	5	4
2-19	42.4	3	3,028	5-23	71.5	3	6
2-21	42	3	2,714	5-28	73	4	23
2-26	43.2	3	1,448	5-30	75	4	15
2-28	40	3	3,334	6-4	74	4	1
3-5	40	3	2,901	6-6	77	4	1
3-7	41	3	2,987	6-11	80	5	1
3-12	46.8	3	426	6-13	77.5	5	3
3-14	48.6	3	298	6-18	78	5	4
3-19	50	4	8,088	6-20	81.9	5	1
3-21	47.3	4	6,720	6-25	80	5	2
3-26	59	2	823	6-27	82	7	4
3-28	52.3	3	588	7-2	83	5	0
4-2	58.6	3	1,240				

APPENDIX B

PRELIMINARY CREEL SURVEY DATA

PERIODS 1 THROUGH 7

10 hr days

TABLE 1
FISHING EFFORT
PERIOD 1

Dates: January 1 - January 28

Number Fishable Days: Weekend 8 Weekday 20

Type Day	Angler Pref.	ACTUAL Interviews No.	Interviews %T	Anglers No.	Anglers Avg/int.	Hours No.	Hours %T	Hours Avg/Angler	Average T. Count	PROJECTED Angler Trips	Effort in Angler Hours
WE	LMB	27	47.4	60	2.22	242	47.4	4.03		370	1490.71
	WC	25	43.8	53	2.12	229	44.9	4.32		327	1412.09
	CC	5	8.8	10	2.0	39.5	7.7	3.95		61	242.16
	TOTAL	57	100	123	2.16	510.5	100	4.15	18.2	758	3144.96
WD	LMB	12	30.8	21	1.75	115.5	33.0	5.5		191	1048.48
	WC	20	51.3	31	1.55	158	45.2	5.10		282	1436.09
	CC	7	17.9	14	2.0	76	21.7	5.43		127	689.45
	TOTAL	39	100	66	1.69	349.5	99.9	5.3	9.4	600	3177.2

Projected Effort in Angler Hours = Average Trailer Count (Boat) × Average Number Anglers × Number of Type of Days × Hours Available to Anglers Per Day

Projected intended effort = sample percentages of effort expended for each species × total effort

Angler Trips = $\frac{\text{Angler Hours}}{\text{Mean Time spent fishing per trip}}$

TABLE 2
NUMBERS of FISH CREELED
PERIOD 1
(LMB: No. Kept / No. caught+released)

PE 24	Angler Pref	LMB	WC	CC	WE	BLG	GR	LE	WM	SUN. HYB	Carp	Y Bull	Bl Bull		T
						Species									
	LMB														
NE	WC		93	1											94
	CC			20											20
	T		93	21											114
	LMB														
D	WC		209	5		3		3							220
	CC			57									3		60
	T		209	62		3		3					3		280

TABLE 3
FISH CATCH RATE PER HOUR
(Catch Rate = No. Kept)

	LMB														
E	WC		.4061	.0044											.410
	CC			.5063											.506
	LMB														
D	WC		1.3228	.0316		.0190		.0190							1.3924
	CC			.7500									.0395		.7895

CPUE = $\frac{\text{measured harvest}}{\text{measured effort}}$

CMP

TABLE 4
PERIOD 1
PROJECTED NUMBER of FISH KEPT

Species

Angler Pref	LMB	WC	CC	WE	BLG	GR	LE	WM	SUN HYB.	Carp	Y BULL	BL BULL			T
LMB															
WC		573	6												579
CC			123												123
S.T.		573	129												702
LMB															
WC		1900	45		27		27								1999
CC			517									27			544
S.T.		1900	562		27		27					27			2543
—		2473	691		27		27					27			3245

arvest by Species = CPUE of Species x Total Estimated Effort for Species

OMP

10 hr days

TABLE 1
FISHING EFFORT
PERIOD 2

Dates: January 29 - February 22

Number Fishable Days: Weekend 7 Weekday 18

Type Day	Angler Pref.	ACTUAL Interviews No.	Interviews %T	Anglers No.	Anglers Avg/int.	Hours No.	Hours %T	Hours Avg/Angler	Average T. Count	PROJECTED Angler Trips	Effort in Angler Hours
WE	LMB	20	37.7	40	2.0	184	37.0	4.6		167	766.54
	WC	23	43.4	44	1.91	205.5	41.3	4.67		183	855.62
	CC	10	18.9	20	2.0	108	21.7	5.4		83	449.59
	TOTAL	53	100	104	1.96	497.5	100	4.78	15.1	433	2071.72
WD	LMB	1	9.1	1	1.0	3.5	4.5	3.5		64	223.17
	WC	6	54.5	9	1.5	39.5	50.3	4.39		568	2494.56
	CC	4	36.4	8	2.0	35.5	45.2	4.44		505	2241.63
	TOTAL	11	100	18	1.64	78.5	100	4.36	16.8	1137	4959.36

