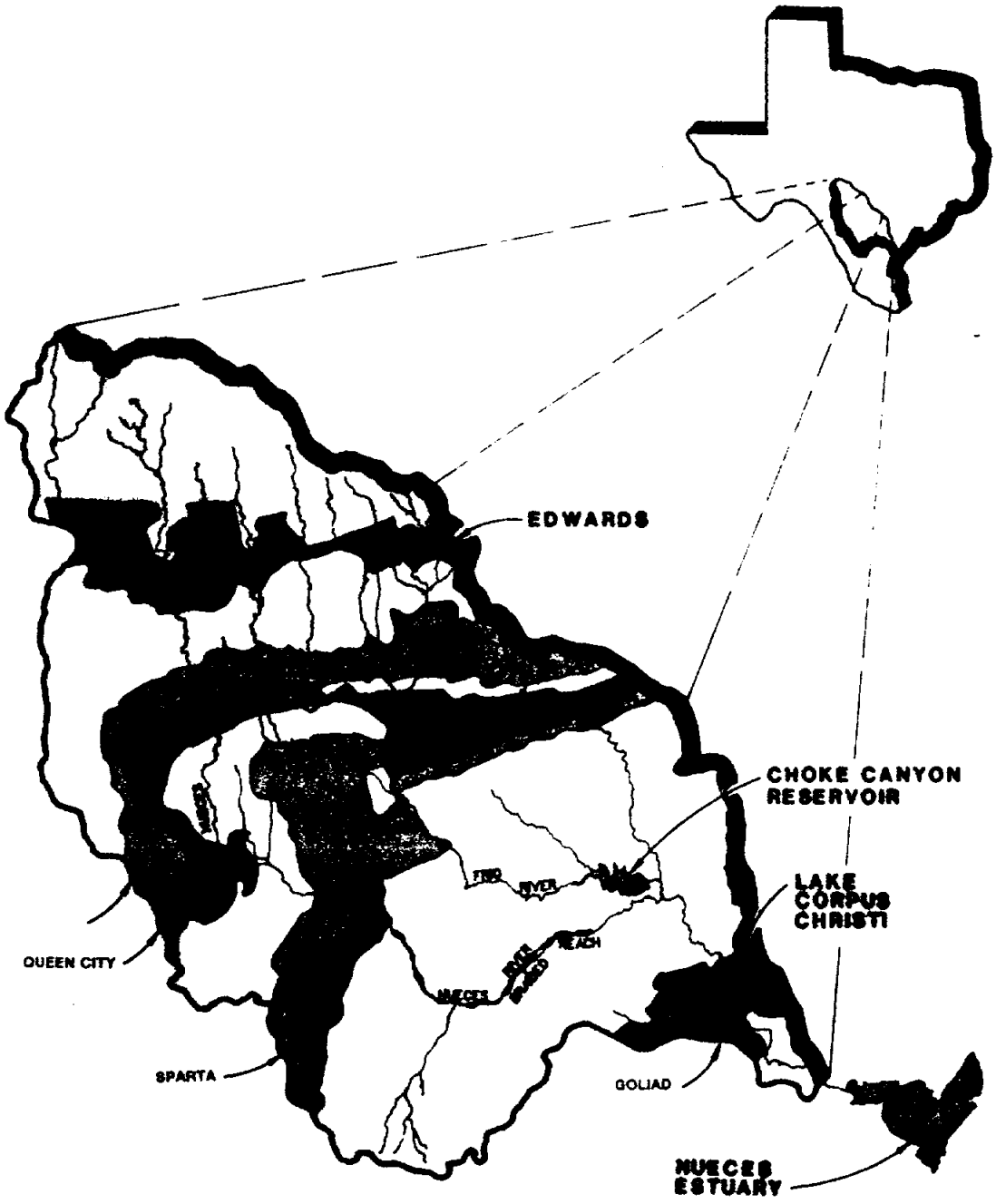
Regional Water Supply Planning Study - Phase I

Nueces River Basin

Volume III - Appendices



Nueces River Authority

City of Corpus Christi

Edwards Underground Water District

South Texas Water Authority

Texas Water Development Board

HDR

HDR Engineering, Inc.

REGIONAL WATER SUPPLY PLANNING STUDY

NUECES RIVER BASIN

VOLUME III - APPENDICES

Prepared for

Nueces River Authority
City of Corpus Christi
Edwards Underground Water District
South Texas Water Authority
Texas Water Development Board

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Population and Water Use Projections

APPENDIX A

Population and Water Use Projections

The quantity of water needed in an area depends upon the size of the population and the types and sizes of water using industries, the acreage and kinds of crops irrigated, and the number and types of livestock and wildlife of the area. For purposes of this study, past and present population and water use, together with low and high population and water use projections, have been tabulated for the 23 counties and parts of counties of the Nueces Basin, for the six counties and parts of counties of the San Antonio-Nueces Coastal Basin, and for the five northernmost counties and parts of counties of the Nueces-Rio Grande Coastal Basin (Appendix A, Tables 1-24). A separate tabulation of the same population and water use data and projections has been made for the 12 counties of the Choke Canyon/Lake Corpus Christi Reservoir Service area (Appendix A, Tables 25-32). The counties of each subarea mentioned above are listed below.

Nueces Basin Counties

Reach One	Reach Two	Reach Three	Reach Four
Bandera*	Dimmit*	Atasiosa	Bee*
Edwards*	Frio	Bexar*	Jim Walls*
Kinney*	Maverick*	Duval*	Live Oak
Medina*	Zavala	Karnes*	Nueces*
Real*		La Salle	San Patricio*
Uvalde		McMullen	
		Webb*	
		Wilson*	

* Includes only those parts of the county located within the Nueces Basin.

San Antonio-Nueces Coastal Basin Counties

Aransas	Goliad**	Refugio**
Bee**	Karnes**	San Patricio**

** Includes only those parts of the county located within the San Antonio-Nueces Coastal Basin.

North Nueces-Rio Grande Coastal Basin Counties

Brooks	Jim Wells***	Nueces***
Duval***	Kleberg	

*** Includes only those parts of the county located in the northern portion of the Nueces-Rio Grande Coastal Basin.

Choke Canyon-Lake Corpus Christi Reservoir Service Area Counties*

Coastal Area	Inland Area	
Aransas	Atascosa	McMullen
San Patricio	Bee	Duval
Nueces	Refugio	Jim Wells
Kleberg	Live Oak	Brooks

* Entire county included

In the case of water use and water requirements, low and high projections are shown for each major type of water using function -- municipal and domestic, manufacturing, steam-electric power generation, agricultural irrigation, mining, livestock watering, and the totals for all uses. All water requirements projections take into account the potentials for water conservation programs to increase the efficiency of water use and reduce the

quantities of water needed per person, and per unit of activity for water using industry and irrigated agriculture. In the case of municipal water requirements, the projections are based upon the drought condition per capita water use experience of each city of the planning area, with water conservation potentials factored into the projections.

A.1 Population and Population Projections

As reported by the U.S. Bureau of the Census, the population of the Nueces Basin in 1980 was 153,289 and is projected to range between 193,000 and 200,000 in the year 2000 and range between 279,000 and 308,000 in 2040 (Appendix A, Table 1).

In 1980, the population of the San Antonio-Nueces Coastal Basin was 98,509. The projected population of this area ranges between 122,000 and 126,000 in the year 2000, and ranges between 171,000 and 190,000 in 2040 (Appendix A, Table 9).

Population of the northern part of the Nueces-Rio Grande Coastal Basin in 1980 was 340,765. Projections to 2000 range between 412,000 and 425,000 and to 2040 range between 634,000 and 742,000, with over 79 percent of this population being in Nueces County (Appendix A, Table 17).

The 1980 population of the 12 county Choke Canyon/Lake Corpus Christi service area was 502,000. The population of this area is projected to grow to a total of 615,000 to 633,000 by the year 2000, and to a range of 913,000 to 1.051 million in 2040, with approximately 58 percent of the 2040 population being in Nueces County in 2040 (Appendix A, Table 25). The projected annual population growth rate of the CC/LCC Service area from 1980 to 2040 ranges between 1.00 percent and 1.24 percent. At these growth rates, the

area's population would double in 58 to 72 years.

A.2 Municipal Water Use and Municipal Water Requirements Projections

Municipal water use includes those quantities of fresh water that are used in homes of cities and unincorporated areas for drinking, bathing, flushing toilets, food preparation, dishwashing, laundering, lawn watering, air conditioning, swimming pools, fire protection, public fountains, car washing, restaurants, public buildings, offices, street washing, and other sanitation and aesthetic purposes. In 1980, municipal water use within the Nueces Basin was reported at 30,000 acre-feet (Appendix A, Table 2). Projected municipal water requirements for the Nueces Basin in year 2000 range from 43,000 acre-feet to 44,000 acre-feet, and for 2040, range from 57,000 acre-feet to 63,000 acre-feet (Appendix A, Table 2).

The projected low and high quantities of municipal water requirements for each county are computed as the sum of per capita water use in each city and rural area of the county during drought years of the 1977-1986 period, times the low and high population projections for each city and rural area, respectively. In both the low and high case projections, it has been assumed that water conservation will be phased in between 1990 and 2020 so as to reduce per capita water use by 15 percent by 2020. Thus, the reasons for the increased municipal water requirements throughout the projection period are the effects of population growth.

Municipal water use in the Choke Canyon/Lake Corpus Christi Reservoir (CC/LCC) service area in 1980 was 103,000 acre-feet, with projected requirements in year 2000 ranging between a low of 127,000 acre-feet and a high of 131,000 acre-feet. The projected municipal

water requirements for the CC/LCC service area in 2040 range between 174,000 acre-feet and 201,000 acre-feet (Appendix A, Table 26). Over the 60-year period 1980-2040, the level of municipal water use in the CC/LCC service area is projected to double, in the case of the low projection; and to increase 2.36 times for the high case projection.

Municipal water use in the coastal basin parts of the study area, together with the projected totals shown in Appendix A, Table 26. Projections for each county are shown in Appendix A, Tables 2, 10, 18, and 26.

A.3 Manufacturing Water Use and Manufacturing Water Requirements Projections

Manufacturing water use includes those quantities used in the production process, cooling the various parts of the process, cleaning, waste disposal, grounds maintenance and landscaping, fire protection, and perhaps other purposes within the manufacturing facility. The estimated and reported quantities used in each county, subarea, basin, and service area in 1974, 1980, and 1985, together with TWDB high and low projections of manufacturing water requirements at each decadal point from 1990 through 2040 are shown in Appendix A, Tables 3, 11, 19, and 27. Manufacturing water use in the 12 county CC/LCC reservoir service area was 42,000 acre-feet in 1980, and is projected to range between 59,000 thousand acre-feet and 81,000 acre-feet in 2040.

The major portion of the manufacturing water use is located in the coastal counties of the area. The low and high projections are based upon low and high growth rates of each water using industry, and the assumption that water conservation, recirculation, and reuse practices and programs will be adopted and thereby reduce the quantities of water needed

for manufacturing per unit of manufacturing activity. The results of both the projected growth rates and the conservation and reuse effects are factored into the projections of manufacturing water requirements.

A.4 Steam Electric Power Water Use and Steam Electric Power Water Requirements Projections

Steam electric power water use is the quantity of fresh water evaporated by fossil fueled electric power generation plants and for boiler supply in the production of electric energy. The total quantity of water required is approximately 100 times that actually consumed, but since this water is recycled and reused many times, only the quantity evaporated or consumed is included in the projections (Appendix A, Tables 4, 12, 20, and 28). It is noted, however, that most of the electric power that is used in the study area is generated by plants located on the coast that use sea water for power plant cooling. Thus, the demands upon the area's fresh water for electric power generation are quite low--less than 4,000 acre-feet in 1980 and projected to be between 27,000 acre-feet and 35,000 acre-feet in 2040.

A.5 Agricultural Irrigation Water Use and Agricultural Irrigation Water Requirements Projections

Agricultural irrigation water use includes the quantities of fresh water applied to cropland to supply the needs of growing crops--vegetables, grains, fruits, fiber, and forage. The quantities used and projected to be needed in each county of the study area are

tabulated in Appendix A, Tables, 5, 13, 21, and 29. Total irrigation water use in the three basins in 1980 was estimated at 480,000 acre-feet, of which 405,000 acre-feet or 84 percent was groundwater from the region's aquifers. The counties of the area in which surface water was used for irrigation in 1980 were Medina, Zavala, Frio, Dimmit, and LaSalle. The source of the surface water used for irrigation in Medina County was Medina Lake, which is located in northeastern Medina County, within the neighboring San Antonio Basin. The source of surface water for irrigation use in the other counties was stream flows of the Frio and Nueces Rivers and their tributaries.

Irrigation water use is quite low in the coastal counties of the study area; i.e., about 3,000 acre-feet annually, and is projected to range between 7,000 and 8,000 acre-feet annually throughout the 50-year projection period. Projections of irrigation water use in the Nueces Basin, however, have a wide range of values; i.e., 245,000 to 413,000 acre-feet annually in 2000, and 185,000 to 312,000 acre-feet annually in 2040 (Appendix A, Table 5). The low projection is based upon the assumption that irrigation profitability will remain low, as was experienced during the latter half of the 1980s. The high projection is based upon a more optimistic outlook for irrigation profitability, a high level of water conservation in irrigation agriculture, and declining water tables in the Carrizo and Edwards Aquifers from which major parts of the present irrigation water supply are obtained. The irrigation water use projections do not include any potential new irrigation water supplies from either surface or groundwater sources.

A.6 Mining Water Use and Mining Water Requirements Projections

The quantities of fresh water used in the extraction of crude petroleum, sand and gravel mining, and the extraction of ores in the study area was about 8.6 thousand acre-feet in 1980, and is projected to be in the 7,000 to 9,000 acre-feet range throughout the 50-year projection period (Appendix A, Tables 6, 14, 22, and 30).

A.7 Livestock Water Use and Livestock Water Requirements Projections

The quantities of fresh water used for watering livestock and poultry in the counties of the study area were about 20.7 thousand acre-feet in 1980 (Appendix A, Tables 7, 15, 23, and 31). It is projected that the maximum future requirements of water for livestock and poultry drinking and sanitation purposes are about 29,000 acre-feet per year. The requirements are relatively uniformly spread throughout the area in the manner in which rangeland is distributed, since most of the livestock water use is for grazing beef herds.

The projections methods include projections of the maximum numbers or populations of each livestock class or type and the nutritional water requirements, in gallons per head, per day, of each type. The possibilities for improved water use efficiency and water conservation in livestock water use are limited, and pertain only to controlling the populations of each species.

A.8 Total Water Use and Total Water Requirements Projections

The sum of municipal, manufacturing, steam electric power, agricultural irrigation, mining, and livestock water use in the study area in 1980 was 680,000 acre-feet (Appendix

A, Table 33). Total use in the Choke Canyon/Lake Corpus Christi Service area was 179,000 acre-feet. Projected requirements for the three basin area, with conservation potentials included, range from 511,000 to 691,000 acre-feet in 2000 and range from 535,000 to 725,000 acre-feet in 2040. These wide ranges are due to wide ranges of projections for irrigation water use (see Appendix A, Table 33).

Total water use in the 12 county Choke Canyon/Lake Corpus Christi service area was 178,000 acre-feet in 1980 (note: this total does not include irrigation requirements of Atascosa County). Projected requirements range from 227,000 to 238,000 acre-feet in 2000 and from 301,000 to 359,000 acre-feet in 2040 (Appendix A, Table 33). Of the 179,000 acre-feet of water used in the CC/LCC service area in 1980, 49.6 thousand or 27.5 percent was groundwater. This is a declining source of supply, in that withdrawal from aquifers exceeds recharge. In addition, as water tables decline, water quality is deteriorating due to saline water being drawn into fresh water aquifers. Thus, the growing demands cannot be met from local area aquifers.

APPENDIX A -- TABLE 1
NUECES BASIN POPULATION PROJECTIONS -- 1990 to 2040*

	POPULATION			POPULATION PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
REACH ONE															
BANDERA	475	477	608	733	735	894	999	1,058	1357	1,150	1505	1,225	1605	1,264	1657
EDWARDS	624	573	590	534	551	595	613	682	712	777	838	894	993	957	1081
KINNEY	177	213	224	225	227	242	250	258	270	278	293	299	321	307	333
MEDINA	17,562	18,969	20,251	21,825	21970	24,935	25861	27,755	29170	30,305	32033	32,435	34448	33,559	35727
REAL	2,082	2,355	2,605	2,634	2789	2,724	2885	2,746	2987	2,769	3047	2,823	3133	2,850	3176
UVALDE	19,229	22,441	24,651	25,075	25340	30,879	31224	36,656	37070	42,003	42615	48,136	48992	51,541	52542
TOTAL	40,149	45,028	48,929	51,026	51,612	60,269	61,832	69,155	71,566	77,282	80,331	85,812	89,492	90,478	94,516
REACH TWO															
DIMMIT	9,869	11,320	11,845	11,518	11575	13,543	14156	15,855	17416	18,414	20552	20,901	23565	22,273	25239
FRIO	12,143	13,785	14,212	14,319	14582	16,554	17087	17,778	19358	19,213	21603	20,117	23477	20,584	24474
MAVERICK	187	217	253	261	269	396	420	465	497	529	583	582	666	624	728
ZAVALA	11,487	11,666	12,046	12,092	12122	12,832	14438	13,747	15787	14,858	17492	16,183	19158	16,889	20049
TOTAL	33,686	36,988	38,356	38,190	38,548	43,325	46,101	47,845	53,058	53,014	60,230	57,783	66,866	60,370	70,490
REACH THREE															
ATASCOSA	20,775	24,543	27,969	30,807	31002	35,617	36033	39,635	40690	43,192	44450	46,222	48480	47,818	50636
BEXAR	1,380	1,901	2,511	2,609	2611	2,956	3068	3,605	3823	5,619	6355	10,025	12489	10,968	14346
DUVAL	3,511	3,780	4,322	4,525	4585	4,933	5107	5,376	5678	5,830	6206	6,258	6664	6,483	6905
KARNES	287	319	306	267	272	279	290	291	307	304	323	318	337	323	346
LA SALLE	5,208	5,514	5,757	5,177	5232	5,802	6051	6,470	6880	7,128	7643	7,741	8307	8,068	8659
MCMULLEN	960	789	970	976	984	998	1081	1,055	1153	1,121	1276	1,221	1425	1,275	1505
WEBB	276	308	230	251	257	314	333	357	386	400	448	456	511	493	553
WILSON	576	566	640	671	689	816	861	872	942	923	1029	1,025	1185	1,070	1260
TOTAL	32,973	37,720	42,705	45,283	45,632	51,715	52,824	57,661	59,859	64,517	67,730	73,266	79,398	76,498	84,210
REACH FOUR															
BEE	765	927	957	894	897	1,000	1012	1,087	1115	1,212	1286	1,367	1486	1,434	1578
JIM WELLS	673	1,210	1,416	1,420	1442	1,509	1582	1,637	1753	1,814	2007	1,928	2214	2,003	2343
LIVE OAK	7,737	9,606	9,549	9,094	9284	9,459	9851	9,756	10264	9,847	10526	9,918	10734	9,952	10838
NUECES	9,931	13,158	14,350	14,869	14961	16,118	16574	17,529	18684	19,614	22183	22,760	26381	24,504	28758
SAN PATRICIO	7,982	8,652	9,179	8,996	9075	10,074	10483	11,399	11995	12,572	13728	13,576	15091	14,145	15865
TOTAL	27,088	33,553	35,451	35,273	35,659	38,160	39,502	41,408	43,811	45,059	49,730	49,549	55,906	52,038	59,382
BASIN TOTAL:	133,896	153,289	165,441	169,772	171,451	193,469	200,259	216,069	228,294	239,872	258,021	266,410	291,662	279,384	308,598

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the Nueces Basin.

APPENDIX A -- TABLE 2

NUECES BASIN MUNICIPAL WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE			MUNICIPAL WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
REACH ONE															
BANDERA	95	56	76	108	108	124	139	139	178	147	192	156	204	161	211
EDWARDS	85	76	73	86	89	90	93	99	102	109	118	125	139	134	151
KINNEY	16	25	28	48	48	49	50	49	51	51	54	55	59	57	62
MEDINA	2,839	3,566	3,930	4734	4764	5112	5296	5366	5631	5675	5988	6049	6412	6246	6638
REAL	279	405	599	598	632	587	620	559	606	547	599	556	615	561	622
UVALDE	3,973	6,160	7,376	9002	9077	10435	10529	11656	11766	12893	13053	14338	14558	15203	15460
TOTAL	7,287	10,288	12,082	14,576	14,718	16,397	16,727	17,868	18,334	19,422	20,004	21,279	21,987	22,362	23,144
REACH TWO															
DIMMIT	1,573	2,774	2,207	2783	2797	3192	3336	3536	3886	3983	4445	4515	5090	4811	5451
FRIO	2,119	2,946	2,700	3324	3384	3667	3784	3735	4066	3928	4417	4118	4806	4214	5011
MAVERICK	20	25	31	44	45	63	67	70	75	78	85	85	98	91	107
ZAVALA	1,298	2,068	2,154	2541	2547	2488	2799	2525	2900	2644	3112	2882	3411	3007	3570
TOTAL	5,010	7,813	7,092	8,692	8,773	9,410	9,986	9,866	10,927	10,633	12,059	11,600	13,405	12,123	14,139
REACH THREE															
ATASCOSA	2,662	4,036	4,871	6092	6131	6685	6766	7037	7226	7447	7663	7965	8356	8242	8727
BEXAR	181	224	298	676	677	726	754	838	889	1270	1436	2266	2823	2479	3243
DUVAL	392	571	546	986	999	1019	1056	1051	1111	1108	1179	1189	1266	1231	1312
KARNES	36	260	150	65	66	64	67	63	67	64	68	67	71	68	73
LA SALLE	990	998	966	1088	1099	1163	1212	1226	1303	1312	1407	1425	1528	1485	1594
MCMULLEN	100	88	142	172	174	167	181	167	182	172	195	187	219	195	231
WEBB	48	36	28	86	88	102	108	110	119	119	134	136	153	147	165
WILSON	66	66	86	99	102	114	120	115	125	119	132	132	152	138	162
TOTAL	4,475	6,279	7,087	9,264	9,336	10,040	10,264	10,607	11,022	11,611	12,214	13,367	14,568	13,985	15,507
REACH FOUR															
BEE	119	111	130	138	138	146	148	150	154	162	172	183	198	191	210
JIM WELLS	52	142	174	206	209	208	218	213	229	230	254	244	280	254	297
LIVE OAK	869	1,805	1,316	1807	1846	1783	1857	1740	1829	1704	1822	1714	1854	1719	1872
NUECES	1,360	3,039	2,292	3456	3479	3568	3669	3685	3928	4025	4552	4689	5436	5057	5936
SAN PATRICIO	826	941	974	1388	1400	1473	1532	1576	1657	1688	1841	1821	2023	1896	2125
TOTAL	3,226	6,038	4,886	6,995	7,072	7,178	7,424	7,364	7,797	7,809	8,641	8,651	9,791	9,117	10,440
BASIN TOTAL:	19,998	30,418	31,147	39,527	39,899	43,025	44,401	45,705	48,080	49,475	52,918	54,897	59,751	57,587	63,230

*Texas Water Development Board, October 1989. High Per Capita with Conservation.

**Includes only those parts of counties located within the Nueces Basin.

APPENDIX A -- TABLE 3
NUECES BASIN MANUFACTURING WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE			MANUFACTURING WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
REACH ONE															
BANDERA	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0
EDWARDS	0	2	2	2	2	3	3	3	4	3	4	4	5	4	6
KINNEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MEDINA	331	205	114	137	140	178	188	209	236	235	288	258	345	281	417
REAL	566	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UVALDE	478	29	327	364	365	424	453	477	546	530	657	580	788	635	949
TOTAL	1,375	244	443	443	443	443	443	443	443	443	443	443	443	443	443
REACH TWO															
DIMMIT	52	27	4	5	5	6	6	6	7	6	9	7	10	8	13
FRIO	138	12	12	14	14	16	17	18	21	20	26	22	32	24	39
MAVERICK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ZAVALA	948	1053	951	1069	1073	1267	1366	1429	1670	1596	2049	1757	2497	1932	3045
TOTAL	1,138	1,092	967	1,088	1,092	1,289	1,389	1,453	1,698	1,622	2,084	1,786	2,539	1,964	3,097
REACH THREE															
ATASCOSA	2	3	3	3	3	4	4	5	5	5	6	6	8	6	10
BEXAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DUVAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KARNES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LA SALLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCMULLEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WEBB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WILSON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	2	3	3	3	3	4	4	5	5	5	6	6	8	6	10
REACH FOUR															
BEE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JIM WELLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LIVE OAK	728	1135	1050	1013	1035	1036	1116	978	1087	981	1094	984	1103	988	1113
NUECES	0	0	372	409	411	479	516	540	625	600	756	658	912	721	1094
SAN PATRICIO	5	6	223	252	255	301	315	342	363	373	406	402	460	431	525
TOTAL	733	1,141	1,645	1,674	1,701	1,816	1,947	1,860	2,075	1,954	2,256	2,044	2,475	2,140	2,732
BASIN TOTAL:	3,248	2,480	3,058	3,208	3,239	3,552	3,783	3,761	4,221	4,024	4,789	4,279	5,465	4,553	6,282

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the Nueces Basin.

APPENDIX A -- TABLE 4
NUECES BASIN STEAM ELECTRIC WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE			STEAM ELECTRIC WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
REACH ONE															
BANDERA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EDWARDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KINNEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MEDINA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UVALDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REACH TWO															
DIMMIT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FRIO	611	682	1,781	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
MAVERICK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ZAVALA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	611	682	1,781	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
REACH THREE															
ATASCOSA	0	0	6,339	6,339	6,339	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
BEXAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DUVAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KARNES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LA SALLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCMULLEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WEBB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WILSON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	6,339	6,339	6,339	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
REACH FOUR															
BEE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JIM WELLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LIVE OAK	0	0	0	0	0	0	0	0	2,500	2,500	8,000	8,000	10,000	8,000	15,000
NUECES	3,246	3,019	2,520	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
SAN PATRICIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	3,246	3,019	2,520	3,000	3,000	3,000	3,000	3,000	5,500	5,500	11,000	11,000	13,000	11,000	18,000
BASIN TOTAL:	3,857	3,701	10,640	11,339	11,339	17,000	17,000	17,000	19,500	19,500	25,000	25,000	27,000	25,000	32,000

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the Nueces Basin.

APPENDIX A -- TABLE 5
NUECES BASIN IRRIGATION WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE			IRRIGATION WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
REACH ONE															
BANDERA	0	246	101	125	138	125	138	125	138	125	138	125	138	125	138
EDWARDS	243	269	0	0	0	0	0	0	0	0	0	0	0	0	0
KINNEY	0	307	139	187	241	127	217	119	203	111	190	103	176	95	163
MEDINA	56,741	93,068	71,933	42,709	55,170	29,120	49,653	27,263	46,527	25,470	43,400	23,631	40,274	21,840	37,420
REAL	941	275	500	600	660	600	660	600	660	600	660	600	660	600	660
UVALDE	70,312	75,474	152,814	75,246	97,200	51,304	87,480	48,033	81,972	44,874	76,464	41,634	70,956	38,478	65,610
TOTAL	128,237	169,639	225,487	118,867	153,409	81,276	138,148	76,140	129,500	71,180	120,852	66,093	112,204	61,138	103,991
REACH TWO															
DIMMIT	33,524	23,356	22,283	13,006	16,800	8,867	15,120	8,302	14,168	7,756	13,216	7,196	12,264	6,651	11,340
FRIO	72,794	75,330	48,998	85,929	111,000	58,588	99,900	54,853	93,610	51,245	87,320	47,545	81,030	43,941	74,925
MAVERICK	3,330	1,200	2,103	1,322	1,708	902	1,537	844	1,440	789	1,344	732	1,247	676	1,153
ZAVALA	146,315	106,870	99,654	65,956	85,200	44,970	76,680	42,103	71,852	39,334	67,024	36,494	62,196	33,728	57,510
TOTAL	255,963	206,756	173,038	166,213	214,708	113,327	193,237	106,102	181,070	99,124	168,904	91,967	156,737	84,996	144,928
REACH THREE															
ATASCOSA	56,684	73,229	30,624	51,445	66,454	35,075	59,809	32,838	56,043	30,680	52,277	28,464	48,511	26,307	44,856
BEXAR	2,678	3,567	3,258	2,171	2,804	1,480	2,524	1,386	2,365	1,295	2,206	1,201	2,047	1,110	1,893
DUVAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KARNES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LA SALLE	12,885	13,363	3,586	6,503	8,400	4,434	7,560	4,151	7,084	3,878	6,608	3,598	6,132	3,325	5,670
MCMULLEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WEBB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WILSON	4,225	2,658	2,171	4,807	6,209	3,278	5,589	3,068	5,236	2,867	4,885	2,659	4,532	2,458	4,191
TOTAL	76,472	92,817	39,639	64,926	83,867	44,267	75,482	41,443	70,728	38,720	65,976	35,922	61,222	33,200	56,610
REACH FOUR															
BEE	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JIM WELLS	1,025	986	675	954	1,048	954	1,048	954	1,048	954	1,048	954	1,048	954	1,048
LIVE OAK	2,157	505	3,541	3,300	3,630	3,300	3,630	3,300	3,630	3,300	3,630	3,300	3,630	3,300	3,630
NUECES	67	912	1,669	1,839	2,020	1,839	2,020	1,839	2,020	1,839	2,020	1,839	2,020	1,839	2,020
SAN PATRICIO	1,265	201	66	140	153	140	153	140	153	140	153	140	153	140	153
TOTAL	4,528	2,604	5,951	6,233	6,851	6,233	6,851	6,233	6,851	6,233	6,851	6,233	6,851	6,233	6,851
BASIN TOTAL:	465,200	471,816	444,115	356,239	458,835	245,103	413,718	229,918	388,149	215,257	362,583	200,215	337,014	185,567	312,380

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the Nueces Basin.

APPENDIX A -- TABLE 6
NUECES BASIN MINING WATER USE PROJECTIONS -- 1990 to 2040*

COUNTIES**	WATER USE			MINING WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
REACH ONE															
BANDERA	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EDWARDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KINNEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MEDINA	22	2	81	0	0	0	0	0	0	0	0	0	0	0	0
REAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UVALDE	654	335	331	424	424	512	512	597	597	683	683	768	768	863	863
TOTAL	677	337	412	424	424	512	512	597	597	683	683	768	768	863	863
REACH TWO															
DIMMIT	11	732	582	761	761	791	791	922	922	1052	1052	1183	1183	1314	1314
FRIO	376	341	438	318	318	296	296	212	212	129	129	45	45	15	15
MAVERICK	8	0	225	0	0	0	0	0	0	0	0	0	0	0	0
ZAVALA	12	68	143	64	64	59	59	42	42	25	25	8	8	2	2
TOTAL	407	1,141	1,388	1,143	1,143	1,146	1,146	1,176	1,176	1,206	1,206	1,236	1,236	1,331	1,331
REACH THREE															
ATASCOSA	128	1169	1752	1393	1393	1269	1269	1362	1362	1454	1454	1547	1547	1646	1646
BEXAR	60	0	207	0	0	0	0	0	0	0	0	0	0	0	0
DUVAL	33	243	1182	750	750	450	450	90	90	0	0	0	0	0	0
KARNES	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LA SALLE	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCMULLEN	9	446	229	404	404	362	362	373	373	1516	1516	2376	2376	3389	3389
WEBB	27	362	86	134	134	91	91	62	62	50	50	44	44	38	38
WILSON	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	273	2,220	3,456	2,681	2,681	2,172	2,172	1,887	1,887	3,020	3,020	3,967	3,967	5,073	5,073
REACH FOUR															
BEE	15	15	0	14	14	3	3	0	0	0	0	0	0	0	0
JIM WELLS	102	0	225	0	0	0	0	0	0	0	0	0	0	0	0
LIVE OAK	61	1428	1260	1374	1374	653	653	292	292	208	208	216	216	225	225
NUECES	8	0	1	0	0	0	0	0	0	0	0	0	0	0	0
SAN PATRICIO	20	0	24	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	206	1,443	1,510	1,388	1,388	656	656	292	292	208	208	216	216	225	225
BASIN TOTAL:	1,563	5,141	6,766	5,636	5,636	4,486	4,486	3,952	3,952	5,117	5,117	6,187	6,187	7,492	7,492

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the Nueces Basin.

APPENDIX A -- TABLE 7
NUECES BASIN LIVESTOCK WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE			LIVESTOCK WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
REACH ONE															
BANDERA	123	109	83	128	128	148	148	148	148	148	148	148	148	148	148
EDWARDS	538	418	212	474	474	530	530	530	530	530	530	530	530	530	530
KINNEY	329	258	196	297	297	337	337	337	337	337	337	337	337	337	337
MEDINA	1,572	1,245	1,178	1,479	1,479	1,713	1,713	1,713	1,713	1,713	1,713	1,713	1,713	1,713	1,713
REAL	276	225	177	259	259	294	294	294	294	294	294	294	294	294	294
UVALDE	1,709	1,411	1,422	1,640	1,640	1,869	1,869	1,869	1,869	1,869	1,869	1,869	1,869	1,869	1,869
TOTAL	4,547	4,968	4,607	5,789	5,789	6,612	6,612	6,612	6,612	6,612	6,612	6,612	6,612	6,612	6,612
REACH TWO															
DIMMIT	1,066	644	637	765	765	886	886	886	886	886	886	886	886	886	886
FRIO	1,558	1,113	1,198	1,322	1,322	1,532	1,532	1,532	1,532	1,532	1,532	1,532	1,532	1,532	1,532
MAVERICK	506	552	971	656	656	761	761	761	761	761	761	761	761	761	761
ZAVALA	1,164	1,190	1,131	1,414	1,414	1,639	1,639	1,639	1,639	1,639	1,639	1,639	1,639	1,639	1,639
TOTAL	4,294	3,499	3,937	4,157	4,157	4,818	4,818	4,818	4,818	4,818	4,818	4,818	4,818	4,818	4,818
REACH THREE															
ATASCOSA	1,842	1,369	1,948	1,622	1,622	1,876	1,876	1,876	1,876	1,876	1,876	1,876	1,876	1,876	1,876
BEXAR	34	20	23	20	20	20	20	20	20	20	20	20	20	20	20
DUVAL	366	395	248	469	469	544	544	544	544	544	544	544	544	544	544
KARNES	203	103	116	123	123	143	143	143	143	143	143	143	143	143	143
LA SALLE	1,162	900	1,047	1,069	1,069	1,238	1,238	1,238	1,238	1,238	1,238	1,238	1,238	1,238	1,238
MCMULLEN	1,028	898	426	1,067	1,067	1,237	1,237	1,237	1,237	1,237	1,237	1,237	1,237	1,237	1,237
WEBB	1,022	899	794	1,068	1,068	1,238	1,238	1,238	1,238	1,238	1,238	1,238	1,238	1,238	1,238
WILSON	132	126	132	149	149	173	173	173	173	173	173	173	173	173	173
TOTAL	5,789	4,710	4,734	5,587	5,587	6,469	6,469	6,469	6,469	6,469	6,469	6,469	6,469	6,469	6,469
REACH FOUR															
BEE	154	111	121	132	132	153	153	153	153	153	153	153	153	153	153
JIM WELLS	213	174	146	207	207	240	240	240	240	240	240	240	240	240	240
LIVE OAK	1,065	803	900	954	954	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105
NUECES	55	27	36	32	32	38	38	38	38	38	38	38	38	38	38
SAN PATRICIO	270	192	401	228	228	265	265	265	265	265	265	265	265	265	265
TOTAL	1,757	1,307	1,604	1,553	1,553	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801
BASIN TOTAL:	16,387	14,484	14,882	17,086	17,086	19,700	19,700	19,700	19,700	19,700	19,700	19,700	19,700	19,700	19,700

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the Nueces Basin.

APPENDIX A -- TABLE 8
NUECES BASIN TOTAL WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE			TOTAL WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
REACH ONE															
BANDERA	219	419	260	361	374	397	425	412	464	420	478	429	490	434	497
EDWARDS	866	765	287	562	565	623	626	632	636	642	652	659	674	668	687
KINNEY	345	590	363	532	586	513	604	505	591	499	581	495	572	489	562
MEDINA	61,505	98,086	77,236	49,059	61,553	36,123	56,850	34,551	54,107	33,093	51,389	31,651	48,744	30,080	46,188
REAL	2,062	905	1,276	1,457	1,551	1,481	1,574	1,453	1,560	1,441	1,553	1,450	1,569	1,455	1,576
UVALDE	77,126	83,409	162,270	86,676	108,706	64,544	100,843	62,632	96,750	60,849	92,726	59,189	88,939	57,048	84,751
TOTAL	142,123	184,174	241,692	138,647	173,335	103,681	160,922	100,185	154,108	96,944	147,379	93,873	140,988	90,174	134,261
REACH TWO															
DIMMIT	36,226	27,533	25,713	17,320	21,128	13,742	20,139	13,652	19,869	13,683	19,608	13,787	19,433	13,670	19,004
FRIO	77,596	80,424	55,127	92,907	118,038	66,099	107,529	62,350	101,441	58,854	95,424	55,262	89,445	51,726	83,522
MAVERICK	3,864	1,777	3,330	2,022	2,409	1,726	2,365	1,675	2,276	1,628	2,190	1,578	2,106	1,528	2,021
ZAVALA	149,737	111,249	104,033	71,044	90,298	50,423	82,543	47,738	78,103	45,238	73,849	42,780	69,751	40,308	65,766
TOTAL	267,423	220,983	188,203	183,293	231,873	131,990	212,576	125,415	201,689	119,403	191,071	113,407	180,735	107,232	170,313
REACH THREE															
ATASCOSA	61,318	79,806	45,537	66,894	81,942	56,909	81,724	55,118	78,512	53,462	75,276	51,858	72,298	50,077	69,115
BEXAR	2,953	3,811	3,786	2,867	3,501	2,226	3,298	2,244	3,274	2,585	3,662	3,487	4,890	3,609	5,156
DUVAL	791	1,209	1,976	2,205	2,218	2,013	2,050	1,685	1,745	1,652	1,723	1,733	1,810	1,775	1,856
KARNES	248	363	266	188	189	207	210	206	210	207	211	210	214	211	216
LA SALLE	15,042	15,261	5,599	8,660	10,568	6,835	10,010	6,615	9,625	6,428	9,253	6,261	8,898	6,048	8,502
MCMULLEN	1,137	1,432	797	1,643	1,645	1,766	1,780	1,777	1,792	2,925	2,948	3,800	3,832	4,821	4,857
WEBB	1,097	1,297	908	1,288	1,290	1,431	1,437	1,410	1,419	1,407	1,422	1,418	1,435	1,423	1,441
WILSON	4,425	2,850	2,389	5,055	6,460	3,565	5,882	3,356	5,534	3,159	5,190	2,964	4,857	2,769	4,526
TOTAL	87,011	106,029	61,258	88,800	107,813	74,952	106,391	72,411	102,111	71,825	99,685	71,731	98,234	70,733	95,669
REACH FOUR															
BEE	302	237	251	284	284	302	304	303	307	315	325	336	351	344	363
JIM WELLS	1,392	1,302	1,220	1,367	1,464	1,402	1,506	1,407	1,517	1,424	1,542	1,438	1,568	1,448	1,585
LIVE OAK	4,880	5,676	8,067	8,448	8,839	7,877	8,361	7,415	10,443	9,798	15,859	15,319	17,908	15,337	22,945
NUECES	4,736	6,997	6,890	8,736	8,942	8,924	9,243	9,102	9,611	9,502	10,366	10,224	11,406	10,655	12,088
SAN PATRICIO	2,386	1,340	1,688	2,008	2,036	2,179	2,265	2,323	2,438	2,466	2,665	2,628	2,901	2,732	3,068
TOTAL	13,696	15,552	18,116	20,843	21,565	20,684	21,679	20,550	24,316	23,505	30,757	29,945	34,134	30,516	40,049
BASIN TOTAL:	510,253	526,738	509,269	431,583	534,586	331,307	501,568	318,561	482,224	311,677	468,892	308,956	454,091	298,655	440,292

*Texas Water Development Board, October 1989. High Per Capita Municipal Water Use with Conservation.

**Includes only those parts of counties located within the Nueces Basin.

APPENDIX A -- TABLE 9

SAN ANTONIO - NUECES COASTAL BASIN POPULATION PROJECTIONS -- 1990 to 2040*

	POPULATION			POPULATION PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
ARANSAS	10,748	14,260	17,482	18,844	18,992	21,525	21,839	24,677	25,174	27,845	29,691	31,786	35,108	33,972	38,190
BEE	23,233	25,103	26,314	26,495	26,582	29,359	29,714	32,006	32,845	34,833	36,957	38,292	41,628	40,170	44,208
GOLIAD	423	358	402	440	442	481	511	525	565	576	635	625	707	651	747
KARNES	241	233	223	193	198	202	211	212	223	222	235	231	246	236	251
REFUGIO	9,312	9,194	8,634	8,456	8,475	8,368	8,457	8,220	8,309	7,865	7,955	7,485	7,580	7,485	7,580
SAN PATRICIO	43,329	49,361	52,585	53,541	54,015	62,983	65,545	71,256	74,986	78,577	85,805	85,358	94,888	88,932	99,750
BASIN TOTAL	87,286	98,509	105,640	107,969	108,704	122,918	126,277	136,896	142,102	149,918	161,278	163,777	180,157	171,446	190,726

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the San Antonio - Nueces Coastal Basin.

APPENDIX A --- TABLE 10
SAN ANTONIO – NUECES COASTAL BASIN MUNICIPAL WATER USE PROJECTIONS --- 1990 to 2040*

	WATER USE			MUNICIPAL WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
ARANSAS	1,816	2,792	2,155	3,985	4,016	4,321	4,383	4,685	4,780	5,132	5,470	5,854	6,463	6,254	7,029
BEE	3,739	3,528	3,794	4,546	4,560	4,760	4,814	4,898	5,017	5,154	5,447	5,627	6,086	5,886	6,441
GOLIAD	54	42	76	93	93	96	100	98	103	103	110	109	120	113	125
KARNES	33	27	150	47	48	47	49	46	49	47	50	49	52	50	53
REFUGIO	1,145	1,433	1,275	1,422	1,425	1,335	1,349	1,241	1,254	1,153	1,166	1,097	1,112	1,097	1,112
SAN PATRICIO	4,754	6,322	5,779	8,206	8,279	9,131	9,494	9,757	10,256	10,435	11,375	11,316	12,556	11,782	13,187
BASIN TOTAL	11,541	14,144	13,229	18,299	18,421	19,690	20,189	20,725	21,459	22,024	23,618	24,052	26,389	25,182	27,947

*Texas Water Development Board, October 1989. High Per Capita with Conservation.

**Includes only those parts of counties located within the San Antonio - Nueces Coastal Basin.

APPENDIX A -- TABLE 11

SAN ANTONIO - NUECES COASTAL BASIN MANUFACTURING WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE			MANUFACTURING WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
ARANSAS	644	146	165	199	200	243	261	281	325	322	401	362	486	406	554
BEE	32	75	1	1	1	2	2	2	3	2	3	3	4	3	5
GOLIAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KARNES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REFUGIO	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAN PATRICIO	12,870	14,299	6,537	7,496	7,670	11,649	14,069	13,341	17,634	14,934	21,110	16,469	24,054	18,176	27,483
BASIN TOTAL	13,555	14,520	6,703	7,696	7,871	11,894	14,332	13,624	17,962	15,258	21,514	16,834	24,544	18,585	28,042

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the San Antonio - Nueces Coastal Basin.

APPENDIX A -- TABLE 12

SAN ANTONIO - NUECES COASTAL BASIN STEAM ELECTRIC WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE			STEAM ELECTRIC WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
ARANSAS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BEE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GOLIAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KARNES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REFUGIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAN PATRICIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BASIN TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the San Antonio - Nueces Coastal Basin.

APPENDIX A -- TABLE 13
SAN ANTONIO - NUECES COASTAL BASIN IRRIGATION WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE			IRRIGATION WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
ARANSAS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BEE	1,597	2,000	740	1,050	1,155	1,050	1,155	1,050	1,155	1,050	1,155	1,050	1,155	1,050	1,155
GOLIAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KARNES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REFUGIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAN PATRICIO	4,721	1,316	1,667	3,360	3,682	3,360	3,682	3,360	3,682	3,360	3,682	3,360	3,682	3,360	3,682
BASIN TOTAL	6,318	3,316	2,407	4,410	4,837	4,410	4,837	4,410	4,837	4,410	4,837	4,410	4,837	4,410	4,837

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the San Antonio - Nueces Coastal Basin.

APPENDIX A -- TABLE 14

SAN ANTONIO – NUECES COASTAL BASIN MINING WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE			MINING WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
ARANSAS	55	45	0	79	79	113	113	85	85	57	57	29	29	14	14
BEE	109	371	121	336	336	300	300	253	253	205	205	158	158	121	121
GOLIAD	4	0	1	45	45	89	89	63	63	38	38	12	12	3	3
KARNES	4	0	0	44	44	88	88	63	63	37	37	12	12	3	3
REFUGIO	138	316	53	292	292	268	268	224	224	180	180	136	136	102	102
SAN PATRICIO	392	148	74	153	153	168	168	134	134	100	100	66	66	43	43
BASIN TOTAL	702	880	249	949	949	1,026	1,026	822	822	617	617	413	413	286	286

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the San Antonio - Nueces Coastal Basin.

APPENDIX A -- TABLE 15
SAN ANTONIO - NUECES COASTAL BASIN LIVESTOCK WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE			LIVESTOCK WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
ARANSAS	68	68	33	80	80	93	93	93	93	93	93	93	93	93	93
BEE	1,129	843	917	1,002	1,002	1,161	1,161	1,161	1,161	1,161	1,161	1,161	1,161	1,161	1,161
GOLIAD	410	360	511	427	427	495	495	495	495	495	495	495	495	495	495
KARNES	101	61	70	73	73	85	85	85	85	85	85	85	85	85	85
REFUGIO	670	473	515	560	560	648	648	648	648	648	648	648	648	648	648
SAN PATRICIO	549	384	800	456	456	529	529	529	529	529	529	529	529	529	529
BASIN TOTAL	2,927	2,189	2,846	2,598	2,598	3,011	3,011	3,011	3,011	3,011	3,011	3,011	3,011	3,011	3,011

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the San Antonio - Nueces Coastal Basin.

APPENDIX A -- TABLE 16

SAN ANTONIO - NUECES COASTAL BASIN TOTAL WATER USE PROJECTIONS -- 1990 to 2040*

COUNTIES**	WATER USE			TOTAL WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
ARANSAS	2,583	3,051	2,353	4,343	4,375	4,770	4,850	5,144	5,283	5,604	6,021	6,338	7,071	6,767	7,690
BEE	6,606	6,817	5,573	6,935	7,054	7,273	7,432	7,364	7,589	7,572	7,971	7,999	8,564	8,221	8,883
GOLIAD	468	402	588	565	565	680	684	656	661	636	643	616	627	611	623
KARNES	138	88	220	164	165	220	222	194	197	169	172	146	149	138	141
REFUGIO	1,962	2,222	1,843	2,274	2,277	2,251	2,265	2,113	2,126	1,981	1,994	1,881	1,896	1,847	1,862
SAN PATRICIO	23,286	22,469	14,857	19,671	20,240	24,837	27,942	27,121	32,235	29,358	36,796	31,740	40,887	33,890	44,924
BASIN TOTAL	35,043	35,049	25,434	33,952	34,676	40,031	43,395	42,592	48,091	45,320	53,597	48,720	59,194	51,474	64,123

*Texas Water Development Board, October 1989. High Per Capita Municipal Water Use with Conservation.

**Includes only those parts of counties located within the San Antonio - Nueces Coastal Basin.

APPENDIX A -- TABLE 17
NUECES - RIO GRANDE COASTAL BASIN POPULATION PROJECTIONS -- 1990 to 2040*

	POPULATION			POPULATION PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
BROOKS	8,172	8,428	9,266	9,553	9,592	10,382	10,533	11,222	11,598	12,159	12,893	13,159	14,042	13,691	14,657
DUVAL	8,520	8,737	9,005	8,591	8,704	9,364	9,693	10,199	10,771	11,057	11,770	11,867	12,639	12,296	13,096
JIM WELLS	33,635	35,288	38,914	37,519	38,108	39,723	41,653	43,797	46,921	48,219	53,346	52,009	59,722	54,002	63,182
KLEBERG	33,243	33,358	34,495	32,015	32,166	34,303	35,439	37,605	40,206	42,085	47,724	48,263	56,476	51,693	61,459
NUECES	239,100	254,954	282,552	292,648	294,448	319,026	328,059	350,056	373,124	396,351	448,276	464,288	538,180	502,679	589,947
BASIN TOTAL	322,670	340,765	374,232	380,326	383,018	412,798	425,377	452,879	482,620	509,871	574,009	589,586	681,059	634,361	742,341

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the Nueces - Rio Grande Coastal Basin.

APPENDIX A -- TABLE 18
NUECES - RIO GRANDE COASTAL BASIN MUNICIPAL WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE			MUNICIPAL WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
BROOKS	1,309	1,136	1,411	1,593	1,600	1,646	1,670	1,683	1,738	1,774	1,880	1,921	2,050	2,000	2,141
DUVAL	745	1,476	1,294	1,651	1,672	1,706	1,767	1,759	1,857	1,852	1,971	1,987	2,117	2,060	2,194
JIM WELLS	4,502	7,458	5,938	9,253	9,398	9,290	9,742	9,716	10,410	10,380	11,484	11,225	12,891	11,655	13,637
KLEBERG	3,981	7,037	5,121	6,732	6,763	6,841	7,064	7,088	7,570	7,699	8,716	8,824	10,307	9,443	11,207
NUECES	38,990	61,755	48,203	70,581	71,007	73,152	75,176	75,985	80,883	83,559	94,289	97,750	113,043	105,742	123,811
BASIN TOTAL	49,527	78,862	61,967	89,810	90,440	92,635	95,419	96,231	102,458	105,264	118,340	121,707	140,408	130,900	152,990

*Texas Water Development Board, October 1989. High Per Capita with Conservation.

**Includes only those parts of counties located within the Nueces - Rio Grande Coastal Basin.

APPENDIX A -- TABLE 19

NUECES - RIO GRANDE COASTAL BASIN MANUFACTURING WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE			MANUFACTURING WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
BROOKS	41	9	9	9	9	10	11	11	12	12	14	13	16	14	18
DUVAL	42	25	0	0	0	0	0	0	0	0	0	0	0	0	0
JIM WELLS	80	118	118	132	132	154	165	173	198	192	240	210	287	230	347
KLEBERG	46	30	30	32	32	36	37	39	45	44	53	49	61	52	74
NUECES	26,604	26,988	30,331	30,509	31,172	32,754	35,890	33,128	38,519	34,969	42,341	36,742	45,937	38,754	49,854
BASIN TOTAL	26,813	27,170	30,488	30,682	31,345	32,954	36,103	33,351	38,774	35,217	42,648	37,014	46,301	39,050	50,293

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the Nueces - Rio Grande Coastal Basin.

APPENDIX A -- TABLE 20
NUECES - RIO GRANDE COASTAL BASIN STEAM ELECTRIC WATER USE PROJECTIONS -- 1990 to 2040*

COUNTIES**	WATER USE			STEAM ELECTRIC WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
BROOKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DUVAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JIM WELLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KLEBERG	0	0	0	0	0	0	0	0	0	0	500	0	1,500	1,500	2,500
NUECES	0	171	210	300	300	500	500	500	500	500	500	500	500	500	500
BASIN TOTAL	0	171	210	300	300	500	500	500	500	500	1,000	500	2,000	2,000	3,000

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the Nueces - Rio Grande Coastal Basin.

APPENDIX A -- TABLE 21
NUECES - RIO GRANDE COASTAL BASIN IRRIGATION WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE			IRRIGATION WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
BROOKS	1,632	300	250	450	495	450	495	450	495	450	495	450	495	450	495
DUVAL	2,909	3,000	2,042	2,815	3,095	2,815	3,095	2,815	3,095	2,815	3,095	2,815	3,095	2,815	3,095
JIM WELLS	1,936	2,013	1,200	1,671	1,837	1,671	1,837	1,671	1,837	1,671	1,837	1,671	1,837	1,671	1,837
KLEBERG	505	600	500	550	600	550	600	550	600	550	600	550	600	550	600
NUECES	16	169	1,664	1,211	1,330	1,211	1,330	1,211	1,330	1,211	1,330	1,211	1,330	1,211	1,330
BASIN TOTAL	6,998	6,082	5,656	6,697	7,357	6,697	7,357	6,697	7,357	6,697	7,357	6,697	7,357	6,697	7,357

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the Nueces - Rio Grande Coastal Basin.

APPENDIX A -- TABLE 22

NUECES – RIO GRANDE COASTAL BASIN MINING WATER USE PROJECTIONS -- 1990 to 2040*

COUNTIES**	WATER USE			MINING WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
BROOKS	37	185	158	151	151	117	117	103	103	88	88	74	74	62	62
DUVAL	104	301	766	190	190	183	183	140	140	121	121	110	110	105	105
JIM WELLS	498	243	9	437	437	414	414	396	396	379	379	361	361	348	348
KLEBERG	133	1,593	1,173	1,272	1,272	950	950	844	844	739	739	633	633	542	542
NUECES	1,464	393	32	480	480	568	568	586	586	604	604	622	622	649	649
BASIN TOTAL	2,236	2,715	2,138	2,530	2,530	2,232	2,232	2,069	2,069	1,931	1,931	1,800	1,800	1,706	1,706

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the Nueces - Rio Grande Coastal Basin.

APPENDIX A -- TABLE 23

NUECES - RIO GRANDE COASTAL BASIN LIVESTOCK WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE			LIVESTOCK WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
BROOKS	968	823	675	978	978	1,133	1,133	1,133	1,133	1,133	1,133	1,133	1,133	1,133	1,133
DUVAL	1,158	1,282	807	1,522	1,522	1,762	1,762	1,762	1,762	1,762	1,762	1,762	1,762	1,762	1,762
JIM WELLS	1,038	862	722	1,020	1,020	1,179	1,179	1,179	1,179	1,179	1,179	1,179	1,179	1,179	1,179
KLEBERG	1,152	1,072	1,347	1,271	1,271	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470
NUECES	441	230	302	272	272	314	314	314	314	314	314	314	314	314	314
BASIN TOTAL	4,757	4,269	3,853	5,063	5,063	5,858	5,858	5,858	5,858	5,858	5,858	5,858	5,858	5,858	5,858

*Texas Water Development Board, October 1989.

**Includes only those parts of counties located within the Nueces - Rio Grande Coastal Basin.

APPENDIX A -- TABLE 24
NUECES - RIO GRANDE COASTAL BASIN TOTAL WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE			TOTAL WATER USE PROJECTIONS											
				1990		2000		2010		2020		2030		2040	
COUNTIES**	1974	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)														
BROOKS	3,987	2,453	2,503	3,181	3,233	3,356	3,426	3,380	3,481	3,457	3,610	3,591	3,768	3,659	3,849
DUVAL	4,958	6,084	4,909	6,178	6,479	6,466	6,807	6,476	6,854	6,550	6,949	6,674	7,084	6,742	7,156
JIM WELLS	8,054	10,694	7,987	12,513	12,824	12,708	13,337	13,135	14,020	13,801	15,119	14,646	16,555	15,083	17,348
KLEBERG	5,817	10,332	8,171	9,857	9,938	9,847	10,121	9,991	10,529	10,502	12,078	11,526	14,571	13,557	16,393
NUECES	67,515	89,706	80,742	103,353	104,561	108,499	113,778	111,724	122,132	121,157	139,378	137,139	161,746	147,170	176,458
BASIN TOTAL	90,331	119,269	104,312	135,082	137,035	140,876	147,469	144,706	157,016	155,467	177,134	173,576	203,724	186,211	221,204

*Texas Water Development Board, October 1989. High Per Capita Municipal Water Use with Conservation.

**Includes only those parts of counties located within the Nueces - Rio Grande Coastal Basin.

APPENDIX A -- TABLE 25

CHOKE CANYON/LAKE CORPUS CHRISTI RESERVOIR SERVICE AREA POPULATION PROJECTIONS -- 1990 to 2040*

	POPULATION		POPULATION PROJECTIONS											
			1990		2000		2010		2020		2030		2040	
COUNTIES	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
COASTAL AREA														
ARANSAS	14,260	17,482	18,844	18,992	21,525	21,839	24,677	25,174	27,845	29,691	31,786	35,108	33,972	38,190
SAN PATRICIO	58,013	61,764	62,537	63,090	73,057	76,028	82,655	86,981	91,149	99,533	98,934	109,979	103,077	115,615
NUECES	268,215	297,018	307,637	309,530	335,274	344,767	367,720	391,953	416,112	470,625	487,213	564,753	527,362	618,915
KLEBERG	33,358	34,495	32,015	32,166	34,303	35,439	37,605	40,206	42,085	47,724	48,263	56,476	51,693	61,459
SUBTOTAL	373,846	410,759	421,033	423,778	464,159	478,073	512,657	544,314	577,191	647,573	666,196	766,316	716,104	834,179
INLAND AREA														
ATASCOSA	25,055	28,524	31,369	31,567	36,236	36,659	40,325	41,398	43,948	45,228	47,034	49,331	48,658	51,525
BEE	26,030	27,271	27,389	27,479	30,359	30,726	33,093	33,960	36,045	38,243	39,659	43,114	41,604	45,786
REFUGIO	9,289	8,729	8,550	8,570	8,461	8,551	8,312	8,402	7,953	8,044	7,569	7,665	7,569	7,665
LIVE OAK	9,606	9,549	9,094	9,284	9,459	9,851	9,756	10,264	9,847	10,526	9,918	10,734	9,952	10,838
MCMULLEN	789	970	976	984	998	1,081	1,055	1,153	1,121	1,276	1,221	1,425	1,275	1,505
DUVAL	12,517	13,327	13,116	13,289	14,297	14,800	15,575	16,449	16,887	17,976	18,125	19,303	18,779	20,001
JIM WELLS	36,498	40,330	38,939	39,550	41,232	43,235	45,434	48,674	50,033	55,353	53,937	61,936	56,005	65,525
BROOKS	8,428	9,266	9,553	9,592	10,382	10,533	11,222	11,598	12,159	12,893	13,159	14,042	13,691	14,657
SUBTOTAL	128,212	137,966	138,986	140,315	151,424	155,436	164,772	171,898	177,993	189,539	190,622	207,550	197,533	217,502
TOTAL	502,058	548,725	560,019	564,093	615,583	633,509	677,429	716,212	755,184	837,112	856,818	973,866	913,637	1,051,681

*Texas Water Development Board, October 1989.

APPENDIX A -- TABLE 26

CHOKE CANYON/LAKE CORPUS CHRISTI RESERVOIR SERVICE AREA MUNICIPAL WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE		MUNICIPAL WATER USE PROJECTIONS											
			1990		2000		2010		2020		2030		2040	
COUNTIES	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)													
COASTAL AREA														
ARANSAS	2,792	2,155	3,985	4,016	4,321	4,383	4,685	4,780	5,132	5,470	5,854	6,463	6,254	7,029
SAN PATRICIO	7,263	6,752	9,594	9,679	10,604	11,026	11,333	11,913	12,123	13,216	13,137	14,579	13,678	15,312
NUECES	64,834	50,568	74,108	74,557	76,793	78,920	79,742	84,888	87,661	98,927	102,525	118,578	110,892	129,856
KLEBERG	7,037	5,120	6,732	6,763	6,841	7,064	7,088	7,570	7,699	8,716	8,824	10,307	9,443	11,207
SUBTOTAL	81,926	64,595	94,419	95,015	98,559	101,393	102,848	109,151	112,615	126,329	130,340	149,927	140,267	163,404
INLAND AREA														
ATASCOSA	4,096	4,941	6,184	6,224	6,782	6,864	7,139	7,331	7,555	7,775	8,082	8,478	8,363	8,855
BEE	3,639	3,924	4,684	4,698	4,906	4,962	5,048	5,171	5,316	5,619	5,810	6,284	6,077	6,651
REFUGIO	1,444	1,287	1,436	1,439	1,348	1,363	1,254	1,267	1,165	1,178	1,108	1,123	1,108	1,123
LIVE OAK	1,805	1,316	1,807	1,846	1,783	1,857	1,740	1,829	1,704	1,822	1,714	1,854	1,719	1,872
MCMULLEN	88	142	172	174	167	181	167	182	172	195	187	219	195	231
DUVAL	2,047	1,840	2,637	2,671	2,725	2,823	2,810	2,968	2,960	3,150	3,176	3,383	3,291	3,506
JIM WELLS	7,600	6,112	9,459	9,607	9,498	9,960	9,929	10,639	10,610	11,738	11,469	13,171	11,909	13,934
BROOKS	1,136	1,411	1,593	1,600	1,646	1,670	1,683	1,738	1,774	1,880	1,921	2,050	2,000	2,141
SUBTOTAL	21,855	20,973	27,972	28,259	28,855	29,680	29,770	31,125	31,256	33,357	33,467	36,562	34,662	38,313
TOTAL:	103,781	85,568	122,391	123,274	127,414	131,073	132,618	140,276	143,871	159,686	163,807	186,489	174,929	201,717

*Texas Water Development Board, October 1989. High Per Capita with Conservation.

APPENDIX A -- TABLE 27

CHOKE CANYON/LAKE CORPUS CHRISTI RESERVOIR SERVICE AREA MANUFACTURING WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE		MANUFACTURING WATER USE PROJECTIONS											
			1990		2000		2010		2020		2030		2040	
COUNTIES	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)													
COASTAL AREA														
ARANSAS	146	165	199	200	243	261	281	325	322	401	362	486	406	554
SAN PATRICIO	14,305	6,760	7,748	7,925	11,950	14,384	13,683	17,997	15,307	21,516	16,871	24,514	18,607	28,008
NUECES	26,988	30,703	30,918	31,583	33,233	36,406	33,668	39,144	35,569	43,097	37,400	46,849	39,475	50,948
KLEGERG	30	30	32	32	36	37	39	45	44	53	49	61	52	74
SUBTOTAL	41,469	37,658	38,897	39,740	45,462	51,088	47,671	57,511	51,242	65,067	54,682	71,910	58,540	79,584
INLAND AREA														
ATASCOSA	3	3	3	3	4	4	5	5	5	6	6	8	6	10
BEE	75	1	1	1	2	2	2	3	2	3	3	4	3	5
REFUGIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LIVE OAK	1,135	1,050	1,013	1,035	1,036	1,116	978	1,087	981	1,094	984	1,103	988	1,113
MCMULLEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DUVAL	25	0	0	0	0	0	0	0	0	0	0	0	0	0
JIM WELLS	118	118	132	132	154	165	173	198	192	240	210	287	230	347
BROOKS	9	9	9	9	10	11	11	12	12	14	13	16	14	18
SUBTOTAL	1,365	1,181	1,158	1,180	1,206	1,298	1,169	1,305	1,192	1,357	1,216	1,418	1,241	1,493
TOTAL	42,834	38,839	40,055	40,920	46,668	52,386	48,840	58,816	52,434	66,424	55,898	73,328	59,781	81,077

*Texas Water Development Board, October 1989.

APPENDIX A -- TABLE 28

CHOKE CANYON/LAKE CORPUS CHRISTI RESERVOIR SERVICE AREA STEAM ELECTRIC WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE		STEAM ELECTRIC WATER USE PROJECTIONS											
			1990		2000		2010		2020		2030		2040	
COUNTIES	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)													
COASTAL AREA														
ARANSAS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAN PATRICIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NUECES	3,190	2,730	3,300	3,300	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
KLEBERG	0	0	0	0	0	0	0	0	0	500	0	1,500	1,500	2,500
SUBTOTAL	3,190	2,730	3,300	3,300	3,500	3,500	3,500	3,500	3,500	4,000	3,500	5,000	5,000	6,000
INLAND AREA														
ATASCOSA	0	6,339	6,339	6,339	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
BEE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REFUGIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LIVE OAK	0	0	0	0	0	0	0	2,500	2,500	8,000	8,000	10,000	8,000	15,000
MCMULLEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DUVAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JIM WELLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BROOKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	6,339	6,339	6,339	12,000	12,000	12,000	14,500	14,500	20,000	20,000	22,000	20,000	27,000
TOTAL	3,190	9,069	9,639	9,639	15,500	15,500	15,500	18,000	18,000	24,000	23,500	27,000	25,000	33,000

*Texas Water Development Board, October 1989.

APPENDIX A -- TABLE 29

CHOKE CANYON/LAKE CORPUS CHRISTI RESERVOIR SERVICE AREA IRRIGATION WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE		IRRIGATION WATER USE PROJECTIONS											
			1990		2000		2010		2020		2030		2040	
COUNTIES	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)													
COASTAL AREA														
ARANSAS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAN PATRICIO	1,517	1,733	3,500	3,835	3,500	3,835	3,500	3,835	3,500	3,835	3,500	3,835	3,500	3,835
NUECES	1,081	3,333	3,050	3,350	3,050	3,350	3,050	3,350	3,050	3,350	3,050	3,350	3,050	3,350
KLEBERG	600	500	550	600	550	600	550	600	550	600	550	600	550	600
SUBTOTAL	3,198	5,566	7,100	7,785	7,100	7,785	7,100	7,785	7,100	7,785	7,100	7,785	7,100	7,785
INLAND AREA														
ATASCOSA	73,817	31,571	52,951	68,400	36,102	61,560	33,800	57,684	31,578	53,808	29,298	49,932	27,077	46,170
BEE	2,000	740	1,050	1,155	1,050	1,155	1,050	1,155	1,050	1,155	1,050	1,155	1,050	1,155
REFUGIO	0	50	150	165	150	165	150	165	150	165	150	165	150	165
LIVE OAK	505	3,541	3,300	3,630	3,300	3,630	3,300	3,630	3,300	3,630	3,300	3,630	3,300	3,630
MCMULLEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DUVAL	3,000	2,042	2,815	3,095	2,815	3,095	2,815	3,095	2,815	3,095	2,815	3,095	2,815	3,095
JIM WELLS	2,999	1,875	2,625	2,885	2,625	2,885	2,625	2,885	2,625	2,885	2,625	2,885	2,625	2,885
BROOKS	300	250	450	495	450	495	450	495	450	495	450	495	450	495
SUBTOTAL	82,621	40,069	63,341	79,825	46,492	72,985	44,190	69,109	41,968	65,233	39,688	61,357	37,467	57,595
TOTAL	85,819	45,635	70,441	87,610	53,592	80,770	51,290	76,894	49,068	73,018	46,788	69,142	44,567	65,380

*Texas Water Development Board, October 1989.

APPENDIX A -- TABLE 30

CHOKE CANYON/LAKE CORPUS CHRISTI RESERVOIR SERVICE AREA MINING WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE		MINING WATER USE PROJECTIONS											
			1990		2000		2010		2020		2030		2040	
COUNTIES	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)													
COASTAL AREA														
ARANSAS	45	0	79	79	113	113	85	85	57	57	29	29	14	14
SAN PATRICIO	148	98	153	153	168	168	134	134	100	100	66	66	43	43
NUECES	393	33	524	524	656	656	649	649	641	641	634	634	652	652
KLEBERG	1,593	1,173	1,272	1,272	950	950	844	844	739	739	633	633	542	542
SUBTOTAL	2,179	1,304	2,028	2,028	1,887	1,887	1,712	1,712	1,537	1,537	1,362	1,362	1,251	1,251
INLAND AREA														
ATASCOSA	1,171	1,752	1,393	1,393	1,269	1,269	1,362	1,362	2,468	2,468	3,575	3,575	4,684	4,684
BEE	386	121	350	350	303	303	253	253	205	205	158	158	121	121
REFUGIO	316	53	292	292	268	268	224	224	180	180	136	136	102	102
LIVE OAK	1,428	1,260	1,374	1,374	653	653	292	292	208	208	216	216	225	225
MCMULLEN	446	229	404	404	362	362	373	373	1,516	1,516	2,376	2,376	3,389	3,389
DUVAL	544	1,948	940	940	633	633	230	230	121	121	110	110	105	105
JIM WELLS	243	234	437	437	414	414	396	396	379	379	361	361	348	348
BROOKS	185	158	151	151	117	117	103	103	88	88	74	74	62	62
SUBTOTAL	4,719	5,755	5,341	5,341	4,019	4,019	3,233	3,233	5,165	5,165	7,006	7,006	9,036	9,036
TOTAL	6,898	7,059	7,369	7,369	5,906	5,906	4,945	4,945	6,702	6,702	8,368	8,368	10,287	10,287

*Texas Water Development Board, October 1989.

APPENDIX A -- TABLE 31

CHOKE CANYON/LAKE CORPUS CHRISTI RESERVOIR SERVICE AREA LIVESTOCK WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE		LIVESTOCK WATER USE PROJECTIONS											
			1990		2000		2010		2020		2030		2040	
COUNTIES	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)													
COASTAL AREA														
ARANSAS	68	33	80	80	93	93	93	93	93	93	93	93	93	93
SAN PATRICIO	576	1,201	684	684	794	794	794	794	794	794	794	794	794	794
NUECES	257	338	304	304	352	352	352	352	352	352	352	352	352	352
KLEBERG	1,072	1,347	1,271	1,271	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470
SUBTOTAL	1,973	2,919	2,339	2,339	2,709	2,709	2,709	2,709	2,709	2,709	2,709	2,709	2,709	2,709
INLAND AREA														
ATASCOSA	1,419	2,020	1,681	1,681	1,945	1,945	1,945	1,945	1,945	1,945	1,945	1,945	1,945	1,945
BEE	954	1,038	1,134	1,134	1,314	1,314	1,314	1,314	1,314	1,314	1,314	1,314	1,314	1,314
REFUGIO	491	535	581	581	673	673	673	673	673	673	673	673	673	673
LIVE OAK	803	900	954	954	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105
MCMULLEN	898	426	1,067	1,067	1,237	1,237	1,237	1,237	1,237	1,237	1,237	1,237	1,237	1,237
DUVAL	1,677	1,055	1,991	1,991	2,306	2,306	2,306	2,306	2,306	2,306	2,306	2,306	2,306	2,306
JIM WELLS	1,036	868	1,227	1,227	1,419	1,419	1,419	1,419	1,419	1,419	1,419	1,419	1,419	1,419
BROOKS	823	675	978	978	1,133	1,133	1,133	1,133	1,133	1,133	1,133	1,133	1,133	1,133
SUBTOTAL	8,101	7,517	9,613	9,613	11,132	11,132	11,132	11,132	11,132	11,132	11,132	11,132	11,132	11,132
TOTAL	10,074	10,436	11,952	11,952	13,841	13,841	13,841	13,841	13,841	13,841	13,841	13,841	13,841	13,841

*Texas Water Development Board, October 1989.

APPENDIX A -- TABLE 32

CHOKE CANYON/LAKE CORPUS CHRISTI RESERVOIR SERVICE AREA TOTAL WATER USE PROJECTIONS -- 1990 to 2040*

	WATER USE		TOTAL WATER USE PROJECTIONS											
			1990		2000		2010		2020		2030		2040	
COUNTIES	1980	1985	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
	(---------- ACRE/FT. OF WATER ----------)													
COASTAL AREA														
ARANSAS	3,051	2,353	4,343	4,375	4,770	4,850	5,144	5,283	5,604	6,021	6,338	7,071	6,767	7,690
SAN PATRICIO	23,809	16,544	21,679	22,276	27,016	30,207	29,444	34,673	31,824	39,461	34,368	43,788	36,622	47,992
NUECES	96,743	87,705	112,204	113,618	117,584	123,184	120,961	131,883	130,773	149,867	147,461	173,263	157,921	188,658
KLEBERG	10,332	8,170	9,857	9,938	9,847	10,121	9,991	10,529	10,502	12,078	11,526	14,571	13,557	16,393
SUBTOTAL	133,935	114,772	148,083	150,207	159,217	168,362	165,540	182,368	178,703	207,427	199,693	238,693	214,867	260,733
INLAND AREA														
ATASCOSA**	6,689	15,055	15,600	15,640	22,000	22,082	22,451	22,643	23,973	24,194	25,608	26,006	26,998	27,494
BEE	7,054	5,824	7,219	7,338	7,575	7,736	7,667	7,896	7,887	8,296	8,335	8,915	8,565	9,246
REFUGIO	2,251	1,925	2,459	2,477	2,439	2,469	2,301	2,329	2,168	2,196	2,067	2,097	2,033	2,063
LIVE OAK	5,676	8,067	8,448	8,839	7,877	8,361	7,415	10,443	9,798	15,859	15,319	17,908	15,337	22,945
MCMULLEN	1,432	797	1,643	1,645	1,766	1,780	1,777	1,792	2,925	2,948	3,800	3,832	4,821	4,857
DUVAL	7,293	6,885	8,383	8,697	8,479	8,857	8,161	8,599	8,202	8,672	8,407	8,894	8,517	9,012
JIM WELLS	11,996	9,207	13,880	14,288	14,110	14,843	14,542	15,537	15,225	16,661	16,084	18,123	16,531	18,933
BROOKS	2,453	2,503	3,181	3,233	3,356	3,426	3,380	3,481	3,457	3,610	3,591	3,768	3,659	3,849
SUBTOTAL	44,844	50,263	60,813	62,157	67,602	69,554	67,694	72,720	73,635	82,436	83,211	89,543	86,461	98,399
TOTAL	178,779	165,035	208,896	212,364	226,819	237,916	233,234	255,088	252,338	289,863	282,904	328,236	301,328	359,132

*Texas Water Development Board, October 1989. High Per Capita Municipal Water Use with Conservation.

**Does not include Atascosa Irrigation Water Requirement Projections.

Appendix A - Table 33
Total Water Use and Total Water Requirements Projections; Nueces, San Antonio-Nueces, North Nueces-Rio Grande, and Choke Canyon/Lake Corpus Christi Service Area Summary***

Area	1980**	2000**		2020**		2040**	
		Low	High	Low	High	Low	High
	thousands of acre-feet						
Nueces Basin							
Reach One[a]	184 (10)	104 (16)	160 (17)	97 (19)	147 (20)	90 (23)	134 (23)
Reach Two[b]	220 (9)	132 (10)	212 (11)	119 (12)	191 (14)	107 (14)	170 (17)
Reach Three[c]	106 (6)	75 (10)	106 (10)	72 (11)	100 (12)	71 (14)	95 (15)
Reach Four[d]	15 (7)	21 (9)	22 (9)	24 (9)	31 (11)	30 (11)	40 (13)
Basin Total	526 (32)	331 (46)	502 (48)	312 (51)	469 (58)	298 (62)	440 (69)
San Antonio-Nueces Coastal Basin	35 (32)	40 (31)	43 (34)	45 (37)	53 (44)	51 (43)	64 (56)
Nueces-Rio Grande North, Coastal Basin	119 (106)	140 (125)	147 (131)	155 (140)	177 (160)	186 (170)	221 (203)
Area Total	680 (166)	511 (202)	691 (213)	512 (228)	699 (262)	535 (275)	725 (328)
Choke Canyon/Lake Corpus Christi Service Area**							
Coastal Area[e]	134 (124)	159 (144)	168 (152)	179 (164)	207 (192)	215 (198)	261 (243)
Inland Area[f*]	45 (22)	68 (30)	70 (31)	74 (32)	82 (34)	86 (36)	98 (39)
Area Total	179 (146)	227 (174)	238 (183)	253 (196)	289 (226)	301 (234)	359 (282)

[a]Bandera, Edwards, Kinney, Medina, Real

[b]Dimmit, Frio, Maverick, Zavala, La Salle

[c]Atascosa, Bexar, Duval, Karnes, San Patricio

[d]Bee, Jim Wells, Live Oak, Nueces, McMullen

[e]Aransas, San Patricio, Nueces, Kleberg, Uvalde

[f]Atascosa, Bee, Refugio, Live Oak, McMullen, Duval, Jim Wells, Brooks

*Does not include Atascosa County irrigation projections.

**Data in parentheses are the municipal plus manufacturing water requirements.

***High per capita water use, with conservation in all uses.

APPENDIX B

Previous Water Supply Studies

APPENDIX B

Previous Water Supply Studies

Numerous reports concerning the development of potential water supply projects in the Nueces River Basin have been published throughout the years. The three most recent and most significant of these reports have been performed within the past decade. A summary of the findings of each of these reports is included here in reverse chronological order.

SUMMARY AND FINDINGS OF 1985 REPORT BY RAUSCHUBER

Report: "Potential for Development of Additional Water Supply from the Nueces River Between Simmons and Calallen Diversion Dam," Donald G. Rauschuber and Associates, Inc., December, 1985.

Summary: This report was prepared for the Subcommittee on Additional Water Supply From the Nueces River Basin and gave preliminary estimates of the yields and costs of the following water supply projects:

Lake Corpus Christi Enlargement;
Bluntzer Reservoir;
R&M Reservoir;
Simmons Pump Facility; and
Choke Canyon and Lake Corpus Christi with revised reservoir operation policy.

Data pertinent to each of the above projects are summarized in Table 1.

Findings: Changing the reservoir operation policy of the Choke Canyon and Lake Corpus Christi was determined to be one of the more economical alternatives followed by construction of the Simmons Pump Facility and R&M Reservoir. The study concluded that the environmental effects of constructing a new reservoir in the lower basin would include:

1. Increased freshwater fishing and water recreation,
2. Increased salinity in Nueces and Corpus Christi Bays, and
3. Decreased freshwater inflow, increased return flow and increased nutrient inflow (from return flows) to the estuarine system.

TABLE 1
SUMMARY OF RESULTS OF
1985 WATER SUPPLY STUDY
(Rauschuber)

	PROJECT	CONSERVATION POOL ELEVATION (Ft msl)	YEAR 2010 INCREMENTAL YIELD INCREASE (Ac-Ft/Yr)	APPROXIMATE UNIT WATER COST ($/Ac-Ft)
	Choke Canyon and	220.5	249,000	
	Lake Corpus Christi	94.0	(Baseline Yield)	--
1A	Choke Canyon and	220.5		
	Enlarged Lake Corpus Christi	100.0	14,000	--
1B	Choke Canyon and	220.5		
	Enlarged Lake Corpus Christi	104.0	22,000	--
1C	Choke Canyon and	220.5		
	Enlarged Lake Corpus Christi	105.0	23,000	$1,887
2A	Choke Canyon and	220.5		
	Lake Corpus Christi and	94.0		
	Bluntzer Reservoir	50.0	4,500	--
2B	Choke Canyon and	220.5		
	Lake Corpus Christi and	94.0		
	Bluntzer Reservoir	61.0	14,000	--
2C	Choke Canyon and	220.5		
	Lake Corpus Christi and	94.0		
	Bluntzer Reservoir	70.0	27,250	$ 658
3A	Choke Canyon and	220.5		
	Lake Corpus Christi and	94.0		
	R&M Reservoir	40.0	9,500	--
3B	Choke Canyon and	220.5		
	Lake Corpus Christi and	94.0		
	R&M Reservoir	50.0	21,400	--

	PROJECT	CONSERVATION POOL ELEVATION (Ft msl)	YEAR 2010 INCREMENTAL YIELD INCREASE (Ac-Ft/Yr)	APPROXIMATE UNIT WATER COST ($/Ac-Ft)
3C	Choke Canyon and Lake Corpus Christi and R&M Reservoir	220.5 94.0 70.0	68,300	$ 355
4A	Choke Canyon and Lake Corpus Christi with Simmons Pump Facility Operating when Corpus spills	220.5 94.0 --	6,000	--
4B	Choke Canyon and Lake Corpus Christi with 100 MGD Simmons Pump Fac. Operating when Choke is more than one foot low	220.5 94.0 --	14,000	$ 108
5A	Choke Canyon and Lake Corpus Christi (Releases from Choke only when Corpus is below Elev. 80 ft msl)	220.5 94.0	8,500	0
5B	Choke Canyon and Lake Corpus Christi (Releases from Choke only when Corpus is about empty)	220.5 94.0	18,000	$ 75
6	Choke Canyon and Lake Corpus Christi with 100 MGD Simmons Pump Fac. (Releases from Choke only when Corpus is about empty)	220.5 94.0 --	24,250	$ 118
7	Choke Canyon and Lake Corpus Christi and R&M Reservoir with 100 MGD Simmons Pump Fac. (Releases from Choke only when Corpus is about empty)	220.5 94.0 70.0 --	89,050	$ 304

SUMMARY AND FINDINGS OF 1983 REPORT BY BUREAU

Report: "A Special Report for the Texas Basins Project," United States Department of the Interior, Bureau of Reclamation, December, 1983.

Summary: This report was prepared for the Nueces River Authority and the City of Corpus Christi and included work by the Bureau of Reclamation to update its previous studies and to reanalyze the water resources of the Nueces River Basin to determine if there remained any economically developable water.

The report included estimates of yields and costs for the following projects:

Cotulla Reservoir;
Cotulla Diversion Dam with Canal;
Goliad Reservoir (in San Antonio River Basin);
Desalting; and
Choke Canyon and Lake Corpus Christi with revised reservoir operation policy.

The study had initially intended to determine information on recharge projects, but concluded that such an analysis would require additional information and modeling requirements. The main findings of this study are summarized in Table 2.

Findings: The proposed Goliad Reservoir located in the San Antonio River Basin was the most economical source of water outside of changing the reservoir operation policy of the Choke Canyon and Lake Corpus Christi system. Water from the Goliad Reservoir project could supply more than enough water to meet the Corpus Christi service area year 2030 projected demands.

The most economical project at the Cotulla site included the construction of a diversion dam on the main channel of the Nueces River. This dam would divert up to 2,010 cubic feet per second (1,300 MGD) into a proposed canal which would drain into the Frio River upstream of Choke Canyon. This type of project would increase water supply, in part, by minimizing losses through the braided reach of the Nueces River.

TABLE 2
SUMMARY OF RESULTS OF
1983 WATER SUPPLY STUDY
(Bureau)

	PROJECT	CONSERVATION POOL CAPACITY (Ac-Ft)	2010 SYSTEM YIELD (Ac-Ft/Yr)	NET GAIN IN YIELD (Ac-Ft/Yr)	APPROXIMATE UNIT WATER COST ($/Ac-Ft)
	Choke Canyon and Lake Corpus Christi	690,000 260,000	252,000 Baseline	--	--
1	Choke Canyon and Lake Corpus Christi and Cotulla Reservoir (Releases from Choke only when Corpus is below Elev. 88 ft msl)	690,000 260,000 341,900	254,500	2,500	$7,458
2	Choke Canyon and Lake Corpus Christi and Cotulla Diversion Dam with Canal (Releases from Choke only when Corpus is below Elev. 88 ft msl)	690,000 260,000 N/A	268,000	16,000	$1.119
3	Goliad Reservoir	713,700	358,000	106,000	$ 407
4	Desalting	N/A	259,300	7,300	$1,219
5	Choke Canyon and Lake Corpus Christi (Release from Choke only when Corpus is below Elev. 85 ft msl)	690,000 260,000	269,400	17,400	0

SUMMARY AND FINDINGS OF 1982 REPORT BY FREESE AND NICHOLS

Report: "Report on Availability of Additional Surface Water Supply from the Nueces River Between Uvalde and Three Rivers," Freese and Nichols, Inc., December, 1982.

Summary: This report was prepared for the Nueces River Authority and gave estimates of the yields of the following water supply projects:

Simmons Reservoir,
Harris Reservoir, and
Indian Creek Reservoir.

Initially, seven potential reservoir sites were considered with the three selected sites representing the most favorable sites within the upper, middle, and lower reaches of the Nueces River. Basic data for the three selected sites are summarized in Table 3.

Findings: The most attractive project was the construction of the Harris Reservoir Project. If this project were operated in conjunction with Choke Canyon Reservoir and Lake Corpus Christi, it could potentially provide up to an additional 18,000 ac-ft per year (i.e 16 MGD) on a firm yield basis. If Harris Reservoir were operated on an overdraft basis, then the average annual increase in water supply would be about 65,000 acre-feet per year (i.e. 58 MGD) of additional (non-firm) yield. However, with the overdrafting operation plan there would be some years with large shortages which would require an alternate water supply source.

Additional findings included estimates of channel losses in the braided reach of the Nueces River which ranged from 45% of the flow passing Cotulla during the critical drought period to 35% during the 1940 to 1981 period. If a reservoir were constructed near Cotulla, the study estimated that proper control of releases would reduce channel losses to about 20% of the volume released through the braided reach.

TABLE 3

SUMMARY OF RESULTS OF 1982 WATER SUPPLY STUDY (Freese and Nichols)

	PROJECT	CONSERVATION POOL CAPACITY (Ac-Ft)	1982 YIELD AT SITE (Ac-Ft/Yr)	NET GAIN IN YIELD (Ac-Ft/Yr)
	Choke Canyon and	700,000		
	Lake Corpus Christi	253,692	269,000	--
	(Bureau of Reclamation operational procedure)		(Baseline)	
1A	Simmons	450,000	124,900	--
	(Holding all inflow)	150,000	75,400	--
1B	Simmons	450,000	14,400	14,400
	(Holding inflows only when Corpus is spilling)	150,000	4,700	4,700
2A	Harris	400,000	51,700	--
	(Holding all inflows)	150,000	26,800	--
2B	Harris	400,000	4,400	4,400
	(Holding inflows only when Lake Corpus Christi is spilling)	150,000	3,200	3,200
2C	Harris (Operational as part of a 3 reservoir system and releasing 250,000 ac-ft in 9/64)	400,000	51,700	18,000
2D	Harris (Operated as part of a 3 reservoir system with overdrafting with average shortage of 10%)	400,000	--	65,000 *

	PROJECT	CONSERVATION POOL CAPACITY (Ac-Ft)	1982 YIELD AT SITE (Ac-Ft/Yr)	NET GAIN IN YIELD (Ac-Ft/Yr)
3A	Indian Creek (Holding all inflows)	165,000	13,300	--
3B	Indian Creek (Holding inflows only when Lake Corpus Christi is spilling)	165,000	0	0
3C	Indian Creek (Operated as part of a 3 reservoir system and releasing 80,000 ac-ft in 9/55)	165,000	13,300	5,300 **

* Not firm yield; represents average annual overdraft potential

** Represents maximum yield; yield is not adjusted for channel losses on water released to Lake Corpus Christi

Summary of Previous Studies

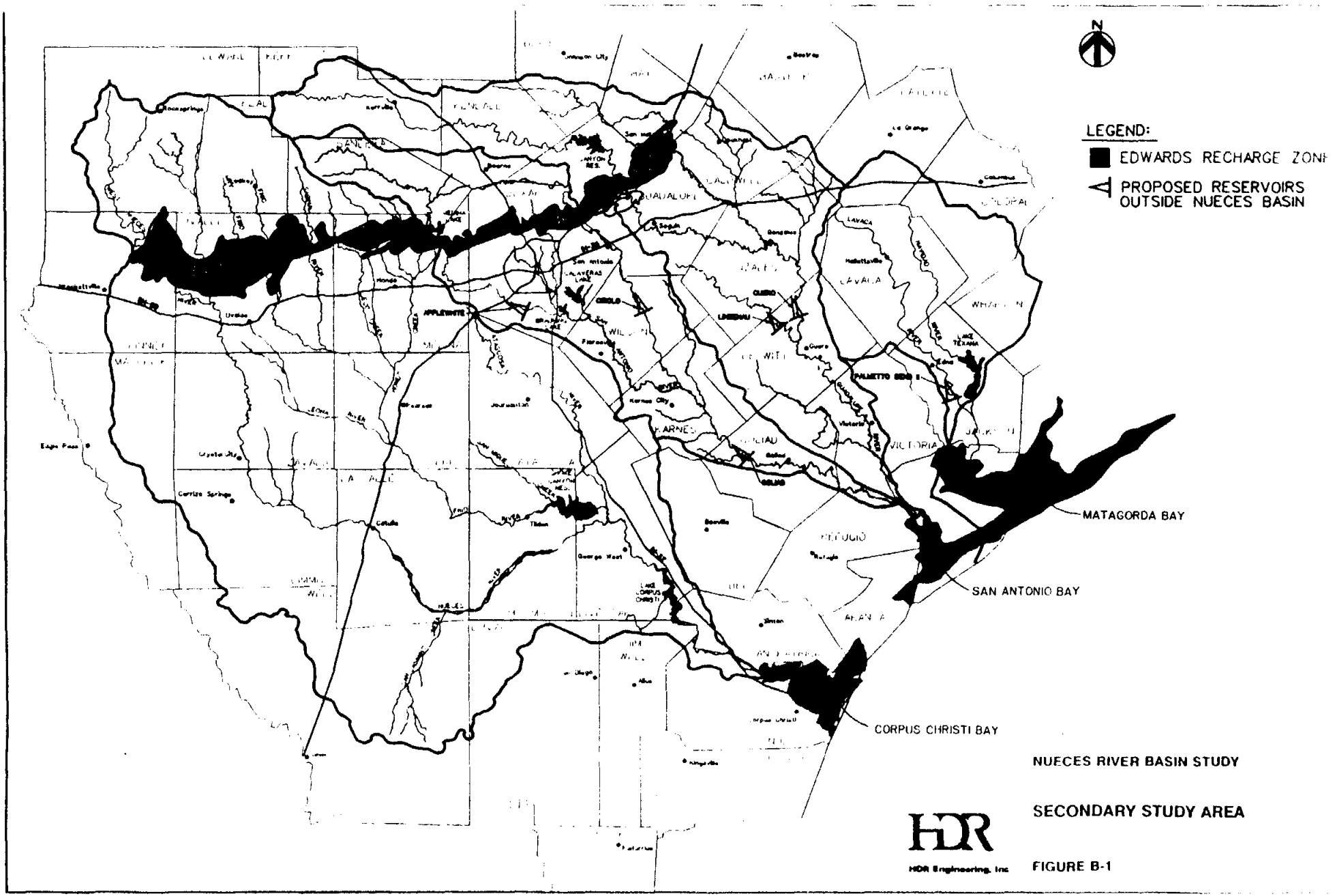
A ranking of the four most economical projects supplying more than 25,000 acre-feet per year is shown below in Table 4. As indicated in this table, the two most attractive projects based on previous economic analysis, without regard to any other issues, include the R&M and Goliad Reservoir projects.

TABLE 4

RANKING OF FOUR MOST ECONOMICAL
WATER SUPPLY PROJECTS
SUPPLYING AT LEAST 25,000 AC-FT FOR WHICH
COSTS ARE AVAILABLE

RANK	PROJECT	POTENTIAL ADDITIONAL YIELD (Ac-Ft/Yr)	APPROXIMATE UNIT COST* ($/Ac-Ft)	($/1,000 Gals)
1	R&M Reservoir	68,300	$ 355	$1.09
2	Goliad Reservoir	106,000	$ 407	$1.25
3	Bluntzer Reservoir	27,250	$ 658	$2.02
4	Desalting	Unlimited	$1,219	$3.74

*Unit costs listed are taken directly from previous studies and not adjusted to current price levels.


N
LEGEND:
EDWARDS RECHARGE ZONE
PROPOSED RESERVOIRS OUTSIDE NUECES BASIN
MATAGORDA BAY
SAN ANTONIO BAY
CORPUS CHRISTI BAY
NUECES RIVER BASIN STUDY
SECONDARY STUDY AREA
HDR
HDR Engineering, Inc.
FIGURE B-1

APPENDIX C

Historical Water Use

HISTORICAL SURFACE WATER USE SUMMARY
NUECES RIVER BASIN

YEAR	TOTAL (ACFT)	MUN. (ACFT)	IND. (ACFT)	IRR. (ACFT)	MINING (ACFT)	RECHARGE (ACFT)
1915	2,087	606	0	1,481	0	0
1916	2,111	679	0	1,432	0	0
1917	3,126	0	30	3,096	0	0
1918	4,928	0	0	4,928	0	0
1919	2,913	810	0	2,103	0	0
1920	12	0	0	12	0	0
1921	0	0	0	0	0	0
1922	400	0	0	400	0	0
1923	126	0	0	126	0	0
1924	40	0	0	40	0	0
1925	10,847	4,408	0	6,439	0	0
1926	10,874	185	0	10,689	0	0
1927	11,870	0	0	11,870	0	0
1928	1,954	0	0	1,954	0	0
1929	9,088	242	0	8,846	0	0
1930	112	0	0	112	0	0
1931	2,832	2,673	0	159	0	0
1932	10,661	251	0	10,410	0	0
1933	95	0	0	95	0	0
1934	78	0	0	78	0	0
1935	202	0	0	202	0	0
1936	186	0	0	186	0	0
1937	12,948	8,401	0	4,547	0	0
1938	23,443	375	0	23,012	56	0
1939	24,108	0	0	24,108	0	0
1940	20,063	0	1	20,062	0	0
1941	7,897	0	2	7,895	0	0
1942	24,249	568	2	23,679	0	0
1943	35,857	13,237	2	22,618	0	0
1944	44,055	18,682	5	25,368	0	0
1945	51,444	25,423	5	26,016	0	0
1946	44,513	17,923	2	26,588	0	0
1947	49,706	22,675	4,478	22,553	0	0
1948	47,095	22,549	6,624	17,922	0	0
1949	48,138	21,644	5,098	21,396	0	0
1950	52,185	26,959	5,808	19,418	0	0
1951	54,070	38,618	8,744	6,708	0	0
1952	95,634	43,255	9,403	42,976	0	0
1953	66,727	43,863	12,283	10,581	0	0
1954	58,310	27,455	17,890	12,965	0	0
1955	59,360	27,411	22,844	9,105	0	0
1956	58,292	29,653	19,838	8,801	0	0
1957	55,075	23,140	24,306	7,629	0	0
1958	75,505	20,624	32,271	22,610	0	0
1959	61,213	19,237	33,244	8,732	0	0
1960	75,137	19,994	34,622	20,521	0	0
1961	86,183	21,719	34,131	30,333	0	0

HISTORICAL SURFACE WATER USE SUMMARY
NUECES RIVER BASIN

YEAR	TOTAL (ACFT)	MUN. (ACFT)	IND. (ACFT)	IRR. (ACFT)	MINING (ACFT)	RECHARGE (ACFT)
1962	76,413	28,633	36,850	10,930	0	0
1963	88,502	30,687	37,833	19,982	0	0
1964	110,774	32,481	37,457	40,836	0	0
1965	119,383	36,330	35,603	47,450	0	0
1966	126,842	28,017	43,117	55,708	0	0
1967	140,359	41,476	39,544	59,339	0	0
1968	96,637	31,596	40,932	24,109	0	0
1969	104,535	40,817	46,068	17,650	0	0
1970	104,508	35,750	44,230	24,528	0	0
1971	127,677	43,680	42,858	41,137	2	0
1972	109,794	43,946	39,629	26,219	0	0
1973	111,179	45,813	41,048	24,318	0	0
1974	117,749	51,596	37,864	28,129	0	160
1975	119,497	43,364	45,251	30,252	10	620
1976	130,438	46,145	41,969	40,294	12	2,018
1977	140,438	45,184	52,585	42,635	28	6
1978	148,332	56,312	44,883	47,017	22	98
1979	141,150	53,034	47,441	36,628	8	4,039
1980	144,719	69,633	43,554	30,246	12	1,274
1981	155,861	57,509	50,631	44,967	59	2,695
1982	159,422	68,558	43,272	47,419	58	115
1983	145,193	61,253	47,405	36,207	74	254
1984	128,681	60,111	45,781	22,097	52	640
1985	143,809	59,176	41,060	42,212	46	1,315
1986	137,770	57,389	43,156	34,493	46	2,686
1987	170,595	66,746	43,562	41,127	0	19,160
1988	175,437	84,442	46,548	44,384	63	0
1989	170,789	93,113	50,262	27,414	0	0
AVG. USE (1979-88)	150,264	63,785	45,241	37,978	42	3,218

Note: 1989 Surface Water Use includes only permitees with authorized and actual diversions in excess of 50 acft/yr.

HISTORICAL SURFACE WATER USE SUMMARY
NUECES RIVER BASIN - REACH 1

YEAR	TOTAL (ACFT)	MUN. (ACFT)	IND. (ACFT)	IRR. (ACFT)	MINING (ACFT)	RECHARGE (ACFT)
1915	35	0	0	35	0	0
1916	227	0	0	227	0	0
1917	211	0	0	211	0	0
1918	1,457	0	0	1,457	0	0
1919	654	0	0	654	0	0
1920	0	0	0	0	0	0
1921	0	0	0	0	0	0
1922	0	0	0	0	0	0
1923	0	0	0	0	0	0
1924	0	0	0	0	0	0
1925	1,303	0	0	1,303	0	0
1926	1,081	0	0	1,081	0	0
1927	234	0	0	234	0	0
1928	964	0	0	964	0	0
1929	1,084	0	0	1,084	0	0
1930	96	0	0	96	0	0
1931	84	0	0	84	0	0
1932	157	0	0	157	0	0
1933	95	0	0	95	0	0
1934	78	0	0	78	0	0
1935	42	0	0	42	0	0
1936	26	0	0	26	0	0
1937	45	0	0	45	0	0
1938	129	0	0	129	0	0
1939	985	0	0	985	0	0
1940	1,012	0	0	1,012	0	0
1941	849	0	0	849	0	0
1942	720	0	0	720	0	0
1943	875	0	0	875	0	0
1944	561	0	0	561	0	0
1945	712	0	0	712	0	0
1946	722	0	0	722	0	0
1947	759	0	0	759	0	0
1948	732	0	0	732	0	0
1949	1,049	0	0	1,049	0	0
1950	1,599	0	0	1,599	0	0
1951	1,650	0	0	1,650	0	0
1952	2,507	0	0	2,507	0	0
1953	1,800	0	0	1,800	0	0
1954	1,973	0	0	1,973	0	0
1955	2,239	0	0	2,239	0	0
1956	2,255	15	0	2,240	0	0
1957	1,941	36	0	1,905	0	0
1958	1,206	4	0	1,202	0	0
1959	647	8	0	639	0	0
1960	976	32	0	944	0	0
1961	1,025	28	0	997	0	0

HISTORICAL SURFACE WATER USE SUMMARY
NUECES RIVER BASIN - REACH 1

YEAR	TOTAL (ACFT)	MUN. (ACFT)	IND. (ACFT)	IRR. (ACFT)	MINING (ACFT)	RECHARGE (ACFT)
1962	3,911	21	0	3,890	0	0
1963	5,317	19	0	5,298	0	0
1964	6,475	20	0	6,455	0	0
1965	7,953	26	0	7,927	0	0
1966	6,423	25	0	6,398	0	0
1967	7,654	55	0	7,599	0	0
1968	4,055	49	0	4,006	0	0
1969	8,067	43	0	8,024	0	0
1970	5,548	55	17	5,476	0	0
1971	7,910	54	1	7,855	0	0
1972	8,009	64	1	7,944	0	0
1973	5,311	12	1	5,298	0	0
1974	7,763	42	1	7,560	0	160
1975	8,101	30	22	7,429	0	620
1976	6,038	229	1	3,790	0	2,018
1977	3,582	68	8	3,492	8	6
1978	3,494	53	96	3,247	0	98
1979	8,170	150	0	3,981	0	4,039
1980	4,505	150	0	3,081	0	1,274
1981	7,251	182	0	4,374	0	2,695
1982	5,644	147	0	5,382	0	115
1983	4,918	37	0	4,627	0	254
1984	3,676	255	0	2,781	0	640
1985	4,994	351	5	3,323	0	1,315
1986	6,209	339	0	3,184	0	2,686
1987	22,344	271	0	2,913	0	19,160
1988	2,665	339	0	2,326	0	0
1989	1,877	386	0	1,491	0	0
AVG. USE (1979-88)	7,038	222	1	3,597	0	3,218

Note: 1989 Surface Water Use includes only permitees with authorized and actual diversions in excess of 50 acft/yr.

HISTORICAL SURFACE WATER USE SUMMARY
NUECES RIVER BASIN - REACH 2

YEAR	TOTAL (ACFT)	MUN. (ACFT)	IND. (ACFT)	IRR. (ACFT)	MINING (ACFT)	RECHARGE (ACFT)
1915	735	0	0	735	0	0
1916	670	0	0	670	0	0
1917	1,945	0	0	1,945	0	0
1918	2,902	0	0	2,902	0	0
1919	1,414	0	0	1,414	0	0
1920	12	0	0	12	0	0
1921	0	0	0	0	0	0
1922	400	0	0	400	0	0
1923	106	0	0	106	0	0
1924	0	0	0	0	0	0
1925	713	0	0	713	0	0
1926	7,851	0	0	7,851	0	0
1927	8,512	0	0	8,512	0	0
1928	953	0	0	953	0	0
1929	5,997	0	0	5,997	0	0
1930	14	0	0	14	0	0
1931	75	0	0	75	0	0
1932	7,548	0	0	7,548	0	0
1933	0	0	0	0	0	0
1934	0	0	0	0	0	0
1935	0	0	0	0	0	0
1936	0	0	0	0	0	0
1937	10	0	0	10	0	0
1938	19,162	0	0	19,162	0	0
1939	18,703	0	0	18,703	0	0
1940	14,869	0	0	14,869	0	0
1941	954	0	0	954	0	0
1942	19,666	0	0	19,666	0	0
1943	17,999	0	0	17,999	0	0
1944	21,476	0	0	21,476	0	0
1945	22,440	0	0	22,440	0	0
1946	23,349	0	0	23,349	0	0
1947	18,161	500	0	17,661	0	0
1948	14,695	500	0	14,195	0	0
1949	13,972	0	0	13,972	0	0
1950	13,151	0	0	13,151	0	0
1951	2,428	0	0	2,428	0	0
1952	38,383	500	0	37,883	0	0
1953	6,203	0	0	6,203	0	0
1954	7,092	0	0	7,092	0	0
1955	2,038	0	0	2,038	0	0
1956	3,277	0	0	3,277	0	0
1957	3,117	44	0	3,073	0	0
1958	17,926	70	0	17,856	0	0
1959	5,476	18	0	5,458	0	0
1960	17,140	2	0	17,138	0	0
1961	25,602	6	0	25,596	0	0

HISTORICAL SURFACE WATER USE SUMMARY
NUECES RIVER BASIN - REACH 2

YEAR	TOTAL (ACFT)	MUN. (ACFT)	IND. (ACFT)	IRR. (ACFT)	MINING (ACFT)	RECHARGE (ACFT)
1962	2,759	12	0	2,747	0	0
1963	9,370	13	0	9,357	0	0
1964	27,807	37	0	27,770	0	0
1965	32,853	30	0	32,823	0	0
1966	44,807	734	0	44,073	0	0
1967	46,315	1,025	0	45,290	0	0
1968	16,822	9	0	16,813	0	0
1969	5,691	2	0	5,689	0	0
1970	14,661	3	0	14,658	0	0
1971	28,924	18	0	28,906	0	0
1972	16,054	117	0	15,937	0	0
1973	15,740	69	0	15,671	0	0
1974	17,192	16	0	17,176	0	0
1975	19,418	50	0	19,368	0	0
1976	34,668	50	0	34,618	0	0
1977	36,764	21	25	36,709	9	0
1978	37,858	19	0	37,825	14	0
1979	29,509	18	0	29,483	8	0
1980	24,069	2	0	24,055	12	0
1981	36,821	2	30	36,782	7	0
1982	37,542	55	24	37,456	7	0
1983	26,304	39	43	26,222	0	0
1984	15,404	36	5	15,363	0	0
1985	36,734	88	5	36,641	0	0
1986	28,148	208	0	27,940	0	0
1987	34,752	83	0	34,669	0	0
1988	37,816	87	1,507	36,222	0	0
1989	19,079	0	0	19,079	0	0
AVG. USE (1979-88)	30,710	62	161	30,483	3	0

Note: 1989 Surface Water Use includes only permitees with authorized and actual diversions in excess of 50 acft/yr.

