

Report of Fisheries Investigations
Inventory of Fish Species Present in Rita Blanca Lake

by

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Dingell-Johnson Project F-7-R-5, Job B-13
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SEGMENT REPORT

State of TEXAS

Project No. F7R5

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

Job No. B-13

Title: Inventory of Fish Species Present in Rita Blanca Lake.

Period Covered: June 1, 1957 through May 31, 1958

ABSTRACT:

A total of 2,664 specimens was collected for study during the Rita Blanca Lake fisheries investigation. Seventeen species, representing six families of fresh-water fish were found to occur. Data concerning relative abundance, food habits, sexual development, spawning success, coefficient of condition and pathological conditions were recorded, and as far as possible, reduced to tabular form.

Low water levels over an extended period of time and an excessive population of golden shiners probably resulted in the failure of successful reproduction of black bass, crappie, and possibly other species.

Remedial recommendations included the control of golden shiners, provision of artificial spawning facilities, stocking of yearling or adult bass and crappie, stabilization of the water level, and additional studies to determine future requirements to maintain good fishing at Rita Blanca Lake.

OBJECTIVES:

1. To determine the fish species present and their relative abundance, as well as to determine the ecological factors influencing their distribution.
2. To determine the following data from laboratory examination of field collected specimens:
 - a. Growth rate of the specimens collected.
 - b. Food habits.
 - c. Sexual development and spawning success.
 - d. Comparative physical condition (coefficient of condition).

TECHNIQUES:

Field work on this job began in July 1957, and continued through December 1957. Collections were taken approximately one month apart. Approximately 1,200 feet of gill

net, ranging in size from 1 to 3 inch (square mesh) was set on each visit. Each fish taken in these nets was measured, weighed, and the stage of gonadal development recorded. In addition, filled stomachs of predacious species were saved in formalin, as well as ripe ovaries, pathological tissues and parasites. Samples of forage fishes were obtained with the use of small-mesh seines, and the complete collections preserved in formalin. In the laboratory, formalin-preserved materials were identified, examined and the data recorded.

In addition to collections made with gill nets and minnow seines, supplemental data was obtained by the use of a 1,200 foot drag seine. Although the use of this seine was limited by stumps, rocks and deep water, it produced some interesting information.

Physical data, including air temperature, water-surface temperature and turbidity were recorded at the lake. Samples of lake water were saved and the pH and dissolved solids present were determined. Ecological data pertaining to the lake were obtained in the usual ways and detailed notes were taken.

In December, following six months of continuous collections, field work on this job was discontinued because the outstanding fisheries problems of Rita Blanca Lake had been determined from the data collected.

FINDINGS:

Rita Blanca Lake is located in Hartley County, approximately 3 miles from Dalhart, Texas. It was constructed by the WPA under the provisions of the Bankhead-Jones Act in 1939. Although the construction work was completed in 1939, it was not filled with water until July, 1941.

The primary purpose of Rita Blanca Lake is to provide fishing and recreation. The water is not used for irrigation purposes nor municipal water supply. The lake is governed by the county courts of Hartley and Dallam Counties. Rita Blanca Lake is located in the rolling grass lands of the High Plains, and it is practically devoid of trees and other emergent vegetation. It occupies an unusually beautiful, oasis-like setting. Good roads surround the lake making it accessible to fishermen almost everywhere. Bait is available at the concession house located at the entrance to the lake.

PHYSICAL CHARACTERISTICS

Rita Blanca Lake received 690 square miles of direct drainage from Rita Blanca Creek and Carrizo Creek, both of which originate in New Mexico. At spillway level, it has a surface area of 524 acres and contains 12,100 acre-feet of water. Its maximum depth is 52 feet.

The lake is elongated and rather narrow, occupying the canyon of Rita Blanca Creek. The dam is at the southeastern end of the lake and the creek to the northwest of the lake is reduced to elongated holes except after rains. No permanent running water enters the lake.

Although the maximum depth is 52 feet (spillway level), it has reached this level

on only one occasion. According to records supplied by the U. S. Soil Conservation Service, the area and volume of Rita Blanca at its various depths is as follows:

Depth (feet)	Surface Acres	Acre-Feet
Spillway Level	524	12,100
45	397	7,507
35	286	4,090
25	177	1,787
15	81	527

Rita Blanca is naturally maintained at unusually low levels, mainly because of low annual rainfall average and high evaporation rate. The average annual rainfall in the Dalhart area from 1908 to 1957 was 17.52 inches, whereas the average annual evaporation rate is 72 inches. According to recent studies of the lake records from 1944 to 1951, the maximum level at which Rita Blanca can be permanently maintained is 35 feet. Above that level the seepage loss is too great due to caliche pockets and caves. At 35 feet, the lake has 286 surface acres and contains 4090 acre-feet (less siltage). The maximum annual evaporation loss at the 35 foot level is 81 inches. The annual loss from both evaporation and seepage at this level is 2400 acre-feet. The monthly average rainfall in the Dalhart area from January, 1908 through December, 1956, is given in Table 18.

The surface of the open water at Rita Blanca reached temperatures as high as 76 degrees F. in July and as low as 38 degrees F. in December. Reports have been received from fishermen that the entire surface often freezes over during extended cold spells when the wind is calm. The water is often quite turbid due to the extremely low mineral content and roiling action of the winds. Physical conditions of Rita Blanca Lake water, at the time when fish samples were taken, are given in Table 1.

