Report of Fisheries Investigations

Basic Survey and Inventory of Species Present in the Pecos River of Texas

by

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Job Completion Report

State of TEXAS

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

Job No. B-13 Title: Basic Survey and Inventory of Species Present in the Pecos River of Texas.

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

Abstract:

The Pecos River of Texas was found to be a highly saline stream which is divided into three main ecological associations. The upper reaches of the river are characterized by turbid, intermittent pools. In the middle reaches of the river are sluggish pools, which are long, deep and infested with vegetation. The lower river, to its confluence with the Rio Grande, is spring fed and has permanent flow. During the study period, the most important fish species in the upper reaches were the white bass and gizzard shad while channel catfish and minnows were the most important species in the remainder of the stream. In all, forty-nine species of fourteen fish families were identified.

Pollution, public access and water conservation practices were found to be the primary fishery problems of the river.

It is recommended that work be done to solve these problems, that experimental stocking be continued, and that a future means of utilizing the salt playa lakes and the potential stream areas in the mountains be sought.

Objectives:

To gather fundamental data on the above waters in regard to their physical, chemical and biological aspects. To determine the distribution of fish species present, their relative abundance and the ecological factors influencing their distribution and production.

Cooperating agencies:

Texas Board of Water Engineers
United States Geological Survey
Red Bluff Power and Water Control District
International Boundry and Water Commission

Procedure:

A. Basic Survey

Standard procedures were employed to secure the information necessary to complete stream survey forms similar to those given by Lagler in his HANDBOOK OF FRESHWATER FISHERY BIOLOGY.

B. Inventory of Species

Twenty-eight seining stations were established to determine the fish species present, their distribution, and their relative abundance.

1. Attempts were made to collect fish at each seining station more than once but because of changing stream conditions this was often impossible.

2. Gill net collections were taken whenever access permitted and the stream was sufficiently deep and clear of vegetation or obstructions.

3. At appropriate intervals in the stream areas worked, water analyses were made and recorded along with other data pertaining to water quality and condition including pH, air and water temperatures.

4. Where field identification of fish specimens was in doubt, individuals were preserved in 10% formalin and examined in the laboratory.

5. The portions of the watershed not covered in this survey were confined to the Davis Mountains Area.

Findings:

The Pecos River rises in Mora, Santa Fe, San Miguel, and Torrance Counties of New Mexico. Its contributing watershed above the Texas-New Mexico Border contains about 20,239 square miles. The average discharge into Red Bluff Reservoir is about 315.6 c. f. s. The watershed is characterized by short grasses and very arid sandy plains. It is the desert or semi-desert that was a barrier to westward migration and development about one hundred years ago. It is the Llano Estacado of history. The mountains that rise out of this desert are known as the Santa Fe Mountains and are a part of the Rocky Mountain System. A series of reservoirs beginning with Nichols Reservoir on Santa Fe Creek and including Almogordo Reservoir, Lake McMillan, and Lake Avalon regulate stream flow into Texas. These reservoirs have a combined storage capacity of 182,000 plus acre feet. Diversions and ground-water withdrawals above the state line provide irrigation for 181,500 acres of New Mexico farm land.

Most of the water entering Texas from the Upper Pecos River is controlled by the Red Bluff Water Power and Control District with offices in Pecos, Texas. Except for an unknown portion of the quantities of local run-off, insignificant seepage, and slight contributions from springs into the river; all stream flow is controlled by Red Bluff Reservoir. This reservoir has a potential storage of 307,000 acre feet volume and has not been filled to spillway capacity since its construction in 1937. For convenience in description of the various portions of the watershed and the stream and because of the difference in the ecological aspect of the watershed and stream, it was surveyed in a southward direction. The area worked was arbitrarily subdivided into three sections. Detailed data on hydrology* and chemical content** are included in appropriate charts. The following descriptions are intended only to provide a general description of the regions.

From Red Bluff Reservoir a vast irrigation system, of an estimated 128 miles of canals and laterals, branches out to irrigate about 21,000 acres, most of which are located between Mentone and Imperial, Texas. Permanent earthen and concrete diversion dams and, brush dams for temperary use, channel the released water from the river bed to its destined area. A 1,000 acre foot control reservoir is employed for temporary storage and is located in a bend of the river about ten miles northwest of Imperial.

* See Tables I, II & III.
** See Table IV.

On the flats at the base of the Guadalupe Mountains below Sierra Diablo, South of Pecos, and to a lesser extent throughout this region, natural playa salt lakes such as Lake Toyah occur. These lakes are devoid of fish life.

Alkaline marshes are often adjacent to the stream and discharge large quantities of chlorides into the river bed. An example of the extent of this discharge is the 274 tons per day that are estimated to be discharged into Red Bluff reservoir on occasions. Above Imperial the stream is characterized by intermittent pools that are often created and maintained by the previously described diversion dams and by natural depressions in the river bed. During inventory, only two streams were encountered in this region where any stability of flow was observed. A tributary of Delaware Creek, located in the Guadalupe Mountains in McKittrick Canyon on the J. C. Hunter ranch was maintained by springs and seepage for about fourteen miles before it entered a porous formation about seven miles west of the Van Horn-Carlsbad highway near Pine Springs. This was private stream and was apparently successfully producing trout fishing for the owners. At present it has no significance in considering stream management for the river.

A number of springs such as Maderia Springs, San Solomon Springs and others provide flow into Balmorhea Lake, an irrigation reservoir near that city. Because of the premium placed on water for irrigation, no consideration has been given to fishery management; and fluctuations in this reservoir prevent it from providing any significant fishery yield. It does not contribute to the river at any time. This stream area is unstable and offers little opportunity for fishery development. Pools in the stream are usually turbid, low in oxygen and high in carbon dioxide content, are saline and have silty bottoms. Because of fluctuation vegetation as saw grass, (Zizaniopsis sp.), and cattails (Typha sp.) are not management problems. The stream banks are usually moderately steep, but are often covered with salt cedar to such an extent that access is very difficult.

From Imperial to Sheffield the stream is characterized by large pools through which a minimum flow is usually maintained, although such flow is often through gravel deposits between pools. The stream is much deeper and is permanent in nature. Dense vegetation makes sampling by seines or nets extremely difficult. Chara (Chara sp.), coontail (Cerataphyllum sp.), and parrots feather (Myriophullum sp.) are the principal types. Cattails, saw grass and bullrushes are also abundant in localities. The water is still highly saline; however, it is clear and there is no deficiency in oxygen or carbon dioxide content. Severe and extensive pollution from oil fields occurrs from Girvin to Bakersfield to Sheffield. This will be discussed later under that heading. Redfish were released in this area and have survived.