HISTORICAL SURFACE WATER USE SUMMARY
NUECES RIVER BASIN - REACH 3

YEAR	TOTAL (ACFT)	MUN. (ACFT)	IND. (ACFT)	IRR. (ACFT)	MINING (ACFT)	RECHARGE (ACFT)
1915	728	17	0	711	0	0
1916	521	11	0	510	0	0
1917	914	0	0	914	0	0
1918	529	0	0	529	0	0
1919	35	0	0	35	0	0
1920	0	0	0	0	0	0
1921	0	0	0	0	0	0
1922	0	0	0	0	0	0
1923	20	0	0	20	0	0
1924	40	0	0	40	0	0
1925	15	0	0	15	0	0
1926	11	0	0	11	0	0
1927	10	0	0	10	0	0
1928	20	0	0	20	0	0
1929	0	0	0	0	0	0
1930	0	0	0	0	0	0
1931	0	0	0	0	0	0
1932	0	0	0	0	0	0
1933	0	0	0	0	0	0
1934	0	0	0	0	0	0
1935	160	0	0	160	0	0
1936	160	0	0	160	0	0
1937	160	0	0	160	0	0
1938	1,198	0	0	1,198	0	0
1939	1,625	0	0	1,625	0	0
1940	1,386	0	0	1,386	0	0
1941	1,692	0	0	1,692	0	0
1942	1,940	84	0	1,856	0	0
1943	1,721	2	0	1,719	0	0
1944	1,632	2	0	1,630	0	0
1945	1,056	2	0	1,054	0	0
1946	1,239	2	0	1,237	0	0
1947	1,795	2	0	1,793	0	0
1948	1,313	3	0	1,310	0	0
1949	1,460	0	0	1,460	0	0
1950	1,497	478	0	1,019	0	0
1951	695	307	0	388	0	0
1952	1,248	796	0	452	0	0
1953	2,105	907	0	1,198	0	0
1954	2,109	1,050	0	1,059	0	0
1955	2,047	484	0	1,563	0	0
1956	1,864	276	0	1,588	0	0
1957	1,693	295	0	1,398	0	0
1958	1,979	1	0	1,978	0	0
1959	2,233	259	0	1,974	0	0
1960	1,098	260	0	838	0	0
1961	2,830	419	0	2,411	0	0

HISTORICAL SURFACE WATER USE SUMMARY
NUECES RIVER BASIN - REACH 3

YEAR	TOTAL (ACFT)	MUN. (ACFT)	IND. (ACFT)	IRR. (ACFT)	MINING (ACFT)	RECHARGE (ACFT)
1962	1,559	436	0	1,123	0	0
1963	2,738	597	0	2,141	0	0
1964	3,803	592	0	3,211	0	0
1965	4,195	589	0	3,606	0	0
1966	4,583	503	52	4,028	0	0
1967	4,878	629	0	4,249	0	0
1968	3,411	287	0	3,124	0	0
1969	3,645	482	0	3,163	0	0
1970	4,430	454	0	3,976	0	0
1971	3,919	544	0	3,375	0	0
1972	2,603	436	0	2,167	0	0
1973	3,606	462	0	3,144	0	0
1974	3,375	380	0	2,995	0	0
1975	2,516	338	0	2,178	0	0
1976	1,952	323	0	1,629	0	0
1977	2,616	356	69	2,191	0	0
1978	5,363	12	0	5,351	0	0
1979	3,130	422	0	2,708	0	0
1980	2,497	708	0	1,789	0	0
1981	4,034	494	0	3,540	0	0
1982	3,987	351	40	3,596	0	0
1983	4,752	406	0	4,346	0	0
1984	3,248	394	0	2,854	0	0
1985	2,388	393	0	1,995	0	0
1986	2,910	481	79	2,350	0	0
1987	4,828	1,138	709	2,981	0	0
1988	4,559	1,237	0	3,322	0	0
1989	4,333	1,294	0	3,039	0	0
AVG. USE (1979-88)	3,633	602	83	2,948	0	0

Note: 1989 Surface Water Use includes only permitees with authorized and actual diversions in excess of 50 acft/yr.

HISTORICAL SURFACE WATER USE SUMMARY
NUECES RIVER BASIN - REACH 4

YEAR	TOTAL (ACFT)	MUN. (ACFT)	IND. (ACFT)	IRR. (ACFT)	MINING (ACFT)	RECHARGE (ACFT)
1915	589	589	0	0	0	0
1916	693	668	0	25	0	0
1917	56	0	30	26	0	0
1918	40	0	0	40	0	0
1919	810	810	0	0	0	0
1920	0	0	0	0	0	0
1921	0	0	0	0	0	0
1922	0	0	0	0	0	0
1923	0	0	0	0	0	0
1924	0	0	0	0	0	0
1925	8,816	4,408	0	4,408	0	0
1926	1,931	185	0	1,746	0	0
1927	3,114	0	0	3,114	0	0
1928	17	0	0	17	0	0
1929	2,007	242	0	1,765	0	0
1930	2	0	0	2	0	0
1931	2,673	2,673	0	0	0	0
1932	2,956	251	0	2,705	0	0
1933	0	0	0	0	0	0
1934	0	0	0	0	0	0
1935	0	0	0	0	0	0
1936	0	0	0	0	0	0
1937	12,733	8,401	0	4,332	0	0
1938	2,954	375	0	2,523	56	0
1939	2,795	0	0	2,795	0	0
1940	2,796	0	1	2,795	0	0
1941	4,402	0	2	4,400	0	0
1942	1,923	484	2	1,437	0	0
1943	15,262	13,235	2	2,025	0	0
1944	20,386	18,680	5	1,701	0	0
1945	27,236	25,421	5	1,810	0	0
1946	19,203	17,921	2	1,280	0	0
1947	28,991	22,173	4,478	2,340	0	0
1948	30,355	22,046	6,624	1,685	0	0
1949	31,657	21,644	5,098	4,915	0	0
1950	35,938	26,481	5,808	3,649	0	0
1951	49,297	38,311	8,744	2,242	0	0
1952	53,496	41,959	9,403	2,134	0	0
1953	56,619	42,956	12,283	1,380	0	0
1954	47,136	26,405	17,890	2,841	0	0
1955	53,036	26,927	22,844	3,265	0	0
1956	50,896	29,362	19,838	1,696	0	0
1957	48,324	22,765	24,306	1,253	0	0
1958	54,394	20,549	32,271	1,574	0	0
1959	52,857	18,952	33,244	661	0	0
1960	55,923	19,700	34,622	1,601	0	0
1961	56,726	21,266	34,131	1,329	0	0

HISTORICAL SURFACE WATER USE SUMMARY
NUECES RIVER BASIN - REACH 4

YEAR	TOTAL (ACFT)	MUN. (ACFT)	IND. (ACFT)	IRR. (ACFT)	MINING (ACFT)	RECHARGE (ACFT)
1962	68,184	28,164	36,850	3,170	0	0
1963	71,077	30,058	37,833	3,186	0	0
1964	72,689	31,832	37,457	3,400	0	0
1965	74,382	35,685	35,603	3,094	0	0
1966	71,029	26,755	43,065	1,209	0	0
1967	81,512	39,767	39,544	2,201	0	0
1968	72,349	31,251	40,932	166	0	0
1969	87,132	40,290	46,068	774	0	0
1970	79,869	35,238	44,213	418	0	0
1971	86,924	43,064	42,857	1,001	2	0
1972	83,128	43,329	39,628	171	0	0
1973	86,522	45,270	41,047	205	0	0
1974	89,419	51,158	37,863	398	0	0
1975	89,462	42,946	45,229	1,277	10	0
1976	87,780	45,543	41,968	257	12	0
1977	97,476	44,739	52,483	243	11	0
1978	101,617	56,228	44,787	594	8	0
1979	100,341	52,444	47,441	456	0	0
1980	113,648	68,773	43,554	1,321	0	0
1981	107,755	56,831	50,601	271	52	0
1982	112,249	68,005	43,208	985	51	0
1983	109,219	60,771	47,362	1,012	74	0
1984	106,353	59,426	45,776	1,099	52	0
1985	99,693	58,344	41,050	253	46	0
1986	100,503	56,361	43,077	1,019	46	0
1987	108,671	65,254	42,853	564	0	0
1988	130,397	82,779	45,041	2,514	63	0
1989	145,500	91,433	50,262	3,805	0	0
AVG. USE (1979-88)	108,883	62,899	44,996	949	38	0

Note: 1989 Surface Water Use includes only permitees with authorized and actual diversions in excess of 50 acft/yr.

APPENDIX D

Water Rights

KEY TO
SUMMARY OF SURFACE WATER RIGHTS
NUECES RIVER BASIN

TYPE:

1	-	Application
6	-	Adjudication Certificate
9	-	Water Contract

USE:

1	-	Municipal & Domestic
2	-	Industrial
3	-	Irrigation
4	-	Mining
7	-	Recreation
8	-	Other
9	-	Recharge

COUNTY:

7	-	Atascosa
10	-	Bandera
64	-	Dimmit
69	-	Edwards
82	-	Frio
125	-	Jim Wells
136	-	Kinney
142	-	La Salle
149	-	Live Oak
156	-	McMullen
162	-	Maverick
163	-	Medina
178	-	Nueces
193	-	Real
205	-	San Patricio
232	-	Uvalde
240	-	Webb
254	-	Zavala

SUMMARY OF SURFACE WATER RIGHTS
NUECES RIVER BASIN

STATE MASTER NUMBER	TYPE	CO.	RIVER ORDER NUMBER	PERMIT NUMBER	APPLICANT OR APPROPRIATOR	STREAM NAME	USE	AUTHORIZED DIVERSION (ACFT/YR)	ACRES IRRIG.	STORAGE CAPACITY (ACFT)	PRIORITY DATE	REMARKS
002468	6	178	0152000000		C E COLEMAN ESTATE	NUECES	3	27	57		19640218	RATE COMBINED WITH 21-2469
002469	6	178	0152000005		ILA M NOAKES LINDGREEN	NUECES	3	101	120		19640218	
002467	6	178	0154000000		GARNETT T & PATSY A BROOKS	NUECES	3	221	262		19640218	
002466	6	178	0325000000		NUECES COUNTY WCID 3	NUECES	1	4246			19090207	
002466	6	178	0325000000		NUECES COUNTY WCID 3	NUECES	3	7300	3431		19090207	
002465	6	205	0500000000		CLEAR LAKE POINT INC ET AL	BAYOU CREEK	3	160	350	580	19521028	& RECREATION
002464	6	178	0700000000		CITY OF CORPUS CHRISTI	NUECES	2	150000			19250115	LAKE CORPUS CHRISTI
000186	9	178	0700000000	0024646	SAN PATRICIO MWD	NUECES	2	20160			19720522	EXPIRES 6/1/94
002464	6	178	0700000000		CITY OF CORPUS CHRISTI	NUECES	3	14			19250115	CALALLEN RES
000186	9	178	0700000000	0024646	SAN PATRICIO MWD	NUECES	1	8960			19720522	CALALLEN RES, EXPIRES 6/1/94
000163	9	178	0700000000	0024646	KOCH REFINING CO-A DELAWARE CO	NUECES	2	2581	1920		19720208	CALALLEN RESERVOIR
000005	9	205	0700000000	0024646	SAN PATRICIO M W D	NUECES RIVER	1	750			19640601	LAKE CORPUS CHRISTI, EXPIRES 6/1/94
001688	9	205	0700000000	0024646	CITY OF MATHIS	NUECES	1				19770914	LAKE CORPUS CHRISTI
002464	6	178	0700000000		CITY OF CORPUS CHRISTI	NUECES	4	12			19250115	TRANSBASIN TO BASINS 20, 22
002464	6	178	0700000000		CITY OF CORPUS CHRISTI	NUECES	1	4872		1175	19131226	CALALLEN RES
001687	9	149	0700000000	0024646	BEEVILLE WATER SUPPLY DIST	NUECES	1				19820303	LAKE CORPUS CHRISTI
002464	6	178	0700000000		CITY OF CORPUS CHRISTI	NUECES	1	150000		300000	19131226	LAKE CORPUS CHRISTI
000295	9	125	0700000000	0024646	ALICE WATER AUTHORITY	NUECES	1	7500			19620504	LAKE CORPUS CHRISTI
004606	1	205	0700500000	004289	CITY OF MATHIS	UNNAMED	3	50	100		19850820	TRIB NUECES RIVER, EXP 12/31/95
002463	6	149	0900000000		R C HARRIS ESTATE ET AL	WALLER GULLY	3	200	301	461	19550822	
005065	1	149	1000000000	005065	DIAMOND SHAMROCK REFINING	FRIO RIVER	3	1121	415	228	19860630	
003215	6	149	1050000000		CITY OF THREE RIVERS	FRIO RIVER	1	724		300	19140921	
003215	6	149	1050000000		CITY OF THREE RIVERS	FRIO RIVER	1	246			19640629	
003215	6	149	1050000000		CITY OF THREE RIVERS	FRIO RIVER	1	330		1900	19540830	
003215	6	149	1050000000		CITY OF THREE RIVERS	FRIO RIVER	2	200			19750210	
005258	1	149	1060000000	005258	MURIELL E MCNEILL	ATASCOSA	3	64	32		19890918	EXP 12/31/99
003219	6	007	1130000000		ERNEST KORUS ET AL	ATASCOSA RIVER	3	30	30		19670630	
003218	6	007	1140000000		JACK L & MARLENE MCGINNIS	ATASCOSA RIVER	3	18	36		19660731	
003217	6	007	1142500000		WOODROW W MARSH	ATASCOSA RIVER	3	27	105		19650430	
004772	6	007	1150000000		MAGSONS N. V.	BONITA CR	3	2	20	32	19260630	
003216	6	007	1180000000		ATASCOSA COWBOY RECREATION	UNNAMED	3	20	20		19690616	TRIB OF ATASCOSA RIVER
003986A	1	007	1200000000	003694A	O M NAEGELIN FARMS INC	UNNAMED OF/AND	3	80	75	20	19790618	ATASCOA, EXP 12/31/99 SEE BOX, 1/22/90
003214A	6	178	1255000000		CITY OF CORPUS CHRISTI	FRIO RIVER	3	200			19760719	AMEND 7/6/88
003214A	6	178	1255000000		CITY OF CORPUS CHRISTI	FRIO RIVER	1	500			19760719	ALSO USE 7, CHOKE CANYON
001731	9	149	1255000000	0032146	TEXAS PARKS & WILDLIFE DEPT	FRIO	3	60			19890410	CHOKE CANYON
003214A	6	178	1255000000		CITY OF CORPUS CHRISTI	FRIO RIVER	2	78530			19760719	

SUMMARY OF SURFACE WATER RIGHTS
NUECES RIVER BASIN

STATE MASTER NUMBER	TYPE	CO.	RIVER ORDER NUMBER	PERMIT NUMBER	APPLICANT OR APPROPRIATOR	STREAM NAME	USE	AUTHORIZED DIVERSION (ACFT/YR)	ACRES IRRIG.	STORAGE CAPACITY (ACFT)	PRIORITY DATE	REMARKS
001731	9	149	1255000000	0032146	TEXAS PARKS & WILDLIFE DEPT	FRIO	1	50			19840410	
003214A	6	178	1255000000		CITY OF CORPUS CHRISTI ET AL	FRIO	1	59770		700000	19700719	CHOKE CANYON
005145A	1	156	1451000000	005145A	SAN MIGUEL ELECTRIC COOP INC	HOG CREEK	2	0		296	19870710	SEDIMENT CONTROL & CO 007, 7/5/89
003213	6	007	1453000000		SAM COUNTISS	UNNAMED	3	13	76		19500630	TRIB OF LIVE OAK CREEK
003919	1	082	1470000000	003627	ROY HINDES	UNNAMED	7	0		949	19780925	LIVEOAK CR-MIRACLE LK-& USE 1-EXP 20 YRS
003212	6	082	1480000000		T C MORROW	BUCKHORN CREEK	3	25	100	112	19771011	
005249	1	082	1531000000	005249	THERESA BIEDIGER	SAN MIGUEL CR	3	50	80		19890718	EXP 12/31/99
005248	1	082	1532000000	005248	HELEN BRANHAM	SAN MIGUEL	3	50	80		19890718	EXP 12/31/99
005247	1	082	1533000000	005247	CONNIE BRADLEY	SAN MIGUEL CR	3	50	60		19890718	EXP 12/31/89
003211A	6	082	1550000000		GLEN EARL BAKER	SAN MIGUEL CR	3	60			19790514	
003211A	6	082	1550000000		GLEN EARL BAKER	SAN MIGUEL CR	3	40	118	4	19200907	AMEND 1/23/89
003884	1	082	1610000000	003605	CLAUDE D J SMITH	SAN MIGUEL	3	80	80		19780515	
004113	1	082	1620010000	003817	DR LESLIE R FRICKE	SAN MIGUEL CR	3	15	25	17	19810413	SEE BOX-OUT OF A 278.97 A
003210	6	082	1630000000		FRANCIS MALDONADO	UNNAMED/SANMIG	3	20	25	20	19710816	TRIB OF SAN MIGUEL CREEK
004041	1	082	1640000000	003747	FLOYD B NEUMAN	SAN MIGUEL	3	25	70		19800414	160-ACRE TRACT - S C
003209	6	082	1660000000		E F MORRIS	CHACON CREEK	3	118	58	10	19171231	
003208	6	082	1665000000		COX FEEDLOTS, INC	UNNAMED	3	230	115	243	19750324	TRIB OF CHACON CREEK
004476	1	163	1668000000	004179	EUGENE & NAOMI I NELSON	CHACON CR	3	50	25		19840807	EXP 12/31/94
004266	1	163	1670000000	003941	ROBERT M & JOYCE R STANTON	CHACON CR	3	35	25		19821122	
004286	1	163	1675000000	003946	C H PIFER	CHACON CR	3	4	4	4	19821220	
003207	6	163	1700000000		BEXAR-MEDINA-ATASCOSA WCID 1	CHACON CREEK	3	2000	1000	730	19120320	SEE 19-2131, ALSO CO 007
003206	6	156	1709000000		JAMES L HOUSE TRUST	FRIO RIVER	3	123	123		19661231	
003205	6	156	1710000000		RICHARD P HORTON	UNNAMED & FRIO	3	103	65	122	19631231	SLOUGH OF THE FRIO RIVER
003204	6	156	1710500000		RICHARD P HORTON	FRIO RIVER	3	233	152		19631231	
003203	6	142	1778000000		DOUGLAS A MILLER, ET AL	UNNAMED	3	106	106	117	19570331	SLOUGH OF THE FRIO RIVER
003202	6	142	1840000000		MALVIN E PLOCEK	UNNAMED & FRIO	3	22	16		19451231	
003201	6	142	1870000000		JEFF E RUSK ET AL	FRIO RIVER	3	649	1100	10	19261231	
003200	6	082	2050000000		T E BURNS ET AL	MARTINE CREEK	1			1140	19481103	ALSO CO 142
003903A	1	082	2120000000	003610A	SHANKLE RANCH INC	FRIO RIVER	3	150	150		19780807	EXP 12/31/98, 9/22/88
004014	1	082	2160000000	003738	JOE H BERRY	LEONA	3	124	124	26	19800107	
003199	6	082	2170000000		PANTHER HOLLOW RANCH, LTD	UNNAMED	3	50	120	30	19641231	TRIB OF TODOS SANTOS CREEK
004310A	1	254	2319000000	004112A	BREWSTER FARMS INC	LEONA RIVER	3	84	42		19830124	AMEND 10/9/89, EXP 12/31/99
004339A	1	254	2320011000	004118A	CHARLES R IRWIN	LEONA RIVER	3	50	25		19830307	EXP 12/31/99, AMEND 1/3/90
003198	6	254	2340000000		DENVER C CARNES	LEONA RIVER	3	150	150		19760329	
003197	6	232	2400000000		MARJORIE LEE KERR ESTATE	LEONA RIVER	3	523	350		19140617	ALSO CO 254
003197	6	232	2400000000		MARJORIE LEE KERR ESTATE	LEONA RIVER	3	305	168		19140629	

SUMMARY OF SURFACE WATER RIGHTS
NUECES RIVER BASIN

STATE MASTER NUMBER	TYPE	CO.	RIVER ORDER NUMBER	PERMIT NUMBER	APPLICANT OR APPROPRIATOR	STREAM NAME	USE	AUTHORIZED DIVERSION (ACFT/YR)	ACRES IRRIG.	STORAGE CAPACITY (ACFT)	PRIORITY DATE	REMARKS
003196	6	232	2548500000		LOIS SMITH	LEONA RIVER	3	40	50		19601231	
003195	6	232	2549000000		UVALDE COUNTY	LEONA RIVER	7			80	19611228	
004304A	1	232	2549100000	004111A	C V & LONA SHEFFIELD	LEONA RIVE	3	12	12		19830110	EXP 12/31/99, AMEND 6/1/89
003194	6	232	2553000000		GEORGE E LIGOCKY	UNNAMED&COOKS	3	50	89	11	19770705	TRIB OF COOK'S SLOUGH
003194	6	232	2553000000		GEORGE E LIGOCKY	UNNAMED&COOKS	3	49	10		19790627	
003990	1	232	2553200000	003702	DON INMAN	UNNAMED	3	30	20		19790625	COOKS SLOUGH - RES EXEMPT
003988	1	232	2553300000	003701	C ALVIN HEARD JR ET AL	UNNAMED	3	28	28	4	19790625	COOKS SLOUGH
003989	1	232	2553400000	003711	KENNETH D SPARKS	UNNAMED	3	56	56	20	19790625	COOKS SLOUGH
003991	1	232	2553500000	003703	C V SHEFFIELD JR ET UX	UNNAMED	3	250	190	6	19790625	COOKS SLOUGH
003193	6	082	2575000000		HOWARD F BENNETT	FRIO RIVER	3	8	40		19321231	
003192	6	163	2589000000		EDWARDS UNDERGROUND WATER DIST	PARKERS CREEK	9	520		200	19720918	
003191	6	163	2590000000		L S MOLLERE, TRUSTEE	SECO CREEK	3	20	66	5	19650430	
003806	1	163	2620000000	003551	EDWARDS UNDERGROUND W D	SECO CREEK	9	1185		2	19770815	STORM & FLOODWATERS FOR RECHARGE SC
005192	1	163	2622000000	005192	JOHN ROBERT WINDROW ET UX	W BR LIVE OAK	8				19881208	
003954A	1	163	2624000000	003664A	ERNESTO & ALONSO RODRIGUEZ	HONDO CR	3	70	35		19790102	EXPIRES 12/31/99, 7/5/89
004506	1	163	2624900000	004187	JAMES THOMAS BAGBY JR	HONDO CR	3	40	25		19841016	
003190	6	163	2625010000		GLEN MCWILLIAMS ET AL	HONDO&UNNAMED	3	80	80		19741125	
003189	6	163	2626000000		RICHARD W SCHWEERS	HONDO CREEK	3	40	60		19620430	
004095	1	163	2626100000	003804	FAYE JEAN WIEMERS HONIG ET AL	HONDO CR	3	70	42		19810105	2 TRACTS 362.65839, EXPIRES 12/31/91
003745	1	163	2627000000	003444	EDWARDS UNDERGROUND W D	MIDDLE VERDE	9	585		22	19770131	
003188	6	010	2650000000		W J SCHMIDT	HONDO CREEK	3	24	47	16	19560220	
003187	6	010	2651000000		BRIAN WEINER	WILLIAMS CREEK	3	23	21	15	19670331	
003186	6	010	2651500000		DOROTHY BAIRD BEAN	WILLIAMS CREEK	3	128	88	73	19631231	
003185	6	010	2651700000		W H THOMPSON, JR	WILLIAMS CREEK	3	15	5	2	19690626	
003184	6	010	2675000000		H B LIVELY	SPRING CREEK	3	10	5	42	19631231	
003914	1	082	2699000000	003620	A. E SCHLETZE ETAL	ELM CREEK	3	25	200	200	19780918	ALSO USE 7, 2189-AC TR, STORE GW
003182	6	232	2755210000		PAUL G SILBER JR ET AL	SABINAL RIVER	3	40	40		19531231	
004352	1	232	2791600000	004030	LOUIS A WATERS	LITTLE CR	3	110	75		19830418	
004505	1	232	2793500000	004203	UTOPIA WATER SUPPLY CORP	SABINAL	1	200			19841016	
003181	6	010	2793800000		BRUCE L BOSWELL ET UX	W SABINAL R	3	400	200		19770117	ALSO CO 232, EXP 12/31/99
003180	6	193	2799000000		LANA J STORMONT	UNNAMED	3	5	10		19700105	TRIB OF WEST SABINAL RIVER
005186	1	010	2824000000	005186	HILL COUNTRY SPRING WATER TX	SPRING/UNNAME	1	161			19880621	TRIB SABINAL R, BOTTLED WATER, .049 RES
003179	6	010	2825000000		JOHN K HARRELL	SABINAL RIVER	3	24	100		19651204	
003179	6	010	2825000000		JOHN K HARRELL	SABINAL RIVER	3	13	25		19631014	
005204	1	010	2840000000	005204	ROGER E. CANTER ET UX	SABINAL R	3	60	20		19881026	
003178	6	010	2850000000		KING & JEWEL FISHER	SABINAL	3	10	56	2	19530709	

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003177	6	010	2850500000		JOE K LEIGHTON	SABINAL RIVER	1	4			19121231	
003176	6	010	2851020000		TEXAS PARKS & WILDLIFE DEPT	CAN CREEK	1	7			19780123	
003176	6	010	2851020000		TEXAS PARKS & WILDLIFE DEPT	CAN CREEK	3		3		19780123	
003175	6	232	2960000000		UVALDE COUNCIL OF GIRL SCOUTS	DRY FRIO RIVER	3	9	10		19630131	
003174	6	232	2961000000		RIO GRANDE CHILDRENS HOME INC	DRY FRIO RIVER	3	31	36	2	19630131	
003173	6	232	3010000000		ALVIN M RIMKUS	FRIO RIVER	3	1000	500		19770815	
004305	1	232	3025000000	003974	A C SANDERLIN ET AL	FRIO RIVER	3	1140	570		19830110	
004177A	1	232	3025100000	003850A	MARVIN G VERSTUYFT ET AL	FRIO	3	965	500		19811207	AMEND 4/17/89
003172	6	232	3030000000		THOMAS & GRETEL EKBAUM	FRIO RIVER	3	1000	505		19770705	
003171	6	232	3052500000		MICHAEL L STONER	FRIO RIVER	3	75	60	32	19521231	
003170	6	232	3052750000		JOHN M & MARY ANN BARKLEY	FRIO RIVER	3	19	19		19631231	
003169	6	232	3100010000		JOHN S. GRAVES, JR, ET AL	MAYHEW&FRIO	3	40	40		19520616	& FRIO RIVER, SEE 21-3168
003168	6	232	3149000000		JOHN S BUCHANAN	FRIO RIVER	3	37			19520616	
003168	6	232	3149000000		JOHN S BUCHANAN	FRIO RIVER	3	4	37		19480531	
005063	1	232	3179000000	005063	GAFFORD FAMILY PARTNERSHIP	FRIO RIVER	3	100	50		19860523	
003167	6	232	3200000000		RALPH S O'CONNOR	FRIO RIVER	3	11	5		19271231	SEE 21-3166
003166	6	232	3210000000		JOE C KRANZ ET UX	FRIO RIVER	3	35	18		19271231	
004238	1	232	3220000000	003962	CON CAN ENTERPRISES INC	FRIO RIVER	3	140	71		19820907	
003165	6	232	3250000000		WALLACE S & ISABEL B WILSON	FRIO RIVER	3	86	79		19381231	
003164	6	232	3255000000		TEXAS PARKS & WILDLIFE DEPT	FRIO RIVER	7			30	19691020	
003163	6	232	3285000000		JOHN HAMMAN JR ESTATE	FRIO RIVER	3	113	123		19281231	
003162	6	193	3287500000		PHYLLIS CHILDS DETERING ET AL	UNNAMED	3	5	25	15	19551231	TRIB OF BUFFALO CREEK
003161	6	193	3289500000		R L HUBBARD	DRY FRIO CREEK	3	17	21		19670619	
003160	6	193	3290000000		GRACIA BASSETT HABY ET AL	FRIO RIVER	3	60	100		19531231	
003159	6	193	3294000000		SAM G HARRISON	FRIO RIVER	3	140	70		19480930	
003157A	6	193	3350000000		DIAMOND J RANCH INC	FRIO	3	250	125		19500322	AMEND 1/9/85
003158	6	193	3375000000		LOMBARDY IRRIGATION CO	FRIO RIVER	3	1600	800	6	19160331	ALSO COUNTY 232
003156	6	193	3400000000		H P COOPER ET AL	FRIO RIVER	3	2			19491231	
003156	6	193	3400000000		H P COOPER ET AL	FRIO RIVER	3	20	22		19140627	
003155	6	193	3420000000		LOTTIE N WRIGHT	FRIO RIVER	3	164	43		19611231	
003154	6	193	3430000000		JAMES TREES	YOUNGBLOOD SPR	3	2	6		19670731	
003153	6	193	3490000000		JOHN J BURDITT, ET AL	UNNAMED&E FRIO	3	23			19140629	
003153	6	193	3490000000		JOHN J BUARDITT ET AL	UNNAMED&E FRIO	3	15	50		18960527	
003152	6	193	3600000000		DAN AULD, JR	E FRIO RIVER	3	324	162		19140527	
003151	6	193	3620000000		KATHERINE MAXINE MORELAND	E FRIO RIVER	3	67	30		19140527	
003878A	1	193	3645000000	003582A	C B SLABAUGH	CYPRESS CR	3	40	30		19780410	68-AC TR, SC, AMEND 11/12/84

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003150	6	193	3655000000		R F BINDOCK	E FRIO RIVER	3	3	11		19571231	
003149	6	193	3660000000		ORA L ROGERS ESTATE	E FRIO RIVER	3	30	28		19531231	
003148	6	193	3750000000		H E BUTT FOUNDATION	E FRIO RIVER	7			11	19300130	
003148	6	193	3750000000		H E BUTT FOUNDATION	E FRIO RIVER	7			10	19260614	
003147	6	193	3810000000		DIAMOND J RANCH INC	W FRIO RIVER	3	165	55		19251231	
005009	1	193	3830000000	005009	JACKSON L BABB ET AL	WEST FRIO R	3	60	30		19850910	
003146	6	193	3850000000		GEORGE HALE ET AL	W FRIO RIVER	7			16	19270621	
003145	6	193	3900000000		GEORGE S HAWN INTERESTS ET AL	S P/L P W FRIO	7			27	19300407	ALSO USE 7
003145	6	193	3900000000		GEORGE S HAWN INTERESTS ET AL	S P/L P W FRIO	3	156	78		19810105	
003145	6	193	3900000000		GEORGE S HAWN INTERESTS ET AL	S P/L P W FRIO	7			68	19671003	
004094	1	193	3905500000	003801	GEORGE S HAWN INTERESTS ET AL	WEST FRIO	3	56	28	9	19810105	OUT OF 1118 ACRES
003144	6	156	3935000000		EDWIN & PATSY DUNN SINGER	NUECES	7			205	19690224	& DOM
003144	6	156	3935000000		EDWIN & PATSY DUNN SINGER	NUECES	7			80	19710125	
003143	6	156	3960000000		L.H. TRUE	NUECES	3	220	110	40	19581231	
003142	6	156	4000000000		W.L.FLOWERS MACHINE&WELDING CO	NUECES	3	132	175	100	19651231	
005170	1	142	4010000000	005170	PATRICK HUGHES WELDER JR ET AL	UNNAMED	1			548	19880212	TRIB GREEN BR, BIG ALAMO TANK
003141	6	156	4030000000		OGDEN D. DOOLEY	OLD CHANNEL	3	8	8		19651231	OLD CHANNEL OF NUECES
003910	1	240	4045000000	003641	VAQUILLAS RANCH CO LTD	SALADO	3	200	100	2640	19780905	1599.41-AC TR - SC
003140	6	142	4075000000		FRED HILLJE ESTATE	NUECES	3	76	76	76	19660103	
003139	6	142	4150000000		HOLLAND TEXAS DAM & IRR. CO.	NUECES&UNNAMED	3	2023	1320	700	19101223	
003138	6	142	4180000000		CHARLES D. JOHNSON	UNNAMED&NUECES	3	55	55		19100507	SLOUGH OF NUECES
003135	6	142	4180010000		H.B. RAMSEY	NUECES&UNNAMED	3	80	320		19060803	
003137	6	142	4180020000		T.G. RANKIN	NUECES	3	84	30		19100507	
003136	6	142	4180030000		DOROTHY M. KINSEL	NUECES	3	200	133		19060803	
003133	6	142	4180040000		ERNEST E. ALLERKAMP	NUECES	3	350	390		19100507	
003134	6	142	4180050000		GEORGE C HIXON	NUECES	3	398	167		19100507	
003132	6	142	4250000000		ERNEST E. ALLERKAMP	UNNAMED&NUECES	3	195	130		19100629	SLOUGH OF NUECES
003131	6	142	4260000000		RONALD C FEUDO	NUECES	3	50	75		19100629	
003130	6	142	4270000000		C.C. SPEED	NUECES	3	126	190		19100629	
003129	6	142	4300000000		LOUISE G DAVIS	NUECES	3	180	150	35	19120122	
003128	6	142	4350000000		PEARL M. KINSEL, ET AL	NUECES	3	39	34	35	19150707	
003127	6	142	4400000000		LEE M & VALDA M GATES	NUECES	3	180	90	20	19110807	
003126	6	142	4450000000		SILLER BROTHERS	NUECES	3	260	390		19671231	
003126	6	142	4450000000		SILLER BROTHERS	NUECES	3	100	100	15	19180316	
003125	6	142	4475000000		GEORGE & SHARON TRIGO	NUECES	3	20	40		19110807	
003124	6	142	4500000000		CLODORMIRO GARZA ET AL	UNNAMED&NUECES	3	5	40	50	19040811	SLOUGH OF NUECES

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003123	6	142	4500200000		LOUIS OSWALD LIND	UNNAMED&NUECES	3	130	32		19040811	
003123	6	142	4500200000		LOUIS OSWALD LIND	UNNAMED&NUECES	3	70	35		18970712	
003122	6	142	4540000000		SANTANA A MORIN ET AL	NUECES	3	30	30		18970712	
003121	6	142	4550000000		RUDY & TERESA RODRIGUEZ SR	NUECES	3	5	6		18970712	
003120	6	142	4600000000		JOE L. GILBERT	NUECES	3	200	100	150	19140627	
003119	6	142	4700000000		MANUEL TRISTON RAMIREZ	NUECES	3	40	40	150	19140627	
003118	6	142	4750000000		WILLIAM V BOOTH JR ET UX	NUECES	3	50	50	150	19150709	
003117	6	142	4840000000		L.D. RANCH & CATTLE CO.	NUECES	3	270	225	70	19100128	
003116	6	142	4850000000		JEFFERSON STATE BANK TRUSTEE	NUECES	3	178	79	70	19100128	
003115	6	142	4850500000		CLAY & SYLVIA MCBRYDE	NUECES	3	55	47	70	19100128	
003114	6	142	4851000000		RALPH P. GUTTMAN	NUECES	3	199	165	70	19100128	
003112	6	142	4858000000		FREDNA K DOBIE	NUECES RIVER	3	47	47	70	19100128	
003111	6	142	4858030000		EUGENE WHITE	NUECES RIVER	3	30	23		19100128	
003108	6	142	4950000000		C L LEHMAN ESTATE	NUECES RIVER	3	298	411	180	19010816	
003107	6	142	5000000000		RICHARD A & NITA V BALLARD	NUECES RIVER	3	210	144	180	19010816	
003110A	6	142	5010000000		J M SHILLING	NUECES RIVER	3	22	33	27	19140626	AMEND 2/1/85, AMEND EXP 12/31/94
003109	6	142	5020000000		M C WHITWELL ET UX	NUECES RIVER	3	10	40		19140626	
003106	6	142	5050100000		M C WHITWELL ET UX	UNNAMED&NUECES	3	20	40		19571231	TRIB OF NUECES RIVER
003106	6	142	5050100000		M C WHITWELL ET UX	UNNAMED&NUECES	3	20	40	15	19140622	
003105	6	142	5150000000		FRANKLIN JERRY MEEKS	NUECES RIVER	3	150	75	60	19041124	SEE ADJ 3104
003104	6	142	5150010000		WAITZ SUPER MARKET, INC	NUECES RIVER	3	250	125	10	19041124	
003103	6	064	5300000000		R W BRIGGS, JR	BURRO CREEK	3	400	200	3500	19460829	
003102	6	064	5400000000		NEEDMORE RANCH INC	APPURCEON CR	3	15	155		19650617	
003101	6	064	5410000000		J R MARMION, JR	UNNAMED	7			1093	19770627	TRIB OF EL MORO CREEK
003099	6	064	5430000000		CHARLES W & MARJORIE V WILSON	EL BARROSA CR	3	34	65		19661010	
003095	6	064	5450000000		MARRS MCLEAN BOWMAN ET AL	NUECES RIVER	3	1090	1606	500	18970323	
003095	6	064	5450000000		MARRS MCLEAN BOWMAN ET AL	SOLDIER SLOUGH	3	201	166		19121104	
003098	6	064	5500000000		LUCILE C WHITECOTTON ET AL	SOLDIER SLOUTH	3	60	40		19121104	
003093	6	064	5580000000		CHARLES H THALMAN	SOLDIER SLOUGH	3	75	75	28	19070912	
003082A	6	254	5600000000		ZAVALA-DIMMIT CO WID 1	NUECES RIVER	3	8000	4000	4010	19251005	
003082A	6	254	5600000000		ZAVALA-DIMMIT CO WID 1	NUECES	4	4		71	19130523	AMENDED 1/25/84
003082A	6	254	5600000000		ZAVALA-DIMMIT CO WID 1	NUECES RIVER	3	19996	10000	1115	19130523	
003082A	6	254	5600000000		ZAVALA-DIMMIT CO WID 1	NUECES RIVER	8			344	19450710	IMPOUNDMENT
003092	6	254	5770000000		JAMIE G HASSETT	UNNAMED&COMANC	3	684	456		19251231	TRIB OF COMANCHE CREEK
003091	6	254	5800000000		MARIE B STEINLAGE	COMANCHE CR	3	2098	800		19240915	
003090	6	254	5816000000		JIM G FERGUSON, JR	COMANCHE CREEK	3	65			19351231	

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003090	6	254	5816000000		JIM G FERGUSON, JR	COMANCHE CREEK	3	45	150		19351231	
003088	6	254	5825000000		CHAPARROSA RANCHES, LTD	CHAPARROSA CR	3	150	75	200	19670605	
003087	6	232	5827000000		R L WHITE COMPANY	GATO CREEK	2	10		2039	19770725	& REC
003913	1	232	5829000000	003663	JOE G JR & J BEAUMONT SMYTH	WOOD SLOUGH	1			1281	19780911	BIG TANK LAKE- EXPIRES 4/10/99-DOM & L S
003089	6	254	5836000000		ERROL O JONSSON, ET AL	CHACON CREEK	3	174	402	114	19790702	
003089	6	254	5836000000		ERROL O JONSSON, ET AL	CHACON CREEK	3	206	412	187	19581231	EXP 12/31/89
005201	1	162	5845000000	005201	EWING HALSELL FOUNDATION	COMANCHE CR	1			4865	19881101	
003097A	6	064	5950200000		DALE L HASTEN	NUECES	3	231	77	500	18970323	AMEND 11/1/85
001523	9	064	5950200000	0030976	ALBERT IVY	NUECES	3	225			19850101	YEAR-TO-YEAR AFTER 86
003096	6	064	5950300000		DONALD JACKSON ET UX	NUECES RIVER	3	337	120	500	18970323	
003094A	6	064	5956000000		ALBERT IVY	LIVE OAK/NUECE	3	300	135		18970323	& NUECES R, AMEND 7/29/85
003086	6	064	5958000000		T R MANAGEMENT, INC	NUECES RIVER	3	554	693	75	19481231	
003084	6	254	6400000000		OPAL E C MARBURGER	NUECES RIVER	3	80	40		19140224	
003083	6	254	6500000000		DALE R WALKER	NUECES RIVER	3	230	105		19131112	
003081	6	254	6650000000		GEORGE C THOREEN ET AL	NUECES RIVER	3	390	200		19160313	
003085	6	254	6650100000		WARD L BOX	NUECES RIVER	3	320	150		19140224	
003080	6	254	6715200000		F F BONNET EX UX	NUECES RIVER	3	75	360		19720406	(PRIORITY DATE 090280)
003079	6	254	6730000000		JACK RUTLEDGE	NUECES RIVER	3	313	155		19340531	
003078	6	254	6730100000		WILBA RALPH WALKER ET AL	NUECES RIVER	3	200	137		19340531	SEE ADJ 3074
003077	6	254	6730200000		K & M FARMS	NUECES RIVER	3	200	157		19340531	SEE ADJ 3074
003076	6	254	6730300000		DON P DIXON	NUECES RIVER	3	154			19340531	SEE ADJ 3074
003075	6	254	6730400000		WALTER D MOORE	NUECES RIVER	3	124	93		19340531	SEE ADJ 3074
003074	6	254	6730500000		DONALD R LINDENBORN JR TRUSTEE	NUECES RIVER	3	200	149		19340531	
003073	6	232	6750000000		SAM BARKLEY	NUECES RIVER	3	144	74		19140629	
003072	6	232	6800000000		JEAN DEBONA DULLNIG	NUECES RIVER	3	200	200		19110805	
003071	6	136	7023010000		LLOYD L DAVIS	W NUECES RIVER	8	0			19760719	IMPOUNDMENT
004365	1	136	7028000000	004136	U S COMPANIES INC	SPRING BR	7	10		42	19840523	4 RES
003070	6	069	7041600000		E B CARRUTH, JR, TRUST	W NUECES RIVER	3	200	184		19750422	
003070	6	069	7041600000		E B CARRUTH, JR, TRUST	W NUECES RIVER	7			19	19681104	
003069	6	232	7049800000		ARIZONA T CRUMP	NUECES RIVER	3	134	65		19131231	
003068	6	232	7100000000		WILLARD R WALLACE ET AL	NUECES	3	310	203		19120706	
003067	6	232	7125000000		EVERETT L CLARK	NUECES RIVER	3	1461	487		19110114	
003066	6	232	7400500000		GEORGE H MOFF	NUECES RIVER	3	10	6		19201231	
003065	6	232	7450000000		WILLIAM R EDWARDS ET AL	NUECES RIVER	3	720	360		18940528	ALSO UNDERFLOW
003064	6	232	7500000000		ADANA TEAGUE	NUECES	3	150	50		19140629	ALSO CO 193

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STATE MASTER NUMBER	TYPE	CO.	RIVER ORDER NUMBER	PERMIT NUMBER	APPLICANT OR APPROPRIATOR	STREAM NAME	USE	AUTHORIZED DIVERSION (ACFT/YR)	ACRES IRRIG.	STORAGE CAPACITY (ACFT)	PRIORITY DATE	REMARKS
003063	6	232	7510000000		COUNTY OF UVALDE	NUECES RIVER	7			281	19620904	
003062	6	193	7550000000		JOANNE FRIEND	NUECES RIVER	3	46	46		19521118	
003061	6	193	7630000000		E E GILDART	NUECES RIVER	3	31	31		19590101	
003049	6	069	7630010000		STEVE GOSE	PULLIAM&NUECES	3	600	550		19770516	
003060	6	193	7631000000		E E GILDART	NUECES	3	35	46		19591231	
003060	6	193	7631000000		E E GILDART	NUECES	3	54	26		19490425	
003060	6	193	7631000000		E E GILDART	NUECES	3	42	21		19490202	
003059	6	193	7730000000		F L JR & CHARLOTTE HATLEY	NUECES RIVER	3	11	7		19591231	
003058	6	193	7740000000		DOROTHY MERRITT ANDERSON	NUECES RIVER	3	8	8		19571231	
004405	1	193	7760000000	004067	CITY OF CAMP WOOD	UNNAMED	1	1000			19831003	TRIB OF NUECES
004405	1	193	7760000000	004067	CITY OF CAMP WOOD	UNNAMED	3	83	16		19831003	
003057	6	193	7800000000		MAGELEE V SWIFT	W CAMP WOOD CR	3	10	4	4	19180316	
003057	6	193	7800000000		MAGELEE V SWIFT	W CAMP WOOD CR	3	21	16	8	18891231	SEE ADJ 3056
003056	6	193	7810000000		ROY GIBBENS	W CAMP WOOD CR	3	2			19631231	
003056	6	193	7810000000		ROY GIBBENS	W CAMP WOOD CR	3	18	9	4	19180316	
003055	6	193	7900000000		WILLIAM C & PATRICIA K SUTTON	W CAMP WOOD CR	3	105	130	2	19140615	
004169	1	193	7910000000	003935	ROARING SPRINGS RANCH INC	CAMP WOOD CR	3	15	10	41	19811123	6 RES & REC
004169	1	193	7910000000	003935	ROARING SPRINGS RANCH INC	CAMP WOOD CR	1	15			19811123	
003054	6	193	7950000000		HAROLD D. SCHERTLER	E CAMP WOOD CR	3	10	10		19140615	SEE ADJ 3051
003053	6	193	7960000000		BARRY BLANKS MCHALEK ET UX	E CAMP WOOD CR	3	1	1		19140615	SEE ADJ 3051
003052	6	193	7970000000		BARRY BLANKS MCHALEK ET UX	E CAMP WOOD CR	3	5	5		19140615	SEE ADJ 3051
003051	6	193	7980000000		L J DEAN	E CAMP WOOD CR	3	6	6		19140615	
003050	6	193	8000000000		W A MALEY	E CAMP WOOD CR	3	28	14		19111221	
004413	1	193	8240000000	004114	WILLIAM C SUTTON ET UX	CAMP WOOD CR	7			2	19831128	
003048	6	069	8340000000		L A MALACHEK ET AL	PULLIAM CREEK	3	27	14		19171231	
003047	6	069	8400000000		STEVE GOSE	CLEAR CREEK	3	6	6	11	19311123	
003046	6	069	8460500000		NORMA JEAN EASLEY	PULLIAM CREEK	3	30	59		19641231	
003045	6	069	8520000000		JOEL CRAIG, ET AL	PULLIAM CREEK	3	100	50		19641231	
003957A	1	069	8550000000	003674A	S A WILLIAMS	CEDAR CREEK	3	40	40		19790129	AMEND 1/13/87
003044	6	069	8700010000		TED JAMES, ET AL	SPRING BRANCH	3	4	20		18851231	
003044	6	069	8700010000		TED JAMES, ET AL	SPRING BRANCH	3	20			19160320	
003044	6	069	8700010000		TED JAMES ET AL	CEDAR CREEK	3	6	12		19160330	
003043	6	069	8760000000		JOY JERNIGAN OWENS	PULLIAM CREEK	3	32	16		19521231	
003042	6	069	8779000000		J R WILLIAMS ET AL	PULLIAM CREEK	3	22	13		19001231	
003041	6	069	8780000000		JOSEPH C WILLIAMS ET AL	PULLIAM CREEK	3	60	44		19001231	
003040	6	069	8790000000		J R WILLIAMS ET AL	PULLIAM CREEK	3	34	17		19001231	

SUMMARY OF SURFACE WATER RIGHTS

NUECES RIVER BASIN

STATE MASTER NUMBER	TYPE	CO.	RIVER ORDER NUMBER	PERMIT NUMBER	APPLICANT OR APPROPRIATOR	STREAM NAME	USE	AUTHORIZED DIVERSION (ACFT/YR)	ACRES IRRIG.	STORAGE CAPACITY (ACFT)	PRIORITY DATE	REMARKS
004006	1	069	8790100000	003716	BAY-HOUSTON TOWING CO	PULLIAM	3	150	75		19791105	
003039	6	069	8800000000		JESS L HANKINS, ET AL	PULLIAM CREEK	3	75	50	8	18973024	
003039	6	069	8800000000		JESS L HANKINS, ET AL	PULLIAM CREEK	3	30	20		19120401	
003038	6	069	8900000000		ROYCE I REID ESTATE	PULLIAM CREEK	3	48	20		19160309	
004278	1	069	8920000000	003961	TRAVELERS INSURANCE CO	PULLIAM CR	3	10	17		19821206	
003037	6	193	8950000000		DAVID WELDON TINDLE	NUECES RIVER	3	25	25		19180420	
003036	6	193	9000000000		SALVADOR ORTIZ ET AL	NUECES RIVER	3	125	50		19140615	
003035	6	193	9001000000		HUNGER BROTHERS, INC	NUECES RIVER	2	168			19621231	
003035	6	193	9001000000		HUNGER BROTHERS, INC	NUECES RIVER	3	-	60		19621231	SECONDARY USE
003034	6	193	9004000000		HERBERT C JEFFRIES ET UX	NUECES RIVER	3	-	2		19491231	SEE ADJ 3030
003033	6	193	9004100000		VELVET JEAN JACKSON	NUECES RIVER	3	-	2		19491231	SEE ADJ 3030
003032	6	193	9004200000		WANNA LOU LLOYD	NUECES RIVER	3	-	4		19491231	SEE ADJ 3030
003030	6	193	9004300000		L J DEAN	NUECES RIVER	3	-	1		19491231	
003031	6	193	9004500000		LEWIS RAY DEAN	NUECES RIVER	3	-	5		19491231	SEE ADJ 3030
003029	6	193	9008000000		HENRY D ENGELKING	NUECES RIVER	3	43	52		19530431	
003028	6	193	9040000000		CLARENCE W HARRISON ET AL	DRY CREEK	3	20	10	43	19710920	
003028	6	193	9040000000		CLARENCE W HARRISON ET AL	DRY CREEK	7			4	19700422	
003027	6	193	9050000000		J F ALSOP	DRY CREEK	3	20	10		18941231	
003026	6	193	9075000000		JOHN A DANIEL ET UX	DRY CREEK	3	16	8	90	19660907	
003025	6	193	9150000000		WILLIAM C & WANDA LEA LANE	DRY CREEK	3	40	20	1	19160329	
003024	6	069	9170000000		DOUGLAS B & MARGARET MARSHALL	NUECES RIVER	3	65	43		19471231	
004008A	1	193	9172500000	003717A	DOUGLAS B & MARGARET MARSHALL	NUECES	3	400	200		19791112	AMEND 12/15/81 INCR AC-FT, ACRES, CFS
003022	6	193	9190000000		MARVIN L BERRY	UNNAMED/NUECES	3	485			19790423	
003022	6	193	9190000000		MARVIN L BERRY	UNNAMED/NUECES	3	259	300	14	19081231	TRIB OF NUECES RIVER
003023	6	069	9195000000		DONALD P TARPEY	NUECES RIVER	3	108	27		19561231	
003021	6	193	9198500000		DSD, INC	BULLHEAD CREEK	3	418	210		19760517	
003020	6	193	9320000000		H C MCCARTY JR & JERRY MCCARTY	BULLHEAD CREEK	3	35	60		19661231	
003020	6	193	9320000000		H C MCCARTY JR & JERRY MCCARTY	BULLHEAD CREEK	3	85			19790521	
003019	6	193	9410000000		SARAH M DAVIS	WADDLE IRR DIT	3		13		18941130	
003019	6	193	9410000000		SARAH M DAVIS	BULLHEAD CR	3	80	40		19790521	
003978	1	193	9421000000	003689	N M FITZGERALD JR ESTATE	FLYNN&BULLHEAD	3	187	63		19790521	BULLHEAD CR, 156.95-AC TR, SC
003018	6	193	9450000000		JO BESS V JACKSON ET AL	SPRING/BULLHEA	3	30	16		19150311	BULLHEAD HOLLOW
003017A	6	069	9520000000		RAY H EUBANK	RUTH DRAW	3	50	50		19281231	AMEND 7/3/84
003016	6	193	9615000000		DANYA MCINTYRE ET AL	E PRONG NUECES	3	4	2		19281231	

APPENDIX E

Precipitation Data

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1900

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	1.24	0.00	2.14	1.81	6.95	0.41	3.79	6.16	0.64	3.17	0.80	0.00	27.11
1917	0.33	0.28	0.05	0.77	3.73	2.59	0.73	1.37	4.78	0.00	0.00	0.00	14.63
1918	0.10	0.19	0.33	2.60	2.79	1.41	0.20	0.45	1.56	5.11	2.12	2.26	19.12
1919	2.27	0.97	3.17	1.79	4.33	6.40	3.37	7.70	9.05	3.64	1.32	1.07	45.08
1920	2.40	0.15	0.46	0.28	3.25	4.14	2.18	4.26	0.96	3.66	1.15	0.00	22.89
1921	0.39	2.57	2.65	0.82	3.05	3.53	1.57	0.43	3.47	1.03	0.32	0.18	20.01
1922	0.39	0.37	1.05	10.11	2.86	9.00	3.64	0.46	2.41	1.67	0.76	0.00	32.72
1923	0.44	3.27	2.68	2.33	0.48	3.93	1.36	1.82	7.40	5.12	2.58	1.82	33.23
1924	1.08	1.15	1.08	1.41	2.09	1.11	1.95	0.13	2.35	0.74	0.00	0.36	13.45
1925	0.00	0.00	0.42	1.54	7.96	1.98	1.22	2.69	4.39	2.99	1.35	0.68	25.22
1926	1.60	0.00	2.70	2.36	1.94	1.85	3.60	0.82	1.20	1.90	1.57	2.94	22.48
1927	0.84	4.15	2.33	1.62	0.65	4.21	0.88	0.65	0.14	4.77	0.00	1.14	21.38
1928	0.35	1.46	0.04	0.90	4.19	2.97	1.16	2.74	5.18	0.31	0.43	0.75	20.48
1929	0.52	0.20	1.88	1.57	4.00	1.40	6.86	0.20	3.24	2.64	0.99	3.61	27.11
1930	0.60	0.65	0.91	1.84	3.13	6.85	0.52	1.06	0.27	7.23	2.86	0.98	26.90
1931	3.93	1.88	0.95	5.10	6.30	2.86	2.64	1.64	0.00	1.32	1.16	2.21	29.99
1932	1.48	1.86	2.30	2.21	0.96	0.73	5.75	5.09	10.68	0.10	0.43	1.27	32.86
1933	1.60	0.96	0.01	0.35	3.78	0.45	1.86	1.89	0.22	1.21	0.45	0.26	13.05
1934	2.26	0.15	2.05	1.22	2.04	0.44	1.67	1.52	0.48	1.00	0.56	0.55	13.94
1935	0.54	1.03	0.13	2.21	10.45	12.43	5.09	0.81	6.15	0.49	0.60	3.06	43.00
1936	0.46	0.19	1.16	1.78	3.68	8.35	1.85	3.99	8.56	4.13	1.39	0.28	35.82
1937	1.06	0.14	1.58	0.63	0.83	3.78	1.07	0.31	1.85	3.34	0.55	5.68	20.82
1938	1.40	0.56	1.18	3.47	2.29	0.48	5.04	0.84	0.59	0.17	0.35	0.92	17.29
1939	2.35	0.15	0.20	0.86	1.44	0.54	4.06	2.49	0.95	3.28	1.76	1.39	19.47
1940	0.43	1.90	1.04	1.83	4.79	4.23	0.04	3.39	0.19	0.88	2.07	1.10	21.89
1941	0.97	2.35	3.35	4.00	1.88	2.30	3.67	2.58	3.46	4.89	0.28	0.36	30.10
1942	0.30	0.44	0.09	3.12	1.48	1.51	4.45	6.47	5.41	3.54	0.48	1.16	28.45
1943	0.44	0.04	1.29	2.02	4.87	2.82	2.04	0.83	3.48	0.43	1.81	2.32	22.39
1944	2.13	1.73	1.98	0.42	4.65	1.46	0.52	4.05	2.98	1.37	1.57	1.17	24.23
1945	2.40	1.46	2.36	1.24	1.72	1.37	1.01	0.46	1.34	3.89	0.00	0.46	17.71
1946	1.82	0.98	0.27	2.39	4.06	3.15	0.69	0.30	4.21	4.42	1.19	0.97	24.45
1947	3.09	0.39	1.34	2.52	2.33	5.22	0.70	2.45	0.63	0.16	1.69	1.50	22.02
1948	0.65	1.60	0.25	3.38	2.55	4.01	2.69	0.69	2.44	0.63	0.62	0.79	20.29
1949	3.26	7.32	0.73	4.04	3.17	3.69	0.93	6.36	4.28	3.92	0.00	2.33	40.03
1950	0.52	1.24	0.12	1.22	4.83	2.26	2.17	2.26	2.94	0.59	0.05	0.00	18.19
1951	0.00	0.70	3.22	1.00	2.99	2.78	0.18	0.32	1.21	3.81	0.10	0.55	16.87
1952	0.18	0.69	2.87	2.69	3.34	1.32	1.17	0.00	1.14	0.00	2.75	2.40	18.56
1953	0.03	0.40	2.46	0.44	1.59	0.66	0.55	4.51	1.71	3.23	0.04	0.54	16.17
1954	0.31	0.05	0.00	3.91	3.84	5.18	1.03	0.83	1.04	2.41	0.28	0.00	18.89
1955	1.09	0.61	0.47	0.01	2.86	2.12	4.29	1.88	7.11	0.29	0.79	0.55	22.08
1956	0.54	0.73	0.04	1.40	0.57	0.45	0.30	1.32	0.77	1.50	0.19	0.43	8.23
1957	0.35	1.86	2.70	6.76	5.50	1.27	0.51	0.38	2.83	6.04	2.88	0.94	32.01
1958	2.68	2.99	1.89	1.08	3.75	8.28	1.12	3.70	9.30	4.48	0.29	0.52	40.07
1959	0.38	1.15	0.04	3.03	3.92	6.86	4.10	1.60	1.50	4.32	0.83	2.06	29.79
1960	0.72	1.73	1.30	0.57	0.78	0.16	5.77	5.25	0.79	5.67	1.06	2.06	25.87
1961	1.56	1.98	0.16	0.36	1.12	5.95	4.20	1.63	1.63	2.51	0.63	0.54	22.26
1962	0.29	0.14	0.74	2.86	1.69	2.66	0.05	0.42	3.11	2.63	0.62	0.79	15.98
1963	0.05	2.30	0.02	1.18	6.34	1.29	0.32	2.57	3.23	1.73	2.12	0.70	21.86
1964	1.67	0.94	2.10	2.24	1.91	0.39	0.57	3.05	10.77	1.03	0.75	0.56	26.00
1965	1.23	2.42	0.94	1.37	4.62	2.73	0.02	0.51	2.98	1.93	0.89	2.28	21.91
1966	1.36	0.90	0.93	4.22	1.47	1.63	1.61	7.64	4.03	0.47	0.20	0.00	24.46
1967	0.16	0.60	0.50	1.88	1.17	0.13	4.23	3.30	4.94	4.12	3.04	0.77	24.85
1968	4.25	1.60	2.08	3.14	4.33	2.09	3.71	0.92	3.33	0.27	3.78	0.07	29.58
1969	0.62	1.30	0.94	3.69	2.64	1.56	1.33	4.14	3.53	8.07	2.79	1.13	31.74
1970	0.50	2.30	1.30	1.31	4.71	2.87	0.45	2.18	5.47	0.58	0.00	0.48	22.16
1971	0.00	1.18	0.12	1.46	0.64	6.01	0.86	13.56	1.70	7.56	0.55	0.93	34.57
1972	1.38	0.21	0.63	2.32	4.69	2.24	1.85	7.99	2.50	0.94	0.87	0.10	25.71
1973	1.62	2.33	0.94	1.23	1.16	6.26	4.89	0.85	2.10	10.06	0.17	0.02	31.63

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1900

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	0.34	0.01	1.05	2.30	4.14	0.47	0.57	7.64	2.11	4.20	0.99	2.07	25.89
1975	0.51	1.92	0.49	2.56	6.96	2.17	5.09	4.53	2.32	2.57	0.63	0.54	30.30
1976	0.13	0.13	0.76	5.51	4.19	2.83	11.03	2.49	3.58	4.69	0.97	1.92	38.23
1977	1.83	1.17	1.37	7.56	1.79	2.21	0.06	0.42	0.85	3.51	2.89	0.35	23.98
1978	0.39	1.19	0.39	1.75	1.56	3.03	1.08	3.88	2.64	0.88	3.69	0.42	20.90
1979	0.87	1.93	3.16	2.47	2.59	3.76	0.96	3.28	0.20	0.14	1.56	1.34	22.27
1980	1.43	0.51	1.73	0.60	2.82	1.19	0.52	3.51	7.48	0.50	2.66	1.38	24.33
1981	0.97	0.42	4.41	6.46	2.65	8.61	0.77	3.68	2.42	10.33	0.66	0.14	41.52
1982	0.48	2.89	0.56	1.29	5.26	2.86	1.62	0.71	3.26	0.36	2.28	1.32	22.91
1983	1.35	1.47	1.73	0.21	3.69	4.11	0.61	1.80	1.85	3.57	3.14	0.17	23.71
1984	1.68	0.17	0.29	0.25	1.11	0.60	2.57	0.80	0.96	5.89	1.77	5.73	21.82
1985	1.95	1.53	1.12	2.78	2.39	3.88	3.04	0.28	4.88	2.15	1.20	0.70	25.91
1986	1.14	1.42	0.36	1.23	5.54	4.30	0.22	2.87	1.97	9.23	2.34	3.87	34.49
1987	0.47	2.87	1.34	2.81	7.48	6.93	2.13	3.48	3.46	0.14	1.56	1.51	34.18
1988	0.24	0.19	0.66	0.58	2.74	4.00	3.71	0.97	3.22	0.71	0.08	0.34	17.43
1989	2.47	2.40	1.33	0.53	3.24	1.87	0.15	1.59	0.35	4.07	1.32	0.18	19.49
AVG	1.09	1.23	1.24	2.20	3.29	3.13	2.14	2.57	3.06	2.84	1.17	1.13	25.08

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1905

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	1.75	0.00	1.92	1.99	5.67	0.32	3.71	5.64	0.81	2.89	0.76	0.00	25.46
1917	0.31	0.25	0.04	1.14	3.18	2.21	0.83	1.12	4.16	0.00	0.00	0.00	13.24
1918	0.08	0.15	0.26	2.22	3.06	1.53	0.29	0.36	1.30	4.99	2.01	2.26	18.49
1919	2.31	0.80	3.38	1.82	4.19	6.06	3.31	6.40	8.23	3.99	1.45	1.07	43.00
1920	2.30	0.12	0.47	0.23	3.19	3.41	2.88	4.13	1.29	3.17	0.98	0.00	22.16
1921	0.41	3.38	2.81	0.95	3.74	3.13	1.72	0.45	2.88	1.22	0.37	0.14	21.20
1922	0.36	0.35	1.02	8.51	2.45	8.19	3.45	0.50	2.27	1.57	0.71	0.00	29.38
1923	0.45	3.16	3.35	2.17	0.58	3.20	1.66	1.86	6.78	5.13	2.48	1.85	32.69
1924	0.90	1.27	0.99	1.36	2.25	1.08	1.55	0.10	2.58	0.64	0.06	0.57	13.35
1925	0.02	0.01	0.51	1.31	8.32	1.93	1.28	2.44	4.12	2.95	1.28	0.81	24.99
1926	1.54	0.02	2.73	2.39	1.78	2.25	3.75	0.64	1.05	2.09	1.54	2.74	22.53
1927	0.78	4.12	2.23	1.86	0.51	4.28	1.35	0.63	0.59	4.41	0.00	1.14	21.88
1928	0.37	1.58	0.03	0.95	3.83	2.70	0.94	2.55	6.05	0.26	0.36	0.70	20.31
1929	0.49	0.18	1.54	1.45	4.11	1.14	5.96	0.15	3.30	2.26	0.81	3.46	24.85
1930	0.49	0.51	0.82	2.09	2.91	6.25	0.73	0.88	0.25	7.24	2.81	0.88	25.85
1931	3.83	1.82	0.95	5.10	6.30	2.86	2.64	1.64	0.00	1.32	1.16	2.21	29.82
1932	1.48	1.86	2.30	2.11	0.89	0.73	5.51	5.10	10.69	0.09	0.39	1.24	32.41
1933	1.65	0.97	0.01	0.32	3.85	0.42	1.86	1.72	0.23	1.25	0.46	0.26	12.99
1934	2.24	0.15	2.02	1.17	2.00	0.46	1.63	1.47	0.48	1.00	0.56	0.52	13.70
1935	0.54	1.03	0.12	2.19	9.86	12.22	4.85	0.79	6.08	0.64	0.58	2.98	41.89
1936	0.45	0.18	1.19	1.67	3.78	8.11	1.83	3.83	8.23	3.98	1.33	0.28	34.85
1937	1.01	0.13	1.52	0.59	0.89	3.59	1.12	0.36	1.87	3.16	0.70	5.61	20.53
1938	1.41	0.55	1.14	3.17	2.41	0.43	5.49	0.84	0.56	0.16	0.33	0.90	17.38
1939	2.31	0.15	0.25	0.82	1.56	0.57	4.05	2.42	0.96	3.17	1.74	1.39	19.39
1940	0.43	1.86	1.03	1.85	4.86	4.17	0.13	3.39	0.20	0.91	2.01	1.10	21.93
1941	0.98	2.25	3.27	3.75	1.91	2.15	4.26	2.69	3.02	3.96	0.28	0.35	28.86
1942	0.30	0.50	0.09	3.12	1.67	1.51	4.27	6.29	5.05	3.57	0.52	1.16	28.05
1943	0.45	0.03	1.37	1.88	5.18	3.03	2.11	1.01	3.59	0.42	1.92	2.38	23.36
1944	2.33	1.68	1.68	0.56	3.54	1.58	0.37	3.62	2.74	0.96	1.65	1.40	22.12
1945	1.83	1.26	2.51	0.91	1.64	1.53	1.14	0.59	1.38	4.04	0.01	0.30	17.13
1946	1.99	0.89	0.21	2.63	3.63	3.40	0.75	0.23	3.31	3.92	0.67	1.08	22.70
1947	3.03	0.31	1.26	2.23	2.15	4.05	0.99	2.36	0.56	0.30	1.77	1.39	20.41
1948	0.75	1.14	0.34	3.09	2.20	6.05	2.99	0.70	2.88	0.64	0.63	0.73	22.13
1949	3.04	6.67	0.52	3.78	2.88	3.82	1.10	5.55	4.23	4.09	0.00	2.22	37.91
1950	0.69	1.05	0.05	1.18	4.34	1.85	2.27	1.81	3.36	0.54	0.03	0.00	17.17
1951	0.00	0.34	2.48	1.10	1.61	1.94	0.41	0.16	1.56	3.26	0.09	0.52	13.47
1952	0.17	0.78	2.27	2.39	2.96	1.08	0.88	0.02	0.72	0.00	2.31	2.16	15.75
1953	0.04	0.42	2.39	0.44	1.41	0.51	0.41	5.08	1.80	2.41	0.02	0.52	15.46
1954	0.33	0.06	0.00	3.35	3.58	6.07	0.80	1.02	0.74	2.62	0.28	0.00	18.84
1955	0.93	0.37	0.55	0.00	2.52	2.38	4.41	2.86	6.92	0.34	0.86	0.54	22.69
1956	0.55	0.63	0.02	1.33	0.62	0.50	0.18	1.05	0.43	1.84	0.13	0.35	7.61
1957	0.36	1.86	2.58	7.30	6.10	0.99	0.35	0.35	2.98	5.89	2.72	0.92	32.41
1958	2.76	3.08	1.93	0.90	3.79	8.27	0.74	3.30	9.32	4.41	0.30	0.46	39.27
1959	0.32	1.09	0.00	2.94	3.55	6.18	4.51	1.82	1.50	3.93	0.88	1.82	28.55
1960	0.68	1.56	1.36	0.50	0.69	0.12	4.41	4.39	0.58	5.81	0.83	2.02	22.94
1961	1.58	1.91	0.15	0.44	1.11	5.54	3.50	0.98	1.54	1.86	0.49	0.52	19.62
1962	0.26	0.14	0.74	2.80	1.77	2.50	0.01	0.41	3.67	2.77	0.48	0.51	16.06
1963	0.05	2.22	0.01	1.11	5.82	1.40	0.22	2.77	2.69	1.82	1.87	0.60	20.59
1964	1.54	0.89	1.68	1.95	1.87	0.19	0.59	2.83	10.57	1.08	0.87	0.58	24.65
1965	0.85	2.20	0.72	1.34	4.74	2.77	0.07	0.57	2.65	1.58	0.62	1.94	20.04
1966	1.26	0.92	0.80	4.60	1.43	2.14	0.66	7.20	5.24	1.28	0.21	0.00	25.73
1967	0.10	0.70	0.37	2.38	0.76	0.32	2.53	2.84	3.84	3.13	2.45	0.74	20.15
1968	3.39	1.72	1.95	3.12	3.69	2.37	2.58	0.32	3.27	0.25	2.10	0.60	25.37
1969	0.54	1.14	0.85	3.73	3.69	3.04	1.27	2.91	2.62	6.61	2.90	1.36	30.65
1970	0.68	1.90	0.79	1.52	3.13	1.57	0.47	1.14	4.89	0.32	0.00	0.22	16.62
1971	0.00	1.25	0.11	2.06	0.93	9.79	2.66	12.40	1.38	4.97	0.46	0.55	36.55
1972	0.83	0.19	1.26	2.33	4.10	1.41	1.17	7.79	2.48	0.75	0.84	0.10	23.24
1973	1.42	2.55	0.95	0.62	1.30	4.73	2.71	0.57	2.79	9.04	0.19	0.00	26.87

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1905

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	0.17	0.00	0.56	1.86	4.09	0.45	0.88	6.29	3.76	3.65	0.80	2.01	24.52
1975	0.12	1.91	0.59	1.72	5.47	1.19	5.64	3.88	3.05	1.72	0.76	0.39	26.45
1976	0.13	0.12	0.51	4.45	4.22	2.74	13.30	1.56	3.90	3.86	0.96	1.84	37.60
1977	1.40	1.17	1.90	4.24	1.23	2.24	0.05	0.51	0.59	2.45	2.75	0.21	18.75
1978	0.30	1.18	0.26	2.66	2.81	2.49	2.15	2.59	3.32	1.98	4.36	0.58	24.70
1979	0.45	2.00	2.83	1.69	2.42	3.54	1.81	3.02	0.34	0.06	0.72	0.58	19.45
1980	0.88	0.29	0.52	0.16	3.67	0.67	0.51	2.68	1.96	0.24	1.75	0.79	14.12
1981	0.42	0.14	2.49	5.38	1.38	7.89	0.85	3.10	1.56	10.55	0.14	0.02	33.90
1982	0.22	2.21	0.46	0.55	5.18	2.85	0.60	1.20	1.51	0.24	1.12	1.20	17.33
1983	0.67	0.95	1.14	0.08	2.98	5.20	0.16	1.55	2.29	5.46	1.01	0.02	21.51
1984	1.19	0.10	0.26	0.10	1.01	0.11	4.02	0.51	0.58	2.49	1.23	5.01	16.60
1985	0.69	0.41	0.56	1.32	2.10	3.43	1.37	0.25	6.11	1.82	0.90	0.13	19.09
1986	0.68	2.19	0.69	0.93	7.44	4.09	0.19	3.49	2.46	6.18	2.13	3.34	33.82
1987	0.19	2.22	0.84	3.31	8.75	7.21	2.95	3.80	2.55	0.07	2.04	1.10	35.03
1988	0.08	0.10	0.22	0.25	3.12	2.61	2.16	4.36	2.93	0.37	0.02	0.37	16.59
1989	1.64	2.33	1.21	0.57	3.16	1.87	0.16	1.52	0.59	4.07	1.62	0.19	18.94
AVG	0.96	1.16	1.12	2.03	3.18	3.04	2.10	2.40	2.93	2.60	1.03	1.05	23.59

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1920

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	1.69	0.00	2.27	2.78	4.49	0.51	5.28	6.42	2.67	2.18	0.95	0.00	29.22
1917	0.53	0.23	0.03	0.65	2.86	3.54	0.86	1.00	3.15	0.11	0.38	0.00	13.34
1918	0.10	0.15	0.43	2.09	2.85	1.49	0.15	0.83	1.58	5.12	1.97	2.61	19.36
1919	2.58	1.07	2.58	2.17	4.13	5.10	3.68	4.97	8.29	4.86	1.40	1.07	41.90
1920	2.31	0.18	0.39	0.18	2.92	3.47	1.83	3.85	1.36	2.67	1.14	0.06	20.37
1921	0.42	2.09	3.26	0.77	4.09	3.18	1.56	0.42	2.52	1.28	0.36	0.18	20.14
1922	0.31	0.55	1.16	8.34	2.40	8.17	2.46	0.29	1.58	1.24	0.70	0.00	27.20
1923	0.43	3.48	3.02	2.95	0.72	3.53	1.17	1.31	5.88	4.68	2.46	2.12	31.76
1924	0.84	1.34	1.05	1.74	2.36	0.96	1.40	0.09	2.26	0.79	0.04	1.43	14.29
1925	0.04	0.00	0.61	1.44	6.30	1.37	1.11	2.39	3.68	2.46	1.37	0.89	21.68
1926	1.82	0.01	2.69	5.29	1.69	2.75	3.08	1.13	0.95	2.35	1.55	2.37	25.67
1927	0.69	3.70	1.98	1.56	0.90	3.64	2.22	0.58	0.42	3.53	0.00	1.57	20.80
1928	0.44	1.77	0.27	0.89	3.97	3.56	0.76	2.36	5.33	0.33	0.29	0.75	20.72
1929	0.48	0.22	1.86	1.21	4.66	1.57	4.68	0.15	4.12	2.40	0.87	2.78	25.01
1930	0.66	0.41	1.24	2.03	2.42	7.24	0.77	0.87	0.50	6.77	2.70	0.82	26.43
1931	4.64	1.68	0.77	5.74	7.39	2.66	3.11	2.27	0.00	0.84	0.96	2.37	32.42
1932	1.23	1.86	2.02	2.93	1.91	0.87	12.48	4.87	9.93	0.19	0.73	1.42	40.44
1933	1.57	1.20	0.06	0.78	2.89	0.87	1.77	3.37	0.14	0.87	0.34	0.32	14.20
1934	2.61	0.22	1.99	1.61	2.34	0.19	2.53	1.58	1.11	0.72	0.47	1.45	16.82
1935	0.48	1.33	0.25	2.46	13.45	8.31	5.20	0.33	5.36	0.68	0.43	2.97	41.26
1936	0.38	0.14	1.29	1.22	4.22	6.52	1.68	3.05	7.52	3.38	1.23	0.33	30.95
1937	0.88	0.13	1.47	0.51	1.05	3.28	1.05	0.29	1.94	2.62	0.67	5.63	19.50
1938	1.65	0.57	1.20	3.18	1.36	0.31	5.36	0.61	0.40	0.22	0.22	1.04	16.10
1939	2.22	0.21	0.29	0.61	2.00	0.54	3.62	4.38	1.14	3.61	1.78	1.29	21.70
1940	0.44	1.93	1.13	2.09	4.86	4.11	0.26	3.28	0.25	2.05	2.05	1.82	24.26
1941	1.36	2.54	3.58	4.63	2.61	2.36	2.66	0.92	5.03	4.62	0.34	0.39	31.05
1942	0.29	0.88	0.19	2.99	1.83	0.79	4.30	5.29	4.66	1.40	0.25	0.77	23.64
1943	0.34	0.14	0.76	2.57	3.59	1.95	1.29	0.09	5.17	1.30	1.50	1.74	20.46
1944	2.22	2.47	2.12	0.38	4.96	3.27	0.25	6.19	2.23	1.53	1.41	1.54	28.57
1945	2.26	1.59	2.06	1.93	0.80	1.70	0.53	0.93	1.92	1.97	0.08	0.47	16.24
1946	1.75	1.16	0.42	2.54	7.08	4.84	0.75	0.99	3.57	3.57	0.74	0.71	28.13
1947	3.22	0.75	1.77	1.78	2.05	6.16	0.67	3.62	0.31	0.78	1.68	0.98	23.79
1948	0.11	1.45	0.05	2.26	2.87	2.39	3.60	0.60	3.33	1.64	0.84	0.22	19.38
1949	3.36	7.51	1.29	3.44	2.12	3.25	1.58	4.27	2.86	3.22	0.00	2.25	35.14
1950	0.28	1.19	0.12	1.72	2.47	3.93	2.73	2.22	2.82	0.28	0.10	0.00	17.85
1951	0.01	0.73	3.63	0.59	6.28	2.93	0.01	1.57	0.78	2.79	0.14	0.46	19.93
1952	0.24	1.24	2.52	2.14	4.33	1.27	1.04	0.03	1.55	0.00	2.64	2.12	19.11
1953	0.10	0.38	1.78	0.25	1.32	0.92	0.21	5.15	2.90	3.44	0.04	0.70	17.18
1954	0.33	0.00	0.01	3.24	4.08	4.36	1.22	1.21	0.80	2.75	0.12	0.00	18.11
1955	0.84	1.19	0.67	0.05	3.33	2.71	4.26	1.68	5.55	0.16	1.13	0.50	22.08
1956	0.42	0.74	0.03	0.78	0.26	0.23	0.63	1.69	0.59	2.91	0.09	0.46	8.83
1957	0.25	1.60	2.21	7.36	6.52	1.81	0.23	0.40	3.99	5.19	2.65	1.63	33.83
1958	3.61	2.97	1.92	1.10	3.69	9.39	1.22	2.99	8.45	5.56	0.35	0.57	41.81
1959	0.40	1.03	0.01	2.71	4.91	7.79	3.42	1.32	2.60	4.75	1.30	1.41	31.65
1960	0.69	1.45	1.42	0.54	1.00	0.35	5.78	5.26	1.02	4.68	1.00	2.23	25.42
1961	1.61	1.78	0.12	0.73	0.82	6.48	6.28	1.66	1.05	3.36	0.49	0.51	24.89
1962	0.31	0.27	0.56	2.47	1.22	2.91	0.02	1.37	1.76	1.51	0.63	0.80	13.83
1963	0.04	2.47	0.04	1.66	6.03	1.65	0.38	1.13	3.35	2.34	1.48	0.79	21.33
1964	1.38	0.90	1.95	1.96	2.48	0.28	0.91	2.17	10.68	1.25	0.38	0.53	24.88
1965	0.77	2.94	1.60	2.28	4.57	2.48	0.20	1.37	3.03	1.71	1.14	2.71	24.81
1966	1.58	1.19	1.06	3.47	2.38	1.36	0.22	5.96	2.97	0.32	0.07	0.01	20.57
1967	0.14	0.63	0.53	1.90	0.28	0.92	1.18	2.85	4.87	3.40	2.61	0.93	20.22
1968	3.35	1.50	1.88	1.75	3.17	1.45	3.20	0.45	3.47	0.98	2.50	0.43	24.12
1969	1.13	0.98	0.73	2.23	3.83	2.74	1.38	5.06	1.97	9.72	2.89	1.53	34.20
1970	0.71	2.09	0.86	0.65	3.80	1.74	0.16	1.93	5.69	0.24	0.00	0.26	18.13
1971	0.00	0.49	0.03	1.07	0.74	9.92	0.28	10.23	2.69	7.18	0.19	1.23	34.05
1972	0.94	0.23	0.49	1.71	2.05	1.52	0.88	5.11	2.54	1.01	0.76	0.23	17.47
1973	1.96	2.34	1.15	2.22	0.65	5.86	5.79	1.37	4.06	9.39	0.05	0.00	34.84

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1920

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	0.91	0.00	1.06	1.38	3.70	0.26	0.12	6.58	1.31	2.52	1.01	2.04	20.88
1975	0.40	1.96	0.36	4.26	4.87	3.84	4.11	1.71	2.22	1.90	0.29	0.86	26.76
1976	0.17	0.00	0.86	5.65	4.55	1.35	12.07	1.16	7.32	4.98	1.42	1.92	41.44
1977	1.99	0.99	0.44	3.72	1.76	1.23	0.01	0.34	0.48	3.05	2.96	0.39	17.38
1978	0.29	0.72	0.29	1.05	2.91	4.54	0.96	5.10	3.22	1.02	3.82	0.61	24.55
1979	1.14	1.85	3.64	3.96	1.34	7.91	0.43	1.34	0.20	0.07	1.59	0.85	24.33
1980	0.77	0.29	1.24	0.84	5.40	0.48	0.33	4.73	3.53	0.74	3.16	1.27	22.77
1981	1.05	0.37	2.74	7.23	2.59	6.09	0.71	1.52	3.09	5.35	0.15	0.23	31.12
1982	0.44	3.09	0.24	1.23	5.02	2.58	2.05	0.85	1.45	0.72	2.43	1.56	21.64
1983	1.50	1.10	2.73	0.13	2.67	3.82	1.38	2.23	2.79	2.88	2.84	0.13	24.21
1984	1.90	0.10	0.12	0.23	1.47	1.29	1.03	0.29	0.96	5.83	1.18	4.09	18.48
1985	1.83	1.70	1.52	2.03	3.51	2.62	2.25	0.19	4.25	2.90	1.55	0.57	24.93
1986	0.89	1.18	0.45	0.70	3.90	4.22	0.11	1.92	3.00	8.99	2.31	3.96	31.62
1987	0.30	3.86	1.71	2.66	9.60	8.07	1.70	3.17	1.86	0.06	1.31	1.86	36.15
1988	0.22	0.66	0.49	0.41	1.79	2.03	2.33	0.32	2.66	1.37	0.16	0.29	12.72
1989	3.09	1.44	0.84	0.93	2.06	1.44	0.24	2.39	0.29	3.89	1.21	0.34	18.16
AVG	1.11	1.25	1.21	2.15	3.29	3.12	2.10	2.32	2.96	2.66	1.11	1.15	24.44

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1930

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	1.38	0.01	0.43	2.89	1.40	0.46	5.07	6.39	1.73	0.79	0.84	0.09	21.48
1917	0.52	0.14	0.06	0.50	1.58	1.21	0.81	1.21	1.07	0.10	0.17	0.00	7.36
1918	0.04	0.19	0.30	1.12	3.63	2.13	0.40	0.35	0.96	4.22	2.17	2.14	17.63
1919	2.62	1.03	2.66	2.53	3.27	4.73	5.20	1.89	6.65	6.10	1.42	1.00	39.10
1920	2.15	0.16	0.56	0.23	2.37	2.74	2.48	3.41	1.02	1.93	0.98	0.06	18.09
1921	0.19	2.51	1.59	1.67	2.56	2.74	1.42	1.01	1.25	0.92	0.76	0.26	16.87
1922	0.40	0.54	1.43	4.50	2.50	5.34	1.22	0.16	2.27	1.65	0.64	0.03	20.68
1923	0.40	4.45	3.51	1.58	0.76	1.67	2.04	2.31	5.59	2.76	2.41	2.66	30.13
1924	0.47	1.80	0.70	2.71	3.62	1.59	0.29	0.00	3.10	0.49	0.06	0.96	15.79
1925	0.15	0.01	1.11	0.64	6.06	0.50	0.76	1.25	3.20	1.79	0.97	1.22	17.66
1926	1.87	0.22	2.55	6.40	1.71	2.73	2.52	0.78	0.56	3.04	1.14	1.56	25.10
1927	0.76	2.21	0.99	0.87	0.18	4.21	2.09	0.77	0.90	2.18	0.00	1.65	16.82
1928	0.82	1.61	0.09	1.04	4.25	2.48	0.79	1.75	7.20	0.47	0.32	0.96	21.78
1929	0.33	0.13	1.25	1.34	4.84	0.71	2.29	0.02	3.57	2.81	0.62	1.54	19.45
1930	0.32	0.22	1.57	2.67	2.36	4.06	1.25	0.23	0.41	6.28	2.69	0.49	22.56
1931	5.01	1.11	1.12	2.67	6.66	2.71	3.21	2.91	0.00	0.39	0.61	2.89	29.28
1932	0.71	2.81	1.08	1.58	2.59	2.51	8.02	5.13	8.27	0.28	0.85	0.92	34.75
1933	1.33	1.84	0.18	0.83	2.11	0.70	1.33	2.32	0.72	0.89	0.21	0.31	12.78
1934	2.74	0.26	0.90	2.19	2.44	0.43	2.71	0.70	2.20	0.71	0.76	1.96	18.01
1935	0.33	0.93	0.46	1.69	5.75	4.84	5.58	0.61	4.16	1.14	0.35	2.55	28.39
1936	0.22	0.06	1.02	0.84	4.30	5.82	1.62	1.76	6.17	2.00	1.06	0.53	25.41
1937	0.49	0.13	1.21	0.24	1.30	1.12	1.70	0.21	1.58	0.95	0.83	5.33	15.10
1938	1.65	0.37	1.11	2.42	1.06	0.93	4.78	0.87	0.37	0.13	0.10	1.17	14.96
1939	1.56	0.24	0.34	0.26	4.39	0.55	2.81	4.09	1.28	4.08	1.59	1.19	22.39
1940	0.42	1.16	1.26	2.49	5.75	4.79	0.49	3.36	0.40	1.06	2.06	1.79	25.05
1941	2.03	1.43	2.19	4.26	2.35	1.21	2.17	1.17	3.27	1.67	0.51	0.46	22.72
1942	0.49	1.43	0.83	2.46	3.18	0.66	3.41	3.82	6.00	0.41	0.21	0.71	23.60
1943	0.73	0.12	0.22	1.06	3.46	2.76	1.36	0.12	4.46	2.04	2.60	1.28	20.21
1944	1.59	1.16	1.35	0.45	5.33	2.09	0.21	7.84	1.24	1.01	1.53	1.73	25.53
1945	1.84	1.35	2.05	2.80	1.38	0.88	0.35	0.56	4.41	3.91	0.16	0.29	19.99
1946	1.68	0.49	0.33	4.24	5.43	3.98	0.40	1.69	3.51	2.59	0.43	0.70	25.48
1947	2.29	0.34	1.14	1.25	3.02	4.91	0.72	3.29	0.18	1.02	1.17	0.71	20.03
1948	0.07	1.15	0.11	1.33	3.20	3.26	2.45	0.31	3.81	3.19	0.89	0.38	20.16
1949	2.12	5.33	0.82	3.49	1.68	4.63	1.65	3.79	1.82	3.56	0.00	2.24	31.14
1950	0.32	0.97	0.06	1.15	3.46	4.05	2.80	2.70	3.03	0.13	0.03	0.00	18.70
1951	0.05	0.53	2.96	0.26	4.57	1.71	0.23	0.72	2.11	2.28	0.24	0.32	15.97
1952	0.18	0.93	1.31	0.64	4.69	0.69	0.44	0.03	0.22	0.00	1.71	1.18	12.04
1953	0.07	0.90	0.92	0.26	0.67	0.16	0.04	4.50	3.05	2.32	0.02	0.50	13.40
1954	0.72	0.04	0.02	2.81	3.38	4.81	0.29	0.97	0.47	2.83	0.19	0.00	16.53
1955	0.76	1.34	0.29	0.10	2.55	1.75	3.93	5.02	1.72	0.28	1.32	0.24	19.30
1956	0.40	0.38	0.00	0.19	0.38	0.27	1.16	1.26	1.10	2.66	0.16	0.20	8.17
1957	0.29	1.56	1.61	7.65	8.96	1.18	0.00	0.52	5.19	3.48	2.54	1.19	34.17
1958	3.33	2.60	1.11	0.68	3.19	6.27	0.62	1.82	8.01	5.63	0.48	0.76	34.51
1959	0.49	1.06	0.01	2.05	5.21	5.40	2.82	0.60	1.98	5.84	1.31	0.90	27.69
1960	0.67	1.25	0.53	0.99	1.82	0.27	4.80	4.76	1.60	4.83	0.97	2.37	24.88
1961	1.55	1.64	0.04	0.70	0.37	4.63	4.22	0.70	0.18	1.57	0.44	0.68	16.72
1962	0.30	0.25	0.39	1.88	0.65	3.53	0.01	1.50	1.52	0.46	1.09	0.54	12.12
1963	0.10	2.08	0.04	2.39	1.99	2.47	0.73	0.00	2.35	3.14	1.16	0.75	17.19
1964	0.81	0.94	1.03	1.04	3.07	0.04	0.75	3.64	9.68	1.62	0.34	0.34	23.29
1965	0.34	2.41	1.55	2.35	5.94	0.96	0.48	1.66	2.95	0.87	1.11	1.98	22.59
1966	1.14	1.33	0.97	3.73	4.61	1.49	0.05	3.52	2.84	0.45	0.00	0.01	20.15
1967	0.08	0.54	1.14	2.59	0.20	1.30	0.56	2.64	7.05	2.43	1.88	0.81	21.22
1968	2.87	2.00	1.34	2.25	3.30	0.86	1.59	0.76	4.07	1.89	1.61	0.71	23.25
1969	0.61	1.54	0.39	2.05	4.42	1.33	0.69	4.34	0.67	7.22	2.99	1.49	27.74
1970	1.14	1.77	0.53	0.27	4.44	1.23	0.48	2.73	6.34	0.16	0.00	0.11	19.20
1971	0.00	0.52	0.01	0.79	0.45	11.04	0.21	9.91	2.72	5.89	0.07	0.91	32.50
1972	0.84	0.23	0.23	0.62	2.58	1.90	1.45	4.68	2.75	0.53	1.00	0.30	17.10
1973	1.61	2.92	0.54	2.18	0.30	4.62	4.43	1.68	4.82	6.75	0.07	0.00	29.93

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1930

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	0.89	0.03	2.49	1.52	2.73	0.89	0.30	6.00	2.21	2.15	0.95	1.48	21.65
1975	0.38	1.66	0.19	2.96	5.55	4.39	2.52	1.62	3.40	2.92	0.18	0.49	26.27
1976	0.07	0.01	0.64	4.30	4.28	0.92	9.92	0.92	4.61	6.02	1.82	1.90	35.41
1977	1.65	0.70	0.31	2.88	1.78	1.42	0.24	0.31	0.19	2.72	1.33	0.33	13.85
1978	0.21	0.41	0.28	0.59	3.83	3.88	0.97	4.06	4.07	1.40	2.17	0.82	22.69
1979	1.08	1.33	2.17	4.09	1.99	8.02	0.42	0.49	0.49	0.01	0.91	0.56	21.55
1980	0.44	0.19	0.45	0.67	6.45	0.07	0.19	3.85	1.29	0.44	3.52	0.93	18.50
1981	1.38	0.45	1.76	5.85	4.16	5.65	0.97	1.14	1.83	2.47	0.05	0.31	26.01
1982	0.40	2.54	0.28	1.69	4.06	2.03	1.33	0.95	1.01	1.28	2.22	1.82	19.61
1983	1.13	1.41	1.66	0.04	1.51	2.46	1.42	1.76	2.19	2.09	1.56	0.14	17.38
1984	1.79	0.06	0.25	0.12	1.46	1.16	0.41	0.11	1.74	4.92	0.75	2.70	15.48
1985	1.51	0.97	1.67	1.84	3.10	2.87	0.91	0.13	2.65	4.00	1.88	0.06	21.59
1986	0.79	0.84	0.35	1.01	4.82	3.51	0.12	1.03	3.32	7.40	1.74	3.49	28.42
1987	0.34	3.29	1.39	2.50	7.29	7.55	1.01	2.68	0.96	0.02	1.37	1.26	29.66
1988	0.14	0.52	0.27	0.49	1.29	1.27	1.47	0.73	2.41	1.80	0.12	0.25	10.75
1989	2.38	0.83	0.30	1.34	1.48	1.94	0.27	1.95	0.58	3.47	1.10	0.52	16.15
AVG	0.99	1.11	0.92	1.87	3.15	2.65	1.74	2.09	2.74	2.34	0.99	1.01	21.61

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1940

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	0.88	0.00	0.25	1.60	0.66	0.41	3.77	7.90	2.71	1.44	1.17	0.42	21.22
1917	0.25	0.01	0.13	0.24	0.83	0.42	1.39	0.35	2.00	0.03	0.45	0.00	6.09
1918	0.08	0.55	0.55	1.29	2.98	0.83	0.40	0.35	2.29	3.14	1.78	2.64	16.89
1919	1.97	1.74	1.95	2.87	3.01	5.87	4.43	1.21	7.97	6.00	1.33	1.01	39.36
1920	2.15	0.54	0.38	0.85	3.98	2.99	1.90	3.11	0.52	2.71	1.05	0.03	20.21
1921	0.23	0.23	1.89	1.20	2.25	2.35	0.46	0.10	2.94	0.63	0.48	0.47	13.25
1922	0.47	0.60	3.20	3.47	4.51	5.18	1.92	0.26	2.40	3.18	0.59	0.02	25.80
1923	0.41	7.12	3.49	0.49	0.24	0.82	1.27	2.21	5.63	1.84	3.26	3.60	30.38
1924	0.42	2.50	0.60	3.04	3.03	1.00	0.33	0.00	4.01	0.29	0.00	1.78	17.01
1925	0.12	0.00	2.91	0.83	1.95	0.02	1.24	2.09	4.80	1.08	1.17	2.29	18.49
1926	2.20	0.42	3.39	2.50	2.25	1.57	2.19	1.16	0.68	3.07	1.41	1.60	22.45
1927	0.96	0.76	1.12	0.27	0.56	3.72	0.71	1.01	1.59	4.45	0.01	1.19	16.35
1928	1.67	1.84	0.13	1.06	3.89	1.20	0.60	1.85	4.91	0.08	0.63	1.94	19.79
1929	0.13	0.08	2.22	1.04	6.39	0.66	1.22	0.01	1.58	1.00	1.62	2.10	18.07
1930	0.29	0.34	2.29	4.59	2.55	3.78	1.34	0.02	0.70	5.92	2.86	0.20	24.89
1931	5.50	0.69	1.06	2.69	6.87	2.72	3.70	3.06	0.07	0.45	0.36	3.92	31.09
1932	0.92	3.47	0.98	1.39	2.36	0.81	2.52	4.72	5.91	0.42	0.68	0.76	24.95
1933	0.66	3.77	0.54	0.36	2.30	0.11	1.71	2.18	2.41	0.88	0.39	0.26	15.57
1934	4.18	0.36	0.63	3.12	1.91	0.07	4.01	0.64	3.21	0.50	2.08	2.35	23.05
1935	0.07	1.44	1.47	1.06	2.90	5.37	3.18	0.63	4.79	1.00	0.24	2.34	24.50
1936	0.29	0.13	1.06	1.96	3.16	3.41	1.09	1.98	5.50	1.48	1.56	0.57	22.20
1937	0.55	0.24	1.42	0.07	1.68	1.57	1.92	0.10	2.21	0.93	0.29	5.84	16.81
1938	2.13	0.54	0.61	1.91	0.90	0.39	3.03	0.94	0.30	0.18	0.06	1.82	12.81
1939	1.14	0.30	0.25	0.04	5.83	1.45	3.62	1.85	1.24	2.97	1.53	0.82	21.02
1940	0.42	1.47	2.34	2.52	4.56	7.72	1.16	3.03	0.43	1.85	1.19	2.19	28.88
1941	1.17	2.26	1.60	5.13	3.17	3.57	2.03	0.64	3.34	1.25	0.54	0.65	25.34
1942	0.63	1.82	0.98	1.55	3.32	0.96	3.66	2.85	5.51	1.52	0.05	0.64	23.48
1943	0.96	0.02	0.33	0.44	3.70	2.77	1.38	0.00	3.21	1.65	1.42	1.82	17.71
1944	1.45	0.51	1.56	0.32	5.47	1.80	0.64	8.03	0.59	0.58	1.30	1.97	24.22
1945	0.55	1.41	3.16	2.82	1.03	0.97	0.41	0.72	5.22	5.44	0.44	0.32	22.50
1946	1.69	0.23	0.45	7.56	5.13	2.00	0.17	2.95	4.98	2.84	0.27	0.56	28.82
1947	2.48	0.07	0.17	1.20	4.14	5.16	0.21	2.78	0.33	1.39	0.91	0.80	19.65
1948	0.17	1.62	0.23	1.09	2.22	3.23	1.25	0.48	3.20	3.60	1.04	0.55	18.68
1949	1.34	2.52	0.94	5.61	0.76	7.14	0.80	2.78	1.92	4.03	0.00	3.19	31.05
1950	0.40	1.40	0.11	1.32	4.89	3.49	1.36	2.17	3.63	0.13	0.01	0.00	18.91
1951	0.03	0.71	3.07	0.56	3.54	0.85	0.04	0.75	3.62	1.27	0.57	0.08	15.08
1952	0.06	0.95	1.50	0.45	5.02	1.41	0.21	0.00	0.36	0.00	1.44	1.12	12.51
1953	0.04	0.92	0.76	1.07	1.97	0.24	0.07	2.61	1.89	3.48	0.01	0.60	13.66
1954	0.38	0.14	0.04	2.86	3.29	3.52	0.37	0.69	0.46	2.07	0.60	0.01	14.43
1955	0.95	1.35	0.09	0.13	3.57	0.82	1.18	3.29	0.64	0.69	1.10	0.23	14.05
1956	0.39	0.55	0.02	0.49	0.20	0.79	2.24	0.90	0.65	1.71	0.28	0.41	8.62
1957	0.25	1.55	1.56	4.89	4.93	1.57	0.00	0.06	5.52	3.21	3.24	0.78	27.58
1958	4.14	3.12	0.66	0.46	3.04	1.92	1.90	1.08	7.89	6.87	0.76	0.60	32.44
1959	0.43	1.78	0.01	1.21	4.15	4.27	1.16	1.02	2.79	6.93	2.03	0.90	26.67
1960	0.91	1.06	0.38	1.22	1.43	1.33	3.28	4.24	1.72	5.34	2.57	3.23	26.70
1961	1.32	1.17	0.05	1.11	0.16	4.31	3.97	1.44	0.35	0.52	0.79	0.56	15.75
1962	0.31	0.04	0.36	1.85	0.34	3.60	0.01	1.60	2.80	0.17	2.27	0.71	14.06
1963	0.23	1.78	0.07	2.18	2.19	3.06	0.95	0.02	2.79	2.05	1.50	1.42	18.25
1964	0.48	1.06	1.55	0.35	3.28	0.27	0.63	4.90	7.44	1.28	0.69	0.26	22.20
1965	0.12	2.15	0.94	1.55	6.17	0.26	0.12	0.71	2.92	1.17	1.72	3.14	20.97
1966	0.78	0.95	0.96	3.27	3.31	0.55	0.23	2.03	4.53	1.19	0.00	0.00	17.81
1967	0.15	0.87	1.06	4.36	0.20	0.36	0.97	5.22	9.38	1.98	2.66	0.83	28.03
1968	2.55	1.91	0.88	3.12	2.22	2.17	1.57	0.73	5.37	1.48	1.28	0.89	24.16
1969	0.40	1.50	0.36	1.71	1.62	1.10	0.65	3.13	0.32	7.15	1.80	1.27	21.01
1970	1.31	1.44	0.21	0.27	3.62	1.57	0.29	3.05	5.91	0.28	0.00	0.18	18.13
1971	0.02	0.15	0.01	0.82	0.84	10.90	0.08	9.56	3.94	10.30	0.11	1.30	38.04
1972	1.20	0.26	0.27	0.66	4.23	2.99	1.78	3.76	2.79	0.29	1.23	0.33	19.80
1973	1.52	3.24	0.18	1.68	0.07	4.56	3.21	2.47	8.58	4.53	0.09	0.00	30.13

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1940

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	0.90	0.07	4.56	1.32	2.20	0.95	0.67	7.81	2.24	2.47	0.80	0.87	24.85
1975	0.31	1.13	0.54	1.99	6.22	4.95	1.76	2.41	3.97	3.11	0.03	0.21	26.63
1976	0.03	0.00	0.88	2.96	3.24	1.30	4.87	1.16	2.94	7.06	2.15	2.42	29.03
1977	1.85	0.47	0.30	4.06	0.74	0.97	0.25	0.49	0.12	2.28	0.74	0.31	12.58
1978	0.22	0.41	0.06	0.26	3.46	3.42	2.06	2.44	3.76	1.45	0.76	1.35	19.65
1979	0.86	0.98	1.15	3.99	1.76	5.08	0.21	0.09	0.64	0.00	0.15	1.10	16.00
1980	0.27	0.36	0.24	0.26	7.26	0.05	0.07	5.75	1.45	0.12	3.34	1.75	20.92
1981	1.76	0.69	2.47	2.85	6.28	5.30	0.64	2.11	2.16	2.45	0.03	0.44	27.21
1982	0.25	2.74	0.72	1.86	2.99	1.02	0.15	0.96	1.99	1.71	2.36	2.37	19.12
1983	0.93	2.06	0.89	0.01	1.87	2.25	1.79	0.49	2.25	1.58	1.26	0.12	15.50
1984	1.84	0.04	0.54	0.82	1.86	1.11	0.49	0.04	1.76	4.60	0.64	1.55	15.30
1985	2.01	0.44	2.09	2.38	2.55	2.66	1.43	1.18	2.01	5.35	1.79	0.10	23.99
1986	1.48	2.80	0.46	1.75	5.72	2.30	0.13	1.01	2.14	9.33	1.26	3.37	31.75
1987	0.79	2.62	1.47	1.88	4.67	7.27	1.20	2.27	0.64	0.03	1.79	0.58	25.22
1988	0.08	0.25	0.23	0.84	1.24	1.01	0.73	1.35	2.74	2.80	0.00	0.08	11.35
1989	1.11	0.29	0.32	2.25	0.63	2.44	0.61	2.16	0.98	2.17	0.85	0.66	14.47
AVG	0.97	1.15	1.03	1.80	2.94	2.43	1.39	2.02	2.93	2.41	1.04	1.17	21.29

