

PECOS RIVER AND DEVILS'S RIVER BASINS PRIMARY CONTROL POINTS

FIGURE 4 –MAP SHOWING RESULTS OF WATER-DELIVERY INVESTIGATIONS OF THE PECOS RIVER IN MARCH 1964 AND APRIL 1967, AND 1921 LOW-FLOW INVESTIGATIONS OF THE DEVILS RIVER.

EXPLANATION

(On the map, reaches with flow GAINS are indicated in BLUE, reaches with flow LOSSES are indicated in RED, and reaches with constant flow or zero/no flow are indicated in GREEN.)

I. PECOS RIVER – Water Delivery From Below Red Bluff Dam (129 cfs released flow) to the Girvin Gage (66.2 cfs flow), March 3-5, 1964. Taken from Grozier, et al. (1966).

Reach Map I. D.	Date(s)	Reach Miles	Net Gain (+) or Loss (-)		Aquifer
			CFS	CFS/Mile	
IA	3/3/64	71.4	-51	-0.71	Cenozoic Alluvium
IB	3/3-5/64	21.8	+2.6	+0.12	do.
IC	3/5/64	94.8	-16	-0.17	do.
IA - IC	3/3-5/64	188.0	-64	-0.34	do.

II. PECOS RIVER – Water Delivery from Below Red Bluff Dam (547 cfs release and seepage flow) to the Girvin Gage (13.0 cfs flow), April 17 - 18, 1967. Taken from Grozier, et al. (1968).

Reach Map I. D.	Date(s)	Reach Miles	Net Gain (+) or Loss (-)		Aquifer
			CFS	CFS/Mile	
IIA	4/17-18/67	40.5	-100	-2.47	Cenozoic Alluvium
IIB	4/17-18/67	43.0	-74	-1.72	do.
IIC	4/18-19/67	41.0	-36	-0.88	do.
IIA - IIC	4/17-19/67	124.5	-210	-1.69	do.
IID	4/18/67	14.0	+12	+0.86	do.
IIE	4/18/67	16.8	-4	-0.24	do.
IIA - IIE	4/17-18-67	155.3	-202	+1.30	do.
IIF	4/18/67	30.2	Constant Flow = 13.0 cfs		do.

III. DEVILS RIVER – Low-Flow From Rubbord Ford to 0.5 Mile Below Southern Pacific Railroad Bridge, January 26 - 28, 1921. Taken from TBWE (1960).

Reach Map I. D.	Date(s)	Reach Miles	Net Gain (+) or Loss (-)		Aquifer
			CFS	CFS/Mile	
IIIA	1/26-28/21	20	+110	+5.50	Edwards-Trinity
IIIB	1/27-28/21	7.2	+55	+7.64	do.
IIIA - IIIB	1/26-28/21	27.2	+165	+6.07	do.

IV. DEVILS RIVER – Low-Flow From Rough Canyon Damsite to Abandoned Gage About 1.1 Miles Below the Southern Pacific Railroad Bridge, October 6-7, 1921. Taken from TBWE (1960)

Reach Map I. D.	Date(s)	Reach Miles	Net Gain (+) or Loss (-)		Aquifer
			CFS	CFS/Mile	
IVA	10/6-7/21	7.8	+52	+6.67	Edwards-Trinity

Devils River nr Juno (CT2100)

Pecos River nr Langtry (GT1000)

Devils River at Pafford Crossing nr Comstock (CT2000)

0 20 40 60 Miles



PECOS RIVER AND DEVILS'S RIVER BASINS PRIMARY CONTROL POINTS

FIGURE 3 -MAP SHOWING RESULTS OF LOW-FLOW INVESTIGATIONS OF THE PECOS RIVER IN MAY 1965 AND FEBRUARY 1968, AND THE DEVILS RIVER IN FEBRUARY 1928.

EXPLANATION

(On the map, reaches with low-flow GAINS are indicated in BLUE, reaches with low-flow LOSSES are indicated in RED, and reaches with constant flow or zero/no flow are indicated in GREEN.)

