

# COLORADO BBEST/BBASC UNAPPROPRIATED FLOW INFO FROM TCEQ WAM RUN3 FOR SELECTED SITES

## WITHOUT BBEST RECOMMENDATIONS AND WITH VARIOUS LEVELS OF CL BBEST AND LYONS REQUIREMENTS IMPOSED

C:\KRC\Active\COLORADO BBASC\WAM FROM TCEQ 03172011\STAGE2-04152011\REVISED FRAT\TASK2\05242011-TCEQ RUN3 UNAP AT SELECTED BBEST SITES.xls\SUMMARY

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				FLOW STATISTICS (ACRE-FEET)						FREQUENCY STATISTICS				PERCENT OF TIME WATER AVAILABLE	
				ANNUAL DRT AVG AF/Y	ANNUAL POR AVG AF/Y	ANNUAL MAX AMT AF/Y	ANNUAL MIN AMT AF/Y	MONTH MIN AMT AF	MONTH MAX AMT AF	YEARS WITH ZERO YEARS	CONSC YEARS	MONTHS WITH ZERO MONTHS	CONSC MONTHS	YEARS %	MONTHS %
<b>WITHOUT CL BBEST RECOMMENDATIONS IMPOSED</b>															
SITE#	PAGE #	WAM ID	BBEST SITES												
10	3	H10000	PEDERNALES NEAR JOHNSON CITY	4,721	54,173	370,035	0	0	192,213	30	9	611	122	49.2%	13.7%
15	6	GS300	LAVACA RIVER NEAR EDNA	60,964	201,454	848,439	0	0	428,297	6	1	386	26	89.5%	43.6%
20	10	GS1300	TRES PALACIOS NEAR MIDFIELD	29,770	65,813	229,902	5,957	0	83,510	0	0	213	7	100.0%	68.9%
21	13	GS1200	GACITAS CREEK NEAR INEZ	15,150	32,107	93,428	1,136	0	46,926	0	0	32	3	100.0%	95.3%
<b>WITH CL BBEST RECOMMENDATIONS IMPOSED</b>															
SITE#	PAGE #	WAM ID	BBEST SITES												
10	4	H10000-BBEST	PEDERNALES NEAR JOHNSON CITY-BBEST	3,739	34,263	304,765	0	0	129,913	30	9	611	122	49.2%	13.7%
15	7	GS300-BBEST	LAVACA RIVER NEAR EDNA-BBEST	36,663	135,156	751,366	0	0	318,738	7	3	388	39	87.7%	43.3%
20	11	GS1300-BBEST	TRES PALACIOS NEAR MIDFIELD-BBEST	19,023	40,997	181,973	2,768	0	68,294	0	0	243	7	100.0%	64.5%
21	14	GS1200-BBEST	GACITAS CREEK NEAR INEZ-BBEST	10,004	20,327	76,057	186	0	40,154	0	0	99	11	100.0%	85.5%
<b>WITH CL BBEST RECOMMENDATIONS IMPOSED BUT NO HIGH FLOW PULSE REQUIREMENT</b>															
SITE#	PAGE #	WAM ID	BBEST SITES												
10	5	H10000-BBEST-NHFP	PEDERNALES NEAR JOHNSON CITY-BBEST-NHFP	4,131	50,153	351,201	0	0	190,319	30	9	611	122	49.2%	13.7%
15	8	GS300-BBEST-NHFP	LAVACA RIVER NEAR EDNA-BBEST-NHFP	58,009	192,199	828,243	0	0	427,092	7	3	388	39	87.7%	43.3%
20	12	GS1300-BBEST-NHFP	TRES PALACIOS NEAR MIDFIELD-BBEST-NHFP	26,746	61,119	222,144	2,768	0	83,080	0	0	242	7	100.0%	64.6%
21	15	GS1200-BBEST-NHFP	GACITAS CREEK NEAR INEZ-BBEST-NHFP	13,654	30,080	90,782	186	0	46,868	0	0	98	11	100.0%	85.7%
<b>WITH LYONS RECOMMENDATIONS IMPOSED</b>															
SITE#	PAGE #	WAM ID	BBEST SITES												
15	9	GS300-BBEST-LYONS	LAVACA RIVER NEAR EDNA-LYONS	59,789	198,227	838,999	0	0	427,758	7	3	387	39	87.7%	43.4%

