

JOB COMPLETION REPORT

As required by

FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-7-R-10

FISHERIES INVESTIGATIONS AND SURVEYS OF THE WATERS OF REGION 1-A

Job No. B-19 Inventory of Species Present in Lake Stamford

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## ABSTRACT

Lake Stamford, located in Haskell County in west central Texas, was built in 1953 by the construction of a rock and earth dam across Paint Creek, a tributary of the Clear Fork of the Brazos River. The lake serves as a municipal water supply for the city of Stamford and is utilized for fishing, boating and skiing, water-fowl hunting, and camping.

Lake Stamford, now about 10 years old, still supports a favorable game fish to rough fish ratio. The predominant game fish species are white crappie and channel catfish, which comprised 26.00 and 12.54 per cent of netting samples respectively. Other game species recorded were flathead catfish, Pylodictus olivaris and largemouth bass, Micropterus salmoides. Surprisingly the white bass, Roccus chrysops, was not taken in the lake, although it is present in Paint Creek and the Brazos River below Lake Stamford.

The only rough fish presently overabundant is the river carpsucker, Carpionodes carpio, which comprised 32.06 per cent of the netting sample and was the most abundant species taken. The gizzard shad, Dorosoma cepedianum, population was considerably lower than expected and heavy predation is considered as the primary reason for the suppression of this species. The population of carp, Cyprinus carpio, and freshwater drum, Aplodinotus grunniens, is moderate according to gill netting results; however, from past experience, it is believed that drum are actually considerably more abundant than data indicate.

Gizzard shad and red shiners, Notropis lutrensis, accounted for 12.08 and 23.19 per cent of the seine samples respectively. Mosquitofish, Gambusia affinis, comprised 19.52 per cent of the seine samples and the Mississippi silverside, Menidia audens, was the most abundant with 34.64 per cent of the total number of fish seined. Except for the bluegill, Lepomis macrochirus, other species taken by seining were of minor importance.

"K" factors were better than average for most species, and stomach analysis revealed that shad and other forage species were the most important items in the diet of predaceous species. The Mississippi silverside, although abundant in Lake Stamford, apparently is not being utilized as food by predaceous species to any great extent.

The spillway of Lake Stamford slopes gently and does not constitute an effective barrier to fish entering the lake from downstream areas. It should be modified to prevent recontamination with rough fish before any rough fish control measures are attempted on Lake Stamford.

## JOB COMPLETION REPORT

State of Texas

Project No. F-7-R-10

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

Job No. B-19

Title: Inventory of Species Present in Lake Stamford

Period Covered January 1, 1962 - December 31, 1962

### Objectives:

To determine the species present and their relative abundance as well as to determine the ecological factors influencing their distribution.

### Techniques Used:

Netting collections were made during January, March, May, July, September, and November at eight stations with nets ranging in size from 1 to 3 inch square mesh. Six of the nets used consisted of one 25-foot section of 1, 1½, 2, 2½, and 3-inch mesh, plus 100 additional feet of 3-inch mesh. Two of the nets used consisted of two 25-foot sections of the sizes mentioned. A total of 1,850 feet of gill net was used during each collection. The total feet of each mesh size used during the collection was 250 feet of 1, 1½, 2, 2½, and 850 feet of 3-inch.

Gill nets were set overnight and all sets were of the "sinking" type, that is, the nets were rigged to fish the lake bottom. Data obtained from gill net collections included length, weight, sex, and stage of gonadal development for each fish taken. Game fish stomachs were removed and preserved for laboratory examination. Pathological conditions were noted in the field.

Seine samples were taken with 20-foot seines from all ecological areas of the lake and were preserved for laboratory identification and counting. Physical data including wind speed and direction, weather conditions, and water and air temperatures were recorded at the time of each collection. Lake level data and pH records were obtained from the city of Stamford. Lake volume and lake temperature data were obtained from records kept by the West Texas Utilities Company electricity plant located at the lake. Lake and watershed maps were obtained from the Soil Conservation Service office in Stamford.

### Findings:

Lake Stamford is located in the southern part of Haskell County, 15 miles northeast of the city of Stamford. This area, located in west-central Texas in the eastern part of the Rolling Plains, has hot dry summers and moderate winters with occasional periods of severely cold weather. Annual rainfall is about 24 inches. Lake Stamford was created in 1953 by the construction of a rock and earth dam across Paint Creek, a tributary of the Clear Fork of the Brazos River.

In general, the watershed of the lake includes the southern half of Haskell County, (excepting the extreme southeast corner) and a portion of the northwest

corner of Jones County. Almost the entire watershed lies in the Permian red beds, and watershed soils consist of mainly deep clay loams and clays with lesser areas of silty clay loam in creek beds. The lake is fed by runoff waters only; therefore, its water level is subject to steady falling during dry periods and rapid rises following heavy rains.

Lake Stamford is seven miles long, with the long axis lying SW. to NE. The greatest width is about one mile, and the dam is at the NE. end of the lake, as shown in Figure 1. Lake Stamford serves as a municipal water supply for the city of Stamford. It is utilized for waterfowl hunting, fishing, boating, skiing, and camping. There are numerous private cottages and commercial camps on the lake. Concessions, boat launching facilities, free public access, and improved roads around most of the lake contribute to the lake's popularity as a recreation area.

West Texas Utilities Company operates an electric plant at Lake Stamford. Lake water is circulated through the plant for cooling purposes. Water circulation through the plant varies from 30,000 to 82,000 gpm, and averages 30,000 gpm in winter and 50,000 gpm in summer. The average increase in the temperature of the water passing through the plant is about 9° F. Table 1 gives the average monthly increase from 1953 to 1959. The warmed water from the plant is discharged back into the lake through a seven-foot diameter pipe at a point located near the mouth of Horse Creek Bay (Figure 1). Fishing near this point is exceptionally good during the cool months, probably owing to the warmer water temperature and a strong up-current.

