Job Completion Report

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State of TEXAS

Project No. F-5-R-5 Name: Fisheries Investigations and Surveys of the Waters of Region 3-B.

Job No. B-17 Title: Inventory of Species Present in Red Bluff Reservoir near Orla, Texas.

Period Covered: April 16, 1957 - April 16, 1958.

Abstract:

Inventory indicated that as a result of a more stabilized volume white bass increased significantly and river carpsuckers decreased. Apparently largemouth bass are not suited to this reservoir and other game species were of little importance.

Objectives:

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

Procedure:

Thirty-six gill nets were set at nine locations in the reservoir. Experimental nylon gill nets, measuring 125 feet long by eight feet deep and made up in five, 25-foot sections, were used. Mesh sizes for these nets increased progressively in each following section, at half-inch intervals, beginning with one-inch mesh section and terminating with a three-inch mesh section.

Fourteen seining collections were made at five seining stations in the reservoir. In nearly all collections, both 26 foot, $\frac{1}{4}$ inch mesh bag seines and 15 foot, $\frac{1}{4}$ inch mesh, common sense seines were used. To estimate relative abundance a count was made of all individuals taken in two hauls with a 26 foot, $\frac{1}{4}$ inch mesh bag seine. In addition to this work, collections with 4 foot, 1/16 inch mesh, common sense fry seine was taken.

Water analyses to determine dissolved oxygen content and the quantity of dissolved carbon dioxide were made periodically. Surface temperature, pH and weather conditions were recorded for each netting and seining collection. Turbidity was measured on two occasions.

In netting collections, samples from each collection and for each species were weighed, measured and sexed. This work was done in the field. Stomachs containing food were preserved for laboratory examination. Similar work for seining collections included identification, weighing and measuring. Individual specimens not readily identifiable in the field were preserved in 10 percent solution of formalin. These were later identified in the laboratoy.

Findings:

Red Bluff Reservoir is the fifth in a series of major reservoirs located on the Pecos River. It is impounded by a 9,200 foot compacted earth-fill dam, located three miles upstream from Screwbean Draw and 4.5 miles north of the town of Orla, Texas, and is designed to have a total storage capacity of 307,000 acre feet of water. The contributing watershed of 20,720 square miles is in the lower staked plains. The reservoir is primarily for the impoundment and control of irrigation waters and is owned by Red Bluff Power Control District, whose offices are in Pecos. About 15,000 acres in Reeves, Ward and Pecos Counties may be irrigated when water supplies permit. As shown in the accompanying hydrology data, the reservoir is subject to extreme fluctuation because of its use; is the most saline inland reservoir in the state and possibly in the south; and is generally unstable in nature. The area, subject to inundation particularily in the upper portions of the reservoir, is covered with dense concentrations of salt cedar and access to much of the reservoir area is difficult. Although bulrushes, Scirpus sp., are present in sparse and very limited concentrations, the reservoir has no vegetation problem. Turbidity was not recordable; pH was from 7.8 to 8.0; dissolved oxygen was from 7 to 10 ppm; and dissolved carbon dioxide was from 0 to 14 ppm. Subsurface infiltration, or seepage of water into the river bed above the reservoir, transported and deposited an estimated 279 tons of salt each 24 hours and a "saline" stratification was considered as possible. The accompanying charts are regarded as the most suitable presentation of other basic findings. (See Tables I and II.)

Fish Populations:

a. Relative Abundance - Because of the previously described concentrations of salt cedar and other obstructions seining could be done as described only near the dam. For that reason gill netting collections are probably more reliable in indicating this aspect of the population study. The species taken are listed in an annotated checklist.

b. Species Distribution - Information pertaining to this part of the survey will be included in part under trends and influences of principal populations and partly under the annotated checklist.

Annotated Checklist of Species of Fish Taken in Red Bluff Reservoir

Lepisosteidae (gars)

Lepisosteus osseus (longnose gar) - common and especially abundant near the mouth of the river.

Clupeidae (shad and herrings)

Dorosoma cepedianum (gizzard shad) - the most numerous and widely distributed species in the reservoir. Abundant and relatively large in size.

Characidae (tetras)

Astyanax fasciatus (Mexican jumper) - probably released by persons handling bait. Found near the dam.