From Sheffield to the river mouth the stream is characterized by spring fed associations. Independence Creek, Live Oak Creek, and others provide permanent and significant flow. Access is extremely difficult because of the banks which often are over one hundred feet above the river bed. There is no vegetation excepting algae and other pelagic aquatics. The stream bed is rock or coarse gravel. The water is unusually clear and the dissolved oxygen and carbon dioxide content is very favorable for fish life. This third area has a larger quantity of water than the combined totals for the other areas described, has more and better game fish populations, and offers excellent management prospects. However, public access is not available at this time.

The following charts are regarded as the best expression of water quality and hydrology for the river during the survey period. (See Tables I through IV)

Historical Change - The following information or comment is included to briefly illustrate the changes that have taken place and to designate their effect on fish life and on the prospects for future fishery development. In 1849, a Lt. French, while engaged in finding suitable travel routes through western Texas, described the Pecos River as "a narrow deep stream, its waters turbid and bitter, and carry, in both mechanical mixture and chemical solution, more impurities than any other river in the south. The only inhabitants of its waters are catfish". Others of that period describe the river as being too deep and swift for safe crossing except at "Horsehead Crossing" near Imperial. Many springs Comanche, Leon, White Sands, Ojo Escondidio, Madeiria, and many others provided permanent stream flow, and the ground water was contributing in much of the area. After the settlement of the country, all of these waters were used in irrigation. This development and exploitation of the rivers sources has continued until today. None of the above springs are contributing; the ground water is at least eight or ten feet lower than it was at the turn of the century and the exploitation is continuing at a rapid pace. (See attached map)

Pollution - As illustrated by the above description, the Pecos has been polluted by salt possibly since its creation. This natural pollution results primarily from fractures or faults in subsurface formations that permit the percolative action of ground waters to deposit these minerals into the stream. Alkali deposits on the surface add mineral to run-off, and salt springs that are naturally formed by aquifers are also contributive. Man made pollution is primarily from two sources. Oil field exploration and development for the past thirty years have resulted in both surface and subsurface release of petroleum and salt water and other materials that are injurious to fish life. Many dams and dikes that are constructed to retain oil well waste become full and overflow with run-off; wastes leak from production procedures; subsurface pollution occurs from wells improperly sealed. A man near Iraan, Texas, makes his living from skimming the oil off the surface of the stream that has leaked or has been lost from wells in that area. The complexity of this problem on the river between Grandfalls and Sheffield would require an extensive study and costly equipment. Probably two men for a year or more. Pollution also occurs from agricultural methods. Crop dusting or spraying is carried out extensively and some of the substances used are residual in nature and are carried by run-off into the stream in sufficient concentrations to cause fish kills. Unplugged wells where responsibility can not be fixed are present.

Fish Populations:

Twenty eight stations on the stream were netted or seined. Because of stream conditions, it was often impossible to duplicate exactly (in instances where two collections were made at a particular station), however, every reasonable effort at duplication was made. Forty-nine species of fourteen families were positively identified and at least six additional species are believed to be present. The following annotated checklist is regarded as the better information pertaining to species distribution. Tables VI and VII are primarily for relative abundance. Other aspects of the fish populations are covered under trends and influences.

Annotated Checklist of Species of Fish in The Pecos River of Texas

Lepisosteidae (gars)

Lepisosteus osseus (longnose gar) - common and abundant in localities. The most numerous and widely distributed species for this group.

Lepisosteus productus (spotted gar) - rare found only in the upper and primary stream and there only below Grandfalls.

Lepisosteus spatula (alligator gar) - taken only near the mouth of the river and probably does not occur more than five or ten miles north of the Rio Grande.

Clupeidae (herrings)

Dorosoma cepedianum (gizzard shad) - common and abundant throughout the watershed, one of the most important forage species, possibly the greatest population by weight.

Salmonidae (trouts)

Salmo gairdneri (rainbow trout) - McKittrick canyon in the Guadalupe Mountains only. There is evidence that this species is reproducing successfully; however, the original stock were imported from New Mexico in 1929.

Characidae (tetras)

Astyanax fasciatus (banded tetra) - common below Sheffield and rare but present to Red Bluff Reservoir. Extreme fluctuation in population in localities.

Catostomidae (suckers and buffalofishes)

Cycleptus elongatus (blue sucker) - common near the mouth but restricted to that area.

Ictiobus bubalus (smallmouth buffalo) - rare but present as far north as the Texas-New Mexico line.

Moxostoma congestum (gray redhorse sucker) - common and distributed more or less uniformly throughout the watershed.

Carpiodes carpio (river carpsucker) - common and abundant except in the last few miles near the mouth of the river.

Cyprinidae (shiners and minnows)

Cyprinus carpio (German carp) - common and abundant on a locality basis. More abundant in the upper one half of the watershed.

Carassius auratus (goldfish) - introduced and rare. Taken near Imperial.

Notemigonus crysoleucas (golden shiner) - rare, but fairly widely distributed. Probably introduced by hatchery release.

Hybopsis aestivalis (speckled chub) - rare, taken from Independence Creek only.

Phenacobius mirabilis (suckermouth minnow) - extremely rare, regarded as released by bait dealers.

Notropis percobromus (plains shiner) - taken in the upper watershed as far south as Buena-Vista-Crane highway crossing.

Notropis venustus (spottail shiner) - restricted to the mid areas of the watershed abundant only on Chandler Ranch near Sheffield.

Notropis lutrensis (redhorse shiner) - common and abundant, the most numerous, important, and widely distributed forage species for the watershed.

Dionda episcopa (roundnose minnow) - the dominant minnow in most of the area where it occurs. Found below Sheffield.

Hybognathus placita (plains minnow) - rare and confined to the upper one third of the watershed.

Pimephales vigilax (parrot minnow) - common but not numerous above McCamey.

Campostoma anomalum (stoneroller) - taken in Independence Creek and at the mouth of the river only.

Ameiuridae (catfishes)

Ictalurus punctatus (channel catfish) - the most common and widely distributed of this group. Probably the most important game species for most of the watershed.

Ictalurus furcatus (blue catfish) - taken near the mouth only. Abundant in that area.

Ictalurus natalis (yellow bullhead) - rare in the stream areas below Imperial, but very abundant above that area.

Ictalurus melas (black bullhead) - confined to localities but abundant where found.

Pylodictus olivaris (flathead catfish) - common but never numerous.

Cyprinodontidae (killifishes and topminnows)

Fundulus kansae (plains killifish) - common and distributed throughout the upper two thirds of the watershed.

Fundulus sp. (Pecos River killifish) - presumably an undescribed species. Found at Wink Lake, at several stations near Imperial and Grandfalls.

Cyprinodon variegatus (variegated cyprinodon) - taken near Imperial and presumably introduced.

Cyprinodon bovinus (Leon Springs pupfish) - not found but listed in the literature for this watershed, presumed extinct.

Cyprinodon elegans (Comanche Springs pupfish) - not actually collected and identified but taken from Hubbs checklist.

