

MEMORANDUM

TO: Regional Water Planning Groups

FROM: Dan Hardin, Director, Water Resources Planning Division, Texas Water Development Board (TWDB) DH

DATE: January 11, 2013

SUBJECT: Proposed Mining Demands for 2016 Regional Water Plans and 2017 State Water Plan

Attached are the TWDB's recommended demand projections for mining demands. The data is based on a study titled "Oil and Gas Water Use Report: Update to the 2011 Mining Water Use Report", which is available on the TWDB's website at:

http://www.twdb.state.tx.us/waterplanning/rwp/planningdocu/2016/current_docs.asp.

The report is an update to the TWDB study conducted in 2011. The update was conducted by the University of Texas, Bureau of Economic Geology for the Texas Oil and Gas Association. TWDB reviewed and agreed with the methodology used in the study and reviewed the draft updated report and had no comments.

This report includes 2011 mining water use estimates as well as projected water demands for 2020 – 2060. TWDB requests that the regional water planning groups review the attached projections and provide any requests for revisions to the TWDB, along with the necessary data to justify such requests, no later than **March 29, 2013**.

Part of the update involves a distinction between Total Water Demands (fresh, saline, treated effluent and recycled water) and Fresh Water Demands (described as 'consumptive use' in the report). In previous regional water plans, water demands for mining have been equivalent to what is presented in this report as Total Water Demands. The spreadsheet includes both Total and Fresh water demand projections. As in previous rounds of planning, Total water demand will be used to represent mining demand, however, the fresh water demand estimates are also provided as information to be considered as the planning groups evaluate existing supplies or water management strategies, if appropriate. Water demand volumes for the non-oil and gas mining sectors are considered fresh water demands unless otherwise specified in the 2011 report.

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The 2070 projections have been calculated by TWDB staff using the 2050-2060 trends in the report.

A summary of the updated report follows:

SUMMARY - Oil and Gas Water Use Report: Update to the 2011 Mining Water Use Report

This updated report employs similar methodology as the 2011 report but differs in several ways, notably:

- Clearly distinguishes between water use and water consumption;
- Includes information on the increased use of brackish water, reused produced water and recycled water from other users; and
- Presents high, low and mostly likely water use scenarios. The most likely scenario is the one recommended for use in regional water planning.

Specific, updated findings since the publication of the 2011 report include:

- An increasing proportion of the total water used is from non-potable sources.
- The oil and gas industry has been developing more water efficient techniques for operations.
- Overall, the total water use for hydraulic fracturing has increased from 36,000 acre-feet in 2008 to approximately 81,500 acre-feet in 2011 (See "Report," Fig. ES1, p. i)
- The amount of recycling/reuse and brackish water use has also increased to approximately 17,000 acre-feet in 2011, 21 percent of the total.
- The Anadarko Basin has hosted much recycling and reuse (estimated at 20 percent) and use of brackish water (estimated at 30 percent).
- For the most part in the Barnett Shale, operators use fresh water (estimated at 80 percent of "new" water). Overall, little recycling/reuse or brackish water use is occurring in this shale gas play.
- Operators in Eagle Ford Shale rely mostly on groundwater, and there is a significant amount of brackish water being used.
- In the Haynesville and East Texas Basin, about 70 percent of the "new" water is groundwater. Water is generally plentiful in East Texas and no significant recycling/reuse and use for brackish water was documented during this updated study.

- The Permian Basin used a significant (30 percent or more) of brackish water in hydraulic fracturing water. Nearly all water used in this region is groundwater.
- The amount of water used depends not only on the length of the well and on operator preferences but, more importantly, on localized factors. For example, in the Eagle Ford the drilling muds used in drilling through horizontal sections (for example, Fan et al., 2011) are oil-based.

In summary:

- The overall result is that the hydraulic fracturing (HF) water use will have a broad plateau at 125,000 acre-feet per year in the 2020-2030 decade and then slowly decrease over time.
- The amount of fresh water consumed (that is, not recycled or reused or brackish water) will stay relatively constant at 70,000 acre-feet per year through the next decade, despite the increase in total water use, and then slowly subside with the decrease in HF activities.
- Fresh water use will decrease for two reasons: (1) the industry is getting better at using brackish water, reusing produced water and recycling water from other users; and (2) in the long run, a greater share of the state's activity is likely to take place in the Permian Basin, where fresh water is at a premium and brackish water is already used by the industry.
- For the oil and gas industry as a whole, water use is projected to peak with a broad plateau at 180,000 acre-feet per year in the 2020-2030 decade, slowly declining to 60,000 acre-feet by 2060. Fresh water consumption in the oil and gas industry is projected to remain at a level close to 100,000 acre-feet per year through the end of this decade and then to slowly decrease to a low level of a few tens of thousands acre-feet by the middle of the century.

