

JOB COMPLETION REPORT

As required by

FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-5-R-10

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

Job No. B-32 Fisheries Reconnaissance

Project Leader: Lawrence S. Campbell

J. Weldon Watson  
Executive Director  
Parks and Wildlife Department  
Austin, Texas

Marion Toole  
D-J Coordinator

Eugene A. Walker  
Director, Program Planning

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## ABSTRACT

Fish populations were examined for 15 public reservoirs and 5 major streams. Sampling of fish populations included analysis of data for 8,768 fish captured in 349 gill net collections and examination of thousands of fish captured in seining collections. Reconnaissance served primarily to sample public waters to determine major changes in relative abundance. This work was also instrumental in providing data that is the basis for biologically sound fish harvest regulations; that justifies and is the basis for affording priority for management planning and specifications; that partially evaluates the results of previous management; that maintains knowledge of the distribution of rare and/or diminishing species and that provides a better understanding of ecological phenomena that influences fish production. Surveys for management justification and planning were carried out for Lake Nasworthy, San Angelo Reservoir, Oak Creek Reservoir, New Winters Lake, Old Ballinger Lake, and Valley Creek Reservoir. Studies to evaluate previous management efforts were carried out at Lake Balmorhea, Lake Ascarate, Oak Creek Reservoir, Lake Sweetwater, Champion Creek Reservoir, and Mountain Creek Reservoir. Studies to determine ecological influences, game fish production, and sound harvest regulations were conducted at Red Bluff Reservoir, Imperial Reservoir, Lake Colorado City, Devils Lake, the lower Pecos River and portions of the upper Colorado River.

JOB COMPLETION REPORT

State of Texas

Project No. F-5-R-10

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

Job No. B-32

Title: Fisheries Reconnaissance

Period Covered March 1, 1962 - February 28, 1963

Objectives:

To conduct limited investigations to obtain current information concerning gross changes in fishing conditions and factors influencing fish populations.

Procedures:

1. Fish populations were examined for 15 public reservoirs and 5 major streams. Population sampling included analysis of data for 8,768 fish captured in 349 gill net collections, and for many thousands of fish captured in seining collections.
2. Reconnaissance was primarily directed toward population sampling required in determining major changes in relative abundance and balance between desirable and undesirable species of fish produced. Data indicative of changes in condition of principal species were obtained.
3. Limited investigations were carried out to obtain data necessary for evaluation of management work, to maintain knowledge of expanding populations of problematic or exotic fish, or to determine the continued existence of diminishing species. Other study was designed to provide data of fish survival in polluted areas, and to obtain knowledge of species or circumstances not previously investigated.
4. Where pertinent, major changes in ecological conditions, water quality, turbidity, plant life, and water usage were investigated.
5. A point of reference for comparing fluctuations in water levels was established on all waters visited.
6. Lesser investigations included making suitable inquiries to determine land usage or changes in land usage for watersheds, sources of pollution, and other changes in influences of importance.
7. Shoreline usage and accessibility, public ingress and egress, and conveniences such as launching ramps, toilets, picnic areas, and fish attractors were determined.
8. Where practical, fishing success and fishing pressure were investigated by cursory examination of spot checks of fish harvest composition.

9. Examination of reconnaissance data was made to determine if more elaborate resurvey of the concerned waters was required. This examination subsequently resulted in extensive study of four major waters.

#### Organization and Limitations of Report

For coherence, reconnaissance work carried out is divided into two major categories. The essential difference between categories under which specific work is discussed is motive for pursuing the effort and the amount of work required for its accomplishment. For this reason, reconnaissance effort for a specific body of water may be of secondary classification under this report and, as a result of work and findings, be of primary classification in the future. Much unfinished work is of this status.

Reconnaissance efforts were required to determine financial practicality and other justification for management planning. These investigations were lengthy and thorough and are delegated primary classification. Such multipurpose work is the means of setting up long-range management plans that ultimately may involve successive management of several bodies of water. These waters are grouped for management consideration and are located within predetermined day-use areas. Data obtained provided: (1) determination of logical succession of tasks and procedures for management of waters grouped; (2) the determination of specific techniques required for included waters; (3) background data essential to future valuation of the pre-management and post-management fishery and (4) data contributive to the expansion of knowledge of population dynamics and of life histories of various species of fish.

Less extensive reconnaissance is designated as secondary reconnaissance effort. These investigations were primarily concerned with providing data for a single body of water or for a specific habitat within a single body of water. These studies also provide data to evaluate the results of previous management work, to record changes in production brought about by changing circumstances or conditions, for providing a basis for harvest regulations, to maintain knowledge of the rate of expansion of specific fish, to determine the status of diminishing species, to ascertain the influence of pollution, to attempt to establish rate of growth or spawning requirements for little known species, and to determine distribution of introduced or exotic species. An outline of work completed and objectives is as follows:

#### Primary Reconnaissance Surveys

##### A. Pre-management reconnaissance and management planning.

1. Lake Nasworthy and associated waters of the Concho River (justification for proposed management, evaluation data, population dynamics).
2. San Angelo Reservoir and portions of the North Concho River (area planning for management, game fish production, factors influencing harvest).
3. Oak Creek Reservoir and connecting portions of Oak Creek (justification for management, evaluation of management, population dynamics).

4. Imperial Reservoir (management planning for the Pecos River watershed, basis for harvest regulations, population dynamics, uncommon influences).

#### Secondary Reconnaissance Surveys

##### A. Reconnaissance to evaluate previous management.

1. Lake Balmorhea
2. Mountain Creek Reservoir
3. Lake Sweetwater
4. Lake Ascarate
5. Champion Creek Reservoir

##### B. Reconnaissance to provide specific data.

1. Red Bluff Reservoir (management planning, population dynamics, harvest regulations).
2. Lake Colorado City (uncommon phenomena and its influence on fish produced, harvest regulations).
3. New Winters Lake (management planning, harvest regulations).
4. Old Ballinger City Lake (management planning, harvest regulations, influence of pollution).
5. Valley Creek Reservoir (management planning, harvest regulations).
6. Devils Lake (production data, harvest regulations, study of little known species).
7. Lower Pecos River (diminishing species, pollution influence, harvest regulations).
8. Upper Colorado River (minnow production and influences).

Note: The other three streams referred to in item 1 of procedures were Elm Creek, North Concho River, and the Concho River below Lake Nasworthy. These investigations were carried out in conjunction with study of reservoirs.

#### Results:

References are made throughout this report to a number of species of fish. The following checklist has been prepared to assure correct identification.

spotted gar -----	<u>Lepisosteus oculatus</u>
alligator gar -----	<u>L. spatula</u>
longnose gar -----	<u>L. osseus</u>
gizzard shad -----	<u>Dorosoma cepedianum</u>
Mexican tetra -----	<u>Astyanax mexicanus</u>
smallmouth buffalo -----	<u>Ictiobus bubalus</u>
river carpsucker -----	<u>Carpionodes carpio</u>
gray redhorse -----	<u>Moxostoma congestum</u>
blue sucker -----	<u>Cycleptus elongatus</u>
carp -----	<u>Cyprinus carpio</u>
golden shiner -----	<u>Notemigonus crysoleucas</u>
blacktail shiner -----	<u>Notropis venustus</u>
red shiner -----	<u>N. lutrensis</u>
roundnose minnow -----	<u>Dionda episcopa</u>
plains minnow -----	<u>Hybognathus placita</u>
bullhead minnow -----	<u>Pimephales vigilax</u>
walleye -----	<u>Stizostedion vitreum</u>
channel catfish -----	<u>Ictalurus punctatus</u>
blue catfish -----	<u>I. furcatus</u>
yellow bullhead -----	<u>I. natalis</u>
black bullhead -----	<u>I. melas</u>
flathead catfish -----	<u>Pylodictus olivaris</u>
plains killifish -----	<u>Fundulus kansae</u>
mosquitofish -----	<u>Gambusia affinis</u>
tidewater silverside -----	<u>Menidia beryllina</u>
white bass -----	<u>Roccus chrysops</u>
Guadalupe bass -----	<u>Micropterus treculi</u>
largemouth bass -----	<u>M. salmoides</u>
warmouth bass -----	<u>Chaenobryttus gulosus</u>
green sunfish -----	<u>Lepomis cyanellus</u>
spotted sunfish -----	<u>L. punctatus</u>
redeer sunfish -----	<u>L. microlophus</u>
bluegill -----	<u>L. macrochirus</u>
redbreast sunfish -----	<u>L. auritus</u>
longear sunfish -----	<u>L. megalotis</u>
white crappie -----	<u>Pomoxis annularis</u>
black crappie -----	<u>P. nigromaculatus</u>
logperch -----	<u>Percina caprodes</u>
freshwater drum -----	<u>Aplodinotus grunniens</u>
Rio Grande perch -----	<u>Cichlasoma cyanoguttatum</u>
southern flounder -----	<u>Paralichthys lethostigma</u>
red drum -----	<u>Sciaenops ocellata</u>

