

Pecos River

SEGMENT COMPLETION REPORT

As required by

FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-18-R-3

REGION I-D FISHERIES STUDIES

Job No. 2 Pollution Studies

Project Leader: George G. Henderson, Jr.

J. R. Singleton
Executive Director
Parks and Wildlife Department
Austin, Texas

Marion Toole
D-J Coordinator

Eugene A. Walker
Director, Wildlife Services

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ABSTRACT

No fish kills were reported or investigated in 1967. Distribution of game fish populations in the Pecos River is affected by high salinity. Extreme fluctuations of salinity and pH are an index to chemical pollutants which have eliminated game fish from about 100 miles of Pecos River water. The river from Red Bluff Lake to Farm Road 1776 is suitable for game fish survival while irrigation releases from Red Bluff Lake maintain acceptable water quality. Between Farm Road 1776 and Sheffield, the water quality is unsuitable for game fish survival. Game fish occur naturally between Sheffield and the Rio Grande.

SEGMENT COMPLETION REPORT

STATE OF Texas

PROJECT NO. F-18-R-3

NAME Region I-D Fisheries Studies

JOB NO. 2

TITLE Pollution Studies

PERIOD COVERED March 1, 1967 to February 28, 1968

Objectives:

General:

To investigate instances of pollution affecting specific fish populations and to report findings to the Water Quality Board when remedial action is needed.

Specific:

1. To determine extent of damage to fish populations.
2. To trace the source of pollution.
3. To determine the nature of the pollution.
4. To delimit saline pollution and its effects on fish populations in the Pecos River below Red Bluff Lake and above the Rio Grande.
5. To report instances of violation and negligence to the State Water Pollution Control Board.

Procedures:

Pecos River

Netted or seined fish were identified in the field where possible. Names of fish used in this report are those accepted by the American Fisheries Society as published in their Special Publication No. 2, 1960, A List of Common and Scientific Names of Fishes From the United States and Canada, Second Edition. A checklist of species is included as Appendix A.

Standard survey gill nets are 150 feet long when constructed. The meshes begin at 1-inch square and progress to 3.5 inches square in 25-foot sections. Large mesh nets are 150 feet long when built and all mesh is 3.5 inches square.

The webbing of all nets is 8 feet deep tied down to 6 feet. Nets are constructed so that they sink when set. The lead line follows bottom contours and the floats support the webbing like a fence. Sets are usually made perpendicular to the shoreline in lakes and at an angle downstream and across in rivers.

Dissolved oxygen content was checked in the field using a Kemmerer sampler to extract samples and a Hach kit to make the determinations. Salinity was also determined by both project personnel and the regional chemist. Salinities presented in this report are those determined by the chemist.

Findings:

No fish kills were reported or investigated in 1967.

Bioassays

All bioassay work was done by Regional Chemist Kenneth Krueger. The first bioassay was done using water from the 16-Mile Lake north of Pecos (Figure 1). The bioassays were conducted using 5-gallon glass jugs. Aeration was provided using a compressor with tubing and air stones. Twelve largemouth bass fry, 15mm in overall length and weighing approximately 0.1 gm, were used in the tests. The fish were fed Daphnia sp. At the conclusion of the experiment (duration over 30 days), 5 of the original 12 largemouth bass were surviving. It was concluded that water of the quality at 16-Mile Lake in April 1967 (A in Figures 2A and 3) was suitable for the survival and growth of largemouth bass fry.

Bioassay of water from the Blue Ranch (just above Farm Road 1776, survey site 2 on Figure 1) was positive. Largemouth bass fry survived and grew. The Blue Ranch is the area farthest downstream from Red Bluff which is affected by irrigation releases.

