

JOB COMPLETION REPORT

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FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-5-R-9

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

Job No. F-1 Experimental Stocking of Marine Fish Species
in Saline Waters of Western Texas

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ABSTRACT

Marine species of fish totalling 1,723 individuals have been introduced in to saline waters in western Texas. Except for a few yearling fish introduced into the Pecos River, fingerling size fish were used. Most of these smaller fish were released in Red Bluff Reservoir and Imperial Reservoir. Redfish (Sciaenops ocellatus), Atlantic croaker (Micropogon undulatus), spotted sea-trout (Cynoscion nebulosus) and southern flounder (Paralichthys lethostigmus) were the species introduced. Reconnaissance data indicate survival of the four species to an undetermined degree, and also an exceptionally high rate of growth for all of the fishes recaptured. No data have been acquired from the releases in the Pecos River because of adverse conditions. Data on biochemical and other ecological factors have been collected for correlations with marine counterpart conditions. It is concluded that this work should be continued.

JOB COMPLETION REPORT

State of TEXAS

Project No. F-5-R-9 Name: : Fisheries Investigations and Surveys of the Waters of Region 3-B

Job No. F-1 Title: Experimental Stocking of Marine Fish Species in Saline Waters of Western Texas

Period Covered: March 1, 1961 - February 28, 1962

Objectives:

To experimentally introduce desirable marine game fish species into saline waters of western Texas.

Techniques Used:

Through the cooperation of the Coastal Fisheries Division, four species of marine fishes have been experimentally introduced into three saline waters of western Texas. The species introduced include redfish (Sciaenops ocellatus), Atlantic croaker (Micropogon undulatus), spotted seatrout (Cynoscion nebulosus) and southern flounder (Paralichthys lethostigmus). Waters selected for the introductions were the Pecos River, Imperial Reservoir, and Red Bluff Reservoir in Reeves County.

Standard small mesh seines were used to capture 1,723 fingerling or juvenile fishes. Adverse weather conditions on the coast during periods of collection prevented capture of the 5,000 fish that were included in original plans. The captured fish were transported by trucks equipped with conventional carrier tanks. Distribution of the species is shown in Table 1.

Table 1. Distribution of species introduced into the Red Bluff Reservoir, Imperial Reservoir and Pecos River

Date	Species	Number	Average Size (inches)	Arrival Condition
Red Bluff Reservoir				
4-10-61	Redfish	50	2.7	Poor
	Seatrout	30	3.8	Poor
	Flounder	25	3.3	Poor
4-12-61	Redfish	183	3.0	Good
	Seatrout	24	4.9	Fair
	Flounder	14	3.3	Good
	Croakers	470	3.5	Good

Date	Species	Number	Average Size (inches)	Arrival Condition
Imperial Reservoir				
4-15-60	Redfish	246	3.0	Good
	Seatrout	50	4.9	Poor
	Flounder	75	3.8	Good
	Croakers	500	3.8	Fair
Pecos River				
9-18-59	Redfish	50	12.0	Fair

Three reconnaissance surveys were conducted during this segment to determine the status of the experimentally introduced fishes. Plans for additional reconnaissance work will be initiated this coming spring.

Data concerning salinities, water level fluctuations, physical spawning facilities and species condition are being compiled for possible correlation with comparable marine circumstances.

Findings:

Upon receiving reports that anglers were occasionally taking marine species from these stocked waters, reconnaissance work was reinitiated to determine current conditions. Despite the relatively few numbers of marine fishes in these waters, every effort to recapture the species was successful. Gill nets of various mesh sizes and lengths were set during night hours to capture the species for examination. The catches and resulting data are tabulated in Table 2.