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1945

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	0.83	0.00	0.20	0.71	0.55	0.26	4.27	7.36	2.02	1.65	1.09	0.16	19.10
1917	0.24	0.01	0.18	0.83	0.50	0.25	0.81	0.45	1.71	0.03	0.49	0.00	5.50
1918	0.15	0.67	0.58	1.74	2.59	1.07	0.14	0.40	2.52	2.70	2.03	2.27	16.86
1919	2.25	1.72	2.29	2.77	3.18	5.64	5.68	1.44	9.65	6.13	1.93	0.84	43.52
1920	2.42	0.45	0.44	0.42	3.91	2.99	1.86	2.50	1.05	2.26	1.39	0.01	19.70
1921	0.45	0.26	2.33	1.12	2.24	1.32	0.93	0.04	4.48	0.59	0.47	0.27	14.50
1922	0.50	0.64	2.83	2.04	2.51	5.58	2.36	1.06	3.39	3.46	0.92	0.08	25.37
1923	0.50	7.57	3.85	0.80	0.09	0.98	1.28	2.08	6.62	2.64	2.86	3.81	33.08
1924	0.68	1.80	0.87	1.49	3.94	2.04	0.14	0.02	4.09	0.57	0.00	2.20	17.84
1925	0.17	0.01	2.94	0.23	1.92	0.43	0.40	1.91	6.40	1.59	1.22	2.23	19.45
1926	2.62	0.29	3.34	2.08	2.21	0.89	3.92	1.06	0.72	3.28	0.98	1.88	23.27
1927	0.85	0.60	1.42	0.47	1.01	4.18	1.03	0.76	1.56	5.29	0.28	1.38	18.83
1928	2.10	2.27	0.25	0.81	4.96	0.70	0.56	1.28	4.29	0.17	1.47	2.43	21.29
1929	0.28	0.10	2.39	1.67	4.96	1.31	1.45	0.41	1.12	0.51	2.64	2.18	19.02
1930	0.55	0.54	1.82	3.27	4.04	3.83	0.69	0.01	1.05	4.19	3.47	0.15	23.61
1931	5.07	1.00	1.35	1.72	6.84	4.23	3.74	3.63	0.21	0.42	0.40	3.60	32.21
1932	1.21	2.06	1.23	2.36	2.05	0.80	1.29	2.87	4.89	0.47	0.62	0.82	20.67
1933	0.46	2.53	0.96	0.45	3.03	0.32	1.50	3.77	4.03	1.26	0.69	0.12	19.12
1934	5.22	0.27	0.84	1.12	1.19	0.17	4.92	0.68	2.57	0.82	2.49	1.87	22.16
1935	0.12	1.95	2.29	1.69	5.68	6.90	1.05	0.39	5.75	1.44	0.56	2.35	30.17
1936	0.33	0.29	2.43	1.82	4.49	4.29	2.01	1.99	5.03	1.16	0.85	0.87	25.56
1937	0.68	0.37	0.92	0.15	1.48	0.94	2.05	0.31	2.94	0.82	0.49	5.62	16.77
1938	2.38	0.66	0.39	2.15	1.15	0.92	0.60	1.74	1.13	0.53	0.20	2.49	14.34
1939	0.81	0.30	0.16	0.05	3.51	2.13	1.67	2.65	2.23	1.26	0.66	0.78	16.21
1940	0.33	0.99	2.56	1.86	2.75	7.14	0.75	3.40	0.62	2.72	1.04	2.09	26.25
1941	1.65	2.40	1.65	4.34	5.57	7.52	1.89	0.30	4.55	1.30	0.62	0.73	32.52
1942	0.53	1.87	0.14	1.77	3.65	0.69	7.39	3.05	4.87	1.55	0.01	0.27	25.79
1943	1.23	0.02	0.98	0.48	2.71	3.72	1.99	0.00	2.69	1.15	1.25	1.46	17.68
1944	1.90	0.36	1.28	0.59	7.56	2.32	0.62	4.36	1.05	0.07	1.56	1.99	23.66
1945	0.46	1.85	1.94	2.53	1.11	1.64	1.64	0.80	1.64	4.03	0.53	0.42	18.59
1946	1.95	0.21	0.95	2.35	5.07	1.48	0.34	2.20	4.40	6.73	0.26	0.24	26.18
1947	2.73	0.02	0.45	1.79	5.63	1.55	0.48	3.45	0.84	1.71	1.35	1.04	21.04
1948	0.35	1.84	0.63	1.22	1.19	0.96	1.38	0.64	3.04	3.62	1.39	0.07	16.33
1949	1.37	2.68	1.25	7.48	0.70	5.38	1.68	2.96	1.11	3.12	0.00	2.39	30.12
1950	0.11	1.53	0.22	1.22	5.22	2.74	2.01	0.49	3.31	0.08	0.14	0.00	17.07
1951	0.23	0.32	2.30	0.92	5.03	3.18	0.21	0.31	5.08	1.42	0.59	0.27	19.86
1952	0.03	0.97	1.17	0.81	3.33	1.98	0.33	0.00	0.55	0.00	1.30	1.06	11.53
1953	0.01	1.15	0.51	2.57	2.33	0.32	0.22	4.51	2.61	4.43	0.00	0.83	19.49
1954	0.37	0.20	0.27	2.48	2.92	4.69	0.72	0.78	1.25	2.67	0.84	0.04	17.23
1955	0.85	1.43	0.12	0.02	2.62	0.97	1.32	2.85	2.49	1.08	1.41	0.55	15.71
1956	0.32	0.68	0.12	1.54	1.55	0.73	1.80	1.74	1.26	1.91	0.16	0.68	12.49
1957	0.18	1.30	1.36	4.81	4.83	0.88	0.00	0.08	4.67	1.39	3.62	1.92	25.04
1958	5.39	4.64	0.62	0.48	2.30	0.93	1.35	0.32	7.21	9.80	0.70	1.13	34.87
1959	0.51	3.03	0.00	1.15	1.90	2.67	0.77	1.61	4.47	2.66	2.43	0.44	21.64
1960	0.78	1.02	0.71	1.43	2.03	3.29	1.53	3.49	1.71	4.97	3.37	4.46	28.79
1961	1.70	0.72	0.03	2.09	0.12	4.19	2.08	1.36	1.24	0.30	1.84	0.41	16.08
1962	0.30	0.00	0.46	2.88	0.32	3.68	0.08	1.34	3.46	0.30	1.25	0.98	15.05
1963	0.32	1.29	0.08	0.83	1.93	4.23	1.05	0.17	2.48	1.06	1.60	1.48	16.52
1964	1.05	1.31	1.38	0.17	2.22	0.64	1.13	3.79	5.07	1.59	0.78	0.42	19.55
1965	0.94	2.24	1.21	0.38	4.10	0.23	0.34	0.84	2.40	1.19	1.32	3.46	18.65
1966	1.54	1.45	0.31	3.77	9.69	2.79	0.34	2.32	4.29	0.97	0.00	0.21	27.68
1967	0.62	0.75	0.45	1.29	1.14	0.73	0.41	7.51	14.39	0.85	1.99	1.07	31.20
1968	2.56	1.51	1.02	2.04	1.71	3.68	1.44	0.39	5.53	3.16	0.82	0.98	24.84
1969	0.36	1.37	0.24	1.94	1.44	1.51	0.47	3.02	1.59	5.47	2.11	1.37	20.89
1970	1.82	1.41	0.79	0.69	5.80	0.98	1.11	3.04	4.31	0.19	0.19	0.16	20.49
1971	0.01	0.54	0.00	0.54	1.05	8.01	0.20	5.30	10.60	9.56	0.28	0.97	37.06
1972	1.72	1.11	0.29	0.28	5.28	3.24	1.11	1.78	5.24	1.90	3.21	0.37	25.53
1973	2.15	3.85	0.29	1.36	0.33	6.50	1.06	2.57	9.60	3.87	0.05	0.07	31.70

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1945

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	0.99	0.11	5.30	0.63	3.03	1.86	1.11	5.97	3.25	2.59	1.00	1.03	26.87
1975	0.49	0.59	0.58	1.01	4.04	2.73	3.00	1.95	2.85	2.19	0.00	0.42	19.85
1976	0.67	0.00	0.78	4.57	3.30	0.93	8.29	1.16	3.13	7.48	3.02	2.40	35.73
1977	1.77	0.47	0.17	3.03	2.65	1.99	0.69	0.71	0.32	2.51	0.42	0.34	15.07
1978	0.50	0.57	0.06	0.38	2.73	3.31	0.92	4.32	5.70	2.23	0.81	1.26	22.79
1979	0.98	0.99	1.39	4.79	1.90	4.30	1.35	0.87	1.57	0.00	0.19	0.93	19.26
1980	0.85	0.76	0.19	0.11	4.08	0.04	0.65	7.33	1.36	0.19	2.99	0.25	18.80
1981	1.95	0.50	2.50	2.45	7.92	5.69	1.01	3.86	2.42	4.00	0.00	0.24	32.54
1982	0.05	2.19	0.60	1.81	3.75	0.70	0.01	0.59	1.92	4.89	2.34	1.83	20.68
1983	0.73	2.01	0.89	0.00	1.57	3.34	1.36	1.51	2.36	1.74	1.08	0.28	16.87
1984	1.48	0.16	0.25	0.35	3.04	0.32	1.27	0.26	1.32	4.34	1.02	1.55	15.36
1985	2.54	0.72	2.13	4.57	4.44	4.84	2.20	0.28	3.09	6.65	3.11	0.19	34.76
1986	1.26	1.04	0.14	1.43	4.68	3.29	0.18	0.38	1.00	6.97	1.56	3.53	25.46
1987	1.07	2.78	0.77	1.44	4.61	5.34	1.44	2.83	1.21	0.12	1.66	0.56	23.83
1988	0.35	0.59	0.41	0.51	2.21	1.84	2.11	1.86	2.90	2.16	0.01	0.04	14.99
1989	1.18	0.49	0.76	2.47	0.23	2.51	0.66	2.25	2.71	1.51	0.64	1.46	16.87
AVG	1.14	1.17	1.07	1.64	3.07	2.57	1.48	1.97	3.33	2.43	1.16	1.20	22.23

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1950

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	1.43	0.00	1.99	2.69	6.66	0.44	3.94	5.58	0.64	3.05	0.86	0.01	27.28
1917	0.39	0.32	0.06	0.73	3.53	2.31	0.71	1.21	4.69	0.09	0.16	0.00	14.21
1918	0.14	0.28	0.40	2.51	2.53	1.47	0.19	0.63	1.86	4.82	2.36	2.77	19.96
1919	2.37	1.07	2.87	1.87	4.34	6.25	3.92	8.11	8.87	4.14	1.29	1.11	46.20
1920	2.44	0.18	0.59	0.32	3.15	4.12	2.11	4.40	1.07	3.49	1.37	0.03	23.27
1921	0.46	2.21	2.70	1.15	3.12	4.29	1.43	0.37	3.37	1.01	0.32	0.36	20.78
1922	0.46	0.43	1.19	9.40	3.00	8.00	3.35	0.48	2.19	1.73	0.89	0.01	31.14
1923	0.42	3.53	2.59	2.62	0.50	3.54	1.63	1.69	6.98	4.95	2.78	2.03	33.26
1924	1.04	1.35	1.27	1.60	2.44	1.36	1.65	0.16	2.45	0.67	0.01	0.55	14.55
1925	0.04	0.00	0.40	1.40	7.19	1.71	1.18	2.59	4.28	3.19	1.39	0.69	24.07
1926	1.73	0.01	2.92	3.39	1.99	1.92	3.46	0.93	1.16	2.05	1.67	2.96	24.20
1927	0.88	3.80	2.39	1.76	0.75	4.59	1.48	0.60	0.67	4.40	0.01	1.38	22.72
1928	0.39	1.61	0.09	0.96	4.03	3.10	1.15	2.83	5.07	0.33	0.49	0.89	20.96
1929	0.63	0.28	1.89	1.54	4.74	1.46	6.19	0.23	3.26	2.74	1.14	3.39	27.49
1930	0.61	0.59	1.02	1.83	3.44	6.58	0.55	0.93	0.38	7.93	2.76	0.97	27.59
1931	4.01	1.92	1.23	4.90	5.76	2.91	2.71	1.61	0.01	1.24	1.27	2.37	29.95
1932	1.56	1.94	2.42	3.04	1.77	0.92	8.29	4.67	10.08	0.15	0.67	1.67	37.17
1933	1.52	1.07	0.11	0.62	3.42	0.68	1.69	3.17	0.49	0.90	0.46	0.31	14.45
1934	2.80	0.28	2.19	1.73	2.46	0.26	2.02	1.68	0.88	0.87	0.66	1.04	16.88
1935	0.59	1.34	0.24	2.20	12.21	10.97	5.17	0.55	6.24	0.72	0.60	3.44	44.27
1936	0.45	0.24	1.15	1.84	3.86	7.70	2.15	3.59	9.74	4.06	1.51	0.47	36.74
1937	1.07	0.14	1.70	0.56	1.11	3.99	1.12	0.30	2.01	3.15	0.74	5.59	21.48
1938	1.73	0.66	1.27	4.29	2.08	1.20	4.73	0.74	0.64	0.19	0.40	0.99	18.91
1939	2.30	0.30	0.24	0.92	1.46	0.67	4.31	2.69	1.06	3.16	1.89	1.30	20.30
1940	0.44	2.10	1.26	2.00	4.51	4.67	0.73	2.87	0.44	1.34	2.15	1.67	24.18
1941	1.43	2.88	3.65	4.37	1.85	2.38	2.58	2.14	4.72	5.93	0.41	0.51	32.84
1942	0.27	0.67	0.19	3.39	2.31	1.18	4.06	6.15	5.49	3.59	0.36	1.05	28.70
1943	0.33	0.10	0.98	2.39	3.99	2.48	1.95	0.31	4.25	0.55	1.57	2.06	20.96
1944	1.75	1.90	2.39	0.36	6.11	1.94	0.72	4.51	2.97	2.31	1.49	1.01	27.47
1945	3.10	1.84	2.14	1.69	2.09	1.43	0.68	0.39	1.96	3.75	0.04	0.73	19.82
1946	1.64	1.11	0.42	2.16	4.64	2.20	0.57	0.75	4.82	4.43	1.75	1.12	25.60
1947	3.06	0.47	1.37	3.05	2.50	6.43	0.62	2.57	0.59	0.19	1.69	1.49	24.03
1948	0.40	2.27	0.14	3.55	2.69	2.94	1.76	0.81	2.20	0.66	0.62	0.79	18.84
1949	3.53	6.34	1.07	4.23	3.13	3.71	1.10	3.75	2.69	3.23	0.00	2.76	35.54
1950	0.41	1.68	0.11	1.77	2.48	3.55	3.22	2.67	3.87	0.42	0.12	0.00	20.29
1951	0.00	1.09	3.00	0.97	6.97	3.22	0.11	0.36	1.21	1.66	0.15	0.39	19.11
1952	0.15	0.55	3.29	2.87	3.90	1.60	1.50	0.00	1.54	0.00	3.10	2.64	21.15
1953	0.02	0.35	1.72	0.27	0.58	0.55	1.40	2.43	2.01	2.94	0.07	0.46	12.80
1954	0.35	0.06	0.04	4.08	3.18	5.33	0.31	0.48	1.36	1.84	0.50	0.00	17.54
1955	1.77	0.91	0.43	0.08	5.05	1.75	3.96	1.57	5.06	0.51	1.25	0.30	22.65
1956	0.37	0.41	0.14	1.03	0.48	0.34	1.43	0.82	0.98	1.53	0.64	0.49	8.67
1957	0.50	1.42	2.42	7.61	6.09	1.03	0.72	0.42	3.62	5.58	3.38	0.91	33.70
1958	2.90	2.29	2.48	1.09	3.49	8.80	2.12	5.46	10.63	4.72	0.60	0.56	45.15
1959	0.63	1.30	0.42	2.66	3.89	7.37	3.02	0.71	1.13	3.92	1.21	2.67	28.91
1960	0.69	1.42	1.48	1.30	1.29	0.47	6.31	5.73	0.27	5.39	1.08	2.60	28.04
1961	1.24	2.30	0.26	0.23	0.79	7.19	4.55	2.28	0.67	4.85	1.08	0.56	26.01
1962	0.28	0.14	0.90	2.96	1.62	2.18	0.21	0.53	1.52	2.92	1.33	1.09	15.69
1963	0.07	1.94	0.08	1.95	3.19	0.91	0.15	1.28	2.41	1.40	3.00	0.79	17.16
1964	2.80	1.12	2.63	2.35	1.85	1.21	0.20	3.03	8.15	1.40	0.71	0.50	25.94
1965	2.47	2.64	1.51	1.42	4.29	2.09	0.00	1.59	4.14	2.50	1.39	2.48	26.52
1966	1.34	1.05	0.80	3.43	3.29	1.25	4.26	12.13	5.71	0.10	0.00	0.00	33.36
1967	0.19	0.56	0.30	2.01	0.78	0.11	6.13	0.90	4.52	5.77	3.25	0.79	25.29
1968	3.74	1.42	1.84	2.98	4.25	1.47	4.26	1.34	3.50	0.25	3.51	0.07	28.63
1969	0.52	1.24	1.11	3.43	1.65	1.76	2.95	3.39	1.69	9.93	2.79	1.32	31.77
1970	0.42	2.68	1.81	1.02	6.56	1.22	0.49	1.51	7.97	1.16	0.00	0.20	25.04
1971	0.04	1.86	0.02	1.85	1.04	2.81	0.70	11.47	2.61	6.85	0.41	1.37	31.03
1972	1.30	0.17	0.54	1.57	8.34	2.85	1.44	7.88	3.14	0.93	0.98	0.05	29.19
1973	1.69	1.96	1.13	1.99	1.75	6.64	7.76	0.26	2.95	9.72	0.21	0.03	36.10

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1950

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	0.88	0.16	1.49	3.28	3.64	1.01	0.80	7.68	1.70	4.03	1.28	2.24	28.19
1975	1.11	1.67	0.43	3.85	5.20	3.05	2.16	1.71	2.36	3.68	0.21	0.80	26.24
1976	0.20	0.10	0.90	5.14	3.96	2.80	8.21	1.50	3.03	3.85	0.95	2.49	33.13
1977	2.34	1.08	1.04	7.37	1.61	1.87	0.17	0.52	1.93	5.60	3.21	0.50	27.22
1978	0.42	1.70	0.36	1.51	1.62	2.42	0.69	4.95	2.19	0.63	4.95	0.60	22.05
1979	1.54	1.65	4.97	3.29	1.47	5.33	1.67	3.44	0.01	0.21	2.30	1.88	27.76
1980	1.43	0.50	2.26	1.06	4.40	0.34	0.46	4.68	16.90	1.04	2.82	1.68	37.56
1981	1.14	0.97	6.14	8.16	2.65	10.33	2.06	2.86	1.86	8.32	1.85	0.40	46.76
1982	0.58	3.06	0.38	1.68	5.91	1.65	2.22	0.70	5.27	0.53	3.45	1.54	27.00
1983	1.41	1.53	2.02	0.16	3.90	4.38	0.84	2.25	2.02	3.63	4.01	0.40	26.54
1984	2.35	0.13	0.28	0.38	1.38	1.75	1.13	0.73	1.63	8.79	1.27	7.29	27.11
1985	1.91	2.17	1.42	3.99	2.73	3.35	2.25	0.35	4.41	3.52	2.56	0.54	29.18
1986	1.10	0.95	0.18	1.48	6.67	4.42	0.05	3.01	2.20	9.71	2.18	5.09	37.04
1987	0.80	2.74	1.67	1.38	9.97	11.22	2.07	4.55	4.12	0.33	1.48	2.32	42.65
1988	0.42	0.32	0.90	0.88	2.26	8.94	4.45	1.23	2.06	1.06	0.10	0.36	22.99
1989	3.53	2.53	1.48	0.97	1.71	3.23	0.27	1.97	0.13	4.62	2.55	0.27	23.26
AVG	1.22	1.28	1.36	2.39	3.45	3.26	2.25	2.49	3.25	2.98	1.37	1.30	26.62

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1960

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	1.24	0.00	2.14	1.81	6.95	0.41	3.79	6.16	0.64	3.17	0.80	0.00	27.11
1917	0.33	0.28	0.05	0.77	3.73	2.59	0.73	1.37	4.78	0.00	0.00	0.00	14.63
1918	0.10	0.19	0.33	2.60	2.79	1.41	0.20	0.45	1.56	5.11	2.12	2.26	19.12
1919	2.27	0.97	3.17	1.79	4.33	6.40	3.37	7.70	9.05	3.64	1.32	1.07	45.08
1920	2.40	0.15	0.46	0.28	3.25	4.14	2.18	4.26	0.96	3.66	1.15	0.00	22.89
1921	0.39	2.57	2.65	0.82	3.05	3.53	1.57	0.43	3.47	1.03	0.32	0.18	20.01
1922	0.39	0.37	1.05	10.11	2.86	9.00	3.64	0.46	2.41	1.67	0.76	0.00	32.72
1923	0.44	3.27	2.68	2.33	0.48	3.93	1.36	1.82	7.40	5.12	2.58	1.82	33.23
1924	1.08	1.15	1.08	1.41	2.09	1.11	1.95	0.13	2.35	0.74	0.00	0.36	13.45
1925	0.00	0.00	0.42	1.54	7.96	1.98	1.22	2.69	4.39	2.99	1.35	0.68	25.22
1926	1.60	0.00	2.70	2.36	1.94	1.85	3.60	0.82	1.20	1.90	1.57	2.94	22.48
1927	0.84	4.15	2.33	1.62	0.65	4.21	0.88	0.65	0.14	4.77	0.00	1.14	21.38
1928	0.35	1.46	0.04	0.90	4.19	2.97	1.16	2.74	5.18	0.31	0.43	0.75	20.48
1929	0.52	0.20	1.88	1.57	4.00	1.40	6.86	0.20	3.24	2.64	0.99	3.61	27.11
1930	0.60	0.65	0.91	1.84	3.13	6.85	0.52	1.06	0.27	7.23	2.86	0.98	26.90
1931	3.93	1.88	0.95	5.10	6.30	2.86	2.64	1.64	0.00	1.32	1.16	2.21	29.99
1932	1.48	1.86	2.30	3.47	1.78	0.74	8.71	5.01	10.51	0.22	0.80	1.54	38.42
1933	1.07	0.82	0.00	0.75	2.93	0.88	1.86	3.87	0.07	0.84	0.37	0.29	13.75
1934	2.46	0.18	2.48	1.84	2.55	0.21	2.09	2.10	0.48	1.00	0.56	0.89	16.84
1935	0.54	1.04	0.27	2.44	12.47	10.57	5.88	0.54	5.62	0.49	0.60	3.06	43.52
1936	0.46	0.19	1.16	1.78	3.68	8.35	1.85	3.99	8.56	4.13	1.39	0.28	35.82
1937	1.06	0.14	1.58	0.63	0.83	3.78	1.07	0.31	1.85	3.34	0.55	5.68	20.82
1938	1.40	0.56	1.18	4.56	1.53	0.58	5.04	0.84	0.59	0.17	0.35	0.92	17.72
1939	2.35	0.15	0.20	0.86	1.44	0.54	4.06	2.49	0.95	3.28	1.76	1.39	19.47
1940	0.43	1.90	1.04	1.83	4.79	4.23	0.04	3.39	0.19	0.88	2.07	1.10	21.89
1941	0.97	2.35	3.35	4.60	1.64	2.48	1.90	1.52	5.50	7.43	0.29	0.38	32.41
1942	0.30	0.44	0.09	3.12	1.48	1.22	4.56	7.13	5.75	2.50	0.34	0.89	27.82
1943	0.33	0.10	0.76	2.85	3.67	1.76	1.65	0.06	4.04	0.64	1.49	2.03	19.38
1944	1.64	1.69	2.32	0.27	6.18	1.85	0.82	4.58	3.34	2.13	1.31	0.82	26.95
1945	3.14	1.73	1.96	1.72	1.99	1.18	0.64	0.41	1.42	3.80	0.00	0.70	18.69
1946	1.55	1.05	0.40	1.96	4.82	2.10	0.58	0.39	5.22	4.62	1.89	0.90	25.48
1947	3.08	0.48	1.34	3.37	2.61	7.14	0.65	2.36	0.64	0.14	1.70	1.52	25.03
1948	0.40	2.28	0.08	3.67	2.89	2.13	1.52	0.85	1.96	0.52	0.57	0.79	17.66
1949	3.43	6.70	1.70	4.69	1.49	3.77	0.45	4.56	3.62	3.04	0.00	2.92	36.38
1950	0.46	1.70	0.23	2.03	3.29	2.62	2.25	2.98	2.46	0.56	0.21	0.00	18.80
1951	0.00	1.35	4.59	1.10	9.40	3.27	0.02	0.70	1.41	2.20	0.09	0.59	24.71
1952	0.17	0.50	3.43	2.56	4.44	1.79	1.34	0.00	1.60	0.00	3.36	2.61	21.80
1953	0.04	0.33	1.88	0.20	0.82	0.76	1.22	3.19	2.23	3.25	0.08	0.55	14.55
1954	0.33	0.04	0.04	4.31	3.34	5.41	0.67	0.62	1.02	1.36	0.40	0.00	17.55
1955	1.62	0.85	0.39	0.08	5.23	1.72	3.76	1.30	5.72	0.37	1.18	0.32	22.54
1956	0.33	0.54	0.14	0.98	0.35	0.21	1.40	1.18	0.89	1.61	0.56	0.46	8.64
1957	0.40	1.31	2.44	7.54	5.76	1.32	0.56	0.39	3.60	5.23	3.31	1.14	33.00
1958	2.86	2.36	2.42	1.26	3.47	9.23	2.31	5.58	10.57	4.94	0.52	0.62	46.14
1959	0.63	1.16	0.39	2.60	4.30	8.05	3.39	0.82	1.64	3.88	1.21	2.36	30.43
1960	0.65	1.24	1.48	1.27	1.16	0.46	6.64	5.23	0.54	5.68	1.03	2.45	27.84
1961	1.33	2.11	0.26	0.17	0.82	7.84	5.43	2.26	0.85	4.82	0.94	0.54	27.36
1962	0.29	0.16	0.82	2.84	1.51	2.60	0.19	0.47	1.61	2.49	1.19	1.14	15.33
1963	0.05	2.26	0.08	2.00	4.08	0.88	0.29	1.41	3.13	1.79	3.00	0.82	19.78
1964	2.62	1.14	2.73	2.54	2.05	1.24	0.22	2.49	9.25	1.30	0.56	0.51	26.64
1965	2.13	2.76	1.58	1.57	4.36	2.62	0.00	1.37	4.36	2.62	1.49	2.70	27.57
1966	1.17	0.88	0.78	3.83	3.09	1.44	2.86	13.05	4.86	0.15	0.06	0.00	32.17
1967	0.15	0.57	0.35	2.12	0.74	0.18	4.85	1.23	4.68	6.17	3.08	0.87	25.00
1968	3.56	1.42	1.70	2.30	5.93	2.19	4.70	1.14	3.82	0.19	3.23	0.10	30.28
1969	0.49	1.32	1.00	3.23	1.57	1.24	2.61	1.87	2.24	11.12	2.62	1.09	30.41
1970	0.39	2.65	0.93	0.86	5.50	1.63	0.45	1.61	8.12	1.35	0.00	0.22	23.71
1971	0.05	2.05	0.02	1.47	1.01	3.68	0.75	11.60	2.68	7.03	0.47	1.27	32.10
1972	1.70	0.15	0.54	1.54	7.94	2.31	1.93	7.78	2.88	0.79	0.78	0.01	28.35
1973	1.73	1.96	0.80	2.08	1.76	8.72	7.90	0.41	2.82	10.11	0.19	0.00	38.47

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1960

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	0.97	0.16	1.25	3.53	3.97	1.06	0.67	8.03	2.02	3.52	1.00	2.18	28.36
1975	1.23	1.68	0.35	3.92	4.70	3.08	3.36	1.86	2.46	3.65	0.35	0.76	27.38
1976	0.19	0.08	0.88	6.33	4.57	3.14	8.87	1.72	3.16	4.04	1.11	2.56	36.66
1977	2.67	1.23	0.86	7.69	1.50	1.76	0.17	0.69	1.68	5.70	3.08	0.57	27.61
1978	0.39	1.74	0.31	1.62	1.65	2.29	0.58	4.64	2.05	0.45	5.53	0.75	22.00
1979	1.35	1.58	4.36	2.87	1.59	4.63	0.77	3.07	0.06	0.19	1.96	1.65	24.08
1980	1.23	0.48	2.30	1.05	4.00	0.68	0.13	4.59	13.96	0.93	2.84	1.63	33.79
1981	1.10	0.62	5.85	8.00	2.48	9.23	1.96	3.14	2.07	8.64	1.77	0.33	45.18
1982	0.50	3.26	0.27	1.54	5.49	2.10	2.48	0.64	4.72	0.35	3.18	1.35	25.88
1983	1.45	1.21	1.52	0.17	4.01	3.49	0.61	2.20	2.40	3.53	3.86	0.35	24.78
1984	1.98	0.12	0.23	0.35	1.27	1.27	1.26	0.49	1.25	7.81	1.54	6.66	24.23
1985	2.01	2.11	1.00	3.92	2.41	3.71	3.14	0.20	4.25	3.36	2.13	0.74	28.99
1986	1.18	1.00	0.20	1.05	6.15	4.40	0.09	2.53	2.21	9.88	2.31	4.56	35.55
1987	0.68	2.76	1.49	1.96	9.20	10.62	2.32	4.07	4.41	0.17	0.94	2.10	40.73
1988	0.36	0.21	0.93	0.73	2.20	8.21	3.49	0.99	2.34	0.69	0.11	0.22	20.47
1989	2.93	2.40	1.64	0.85	2.30	2.37	0.14	1.70	0.07	3.98	2.16	0.24	20.78
AVG	1.16	1.25	1.32	2.40	3.46	3.26	2.23	2.52	3.24	2.98	1.31	1.23	26.34

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1975

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	1.61	0.00	2.13	4.51	3.80	0.64	5.55	5.88	2.55	1.97	1.03	0.02	29.67
1917	0.68	0.21	0.05	0.39	2.58	3.05	0.78	0.79	3.25	0.35	0.85	0.00	12.98
1918	0.12	0.29	0.57	1.66	2.36	1.35	0.10	0.84	1.93	5.02	2.05	3.44	19.72
1919	2.72	1.31	1.77	2.61	4.21	5.08	4.75	4.71	7.51	5.44	1.22	1.16	42.48
1920	2.52	0.18	0.58	0.19	2.44	3.30	1.82	3.36	1.54	2.49	1.31	0.10	19.82
1921	0.48	1.26	3.38	1.36	4.31	3.93	1.36	0.31	2.31	1.21	0.34	0.59	20.84
1922	0.41	0.65	1.46	7.60	2.71	6.78	1.58	0.19	1.26	1.31	0.72	0.03	24.70
1923	0.38	4.10	2.75	3.45	0.59	3.26	1.69	0.96	4.91	4.43	2.52	2.39	31.44
1924	0.82	1.63	1.05	2.36	2.75	1.23	1.06	0.06	1.91	0.65	0.03	1.87	15.43
1925	0.08	0.00	0.63	1.24	5.32	1.03	0.84	2.26	3.35	2.14	1.24	0.91	19.06
1926	1.96	0.00	2.74	8.39	1.83	2.83	2.56	1.16	1.07	2.56	1.58	2.18	28.86
1927	0.72	2.89	2.02	1.77	1.14	4.48	3.36	0.62	0.67	2.53	0.00	1.86	22.05
1928	0.53	1.85	0.28	0.95	3.76	3.83	0.54	2.97	4.77	0.32	0.32	0.82	20.95
1929	0.55	0.29	1.98	1.21	5.23	1.74	3.91	0.26	4.10	2.79	1.00	2.43	25.50
1930	0.73	0.27	1.47	2.01	2.22	7.09	0.57	0.62	0.67	7.82	2.51	0.82	26.79
1931	4.82	1.66	1.19	5.36	6.34	2.38	3.03	2.05	0.00	0.64	0.92	2.58	30.98
1932	0.87	1.84	1.60	2.08	1.91	1.44	16.73	4.20	8.93	0.11	0.69	1.38	41.78
1933	2.26	1.80	0.17	0.88	2.94	0.81	1.33	3.92	0.50	0.80	0.39	0.38	16.17
1934	2.80	0.23	1.27	1.66	1.98	0.12	2.71	1.36	1.50	0.39	0.77	2.42	17.21
1935	0.34	2.02	0.30	2.21	16.69	6.75	5.37	0.16	6.05	0.43	0.32	3.38	44.03
1936	0.34	0.16	1.34	0.83	4.33	5.40	1.80	2.19	6.82	3.07	1.41	0.42	28.11
1937	0.85	0.15	1.86	0.44	1.45	3.14	0.86	0.34	1.62	2.16	0.55	5.66	19.07
1938	1.52	0.55	1.28	4.04	1.39	0.32	4.42	0.56	0.51	0.29	0.23	1.09	16.19
1939	2.27	0.22	0.18	0.56	1.63	0.43	3.58	4.19	1.21	3.43	1.76	1.25	20.71
1940	0.41	1.88	1.24	1.97	4.70	4.55	0.58	2.89	0.25	1.78	2.09	2.04	24.40
1941	1.69	2.80	4.06	4.66	2.20	2.85	2.42	1.81	4.92	5.28	0.41	0.54	33.63
1942	0.29	0.89	0.24	3.51	1.52	0.90	4.09	5.10	4.95	1.59	0.20	0.66	23.96
1943	0.38	0.13	0.85	2.31	3.67	1.94	1.49	0.21	4.26	0.92	1.47	1.53	19.18
1944	2.05	2.67	2.33	0.61	5.26	3.41	0.30	6.69	0.95	3.12	1.94	1.93	31.27
1945	2.81	1.56	3.01	2.40	2.30	3.19	0.55	0.44	5.35	1.46	0.13	1.19	24.40
1946	1.87	1.16	0.41	3.11	4.71	2.36	0.97	3.65	4.09	3.19	1.02	1.39	27.93
1947	2.95	0.40	1.30	1.40	1.95	4.90	0.46	3.73	0.27	0.86	1.70	0.91	20.84
1948	0.24	1.95	0.34	2.33	1.78	5.10	3.73	0.63	4.58	1.86	0.93	0.46	23.94
1949	2.83	5.17	1.74	4.42	0.77	4.18	1.26	3.00	4.31	4.88	0.00	2.63	35.19
1950	0.73	1.40	0.18	1.54	3.14	2.90	2.41	3.18	2.76	0.35	0.14	0.30	18.73
1951	0.03	1.02	2.72	0.62	7.69	2.06	0.02	0.83	0.89	2.63	0.39	0.42	19.32
1952	0.16	2.10	2.56	2.12	5.25	1.11	0.67	0.00	2.04	0.00	2.65	1.97	20.63
1953	0.16	0.47	1.48	0.42	0.64	0.67	0.29	4.89	4.15	4.44	0.03	0.76	18.41
1954	0.34	0.01	0.03	2.36	3.41	3.82	0.72	0.96	0.67	2.85	0.52	0.00	15.69
1955	1.45	1.79	0.63	0.16	3.99	2.06	3.53	3.51	1.44	0.37	1.79	0.31	21.02
1956	0.64	0.54	0.07	0.37	0.27	0.26	2.31	1.28	0.30	3.00	0.35	0.40	9.80
1957	0.36	1.56	1.84	8.76	7.78	1.98	0.17	0.53	5.20	5.52	3.19	1.35	38.23
1958	4.81	2.66	1.78	1.12	3.04	8.90	1.40	2.74	7.80	6.13	0.45	0.55	41.40
1959	0.48	1.10	0.11	2.04	4.13	5.74	3.08	1.14	2.79	5.94	1.72	1.45	29.72
1960	0.95	0.89	1.91	0.53	1.67	0.53	5.05	4.72	0.60	4.57	1.06	3.07	25.55
1961	1.24	2.80	0.13	0.81	0.31	5.98	6.73	1.52	0.28	5.58	0.70	0.77	26.85
1962	0.33	0.48	0.63	2.67	0.99	2.22	0.07	2.01	1.60	1.25	1.20	0.80	14.23
1963	0.09	2.30	0.08	2.24	4.18	2.18	0.13	0.44	2.61	1.60	1.40	0.70	17.93
1964	1.70	1.03	1.57	1.76	2.56	1.56	0.80	2.04	7.52	1.84	0.74	0.58	23.70
1965	0.81	3.71	2.07	2.71	4.00	1.09	1.69	2.12	2.89	2.11	1.06	3.39	27.63
1966	1.76	1.46	0.60	3.51	3.39	1.13	0.62	7.51	2.34	0.43	0.01	0.02	22.78
1967	0.22	0.84	1.46	2.18	0.21	1.12	0.92	3.11	5.19	2.84	3.03	0.86	21.98
1968	4.06	1.74	2.29	2.69	4.41	2.20	2.66	0.61	4.21	0.66	1.91	0.92	28.36
1969	1.33	1.13	0.70	2.03	4.41	2.26	0.86	3.74	1.82	11.13	2.00	1.41	32.83
1970	0.75	2.32	1.03	0.30	3.73	1.17	0.45	1.32	5.95	0.50	0.00	0.18	17.69
1971	0.01	0.71	0.21	2.06	0.82	6.74	0.41	10.26	2.37	5.99	0.13	1.44	31.17
1972	1.02	0.17	0.32	0.45	4.27	1.63	1.20	4.58	3.62	0.84	0.82	0.20	19.12
1973	1.71	2.47	1.15	3.52	1.30	6.34	6.63	1.36	4.20	6.18	0.13	0.00	35.02

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1975

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	1.35	0.02	1.00	1.54	4.12	0.97	0.49	14.99	1.44	2.61	1.53	2.58	32.65
1975	0.55	2.87	0.27	4.51	5.98	2.04	2.27	0.70	1.55	3.06	0.10	1.02	24.90
1976	0.30	0.11	1.41	5.94	5.40	3.03	9.44	1.46	7.23	5.23	1.47	2.03	43.05
1977	2.34	0.83	0.56	4.02	2.59	1.90	0.12	0.77	1.43	2.51	2.63	0.52	20.21
1978	0.38	0.99	0.30	1.01	2.47	3.32	0.49	4.24	2.16	0.69	2.75	1.05	19.85
1979	1.39	1.34	4.04	4.20	1.65	9.46	0.90	2.03	0.23	0.12	2.36	1.41	29.15
1980	0.81	0.41	1.25	0.84	5.59	0.25	0.39	5.55	7.88	1.15	2.97	1.21	28.29
1981	1.04	0.58	3.71	7.49	3.14	6.63	1.02	1.59	2.76	6.21	0.83	0.40	35.40
1982	0.59	3.12	0.31	1.32	5.06	2.00	2.62	0.90	2.52	0.63	3.16	1.54	23.77
1983	1.62	1.15	3.16	0.11	2.62	3.89	1.59	2.83	2.42	2.56	3.10	0.27	25.33
1984	2.15	0.13	0.14	0.44	1.29	1.73	0.85	0.56	1.21	6.83	1.11	5.11	21.55
1985	1.88	1.82	1.77	2.26	3.63	1.99	1.94	0.38	3.91	4.35	2.28	0.44	26.65
1986	1.15	1.50	0.48	1.11	5.27	4.10	0.04	2.14	2.67	9.61	2.02	4.53	34.62
1987	0.51	3.58	1.99	1.75	10.88	10.36	1.55	2.96	2.13	0.12	1.57	2.33	39.72
1988	0.33	0.49	0.65	0.61	1.89	4.79	2.96	0.69	2.45	1.62	0.13	0.35	16.96
1989	3.53	1.60	1.07	1.25	1.44	1.57	0.23	2.62	0.30	4.18	1.62	0.41	19.80
AVG	1.23	1.32	1.29	2.30	3.40	3.07	2.11	2.44	2.95	2.78	1.20	1.31	25.39

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1980

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	1.72	0.00	1.50	6.60	4.70	0.65	4.43	3.77	0.42	2.47	1.03	0.04	27.32
1917	0.68	0.34	0.09	0.43	2.63	0.93	0.60	0.58	4.54	0.60	1.11	0.00	12.55
1918	0.21	0.59	0.66	1.54	1.56	1.35	0.14	0.77	2.65	4.28	2.69	4.71	21.15
1919	2.70	1.48	1.31	2.69	4.43	5.95	6.28	7.61	6.99	5.77	1.02	1.30	47.54
1920	2.79	0.18	1.05	0.36	2.22	3.50	2.36	3.68	1.62	2.82	1.82	0.13	22.53
1921	0.63	0.84	3.01	2.56	3.85	6.20	1.00	0.13	2.67	0.93	0.32	1.22	23.36
1922	0.69	0.66	1.82	6.73	3.52	4.23	1.50	0.36	1.39	1.89	1.03	0.08	23.89
1923	0.33	4.80	2.34	3.68	0.33	2.34	2.95	1.00	4.67	4.37	3.05	2.71	32.57
1924	0.87	2.12	1.43	2.82	3.54	2.07	0.59	0.13	2.07	0.31	0.04	1.56	17.56
1925	0.15	0.01	0.44	0.80	4.99	0.85	0.72	2.17	3.52	2.86	1.19	0.78	18.47
1926	2.06	0.02	3.24	9.64	2.22	2.29	2.55	1.00	1.27	2.63	1.80	2.58	31.30
1927	0.94	2.07	2.48	2.39	1.18	6.49	4.22	0.60	1.87	2.19	0.02	2.10	26.56
1928	0.58	1.95	0.16	1.15	3.35	3.54	0.68	3.90	4.43	0.31	0.59	1.13	21.76
1929	0.86	0.46	1.93	1.46	6.53	1.68	3.87	0.43	3.23	3.33	1.42	2.53	27.75
1930	0.67	0.24	1.46	1.89	3.36	5.71	0.34	0.28	0.77	10.50	2.32	0.91	28.45
1931	4.30	1.92	2.25	4.00	3.36	2.50	2.62	1.17	0.02	0.84	1.35	2.90	27.23
1932	1.18	1.98	1.98	2.32	2.12	1.89	14.24	3.37	8.40	0.05	0.74	1.91	40.17
1933	2.40	1.93	0.33	0.87	3.43	0.66	0.90	4.92	1.25	0.59	0.58	0.42	18.29
1934	3.36	0.37	1.32	2.21	2.19	0.07	2.22	1.62	1.43	0.41	1.27	2.60	19.07
1935	0.42	2.52	0.37	1.74	16.45	7.88	5.18	0.12	7.36	0.86	0.46	4.19	47.55
1936	0.39	0.30	1.23	1.23	4.16	5.73	2.60	1.92	8.95	3.49	1.78	0.73	32.50
1937	0.95	0.16	2.30	0.33	2.00	3.59	1.02	0.56	1.59	2.12	1.09	5.37	21.09
1938	3.00	0.99	1.56	4.52	3.26	3.98	4.02	0.44	0.78	0.22	0.62	1.20	24.59
1939	2.03	0.76	0.36	1.33	1.47	1.21	5.47	3.09	1.36	2.68	2.39	0.99	23.16
1940	0.47	2.90	1.95	2.52	3.39	6.05	3.09	1.12	1.37	2.90	2.43	3.33	31.52
1941	2.96	4.63	4.39	4.28	2.30	1.99	2.68	2.67	4.50	4.12	0.82	0.93	36.26
1942	0.15	1.35	0.50	3.89	5.55	0.77	2.74	4.22	5.32	6.70	0.28	1.43	32.90
1943	0.16	0.17	1.00	1.97	3.54	3.82	2.56	0.18	6.07	0.52	1.46	2.09	23.55
1944	2.49	3.81	3.60	1.09	7.24	3.08	0.06	4.34	0.57	4.35	3.20	2.37	36.20
1945	3.72	3.79	3.97	1.36	2.52	2.68	0.89	0.39	5.18	5.04	0.61	0.68	30.82
1946	2.32	1.72	0.82	2.49	3.92	2.39	0.10	2.22	3.10	2.62	1.10	3.01	25.80
1947	2.77	0.66	1.95	1.72	1.53	2.35	0.34	3.49	0.06	0.54	1.81	1.41	18.62
1948	0.17	3.29	0.37	3.21	1.52	7.19	0.98	0.76	2.21	1.28	0.95	0.99	22.93
1949	3.86	4.58	2.29	5.50	1.29	4.68	2.20	6.16	2.49	4.92	0.00	3.14	41.**
1950	0.97	2.70	0.23	1.46	3.75	4.23	2.73	2.95	2.89	0.20	0.27	0.00	22.38
1951	0.07	1.54	3.35	0.46	6.44	2.63	0.24	0.30	1.37	1.27	0.74	0.48	18.89
1952	0.21	0.95	3.23	3.25	4.17	2.20	1.25	0.00	2.38	0.00	3.06	3.09	23.80
1953	0.12	0.56	1.56	0.26	0.77	1.00	1.49	3.00	2.63	4.91	0.05	0.65	17.00
1954	0.47	0.03	0.14	3.34	3.21	4.67	0.81	0.51	1.23	1.70	0.79	0.05	16.96
1955	1.66	1.58	0.82	0.18	5.06	1.49	3.81	2.27	3.24	0.47	1.60	0.26	22.42
1956	0.48	0.74	0.18	0.59	0.46	0.94	2.18	0.73	0.80	1.49	0.73	0.48	9.80
1957	0.46	1.27	2.95	8.03	6.93	1.49	0.45	0.35	4.94	5.43	3.42	0.92	36.64
1958	3.40	2.60	2.29	0.97	2.92	9.47	1.69	4.43	10.65	5.39	0.44	0.54	44.78
1959	0.85	1.07	0.31	2.35	3.93	6.42	2.52	1.33	1.62	5.55	1.58	2.40	29.93
1960	1.01	1.06	1.83	1.44	1.53	0.58	7.55	5.74	0.41	5.64	1.08	3.22	31.09
1961	0.92	3.48	0.25	0.15	0.69	7.90	5.27	2.17	0.53	4.80	1.03	0.70	27.88
1962	0.35	0.34	0.92	3.27	1.45	2.39	0.64	0.89	2.37	2.16	1.59	1.21	17.57
1963	0.04	2.09	0.06	2.74	3.14	1.31	0.32	1.14	2.46	1.86	2.85	0.78	18.79
1964	2.93	1.42	2.09	2.42	1.59	1.53	0.47	1.91	7.43	1.30	1.14	0.56	24.79
1965	1.64	3.48	1.51	1.65	5.56	1.77	0.35	1.85	4.15	2.00	0.97	1.93	26.84
1966	1.36	1.11	0.80	3.16	3.99	1.52	3.21	12.23	4.51	0.16	0.00	0.00	32.06
1967	0.17	0.67	1.05	2.17	0.64	0.39	3.41	1.41	5.29	5.25	3.22	0.85	24.51
1968	4.33	1.59	2.18	2.49	5.24	2.36	4.26	0.98	4.08	0.31	2.78	0.32	30.93
1969	0.55	1.49	1.10	3.02	2.25	1.75	2.31	2.62	2.00	10.46	2.24	1.30	31.07
1970	0.59	2.86	1.29	0.72	6.19	1.38	0.52	1.24	8.06	1.42	0.00	0.20	24.48
1971	0.05	1.79	0.17	1.93	1.46	3.60	0.74	12.10	2.61	6.55	0.37	1.38	32.75
1972	1.47	0.18	0.63	1.38	8.28	2.20	2.03	7.37	3.01	0.92	1.06	0.13	28.67
1973	1.88	2.21	1.03	2.88	2.04	8.20	8.18	0.63	3.50	8.96	0.27	0.02	39.79

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1980

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	1.28	0.17	1.30	3.12	4.12	1.36	0.77	9.89	2.16	3.69	1.31	2.61	31.78
1975	1.06	2.58	0.36	4.31	5.39	2.96	3.06	0.83	1.95	3.61	0.32	0.99	27.42
1976	0.21	0.14	1.05	6.08	4.75	3.30	7.92	1.23	3.60	4.22	1.25	2.52	36.27
1977	2.75	1.10	0.90	7.11	1.91	2.17	0.22	0.55	1.35	4.68	3.60	0.57	26.91
1978	0.43	1.77	0.41	1.42	1.62	2.34	0.56	5.36	3.49	0.59	4.94	0.86	23.79
1979	1.70	1.72	5.70	5.42	1.33	5.64	3.55	3.65	0.04	0.23	2.65	2.11	33.77
1980	1.68	0.49	2.15	0.72	4.23	0.13	1.31	5.35	17.39	0.67	3.16	1.35	38.63
1981	1.26	1.66	5.13	7.05	3.34	11.52	0.71	1.60	2.52	7.34	0.46	0.44	43.03
1982	0.80	2.45	0.54	1.88	6.66	1.16	0.53	0.98	4.13	0.85	3.14	1.89	25.03
1983	1.20	2.04	3.65	0.29	4.12	6.22	2.07	1.69	1.34	4.13	4.79	0.41	31.95
1984	3.19	0.19	0.47	0.40	1.84	2.52	1.58	1.57	1.69	9.79	0.63	7.14	31.00
1985	2.47	2.37	2.75	3.41	3.87	2.32	0.84	0.53	5.34	2.48	2.51	0.63	29.52
1986	0.91	0.82	0.40	2.16	5.29	4.46	0.15	4.18	2.80	9.82	2.38	5.59	38.96
1987	0.80	3.42	2.14	1.54	10.92	9.54	2.23	5.39	2.58	0.66	2.63	2.44	44.28
1988	0.48	0.66	0.66	1.09	2.57	4.46	6.74	1.30	1.85	2.00	0.12	0.77	22.70
1989	5.18	2.26	0.93	1.02	0.90	4.73	0.72	2.69	0.19	5.90	2.15	0.30	26.97
AVG	1.41	1.54	1.54	2.55	3.57	3.33	2.37	2.49	3.23	3.09	1.48	1.53	28.13

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1985

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	1.43	0.00	1.44	7.96	3.51	0.77	4.49	3.69	0.17	2.26	1.03	0.06	26.81
1917	0.80	0.22	0.12	0.25	2.29	0.36	0.53	0.42	4.66	0.86	1.60	0.00	12.11
1918	0.16	0.63	0.71	0.77	1.35	1.05	0.13	0.35	2.51	4.63	2.30	5.14	19.73
1919	2.75	1.62	0.60	3.32	4.50	6.12	7.05	5.77	5.55	5.91	0.84	1.38	45.41
1920	3.03	0.10	1.13	0.29	1.53	2.90	2.86	2.45	1.88	2.63	1.59	0.13	20.52
1921	0.60	0.51	3.18	3.02	4.40	5.82	1.01	0.06	2.25	0.93	0.31	1.58	23.67
1922	0.72	0.69	2.06	6.12	3.61	3.39	0.47	0.16	1.22	1.86	0.78	0.10	21.18
1923	0.28	5.33	2.36	3.88	0.10	2.29	3.50	0.68	3.53	4.29	2.71	2.77	31.72
1924	0.83	2.29	0.98	3.50	3.60	2.04	0.43	0.01	1.37	0.16	0.05	2.02	17.28
1925	0.14	0.00	0.56	0.60	5.07	0.80	0.35	2.02	3.05	1.87	0.83	0.84	16.13
1926	2.01	0.00	2.89	13.01	2.32	2.46	2.01	0.71	1.51	2.75	1.63	2.12	33.42
1927	0.89	1.32	2.39	2.61	1.33	7.30	5.25	0.75	1.44	1.01	0.00	2.09	26.38
1928	0.66	1.82	0.06	1.16	3.13	3.57	0.20	4.75	4.08	0.23	0.50	0.94	21.10
1929	0.74	0.41	1.96	1.48	6.07	1.72	3.52	0.56	3.14	3.65	1.25	2.30	26.80
1930	0.72	0.04	1.59	1.99	2.28	5.67	0.00	0.00	0.82	11.00	2.17	0.88	27.16
1931	4.37	1.80	2.44	3.67	2.50	1.90	2.28	0.80	0.00	0.67	1.06	2.96	24.45
1932	0.65	1.81	1.30	1.44	1.65	2.34	17.64	3.08	8.06	0.00	0.74	1.55	40.26
1933	2.65	2.26	0.27	1.02	3.13	0.69	0.58	6.15	1.10	0.56	0.55	0.44	19.40
1934	2.87	0.18	0.79	2.28	1.65	0.00	2.15	1.98	0.98	0.29	1.60	3.30	18.07
1935	0.16	2.87	0.42	1.65	18.85	6.02	6.05	0.00	7.44	0.45	0.32	3.98	48.21
1936	0.36	0.25	1.34	0.54	4.03	5.47	2.30	1.36	5.48	3.15	1.73	0.52	26.53
1937	0.83	0.18	2.57	0.28	2.16	2.73	0.82	0.81	0.85	1.63	0.97	5.38	19.21
1938	1.54	0.52	1.45	5.22	1.50	0.49	3.07	0.16	0.61	0.51	0.16	1.30	16.53
1939	2.14	0.35	0.12	0.17	1.30	0.26	3.25	5.02	1.65	2.77	1.72	0.99	19.75
1940	0.36	1.78	1.74	1.97	4.31	5.82	2.35	1.38	0.47	2.24	2.04	3.54	28.01
1941	3.24	3.69	5.57	4.31	1.78	3.79	3.20	3.87	3.87	3.23	0.70	1.04	38.28
1942	0.28	1.57	0.53	5.04	1.94	0.68	2.57	2.52	4.03	1.35	0.03	0.18	20.72
1943	0.45	0.14	1.11	1.26	4.10	2.36	1.92	0.71	3.29	0.39	1.53	0.74	18.00
1944	2.03	3.11	2.64	0.81	6.07	2.86	0.27	4.44	0.37	4.10	2.07	1.98	30.75
1945	2.91	1.79	2.23	2.34	3.45	3.65	0.45	0.00	7.00	1.18	0.00	1.60	26.60
1946	1.86	1.45	0.42	4.30	3.98	2.15	0.86	5.03	1.80	3.81	1.37	2.32	29.35
1947	3.07	0.36	1.33	0.60	2.31	2.66	0.36	4.89	0.36	0.63	1.33	1.08	18.98
1948	0.25	2.04	0.51	2.40	1.39	7.96	4.85	0.50	5.37	2.07	0.98	0.50	28.82
1949	2.83	3.61	3.84	7.14	0.70	5.02	1.08	4.15	2.25	6.82	0.00	2.46	39.90
1950	2.66	1.85	0.05	0.48	4.55	4.46	1.75	1.70	2.29	0.00	0.00	0.00	19.79
1951	0.00	1.33	2.33	0.00	7.43	1.41	0.00	0.00	0.89	1.12	0.92	0.20	15.63
1952	0.00	2.28	2.68	2.38	6.66	1.41	0.36	0.00	2.29	0.00	2.80	2.30	23.16
1953	0.30	0.47	2.52	0.84	0.56	0.32	0.00	4.82	3.84	6.92	0.00	0.85	21.44
1954	0.23	0.00	0.00	2.15	3.34	2.47	0.92	0.25	1.18	3.19	0.99	0.00	14.72
1955	2.17	2.12	0.35	0.22	4.15	1.76	1.10	6.09	0.29	0.29	2.26	0.07	20.87
1956	1.05	0.53	0.07	0.02	0.13	0.04	4.19	1.48	0.18	2.83	0.44	0.33	11.29
1957	0.27	1.80	1.70	8.67	9.87	2.51	0.12	0.37	5.98	4.33	3.40	1.01	40.03
1958	5.42	2.97	1.36	1.53	1.89	8.98	1.17	1.24	8.83	7.15	0.20	0.44	41.18
1959	0.45	0.93	0.00	2.04	3.55	2.27	1.80	0.99	5.11	6.77	1.94	1.17	27.02
1960	1.43	0.91	2.11	0.18	1.76	0.34	3.77	4.10	0.54	5.74	1.04	4.32	26.24
1961	1.17	3.46	0.14	0.16	0.01	6.94	6.25	1.81	0.07	5.53	0.63	1.07	27.24
1962	0.28	0.76	0.55	2.65	1.13	2.62	0.06	1.06	1.51	0.49	1.59	0.88	13.58
1963	0.09	2.43	0.08	2.32	3.39	3.34	0.03	0.47	3.10	1.95	1.13	0.66	18.99
1964	1.66	1.22	1.33	2.05	2.84	3.74	0.04	1.78	5.51	2.09	0.93	0.59	23.78
1965	0.30	4.14	1.53	3.66	3.83	0.36	4.54	2.14	2.30	2.49	0.69	3.43	29.41
1966	1.68	1.66	0.58	1.90	3.05	1.53	0.18	8.95	1.77	0.24	0.00	0.00	21.54
1967	0.20	0.95	3.90	1.66	0.12	0.83	0.04	4.53	5.53	1.94	3.40	0.79	23.89
1968	5.05	1.94	3.12	2.63	4.60	3.65	3.26	1.06	4.85	0.25	1.61	1.12	33.14
1969	0.90	1.59	0.49	2.58	5.20	2.34	0.81	5.81	2.87	7.03	1.58	1.85	33.05
1970	0.86	2.77	1.11	0.29	5.89	1.40	0.44	1.31	7.14	0.69	0.00	0.23	22.13
1971	0.00	0.63	0.66	2.80	0.89	5.71	0.32	11.09	2.42	5.10	0.13	1.25	31.00
1972	1.01	0.20	0.18	0.26	5.33	1.34	0.87	5.89	3.81	1.11	0.87	0.23	21.10
1973	1.86	2.68	1.14	5.71	2.15	8.51	6.64	1.54	3.96	6.50	0.16	0.00	40.85

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 1985

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	1.24	0.00	1.12	1.09	4.79	2.12	0.94	16.96	0.98	3.69	1.47	3.49	37.89
1975	0.47	4.00	0.34	3.35	5.42	1.82	2.62	0.19	1.28	3.01	0.12	1.03	23.65
1976	0.13	0.32	1.10	5.44	5.61	4.38	8.48	0.62	5.72	5.27	1.62	2.13	40.82
1977	2.51	0.73	0.80	4.32	1.77	2.26	0.30	0.11	0.15	1.56	2.09	0.46	17.06
1978	0.39	1.27	0.76	0.92	2.13	2.38	1.27	4.05	2.69	0.80	3.08	1.54	21.28
1979	1.60	1.48	4.36	4.92	2.18	7.95	1.60	2.11	0.36	0.13	3.40	2.03	32.13
1980	0.75	0.43	1.06	0.76	4.14	0.04	0.61	6.08	8.65	0.75	3.09	1.03	27.38
1981	1.14	0.92	2.59	5.70	3.76	8.23	0.28	1.34	2.37	6.91	0.17	0.57	33.98
1982	0.65	2.03	0.41	1.25	5.19	0.80	1.02	1.11	2.56	0.75	3.10	1.52	20.38
1983	1.43	1.06	3.97	0.16	2.93	4.15	2.55	2.74	1.16	2.41	2.96	0.35	25.87
1984	2.15	0.25	0.22	1.05	1.16	3.15	1.27	1.55	1.36	6.39	0.76	4.41	23.72
1985	1.88	1.81	2.38	1.60	3.72	1.21	1.13	0.49	4.07	4.38	2.36	0.36	25.40
1986	1.09	1.60	0.61	1.87	5.87	4.03	0.04	2.40	2.94	9.54	1.97	4.72	36.68
1987	0.47	3.98	2.27	1.65	11.69	9.93	1.35	2.94	1.07	0.21	2.11	2.45	40.11
1988	0.38	0.88	0.48	0.95	2.03	2.24	3.82	1.00	1.87	1.85	0.15	0.58	16.23
1989	4.21	1.36	0.83	1.20	0.55	1.74	0.37	2.74	0.44	4.67	1.54	0.46	20.13
AVG	1.33	1.44	1.40	2.43	3.47	3.08	2.08	2.49	2.79	2.78	1.26	1.46	26.01

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2000

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	2.38	0.00	2.11	6.26	5.59	0.54	4.45	3.79	0.68	2.50	1.16	0.11	29.55
1917	0.96	0.59	0.05	1.42	3.15	0.69	0.96	0.54	3.64	0.35	0.85	0.00	13.21
1918	0.27	0.78	0.69	2.94	2.20	1.51	0.32	1.32	2.69	2.95	3.00	5.48	24.13
1919	2.89	1.79	1.68	2.39	4.08	6.01	7.11	6.61	7.96	5.53	0.99	1.36	48.39
1920	2.78	0.30	1.34	0.44	3.28	3.91	2.08	4.91	1.61	2.16	2.68	0.18	25.67
1921	0.83	0.47	3.52	3.24	3.88	7.84	0.49	0.37	4.55	0.86	0.35	1.24	27.63
1922	0.92	0.75	2.74	6.23	3.56	3.49	1.57	0.72	1.82	4.05	1.56	0.11	27.51
1923	0.33	5.42	2.79	3.60	0.54	1.82	2.83	1.66	4.91	3.68	4.00	3.45	35.02
1924	1.08	2.42	2.23	4.07	3.87	3.65	0.11	0.19	2.83	0.23	0.04	1.95	22.66
1925	0.29	0.01	0.32	0.92	2.71	0.21	1.27	1.93	3.31	3.24	2.09	0.87	17.16
1926	2.33	0.08	3.83	8.72	2.02	2.22	2.38	2.45	0.99	1.98	1.99	2.67	31.64
1927	0.96	2.32	2.07	2.11	1.39	5.76	3.41	0.26	2.57	2.25	0.06	2.67	25.83
1928	0.70	2.80	1.20	1.50	4.75	3.04	1.82	2.24	4.07	0.63	0.83	1.45	25.01
1929	0.95	0.58	1.97	1.83	8.58	2.08	2.60	0.29	2.83	2.68	1.89	2.49	28.78
1930	0.77	0.33	1.82	2.09	4.49	5.27	0.56	0.29	0.76	9.48	2.39	0.84	29.10
1931	4.64	2.17	2.64	3.51	4.03	2.71	2.90	1.61	0.03	0.71	1.65	3.34	29.96
1932	2.00	2.63	2.26	2.83	2.75	1.68	10.78	3.17	6.81	0.07	0.55	2.63	38.15
1933	2.52	2.33	0.57	0.69	3.78	0.68	0.83	3.33	2.03	0.83	1.00	0.50	19.09
1934	5.08	0.81	1.50	3.00	2.19	0.07	2.30	0.40	2.87	0.19	2.00	2.73	23.13
1935	0.65	3.07	0.55	1.79	17.50	9.32	3.64	0.22	9.13	1.53	0.74	4.64	52.77
1936	0.45	0.43	1.81	2.27	5.47	5.68	3.61	1.32	11.99	3.18	2.01	1.25	39.46
1937	1.08	0.12	2.43	0.41	3.35	4.26	1.32	0.46	2.10	2.01	1.42	5.24	24.21
1938	3.19	1.05	1.57	4.43	3.50	4.44	4.15	0.48	0.80	0.18	0.68	1.19	25.66
1939	2.02	0.82	0.39	1.49	1.49	1.34	5.77	2.83	1.32	2.67	2.48	0.99	23.61
1940	0.48	3.05	1.98	2.59	3.27	6.08	3.19	1.09	1.49	2.99	2.48	3.30	31.99
1941	2.92	4.75	4.23	4.27	2.37	1.75	2.61	2.51	4.58	4.24	0.84	0.92	35.99
1942	0.13	1.32	0.50	3.74	6.03	0.78	2.76	4.45	5.49	7.41	0.31	1.60	34.52
1943	0.12	0.18	0.99	2.07	3.46	4.02	2.64	0.11	6.44	0.54	1.45	2.27	24.29
1944	2.58	4.00	3.76	1.16	7.40	3.17	0.00	4.32	0.43	4.50	3.41	2.49	37.22
1945	3.83	4.09	4.24	1.25	2.47	2.68	0.94	0.42	5.24	5.45	0.70	0.60	31.91
1946	2.41	1.78	0.88	2.36	3.86	2.43	0.00	2.08	3.09	2.40	1.03	3.19	25.51
1947	2.72	0.70	2.04	1.72	1.40	2.04	0.32	3.43	0.00	0.55	1.86	1.43	18.21
1948	0.15	3.46	0.38	3.25	1.45	7.42	0.61	0.78	1.95	1.25	0.97	1.05	22.72
1949	4.17	3.89	2.54	5.78	0.77	5.09	2.99	7.73	2.38	5.58	0.00	3.36	44.28
1950	0.99	3.29	0.30	1.35	4.31	4.61	2.71	3.19	2.67	0.10	0.35	0.00	23.87
1951	0.12	1.72	3.42	0.25	5.30	2.50	0.35	0.25	1.45	1.25	1.02	0.55	18.18
1952	0.35	1.53	2.98	4.54	3.38	2.99	1.22	0.00	3.70	0.00	2.60	4.01	27.30
1953	0.24	0.96	1.30	0.35	1.40	1.68	1.67	3.36	2.89	8.07	0.00	0.87	22.79
1954	0.71	0.00	0.32	2.06	3.61	3.00	1.65	0.50	1.62	2.38	1.24	0.15	17.24
1955	1.28	2.73	1.60	0.30	3.84	1.35	4.32	2.93	0.95	0.45	1.92	0.33	22.00
1956	0.72	1.36	0.20	0.19	0.67	2.28	2.59	0.40	0.80	1.16	0.80	0.55	11.72
1957	0.45	1.35	4.14	7.90	8.05	2.00	0.25	0.24	6.65	5.95	3.30	0.70	40.98
1958	3.90	3.35	1.85	0.50	2.25	9.95	0.30	1.95	10.35	6.00	0.15	0.41	40.96
1959	1.16	0.84	0.00	2.30	3.81	4.50	1.30	2.56	1.65	8.55	1.95	2.30	30.92
1960	1.60	1.10	2.20	1.50	1.85	0.65	10.00	7.10	0.65	5.55	1.25	4.10	37.55
1961	0.40	5.50	0.20	0.15	0.75	7.90	5.25	2.10	0.60	3.50	1.00	0.90	28.25
1962	0.45	0.60	1.00	3.95	1.35	2.50	1.40	1.50	4.10	1.40	1.90	1.35	21.50
1963	0.00	2.05	0.00	3.65	3.60	2.00	0.60	1.20	2.10	2.35	2.35	0.75	20.65
1964	3.00	1.85	1.05	2.35	0.80	1.30	1.15	0.95	6.40	0.95	2.00	0.65	22.45
1965	0.40	4.60	1.20	1.65	8.00	0.95	0.35	2.05	3.55	0.66	0.00	0.41	23.82
1966	1.76	1.37	1.29	2.33	6.85	2.45	5.73	7.71	4.68	0.46	0.00	0.03	34.66
1967	0.27	0.85	0.83	2.51	1.15	0.89	0.71	1.09	9.06	4.26	3.40	0.98	26.00
1968	6.77	2.04	3.20	2.86	4.60	2.41	3.24	0.41	4.19	0.47	2.99	0.28	33.46
1969	0.47	2.39	2.24	3.29	2.48	3.18	1.84	2.36	2.21	12.78	1.70	1.18	36.12
1970	0.96	3.93	2.39	1.09	7.83	2.53	0.91	0.38	6.86	2.47	0.00	0.51	29.86
1971	0.09	1.45	0.28	2.17	4.02	3.85	0.73	20.14	1.79	7.42	0.48	1.71	44.13
1972	1.47	0.44	1.48	3.17	9.15	2.21	5.05	6.48	2.68	1.44	2.32	0.46	36.35
1973	2.48	2.68	1.72	2.18	2.61	7.14	9.10	1.52	5.71	7.61	0.69	0.17	43.61

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2000

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	1.81	0.17	1.58	2.49	4.43	1.28	0.73	10.28	3.92	4.55	2.27	3.27	36.78
1975	0.72	5.12	0.61	6.57	9.50	2.61	4.56	0.97	0.79	3.35	0.65	1.93	37.32
1976	0.36	0.06	1.41	7.63	5.07	2.98	6.07	1.36	3.59	4.90	1.46	2.52	37.41
1977	3.13	1.22	1.06	8.23	4.37	3.81	0.25	0.10	0.33	1.96	8.24	0.64	33.34
1978	0.59	1.90	0.45	1.41	0.74	2.97	0.21	6.09	10.22	0.79	3.72	0.25	29.34
1979	3.59	2.63	5.01	2.80	1.05	5.04	4.27	2.70	0.00	0.62	2.95	2.34	33.00
1980	1.40	0.59	2.04	0.92	3.59	0.02	1.02	4.27	12.43	1.77	3.42	0.81	32.29
1981	1.24	1.15	8.54	4.87	3.83	8.92	1.32	2.19	3.23	12.15	0.84	0.38	48.65
1982	0.79	2.50	0.53	2.46	5.63	3.63	0.33	2.44	2.07	0.74	3.26	1.90	26.28
1983	1.40	1.98	3.13	0.46	2.89	5.27	1.63	1.39	2.83	3.78	4.53	0.42	29.71
1984	2.28	0.29	0.52	0.37	2.25	1.52	1.10	0.92	1.43	7.07	1.57	6.52	25.85
1985	2.97	2.20	3.48	2.61	4.36	2.40	2.31	0.09	5.03	3.97	3.81	0.59	33.83
1986	0.88	0.96	0.42	2.78	5.46	5.36	0.66	1.65	5.13	11.50	3.03	5.66	43.50
1987	0.54	3.45	1.84	1.72	10.59	15.53	2.14	2.51	2.39	0.69	3.72	2.61	47.73
1988	0.42	0.54	1.67	1.06	1.81	3.17	4.95	0.87	4.55	1.65	0.09	0.53	21.31
1989	4.55	1.83	1.65	1.08	0.69	2.04	0.45	1.39	1.43	5.79	1.67	0.29	22.87
AVG	1.57	1.81	1.79	2.65	3.90	3.45	2.40	2.40	3.51	3.23	1.73	1.64	30.10

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2007

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	2.23	0.00	3.10	5.81	5.52	0.51	4.19	5.13	0.58	2.50	1.19	0.20	30.97
1917	1.32	0.61	0.03	2.42	3.72	0.21	1.32	0.62	2.96	0.23	0.93	0.00	14.37
1918	0.15	0.82	0.64	3.63	3.27	1.08	0.54	0.88	1.78	2.61	2.17	5.80	23.38
1919	2.95	2.13	1.74	2.81	3.77	6.70	7.93	1.55	7.32	4.23	0.74	1.45	43.32
1920	3.02	0.24	1.49	0.34	3.73	3.52	2.68	4.12	1.74	1.50	2.80	0.16	25.32
1921	0.85	0.41	4.26	3.94	4.60	7.34	0.26	0.68	6.40	0.82	0.35	1.36	31.27
1922	1.06	0.76	3.87	6.45	3.39	3.77	0.78	0.80	2.60	6.40	1.47	0.15	31.49
1923	0.30	6.33	3.57	3.12	0.40	2.10	2.89	2.27	4.45	3.14	4.09	3.88	36.53
1924	1.37	2.52	1.99	6.12	3.49	4.87	0.04	0.00	2.40	0.10	0.02	2.63	25.56
1925	0.35	0.00	0.41	1.09	2.02	0.03	1.46	1.66	2.59	1.66	2.51	1.03	14.81
1926	2.25	0.08	3.45	10.31	1.81	2.21	1.69	3.44	1.13	1.01	1.70	2.01	31.10
1927	0.81	2.29	1.30	1.78	1.63	5.20	2.56	0.19	1.41	1.42	0.05	2.73	21.38
1928	0.87	3.24	2.15	1.79	6.45	2.16	2.46	1.37	3.36	0.83	0.81	1.18	26.65
1929	0.60	0.44	2.05	2.39	8.46	2.47	2.18	0.27	2.17	2.17	1.81	2.61	27.61
1930	0.94	0.27	2.17	2.50	3.40	5.35	0.23	0.19	0.57	7.32	2.50	0.73	26.17
1931	4.97	2.19	2.69	2.90	4.81	1.91	2.52	1.63	0.00	0.52	1.29	3.56	28.98
1932	1.25	2.36	1.13	1.74	1.75	1.95	14.16	3.38	6.92	0.05	0.55	1.86	37.11
1933	2.38	2.49	0.34	0.88	2.99	0.84	0.67	4.95	1.29	0.93	0.91	0.49	19.17
1934	3.97	0.40	1.04	3.10	1.30	0.00	2.11	1.14	1.76	0.20	2.42	3.30	20.75
1935	0.23	3.12	0.63	1.97	20.46	7.23	5.45	0.20	8.74	0.65	0.59	3.73	52.99
1936	0.44	0.30	2.09	1.37	5.19	6.45	2.84	1.13	5.45	2.76	1.76	0.71	30.50
1937	0.91	0.16	2.63	0.48	3.32	2.76	1.01	0.81	0.85	1.63	0.97	5.38	20.90
1938	3.27	1.01	1.65	4.63	4.25	3.84	3.75	0.61	0.91	0.21	0.62	1.26	26.00
1939	2.13	0.77	0.35	1.38	1.61	1.22	5.42	3.27	1.34	2.48	2.52	1.03	23.53
1940	0.49	2.79	1.83	2.43	3.71	5.80	3.10	1.08	1.40	3.06	2.45	3.18	31.30
1941	3.11	5.17	4.36	4.47	2.41	2.36	2.60	2.19	4.96	4.04	0.81	0.94	37.43
1942	0.16	1.37	0.51	4.00	5.50	0.74	3.34	4.56	5.38	7.26	0.31	1.45	34.58
1943	0.24	0.19	1.05	2.07	3.57	4.46	2.92	0.09	6.44	0.81	1.59	2.13	25.57
1944	2.59	3.77	3.69	1.16	7.34	3.14	0.03	4.66	0.42	4.19	3.37	2.36	36.73
1945	3.74	3.91	3.99	1.59	2.43	2.83	0.91	0.44	5.44	5.04	0.68	0.66	31.67
1946	2.33	1.76	0.93	2.58	3.66	2.32	0.09	2.39	3.18	2.55	1.07	3.10	25.94
1947	2.76	0.66	1.97	1.60	1.49	2.10	0.32	3.58	0.04	0.56	1.81	1.39	18.29
1948	0.16	3.31	0.39	3.16	1.44	7.48	1.05	0.75	2.30	1.33	0.97	0.99	23.35
1949	4.02	3.86	2.68	5.93	0.76	5.08	2.78	7.33	2.37	5.72	0.00	3.26	43.79
1950	1.18	3.13	0.29	1.34	4.25	4.54	2.66	3.31	2.83	0.11	0.33	0.01	23.99
1951	0.11	1.68	3.34	0.28	5.91	2.51	0.32	0.34	1.79	1.15	1.05	0.51	18.98
1952	0.17	1.97	2.33	2.40	3.13	3.61	1.39	0.01	4.36	0.00	3.20	2.84	25.41
1953	0.09	1.18	1.40	0.59	0.94	0.68	0.95	3.00	5.90	4.93	0.06	0.99	20.73
1954	0.51	0.01	0.14	1.43	2.80	3.06	0.87	0.60	0.57	2.06	1.42	0.10	13.56
1955	1.41	2.45	1.01	0.22	6.36	1.41	2.29	1.98	1.14	0.43	2.09	0.68	21.45
1956	0.95	0.95	0.19	0.83	0.46	0.86	1.96	2.11	0.84	2.12	1.75	0.76	13.77
1957	0.52	1.38	3.05	7.76	7.61	1.94	0.08	1.24	4.65	4.44	3.04	1.20	36.91
1958	5.46	3.45	1.42	1.54	2.55	4.92	0.88	1.76	11.26	6.88	0.34	0.94	41.40
1959	1.19	2.00	0.15	2.74	3.13	4.01	1.60	1.44	2.57	8.58	1.78	1.57	30.75
1960	1.60	1.36	2.09	1.40	1.88	0.97	7.08	3.33	0.95	7.27	1.40	4.63	33.97
1961	1.24	4.17	0.26	0.25	0.55	7.13	3.81	1.86	0.52	5.86	0.92	1.07	27.63
1962	0.62	0.61	0.92	4.41	1.51	2.08	0.43	1.31	3.06	0.61	1.79	1.63	18.98
1963	0.22	2.89	0.06	3.97	2.54	1.59	0.49	0.96	1.80	2.08	2.01	0.82	19.44
1964	2.67	1.55	1.60	2.29	2.70	3.51	0.85	1.51	4.47	1.72	2.64	0.97	26.49
1965	0.40	5.57	1.75	2.19	5.91	0.81	0.20	1.04	2.64	2.64	0.53	4.97	28.65
1966	1.88	1.86	0.91	3.08	6.64	1.60	3.15	8.01	4.56	0.48	0.00	0.05	32.22
1967	0.22	0.90	1.13	3.81	1.14	0.50	1.01	2.32	9.00	3.66	3.27	1.07	28.03
1968	6.09	2.17	2.61	3.23	4.23	1.77	3.25	0.51	4.93	0.43	2.52	1.00	32.73
1969	0.77	2.74	1.98	2.77	4.06	2.74	1.15	2.81	2.29	9.26	1.50	2.25	34.33
1970	1.04	3.86	1.92	1.01	9.63	1.92	1.56	1.57	5.87	1.59	0.01	0.40	30.38
1971	0.07	1.06	0.18	1.91	2.30	3.61	0.51	18.64	1.74	6.89	0.45	1.54	38.89
1972	1.30	0.45	0.96	2.14	7.35	1.77	3.54	6.44	3.07	1.76	1.99	0.48	31.23
1973	2.45	2.89	1.39	3.83	2.04	7.81	10.17	1.04	6.09	7.22	0.53	0.12	45.58

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2007

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	1.81	0.10	1.64	1.68	5.48	0.78	0.43	13.41	3.36	3.59	1.95	2.75	36.96
1975	0.67	5.23	0.48	5.06	7.59	2.24	3.65	0.60	1.02	3.19	0.40	1.51	31.65
1976	0.25	0.18	1.26	6.60	5.32	3.64	7.20	1.01	4.59	5.07	1.54	2.34	39.01
1977	2.84	0.99	0.94	6.40	3.15	3.08	0.27	0.10	0.25	1.77	5.36	0.56	25.71
1978	0.50	1.60	0.60	1.18	1.39	2.69	0.71	5.13	6.69	0.79	3.42	0.85	25.56
1979	3.00	1.83	4.21	3.98	1.64	7.06	2.95	1.75	0.02	0.35	1.72	1.96	30.47
1980	0.80	0.50	1.16	0.98	4.68	0.02	0.61	4.54	6.79	1.05	3.36	0.69	25.19
1981	1.34	0.94	5.53	3.70	4.67	5.79	2.18	1.12	2.26	7.93	0.44	0.67	36.56
1982	0.70	2.03	0.46	2.02	6.59	2.11	0.34	1.98	1.97	1.13	2.90	1.58	23.33
1983	1.81	1.54	3.21	0.37	3.09	3.70	1.15	2.43	2.51	2.94	2.90	0.53	26.18
1984	1.94	0.43	0.47	0.73	1.37	2.08	0.56	0.46	2.45	6.98	1.29	4.54	23.32
1985	2.22	1.99	2.81	1.84	3.53	3.14	2.13	0.00	4.12	6.34	3.12	0.30	31.54
1986	1.04	0.90	0.58	2.12	5.86	5.80	0.66	0.85	3.61	11.34	2.37	5.01	40.15
1987	0.50	3.73	1.72	2.01	12.47	12.00	2.05	2.27	1.61	0.33	2.63	2.17	43.50
1988	0.38	1.37	1.01	0.92	1.39	1.95	3.06	0.62	2.38	1.69	0.04	0.34	15.16
1989	3.72	1.06	1.88	0.84	0.85	1.42	0.74	0.60	1.08	4.35	1.54	0.41	18.49
AVG	1.54	1.82	1.69	2.67	3.95	3.15	2.23	2.32	3.14	2.99	1.59	1.67	28.75

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2015

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	1.82	0.00	1.38	7.48	4.29	0.69	4.56	3.32	0.38	2.34	1.07	0.05	27.38
1917	0.75	0.35	0.10	0.37	2.43	0.63	0.57	0.44	4.50	0.71	1.31	0.00	12.16
1918	0.23	0.67	0.72	1.35	1.33	1.35	0.13	0.84	2.86	4.12	2.81	5.17	21.57
1919	2.78	1.57	0.97	2.85	4.45	5.87	6.82	7.63	6.62	6.17	0.97	1.34	48.05
1920	2.86	0.19	1.16	0.38	2.03	3.39	2.39	3.59	1.75	2.66	1.96	0.15	22.50
1921	0.68	0.51	3.07	2.89	3.99	6.71	0.89	0.08	2.52	0.91	0.33	1.42	23.99
1922	0.75	0.71	1.96	6.09	3.64	3.34	1.11	0.34	1.20	1.94	1.09	0.09	22.27
1923	0.31	5.08	2.28	3.93	0.30	2.03	3.24	0.85	4.18	4.23	3.15	2.88	32.46
1924	0.83	2.31	1.51	3.08	3.82	2.25	0.34	0.13	2.03	0.23	0.05	1.78	18.35
1925	0.17	0.01	0.44	0.66	4.42	0.64	0.63	2.07	3.37	2.85	1.16	0.80	17.23
1926	2.15	0.03	3.35	10.96	2.28	2.38	2.36	1.04	1.27	2.77	1.85	2.52	32.94
1927	0.96	1.69	2.51	2.53	1.28	6.91	4.84	0.59	2.21	1.72	0.03	2.28	27.55
1928	0.62	2.04	0.18	1.20	3.20	3.64	0.59	4.10	4.30	0.31	0.62	1.21	22.02
1929	0.92	0.51	1.94	1.44	7.02	1.73	3.31	0.47	3.23	3.45	1.51	2.33	27.88
1930	0.69	0.17	1.57	1.90	3.42	5.50	0.31	0.13	0.86	11.11	2.22	0.90	28.77
1931	4.37	1.93	2.50	3.80	2.82	2.44	2.62	1.09	0.02	0.75	1.39	3.03	26.76
1932	0.82	1.88	1.52	1.67	1.85	2.27	16.86	3.05	8.00	0.01	0.73	1.71	40.38
1933	2.67	2.23	0.32	0.98	3.29	0.66	0.62	5.79	1.26	0.55	0.58	0.44	19.38
1934	3.13	0.27	0.89	2.28	1.82	0.01	2.19	1.81	1.23	0.28	1.54	3.19	18.63
1935	0.25	2.87	0.41	1.62	18.30	6.48	5.67	0.01	7.56	0.63	0.36	4.16	48.31
1936	0.36	0.28	1.31	0.75	4.42	5.34	2.47	1.39	6.79	3.22	1.78	0.63	28.45
1937	0.87	0.17	2.53	0.27	2.20	3.03	0.89	0.74	1.10	1.71	1.06	5.35	19.93
1938	3.19	1.05	1.57	4.43	3.50	4.44	4.15	0.48	0.80	0.18	0.68	1.19	25.66
1939	2.02	0.82	0.39	1.49	1.49	1.34	5.77	2.83	1.32	2.67	2.48	0.99	23.61
1940	0.48	3.05	1.98	2.59	3.27	6.08	3.19	1.09	1.49	2.99	2.48	3.30	31.99
1941	2.92	4.75	4.23	4.27	2.37	1.75	2.61	2.51	4.58	4.24	0.84	0.92	35.99
1942	0.13	1.32	0.50	3.74	6.03	0.78	2.76	4.45	5.49	7.41	0.31	1.60	34.52
1943	0.12	0.18	0.99	2.07	3.46	4.02	2.64	0.11	6.44	0.54	1.45	2.27	24.29
1944	2.58	4.00	3.76	1.16	7.40	3.17	0.00	4.32	0.43	4.50	3.41	2.49	37.22
1945	3.83	4.09	4.24	1.25	2.47	2.68	0.94	0.42	5.24	5.45	0.70	0.60	31.91
1946	2.41	1.78	0.88	2.36	3.86	2.43	0.00	2.08	3.09	2.40	1.03	3.19	25.51
1947	2.72	0.70	2.04	1.72	1.40	2.04	0.32	3.43	0.00	0.55	1.86	1.43	18.21
1948	0.15	3.46	0.38	3.25	1.45	7.42	0.61	0.78	1.95	1.25	0.97	1.05	22.72
1949	4.17	3.89	2.54	5.78	0.77	5.09	2.99	7.73	2.38	5.58	0.00	3.36	44.28
1950	0.99	3.29	0.30	1.35	4.31	4.61	2.71	3.19	2.67	0.10	0.35	0.00	23.87
1951	0.12	1.72	3.42	0.25	5.30	2.50	0.35	0.25	1.45	1.25	1.02	0.55	18.18
1952	0.35	1.53	2.98	4.54	3.38	2.99	1.22	0.00	3.70	0.00	2.60	4.01	27.30
1953	0.24	0.96	1.30	0.35	1.40	1.68	1.67	3.36	2.89	8.07	0.00	0.87	22.79
1954	0.71	0.00	0.32	2.06	3.61	3.00	1.65	0.50	1.62	2.38	1.24	0.15	17.24
1955	1.28	2.73	1.60	0.30	3.84	1.35	4.32	2.93	0.95	0.45	1.92	0.33	22.00
1956	0.72	1.36	0.20	0.19	0.67	2.28	2.59	0.40	0.80	1.16	0.80	0.55	11.72
1957	0.45	1.35	4.14	7.90	8.05	2.00	0.25	0.24	6.65	5.95	3.30	0.70	40.98
1958	3.90	3.35	1.85	0.50	2.25	9.95	0.30	1.95	10.35	6.00	0.15	0.41	40.96
1959	1.16	0.84	0.00	2.30	3.81	4.50	1.30	2.56	1.65	8.55	1.95	2.30	30.92
1960	1.60	1.10	2.20	1.50	1.85	0.65	10.00	7.10	0.65	5.55	1.25	4.10	37.55
1961	0.40	5.50	0.20	0.15	0.75	7.90	5.25	2.10	0.60	3.50	1.00	0.90	28.25
1962	0.45	0.60	1.00	3.95	1.35	2.50	1.40	1.50	4.10	1.40	1.90	1.35	21.50
1963	0.00	2.05	0.00	3.65	3.60	2.00	0.60	1.20	2.10	2.35	2.35	0.75	20.65
1964	3.00	1.85	1.05	2.35	0.80	1.30	1.15	0.95	6.40	0.95	2.00	0.65	22.45
1965	0.40	4.60	1.20	1.65	8.00	0.95	0.35	2.05	3.55	0.66	0.00	0.41	23.82
1966	1.75	1.40	1.23	2.29	6.50	2.37	5.23	7.82	4.42	0.44	0.00	0.03	33.47
1967	0.26	0.86	1.11	2.43	1.06	0.88	0.65	1.40	8.74	4.05	3.40	0.96	25.81
1968	6.61	2.03	3.19	2.84	4.60	2.52	3.24	0.47	4.25	0.45	2.86	0.36	33.43
1969	0.51	2.32	2.08	3.23	2.73	3.10	1.75	2.67	2.27	12.26	1.69	1.24	35.84
1970	0.95	3.82	2.27	1.02	7.65	2.43	0.87	0.46	6.89	2.31	0.00	0.48	29.16
1971	0.08	1.38	0.31	2.23	3.74	4.02	0.69	19.32	1.85	7.21	0.45	1.67	42.94
1972	1.43	0.42	1.36	2.91	8.80	2.13	4.67	6.43	2.78	1.41	2.19	0.44	34.96
1973	2.42	2.68	1.67	2.50	2.57	7.26	8.88	1.52	5.55	7.51	0.64	0.15	43.36

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2015

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	1.76	0.15	1.54	2.36	4.46	1.36	0.75	10.89	3.65	4.47	2.20	3.29	36.88
1975	0.70	5.02	0.59	6.28	9.13	2.54	4.38	0.90	0.83	3.32	0.60	1.85	36.13
1976	0.34	0.08	1.38	7.43	5.12	3.11	6.29	1.29	3.78	4.93	1.47	2.48	37.72
1977	3.07	1.18	1.04	7.87	4.13	3.67	0.25	0.10	0.31	1.92	7.68	0.62	31.86
1978	0.57	1.84	0.48	1.37	0.87	2.92	0.31	5.90	9.54	0.79	3.66	0.37	28.61
1979	1.80	1.78	5.76	5.33	1.26	5.46	3.72	3.71	0.02	0.26	2.62	2.13	33.85
1980	1.73	0.49	2.22	0.73	4.21	0.13	1.34	5.25	17.74	0.71	3.17	1.34	39.09
1981	1.27	1.68	5.46	7.04	3.33	11.62	0.77	1.65	2.56	7.60	0.50	0.43	43.92
1982	0.81	2.48	0.55	1.96	6.72	1.31	0.49	1.04	4.14	0.85	3.15	1.92	25.40
1983	1.19	2.10	3.61	0.31	4.15	6.32	2.02	1.60	1.42	4.23	4.90	0.41	32.25
1984	3.21	0.19	0.49	0.35	1.91	2.43	1.58	1.54	1.70	9.89	0.67	7.29	31.25
1985	2.53	2.40	2.81	3.50	3.90	2.40	0.89	0.51	5.41	2.42	2.58	0.65	30.00
1986	0.90	0.77	0.38	2.21	5.26	4.53	0.18	4.18	2.90	9.92	2.44	5.65	39.33
1987	0.81	3.38	2.12	1.54	10.86	9.80	2.28	5.41	2.68	0.69	2.72	2.45	44.73
1988	0.49	0.64	0.72	1.10	2.57	4.55	6.85	1.30	1.98	1.99	0.12	0.77	23.07
1989	5.22	2.30	0.97	1.01	0.92	4.80	0.73	2.63	0.23	5.98	2.17	0.29	27.34
AVG	1.49	1.74	1.64	2.64	3.77	3.38	2.48	2.54	3.33	3.17	1.59	1.61	29.37

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2027

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	1.64	0.00	1.87	7.40	4.03	0.70	4.41	4.06	0.28	2.32	1.07	0.10	27.89
1917	0.94	0.32	0.10	0.81	2.66	0.32	0.74	0.47	4.22	0.70	1.43	0.00	12.70
1918	0.16	0.68	0.69	1.51	1.85	1.06	0.23	0.49	2.32	4.11	2.27	5.31	20.68
1919	2.80	1.75	0.89	3.19	4.31	6.27	7.28	4.67	6.01	5.47	0.81	1.40	44.87
1920	3.03	0.14	1.22	0.30	2.10	3.06	2.81	2.88	1.84	2.34	1.90	0.14	21.77
1921	0.67	0.48	3.46	3.26	4.45	6.22	0.81	0.22	3.33	0.90	0.32	1.52	25.64
1922	0.81	0.71	2.53	6.20	3.55	3.49	0.55	0.32	1.58	3.04	0.96	0.11	23.85
1923	0.29	5.59	2.67	3.68	0.18	2.24	3.34	1.09	3.77	3.99	3.07	3.06	32.97
1924	0.97	2.35	1.24	4.18	3.57	2.77	0.33	0.01	1.64	0.14	0.04	2.18	19.43
1925	0.20	0.00	0.52	0.73	4.28	0.60	0.64	1.93	2.93	1.82	1.26	0.89	15.79
1926	2.07	0.02	3.04	12.31	2.19	2.39	1.93	1.42	1.41	2.30	1.65	2.09	32.82
1927	0.87	1.57	2.11	2.39	1.41	6.76	4.55	0.61	1.43	1.12	0.01	2.25	25.08
1928	0.72	2.19	0.60	1.32	3.99	3.20	0.78	3.87	3.89	0.38	0.58	1.00	22.54
1929	0.70	0.42	1.98	1.72	6.69	1.91	3.17	0.49	2.89	3.27	1.39	2.38	27.01
1930	0.78	0.10	1.74	2.12	2.57	5.59	0.06	0.05	0.75	10.05	2.26	0.84	26.90
1931	4.52	1.90	2.51	3.47	3.10	1.90	2.34	1.01	0.00	0.63	1.12	3.12	25.62
1932	1.07	2.20	1.18	1.66	1.72	2.06	15.16	3.30	7.25	0.04	0.60	1.77	38.01
1933	2.46	2.42	0.32	0.92	3.03	0.80	0.64	5.30	1.23	0.82	0.81	0.48	19.24
1934	3.65	0.34	0.97	2.87	1.40	0.00	2.12	1.38	1.53	0.23	2.19	3.30	19.98
1935	0.21	3.04	0.57	1.88	20.00	6.88	5.62	0.14	8.36	0.59	0.51	3.81	51.61
1936	0.42	3.29	1.87	1.13	4.86	6.17	2.68	1.20	5.46	2.88	1.75	0.66	29.36
1937	0.88	0.16	2.62	0.42	2.98	2.75	0.95	0.81	0.85	1.63	0.97	5.38	20.41
1938	2.58	0.79	1.60	4.96	3.40	2.21	3.31	0.47	0.83	0.34	0.40	1.30	22.19
1939	2.17	0.58	0.24	0.84	1.53	0.77	4.39	4.17	1.48	2.53	2.20	1.03	21.92
1940	0.44	2.27	1.73	2.17	4.13	5.70	2.75	1.21	0.98	2.74	2.27	3.28	29.66
1941	3.24	4.72	4.91	4.49	2.16	3.19	2.84	2.77	4.66	3.62	0.75	0.99	38.35
1942	0.22	1.47	0.52	4.53	3.82	0.70	3.25	3.76	4.78	4.75	0.20	0.86	28.84
1943	0.38	0.17	1.10	1.73	3.84	3.76	2.61	0.34	5.13	0.74	1.62	1.49	22.92
1944	2.46	3.40	3.38	1.08	6.98	3.04	0.11	4.93	0.40	3.89	3.02	2.15	34.85
1945	3.46	3.24	3.35	2.09	2.64	3.16	0.77	0.35	6.00	3.73	0.49	0.95	30.23
1946	2.14	1.67	0.85	3.19	3.55	2.18	0.36	3.30	2.94	2.98	1.17	2.83	27.15
1947	2.86	0.56	1.75	1.26	1.78	2.30	0.34	4.03	0.15	0.58	1.64	1.29	18.53
1948	0.19	2.87	0.43	2.90	1.43	7.64	2.36	0.66	3.36	1.59	0.97	0.82	25.24
1949	3.55	3.76	3.14	6.41	0.74	5.06	2.10	6.06	2.32	6.16	0.00	2.94	42.24
1950	1.77	2.62	0.23	1.15	4.23	4.41	2.39	3.15	2.95	0.11	0.24	0.03	23.28
1951	0.06	1.54	3.01	0.27	7.14	2.29	0.21	0.42	2.11	0.99	1.06	0.39	19.49
1952	0.24	1.79	2.69	3.44	3.68	3.04	1.18	0.00	3.79	0.00	2.86	3.34	26.05
1953	0.19	0.99	1.49	0.50	1.12	1.12	1.18	3.40	4.19	6.69	0.02	0.92	21.81
1954	0.57	0.01	0.21	1.82	3.26	2.96	1.25	0.51	1.15	2.35	1.28	0.11	15.48
1955	1.44	2.54	1.21	0.26	4.87	1.42	3.13	2.94	0.94	0.42	2.03	0.44	21.65
1956	0.85	1.10	0.18	0.42	0.52	1.45	2.54	1.21	0.74	1.74	1.13	0.61	12.48
1957	0.46	1.42	3.42	7.94	8.10	2.04	0.17	0.65	5.78	5.16	3.21	0.94	39.26
1958	4.70	3.34	1.62	1.04	2.33	7.85	0.63	1.79	10.53	6.49	0.23	0.62	41.16
1959	1.08	1.31	0.06	2.44	3.51	4.04	1.48	1.93	2.43	8.35	1.88	1.87	30.38
1960	1.58	1.18	2.15	1.30	1.85	0.74	8.09	5.25	0.76	6.25	1.28	4.33	34.77
1961	0.83	4.73	0.21	0.19	0.58	7.48	4.80	1.97	0.50	4.68	0.92	0.99	27.88
1962	0.49	0.62	0.92	3.97	1.39	2.35	0.86	1.37	3.38	0.98	1.82	1.40	19.54
1963	0.10	2.43	0.03	3.62	3.16	2.00	0.49	1.02	2.10	2.20	2.07	0.77	19.97
1964	2.71	1.66	1.30	2.29	1.80	2.47	0.90	1.27	5.53	1.39	2.12	0.77	24.21
1965	0.39	4.93	1.46	2.11	6.67	0.82	0.80	1.66	3.04	1.66	0.29	2.57	26.40
1966	1.83	1.89	0.69	2.76	5.11	1.38	1.34	8.47	3.39	0.39	0.00	0.03	27.27
1967	0.20	0.93	2.34	3.22	0.71	0.54	0.68	3.51	7.56	2.82	3.29	0.97	26.79
1968	5.51	2.10	2.69	3.06	4.30	2.40	3.26	0.76	5.06	0.35	2.04	1.21	32.74
1969	0.89	2.35	1.31	2.57	4.88	2.48	0.85	4.15	2.55	7.54	1.49	2.33	33.40
1970	0.98	3.40	1.48	0.69	8.50	1.57	1.25	1.73	6.17	1.02	0.01	0.31	27.10
1971	0.03	0.80	0.36	2.22	1.33	4.42	0.38	15.19	2.01	6.03	0.31	1.38	34.45
1972	1.14	0.35	0.52	1.13	6.11	1.49	2.09	6.20	3.46	1.56	1.45	0.38	25.90
1973	2.20	2.85	1.21	4.98	1.96	8.25	8.96	1.14	5.30	6.84	0.34	0.06	44.08

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2027

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	1.57	0.04	1.44	1.25	5.43	1.22	0.58	15.58	2.25	3.41	1.68	2.93	37.39
1975	0.58	4.75	0.40	4.01	6.26	1.98	3.02	0.35	1.18	3.08	0.23	1.22	27.05
1976	0.18	0.27	1.16	5.89	5.50	4.09	7.98	0.77	5.28	5.19	1.59	2.21	40.12
1977	2.64	0.83	0.85	5.13	2.31	2.58	0.29	0.11	0.19	1.64	3.36	0.50	20.41
1978	0.43	1.40	0.70	1.02	1.84	2.50	1.05	4.47	4.24	0.80	3.21	1.27	22.94
1979	2.17	1.53	4.16	4.63	2.03	7.85	2.01	1.79	0.21	0.19	2.49	1.95	31.01
1980	0.68	0.45	0.97	0.87	4.52	0.03	0.54	5.42	6.88	0.80	3.20	0.85	25.22
1981	1.24	0.88	3.50	4.60	4.30	6.64	1.25	1.10	2.19	6.83	0.24	0.65	33.43
1982	0.66	1.96	0.42	1.53	5.92	1.20	0.72	1.45	2.24	0.97	2.96	1.50	21.56
1983	1.66	1.21	3.64	0.24	3.00	3.70	1.86	2.75	1.74	2.51	2.69	0.44	25.43
1984	1.99	0.35	0.33	0.96	1.13	2.74	0.87	0.99	1.98	6.58	0.97	4.16	23.06
1985	1.93	1.85	2.48	1.57	3.52	2.17	1.57	0.25	3.95	5.63	2.62	0.29	27.84
1986	1.09	1.29	0.62	1.90	5.93	4.89	0.32	1.55	3.06	10.34	2.06	4.75	37.80
1987	0.47	3.91	2.00	1.85	12.31	10.44	1.64	2.55	1.18	0.21	2.20	2.27	41.04
1988	0.37	1.22	0.63	0.92	1.67	1.90	3.16	0.79	1.83	1.78	0.10	0.44	14.81
1989	3.86	1.10	1.34	1.01	0.70	1.45	0.57	1.66	0.70	4.31	1.51	0.46	18.67
AVG	1.42	1.65	1.53	2.57	3.71	3.12	2.20	2.42	2.98	2.87	1.41	1.55	27.43

