

**Report of Fisheries Investigations**  
**Experimental Control of Undesirable Fish Species in Lake Diversion**

by

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**Dingell-Johnson Project F-7-R-7, Job E-2**  
**June 1, 1959 - December 31, 1959**

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ABSTRACT

Tabulation of data collected during the seven consecutive months prior to the selective kill treatment of Lake Diversion revealed a fish population consisting of 85.1 percent undesirable fish. Gizzard shad, smallmouth buffalo, and carpsucker alone constituted 78.8 percent of the total fish taken during this period.

The lake was treated for the selective control of shad and drum in March 1957. The immediate results of this treatment are given in Job Completion Report F-7-R-5, Job E-1. During the segment following the treatment, netting showed that shad had been reduced from 36.3 percent to less than 7 percent of the population. It was found that game fish increased in numbers, and were in better condition. This may have been due to a change in their feeding habits, or perhaps due to less crowded conditions. Mayfly nymphs, an important food item of game fish in Lake Diversion, were killed by the treatment. At present they are once again abundant in the lake.

Shad have gradually increased since their reduction, but game fish, which have done very well in the absence of an abundance of shad, have decreased in relative abundance and have become poorer as the shad reinfested the lake. Conditions have in general almost returned to the point they were before the treatment.

During the segment covered by this report, the relative abundance of shad increased almost 10 percent. The relative abundance of buffalo decreased slightly, and the relative abundance of carpsucker decreased 6 percent. Crappie showed a gain of 3 percent, but all other game fish decreased.

## Segment Completion Report

State of TEXAS

Project No. F-7-R-7

Name: Fisheries Investigations and Surveys  
of the Waters of Region 1-B.

Job No. E-2

Title: Experimental Control of Undesirable  
Fish Species in Lake Diversion.

Period Covered:

June 1, 1959 - December 31, 1959

### OBJECTIVES

To determine the practical application and effectiveness of methods developed under Job E-1 (Experimental Control of Undesirable Fish Species). Specifically, objectives of the work covered by this report were to determine effects of the selective-kill treatment during March 1957.

### TECHNIQUES

Prior to the selective kill treatment in March 1957, monthly gill net and seine collections were made. Netting was done at six stations using approximately 200 feet of net at each station. The nets that were used consisted of one length of experimental net comprised of equal sections of 1-1 $\frac{1}{2}$ -2-2 $\frac{1}{2}$ -3-inch mesh, and one length of three inch mesh net. Seining was done with twenty foot, one-fourth inch mesh minnow seines.

All fish taken in gill nets were measured, weighed, sex determined, and inspected for abnormalities. All game fish stomachs were opened and contents noted. If stomach contents consisted of fish remains too well digested to be identified, they were recorded as simply "fish remains - unidentifiable". These data as well as physical data were recorded in the field and tabulated in the lab. Seine samples were preserved for later identification.

In order to have comparable data, these same techniques have been used during all segments of this job.

### BACKGROUND INFORMATION

For background information concerning this report, readers are referred to the following job completion reports:

F-7-R-4 Job E-2  
F-7-R-5 Job E-2  
F-7-R-6 Job E-2  
F-7-R-5 Job E-1

Readers are also referred to Table 1 which gives the numbers and percents of species taken during each of the four segments of this job.

## FINDINGS

Fish Collections

During the segment covered by this report a total of 10,148 fish was collected. Eight hundred and forty-four were taken in gill nets. The remainder was taken by seine. Of the 844 fish taken by gill nets, 267 were gizzard shad, 167 were buffalo, and 165 were carpsucker. Carpsucker, gizzard shad, and buffalo together comprised 71 percent of the total catch.

Game fish totaled 15.29 percent of the catch which is 4.3 percent less than during the previous segment, but 0.4 percent more than before the treatment. Crappie increased 3 percent during this segment, but all other game fish decreased. Although only two largemouth bass were taken, it is believed that a good population of bass exists. Bass fishermen reported very good catches during late summer and early fall, and numerous young bass were taken in minnow seines. Table 2 shows percentage composition, sex ratios, and average weight by sex of all fish taken by gill nets during this segment.

