

Segment Completion Report

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Project Leader

TITLE

Inventory of species present and their distribution in those portions of the Devil's River, excluding Devil's Lake and Lake Walk which lie within Val Verde Co., Texas.

OBJECTIVES

To determine the distribution of the species present and their relative abundance as well as the ecological factors influencing their distribution.

COOPERATING AGENCIES

University of Texas (Department of Zoology, Dr. Clark Hubbs)
Central Power and Light Co.

METHODS

A total of 16 fish collections were made at 12 different stations on the Devil's River. The collections consisted of 15 seining collections and 1 gill net collection. The seining collections were made with the following seines: 30' x 6' x $\frac{1}{4}$ " straight seine; 26' x 6' x $\frac{1}{4}$ " bag seine; common sense seines, 4' deep by $\frac{1}{8}$ " mesh with lengths varying from four to ten feet. The one gill net collection was made with an experimental, nylon gill net, 8 x 125 ft., consisting of 25 ft. sections ranging from one to three inches in mesh size and graduated in one-half inch intervals. All mesh sizes are given as square mesh sizes.

Field water analyses, including air and water temperatures, pH, dissolved oxygen, carbon dioxide, alkalinity and chlorides were made at seven stations on the Devil's River.

Cooperation of Dr. Clark Hubbs, Department of Zoology, University of Texas, in the verification and identification of many fish species was greatly appreciated. All seining collections were preserved in 10% formalin and brought to the laboratory for verification and tabulation.

Work on this job was greatly hampered by the late arrival of waders during the cold winter months, lack of sufficient time for job, and more directly by the inaccessibility of the river.

PHYSICAL CHARACTERISTICS

The flowing portion of the Devil's River is entirely within the Edwards Plateau in Val Verde County, Texas. Johnson Creek in Crockett County and the Dry Devil's River in Val Verde County are normally only dry draws but they carry tremendous amounts of flood waters to the Devil's River during moderate to heavy rains on the watershed. The perennial portion of the river begins at Pecan Springs on the Hudspeth River Ranch, approximately 4.5 air miles southwest of Juno and flows approximately

thirty-five miles in a southeasterly to southern direction to its convergence with the Rio Grande River, approximately six air miles southwest of Del Rio. The river has several large springs and several thousand small springs along its entire course and is characterized by a rather large volume of flowing, slightly turbid to perfectly clear, water. The river has high limestone canyon walls along much of its course. The stream bed is several hundred feet wide in places and mostly limestone bedrock. However, there are numerous deep pools with gravel and rubble bottoms with slight to heavy silt deposits in some areas.

The watershed is mostly rolling to rugged limestone hills with a thin soil cover. There is very little grass cover due to overgrazing and recent years of drouth. The present vegetation consists of thorny brush species and semi-arid to arid plants. The nature of the watershed causes small "flash floods" as well as major floods during periods of only moderate rain.

There are three impoundments on the Devil's River, all built and owned by the Central Power and Light Co. The smallest dam, located approximately one mile above the mouth of the river, is only about six feet deep and furnishes water to the Central Power and Light Steam Plant. The two larger dams, Lake Walk and Devil's Lake, approximately six and eight miles respectively northwest of Del Rio are hydroelectric dams. Lake Walk is 250 surface acres and Devil's Lake is 440 surface acres. Both are shallow lakes, less than 50 feet deep.

Detailed information regarding the physical aspects of the Devil's River may be found in Job A-1, Segment Completion Report.