WATER QUALITY

The water in Rita Blanca Lake is very low in mineral content. Total solids ranged from 185 ppm to 221 ppm. The Beckman pH meter was not operating during this period of study, but a field analysis using a colorometric pocket comparator measured the pH at 7.2. Table 2 gives the chemical nature of the water.

VEGETATION

The only aquatic vegetation observed during the study was small amounts of chara and algae. Floating and marginal vegetation was completely lacking. Emergent vegetation consisted only of native grasses and weeds.

FISH COLLECTIONS

A total of 17 species, representing six families of fresh-water fish, was taken from Rita Blanca during the study period. The total number of specimens collected was 2,664. Gill nets were used to collect 226 of the specimens, and the remaining 2,438 were collected with seines. Monthly totals of species collected by gill nets are given in Table 3. Percentage composition of forage fish fauna taken by seining only is given in Table 4. Total number of fishes taken by the large seine is given in Table 5. Table 6 presents the total number of fishes collected by both gill netting and seining. The check-list of fishes present in Rita Blanca Lake is as follows:

Family Cyprinidae

Minnows

Cyprinus carpio: carp. The carp is present in very small numbers. It represented only .04% of the total gill net collections.

Carassius auratus: goldfish. This species is present only in small numbers. It made up only 1.8% of the total gill net collection. Four were taken by gill nets and 24 by seines.

Carassius X Cyprinus: carp-goldfish hybrid. Few hybrids were taken. They are almost perfectly intermediate in characters: face shorter than the carp but longer than the goldfish; color somewhat redder than the carp but less so than the goldfish; one set of barbels rather than two, as the carp, or none as the goldfish; the hump on the back more pronounced than in the carp, but less so than in the goldfish. Caudal peduncle deeper than in the carp but less so than in the goldfish. One distinctive feature of the hybrids is the distinctiveness of the lateral line. This is no stronger than in the two parent species, but in those forms it is obscured, in the carp by the scale markings and in the goldfish by the bright red colors.

Notemigonus crysoleucas: golden shiner. This was the most abundant species found in Rita Blanca. Since this species feed on fry of other fish, their over-abundance may be responsible for the lack of successful reproduction of bass, crappie and other nest-building sunfishes. It is definitely a problem species, and a reduction of their numbers would be beneficial.

Notropis bairdi: Red River shiner. Only three individuals were collected during the study.

Notropis lutrensis: redhorse shiner. This is one of the most abundant cyprinids in Texas, but it made up only 1.6% of the forage fish taken in Rita Blanca.

Hybognathus nuchalis: silvery minnow. This is a common bait minnow of Northern Texas. It is primarily a river species, and the one individual captured was probably released or escaped bait.

Pimephales promelas: fathead minnow. This minnow is widespread throughout the lake and made up 48.5% of the forage fish population. Some were taken in almost every drag during the study.

Family Ameiuridae

Freshwater catfishes

Ictalurus punctatus: channel catfish. This is one of the most abundant game fish species present in the lake. It is a very popular sport fish of this area, and much fishing effort is devoted to catching them.

Ictalurus melas: black bullhead. Bullheads are common in most waters of the Texas Panhandle and considerable fishing effort is devoted to their capture. Comprising 30.5% of the total, it was the most numerous of all fishes taken by gill nets.

Family Cyprinodontidae

Killifishes and topminnows

Fundulus kansae: plains killifish. Killifishes are common in most Panhandle streams and are not ordinarily lake fishes. Due to the small number present it can be assumed that they may have been introduced as bait, although this species is not widely used as such.

Family Poeciliidae

Mosquitofishes

Gambusia affinis: common mosquitofish. This livebearer is not as common in Rita Blanca as one would think. In the absence of other bait species it is sold as bait at the Rita Blanca concession. Fishermen have expressed amazement when the Gambusia reproduced in their minnow buckets after purchase.

Family Centrarchidae

Black basses and sunfishes

Micropterus salmoides: largemouth bass. This very popular game fish made up less than 1% of the gill net collection. Only two individuals were taken during the survey by gill nets and 19 by seining, most of which were probably fry released by the State hatchery. It is doubtful that this species successfully reproduces in the lake.

Lepomis cyanellus: green sunfish. Present in very small numbers. Only one was taken.

Lepomis macrochirus: bluegill sunfish. Bluegills are rare in the lake. Only one was taken during the study.

Pomoxis annularis: white crappie. The crappie is the second most abundant game fish present, according to the gill net results. It is a popular game fish species and efforts should be made to keep it present in large enough numbers to offer good fishing and to feed on golden shiners.

Family Percidae

Perches and darters

Percina caprodes: logperch. This species is of erratic distribution in the Panhandle and is rare in the lake. Only one was taken.

COEFFICIENT OF CONDITION

"K" factors were worked out for the fishes collected in gill nets. Each fish was weighed, measured and the stage of gonadal development recorded, in an effort to determine condition of the Rita Blanca fish population as compared to the condition of fishes of other lakes. Monthly totals, average lengths and average weights of the species collected by gill nets are given in Tables 7 through 14. Distribution of "K" factors for fishes collected from Rita Blanca are given in Table 15. A comparison of the condition of fishes in Rita Blanca with those of Lake Diversion and Buffalo Lake for the same period is presented in Table 16. All of the fish collected in Rita Blanca Lake were in excellent condition.