TABLE 2
NUMBERS of FISH CREELED
PERIOD 2
(LMB: No. Kept / No. caught+released)

Angler Pref	LMB	WC	CC	WE	BLG	GR	LE	WM	SUN. HYB	Carp	Y Bull	Bl Bull		T
	Species													
LMB	3	3		1										7
WC		361	11		6			1	1					380
CC		7	105		1				1			1		115
T	3	371	116	1	7			1	2			1		502
LMB														
WC		57		1										58
CC		1	31											32
T		58	31	1										90

TABLE 3
FISH CATCH RATE PER HOUR
(Catch Rate = No. Kept)

LMB	.0163	.0163		.0054										.038
WC		1.7567	.0535		.0292			.0049	.0049					1.849
CC		.0648	.9722		.0093				.0093			.0093		1.0649
LMB														
WC		1.443		.0253										1.4683
CC		.0282	.8732											.9014

CMP

TABLE 4
PERIOD 2
PROJECTED NUMBER of FISH KEPT

Species

PE IY	Angler Pref	LMB	WC	CC	WE	BLG	GR	LE	WM	SUN HYB.	carp	Y BULL	BL BULL			T
	LMB	12	12		4											28
NE	WC		1503	46		25			4	4						1582
	CC		29	437		4				4			4			478
	S.T.	12	1544	483	4	29			4	8			4			2088
	LMB															
D	WC		3600		63											3663
	CC		63	1957												2020
	S.T.		3663	1957	63											5683
GRAND TOTAL	—	12	5207	2440	67	29			4	8			4			7771

OMP

10 hr days

TABLE 1
FISHING EFFORT
PERIOD 3

Dates: February 23 - March 22

Number Fishable Days: Weekend 8 Weekday 20

Time of Day	Angler Pref.	ACTUAL Interviews No.	Interviews %T	Anglers No.	Anglers Avg/int.	Hours No.	Hours %T	Hours Avg/Angler	Average T. Count	PROJECTED Angler Trips	Effort in Angler Hours
	LMB	38	51.4	82	2.16	354.5	49.7	4.32		492	2124.14
E	WC	22	29.7	52	2.36	241.5	33.9	4.64		312	1448.86
	CC	14	18.9	23	1.64	117	16.4	5.09		138	700.92
	TOTAL	74	100	157	2.12	713	100	4.54	25.2	942	4273.92
	LMB	20	46.5	36	1.80	176.5	41.3	4.90		266	1304.67
ID	WC	9	20.9	18	2.00	122	28.6	6.78		133	903.47
	CC	14	32.6	30	2.14	128.5	30.1	4.28		222	950.86
	TOTAL	43	100	84	1.95	427	100	5.08	8.1	621	3159

TABLE 2
NUMBERS of FISH CREELED
PERIOD 3
(LMB: No. Kept / No. caught+released)

DE Day	Angler Pref	LMB	WC	CC	WE	BLG	GR	LE	WM	SUN HYB	Carp	Y Bull	Bl Bull		T
		Species													
	LMB	1		3											4
NE	WC		162	10		1	1						1		175
	CC			147								1			148
	T	1	162	160		1	1					1	1		327
	LMB	1		2	1										4
ND	WC		173	3		2		1							179
	CC			90											90
	T	1	173	95	1	2		1							273

TABLE 3
FISH CATCH RATE PER HOUR
(Catch Rate = No. Kept)

	LMB	.0028		.0085											.0113
	WC		.6708	.0414		.0041	.0041						.0041		.724
	CC			1.2564								.0085			1.264
	LMB	.0057		.0113	.0057										.022
ND	WC		1.4180	.0246		.0164		.0082							1.467
	CC			.7004											.700

