

September 30, 2015

Mr. Tim Andruss
 General Manager, Victoria County Groundwater Conservation District
 2805 N. Navarro St, Suite 210
 Victoria, TX 77901

Subject: Revised Summary Tables for DFC GAM Simulations

Dear Tim:

The purpose of this letter is to provide GMA 15 with revised pumping rates and estimated drawdowns for the GMA 15-requested GAM simulations. The revised GAM runs were performed because of concerns that the revisions to the pumping amounts in model pumping files, based on the information submitted by GMA 15, may not accurately reflect the intended pumping amounts of each GCD.

Because of the possibility that the districts had different interpretation of how the replacement operation was to be implemented for revising pumping rates, INTERA has performed two sets of calculations for the three GMA 15-requested GAM runs. "Option 0" implements a strict interpretation of the replacement operation for those layers of replacement zones where values of 0 were assigned. Under "Option 0", the pumping amount for a cell of a layer of a replacement zone with a value of 0 (percent) was set to 0 acre-feet. "Option 1" implements an alternative interpretation of the replacement operation for those layers of replacement zones where values of 0 were assigned. Under "Option 1", the pumping amount for a cell of a layer of a replacement zone with a value of 0 (percent) was not revised.

Table 1 summarizes the modeling results sent to GMA 15 on June 8, the "Option 0" and "Option 1" results contained in the Appendices of this memo.

Table 1. Comparison of Results for DFC GAM Runs

Scenario	Previous Results		Revised Option 0 Results		Revised Option 1 Results	
	2070 Pumping (AFY)	Average Drawdown(ft)	2070 Pumping (AFY)	Average Drawdown(ft)	2070 Pumping (AFY)	Average Drawdown(ft)
Baseline	559,524	12.8	553,515	12.4	553,587	12.5
Baseline (50% recharge)	559,524	17.6	553,515	17.3	553,587	17.3
High Production	951,656	40.8	962,656	41.3	964,348	41.4

Prior to this memo, problems had been identified with the revised GMA 15 pumping information because the revisions from Fayette County GCD (FCGCD) were not included in the GMA 15-requested GAM simulations. Recently, both Evergreen UWCD (EUWCD) and Pecan Valley GCD (PVGCD) raised concerns that their pumping rates in 2070 were lower than expected. As a result of concerns expressed by GMA 15 districts, INTERA has spent the last several weeks checking and revising pumping files received from GMA 15.

The fix for the FCGCD pumping was to append the two pumping information files that INTERA had received from GMA 15. The fix used to address PVGCD and EUWCD concerns with pumping rates was to extend their modified pumping rates from 2060 to 2070 in the pumping files received from GMA 15. Among the other changes made by INTERA in the revised pumping files used to generate the results in the Appendices are: 1) all pumping zone changes that ended in 2060 were extended to 2070 for other districts besides PVGCD and EUWCD; 2) time periods for pumping zones were adjusted to prevent overlapping years; 3) no pumping adjustments were allowed prior to 2000; and 4) no two overlapping zones were allowed to be replacements for the same time period. Besides these changes, the two pumping files received from GMA 15 (which consolidated the pumping requests from the districts) were checked for consistency in the name used for the same pumping zones in the two files. INTERA discovered that several zones had names that were slightly different in the two files. This difference prevented them from being implemented by INTERA software. INTERA corrected the naming convention in the two files.

If GMA 15 has any questions, I would be glad to try to answer them. INTERA will be sending the final pumping files created by INTERA to GMA 15 in a few days.

Sincerely,



Steven C. Young, P.G., P.E.

APPENDIX A
REVISED RESULTS BASED ON OPTION 0

Average drawdown from 2000 to 2070 in the Baseline Run Based on Option 0*

County	Chicot	Evangeline	Chicot+ Evangeline	Burkeville	Jasper	Overall	Overall (without Burkeville)
ARANSAS	-0.1	5.9	0.0	NA	NA	0.0	0.0
AUSTIN	0.0	15.3	7.8	19.1	19.9	13.7	11.9
BEE	1.4	8.7	6.2	7.7	5.7	6.5	6.0
BRAZORIA	-0.3	9.8	3.5	12.6	19.0	5.5	4.0
CALHOUN	-0.6	10.7	2.7	2.9	NA	2.7	2.7
COLORADO	12.9	26.0	20.1	22.6	24.5	21.9	21.7
DEWITT	1.2	6.1	5.4	17.0	26.2	17.3	17.4
FAYETTE	NA	5.5	5.5	17.4	18.1	16.0	15.5
FORTBEND	3.1	18.0	10.6	20.3	22.8	16.0	14.6
GOLIAD	-3.4	0.7	-0.1	7.1	10.4	5.1	4.2
JACKSON	15.2	20.3	17.7	14.6	22.2	17.6	18.6
KARNES	NA	0.3	0.3	18.1	24.1	20.4	21.1
LAVACA	7.2	6.8	6.9	16.2	31.3	17.7	18.3
MATAGORDA	4.0	17.2	8.0	16.9	NA	8.9	8.0
REFUGIO	-0.4	7.3	3.2	2.8	NA	3.1	3.2
VICTORIA	-4.3	6.0	1.0	5.1	9.6	3.6	3.0
WHARTON	14.7	12.4	13.5	25.8	28.6	20.1	18.2
Average	5.0	11.6	8.4	15.3	22.0	13.1	12.4