#### Primary Reconnaissance

##### A. Pre-management reconnaissance and management planning.

Lake Nasworthy was formerly the primary source of municipal water for San Angelo, Texas. The lake is 6.5 miles southwest of the city and impounds the Middle and South Concho Rivers. Within the year a major flood control-irrigation project has been completed above Lake Nasworthy. A Bureau of Reclamation project, Twin Buttes, will be capable of impounding 600,000 acre feet and of expanding to 23,000 acres. In the future, water from Twin Buttes will be released into Lake Nasworthy. The lower structure, acting as the control reservoir, will divert flow either into a canal system where it will be transported to irrigated

farm lands located west of the city, or into the old stream channel below the dam where it enters the city water supply system. The basin area for the new reservoir and most of Twin Buttes watershed has been chemically treated to reduce problematic fish. (See completion report for Job 16a39, Project F-14-D-6). Previous survey work for Lake Nasworthy indicated river carpsuckers, carp and other problematic species have dominated past fish production. In order to continue the watershed renovation program to its logical limits a thorough reconnaissance of Lake Nasworthy and its associated waters was required. Fifty-four gill net collections were made from the lake and the stream areas below the dam. Approximately three-fourths (74.46 per cent) of 2,028 fish captured in 15,025 feet of gill nets were problematic species. River carpsuckers and gizzard shad represented 62.62 per cent of the total catch. The next most abundant species was white crappie making up 8.92 per cent of fish captured. One-third of these (68 of 181) were classified as nonutilizable. Less than 18 per cent of fish taken were considered to possess utility.

During this period of study the lake receded from 12,340 acre feet storage to 2,400 acre feet. This has resulted in relatively high fishing success due to crowding of game fish present. In order to proceed with management to its logical conclusion and so that Lake Nasworthy could be improved at minimum costs, it was recommended to responsible authorities that existing fish (with the exception of salvagable game fish) be drastically reduced or eradicated. This recommendation was endorsed by the Concho Bass Club, the Lake Advisory Board and the City Commission. The work will be carried out during the summer of 1963.

Table 1

Netting locations and feet of net per location for reconnaissance of Lake Nasworthy and associated waters - January 1-31, 1963

Location	No. Nets	No. Feet of Net
Red Bluff Slough	8	1,250
South Concho River	14	1,975
Spring Creek	14	1,975
Middle Concho River	14	1,975
Lower Concho River (Country Club, Ben Ficklin, Lone Wolf)	24	3,450
Lake Nasworthy	19	4,400
<b>Totals</b>	<b>93</b>	<b>15,025</b>

Table 2

Analysis of utilizable game fish taken from Lake Nasworthy and associated waters  
January 1-31, 1963

Species	No.	Per cent of total catch by number	Total weight pounds	Per cent of total catch by weight	Average weight
largemouth bass	83	4.09	274.05	7.15	3.30
white bass	104	5.13	80.34	2.10	0.77
yellow bullheads	1	0.05	0.65	0.02	0.65
channel catfish	60	2.96	94.53	2.47	1.58
flathead catfish	4	0.20	21.56	0.56	5.39
white crappie	113	5.57	67.96	1.77	0.60
Subtotal	365	18.00	539.09	14.07	
Total game fish	518	25.54	556.19	14.53	
Total problematic fish	1,510	74.46	3,274.40	85.47	
Total catch	2,028	100.00	3,830.59	100.00	

Minimum weights of fish regarded as having utility - catfish - 200 grams, all others 100 grams.

Table 3 Per cent composition by number of fish taken from Lake Nasworthy and associated waters - January 1-31, 1963

Species	Red Bluff		South Concho		Spring Creek		Middle Concho		Lower Concho		Lake Nasworthy		Totals	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
largemouth bass	1	0.47	22	6.62	7	2.37	8	3.24	5	2.54	43	5.77	86	4.24
white bass	3	1.41	22	6.62	29	9.83	9	3.64	4	2.03	44	5.90	111	5.47
yellow bullhead					1	0.34							1	0.05
channel catfish	1	0.47	6	1.81	9	3.05	26	10.53	7	3.55	21	2.82	69	3.40
flathead catfish			1	0.30							2	0.27	4	0.20
white crappie	16	7.55	33	9.94	26	8.81	21	8.50	14	7.11	71	9.53	181	8.92
bluegill	8	3.77	9	2.71	12	4.07	4	1.62	3	1.52	24	3.22	60	2.96
green sunfish					1	0.34			1	0.51			2	0.10
longear sunfish			2	0.60					1	0.51	1	0.14	4	0.20
<b>Subtotals</b>	<b>29</b>	<b>13.68</b>	<b>95</b>	<b>28.61</b>	<b>85</b>	<b>28.81</b>	<b>68</b>	<b>27.53</b>	<b>35</b>	<b>17.77</b>	<b>206</b>	<b>27.65</b>	<b>518</b>	<b>25.54</b>
smallmouth buffalo	11	5.19	6	1.81	9	3.05	10	4.06	13	6.60	12	1.61	13	0.64
carp									14	7.11			62	3.06
freshwater drum	79	37.26					1	0.40	1	0.51	3	0.40	5	0.25
longnose gar	1	0.47					1	0.40	34	17.26	27	3.62	141	6.95
gray redbhorse			8	2.41	2	0.68			4	2.03	1	0.14	16	0.79
golden shiners			2	0.60	1	0.34							3	0.15
river carpsuckers	57	26.89	172	51.81	135	45.76	113	45.75	60	30.45	374	50.20	911	44.92
gizzard shad	35	16.51	49	14.76	63	21.36	54	21.86	36	18.27	122	16.38	359	17.70
<b>Subtotals</b>	<b>183</b>	<b>86.32</b>	<b>237</b>	<b>71.39</b>	<b>210</b>	<b>71.19</b>	<b>179</b>	<b>72.47</b>	<b>162</b>	<b>82.23</b>	<b>539</b>	<b>72.35</b>	<b>1510</b>	<b>74.46</b>
<b>Totals</b>	<b>212</b>		<b>332</b>		<b>295</b>		<b>247</b>		<b>197</b>		<b>745</b>		<b>2028</b>	<b>100.00</b>

Table 4

Per cent composition by weight of fish taken from Lake Nasworthy and associated waters - January 1-31, 1963