Enclosure: Updated Draft Mining Projections

c: Political Subdivisions

Updated Draft Mining Projections (Total Water Demand)

REGION	COUNTY	2020	2030	2040	2050	2060	2070
A	Armstrong	0	0	0	0	0	0
A	Carson	14	14	14	14	14	14
A	Childress	0	0	0	0	0	0
A	Collingsworth	0	0	0	0	0	0
A	Dallam	0	0	0	0	0	0
A	Donley	0	0	0	0	0	0
A	Gray	75	74	67	60	53	47
A	Hall	0	0	0	0	0	0
A	Hansford	577	904	602	309	16	1
A	Hartley	7	7	6	5	4	3
A	Hemphill	2,314	1,763	1,244	732	223	68
A	Hutchinson	184	231	170	113	56	34
A	Lipscomb	1,098	758	446	142	21	3
A	Moore	16	16	16	15	15	15
A	Ochiltree	824	853	503	161	23	3
A	Oldham	475	563	639	671	737	808
A	Potter	941	1,149	1,341	1,453	1,631	1,831
A	Randall	0	0	0	0	0	0
A	Roberts	1,502	1,041	611	189	20	2
A	Sherman	35	207	151	98	44	20
A	Wheeler	3,268	2,329	1,413	503	139	119
A	TOTAL	11,330	9,909	7,223	4,465	2,996	2,968

Updated Draft Mining Projections (Fresh Water Demand)

Region	COUNTY	2020	2030	2040	2050	2060	2070
A	Armstrong	0	0	0	0	0	0
A	Carson	13	13	13	13	13	13
A	Childress	0	0	0	0	0	0
A	Collingsworth	0	0	0	0	0	0
A	Dallam	0	0	0	0	0	0
A	Donley	0	0	0	0	0	0
A	Gray	17	15	15	15	15	14
A	Hall	0	0	0	0	0	0
A	Hansford	261	348	218	108	13	2
A	Hartley	0	0	0	0	0	0
A	Hemphill	971	683	452	252	80	26
A	Hutchinson	113	117	88	66	46	34
A	Lipscomb	467	290	161	52	13	3
A	Moore	13	12	13	13	13	13
A	Ochiltree	355	325	180	57	13	3
A	Oldham	463	551	628	661	728	800
A	Potter	940	1,148	1,340	1,452	1,630	1,830
A	Randall	0	0	0	0	0	0
A	Roberts	647	412	231	76	20	5
A	Sherman	26	84	59	39	21	11
A	Wheeler	1,419	969	589	257	138	121
A	TOTAL	5,705	4,967	3,987	3,061	2,743	2,875

Updated Draft Mining Projections (Total Water Demand)

REGION	COUNTY	2020	2030	2040	2050	2060	2070
B	Archer	405	483	344	279	213	163
B	Baylor	14	14	13	13	13	13
B	Clay	613	786	584	471	357	271
B	Cottle	41	41	38	34	31	28
B	Foard	12	12	12	12	11	10
B	Hardeman	17	17	18	18	18	18
B	King	7,836	7,730	6,857	5,946	5,144	4,450
B	Montague	3,639	2,577	1,606	691	777	875
B	Wichita	62	61	55	49	44	40
B	Wilbarger	20	20	19	19	18	17
B	Young	10	15	10	8	6	4
B	TOTAL	12,669	11,756	9,556	7,540	6,632	5,889

Updated Draft Mining Projections (Fresh Water Demand)

Region	COUNTY	2020	2030	2040	2050	2060	2070
B	Archer	337	344	222	167	119	85
B	Baylor	12	12	12	12	13	13
B	Clay	506	563	382	286	202	142
B	Cottle	14	13	13	13	13	13
B	Foard	10	10	10	10	10	10
B	Hardeman	17	17	18	18	18	18
B	King	565	357	311	271	236	205
B	Montague	2,863	1,949	1,243	680	767	865
B	Wichita	12	11	11	10	10	10
B	Wilbarger	14	14	14	14	14	14
B	Young	8	10	7	5	3	2
B	TOTAL	4,358	3,300	2,243	1,486	1,405	1,377

Updated Draft Mining Projections (Total Water Demand)

REGION	COUNTY	2020	2030	2040	2050	2060	2070
C	Collin	0	0	0	0	0	0
C	Cooke	1,583	900	378	446	511	586
C	Dallas	3,038	2,656	2,279	1,930	1,922	1,916
C	Denton	4,326	2,729	3,345	4,306	5,204	6,291
C	Ellis	147	213	164	123	82	55
C	Fannin	11	16	23	27	33	40
C	Freestone	5,347	5,115	5,251	5,286	5,356	5,582
C	Grayson	79	91	107	123	142	163
C	Henderson	313	457	535	571	598	658
C	Jack	1,555	1,745	1,698	1,731	1,768	1,862
C	Kaufman	296	386	491	646	783	951
C	Navarro	883	1,071	1,282	1,572	1,806	2,076
C	Parker	3,182	4,029	4,006	4,073	4,124	4,364
C	Rockwall	0	0	0	0	0	0
C	Tarrant	7,367	4,482	1,589	1,537	1,497	1,464
C	Wise	10,320	11,159	12,337	13,975	15,378	17,694
C	TOTAL	38,447	35,049	33,485	36,346	39,204	43,702