FOOD HABITS

Food remains were found in stomachs of 31 specimens, 28 of which were channel catfish. Table 17 presents results of analyses made on food remains of all stomachs taken. Channel catfish definitely prefer insects, especially grasshoppers when then are available. Twenty-three of the 28 channel cat stomachs contained grasshoppers, crickets or other insect remains. Grain seeds, mostly maize, were found in stomachs of six channel catfish. Two stomachs were found to be gorged with snails, and nothing else. Fish eggs, probably those of carp or goldfish, were found in the stomach of one channel cat. Fish remains and other miscellaneous food items were found in 5 catfish stomachs.

The only black bass captured with food in its stomach contained water beetles and grasshopper remains. Two crappie were taken with filled stomachs. One contained a five inch golden shiner, and the other was filled with unidentifiable fish remains.

SEXUAL DEVELOPMENT AND SPAWNING SUCCESS

All fishes collected in gill nets were opened in the field and their gonads examined and the stage of development recorded. If the gonads were of medium-size or smaller, and were poorly developed, they were recorded as "immature". If they were large and well-developed, obviously approaching spawning condition, they were termed "ripe". In those few instances where a fish was captured shortly after spawning, it was called "spent". The latter condition is difficult to determine in males, but easier in females.

Immature individuals of the larger fishes were taken in seine drags and measured and counted. In addition, notes were made of schools of fry seen, young fishes found in the stomachs of predacious fishes, etc.

When ovaries contained large eggs, nearly ready to be spawned, the two ovaries of such fish were carefully removed, labeled and preserved in formalin. In the laboratory the ovaries were carefully cleaned of excess tissues and weighed to the nearest one-tenth of a gram. Then a small quantity, roughly a gram, was snipped from one ovary and weighed on a chemical balance to the nearest one-one hundredth of a gram. The eggs in the small portion were then countered. An average of 3 counts was determined and the total number of eggs present in the two ovaries estimated (number of eggs counted times weight of both ovaries divided by the weight of the small section).

Since the survey of Rita Blanca Lake began in July, after most of the spawning had occurred, practically all of the gonads of the fish collected were either in a spent or immature condition during the time of the survey. The only gonads collected were those of a channel cat weighing 325 grams, which contained 4,114 eggs.

According to information obtained from seine samples for the six months period of study, successful reproduction of black bass and other nesting sunfishes is sadly lacking. The only bass fingerlings collected were those that were taken following a stocking by the state fish hatchery. The only explanation for this lack of reproduction at this time is the lack of suitable spawning areas and heavy depredation on fry by the overly-abundant golden shiner population. During the extended periods of draw-down, the bottom of Rita Blanca Lake is mostly slick, hard-packed caliche, mud and deep silt. Bottom nesting fishes cannot reproduce under these circumstances.

Those that may successfully reproduce in the rocks and gravel near the dam probably lose their spawn to golden shiners and other predators. The lake has been heavily stocked on several occasions with bass fry from both the state and federal hatcheries. Apparently, most of these fry were also eaten by predators.

Although spawning sites for channel catfish are limited, this species is successfully reproducing. They probably spawn in the rocks and bank holes near the dam. Lack of vegetation and suitable spawning areas for carp and goldfish probably account for their small numbers. Eggs of carp and goldfish deposited on tumbleweeds and cocklebur stalks at the head of the lake are probably mostly eaten by fingerling and yearling channel catfish.

PATHOLOGICAL CONDITIONS

All fishes taken during the study were examined for evidence of disease, parasites or other abnormalities.

The fungus, Saprolognia parasitica, was present on only a few minnows collected from the lake. In all instances, the infected fishes had escaped from a hook or had otherwise been injured. This infection is quite common on the bait minnows sold at the Rita Blanca concession.

Gonads of one goldfish were greatly enlarged and filled with water, apparently a large hydrocele. This is a common occurrence in goldfish.

Other than blindness in a few bullhead catfishes, probably caused by injuries which had no apparent effect on their health, no other abnormalities were noticed in the specimens collected.

DISCUSSION AND RECOMMENDATIONS:

Information obtained during this study clearly indicates the need for fisheries improvement work at Rita Blanca Lake. The problems involved are sufficiently outstanding and obvious so as to justify reducing the originally proposed period of study from one year to a period of six months. Fortunately, the problematic factors governing the fisheries at Rita Blanca are such that, with sufficient effort and financing, can be coped with and remedied. This is potentially a very productive body of water.

Rita Blanca Lake is located in an area practically devoid of public fishing waters. It received tremendous fishing pressure for its size and is also utilized for boating, skiing and other forms of aquatic recreation. In this regard, attention is directed to the records of fishing licenses sold in Texas and in the upper twenty-six counties of the Panhandle for the fiscal years ended August 31, 1952 and August 31, 1953. For the 1952 year, the percentage of licenses per capita in the twenty-six counties was 6.6 for each 100 population of those counties, whereas for the State of Texas, the per capita sales was only 5.0. For the year ended 1953, the per capita sales for the twenty-six counties was 4.9 per 100, as compared with the state percentage of 4.8. This indicates that the sports fishermen of the Texas Panhandle either exerted much pressure on the local lakes, which are few and scattered, or went elsewhere to do their fishing. In either case, the need for increasing the sports fishing facilities in the Texas Panhandle is emphasized by these records.