#### Fish Collections

Gill netting at the eight stations shown in Figure 1 produced a total of 1,204 fish. Represented in this total were 14 species in 7 families, as shown in Table 2. Seining with 20-foot minnow seines produced a total of 12,817 fish. Represented were 6 families and 17 species, as shown in Table 3. Seining and netting combined produced 14,021 fish from 9 families and 21 species as shown in the checklist of Table 4.

Six netting collections were made from January to November, 1962. The netting stations shown in Figure 1 were selected to provide samples of fish from different ecological areas at different depths. Station 1, located on the SE. side and opposite the east side of the mouth of Buffalo Creek Bay, ranged from 5 to 35 feet in depth and had a rock and mud bottom. At this station the end of the net furthest from the bank lay in a channel. The average depth at Station 1 was 19.5 feet. Average depths at the other stations ranged from 16.7 to 3.7 feet, and bottom types varied from soft mud to hard clay. Table 5 gives the depth range and averages as well as the general bottom type for the eight netting stations.

The river carpsucker, Carpiodes carpio, the most abundant species in the net collections, comprised 32.06 per cent of the total gill net catch. Males and females of this species averaged 1.45 and 1.88 pounds respectively. The carpsucker was taken in abundance during every collection except the one in January when an ice covering prevented the setting of nets at stations 6, 7 and 8 and when the overall catch was low. More carpsuckers were taken from stations having moderate to shallow water depths. This is probably related to feeding, since the micro-organisms that the carpsucker feeds upon are more abundant in the littoral zones.



FIGURE 1  
 LAKE STAMFORD HASKELL COUNTY  
 TOTAL ACRES SUBMERGED AT SPILLWAY CREST ---- 5200 ACRES  
 GREATEST AREA AT SPILLWAY CREST ---- 6000 ACRES FEET  
 GREATEST DEPTH AT SPILLWAY CREST ---- 6 FEET  
 SPILLWAY ELEVATION ---- 1416 FEET ABOVE SEA LEVEL  
 SHORE LINE ---- 48 miles  
 GREATEST LENGTH ---- 8 MILES  
 GREATEST WIDTH ---- 1 MILE  
 PURPOSES:  
 FISHING AND RECREATION  
 MUNICIPAL WATER SUPPLY

Table 1. Average Monthly Temperature Increase of Water Passing Through West Texas Utility Company Electric Plant on Lake Stamford.

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1953											57-66	47-56
1954	42-50	50-57	51-58	65-71	68-76	78-86	83-92	82-91	79-88	72-80	58-60	50-59
1955	46-55	47-56	56-66	58-68	73-82	76-85	81-92	83-93	79-89	73-81	57-66	48-55
1956	45-53	45-53	54-62	61-69	75-83	80-90	82-93	83-92	78-87	72-81	58-67	49-58
1957	48-58	50-60	55-65	60-68	70-78	77-86	84-94	83-94	78-88	68-78	55-65	47-59
1958	44-55	44-55	50-69	59-69	69-78	81-91	82-92	84-95	80-91	71-80	61-71	48-58
1959	44-55	46-57	53-65	61-72	73-83	79-89	82-92	83-93	79-89	67-80	55-69	47-60
1960	47-62	47---	44---	63---	70---	79---	81---	82---	79---	71---	61---	48---
1961	44---	44---	56---	60---	71---	75---	80---	82---	76---	70---	57---	49---
1962	41---	48---	50---	60---	72---	77---	82---	82---	78---	73---		

Nine Year Monthly Average Water Temperature.

44.6	46.8	52.1	60.8	71.2	78.0	81.9	82.7	78.4	70.7	57.7	47.9
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Average Monthly Temperature Change.

-3	+2	+5	+9	+10	+7	+4	+1	-5	-7	-13	-10
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Table 2. Species Taken From Lake Stamford by Gill Nets - January - December 1962

<u>Scientific Name</u>	<u>Common Name</u>
<u>LEPISOSTEIDAE</u>	
<u>Lepisosteus platostomus</u>	Shortnose Gar
<u>CLUPEIDAE</u>	
<u>Dorosoma cepedianum</u>	Gizzard Shad
<u>CATOSTOMIDAE</u>	
<u>Ictiobus bubalus</u>	Smallmouth Buffalo
<u>Carpionodes carpio</u>	River Carpsucker
<u>CYPRINIDAE</u>	
<u>Cyprinus carpio</u>	Carp
<u>AMEIURIDAE</u>	
<u>Ictalurus punctatus</u>	Channel Catfish
<u>Ictalurus melas</u>	Black Bullhead
<u>Pylodictus olivaris</u>	Flathead Catfish
<u>CENTRARCHIDAE</u>	
<u>Micropterus salmoides</u>	Largemouth Bass
<u>Lepomis cyanellus</u>	Green Sunfish
<u>Lepomis macrochirus</u>	Bluegill
<u>Lepomis megalotis</u>	Longear Sunfish
<u>Pomoxis annularis</u>	White Crappie
<u>SCIAENIDAE</u>	
<u>Aplodinotus grunniens</u>	Freshwater Drum

Table 3. Species Taken by Twenty Foot Seine From Lake Stamford.  
January - November, 1962