Updated Draft Mining Projections (Fresh Water Demand)

Region	COUNTY	2020	2030	2040	2050	2060	2070
C	Collin	0	0	0	0	0	0
C	Cooke	1,241	709	363	433	500	577
C	Dallas	2,780	2,449	2,160	1,930	1,922	1,916
C	Denton	3,794	2,722	3,345	4,306	5,204	6,291
C	Ellis	114	150	107	74	45	28
C	Fannin	11	16	23	27	33	40
C	Freestone	5,205	4,875	5,016	5,089	5,217	5,486
C	Grayson	75	87	103	120	139	160
C	Henderson	306	437	508	544	575	641
C	Jack	1,450	1,549	1,527	1,584	1,658	1,781
C	Kaufman	296	386	491	646	783	951
C	Navarro	874	1,062	1,274	1,565	1,800	2,071
C	Parker	2,857	3,442	3,470	3,613	3,779	4,110
C	Rockwall	0	0	0	0	0	0
C	Tarrant	5,989	3,650	1,589	1,537	1,497	1,464
C	Wise	9,696	10,595	11,908	13,730	15,378	17,694
C	TOTAL	34,688	32,129	31,884	35,198	38,530	43,210

Updated Draft Mining Projections (Total Water Demand)

REGION	COUNTY	2020	2030	2040	2050	2060	2070
D	Bowie	0	0	0	0	0	0
D	Camp	12	11	10	9	8	7
D	Cass	39	58	60	45	30	20
D	Delta	0	0	0	0	0	0
D	Franklin	5	5	4	4	3	2
D	Gregg	274	433	429	337	246	180
D	Harrison	2,498	2,077	1,740	1,412	1,088	855
D	Hopkins	1,031	1,124	1,222	1,329	1,446	1,577
D	Hunt	128	118	88	71	58	47
D	Lamar	0	0	0	0	0	0
D	Marion	489	764	712	595	478	393
D	Morris	0	0	0	0	0	0
D	Rains	0	0	0	0	0	0
D	Red River	4	4	3	3	3	3
D	Smith	287	309	341	394	438	497
D	Titus	1,331	1,462	1,595	1,740	1,901	2,077
D	Upshur	379	726	771	609	450	333
D	Van Zandt	300	319	358	396	430	470
D	Wood	25	25	23	21	20	19
D	TOTAL	6,802	7,435	7,356	6,965	6,599	6,480

Updated Draft Mining Projections (Fresh Water Demand)

Region	COUNTY	2020	2030	2040	2050	2060	2070
D	Bowie	0	0	0	0	0	0
D	Camp	1	1	0	0	0	0
D	Cass	36	52	52	38	24	15
D	Delta	0	0	0	0	0	0
D	Franklin	0	0	0	0	0	0
D	Gregg	256	387	371	282	199	141
D	Harrison	2,299	1,856	1,518	1,203	911	708
D	Hopkins	996	1,088	1,189	1,301	1,422	1,556
D	Hunt	128	118	88	71	58	47
D	Lamar	0	0	0	0	0	0
D	Marion	463	697	636	523	417	343
D	Morris	0	0	0	0	0	0
D	Rains	0	0	0	0	0	0
D	Red River	0	0	0	0	0	0
D	Smith	286	308	340	392	437	496
D	Titus	1,325	1,455	1,589	1,735	1,896	2,072
D	Upshur	325	620	644	491	349	248
D	Van Zandt	253	272	316	359	398	442
D	Wood	11	10	10	10	10	10
D	TOTAL	6,379	6,864	6,753	6,405	6,121	6,078

Updated Draft Mining Projections (Total Water Demand)

REGION	COUNTY	2020	2030	2040	2050	2060	2070
E	Brewster	0	0	0	0	0	0
E	Culberson	506	1,240	1,393	1,110	843	640
E	El Paso	4,008	4,626	5,262	5,948	6,693	7,539
E	Hudspeth	479	451	468	483	492	502
E	Jeff Davis	0	0	0	0	0	0
E	Presidio	0	0	0	0	0	0
E	Terrell	673	776	740	606	483	385
E	TOTAL	5,666	7,093	7,863	8,147	8,511	9,066

Updated Draft Mining Projections (Fresh Water Demand)

Region	COUNTY	2020	2030	2040	2050	2060	2070
E	Brewster	0	0	0	0	0	0
E	Culberson	249	371	368	279	208	155
E	El Paso	4,008	4,626	5,262	5,948	6,693	7,539
E	Hudspeth	479	451	468	483	492	502
E	Jeff Davis	0	0	0	0	0	0
E	Presidio	0	0	0	0	0	0
E	Terrell	145	160	154	120	92	70
E	TOTAL	4,881	5,608	6,252	6,830	7,485	8,266

Updated Draft Mining Projections (Total Water Demand)