Species	Red Bluff		South Concho		Spring Creek		Middle Concho		Lower Concho		Lake Nasworthy		Totals	
	lbs.	%	lbs.	%	lbs.	%	lbs.	%	lbs.	%	lbs.	%	lbs.	%
largemouth bass	3.38	0.70	35.24	6.05	24.75	6.15	27.23	6.49	14.32	3.10	169.48	11.46	274.40	7.16
white bass	4.94	1.02	15.94	2.74	20.03	4.98	9.47	2.26	6.42	1.39	24.63	1.66	81.43	2.13
yellow bullhead					0.65	0.16							0.65	0.02
channel catfish	1.38	0.28	10.77	1.85	16.51	4.10	33.07	7.88	8.56	1.85	28.02	1.89	96.93	2.53
flathead catfish	6.24	1.28	16.80	2.89	12.00	2.98	8.92	2.12	3.49	0.76	10.94	0.74	21.57	0.56
white crappie	0.66	0.14	0.76	0.13	1.15	0.29	0.37	0.09	0.26	0.06	28.27	1.91	75.72	1.93
bluegill					0.11	0.03			0.12	0.03	1.71	0.12	4.91	0.13
green sunfish			0.15	0.03					0.12	0.03	0.09	0.01	0.23	0.01
longear sunfish									0.12	0.03	0.09	0.01	0.36	0.01
Subtotals	16.60	3.42	88.91	15.28	75.20	18.69	79.06	18.84	33.29	7.22	263.14	17.79	556.20	14.52
smallmouth buffalo									45.06	9.77			45.06	1.18
carp	12.69	2.61	7.32	1.26	10.47	2.60	14.64	3.49	8.77	1.90	41.94	2.83	95.83	2.50
freshwater drum							1.44	0.34	0.51	0.11	11.45	0.77	13.40	0.35
longnose gar	276.44	56.84					2.06	0.49	195.63	42.42	93.56	6.32	567.69	14.82
golden shiners			0.28	0.05	0.16	0.04							0.44	0.01
gray redborse sucker	2.56	0.53	18.38	3.16	3.56	0.89			12.56	2.72	2.94	0.20	40.00	1.04
river carpsuckers	173.25	35.62	461.19	79.27	305.81	76.03	315.81	75.24	159.56	34.60	1053.19	71.19	2468.81	64.45
gizzard shad	4.77	0.98	5.69	0.98	7.04	1.75	6.73	1.60	5.81	1.26	13.13	0.89	43.17	1.13
Subtotals	469.71	96.58	492.86	84.72	327.04	81.31	340.68	81.16	427.90	92.78	1216.21	82.21	3274.40	85.48
Per cent														
Totals		100.00		100.00		100.00		100.00		100.00		100.00		100.00
Weight	486.31		581.77		402.24		419.74		461.19		1479.35		38.30.59	

Table 5

Seining collections from Lake Nasworthy and associated waters - January 1-31, 1963

Species	A.		B.		C.		D.		Totals	
	No.	%	No.	%	No.	%	No.	%	No.	%
largemouth bass	61	2.77	8	4.96	2	0.22	3	0.27	74	1.69
channel catfish	2	0.09					3	0.27	5	0.11
flathead catfish	2	0.09							2	0.05
white crappie	258	11.75	2	1.25	85	9.53	33	2.95	378	8.65
bluegill	650	29.58	19	11.80	39	4.37	48	4.29	756	17.30
green sunfish	26	1.19	3	1.86	12	1.35	1	0.09	42	0.96
redear sunfish	10	0.45			2	0.22	1	0.09	13	0.30
warmouth bass	46	2.10			1	0.11	5	0.45	52	1.19
longear sunfish	27	1.22	1	0.62	7	0.79	22	1.96	57	1.31
redbreast sunfish	1	0.05			1	0.11			2	0.05
Subtotals	1083	49.29	33	20.49	149	16.70	116	10.37	1381	31.61
carp	18	0.82					7	0.62	25	0.57
freshwater drum	5	0.23					1	0.09	6	0.14
golden shiners	17	0.77	2	1.25	3	0.34			22	0.50
bullhead minnows	72	3.28			35	3.92	12	1.07	119	2.72
gizzard shad	1002	45.61	126	78.26	705	79.04	983	87.85	2816	64.46
Subtotal	1114	50.71	128	79.51	743	83.30	1003	89.63	2988	68.39
Totals	2197	100.00	161	100.00	892	100.00	1119	100.00	4369	100.00

A. Upper area of South Concho River in pools severed from main body of lake.

B. Upper area of South Concho River in pools connected to the main body of the lake.

C. Upper area of Spring Creek near old railroad bridge.

D. Upper end of Middle Concho River near Twin Buttes dam.



Table 7 Analysis of condition, K-Factor, of problematic species taken from Lake Nasworthy and associated waters - January 1-31, 1963

	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	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	3.9	4.0	4.1	4.2	Avg's.			
smallmouth buffalo													1	2	1	1	1	1															7	2.62	
													1																				6	2.68	
																																	13	2.65	
carp			1	2	1	4	5	1	4	2	4	2	1	1	2	1	1	1					1										29	2.30	
																																	31	2.47	
																																	60	2.39	
gray redhorse suckers																																	4	2.85	
																																	7	2.72	
																																	11	2.77	
river carpsuckers																																	45	2.58	
																																	93	2.68	
																																	138	2.65	
gizzard shad																																		63	1.66
																																	47	1.70	
																																	110	1.68	
longnose gar																																		48	.39
																																		28	.44
																																		76	.41

Others: golden shiners F 1.8, 2.2  
M. 2.7  
freshwater drum F 1.8, 1.9, 2.8  
M 1.8, 2.3

Table 8  
Stomach content of fish taken from Lake Nasworthy and associated waters  
January 1-31, 1963

Species	Number Examined	Number with Food	Food Items	Frequency of Occurrence
largemouth bass	20	14	gizzard shad fish remains	11 3
white bass	98	48	gizzard shad fish remains	21 26
channel catfish	28	12	gizzard shad fish remains algae pecan	8 2 1 1
white crappie	90	47	gizzard shad fish remains	12 33
bluegill	2	0		
freshwater drum	4	1	gizzard shad	1
Totals	242	122		

San Angelo Reservoir is a flood control structure constructed and operated by the U. S. Corps of Engineers. The dam is adjacent to the northwestern residential section of San Angelo. At conservation pool the reservoir retains 119,188 acre feet and covers 5,456 acres. Under a change in water usage practices San Angelo Reservoir is presently the primary source of water for San Angelo. Currently the reservoir has 52,730 acre feet of water and is about 31,000 acre feet below dead storage. The lake has receded continuously for four years. In conjunction with management planning for Lake Nasworthy a survey of San Angelo Reservoir and portions of the North Concho River was carried out. This was done to provide assurance of public fishing while management was being carried out for the smaller lake and for setting up long-range management plans. Thirty gill net collections captured 707 fish, and 2 seining collections captured over 830 individuals. Less than 18 per cent of fish captured were usable game fish. Approximately 77 per cent of fish taken were problematic species. River carp-suckers made up 68.03 per cent of the total number of fish netted and 55.30 per cent of the weight of fish captured. White bass were the most numerous game species, but largemouth bass, with an average weight of 5.64 pounds, were probably the greatest fishery asset. Failure to capture smaller largemouth bass, channel catfish, and white bass is interpreted as being indicative of failure of those species to reproduce. Gill netting collections from the Concho River below the reservoir resulted in capturing 96.67 per cent problematic species. Fishing results expressed in fish per man hour have been low, but skillful anglers consistently record sizeable catches of largemouth bass and white bass. The crowding of fish through the continued reduction of the lake volume is of significance in aiding anglers.

Table 9  
Per cent composition by weight and mean weight of fish taken from  
San Angelo Reservoir  
January 1-31, 1963

Species	Number	Per Cent	Total Weight Pounds	Per Cent by Weight Pounds	Mean Weight
largemouth bass	40	5.66	225.56	14.94	5.64
white bass	66	9.34	120.19	7.96	1.82
channel catfish	18	2.55	33.76	2.24	1.88
flathead catfish	1	0.14	50.13	3.32	50.13
white crappie	30	4.24	15.50	1.03	0.52
bluegill	4	0.57	0.26	0.02	0.07
Subtotal	159	22.50	445.40	29.51	
smallmouth buffalo	9	1.27	114.38	7.57	12.71
carp	29	4.10	86.69	5.74	2.99
river carpsuckers	481	68.03	835.13	55.30	1.74
black bullhead	1	0.14	0.65	0.04	0.65
freshwater drum	1	0.14	1.13	0.07	1.13
longnose gar	2	0.28	12.81	0.85	6.40
gizzard shad	19	2.69	2.85	0.19	0.15
golden shiner	1	0.14	0.14	0.01	0.14
gray redhorse	5	0.71	10.88	0.72	2.18
Subtotal	548	77.50	1064.66	70.49	
Totals	707	100.00	1510.06	100.00	

Table 10  
Analysis of utilizable game fish taken from San Angelo Reservoir  
January 1-31, 1963

Species	Number	Per Cent of Total Catch by Number	Total Weight Pounds	Per Cent of Total Catch by Weight	Average Weight
largemouth bass	40	5.66	225.56	14.94	5.64
white bass	65	9.20	119.98	7.95	1.85
channel catfish	15	2.12	32.90	2.18	2.19
flathead catfish	1	0.14	50.13	3.32	50.13
white crappie	6	0.85	6.71	0.44	1.12
Subtotal	127	17.97	435.28	28.83	
Total game fish	159	22.50	445.40	29.51	
Total problematic fish	548	77.50	1064.66	70.49	
Total catch	707	100.00	1510.06	100.00	

Minimum weights of fish regarded as having utility - catfish 200 grams, all others 100 grams.