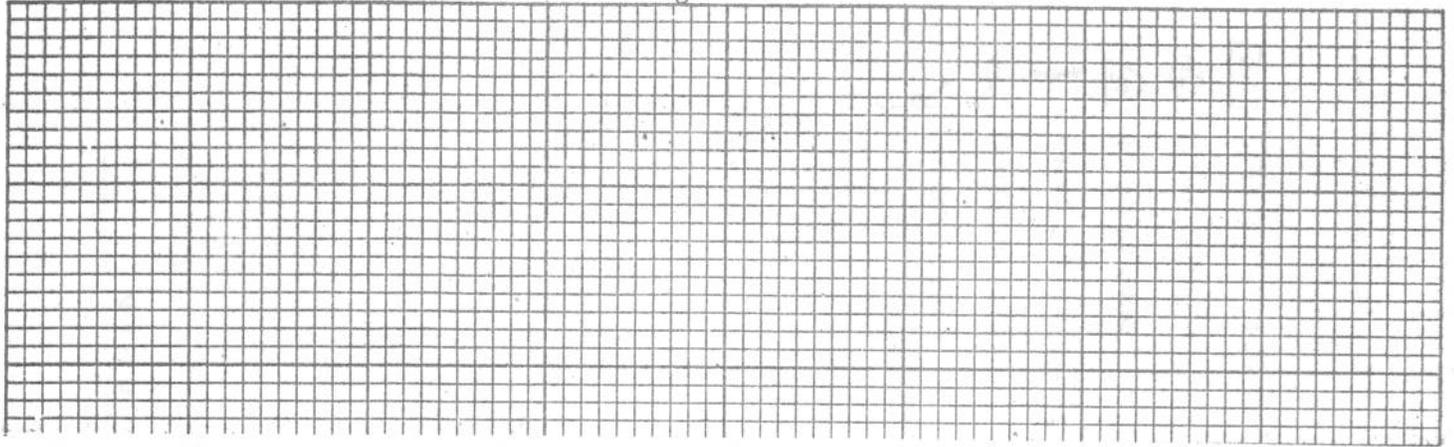
Water taken from the "pump hole" collecting site produced only negative results (D on Figures 2A and 3). All fry died or were very weakened within 48 hours. A 50 per cent dilution of water from the pump hole sample was made. Survival in the 50 per cent solution was 100 per cent until the fourth day when all fish died. There was no malfunction of equipment indicated. No other bioassays were done.