REGION	COUNTY	2020	2030	2040	2050	2060	2070
F	Andrews	3,959	3,710	3,177	2,509	1,929	1,483
F	Borden	679	927	784	494	244	121
F	Brown	943	948	951	952	948	944
F	Coke	488	482	430	376	328	286
F	Coleman	108	107	97	86	77	69
F	Concho	480	474	422	367	320	279
F	Crane	617	840	861	692	531	407
F	Crockett	1,732	1,843	1,261	682	207	63
F	Ector	1,977	2,164	1,926	1,574	1,272	1,076
F	Glasscock	3,423	3,101	2,384	1,679	1,100	798
F	Howard	2,491	2,747	1,940	1,138	476	199
F	Irion	3,192	3,357	2,423	1,487	713	342
F	Kimble	19	19	19	19	19	19
F	Loving	792	1,058	934	762	601	474
F	Martin	3,527	2,998	2,251	1,441	771	413
F	Mason	1,023	941	708	568	460	372
F	McCulloch	8,927	8,347	6,641	5,627	4,836	4,201
F	Menard	1,086	1,071	952	827	717	622
F	Midland	3,893	3,418	2,630	1,774	1,056	743
F	Mitchell	593	738	632	493	375	290
F	Pecos	690	1,068	1,072	861	672	524
F	Reagan	4,211	3,395	2,457	1,406	529	199
F	Reeves	1,531	2,632	2,537	2,068	1,632	1,288
F	Runnels	272	269	240	210	184	161
F	Schleicher	621	732	562	392	241	148
F	Scurry	280	456	483	363	246	167
F	Sterling	780	953	812	522	270	140
F	Sutton	446	720	763	573	389	264
F	Tom Green	1,056	1,080	1,119	1,112	1,134	1,156
F	Upton	4,237	3,634	2,873	1,926	1,150	803
F	Ward	797	964	840	645	458	329
F	Winkler	787	1,169	991	756	531	373
F	TOTAL	55,657	56,362	46,172	34,381	24,416	18,753

Updated Draft Mining Projections (Fresh Water Demand)

Region	COUNTY	2020	2030	2040	2050	2060	2070
F	Andrews	1,029	819	640	453	311	214
F	Borden	263	331	267	164	82	41
F	Brown	923	929	934	937	935	933
F	Coke	50	38	36	34	32	30
F	Coleman	24	22	21	21	20	20
F	Concho	46	34	31	29	27	25
F	Crane	225	273	265	201	149	110
F	Crockett	641	650	434	235	85	31
F	Ector	1,028	1,044	938	828	753	715
F	Glasscock	1,376	1,222	965	738	572	504
F	Howard	898	938	633	354	142	57
F	Irion	937	940	621	327	102	32
F	Kimble	19	19	19	19	19	19
F	Loving	223	279	229	175	131	98
F	Martin	1,191	933	651	380	177	82
F	Mason	1,023	941	708	568	460	372
F	McCulloch	8,892	8,311	6,609	5,599	4,812	4,180
F	Menard	88	59	53	48	43	39
F	Midland	1,627	1,398	1,098	819	608	534
F	Mitchell	374	411	364	287	234	194
F	Pecos	313	353	320	249	198	158
F	Reagan	1,501	1,153	796	432	155	55
F	Reeves	699	921	806	631	495	388
F	Runnels	32	26	24	23	22	21
F	Schleicher	199	225	165	109	64	37
F	Scurry	118	169	168	123	83	56
F	Sterling	290	331	270	166	85	44
F	Sutton	185	264	264	192	130	88
F	Tom Green	1,011	1,035	1,079	1,077	1,104	1,131
F	Upton	1,808	1,513	1,220	900	670	578
F	Ward	339	356	292	221	161	121
F	Winkler	295	387	305	220	149	101
F	TOTAL	27,667	26,324	21,225	16,559	13,010	11,008

Updated Draft Mining Projections (Total Water Demand)

REGION	COUNTY	2020	2030	2040	2050	2060	2070
G	Bell	3,242	3,980	4,599	5,349	6,105	6,968
G	Bosque	1,972	2,071	1,892	1,872	1,833	1,821
G	Brazos	1,088	1,610	1,433	1,144	923	814
G	Burleson	995	1,923	1,512	1,100	686	428
G	Callahan	228	227	214	201	190	180
G	Comanche	444	525	363	276	188	128
G	Coryell	1,510	1,072	491	363	398	437
G	Eastland	1,164	1,173	929	714	518	432
G	Erath	505	536	376	304	232	177
G	Falls	225	246	259	286	307	331
G	Fisher	407	402	359	313	273	238
G	Grimes	323	602	471	340	209	128
G	Hamilton	393	236	101	0	0	0
G	Haskell	93	92	83	74	66	59
G	Hill	1,634	1,190	775	403	436	472
G	Hood	2,078	2,436	2,222	2,133	2,043	2,057
G	Johnson	4,126	2,788	1,515	1,013	1,161	1,336
G	Jones	239	234	218	199	183	169
G	Kent	38	38	35	32	29	26
G	Knox	15	15	14	14	14	14
G	Lampasas	198	221	241	261	286	313
G	Lee	3,180	7,289	7,767	8,304	8,904	9,631
G	Limestone	10,317	9,925	9,865	10,339	10,805	11,425
G	McLennan	2,538	3,000	3,060	3,508	3,832	4,216
G	Milam	14	14	14	14	14	14
G	Nolan	225	222	200	178	158	141
G	Palo Pinto	656	847	625	480	336	235
G	Robertson	9,913	11,753	13,768	16,222	19,217	22,940
G	Shackelford	562	747	558	442	328	243
G	Somervell	1,112	1,279	1,146	1,060	998	971
G	Stephens	5,064	5,141	4,458	3,825	3,257	2,773
G	Stonewall	584	576	512	446	388	338
G	Taylor	391	391	366	346	329	315
G	Throckmorton	194	191	171	150	132	116
G	Washington	569	866	703	538	373	264
G	Williamson	5,163	6,247	7,364	8,555	9,782	11,186
G	Young	187	276	196	151	105	73
G	TOTAL	61,586	70,381	68,875	70,949	75,038	81,409