Table 11  
A comparison of utilizable game fish with problematic fish from  
North Concho River  
January 1-31, 1963

Species	Number	Per Cent of Total Catch by Number	Total Pounds Weight	Per Cent of Total Catch by Weight	Average Weight
largemouth bass	1	.83	3.06	4.67	3.06
channel catfish	2	1.67	5.19	7.92	2.50
Subtotal	3	2.50	8.25	12.59	
river carpsuckers	29	24.16	45.31	69.18	1.56
freshwater drum	1	.83	1.13	1.72	1.13
gizzard shad	87	72.51	10.81	16.51	.12
Subtotal	117	97.50	57.25	87.41	
Total	120	100.00	65.50	100.00	

Minimum weights of fish regarded as having utility - catfish 200 grams, all others 100 grams.

Table 12  
Composition by number of fish taken by rotenone sampling of  
North Concho River  
January 1-31, 1963

Species	Number	Per Cent by Number
channel catfish	2	2.77
bluegill	6	8.34
green sunfish	2	2.77
longear sunfish	5	6.95
warmouth bass	2	2.77
Subtotal	17	23.60
river carpsucker	2	2.77
freshwater drum	1	1.39
gizzard shad	32	44.45
golden shiner	2	2.77
Subtotal	37	51.38
blacktail shiners	4	5.57
bullhead minnows	14	19.45
Subtotal	18	25.02
Total	72	100.00

Table 13

Seining Collections taken from North Concho River above San Angelo Reservoir  
January 1-31, 1963

Species	County Park		Wildlife Area		Totals	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
largemouth bass	20	2.41	15	1.99	35	2.21
white bass	2	0.24	1	0.13	3	0.19
channel catfish			2	0.27	2	0.13
flathead catfish	1	0.12			1	0.06
white crappie	25	3.01	40	5.32	65	4.11
bluegill	51	6.14	55	7.32	106	6.70
green sunfish	3	0.36	1	0.13	4	0.25
longear sunfish	4	0.48	2	0.27	6	0.38
redear sunfish			1	0.13	1	0.06
redbreast sunfish	2	0.24			2	0.13
Subtotal	108	13.00	117	15.56	225	14.22
carp	6	0.72	4	0.53	10	0.63
river carpsucker	16	1.93	30	3.99	46	2.91
freshwater drum	1	0.12	1	0.13	2	0.13
longnose gar	5	0.60			5	0.32
gizzard shad	626	75.33	307	40.83	933	58.93
gray redbhorse	2	0.24	1	0.13	3	0.19
Subtotal	656	78.94	343	45.61	999	63.11
logperch	2	0.24				
bullhead minnow	9	1.08	2	0.27	4	0.25
plains minnow	39	4.69	45	5.98	54	3.41
blacktail shiner	1	0.12	85	11.30	124	7.83
golden shiner	16	1.93	125	16.62	126	7.96
Subtotal	67	8.06	292	38.83	359	22.67
Totals	831	100.00	752	100.00	1583	100.00



Table 15 Stomach contents of fish taken from San Angelo Reservoir January 1-31, 1963

Species	No. stomachs Examined	Number With Food	Food items	Frequency of Occurrence
largemouth bass	24	14	unidentifiable	7
			fish remains	6
			gizzard shad	1
white bass	70	54	unidentifiable	22
			fish remains	29
white crappie	26	4	unidentifiable	2
			fish remains	2
bluegill	2	0		
black bullhead	1	0		
freshwater drum	1	0		
Totals	124	72		

Oak Creek Reservoir is located three miles southeast of Blackwell, Texas, on the Nolan-Coke county line. At spillway level the reservoir contains 52,900 acre feet of water and covers 1,500 acres. The lakes waters are normally clear, and the basin topography is excellent for fishing. Practically no run-off has entered the lake in the past two years. Reconnaissance work completed under project F-5-R-9 indicated that due to a continued recession of the lake, problematic species had increased from less than 50 per cent in 1960 to over 80.95 per cent in January of 1962. The city of Sweetwater and other municipalities who own the reservoir requested that something be done to improve fishing. In compliance with this request a reconnaissance was made of the lake. This pre-treatment sampling consisted of eighteen gill net sets that captured 619 fish. Of the fish captured not less than 89.91 per cent by weight and 75.25 per cent by number were undesirable. The capture of over 34 fish per net is significantly higher than average netting success. It was originally proposed to attempt eradication of fish life. However, permission from State health authorities to use toxaphene for this purpose could not be obtained. The cost of using rotenone in a total kill effort was too great. An alternate plan was selected that provided for a drastic reduction of existing fish by employing a contour type treatment. Between June 14 and June 19, 1962, Oak Creek Reservoir was treated with 8,800 pounds of 5.67 per cent powdered rotenone. The shallower areas of the lake, those less than 8 feet deep, were treated with sufficient chemical to provide an immediate concentration of 1.47 parts per million. The deeper areas were treated in such a manner as to achieve an immediate dosage of .099 parts per million. The resulting destruction of fish was estimated as approximately 68,000 pounds. For further data see job completion report 16a36, Project F-14-D-6.

To evaluate the results of this work 44 gill nets were set after the treatment. A total of 560 fish were captured, an average of 12.72 fish per net, or about 30 per cent of the pre-treatment catch. The primary problematic species, river carpsuckers, were reduced from about 24 per cent of the pre-treatment catch to about 13 per cent of the post-treatment sample. Gizzard shad were reduced from 52 per cent of the pre-treatment sample to about 11 per cent of the post-treatment catch. Largemouth bass increased from about .65 per cent in June to 20.66 per cent in October. An examination of creels also indicated a marked increase in fishing success during the period. The final results of this work will depend upon spring run-off that should refill the reservoir. For specific data see tables 16 through 20.

Table 16

Results of 14 gill nets set for fisheries reconnaissance of Oak Creek Reservoir  
April 20, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	Total Weight ozs.	Average Weight lbs.	Average Weight ozs.	Per Cent of Weight	Average "K"
gizzard shad	300	57.14	219	5	11.70	33.03	2.07	
river carpsucker	134	25.52	278	2	1.20	41.88	2.43	
carp	38	7.24	150	12	15.50	22.71	2.13	
black bullheads	4	.76	1	1	4.25	.16	1.81	
bluegill	35	6.67	12		5.50	1.82	3.93	
white crappie	11	2.09	2	1	3	.33	2.31	
golden shiner	3	.58		8	2.66	.07	2.03	
Totals	525	100.00	663	11		100.00		

Table 17

Results of 4 gill nets set for fisheries reconnaissance of Oak Creek Reservoir  
June 19, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
gizzard shad	23	24.47	12	3	0	8.5	23.89	1.68
river carpsucker	16	17.02	24	0	1	8	47.06	1.74
carp	1	1.06	4	0	4	0	7.85	2.12
channel catfish	7	7.45	3	2	0	7	6.12	1.79
yellow bullheads	1	1.06	1	14	1	14	3.68	2.56
white bass	1	1.06	0	2	0	2	.25	1.79
largemouth bass	4	4.26	0	11	0	2.7	1.34	2.26
redear sunfish	17	18.08	2	10	0	2.5	5.15	2.17
bluegill	7	7.45	0	8.7	0	1.7	.98	2.41
longear sunfish	2	2.13	0	5	0	2.5	.61	2.66
white crappie	15	15.96	1	9	0	1.7	3.07	1.97
Totals	94	100.00	51	0			100.00	

Table 18

Results of 20 gill nets set for fisheries reconnaissance of Oak Creek Reservoir  
June 22, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
river carpsucker	41	15.64	89	5	2	2.6	70.86	2.46
carp	10	3.82	19	5	1	15.3	15.31	1.83
channel catfish	2	.76		4		2.0	.20	1.41
bluegill	38	14.51	5	15		2.5	4.69	3.16
white crappie	171	65.27	11	5		1.1	8.94	2.02
Totals	262	100.00	126	2			100.00	