A total of 1,297 pounds of fish was taken, of which gizzard shad, smallmouth buffalo, carpsucker, and carp comprised 1,042 pounds, constituting 80.33 percent of the total weight. Table 3 gives the percentage composition by weight, and mean weights of fishes taken by gill nets.

Seining produced a total of 9,304 forage fish. Gizzard shad were by far the most common forage fish taken. They comprised 58.87 percent of the catch. Notropis lutrens and Pimephales vigilax were also common. Table 4 gives the numbers and percentages of forage fish taken. Table 5 gives the number of all fishes taken by both gill nets and by seining. The average number of fish taken by gill nets each month was approximately 120 fish. The most fish taken in one month was 206 in June. The least number taken was 56 in December. Table 6 gives the monthly totals and percentages of each species taken.

The only black bullhead taken from Lake Diversion during this segment was during a Job B-15 (NATURAL HISTORY) gill net collection.

Several abnormal fish were taken during this segment. On two occasions shad were taken that had large, bulbous, spongy masses of tissue protruding from their head. One drum that had symptoms of brain tumor was picked up. Its eyes were greatly protruded and bloodshot, and its movements at the surface were violent and erratic. Examination of gills, and body cavity showed nothing that could have caused such conditions. One buffalo had extremely large fleshy lips. This may have been due to the continuous sucking of food from hard surfaces rather than due to a pathogenic organism.

Food Habits

Of the 129 game fish taken, 58 had identifiable food in their stomachs. Shad, mayfly nymphs, and unidentifiable fish remains were the most frequently occurring items. Tables 7 through 11 give food items of each species of game fish, frequency of occurrence, and the total number identified.

The only black bass found to have food in its stomach had eaten three shad. A flathead catfish had one shad in its stomach. Crappie were found to feed mostly on shad

and other forage fish. White bass fed on a variety of items including shad, sunfish, minnows, mayflies, mayfly nymphs, and other insects. Eleven different food items were noted in channel catfish stomachs. Grasshoppers, fish remains, and mayfly nymphs were most often present. The remains of one cotton rat, Sigmodon hispidus, were found in one channel catfish. Table 12 gives the aggregate of food items of all game fish.

#### Sexual Development and Spawning Success

All fish taken in gill nets were opened and the stage of gonadal development was recorded. If the gonads were large and approaching spawning condition, they were recorded as being "ripe". Gonads of immature fish, and gonads of fish that were not approaching spawning condition were both recorded as "immature". Gonads of fish taken shortly after spawning were recorded as "spent".

In June, 20 percent of the buffalo taken had spawned, while in July, 75 percent had spawned. Thirty percent of the carpsuckers taken in June were spent and in July, 90 percent were spent. Most of the shad apparently spawned in late May or early June. Seining in the upper portions of the lake in early June produced many hundreds of young shad. One short seine drag in Boggy Bay took 1,986 small shad.

One spent channel catfish was taken in June; two were taken in July. Two ripe channel catfish were also taken in July. Many ripe carp were taken in both June and July, but only a few were taken that were spent. Most carp seemed to have spawned in August and September. Some apparently did not spawn at all, for ripe carp have been regularly taken almost every month. Spent crappie were not taken until September.

#### Coefficient of Condition

In general, average "K" factors were fairly near the same as during the last segment, however, there were a few changes that should be mentioned. Shad "K" factors for both males and females decreased. During the last segment they were 2.1 and 2.2 respectively. This segment they were 1.9 and 2.1. This decrease in "K" is probably due to a reduction of food brought about by the increase in numbers of shad. "K" factors for both longnose and shortnose gar, smallmouth buffalo, and carp were unchanged. Males of bigmouth buffalo, carpsucker, and channel catfish showed a 0.1 increase in "K". Two male flathead catfish, the first males of this species to be taken under this job, had an average "K" of 1.7. The only female flathead catfish taken had a "K" factor of 2.2. "K" factors for female white bass and white crappie remained at 2.7 and 2.8 respectively, while the males of these species showed a decrease. Table 13 gives a comparison of "K" factors for the four segments that this job has been in effect. Table 14 gives the distribution of "K" factors, by sex, for each species.