*option 0 enforces the zero pumping condition for the replace modification

Average drawdown from 2000 to 2070 in the High Production Run Based on Option 0*

County	Chicot	Evangeline	Chicot+ Evangeline	Burkeville	Jasper	Overall	Overall (without Burkeville)
ARANSAS	0.0	46.0	1.1	NA	NA	1.1	1.1
AUSTIN	13.4	36.9	25.4	37.5	35.9	31.1	29.0
BEE	3.9	15.4	11.5	11.2	6.7	10.2	9.7
BRAZORIA	0.0	26.2	9.8	21.3	24.0	12.2	10.3
CALHOUN	4.6	108.7	34.2	8.0	NA	34.0	34.2
COLORADO	30.6	54.5	43.8	36.9	36.5	40.1	41.2
DEWITT	4.1	7.4	6.9	26.7	53.0	31.6	33.6
FAYETTE	NA	14.9	14.9	40.1	50.6	42.6	43.3
FORTBEND	12.5	41.8	27.1	38.5	35.7	32.1	30.0
GOLIAD	4.5	13.0	11.2	13.0	19.8	14.2	14.8
JACKSON	66.4	144.4	105.3	53.8	43.0	83.2	92.9
KARNES	NA	1.3	1.3	21.3	32.9	27.3	28.7
LAVACA	25.4	19.3	21.1	21.5	35.9	26.1	28.0
MATAGORDA	8.3	65.5	25.7	27.7	NA	25.9	25.7
REFUGIO	1.6	67.7	32.0	20.3	NA	30.2	32.0
VICTORIA	27.4	81.7	55.6	69.2	180.9	80.1	84.3
WHARTON	38.7	61.1	49.9	44.2	38.7	45.9	46.5
Average	20.9	56.3	38.9	35.2	46.9	39.8	41.3

*option 0 enforces the zero pumping condition for the replace modification

Average drawdown from 2000 to 2070 in the Baseline Run With 50% Recharge Based on Option 0*

County	Chicot	Evangeline	Chicot+ Evangeline	Burkeville	Jasper	Overall	Overall (without Burkeville)
ARANSAS	-0.1	7.0	0.1	NA	NA	0.1	0.1
AUSTIN	15.7	29.2	22.6	29.5	27.6	25.6	24.3
BEE	14.8	19.9	18.1	13.5	9.7	14.5	15.0
BRAZORIA	0.6	11.6	4.8	13.7	19.8	6.7	5.3
CALHOUN	-0.4	12.3	3.2	3.0	NA	3.2	3.2
COLORADO	27.5	38.9	33.8	29.9	29.8	31.7	32.4
DEWITT	9.6	8.9	9.0	19.7	28.2	20.1	20.3
FAYETTE	NA	12.5	12.5	21.4	20.8	19.8	19.1
FORTBEND	8.6	23.9	16.2	24.9	26.2	20.9	19.5
GOLIAD	3.0	5.0	4.6	9.8	12.7	8.5	7.9
JACKSON	23.9	27.5	25.7	17.5	24.1	23.4	25.4
KARNES	NA	12.2	12.2	22.6	25.7	23.7	24.0
LAVACA	24.1	13.4	16.7	19.6	33.7	23.1	24.6
MATAGORDA	4.5	19.5	9.0	17.5	NA	9.9	9.0
REFUGIO	0.6	9.9	4.9	4.3	NA	4.8	4.9
VICTORIA	-0.2	9.5	4.8	7.2	11.8	6.6	6.4
WHARTON	21.5	19.3	20.4	28.6	30.6	24.9	23.5
Average	10.5	17.7	14.1	18.9	24.8	17.7	17.3

* option 0 does enforces the zero pumping condition for the replace modification

Baseline Pumping Rates in 2070 for Option 0*

County	Chicot	Evangeline	Burkeville	Jasper	Total
ARANSAS	1,863	0	0	0	1,863
AUSTIN	3,180	4,006	5	22	7,214
BEE	3,707	5,505	17	289	9,518
BRAZORIA	8,901	289	0	0	9,189
CALHOUN	7,950	68	0	0	8,018
COLORADO	31,602	40,066	0	876	72,544
DEWITT	1,019	7,818	166	6,408	15,411
FAYETTE	0	264	375	1,878	2,517
FORTBEND	6,248	5,381	0	0	11,629
GOLIAD	714	10,702	306	102	11,824
JACKSON	66,147	24,529	0	0	90,676
KARNES	0	105	627	3,262	3,993
LAVACA	3,095	12,647	151	4,692	20,585
MATAGORDA	33,898	7,121	0	0	41,020
REFUGIO	3,383	2,636	0	0	6,019
VICTORIA	32,170	27,873	0	0	60,043
WHARTON	114,878	66,575	0	0	181,452
Total	318,755	215,584	1,647	17,529	553,515