Updated Draft Mining Projections (Fresh Water Demand)

Region	COUNTY	2020	2030	2040	2050	2060	2070
G	Bell	3,242	3,980	4,599	5,349	6,105	6,968
G	Bosque	1,877	1,877	1,716	1,711	1,698	1,708
G	Brazos	824	1,124	1,033	842	732	694
G	Burleson	632	1,135	855	595	354	210
G	Callahan	158	156	150	146	143	139
G	Comanche	374	380	240	170	109	70
G	Coryell	1,244	853	436	363	398	437
G	Eastland	766	711	548	422	328	330
G	Erath	427	391	250	188	134	96
G	Falls	225	246	259	286	307	331
G	Fisher	44	34	31	29	28	26
G	Grimes	214	367	276	192	115	68
G	Hamilton	312	169	66	0	0	0
G	Haskell	18	16	15	15	15	15
G	Hill	1,322	938	632	403	436	471
G	Hood	1,928	2,154	1,964	1,912	1,877	1,934
G	Johnson	3,276	2,173	1,279	1,013	1,161	1,336
G	Jones	140	134	129	122	117	112
G	Kent	14	13	13	13	13	13
G	Knox	12	12	12	12	12	12
G	Lampasas	198	221	241	261	286	313
G	Lee	3,031	7,029	7,553	8,142	8,803	9,568
G	Limestone	10,270	9,855	9,801	10,285	10,767	11,398
G	McLennan	2,501	2,916	2,989	3,447	3,787	4,183
G	Milam	14	14	14	14	14	14
G	Nolan	44	39	38	37	36	35
G	Palo Pinto	483	557	370	261	165	105
G	Robertson	9,754	11,591	13,629	16,115	19,154	22,903
G	Shackelford	329	409	263	187	121	78
G	Somervell	1,044	1,152	1,030	961	923	916
G	Stephens	663	591	423	328	244	182
G	Stonewall	54	39	35	32	30	28
G	Taylor	331	330	312	299	288	280
G	Throckmorton	25	20	19	19	18	17
G	Washington	370	526	415	309	213	152
G	Williamson	5,163	6,247	7,364	8,555	9,782	11,186
G	Young	157	198	128	92	62	41
G	TOTAL	51,480	58,597	59,127	63,127	68,775	76,369

Updated Draft Mining Projections (Total Water Demand)

REGION	COUNTY	2020	2030	2040	2050	2060	2070
H	Austin	127	320	257	194	132	90
H	Brazoria	968	1,189	1,389	1,609	1,842	2,126
H	Chambers	9	9	9	9	9	9
H	Fort Bend	72	75	57	42	28	19
H	Galveston	381	408	450	486	520	555
H	Harris	3,273	3,252	3,194	3,159	3,132	3,110
H	Leon	2,402	2,481	2,077	1,530	985	634
H	Liberty	437	457	446	468	496	539
H	Madison	597	972	754	538	323	194
H	Montgomery	1,453	1,363	1,077	921	806	728
H	Polk	124	98	72	46	21	9
H	San Jacinto	8	8	9	9	9	9
H	Trinity	5	5	5	5	5	5
H	Walker	11	11	11	11	11	11
H	Waller	7	7	7	7	7	7
H	TOTAL	9,874	10,655	9,814	9,034	8,326	8,045

Updated Draft Mining Projections (Fresh Water Demand)

Region	COUNTY	2020	2030	2040	2050	2060	2070
H	Austin	88	195	151	110	73	48
H	Brazoria	944	1,150	1,356	1,585	1,828	2,118
H	Chambers	9	9	9	9	9	9
H	Fort Bend	54	52	39	30	21	15
H	Galveston	381	408	450	486	520	555
H	Harris	3,273	3,252	3,194	3,159	3,132	3,111
H	Leon	1,897	1,611	1,325	941	584	362
H	Liberty	437	457	446	468	496	539
H	Madison	384	581	432	295	169	97
H	Montgomery	1,453	1,363	1,077	921	806	728
H	Polk	81	63	45	29	15	7
H	San Jacinto	8	8	9	9	9	9
H	Trinity	5	5	5	5	5	5
H	Walker	11	11	11	11	11	11
H	Waller	7	7	7	7	7	7
H	TOTAL	9,032	9,172	8,556	8,065	7,685	7,621