Catostomidae (suckers)

Carpiodes carpio (river carpsucker) - common and abundant, taken in all reservoir areas, high average coefficient of condition, however, apparently there was no significant increase during the second year of work.

Moxostoma congestum (gray redhorse sucker) - common but usually restricted to the mouth of the river.

Cyprinidae (minnows)

Cyprinus carpio (carp) - common and fairly abundant, taken at all netting stations, possibly controlled or partially controlled by salinity.

Notropis lutrensis (redhorse shiner) - common, probably the dominant minnow for the lake.

Pimephales vigilax (parrot minnow) - common but less numberous than redhorse shiners or killifishes.

Ameiuridae (catfishes)

Ictalurus natalis (yellow bullhead) - not actually taken but known to be present immediately below release structures and above reservoir in river. Significance undetermined.

Ictalurus punctatus (channel catfish) - common but not numerous, evenly distributed but less concentrated in the upper reservoir.

Pylodictus olivaris (flathead catfish) - rare and apparently not present in the saline upper reservoir near the river mouth.

Cyprinodontidae (killifishes and topminnows)

Fundulus kansae (plains killifish) - common and abundant, probably next to shad as the most numerous species for the reservoir.

Gambusia affinis (mosquitofish) - abundant in all areas where protection was afforded.

Serranidae (basses)

Roccus chrysops (white or striped bass) - abundant, the most numerous game species, concentrated near the Pecos mouth, high average coefficient of condition, apparently particularly well suited to this type habitat.

Centrarchidae (black basses and sunfish)

Micropterus salmoides (largemouth bass) - rare, and confined in distribution to the areas low in salinity near the dam. Unimportant as a resource, no juvenile fish taken in seining, condition poor and indicative of unsuccessful reproduction.

Chaenobryttus gulosus (warmouth bass) - rare, taken in seining only.

Lepomis cyanellus (green sunfish) - common and fairly abundant near the dam.

Lepomis macrochirus (bluegill) - of about equal importance with green sunfish, more widely distributed, but not important as a game species.

Lepomis microlophus (redear sunfish) - rare, taken in one collection only.

Lepomis megalotis (longear sunfish) - rare, but more numerous than redear.

Pomoxis annularis (white crappie) - possibly the most numerous centrarchid, but apparently stunted and not present in the extremely saline areas of the river mouth.

Percidae (perches and darters)

Percina caprodes (logperch) - not actually taken in reservoir, but present in the stream immediately below.

Sciaenidae (drum)

Aplodinotus grunniens (freshwater drum) - not actually taken in year's netting, but observed in fishermen catches and taken in the previous year of inventory. Believed to be much more common than netting would indicate, more widely distributed, and of some importance as a game fish.

(See Table III.)

c. Trends and Influences in the Principal Fish Populations.

Gizzard shad - netting and other data indicate a significant increase of this population. The average size of shad was slightly larger indicating that a lessor percent were in utilizable form, and there was evidence of a coinciding increase in this species and white bass.

White bass - the numerical increase indicated by netting is insufficient to express the importance in the change occurring within this population. Most fish taken were utilizable, had a higher coefficient of condition, and spawning was successful. The majority or bulk of these fish were taken near the river mouth.

Other population trends - with a more stabilized volume most game species increased numerically and in condition. There was no apparent increase in the number of river carpsuckers; however, condition remained high for the species. Sunfishes were relatively unimportant and only redhorse shiners were of importance as forage in the minnow category.

Summary:

1. The reservoir remained comparatively constant in volume and elevation during the year, however, extreme fluctuations during August, 8.2 feet, and September, 6.3 feet, probably had a detrimental effect on the game species.

2. Increases in gizzard shad were regarded as being of temporary benefit since a corresponding size increase indicated that there was a trend toward a lesser number of utilizable individuals of this species.

3. White bass increases in numbers and utilizable form were the most important trends or improvements by any fish population, and the previously known importance of this species was confirmed and increased.