#### Physical Characteristics

Physical conditions at the time of each collection were recorded. Recorded data included air and water temperatures, wind speed and direction, barometer readings, and weather conditions. The highest recorded water temperature at one foot below the surface was 86 degrees F. on August 15. The lowest temperature was 44 degrees F. on December 3. The water temperature rose during December, and on January 13, 1960, it was 49 degrees F. Lake Diversion water remained quite clear except for short periods

following heavy winds. Broad shallow bays and the river above the lake were often more turbid. Table 15 gives water and air temperatures on the days that collections were made.

## DISCUSSION

As stated in the objectives, the purpose of this job is to collect data from which the overall effects of the selective kill treatment of Lake Diversion in March 1957 can be determined. Thus far several important results have been noted. First it was found that although gizzard shad and drum were not totally eliminated, they were greatly reduced. This removal of shad and drum affected the game fish population. Game fish grew better and apparently increased in numbers. In the absence of great numbers of shad and drum, game fish probably had to move about more in search of food. This increased fishing success.

Those shad that survived the rotenone also fared very well. With less competition for food they too were in better condition. Their reproductive capacity increased and they produced many offspring. Shad have increased steadily, and now, after three years, are once again present in abundance. Table 16, which gives the average weight of species taken during each of the segments of this job, shows that the average weight of shad after the treatment was 1.43 pounds, but at present their average weight is 0.51 pounds. This shows that smaller shad are greatly dominant now.

Data collected by present netting techniques has failed to show the true relative abundance of species. At present we still do not know the status of the drum in Lake Diversion. It is believed that drum and black bass both are much more abundant than our data shows them to be. It will probably be necessary to make a rotenone sample in an enclosed bay in order to see just how abundant the drum have become.

During the next segment netting techniques will be changed. Different types of specially rigged gill nets will be used, and possibly more netting stations will be selected. It is believed that by varying our sampling methods, more complete and accurate data will be obtained.

If at the end of the next segment (December 31, 1960), it is found that conditions have stabilized and that all changes due to the rotenone treatment have been learned, then this job will be terminated and final conclusions will be made. If, however, new changes are realized, this job will be continued.

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Approved by Marion Toole  
Director Inland Fisheries Division

Date April 8, 1960

Table 1. Comparison of the Number and Percent of Total Fish Taken in Gill Nets From Lake Diversion 1956 - 1960.

	Number Taken				Percent of Total			
	1956	1957	1958	1959	1956	1957	1958	1959
<u>Lepisosteus osseus</u>	37	113	68	39	2.9	6.6	4.92	4.62
<u>Lepisosteus platostomus</u>	4	6	11	10	0.3	0.3	0.80	1.18
<u>Dorosoma cepedianum</u>	472	116	311	267	36.6	6.8	22.52	31.64
<u>Ictiobus cyprinellus</u>	0	0	2	3	0.0	0.0	0.15	0.36
<u>Ictiobus bubalus</u>	175	456	291	167	13.6	26.6	21.07	19.78
<u>Carpiodes carpio</u>	369	620	356	165	28.6	36.1	25.78	19.55
<u>Cyprinus carpio</u>	31	44	64	54	2.4	2.6	4.63	6.40
<u>Ictalurus punctatus</u>	38	95	71	19	3.0	5.5	5.14	2.25
<u>Ictalurus melas</u>	0	3	0	0	0.0	0.2	0.0	0.0
<u>Pylodictus olivaris</u>	2	3	7	3	0.2	0.2	0.51	0.35
<u>Roccus chrysops</u>	76	121	121	46	5.9	7.1	8.76	5.45
<u>Micropterus salmoides</u>	7	18	17	2	0.5	1.0	1.23	0.24
<u>Pomoxis annularis</u>	68	110	55	59	5.3	6.4	3.99	6.99
<u>Aplodinotus grunniens</u>	9	11	7	10	0.7	0.6	0.50	1.19
Totals	1,288	1,716	1,381	844	100.00	100.00	100.00	100.00

Table 2. Percentage Composition, Sex Ratios, and Average Weights by Sex of Fishes Collected by Gill Nets from Lake Diversion, June 1, 1959 - Dec. 31, 1959.