<u>Scientific Name</u>	<u>Common Name</u>
CLUPEIDAE	
<u>Dorosoma cepedianum</u>	Gizzard Shad
CYPRINIDAE	
<u>Cyprinus carpio</u>	Carp
<u>Notemigonus crysoleucas</u>	Golden Shiner
<u>Notropis lutrensis</u>	Red Shiner
<u>Pimephales vigilax</u>	Bullhead Minnow
<u>Pimephales promelas</u>	Fathead Minnow
AMEIURIDAE	
<u>Ictalurus punctatus</u>	Channel Catfish
<u>Ictalurus melas</u>	Black Bullhead
POECILIIDAE	
<u>Gambusia affinis</u>	Common Mosquitofish
ATHERINIDAE	
<u>Menidia audens</u>	Mississippi Silverside
CENTRARCHIDAE	
<u>Micropterus salmoides</u>	Largemouth Bass
<u>Chaenobryttus gulosus</u>	Warmouth
<u>Lepomis cyanellus</u>	Green Sunfish
<u>Lepomis macrochirus</u>	Bluegill
<u>Lepomis humilis</u>	Orangespotted Sunfish
<u>Lepomis megalotis</u>	Longear Sunfish
<u>Pomoxis annularis</u>	White Crappie

Table 4. Checklist of Fish Species Taken From Lake Stamford  
January - November 1962

<u>Scientific Name</u>	<u>Common Name</u>
LEPISOSTEIDAE	
<u>Lepisosteus platostomus</u>	Shortnose Gar
CLUPEIDAE	
<u>Dorosoma cepedianum</u>	Gizzard Shad
CATOSTOMIDAE	
<u>Ictiobus bubalus</u>	Smallmouth Buffalo
<u>Carpiodes carpio</u>	River Carpsucker
CYPRINIDAE	
<u>Cyprinus carpio</u>	Carp
<u>Notemigonus crysoleucas</u>	Golden Shiner
<u>Notropis lutrensis</u>	Red Shiner
<u>Pimephales vigilax</u>	Bullhead Minnow
<u>Pimephales promelas</u>	Fathead Minnow
AMEIURIDAE	
<u>Ictalurus punctatus</u>	Channel Catfish
<u>Ictalurus melas</u>	Black Bullhead
<u>Pylodictus olivaris</u>	Flathead Catfish
POECILIIDAE	
<u>Gambusia affinis</u>	Mosquitofish
ATHERINIDAE	
<u>Menidia audens</u>	Mississippi Silverside
CENTRARCHIDAE	
<u>Micropterus salmoides</u>	Largemouth Bass
<u>Chaenobryttus gulosus</u>	Warmouth
<u>Lepomis cyanellus</u>	Green Sunfish
<u>Lepomis macrochirus</u>	Bluegill
<u>Lepomis megalotis</u>	Longear Sunfish
<u>Pomoxis annularis</u>	White Crappie
SCIAENIDAE	
<u>Aplodinotus grunniens</u>	Freshwater Drum

Table 5 Bottom Types and Depths at Lake Stamford Netting Stations

Station No.	Bottom	Depth Readings (Feet)			Average Depth
		Depth Soundings	Max.	Min.	
1.	Rocks & Mud	5-8-12½-15-17½-23-25-26 - 28½-35	35	5	19.50
2.	Rocks & Mud	8-12½-15-16½-18½-19-19-19	19	8	15.94
3.	Rocks & Mud	10-16-16-16-15-15-16½-15- 16½-15	16½	10	15.10
4.	Mud	6½-9-10-11-11½-12-14-15- 19-22	22	6½	13.00
5.	Mud & Submerged Brush	16-16-15½-16-16½-18½-20- 16-15½	18½	15½	16.67
6.	Soft Mud	5-5-6-6-6½--6½-7-7	7	5	6.12
7.	Hard Mud & Clay	2½-4-4-5-4-4-3½-3½-3	5	2½	3.72
8.	Soft Mud	3½-4-5½-6½-8-9-10-10½- 10-11-10½	11	3½	8.05

White crappie, Pomoxis annularis, were second in abundance and comprised 26.00 per cent of the total. Three hundred and thirteen crappie were taken which was over one hundred more than all of the other game species combined. Turbid water and an abundant supply of forage contribute to the success of this species in Lake Stamford. Male and female white crappie averaged 0.54 and 0.39 pounds respectively. The sex ratio of 1 male to 2 females was considerably out of balance. Errors in sexing the extremely small individuals and a tendency to label unsure specimens as females might account for this variation in sex ratio and also the difference in average weight of the sexes. The mean weight for white crappie was 0.44 pounds as shown in Table 6, which gives the percentage composition by weight and mean weight.

A total of 151 channel catfish were taken which comprised 12.54 per cent of the total. This relatively high percentage of channel catfish together with the abundance of white crappie totaled 38.54 per cent and largely accounted for the high percentage of game species (42.19 per cent) as shown in Table 7, which gives the percentage composition by number, and average weight by sex. Male channel catfish averaged 0.72 pounds while females averaged 0.64 pounds.

Freshwater drum, Aplodinotus grunniens, was fourth most abundant with 107 individuals comprising 8.89 per cent of the total. Male drum averaged 1.16 pounds and females averaged 2.34 pounds. Several very large females account for the difference in average weight. Experience has shown that netting does not reveal the true relative abundance of drum, and that figures obtained are always low. Therefore, the actual relative abundance of drum in Lake Stamford is probably somewhat higher than shown. Prior to the selective kill treatment of Lake Diversion, intensive netting showed only about 3 per cent drum. The rotenone treatment resulted in the killing of almost as many drum as gizzard shad. Shad were noted to have comprised about 36 per cent of the pre-treatment netting collections. This inability to get accurate figures concerning the abundance of drum might be attributed to the anteriorly-blunt body shape of the drum. Also, movements and habits of the species are probably factors involved.