I. PECOS RIVER - From Below Red Bluff Dam to the Girvin Gage, May 10 - 12, 1965. Taken from Grozier, et al. (1966).

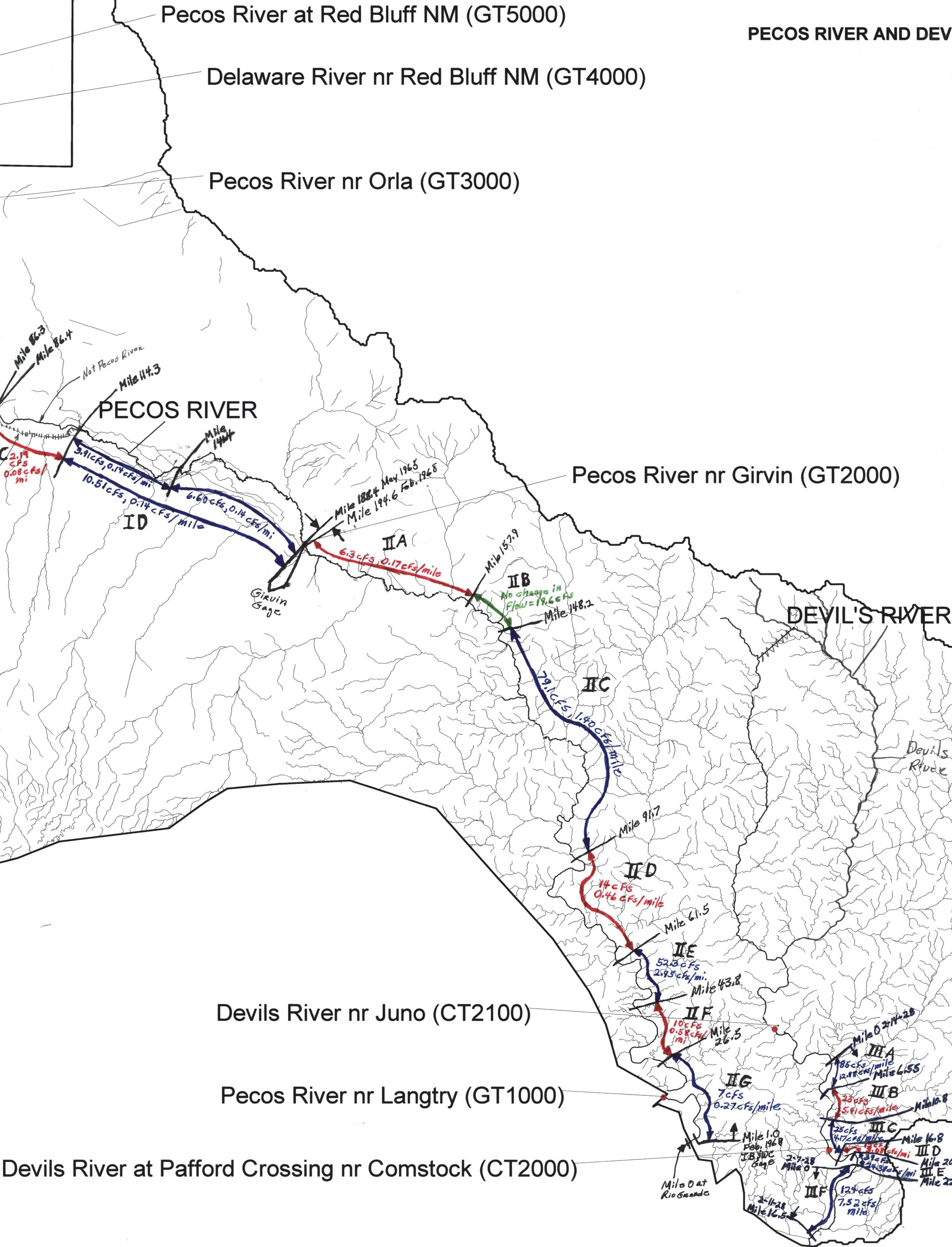
Reach Map I. D.	Date(s)	Reach Miles	Net Gain (+) or Loss (-)		Aquifer
			CFS	CFS/Mile	
IA	5/10/65	43	-2.58	-0.06	Cenozoic Alluvium
IB	5/10-11/65	42.9	Four Zero Flow Mm'ts		do.
IC	5/11/65	27.9	-2.19	-0.08	do.
ID	5/11-12/65	74.1	+10.51	+0.14	do.
IA - ID	5/10-12/65	187.9	+5.74	+0.03	do.

