Appendix 1-A

Species of Special Concern in the Region

The TPWD has compiled a list of species of special concern in the State of Texas. Rare species are listed by county in the Rare, Threatened, and Endangered Species Database, which includes regulatory listing and habitats of each species.

Table 1-A.1 identifies rare, threatened or endangered species in the region by county and lists federal and state status for each species. Species are grouped by taxonomic assemblage (i.e., bird, insect, fish, mammal, vascular plant, etc.). Information on habitats for these species may be found on the TPWD website.[1]

The key to the federal and state status for threatened and endangered species follows:

LE, LT	Federally Listed Endangered/Threatened
PE, PT	Federally Proposed Endangered/Threatened
SAE, SAT	Federally Listed Endangered/Threatened by Similarity of Appearance
C	Federal Candidate for Listing; formerly Category 1 Candidate
DL, PDL	Federally Delisted/Proposed for Delisting
NL	Not Federally Listed
E, T	State Listed Endangered/Threatened
NT	Not tracked or no longer tracked by the State
“blank”	Rare, but with no regulatory listing status

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Table 1-A.1 Species of Special Concern

	Species	Federal Status	State Status	Anderson	Angelina	Cherokee	Hardin	Henderson	Houston	Jasper	Jefferson	Nacogdoches	Newton	Orange	Panola	Polk	Rusk	Sabine	San Augustine	Shelby	Smith	Trinity	Tyler
				County																			
Birds	American Peregrine Falcon	DL	T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Birds	Arctic Peregrine Falcon	DL		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Birds	Bachman's Sparrow		T	•	•	•	•	•	•	•		•	•		•	•	•	•	•	•	•	•	•
Birds	Bald Eagle	DL	T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Birds	Black Rail										•												
Birds	Brown Pelican	DL	E								•			•									
Birds	Henslow's Sparrow			•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•
Birds	Interior Least Tern	LE	E	•		•		•	•						•					•	•		
Birds	Peregrine Falcon	DL	T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Birds	Piping plover	LT	T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Birds	Red-cockaded Woodpecker	LE	E	•	•	•	•		•	•		•	•		•	•		•	•	•		•	•
Birds	Reddish egret		T								•												
Birds	Southeastern snowy plover										•												
Birds	Sooty tern		T											•									
Birds	Swallow-tailed kite		T		•		•			•	•	•	•	•				•	•	•		•	•
Birds	Western snowey plover										•												
Birds	White-faced Ibis		T	•			•			•	•		•	•								•	
Birds	Whooping Crane	LE	E	•				•															
Birds	Wood Stork		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Insects	A Caddisfly			•																			

Table 1-A.1 Species of Special Concern (Cont.)

	Species	Federal Status	State Status	Anderson	Angelina	Cherokee	Hardin	Henderson	Houston	Jasper	Jefferson	Nacogdoches	Newton	Orange	Panola	Polk	Rusk	Sabine	San Augustine	Shelby	Smith	Trinity	Tyler
				County																			
	A purse casemaker caddisfly			•																			
	Holzenthal's philopotamid caddisfly			•																			
	A mayfly									•													
	Bay skipper										•												
	Morse's net-spinning caddisfly			•																			
	Texas emerald dragonfly			•					•									•	•	•		•	
	Gulf Coast clubtail												•										
Fish	American Eel			•	•	•	•		•	•	•		•	•		•						•	•
Fish	Blackside darter		T									•			•					•	•		
Fish	Blue sucker		T				•			•			•					•					•
Fish	Creek chubsucker		T		•	•	•		•	•		•	•		•	•	•	•	•	•	•	•	•
Fish	Orangebelly darter				•	•				•		•	•		•	•	•	•	•	•	•		
Fish	Paddlefish		T	•	•	•			•			•	•		•	•	•	•	•	•	•	•	•
Fish	Western sand darter						•			•			•				•	•			•		•
Fish	Smalltooth sawfish	LE	E								•												
Fish	Ironcolor shiner												•	•	•		•	•		•	•		
Mammals	Black bear	T/SA; NL	T	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Mammals	Louisiana black bear	LT	T	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•		•	•
Mammals	Plains spotted skunk			•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•
Mammals	Rafinesque's big-eared bat		T		•	•	•		•	•	•	•	•	•	•	•	•	•	•	•		•	•

Table 1-A.1 Species of Special Concern (Cont.)

	Species	Federal Status	State Status	County: Anderson	Angelina	Cherokee	Hardin	Henderson	Houston	Jasper	Jefferson	Nacogdoches	Newton	Orange	Panola	Polk	Rusk	Sabine	San Augustine	Shelby	Smith	Trinity	Tyler
	Red wolf	LE	E	•	•	•	•		•		•	•	•	•		•	•	•	•	•	•	•	•
	Southeastern myotis			•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Reptiles and Amphibians	Alligator snapping turtle		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Reptiles and Amphibians	Atlantic hawksbill sea turtle	LE	E								•												
Reptiles and Amphibians	Green sea turtle	LT	T								•												
Reptiles and Amphibians	Gulf saltmarsh snake										•			•									
Reptiles and Amphibians	Kemp's ridley sea turtle	LE	E								•												
Reptiles and Amphibians	Leatherback sea turtle	LE	E								•												
Reptiles and Amphibians	Loggerhead sea turtle	LT	T								•												
Reptiles and Amphibians	Louisiana pine snake	C	T	•	•	•	•		•	•		•	•			•	•	•	•	•	•	•	•
Reptiles and Amphibians	Northern Scarlet Snake		T			•	•	•		•	•		•	•	•		•	•	•	•	•		•
Reptiles and Amphibians	Pig frog						•			•	•		•	•									•
Reptiles and Amphibians	Sabine map turtle			•	•	•	•	•		•	•	•	•	•	•		•	•	•	•	•		•
Reptiles and Amphibians	Southern redback salamander											•											
Reptiles and Amphibians	Texas diamondback terrapin										•			•									
Reptiles and Amphibians	Texas horned lizard		T	•		•		•	•		•	•		•			•				•		
Reptiles and Amphibians	Timber/canebrake rattlesnake		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Mollusks	Creeper (Squawfoot)			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Mollusks	Fawnsfoot			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Mollusks	Little Spectaclecase			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Mollusks	Louisiana pigtoe		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Table 1-A.1 Species of Special Concern (Cont.)

	Species	Federal Status	State Status	County																			
				Anderson	Angelina	Cherokee	Hardin	Henderson	Houston	Jasper	Jefferson	Nacogdoches	Newton	Orange	Panola	Polk	Rusk	Sabine	San Augustine	Shelby	Smith	Trinity	Tyler
	Pistolgrip			•	•	•	•	•	•	•	•	•	•		•	•		•	•	•	•	•	•
	Rock pocketbook			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Sandbank pocketbook		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Southern hickorynut		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Texas heelsplitter		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Texas pigtoe		T	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•
	Triangle Pigtoe		T				•					•							•	•			
	Wabash pigtoe			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Wartyback			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Vascular Plants	Boynton's Oak				•																		
	Carrizo leather flower					•															•		
	Chapman's Orchid						•				•			•									•
	Chapman's yellow-eyed grass							•															
	Earth fruit (Tinytim)	LT	T	•											•								
	Long-sepaled false dragon-head						•			•			•	•									•
	Navasota false foxglove																						•
	Navasota ladies' –tresses	LE	E							•													
	Neches River rose-mallow	C				•			•	•												•	
	Nodding yucca									•			•										
	Rough-stem aster			•				•													•		
	Sandhill woolywhite			•																			

Table 1-A.1 Species of Special Concern (Cont.)

				County																			
	Species	Federal Status	State Status	Anderson	Angelina	Cherokee	Hardin	Henderson	Houston	Jasper	Jefferson	Nacogdoches	Newton	Orange	Panola	Polk	Rusk	Sabine	San Augustine	Shelby	Smith	Trinity	Tyler
	Shinner's sunflower												•								•		
	Small-headed pipewort			•				•															
	Texas golden glade cress	C																•	•				
	Texas Prairie dawn	LE	E																			•	
	Texas screwstem				•		•			•		•	•			•			•				•
	Texas three-birds orchid								•														
	Texas trailing phlox	LE	E				•									•							•
	Texas trillium				•	•			•	•		•			•		•				•		
	White bladderpod	LE	E																•				
	White firewheel						•																•
Crustaceans	A crayfish				•																	•	
	Texas prairie crayfish				•																		

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Appendix 1-B

2008 303(d) List of Impaired Water Bodies Within the East Texas Regional Water Planning Area

Under Section 303(d) of the 1972 Clean Water Act, the TCEQ evaluates surface water in or bordering the state and compiles a list of impaired water bodies, or water bodies that do not meet uses and criteria defined in the Texas Surface Water Quality Standards. All impaired water bodies are placed into one of five categories, dependent on the water quality or status of TMDLs for these waters.

The TCEQ prepares a list of impaired water bodies on a bi-annual basis. The TCEQ 2008 Texas 303(d) List identifies such water bodies within the ETRWPA. The 303(d) list is expected to be finalized by mid-2010.

Tables 1-B.1 and 1-B.2 follow in this appendix. Table 1-B.1 provides a general listing of the types of water quality impairments currently identified in the ETRWPA. A total of 69 separate impairments are noted. These include impairments in water, sediment, and fish or shellfish tissue. A range of use impairments is noted. Table 1-B.2 lists, by segment number, the specific water quality impairments identified in the 2008 303(d) List. The following describes the information provided in the tables:

Segment Number and Name: Segment Numbers (TCEQ defined unique identifier or SegID) and Segment Names are provided. Four-digit numbers are classified segments as defined in Appendix A of the *Texas Surface Water Quality Standards*. Five-digit numbers are described in Appendix D of the *Texas Surface Water Quality Standards* and are partially classified or unclassified water bodies associated with a classified water body because it is in the same watershed.

Concern:	A water use concern is designated based upon the impairment(s) in the water body.
Description of Impairment:	Pollutants or water quality conditions found in the water body which do not meet Texas Surface Water Quality Standards.
Category:	Category 5 constitutes water bodies included on the 303(d) List of Impaired Waters, in which a TMDL may be required. Each impaired parameter was assigned one of three subcategories based upon the status of a TMDL schedule. A summary of the subcategories follows:

- 5a – A TMDL is underway, scheduled, or will be scheduled.
- 5b – A review of the water quality standards for the water body will be conducted before a TMDL is scheduled
- 5c – Additional data and information will be collected before a TMDL is scheduled.

Texas Commission on Environmental Quality 2008 303(d) List of Impaired Water Bodies Within the East Texas Regional Water Planning Area

Table 1-B.1 Impairments in ETRWPA

Impairment Parameters	2008 Number of Impairments	Use
Bacteria in water	29	Recreation
Dissolved Oxygen	18	Aquatic Life
Toxicity in Water or Sediment	4	Aquatic Life
Metals (except Mercury) in Water or Fish/Shellfish	5	Fish Consumption, Aquatic Life
Mercury in Water or Fish/Shellfish	9	Aquatic Life, Fish Consumption
pH	3	General
Biological	3	Aquatic Life
Total	**69**	

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Table 1-B.2 Impaired Water Bodies in ETRWPA

Segment		Concern is for				Description of Impairment	Category
Number	Name	Aquatic Life	Recreation	Fish Consumption	General Use		
0501	Sabine River Tidal		●			Bacteria.	5c
0501B	Little Cypress Bayou (unclassified water body)	●	●			Depressed dissolved oxygen, toxicity in water, bacteria.	5c
0502A	Nichols Creek (unclassified water body)	●	●			Depressed dissolved oxygen, toxicity in water, bacteria.	5c
0502B	Caney Creek (unclassified water body)		●			Bacteria.	5c
0504	Toledo Bend Reservoir	●		●		Depressed dissolved oxygen, mercury in edible tissue.	5c
0504C	Palo Gaucho Bayou (unclassified water body)	●				Toxicity in water.	5c
0504E	Clear Lake	●		●		Mercury in edible tissue.	5c
0505	Sabine River above Toledo Bend Reservoir		●			Bacteria.	5a
0505O	Hills Lake	●		●		Mercury in edible tissue.	5c
0603	B. A. Steinhagen Lake	●		●		Mercury in edible tissue.	5c

Table 1-B.2 Impaired Water Bodies in ETRWPA (Cont.)

Segment		Concern is for				Description of Impairment	Category
Number	Name	Aquatic Life	Recreation	Fish Consumption	General Use		
0603A	Sandy Creek (unclassified water body)		●			Bacteria.	5c
0603B	Wolf Creek (unclassified water body)		●			Bacteria.	5c
0604	Neches River Below Lake Palestine	●		●		Lead in water.	5c
0604A	Cedar Creek (unclassified water body)		●			Bacteria.	5c
0604B	Hurricane Creek (unclassified water body)		●			Bacteria.	5c
0604C	Jack Creek (unclassified water body)		●			Bacteria.	5c
0604D	Piney Creek (unclassified water body)	●	●			Depressed dissolved oxygen, bacteria.	5c
0604M	Biloxi Creek (unclassified water body)	●	●			Depressed dissolved oxygen, bacteria.	5c

Table 1-B.2 Impaired Water Bodies in ETRWPA (Cont.)

Segment		Concern is for					
Number	Name	Aquatic Life	Recreation	Fish Consumption	General Use	Description of Impairment	Category
0604T	Lake Ratcliff (unclassified water body)	●		●		Mercury in edible tissue.	5c
0605	Lake Palestine				●	pH	5c
0605A	Kickapoo Creek (unclassified water body)	●	●			Depressed dissolved oxygen, bacteria.	5c
0606	Neches River Above Lake Palestine	●	●	●	●	Depressed dissolved oxygen, zinc in water, bacteria, pH.	5c
0606A	Prairie Creek (unclassified water body)		●			Bacteria.	5c
0607	Pine Island Bayou	●	●			Depressed dissolved oxygen, bacteria.	5b (dissolved oxygen), 5c (bacteria)
0607A	Boggy Creek (unclassified water body)	●				Depressed dissolved oxygen.	5b
0607B	Little Pine Island Bayou (unclassified water body)	●	●			Depressed dissolved oxygen, bacteria.	5b (dissolved oxygen), 5c (bacteria)
0607C	Willow Creek (unclassified water body)	●				Depressed dissolved oxygen.	5b
608	Village Creek				●	pH.	5b

Table 1-B.2 Impaired Water Bodies in ETRWPA (Cont.)

Segment		Concern is for				Description of Impairment	Category
Number	Name	Aquatic Life	Recreation	Fish Consumption	General Use		
0608A	Beech Creek (unclassified water body)		●			Bacteria.	5c
0608B	Big Sandy Creek (unclassified water body)		●			Bacteria.	5c
0608C	Cypress Creek (unclassified water body)	●	●	●		Depressed dissolved oxygen, aluminum in water, bacteria.	5b (dissolved oxygen), 5c (aluminum & bacteria)
0608E	Mill Creek	●				Depressed dissolved oxygen.	5c
0608F	Turkey Creek (unclassified water body)		●			Bacteria.	5c
0608G	Lake Kimball (unclassified water body)	●		●		Mercury in edible tissue.	5c
0610	Sam Rayburn Reservoir	●		●		Mercury in edible tissue.	5c
0610A	Ayish Bayou (unclassified water body)		●			Bacteria.	5a
0611	Angelina River Above Sam Rayburn Reservoir		●			Bacteria.	5a
0611A	East Fork Angelina River (unclassified water body)	●	●	●		Bacteria, Lead in water.	5c

Table 1-B.2 Impaired Water Bodies in ETRWPA (Cont.)

Segment		Concern is for				Description of Impairment	Category
Number	Name	Aquatic Life	Recreation	Fish Consumption	General Use		
0611B	La Nana Bayou (unclassified water body)		●			Bacteria.	5a
0612	Attoyac Bayou		●			Bacteria.	5a
0615	Angelina River/Sam Rayburn Reservoir	●	●	●		Depressed dissolved oxygen, impaired fish community, mercury in edible tissue, bacteria.	5c
0615A	Papermill Creek (unclassified water body)		●			Bacteria.	5c
0701	Taylor Bayou above Tidal	●				Depressed dissolved oxygen.	5a
0701D	Shallow Prong Lake (unclassified water body)	●				Depressed dissolved oxygen.	5a
0702A	Alligator Bayou (unclassified water body)	●				Impaired fish community, toxicity in water and sediment.	5c
0704	Hillebrandt Bayou	●				Depressed dissolved oxygen.	5a
0804G	Catfish Creek (unclassified water body)	●				Depressed dissolved oxygen, impaired macrobenthic community.	5c
2501	Gulf of Mexico *(areas in or next to East Texas Region)*	●		●		Mercury in edible tissue.	5c

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Appendix 1-C

Determination of Available Groundwater Supplies and Quality

This appendix was prepared for the ETRWPA 2006 Water Plan. It has been reviewed for applicability to the 2011 Plan, and updated where necessary.

1-C.1 Groundwater Availability Modeling

The ETRWPG used the groundwater availability estimates from the previous round of planning because official managed available groundwater (MAG) values had not been determined by the GCDs in the GMAs. In the previous plan, the ETRWPG used the Queen City/Sparta/Carrizo-Wilcox GAM to estimate regional groundwater availability in the ETRWPA for the Carrizo-Wilcox and Queen City/Sparta aquifers. Since the 2006 Plan was completed, the GCDs in both GMA 11 and 14 have been working on developing DFCs and MAGs. A predictive groundwater availability model (GAM) for the Gulf Coast aquifer is being used to determine MAGs for the Gulf Coast aquifers. A draft GAM has been completed for the Yegua-Jackson aquifer, but was not ready for use during the current planning period. Therefore, the groundwater availability assessment for the Gulf Coast and Yegua-Jackson and other small aquifers were based on published information, historical water use data from these aquifers, available well and water level records, and the knowledge base of the consultant team.

The GAMs are regional models that were developed as a tool to better understand long-term regional impacts from historical and proposed groundwater pumping. The GAMs do not define, estimate, or prescribe groundwater availability or supply for the ETRWPA, but rather provide a tool to evaluate aquifer water level impacts under different pumping scenarios.

1-C.2 Groundwater Availability Assessment

As stated above, the groundwater availability estimates for the 2011 Plan were adopted from the 2006 Plan. For the 2006 Plan, the ETRWPG determined that it is in the best interest of the ETRWPA to maintain an acceptable level of aquifer sustainability during the 50-year planning window, as well as for future generations beyond the 50-year planning period. Thus, for the Carrizo-Wilcox, Queen City, and Sparta aquifers (for which a GAM exists), the groundwater availability for the planning period was defined as the amount of groundwater that could be withdrawn from aquifers over the next 50 years that would not cause more than 50 feet of water level decline (or more than a 10% decrease in the saturated thickness in outcrop areas) in the aquifers as compared to water levels in 2000. These criteria were used to guide the development of the groundwater availability assessment and to determine groundwater supply for each aquifer in each county. The planning group acknowledges that additional water does occur in storage within the aquifers and that a portion of that water (above the estimated supply) could be pumped if there is not a groundwater conservation district in place to prevent such withdrawals.

The steps involved in determining the water supply by county and aquifer using the Queen City/Sparta/Carrizo-Wilcox GAM is summarized below. Because the GAM does not "output" a value for groundwater availability or supply, the model was used to determine the impact of different pumping scenarios so that those impacts could be compared to the criteria set by the planning group. In other words, an iterative approach was used to determine what groundwater demand in each county would result in no more than 50 feet of water level decline or 10% decline in saturated thickness in the outcrop areas. Future pumping locations are not known with certainty. Therefore, the total "estimated" supply was distributed equally across each county and implemented into the predictive GAM model (2000-2050). The pumping was assumed to be constant starting in 2001, and was held at the projected level for 50 years.

The drawdown across the model area was then assessed to determine if the drawdown criteria were met (i.e., if the average drawdown across the county was less about 50 feet). Depending on the drawdown results, projected supplies were adjusted and another simulation completed. This approach was used until the average drawdown in each county met the criteria at the end of the 50-year simulation period. The supply for the county and aquifer was then set equal to the total county pumping that was necessary to meet the drawdown criteria.

Some of the groundwater in the ETRWPA is brackish (i.e., above 1000 mg/L of total dissolved solids [TDS]). In order to be used for municipal supply, the brackish groundwater may require treatment. The portion of groundwater that is brackish can be estimated by observing the overall water quality in each county on an aquifer-by-aquifer basis. The groundwater quality information is discussed in more detail in the following sections.

1-C.3 Groundwater Quality

The TWDB well database was used to complete a detailed water quality assessment of the aquifers in the ETRWPA. TWDB standard water quality constituent analytical results from wells within the ETRWPA were compared to primary and secondary drinking water maximum contaminant levels (MCLs) when the database contained sufficient data. In the case of fluoride, the lower secondary MCL of 2 milligrams per liter (mg/L) was used for comparison purposes. The standard water quality constituents studied were: sulfate, chloride, pH, TDS, nitrate, and fluoride.

TWDB infrequent water quality constituent analytical results were also compared to primary drinking water MCLs. Only constituents with primary drinking water MCLs and representative data records were selected for this effort. Only the most recent data for each well was used. The infrequent water quality constituents studied were: gross alpha, arsenic, barium, cadmium, chromium, copper, lead, and selenium. In the following discussions, gross alpha is reported in units of picocuries per liter (pCi/L), while the other infrequent constituents are reported in units of micrograms per liter (µg/L). Organic and other regulated infrequent constituent data was very sparse and were not considered to be representative.

1-C.3.1 Carrizo-Wilcox Water Quality. Table 1-C.1 summarizes the results for the Carrizo-Wilcox aquifer and maps of Carrizo-Wilcox groundwater quality in the ETRWPA are included at the end of this Appendix in Figures 1-C.1 through 1-C.16.

Table 1-C.1 Groundwater Quality Summary for Carrizo-Wilcox Aquifer in the ETRWPA

MCL Class	Constituent	Limit(s)	Units	Total Results	Results Over MCL	% Over	Average	Median
primary	Alpha	15	pCi/L	144	1	0.7%	< 3	< 2
primary	Arsenic	10	µg/L	303	1	0.3%	< 6	< 2
primary	Barium	2000	µg/L	236	0	0.0%	< 140	30.05
primary	Cadmium	5	µg/L	286	0	0.0%	< 4	< 2
primary	Chromium	100	µg/L	282	0	0.0%	< 10	< 5
primary	Lead	15	µg/L	263	3	1.5%	< 12	< 5
primary	Nitrate as N	10	mg/L	830	6	0.7%	1.7	0.22
primary	Selenium	50	µg/L	288	3	1.0%	< 6	< 2
secondary	Copper	1000	µg/L	297	0	0.0%	< 20	4.77
secondary	Fluoride	2	mg/L	819	5	0.6%	0.33	0.2
secondary	Chloride	300	mg/L	909	5	0.6%	59	15
secondary	Iron	300	µg/L	811	192	23.7%	821	< 100
secondary	Manganese	50	µg/L	488	48	9.8%	35	< 20
secondary	pH	6.5 - 8.5	std. units	817	287	35.1%	7.9	8.2
secondary	Sulfate	300	mg/L	908	3	0.3%	32	16
secondary	TDS	1000	mg/L	909	5	0.6%	404	299

Alpha. Only one result for dissolved alpha particles exceeded the 15 pCi/L primary MCL in the Carrizo-Wilcox in the ETRWPA. This result was 23 pCi/L and the sample was collected from a shallow well on the Carrizo outcrop in northern Sabine county. The alpha results are well distributed spatially in the outcrop and downdip sections of the Carrizo-Wilcox in the ETRWPA. Alpha particles were only detected in 15% of the groundwater results in the ETRWPA. Typical reporting limits were 2, 3, and 4 pCi/L.

Arsenic. No arsenic results exceeded the 10 µg/L primary MCL in the Carrizo-Wilcox aquifer group in the ETRWPA. The results were well distributed spatially throughout the Carrizo-Wilcox aquifer group in the ETRWPA. One arsenic result was non-detect with a reporting limit that exceeded the current MCL. This result was not included on the figure for this aquifer group in the ETRWPA. Arsenic was detected above the 10 µg/L primary

MCL in only one result from the Carrizo-Wilcox aquifer in the ETRWPA. Arsenic was detected in less than 2% of all of the results in the ETRWPA. Typical reporting limits were 1, 2, 5, and 10 µ/L.

Barium. No barium results exceeded the 2,000 µg/L primary MCL in the Carrizo-Wilcox aquifer group in the ETRWPA. The results were well distributed spatially throughout the Carrizo-Wilcox aquifer group in the ETRWPA. Barium was detected in most of the results, and the average for all of the detections is less than 140 µg/L, and the median is less than 2 µg/L.

Cadmium. No cadmium results exceeded the 5 µg/L primary MCL in the Carrizo-Wilcox aquifer group in the ETRWPA. The results were well distributed spatially throughout the Carrizo-Wilcox aquifer group in the ETRWPA. Cadmium was only detected in 1% of the results in the ETRWPA. Typical reporting limits were 1, 2, and 5 µ/L. There were several results in which cadmium was not detected with a reporting limit of 10 µg/L. These results were not considered useful since the reporting limit exceeded the MCL and were not included in the summary table or figure.

Chromium. Chromium was not detected in any of the results above the 100 µg/L primary MCL in the Carrizo-Wilcox aquifer in the ETRWPA. The results were well distributed spatially throughout the Carrizo-Wilcox aquifer group in the ETRWPA. Chromium was detected in approximately 30% of the results, and the average for all of the results is <10 µg/L, and the median is <5 µg/L.

Lead. Lead was not detected in any of the results above the 15 µg/L primary MCL in the Carrizo-Wilcox aquifer in the ETRWPA. Three lead results exceeded the 15 µg/L primary MCL in the Carrizo-Wilcox aquifer group in the ETRWPA. The remaining results were well distributed spatially throughout the Carrizo-Wilcox aquifer group in the ETRWPA. Lead was detected in approximately 12% of the results, and the average for all of the results is <12 µg/L, and the median is <5 µg/L. There were 95 lead results that were below reporting limits that exceeded the current MCL (reporting limits greater than 15 µg/L). These results were not included on the figure or in the table for this aquifer group in the ETRWPA.

Nitrate as N. Six nitrate results exceeded the 10 mg/L (as N) primary MCL in the Carrizo-Wilcox aquifer group in the ETRWPA. Most of these were from samples collected from shallow wells on the Carrizo outcrop, but these were not concentrated in any particular area. The remaining results were well distributed spatially throughout the Carrizo-Wilcox aquifer group in the ETRWPA. Nitrate (as N) was detected above the primary MCL of 10 mg/L in less than 1% of the results in the Carrizo-Wilcox aquifer in the ETRWPA. The average for all of the results is 1.7 mg/L, and the median for all of the results is 0.22 mg/L.

Selenium. Three selenium results exceeded the 50 µg/L primary MCL in the Carrizo-Wilcox aquifer group in the ETRWPA. Two of these results were in Angelina County, and one was in Anderson County. All three were in the downdip section of the Carrizo. The results were well distributed spatially throughout the Carrizo-Wilcox aquifer group in the ETRWPA. Selenium was detected above the 50 µg/L primary MCL in 1% of the results in the Carrizo-Wilcox aquifer in the ETRWPA. Selenium was detected in only 7% of the results, and the average for all of the results is <6 µg/L, and the median is 4.77 µg/L.

Copper. Copper was not detected above the 1,000 µg/L secondary MCL or the 1,300 µg/L primary MCL in the Carrizo-Wilcox aquifer in the ETRWPA. The results considered were well distributed spatially throughout the Carrizo-Wilcox aquifer group in the ETRWPA. The average for all of the results is <20 µg/L, and the median is 0.2 µg/L.

Fluoride. Five fluoride results exceeded the 2 mg/L secondary MCL in the Carrizo-Wilcox aquifer group in the ETRWPA. Three of these results were from deep wells in the Wilcox in western Rusk County, and there were several other wells in this area with elevated levels of fluoride (well above the average for the ETRWPA, in the 1.5 - 2 mg/L range). The other two results that exceeded the secondary MCL were in eastern Shelby County. No results exceeded the 4 mg/L primary MCL. The available results were well distributed spatially throughout the Carrizo-Wilcox aquifer group in the ETRWPA. Fluoride was detected above the secondary MCL of 2 mg/L in less than 1% of the results in the Carrizo-Wilcox aquifer in the ETRWPA. None of the results exceeded the primary

MCL of 4 mg/L. The average for all of the results is 0.33 mg/L, and the median for all of the results is 0.2 mg/L.

Chloride. Only five chloride results exceeded the 300 mg/L secondary MCL in the Carrizo-Wilcox aquifer group in the ETRWPA, and no significant spatial trends appear to be associated with these results. A disproportionate number of results in Panola County are in the 100-300 mg/L range, but these are all below the 300 mg/L secondary MCL. The available results were well distributed spatially throughout the Carrizo-Wilcox aquifer group in the ETRWPA. Chloride was detected in less than 1% of the results above the secondary MCL of 300 mg/L in the Carrizo-Wilcox aquifer in the ETRWPA. The average for all of the results is 59 mg/L, and the median for all of the results is 15 mg/L.