Carp, Cyprinus carpio, were next in abundance with 95 individuals comprising 7.89 per cent of the total. With 49 male carp averaging 2.33 pounds and 46 females averaging 3.13 pounds, carp were fourth highest in mean weight as shown in Table 6. Carp were widespread, but nowhere abundant.

Seventy smallmouth buffalo, Ictiobus bubalus, comprised 5.81 per cent of the total and had average weights of 2.85 and 2.99 pounds for males and females respectively. This species has been fished for commercially in Lake Stamford. It was reported that some 75,000 pounds were removed in early 1959 by two fishermen operating with 3½ and 4 inch mesh gill nets. Discussions with these commercial fishermen revealed that the average weight of the buffalo they removed was about 8 pounds. According to data collected on this inventory, the population of larger buffalo was greatly reduced.

Surprisingly, gizzard shad comprised only 2.66 per cent. Only 32 individuals were taken and 15 males averaged only 0.16 pounds, and 17 females averaged only 0.12 pounds. Seining data shown in Table 8 showed 12.08 per cent shad with 1,549 individuals taken by this method. It would seem that shad had been introduced to Lake Stamford only recently. However, local fishermen report that they have seined young shad for bait for the past several years. In view of this, it

Table 6. Percentage Composition by Weight and Mean Weight of Fish Species  
 Taken by Gill Nets from Lake Stamford  
 January - November 1962

Species	No.	%	T. Wt. Lb.	% By Weight	Mean Weight
Shortnose Gar	5	0.41	14.84	0.85	2.97
Gizzard Shad	32	2.66	4.50	0.26	0.14
Smallmouth Buffalo	70	5.81	205.37	11.84	2.93
River Carpsucker	386	32.06	652.28	37.61	1.69
Carp	95	7.89	258.25	14.89	2.72
Channel Catfish	151	12.54	100.42	5.79	0.67
Black Bullhead	1	0.09	0.15	0.01	0.15
Flathead Catfish	21	1.74	109.30	6.30	5.20
Largemouth Bass	17	1.41	54.24	3.13	3.19
Green Sunfish	2	0.17	0.23	0.01	0.12
Bluegill	3	0.25	0.34	0.02	0.11
Longear Sunfish	1	0.08	0.06	0.01	0.06
White Crappie	313	26.00	137.04	7.90	0.44
Freshwater Drum	107	8.89	197.28	11.38	1.84
Total	1,204	100.00	1,734.30	100.00	1.44

Table 7. Percentage Composition and Average Weight, By Sex, of Fish Species Taken by Gill Nets from Lake Stamford January - November 1962

Species			Males				Females			
	No.	%	No.	%	T.Wt.	Av.Wt.	No.	%	T.Wt.	Av.Wt.
Shortnose Gar	3	0.41	3	60.00	4.28	1.43	2	40.0	10.56	5.28
Gizzard Shad	32	2.66	15	46.86	2.44	0.16	17	53.14	2.06	0.12
Smallmouth Buffalo	70	5.81	29	41.43	82.72	2.85	41	58.57	122.65	2.99
River Carpsucker	386	32.06	167	43.26	241.39	1.45	219	56.74	410.89	1.88
Carp	95	7.89	49	51.58	114.24	2.33	46	48.42	144.01	3.13
Channel Catfish	151	12.54	53	35.10	38.05	0.72	98	64.90	62.37	0.64
Black Bullhead	1	0.09	1	100.00	0.15	0.15	0	0.00	0.00	0.00
Flathead Catfish	21	1.74	4	19.05	23.57	5.89	17	80.95	85.73	5.04
Largemouth Bass	17	1.41	10	58.82	35.02	3.50	7	41.18	19.22	2.75
Green Sunfish	2	0.17	2	100.00	0.23	0.12	0	0.00	0.00	0.00
Bluegill	3	0.25	0	0.00	0.00	0.00	3	100.00	0.34	0.11
Longear Sunfish	1	0.08	0	0.00	0.00	0.00	1	100.00	0.06	0.06
White Crappie	313	26.00	104	33.33	56.32	0.54	209	66.77	80.72	0.39
Freshwater Drum	107	8.89	45	42.06	52.04	1.16	62	57.94	145.24	2.34
Totals	1204	100.00	482		650.45	1.35	722		1083.85	1.50
Gamefish	508	42.19	173	34.06	153.20	0.89	335	65.94	248.43	0.74
Roughfish	696	57.81	309	44.40	497.25	1.61	387	55.60	835.41	2.16

Table 8. Monthly Totals of Species Taken by Twenty-Foot Minnow Seine  
From Lake Stamford  
March - November 1962

Species	March No.	May No.	July No.	September No.	November No.	Total No.	%
Gizzard Shad	16	47	544	645	297	1549	12.08
Carp	0	2	0	0	0	2	0.02
Red Shiner	55	284	583	1910	141	2973	23.19
Golden Shiner	0	0	0	1	0	1	0.00
Bullhead Minnow	5	0	86	0	17	108	0.84
Fathead Minnow	1	11	0	143	31	186	1.45
Channel Catfish	0	0	20	3	0	23	0.18
Black Bullhead	0	0	0	0	10	10	0.08
Mosquitofish	0	3	4	451	2044	2502	19.52
Silverside	255	280	1241	2169	495	4440	34.64
Largemouth Bass	0	8	40	7	4	59	0.46
Warmouth	0	0	1	0	8	9	0.07
Green Sunfish	0	41	0	34	36	111	0.87
Bluegill	1	18	117	181	307	624	4.87
Orangespot Sunfish	0	0	0	0	7	7	0.05
Longear Sunfish	2	35	48	7	53	145	1.13
White Crappie	0	28	16	8	16	68	0.54
<b>Total</b>	<b>335</b>	<b>757</b>	<b>2700</b>	<b>5559</b>	<b>3466</b>	<b>12817</b>	<b>99.99</b>

appears that the shad population has been kept in control by the abundance of predaceous species present. Stomach analysis data, shown in Tables 9 to 12, shows all game species to have fed heavily on shad. The drum population has also contributed to controlling the numbers of shad.