II. PECOS RIVER - From Girvin Gage to IB&WC Gage Near Comstock, Texas, February 6 - 9, 1968. Taken from Spiers, et al. (1970).

Reach Map I. D.	Date(s)	Reach Miles	Net Gain (+) or Loss (-)		Aquifer
			CFS	CFS/Mile	
IIA	2/6/68	36.7	-6.3	-0.17	Cenozoic Alluvium
IIB	2/6/68	9.7	Constant Flow = 19.6 cfs		Edwards-Trinity
IIC	2/6-7/68	56.5	+79.1	+1.40	do.
IID	2/6-8/68	30.2	-14	-0.46	do.
IIE	2/6-8/68	17.7	+52.3	+2.95	do.
IIF	2/7-8/68	17.3	-10	-0.58	do.
IIG	2/7-9/68	25.5	+7	+0.27	do.
IIA - IIG	2/6-9/68	193.6	+108.1	+0.56	CA & E-T
IIB - IIG	2/6-9/68	156.9	+114.4	+0.73	Edwards-Trinity

III. DEVILS RIVER - From Just above Dolans Creek to 0.75 Mile above Smith Ranch during February 14 - 20, 1928. Then During February 7 - 11, 1928 From 0.75 Mile above Smith Ranch to 3,000 Feet below the Southern Pacific Railroad Bridge. Taken from TBWE (1960).

Reach Map I. D.	Date(s)	Reach Miles	Net Gain (+) or Loss (-)		Aquifer
			CFS	CFS/Mile	
IIIA	2/14-16/28	6.55	+85	+12.98	Edwards-Trinity
IIIB	2/16-18/28	4.25	-23	-5.41	do.
IIIC	2/18-20/28	6.0	+25	+4.17	do.
IIID	2/19-20/28	3.9	-12	-3.08	do.
IIIE	2/20/28	1.6	+39	+24.38	do.
IIIF	2/7-11/28	16.5	+124	+7.52	do.
IIIA - IIIF	2/7-20/28	38.8	+238	+6.13	do.



PECOS RIVER AND DEVILS'S RIVER BASINS PRIMARY CONTROL POINTS

FIGURE 2 – MAP SHOWING RESULTS OF SELECTED EARLIEST LOW-FLOW INVESTIGATIONS OF THE PECOS RIVER AND DEVILS RIVER.

EXPLANATION

(On the map, reaches with low-flow GAINS are indicated in BLUE, reaches with low-flow LOSSES are indicated in RED, and reaches with constant flow or zero/no flow are indicated in GREEN.)

I. PECOS RIVER – From Texas-New Mexico State Line to Near Girvin, Texas, May 28-30, 1918. Taken from Grover, et al. (1922) and TBWE (1960).