Iron. About one-quarter of iron sample results in the Carrizo-Wilcox aquifer group exceeded the 300 µg/L secondary MCL in the ETRWPA. The results that exceeded the MCL were evenly distributed spatially and represented samples collected from wells completed in both the Carrizo and Wilcox Formations. Iron was detected above the secondary MCL of 300 µg/L in 23.7% of the results above in the Carrizo-Wilcox aquifer in the ETRWPA. The average for all of the results is 821 µg/L, and the median for all of the results is <100 µg/L, indicating that the average is skewed upward due to the presence of a limited number of high values.

Manganese. Forty-eight manganese sample results in the Carrizo-Wilcox aquifer group exceeded the 50 µg/L secondary MCL in the ETRWPA. The results that exceeded the MCL were evenly distributed spatially and represented samples collected from wells completed in both the Carrizo and Wilcox Formations. Manganese was detected in 9.8% of the results above the secondary MCL of 50 µg/L in the Carrizo-Wilcox aquifer in the ETRWPA. Manganese was detected in approximately half of the results, and the average for all of the results is 35 µg/L, and the median for all of the results is <20 µg/L.

pH. About one-third of pH results in the Carrizo-Wilcox aquifer group were outside of the 6.5 - 8.5 secondary MCL range in the ETRWPA. Most of the out-of-range results were more alkaline than the upper pH MCL of 8.5. The results that were out of the MCL range were evenly distributed spatially and represented samples collected from wells completed in both the Carrizo and Wilcox Formations. The pH of water samples was outside the secondary MCL range of 6.5 to 8.5 in 35% of the results in the Carrizo-Wilcox aquifer in the ETRWPA. The range of all of the results was 3.6 to 10.7, and the average is 7.9 and the median is 8.2.

Sulfate. Only three sulfate results exceeded the 300 mg/L secondary MCL in the Carrizo-Wilcox aquifer group in the ETRWPA. Two of these are from wells in the Wilcox in northwestern Nacogdoches County. However, several other results in the immediate area are well below the MCL. A disproportionate number of results in northwestern Cherokee County are in the 150-300 mg/L range, but these are all below the 300 mg/L secondary MCL. The available results were well distributed spatially throughout the Carrizo-Wilcox aquifer group in the ETRWPA. Sulfate was detected in less than 1% of the results above the secondary MCL of 300 mg/L in the Carrizo-Wilcox aquifer in the ETRWPA. The average for all of the results is 32 mg/L, and the median for all of the results is 16 mg/L.

Total Dissolved Solids. Only four TDS results exceeded the 1,000 mg/L secondary MCL in the Carrizo-Wilcox aquifer group in the ETRWPA. TDS results tended to be higher in Panola, Rusk, Shelby, and eastern Anderson Counties, but these were for the most part below the secondary MCL. The available results were well distributed spatially throughout the Carrizo-Wilcox aquifer group in the ETRWPA. The TDS concentration was above the secondary MCL of 1,000 mg/L in less than 1% of the results in the Carrizo-Wilcox aquifer in the ETRWPA. The average for all of the results is 404 mg/L, and the median for all of the results is 299 mg/L.

1-C.3.2 Gulf Coast Water Quality. Table 1-C.2 summarizes the results for the Gulf Coast aquifer and maps of Gulf Coast groundwater quality in the ETRWPA are included at the end of this Appendix in Figures 1-C.1 through 1-C.16.

Table 1-C.2 Groundwater Quality Summaries for Gulf Coast Aquifer in the ETRWPA

MCL Class	Constituent	Limits	Units	Total Results	Results Over MCL	% Over	Average	Median
primary	Alpha	15	pCi/L	82	1	1.2%	3	2
primary	Arsenic	10	µg/L	116	0	0.0%	4	2
primary	Barium	2000	µg/L	116	1	0.9%	177	109
primary	Cadmium	5	µg/L	97	0	0.0%	< 2	< 1
primary	Chromium	100	µg/L	97	0	0.0%	< 10	< 1
primary	Lead	15	µg/L	115	0	0.0%	< 2	< 1
primary	Nitrate as N	10	mg/L	712	58	8.1%	3	0.0
primary	Selenium	50	µg/L	116	0	0.0%	4	4
secondary	Copper	1000	µg/L	116	0	0.0%	10	2.26
secondary	Fluoride	2	mg/L	511	5	1.0%	0	0.20
secondary	Chloride	300	mg/L	952	120	12.6%	154	32
secondary	Iron	300	µg/L	373	100	26.8%	520	100
secondary	Manganese	50	µg/L	142	51	35.9%	65	26
secondary	pH	6.5 - 8.5	std. units	393	93	23.7%	7.2	7.3
secondary	Sulfate	300	mg/L	947	9	1.0%	18	3
secondary	TDS	1000	mg/L	950	96	10.1%	450	224

Alpha. Only one result for alpha particles exceeded the 15 pCi/L primary MCL in the Gulf Coast in the ETRWPA. This result was 29 pCi/L and the sample was collected from a 532-ft well in Beaumont completed in the Chicot Aquifer. The alpha results are well distributed spatially in the Gulf Coast Aquifer in the ETRWPA. The average for all of the results is 3 pCi/L, and the median for all of the results is 2 pCi/L.

Arsenic. No arsenic results exceeded the 10 µg/L primary MCL in the Gulf Coast aquifer group in the ETRWPA. The results were well distributed spatially throughout the Gulf Coast aquifer group in the ETRWPA. The average for all of the results is 4 µg/L, and the median is 2 µg/L.

Barium. Barium was detected in only one of the results above the 2,000 µg/L primary MCL in the Gulf Coast aquifer group in the ETRWPA. This result was from a sample collected from a well completed in the Chicot in Jefferson County. The results were well distributed spatially throughout the Gulf Coast aquifer group in the ETRWPA. Barium was detected in more than 95% of the results, and the average for all of the results is 177 µg/L, and the median is 109 µg/L.

Cadmium. No cadmium results exceeded the 5 µg/L primary MCL in the Gulf Coast aquifer group in the ETRWPA. The results were well distributed spatially throughout the Gulf Coast aquifer group in the ETRWPA. There were 44 cadmium results were below reporting limits that exceeded the current MCL. These results were not included in the figure for this aquifer group in the ETRWPA. Cadmium was not detected in any results in the Gulf Coast aquifer group in the ETRWPA. The typical reporting limit was 1 mg/L. There were several results in which cadmium was not detected with a reporting limit of 10 µg/L. These results were not considered useful since the reporting limit exceeded the MCL and were not included in the summary table or figure.

Chromium. No chromium results exceeded the 100 µg/L primary MCL in the Gulf Coast aquifer group in the ETRWPA. The results were well distributed spatially throughout the Gulf Coast aquifer group in the ETRWPA. Chromium was only detected in one of the results in the Gulf Coast aquifer group in the ETRWPA, and it was not above the 100 µg/L primary MCL. Typical reporting limits were 1 and 20 µg/L.

Lead. No lead results exceeded the 15 µg/L primary MCL in the Gulf Coast aquifer group in the ETRWPA. The results were well distributed spatially throughout the Gulf Coast aquifer group in the ETRWPA. There were 35 lead results that were below reporting limits that exceeded the current MCL (reporting limits greater than 15 µg/L). These results were not included the figure or table for this aquifer group in the ETRWPA. The average for all of the lead results is less than 2 µg/L, and the median for all of the results is less than 1 µg/L.

Nitrate as N. For 58 out of 712 samples, the analytical results exceeded the Gulf Coast aquifer in the ETRWPA primary MCL of 10 mg/L (as N). Most of the results that exceeded the MCL were from samples collected from shallow wells. The remaining results were well distributed spatially throughout the Gulf Coast aquifer group in the ETRWPA. It should also be noted that the majority of these nitrate results are from samples collected before 1970. These represent the most recent results from these wells.

Relatively few samples have been collected in the Gulf Coast aquifer group in the ETRWPA since that time. Nitrate (as N) was detected in 8.1% of the results above the primary MCL of 10 mg/L in the Gulf Coast aquifer group in the ETRWPA. The average for all of the results is 3 mg/L, and the median for all of the results is 0.05 mg/L.

Selenium. Selenium was not detected above the 50 µg/L primary MCL in any of the results in the Gulf Coast aquifer group in the ETRWPA. The results were well distributed spatially throughout the Gulf Coast aquifer group in the ETRWPA. Selenium was detected in only three of the results, with typical reporting limits in the 2 – 6 µg/L range.

Copper. No copper results exceeded the 1,000 µg/L primary MCL in the Gulf Coast aquifer group in the ETRWPA. The results considered were well distributed spatially throughout the Gulf Coast aquifer group in the ETRWPA. Copper was detected in 27.5% of the results, and the average for all of the results is 10 µg/L, and the median is 2.26 µg/L, indicating that the average is skewed upward due to the presence of a limited number of high values.

Fluoride. Five fluoride results exceeded the 2 mg/L secondary MCL in the Gulf Coast aquifer group in the ETRWPA. Four of these were from samples collected from wells completed in the Evangeline, Jasper, and Gulf Coast in Hardin County. Sample results from three other wells completed in the Evangeline, Chicot, and Gulf Coast in this area had elevated levels of fluoride (well above the average for the ETRWPA, in the 1.5 - 2 mg/L range). The remaining sample result that exceeded the MCL was collected from a well completed in the Chicot in Jefferson County. The available results were well distributed spatially throughout the Gulf Coast aquifer group in the ETRWPA. Fluoride was detected in 1% of the results above the secondary MCL of 2 mg/L in the Gulf Coast aquifer group in the ETRWPA. Of these, none were above the primary MCL of 4 mg/L. Fluoride was detected in nearly all of the results, and the average for all of the results is 0.35 mg/L, and the median for all of the results is 0.2 mg/L.

Chloride. About 13% of chloride results exceeded the 300 mg/L secondary MCL in the Gulf-Coast aquifer group in the ETRWPA. Most of these results were collected from wells completed in the Chicot in Jefferson, Orange, and southern Hardin Counties. Six results from the Catahoula in northern Tyler and Jasper Counties exceeded the secondary MCL. The available results were well distributed spatially throughout the Gulf Coast aquifer group in the ETRWPA. The average for all of the chloride results is 154 mg/L, and the median for all of the results is 32 mg/L, indicating that the average is skewed upward due to the presence of a limited number of relatively high values.

Iron. About one-quarter of iron sample results in the Gulf Coast aquifer group exceeded the 300 µg/L secondary MCL in the ETRWPA. Several results from samples collected from wells completed in the Jasper Aquifer south of Woodville in Tyler County exceeded the MCL. Shallow wells completed in the Burkeville Aquiclude in central Polk County also produced samples (in 1947) that exceeded the current secondary MCL for iron. The Catahoula in northern Polk, Tyler, and Jasper Counties was as third source of sample results that exceeded the MCL. The remaining results that exceeded the MCL were evenly distributed spatially and represented samples collected from wells completed in several formations in the Gulf Coast aquifer group. Iron was detected in 26.8% of the results above the secondary MCL of 300 µg/L in the Gulf Coast aquifer group in the ETRWPA. Iron was detected in more than 80% of the results, and the average for all of the results is 520 µg/L, and the median for all of the results is only 100 µg/L, indicating that the average is skewed upward due to the presence of a limited number of high values.

Manganese. About one-third manganese sample results in the Gulf Coast aquifer group exceeded the 50 µg/L secondary MCL in the ETRWPA. A significant percentage of results from Jasper aquifer wells in Polk, Tyler, Jasper, and Newton Counties exceeded the MCL. Several other results exceeding the MCL were from samples collected from the Chicot aquifer in Jefferson, Jasper, Newton, and Hardin Counties. A small percentage of results from wells completed in the Evangeline also exceeded the MCL for manganese. Manganese was detected in 35.9% of the results above the secondary MCL of 50 µg/L in the Gulf Coast aquifer group in the ETRWPA. Manganese was detected in approximately 78% of the results, and the average for all of the results is 65 µg/L, and the median for all of the results is only 26 µg/L, indicating that the average is skewed upward due to the presence of a limited number of high values.

pH. About one-quarter of results from the Gulf Coast aquifer group were outside of the 6.5 - 8.5 secondary MCL range in the ETRWPA. Most of the out-of-range results were more below the lower pH MCL of 6.5, and these were from samples collected from the Chicot, Jasper, and Evangeline aquifers in Polk, Tyler, Jasper, and Newton Counties. The results available were evenly distributed spatially in the Gulf Coast aquifer group in the ETRWPA. The pH of water samples was outside the secondary MCL range of 6.5 to 8.5 in 23.7% of the results in the Gulf Coast aquifer group in the ETRWPA. The range of all of the results was 4.7 to 9.08, and the average is 7.2, and the median is 7.3.

Sulfate. Only 9 sulfate results exceeded the 300 mg/L secondary MCL in the Gulf-Coast aquifer group in the ETRWPA. All of these results were collected from wells in Jefferson County. The available results were well distributed spatially throughout the Gulf Coast aquifer group in the ETRWPA. Sulfate was detected in 1% of the results above the secondary MCL of 300 mg/L in the Gulf Coast aquifer group in the ETRWPA. The average for all of the results is 18 mg/L, and the median for all of the results is 3 mg/L.

Total Dissolved Solids. About 10% of TDS results exceeded the 1,000 mg/L secondary MCL in the Gulf-Coast aquifer group in the ETRWPA. Most of these results were collected from wells completed in the Chicot in Jefferson, Orange, and southern Hardin Counties. Six results from the Catahoula in northern Tyler and Jasper Counties exceeded the secondary MCL. The available results were well distributed spatially throughout the Gulf Coast aquifer group in the ETRWPA. The TDS concentration was above the secondary MCL of 1,000 mg/L in 96 results in the Gulf Coast aquifer group in the ETRWPA. The average for all of the results is 450 mg/L, and the median for all of the results is 224 mg/L.

1-C.3.3 Queen City-Sparta Water Quality. Table 1-C.3 summarizes the results for the Queen City/Sparta Aquifer.

Table 1-C.3 Groundwater Quality Summaries for Queen City/Sparta Aquifer in the ETRWPA

MCL Class	Constituent	Limit(s)	Units	Total Results	Results Over MCL	% Over	Average	Median
primary	Alpha Radiation	15	pCi/L	43	0	0.0%	< 3	< 3
primary	Arsenic	10	µg/L	68	0	0.0%	< 2	< 2
primary	Barium	2000	µg/L	68	0	0.0%	62	45.75
primary	Cadmium	5	µg/L	65	1	1.5%	< 1	< 1
primary	Chromium	100	µg/L	65	0	0.0%	3	1.43
primary	Lead	15	µg/L	68	0	0.0%	< 3	< 1
primary	Nitrate (as N)	10	mg/L	338	15	4.4%	2.0	0.19
primary	Selenium	50	µg/L	65	0	0.0%	< 4	< 4
secondary	Copper	1000	µg/L	68	0	0.0%	8	2.8
secondary	Fluoride	2	mg/L	332	6	1.8%	0.3	0.1
secondary	Chloride	300	mg/L	568	11	1.9%	45	17
secondary	Iron	300	µg/L	287	97	33.8%	1375	125
secondary	Manganese	50	µg/L	86	13	15.1%	42	13
secondary	pH	6.5 - 8.5	std. units	328	143	43.6%	6.9	6.975
secondary	Sulfate	300	mg/L	537	13	2.4%	55	10
secondary	TDS	1000	mg/L	569	15	2.6%	261	130

Alpha. Dissolved alpha particles were not detected above the 15 pCi/L primary MCL in the Queen City-Sparta aquifer in the ETRWPA. No alpha results were available for the Sparta in Sabine County Alpha particles were only detected in less than 20% of the groundwater results in the ETRWPA.

Arsenic. Arsenic was detected in only two results from the Queen City-Sparta aquifer in the ETRWPA, and neither was above the 10 µg/L primary MCL. No arsenic results were available for the Sparta in Sabine County.

Barium. Barium was not detected in any of the results above the 2,000 µg/L primary MCL in the Queen City-Sparta aquifer in the ETRWPA. No barium results were available for the Sparta in Sabine County. Barium was detected in all but one of the results, and the average of the results is 62 µg/L, and the median is 45.75 µg/L.

Cadmium. Cadmium was detected in only one of the results in the Queen City-Sparta aquifer in the ETRWPA, at a concentration of 19.8 µg/L, which is above the 5 µg/L primary MCL. This result was from sample collected from a shallow well on the Queen City outcrop near Murchison in Henderson County. However, other shallow Queen City wells near Murchison have produced waters with no cadmium above detection limits. The available results in the Queen City-Sparta were generally well distributed, but no cadmium results were available for the Sparta in Sabine County. Typical reporting limits for cadmium were 1 – 2 μg/L.

Chromium. Chromium was not detected in any of the results above the 100 μg/L primary MCL in the Queen City-Sparta aquifer in the ETRWPA. No chromium results were available for the Sparta in Sabine County. Chromium was detected in approximately one-third of the results. The average for all of the results is 3 μg/L, and the median is 1.43 μg/L.

Lead. Lead was not detected in any of the results above the 15 μg/L primary MCL in the Queen City-Sparta aquifer in the ETRWPA. No lead results were available for the Sparta in Sabine County. Lead was detected in only seven of the results, all at concentrations of 2 μg/L or less. Typical reporting limits were 1 and 5 μg/L. There were three lead results that were below reporting limits that exceeded the current MCL (reporting limits greater than 15 μg/L). These results were not included the figure or table for this aquifer group in the ETRWPA.

Nitrate as N. Fifteen nitrate results exceed the 10 mg/L (as N) primary MCL in the Queen City-Sparta aquifer group in the ETRWPA. The majority of these were from samples collected from shallow wells on the Queen City outcrop in Anderson and Cherokee Counties. The available results in the Queen City-Sparta were well distributed. Nitrate (as N) was detected above the primary MCL of 10 mg/L in 4.4% of the results in the Queen City-Sparta aquifer in the ETRWPA. The average for all of the results is 2 mg/L, and the median for all of the results is 0.19 mg/L.

Selenium. Selenium was detected in only two samples in the Queen City-Sparta aquifer in the ETRWPA, and it was not detected above the 50 μg/L primary MCL. No selenium results were available for the Queen City-Sparta in Sabine County.

Copper. No copper results exceeded the 1,000 µg/L secondary MCL or the 1,300 µg/L primary MCL in the Queen City-Sparta aquifer group in the ETRWPA. The available results in the Queen City-Sparta were generally well distributed, but no cadmium results were available for the Sparta in Sabine County. The average for all of the results is 8 µg/L, and the median is 2.8 µg/L.

Fluoride. Six fluoride results exceeded the 2 mg/L secondary MCL in the Queen City-Sparta aquifer group in the ETRWPA. Most of these were from samples collected from Sparta Sand wells in northern Angelina and southern Nacogdoches Counties. The available results in the Queen City-Sparta were well distributed. Fluoride was detected above the secondary MCL of 2 mg/L in 1.8% of the results in the Queen City-Sparta aquifer in the ETRWPA. None of the results exceeded the primary MCL of 4 mg/L. The average for all of the results is 0.3 mg/L, and the median for all of the results is 0.1 mg/L.

Chloride. Less than 2% of chloride results exceeded the 300 mg/L secondary MCL in the Queen City-Sparta aquifer group in the ETRWPA. The Queen City wells in the ETRWPA portion of Henderson County generally had higher chloride results than other counties with Queen City or Sparta wells. The available results in the Queen City-Sparta were well distributed. The average for all of the results is 45 mg/L, and the median for all of the results is 17 mg/L.

Iron. One-third of iron results exceeded the 300 µg/L secondary MCL in the Queen City-Sparta aquifer group in the ETRWPA. The iron results that exceeded the MCL were proportionally distributed between the Queen City and Sparta and among the counties that contain these formations in the ETRWPA. Iron was detected above the secondary MCL of 300 µg/L in 33.8% of the results in the Queen City-Sparta aquifer in the ETRWPA. Iron was detected in approximately 85% of the results, and the average for all of the results is 1375 µg/L, and the median for all of the results is 125 µg/L, indicating that the average is significantly skewed upward due to the presence of a limited number of very high values.

Manganese. About 15% of manganese results exceeded the 50 µg/L secondary MCL in the Queen City-Sparta aquifer group in the ETRWPA. Most of these results were from

Queen City wells in northeastern ETRWPA. However, there were several elevated manganese results from the Sparta in Houston County, two of which exceeded the MCL. The available results in the Queen City-Sparta in the ETRWPA were well distributed. Manganese was detected in 15.1% of the results above the secondary MCL. Manganese was detected approximately 75% of the results, and the average for all of the results is 42 µg/L, and the median for all of the results is 13 µg/L.

pH. A large number of results from the Queen City-Sparta aquifer group were outside of the 6.5 - 8.5 secondary MCL range in the ETRWPA. The majority of these out-of-range results were below the 6.5 lower pH MCL, and were from samples collected from Queen City and Sparta wells in northeastern ETRWPA. The results that exceeded the upper 8.5 pH MCL were mostly from samples collected from wells in the Sparta outcrop areas. The available results were well distributed throughout the Queen City-Sparta in the ETRWPA. The pH of water samples was outside the secondary MCL range of 6.5 to 8.5 in 43.6% of the results in the Queen City-Sparta aquifer in the ETRWPA. The range of all of the results was 3.8 to 9. The average pH was 6.9, and the median pH was 6.975.

Sulfate. Sulfate was detected in 2.4% of the results above the secondary MCL of 300 mg/L in the Queen City-Sparta aquifer in the ETRWPA. The Queen City wells in the ETRWPA portion of Henderson County and downdip Sparta wells in central ETRWPA generally had higher TDS results than other areas. The available results in the Queen City-Sparta were well distributed. The average for all of the results is 55 mg/L, and the median for all of the results is 10 mg/L.

Total Dissolved Solids. The TDS concentration was above the secondary MCL of 1,000 mg/L in 2.6% of the results in the Queen City-Sparta aquifer in the ETRWPA. The Queen City wells in the ETRWPA portion of Henderson County and generally had higher TDS results than other counties with Queen City or Sparta wells. The available results in the Queen City-Sparta were well distributed. The average for all of the results is 261 mg/L, and the median for all of the results is 130 mg/L.

1-C.3.4 Yegua-Jackson Water Quality. Table 1-C.4 summarizes the results for the Yegua-Jackson aquifer.

Table 1-C. 4 Groundwater Quality Summaries for Yegua-Jackson Aquifer in the ETRWPA

MCL Class	Constituent	Limit(s)	Units	Total Results	Results Over MCL	% Over	Average	Median
primary	Alpha Radiation	15	pCi/L	15	0	0.0%	< 2	< 2
primary	Arsenic	10	µg/L	34	0	0.0%	< 7	< 10
primary	Barium	2000	µg/L	16	0	0.0%	59	28.4
primary	Cadmium	5	µg/L	32	0	0.0%	< 3	< 5
primary	Chromium	100	µg/L	34	0	0.0%	12	20
primary	Lead	15	µg/L	15	0	0.0%	< 1	< 1
primary	Nitrate (as N)	10	mg/L	200	7	3.5%	1.5	0.09
primary	Selenium	50	µg/L	34	0	0.0%	< 4	< 2
secondary	Copper	1000	µg/L	30	0	0.0%	29	13.045
secondary	Fluoride	2	mg/L	166	3	1.8%	0.5	0.3
secondary	Chloride	300	mg/L	214	18	8.4%	125	65.5
secondary	Iron	300	µg/L	157	51	32.5%	1363	130
secondary	Manganese	50	µg/L	60	11	18.3%	49	20
secondary	pH	6.5 - 8.5	std. units	157	39	24.8%	7.81	8.04
secondary	Sulfate	300	mg/L	214	14	6.5%	113	47.9
secondary	TDS	1000	mg/L	214	38	17.8%	672	557

Alpha. No alpha particles results exceeded the 15 pCi/L primary MCL in the Yegua-Jackson aquifer group in the ETRWPA. The alpha results are not well distributed spatially in the Yegua-Jackson in the ETRWPA, most of the alpha results available are from samples collected in Angelina County. Dissolved alpha particles were not detected in the Yegua-Jackson aquifer in the ETRWPA. All reporting limits were 2 µg/L.

Arsenic. No arsenic results exceeded the 10 µg/L primary MCL in the Yegua-Jackson aquifer group in the ETRWPA. Most of the arsenic results available are from samples collected in Angelina County, although samples were also collected from the Yegua-Jackson in Nacogdoches, Houston, Trinity, and Sabine Counties in the ETRWPA.

Arsenic was not detected in the Yegua-Jackson aquifer in the ETRWPA, and typical reporting limits were 2 and 10 µg/L.

Barium. No barium results exceeded the 2,000 µg/L primary MCL in the Yegua-Jackson aquifer group in the ETRWPA. Most of the barium results available are from samples collected in Angelina County, although samples were also collected from the Yegua-Jackson in Nacogdoches, Houston, Trinity, and Sabine Counties in the ETRWPA. Barium was detected in all but one of the results, and the average of the results is 59 µg/L, and the median is 28.4 µg/L.

Cadmium. No cadmium results exceeded the 5 µg/L primary MCL in the Yegua-Jackson aquifer group in the ETRWPA. Most of the cadmium results available are from samples collected in Angelina County, although samples were also collected from the Yegua-Jackson in Nacogdoches, Houston, Trinity, Polk, and Sabine Counties in the ETRWPA. Cadmium was not detected in any results in the Yegua-Jackson aquifer in the ETRWPA, and typical reporting limits were 1 and 5 µg/L.

Chromium. No chromium results exceeded the 100 µg/L primary MCL in the Yegua-Jackson aquifer group in the ETRWPA. Most of the chromium results available are from samples collected in Angelina County, although samples were also collected from the Yegua-Jackson in Nacogdoches, Houston, Jasper, Polk, Trinity, and Sabine Counties in the ETRWPA. Chromium was detected in less than 25% of the results. The average for all of the results is 12 µg/L, and the median is 20 µg/L.

Lead. No lead results exceeded the 15 µg/L primary MCL in the Yegua-Jackson aquifer group in the ETRWPA. Most of the lead results available are from samples collected in Angelina County, although samples were also collected from the Yegua-Jackson in Houston, Trinity, Polk, Jasper, and Sabine Counties in the ETRWPA. Lead was detected in only two of the results, both at concentrations of less than 2 µg/L.

Nitrate as N. Seven nitrate results (out of 200) exceeded the 10 mg/L (as N) primary MCL in the Yegua-Jackson aquifer group in the ETRWPA. Most of the results that exceed the MCL were from samples collected from shallow wells, but these were not concentrated in any particular area. The remaining results were well distributed spatially throughout the Yegua-Jackson aquifer group in the ETRWPA. Nitrate (as N) was detected above the primary MCL of 10 mg/L in 3.5% of the results in the Yegua-Jackson aquifer in the ETRWPA. The average for all of the results is 1.5 mg/L, and the median for all of the results is 0.09 mg/L.

Selenium. No selenium results exceeded the 50 µg/L primary MCL in the Yegua-Jackson aquifer group in the ETRWPA. Most of the selenium results available are from samples collected in Angelina County, although samples were also collected from the Yegua-Jackson in Jasper, Nacogdoches, Houston, Polk, Trinity, and Sabine Counties in the ETRWPA. Selenium was detected in only one sample in the Yegua-Jackson aquifer in the ETRWPA, and typical reporting limits were 2 – 20 µg/L.

Copper. Copper was not detected above the 1,000 µg/L secondary MCL or the 1,300 µg/L primary MCL in the Yegua-Jackson aquifer in the ETRWPA. Most of the copper results available are from samples collected in Angelina County, although samples were also collected from the Yegua-Jackson in Jasper, Nacogdoches, Houston, Polk, Trinity, and Sabine Counties in the ETRWPA. The average for all of the results is 29 µg/L, and the median is 13 µg/L.

Fluoride. Three fluoride results exceeded the 2 mg/L secondary MCL in the Yegua-Jackson aquifer group in the ETRWPA. All three were from wells completed in the Yegua Formation in Angelina County. One of the three results mentioned in Angelina County was 5 mg/L, which exceeds the 4 mg/L primary MCL. The available results were well distributed spatially throughout the Yegua-Jackson aquifer group in the ETRWPA. Fluoride was detected above the secondary MCL of 2 mg/L in 1.8% of the results in the Yegua-Jackson aquifer in the ETRWPA. Only one result also exceeded the primary MCL of 4 mg/L. The average for all of the results is 0.5 mg/L, and the median for all of the results is 0.3 mg/L.