Each of the remaining species comprised less than 2 per cent of the total. Only one black bullhead, Ictalurus melas, one longear sunfish, Lepomis megalotis, two green sunfish, Lepomis cyanellus, three bluegill, Lepomis macrochirus, and five shortnose gar, Lepisosteus platostomus, were taken. Largemouth bass, Micropterus salmoides, totaled only 17 (1.41 per cent) but comprised 3.19 per cent by weight. Male bass averaged 3.50 pounds, and female bass averaged 2.75 pounds. Similarly, flathead catfish, (Pylodictus olivaris) (21) comprised only 1.74 per cent by number but comprised a significant 5.70 per cent by weight.

It was intended that a series of seining stations would be established, and that seine samples would be taken at each station during each collecting trip. However, a fluctuating water level made some stations unseivable; so the original set of stations was abandoned. Areas of the lake from the dam, to about four miles up Paint Creek, were seined to obtain samples from all ecological areas. Table 8 gives the monthly totals of species taken by seine. Of a total of 12,817 fish in the seine sample, 34.64 per cent were Mississippi silversides, Menidia audens, 23.20 per cent were red shiners, Notropis lutrensis, 19.52 per cent were mosquitofish, Gambusia affinis, and 12.08 per cent were gizzard shad. Combined, these four species comprised 89.44 per cent of the total, and thus accounted for the bulk of the forage sample. The most abundant forage species, the Mississippi silverside, was reported to have been absent from Lake Stamford prior to 1961. It was on July 10, 1961, that Lake Stamford first discharged water over the spillway, and it was during the subsequent period of run-over that the silverside probably entered the lake. If this was the case, the silverside attained the position of "most abundant forage species" within one year. A similar occurrence was observed at Lake Wichita when M. audens entered the lake during a period of overflow in 1957 and became well established, in fact, abundant within the following year.

The value of M. audens as a forage species is questionable at the present time. Stomach analyses, Tables 9-12, show the frequency of occurrence of M. audens to be quite low. It occurred once in channel catfish, three times in white crappie, once in largemouth bass, and not at all in flathead catfish. Considering the abundance of this species and its frequency of occurrence in game fish, obviously the two are not proportional. M. audens, however, is very delicate and probably would be rapidly digested to the extent that its presence in some cases would be recorded as "fish remains". In spite of this, however, it is believed that game fish in Lake Stamford are not utilizing the silverside to the extent that would be expected. Perhaps game fish instinctively prefer shad, or perhaps shad are easier to catch. More study of this problem is needed. It would be interesting to stock M. audens in a lake where shad do not occur and determine whether under these circumstances they would be utilized for food by the game species present.

A check of the stomach contents of M. audens revealed a diet consisting mostly of small insect larvae (1 to 2 mm), copepods, and cladocerans. Further study of their food habits with careful attention to possible competition for food between M. audens and game fish fry is needed. The prolific nature of M. audens

Table 9. Food Items of Channel Catfish Taken from Lake Stamford  
January - November 1962

Number Examined	Number with Food	Food Items	Frequency of Occurrence
151	95	Insect	32
		Insect Larvae	22
		Mayfly Nymphs	2
		Shad	25
		Fish Remains	22
		Silverside	1
		Plant Material	33
		Channel Catfish	1
		Snail	4
		Earthworm	1
		Grain	6
		Algae	9
		Sunfish	1
		Largemouth Bass	1
		Crustaceans	3
		Freshwater Mussel	1
		Shrimp	1

Table 10. Food Items of White Crappie Taken from Lake Stamford  
January - November 1962

Number Examined	Number with Food	Food Items	Frequency of Occurrence
313	169	Fish remains	105
		Shad	92
		Shrimp	2
		Silverside	3
		Insect	10
		Insect Larvae	16
		Sunfish	2
		Algae	22
		Crustacean	11
		Plant Material	3
		Crappie	1

Table 11. Food Items of Flathead Catfish Taken from Lake Stamford  
January - November 1962

Number Examined	Number with Food	Food Items	Frequency of Occurrence
21	13	Fish remains	2
		Shad	10
		Channel Catfish	1
		Crustaceans	1
		Drum	1
		Worm	1

Table 12. Food Items of Largemouth Bass Taken from Lake Stamford  
January - November 1962

Number Examined	Number with Food	Food Items	Frequency of Occurrence
17	13	Shad	11
		Silverside	1
		Fish remains	13
		Crappie	1
		Sunfish	1

plus their ideal size of 100 to 150 mm suggests that they could be important as an introduced forage species in waters lacking an adequate forage crop, provided that they would not compete with or feed upon game fish fry.

#### Coefficient of Condition

All fish taken in gill nets were weighed in grams and measured (standard length) in millimeters. From these measurements, "K" factors were determined using the alignment chart method. Table 13 gives the "K" factor ranges, distribution, and averages for species taken in gill nets. All species were in average to better-than-average condition.

#### Food Items of Game Species

Stomachs from channel catfish, flathead catfish, largemouth bass, and white crappie were removed in the field, placed in cloth bags, and preserved in 10 per cent formalin for laboratory examination. Tables 9 to 12 give the frequency of occurrence of each food item noted for each game fish species.