Fish Population

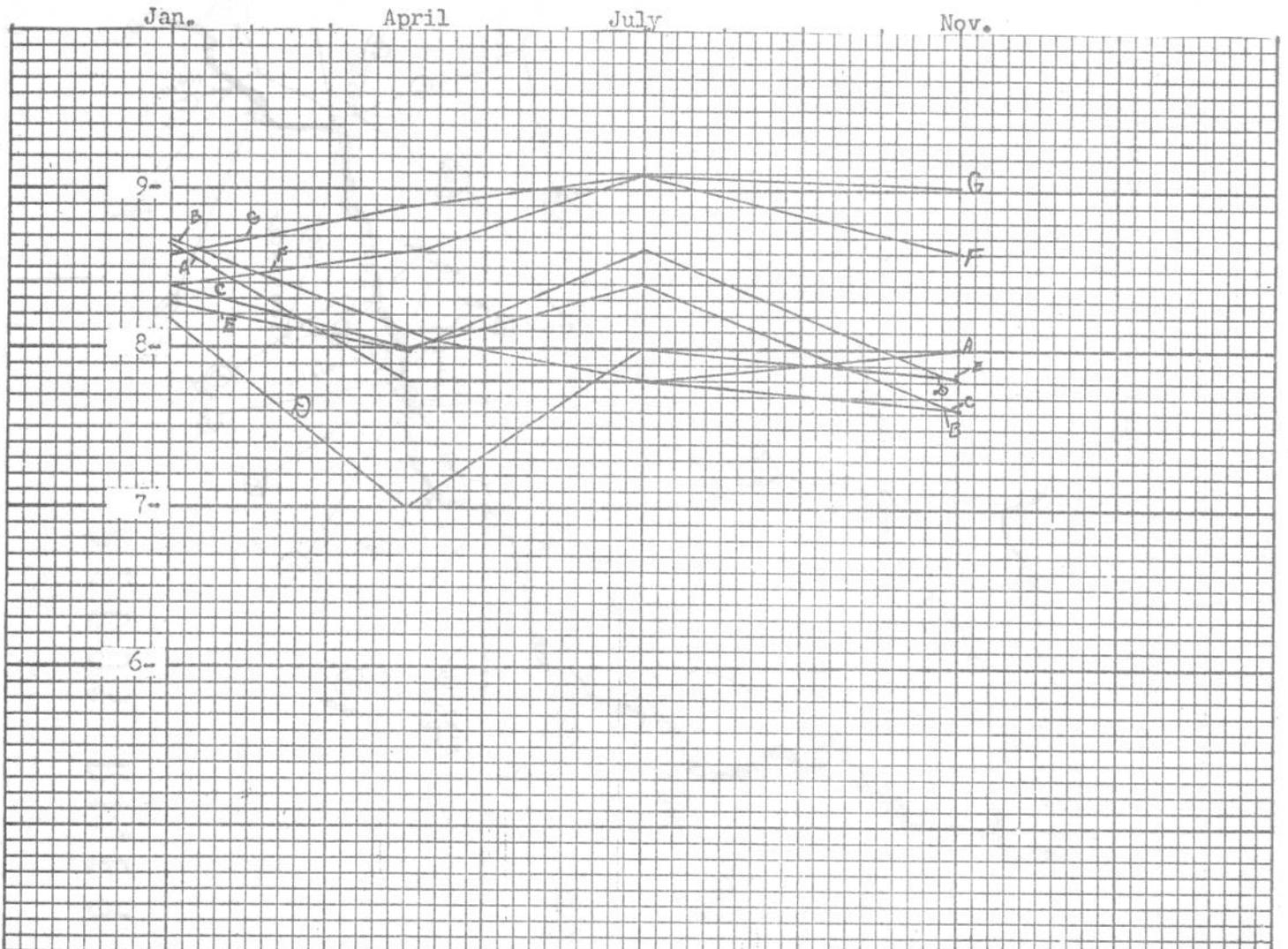
The Pecos River was surveyed with gill nets and seines at 8 sites for this job. The occurrence of species and the percentage composition for larger (nettable) species of fish is shown in Table 1. The other species listed are small salt-tolerant species which were seined. Game fish are underlined in Table 1 to emphasize areas of occurrence or absence.