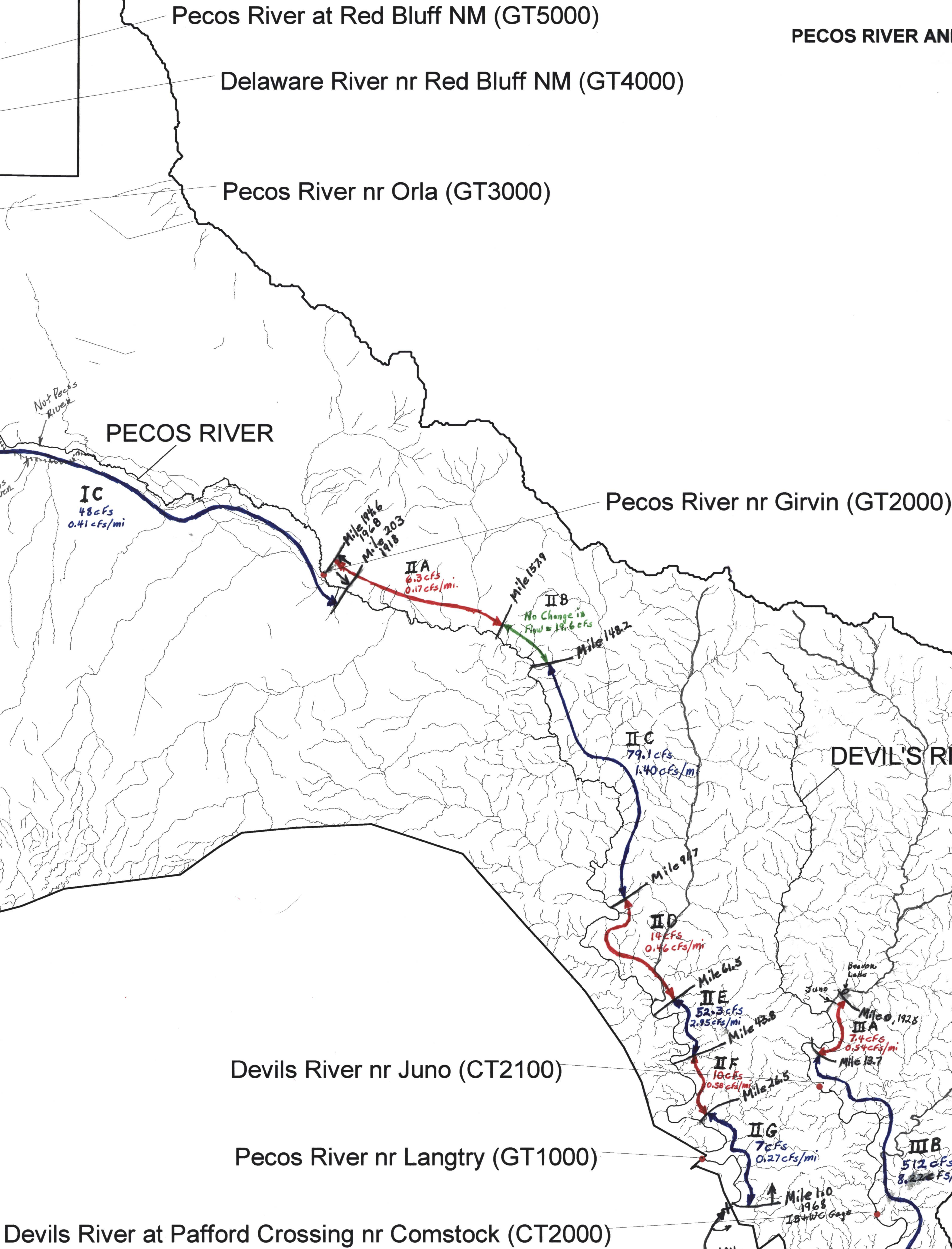
Reach Map I. D.	Date(s)	Reach Miles	Net Gain (+) or Loss (-)		Aquifer
			CFS	CFS/Mile	
IA	5/28-29/18	56	+25	+0.45	Cenozoic Alluvium
IB	5/29/18	30.5	-30	-0.98	do.
IC	5/29-30/18	116.5	+48	+0.41	do.
IA – IC	5/28-30/18	203	+43	+0.21	do.

II. PECOS RIVER – From Girvin Gage to IB&WC Gage Near Comstock, Texas, February 6 – 9, 1968. Taken from Spiers, et al. (1970).