Chloride. Eighteen chloride results exceeded the 300 mg/L secondary MCL in the Yegua-Jackson aquifer group in the ETRWPA. Most of these results were collected from wells completed in downdip sections of the Yegua Formation in Houston, Trinity, and

Polk Counties. Six Jackson Group wells in these counties also exceeded the secondary MCL. Chloride results are lower on the Yegua outcrop and in downdip sections in Angelina and Sabine Counties. The available chloride results were well distributed spatially throughout the Yegua-Jackson aquifer group in the ETRWPA. Chloride was detected in 8.4% of the results above the secondary MCL of 300 mg/L in the Yegua-Jackson aquifer in the ETRWPA. The average for all of the results is 125 mg/L, and the median for all of the results is 65.5 mg/L.

Iron. About one-third of the available results in the Yegua-Jackson exceeded the 300 µg/L secondary MCL for iron. No significant trends were observed in these results. The available results were well distributed spatially throughout the Yegua-Jackson aquifer group in the ETRWPA. Iron was detected above the secondary MCL of 300 µg/L in 32.5% of the results in the Yegua-Jackson aquifer in the ETRWPA. Iron was detected in approximately 90% of the results, and the average for all of the results is 1363 µg/L, and the median for all of the results is 130 µg/L, indicating that the average is significantly skewed upward due to the presence of a limited number of very high values.

Manganese. Eleven manganese results exceeded the 50 µg/L secondary MCL in the Yegua-Jackson aquifer group in the ETRWPA. Five of these results were from samples collected from wells completed in the Yegua Formation near Lufkin in Angelina County. Other sample results exceeding the current MCL were collected in Houston, Nacogdoches, and Polk Counties. Most of the manganese results available are from samples collected in Angelina County, although samples were also collected from the Yegua-Jackson in Jasper, Nacogdoches, Houston, Polk, Trinity, and Sabine Counties in the ETRWPA. Manganese was detected in 18.3% of the results above the secondary MCL of 50 µg/L in the Yegua-Jackson aquifer in the ETRWPA. Manganese was detected approximately in half of the results, and the average for all of the results is 49 µg/L, and the median for all of the results is 20 µg/L.

pH. About one-quarter of results from the Yegua-Jackson aquifer group were outside of the 6.5 - 8.5 secondary MCL range in the ETRWPA. The majority of these out-of-range results exceeded the 8.5 upper pH MCL, and were from samples collected from wells in downdip areas. The results that were below the lower 6.5 pH MCL were from samples collected from wells in outcrop areas. The available results were well distributed throughout the Yegua-Jackson in the ETRWPA. The pH of water samples was outside the secondary MCL range of 6.5 to 8.5 in 24.8% of the results in the Yegua-Jackson aquifer in the ETRWPA. The range of all of the results was 5.33 to 9. The average pH was 7.8, and the median pH was 8.0.

Sulfate. Sulfate was detected in 6.5% of the results above the secondary MCL of 300 mg/L in the Yegua-Jackson aquifer in the ETRWPA. Most of these were in the downdip area of the Yegua Formation throughout the ETRWPA. The available results were well distributed throughout the Yegua-Jackson in the ETRWPA. The average for all of the results is 113 mg/L, and the median for all of the results is 47.9 mg/L.

Total Dissolved Solids. The TDS concentration was above the secondary MCL of 1,000 mg/L in 17.8% of the results in the Yegua-Jackson aquifer in the ETRWPA. Most of these results were from samples collected from downdip Yegua Formation wells. The available results were well distributed throughout the Yegua-Jackson in the ETRWPA. The average for all of the results is 672 mg/L, and the median for all of the results is 557 mg/L.

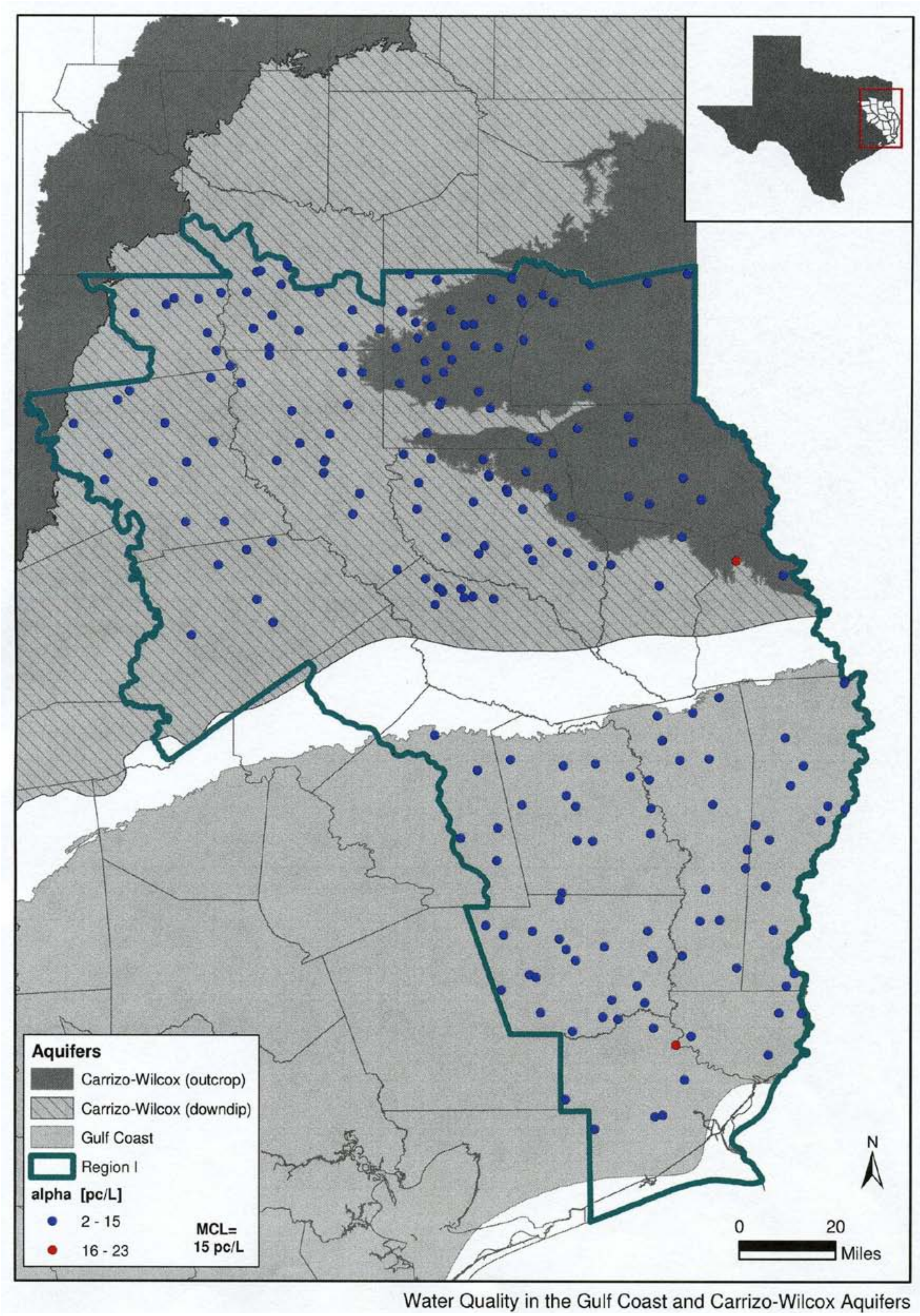


Figure 1-C.1 Distribution of Alpha in Groundwater in the ETRWPA

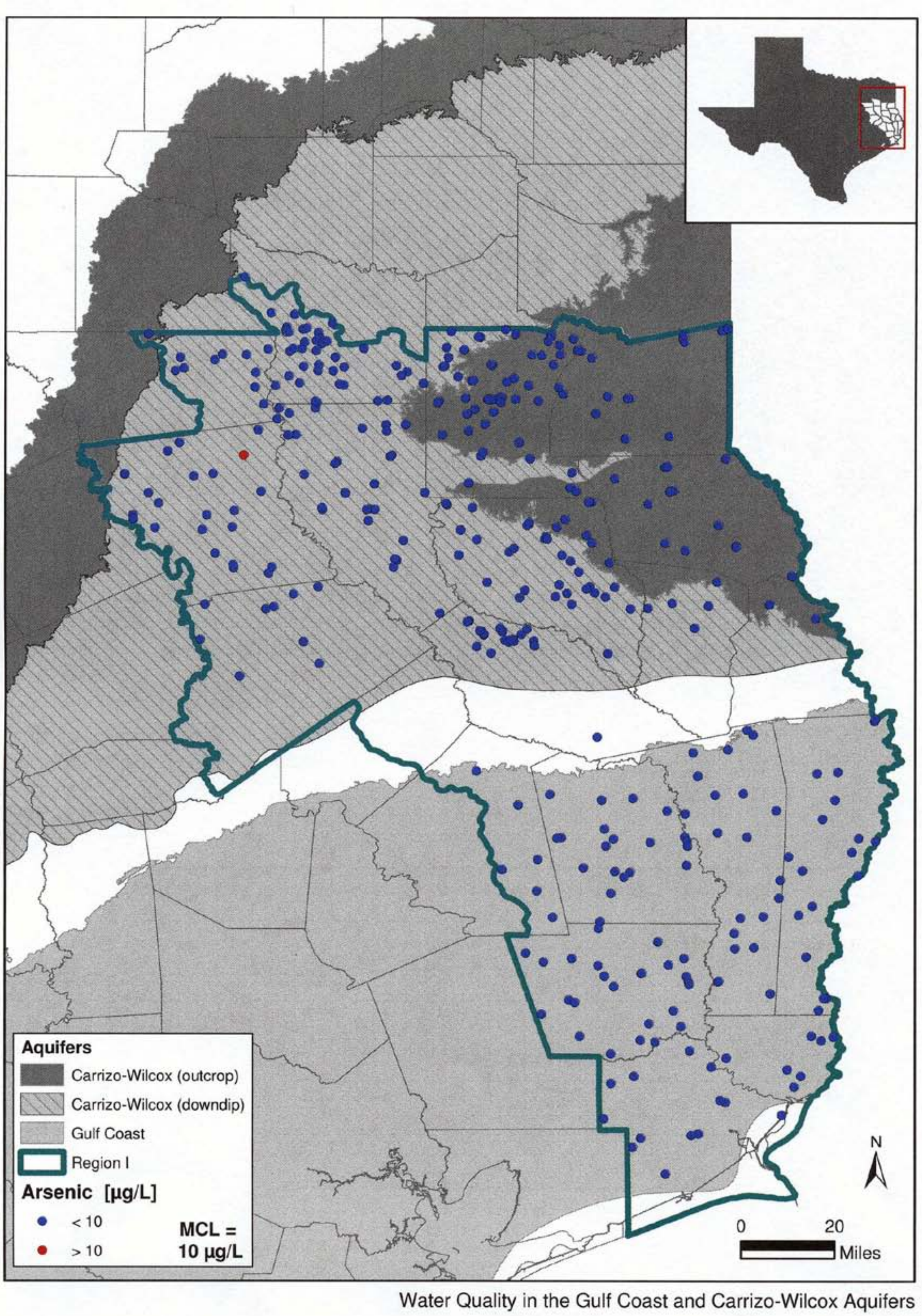
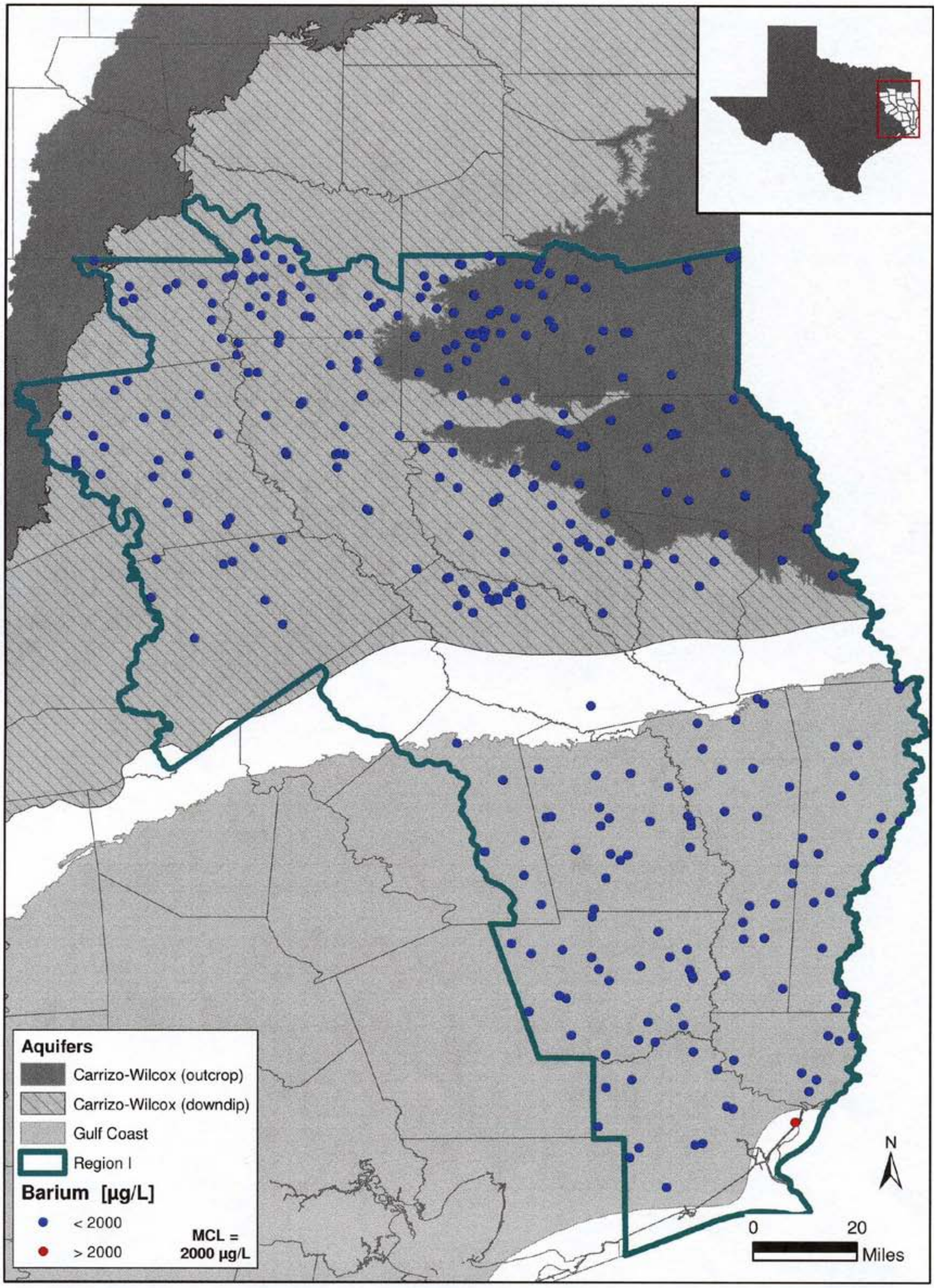