Updated Draft Mining Projections (Total Water Demand)

REGION	COUNTY	2020	2030	2040	2050	2060	2070
I	Anderson	140	177	185	147	105	75
I	Angelina	220	412	389	312	237	180
I	Cherokee	172	263	267	204	141	97
I	Hardin	12	12	12	12	12	12
I	Henderson	44	74	77	59	40	28
I	Houston	322	254	187	119	51	22
I	Jasper	148	118	88	58	28	14
I	Jefferson	193	215	244	294	329	368
I	Nacogdoches	2,299	1,986	1,643	1,299	958	707
I	Newton	429	373	279	209	146	107
I	Orange	309	314	313	314	319	327
I	Panola	3,220	3,560	3,418	3,300	3,201	3,201
I	Polk	123	97	72	46	20	9
I	Rusk	2,990	4,007	3,870	3,724	3,601	3,592
I	Sabine	899	1,365	1,203	1,046	888	776
I	San Augustine	2,077	1,779	1,479	1,180	884	662
I	Shelby	3,283	2,938	2,496	1,980	1,467	1,087
I	Smith	102	138	140	109	80	58
I	Trinity	5	5	5	5	5	5
I	Tyler	160	198	150	103	55	29
I	TOTAL	17,147	18,285	16,517	14,520	12,567	11,356

Updated Draft Mining Projections (Fresh Water Demand)

Region	COUNTY	2020	2030	2040	2050	2060	2070
I	Anderson	88	109	121	93	63	43
I	Angelina	203	366	336	263	195	144
I	Cherokee	163	239	236	173	116	77
I	Hardin	12	12	12	12	12	12
I	Henderson	41	67	68	50	33	22
I	Houston	210	161	116	74	35	17
I	Jasper	98	77	57	38	21	12
I	Jefferson	193	215	244	294	329	368
I	Nacogdoches	2,101	1,764	1,420	1,089	779	558
I	Newton	371	324	242	185	138	105
I	Orange	309	314	313	314	319	327
I	Panola	3,043	3,363	3,220	3,114	3,043	3,070
I	Polk	81	62	45	29	14	7
I	Rusk	2,858	3,743	3,606	3,478	3,393	3,418
I	Sabine	851	1,245	1,084	935	793	697
I	San Augustine	1,880	1,567	1,268	983	715	520
I	Shelby	2,976	2,593	2,143	1,650	1,185	851
I	Smith	81	111	111	84	58	40
I	Trinity	5	5	5	5	5	5
I	Tyler	106	125	93	63	36	20
I	TOTAL	15,670	16,462	14,740	12,926	11,282	10,313

Updated Draft Mining Projections (Total Water Demand)

REGION	COUNTY	2020	2030	2040	2050	2060	2070
J	Bandera	0	0	0	0	0	0
J	Edwards	29	29	29	29	29	29
J	Kerr	76	80	100	102	111	120
J	Kinney	0	0	0	0	0	0
J	Real	0	0	0	0	0	0
J	Val Verde	190	249	259	223	192	171
J	TOTAL	295	358	388	354	332	320

Updated Draft Mining Projections (Fresh Water Demand)

Region	COUNTY	2020	2030	2040	2050	2060	2070
J	Bandera	0	0	0	0	0	0
J	Edwards	29	29	29	29	29	29
J	Kerr	76	80	100	102	111	120
J	Kinney	0	0	0	0	0	0
J	Real	0	0	0	0	0	0
J	Val Verde	137	156	158	146	140	137
J	TOTAL	242	265	287	277	280	286

Updated Draft Mining Projections (Total Water Demand)

REGION	COUNTY	2020	2030	2040	2050	2060	2070
K	Bastrop	2,884	6,813	7,498	8,263	9,085	9,996
K	Blanco	0	0	0	0	0	0
K	Burnet	4,490	5,412	6,379	7,255	8,263	9,412
K	Colorado	3,426	4,446	4,137	3,789	3,501	3,337
K	Fayette	2,526	2,032	1,465	918	359	350
K	Gillespie	4	4	4	4	4	4
K	Hays	845	1,075	1,361	1,445	1,654	1,893
K	Llano	0	0	0	0	0	0
K	Matagorda	96	100	75	55	35	22
K	Mills	0	0	0	0	0	0
K	San Saba	1,088	1,093	944	900	864	838
K	Travis	3,502	4,108	4,762	5,374	6,046	6,817
K	Wharton	71	74	55	41	26	17
K	Williamson	0	0	0	0	0	0
K	TOTAL	18,932	25,157	26,680	28,044	29,837	32,686

Updated Draft Mining Projections (Fresh Water Demand)