Table 2. Recaptured marine species from the Red Bluff and Imperial Reservoirs with accompanying data

Species	No.	Tenure (Months)	Avg. Length (Inches)	Avg. Weight (Pounds)	Avg. K Factor
Red Bluff Reservoir					
Redfish	3	5	16.9	1.95	1.60
Imperial Reservoir					
Redfish	2	5	15.0	1.15	1.22
Redfish	1	12	17.0	1.90	1.43
Redfish	4	14	20.0	3.20	1.37
Redfish	19	18	26.0	6.75	1.94
Croakers	1	5	7.0	.30	2.07
Croakers	2	18	8.4	.75	2.36
Flounder	1	18	18.0	4.20	2.38

No data concerning the Pecos River are contained in Table 2 as no reconnaissance effort was attempted due to adverse conditions. The problems created by the remoteness of this section of the river and the existing weed problem are such that no further work is anticipated in this immediate area. However, it should be noted that a previous introduction of marine species at this same site, not under the auspices of the current project, did indicate survival. The degree of success of this experimental stocking during the winter of 1956 is unknown, and confirmed facts are too few for tabulation. The chemical composition of the waters of Red Bluff Reservoir and the Pecos River near Imperial are given in Tables 3 and 4. These data were compiled during the first five months of 1961 through a cooperative effort of the Texas State Department of Health and the Texas Game and Fish Commission. No chemical data are available at this time on the waters of Imperial Reservoir. However, preliminary findings indicate a near identical composition of these waters with the waters of the Pecos River near Imperial (Table 4). Chemical analysis of the waters of the Pecos River near Imperial during the past 10 years indicate a mean average chloride concentration of approximately 4,500 parts per million. The maximum concentration of dissolved solids recorded during the past 20 years at Red Bluff Reservoir was 15,600 parts per million. ~~These~~ data were recorded in September 1953. A low concentration of 1,090 parts per million occurred in June 1948. The mean average chlorides for Red Bluff Reservoir during the past 10 years was approximately 3,000 parts per million.

Table 3. Chemical composition of Red Bluff Reservoir waters through the first five months of 1961

Chemical	Maximum	Date	Minimum	Date	Mean Average
Dissolved solids	16,200.0	2-2-61	6,450.0	3-15-61	9,510.0
Chlorides	6,400.0	2-2-61	1,700.0	3-15-61	3,191.0
Sulphates	2,470.0	4-1-61	1,575.0	4-26-61	1,940.0
BOD <u>1/</u>	2.0	1-6-61	0.5	4-13-61	1.1
pH	7.9	1-6-61	7.3	4-13-61	7.7
Dissolved oxygen	9.4	1-6-61	4.7	4-13-61	7.3

Table 4. Chemical composition of the Pecos River near Imperial. The composition of these waters are believed to be near identical to the waters of Imperial Reservoir. Data were collected during the same periods as Table 3.

Chemical	Maximum	Date	Minimum	Date	Mean Average
Dissolved solids	19,020.0	2-15-61	14,280.0	4-12-61	16,828.0
Chlorides	8,400.0	2-15-61	5,800.0	1-17-61	6,320.0
Sulphates	3,676.0	5-24-61	1,420.0	2-15-61	2,732.0
BOD <u>1/</u>	2.0	2-15-61	0.5	4-12-61	1.0
pH	7.9	5-24-61	7.1	3-1-61	7.6
Dissolved oxygen	8.8	1-4-61	6.5	3-14-61	7.8

1/ Biochemical oxygen demand

Discussion: :

It is concluded that a significant number of marine species have not only survived the experimental stocking in these saline waters, but also have enjoyed an exceptionally high degree of well-being. The well-being or advanced rate of growth of the marine fishes may be attributed to either a condition of more productive environment or a circumstance of lesser feeding competition than existed in their native habitat. Without exception, the recaptured fishes have experienced a higher growth rate than their marine counterparts and in some cases have doubled the average rate. Seemingly, these species are afforded a more productive environment rather than lesser feeding competition in that the redbfish in Red Bluff Reservoir have significantly exceeded the growth rates of the redbfish in Imperial Reservoir. The waters of Red Bluff Reservoir are supporting a heavy population of white bass (Roccus chrysops) as competitors to the redbfish, whereas Imperial Reservoir has a low percentage of carnivorous species.

Recommendations:

Having acquired the knowledge that marine species will survive in these saline waters and experience a high degree of fitness, it is recommended that this investigation be continued and supplemented as follows:

- (1) Additional introductions of these species should be made in order to assure a breeding potential in the event of reproduction.
- (2) Biochemical and physical factors of the native marine spawning habitat should be compiled for comparison with existing conditions in the saline reservoir waters.
- (3) A more thorough knowledge of the spawning requirements and other life history habits of these species should be acquired.
- (4) More frequent reconnaissance surveys should be conducted to determine species condition, development and possible reproduction.