*option 0 enforces the zero pumping condition for the replace modification

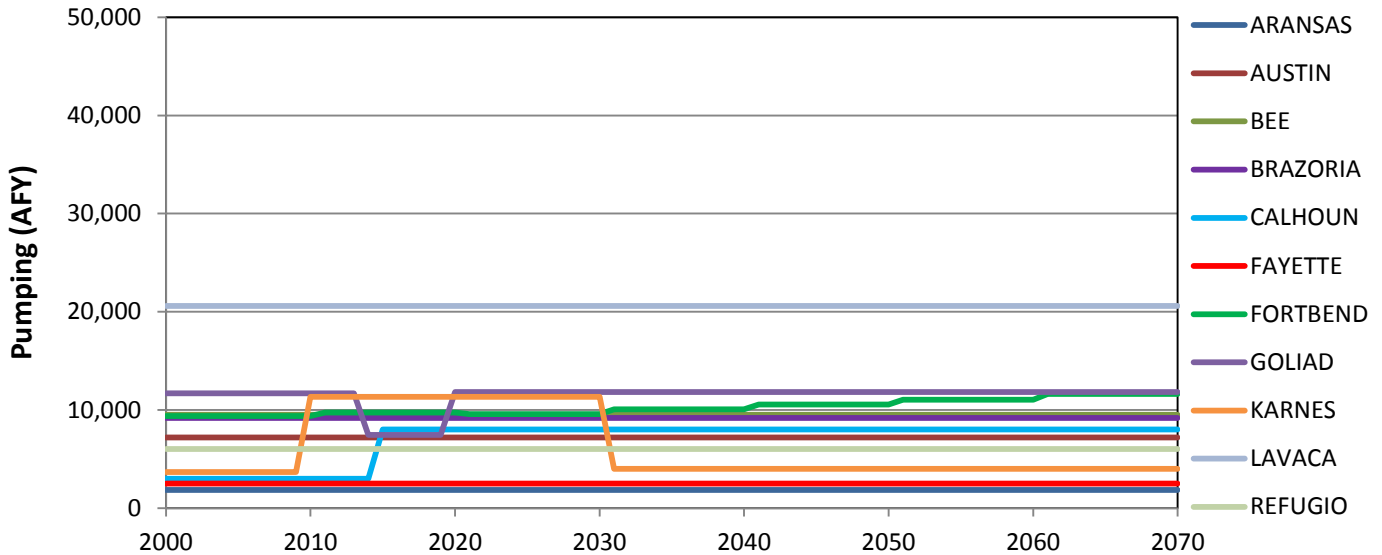
High Production Pumping Rates in 2070 for Option 0*

County	Chicot	Evangeline	Burkeville	Jasper	Total
ARANSAS	1,863	0	0	0	1,863
AUSTIN	3,180	4,006	5	22	7,214
BEE	3,707	5,505	17	289	9,518
BRAZORIA	8,901	289	0	0	9,189
CALHOUN	12,456	10,070	0	0	22,526
COLORADO	48,419	62,874	0	876	112,168
DEWITT	1,019	6,607	9	19,178	26,812
FAYETTE	0	914	1,350	6,664	8,929
FORTBEND	6,286	5,381	0	0	11,667
GOLIAD	724	12,288	311	286	13,609
JACKSON	92,308	85,452	0	0	177,760
KARNES	0	105	737	4,485	5,327
LAVACA	3,095	12,647	151	4,692	20,585
MATAGORDA	42,732	9,063	0	0	51,795
REFUGIO	6,379	37,951	0	0	44,331
VICTORIA	104,670	70,373	0	50,000	225,043
WHARTON	135,864	78,713	0	0	214,577
Total	471,604	402,236	2,580	86,493	962,913

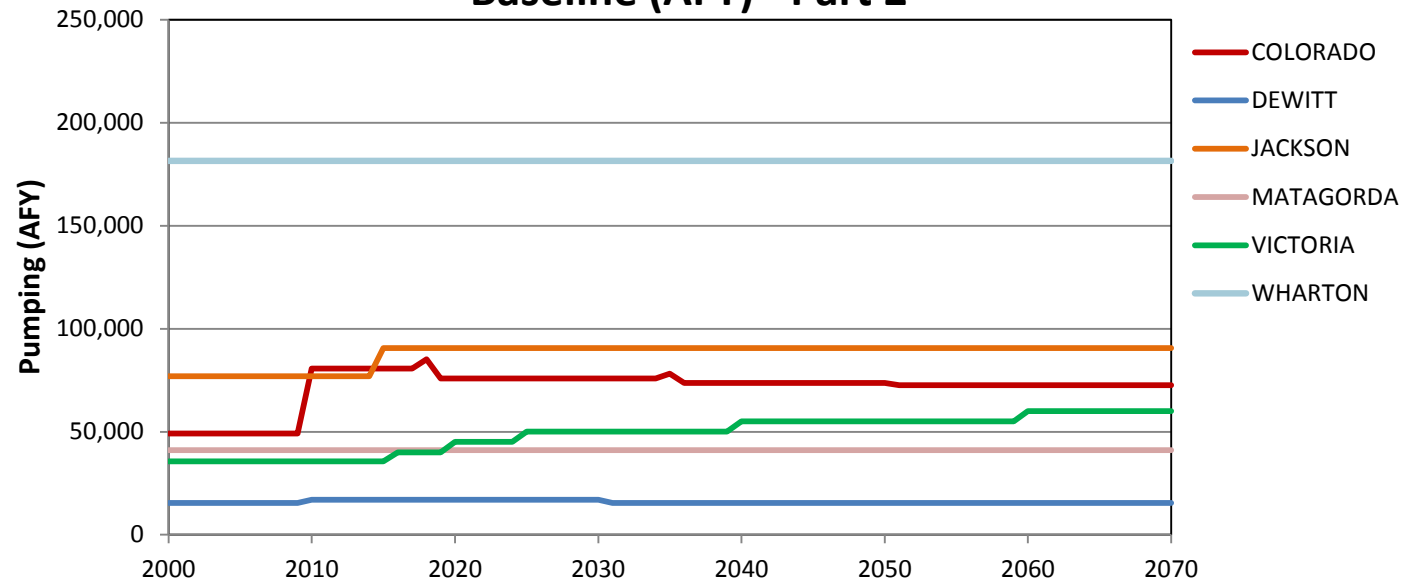
*option 0 enforces the zero pumping
condition for the replace modification