Common Name	Number Taken	Percent of Total	Percent		Avg. Wt.	
			Males	Females	Males	Females
Longnose gar	39	4.62	74.36	25.64	2.63	3.69
Shortnose gar	10	1.18	40.00	60.00	1.31	1.58
Shad	267	31.64	39.32	60.68	0.41	0.58
Smallmouth buffalo	167	19.78	52.10	47.90	3.02	3.26
Bigmouth buffalo	3	0.36	66.67	33.33	3.61	5.07
Carp sucker	165	19.55	46.67	53.33	1.35	1.48
Carp	54	6.40	29.63	70.37	2.58	2.78
Channel catfish	19	2.25	42.11	57.89	2.49	1.97
Flathead catfish	3	0.35	66.67	33.33	3.18	6.50
White bass	46	5.45	52.17	47.83	0.54	0.78
Black bass	2	0.24	0.00	100.00	0.00	0.73
Crappie	59	6.99	30.51	69.49	0.25	0.49
Drum	10	1.19	50.00	50.00	0.49	0.42
Totals	844	100.00				

Table 3. Percentage Composition by Weight and Mean Weights of  
Fishes Taken from Lake Diversion.  
June 1, 1959 - December 31, 1959.

Species	Weight (Lbs.)	Percent of Total Weight	Mean Weight
Longnose gar	113.05	8.71	2.90
Shortnose gar	14.70	1.14	1.47
Shad	137.11	10.57	0.51
Smallmouth buffalo	523.54	40.36	3.13
Bigmouth buffalo	12.29	0.95	4.10
Carp sucker	234.16	18.06	1.42
Carp	146.99	11.34	2.72
Channel catfish	41.60	3.21	2.19
Flathead catfish	12.86	0.99	4.29
White bass	30.00	2.31	0.65
Black bass	1.45	0.12	0.73
Crappie	24.61	1.89	0.42
Drum	4.56	0.35	0.46
Totals	1,296.92	100.00	

Table 4. Total Number of Forage Fish Taken from Lake Diversion  
June 1, 1959 - December 31, 1959

Scientific Name	Number
<u>Dorosoma cepedianum</u>	5,478
<u>Ictiobus bubalus</u>	32
<u>Carpionodes carpio</u>	25
<u>Phenacobius mirabilis</u>	4
<u>Notropis brazosensis</u>	2
<u>Notropis bairdi</u>	13
<u>Notropis girardi</u>	2
<u>Notropis lutrensis</u>	1,190
<u>Notropis deliciosus</u>	18
<u>Hybognathus placita</u>	2
<u>Pimephales vigilax</u>	1,289
<u>Pimephales promelas</u>	1
<u>Ictalurus punctatus</u>	2
<u>Gambusia affinis</u>	176
<u>Roccus chrysops</u>	127
<u>Micropterus punctulatus</u>	1
<u>Micropterus salmoides</u>	54
<u>Lepomis cyanellus</u>	15
<u>Lepomis punctatus</u>	126
<u>Lepomis microlophus</u>	18
<u>Lepomis macrochirus</u>	281
<u>Lepomis humilis</u>	285
<u>Lepomis megalotis</u>	7
<u>Pomoxis annularis</u>	8
<u>Percina caprodes</u>	139
<u>Aplodinotus grunniens</u>	9
Totals	9,304

Table 5. Total Number of Fish Taken From Lake Diversion \*  
June 1, 1959 - December 31, 1959