Region	COUNTY	2020	2030	2040	2050	2060	2070
K	Bastrop	2,884	6,813	7,498	8,263	9,085	9,996
K	Blanco	0	0	0	0	0	0
K	Burnet	4,490	5,412	6,379	7,255	8,263	9,412
K	Colorado	3,220	3,825	3,613	3,375	3,213	3,137
K	Fayette	1,599	1,263	916	618	338	349
K	Gillespie	4	4	4	4	4	4
K	Hays	845	1,075	1,361	1,445	1,654	1,893
K	Llano	0	0	0	0	0	0
K	Matagorda	72	69	51	38	27	19
K	Mills	0	0	0	0	0	0
K	San Saba	1,088	1,093	944	900	864	838
K	Travis	3,502	4,108	4,762	5,374	6,046	6,817
K	Wharton	53	51	38	29	20	14
K	Williamson	0	0	0	0	0	0
K	TOTAL	17,757	23,713	25,566	27,301	29,514	32,479

Updated Draft Mining Projections (Total Water Demand)

REGION	COUNTY	2020	2030	2040	2050	2060	2070
L	Atascosa	4,081	4,043	3,935	3,212	2,478	2,043
L	Bexar	7,820	8,740	9,533	10,404	11,399	12,502
L	Caldwell	123	98	72	46	20	9
L	Calhoun	52	55	41	30	19	12
L	Comal	8,600	9,996	11,340	12,513	13,982	15,628
L	DeWitt	1,858	1,421	958	500	42	4
L	Dimmit	4,919	5,001	4,337	2,824	1,315	612
L	Frio	1,217	1,250	1,178	986	620	390
L	Goliad	70	73	54	40	26	17
L	Gonzales	1,600	1,207	813	418	24	1
L	Guadalupe	456	550	639	755	884	1,043
L	Hays	0	0	0	0	0	0
L	Karnes	2,528	1,919	1,288	662	35	2
L	Kendall	0	0	0	0	0	0
L	La Salle	4,617	4,772	4,263	2,819	1,380	676
L	Medina	1,851	2,057	2,231	2,407	2,629	2,872
L	Refugio	66	69	51	38	24	15
L	Uvalde	2,661	2,916	3,037	3,279	3,564	3,874
L	Victoria	72	75	56	41	27	18
L	Wilson	1,929	1,548	1,165	782	399	204
L	Zavala	2,531	2,257	1,977	1,559	932	557
L	TOTAL	47,051	48,047	46,968	43,315	39,799	40,479

Updated Draft Mining Projections (Fresh Water Demand)

Region	COUNTY	2020	2030	2040	2050	2060	2070
L	Atascosa	3,022	2,888	2,657	2,191	1,789	1,583
L	Bexar	7,820	8,740	9,533	10,404	11,399	12,502
L	Caldwell	81	62	45	29	14	7
L	Calhoun	39	38	28	21	15	10
L	Comal	8,600	9,996	11,340	12,513	13,982	15,628
L	DeWitt	1,149	846	550	281	35	4
L	Dimmit	2,980	2,795	2,246	1,368	569	236
L	Frio	772	752	652	504	296	174
L	Goliad	53	50	37	28	20	14
L	Gonzales	980	712	463	233	23	2
L	Guadalupe	456	550	639	755	884	1,043
L	Hays	0	0	0	0	0	0
L	Karnes	1,545	1,127	728	363	29	2
L	Kendall	0	0	0	0	0	0
L	La Salle	2,801	2,647	2,183	1,349	590	258
L	Medina	1,851	2,057	2,231	2,407	2,629	2,872
L	Refugio	49	47	35	26	18	13
L	Uvalde	2,661	2,916	3,037	3,279	3,564	3,874
L	Victoria	54	52	38	29	20	14
L	Wilson	1,182	912	659	426	210	104
L	Zavala	1,570	1,336	1,092	802	450	253
L	TOTAL	37,665	38,523	38,193	37,008	36,536	38,593

Updated Draft Mining Projections (Total Water Demand)

REGION	COUNTY	2020	2030	2040	2050	2060	2070
M	Cameron	65	68	47	31	15	7
M	Hidalgo	2,445	3,203	3,888	4,592	5,385	6,339
M	Jim Hogg	93	97	72	53	34	22
M	Maverick	1,988	2,737	2,933	2,302	1,674	1,217
M	Starr	571	697	775	858	961	1,091
M	Webb	3,862	3,008	2,257	1,537	690	502
M	Willacy	49	51	38	28	18	12
M	Zapata	85	89	66	49	31	20
M	TOTAL	9,158	9,950	10,076	9,450	8,808	9,210

Updated Draft Mining Projections (Fresh Water Demand)

Region	COUNTY	2020	2030	2040	2050	2060	2070
M	Cameron	45	43	28	18	9	4
M	Hidalgo	2,413	3,161	3,856	4,570	5,374	6,334
M	Jim Hogg	70	67	49	37	26	18
M	Maverick	1,201	1,474	1,461	1,085	744	511
M	Starr	547	665	750	840	953	1,088
M	Webb	2,491	1,905	1,416	986	545	464
M	Willacy	37	35	26	19	14	10
M	Zapata	64	61	45	34	24	17
M	TOTAL	6,868	7,411	7,631	7,589	7,689	8,446