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# F-1, F-2 & F-3

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	2.26	0.00	3.16	5.73	5.59	0.50	4.18	5.18	0.60	2.51	1.20	0.21	31.12
1917	1.34	0.62	0.03	2.50	3.77	0.20	1.35	0.63	2.90	0.21	0.90	0.00	14.45
1918	0.15	0.83	0.64	3.74	3.34	1.08	0.55	0.90	1.75	2.54	2.17	5.82	23.51
1919	2.96	2.15	1.78	2.79	3.74	6.72	7.96	1.39	7.39	4.17	0.74	1.45	43.24
1920	3.02	0.25	1.50	0.34	3.81	3.54	2.67	4.18	1.73	1.46	2.84	0.16	25.50
1921	0.86	0.41	4.30	3.97	4.61	7.40	0.23	0.70	6.55	0.82	0.35	1.35	31.55
1922	1.07	0.76	3.94	6.46	3.38	3.78	0.79	0.82	2.65	6.57	1.50	0.15	31.87
1923	0.30	6.37	3.61	3.09	0.41	2.09	2.87	2.33	4.48	3.10	4.14	3.92	36.71
1924	1.39	2.53	2.03	6.22	3.49	4.97	0.03	0.00	2.44	0.10	0.02	2.65	25.87
1925	0.36	0.00	0.40	1.11	1.91	0.00	1.50	1.65	2.57	1.65	2.57	1.04	14.76
1926	2.26	0.08	3.47	10.21	1.79	2.20	1.68	3.54	1.12	0.95	1.70	2.01	31.01
1927	0.81	2.33	1.26	1.75	1.64	5.12	2.46	0.17	1.41	1.44	0.05	2.75	21.19
1928	0.88	3.29	2.23	1.81	6.57	2.11	2.54	1.24	3.33	0.85	0.82	1.19	26.86
1929	0.59	0.44	2.05	2.42	8.55	2.50	2.13	0.26	2.13	2.12	1.83	2.62	27.64
1930	0.95	0.28	2.19	2.52	3.44	5.34	0.24	0.20	0.56	7.18	2.51	0.72	26.13
1931	4.99	2.20	2.70	2.87	4.90	1.91	2.53	1.66	0.00	0.51	1.30	3.58	29.15
1932	2.13	2.81	0.61	2.32	2.13	1.17	8.89	4.53	6.34	0.07	0.21	1.83	33.05
1933	1.92	2.80	0.28	0.73	2.68	2.04	1.10	3.58	1.37	0.91	0.89	0.60	18.91
1934	5.25	0.72	1.36	3.79	1.06	0.58	2.06	0.09	2.05	0.07	2.68	3.39	23.11
1935	0.38	3.03	1.33	2.03	19.51	8.40	4.01	0.28	10.67	1.09	0.60	3.15	54.49
1936	0.51	0.39	2.56	1.89	6.02	8.98	3.17	1.01	4.30	2.31	1.86	1.01	34.00
1937	1.04	0.09	2.72	0.62	3.67	3.35	1.72	0.74	1.12	2.07	0.89	4.97	22.99
1938	3.38	1.02	1.97	4.80	4.73	2.50	2.30	0.64	1.46	0.32	0.47	1.35	24.95
1939	2.16	0.65	0.31	1.08	1.57	0.87	4.46	3.36	1.43	1.63	2.48	1.09	21.09
1940	0.50	2.20	1.33	1.87	4.39	5.94	2.49	0.86	1.23	3.78	2.18	3.25	30.04
1941	2.67	6.48	4.66	4.77	2.59	3.45	2.42	1.22	5.31	2.84	0.65	0.82	37.89
1942	0.15	1.29	0.35	5.54	3.85	0.80	5.36	4.25	5.46	5.81	0.32	1.04	34.21
1943	0.39	0.15	1.15	2.10	4.08	4.88	2.87	0.19	4.83	1.01	1.90	1.60	25.16
1944	2.71	2.63	3.13	1.10	6.67	2.75	0.51	6.43	0.49	2.66	3.23	2.13	34.42
1945	3.35	2.89	2.71	2.80	2.19	3.12	0.91	0.53	6.06	3.07	0.48	1.00	29.12
1946	2.12	1.66	1.04	3.33	2.83	2.14	0.61	4.55	4.14	3.04	1.28	2.61	29.35
1947	2.71	0.49	1.60	0.97	2.00	2.04	0.39	3.78	0.22	0.55	1.41	1.18	17.34
1948	0.21	2.67	0.47	2.68	1.67	7.09	2.73	0.56	3.56	1.81	0.96	0.69	25.09
1949	2.62	4.88	2.59	7.17	1.02	6.84	1.52	3.37	1.60	6.53	0.00	2.50	40.65
1950	1.42	1.94	0.22	2.23	3.78	4.87	2.24	3.24	2.18	0.14	0.22	0.01	22.50
1951	0.46	1.99	2.35	0.42	9.33	1.30	0.61	0.50	2.71	0.43	1.08	0.23	21.41
1952	0.17	1.95	2.34	2.21	3.01	3.26	1.63	0.01	5.36	0.00	3.51	2.77	26.20
1953	0.16	1.06	1.19	0.63	0.83	0.78	0.80	3.19	5.85	4.37	0.07	1.14	20.08
1954	0.56	0.02	0.10	1.39	2.59	2.82	0.87	0.67	0.59	2.15	1.38	0.10	13.25
1955	1.54	2.20	0.90	0.21	6.03	1.37	1.81	1.86	1.09	0.42	2.11	0.74	20.28
1956	0.98	0.92	0.18	0.96	0.41	0.65	1.61	2.44	0.79	2.15	1.70	0.76	13.56
1957	0.50	1.51	3.10	7.93	7.73	2.02	0.10	1.14	4.47	4.32	3.12	1.18	37.13
1958	5.40	3.40	1.39	1.62	3.93	4.05	0.79	1.54	11.57	6.59	0.38	0.92	41.57
1959	1.09	2.30	0.21	2.78	3.05	4.46	2.27	1.40	2.55	8.86	1.85	1.73	32.56
1960	1.40	1.53	2.21	1.54	1.90	1.22	6.29	3.35	1.02	7.29	1.34	4.50	33.60
1961	1.35	3.68	0.24	0.31	0.44	6.99	4.14	1.60	0.76	5.35	1.06	0.98	26.89
1962	0.60	0.63	0.97	5.20	1.55	2.43	0.29	1.05	3.34	0.48	1.85	1.72	20.12
1963	0.47	2.95	0.07	3.81	2.49	1.41	0.49	0.75	1.70	2.03	1.96	0.84	18.95
1964	2.79	1.69	1.66	2.13	2.91	3.57	0.68	1.88	4.15	1.99	2.36	1.00	26.81
1965	0.54	5.85	1.90	2.19	5.76	1.23	0.20	1.36	2.35	2.66	0.59	5.51	30.14
1966	1.77	2.25	0.86	3.15	7.54	1.70	2.80	7.62	4.25	0.38	0.00	0.05	32.37
1967	0.23	0.90	1.15	3.29	1.28	0.48	1.38	2.31	9.42	3.09	3.06	1.22	27.81
1968	5.94	1.92	2.47	2.69	3.60	1.69	2.66	0.56	4.60	0.33	2.61	0.98	30.05
1969	0.86	3.09	1.94	2.47	4.66	2.42	1.12	3.23	2.25	9.75	1.47	2.29	35.54
1970	1.01	3.78	2.31	0.95	7.53	1.52	1.38	1.36	4.86	1.52	0.01	0.32	26.54
1971	0.06	1.01	0.15	1.80	2.21	4.03	0.41	17.03	2.13	6.63	0.66	1.57	37.69
1972	1.25	0.47	0.97	2.28	8.05	2.10	2.99	6.18	3.12	1.91	1.85	0.46	31.62
1973	2.56	2.86	1.55	4.17	1.83	7.23	9.02	1.31	8.08	7.46	0.50	0.10	46.67

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# F-1, F-2 & F-3

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	1.79	0.11	1.44	2.16	4.93	0.98	0.42	12.76	2.86	3.60	1.77	2.65	35.47
1975	0.79	4.90	0.43	4.68	6.67	2.19	4.23	0.92	1.26	2.95	0.33	1.54	30.88
1976	0.26	0.15	1.16	7.77	5.20	3.22	6.81	1.17	4.00	6.05	1.66	2.46	39.90
1977	2.85	0.96	1.00	6.34	2.99	3.22	0.20	0.13	0.66	1.68	5.30	0.54	25.87
1978	0.49	1.58	0.65	1.54	1.37	2.82	0.82	5.94	7.07	0.67	3.87	1.35	28.17
1979	2.75	1.45	4.20	4.06	1.58	5.65	3.13	2.07	0.24	0.19	1.39	2.30	29.01
1980	0.77	0.66	0.83	1.10	5.75	0.01	0.75	4.18	5.07	1.02	3.31	0.57	24.01
1981	1.51	0.74	4.73	3.38	6.41	9.38	1.65	0.61	1.36	5.45	0.21	0.74	36.16
1982	0.45	1.94	0.43	2.14	6.93	1.55	0.15	2.06	1.89	1.83	2.74	1.47	23.59
1983	1.94	1.42	4.15	0.17	3.35	3.05	2.64	3.20	1.50	2.37	2.36	0.27	26.41
1984	1.90	0.79	0.54	0.47	1.39	1.32	0.34	0.37	1.41	6.74	1.54	2.86	19.66
1985	2.21	2.52	3.06	2.52	2.95	4.57	1.27	0.04	3.47	6.44	2.77	0.42	32.23
1986	0.89	1.07	0.46	1.11	6.00	8.74	0.30	0.79	2.88	9.92	2.35	4.62	39.13
1987	0.62	3.95	1.71	2.33	10.92	10.74	2.36	2.69	1.77	0.16	2.28	2.01	41.54
1988	0.17	1.46	0.68	0.95	0.90	2.94	2.62	0.28	2.41	1.12	0.02	0.38	13.93
1989	3.09	1.02	1.51	1.60	0.38	2.23	0.62	1.02	0.82	4.35	1.65	0.40	18.70
AVG	1.54	1.81	1.66	2.78	3.97	3.28	2.11	2.28	3.12	2.85	1.56	1.62	28.57

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2055

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	1.67	0.00	1.37	4.56	2.96	0.87	4.58	5.01	1.53	2.02	1.10	0.12	25.79
1917	0.75	0.24	0.08	0.58	2.12	1.10	1.26	0.46	2.77	0.32	1.25	0.00	10.93
1918	0.12	0.65	0.73	2.15	2.78	1.30	0.33	0.93	1.94	3.61	1.98	4.62	21.13
1919	3.08	1.69	1.53	2.74	4.02	6.60	6.68	2.53	6.84	5.47	0.87	1.15	43.20
1920	2.55	0.22	0.89	0.43	3.53	3.36	2.57	2.71	1.16	2.17	1.51	0.10	21.19
1921	0.59	0.55	3.38	2.76	3.53	4.17	0.83	0.40	3.07	1.09	0.70	0.69	21.76
1922	0.79	0.73	2.93	5.46	4.09	4.13	1.19	0.28	1.78	3.06	0.85	0.10	25.40
1923	0.29	5.32	3.22	2.87	0.43	2.12	2.27	1.59	4.67	4.01	3.01	3.17	32.96
1924	0.78	1.92	1.36	3.11	3.06	1.81	0.30	0.03	2.51	0.56	0.03	1.94	17.41
1925	0.21	0.02	1.28	0.72	3.25	0.50	1.55	1.65	3.22	1.59	1.77	1.27	17.04
1926	2.15	0.08	3.31	8.61	1.67	2.54	1.46	1.35	0.91	2.13	1.36	2.03	27.59
1927	0.79	1.58	1.66	1.43	1.22	5.66	2.85	0.38	1.23	1.38	0.01	1.88	20.06
1928	0.75	1.97	0.72	1.49	4.27	3.42	0.85	2.58	4.50	0.46	0.49	1.19	22.68
1929	0.49	0.31	2.03	1.22	7.48	1.47	2.53	0.32	2.65	2.86	1.31	1.85	24.52
1930	0.66	0.29	2.18	2.78	2.77	4.94	0.69	0.21	0.78	6.62	2.79	0.68	25.38
1931	4.76	1.59	1.54	3.70	5.48	2.40	3.62	2.23	0.19	0.50	1.13	3.21	30.36
1932	1.05	2.45	1.14	1.50	2.50	1.83	11.72	4.16	7.10	0.15	0.90	1.45	35.94
1933	1.84	2.40	0.29	0.64	2.42	0.71	1.30	3.34	1.06	0.78	0.87	0.38	16.04
1934	3.61	0.42	0.78	2.70	1.66	0.04	2.70	1.27	2.32	0.34	1.70	3.07	20.62
1935	0.19	2.52	1.35	1.82	14.30	6.09	4.49	0.16	7.69	0.55	0.32	3.09	42.58
1936	0.28	0.18	1.47	1.21	5.12	5.74	2.10	1.79	5.11	2.36	1.57	0.57	27.51
1937	0.71	0.15	1.89	0.55	3.18	2.04	1.56	0.60	1.70	1.54	0.59	5.53	20.04
1938	2.26	0.64	1.33	3.63	2.79	0.50	2.44	0.55	0.78	0.44	0.12	1.51	17.01
1939	1.94	0.40	0.22	0.28	1.96	0.77	3.53	4.29	1.41	2.84	2.03	1.01	20.68
1940	0.46	1.66	1.34	1.96	4.63	5.38	1.48	2.03	0.42	2.03	2.16	3.04	26.58
1941	2.41	3.50	3.66	4.92	2.40	4.40	2.45	1.28	3.94	2.45	0.56	0.91	32.88
1942	0.41	1.58	0.54	3.91	2.38	0.48	4.07	3.56	6.17	2.60	0.23	0.60	26.54
1943	0.72	0.14	0.84	1.40	3.60	3.29	2.08	0.45	4.10	1.24	2.07	1.06	20.99
1944	2.10	1.77	2.38	0.88	5.45	2.87	0.35	6.14	0.55	2.21	2.66	2.14	29.50
1945	2.37	1.88	2.59	2.63	1.58	2.94	0.60	0.58	5.43	1.79	0.39	0.97	23.75
1946	1.98	1.10	0.73	4.17	4.64	1.99	0.65	5.60	4.27	2.87	0.83	1.33	30.16
1947	2.85	0.30	1.28	0.84	2.82	4.18	0.46	3.11	0.26	0.86	1.17	0.87	19.01
1948	0.24	2.08	0.31	2.07	1.75	5.36	3.39	0.47	4.09	2.41	1.02	0.42	23.62
1949	2.52	3.81	2.19	5.59	0.89	5.06	1.27	3.73	2.67	6.28	0.01	2.64	36.66
1950	1.37	1.49	0.13	1.22	4.00	3.88	2.56	2.27	2.62	0.11	0.06	0.01	19.72
1951	0.04	1.16	2.17	0.39	6.65	1.75	0.06	0.51	1.74	1.85	0.93	0.20	17.46
1952	0.11	1.86	2.61	1.53	4.28	1.84	0.75	0.00	2.80	0.00	2.79	1.88	20.46
1953	0.15	0.84	1.14	0.67	0.90	0.33	0.21	5.25	4.05	4.92	0.04	0.81	19.29
1954	0.29	0.00	0.03	2.15	3.18	2.86	0.50	0.61	1.06	2.27	0.75	0.03	13.73
1955	1.55	1.90	0.32	0.20	5.65	1.59	2.10	3.77	0.93	0.39	1.72	0.41	20.54
1956	0.74	0.54	0.08	0.33	0.23	0.21	3.72	1.05	0.37	2.21	0.95	0.53	10.96
1957	0.35	1.65	2.21	7.18	8.64	2.17	0.05	0.53	5.38	5.18	3.28	0.85	37.47
1958	5.88	3.28	1.47	1.45	3.49	5.07	0.90	1.00	8.56	6.61	0.33	0.72	38.76
1959	0.54	1.59	0.06	2.33	4.57	3.04	2.77	0.71	4.80	7.51	1.96	1.27	31.15
1960	1.12	1.20	1.58	1.05	1.81	1.68	4.90	3.59	1.13	6.01	1.36	4.30	29.72
1961	1.25	3.15	0.12	0.40	0.15	7.03	5.04	1.59	0.21	3.74	1.06	0.90	24.64
1962	0.38	0.57	0.53	3.30	1.09	2.42	0.03	1.38	2.25	0.78	1.89	0.97	15.58
1963	0.18	2.35	0.06	2.50	3.50	2.53	0.54	0.36	2.06	1.84	1.87	0.91	18.72
1964	1.64	1.25	1.57	1.51	3.07	2.45	0.53	2.49	5.18	1.77	1.43	0.74	23.63
1965	0.29	4.00	1.94	2.82	5.05	0.67	1.52	1.69	2.68	2.49	0.97	3.85	27.96
1966	1.58	1.80	0.72	2.38	4.43	1.78	0.24	4.88	2.15	0.72	0.00	0.01	20.70
1967	0.15	1.10	1.38	3.52	0.73	0.25	0.56	3.20	10.42	2.48	2.76	0.93	27.50
1968	4.61	2.15	1.66	3.66	4.90	1.98	2.36	1.08	7.36	0.66	2.32	0.79	33.53
1969	0.74	1.83	0.85	2.25	4.34	1.67	0.37	4.51	1.40	7.23	1.71	1.87	28.77
1970	1.02	2.63	0.81	0.75	6.27	1.51	0.58	1.85	6.75	0.33	0.00	0.13	22.62
1971	0.02	0.73	0.17	1.26	0.72	6.01	0.14	12.94	2.61	6.73	0.46	1.20	32.99
1972	1.43	0.20	0.16	0.56	3.95	1.34	1.26	4.89	3.37	1.01	1.21	0.73	20.10
1973	1.86	2.86	0.77	4.24	1.27	6.65	4.77	2.04	5.94	4.98	0.15	0.02	35.56

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2055

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	1.14	0.03	1.08	1.03	4.77	2.15	0.32	12.04	2.34	2.14	1.19	1.99	30.21
1975	0.34	2.80	0.30	2.45	7.76	3.06	2.42	0.68	2.81	2.70	0.10	0.77	26.19
1976	0.13	0.12	1.27	6.08	6.09	2.64	7.29	1.14	3.86	6.17	2.26	2.26	39.31
1977	2.14	0.76	0.50	5.26	1.50	1.95	0.34	0.11	0.18	1.84	2.22	0.38	17.20
1978	0.38	1.04	0.37	0.92	2.91	3.29	0.88	4.17	3.19	0.82	2.33	1.38	21.71
1979	1.75	1.10	2.56	5.18	1.80	7.96	2.18	1.73	0.28	0.07	1.67	1.43	27.72
1980	0.50	0.39	0.42	1.06	7.47	0.01	0.20	5.81	2.71	0.61	3.75	0.86	23.79
1981	1.39	0.70	1.99	4.07	4.24	6.38	1.08	1.33	2.68	6.07	0.06	0.66	30.64
1982	0.50	2.27	0.39	1.21	4.02	1.71	0.91	1.04	1.41	1.59	3.26	1.64	19.95
1983	1.50	1.21	2.77	0.08	2.46	3.53	2.26	2.56	2.86	1.77	1.65	0.25	22.91
1984	1.79	0.27	0.34	0.48	1.12	1.60	0.66	0.56	2.70	5.82	0.87	3.20	19.41
1985	1.60	1.42	2.35	1.62	3.36	2.44	2.00	0.15	3.80	5.91	2.40	0.11	27.15
1986	1.08	1.07	0.62	1.33	4.43	4.09	0.22	1.18	3.67	8.84	1.65	4.27	32.45
1987	0.44	3.38	1.55	1.56	8.10	9.15	1.29	3.25	0.83	0.13	1.26	1.79	32.71
1988	0.28	0.71	0.54	0.74	1.85	1.72	1.85	0.41	2.09	2.28	0.08	0.31	12.86
1989	3.34	1.03	1.30	1.44	0.96	0.99	0.40	1.67	0.66	4.67	1.05	0.64	18.16
AVG	1.27	1.39	1.26	2.26	3.55	2.88	1.90	2.24	2.98	2.63	1.29	1.36	25.02

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2070

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	1.34	0.00	0.24	1.63	1.80	0.79	3.91	5.06	1.06	2.05	1.38	0.26	19.52
1917	0.28	0.09	0.14	0.42	0.95	0.06	1.32	0.17	1.51	0.04	1.11	0.00	6.09
1918	0.13	0.84	0.72	2.91	2.57	1.26	0.34	0.94	2.31	2.63	1.76	4.48	20.89
1919	3.13	1.75	2.42	3.10	3.52	7.41	5.64	1.80	6.36	4.87	0.94	1.00	41.94
1920	2.06	0.56	0.71	0.98	5.65	4.18	4.09	2.28	0.29	2.09	1.12	0.03	24.04
1921	0.61	0.24	3.23	2.01	2.35	2.48	0.67	0.30	4.06	1.10	0.89	0.18	18.12
1922	0.85	0.67	3.54	3.97	4.36	2.58	3.11	0.75	3.20	3.52	1.00	0.08	27.63
1923	0.25	6.82	3.70	1.41	0.18	1.23	1.50	3.29	5.22	4.02	2.98	3.70	34.30
1924	0.68	1.96	1.77	2.46	3.20	1.42	0.16	0.02	3.32	0.85	0.00	1.80	17.64
1925	0.35	0.03	2.42	0.26	1.53	0.59	1.80	1.70	4.30	1.29	2.09	1.70	18.06
1926	2.33	0.27	4.13	3.73	1.53	1.41	0.64	0.98	0.71	1.67	1.10	2.21	20.71
1927	0.87	0.79	1.53	0.68	1.18	5.62	1.01	0.41	1.85	1.57	0.14	1.70	17.35
1928	0.98	1.43	0.48	1.52	3.86	2.22	0.61	1.66	4.24	0.29	0.68	1.89	19.36
1929	0.41	0.13	3.05	1.66	8.26	0.86	1.95	0.36	1.15	1.93	1.90	1.90	23.56
1930	0.50	0.47	2.65	4.67	4.15	3.48	0.79	0.06	0.83	3.62	3.37	0.36	24.95
1931	4.36	1.32	0.91	2.66	5.51	3.30	4.45	4.15	0.31	0.73	0.77	3.93	32.40
1932	1.46	2.78	0.84	1.10	2.32	0.42	2.15	4.16	5.94	0.59	1.01	1.36	24.13
1933	0.80	3.10	0.32	0.35	2.02	1.00	2.36	2.59	1.70	0.53	0.96	0.18	15.91
1934	4.72	0.34	0.79	2.98	1.42	0.23	4.69	1.46	3.32	0.51	3.21	3.00	26.67
1935	0.09	2.48	2.70	1.39	6.83	6.57	1.59	0.16	8.83	0.92	0.25	2.30	34.11
1936	0.29	0.17	0.97	1.35	6.03	5.94	1.77	1.93	2.55	1.65	1.72	0.70	25.07
1937	0.47	0.24	1.22	0.50	2.94	0.92	1.98	0.71	2.88	1.31	0.46	6.46	20.09
1938	2.27	0.56	0.57	3.12	1.91	0.85	0.61	0.87	1.37	0.36	0.20	2.05	14.74
1939	1.12	0.50	0.25	0.08	2.01	1.92	3.08	1.02	1.97	0.98	1.41	0.80	15.14
1940	0.40	1.94	1.58	2.66	3.96	7.20	1.33	2.95	0.50	1.70	1.67	3.15	29.04
1941	2.28	2.62	2.17	5.63	3.85	4.60	2.73	0.34	5.78	1.53	0.53	0.84	32.90
1942	0.52	1.86	0.43	2.73	2.88	0.84	5.73	3.84	6.84	2.64	0.33	0.43	29.07
1943	0.98	0.04	1.08	0.99	3.92	4.09	1.91	0.34	3.11	0.98	2.14	1.06	20.64
1944	2.67	0.58	1.99	0.99	6.89	2.51	0.64	3.92	0.65	0.50	2.91	2.42	26.67
1945	1.00	1.99	3.00	2.42	0.71	3.14	1.72	0.70	2.70	3.61	0.89	0.60	22.48
1946	2.25	0.72	1.47	4.32	5.86	2.37	0.22	5.21	3.63	4.14	0.55	0.67	31.41
1947	2.65	0.27	1.08	1.20	4.42	2.62	0.46	2.00	0.72	1.40	1.15	1.03	19.00
1948	0.48	2.17	0.37	1.48	1.08	2.62	2.18	0.23	2.61	3.24	1.14	0.36	17.96
1949	1.94	2.67	1.48	6.68	0.64	6.76	2.28	2.95	0.75	4.82	0.03	3.14	34.14
1950	0.32	1.03	0.17	2.03	4.20	3.58	2.72	1.29	2.34	0.07	0.04	0.00	17.79
1951	0.14	1.07	2.04	0.53	4.06	2.44	0.17	0.75	5.61	2.19	0.85	0.07	19.92
1952	0.07	1.73	2.03	1.59	3.28	1.51	0.44	0.00	2.08	0.00	2.07	1.73	16.53
1953	0.18	1.11	0.40	1.65	3.05	0.39	0.19	6.28	3.36	4.03	0.04	0.96	21.64
1954	0.21	0.01	0.02	2.68	2.36	3.27	0.41	0.71	1.53	1.71	0.61	0.04	13.56
1955	1.08	2.04	0.43	0.04	4.41	1.09	1.35	2.21	0.95	0.48	0.98	0.52	15.58
1956	0.50	0.32	0.07	0.34	0.54	0.32	1.26	0.47	1.60	1.51	0.59	1.13	8.65
1957	0.29	1.59	2.30	5.13	6.60	1.53	0.00	0.24	6.09	3.34	3.73	1.30	32.14
1958	5.97	4.54	0.95	0.97	3.50	2.12	1.36	0.30	8.43	7.16	0.73	1.24	37.27
1959	0.35	2.41	0.03	1.95	4.04	3.75	2.22	0.77	3.11	4.91	1.90	1.29	26.73
1960	0.80	1.29	1.11	1.80	1.49	4.75	3.35	4.05	0.79	5.82	2.50	3.79	31.54
1961	1.08	1.75	0.15	1.93	0.49	5.25	3.95	1.75	0.45	1.40	1.53	0.59	20.32
1962	0.32	0.33	0.49	2.55	1.04	2.81	0.02	1.36	2.88	0.28	1.32	1.06	14.46
1963	0.22	2.07	0.06	2.08	2.67	3.42	1.10	0.29	1.92	1.50	2.47	1.72	19.52
1964	1.16	1.44	1.52	0.67	3.13	0.90	0.70	3.69	2.91	1.25	1.71	0.70	19.78
1965	0.56	3.63	1.06	1.80	7.44	1.01	0.31	1.42	2.64	2.62	1.10	4.48	28.07
1966	1.45	1.98	0.54	3.13	5.76	1.94	0.82	2.70	4.80	1.38	0.01	0.10	24.61
1967	0.50	1.20	0.60	1.83	1.43	0.10	1.54	4.22	13.77	1.74	2.46	0.85	30.24
1968	5.80	2.26	0.98	2.24	4.53	3.11	1.98	0.28	6.20	0.94	2.52	0.68	31.52
1969	0.62	2.09	1.02	2.18	2.36	1.40	0.36	4.21	1.16	6.83	1.56	1.69	25.48
1970	1.64	1.86	1.44	0.62	7.26	1.76	1.24	2.31	4.93	0.31	0.18	0.16	23.71
1971	0.03	0.56	0.00	0.75	0.81	4.98	0.32	7.31	5.38	7.51	1.04	1.63	30.32
1972	1.64	0.29	0.26	0.42	4.84	2.24	2.02	2.42	4.66	0.57	1.52	0.53	21.41
1973	2.27	3.37	0.63	3.27	0.60	5.46	1.86	2.83	9.38	4.09	0.06	0.01	33.83

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2070

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	0.88	0.09	2.49	0.67	3.14	1.54	0.71	7.88	3.77	2.14	1.16	1.20	25.67
1975	0.48	1.50	0.52	2.20	7.55	2.77	3.04	1.99	3.64	2.34	0.00	0.65	26.68
1976	0.46	0.00	1.01	5.52	4.51	0.82	7.42	1.16	4.10	7.14	2.70	2.53	37.37
1977	1.97	0.53	0.44	5.96	0.96	2.96	0.85	0.12	0.66	2.26	1.83	0.15	18.69
1978	0.46	0.71	0.07	0.86	2.71	4.39	1.35	4.96	4.18	1.18	2.00	1.26	24.13
1979	1.71	1.20	1.18	4.70	1.31	4.57	1.87	1.92	1.00	0.02	0.81	1.37	21.66
1980	0.82	0.55	0.55	0.52	9.17	0.00	0.79	6.78	2.25	0.50	4.00	0.89	26.82
1981	1.82	0.75	1.68	2.14	5.86	6.71	0.77	3.43	1.63	5.53	0.02	0.76	31.10
1982	0.34	2.54	0.53	2.28	2.91	2.22	0.20	1.17	1.74	3.55	3.01	1.55	22.04
1983	0.96	1.83	2.29	0.03	2.26	3.46	2.50	1.58	3.43	1.88	1.12	0.23	21.57
1984	1.82	0.49	0.85	0.33	1.49	0.85	0.63	0.53	1.74	6.47	0.64	1.89	17.73
1985	2.21	0.99	2.26	3.16	2.75	3.09	2.11	0.25	3.48	5.61	2.26	0.17	28.34
1986	1.26	1.21	0.21	0.95	4.53	4.55	0.19	0.75	2.52	8.86	1.70	4.23	30.96
1987	0.90	2.86	0.92	0.58	5.45	6.72	1.18	3.30	0.77	0.14	1.75	1.16	25.73
1988	0.28	0.58	0.77	1.03	3.10	1.87	2.00	0.61	2.18	1.69	0.02	0.16	14.29
1989	2.03	0.49	1.34	2.41	0.34	1.73	0.57	1.69	0.60	3.27	0.97	0.66	16.10
AVG	1.23	1.33	1.21	2.02	3.35	2.71	1.69	2.02	3.12	2.40	1.31	1.36	23.78

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2080

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	1.22	0.00	0.14	1.93	1.31	1.32	5.04	3.77	1.80	3.29	1.68	0.15	21.65
1917	0.52	0.13	0.11	0.38	1.37	0.01	0.82	0.38	1.64	0.15	1.32	0.00	6.83
1918	0.09	0.99	0.96	3.28	2.55	2.29	0.49	1.12	2.98	3.10	2.50	4.78	25.13
1919	3.47	1.63	4.65	2.74	4.47	5.72	7.37	2.62	6.34	4.09	1.08	1.61	45.79
1920	2.56	0.45	0.53	1.11	3.80	2.48	4.86	1.80	0.08	1.87	1.69	0.01	21.24
1921	0.87	0.37	2.45	2.64	2.19	4.18	2.35	1.51	6.15	0.34	0.83	0.50	24.38
1922	1.11	0.66	2.66	4.81	3.61	3.85	1.88	0.06	4.29	2.88	2.69	0.04	28.54
1923	0.26	5.67	3.82	1.34	0.38	1.51	2.53	3.61	4.56	4.02	2.07	5.38	35.15
1924	0.67	1.76	1.45	2.14	4.12	3.28	0.59	0.02	2.27	0.36	0.00	2.02	18.68
1925	0.44	0.03	2.77	0.29	1.19	1.00	1.57	1.85	6.78	2.97	2.02	1.80	22.71
1926	2.08	0.00	4.55	2.47	1.06	3.57	1.56	1.11	1.67	2.50	0.97	2.47	24.01
1927	0.87	1.23	1.81	1.70	1.40	4.36	0.69	0.33	4.94	3.03	0.40	1.82	22.58
1928	1.01	1.38	0.74	1.00	2.83	2.28	0.69	1.28	4.80	0.58	1.66	3.48	21.73
1929	1.43	0.11	4.53	1.24	7.40	0.66	2.59	0.15	1.62	2.23	1.86	2.08	25.90
1930	0.73	0.61	2.70	6.74	3.32	2.51	1.40	0.02	0.87	3.36	3.36	0.50	26.12
1931	3.68	1.44	0.96	2.53	4.76	3.26	3.97	5.36	0.33	1.07	0.61	3.76	31.73
1932	2.42	2.86	0.53	2.38	1.92	0.67	1.89	5.02	7.39	0.18	1.56	2.13	28.95
1933	1.52	2.81	0.64	0.70	3.41	2.12	3.26	2.42	1.76	0.18	1.00	0.26	20.08
1934	6.08	0.62	1.40	3.53	0.51	0.28	3.57	1.93	3.49	0.07	2.46	4.10	28.04
1935	0.27	2.31	2.86	1.99	6.81	7.60	1.99	0.19	11.60	1.99	0.08	3.88	41.57
1936	0.66	0.13	1.65	1.31	6.53	6.97	2.41	1.38	2.87	1.60	1.25	1.11	27.87
1937	0.37	0.60	1.62	0.53	3.20	1.24	1.43	1.39	1.13	1.85	0.85	6.44	20.65
1938	1.92	0.71	0.68	4.41	1.55	0.86	0.30	0.89	1.14	0.36	0.83	2.34	15.99
1939	1.14	0.55	0.22	0.15	2.36	0.94	4.20	1.52	2.69	0.40	1.12	0.98	16.27
1940	0.37	1.55	1.10	2.54	4.09	6.80	2.28	1.59	0.39	3.12	2.18	4.16	30.17
1941	1.52	3.24	2.86	6.98	5.03	3.24	3.98	0.64	9.41	2.29	0.95	0.85	40.99
1942	0.42	1.71	0.49	2.55	3.04	0.70	7.58	5.14	5.80	2.05	0.64	0.46	30.58
1943	1.01	0.02	1.59	1.05	3.83	2.52	1.34	0.30	5.63	0.67	2.47	1.07	21.50
1944	4.00	0.77	2.83	0.86	5.34	1.98	0.31	3.65	0.80	1.32	4.02	2.36	28.24
1945	1.21	2.24	1.70	3.45	0.88	5.90	1.41	0.62	2.68	2.54	0.20	0.82	23.65
1946	2.63	1.46	1.68	3.84	4.69	4.62	0.47	9.09	8.45	3.20	1.30	0.89	42.32
1947	2.68	0.29	1.99	1.16	3.38	0.55	1.14	3.25	0.51	0.45	1.26	1.17	17.83
1948	0.66	3.04	0.36	1.57	1.67	2.96	3.37	0.54	1.61	2.39	1.12	0.50	19.79
1949	2.76	2.79	1.09	7.22	0.51	6.50	6.06	1.10	0.68	5.44	0.03	3.26	37.44
1950	0.49	1.35	0.48	2.63	3.28	3.38	1.31	2.03	1.45	0.16	0.08	0.00	16.64
1951	0.38	1.26	2.08	0.76	5.07	2.19	0.83	0.47	6.31	1.37	1.13	0.15	22.00
1952	0.07	2.06	1.64	2.13	2.71	0.74	1.02	0.00	3.88	0.00	2.49	2.15	18.89
1953	0.40	1.47	1.00	1.48	3.05	0.93	0.20	3.91	3.74	2.56	0.16	1.18	20.08
1954	0.43	0.04	0.05	2.55	2.54	2.26	0.65	1.67	0.86	2.03	0.53	0.02	13.63
1955	1.47	2.99	0.51	0.09	3.96	1.61	1.05	3.41	0.65	0.37	0.66	1.14	17.91
1956	0.74	0.44	0.31	0.77	1.42	0.30	1.16	0.58	2.86	1.39	0.60	2.52	13.09
1957	0.36	1.98	3.11	9.02	6.41	2.24	0.00	0.53	9.30	2.21	4.29	1.07	40.52
1958	5.37	5.24	0.64	1.49	4.01	2.05	1.95	0.49	8.32	8.72	1.05	1.18	40.51
1959	0.31	2.69	0.08	2.63	3.95	2.81	1.62	1.08	1.19	5.55	2.72	1.26	25.89
1960	0.70	1.37	1.68	2.14	1.48	4.21	5.03	5.65	0.72	6.48	3.00	3.63	36.09
1961	1.01	1.51	0.26	1.32	1.27	5.86	4.16	0.83	0.68	3.14	3.15	0.63	23.82
1962	0.48	0.56	0.57	3.18	1.19	2.94	0.13	0.85	3.60	0.74	1.04	1.67	16.95
1963	0.25	2.69	0.13	2.11	1.99	2.43	0.95	0.16	1.98	1.15	3.41	1.98	19.23
1964	1.61	1.88	1.61	1.56	2.90	0.84	0.44	3.59	2.63	1.66	0.90	0.97	20.59
1965	0.88	5.57	1.31	2.21	6.84	0.70	0.19	0.84	3.32	2.70	1.12	4.95	30.63
1966	1.66	2.17	0.47	3.01	4.03	4.17	1.72	1.66	3.76	1.19	0.01	0.47	24.32
1967	0.39	0.70	1.28	1.12	1.01	0.02	1.67	3.28	14.85	2.66	2.98	0.92	30.88
1968	7.50	2.74	1.19	2.78	6.25	4.03	3.45	0.79	7.11	0.96	4.23	1.01	42.04
1969	0.84	3.48	2.56	2.35	5.14	0.92	0.07	3.04	0.60	5.37	1.67	2.06	28.10
1970	1.63	2.67	2.37	1.18	9.28	0.73	1.95	1.40	4.50	0.49	0.01	0.28	26.49
1971	0.00	0.99	0.00	0.89	0.58	2.92	0.10	7.87	5.59	4.65	1.29	2.20	27.08
1972	1.45	0.26	0.36	1.06	7.09	2.66	2.16	3.04	5.11	0.76	2.41	0.67	27.03
1973	2.29	3.78	1.52	4.02	0.89	12.81	2.23	2.21	9.15	4.85	0.21	0.07	44.03

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2080

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	1.20	0.10	0.83	0.71	5.76	0.37	0.84	9.69	4.24	2.10	2.10	1.35	29.29
1975	0.43	1.85	0.54	2.82	9.23	3.50	2.05	2.54	2.56	3.67	0.07	0.99	30.25
1976	0.49	0.00	1.16	6.89	5.00	0.58	5.55	0.68	4.79	7.32	2.53	2.35	37.34
1977	2.54	0.80	0.76	10.28	1.91	2.30	0.13	0.07	0.83	1.74	1.62	0.16	23.14
1978	0.83	1.05	0.16	1.65	1.60	3.30	1.65	5.72	4.34	1.34	2.78	1.36	25.78
1979	2.55	1.18	1.25	6.33	2.32	4.77	2.41	1.78	1.81	0.05	1.22	1.25	26.92
1980	0.70	0.78	0.61	0.55	9.79	0.00	1.24	7.19	3.85	0.99	4.50	0.76	30.96
1981	1.81	0.87	1.50	1.71	4.60	7.90	0.37	3.82	1.86	4.34	0.13	1.09	30.00
1982	0.54	4.31	0.46	1.96	3.69	3.17	0.61	2.10	2.04	4.13	3.41	1.47	27.89
1983	1.06	2.06	3.19	0.05	2.88	3.84	2.65	2.38	3.28	2.78	1.09	0.38	25.64
1984	2.18	0.55	0.72	0.42	1.99	1.31	0.41	1.43	2.23	6.98	1.08	2.26	21.56
1985	2.40	1.24	1.87	3.10	2.94	4.25	2.38	0.04	6.11	5.38	3.94	0.32	33.97
1986	1.29	0.56	0.46	0.64	4.99	3.64	0.49	0.54	3.60	8.25	1.52	5.44	31.42
1987	1.27	4.13	0.98	0.19	4.83	10.56	1.53	2.73	1.00	0.22	2.23	2.29	31.96
1988	0.33	0.25	0.69	0.91	2.34	2.39	2.42	0.44	1.52	0.93	0.02	0.38	12.62
1989	2.07	0.25	1.42	2.29	0.48	1.61	0.45	1.39	0.40	4.17	1.15	0.68	16.36
AVG	1.42	1.54	1.38	2.37	3.45	2.92	1.95	2.13	3.59	2.45	1.58	1.65	26.43

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2100

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	0.63	0.01	0.00	1.36	0.44	0.70	6.54	6.05	1.20	3.77	2.15	0.19	23.04
1917	0.54	0.02	0.05	1.11	1.05	0.01	0.87	0.50	1.17	0.06	1.07	0.00	6.45
1918	0.10	1.45	1.09	3.30	1.85	3.81	0.14	0.40	4.98	3.49	3.47	4.41	28.49
1919	3.14	1.53	3.15	2.09	4.25	4.71	7.40	1.86	10.80	3.71	1.72	1.12	45.48
1920	2.49	0.25	0.39	1.02	4.35	2.95	2.22	1.77	0.03	1.53	3.11	0.00	20.11
1921	1.33	0.44	2.03	1.77	1.95	1.81	2.10	0.71	9.91	0.13	0.59	0.35	23.12
1922	0.89	0.83	2.70	3.14	1.84	4.40	0.95	1.80	5.69	2.20	2.84	0.28	27.56
1923	0.86	8.13	3.99	0.82	0.29	0.80	2.79	3.76	3.25	4.73	3.44	8.14	41.00
1924	0.91	1.55	0.98	1.92	5.62	2.44	0.28	0.14	2.39	0.49	0.00	2.90	19.62
1925	0.27	0.01	3.88	0.11	0.34	1.88	0.27	2.45	7.03	3.87	1.14	2.31	23.56
1926	2.91	0.40	4.11	1.58	2.27	1.72	1.97	1.82	1.51	5.96	0.91	2.65	27.81
1927	0.59	1.04	2.13	1.24	0.76	7.24	0.65	0.20	3.85	3.06	0.83	1.32	22.91
1928	1.14	1.86	0.83	0.94	3.45	1.79	0.70	1.32	5.20	0.30	3.08	3.98	24.59
1929	1.57	0.15	3.44	1.75	6.47	2.19	3.61	0.44	1.87	1.03	2.65	3.50	28.67
1930	1.01	0.90	1.96	4.68	3.36	3.77	0.73	0.00	1.46	6.33	2.68	0.41	27.29
1931	4.77	1.63	2.01	1.66	3.73	4.35	3.72	3.51	0.36	1.09	0.02	4.85	31.70
1932	3.40	2.98	1.00	1.70	1.20	1.15	0.51	4.18	4.70	0.58	0.80	1.78	23.98
1933	1.17	3.15	0.95	0.56	2.51	3.59	4.66	2.87	3.22	0.56	1.16	0.11	24.51
1934	6.42	0.36	1.52	3.42	0.42	0.04	3.99	1.95	3.98	0.34	4.20	2.80	29.44
1935	0.60	2.29	4.16	2.16	4.21	7.78	1.48	0.45	12.41	1.94	0.71	3.94	42.13
1936	0.68	0.28	1.97	1.79	8.28	6.04	2.49	2.09	4.14	1.37	1.23	0.95	31.31
1937	0.56	0.61	1.03	0.21	2.12	0.71	1.72	1.11	0.63	2.19	0.78	9.64	21.31
1938	1.25	0.54	0.28	3.26	1.92	0.79	0.11	1.71	1.40	0.36	0.95	3.08	15.65
1939	0.89	0.86	0.26	0.34	1.78	2.17	2.00	2.15	3.66	0.26	0.72	0.93	16.02
1940	0.40	1.29	2.11	1.99	6.26	7.17	1.86	3.87	1.05	3.65	1.99	3.53	35.17
1941	1.41	2.61	2.71	6.85	6.38	2.72	5.71	1.74	7.51	3.77	0.83	1.09	43.33
1942	0.61	2.14	0.50	1.44	2.69	1.16	8.55	5.36	5.02	1.38	0.31	0.39	29.55
1943	1.52	0.17	1.75	0.57	3.36	3.38	0.98	0.02	6.06	0.68	2.50	1.71	22.70
1944	3.74	0.61	4.65	0.23	5.59	2.36	0.89	5.17	1.52	0.61	2.60	1.44	29.41
1945	0.51	1.77	2.40	2.59	1.04	5.01	1.32	0.64	1.49	2.42	0.23	0.74	20.16
1946	2.98	1.11	1.84	2.59	5.97	3.07	0.65	4.90	3.06	4.97	0.42	0.88	32.44
1947	2.86	0.07	0.83	3.71	5.53	0.98	0.65	3.97	1.54	0.68	1.81	1.55	24.18
1948	0.91	2.12	1.06	1.16	1.49	1.77	1.76	0.92	2.56	2.49	1.77	0.46	18.47
1949	1.83	2.78	1.30	8.43	0.24	3.00	3.69	1.32	0.93	5.22	0.03	3.75	32.52
1950	0.31	0.98	0.43	2.37	3.54	3.10	2.43	1.11	0.99	0.22	0.13	0.00	15.61
1951	0.64	1.04	2.17	0.87	4.02	3.33	0.31	0.61	9.03	1.37	1.44	0.22	25.05
1952	0.25	1.65	0.96	2.21	3.74	1.19	1.13	0.05	2.68	0.00	2.43	1.74	18.03
1953	0.22	1.51	0.21	2.50	2.91	0.26	0.80	6.19	2.48	5.07	0.15	1.10	23.40
1954	0.33	0.05	0.23	2.55	1.88	3.74	0.49	1.20	1.60	1.94	2.40	0.07	16.48
1955	0.68	1.70	0.29	0.14	3.06	1.41	1.26	1.61	1.77	0.67	1.28	0.52	14.39
1956	0.26	0.60	0.19	0.67	2.39	0.89	0.46	1.46	1.66	2.69	0.81	2.26	14.34
1957	0.27	1.33	2.35	6.18	5.78	1.49	0.01	0.89	6.20	1.50	4.41	1.91	32.32
1958	5.37	4.66	0.92	0.54	3.22	1.67	0.69	0.37	10.35	7.64	0.99	1.64	38.06
1959	0.31	3.77	0.10	1.46	1.75	2.04	1.02	2.14	1.82	3.68	1.30	0.96	20.35
1960	0.83	1.61	0.95	1.73	1.61	5.43	1.85	5.49	1.04	8.08	3.62	4.77	37.01
1961	1.30	1.85	0.28	2.32	0.26	4.88	1.51	1.38	1.26	1.56	2.06	0.50	19.16
1962	0.48	0.19	0.76	3.13	1.54	3.55	0.03	0.92	2.89	0.47	0.69	1.90	16.55
1963	0.43	2.01	0.09	0.53	1.19	3.87	1.95	0.22	2.31	1.35	4.34	1.90	20.19
1964	1.88	1.55	1.60	0.20	2.77	1.01	1.30	2.33	2.23	1.18	0.65	1.50	18.20
1965	1.93	4.84	0.91	1.00	5.01	0.69	0.38	0.69	2.38	3.70	1.56	3.43	26.52
1966	1.84	2.59	0.50	3.24	6.32	3.64	0.88	1.75	3.70	0.33	0.00	0.24	25.03
1967	1.18	1.16	0.62	1.49	3.25	0.07	1.81	5.68	19.05	2.43	1.20	0.52	38.46
1968	4.78	1.99	1.03	1.21	6.21	4.42	1.88	0.99	5.01	1.52	1.49	1.61	32.14
1969	0.72	2.76	1.32	2.65	3.07	1.07	0.73	2.65	1.49	3.90	3.49	1.66	25.51
1970	2.16	1.58	2.05	0.41	7.41	1.38	1.40	2.70	4.36	0.37	0.16	0.28	24.26
1971	0.00	0.65	0.00	1.59	0.92	3.59	0.27	4.84	9.73	6.77	0.53	1.61	30.50
1972	2.59	0.74	0.24	0.57	5.49	2.51	3.88	1.74	5.95	1.89	2.31	0.44	28.35
1973	2.28	3.25	0.63	3.44	0.61	8.26	0.60	3.58	8.27	3.95	0.09	0.07	35.03

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2100

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	1.49	0.15	2.60	0.41	3.23	1.43	1.21	9.15	6.48	2.34	1.25	0.99	30.73
1975	0.50	0.64	0.54	1.41	5.06	2.99	1.84	1.64	1.65	1.91	0.11	1.23	19.52
1976	0.49	0.00	0.57	5.91	3.77	0.93	7.92	1.13	4.94	7.91	3.13	2.70	39.40
1977	2.41	0.95	0.68	4.62	1.95	4.44	0.76	0.25	2.00	3.20	2.63	0.11	24.00
1978	1.05	1.08	0.42	1.44	2.00	3.95	1.05	3.29	5.40	0.97	2.12	1.40	24.17
1979	2.09	1.29	1.13	3.84	3.24	2.84	4.21	1.79	3.20	0.06	0.27	0.72	24.68
1980	3.28	0.82	0.76	0.15	6.71	0.00	0.70	9.38	3.36	0.22	3.11	0.58	29.07
1981	1.79	0.64	2.15	2.04	8.11	6.13	1.75	4.91	0.85	3.21	0.07	0.51	32.16
1982	0.08	3.20	0.37	2.49	2.64	0.83	0.09	0.94	4.04	5.06	2.71	0.60	23.05
1983	0.81	2.33	2.13	0.00	1.24	3.20	1.59	1.59	3.76	2.25	1.93	0.46	21.29
1984	1.83	0.84	1.05	0.35	2.24	0.82	1.77	0.47	1.16	5.42	1.08	1.53	18.56
1985	3.16	1.06	2.09	3.62	3.31	4.27	1.44	0.31	4.01	5.96	4.04	0.56	33.83
1986	1.42	0.43	0.29	0.95	3.75	5.07	0.34	0.99	1.48	4.20	1.94	3.70	24.56
1987	1.42	3.84	0.69	0.25	3.69	6.80	1.77	1.60	2.05	0.16	2.52	0.79	25.58
1988	0.46	0.39	0.62	0.98	2.87	1.10	3.03	1.18	2.74	1.29	0.08	0.33	15.07
1989	2.18	0.75	0.57	2.65	0.97	1.74	0.86	1.24	1.41	1.45	1.10	1.15	16.07
AVG	1.49	1.46	1.33	1.97	3.19	2.80	1.83	2.18	3.82	2.47	1.60	1.67	25.82

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2110

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1916	0.70	0.01	0.00	1.26	0.42	0.57	7.09	6.23	1.11	3.87	2.21	0.21	23.68
1917	0.59	0.03	0.06	1.41	1.36	0.13	0.97	0.76	1.39	0.09	1.04	0.00	7.83
1918	0.08	1.59	1.12	3.29	2.47	4.03	0.22	0.42	5.21	3.65	3.79	4.11	29.98
1919	3.21	1.56	2.67	1.56	4.68	4.62	7.99	1.40	12.55	3.98	1.78	0.86	46.86
1920	2.69	0.11	0.35	0.83	4.64	3.02	1.15	1.57	0.07	1.60	3.44	0.04	19.51
1921	1.38	0.56	2.00	1.75	1.82	1.53	1.95	0.56	10.54	0.03	0.57	0.48	23.17
1922	0.96	0.97	2.76	2.48	2.45	4.79	0.50	2.09	5.98	2.23	2.83	0.35	28.39
1923	0.98	8.33	3.90	0.88	0.28	0.67	3.12	3.53	3.20	5.42	3.76	8.75	42.82
1924	1.12	1.32	0.75	1.55	5.91	2.51	0.28	0.15	2.26	0.45	0.02	3.12	19.44
1925	0.24	0.06	4.16	0.25	0.42	2.00	0.46	2.49	7.13	4.29	0.96	2.58	25.04
1926	3.02	0.43	3.84	1.25	2.64	1.75	2.41	2.12	1.35	6.77	0.86	2.78	29.22
1927	0.47	0.99	2.45	1.08	0.55	7.88	0.82	0.13	3.25	3.13	0.89	1.07	22.71
1928	1.09	2.23	1.01	0.93	3.82	2.14	0.82	2.15	5.68	0.30	3.97	4.22	28.36
1929	1.77	0.27	2.85	1.62	6.39	2.58	4.10	0.56	1.70	1.02	2.87	3.82	29.55
1930	1.12	1.10	1.92	3.84	3.25	3.90	0.86	0.02	1.74	6.78	2.62	0.53	27.68
1931	5.03	1.73	2.44	1.71	3.56	5.20	3.66	2.45	0.44	1.19	0.09	4.96	32.46
1932	4.63	2.95	1.30	1.86	1.09	1.63	0.44	4.13	4.04	0.74	0.42	1.55	24.78
1933	1.00	3.12	1.26	0.51	1.89	4.54	5.61	3.01	4.03	0.89	1.40	0.13	27.39
1934	6.61	0.40	1.68	3.30	0.50	0.07	3.77	1.82	3.92	0.46	4.67	2.05	29.25
1935	0.92	2.11	5.19	2.17	3.37	7.36	1.34	0.60	12.33	1.74	0.99	4.03	42.15
1936	0.69	0.39	2.36	2.27	8.83	5.91	2.75	2.82	5.20	1.41	1.17	0.96	34.76
1937	0.81	0.59	1.01	0.13	1.88	0.96	2.21	0.98	0.14	2.59	0.85	10.52	22.67
1938	1.04	0.67	0.27	2.73	2.64	1.02	0.14	2.13	1.71	0.56	1.13	3.47	17.51
1939	0.91	0.96	0.33	0.55	1.37	2.68	1.33	2.32	4.01	0.36	0.75	0.99	16.56
1940	0.48	1.01	2.46	1.14	7.05	7.03	1.63	4.11	1.45	4.12	2.04	3.30	35.82
1941	0.97	2.85	2.73	6.52	6.70	2.81	6.26	2.49	4.88	4.45	0.87	1.58	43.11
1942	0.70	2.32	0.58	1.62	2.28	1.47	9.32	5.59	4.93	1.72	0.18	0.53	31.24
1943	1.85	0.31	1.70	0.43	3.44	3.37	1.10	0.08	5.76	0.73	2.82	2.23	23.82
1944	3.12	0.65	5.43	0.06	4.78	2.36	0.91	5.73	2.14	0.97	2.77	1.41	30.33
1945	0.42	1.70	1.78	2.30	1.26	4.65	1.28	0.79	1.44	2.03	0.19	0.89	18.73
1946	3.07	1.13	1.63	2.48	5.70	2.30	0.89	4.75	3.73	5.82	0.50	0.68	32.68
1947	3.00	0.05	0.72	4.12	5.92	1.18	0.90	4.45	1.89	0.59	1.70	1.66	26.18
1948	1.05	1.96	1.34	1.23	1.63	2.07	1.44	1.05	2.99	2.44	1.82	0.19	19.21
1949	1.85	2.85	1.24	8.90	0.28	2.78	5.21	0.95	1.01	5.62	0.01	4.23	34.93
1950	0.63	0.81	0.39	2.63	3.32	2.91	2.48	1.30	0.84	0.17	0.10	0.00	15.58
1951	0.86	1.11	2.16	0.90	3.40	4.48	0.18	0.44	7.66	1.61	2.00	0.24	25.04
1952	0.38	1.53	0.62	2.79	3.24	1.22	2.42	0.05	3.76	0.00	2.87	1.64	20.52
1953	0.33	1.70	0.23	2.38	1.77	0.08	1.61	6.23	2.33	6.19	0.21	1.21	24.27
1954	0.48	0.06	0.29	2.36	1.53	3.53	0.41	1.02	1.36	2.21	3.21	0.13	16.59
1955	0.68	1.64	0.17	0.21	2.14	1.29	1.39	1.36	2.83	1.08	1.37	0.56	14.72
1956	0.29	0.81	0.31	0.93	3.53	1.37	0.27	1.34	1.32	3.23	1.05	3.17	17.62
1957	0.30	1.10	2.15	6.76	5.52	2.31	0.02	0.97	5.94	1.55	4.58	1.38	32.58
1958	5.28	5.38	0.92	0.39	3.83	1.17	0.93	0.42	12.38	7.93	0.97	1.49	41.09
1959	0.46	4.04	0.12	1.39	1.82	2.59	0.85	3.34	1.38	4.42	0.79	1.09	22.29
1960	0.97	1.79	0.95	1.04	1.56	5.16	1.79	5.78	1.48	8.49	3.18	5.62	37.81
1961	1.41	1.96	0.27	2.05	0.21	4.00	1.68	1.65	1.87	1.22	2.17	0.50	18.99
1962	0.49	0.14	0.76	3.22	1.78	4.39	0.05	1.52	3.20	0.54	0.59	1.91	18.59
1963	0.43	1.99	0.08	0.34	0.59	3.01	1.99	0.40	2.85	1.62	5.27	1.71	20.28
1964	1.94	1.50	1.70	0.19	3.58	0.95	2.05	1.64	1.98	1.08	0.36	2.09	19.06
1965	2.55	5.39	0.98	1.00	4.48	1.01	0.27	0.74	2.26	4.30	2.06	3.25	28.29
1966	2.30	2.41	0.40	4.01	6.87	4.29	1.24	2.35	3.71	0.30	0.00	0.39	28.27
1967	1.64	1.20	0.44	1.17	4.21	0.03	1.47	6.01	18.61	3.76	0.89	0.52	39.95
1968	3.77	2.32	1.26	1.39	6.05	5.17	3.23	1.31	3.53	2.50	1.00	1.68	33.21
1969	1.00	4.37	1.57	2.62	3.40	0.62	1.69	3.65	1.74	2.64	4.61	1.61	29.52
1970	2.23	1.32	1.89	0.38	7.78	2.59	1.20	2.72	4.81	0.57	0.41	0.34	26.24
1971	0.01	0.75	0.00	1.89	1.19	2.81	0.38	6.60	14.20	7.63	0.36	1.77	37.59
1972	2.74	0.94	0.38	1.34	6.99	2.50	3.85	2.20	5.24	2.76	1.88	0.42	31.24
1973	2.22	2.71	0.55	3.04	0.68	11.89	0.93	4.54	7.90	5.93	0.18	0.04	40.61

AREAL PRECIPITATION IN INCHES FOR SUBWATERSHED ABOVE USGS# 2110

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1974	1.94	0.08	3.15	0.35	2.99	2.60	1.20	10.07	9.51	2.62	1.67	1.04	37.22
1975	0.88	0.45	0.59	0.88	4.01	2.95	2.12	2.75	1.63	2.03	0.33	1.84	20.46
1976	0.54	0.00	0.60	7.37	3.75	1.98	8.38	1.47	5.03	7.86	3.80	3.69	44.47
1977	2.59	1.33	0.81	4.07	2.30	4.63	0.50	0.47	2.45	4.06	2.68	0.13	26.02
1978	1.59	1.41	0.31	1.73	1.78	4.48	1.13	2.68	4.30	1.40	2.09	1.26	24.16
1979	3.07	1.68	1.70	4.07	3.45	2.28	4.62	1.82	5.40	0.28	0.23	0.97	29.57
1980	5.87	1.05	0.83	0.20	5.43	0.00	0.74	10.93	4.26	0.43	3.05	0.62	33.41
1981	2.31	1.20	2.51	1.77	9.83	7.92	3.71	5.46	0.54	4.47	0.13	0.80	40.65
1982	0.09	3.23	0.42	2.44	3.97	0.21	0.15	0.42	2.82	4.78	2.88	0.64	22.05
1983	0.79	2.48	2.57	0.01	1.20	3.84	2.51	1.77	3.99	2.68	2.05	0.48	24.37
1984	2.57	0.78	0.88	0.19	2.90	1.37	2.54	1.52	1.80	5.51	1.71	2.07	23.84
1985	3.62	1.77	2.31	5.74	4.58	5.69	0.75	0.67	3.79	5.96	4.12	0.48	39.48
1986	1.21	0.97	0.24	0.73	3.35	4.40	0.20	1.61	2.15	4.52	2.17	3.12	24.67
1987	1.71	4.39	0.60	0.92	4.87	8.18	2.13	0.48	1.72	1.00	2.73	0.76	29.49
1988	0.58	0.58	0.78	0.95	2.22	1.40	2.39	1.49	3.88	1.38	0.29	0.81	16.75
1989	2.14	0.50	0.34	1.75	0.53	1.91	1.09	1.99	1.24	1.92	1.34	1.41	16.16
AVG	1.65	1.57	1.39	1.97	3.27	3.04	2.02	2.40	4.01	2.77	1.72	1.77	27.57

APPENDIX F

Net Evaporation Data

NET EVAPORATION IN FEET - CHOKE CANYON RESERVOIR

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	-0.25	0.21	0.17	-0.03	0.41	0.67	0.52	0.62	0.42	0.41	-0.10	-0.03	3.02
1935	0.18	0.00	0.15	0.13	0.03	-0.50	0.52	0.71	-0.75	0.24	0.17	-0.14	0.74
936	0.14	0.15	0.14	0.25	-0.27	-0.03	0.24	0.52	0.18	0.24	0.14	0.11	1.81
1937	0.10	0.17	0.17	0.38	0.28	0.48	0.52	0.61	0.61	0.48	0.30	-0.67	3.43
1938	0.13	0.13	0.26	0.11	0.27	0.59	0.76	0.52	0.50	0.53	0.35	0.00	4.15
1939	0.08	0.16	0.31	0.46	0.34	0.25	0.60	0.39	0.31	0.41	0.20	0.15	3.66
1940	0.13	0.12	0.22	0.21	0.15	-0.09	0.49	0.51	0.61	0.23	0.11	-0.05	2.64
1941	0.05	-0.03	0.01	-0.20	-0.05	0.11	0.27	0.53	0.04	0.19	0.23	0.18	1.33
1942	0.21	0.01	0.33	0.14	0.19	0.45	-0.13	0.20	-0.05	0.23	0.34	0.27	2.19
1943	0.11	0.27	0.23	0.37	0.21	0.26	0.46	0.75	0.14	0.52	0.11	0.11	3.54
1944	-0.06	0.13	0.03	0.40	-0.05	0.42	0.75	0.34	0.43	0.45	0.08	0.03	2.95
1945	0.18	0.09	0.15	0.14	0.46	0.27	0.50	0.58	0.53	0.18	0.33	0.20	3.61
1946	0.01	0.09	0.27	0.18	-0.06	0.28	0.70	0.34	0.09	-0.02	0.25	0.16	2.29
1947	-0.05	0.22	0.23	0.16	0.00	0.47	0.72	0.41	0.65	0.44	0.24	0.08	3.57
1948	0.17	0.00	0.22	0.30	0.39	0.53	0.53	0.68	0.34	0.26	0.27	0.21	3.90
1949	0.04	0.01	0.21	-0.23	0.36	0.23	0.38	0.56	0.55	0.06	0.26	-0.02	2.41
1950	0.21	0.14	0.34	0.24	0.20	0.27	0.53	0.65	0.49	0.52	0.40	0.32	4.31
1951	0.26	0.11	0.21	0.37	0.15	0.28	0.73	0.84	-0.05	0.34	0.19	0.25	3.68
1952	0.26	0.11	0.26	0.21	0.24	0.45	0.53	0.84	0.23	0.54	0.06	0.10	3.83
1953	0.28	0.12	0.29	0.27	0.25	0.68	0.76	0.30	0.26	-0.07	0.29	0.21	3.64
1954	0.19	0.32	0.38	0.21	0.34	0.43	0.67	0.76	0.60	0.39	0.25	0.35	4.89
1955	0.16	0.12	0.39	0.48	0.39	0.75	0.86	0.70	0.48	0.61	0.38	0.28	5.60
1956	0.20	0.26	0.39	0.38	0.38	0.63	0.81	0.85	0.59	0.37	0.34	0.20	5.40
1957	0.28	0.15	0.17	-0.03	-0.01	0.35	0.80	0.77	0.28	0.21	-0.07	0.18	3.08
1958	-0.16	-0.16	0.17	0.20	0.11	0.45	0.74	0.76	-0.14	-0.20	0.18	0.11	2.06
1959	0.23	-0.07	0.35	0.21	0.23	0.29	0.63	0.57	0.51	0.17	0.21	0.19	3.52
1960	0.13	0.13	0.16	0.26	0.36	0.36	0.40	0.23	0.53	-0.14	0.09	-0.09	2.42
1961	0.03	0.01	0.24	0.14	0.50	0.24	0.43	0.51	0.47	0.30	0.03	0.12	3.02
1962	0.16	0.27	0.31	0.22	0.52	0.19	0.86	0.78	0.32	0.50	0.19	-0.01	4.31
1963	0.18	0.05	0.32	0.32	0.37	0.40	0.62	0.84	0.46	0.41	0.10	0.07	4.14
1964	0.09	0.07	0.15	0.34	0.17	0.57	0.66	0.59	0.40	0.46	0.37	0.13	4.00
1965	0.08	-0.17	0.18	0.23	-0.19	0.40	0.70	0.63	0.49	0.18	0.15	-0.07	2.61
1966	-0.16	0.04	0.07	0.11	-0.02	0.23	0.45	0.56	0.26	0.39	0.14	0.24	2.31
1967	0.15	0.06	0.09	0.17	0.14	0.62	0.77	0.51	0.17	0.13	0.10	0.06	2.97
1968	0.06	-0.06	0.02	0.05	0.07	0.39	0.45	0.49	0.06	0.26	0.34	0.20	2.33
1969	0.10	0.01	0.26	0.08	-0.03	0.36	0.69	0.65	0.22	0.41	0.30	0.23	3.28
1970	0.10	0.15	0.20	0.25	0.32	0.55	0.53	0.41	-0.49	0.30	0.30	0.27	2.89
1971	0.28	0.23	0.45	0.31	0.39	0.34	0.72	0.19	-0.02	0.05	0.27	0.10	3.31
1972	0.08	0.13	0.30	0.33	0.08	0.28	0.34	0.39	0.28	0.33	0.11	0.18	2.83
1973	0.06	-0.02	0.23	0.09	0.41	0.09	0.42	0.36	0.12	0.12	0.32	0.32	2.52
1974	0.08	0.31	0.13	0.35	0.28	0.49	0.60	0.25	0.29	0.21	0.11	0.13	3.23
1975	0.16	0.16	0.30	0.28	0.17	0.31	0.39	0.44	0.33	0.35	0.33	0.18	3.40
1976	0.23	0.31	0.27	0.08	0.17	0.55	0.17	0.58	0.29	0.13	0.03	0.03	2.84
1977	-0.03	0.17	0.26	0.02	0.20	0.37	0.69	0.77	0.59	0.42	0.26	0.29	4.01
1978	0.09	0.10	0.38	0.32	0.44	0.35	0.63	0.40	0.14	0.31	0.12	0.14	3.42
1979	0.01	0.08	0.22	0.06	0.25	0.30	0.39	0.54	0.37	0.57	0.31	0.15	3.25
1980	0.06	0.15	0.32	0.46	0.16	0.74	0.81	0.33	0.33	0.40	0.10	0.14	4.00
1981	0.06	0.11	0.14	0.16	0.14	0.16	0.46	0.41	0.46	0.17	0.27	0.22	2.76
1982	0.23	0.02	0.21	0.14	0.18	0.45	0.80	0.70	0.52	0.01	0.11	0.21	3.58
1983	0.12	0.00	0.10	0.48	0.33	0.38	0.48	0.48	0.34	0.24	0.17	0.18	3.30
1984	0.06	0.22	0.34	0.48	0.45	0.63	0.57	0.76	0.60	0.07	0.15	0.08	4.41
1985	0.03	0.07	0.07	0.10	0.19	-0.20	0.56	0.77	0.21	0.13	-0.09	0.14	1.98
1986	0.14	0.22	0.40	0.33	0.11	-0.12	0.71	0.69	0.57	-0.06	0.12	-0.12	2.99
1987	0.08	-0.11	0.21	0.38	0.12	-0.15	0.49	0.69	0.40	0.56	0.19	0.15	3.01
1988	0.18	0.16	0.26	0.27	0.22	0.54	0.45	0.61	0.40	0.38	0.37	0.25	4.09
1989	0.03	0.12	0.31	0.28	0.66	0.56	0.71	0.64	0.55	0.38	0.16	0.00	4.40
AVG	0.11	0.10	0.23	0.22	0.22	0.35	0.57	0.56	0.31	0.28	0.20	0.12	3.27

NET EVAPORATION IN FEET - LAKE CORPUS CHRISTI

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	-0.30	0.16	0.16	0.09	0.37	0.63	0.40	0.57	0.23	0.43	-0.14	0.10	2.70
1935	0.08	0.12	-0.08	0.19	0.21	-0.06	0.53	0.63	-0.44	0.23	0.22	-0.16	1.47
1936	0.11	0.13	0.02	0.15	-0.29	0.21	0.23	0.32	-0.10	0.26	0.21	0.09	1.34
1937	0.07	0.14	0.16	0.37	0.33	0.39	0.46	0.53	0.57	0.48	0.27	-0.55	3.22
1938	0.15	0.10	0.24	0.16	0.17	0.47	0.78	0.43	0.40	0.49	0.26	-0.08	3.57
1939	0.10	0.19	0.29	0.43	0.37	0.21	0.60	0.49	0.24	0.42	0.23	0.14	3.71
1940	0.11	0.14	0.20	0.28	0.23	-0.05	0.41	0.50	0.49	0.12	0.08	-0.03	2.48
1941	0.08	-0.09	-0.01	-0.21	-0.23	0.01	0.30	0.47	0.20	0.14	0.22	0.10	0.98
1942	0.18	-0.04	0.30	0.17	0.22	0.36	-0.34	0.14	0.06	0.19	0.31	0.26	1.81
1943	0.04	0.23	0.19	0.36	0.14	0.30	0.41	0.71	0.08	0.48	0.07	0.01	3.02
1944	-0.03	0.12	0.05	0.36	-0.07	0.42	0.69	0.23	0.26	0.43	0.07	0.02	2.55
1945	0.17	0.09	0.15	0.06	0.40	0.30	0.45	0.40	0.53	0.17	0.33	0.16	3.21
1946	-0.02	0.05	0.26	0.17	0.02	0.18	0.58	0.37	-0.02	-0.11	0.21	0.15	1.84
1947	-0.03	0.21	0.21	0.10	-0.03	0.41	0.63	0.25	0.60	0.40	0.10	0.05	2.90
1948	0.15	0.02	0.17	0.25	0.35	0.39	0.48	0.66	0.17	0.26	0.26	0.22	3.38
1949	0.04	0.00	0.16	-0.26	0.37	0.28	0.32	0.50	0.48	0.08	0.33	0.03	2.33
1950	0.14	0.15	0.32	0.27	0.26	0.34	0.46	0.64	0.51	0.49	0.38	0.31	4.27
1951	0.23	0.15	0.18	0.36	0.27	0.28	0.69	0.83	0.03	0.36	0.14	0.23	3.75
1952	0.24	0.15	0.29	0.12	0.37	0.47	0.34	0.80	-0.16	0.51	0.05	0.12	3.30
1953	0.27	0.10	0.26	0.25	0.32	0.63	0.65	0.01	0.37	-0.26	0.28	0.17	3.05
1954	0.17	0.30	0.35	0.18	0.33	0.30	0.64	0.66	0.46	0.22	0.23	0.33	4.17
1955	0.17	0.16	0.40	0.45	0.50	0.76	0.84	0.69	0.03	0.50	0.37	0.27	5.14
1956	0.22	0.25	0.36	0.19	0.21	0.53	0.83	0.81	0.54	0.30	0.34	0.14	4.72
1957	0.29	0.16	0.22	-0.20	-0.12	0.16	0.77	0.73	0.25	0.32	-0.08	0.21	2.71
1958	-0.32	-0.33	0.13	0.26	0.18	0.43	0.74	0.76	-0.41	-0.31	0.20	0.07	1.40
1959	0.17	-0.16	0.31	0.21	0.28	0.28	0.66	0.37	0.48	0.11	0.28	0.19	3.18
1960	0.09	0.07	0.12	0.25	0.29	0.34	0.59	0.20	0.37	-0.35	0.07	-0.29	1.75
1961	0.02	-0.03	0.26	0.19	0.51	0.19	0.42	0.48	0.31	0.45	0.09	0.16	3.05
1962	0.19	0.29	0.31	0.13	0.47	0.16	0.87	0.73	0.29	0.55	0.31	0.06	4.36
1963	0.17	0.14	0.31	0.41	0.46	0.63	0.67	0.78	0.46	0.49	0.23	0.10	4.85
1964	0.11	0.03	0.19	0.36	0.00	0.56	0.36	0.87	0.10	0.18	0.38	0.09	3.23
1965	0.13	-0.17	0.14	0.30	-0.14	0.50	0.76	0.69	0.56	0.22	0.23	-0.01	3.21
1966	-0.04	0.02	0.16	-0.16	-0.24	0.01	0.39	0.20	0.25	0.48	0.41	0.25	1.73
1967	0.06	0.18	0.31	0.38	0.22	0.66	0.71	0.04	-0.26	0.03	0.23	0.22	2.78
1968	-0.03	0.03	0.19	0.17	0.02	0.11	0.26	0.66	0.37	0.04	0.38	0.22	2.42
1969	0.17	-0.44	0.13	0.20	0.14	0.62	0.56	0.29	0.43	0.43	0.00	0.15	2.68
1970	-0.02	0.14	0.17	0.28	-0.07	0.10	0.58	0.47	0.20	0.42	0.37	0.26	2.90
1971	0.30	0.23	0.45	0.29	0.42	0.40	0.74	-0.22	-1.06	-0.03	0.32	0.07	1.91
1972	0.08	0.14	0.29	0.16	-0.23	0.21	0.33	0.45	0.24	0.14	0.19	0.21	2.21
1973	0.09	0.02	0.25	0.18	0.35	-1.24	0.48	0.14	-0.15	-0.41	0.35	0.35	0.41
1974	-0.01	0.32	-0.13	0.42	0.26	0.19	0.65	0.15	-0.08	0.26	0.14	0.11	2.28
1975	0.12	0.21	0.32	0.37	0.25	0.34	0.34	0.16	0.25	0.41	0.37	0.18	3.32
1976	0.25	0.32	0.29	-0.25	0.01	0.33	-0.37	0.60	0.28	-0.21	-0.17	-0.14	0.94
1977	-0.02	0.10	0.27	0.16	0.18	0.37	0.66	0.74	0.41	0.19	0.26	0.30	3.62
1978	0.03	0.07	0.39	0.27	0.47	0.31	0.77	0.55	0.01	0.21	0.19	0.14	3.41
1979	-0.10	0.02	0.15	0.01	0.11	0.45	0.12	0.48	-0.02	0.54	0.36	0.17	2.29
1980	-0.26	0.10	0.31	0.47	0.20	0.78	0.89	-0.02	-0.05	0.46	0.08	0.19	3.15
1981	-0.05	0.02	0.09	0.24	-0.16	-0.28	0.15	0.21	0.53	0.01	0.32	0.20	1.28
1982	0.27	-0.01	0.21	0.15	-0.03	0.57	0.86	0.80	0.65	0.30	0.17	0.24	4.18
1983	0.16	-0.02	0.19	0.49	0.40	0.00	0.43	0.61	0.31	0.22	0.31	0.18	3.28
1984	-0.01	0.24	0.40	0.53	0.52	0.42	0.56	0.70	0.44	-0.14	0.17	0.08	3.91
1985	-0.13	-0.07	0.09	-0.51	0.06	0.15	0.63	0.76	0.30	0.01	-0.04	0.18	1.43
1986	0.19	0.11	0.43	0.37	0.28	0.19	0.84	0.58	0.35	0.14	0.04	-0.08	3.44
1987	0.07	-0.19	0.25	0.17	-0.16	-0.42	0.42	0.70	0.49	0.29	0.10	0.17	1.89
1988	0.15	0.13	0.28	0.40	0.34	0.44	0.54	0.59	0.03	0.34	0.38	0.18	3.80
1989	0.06	0.30	0.61	0.55	0.85	0.75	0.88	0.89	0.79	0.38	0.29	0.13	6.48
AVG	0.08	0.09	0.23	0.21	0.20	0.29	0.53	0.50	0.23	0.23	0.21	0.12	2.90

NET EVAPORATION IN FEET - MONTELL AND INDIAN CREEK RECHARGE RESERVOIR SITES

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	-0.05	0.21	0.13	0.20	0.27	0.69	0.57	0.60	0.59	0.42	0.33	0.10	4.06
1935	0.12	0.15	0.34	0.16	-0.63	-0.49	0.12	0.73	-0.02	0.39	0.17	-0.12	0.92
1936	0.15	0.21	0.23	0.26	0.07	-0.14	0.43	0.40	-0.21	0.00	0.09	0.14	1.63
1937	0.04	0.22	0.10	0.35	0.39	0.27	0.57	0.81	0.47	0.21	0.25	-0.36	3.32
1938	0.06	0.12	0.21	-0.07	0.29	0.56	0.30	0.70	0.59	0.52	0.34	0.14	3.76
1939	-0.01	0.23	0.32	0.38	0.31	0.54	0.39	0.35	0.53	0.14	0.08	0.07	3.33
1940	0.19	0.14	0.26	0.16	0.09	0.20	0.73	0.63	0.78	0.42	0.17	0.07	3.84
1941	0.06	-0.08	-0.07	0.00	0.20	0.25	0.43	0.67	0.22	0.15	0.28	0.16	2.27
1942	0.21	0.13	0.36	0.03	0.21	0.58	0.45	0.48	0.23	0.23	0.34	0.19	3.44
1943	0.18	0.30	0.37	0.43	0.35	0.37	0.62	0.97	0.19	0.35	0.24	0.03	4.40
1944	0.05	0.07	0.23	0.46	0.10	0.44	0.92	0.49	0.48	0.40	0.21	0.09	3.94
1945	0.05	0.10	0.12	0.29	0.53	0.60	0.87	0.93	0.64	0.24	0.38	0.27	5.02
1946	0.05	0.23	0.40	0.24	0.07	0.36	0.77	0.79	0.31	0.21	0.29	0.16	3.88
1947	-0.07	0.29	0.33	0.37	0.46	0.37	0.94	0.57	0.81	0.65	0.28	0.19	5.19
1948	0.24	0.06	0.41	0.40	0.52	0.40	0.58	0.91	0.44	0.35	0.37	0.25	4.93
1949	-0.02	-0.25	0.23	-0.05	0.36	0.35	0.68	0.40	0.40	0.12	0.38	0.00	2.60
1950	0.12	0.10	0.43	0.30	0.26	0.41	0.71	0.73	0.42	0.58	0.44	0.31	4.81
1951	0.25	0.13	0.14	0.35	0.06	0.52	0.90	0.91	0.72	0.53	0.36	0.28	5.15
1952	0.22	0.19	0.20	0.21	0.17	0.62	0.86	1.04	0.57	0.64	0.18	0.20	5.10
1953	0.31	0.25	0.25	0.56	0.69	0.94	1.11	0.61	0.39	0.17	0.34	0.19	5.81
1954	0.20	0.43	0.51	0.27	0.45	0.45	0.86	0.97	0.87	0.38	0.40	0.38	6.17
1955	0.15	0.19	0.35	0.61	0.36	0.66	0.69	0.69	0.46	0.72	0.32	0.23	5.43
1956	0.15	0.21	0.47	0.49	0.71	0.99	1.06	1.03	0.83	0.52	0.44	0.30	7.20
1957	0.21	0.12	0.30	-0.21	-0.28	0.45	1.02	1.08	0.34	0.09	-0.04	0.12	3.20
1958	-0.11	-0.04	0.11	0.27	0.22	0.17	0.72	0.79	-0.08	-0.16	0.21	0.15	2.25
1959	0.16	0.06	0.35	0.14	0.20	0.22	0.52	0.66	0.57	-0.02	0.20	0.14	3.20
1960	0.08	0.15	0.17	0.37	0.46	0.85	0.28	0.42	0.63	0.11	0.17	-0.06	3.63
1961	0.03	0.00	0.28	0.36	0.53	0.12	0.24	0.48	0.61	0.16	0.22	0.14	3.17
1962	0.19	0.32	0.38	0.24	0.61	0.51	0.99	0.89	0.59	0.51	0.27	0.12	5.62
1963	0.18	0.07	0.38	0.30	0.17	0.52	0.81	0.86	0.46	0.46	0.24	0.11	4.56
1964	0.11	0.14	0.20	0.29	0.29	0.59	0.78	0.69	-0.09	0.34	0.25	0.13	3.72
1965	0.20	-0.10	0.18	0.19	0.03	0.47	0.82	0.77	0.57	0.29	0.17	-0.05	3.54
1966	0.10	0.06	0.23	0.13	0.11	0.39	0.78	0.40	0.30	0.24	0.37	0.25	3.36
1967	0.22	0.18	0.25	0.23	0.44	0.76	0.87	0.47	0.16	0.27	0.07	0.17	4.09
1968	-0.03	0.05	0.07	0.10	0.07	0.37	0.48	0.66	0.25	0.26	0.14	0.15	2.57
1969	0.09	0.04	0.22	0.09	0.09	0.54	0.80	0.51	0.25	-0.10	0.09	0.04	2.66
1970	0.07	0.04	0.16	0.15	0.09	0.42	0.67	0.52	0.11	0.22	0.32	0.19	2.96
1971	0.29	0.28	0.48	0.34	0.51	0.31	0.64	0.19	0.36	0.08	0.25	0.11	3.84
1972	0.15	0.24	0.37	0.40	0.20	0.45	0.58	0.38	0.39	0.39	0.24	0.22	4.01
1973	0.12	-0.01	0.28	0.17	0.49	0.25	0.35	0.60	0.27	0.19	0.29	0.31	3.31
1974	0.13	0.33	0.23	0.40	0.33	0.71	0.83	0.26	0.29	0.25	0.14	0.06	3.96
1975	0.17	0.08	0.36	0.22	0.16	0.43	0.38	0.65	0.41	0.33	0.41	0.19	3.79
1976	0.26	0.32	0.32	0.09	0.19	0.53	0.13	0.61	0.29	0.14	0.13	0.09	3.10
1977	0.04	0.15	0.25	0.13	0.15	0.45	0.75	0.75	0.60	0.32	0.19	0.26	4.04
1978	0.16	0.11	0.37	0.33	0.34	0.44	0.76	0.42	0.21	0.31	0.04	0.15	3.64
1979	0.07	0.07	0.12	0.14	0.34	0.24	0.60	0.53	0.67	0.70	0.25	0.14	3.87
1980	0.13	0.21	0.33	0.48	0.25	0.72	0.94	0.53	0.42	0.44	0.08	0.12	4.65
1981	0.10	0.13	0.14	-0.01	0.28	0.16	0.64	0.62	0.47	0.17	0.36	0.25	3.31
1982	0.22	0.07	0.25	0.29	0.18	0.45	0.74	0.80	0.58	0.52	0.17	0.15	4.42
1983	0.09	0.11	0.21	0.52	0.36	0.31	0.66	0.59	0.51	0.28	0.18	0.21	4.03
1984	0.07	0.30	0.40	0.58	0.53	0.63	0.77	0.81	0.62	0.14	0.21	-0.02	5.04
1985	0.06	0.04	0.10	0.22	0.34	0.37	0.52	0.92	0.49	0.26	0.12	0.14	3.58
1986	0.16	0.22	0.43	0.34	0.23	0.27	0.85	0.67	0.38	0.09	0.11	-0.02	3.73
1987	0.18	0.00	0.15	0.22	0.09	0.16	0.53	0.60	0.43	0.53	0.21	0.14	3.24
1988	0.20	0.20	0.36	0.47	0.44	0.49	0.53	0.66	0.46	0.45	0.40	0.23	4.89
1989	-0.08	0.11	0.36	0.36	0.64	0.79	0.95	0.62	0.73	0.30	0.20	0.16	5.14
AVG	0.12	0.14	0.27	0.26	0.27	0.44	0.67	0.66	0.43	0.30	0.24	0.14	3.93

NET EVAPORATION IN FEET - CONCAN AND UPPER DRY FRIO RECHARGE RESERVOIR SITES

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	-0.05	0.21	0.13	0.20	0.27	0.69	0.57	0.60	0.59	0.42	0.33	0.10	4.06
1935	0.12	0.15	0.34	0.16	-0.63	-0.49	0.12	0.73	-0.02	0.39	0.17	-0.12	0.92
1936	0.15	0.21	0.23	0.26	0.07	-0.14	0.43	0.40	-0.21	0.00	0.09	0.14	1.63
1937	0.04	0.22	0.10	0.35	0.39	0.27	0.57	0.81	0.47	0.21	0.25	-0.36	3.32
1938	0.06	0.12	0.21	-0.07	0.29	0.56	0.30	0.70	0.59	0.52	0.34	0.14	3.76
1939	-0.01	0.23	0.32	0.38	0.31	0.54	0.39	0.35	0.53	0.14	0.08	0.07	3.33
1940	0.18	0.12	0.24	0.14	0.06	0.16	0.67	0.64	0.74	0.35	0.13	0.00	3.43
1941	0.02	-0.17	-0.13	-0.06	0.16	0.20	0.47	0.64	0.19	0.19	0.27	0.15	1.93
1942	0.20	0.11	0.33	-0.04	0.19	0.56	0.40	0.51	0.19	0.17	0.33	0.18	3.13
1943	0.17	0.29	0.35	0.42	0.36	0.31	0.59	0.94	0.15	0.32	0.23	0.05	4.18
1944	0.02	0.04	0.18	0.45	0.00	0.40	0.89	0.33	0.49	0.43	0.16	0.07	3.46
1945	-0.03	0.07	0.06	0.21	0.49	0.52	0.84	0.88	0.51	0.26	0.35	0.22	4.38
1946	0.06	0.18	0.37	0.19	0.04	0.40	0.76	0.67	0.20	0.17	0.26	0.14	3.44
1947	-0.06	0.28	0.30	0.34	0.40	0.28	0.90	0.52	0.87	0.63	0.26	0.20	4.92
1948	0.23	0.03	0.37	0.33	0.48	0.38	0.59	0.89	0.38	0.31	0.38	0.23	4.60
1949	0.00	-0.20	0.16	-0.11	0.34	0.29	0.64	0.44	0.41	0.09	0.37	-0.01	2.42
1950	0.09	0.08	0.43	0.28	0.23	0.36	0.70	0.66	0.46	0.58	0.41	0.32	4.60
1951	0.19	0.06	0.06	0.27	-0.16	0.49	0.86	0.88	0.74	0.71	0.39	0.31	4.80
1952	0.21	0.15	0.16	0.16	0.11	0.52	0.83	1.00	0.42	0.60	0.14	0.21	4.51
1953	0.28	0.19	0.22	0.53	0.62	0.88	1.04	0.60	0.32	0.06	0.31	0.17	5.22
1954	0.19	0.42	0.50	0.31	0.44	0.52	0.81	0.96	0.86	0.35	0.34	0.36	6.06
1955	0.13	0.16	0.32	0.56	0.27	0.65	0.68	0.68	0.52	0.71	0.31	0.24	5.23
1956	0.14	0.18	0.43	0.44	0.65	0.95	0.97	0.99	0.80	0.51	0.42	0.28	6.76
1957	0.22	0.13	0.25	-0.35	-0.32	0.39	0.96	1.07	0.33	0.04	-0.06	0.11	2.77
1958	-0.16	-0.06	0.10	0.23	0.23	0.16	0.70	0.75	-0.10	-0.19	0.20	0.13	1.99
1959	0.13	0.03	0.33	0.11	0.20	0.25	0.55	0.65	0.51	-0.08	0.16	0.12	2.96
1960	0.05	0.14	0.13	0.34	0.40	0.76	0.34	0.39	0.60	0.01	0.14	-0.13	3.17
1961	0.02	-0.06	0.25	0.33	0.52	0.11	0.23	0.47	0.59	0.12	0.18	0.10	2.86
1962	0.17	0.30	0.34	0.19	0.55	0.47	0.93	0.81	0.51	0.50	0.21	0.08	5.06
1963	0.16	0.05	0.35	0.25	0.20	0.50	0.76	0.81	0.40	0.39	0.18	0.09	4.14
1964	0.07	0.11	0.18	0.26	0.26	0.50	0.74	0.66	0.01	0.30	0.20	0.10	3.39
1965	0.19	-0.16	0.15	0.18	0.02	0.46	0.80	0.75	0.60	0.23	0.15	-0.10	3.27
1966	0.13	0.04	0.21	0.16	0.08	0.41	0.69	0.45	0.29	0.12	0.33	0.21	3.12
1967	0.14	0.14	0.19	0.20	0.33	0.63	0.81	0.41	0.18	0.31	0.05	0.18	3.57
1968	-0.01	0.04	0.04	0.07	0.03	0.32	0.54	0.55	0.22	0.21	0.17	0.09	2.27
1969	0.06	-0.01	0.16	0.07	0.03	0.50	0.72	0.43	0.15	0.01	0.13	0.07	2.32
1970	0.05	0.05	0.14	0.09	0.06	0.40	0.61	0.48	0.15	0.11	0.29	0.18	2.61
1971	0.28	0.25	0.46	0.32	0.48	0.32	0.63	0.16	0.30	0.07	0.24	0.08	3.59
1972	0.14	0.23	0.35	0.37	0.18	0.42	0.55	0.39	0.35	0.38	0.22	0.21	3.79
1973	0.09	-0.02	0.27	0.13	0.45	0.23	0.32	0.56	0.22	0.17	0.28	0.30	3.00
1974	0.10	0.32	0.22	0.39	0.30	0.65	0.78	0.18	0.30	0.24	0.11	0.05	3.64
1975	0.18	0.07	0.33	0.18	0.12	0.39	0.42	0.63	0.40	0.30	0.40	0.18	3.60
1976	0.24	0.31	0.27	0.05	0.16	0.48	0.15	0.58	0.25	0.13	0.11	0.08	2.81
1977	0.02	0.16	0.26	0.12	0.14	0.44	0.76	0.75	0.59	0.35	0.16	0.25	4.00
1978	0.14	0.10	0.36	0.32	0.35	0.42	0.76	0.36	0.22	0.33	0.05	0.13	3.54
1979	0.04	0.06	0.09	0.10	0.30	0.22	0.53	0.49	0.64	0.66	0.21	0.10	3.44
1980	0.12	0.18	0.29	0.44	0.23	0.70	0.89	0.49	0.35	0.38	0.06	0.11	4.24
1981	0.08	0.11	0.11	-0.02	0.24	0.14	0.61	0.60	0.42	0.14	0.33	0.22	2.98
1982	0.20	0.06	0.24	0.25	0.14	0.42	0.71	0.76	0.55	0.50	0.15	0.14	4.12
1983	0.08	0.09	0.16	0.49	0.30	0.27	0.57	0.55	0.49	0.27	0.16	0.20	3.63
1984	0.06	0.29	0.39	0.55	0.53	0.60	0.76	0.77	0.59	0.13	0.22	-0.02	4.87
1985	0.07	0.03	0.08	0.21	0.33	0.36	0.51	0.91	0.50	0.25	0.10	0.13	3.48
1986	0.16	0.21	0.41	0.30	0.20	0.27	0.86	0.66	0.41	0.08	0.10	-0.03	3.63
1987	0.17	-0.02	0.12	0.25	0.08	0.15	0.52	0.62	0.44	0.54	0.19	0.11	3.17
1988	0.19	0.18	0.35	0.43	0.41	0.48	0.50	0.69	0.48	0.44	0.39	0.22	4.76
1989	-0.08	0.11	0.36	0.36	0.64	0.79	0.95	0.62	0.73	0.30	0.20	0.16	5.14
AVG	0.10	0.12	0.24	0.23	0.24	0.41	0.65	0.63	0.41	0.28	0.22	0.12	3.66

NET EVAPORATION IN FEET - UPPER SABINAL AND UPPER SECO RECHARGE RESERVOIR SITES

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	-0.05	0.21	0.13	0.20	0.27	0.69	0.57	0.60	0.59	0.42	0.33	0.10	4.06
1935	0.12	0.15	0.34	0.16	-0.63	-0.49	0.12	0.73	-0.02	0.39	0.17	-0.12	0.92
1936	0.15	0.21	0.23	0.26	0.07	-0.14	0.43	0.40	-0.21	0.00	0.09	0.14	1.63
1937	0.04	0.22	0.10	0.35	0.39	0.27	0.57	0.81	0.47	0.21	0.25	-0.36	3.32
1938	0.06	0.12	0.21	-0.07	0.29	0.56	0.30	0.70	0.59	0.52	0.34	0.14	3.76
1939	-0.01	0.23	0.32	0.38	0.31	0.54	0.39	0.35	0.53	0.14	0.08	0.07	3.33
1940	0.17	0.10	0.23	0.13	0.04	0.13	0.63	0.65	0.71	0.31	0.11	-0.05	3.16
1941	-0.01	-0.23	-0.17	-0.09	0.14	0.17	0.49	0.62	0.17	0.21	0.26	0.14	1.70
1942	0.20	0.09	0.32	-0.08	0.18	0.55	0.37	0.53	0.16	0.14	0.33	0.18	2.97
1943	0.17	0.28	0.33	0.41	0.36	0.28	0.57	0.93	0.13	0.30	0.22	0.06	4.04
1944	0.01	0.02	0.15	0.44	-0.07	0.38	0.87	0.24	0.50	0.45	0.13	0.05	3.17
1945	-0.08	0.05	0.02	0.16	0.47	0.47	0.82	0.85	0.43	0.27	0.33	0.19	3.98
1946	0.06	0.15	0.35	0.16	0.02	0.42	0.76	0.60	0.13	0.14	0.25	0.13	3.17
1947	-0.06	0.27	0.28	0.32	0.37	0.23	0.88	0.49	0.90	0.62	0.24	0.20	4.74
1948	0.23	0.02	0.35	0.29	0.45	0.37	0.59	0.87	0.34	0.28	0.38	0.22	4.39
1949	0.01	-0.17	0.12	-0.14	0.33	0.26	0.61	0.46	0.42	0.07	0.37	-0.02	2.32
1950	0.07	0.07	0.43	0.26	0.21	0.33	0.70	0.62	0.48	0.58	0.40	0.32	4.47
1951	0.16	0.02	0.02	0.22	-0.30	0.48	0.83	0.86	0.76	0.82	0.41	0.33	4.61
1952	0.21	0.13	0.13	0.13	0.07	0.46	0.81	0.97	0.33	0.58	0.12	0.22	4.16
1953	0.26	0.16	0.20	0.52	0.58	0.84	0.99	0.59	0.28	0.00	0.29	0.15	4.86
1954	0.19	0.42	0.49	0.33	0.43	0.56	0.78	0.95	0.86	0.34	0.31	0.35	6.01
1955	0.12	0.14	0.31	0.53	0.22	0.64	0.67	0.68	0.55	0.70	0.30	0.24	5.10
1956	0.13	0.17	0.40	0.41	0.62	0.92	0.91	0.97	0.78	0.51	0.40	0.27	6.49
1957	0.22	0.13	0.22	-0.43	-0.35	0.35	0.93	1.07	0.33	0.01	-0.07	0.11	2.52
1958	-0.19	-0.08	0.09	0.21	0.24	0.15	0.68	0.73	-0.12	-0.21	0.19	0.12	1.81
1959	0.11	0.01	0.32	0.09	0.20	0.27	0.57	0.64	0.47	-0.12	0.14	0.11	2.81
1960	0.03	0.14	0.10	0.32	0.37	0.71	0.38	0.37	0.58	-0.05	0.12	-0.17	2.90
1961	0.01	-0.10	0.23	0.31	0.52	0.11	0.22	0.47	0.58	0.09	0.16	0.07	2.67
1962	0.16	0.28	0.32	0.16	0.52	0.45	0.89	0.76	0.47	0.49	0.18	0.05	4.73
1963	0.14	0.03	0.33	0.22	0.22	0.49	0.73	0.78	0.37	0.35	0.14	0.08	3.88
1964	0.04	0.09	0.17	0.24	0.24	0.44	0.72	0.64	0.07	0.28	0.17	0.08	3.18
1965	0.19	-0.20	0.14	0.18	0.02	0.46	0.78	0.74	0.61	0.19	0.14	-0.13	3.12
1966	0.15	0.03	0.20	0.18	0.07	0.42	0.63	0.48	0.29	0.04	0.30	0.18	2.97
1967	0.09	0.11	0.15	0.18	0.26	0.55	0.77	0.37	0.19	0.34	0.04	0.18	3.23
1968	0.00	0.03	0.03	0.05	0.00	0.29	0.57	0.48	0.21	0.18	0.19	0.05	2.08
1969	0.04	-0.04	0.12	0.06	0.00	0.47	0.67	0.38	0.08	0.08	0.16	0.09	2.11
1970	0.04	0.05	0.13	0.06	0.04	0.39	0.57	0.45	0.17	0.05	0.27	0.18	2.40
1971	0.27	0.24	0.44	0.31	0.47	0.33	0.63	0.14	0.27	0.06	0.24	0.06	3.46
1972	0.13	0.22	0.34	0.36	0.17	0.41	0.53	0.40	0.33	0.37	0.20	0.20	3.66
1973	0.08	-0.03	0.26	0.10	0.43	0.21	0.30	0.53	0.19	0.16	0.27	0.29	2.79
1974	0.09	0.31	0.22	0.38	0.28	0.62	0.75	0.13	0.31	0.24	0.10	0.04	3.47
1975	0.18	0.07	0.32	0.16	0.10	0.37	0.44	0.61	0.39	0.29	0.40	0.18	3.51
1976	0.23	0.30	0.24	0.03	0.15	0.45	0.17	0.56	0.22	0.13	0.10	0.07	2.65
1977	0.01	0.16	0.27	0.12	0.14	0.44	0.76	0.75	0.59	0.36	0.14	0.24	3.98
1978	0.13	0.09	0.35	0.32	0.35	0.40	0.76	0.32	0.22	0.34	0.06	0.12	3.46
1979	0.02	0.06	0.08	0.08	0.28	0.21	0.48	0.46	0.62	0.64	0.18	0.08	3.19
1980	0.11	0.16	0.26	0.42	0.21	0.68	0.86	0.46	0.31	0.34	0.04	0.11	3.96
1981	0.07	0.10	0.09	-0.03	0.21	0.12	0.59	0.59	0.39	0.12	0.31	0.21	2.77
1982	0.19	0.06	0.23	0.23	0.11	0.41	0.69	0.73	0.54	0.48	0.13	0.13	3.93
1983	0.07	0.08	0.13	0.47	0.27	0.25	0.51	0.52	0.48	0.27	0.15	0.19	3.39
1984	0.06	0.28	0.39	0.54	0.53	0.58	0.76	0.75	0.57	0.13	0.22	-0.02	4.79
1985	0.07	0.02	0.07	0.21	0.32	0.36	0.51	0.91	0.50	0.24	0.09	0.13	3.43
1986	0.16	0.20	0.40	0.27	0.19	0.27	0.86	0.65	0.43	0.08	0.09	-0.04	3.56
1987	0.17	-0.03	0.10	0.26	0.07	0.15	0.51	0.63	0.45	0.54	0.17	0.10	3.12
1988	0.18	0.17	0.34	0.41	0.40	0.47	0.48	0.71	0.49	0.44	0.38	0.22	4.69
1989	-0.08	0.11	0.36	0.36	0.64	0.79	0.95	0.62	0.73	0.30	0.20	0.16	5.14
AVG	0.10	0.11	0.23	0.22	0.22	0.39	0.63	0.61	0.40	0.27	0.21	0.11	3.50

NET EVAPORATION IN FEET - UPPER HONDO RECHARGE RESERVOIR SITE

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	-0.05	0.21	0.13	0.20	0.27	0.69	0.57	0.60	0.59	0.42	0.33	0.10	4.06
1935	0.12	0.15	0.34	0.16	-0.63	-0.49	0.12	0.73	-0.02	0.39	0.17	-0.12	0.92
1936	0.15	0.21	0.23	0.26	0.07	-0.14	0.43	0.40	-0.21	0.00	0.09	0.14	1.63
1937	0.04	0.22	0.10	0.35	0.39	0.27	0.57	0.81	0.47	0.21	0.25	-0.36	3.32
1938	0.06	0.12	0.21	-0.07	0.29	0.56	0.30	0.70	0.59	0.52	0.34	0.14	3.76
1939	-0.01	0.23	0.32	0.38	0.31	0.54	0.39	0.35	0.53	0.14	0.08	0.07	3.33
1940	0.14	0.08	0.23	0.15	0.10	0.09	0.61	0.68	0.68	0.28	0.06	-0.06	3.04
1941	-0.01	-0.20	-0.15	-0.10	0.12	0.14	0.50	0.64	0.19	0.20	0.25	0.13	1.71
1942	0.19	0.11	0.31	-0.08	0.17	0.51	0.26	0.51	0.11	0.08	0.30	0.18	2.65
1943	0.16	0.27	0.30	0.39	0.33	0.31	0.53	0.90	0.13	0.34	0.20	0.05	3.91
1944	-0.03	0.00	0.12	0.42	-0.07	0.41	0.84	0.29	0.49	0.44	0.08	0.00	2.99
1945	-0.08	0.02	0.04	0.18	0.48	0.46	0.75	0.80	0.44	0.23	0.31	0.17	3.80
1946	0.02	0.12	0.30	0.16	0.05	0.37	0.75	0.53	0.03	0.14	0.20	0.09	2.76
1947	-0.07	0.25	0.25	0.31	0.31	0.32	0.84	0.48	0.85	0.60	0.24	0.17	4.55
1948	0.21	0.00	0.32	0.31	0.44	0.41	0.59	0.79	0.36	0.27	0.35	0.22	4.27
1949	-0.01	-0.14	0.13	-0.17	0.34	0.24	0.60	0.48	0.46	0.05	0.36	-0.02	2.32
1950	0.08	0.08	0.41	0.23	0.23	0.35	0.67	0.64	0.48	0.55	0.39	0.31	4.42
1951	0.19	0.02	0.07	0.26	-0.20	0.45	0.82	0.87	0.67	0.71	0.36	0.30	4.52
1952	0.21	0.13	0.14	0.14	0.12	0.47	0.75	0.96	0.24	0.58	0.10	0.15	3.99
1953	0.27	0.15	0.21	0.45	0.55	0.80	0.95	0.56	0.29	0.04	0.27	0.14	4.68
1954	0.18	0.40	0.46	0.31	0.42	0.57	0.79	0.92	0.83	0.35	0.31	0.34	5.88
1955	0.12	0.11	0.30	0.52	0.24	0.62	0.69	0.67	0.56	0.68	0.30	0.23	5.04
1956	0.14	0.17	0.39	0.40	0.58	0.87	0.89	0.89	0.76	0.50	0.37	0.24	6.20
1957	0.23	0.11	0.18	-0.40	-0.30	0.34	0.91	1.02	0.24	0.03	-0.08	0.11	2.39
1958	-0.18	-0.09	0.09	0.19	0.16	0.19	0.66	0.72	-0.13	-0.20	0.18	0.12	1.71
1959	0.12	-0.01	0.31	0.09	0.19	0.25	0.55	0.58	0.47	-0.10	0.15	0.10	2.70
1960	0.04	0.12	0.09	0.29	0.36	0.63	0.40	0.34	0.57	-0.09	0.12	-0.16	2.71
1961	0.02	-0.09	0.23	0.31	0.50	0.06	0.19	0.51	0.54	0.12	0.14	0.08	2.61
1962	0.15	0.26	0.29	0.11	0.49	0.39	0.85	0.76	0.42	0.45	0.15	0.04	4.36
1963	0.14	0.02	0.32	0.20	0.24	0.48	0.73	0.77	0.40	0.35	0.14	0.08	3.87
1964	0.02	0.08	0.16	0.23	0.25	0.43	0.75	0.64	0.11	0.29	0.16	0.09	3.21
1965	0.17	-0.22	0.14	0.16	-0.06	0.44	0.78	0.72	0.61	0.18	0.17	-0.14	2.95
1966	0.09	0.03	0.21	0.17	0.05	0.41	0.65	0.46	0.23	0.15	0.32	0.18	2.95
1967	0.12	0.11	0.17	0.19	0.27	0.58	0.76	0.43	0.13	0.32	0.06	0.15	3.29
1968	-0.06	0.02	0.04	0.06	0.01	0.29	0.55	0.51	0.20	0.22	0.21	0.07	2.12
1969	0.05	-0.04	0.14	0.07	0.02	0.47	0.69	0.40	0.13	0.07	0.18	0.10	2.28
1970	0.06	0.04	0.11	0.10	0.05	0.42	0.57	0.50	0.10	0.10	0.28	0.20	2.53
1971	0.27	0.24	0.44	0.31	0.45	0.35	0.65	0.14	0.25	0.07	0.22	0.05	3.44
1972	0.12	0.21	0.34	0.34	0.14	0.39	0.50	0.38	0.35	0.35	0.18	0.19	3.49
1973	0.06	-0.03	0.24	0.08	0.40	0.19	0.30	0.53	0.15	0.14	0.27	0.29	2.62
1974	0.08	0.30	0.22	0.35	0.27	0.59	0.73	0.15	0.28	0.22	0.07	0.05	3.31
1975	0.17	0.06	0.30	0.15	0.09	0.34	0.44	0.58	0.40	0.30	0.39	0.17	3.39
1976	0.23	0.29	0.23	0.03	0.15	0.45	0.18	0.55	0.24	0.15	0.09	0.06	2.65
1977	0.00	0.16	0.26	0.09	0.15	0.42	0.75	0.75	0.57	0.36	0.14	0.25	3.90
1978	0.13	0.07	0.33	0.28	0.35	0.40	0.73	0.33	0.19	0.36	0.04	0.11	3.32
1979	0.00	0.05	0.08	0.07	0.26	0.22	0.43	0.46	0.61	0.61	0.19	0.06	3.04
1980	0.10	0.15	0.25	0.39	0.19	0.66	0.84	0.47	0.28	0.34	0.03	0.12	3.82
1981	0.07	0.09	0.10	0.01	0.20	0.11	0.56	0.56	0.40	0.12	0.29	0.21	2.72
1982	0.18	0.06	0.21	0.21	0.10	0.40	0.70	0.71	0.55	0.43	0.12	0.12	3.79
1983	0.07	0.07	0.12	0.46	0.25	0.26	0.48	0.51	0.45	0.27	0.17	0.18	3.29
1984	0.07	0.26	0.37	0.53	0.50	0.57	0.77	0.74	0.58	0.12	0.21	-0.01	4.71
1985	0.06	0.03	0.08	0.19	0.31	0.35	0.51	0.88	0.47	0.24	0.12	0.13	3.37
1986	0.16	0.18	0.38	0.28	0.16	0.24	0.83	0.64	0.39	0.08	0.09	-0.05	3.38
1987	0.16	-0.04	0.12	0.29	0.08	0.13	0.49	0.65	0.44	0.53	0.17	0.10	3.12
1988	0.18	0.16	0.31	0.40	0.37	0.46	0.47	0.68	0.47	0.43	0.38	0.22	4.53
1989	-0.08	0.11	0.36	0.36	0.64	0.79	0.95	0.62	0.73	0.30	0.20	0.16	5.14
AVG	0.09	0.10	0.22	0.21	0.22	0.38	0.62	0.61	0.38	0.27	0.20	0.11	3.40

