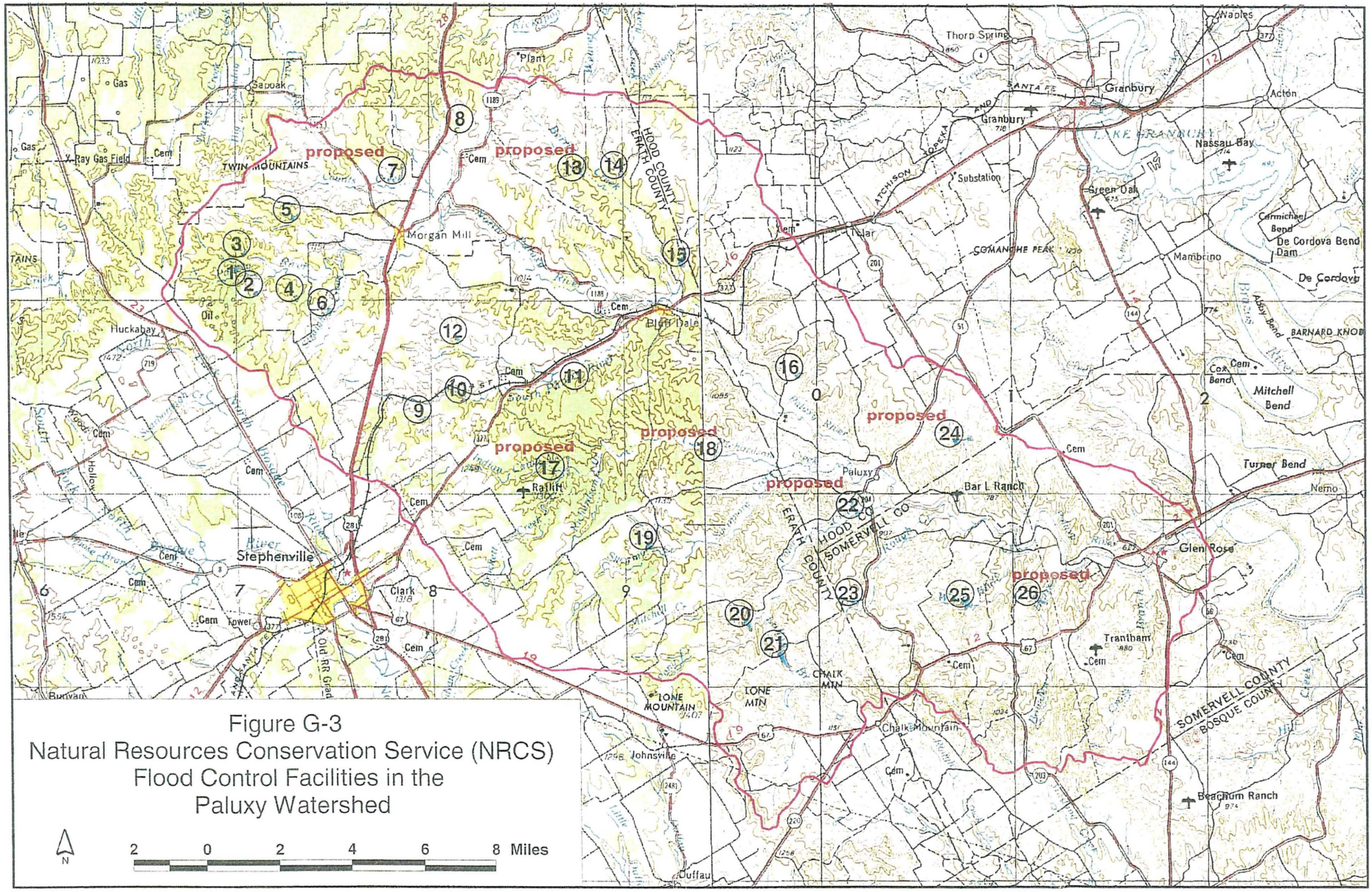
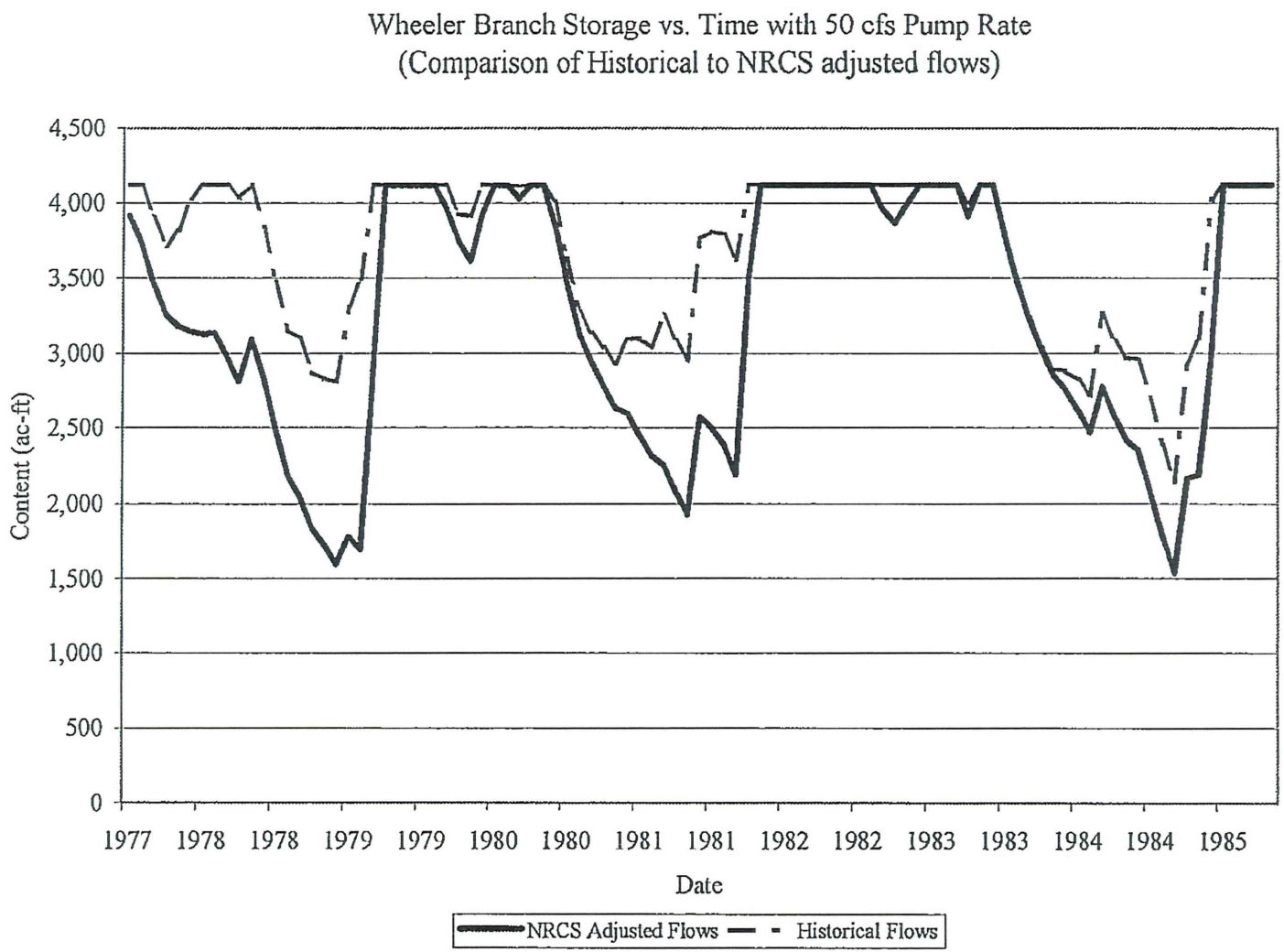


Figure G-3
Natural Resources Conservation Service (NRCS)
Flood Control Facilities in the
Paluxy Watershed

N

2 0 2 4 6 8 Miles

Figure G-4


Wheeler Branch Storage vs. Time with 50 cfs Pump Rate
(Comparison of Historical to NRCS adjusted flows)
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Content (ac-ft)
1977
1978
1978
1979
1979
1980
1980
1981
1981
1982
1982
1983
1983
1984
1984
1985
Date
NRCS Adjusted Flows
Historical Flows

Impact of Upstream Water Rights on the Project

Table G-5 lists the water rights in the Paluxy River watershed upstream of the proposed diversion dam. There are a total of 14 water rights, all for irrigation, with a combined permitted diversion of 1,363 acre-feet per year. These water rights will have little impact on the operation of the proposed project for the following reasons:

- 13 of the 14 water rights with a total diversion of 1,163 acre-feet per year were already in place during the historical critical period.
- Four of the water rights with a total diversion of 883 acre-feet per year are upstream of the NRCS reservoirs.
- The diversions for upstream rights will not significantly impact moderate and high flows, which is when most of the diversions for the proposed project occur.

Impact of the Project on Downstream Water Rights

As discussed in Section 4 of the report, the Somervell County Water District has a subordination agreement with the Brazos River Authority, allowing the District to divert flows otherwise appropriated to Lake Whitney downstream. There are no water rights allowing diversions from the Paluxy River downstream of the diversion dam. Table G-6 shows the water rights on the Brazos River downstream of the proposed diversion dam and upstream of Lake Whitney. There are five water rights along this segment of the Brazos River, with a total permitted diversion of 4,385 acre-feet per year.

The drainage area of the proposed diversion is 2.5 percent of the total contributing drainage area of the Brazos River at the mouth of the Paluxy River, and the proposed bypass requirements will provide more than a proportional share of the flow required to meet these existing water rights. The minimum historical annual flow for the Brazos River near Glen Rose, which is upstream from the Paluxy River, is 67,974 acre-feet in 1988. There is more than enough flow in the Brazos River to meet these downstream water rights with the proposed project.

Table G-5
Water Rights in the Paluxy River Watershed Upstream of the Diversion Dam

Number	County	Permitted Irrigation Diversion (ac-ft/yr)	Diversion Rate (cfs)	Reservoir Capacity (ac-ft)	Stream	Priority	Owner	Comments
CA-4084 A	Erath	25	1.33	25	North Paluxy	11/19/73	Earl R. Allison *et al.*	
CA-4085	Erath	28	0.33		Trib - North Paluxy	12/9/1974	Earl R. Allison *et al.*	
CA-4086	Erath	15	1.22	2	South Paluxy	9/2/1975	Gary & Beverly Lewellen	
CA-4087	Hood	81	2.67	360	East Branch Wolf Creek	9/30/1965	Leland A. Hodges *et al.*	
CA-4088	Hood	55	2.67	2	Paluxy River	6/30/1966	Milton C & Vivian Young	
CA-4089	Erath	31	1.67		Richardson Creek	3/31/1963	Jacob T & Laura Dameron	
CA-4090	Erath	197	1.00	332	Mitchell Creek	8/14/1967	Richard T Lietz	
CA-4091	Erath	360	2.00	511	Lallah Branch	1/20/1965	Kenneth Lesley	
CA-4092	Erath	6	1.11		Pony Creek	7/31/1964	Robert D. Adams, Sr.	
CA-4093	Hood	94	2.00		Pony Creek	12/31/1963	Ernest H. Cannon	
CA-4094	Somervell	16	1.35		Paluxy River	6/30/1935	J. B. Sanderson *et al.*	
CA-4095	Somervell	10	1.11		Paluxy River	12/31/1949	J. C. Mcfall	
P-3939	Erath	245	4.50	725	Lallah Branch	11/1/1982	Kenneth Lesley	
P-5295	Erath	100	1.10		Crockett Creek	5/11/1990	Jay D. & Deborah Mills	Expiration date 12/31/2000
P-5295	Erath	100	1.10		Richardson Creek	5/11/1990	Jay D. & Deborah Mills	Expiration date 12/31/2000

Table G-6
Water Rights on the Brazos River Downstream of the Diversion Dam and Upstream of Lake Whitney

Number	County	Permitted Diversions (acre-feet/year)			Diversion Rate (cfs)	Priority	Owner	Comments
		Irrigation	Mining	Total				
CA-4098	Somervell	258		258	2.20	7/31/54	Bob Harris Oil Company	
CA-4099	Somervell	5		5	1.33	8/31/49	Dorothy W. Little *et al.*	
CA-4100	Johnson		125	125	2.22	12/31/59	Trinity Materials Inc	Mining
CA-4103	Bosque	186		186	3.67	12/31/55	Cyril Wagner, Jr. *et al.*	
CA-4104	Bosque	3,811		3,811	31.67	12/31/57	Perry R Bass, Inc.	
Total		**4,260**	**125**	**4,385**				

APPENDIX H

SUMMARY OF OPERATION STUDY BASED ON HISTORICAL FLOWS

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	**50**
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
											169	4,118
1947	6	2,892	2,374	634	274	2,618	0	0.55	92	182	169	4,118
1947	7	392	293	293	293	99	0	1.00	167	246	164	3,998
1947	8	358	272	193	193	165	0	0.76	122	246	158	3,823
1947	9	1,561	1,469	457	457	1,104	0	0.74	117	188	164	3,975
1947	10	1,263	1,165	420	394	869	0	0.50	81	170	169	4,118
1947	11	720	624	621	173	547	0	0.20	33	140	169	4,118
1947	12	3,607	3,509	1,261	118	3,489	0	-0.13	-22	140	169	4,118
Total		10,793	9,707	3,879	1,902	8,891	0	4	590	1,312		
1948	1	2,162	1,953	962	143	2,019	0	0.05	9	134	169	4,118
1948	2	12,239	11,934	928	102	12,137	0	-0.11	-18	120	169	4,118
1948	3	5,126	4,658	2,407	174	4,952	0	0.23	38	136	169	4,118
1948	4	1,321	798	798	213	1,108	0	0.42	71	142	169	4,118
1948	5	6,547	6,006	1,225	196	6,351	0	0.24	40	156	169	4,118
1948	6	3,851	3,386	827	257	3,594	0	0.45	75	182	169	4,118
1948	7	3,302	3,204	1,334	361	2,941	0	0.68	115	246	169	4,118
1948	8	371	277	234	234	137	0	0.80	133	246	164	3,973
1948	9	1,290	1,195	418	418	872	0	0.64	104	188	164	4,099
1948	10	308	209	209	209	99	0	0.57	93	170	164	4,045
1948	11	493	397	397	291	202	0	0.47	78	140	169	4,118
1948	12	572	474	474	197	375	0	0.33	57	140	169	4,118
Total		37,582	34,490	10,213	2,795	34,787	0	4.76	795	2,000		
1949	1	1,108	899	778	97	1,011	0	-0.22	-37	134	169	4,118
1949	2	4,669	4,375	859	112	4,557	0	-0.05	-8	120	169	4,118
1949	3	6,424	5,957	1,420	151	6,273	0	0.09	15	136	169	4,118
1949	4	9,783	9,260	1,974	150	9,633	0	0.04	8	142	169	4,118
1949	5	76,409	75,868	2,808	155	76,254	0	-0.01	-1	156	169	4,118
1949	6	7,626	7,102	2,863	223	7,403	0	0.24	41	182	169	4,118
1949	7	1,607	1,509	1,491	373	1,234	0	0.75	127	246	169	4,118
1949	8	1,147	1,048	894	362	785	0	0.69	116	246	169	4,118
1949	9	585	489	489	299	286	0	0.66	111	188	169	4,118
1949	10	5,362	5,263	1,376	194	5,168	0	0.14	24	170	169	4,118
1949	11	817	722	722	215	602	0	0.44	75	140	169	4,118
1949	12	1,038	940	940	152	886	0	0.07	12	140	169	4,118
Total		116,575	113,431	16,614	2,483	114,092	0	2.86	483	2,000		