Channel catfish stomachs contained primarily insects, insect larvae, shad, fish remains, and plant material. Plant material consisted of vegetation other than algae; and although having occurred frequently, is not considered as an important food item. In many cases the plant material consisted of small amounts of wood bits, bits of leaves from terrestrial plants, etc., which were probably taken incidentally to feeding on insect larvae or other bottom dwelling organisms. Large swarms of mayflies were noted around the lake during July, and it was surprising that mayfly nymphs were of minor importance in the diet of channel catfish. With an abundance of forage fish available, possibly they preferred a fish diet over mayfly nymphs.

The primary food items of white crappie were identified as shad or fish remains. Insects and insect larvae, as well as algae, were commonly noted in larger individuals, while smaller crappie fed to a great extent on small crustaceans - copepods and cladocerans. Contents identified as silversides occurred only three times out of 165 crappie stomachs which contained food, which as previously stated, is puzzling in view of the great abundance of silversides available.

Shad occurred in 10 out of 13 flathead catfish stomachs containing food and was, therefore, the most important food item of this species. Other fish species identified from flathead stomachs include channel catfish and freshwater drum. Crayfish, a worm, and fish remains were the only other items noted.

Table 13. "K" Factor Range, Distribution, and Average of Species Taken by Gill Nets from Lake Stamford  
January - November 1962

Species	Factor Range	Distribution	Average															
Shortnose Gar	0.6 - 0.8																	
	2	1	0.7															
Shad	0	1	0.8															
	1.7-1.8-1.9-2.0-2.1-2.2-2.3-2.4																	
M.	1	5	1	0	1	2.0												
F.	1	3	6	1	2	1	0	2.0										
Smallmouth Buffalo	2.9- 3.1- 3.2- 3.3- 3.4- 3.5- 3.6- 3.7- 3.8- 4.0- 4.2- 4.4																	
	M.	0	1	2	0	3	5	9	1	3	2	2	1	3.6				
F.	1	1	0	2	5	3	5	3	10	6	4	1	3.7					
Carp sucker	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																	
	M.	0	0	3	12	19	28	29	27	18	13	5	8	1	0	1	2.7	
F.	1	1	1	7	14	19	33	24	37	22	25	13	12	1	4	2	1	2.8
Carp	2.0- 2.2- 2.3- 2.4- 2.5- 2.6- 2.7- 2.8- 2.9- 3.0- 3.1- 3.2- 3.8																	
	M.	0	0	1	6	5	7	9	6	9	2	3	0	1	2.7			
F.	1	1	4	4	5	3	12	8	3	2	2	1	0	2.6				
Channel Catfish	1.2- 1.3- 1.4- 1.5- 1.6- 1.7- 1.8- 1.9- 2.0- 2.1- 2.2- 2.3- 2.4																	
	M.	1	0	2	9	10	6	9	7	5	1	1	1	1	1.7			
F.	0	4	3	16	15	20	16	10	7	3	1	2	0	1.7				
Black Bullhead	2.5																	
	M.	1																
F.	0																	
Flathead Catfish	1.7- 1.9- 2.0- 2.1- 2.2- 2.3- 2.5- 3.2- 3.4																	
	M.	0	1	0	1	0	1	1	0	0				2.2				
F.	1	2	1	2	1	1	1	2	1				2.3					
Black Bass	2.5- 2.7- 2.9- 3.0- 3.1- 3.2- 3.3- 3.4- 3.5- 3.6- 3.8																	
	M.	0	0	2	2	0	1	1	1	2	0	1		3.3				
F.	1	1	0	2	1	0	0	0	1	1	1	0	3.1					



Table 14. Physical Conditions Recorded During Each Survey Made at  
Lake Stamford  
January - November 1962

Date	Air Temperature	Water Temperature	Wind Speed	Wind Direction	Weather
January 12	27 F.	33 F.	8-12 M.P.H.	S.-S.W.	Clear
March 7	60 F.	50 F.	15-20 M.P.H.	S.	Cloudy
May 24	95 F.	75 F.	5-10 M.P.H.	S.W.	Partly Cloudy
July 18	76 F.	82 F.	10-15 M.P.H.	S.	Partly Cloudy
September 12	70 F.	67 F.	10-12 M.P.H.	S.-S.W.	Clear
November 14	71 F.	56 F.	15-25 M.P.H.	S.W.	Clear

Thirteen of seventeen largemouth bass stomachs examined contained food. Fish remains were noted in all thirteen; shad were identified in eleven. Silver-sides, crappie, and sunfish each occurred once. No other food items were noted in bass.

Considering game fish as a whole and categorizing food items as (1) fish, (2) insect, (3) vegetation, (4) crustacean, and (5) other, fish occurred 305 times, insect 82 times, vegetation 73 times, crustacean 15 times, and other items 10 times. Fish, therefore, (occurring 305 times) was more important than all other items combined (180 times).

#### Physical Data

Physical data recorded at the time of each survey included water temperature, air temperature, wind speed and direction, and weather conditions. Table 14 gives the physical data for each collecting period. Table 15 gives the pH of Lake Stamford water from September 1961 to September 1962. Water temperatures, taken in open water at a one-foot depth, ranged from 33° F. on January 12 to 82° F. on July 18. Average monthly water temperatures from November 1953 to October 1962 were obtained from the electric plant's records and are given in Table 1. These temperature readings were taken from the plant's water intake which is at a depth of approximately 30 feet below spillway elevation. The nine year monthly average water temperatures show the lake to be coldest in January with an average of 44.6° F. The lake then warms with average increases for the next seven months of 2°, 5°, 9°, 10°, 7°, 4°, and 1° F. up to an average August temperature of 82.7° F. Cooling then begins in September with average decreases of 5°, 7°, 13°, 10°, and 3° F. through the following January. The most rapid warming occurs in April and May with an average combined increase of 19° F. in these two months. The most rapid cooling occurs in November and December with an average combined decrease of 23° F. during these two months.