NET EVAPORATION IN FEET - UPPER VERDE RECHARGE RESERVOIR SITE

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	-0.05	0.21	0.13	0.20	0.27	0.69	0.57	0.60	0.59	0.42	0.33	0.10	4.06
1935	0.12	0.15	0.34	0.16	-0.63	-0.49	0.12	0.73	-0.02	0.39	0.17	-0.12	0.92
1936	0.15	0.21	0.23	0.26	0.07	-0.14	0.43	0.40	-0.21	0.00	0.09	0.14	1.63
1937	0.04	0.22	0.10	0.35	0.39	0.27	0.57	0.81	0.47	0.21	0.25	-0.36	3.32
1938	0.06	0.12	0.21	-0.07	0.29	0.56	0.30	0.70	0.59	0.52	0.34	0.14	3.76
1939	-0.01	0.23	0.32	0.38	0.31	0.54	0.39	0.35	0.53	0.14	0.08	0.07	3.33
1940	0.13	0.07	0.23	0.17	0.13	0.07	0.59	0.69	0.67	0.27	0.04	-0.06	3.00
1941	-0.01	-0.18	-0.14	-0.10	0.10	0.12	0.51	0.64	0.20	0.20	0.25	0.13	1.72
1942	0.18	0.11	0.31	-0.08	0.16	0.49	0.21	0.51	0.08	0.06	0.29	0.18	2.50
1943	0.15	0.27	0.29	0.39	0.32	0.33	0.51	0.88	0.13	0.36	0.19	0.05	3.87
1944	-0.04	0.00	0.11	0.40	-0.07	0.42	0.83	0.32	0.49	0.43	0.05	-0.02	2.92
1945	-0.08	0.00	0.04	0.18	0.49	0.46	0.71	0.77	0.45	0.20	0.31	0.16	3.69
1946	0.01	0.11	0.28	0.16	0.06	0.35	0.74	0.49	-0.01	0.14	0.17	0.07	2.57
1947	-0.07	0.24	0.24	0.30	0.29	0.36	0.82	0.47	0.83	0.59	0.24	0.15	4.46
1948	0.19	-0.02	0.31	0.32	0.44	0.42	0.59	0.75	0.37	0.26	0.34	0.22	4.19
1949	-0.03	-0.13	0.14	-0.19	0.35	0.22	0.60	0.49	0.47	0.03	0.35	-0.02	2.28
1950	0.09	0.09	0.40	0.21	0.23	0.35	0.65	0.65	0.48	0.54	0.39	0.30	4.38
1951	0.20	0.02	0.09	0.27	-0.15	0.43	0.81	0.87	0.63	0.66	0.33	0.29	4.45
1952	0.21	0.13	0.14	0.14	0.15	0.48	0.72	0.96	0.20	0.58	0.09	0.12	3.92
1953	0.27	0.15	0.21	0.41	0.53	0.78	0.93	0.55	0.30	0.05	0.27	0.13	4.58
1954	0.17	0.38	0.44	0.29	0.41	0.57	0.79	0.90	0.82	0.35	0.31	0.34	5.77
1955	0.12	0.10	0.30	0.51	0.26	0.60	0.69	0.66	0.56	0.67	0.30	0.23	5.00
1956	0.14	0.17	0.39	0.40	0.56	0.85	0.89	0.86	0.74	0.50	0.36	0.23	6.09
1957	0.23	0.10	0.16	-0.38	-0.28	0.33	0.90	1.00	0.20	0.05	-0.08	0.11	2.34
1958	-0.17	-0.10	0.09	0.19	0.12	0.21	0.64	0.72	-0.13	-0.20	0.18	0.12	1.67
1959	0.12	-0.03	0.31	0.09	0.19	0.23	0.54	0.55	0.47	-0.10	0.15	0.09	2.61
1960	0.05	0.12	0.09	0.28	0.35	0.59	0.40	0.32	0.57	-0.11	0.12	-0.15	2.63
1961	0.02	-0.08	0.23	0.31	0.49	0.04	0.17	0.53	0.52	0.13	0.13	0.08	2.57
1962	0.14	0.24	0.28	0.08	0.48	0.36	0.84	0.76	0.39	0.43	0.13	0.03	4.16
1963	0.14	0.01	0.31	0.19	0.24	0.47	0.73	0.77	0.42	0.35	0.14	0.08	3.85
1964	0.01	0.07	0.15	0.23	0.25	0.42	0.76	0.64	0.13	0.30	0.16	0.09	3.21
1965	0.15	-0.23	0.14	0.16	-0.10	0.44	0.78	0.72	0.61	0.17	0.18	-0.15	2.87
1966	0.06	0.03	0.21	0.17	0.04	0.40	0.66	0.44	0.21	0.20	0.32	0.18	2.92
1967	0.13	0.11	0.19	0.19	0.27	0.59	0.76	0.45	0.10	0.32	0.06	0.14	3.31
1968	-0.09	0.02	0.05	0.06	0.02	0.29	0.54	0.53	0.20	0.24	0.22	0.08	2.16
1969	0.06	-0.04	0.15	0.07	0.03	0.47	0.69	0.40	0.15	0.07	0.19	0.11	2.35
1970	0.06	0.04	0.10	0.13	0.05	0.44	0.57	0.52	0.07	0.12	0.29	0.21	2.60
1971	0.27	0.24	0.44	0.31	0.45	0.36	0.66	0.14	0.24	0.08	0.21	0.05	3.45
1972	0.11	0.21	0.34	0.34	0.12	0.37	0.48	0.37	0.36	0.34	0.16	0.18	3.38
1973	0.06	-0.03	0.23	0.06	0.38	0.17	0.30	0.53	0.13	0.13	0.27	0.29	2.52
1974	0.08	0.30	0.22	0.34	0.26	0.58	0.72	0.15	0.27	0.20	0.05	0.05	3.22
1975	0.16	0.06	0.30	0.15	0.09	0.33	0.44	0.56	0.40	0.31	0.38	0.16	3.34
1976	0.23	0.29	0.23	0.03	0.15	0.45	0.18	0.54	0.25	0.15	0.09	0.05	2.64
1977	-0.01	0.16	0.26	0.08	0.15	0.42	0.75	0.75	0.57	0.36	0.14	0.25	3.88
1978	0.13	0.06	0.32	0.26	0.35	0.40	0.72	0.33	0.18	0.36	0.03	0.11	3.25
1979	0.00	0.04	0.08	0.06	0.26	0.22	0.40	0.46	0.60	0.60	0.20	0.06	2.98
1980	0.10	0.14	0.25	0.38	0.17	0.66	0.83	0.47	0.26	0.34	0.03	0.12	3.75
1981	0.07	0.09	0.11	0.02	0.20	0.10	0.54	0.55	0.41	0.12	0.27	0.21	2.69
1982	0.17	0.06	0.21	0.21	0.10	0.39	0.70	0.69	0.55	0.40	0.11	0.12	3.71
1983	0.07	0.07	0.11	0.45	0.25	0.27	0.46	0.50	0.44	0.27	0.18	0.17	3.24
1984	0.07	0.26	0.36	0.53	0.49	0.56	0.77	0.74	0.58	0.12	0.21	0.00	4.69
1985	0.06	0.03	0.08	0.19	0.30	0.34	0.51	0.86	0.46	0.24	0.13	0.13	3.33
1986	0.16	0.17	0.37	0.29	0.15	0.22	0.82	0.64	0.36	0.08	0.09	-0.05	3.30
1987	0.15	-0.04	0.14	0.30	0.08	0.13	0.49	0.65	0.43	0.53	0.17	0.10	3.13
1988	0.18	0.16	0.30	0.40	0.35	0.45	0.47	0.66	0.47	0.43	0.38	0.22	4.47
1989	-0.08	0.11	0.36	0.36	0.64	0.79	0.95	0.62	0.73	0.30	0.20	0.16	5.14
AVG	0.09	0.09	0.22	0.21	0.22	0.38	0.61	0.60	0.37	0.27	0.20	0.10	3.35

APPENDIX G

Natural Streamflow

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

1900 - NUECES RIVER AT LAGUNA

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	1993	1933	2315	2777	3440	1623	1009	694	554	529	495	645	18006
1935	847	1042	1343	1414	53365	321807	24117	13866	22823	10002	7171	7261	465057
1936	6201	4991	5362	4692	5003	7714	9214	4004	134302	24541	16511	10891	233426
1937	7752	5622	7033	5763	3955	4896	3036	2016	1443	1692	2431	16391	62030
1938	13644	7665	6058	7450	7805	4079	9579	5257	3009	2895	2494	2643	72579
1939	3322	2823	2955	2496	2138	1580	97180	8769	4545	23153	4632	4892	158485
1940	4263	4394	4196	5337	10390	6153	4233	3252	2637	2053	2433	3562	52903
1941	3503	3563	4535	7437	14820	7763	8613	4991	4846	14653	6823	5222	86769
1942	4196	3267	3291	3363	5839	3285	2555	3582	24652	24576	10405	7164	96175
1943	4856	3827	4011	4634	4240	7106	3236	2084	1873	2207	2395	3124	43594
1944	4906	5227	7571	6384	4920	3977	2287	1944	12713	6007	3835	4114	63885
1945	8433	5633	5365	5406	3329	1992	1422	1171	903	5033	3612	3262	45561
1946	3363	3164	2866	2477	4321	7974	3474	1452	1677	24093	7083	4912	66856
1947	8114	7945	7068	5340	7634	9219	8419	3857	2429	1905	1874	2283	66087
1948	2545	2736	2830	2452	2408	2923	15513	2091	1361	1516	1595	1694	39665
1949	2080	64431	19798	10502	11972	7592	4932	28117	11551	8970	7388	6287	183621
1950	5812	5054	4663	3658	4591	5443	4163	3028	2846	2933	2511	2818	47521
1951	2532	2214	2752	2898	2289	1882	1402	1022	668	548	673	885	19765
1952	1064	1257	1554	4765	6799	2703	1443	967	646	480	464	543	22686
1953	918	1178	1726	1897	1202	834	605	525	6983	3037	2261	1897	23063
1954	1697	1472	1419	2235	11052	22309	10429	3232	1729	1750	1452	1385	60162
1955	1682	1695	1940	1530	1411	1184	3814	2124	158746	10763	6299	3875	195062
1956	3025	2554	2454	1910	1695	1175	921	610	571	696	361	380	16352
1957	358	310	461	4759	10640	16987	4029	2054	2022	7083	7188	7086	62975
1958	7282	10416	17588	8897	9577	65073	19419	9298	54366	30854	25137	15695	273601
1959	10436	8199	7702	6289	8003	25874	23846	12078	12117	28387	9932	8568	161431
1960	8449	8633	8227	6580	5713	3689	6229	17859	8909	14451	16483	12654	117876
1961	11718	12811	10684	7966	6126	11651	20414	13962	8553	12325	10392	7964	134565
1962	6519	5145	5072	4709	3725	5836	2808	1839	1483	6969	5947	4448	54500
1963	3815	3827	3987	3946	25975	4070	2610	1547	1396	1454	1523	2325	56477
1964	2613	3497	4497	4502	4016	2756	1837	1429	80609	20243	8117	6913	141030
1965	6520	7196	6219	5582	11671	15590	7433	4099	2932	3620	3948	5338	80147
1966	4916	3777	3858	5347	6325	3875	5198	62220	29670	9443	6045	5192	145965
1967	4782	3922	3766	3413	2739	2584	2110	2225	5736	19438	14299	10038	75051
1968	24962	14414	14934	14997	18369	9774	15239	7137	5628	5163	4514	5545	140676
1969	5161	4217	4529	7053	6576	5036	3158	2513	2162	47153	14007	16360	117925
1970	10947	7726	11406	8288	8532	7224	4631	3606	27867	12029	7015	5936	115207
1971	5031	4216	4969	3797	3443	4860	6404	154594	20320	36712	19298	14502	278145
1972	11725	8536	7545	6266	13352	7759	5673	36424	11634	8528	6885	6216	130543
1973	5855	5635	6636	6235	4647	15325	18384	9386	6117	124894	17755	12137	233008
1974	8988	6163	5624	4085	13929	5842	2358	8649	10094	14118	14913	8510	103272
1975	7614	8572	8085	6414	12763	12407	14925	10380	6783	5517	5323	5102	103885
1976	4575	3683	3590	5442	13538	6122	52031	21913	16477	13788	15267	14215	170642
1977	12762	11320	11326	45671	25604	13751	9131	5898	3922	3561	8210	6656	157812
1978	5578	4695	4783	6971	4231	4224	2185	8328	4029	3284	4606	4015	56928
1979	3931	3962	9067	11129	7594	11423	5640	3663	2683	1929	2192	2978	66191
1980	3419	3097	3180	2907	4277	2550	1572	1545	2522	3768	2708	3200	34746
1981	3254	2671	5624	25850	16515	66485	19274	12306	11792	74437	16770	11636	266614
1982	9114	7493	8410	6731	10131	9203	6491	3817	3031	3214	3132	3588	74355
1983	3849	3719	4461	4030	4785	5475	4221	3096	2971	6662	9725	6021	59016
1984	5109	3921	3460	2872	2287	1890	1498	1237	963	1929	3336	39544	68048
1985	30348	14612	13496	9172	9477	8399	12355	4116	4893	15817	7510	6784	136979
1986	5631	5777	4787	4041	4775	11118	5051	2608	10322	37593	20933	15435	128072
1987	16001	11636	13570	12362	35495	94058	26998	15400	33478	13108	9980	9229	291316
1988	8133	6752	6534	5285	4981	7411	9978	6613	4607	4777	4215	3958	73244
1989	4023	4856	5445	4719	3830	2873	2104	1622	1105	1320	3831	3815	39563
AVG	6432	6412	6011	6484	8897	16186	9765	9859	14370	13707	7256	6924	112304

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

1905 - WEST NUECES RIVER NEAR BRACKETTVILLE

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	0	0	0	0	0	0	0	0	0	0	0	0	0
1935	0	0	0	0	27298	181330	10516	4634	9773	2417	792	844	237605
1936	236	0	0	0	0	1104	1965	0	73740	10759	6152	2927	96882
1937	1126	0	713	0	0	0	0	0	0	0	0	6083	7921
1938	4506	1076	154	952	1156	0	2174	0	0	0	0	0	10018
1939	0	0	0	0	0	0	52439	1709	0	9730	75	0	63954
1940	0	0	0	7	183	27	210	0	0	0	0	0	427
1941	0	0	15	20	161	8	0	0	0	22	4	0	230
1942	0	0	0	0	0	0	0	0	85	3770	43	0	3898
1943	0	0	0	0	37	33	0	0	0	0	0	0	70
1944	0	3	3	0	0	8	0	0	0	0	0	0	14
1945	11	0	0	0	0	0	0	0	0	0	0	0	11
1946	0	0	0	0	0	15	0	0	22	7500	82	0	7619
1947	98	8	0	14	273	1650	409	16	0	0	0	0	2468
1948	0	0	0	0	0	25510	58	0	0	0	0	0	25568
1949	0	54320	2140	26	0	0	0	1460	328	28	7	0	58309
1950	0	0	0	0	0	0	0	0	3	0	0	0	3
1951	0	0	0	0	0	0	0	0	0	0	0	0	0
1952	0	0	0	0	579	0	0	0	0	0	0	0	579
1953	0	0	0	0	0	0	0	0	684	0	0	0	684
1954	0	0	0	0	3019	9478	2662	0	0	0	0	0	15159
1955	0	0	0	0	0	0	0	0	87766	2853	292	0	90911
1956	0	0	0	0	0	0	0	0	0	174	0	0	174
1957	0	0	0	1780	16370	132	0	0	0	0	0	0	18282
1958	0	4510	1850	105	0	111900	3650	289	49400	5410	4550	541	182205
1959	29	0	0	0	1840	15040	11210	1900	300	2350	27	0	32696
1960	0	0	0	0	0	0	11	96	0	6480	447	8	7042
1961	1	27	0	0	0	0	27660	133	0	0	0	0	27821
1962	0	0	0	0	0	0	0	0	0	0	0	0	0
1963	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	129700	5550	373	24	135647
1965	0	0	0	0	132	40940	1810	68	0	0	0	0	42950
1966	0	0	0	1960	241	2	0	12180	4150	311	22	0	18866
1967	0	0	0	0	0	0	0	0	48	130	302	40	520
1968	507	254	113	27	169	12	0	0	0	0	0	0	1082
1969	0	0	0	1	0	0	0	0	0	4230	448	216	4895
1970	17	29	22	0	0	0	0	0	31	55	0	0	154
1971	0	0	0	0	0	20300	2690	80440	5810	8220	514	177	118151
1972	21	4	0	0	3	4	0	40420	92	2	0	0	40546
1973	0	5	3	13	0	3150	2890	282	53	57570	1830	378	66174
1974	96	18	13	3	1170	1	0	7	6	12	6	2	1334
1975	2	35	5	1	17	27	336	120	22	18	13	3	599
1976	1	0	0	7	153	9	45340	5280	1800	504	764	345	54203
1977	170	228	102	168	1081	258	30	6	1	5	9	8	2066
1978	14	3	0	1	0	0	0	1850	0	0	1630	1	3499
1979	0	0	3700	241	18	78	0	0	0	0	0	0	4037
1980	0	0	0	0	0	0	0	2	0	0	0	0	2
1981	0	0	1	11220	717	43730	3950	349	246	68460	1030	183	129886
1982	38	68	95	21	990	161	33	3	2	1	2	2	1416
1983	5	3	2	0	20	10710	74	11	0	9300	1200	86	21411
1984	7	3	1	0	0	0	2	1	0	9	9	10110	10142
1985	4200	176	114	54	37	86	474	58	18	28	9	3	5257
1986	3	24	8	5	443	2090	74	8	12	4230	710	324	7931
1987	217	85	107	222	6400	4800	2930	493	5120	659	29	28	21090
1988	29	32	34	24	21	21	1420	16	55	27	13	9	1701
1989	9	22	13	4	43	45	8	1	0	55	55	17	272
AVG	203	1088	164	301	1117	8440	3125	2711	6594	3766	383	399	28293

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

1920 - NUECES RIVER BELOW UVALDE

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	542	636	576	340	460	369	415	346	321	317	251	252	4824
1935	223	189	200	261	79745	603207	20327	9606	24083	7652	3421	3221	752133
1936	2571	1881	2172	1432	1353	4784	8034	2254	126802	22211	14341	7861	195695
1937	5242	3192	3113	2493	1625	1376	1176	1116	905	817	665	24091	45809
1938	6734	2745	1778	1370	2774	1388	18718	2506	1329	1085	903	759	42088
1939	684	550	583	572	899	747	61590	2179	1505	11833	2622	1922	85683
1940	1573	1274	1146	1107	1190	1212	1122	935	826	771	642	924	12721
1941	729	693	873	1007	6070	2902	2322	1690	1446	8923	2473	2152	31279
1942	1807	1318	1292	1135	1362	910	953	730	8444	16657	4456	2565	41629
1943	1966	1217	1190	1173	1129	1025	993	759	739	846	735	690	12461
1944	621	675	600	519	771	2006	578	1973	2912	1367	995	958	13974
1945	903	703	812	714	669	571	470	378	427	458	409	439	6953
1946	443	400	384	334	646	1473	844	549	1507	13133	1763	1402	22878
1947	996	840	972	978	983	2578	2288	1606	1219	989	871	840	15159
1948	790	720	712	589	570	23354	7984	1212	795	582	446	421	38174
1949	442	138143	13121	2718	3457	2275	1795	20557	3352	2771	2323	2177	193130
1950	1807	1425	1338	1153	1095	1016	912	608	583	551	404	439	11331
1951	419	326	408	338	540	404	259	230	127	99	80	41	3270
1952	79	89	146	181	3249	558	347	303	168	85	68	53	5326
1953	46	52	85	105	151	197	197	176	10088	250	118	31	11495
1954	49	56	93	114	9713	38834	5894	542	218	144	80	49	55786
1955	56	64	104	129	184	242	308	220	146319	1830	530	239	150224
1956	256	198	137	164	171	151	140	174	82	57	86	68	1686
1957	79	85	121	658	9104	8641	923	535	316	290	196	154	21102
1958	242	133	3757	1925	1164	208051	12066	2775	95374	24973	22617	12075	385150
1959	7398	4358	3510	2507	3611	36652	23304	9455	18985	51235	10151	7089	178256
1960	6733	5977	5041	3991	3015	2203	2485	11375	5146	9341	13308	8467	77082
1961	8184	9522	6918	3908	2739	6419	40561	11661	4706	7394	6682	4075	112769
1962	3597	2875	2866	2268	2047	1782	1336	986	944	1220	1081	1052	22055
1963	1055	950	1081	1021	20283	1933	1386	995	780	610	508	551	31154
1964	611	515	749	613	795	868	781	702	183697	11511	2554	1519	204917
1965	1295	1133	1286	1607	1826	42570	4022	2242	1430	1183	1073	1100	60769
1966	1002	926	1020	1091	1229	1284	1171	41756	20110	4345	2264	1714	77911
1967	1516	1302	1277	1371	1292	1177	1129	818	612	8176	4857	3577	27104
1968	16964	9596	8430	8946	14599	5177	7250	3137	2247	1908	1472	1365	81092
1969	1313	1349	1632	1574	1719	1744	1680	1611	1365	49275	12080	15453	90795
1970	8035	4119	7291	4253	3299	3326	2618	2213	17743	6270	2553	1914	63633
1971	1625	1415	1174	1321	1662	14302	3295	225631	20275	35676	19510	12702	338588
1972	9324	6411	4946	3707	7247	4308	3375	61970	8415	5681	3890	3134	122408
1973	2715	2192	2615	2630	2668	8772	15769	7033	3899	194078	20028	11467	273866
1974	8457	5453	4753	3575	11561	4609	3475	5083	7461	8433	19972	7199	90032
1975	6018	7575	6209	5528	9120	10914	29895	9646	5188	3757	3473	2939	100262
1976	2371	1850	2040	1938	6773	3786	94174	24626	23337	19676	20334	17733	218638
1977	15902	14162	12913	46862	33966	15212	8314	5145	3865	2947	6985	5844	172116
1978	4840	3389	2794	3007	2772	2197	1809	9778	2376	1908	1860	1718	38448
1979	1581	1333	3655	9519	6138	16561	4527	3154	2413	1700	1452	1479	53513
1980	1399	1246	1169	1224	1507	1169	978	962	1063	846	747	768	13077
1981	838	694	688	31280	11936	99673	18438	8775	7846	158401	15966	9419	363953
1982	6750	5207	6605	4472	24020	9988	5663	3057	2199	1996	1780	1596	73335
1983	1500	1345	1469	1564	1522	3970	1729	1539	1247	1061	1584	1859	20389
1984	1601	1343	1229	898	890	700	622	582	360	876	586	29873	39560
1985	40395	9903	9631	4695	4093	2831	5463	2142	6833	22339	5270	3544	117139
1986	2719	1903	1895	1800	1727	6236	2864	1930	3849	32941	19072	12584	89522
1987	13310	8005	10158	8432	59898	134951	34922	22324	40820	18033	12079	10384	373316
1988	8809	6269	5416	3971	2919	2816	4711	3203	2538	2135	1874	1824	46483
1989	1861	1566	1593	1511	1404	1092	890	952	654	647	619	660	13449
AVG	3911	5027	2817	3439	6738	24241	8559	9615	14862	14005	4949	4436	102600

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

1930 - NUECES RIVER NEAR ASHERTON

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	2	685	20	5456	5472	7784	6	429	8769	2962	11464	3000	46049
1935	1386	18	599	13312	111334	538220	86954	25332	77635	8226	3959	2633	869608
1936	2032	1137	743	540	7436	1826	112279	394	173282	47657	13079	8106	368511
1937	4424	2067	1896	812	61	10346	4	4	3	2	2	2	19623
1938	37683	4036	2983	12806	4097	2351	34369	47412	1244	1606	1370	1156	151113
1939	1407	1297	1773	1716	87754	11641	23926	8653	1200	41006	2086	1003	183462
1940	1135	1197	2539	19532	24682	30657	11392	6376	3061	1214	1036	844	103665
1941	6204	24694	76	10059	24489	1104	54	115	4903	382	94	10	72184
1942	1539	1429	1938	5435	15355	2427	8171	1870	65246	11485	2723	1097	118715
1943	1348	1253	1697	1677	2196	29713	1672	1198	1303	4851	2880	978	50766
1944	1655	1538	3934	2060	29289	14578	1902	104869	148972	5560	1510	1198	317065
1945	1727	1576	9988	32391	5078	2381	1927	1488	23883	50939	1555	1199	134132
1946	1847	1715	2325	38946	19989	8734	2250	3224	8310	10965	1696	1332	101333
1947	1345	1251	1688	1672	5126	31835	2630	2649	1264	1473	1303	973	53209
1948	1103	1029	1392	1383	1563	33887	13221	1041	13447	4734	1101	800	74701
1949	1066	84204	84194	18245	7713	20285	1474	21011	1726	7539	1151	759	249367
1950	1026	959	1311	1308	3659	18671	4542	10817	8029	1324	935	731	53312
1951	213	204	286	298	27485	1654	346	282	263	571	206	151	31959
1952	3068	2859	3881	3855	24584	5834	3665	2856	2610	3284	2805	2198	61499
1953	509	477	654	657	2523	788	658	2171	66642	9814	487	362	85742
1954	574	538	739	957	42423	16548	32310	585	509	10973	522	408	107086
1955	173	167	236	247	373	360	24092	1234	93382	4175	156	122	124717
1956	343	314	375	160	153	156	4186	2530	718	4917	366	257	14475
1957	323	320	291	75057	107139	88207	304	372	1903	24465	791	335	299507
1958	5165	9878	3062	1466	1474	185912	17062	2096	127962	47727	39424	12411	453639
1959	6889	4431	2512	627	10936	30911	29412	8160	13376	200643	9741	5487	323125
1960	6998	5611	4543	3038	2284	1873	27614	11089	9195	17012	18778	8901	116936
1961	9252	11412	7412	2675	2090	22035	48929	12332	4009	2720	3575	3268	129709
1962	751	308	451	435	305	306	250	187	249	499	565	231	4537
1963	992	645	791	1701	12452	1184	996	603	2113	2403	675	519	25074
1964	2488	2151	2862	2814	4861	3295	2707	13629	220447	67060	2675	1652	326641
1965	2749	2756	3376	3488	52149	30802	4505	2679	2468	2998	2479	1960	112409
1966	3565	3218	4425	9633	54038	5545	4315	26249	17614	4082	3407	2651	138742
1967	3806	3546	4909	5248	4805	5677	4707	3904	37290	16485	3158	2627	96162
1968	13897	9615	7969	8079	94461	3170	2681	1444	2090	11916	1347	887	157556
1969	342	207	736	654	8456	5463	1170	3787	5529	94590	22690	20346	163970
1970	8497	4132	6748	2827	1203	2161	1636	2441	15020	8153	1273	885	54976
1971	1516	1533	5209	5159	5125	47524	114791	323560	22866	86143	22164	14346	649936
1972	10137	7313	4437	1737	4277	3254	1609	40099	7626	3346	1474	762	86071
1973	2816	2771	2383	1597	1383	1838	13588	4679	3543	135232	24367	12664	206861
1974	8804	4946	7835	2578	11962	1891	1484	7501	16293	4132	15835	5943	89204
1975	5876	6744	3410	6700	8148	119496	27688	9402	4863	3883	3387	1917	201514
1976	3211	2823	3557	3350	6279	4263	86095	26320	23106	29236	31928	19506	239674
1977	17081	15176	13765	40601	34573	14108	7279	3256	2408	3143	4389	4496	160275
1978	3095	2912	3836	3602	13702	14674	3663	2669	7554	3201	2662	2260	63830
1979	2455	2255	2862	15463	10372	131697	3525	2139	1942	2517	2352	1809	179388
1980	1604	1717	2481	2352	45604	6457	2337	4538	1862	2088	1574	1094	73708
1981	2527	2285	3365	40754	28782	130274	22080	5080	7860	114583	20034	8680	386304
1982	7081	4455	9395	4854	22376	7957	4545	3128	2918	3374	2607	1929	74619
1983	1662	1682	2564	2838	2144	2630	2637	2162	31617	3726	3571	1668	58901
1984	979	1176	1742	1874	1255	1871	1424	951	1133	65649	2308	1343	81705
1985	47174	8431	13305	10516	11344	4163	3256	2729	2496	65353	11613	3564	183944
1986	2228	2268	2820	2903	8938	47400	2475	2069	9369	58501	17058	12505	168534
1987	15679	9801	12739	9182	37642	262404	40079	18598	34901	18208	12303	10207	481743
1988	9375	6418	5308	3856	3341	4021	3797	3097	2339	3137	2528	2030	49247
1989	1289	1299	1622	1718	2022	2242	1786	1480	1058	2488	1624	1025	19653
AVG	5038	4980	4964	8088	19085	35473	15401	14267	24133	24006	6194	3558	165185

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

1940 - NUECES RIVER AT COTULLA

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	800	795	22	8333	6464	9045	240	497	12402	3442	13561	4031	59632
1935	1611	21	695	15472	130902	635303	103203	29442	97581	9561	4601	3591	1031983
1936	2361	1321	863	767	10731	4851	130501	611	211701	55391	15201	9421	443720
1937	5141	2402	2202	942	80	12023	31	3	2	1	1	1971	24799
1938	43459	4110	2680	14213	4034	1846	41014	54553	928	1198	1022	955	170012
1939	1063	976	1340	1283	113102	12721	30473	9623	921	41384	1457	823	215166
1940	862	843	5520	31268	40381	66332	30356	842	7058	928	796	632	185818
1941	38	32503	202	8428	59028	2273	661	28	6133	121	441	28	109884
1942	1164	1080	1455	4165	14216	2478	19358	1210	107550	14784	2534	846	170840
1943	1151	993	1297	1287	1201	44550	6223	975	1658	6420	2189	968	68912
1944	1295	1180	3965	1639	43557	39606	1450	181517	213944	4076	1172	1426	494827
1945	1315	1263	6230	62919	14617	1832	1473	1137	1065	183675	1345	962	277833
1946	1413	1290	1826	86011	39001	21328	1896	2217	23689	24931	1312	990	205904
1947	1050	950	1278	1267	7206	51804	13162	1356	1109	1093	936	737	81948
1948	850	794	1074	1066	1011	27291	36227	801	12360	6984	1131	617	90006
1949	801	9627	145618	45071	10054	45855	4144	16982	1108	9236	1199	856	290551
1950	812	751	1023	1020	4150	22359	4899	1340	20503	2846	730	570	61003
1951	171	163	228	237	25539	4080	272	220	172	692	222	121	32117
1952	2303	2146	2914	2893	24272	15873	2743	2143	1959	2466	2106	1650	63468
1953	389	364	499	500	1880	600	500	2017	81754	22366	763	277	111909
1954	444	415	570	2822	20627	36344	38299	450	393	8074	403	316	109157
1955	148	142	200	207	1319	295	13999	333	46461	40228	134	105	103571
1956	292	269	325	162	158	165	23130	1107	622	6087	377	235	32929
1957	269	264	282	86159	115387	139141	242	296	11458	31540	3291	341	388670
1958	13085	17087	8463	1131	1138	128472	33307	1433	131077	70335	55187	12622	473337
1959	6799	4063	1875	482	8906	10492	49576	8301	8737	240609	9964	5132	354936
1960	6445	5105	4125	2323	1580	1447	21313	14116	8022	24736	27042	11905	123159
1961	8615	11980	6834	2265	1574	32396	31309	25385	3200	2066	1887	2384	129895
1962	758	265	404	404	293	1079	211	146	191	378	3684	195	8008
1963	865	575	730	4848	11456	1517	836	523	1479	2739	689	445	26702
1964	1907	1664	2177	2229	3859	2694	2086	36838	323720	122511	3097	1368	504150
1965	2087	2071	2515	2505	81396	21116	7795	2091	1888	3295	1862	1476	130097
1966	2714	2422	3317	9249	57815	4962	3296	16704	24660	3596	2619	2078	133432
1967	2874	2665	3702	11338	3707	4274	3555	14596	110246	27907	4045	1960	190869
1968	16377	10595	7572	8111	84264	3385	1687	1229	1872	12219	1019	676	149006
1969	286	202	603	597	7600	5217	1030	786	6965	110763	42062	25592	201703
1970	8624	4268	6200	3176	2084	4427	1287	2693	13619	19066	1054	677	67175
1971	1207	1200	3961	3918	3845	47368	242302	395106	30003	191489	25403	13408	959210
1972	9533	6487	3662	1486	7499	2843	1198	34305	7416	3204	1187	542	79362
1973	1744	2172	2004	1163	1287	1503	12670	4084	30467	157292	30086	15298	259770
1974	8470	4882	10533	2651	13638	1796	1244	22336	27246	3868	16383	5920	118967
1975	5712	5842	3385	5641	8547	121359	50807	9219	4867	3440	3485	1506	223810
1976	2413	2097	2739	2616	5399	4259	82411	36369	26577	28497	66954	26073	286404
1977	18728	16105	13606	41676	43661	14694	6471	2843	1845	2358	2601	3659	168247
1978	2581	2182	2871	2773	11542	20108	2871	2638	7643	2593	1778	1727	61307
1979	1855	1672	2102	13327	8432	154770	2894	1558	1442	1858	1715	1330	192955
1980	1173	1242	1737	1730	49115	26418	1933	23230	1507	1550	1169	813	111617
1981	1877	1690	2497	26471	65643	240275	26133	4123	6764	100801	20847	8648	505769
1982	6592	3693	8654	4489	23596	8262	3645	2356	2169	2511	1936	1434	69337
1983	1233	1253	1906	2128	1597	1953	1965	1612	19764	4193	3208	1247	42059
1984	733	880	1308	1393	933	1389	1063	706	732	71903	2277	818	84135
1985	48770	7618	12578	8341	21245	5764	3345	2039	1863	68823	12155	3515	196056
1986	1674	1712	2106	2167	2099	67333	1900	1542	6503	70736	16892	15473	190137
1987	15271	9047	11399	7927	27779	316947	51856	16423	39119	18162	11794	10097	535821
1988	9061	5859	4690	3453	2718	3001	2818	2299	1737	2448	1993	1527	41604
1989	956	964	1204	1335	1531	1664	1325	2408	785	3294	1398	753	17617
AVG	5004	3647	5782	10026	22405	43950	20726	17852	30655	33157	7757	3799	204759

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

1945 - NUECES RIVER NEAR TILDEN

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	42905	10257	891	10529	7487	6087	13158	29811	10081	11594	68140	2951	213891
1935	5914	5864	5813	46686	59698	763190	65503	115434	129609	46214	4515	2792	1251232
1936	4037	1064	17449	4571	6702	7831	164275	880	108524	137981	21306	13967	488587
1937	8242	4524	3696	2295	2312	11033	1215	16780	5442	21	555	1330	57445
1938	115830	6260	2792	55353	34920	3146	1539	47911	4507	1464	3719	3325	280766
1939	1582	1239	1410	1391	108141	46601	19613	11189	16775	27441	1843	1315	238540
1940	1195	1507	17402	86687	45394	133781	221502	31333	17657	5239	572	464	562733
1941	103	32058	986	189	267069	83698	65743	149	13759	390	2393	1041	467578
1942	1768	952	1703	2997	13053	9508	164229	786	199516	20206	6461	677	421856
1943	785	733	1233	997	1280	71823	9433	724	16531	10308	3446	2473	119766
1944	909	843	3552	1541	72104	132204	1893	8754	384053	4417	861	911	612042
1945	925	1994	16185	83022	28316	2818	3724	799	2766	210323	1177	662	352711
1946	965	890	1456	25242	95153	77838	3535	2134	67723	344092	1181	736	620945
1947	871	707	922	5200	142781	14697	40463	12114	1239	936	5710	851	226491
1948	640	642	1159	903	3591	1067	52029	641	9668	14638	2383	613	87974
1949	557	1402	130099	121413	81102	53722	11987	27873	2323	11351	3446	5022	450297
1950	679	1536	822	2825	47975	90754	4554	607	16275	15872	532	428	182859
1951	129	136	1113	272	15420	63736	482	169	34400	6863	546	119	123385
1952	1523	1659	2064	2032	15948	66624	4139	1425	1295	1621	1391	1101	100822
1953	298	316	377	12832	16375	454	376	13843	151955	48166	15220	246	260458
1954	347	598	432	1764	8308	105739	80552	1264	1895	9319	6222	257	216697
1955	198	202	231	286	13137	11454	5780	1225	20420	42461	372	158	95924
1956	284	292	359	730	3288	459	10195	13406	3295	6175	637	264	39384
1957	242	289	2279	95738	253734	223062	307	283	47817	27509	15292	1371	667923
1958	118396	266980	26990	943	10122	15900	101131	969	34306	153382	106492	14234	849845
1959	10756	4567	2379	547	6386	4459	35239	8287	10565	259343	10099	5056	357683
1960	5974	4468	3586	1893	2489	15429	11289	24756	9602	27778	32984	24514	164762
1961	18586	13906	6773	4846	1276	18134	12938	29080	2612	1361	1080	1506	112098
1962	639	230	407	728	339	7979	421	144	1616	365	2002	189	15059
1963	648	1557	598	2455	10528	94088	1758	484	1787	606	1872	592	116973
1964	1392	1242	2396	2071	5534	2828	1679	13750	230671	224323	2723	1108	489717
1965	1771	2306	1877	1879	134178	16977	13598	1728	3984	4398	2281	2355	187332
1966	2079	2397	2411	24840	178110	28047	2715	10950	27933	3076	1993	1568	286119
1967	2170	2047	2782	11114	4932	3168	2614	28034	605775	64142	5393	2439	734610
1968	14943	10982	6655	6820	61342	5687	1602	1125	7873	12043	969	691	130732
1969	353	329	627	1066	5998	4783	1519	2007	4691	74709	70412	31599	198093
1970	10202	4765	5859	3307	19994	51662	1337	13502	3114	24907	1005	729	140383
1971	900	907	2735	3072	3228	11994	387535	443042	394578	692124	40543	18450	1999108
1972	10577	6927	6423	1741	85734	9272	1085	20131	15757	6300	1127	571	165645
1973	1161	4432	3163	1583	1375	6437	9948	4897	43451	337832	42547	14380	471206
1974	7640	5124	28958	3195	12985	2367	996	70016	39873	3138	17135	6242	197669
1975	6204	5151	3230	4629	27419	112716	84920	14439	11281	7262	10252	1291	288794
1976	1842	1563	1899	5414	7359	4606	97821	55942	71362	87683	209898	79254	624643
1977	28361	18740	14683	25583	53435	23193	5917	2157	1410	3805	1697	2603	181584
1978	2241	2168	2330	2557	9647	28597	2136	6302	16763	2433	1365	1092	77631
1979	1482	1368	1500	21390	10205	137147	3888	1181	1117	1247	1199	928	182652
1980	1019	1060	1228	1184	32784	31846	1471	99578	3900	1055	782	545	176452
1981	1709	1651	4183	10345	136837	310561	76281	7293	56606	71841	28008	9151	714466
1982	6723	4311	7577	3974	95642	8647	2417	1689	2937	14344	1422	987	150670
1983	1010	1062	1472	1575	1186	2669	1540	1182	5796	6250	4593	1001	29336
1984	1956	664	953	973	1007	938	726	499	477	55987	10753	621	75554
1985	39309	5314	21183	31914	107722	43964	45466	1471	6296	92741	84667	8113	488160
1986	1421	1387	1587	1447	1426	53790	1471	1111	3325	48766	17926	21247	154904
1987	16355	9306	10042	6791	19940	323432	66011	15731	31322	16731	10168	8623	534452
1988	8075	5126	3956	2670	2823	2162	5092	2017	4299	2836	6771	993	46820
1989	626	647	1009	893	2805	1522	861	1401	654	2749	1789	489	15445
AVG	9240	8369	7069	13552	42823	60113	34458	21865	52201	59110	16069	5468	330338

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

1950 - FRIO RIVER AT CONCAN

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	2620	2150	2350	3800	4070	1400	1080	978	643	649	728	1230	21698
1935	1500	1620	1510	1920	64040	146900	34780	14750	29150	10580	7000	7940	321690
1936	6930	5550	5370	5410	5860	5650	5460	3450	79300	24330	16090	10150	173550
1937	7920	6110	7240	5480	4181	5161	3091	2071	1730	2160	2630	6220	53995
1938	8250	6430	6091	5711	6541	4252	3202	2451	1851	1730	1490	1840	49840
1939	2665	2469	2494	1959	1573	1278	23128	5772	2583	3967	3020	2823	53730
1940	2585	2909	2834	4530	7004	5609	6739	3083	2284	1867	2510	4084	46039
1941	3659	4272	5403	15136	20785	9004	6174	9591	11661	13451	9595	6930	115660
1942	5240	4142	3977	5716	7395	3995	3505	3526	9992	9061	6527	4964	68041
1943	4197	3180	3329	3611	3097	3534	2594	1472	1626	1878	1753	2488	32759
1944	3155	3027	5577	4694	6509	7424	3794	4567	5651	4666	3373	4020	56456
1945	8364	6647	6404	7105	5958	3363	2213	1332	1023	3786	2841	3246	52280
1946	2844	2717	2544	2315	3138	2262	1832	968	1710	17176	6341	4256	48103
1947	6534	5607	5184	5195	6189	9853	6693	3512	2361	1956	2241	2706	58032
1948	2491	2471	2441	2011	1752	1902	1732	844	835	1171	1200	1420	20270
1949	1780	27720	10961	8191	7081	5121	3171	3141	3281	3730	3190	3310	80678
1950	3431	3221	3442	2863	2994	2575	1795	1435	1363	1461	1161	1531	27272
1951	1291	1401	2032	2253	7524	2605	893	437	2302	729	985	1231	23684
1952	1273	1164	1433	1929	2661	1664	781	296	118	108	426	1239	13091
1953	1775	1337	1308	1015	524	136	142	239	883	1306	1233	1220	11121
1954	1100	908	819	697	10777	3618	2788	1208	565	380	457	581	23898
1955	830	1020	1112	745	2635	954	2368	982	2028	1135	928	962	15698
1956	834	906	748	529	470	123	285	18	15	154	2	19	4104
1957	215	514	1749	10642	5657	8475	2122	811	1379	6684	6156	5143	49545
1958	5755	8577	13008	6623	5774	31319	12895	8552	45602	24806	23303	12120	198335
1959	8170	5664	5180	5037	5398	23061	14691	7661	5850	15530	7930	6510	110684
1960	6472	5997	5892	5069	4311	2938	5706	13080	7222	7921	10441	12071	87119
1961	10452	13012	11052	7683	5622	13107	11045	9020	5823	6402	5452	4879	103548
1962	4342	3499	3243	3463	3213	5263	1819	883	788	3953	3115	3122	36701
1963	2859	2595	2905	2856	2951	1727	1053	629	564	807	2230	2581	23757
1964	2676	3613	3950	4086	3400	1997	1119	771	7028	6470	3898	3638	42645
1965	3294	3981	3750	3891	9853	12500	4720	2479	1748	3089	3357	4017	56680
1966	3924	3248	3296	4131	4831	3158	6049	38752	18337	9744	5885	4648	106003
1967	4069	3380	3359	3040	2257	1424	9008	2894	5335	16974	18010	9994	79745
1968	13707	12901	12366	10812	16567	9186	10354	5739	4789	4422	3949	4520	109311
1969	3851	3408	3558	4444	4085	2575	1581	1544	2378	39862	9773	11383	88442
1970	7668	5670	8513	6456	11617	8143	4736	3322	13295	9633	6378	5404	90835
1971	4465	3517	3744	3164	2741	1938	1840	64702	12015	29463	17572	11575	156739
1972	8133	6184	5519	4297	16782	8658	5669	17096	11655	9298	6778	5793	105863
1973	5176	4853	6161	6034	4650	16785	51863	14593	7531	38075	14528	9910	180162
1974	7979	5794	5919	4832	14118	5250	3469	7978	6634	6885	7611	6178	82646
1975	6363	8908	7517	6113	10378	9043	7867	6108	4588	5030	5104	4572	81592
1976	4133	3561	3655	5385	13029	6043	49186	16647	9576	7965	8783	9113	137074
1977	9275	9919	9514	28616	18122	10174	6674	4745	3795	22584	11130	6916	141464
1978	6312	5027	4040	3389	2919	3508	1807	10061	4488	3884	4762	4982	55180
1979	4686	4587	12369	12612	8761	23288	7541	5660	4160	3161	3155	3731	93712
1980	4014	3574	3241	2841	3290	2347	1316	2353	31590	8056	6032	6978	75632
1981	5919	4433	12487	51158	23276	66996	23830	12347	7900	32442	11547	8715	261050
1982	7470	6276	7047	5729	16494	7381	5229	3231	3174	2863	2946	4153	71992
1983	4025	3781	5444	3869	4049	5152	3822	2620	2191	4228	8158	4892	52230
1984	4204	3337	3082	2313	1844	1523	1009	753	750	3966	4972	40172	67925
1985	26023	13316	13278	9116	9690	6580	6136	3684	3707	15883	8153	6712	122277
1986	5185	4207	4033	3708	3997	9844	5298	3480	4161	18179	13182	15022	90295
1987	16493	10665	13476	10406	34419	105020	32185	14578	21629	10989	8180	7432	285472
1988	6364	5225	4963	4340	4386	13537	24275	8056	4926	4190	3664	3844	87769
1989	4186	4939	5055	4379	3368	2358	1581	1737	1276	1686	3424	3073	37062
AVG	5342	5092	5303	6131	8297	11762	7960	6477	7658	8796	5987	5861	84664

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

1960 - DRY FRIO RIVER NEAR REAGAN WELLS

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	513	386	452	851	946	177	72	34	0	0	0	99	3529
1935	177	215	197	308	18518	49679	9776	4128	8243	2893	1849	2100	98083
1936	1797	1390	1356	1343	1473	1511	1512	801	25344	7028	4574	2810	50938
1937	2112	1560	1907	1398	993	1284	673	368	258	381	530	1961	13426
1938	2402	1715	1570	1518	1749	1016	928	580	344	308	231	329	12692
1939	570	501	512	355	241	144	9217	1579	591	1599	709	666	16684
1940	582	672	645	1133	1961	1446	1678	678	446	316	499	954	11008
1941	839	1003	1336	4008	5756	2399	1680	2458	3000	3812	2523	1763	30578
1942	1281	959	916	1378	1907	921	766	807	3243	2994	1835	1310	18316
1943	1028	724	770	866	716	930	549	212	246	324	297	517	7178
1944	754	732	1486	1212	1641	1851	833	1025	1683	1192	775	956	14141
1945	2253	1702	1629	1816	1441	709	385	144	53	926	627	722	12405
1946	619	579	523	449	730	624	355	57	261	5122	1672	1046	12036
1947	1758	1507	1365	1309	1650	2673	1811	813	459	334	408	545	14633
1948	497	499	494	367	297	355	744	47	19	113	123	185	3741
1949	294	9301	3331	2278	2036	1367	760	1551	1017	1047	849	843	24673
1950	859	777	822	634	701	620	369	235	210	239	145	253	5863
1951	180	198	383	447	1819	505	36	0	383	0	35	107	4092
1952	124	102	184	426	689	284	7	0	7	6	28	232	2090
1953	391	235	284	221	82	12	5	15	1510	529	412	271	3967
1954	223	178	138	95	5350	1610	1090	249	112	164	120	122	9451
1955	186	244	252	155	160	116	471	218	6190	877	299	266	9434
1956	202	190	167	89	53	19	13	0	0	0	0	3	736
1957	32	48	266	1590	2870	7750	502	184	1170	13630	2480	1510	32032
1958	2570	5110	6470	2260	1810	13760	5020	2150	16460	10190	7540	3190	76530
1959	2070	1440	1190	1210	2010	4530	3500	1520	3430	10230	2210	1710	35050
1960	1640	1250	1090	926	979	430	1510	5740	1790	2430	2560	2400	22745
1961	2370	3230	2110	1250	720	8580	4400	3810	1560	1620	1250	906	31806
1962	781	657	649	607	691	337	181	91	86	64	62	437	4643
1963	349	510	429	686	978	299	106	25	13	41	236	440	4113
1964	492	1331	1541	1151	530	186	41	16	1111	1521	863	543	9327
1965	422	1871	769	800	4842	2022	499	168	238	686	576	1410	14304
1966	1391	802	700	570	703	236	478	22473	5252	1941	1061	818	36424
1967	703	612	597	454	270	143	1505	491	3202	10571	7981	2971	29500
1968	3540	3200	3430	4950	4490	2510	5900	1910	1340	1040	789	1079	34169
1969	822	700	716	1113	851	550	237	270	420	15872	3171	3311	28033
1970	1793	1543	2295	1446	1379	1222	626	373	6626	3163	1472	1132	23071
1971	887	768	767	653	505	537	1080	17790	3610	10210	4770	2460	44037
1972	1621	1321	1132	761	1074	2675	688	1794	1792	1441	902	757	15958
1973	821	1073	1334	1495	1167	12500	16300	4669	2455	14132	4612	2522	63079
1974	1850	1220	1281	951	3101	940	682	4152	1941	2330	2480	1719	22639
1975	1900	3361	1861	1351	2491	2382	2802	1242	802	830	799	669	20491
1976	525	470	482	1803	8195	1566	17016	4776	5383	3632	3781	3991	51620
1977	3190	3440	2460	2910	3610	2160	877	550	381	993	3020	1160	24751
1978	936	859	743	572	436	907	234	1990	537	353	922	821	9310
1979	754	899	4150	4960	2230	10120	2580	1030	412	326	453	501	28415
1980	560	443	456	365	835	217	108	351	1970	592	825	1180	7902
1981	873	766	3350	15320	5790	16140	4050	1440	1010	6830	1540	1200	58309
1982	996	839	988	678	5170	2400	1370	442	557	357	555	845	15197
1983	681	633	956	707	2360	1250	481	317	375	868	2390	857	11875
1984	648	485	418	284	183	192	156	99	71	1690	1600	9750	15576
1985	6260	2610	2980	2270	3660	2430	4990	876	1300	2590	1440	1200	32606
1986	984	807	621	454	3160	6280	1160	559	875	5910	3610	4000	28420
1987	2950	2880	3740	1840	20800	28740	5800	2890	4360	1980	1580	1410	78970
1988	1070	845	785	568	436	1630	1330	447	414	442	402	421	8790
1989	483	770	730	562	310	118	34	112	29	59	351	398	3956
AVG	1189	1289	1289	1432	2492	3678	2142	1799	2225	2835	1550	1353	23274

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

1975 - FRIO RIVER NEAR UVALDE

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	0	0	0	0	0	0	0	0	0	0	0	0	0
1935	0	0	0	0	43883	110891	21995	7276	17901	4164	1507	2187	209804
1936	1430	402	282	293	626	548	451	0	57076	14472	8313	3878	87772
1937	2186	823	1676	372	0	119	0	0	0	0	0	1194	6369
1938	2583	1109	821	585	1193	0	0	0	0	0	0	0	6290
1939	0	0	0	0	0	0	15571	664	0	0	0	0	16235
1940	0	0	0	0	1597	476	1239	0	0	0	0	0	3311
1941	0	0	284	7380	11653	2967	950	3316	4804	6360	3368	1403	42485
1942	157	0	0	478	1755	0	0	0	4137	3464	1253	38	11282
1943	0	0	0	0	0	0	0	0	0	0	0	0	0
1944	0	0	491	0	1092	1726	0	0	684	0	0	0	3993
1945	2524	1210	1028	1534	651	0	0	0	0	0	0	0	6948
1946	0	0	0	0	0	0	0	0	0	9302	1029	0	10331
1947	1196	523	194	156	934	3619	1319	0	0	0	0	0	7941
1948	0	0	0	0	0	0	0	0	0	0	0	0	0
1949	0	17996	4704	2455	1695	163	0	0	0	0	0	0	27013
1950	0	0	0	0	0	0	0	0	0	0	0	0	0
1951	0	0	0	0	1752	0	0	0	0	0	0	0	1752
1952	0	0	0	0	0	0	0	0	16	8	7	6	36
1953	10	12	18	23	33	43	43	56	21	10	9	7	286
1954	12	14	23	28	15650	52	52	46	26	13	10	8	15935
1955	14	15	25	30	44	56	56	51	5238	15	11	9	5564
1956	6	90	11	11	36	30	61	9	8	79	1	10	353
1957	15	29	20	3202	4054	4859	73	47	725	7777	8	7	20816
1958	8	9	180	22	28	18171	171	32	41636	5508	4847	5	70617
1959	0	2	0	4	14	18181	206	1	45	6870	0	0	25323
1960	11	14	1	5	6	30	34	893	1	1	1	1	996
1961	1	1	1	2	11	3910	3	10	2	1	1	5	3947
1962	6	15	2	2	12	32	35	2	2	2	3	1	113
1963	35	49	53	66	93	164	144	145	61	30	25	19	885
1964	34	37	75	79	111	174	170	126	407	36	28	22	1097
1965	32	36	63	76	107	2019	139	127	68	35	27	21	2750
1966	68	71	93	57	82	111	596	47201	2294	27	22	18	50641
1967	29	46	53	67	100	205	2996	121	63	12883	2779	20	19362
1968	1840	64	36	45	553	116	554	86	47	25	26	20	3412
1969	13	16	44	47	32	120	129	110	42	44088	3	2	44648
1970	27	33	47	49	519	73	65	61	38	36	11	9	966
1971	23	29	38	38	62	127	103	55248	53	10402	843	3	66969
1972	7	34	42	62	2570	310	96	4628	26	15	5	33	7830
1973	15	40	101	68	41	10150	36749	2184	4	26689	1041	3	77036
1974	15	23	67	43	3331	89	119	8032	36	252	707	4	12717
1975	12	20	40	54	92	80	128	129	20	10	7	6	600
1976	8	23	82	97	6130	58	25739	914	40	7	11	9	33113
1977	19	18	59	11879	969	100	84	64	39	4788	26	13	18057
1978	1	4	15	25	20	61	40	1892	20	2	1	1	2081
1979	8	4	1801	582	237	14405	119	51	46	36	13	1	17304
1980	7	7	21	93	26	65	75	63	23508	3473	6	4	27349
1981	5	7	793	41858	6047	57668	5445	342	180	17546	23	3	129915
1982	5	8	256	196	5984	457	87	72	53	27	24	17	7187
1983	3	11	17	20	401	424	326	62	36	35	9	1	1344
1984	2	4	22	32	38	43	55	47	29	3	1	43641	43917
1985	13162	129	30	24	564	351	275	164	53	10404	2	1	25156
1986	253	254	7	14	1279	1139	76	87	21	4185	1	264	7579
1987	16	11	17	25	53195	87294	10351	579	5356	76	28	9	156957
1988	15	11	21	79	79	5136	8818	126	55	13	8	7	14368
1989	3	5	8	41	40	25	31	34	18	3	2	2	212
AVG	461	415	244	1291	3025	6194	2424	2412	2945	3450	465	945	24272

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

1980 - SABINAL RIVER NEAR SABINAL

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	698	375	512	1508	1693	0	0	0	0	0	0	0	4787
1935	0	11	0	217	42863	99746	22776	9025	18911	6162	3705	4350	207766
1936	3657	2709	2586	2613	2922	2778	2647	1268	53339	15602	9945	5867	105932
1937	4336	3094	3869	2661	1769	2442	1021	321	87	382	705	3169	23857
1938	4563	3313	3081	2820	3390	1818	1097	582	170	87	0	162	21083
1939	729	594	611	244	0	0	14777	2862	672	1623	972	837	23921
1940	674	896	845	2009	3707	2750	3526	1016	467	181	622	1703	18395
1941	1411	1832	2608	9290	13168	5080	3138	5483	6904	8133	5486	3657	66191
1942	2496	1743	1629	2823	3976	1642	1305	1320	5759	5120	2550	1770	32133
1943	1330	930	964	1760	909	2180	1660	442	180	198	186	324	11063
1944	851	1310	4360	2770	2820	3800	1730	2530	1310	998	801	1610	24890
1945	6140	3640	5240	6340	3440	1670	820	264	563	995	672	978	30762
1946	754	732	617	1010	1170	696	305	28	1890	4860	2820	1710	16592
1947	2180	2040	1840	1660	1900	4010	1560	731	312	78	72	206	16589
1948	274	397	451	206	49	278	151	0	348	306	42	84	2586
1949	288	5380	3800	5500	4890	2950	1510	1420	1300	1770	1310	1140	31258
1950	1270	1460	1610	1240	1250	1840	869	193	50	30	28	67	9907
1951	109	122	254	292	5030	1290	219	3	0	0	0	0	7319
1952	0	0	0	268	1550	1190	195	11	3	0	0	27	3244
1953	104	184	152	15	9	12	12	27	282	1253	587	500	3138
1954	247	114	35	1	5701	1051	559	88	1	0	0	0	7798
1955	2	3	4	5	356	23	238	9	5	2	2	2	650
1956	0	5	5	5	5	0	1150	0	0	0	5	5	1180
1957	1	1	1382	6092	2653	5574	505	5	5232	4051	4091	3671	33259
1958	5900	8810	15740	5970	5700	42600	9530	3670	15350	18400	19100	7990	158760
1959	4550	2790	2180	2650	2010	13105	9205	3835	2166	7576	4910	3980	58957
1960	4110	3560	2990	2536	2727	976	5900	11840	3730	5370	5610	6420	55769
1961	5840	9860	7540	3980	2720	9756	5455	3595	1586	2215	1170	1200	54919
1962	1040	690	545	725	550	370	15	2	0	0	12	399	4348
1963	488	845	427	495	1689	258	37	7	4	2	2	1	4254
1964	192	666	2213	1204	663	177	8	191	6024	2632	1512	1191	16673
1965	921	1831	1482	1323	1724	2525	888	240	2553	3391	1655	2558	21091
1966	1871	1431	1362	1406	2323	1134	516	5104	12522	5484	2824	2041	38017
1967	1433	1008	846	2369	678	215	48	43	7483	12372	13369	6427	46290
1968	9160	10620	11370	7878	18138	7940	7323	3183	2971	2212	1602	1730	84128
1969	1550	1330	1420	1545	1865	1068	331	385	637	19541	5580	4180	39433
1970	3275	3258	6232	4428	4190	2295	1540	674	555	1303	1083	1091	29925
1971	880	616	672	588	299	152	94	41130	6550	19540	10970	5840	87333
1972	3970	2900	2362	1623	5413	3324	1840	9110	5690	4160	2990	2300	45684
1973	2000	1940	2620	3200	2950	9310	63610	13870	5590	12600	7890	5400	130982
1974	3960	2570	2300	1563	4414	2334	1054	3433	3293	2280	2880	2890	32973
1975	3263	7093	5303	3363	3904	3864	3984	2164	1724	1764	1453	1273	39154
1976	1063	806	595	3234	11334	3234	39364	10634	5083	4142	4630	4870	88991
1977	5660	7470	6750	10920	14490	7920	4570	2280	1432	13340	6440	4980	86254
1978	3560	2670	2160	1560	1250	1903	508	18380	3830	2250	2920	2628	43622
1979	2260	2700	8890	13529	9728	20838	7149	3401	2186	1385	1330	1330	74728
1980	1153	1023	1015	818	1448	552	200	293	18219	3838	2632	2672	33862
1981	2400	1670	6650	19970	16450	49030	20900	6151	3835	14245	4260	3270	148834
1982	2730	2120	2040	1460	6380	2495	1099	714	972	842	879	1130	22861
1983	1180	1340	2330	1480	1725	3785	2645	1546	708	643	4290	1900	23575
1984	2540	1780	1450	875	668	741	172	115	41	481	1260	8690	18816
1985	11322	7042	8121	6412	5922	3871	2183	1066	1024	6578	3364	3043	59951
1986	2313	1683	1314	875	1465	4024	1537	1329	2914	9934	8334	10924	46644
1987	11964	6803	8974	6455	23946	90917	17158	7619	6647	4086	2865	2714	190146
1988	2234	1754	1535	1087	923	991	6413	1625	828	692	692	735	19508
1989	1204	1534	1535	1286	796	391	117	34	12	120	401	555	7985
AVG	2466	2377	2811	3003	4709	7766	4949	3309	3999	4201	2920	2468	44978

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

1985 - SABINAL RIVER AT SABINAL

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	0	0	0	0	0	0	0	0	0	0	0	0	0
1935	0	0	0	0	39952	84926	20126	5764	15841	3522	1431	2088	173651
1936	1459	568	591	382	802	647	495	0	45066	12414	7443	3396	73263
1937	2123	785	1805	534	0	253	0	0	0	0	0	1059	6558
1938	2018	1004	935	923	1033	0	0	0	0	0	0	0	5914
1939	0	0	0	0	0	0	10826	1610	0	0	0	0	12436
1940	0	0	0	0	1914	627	1200	0	0	0	0	0	3741
1941	0	0	881	6763	10030	4158	1217	3878	4290	5293	3157	1658	41326
1942	284	0	0	1115	1526	0	0	0	3126	2486	329	0	8865
1943	0	0	0	0	0	18	0	0	0	0	0	0	18
1944	0	0	1909	592	584	1565	0	492	0	0	0	0	5142
1945	3519	1244	2591	5030	1717	0	0	0	0	0	0	0	14100
1946	0	0	0	0	0	0	0	0	0	3265	931	0	4196
1947	225	0	0	0	219	1955	0	0	0	0	0	0	2400
1948	0	0	0	0	0	0	489	0	0	0	0	0	489
1949	0	2832	2488	3879	2367	941	0	0	0	245	0	0	12753
1950	422	0	0	0	0	0	0	0	0	0	0	0	422
1951	0	0	0	0	3102	0	0	0	0	0	0	0	3102
1952	0	0	0	0	941	0	0	0	4	0	0	0	945
1953	3	3	9	10	8	10	10	35	857	637	90	115	1786
1954	45	22	13	10	8071	233	65	60	10	66	5	5	8604
1955	17	25	30	35	10	25	11	20	29	7	2	2	212
1956	0	4	4	4	4	0	672	64	8	33	5	4	804
1957	1	1	385	5902	3123	3173	79	170	4252	1461	966	573	20086
1958	2070	4920	11630	2420	822	54130	6440	159	12510	11760	13050	3820	123731
1959	1100	255	165	111	27	11734	3954	308	128	3175	621	241	21820
1960	193	323	193	145	116	36	24	459	122	559	1260	2090	5520
1961	1800	4360	2150	380	142	1915	288	256	121	120	101	89	11723
1962	35	38	48	31	21	3	4	2	0	0	0	5	186
1963	7	10	10	22	20	9	7	6	3	2	2	3	99
1964	9	12	10	12	13	116	29	9	4513	295	142	78	5238
1965	54	51	39	40	40	28	55	22	887	1401	158	99	2875
1966	76	64	42	30	25	10	7	1713	4612	299	120	87	7086
1967	84	65	89	1155	133	102	68	53	5480	8900	6218	2046	24394
1968	4790	5680	6040	3187	12027	3220	1523	205	155	96	83	91	37095
1969	68	46	53	57	82	64	54	170	145	16057	705	220	17720
1970	154	101	540	271	230	127	99	86	68	72	87	75	1910
1971	66	62	68	79	70	72	59	43590	2350	14630	5000	1280	67326
1972	307	173	144	113	444	141	90	4800	475	191	149	121	7147
1973	93	82	74	77	59	6250	65550	8920	964	8290	3340	956	94655
1974	382	233	160	122	863	170	101	3273	454	267	220	168	6413
1975	156	1003	344	212	198	165	147	111	76	69	79	80	2641
1976	70	57	41	72	5483	269	37103	5003	545	303	357	308	49612
1977	614	2670	1710	5650	9590	2870	428	196	124	10250	1860	612	36574
1978	221	152	117	68	53	58	33	14840	190	89	123	81	16024
1979	62	43	6250	10058	3567	19707	1748	286	199	146	153	122	42340
1980	88	76	76	66	61	52	53	92	11078	1097	241	143	13122
1981	113	87	636	16850	8259	42259	11780	1284	410	7654	627	254	90213
1982	209	117	114	115	2109	197	141	79	107	65	64	54	3371
1983	41	50	58	52	38	34	35	43	48	53	674	108	1235
1984	79	52	42	45	53	63	50	54	38	43	106	5170	5797
1985	6242	1942	2341	954	498	242	152	80	94	3617	121	135	16416
1986	142	84	71	44	56	134	114	89	90	3353	1683	4543	10404
1987	5923	2253	3523	1444	26265	88862	11373	2204	1454	520	416	429	144668
1988	272	200	188	199	187	168	2959	186	173	158	153	129	4974
1989	134	105	80	81	85	78	47	49	54	67	75	74	932
AVG	639	569	869	1238	2626	5925	3209	1799	2163	2197	935	582	22751

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

2000 - HONDO CREEK NEAR TARPLEY

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	309	113	196	800	912	0	0	0	0	0	0	0	2330
1935	0	0	0	17	25884	60387	13700	5360	11356	3623	2132	2524	124983
1936	2103	1529	1454	1470	1658	1570	1491	654	32238	9349	5918	3444	62878
1937	2516	1762	2232	1500	959	1367	505	80	0	117	313	1808	13157
1938	2653	1895	1754	1596	1941	988	551	238	0	0	0	0	11617
1939	327	246	256	33	0	0	8848	1621	293	870	475	393	13363
1940	294	429	398	1104	2134	1553	2024	501	169	0	263	918	9787
1941	741	997	1468	5520	7873	2967	1789	3211	4073	4819	3213	2103	38774
1942	1400	942	874	1598	2297	881	677	686	3378	3117	1552	1078	18480
1943	810	566	587	1071	553	1327	1011	269	110	121	113	197	6735
1944	518	798	2654	1686	1717	2313	1053	1540	798	608	488	980	15153
1945	3738	2216	3190	3860	2094	1017	499	161	343	606	409	595	18728
1946	459	446	376	615	712	424	186	17	1151	2959	1717	1041	10101
1947	1327	1242	1120	1011	1157	2441	950	445	190	47	44	125	10099
1948	167	242	275	125	30	169	92	0	212	186	26	51	1574
1949	175	3275	2313	3348	2977	1796	919	865	791	1078	798	694	19030
1950	773	889	980	755	761	1120	529	118	30	18	17	41	6031
1951	66	74	155	178	3062	785	133	2	0	0	0	0	4456
1952	0	0	0	163	944	724	119	7	432	0	136	665	3190
1953	279	148	124	72	5	40	2	397	2170	3030	676	353	7296
1954	230	116	94	127	2240	517	85	11	19	97	0	0	3536
1955	9	62	384	15	128	1	114	5	0	0	0	0	718
1956	0	0	0	0	0	40	168	34	58	111	1	5	417
1957	0	0	2370	8584	4290	4600	601	113	7244	4860	5390	2880	40932
1958	7810	8330	9610	3080	2300	31570	3730	1090	9090	8630	7950	2830	96020
1959	1390	827	633	3020	1750	2350	2040	727	382	4060	1990	1390	20560
1960	1400	1130	1210	1486	1130	398	2950	3800	1860	2330	3330	5030	26054
1961	3920	6160	3800	1770	839	6930	2700	1530	724	732	478	365	29948
1962	266	194	195	302	274	434	41	3	51	70	81	125	2036
1963	72	123	102	262	550	151	39	23	12	122	84	64	1604
1964	276	452	329	424	213	163	30	13	3246	1263	798	437	7644
1965	291	1425	1098	916	4065	2549	711	314	337	4195	585	2623	19109
1966	1325	909	811	594	1125	979	748	3017	4120	1265	465	320	15678
1967	217	194	141	241	83	45	38	98	3447	2289	3917	1686	12394
1968	6670	5330	8280	4960	9580	3830	3940	1780	912	640	433	621	46976
1969	439	455	640	2021	3551	1274	506	695	914	6740	2250	2280	21766
1970	1450	1850	4690	2220	2840	2281	919	440	495	644	368	249	18447
1971	230	161	50	125	90	70	55	40201	4260	15610	4440	2270	67563
1972	1370	852	592	1081	8581	3341	1621	6721	3546	1791	1070	829	31395
1973	743	1480	2691	2191	2091	8820	35271	5461	2171	7931	3361	1901	74112
1974	1266	830	750	505	6303	2469	864	1787	2122	1231	2406	1886	22419
1975	2850	10380	3080	2411	10391	6511	5221	2296	1211	742	661	560	46315
1976	363	263	229	5100	12540	2504	4089	1859	1890	4001	6110	5510	44460
1977	5367	5647	3377	3126	14471	5206	2189	924	471	258	797	294	42127
1978	194	219	200	166	114	774	47	10781	2900	1300	1020	1080	18796
1979	2170	3851	10681	9801	4501	16141	3441	1721	644	344	348	315	53958
1980	348	274	259	262	1146	381	102	162	5760	1660	1130	1710	13194
1981	1110	753	2460	9820	9961	27641	7091	1980	1070	2381	1200	716	66184
1982	514	361	358	262	2920	1710	538	276	148	115	153	202	7560
1983	196	227	861	733	1451	4810	1650	860	382	258	770	469	12667
1984	616	428	291	145	51	107	1	0	0	134	330	3920	6025
1985	6124	3510	6011	3530	8140	3610	1660	523	420	2330	2460	2511	40829
1986	1435	1040	731	540	1340	4451	1374	996	1551	5230	3980	7410	30078
1987	6200	3300	5280	2911	24720	62860	6555	2096	1042	535	778	768	117045
1988	868	513	405	311	156	104	1891	523	411	296	195	119	5791
1989	269	498	544	398	207	48	7	1	0	610	464	272	3318
AVG	1369	1428	1672	1785	3604	5206	2288	1947	2154	2060	1394	1262	26169

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

2007 - HONDO CREEK NEAR HONDO

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	0	0	0	0	0	0	0	0	0	0	0	0	0
1935	0	0	0	0	24720	48417	13197	2745	9076	1503	498	725	100881
1936	541	0	63	0	91	244	0	0	24637	7092	4002	1479	38149
1937	867	0	759	58	0	0	0	0	0	0	0	323	2007
1938	1102	369	277	138	669	0	0	0	0	0	0	0	2555
1939	0	0	0	0	0	0	6702	256	0	0	0	0	6958
1940	0	0	0	0	745	1	457	0	0	0	0	0	1202
1941	0	0	0	3863	6087	1775	261	1449	2566	3016	1598	607	21222
1942	0	0	0	161	625	0	0	0	1722	1476	25	0	4009
1943	0	0	0	0	0	0	0	0	0	0	0	0	0
1944	0	0	1054	188	191	746	0	123	0	0	0	0	2303
1945	2051	618	1492	2532	532	0	0	0	0	0	0	0	7225
1946	0	0	0	0	0	0	0	0	0	1435	247	0	1682
1947	0	0	0	0	0	908	0	0	0	0	0	0	908
1948	0	0	0	0	0	0	0	0	0	0	0	0	0
1949	0	1644	810	1780	1390	277	0	0	0	0	0	0	5900
1950	0	0	0	0	0	0	0	0	0	0	0	0	0
1951	0	0	0	0	1669	0	0	0	0	0	0	0	1669
1952	0	0	0	0	0	0	0	0	0	0	0	0	0
1953	0	0	0	0	0	0	0	0	2176	963	0	0	3139
1954	0	0	0	0	474	0	0	0	0	0	0	0	474
1955	0	0	0	0	0	0	0	0	0	0	0	0	0
1956	0	0	0	0	0	0	0	0	0	0	0	0	0
1957	0	0	547	6596	2490	2895	0	0	4611	2655	3495	1749	25037
1958	7006	6508	6055	1055	878	24584	1492	0	7517	7188	4737	800	67818
1959	0	80	0	1654	78	663	700	0	0	2403	387	0	5965
1960	0	0	0	0	0	0	933	1546	589	228	0	0	3296
1961	0	1020	4	0	0	4790	16	0	0	0	0	0	5830
1962	0	0	0	0	0	0	0	0	0	0	0	0	0
1963	4	5	8	10	14	25	18	16	9	5	4	3	119
1964	2	2	5	5	8	56	10	8	1935	10	18	2	2061
1965	4	4	6	8	460	28	18	13	8	2494	3	33	3078
1966	4	4	6	8	12	15	15	13	8	4	3	2	92
1967	6	7	12	17	21	28	27	24	2553	7	219	5	2925
1968	3500	67	2970	86	6150	67	1710	0	0	0	0	0	14550
1969	8	0	8	1	908	11	44	41	15	3890	0	0	4925
1970	0	8	0	0	2300	35	33	34	31	12	8	0	2460
1971	15	12	4	11	8	8	16	62411	171	9848	658	15	73177
1972	8	16	16	24	5726	31	22	3211	19	21	18	9	9120
1973	1	1	1	3	1	3180	31291	198	42	2231	42	25	37014
1974	23	18	22	6	621	72	23	4385	16	20	22	16	5245
1975	2	3430	2	4	16	6	5	12	13	7	2	2	3500
1976	11	2	15	2490	5100	11	19	9	3	915	46	8	8629
1977	7	10	27	22	3366	32	31	45	21	38	28	6	3634
1978	1	25	23	35	29	19	8	6391	18	3	12	15	6578
1979	13	7	6551	2671	12	12014	38	17	11	12	0	1	21345
1980	1	1	11	11	177	0	0	12	8980	0	0	0	9192
1981	0	1	0	5330	1341	12531	15	0	0	1	0	0	19218
1982	0	0	0	0	44	0	0	0	0	0	4	4	52
1983	0	0	1	1	20	2480	0	26	0	0	1	0	2528
1984	2	0	0	0	0	209	0	0	0	0	0	1920	2131
1985	190	0	166	0	1300	0	0	1	1	848	109	1	2616
1986	4	0	0	3	0	1721	3	1	1	201	0	480	2413
1987	0	0	0	1	28750	63070	142	5	2	1	0	0	91970
1988	1	1	2	2	4	8	166	5	2	1	1	1	193
1989	0	0	0	0	0	0	0	0	0	0	0	0	0
AVG	275	248	374	514	1733	3231	1025	1482	1192	867	289	147	11375

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

2015A - SECO CREEK NEAR UTOPIA INCLUDING ADDITIONAL AREA UPSTREAM OF EDWARDS AQUIFER RECHARGE ZONE

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	4	0	0	488	599	0	0	0	0	0	0	0	1092
1935	0	0	0	0	25235	59274	13215	4987	10902	3274	1803	2189	120879
1936	1774	1207	1133	1150	1335	1248	1170	345	31504	8922	5537	3097	58423
1937	2181	1437	1902	1179	645	1048	197	0	0	0	8	1483	10079
1938	2317	1569	1430	1274	1614	674	243	0	0	0	0	0	9120
1939	22	0	0	0	0	0	8428	1299	0	557	168	87	10561
1940	0	122	92	788	1805	1232	1696	194	0	0	0	605	6534
1941	431	682	1147	5145	7466	2626	1464	2867	3718	4453	2869	1774	34643
1942	1080	629	561	1276	1965	569	367	376	3032	2981	1485	1030	15351
1943	774	541	561	1025	529	1269	966	257	105	115	108	189	6441
1944	495	763	2538	1613	1642	2212	1007	1473	763	581	466	937	14491
1945	3575	2119	3051	3691	2003	972	477	154	328	579	391	569	17909
1946	439	426	359	588	681	405	178	16	1100	2829	1642	996	9660
1947	1269	1188	1071	966	1106	2335	908	426	182	45	42	120	9658
1948	160	231	263	120	29	162	88	0	203	178	24	49	1506
1949	168	3132	2212	3202	2847	1717	879	827	757	1030	763	664	18198
1950	739	850	937	722	728	1071	506	112	29	17	16	39	5768
1951	63	71	148	170	2928	751	128	2	0	0	0	0	4261
1952	0	0	0	156	902	693	114	6	277	0	87	430	2665
1953	198	130	109	49	5	28	4	259	1441	2178	545	322	5268
1954	195	96	67	81	2531	533	162	24	12	62	0	0	3764
1955	6	40	246	11	150	5	119	5	1	0	0	0	584
1956	0	1	1	1	1	26	329	22	37	71	2	4	494
1957	0	0	1781	6661	3254	4015	482	73	5639	3888	4234	2549	32576
1958	6130	7023	9177	3120	2569	28393	4222	1404	8770	9064	8764	3349	91986
1959	1766	1067	825	2441	1506	4029	3079	1204	662	4056	2219	1656	24509
1960	1687	1409	1350	1439	1248	443	3023	4712	1908	2525	3210	4453	27406
1961	3632	5839	3883	1899	751	4659	2933	1974	963	878	589	487	29485
1962	368	312	333	451	397	401	131	54	171	87	67	104	2877
1963	85	125	89	235	815	220	48	19	102	31	62	52	1884
1964	277	374	349	352	181	137	48	2454	7176	2808	867	524	15548
1965	370	1208	772	666	2475	2330	792	256	3328	3702	957	3515	22372
1966	1733	1069	942	699	720	474	289	4098	6594	1866	684	456	19623
1967	327	254	233	815	218	62	31	58	7800	5034	5678	2413	22924
1968	7467	6282	8757	4763	9963	4514	6635	1664	1181	828	597	680	53331
1969	557	572	678	1835	1148	462	239	418	381	5886	1612	1279	15068
1970	859	1248	2870	1281	1273	1375	456	316	437	591	337	293	11336
1971	223	214	158	191	187	85	83	35672	6989	21632	5658	2558	73651
1972	1304	786	705	913	6614	2392	969	15746	6282	2642	1263	799	40414
1973	630	1011	1955	1968	1585	4576	35318	5138	2142	6989	3536	1733	66581
1974	1109	649	584	505	2621	911	678	865	2891	1416	2725	1993	16948
1975	2517	8091	3245	1893	5325	4493	3619	1454	740	649	522	437	32985
1976	304	223	179	2538	7634	2309	7758	2787	1188	1612	2912	2850	32292
1977	2954	3869	2621	3973	9027	4555	1595	456	260	245	1007	487	31048
1978	491	505	422	300	212	497	58	7280	2122	761	1539	1352	15540
1979	1658	2808	6552	6594	4098	13229	2808	1156	456	254	320	297	40229
1980	339	225	248	218	672	94	33	202	869	645	788	1350	5683
1981	836	480	2517	8341	9630	26978	12771	2850	1050	3973	1019	564	71009
1982	393	349	302	295	4139	1510	460	1394	339	173	166	210	9730
1983	227	218	528	508	815	2038	780	456	260	212	491	318	6852
1984	774	439	362	189	83	121	42	21	27	699	693	8403	11852
1985	7238	4264	6323	4181	5346	2662	867	264	268	3370	2080	1968	38732
1986	994	953	693	547	1986	6386	2205	603	1510	9589	6053	6989	38507
1987	5533	3016	4805	2538	15288	58240	6594	2011	978	520	724	622	100868
1988	541	362	356	239	135	127	630	239	139	110	77	75	3031
1989	193	327	314	227	119	19	2	0	0	495	391	277	2363
AVG	1239	1264	1477	1545	2835	4671	2363	1981	2286	2234	1389	1242	24528

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

2027 - SECO CREEK NEAR D'HANIS

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	0	0	0	0	0	0	0	0	0	0	0	0	0
1935	0	0	0	0	14403	30772	6854	1749	5738	880	134	407	60937
1936	218	0	0	0	31	0	0	0	17400	4285	2445	986	25364
1937	479	0	287	0	0	0	0	0	0	0	0	43	808
1938	443	54	12	0	105	0	0	0	0	0	0	0	614
1939	0	0	0	0	0	0	3771	124	0	0	0	0	3895
1940	0	0	0	0	346	0	118	0	0	0	0	0	464
1941	0	0	0	2198	3507	1119	55	872	1341	1643	836	254	11824
1942	0	0	0	5	216	0	0	0	851	734	0	0	1807
1943	0	0	0	0	0	0	0	0	0	0	0	0	0
1944	0	0	597	112	102	439	0	96	0	0	0	0	1346
1945	1182	327	832	1705	357	0	0	0	0	0	0	0	4403
1946	0	0	0	0	0	0	0	0	0	921	184	0	1105
1947	0	0	0	0	0	573	0	0	0	0	0	0	573
1948	0	0	0	0	0	0	0	0	0	0	0	0	0
1949	0	967	556	1119	837	172	0	0	0	0	0	0	3651
1950	0	0	0	0	0	0	0	0	0	0	0	0	0
1951	0	0	0	0	1168	0	0	0	0	0	0	0	1168
1952	0	0	0	0	0	0	0	0	0	0	0	0	0
1953	0	0	0	0	0	0	0	0	206	352	0	0	558
1954	0	0	0	0	594	0	0	0	0	0	0	0	594
1955	0	0	0	0	0	0	0	0	0	0	0	0	0
1956	0	0	0	0	0	0	0	0	0	0	0	0	0
1957	0	0	152	3049	1063	1532	0	0	2309	1326	1598	769	11798
1958	2928	3245	4498	802	667	15103	1361	0	4309	4574	3666	918	42071
1959	201	0	0	602	28	1434	1054	0	0	1498	445	87	5349
1960	154	25	0	0	0	0	790	1688	346	0	0	0	3004
1961	0	0	0	0	0	2710	2	0	0	0	0	0	2712
1962	0	0	0	0	0	0	0	0	0	0	0	0	0
1963	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	67	0	447	1600	2	0	0	2116
1965	0	0	0	0	0	0	0	0	320	917	0	0	1237
1966	0	0	0	0	0	0	0	0	59	0	0	0	59
1967	0	0	0	0	1	1	1	1	2770	0	0	0	2774
1968	1521	1	945	2	3133	4	45	4	2	1	1	1	5660
1969	0	0	0	0	555	0	3	4	0	491	0	0	1053
1970	0	0	0	0	0	0	13	0	0	0	0	9	22
1971	9	0	10	34	34	29	12	53031	0	11240	0	0	64399
1972	0	0	4	48	42	0	0	5610	5	0	0	0	5709
1973	0	0	0	0	0	363	16880	1	0	13	0	0	17257
1974	0	0	29	34	0	0	50	75	13	0	0	0	201
1975	0	231	0	0	0	0	0	0	0	0	0	0	231
1976	0	12	58	506	3100	0	155	0	0	27	3	0	3861
1977	0	0	0	0	226	0	0	81	0	0	0	0	307
1978	0	0	33	63	0	0	0	1420	0	0	0	0	1516
1979	0	0	971	2300	0	9600	0	0	0	0	0	0	12871
1980	0	0	0	0	0	0	0	0	3480	0	0	0	3480
1981	0	0	0	4440	769	6990	138	0	0	209	0	0	12546
1982	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	3533	3533
1985	127	51	180	38	38	0	0	0	0	2251	3	0	2688
1986	0	0	0	0	28	151	0	0	340	0	17	321	857
1987	109	0	0	0	17035	26959	41	0	0	0	0	0	44144
1988	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0
AVG	132	88	164	305	864	1750	560	1164	734	560	167	131	6617

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

F-1 - VERDE CREEK ABOVE EDWARDS AQUIFER RECHARGE ZONE

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	185	15	33	1012	0	0	686	0	675	0	1462	2577	6645
1935	0	1986	106	35	17977	13692	8727	0	8798	1046	798	222	53387
1936	1213	670	1785	376	1250	4061	428	92	2221	3056	2909	1313	19374
1937	1287	0	1527	1329	698	179	601	255	28	59	0	734	6697
1938	1600	961	1533	1106	2453	0	0	282	176	0	0	116	8227
1939	213	25	54	0	248	0	2611	1395	184	3	217	263	5213
1940	164	0	0	99	2508	702	404	79	5	3268	29	415	7673
1941	217	1826	1078	3765	4985	5371	699	159	3160	797	1215	926	24198
1942	0	435	199	2812	60	486	3146	239	1735	534	751	83	10480
1943	0	165	454	550	611	1391	686	267	0	512	246	0	4882
1944	312	0	739	783	486	744	0	2974	517	0	152	231	6938
1945	1336	247	296	6365	731	879	212	173	449	0	36	988	11712
1946	87	137	322	1116	15	77	0	1538	1586	2621	1414	177	9090
1947	646	299	199	17	1445	1259	627	367	0	15	0	1	4875
1948	156	0	252	0	49	25	3434	0	1361	443	3	0	5723
1949	0	3088	1241	3382	2287	2610	0	0	21	1129	0	25	13783
1950	989	0	278	1507	147	718	60	54	0	29	0	0	3782
1951	641	99	0	320	7324	0	361	124	1504	0	19	0	10392
1952	0	572	1009	0	250	520	246	0	1262	0	445	0	4304
1953	36	104	17	291	0	0	0	117	6001	0	0	425	6991
1954	25	0	0	0	306	160	0	49	0	4	131	0	675
1955	36	0	0	0	1126	0	0	0	21	0	740	0	1923
1956	3	0	0	2	0	0	0	3535	16	772	438	49	4815
1957	0	208	381	4703	1980	2555	32	1826	1208	884	2532	2884	19193
1958	7524	4655	136	284	4112	3728	0	199	6603	5697	0	0	32938
1959	620	3355	0	2395	332	1171	3124	0	944	2426	874	218	15459
1960	470	1264	602	807	598	1030	22	0	1923	2994	2045	3318	15073
1961	116	1017	0	0	79	2609	522	284	652	1916	276	235	7706
1962	303	107	65	738	231	163	0	0	0	0	18	213	1838
1963	0	488	0	163	0	0	0	0	0	2	0	51	704
1964	58	121	750	98	3449	2649	0	495	194	2800	695	690	11999
1965	325	1797	1672	1062	499	2071	97	0	0	1433	0	6801	15757
1966	673	1687	65	942	921	57	0	1511	1637	460	0	0	7953
1967	61	109	266	502	66	0	460	1063	2114	292	1562	1388	7883
1968	2483	2621	2886	2322	3170	873	1232	1292	694	131	65	2072	19841
1969	900	680	134	334	6351	161	0	1091	470	1185	815	3810	15931
1970	849	809	2364	911	1250	180	1242	2415	0	0	0	8	10028
1971	25	0	0	0	0	49	0	16148	3116	6893	0	957	27188
1972	428	498	16	71	3217	1571	2	3193	2605	1750	186	420	13957
1973	406	914	1134	4690	300	4927	19622	2458	3566	4051	1213	0	43281
1974	603	174	240	90	4255	753	81	2527	283	145	603	428	10182
1975	1689	5153	1056	181	2039	2606	2281	1128	1585	162	26	65	17971
1976	64	271	15	2876	7142	1595	3030	670	1373	3703	3945	2855	27539
1977	2347	2337	1690	450	4525	1834	0	0	910	25	0	67	14185
1978	30	11	308	115	588	286	983	5556	98	479	604	3627	12885
1979	398	395	4103	8955	3957	10598	627	316	0	0	0	122	29471
1980	0	190	0	245	2826	0	0	47	0	109	484	450	4351
1981	937	52	0	2464	12019	16491	307	0	0	0	0	1162	33432
1982	14	8	84	26	2934	0	24	19	19	1248	0	0	4376
1983	411	0	1267	12	1190	349	2543	3345	0	0	0	59	9176
1984	98	1303	159	158	0	4	0	0	147	15	127	0	2011
1985	1809	2459	2439	1701	1852	6490	47	0	0	4559	367	814	22537
1986	781	696	451	0	1029	7713	113	0	0	1540	1087	2415	15825
1987	0	2424	2583	2782	14444	22122	4197	1282	113	0	0	72	50019
1988	44	2077	0	76	0	7	0	0	0	0	0	1	2205
1989	0	0	161	705	0	47	46	0	0	1	196	296	1452
AVG	600	866	646	1174	2327	2278	1135	1046	1071	1057	513	786	13499

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

F-2 - VERDE CREEK BELOW EDWARDS AQUIFER RECHARGE ZONE

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	0	0	0	0	0	0	0	0	0	0	210	1409	1619
1935	0	773	0	0	17898	13313	7961	0	8072	0	0	0	48017
1936	0	0	555	0	0	2997	0	0	1023	1909	1746	36	8266
1937	7	0	279	62	0	0	0	0	0	0	0	0	348
1938	356	0	280	0	1272	0	0	0	0	0	0	0	1908
1939	0	0	0	0	0	0	1442	135	0	0	0	0	1577
1940	0	0	0	0	1331	0	0	0	0	2151	0	0	3482
1941	0	597	0	2682	3963	4388	0	0	2031	0	0	0	13661
1942	0	0	0	1657	0	0	2016	0	499	0	0	0	4172
1943	0	0	0	0	0	129	0	0	0	0	0	0	129
1944	0	0	0	0	0	0	0	1830	0	0	0	0	1830
1945	72	0	0	5436	0	0	0	0	0	0	0	0	5508
1946	0	0	0	0	0	0	0	288	340	1453	146	0	2227
1947	0	0	0	0	186	0	0	0	0	0	0	0	186
1948	0	0	0	0	0	0	2317	0	98	0	0	0	2415
1949	0	1954	0	2268	1085	1440	0	0	0	0	0	0	6747
1950	0	0	0	254	0	0	0	0	0	0	0	0	254
1951	0	0	0	0	6493	0	0	0	255	0	0	0	6748
1952	0	0	0	0	0	0	0	0	0	0	0	0	0
1953	0	0	0	0	0	0	0	0	5079	0	0	0	5079
1954	0	0	0	0	0	0	0	0	0	0	0	0	0
1955	0	0	0	0	0	0	0	0	0	0	0	0	0
1956	0	0	0	0	0	0	0	2420	0	0	0	0	2420
1957	0	0	0	3685	763	1371	0	586	0	0	1358	1724	9487
1958	6707	3625	0	0	3054	2645	0	0	5722	4751	0	0	26504
1959	0	2226	0	1209	0	0	1980	0	0	1242	0	0	6657
1960	0	0	0	0	0	0	0	0	692	1851	819	2202	5564
1961	0	0	0	0	0	1438	0	0	0	694	0	0	2132
1962	0	0	0	0	0	0	0	0	0	0	0	0	0
1963	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	2335	1486	0	0	0	1632	0	0	5453
1965	0	566	428	0	0	848	0	0	0	178	0	5939	7959
1966	0	447	0	0	0	0	0	259	395	0	0	0	1101
1967	0	0	0	0	0	0	0	0	908	0	316	118	1342
1968	1303	1440	1729	1130	2044	0	0	24	0	0	0	854	8524
1969	0	0	0	0	5449	0	0	0	0	0	0	2710	8159
1970	0	0	1171	0	0	0	0	1216	0	0	0	0	2387
1971	0	0	0	0	0	0	0	15939	1970	6034	0	0	23943
1972	0	0	0	0	2091	321	0	2065	1436	511	0	0	6424
1973	0	0	0	3673	0	3925	19618	1263	2465	2986	0	0	33930
1974	0	0	0	0	3208	0	0	1353	0	0	0	0	4561
1975	446	4173	0	0	826	1428	1088	0	328	0	0	0	8289
1976	0	0	0	1725	6298	351	1890	0	111	2613	2855	1696	17539
1977	1158	1141	442	0	3482	609	0	0	0	0	0	0	6832
1978	0	0	0	0	0	0	0	4601	0	0	0	2520	7121
1979	0	0	3047	8204	2869	9979	0	0	0	0	0	0	24099
1980	0	0	0	0	1672	0	0	0	0	0	0	0	1672
1981	0	0	0	1287	11501	16304	0	0	0	0	0	0	29092
1982	0	0	0	0	1787	0	0	0	0	0	0	0	1787
1983	0	0	0	0	0	0	1365	2227	0	0	0	0	3592
1984	0	28	0	0	0	0	0	0	0	0	0	0	28
1985	577	1274	1258	464	629	5595	0	0	0	3531	0	0	13328
1986	0	0	0	0	0	6910	0	0	0	291	0	1231	8432
1987	0	1242	1397	1617	14114	22305	3123	15	0	0	0	0	43813
1988	0	854	0	0	0	0	0	0	0	0	0	0	854
1989	0	0	0	0	0	0	0	0	0	0	0	0	0
AVG	190	363	189	631	1685	1746	764	611	561	568	133	365	7807

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

2040 - LEONA RIVER SPRING FLOW NEAR UVALDE

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	1089	1023	957	891	824	759	693	1255	1121	989	1011	582	11194
1935	657	734	811	886	963	1039	1115	1191	1290	1402	3026	3250	16363
1936	3472	1836	1833	3661	3655	1826	3647	3641	1826	1847	3737	3778	34758
1937	3819	3860	1952	1973	1993	2014	4071	1959	1874	1806	3477	3340	32138
1938	3203	3264	3359	1706	3450	3450	3299	3327	1630	3264	1580	2984	34516
1939	1540	1390	1480	1190	1110	934	900	1160	1190	1240	1320	1500	14954
1940	1560	1370	1310	1210	1200	1070	1070	952	906	833	819	837	13137
1941	799	676	781	795	1110	1310	1440	1360	1440	1640	1770	1880	15001
1942	1930	1780	1880	1760	1740	1390	1390	1240	1330	1540	1550	1660	19190
1943	1660	1500	1680	1650	1340	1260	1210	1010	1010	1060	891	855	15126
1944	728	538	560	497	478	590	585	394	672	781	809	885	7517
1945	875	827	1050	976	986	837	672	508	433	411	336	331	8242
1946	331	228	204	114	121	72	40	30	63	145	261	408	2017
1947	472	450	626	714	726	695	978	1000	839	762	843	863	8968
1948	742	637	518	325	198	54	50	5	14	15	25	7	2590
1949	15	18	20	85	264	374	374	460	532	774	996	1110	5022
1950	1230	1080	1070	899	789	698	465	355	295	254	113	51	7299
1951	18	12	1	0	0	0	0	0	0	0	0	0	31
1952	0	0	0	0	0	0	0	0	0	0	0	0	0
1953	0	0	0	0	0	0	0	0	0	0	0	0	0
1954	0	0	0	0	0	0	0	0	0	0	0	0	0
1955	0	0	0	0	0	0	0	0	0	0	0	0	0
1956	0	0	0	0	0	0	0	0	0	0	0	0	0
1957	0	0	0	0	0	0	0	0	0	0	0	0	0
1958	0	0	0	0	0	0	0	0	0	0	0	0	0
1959	0	94	223	336	478	663	899	1080	966	1610	1730	2020	10099
1960	1910	1980	2100	1960	1970	1730	1730	1780	1670	1630	1770	1960	22190
1961	2240	2050	2140	1940	1580	1380	1920	2150	1870	1770	1940	2150	23130
1962	2210	2080	2330	1820	1510	1340	1080	910	833	904	712	780	16509
1963	672	493	300	404	482	251	110	26	16	21	18	26	2819
1964	19	0	0	0	0	0	0	0	0	0	0	0	19
1965	0	0	0	4	38	10	0	0	0	215	256	272	795
1966	729	806	770	292	276	202	0	0	0	222	280	489	4066
1967	555	830	282	211	118	0	0	0	0	0	0	0	1997
1968	220	1025	759	982	1142	2623	1171	1253	1195	2678	1364	2648	17058
1969	1347	1224	1094	998	1006	1013	718	1186	1066	1148	1145	1395	13340
1970	1624	1706	3373	1767	3368	3075	1307	1251	1177	1279	1375	1329	22631
1971	1350	1093	930	815	764	680	261	551	1121	2774	3526	1888	15752
1972	1984	3797	1836	3622	1628	3250	3140	3223	1669	3677	1908	3800	33533
1973	3841	3688	1908	1922	3896	3212	1713	4093	2089	2239	2410	2504	33515
1974	4977	4914	4728	2246	2114	4293	3669	1758	4416	2294	2298	4723	42429
1975	4851	4878	4955	2346	2499	5147	2356	2427	4632	2315	2305	4572	43284
1976	2223	4044	3691	3537	3934	2093	3619	2431	2582	2723	2832	2914	36622
1977	2976	2996	3028	2954	3002	3080	2794	2675	5141	2531	5138	2651	38965
1978	2651	5015	4621	2233	4189	3866	3778	3442	1895	3921	3855	1990	41455
1979	3879	3847	1829	1860	2189	2205	2458	2342	2285	4430	2175	4348	33847
1980	2178	3951	1685	3053	2637	2952	1039	682	924	930	931	972	21934
1981	1030	974	671	740	1201	2990	3595	1915	2020	4421	4851	2527	26934
1982	2547	2452	2322	2356	4443	4731	4380	2082	1936	3636	3691	3732	38306
1983	1897	3745	1767	3518	3198	2724	1264	1182	1160	1154	1191	1275	24075
1984	2670	1343	1050	915	585	224	0	0	0	0	0	0	6786
1985	0	954	807	1087	1102	1136	1026	953	933	1128	3431	3710	16266
1986	1870	3751	1593	3031	2834	2724	2998	1283	2637	2719	3318	1847	30606
1987	4016	2168	4618	4941	5018	2963	3483	3381	3325	3349	3288	3284	43835
1988	3260	3193	2951	2802	2551	4736	2086	2144	4290	4462	2209	4394	39080
1989	2171	2148	2093	3942	3567	1375	794	537	1309	1145	530	1052	20664
AVG	1536	1651	1438	1392	1505	1519	1346	1189	1243	1430	1483	1600	17332

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

2055 - FRIO RIVER NEAR DERBY

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	1360	822	664	4050	581	20	55	38	8	970	1210	1070	10848
1935	56	200	119	1780	142600	480100	111900	9970	37120	5720	1610	3030	794205
1936	2830	2010	1810	3710	5990	2770	37570	744	71080	26530	7360	4760	167164
1937	3640	2870	3290	2430	1560	4291	1010	704	837	910	871	5170	27583
1938	6376	1544	2364	4794	2581	660	732	312	305	331	454	724	21177
1939	1014	925	1084	561	1626	563	34103	5249	449	13206	982	1063	60825
1940	1232	1178	1007	1734	2010	4882	1158	114	43	55	1647	3487	18547
1941	1230	48476	9040	22642	37455	6447	2362	7522	6696	11163	1442	1208	155683
1942	1344	1607	1427	2618	1421	410	10313	1256	34595	14057	780	805	70633
1943	1261	1207	1267	1206	922	16196	558	54	404	426	1796	447	25744
1944	417	305	2473	238	4097	3128	47	12505	8462	15281	88	412	47453
1945	7196	883	885	4831	180	1169	80	62	8288	18195	64	50	41883
1946	10	9	13	3183	1062	142	12	16309	28888	8288	32	22	57970
1947	95	89	118	121	110	20316	295	122	64	83	71	55	21539
1948	44	41	55	54	51	24362	2310	39	294	5237	40	31	32558
1949	58	24204	5843	15362	2289	5342	89	3991	48	13642	64	41	70973
1950	13	12	16	16	2015	49	178	11	11	14	12	9	2356
1951	0	0	0	0	61091	709	0	0	0	105	0	0	61905
1952	0	0	0	0	353	145	0	0	685	4	4	3	1194
1953	7	8	11	14	21	27	27	655	79423	7907	99	5	88204
1954	6	7	12	15	19281	112	27	151	14	7	5	4	19641
1955	8	9	14	17	6916	33	33	70	1416	19	7	6	8548
1956	3	48	8	444	20	15	6981	1655	4	1260	3	7	10448
1957	8	15	572	63824	74449	48787	39	26	9833	29079	1345	216	228193
1958	10084	10735	18637	1941	9434	98061	7737	22	57628	23034	29804	3683	270800
1959	1070	483	84	388	441	22348	7128	94	557	49463	275	164	82495
1960	153	89	124	46	6	15	256	2108	68	717	514	469	4565
1961	167	4754	1305	46	47	63953	4094	729	155	1191	772	885	78098
1962	1031	693	454	1873	182	133	40	18	16	20	19	14	4493
1963	31	38	45	56	3220	114	97	94	45	30	25	19	3814
1964	34	35	594	146	107	5820	112	84	6941	3116	2030	24	19043
1965	52	305	141	3305	4380	161	120	102	67	1655	47	850	11185
1966	127	172	75	1309	733	309	110	23786	3778	39	31	24	30493
1967	40	49	64	2026	103	165	300	108	25173	14564	7516	1078	51186
1968	10218	5038	7088	3476	31646	2461	2063	249	481	21	21	16	62778
1969	11	8	31	31	1825	387	466	255	50	49590	2164	1856	56674
1970	1100	821	1264	969	11157	2594	345	161	5850	1532	851	846	27490
1971	983	368	277	314	320	239	4227	347399	6952	57168	12821	4869	435937
1972	3333	2650	1834	1206	23651	1179	463	13699	3293	1696	1260	1851	56115
1973	2533	2729	2783	5427	1755	16645	158952	18324	29673	45764	15026	8432	308043
1974	7351	5627	5411	3572	11820	2913	976	8780	84001	7732	8023	6953	153159
1975	7313	27262	8056	8655	16677	9182	8392	4987	5065	4490	4829	4575	109483
1976	4544	3183	2637	24220	35907	5440	58915	14137	9231	15217	13974	14452	201857
1977	13762	15393	13182	27069	28400	11570	5775	3704	3040	14886	7481	6583	150845
1978	5608	3924	3384	2732	1626	5242	431	24164	1878	1416	2488	2694	55587
1979	4221	3069	15718	25247	10146	91357	7432	2902	2047	1689	2051	3226	169105
1980	3308	1729	1125	844	33102	1360	109	10074	22244	11670	406	444	86415
1981	970	832	566	44396	25715	136950	28315	3970	2966	32568	5173	4537	286958
1982	4248	2857	4355	3313	16002	3147	1864	658	658	703	1289	1771	40865
1983	2407	2101	2237	1848	993	6678	953	1093	818	743	876	1117	21864
1984	1431	824	293	270	203	237	139	108	80	29749	106	77	33517
1985	33202	2059	5174	1077	3862	697	568	196	75	16213	2222	1819	67164
1986	1613	1319	477	849	1223	35048	1103	136	3186	32103	5769	9751	92577
1987	10572	5917	8978	6149	51396	384905	39708	12691	15973	9597	8816	9590	564292
1988	9671	7648	6373	5123	3612	5336	9468	1362	1858	2318	3058	2604	58431
1989	3448	3714	3151	1833	1321	69	61	88	70	101	56	3	13915
AVG	3087	3623	2643	5596	12495	27418	10011	9961	10409	10773	2853	2105	100974