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	**50**
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1950	1	2,633	2,424	1,291	110	2,523	0	-0.14	-24	134	169	4,118
1950	2	5,521	5,227	2,503	116	5,405	0	-0.02	-4	120	169	4,118
1950	3	1,901	1,433	1,419	213	1,688	0	0.46	77	136	169	4,118
1950	4	4,652	4,128	1,726	157	4,495	0	0.09	15	142	169	4,118
1950	5	4,118	3,577	2,381	178	3,940	0	0.13	22	156	169	4,118
1950	6	1,723	1,200	1,068	260	1,463	0	0.46	78	182	169	4,118
1950	7	4,047	3,949	1,763	290	3,757	0	0.26	44	246	169	4,118
1950	8	589	491	491	383	206	0	0.81	137	246	169	4,118
1950	9	4,718	4,622	1,477	200	4,518	0	0.07	12	188	169	4,118
1950	10	673	575	575	282	391	0	0.66	112	170	169	4,118
1950	11	659	564	564	240	419	0	0.59	100	140	169	4,118
1950	12	645	547	547	201	444	0	0.36	61	140	169	4,118
Total		31,879	28,737	15,805	2,630	29,249	0	3.72	630	2,000		
1951	1	561	352	352	170	391	0	0.22	36	134	169	4,118
1951	2	759	465	465	131	628	0	0.07	11	120	169	4,118
1951	3	670	203	203	189	481	0	0.32	53	136	169	4,118
1951	4	727	204	204	196	531	0	0.32	54	142	169	4,118
1951	5	1,823	1,303	513	164	1,659	0	0.05	8	156	169	4,118
1951	6	9,793	9,278	1,290	186	9,607	0	0.03	4	182	169	4,118
1951	7	368	269	269	269	99	0	0.63	106	246	164	4,035
1951	8	61	17	17	17	44	0	0.84	133	246	153	3,673
1951	9	16	0	0	0	16	0	0.71	104	188	143	3,381
1951	10	51	15	15	15	36	0	0.50	69	170	134	3,157
1951	11	218	123	123	123	95	0	0.30	41	140	134	3,099
1951	12	361	263	263	263	98	0	0.27	36	140	134	3,186
Total		15,408	12,491	3,714	1,723	13,685	0	4.25	655	2,000		
1952	1	486	277	277	277	209	0	0.19	25	134	138	3,304
1952	2	456	151	151	151	305	0	0.23	32	120	138	3,303
1952	3	534	73	73	73	461	0	0.18	24	136	138	3,216
1952	4	3,180	2,690	706	706	2,474	0	-0.13	-18	142	158	3,798
1952	5	30,196	29,655	1,698	482	29,714	0	0.04	6	156	169	4,118
1952	6	975	468	468	322	653	0	0.83	140	182	169	4,118
1952	7	270	172	172	172	98	0	0.92	151	246	158	3,893
1952	8	87	43	43	43	44	0	1.24	190	246	148	3,500
1952	9	17	0	0	0	17	0	0.80	113	188	138	3,199
1952	10	10	0	0	0	10	0	0.79	103	170	125	2,926
1952	11	2,008	1,934	455	455	1,553	0	-0.09	-12	140	138	3,253
1952	12	597	498	498	498	99	0	0.00	0	140	148	3,611
Total		38,816	35,963	4,541	3,179	35,637	0	5.01	754	2,000		

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	**50**
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1953	1	508	299	299	299	209	0	0.27	41	134	153	3,735
1953	2	365	71	71	71	294	0	0.20	31	120	153	3,655
1953	3	601	166	166	166	435	0	0.13	19	136	153	3,666
1953	4	1,732	1,270	557	557	1,175	0	0.14	23	142	164	4,058
1953	5	4,346	3,830	787	248	4,098	0	0.19	32	156	169	4,118
1953	6	146	0	0	0	146	0	0.95	153	182	153	3,783
1953	7	869	807	706	685	184	0	0.65	104	246	169	4,118
1953	8	1,656	1,559	625	353	1,303	0	0.64	107	246	169	4,118
1953	9	326	268	253	253	73	0	0.73	121	188	164	4,062
1953	10	1,512	1,422	704	264	1,248	0	0.23	38	170	169	4,118
1953	11	646	551	482	164	482	0	0.14	24	140	169	4,118
1953	12	472	373	373	182	290	0	0.25	42	140	169	4,118
Total		13,179	10,616	5,023	3,242	9,937	0	4.54	735	2,000		
1954	1	473	264	264	145	328	0	0.07	11	134	169	4,118
1954	2	354	60	60	60	294	0	0.34	56	120	164	4,002
1954	3	477	150	150	150	327	0	0.36	59	136	164	3,957
1954	4	4,421	3,937	713	315	4,106	0	0.07	12	142	169	4,118
1954	5	2,401	1,900	757	187	2,214	0	0.18	31	156	169	4,118
1954	6	2,943	2,731	318	260	2,683	0	0.46	78	182	169	4,118
1954	7	220	200	99	99	121	0	0.74	122	246	158	3,849
1954	8	125	103	103	103	22	0	0.89	136	246	148	3,570
1954	9	5	0	0	0	5	0	0.71	101	188	138	3,281
1954	10	1,326	1,282	351	351	975	0	0.23	33	170	143	3,429
1954	11	905	810	743	743	162	0	0.13	20	140	164	4,012
1954	12	431	332	332	279	152	0	0.20	33	140	169	4,118
Total		14,081	11,769	3,890	2,692	11,389	0	4.38	692	2,000		
1955	1	338	129	129	129	209	0	0.07	11	134	164	4,102
1955	2	551	261	261	151	400	0	0.09	15	120	169	4,118
1955	3	773	402	308	187	586	0	0.30	51	136	169	4,118
1955	4	1,797	1,420	327	189	1,608	0	0.28	47	142	169	4,118
1955	5	38,777	38,354	1,606	149	38,628	0	-0.04	-7	156	169	4,118
1955	6	2,397	1,888	1,116	240	2,157	0	0.34	58	182	169	4,118
1955	7	665	567	517	336	329	0	0.53	90	246	169	4,118
1955	8	203	141	141	141	62	0	0.50	83	246	158	3,930
1955	9	20,787	20,729	912	342	20,445	0	-0.21	-34	188	169	4,118
1955	10	1,093	995	639	232	861	0	0.37	62	170	169	4,118
1955	11	266	171	171	171	95	0	0.35	57	140	164	4,092
1955	12	375	276	276	195	180	0	0.17	29	140	169	4,118
Total		68,022	65,334	6,403	2,462	65,560	0	2.75	462	2,000		

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	50
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1956	1	425	216	216	152	273	0	0.10	18	134	169	4,118
1956	2	766	461	461	118	648	0	-0.01	-2	120	169	4,118
1956	3	374	0	0	0	374	0	0.44	72	136	158	3,910
1956	4	896	756	336	336	560	0	0.20	32	142	164	4,072
1956	5	23,730	23,190	1,159	252	23,478	0	0.30	50	156	169	4,118
1956	6	259	15	15	15	244	0	0.65	106	182	158	3,845
1956	7	11	0	0	0	11	0	0.91	137	246	143	3,462
1956	8	1,330	1,304	350	350	980	0	0.82	117	246	143	3,449
1956	9	158	121	121	121	37	0	0.68	95	188	138	3,287
1956	10	496	451	332	332	164	0	0.19	26	170	143	3,423
1956	11	359	267	252	252	107	0	0.17	25	140	148	3,510
1956	12	2,475	2,376	533	533	1,942	0	0.06	9	140	158	3,894
Total		31,279	29,157	3,775	2,461	28,818	0	4.50	685	2,000		
1957	1	395	186	186	186	209	0	0.11	18	134	158	3,928
1957	2	437	142	142	142	295	0	-0.02	-3	120	164	3,953
1957	3	1,019	575	355	319	700	0	0.11	18	136	169	4,118
1957	4	40,217	39,695	1,580	27	40,190	0	-0.69	-115	142	169	4,118
1957	5	66,048	65,507	3,074	83	65,965	0	-0.43	-73	156	169	4,118
1957	6	10,232	9,709	2,724	227	10,005	0	0.26	45	182	169	4,118
1957	7	1,618	1,520	1,141	363	1,255	0	0.69	117	246	169	4,118
1957	8	346	248	248	248	98	0	0.73	122	246	164	3,998
1957	9	227	132	132	132	95	0	0.30	49	188	158	3,893
1957	10	5,806	5,708	1,121	374	5,432	0	-0.13	-21	170	169	4,118
1957	11	8,860	8,765	2,741	102	8,758	0	-0.22	-38	140	169	4,118
1957	12	3,490	3,392	2,908	151	3,339	0	0.06	11	140	169	4,118
Total		138,695	135,578	16,352	2,354	136,341	0	0.79	130	2,000		
1958	1	5,316	5,107	2,863	131	5,185	0	-0.02	-3	134	169	4,118
1958	2	3,767	3,473	2,769	124	3,643	0	0.02	4	120	169	4,118
1958	3	7,201	6,733	3,074	133	7,068	0	-0.02	-3	136	169	4,118
1958	4	7,371	6,847	2,876	128	7,243	0	-0.08	-14	142	169	4,118
1958	5	16,216	15,675	3,041	164	16,052	0	0.05	8	156	169	4,118
1958	6	2,616	2,092	1,589	243	2,373	0	0.36	61	182	169	4,118
1958	7	6,080	5,982	1,231	337	5,743	0	0.54	91	246	169	4,118
1958	8	341	242	242	242	99	0	0.45	75	246	164	4,039
1958	9	2,164	2,069	1,184	241	1,923	0	-0.16	-26	188	169	4,118
1958	10	771	673	673	201	570	0	0.18	31	170	169	4,118
1958	11	735	639	639	157	578	0	0.10	17	140	169	4,118
1958	12	796	697	697	152	644	0	0.07	12	140	169	4,118
Total		53,374	50,230	20,878	2,253	51,121	0	1.49	253	2,000		

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	50
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1959	1	694	485	485	162	532	0	0.17	28	134	169	4,118
1959	2	676	382	382	124	552	0	0.02	4	120	169	4,118
1959	3	523	56	56	56	467	0	0.45	75	136	164	3,963
1959	4	3,084	2,578	634	309	2,775	0	0.07	12	142	169	4,118
1959	5	523	74	74	74	449	0	0.32	54	156	164	3,982
1959	6	3,109	2,720	1,024	307	2,802	0	-0.07	-11	182	169	4,118
1959	7	1,615	1,516	1,045	276	1,339	0	0.18	30	246	169	4,118
1959	8	1,260	1,165	243	243	1,017	0	0.51	84	246	164	4,031
1959	9	553	458	384	333	220	0	0.35	58	188	169	4,118
1959	10	46,441	46,342	2,934	95	46,346	0	-0.45	-75	170	169	4,118
1959	11	3,257	3,161	2,291	170	3,087	0	0.18	30	140	169	4,118
1959	12	3,807	3,709	2,396	129	3,678	0	-0.06	-11	140	169	4,118
Total		65,542	62,646	11,948	2,278	63,264	0	1.67	278	2,000		
1960	1	15,593	15,384	3,074	110	15,483	0	-0.14	-24	134	169	4,118
1960	2	5,514	5,209	2,876	137	5,377	0	0.10	17	120	169	4,118
1960	3	3,780	3,312	2,934	169	3,611	0	0.20	33	136	169	4,118
1960	4	5,239	4,716	1,989	184	5,055	0	0.25	42	142	169	4,118
1960	5	7,689	7,148	2,771	185	7,504	0	0.17	29	156	169	4,118
1960	6	2,466	1,943	1,308	250	2,216	0	0.41	68	182	169	4,118
1960	7	1,992	1,893	1,131	323	1,669	0	0.46	77	246	169	4,118
1960	8	597	499	499	324	273	0	0.46	78	246	169	4,118
1960	9	268	173	173	173	95	0	0.45	75	188	164	4,028
1960	10	635	536	527	300	335	0	0.24	40	170	169	4,118
1960	11	442	347	347	183	259	0	0.26	43	140	169	4,118
1960	12	902	803	803	91	811	0	-0.29	-49	140	169	4,118
Total		45,117	41,962	18,432	2,429	42,688	0	2.56	429	2,000		
1961	1	13,441	13,232	2,610	64	13,377	0	-0.41	-70	134	169	4,118
1961	2	14,064	13,770	2,777	117	13,947	0	-0.02	-3	120	169	4,118
1961	3	6,007	5,539	3,074	172	5,835	0	0.21	36	136	169	4,118
1961	4	3,648	3,124	2,441	210	3,438	0	0.40	68	142	169	4,118
1961	5	2,682	2,141	1,731	196	2,486	0	0.24	40	156	169	4,118
1961	6	6,915	6,391	1,899	144	6,771	0	-0.23	-38	182	169	4,118
1961	7	5,099	5,000	2,329	264	4,835	0	0.11	18	246	169	4,118
1961	8	854	756	756	333	521	0	0.52	87	246	169	4,118
1961	9	1,009	914	724	234	775	0	0.27	46	188	169	4,118
1961	10	19,757	19,659	2,696	139	19,618	0	-0.18	-31	170	169	4,118
1961	11	3,941	3,846	2,254	142	3,799	0	0.01	2	140	169	4,118
1961	12	3,891	3,793	2,922	151	3,740	0	0.06	11	140	169	4,118
Total		81,308	78,165	26,213	2,166	79,142	0	0.97	166	2,000		

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	**50**
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1962	1	2,399	2,190	2,190	155	2,244	0	0.12	21	134	169	4,118
1962	2	1,713	1,419	1,419	158	1,555	0	0.22	38	120	169	4,118
1962	3	1,686	1,219	1,219	175	1,511	0	0.23	39	136	169	4,118
1962	4	2,131	1,608	1,533	145	1,986	0	0.02	3	142	169	4,118
1962	5	1,052	511	511	225	827	0	0.41	69	156	169	4,118
1962	6	1,735	1,215	761	193	1,542	0	0.07	11	182	169	4,118
1962	7	1,238	1,139	818	310	928	0	0.38	64	246	169	4,118
1962	8	904	809	415	312	592	0	0.39	66	246	169	4,118
1962	9	939	851	586	172	767	0	-0.10	-16	188	169	4,118
1962	10	22,487	22,389	1,843	161	22,326	0	-0.05	-9	170	169	4,118
1962	11	2,359	2,264	1,573	144	2,215	0	0.02	4	140	169	4,118
1962	12	2,556	2,457	2,379	158	2,398	0	0.10	18	140	169	4,118
Total		41,199	38,071	15,247	2,308	38,891	0	1.82	308	2,000		
1963	1	1,651	1,442	1,442	156	1,495	0	0.13	22	134	169	4,118
1963	2	1,209	915	915	149	1,060	0	0.17	29	120	169	4,118
1963	3	1,128	660	660	180	948	0	0.26	44	136	169	4,118
1963	4	2,209	1,685	719	174	2,035	0	0.19	32	142	169	4,118
1963	5	5,123	4,582	1,488	169	4,954	0	0.08	13	156	169	4,118
1963	6	1,835	1,311	975	248	1,587	0	0.39	66	182	169	4,118
1963	7	199	118	118	118	81	0	0.62	102	246	158	3,888
1963	8	111	60	60	60	51	0	0.57	88	246	148	3,614
1963	9	46	1	1	1	45	0	0.19	27	188	143	3,400
1963	10	30	0	0	0	30	0	0.44	61	170	134	3,169
1963	11	286	196	196	196	90	0	0.05	7	140	138	3,218
1963	12	515	416	416	416	99	0	0.04	6	140	148	3,488
Total		14,342	11,386	6,990	1,867	12,475	0	3.12	497	2,000		
1964	1	1,373	1,164	590	590	783	0	-0.12	-19	134	164	3,963
1964	2	1,235	930	901	293	942	0	0.11	18	120	169	4,118
1964	3	2,226	1,759	1,293	141	2,085	0	0.03	5	136	169	4,118
1964	4	9,235	8,711	1,367	140	9,095	0	-0.01	-2	142	169	4,118
1964	5	1,848	1,307	1,068	213	1,635	0	0.34	57	156	169	4,118
1964	6	427	99	99	99	328		0.50	82	182	164	3,953
1964	7	293	236	102	102	191		0.81	126	246	153	3,683
1964	8	349	279	279	279	70		0.59	90	246	148	3,626
1964	9	4,959	4,883	1,041	711	4,248		0.19	31	188	169	4,118
1964	10	516	420	420	210	306		0.24	40	170	169	4,118
1964	11	9,413	9,318	1,455	134	9,279		-0.03	-6	140	169	4,118
1964	12	862	764	764	165	697		0.15	25	140	169	4,118
Total		32,736	29,870	9,379	3,077	29,659	0	2.79	447	2,000		

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	**50**
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1965	1	2,664	2,455	1,103	121	2,543		-0.07	-13	134	169	4,118
1965	2	10,731	10,437	2,272	94	10,637		-0.15	-26	120	169	4,118
1965	3	2,439	1,972	1,970	177	2,262		0.24	41	136	169	4,118
1965	4	1,745	1,222	1,111	207	1,538		0.39	65	142	169	4,118
1965	5	29,571	29,030	2,309	61	29,510		-0.56	-95	156	169	4,118
1965	6	3,191	2,667	1,919	266	2,925		0.50	84	182	169	4,118
1965	7	489	391	391	371	118		0.74	125	246	169	4,118
1965	8	114	29	29	29	85		0.59	97	246	158	3,804
1965	9	370	290	244	244	126		0.47	73	188	153	3,787
1965	10	1,790	1,691	565	522	1,268		0.13	21	170	169	4,118
1965	11	787	691	691	149	638		0.05	9	140	169	4,118
1965	12	831	732	732	128	703		-0.07	-12	140	169	4,118
Total		54,722	51,607	13,336	2,369	52,353	0	2.25	369	2,000		
1966	1	871	662	662	139	732		0.03	5	134	169	4,118
1966	2	1,492	1,198	888	111	1,381		-0.05	-9	120	169	4,118
1966	3	1,146	679	613	189	957		0.31	53	136	169	4,118
1966	4	9,546	9,022	747	155	9,391		0.08	13	142	169	4,118
1966	5	10,192	9,651	2,110	180	10,012		0.14	24	156	169	4,118
1966	6	6,073	5,550	1,392	203	5,870		0.13	21	182	169	4,118
1966	7	862	764	745	357	505		0.66	111	246	169	4,118
1966	8	1,994	1,895	902	278	1,716		0.19	32	246	169	4,118
1966	9	1,935	1,840	998	196	1,739		0.05	8	188	169	4,118
1966	10	692	594	594	225	467		0.32	55	170	169	4,118
1966	11	749	653	653	194	555		0.32	54	140	169	4,118
1966	12	816	717	717	158	658		0.11	18	140	169	4,118
Total		36,368	33,225	11,021	2,385	33,983	0	2.27	385	2,000		
1967	1	661	452	452	177	484		0.25	43	134	169	4,118
1967	2	610	315	315	156	454		0.22	36	120	169	4,118
1967	3	750	283	283	189	561		0.31	53	136	169	4,118
1967	4	1,243	739	510	178	1,065		0.21	36	142	169	4,118
1967	5	2,295	1,820	603	189	2,106		0.19	33	156	169	4,118
1967	6	708	417	280	253	455		0.42	71	182	169	4,118
1967	7	5,544	5,460	872	277	5,267		0.18	31	246	169	4,118
1967	8	266	173	173	173	93		0.71	115	246	158	3,930
1967	9	3,225	3,133	1,247	359	2,866		-0.10	-17	188	169	4,118
1967	10	898	799	796	203	695		0.20	33	170	169	4,118
1967	11	937	842	842	162	775		0.13	22	140	169	4,118
1967	12	1,178	1,080	1,080	135	1,043		-0.03	-5	140	169	4,118
Total		18,315	15,512	7,453	2,451	15,864	0	2.70	451	2,000		

