GTA Aquifer Assessment 10-03
Groundwater Management Area 10
Trinity Aquifer subcrop
Draft Managed Available Groundwater estimates
June 10, 2010

GTA Aquifer Assessment 10-03

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This document is released for the purpose of interim review under the authority of David Thorkildsen, P.G. 705 on June 10, 2010

REQUESTOR:

Rick Illgner, of the Edwards Aquifer Authority acting on behalf of Groundwater Management Area 10.

DESCRIPTION OF REQUEST:

Mr. Illgner provided the Texas Water Development Board (TWDB) with alternative draft desired future conditions for the Trinity Aquifer subcrop in Groundwater Management Area 10 and requested that TWDB estimate alternative draft managed available groundwater values. This aquifer assessment presents the alternative draft managed available groundwater for the Trinity Aquifer subcrop in Groundwater Management Area 10.

DRAFT DESIRED FUTURE CONDITIONS:

Trinity Aquifer subcrop – Allow average drawdowns of 25, 50, 75, 100, and 125 feet in the Subcrop Trinity Aquifer [over the next 50 years] (lumping the upper, middle, and lower Trinity into one aquifer, and further specifying that part of the Trinity that is a freshwater aquifer).

METHODS:

A transient hydrologic budget for the saturated portion of an aquifer is described by Freeze and Cherry (1979, p.365):

$$Q(t) = R(t) - D(t) + \frac{dS}{dt}$$

where Q(t)= total rate of groundwater withdrawal
R(t)= total rate of groundwater recharge to the basin
D(t)= total rate of groundwater discharge from the basin
$\frac{dS}{dt}$ = rate of change of storage in the saturated zone of the basin

For this analysis, it is assumed that

$$R(t) = R(r) + R(e)$$

where R(r) = rejected recharge for the basin
R(e) = effective recharge

Effective recharge is the amount of water that enters an aquifer and is available for development (Muller and Price, 1978, p. 5). Rejected recharge is the amount of total (or potential) recharge that discharges from an aquifer because it is over-full and cannot accept more water (Theis, 1940, p.1).

In addition, it is assumed that

$$R(r) \cong D(t)$$

Therefore, the total rate of groundwater withdrawal equals effective recharge plus the change in storage of the aquifer, or

$$Q(t) = R(e) + \frac{dS}{dt}$$

County, river basin, regional water planning area, area with water quality less than or equal to 3,000 milligrams per liter (mg/l) total dissolved solids (TDS), and groundwater conservation district boundaries were used to split the aquifer into map areas (Figure 1). The areal extent of each aquifer map area was calculated.

Because Groundwater Management Area 10 does not include any outcrop area for the Trinity Aquifer, no estimated effective recharge based on precipitation was included in the draft managed available groundwater calculations.

Lateral inflow to the Trinity Aquifer subcrop in Groundwater Management Area 10 was estimated based on the average outflow across the Balcones Fault Zone results of Draft GAM Task 10-005 (Hutchison, 2010). Draft GAM Task 10-005 provides results of seven pumping scenarios from the Trinity Aquifer within Groundwater Management Area 9 using the Groundwater Availability Model (GAM) for the Hill Country portion of the Trinity Aquifer system in Texas. The average outflow across the Balcones Fault Zone results from Scenario 5 (total pumpage approximately 80,000 acre-feet per year) is used for the calculations in this assessment.

The areal extent of each map area in Travis and Hays counties was multiplied by the aquifer storage coefficient derived from aquifer tests performed and compiled by the Barton Springs/Edwards Aquifer Conservation District (BSEACD) for the Trinity Aquifer subcrop in Travis and Hays counties (BSEACD, in preparation). The remaining map areas were multiplied by the aquifer storage coefficient derived for the calibrated Groundwater Availability Model (GAM) for the Hill Country portion of the Trinity Aquifer system in Texas (Jones and others, 2009). Each map area was then multiplied by several uniform water level drawdown scenarios specified in the draft desired future conditions.

Volumes for each scenario were then divided by 50 years to obtain an annual volume.

The calculations were completed in a Microsoft Excel worksheet.