Table 19

Results of 16 gill nets set for fisheries reconnaissance of Oak Creek Reservoir  
July 23, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
gizzard shad	5	8.92	3	1	0	12.3	4.07	1.74
river carpsuckers	22	39.29	40	15	1	13.8	54.45	2.30
carp	7	12.50	24	5	3	7.6	32.33	2.64
channel catfish	7	12.50	4	9	0	10.4	6.07	1.59
black bullheads	1	1.79	0	6	0	6	.50	2.07
bluegill	8	14.28	1	1	0	2.3	1.41	3.39
white crappie	6	10.72	0	14	0	2.3	1.17	2.44
Totals	56	100.00	75	3			100.00	

Table 20

Results of 8 gill nets set for fisheries reconnaissance of Oak Creek Reservoir  
October 4, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
gizzard shad	62	25.61	54	9	14.8	40.88	1.85	
golden shiner	2	.83		5	2.7	.24	1.69	
river carpsucker	8	3.31	16	2	2.	12.08	2.25	
carp	32	13.22	15	9	7.7	11.67	2.37	
channel catfish	13	5.37	13	3	1	9.88	1.50	
black bullheads	34	14.05	12	3	5.7	9.13	2.17	
largemouth bass	50	20.66	9	5	2.9	6.98	2.53	
sunfish	16	6.61	2	1	2.	1.55	3.20	
white crappie	25	10.34	10	2	6.4	7.59	2.67	
Totals	242	100.00	133	7		100.00		

Imperial Reservoir is an irrigation control reservoir for Red Bluff Power and Water District. This playa lake, whose natural capacity was increased by construction of a dam, is located in a bend of the Pecos River about 10 miles west of the town of Imperial in Reeves County. Water is diverted from the Pecos and enters the reservoir through a canal. Releases are as irrigation demands. Flow of the upper Pecos is controlled by Red Bluff Reservoir and several reservoirs in New Mexico. The reservoir is primarily for irrigation but is of unusually high recreational importance because of its geographical location. Imperial is unique in the relatively high salinity of its water, (1,500 ppm. chlorides to over 4,000 ppm.) At spillway crest the reservoir contains 3,000 acre feet and covers nearly 1,000 acres. Periodically the reservoir affords excellent fishing for white bass and the growth rates of these fish is unusually rapid. Much of the data included was obtained as a secondary benefit of the study made of marine species introduced into this saline lake. However, these data also provide information pertaining to seasonal expansions of various populations and of the rate of increase that may occur within relatively short periods. This reconnaissance was also to provide data on the success of stocking from fish hatcheries and of the effect of sudden withdrawals on various species of fish. In all 64 gill net collections captured 1,970 fish. Of these 13.85 per cent were usable game fish. The primary problematic species were longnose gar, carp, gizzard shad and river carpsuckers. This group made up 81.37 per cent of all fish captured. Experimental management of the reservoir may be justifiable; however, a maximum management effort would necessarily be of watershed scope and would depend upon management work on reservoirs located on the Pecos above Imperial.

Table 21

Results of 12 gill nets set for fisheries reconnaissance of Imperial Reservoir  
November 9, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
longnose gar	56	30.76	132	9	2	5.9	68.51	.43
gizzard shad	60	32.97	8	4		2.2	4.26	1.49
river carpsucker	27	14.84	17			10.1	8.78	1.74
carp	8	4.40	6	2		12.2	3.16	1.74
white bass	26	14.28	17	14		11.	9.23	2.53
largemouth bass	2	1.10	3	14	1	15.	2.03	2.88
bluegill	2	1.10		6		3.	.19	3.47
southern flounder	1	.55	7	7	7	7.	3.84	2.61
Totals	182	100.00	193	8			100.00	

Table 22

Results of 11 gill nets set for fisheries reconnaissance of Imperial Reservoir  
December 7, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
longnose gar	3	3.75	8	4	2	12	8.00	.39
gizzard shad	10	12.50	2	7	0	3.9	2.37	1.51
smallmouth buffalo	1	1.25	4	8	4	8	4.36	1.96
river carpsuckers	26	32.50	21	2	0	13	20.50	1.79
carp	7	8.75	10	14	1	8.9	10.55	1.81
channel catfish	1	1.25	2	1	2	1	2.01	1.83
white bass	30	37.50	41	7	1	6	40.20	2.83
bluegill	1	1.25	0	2	0	2	.12	4.23
red drum (red fish)	1	1.25	12	4	12	4	11.89	1.65
Totals	80	100.00	103	1			100.00	

Table 23

Results of 20 gill nets set for fisheries reconnaissance of Imperial Reservoir  
May 8, 1962

Species	Number	Per Cent of Number		Total Weight		Average Weight		Per Cent of Weight	Average "K"
		lbs.	ozs.	lbs.	ozs.	lbs.	ozs.		
longnose gar	135	202	12	1	8	44.96	.41		
gizzard shad	351	62	11	0	2.86	13.90	1.73		
river carpsuckers	62	69	13	1	2	15.48	2.14		
carp	112	105	3	0	15	23.33	2.39		
white bass	14	10	8	0	12	2.33	2.48		
Totals	674	450	15			100.00			

Table 24

Results of 8 gill nets set for fisheries reconnaissance of Imperial Reservoir  
April 18, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
longnose gar	58	12.71	261		2	8	50.99	.42
gizzard shad	252	55.27	47	4		3	9.23	1.61
river carpsucker	67	14.69	108		1	9	21.10	1.79
carp	70	15.35	82	11	1	2	16.15	2.44
white bass	6	1.32	6	6	1	1	1.25	2.99
largemouth bass	1	.22		7		7	.08	2.05
green sunfish	1	.22		2		2	.02	3.57
red drum (red fish)	1	.22	6		6		1.18	1.72
Totals	456	100.00	511	14			100.00	

Table 25

Results of 13 gill nets set for fisheries reconnaissance of Imperial Reservoir  
February 27, 1963

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
longnose gar	78	13.49	125	2	1	9.6	22.68	.44
gizzard shad	138	23.88	38	2		4.4	6.91	1.87
smallmouth buffalo	93	16.09	103	4	1	1.7	18.72	2.30
river carpsucker	64	11.07	43	8		10.8	7.88	1.75
carp	19	3.29	26	12	1	6.5	4.85	2.14
channel catfish	1	.17	1	13	1	13.0	.33	2.06
white bass	181	31.31	200	4	1	1.7	36.30	2.64
largemouth bass	3	.53	6	5	2	1.6	1.15	2.83
southern flounder	1	.17	6	8	6	8.0	1.18	2.30
Totals	578	100.00	551	10			100.00	

## Secondary Reconnaissance Surveys

### A. Reconnaissance to Evaluate Previous Management

Lake Balmorhea is an irrigation control reservoir owned and operated by Reeves County Irrigation District No. 1. The reservoir is 4 miles southeast of Balmorhea in Reeves County, was constructed in 1913, and is fed by natural springs. At spillway capacity the reservoir has 640 acres and contains 6,350 acre feet. Studies of the reservoir were initiated in June 1960. Sampling at that time indicated that 88.78 per cent of all fish in the lake were gizzard shad, river carpsuckers or carp. Game species were less than 8.44 per cent by weight. More thorough reconnaissance was completed between June 13, 1961 and October 18, 1961. Findings indicated that problematic species were 87.31 per cent by number and 88.23 per cent by weight. On December 1, 1961, the reservoir was treated with .20 parts per million toxaphene. Sixty days later 2,400 feet of experimental gill nets were set and failed to capture fish. During the segment 15 experimental gill net collections were taken. As shown in the accompanying data no problematic fish were captured. Game fish made up 100 per cent of fish captured and growth rates were deemed adequate when the rate of stocking and fluctuations of the lake are considered. Fishing success was meager. The fish were not yet large enough to provide catches of acceptable sizes.