Baseline Pumping Rates from 2000 to 2007 for Option 0*

Baseline (AFY) - Part 1



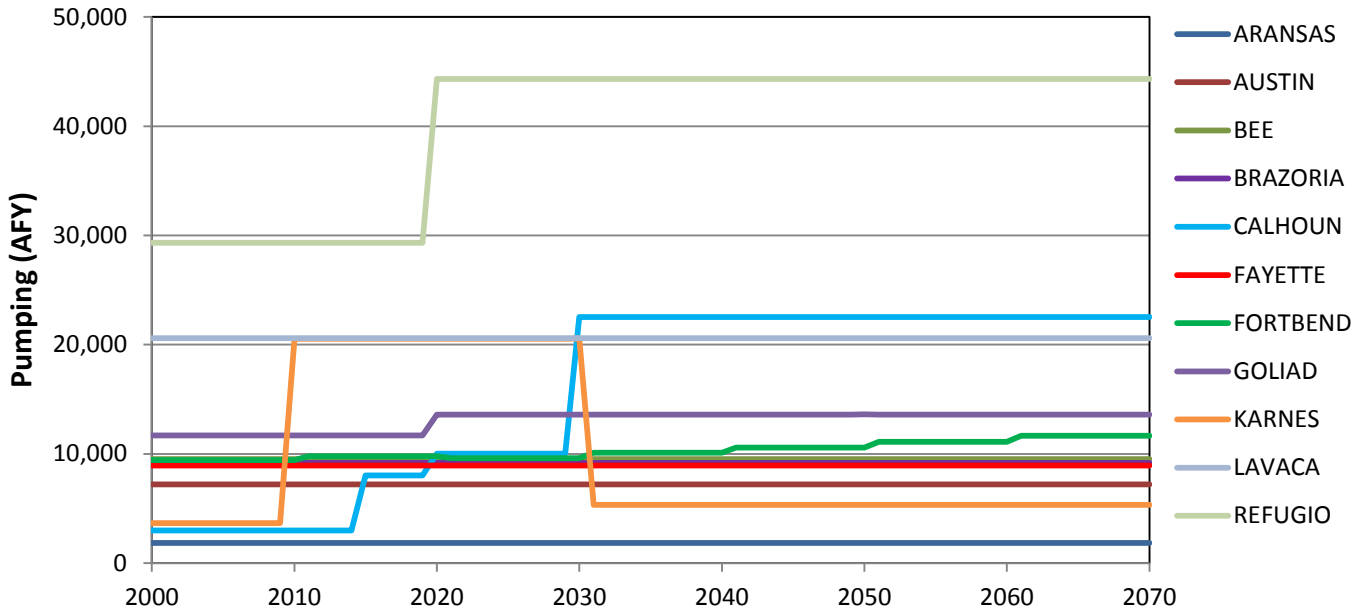
Baseline (AFY) - Part 2



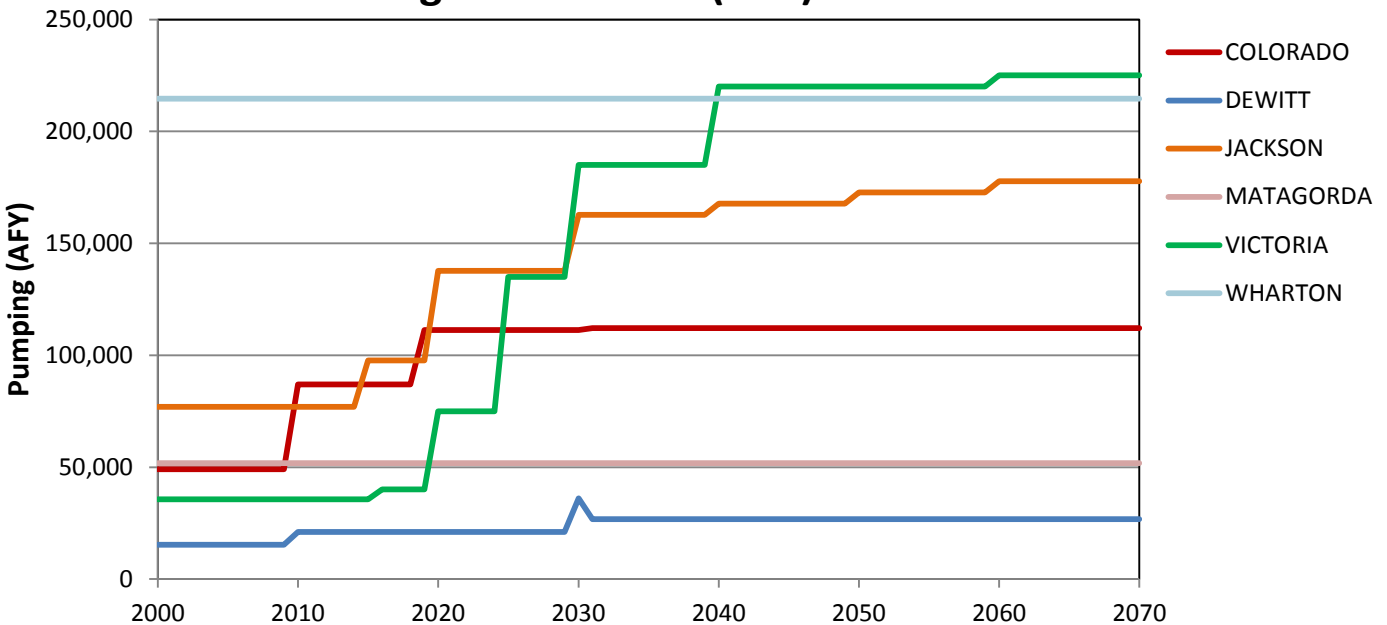
*option 0 enforces the zero pumping condition for the replace modification

High Production Pumping Rates from 2000 to 2007 for Option 0*

High Production (AFY) - Part 1



High Production (AFY) - Part 2



*option 0 enforces the zero pumping condition for the replace modification

APPENDIX B
REVISED RESULTS BASED ON OPTION 1

Average drawdown from 2000 to 2070 in the Baseline Run Based on Option 1*

County	Chicot	Evangeline	Chicot+ Evangeline	Burkeville	Jasper	Overall	Overall (without Burkeville)
ARANSAS	-0.1	5.9	0.0	NA	NA	0.0	0.0
AUSTIN	0.0	15.3	7.8	19.1	20.0	13.8	12.0
BEE	1.4	8.7	6.2	7.7	5.7	6.6	6.0
BRAZORIA	-0.3	9.8	3.5	12.6	19.0	5.5	4.0
CALHOUN	-0.6	10.7	2.7	2.9	NA	2.7	2.7
COLORADO	12.9	26.0	20.1	22.8	25.1	22.1	21.9
DEWITT	1.2	6.1	5.4	17.0	26.2	17.3	17.4
FAYETTE	NA	5.6	5.6	17.8	18.2	16.2	15.6
FORTBEND	3.1	18.0	10.6	20.3	22.8	16.1	14.7
GOLIAD	-3.4	0.7	-0.1	7.2	10.6	5.2	4.3
JACKSON	15.2	20.3	17.7	14.6	22.2	17.6	18.6
KARNES	NA	0.4	0.4	18.2	24.1	20.5	21.1
LAVACA	7.2	6.8	6.9	16.3	31.4	17.7	18.3