PARAMETERS AND ASSUMPTIONS:

- The entire aquifer extent is assumed to be under artesian conditions and calculated as a confined aquifer.
- The aquifer is considered to contain water that is fresh to slightly saline (< = 3,000 TDS)
- The aquifer area was calculated from the TWDB shapefile for the Trinity Aquifer, projected into the GAM projection (Anaya, 2001).
- Areas, in acres, were calculated within ArcGIS 9.3.
- Map areas were designated as Plum Creek Conservation District only where their jurisdiction does not overlap with the BSEACD.
- The Edwards Aquifer Authority (EAA) is not included in this assessment because they are restricted by their legislation to manage only the Edwards Aquifer. Map areas where the EAA (and no other district) exists are designated as “no regulatory GCD.”
- The draft managed available groundwater volume estimates are the annual volume of water depleted from the aquifer based on the draft desired future conditions.
- Water level drawdowns were assumed to be uniform across the aquifer.
- Annual volumes are calculated by dividing the total volume by 50 years.
- Because Groundwater Management Area 10 does not include any outcrop area for the Trinity Aquifer annual effective recharge from precipitation is assumed to be zero.
- Lateral inflow to the Trinity Aquifer subcrop in Groundwater Managemnet Area 10 is estimated to be 64,696 acre-feet per year based on the average outflow across the Balcones Fault Zone results (Scenario 5) from Draft GAM Task 10-005 (Hutchison, 2010) This volume was apportioned across the aquifer map areas.
- The storage coefficient of the Trinity Aquifer subcrop is 0.001 derived from aquifer tests of the Trinity Aquifer subcrop in Travis and Hays counties (BSEACD, in preparation). The storage coefficient of the Trinity Aquifer subcrop in the remaining counties is 0.0000001 as derived from the calibrated GAM for the hill country portion of the Trinity Aquifer system in Texas (Jones and others, 2009).
- Conditions were assumed to be physically possible across of Groundwater Management Area 10.