Reach Map I. D.	Date(s)	Reach Miles	Net Gain (+) or Loss (-)		Aquifer
			CFS	CFS/Mile	
IIA	2/6/68	36.7	-6.3	-0.17	Cenozoic Alluvium
IIB	2/6/68	9.7	Constant Flow = 19.6 cfs	+1.40	Edwards-Trinity
IIC	2/6-7/68	56.5	+79.1	+1.40	do.
IID	2/6-8/68	30.2	-14	-0.46	do.
IIE	2/6-8/68	17.7	+52.3	+2.95	do.
IIF	2/7-8/68	17.3	-10	-0.58	do.
IIG	2/7-9/68	25.5	+7	+0.27	do.
IIA – IIG	2/6-9/68	193.6	+108.1	+0.56	CA & E-T
IIB – IIG	2/6-9/68	156.9	+114.4	+0.73	Edwards-Trinity

III. DEVILS RIVER – Above Juno and Below “Beaver Lake” (?) to Under Amistad Reservoir at old Devils River Gage at Highway 90 Crossing, August 8 – 13, 1925. Taken from TBWE (1960)

Reach Map I. D.	Date(s)	Reach Miles	Net Gain (+) or Loss (-)		Aquifer
			CFS	CFS/Mile	
IIIA	8/8/25	13.7	-7.4	-0.54	Edwards-Trinity
IIIB	8/8-13/25	62.3	+512	+8.22	do.
IIIA – IIIB	8/8-13-25	76.0	+505	+6.64	do.



NEW MEXICO

FIGURE 1 – MAP SHOWING THE RESULTS OF LOW-FLOW AND OTHER GAIN-LOSS INVESTIGATIONS OF THE RIO GRANDE, TEXAS AND MEXICO.

EXPLANATION
(On the map, reaches with GAINS are indicated in BLUE, reaches with LOSS are indicated in RED, and reaches with constant flow or zero/no flow are indicated in GREEN.)

I. Low-Flow of Rio Grande from Lajitas, Texas to Del Rio, Texas, February 7-20, 1925. Taken from TBWE (1960).

Reach Map I. D.	Date(s)	Reach Miles	Net Gain (+) or Loss (-)		Aquifer
			CFS	CFS/Mile	
IA	2/7-8/25	17.3	-20	-1.16	Not Delineated
IB	2/8-9/25	43.2	Constant Flow = 1,040 cfs		RGA
IC	2/9-11/25	19.0	+50	+2.63	Includes Hot Springs
ID	2/13-14/25	39.4	+130	+3.30	Edwards-Trinity
IE	2/15-19/25	100.9	+220	+2.18	do.
IF	2/19-20/25	73.3	+980	+13.37	do.
1) IF	2/19-20/25	73.3	+403	+5.50	do.
2) IF	2/19/25	Inflow	+199	---	do.
3) IF	2/20/25	Inflow	+378	---	do.
4) IC - IF	2/7-20/25	293.1	+1783	+6.08	I. H. S. & E-T
5) ID - IF	2/13-20/25	213.6	+1330	+6.22	Edwards-Trinity

Footnotes: 1) Gain in Rio Grande channel over Edwards-Trinity Plateau Aquifer (ETPA). 2) Inflow from Pecos River which apparently is ground-water discharge from the ETPA. 3) Inflow from the Devils River which apparently is ground-water discharge from the ETPA. 4) Total gain from "Mariscal damsite" (Mariscal Canyon) to Del Rio (includes flow of Hot Springs above Boquillas). 5) Total gain from ground-water discharge as spring flow and baseflow from the ETPA in the Rio Grande Basin of Texas and Mexico.

II. Low-Flow of the Rio Grande from Del Rio, Texas to Eagle Pass, Texas, February 9 - March 3, 1926. Taken from TBWE (1960).

Reach Map I. D.	Date(s)	Reach Miles	Net Gain (+) or Loss (-)		Aquifer
			CFS	CFS/Mile	
II A	2/9 - 3/3/26	43	+330 1)	+7.67	Rio Grande Alluvium
II B	2/12/26	14	-20	-1.42	None

Footnote: 1) The net gain of 330 cfs includes 194 cfs of tributary inflow from San Felipe Creek (San Felipe Spring), Sycamore Creek, Pinto Creek and Las Moras Creek on the Texas side, and the Rio San Diego and Rio Rodrigo on the Mexico side. The remaining 136 cfs is estimated gain in the Rio Grande channel. The inflow from San Felipe Spring (76 cfs) in Texas, and the inflow from the Rio San Diego (77 cfs) and the Rio Rodrigo (27 cfs) in Mexico are considered ground-water discharge from Edwards-Trinity Plateau Aquifer in the Rio Grande Basin of Texas and Mexico.