Cyprinodon sp. (Pecos River pupfish) - common in the upper watershed.

Poeciliidae (mosquitofishes)

Gambusia nobilis (Pecos gambusia) - common in upper watershed.

Gambusia affinis (mosquitofish) - common throughout watershed.

Mugilidae (mullets)

Mugil cephalus (striped mullet) - not actually taken but reported from the mouth of the Pecos.

Serranidae (basses)

Roccus chrysops (striped bass) - common and when conditions permit, the most important game species for the watershed.

Centrarchidae (black basses and sunfishes)

Micropterus punctulatus (spotted bass) - rare and this may be a case of misidentification.

Micropterus salmoides (largemouth bass) - rare but widely distributed.

Chaenobryttus gulosus (warmouth bass) - common but never numerous.

Lepomis cyanellus (green sunfish) - common and abundant found throughout the watershed.

Lepomis microlophus (redear sunfish) - common but never numerous in the upper watershed. Not taken near mouth.

Lepomis macrochirus (bluegill sunfish) - common and abundant. Probably the most numerous species of this group.

Lepomis humilis (orange spotted sunfish) - common but never abundant.

Lepomis auritus (yellowbelly sunfish) - common in the upper watershed as far south as Iraan, but never abundant.

Lepomis megalotis (longear sunfish) - common and abundant. Some evidence of hybridization in a number of individuals.

Pomoxis annularis (white crappie) - rare and localized in distribution.

Percidae (perches and darters)

Hadropterus sp. (Pecos darter) - presumably an undescribed species of this genus.

Percina caprodes (logperch) - found primarily below brush diversion dams in the upper watershed. Rare.

Sciaenidae (drum and weakfishes)

Aplodinotus grunniens (freshwater drum) - common, but more abundant in the upper portions of the reservoir.

Sciaenops ocellata (redfish) - rare, known to be released by the Texas Game and Fish Commission, confined to the area near Imperial.

Cichilidae (cichlids)

Cichlasoma cyanoguttatum (Rio Grande cichlid) - common from Balmorhea to mouth.

B. Trends and Influences of the Principal Fishery Populations.

Killifishes and topminnows - In all areas where the stream was intermittent or where salinity was unusually high, these fishes were quick to gain dominance. In several instances where stations were rechecked it appeared that more desirable forage and game species quickly disappeared as salinity increased with a reduction of water volume in stream pools, and there was a remarkable increase in the numbers of these species. It also appeared that killifishes could tolerate crowding to an extent where there may have been an actual increase in total fish per unit volume. (The weight of killifishes and pupfish in a reduced volume may have exceeded the total weight for all species in a greater volume under different conditions.) The utility of these fish as forage for game species is undetermined, however, they have been recovered from stomachs of the redfish that were released near Imperial. The apparent ecological succession for the upper watershed appears to be a reduction of killifishes during periods when sustained run-off occurs and for a short period following this phenomena and a gradual and at times a rapid recapture of dominance by this group from game species and from minnows and shiners.

Minnows and shiners - These populations and their relative density were apparently controlled by three variables. Of primary importance was stream flow and its stability, however, in some localities natural salinity and in many others salt pollution were detrimental. Pollution as discussed elsewhere also apparently controlled the game fish populations.

Suckers, carp and other species of questionable benefit - As in virtually all stream areas in the region, river carpsuckers were excessive in much of the stream. However, where flow was stabilized and where the stream was unpolluted suckers, carp, and other undesirable species were not dominant. Blue suckers in the lower stream were numerous, but apparently catfishes were able to compete successfully.

Gizzard shad and white bass - In the upper stream areas when run-off occurred or when periodic releases were made from Red Bluff Reservoir or Imperial Reservoir, the flow thus created had tremendous effect upon the spawning and growth rate for these species. When flow was created in the spring, extensive schools of shad were observed and during the following fall and summer white bass fishing results were excellent. Sampling before and after this phenomena confirmed this occurrance. White bass fishing can for practical purposes be considered to be the only significant fishery yield for all stream areas above Sheffield, Texas, and as previously stated this yield is virtually dependent upon uncertain and infrequent occurrances of stream flow. Further evidence of the cycle of

tremendous increase and reduction is apparent in the lower stream where populations remain relatively constant as a result of stabilized stream flow. In these areas neither shad nor white bass are dominant in their ecological station or position. It is regarded as possible that the recession phase (the cession of flow, the withdrawal of and reduction of stream pools) is as important in producing this rapid and unpredictable production of utilizable fishery yield as is the opposite flood stage.

Catfishes and largemouth bass - Blue catfish dominate the area near the mouth and for a number of miles upstream; however, channel catfish are the more important for virtually all of the watershed. Flathead catfish are of lesser importance. Largemouth bass with the exception of one or two localities are of no importance on a watershed basis, and since these fish are released from the hatcheries almost every year, it is assumed that the complex of many factors prevent this species from either maintaining or developing into any fishery asset.

Redfish - Approximately 500 redfish or channel bass were released by the Game and Fish Commission near Imperial, Texas, in 1955. Of this number, claims of about 200 recaptures have been made. None of these fish were captured during the last year of study, however, a report of one reaching a length of 27 inches was received indirectly and was supposedly captured about 14 stream miles from the point of release. A number of individuals recaptured by sportsmen and mailed to the marine biological staff for appraisal indicated that these fish were in excellent condition and had grown faster than fish of the same species spawned at approximately the same time on the coast. An experimental restocking is recommended and requested under a different job for the coming years work.

Summary:

1. The Pecos River is divided into three general ecological types. (a) the upper watershed area, between Red Bluff Reservoir and Imperial, Texas, is characterized by turbid saline pools of extreme fluctuation. (b) the mid-watershed area, from Imperial to Sheffield, is characterized by long deep pools of sluggish flow connected by gravel bars and infested with dense concentrations of aquatic vegetation. This area is more stable but is subjected to almost constant pollution from oil fields and through agricultural processes. (c) the lower Pecos, the area from Sheffield to the confluence with the Rio Grande, is characterized by spring fed associations, gravel and rock bottoms, and unusually clear waters.

2. All of the waters of the Pecos are relatively high in chlorides and there seems to be some correlation between salinity and species distribution.

3. The most important forage species for the upper Pecos is the gizzard shad and the most important game species is the white bass. These populations have extreme fluctuation in response to stream conditions.

4. The most important forage fishes for the middle and lower Pecos are shiners and minnows and the most important game species is the channel catfish. Blue catfish dominate the mouth of the stream.

5. The utility of the heavy populations of cyprinodons as forage is questionable, however, they were utilized to some extent by channel bass released near Imperial on an experimental basis.

6. The high premium on water for irrigation has decreased the upper stream flow to a point where it is nonexistent much of the time. Many historic springs that originally supplied the stream are no longer productive for various reasons, and public access is confined to insignificant and unproductive stream areas.