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	**50**
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1968	1	19,293	19,084	2,153	74	19,219		-0.35	-60	134	169	4,118
1968	2	6,226	5,921	2,876	120	6,106		0.00	0	120	169	4,118
1968	3	31,239	30,771	3,074	129	31,110		-0.04	-7	136	169	4,118
1968	4	9,378	8,854	2,975	157	9,221		0.09	15	142	169	4,118
1968	5	55,183	54,642	3,074	84	55,099		-0.42	-72	156	169	4,118
1968	6	6,466	5,942	2,953	240	6,226		0.35	58	182	169	4,118
1968	7	8,547	8,449	2,926	309	8,238		0.37	63	246	169	4,118
1968	8	6,770	6,672	2,036	330	6,440		0.50	84	246	169	4,118
1968	9	1,585	1,490	1,403	247	1,338		0.35	59	188	169	4,118
1968	10	973	874	874	230	743		0.35	60	170	169	4,118
1968	11	1,410	1,314	1,314	143	1,267		0.02	3	140	169	4,118
1968	12	1,395	1,297	1,297	167	1,228		0.16	27	140	169	4,118
Total		148,465	145,311	26,955	2,230	146,235	0	1.37	230	2,000		
1969	1	1,240	1,031	1,031	164	1,076		0.18	30	134	169	4,118
1969	2	1,298	1,003	1,003	125	1,173		0.03	5	120	169	4,118
1969	3	4,277	3,810	2,096	110	4,167		-0.15	-26	136	169	4,118
1969	4	32,716	32,192	2,874	120	32,596		-0.13	-22	142	169	4,118
1969	5	37,628	37,087	3,074	144	37,484		-0.07	-12	156	169	4,118
1969	6	6,503	5,980	2,867	262	6,241		0.47	80	182	169	4,118
1969	7	1,323	1,224	1,224	367	956		0.72	121	246	169	4,118
1969	8	2,313	2,215	1,362	300	2,013		0.32	54	246	169	4,118
1969	9	843	747	747	233	610		0.26	45	188	169	4,118
1969	10	6,278	6,179	1,622	143	6,135		-0.16	-27	170	169	4,118
1969	11	1,625	1,529	1,529	168	1,457		0.16	28	140	169	4,118
1969	12	3,789	3,691	2,038	130	3,659		-0.06	-10	140	169	4,118
Total		99,833	96,689	21,467	2,266	97,567	0	1.57	266	2,000		
1970	1	4,116	3,907	3,031	145	3,971		0.07	11	134	169	4,118
1970	2	9,226	8,932	2,578	90	9,136		-0.18	-30	120	169	4,118
1970	3	26,933	26,465	3,074	120	26,813		-0.09	-16	136	169	4,118
1970	4	15,002	14,478	2,975	143	14,859		0.00	1	142	169	4,118
1970	5	7,604	7,063	3,074	179	7,425		0.14	23	156	169	4,118
1970	6	4,716	4,193	2,340	260	4,456		0.46	78	182	169	4,118
1970	7	1,061	963	963	362	699		0.69	116	246	169	4,118
1970	8	498	400	400	360	138		0.67	114	246	169	4,118
1970	9	2,120	2,025	1,094	178	1,942		-0.06	-10	188	169	4,118
1970	10	1,517	1,418	1,213	200	1,317		0.18	30	170	169	4,118
1970	11	1,075	980	980	199	876		0.35	59	140	169	4,118
1970	12	965	867	867	186	779		0.27	46	140	169	4,118
Total		74,833	71,691	22,589	2,422	72,411	0	2.50	422	2,000		

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	50
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1971	1	900	691	691	176	724		0.25	42	134	169	4,118
1971	2	824	530	530	152	672		0.19	32	120	169	4,118
1971	3	774	307	307	223	551		0.51	87	136	169	4,118
1971	4	812	289	289	194	618		0.31	52	142	169	4,118
1971	5	4,719	4,281	314	179	4,540		0.14	23	156	169	4,118
1971	6	905	425	425	277	628		0.56	95	182	169	4,118
1971	7	5,593	5,557	592	276	5,317		0.18	30	246	169	4,118
1971	8	2,791	2,693	1,535	280	2,511		0.20	34	246	169	4,118
1971	9	620	525	507	235	385		0.28	47	188	169	4,118
1971	10	12,048	11,949	1,732	91	11,957		-0.47	-79	170	169	4,118
1971	11	2,020	1,925	1,757	148	1,872		0.05	8	140	169	4,118
1971	12	20,872	20,774	3,036	77	20,795		-0.37	-63	140	169	4,118
Total		52,878	49,945	11,715	2,308	50,570	0	1.81	308	2,000		
1972	1	4,515	4,306	3,072	148	4,367		0.08	14	134	169	4,118
1972	2	2,557	2,252	2,252	157	2,400		0.22	37	120	169	4,118
1972	3	1,772	1,304	1,304	209	1,563		0.43	73	136	169	4,118
1972	4	2,479	1,956	1,015	176	2,303		0.20	34	142	169	4,118
1972	5	3,474	2,933	1,821	159	3,315		0.02	3	156	169	4,118
1972	6	1,035	527	499	272	763		0.53	90	182	169	4,118
1972	7	4,387	4,288	929	341	4,046		0.56	95	246	169	4,118
1972	8	346	248	236	236	110		0.34	56	246	164	4,052
1972	9	867	776	629	247	620		-0.04	-7	188	169	4,118
1972	10	946	848	688	162	784		-0.05	-8	170	169	4,118
1972	11	1,063	967	967	137	926		-0.02	-3	140	169	4,118
1972	12	884	786	786	167	717		0.16	27	140	169	4,118
Total		24,325	21,192	14,198	2,411	21,914	0	2.44	411	2,000		
1973	1	1,771	1,562	1,532	109	1,662		-0.15	-25	134	169	4,118
1973	2	2,570	2,276	1,984	123	2,447		0.02	3	120	169	4,118
1973	3	3,263	2,796	2,342	160	3,103		0.14	24	136	169	4,118
1973	4	45,284	44,760	2,573	88	45,196		-0.32	-54	142	169	4,118
1973	5	9,783	9,242	3,038	206	9,577		0.30	50	156	169	4,118
1973	6	18,985	18,461	2,808	132	18,853		-0.29	-50	182	169	4,118
1973	7	6,537	6,439	2,283	252	6,285		0.04	6	246	169	4,118
1973	8	1,610	1,511	1,334	348	1,262		0.60	102	246	169	4,118
1973	9	912	817	817	216	696		0.16	28	188	169	4,118
1973	10	4,275	4,177	1,632	146	4,129		-0.14	-24	170	169	4,118
1973	11	1,514	1,419	1,384	167	1,347		0.16	27	140	169	4,118
1973	12	1,186	1,087	1,087	182	1,004		0.25	42	140	169	4,118
Total		97,690	94,547	22,814	2,129	95,561	0	0.75	129	2,000		

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	50
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1974	1	1,172	963	963	134	1,038		0.00	0	134	169	4,118
1974	2	1,023	729	729	162	861		0.25	42	120	169	4,118
1974	3	1,054	587	587	201	853		0.38	65	136	169	4,118
1974	4	778	254	254	224	554		0.49	82	142	169	4,118
1974	5	584	151	151	151	433		0.31	51	156	164	4,062
1974	6	92	0	0	0	92		0.53	84	182	158	3,796
1974	7	1	0	0	0	1		0.71	104	246	143	3,446
1974	8	268	230	214	214	54		0.18	26	246	143	3,388
1974	9	1,222	1,127	858	858	364		-0.32	-49	188	164	4,107
1974	10	7,677	7,579	1,106	151	7,526		-0.18	-30	170	169	4,118
1974	11	6,402	6,307	2,936	155	6,247		0.09	15	140	169	4,118
1974	12	2,284	2,185	2,185	147	2,137		0.04	7	140	169	4,118
Total		22,557	20,113	9,983	2,397	20,160	0	2.47	397	2,000		
1975	1	1,962	1,753	1,753	146	1,816		0.07	12	134	169	4,118
1975	2	10,977	10,683	2,777	109	10,868		-0.07	-11	120	169	4,118
1975	3	3,824	3,356	2,997	156	3,668		0.12	20	136	169	4,118
1975	4	11,534	11,011	2,828	156	11,378		0.08	14	142	169	4,118
1975	5	3,677	3,136	2,614	159	3,518		0.02	3	156	169	4,118
1975	6	2,162	1,639	1,334	255	1,907		0.43	73	182	169	4,118
1975	7	621	523	523	300	321		0.32	54	246	169	4,118
1975	8	182	86	86	86	96		0.53	86	246	158	3,872
1975	9	869	795	336	336	533		0.29	47	188	164	3,973
1975	10	118	28	28	28	90		0.44	70	170	153	3,761
1975	11	226	131	131	131	95		0.29	45	140	153	3,707
1975	12	513	415	415	415	98		0.07	10	140	164	3,972
Total		36,665	33,553	15,822	2,277	34,388	0	2.60	423	2,000		
1976	1	611	402	402	323	288		0.27	43	134	169	4,118
1976	2	590	286	286	174	416		0.32	54	120	169	4,118
1976	3	725	257	257	182	543		0.27	46	136	169	4,118
1976	4	4,310	3,786	1,106	116	4,194		-0.15	-26	142	169	4,118
1976	5	13,397	12,862	865	141	13,256		-0.09	-15	156	169	4,118
1976	6	2,741	2,218	1,002	248	2,493		0.39	66	182	169	4,118
1976	7	3,702	3,604	1,071	295	3,407		0.29	49	246	169	4,118
1976	8	1,143	1,070	142	142	1,001		0.45	73	246	158	3,941
1976	9	1,582	1,487	899	391	1,191		0.16	26	188	169	4,118
1976	10	2,559	2,461	971	153	2,406		-0.10	-17	170	169	4,118
1976	11	1,289	1,194	1,194	164	1,125		0.14	24	140	169	4,118
1976	12	2,255	2,157	1,740	134	2,121		-0.03	-6	140	169	4,118
Total		34,904	31,784	9,935	2,463	32,441	0	1.91	317	2,000		

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	50
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1977	1	1,877	1,668	1,668	131	1,746		-0.02	-3	134	169	4,118
1977	2	2,946	2,652	2,362	142	2,804		0.13	22	120	169	4,118
1977	3	27,537	27,070	2,498	111	27,426		-0.15	-25	136	169	4,118
1977	4	13,971	13,447	2,975	140	13,831		-0.01	-2	142	169	4,118
1977	5	15,713	15,172	3,074	175	15,538		0.11	19	156	169	4,118
1977	6	2,413	1,890	1,795	264	2,149		0.49	82	182	169	4,118
1977	7	499	400	400	354	145		0.64	108	246	169	4,118
1977	8	438	340	337	325	113		0.47	79	246	169	4,118
1977	9	150	77	77	77	73		0.61	99	188	158	3,908
1977	10	81	24	24	24	57		0.31	48	170	153	3,714
1977	11	359	263	263	263	96		0.14	21	140	158	3,816
1977	12	501	403	403	403	98		0.30	49	140	164	4,030
Total		66,485	63,407	15,876	2,409	64,076	0	3.00	497	2,000		
1978	1	683	474	474	229	454		0.04	7	134	169	4,118
1978	2	836	542	542	97	739		-0.13	-23	120	169	4,118
1978	3	753	286	286	181	572		0.27	45	136	169	4,118
1978	4	630	116	116	116	514		0.34	57	142	164	4,035
1978	5	2,445	1,942	424	235	2,210		-0.03	-4	156	169	4,118
1978	6	132	1	1	1	131		0.61	99	182	158	3,838
1978	7	0	0	0	0	0		0.79	119	246	143	3,473
1978	8	0	0	0	0	0		0.54	75	246	134	3,152
1978	9	201	156	156	156	45		0.15	20	188	134	3,100
1978	10	0	0	0	0	0		0.43	55	170	125	2,875
1978	11	130	84	84	84	46		-0.10	-13	140	125	2,832
1978	12	236	138	138	138	98		0.16	19	140	125	2,811
Total		6,046	3,737	2,221	1,237	4,809	0	3.06	456	2,000		
1979	1	1,418	1,209	610	610	808		-0.15	-19	134	138	3,306
1979	2	588	294	294	294	294		-0.07	-9	120	148	3,489
1979	3	4,627	4,161	1,473	732	3,895		-0.21	-33	136	169	4,118
1979	4	6,514	5,990	2,525	154	6,360		0.07	12	142	169	4,118
1979	5	58,293	57,752	3,074	112	58,181		-0.26	-44	156	169	4,118
1979	6	3,586	3,063	1,821	220	3,366		0.22	38	182	169	4,118
1979	7	1,105	1,006	1,003	312	793		0.39	66	246	169	4,118
1979	8	1,479	1,381	824	318	1,161		0.43	72	246	169	4,118
1979	9	345	249	249	228	117		0.24	40	188	169	4,118
1979	10	113	26	26	26	87		0.31	50	170	158	3,924
1979	11	261	165	165	165	96		0.22	35	140	158	3,914
1979	12	707	609	609	316	391		-0.17	-28	140	169	4,118
Total		79,036	75,905	12,673	3,487	75,549	0	1.02	180	2,000		

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	50
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1980	1	1,016	806	714	142	874		0.05	8	134	169	4,118
1980	2	657	352	352	144	513		0.14	24	120	169	4,118
1980	3	632	165	165	165	467		0.24	40	136	164	4,107
1980	4	1,016	492	466	188	828		0.21	35	142	169	4,118
1980	5	6,094	5,552	2,162	128	5,966		-0.17	-28	156	169	4,118
1980	6	562	177	177	177	385		0.62	103	182	164	4,010
1980	7	14	0	0	0	14		0.88	136	246	148	3,628
1980	8	2	0	0	0	2		0.74	106	246	138	3,276
1980	9	73	54	54	54	19		0.09	12	188	134	3,130
1980	10	172	135	135	135	37		0.41	54	170	130	3,041
1980	11	102	47	47	47	55		0.14	18	140	130	2,930
1980	12	402	304	304	304	98		-0.01	-1	140	134	3,095
Total		10,742	8,085	4,576	1,484	9,258	0	3.33	507	2,000		
1981	1	364	155	155	155	209		0.12	17	134	134	3,099
1981	2	369	75	75	75	294		0.10	13	120	130	3,041
1981	3	821	360	360	360	461		0.10	13	136	138	3,252
1981	4	441	11	11	11	430		0.25	33	142	134	3,088
1981	5	246	43	43	43	203		0.16	20	156	130	2,955
1981	6	2,636	2,187	989	989	1,647		0.00	0	182	153	3,762
1981	7	459	398	378	378	81		0.56	86	246	158	3,808
1981	8	406	370	304	304	102		0.48	74	246	158	3,792
1981	9	134	70	70	70	64		0.37	55	188	148	3,619
1981	10	6,353	6,272	1,297	602	5,751		-0.42	-67	170	169	4,118
1981	11	3,611	3,516	1,403	152	3,459		0.07	12	140	169	4,118
1981	12	820	721	721	171	649		0.18	31	140	169	4,118
Total		16,660	14,177	5,806	3,310	13,350	0	1.97	287	2,000		
1982	1	859	650	650	150	709		0.10	16	134	169	4,118
1982	2	1,159	864	864	116	1,043		-0.02	-4	120	169	4,118
1982	3	1,759	1,292	1,267	154	1,605		0.11	18	136	169	4,118
1982	4	1,368	845	845	162	1,206		0.12	20	142	169	4,118
1982	5	36,879	36,338	2,947	103	36,776		-0.32	-53	156	169	4,118
1982	6	15,213	14,689	2,975	187	15,026		0.03	5	182	169	4,118
1982	7	4,793	4,694	2,708	305	4,488		0.35	59	246	169	4,118
1982	8	1,046	947	947	347	699		0.60	101	246	169	4,118
1982	9	376	280	280	280	96		0.55	92	188	169	4,118
1982	10	369	270	270	211	158		0.24	41	170	169	4,118
1982	11	626	531	531	128	498		-0.07	-12	140	169	4,118
1982	12	815	717	717	143	672		0.02	3	140	169	4,118
Total		65,262	62,118	15,001	2,286	62,976	0	1.70	286	2,000		