CHEMICAL CHARACTERISTICS

A key to the water analysis stations is included in Table 1. The stations are also located on the map accompanying this report. The results of these water analyses may be found in Table 2. The water temperature ranged from 69 F in November to 82°F in September. The average temperature for the seven analyses was 76.1°F. Most of the springs have a constant, year-round temperature near 72°F. The air temperature ranged from 96°F in July to 75°F in October and November. The pH of the river ranged from 7.2 to 8.7 with an average of 8.4. Most of the spring waters have a low pH near 7.2. The dissolved oxygen of the river varied from 3.2 to 8.6 with an average of 6.5 parts per million. The carbon dioxide ranged from 0.5 to 29.0 with an average of 7.5 parts per million. The spring areas consistently give the higher carbon dioxide readings. The total alkalinity, due entirely to bicarbonate alkalinity, varied from 155 to 220 with an average of 191 parts per million. The chloride content ranged from 17.7 to 42.6 with an average of 33.4 parts per million. There is a slight turbidity present in certain areas of the river, especially at Station 3 and downstream near the Rio Grande River. However, the turbidity is so low in the majority of the stream that it can not be recorded with a Jackson turbidimeter.

RESULTS OF FISH COLLECTIONS

A key to the fish collection stations may be found in Table 1. A total of 16 collections were made at 12 different locations on the River. These 16 collections consist of 15 seining collections and one gill net collection. Table 3 contains a checklist of fish species for the Devil's River and Table 4 gives the number of each species collected at each station. A total of 6,760 fish specimens were collected. This total contains 28 species and one hybrid, representing 10 families. The fish fauna of the Devil's River is typical of that of the Rio Grande River Drainage below the mouth of the Devil's River. The number of species present is much lower than that of streams of the eastern portion of the State. Two new species were discovered as the result of this investigation. One, a new cyprinodont, Cyprinodon species is to be described by Dr. Reeve Bailey of the University of Michigan. The other, a new cyprinid, Dionda species is to be described by Dr. Clark Hubbs

and the author. The minnow species are most abundant in the Devil's River, especially Notropis venustus, the spottail shiner, and Dionda episcopa, the roundnose minnow. The spottail shiner is found throughout the entire river, but the roundnose minnow is found only in the immediate vicinity of springs. The game species are found throughout the entire stream and provide good to excellent fishing in the deeper pools of water. The following fishes are found only in the spring areas or they are closely associated with the spring waters:

Dionda episcopa - roundnose minnow
Dionda species - new species
Cyprinodon species - new species
Lepomis punctatus - spotted sunfish
Cichlasoma cyanoguttata - Rio Grande perch

The Rio Grande tetra is found throughout the entire river but its abundance is no doubt due to the large volume of flowing spring water. The river carpsucker may be considered as numerous in the river. Several species are closely associated with rapids and fast flowing waters. They include the proserpine shiner, the red-spot darter and the Rio Grande shiner. The spottail shiner is much more numerous in the swifter waters.

Many of the species collected are different sub-species from those of the central and eastern portions of the State but they have not been recorded as such in this report.

SUMMARY

1. A total of 16 fish collections, including 15 seining collections and 1 gill net collection were made at 12 different locations on the Devil's River. A total of 7 field water analyses were made at seven different locations on the river.
2. The water temperature ranged from 69°F in November to 82°F in September with an average temperature of 76.1°F. The spring waters had a rather constant temperature near 72°F. The pH ranged from 7.2 to 8.7 with an average of 8.4. The spring waters had a rather constant pH near 7.2. The dissolved oxygen varied from 3.2 to 8.6 with an average of 6.5 parts per million. The carbon dioxide varied from 0.5 to 29.0 with an average of 7.5 parts per million. The springs have high carbon dioxide readings. The total alkalinity, due entirely to bicarbonate alkalinity, ranged from 155 to 220 with an average of 191 parts per million. The turbidity of the stream is normally very low, below the recording limits of a Jackson Turbidimeter.
3. A total of 6,760 fish were collected, representing 10 families, 28 species and one hybrid. Two new fish species were discovered as the result of this investigation. The presence of numerous springs and the constant rather high rate of flow of the river seem to be the most important factors effecting the distribution of the fish species.
4. Minnow species are most numerous in the river and the game species are widely distributed and furnish good to excellent fishing in most of the stream.

Table 1. Key to Seining and Water Analysis Stations on the Devil's River.