Recommendations and Conclusions:

It is concluded that because of the water conservation and utilization practices employed in the upper watershed nothing can be done at present toward development of fishery resources in that portion of the stream. Emphasis should be placed on reservoir management since these are public waters. The middle and lower Pecos offer many more potentialities for development work; however, until public access is obtained and pollution more adequately controlled, only experimental work such as the introduction of suitable marine species like the redfish or the channel bass should be attempted. It is further recommended that future development and survey work be concentrated toward obtaining public access and toward controlling pollution. If these problems are resolved, appropriate, vegetation control and fishery management procedures can be employed to increase game fish production and to aid in the fishery yield. Extensive study and investigation is also needed to determine if streams or reservoirs in the Davis, Guadalupe and other mountains may be practical, and when time permits that work should be done. Further study is also needed to determine if the playa salt lakes of the region can be made to be productive in any manner since these are potential resources that may in the future be the only waters available for fishery management or for development. Any success in that endeavor would or could materially increase the potential resources for the southwest.

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Table I. Hydrology and Fluctuation of Flow Data for the Pecos River at Red Bluff, New Mexico from October 1955 through September 1957.

Month	Maximum Discharge c.f.s.	Minimum Discharge c.f.s.	Average Discharge c.f.s.	Number of Days No Flow	Percent of Time No Flow	Run-off in Acre Feet
1955						
October	5730	87	767.0	0	0	47,150
November	138	82	111.0	0	0	6,620
December	138	104	118.0	0	0	7,270
1956						
January	114	82	96.3	0	0	5,920
February	104	29	52.0	0	0	2,990
March	80	31	54.4	0	0	3,340
April	65	35	43.1	0	0	2,570
May	76	23	39.2	0	0	2,410
June	58	22	30.1	0	0	1,790
July	52	29	34.4	0	0	2,110
August	43	26	30.4	0	0	1,870
September	48	25	30.8	0	0	1,830
October	63	41	52.7	0	0	3,240
November	69	32	44.1	0	0	2,630
December	89	55	64.7	0	0	3,980
1957						
January	74	65	66.9	0	0	4,120
February	66	20	40.4	0	0	2,240
March	39	18	22.8	0	0	1,400
April	25	15	19.1	0	0	1,140
May	904	18	53.3	0	0	3,270
June	246	13	25.7	0	0	1,530
July	77	11	18.6	0	0	1,140
August	2,450	16	122.0	0	0	7,520
September	33	26	28.5	0	0	1,700

Drainage area is 19,540 square miles.
The average discharge for a 19 year period is 203,400 acre feet per year.

Table II. Hydrology and Fluctuation Data for Red Bluff Reservoir for the Period from October 1955, through September 1957.

Month	Max. El.	Min. El.	Avg.	Fluc.	Avg. Acre Feet
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
Averages	116.9	83.5	100.2	3.3	*58,145

* Maximum acre feet was 103,500 in February of 1955.
Minimum acre feet was 12,750 in February of 1957.

Table III. Hydrology and Fluctuation of Flow Data for the Pecos River at Girvin from October 1955 through September 1957.

Month	Maximum Discharge c.f.s.	Minimum Discharge c.f.s.	Average Discharge c.f.s.	Number of Days No Flow	Percent of Time No Flow	Run-off in Acre Feet
1955						
October	156	24	40.6	0	0	2,500
November	30	23	24.7	0	0	1,470
December	36	26	27.7	0	0	1,710
1956						
January	61	36	43.7	0	0	2,690
February	48	40	44.3	0	0	2,550
March	42	34	38.8	0	0	2,390
April	36	15	25.7	0	0	1,530
May	18	10	12.6	0	0	744
June	12	9	10.7	0	0	632
July	12	11	18.9	0	0	1,160
August	34	10	13.6	0	0	839
September	49	11	15.5	0	0	922
October	105	12	21.6	0	0	1,330
November	24	23	23.6	0	0	1,410
December	25	23	24.1	0	0	1,480
1957						
January	24	21	22.2	0	0	1,370
February	115	22	54.7	0	0	3,040
March	111	25	43.2	0	0	2,660
April	2,240	25	142.0	0	0	8,480
May	390	20	46.9	0	0	2,880
June	93	15	27.0	0	0	1,600
July	51	14	18.0	0	0	1,100
August	26	14	14.8	0	0	910
September	154	12	19.7	0	0	1,170

Drainage area is 29,560 square miles.
The average discharge for a 17 year period is 122,400 acre feet per year.

Table IV. Water Quality Data for the Pecos River.

Location	Date	Air Temp.	Surface Water Temp.	pH	O_2 PPM	CO_2 PPM	Date	Cl PPM	Dissolved Solids	Total Hardness
Pecos River near Orla, Texas	October 1955	82	74	8.4	6	13	October 1946	2,300	6,330	2,080
	May 1956	70	69	8.1	8	7	May 1955	1,650	5,180	1,940
	September 1957	87	76	8.6	1.6	15	September 1957	3,490	9,050	2,640
Toyah Creek near Pecos, Texas	--	--	--	--	--	--	October 1946	2,060	8,160	2,580
	--	--	--	--	--	--	May 1955	262	2,440	1,520
Pecos River near Grand Falls, Texas	October 1955	84	75	8.6	4	15	October 1946	3,780	10,500	3,320
	May 1956	74	68	8.1	10	5	April 1955	4,030	10,600	3,280
	September 1957	82	78	8.2	11	4	September 1957	3,900	10,800	3,210

Table IV. Water Quality Data for the Pecos River (Continued)

Location	Date	Air Temp.	Surface Water Temp.	pH	O_2 PPM	CO_2 PPM	Date	Cl PPM	Dissolved Solids	Total Hardness
Pecos River near Girvin, Texas	October 1955	86	74	7.6	11	0	October 1946	4,700	12,500	3,770
	May 1956	70	70	7.8	4	10	April 1955	5,130	13,300	3,920
	September 1957	82	76	7.4	3	8	September 1957	5,300	14,100	4,180
Pecos River near Sheffield, Texas	May 1956	74	70	7.3	10	0	October 1946	3,610	9,510	2,760
	September 1957	82	76	7.1	10	1	May 1955	3,910	9,970	2,990
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Table V. Collection Stations on the Pecos River.