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Date February 28, 1962

Approved by Marion Toole
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Figure 1. From fingerling to over 7 pounds in 18 months. This redfish was recaptured from Imperial Reservoir after being experimentally introduced from coastal waters.

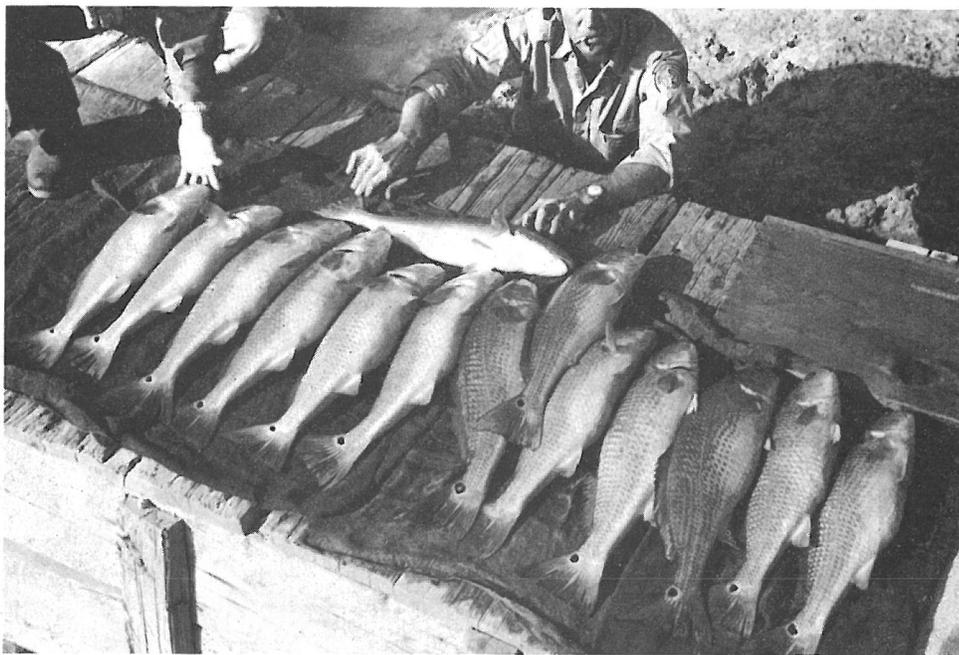


Figure 2. Part of a one-night gill net catch of redfish from Imperial Reservoir. Commission personnel endeavor to collect necessary data prior to releasing the unharmed fish.