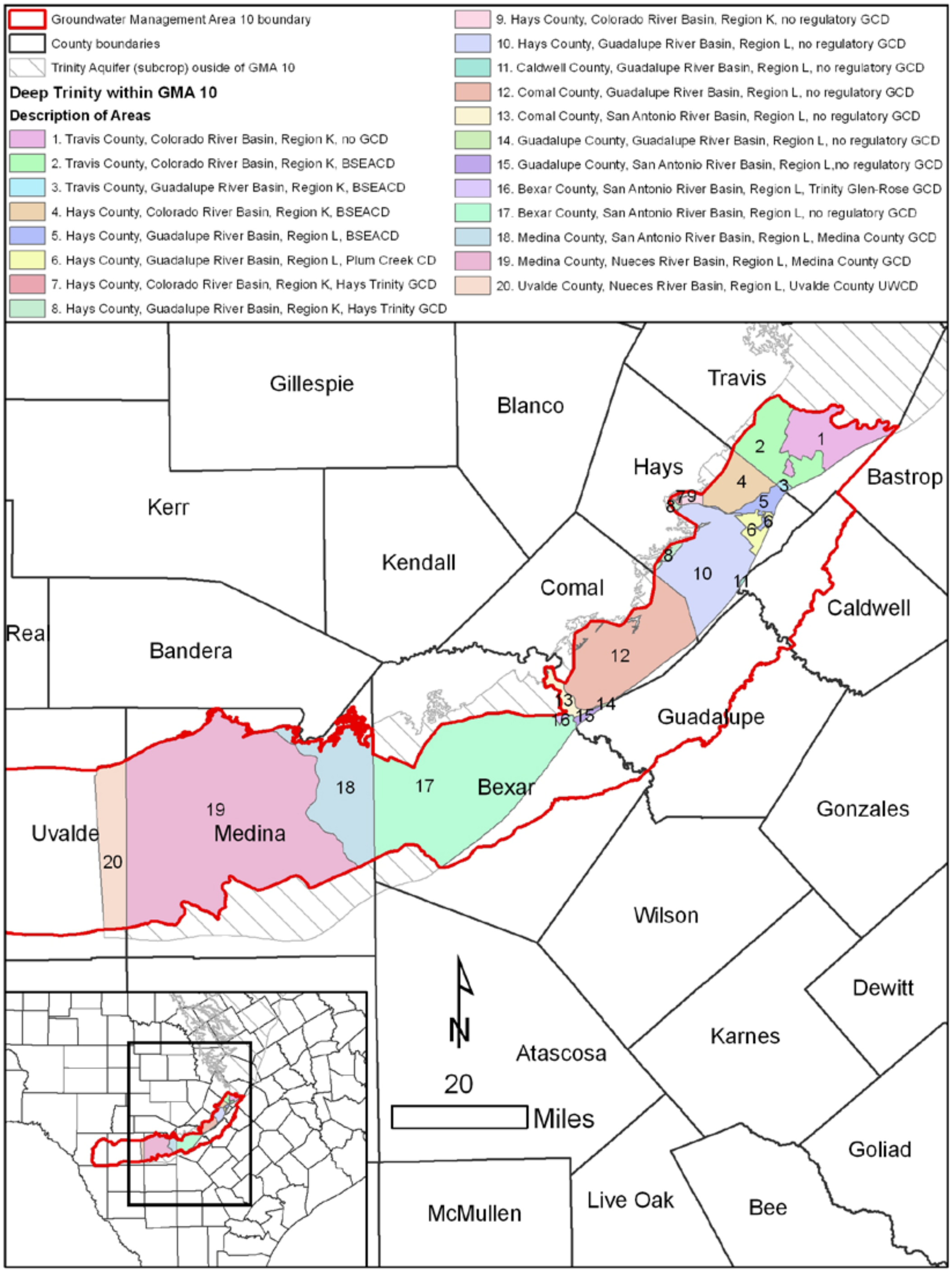

Figure 1. Geographic subdivisions for analyzing draft managed available groundwater for the Trinity Aquifer subcrop in GMA 10. GMA = groundwater management area, BSEACD = Barton Springs/Edwards Aquifer Conservation District, CD = conservation district, GCD = groundwater conservation district, UWCD = underground water conservation district

RESULTS:

The results (Tables 1-7) show the draft managed available groundwater estimates for the Trinity Aquifer subcrop in Groundwater Management Area 10. Drawdowns of 25, 50, 75, 100, and 125 feet result in an estimated annual total volume of 64,833; 64,966; 65,104; 65,238 and 65,372 acre-feet per year, respectively.

The following table summarizes the draft managed available groundwater for the groundwater conservation districts based on the requested conditions for the Trinity Aquifer subcrop in Groundwater Management Area 10. Summaries of draft managed available groundwater for the groundwater conservation districts using alternative inflow estimates (scenarios 6 and 7) from Draft GAM Task 10-005 are provided in Appendix A.

Table 1. Summary of draft managed available groundwater for the Trinity Aquifer subcrop in Groundwater Management Area 10 by groundwater conservation district.

Groundwater Conservation District	25 ft. decline	50 ft. decline	75 ft. decline	100 ft. decline	125 ft. decline
BSEACD	1,724	1,772	1,823	1,873	1,921
Hays Trinity GCD	146	148	152	154	156
Medina County GCD	6,788	6,788	6,788	6,788	6,788
Plum Creek CD	292	297	303	308	314
Trinity Glen-Rose GCD	122	122	122	122	122
Uvalde County UWCD	754	754	754	754	754
Total (ac-ft/yr)	**9,826**	**9,881**	**9,942**	**9,999**	**10,055**

BSEACD = Barton Springs/Edwards Aquifer Conservation District
GCD = groundwater conservation district
UWCD = underground water conservation district
CD = conservation district
ac-ft/yr = acre-feet per year

Table 2. Estimates of draft managed available groundwater for the subcrop Trinity Aquifer summarized by map areas (see Figure 1).