Figure 1-C.2 Distribution of Arsenic in Groundwater in the ETRWPA



Water Quality in the Gulf Coast and Carrizo-Wilcox Aquifers

Figure 1-C.3 Distribution of Barium in Groundwater in the ETRWPA

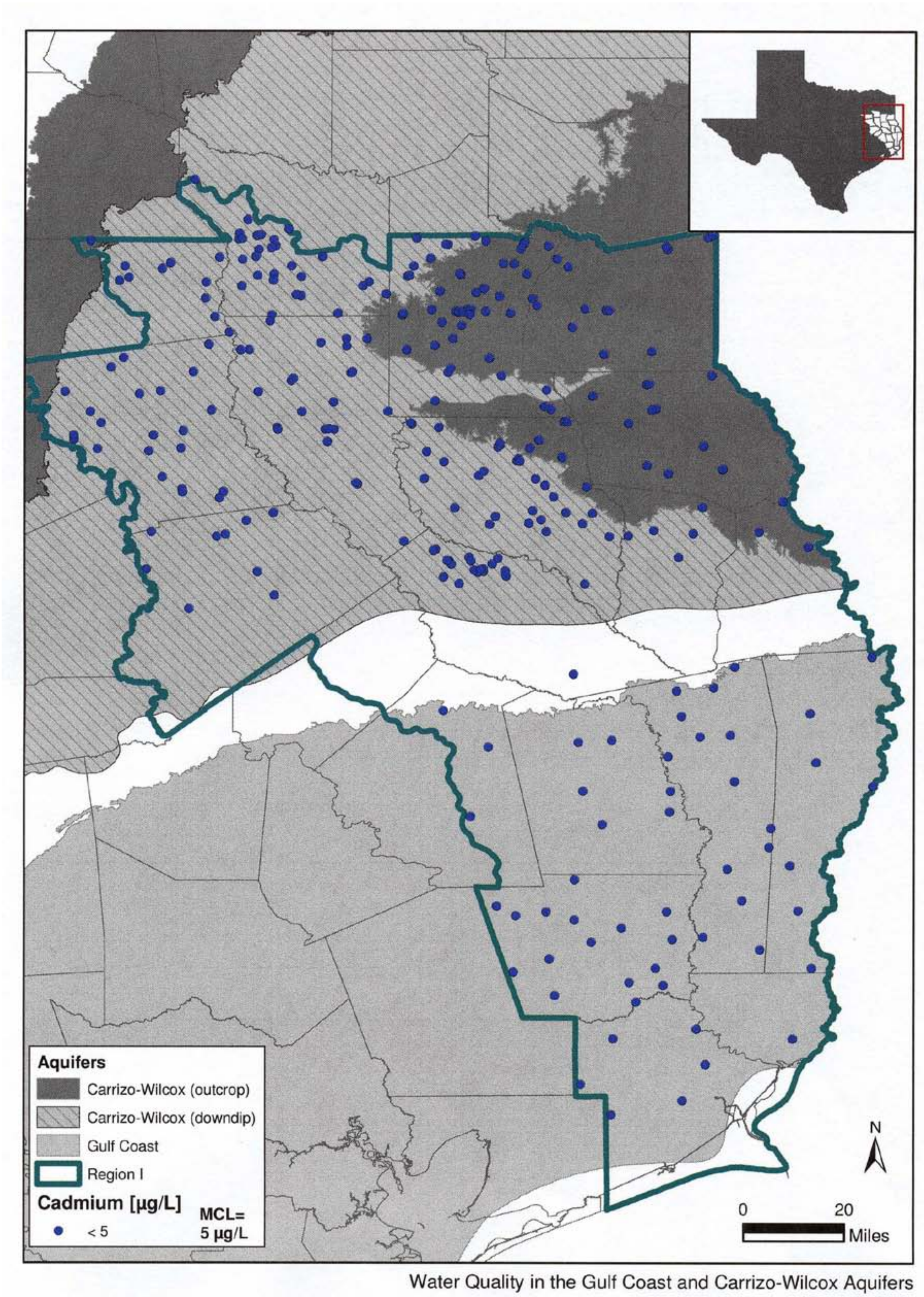


Figure 1-C.4 Distribution of Cadmium in Groundwater in the ETRWPA

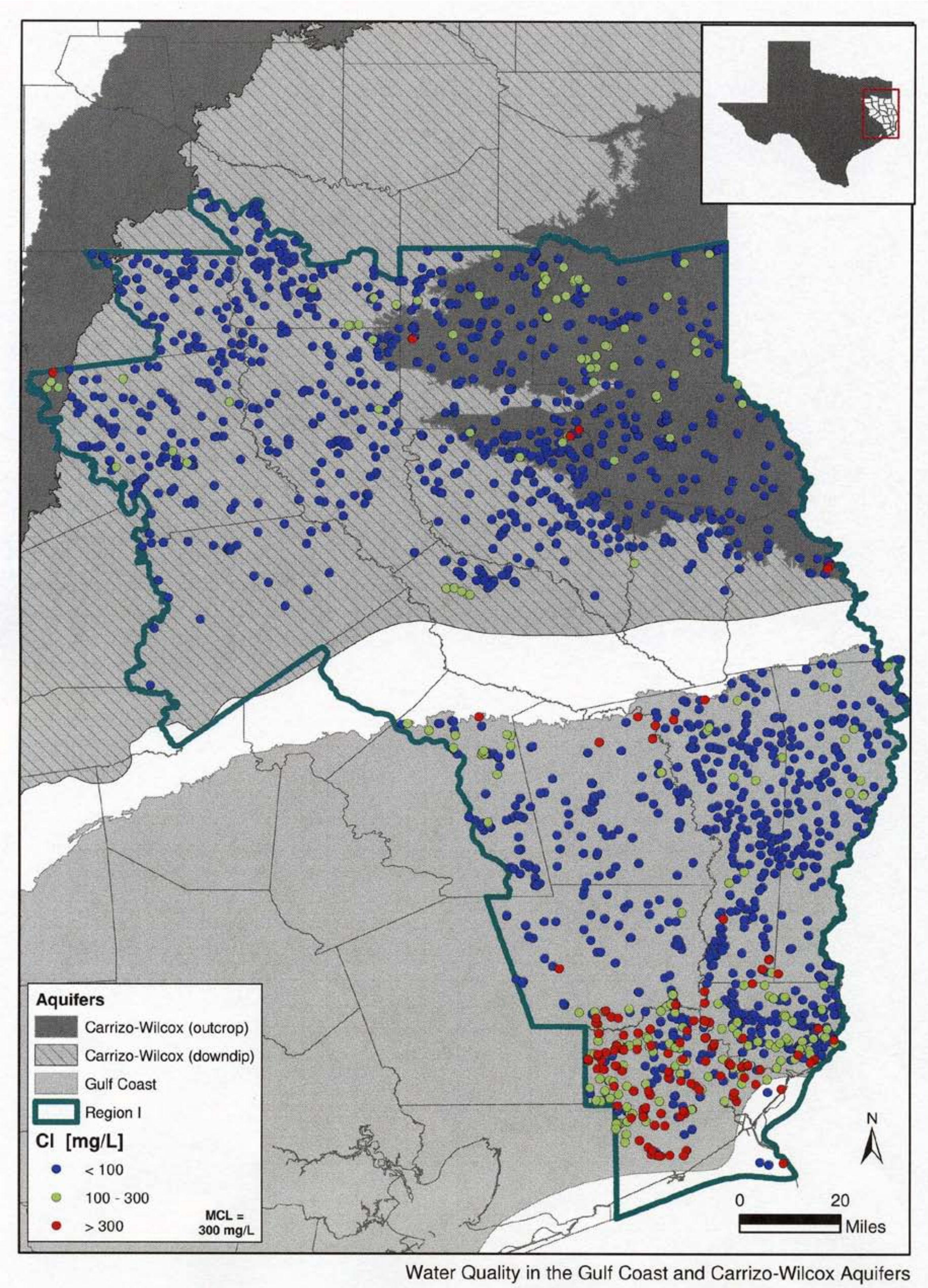


Figure 1-C.5 Distribution of Chloride in Groundwater in the ETRWPA

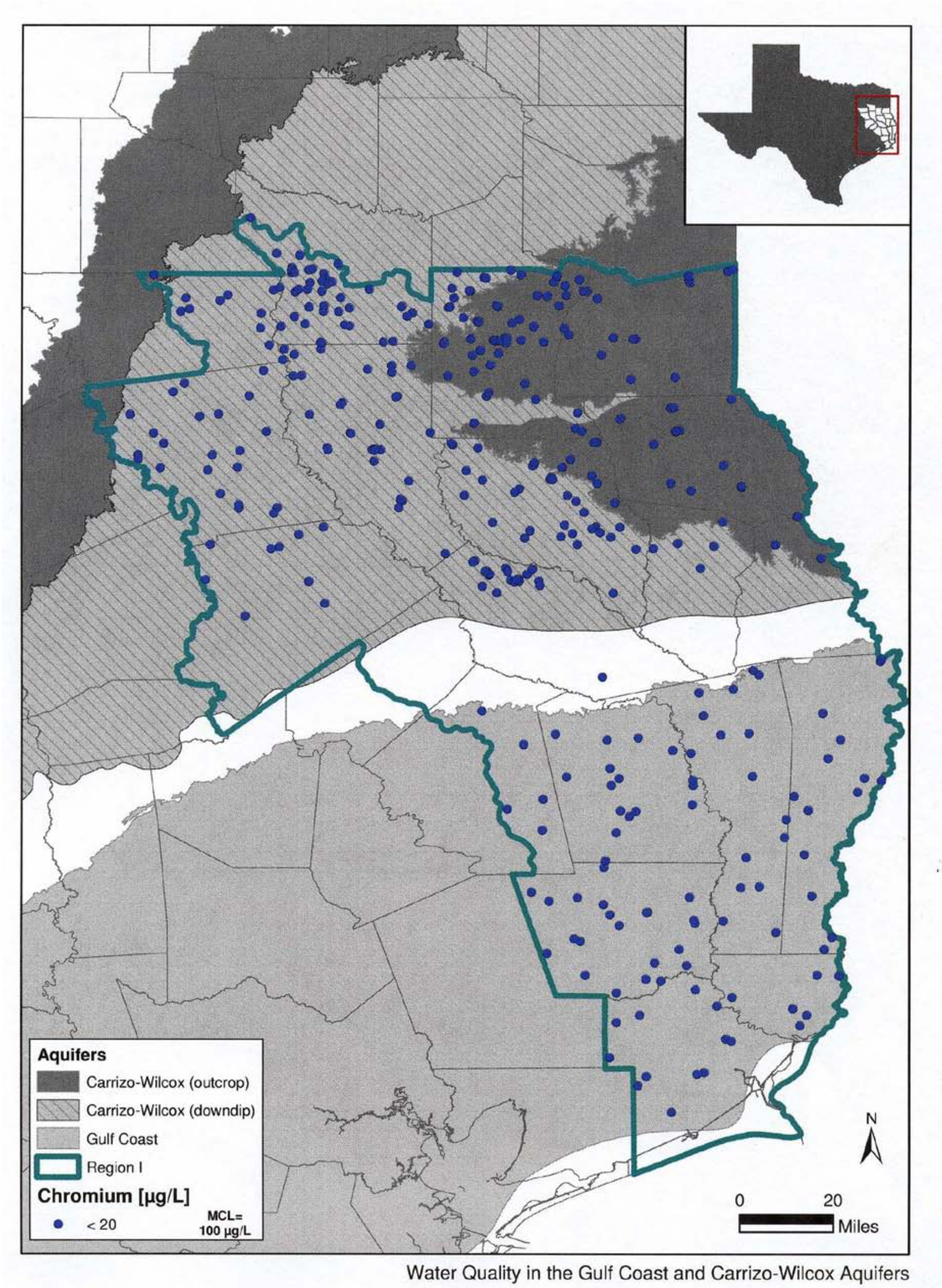


Figure 1-C.6 Distribution of Chromium in Groundwater in the ETRWPA

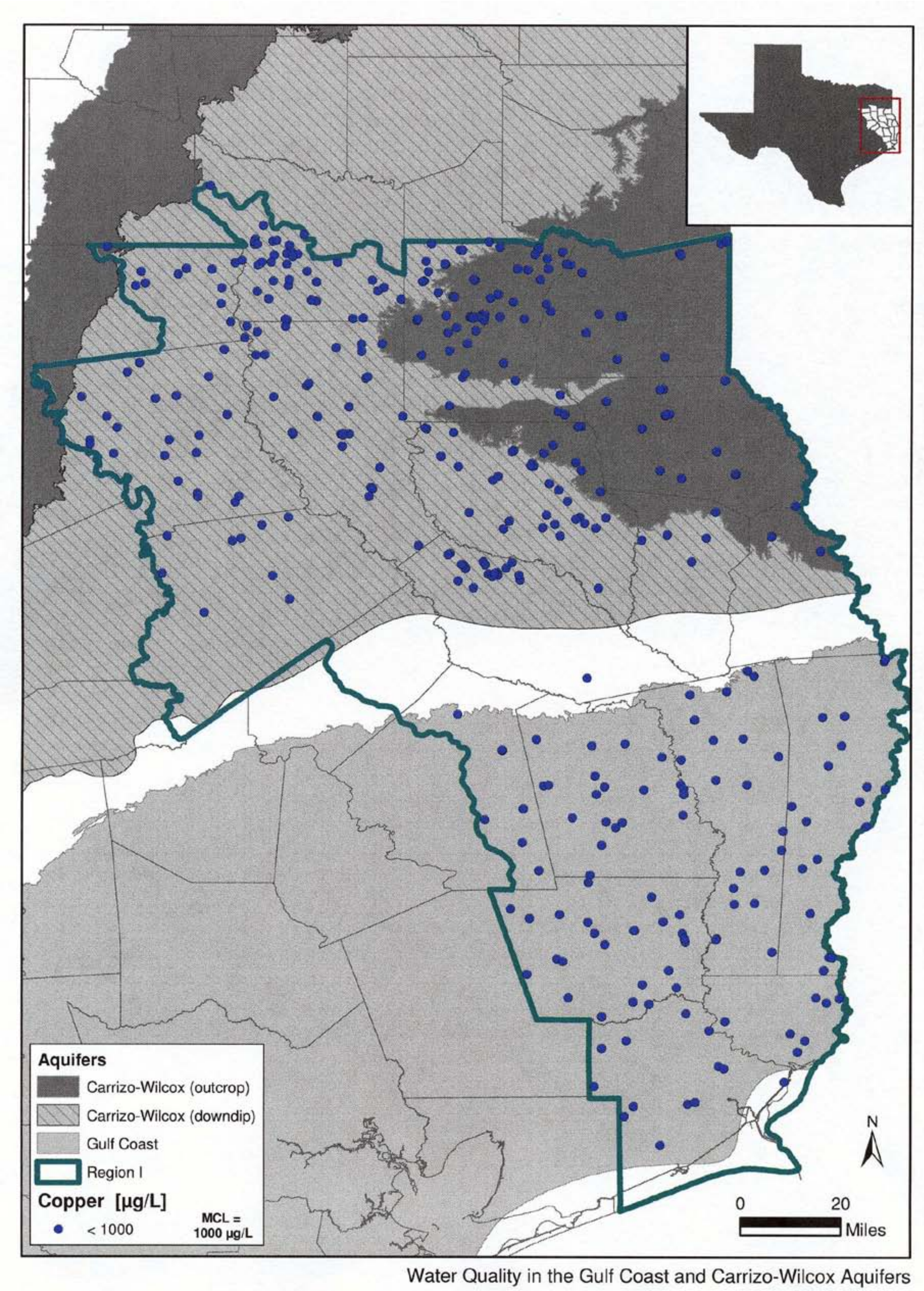


Figure 1-C.7 Distribution of Copper in Groundwater in the ETRWPA

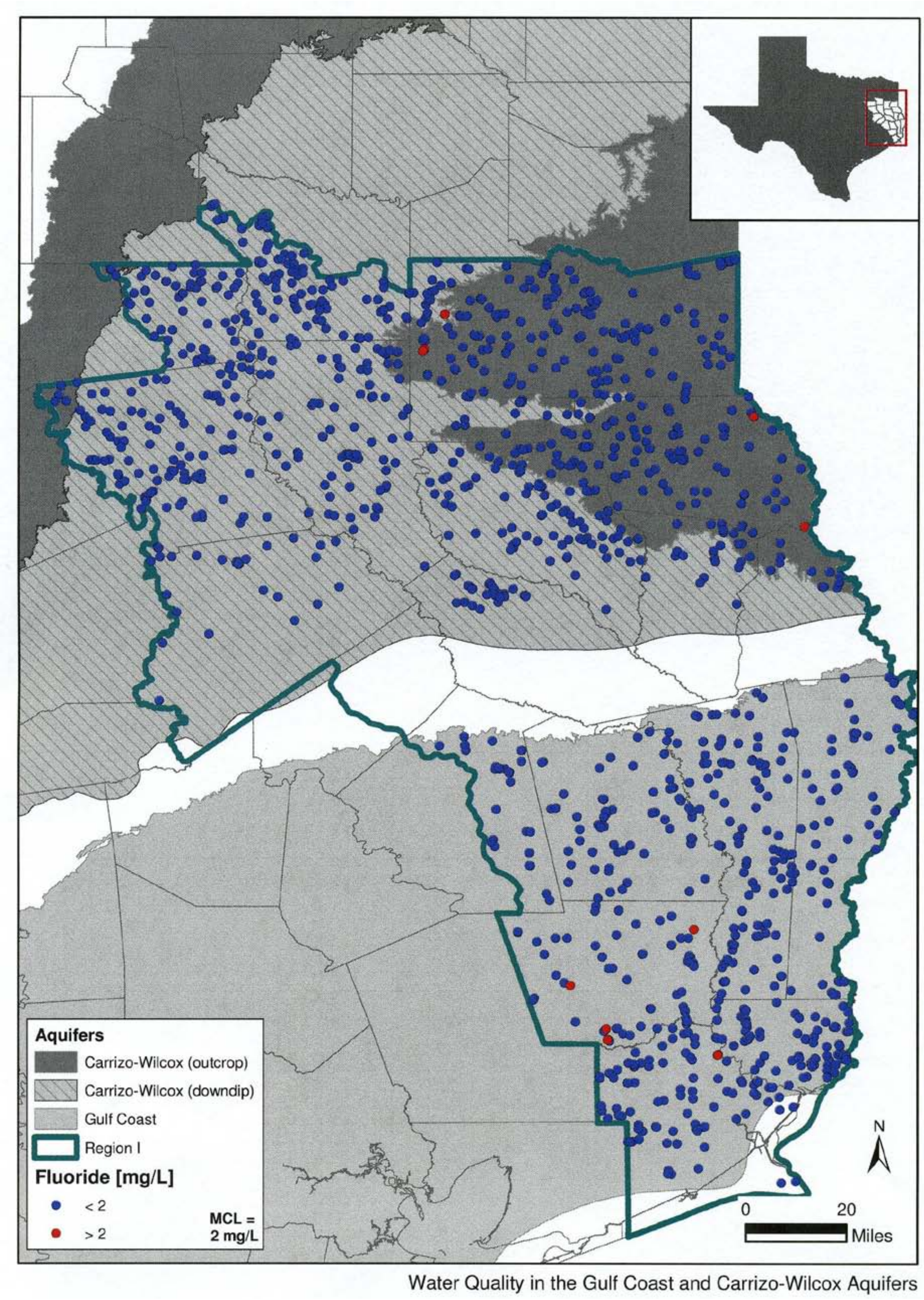


Figure 1-C.8 Distribution of Fluoride in Groundwater in the ETRWPA

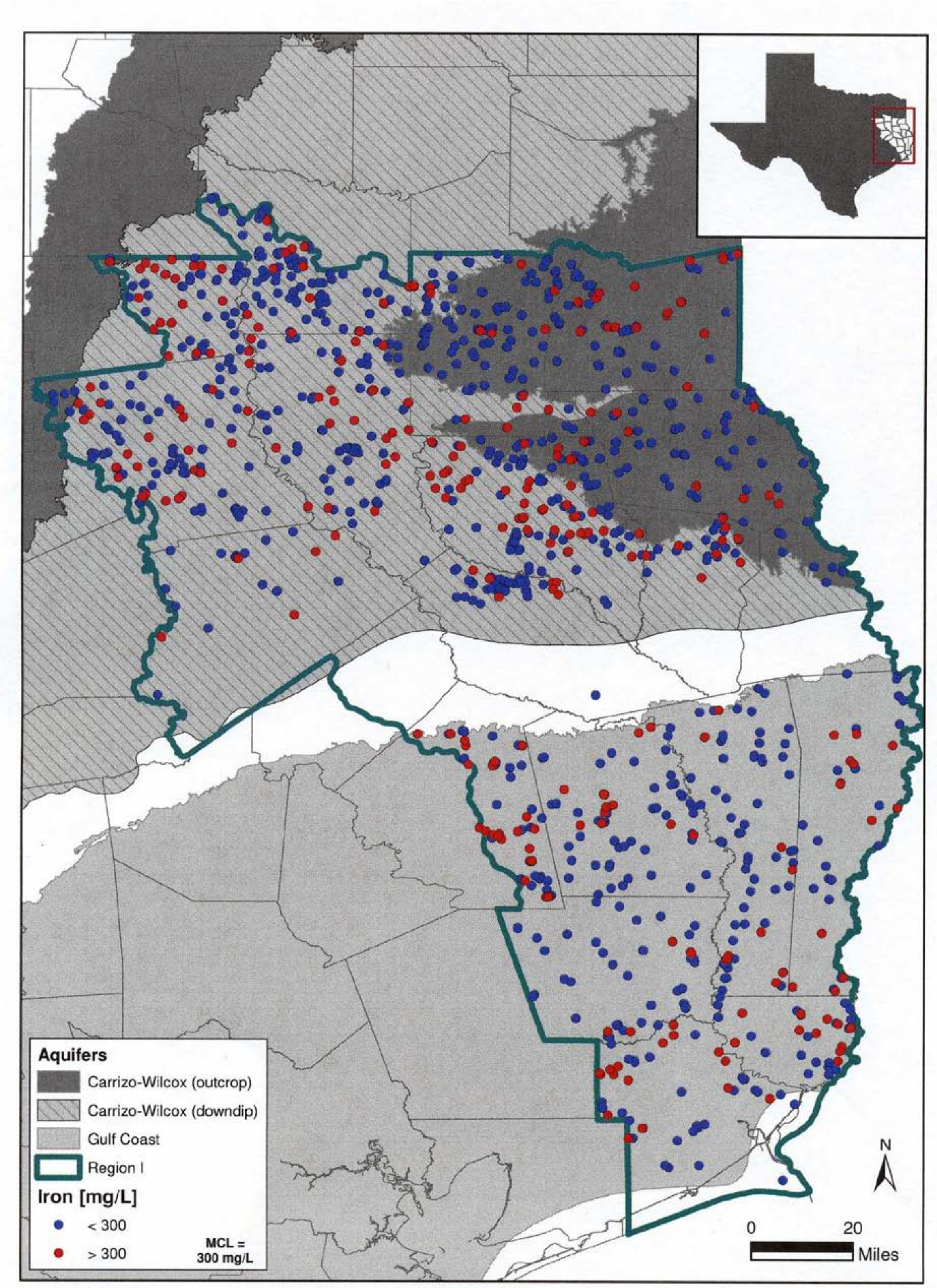


Figure 1-C.9 Distribution of Iron in Groundwater in the ETRWPA

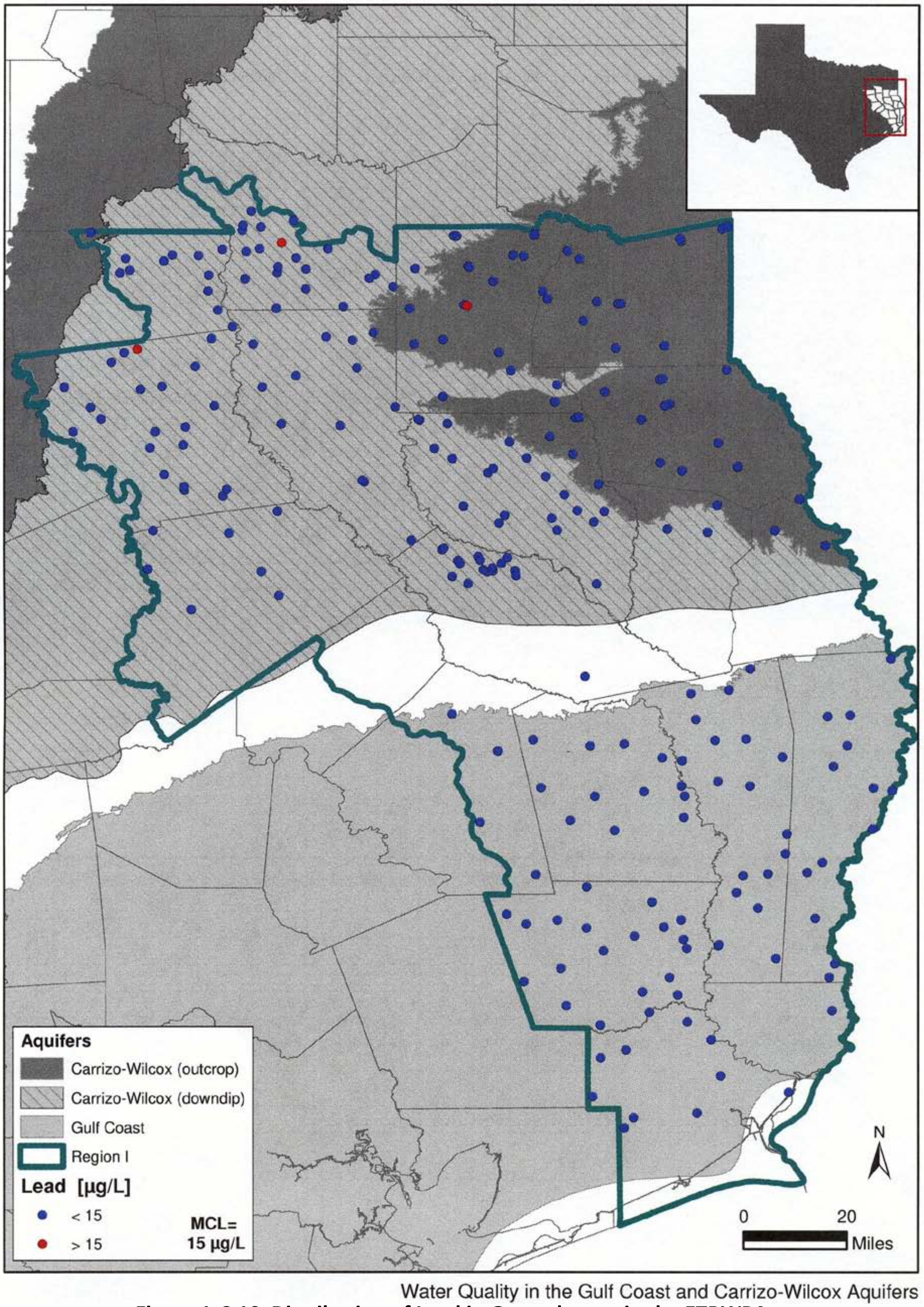


Figure 1-C.10 Distribution of Lead in Groundwater in the ETRWPA

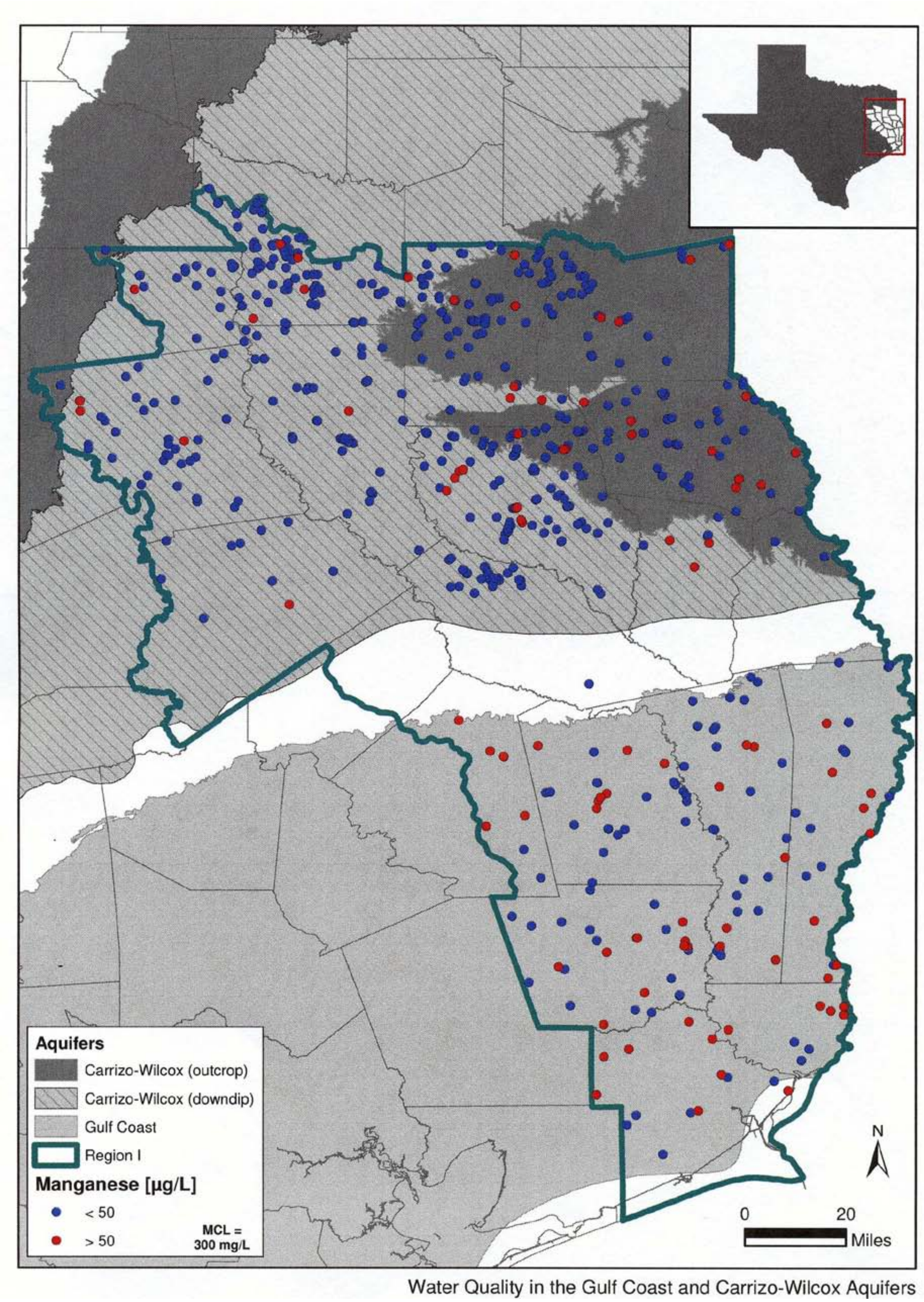


Figure 1-C.11 Distribution of Manganese in Groundwater in the ETRWPA

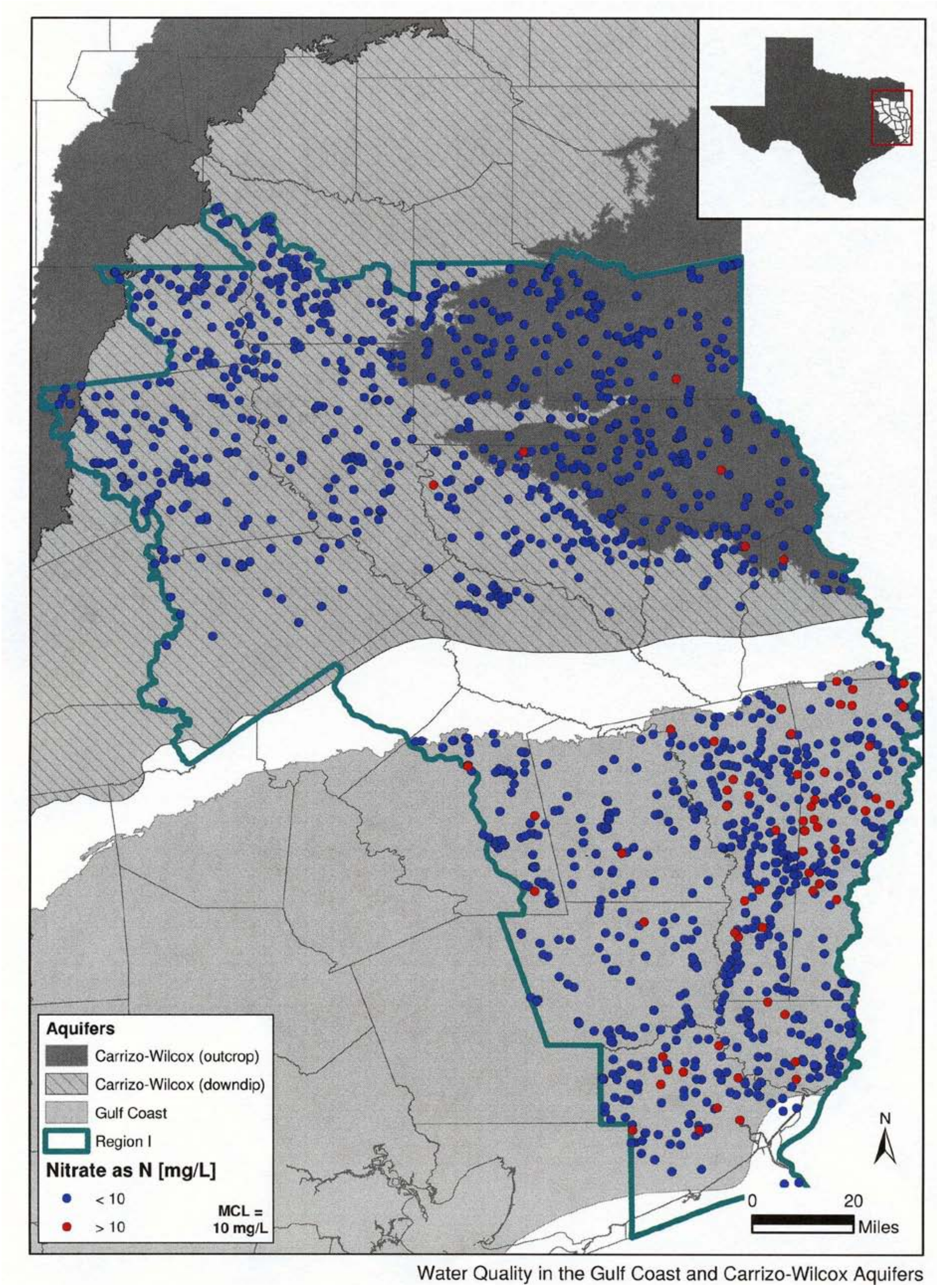


Figure 1-C.12 Distribution of Nitrate as Nitrogen in Groundwater in the ETRWPA

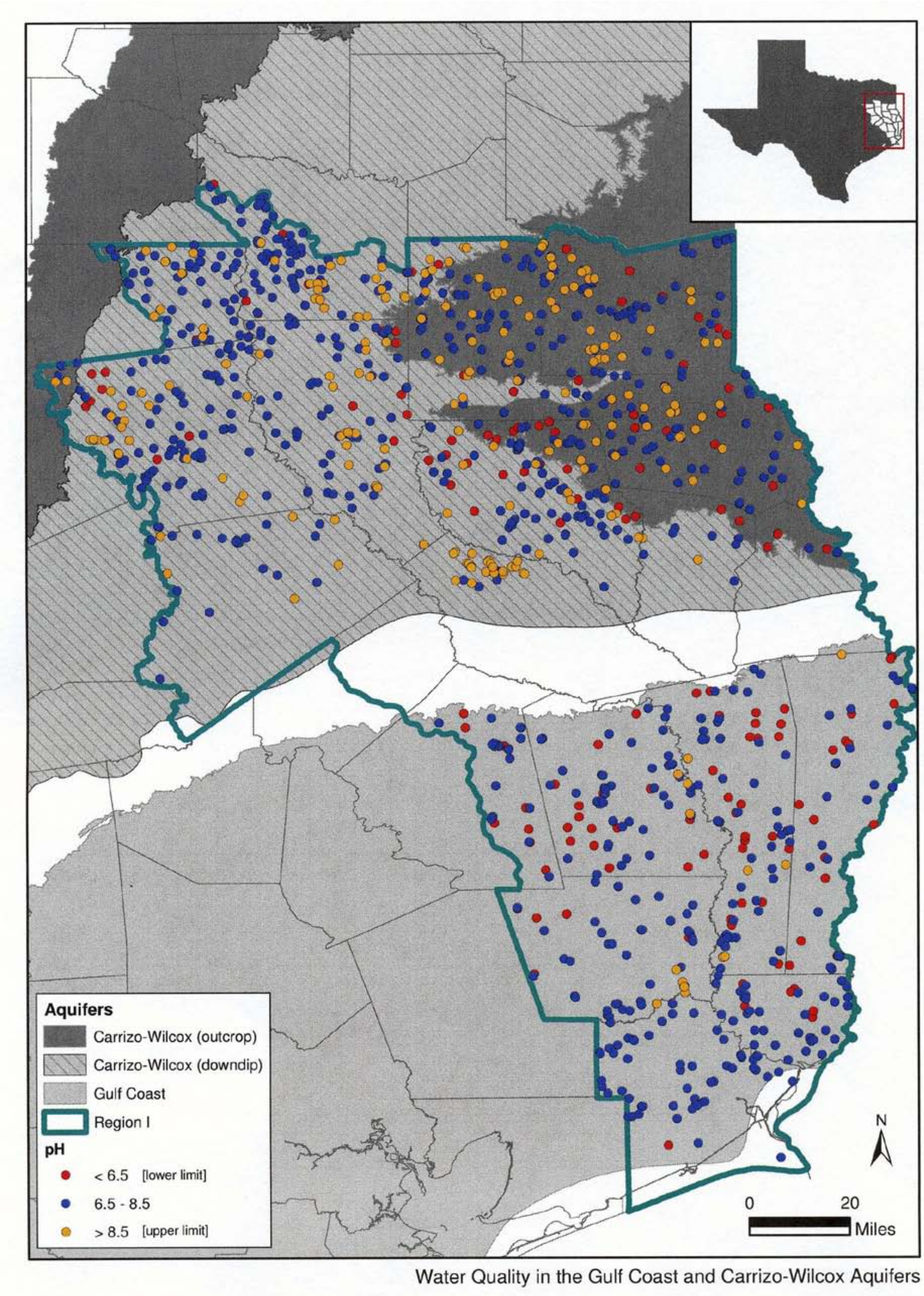


Figure 1-C.13 Distribution of pH in Groundwater in the ETRWPA

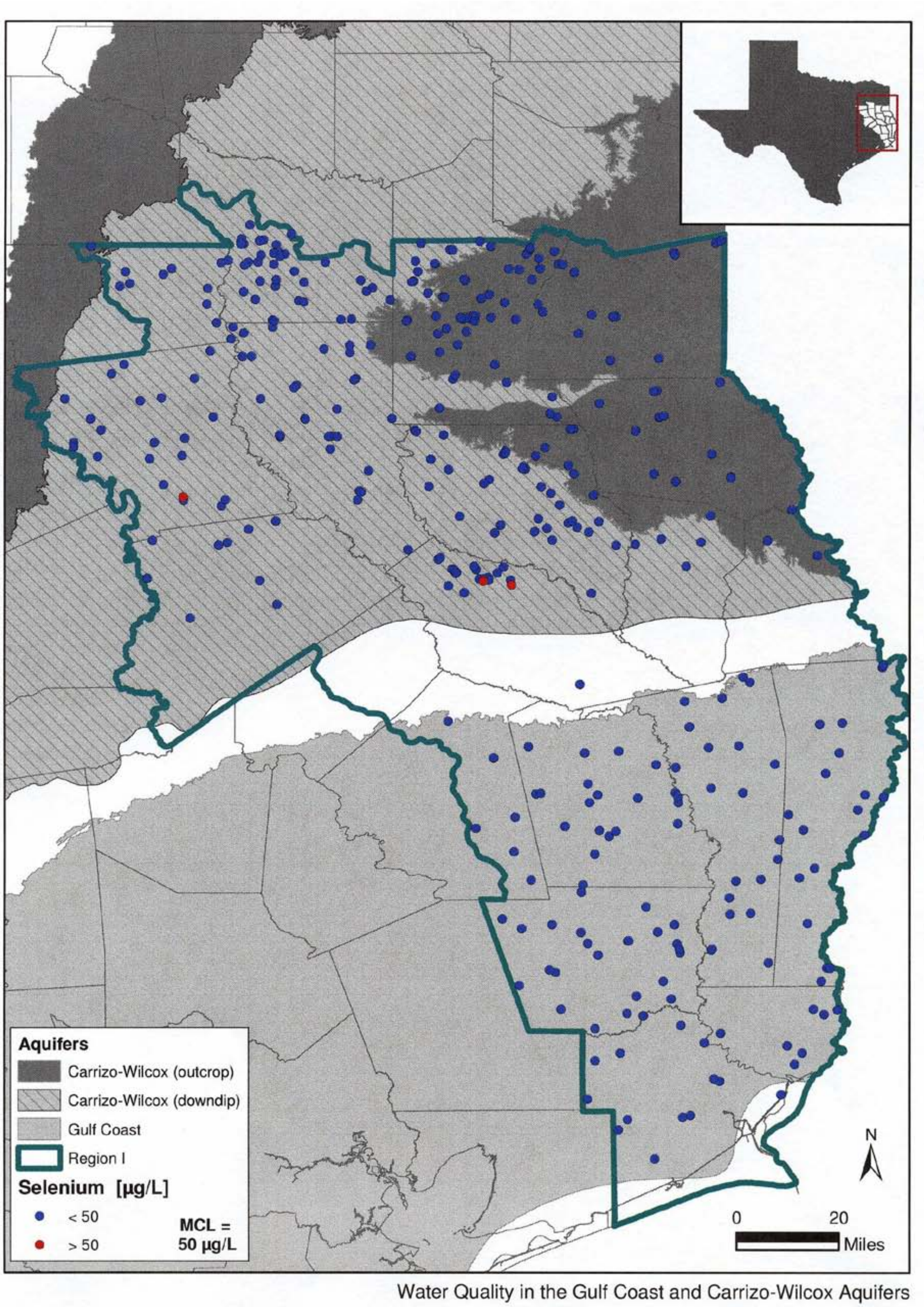


Figure 1-C.14 Distribution of Selenium in Groundwater in the ETRWPA

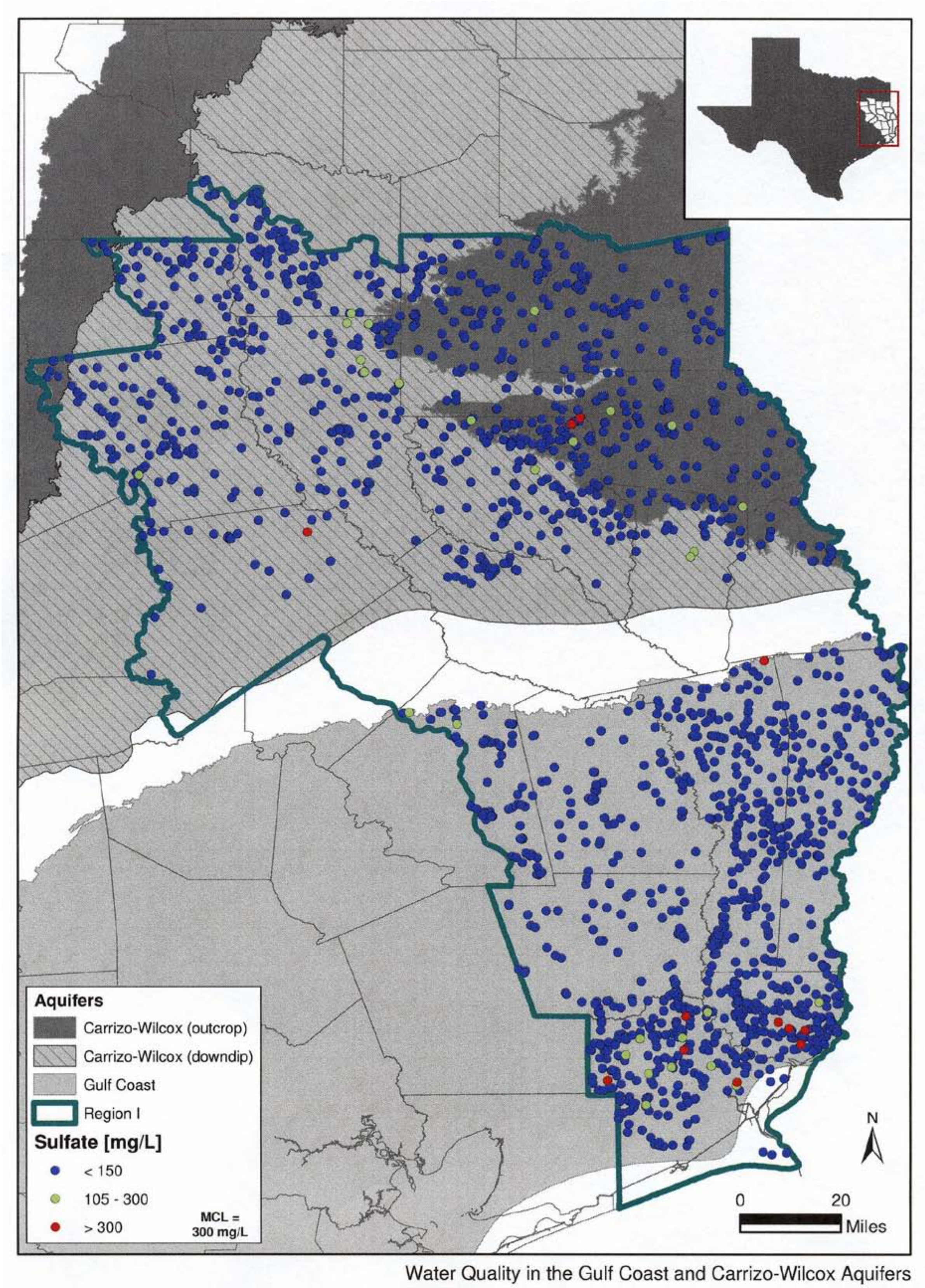


Figure 1-C.15 Distribution of Sulfate in Groundwater in the ETRWPA

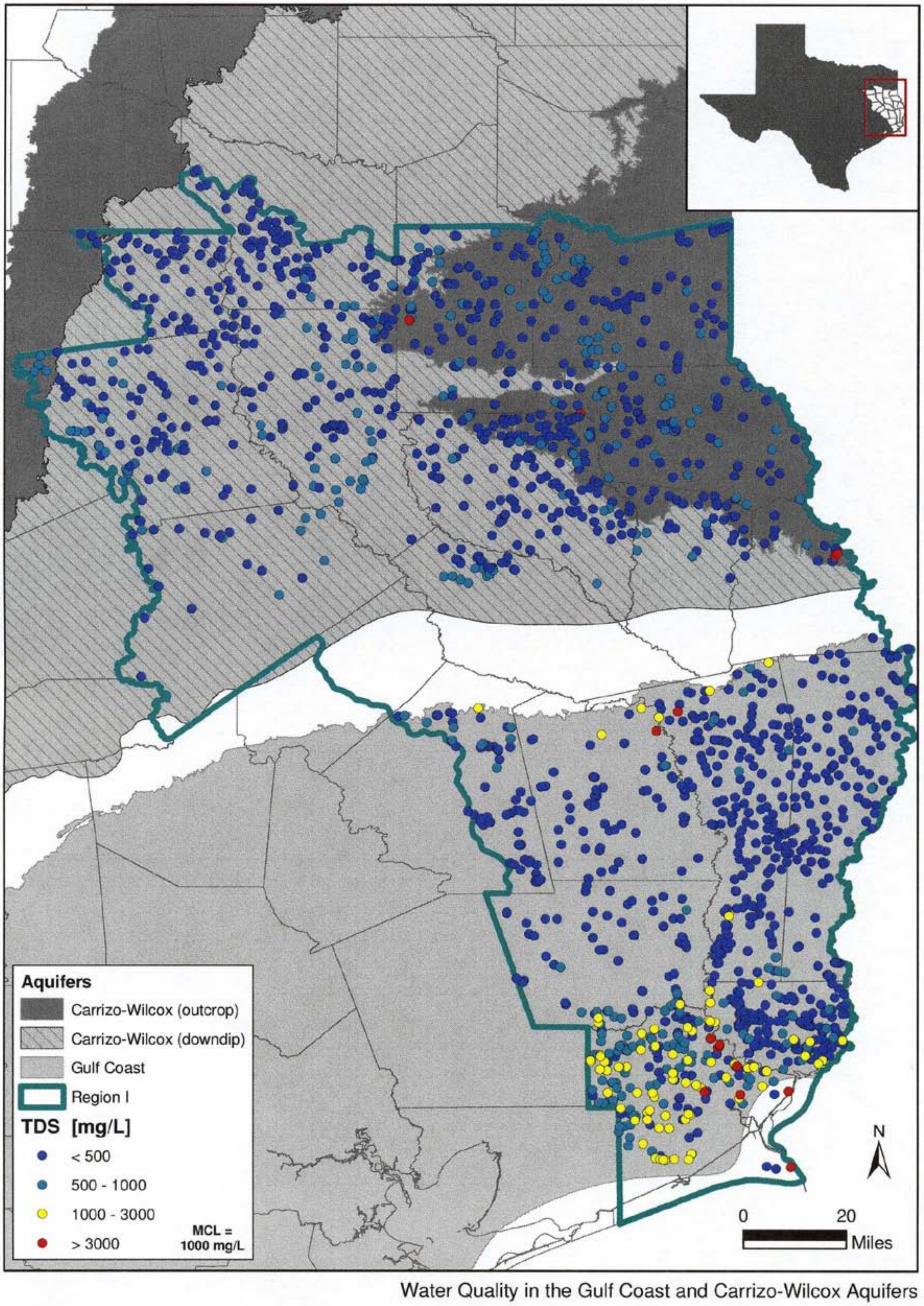


Figure 1-C.16 Distribution of Total Dissolved Solids in Groundwater in the ETRWPA

Appendix 1-D

Water Loss and Water Loss Audits

The TWDB established new requirements requiring water audit reporting for public utilities that provide potable water. Every five years public utilities must perform a water audit computing the utility's most recent annual water loss. This appendix provides the Executive Summary and water loss comparison by regional water planning area from the report prepared for the TWDB entitled, *An Analysis of Water Loss as Reported by Public Water Suppliers in Texas*.

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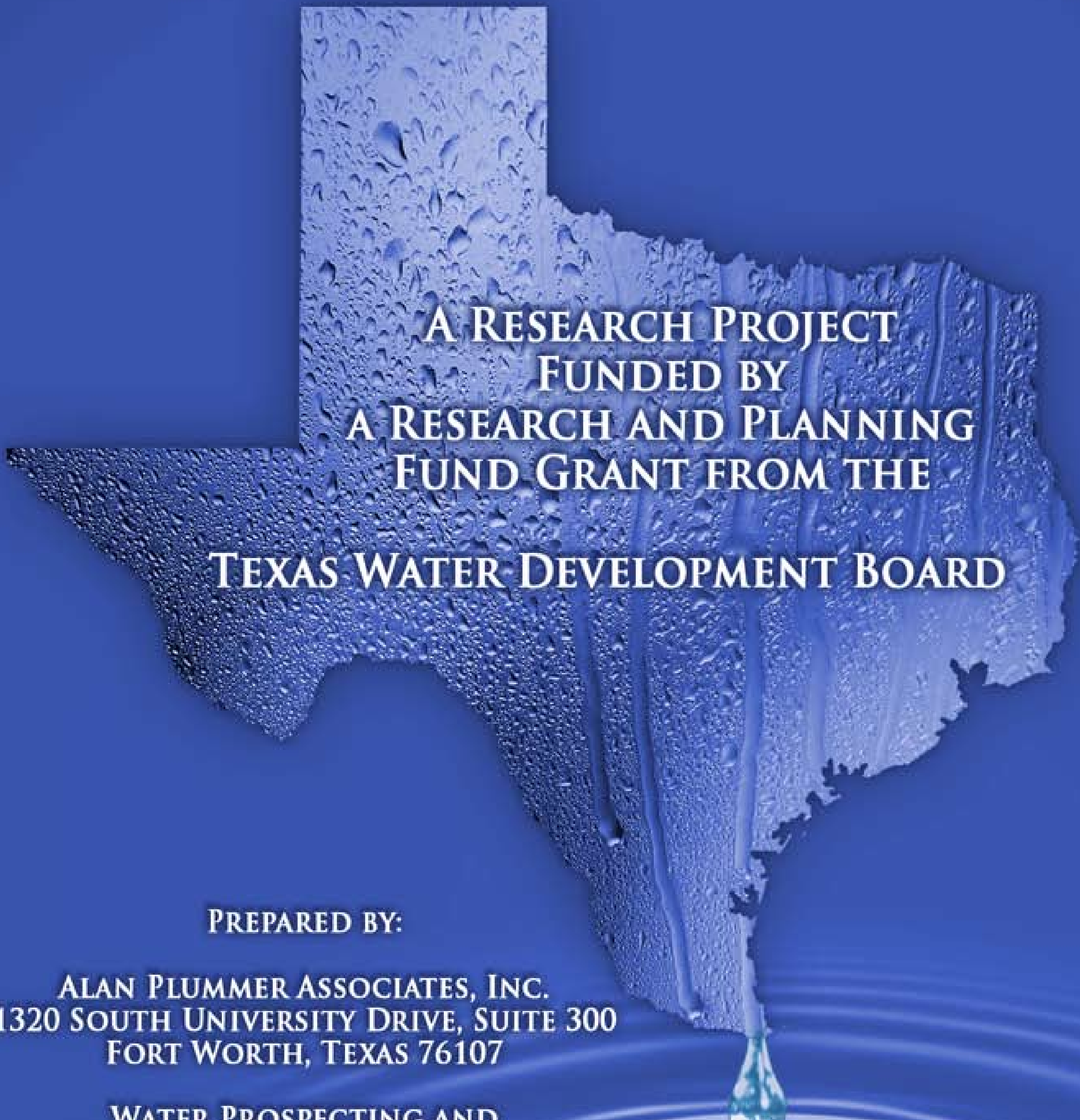
FINAL REPORT

AN ANALYSIS OF WATER LOSS AS REPORTED BY PUBLIC WATER SUPPLIERS IN TEXAS



A RESEARCH PROJECT
FUNDED BY
A RESEARCH AND PLANNING
FUND GRANT FROM THE

TEXAS WATER DEVELOPMENT BOARD

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JANUARY 24, 2007

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1 EXECUTIVE SUMMARY – ANALYSIS OF WATER LOSS

The first broad analysis of water loss for retail public utilities in Texas reveals that:

- Approximately half of retail public utilities in Texas reported their water loss data.
- Reporting utilities serve as much as 84 percent of the state's population.[1]
- A substantial amount of water (the balancing adjustment) was not attributed to any water use category, causing significant uncertainty in estimates of water loss and non-revenue water.
- Reporting utilities experienced total water loss[2] of 212,221 to 464,219 acre-feet per year,[3] or 5.6 to 12.3 percent[3] of all water entering the reporting systems. Based on the 2004 statewide average municipal water use of 150 gallons per capita per day,[A,4] equivalent water volumes could supply between 1.3 million and 2.7 million Texans.[5]
- Reporting utilities experienced non-revenue water[6] of 311,333 to 563,331 acre-feet per year,[3] or 8.3 to 15.0 percent[3] of all water entering the reporting systems.
- When extrapolated to all retail public utilities in Texas, the statewide value of total water loss is estimated to be between $152 million and $513 million per year.
- Reporting utilities may have underestimated their real water loss.

This research provides information necessary for the Texas Water Development Board (TWDB), Regional Water Planning Groups (RWPGs), and retail public utilities to direct planning and funding resources, to recover lost revenue through reduction of non-revenue water, and to achieve water savings through reduction of real loss.

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[1] This percentage is uncertain because some utilities reported both retail and wholesale customer populations.
[2] Total water loss includes real loss (water that was physically lost from the system, such as main breaks and leaks, customer service line breaks and leaks, and storage overflows) and apparent loss (water that was not accurately measured and billed to a customer, such as unauthorized consumption, customer meter under-registering, and billing adjustment and waivers).
[3] The smaller number is the total reported by the utilities. The larger number is based on the assumption that the entire balancing adjustment is water loss.
[4] References are denoted with letters and are presented in Chapter 17. Footnotes are denoted with numbers and are presented at the bottom of the same page.
[5] However, it is not possible to recover all water loss.
[6] Non-revenue water includes real loss, apparent loss, and unbilled authorized consumption. Unbilled authorized consumption includes water used for fire fighting, sewer flushing, etc.

1.A Introduction

Water loss minimization can be an important water conservation strategy for retail water suppliers. Historically, retail public utilities have lacked detailed knowledge about their water loss performance. This is due partially to a lack of careful water auditing and partially to inconsistent water loss reporting using non-uniform statistics, including the use of "unaccounted-for water" percentages to compare performance. As a result, utilities may not know whether their water losses are due to leaks, accounting practices, theft, metering problems, or other factors, and may have difficulty developing water loss minimization strategies.

To address the lack of information on water loss, the 78th Texas Legislature passed House Bill 3338, which required retail public utilities that provide potable water to "perform and file with the [Texas Water Development Board] a water audit computing the utility's most recent annual system water loss"[B] every five years. Under this authority, the Texas Water Development Board (TWDB) instituted new water audit reporting requirements[C] that require retail public utilities to carefully audit their system water use at least once every five years; to estimate system water use in standard, well defined categories; and to report their first set of water loss data to the TWDB by March 31, 2006.

The new water audit reporting requirements follow a methodology that is recommended by the International Water Association (IWA) and the American Water Works Association (AWWA) Water Loss Control Committee. This methodology relies on strictly defined water use categories (Table 1-1) and water loss performance indicators and is becoming the international water loss accounting standard. The IWA Water Loss Task Force (which included AWWA participation) developed this methodology from 1997 through 2000.[D] The first reference to the methodology's performance indicators was published in 2000.[E (cited in D)]

The U.S. Bureau of Reclamation (BOR) has designated a number of "hot spots" in the Western U.S. where existing water supplies are projected to be inadequate to meet the demands of people, farms, and the environment by the year 2025, including six hot spots in Texas.[F] As part of the Water 2025 Program, the BOR offered Challenge Grants to fund projects related to "water conservation, efficiency and markets and collaboration. Recognizing this program as an opportunity to partner with the BOR, to leverage its existing budget, and to enhance conservation technical assistance, the TWDB applied for and received a Challenge Grant for two purposes: 1) to purchase 10 acoustical leak-detection units and make them available to public water suppliers, and 2) to perform an analysis of water loss in Texas, using water loss data provided by public water suppliers. The TWDB solicited proposals for the analysis of water loss and subsequently awarded a Research and Planning Fund Grant to the research team of Alan Plummer Associates, Inc., and Water Prospecting and Resource Consulting, LLC.

This executive summary describes the results of a research project to examine the reported water loss data for consistency, errors, omissions, and other quality control issues; to calculate water loss performance statistics; to compare water loss performance by utility location, type, and size; and to make recommendations for improving the water audit reporting process. The details of the data quality control are discussed in later chapters. A statewide summary of water loss performance, comparative analysis of water loss performance, and recommendations are presented below.

1.B Statewide Summary of Water Loss Performance

For reporting utilities, statewide totals for each water use category are shown in Table 1-1 (acre-feet), Table 1-2 (gallons), and Table 1-3 (percent of corrected input volume). The total reported corrected input volume[7] is 3,761,965 acre-feet over approximately one year. This figure includes retail water sales and wholesale water sales[8] for the reporting utilities.

The balancing adjustment in Table 1-1 through Table 1-3 is the water volume remaining after authorized consumption and total water loss are subtracted from the amount of water that entered the utility system (the corrected input volume). If a utility perfectly accounts for its water use, the balancing adjustment equals zero.

[7] Corrected input volume is the amount of water that was actually delivered to a utility, including water that was not measured by the master meter(s).
[8] A retail water sale is the sale of water to the end user. A wholesale water sale is the sale of water to a utility that resells the water.

Table 1-1: Statewide Totals of Reported Water Loss* (acre-feet)

<table>
<tr><td rowspan="12">Corrected input volume
(3,758,484)</td><td rowspan="4">Authorized consumption
(3,294,265)</td><td rowspan="2">Billed authorized consumption
(3,195,153)</td><td>Billed metered consumption
(3,190,972)</td><td rowspan="2">Revenue water
(3,195,153)</td></tr>
<tr><td>Billed unmetered consumption
(4,181)</td></tr>
<tr><td rowspan="2">Unbilled authorized consumption
(99,112)</td><td>Unbilled metered consumption
(52,698)</td><td rowspan="9">Non-revenue water
(311,333)</td></tr>
<tr><td>Unbilled unmetered consumption
(46,414)</td></tr>
<tr><td rowspan="7">Water losses
(212,221)</td><td rowspan="3">Apparent losses
(109,310)</td><td>Unauthorized consumption
(10,770)</td></tr>
<tr><td>Customer meter under-registering
(87,218)</td></tr>
<tr><td>Billing adjustment and waivers
(11,322)</td></tr>
<tr><td rowspan="3">Real losses
(102,910)</td><td>Main breaks and leaks
(83,529)</td></tr>
<tr><td>Storage overflows
(3,341)</td></tr>
<tr><td>Customer service line breaks and leaks
(16,040)</td></tr>
<tr><td colspan="4">Balancing Adjustment**
(251,998)</td></tr>
</table>