Station No.
1. Below Red Bluff Dam
2. Mouth of Screwbean Draw, 3 miles below Red Bluff Dam
3. Pasotex Pipe Line Crossing, 6 miles southeast of Orla
4. Mentone Crossing Bridge on Ranch Road 302
5. Ward County Water District No. 3, Diversion Dam
6. Ward County Irrigation District No. 1
7. Highway 80 Bridge in Pecos
8. Big Valley Ward County District No. 2, Diversion Dam
9. Stream crossing 1½ miles south of Ward Diversion Dam No. 2
10. Pecos County Water District No. 2, 600 feet below Diversion Dam, 18 stream miles above Grandfalls Crossing
11. Ward County Water District No. 2, ½ mile above Reeves-Pecos County Line
12. Pecos County Water District No. 2, Diversion Dam No. 2 at Royalty Crossing
13. Grandfalls Crossing
14. Pecos County Water District No. 3, Diversion Dam, Zimmerman or Imperial Reservoir
15. 4 miles above highway bridge on Ranch Road 1053
16. Buena Vista-Crane Farm Road Crossing
17. Girvin Highway, 2 miles east of Girvin
18. Highway 305 crossing Iraan-McCamey Road
19. Highway 51 crossing Rankin-Iraan Road
20. Brooks Ranch 4 miles north of bridge on Highway 290, Ozona-Sheffield highway
21. Highway 290 bridge
22. Hugh Childress Ranch, 14 miles south of Sheffield
23. Mouth of Independence Creek on Chandler Ranch
24. Pandale Crossing
25. Mouth Howard Draw on Al Mills Ranch 8 miles south of Pandale
26. Bud Mills Ranch 4 miles west of Pandale
27. Marty King Ranch 4 miles east of Comstock-Langtry Bridge
28. Marty King Ranch at Comstock-Langtry Bridge
29. Marty King Ranch at mouth of Pecos River

Collections From Principle Tributaries

Wink Lake at Wink

Toyah Creek
Springs at base of Timber Mountain 5 miles west of Balmorhea
State Park at Balmorhea
Lake Balmorhea

Comanche Creek
Comanche Springs above Lake Leon
Crossing of Comanche Creek between Ft. Stockton and Imperial on Highway 1053

Independence Creek
Independence Spring 1 mile above Dryden-Sheffield Bridge on Highway 1217
Dryden-Sheffield Bridge on Highway 1217
1 mile below bridge on Highway 1217

Table VI. Netting Collections on the Pecos River and its Tributaries

Collection Station Number 23
Location: Mouth of Independence Creek
Type of Collection: 3 experimental gill nets
Date: March 6, 1958

Species	No.	% by No.	Avg. Wt. Ozs.	% by Wt.	Avg. K.
Longnose gar	46	46.47	66		0.89
Gizzard shad	44	44.44			
Blue sucker	5	5.05	50		2.51
Smallmouth buffalo	1	1.01	72		1.85
Channel catfish	1	1.01	33		3.10
Yellow catfish	1	1.01	48		2.12
Black bass	1	1.01	18		3.19
Totals	99	100.00			

Collection Station Number 28
Location: 1 mile above Highway 90 bridge on Marty King Ranch
Type of Collection: 2 experimental gill nets and one 2" net
Date: April 9, 1958

Species	No.	% by No.	Avg. Wt. Ozs.	% by Wt.	Avg. K.
Alligator gar	2	5.56	160	9.67	.70
Longnose gar	3	8.33	305	27.74	.28
Gizzard shad	1	2.78	24	0.73	1.88
River carpsucker	1	2.78	11	0.33	2.58
Blue sucker	4	11.11	59	7.16	1.40
Smallmouth buffalo	3	8.33	144	8.70	3.08
Yellow catfish	1	2.78	336	10.19	1.90
Rio Grande blue catfish	16	44.44	60	29.11	1.59
Channel catfish	3	8.33	41	3.73	1.55
Freshwater drum	2	5.56	44	2.64	2.29
Totals	36	100.00		100.00	

Collection Station Number 29
Location: mouth of Pecos River at Rio Grande on Marty King Ranch
Type of Collection: 3 experimental gill nets and one 2" net
Date: March 6, 1958

Species	No.	% by No.	Avg. Wt. Ozs.	% by Wt.	Avg. K.
Alligator gar	1	1.64	240	7.61	0.80
Longnose gar	4	6.56	28	3.55	0.35
Gizzard shad	1	1.64	2	0.06	2.19
River carpsucker	6	9.83	14	2.67	2.24
Blue sucker	1	1.64	43	1.37	1.41
Rio Grande blue catfish	47	77.05	56	84.07	1.57
Freshwater drum	1	1.64	21	0.67	1.98
Totals	61	100.00		100.00	

Table VII. Fish Populations of the Pecos River taken by Seining.

Collection Station Number 1
Location: Below Red Bluff Dam
Type Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	August 21, 1955		April 18, 1956	
	No.	%	No.	%
Gambusia	60	11.48	25	5.48
Killifishes	300	57.36	200	43.76
Tetra	0	0.00	8	1.75
Redhorse shiners	20	3.82	17	3.71
Parrot minnow	12	2.29	0	0.00
Carp	2	0.38	6	1.31
Green sunfish	60	11.48	52	11.38
Bluegill	58	11.08	105	22.98
White bass	11	2.11	44	9.63
Totals	523	100.00	457	100.00

* * *

Collection Station Number 2
Location: mouth of Screwbean Draw, 3 miles below Red Bluff Dam
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	August 21, 1955	
	No.	%
Gambusia	200	38.58
Killifishes	180	34.68
Redhorse shiners	74	14.25
Spottail shiners	12	2.31
Parrot minnows	18	3.46
Carp	8	1.54
Smallmouth buffalo	2	0.38
Shad	14	2.69
White bass	11	2.11
Totals	519	100.00

Table VII. Fish Populations of the Pecos River Taken by Seining. (Continued)

Collection Station Number 3.
Location: Pasotex Pipe Line crossing river 6 miles southeast of Orla
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	August 22, 1955		April 19, 1956	
	No.	%	No.	%
Gambusia	18	22.78	26	23.21
Fundulus	32	40.50	40	35.71
Shad	8	10.13	6	5.36
Carp	2	2.54	6	5.36
White bass	2	2.54	9	8.04
Bluegill	11	13.92	16	14.28
Green sunfish	6	7.59	9	8.04
Totals	79	100.00	112	100.00

* * *

Collection Station Number 4.
Location: Mentone Crossing Bridge on Ranch Road 302
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	August 22, 1955		April 19, 1956	
	No.	%	No.	%
Gambusia	80	41.24	68	33.17
Fundulus	46	23.71	37	18.04
Parrot minnows	0	0.00	8	3.92
Redhorse shiners	0	0.00	24	11.70
Tetra	2	1.03	9	4.39
Shad	12	6.19	1	0.48
White bass	6	3.09	8	3.92
Channel cat	0	0.00	3	1.46
Green sunfish	24	12.37	17	8.29
Bluegill	18	9.28	30	14.63
Western longear	6	3.09	0	0.00
Totals	194	100.00	205	100.00

Table VII. Fish Populations of the Pecos River Taken by Seining. (Continued)