GMA	Aquifer	County	GCD	Map Area	Estimated storage coefficient	Areal extent (acres)	Desired total aquifer water level decline (feet)	Estimated total volume from water level decline (acre-feet)	Estimated annual volume from water level decline (ac-ft/yr)	Estimated annual lateral inflow (ac-ft/yr)	Estimated annual total volume (ac-ft/yr)
10	Trinity Subcrop	Travis	none	1	0.001	53,168	25	1,329	27	470	497
							50	2,658	53		523
							75	3,988	80		550
							100	5,317	106		576
							125	6,646	133		603
			BSEACD	2	0.001	53,352	25	1,334	27	470	497
							50	2,668	53		523
							75	4,001	80		550
							100	5,335	107		577
							125	6,669	133		603
				3	0.001	1,340	25	34	1	10	11
							50	67	1		11
							75	101	2		12
							100	134	3		13
							125	168	3		13
		Hays		4	0.001	33,789	25	845	17	907	924
							50	1,689	34		941
							75	2,534	51		958
							100	3,379	68		975
							125	4,224	84		991
				5	0.001	11,243	25	281	6	286	292
							50	562	11		297
							75	843	17		303
							100	1,124	22		308
							125	1,405	28		314
			Plum Creek CD	6	0.001	11,042	25	276	6	286	292
							50	552	11		297
							75	828	17		303
							100	1,104	22		308
							125	1,380	28		314
			Hays Trinity GCD	7	0.001	994	25	25	1	48	49
							50	50	1		49
							75	75	2		50
							100	99	2		50
							125	124	2		50
				8	0.001	4,342	25	109	2	95	97
							50	217	4		99
							75	326	7		102
							100	434	9		104
							125	543	11		106
			no regulatory GCD	9	0.001	2,618	25	65	1	48	49
							50	131	3		51
							75	196	4		52
							100	262	5		53
							125	327	7		55
				10	0.001	98,837	25	2,471	49	2,673	2,722
							50	4,942	99		2,772
							75	7,413	148		2,821
							100	9,884	198		2,871
							125	12,355	247		2,920

Table 2 continued.

GMA	Aquifer	County	GCD	Map Area	Estimated storage coefficient	Areal extent (acres)	Desired total aquifer water level decline (feet)	Estimated total volume from water level decline (acre-feet)	Estimated annual volume from water level decline (ac-ft/yr)	Estimated annual lateral inflow (ac-ft/yr)	Estimated annual total volume (ac-ft/yr)
10	Trinity Subcrop	Caldwell	no regulatory GCD	11	0.0000001	420	25	0	0	0	0
							50	0	0		0
							75	0	0		0
							100	0	0		0
							125	0	0		0
		Comal		12	0.0000001	123,768	25	0	0	27,930	27,930
							50	1	0		27,930
							75	1	0		27,930
							100	1	0		27,930
							125	2	0		27,930
				13	0.0000001	8,679	25	0	0	2,095	2,095
							50	0	0		2,095
							75	0	0		2,095
							100	0	0		2,095
							125	0	0		2,095
		Guadalupe		14	0.0000001	302	25	0	0	0	0
							50	0	0		0
							75	0	0		0
							100	0	0		0
							125	0	0		0
				15	0.0000001	2,362	25	0	0	0	0
							50	0	0		0
							75	0	0		0
							100	0	0		0
							125	0	0		0
		Bexar	Trinity Glen-Rose GCD	16	0.0000001	1,642	25	0	0	122	122
							50	0	0		122
							75	0	0		122
							100	0	0		122
							125	0	0		122
			no regulatory GCD	17	0.0000001	264,374	25	1	0	21,714	21,714
							50	1	0		21,714
							75	2	0		21,714
							100	3	0		21,714
							125	3	0		21,714
		Medina	Medina County GCD	18	0.0000001	103,048	25	0	0	1,257	1,257
							50	1	0		1,257
							75	1	0		1,257
							100	1	0		1,257
							125	1	0		1,257
				19	0.0000001	455,928	25	1	0	5,531	5,531
							50	2	0		5,531
							75	3	0		5,531
							100	5	0		5,531
							125	6	0		5,531
		Uvalde	Uvalde County UWCD	20	0.0000001	63,462	25	0	0	754	754
							50	0	0		754
							75	0	0		754
							100	1	0		754
							125	1	0		754
	Total					1,294,711	25			64,696	64,833
							50				64,966
							75				65,104
							100				65,238
							125				65,372

GMA = groundwater management area GCD = groundwater conservation district CD = conservation district
BSEACD = Barton Springs/Edwards Aquifer Conservation District UWCD = underground water conservation district ac-ft/yr = acre-feet per year
The formulas for this table are: storage coefficient * areal extent * desired total aquifer water level decline = estimated total volume from water level decline/50 = estimated annual volume from water level decline. Estimated annual volume from water level decline + estimated annual lateral inflow = estimated annual total volume.