WATER SUPPLY

Before attempting long range rehabilitation measures to improve the fishery at Rita Blanca, an adequate water supply must be assured. Past records prove that this lake cannot rely upon rainfall alone to provide sufficient water to maintain satisfactory water levels.

According to records and statistics provided by Rev. John Todd, member-at-large of the Project Development Board, adequate water for stabilizing the water level is available from the sub-surface water supply near the lake, and the cost of drilling wells and maintaining pumps for this purpose is within reason.

With this encouragement, samples of the untreated well water and Rita Blanca Lake water were collected and transported to the Wichita Falls Fisheries lab for testing. It was suspected that since the well water was considerably higher in total hardness than the lake water, it would flocculate the silt and decrease turbidity in the lake when mixed together. This was proven to be true by the following simple experiments:

Equal amounts of Rita Blanca bottom mud were placed in two 500 ml. graduated cylinders. Cylinder #1 was filled with equal parts of lake water and well water. Cylinder #2 was filled with straight lake water. Both were agitated with equal efforts and allowed to settle. One hour and 45 minutes later, 400 ml. of water was withdrawn from the top of each cylinder and checked with a Jackson turbidimeter. Cylinder #1 measured 203 ppm, and Cylinder #2 measured 530 ppm., indicating that an addition of 50% well water to the lake water will make the lake 2.6 times clearer than before.

Another experiment was performed using 375 ml. of lake water and only 125 ml. of well water. One hour and 45 minutes later, 400 ml. of both samples were withdrawn and checked again with the turbidimeter. The one to three part well and lake mixture gave a reading of 415 ppm or 2.0 times as clear as the straight lake water.

Considering the information discussed in this report under the heading of physical characteristics, the most logical level at which to stabilize the lake is the 35 foot level. At this level, the lake would be 286 surface acres in size and contain 4090 acre-feet of water. The remaining 8010 acre-feet capacity will be in reserve to absorb flood waters. At the 35 foot level the annual loss from both evaporation and seepage is 2400 acre-feet, which is the amount of water to be replaced by the wells and natural drainage. The volume of water to be supplied by the pumps will also depend upon the amount of rainfall on the watersheds of the lake and the amount of water necessary to raise the surface to the proposed 35 foot level at the beginning.

If, however, it is found that the cost of stabilizing the lake at the 35 foot level is prohibitive, it may be necessary to accept a lower level at which to stabilize. This will not greatly affect any of the other plans and recommendations for improving the fishery at Rita Blanca.

If plans were approved to stabilize the lake level in this manner, other rehabilitative measures should begin immediately in order to be completed before the lake level rises from its presently low level. A survey should be made to predetermine the contour at which the lake will be stabilized so that spawning facilities for bottom nesting game fishes as well as spawning devices for channel catfish can be provided. This can be accomplished by scattering loads of small rock in suitable

spawning areas. Defective tiles, culverts, nail kegs and hatchery crocks may be placed as spawning devices for channel catfish. This is also an ideal time for constructing shallow water crappie shelters. Seining beaches should be cleaned before the water rises for the benefit of future rough fish removal and fisheries surveys.

Regardless of any considerations to stabilize the lake level, efforts should be made to reduce the golden shiner population as soon as possible (while the lake is low). Since this species is difficult to trap, extensive seining operations is probably the most effective method for reducing their numbers. Supervised seining by commercial bait dealers and concessionaires should be considered.

Substantial stockings of yearling or adult bass and crappie should begin as soon as possible. This size fish is too large to be eaten by golden shiners or other predators and serves as potential brood stock. They may also serve as predators on the smaller golden shiners. Stocking of bass fry and fingerlings is discouraged because they will probably be wasted as food for the shiners.

Accompanying the stocking of brood fish, portable spawning beds should be placed in suitable locations. These beds should be equipped with facilities for moving and varying their depth under the water to correspond with fluxuating water levels. Galvanized wash tubs and wooden frames filled with small rock and gravel can be used for this purpose. These devices will also prevent the spawning material from sinking into the soft bottom mud to where they will not be available to the spawning fishes.

SUMMARY OF RECOMMENDATIONS:

1. Reduce the population of golden shiners. This species is notorious for its habit of feeding on bass fry and is present in Rita Blanca Lake in excessive numbers.
2. Provide portable spawning facilities for black bass and crappie. These spawning beds should be constructed so that they can be moved to correspond with fluxuating water levels.
3. Stock with substantial numbers of yearling or adult black bass and crappie. The purpose of these fish is to serve as brood stock and to depredate on golden shiners. Do not stock hatchery fry.
4. If the necessary financing can be obtained, the water level of Rita Blanca Lake should be stabilized at a desirable level, using sub-surface water as the supplementary water supply. This water will also supply additional mineral content to the lake and make the water clearer. Permanent spawning facilities for game fishes should be provided in suitable locations before the lake rises to the stabilized level. Provisions should also be made at this time for seining beaches to be used during future fisheries investigations and rough fish control projects.
5. If and when the above recommendations are accepted and carried out, studies should be made to determine additional requirements for establishing and maintaining good fishing at Rita Blanca Lake. Aquatic and emergent vegetation will be needed to produce natural foods and to provide shelter for young fishes. Aquatic vegetation is

greatly affected by water clarity, and a stabilized water level is conducive to stands of emergent vegetation. Fertilization requirements will depend upon the fertility and quality of the water after stabilization.