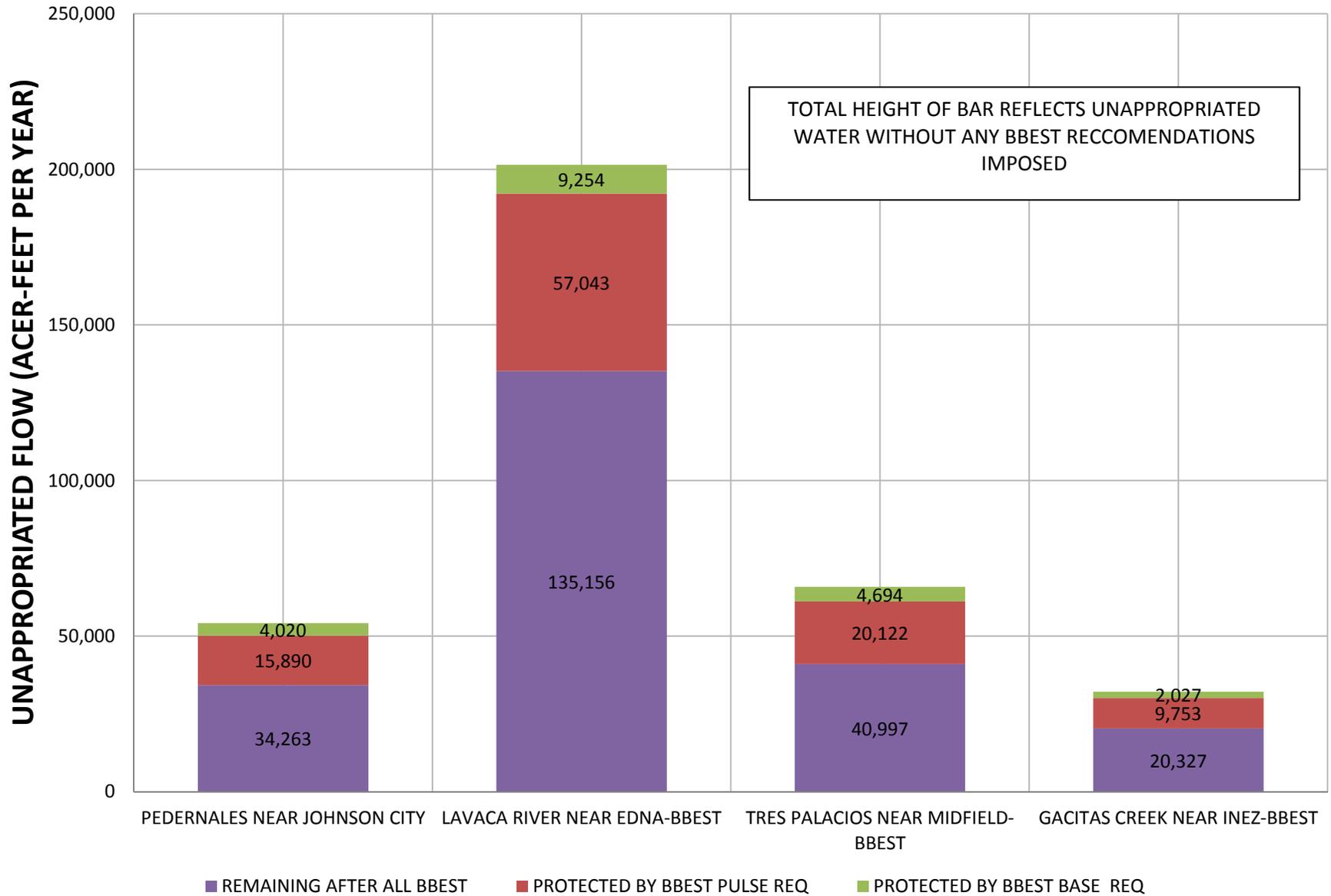
PERIOD OF RECORD FOR THE VARIOUS TCEQ WAM MODELS	
	COLORADO BASIN WAM (1940-1998)
	LAVACA BASIN WAM (1940-1996)
	COLORADO/LAVACA COASTAL WAM (1940-1996)
	LAVACA/GUADALUPE COASTAL WAM (1940-1996)

ABBREVIATIONS USED IN ABOVE INFORMATION	
POR	ENTIRE PERIOD OF RECORD, WHICH VARIES DEPENDING ON BASIN WAM MODEL.
DRT	CRITICAL DROUGHT PERIOD, THE 10 YEAR PERIOD BEGINNING IN JUNE 1945 AND ENDING IN MAY 1957.
AF/Y	ANNUAL VOLUME OF WATER IN UNITS OF ACRE-FEET.
CONSC	CONSECUTIVE.
BBEST	CL BBEST'S RECOMMENDATIONS, AS SPECIFIED IN BBEST REPORT.
NHFP	NO HIGH FLOW PULSE RECOMMENDATIONS.