Spawning activity begins in late April when shallow water temperatures climb into the 70° F. range. By mid-May spawning activity should be quite heavy and should continue through June.

The spillway elevation of Lake Stamford is 1414. Lake level records, shown in Table 16, show that from May 1954 to May 1956 the lake level varied from 1408.8 to 1405.2, then through the next eight months it gradually dropped to a low mark of 1400.2 or about 14 feet below spillway level. Through the next three months the lake gained about three feet of water; then in May 1957, heavy rains brought the lake level up eight feet to 1411.4. From that time until the present, the lake level has varied between 1408.6 and 1415.3. As mentioned, the lake first discharged over the spillway in July 1961. It has since spilled over in June 1962, and again in September 1962. Table 17 gives the surface area and capacity of Lake Stamford at lake elevations 1400 to 1414 at two-foot intervals.

#### Fishing Success

Lake Stamford is a relatively new lake with abundant forage and a comparatively high game fish population. Fishing success has been typical of newly built lakes. White crappie, the species most fished for, are most commonly taken in spring and fall. Minnows are the most common bait used for crappie, but some fishermen prefer small jigs and are quite successful with them. Most crappie fishing is done from boats in 10 to 20 feet of water.

Table 15. pH of Lake Stamford Water

<u>Date</u>	<u>pH</u>
9-1-61	8.0
10-1-61	8.0
11-1-61	8.2
12-1-61	8.0
1-1-62	8.0
2-1-62	8.0
3-1-62	8.0
4-1-62	8.2
5-1-62	8.0
6-1-62	8.2
7-1-62	8.0
8-1-62	8.0
9-1-62	8.2

Table 16. Stamford Lake Level Elevations  
May 1954 - November 1962

<u>Date</u>	<u>Elevation</u>	<u>Date</u>	<u>Elevation</u>
5-27-54	1408.8	1-28-59	1412.5
7-31-54	1408.5	4-28-59	1411.4
9-14-54	1407.5	5-17-59	1411.4
11-17-54	1406.7	6-23-59	1411.9
1-7-55	1406.4	7-22-59	1411.8
4-1-55	1406.0	9-4-59	1410.8
5-13-55	1405.3	10-13-59	1411.0
6-22-55	1407.1	12-31-59	1410.5
8-17-55	1405.6	1-31-60	1410.5
9-24-55	1407.1	2-28-60	1410.4
10-5-55	1407.9	3-31-60	1410.2
12-17-55	1406.6	4-30-60	1409.9
1-16-56	1406.3	5-31-60	1409.3
4-10-56	1405.6	6-30-60	1408.6
5-29-56	1405.2	7-31-60	1413.5
7-21-56	1403.5	8-31-60	1412.8
8-7-56	1403.0	9-30-60	1412.0
9-8-56	1402.1	10-31-60	1412.2
10-11-56	1401.3	11-30-60	1411.9
1-31-57	1400.2	12-31-60	1411.9
2-11-57	1402.2	1-31-61	1412.0
3-22-57	1402.2	2-28-61	1412.0
4-30-57	1403.3	3-31-61	1411.8
5-31-57	1411.4	4-30-61	1411.4
6-5-57	1412.9	5-31-61	1410.9
7-25-57	1411.9	6-30-61	1413.7

Table 16. (Continued)

10-18-57	1410.9	7-10-61	1414.2*
11-8-57	1411.5	7-31-61	1415.3
2-28-58	1411.1	8-31-61	1414.1
4-30-58	1410.8	9-5-61	1414.4
5-29-58	1411.3	10-31-61	1413.7
7-9-58	1411.2	12-31-61	1413.9
8-14-58	1410.1	1-31-62	1413.7
9-27-58	1413.3	3-31-62	1413.2
10-14-58	1413.3	4-30-62	1413.5
		5-31-62	1412.9
		6-30-62	1414.7
		7-31-62	1414.4
		8-31-62	1413.8
		9-30-62	1414.9
		10-31-62	1414.4
		11-14-62	1414.

\* First time Lake Stamford overflowed.

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Table 17. Lake Stamford Capacity and Area at Elevations 1400-1414  
Elevation of Spillway = 1414

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Elevation	Area (Acres)	Capacity (Acre Feet)
1400	1675	13,000
1402	2050	17,500
1404	2450	22,000
1406	2950	27,500
1408	3500	33,550
1410	4050	41,500
1412	4600	50,000
1414	5200	60,000

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Largemouth bass fishing is best during May to July. Plug fishing is limited by turbidity over most of the lake; however, the deep section of the lake is often clear enough to permit plugging. Most bass are taken by fishermen who "dabble" minnows or lures in or around beds of cattails or bullrush.

Fishing for channel catfish was reported to have been declining for the past two years. Most fishermen questioned, said that although they were catching a few, there was "no size to them". Table 6 shows the mean weight of channel catfish to be 0.67 pounds, which substantiates the fishermen's reports that channel catfish were as a rule pretty small. With channel catfish comprising 12 per cent of the total net collection it appears that there is no shortage and that fishing for this species will improve as they attain greater size.

Lake Stamford is noted for producing large and abundant flathead catfish, and fishing pressure for this species is quite heavy, with trotline fishing being the almost-exclusive method for taking this species. Fifteen to twenty-five pound flatheads are usually taken, but twenty-five to forty-five pounders are common, and a few flatheads up to sixty pounds have been reported.

Abandoned trotlines have become so abundant as to constitute a nuisance, and stricter regulations concerning trotlining are needed.