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	**50**
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1983	1	807	598	598	145	662		0.06	11	134	169	4,118
1983	2	673	378	378	142	531		0.13	22	120	169	4,118
1983	3	867	399	399	148	719		0.07	12	136	169	4,118
1983	4	613	89	89	89	524		0.40	67	142	164	3,998
1983	5	1,665	1,127	807	234	1,431		-0.25	-42	156	169	4,118
1983	6	1,064	578	578	249	815		0.40	67	182	169	4,118
1983	7	103	33	33	33	70		0.62	101	246	158	3,804
1983	8	4	0	0	0	4		0.45	70	246	148	3,488
1983	9	0	0	0	0	0		0.40	58	188	138	3,242
1983	10	13	8	8	8	5		0.27	36	170	130	3,044
1983	11	66	20	20	20	46		0.22	27	140	125	2,897
1983	12	232	133	133	133	99		0.06	8	140	125	2,882
Total		6,107	3,364	3,043	1,201	4,906	0	2.83	437	2,000		
1984	1	302	93	93	93	209		0.13	16	134	125	2,825
1984	2	329	38	38	38	291		0.17	21	120	121	2,722
1984	3	2,443	2,004	659	659	1,784		-0.14	-18	136	138	3,263
1984	4	448	30	30	30	418		0.47	63	142	134	3,088
1984	5	349	84	84	84	265		0.35	45	156	130	2,971
1984	6	465	317	238	238	227		0.52	66	182	130	2,961
1984	7	76	60	60	60	16		0.57	69	246	121	2,706
1984	8	0	0	0	0	0		0.65	74	246	110	2,386
1984	9	0	0	0	0	0		0.52	55	188	103	2,143
1984	10	3,439	3,401	928	928	2,511		-0.31	-34	170	130	2,935
1984	11	415	320	320	320	95		0.11	14	140	134	3,101
1984	12	2,839	2,741	1,023	1,023	1,816		-0.26	-38	140	164	4,022
Total		11,105	9,088	3,473	3,473	7,632	0	2.79	333	2,000		
1985	1	2,899	2,690	1,539	251	2,648		0.13	21	134	169	4,118
1985	2	1,210	916	862	121	1,089		0.01	1	120	169	4,118
1985	3	1,906	1,439	1,243	157	1,749		0.12	21	136	169	4,118
1985	4	8,082	7,558	676	158	7,924		0.10	16	142	169	4,118
1985	5	3,451	2,910	2,152	203	3,248		0.28	47	156	169	4,118
1985	6	2,773	2,253	805	253	2,520		0.42	71	182	169	4,118
1985	7	1,020	928	526	338	682		0.54	92	246	169	4,118
1985	8	24	3	3	3	21		0.71	114	246	153	3,761
1985	9	83	58	58	58	25		0.42	63	188	148	3,568
1985	10	866	815	455	455	411		-0.10	-15	170	158	3,868
1985	11	323	228	228	228	95		0.06	10	140	158	3,946
1985	12	439	341	341	332	107		0.13	20	140	169	4,118
Total		23,076	20,138	8,888	2,557	20,519	0	2.81	461	2,000		

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	**50**
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1986	1	423	214	214	176	247		0.25	42	134	169	4,118
1986	2	1,749	1,455	594	133	1,616		0.08	13	120	169	4,118
1986	3	483	28	28	28	455		0.35	58	136	164	3,952
1986	4	402	2	2	2	400		0.32	50	142	153	3,762
1986	5	4,925	4,425	1,420	434	4,491		-0.48	-78	156	169	4,118
1986	6	26,854	26,330	2,548	173	26,681		-0.05	-9	182	169	4,118
1986	7	770	672	672	317	453		0.42	71	246	169	4,118
1986	8	262	163	163	163	99		0.53	86	246	158	3,949
1986	9	20,079	19,983	2,195	272	19,807		-0.52	-85	188	169	4,118
1986	10	1,355	1,257	1,257	168	1,187		-0.01	-2	170	169	4,118
1986	11	1,129	1,034	1,034	152	977		0.07	12	140	169	4,118
1986	12	1,991	1,893	1,853	118	1,873		-0.13	-22	140	169	4,118
Total		60,422	57,455	11,980	2,136	58,286	0	0.83	136	2,000		
1987	1	2,479	2,270	2,238	138	2,341		0.02	4	134	169	4,118
1987	2	6,808	6,513	2,034	87	6,721		-0.20	-33	120	169	4,118
1987	3	8,070	7,603	3,067	173	7,897		0.22	37	136	169	4,118
1987	4	2,252	1,728	1,728	218	2,034		0.45	76	142	169	4,118
1987	5	14,354	13,813	2,142	78	14,276		-0.46	-78	156	169	4,118
1987	6	16,057	15,533	2,950	184	15,873		0.01	2	182	169	4,118
1987	7	1,748	1,650	1,650	347	1,401		0.60	101	246	169	4,118
1987	8	591	493	493	343	248		0.57	97	246	169	4,118
1987	9	407	312	312	237	170		0.29	49	188	169	4,118
1987	10	291	192	192	192	99		0.42	69	170	164	4,071
1987	11	603	507	507	193	410		0.03	6	140	169	4,118
1987	12	752	654	654	139	613		-0.01	-1	140	169	4,118
Total		54,412	51,269	17,967	2,329	52,083	0	1.95	329	2,000		
1988	1	689	480	480	163	526		0.17	29	134	169	4,118
1988	2	635	330	330	152	483		0.19	32	120	169	4,118
1988	3	591	123	123	123	468		0.34	57	136	164	4,048
1988	4	421	2	2	2	419		0.37	60	142	158	3,848
1988	5	214	0	0	0	214		0.33	51	156	153	3,641
1988	6	8,203	7,746	876	632	7,571		-0.17	-27	182	169	4,118
1988	7	489	400	400	318	171		0.43	72	246	169	4,118
1988	8	5	0	0	0	5		0.64	103	246	153	3,769
1988	9	37	31	31	31	6		0.10	15	188	148	3,597
1988	10	192	131	131	131	61		0.19	28	170	148	3,530
1988	11	91	22	22	22	69		0.30	44	140	143	3,368
1988	12	223	124	124	124	99		0.07	10	140	143	3,342
Total		11,790	9,390	2,519	1,698	10,092	0	2.97	474	2,000		

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	50
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1989	1	375	166	166	166	209		0.00	1	134	143	3,373
1989	2	1,586	1,292	623	623	963		-0.14	-21	120	158	3,897
1989	3	27,273	26,806	591	314	26,959		-0.26	-43	136	169	4,118
1989	4	11,188	10,664	2,480	180	11,008		0.22	38	142	169	4,118
1989	5	48,570	48,029	2,869	79	48,491		-0.45	-77	156	169	4,118
1989	6	55,268	54,744	2,972	126	55,142		-0.33	-56	182	169	4,118
1989	7	3,630	3,531	2,755	351	3,279		0.62	105	246	169	4,118
1989	8	3,092	2,993	2,052	278	2,814		0.19	32	246	169	4,118
1989	9	1,777	1,682	1,391	223	1,554		0.21	35	188	169	4,118
1989	10	1,081	983	983	238	843		0.40	68	170	169	4,118
1989	11	1,182	1,087	1,087	189	993		0.29	49	140	169	4,118
1989	12	1,206	1,107	1,107	178	1,028		0.22	38	140	169	4,118
Total		156,228	153,084	19,076	2,945	153,283	0	0.98	169	2,000		
1990	1	1,281	1,072	1,072	123	1,158		-0.07	-11	134	169	4,118
1990	2	1,480	1,186	1,161	99	1,381		-0.12	-21	120	169	4,118
1990	3	7,999	7,532	2,225	108	7,891		-0.16	-28	136	169	4,118
1990	4	51,367	50,844	2,855	117	51,250		-0.15	-25	142	169	4,118
1990	5	62,515	61,973	3,074	104	62,411		-0.30	-52	156	169	4,118
1990	6	9,328	8,804	2,894	250	9,078		0.40	68	182	169	4,118
1990	7	2,558	2,459	2,393	320	2,238		0.44	74	246	169	4,118
1990	8	4,776	4,678	2,319	269	4,507		0.14	23	246	169	4,118
1990	9	1,556	1,461	1,461	229	1,327		0.24	41	188	169	4,118
1990	10	909	810	805	197	712		0.16	27	170	169	4,118
1990	11	978	883	883	132	846		-0.04	-8	140	169	4,118
1990	12	1,018	919	919	151	867		0.07	11	140	169	4,118
Total		145,765	142,621	22,061	2,099	143,666	0	0.59	99	2,000		
1991	1	1,797	1,588	1,578	108	1,689		-0.15	-26	134	169	4,118
1991	2	1,610	1,316	1,316	148	1,462		0.17	28	120	169	4,118
1991	3	1,493	1,026	1,026	196	1,297		0.35	60	136	169	4,118
1991	4	1,482	959	959	164	1,318		0.13	22	142	169	4,118
1991	5	3,073	2,532	1,949	157	2,916		0.01	1	156	169	4,118
1991	6	5,701	5,177	1,920	194	5,507		0.07	12	182	169	4,118
1991	7	608	510	510	368	240		0.72	122	246	169	4,118
1991	8	1,714	1,615	814	265	1,449		0.11	19	246	169	4,118
1991	9	1,545	1,450	1,289	207	1,338		0.11	19	188	169	4,118
1991	10	27,200	27,102	1,314	110	27,090		-0.35	-60	170	169	4,118
1991	11	13,110	13,015	2,975	168	12,942		0.16	28	140	169	4,118
1991	12	88,650	88,552	3,074	19	88,631		-0.72	-121	140	169	4,118
Total		147,983	144,841	18,724	2,104	145,879	0	0.61	104	2,000		

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	50
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1992	1	24,367	24,158	3,074	110	24,257		-0.14	-24	134	169	4,118
1992	2	56,013	55,708	2,876	77	55,936		-0.25	-43	120	169	4,118
1992	3	21,825	21,358	3,074	166	21,659		0.18	30	136	169	4,118
1992	4	9,344	8,821	2,975	169	9,175		0.16	27	142	169	4,118
1992	5	13,586	13,045	3,074	107	13,479		-0.29	-49	156	169	4,118
1992	6	12,671	12,148	2,975	210	12,461		0.17	28	182	169	4,118
1992	7	3,522	3,423	2,812	334	3,188		0.52	88	246	169	4,118
1992	8	1,903	1,805	1,705	268	1,635		0.13	22	246	169	4,118
1992	9	1,451	1,355	1,355	248	1,203		0.35	60	188	169	4,118
1992	10	1,104	1,006	1,006	240	864		0.42	70	170	169	4,118
1992	11	1,715	1,620	1,528	135	1,580		-0.03	-5	140	169	4,118
1992	12	4,393	4,295	2,148	121	4,272		-0.12	-19	140	169	4,118
Total		151,894	148,741	28,602	2,185	149,709	0	1.10	185	2,000		
1993	1	3,091	2,882	2,650	120	2,971		-0.08	-14	134	169	4,118
1993	2	9,121	8,827	2,777	106	9,015		-0.08	-14	120	169	4,118
1993	3	14,079	13,612	3,074	146	13,933		0.06	10	136	169	4,118
1993	4	12,332	11,809	2,975	170	12,162		0.17	28	142	169	4,118
1993	5	5,539	4,998	2,872	186	5,353		0.18	30	156	169	4,118
1993	6	2,723	2,199	2,062	225	2,498		0.25	43	182	169	4,118
1993	7	1,769	1,671	1,671	407	1,362		0.95	161	246	169	4,118
1993	8	950	851	851	383	567		0.81	137	246	169	4,118
1993	9	2,128	2,032	1,317	252	1,876		0.38	64	188	169	4,118
1993	10	5,535	5,437	2,184	154	5,381		-0.09	-16	170	169	4,118
1993	11	1,100	1,005	1,005	162	938		0.13	22	140	169	4,118
1993	12	1,158	1,060	1,060	139	1,019		0.00	-1	140	169	4,118
Total		59,525	56,383	24,498	2,450	57,075	0	2.67	450	2,000		
1994	1	1,553	1,344	1,342	145	1,408		0.06	11	134	169	4,118
1994	2	1,620	1,326	1,313	125	1,495		0.03	5	120	169	4,118
1994	3	1,730	1,263	1,263	169	1,561		0.20	33	136	169	4,118
1994	4	1,895	1,372	1,012	175	1,720		0.19	33	142	169	4,118
1994	5	19,995	19,454	2,598	154	19,841		-0.01	-2	156	169	4,118
1994	6	2,034	1,511	1,346	271	1,763		0.53	89	182	169	4,118
1994	7	1,055	956	749	346	709		0.59	100	246	169	4,118
1994	8	183	89	89	89	94		0.66	107	246	158	3,854
1994	9	4,534	4,439	1,967	455	4,079		0.02	3	188	169	4,118
1994	10	9,265	9,167	1,978	150	9,115		-0.12	-20	170	169	4,118
1994	11	11,528	11,433	2,880	121	11,407		-0.11	-19	140	169	4,118
1994	12	7,863	7,764	3,074	125	7,738		-0.09	-15	140	169	4,118
Total		63,255	60,116	19,611	2,325	60,930	0	1.94	325	2,000		

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	50
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1995	1	7,029	6,820	3,074	146	6,883		0.07	12	134	169	4,118
1995	2	3,641	3,347	2,768	147	3,494		0.16	27	120	169	4,118
1995	3	9,303	8,836	3,054	112	9,191		-0.14	-24	136	169	4,118
1995	4	8,705	8,182	2,975	164	8,541		0.13	22	142	169	4,118
1995	5	19,559	19,017	3,074	143	19,416		-0.08	-13	156	169	4,118
1995	6	34,106	33,583	2,975	211	33,895		0.17	29	182	169	4,118
1995	7	15,705	15,607	2,598	215	15,490		-0.18	-31	246	169	4,118
1995	8	46,220	46,121	3,073	314	45,906		0.40	68	246	169	4,118
1995	9	4,585	4,490	2,556	220	4,365		0.19	32	188	169	4,118
1995	10	2,218	2,120	2,120	242	1,976		0.43	72	170	169	4,118
1995	11	1,837	1,742	1,742	174	1,663		0.20	34	140	169	4,118
1995	12	1,879	1,781	1,781	163	1,716		0.13	23	140	169	4,118
Total		154,787	151,646	31,790	2,251	152,536	0	1.49	251	2,000		
1996	1	1,757	1,548	1,548	166	1,591		0.19	32	134	169	4,118
1996	2	1,360	1,055	1,055	166	1,194		0.27	46	120	169	4,118
1996	3	1,358	891	891	186	1,172		0.29	50	136	169	4,118
1996	4	1,500	977	977	189	1,311		0.28	47	142	169	4,118
1996	5	931	429	370	242	689		0.51	86	156	169	4,118
1996	6	1,907	1,453	796	239	1,668		0.34	57	182	169	4,118
1996	7	253	159	159	159	94		0.48	79	246	164	3,952
1996	8	4,401	4,315	1,328	362	4,039		-0.30	-50	246	169	4,118
1996	9	6,493	6,397	2,231	185	6,308		-0.01	-3	188	169	4,118
1996	10	3,811	3,713	1,544	188	3,623		0.10	18	170	169	4,118
1996	11	7,182	7,087	2,805	123	7,059		-0.10	-17	140	169	4,118
1996	12	5,318	5,219	3,073	174	5,144		0.20	34	140	169	4,118
Total		36,271	33,242	16,777	2,379	33,892	0	2.24	379	2,000		
1997	1	3,015	2,805	2,805	166	2,849		0.19	32	134	169	4,118
1997	2	52,643	52,349	2,394	31	52,612		-0.53	-89	120	169	4,118
1997	3	32,159	31,692	3,074	152	32,007		0.09	16	136	169	4,118
1997	4	24,392	23,868	2,975	127	24,265		-0.09	-15	142	169	4,118
1997	5	30,363	29,822	3,074	180	30,183		0.14	24	156	169	4,118
1997	6	16,237	15,713	2,975	201	16,036		0.11	19	182	169	4,118
1997	7	6,357	6,258	2,894	335	6,022		0.53	89	246	169	4,118
1997	8	2,119	2,021	1,905	329	1,790		0.49	83	246	169	4,118
1997	9	989	893	893	275	714		0.51	87	188	169	4,118
1997	10	1,194	1,096	1,096	159	1,035		-0.06	-11	170	169	4,118
1997	11	1,413	1,318	1,318	158	1,255		0.11	18	140	169	4,118
1997	12	1,668	1,570	1,570	110	1,558		-0.18	-30	140	169	4,118
Total		172,549	169,405	26,973	2,223	170,326	0	1.33	223	2,000		

Operation Study Based on Historical Flows
(Diversion Rate = 50 cfs)

Wheeler Branch Reservoir

Pump capacity (cfs)	50
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	2,143