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

2070 - FRIO RIVER AT CALLIHAM, CHOKE CANYON RESERVOIR

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	12900	5100	1830	16700	1380	1540	17200	1840	1530	7690	23990	6570	98270
1935	1480	10120	3530	9700	125800	550400	70660	31080	83380	12990	3760	4570	907470
1936	3930	2740	2860	4030	17320	23690	140500	2900	26130	51920	8190	5590	289800
1937	4260	3160	4000	2440	1730	8761	1150	431	1590	1400	621	42360	71903
1938	49007	2106	2672	28552	10340	1124	855	334	467	35	405	4723	100620
1939	1645	857	801	399	9623	7417	25931	6965	15803	10759	1039	776	82015
1940	1026	2116	958	29069	16017	68691	49251	19095	841	3899	9955	13298	214216
1941	13050	43077	10969	85931	139663	22117	6937	5364	112244	10648	2511	1992	454503
1942	1483	1700	1247	6012	11047	919	176840	10993	105234	28863	2312	1558	348208
1943	1750	1469	2133	1418	4088	31066	27512	221	2403	713	2617	775	76165
1944	1281	737	3853	1357	72307	14112	1892	9295	19733	9700	723	1857	136847
1945	5583	9652	2702	27421	844	17140	2195	65	1221	44691	531	540	112585
1946	746	497	2305	16433	18526	14584	87	44175	106918	119223	2263	1308	327065
1947	1692	728	1684	1012	10700	14491	6710	1784	147	77	1018	327	40370
1948	124	355	150	61	61	1671	27191	46	58	14490	174	165	44546
1949	187	7105	24091	77248	15974	48536	14829	5993	81	17524	2022	11125	224715
1950	237	115	78	515	11810	9492	460	7	7	9	8	6	22744
1951	26	29	40	111	61375	36378	99	53	50598	6445	575	156	155385
1952	130	6962	1855	7187	13826	4690	70	37	80	30	58	35	34960
1953	69	75	94	789	31521	200	320	12993	180585	31131	1502	256	259535
1954	197	129	104	6442	7555	20007	1247	105	153	1258	662	74	37933
1955	62	1645	26	26	29034	2777	416	3892	1949	2483	13	22	42345
1956	36	56	5	5	3913	1260	3440	18183	17063	11966	138	97	56162
1957	37	63	5197	78179	142413	102526	358	132	33510	55109	9417	2929	429870
1958	101303	112303	23835	3653	15262	51549	16203	296	53951	43943	41893	8621	472812
1959	3122	1861	868	1005	1956	24841	23041	698	1787	70116	5822	909	136026
1960	992	1185	860	4283	1086	8492	2473	24097	1871	26819	17551	7071	96780
1961	5154	16534	2606	13659	213	77167	5249	1439	173	1321	811	678	125004
1962	1194	832	622	757	1319	6902	141	12	55	13	22	51	11920
1963	76	857	79	76	4303	17456	2520	86	794	762	2633	2210	31852
1964	91	72	1359	148	601	3442	476	3619	1261	8007	9047	171	28294
1965	722	4833	198	7149	68856	2498	138	108	80	1899	324	4625	91430
1966	230	2614	288	17088	18869	9765	1064	11552	21549	645	120	54	83838
1967	107	372	239	1151	4699	330	506	9261	340190	24949	13732	2547	398083
1968	95805	10435	9312	7061	111838	8084	17794	817	3592	293	154	738	265923
1969	264	3856	414	1222	2960	709	308	1663	1130	52285	12639	3774	81224
1970	2023	1135	6829	1000	36836	29669	1600	2267	7908	3804	698	655	94424
1971	666	356	237	320	222	3686	5989	291368	24038	116969	15942	7520	467313
1972	4940	3808	2326	1674	21029	2859	881	4232	24092	2861	1437	1854	71993
1973	2474	3677	2885	8987	2175	30597	107650	22925	45884	88342	16080	8678	340354
1974	7577	5486	14861	3556	11175	4177	1246	32005	71475	8719	7930	6866	175073
1975	6857	21849	5926	6055	55747	22648	10292	4834	9373	4499	4088	3880	156048
1976	4069	2450	2262	21046	61081	7008	66451	18637	9608	40963	32925	22018	288518
1977	17181	14028	12321	112114	34318	13298	6299	3156	3858	8962	9900	6262	241697
1978	6111	4677	3578	2857	2720	61796	2432	54606	22876	2202	2939	2927	169721
1979	5375	3349	12040	32826	11370	80687	10093	2876	1880	1262	1414	2889	166061
1980	3390	1793	932	776	97539	9132	378	36663	17752	9620	1119	1013	180107
1981	1913	1136	2507	21335	46996	131328	30492	6412	5763	53036	7414	6244	314576
1982	6385	5705	5509	4891	14349	5613	3355	2098	2127	12969	1012	1625	65638
1983	2038	2485	2748	1168	584	10191	1006	581	17225	956	373	326	39681
1984	20	70	115	253	373	455	408	259	174	59969	20	30	62146
1985	28319	1720	4250	7655	6388	3558	9471	1078	22177	71672	8423	828	165539
1986	1658	241	120	186	2208	40702	1906	1556	11129	64696	3033	31603	159038
1987	11550	5990	9012	6346	18382	496349	79689	20950	12446	6618	8154	8541	684027
1988	8620	8062	6464	3917	6959	9042	24230	5603	1043	2680	247	262	77129
1989	2883	4398	6653	12263	8195	9293	7245	7242	381	2120	1507	261	62441
AVG	7751	6228	3847	12634	25491	39052	18164	13375	26774	22090	5427	4408	185240

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

2080 - ATASCOSA RIVER AT WHITSETT

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	16200	5890	4240	9340	387	91	2040	141	928	2180	6570	7020	55027
1935	866	8880	2840	10460	33870	205000	3280	762	60090	4460	1320	2580	334408
1936	1490	972	5040	837	48860	10050	45720	2700	4110	2300	851	954	123884
1937	956	658	800	528	854	3180	1350	76	8	974	197	24520	34101
1938	12360	1280	1230	15990	2800	647	425	86	682	18	516	1790	37824
1939	776	562	455	95	1860	6220	8110	2740	5740	226	66	218	27068
1940	352	1207	772	8003	7345	19813	9162	8710	1057	4636	23737	17117	101911
1941	6009	8390	5681	69807	72279	26197	3605	6783	83829	10208	1109	1079	294977
1942	985	1380	948	6887	3290	549	177016	11594	116509	7278	1850	1400	329685
1943	1542	1303	2165	1113	2517	3504	1981	183	7563	701	1523	1043	25137
1944	6143	1293	5634	837	26587	1426	1275	1685	743	209	2393	2553	50779
1945	1326	4687	1918	23852	669	8762	959	141	1396	21195	561	563	66030
1946	1299	1540	8692	8417	15490	23108	556	74254	70409	48458	3350	2430	258002
1947	4389	1670	3552	1917	15050	958	697	7294	438	264	2220	903	39351
1948	699	1098	815	692	338	2765	11843	5232	429	2557	415	496	27378
1949	670	4990	1051	58557	3200	18468	62485	4903	1679	5588	1159	4060	166811
1950	1028	863	768	1774	6077	6835	11053	138	373	35	43	174	29160
1951	306	362	623	427	11563	14222	108	408	26466	1235	1236	858	57815
1952	1086	2797	923	3901	2423	414	7010	424	14616	471	980	1516	36562
1953	1389	966	1081	3557	33370	1818	1985	3113	35179	4698	837	627	88621
1954	614	866	937	3711	2701	2371	468	1	197	1330	1621	571	15386
1955	1180	7080	996	725	8000	3610	1180	2420	1160	48	310	721	27430
1956	716	649	652	1900	3860	1290	889	4180	10530	12560	408	3610	41244
1957	900	1040	6610	71870	83900	19080	845	548	41830	6170	14330	1440	248563
1958	57800	83230	3980	1830	12770	1410	2920	190	7010	23750	17040	5400	217330
1959	1770	2060	1210	1020	5130	1430	526	171	434	12300	1860	732	28643
1960	1030	990	1940	1320	619	11970	8710	8330	844	23140	12250	18070	89213
1961	5910	14290	1170	2490	495	46940	2750	909	319	16310	4400	1240	97223
1962	1200	1170	803	906	489	11190	150	130	463	59	254	1280	18094
1963	488	2773	331	151	2156	1216	347	208	178	214	1864	2784	12708
1964	431	1272	846	528	561	250	486	6303	191	1302	1034	280	13485
1965	449	5314	400	1917	33360	1159	624	136	229	2044	601	4095	50327
1966	490	609	381	11668	5776	3611	738	783	2744	572	131	268	27773
1967	340	390	355	233	3211	335	213	5847	297942	5725	9390	1530	325511
1968	126202	8282	2603	3304	76945	6284	5494	700	4902	618	667	2582	238585
1969	650	11039	1310	3551	21479	3063	313	1397	632	9161	555	892	54042
1970	1861	1630	15381	971	52306	48481	1872	1060	1972	533	305	466	126837
1971	444	420	422	303	165	961	72	18177	4054	20362	1082	1231	47693
1972	823	714	580	328	54151	4086	493	2536	6113	564	367	357	71111
1973	564	2910	766	10232	1221	171515	4059	1659	26023	34882	2901	1401	258132
1974	1280	982	883	769	2750	1213	159	8600	11060	826	1620	675	30817
1975	582	588	543	1490	40417	13982	3371	802	904	689	434	410	64212
1976	484	395	413	7250	19610	793	5292	161	5060	45680	16180	8950	110268
1977	6550	2120	1202	136800	15850	2432	663	231	1690	582	1710	430	170260
1978	466	516	429	384	669	7272	4152	28602	23800	1010	3090	1030	71420
1979	7260	1522	879	14670	3982	20891	1464	604	716	111	196	1350	53645
1980	510	417	391	205	78881	880	340	55074	3980	942	2660	1120	145400
1981	1430	899	1960	2580	2650	5840	1760	1305	13580	2820	1300	843	36967
1982	702	7080	1430	806	7950	3300	137	26	1130	4560	571	424	28116
1983	449	1250	3420	412	1100	2440	1560	2540	45600	4440	499	498	64208
1984	2370	450	413	293	367	303	122	15	228	12920	2120	1430	21031
1985	2380	728	2910	14630	2330	2490	5930	29	4080	28280	14260	1570	79617
1986	756	617	364	120	904	8160	68	42	706	18650	1200	26770	58357
1987	2990	11140	5090	856	1840	71180	1110	393	987	112	189	553	96440
1988	278	306	201	158	711	370	1210	55	544	3	12	11	3859
1989	317	286	460	161	218	0	154	32	7	220	1200	242	3297
AVG	5224	4050	1998	9420	14971	14925	7345	5099	17037	7343	3028	2985	93425

NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

2100 - NUECES RIVER NEAR THREE RIVERS

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	84201	21601	7441	38502	8672	7022	33402	31502	15801	20351	100501	18381	387377
1935	7789	25930	16040	68406	211919	1501017	128415	142212	306309	62777	8869	13049	2492733
1936	8749	4110	26241	8766	99198	49026	341014	6772	139509	184207	28809	19409	915810
1937	12559	7530	7581	4525	4899	21958	3605	16803	6309	2557	840	88079	177245
1938	172273	9054	5938	101376	46914	4225	2144	48012	5210	884	4111	10879	411020
1939	3341	2073	2021	1200	118479	60816	51466	20505	39787	36174	2199	1667	339728
1940	1909	4240	19142	121225	77345	228636	274690	61386	19188	16843	36499	35383	896486
1941	17841	79474	18203	152128	486455	136750	83937	12815	227735	25096	5412	3584	1249429
1942	3636	4065	3287	16201	27109	10298	555079	19168	442726	53046	10154	4288	1149056
1943	4488	3725	5920	3732	6350	107590	40640	1084	28330	11886	7099	4622	225467
1944	8334	2952	11395	3999	113774	176434	6156	23352	339752	16570	4024	5699	712438
1945	8600	18073	23333	134901	41700	44410	6532	789	2359	248819	2311	1738	533564
1946	2915	2927	13201	39954	151981	128854	4820	77657	262367	505643	9505	4545	1204369
1947	7231	3026	6553	15977	146064	42021	52818	23535	2254	1037	8261	2436	311211
1948	1340	2164	2052	1314	3002	3410	93384	8411	8973	31048	3524	1023	159645
1949	1242	14336	141160	210993	144184	115391	81563	39018	4382	34814	10012	20371	817466
1950	2021	2164	1644	4749	56231	112993	14784	726	12722	17817	490	438	226778
1951	359	450	1329	771	93180	139931	789	447	153339	15747	2686	981	410008
1952	2334	11920	3180	14377	33420	68376	9794	1506	15124	1775	2271	2134	166210
1953	1874	1166	1399	15858	87240	1241	3421	30298	349898	73187	26040	1107	592728
1954	1168	1443	1289	10489	13725	70585	125173	1450	895	11361	10980	691	249249
1955	1135	8084	1099	837	43269	18353	6043	8626	24060	39702	512	1052	152770
1956	875	845	877	3695	15061	3126	12994	31932	34396	38314	1772	4487	148375
1957	1090	1519	25099	202941	531826	422165	1939	847	147363	95506	43803	5508	1479605
1958	297856	437643	92376	7423	46222	59963	111042	1723	86406	225226	169334	29025	1564238
1959	18294	8947	5284	3604	12631	29940	58932	10049	9335	320120	18865	7069	503070
1960	8508	7610	7005	7509	4184	44829	20694	63036	15316	102569	80416	56471	418147
1961	36899	54258	10720	20648	1843	123743	22349	32499	3627	17452	7172	3260	334469
1962	3126	2421	1841	3734	1963	26584	715	173	2180	303	1959	3285	48284
1963	1097	4795	986	2305	16946	111460	5971	559	2590	1795	17602	6496	172601
1964	1667	2569	4546	2079	5884	5717	1787	26685	217190	247405	11970	1445	528942
1965	3034	22058	2212	7066	216752	30472	14095	1579	2217	11721	3056	11560	325821
1966	2630	7038	2556	49090	214198	46900	4558	22573	54451	4495	1819	1622	411929
1967	2126	2405	3009	10821	16368	3418	2608	44019	1408493	139218	29519	6553	1668555
1968	237892	34363	19555	17196	267242	33753	27451	2908	18734	12936	1866	4763	678657
1969	1567	19327	3782	9575	33331	8953	2487	4973	6615	132041	88553	38773	349976
1970	14751	7660	29052	5347	101978	171445	5904	13784	9626	25612	2042	1758	388959
1971	1942	1543	2966	3278	3003	16489	352708	649349	484768	849736	72667	25487	2463937
1972	17696	11923	9241	4179	148063	16574	3079	25491	46336	11167	3163	3068	299980
1973	4189	9616	6842	26355	4368	217638	114357	31812	76593	456879	67854	24656	1041159
1974	16960	11845	41074	8055	26172	7660	2144	97802	128847	12112	24847	13110	390627
1975	12448	26115	10623	12764	129324	129627	81032	21016	22104	9848	15875	6110	476885
1976	5891	4329	4328	31966	90994	12990	151006	76335	101905	170034	295211	111453	1056439
1977	54105	33486	26783	303967	101938	43249	13284	5408	6658	11980	13485	8684	623026
1978	8408	6994	6085	6003	12388	104133	7945	85861	68146	6227	7306	4756	324252
1979	14893	6278	10913	65446	28537	217729	16173	4589	3834	2188	2550	4834	377962
1980	6069	3169	2242	1959	235797	38208	1950	318666	32562	10828	4929	3226	659606
1981	4691	3579	5866	19623	192304	445216	137502	16418	70193	117488	44820	16267	1073965
1982	13690	16661	15124	9128	105958	22276	4086	2128	4882	21593	2415	1544	219485
1983	1572	2770	8937	1982	2666	7164	3598	4635	102133	22325	8158	1806	167745
1984	5247	1252	1528	1344	1553	14274	12155	783	660	90143	14036	1159	144135
1985	42014	5991	24785	43707	99064	46701	50377	1740	5838	132219	108543	12973	573952
1986	2649	2086	2382	2197	3110	63722	3168	2256	4465	65009	21465	49077	221585
1987	22211	21703	24596	10898	22341	508676	115661	26040	34335	20525	13903	12163	833050
1988	11175	7362	5893	5108	6690	4539	8656	4271	6482	4186	12492	17069	93921
1989	17008	4794	10480	16785	18699	32333	35057	29508	8486	19189	10688	9481	212508
AVG	22314	18312	13376	33894	84545	109304	59413	39956	100621	86067	26951	13403	608154

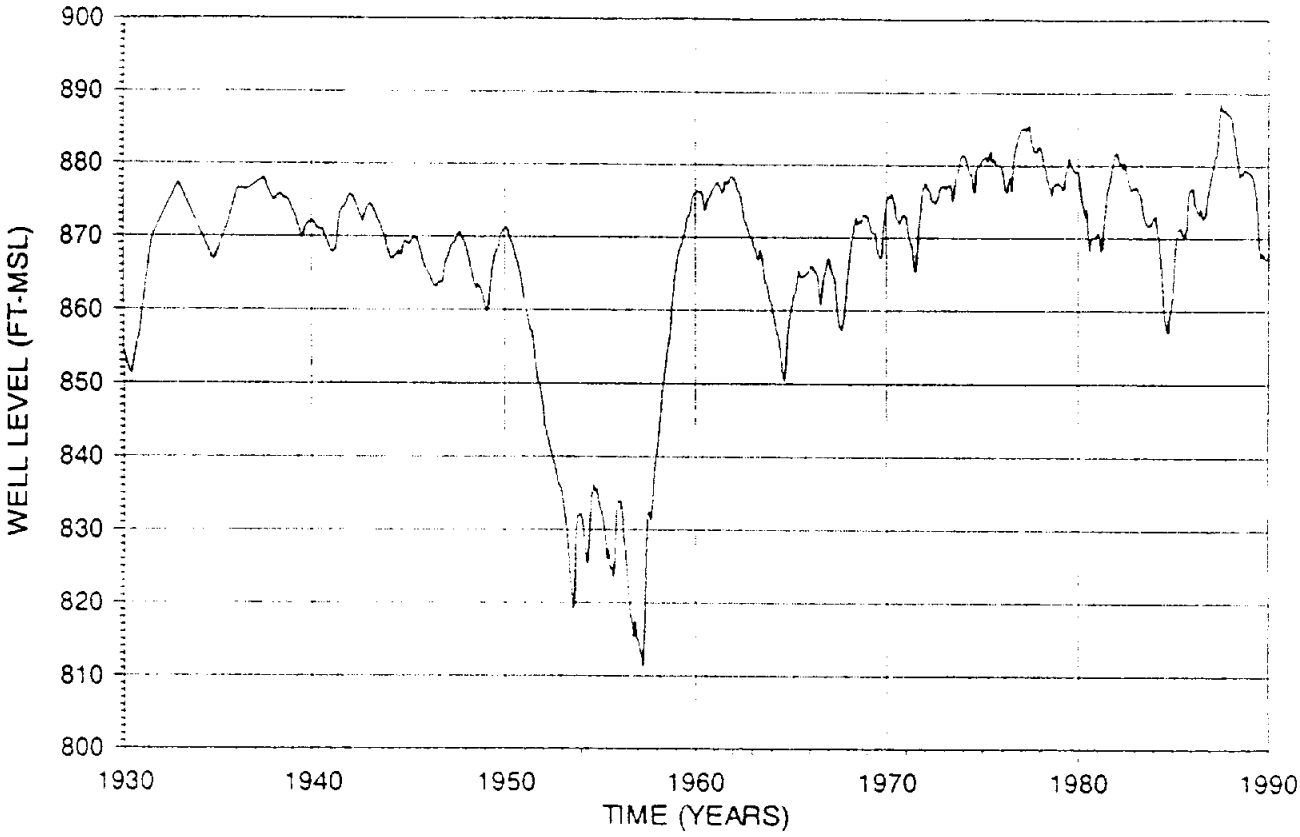
NUECES RIVER BASIN MODEL - NATURAL STREAMFLOW IN ACRE-FEET

2110 - NUECES RIVER NEAR MATHIS, LAKE CORPUS CHRISTI

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1934	96663	20403	5916	40519	6970	5256	36213	31029	18264	19105	108096	17626	406060
1935	6051	25535	21718	69737	220835	1571069	131419	145715	346886	63454	7172	15657	2625248
1936	7048	2228	26176	7897	119398	58022	353817	6659	150030	189416	27894	18123	966708
1937	11006	5781	5834	2657	3438	20770	2459	15415	4513	1906	7	113671	187457
1938	176751	7178	3876	104543	47821	2056	595	48316	3450	523	2047	12017	409173
1939	1225	483	645	670	120848	62278	51215	19963	43218	35328	472	382	336727
1940	406	2210	18737	123698	90684	247780	283346	65913	17842	19642	36288	37156	943702
1941	16458	82211	18336	166897	514804	141618	95266	12360	240799	29155	3544	1803	1323251
1942	1521	2879	1104	14688	26693	8435	594463	25876	464160	53104	8309	2252	1203484
1943	2789	1640	4100	1574	7140	112147	39943	474	35919	10102	6817	3395	226040
1944	8597	811	17269	1816	121880	181890	4083	30615	351439	14937	3512	3778	740627
1945	6662	16758	22213	138696	41018	49431	4497	527	480	256785	526	421	538014
1946	2864	779	11566	40291	164098	132368	2687	84347	273820	531938	7616	2507	1254881
1947	7256	914	4517	18648	158620	41325	52591	27378	533	516	6597	550	319445
1948	401	527	505	529	1058	1852	94865	6538	9425	34219	5257	875	156051
1949	747	9277	149719	216116	229800	114653	96529	42610	4863	34522	12365	19802	931003
1950	2433	1428	1635	4851	51798	114663	12445	405	9552	16515	361	296	216382
1951	97	478	1327	1481	86573	137573	155	132	204518	18823	2432	642	454231
1952	2082	12860	2236	16277	32875	79056	12431	1309	18530	1063	2027	2331	183077
1953	2453	1359	1713	14249	91717	361	737	43697	396427	71114	35484	702	660013
1954	1992	1973	1762	11353	10259	64694	141319	1860	4111	12931	12145	633	265032
1955	834	7893	1113	524	36837	18261	5774	10223	28562	41474	1682	1245	154422
1956	1310	844	1040	5311	22093	4372	10996	25337	39728	46625	1993	11638	171287
1957	870	2257	28844	167627	580629	477169	3667	839	130808	118592	45475	5234	1562011
1958	312355	363892	184603	4896	43280	44297	115597	571	64432	249345	197869	20692	1601829
1959	27138	6025	8247	617	8104	27395	63171	11466	4791	282411	21234	8362	468961
1960	8658	8207	7047	3133	1542	43246	25478	64575	25021	160419	92332	58700	498358
1961	47203	64728	13129	19896	827	112045	27943	34997	5186	14922	5453	1560	347889
1962	197	178	290	284	286	40255	218	143	20680	200	239	985	63955
1963	2499	5763	2548	586	16534	111713	551	411	335	427	25225	5854	172446
1964	969	830	3534	1159	4640	6352	3339	27091	172198	233268	12146	722	466248
1965	1160	977	41129	5743	181798	48409	10410	1135	979	2471	3126	10078	307415
1966	1321	1228	1544	41566	222156	43736	1658	15133	47597	3246	1534	1042	381761
1967	1410	2268	4814	8402	19338	2152	1794	49074	1632518	201040	26789	26577	1976176
1968	219257	37396	18836	16924	284373	33483	32607	6120	17918	13489	4058	7401	691862
1969	2779	21312	1538	12057	29784	10355	8176	2240	10149	116180	81776	43528	339874
1970	12513	7251	30537	5914	91199	179355	7377	15429	6999	26682	2517	5835	391608
1971	2436	1458	1855	13003	2140	3851	306326	622267	626848	914173	87515	29475	2611347
1972	21749	12380	9805	931	168810	15030	5723	23657	48743	8207	646	339	316020
1973	630	486	7368	23735	6922	271292	116498	31559	69821	457956	72257	26803	1085327
1974	14157	533	49933	7942	27468	6434	2796	107918	172577	14769	24303	12545	441375
1975	12085	22213	10566	11405	115709	126891	74204	18164	16203	7753	15533	2621	433347
1976	8182	1057	1245	30175	78078	8014	138374	69797	104739	154808	268358	113767	976594
1977	49020	31287	24511	279518	92467	39319	11963	4946	4270	11228	19638	8628	576795
1978	9079	7119	6575	6537	10147	106221	9160	81878	67243	3585	8560	4768	320872
1979	12338	5673	9570	65094	30171	221207	13906	7611	3619	4268	806	6720	380983
1980	725	762	868	874	200077	39544	4429	341311	33811	7925	2159	6153	638638
1981	3796	2912	5468	18993	204374	444583	163135	22784	72914	111907	50413	15101	1116380
1982	14545	15013	15174	10056	107666	21023	6365	5755	10138	24813	7919	5924	244391
1983	875	3063	10508	2146	5956	7866	5486	8196	78749	20763	10032	849	154489
1984	8254	2594	3361	818	8215	14743	13699	4009	2056	77603	13657	5713	154722
1985	33498	6137	24951	59207	103317	54235	52101	3440	5706	125813	115527	15040	598972
1986	1774	7434	1096	2717	3721	63342	4841	3328	1124	58739	18359	45464	211939
1987	20435	20462	23045	5331	30657	483030	128364	27004	28296	11985	14321	10955	803885
1988	10117	7732	7136	7125	5717	7002	9070	9730	10357	7915	11000	18971	111872
1989	17794	7828	14976	18042	21499	30026	37282	34016	14210	16147	12814	12072	236706
AVG	22098	15802	16031	33133	87765	112742	61313	41130	110323	88683	27968	14393	631381

APPENDIX H

Well Levels



SOURCES: EUWD & TWC (Ref. 38)

NUECES RIVER BASIN STUDY

CITY OF UVALDE WELL
HISTORICAL LEVELS

HDR Engineering, Inc.

FIGURE H-1

CITY OF UVALDE WELL
BEGINNING-OF-MONTH WELL LEVELS
UNITS = FEET-MSL

YEAR	MONTH	LEVEL	YEAR	MONTH	LEVEL	YEAR	MONTH	LEVEL
1929	DEC	855.43						
1930	JAN	854.46	1934	JAN	871.17	1938	JAN	874.92
	FEB	853.57		FEB	870.69		FEB	875.14
	MAR	852.76		MAR	870.21		MAR	875.49
	APR	852.04		APR	869.73		APR	875.68
	MAY	851.34		MAY	869.24		MAY	875.82
	JUN	851.53		JUN	868.76		JUN	875.82
	JUL	852.85		JUL	868.28		JUL	875.27
	AUG	854.18		AUG	867.80		AUG	875.37
	SEP	855.45		SEP	867.31		SEP	875.13
	OCT	856.10		OCT	866.83		OCT	875.14
	NOV	857.06		NOV	866.91		NOV	874.76
	DEC	858.68		DEC	867.47		DEC	874.12
1931	JAN	860.30	1935	JAN	868.02	1939	JAN	873.68
	FEB	861.93		FEB	868.58		FEB	873.29
	MAR	863.55		MAR	869.14		MAR	872.77
	APR	865.18		APR	869.69		APR	871.83
	MAY	866.80		MAY	870.25		MAY	871.39
	JUN	868.24		JUN	870.81		JUN	870.50
	JUL	869.52		JUL	871.36		JUL	869.74
	AUG	870.23		AUG	871.92		AUG	870.43
	SEP	870.70		SEP	872.64		SEP	871.25
	OCT	871.17		OCT	873.46		OCT	871.57
	NOV	871.63		NOV	874.27		NOV	871.84
	DEC	872.08		DEC	875.09		DEC	872.07
1932	JAN	872.53	1936	JAN	875.90	1940	JAN	872.26
	FEB	872.97		FEB	876.63		FEB	872.12
	MAR	873.42		MAR	876.61		MAR	871.78
	APR	873.87		APR	876.59		APR	871.37
	MAY	874.32		MAY	876.57		MAY	871.05
	JUN	874.77		JUN	876.56		JUN	870.96
	JUL	875.21		JUL	876.54		JUL	870.97
	AUG	875.66		AUG	876.52		AUG	870.95
	SEP	876.11		SEP	876.56		SEP	870.41
	OCT	876.56		OCT	876.71		OCT	869.82
	NOV	877.00		NOV	876.87		NOV	869.30
	DEC	877.45		DEC	877.02		DEC	868.78
1933	JAN	876.97	1937	JAN	877.17	1941	JAN	868.27
	FEB	876.48		FEB	877.32		FEB	867.80
	MAR	876.00		MAR	877.48		MAR	867.93
	APR	875.52		APR	877.63		APR	868.22
	MAY	875.03		MAY	877.78		MAY	869.35
	JUN	874.55		JUN	877.93		JUN	871.89
	JUL	874.07		JUL	878.09		JUL	873.29
	AUG	873.59		AUG	877.53		AUG	873.82
	SEP	873.10		SEP	876.91		SEP	873.99
	OCT	872.62		OCT	876.41		OCT	874.31
	NOV	872.14		NOV	875.92		NOV	874.60
	DEC	871.66		DEC	875.42		DEC	875.40

CITY OF UVALDE WELL
BEGINNING-OF-MONTH WELL LEVELS
UNITS = FEET-MSL

YEAR	MONTH	LEVEL	YEAR	MONTH	LEVEL	YEAR	MONTH	LEVEL
1942	JAN	875.74	1946	JAN	865.22	1950	JAN	871.19
	FEB	875.77		FEB	864.88		FEB	871.30
	MAR	875.55		MAR	864.35		MAR	870.98
	APR	875.01		APR	863.79		APR	869.98
	MAY	874.51		MAY	863.33		MAY	869.35
	JUN	873.91		JUN	863.14		JUN	868.90
	JUL	873.29		JUL	863.37		JUL	868.05
	AUG	872.73		AUG	863.94		AUG	867.20
	SEP	871.96		SEP	863.79		SEP	866.55
	OCT	872.76		OCT	863.79		OCT	865.78
	NOV	873.42		NOV	865.10		NOV	864.52
	DEC	874.12		DEC	866.50		DEC	863.13
1943	JAN	874.45	1947	JAN	867.11	1951	JAN	861.78
	FEB	874.54		FEB	867.49		FEB	860.70
	MAR	874.27		MAR	868.37		MAR	859.58
	APR	873.78		APR	868.92		APR	858.49
	MAY	873.15		MAY	869.23		MAY	857.15
	JUN	872.58		JUN	869.18		JUN	857.23
	JUL	872.27		JUL	869.89		JUL	855.74
	AUG	871.79		AUG	870.45		AUG	853.43
	SEP	870.86		SEP	870.68		SEP	851.72
	OCT	870.45		OCT	870.15		OCT	850.32
	NOV	869.76		NOV	869.66		NOV	849.76
	DEC	868.81		DEC	869.21		DEC	848.64
1944	JAN	868.01	1948	JAN	868.45	1952	JAN	846.89
	FEB	867.31		FEB	867.59		FEB	844.34
	MAR	866.89		MAR	866.86		MAR	843.50
	APR	867.08		APR	865.74		APR	842.66
	MAY	867.39		MAY	864.68		MAY	841.82
	JUN	867.56		JUN	863.89		JUN	840.97
	JUL	868.09		JUL	862.83		JUL	840.12
	AUG	867.50		AUG	863.53		AUG	839.27
	SEP	867.57		SEP	863.35		SEP	838.42
	OCT	868.95		OCT	863.03		OCT	837.47
	NOV	869.34		NOV	862.41		NOV	836.03
	DEC	869.28		DEC	861.52		DEC	836.10
1945	JAN	869.01	1949	JAN	860.52	1953	JAN	835.14
	FEB	869.01		FEB	859.71		FEB	833.71
	MAR	869.45		MAR	860.16		MAR	832.01
	APR	869.74		APR	863.02		APR	830.41
	MAY	870.03		MAY	865.20		MAY	827.74
	JUN	869.85		JUN	866.45		JUN	824.71
	JUL	869.45		JUL	867.61		JUL	821.76
	AUG	868.66		AUG	867.99		AUG	819.05
	SEP	867.81		SEP	868.58		SEP	820.02
	OCT	866.81		OCT	869.56		OCT	828.98
	NOV	866.13		NOV	870.48		NOV	832.11
	DEC	865.57		DEC	870.92		DEC	831.91

CITY OF UVALDE WELL
BEGINNING-OF-MONTH WELL LEVELS
UNITS = FEET-MSL

YEAR	MONTH	LEVEL	YEAR	MONTH	LEVEL	YEAR	MONTH	LEVEL
1954	JAN	832.23	1958	JAN	840.95	1962	JAN	878.29
	FEB	831.55		FEB	843.14		FEB	878.00
	MAR	829.36		MAR	845.82		MAR	877.31
	APR	826.28		APR	848.86		APR	876.48
	MAY	825.22		MAY	850.22		MAY	876.11
	JUN	827.55		JUN	851.82		JUN	875.31
	JUL	832.50		JUL	854.14		JUL	874.06
	AUG	835.32		AUG	855.27		AUG	872.41
	SEP	836.25		SEP	856.52		SEP	871.96
	OCT	835.11		OCT	859.61		OCT	871.38
	NOV	835.65		NOV	862.28		NOV	870.58
	DEC	834.03		DEC	864.45		DEC	870.08
1955	JAN	833.03	1959	JAN	866.12	1963	JAN	869.75
	FEB	832.44		FEB	867.50		FEB	868.73
	MAR	831.20		MAR	868.48		MAR	868.36
	APR	829.70		APR	868.71		APR	867.30
	MAY	825.87		MAY	869.62		MAY	866.80
	JUN	827.43		JUN	870.42		JUN	868.29
	JUL	824.64		JUL	871.41		JUL	867.46
	AUG	825.03		AUG	872.86		AUG	865.66
	SEP	823.40		SEP	872.86		SEP	863.81
	OCT	824.78		OCT	873.71		OCT	863.75
	NOV	831.41		NOV	875.40		NOV	862.43
	DEC	833.99		DEC	875.95		DEC	861.40
1956	JAN	833.80	1960	JAN	876.09	1964	JAN	860.98
	FEB	834.04		FEB	876.36		FEB	859.64
	MAR	832.13		MAR	876.21		MAR	858.65
	APR	828.82		APR	876.30		APR	857.36
	MAY	827.05		MAY	876.27		MAY	856.58
	JUN	824.08		JUN	875.48		JUN	855.56
	JUL	820.75		JUL	873.60		JUL	853.23
	AUG	818.09		AUG	874.08		AUG	851.41
	SEP	817.73		SEP	875.27		SEP	850.42
	OCT	815.08		OCT	875.41		OCT	852.13
	NOV	817.47		NOV	875.97		NOV	856.57
	DEC	815.31		DEC	876.47		DEC	858.23
1957	JAN	814.84	1961	JAN	876.96	1965	JAN	860.36
	FEB	813.68		FEB	877.27		FEB	860.66
	MAR	812.73		MAR	877.74		MAR	862.05
	APR	811.30		APR	877.22		APR	862.48
	MAY	817.28		MAY	876.90		MAY	864.01
	JUN	826.19		JUN	876.04		JUN	865.64
	JUL	832.55		JUL	876.31		JUL	864.70
	AUG	832.56		AUG	877.78		AUG	864.56
	SEP	831.33		SEP	877.57		SEP	864.69
	OCT	833.04		OCT	877.29		OCT	864.79
	NOV	837.72		NOV	878.24		NOV	865.09
	DEC	839.69		DEC	878.38		DEC	865.20

CITY OF UVALDE WELL
BEGINNING-OF-MONTH WELL LEVELS
UNITS = FEET-MSL

YEAR	MONTH	LEVEL	YEAR	MONTH	LEVEL	YEAR	MONTH	LEVEL
1966	JAN	865.88	1970	JAN	875.08	1974	JAN	881.40
	FEB	866.16		FEB	875.68		FEB	881.17
	MAR	866.03		MAR	875.54		MAR	880.49
	APR	865.35		APR	876.13		APR	879.63
	MAY	865.23		MAY	875.52		MAY	878.66
	JUN	864.69		JUN	874.45		JUN	878.90
	JUL	862.12		JUL	872.77		JUL	876.62
	AUG	860.73		AUG	872.36		AUG	876.06
	SEP	862.55		SEP	871.82		SEP	879.35
	OCT	864.84		OCT	872.56		OCT	879.98
	NOV	865.26		NOV	873.26		NOV	880.01
	DEC	866.79		DEC	872.93		DEC	880.47
1967	JAN	867.27	1971	JAN	873.08	1975	JAN	880.94
	FEB	866.25		FEB	871.20		FEB	881.04
	MAR	865.28		MAR	870.01		MAR	881.32
	APR	864.76		APR	869.17		APR	880.36
	MAY	864.08		MAY	868.80		MAY	881.48
	JUN	860.88		JUN	865.70		JUN	882.02
	JUL	858.90		JUL	865.12		JUL	880.43
	AUG	857.80		AUG	867.24		AUG	880.95
	SEP	857.21		SEP	871.41		SEP	880.14
	OCT	858.12		OCT	873.35		OCT	880.13
	NOV	859.46		NOV	876.10		NOV	880.06
	DEC	862.58		DEC	877.01		DEC	879.92
1968	JAN	864.82	1972	JAN	877.71	1976	JAN	879.46
	FEB	866.96		FEB	877.09		FEB	877.99
	MAR	868.76		MAR	876.63		MAR	876.70
	APR	870.39		APR	876.45		APR	876.14
	MAY	871.56		MAY	875.11		MAY	877.59
	JUN	872.80		JUN	875.09		JUN	878.51
	JUL	871.77		JUL	874.69		JUL	876.44
	AUG	872.37		AUG	874.99		AUG	880.98
	SEP	871.95		SEP	875.41		SEP	882.08
	OCT	873.00		OCT	876.65		OCT	883.11
	NOV	873.18		NOV	877.16		NOV	883.91
	DEC	872.89		DEC	877.10		DEC	884.51
1969	JAN	873.06	1973	JAN	877.25	1977	JAN	884.96
	FEB	872.16		FEB	876.69		FEB	885.11
	MAR	871.21		MAR	877.16		MAR	885.34
	APR	870.51		APR	877.26		APR	884.80
	MAY	870.57		MAY	877.45		MAY	885.15
	JUN	870.62		JUN	874.95		JUN	885.72
	JUL	868.46		JUL	875.73		JUL	883.63
	AUG	867.55		AUG	878.17		AUG	882.76
	SEP	867.11		SEP	878.48		SEP	882.00
	OCT	867.41		OCT	879.58		OCT	881.71
	NOV	871.58		NOV	880.83		NOV	881.99
	DEC	873.41		DEC	881.51		DEC	882.59

CITY OF UVALDE WELL
BEGINNING-OF-MONTH WELL LEVELS
UNITS = FEET-MSL

YEAR	MONTH	LEVEL	YEAR	MONTH	LEVEL	YEAR	MONTH	LEVEL
1978	JAN	882.59	1982	JAN	881.83	1986	JAN	876.88
	FEB	881.54		FEB	881.13		FEB	876.92
	MAR	880.10		MAR	880.18		MAR	874.86
	APR	879.53		APR	880.43		APR	874.29
	MAY	878.52		MAY	879.45		MAY	873.57
	JUN	877.34		JUN	880.50		JUN	873.17
	JUL	877.02		JUL	879.22		JUL	874.17
	AUG	875.79		AUG	878.43		AUG	872.59
	SEP	877.06		SEP	877.36		SEP	872.85
	OCT	877.54		OCT	876.50		OCT	873.15
	NOV	877.30		NOV	876.70		NOV	875.34
	DEC	877.76		DEC	876.85		DEC	876.71
1979	JAN	877.39	1983	JAN	877.08	1987	JAN	877.89
	FEB	877.27		FEB	876.90		FEB	879.06
	MAR	876.58		MAR	876.13		MAR	880.09
	APR	876.81		APR	876.07		APR	881.27
	MAY	879.21		MAY	874.90		MAY	881.55
	JUN	879.33		JUN	873.17		JUN	884.87
	JUL	881.18		JUL	872.45		JUL	888.67
	AUG	880.33		AUG	871.85		AUG	887.92
	SEP	879.91		SEP	871.69		SEP	887.51
	OCT	879.40		OCT	871.65		OCT	887.69
	NOV	879.11		NOV	871.92		NOV	887.24
	DEC	879.10		DEC	872.53		DEC	887.21
1980	JAN	879.13	1984	JAN	872.97	1988	JAN	887.04
	FEB	877.65		FEB	873.03		FEB	886.55
	MAR	875.53		MAR	870.89		MAR	884.78
	APR	874.37		APR	869.90		APR	883.69
	MAY	872.85		MAY	867.49		MAY	881.86
	JUN	874.00		JUN	864.85		JUN	880.52
	JUL	870.81		JUL	861.34		JUL	878.46
	AUG	868.20		AUG	858.27		AUG	878.88
	SEP	869.97		SEP	857.36		SEP	878.89
	OCT	870.01		OCT	857.01		OCT	879.52
	NOV	870.02		NOV	859.30		NOV	879.36
	DEC	870.32		DEC	860.44		DEC	879.27
1981	JAN	870.74	1985	JAN	861.82	1989	JAN	879.08
	FEB	870.33		FEB	866.70		FEB	878.91
	MAR	868.12		MAR	869.11		MAR	878.51
	APR	868.62		APR	871.16		APR	877.62
	MAY	871.99		MAY	871.27		MAY	876.25
	JUN	874.14		JUN	871.52		JUN	873.26
	JUL	876.35		JUL	870.71		JUL	869.02
	AUG	877.21		AUG	870.18		AUG	867.14
	SEP	877.98		SEP	870.03		SEP	868.00
	OCT	879.37		OCT	871.46		OCT	867.40
	NOV	880.94		NOV	875.75		NOV	867.09
	DEC	881.68		DEC	876.77		DEC	867.06

APPENDIX I

Recharge Summaries

KEY TO
ANNUAL RECHARGE SUMMARIES
NUECES RIVER BASIN

CONTROL POINT	WATERSHED(S)
CP3	Nueces River
CP9	Frio River
CP10	Leona River
CP11	Hackberry & Blanco Creeks
CP13	Sabinal River
CP14	Little Blanco & Nolton Creeks
CP15	Ranchero Creek
CP17	Seco Creek
CP19	Hondo Creek
CP20	Parkers & Live Oak Creeks
CP22	Verde Creek
CP23	Elm & Quihi Creeks

ANNUAL RECHARGE SUMMARY

EXISTING RECHARGE STRUCTURES HONORING UPSTREAM WATER RIGHTS — UNITS = ACRE-FEET

YEAR	CP3	CP9	CP10	CP11	CP13	CP14	CP15	CP17	CP19	CP20	CP22	CP23	TOTAL
1934	30623	27063	1099	2773	6432	2131	468	6432	6946	2145	12080	8696	106888
1935	131989	277243	18959	23006	54282	12354	3341	115582	74247	14062	57002	43035	825102
1936	209204	154350	4932	7320	40197	6368	1589	70190	39951	5229	31550	21668	592548
1937	39882	64822	1461	3157	18442	1990	429	14896	15786	2027	13167	8610	184669
1938	65331	58497	1025	2682	15495	1062	230	11931	15207	2590	15240	9974	199264
1939	219447	61477	2291	4611	13178	2183	497	12083	12717	2735	9238	6965	347422
1940	70860	58551	1480	3783	15574	1777	385	11939	14483	2787	12391	9637	203647
1941	102168	126355	5882	9548	34473	7944	2003	47947	38446	7126	35372	25909	443173
1942	78877	78488	1278	3147	24223	1628	366	17702	22140	3212	17598	12476	261135
1943	53568	39743	673	1953	11459	1522	327	8391	9772	1735	9683	6877	145703
1944	95395	86567	5381	9088	20070	1250	244	18554	18962	2785	12212	8826	279334
1945	56485	78825	5798	9369	21255	4165	1061	25624	20611	3590	17749	12549	257081
1946	104102	64306	4386	7086	16462	4166	1018	14232	13024	2255	16769	11217	259023
1947	100676	72498	2307	4343	15887	2552	571	13631	13478	2141	9615	6616	244315
1948	55492	36671	3949	6420	6586	4050	1031	5393	2388	841	9280	6973	139074
1949	116183	96038	5090	7789	22694	4077	1002	24951	21490	3525	21747	15653	340239
1950	59207	33786	939	2108	10834	1840	455	7992	8410	1430	7470	5226	139697
1951	53871	28196	1197	2569	4689	885	212	8430	5715	1490	14123	10667	132044
1952	26794	19593	1957	2887	5868	2759	659	5547	6254	1656	8526	6074	88574
1953	24977	22166	2220	3972	2383	1684	382	7889	10524	2324	8940	7459	94920
1954	40862	21445	1095	1925	2520	1066	251	4524	3683	539	1379	1360	80649
1955	201652	23124	1459	3166	1326	1323	314	1543	2563	957	3805	2739	243971
1956	20976	5938	612	1485	2067	1717	417	1452	4056	1518	7380	5716	53334
1957	102713	78144	4947	7466	17719	3674	936	39882	33529	5966	30314	21356	346646
1958	199326	235076	7383	10707	58503	9060	2416	94785	58848	9719	39799	32814	758436
1959	104235	150412	8025	11024	44206	5919	1518	33076	26165	4321	25100	17600	431601
1960	95307	120639	3570	6051	53571	5156	1280	37627	36156	4875	25451	17283	406966
1961	123662	147989	4909	7565	47108	4287	1063	33779	31921	3135	13810	9636	428864
1962	57439	44973	1720	3179	3987	702	145	3377	2884	736	3683	2988	125813
1963	46974	31254	1543	3195	4362	1446	316	2059	2035	472	1419	1268	96343
1964	134170	58581	2408	4468	16162	2648	614	25337	15496	3816	19203	14124	297027
1965	114570	79523	3056	6081	34706	7542	2045	27381	27901	4357	24529	16952	348643
1966	122953	95595	1012	2391	31373	1147	239	27276	22660	2974	15584	10090	333294
1967	82085	118267	8202	10711	30445	6739	1722	32296	16663	3049	14998	10095	335272
1968	94884	164465	6728	10112	61703	10785	2855	79364	55137	7598	32612	22361	548604
1969	120105	101102	5393	7811	28349	5747	1432	24081	29586	4597	23660	17286	369149
1970	77282	116919	1585	3086	30292	2397	553	16855	27723	4066	17962	11390	310110
1971	166921	161816	5811	8244	28468	3349	816	44064	26477	5681	29780	22885	504312
1972	62797	119450	1863	3363	41109	2416	585	53439	34090	4444	22772	16266	362594
1973	146485	191129	6659	10472	49722	5461	1341	92014	78276	11922	52173	39032	684686
1974	45170	121127	7952	10822	33888	6050	1527	24090	28295	4249	16249	12591	312010
1975	68129	114477	3834	6452	39459	2821	670	41009	59412	5640	29089	19712	390704
1976	123116	212313	15724	20344	54041	8917	2290	51786	60376	8039	38867	28842	624655
1977	18013	165695	5188	7521	54752	4147	1049	36492	51134	4177	22795	15572	386535
1978	63138	70244	2555	4684	32147	4259	1030	23225	20639	3049	18387	13656	257013
1979	87623	132080	7818	10633	43037	7124	1871	55129	64359	8958	34422	26369	479423
1980	52110	60532	1630	3307	21564	1299	282	6395	9989	1370	7275	5475	171228
1981	99050	220255	6018	8815	69243	7987	2057	79044	66629	6463	36644	27265	629470
1982	40796	90125	2773	5575	20648	1520	326	13628	10530	1477	7188	5431	200017
1983	91570	71040	2439	4750	23675	2049	441	8908	14887	2204	15156	10866	247985
1984	54265	41581	307	1116	14088	1433	329	11841	6637	1456	3981	2922	139956
1985	91154	153696	6622	9668	49426	5111	1261	59238	55081	6157	33389	24420	495223
1986	95768	122946	3326	5974	40994	4441	1070	59655	40154	4635	23469	16646	419078
1987	91037	263550	9719	12957	69782	6191	1672	104186	77270	13209	55060	40528	745161
1988	52593	89093	2081	4277	15144	1063	202	4068	7782	1005	3842	2589	183739
1989	44922	42699	1093	2730	7380	590	120	3331	4288	786	2905	2403	113247
AVG	88018	98617	4096	6424	27454	3821	952	30457	26498	3988	19534	14172	324029

ANNUAL RECHARGE SUMMARY

TYPE 1 RECHARGE STRUCTURES HONORING ALL WATER RIGHTS EXCLUDING THE CC/LCC SYSTEM UNITS = ACRE-FEET

YEAR	CP3	CP9	CP10	CP11	CP13	CP14	CP15	CP17	CP19	CP20	CP22	CP23	TOTAL
1934	31534	27057	1099	2773	6429	2131	468	6432	6944	2145	13078	8696	108786
1935	220583	321039	18959	23006	68083	12353	3341	148660	121468	14062	74352	43033	1068939
1936	331964	231220	4932	7320	77299	6368	1589	83089	89735	5229	51215	21668	911628
1937	166955	163138	1461	3157	60335	1990	429	24417	21457	2027	13167	8610	467143
1938	187954	101876	1025	2682	52624	1062	230	11960	17703	2590	16101	9974	405781
1939	252483	76353	2291	4611	24995	2183	497	15440	19622	2735	10269	6965	418444
1940	77401	60984	1480	3783	18983	1777	385	11939	15635	2787	15051	9637	219842
1941	121493	166497	5882	9548	66632	7944	2003	56565	59497	7126	45677	25909	574773
1942	112016	88944	1278	3147	39828	1628	366	18459	26087	3212	20537	12476	327978
1943	59980	39737	673	1953	11453	1522	327	8391	9765	1735	9683	6877	152096
1944	103490	89705	5381	9088	24756	1250	244	18762	21167	2785	13631	8826	299085
1945	58735	85063	5798	9369	34191	4165	1061	28101	27774	3590	20490	12548	290885
1946	121378	74489	4386	7086	20572	4166	1018	14739	14688	2255	17811	11217	293805
1947	109612	79111	2307	4343	18036	2552	571	13790	14354	2141	9615	6616	263048
1948	66756	36665	3949	6420	6589	4050	1031	5393	2381	841	11186	6973	152234
1949	167643	117747	5090	7789	35025	4077	1002	26774	27310	3525	26850	15653	438485
1950	64704	33780	939	2108	11214	1840	455	7992	8403	1430	7470	5226	145561
1951	54085	29702	1197	2569	7695	885	212	9184	7361	1490	19701	10667	144748
1952	29301	19587	1957	2887	6714	2759	659	5547	6249	1656	8526	6074	91916
1953	31117	22161	2220	3972	3299	1684	382	7889	13131	2324	13516	7459	109154
1954	74849	34190	1095	1925	8184	1066	251	4704	4133	539	1379	1360	133675
1955	237013	28200	1459	3166	1323	1322	312	1543	2560	957	3805	2739	284399
1956	55412	5942	612	1485	2619	1717	417	1452	4053	1518	9389	5716	90332
1957	118274	97794	4947	7466	35398	3673	935	48630	58466	5966	37378	21356	440283
1958	276565	266253	7383	10707	91477	9060	2416	131140	122975	9719	63087	32811	1023593
1959	239633	204816	8025	11024	72477	5919	1518	36039	32024	4321	30113	17600	663509
1960	214766	121244	3570	6051	72529	5156	1280	39277	39380	4875	29371	17283	554782
1961	198278	151577	4909	7565	75971	4287	1063	36075	37693	3135	15120	9636	545309
1962	73178	44967	1720	3179	23391	702	145	3377	2877	736	3683	2988	160943
1963	68263	31248	1543	3195	4359	1446	316	2059	2029	472	1419	1268	117617
1964	174932	58826	2408	4468	20655	2648	614	26556	17461	3816	23423	14124	349931
1965	189946	81220	3056	6081	37085	7542	2045	27884	30855	4357	27879	16951	434901
1966	155642	129632	1012	2391	37515	1147	239	27276	22653	2974	15620	10090	406191
1967	101265	136461	8202	10711	44412	6739	1722	34652	19428	3049	15495	10095	392231
1968	154745	166775	6728	10112	96812	10785	2855	83721	69576	7598	38646	22361	670714
1969	160351	108997	5392	7810	40549	5747	1432	24299	34395	4597	28700	17286	439555
1970	154671	141638	1585	3086	44130	2397	553	16855	29941	4066	19527	11390	429839
1971	225307	168168	5811	8244	40596	3349	816	71786	60421	5681	39767	22884	652830
1972	198480	173037	1863	3363	65959	2416	585	69560	59057	4444	35940	16266	630970
1973	273761	221967	6659	10472	76840	5461	1341	107524	109866	11922	68777	39031	933621
1974	182356	171809	7951	10822	65664	6050	1527	24090	30533	4249	29324	12591	546966
1975	198088	114471	3834	6452	64185	2821	670	41009	62830	5640	34965	19712	554677
1976	200024	243054	15724	20344	78914	8916	2290	54564	68890	8039	52908	28842	782509
1977	155487	182167	5188	7521	81733	4147	1049	36492	54606	4177	27538	15571	575676
1978	129725	71848	2555	4684	64146	4259	1030	24231	27088	3049	24637	13655	370907
1979	128269	148199	7818	10633	77000	7123	1870	64195	85438	8958	53624	26368	619495
1980	59094	82886	1630	3307	49231	1299	282	7264	15885	1370	8536	5475	236259
1981	198409	246549	6018	8814	86977	7986	2057	89737	85457	6463	57983	27264	823714
1982	174008	174864	2773	5575	61294	1520	326	13628	10548	1477	8564	5431	460008
1983	125264	75128	2439	4750	42514	2049	441	8908	17340	2204	17926	10866	309829
1984	62089	55336	307	1116	18303	1433	329	14960	8606	1456	3981	2922	170838
1985	177431	176996	6621	9668	64804	5111	1261	60947	57641	6157	41374	24419	632430
1986	146672	129471	3326	5974	50158	4441	1070	59655	42514	4635	30011	16646	494573
1987	222130	292341	9719	12957	87841	6190	1672	124643	124884	13208	77851	40527	1013963
1988	182601	172026	2081	4277	60706	1063	202	4068	7916	1005	5242	2589	443776
1989	93399	54028	1093	2730	37446	590	120	3331	4282	786	2905	2403	203113
AVG	145528	118375	4096	6424	44249	3821	952	34815	35626	3988	25068	14172	437112

ANNUAL RECHARGE SUMMARY

TYPE 1 RECHARGE STRUCTURES HONORING ALL WATER RIGHTS

UNITS = ACRE-FEET

YEAR	CP3	CP9	CP10	CP11	CP13	CP14	CP15	CP17	CP19	CP20	CP22	CP23	TOTAL
1934	31534	27057	1099	2773	6429	2131	468	6432	6944	2145	13078	8696	108786
1935	220583	321039	18959	23006	68083	12353	3341	148660	121468	14062	74352	43033	1068939
1936	332601	255293	4932	7320	77299	6368	1589	81674	83282	5229	51215	21668	928470
1937	166955	146271	1461	3157	60335	1990	429	14961	17753	2027	13167	8610	437116
1938	184443	64079	1025	2682	52624	1062	230	11960	17703	2590	16101	9974	364473
1939	233187	75191	2291	4611	18761	2183	497	15440	19622	2735	10269	6965	391752
1940	77401	60984	1480	3783	18983	1777	385	11939	15635	2787	15051	9637	219842
1941	121493	166497	5882	9548	66853	7944	2003	56565	59497	7126	45677	25909	574994
1942	112016	88944	1278	3147	38528	1628	366	18459	26087	3212	20537	12476	326678
1943	59980	39737	673	1953	11453	1522	327	8391	9765	1735	9683	6877	152096
1944	103490	89705	5381	9088	24756	1250	244	18762	21167	2785	13631	8826	299085
1945	58735	85063	5798	9369	34191	4165	1061	28101	27774	3590	20490	12548	290885
1946	121378	74489	4386	7086	20572	4166	1018	14739	14688	2255	17811	11217	293805
1947	109612	79111	2307	4343	18036	2552	571	13790	14354	2141	9615	6616	263048
1948	63209	36665	3949	6420	6589	4050	1031	5393	2381	841	11186	6973	148687
1949	158245	117747	5090	7789	35025	4077	1002	26774	27310	3525	26850	15653	429087
1950	64704	33780	939	2108	11214	1840	455	7992	8403	1430	7470	5226	145561
1951	54085	29702	1197	2569	7695	885	212	9184	7361	1490	16864	10667	141911
1952	29301	19587	1957	2887	6714	2759	659	5547	6249	1656	8526	6074	91916
1953	31117	22161	2220	3972	3299	1684	382	7889	13131	2324	11681	7459	107319
1954	51827	34190	1095	1925	7523	1066	251	4704	4133	539	1379	1360	109992
1955	206636	28200	1459	3166	1323	1322	312	1543	2560	957	3805	2739	254022
1956	20974	5942	612	1485	2619	1717	417	1452	4053	1518	9389	5716	55894
1957	118274	97794	4947	7466	34324	3673	935	48630	58466	5966	36802	21356	438633
1958	255854	281251	7383	10707	96891	9060	2416	122623	107020	9719	55640	32811	991375
1959	181890	166859	8025	11024	57725	5919	1518	36039	32024	4321	30113	17600	553057
1960	149328	121244	3570	6051	58424	5156	1280	39277	39380	4875	29371	17283	475239
1961	172796	151577	4909	7565	57975	4287	1063	36075	37693	3135	15120	9636	501831
1962	73178	44967	1720	3179	3984	702	145	3377	2877	736	3683	2988	141536
1963	55585	31248	1543	3195	4359	1446	316	2059	2029	472	1419	1268	104939
1964	153156	58826	2408	4468	20655	2648	614	26556	17461	3816	23423	14124	328155
1965	141263	81220	3056	6081	37085	7542	2045	27884	30855	4357	27879	16951	386218
1966	139528	118544	1012	2391	37515	1147	239	27276	22653	2974	15620	10090	378989
1967	101265	136461	8202	10711	45971	6739	1722	34652	19428	3049	15495	10095	393790
1968	154745	166775	6728	10112	86030	10785	2855	83721	69576	7598	38646	22361	659932
1969	138076	119658	5392	7810	33454	5747	1432	24299	34395	4597	28700	17286	420846
1970	108093	117191	1585	3086	31421	2397	553	16855	29941	4066	19527	11390	346105
1971	224698	192976	5811	8244	42172	3349	816	64542	46515	5681	39342	22884	657030
1972	200632	126118	1863	3363	59446	2416	585	58509	43053	4444	27231	16266	543926
1973	270623	221967	6659	10472	66090	5461	1341	107524	109866	11922	68874	39031	919830
1974	183575	171809	7951	10822	65664	6050	1527	24090	30533	4249	28083	12591	546944
1975	122404	114471	3834	6452	64185	2821	670	41009	62830	5640	33974	19712	478002
1976	186197	238284	15724	20344	69626	8916	2290	54564	68890	8039	50329	28842	752045
1977	141330	182167	5188	7521	82902	4147	1049	36492	54606	4177	27538	15571	562688
1978	88217	71848	2555	4684	37306	4259	1030	24231	27088	3049	23237	13655	301159
1979	113721	148199	7818	10633	61049	7123	1870	62582	80807	8958	44998	26368	574126
1980	59094	71576	1630	3307	27129	1299	282	7264	15885	1370	8536	5475	202847
1981	198703	261631	6018	8814	86990	7986	2057	89737	85457	6463	52216	27264	833336
1982	174444	146296	2773	5575	61294	1520	326	13628	10548	1477	8564	5431	431876
1983	111197	71312	2439	4750	31048	2049	441	8908	17340	2204	17926	10866	280480
1984	62089	55336	307	1116	18303	1433	329	14960	8606	1456	3981	2922	170838
1985	127496	173260	6621	9668	62932	5111	1261	60947	57641	6157	41018	24419	576531
1986	134626	129471	3326	5974	50238	4441	1070	59655	42514	4635	27030	16646	479626
1987	150056	320149	9719	12957	101670	6190	1672	114206	91841	13208	66230	40527	928425
1988	84479	101059	2081	4277	21691	1063	202	4068	7916	1005	4285	2589	234715
1989	52204	42693	1093	2730	7677	590	120	3331	4282	786	2905	2403	120814
AVG	129327	114923	4096	6424	39681	3821	952	33927	33952	3988	24028	14172	409290

ANNUAL RECHARGE SUMMARY

TYPE 2 RECHARGE STRUCTURES HONORING ALL WATER RIGHTS EXCLUDING THE CC/LCC SYSTEM UNITS = ACRE-FEET

YEAR	CP3	CP9	CP10	CP11	CP13	CP14	CP15	CP17	CP19	CP20	CP22	CP23	TOTAL
1934	30618	27057	1099	2773	6429	2131	468	6432	6944	2145	13078	8696	107870
1935	199480	452425	18959	23006	172515	14025	3341	171002	154120	14062	102274	52879	1378088
1936	310444	238332	4932	7320	95720	6368	1589	73805	48742	5229	34920	21668	849069
1937	141120	69619	1461	3157	24630	1990	429	14961	17753	2027	13167	8610	298924
1938	136782	62577	1025	2682	21094	1062	230	11960	17703	2590	16101	9974	283780
1939	267160	76051	2291	4611	25360	2183	497	15440	19622	2735	10269	6965	433184
1940	71557	59634	1480	3783	18391	1777	385	11499	14477	2787	11569	9637	206976
1941	108973	162457	5882	9548	70944	7944	2003	55475	57187	7126	42436	26317	556292
1942	102472	87329	1278	3147	31519	1628	366	18243	25461	3212	20537	12476	307668
1943	54138	39737	673	1953	11453	1522	327	8391	9765	1735	9683	6877	146254
1944	100129	87891	5381	9088	24213	1250	244	18650	20993	2785	13631	8826	293081
1945	56808	83667	5798	9369	30071	4165	1061	26585	23427	3590	17338	12548	274427
1946	117710	73355	4386	7086	19676	4166	1018	14555	14446	2255	17184	11217	287054
1947	101950	75121	2307	4343	17715	2552	571	13790	14354	2141	9429	6616	250889
1948	83096	36665	3949	6420	6945	4050	1031	5393	2381	841	11088	6973	168832
1949	208984	120908	5090	7789	34394	4077	1002	24990	24302	3525	23811	15653	474525
1950	123843	33780	939	2108	10829	1840	455	7992	8403	1430	7216	5226	204061
1951	53865	29187	1197	2569	7690	885	212	9184	7361	1490	19950	11605	145195
1952	29025	19587	1957	2887	6074	2759	659	5547	6249	1656	8526	6074	91000
1953	34309	22161	2220	3972	3755	1969	382	7889	13639	2324	13608	7978	114206
1954	74586	36333	1712	2979	5354	1705	251	4110	3678	539	1379	1360	133986
1955	235395	25123	1459	3166	1323	1322	312	1543	2560	957	3805	2739	279704
1956	107323	5933	612	1485	2702	1836	417	1452	4053	1518	9389	5716	142436
1957	118142	95742	4947	7466	36604	5224	935	47617	52830	5966	33667	21433	430573
1958	258381	303306	8434	12263	162309	11990	2416	132302	125623	9719	63336	34988	1125067
1959	205474	174219	8502	11870	64377	5923	1518	35124	30002	4321	26979	17600	585909
1960	196544	120641	3570	6051	55727	5156	1280	38000	37149	4875	24069	17283	510345
1961	224900	150902	4909	7565	55782	4287	1063	36075	37693	3135	15120	9636	551067
1962	116255	44967	1720	3179	3984	702	145	3377	2877	736	3683	2988	184613
1963	62669	31248	1543	3195	4359	1446	316	2059	2029	472	1419	1268	112023
1964	167913	58575	2408	4468	18945	2648	614	24509	15538	3816	21088	14124	334646
1965	215808	79517	3056	6081	36132	7542	2045	27564	28895	4357	23390	17743	452130
1966	224191	128827	1255	2943	35899	1147	239	27276	22653	2974	14678	10090	472172
1967	118320	133477	8202	10711	53776	6739	1722	34648	19416	3049	15377	10095	415532
1968	150304	166068	6728	10112	97684	10785	2855	83714	69409	7598	37768	22361	665386
1969	147722	144937	8322	11467	45208	5747	1432	24292	34352	4597	26544	17905	472525
1970	162827	116914	1585	3086	31396	2397	553	16855	30045	4066	18311	11390	399425
1971	225712	226971	7997	10893	86576	6279	816	82783	65150	5681	52490	27373	798721
1972	164035	125000	1863	3363	47412	2416	585	55076	39864	4444	25166	16266	485490
1973	247725	264623	6659	10472	113111	8391	1341	108480	111913	11922	83637	43787	1012061
1974	146408	131355	8138	11041	39445	6050	1527	24090	33164	4249	18635	12591	436693
1975	169368	114471	3834	6452	41234	2821	670	41009	62830	5640	34995	19952	503276
1976	224354	242458	15724	20344	100814	11059	2290	54564	68890	8039	53478	29723	831737
1977	119254	181792	5188	7521	90446	4147	1049	36492	54606	4177	27572	15574	547818
1978	163634	71245	2555	4684	47497	4259	1030	24231	27088	3049	24686	14024	387982
1979	116500	146914	7818	10633	84498	7841	1870	66758	85566	8958	56877	29565	623798
1980	52622	86771	1630	3307	34023	1299	282	9461	15350	1370	8536	5475	220126
1981	174978	345504	8344	11915	150861	8217	2057	86674	80451	6463	63216	33365	972045
1982	142036	95347	2773	5575	23183	1520	326	13628	10548	1477	8564	5431	310408
1983	168323	71035	2439	4750	23979	2049	441	8908	17339	2204	15984	10866	328317
1984	54756	41576	307	1116	14083	1433	329	11427	6632	1456	3953	2922	139990
1985	179542	176778	6676	9745	64992	5111	1261	61075	57641	6157	38245	24752	631975
1986	133599	127677	3326	5974	50577	4441	1070	59655	42514	4635	30788	17710	481966
1987	192278	401882	15460	19852	133660	9120	1672	130317	105381	13208	82278	45876	1150984
1988	153832	101059	2081	4277	19025	1063	202	4068	7916	1005	4285	2589	301402
1989	94940	42693	1093	2730	7564	590	120	3331	4282	786	2905	2403	163437
AVG	143627	119097	4378	6792	45071	4162	952	34720	34344	3988	24859	14925	436913

ANNUAL RECHARGE SUMMARY

TYPE 2 RECHARGE STRUCTURES HONORING ALL WATER RIGHTS — UNITS = ACRE-FEET

YEAR	CP3	CP9	CP10	CP11	CP13	CP14	CP15	CP17	CP19	CP20	CP22	CP23	TOTAL
1934	30618	27057	1099	2773	6429	2131	468	6432	6944	2145	11459	8696	106251
1935	199480	449088	18959	23006	169157	14025	3341	170595	153399	14062	102191	52879	1370182
1936	310444	197430	4932	7320	54162	6368	1589	72601	47321	5229	34365	21668	763429
1937	141120	64829	1461	3157	18439	1990	429	14152	15780	2027	12819	8610	284813
1938	119528	58511	1025	2682	15490	1062	230	11346	15204	2590	14193	9974	251835
1939	219586	61471	2291	4611	13173	2183	497	11545	12711	2735	8692	6965	346460
1940	70867	58550	1480	3783	15569	1777	385	11475	14477	2787	11569	9637	202356
1941	108973	156560	5882	9548	62248	7944	2003	52905	52515	7126	42436	26317	534457
1942	101690	85348	1278	3147	29705	1628	366	18238	25314	3212	18880	12476	301282
1943	53669	39737	673	1953	11453	1522	327	8391	9765	1735	9554	6877	145656
1944	97668	86564	5381	9088	20064	1250	244	17416	18955	2785	11801	8826	280042
1945	56572	78856	5798	9369	21249	4165	1061	23698	20605	3590	17266	12548	254777
1946	117710	73355	4386	7086	19676	4166	1018	14555	14446	2255	16897	11217	286767
1947	100732	72493	2307	4343	15881	2552	571	13217	13471	2141	9429	6616	243753
1948	76812	36665	3949	6420	6582	4050	1031	5393	2381	841	8771	6973	159868
1949	208984	96048	5090	7789	22695	4077	1002	23123	21484	3525	20103	15653	429573
1950	112254	33780	939	2108	10829	1840	455	7992	8403	1430	7216	5226	192472
1951	53865	28220	1197	2569	4686	885	212	8016	5711	1490	13457	10667	130975
1952	26809	19587	1957	2887	5866	2759	659	5547	6249	1656	8526	6074	88576
1953	34309	22161	2220	3972	2378	1684	382	7331	10519	2324	8529	7459	103268
1954	45645	21440	1095	1925	2517	1066	251	4110	3678	539	1379	1360	85005
1955	235395	23118	1459	3166	1323	1322	312	1543	2560	957	3805	2739	277699
1956	54289	5933	612	1485	2085	1829	417	1452	4053	1518	6969	5716	86358
1957	118142	78292	4947	7466	17717	3673	935	36832	33524	5966	27848	21356	356698
1958	258381	244979	7383	10707	83369	9060	2416	98471	70756	9719	42084	33224	870549
1959	205474	157029	8025	11024	47330	5919	1518	32188	28557	4321	24698	17600	543683
1960	196544	120633	3570	6051	54212	5156	1280	36274	36150	4875	23807	17283	505835
1961	188142	150902	4909	7565	53219	4287	1063	36073	37693	3135	14426	9636	511050
1962	57432	44967	1720	3179	3984	702	145	3377	2877	736	3683	2988	125790
1963	46967	31248	1543	3195	4359	1446	316	2059	2029	472	1419	1268	96321
1964	155503	58575	2408	4468	16219	2648	614	24507	15514	3816	17970	14124	316366
1965	153020	79517	3056	6081	34717	7542	2045	26647	27895	4357	22707	16951	384535
1966	131725	95589	1012	2391	31366	1147	239	27217	22653	2974	14519	10090	340922
1967	90472	118303	8202	10711	30469	6739	1722	31878	16658	3049	14153	10095	342451
1968	134114	164468	6728	10112	61748	10785	2855	78061	55132	7598	30122	22361	584084
1969	122524	101096	5392	7810	28342	5747	1432	23246	29580	4597	22838	17286	369890
1970	89149	116914	1585	3086	30295	2397	553	16833	27718	4066	17140	11390	321126
1971	211458	226971	7997	10893	52510	6279	816	54348	36977	5681	34581	23693	672204
1972	164035	119454	1863	3363	41106	2416	585	52926	34085	4444	20807	16266	461350
1973	229738	254191	6659	10472	97151	8391	1341	108116	108561	11922	74776	43559	954877
1974	146408	121121	7951	10822	34258	6050	1527	23902	28293	4249	15427	12591	412599
1975	146488	114471	3834	6452	39503	2821	670	40778	59406	5640	28134	19712	467909
1976	159117	212308	15724	20344	54892	8916	2290	50737	61323	8039	43103	28842	665635
1977	119254	177328	5188	7521	73026	4147	1049	36411	54488	4177	26521	15574	524684
1978	101723	70380	2555	4684	32147	4259	1030	22715	20633	3049	17565	13655	294395
1979	88661	132124	7818	10633	43043	7123	1870	53887	64354	8958	32778	26368	477617
1980	52111	60669	1630	3307	21559	1299	282	5981	9982	1370	6864	5475	170529
1981	174978	299255	7510	10726	123504	8217	2057	84792	79129	6463	51715	31040	879386
1982	142036	92737	2773	5575	20642	1520	326	13628	10523	1477	6777	5431	303445
1983	142586	71035	2439	4750	23668	2049	441	8908	14894	2204	14334	10866	298174
1984	54260	41576	307	1116	14083	1433	329	11427	6632	1456	3953	2922	139494
1985	96250	153691	6621	9668	49420	5111	1261	58387	55075	6157	30512	24419	496572
1986	115225	122943	3326	5974	40991	4441	1070	58798	40148	4635	22356	16646	436553
1987	150406	352905	12649	16343	96902	9120	1672	103249	77381	13208	55702	40527	930064
1988	141774	89175	2081	4277	15143	1063	202	4068	7775	1005	3431	2589	272583
1989	44917	42693	1093	2730	7375	590	120	3331	4282	786	2905	2403	113225
AVG	125108	109185	4214	6566	34106	4014	952	31806	29761	3988	20892	14525	385115

APPENDIX J

Elevation-Area-Capacity Data

Table J-1 Elevation - Area-Capacity Data for Lake Corpus Christi						
	1987 Conditions		1990 Conditions		2040 Conditions	
Elevation Ft. (MSL)	Area (Acres)	Capacity (Ac-Ft)	Area (Acres)	Capacity (Ac-Ft)	Area (Acres)	Capacity (Ac-Ft)
94	19,251	241,241	19,251	237,473	19,251	174,673
90	16,784	169,171	16,635	165,601	13,682	106,739
86	13,834	107,935	13,674	104,982	10,496	58,380
82	8,619	63,029	8,467	60,700	5,441	26,505
78	5,701	34,389	5,565	32,636	2,866	9,885
74	3,407	16,173	3,292	14,920	1,007	2,127
70	1,298	6,763	1,206	5,924	0	0
66	759	2,649	689	2,133	0	0
62	211	709	163	427	0	0
58	40	207	10	80	0	0
54	20	87	7	46	0	0
50	11	25	0	0	0	0
46	1	1	0	0	0	0

October 12, 1990

HDR

Mr. James L. Riley, P.E.
Water Supply Superintendent
Water Division
Wesley Seale Dam
P.O. Box 98
Sandia, Texas 78383

RE: Letter Report - Revisions to USGS 1987 Capacity Estimates of Lake Corpus Christi

Dear Mr. Riley:

Enclosed are the results of calculations performed by HDR Engineering, Inc. (HDR) with regards to the 1987 capacity survey of Lake Corpus Christi. The 1987 capacity survey was performed under the direction of the U.S. Geological Survey's (USGS) Denver, Colorado office. Our review of their report entitled "Preliminary Results of an Investigation of Factors Contributing to Water Storage Reduction within Lake Corpus Christi, Texas" indicates that with their estimates of surface area, it is mathematically impossible to derive their corresponding capacity figures. Likewise, a review of their surface area estimates reveal suspect figures when compared with their bathymetric map. However, a review of their bathymetric map shows reasonable contour spacings and bottom elevations. Additionally, a comparison of their elevation 94 feet MSL contour line with the most recent USGS 7.5 minute series maps shows very good agreement at this elevation. In summary, it appears that the USGS bathymetric map is reasonably accurate but their calculations of surface area and capacity are not.

Revised Surface Area Calculations

To correct the apparent errors in the USGS surface area calculations, HDR recalculated the surface area of the lake at each of the four foot contour lines on the USGS bathymetric map (scale 1 inch = 2000 feet). The area at each contour line was measured using a compensating polar planimeter. The new surface area figures obtained are shown in Table 1. A comparison of the HDR values with the USGS values is shown in Table 2. This comparison shows that beginning at the bottom of the lake and continuing up to elevation 82 feet MSL, there is, at the most, 331 acres difference between the USGS and HDR figures. However, at elevations 86 and 90 feet MSL, there are differences of 1,845 and 1,736 acres, respectively. At all elevations except 94 ft MSL, the surface area calculated by HDR is less than the corresponding USGS figure. At the conservation pool level of 94 ft. MSL, the surface area is only 368 acres greater than the USGS figure, a difference of less than 2 percent.

Revised Capacity Calculations

Revised capacity figures were calculated by HDR based on the new surface area figures utilizing the average end area method. This method was selected based on a review of the revised elevation versus surface area plot (shown on the top half of the attached blueline print), which shows that a straight line reasonably represents the relationship of area to elevation between the four foot contour intervals. A comparison of results obtained by the average end area method with a conical section method showed capacity differences of less

HDR Engineering, Inc.
3000 South IH 35
Suite 400
Austin, Texas 78704
Telephone
512 442-8501

than 1%. The results of these capacity calculations are summarized in Table 1. Table 2 compares the new capacity estimate with that obtained by the USGS. The 1987 capacity computed by HDR is 241,241 acre-feet or 8.2% less than the 262,666 acre-feet calculated by the USGS.

On the basis of the revised capacity data, we have recomputed the sediment deposition rate for the 1972 to 1987 period as well as the long-term sedimentation rate. The results of these calculations are summarized in Table 3. The revised sedimentation rate for the recent (15-year) period is 2,074 acre-feet per year and the new long-term (53-year) rate is 1,256 acre-feet per year. We intend to utilize the revised long-term rate in our regional planning study of the Nueces River Basin in estimating the future capacity of Lake Corpus Christi.

We have included for your use area and capacity tables in one-hundredth of a foot increments between elevations 70 and 94 ft. MSL. This data is also included on the enclosed floppy disk.

If you have any questions concerning this study or if you would like for us to perform any additional analysis, please give me a call.

Sincerely,

HDR Engineering, Inc.

Kenneth L. Choffel, P.E.
Vice President

Enclosures

klc/sh

cc: Paul Werner
Victor Medina

TABLE 1
LAKE CORPUS CHRISTI
1987 SURFACE AREA AND CAPACITY*
HDR ENGINEERING, INC.

ELEVATION (feet above msl)	SURFACE AREA (acres)	TOTAL CAPACITY (acre-feet)
94	19,251	241,241
90	16,784	169,171
86	13,834	107,935
82	8,619	63,029
78	5,701	34,389
74	3,407	16,173
70	1,298	6,763
66	759	2,649
62	211	709
58	40	207
54	20	87
50	11	25
46	1	1

* Based on planimetering four-foot contour interval map contained in 1987 USGS report titled "Preliminary results of an investigation of factors contributing to water storage reduction within Lake Corpus Christi, Texas.

TABLE 2

LAKE CORPUS CHRISTI

1987 SURFACE AREA AND CAPACITY COMPARISONS

ELEVATION (feet above msl)	SURFACE AREA – acres			TOTAL CAPACITY – acre-feet		
	USGS*	HDR**	% DIFF***	USGS*	HDR**	% DIFF***
94	18,883	19,251	1.9	262,666	241,241	(8.2)
90	18,520	16,784	(9.4)	188,845	169,171	(10.4)
86	15,679	13,834	(11.8)	120,068	107,935	(10.1)
82	8,855	8,619	(2.7)	86,361	63,029	(27.0)
78	6,032	5,701	(5.5)	37,699	34,389	(8.8)
74	3,565	3,407	(4.4)	17,005	16,173	(4.9)
70	1,404	1,298	(7.6)	7,385	6,763	(8.4)
66	873	759	(13.0)	2,799	2,649	(5.3)
62	236	211	(10.6)	611	709	16.0
58	42	40	(4.8)	214	207	(3.1)
54	22	20	(9.4)	92	87	(5.1)
50	12	11	(6.0)	25	25	(1.3)
46	1	1		0	1	

* From USGS Report Titled "Preliminary results of an investigation of factors contributing to water storage reduction within Lake Corpus Christi, Texas" dated 1987.

** Based on planimetering four-foot contour interval map contained in 1987 USGS report listed in footnote above.

*** Numbers in parentheses are negative values.

TABLE 3

LAKE CORPUS CHRISTI SEDIMENTATION SUMMARY

DATE	CAPACITY	ESTIMATED SEDIMENT VOLUME	ESTIMATED SEDIMENT VOLUME FOR LISTED INTERVAL	SEDIMENT DEPOSITION RATE FOR LISTED INTERVAL
1934	52,672	0		
			10,625	1,328
1942	43,801	10,625		
			4,414	736
1948	39,387	15,039		
			20,406	832
1972	272,352	35,445		
			31,111	2,074
1987	241,241	66,556		
AVERAGE FOR ENTIRE PERIOD				1,256

Table J-2
Elevation - Area-Capacity Data for Choke Canyon Reservoir

	1982 Conditions		1990 Conditions		2040 Conditions	
Elevation Ft. (MSL)	Area (Acres)	Capacity (Ac-Ft)	Area (Acres)	Capacity (Ac-Ft)	Area (Acres)	Capacity (Ac-Ft)
220.5	25,733	691,130	25,733	689,314	25,733	677,964
220.0	25,413	678,343	25,398	676,529	25,305	665,195
215.0	22,456	558,636	22,424	556,937	22,224	546,320
210.0	20,082	452,616	20,046	451,088	19,819	441,537
205.0	17,536	358,710	17,499	357,365	17,266	348,962
200.0	15,092	277,055	15,056	275,894	14,828	268,641
195.0	12,452	208,382	12,417	207,399	12,202	201,252
190.0	10,343	151,473	10,311	150,656	10,111	145,548
185.0	8,091	105,987	8,062	105,322	7,881	101,166
180.0	6,261	69,723	6,235	69,195	6,075	65,892
175.0	4,396	43,236	4,374	42,828	4,234	40,275
170.0	2,909	25,004	2,890	24,699	2,772	22,790
165.0	1,747	13,564	1,731	13,345	1,634	11,973
160.0	922	6,858	910	6,708	832	5,772
155.0	460	3,511	451	3,415	392	2,818
150.0	301	1,650	294	1,595	252	1,248
145.0	111	684	107	656	79	481
140.0	78	224	76	213	60	142
135.0	9	39	8	36	2	18
130.0	4	6	4	6	3	5
127.0	0	0	0	0	0	0

Table J-3 Elevation - Area-Capacity Data for Montell Reservoir		
Initial Conditions		
Elevation Ft. (MSL)	**Area (Acres)**	**Capacity (Ac-Ft)**
1,330	6,250	256,250
1,320	5,300	198,500
1,310	4,450	149,750
1,300	3,650	109,250
1,290	2,950	76,250
1,280	2,250	50,250
1,270	1,600	31,000
1,260	1,050	17,750
1,250	650	9,250
1,240	400	4,000
1,230	150	1,250
1,220	50	250
1,210	0	0

Table J-4 Elevation - Area-Capacity Data for Upper Dry Frio Reservoir		
Elevation Ft. (MSL)	**Area (Acres)**	**Capacity (Ac-Ft)**
1,440	1,870	63,440
1,430	1,510	46,540
1,420	1,230	32,840
1,410	970	21,840
1,405	840	17,315
1,400	730	13,390
1,395	610	10,040
1,390	500	7,265
1,385	390	5,040
1,380	290	3,340
1,375	210	2,090
1,370	145	1,200
1,345	0	0

Table J-5 Elevation - Area-Capacity Data for Concan Reservoir		
Elevation Ft. (MSL)	**Area (Acres)**	**Capacity (Ac-Ft)**
1,370	4,150	166,875
1,360	3,500	128,625
1,350	2,800	97,125
1,340	2,350	71,375
1,330	1,850	50,375
1,320	1,360	34,325
1,310	950	22,775
1,300	700	14,525
1,295	580	11,325
1,290	470	8,700
1,285	390	6,550
1,280	320	4,775
1,275	270	3,300
1,270	200	2,125
1,265	140	1,275
1,260	90	700
1,250	25	125
1,240	0	0

Table J-6
Elevation - Area-Capacity Data for Upper Sabinal Reservoir*

Initial Conditions		
Elevation Ft. (MSL)	**Area (Acres)**	**Capacity (Ac-Ft)**
1,230	3,250	106,350
1,220	2,600	77,100
1,210	1,990	54,150
1,200	1,490	36,750
1,190	1,080	23,900
1,180	750	14,750
1,170	500	8,500
1,160	310	4,450
1,150	190	1,950
1,140	90	550
1,130	10	50
1,120	0	0

*This relationship was also used for Upper Seco, Upper Hondo and Upper Verde Reservoirs.

Table J-7 Elevation - Area-Capacity Data for Indian Creek Reservoir		
Initial Conditions		
Elevation Ft. (MSL)	Area (Acres)	Capacity (Ac-Ft)
1,013	7,765	169,040
1,010	7,080	146,760
1,005	5,960	114,120
1,000	4,945	86,930
995	3,995	64,630
990	3,110	46,900
985	2,295	33,450
980	1,680	23,450
975	1,255	16,310
970	945	10,880
965	735	6,680
960	485	3,600
955	265	1,800
950	143	825
945	58	335
940	33	110
933	0	0

Table J-8 Elevation - Area-Capacity Data for Lower Dry Frio Reservoir		
Initial Conditions		
Elevation Ft. (MSL)	**Area (Acres)**	**Capacity (Ac-Ft)**
1,172	1,230	31,220
1,170	1,155	28,835
1,160	870	18,710
1,150	606	11,330
1,140	368	6,460
1,130	250	3,370
1,120	140	1,420
1,110	60	420
1,100	16	40
1,095	0	0

Table J-9 Elevation - Area-Capacity Data for Lower Frio Reservoir		
Initial Conditions		
Elevation Ft. (MSL)	**Area (Acres)**	**Capacity (Ac-Ft)**
1,124	1,780	51,320
1,120	1,690	44,380
1,110	1,390	28,980
1,100	1,053	16,765
1,090	608	8,460
1,080	268	4,080
1,070	148	2,000
1,060	86	830
1,050	40	200
1,040	0	0

Table J-10 Elevation - Area-Capacity Data for Lower Sabinal Reservoir		
Initial Conditions		
Elevation Ft. (MSL)	**Area (Acres)**	**Capacity (Ac-Ft)**
1,046	1,472	36,790
1,040	1,273	28,555
1,030	956	17,410
1,020	598	9,640
1,010	358	4,860
1,000	197	2,085
990	87	665
980	23	115
970	0	0

Table J-11 Elevation - Area-Capacity Data for Lower Seco Reservoir		
Initial Conditions		
Elevation Ft. (MSL)	**Area (Acres)**	**Capacity (Ac-Ft)**
1,090	1,644	28,450
1,080	1,042	15,020
1,070	604	6,790
1,060	214	2,700
1,050	104	1,110
1,040	42	380
1,030	17	85
1,020	0	0

Table J-12
Elevation - Area-Capacity Data for Parker Creek Reservoir

Initial Conditions		
Elevation Ft. (MSL)	**Area (Acres)**	**Capacity (Ac-Ft)**
1,027.5*	220	2,507
1,024	174	1,849
1,020	131	1,239
1,016	96.5	785
1,012**	66.5	458
1,006	36	200
1,004	24.5	116
1,000	15.5	37
996	3	6

*Elevation of Emergency Spillway.
**Elevation of Principal Spillway.

APPENDIX K

Choke Canyon Certificate of Adjudication

CERTIFICATE OF ADJUDICATION

CERTIFICATE OF ADJUDICATION: 21-3214 OWNERS: City of Corpus Christi
City Hall
P. O. Box 9277
Corpus Christi, TX 78408

Nueces River Authority
P. O. Box 349
Uvalde, TX 78801

COUNTIES: Nueces, San Patricio, Aransas, Jim Wells, Live Oak, Kleberg, Bee, McMullen, Duval and Atascosa Counties

PRIORITY DATE: July 19, 1976

WATERCOURSE: Frio River, tributary of the Nueces River

BASIN: Nueces River

WHEREAS, by final decree of the 73rd Judicial District Court of Bexar County, in Cause No. 82CI-01498 In Re: The Adjudication of Water Rights in the Frio-Atascosa Rivers Watershed of the Nueces River Basin, dated April 12, 1982, a right was recognized under Permit 3358 and Permit 1604 authorizing the City of Corpus Christi and the Nueces River Authority to appropriate waters of the State of Texas as set forth below;

NOW, THEREFORE, this certificate of adjudication to appropriate waters of the State of Texas in the Nueces River Basin is issued to the City of Corpus Christi (hereinafter City) and the Nueces River Authority (hereinafter Authority), subject to the following terms and conditions;

1. IMPOUNDMENT

Owners are authorized to maintain an existing dam and reservoir on the Frio River, known as Choke Canyon Dam and Reservoir, and impound therein not to exceed 700,000 acre-feet of water. The dam is located adjacent to the Thomas Henry Grant, Abstract 14 and the Patrick Henry Grant, Abstract 12, Live Oak County, Texas.

2. USE

A. Owners are authorized to divert and use not to exceed 59,770 acre-feet of water per annum from Choke Canyon Dam and Reservoir for municipal purposes in Aransas, Atascosa, Bee, Duval, Jim Wells, Kleberg, Live Oak, McMullen, Nueces and San Patricio Counties.

B. Owners are authorized to divert and use not to exceed 78,730 acre-feet of water per annum from Choke Canyon Dam and Reservoir for industrial purposes in Aransas, Atascosa, Bee, Duval, Jim Wells, Kleberg, Live Oak, McMullen, Nueces and San Patricio Counties.

C. Owners are authorized to use the impounded water for nonconsumptive recreational purposes.

D. Owners are authorized to divert and use 500 acre-feet of water per annum from Choke Canyon Dam and Reservoir for livestock and domestic purposes in Live Oak and McMullen Counties.

E. Owner (City) is authorized to use the bed and banks of the Atascosa River, Frio River and Nueces River to convey through Choke Canyon Dam and Reservoir and deliver into Lake Corpus Christi, groundwater which is released into the Atascosa River in Atascosa County, Texas.

THE STATE OF TEXAS
COUNTY OF TRAVIS

I hereby certify that this is a true and correct copy of a Texas Water Commission document, the original of which is filed in the permanent records of the Commission.
Given under my hand and the seal of office on JAN 2 1990

Brenda W. Foster, Chief Clerk
Texas Water Commission

3. DIVERSION

A. Location:
Through gates located in Choke Canyon Dam.

B. Maximum Rate: 1000 cfs (448,800 gpm).

4. PRIORITY

The time priority of owners' rights is July 19, 1976.

5. SPECIAL CONDITIONS

A. The Commission recognizes the following division of ownership in any and all rights under this Certificate of Adjudication, the same to be held by owners as tenants in common:

City of Corpus Christi	80% undivided interest
Nueces River Authority	20% undivided interest

The Commission further recognizes that the Authority has contractually agreed that for the life of the project the City shall have, subject to the Commission's jurisdiction, the right to dispose of all water produced by the project; provided however, on approval of the City of Corpus Christi, Nueces River Authority may sell water subject to the Commission's jurisdiction.

B. Following completion and filling of Choke Canyon Dam and Reservoir, scheduled releases shall be made from the reservoir system at Lake Corpus Christi Dam together with return flows to the estuaries for the proper ecological environment and health of related living marine resources therein. Water provided to the estuaries from the reservoir system under this paragraph shall be released in such quantities and in accordance with such operational procedures as may be ordered by the Commission. Owners shall provide not less than 151,000 acre-feet of water per annum for the estuaries by a combination of releases and spills from the reservoir system at Lake Corpus Christi Dam and return flows to Nueces and Corpus Christi Bays and other receiving estuaries.

C. Owners' appropriative rights to divert a total of 139,000 acre-feet per annum under the paragraph numbered 2, above, is contingent upon the operation of Choke Canyon Dam and Reservoir in conjunction with Lake Corpus Christi under systems operation criteria such that the additional 139,000 acre-feet is available for appropriation on a firm annual yield basis under the terms of this certificate.

D. Owners shall maintain a suitable outlet in the aforesaid dam authorized herein to allow the free passage of water that owners are not entitled to divert or impound.

E. Owners shall continuously maintain a minimum flow of 33 cubic feet per second below the dam at Choke Canyon Reservoir.

The locations of pertinent features related to this certificate are shown on Page 16 of the Frio-Atascosa Rivers Watershed Certificates of Adjudication Maps, copies of which are located in the offices of the Texas Department of Water Resources, Austin, Texas and the Atascosa, Jim Wells, Live Oak, McMullen, Nueces and San Patricio County Clerks.

This certificate of adjudication is issued subject to all terms, conditions and provisions in the final decree of the 73rd Judicial District Court of Bexar County, Texas, in Cause No. 82CI-01498, In Re: The Adjudication of Water Rights in the Frio-Atascosa Rivers Watershed of the

Nueces River Basin, dated April 12, 1982, and supersedes all rights of the owner asserted in that cause.

This certificate of adjudication is issued subject to senior and superior water rights in the Nueces River Basin.

This certificate of adjudication is issued subject to the Rules of the Texas Department of Water Resources and its continuing right of supervision of State water resources consistent with the public policy of the State as set forth in the Texas Water Code.

TEXAS WATER COMMISSION

Paul Hopkins

Paul Hopkins, Chairman

DATE ISSUED:

MAY 11 1984

ATTEST:

Mary Ann Hefner

Mary Ann Hefner, Chief Clerk

COUNTY OF TRAVIS
I hereby certify that this is a true and correct copy of a Texas Water Commission document, the original of which is filed in the permanent records of the Commission.
Given under my hand and the seal of office on JAN 2 1990

Brenda W. Foster, Chief Clerk
Texas Water Commission

AMENDMENT TO CERTIFICATE OF ADJUDICATION

CERTIFICATE NO. 21-3214A TYPE: AMENDMENT

Name:	City of Corpus Christi	Address:	P.O. Box 9097 Corpus Christi, Texas 78469
	Nueces River Authority		P.O. Box 349 Uvalde, Texas 78801
	City of Three Rivers		P.O. Box 398 Three Rivers, Texas 78071
Filed:	June 8, 1988	Granted:	June 28, 1988
Purposes:	Irrigation and Recreation	Counties:	McMullen & Live Oak
tercourse:	Frio River, tributary of Nueces River	Watershed:	Nueces River Basin

WHEREAS, Certificate No. 21-3214 was issued to the City of Corpus Christi and the Nueces River Authority on May 11, 1984, and authorizes the certificate owners to maintain Choke Canyon Dam and Reservoir in Live Oak and McMullen Counties and to use water for municipal, industrial, livestock and domestic and recreational purposes with a time priority of July 19, 1976; and

WHEREAS, the certificate includes a SPECIAL CONDITION stating that the City of Corpus Christi owns an eighty percent undivided interest in the project and the Nueces River Authority owns a twenty percent undivided interest in the project; and

WHEREAS, in a December 3, 1984 "Deed and Water Contract", the City of Corpus Christi sold a portion of their share of the reservoir storage and yield to the City of Three Rivers; and

WHEREAS, the City of Corpus Christi, the Nueces River Authority and the City of Three Rivers have requested an amendment to Certificate No. 21-3214 to authorize the maintenance of an existing cofferdam on an arm of Choke Canyon Reservoir creating an inland reservoir at the Choke Canyon State Park, to change a portion of the industrial water authorization to irrigation use at the park, to authorize diversion of water from any point on the perimeter of Choke Canyon Reservoir and to add a diversion point on the Frio River for use by the City of Three Rivers; and

WHEREAS, the Texas Water Commission finds that jurisdiction over the application is established; and

WHEREAS, no person protested the granting of this application; and

WHEREAS, the Commission has complied with the requirements of the Texas Water Code and Rules of the Texas Water Commission in issuing this amendment.

NOW, THEREFORE, this amendment to Certificate No. 21-3214 is issued to the City of Corpus Christi, the Nueces River Authority and the City of Three Rivers, subject to the following provisions:

1. IMPOUNDMENT

Certificate owners are authorized to maintain a cofferdam on an arm of Choke Canyon Reservoir creating an inland (constant level) reservoir at the Choke Canyon State Park in McMullen County, approximately 13 miles east of Tilden, Texas. Certificate owners may impound not to exceed 351 acre-feet of water in said inland reservoir. This amendment does not authorize an additional impoundment of water above the 700,000 acre-feet authorized in Certificate of Adjudication No. 21-3214, but rather the 351 acre-foot impoundment authorized herein is a portion of the 700,000 acre-foot capacity already authorized for Choke Canyon Reservoir. The cofferdam is in the Michael Hely Grant, Abstract No. 6, McMullen County and the midpoint of the dam is S 22° E., 8000 feet from the northwest corner of the grant.

2. USE

In lieu of the 78,730 acre-feet of water per annum authorized for industrial purposes, certificate owners are authorized to use 78,530 acre-feet of water per annum for industrial purposes and 200 acre-feet of water per annum for the irrigation of land at the Choke Canyon State Park in McMullen County. Certificate owners are also authorized to use the inland reservoir created by the aforesaid cofferdam for recreational purposes.

3. DIVERSION

In addition to the authorization to divert water for use through the gates in Choke Canyon Dam:

(a) Water for irrigation of Choke Canyon State Park and water for domestic and livestock purposes may be diverted from any point on the perimeter of the reservoir; and

(b) The City of Three Rivers is authorized to divert water released from Choke Canyon Reservoir at a point on the Frio River in Live Oak County, also included in the City of Three Rivers' Certificate No. 21-3215, that is S 07°10' E, 8255 feet from the northwest corner of the Wm. O'Docharty Survey, Abstract No. 33.

4. PRIORITY

The time priority of this amendment is July 19, 1976.

This amendment is issued subject to all terms, conditions and provisions contained in Certificate No. 21-3214, except as specifically amended herein.

This amendment is issued subject to all superior and senior water rights in the Nueces River Basin.

Certificate owners agree to be bound by the terms, conditions and provisions contained herein and such agreement is a condition precedent to the granting of this amendment.

All other matters requested in the application which are not specifically granted by this amendment are denied.

This amendment is issued subject to the Rules of the Texas Water Commission and to the right of continuing supervision of State water resources exercised by the Commission.

TEXAS WATER COMMISSION

Paul Hopkins

Paul Hopkins, Chairman

DATE ISSUED: July 6, 1988

ATTEST:

Karen A. Phillips

Karen A. Phillips, Chief Clerk

APPENDIX

Lake Corpus Christi Certificate of Adjudication

CERTIFICATE OF ADJUDICATION

CERTIFICATE OF ADJUDICATION: 21-2464

OWNER: City of Corpus Christi
P. O. Box 9277
Corpus Christi, TX 78408

Lower Nueces River Supply
Water District
P. O. Box 1340
Corpus Christi, TX 78403

COUNTIES: Atascosa, Aransas, Bee, Duval, Jim Wells, Kenedy, Kleberg, Live Oak, Nueces, San Patricio and Willacy

PRIORITY DATES: December 26, 1913, May 4, 1914, May 21, 1931, September 15, 1952 and January 15, 1925

WATERCOURSE: Atascosa River, Frio River and Nueces River

BASIN: Nueces River

WHEREAS, by final decree of the 214th Judicial District Court of Nueces County, Texas, in Cause No. 82-3020-F, In Re: The Adjudication of Water Rights in the Lower Nueces River Segment of the Nueces River Basin, dated September 23, 1982, a right was recognized under Certified Filing 64, Permit 51, Permit 1177, Permit 933 ABC, Permit 1604 and Permit 1656 authorizing the City of Corpus Christi and the Lower Nueces River Water Supply District to appropriate waters of the State of Texas as set forth below;

NOW, THEREFORE, this certificate of adjudication to appropriate waters of the State of Texas in the Nueces River Basin is issued to the City of Corpus Christi (hereinafter City) and the Lower Nueces River Water Supply District (hereinafter Nueces District) subject to the following terms and conditions;

1. IMPOUNDMENT

A. Owner (Nueces District) is authorized to maintain an existing dam and reservoir (known as Wesley Seale Dam and Lake Corpus Christi) on the Nueces River and impound therein not to exceed 300,000 acre-feet of water. The dam is located in the Juan Delgado, et al Grant, Abstract 4, San Patricio County, and the Juan Jose De La Garza Montemayor et al Survey, Abstract 296, Jim Wells County, Texas.

B. Owner (City) is authorized to maintain an existing dam and reservoir (known as Calallen Reservoir) on the Nueces River and impound therein not to exceed 1175 acre-feet of water. The dam is located in the Gregorio Farias Survey, Abstract 592, Nueces County, and the Victoriano Tares and Pedro Villareal Grant, Abstract 32, San Patricio County, Texas.

2. USE

A. Owner (City) is authorized to divert and use not to exceed 4872 acre-feet of water per annum from Calallen Reservoir on the Nueces River for municipal purposes.

B. Owner (City) is authorized to divert and use not to exceed 150,000 acre-feet of water per annum from Lake Corpus Christi on the Nueces River for municipal purposes.

C. Owner (City) is authorized to divert and use not to exceed 150,000 acre-feet of water per annum from Lake Corpus Christi on the Nueces River for industrial purposes.