Table 3. Estimates of draft managed available groundwater for water level declines of 25 feet in the Trinity Aquifer subcrop (see Figure 1).

Map Key	Aquifer	County	RWPA	River Basin	GCD	GMA	GeoArea	Year	Draft MAG (ac-ft/yr)
1	Trinity	Travis	K	Colorado	none	10	n/a	n/a	497
2	Trinity	Travis	K	Colorado	BSEACD	10	n/a	n/a	497
3	Trinity	Travis	K	Guadalupe	BSEACD	10	n/a	n/a	11
4	Trinity	Hays	K	Colorado	BSEACD	10	n/a	n/a	924
5	Trinity	Hays	L	Guadalupe	BSEACD	10	n/a	n/a	292
6	Trinity	Hays	L	Guadalupe	Plum Creek CD	10	n/a	n/a	292
7	Trinity	Hays	K	Colorado	Hay Trinity GCD	10	n/a	n/a	49
8	Trinity	Hays	L	Guadalupe	Hay Trinity GCD	10	n/a	n/a	97
9	Trinity	Hays	K	Colorado	no regulatory GCD	10	n/a	n/a	49
10	Trinity	Hays	L	Guadalupe	no regulatory GCD	10	n/a	n/a	2,722
11	Trinity	Caldwell	L	Guadalupe	no regulatory GCD	10	n/a	n/a	0
12	Trinity	Comal	L	Guadalupe	no regulatory GCD	10	n/a	n/a	27,930
13	Trinity	Comal	L	San Antonio	no regulatory GCD	10	n/a	n/a	2,095
14	Trinity	Guadalupe	L	Guadalupe	no regulatory GCD	10	n/a	n/a	0
15	Trinity	Guadalupe	L	San Antonio	no regulatory GCD	10	n/a	n/a	0
16	Trinity	Bexar	L	San Antonio	Trinity Glen Rose GCD	10	n/a	n/a	122
17	Trinity	Bexar	L	San Antonio	no regulatory GCD	10	n/a	n/a	21,714
18	Trinity	Medina	L	San Antonio	Medina County GCD	10	n/a	n/a	1,257
19	Trinity	Medina	L	Nueces	Medina County GCD	10	n/a	n/a	5,531
20	Trinity	Uvalde	L	Nueces	Uvalde County UWCD	10	n/a	n/a	754

RWPA = regional water planning area
GMA = groundwater management area
GCD = groundwater conservation district
UWCD = underground water conservation district
CD = conservation district
ac-ft/yr = acre-feet per year
BSEACD = Barton Springs/Edwards Aquifer Conservation District
GeoArea = Geographic areas defined by unique desired future conditions as specified by a groundwater management area
MAG = Managed available groundwater in units of acre-feet per year

Table 4. Estimates of draft managed available groundwater for water level declines of 50 feet in the Trinity Aquifer subcrop (see Figure 1).

Map Key	Aquifer	County	RWPA	River Basin	GCD	GMA	GeoArea	Year	Draft MAG (ac-ft/yr)
1	Trinity	Travis	K	Colorado	none	10	n/a	n/a	523
2	Trinity	Travis	K	Colorado	BSEACD	10	n/a	n/a	523
3	Trinity	Travis	K	Guadalupe	BSEACD	10	n/a	n/a	11
4	Trinity	Hays	K	Colorado	BSEACD	10	n/a	n/a	941
5	Trinity	Hays	L	Guadalupe	BSEACD	10	n/a	n/a	297
6	Trinity	Hays	L	Guadalupe	Plum Creek CD	10	n/a	n/a	297
7	Trinity	Hays	K	Colorado	Hay Trinity GCD	10	n/a	n/a	49
8	Trinity	Hays	L	Guadalupe	Hay Trinity GCD	10	n/a	n/a	99
9	Trinity	Hays	K	Colorado	no regulatory GCD	10	n/a	n/a	51
10	Trinity	Hays	L	Guadalupe	no regulatory GCD	10	n/a	n/a	2,772
11	Trinity	Caldwell	L	Guadalupe	no regulatory GCD	10	n/a	n/a	0
12	Trinity	Comal	L	Guadalupe	no regulatory GCD	10	n/a	n/a	27,930
13	Trinity	Comal	L	San Antonio	no regulatory GCD	10	n/a	n/a	2,095
14	Trinity	Guadalupe	L	Guadalupe	no regulatory GCD	10	n/a	n/a	0
15	Trinity	Guadalupe	L	San Antonio	no regulatory GCD	10	n/a	n/a	0
16	Trinity	Bexar	L	San Antonio	Trinity Glen Rose GCD	10	n/a	n/a	122
17	Trinity	Bexar	L	San Antonio	no regulatory GCD	10	n/a	n/a	21,714
18	Trinity	Medina	L	San Antonio	Medina County GCD	10	n/a	n/a	1,257
19	Trinity	Medina	L	Nueces	Medina County GCD	10	n/a	n/a	5,531
20	Trinity	Uvalde	L	Nueces	Uvalde County UWCD	10	n/a	n/a	754