CMP

TABLE 4
PERIOD 3
PROJECTED NUMBER of FISH KEPT

Species

PE EY	Angler Pref	LMB	WC	CC	WE	BLG	GR	LE	WM	SUN HYB.	Carp	Y Bull	BL Bull			T
	LMB	6		18												24
WE	WC		972	60		6	6						6			1050
	CC			881								6				887
	S.T.	6	972	959		6	6					6	6			1961
	LMB	7		15	7											29
ND	WC		1281	22		15		7								1325
	CC			666												666
	S.T.	7	1281	703	7	15		7								2020
GRAND TOTAL	—	13	2253	1662	7	21	6	7				6	6			3981

OMP

14 hr days

TABLE 1
FISHING EFFORT
PERIOD 4

Dates: March 23 - April 19

Number Fishable Days: Weekend 8 Weekday 20

Day	Angler Pref.	Interviews No.	Interviews %T	Anglers No.	Anglers Avg/int.	Hours No.	Hours %T	Hours Avg/Angler	Average T. Count	Angler Trips	Effort in Angler Hours
		ACTUAL									PROJECTED
	LMB	49	46.2	102	2.08	651.5	49.8	6.39		525	3355.93
E	WC	40	37.7	88	2.2	436	33.3	4.95		453	2244.03
	CC	17	16.0	41	2.41	221	16.9	5.39		211	1138.86
	TOTAL	106	99.9	231	2.18	1308.5	100	5.66	27.6	1191	6738.82
	LMB	24	50.0	37	1.54	203	43.9	5.49		329	1806.43
D	WC	15	30.6	28	1.87	159.5	34.5	5.70		249	1419.63
	CC	10	20.4	17	1.70	99.5	21.5	5.85		151	884.70
	TOTAL	49	100	82	1.67	462	99.9	5.63	8.8	731	4114.88

TABLE 2
NUMBERS of FISH CREELED
PERIOD 4
(LMB: No. Kept / No. caught+released)

Angler Pref	LMB	WC	CC	WE	BLG	GR	LE	WM	S.N. HYB	Carp	Y Bull	Bl Bull		T
LMB	16	64		1										81
WC		387	11		1									399
CC		13	33		5	3				4	1			59
T	16	464	44	1	6	3				4	1			539
LMB	1													1
WC		153	9		2									164
CC			72			1								73
T	1	153	81		2	1								238

TABLE 3
FISH CATCH RATE PER HOUR
(Catch Rate = No. Kept)

LMB	.0246	.0982		.0015										.1243
WC		.8876	.0252		.0023									.9151
CC		.0588	.1493		.0226	.0136				.0181	.0045			.2669
LMB	.0049													.0049
WC		.9592	.0564		.0125									1.0281
CC			.7236			.0100								.7336

OMP

TABLE 4
PERIOD 4

PROJECTED NUMBER OF FISH KEPT

Species

Angler Pref	LMB	WC	CC	WE	BLG	GR	LE	WM	SUN HYB.	Carp	Y BULL	BL BULL			T
LMB	83	330		5											418
WC		1992	57		5										2054
CC		67	170		26	15				21	5				304
S.T.	83	2389	227	5	31	15				21	5				2776
LMB	9														9
WC		1362	80		18										1460
CC			640		9										649
S.T.	9	1362	720		27										2118
—	92	3751	947	5	58	15				21	5				4894

OMP

17 Nr days

TABLE 1
FISHING EFFORT
PERIOD 5

Dates: April 20 - May 17

Number Fishable Days: Weekend 8 Weekday 20

Time of Day	Angler Pref.	ACTUAL Interviews No.	Interviews %T	Anglers No.	Anglers Avg/int.	Hours No.	Hours %T	Hours Avg/Angler	Average T. Count	PROJECTED Angler Trips	Effort in Angler Hours
E	LMB	49	40.8	98	2.00	609.5	42.2	6.22		448	2785.65
	WC	40	33.3	83	2.08	436	30.2	5.25		379	1993.52
	CC	31	25.8	70	2.26	400	27.6	5.71		319	1821.89
	TOTAL	120	99.9	251	2.09	1445.5	100	5.76	28.2	1146	6601.06
D	LMB	49	46.2	93	1.90	653	51.7	7.02		979	6875.81
	WC	41	38.7	72	1.76	402	31.8	5.58		758	4229.22
	CC	16	15.1	33	2.06	208.5	16.5	6.32		347	2194.41
	TOTAL	106	100	198	1.87	1263.5	100	6.38	25.4	2084	13299.44