MATAGORDA	4.0	17.2	8.0	16.9	NA	8.9	8.0
REFUGIO	-0.4	7.3	3.2	2.8	NA	3.1	3.2
VICTORIA	-4.3	6.0	1.0	5.1	9.6	3.6	3.0
WHARTON	14.7	12.4	13.5	25.8	28.7	20.2	18.2
Average	5.0	11.6	8.4	15.4	22.1	13.2	12.5

*option 1 ignores the zero pumping condition for the replace modification and keeps existing pumping

Average drawdown from 2000 to 2070 in the High Production Run Based on Option 1*

County	Chicot	Evangeline	Chicot+ Evangeline	Burkeville	Jasper	Overall	Overall (without Burkeville)
ARANSAS	0.0	46.0	1.1	NA	NA	1.1	1.1
AUSTIN	13.5	36.9	25.4	37.5	36.0	31.2	29.0
BEE	3.9	15.4	11.5	11.2	6.7	10.2	9.7
BRAZORIA	0.0	26.2	9.8	21.3	24.0	12.2	10.3
CALHOUN	4.6	108.7	34.2	8.0	NA	34.0	34.2
COLORADO	30.7	54.5	43.8	37.1	37.1	40.3	41.4
DEWITT	4.1	9.5	8.7	27.2	53.8	32.7	34.8
FAYETTE	NA	15.0	15.0	40.6	50.7	42.8	43.4
FORTBEND	12.5	41.8	27.1	38.5	35.7	32.1	30.0
GOLIAD	4.5	13.1	11.3	13.1	19.9	14.3	14.9
JACKSON	66.4	144.4	105.3	53.8	43.0	83.2	92.9
KARNES	NA	1.6	1.6	21.5	32.9	27.4	28.8
LAVACA	25.4	19.3	21.1	21.5	36.0	26.2	28.0
MATAGORDA	8.3	65.5	25.7	27.7	NA	25.9	25.7
REFUGIO	1.6	67.7	32.0	20.3	NA	30.2	32.0
VICTORIA	27.4	81.7	55.6	69.2	180.9	80.1	84.3
WHARTON	38.7	61.1	49.9	44.2	38.9	45.9	46.5
Average	20.9	56.4	39.0	35.4	47.1	40.0	41.4