Collection Station Number 5.
Location: Ward County Water District No. 3, Diversion Dam
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	August 22, 1955		April 19, 1956	
	No.	%	No.	%
Gambusia	200	55.41	64	33.68
Killifishes	75	20.78	60	31.58
Spottail shiners	28	7.75	4	2.11
Redhorse shiners	16	4.43	22	11.58
Shad	11	3.04	2	1.05
Carp	2	0.56	6	3.16
River carpsuckers	2	0.56	0	0.00
Green sunfish	18	4.98	2	1.05
Bluegill sunfish	9	2.49	14	7.37
White bass	0	0.00	16	8.42
Totals	361	100.00	190	100.00

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Collection Station Number 6.
Location: Ward County Irrigation District No. 1
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	August 22, 1955		April 19, 1956	
	No.	%	No.	%
Gambusia	124	47.88	80	47.62
Killifishes	82	31.66	40	23.81
Plains shiners	21	8.10	6	3.57
Shad	8	3.09	2	1.19
Carp	11	4.25	6	3.57
Drum	0	0.00	4	2.38
Longnose gar	2	0.77	1	0.60
White bass	11	4.25	29	17.26
Totals	259	100.00	168	100.00

Table VII. Fish Populations of the Pecos River Taken by Seining. (Continued)

Collection Station Number 7.
Location: Highway bridge 2 miles east of Pecos
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	May 24, 1956		January 8, 1957	
	No.	%	No.	%
Gambusia	68	36.56	74	37.94
Killifishes	32	17.20	48	24.61
Tetra	6	3.22	3	1.53
Redhorse shiners	26	13.98	4	2.06
Plains shiners	2	1.08	0	0.00
Carp	11	5.91	4	2.06
River carpsuckers	2	1.08	2	1.03
Drum	2	1.08	1	0.52
Sunfish	28	15.05	37	18.97
White bass	9	4.84	22	11.28
Totals	186	100.00	195	100.00

* * *

Collection Station Number 8.
Location: Big Valley Ward County District Number 2, Diversion Dam
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine.

Species	May 31, 1955		May 24, 1956	
	No.	%	No.	%
Gambusia	72	48.64	30	19.73
Killifishes	38	25.67	61	40.13
Redhorse shiner	12	8.11	18	11.84
Shad	8	5.42	9	5.93
Bluegill	8	5.42	14	9.21
Green sunfish	5	3.37	11	7.23
White bass	5	3.37	9	5.93
Totals	148	100.00	152	100.00

Table VII. Fish Populations of the Pecos River Taken by Seining. (Continued)

Collection Station Number 9.
Location: Stream crossing 1½ miles south of Ward Diversion Dam Number 2
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	May 31, 1955	
	No.	%
Redhorse shiner	60	68.97
Green sunfish	17	19.54
Bluegill	5	5.75
Western longear	3	3.45
White bass	2	2.29
Totals	87	100.00

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Collection Station Number 10
Location: Pecos County Water District Number 2, 600 ft. below Diversion Dam, 18 stream miles northwest of Grandfalls Crossing
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	May 24, 1956		January 8, 1957	
	No.	%	No.	%
Gambusia	29	14.65	16	10.67
Fundulus	60	30.30	80	53.33
Redhorse shiner	38	19.19	8	5.33
Parrot minnows	4	2.02	0	0.00
River carpsuckers	4	2.02	2	1.34
Carp	2	1.01	1	0.66
Shad	18	9.09	6	4.00
Longnose gar	2	1.01	2	1.34
Spotted gar	2	1.01	0	0.00
Largemouth bass	1	0.51	0	0.00
White crappie	7	3.54	11	7.33
Bluegill	12	6.06	2	1.34
Green sunfish	9	4.54	8	5.33
Western longear	4	2.02	0	0.00
White bass	6	3.03	14	9.33
Totals	198	100.00	150	100.00

Table VII. Fish Populations of the Pecos River Taken by Seining.
(Continued)

Collection Station Number 11.
Location: Ward County Water District Number 2, ½ mile above Reeves-Pecos County Line
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	May 24, 1956		January 8, 1957	
	No.	%	No.	%
Gambusia	58	43.28	49	30.44
Killifishes	22	16.42	37	22.98
Redhorse shiners	12	8.95	0	0.00
Shad	8	5.98	2	1.24
Drum	0	0.00	2	1.24
Bluegill	21	15.68	19	11.80
Green sunfish	11	8.20	36	22.36
White bass	2	1.49	16	9.94
Totals	134	100.00	161	100.00

* * *

Collection Station Number 12.
Location: Pecos County Water District Number 2, Diversion Dam Number 2 at Royalty Crossing
Type of Equipment Employed: 12 ft. common seine

Species	February 26, 1957		November 19, 1957	
	No.	%	No.	%
Gambusia	144	35.82	62	33.51
Killifishes	108	26.86	52	28.11
Redhorse shiners	84	20.89	29	15.68
Plains shiners	20	4.97	0	0.00
Carp	1	0.24	1	0.54
Redhorse suckers	4	0.99	0	0.00
River carpsuckers	1	0.24	3	1.63
Drum	0	0.00	1	0.54
Bluegill	38	9.51	16	8.64
White bass	2	0.48	21	11.35
Totals	402	100.00	185	100.00

Table VII. Fish Populations of the Pecos River Taken by Seining. (Continued)

Collection Station Number 13.
Location: Grandfalls Crossing
Type of Equipment Employed: 12 ft. common seine

Species	February 26, 1957		November 19, 1957	
	No.	%	No.	%
Gambusia	112	61.55	139	55.16
Killifishes	22	12.09	30	11.90
Redhorse shiners	10	5.49	24	9.52
Parrot minnows	16	8.79	0	0.00
Redhorse suckers	0	0.00	4	1.58
Yellow bullheads	0	0.00	13	5.16
Bluegill	20	10.99	14	5.56
White bass	2	1.09	28	11.12
Totals	182	100.00	252	100.00

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Collection Station Number 14.
Location: Pecos County Water District Number 3, Diversion Dam at Zimmerman Reservoir
Type of Equipment Employed: 12 ft. common seine

Species	February 25, 1957		November 18, 1957	
	No.	%	No.	%
Shad	14	29.16	11	45.83
Carp	12	25.00	4	16.66
White bass	22	45.84	9	37.51
Totals	48	100.00	24	100.00

Table VII. Fish Populations of the Pecos River Taken by Seining. (Continued)

Collection Station Number 15.
Location: 4 miles above highway bridge on Ranch Road 1053
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	May 24, 1956		November 18, 1957	
	No.	%	No.	%
Gambusia	63	18.36	48	27.11
Killifishes	112	32.65	40	22.59
Redhorse shiners	38	11.07	0	0.00
Spottail shiners	2	0.59	0	0.00
Plains shiners	6	1.74	4	2.27
Tetra	14	4.08	21	11.89
Cichlids	2	0.59	6	3.38
Shad	13	3.79	0	0.00
Drum	2	0.59	1	0.56
Carp	12	3.49	18	10.16
Longnose gar	0	0.00	2	1.12
Bluegill	28	8.17	16	9.03
Green sunfish	40	11.67	11	6.23
White crappie	0	0.00	2	1.12
White bass	11	3.21	4	2.27
Channel catfish	0	0.00	4	2.27
Totals	343	100.00	177	100.00