Station No.	Seining Collection No.	Location ¹
1.	DR-S-6	Devil's River, at headwaters, Pecan Springs, Hudspeth Ranch, 12½ miles north of Comstock, Val Verde Co.
2.	DR-S-3	Devil's River, 10½ miles north of Comstock, Val Verde, Co.
3.	DR-S-2, DR-S-14	Devil's River, at Baker's Crossing, State Highway 163, 9½ miles north of Comstock, Val Verde County.
4.	DR-S-10	Devil's River at Indian Creek Canyon, Lucious Hines Ranch, 11 miles Northeast of Comstock, Val Verde Co.
5.	DR-S-15	Devil's River, ¼ mile below mouth of Dry Devil's River, Val Verde Co.
6.	DR-S-7, DR-S-12	Devil's River, ½ mile above head of Devil's Lake, Val Verde County.
7.	DR-S-11	Devil's River, ¼ mile above head of Devil's Lake, Val Verde County
8.	DR-S-1, DR-S-9	Devil's River, at U. S. Highway 90 Bridge, Val Verde County.
9.	DR-S-8	California Creek, Castle Canyon, below U. S. Highway 90 Bridge, Val Verde County.
10.	DR-S-13	Devil's River at railroad bridge, 2 miles below Station 8, Val Verde Co.
11.	DR-S-4, DR-GN-1	Devil's River at Central Power and Light Steam Plant, 1 mile above mouth of river, Val Verde Co., Texas.
12.	DR-S-5	Devil's River, 300 yards above junction with Rio Grande River, Val Verde County.
1.	Given as approximate air miles.	

Table 2. Water analysis of Devil's River, Val Verde County, Texas.¹

Station	Date	Air Temp. F°	Water Temp. F°	pH	Dissolved Oxygen, ppm	Carbon Dioxide ppm	Total Alkalinity ppm	Chlorides ppm	Remarks
1.	10-7-53	75.0	72.0	7.2	7.0	29.0	220	42.6	Flowing springs
2.	9-9-53	86.0	77.0	8.4	7.0	14.0	197	35.5	Slight tur- bidity
3.	7-29-53	96.0	81.0	8.7	----	0.5	215	---	Mod. turbid.
4.	11-17-53	75.0	69.0	8.7	3.2	3.5	205	17.7	Water clear.
8.	7-29-53	82.0	76.5	8.7	----	0.5	173	----	Slight turbid.
11.	9-9-53	90.0	82.0	8.7	8.6	2.0	155	35.5	Very slight- ly turbid
12.	10-6-54	73.0	75.0	8.7	6.8	3.0	172	35.5	Mod. turbid.
Averages		82.4	76.1	8.4	6.5	7.5	191	33.4	

¹. Samples taken at approximately one foot depth.

Table 3. Checklist of fishes from Devil's River, exclusive of Devil's Lake and Lake Walk, Val Verde County, Texas.

	Scientific Name	Common Name
1.	<u>Dorosoma cepedianum</u>	Gizzard shad
2.	<u>Astyanax fasciatus</u>	Rio Grande tetra
3.	<u>Carpionodes carpio</u>	River carpsucker
4.	<u>Moxostoma congestum</u>	Redhorse sucker
5.	<u>Notropis jemezanus</u>	Rio Grande shiner
6.	<u>Notropis amabilis</u>	Texas shiner
7.	<u>Notropis braytoni</u>	Tamaulipas shiner
8.	<u>Notropis venustus</u>	Spottail shiner
9.	<u>Notropis lutrensis</u>	Red shiner
10.	<u>Notropis proserpinus</u>	Proserpine shiner
11.	<u>Notropis deliciosus</u>	Sand shiner
12.	<u>Dionda episcopa</u>	Roundnose minnow
13.	<u>Dionda species</u>	New species
14.	<u>Pimephales vigilax</u>	Parrot minnow
15.	<u>Campostoma anomalum</u>	Stoneroller
16.	<u>Ictalurus punctatus</u>	Southern channel catfish
17.	<u>Pilodictus olivaris</u>	Flathead catfish
18.	<u>Cyprinodon species</u>	New species
19.	<u>Gambusia affinis</u>	Common mosquitofish
20.	<u>Micropterus salmoides</u>	Largemouth black bass
21.	<u>Chaenobryttus coronarius</u>	Warmouth bass
22.	<u>Lepomis cyanellus</u>	Green sunfish
23.	<u>Lepomis punctatus</u>	Spotted sunfish
24.	<u>Lepomis macrochirus</u>	Bluegill sunfish
25.	<u>Lepomis auritus</u>	Yellowbelly sunfish
26.	<u>Lepomis megalotis</u>	Longear sunfish
27.	<u>L. punctatus x L. macrochirus</u>	Hybrid sunfish
28.	<u>Etheostoma grahami</u>	Redspot darter
29.	<u>Cichlasoma cyanoguttata</u>	Rio Grande perch