Common Name	Scientific Name	Number
Shortnose gar	<u>Lepisosteus platostomus</u>	10
Longnose gar	<u>Lepisosteus osseus</u>	39
Gizzard shad	<u>Dorosoma cepedianum</u>	5,745
Bigmouth buffalo	<u>Ictiobus cyprinellus</u>	3
Smallmouth buffalo	<u>Ictiobus bubalus</u>	199
River carpsucker	<u>Carpionodes carpio</u>	190
Carp	<u>Cyprinus carpio</u>	54
Suckermouth minnow	<u>Phenacobius mirabilis</u>	4
Brazos River shiner	<u>Notropis brazosensis</u>	2
Red River shiner	<u>Notropis bairdi</u>	13
Arkansas River shiner	<u>Notropis girardi</u>	2
Redhorse shiner	<u>Notropis lutrensis</u>	1,190
Sand shiner	<u>Notropis deliciosus</u>	18
Plains minnow	<u>Hybognathus placita</u>	2
Parrot minnow	<u>Pimephales vigilax</u>	1,289
Fathead minnow	<u>Pimephales promelas</u>	1
Channel catfish	<u>Ictalurus punctatus</u>	21
Flathead catfish	<u>Pylodictus olivaris</u>	3
Common mosquitofish	<u>Gambusia affinis</u>	176
White bass	<u>Roccus chrysops</u>	173
Spotted bass	<u>Micropterus punctulatus</u>	1
Largemouth bass	<u>Micropterus salmoides</u>	56
Green sunfish	<u>Lepomis cyanellus</u>	15
Spotted sunfish	<u>Lepomis punctatus</u>	126
Redear sunfish	<u>Lepomis microlophus</u>	18
Bluegill sunfish	<u>Lepomis macrochirus</u>	281
Orangespotted sunfish	<u>Lepomis humilis</u>	285
Longear sunfish	<u>Lepomis megalotis</u>	7
White crappie	<u>Pomoxis annularis</u>	67
Logperch	<u>Percina caprodes</u>	139
Drum	<u>Aplodinotus grunniens</u>	19
Total		10,148

\* Game fish taken in seine collections were counted and released.

Table 6. Monthly Totals of Species Collected by Gill Nets From Lake Diversion, June - December 1959.

Species	June		July		August		September		October		November		December	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Longnose gar	5	2.42	17	14.28	10	8.77	6	4.65	1	0.82	0	0.00	0	0.00
Shortnose gar	2	0.97	3	2.52	4	3.51	0	0.00	1	0.82	0	0.00	0	0.00
Gizzard shad	54	26.22	47	39.50	37	32.46	58	44.95	44	36.06	15	15.30	12	21.42
Smallmouth buffalo	37	17.96	9	7.56	22	19.31	27	20.93	29	23.77	29	29.59	14	25.00
Bigmouth buffalo	0	0.00	0	0.00	0	0.00	2	1.55	1	0.82	0	0.00	0	0.00
Carp sucker	59	28.63	15	12.61	13	11.40	8	6.20	21	17.21	33	33.69	16	28.59
Carp	19	9.22	13	10.92	6	5.26	8	6.21	7	5.74	1	1.02	0	0.00
Channel catfish	2	0.97	3	2.52	2	1.75	2	1.55	1	0.82	5	5.10	4	7.14
Flathead catfish	1	0.49	0	0.00	2	1.75	0	0.00	0	0.00	0	0.00	0	0.00
White bass	13	6.31	2	1.68	5	4.39	7	5.43	8	6.56	5	5.10	6	10.71
Black bass	1	0.49	0	0.00	1	0.88	0	0.00	0	0.00	0	0.00	0	0.00
Crappie	12	5.83	2	1.68	12	10.52	11	8.53	9	7.38	9	9.18	4	7.14
Drum	1	0.49	8	6.73	0	0.00	0	0.00	0	0.00	1	1.02	0	0.00
Totals	206	100.00	119	100.00	114	100.00	129	100.00	122	100.00	98	100.00	56	100.00