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available to pump	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1998	1	4,968	4,759	2,423	140	4,828		0.04	6	134	169	4,118
1998	2	8,165	7,871	1,874	79	8,086		-0.24	-41	120	169	4,118
1998	3	41,951	41,484	3,074	112	41,839		-0.14	-24	136	169	4,118
1998	4	7,129	6,605	2,975	207	6,922		0.39	65	142	169	4,118
1998	5	3,974	3,433	2,692	209	3,765		0.32	53	156	169	4,118
1998	6	2,528	2,005	1,766	266	2,262		0.50	84	182	169	4,118
1998	7	735	637	636	363	372		0.69	117	246	169	4,118
1998	8	474	376	376	326	148		0.47	80	246	169	4,118
1998	9	670	577	555	248	422		0.35	60	188	169	4,118
1998	10	898	799	799	184	714		0.08	14	170	169	4,118
1998	11	2,380	2,284	1,451	97	2,283		-0.25	-43	140	169	4,118
1998	12	1,426	1,328	1,328	139	1,287		-0.01	-1	140	169	4,118
Total		75,298	72,157	19,949	2,370	72,928	0	2.20	370	2,000		
1999	1	1,141	932	910	148	993		0.09	14	134	169	4,118
1999	2	898	603	603	162	736		0.25	42	120	169	4,118
1999	3	1,134	666	654	153	981		0.10	17	136	169	4,118
1999	4	903	379	379	196	707		0.32	54	142	169	4,118
1999	5	801	274	274	178	623		0.13	22	156	169	4,118
1999	6	4,566	4,043	1,487	210	4,356		0.17	28	182	169	4,118
1999	7	605	518	513	346	259		0.59	100	246	169	4,118
1999	8	1	0	0	0	1		0.74	119	246	153	3,753
1999	9	0	0	0	0	0		0.50	76	188	148	3,489
1999	10	0	0	0	0	0		0.28	40	170	138	3,279
1999	11	121	37	37	37	84		0.25	34	140	134	3,142
1999	12	625	527	527	527	98		0.04	6	140	148	3,523
Total		10,795	7,980	5,384	1,957	8,838	0	3.46	552	2,000		
2000	1	636	427	427	427	209		0.03	4	134	158	3,812
2000	2	759	455	455	452	307		0.17	26	120	169	4,118
2000	3	1,057	590	590	157	900		0.12	21	136	169	4,118
2000	4	644	169	169	169	475		0.28	46	142	164	4,099
2000	5	306	50	50	50	256		0.38	61	156	158	3,932
2000	6	8,302	7,813	1,810	319	7,983		-0.30	-49	182	169	4,118
2000	7	244	195	195	195	49		0.65	107	246	164	3,960
2000	8	0	0	0	0	0		0.75	117	246	148	3,597
2000	9	0	0	0	0	0		0.58	83	188	138	3,326
Total		11,948	9,699	3,696	1,769	10,179	0	2.66	416	1,550		

APPENDIX I

SUMMARY OF CRITICAL PERIOD OPERATION STUDY CONSIDERING IMPACTS OF NRCS STRUCTURES

Critical Period Operation Study
Considering NRCS Structures
(July 1977 to May 1985)

Wheeler Branch Reservoir

Pump capacity (cfs)	50
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	1,540

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available pumped @ 50 cfs	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
											169	4,118
1977	7	242	146	146	146	96	0	0.64	105	246	158	3,913
1977	8	213	133	133	133	80	0	0.47	73	246	153	3,727
1977	9	74	19	19	19	55	0	0.61	90	188	143	3,468
1977	10	40	0	0	0	40	0	0.31	44	170	138	3,254
1977	11	174	82	82	82	92	0	0.14	19	140	134	3,177
1977	12	245	149	149	149	96	0	0.30	41	140	134	3,145
Total		988	529	529	529	459	0	2	372	1,130		
1978	1	333	121	121	121	212	0	0.04	5	134	134	3,127
1978	2	406	111	111	111	295	0	-0.13	-18	120	134	3,136
1978	3	406	12	12	12	394	0	0.27	35	136	130	2,977
1978	4	337	21	21	21	316	0	0.34	45	142	125	2,811
1978	5	2,445	1,952	437	437	2,008	0	-0.03	-3	156	134	3,095
1978	6	64	0	0	0	64	0	0.61	78	182	125	2,835
1978	7	0	0	0	0	0	0	0.79	95	246	113	2,494
1978	8	0	0	0	0	0	0	0.54	61	246	103	2,187
1978	9	98	63	63	63	35	0	0.15	15	188	99	2,047
1978	10	0	0	0	0	0	0	0.43	41	170	93	1,836
1978	11	63	21	21	21	42	2	-0.10	-9	140	87	1,724
1978	12	115	22	22	22	93	0	0.16	14	140	84	1,592
Total		4,267	2,323	808	808	3,459	2	3.06	359	2,000		
1979	1	689	487	306	306	383	0	-0.15	-13	134	90	1,777
1979	2	287	28	28	28	259	0	-0.07	-6	120	87	1,691
1979	3	4,413	4,023	1,314	1,314	3,099	0	-0.21	-20	136	125	2,889
1979	4	6,437	5,917	2,498	1,380	5,057	0	0.07	9	142	169	4,118
1979	5	58,429	57,891	3,074	115	58,314	0	-0.26	-41	156	169	4,118
1979	6	3,378	2,858	1,673	220	3,158	0	0.22	38	182	169	4,118
1979	7	752	656	656	312	440	0	0.39	66	246	169	4,118
1979	8	1,122	1,026	512	318	804	0	0.43	72	246	169	4,118
1979	9	167	75	75	75	92	0	0.24	39	188	164	3,966
1979	10	55	4	4	4	51	0	0.31	48	170	153	3,752
1979	11	126	33	33	33	93	0	0.22	34	140	148	3,611
1979	12	520	424	424	424	96	0	-0.17	-26	140	158	3,921
Total		76,375	73,422	10,597	4,529	71,846	0	1.02	200	2,000		

Critical Period Operation Study
Considering NRCS Structures
(July 1977 to May 1985)

Wheeler Branch Reservoir

Pump capacity (cfs)	50
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	1,540

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available pumped @ 50 cfs	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1980	1	971	760	671	338	633	0	0.05	7	134	169	4,118
1980	2	530	224	224	144	386	0	0.14	24	120	169	4,118
1980	3	417	84	84	84	333	0	0.24	40	136	164	4,026
1980	4	824	329	309	269	555	0	0.21	35	142	169	4,118
1980	5	6,232	5,694	2,251	128	6,104	0	-0.17	-28	156	169	4,118
1980	6	282	14	14	14	268	0	0.62	101	182	158	3,849
1980	7	6	0	0	0	6	0	0.88	132	246	143	3,471
1980	8	1	0	0	0	1	0	0.74	102	246	134	3,123
1980	9	36	21	21	21	15	0	0.09	11	188	130	2,945
1980	10	85	58	58	58	27	0	0.41	52	170	121	2,781
1980	11	51	4	4	4	47	0	0.14	17	140	117	2,628
1980	12	202	107	107	107	95	0	-0.01	-1	140	117	2,596
Total		9,637	7,295	3,743	1,167	8,470	0	3.33	492	2,000		
1981	1	181	0	0	0	181	0	0.12	14	134	113	2,448
1981	2	193	0	0	0	193	0	0.10	11	120	106	2,317
1981	3	430	81	81	81	349	0	0.10	11	136	106	2,251
1981	4	237	0	0	0	237	0	0.25	27	142	99	2,082
1981	5	123	14	14	14	109	0	0.16	16	156	96	1,924
1981	6	1,659	1,234	830	830	829	0	0.00	0	182	117	2,572
1981	7	288	234	234	234	54	0	0.56	61	246	113	2,499
1981	8	213	184	184	184	29	0	0.48	50	246	110	2,387
1981	9	70	27	27	27	43	0	0.37	37	188	103	2,189
1981	10	5,956	5,882	1,441	1,441	4,515	0	-0.42	-46	170	148	3,506
1981	11	3,555	3,462	1,350	762	2,793	0	0.07	10	140	169	4,118
1981	12	657	561	561	168	489	0	0.18	28	140	169	4,118
Total		13,562	11,679	4,722	3,741	9,821	0	1.97	219	2,000		
1982	1	775	564	564	150	625	0	0.10	16	134	169	4,118
1982	2	1,178	883	882	116	1,062	0	-0.02	-4	120	169	4,118
1982	3	1,665	1,198	1,176	154	1,511	0	0.11	18	136	169	4,118
1982	4	1,269	749	749	162	1,107	0	0.12	20	142	169	4,118
1982	5	37,280	36,742	2,983	103	37,177	0	-0.32	-53	156	169	4,118
1982	6	15,233	14,713	2,975	187	15,046	0	0.03	5	182	169	4,118
1982	7	4,489	4,393	2,572	305	4,184	0	0.35	59	246	169	4,118
1982	8	623	527	527	347	276	0	0.60	101	246	169	4,118
1982	9	213	120	120	120	93	0	0.55	91	188	164	3,959
1982	10	208	112	112	112	96	0	0.24	39	170	158	3,862
1982	11	356	263	263	263	93	0	-0.07	-11	140	164	3,996
1982	12	632	536	536	265	367	0	0.02	3	140	169	4,118
Total		63,921	60,800	13,459	2,284	61,637	0	1.70	284	2,000		

Critical Period Operation Study
Considering NRCS Structures
(July 1977 to May 1985)

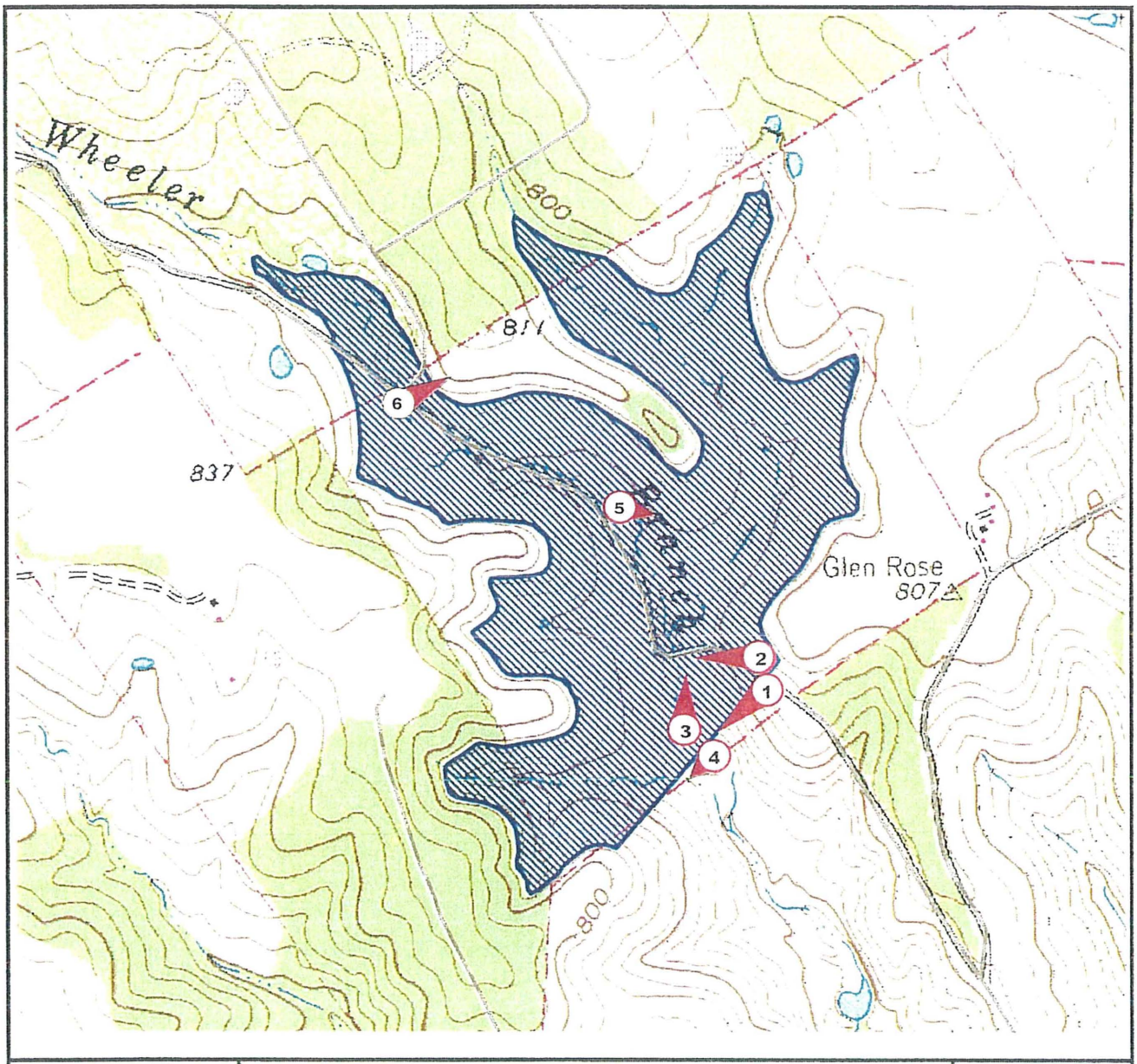
Wheeler Branch Reservoir

Pump capacity (cfs)	50
Yearly Demand (ac-ft)	2,000
Initial Content (ac-ft)	4,118
Minimum Content (ac-ft)	1,540

Year	Month	Paluxy Flow @ diversion (acre-ft)	Available Diversion (acre-ft)	Available pumped @ 50 cfs	Pumped Diversion (acre-ft)	Bypass Flow (acre-ft)	Releases (ac-ft)	Evap Rate (ft)	Evap Loss (acre-ft)	Demand (acre-ft)	EOM Area (acres)	Total Content (acre-ft)
1983	1	749	537	537	145	604	0	0.06	11	134	169	4,118
1983	2	570	275	275	142	428	0	0.13	22	120	169	4,118
1983	3	802	335	335	148	654	0	0.07	12	136	169	4,118
1983	4	347	0	0	0	347	0	0.40	66	142	158	3,910
1983	5	1,820	1,290	953	323	1,497	0	-0.25	-41	156	169	4,118
1983	6	788	373	373	249	539	0	0.40	67	182	169	4,118
1983	7	60	7	7	7	53	0	0.62	100	246	153	3,779
1983	8	2	0	0	0	2	0	0.45	67	246	143	3,466
1983	9	0	0	0	0	0	0	0.40	57	188	138	3,221
1983	10	8	4	4	4	4	0	0.27	36	170	130	3,019
1983	11	40	6	6	6	34	0	0.22	27	140	125	2,858
1983	12	141	45	45	45	96	0	0.06	7	140	121	2,756
Total		5,327	2,872	2,535	1,069	4,258	0	2.83	431	2,000		
1984	1	185	4	4	4	181	0	0.13	15	134	117	2,611
1984	2	201	0	0	0	201	0	0.17	20	120	113	2,471
1984	3	1,494	1,127	427	427	1,067	0	-0.14	-16	136	121	2,778
1984	4	275	0	0	0	275	0	0.47	57	142	117	2,579
1984	5	223	35	35	35	188	0	0.35	40	156	110	2,418
1984	6	298	179	172	172	126	0	0.52	57	182	110	2,351
1984	7	49	35	35	35	14	0	0.57	59	246	99	2,081
1984	8	0	0	0	0	0	0	0.65	62	246	90	1,773
1984	9	0	0	0	0	0	0	0.52	45	188	81	1,540
1984	10	2,225	2,188	768	768	1,457	0	-0.31	-27	170	103	2,165
1984	11	269	176	176	176	93	0	0.11	11	140	103	2,190
1984	12	2,552	2,456	922	922	1,630	0	-0.26	-27	140	130	2,999
Total		7,771	6,200	2,539	2,539	5,232	0	2.79	296	2,000		
1985	1	2,817	2,605	1,451	1,269	1,548	0	0.13	16	134	169	4,118
1985	2	1,220	925	869	121	1,099	0	0.01	1	120	169	4,118
1985	3	1,813	1,345	1,155	157	1,656	0	0.12	21	136	169	4,118
1985	4	8,093	7,573	614	158	7,935	0	0.10	16	142	169	4,118
1985	5	3,234	2,696	2,003	203	3,031	0	0.28	47	156	169	4,118
Total		17,177	15,144	6,092	1,908	15,269	0	0.63	101	688		