Large fish taken from the Pecos River from just below Farm Road 1776 to just above Sheffield (Figure 1) were longnose gar, gizzard shad, carp, and Rio Grande perch.

Figure 2A



Pecos River pH, 1967



- A - Mentone JCT 302
- B - East of Pecos U.S. 80
- C - West of Grandfalls FM 1776
- D - South of Grandfalls Texas 18
- E - East of Grandfalls FM 11
- F - West of McCamey U.S. 67
- G - South of McCamey FM 305

Figure 2B

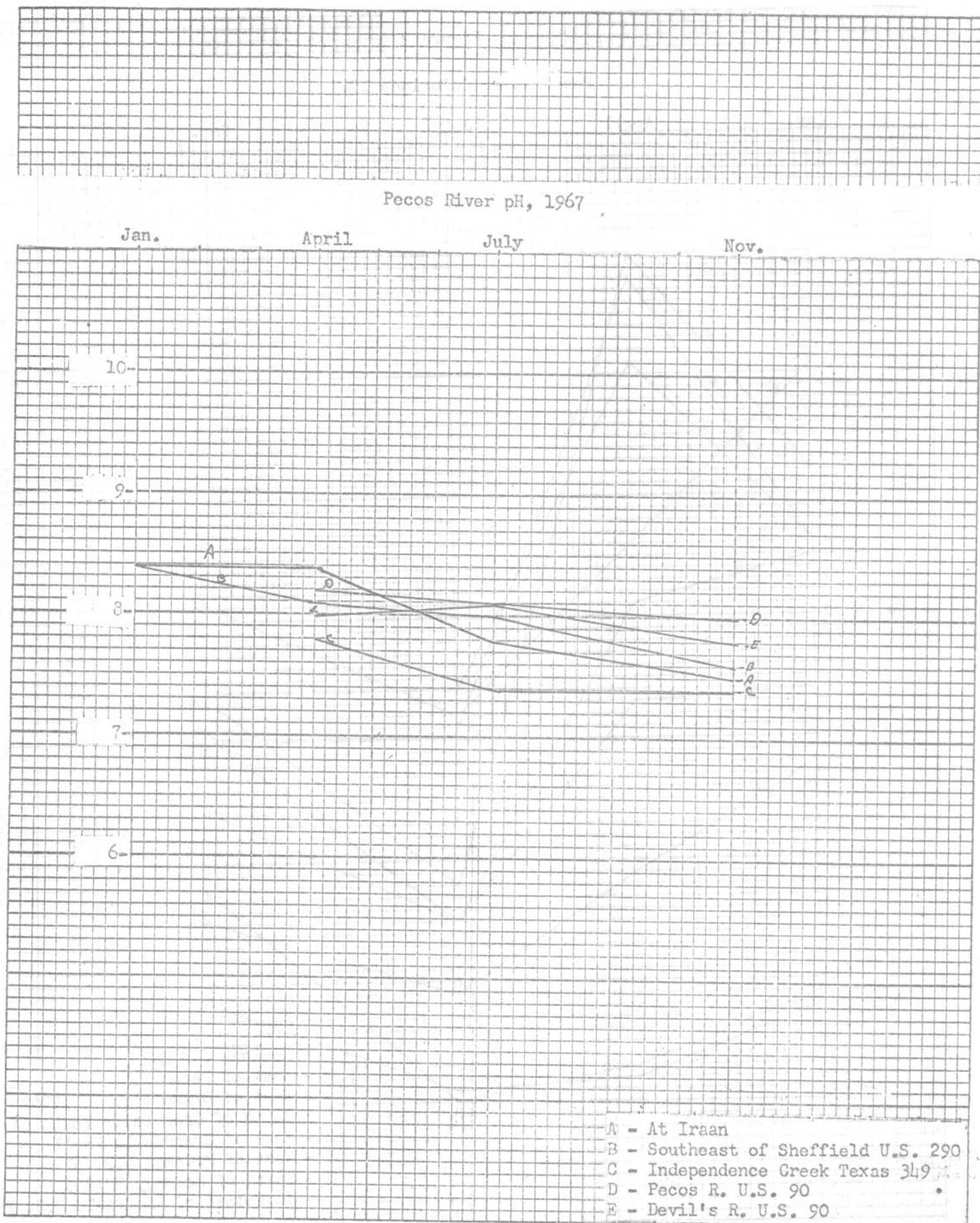


Figure 3

Pecos River Chlorides 1967

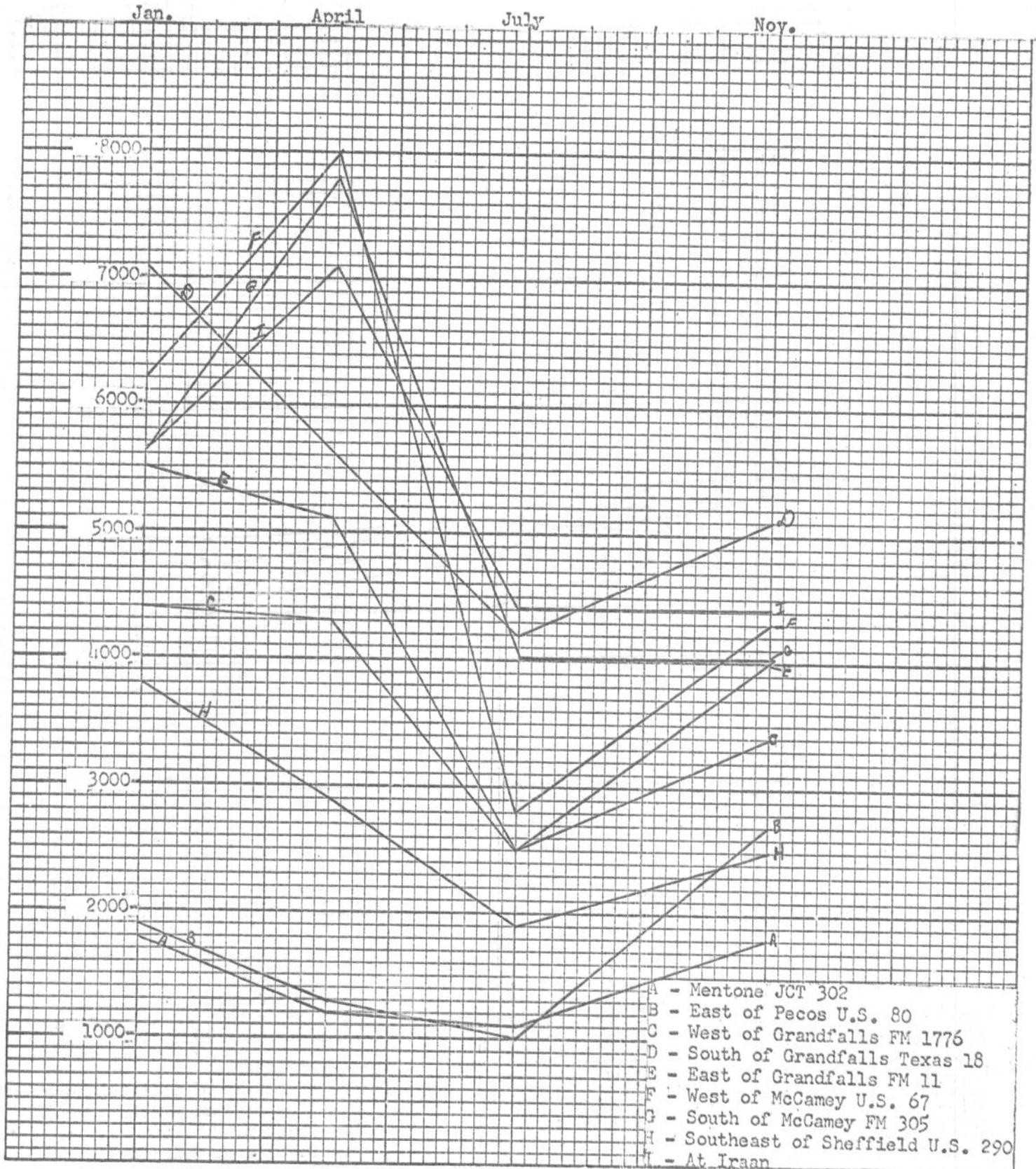




Table 1

Species of Fish Occurring at Various Survey Sites on the Pecos River.*

Species	16-Mile	Blue Ranch	Pump Hole	Route 11	Blue Hole	McCamey	Sheffield	Independence Creek
Longnose gar		X			N28.57	N25.92	N24.70	N38.54
Gizzard shad	N33.34	N85.35	N100.00	N94.57	N70.53	N74.08	N30.59	N38.54
Mexican tetra	N8.33	N					N	N
River carpsucker							N20.70	N16.67
Gray redbhorse	N25.00	N1.12		N4.65	N0.90			N1.05
Carp								N0.34
Blacktail shiner								N
Red shiner	N	N					N	N
Proserpine shiner		N					N	N
Sand shiner								N
Roundnose minnow								N
Bullhead minnow								N
Channel catfish							N10.59	N2.09
Flathead catfish							N2.35	N0.34
Rainwater killifish	N	N		N		N	N	
Rio Grande killifish	N	N		N		N	N	
Plains killifish	N	N		N				
Pecos River pupfish	N	N	N	N	N			N
Mosquitofish	N	N	N	N	N			
Tidewater silverside								
Largemouth bass	S25.00						N5.88	X
Green sunfish	N8.33	N13.24						N0.34
Bluegill							N3.54	N0.70
Longear sunfish							N	N0.34
Rio Grande perch	N	N0.29	X	N0.78			N2.35	N1.05
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

X - Observed or known to be present

N - Naturally occurring species

S - Believed to be game fish stocked in conjunction with this study

* - Population percentage composition by number is shown for netted species, all other fish are small salt-tolerant species.

2 FISH

Water Quality

Dissolved oxygen was adequate in all waters sampled (above 5 ppm). The fluctuations in water quality seen in Figures 2A, 2B and 3 are probably the result of dilution by rainwater. Total monthly rainfall figures are listed in Table 2. Comparison of this table with the data in Figures 2A, 2B and 3 will reveal a close coordination between rainfall and water quality.