* Over approximately one year. Most utilities reported data for calendar or fiscal year 2005.

** Balancing adjustment is the corrected input volume minus authorized consumption minus total water loss. If all water is fully attributed to the various potential uses, balancing adjustment is zero. Balancing adjustment may consist of underestimated real loss, apparent loss, or authorized consumption. Without further refinement of a utility's water audit, there is no accurate *ad hoc* method for determining the actual water use for water that has been allocated to balancing adjustment.

Table 1-2: Statewide Totals of Reported Water Loss* (gallons)

<table>
<tr><td rowspan="11">Corrected input volume (1,224,705,675,107)</td><td rowspan="4">Authorized consumption (1,073,439,695,489)</td><td rowspan="2">Billed authorized consumption (1,041,143,853,511)</td><td>Billed metered consumption (1,039,781,485,415)</td><td rowspan="2">Revenue water (1,041,143,853,511)</td></tr>
<tr><td>Billed unmetered consumption (1,362,368,096)</td></tr>
<tr><td rowspan="2">Unbilled authorized consumption (32,295,841,978)</td><td>Unbilled metered consumption (17,171,730,325)</td><td rowspan="8">Non-revenue water (101,448,133,344)</td></tr>
<tr><td>Unbilled unmetered consumption (15,124,111,653)</td></tr>
<tr><td rowspan="6">Water losses (69,152,291,366)</td><td rowspan="3">Apparent losses (35,618,824,222)</td><td>Unauthorized consumption (3,509,318,446)</td></tr>
<tr><td>Customer meter under-registering (28,420,204,130)</td></tr>
<tr><td>Billing adjustment and waivers (3,689,301,646)</td></tr>
<tr><td rowspan="3">Real losses (33,533,467,144)</td><td>Main breaks and leaks (27,218,129,878)</td></tr>
<tr><td>Storage overflows (1,088,723,441)</td></tr>
<tr><td>Customer service line breaks and leaks (5,226,613,826)</td></tr>
<tr><td colspan="4">Balancing Adjustment** (82,113,688,252)</td></tr>
</table>

* Over approximately one year. Most utilities reported data for calendar or fiscal year 2005.

** Balancing adjustment is the corrected input volume minus authorized consumption minus total water loss. If all water is fully attributed to the various potential uses, balancing adjustment is zero. Balancing adjustment may consist of underestimated real loss, apparent loss, or authorized consumption. Without further refinement of a utility's water audit, there is no accurate *ad hoc* method for determining the actual water use for water that has been allocated to balancing adjustment.

Table 1-3: Statewide Percentages of Reported Water Loss*

<table>
<tr><td rowspan="11">Corrected input volume
(100.0)</td><td rowspan="4">Authorized consumption
(87.6)</td><td rowspan="2">Billed authorized consumption
(85.0)</td><td>Billed metered consumption
(84.9)</td><td rowspan="2">Revenue water
(85.0)</td></tr>
<tr><td>Billed unmetered consumption
(0.1)</td></tr>
<tr><td rowspan="2">Unbilled authorized consumption
(2.6)</td><td>Unbilled metered consumption
(1.4)</td><td rowspan="8">Non-revenue water
(8.3)</td></tr>
<tr><td>Unbilled unmetered consumption
(1.2)</td></tr>
<tr><td rowspan="6">Water losses
(5.6)</td><td rowspan="3">Apparent losses
(2.9)</td><td>Unauthorized consumption
(0.3)</td></tr>
<tr><td>Customer meter under-registering
(2.3)</td></tr>
<tr><td>Billing adjustment and waivers
(0.3)</td></tr>
<tr><td rowspan="3">Real losses
(2.7)</td><td>Main breaks and leaks
(2.2)</td></tr>
<tr><td>Storage overflows
(0.1)</td></tr>
<tr><td>Customer service line breaks and leaks
(0.4)</td></tr>
<tr><td colspan="4">Balancing Adjustment**
(6.7)</td></tr>
</table>

* Over approximately one year. Most utilities reported data for calendar or fiscal year 2005.

** Balancing adjustment is the corrected input volume minus authorized consumption minus total water loss. If all water is fully attributed to the various potential uses, balancing adjustment is zero. Balancing adjustment may consist of underestimated real loss, apparent loss, or authorized consumption. Without further refinement of a utility's water audit, there is no accurate *ad hoc* method for determining the actual water use for water that has been allocated to balancing adjustment.

Some or all of the balancing adjustment is due to underestimation of real and apparent water losses. Without further refinement of a utility's water audit, there is no accurate *ad hoc* method for determining the actual water use for water that has been allocated to balancing adjustment. Therefore, for a given water loss performance indicator, a range of potential values are presented. One end of the range is calculated directly from the reported water loss data, and the other end of the range is based on the assumption that all of the balancing adjustment is unreported water loss (either real or apparent, depending on the performance indicator). The balancing adjustment may be a positive quantity or a negative quantity.

Assuming the real loss is valued at the marginal production water cost and that apparent loss and the balancing adjustment are valued at the retail water cost, the estimated value of total water loss in Texas is between $152 million and $513 million per year.[9] Adding the value of unbilled authorized consumption to these totals gives an estimated value of non-revenue water in Texas between $253 million and $635 million. To increase the reliability and narrow the range of these estimates, the production and retail water costs must be more uniformly reported, and utilities must refine their water accounting, thereby reducing the balancing adjustment.

Statewide median and average water loss performance indicators are shown in Table 1-4. Generally speaking, the balancing adjustment is too large in relation to other quantities to draw reliable conclusions about water loss trends. From all reported data, balancing adjustment was 6.7 percent of total corrected input volume, while real loss was 2.7 percent, and apparent loss was 2.9 percent. On average, therefore, the balancing adjustment is larger than sum of the real and apparent losses. Given similar statistics, an individual utility would not be able to determine whether its best strategy is to reduce real loss or to reduce apparent loss.

The screening-level infrastructure leakage index (SLILI) is the real loss divided by the theoretical unavoidable annual real loss. In theory, the SLILI should not be less than one, because the real loss should not be less than the unavoidable real loss. However, the statewide median SLILI is 0.22 when calculated from reported data. In addition, the statewide median real loss is 3.6 gallons per connection per day, which is only about 23 percent of the lowest identified

[9] This estimate is not fully reliable, because up to 10 percent of the reported production and retail water costs were modified as discussed in Chapters 3.B.13 and 3.B.14. Not all non-revenue water can be recovered.

Table 1-4: Statewide Summary of Reported Water Loss Data

Statistic or Performance Indicator	Units	Median from Reported Data	Median With Balancing Adjustment Assumption	Average from Reported Data	Average With Balancing Adjustment Assumption
Absolute Value of Balancing Adjustment/Corrected Input Volume[10]	%	2.6	2.6	7.1	7.1
Real Loss per Mile of Main Per Day	gal/mi/day	77	233	204	417
Real Loss per Service Connection per Day	gal/conn/day	3.6	18.8	14	51
Apparent Loss per Service Connection per Day	gal/conn/day	6.4	17.5	15	51
Non-Revenue Water/Corrected Input Volume	%	7.3	13.4	8.3	15.0
Value of Real Loss per Mile of Main Per Day	$/mi/day	0.12	0.31	0.24	0.49
Value of Real Loss per Service Connection per Day	$/conn/day	0.004	0.018	0.010	0.040
Value of Apparent Loss per Service Connection per Day	$/conn/day	0.018	0.046	0.042	0.140
Screening-Level Infrastructure Leakage Index (SLILI)[11]	--	0.22	2.04	1.08	4.10

[10] The average of the absolute value balancing adjustment as a percentage of corrected input volume does not match the balancing adjustment percentage shown in Table 9-3, because the balancing adjustment is a negative quantity for some utilities.

[11] Calculation of the Screening-Level Infrastructure Leakage Index was performed only for utilities with 5,000 or more connections and 32 or more connections per mile of main. See discussion in Chapter 5.C.

real loss for a North American system (16 gal/conn/day for Halifax Central, shown in Table 7-1).

Even assuming that the balancing adjustment is unreported real loss, the statewide median SLILI is only 2.04, and the statewide median real loss is 18.8 gal/conn/day. Compared to the American Water Works Association (AWWA) guidelines for ILI goals (Table 7-3) and real loss performance by North American utilities (Table 7-1), these statistics seem to indicate that at least half of reporting utilities have excellent real loss control. However, most utilities in Texas practice real loss control in a reactive way (rather than a proactive way), so it is surprising that half of the reporting utilities have such excellent real loss performance, particularly in comparison to other North American utilities.

Because the actual statewide median SLILI value is so low (somewhere between 0.22 and 2.04), it appears that most reporting utilities have underestimated actual real loss. Furthermore, from comparison to AWWA guidelines and real loss performance by other North American utilities, it appears likely that the actual real loss is underestimated even if the balancing adjustment is treated as real loss. Real loss estimation problems notwithstanding, at least 8 to 30 percent of Texas utilities with more than 5,000 connections and 32 or more connections per mile of main have an SLILI greater than 3.0 (Appendix C).

1.C Comparative Analysis of Water Loss Performance

Water loss performance was also compared on the basis of utility location, type, size, water source, and connection density. The primary findings of the comparative analysis are similar to the findings in the statewide summary: the balancing adjustment is too large to allow identification of trends in the water loss data, and real loss appears to be underestimated. Other findings from the comparative analysis are discussed further in the conclusions and recommendations section (Chapter 1.D).

1.D Recommendations

This report, the first broad analysis of water loss and water loss accounting for retail public utilities in Texas, provides information necessary for the TWDB, RWPGs, and retail public utilities to direct planning and funding resources, to recover lost revenue through reduction of non-revenue water, and to achieve water savings through reduction of real loss. However, the size of the balancing adjustment results in significant uncertainty in the water loss performance indicators. Recommendations for improving water loss performance and water loss accounting are presented below in the following categories: water loss performance, regional water planning, and TWDB actions.

1.D.1 Water Loss Performance

Recommendations regarding balancing adjustment, real loss, connection density, non-revenue water, and the value of total water loss are discussed below.