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TABLE 1 PHYSICAL CONDITIONS OF RITA BLANCA LAKE WATER

Date	Air	Water	Turbidity	
			Secchi Disk	Jackson Turbidimeter
7/25/57	73	76	170	
8/28/57	74	73	290	
9/18/57	70	64	160	95 ppm
10/23/57	63	53	110	108 ppm
11/21/57	43	43	253	54 ppm
12/18/57	57	38	182	

TABLE 2 CHEMICAL ANALYSIS OF RITA BLANCA LAKE WATER

Date	ca	na	cl	So4	Co3	HCo3	Total	pH
7/25/57	54	4	7	10	6	140	221	
8/28/57	50	4	14	--	18	122	208	
9/18/57	46	5	14	24	0	96	185	
10/23/57	46	4	21	--	0	144	215	
11/21/57	46	5	7	--	-	156	214	

TABLE NO. 3 MONTHLY TOTALS OF SPECIES COLLECTED BY GILL NETS - JULY 1 - DECEMBER 31, 1957

RITTA BIANCA LAKE

Species	July		August		September		October		November		December		Total Number	% of Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Carp	0	-	0	-	1	2.2	0	-	0	-	0	-	1	0.4
Goldfish	1	3.1	1	4.8	2	4.4	0	-	0	-	0	-	4	1.8
Carp-Goldfish Cross	0	-	4	19.0	0	-	1	2.4	2	2.8	0	-	7	3.1
Golden shiner	1	3.1	3	14.3	1	2.2	0	-	37	51.4	5	35.7	47	20.8
Channel cat	17	53.1	7	33.3	4	8.9	12	28.6	12	16.7	5	35.7	57	25.2
Black Bullhead	9	28.1	0	-	25	55.6	25	59.5	9	12.5	1	7.1	69	30.5
Black bass	1	3.1	0	-	0	-	1	2.4	0	-	0	-	2	0.9
White crappie	3	9.4	6	28.6	12	26.7	3	7.1	12	16.7	3	21.4	39	17.3
Totals	32	99.9	21	100.0	45	100.0	42	100.0	72	100.1	14	99.9	226	100.3

TABLE 4 PERCENTAGE COMPOSITION OF FORAGE FISH FAUNA OF
RITA BLANCA LAKE TAKEN BY SEINING ONLY.

Species	Number Taken	% of Total
<u>Notemigonus crysoleucas</u>	968	49.7
<u>Notropis bairdi</u>	3	0.15
<u>Notropis lutrensis</u>	30	1.5
<u>Hybognathus nuchalis</u>	1	0.05
<u>Pimephales promelas</u>	954	48.5
<u>Fundulus kansae</u>	4	0.2
<u>Gambusia affinis</u>	4	0.2
<u>Lepomis cyanellus</u>	1	0.05
<u>Lepomis macrochirus</u>	1	0.05
<u>Percina caprodes</u>	1	0.05
TOTALS	1967	100.45

TABLE 5 TOTAL NUMBER OF FISHES TAKEN BY LARGE SEINE

Date	Species	*1200' Seine 1 drag only	**300' Seine 1st Drag	300' Seine 2nd Drag		Total
7/25/57	Channel cat	12	2	6		20
	Bullhead	50	5	121		176
	Crappie	42	7	70		119
	Golden Shiner	23	3	6		32
	Black Bass	-	2	1		3
	Goldfish	<u>14</u>	<u>-</u>	<u>-</u>		<u>14</u>
Totals (7/25/57)		141	19	204		364

Date	Species	300' Seine 1st Drag	300' Seine 2nd Drag	300' Seine 3rd Drag	300' Seine 4th Drag	Total
8/28/57	Channel cat	-	-	11	3	14
	Bullhead	-	3	18	9	30
	Crappie	1	2	9	1	13
	Golden Shiner	7	1	4	-	12
	Black Bass	-	-	4	1	5
	Goldfish	1	1	5	3	10
	Carp-Goldfish Cross	<u>-</u>	<u>2</u>	<u>1</u>	<u>3</u>	<u>6</u>
TOTALS (8/28/57)		9	9	52	20	90
TOTAL TAKEN BY LARGE SEINE		141	28	213	20	454

* 1200' Seine (300' of 1" mesh; 900' of 2½" mesh). (Water too deep for seine).

** 300' Seine (1" mesh)

TABLE 6 TOTAL NUMBER OF FISHES TAKEN FROM LAKE RITA BLANCA

Species	Number Taken
<i>Cyprinus carpio</i>	2
<i>Carassius auratus</i>	30
Cyprinus-Carassius hybrid	13
<i>Notemigonus crysoleucas</i>	1015
<i>Notropis bairdi</i>	3
<i>Notropis lutrensis</i>	30
<i>Hybognathus nuchalis</i>	1
<i>Pimephales promelas</i>	954
<i>Ictalurus punctatus</i>	100
<i>Ictalurus melas</i>	302
<i>Fundulus kansae</i>	4
<i>Gambusia affinis</i>	4
<i>Micropterus salmoides</i>	21
<i>Lepomis cyanellus</i>	1
<i>Lepomis macrochirus</i>	1
<i>Pomoxis annularis</i>	182
<i>Percina caprodes</i>	1
TOTAL	2664

TABLE NO. 7 MONTHLY TOTALS, AVERAGE LENGTH AND AVERAGE WEIGHT OF CRAPPIE IN RITA BLANCA LAKE. JUNE 1, 1957 TO DECEMBER 31, 1957

Date	Number Taken		Monthly Totals	Average Length		Average Weight	
	Male	Female		Male	Female	Male	Female
June, 1957	-	-	-	-	-	-	-
July, 1957	-	3	3	-	143	-	138
August, 1957	2	4	6	182	182	293	211
September, 1957	5	7	12	128	127	57	55
October, 1957	1	2	3	267	196	625	321
November, 1957	7	5	12	144	179	87	273
December, 1957	1	2	3	135	151	62	89

TABLE NO. 8 . MONTHLY TOTALS, AVERAGE LENGTH AND AVERAGE WEIGHT OF BLACK BULLHEAD IN RITA BLANCA LAKE. JUNE 1, 1957 TO DECEMBER 31, 1957.