RWPA = regional water planning area
GMA = groundwater management area
GCD = groundwater conservation district
UWCD = underground water conservation district
CD = conservation district
ac-ft/yr = acre-feet per year
BSEACD = Barton Springs/Edwards Aquifer Conservation District
GeoArea = Geographic areas defined by unique desired future conditions as specified by a groundwater management area
MAG = Managed available groundwater in units of acre-feet per year

Table 5. Estimates of draft managed available groundwater for water level declines of 75 feet in the Trinity Aquifer subcrop (see Figure 1).

Map Key	Aquifer	County	RWPA	River Basin	GCD	GMA	GeoArea	Year	Draft MAG (ac-ft/yr)
1	Trinity	Travis	K	Colorado	none	10	n/a	n/a	550
2	Trinity	Travis	K	Colorado	BSEACD	10	n/a	n/a	550
3	Trinity	Travis	K	Guadalupe	BSEACD	10	n/a	n/a	12
4	Trinity	Hays	K	Colorado	BSEACD	10	n/a	n/a	958
5	Trinity	Hays	L	Guadalupe	BSEACD	10	n/a	n/a	303
6	Trinity	Hays	L	Guadalupe	Plum Creek CD	10	n/a	n/a	303
7	Trinity	Hays	K	Colorado	Hay Trinity GCD	10	n/a	n/a	50
8	Trinity	Hays	L	Guadalupe	Hay Trinity GCD	10	n/a	n/a	102
9	Trinity	Hays	K	Colorado	no regulatory GCD	10	n/a	n/a	52
10	Trinity	Hays	L	Guadalupe	no regulatory GCD	10	n/a	n/a	2,821
11	Trinity	Caldwell	L	Guadalupe	no regulatory GCD	10	n/a	n/a	0
12	Trinity	Comal	L	Guadalupe	no regulatory GCD	10	n/a	n/a	27,930
13	Trinity	Comal	L	San Antonio	no regulatory GCD	10	n/a	n/a	2,095
14	Trinity	Guadalupe	L	Guadalupe	no regulatory GCD	10	n/a	n/a	0
15	Trinity	Guadalupe	L	San Antonio	no regulatory GCD	10	n/a	n/a	0
16	Trinity	Bexar	L	San Antonio	Trinity Glen Rose GCD	10	n/a	n/a	122
17	Trinity	Bexar	L	San Antonio	no regulatory GCD	10	n/a	n/a	21,714
18	Trinity	Medina	L	San Antonio	Medina County GCD	10	n/a	n/a	1,257
19	Trinity	Medina	L	Nueces	Medina County GCD	10	n/a	n/a	5,531
20	Trinity	Uvalde	L	Nueces	Uvalde County UWCD	10	n/a	n/a	754

RWPA = regional water planning area GMA = groundwater management area GCD = groundwater conservation district
UWCD = underground water conservation district CD = conservation district ac-ft/yr = acre-feet per year
BSEACD = Barton Springs/Edwards Aquifer Conservation District
GeoArea = Geographic areas defined by unique desired future conditions as specified by a groundwater management area
MAG = Managed available groundwater in units of acre-feet per year

Table 6. Estimates of draft managed available groundwater for water level declines of 100 feet in the Trinity Aquifer subcrop (see Figure 1).