TABLE 2
NUMBERS of FISH CREELED
PERIOD 5
(LMB: No. Kept / No. caught+released)

Angler Pref	LMB	WC	CC	WE	BLG	GR	LE	WM	SUN. HYB	Carp	Y Bull	Bl Bull		T
LMB	41	26	6	2										75
WC	2	704	50	4	12	9	1							782
CC	1	10	313		8	8				3				343
T	44	740	369	6	20	17	1			3				1200
LMB	27	65												92
WC		517	33	3	5	1	2			1	1			563
CC		3	103		3	2								111
T	27	585	136	3	8	3	2			1	1			766

TABLE 3
FISH CATCH RATE PER HOUR
(Catch Rate = No. Kept)

LMB	.0673	.0426	.0098	.0033										.1230
WC	.0046	1.6147	.1147	.0092	.0275	.0206	.0023							1.7936
CC	.0025	.025	.7825		.0200	.0200				.0075				.8575
LMB	.0413	.0995												.1408
WC		1.2861	.0821	.0075	.0124	.0025	.0050			.0025	.0025			1.4006
CC		.0144	.4940		.0144	.0096								.5324

CMP

TABLE 4
PERIOD 5
PROJECTED NUMBER OF FISH KEPT

Species

Angler Pref	LMB	WC	CC	WE	BLG	GR	LE	WM	SUN HYB.	carp	Y BULL	BL BULL			T
LMB	187	119	27	9											342
WC	9	3219	229	18	55	41	5								3576
CC	5	46	1426		36	36				14					1563
S.T.	201	3384	1682	27	91	77	5			14					5481
LMB	284	684													968
WC		5439	347	32	52	11	21			11	11				5924
CC		32	1084		32	21									1169
S.T.	284	6155	1431	32	84	32	21			11	11				8061
—	485	9539	3113	59	175	109	26			25	11				13,542

OMP

14 hr days

TABLE 1
FISHING EFFORT
PERIOD 6

Dates: May 18 - June 14

Number Fishable Days: Weekend 8 Weekday 20

	Angler Pref.	Interviews No.	Interviews %T	Anglers No.	Anglers Avg/int.	Hours No.	Hours %T	Hours Avg/Angler	Average T. Count	Angler Trips	Effort in Angler Hours
ACTUAL	LMB	85	53.8	165	1.94	1036.5	56.7	6.28		913	5731.17
	WC	28	17.7	99	3.54	310	17.0	3.13		549	1718.34
	CC	45	28.5	53	1.18	480.5	26.3	9.07		293	2658.38
	TOTAL	158	100	317	2.01	1827	100	5.76	44.9	1755	10,107.89
PROJECTED	LMB	47	52.2	81	1.72	374	43.1	4.62		1336	6171.09
	WC	25	27.8	50	2.00	253.5	29.2	5.07		825	4180.88
	CC	18	20.0	38	2.11	240	27.7	6.32		628	3966.11
	TOTAL	90	100	169	1.88	867.5	100	5.13	27.2	2791	14,318.08

TABLE 2
NUMBERS of FISH CREELED
PERIOD 6
(LMB: No. Kept / No. caught+released)

DE 4	Angler Pref	LMB	WC	CC	WE	BLG	GR	LE	WM	SUN HYB	Carp	Y Bull	Bl Bull		T
		Species													
	LMB	31	7	5	6										49
VE	WC		435	28	2										465
	CC		35	292	1	1	3		1		2				335
	T	31	477	325	9	1	3		1		2				849
	LMB	20	1	2	7										30
D	WC	2	344	32		6		1			1				386
	CC		9	201									1		211
	T	22	354	235	7	6		1			1		1		627

TABLE 3
FISH CATCH RATE PER HOUR
(Catch Rate = No. Kept)

LMB	.0299	.0068	.0048	.0058										.0473
WC		1.4032	.0903	.0065										1.5000
CC		.0728	.6077	.0021	.0021	.0062		.0021		.0042				.6972
LMB	.0534	.0027	.0053	.0187										.0801
WC	.0079	1.357	.1262		.0237		.0039			.0039				1.5226
CC		.0375	.8375									.0042		.8792