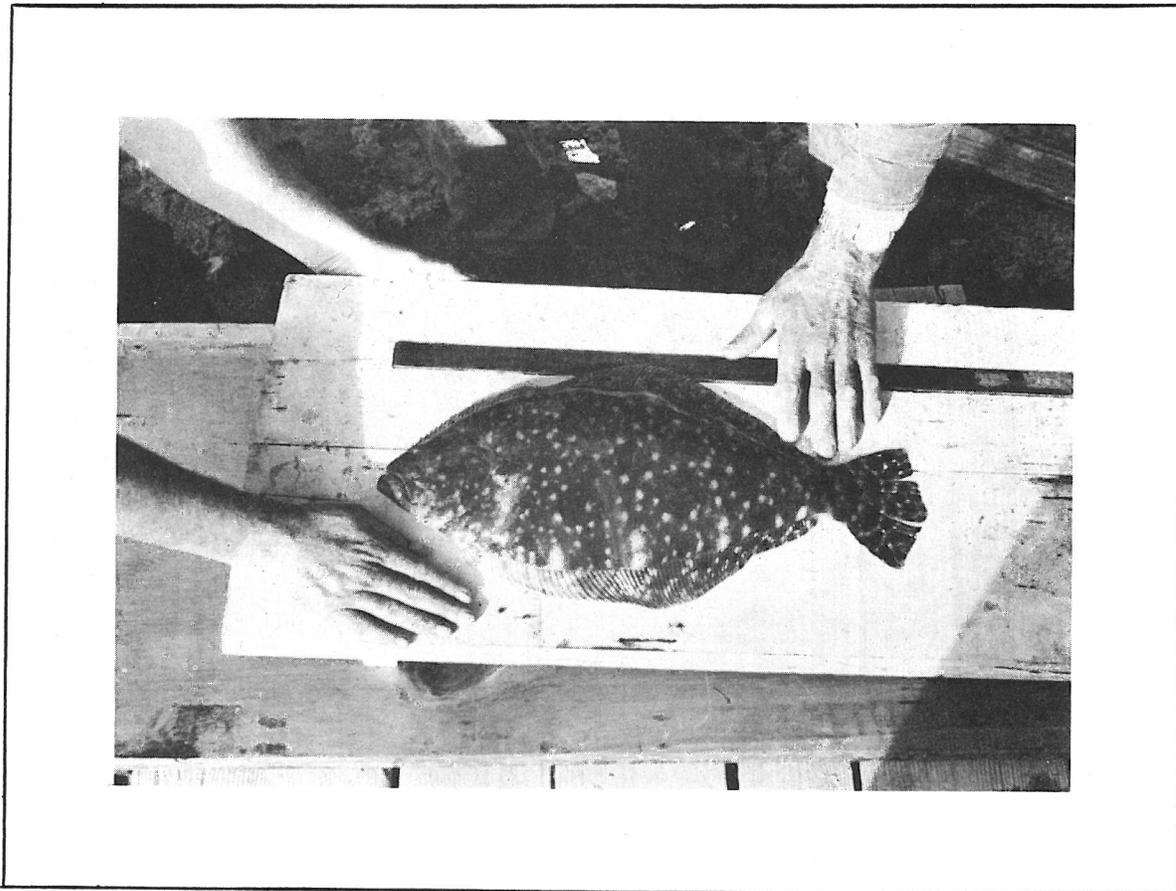


Figure 3. This $4\frac{1}{2}$ pound flounder measured 18 inches, after having survived 18 months in Imperial Reservoir.



Figure 4. Presence of these two golden croakers taken in gill nets indicate a third species surviving and progressing in their new habitat.

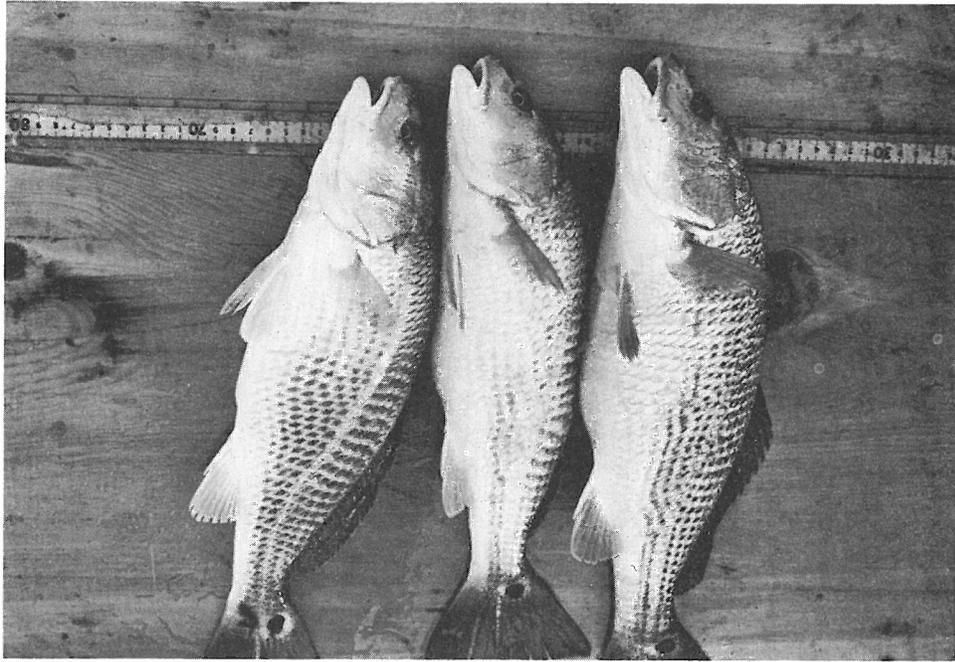


Figure 5. These three redfish averaged two pounds each after being stocked as fingerlings in Red Bluff Reservoir five months prior to their recapture.