* option 1 ignores the zero pumping condition for the
replace modification and keeps existing pumping

Average drawdown from 2000 to 2070 in the Baseline Run With 50% Recharge Based on Option 1*

County	Chicot	Evangeline	Chicot+ Evangeline	Burkeville	Jasper	Overall	Overall (without Burkeville)
ARANSAS	-0.1	7.0	0.1	NA	NA	0.1	0.1
AUSTIN	15.7	29.2	22.6	29.6	27.8	25.7	24.4
BEE	14.8	19.9	18.1	13.6	9.8	14.6	15.0
BRAZORIA	0.6	11.6	4.8	13.7	19.8	6.7	5.3
CALHOUN	-0.4	12.3	3.2	3.0	NA	3.2	3.2
COLORADO	27.5	39.0	33.8	30.1	30.3	31.9	32.6
DEWITT	9.6	8.9	9.0	19.7	28.2	20.1	20.3
FAYETTE	NA	12.6	12.6	21.8	20.9	20.0	19.2
FORTBEND	8.6	23.9	16.2	24.9	26.2	20.9	19.5
GOLIAD	3.0	5.0	4.6	9.9	12.8	8.6	8.0
JACKSON	23.9	27.5	25.7	17.5	24.1	23.4	25.4
KARNES	NA	12.2	12.2	22.7	25.7	23.7	24.0
LAVACA	24.1	13.4	16.7	19.6	33.7	23.2	24.6
MATAGORDA	4.5	19.5	9.0	17.5	NA	9.9	9.0
REFUGIO	0.6	9.9	4.9	4.3	NA	4.8	4.9
VICTORIA	-0.2	9.5	4.8	7.2	11.8	6.6	6.4
WHARTON	21.5	19.3	20.4	28.7	30.7	24.9	23.6
Average	10.5	17.7	14.1	19.0	24.9	17.7	17.3

*option 1 ignores the zero pumping condition for the
replace modification and keeps existing pumping

Baseline Pumping Rates in 2070 for Option 1*

County	Chicot	Evangeline	Burkeville	Jasper	Total
ARANSAS	1,863	0	0	0	1,863
AUSTIN	3,180	4,006	5	22	7,214
BEE	3,707	5,505	17	289	9,518
BRAZORIA	8,901	289	0	0	9,189
CALHOUN	7,950	68	0	0	8,018
COLORADO	31,602	40,066	0	919	72,587
DEWITT	1,019	7,818	166	6,408	15,411
FAYETTE	0	264	405	1,878	2,546
FORTBEND	6,248	5,381	0	0	11,629
GOLIAD	714	10,702	306	102	11,824
JACKSON	66,147	24,529	0	0	90,676
KARNES	0	105	627	3,262	3,993
LAVACA	3,095	12,647	151	4,692	20,585
MATAGORDA	33,898	7,121	0	0	41,020
REFUGIO	3,383	2,636	0	0	6,019
VICTORIA	32,170	27,873	0	0	60,043
WHARTON	114,878	66,575	0	0	181,452
Total	318,755	215,584	1,676	17,572	553,587

*option 1 ignores the zero pumping condition for the replace modification and keeps existing pumping

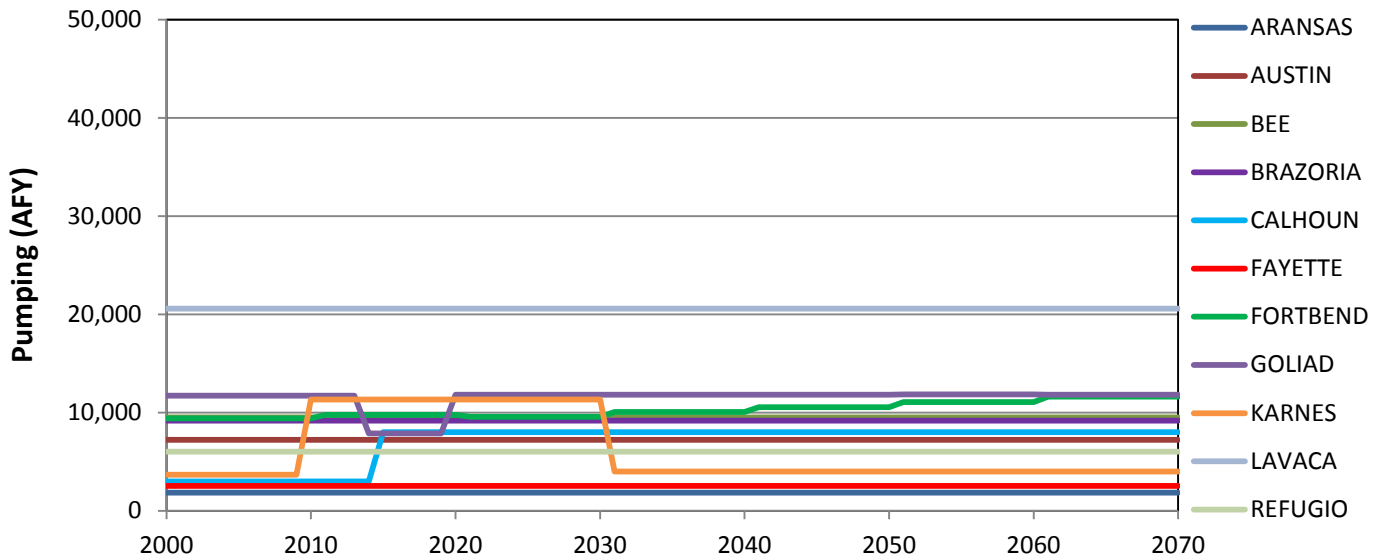
High Production Pumping Rates in 2070 for Option 1*