Table 7. Stomach Analysis of Black Bass Taken From Lake Diversion  
June 1, 1959 - December 31, 1959

Food Items	Frequency of Occurrence	Total Number Identified
Shad	1	3

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Table 8. Stomach Analysis of Flathead Catfish Taken From Lake Diversion  
June 1, 1959 - December 31, 1959

Food Items	Frequency of Occurrence	Total Number Identified
Shad	1	1

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Table 9. Stomach Analysis of Crappie Taken From Lake Diversion  
June 1, 1959 - December 31, 1959

Food Items	Frequency of Occurrence	Total Number Identified
Shad	8	13
Mayflys	3	8
Insects	1	1
Fish Remains	7	9
Sunfish	1	1
Minnows	1	1
Mayfly nymphs	2	4

Table 10. Stomach Analysis of White Bass Taken From Lake Diversion  
June 1, 1959 - December 31, 1959

Food Items	Frequency of Occurrence	Total Number Identified
Mayfly nymphs	6	24
Fish remains	4	4
Mayflies	2	51
Shad	7	12
Minnows	2	3
Sunfish	5	7
Insects	2	2
Mosquito larvae	1	1

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Table 11. Stomach Analysis of Channel Catfish Taken From Lake  
Diversion June 1, 1959 - December 31, 1959

Food Items	Frequency of Occurrence	Total Number Identified
Sunfish	1	1
Caterpillar	1	1
Fish remains	3	3
Insects	2	5
Plant material	2	-
Mayfly nymphs	3	73
Mussels	1	1
Cotton rat	1	1
Grasshoppers	4	46
Seeds	2	8
Fish scales (10 mm)	1	1

Table 12. Food Items of Game Fish.

Food Items	Frequency of Occurrence	Total Number Identified
Shad	17	29
Sunfish	7	9
Minnows	3	4
Fish Remains	14	16
Fish scales	1	1
Mayflies	5	59
Mayfly nymphs	11	101
Grasshoppers	4	46
Catapillars	1	1
Mosquito larvae	1	1
Insects (unknown)	5	8
Cotton rats	1	1
Mussels	1	1
Plant material	2	-
Seeds	2	8

Table 13. Comparison of Average "K" Factors of Fish Taken From Lake Diversion, 1956 - 1960.

	1956	1957	1958	1959
Longnose gar				
Male	.4	.4	.4	.4
Female	.4	.4	.4	.4
Shortnose gar				
Male	.5	--	.5	.5
Female	.6	.6	.5	.5
Gizzard shad				
Male	1.9	2.2	2.1	1.9
Female	1.9	2.3	2.2	2.1
Bigmouth buffalo				
Male	--	--	3.5	3.4
Female	--	--	3.4	3.4
Smallmouth buffalo				
Male	3.1	3.2	3.2	3.2
Female	3.1	3.2	3.2	3.2
Carp sucker				
Male	2.6	2.7	2.7	2.8
Female	2.7	2.7	2.8	2.8
Carp				
Male	2.5	2.6	2.8	2.8
Female	2.6	2.7	2.8	2.8
Channel catfish				
Male	1.7	1.8	1.7	1.8
Female	1.6	1.8	1.7	1.7
Flathead catfish				
Male	--	--	--	1.7
Female	1.5	1.8	1.7	2.2
White bass				
Male	2.4	3.0	2.8	2.6
Female	2.6	3.0	2.7	2.7
Black bass				
Male	2.4	2.7	2.5	--
Female	2.4	2.7	2.7	2.4
Crappie				
Male	2.5	3.0	2.9	2.8
Female	2.5	2.9	2.8	2.8
Drum				
Male	2.2	2.8	2.9	2.9
Female	2.2	2.9	3.0	2.9

Table 14. Distribution of "K" Factors of Fish Taken From Lake Diversion, June 1959 - December 1959.