APPENDIX J

PHOTOGRAPHS OF PROJECT AREA

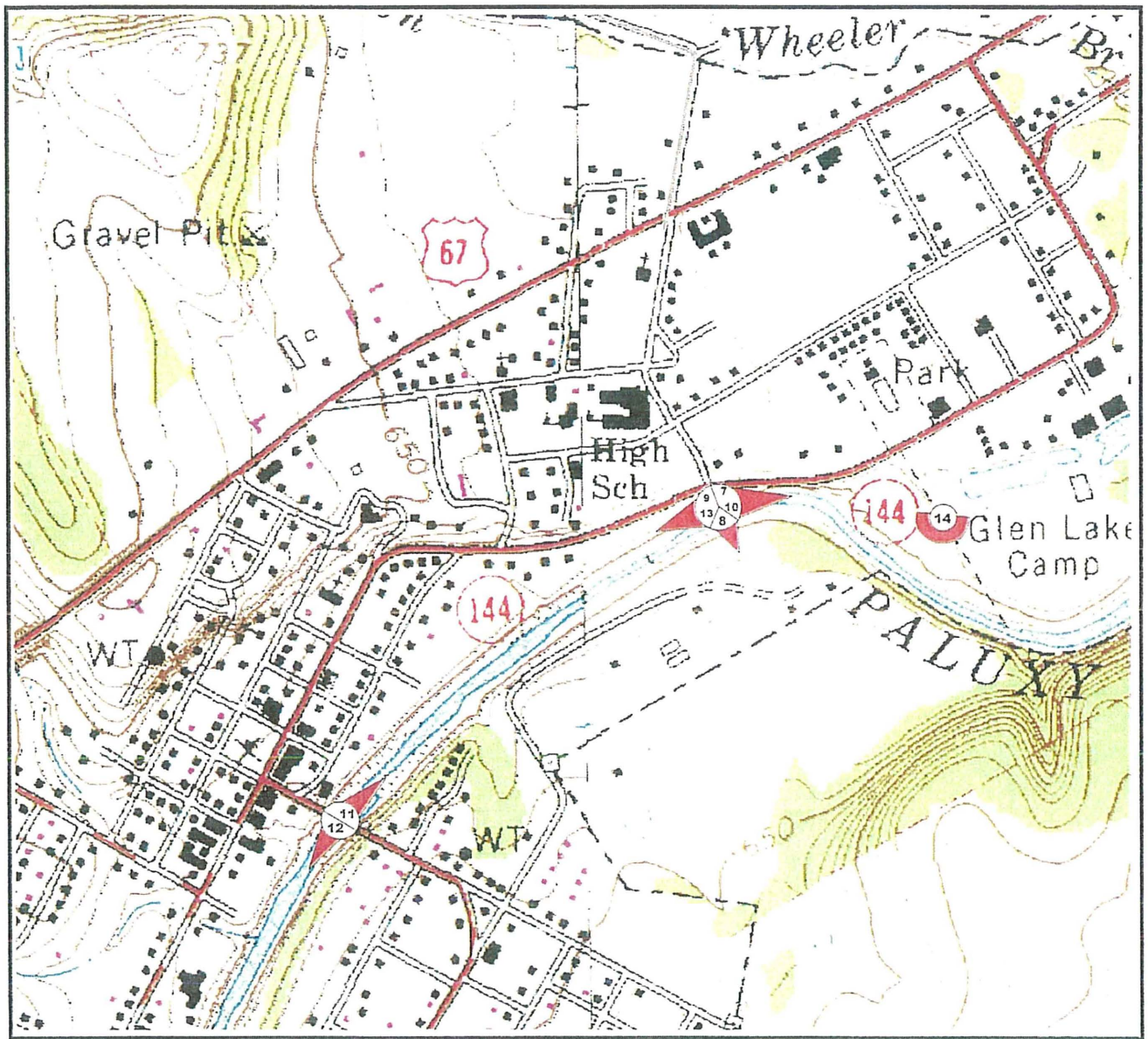


FREESE • NICHOLS
4055 International Plaza Suite 200
Fort Worth, Texas 76109 4895
817 735 7300

Photograph Location Map
for Wheeler Branch Reservoir

Somervell County Water District

Figure
J-1



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4055 International Plaza Suite 200
Fort Worth, Texas 76109 4895
817 735 7300

Photograph Location Map
for Channel Dam on the Paluxy River

Somervell County Water District

Figure
J-2

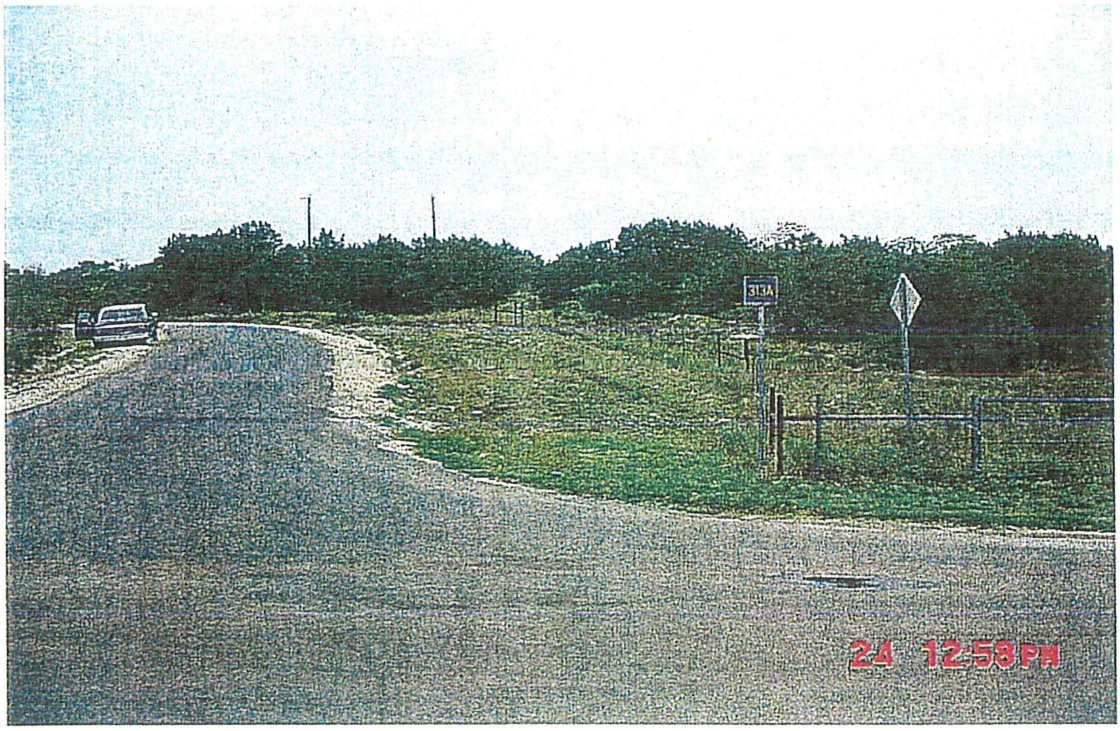
1. Proposed Wheeler Branch Reservoir Dam Site looking southwest.

2. Wheeler Branch Reservoir looking west across main body.

3. Wheeler Branch looking upstream near proposed dam site.

4. Core sample site at Wheeler Branch dam site

5. Wheeler Branch Channel

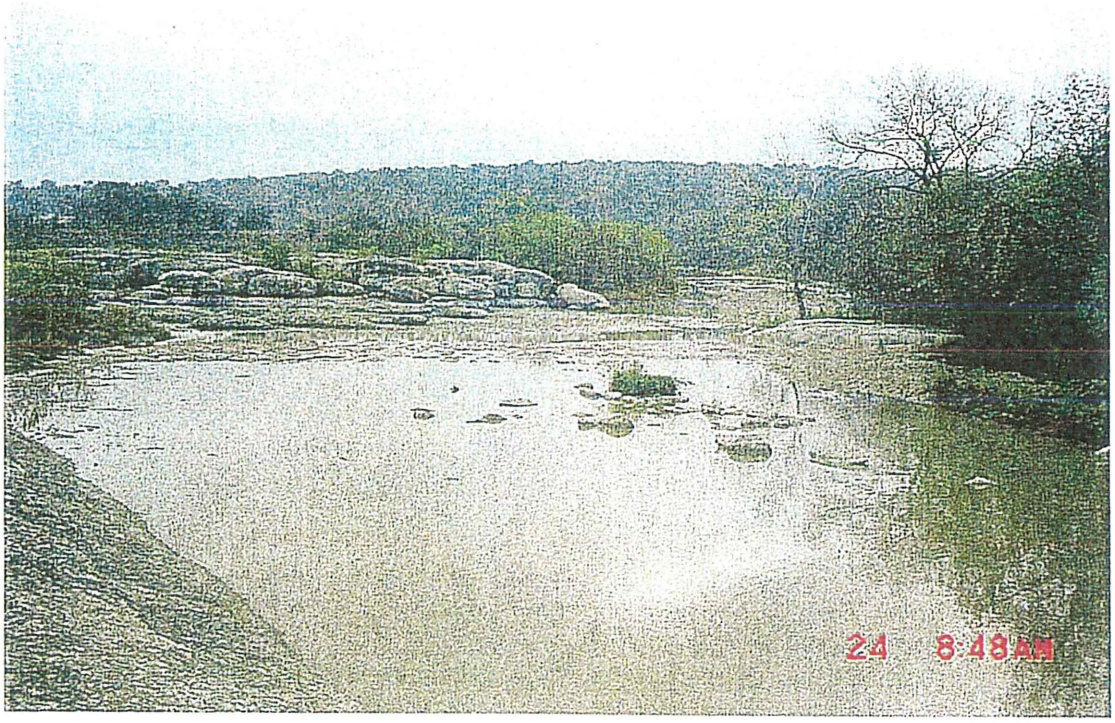


6. Wheeler Branch Reservoir at intersection of CR301 and CR313A

7. Old dam near proposed channel dam site

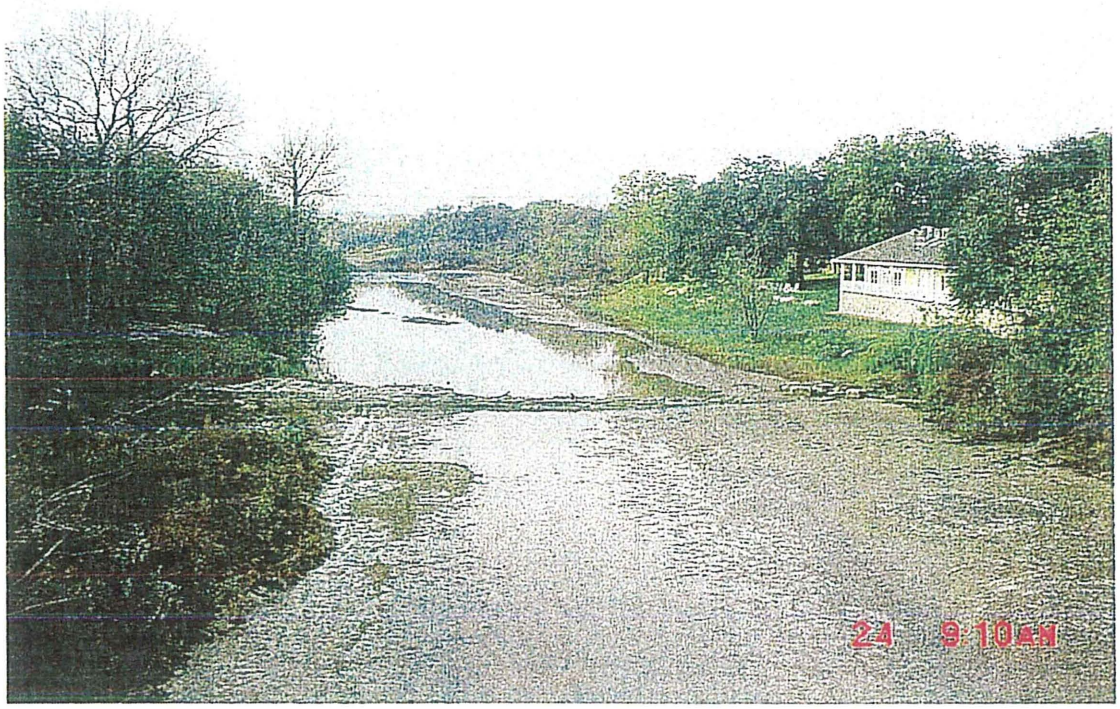
8. Old dam near proposed channel dam site

9. Channel dam site looking upstream



10. Channel dam site looking downstream

11. Highway 144 Bridge looking downstream (upper of channel dam pool)



12. Highway 144 Bridge looking upstream (upper of channel dam pool)

13. Channel dam site and Highway 144 looking upstream

14. 180° Panoramic view from Big Rock Park downstream of channel dam site

APPENDIX K

SOMERVELL COUNTY WATER DISTRICT

WATER CONSERVATION AND DROUGHT CONTINGENCY PLAN

SOMERVELL COUNTY WATER DISTRICT

SOM00166

WATER CONSERVATION AND DROUGHT CONTINGENCY PLANS

MARCH 2001

Prepared for
SOMERVELL COUNTY WATER DISTRICT

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Figure 1: Service Area Map for Somervell County Water District

Figure 2: Proposed Channel Dam

Figure 3: Proposed Wheeler Branch Reservoir

1. INTRODUCTION

1.1 Somervell County Water District

The Somervell County Water District was created by the 69th Texas Legislature in 1985 as an official agency of the State of Texas. The District was created under Senate Bill 287 as a conservation and reclamation district. The service area of Somervell County Water District consists of all of Somervell County and a portion of Hood County adjacent to Somervell County. Figure 1 is a map of Somervell County. Once the District constructs the proposed water supply facilities, it will be a wholesale water supplier to the City of Glen Rose, and in the future it will supply rural areas of the County on a retail basis.

1.2 Need for Water Conservation Plan

Title 30, Texas Administrative Code, Chapter 288 states that holders of water rights or 1,000 acre-fee/year or more, for municipal, industrial and other uses are required to submit a water conservation plan. The District is currently seeking a water right for the consumptive use of 2,000 acre-feet per year and if granted, will fall under this requirement to submit a water conservation plan. The Texas Natural Resource Conservation Commission (TNRCC) is responsible for oversight of these plans. According to Chapter 288.5, requirements for water conservation plans for wholesale water suppliers include, as a minimum:

- *Description of wholesaler's service area including information on population, customer data, water use data, water supply system, and wastewater system.*
- *Specification of conservation goals including, where appropriate, target per capita water use, maximum acceptable unaccounted for water, the basis for goal development, and timeframe for achieving goals.*
- *A description as to which practice(s) and/or device(s) will be utilized to measure and account for the amount of water diverted from the source(s) of supply.*
- *A monitoring and record management program to determine water deliveries, sales and losses.*

- *A metering, leak detection and repair program for the wholesaler's water storage, delivery and distribution system.*
- *The requirement that every wholesale supply contract or contract renewal include a requirement that each successive wholesale customer develop and implement a water conservation plan or conservation practices.*
- *A reservoir system operation plan, if applicable (not applicable in the District's case).*
- *A means for implementation and enforcement.*
- *Documentation of coordination with the Regional Water Planning Group for the service area (which is the Brazos G Regional Water Planning Group).*

In addition to the minimum requirements cited above, the TNRCC provides guidance on additional conservation strategies that may be selected by water wholesalers if they are necessary to achieve the plan's stated water conservation goals. These optional conservation strategies can include:

- *Conservation-oriented water rates and water rate structures.*
- *A program to assist customers in the development of conservation plans.*
- *A program for reuse/ recycling of wastewater/greywater.*
- *Any other appropriate practice.*

Since the District will also supply water to the rural population of Somervell County on a retail basis, it must also include in its water conservation plan the requirements that apply to Retail Public Water Suppliers according to Chapter 288.2. Most of these requirements are similar to the requirements set for wholesale suppliers, but also include:

- *A program for universal metering of both customer and public uses of water, for meter testing and repair, and for periodic meter replacement.*
- *Measures to determine and control unaccounted-for uses of water.*
- *Program of continuing public education and information regarding water conservation.*
- *A water rate structure which is not "promotional".*

- *A record management system to record water pumped, water deliveries, water sales and water losses which allows for the desegregation of water sales and uses into residential, commercial, public and institutional, and industrial customer classes.*

Section 2 of this report outlines how the Somervell County Water District meets these requirements.

1.3 Need for Drought Contingency Plan

Title 30, Texas Administrative Code, Chapter 288 states that wholesale public water suppliers are required to develop a drought contingency plan. The District's required drought contingency plan is contained in Section 3 of this report. The Texas Natural Resource Conservation Commission (TNRCC) is responsible for oversight of these plans. The minimum requirements for drought contingency plans for wholesale water suppliers as outlined in Cahpter 288.22 include:

- *Public Involvement. Provision shall be made to actively inform the public and to affirmatively provide opportunity for user input in the preparation of the plan and for informing wholesale customers about the plan. Such acts may include, but are not limited to, having a public meeting at a time and location convenient to the public and providing written notice to the public concerning the proposed plan and meeting.*
- *Coordination with Regional Water Planning Groups. The drought contingency plan must document coordination with the Regional Water Planning Groups for the service area of the wholesale public water supplier in order to insure consistency with the appropriate approved regional water plans.*
- *Specific criteria for the initiation and termination of drought response stages, accompanied by an explanation of the rationale or basis for such triggering criteria.*
- *A minimum of three drought or emergency response stages providing for the implementation of measures in response to water supply conditions during a repeat of the drought-of-record.*
- *A description of the information to be monitored by the water supplier and the procedures to be followed for the initiation or termination of drought response stages.*

- *Procedures for notification of wholesale customers regarding the initiation or termination of drought response stages.*
- *The specific water supply or water demand management measures to be implemented during each stage of the plan including, but not limited to, the following:*
    - *Pro rata curtailment of water deliveries to or diversions by wholesale water customers as provided in Texas Water Code 11.039; and*
    - *Utilization of alternative water sources with the prior approval of the executive director as appropriate (e.g., interconnection with another water system, temporary use of a non-municipal water supply, use of reclaimed water for non-potable purposes, etc.)*
- *A provision in every wholesale water contract entered into or renewed after adoption of the plan, including contract extensions, that in case of a shortage of water resulting from drought, the water to be distributed shall be divided in accordance with Texas Water Code 11.039.*
- *Procedures for granting variances to the plan*
- *Procedures for the enforcement of any mandatory water use restrictions including specification of penalties (e.g., liquidated damages, water rate surcharges, discontinuation of service) for violations of such restrictions.*

Since the District will also supply water to the rural population of Somervell County on a retail basis, it must also include in its drought contingency plan the requirements that apply to Retail Public Water Suppliers according to Chapter 288.20. Most of these requirements are similar to the requirements set for wholesale suppliers, but also include:

- *A public education program.*

Section 3 of this report outlines how the Somervell County Water District meets these requirements.