CMP

TABLE 4
PERIOD 6

PROJECTED NUMBER OF FISH KEPT

Species

Angler Pref	LMB	WC	CC	WE	BLG	GR	LE	WM	SUN HYB.	carp	Y BULL	BL BULL			T
LMB	171	39	28	33											271
WC		2411	155	11											2577
CC		194	1615	6	6	16		6		11					1854
S.T.	171	2644	1798	50	6	16		6		11					4702
LMB	330	17	33	115											495
WC	33	5673	528		99		16			16					6365
CC		149	3322									17			3488
S.T.	363	5839	3883	115	99		16			16		17			10348
—	534	8483	5681	165	105	16	16	6		27		17			15050

OMP

TABLE 1
FISHING EFFORT
PERIOD 7

Dates: June 15 - July 12

Number Fishable Days: Weekend 8 Weekday 20

Type Day	Angler Pref.	ACTUAL Interviews No.	Interviews %T	Anglers No.	Anglers Avg/int.	Hours No.	Hours %T	Hours Avg/Angler	Average T. Count	PROJECTED Angler Trips	Effort in Angler Hours
WE	LMB	36	52.9	70	1.94	428	51.2	6.11		402	2455.07
	WC	12	17.6	27	2.25	130.5	15.6	4.83		154	748.03
	CC	20	29.4	48	2.4	278	33.2	5.79		275	1591.96
	TOTAL	68	99.9	145	2.13	836.5	100	5.77	20.1	831	4795.06
WD	LMB	12	35.3	23	1.92	114	32.0	4.96		414	2051.12
	WC	9	26.5	17	1.89	98	27.5	5.76		306	1762.68
	CC	13	38.2	26	2.0	144.5	40.5	5.56		467	2595.95
	TOTAL	34	100	66	1.94	356.5	100	5.40	11.8	1187	6409.76

TABLE 2
NUMBERS of FISH CREELED
PERIOD 7
(LMB: No. Kept / No. caught+released)

Angler Pref	LMB	WC	CC	WE	BLG	GR	LE	WM	S.N. NYB	Carp	Y Bull	Bl Bull		T
LMB	17		2											19
WC		224	18		4									246
CC			172		2					3				177
T	17	224	192		6					3				442
LMB	3	1	1	1										6
WC		258	11											269
CC		1	160								6			167
T	3	260	172	1							6			442

TABLE 3
FISH CATCH RATE PER HOUR
(Catch Rate = No. Kept)

LMB	.0397		.0047											.0444
WC		1.7165	.1379		.0307									1.8851
CC			.6187		.0072					.0108				.6367
LMB	.0263	.0088	.0088	.0088										.0527
WC		2.6327	.1122											2.7449
CC		.0069	1.1073								.0415			1.1557

CMP

TABLE 4
PERIOD 1
PROJECTED NUMBER of FISH KEPT

Species

Angler Pref	LMB	WC	CC	WE	BLG	GR	LE	WM	SUN HYB.	Carp	Y BULL	BL BULL			T
LMB	97		12												109
WC		1284	103		23										1410
CC			985		11					17					1013
S.T.	97	1284	1100		34					17					2532
LMB	54	18	18	18											108
WC		4641	198												4839
CC		18	2874								108				3000
S.T.	54	4677	3090	18							108				7947
—	151	5961	4190	18	34					17	108				10479

OMP

PROJECTED NUMBER OF ANGLERS
(ANGLER-TRIPS)

PERIOD 1 THROUGH PERIOD 6

PERIOD	WEEKENDS	WEEKDAYS	TOTAL	
1	758	600	1358	
2	433	1137	1570	
3	942	621	1563	
4	1191	731	1922	
5	1146	2084	3230	
6	1755	2791	4546	
GRAND TOTAL	6225	7964	14189	

PROJECTED NUMBER ANGLER HOURS

PERIOD 1 THROUGH PERIOD 6

PERIOD	WEEKENDS	WEEKDAYS	TOTAL	Hours per Lake acre (1400 acres)
1	3145	3177	6322	4.52
2	2072	4959	7031	5.02
3	4274	3159	7433	5.31
4	6739	4115	10854	7.75
5	6601	13299	19900	14.21
6	10108	14318	24426	17.45
GRAND TOTAL	32939	43027	75966	54.26