County	Chicot	Evangeline	Burkeville	Jasper	Total
ARANSAS	1,863	0	0	0	1,863
AUSTIN	3,180	4,006	5	22	7,214
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CALHOUN	12,456	10,070	0	0	22,526
COLORADO	48,419	62,874	0	919	112,211
DEWITT	1,019	7,813	165	19,178	28,176
FAYETTE	0	914	1,380	6,664	8,958
FORTBEND	6,286	5,381	0	0	11,667
GOLIAD	724	12,288	311	286	13,609
JACKSON	92,308	85,452	0	0	177,760
KARNES	0	105	737	4,485	5,327
LAVACA	3,095	12,647	151	4,692	20,585
MATAGORDA	42,732	9,063	0	0	51,795
REFUGIO	6,379	37,951	0	0	44,331
VICTORIA	104,670	70,373	0	50,000	225,043
WHARTON	135,864	78,713	0	0	214,577
Total	471,604	403,442	2,766	86,536	964,348

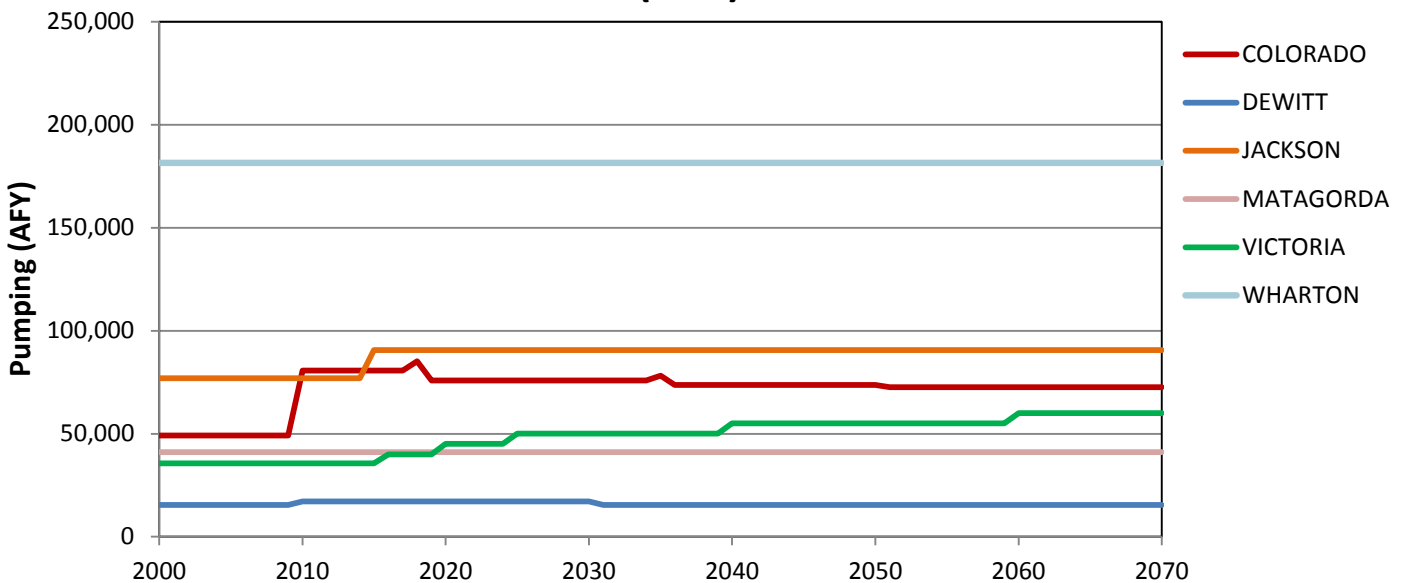
*option 1 ignores the zero pumping condition for the replace modification and keeps existing pumping