2. WATER CONSERVATION PLAN

2.1 *Description of Service Area*

The service area of the Somervell County Water District includes all of Somervell County and a portion of Hood County adjacent to Somervell County. (See Appendix B for a detail description of the service area.) Somervell County it located approximately 50 miles southwest of the Dallas/Fort Worth Metroplex. Currently, the water needs of the County are being served by groundwater wells owned by the City of Glen Rose and individual rural users. However, the groundwater level has been rapidly declining in recent years (approximately 5 feet per year). The District proposes to develop a surface water supply system and become a wholesale water supplier for the county. The District does not currently have any water supply facilities or customers, but is proposing new facilities for water supply and recreational use. An 8-foot high channel dam is proposed on the Paluxy River within the City of Glen Rose to provide head for diversions from the Paluxy River. This dam and inundation area are shown in Figure 2. The surface area of this impoundment would be about 9 acres. Water diverted from the Paluxy River will be pumped to a proposed storage reservoir located on Wheeler Branch approximately 2 miles northwest of Glen Rose. The top of conservation level for the Wheeler Branch Reservoir will be at 785 msl. The reservoir will have a storage capacity of 4,118 acre-feet and a surface area of 169 acres. The natural drainage area to this dam is only 1.6 square miles so the majority of the water stored in the reservoir will have been pumped from the Paluxy River. The proposed Wheeler Branch Reservoir is shown on Figure 3.

The District intends to provide treated water to the City of Glen Rose as soon as the necessary permits are obtained and the facilities are constructed. The District will later serve a portion of rural Somervell County on a retail basis. The estimated population of Somervell County was 6,471 in 2000, and the amount of water used for municipal purposes was 1,040 acre-feet, or approximately 142 gallons per person per day (gpcd) (*Brazos G Regional Water Plan, 2001*). Table 1 shows the projected population for the county, and Table 2 shows the projected municipal water. These population and water use projections are somewhat different from those shown in the Brazos G Regional Water Plan. Based on recent growth and increased water use in and surrounding the City of Glen Rose, the District anticipates that the per capita water use will

increase slightly over time (shown in Table 3) rather than decrease as assumed in the Brazos G Plan. (The Brazos G Plan estimates a year 2050 per capita use of 133 gpcd.)

Table 1: Projected Population in Glen Rose and Somervell County

	2000	2010	2020	2030	2040	2050
Glen Rose	2,335	2,721	3,107	3,493	3,879	4,265
Rest of Somervell County	4,136	5,090	6,322	7,889	9,860	12,319
Total County Population	**6,471**	**7,811**	**9,429**	**11,382**	**13,739**	**16,584**

Table 2: Projected Municipal Water Requirements in Glen Rose and Somervell County (Water use is in acre-feet per year.)

	2000	2010	2020	2030	2040	2050
Glen Rose	484	558	630	700	769	836
Rest of Somervell County	556	741	991	1,326	1,657	2,070
Total County Demand	**1,040**	**1,299**	**1,621**	**2,026**	**2,426**	**2,906**

Table 3: Projected Per Capita Water Use in Glen Rose and Somervell County

	2000	2010	2020	2030	2040	2050
Glen Rose	185	183	181	179	177	175
Rest of Somervell County	120	130	140	150	150	150
Per Capita Use (gal/person/day)	142	148	153	159	158	156

The City of Glen Rose owns and operates the only wastewater treatment facility in the County. Over the past several years, the City of Glen Rose's wastewater plant treated has consistently discharged an average of 0.20 mgd. The remaining portions of the County are served by individual septic systems. No information is available on the volume of return flow in the rural portions of the County.

2.2 Conservation Goals

It is the goal of the District that its customers have reasonable levels of per capita water use and unaccounted-for water. The following general standards were developed considering

historical data from Somervell County as well as the geographic and hydrologic conditions of the area. The 2010 per capita water use of the District's customers should not be in excess of 210 gallons per capita per day (gpcd). By year 2030, the goal should be a per capita use not to exceed 200 gpcd, and by year 2050, not to exceed 190 gpcd. Should any of the District's customers fail to meet these goals, the District will assist that customer in reducing its per capita water use in any possible, including but not limited to the items mentioned in this conservation plan.

The District's year 2010 goal for unaccounted-for water for its customers is 20 percent. The goal for 2050 is 15 percent. Again, should any of the District's customers fail to meet these goals, the District will assist them in any way possible.

In addition to helping its customers eliminate losses in their systems, the District will strive to keep losses within its own system at a minimum. The rate of unaccounted water is expected to be higher in the District's system than its customers due to the great length of pipeline in a county-wide system such as the District's. The District's year 2010 goal for unaccounted-for water within its own system is 25 percent. The goal for 2050 is 20 percent. Should the District fail to meet these goals, the District will implement a more strict system of monitoring, measuring and accounting and will implement an aggressive leak detection and repair program until the rate of unaccounted-for water is decreased below its goal.

2.3 Measurement and Accounting

Flow meters will be used to measure and account for all water diverted from the District's water supply. Meters will be located at the channel dam pump station, the Wheeler Reservoir pump station, the future water treatment plant, and at customer take points. All wholesale water sales will be metered in order to record the amount of water used by each wholesale customer. The meters will be read by District personnel on a monthly basis.

In addition to the meters at the water supply sources and wholesale customers, the District will meter water at each retail customer's diversion point. The District will designate each customer as one of the following classes: residential, commercial, public/institutional, or

industrial. Water use totals will be categorized into these customer classes to allow for tracking of specific water uses and losses.

2.4 Monitoring and Record Management Program

All meter readings (as described above) will be recorded and kept on file at the District office. This metered water use data will be checked periodically using a simple accounting balance approach to determine if there are problems within the system. As mentioned in Section 2.3, water use will be categorized by customer class, including residential, commercial, public/institutional, and industrial.

2.5 Metering and Leak Detection

As stated in Section 2.3, flow meters will be used to measure and account for all water diverted from the District's water supply. All water sales will be metered in order to record the amount of water used. The District recognizes the importance of metering and of keeping the meters checked and maintained for accuracy. This will require the installation and maintenance of the proper metering equipment by the District and its wholesale customers. Water meters will be required to measure in accordance with American Water Works Association (AWWA) Standards with an accuracy tolerance not to exceed five percent. Meters are to be calibrated by their owner with the other party having the right to be present during the calibration.

The District will meter all water used, whether for individual customers use, wholesale customer use, or for use by the District. The District will periodically test these meters for accuracy and will have a replace program for meters as they exceed their useful age as recommended by AWWA.

As mentioned in Section 2.4 above, the District will periodically perform water balances to determine if there are any excessive losses that would indicate leaks in the system or unaccounted-for uses which might indicate water theft. The District will seek to minimize unaccounted water losses through these water balances, through periodic visual inspections along the transmission and distribution lines, and by utilizing, if necessary, the conservation services of

the Texas Water Development Board (TWDB) and the Texas Rural Water Association (TRWA). The District will provide technical assistance to any water customers through these same agencies. The TRWA provides water audits and leak detection services to rural users.

2.6 *Water Supply Contracts*

Every wholesale water supply contract entered into by the District will require that the customer develop and implement its own water conservation plan or water conservation measures in accordance with Title 30, Texas Administrative Code, Chapter 288. If the customer intends to resell the water, then the contract between the District and that customer will provide that the contract for the resale of water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures.

2.7 *Implementation and Enforcement of Plan*

The District has passed a resolution adopting this Water Conservation Plan. This resolution is included as Appendix A. The District will implement conservation measures directed at improving the District's water conservation and efficiency through the routine operations and maintenance of its facilities.

Upon the execution of any water supply contracts, the District will provide its customer with a copy of its Water Conservation Plan. The terms and conditions of the water supply agreements will specify the required conservation measures for each client and implement the District's conservation program as it relates to water sales. These provisions include deadlines for compliance with plan requirements, and specify penalties for clients failing to meet these requirements in the specified time. These penalties will include the option of reduced water supply or imposing a surcharge on all charges for water.

2.8 Coordination with the Regional Water Planning Groups (RWPG)

The water service area of the District is located within the Senate Bill One Brazos G Regional Water Planning Area. The District will provide a copy of this conservation plan to the Regional Water Planning Group.

2.9 Additional Conservation Strategies

The District recognizes that proper water pricing can be a very important water conservation measure. The District will not have a "promotional" water rate that would encourage excessive use of water. It will implement a flat rate structure to promote wise use of water. The final determination of exact rates will be made at a later date.

Reuse and recycling of wastewater or greywater can also be an effective conservation management strategy. The City of Glen Rose owns and operates the only wastewater treatment facility in the County, which serves the City of Glen Rose. The remaining portions of the County are served by individual septic systems. The City of Glen Rose currently has some reuse involving local golf courses. In the future, the District will work with the City to encourage additional reuse of wastewater as appropriate. The District will also encourage its future rural customers to install lawn sprinkling systems that utilize water from septic systems rather than treated water from the District.

2.10 Public Education

The District will have a program of public education and information regarding water conservation. This program will consist of periodic inserts in water bill that outline water saving facts, tips and other information. This information will also be available in the form of brochures at the District offices. Most likely, TWDB conservation information and brochures will be used for this purpose.

3. DROUGHT CONTINGENCY PLAN

3.1 Declaration of Policy, Purpose, and Intent

In order to conserve the available water supply and/or to protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortages and other water supply emergency conditions, the Somervell County Water District (the District) adopts the following Drought Contingency Plan (the Plan).

3.2 Public Involvement

Opportunity for the public and potential wholesale water customers to provide input into the preparation of the Drought Plan was provided by the District by means of a public meeting on February 12, 2001 at the Somervell County Water District offices. The public was notified of this meeting through a Public Notice published in the Glen Rose Reporter newspaper on February 8, 2001. Notices of the meeting were also posted at the Somervell County Courthouse in Glen Rose and the Hood County Courthouse in Granbury beginning on February 6, 2001.

3.3 Wholesale Water Customer Education

The District will periodically provide wholesale water customers with information about the Drought Plan, including information about the conditions under which each stage of the Drought Plan is to be initiated or terminated and the drought response measure to be implemented in each stage. This information will be provided by means of distributing copies of the approved Drought Plan to the District's customers by mail.

3.4 Coordination with Regional Water Planning Groups

The water service area of the District is located within the Senate Bill One Brazos G Regional Water Planning Area. The District will provide a copy of this drought plan to the Regional Water Planning Group.

3.5 *Authorization*

The President of the Board of the District, or his/her designee, is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The Board President, or his/her designee, shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

3.6 *Application*

The provisions of the Plan shall apply to all customers utilizing water provided by the District. The District will require its customers to create their own Water Conservation and Drought Contingency Plans.

All customers of the District will be required to adhere to any mandatory water use restrictions that may be implemented as part of this Drought Contingency Plan. If a customer does not adhere to these restrictions when implemented, that customer may be subject to penalties including, but not limited to, water rate surcharges and discontinuation of services. Any penalties for violations will be assessed by the District's Board of Directors.

The District shall review and update this drought contingency plan, as appropriate, at least every five (5) years, based on new or updated information, such as adoption or revision of the regional water plan.

3.7 *Trigger Criteria for Initiation and Termination of Drought Response Stages*

The Board President, or his/her designee, shall monitor water supply conditions on a monthly basis and shall determine when conditions warrant initiation or termination of each stage of the Plan. Customer notification of the initiation or termination of drought response stages will be made by mail and/or telephone. The news media will also be informed.

The triggering criteria described below are based on water contracts and demands placed on the various components of the District's water supply system and on drought of record determinations for the Wheeler Branch Reservoir.

a. Stage 1 - Mild Water Shortage Conditions

Requirement for initiation - The District will recognize that mild water shortage conditions exist when the capacity in Wheeler Branch Reservoir is equal to or less than 75 percent of total capacity; or when total daily water demand of all customers combined equals or exceeds 70 percent of the capacity of the water treatment plant for 5 consecutive days or 90 percent on a single day.

Requirements for termination - Termination of the mild water shortage condition and corresponding measures will take place when conditions that initiated the mild water shortage condition have ceased to exist for a period of thirty (30) consecutive days. The District will inform its customers and the media of the termination of the mild water shortage conditions in the same manner as in its initiation.

b. Stage 2 - Moderate Water Shortage Conditions

Requirement for initiation - The District will recognize that moderate water shortage conditions exist when the capacity Wheeler Branch Reservoir is equal to or less than 66 percent of total capacity; or when total daily water demand of all customers combined equals or exceeds 80 percent of the capacity of the water treatment plant for 5 consecutive days or 95 percent on a single day.

Requirements for termination - Termination of the moderate water shortage condition and corresponding measures will take place when conditions that initiated the moderate water shortage condition have ceased to exist for a period of thirty (30) consecutive days. The District will inform its customers and the media of the termination of the moderate water shortage conditions in the same manner as in its initiation.

c. Stage 3 - Severe Water Shortage Conditions

Requirements for initiation - The District will recognize that severe water shortage conditions exist when the capacity in Wheeler Branch Reservoir is equal to or less than 50 percent of total capacity; or when total daily water demand of all customers combined equals or exceeds 90 percent of the capacity of the water treatment plant for 5 consecutive days or 100 percent on a single day. The District will also recognize that severe water shortage conditions exist if the Governor of Texas declares the county to be in a State of Emergency concerning water supply.

Requirements for termination - Termination of the severe water shortage condition and corresponding measures will take place when reservoir capacity or demand conditions that initiated the severe water shortage condition have ceased to exist for a period of thirty (30) consecutive days, or when the State of Emergency declared by the Governor has been lifted. The District will inform its customers and the media of the termination of the severe water shortage conditions in the same manner as in its initiation.

d. Stage 4 - Emergency Water Shortage Conditions

The failure of a major component of any of the pump stations or the treatment plant or any significant impairment to the water quality of Wheeler Branch Reservoir will have a significant impact on the supply of water to the District's customers. However, the supply restriction will tend to be of short duration in this situation. In the event of an emergency condition, the District will notify its customers of the water supply situation and make such operational changes it finds necessary while the emergency condition exists. Customers will be notified when the situation has been rectified and the system is fully operational.

3.8 Drought Response Stages

The Board President, or his/her designee, shall monitor water supply conditions in accordance with the trigger criteria set forth in Section 3.7, shall determine that mild, moderate, or sever water shortage conditions exist or that an emergency condition exists and shall implement the following actions:

a. Stage 1 - Mild Water Shortage Conditions

Goal: Inform the District's customers and the general public of the situation and encourage the wise use of water.

Measures:

1. When mild water shortage conditions exist, the District will inform its customers of the drought condition by mail and telephone.

2. The District will activate an information center to answer inquiries from the citizens. At the same time, representatives of the District and its customers will discuss the drought condition and its impact on the water supply situation in the news media.

3. The District will continue to advise its wholesale customers of the reservoir elevations weekly. Each customer in turn will follow its individual emergency measures.

b. Stage 2 - Moderate Water Shortage Conditions

Goal: Achieve a voluntary 30 percent reduction in non-essential outdoor water use.

Measures:

1. When the system reaches moderate water shortage conditions, the District will inform its customers by mail and by telephone that the drought has reached the moderate trigger level. This information will be given at weekly intervals as long as the moderate drought condition continues.

2. During the moderate water shortage conditions, the District may curtail water delivered to its customers on a pro-rata basis, if necessary.

3. The District may request its municipal customers to implement voluntary lawn irrigation restrictions through the media. The District itself will use the media to inform the general public of the need to curtail outdoor water use.

4. The District may request its municipal customers to prohibit such other non-essential outdoor uses as car washing, filling of swimming pools, etc.

c. Stages 3 & 4 - Severe and Emergency Water Shortage Conditions

Goal: Achieve a voluntary 90 percent reduction in non-essential outdoor water use and a reduction of 30 percent in total water use.

Measures:

1. When the system reaches severe water shortage conditions, the District will inform its customers by mail or telephone about the serious water supply situation. Similar action will be taken in the event of a major emergency. The news media also will be informed. Situation reports will be issued to the District's customers and the news media weekly. The District management may call emergency meetings to discuss with its customers major operational changes if it finds such action necessary during the progress of a severe drought.

2. The District may reduce water delivery on a pro-rata basis to its customers as the situation dictates. This is further discussed in Section 3.9 of the Plan.

3. The District may request all its municipal customers to prohibit outdoor water use and to activate applicable drought measures to minimize indoor uses until the drought condition changes to a moderate condition or better.

4. The District will notify the Executive Director of TNRCC within five business days of implementing any mandatory provisions of the drought contingency plan.