Updated Draft Mining Projections (Total Water Demand)

REGION	COUNTY	2020	2030	2040	2050	2060	2070
N	Aransas	10	7	5	5	5	5
N	Bee	472	458	428	372	338	318
N	Brooks	357	360	340	324	308	298
N	Duval	1,388	1,444	1,352	1,241	1,165	1,104
N	Jim Wells	71	74	55	40	26	17
N	Kenedy	118	123	92	68	43	27
N	Kleberg	357	360	340	324	308	298
N	Live Oak	814	757	798	729	492	332
N	McMullen	2,912	3,448	3,398	2,622	1,850	1,305
N	Nueces	724	853	947	1,021	1,130	1,260
N	San Patricio	372	421	440	460	492	533
N	TOTAL	7,595	8,305	8,195	7,206	6,157	5,497

Updated Draft Mining Projections (Fresh Water Demand)

Region	COUNTY	2020	2030	2040	2050	2060	2070
N	Aransas	10	6	5	5	5	5
N	Bee	434	420	400	355	332	317
N	Brooks	338	335	321	311	302	295
N	Duval	1,351	1,396	1,315	1,215	1,152	1,098
N	Jim Wells	53	51	37	28	20	14
N	Kenedy	89	85	62	47	33	23
N	Kleberg	338	335	321	311	302	295
N	Live Oak	523	455	433	363	230	146
N	McMullen	1,775	1,911	1,746	1,276	848	564
N	Nueces	707	831	929	1,009	1,124	1,257
N	San Patricio	358	402	426	450	487	531
N	TOTAL	5,976	6,227	5,995	5,370	4,835	4,545

Updated Draft Mining Projections (Total Water Demand)

REGION	COUNTY	2020	2030	2040	2050	2060	2070
O	Bailey	0	0	0	0	0	0
O	Briscoe	0	0	0	0	0	0
O	Castro	0	0	0	0	0	0
O	Cochran	154	208	210	163	115	81
O	Crosby	994	980	871	757	656	568
O	Dawson	954	1,164	1,023	703	423	255
O	Deaf Smith	0	0	0	0	0	0
O	Dickens	12	12	12	12	12	12
O	Floyd	486	492	489	486	484	485
O	Gaines	1,829	2,400	2,071	1,527	1,051	776
O	Garza	395	544	438	334	234	164
O	Hale	1,168	1,152	1,022	886	766	662
O	Hockley	18	18	17	17	16	15
O	Lamb	586	579	513	445	385	333
O	Lubbock	6,354	6,425	5,913	5,302	4,763	4,314
O	Lynn	1,166	1,327	1,255	1,033	826	660
O	Motley	240	213	205	198	179	161
O	Parmer	0	0	0	0	0	0
O	Swisher	0	0	0	0	0	0
O	Terry	355	525	543	416	293	206
O	Yoakum	1,300	1,334	1,147	957	783	641
O	TOTAL	16,011	17,373	15,729	13,236	10,986	9,333

Updated Draft Mining Projections (Fresh Water Demand)

Region	COUNTY	2020	2030	2040	2050	2060	2070
O	Bailey	0	0	0	0	0	0
O	Briscoe	0	0	0	0	0	0
O	Castro	0	0	0	0	0	0
O	Cochran	54	71	70	54	38	27
O	Crosby	82	55	50	45	40	36
O	Dawson	328	360	296	189	104	58
O	Deaf Smith	0	0	0	0	0	0
O	Dickens	12	12	12	12	13	13
O	Floyd	361	365	377	388	399	412
O	Gaines	990	1,094	933	744	597	513
O	Garza	144	184	142	104	71	49
O	Hale	82	51	45	39	33	29
O	Hockley	13	13	13	13	13	13
O	Lamb	41	26	22	19	17	14
O	Lubbock	1,124	1,039	1,092	1,130	1,165	1,211
O	Lynn	179	205	200	150	107	76
O	Motley	130	102	106	113	105	98
O	Parmer	0	0	0	0	0	0
O	Swisher	0	0	0	0	0	0
O	Terry	121	168	167	122	83	57
O	Yoakum	209	191	151	115	84	62
O	TOTAL	3,870	3,936	3,676	3,237	2,869	2,668

Updated Draft Mining Projections (Total Water Demand)

REGION	COUNTY	2020	2030	2040	2050	2060	2070
P	Jackson	70	73	55	40	26	17
P	Lavaca	1,613	1,313	985	662	340	175
P	Wharton	18	19	14	10	7	4
P	TOTAL	1,701	1,405	1,054	712	373	196

Updated Draft Mining Projections (Fresh Water Demand)

Region	COUNTY	2020	2030	2040	2050	2060	2070
P	Jackson	53	51	37	28	20	14
P	Lavaca	1,005	786	567	368	184	92
P	Wharton	14	13	9	7	5	4
P	TOTAL	1,072	850	613	403	209	110