Date	Number Taken		Monthly Totals	Average Length		Average Weight	
	Male	Female		Male	Female	Male	Female
June, 1957	-	-	-	-	-	-	-
July, 1957	(9 caught, but returned to lake)						
August, 1957	0	0	0	-	-	-	-
September, 1957	1	24	25	160	146	90	78
October, 1957	(25 caught but not worked up)						
November, 1957	1	8	9	198	146	225	117
December, 1957	1	-	1	144	-	88	-

TABLE NO. 9. MONTHLY TOTALS, AVERAGE LENGTH AND AVERAGE WEIGHT OF CARP
IN RITA BLANCA LAKE. JUNE 1, 1957 TO DECEMBER 31, 1957

Date	Number Taken		Monthly Totals	Average Length		Average Weight	
	Male	Female		Male	Female	Male	Female
June, 1957	-	-	-	-	-	-	-
July, 1957	0	0	0	-	-	-	-
August, 1957	0	0	0	-	-	-	-
September, 1957	0	1	1	-	410	-	2120
October, 1957	0	0	0	-	-	-	-
November, 1957	0	0	0	-	-	-	-
December, 1957	0	0	0	-	-	-	-

TABLE NO. 10 MONTHLY TOTALS, AVERAGE LENGTH AND AVERAGE WEIGHT OF GOLDFISH
IN RITA BLANCA LAKE. JUNE 1, 1957 TO DECEMBER 31, 1957

Date	Number Taken		Monthly Totals	Average Length		Average Weight	
	Male	Female		Male	Female	Male	Female
June, 1957	-	-	-	-	-	-	-
July, 1957	1	0	1	235	-	540	-
August, 1957	0	1	1	-	280	-	1265
September, 1957	1	1	2	245	225	675	600
October, 1957	0	0	0	-	-	-	-
November, 1957	0	0	0	-	-	-	-
December, 1957	0	0	0	-	-	-	-

TABLE NO. 11 MONTHLY TOTALS, AVERAGE LENGTH AND AVERAGE WEIGHT OF GOLDEN SHINER IN RITA BLANCA LAKE. JUNE 1, 1957 TO DECEMBER 31, 1957

Date	Number Taken		Monthly Totals	Average Length		Average Weight		
	Male	Female		Male	Female	Male	Female	
June, 1957	-	-	-	-	-	-	-	
July, 1957	0	1	1	0	150	-	70	
August, 1957	0	3	3	-	153	-	75	
September, 1957	1	0	1	147	-	75	-	
October, 1957	0	0	0	-	-	-	-	
November, 1957	(37 caught, but not worked up)							
December, 1957	(5 caught, but not worked up)							

TABLE NO. 12 MONTHLY TOTALS, AVERAGE LENGTH AND AVERAGE WEIGHT OF CHANNEL CAT IN RITA BLANCA LAKE. JUNE 1, 1957 TO DECEMBER 31, 1957

Date	Number Taken		Monthly Totals	Average Length		Average Weight	
	Male	Female		Male	Female	Male	Female
June, 1957	-	-	-	-	-	-	-
July, 1957	0	17	17	-	322	-	660
August, 1957	0	7	7	-	304	-	437
September, 1957	0	4	4	-	286	-	523
October, 1957	5	7	12	319	263	422	304
November, 1957	4	8	12	306	266	625	409
December, 1957	3	2	5	278	235	501	365

TABLE NO. 13. MONTHLY TOTALS, AVERAGE LENGTH AND AVERAGE WEIGHT OF CARP-GOLDFISH CROSS IN RITA BLANCA LAKE. JUNE 1, 1957 TO DECEMBER 31, 1957

Date	Number Taken		Monthly Totals	Average Length		Average Weight	
	Male	Female		Male	Female	Male	Female
June, 1957	-	-	-	-	-	-	-
July, 1957	0	0	0	-	-	-	-
August, 1957	2	2	4	238	242	521	457
September, 1957	0	0	0	-	-	-	-
October, 1957	0	1	1	-	240	-	565
November, 1957	0	2	2	-	236	-	497
December, 1957	0	0	0	-	-	-	-

TABLE NO. 14 MONTHLY TOTALS, AVERAGE LENGTH AND AVERAGE WEIGHT OF BLACK BASS IN RITA BLANCA LAKE. JUNE 1, 1957 TO DECEMBER 31, 1957

Date	Number Taken		Monthly Totals	Average Length		Average Weight	
	Male	Female		Male	Female	Male	Female
June, 1957	-	-	-	-	-	-	-
July, 1957	0	1	1	-	160	-	111
August, 1957	0	0	0	-	-	-	-
September, 1957	0	0	0	-	-	-	-
October, 1957	0	1	1	-	285	-	700
November, 1957	0	0	0	-	-	-	-
December, 1957	0	0	0	-	-	-	-