5. If the restrictions of this Stage of the Plan cause undue hardship on a customer, that customer may request a variance from the District's Board of Directors. These requests will be considered on a case-by-case basis.

3.9 Pro Rata Water Allocation

In the event that the trigger criteria specified in Section 3.7 of the Plan for Stage 3 – Severe Water Shortage Conditions have been met, the Board President, or his/her designee, is hereby authorized it initiate allocation of water supplies on a pro rata basis in accordance with Texas Water Code Section 11.039 and according to the following water allocation policies and procedures:

a) A wholesale customers' monthly allocation shall be a percentage of the customer's water usage baseline. The percentage will be set by resolution of the District's Board of Directors based on the Board President's assessment of the severity of the water shortage condition and the need to curtail water diversions and/or deliveries and may be adjusted periodically by resolution of the District's Board of Directors as conditions warrant. Once pro rata allocation is in effect, water diversions by or deliveries to each wholesale customer shall be limited to the allocation established for each month.

b) A monthly water usage allocation shall be established by the Board President, or his/her designee, for each wholesale customer. The wholesale customer's water usage baseline will be computed based on the monthly average for the period for which records exist.

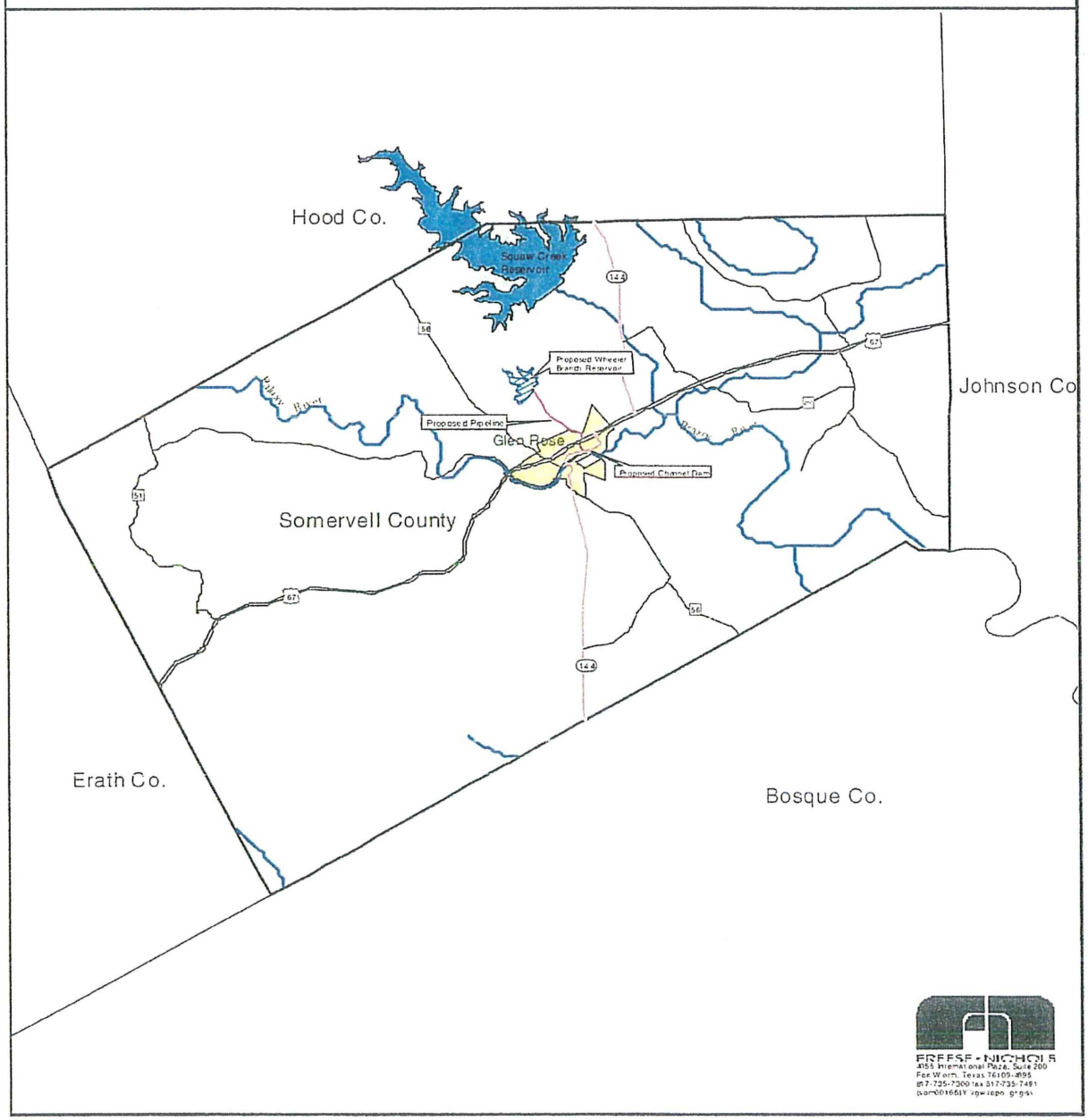
Any wholesale water contracts entered into shall contain a provision that in case of a shortage of water resulting from drought, the water to be distributed shall be divided in accordance with Texas Water Code 11.039.

3.10 Retail Water Customer Public Education

The District will have a program of public education and information regarding the drought contingency plan for its retail customers. This program will consist of special notices printed in water bills once a year (preferably in May or June) outlining the drought triggers and responses and giving current water supply conditions. The District will also print special notices in customer water bills when the District is nearing drought trigger conditions. The notice will include the voluntary and mandatory water savings practices for the appropriate trigger level. This information will also be available at the offices of the District.

Figures

FIGURE 1 - SERVICE AREA MAP OF SOMERVELL COUNTY WATER DISTRICT AND PROPOSED PROJECT



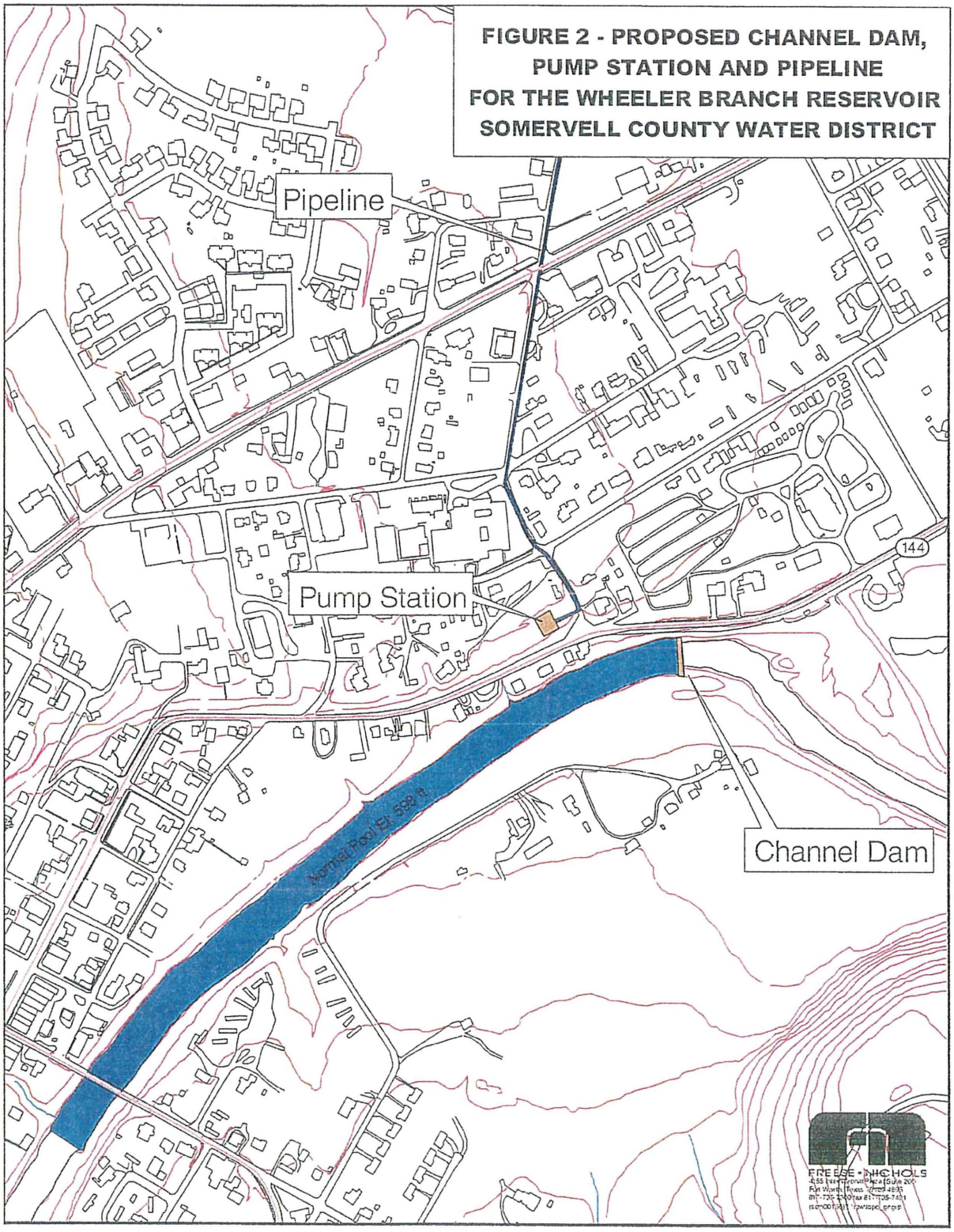
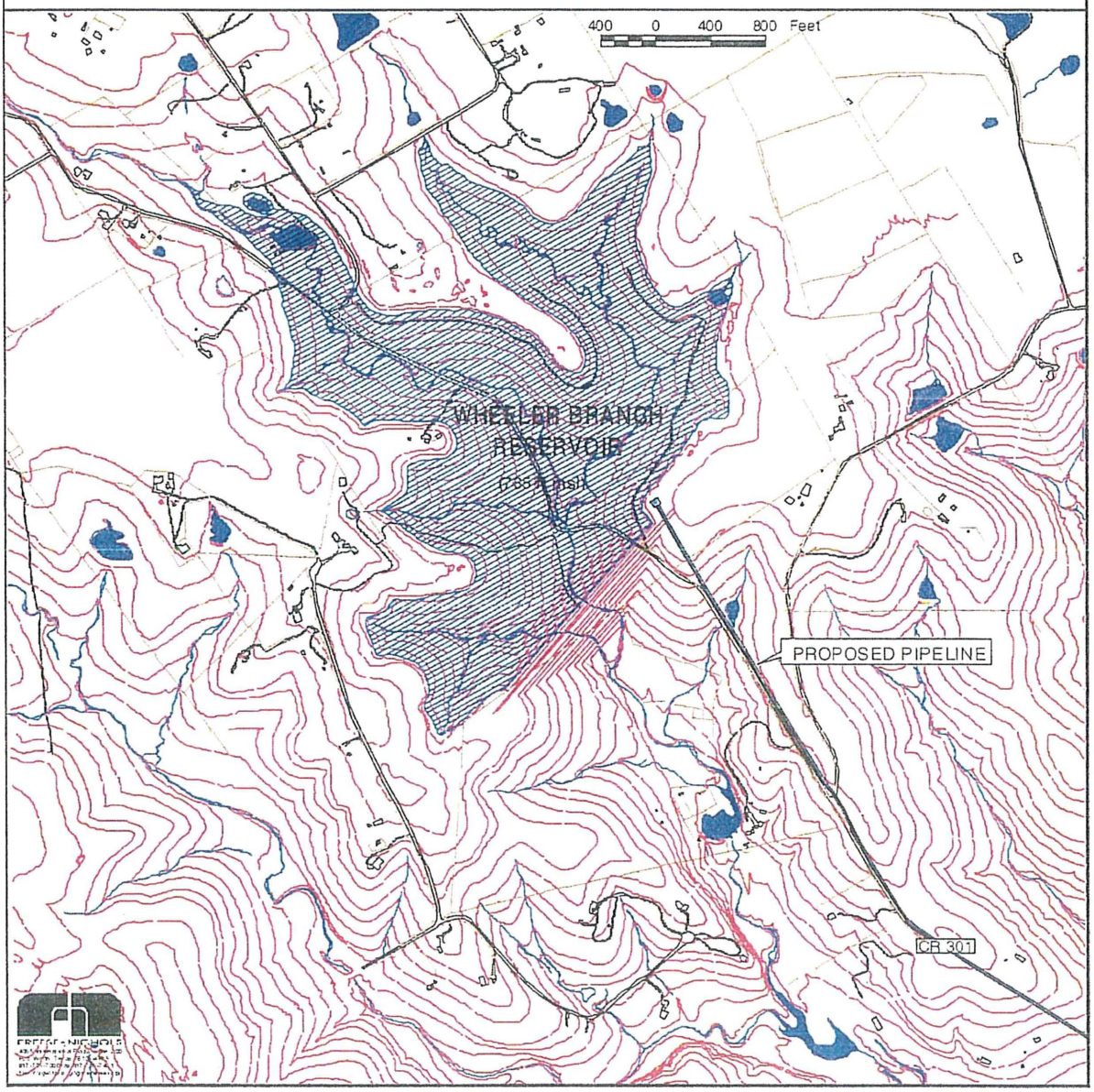


FIGURE 2 - PROPOSED CHANNEL DAM,
PUMP STATION AND PIPELINE
FOR THE WHEELER BRANCH RESERVOIR
SOMERVELL COUNTY WATER DISTRICT
Pipeline
Pump Station
Channel Dam
144
Normal Pool El. 598 ft.
FREESE • NICHOLS

FIGURE 3 - PROPOSED WHEELER BRANCH RESERVOIR

Somervell County Water District



Appendix A

Resolution Adopting the Water Conservation and Drought Contingency Plans

RESOLUTION NO. 01-01

A RESOLUTION OF THE BOARD OF DIRECTORS ADOPTING A WATER CONSERVATION AND DROUGHT CONTINGENCY PLAN FOR THE SOMERVELL COUNTY WATER DISTRICT.

WHEREAS, the Board recognizes that the amount of water available to the Somervell County Water District and to its future wholesale and retail customers is limited and subject to depletion during periods of extended drought;

WHEREAS, the Somervell County Water District recognizes that natural limitations due to drought conditions and other acts of God cannot guarantee an uninterrupted water supply for all purposes;

WHEREAS, Section 11.1271 of the Texas Water Code and applicable rules of the Texas Natural Resource Conservation Commission require that any water right holder of over 1,000 acre-feet per year prepare a water conservation plan;

WHEREAS, Section 11.1272 of the Texas Water Code and applicable rules of the Texas Natural Resource Conservation Commission require that all public water supply systems in Texas prepare a drought contingency plan;

WHEREAS, Section 11.039 of the Texas Water Code authorizes water suppliers to distribute available water supplies on a pro rata basis during times of water supply shortage; and

WHEREAS, as authorized under law, and in the best interests of the customers of the Somervell County Water District, the Board deems it expedient and necessary to establish certain rules and policies for the orderly and efficient management of limited water supplies during drought and other water supply emergencies;

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE SOMERVELL COUNTY WATER DISTRICT:

SECTION 1. That the Water Conservation and Drought Contingency Plan attached hereto is hereby adopted as the official policy of the Somervell County Water District.

SECTION 2. That the President of the Board is hereby directed to implement, administer, and enforce the Water Conservation and Drought Contingency Plan.

SECTION 3. That this resolution shall take effect immediately upon its passage.

DULY PASSED BY THE BOARD OF DIRECTORS OF THE SOMERVELL COUNTY WATER DISTRICT ON THIS 27th day of March, 2001.

President, Board of Directors

ATTESTED TO:

Secretary, Board of Directors

Appendix B
Service Area Description

Service Area Description for Somervell County Water District

Senate Bill No. 287 enacted by the 69th Texas Legislature in 1985 created the Somervell County Water District. This Act specifies the boundary of the District as follows:

> *"The district's boundaries include all the territory within the boundaries of Somervell County and all of that portion of the territory within the boundaries of Hood County adjacent to Somervell County beginning at the point where the western edge of presently existing Hood County Road number 221 intersects the Hood-Somervell County line and proceeding along the presently existing western edge of County Road 221 in a northerly direction to a point where said County Road 221 intersects the northern edge of presently existing Farm to Market Road 204 and thence in an easterly direction along the northern edge of Farm to Market Road 204 to a point where said northern line of Farm to Market Road 204 is intersected by the eastern edge of presently existing Hood County Road 219B and thence in a northerly direction along the western edge of presently existing Hood County Road 219B to the point where it intersects the southern edge of presently existing Hood County Road 219 and thence in a westerly direction along the southern edge of presently existing Hood County Road 219 to a point where it intersects the western edge of presently existing Hood County Road number 218 and thence in a northerly direction along the western edge of presently existing Hood County Road 218 to a point where the southern edge of presently existing Hood County Road 218A intersects presently existing Hood County Road 218 and thence in a westerly direction along the southern edge of presently existing Hood County Road 218A until it intersects the eastern edge of presently existing Texas Farm to Market Road 2870 and thence in a southerly direction along the generally eastern edge of presently existing Texas Farm to Market Road 2870 to the point where it intersects the Erath-Hood County Line."*