D. Owner (City) is authorized to divert and use not to exceed 14 acre-feet of water per annum from Calallen Reservoir on the Nueces River for irrigation purposes.

THE STATE OF TEXAS
COUNTY OF TRAVIS
I hereby certify that this is a true and correct copy of a Texas Water Commission document, the original of which is filed in the permanent records of the Commission. Given under my hand and the seal of office on JAN 2 1990

Brenda W. Foster, Chief Clerk
Texas Water Commission

E. Owner (City) is authorized to divert and use not to exceed 12 acre-feet of water per annum from the Nueces River for mining purposes.

F. Owners (City and Nueces District) are authorized to use the water impounded in Lake Corpus Christi for other non-consumptive purposes.

G. Owner (City) is authorized to use the bed and banks of the Atascosa River, the Frio River, and the Nueces River to convey and deliver into Lake Corpus Christi ground water which is released into the Atascosa River in Atascosa County, Texas.

3. DIVERSION

A. Location:

(1) At a point on the perimeter of Lake Corpus Christi in the Juan Jose De La Garza Montemayor et al Survey, Abstract 296, Jim Wells County, Texas.

(2) At the outlet works of Wesley Seale Dam in the Juan Jose De La Garza Montemayor et al Survey, Abstract 296, Jim Wells County, Texas.

(3) At five points on the perimeter of Calallen Reservoir in the Gregorio Farias Survey, Abstract 592, the Mariano Lopez De Herrera Survey, Abstract 606, Nueces County, and the Victoriano Tares and Pedro Villareal Grant, Abstract 32, San Patricio County, Texas.

B. Maximum Combined Rate: 339.68 cfs (152,460 gpm).

4. PRIORITY

The time priority of owners' right is as follows:

A. Storage

(1) 104 acre-feet of water stored in Calallen Reservoir above elevation 1.62 feet mean sea level has a priority date of May 4, 1914.

(2) 928 acre-feet of water stored in Calallen Reservoir below elevation 1.62 feet mean sea level, as well as the remainder of the storage in Calallen Reservoir above elevation 1.62 feet mean sea level, being 143 acre-feet of water, for a total of 1071 acre-feet, has a priority date of May 21, 1931.

(3) 300,000 acre-feet of water stored in Lake Corpus Christi has a priority date of September 15, 1952.

B. USE

(1) 675 acre-feet of water for municipal purposes has a priority date of December 26, 1913.

(2) 4054 acre-feet of water for municipal purposes has a priority date of May 4, 1914.

(3) 143 acre-feet of water for municipal purposes has a priority date of May 21, 1931.

(4) 150,000 acre-feet of water for municipal purposes has a priority date of January 15, 1925.

(5) 150,000 acre-feet of water for industrial purposes has a priority date of January 15, 1925.

(6) 14 acre-feet of water for irrigation purposes has a priority date of January 15, 1925.

(7) 12 acre-feet of water for mining purposes has a priority date of January 15, 1925.

(8) Use of the water impounded in Lake Corpus Christi for other non-consumptive purposes is September 15, 1952.

(9) The right to release, convey and deliver ground water produced in Atascosa County to Lake Corpus Christi has a priority date of September 14, 1951.

C. Rate

(1) 0.93 cfs (418 gpm) has a priority date of December 26, 1913.

(2) 5.6 cfs (2514 gpm) has a priority date of May 4, 1914.

(3) 313.50 cfs (140,708 gpm) has a priority date of May 21, 1931.

(4) 19.65 cfs (8820 gpm) has a priority date of January 15, 1925.

5. SPECIAL CONDITIONS

A. Owners (City and Nueces District) shall maintain suitable outlets in the aforesaid dams authorized herein to allow free passage of water that owners are not entitled to divert or impound.

B. Owner (Nueces District) is authorized to use the bed and banks of the Nueces River to convey and deliver water impounded in Lake Corpus Christi to the diversion points of owner (City) on the perimeter of Calallen Reservoir.

C. Owner (City) is authorized to make transbasin diversions from the Nueces River, the basin of origin, to the San Antonio-Nueces and the Nueces-Rio Grande Coastal Basins within the counties which make up the service area of the City of Corpus Christi.

D. Owner's (City's) use of the amount of water which is authorized for irrigation purposes is restricted to the maximum use of two acre-feet per acre for each acre actually irrigated.

E. Measurement of water diverted from Lake Corpus Christi shall be made at the outlet works of Wesley Seale Dam and at the point of diversion on the perimeter of the reservoir.

F. The area authorized to be served under this certificate shall be coterminous with the boundaries of the service area of the City of Corpus Christi. The owner shall notify the Department of all changes in the boundaries of said service area.

G. Owners (City and Nueces District) are required to allow as much of the flow of the Nueces River to flow through the Lake Corpus Christi Dam and Reservoir as is necessary to satisfy the prior downstream water rights of the Nueces County Water Control and Improvement District No. 3 (hereinafter Robstown District) and the City of Corpus Christi. However, owners (City and Nueces District) are authorized to impound and use all water flowing into Lake Corpus Christi which exceeds the prior diversion rate of the City of Corpus Christi and the Robstown District.

The locations of pertinent features related to this certificate are shown on Pages 2 and 4 of the Lower Nueces River Segment Certificates of Adjudication Maps, copies of which are located in the offices of the Texas Department of Water Resources and the office of the County Clerk.

This certificate of adjudication is issued subject to all terms, conditions and provisions in the final decree of the 214th Judicial District Court of Nueces County, Texas, in Cause No. 82-3020-F, In Re: The

Adjudication of Water Rights in the Lower Nueces River Segment of the Nueces River Basin, dated September 23, 1982, and supersedes all rights of the owner asserted in that cause.

This certificate of adjudication is issued subject to senior and superior water rights in the Nueces River Basin.

This certificate of adjudication is issued subject to the Rules of the Texas Department of Water Resources and its continuing right of supervision of State water resources consistent with the public policy of the State as set forth in the Texas Water Code.

TEXAS WATER COMMISSION

/s/ Felix McDonald
Felix McDonald, Chairman

DATE ISSUED:

ATTEST:

/s/ Mary Ann Hefner
Mary Ann Hefner, Chief Clerk

APPENDIX M

Status of Bay and Estuary Studies

and

Federal Wetlands Rules

APPENDIX M

STATUS OF BAY AND ESTUARY STUDIES AND FEDERAL WETLANDS RULES

Two important environmental considerations affecting water supplies of the study area are: (1) fresh water needs of bays and estuaries, and (2) federal wetlands rules. Each is described in the following discussion.

M.1 Status of Studies of Fresh Water Needs of Nueces Estuary

In 1967, the Texas Water Development Board, in cooperation with other state agencies and agencies of the federal government, initiated a Texas Bays and Estuaries program. The purpose of the program was to collect physical, chemical, and biological data pursuant to the development of an understanding of the relationships among fresh water inflows, nutrients, sediments, and other factors affecting the ecology and fisheries of each of the Texas bays and estuaries.

Between 1975 and 1979, The Texas Water Development Board and The Texas Department of Water Resources conducted intensive data collection, laboratory studies, and hydrologic modelling studies were performed, with publication of reports for each of the major Texas estuarine systems, including "Nueces and Mission-Aransas Estuaries: A Study of the Influence of Freshwater Inflows," LP-108, November, 1979. In the preparation of this report, the hydrology of the contributing drainage areas was calculated, water quality of inflows was tested, (computer) mathematical models of circulation and the salinity of Nueces Bay were calculated, production and transport of nutrients from the marshes into the estuary

were estimated, and phytoplankton, zooplankton, and benthic organisms of the food chain were identified and related to salinity. Quantities of commercial and sport fish landings for the period 1962 through 1976 were statistically correlated to quantities of fresh water inflows during each of five seasonal time periods: (1) January - March, (2) April - June, (3) July - August, (4) September - October, and (5) November - December. An equation was estimated for each major fisheries species -- brown shrimp, white shrimp, pink shrimp, blue crab, bay oyster, spotted sea trout, red drum, and black drum.

The analyses showed that shrimp harvests were positively correlated with freshwater inflows in the spring months of April - June and negatively correlated with fresh water inflows in the winter months of December - March. Crab, oyster, and finfish (trout and drum) harvests were positively correlated with inflows in November, December, July, and August. Thus, from these analyses, it appeared that the fresh water needs of some species, for example shrimp, could be adverse to the productivity of other species, for example, trout and drum, and vice versa.

Using the equations and computer models developed during the study, computations were made of the quantities of fresh water flows that might be needed to achieve: (1) upper and lower monthly salinity limits for metabolic activities of fisheries species, (2) marsh inundation needs for nutrient transport, and (3) the quantities of fresh water inflows correlated with average values of fisheries harvests for the 1962-1976 period for the major commercial and sport fisheries species of Nueces Bay -- red drum, sea trout, white shrimp, and blue crab. Computations were also made of the maximum estimated total commercial harvests of finfish (the highest commercial valued species) if the 1941-1976 average annual

fresh water inflows were distributed in a seasonal pattern so as to meet salinity and marsh inundation needs; i.e., harvest enhancement of the major commercial species of the estuary.

The reported average annual inflow to the Nueces estuary for the 1941-1976 period was 682,000 acre-feet, of which 628,000 acre-feet was from the gaged flows of the Nueces Basin. The annual quantities of inflow from gaged drainage areas, computed as described above, for salinity and marsh inundation, the quantities correlated with mean harvests of major fisheries species, and maximum harvests of red drum were 356,000, 397,000, and 550,000 acre-feet, respectively.

Although the studies of 1975 - 1979 were the most comprehensive undertaken to that date, the mathematical expressions of the relationships, of necessity, had to be estimated using only a few years, and in some cases, only a few months of data. No more data were available, since comprehensive data collection and carefully planned field and laboratory studies had only been started in the early 1970s, with some data collection and some studies having been done for only one season for each of the estuaries, during the 1975 through 1979 period. Because of the lack of data for the 1975-1979 studies, collection of water quality, nutrients, salinity, and some fisheries data were continued during the 1980-1985 period.

In 1985, the Texas Legislature authorized and funded joint Texas Water Development Board, Texas Parks and Wildlife Department, and Texas Water Commission studies with emphasis upon understanding the relationships among fresh water inflows and associated nutrients, sediments, and bay conditions necessary for a sound ecological environment. The schedule for these studies was 1985 - 1989. As of October 1990, the study report is nearing

publication and release to the public. A brief summary of the information available, insofar as it pertains to the Nueces Estuary, is presented below.

The objectives were:

(1) compilation of fresh water inflow, bay hydrographic, and biological data;

(2) development of a mathematical, computer model of circulation, salinity, hydrodynamics, conservative mass transport, and statistical salinity -- fresh water inflow equations;

(3) evaluation of efforts of salinity upon estuarine plants and animals;

(4) assessment of water quality trends (selected chemical and quality parameters) for the 1969-1989 period;

(5) determination of fresh water inflow effects upon deltas and bay sedimentation;

(6) evaluation of effects of fresh water inflows upon estuarine plant production;

(7) development of statistical equations which correlate commercial catch of estuarine-dependent species with fresh water inflow quantities; and

(8) development of methods to specify or define fisheries harvest objectives or goals, and then to use the analytical tools and data developed in objectives one through seven above to develop estimates of fresh water inflow needs for a range of goals and conditions pertinent to fresh water resources development and use, compatible with maintenance of a sound estuarine environment.

During the 1985-1989 studies, computer models of salinity, circulation, and fishery harvests were developed (see Figure M.1). The quantity and pattern of freshwater inflow for the time period 1941-1987, frequency of flooding of delta marshes, effects of salinity on bottom dwelling organisms, small fish, and adult marine species were studied. Annual, seasonal, and daily changes in chemicals in bay waters, nutrient budgets accounting for changes in carbon and nitrogen, and effects of nitrogen, turbidity, and salinity on growth of bay plants were studied. Effects of fresh water flows upon sediment input to bays and upon carbon and nitrogen were also studied (Figure M.1).

The computer models and results of studies to produce relationships and information incorporated into the models will be available for use in developing calculations of fresh water inflow needs on a case by case basis. (Note: The reports in which these models and studies are documented and explained are not available as of the date of this draft -- October 5, 1990.)

In the 1985-1989 study effort, fishery harvests (fish landings) were correlated with fresh water inflows and temperature. The general form of the statistical estimating equations is:

$$\ln H = a + b_1 \ln(Q_{JF}) + b_2 \ln(Q_{MA}) + b_3 \ln(Q_{MJ}) + b_4 \ln(Q_{JA}) + b_5 \ln(Q_{SO}) + b_6 \ln(Q_{ND}) + b_7 T_{JF} + b_8 T_{MA} + b_9 T_{MJ} + b_{10} T_{JA} + b_{11} T_{WO} + b_{12} T_{ND} + b_{13} E_i + e$$

Where the terms of the equation are:

H = commercial harvest of fishery species in thousands of pounds per year

$\ln H$ = natural logarithm of fishery harvest

E_i = inshore harvest effort in number of fishing trips per year

Q = bimonthly freshwater inflow in thousands of acre-feet per year

$\ln Q_{JF}$ = natural logarithm of inflow in January + February

$\ln Q_{MA}$ = natural logarithm of inflow in March + April

$\ln Q_{MJ}$ = natural logarithm of inflow in May + June

$\ln Q_{JA}$ = natural logarithm of inflow in July + August

$\ln Q_{SO}$ = natural logarithm of inflow in September + October

$\ln Q_{ND}$ = natural logarithm of inflow in November + December

T = bimonthly mean air temperature (°F)

T_{JF} = mean temperature in January and February

T_{MA} = mean temperature in March and April

T_{MJ} = mean temperature in May and June

T_{JA} = mean temperature in July and August

T_{SO} = mean temperature in September and October

T_{ND} = mean temperature in November and December

and ϵ is the error term.

The coefficients (a and b_i) were estimated using a time series of data. The resulting equations for the Nueces Estuary for white shrimp, brown shrimp, blue crab, spotted sea

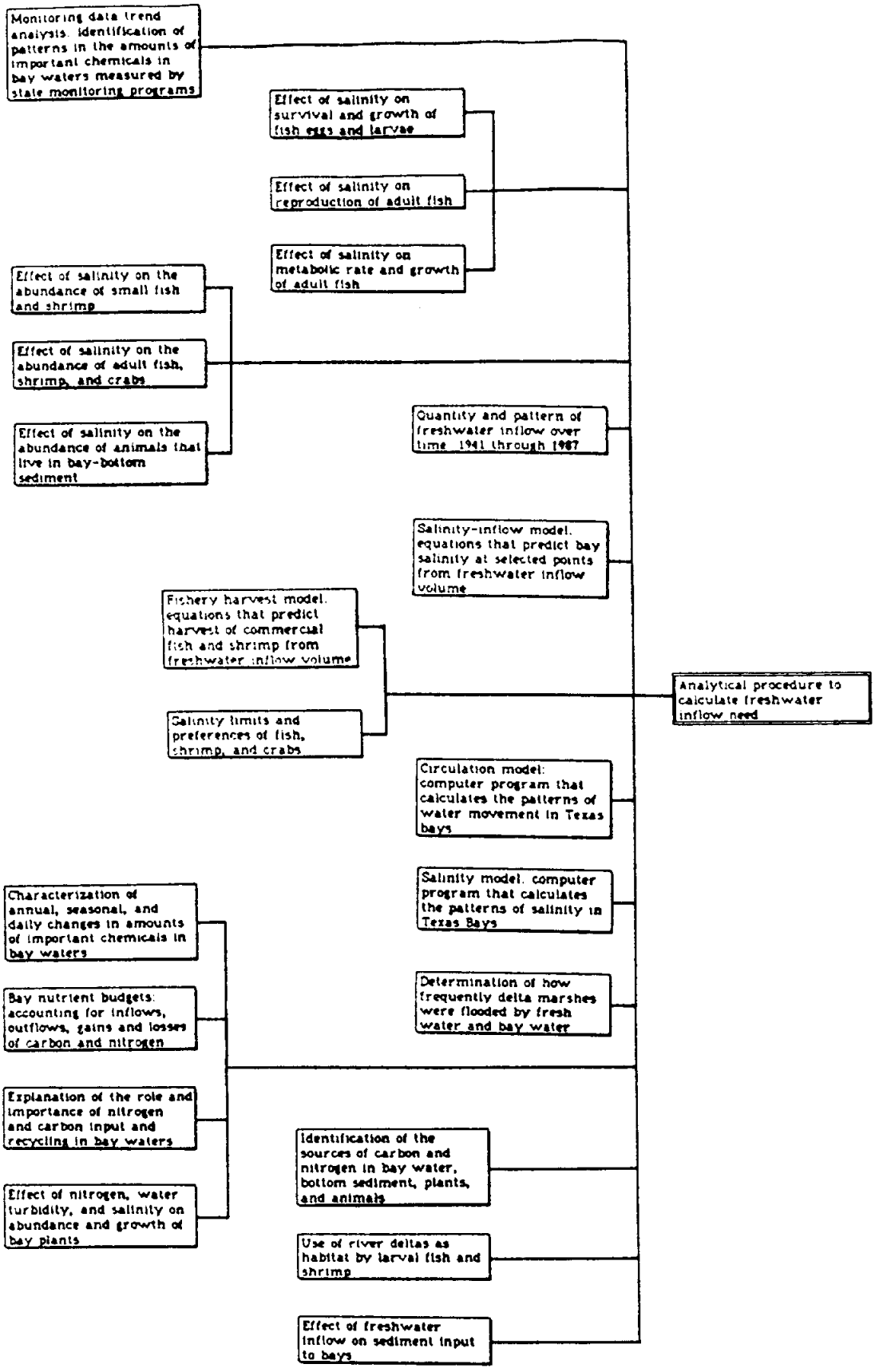


Figure M.1 TWDB-TPWD-TWC Joint Studies on the Influence of Freshwater Inflows on Bays and Estuaries

Source: Texas Water Development Board, Unpublished, October, 1990.

trout, red drum, and black drum are listed in Table M.1. The algebraic signs of the coefficients of the equations indicate the direction of influence that an increase in each respective variable has upon the estimate of commercial harvests of the fishery species. The size of the coefficient indicates the degree of effect. However, it is emphasized that the units of the fisheries harvests and the fresh water inflows are expressed in natural logarithmic terms, and temperature is in degrees fahrenheit.

The white shrimp equation indicates that estimates of commercial harvests of white shrimp increase as the quantity of fresh water inflows in November, December, May, and June increase. However, the harvests are negatively correlated with temperature in May and June; i.e., the higher the May-June temperature, the lower the harvests.

Estimates of commercial harvests of brown shrimp decrease as September and October fresh water inflows increase, and, as expected, increase as the number of fishing trips increase. Brown shrimp harvests increase as May and April temperatures increase.

Blue crab harvests estimates are positively correlated with fresh water inflows in January, February, November, and December, and March, April, November and December temperatures. Blue crab harvests are negatively correlated with fresh water inflows in March, April, May, and June and with January and February temperatures.

Estimates of spotted sea trout harvests increase as fresh water inflows increase in September, October, March, April, May, and June, and decrease as inflows increase in January and February.

Table M.1
Nueces Estuary Fisheries Estimating Equations*

White Shrimp

White shrimp harvest = f (seasonal combined flow, temperature)
(n = 26 years, P = 0.0006, R = 0.74, Adj. R^2 = 48%, S.E. Est. = ± 0.4349)

$$\ln H_{ws} = 24.7974 + 0.1640 (\ln Q_{ND}) + 0.1962 (\ln Q_{MJ}) - 0.2837 (T_{MJ})$$

Brown Shrimp

Brown shrimp harvest = f (seasonal combined flow, effort, temperature)
(n = 29 years, P < 0.0001, R = 0.83, Adj. R^2 = 64%, S.E. Est. = ± 1.2685)

$$\ln H_{bs} = -5.8221 - 0.4077 (\ln Q_{SO}) + 0.00086 (E_i) + 0.1845 (T_{MA})$$

Blue Crab

Blue crab harvest = f (seasonal combined flow, temperature)
(n = 21 years, P = 0.0020, R = 0.88, Adj. R^2 = 66%, S.E. Est. = ± 0.6524)

$$\ln H_{bc} = -7.8143 + 0.5423 (\ln Q_{JF}) - 0.5287 (\ln Q_{MA}) - 0.6442 (\ln Q_{MJ}) + 0.5502 (\ln Q_{ND}) - 0.2451 (T_{JF}) + 0.2595 (T_{MA}) + 0.1763 (T_{ND})$$

Spotted Sea Trout

Spotted seatrout harvest = f (seasonal combined flow)
(n = 20 years, P < 0.0001, R = 0.96, Adj. R^2 = 90%, S.E. Est. = ± 0.3017)

$$\ln H_{ss} = 1.6865 + 0.3863 (\ln Q_{SO}) - 1.1369 (\ln Q_{JF}) + 0.6850 (\ln Q_{MA}) + 0.4586 (\ln Q_{MJ})$$

Red Drum

Red drum harvest = f (seasonal combined flow)
(n = 20 years, P < 0.0001 R = 0.95, Adj. R^2 = 87%, S.E. Est. = ± 0.4907)

$$\ln H_{rd} = -1.3034 + 0.4024 (\ln Q_{SO}) + 0.4090 (\ln Q_{ND}) - 1.2721 (\ln Q_{JF}) + 1.2153 (\ln Q_{MJ})$$

Black Drum

Black drum harvest = f (seasonal combined flow, temperature)
(n = 25 years, P < 0.0001, R = 0.92, Adj. R^2 = 80%, S.E. Est. = ± 0.4748)

$$\ln H_{bd} = -10.9732 - 0.9779 (\ln Q_{JF}) + 0.8893 (\ln Q_{MA}) + 0.6339 (\ln Q_{MJ}) + 0.1149 (T_{JF}) + 0.1115 (T_{SO})$$

* Source: Texas Water Development Board, Unpublished, October, 1990.
n = number of years of data used; P = Confidence level of statistical test; R = correlation coefficient; R^2 = percent of variation explained; and S.E. = standard error of the estimate.

Estimates of red drum harvests increase with increased fresh water inflows in September, October, November, December, May, and June, and decrease with increased inflows in January and February.

Black drum harvests estimates decrease with increased inflows in January and February, and increase with increased inflows in March, April, May, and June, and with increased temperatures in January, February, September, and October.

The statistical analyses of commercial harvests of fisheries species of the Nueces Estuary show that seasonal inflows which are positively correlated for some species are negatively correlated with others (Table M.2). For example, inflows in January and February increase estimates of blue crab harvests, but decrease estimates for spotted sea trout, red drum, and black drum (Table M.2). The results of the analyses show that inflows in May and June increase the estimates of harvests of white shrimp, spotted sea trout, red drum, and black drum, but decrease that of blue crab. In the case of brown shrimp, the statistical analyses of the studies showed a negative effect upon estimates of commercial harvests as fresh water inflows increase in September and October, and no correlations with inflows in any other months, implying that fresh water inflows are detrimental to this species.

It is interesting to note that the statistical analyses show that there is no correlation in either a positive or a negative direction, for either of the Nueces Estuary species, for fresh water inflows in July and August.

Table M.2
Summary of Algebraic Signs of Coefficients of Fresh Water Inflow Terms in Fisheries Harvests Estimating Equations -- Nueces Estuary*

Fishery	Jan. Feb. JF	March April MA	May June MJ	July Aug. JA	Sept. Oct. SO	Nov. Dec. ND
White Shrimp			+			
Brown Shrimp					-	+
Blue Crab	+	-	-			+
Spotted Sea Trout	-	+	+		+	
Red Drum	-		+		+	+
Black Drum	-	+	+			

Source: Equations of Table M.1.
*For cells with no entry, the statistical analyses showed no correlation, i.e., neither a positive nor a negative coefficient.

Economic Impact of Recreational and Commercial Fishing: An August 1987 report estimated that the total business associated with sport fishing, other recreational activity, and commercial fishing in the Nueces and Mission-Aransas estuary in 1986 amounted to, $357 million in the local region and $653 million for the state (Ref. 2). Sport fishing accounted for 50 percent of the regional business and 51 percent of the state business effect.

The estimated statewide employment effects of sport fishing were 8,216 full-time job equivalents, with total income of $126 million. The number of full-time job equivalents for commercial fishing in the Nueces and Mission-Aransas estuaries were 4,021, with total personal income of $47 million.

The estimated state and local tax effects of sport fishing in 1986 in the Nueces and Mission-Aransas estuaries were $17.6 million; the tax effects for commercial fishing were $6.4 million (Ref. 2).

M.2 Federal Wetlands Rules

On February 6, 1990 the Assistant Secretary of the Army for Civil Works, and the Assistant Administrator for Water, U.S. Environmental Protection Agency entered into a memorandum of agreement concerning the determination of mitigation under the Clean Water Act, Section 404(b)(1) guidelines (Ref. 52). The agreement is summarized below as to (1) purpose, (2) wetlands policy, and (3) other procedures. The following acronyms are defined: Memorandum of Agreement (MOA), Clean Water Act (CWA), Department of the Army (DOA), Environmental Protection Agency (EPA), and Corps of Engineers (USCE).

1. Purpose

   - Articulate policy and procedures to be used in the determination of the type and level of mitigation necessary to demonstrate compliance with the Clean Water Act Section 404(b)(1) Guidelines;

   - Expresses intent of Army and EPA to implement CWA to restore and maintain chemical, physical, and biological integrity of nation's waters, including wetlands;

- MOA limited to Section 404 regulatory program and is written to provide guidance for agency field personnel on type and level of mitigation requirements in the guidelines.

- MOA does not change requirements of the guidelines. Intended to provide guidance regarding the exercise of discretion under the guidelines;

- MOA focuses on standard permits (33 CFR 325.5(b)(1)).

2. Wetlands Policy

   - Avoidance of impacts;
   - Minimization of impacts; and
   - Compensatory mitigation.

Goal: No overall net loss of values and functions; not necessarily achievable in each and every permit action.

Appropriate Mitigation: Based solely on the values and functions of the aquatic resource that will be impacted.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics, in light of overall project purposes.

In evaluation of standard Section 404 permit applications, the USCE: (1) Gathers and reviews, at the same time, information on all facets of a project, including potential mitigation, and (2) Makes determination: (a) that potential impacts have been avoided to the maximum extent practicable, and (b) remaining unavoidable impacts are to be mitigated to the extent appropriate and practicable by minimizing impacts and compensating for aquatic resource values.

a. Avoidance (Does not include compensatory mitigation): Section 230.10(a) allows permit issuance for only the least environmentally damaging, practicable alternative. In some cases, the project cannot be done. No discharge is permitted if there is a practicable alternative, which in and of itself does not have significant adverse impacts.

   The rebuttable presumptions are that there are alternatives for non-water dependent activities that do not involve special aquatic sites, and that such alternatives have less adverse impacts on the aquatic environment.

b. Minimization: Section 230.10(b): appropriate and practicable steps to minimize impacts are project modifications and permit conditions.

c. Compensatory Mitigation: appropriate and practicable mitigation is required for unavoidable impacts remaining after all appropriate and practicable minimization has been required. When practicable, compensatory actions

should be taken adjacent or contiguous to the discharge site or in the same geographic area when this is not practicable.

When calculating compensatory mitigation, consider functional values lost by the resource to be impacted. In-kind is preferable to out-of-kind. First option is restoration of existing wetland, since there is uncertainty regarding potential success of wetland creation and other habitat development.

The USCE may consider compensatory mitigation required by another agency as a part of the overall application, for purposes of public notice, but avoidance and mitigation shall be sought.

Mitigation banking may be considered acceptable.

Simple purchase or "preservation" of existing wetlands may, in only exceptional circumstances, be acceptable as compensatory mitigation.

3. Other Procedures

A. Potential applicants should have preapplication meetings with USCE, other federal agencies, and local authorities to determine requirements and documentation needed for permit evaluations. Compliance with other statutes may not satisfy requirements of the Guidelines.

B. Clean Water Act goals are that USCE strive to avoid adverse impacts, and offset unavoidable adverse impacts to existing aquatic resources. Resource assessments are to be done by professionals. Functional values are assessed by applying aquatic site assessment techniques recognized by experts. Ecological functions in the Guidelines (33CFR 325.5(b)(1)) must be fully considered. Mitigation is one-for-one (no net loss). In the absence of definitive information, minimum one-for-one acreage replacement is required (Functional equality).

C. Guidelines (33CFR 325.5(b)(1)) are the environmental standard for Section 404 permit issuance under the Clean Water Act (CWA).

D. Monitoring is an important aspect of mitigation; i.e.; scientific uncertainty exists. The purpose is to determine if permit conditions are being met. Where high levels of uncertainty exist, there must be long term monitoring, reporting, and remedial action.

E. Mitigation requirements shall be conditions of Standard Section 404 permits to ensure legal enforceability of mitigation conditions, and to enhance level of compliance. If the mitigation plan is not reasonably implementable or enforceable, the permit shall be denied.

F. The MOA does not modify statutory or regulatory authorities of the agencies.

G. The effective date of the MOA is February 7, 1990. It applies to applications received on or after February 7, 1990. The MOA may be modified or revoked by one or either party upon six (6) months written notice.

The "Federal Manual for Identifying and Delineating Jurisdictional Wetlands", (Ref. 54), describes technical criteria, field indications, and other sources of information, and methods for identifying and delineating wetlands in the United States. Mandatory technical criteria for wetlands identification include: hydrophytic vegetation, hydric soils, and wetland hydrology.

Hydrophytic vegetation is plant life growing in water, soil or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content (Ref. 56). Of the nearly 7,000 vascular plants that have been found growing in U.S. wetlands, 27 percent are "obligate wetland" species.

Hydric soils are soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part (Ref. 55).

Wetland hydrology is the condition of permanent or periodic inundation, or soil saturation to the surface (Ref 57). All wetlands usually have a seasonal abundance of water and may be continually inundated.

The manual for identifying and delineating wetlands describes the criteria and the process at length and contains examples of data sheets for calculations. A sample problem is presented, and references are given to technical reports required for wetlands delineation, including Reed, Porter B., "National List of Plant Species that Occur in Wetlands: National

Summary," U.S. Fish and Wildlife Service, in cooperation with U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, and U.S. Soil Conservation Service, Biological Report 88(24), U.S. Department of the Interior, Fish and Wildlife Service, Research and Development, Washington, D.C., September 1988, and "Hydric Soils of the United States," Soil Conservation Service, in cooperation with the National Technical Committee for Hydric Soils, U.S. Department of Agriculture, Washington, D.C., December 1987.

Any actions or projects of the study area involving dredge and fill would require a Section 404 permit. The wetlands policy and the procedures for delineating wetlands would apply to applications for Section 404 permits. Without extensive field work, it is not possible to determine the extent of the effects of the federal wetlands policy upon water development and use in the study area, including whether or not it would be possible or feasible to mitigate any proposed actions. Proposals will most likely have to be considered on a case by case basis, since the cost of field work and analyses would otherwise be prohibitive.

APPENDIX N

Program Listing

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C*************************************************************************
C********* NUECES RIVER BASIN MODEL **********************************
C********* HDR ENGINEERING, INC.    **********************************
C********* FEBRUARY, 1991           **********************************
C*************************************************************************
C
C     MAIN PROGRAM
C
      INTEGER*1 I,J,K,NCP,NYRS,KRRES(30),KRCR(30),NUSCP(30),KRES(30)
     1,IDRCH(30),KUS(30,15),KRCRP(30),NESET(30),NLEV,IOP,ISYSOPF
     2,KWRS(30,10),NWRS(30),IWR,IPASS,IYLD
      INTEGER QN(30,56,12),QL(30,56,12),AQM(30),ARECHRG(30)
     1,WR(30,4),STOR1(30),CONSTOR(30),DSTOR(30),IRCNT
     2,ADSHORT(30),ANEVAP(30)
C
      COMMON /A/ DMF(4,12,12),PARF(30),DLVF(30),WRF(30),I,J,K,NCP,NYRS
     1,KRRES,KRCR,NUSCP,IDRCH,KUS,KRES,IOP,IRCNT,CONV,SYSMIN,SYSDEM
     2,KRCRP,NESET,AAA,BBB,DEM,SYSDEAD,SYSCON,ISYSOPF,XLCC,BEREL
     3,WRDLVF(30,10),NWRS,IWR,KWRS,IPASS,IYLD
      COMMON /B/ QM(30,56,12),QN,QL,WR
      COMMON /C/ EVNT(30,56,12),E(30,20),A(30,20),C(30,20),STOR1
     1,BSTOR(30),ESTOR(30),CONSTOR,DSTOR,RCRATE(30),RCREL(30),NLEV
     2,WRREL(30),QCUSD1(30),QMUSD1(30),XESTOR(30),QMN(30)
      COMMON /D/ DIV,DSHORT(30),QIN(30),SHORT(3,30),PREVALL(30)
      COMMON /E/ AQN(30),AQL(30),AQM,ARECHRG,RECHRG(30),ADDR(30)
     1,EVAP(30),ADSHORT,ANEVAP
C
      OPEN (3,FILE='OSHORT')
      OPEN (4,FILE='ONEVAP')
      OPEN (5,FILE='NDATA1')
      OPEN (6,FILE='ORCHRG')
      OPEN (7,FILE='OFLOWS')
      OPEN (8,FILE='OSYSOP')
C
      CALL READIN
      IRCNT=0
C
C*****CALCULATE SELECTED SYSTEM STORAGES
C
      SYSCON=CONSTOR(26)+CONSTOR(29)
      SYSDEAD=DSTOR(26)+DSTOR(29)
C
C*****APPLY GOLDEN SECTION SOLUTION ALGORITHM
C
      AAA=SYSCON
      BBB=SYSDEAD
      ISYSOPF=0
C
      IF (IYLD.EQ.0) THEN
      ISYSOPF=1
      GO TO 20
      END IF
C
      CALL GOLDEN
C
      SYSYLD=(AAA+BBB)/2.
      WRITE (*,15) ' SYSTEM YIELD = ',SYSYLD,' ACFT/YR'
   15 FORMAT (A16,F10.0,A8)
C
```

```
C*****CALL FLOWS TO SUMMARIZE OPERATIONS AT FIRM YIELD
C*****  OR FIXED DEMAND
C
      ISYSOPF=1
      SYSDEM=SYSYLD
   20 CALL FLOWS
C
      END
C*************************************************************************
      SUBROUTINE READIN
C*************************************************************************
C
      INTEGER*1 I,J,K,NCP,NYRS,KRRES(30),KRCR(30),NUSCP(30),KRES(30)
     1,IDRCH(30),KUS(30,15),KRCRP(30),NESET(30),NLEV,IOP,ISYSOPF
     2,KWRS(30,10),NWRS(30),IWR,IPASS,IYLD
      INTEGER QN(30,56,12),QL(30,56,12),AQM(30),ARECHRG(30)
     1,WR(30,4),STOR1(30),CONSTOR(30),DSTOR(30),IRCNT
     2,ADSHORT(30),ANEVAP(30)
C
      COMMON /A/ DMF(4,12,12),PARF(30),DLVF(30),WRF(30),I,J,K,NCP,NYRS
     1,KRRES,KRCR,NUSCP,IDRCH,KUS,KRES,IOP,IRCNT,CONV,SYSMIN,SYSDEM
     2,KRCRP,NESET,AAA,BBB,DEM,SYSDEAD,SYSCON,ISYSOPF,XLCC,BEREL
     3,WRDLVF(30,10),NWRS,IWR,KWRS,IPASS,IYLD
      COMMON /B/ QM(30,56,12),QN,QL,WR
      COMMON /C/ EVNT(30,56,12),E(30,20),A(30,20),C(30,20),STOR1
     1,BSTOR(30),ESTOR(30),CONSTOR,DSTOR,RCRATE(30),RCREL(30),NLEV
     2,WRREL(30),QCUSD1(30),QMUSD1(30),XESTOR(30),QMN(30)
      COMMON /D/ DIV,DSHORT(30),QIN(30),SHORT(3,30),PREVALL(30)
      COMMON /E/ AQN(30),AQL(30),AQM,ARECHRG,RECHRG(30),ADDR(30)
     1,EVAP(30),ADSHORT,ANEVAP
C
C*****READ CONTROL PARAMETERS
C
      READ (5,10) NCP,NRES,NRCR,NYRS,NNE,IWR,IYLD
   10 FORMAT(7I5)
C
C*****READ FIXED SYSTEM DEMAND, OPERATION POLICY,
C       LCC TARGET LEVEL, AND CONVERGENCE INTERVAL
C
      READ (5,11) SYSDEM,IOP,XLCC,CONV
   11 FORMAT (F10.0,I10,F10.2,F10.0)
C
C*****READ MONTHLY DEMAND FACTORS BY REACH
C
      DO 100 N=1,4
      DO 99 M=1,4
      READ (5,12) (DMF(N,M,J),J=1,12)
   12 FORMAT(12F6.2)
   99 CONTINUE
  100 CONTINUE
C
C*****READ NET EVAPORATION FILES
C
      READ (5,14) (((EVNT(N,I,J),J=1,12),I=1,NYRS),N=1,NNE)
   14 FORMAT(20X,12F5.2)
C
C*****ENTER CONTROL POINT DATA
C
      DO 500 K=1,NCP
C
```

```
      WRITE (*,13)' READING DATA FOR CONTROL POINT',K
   13 FORMAT(A32,I3)
C
C*****IDENTIFY CONTROL POINT TYPE
C
      READ (5,15) KRRES(K),KRCR(K),KRES(K),KRCRP(K),NESET(K)
   15 FORMAT(5I5)
C
C*****READ D/S DELIVERY FAC, WATER RIGHTS FAC, PARTNER AREA FAC,
C*****   UPSTREAM POINTS, REACH ID, AND NUMBER OF RELEASE SOURCES
C
      READ(5,20) DLVF(K),WRF(K),PARF(K),NUSCP(K),IDRCH(K),NWRS(K)
   20 FORMAT (3F10.4,3I5)
      IF (NUSCP(K).GT.0) THEN
      READ (5,25) (KUS(K,N),N=1,NUSCP(K))
   25 FORMAT(15I3)
      END IF
C
C*****SPECIFY WATER RIGHTS RELEASE SOURCE(S) AND DELIVERY FACTORS
C*****  IN PREFERRED SEQUENCE
C
      IF (NWRS(K).GT.0) THEN
      DO 200 N=1,NWRS(K)
      READ (5,27) KWRS(K,N),WRDLVF(K,N)
   27 FORMAT(I5,F10.4)
  200 CONTINUE
      END IF
C
C*****READ DIVERSION RIGHTS
C
      READ (5,30) (WR(K,M),M=1,4)
   30 FORMAT(4I10)
C
C*****READ NATURAL FLOW
C
      IF (KRCR(K).EQ.1.AND.KRCRP(K).GT.0) GO TO 300
      READ (5,35) ((QN(K,I,J),J=1,12),I=1,NYRS)
   35 FORMAT(4X,12I9)
  300 IF (KRCR(K).EQ.1) THEN
      READ (5,35) ((QL(K,I,J),J=1,12),I=1,NYRS)
      END IF
C
C*****READ RESERVOIR DATA
C
      IF (KRES(K).EQ.1.OR.KRRES(K).EQ.1) THEN
      READ (5,40) NLEV,STOR1(K),CONSTOR(K),DSTOR(K),RCRATE(K),RCREL(K)
   40 FORMAT(4I10,2F10.0)
      DO 400 L=1,NLEV
      READ (5,45) E(K,L),A(K,L),C(K,L)
   45 FORMAT (F10.2,2F10.0)
  400 CONTINUE
      END IF
C
      IF (KRRES(K).GT.1) THEN
      READ (5,50) CONSTOR(K),DSTOR(K)
   50 FORMAT (2I10)
      END IF
C
  500 CONTINUE
      RETURN
```

```
      END
C*********************************************************************
      SUBROUTINE GOLDEN
C*********************************************************************
C
      INTEGER*1 I,J,K,NCP,NYRS,KRRES(30),KRCR(30),NUSCP(30),KRES(30)
     1,IDRCH(30),KUS(30,15),KRCRP(30),NESET(30),NLEV,IOP,ISYSOPF
     2,KWRS(30,10),NWRS(30),IWR,IPASS,IYLD
      INTEGER QN(30,56,12),QL(30,56,12),AQM(30),ARECHRG(30)
     1,WR(30,4),STOR1(30),CONSTOR(30),DSTOR(30),IRCNT
     2,ADSHORT(30),ANEVAP(30)
C
      COMMON /A/ DMF(4,12,12),PARF(30),DLVF(30),WRF(30),I,J,K,NCP,NYRS
     1,KRRES,KRCR,NUSCP,IDRCH,KUS,KRES,IOP,IRCNT,CONV,SYSMIN,SYSDEM
     2,KRCRP,NESET,AAA,BBB,DEM,SYSDEAD,SYSCON,ISYSOPF,XLCC,BEREL
     3,WRDLVF(30,10),NWRS,IWR,KWRS,IPASS,IYLD
      COMMON /B/ QM(30,56,12),QN,QL,WR
      COMMON /C/ EVNT(30,56,12),E(30,20),A(30,20),C(30,20),STOR1
     1,BSTOR(30),ESTOR(30),CONSTOR,DSTOR,RCRATE(30),RCREL(30),NLEV
     2,WRREL(30),QCUSD1(30),QMUSD1(30),XESTOR(30),QMN(30)
      COMMON /D/ DIV,DSHORT(30),QIN(30),SHORT(3,30),PREVALL(30)
      COMMON /E/ AQN(30),AQL(30),AQM,ARECHRG,RECHRG(30),ADDR(30)
     1,EVAP(30),ADSHORT,ANEVAP
C
   10 AA=AAA
      BB=BBB
      IFLAG=0
      IT=2
      T=.5*(3.-SQRT(5.))
      X1=T*(BB-AA)
      X2=BB-X1
      X1=AA+X1
      SYSDEM=X1
      CALL FLOWS
      F1=SYSMIN
      SYSDEM=X2
      CALL FLOWS
      F2=SYSMIN
C
  100 IT=IT+1
      IF (F2-F1) 110,110,120
C
  110 AA=X1
      FA=F1
      X1=X2
      F1=F2
      X2=BB-T*(BB-AA)
      SYSDEM=X2
      CALL FLOWS
      F2=SYSMIN
      GO TO 130
C
  120 BB=X2
      FB=F2
      X2=X1
      F2=F1
      X1=AA+T*(BB-AA)
      SYSDEM=X1
      CALL FLOWS
      F1=SYSMIN
```

```
C
  130 CONTINUE
C
      WRITE (*,20) ' CURRENT YIELD ESTIMATE =',SYSDEM
   20 FORMAT(A26,F10.0)
C
      IF (ABS(BB-AA)-CONV) 210,210,100
  210 AAA=AA
      BBB=BB
      RETURN
      END
C*****************************************************************
      SUBROUTINE FLOWS
C*****************************************************************
C
      INTEGER*1 I,J,K,NCP,NYRS,KRRES(30),KRCR(30),NUSCP(30),KRES(30)
     1,IDRCH(30),KUS(30,15),KRCRP(30),NESET(30),NLEV,IOP,ISYSOPF
     2,KWRS(30,10),NWRS(30),IWR,IPASS,IYLD
      INTEGER QN(30,56,12),QL(30,56,12),AQM(30),ARECHRG(30)
     1,WR(30,4),STOR1(30),CONSTOR(30),DSTOR(30),IRCNT
     2,ADSHORT(30),ANEVAP(30)
C
      COMMON /A/ DMF(4,12,12),PARF(30),DLVF(30),WRF(30),I,J,K,NCP,NYRS
     1,KRRES,KRCR,NUSCP,IDRCH,KUS,KRES,IOP,IRCNT,CONV,SYSMIN,SYSDEM
     2,KRCRP,NESET,AAA,BBB,DEM,SYSDEAD,SYSCON,ISYSOPF,XLCC,BEREL
     3,WRDLVF(30,10),NWRS,IWR,KWRS,IPASS,IYLD
      COMMON /B/ QM(30,56,12),QN,QL,WR
      COMMON /C/ EVNT(30,56,12),E(30,20),A(30,20),C(30,20),STOR1
     1,BSTOR(30),ESTOR(30),CONSTOR,DSTOR,RCRATE(30),RCREL(30),NLEV
     2,WRREL(30),QCUSD1(30),QMUSD1(30),XESTOR(30),QMN(30)
      COMMON /D/ DIV,DSHORT(30),QIN(30),SHORT(3,30),PREVALL(30)
      COMMON /E/ AQN(30),AQL(30),AQM,ARECHRG,RECHRG(30),ADDR(30)
     1,EVAP(30),ADSHORT,ANEVAP
C
C*****BEGIN FLOW CALCULATIONS IN 1ST YEAR AT MOST UPSTREAM POINT
C
      SYSMIN=SYSCON
      DO 1000 I=1,NYRS
C
C*****INITIALIZE ANNUAL SUMS
C
      IF (ISYSOPF.EQ.1) THEN
      DO 100 K=1,NCP
C     AQN(K)=0.
C     AQL(K)=0.
      AQM(K)=0
      ARECHRG(K)=0
      ADSHORT(K)=0
      ANEVAP=0
  100 CONTINUE
      END IF
C
      DO 990 J=1,12
C
      IF (IWR.EQ.0) THEN
      IPZ=3
      ELSE
      IPZ=1
      END IF
      DO 985 IPASS=IPZ,3
```

```
      IF (IWR.NE.0.AND.IPASS.EQ.3) CALL WRR
      RECHRG(K)=0.
      ADDR(K)=0.
C
      DO 980 K=1,NCP
C
C*****COMPUTE MONTHLY DIVERSIONS
C
      DIV=0.
      DO 500 M=1,4
      DIV=DIV+DMF(IDRCH(K),M,J)*WR(K,M)*WRF(K)/100.
  500 CONTINUE
C
C*****COMPUTE INFLOW TO CONTROL POINT AND CHECK FOR SHORTAGE
C
      QIN(K)=QN(K,I,J)-DIV
      IF (NUSCP(K).GT.0) THEN
      DO 550 N=1,NUSCP(K)
      IF (KRCRP(KUS(K,N)).EQ.0) QIN(K)=QIN(K)-DLVF(KUS(K,N))*
     1(QN(KUS(K,N),I,J)-QM(KUS(K,N),I,J))
      IF (KRCRP(KUS(K,N)).GT.0) QIN(K)=QIN(K)-DLVF(KUS(K,N))*
     1(QMN(KUS(K,N))-QM(KUS(K,N),I,J))
  550 CONTINUE
      END IF
C
      SHORT(IPASS,K)=0.
C
      IF (QIN(K).LT.0.) THEN
      IF (K.GT.26) GO TO 5
      SHORT(IPASS,K)=ABS(QIN(K))
    5 QIN(K)=0.
      END IF
C
C*****CHECK CONTROL POINT TYPE AND COMPUTE OUTFLOW
C
      IF (KRCR(K).EQ.1) CALL RCHRG
      IF (KRRES(K).GE.1.AND.IPASS.GT.1) CALL RRESOP
      IF (KRRES(K).EQ.3.AND.IPASS.EQ.1) CALL RRESOP
      IF (KRES(K).EQ.1) CALL SYSOP
      IF (KRES(K).EQ.0.AND.KRCR(K).EQ.0.AND.KRRES(K).EQ.0)
     1QM(K,I,J)=QIN(K)
      IF (KRRES(K).EQ.1.AND.IPASS.EQ.1) QM(K,I,J)=QIN(K)
C
C*****CALCULATE RECHARGE
C
      IF (KRCR(K).EQ.1) THEN
      RECHRG(K)=RECHRG(K)+ADDR(K)
      DO 600 N=1,NUSCP(K)
      RECHRG(K)=RECHRG(K)+ADDR(KUS(K,N))
  600 CONTINUE
      END IF
C
C*****INCREMENT SHORTAGE RESPECTING CCR/LCC STORAGE
C
      IF (IWR.EQ.2) THEN
      IF (K.EQ.26.OR.K.EQ.29) SHORT(IPASS,K)=SHORT(IPASS,K)
     1+CONSTOR(K)-XESTOR(K)
      END IF
C
C*****WRITE OUT SHORTAGES
```

```
C
C*    WRITE (*,7) K,I,J,IPASS,SHORT(IPASS,K)
C*   1,QIN(K),DIV,QM(K,I,J),RECHRG(K)
C*  7 FORMAT (4I3,5F10.0)
C
C*****ACCUMULATE ANNUAL SUMS
C
      IF (ISYSOPF.EQ.1.AND.IPASS.EQ.3) THEN
C     AQN(K)=AQN(K)+QN(K,I,J)
C     IF (KRCR(K).EQ.1) AQL(K)=AQL(K)+QL(K,I,J)
      AQM(K)=AQM(K)+IFIX(QM(K,I,J))
      ARECHRG(K)=ARECHRG(K)+IFIX(RECHRG(K))
      ANEVAP(K)=ANEVAP(K)+IFIX(EVAP(K))
      END IF
C
  980 CONTINUE
  985 CONTINUE
  990 CONTINUE
C
C*****WRITE OUT ANNUAL RECHARGE AND MODIFIED FLOW SUMMARIES
C
      IF (ISYSOPF.EQ.1) THEN
      WRITE (6,10) I,(ARECHRG(K),K=1,NCP)
      WRITE (7,10) I,(AQM(K),K=1,NCP)
      WRITE (3,10) I,(ADSHORT(K),K=1,NCP)
      WRITE (4,10) I,(ANEVAP(K),K=1,NCP)
   10 FORMAT(I3,3018)
      END IF
C
 1000 CONTINUE
C
C*****CHECK MINIMUM SYSTEM STORAGE & RETURN TO GOLDEN
C
      IF (SYSMIN.LT.SYSDEAD) SYSMIN=2*SYSDEAD-SYSMIN
C
      RETURN
      END
C*********************************************************************
      SUBROUTINE WRR
C*********************************************************************
C
      INTEGER*1 I,J,K,NCP,NYRS,KRRES(30),KRCR(30),NUSCP(30),KRES(30)
     1,IDRCH(30),KUS(30,15),KRCRP(30),NESET(30),NLEV,IOP,ISYSOPF
     2,KWRS(30,10),NWRS(30),IWR,IPASS,IYLD
      INTEGER QN(30,56,12),QL(30,56,12),AQM(30),ARECHRG(30)
     1,WR(30,4),STOR1(30),CONSTOR(30),DSTOR(30),IRCNT
     2,ADSHORT(30),ANEVAP(30)
C
      COMMON /A/ DMF(4,12,12),PARF(30),DLVF(30),WRF(30),I,J,K,NCP,NYRS
     1,KRRES,KRCR,NUSCP,IDRCH,KUS,KRES,IOP,IRCNT,CONV,SYSMIN,SYSDEM
     2,KRCRP,NESET,AAA,BBB,DEM,SYSDEAD,SYSCON,ISYSOPF,XLCC,BEREL
     3,WRDLVF(30,10),NWRS,IWR,KWRS,IPASS,IYLD
      COMMON /B/ QM(30,56,12),QN,QL,WR
      COMMON /C/ EVNT(30,56,12),E(30,20),A(30,20),C(30,20),STOR1
     1,BSTOR(30),ESTOR(30),CONSTOR,DSTOR,RCRATE(30),RCREL(30),NLEV
     2,WRREL(30),QCUSD1(30),QMUSD1(30),XESTOR(30),QMN(30)
      COMMON /D/ DIV,DSHORT(30),QIN(30),SHORT(3,30),PREVALL(30)
      COMMON /E/ AQN(30),AQL(30),AQM,ARECHRG,RECHRG(30),ADDR(30)
     1,EVAP(30),ADSHORT,ANEVAP
C
```

```
C*****BEGIN CONTROL POINT SEQUENCE
C
      DO 500 K=1,NCP
C
      WRREL(K)=0.
      PREVALL(K)=0.
      IF (NWRS(K).EQ.0) GO TO 500
C
      DSHORT(K)=SHORT(2,K)-SHORT(1,K)
      IF (DSHORT(K).LT.0) DSHORT(K)=0.
      ADSHORT(K)=ADSHORT(K)+IFIX(DSHORT(K))
      IF (DSHORT(K).LE.0.) GO TO 500
C
C*****BEGIN PREFERENTIAL RELEASE SEQUENCE
C
      DO 400 N=1,NWRS(K)
      IF (PREVALL(KWRS(K,N)).GE.QIN(KWRS(K,N))) GO TO 400
      IF (KRRES(KWRS(K,N)).EQ.1.AND.RCREL(KWRS(K,N)).GE
     1.QIN(KWRS(K,N))) THEN
      PREVALL(KWRS(K,N))=QIN(KWRS(K,N))
      GO TO 400
      END IF
C
      IF (PREVALL(KWRS(K,N)).GE.RCREL(KWRS(K,N))) THEN
      WRREL(KWRS(K,N))=WRREL(KWRS(K,N))+DSHORT(K)/WRDLVF(K,N)
      ELSE
      WRREL(KWRS(K,N))=WRREL(KWRS(K,N))+RCREL(KWRS(K,N))
     1+DSHORT(K)/WRDLVF(K,N)
      END IF
C
C*****COMPARE RELEASE REQUIREMENT TO INFLOW AND PREVIOUS ALLOCATION
C
      IF(WRREL(KWRS(K,N)).LE.QIN(KWRS(K,N))-PREVALL(KWRS(K,N))) THEN
      PREVALL(KWRS(K,N))=PREVALL(KWRS(K,N))+WRREL(KWRS(K,N))
      GO TO 500
      END IF
C
      WRREL(KWRS(K,N))=QIN(KWRS(K,N))
      IF(PREVALL(KWRS(K,N)).GE.RCREL(KWRS(K,N))) THEN
      DSHORT(K)=DSHORT(K)-(WRREL(KWRS(K,N))-PREVALL(KWRS(K,N)))
     1*WRDLVF(K,N)
      ELSE
      DSHORT(K)=DSHORT(K)-(WRREL(KWRS(K,N))
     1-RCREL(KWRS(K,N)))*WRDLVF(K,N)
      END IF
C
      PREVALL(KWRS(K,N))=WRREL(KWRS(K,N))
C
  400 CONTINUE
  500 CONTINUE
C
      RETURN
      END
C**********************************************************************
      SUBROUTINE RCHRG
C**********************************************************************
C
      INTEGER*1 I,J,K,NCP,NYRS,KRRES(30),KRCR(30),NUSCP(30),KRES(30)
     1,IDRCH(30),KUS(30,15),KRCRP(30),NESET(30),NLEV,IOP,ISYSOPF
     2,KWRS(30,10),NWRS(30),IWR,IPASS,IYLD
```

```
      INTEGER QN(30,56,12),QL(30,56,12),AQM(30),ARECHRG(30)
     1,WR(30,4),STOR1(30),CONSTOR(30),DSTOR(30),IRCNT
     2,ADSHORT(30),ANEVAP(30)
C
      COMMON /A/ DMF(4,12,12),PARF(30),DLVF(30),WRF(30),I,J,K,NCP,NYRS
     1,KRRES,KRCR,NUSCP,IDRCH,KUS,KRES,IOP,IRCNT,CONV,SYSMIN,SYSDEM
     2,KRCRP,NESET,AAA,BBB,DEM,SYSDEAD,SYSCON,ISYSOPF,XLCC,BEREL
     3,WRDLVF(30,10),NWRS,IWR,KWRS,IPASS,IYLD
      COMMON /B/ QM(30,56,12),QN,QL,WR
      COMMON /C/ EVNT(30,56,12),E(30,20),A(30,20),C(30,20),STOR1
     1,BSTOR(30),ESTOR(30),CONSTOR,DSTOR,RCRATE(30),RCREL(30),NLEV
     2,WRREL(30),QCUSD1(30),QMUSD1(30),XESTOR(30),QMN(30)
      COMMON /D/ DIV,DSHORT(30),QIN(30),SHORT(3,30),PREVALL(30)
      COMMON /E/ AQN(30),AQL(30),AQM,ARECHRG,RECHRG(30),ADDR(30)
     1,EVAP(30),ADSHORT,ANEVAP
C
C*****CHECK UNGAGED AREA
C
      RECHRG(K)=0.
      IF (IPASS.EQ.1) THEN
      DO 400 N=1,NUSCP(K)
      ADDR(KUS(K,N))=0.
  400 CONTINUE
      END IF
      IF (KRCRP(K).GT.0) GO TO 10
C
C*****CALCULATE BASIC LOCAL RECHARGE
C
      QUS=0.
      QCUSD=0.
      DO 500 N=1,NUSCP(K)
      QUS=QUS+QM(KUS(K,N),I,J)
      QCUSD=QCUSD+DLVF(KUS(K,N))*(QN(KUS(K,N),I,J)
     1-QM(KUS(K,N),I,J))
  500 CONTINUE
      IF (QN(K,I,J).GT.QCUSD) THEN
      RECHRG(K)=QUS+QL(K,I,J)-QN(K,I,J)+QCUSD
      ELSE
      RECHRG(K)=QUS+QL(K,I,J)
      END IF
      IF (RECHRG(K).LT.0.) RECHRG(K)=0.
C
C*****CALCULATE MODIFIED FLOW
C
      QM(K,I,J)=QN(K,I,J)-DIV-QCUSD
      IF (QM(K,I,J).LT.0.) QM(K,I,J)=0.
      GO TO 1000
C
C*****CALCULATE RECHARGE FOR UNGAGED AREA USING PARTNER AREA
C*****  (PRIOR TO UPSTREAM STRUCTURE)
C
   10 IF (IPASS.GT.1) GO TO 20
      QCUSD=0.
      DO 600 N=1,NUSCP(KRCRP(K))
      QCUSD=QCUSD+DLVF(KRCRP(K)-N)*(QN(KRCRP(K)-N,I,J)-
     1QIN(KRCRP(K)-N))
  600 CONTINUE
      QCUSD1(KRCRP(K))=QCUSD
   20 IF (IPASS.GT.1) QCUSD=QCUSD1(KRCRP(K))
C
```

```
      QNH2=QN(KRCRP(K),I,J)-QCUSD
      IF (QL(KRCRP(K),I,J).EQ.0.OR.QNH2.LE.0.) THEN
      RECHRG(K)=QL(K,I,J)
      GO TO 900
      END IF
C
      IF (QNH2.GT.0.) THEN
      IF (IPASS.GT.1) GO TO 30
      QMUSD=0.
      DO 700 N=1,NUSCP(KRCRP(K))
      QMUSD=QMUSD+DLVF(KRCRP(K)-N)*QIN(KRCRP(K)-N)
  700 CONTINUE
      QMUSD1(KRCRP(K))=QMUSD
   30 IF (IPASS.GT.1) QMUSD=QMUSD1(KRCRP(K))
      RB=QL(KRCRP(K),I,J)-QNH2+QMUSD
      IF (RB.GT.QL(KRCRP(K),I,J)) RB=QL(KRCRP(K),I,J)
      IF (RB.LT.0.) RB=0.
      RECHRG(K)=QL(K,I,J)*RB/(QL(KRCRP(K),I,J)*PARF(K))
      IF (RECHRG(K).GT.QL(K,I,J)) RECHRG(K)=QL(K,I,J)
      END IF
C
C*****CALCULATE MODIFIED FLOW
C
  900 QM(K,I,J)=QL(K,I,J)-RECHRG(K)
      IF (KRCRP(K).GT.0.AND.IPASS.EQ.1) QMN(K)=QM(K,I,J)
C
 1000 CONTINUE
      RETURN
      END
C**********************************************************************
      SUBROUTINE RRESOP
C**********************************************************************
C
      INTEGER*1 I,J,K,NCP,NYRS,KRRES(30),KRCR(30),NUSCP(30),KRES(30)
     1,IDRCH(30),KUS(30,15),KRCRP(30),NESET(30),NLEV,IOP,ISYSOPF
     2,KWRS(30,10),NWRS(30),IWR,IPASS,IYLD
      INTEGER QN(30,56,12),QL(30,56,12),AQM(30),ARECHRG(30)
     1,WR(30,4),STOR1(30),CONSTOR(30),DSTOR(30),IRCNT
     2,ADSHORT(30),ANEVAP(30)
C
      COMMON /A/ DMF(4,12,12),PARF(30),DLVF(30),WRF(30),I,J,K,NCP,NYRS
     1,KRRES,KRCR,NUSCP,IDRCH,KUS,KRES,IOP,IRCNT,CONV,SYSMIN,SYSDEM
     2,KRCRP,NESET,AAA,BBB,DEM,SYSDEAD,SYSCON,ISYSOPF,XLCC,BEREL
     3,WRDLVF(30,10),NWRS,IWR,KWRS,IPASS,IYLD
      COMMON /B/ QM(30,56,12),QN,QL,WR
      COMMON /C/ EVNT(30,56,12),E(30,20),A(30,20),C(30,20),STOR1
     1,BSTOR(30),ESTOR(30),CONSTOR,DSTOR,RCRATE(30),RCREL(30),NLEV
     2,WRREL(30),QCUSD1(30),QMUSD1(30),XESTOR(30),QMN(30)
      COMMON /D/ DIV,DSHORT(30),QIN(30),SHORT(3,30),PREVALL(30)
      COMMON /E/ AQN(30),AQL(30),AQM,ARECHRG,RECHRG(30),ADDR(30)
     1,EVAP(30),ADSHORT,ANEVAP
C
      ADDR(K)=0.
      DIRR=0.
      REL=0.
      IF (IPASS.LT.3) WRREL(K)=0.
C
      IF (KRRES(K).EQ.1) THEN
C
C*****CALCULATE MODIFIED FLOW FOR TYPE I RES (TRACK EVAP)
```

```
C
C*****CALCULATE BEGINNING SURFACE AREA AND ESTIMATE NET EVAP
C
      IF (I.EQ.1.AND.J.EQ.1) THEN
      BSTOR(K)=STOR1(K)
      ELSE
      BSTOR(K)=ESTOR(K)
      END IF
      XE=BSTOR(K)
      CALL STORARE (XE,YE)
      BSAREA=YE
      EVAP(K)=BSAREA*EVNT(NESET(K),I,J)
C
C*****ESTIMATE ENDING STORAGE
C
      IF (WRREL(K).GT.RCREL(K)) WRREL(K)=WRREL(K)-RCREL(K)
      QOUT=RCRATE(K)+RCREL(K)+WRREL(K)
      ESTOEST=BSTOR(K)+QIN(K)-EVAP(K)-QOUT
C
C*****ESTIMATE AVERAGE SURFACE AREA AND RE-ESTIMATE NET EVAP
C
      IF (ESTOEST.GT.DSTOR(K).AND.ESTOEST.LT.CONSTOR(K)) THEN
      XE=ESTOEST
      CALL STORARE (XE,YE)
      ELSE
      IF (ESTOEST.GE.CONSTOR(K)) THEN
      XE=CONSTOR(K)
      CALL STORARE (XE,YE)
      ELSE
      XE=DSTOR(K)
      CALL STORARE (XE,YE)
      END IF
      END IF
      EVAP(K)=((BSAREA+YE)/2.)*EVNT(NESET(K),I,J)
C
C*****RE-ESTIMATE ENDING STORAGE
C
      ESTOEST=BSTOR(K)+QIN(K)-EVAP(K)-WRREL(K)
C
C*****CHECK AVAILABILITY FOR RECHARGE RELEASE
C
      IF (ESTOEST.GT.DSTOR(K)) THEN
      IF (ESTOEST-RCREL(K)-DSTOR(K)) 2,3,4
    2 REL=ESTOEST-DSTOR(K)
      DIRR=0.
      ESTOEST=DSTOR(K)
      GO TO 20
    3 REL=RCREL(K)
      DIRR=0.
      ESTOEST=DSTOR(K)
      GO TO 20
    4 REL=RCREL(K)
      ESTOEST=ESTOEST-REL
C
C*****CHECK AVAILABILITY FOR DIRECT RECHARGE DIVERSION
C
      IF (ESTOEST-RCRATE(K)-DSTOR(K)) 6,7,8
    6 DIRR=ESTOEST-DSTOR(K)
      ESTOEST=DSTOR(K)
      GO TO 20
```

```
    7 DIRR=RCRATE(K)
      ESTOEST=OSTOR(K)
      GO TO 20
    8 DIRR=RCRATE(K)
      ESTOEST=ESTOEST-DIRR
      END IF
C
      IF (ESTOEST-CONSTOR(K)) 10,20,30
   10 SPILL=0.
      IF (ESTOEST.GE.DSTOR(K)) GO TO 20
      ESTOR(K)=DSTOR(K)
      GO TO 40
   20 ESTOR(K)=ESTOEST
      SPILL=0.
      GO TO 40
   30 SPILL=ESTOEST-CONSTOR(K)
      ESTOR(K)=CONSTOR(K)
C
   40 QM(K,I,J)=SPILL+REL+WRREL(K)
      ADDR(K)=DIRR
C
      IF (KRCR(K).EQ.0) THEN
      IF (QM(K,I,J).LE.RCREL(K)) THEN
      ADDR(K)=ADDR(K)+QM(K,I,J)
      QM(K,I,J)=0.
      ELSE
      ADDR(K)=ADDR(K)+RCREL(K)
      QM(K,I,J)=QM(K,I,J)-RCREL(K)
      END IF
      END IF
C
      IF (KRRES(K).EQ.1.AND.KRCR(K).EQ.1) ADDR(K)=DIRR
C
      ELSE
C
C*****CALCULATE ADDITIONAL RECHARGE & MODIFIED FLOW FOR TYPE2 RES
C*****  TYPE2 PROPOSED: KRRES=2      TYPE2 EXISTING: KRRES=3
C
      QIN(K)=QM(K,I,J)
      TEST=QIN(K)-CONSTOR(K)-WRREL(K)
      IF (TEST) 110,110,130
  110 RECHRG(K)=RECHRG(K)+QIN(K)-WRREL(K)
      QM(K,I,J)=WRREL(K)
      GO TO 140
  130 RECHRG(K)=RECHRG(K)+CONSTOR(K)
      QM(K,I,J)=QIN(K)-CONSTOR(K)
  140 CONTINUE
C
      END IF
C
C*    WRITE (*,160) K,I,J,BSTOR(K),QIN(K),EVAP(K),REL,DIRR,SPILL
C*   1,ESTOR(K),QM(K,I,J),WRREL(K)
C*160 FORMAT(3I3,9F8.0)
C
      IF (IPASS.LT.3) ESTOR(K)=BSTOR(K)
C
      RETURN
      END
C*********************************************************************
      SUBROUTINE SYSOP
```

```
C*********************************************************************
C
      INTEGER*1 I,J,K,NCP,NYRS,KRRES(30),KRCR(30),NUSCP(30),KRES(30)
     1,IDRCH(30),KUS(30,15),KRCRP(30),NESET(30),NLEV,IOP,ISYSOPF
     2,KWRS(30,10),NWRS(30),IWR,IPASS,IYLD
      INTEGER QN(30,56,12),QL(30,56,12),AQM(30),ARECHRG(30)
     1,WR(30,4),STOR1(30),CONSTOR(30),DSTOR(30),IRCNT
     2,ADSHORT(30),ANEVAP(30)
C
      COMMON /A/ DMF(4,12,12),PARF(30),DLVF(30),WRF(30),I,J,K,NCP,NYRS
     1,KRRES,KRCR,NUSCP,IDRCH,KUS,KRES,IOP,IRCNT,CONV,SYSMIN,SYSDEM
     2,KRCRP,NESET,AAA,BBB,DEM,SYSDEAD,SYSCON,ISYSOPF,XLCC,BEREL
     3,WRDLVF(30,10),NWRS,IWR,KWRS,IPASS,IYLD
      COMMON /B/ QM(30,56,12),QN,QL,WR
      COMMON /C/ EVNT(30,56,12),E(30,20),A(30,20),C(30,20),STOR1
     1,BSTOR(30),ESTOR(30),CONSTOR,DSTOR,RCRATE(30),RCREL(30),NLEV
     2,WRREL(30),QCUSD1(30),QMUSD1(30),XESTOR(30),QMN(30)
      COMMON /D/ DIV,DSHORT(30),QIN(30),SHORT(3,30),PREVALL(30)
      COMMON /E/ AQN(30),AQL(30),AQM,ARECHRG,RECHRG(30),ADDR(30)
     1,EVAP(30),ADSHORT,ANEVAP
C
C*****CALCULATE BEGINNING SURFACE AREA AND ESTIMATE NET EVAP
C
      IF (I.EQ.1.AND.J.EQ.1) THEN
      BSTOR(K)=STOR1(K)
      ELSE
      BSTOR(K)=ESTOR(K)
      END IF
      XE=BSTOR(K)
      CALL STORARE (XE,YE)
      BSAREA=YE
      EVAP(K)=BSAREA*EVNT(NESET(K),I,J)
C
C*****ESTIMATE REQUIRED RELEASE (REL)
C
C*****NO DEDICATED RELEASE TO ESTUARY
      IF (IOP.EQ.1) THEN
      BEREL=0.
      CALL PHASE4
      END IF
C
      REL=DEM
C
C*****ESTIMATE ENDING STORAGE
C
      ESTOEST=BSTOR(K)+QIN(K)-EVAP(K)-REL
C
C*****ESTIMATE AVERAGE SURFACE AREA AND RE-ESTIMATE NET EVAP
C
      IF (ESTOEST.GT.DSTOR(K).AND.ESTOEST.LT.CONSTOR(K)) THEN
      XE=ESTOEST
      CALL STORARE (XE,YE)
      ELSE
      IF (ESTOEST.GE.CONSTOR(K)) THEN
      XE=CONSTOR(K)
      CALL STORARE (XE,YE)
      ELSE
      XE=DSTOR(K)
      CALL STORARE (XE,YE)
      END IF
```

```
      END IF
      EVAP(K)=((BSAREA+YE)/2.)*EVNT(NESET(K),I,J)
C
C*****RE-ESTIMATE ENDING STORAGE
C
      ESTOEST=BSTOR(K)+QIN(K)-EVAP(K)-REL
C
C
      IF (ESTOEST-CONSTOR(K)) 10,20,30
   10 SPILL=0.
      IF (ESTOEST.GE.DSTOR(K)) GO TO 20
      REL=REL-ABS(ESTOEST-DSTOR(K))
      IF (REL.LT.0.) REL=0.
      ESTOR(K)=DSTOR(K)
      GO TO 40
   20 ESTOR(K)=ESTOEST
      SPILL=0.
      GO TO 40
   30 SPILL=ESTOEST-CONSTOR(K)
      ESTOR(K)=CONSTOR(K)
C
C*****COMPUTE MODIFIED FLOW
C
   40 QM(K,I,J)=SPILL+REL
C
C*****WRITE OUT MONTHLY SYSOP SUMMARIES AT FIRM YIELD
C*****  AND CALCULATE E-O-M WSEL
C
      IF (IPASS.EQ.3) THEN
      IF (K.EQ.26.AND.ISYSOPF.EQ.1.OR.K.EQ.29.AND.ISYSOPF.EQ.1) THEN
      XE=ESTOR(K)
      CALL STORELV (XE,YE)
      WSEL=YE
      WRITE (8,70) K,I,J,BSTOR(K),QIN(K),EVAP(K),REL,SPILL,ESTOR(K),WSEL
     1,QM(K,I,J)
   70 FORMAT(3I3,6F10.0,F10.2,F10.0)
      END IF
      END IF
C
      XESTOR(K)=ESTOR(K)
      IF (IPASS.LT.3) ESTOR(K)=BSTOR(K)
C
C*****CHECK MINIMUM SYSTEM STORAGE
C
      IF (K.EQ.29) THEN
      SYSTOR=ESTOR(26)+ESTOEST
      IF (SYSTOR.LT.SYSMIN) SYSMIN=SYSTOR
      END IF
C
      RETURN
      END
C*********************************************************************
      SUBROUTINE PHASE4
C*********************************************************************
C
      INTEGER*1 I,J,K,NCP,NYRS,KRRES(30),KRCR(30),NUSCP(30),KRES(30)
     1,IDRCH(30),KUS(30,15),KRCRP(30),NESET(30),NLEV,IOP,ISYSOPF
     2,KWRS(30,10),NWRS(30),IWR,IPASS,IYLD
      INTEGER QN(30,56,12),QL(30,56,12),AQM(30),ARECHRG(30)
     1,WR(30,4),STOR1(30),CONSTOR(30),DSTOR(30),IRCNT
```

```
     2,ADSHORT(30),ANEVAP(30)
C
      COMMON /A/ DMF(4,12,12),PARF(30),DLVF(30),WRF(30),I,J,K,NCP,NYRS
     1,KRRES,KRCR,NUSCP,IDRCH,KUS,KRES,IOP,IRCNT,CONV,SYSMIN,SYSDEM
     2,KRCRP,NESET,AAA,BBB,DEM,SYSDEAD,SYSCON,ISYSOPF,XLCC,BEREL
     3,WRDLVF(30,10),NWRS,IWR,KWRS,IPASS,IYLD
      COMMON /B/ QM(30,56,12),QN,QL,WR
      COMMON /C/ EVNT(30,56,12),E(30,20),A(30,20),C(30,20),STOR1
     1,BSTOR(30),ESTOR(30),CONSTOR,DSTOR,RCRATE(30),RCREL(30),NLEV
     2,WRREL(30),QCUSD1(30),QMUSD1(30),XESTOR(30),QMN(30)
      COMMON /D/ DIV,DSHORT(30),QIN(30),SHORT(3,30),PREVALL(30)
      COMMON /E/ AQN(30),AQL(30),AQM,ARECHRG,RECHRG(30),ADDR(30)
     1,EVAP(30),ADSHORT,ANEVAP
C
C*****COMPUTE STORAGE AT KEY RESERVOIR LEVELS ON FIRST ENTRY
C
      IRCNT=IRCNT+1
      IF (IRCNT.EQ.1) THEN
C*****CHOKE STORAGE AT 155 FT-MSL
      XE=155.
      KK=26
      CALL ELVSTOR (XE,KK,YE)
      CHS155=YE
C*****CORPUS STORAGE AT TARGET LEVEL
      XE=XLCC
      KK=29
      CALL ELVSTOR (XE,KK,YE)
      SXLCC=YE
      END IF
C
C*****CALCULATE CHOKE RELEASE
C
      IF (I.EQ.1.AND.J.EQ.1) ESTOR(29)=STOR1(29)
      IF (K.EQ.26) THEN
      XLCCTST=SXLCC+(SYSDEM*DMF(4,1,J)/DLVF(29))/100.+BEREL
      IF (ESTOR(29).GT.XLCCTST) DEM=2000.
      IF (ESTOR(29).LE.XLCCTST.AND.BSTOR(K).GT.CHS155) THEN
      DEM=(SYSDEM*DMF(4,1,J)/(DLVF(26)*DLVF(28)*DLVF(29)))/100.
     1+(SXLCC-ESTOR(29))/(DLVF(26)*DLVF(28))+BEREL/(DLVF(26)*DLVF(28))
      IF (DEM.LT.2000.) DEM=2000.
      END IF
      IF (ESTOR(29).LE.XLCCTST.AND.BSTOR(K).LE.CHS155) THEN
      TEST=ESTOR(29)-DSTOR(29)-(SYSDEM*DMF(4,1,J)/DLVF(29))/100.-BEREL
      IF (TEST.LT.0.) THEN
      DEM=-(TEST)/(DLVF(26)*DLVF(28))
      ELSE
      DEM=2000.
      END IF
      END IF
      END IF
C
C*****CALCULATE CORPUS RELEASE
C
      IF (K.EQ.29) DEM=(SYSDEM*DMF(4,1,J)/DLVF(29))/100.+BEREL
C
      RETURN
      END
C*********************************************************************
      SUBROUTINE ELVSTOR (XE,KK,YE)
C*********************************************************************
```

```
C
      INTEGER*1 I,J,K,NCP,NYRS,KRRES(30),KRCR(30),NUSCP(30),KRES(30)
     1,IDRCH(30),KUS(30,15),KRCRP(30),NESET(30),NLEV,IOP,ISYSOPF
     2,KWRS(30,10),NWRS(30),IWR,IPASS,IYLD
      INTEGER QN(30,56,12),QL(30,56,12),AQM(30),ARECHRG(30)
     1,WR(30,4),STOR1(30),CONSTOR(30),DSTOR(30),IRCNT
     2,ADSHORT(30),ANEVAP(30)
C
      COMMON /A/ DMF(4,12,12),PARF(30),DLVF(30),WRF(30),I,J,K,NCP,NYRS
     1,KRRES,KRCR,NUSCP,IDRCH,KUS,KRES,IOP,IRCNT,CONV,SYSMIN,SYSDEM
     2,KRCRP,NESET,AAA,BBB,DEM,SYSDEAD,SYSCON,ISYSOPF,XLCC,BEREL
     3,WRDLVF(30,10),NWRS,IWR,KWRS,IPASS,IYLD
      COMMON /B/ QM(30,56,12),QN,QL,WR
      COMMON /C/ EVNT(30,56,12),E(30,20),A(30,20),C(30,20),STOR1
     1,BSTOR(30),ESTOR(30),CONSTOR,DSTOR,RCRATE(30),RCREL(30),NLEV
     2,WRREL(30),QCUSD1(30),QMUSD1(30),XESTOR(30),QMN(30)
      COMMON /D/ DIV,DSHORT(30),QIN(30),SHORT(3,30),PREVALL(30)
      COMMON /E/ AQN(30),AQL(30),AQM,ARECHRG,RECHRG(30),ADDR(30)
     1,EVAP(30),ADSHORT,ANEVAP
C
C*****COMPUTE STORAGE FROM ELEVATION BY LINEAR INTERPOLATION
C
      L=2
    9 IF (XE-E(KK,L)) 12,11,10
   10 L=L+1
      GO TO 9
   11 YE=C(KK,L)
      GO TO 13
   12 YE=C(KK,L-1)+(C(KK,L)-C(KK,L-1))/
     1(E(KK,L)-E(KK,L-1))*(XE-E(KK,L-1))
   13 CONTINUE
      RETURN
      END
C*********************************************************************
      SUBROUTINE STORARE (XE,YE)
C*********************************************************************
C
      INTEGER*1 I,J,K,NCP,NYRS,KRRES(30),KRCR(30),NUSCP(30),KRES(30)
     1,IDRCH(30),KUS(30,15),KRCRP(30),NESET(30),NLEV,IOP,ISYSOPF
     2,KWRS(30,10),NWRS(30),IWR,IPASS,IYLD
      INTEGER QN(30,56,12),QL(30,56,12),AQM(30),ARECHRG(30)
     1,WR(30,4),STOR1(30),CONSTOR(30),DSTOR(30),IRCNT
     2,ADSHORT(30),ANEVAP(30)
C
      COMMON /A/ DMF(4,12,12),PARF(30),DLVF(30),WRF(30),I,J,K,NCP,NYRS
     1,KRRES,KRCR,NUSCP,IDRCH,KUS,KRES,IOP,IRCNT,CONV,SYSMIN,SYSDEM
     2,KRCRP,NESET,AAA,BBB,DEM,SYSDEAD,SYSCON,ISYSOPF,XLCC,BEREL
     3,WRDLVF(30,10),NWRS,IWR,KWRS,IPASS,IYLD
      COMMON /B/ QM(30,56,12),QN,QL,WR
      COMMON /C/ EVNT(30,56,12),E(30,20),A(30,20),C(30,20),STOR1
     1,BSTOR(30),ESTOR(30),CONSTOR,DSTOR,RCRATE(30),RCREL(30),NLEV
     2,WRREL(30),QCUSD1(30),QMUSD1(30),XESTOR(30),QMN(30)
      COMMON /D/ DIV,DSHORT(30),QIN(30),SHORT(3,30),PREVALL(30)
      COMMON /E/ AQN(30),AQL(30),AQM,ARECHRG,RECHRG(30),ADDR(30)
     1,EVAP(30),ADSHORT,ANEVAP
C
C*****COMPUTE SURFACE AREA FROM STORAGE BY LINEAR INTERPOLATION
C
      L=2
    9 IF (XE-C(K,L)) 12,11,10
```