TABLE NO. 15 (CONT.) DISTRIBUTION OF "K" FACTORS FOR RITA BLANCA LAKE -
JUNE 1957 THROUGH DECEMBER 1957

Cyprinus-Carassius Cross

Factor	3.0	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	Average "K" Factor
Males	0	0	0	0	0	2	0	0	0	0	3.70
Females	1	0	1	0	0	1	1	0	1	0	3.58

Micropterus salmoides

Factor	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	Average "K" Factor
Males	0	0	0	0	0	0	0	0	0	0	
Females	0	0	1	0	0	1	0	0	0	0	2.85

Carassius

Factor	4.2	4.3	4.4	4.5	4.6	5.0	5.1	5.2	5.3	5.8	Average "K" Factor
Males	1	0	0	1	0	0	0	0	0	0	4.35
Females	0	0	0	0	0	0	0	1	0	1	5.50

TABLE NO. 16 RITA BIANCA LAKE COMPARISON OF CONDITION - JULY 1 TO DECEMBER 31, 1957
 (AS COMPARED TO DIVERSION AND BUFFALO LAKES FOR THE SAME PERIOD)

Species	Number	Range	Average		LAKE DIVERSION Average		BUFFALO LAKE Average	
			Males	Females	Males	Females	Males	Females
RITA BIANCA								
Carp	1	3.10	-	3.10	2.65	2.69	2.60	2.62
Goldfish	4	4.20 5.80	4.35	5.50	-	-	4.35	5.16
Carp-Goldfish Cross	7	3.00 4.00	3.70	3.58	-	-	3.19	3.31
Golden Shiner	5	2.00 2.40	2.40	2.08	-	-	-	-
Channel Cat	69	1.50 2.50	1.90	1.78	1.75	1.68	1.70	1.78
Black Bullhead	35	2.10 3.10	2.63	2.54	-	2.95	2.95	2.51
Black Bass	2	2.70 3.00	-	2.85	2.15	2.73	3.30	3.33
White Crappie	39	2.40 3.70	2.84	2.83	2.89	2.85	3.38	3.24

TABLE 17 FOOD REMAINS IN STOMACHS OF RITA BLANCA FISHES.

Date	Length	Weight	Contents of Stomach
<u>CHANNEL CATFISH</u>			
7/25/57	325	590	Intestine full of snail shells.
	280	320	Intestine full of snail shells.
	260	291	Intestine full of grasshoppers.
	305	422	Crabidae and other insect remains. Intestine full of maize.
	350	1010	15 maize seeds, 1 grasshopper leg, 1 pectoral fin from catfish or dorsal or anal fin of carp and large unidentifiable bones.
	240	740	13.4 grams of fish eggs and cottonseed mill dough bait and plant material probably taken accidentally.
	350	730	Remains of grasshoppers, 249 maize seeds.
	425	1545	1 grasshopper leg, unidentified bones, 2 unidentified fish; (3" long), 1 maize seed, 1 nematode.
8/28/57	330	600	1 golden shiner (130 mm).
	170	75	1 cricket, 1 grasshopper leg, 1 water beetle, and insect remains.
	275	320	6 corn seeds, 1 oat seed, 30 maize seeds, unidentified insect remains.
10/24/57	310	615	24 ♀ grasshopper remains.
	275	420	10 stink bugs, 40 ♀ grasshopper remains.
	345	710	72 ♀ grasshopper remains, 2 stink bugs.
	260	373	34 ♀ grasshopper remains.
	330	620	44 ♀ grasshopper remains.
	265	360	30 ♀ grasshopper remains.
	365	970	100 ♀ grasshopper remains, 1 stink bug.
	345	800	approximately 47 grasshopper remains.
	255	350	19 ♀ grasshopper remains, 1 stink bug.
	340	805	106 ♀ grasshopper remains, 22 stink bugs.
	265	355	28 grasshopper remains.
	345	760	98 grasshopper remains.
	295	525	39 ♀ grasshopper remains.
	240	275	18 ♀ grasshopper remains, 1 stink bug.
	315	605	51 grasshopper remains.
	255	320	32 ♀ grasshopper remains.
12/18/57	375	985	fish remains, 3 nematodes.
<u>BLACK BASS</u>			
7/25/57	160	111	Water beetle and grasshopper remains.
<u>WHITE CRAPPIE</u>			
10/24/57	260	580	1 golden shiner (5" long).
11/21/57	252	510	1 unidentified fish remains.