Baseline Pumping Rates from 2000 to 2007 for Option 1*

Baseline (AFY) - Part 1



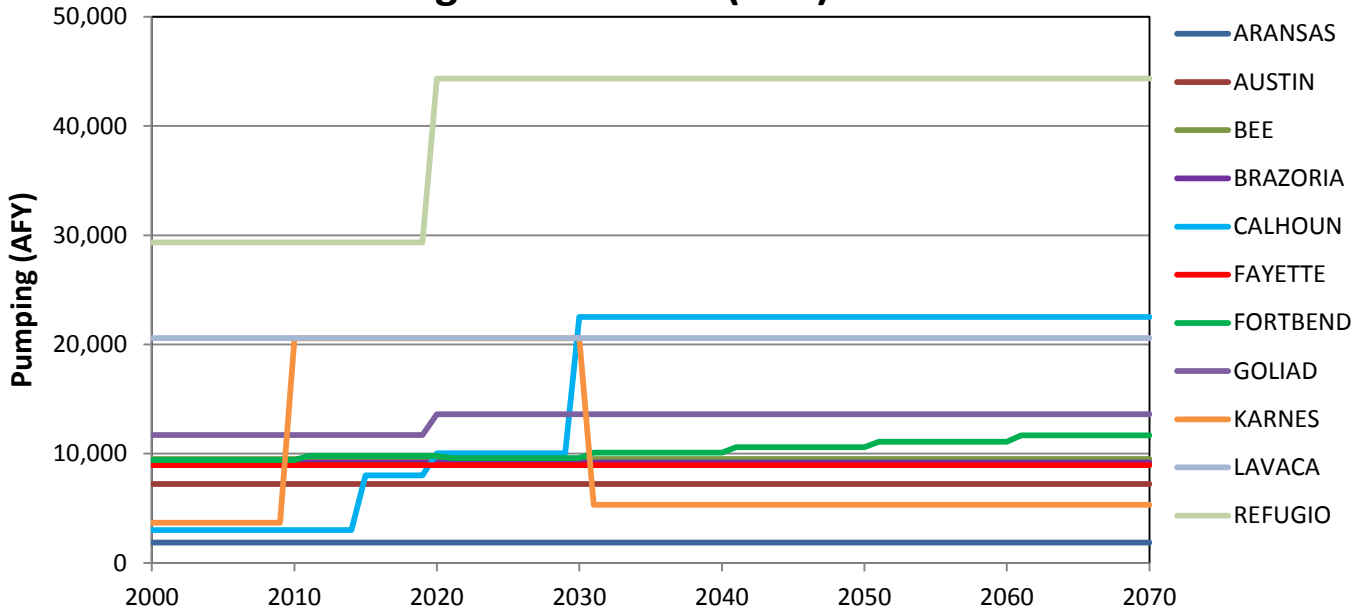
Baseline (AFY) - Part 2



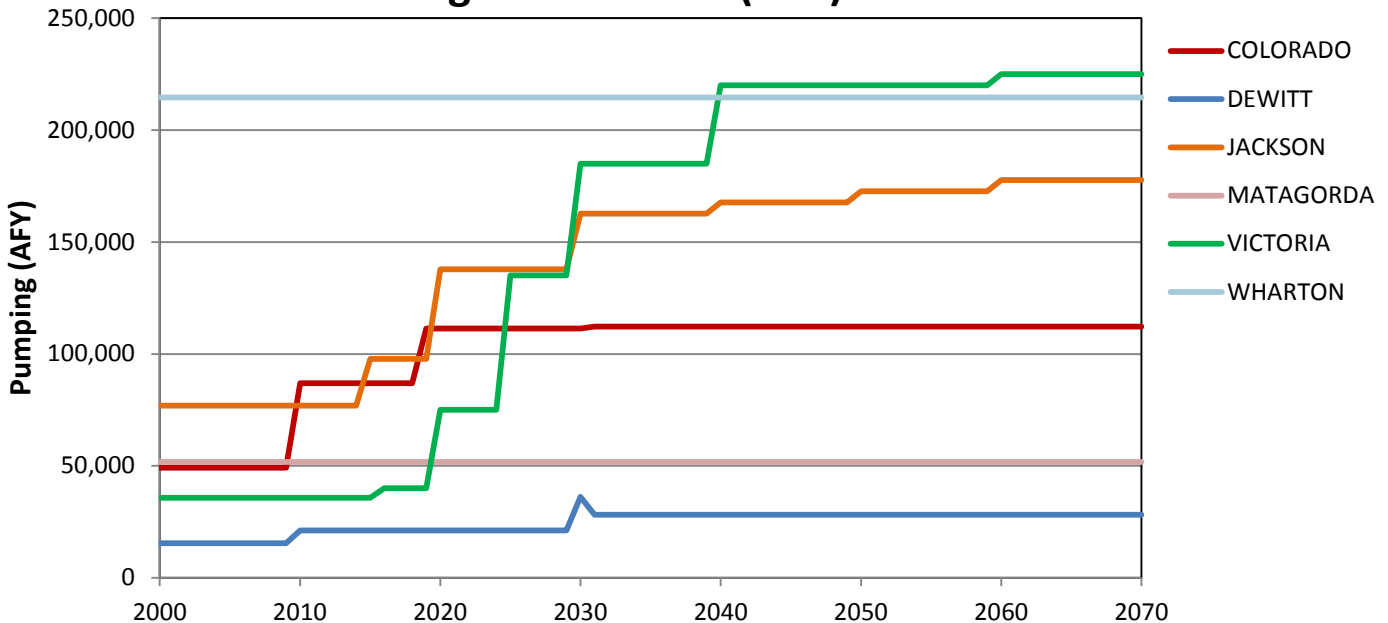
*option 1 ignores the zero pumping condition for the replace modification and keeps existing pumping

High Production Pumping Rates from 2000 to 2007 for Option 1*

High Production (AFY) - Part 1



High Production (AFY) - Part 2



*option 1 ignores the zero pumping condition for the replace modification and keeps existing pumping