```
   10 L=L+1
      GO TO 9
   11 YE=A(K,L)
      GO TO 13
   12 YE=A(K,L-1)+(A(K,L)-A(K,L-1))/
     1(C(K,L)-C(K,L-1))*(XE-C(K,L-1))
   13 CONTINUE
      RETURN
      END
C*********************************************************************
      SUBROUTINE STORELV (XE,YE)
C*********************************************************************
C
      INTEGER*1 I,J,K,NCP,NYRS,KRRES(30),KRCR(30),NUSCP(30),KRES(30)
     1,IDRCH(30),KUS(30,15),KRCRP(30),NESET(30),NLEV,IOP,ISYSOPF
     2,KWRS(30,10),NWRS(30),IWR,IPASS,IYLD
      INTEGER QN(30,56,12),QL(30,56,12),AQM(30),ARECHRG(30)
     1,WR(30,4),STOR1(30),CONSTOR(30),DSTOR(30),IRCNT
     2,ADSHORT(30),ANEVAP(30)
C
      COMMON /A/ DMF(4,12,12),PARF(30),DLVF(30),WRF(30),I,J,K,NCP,NYRS
     1,KRRES,KRCR,NUSCP,IDRCH,KUS,KRES,IOP,IRCNT,CONV,SYSMIN,SYSDEM
     2,KRCRP,NESET,AAA,BBB,DEM,SYSDEAD,SYSCON,ISYSOPF,XLCC,BEREL
     3,WRDLVF(30,10),NWRS,IWR,KWRS,IPASS,IYLD
      COMMON /B/ QM(30,56,12),QN,QL,WR
      COMMON /C/ EVNT(30,56,12),E(30,20),A(30,20),C(30,20),STOR1
     1,BSTOR(30),ESTOR(30),CONSTOR,DSTOR,RCRATE(30),RCREL(30),NLEV
     2,WRREL(30),QCUSD1(30),QMUSD1(30),XESTOR(30),QMN(30)
      COMMON /D/ DIV,DSHORT(30),QIN(30),SHORT(3,30),PREVALL(30)
      COMMON /E/ AQN(30),AQL(30),AQM,ARECHRG,RECHRG(30),ADDR(30)
     1,EVAP(30),ADSHORT,ANEVAP
C
C*****COMPUTE WSEL FROM STORAGE BY LINEAR INTERPOLATION
C
      L=2
    9 IF (XE-C(K,L)) 12,11,10
   10 L=L+1
      GO TO 9
   11 YE=E(K,L)
      GO TO 13
   12 YE=E(K,L-1)+(E(K,L)-E(K,L-1))/
     1(C(K,L)-C(K,L-1))*(XE-C(K,L-1))
   13 CONTINUE
      RETURN
      END
```

APPENDIX Q

1990 Yield Summary - 1988 Water Use

CHOKE CANYON RESERVOIR - 1990 SEDIMENT, 1988 WATER USE

YEAR	BSTOR (AC-FT)	INFLOW (AC-FT)	EVAP (AC-FT)	RELEASE (AC-FT)	SPILL (AC-FT)	ESTOR (AC-FT)	MAXWSEL (FT-MSL)	MINWSEL (FT-MSL)
1934	689314	95745	75413	24000	25126	660520	220.50	218.11
1935	660520	902379	18697	24000	830888	212906	94.00	88.60
1936	689314	285645	46394	24000	215251	689314	220.50	219.12
1937	689314	68841	85148	61019	0	219068	94.00	91.86
1938	611989	97524	100877	24000	0	689314	220.50	219.99
1939	584637	78986	81085	53753	0	232256	94.00	90.39
1940	528785	211313	62719	24000	0	611989	220.47	216.11
1941	653379	449903	34019	24000	366512	112577	93.09	75.58
1942	678751	344743	55477	24000	270749	584637	219.75	216.05
1943	673268	73569	88354	24000	0	104767	94.00	85.98
1944	634483	133696	73019	49444	0	528785	216.06	213.55
1945	645716	109468	89101	24000	0	110173	89.89	75.96
1946	642083	324500	57071	24000	207353	653379	219.15	213.07
1947	678159	37838	88144	24000	0	237473	94.00	82.90
1948	603852	42806	86176	66470	0	678751	220.50	219.43
1949	494012	221057	54032	90456	0	198653	94.00	91.84
1950	570580	21452	93572	24000	0	673268	220.50	219.06
1951	474460	154173	74858	75994	0	198646	94.00	85.70
1952	477781	33564	76789	24000	0	634483	220.10	218.24
1953	410556	257296	62513	133105	0	80827	90.92	83.82
1954	472233	36051	95810	24000	0	645716	219.62	217.66
1955	388474	40917	92579	95781	0	185342	94.00	76.64
1956	241030	54537	35227	230317	0	642083	219.63	217.65
1957	30023	426019	40610	48880	0	192777	94.00	88.68
1958	366553	467583	51013	24000	69809	678159	220.50	218.07
1959	689314	132159	89235	24000	26925	202479	94.00	88.80
1960	681313	93821	60186	24000	1634	603852	220.10	216.96
1961	689314	122070	76476	24000	72026	144402	94.00	88.60
1962	638883	10164	97915	142588	0	494012	216.71	212.03
1963	408544	30136	59184	216268	0	24978	87.33	75.50
1964	163228	25595	7623	171313	0	570580	215.82	209.77
1965	9888	88733	15094	24000	0	194283	94.00	76.01
1966	59527	81111	16578	32951	0	474460	215.29	211.10
1967	91109	395164	19545	100863	0	83027	92.70	84.02
1968	365865	262149	52989	24000	0	477781	211.99	208.64
1969	551025	78263	70468	52496	0	177911	93.53	75.88
1970	506324	91460	62245	24000	0	410556	211.12	207.84
1971	511539	463025	69745	83347	132157	41522	89.50	79.27
1972	689314	68327	71798	24000	699	472233	211.61	200.33
1973	661144	336153	64089	24000	221605	217267	94.00	76.05
1974	687603	171564	82299	24000	63554	388474	210.73	206.66
1975	689314	152348	86785	24000	69432	134203	94.00	86.86
1976	661445	284347	72108	24000	160370	241030	206.40	197.46
1977	689314	238068	100870	24000	163427	28696	86.69	76.00
1978	639085	166528	83312	61004	0	30023	195.86	170.75
1979	661297	162269	81571	73511	30618	38172	82.25	75.84
1980	637866	177086	97937	69704	0	366553	205.62	136.30
1981	647311	310795	70208	24000	177857	219161	94.00	75.81
1982	686041	62676	89885	24000	2190	689314	220.50	210.82
1983	632642	36608	71551	175851	0	235215	94.00	91.83
1984	421848	60192	66120	222142	0	681313	220.50	219.01
1985	193779	161502	24560	47634	0	217096	94.00	86.70
1986	283087	155805	45143	31725	0	689314	220.50	218.48
1987	362024	678353	72574	70488	214254	237473	94.00	87.54
1988	683061	74164	98694	167605	0	638883	220.50	218.43
1989	490926	60075	82774	143604	0	157555	94.00	89.47
AVG		182148	67469	61863	59329			

LAKE CORPUS CHRISTI - 1990 SEDIMENT, 1988 WATER USE

YEAR	BSTOR (AC-FT)	INFLOW (AC-FT)	EVAP (AC-FT)	RELEASE (AC-FT)	SPILL (AC-FT)	ESTOR (AC-FT)	MAXWSEL (FT-MSL)	MINWSEL (FT-MSL)
1934	237473	363870	46305	253738	88394	408544	218.22	207.73
1935	212906	2578685	28057	253738	2290728	24325	88.09	75.27
1936	219068	923133	25376	253738	630830	163228	206.20	191.11
1937	232256	175148	41089	253738	0	31718	86.75	75.39
1938	112577	345700	61796	253738	37975	9888	189.65	136.30
1939	104767	307861	48717	253738	0	198823	94.00	55.53
1940	110173	801278	41487	253738	378753	59527	181.60	161.26
1941	237473	1274044	18384	253738	1040741	90671	94.00	84.71
1942	198653	1156461	30603	253738	872127	91109	184.60	177.57
1943	198646	181574	45655	253738	0	121117	94.00	78.69
1944	80827	669547	40791	253738	270503	365865	205.49	136.30
1945	185342	466689	57499	253738	148017	234470	94.00	75.33
1946	192777	1177596	33040	253738	881115	551025	216.25	210.33
1947	202479	300045	53022	253738	51363	141725	94.00	88.42
1948	144402	164355	30040	253738	0	506324	214.60	211.50
1949	24978	827056	42580	253738	361433	173301	90.43	77.40
1950	194283	209629	67146	253738	0	511539	214.03	212.00
1951	83027	394558	45935	253738	0	123969	94.00	87.25
1952	177911	163758	46408	253738	0	689314	220.50	206.88
1953	41522	565620	26930	253738	109208	237473	94.00	75.55
1954	217267	248595	70462	253738	7457	661144	220.50	219.36
1955	134203	187543	39312	253738	0	132211	94.00	87.80
1956	28696	289358	26143	253738	0	687603	220.50	218.92
1957	38172	1287511	42353	253738	810432	233466	94.00	81.05
1958	219161	1325213	25971	253738	1029449	689314	220.50	219.16
1959	235215	398661	53404	253738	109638	210280	94.00	88.44
1960	217096	437829	26186	253738	137528	661445	220.50	219.37
1961	237473	316667	55848	253738	86999	152223	94.00	89.12
1962	157555	153216	32707	253738	0	689314	220.50	218.62
1963	24325	296766	35635	253738	0	237473	94.00	84.40
1964	31718	556237	19289	253738	116106	639085	220.50	218.43
1965	198823	250366	55651	253738	49128	100130	94.00	85.56
1966	90671	334409	30421	253738	19803	661297	219.90	216.92
1967	121117	1755616	23346	253738	1365179	49942	85.61	77.02
1968	234470	511784	43257	253738	307533	637866	220.50	218.38
1969	141725	312166	26851	253738	0	89785	93.07	75.89
1970	173301	333019	49157	253738	79456	647311	219.22	216.79
1971	123969	2423389	9583	253738	2046564	176420	94.00	75.37
1972	237473	273065	39177	253738	85412	686041	220.50	218.42
1973	132211	1011307	7228	253738	649085	226378	94.00	86.29
1974	233466	372386	40179	253738	101655	632642	220.50	218.12
1975	210280	377761	59328	253738	122752	88772	94.00	84.54
1976	152223	891942	14620	253738	538333	421848	218.05	208.44
1977	237473	527029	63061	253738	347573	53774	84.38	75.49
1978	100130	232880	29329	253738	0	193779	208.27	191.83
1979	49942	326790	33208	253738	0	40594	81.78	75.47
1980	89785	552763	42342	253738	170047	283087	200.65	193.83
1981	176420	1025948	23420	253738	698831	230492	94.00	77.01
1982	226378	205067	69904	253738	19030	362024	205.25	198.74
1983	88772	240851	22111	253738	0	46903	92.46	78.77
1984	53774	260547	19989	253738	0	683061	220.50	204.41
1985	40594	515077	29584	253738	41857	156610	94.00	75.73
1986	230492	118043	47893	253738	0	490926	220.39	211.88
1987	46903	511574	35194	253738	112934	40844	88.34	72.92
1988	156610	166736	28764	253738	0	324624	211.89	202.99
1989	40844	286818	39352	253738	0	34572	80.37	76.60
AVG		577885	38234	253738	289535			

APPENDIX P

2040 Yield Summary - 1988 Water Use

CHOKE CANYON RESERVOIR - 2040 SEDIMENT, 1988 WATER USE

YEAR	BSTOR (AC-FT)	INFLOW (AC-FT)	EVAP (AC-FT)	RELEASE (AC-FT)	SPILL (AC-FT)	ESTOR (AC-FT)	MAXWSEL (FT-MSL)	MINWSEL (FT-MSL)
1934	677964	95745	75108	24000	25133	649467	220.50	218.11
1935	649467	902379	18648	24000	831234	677964	220.50	219.12
1936	677964	285645	46343	24000	215302	677964	220.50	219.99
1937	677964	68841	84962	76072	0	585771	220.47	215.33
1938	585771	97524	98809	24000	0	560487	219.14	215.49
1939	560487	78986	77951	73882	0	487639	215.50	211.99
1940	487639	211313	60412	24000	0	614540	217.95	211.62
1941	614540	449903	33957	24000	339069	667416	220.50	218.28
1942	667416	344743	55317	24000	270893	661950	220.50	219.06
1943	661950	73569	87988	24000	0	623531	220.11	218.25
1944	623531	133696	72496	52790	0	631942	219.50	217.64
1945	631942	109468	88458	24000	0	628952	219.53	217.55
1946	628952	324500	56754	24000	205873	666825	220.50	217.98
1947	666825	37838	87724	24000	0	592938	220.10	216.96
1948	592938	42806	83939	90099	0	461706	216.71	210.96
1949	461706	221057	53511	69546	0	559706	215.80	209.67
1950	559706	21452	92664	24000	0	464495	215.29	211.10
1951	464495	154173	74141	74212	0	470314	212.10	208.49
1952	470314	33564	76153	24000	0	403725	211.24	207.96
1953	403725	257296	62888	112243	0	485889	212.74	201.65
1954	485889	36051	97433	24000	0	400507	211.84	207.78
1955	400507	40917	93129	102971	0	245325	207.52	198.27
1956	245325	54537	45091	188885	0	65886	197.41	179.97
1957	65886	426019	44271	59704	0	387930	207.25	170.92
1958	387930	467583	52384	24000	101165	677964	220.50	212.30
1959	677964	132159	88984	24000	27168	669971	220.50	219.01
1960	669971	93821	59913	24000	1915	677964	220.50	218.48
1961	677964	122070	76273	24000	72069	627691	220.50	218.42
1962	627691	10164	95918	143834	0	398104	218.22	207.65
1963	398104	30136	60423	179413	0	188403	206.24	193.85
1964	188403	25595	13468	190711	0	9820	192.90	136.29
1965	9820	88733	15181	24000	0	59372	182.09	162.05
1966	59372	81111	12711	63891	0	63880	181.17	172.27
1967	63880	395164	13380	79832	0	365831	205.95	136.29
1968	365831	262149	53190	24000	0	550791	216.70	210.79
1969	550791	78263	70269	62020	0	496765	215.08	211.31
1970	496765	91460	61700	24000	0	502525	214.09	212.03
1971	502525	463025	68616	97157	121812	677964	220.50	206.18
1972	677964	68327	71592	24000	699	650000	220.50	219.36
1973	650000	336153	63912	33892	212093	676255	220.50	218.93
1974	676255	171564	82138	24000	63718	677964	220.50	219.16
1975	677964	152348	86629	24000	69452	650231	220.50	219.37
1976	650231	284347	71973	24000	160641	677964	220.50	218.62
1977	677964	238068	100569	24000	163427	628035	220.50	218.44
1978	628035	166528	81579	80606	0	632379	219.15	215.92
1979	632379	162269	81301	47740	38900	626707	220.50	218.38
1980	626707	177086	96968	75319	0	631506	219.03	216.36
1981	631506	310795	70022	24000	173582	674697	220.50	218.22
1982	674697	62676	89595	24000	2215	621563	220.50	218.12
1983	621563	36608	69983	178772	0	409415	218.05	208.27
1984	409415	60192	68259	178018	0	223331	208.10	194.66
1985	223331	161502	27516	36578	0	320740	203.47	197.30
1986	320740	155805	48461	49168	0	378915	206.62	201.64
1987	378915	678353	72882	55553	257081	671752	220.50	206.51
1988	671752	74164	97312	168930	0	479674	220.39	211.82
1989	479674	60075	83903	100390	0	355457	211.82	205.35
AVG		182148	67413	60611	59883			

LAKE CORPUS CHRISTI - 2040 SEDIMENT, 1988 WATER USE

YEAR	BSTOR (AC-FT)	INFLOW (AC-FT)	EVAP (AC-FT)	RELEASE (AC-FT)	SPILL (AC-FT)	ESTOR (AC-FT)	MAXWSEL (FT-MSL)	MINWSEL (FT-MSL)
1934	174673	363875	42097	231907	95150	169393	94.00	89.69
1935	169393	2578928	28115	231907	2328816	159483	94.00	92.96
36	159483	923168	24976	231907	654694	171074	94.00	90.79
1937	171074	185731	31131	231907	0	93767	93.23	75.50
1938	93767	345700	56018	231907	90876	60666	94.00	86.19
1939	60666	322012	45507	231907	0	105263	92.47	75.40
1940	105263	801278	42433	231907	457528	174673	94.00	86.97
1941	174673	1254752	17917	231907	1040308	139292	94.00	91.92
1942	139292	1156562	27331	231907	897148	139468	94.00	85.72
1943	139468	181574	38229	231907	0	50906	91.05	85.02
1944	50906	671899	38249	231907	324814	127835	94.00	75.45
1945	127835	466689	53337	231907	175686	133593	94.00	88.75
1946	133593	1176556	30835	231907	904281	143126	94.00	88.94
1947	143126	300045	50395	231907	68729	92139	94.00	88.79
1948	92139	180966	24141	231907	0	17057	87.57	75.58
1949	17057	812355	41680	231907	416825	139000	94.00	76.06
1950	139000	209629	60647	231907	0	56074	93.87	85.71
1951	56074	393306	43071	231907	45447	128954	94.00	76.21
1952	128954	163758	40209	231907	0	20596	90.74	80.58
1953	20596	550954	23908	231907	159588	156147	94.00	76.42
1954	156147	248595	62227	231907	26714	83893	94.00	86.85
1955	83893	192598	28045	231907	0	16539	86.73	76.89
1956	16539	260231	18407	231907	0	26456	84.74	76.07
1957	26456	1295121	38925	231907	892696	158048	94.00	76.84
1958	158048	1347257	24722	231907	1074647	174028	94.00	91.87
1959	174028	398832	47550	231907	135764	157638	94.00	87.26
1960	157638	438027	21159	231907	167925	174673	94.00	87.80
1961	174673	316698	53420	231907	98682	107361	94.00	90.04
1962	107361	154092	22847	231907	0	6699	88.50	75.10
1963	6699	270858	29521	231907	0	16128	89.40	75.06
1964	16128	569874	19231	231907	195354	139510	94.00	75.67
1965	139510	250366	50358	231907	63729	43881	94.00	84.18
1966	43881	356160	26515	231907	68193	73426	94.00	75.90
1967	73426	1740832	15626	231907	1392051	174673	94.00	70.00
1968	174673	511784	40325	231907	321187	93037	94.00	88.87
1969	93037	318862	20718	231907	0	159274	93.09	76.73
1970	159274	333019	45244	231907	138351	76791	94.00	87.52
1971	76791	2425825	1734	231907	2094301	174673	94.00	75.58
1972	174673	273065	36336	231907	94145	85350	94.00	88.23
1973	85350	1011575	6518	231907	686211	172289	94.00	80.11
1974	172289	372501	37587	231907	122586	152709	94.00	89.09
1975	152709	377776	55361	231907	142727	100489	94.00	89.48
1976	100489	892132	12797	231907	573244	174673	94.00	84.18
1977	174673	527029	57768	231907	358120	53907	94.00	85.44
1978	53907	246660	25205	231907	0	43454	88.58	77.31
1979	43454	314495	30621	231907	37937	57484	94.00	76.75
1980	57484	556710	38990	231907	223902	119394	94.00	75.26
1981	119394	1022942	22555	231907	722645	165229	94.00	86.13
1982	165229	205085	61988	231907	29838	46581	94.00	84.52
1983	46581	242904	16316	231907	0	41261	86.93	75.55
1984	41261	229528	12860	231907	0	26022	83.84	75.44
1985	26022	507304	31833	231907	100265	169322	94.00	79.09
1986	169322	130306	38701	231907	0	29020	92.57	78.11
1987	29020	531181	33464	231907	189989	104841	94.00	75.55
1988	104841	164805	17807	228471	0	23367	88.67	70.00
1989	23367	256439	30865	231907	0	17034	82.79	78.53
AVG		577343	33828	231846	314484			

APPENDIX Q

1990 Yield Sumary - Full Water Rights Use

CHOKE CANYON RESERVOIR - 1990 SEDIMENT, FULL WATER RIGHTS USE

YEAR	BSTOR (AC-FT)	INFLOW (AC-FT)	EVAP (AC-FT)	RELEASE (AC-FT)	SPILL (AC-FT)	ESTOR (AC-FT)	MAXWSEL (FT-MSL)	MINWSEL (FT-MSL)
1934	689314	94137	75380	24000	24559	659513	220.50	218.08
1935	659513	899095	18682	24000	826612	689314	220.50	219.07
1936	689314	282578	46387	24000	212190	689314	220.50	219.95
1937	689314	66553	85036	60793	0	610038	220.47	216.03
1938	610038	95147	100518	24000	0	580667	219.60	215.89
1939	580667	76747	80739	52511	0	524162	215.89	213.39
1940	524162	208892	62338	24000	0	646716	218.88	212.84
1941	646716	446251	33999	24000	356566	678403	220.50	219.15
1942	678403	342179	55440	24000	268170	672971	220.50	218.98
1943	672971	71934	88249	24000	0	632656	220.05	218.17
1944	632656	131108	72871	47708	0	643185	219.54	217.56
1945	643185	107491	88763	24000	0	637913	219.48	217.48
1946	637913	323039	56851	24000	202112	677989	220.50	217.88
1947	677989	36172	88030	24000	0	602131	220.09	216.89
1948	602131	42108	86120	64154	0	493965	216.64	212.03
1949	493965	218813	53968	89801	0	569008	215.77	209.77
1950	569008	20676	93371	24000	0	472313	215.22	211.00
1951	472313	153200	74778	73851	0	476884	211.96	208.62
1952	476884	32783	76654	24000	0	409013	211.05	207.76
1953	409013	256256	62580	129479	0	473209	211.66	200.41
1954	473209	34819	95829	24000	0	388199	210.77	206.64
1955	388199	39867	92609	93992	0	241466	206.38	197.49
1956	241466	53600	35524	229048	0	30494	195.91	170.93
1957	30494	423638	40510	49326	0	364296	205.51	136.30
1958	364296	464975	50842	24000	65116	689314	220.50	210.70
1959	689314	129998	89149	24000	25038	681125	220.50	218.94
1960	681125	92020	60132	24000	0	689014	220.49	218.44
1961	689014	120224	76459	24000	70628	638150	220.50	218.40
1962	638150	9205	97825	140155	0	409375	218.19	207.77
1963	409375	29201	59305	214588	0	164683	206.26	191.24
1964	164683	24178	7802	171457	0	9601	189.82	136.30
1965	9601	87627	14942	24000	0	58287	181.47	160.99
1966	58287	79289	16374	32176	0	89027	184.31	177.29
1967	89027	393605	19055	98342	0	365234	205.46	136.30
1968	365234	259911	52859	24000	0	548286	216.16	210.29
1969	548286	76661	70216	52016	0	502714	214.46	211.36
1970	502714	89371	61945	24000	0	506140	213.81	211.80
1971	506140	461321	69350	83735	125062	689314	220.50	206.56
1972	689314	65740	71707	24000	573	658774	220.50	219.26
1973	658774	333127	64005	24000	216409	687486	220.50	218.79
1974	687486	168908	82254	24000	60827	689314	220.50	219.11
1975	689314	150331	86758	24000	68318	660568	220.50	219.33
1976	660568	281524	72078	24000	156700	689314	220.50	218.57
1977	689314	235576	100838	24000	161904	638148	220.50	218.40
1978	638148	164323	83115	61631	0	657725	219.77	216.84
1979	657725	159600	81469	72906	25956	636993	220.50	218.35
1980	636993	174974	97557	72161	0	642250	219.03	216.61
1981	642250	307470	70120	24000	169797	685802	220.50	218.18
1982	685802	60230	89833	24000	738	631461	220.50	218.09
1983	631461	34523	71492	173402	0	421091	217.99	208.40
1984	421091	59702	66211	218970	0	195611	208.23	191.97
1985	195611	159109	24575	47696	0	282449	200.62	193.81
1986	282449	153623	44976	29655	0	361441	205.22	198.65
1987	361441	675191	72539	71931	209743	682418	220.50	204.25
1988	682418	71622	98504	167162	0	488374	220.36	211.76
1989	488374	58471	82576	140807	0	323462	211.76	202.92
AVG		180156	67359	61347	57982			

LAKE CORPUS CHRISTI - 1990 SEDIMENT, FULL WATER RIGHTS USE

YEAR	BSTOR (AC-FT)	INFLOW (AC-FT)	EVAP (AC-FT)	RELEASE (AC-FT)	SPILL (AC-FT)	ESTOR (AC-FT)	MAXWSEL (FT-MSL)	MINWSEL (FT-MSL)
1934	237473	357841	46205	248921	88316	211871	94.00	88.54
1935	211871	2569210	28050	248921	2285421	218688	94.00	91.80
1936	218688	914980	25373	248921	627289	232084	94.00	90.35
1937	232084	169977	40920	248921	0	112219	93.07	75.52
1938	112219	340403	61801	248921	36726	105172	94.00	86.01
1939	105172	301362	48634	248921	0	108979	89.82	76.06
1940	108979	795862	41392	248921	377054	237473	94.00	82.80
1941	237473	1262502	18389	248921	1033948	198717	94.00	91.84
1942	198717	1149420	30602	248921	869830	198784	94.00	85.65
1943	198784	177332	45752	248921	0	81443	90.94	83.87
1944	81443	663066	40776	248921	269235	185577	94.00	76.82
1945	185577	461923	57521	248921	148039	193018	94.00	88.71
1946	193018	1168803	33056	248921	877097	202747	94.00	88.85
1947	202747	295376	53042	248921	51368	144791	94.00	88.63
1948	144791	158796	30016	248921	0	24650	87.37	75.48
1949	24650	820861	42580	248921	359648	194362	94.00	75.99
1950	194362	205128	67158	248921	0	83409	92.68	84.05
1951	83409	389570	45916	248921	0	178142	93.52	75.84
1952	178142	159633	46470	248921	0	42384	89.53	79.39
1953	42384	559583	26906	248921	108648	217492	94.00	76.02
1954	217492	243656	70502	248921	7062	134662	94.00	86.88
1955	134662	182243	39450	248921	0	28534	86.73	75.86
1956	28534	284448	25946	248921	0	38114	82.22	75.80
1957	38114	1283072	42383	248921	810694	219187	94.00	75.78
1958	219187	1316437	25966	248921	1025659	235077	94.00	91.85
1959	235077	391092	53326	248921	106957	216965	94.00	86.62
1960	216965	430700	26124	248921	135147	237473	94.00	87.48
1961	237473	310127	55816	248921	85326	157536	94.00	89.47
1962	157536	148402	32819	248921	0	24197	88.10	75.23
1963	24197	291709	35542	248921	0	31444	86.72	75.37
1964	31444	551268	19195	248921	115719	198875	94.00	55.53
1965	198875	245539	55644	248921	49137	90712	94.00	84.71
1966	90712	327460	30401	248921	18372	120478	94.00	78.71
1967	120478	1747054	23117	248921	1361156	234338	94.00	75.17
1968	234338	506183	43268	248921	306233	142098	94.00	88.45
1969	142098	306415	26826	248921	0	172766	90.40	77.29
1970	172766	327452	49134	248921	78117	124045	94.00	87.26
1971	124045	2412300	9532	248921	2040418	237473	94.00	75.38
1972	237473	267303	39163	248921	84495	132196	94.00	87.80
1973	132196	1002547	7250	248921	645160	233411	94.00	81.11
1974	233411	364866	40127	248921	99460	209767	94.00	88.39
1975	209767	370304	59249	248921	119995	151906	94.00	89.10
1976	151906	883860	14545	248921	534827	237473	94.00	84.42
1977	237473	519446	63029	248921	345096	99872	94.00	85.54
1978	99872	227717	29086	248921	0	49581	85.55	76.86
1979	49581	318701	32756	248921	0	86604	92.81	75.85
1980	86604	550793	42184	248921	169096	177196	94.00	75.35
1981	177196	1014598	23428	248921	693122	226322	94.00	86.38
1982	226322	198129	69840	248921	16920	88769	94.00	84.54
1983	88769	235549	22019	248921	0	53378	84.34	75.45
1984	53378	255845	19910	248921	0	40391	81.72	75.44
1985	40391	509520	29528	248921	41026	230436	94.00	76.91
1986	230436	113045	48072	248921	0	46488	92.46	78.84
1987	46488	502492	35180	248921	108924	155954	94.00	75.58
1988	155954	162244	28534	248921	0	40743	88.29	72.67
1989	40743	281887	39231	248921	0	34478	80.35	76.60
AVG		571536	38191	248921	288049			

APPENDIX R

2040 Yield Summary - Full Water Rights Use

CHOKE CANYON RESERVOIR - 2040 SEDIMENT, FULL WATER RIGHTS USE

YEAR	BSTOR (AC-FT)	INFLOW (AC-FT)	EVAP (AC-FT)	RELEASE (AC-FT)	SPILL (AC-FT)	ESTOR (AC-FT)	MAXWSEL (FT-MSL)	MINWSEL (FT-MSL)
1934	677964	94137	75073	24000	24566	648462	220.50	218.08
1935	648462	899095	18633	24000	826961	677964	220.50	219.08
1936	677964	282578	46335	24000	212243	677964	220.50	219.95
1937	677964	66553	84828	72867	0	586821	220.47	215.36
1938	586821	95147	98741	24000	0	559227	219.12	215.44
1939	559227	76747	78015	69781	0	488177	215.44	212.08
1940	488177	208892	60348	24000	0	612721	217.89	211.62
1941	612721	446251	33947	24000	333957	667068	220.50	218.19
1942	667068	342179	55278	24000	268316	661653	220.50	218.98
1943	661653	71934	87874	24000	0	621713	220.06	218.17
1944	621713	131108	72604	46868	0	633350	219.60	217.56
1945	633350	107491	88458	24000	0	628383	219.54	217.54
1946	628383	323039	56694	24000	204073	666656	220.50	217.95
1947	666656	36172	87605	24000	0	591222	220.09	216.89
1948	591222	42108	84101	84662	0	464567	216.64	211.10
1949	464567	218813	53729	66918	0	562733	215.95	209.93
1950	562733	20676	92897	24000	0	466512	215.41	211.19
1951	466512	153200	74694	67797	0	477220	212.45	208.92
1952	477220	32783	76717	24000	0	409286	211.53	208.26
1953	409286	256256	64095	103073	0	498374	213.35	202.47
1954	498374	34819	98746	24000	0	410447	212.43	208.32
1955	410447	39867	95238	97339	0	257738	208.05	199.19
1956	257738	53600	48623	184264	0	78450	198.41	181.78
1957	78450	423638	45699	57264	0	399124	207.86	175.01
1958	399124	464975	52945	24000	109191	677964	220.50	212.84
1959	677964	129998	88886	24000	25293	669784	220.50	218.94
1960	669784	92020	59856	24000	0	677948	220.50	218.44
1961	677948	120224	76256	24000	70956	626960	220.50	218.39
1962	626960	9205	96083	136750	0	403333	218.18	207.94
1963	403333	29201	61376	174733	0	196424	206.55	194.57
1964	196424	24178	14995	195729	0	9878	193.67	136.29
1965	9878	87627	15080	24000	0	58425	182.01	162.03
1966	58425	79289	12884	60498	0	64332	181.25	172.83
1967	64332	393605	13491	79245	0	365201	205.92	136.29
1968	365201	259911	53052	24000	0	548059	216.60	210.75
1969	548059	76661	70095	57970	0	496655	214.95	211.32
1970	496655	89371	61618	24000	0	500408	214.02	211.99
1971	500408	461321	68551	94330	120883	677964	220.50	206.19
1972	677964	65740	71491	24000	573	647640	220.50	219.26
1973	647640	333127	63854	29535	211240	676138	220.50	218.79
1974	676138	168908	82086	24000	60997	677964	220.50	219.11
1975	677964	150331	86598	24000	68340	649357	220.50	219.33
1976	649357	281524	71941	24000	156976	677964	220.50	218.57
1977	677964	235576	100536	24000	161904	627100	220.50	218.40
1978	627100	164323	81570	78184	0	631669	219.13	215.95
1979	631669	159600	81279	44515	39639	625836	220.50	218.34
1980	625836	174974	97248	69401	0	634162	219.16	216.52
1981	634162	307470	70043	24000	173131	674458	220.50	218.31
1982	674458	60230	89537	24000	767	620385	220.50	218.09
1983	620385	34523	70206	171920	0	412782	217.99	208.45
1984	412782	59702	69229	171329	0	231926	208.28	195.32
1985	231926	159109	28110	35407	0	327517	203.90	197.85
1986	327517	153623	48957	44206	0	387977	207.11	202.00
1987	387977	675191	73010	55413	263632	671113	220.50	206.95
1988	671113	71622	97335	163762	0	481638	220.36	211.91
1989	481638	58471	84363	94460	0	361287	211.91	205.67
AVG		180156	67706	58575	59529			

LAKE CORPUS CHRISTI - 2040 SEDIMENT, FULL WATER RIGHTS USE

YEAR	BSTOR (AC-FT)	INFLOW (AC-FT)	EVAP (AC-FT)	RELEASE (AC-FT)	SPILL (AC-FT)	ESTOR (AC-FT)	MAXWSEL (FT-MSL)	MINWSEL (FT-MSL)
1934	174673	357846	42134	224765	96110	169510	94.00	89.76
1935	169510	2569455	28122	224765	2326629	159449	94.00	92.98
1936	159449	915017	24981	224765	653646	171074	94.00	90.82
1937	171074	178465	31375	224765	0	93399	93.23	75.35
1938	93399	340403	56160	224765	90513	62364	94.00	86.33
1939	62364	313502	45619	224765	0	105483	92.43	75.14
1940	105483	795862	42478	224765	459430	174673	94.00	87.03
1941	174673	1246608	17934	224765	1038886	139697	94.00	91.94
1942	139697	1149522	27406	224765	897106	139943	94.00	85.83
1943	139943	177332	38684	224765	0	53826	91.10	85.26
1944	53826	662475	38555	224765	324383	128598	94.00	77.09
1945	128598	461923	53449	224765	178135	134173	94.00	88.83
1946	134173	1170181	30902	224765	904955	143732	94.00	89.07
1947	143732	295376	50502	224765	70396	93445	94.00	88.90
1948	93445	173213	24285	224765	0	17608	87.51	75.41
1949	17608	804774	41704	224765	416128	139786	94.00	76.01
1950	139786	205128	61234	224765	0	58916	93.96	86.04
1951	58916	385315	43460	224765	46185	129820	94.00	76.06
1952	129820	159633	40737	224765	0	23952	90.83	81.39
1953	23952	541019	24075	224765	159589	156542	94.00	76.36
1954	156542	243656	62455	224765	27725	85254	94.00	86.95
1955	85254	184596	28194	224765	0	16891	86.87	76.62
1956	16891	252965	18174	224765	0	26918	84.72	75.98
1957	26918	1288653	39037	224765	893525	158245	94.00	76.75
1958	158245	1347422	24563	224765	1082278	174061	94.00	91.91
1959	174061	391271	47617	224765	135103	157847	94.00	87.29
1960	157847	430700	21258	224765	167851	174673	94.00	87.86
1961	174673	310357	53459	224765	98313	108493	94.00	90.10
1962	108493	146008	23163	224765	0	6573	88.61	75.03
1963	6573	263692	29471	224765	0	16029	89.35	75.00
1964	16029	568331	19503	224765	200189	139903	94.00	75.42
1965	139903	245539	50447	224765	65170	45061	94.00	84.33
1966	45061	347370	26585	224765	67156	73926	94.00	75.63
1967	73926	1733629	15547	224765	1392570	174673	94.00	70.00
1968	174673	506183	40429	224765	321137	94526	94.00	88.99
1969	94526	310600	21276	224765	0	159085	93.08	77.89
1970	159085	327452	45338	224765	138457	77977	94.00	87.62
1971	77977	2416810	1863	224765	2093486	174673	94.00	75.21
1972	174673	267303	36412	224765	94130	86670	94.00	88.34
1973	86670	1002803	6595	224765	685711	172403	94.00	80.69
1974	172403	364985	37638	224765	122259	152727	94.00	89.15
1975	152727	370319	55390	224765	141793	101098	94.00	89.53
1976	101098	884054	12811	224765	572904	174673	94.00	84.42
1977	174673	519446	57819	224765	356762	54773	94.00	85.55
1978	54773	239353	25146	224765	0	44217	88.57	77.03
1979	44217	308408	30742	224765	37491	59627	94.00	77.61
1980	59627	548852	39175	224765	223857	120682	94.00	75.13
1981	120682	1016942	22587	224765	724929	165344	94.00	86.34
1982	165344	198149	62058	224765	28794	47875	94.00	84.68
1983	47875	234507	16250	224765	0	41368	86.89	75.45
1984	41368	222353	12795	224765	0	26162	83.79	75.38
1985	26162	500880	31858	224765	100983	169437	94.00	79.15
1986	169437	123274	39345	224765	0	28602	92.59	78.77
1987	28602	528763	33482	224765	193986	105133	94.00	75.35
1988	105133	156739	17867	220737	0	23268	88.70	70.00
1989	23268	249305	30867	224765	0	16941	82.80	78.70
AVG		570620	33947	224693	314797			

APPENDIX S

1990 Yield Summary - Type 1 Recharge Reservoirs

CHOKE CANYON RESERVOIR - 1990 SEDIMENT, TYPE 1 RECHARGE RESERVOIRS

YEAR	BSTOR (AC-FT)	INFLOW (AC-FT)	EVAP (AC-FT)	RELEASE (AC-FT)	SPILL (AC-FT)	ESTOR (AC-FT)	MAXWSEL (FT-MSL)	MINWSEL (FT-MSL)
1934	689314	93802	75380	24000	24559	659177	220.50	218.08
1935	659177	758605	18678	24000	685790	689314	220.50	219.06
1936	689314	236644	46251	24000	171398	684309	220.50	219.73
1937	684309	62165	84337	59402	0	602736	220.21	215.74
1938	602736	90744	99402	24000	0	570078	219.14	215.45
1939	570078	63933	79665	47574	0	506772	215.45	212.63
1940	506772	207862	61218	24000	0	629416	218.14	212.03
1941	629416	410515	33930	24000	306763	675238	220.50	218.43
1942	675238	334451	55318	24000	257728	672643	220.50	218.80
1943	672643	71934	88221	24000	0	632356	220.04	218.15
1944	632356	128030	73153	39839	0	647395	219.78	217.50
1945	647395	101635	88659	24000	0	636371	219.41	217.42
1946	636371	318067	56782	24000	195666	677989	220.50	217.82
1947	677989	34319	87907	24000	0	600401	220.09	216.82
1948	600401	41464	86205	58860	0	496801	216.57	212.16
1949	496801	204842	53503	87601	0	560540	215.40	209.56
1950	560540	20676	92585	24000	0	464630	214.86	210.64
1951	464630	149148	74417	65958	0	473404	211.79	208.62
1952	473404	32713	76339	24000	0	405777	210.89	207.58
1953	405777	253570	63091	118434	0	477823	211.88	200.87
1954	477823	29831	95917	24000	0	387736	210.98	206.62
1955	387736	39192	92803	94528	0	239597	206.36	197.35
1956	239597	52740	33749	231879	0	26710	195.27	169.69
1957	26710	401318	39319	45629	0	343081	204.28	136.30
1958	343081	366503	47495	24000	0	638089	218.39	209.36
1959	638089	113251	84398	24000	0	642942	218.92	216.47
1960	642942	90851	57893	24000	0	651901	218.97	216.91
1961	651901	113161	75858	24000	27309	637895	220.50	218.38
1962	637895	9205	97281	146929	0	402891	218.18	207.43
1963	402891	29201	58435	212752	0	160904	205.94	190.90
1964	160904	22590	7572	166819	0	9113	189.50	136.30
1965	9113	86411	14838	24000	0	56687	181.39	160.62
1966	56687	66475	15893	27856	0	79413	182.93	176.98
1967	79413	378779	16897	90423	0	350871	204.69	136.30
1968	350871	239101	51024	24000	0	514948	214.69	209.35
1969	514948	57068	67648	45827	0	458541	212.89	210.11
1970	458541	87997	59095	24000	0	463442	211.74	209.69
1971	463442	394402	66284	81360	20887	689314	220.50	204.48
1972	689314	58443	71449	24000	482	651826	220.50	218.97
1973	651826	256391	63753	24000	133294	687170	220.50	218.46
1974	687170	161784	82133	24000	53508	689314	220.50	219.02
1975	689314	146591	86746	24000	64853	660307	220.50	219.32
1976	660307	247740	72055	24000	122678	689314	220.50	218.55
1977	689314	215361	100729	24000	147633	632313	220.50	218.15
1978	632313	154183	82460	60903	0	643133	219.18	216.62
1979	643133	124393	79917	68848	0	618761	219.76	217.58
1980	618761	161650	93841	93427	0	593142	217.57	214.93
1981	593142	225955	69089	24000	40477	685532	220.50	215.90
1982	685532	57144	89645	24000	0	629031	220.40	217.99
1983	629031	33312	71582	167051	0	423710	217.89	208.54
1984	423710	59702	67077	213317	0	203017	208.37	192.59
1985	203017	142935	23896	55468	0	266589	199.58	192.99
1986	266589	145731	43166	33506	0	335648	203.67	197.53
1987	335648	584936	71845	87739	81144	679855	220.50	200.83
1988	679855	66086	97465	174968	0	473509	220.25	211.06
1989	473509	58407	81223	135138	0	315555	211.06	202.43
AVG		162392	66527	60858	41682			

LAKE CORPUS CHRISTI - 1990 SEDIMENT, TYPE 1 RECHARGE RESERVOIRS

YEAR	BSTOR (AC-FT)	INFLOW (AC-FT)	EVAP (AC-FT)	RELEASE (AC-FT)	SPILL (AC-FT)	ESTOR (AC-FT)	MAXWSEL (FT-MSL)	MINWSEL (FT-MSL)
1934	237473	357841	46419	244823	88613	215459	94.00	88.74
1935	215459	2422458	28086	244823	2147891	217117	94.00	92.02
1936	217117	867733	25347	244823	585494	229185	94.00	90.34
1937	229185	168594	40736	244823	0	112219	92.91	75.52
1938	112219	338715	61892	244823	36859	107360	94.00	86.16
1939	107360	290125	48586	244823	0	104076	89.84	76.76
1940	104076	795753	41072	244823	376460	237473	94.00	82.46
1941	237473	1226530	18418	244823	1001439	199322	94.00	91.88
1942	199322	1138353	30686	244823	862780	199386	94.00	85.86
1943	199386	177258	46162	244823	0	85658	90.99	84.25
1944	85658	656792	41067	244823	270200	186360	94.00	77.99
1945	186360	461872	57589	244823	152197	193622	94.00	88.79
1946	193622	1162119	33105	244823	874461	203351	94.00	88.95
1947	203351	295175	53105	244823	54138	146459	94.00	88.74
1948	146459	153981	30317	244823	0	25300	87.49	75.83
1949	25300	813092	42597	244823	355710	195262	94.00	75.99
1950	195262	205128	67813	244823	0	87753	92.84	84.44
1951	87753	384021	46457	244823	0	180494	93.60	75.82
1952	180494	159283	47361	244823	0	47592	89.70	80.13
1953	47592	550856	27164	244823	108667	217794	94.00	76.02
1954	217794	238388	70565	244823	4485	136309	94.00	86.91
1955	136309	171081	39249	244823	0	23317	86.86	75.84
1956	23317	286438	25910	244823	0	39021	82.25	75.80
1957	39021	1278056	42401	244823	810365	219489	94.00	75.78
1958	219489	1244441	25936	244823	962005	231165	94.00	91.53
1959	231165	357691	52712	244823	76135	215186	94.00	86.09
1960	215186	421541	25920	244823	128511	237473	94.00	87.39
1961	237473	270309	55008	244823	60441	147509	94.00	88.81
1962	147509	153163	31651	244823	0	24197	87.46	75.23
1963	24197	287921	35550	244823	0	31745	86.72	75.36
1964	31745	534310	19172	244823	102579	199480	94.00	55.53
1965	199480	243089	55740	244823	49381	92624	94.00	84.88
1966	92624	315490	29996	244823	19029	114266	94.00	79.09
1967	114266	1739590	22411	244823	1351849	234773	94.00	75.20
1968	234773	497411	43329	244823	300120	143910	94.00	88.57
1969	143910	290553	27239	244823	0	162401	89.79	77.25
1970	162401	323347	48851	244823	67658	124415	94.00	87.28
1971	124415	2300078	9718	244823	1932479	237473	94.00	75.24
1972	237473	258128	38974	244823	83471	128333	94.00	87.54
1973	128333	918236	7116	244823	562661	231968	94.00	80.83
1974	231968	350964	39904	244823	91253	206951	94.00	88.20
1975	206951	358096	58881	244823	109944	151399	94.00	88.89
1976	151399	839767	13891	244823	494979	237473	94.00	84.30
1977	237473	490288	62809	244823	321479	98650	94.00	85.43
1978	98650	226516	29145	244823	0	51197	85.62	76.79
1979	51197	293857	30655	244823	0	69575	91.64	75.84
1980	69575	565662	41745	244823	170541	178128	94.00	75.42
1981	178128	892895	23444	244823	577560	225195	94.00	86.52
1982	225195	192643	69852	244823	12874	90289	94.00	84.67
1983	90289	230692	22244	244823	0	53914	84.33	75.78
1984	53914	251793	19967	244823	0	40917	81.71	75.44
1985	40917	502993	29606	244823	39135	230345	94.00	76.57
1986	230345	107438	48421	244823	0	44538	92.48	78.42
1987	44538	382501	35043	244823	1432	145740	94.00	75.31
1988	145740	166557	26730	244823	0	40743	87.56	72.77
1989	40743	277902	39345	244823	0	34478	80.35	76.72
AVG		551527	38091	244823	272237			

APPENDIX T

1990 Yield Summary - Type 2 Recharge Reservoirs

CHOKE CANYON RESERVOIR - 1990 SEDIMENT, TYPE 2 RECHARGE RESERVOIRS

YEAR	BSTOR (AC-FT)	INFLOW (AC-FT)	EVAP (AC-FT)	RELEASE (AC-FT)	SPILL (AC-FT)	ESTOR (AC-FT)	MAXWSEL (FT-MSL)	MINWSEL (FT-MSL)
1934	689314	93802	75380	24000	24559	659177	220.50	218.08
1935	659177	735562	18678	24000	662747	689314	220.50	219.06
1936	689314	233666	46251	24000	168419	684309	220.50	219.73
1937	684309	62165	84297	56216	0	605962	220.21	215.87
1938	605962	90744	99718	24000	0	572988	219.27	215.57
1939	572988	63933	80037	44994	0	511890	215.57	212.87
1940	511890	207862	61534	24000	0	634218	218.34	212.27
1941	634218	410459	33930	24000	311509	675238	220.50	218.63
1942	675238	334451	55318	24000	257728	672643	220.50	218.80
1943	672643	71934	88221	24000	0	632356	220.04	218.15
1944	632356	128030	73390	35864	0	651133	219.95	217.50
1945	651133	101635	88980	24000	0	639787	219.56	217.56
1946	639787	318067	56936	24000	198929	677989	220.50	217.96
1947	677989	34319	87907	24000	0	600401	220.09	216.82
1948	600401	41345	86315	56257	0	499174	216.57	212.27
1949	499174	204842	53730	85902	0	564384	215.57	209.78
1950	564384	20676	92941	24000	0	468118	215.03	210.80
1951	468118	148681	74958	61807	0	480034	212.11	209.01
1952	480034	32713	76927	24000	0	411820	211.19	207.91
1953	411820	252901	64125	112670	0	487926	212.36	201.54
1954	487926	28213	96945	24000	0	395193	211.46	207.02
1955	395193	39192	94254	90988	0	249144	206.75	198.05
1956	249144	52670	36952	229648	0	35214	195.98	172.34
1957	35214	400207	39422	56313	0	339685	204.07	136.30
1958	339685	361439	47256	24000	0	629868	218.05	209.15
1959	629868	111850	83627	24000	0	634092	218.55	216.09
1960	634092	90851	57376	24000	0	643567	218.62	216.56
1961	643567	113161	75645	24000	19188	637895	220.50	218.38
1962	637895	9205	96862	152464	0	397774	218.18	207.16
1963	397774	29201	57908	210171	0	158896	205.68	190.73
1964	158896	22590	7469	164913	0	9113	189.32	136.30
1965	9113	86411	14838	24000	0	56687	181.39	160.62
1966	56687	66475	16147	25565	0	81450	183.22	176.98
1967	81450	378779	17522	91837	0	350871	204.69	136.30
1968	350871	239101	51024	24000	0	514948	214.69	209.35
1969	514948	51151	67630	42410	0	456059	212.89	210.23
1970	456059	87958	58931	24000	0	461086	211.62	209.56
1971	461086	381970	66127	80623	6992	689314	220.50	204.39
1972	689314	58443	71449	24000	482	651826	220.50	218.97
1973	651826	257003	63752	24000	133907	687170	220.50	218.46
1974	687170	161010	82127	24000	52739	689314	220.50	219.02
1975	689314	146510	86746	24000	64772	660307	220.50	219.32
1976	660307	245890	72055	24000	120828	689314	220.50	218.55
1977	689314	215360	100729	24000	147633	632313	220.50	218.15
1978	632313	154059	82615	58027	0	645730	219.29	216.73
1979	645730	120717	80056	66575	0	619816	219.80	217.63
1980	619816	158681	94043	91489	0	592966	217.61	215.05
1981	592966	217711	69074	24000	32071	685532	220.50	215.90
1982	685532	57144	89645	24000	0	629031	220.40	217.99
1983	629031	33312	71765	163435	0	427143	217.89	208.72
1984	427143	59702	67817	210257	0	208771	208.55	193.08
1985	208771	142824	24217	56713	0	270665	199.88	193.36
1986	270665	145182	43560	30809	0	341478	204.02	197.81
1987	341478	572908	71963	92129	70439	679855	220.50	201.25
1988	679855	66086	97595	171716	0	476631	220.25	211.21
1989	476631	58407	81730	132318	0	320990	211.20	202.77
AVG		160878	66722	60145	40588			

LAKE CORPUS CHRISTI - 1990 SEDIMENT, TYPE 2 RECHARGE RESERVOIRS

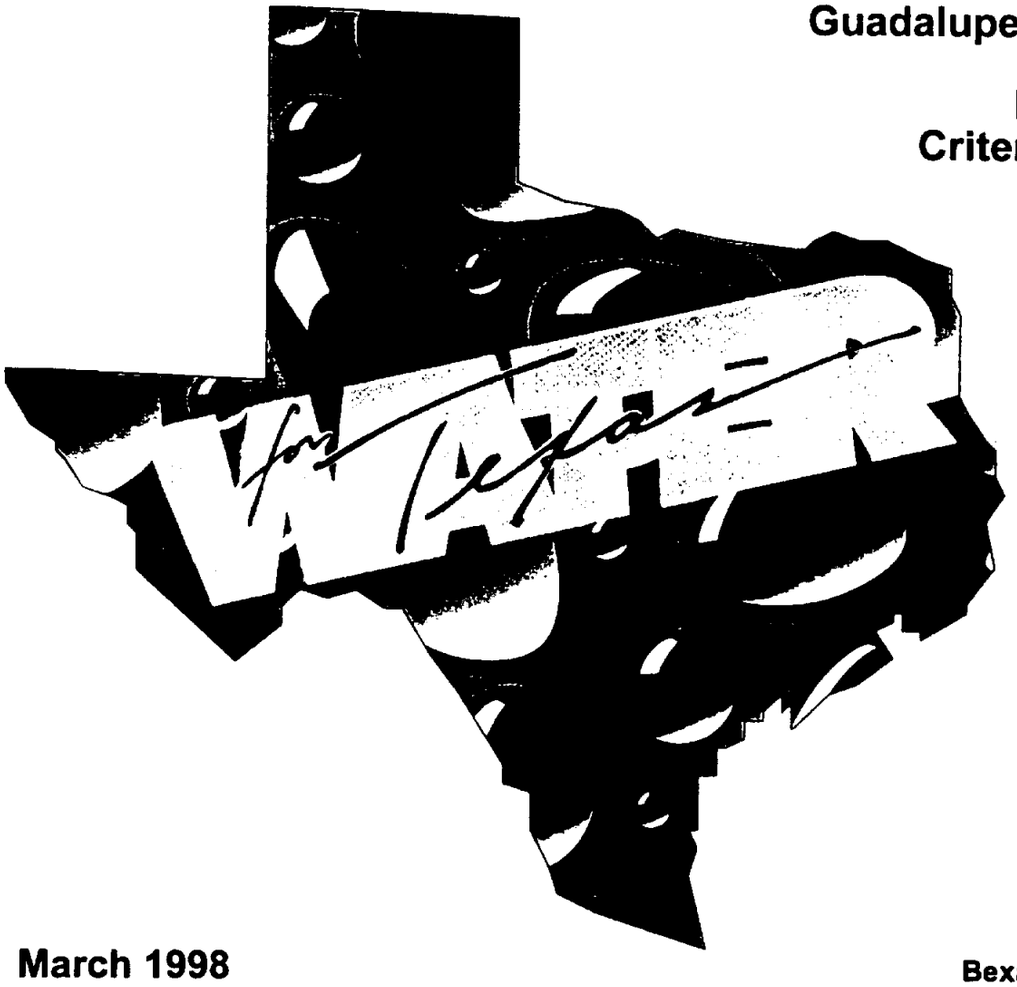
YEAR	BSTOR (AC-FT)	INFLOW (AC-FT)	EVAP (AC-FT)	RELEASE (AC-FT)	SPILL (AC-FT)	ESTOR (AC-FT)	MAXWSEL (FT-MSL)	MINWSEL (FT-MSL)
1934	237473	357841	46521	242785	88760	217248	94.00	88.84
1935	217248	2419661	28100	242785	2148603	217420	94.00	92.13
936	217420	866344	25356	242785	585737	229886	94.00	90.39
1937	229886	166354	41238	242785	0	112218	92.96	75.51
1938	112218	338715	61954	242785	37649	108546	94.00	86.24
1939	108546	288312	48857	242785	0	105215	89.85	77.13
1940	105215	795753	41197	242785	379513	237473	94.00	82.59
1941	237473	1229866	18411	242785	1006520	199623	94.00	91.89
1942	199623	1138353	30729	242785	864778	199685	94.00	85.97
1943	199685	177258	46366	242785	0	87792	91.01	84.45
1944	87792	653998	41212	242785	270968	186826	94.00	78.37
1945	186826	461872	57625	242785	154366	193922	94.00	88.83
1946	193922	1164413	33130	242785	878769	203652	94.00	89.00
1947	203652	295175	53137	242785	55617	147289	94.00	88.79
1948	147289	152151	30607	242785	0	26049	87.56	76.19
1949	26049	811898	42606	242785	356662	195894	94.00	75.99
1950	195894	205128	68164	242785	0	90073	92.92	84.65
1951	90073	381104	46728	242785	0	181664	93.64	75.81
1952	181664	159283	47791	242785	0	50370	89.79	80.53
1953	50370	546297	27290	242785	108649	217944	94.00	76.02
1954	217944	238142	70653	242785	5521	137128	94.00	86.97
1955	137128	168593	39621	242785	0	23315	86.92	75.82
1956	23315	284869	25927	242785	0	39472	82.27	75.80
1957	39472	1285568	42405	242785	820212	219639	94.00	75.78
1958	219639	1253761	25891	242785	973059	231664	94.00	91.55
1959	231664	360346	52918	242785	80914	215393	94.00	86.21
1960	215393	421541	26027	242785	130650	237473	94.00	87.48
1961	237473	261358	54488	242785	60724	140834	94.00	88.37
962	140834	157055	30907	242785	0	24197	87.03	75.23
1963	24197	286107	35624	242785	0	31895	86.72	75.36
1964	31895	517838	19107	242784	88060	199781	94.00	55.53
1965	199781	238813	55794	242785	46378	93638	94.00	84.98
1966	93638	313879	30054	242785	19403	115274	94.00	79.30
1967	115274	1740583	22600	242785	1355400	235073	94.00	75.19
1968	235073	497411	43371	242785	301400	144928	94.00	88.64
1969	144928	287490	27570	242785	0	162064	89.77	77.24
1970	162064	323347	48903	242785	68300	125423	94.00	87.35
1971	125423	2290957	9877	242785	1926245	237473	94.00	74.92
1972	237473	255125	38903	242785	84262	126648	94.00	87.43
1973	126648	925355	7062	242785	569976	232180	94.00	80.72
1974	232180	349535	39973	242785	92423	206534	94.00	88.29
1975	206534	355648	58906	242785	108268	152223	94.00	88.90
1976	152223	829787	13787	242785	487966	237473	94.00	84.43
1977	237473	498460	62897	242785	330395	99857	94.00	85.54
1978	99857	224494	29386	242785	0	52181	85.67	76.79
1979	52181	291432	30684	242785	0	70144	91.62	75.84
1980	70144	564299	41768	242785	171299	178591	94.00	75.42
1981	178591	882979	23458	242785	569982	225345	94.00	86.59
1982	225345	190442	69952	242785	11610	91440	94.00	84.78
1983	91440	228150	22441	242785	0	54364	84.33	75.84
1984	54364	249642	20005	242785	0	41216	81.71	75.44
1985	41216	500967	29667	242785	39237	230495	94.00	76.57
1986	230495	105542	48714	242785	0	44538	92.49	78.42
987	44538	379666	35071	242785	0	146349	93.82	75.31
1988	146349	164120	26941	242785	0	40743	87.60	72.76
1989	40743	275920	39401	242785	0	34478	80.35	76.78
AVG		550161	38175	242785	272826			

TRANS-TEXAS WATER PROGRAM

West Central Study Area

Phase II

Guadalupe - San Antonio River Basin Environmental Criteria Refinement



March 1998

HDR Engineering, Inc.
Paul Price Associates, Inc.

San Antonio River Authority

San Antonio Water System

Edwards Aquifer Authority

Guadalupe-Blanco River Authority

Lower Colorado River Authority

Bexar Metropolitan Water District

Nueces River Authority

Canyon Lake Water Supply Corporation

Bexar-Medina-Atascosa Counties WCID No. 1

Texas Natural Resource Conservation Commission

Texas Parks and Wildlife Department

Texas Water Development Board

TRANS-TEXAS WATER PROGRAM

WEST CENTRAL STUDY AREA

PHASE 2

ENVIRONMENTAL CRITERIA REFINEMENT

San Antonio River Authority
San Antonio Water System
Edwards Aquifer Authority
Guadalupe-Blanco River Authority
Lower Colorado River Authority
Bexar Metropolitan Water District
Nueces River Authority
Canyon Lake Water Supply Corporation
Bexar-Medina-Atascosa Counties WCID No. 1
Texas Natural Resource Conservation Commission
Texas Parks and Wildlife Department
Texas Water Development Board

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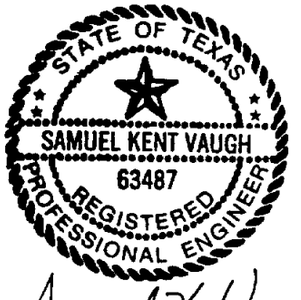
Paul Price
3/30/98

March 1998



Samuel K Vaugh
3/25/98

GUADALUPE-SAN ANTONIO RIVER BASIN
ENVIRONMENTAL CRITERIA REFINEMENT

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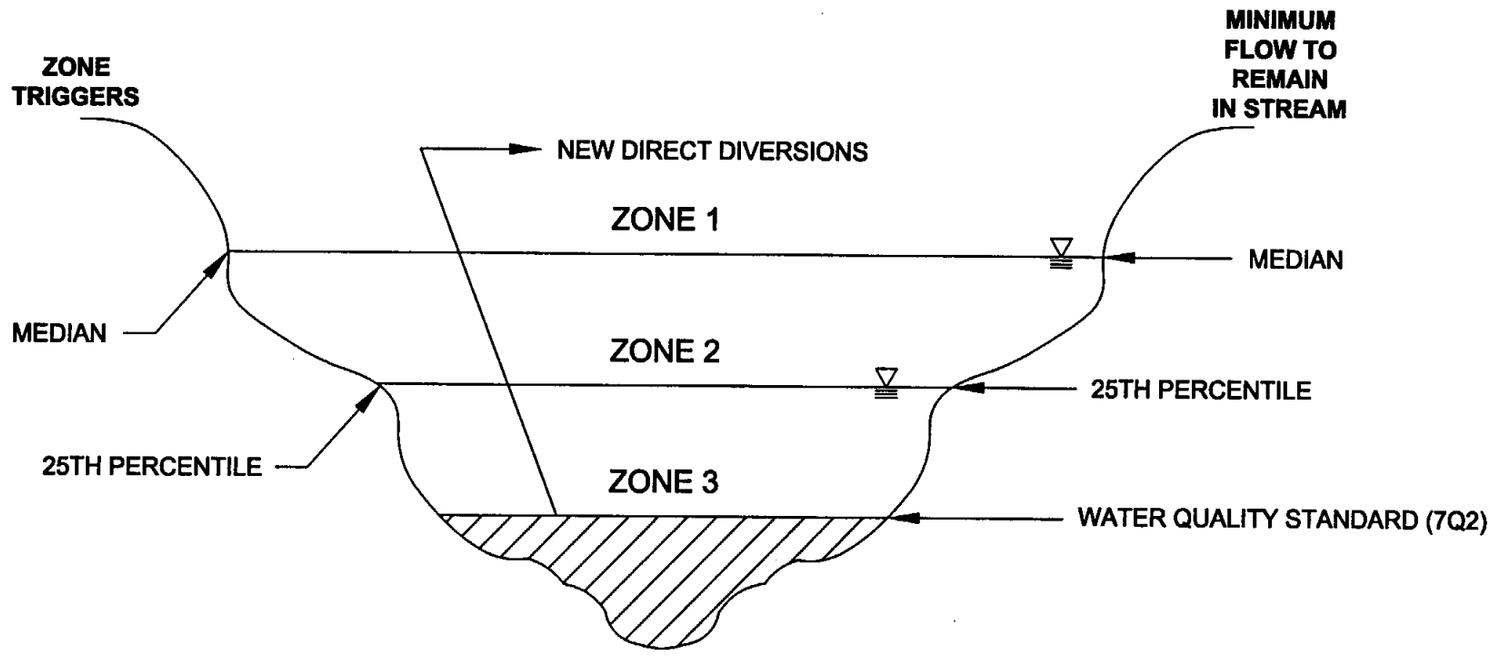
1.0 INTRODUCTION

The general environmental criteria applicable to the evaluation of alternative water supply projects have been evolving throughout the course of the Trans-Texas Water Program. The criteria governing run-of-the-river or direct diversions moved from that promulgated in the beginning which excluded drought contingency provisions, through a two-zoned alternative criteria using moving averages of monthly streamflow to trigger drought contingency provisions, to the three-zoned Environmental Water Needs Criteria of the Consensus Planning Process, or "Consensus Criteria," which uses daily streamflows to trigger drought contingency provisions.

The Consensus Criteria governing new direct diversion projects is summarized in Figure 1-1 which defines three streamflow zones, the minimum flow to remain in the stream associated with each zone, and the two streamflow statistics (monthly median and 25th percentile) triggering the transition from one zone to another. Zone triggers and minimum flows to remain in the stream are to be computed from natural daily streamflows, however, the minimum flow associated with Zone 3 is to be the water quality standard used by the Texas Natural Resource Conservation Commission (TNRCC). The rules of the TNRCC generally define the water quality standard as the 7Q2 flow, the lowest average flow for 7 consecutive days which occurs with a recurrence interval of 2 years.[1] For reference, the Consensus Criteria is included as Appendix A. While the Consensus Criteria was developed from a statewide perspective, certain aspects may become quite restrictive when applied to springflow or treated effluent dominated streams such as the Guadalupe and San Antonio Rivers, respectively (Figure 1-2). For example, the water quality standard, below which no new diversions would be allowed, actually exceeds the natural 25th percentile streamflow in about half of the months of the year in these rivers.

As the sponsors of the Trans-Texas Water Program for the West Central Study Area prepare to embark on regional planning efforts with the objective of developing feasible, long-range water supply plans, it is imperative that the environmental criteria used to evaluate projects and plans adequately reflects the unique characteristics of the Guadalupe - San Antonio River

[1] TNRCC, "Permanent Rule Changes, Texas Surface Water Quality Standards," Sections 307.1 - 307.10, July 13, 1995.



NO NEW DIRECT DIVERSIONS ALLOWED

NOTES:

1) STATISTICS BASED ON NATURAL DAILY STREAMFLOW.
2) NEW DIRECT DIVERSIONS IN ALL ZONES SUBJECT TO SENIOR WATER RIGHTS.

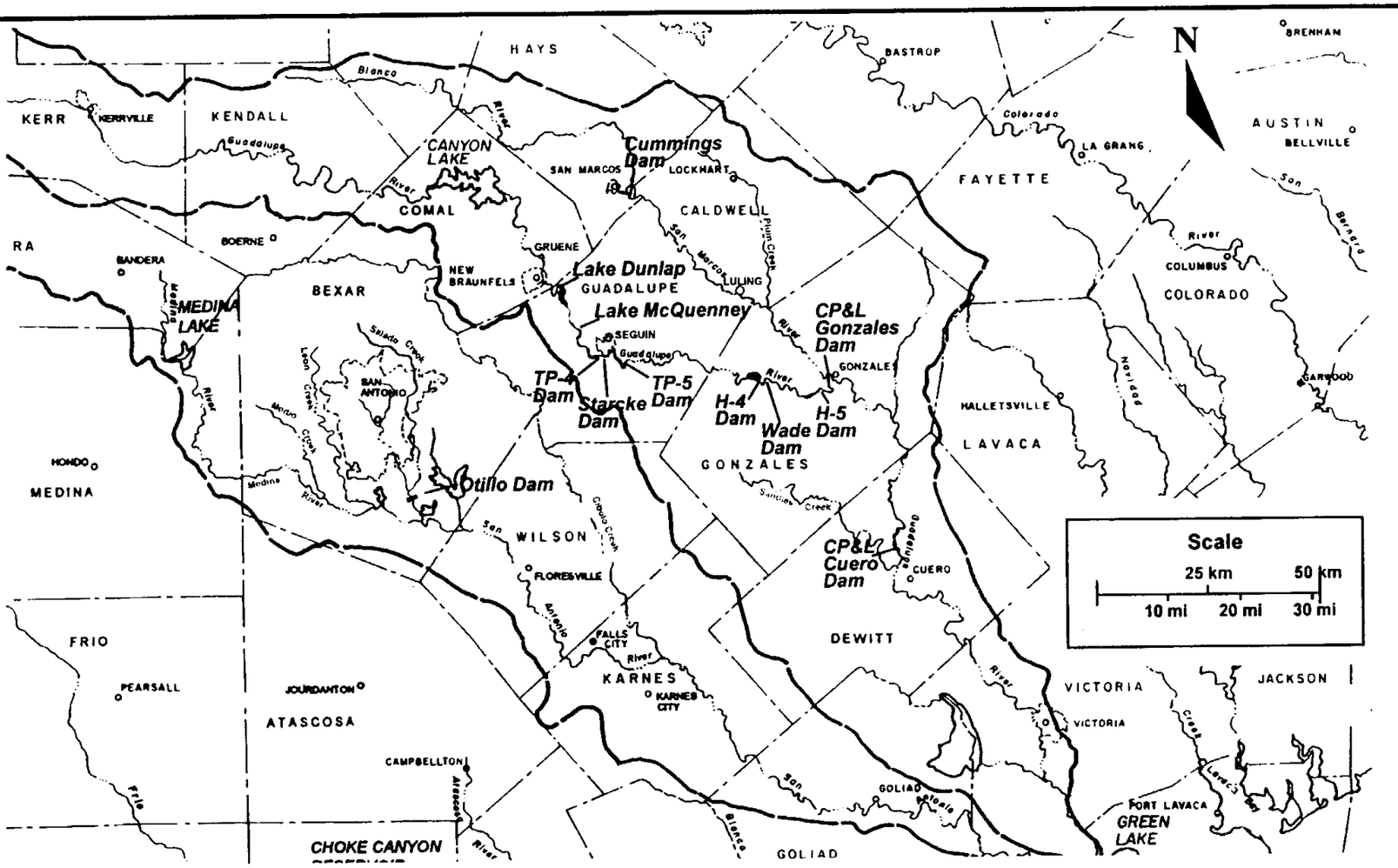
TRANS TEXAS WATER PROGRAM / WEST CENTRAL STUDY AREA

CONSENSUS CRITERIA FOR NEW DIRECT DIVERSIONS

GUADALUPE - SAN ANTONIO RIVER BASIN ENVIRONMENTAL CRITERIA REFINEMENT

HDR Engineering, Inc.

FIGURE 1-1



Legend

- River Basin Boundary
- Reservoir

GUADALUPE - SAN ANTONIO RIVER BASIN ENVIRONMENTAL CRITERIA REFINEMENT

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TRANS TEXAS WATER PROGRAM
WEST CENTRAL STUDY AREA

MAP OF GUADALUPE-SAN ANTONIO RIVER BASIN

FIGURE 1-2

98-11

Basin. Furthermore, the environmental criteria should, to the extent possible, facilitate the selection and implementation of the most economically and environmentally feasible plan(s).

This Technical Memorandum summarizes discussions and technical analyses comprising a process by which refinement of the statewide Consensus Criteria has been considered for the Guadalupe - San Antonio River Basin. The intent is to make the Consensus Criteria more suitable for planning purposes and approximate criteria for permitting projects at some point in the future. Note that the intended goal of this process was not to reassess all aspects of the Consensus Criteria, but to refine the selection of appropriate desired minimum instream flows for Zones 2 and 3 as these will likely have the greatest effects on dependable water supply during drought. The environmental criteria refinement process was keyed to the participation of state and local sponsors on an Environmental Criteria Subcommittee (ECS) with technical support from HDR Engineering, Inc. (HDR) and Paul Price Associates, Inc. (PPA). Notes summarizing discussions during the ECS meetings are included as Appendix G. Technical analyses performed in support of the environmental criteria refinement process are presented in the following sections of this Technical Memorandum and include:

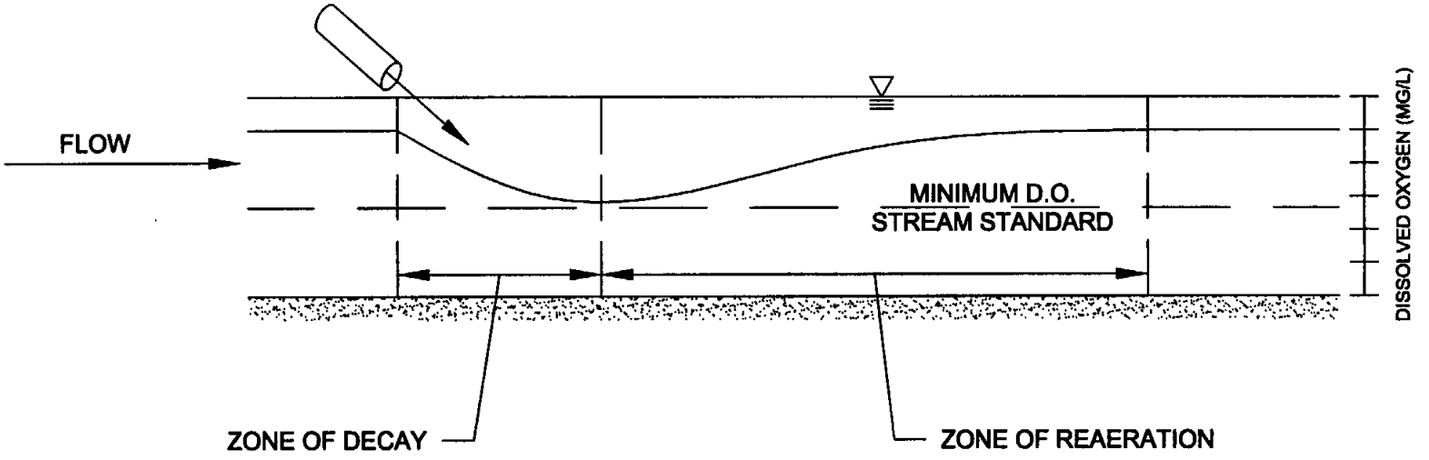
- Development and application of water quality models of the Guadalupe and San Antonio Rivers focusing on simulation of dissolved oxygen subject to various effluent loading and streamflow conditions (Section 2);
- Summary and interpretation of pertinent biological studies potentially providing insight into the selection of minimum instream flows (Section 3); and
- Performance of sensitivity analyses illustrating the effects of Zone 2 and 3 triggers and minimum flows on water availability, firm yield with off-channel storage, project cost, instream flows, and freshwater inflows to the Guadalupe Estuary (Section 4).

2.0 WATER QUALITY MODELING

For Zone 3 of the environmental criteria refinement, the focus of this study is on the interaction of streamflow, wastewater discharges, and dissolved oxygen levels in the streams of the study area. Figure 2-1 depicts the typical dissolved oxygen "sag" behavior in a stream after the introduction of a wasteload with organic materials, such as those found in municipal or industrial wastewater. Initially, just downstream of the discharge point, the biologic decay of the organic waste is of dominant importance. In this region, bacteria utilize oxygen in the conversion of organic carbonaceous and nitrogenous compounds from the waste stream which leads to declining dissolved oxygen levels. The central question in water quality analysis is whether the minimum of the dissolved oxygen sag curve will fall below the minimum acceptable stream standard. Table 2-1 presents a summary of the dissolved oxygen standards for the streams and rivers in the study area.

As the wasteload is transported downstream and the decay processes consume much of the initial wasteload, the D.O. levels in the stream begin to recover. In this region, the dominant process becomes the reaeration of dissolved oxygen from the atmosphere. Obviously, the volume of the wasteload and the strength (concentration) of the organic materials it contains are of crucial importance in determining the magnitude of the sag and how far downstream it extends.

Of equal importance is the flow of water in the receiving stream. The amount of streamflow is important for several reasons. First are the direct dilution and dispersion effects which spread out the wasteload and reduce the severity of the minimum of the sag. Secondly, streamflow has a direct influence on the process of reaeration. Reaeration is predominantly related to the velocity and depth of the stream which are highly dependent upon streamflow as will be discussed in more detail herein. Therefore, the choice of an appropriate streamflow for evaluation of the potential effects of a wasteload is crucial. For the springflow-dominated river segments of this study (Guadalupe and San Marcos Rivers), the 7Q2 streamflows normally used to evaluate wasteload impacts are high as compared to other Texas streams.



TRANS TEXAS WATER PROGRAM /
WEST CENTRAL STUDY AREA

TYPICAL DISSOLVED OXYGEN PROFILE IN A RECEIVING STREAM NEAR A WASTELOAD INPUT

FIGURE 2-1

HDR Engineering, Inc.

GUADALUPE - SAN ANTONIO RIVER BASIN
ENVIRONMENTAL CRITERIA REFINEMENT

Table 2-1
Use Classification and Dissolved Oxygen Criteria for Select Segments on the Guadalupe and San Antonio Rivers

Segment No.	Segment Name	Aquatic Life Uses	Domestic Water Supply	Recreation	Dissolved Oxygen+ Criteria (mg/l)
Guadalupe River Basin					
1803	Guadalupe River Below San Marcos	High	PS	CR	5.0
1804	Guadalupe River Below Comal River	High	PS	CR	5.0
1808	Lower San Marcos River	High	PS	CR	5.0
1814	Upper San Marcos River	Exceptional	PS	CR	6.0
San Antonio River					
1901	Lower San Antonio River	High	PS	CR	5.0
1903	Medina River Below Medina Diversion Lake	High	PS*	CR	5.0
1906	Lower Leon Creek	High	PS**	CR	5.0
1910	Salado Creek	High	PS/AP	CR	5.0
1911	Upper San Antonio River	High		CR	5.0

notes: from the Texas Natural Resource Conservation Commission. Texas Surface Water Quality Standards Sections 307.1-307.10 Effective: July 13, 1995. PS = Public Water Supply, AP = Aquifer Protection. CR = Contract Recreation

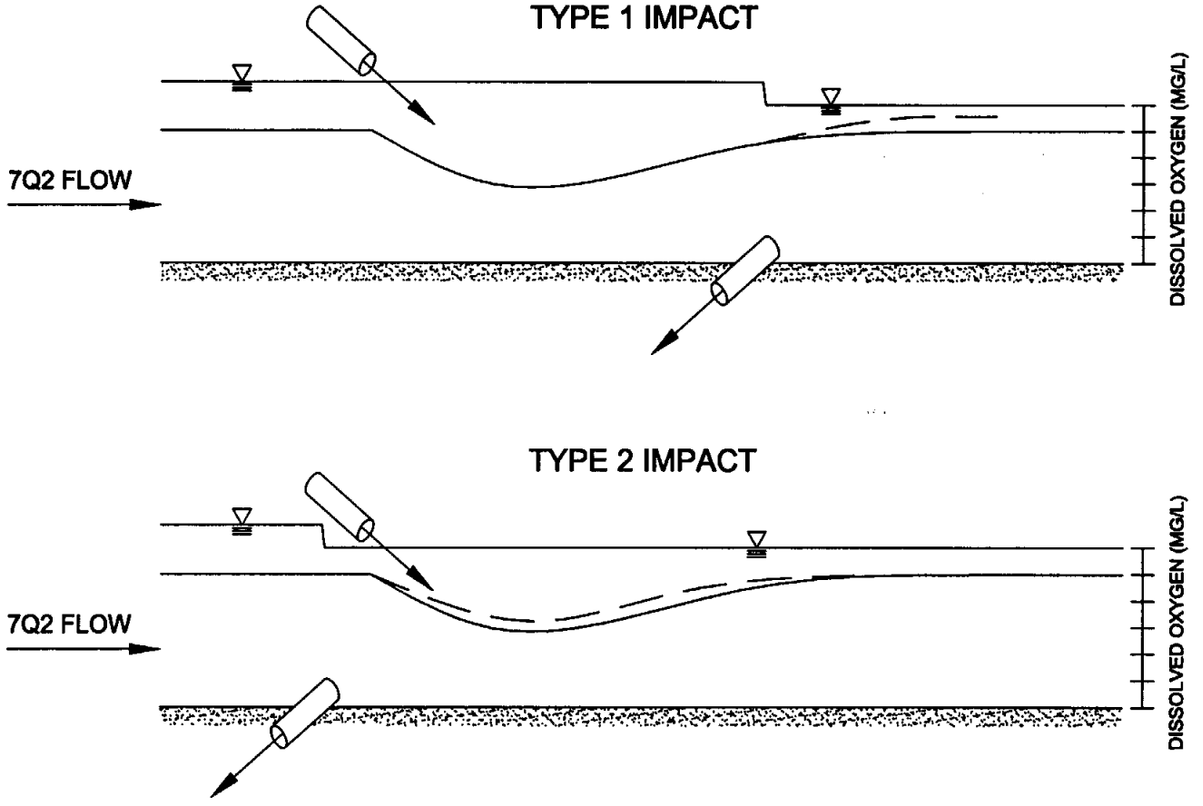
+ Minimum 24-hour means at any site within segment.

* For Segment 1903, the public water supply designation does not apply from the confluence with the San Antonio River to a point 2.5 kilometers upstream of the confluence.

** For Segment 1906, the public supply does not apply from the confluence of the Medina River to a point 4.8 kilometers upstream.

Figure 2-2 illustrates the potential effects of reducing flow in the receiving stream below the 7Q2 flow. In the upper portion of Figure 2-2, a diversion removes water downstream from a wasteload discharge at a point beyond the minimum of the dissolved oxygen sag curve. After the diversion, the flow remaining in the stream is below the 7Q2 flow. This downstream reduction in streamflow delays the recovery of dissolved oxygen levels in the stream, but does not cause the crucial minimum point to be lower. For the purposes of this study, this will be designated a "Type 1" impact of the diversion; it is the impact of the diversion relative to an upstream wasteload discharge.

The lower portion of Figure 2-2 shows a diversion taking place upstream of the D.O. sag curve minimum. In this case, the reduction in streamflow to a level below the 7Q2 flow will tend to amplify the severity of the D.O. sag curve. For the purposes of this study, this will be



LEGEND:

— — ORIGINAL DISSOLVED OXYGEN PROFILE AT 7Q2

——— DISSOLVED OXYGEN PROFILE AFTER DIVERSION SUCH THAT STREAMFLOW IS BELOW 7Q2

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POTENTIAL IMPACTS OF DIVERSIONS ON THE D.O. BEHAVIOR IN A STREAM

FIGURE 2-2

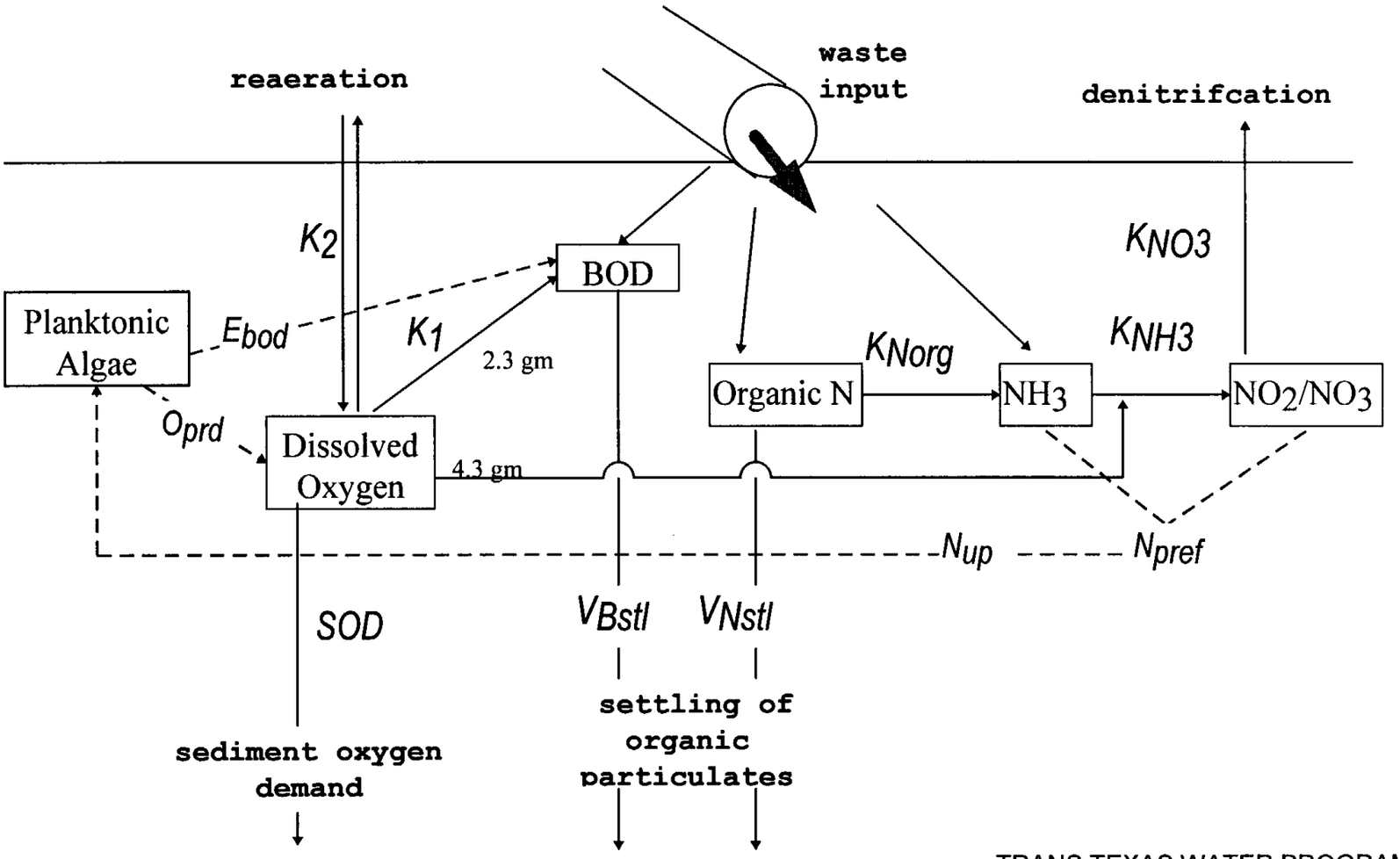
designated a "Type 2" diversion impact; it is generally the impact of the diversion relative to a downstream wasteload discharge. If the diversion takes place below the discharge point but upstream of the minimum of the D.O. sag curve it is still a "Type 2" impact with regard to its effect on the sag.

To evaluate the appropriateness of the 7Q2 flow as the minimum for Zone 3 of the environmental criteria, a methodology is needed which can integrate the impacts of the biologic decay process of wasteloads, the hydrologic behavior of the receiving stream, and the geographic relationships between the discharges of wasteloads and potential diversion sites of water. Such methodologies already exist and are generally referred to as *water quality models*. They are routinely used by state and federal agencies in the regulation of surface water quality and the evaluation of wasteload impacts on receiving streams.

2.1 Water Quality Modeling

The D.O. sag curve results from two dominant processes, namely the decay of oxygen consuming compounds and reaeration from the atmosphere. However, the level of detail necessary to develop a working water quality model is considerably greater. This is necessary because of the multitude of interactions between several constituents which influence the concentration of dissolved oxygen as shown in Figure 2-3. The water quality models typically employed for wasteload evaluations and other analyses are capable of tracking the concentrations of the many chemical parameters or constituents shown in Figure 2-3.

As indicated on Figure 2-3, each gram of organic carbon-containing material, usually denoted as biochemical oxygen demand (BOD), utilizes approximately 2.3 grams of dissolved oxygen. In the decay of organic nitrogen compounds (Organic N) a multi-step sequence occurs. In the presence of bacteria, this sequence of reactions converts ammonia (NH_3) to nitrite (NO_2) and, then, nitrite to nitrate (NO_3). These steps, respectively, consume approximately 1.1 and 3.2 grams of dissolved oxygen per gram of nitrogen. Another constituent which can be of importance for D.O. levels is Planktonic Algae, also called phytoplankton. Algae produce oxygen during photosynthesis in the presence of sunlight and consume oxygen during



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PRINCIPAL PATHWAYS OF DISSOLVED OXYGEN LOSS AND REPLENISHMENT DOWNSTREAM FROM A WASTELOAD INPUT

FIGURE 2-3

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respiration. Algae are usually represented as the concentration of chlorophyll_a (ug/l) as opposed to the actual biomass of algae.[1]

Most water quality models use the finite-difference technique[2] wherein the stream under study is subdivided into a number of segments or elements as shown in Figure 2-4. For any given element *i* an equation based on the fundamental conservation of mass principle is solved for each constituent. The equation for any constituent *j* is,

$$\frac{\partial C_j}{\partial t} = \frac{1}{A_i}\frac{\partial}{\partial x}\left(EA_i\frac{\partial C_j}{\partial x}\right) - \frac{1}{A_i}\frac{\partial}{\partial x}\left(QC_j\right) + W_j - K_jC_j \qquad (2\text{-}1)$$

where,

C_j = the concentration of constituent *j*,
x = distance along the stream channel,
A_i = cross sectional area of the stream element *i*,
E_i = dispersion coefficient for element *i*,
Q*i* = the streamflow at element *i*,
W_j = a wasteload source of constituent *j* entering element *i*,
K_j = the decay or transformation rate of constituent *j*.

For most applications of water quality models, the receiving stream and waste discharges are assumed to be at constant, or steady-state, conditions. Under this assumption, concentrations may vary spatially but do not vary through time allowing the left side of equation 2-1 to be set to zero. The derivation of Equation 2-1 is fully explained in standard reference texts such as Thomann and Mueller (1987)[3].

2.1.1 The QUAL-TX Model

One of the most widely used water quality models in the United States is the EPA-supported QUAL-2E model.[4] The TNRCC uses a specialized version of this model known as QUAL-TX. The predecessor to both of these models was the QUAL-I model developed under

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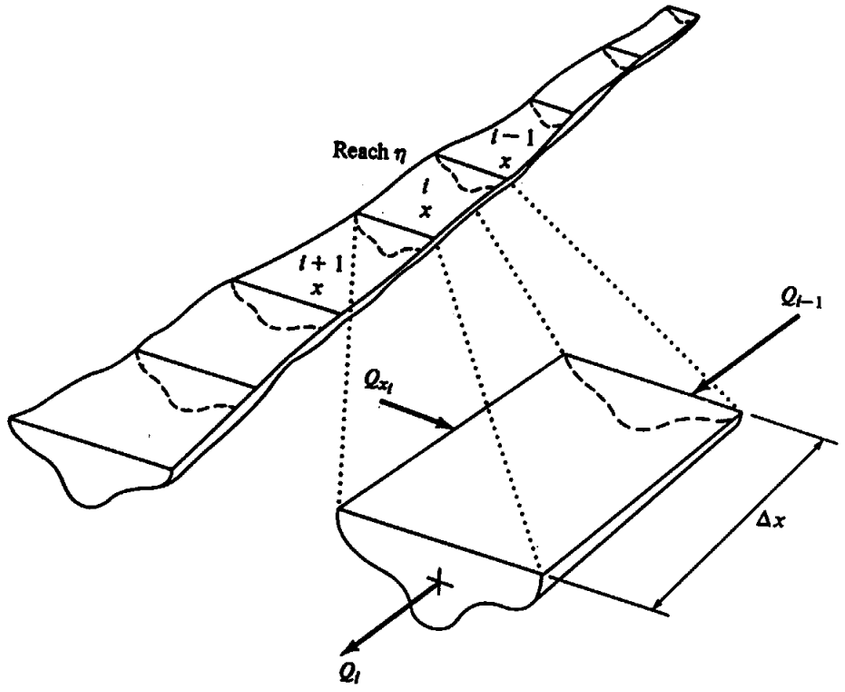
[1] Thomann, R. V. and J. A. Mueller, "Principles of Surface Water Quality Modeling and Control." New York: Harper & Row. 1987.
[2] Smith, G D. "Numerical Solution of Partial Differential Equations." Oxford University Press: London, 1965.
[3] Thomann and Mueller, op cit.
[4] Brown, L. C. and Barnwell, T. O. "The Enhanced Stream Water Quality Models QUAL2E and QUAL2E-UNCAS: Documentation and User Manual" EPA Rep. 600/3-87/007. U. S. Environmental Protection Agency: Athens, GA. 1987.



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TYPICAL SEGMENTATION OF A STREAM IN A WATER QUALITY MODEL

FIGURE 2-4

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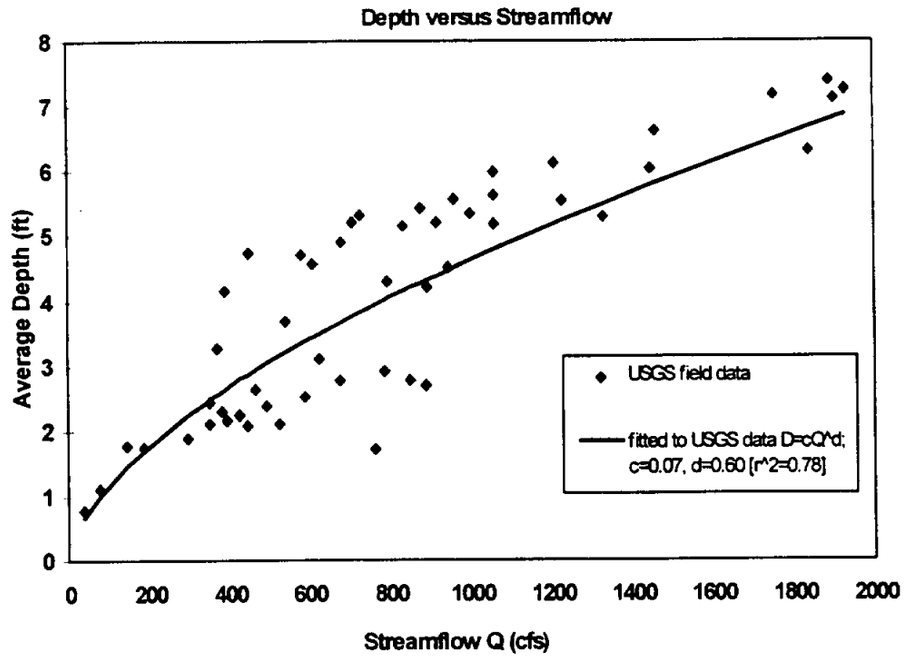

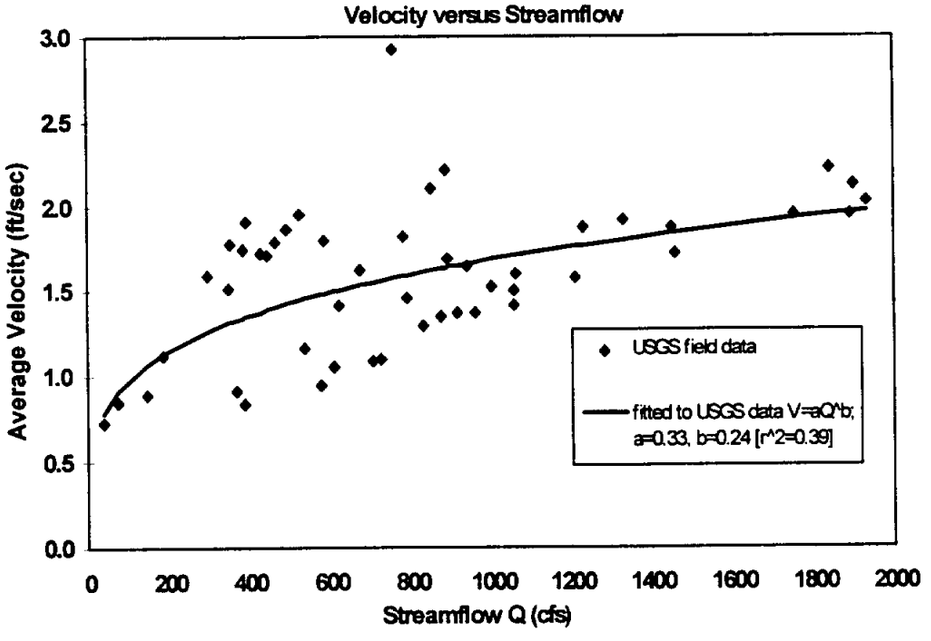

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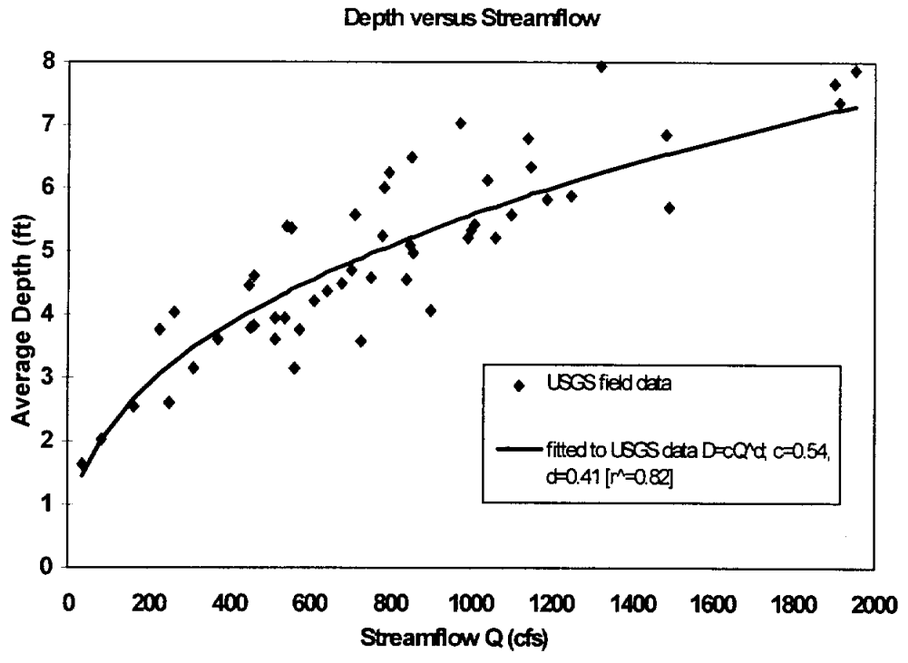
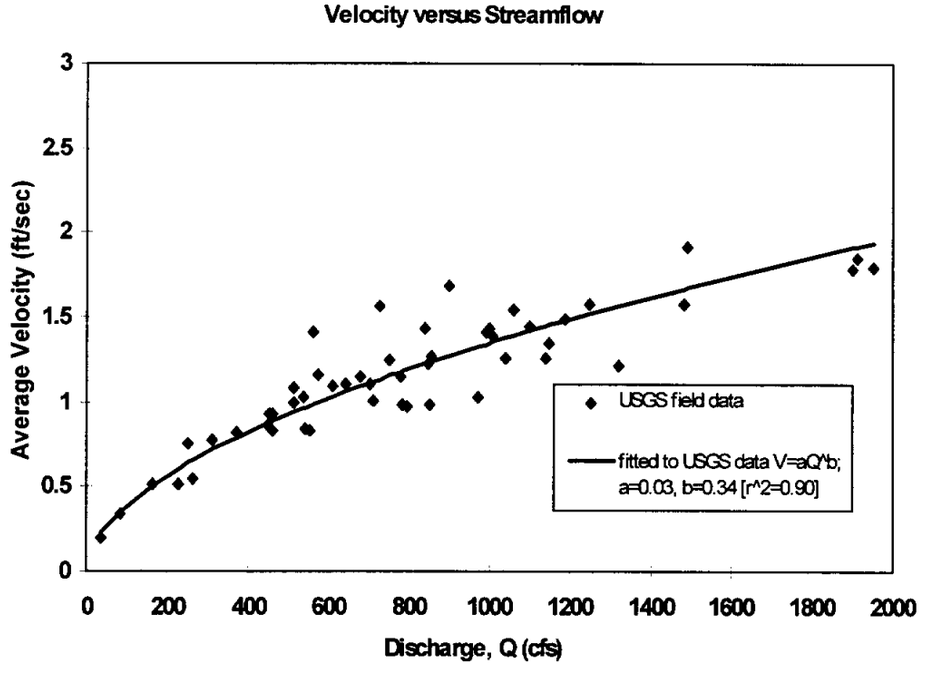
GUADALUPE RIVER CHANNEL HYDRAULIC CHARACTERIZATION AT CUERO (USGS #08175800)

FIGURE 2-8





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GUADALUPE RIVER CHANNEL HYDRAULIC CHARACTERIZATION AT VICTORIA (USGS #08176500)

FIGURE 2-9

contract to the Texas Water Development Board (TWDB) in the late 1960s. The QUAL-I model was able to track temperature, BOD and D.O. for steady-state solution (TWDB, 1970).[5]

Throughout the 1970s, the QUAL-I model underwent many changes to expand and upgrade its capabilities. In 1977, the QUAL-II version was released with the new capabilities to simulate the three component nitrogen series, phosphorus, phytoplankton, and coliform bacteria, in either a dynamic or steady-state manner (Roesner and others, 1977).[6]

The QUAL-II model continued to be modified with special capabilities for Texas conditions, culminating in 1985 with the release of a version named QUAL-TX. The changes represented not only refinements necessary to keep abreast of the burgeoning research concerning the natural processes occurring in receiving waters, but also increased the flexibility and applicability of the model. The internal mathematical solution algorithms for Equation 2-1 are the same for QUAL-TX and QUAL-II.[7] Among the changes made were to remove the dynamic capability of QUAL-II due to computational difficulties, modify several of the terms describing the loss of D.O. which was observed to be inhibited at low D.O. levels, provide for simulating water bodies influenced by tides, and update the simulation of phytoplankton.

Many water quality models provide for tracking the concentration of Planktonic Algae because of their influence of dissolved oxygen. Unfortunately, the simulation of algae growth is a very difficult process because it is a population dynamic process related to temperature, nutrient (NH_3 and NO_2/NO_3 and phosphorous) concentrations and sunlight availability. Because of this difficulty, the QUAL-TX model has the special capability of performing a pseudo-simulation of algae indicated by the dotted lines of Figure 2-3. Under this option the concentration of algae, as indicated by chlorophyll_a levels, in any reach is fixed. These fixed levels of algae produce dissolved oxygen and utilize ammonia and nitrite/nitrate.

The QUAL-TX model, with the latest version released in 1995, has now become the standard model in Texas for the evaluation of water quality and the wasteload permitting (wasteload allocation) process.

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[5] Texas Water Development Board. "Simulation of Water Quality in Streams and Canals: QUAL-I Program Documentation and User's Manual." Texas Water Development Board: Austin, TX. 1970.

[6] Roesner, L. A., J. R. Monser, and D. E. Evanson. "Computer Program Documentation for the Stream Quality Model QUAL-II." Water Resources Engineers: Walnut Creek, CA. 1977.

[7] Texas Natural Resource Conservation Commission. "QUAL-TX User's Manual, Version 3.4." Texas Natural Resource Conservation Commission: Austin, TX. 1995

2.1.2 Previous Use of the QUAL-TX Model in the Study Area

The QUAL-TX model has been used in several previous studies of creeks and rivers in the study area as shown on Figure 2-5. In all cases, QUAL-TX was used to support regulatory decisions on the acceptable wasteloads that could be discharged to the streams without violating D.O. standards.

The most extensive of these is the QUAL-TX model developed by the Texas Water Commission to model most of the major streams in the San Antonio River basin. Because of the geographic locations of the important wastewater discharges in the San Antonio River basin, the development of this model included separate tributary models for Leon and Medio creeks and the Medina River as well as the mainstem model of the San Antonio River.[8]

Another application of the QUAL-TX model in the study area was to Plum Creek[9] (see Figure 2-5) in order to recommend treatment levels for wastewater discharges through the year 2005. Finally, the QUAL-TX model was applied to a small portion of the San Marcos River during a wastewater discharge permit hearing.[10]

2.1.3 Model Layout and Calibration

Within the QUAL-TX model, the stream channel must be divided into reaches along its length. Each reach contains a number of elements, such as those shown in Figure 2-4. Each QUAL-TX model reach, and the elements within it, are characterized by constant properties. The subdivision of the stream into reaches is made primarily by choosing points which reflect any significant changes in stream properties. Many other coefficients related to the biologic processes of Figure 2-3 can only be varied on a reach-by-reach basis, thus serving as another criteria for the segmentation of the model.

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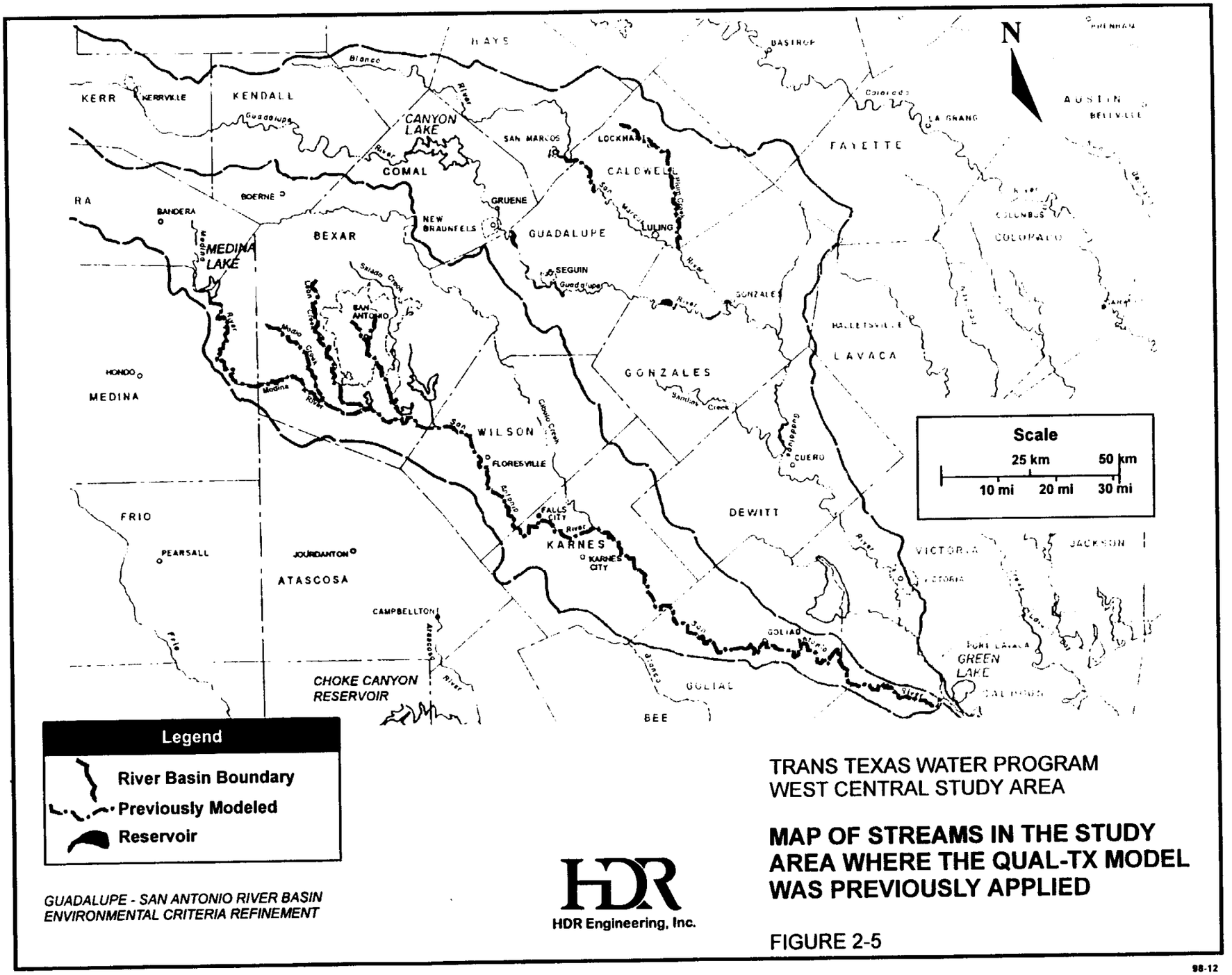
[8] Texas Water Commission. "Waste Load Evaluation for the San Antonio River System in the San Antonio River Basin." TWC Rep. WLE 89-01. Texas Water Commission: Austin, TX. 1989.
[9] Texas Water Commission. "Waste Load Evaluation for Plum Creek in the Guadalupe River Basin." TWC Rep. WLE 91-01. Texas Water Commission: Austin, TX. 1991.
[10] Black & Veatch, Inc. "City of San Marcos Wastewater Master Plan." San Marcos, TX. 1995.



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MAP OF STREAMS IN THE STUDY AREA WHERE THE QUAL-TX MODEL WAS PREVIOUSLY APPLIED

FIGURE 2-5

98-12

Within any given reach, the stream channel geometry is represented by two equations relating the average stream velocity and average depth at any point along a cross section to the streamflow. For stream velocity, the equation is:

$$V = aQ^b \tag{2-2}$$

where,

V = the average stream velocity,
Q = streamflow,
a & *b* = coefficients to be specified.

For stream depth the equation is:

$$D = cQ^d + e \tag{2-3}$$

where,

D = the average stream depth,
Q = streamflow,
c, d, and e = coefficients to be specified.

Thus, in order to accurately portray the hydrologic behavior of the stream channel, the model must be subdivided into reaches at each point where an appreciable change in depth and/or velocity occurs. The channel geometry coefficients *a, b, c, d,* and *e* must then be specified for each individual reach.

Achieving representative velocities and depths are important because of their influence on the simulation of transport and decay of the water quality constituents away from the discharge point. Specifically, a high-velocity channel will have a shallow D.O. sag curve as compared to a deeper or slower stream receiving the same wasteload. The actual derivation of these coefficients for each river section of this study is presented in following sections. The channel geometry coefficients are also of great importance because of their influence on the process of reaeration.

Within QUAL-TX there are a variety of functional forms for the reaeration process from which the modeler may choose. The most commonly used form is the so-called Texas

Reaeration Equation which was developed specifically with data collected by TNRCC and its predecessor agencies on Texas streams.[11] The equation is:

$$K_2 = 1.923 V^{0.273} / D^{0.894} \quad (2\text{-}4)$$

where V and D are as defined above and K_2 is the reaeration rate (1/day). Because the average stream velocity and depth are of great importance in the reaeration equation, the channel geometry coefficients (*a, b, c, d* and *e*) on which they are based are critical.

One particular feature of the Texas Reaeration Equation of note is that for certain values of the channel geometry coefficients (*a, b, c, d* and *e*), the reaeration rate K_2 will increase with decreasing streamflow. Although this may be a true reflection of stream behavior, and is actually evident in the reaeration data from the San Antonio River[12]upon which the Texas Reaeration Equation is partially based, a more conservative approach was used in this study. In all evaluations of the effects of reducing streamflow below 7Q2, the reaeration rate was fixed at the baseline value corresponding to 7Q2 flow.

While the coefficients above are related to physical properties of the stream channel, there are many other coefficients affecting the simulation of biologic processes which must be specified. Each of the processes or transformations in Figure 2-3 is governed by a reaction rate coefficient, usually denoted by an uppercase K. The entries in Table 2-2 define each of the parameters of Figure 2-3. A thorough description of the theoretical basis for these constants and coefficients can be found in Bowie and others (1985).[13]

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[11] Cleveland, K. D. "Predicting Reaeration Rates in Texas Streams." Journal of Environmental Engineering, V.115, No. 3. 1989.

[12] Ibid.

[13] Bowie, G. L., W. B. Mills, D. B. Porcella, C. L. Campbell, J. R. Pagenkopf, G. L. Rupp, K. M. Jonson, P. W. H. Chan, S. A. Gherini, and C. E. Chamberlin. "Rates, Constants, and Kinetic Formulations in Surface Water Quality Modeling (Second Edition)" EPA Rep. 600/3-85/040. U. S. Environmental Protection Agency: Athens, GA. 1985.

Table 2-2 Description of the Constants and Coefficients Used in the QUAL-TX Model of the Guadalupe and San Marcos Rivers	
Constant or Coefficient Name	**Description/Units**
K1	aerobic decay rate of carbonaceous BOD (1/day)
K2	atmospheric reaeration rate constant (function of stream depth and velocity as in Equation. 2-4) (1/day)
KNorg	decay rate of organic nitrogen waste to ammonia (NH_3) (1/day)
KNH3	decay rate of ammonia to nitrite and nitrate (1/day)
KNO3	anaerobic loss rate of nitrite and nitrate to the atmosphere (1/day)
SOD	background sediment oxygen demand (gm/sq. meter -day)
VBstl	settling rate of BOD (converts to SOD) (m/day)
VNstl	settling rate of organic nitrogen (m/day)
Nup	nitrogen uptake rate constant for algae/ (mg Nitrogen/ug chlorophyll_a-day)
Npref	nitrogen source preference of algae (1 = total preference for NO_3, 0 = total preference for NH_3)
Oprd	production rate of dissolved oxygen by algae (mg D.O. / ug chlorophyll_a - day)
Ebod	effective interference of algae on BOD (mg BOD /ug chlorophyll_a)

The rate constants and coefficients in Table 2-2 vary depending on the characteristics of a given water body and the wasteload(s) entering it. As a water quality model for a stream is being developed, it is necessary to arrive at the unique set of these rate constants and coefficients such that the model can reasonably replicate actual stream concentrations. This process of tailoring the water quality model to the stream of interest via adjustment of the set of rate constants and coefficients is known as *calibration*. Calibration is typically performed by selecting a time when the stream is at low-flow and nearly steady-state conditions, that is, with constant streamflow and wastewater discharges. Model calibration, as well as model application, is also generally restricted to summer, high temperature periods because the reaction rates are at their highest and the D.O. curve is most severe.

The calibration effort is best supported by a rather rigorous set of data. Among the most important data requirements are: measurements of all entering river and tributary streamflows and constituent concentrations, measurements or estimates of the volumes and constituent concentrations of each wastewater discharge and, measurements of constituent concentrations

along the length of the stream at a spatial resolution sufficient to capture the progress of the decay and transformation processes.

Once the model is fully calibrated to sufficiently represent the stream with the available data from one period, a verification is then performed. For verification, the calibrated set of constants and coefficients is used in conjunction with the streamflows and wastewater discharges of another period to see if the model can reasonably replicate the field-measured constituent concentrations again.

Figure 2-6 shows the simulated D.O. in the San Antonio River after the QUAL-TX model was calibrated with the in-stream data gathered in a previous study by the Texas Water Commission (now the TNRCC) specifically for that purpose.[14] The present study relied exclusively upon existing data for in-stream concentrations, streamflows, and wastewater discharges in the calibration process. The adequacy and shortcomings of these available data will be discussed in the following sections. A summary of the final calibration values for the rivers of interest in this study is also presented in a subsequent section.

2.1.4 Model Limitations

QUAL-TX is a fairly flexible water quality model allowing the user a great deal of latitude in the spatial layout of the system. This includes the capability to include tributaries, multiple waste loads in one segment, and other features added by the Texas Water Commission and/or Texas Department of Water Resources.[15]

Nonetheless, there are several limitations of the water quality modeling process which should be pointed out. At the most general level, the biggest limitation in water quality modeling is the assumption of steady-state conditions although most rivers are highly dynamic in streamflow behavior. Steady-state conditions are typically assumed because of the greatly increased data requirements necessary to calibrate a dynamic model. However, the steady-state assumption is generally considered reasonable since the critical low-flow periods of interest

[14] Texas Water Commission. "Waste Load Evaluation for the San Antonio River System in the San Antonio River Basin." TWC Rep. WLE 89-01. Texas Water Commission: Austin, TX. 1989.
[15] Texas Natural Resource Conservation Commission. "QUAL-TX User's Manual, Version 3.4." Texas Natural Resource Conservation Commission: Austin, TX. 1995.

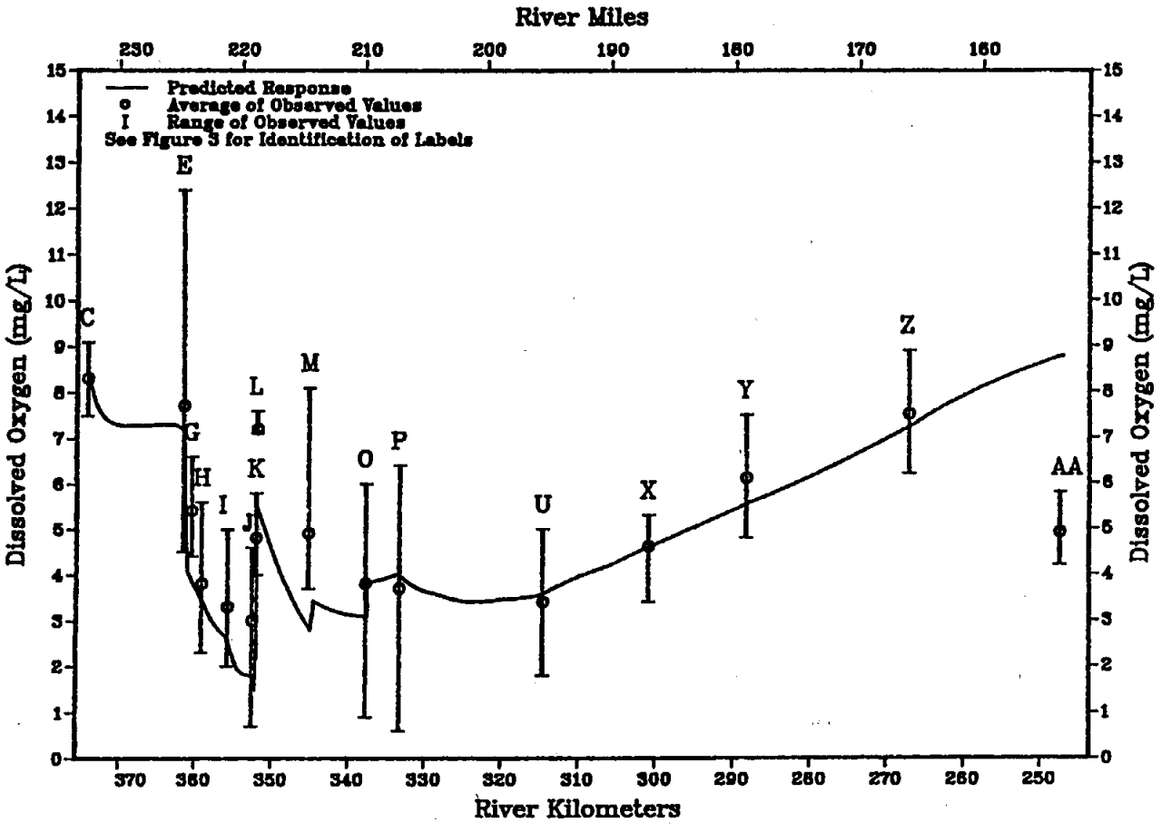

FIGURE 24

UPPER SAN ANTONIO RIVER CALIBRATION PLOT FOR DISSOLVED OXYGEN
July 23-August 1, 1984 Data

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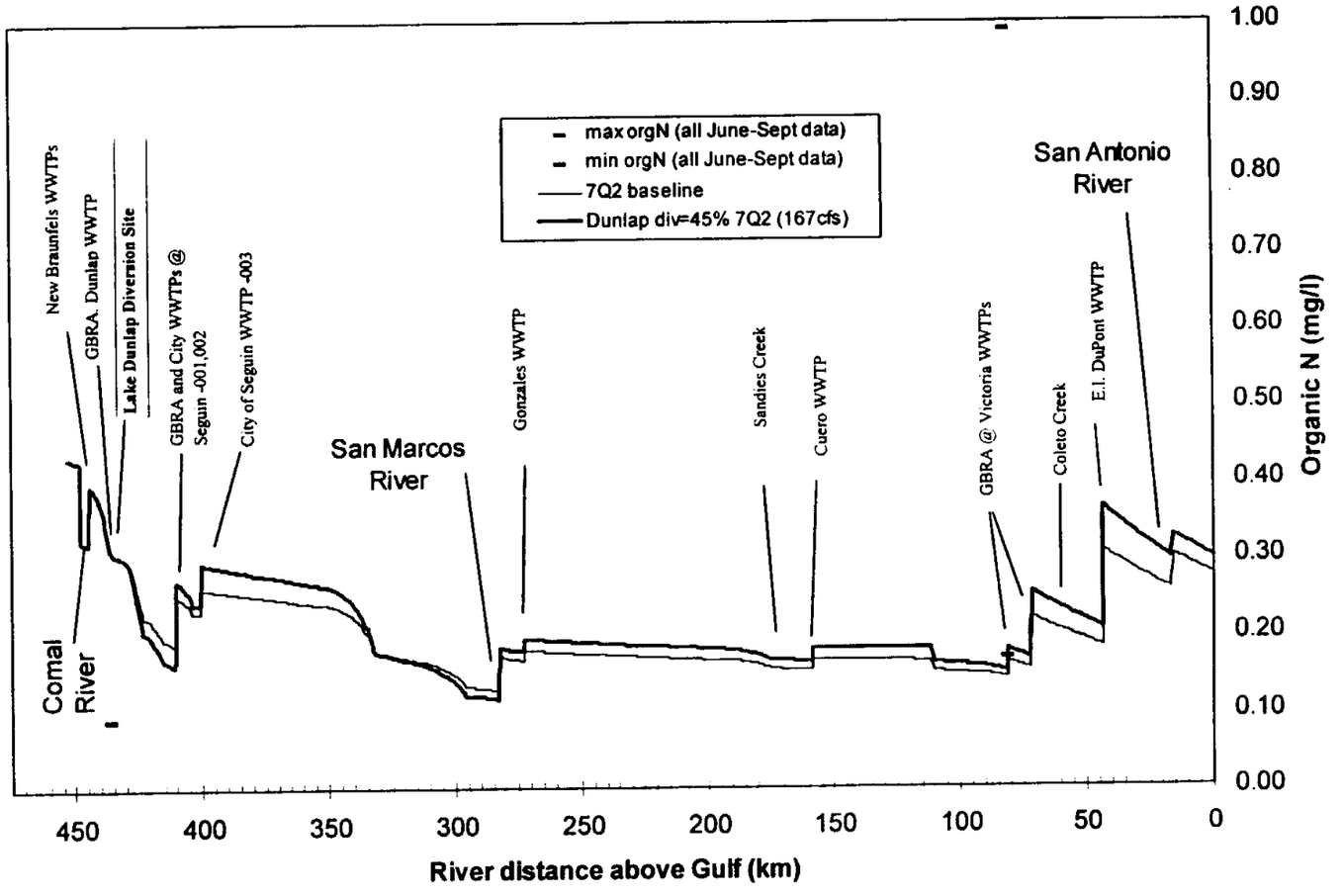
EXAMPLE OFMODEL CALIBRATION FOR THE SAN ANTONIO RIVER FROM A PREVIOUS STUDY

FIGURE 2-6



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CURRENT PERMIT SCENARIO-ORGANIC NITROGEN SIMULATION: DIVERSIONS FROM LAKE DUNLAP

FIGURE 2-24

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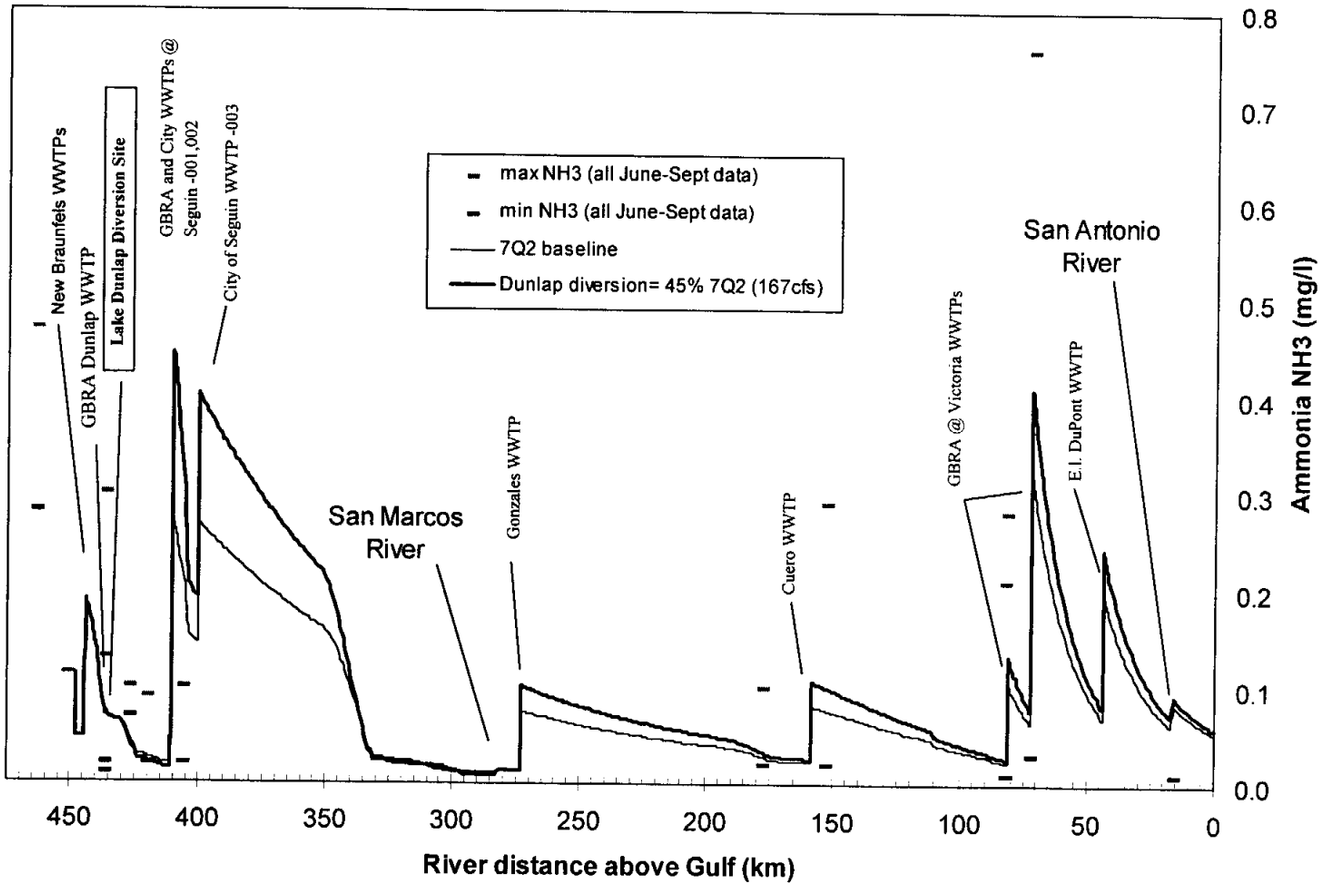

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CURRENT PERMIT SCENARIO-AMMONIA SIMULATION: DIVERSIONS FROM LAKE DUNLAP

FIGURE 2-25

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