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Collection Station Number 16.
Location: Buena Vista-Crane Farm Road Crossing
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	February 27, 1957		November 25, 1957	
	No.	%	No.	%
Gambusia	136	46.89	47	37.60
Killifishes	38	13.10	30	24.00
Spottail shiners	24	8.29	2	1.60
Parrot minnows	16	5.52	14	11.20
Shad	28	9.66	3	2.40
Bluegill	19	6.55	16	12.80
Green sunfish	21	7.24	9	7.20
White crappie	2	0.68	2	1.60
White bass	6	2.07	2	1.60
Totals	290	100.00	125	100.00

Table VII. Fish Populations of the Pecos River Taken by Seining. (Continued)

Collection Station Number 17.
Location: Highway bridge 2 miles east of Girvin
Type of Equipment Employed: 12 ft. common seine

Species	November 19, 1957	
	No.	%
Killifishes	30	75.00
Tetra	2	5.00
Shad	8	20.00
Totals	40	100.00

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Collection Station Number 18.
Location: Highway 305 crossing on Iraan-McCamey Road
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	May 30, 1955		April 5, 1957	
	No.	%	No.	%
Gambusia	48	33.10	29	22.48
Killifishes	16	11.03	38	29.46
Redhorse shiners	21	14.49	12	9.31
Plains shiners	16	11.05	0	0.00
Parrot minnows	14	9.65	6	4.65
Shad	3	2.06	0	0.00
Carp	9	6.23	4	3.10
River carpsuckers	4	2.75	9	6.96
Green sunfish	11	7.58	7	5.42
White crappie	1	0.69	12	9.31
White bass	2	1.37	12	9.31
Totals	145	100.00	129	100.00

Table VII. Fish Populations of the Pecos River Taken by Seining. (Continued)

Collection Station Number 19.
Location: Highway 51 crossing on Rankin-McCamey Road
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	May 30, 1955		April 5, 1957	
	No.	%	No.	%
Gambusia	200	72.46	150	63.29
Killifishes	46	16.66	40	16.87
Redhorse shiners	8	2.89	0	0.00
Parrot minnows	2	0.72	6	2.53
Plains minnows	0	0.00	4	1.68
Shad	0	0.00	4	1.68
Drum	2	0.72	6	2.53
Green sunfish	16	5.83	21	8.86
Largemouth bass	2	0.72	2	0.88
White bass	0	0.00	4	1.68
Totals	276	100.00	237	100.00

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Collection Station Number 20.
Location: Brooks Ranch 4 miles north of bridge on Highway 290, Ozona-Sheffield Highway
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	No.	%	No.	%
Gambusia	120	41.37	76	36.01
Killifishes	64	22.06	80	37.91
Shad	10	3.44	4	1.89
Longnose gar	28	9.72	3	1.43
Spotted gar	6	2.06	0	0.00
Bluegill sunfish	24	8.27	16	7.58
Green sunfish	18	6.20	14	6.63
Western longear	8	2.75	2	0.96
Largemouth bass	2	0.69	1	0.48
White crappie	2	0.69	7	3.31
White bass	8	2.75	6	2.84
Channel catfish	0	0.00	2	0.96
Totals	290	100.00	211	100.00

Table VII. Fish Populations of the Pecos River Taken by Seining. (Continued)

Collection Station Number 21.
Location: Highway 290, Ozona-Sheffield Highway
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	No.	%	No.	%
Gambusia	120	46.33	64	43.84
Killifishes	80	30.88	16	10.95
Redhorse shiners	18	6.94	11	7.63
Parrot minnows	6	2.32	8	5.48
Shad	9	3.48	2	1.36
Longnose gar	2	0.78	0	0.00
Carp	1	0.39	6	4.12
Redhorse suckers	3	1.16	0	0.00
Sunfish	16	6.18	21	14.38
White bass	4	1.54	18	12.24
Totals	259	100.00	146	100.00

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Collection Station Number 22.
Location: Hugh Childress Ranch 14 miles south of Sheffield
Type of Equipment Employed: 12 ft. common seine

Species	No.	%
Gambusia	124	44.77
Killifishes	60	21.66
Redhorse shiners	18	6.49
Dionda	28	10.10
Carp	4	1.44
Redhorse suckers	6	2.16
River carpsuckers	4	1.44
Shad	13	4.69
Longnose gar	2	0.73
Largemouth bass	2	0.73
Sunfish	16	5.79
Totals	277	100.00

Table VII. Fish Populations of the Pecos River Taken by Seining.
(Continued)

Collection Station Number 23.
Location: Independence Creek bridge Highway 349
Type of Equipment Used: 26 ft. bag seine and 12 ft. common seine

Species	No.	%	No.	%
Gambusia	24	5.38	18	4.61
Killifishes	60	13.45	21	5.38
Redhorse shiners	4	0.89	6	1.53
Dionda	300	67.33	250	64.10
Stone rollers	3	0.67	2	0.53
Tetra	6	1.34	18	4.61
Cichlids	8	1.79	9	2.32
Green sunfish	27	6.05	33	8.46
Bluegill	3	0.67	16	4.11
Redear sunfish	2	0.44	0	0.00
Western longear sunfish	2	0.44	8	2.05
Yellowbelly sunfish	1	0.22	3	0.77
Largemouth bass	4	0.89	6	1.53
White crappie	2	0.44	0	0.00
Totals	446	100.00	390	100.00

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Collection Station Number 23a.
Location: Mouth of Independence Creek
Type of Equipment Employed: 26 ft. bag seine

Species	No.	%	No.	%
Dionda	200	90.49	160	76.55
Green sunfish	16	7.23	38	18.18
Largemouth bass	5	2.28	11	5.27
Totals	221	100.00	209	100.00

Table VII. Fish Populations of the Pecos River Taken by Seining.
(Continued)

Collection Station Number 24.
Location: Pandale Crossing
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	No.	%	No.	%
Dionda	200	69.45	130	70.65
Plains shiners	30	10.42	27	14.67
Parrot minnows	12	4.17	1	0.55
Tetra	16	5.55	8	4.35
Cichlids	2	0.69	6	3.26
Green sunfishes	12	4.17	7	3.80
Bluegill	12	4.17	4	2.17
Western longear	2	0.69	0	0.00
Largemouth bass	2	0.69	1	0.55
Totals	288	100.00	184	100.00