Balancing Adjustment

Recommendation #1: Utilities should refine their water audits until the balancing adjustment is small in comparison to the other quantities of interest (*e.g.*, real and apparent water loss) so that reliable conclusions about water loss trends can be drawn. It may be tempting to change the volumes in some water use categories for the sole purpose of eliminating the balancing adjustment. This is not a legitimate way to reduce balancing adjustment: it only disguises the real issues, making it harder to identify what strategies a utility should pursue in the future. To legitimately reduce balancing adjustment, a utility should refine its estimates for each water use category by implementing more accurate measurement and/or estimation procedures.

Recommendation #2: Although utilities are only required to report their water audits every five years, utilities should implement annual or biennial programs to develop the data necessary to gradually reduce the uncertainty in their water audits and should review their water audits annually or biennially. Programs should target the water audit categories with the most uncertain water volume estimates.

Real Loss

Recommendation #3: Because it appears that utilities have underestimated real loss, utilities should refine their water audits to better estimate their actual real loss. This may involve confirmation of existing information (*e.g.*, calibration of production and consumption meters), additional analysis of existing information, and collection of new information (*e.g.*, flow monitoring in District Metered Areas).

Recommendation #4: Utilities should determine their economic level of leakage (ELL) and should use the ELL as a goal for real loss. Prior to determining an ELL, utilities should strive for a maximum ILI of 3.0 (Table 7-3). Utilities with an SLILI greater than 3.0 and other utilities with significant real loss in comparison to other North American utilities (Table 7-1) should consider implementing real loss control measures.

Water Loss Performance and Connection Density

Recommendation #5: Average real loss per mile of main per day increases with increasing connection density,[12] and average non-revenue water percentage decreases with increasing connection density (Figure I-2 in Appendix I). Reasons for these trends should be identified. Future analysis of water loss performance should consider connection density as an independent variable, along with utility location, type, and size.

Non-Revenue Water

Recommendation #6: Utilities should determine their economic target level for non-revenue water and strive to reduce their non-revenue water to the economic target level. In particular, utilities in Regions I and J should consider steps to recover lost revenue from unbilled authorized consumption, and utilities in Harris, Hidalgo, Nueces, Tarrant, and Travis Counties should consider steps to reduce non-revenue water.

Statewide Value of Total Water Loss

Recommendation #7: The estimated total value of total water loss in Texas is between $152 million and $513 million per year. To increase the reliability and narrow the range of this estimate, the production and retail water costs should be reported in consistent units, and utilities must refine their water accounting, thereby reducing the balancing adjustment.

[12] The number of service connections per mile of main.

1.D.2 Regional Water Planning

Recommendation #8: RWPGs should use the research results to estimate potential water savings from system water audits and water loss prevention strategies and should update the regional water plans as appropriate.

Recommendation #9: The TWDB should work to align the regional water planning cycle and the water audit reporting cycle so that up-to-date water loss data is used in developing the regional water plans.

1.D.3 TWDB Actions to Enhance Water Loss Accounting and Prevention

The TWDB should consider the following general actions to enhance water loss accounting and prevention in Texas:

Recommendation #10: To provide a more comprehensive picture of water loss in Texas, the TWDB should consider extending water auditing requirements to include wholesale utilities that provide raw or potable water. This may require additional authorization from the Legislature.

Recommendation #11: The TWDB should continue to promote water loss prevention to retail public utilities, focusing on the retail public utilities that have the greatest need for water loss reduction.

Recommendation #12: To make the water loss data more comprehensive, the TWDB should continue to seek water audit data from retail public utilities that have not reported.

Recommendation #13: The TWDB should continue to provide equipment, education, and financial assistance to help retail public utilities achieve improved water loss accounting and water loss performance.

Recommendation #14: To minimize the impact of balancing adjustment on the water loss analysis, the TWDB should consider devoting additional personnel and/or resources to assisting utilities with refinement of their water audits.

Recommendation #15: The TWDB should convey the findings, conclusions, and recommendations of this research effort to stakeholders through workshops or other means of communication.

In addition, the water loss reporting process should be revised to help assure data quality and to make the maximum use of reported water loss data. Additional recommendations regarding data quality control and the water loss reporting process are presented in Chapter 16.

10 COMPARATIVE ANALYSIS BY REGIONAL WATER PLANNING AREA

Water loss results were compared across the 16 regional water planning areas in Texas (Figure 10-1). The distribution of reporting utilities and the total corrected input volume is shown by region in Figure 10-2. As discussed in the previous chapter, wholesale water sales are included in the corrected input volume multiple times, so the total corrected input volume does not necessarily reflect total retail water use.

Regional statistics and water loss performance indicators are presented in the following sections.

10.A <u>Regional Statistics</u>

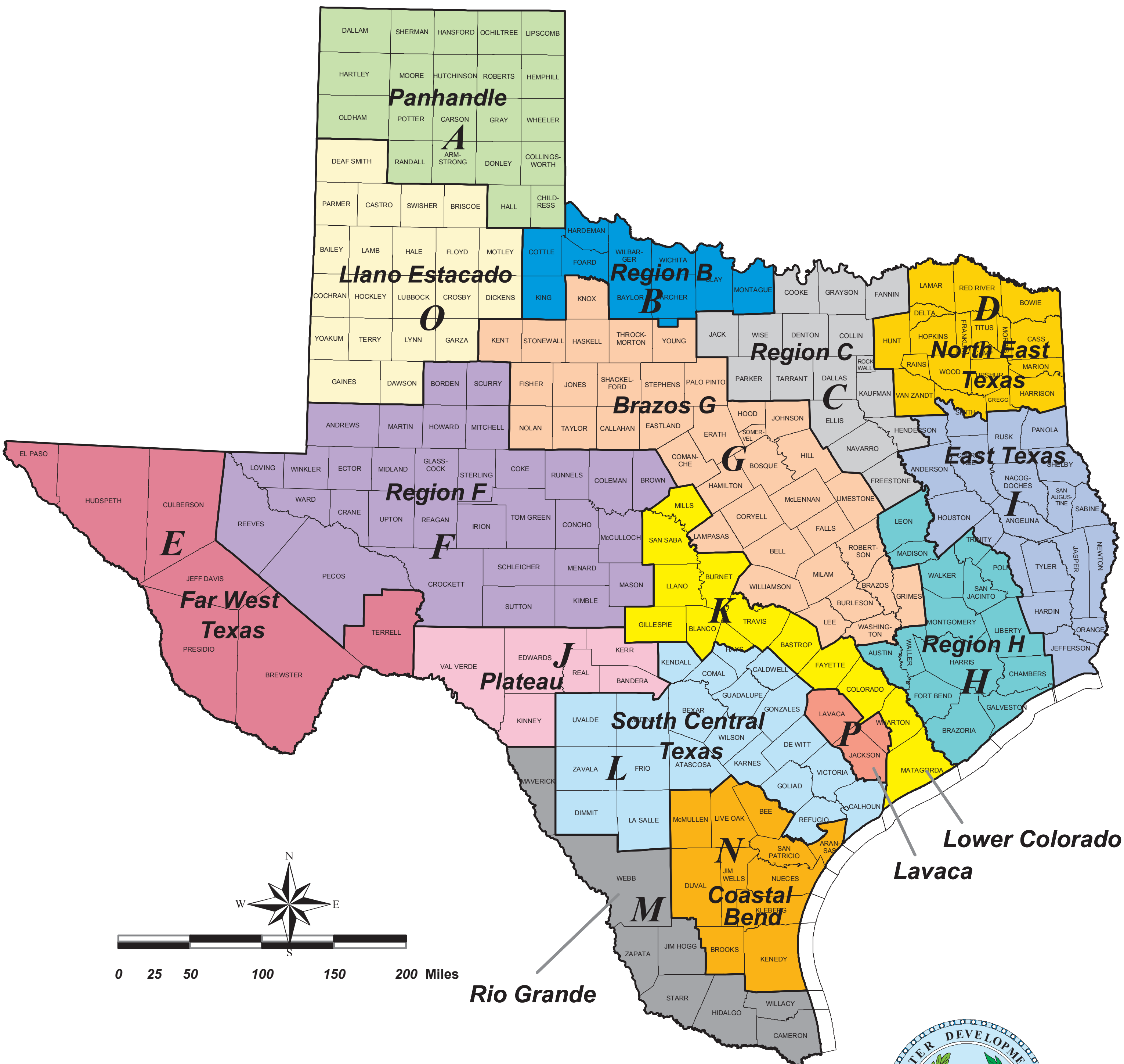
Several additional regional average quantities can be derived from the reported data (Table 10-1). The ranges of the regional averages are:

- Master meter accuracy: 95.7 – 100.3 percent
- Customer meter accuracy: 94.1 – 99.5 percent
- Production water cost: $0.34 – $2.02 per thousand gallons
- Retail water cost: $0.94 – $5.13 per thousand gallons
- Service connections per mile of main: 14.6 – 89.6
- Reporting period: 346.7 – 383.5 days

10.B <u>Regional Water Loss Performance Indicators</u>

The average reported non-revenue water as a percentage of corrected input volume for each region is shown in Figure 10-3. Regions I and J have the highest average non-revenue water percentage (ranging from approximately 19 percent to as much as 27 percent). These regions also had the highest reported average unbilled authorized water use, at 5.5 percent and 9.4 percent of corrected input volume, respectively, compared to the statewide reported average of 2.6 percent. Utilities in Regions I and J should consider steps to recover lost revenue from unbilled authorized consumption. This will reduce the non-revenue water percentage in these regions.

*Figure 10-1: Regional Water Planning Areas in Texas**



* Texas Water Development Board,
Available URL: http://www.twdb.state.tx.us/mapping/maps/pdf/sb1_groups_8x11.pdf,
accessed November 2006.

Figure 10-2: Distribution of Reporting Utilities by Regional Water Planning Area

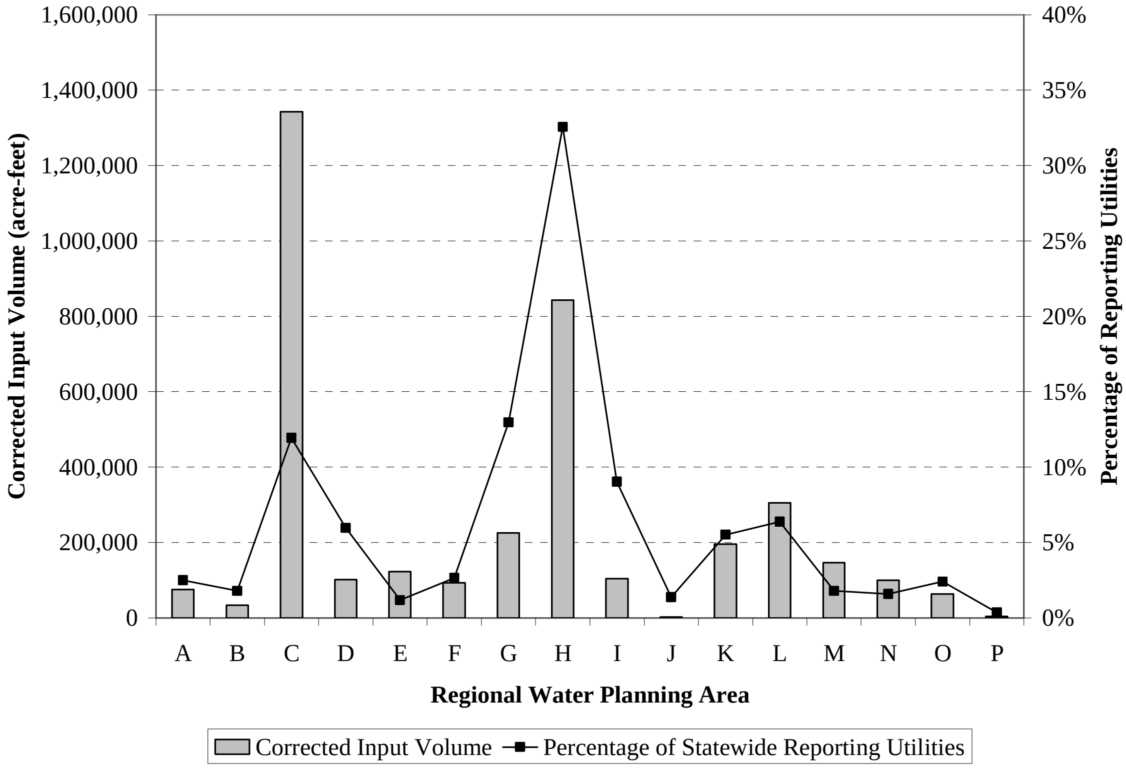
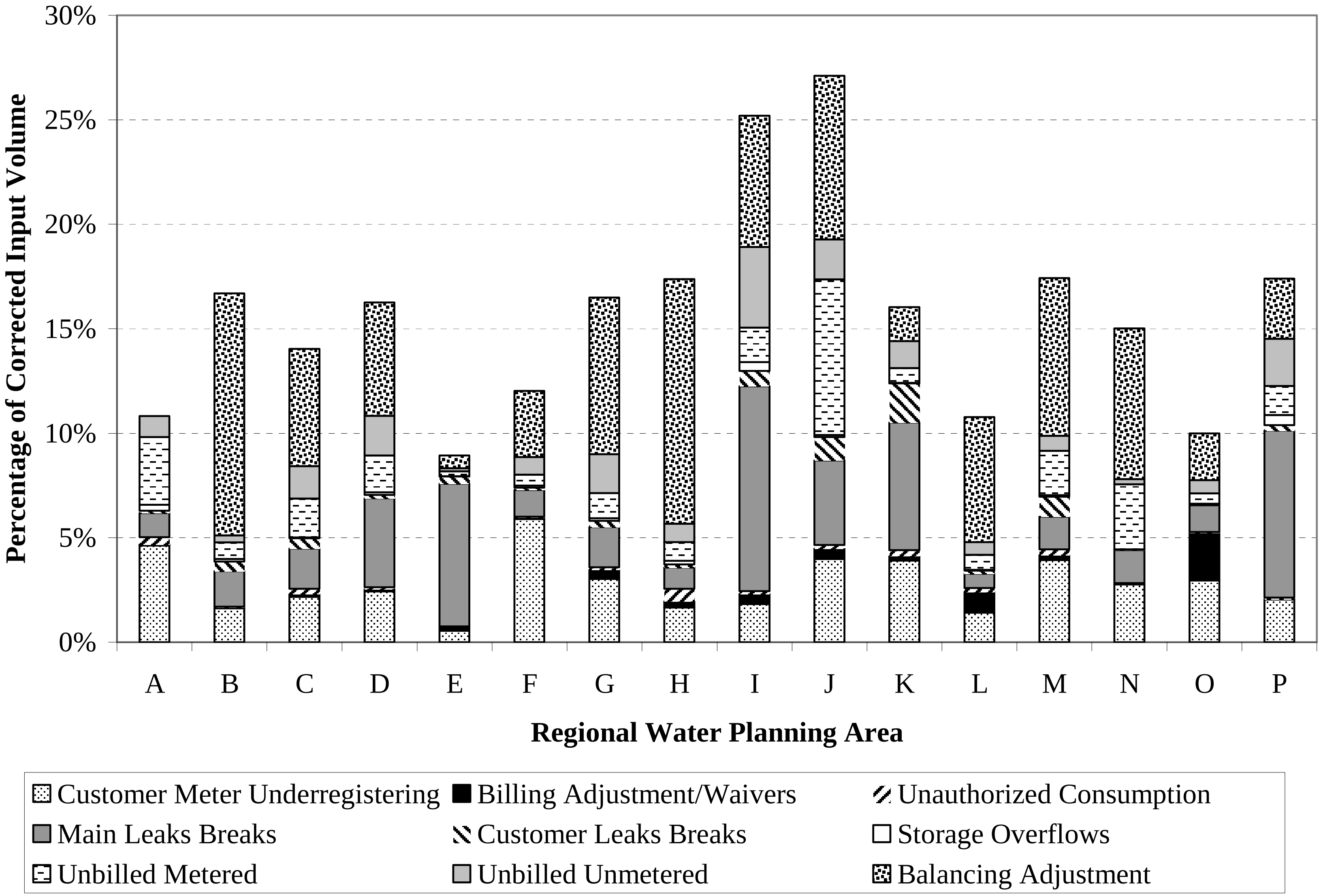


Table 10-1: Regional Average Quantities

Region	Master Meter Accuracy	Customer Meter Accuracy	Production Water Cost ($/1,000 gallons)	Retail Water Cost ($/1,000 gallons)	Service Connections per Mile of Main	Reporting Period
A	98.0%	95.4%	$0.70	$1.89	40.2	362.8
B	98.4%	98.4%	$1.70	$3.11	22.3	365.4
C	99.7%	97.8%	$0.90	$2.60	51.2	366.0
D	99.0%	97.6%	$1.51	$3.96	14.6	383.5
E	99.4%	99.5%	$0.61	$2.52	73.9	346.7
F	99.1%	94.1%	$2.02	$2.66	29.6	372.1
G	98.5%	97.0%	$1.42	$2.85	19.5	363.0
H	98.4%	98.3%	$0.80	$2.38	89.6	363.4
I	99.8%	98.2%	$0.34	$2.68	19.2	363.5
J	97.9%	96.0%	$0.91	$3.09	27.9	360.7
K	100.3%	96.1%	$0.57	$2.89	38.8	360.0
L	99.6%	98.6%	$1.20	$5.13	50.0	364.6
M	99.3%	96.1%	$0.72	$1.81	38.2	364.2
N	95.7%	97.2%	$1.62	$2.46	38.7	364.1
O	98.5%	97.0%	$0.86	$1.64	49.0	380.4
P	98.3%	98.0%	$0.36	$0.94	47.0	365.0
TOTAL	99.1%	97.7%	$0.84	$2.72	43.5	365.2

Figure 10-3: Average Annual Non-Revenue Water by Region



The average annual value of non-revenue water per connection is shown by region in Figure 10-4.[9] On a per-connection basis, utilities in Region E report the lowest average value of non-revenue water (approximately $14 per connection per year), and utilities in Regions D and K report the highest average value of non-revenue water (more than $50 per connection per year). Reported values include real loss, apparent loss, and unbilled authorized consumption. However, after accounting for the balancing adjustment, the average value of non-revenue water in Regions B, C, D, G, L, and N may be more than $80 per connection per year. The total balancing adjustment for Region A is negative, which causes the balancing adjustment assumption to reduce the average value of non-revenue water.

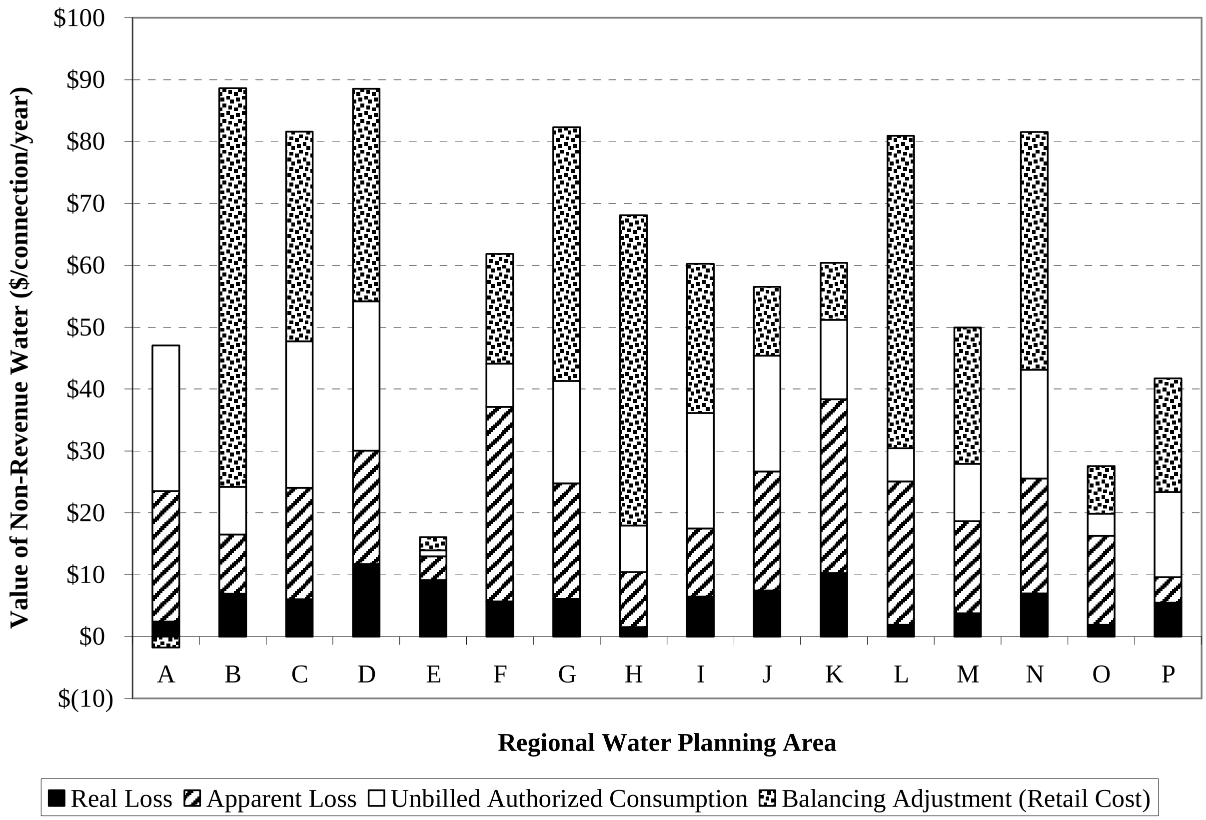
Graphs showing other average water loss performance indicators by region for all reporting water utilities (after quality control) are presented in Appendix D. These graphs present the performance indicators with and without the balancing adjustment assumption discussed in Chapter 6.A. The ranges of average real loss and average SLILI are on the low end of the ranges of real loss and ILI reported by North American utilities (Table 7-1), while the range of average apparent loss is similar to, or perhaps somewhat greater than, the range of apparent loss reported by North American utilities.

Regions B, H, and M each have an average balancing adjustment (absolute value) that is more than 10 percent of the corrected input volume (Figure D-1). With the balancing adjustment assumption, this results in a relatively wide range of upper and lower bounds for water loss performance indicators for these regions. This suggests that utilities in these regions should refine their water accounting procedures to more accurately quantify water use in each category.

Three regions (A, F, and O) have average SLILI values that range from 0.36 to 0.71 as calculated from the reported data and range from 0.71 to 1.77 with the balancing adjustment assumption (Figure D-4). As discussed in Chapter 5.C, the theoretical minimum SLILI is 1. These observations suggest that the larger utilities[25] in these regions may be underestimating real loss. It is interesting to note that these regions are contiguous and are located in West Texas and the Panhandle (Figure D-12). It is not known whether there is a common geographic or system factor that would result in low levels of real loss in these regions.

[25] Utilities having 5,000 connections or more and 32 or more connections per mile of main.

Figure 10-4: Average Annual Value of Non-Revenue Water per Connection by Region



The average SLILI values for Regions I and K suggest that the larger utilities[25] in these regions might benefit from real loss control measures.

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Appendix 2-A

Correspondence of the East Texas Regional Water Planning Group Chair to the Texas Water Development Board

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Following are three letters from Kelley Holcomb, Chair of the ETRWPG, to the TWDB, regarding the 2011 Plan. The first letter, dated August 26, 2009, contains a memorandum prepared by Freese and Nichols, Inc. presenting revised water demand projections for steam-electric power generation in the ETRWPA for the 2011 Plan. The second letter, dated December 18, 2009, contains approved population projections and water demand changes for the ETRWPA for the current planning cycle. The third letter, dated February 26, 2010, is a request by the ETRWPG to the TWDB for technical assistance in conducting a socioeconomic analysis for the *2011 East Texas Regional Water Plan*.

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EAST TEXAS
Regional Water Planning Group
Region I WPG

Kelley Holcomb, Chair
P.O. Box 387
Lufkin, TX 75902
936-633-7543 (Phone)
936-632-2564 (Fax)

August 26, 2009

Mr. Kevin Ward
Executive Administrator
Texas Water Development Board
1700 North Congress
Austin, Texas 78711-3231

Re: Steam-Electric Water Demand Projections
Current (2007-2011) Planning Cycle
East Texas Regional Water Planning Area

Dear Mr. Ward:

The purpose of this letter is to provide to the Texas Water Development Board with approved steam-electric water demands for the current regional water planning cycle. Steam-electric water demand projections were discussed and approved by the East Texas Regional Water Planning Group at its regular meeting on April 8, 2009.

In a memorandum prepared by Freese and Nichols (see Attachment A), water demand projections for steam-electric power generation in Region I were evaluated. Two approaches were reviewed, including projections developed by the Bureau of Economic Geology (BEG) and projections provided in the *2006 Regional Water Plan*. In general, BEG projections were considerably lower than those provided in the 2006 Water Plan. The BEG projections did not include power plant projects that have been either postponed or canceled. In addition, neither the BEG nor 2006 Water Plan projections included new water demands in Angelina County where a 50 MW biomass power plant is currently being developed.

The East Texas Regional Water Planning Group approved revised steam-electric power demand projections, as recommended in the attached memorandum. The revised demands include steam-electric power demands developed for the 2006 water plan, with the addition of new demands for Angelina County.

Thank you for your attention to this matter. Please call me if you have any questions.

Sincerely,

Kelley Holcomb
Chairman, East Texas Region

Attachment

cc: Temple McKinnon, Texas Water Development Board
Lila Fuller, City of Nacogdoches
Rex Hunt, Alan Plummer Associates, Inc.

Lila Fuller, Administrative Contact
P. O. Box 635030, Nacogdoches, TX 75963-5030
Phone: 936-559-2504 Fax: 936-559-2912

Attachment A

Memorandum: Review of Steam Electric Power Demands

Freese and Nichols

MEMORANDUM

TO: East Texas Regional Water Planning Group; File, PLU09129

FROM: Simone Kiel

SUBJECT: Review of Steam Electric Power Demands

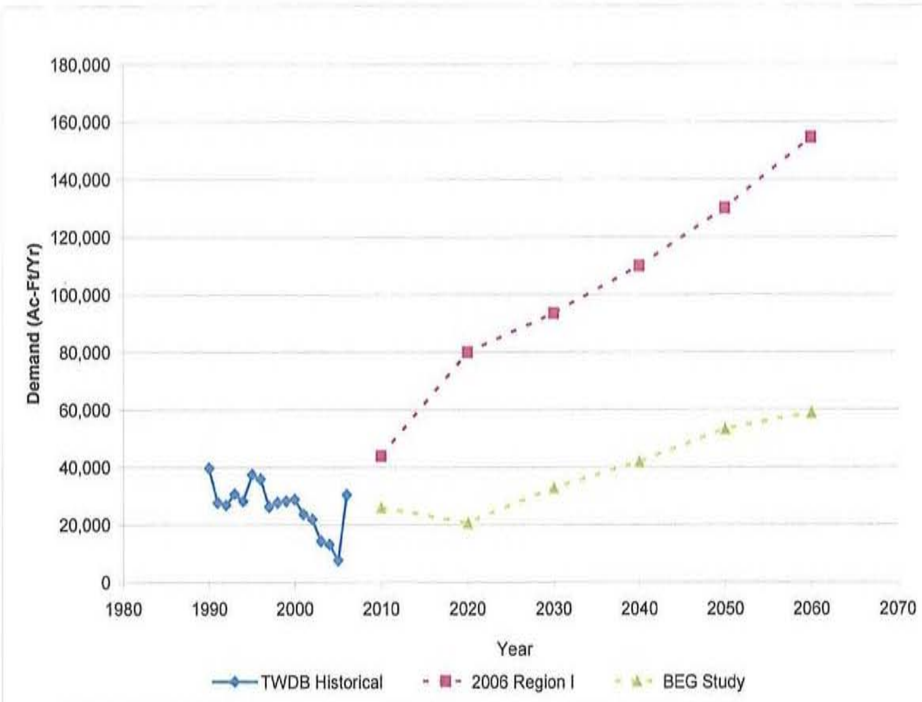
DATE: March 16, 2009 (Updated April 2, 2009)

The TWDB contracted with the Bureau of Economic Geology (BEG) to develop water demand projections for power generation in Texas. This report provided a comprehensive review of existing and planned power needs for Texas. Eight different demand scenarios were evaluated. The demand methodology recommended by the TWDB for regional water planning is the BEG Scenario 2L, which assumes low annual electric sales growth, high natural gas prices and carbon capture technology for future facilities.

The TWDB has asked the regions to select the preferred demand projections for steam electric power by choosing either the projections developed for the 2006 regional water plans or the recommended BEG projections. The regions can choose either projection on a county-level basis. Alternatively, if the region has data to support demands that are different from either of the above projections, the region can submit the proposed projections to the TWDB for consideration. To assist the region in this selection, this memorandum focuses on comparing the BEG developed projections to the steam electric power projections in the *2006 East Texas Region Water Plan.*

Figure 1 shows the historical steam electric power demand, adopted demands for the 2006 East Texas Regional Water Plan, and the recommended demands from the BEG study.