Table 26

Results of 8 gill nets set for fisheries reconnaissance of Lake Balmorhea  
November 8, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
largemouth bass	7	20.58	2	1	4.7	38.82	1.88	
green sunfish	20	58.84	2	6	1.9	44.70	3.43	
warmouth bass	7	20.58	14		2.	16.48	3.53	
Totals	34	100.00	5	5		100.00		

Table 27

Results of 7 gill nets set for fisheries reconnaissance of Lake Balmorhea  
March 6, 1963

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
channel catfish	3	4.28	0	7	0	2.33	4.54	1.47
largemouth bass	3	4.28	1	0	0	5.33	10.39	2.09
green sunfish	51	72.86	6	11	0	2.10	69.48	3.14
warmouth bass	13	18.58	1	8	0	1.84	15.59	3.33
Totals	70	100.00	9	10		100.00		

Mountain Creek Reservoir is the primary source of municipal water for the city of Robert Lee in Coke County. The lake has 77 acres at spillway elevation and impounds 950 acre feet of water. The reservoir is located approximately 1 mile east of the city. Pre-management sampling of this reservoir was initiated in May 1958 and continued through September 1960. Based upon 395 fish captured in gill nets, it was estimated that 86.32 per cent of fish being produced were undesirable. These fish made up 98.95 per cent of the production in weight. River carpsuckers were 51.21 per cent of the total number of fish captured and made up 88.66 per cent of the weight of the catch. In April 1961 this reservoir and associated waters of the watershed were treated to eradicate existing fish populations. On May 10, 1961, 725 feet of experimental gill nets were set in the reservoir. No fish were captured. To evaluate the results of this management effort, 22 experimental gill net collections were taken in the 1962-63 period. As shown in accompanying data, bullheads were not eliminated by the treatment or were reintroduced by March 1962. However, the primary objective, a basic manipulation in fish production, was achieved. No carp, river carpsuckers, or gizzard shad were captured in sampling during the twenty-two month period following the renovation effort. Game fish exhibited excellent growth and made up nearly 98 per cent of fish produced. Creels taken indicate that fishing results beginning with the spring of 1962 have averaged over four fish per man hour. There is no reason to doubt that more fish have been produced and harvested since the renovation effort than were captured during the previous 8 years of the reservoirs existence.

Table 28

Results of 8 gill nets set for fisheries reconnaissance of Mountain Creek Reservoir  
 March 9, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
channel catfish	4	14.28	5	4	1	3	41.17	1.80
yellow bullheads	3	10.72	3	11	1	4	28.92	2.94
largemouth bass	9	32.14	2	4		4	17.65	1.86
green sunfish	10	35.71	1	6		2.20	10.78	3.03
golden shiner	2	7.15		3		1.50	1.48	1.78
Totals	28	100.00	12	12			100.00	

Table 29

Results of 6 gill nets set for fisheries reconnaissance of Mountain Creek Reservoir  
March 28, 1962

Species	Number	Per Cent of Number	Total Weight lbs. ozs.	Average Weight lbs.	Average Weight ozs.	Per Cent of Weight	Average "K"
channel catfish	8	16.32	9 0	1	2	41.61	1.63
yellow bullheads	3	6.12	4 12	1	9.33	21.97	2.42
largemouth bass	8	16.33	3 4		6.75	15.03	2.12
green sunfish	23	46.94	3 11		2.30	17.05	3.81
bluegill	1	2.05		2		.58	4.14
warmouth bass	3	6.12		5	1.66	1.44	3.81
golden shiner	3	6.12		8	2.66	2.32	2.05
Totals	49	100.00	21 10			100.00	

Table 30

Results of 3 gill nets set for fisheries reconnaissance of Mountain Creek Reservoir  
November 27, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
golden shiner	3	11.11	0	9	0	3	3.23	1.85
channel catfish	3	11.11	10	15	3	10	62.95	1.68
yellow bullheads	2	7.40	1	11	0	13	9.71	2.23
largemouth bass	4	14.82	1	8	0	6	8.64	1.74
green sunfish	7	25.92	0	15	0	2	5.39	2.93
warmouth bass	4	14.82	0	8	0	2	2.88	3.19
bluegill	4	14.82	1	4	0	5	7.20	4.27
Totals	27	100.00	17	6			100.00	

Table 31  
 Results of 5 gill nets set for fisheries reconnaissance of Mountain Creek Reservoir  
 February 8, 1963

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
golden shiner	11	21.15	2	5	0	3.7	13.26	1.88
black bullheads	1	1.92	0	11	0	11	3.94	1.72
flathead catfish	1	1.92	8	2	8	2	46.59	1.38
largemouth bass	6	11.54	1	12	0	4.6	10.04	1.70
green sunfish	24	46.16	3	4	0	2.1	18.64	2.81
warmouth bass	7	13.46	1	2	0	2.5	6.45	3.41
bluegill	2	3.85	0	3	0	1.5	1.08	2.95
Totals	52	100.00	17	7			100.00	

Lake Sweetwater is one of three reservoirs owned by the city of Sweetwater and used for municipal water supply. At spillway elevation the lake contains 11,500 acre feet of water and has 825 acres. Surveys beginning in 1957 and continuing until August 1960 indicated that 0.11 per cent of fish present were game fish and 99.99 per cent were undesirable species. To renovate game fish production 4,256 acre feet of water contained in Lake Sweetwater and the contributing watershed were chemically treated to eradicate existing fish. Live boxes containing 1,400 fish were suspended at various depths during the treatment. None of these fish survived. Thirty days following the treatment 8,000 feet of gill nets were set in the lake and captured only one channel catfish. Following the restocking program Lake Sweetwater was closed until February 1962. At that time creel data indicated that the average catch was 1.3 fish per man hour. This was more than 10 times as great as was indicated in pre-treatment creels. Approximately 3,500 persons attended the re-opening of the lake. Many of the largemouth bass exceeded 2 pounds, and catfish were recorded as high as 3 pounds 11 ounces. Later reports indicated that fishing success was greater later in the spring. Twenty-one gill net collections taken between July and December 1961 established that bullheads, bluegill sunfish, and white crappie had been reintroduced into the reservoir. However, these undesirable fish made up only 10 per cent of the catch and were only 17.50 per cent of the total weight. In October of 1962, results from six gill net collections indicated that the primary problematic species, carp, river carp-suckers, and gizzard shad were still absent from the lake. However, bullheads had increased to 43.66 per cent of the fish caught. These fish were being readily taken by trotliners since they weighed over one and one-half pounds. Largemouth bass fishing remained good during the 1962 season and excellent catches of white crappie were reported in the early spring of 1963.

Table 32

Results of 6 gill nets set for fisheries reconnaissance of Sweetwater Reservoir  
October 30, 1962

Species	Number	Per Cent of Number	Total Weight lbs. ozs.	Average Weight lbs. ozs.	Per Cent of Weight	Average "K"
golden shiner	9	4.22	1 6	2.4	.78	1.86
channel catfish	8	3.76	24 11	1.7	14.15	1.89
black bullheads	93	43.66	119 2	4.4	68.32	2.56
largemouth bass	11	5.16	17 11	9.7	10.15	2.37
green sunfish	4	1.88	6	1.5	.22	2.47
bluegill	84	39.44	10 8	2.	6.03	3.59
white crappie	4	1.88	10	2.5	.35	2.18
<b>Totals</b>	<b>213</b>	<b>100.00</b>	<b>174 6</b>		<b>100.00</b>	

Lake Ascarate is located in the southwest quarter of the city of El Paso in county-owned Ascarate Park. The reservoir is supplied by wells from sub-surface deposits, has 47 acres, and contains 247 acre feet. Survey work completed in June 1960 indicated that 93.05 per cent of the total sample weight and 95.50 per cent of all fish present were undesirable species (Project F-5-R-8, Job B-22). To improve game fish production for the lake, existing fish were drastically reduced by a chemical treatment completed in August 1960. This work was apparently successful and the lake was subsequently restocked with game fish (Project F-14-D-4, Job 16a29). Sampling in the 1960-61 period indicated a complete kill was achieved. Results of 6 gill nets set for reconnaissance in April 1962 revealed that black bullheads and carp had been reintroduced into the lake. The occurrence of carp remains unexplained; however, bullheads were introduced by well meaning, but misinformed, sportsmen who believed them to be flathead catfish. Accompanying this effort a vegetation control program was carried out to reduce the dense concentrations of aquatic plants in the lake (F-15-D-2, Job 15a11). This work succeeded for 11 months following the treatment. However, regrowth during the summer of 1962 resulted in a submerged aquatic vegetation problem equally inhibiting with that encountered prior to the chemical treatment. Since that time a mechanical weed cutter has been purchased, and when regularly applied provides partial control of the vegetative growth.