III. Low-Flow of the Rio Grande from Eagle Pass, Texas to San Ygnacio, Texas, February 12 - 22, 1926. Taken from TBWE (1960).

Reach Map I. D.	Date(s)	Reach Miles	Net Gain (+) or Loss (-)		Aquifer
			CFS	CFS/Mile	
III A	2/12-13/26	11	-90 1)	-8.18	None
III B	2/13-14/26	18	+50 2)	+2.78	do.
III C	2/14-16/26	26	-130	-5.00	RGA & Wilcox Gp.
III D	2/16/26	12	+120 3)	+10.00	Carrizo-Wilcox
III E	2/16-21/26	72.5	-214 4)	-2.97	None
III F	2/21/26	6.5	+40	+6.15	do.
III G	2/21-22/26	11	-30	-2.73	do.
III H	2/22/26	10	Constant Flow = 2,760 cfs		do.

Footnote: 1) Loss includes 71 cfs of inflow from Rio Chico in Mexico, and 19 cfs from the Rio Grande channel. 2) Gain includes 10 cfs of inflow from Rio Domingo in Mexico, and 40 cfs from Rio Grande channel. 3) This 120 cfs gain may be considered ground-water discharge from the Carrizo-Wilcox Aquifer which is equivalent to about 86,875 acre-feet of annual recharge to the aquifer in the mid-1920s in the Rio Grande Basin of Texas and Mexico. 4) Loss of 215 cfs to Rio Grande channel with 25 cfs of diversions by irrigation pumps.

IV. Low-Flow of the Rio Grande from Old Zapata Gage (Mile 0) to Old Gage at Anzalduas Dam (Mile 127.3), June 1948. Taken from Lowery, et al. (1948).

Reach Map I. D.	Date(s)	Reach Miles	Net Gain (+) or Loss (-)		Aquifer
			CFS	CFS/Mile	
IV A	June 1948	27.2	-95	-3.49	Rio Grande Alluvium
IV B	do.	17.3	+22.9	+1.32	do.
IV C	do.	23.3	-51.7	-2.22	do.
IV D	do.	59.5	-32.7	-0.55	do.
IV A - IV D	do.	127.3	-156.5	-1.23	do.

V. Average Annual Channel Loss of USA Share of Rio Grande from Falcon Dam to the Gulf of Mexico, 1954 - 1963. Taken and modified from Hendricks (1965).

Reach Map I. D.	Reach Miles	Annual Channel Loss		Aquifer
		Acre-Feet	CFS	
V A	40	12,100	16.7	Rio Grande Alluvium
V B	63	23,600	32.6	do.
V C	47	25,000	34.5	do.
V D	27	5,900	8.15	do.
V E	48	4,900	6.77	do.
V F	49	2,300	3.18	do.
V A - V F	274	73,800	101.9	do.

VI. Estimated Average Annual Rio Grande Gain or Loss in the Hueco Bolson of the El Paso/Juarez Area of Texas, New Mexico and Mexico, 1903 - 1991. Taken from Meyer (1976).

Period	Gain (+) or Loss (-)		Aquifer
	Acre-Feet/Year	CFS	
1903 - 1920	+6,864	+9.49	Rio Grande Alluvium
1920 - 1936	+355	+0.49	do.
1936 - 1948	-4,588	-6.34	do.
1948 - 1953	-7,625	-10.39	do.
1953 - 1958	-13,466	-18.60	do.
1958 - 1963	-18,767	-25.92	do.
1963 - 1968	-19,183	-26.50	do.
1968 - 1973	-12,765	-17.63	do.
1973 - 1991 1)	-21,075	-29.11	do.

Footnote: 1) Projected by model application.

RIO GRANDE BASIN PRIMARY CONTROL POINTS AND SPRINGS

TEXAS

COAHUILA

TAMAULIPAS

NUEVO LEON

30 0 30 60 90 Miles