Map Key	Aquifer	County	RWPA	River Basin	GCD	GMA	GeoArea	Year	Draft MAG (ac-ft/yr)
1	Trinity	Travis	K	Colorado	none	10	n/a	n/a	576
2	Trinity	Travis	K	Colorado	BSEACD	10	n/a	n/a	577
3	Trinity	Travis	K	Guadalupe	BSEACD	10	n/a	n/a	13
4	Trinity	Hays	K	Colorado	BSEACD	10	n/a	n/a	975
5	Trinity	Hays	L	Guadalupe	BSEACD	10	n/a	n/a	308
6	Trinity	Hays	L	Guadalupe	Plum Creek CD	10	n/a	n/a	308
7	Trinity	Hays	K	Colorado	Hay Trinity GCD	10	n/a	n/a	50
8	Trinity	Hays	L	Guadalupe	Hay Trinity GCD	10	n/a	n/a	104
9	Trinity	Hays	K	Colorado	no regulatory GCD	10	n/a	n/a	53
10	Trinity	Hays	L	Guadalupe	no regulatory GCD	10	n/a	n/a	2,871
11	Trinity	Caldwell	L	Guadalupe	no regulatory GCD	10	n/a	n/a	0
12	Trinity	Comal	L	Guadalupe	no regulatory GCD	10	n/a	n/a	27,930
13	Trinity	Comal	L	San Antonio	no regulatory GCD	10	n/a	n/a	2,095
14	Trinity	Guadalupe	L	Guadalupe	no regulatory GCD	10	n/a	n/a	0
15	Trinity	Guadalupe	L	San Antonio	no regulatory GCD	10	n/a	n/a	0
16	Trinity	Bexar	L	San Antonio	Trinity Glen Rose GCD	10	n/a	n/a	122
17	Trinity	Bexar	L	San Antonio	no regulatory GCD	10	n/a	n/a	21,714
18	Trinity	Medina	L	San Antonio	Medina County GCD	10	n/a	n/a	1,257
19	Trinity	Medina	L	Nueces	Medina County GCD	10	n/a	n/a	5,531
20	Trinity	Uvalde	L	Nueces	Uvalde County UWCD	10	n/a	n/a	754

RWPA = regional water planning area
GMA = groundwater management area
GCD = groundwater conservation district
UWCD = underground water conservation district
CD = conservation district
ac-ft/yr = acre-feet per year
BSEACD = Barton Springs/Edwards Aquifer Conservation District
GeoArea = Geographic areas defined by unique desired future conditions as specified by a groundwater management area
MAG = Managed available groundwater in units of acre-feet per year

Table 7. Estimates of draft managed available groundwater for water level declines of 125 feet in the Trinity Aquifer subcrop (see Figure 1).

Map Key	Aquifer	County	RWPA	River Basin	GCD	GMA	GeoArea	Year	Draft MAG (ac-ft/yr)
1	Trinity	Travis	K	Colorado	none	10	n/a	n/a	603
2	Trinity	Travis	K	Colorado	BSEACD	10	n/a	n/a	603
3	Trinity	Travis	K	Guadalupe	BSEACD	10	n/a	n/a	13
4	Trinity	Hays	K	Colorado	BSEACD	10	n/a	n/a	991
5	Trinity	Hays	L	Guadalupe	BSEACD	10	n/a	n/a	314
6	Trinity	Hays	L	Guadalupe	Plum Creek CD	10	n/a	n/a	314
7	Trinity	Hays	K	Colorado	Hay Trinity GCD	10	n/a	n/a	50
8	Trinity	Hays	L	Guadalupe	Hay Trinity GCD	10	n/a	n/a	106
9	Trinity	Hays	K	Colorado	no regulatory GCD	10	n/a	n/a	55
10	Trinity	Hays	L	Guadalupe	no regulatory GCD	10	n/a	n/a	2,920
11	Trinity	Caldwell	L	Guadalupe	no regulatory GCD	10	n/a	n/a	0
12	Trinity	Comal	L	Guadalupe	no regulatory GCD	10	n/a	n/a	27,930
13	Trinity	Comal	L	San Antonio	no regulatory GCD	10	n/a	n/a	2,095
14	Trinity	Guadalupe	L	Guadalupe	no regulatory GCD	10	n/a	n/a	0
15	Trinity	Guadalupe	L	San Antonio	no regulatory GCD	10	n/a	n/a	0
16	Trinity	Bexar	L	San Antonio	Trinity Glen Rose GCD	10	n/a	n/a	122
17	Trinity	Bexar	L	San Antonio	no regulatory GCD	10	n/a	n/a	21,714
18	Trinity	Medina	L	San Antonio	Medina County GCD	10	n/a	n/a	1,257
19	Trinity	Medina	L	Nueces	Medina County GCD	10	n/a	n/a	5,531
20	Trinity	Uvalde	L	Nueces	Uvalde County UWCD	10	n/a	n/a	754