Figure 1: East Texas Region Steam Electric Power Demand Comparison



As shown on Figure 1, the BEG water demand estimates for steam electric power are lower than those in the 2006 regional water plan. The BEG projections were developed through 2015 based on existing and planned facilities (those reported to the PUC or obtained a permit). The drop in demand in 2020 is associated with a higher percentage of power generation from new more efficient facilities. By 2030, it is assumed that additional power will be needed across the state and this demand will be met by additional facilities. The future power plants were located in the same counties as existing facilities based on the percentage of generation by facility type. For the East Texas Region, this results in low to moderate growth in water demands.

One of the considerations in the BEG report was the status of existing facilities. For the East Texas Region, there are six existing facilities that are reported with a status of "delayed" or "cancelled". Future water demands for these facilities are not included in the BEG projections.

The six facilities are:

FACILITY	COUNTY	STATUS
Sabine Power/ Port of Port Arthur	Jefferson	Delayed
Nacogdoches Power (2)	Nacogdoches	Cancelled
Amelia Energy Center	Jefferson	Cancelled (air permit expired)
Hartburg Power	Newton	Cancelled (air permit expired)
Palestine Project Power	Anderson	Cancelled
Martin Lake 4	Rusk	Cancelled

Note: There were two proposed facilities in Nacogdoches County. One facility was cancelled.

All counties show a lower projected demand in the BEG report than reported in the 2006 regional water plan. For Cherokee and Orange Counties, the BEG projected demands are lower than the TWDB reported historical water usage. Summaries of this comparison for years 2020 and 2060 are shown in Figures 2 and 3.

Figure 2: Steam Electric Power Demand Comparison by County for Year 2020

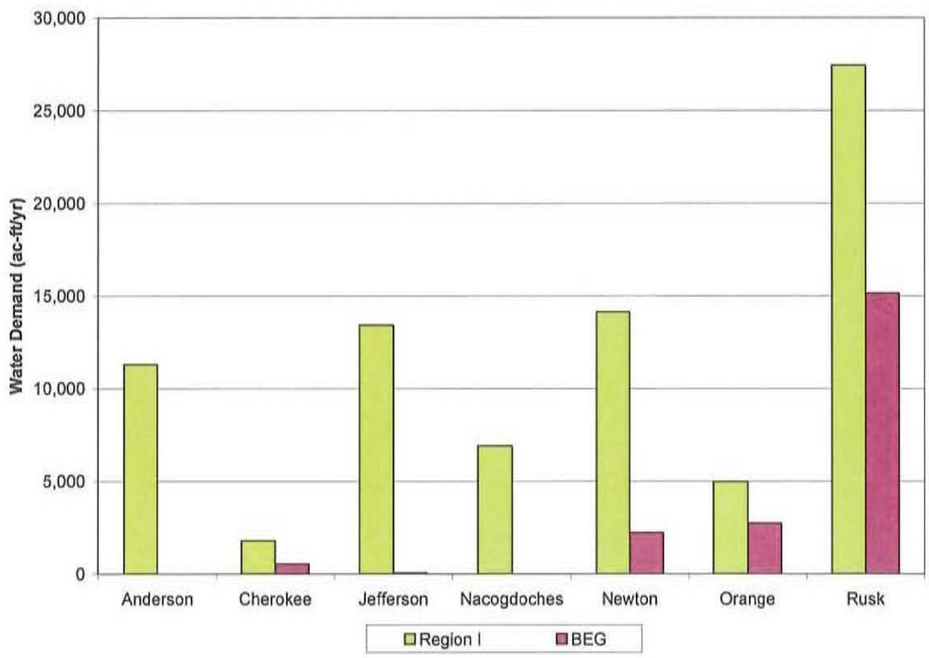
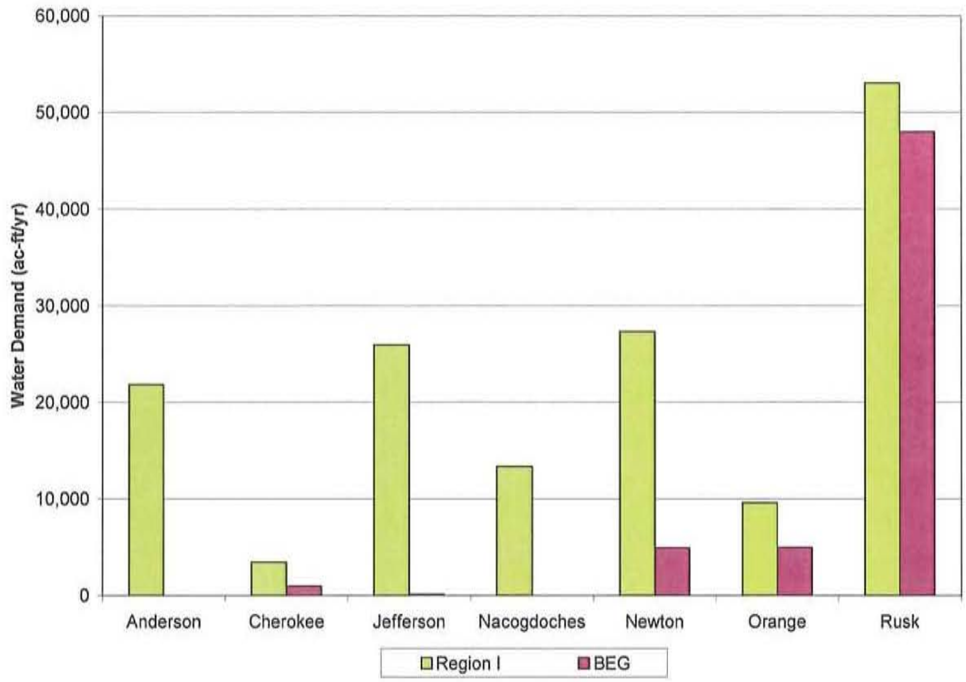


Figure 3: Steam Electric Power Demand Comparison by County for Year 2060



Since the 2006 East Texas Regional Water Plan was developed, a new power facility in Angelina County is being developed. The Aspen Power Facility is 50 MW bioelectric plant. The facility is located in Lufkin and intends to use on-site groundwater for cooling with back-up supplies from the City of Lufkin. Total water usage is estimated at 1,000 acre-feet per year (based on usage estimates provided by Aspen Pipeline on April 2, 2009). This facility was not included in either the 2006 water plan or the BEG report. Water demands are expected to begin before 2010, and stay relatively constant over the planning cycle.

Also, one of two proposed Nacogdoches Power Plants is moving forward. This facility is a 100 MW plant that will use wood/wood waste for fuel. The BEG report identifies a water demand with this facility only in 2015. After 2015, there is no demand in Nacogdoches County. On a decadal basis the BEG report shows no demands in Nacogdoches County.

RECOMMENDATIONS

Based on this review and the uncertainty of the locations of new facilities, it is recommended that the East Texas Region continue to use the steam electric power demands developed for the 2006 water plan, with the addition of new demands for Angelina County. The recommended demands by county are shown on Table 1.

Table 1

Recommended Demands for 2011 East Texas Regional Water Plan

	Demands (Acre-feet per Year)					
County	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Anderson	0	11,306	13,218	15,549	18,390	21,853
Angelina	1,000	1,000	1,000	1,000	1,000	1,000
Cherokee	2,245	1,790	2,093	2,462	2,912	3,460
Hardin	0	0	0	0	0	0
Henderson	0	0	0	0	0	0
Houston	0	0	0	0	0	0
Jasper	0	0	0	0	0	0
Jefferson	0	13,426	15,696	18,464	21,838	25,951
Nacogdoches	4,828	6,911	8,079	9,504	11,241	13,358
Newton	5,924	14,132	16,522	19,436	22,987	27,317
Orange	6,228	4,966	5,805	6,829	8,077	9,598
Panola	0	0	0	0	0	0
Polk	0	0	0	0	0	0
Rusk	24,760	27,458	32,102	37,762	44,663	53,074
Sabine	0	0	0	0	0	0
San Augustine	0	0	0	0	0	0
Shelby	0	0	0	0	0	0
Smith	0	0	0	0	0	0
Trinity	0	0	0	0	0	0
Tyler	0	0	0	0	0	0
Region I Total	**44,985**	**80,989**	**94,515**	**111,006**	**131,108**	**155,611**

EAST TEXAS
Regional Water Planning Group
Region I WPG

Kelley Holcomb, Chair
P.O. Box 387
Lufkin, TX 759023
936-633-7543 (Phone)
936-632-2564 (Fax)

December 18, 2009

Mr. Kevin Ward
Executive Administrator
Texas Water Development Board
1700 North Congress
Austin, Texas 78711-3231

Re: Population Projection and Water Demand Changes
Current (2011) Planning Cycle East Texas Regional Water Planning Area

Dear Mr. Ward:

The purpose of this letter is to provide approved population projections and water demand changes to the Texas Water Development Board for the 2011 regional water planning cycle for the East Texas Regional Water Planning Area, Region I. Population projections and water demand changes were discussed and approved by the East Texas Regional Water Planning Group (Planning Group) at regular meetings of the group on October 14, 2009 and December 9, 2009. Tables 1 through 5, attached, contain the approved changes for population projections and water demands.

As instructed by the Planning Group, an explanation of the manufacturing water demand changes for Jefferson County is necessary. As seen in Table 3, the proposed manufacturing demands for Jefferson County substantially exceed those of the 2006 Plan beginning in 2020 and extending through the remainder of the planning period. The increases are due, primarily, to new demands projected by the Lower Neches Valley Authority (LNVA) for two liquid natural gas (LNG) facilities in development in Jefferson County.

LNVA is proposing to provide water to these facilities as a heat transfer fluid for warming the LNG to a gaseous state for pipeline transport. LNVA estimates that approximately 179,225 acre-feet per year of water will be necessary for each of the two plants. The Golden Pass LNG facility is currently under construction and expected to begin operation in 2010. The Golden Pass plant is expected to need this volume of water annually by 2020. The second facility, Sempra LNG, is currently in development and awaiting finalized commercial arrangements. LNVA estimates the Sempra plant will need this annual volume by 2030.

The projected manufacturing water demands for Jefferson County were unanimously approved by the Planning Group at its October 14, 2009 meeting, with the understanding of the Planning Group that the demands would be met by LNVA's current water rights. At the December 9, 2009 meeting, this approval was clarified to note that the additional demands requested by LNVA for these LNG facilities is understood to be within LNVA's currently unmodified, unamended water rights permits with all of the terms, statutes, conditions and legal authority, as they read as of October 14, 2009.

If I can be of any further service, please contact me at 936-633-7543.

Respectfully,

Kelley Holcomb
Chairman

Attachment

cc: Temple McKinnon, Texas Water Development Board
Lila Fuller, City of Nacogdoches
Rex Hunt, Alan Plummer Associates, Inc.

Lila Fuller, Administrative Contact
P. O. Box 635030, Nacogdoches, TX 75963-5030
Phone: 936-559-2504 Fax: 936-559-2912

Attachment A

Tables of Population Projections and Water Demand Changes

Table 1 Proposed Population Projection Changes							
County/WUG		2010	2020	2030	2040	2050	2060
Angelina County							
County-Other	2006 RWP	21,111	22,526	24,269	26,466	29,479	33,473
	Requested 2011	15,180	16,197	17,451	19,031	21,197	24,069
	Difference	- 5,931	- 6,329	- 6,818	-7,435	- 8,282	- 9,404
Angelina WSC	2006 RWP	*Not a WUG in 2006 RWP					
	Requested 2011	3,537	3,774	4,066	4,434	4,939	5,608
	Difference	+ 3,537	+ 3,774	+4,066	+ 4,434	+4,939	+ 5,608
Redland WSC	2006 RWP	*Not a WUG in 2006 RWP					
	Requested 2011	2,394	2,555	2,752	3,001	3,343	3,796
	Difference	+ 2,394	+ 2,555	+ 2,752	+ 3,001	+ 3,343	+ 3,796
Angelina County Total	2006 RWP	91,399	104,853	120,936	140,497	165,783	197,878
	Requested 2011	91,399	104,853	120,936	140,497	165,783	197,878
	Difference	0	0	0	0	0	0
Nacogdoches County							
County-Other	2006 RWP	21,463	23,669	25,755	28,054	32,380	36,944
	Requested 2011	9,802	10,810	11,762	12,812	14,788	16,872
	Difference	-11,661	-12,859	-13,993	-15,242	-17,592	-20,072
D&M WSC	2006 RWP	*Not a WUG in 2006 RWP					
	Requested 2011	5,742	6,331	6,890	7,506	8,662	9,883
	Difference	+ 5,742	+ 6,331	+ 6,890	+ 7,506	+ 8,662	+ 9,883
Melrose WSC	2006 RWP	*Not a WUG in 2006 RWP					
	Requested 2011	3,381	3,729	4,057	4,419	5,101	5,820
	Difference	+ 3,381	+ 3,729	+ 4,057	+ 4,419	+ 5,101	+ 5,820
Woden WSC	2006 RWP	*Not a WUG in 2006 RWP					
	Requested 2011	2,538	2,799	3,046	3,317	3,829	4,369
	Difference	+ 2,538	+ 2,799	+ 3,046	+ 3,317	+ 3,829	+ 4,369
Nacogdoches County Total	2006 RWP	67,357	75,914	84,183	92,628	108,753	124,453
	Requested 2011	67,357	75,914	84,183	92,628	108,753	124,453
	Difference	0	0	0	0	0	0

Table 2 Proposed Municipal Water Demand Changes (acre-feet per year)							
County/WUG		2010	2020	2030	2040	2050	2060
Angelina County							
County-Other	2006 RWP	2,530	2,624	2,746	2,905	3,203	3,637
	Requested 2011	1,819	1,886	1,975	2,089	2,303	2,616
	Difference	-711	-738	-771	-816	-900	-1,021
Angelina WSC	2006 RWP	*Not a WUG in 2006 RWP					
	Requested 2011	424	440	460	487	537	609
	Difference	+ 424	+ 440	+ 460	+ 487	+ 537	+ 609
Redland WSC	2006 RWP	*Not a WUG in 2006 RWP					
	Requested 2011	287	298	311	329	363	412
	Difference	+ 287	+ 298	+ 311	+ 329	+ 363	+ 412
Angelina County Total	2006 RWP	13,650	15,224	17,080	19,302	22,359	26,315
	Requested 2011	13,650	15,224	17,080	19,302	22,359	26,315
	Difference	0	0	0	0	0	0
Nacogdoches County							
County-Other	2006 RWP	2,452	2,625	2,770	2,954	3,373	3,849
	Requested 2011	1,120	1,199	1,265	1,350	1,541	1,758
	Difference	-1,332	-1,426	-1,505	-1,604	-1,832	-2,091
D&M WSC	2006 RWP	*Not a WUG in 2006 RWP					
	Requested 2011	656	702	741	790	902	1,030
	Difference	+ 656	+ 702	+ 741	+ 790	+ 902	+ 1,030
Melrose WSC	2006 RWP	*Not a WUG in 2006 RWP					
	Requested 2011	386	414	436	465	531	606
	Difference	+ 386	+ 414	+ 436	+ 465	+ 531	+ 606
Woden WSC	2006 RWP	*Not a WUG in 2006 RWP					
	Requested 2011	290	310	328	349	399	455
	Difference	+ 290	+ 310	+ 328	+ 349	+ 399	+ 455
Nacogdoches County Total	2006 RWP	12,024	13,375	14,670	15,974	18,589	21,098
	Requested 2011	12,024	13,375	14,670	15,974	18,589	21,098
	Difference	0	0	0	0	0	0

Table 3 Proposed Manufacturing Water Demand Changes (acre-feet per year)							
County		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Angelina	2006 RWP	30,266	34,359	37,982	41,642	44,887	48,356
	Requested 2011	14,750	23,500	25,980	28,490	30,720	33,100
	Difference	-15,516	-10,859	-12,002	-13,152	-14,167	-15,256
Jefferson	2006 RWP	237,954	267,434	292,871	318,669	341,559	365,636
	Requested 2011	151,672	423,258	603,321	629,171	655,034	680,914
	Difference	-86,282	+ 155,824	+ 310,450	+ 310,502	+ 313,475	+315,278

Table 4 Proposed Irrigation Water Demand Projection Changes (acre-feet per year)							
County		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Hardin	2006 RWP	7,213	7,213	7,213	7,213	7,213	7,213
	Requested 2011	3,502	3,502	3,502	3,502	3,502	3,502
	Difference	-3,711	-3,711	-3,711	-3,711	-3,711	-3,711
Jefferson	2006 RWP	208,035	208,035	208,035	208,035	208,035	208,035
	Requested 2011	140,000	140,000	140,000	140,000	140,000	140,000
	Difference	-68,035	-68,035	-68,035	-68,035	-68,035	-68,035

Table 5 Proposed Mining Water Demand Changes (acre-feet per year)							
County		2010	2020	2030	2040	2050	2060
Angelina	2006 RWP	18	17	17	17	17	17
	Requested 2011	2,018	4,017	17	17	17	17
	Difference	+2,000	+4,000	0	0	0	0
Cherokee	2006 RWP	93	97	99	101	103	105
	Requested 2011	593	1,597	99	101	103	105
	Difference	+500	+1,500	0	0	0	0
Nacogdoches	2006 RWP	215	213	212	211	210	209
	Requested 2011	2,715	7,213	212	211	210	209
	Difference	+2,500	+7,000	0	0	0	0
Shelby	2006 RWP	0	0	0	0	0	0
	Requested 2011	500	1,500	0	0	0	0
	Difference	+500	+1,500	0	0	0	0
San Augustine	2006 RWP	0	0	0	0	0	0
	Requested 2011	1500	7000	0	0	0	0
	Difference	+1,500	+7,000	0	0	0	0

EAST TEXAS
Regional Water Planning Group
Region I WPG

Kelley Holcomb, Chair
P.O. Box 387
Lufkin, TX 759023
936-633-7543 (Phone)
936-632-2564 (Fax)

February 26, 2010

Mr. Kevin Ward
Executive Administrator
Texas Water Development Board
1700 North Congress
Austin, Texas 78711-3231

Re: Request for the Texas Water Development Board to Conduct a Socio-economic Analysis for the East Texas Region (Region I)

Dear Mr. Ward:

At the East Texas Regional Water Planning Group Meeting on February 17, 2010, we discussed and approved a request for the Texas Water Development Board to provide technical assistance in conducting a socio-economic analysis for the *2011 East Texas Regional Water Plan*. The East Texas Regional Water Planning Group requests that the analysis be conducted utilizing information specific to the East Texas Region, and that the models correspond to the needs of the East Texas Regional Planning Area.

Data will be available in the 2012 Regional Water Planning Data Web Interface (DB12) by March 1, 2010.

Thank you for your attention to this matter. Please call me if you have any questions regarding our request.

Sincerely,

Kelley Holcomb
Chairman, East Texas Regional Water Planning Group

cc: Lann Bookout, Texas Water Development Board
Temple McKinnon, Texas Water Development Board
Lila Fuller, City of Nacogdoches
Rex Hunt, Alan Plummer Associates, Inc.

Lila Fuller, Administrative Contact
P. O. Box 635030, Nacogdoches, TX 75963-5030
Phone: 936-559-2504 Fax: 936-559-2912

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Appendix 2-B

Population Estimates and Water Demand Projections from the Data Web Interface

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The following appendix includes a copy of the data from the TWDB Data Web Interface. This appendix provides a summary of population estimates and water demand projections for entities in the ETRWPA.

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Region I Water User Group Population Projections

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
BRUSHY CREEK WSC	ANDERSON	NECHES	1,735	1,832	1,906	1,982	2,041	2,092
BRUSHY CREEK WSC	ANDERSON	TRINITY	1,420	1,500	1,560	1,622	1,671	1,713
CONSOLIDATED WSC	ANDERSON	NECHES	359	379	394	410	422	433
CONSOLIDATED WSC	ANDERSON	TRINITY	1,201	1,268	1,319	1,371	1,412	1,448
COUNTY-OTHER	ANDERSON	NECHES	3,860	4,077	4,240	4,409	4,542	4,655
COUNTY-OTHER	ANDERSON	TRINITY	22,484	23,744	24,694	25,682	26,452	27,113
ELKHART	ANDERSON	TRINITY	1,309	1,383	1,438	1,496	1,541	1,579
FOUR PINE WSC	ANDERSON	TRINITY	2,939	3,104	3,228	3,357	3,458	3,544
FRANKSTON	ANDERSON	NECHES	1,303	1,376	1,431	1,488	1,533	1,571
PALESTINE	ANDERSON	NECHES	9,975	10,534	10,956	11,394	11,736	12,029
PALESTINE	ANDERSON	TRINITY	8,990	9,494	9,874	10,269	10,577	10,841
WALSTON SPRINGS WSC	ANDERSON	NECHES	3,815	4,029	4,190	4,358	4,488	4,601
ANGELINA WSC	ANGELINA	NECHES	3,537	3,774	4,066	4,434	4,939	5,608
CENTRAL WCID OF ANGELINA COUNTY	ANGELINA	NECHES	6,564	6,886	7,283	7,783	8,470	9,380
COUNTY-OTHER	ANGELINA	NECHES	15,180	16,197	17,451	19,031	21,197	24,069
DIBOLL	ANGELINA	NECHES	6,449	7,654	9,137	11,007	13,574	16,976
FOUR WAY WSC	ANGELINA	NECHES	4,503	6,388	8,708	11,634	15,649	20,970
HUDSON	ANGELINA	NECHES	5,021	6,535	8,398	10,747	13,971	18,243
HUDSON WSC	ANGELINA	NECHES	7,579	9,268	11,346	13,967	17,564	22,331
HUNTINGTON	ANGELINA	NECHES	2,306	2,598	2,958	3,412	4,035	4,861
LUFKIN	ANGELINA	NECHES	37,219	42,351	48,190	54,834	62,394	70,997
REDLAND WSC	ANGELINA	NECHES	2,394	2,555	2,752	3,001	3,343	3,796
ZAVALLA	ANGELINA	NECHES	647	647	647	647	647	647
ALTO	CHEROKEE	NECHES	1,290	1,404	1,502	1,592	1,681	1,786
ALTO RURAL WSC	CHEROKEE	NECHES	4,806	5,156	5,456	5,732	6,006	6,329
BULLARD	CHEROKEE	NECHES	54	55	56	57	58	59
COUNTY-OTHER	CHEROKEE	NECHES	6,288	5,555	4,406	2,811	2,110	1,690
CRAFT-TURNEY WSC	CHEROKEE	NECHES	5,672	7,032	8,719	10,810	12,000	13,000
JACKSONVILLE	CHEROKEE	NECHES	14,543	15,316	15,978	16,587	17,191	17,904
NEW SUMMERFIELD	CHEROKEE	NECHES	1,290	1,624	1,910	2,173	2,434	2,742
NORTH CHEROKEE WSC	CHEROKEE	NECHES	4,116	4,834	5,449	6,015	6,576	7,238
RUSK	CHEROKEE	NECHES	5,525	6,029	6,461	6,858	7,252	7,717
RUSK RURAL WSC	CHEROKEE	NECHES	3,166	3,391	3,584	3,761	3,937	4,145
SOUTHERN UTILITIES COMPANY	CHEROKEE	NECHES	2,525	2,799	3,034	3,250	3,464	3,717
TROUP	CHEROKEE	NECHES	44	49	53	57	61	66
WELLS	CHEROKEE	NECHES	774	780	785	789	793	798
COUNTY-OTHER	HARDIN	NECHES	12,692	13,766	14,254	14,760	15,283	15,825
COUNTY-OTHER	HARDIN	TRINITY	132	143	148	153	158	164

Region I Water User Group Population Projections

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
KOUNTZE	HARDIN	NECHES	2,398	2,601	2,693	2,788	2,887	2,990
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE CO	HARDIN	TRINITY	100	108	112	116	120	124
LUMBERTON	HARDIN	NECHES	9,899	10,736	11,117	11,511	11,919	12,342
LUMBERTON MUD	HARDIN	NECHES	8,241	8,939	9,256	9,584	9,923	10,275
NORTH HARDIN WSC	HARDIN	NECHES	7,370	7,993	8,276	8,570	8,874	9,188
SILSBEE	HARDIN	NECHES	7,248	7,861	8,140	8,429	8,728	9,037
SOUR LAKE	HARDIN	NECHES	1,890	2,050	2,123	2,198	2,276	2,356
WEST HARDIN WSC	HARDIN	NECHES	4,534	4,918	5,092	5,272	5,459	5,653
ATHENS	HENDERSON	NECHES	380	536	690	848	1,040	1,283
BERRYVILLE	HENDERSON	NECHES	977	1,071	1,164	1,259	1,375	1,521
BETHEL-ASH WSC	HENDERSON	NECHES	3,096	3,860	4,614	5,387	6,330	7,521
BROWNSBORO	HENDERSON	NECHES	949	1,115	1,279	1,447	1,652	1,910
BRUSHY CREEK WSC	HENDERSON	NECHES	837	951	1,063	1,178	1,318	1,495
CHANDLER	HENDERSON	NECHES	2,385	2,695	3,001	3,314	3,696	4,179
COUNTY-OTHER	HENDERSON	NECHES	14,004	14,971	15,923	16,904	18,097	19,604
MURCHISON	HENDERSON	NECHES	642	696	749	804	871	955
R P M WSC	HENDERSON	NECHES	495	552	608	665	735	823
CONSOLIDATED WSC	HOUSTON	NECHES	3,751	3,847	4,001	4,161	4,327	4,500
CONSOLIDATED WSC	HOUSTON	TRINITY	9,640	9,885	10,280	10,691	11,119	11,564
COUNTY-OTHER	HOUSTON	NECHES	197	202	210	219	228	237
COUNTY-OTHER	HOUSTON	TRINITY	856	878	913	950	988	1,027
CROCKETT	HOUSTON	TRINITY	7,376	7,563	7,866	8,180	8,507	8,848
GRAPELAND	HOUSTON	NECHES	567	581	605	629	654	680
GRAPELAND	HOUSTON	TRINITY	932	955	994	1,033	1,075	1,118
LOVELADY	HOUSTON	TRINITY	628	644	670	696	724	753
COUNTY-OTHER	JASPER	NECHES	14,492	15,379	15,902	16,035	16,035	16,035
COUNTY-OTHER	JASPER	SABINE	7,752	8,245	8,537	8,612	8,612	8,612
JASPER	JASPER	NECHES	8,315	8,883	9,218	9,303	9,303	9,303
JASPER COUNTY WCID #1	JASPER	SABINE	4,319	4,595	4,757	4,799	4,799	4,799
KIRBYVILLE	JASPER	SABINE	2,251	2,395	2,480	2,501	2,501	2,501
MAURICEVILLE SUD	JASPER	SABINE	1,316	1,400	1,450	1,462	1,462	1,462
BEAUMONT	JEFFERSON	NECHES	41,490	41,490	41,490	41,490	41,490	41,490
BEAUMONT	JEFFERSON	NECHES-TRINITY	72,376	72,376	72,376	72,376	72,376	72,376
BEVIL OAKS	JEFFERSON	NECHES	1,346	1,346	1,346	1,346	1,346	1,346
CHINA	JEFFERSON	NECHES-TRINITY	1,096	1,072	1,051	1,035	1,018	987
COUNTY-OTHER	JEFFERSON	NECHES	148	197	239	273	308	373
COUNTY-OTHER	JEFFERSON	NECHES-TRINITY	21,101	28,068	34,349	39,191	44,073	53,302
GROVES	JEFFERSON	NECHES	217	217	217	217	217	217