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Collection Station Number 25.
Location: Mouth of Howards Draw on Al Mills Ranch 8 miles south of Pandale
Type Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	April 17, 1957		March 6, 1958	
	No.	%	No.	%
Gambusia	111	29.67	80	19.23
Killifishes	39	10.42	62	14.91
Plains shiners	8	2.13	16	3.84
Dionda	140	37.43	201	48.31
Shad	3	0.80	2	0.49
Green sunfish	16	4.26	28	6.73
Bluegill	36	9.62	6	1.44
Western longear	2	0.60	0	0.00
Largemouth bass	6	1.60	2	0.49
Channel catfish	0	0.00	12	2.88
Yellow bullheads	13	3.47	7	1.68
Totals	374	100.00	416	100.00

Table VII. Fish Populations of the Pecos River Taken by Seining. (Continued)

Collection Station Number 26.
Location: Bud Mills Ranch 4 miles west of Pandale
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

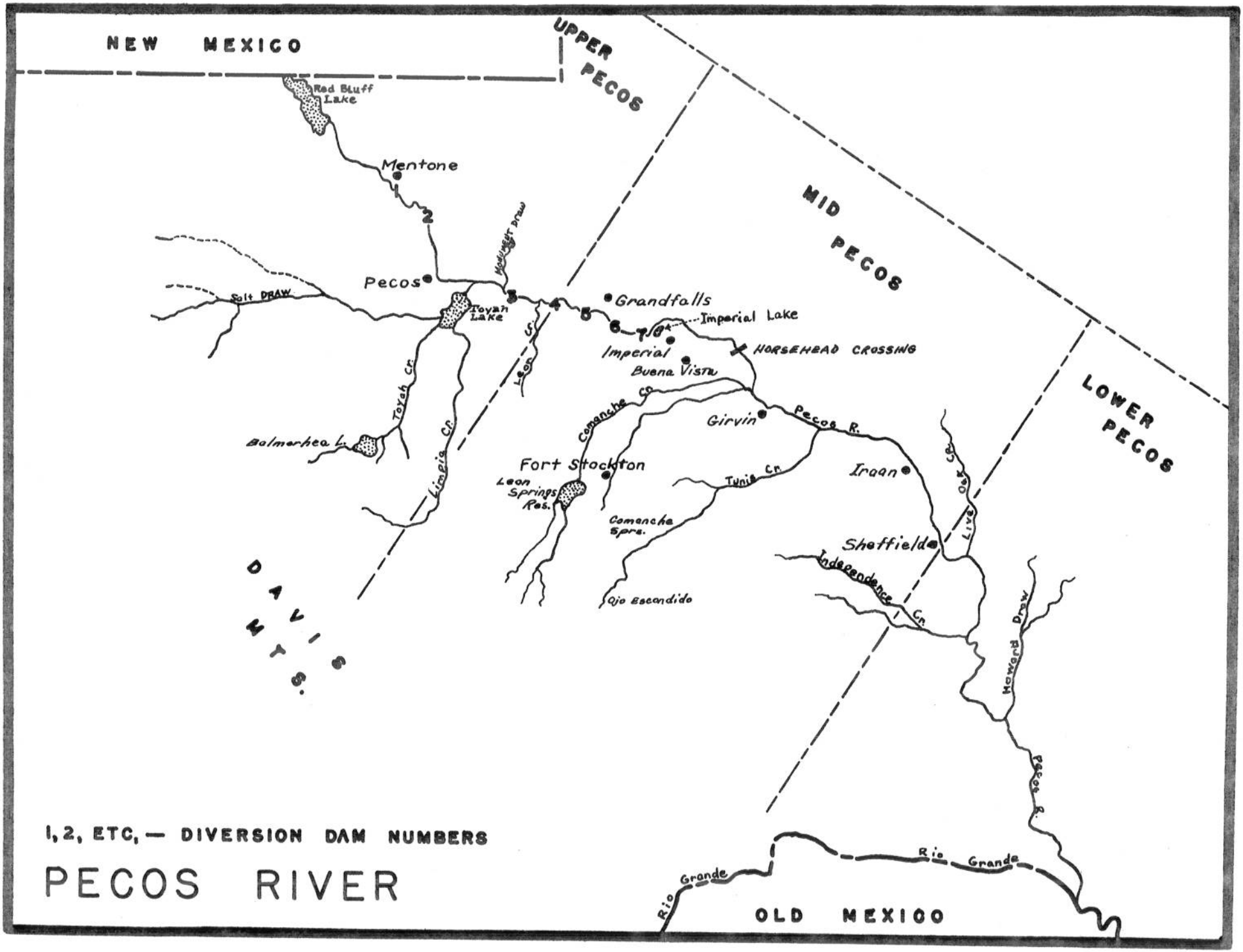
Species	March 6, 1958	
	No.	%
Gambusia	16	5.89
Killifishes	22	8.08
Campostoma	14	5.14
Dionda	160	58.84
Green sunfish	28	10.29
Western longear	12	4.41
Redear sunfish	12	4.41
Tetra	6	2.21
Chiclids	2	0.73
Totals	272	100.00

Collection Station Number 27.
Location: Marty King Ranch 4 miles east of Comstock-Langtry Bridge
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	March 6, 1958		April 9, 1958	
	No.	%	No.	%
Gambusia	21	10.71	16	11.67
Dionda	125	63.77	86	62.77
Campostoma	12	6.12	14	10.23
Tetra	23	11.73	8	5.83
Chiclids	4	2.04	4	2.94
Green sunfish	11	5.63	9	6.56
Totals	196	100.00	137	100.00

Collection Station Number 28.
Location: Marty King Ranch at Comstock-Langtry Bridge
Type of Equipment Employed: 26 ft. bag seine and 12 ft. common seine

Species	March 6, 1958		April 9, 1958	
	No.	%	No.	%
Gambusia	18	11.92	24	20.16
Dionda	91	60.26	68	57.14
Campostoma	20	13.24	16	13.44
Tetra	5	3.33	9	7.56
Chiclids	3	1.98	1	0.85
Green sunfish	14	9.27	1	0.85
Totals	151	100.00	119	100.00


NEW MEXICO
UPPER PECOS
MID PECOS
LOWER PECOS
Red Bluff Lake
Mentone
Pecos
Salt DRAW
Toyah Lake
Toyah Cr.
Limpia Cr.
Balmorhea L.
Leon Cr.
Grandfalls
Imperial Lake
Imperial
HORSEHEAD CROSSING
Buena Vista
Comanche Co.
Girvin
Pecos R.
Fort Stockton
Leon Springs Res.
Comanche Spgs.
Ojo Escondido
Tunis Cr.
Iraan
Live Oak Cr.
Sheffield
Independence Cr.
Howard Draw
Pecos R.
DAVIS MTS.
Rio Grande
Rio Grande
OLD MEXICO
1, 2, ETC, — DIVERSION DAM NUMBERS
PECOS RIVER