4. Apparently largemouth bass are not suited to this reservoir and other game species are of little importance.

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Date May 19, 1959

Table I. Hydrology and Fluctuation Data for Red Bluff Reservoir (1953-1958)

	Date	El	Acre Ft.
1953	January	2795.2	28,780
	February	2796.5	31,100
	March	2796.8	31,900
	April	2796.2	30,700
	May	2796.1	30,500
	June	2795.2	28,780
	July	2794.2	26,980
	August	2792.8	24,580
	September	2792.0	23,300
	October	2788.8	18,840
	November	2791.1	21,950
	December	2793.5	25,750
1954	January	2799.1	36,840
	February	2799.2	37,080
	March	2792.9	24,740
	April	2799.2	37,080
	May	2798.9	36,380
	June	2796.7	31,700
	July	2790.2	20,680
	August	2794.9	28,220
	September	2788.9	18,970
	October	2797.5	33,350
	November	2797.7	33,770
	December	2798.1	34,620
1955	January	2826.7	164,200
	February	2826.4	162,000
	March	2823.4	141,600
	April	2819.1	115,600
	May	2816.7	102,500
	June	2812.2	80,900
	July	2805.0	53,000
	August	2793.3	25,410
	September	2796.7	31,700
	October	2826.6	163,500
	November	2826.5	162,800
	December	2826.4	162,000
1956	January	2816.7	102,500
	February	2816.8	103,000
	March	2816.0	99,000
	April	2812.3	81,350
	May	2810.8	74,700
	June	2807.0	60,000
	July	2800.7	40,750
	August	2794.2	26,960
	September	2791.9	23,150
	October	2815.1	94,500
	November	2815.5	96,500
	December	2816.2	100,000

Table II. Hydrology and Fluctuation Data for Red Bluff Reservoir

	Month	Max. El.	Min. El.	Avg.	Fluc.	Avg. Af.
1955	October	115.1	96.7	105.9	18.4	55,900
	November	115.5	115.1	115.3	0.4	95,500
	December	116.2	115.5	115.85	0.7	97,900
1956	January	116.7	116.3	116.5	0.4	101,500
	February	116.9	116.8	116.85	0.1	103,200
	March	116.8	116.3	116.55	0.5	101,700
	April	115.9	112.7	114.3	3.2	91,700
	May	112.3	111.0	111.65	1.3	78,400
	June	110.7	107.0	108.8	3.7	66,700
	July	107.0	100.7	103.8	6.3	48,500
	August	100.5	95.1	97.8	5.4	33,980
	September	94.0	92.2	93.1	1.8	24,900
	October	92.5	91.9	92.2	0.6	23,620
	November	93.4	92.9	93.1	0.5	25,070
	December	95.0	93.5	94.2	1.5	26,960
1957	January	96.0	95.0	95.5	1.0	29,430
	February	95.0	83.5	89.3	11.5	19,490
	March	86.2	83.5	84.8	2.7	14,000
	April	86.8	86.2	86.6	0.6	16,010
	May	87.1	85.4	86.3	1.7	15,660
	June	89.6	88.9	89.3	0.7	19,490
	July	88.9	88.0	88.5	0.9	18,450
	August	96.8	88.6	92.7	8.2	24,400
	September	94.2	87.9	90.0	6.3	22,300

Two Year Period -- October, 1955 to October, 1957.

Max. El.	Min. El.	Avg.	Fluc.	Max. Af Feb. 55	Min. Af. Feb. 57	Avg.
116.9	83.5	100.2	33.4	103.500	12.750	58.145

Table III. Results of Gill Netting Collections taken from Red Bluff Reservoir from April 16, 1957 through April 16, 1958.

Species	No.	% by No.	Total Wt. Oz.	Avg. Wt. Oz.	% by Wt.	Avg. K
Gizzard shad	70	35.00	185	2.6	6.97	1.49
River carpsuckers	5	2.50	125	25.0	4.67	2.20
Carp	2	1.00	18	9.0	0.67	2.56
Smallmouth buffalo	16	8.00	1127	74.0	42.41	2.84
Freshwater drum *						
Channel catfish	3	1.50	80	27.0	3.02	2.10
Largemouth bass	2	1.00	22	11.0	0.83	2.30
White crappie *						3.84
Sunfish *						4.10
White bass	102	51.00	1101	11.0	41.43	2.24
Total	200	100.00	2658		100.00	

* Not taken in netting but obtained from sportsmen catches.