<u>Lepisosteus osseus</u>											
Average "K"											
Factor	.3	.4	.5								
Males	3	26	7								
Females	3	7									
<u>Lepisosteus platostomus</u>											
Average "K"											
Factor	.4	.5	.6								
Males	0	2	1								
Females	1	3	3								
<u>Dorosoma cepedianum</u>											
Average "K"											
Factor	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5
Males	2	2	9	17	30	29	7	4	6	1	0
Females	0	4	4	22	37	37	28	16	9	1	1
<u>Ictiobus bubalus</u>											
Average "K"											
Factor	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7
Males	3	2	8	12	11	17	8	10	8	2	1
Females	0	2	6	11	14	12	10	10	6	6	0
<u>Ictiobus cyprinellus</u>											
Average "K"											
Factor	3.3	3.4									
Males	1	1									
Females		1									
<u>Carpionides carpio</u>											
Average "K"											
Factor	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1
Males	1	1	1	3	6	8	11	13	17	9	4
Females	0	0	0	6	5	11	16	16	12	11	5
Average "K"											
2.8											

Table 14. Distribution of "K" Factors for Fish Taken From Lake Diversion, June 1959 - December 1959.  
(Continued)

		<u>Cyprinus carpio</u>												Average		
														"K"		
Factor	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	2.8
Males	2	0	2	1	3	3	1	2	0	0	1	1	0	0	0	0
Females	0	2	4	5	6	7	2	3	2	2	1	1	1	0	1	2.8

		<u>Ictalurus punctatus</u>												Average			
														"K"			
Factor	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3						1.8	
Males	0	1	2	2	1	1	0	0	1	0	1.8						1.8
Females	1	1	4	2	0	1	1	0	0	0	1.7						1.7

		<u>Pylodictus olivaris</u>												Average		
														"K"		
Factor	1.6	1.7	1.8	1.9	2.0	2.1	2.2						1.7			
Males	1	0	1	0	0	0	0	0	1	1.7						1.7
Females	0	0	0	0	0	0	0	1	2.2						2.2	

		<u>Roccus chrysops</u>												Average	
														"K"	
Factor	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2		
Males	1	0	0	1	3	5	5	2	4	1	1	0	1	1	2.6
Females	0	1	0	0	1	3	6	5	3	1	2	0	0	0	2.7

		<u>Micropterus salmoides</u>												Average
														"K"
Factor	2.3	2.4											2.4	
Males	0	0											0	
Females	1	1											2.4	

		<u>Pomoxis annularis</u>												Average						
														"K"						
Factor	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	2.8
Males	0	0	0	1	2	3	1	3	1	3	2	0	0	1	0	0	0	0	1	2.8
Females	1	0	0	3	0	6	4	7	3	5	5	4	1	1	1	0	0	0	0	2.8

		<u>Aplodinotus grunniens</u>												Average	
														"K"	
Factor	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2						2.9	
Males	1	0	0	2	0	1	0	1	2.9						2.9
Females	0	1	0	0	1	2	1	0	2.9						2.9

Table 15. Air and Water Temperatures at Lake Diversion on  
Dates That Fish Collections Were Made.

Date	Air Temperature	Water Temperature
June 6	80	77
July 9	83	83
August 6	95	86
September 3	73	77
October 28	62	64
November 24	58	45
December 15	55	47

Table 16. Comparison of the Average Weights of Fish Taken From  
Lake Diversion, 1956 - 1960.

	1956	1957	1958	1959
Longnose gar	4.5	6.03	4.65	2.90
Shortnose gar	3.45	1.54	.98	1.47
Gizzard shad	.71	1.43	.97	.51
Smallmouth buffalo	2.7	3.10	3.06	3.13
Bigmouth buffalo	--	--	2.34	4.10
Carp sucker	1.3	1.37	1.37	1.42
Carp	4.15	3.80	2.02	2.72
Channel catfish	1.6	2.04	2.55	2.19
Flathead catfish	1.4	4.10	4.96	4.29
White bass	.72	1.26	.82	.65
Black bass	1.50	2.16	1.93	.73
Crappie	.44	.66	.63	.42
Drum	.85	.96	.25	.46