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1 STACKED BAR PLOT FOR EACH SITE SHOWING TOTAL UNUAPPROPRIATED WATER REAMAINING WITH NO BBEST, WITH FULL BBEST, AND WITH FULL BBEST BUT NHFP RECOMMENDATIONS FOR POR.  
 2 STACKED BAR PLOT FOR EACH SITE SHOWING TOTAL UNUAPPROPRIATED WATER REAMAINING WITH NO BBEST, WITH FULL BBEST, AND WITH FULL BBEST BUT NHFP RECOMMENDATIONS FOR DRT.

## UNAPPROPRIATED WATER REMAINING AFTER BBEST COMPONENTS IMPOSED ANNUAL AVERAGE AMOUNT FOR PERIOD OF RECORD



HYDROLOGIC TRIGGERS USED FOR PEDERNALES ANALYSIS  
 USING LCRA SYSTEM STORAGE FROM TCEQ RUN3 (1940-1998)

	% OF TIME ENGAGED		TRIGGER IN WHICH ENGAGED	% OF SYSTEM STORAGE
BASE HIGH	23.8%	100.0%	2,163,227	100.0%
BASE MED	50.5%	76.2%	2,122,659	98.1%
BASE LOW	20.4%	25.7%	1,446,423	66.9%
SUBSISTENCE	5.3%	5.3%	720,800	33.3%

100.0%

# PEDERNALES NEAR JOHNSON CITY

## SUMMARY OF RESULTS FOR BBEST APPLICATION OF ASR PROJECT

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6/28/2011

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INPUT PARAMETERS		SCENARIO			
		1-NO EFLOWS	2-FULL BBEST EFLOWS	3-BBEST BUT NO HFP'S	4-BBEST WITH SEASONAL PULSES ONLY
(1)	RIVER PUMP RATE INTO TREATMENT RESERVOIR (OCR)	1,000 CFS (60,330 AC-FT/MONTH)			
(2)	SIZE OF TREATMENT RESERVOIR	10,000 ACRE-FEET			
(3)	PUMP RATE FROM TREATMENT RESERVOIR (used to meet project demand then inject the balance)	50 CFS (3,016 AC-FT/MONTH or 36,198 AC-FT/YR)			
(4)	AVAILABLE SPACE IN AQUIFER TO STORE WATER	100,000 ACRE-FEET			
SIMULATION RESULTS		SCENARIO			
		1-NO EFLOWS	2-FULL BBEST EFLOWS	3-BBEST BUT NO HFP'S	4-BBEST WITH SEASONAL PULSES ONLY
(5)	Beginning Storage in Aquifer	35,000	52,000	42,000	46,600
Diversions from River into OCR (1000 cfs diversion trying to keep the treatment reservoir full)					
(6)	Maximum Annual Diversion (ac-ft/yr)	31,222	30,342	30,342	30,342
(7)	Average Annual Diversion (ac-ft/yr)	9,213	8,284	8,646	8,378
(8)	Minimum Annual Diversion (ac-ft/yr)	0	0	0	0
Diversions from OCR to Meet Demand then Inject Balance into ASR (50 cfs diversion from treatment reservoir to be used or injected)					
(9)	Annual Demand from OCR (ac-ft/yr)	36,198	36,198	36,198	36,198
(10)	Percent of Years Full Demand Met	1.7%	0.0%	0.0%	0.0%
(11)	Percent of Years at least 75% of Full Annual Demand Met	11.9%	8.5%	8.5%	8.5%
(12)	Percent of Months Full Monthly Demand Met	23.7%	20.6%	21.2%	20.9%
(13)	Percent of Months any Water Pumped	28.4%	26.1%	27.0%	26.4%
(14)	Maximum Annual Diversion (ac-ft/yr)	36,198	34,892	36,112	34,892
(15)	Average Annual Diversion (ac-ft/yr)	9,383	8,454	8,816	8,547
(16)	Minimum Annual Diversion (ac-ft/yr)	0	0	0	0
(17)	Firm Yield of ASR Project (af-ft/yr)	9,560	8,900	9,100	8,900
(18)	Firm Yield of ASR Project (cfs)	13.2	12.3	12.6	12.3
(19)	Maximum Rate Water Injected into ASR (cfs)	36.8	37.7	37.4	37.7
(18)	Minimum Storage in ASR (ac-ft)	351	314	221	407
(20)	Maximum Storage in ASR (ac-ft)	99,569	99,792	99,516	99,885