Table 2

Total Monthly Rainfall at Various Sties on the Pecos River Watershed in Inches.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.
Mentone	0.00	0.00	0.00	0.00	0.00	0.71	0.50	0.00	0.60	0.00	0.58
Pecos	0.00	0.00	0.57	0.96	0.31	1.20	0.65	0.02	1.70	tr	0.44
Grandfalls	0.00	tr	0.02	0.38	0.00	2.01	0.89	0.04	0.65	0.10	0.42
Imperial	0.00	0.00	0.23	0.10	0.52	2.49	0.79	0.22	2.52	0.20	0.00
McCamey	0.00	0.19	0.35	0.40	0.00	0.49	0.06	1.33	2.70	0.15	0.60
Girvin	0.00	0.12	0.54	0.05	0.00	0.87	0.26	0.44	3.95	0.24	0.00
Sheffield	0.00	0.60	1.14	2.34	0.00	0.33	0.35	1.61	1.78	0.08	0.92
Red Bluff	0.00	0.02	0.22	0.26	0.57	1.60	1.49	0.25	0.98	tr	0.50
Total	0.00	0.93	3.07	4.49	1.40	9.70	4.99	3.91	14.88	0.77	3.46

The pH varied between extremes of 9.1 at U.S. Highway 67 west of McCamey and 7.0 at Texas Highway 18 near Grandfalls (Figure 2A). Chlorides varied from 8,000 milligrams per liter (mg/l) near McCamey on W.U. Highway 67 to 1,000 mg/l at U.S. Highway 80 east of Pecos (Figure 3). The significance of these tables is in the extreme variation in water quality shown. Other dissolved solids varied just as widely and this variation has proved fatal to most species of fish in this area as shown by surveys. Tables 3 through 6 contain detailed analysis of water quality at all stations.

Discussion and Conclusions

Largemouth bass and channel catfish were stocked in the 16-Mile Lake following the bioassays. Their survival and growth were excellent. The Pecos River above Farm Road 1776 to the Red Bluff Dam is suitable for game fish when irrigation releases maintain water of sufficiently good quality. Red Bluff Lake filled in August 1966 and water quality was excellent for a while. Water quality is becoming poorer as the lake is lowered. When Red Bluff water quality degrades because of drought, the river water quality declines also. Surveys of 16-Mile Lake will be done in the spring of 1968 preceding resumption of irrigation releases in order to evaluate survival of stocked game fish over the winter. No or few irrigation releases are made after September. Sometimes releases are made during the winter from deep-water strata in Red Bluff Reservoir in an attempt to improve the quality of water in the reservoir and provide space to accommodate any beneficial rainwater.

Table 3

Pecos River Water Quality
January 11, 1967

Station	pH	Pht. Alk.	Total Alk.	Amm. Nitrogen	Sulfates	Chlorides	Hardness	Flow
Jct. FM 302	8.6	16	132	0.86	975	1800	2000	60 cfs
Jct. US 80	8.6	12	128	0.78	975	1900	2200	40 cfs
Jct. FM 1776	8.4	8	184	0.75	2500	4400	4600	5 cfs
Jct. Texas 18	8.2	0	152	0.75	2850	7100	4400	9 cfs
Jct. FM 11	8.3	8	148	0.69	2600	5500	3700	10 cfs
Jct. US 67	8.4	12	176	0.72	4000	6200	4400	30 cfs
Jct. FM 305	8.6	16	148	0.72	3300	5600	4400	30 cfs
River at Iraan	8.4	0.0	140	0.75	3100	5600	4100	30 cfs
Jct. US 290	8.4	0.0	172	0.86	1650	3800	2700	30 cfs

Table 4

Pecos River Water Quality
April 4, 1967

Jct. Texas 302	7.8	0	120	0.58	1200	725	1000	
Jct. US 80	8.1	0	108	0.52	1300	700	1000	
Jct. FM 1776	8.0	0	160	0.63	4300	2400	2500	
Jct. Texas 18	7.9	0	128	0.72	5600	2100	2800	
Jct. FM 11	8.0	0	128	0.72	5100	2825	3200	
Jct. US 67	8.6	16	128	0.68	8000	4800	3500	
Jct. FM 305	8.9	20	116	0.58	7800	5000	4500	
River at Iraan	8.4	12	120	0.86	7100	3800	4000	
8 mi. below Iraan	8.4	12	112	0.58	6300	3300	3700	
Jct. US 290	8.1	0	164	0.52	2900	1800	2300	
Jct. US 90	8.2	6	144	0.48	900	475	600	
Pandale Crossing	8.3	12	172	0.42	1500	500	800	