Table 4. Fish Species Collected from the Devil's River, Val Verde County, Texas by Number of Each Species Taken From Each Collection Station

Fish Species	Fish Collection Stations												Totals
	1	2	3	4	5	6	7	8	9	10	11	12	
Dorosoma cepedianum	0	0	0	0	0	0	0	0	0	1	1	1	3
Astyanax fasciatus	1	0	1	22	9	2	0	54	14	0	52	18	173
Carpionodes carpio	0	0	0	11	50	0	0	0	1	19	164	1	246
Moxostoma congestum	0	3	1	3	0	3	0	0	0	2	0	0	12
Notropis jemezianus	41	0	4	2	2	8	0	1	0	0	0	0	58
Notropis amabilis	0	36	71	0	8	6	4	0	0	0	1	0	126
Notropis braytoni	0	0	0	12	9	0	0	0	0	0	27	12	60
Notropis venustus	0	14	758	87	71	38	5	480	6	174	55	31	1,719
Notropis lutrensis	0	0	0	4	4	0	0	0	60	0	1	1	70
Notropis proserpinus	4	33	83	74	14	87	8	15	0	5	6	2	331
Notropis deliciosus	0	0	24	7	0	0	0	50	36	11	0	0	128
Dionda episcopa	143	293	157	683	0	152	73	0	1	61	0	0	1,563
Dionda species	10	36	58	0	0	0	0	0	0	0	0	0	104
Pimephales vigilax	0	0	0	6	15	2	2	1	35	4	4	5	74
Campostoma anomalum	0	0	0	9	17	3	1	7	0	21	5	0	63
Ictalurus punctatus	9	4	16	3	16	2	0	8	0	1	1	2	62
Pilodictus olivaris	0	0	1	0	1	0	0	1	0	0	0	0	3
Xyprinodon species	0	0	0	14	0	2	0	34	0	24	0	0	74
Gambusia affinis	164	16	35	61	0	245	5	327	1	101	4	26	985
Micropterus salmoides	8	0	1	0	0	0	0	4	0	18	0	0	31
Chaenobryttus coronarius	0	0	0	0	0	2	0	0	0	0	0	0	2
Lepomis cyanellus	2	0	1	0	0	0	0	2	184	6	0	0	195
Lepomis punctatus	2	0	0	0	0	0	0	0	0	0	0	0	2
Lepomis macrochirus	44	0	0	0	0	81	0	27	14	11	0	17	194
Lepomis auritus	12	0	11	0	0	9	1	1	0	0	1	0	35
Lepomis megalotis	5	5	10	1	0	16	0	1	0	0	0	1	39
L. punctatus x L. macrochirus	1	0	0	0	0	0	0	0	0	0	0	0	1
Etheostoma grahami	9	11	11	4	0	1	1	0	0	1	2	7	47
Cichlasoma cyanoguttata	23	15	34	29	1	63	13	135	0	2	26	19	360
Totals	478	466	1277	1032	217	722	109	1152	352	462	350	143	6,760



Head of Devil's Lake, looking upstream.



Devil's Lake, halfway up lake.

Job B-6



Devil's River at Baker's Crossing, State Highway 16.



Devil's River at U. S. Highway 90 Bridge.

JOB B-6