Table 33

Results of 6 gill nets set for fisheries reconnaissance of Ascarate Reservoir  
April 5, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	Average Weight ozs.	Per Cent of Weight	Average "K"
carp	3	5.08	3	4	1	1.33	15.07	3.53
channel catfish	2	3.39	6		3		27.82	2.04
black bullheads	5	8.48	3	2		10	14.50	2.89
largemouth bass	4	6.78	3	14		15.50	17.97	2.88
green sunfish	43	72.89	5			1.86	23.19	4.34
longear sunfish	1	1.69		2		2	.58	5.26
black crappie	1	1.69		3		3	.87	3.11
Totals	59	100.00	21	9			100.00	

Champion Creek Reservoir is located on Champion Creek six miles east of Colorado City in Mitchell County. The reservoir is capable of containing 42,000 acre feet at spillway capacity and at that elevation has approximately 2,750 acres. To date storage has not exceeded 14,000 acre feet. The lake and watershed were treated in 1959 to eliminate problematic fish (Job 16a15, Project F-14-D-3). At the time of treatment the included waters were heavily dominated by river carpsuckers, carp, gizzard shad, longnose gar, and drum. Fishing has been excellent for three years and exceptionally rapid growth has been evident in the initial stocking of largemouth bass. These fish grew to an average size of 3 pounds 1 ounce during the first 20 months following their introduction. In October 1962, six experimental gill nets were set to determine the status of game fish production. As shown in table 34, black bullheads, golden shiners, and white bass have been reintroduced into the watershed or have survived the control effort. However, fishing results remain high, and no carp, river carpsuckers, gizzard shad, or smallmouth buffalo have been taken in the four-year period following the control effort. Bullheads are of sufficient size to afford utility, as evidenced by sportsmen retaining them in creels.

Table 34

Results of 6 gill nets set for fisheries reconnaissance of Champion Creek Reservoir  
October 31, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
golden shiner	1	4.00	4		4		1.19	2.14
black bullheads	14	56.00	12	14	14.7		61.68	2.13
white bass	1	4.00	2	12	2	12	13.17	2.48
largemouth bass	3	12.00	4	7	1	7.7	21.26	1.97
green sunfish	4	16.00		5		1.2	1.50	3.07
white crappie	2	8.00		4		2.	1.20	2.27
Totals	25	100.00	20	14			100.00	

B. Reconnaissance to Provide Specific Data

Red Bluff Reservoir cleaves the Texas-New Mexico boundary 52 miles northwest of Pecos in Reeves County. This irrigation impoundment is designed to store 307,000 acre feet of water and at maximum capacity has 18,000 acres. The reservoir is subject to extreme fluctuations. Vertical reductions of 32 feet between January and August are not uncommon. The primary purpose of the sampling effort was to attempt to recapture marine species introduced. However, this reconnaissance was also to determine the results of releases from hatcheries and the productivity of white bass populations. In 1957-58 white bass made up 51 per cent of fish captured. The population was apparently reduced to 24 per cent in 1958-59 and were further reduced to 8 per cent by 1960. An increase in the reservoir volume in the spring of 1960 resulted in an expansion of the white bass population to 33.33 per cent of fish captured. The relative abundance of that species is currently estimated at 32.72 per cent. Following the expansion of the reservoir, large quantities of largemouth bass fry were released. This was done to take advantage of the growing room created. During 1961, reports of excellent catches of "yearling" size bass were common. However, netting did not indicate a great increase. As shown in table 35, largemouth bass were apparently down to 0.26 per cent of the netting sample by December 1962.

Table 35

Results of 12 gill nets set for fisheries reconnaissance of Red Bluff Reservoir  
December 4, 5, 6, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
longnose gar	15	3.95	60	15	4	1	11.52	.46
gizzard shad	65	17.15	17	7		4	3.30	1.49
smallmouth buffalo	59	15.57	213	14	3	10	40.43	2.18
river carpsucker	103	27.18	68	3		10	12.89	1.76
carp	10	2.65	11	11	1	2	2.21	1.60
channel catfish	1	.26		5		5	.05	1.15
white bass	124	32.72	147	3	1	3	27.82	2.43
largemouth bass	1	.26	2	2	2	2	.40	2.56
red drum (red fish)	1	.26	7	5	7	5	1.38	1.75
Totals	379	100.00	529	1			100.00	

Table 36

Results of 13 gill nets set for fisheries reconnaissance of Red Bluff Reservoir  
 May 9, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	Total Weight ozs.	Average Weight lbs.	Average Weight ozs.	Per Cent of Weight	Average "K"
longnose gar	77	14.07	186	2	2	6.6	20.72	.45
gizzard shad	123	22.49	23	1	0	3	2.57	1.58
smallmouth buffalo	103	18.83	437	12	4	4	48.75	2.32
river carpsuckers	76	13.89	70	9	0	14.8	7.86	2.09
carp	19	3.49	20	9	1	1.3	2.29	2.04
channel catfish	1	.18	1	8	1	8	.16	1.48
white bass	146	26.69	150	8	1	.44	16.76	2.39
largemouth bass	1	.18	4	8	4	8	.50	2.71
red drum (red fish)	1	.18	3	8	3	8	.39	1.96
Totals	547	100.00	898	1			100.00	

Lake Colorado City is situated on Morgan Creek, a small tributary of the Upper Colorado River, in Mitchell County. The dam was completed in 1949 by the Texas Electric Service Company to provide a supply of cooling water for a steam-electric power plant. The lake also serves as a municipal water supply for Colorado City. At spillway level 31,800 acre feet are impounded and cover 2,030 acres. The inventory survey was completed for this reservoir in 1960. Findings indicated that the water expelled from the plant created a warm circulating current. This phenomena was also found to be attractive to channel catfish and gizzard shad in the summer, and to largemouth bass and river carp-suckers during the winter. To continue to study the effect of this condition with a view of possibly employing this circumstance in management, 12 standard gill nets were set in the reservoir. As shown in tables 37 and 38 the relative abundance of game fish has reduced. This apparent reduction may have been brought about by sampling error due to the severity of the weather. For this reason further study will be required before the trend is established.

Table 37

Results of 6 gill nets set for fisheries reconnaissance of Colorado City Reservoir  
February 7, 1963

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
gizzard shad	12	16.66	2	0	0	2.6	2.46	1.73
river carpsucker	25	34.72	31	1	1	3.8	38.35	2.21
channel catfish	16	22.23	13	11	0	13.6	16.90	1.45
white bass	2	2.77	4	13	2	6.5	5.94	2.43
largemouth bass	8	11.12	21	2	2	10.2	26.08	2.43
bluegill	1	1.38	0	2	0	2	.16	2.83
white crappie	8	11.12	8	3	1	.3	10.11	2.79
Totals	72	100.00	81	0			100.00	

Table 38

Results of 6 gill nets set for fisheries reconnaissance of Colorado City Reservoir  
March 21, 1963

Species	Number	Per Cent of Number	Total Weight lbs. ozs.	Average Weight lbs. ozs.	Per Cent of Weight	Average "K"
gizzard shad	92	23.95	15 10	0 2.7	2.18	1.70
river carpsucker	161	41.93	214 14	1 5.3	29.77	2.22
carp	20	5.21	46 3	2 4.9	6.39	2.36
channel catfish	28	7.29	141 13	5 1	19.64	1.47
flathead catfish	17	4.43	212 2	12 7	29.38	1.68
white bass	1	.26	0 4	0 4	.03	3.78
largemouth bass	24	6.25	57 14	2 6.9	8.01	2.30
bluegill	3	.78	0 4	0 1.3	.03	2.91
white crappie	38	9.90	33 0	0 13.8	4.57	2.60
Totals	384	100.00	722 0		100.00	

New Winters Lake is the primary source of water for the city of Winters in northwest Runnels County. The reservoir impounds 11,000 acre feet at maximum capacity and has 250 acres. Reconnaissance was carried out as part of a watershed study to determine the feasibility of management of Elm Creek and reservoirs created by that tributary of the Colorado River. Previous reconnaissance completed in the spring of 1961 indicated that New Winters Lake was dominated by gizzard shad and river carpsucker. However, significant channel catfish and white crappie populations afforded some successful game fish production at that time. Old Winters Lake, the reservoir previously serving for municipal water, was chemically treated to improve game fish production in 1960. This reservoir was producing excellent fishing by the fall of 1961. Fishing results were extremely meager for the remainder of Elm Creek. For this reason management appeared opportune. As shown in table 39, gizzard shad, smallmouth buffalo, river carpsucker and carp made up 58.33 per cent of fish captured in 6 gill nets and were 61.67 per cent of the weight of the catch. These figures indicate that rough fish species were significantly less than was indicated by sampling in June 1961. At that time these species were 65.45 per cent of the total number of fish netted and made up 73.36 per cent of the sample weight. Current data also indicates that white crappie were 22.62 per cent of fish present but averaged only 2.8 ounces in weight. The June sample indicated an average weight of 1 pound 4 ounces for crappie.