Table 5

Pecos River Water Quality
July 25, 1967

Station	pH	Pht. Alk.	Total Alk.	Chlorides	Sulfates	Hardness	Calcium
Jct. Texas 302	7.8	0.0	120	1100	800	1200	1000
Jct. US 80	7.8	0.0	120	1000	900	1100	1000
Jct. FM 1776	8.4	0.0	120	2500	1900	2800	2100
Jct. Texas 18	8.0	0.0	128	4200	2050	3000	2500
Blue Ranch	7.4	0.0	128	1100	800	1200	1000
Jct. FM 11	8.6	8.0	80	2500	2500	2800	2700
Jct. US 67	9.1	16.0	60	2800	2300	2700	2400
Jct. FM 305	9.1	16.0	60	4000	3300	3500	3300
River at Iraan	7.8	0.0	160	4400	2400	3500	3100
Jct. US 290	8.0	0.0	140	1900	1200	1600	1400
Pandale Crossing	8.0	0.0	172	700	300	600	500

Table 6

Pecos River Water Quality
November 20, 1967

Station	pH	Pht. Alk.	Total Alk.	Chlorides	Sulfates	Hardness	Calcium	Sodium
Jct. Texas 302	8.0	0	88	1800	1400	2000	1300	958
Jct. US 80	7.6	0	152	2700	2300	3000	2600	1684
Jct. FM 1776	7.6	0	188	3400	2600	3500	2700	1902
Jct. Texas 18	7.8	0	192	5100	2550	3500	2900	3005
Jct. FM 11	7.8	0	140	4000	3000	3500	3300	2483
Jct. US 67	8.6	12	92	4300	4000	4700	3500	2582
Jct. FM 305	9.0	12	48	4000	3800	3800	3400	2686
River at Iraan	7.5	0	128	4400	3100	3600	3100	2739
Jct. US 290	7.6	0	160	2500	1800	2300	2100	1498
Jct. US 90	8.0	0	152	310	220	460	380	164

The Pecos River below Sheffield is suitable for survival of game fish.

The water in the Pecos River south of Farm Road 1776 and north of Sheffield is unsuitable for survival of game fish.

Acknowledgements

Field work and compilation of tables and figures were accomplished with the able assistance of Technicians Charles Roberts and Joe Vasquez. Assistance in editing was given by Assistant Project Leader, Ronald R. Anderson.

Recommendations

No fish should be stocked in the area between Farm Road 1776 and just above Sheffield. Efforts should be directed toward improving the quality of water in the entire Pecos River, whenever the opportunity arises.

Prepared by George G. Henderson, Jr.
Project Leader

Approved by Marion Toole
Coordinator

Date March 18, 1968

Leo D. Lewis
Inland Fisheries Supervisor

Appendix A

Checklist of Species

<u>COMMON NAME</u>	<u>SCIENTIFIC NAME</u>
Longnose gar	<u>Lepisosteus osseus</u>
Gizzard shad	<u>Dorosoma cepedianum</u>
Mexican tetra	<u>Astyanax mexicanus</u>
River carpsucker	<u>Carpionodes carpio</u>
Gray redhorse	<u>Moxostoma congestum</u>
Carp	<u>Cyprinus carpio</u>
Blacktail shiner	<u>Notropis venustus</u>
Red shiner	<u>Notropis lutrensis</u>
Proserpine shiner	<u>Notropis proserpinus</u>
Sand shiner	<u>Notropis stramineus</u>
Roundnose minnow	<u>Dionda episcopa</u>
Bullhead minnow	<u>Pimephales vigilax</u>
Channel catfish	<u>Ictalurus punctatus</u>
Flathead catfish	<u>Pylodictis olivaris</u>
Rainwater killifish	<u>Lucania parva</u>
Rio Grande killifish	<u>Fundulus zebrinus</u>
Plains killifish	<u>Fundulus kansae</u>
Pecos River pupfish	<u>Cyprinodon</u> sp.
Mosquitofish	<u>Gambusia</u> sp.
Tidewater silverside	<u>Menidia beryllina</u>
Largemouth bass	<u>Micropterus salmoides</u>
Green sunfish	<u>Lepomis cyanellus</u>
Bluegill	<u>Lepomis macrochirus</u>
Longear sunfish	<u>Lepomis megalotis</u>
Rio Grande perch	<u>Cichlasoma cyanoguttatum</u>