RWPA = regional water planning area
GMA = groundwater management area
GCD = groundwater conservation district
UWCD = underground water conservation district
CD = conservation district
ac-ft/yr = acre-feet per year
BSEACD = Barton Springs/Edwards Aquifer Conservation District
GeoArea = Geographic areas defined by unique desired future conditions as specified by a groundwater management area
MAG = Managed available groundwater in units of acre-feet per year

Limitations:

Additional data are needed to create improved estimates; these estimates are a fundamental interpretation of the requested conditions. This analysis assumes homogeneous and isotropic aquifers; however, conditions for the Trinity Aquifer subcrop may not behave in a uniform manner. The analysis further assumes that aquifer recharge from direct precipitation is zero.

Note that estimates of managed available groundwater are based on the best available scientific tools that can be used to develop managed available groundwater and that these estimates can be a function of assumptions made on the magnitude and distribution of pumping in the aquifer. Therefore, it is important for groundwater conservation districts to monitor whether or not they are achieving their desired future conditions and to work with the TWDB to refine managed available groundwater given the reality of how the aquifer responds to the actual magnitude and distribution of pumping now and in the future.

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Appendix A

Summary of draft managed available groundwater for the Trinity Aquifer subcrop in Groundwater Management Area 10 by groundwater conservation district using average outflow across the Balcones Fault Zone estimates from Scenario 6 (total pumpage approximately 100,000 acre-feet per year), Draft GAM Task 10-005.

Groundwater Conservation District	25 ft. decline	50 ft. decline	75 ft. decline	100 ft. decline	125 ft. decline
BSEACD	1,379	1,427	1,478	1,528	1,576
Hays Trinity GCD	123	125	129	131	133
Medina County GCD	5,384	5,384	5,384	5,384	5,384
Plum Creek CD	246	251	257	262	268
Trinity Glen-Rose GCD	113	113	113	113	113
Uvalde County UWCD	598	598	598	598	598
Total (ac-ft/yr)	**7,843**	**7,898**	**7,959**	**8,016**	**8,072**

BSEACD = Barton Springs/Edwards Aquifer Conservation District
GCD = groundwater conservation district
UWCD = underground water conservation district
CD = conservation district
ac-ft/yr = acre-feet per year

Summary of draft managed available groundwater for the Trinity Aquifer subcrop in Groundwater Management Area 10 by groundwater conservation district using average outflow across the Balcones Fault Zone estimates from Scenario 7 (total pumpage approximately 120,000 acre-feet per year), Draft GAM Task 10-005.

Groundwater Conservation District	25 ft. decline	50 ft. decline	75 ft. decline	100 ft. decline	125 ft. decline
BSEACD	1,013	1,061	1,112	1,162	1,210
Hays Trinity GCD	99	101	105	107	109
Medina County GCD	3,631	3,631	3,631	3,631	3,631
Plum Creek CD	197	202	208	213	219
Trinity Glen-Rose GCD	99	99	99	99	99
Uvalde County UWCD	403	403	403	403	403
Total (ac-ft/yr)	**5,442**	**5,497**	**5,558**	**5,615**	**5,671**

BSEACD = Barton Springs/Edwards Aquifer Conservation District
GCD = groundwater conservation district
UWCD = underground water conservation district
CD = conservation district
ac-ft/yr = acre-feet per year