Table 39

Results of 6 gill nets set for fisheries reconnaissance of New Winters Reservoir  
July 25, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
gizzard shad	70	41.66	4	12	1.8	8.69	1.13	
smallmouth buffalo	1	.60	1	8	8.0	2.75	2.75	
river carpsucker	18	10.71	10	14	9.6	19.91	2.12	
carp	9	5.36	16	9	13.4	30.32	2.22	
channel catfish	10	5.95	4	9	7.3	8.35	1.30	
flathead catfish	1	.60	4	14	14.0	8.92	1.58	
largemouth bass	2	1.19	1	11	13.5	3.09	1.84	
bluegill	3	1.78		4	1.3	.46	2.57	
white crappie	38	22.62	6	9	2.8	12.01	2.35	
freshwater drum	16	9.53	3	0	3.0	5.50	1.94	
Totals	168	100.00	54	10		100.00		

Old Ballinger City Lake is located on Elm Creek in the city park north of the city of Ballinger. The usage of the lake is entirely recreational. Water impounded is approximately 250 acre feet and about 50 acres are covered. The purpose of this reconnaissance was to determine the feasibility of a watershed renovation effort. As shown in table 40, 73.27 per cent of fish captured in 5 gill nets were rough fish species. Over 96.18 per cent of the total weight of the sample were non-game species. It is believed that only an eradication effort will serve to renovate Elm Creek and its included reservoirs. This has been requested by the city of Winters and the Ballinger city commissioner.

Table 40

Results of 5 gill nets set for fisheries reconnaissance of Old Ballinger Reservoir  
July 25, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
longnose gar	28	11.33	77	3	2	12.1	33.66	.37
gizzard shad	117	47.37	35	7	0	4.8	15.46	1.76
smallmouth buffalo	7	2.83	25	1	3	9.2	10.93	3.15
river carpsuckers	25	10.12	48	8	1	15	21.16	2.93
carp	4	1.62	15	7	3	13.7	6.73	2.47
largemouth bass	1	.41	1	1	1	1	.47	2.14
bluegill	2	.81	0	3	0	1.5	.08	4.07
white crappie	49	19.84	7	8	0	2.4	3.27	2.84
freshwater drum	14	5.67	18	14	1	5.5	8.24	2.47
Totals	247	100.00	229	4			100.00	

Valley Creek Reservoir is the present source of water for the city of Ballinger. The reservoir is located within the western part of the city, has 87 acres, and contains 1,100 acre feet. The purpose of the reconnaissance effort was to determine the status of game fish production in order to ascertain whether adequate fishing would be provided for local fishermen while the proposed renovation of Elm Creek was being carried out. As shown in table 41, problematic fish made up 91.42 per cent of fish captured in 8 experimental gill nets and were 84.30 per cent of the total sample weight. The only acceptable fishery assets were the channel catfish, flathead catfish, and largemouth bass populations.

Table 41 Results of 8 gill nets set for fisheries reconnaissance of Valley Creek Reservoir July 10, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
longnose gar	11	4.10	34	13	3	2.6	14.31	.40
gizzard shad	51	19.03	8	10		2.7	3.54	1.77
smallmouth buffalo	1	.38	13	8	13	8.0	5.55	3.52
river carpsucker	75	27.99	106	6	1	6.6	43.73	2.28
carp	4	1.49	24	12	6	3.0	10.18	2.49
channel catfish	14	5.22	14	3	1	0.2	5.83	1.71
flathead catfish	1	.38	6	6	6	6.	2.62	1.75
largemouth bass	8	2.98	17	10	2	3.2	7.25	2.51
bluegill	54	20.15	7	2		2.1	2.93	3.30
white crappie	38	14.18	4	10		1.9	1.90	2.22
freshwater drum	11	4.10	5	4		7.6	2.16	2.25
Totals	268	100.00	243	4			100.00	

Devils Lake is located eight miles northwest of Del Rio in Val Verde County. Storage capacity is 10,750 acre feet and area is 440 acres. The reservoir was constructed in 1928 for the generation of hydroelectric power by the Central Power and Light Company. The initial fishery survey of the lake was completed in June 1955 (see Project F-9-R-2, Job B-4). This survey indicated that rough fish species accounted for 68.77 per cent of the total catch. To obtain current data of fish populations, 8 gill nets were set in November 1962. As shown in tables 42 and 43, there is apparently little change in game fish production. Over 62 per cent of fish produced are non-game species and condition of most game species is poor. This lake and Lake Walk will be inundated by the new international reservoir, Amistad Reservoir, and may serve as the means of producing a maximum game fish population for that lake. Further study will be required.

Table 42

Results of 5 gill nets set for fisheries reconnaissance of Devils Reservoir  
November 14, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
longnose gar	1	2.00	11	11	11	.88	.28	
spotted gar	6	12.00	3	13	10.1	4.94	.54	
gizzard shad	10	20.00	5	1	8.1	6.55	1.83	
smallmouth buffalo	1	2.00	5	8	5	7.12	2.73	
gray redhorse	3	6.00	2	13	15.	3.64	1.83	
river carpsucker	10	20.00	18	9	1	13.7	2.27	
channel catfish	10	20.00	23	9	2	5.7	1.49	
flathead catfish	1	2.00	2	12	2	12.	1.63	
white bass	1	2.00	7	7	7.	.57	2.21	
redbreast sunfish	1	2.00	5	5	5.	.41	2.80	
bluegill	1	2.00	5	5	5.	.41	3.31	
white crappie	2	4.00	9	4.5	4.5	.73	2.33	
freshwater drum	3	6.00	12	14	4.6	16.66	1.64	
Totals	50	100.00	77	4		100.00		

Table 43

Results of 3 gill nets set for fisheries reconnaissance of Devils Reservoir  
November 15, 1962

Species	Number	Per Cent of Number	Total Weight lbs.	ozs.	Average Weight lbs.	ozs.	Per Cent of Weight	Average "K"
gizzard shad	3	20.00	1	6	7.3	5.39	1.79	
river carpsucker	1	6.67	1	2	1	4.42	2.27	
gray redbreast	4	26.64	7	8	1	29.41	1.57	
carp	1	6.67	6		6	23.53	2.05	
channel catfish	1	6.67	1		1	3.92	1.48	
white bass	1	6.67		12		2.94	2.14	
largemouth bass	1	6.67	2	14	2	11.28	2.18	
green sunfish	1	6.67		5		1.22	3.75	
white crappie	1	6.67		6		1.47	2.22	
freshwater drum	1	6.67	4	3	4	16.42	2.27	
Totals	15	100	25	8		100		

The Lower Pecos River at Langtry was studied to determine if pollution entering the Pecos River in the Pandale area had resulted in destruction of blue catfish that concentrate near the stream mouth. Large mesh gill nets were employed and 17 blue catfish were captured. Seining in the area did not result in capture of juvenile blue catfish.

The Upper Colorado River near Robert Lee was seined to attempt to determine ecological factors that result in extreme fluctuations in various species of minnows. It was established that redhorse shiners may reproduce in the fall and that plains shiners may reproduce as early as February.

Recommendations:

Future reconnaissance efforts should concentrate on evaluating the results of management work.

Prepared by Lawrence S. Campbell

Date October 24, 1963

Approved by Marion Toole  
Coordinator

Leo D. Lewis  
Regional Supervisor