#### Conclusions

Lake Stamford, which is a relatively young lake, has consistently produced great numbers of white crappie and channel and flathead catfish since it was first opened to fishing in 1953. The lake, now about ten years old, still maintains a favorable game fish to rough fish ratio. The river carpsucker, which comprised about 32 per cent of the total gill net catch, is the only rough fish abundant at present. However, gizzard shad and carp can be expected to increase within the next few years. The black bullhead, found in abundance throughout most lakes in the plains area to the west and northwest of Lake Stamford, is rare in the main area of Lake Stamford, but is common up in the tributary creeks. The bullhead will probably never become a problem in Lake Stamford.

Conspicuously absent from Lake Stamford is the white bass, Roccus chrysops, which could be a valuable additional predator for control of shad, if shad should begin to increase. The white bass is present in Paint Creek below the lake dam and could probably enter the lake during a period of overflow. Should the white bass enter Lake Stamford from the downstream area or be stocked to help control rough species, it would probably not become too numerous, owing to a lack of adequate spawning areas. Lake Kickapoo, physically similar to Lake Stamford, supports a moderate (9.67 per cent in 1960) white bass population. Although they attain a great size in Lake Kickapoo, they are seldom sought by fishermen due to the great turbidity which prevents plug fishing. Most fishermen questioned concerning the desirability of white bass replied that they did not like them and would not like to see them get started in Lake Stamford. They feared that white bass would compete with and eventually dominate the more desirable white crappie. This is not likely since they have failed to do so in Lake Kickapoo.

Recommendations:

Lake Stamford should be periodically surveyed under Job B-18 (Fisheries Reconnaissance) to provide current data concerning population changes or changes in any aspect of the fishery that may be of importance. Future reconnaissance surveys should include netting with sufficient length of 3½ inch gill nets to determine the status of larger buffalo and carp populations.

Consideration should be given to some method for controlling trotlining and especially to a system to enable the removal of abandoned trotlines now in the lake.

Should developmental work become necessary in the future, before such work is carried out, consideration should be given to altering the present spillway in such a manner as to prevent fish from going up the spillway and into the lake. This would prevent recontamination and the introduction of additional undesirable species. The present spillway slopes gently, the greatest single drop being only about eight feet. Figure II shows the waterfall created by this eight-foot drop. An eight-foot excavation at the base of the drop shown in Figure II would eliminate the possibility of any fish species being able to go upstream past this point. Figure III shows rough fish moving upstream in Paint Creek below the Lake Stamford spillway in September 1962. The fish in this school are mostly shad.

Prepared by Lonnie Peters

Date February 18, 1963

Approved by Marion Toole  
Coordinator  
Leo D. Lewis  
Regional Supervisor



Figure II. The greatest waterfall in the Lake Stamford spillway, shown above, is about 8 feet. It is no barrier to fish moving upstream.

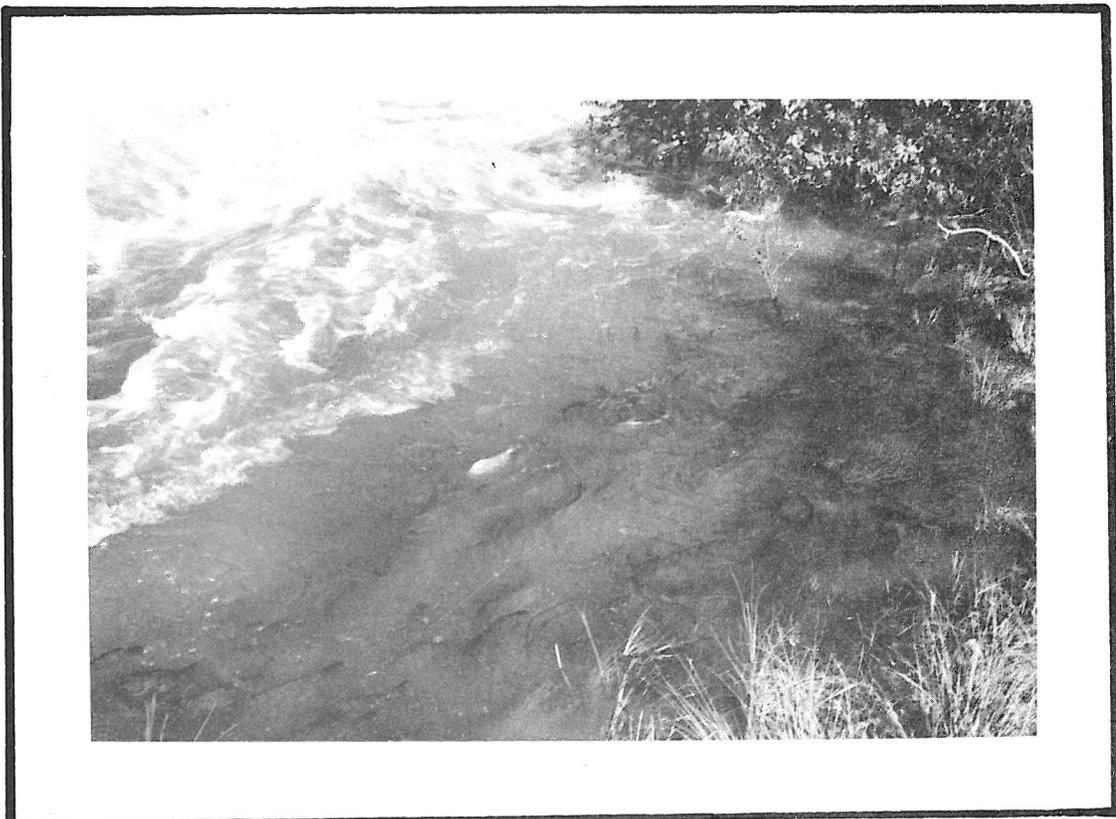


Figure III. Rough fish going upstream in the Lake Stamford spillway.