OCR = Off-Channel Reservoir

ASR = Aquifer Storage and Recovery

ac-ft = acre-feet

**SUMMARY OF COMPLIANCE RESULTS WITH CL BBEST EFLOW RECOMMENDATIONS**

PEDERNALES NEAR JOHNSON CITY SITE FOR VARIOUS BBASC ANALYSES

PEDERNALES ASR PROJECT (SUBSISTENCE CHANGED TO Q95)

6/28/2011

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)	FIRM YIELD (AF/Y)	NA	NA	NA	9,560	8,900	9,100	8,900
(2)	PROJECT IN / OUT	NO PROJECT			WITH PROJECT IN PLACE (RUN NUMBER - SEE BELOW)			
(3)	EFLOW COMPONENT	HISTORICAL	WAM RUN3 USED FOR BBEST REPORT	WAM RUN3 USED FOR PROJECT	RUN 1	RUN 2	RUN 3	RUN 4
(4)	NON-PULSE FLOWS (PERCENT OF TIME FLOW EQUALS OR EXCEEDS BBEST RECOMMENDATIONS.							
(5)	SUBSISTENCE	92%	na (3)	93%	92%	93%	93%	93%
(6)	BASE LOW	72%	71%	71%	69%	71%	71%	71%
(7)	BASE MEDIUM	55%	54%	54%	51%	54%	54%	54%
(8)	BASE HIGH	37%	37%	37%	34%	36%	35%	36%
(9)	PULSE FLOWS (NUMBER OF QUALIFYING PULSE EVENTS PASSED.							
(10)	2PER SEASON (HFP1)	92	93	93	88	90	87	91
(11)	1PER SEASON (HFP2)	46	46	45	44	45	44	45
(12)	1 PER YEAR (HFP3)	46	46	46	46	46	46	46
(13)	1 PER 2 YEARS (HFP4)	27	27	24	24	24	24	24
(14)	1 PER 5 YEARS (HFP5)	11	10	10	10	10	10	10

RUN NUMBER	DESCRIPTION OF EFLOW REQUIREMENTS IMPOSED ON PROJECT
1	NO EFLOW REQUIREMENTS.
2	CL BBEST RECOMMENDATIONS.
3	CL BBEST RECOMMENDATIONS BUT NONE OF THE HIGH FLOW PULSE RECOMMENDATIONS IMPOSED.
4	CL BBEST RECOMMENDATIONS BUT ONLY SEASONAL PULSES IMPOSED.

NOTE 1: ATTAINMENT FREQUENCIES FOR SEASONAL RECOMMENDATIONS (ALL NON-PULSE RECOMMENDATIONS AND FIRST 2 PULSE RECOMMENDATIONS) SUMMARIZED BY AVERAGING RESULTS FOR ALL FOUR SEASONS INTO SINGLE VALUE FOR ALL COMPARISONS.

NOTE 2: INFORMATION IN COLUMNS 2 AND 3 ARE REPORTED IN BBEST REPORT (PAGES 5-6 AND 5-10). NOTE THAT SUBSISTENCE COMPLIANCE FROM BBEST REPORT NOT STATED BECAUSE BBEST REPORT STATISTICS WERE NOT BASED ON Q95 VALUE. INFORMATION IN COLUMN 4 WAS DETERMINED USING A MORE RECENT VERSION OF THE TCEQ RUN3 WAM MODEL AND WITH LCRA'S PERMIT 5731 INCLUDED.

NOTE 3: ALL BBEST SCENARIOS (COLUMNS 6,7,8) USE HIGHLAND LAKES SYSTEM STORAGE AND BBEST PROPOSED IMPLEMENTATION PLAN AS SIGNAL TO DESIGNATE WHICH NON-PULSE LEVEL OF FLOW IS REQUIRED TO BE PASSING PROJECT LOCATION BEFORE DIVERSION CAN OCCUR. PULSE RECOMMENDATIONS ARE APPLIED AT TIMESFOR ALL CONDITIONS.