RAINFALL

DALHART, TEXAS, AREA FOR PERIOD SHOWN BELOW

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1908	T	.85	.04	2.28	.53	2.83	4.11	1.08	.39	.29	.99	.00	13.39
1909	T	.28	.71	.18	1.70	5.10	1.27	.65	2.12	2.60	1.21	.15	15.97
1910	.20	.03	.12	1.51	2.96	4.04	2.48	3.28	.05	.00	.07	.02	14.76
1911	.00	.54	.43	.59	3.37	.24	3.65	1.87	.58	1.72	.25	1.28	14.56
1912	.00	1.30	.58	2.56	2.37	3.36	1.68	2.64	1.98	.05	.00	.03	16.35
1913	.06	1.01	.02	.88	2.35	1.29	.85	1.50	1.45	.19	1.78	3.18	13.69
1914	.05	T	T	3.98	7.29	3.65	2.58	1.38	.32	3.00	.00	.56	22.81
1915	.19	.72	.42	5.15	2.58	3.15	3.70	2.11	1.21	2.60	.10	.01	20.94
1916	.44	.00	.12	1.49	.69	4.42	2.55	3.45	.72	.22	.03	.37	14.50
1917	.14	.09	.03	.37	2.70	.93	1.64	2.28	1.28	.31	1.02	.00	10.79
1918	.27	.05	2.85	.89	4.87	1.23	1.49	1.67	1.49	1.87	.25	1.74	18.67
1919	.09	.96	3.18	3.48	3.75	1.88	2.41	3.45	5.12	2.50	1.14	T	26.96
1920	.36	.43	.05	.32	3.25	6.81	2.56	1.33	.81	4.49	.34	.08	20.83
1921	1.90	.08	.15	.76	3.70	5.82	5.12	.69	.04	.54	.00	.26	18.96
1922	.37	.67	.73	5.23	5.06	3.40	1.57	1.88	.52	.15	.36	.02	19.93
1923	.00	1.03	1.72	4.09	1.78	6.05	.87	6.92	2.10	6.29	1.23	1.32	33.40
1924	.05	.09	1.61	1.16	2.44	.69	1.32	5.00	1.72	1.01	.24	.03	15.36
1925	.07	.34	.54	1.12	3.36	1.93	4.09	3.00	4.52	1.16	.35	.14	20.66
1926	.19	.01	1.00	2.84	3.70	4.04	.68	1.32	2.05	.33	.10	.81	17.03
1927	T	.33	.29	.90	.00	3.59	4.85	4.53	2.76	.22	T	.05	17.52
1928	.00	.27	.80	.47	6.28	3.33	3.14	4.91	.13	4.25	1.75	.79	26.16
1929	.04	.56	2.43	.40	2.21	2.91	1.60	5.66	1.53	1.04	.89	.09	19.36
1930	.09	T	.63	2.53	1.50	5.58	4.09	2.28	.66	6.79	.36	T	24.51
1931	.27	.40	1.64	2.13	1.92	.85	2.37	2.40	.80	.85	.36	.31	14.30
1932	.42	.46	.30	1.61	1.44	8.74	1.24	1.68	1.71	.81	.18	.86	19.45
1933	.02	.17	.04	.08	.80	.66	.56	5.61	.54	.76	.90	.00	10.14
1934	T	.34	.09	.81	1.52	1.48	.66	1.14	1.94	1.46	.34	T	9.78
1935	.68	.02	.27	T	2.05	1.63	2.91	2.26	1.89	.65	.87	.08	13.31
1936	.37	.03	T	.01	3.67	2.44	1.49	.25	1.19	.07	.02	.41	9.93
1937	.01	.10	.60	1.04	5.86	1.23	1.68	1.27	1.27	.95	.15	.32	14.48
1938	T	.40	.78	.64	1.43	1.11	1.49	1.04	4.12	2.52	.04	.51	14.08
1939	2.04	.15	.35	2.15	.62	3.14	.81	2.79	.57	.61	.10	1.11	14.49
1940	.27	.46	.31	.50	2.74	.28	.89	1.17	1.90	.03	3.83	.36	12.74
1941	.25	.36	2.18	2.71	9.94	5.34	6.74	2.29	5.24	5.67	.02	.13	40.91
1942	T	.40	.87	3.35	.15	2.99	1.80	4.32	1.87	4.66	T	.85	21.26
1943	.06	.06	.01	1.07	1.55	4.48	.25	3.79	.31	.08	.51	1.06	13.73
1944	.92	.49	.31	3.32	3.19	.36	3.16	2.28	1.47	1.65	.71	1.19	19.55
1945	.95	.23	.43	.81	.10	.62	4.67	2.14	3.01	.44	.00	.16	13.56
1946	T	.16	.33	2.15	3.28	1.64	1.31	4.20	1.45	4.37	.90	.02	19.81
1947	.19	.25	.49	2.22	5.57	1.32	3.81	2.82	T	.30	.95	1.06	18.88
1948	.52	2.46	.40	.12	2.46	1.59	2.32	4.93	.10	2.29	.02	.06	17.32
1949	.74	1.27	.80	2.77	5.92	3.25	6.31	1.11	.64	.13	.04	.50	23.48
1950	.01	.02	.02	.75	1.24	4.65	5.64	1.51	4.84	.18	.03	.18	19.07
1951	.83	.75	.48	.42	2.80	1.06	4.45	1.13	.07	.91	.11	.03	13.04
1952	.21	.71	.91	3.98	1.69	1.25	1.30	3.90	.35	.00	.78	.29	15.33
1953	.00	.16	.79	.08	1.20	.24	2.02	4.73	.13	5.00	.69	.25	15.29
1954	.73	.78	.60	.49	4.01	.75	1.06	.98	.71	1.78	.04	.06	11.63
1955	.06	.14	.03	1.93	3.39	.65	.97	.03	1.16	T	.09	T	8.45
1956	.08	.07	.07	.42	3.26	1.11	1.29	3.60	.08	.17	T	T	10.15
Normal	.29	.43	.66	1.63	2.85	2.68	2.46	2.55	1.48	1.62	.50	.43	17.52

T—Trace

AVERAGE DATE FIRST FROST—OCTOBER 17

AVERAGE DATE LAST FROST—APRIL 22