Region I Water User Group Population Projections

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
GROVES	JEFFERSON	NECHES-TRINITY	15,516	15,516	15,516	15,516	15,516	15,516
JEFFERSON COUNTY WCID #10	JEFFERSON	NECHES	1,871	2,103	2,312	2,473	2,636	2,944
JEFFERSON COUNTY WCID #10	JEFFERSON	NECHES-TRINITY	3,052	3,431	3,773	4,036	4,301	4,803
MEEKER MUD	JEFFERSON	NECHES	531	643	744	822	900	1,048
MEEKER MUD	JEFFERSON	NECHES-TRINITY	2,791	3,379	3,909	4,317	4,729	5,508
NEDERLAND	JEFFERSON	NECHES	698	733	765	789	814	860
NEDERLAND	JEFFERSON	NECHES-TRINITY	17,354	18,225	19,010	19,615	20,225	21,378
NOME	JEFFERSON	NECHES	390	425	457	481	506	552
NOME	JEFFERSON	NECHES-TRINITY	159	173	186	196	206	225
PORT ARTHUR	JEFFERSON	NECHES	350	350	350	350	350	350
PORT ARTHUR	JEFFERSON	NECHES-TRINITY	57,405	57,405	57,405	57,405	57,405	57,405
PORT NECHES	JEFFERSON	NECHES	7,119	7,379	7,614	7,795	7,977	8,322
PORT NECHES	JEFFERSON	NECHES-TRINITY	6,837	7,087	7,312	7,486	7,661	7,992
WEST JEFFERSON COUNTY MWD	JEFFERSON	NECHES-TRINITY	7,853	9,071	10,169	11,016	11,870	13,484
APPLEBY WSC	NACOGDOCHES	NECHES	4,341	5,481	6,560	7,749	9,985	12,345
COUNTY-OTHER	NACOGDOCHES	NECHES	9,802	10,810	11,762	12,812	14,788	16,872
CUSHING	NACOGDOCHES	NECHES	683	730	774	823	915	1,012
D&M WSC	NACOGDOCHES	NECHES	5,742	6,331	6,890	7,506	8,662	9,883
GARRISON	NACOGDOCHES	NECHES	844	844	844	844	844	844
LILLY GROVE SUD	NACOGDOCHES	NECHES	3,229	4,172	5,064	6,047	7,896	9,847
MELROSE WSC	NACOGDOCHES	NECHES	3,381	3,729	4,057	4,419	5,101	5,820
NACOGDOCHES	NACOGDOCHES	NECHES	33,044	36,501	39,946	43,074	49,198	54,345
SWIFT WSC	NACOGDOCHES	NECHES	3,753	4,517	5,240	6,037	7,535	9,116
WODEN WSC	NACOGDOCHES	NECHES	2,538	2,799	3,046	3,317	3,829	4,369
COUNTY-OTHER	NEWTON	SABINE	9,967	10,417	10,476	10,790	11,114	11,447
MAURICEVILLE SUD	NEWTON	SABINE	485	507	510	525	541	557
NEWTON	NEWTON	SABINE	2,612	2,730	2,745	2,827	2,912	3,000
SOUTH NEWTON WSC	NEWTON	SABINE	2,944	3,077	3,094	3,187	3,282	3,381
BRIDGE CITY	ORANGE	NECHES	1,299	1,357	1,381	1,391	1,412	1,427
BRIDGE CITY	ORANGE	NECHES-TRINITY	1,220	1,275	1,297	1,307	1,327	1,341
BRIDGE CITY	ORANGE	SABINE	6,745	7,049	7,173	7,226	7,336	7,416
COUNTY-OTHER	ORANGE	NECHES	14,800	14,998	15,079	15,113	15,185	15,237
COUNTY-OTHER	ORANGE	NECHES-TRINITY	6	6	6	6	6	6
COUNTY-OTHER	ORANGE	SABINE	17,757	17,994	18,092	18,133	18,220	18,284
MAURICEVILLE SUD	ORANGE	SABINE	9,467	11,866	12,848	13,265	14,137	14,769
ORANGE	ORANGE	SABINE	18,643	18,643	18,643	18,643	18,643	18,643
PINE FOREST	ORANGE	NECHES	632	632	632	632	632	632
PINEHURST	ORANGE	SABINE	2,274	2,274	2,274	2,274	2,274	2,274

Region I Water User Group Population Projections

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
ROSE CITY	ORANGE	NECHES	519	519	519	519	519	519
SOUTH NEWTON WSC	ORANGE	SABINE	1,108	1,299	1,377	1,410	1,479	1,529
VIDOR	ORANGE	NECHES	9,538	9,801	9,909	9,955	10,050	10,119
VIDOR	ORANGE	SABINE	2,384	2,450	2,477	2,488	2,512	2,529
WEST ORANGE	ORANGE	SABINE	4,111	4,111	4,111	4,111	4,111	4,111
BECKVILLE	PANOLA	SABINE	790	806	820	831	840	846
CARTHAGE	PANOLA	SABINE	7,000	7,146	7,263	7,362	7,444	7,497
COUNTY-OTHER	PANOLA	CYPRESS	46	47	48	49	49	49
COUNTY-OTHER	PANOLA	SABINE	15,113	15,429	15,680	15,895	16,072	16,186
GILL WSC	PANOLA	SABINE	728	743	755	766	774	780
TATUM	PANOLA	SABINE	226	231	234	238	240	242
CORRIGAN	POLK	NECHES	2,232	2,720	3,132	3,409	3,580	3,759
COUNTY-OTHER	POLK	NECHES	8,190	9,981	11,490	12,508	13,132	13,789
COUNTY-OTHER	RUSK	NECHES	12,861	13,700	14,177	14,415	15,076	16,702
COUNTY-OTHER	RUSK	SABINE	15,069	16,054	16,612	16,892	17,665	19,569
EASTON	RUSK	SABINE	61	83	96	102	120	163
ELDERVILLE WSC	RUSK	SABINE	2,518	2,741	2,868	2,931	3,107	3,539
HENDERSON	RUSK	NECHES	10,167	10,239	10,280	10,300	10,357	10,497
HENDERSON	RUSK	SABINE	1,191	1,199	1,204	1,206	1,213	1,229
KILGORE	RUSK	SABINE	2,580	2,580	2,580	2,580	2,580	2,580
MOUNT ENTERPRISE	RUSK	NECHES	540	554	562	566	577	605
NEW LONDON	RUSK	NECHES	535	554	565	570	585	622
NEW LONDON	RUSK	SABINE	491	509	519	524	538	572
OVERTON	RUSK	NECHES	252	267	275	279	291	320
OVERTON	RUSK	SABINE	2,111	2,236	2,307	2,342	2,441	2,683
SOUTHERN UTILITIES COMPANY	RUSK	NECHES	426	451	465	472	492	541
TATUM	RUSK	SABINE	960	960	960	960	960	960
WEST GREGG WSC	RUSK	SABINE	112	114	115	116	118	123
COUNTY-OTHER	SABINE	NECHES	1,498	1,559	1,606	1,654	1,704	1,755
COUNTY-OTHER	SABINE	SABINE	377	393	404	416	429	442
G-M WSC	SABINE	SABINE	7,157	7,451	7,675	7,905	8,142	8,386
HEMPHILL	SABINE	SABINE	1,192	1,241	1,278	1,316	1,356	1,396
PINELAND	SABINE	NECHES	1,056	1,099	1,132	1,166	1,201	1,237
COUNTY-OTHER	SAN AUGUSTINE	NECHES	6,160	6,284	6,445	6,638	6,838	6,974
COUNTY-OTHER	SAN AUGUSTINE	SABINE	43	44	45	47	48	49
G-M WSC	SAN AUGUSTINE	SABINE	824	841	862	888	915	933
SAN AUGUSTINE	SAN AUGUSTINE	NECHES	2,688	2,742	2,812	2,897	2,984	3,043
CENTER	SHELBY	SABINE	5,974	6,363	6,668	6,896	7,092	7,306

Region I Water User Group Population Projections

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
COUNTY-OTHER	SHELBY	NECHES	2,639	2,825	2,971	3,080	3,174	3,277
COUNTY-OTHER	SHELBY	SABINE	14,778	15,822	16,643	17,253	17,779	18,355
JOAQUIN	SHELBY	SABINE	974	1,038	1,088	1,126	1,158	1,193
TENAHA	SHELBY	SABINE	1,046	1,046	1,046	1,046	1,046	1,046
TIMPSON	SHELBY	NECHES	15	15	15	15	15	15
TIMPSON	SHELBY	SABINE	1,105	1,139	1,166	1,186	1,203	1,222
ARP	SMITH	NECHES	965	1,013	1,061	1,109	1,189	1,295
BULLARD	SMITH	NECHES	1,284	1,424	1,563	1,702	1,936	2,245
COMMUNITY WATER COMPANY	SMITH	NECHES	1,340	1,557	1,773	1,989	2,352	2,832
COUNTY-OTHER	SMITH	NECHES	4,253	3,807	3,409	3,052	2,732	2,446
CRYSTAL SYSTEMS INC	SMITH	NECHES	321	355	389	423	480	555
DEAN WSC	SMITH	NECHES	5,111	5,710	6,307	6,903	7,904	9,229
JACKSON WSC	SMITH	NECHES	3,832	4,650	5,535	6,420	7,000	7,550
LINDALE	SMITH	NECHES	673	673	673	673	673	673
LINDALE RURAL WSC	SMITH	NECHES	2,714	3,064	3,413	3,761	4,346	5,119
NEW CHAPEL HILL	SMITH	NECHES	635	697	758	819	922	1,058
NOONDAY	SMITH	NECHES	550	576	602	628	672	730
OVERTON	SMITH	NECHES	61	64	67	70	75	81
R P M WSC	SMITH	NECHES	228	249	269	289	323	368
SOUTHERN UTILITIES COMPANY	SMITH	NECHES	36,295	38,496	40,620	42,736	47,202	53,328
TROUP	SMITH	NECHES	2,113	2,266	2,418	2,570	2,825	3,163
TYLER	SMITH	NECHES	88,332	92,372	96,399	100,415	107,168	116,102
WHITEHOUSE	SMITH	NECHES	6,305	7,022	7,736	8,449	9,647	11,232
COUNTY-OTHER	TRINITY	NECHES	3,186	3,435	3,518	3,660	3,817	3,960
GROVETON	TRINITY	NECHES	604	652	668	660	633	610
COLMESNEIL	TYLER	NECHES	756	872	946	974	974	974
COUNTY-OTHER	TYLER	NECHES	13,363	15,398	16,707	17,209	17,209	17,209
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE CO	TYLER	NECHES	104	120	130	134	134	134
TYLER COUNTY WSC	TYLER	NECHES	7,658	8,824	9,574	9,862	9,862	9,862
WOODVILLE	TYLER	NECHES	2,863	3,299	3,580	3,687	3,687	3,687

Region I Water User Group Demand
(Ac-ft per Year)

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
BRUSHY CREEK WSC	ANDERSON	NECHES	150	152	154	153	155	159
BRUSHY CREEK WSC	ANDERSON	TRINITY	122	124	126	125	127	130
CONSOLIDATED WSC	ANDERSON	NECHES	29	30	30	29	30	31
CONSOLIDATED WSC	ANDERSON	TRINITY	98	99	99	98	100	102
COUNTY-OTHER	ANDERSON	NECHES	800	831	850	869	890	912
COUNTY-OTHER	ANDERSON	TRINITY	4,659	4,841	4,951	5,063	5,185	5,315
ELKHART	ANDERSON	TRINITY	177	183	185	188	192	196
FOUR PINE WSC	ANDERSON	TRINITY	283	292	296	301	306	314
FRANKSTON	ANDERSON	NECHES	524	547	564	582	598	612
IRRIGATION	ANDERSON	NECHES	14	14	14	14	14	14
IRRIGATION	ANDERSON	TRINITY	198	198	198	198	198	198
LIVESTOCK	ANDERSON	NECHES	803	803	803	803	803	803
LIVESTOCK	ANDERSON	TRINITY	905	905	905	905	905	905
MINING	ANDERSON	NECHES	462	502	525	548	570	592
MINING	ANDERSON	TRINITY	51	55	58	60	63	65
PALESTINE	ANDERSON	NECHES	1,955	2,018	2,062	2,106	2,156	2,210
PALESTINE	ANDERSON	TRINITY	1,762	1,819	1,858	1,898	1,943	1,992
STEAM ELECTRIC POWER	ANDERSON	NECHES	0	11,306	13,218	15,549	18,390	21,853
WALSTON SPRINGS WSC	ANDERSON	NECHES	427	438	441	444	452	464
ANGELINA WSC	ANGELINA	NECHES	424	440	460	487	537	609
CENTRAL WCID OF ANGELINA COUNTY	ANGELINA	NECHES	676	686	702	724	778	862
COUNTY-OTHER	ANGELINA	NECHES	1,819	1,886	1,975	2,089	2,303	2,616
DIBOLL	ANGELINA	NECHES	968	1,123	1,310	1,554	1,901	2,377
FOUR WAY WSC	ANGELINA	NECHES	368	501	673	886	1,192	1,597
HUDSON	ANGELINA	NECHES	579	732	931	1,168	1,518	1,982
HUDSON WSC	ANGELINA	NECHES	654	768	902	1,095	1,358	1,726
HUNTINGTON	ANGELINA	NECHES	243	262	288	325	380	457
IRRIGATION	ANGELINA	NECHES	30	30	30	30	30	30
LIVESTOCK	ANGELINA	NECHES	598	620	647	677	712	749
LUFKIN	ANGELINA	NECHES	7,546	8,444	9,446	10,565	11,951	13,599
MANUFACTURING	ANGELINA	NECHES	14,750	23,500	25,980	28,490	30,720	33,100
MINING	ANGELINA	NECHES	2,018	4,017	17	17	17	17
REDLAND WSC	ANGELINA	NECHES	287	298	311	329	363	412
STEAM ELECTRIC POWER	ANGELINA	NECHES	1,000	1,000	1,000	1,000	1,000	1,000
ZAVALLA	ANGELINA	NECHES	86	84	82	80	78	78
ALTO	CHEROKEE	NECHES	233	248	261	273	286	304
ALTO RURAL WSC	CHEROKEE	NECHES	393	404	409	411	424	447
BULLARD	CHEROKEE	NECHES	13	13	13	13	13	14
COUNTY-OTHER	CHEROKEE	NECHES	902	790	617	378	272	218

Region I Water User Group Demand
(Ac-ft per Year)

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
CRAFT-TURNEY WSC	CHEROKEE	NECHES	515	614	742	908	995	1,078
IRRIGATION	CHEROKEE	NECHES	321	321	321	321	321	321
JACKSONVILLE	CHEROKEE	NECHES	3,502	3,637	3,741	3,827	3,948	4,111
LIVESTOCK	CHEROKEE	NECHES	1,765	1,765	1,765	1,765	1,765	1,765
MANUFACTURING	CHEROKEE	NECHES	718	784	839	891	934	1,007
MINING	CHEROKEE	NECHES	593	1,597	99	101	103	105
NEW SUMMERFIELD	CHEROKEE	NECHES	208	258	302	338	379	427
NORTH CHEROKEE WSC	CHEROKEE	NECHES	387	439	482	519	560	616
RUSK	CHEROKEE	NECHES	1,194	1,283	1,353	1,421	1,495	1,591
RUSK RURAL WSC	CHEROKEE	NECHES	358	372	381	388	401	423
SOUTHERN UTILITIES COMPANY	CHEROKEE	NECHES	421	458	486	513	543	583
STEAM ELECTRIC POWER	CHEROKEE	NECHES	2,245	1,790	2,093	2,462	2,912	3,460
TROUP	CHEROKEE	NECHES	6	6	7	7	8	8
WELLS	CHEROKEE	NECHES	122	121	119	117	115	116
COUNTY-OTHER	HARDIN	NECHES	1,834	1,943	1,964	1,984	2,037	2,109
COUNTY-OTHER	HARDIN	TRINITY	19	20	20	21	21	22
IRRIGATION	HARDIN	NECHES	3,502	3,502	3,502	3,502	3,502	3,502
KOUNTZE	HARDIN	NECHES	306	323	326	328	336	348
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE CO	HARDIN	TRINITY	6	7	7	7	7	7
LIVESTOCK	HARDIN	NECHES	154	154	154	154	154	154
LIVESTOCK	HARDIN	TRINITY	2	2	2	2	2	2
LUMBERTON	HARDIN	NECHES	1,430	1,515	1,544	1,573	1,615	1,673
LUMBERTON MUD	HARDIN	NECHES	1,929	2,073	2,125	2,179	2,245	2,325
MANUFACTURING	HARDIN	NECHES	146	165	182	200	216	233
MINING	HARDIN	NECHES	7,800	8,648	9,219	9,788	10,361	10,798
NORTH HARDIN WSC	HARDIN	NECHES	685	716	714	720	736	762
SILSBEE	HARDIN	NECHES	1,072	1,136	1,149	1,161	1,193	1,235
SOUR LAKE	HARDIN	NECHES	176	184	183	182	186	193
WEST HARDIN WSC	HARDIN	NECHES	315	325	325	325	330	342
ATHENS	HENDERSON	NECHES	77	107	136	163	199	246
BERRYVILLE	HENDERSON	NECHES	126	134	142	149	162	179
BETHEL-ASH WSC	HENDERSON	NECHES	250	303	351	404	468	556
BROWNSBORO	HENDERSON	NECHES	158	182	206	232	263	304
BRUSHY CREEK WSC	HENDERSON	NECHES	72	79	86	91	100	114
CHANDLER	HENDERSON	NECHES	409	453	494	538	596	674
COUNTY-OTHER	HENDERSON	NECHES	2,761	2,901	3,032	3,162	3,365	3,645
IRRIGATION	HENDERSON	NECHES	10	10	10	10	10	10
LIVESTOCK	HENDERSON	NECHES	2,594	2,594	2,594	2,594	2,594	2,594
MANUFACTURING	HENDERSON	NECHES	12	14	16	18	20	22

Region I Water User Group Demand
(Ac-ft per Year)

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
MINING	HENDERSON	NECHES	14	14	14	14	14	14
MURCHISON	HENDERSON	NECHES	139	148	157	166	179	196
R P M WSC	HENDERSON	NECHES	69	75	80	86	95	106
CONSOLIDATED WSC	HOUSTON	NECHES	307	302	300	298	305	318
CONSOLIDATED WSC	HOUSTON	TRINITY	788	775	772	766	785	816
COUNTY-OTHER	HOUSTON	NECHES	33	33	34	35	36	37
COUNTY-OTHER	HOUSTON	TRINITY	145	146	148	151	156	162
CROCKETT	HOUSTON	TRINITY	1,438	1,449	1,480	1,512	1,553	1,615
GRAPELAND	HOUSTON	NECHES	100	100	102	104	107	111
GRAPELAND	HOUSTON	TRINITY	164	165	168	171	176	183
IRRIGATION	HOUSTON	NECHES	879	971	1,073	1,185	1,309	1,446
IRRIGATION	HOUSTON	TRINITY	1,860	2,053	2,270	2,506	2,768	3,057
LIVESTOCK	HOUSTON	NECHES	698	756	820	888	962	1,042
LIVESTOCK	HOUSTON	TRINITY	1,417	1,535	1,663	1,802	1,953	2,116
LOVELADY	HOUSTON	TRINITY	75	75	76	76	78	81
MANUFACTURING	HOUSTON	NECHES	7	8	9	10	10	11
MANUFACTURING	HOUSTON	TRINITY	162	182	200	217	233	252
MINING	HOUSTON	NECHES	62	61	60	59	58	58
MINING	HOUSTON	TRINITY	101	99	98	97	96	95
COUNTY-OTHER	JASPER	NECHES	1,834	1,895	1,906	1,868	1,850	1,850
COUNTY-OTHER	JASPER	SABINE	981	1,016	1,023	1,003	994	994
JASPER	JASPER	NECHES	1,602	1,682	1,714	1,699	1,688	1,688
JASPER COUNTY WCID #1	JASPER	SABINE	324	329	325	312	306	306
KIRBYVILLE	JASPER	SABINE	474	494	506	501	499	499
LIVESTOCK	JASPER	NECHES	197	197	197	197	197	197
LIVESTOCK	JASPER	SABINE	120	120	120	120	120	120
MANUFACTURING	JASPER	NECHES	64,231	67,611	70,123	72,318	73,965	74,028
MANUFACTURING	JASPER	SABINE	36	38	39	41	41	41
MAURICEVILLE SUD	JASPER	SABINE	100	104	104	103	103	103
MINING	JASPER	NECHES	2	2	2	2	2	2
MINING	JASPER	SABINE	2	2	2	2	2	2
BEAUMONT	JEFFERSON	NECHES	9,853	9,713	9,574	9,434	9,341	9,341
BEAUMONT	JEFFERSON	NECHES-TRINITY	17,187	16,944	16,701	16,458	16,295	16,295
BEVIL OAKS	JEFFERSON	NECHES	137	133	128	124	121	121
CHINA	JEFFERSON	NECHES-TRINITY	165	157	151	145	140	136
COUNTY-OTHER	JEFFERSON	NECHES	13	17	20	23	26	31
COUNTY-OTHER	JEFFERSON	NECHES-TRINITY	1,867	2,421	2,886	3,249	3,653	4,418
GROVES	JEFFERSON	NECHES	44	43	43	42	41	41
GROVES	JEFFERSON	NECHES-TRINITY	3,146	3,094	3,042	2,989	2,955	2,955

Region I Water User Group Demand
(Ac-ft per Year)

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
IRRIGATION	JEFFERSON	NECHES	7,839	7,839	7,839	7,839	7,839	7,839
IRRIGATION	JEFFERSON	NECHES-TRINITY	132,161	132,161	132,161	132,161	132,161	132,161
JEFFERSON COUNTY WCID #10	JEFFERSON	NECHES	243	266	285	299	316	353
JEFFERSON COUNTY WCID #10	JEFFERSON	NECHES-TRINITY	397	434	465	488	516	576
LIVESTOCK	JEFFERSON	NECHES	105	105	105	105	105	105
LIVESTOCK	JEFFERSON	NECHES-TRINITY	702	702	702	702	702	702
MANUFACTURING	JEFFERSON	NECHES	38,760	108,166	154,182	160,816	167,397	174,011
MANUFACTURING	JEFFERSON	NECHES-TRINITY	112,912	315,092	449,139	468,355	487,637	506,903
MEEKER MUD	JEFFERSON	NECHES	52	61	68	74	80	93
MEEKER MUD	JEFFERSON	NECHES-TRINITY	272	318	355	387	418	487
MINING	JEFFERSON	NECHES	67	69	71	72	74	75
MINING	JEFFERSON	NECHES-TRINITY	256	265	270	276	281	285
NEDERLAND	JEFFERSON	NECHES	159	165	170	172	177	187
NEDERLAND	JEFFERSON	NECHES-TRINITY	3,966	4,103	4,217	4,284	4,396	4,647
NOME	JEFFERSON	NECHES	90	97	102	107	112	122
NOME	JEFFERSON	NECHES-TRINITY	37	39	42	43	45	50
PORT ARTHUR	JEFFERSON	NECHES	59	58	56	55	54	54
PORT ARTHUR	JEFFERSON	NECHES-TRINITY	9,645	9,452	9,259	9,067	8,939	8,939
PORT NECHES	JEFFERSON	NECHES	909	909	913	908	920	960
PORT NECHES	JEFFERSON	NECHES-TRINITY	873	873	876	872	884	922
STEAM ELECTRIC POWER	JEFFERSON	NECHES	0	13,426	15,696	18,464	21,838	25,951
WEST JEFFERSON COUNTY MWD	JEFFERSON	NECHES-TRINITY	1,029	1,148	1,264	1,345	1,436	1,631
APPLEBY WSC	NACOGDOCHES	NECHES	763	945	1,117	1,311	1,678	2,074
COUNTY-OTHER	NACOGDOCHES	NECHES	1,120	1,199	1,265	1,350	1,541	1,758
CUSHING	NACOGDOCHES	NECHES	129	135	140	147	162	179
D&M WSC	NACOGDOCHES	NECHES	656	702	741	790	902	1,030
GARRISON	NACOGDOCHES	NECHES	149	147	144	141	139	139
IRRIGATION	NACOGDOCHES	NECHES	302	302	302	302	302	302
LILLY GROVE SUD	NACOGDOCHES	NECHES	423	533	641	752	982	1,224
LIVESTOCK	NACOGDOCHES	NECHES	1,719	1,954	2,227	2,544	2,911	3,332
MANUFACTURING	NACOGDOCHES	NECHES	2,288	2,553	2,786	3,016	3,214	3,468
MELROSE WSC	NACOGDOCHES	NECHES	386	414	436	465	531	606
MINING	NACOGDOCHES	NECHES	2,715	7,213	212	211	210	209
NACOGDOCHES	NACOGDOCHES	NECHES	7,625	8,423	9,218	9,939	11,352	12,540
STEAM ELECTRIC POWER	NACOGDOCHES	NECHES	4,828	6,911	8,079	9,504	11,241	13,358
SWIFT WSC	NACOGDOCHES	NECHES	483	567	640	730	903	1,093
WODEN WSC	NACOGDOCHES	NECHES	290	310	328	349	399	455
COUNTY-OTHER	NEWTON	SABINE	1,128	1,132	1,103	1,100	1,120	1,154
IRRIGATION	NEWTON	SABINE	367	367	367	367	367	367

Region I Water User Group Demand
(Ac-ft per Year)

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
LIVESTOCK	NEWTON	SABINE	110	110	110	110	110	110
MANUFACTURING	NEWTON	SABINE	678	793	899	1,006	1,103	1,196
MAURICEVILLE SUD	NEWTON	SABINE	37	37	37	37	38	39
MINING	NEWTON	NECHES	6	6	6	6	6	6
MINING	NEWTON	SABINE	26	26	26	26	26	26
NEWTON	NEWTON	SABINE	480	495	489	497	509	524
SOUTH NEWTON WSC	NEWTON	SABINE	257	259	253	253	257	265
STEAM ELECTRIC POWER	NEWTON	SABINE	5,924	14,132	16,522	19,436	22,987	27,317
BRIDGE CITY	ORANGE	NECHES	135	137	135	131	131	133
BRIDGE CITY	ORANGE	NECHES-TRINITY	127	129	126	123	123	125
BRIDGE CITY	ORANGE	SABINE	703	711	699	680	682	689
COUNTY-OTHER	ORANGE	NECHES	2,072	2,033	1,993	1,947	1,939	1,946
COUNTY-OTHER	ORANGE	NECHES-TRINITY	1	1	1	1	1	1
COUNTY-OTHER	ORANGE	SABINE	2,486	2,439	2,391	2,336	2,327	2,335
IRRIGATION	ORANGE	NECHES	2,032	2,032	2,032	2,032	2,032	2,032
IRRIGATION	ORANGE	SABINE	477	477	477	477	477	477
LIVESTOCK	ORANGE	NECHES	92	92	92	92	92	92
LIVESTOCK	ORANGE	SABINE	118	118	118	118	118	118
MANUFACTURING	ORANGE	NECHES	1,242	1,389	1,518	1,647	1,761	1,889
MANUFACTURING	ORANGE	SABINE	56,382	63,072	68,921	74,752	79,929	85,752
MAURICEVILLE SUD	ORANGE	SABINE	721	877	921	936	998	1,042
MINING	ORANGE	NECHES	7	8	8	8	8	8
MINING	ORANGE	SABINE	1	1	1	1	1	1
ORANGE	ORANGE	SABINE	3,801	3,738	3,675	3,613	3,571	3,571
PINE FOREST	ORANGE	NECHES	73	71	69	67	65	65
PINEHURST	ORANGE	SABINE	336	329	321	313	308	308
ROSE CITY	ORANGE	NECHES	84	83	81	79	78	78
SOUTH NEWTON WSC	ORANGE	SABINE	97	109	113	112	116	120
STEAM ELECTRIC POWER	ORANGE	NECHES	6,228	4,966	5,805	6,829	8,077	9,598
VIDOR	ORANGE	NECHES	1,303	1,295	1,276	1,249	1,250	1,258
VIDOR	ORANGE	SABINE	326	324	319	312	312	314
WEST ORANGE	ORANGE	SABINE	530	516	502	488	479	479
BECKVILLE	PANOLA	SABINE	133	133	132	131	131	132
CARTHAGE	PANOLA	SABINE	2,274	2,297	2,311	2,317	2,326	2,343
COUNTY-OTHER	PANOLA	CYPRESS	5	5	5	5	5	5
COUNTY-OTHER	PANOLA	SABINE	1,693	1,676	1,651	1,620	1,602	1,614
GILL WSC	PANOLA	SABINE	94	96	97	99	100	100
LIVESTOCK	PANOLA	CYPRESS	31	31	31	31	31	31
LIVESTOCK	PANOLA	SABINE	3,065	3,065	3,065	3,065	3,065	3,065

Region I Water User Group Demand
(Ac-ft per Year)

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
MANUFACTURING	PANOLA	SABINE	1,357	1,437	1,500	1,561	1,614	1,720
MINING	PANOLA	SABINE	3,756	4,271	4,587	4,905	5,228	5,536
TATUM	PANOLA	SABINE	29	28	28	28	27	28
CORRIGAN	POLK	NECHES	270	320	358	378	389	408
COUNTY-OTHER	POLK	NECHES	1,110	1,319	1,480	1,583	1,647	1,730
IRRIGATION	POLK	NECHES	135	135	135	135	135	135
LIVESTOCK	POLK	NECHES	202	202	202	202	202	202
MANUFACTURING	POLK	NECHES	619	725	825	930	1,026	1,110
COUNTY-OTHER	RUSK	NECHES	1,225	1,258	1,270	1,243	1,283	1,422
COUNTY-OTHER	RUSK	SABINE	1,435	1,475	1,489	1,457	1,504	1,666
EASTON	RUSK	SABINE	8	11	12	13	15	21
ELDERVILLE WSC	RUSK	SABINE	324	353	369	378	400	456
HENDERSON	RUSK	NECHES	2,164	2,145	2,119	2,088	2,077	2,105
HENDERSON	RUSK	SABINE	253	251	248	245	243	246
IRRIGATION	RUSK	NECHES	19	19	19	19	19	19
IRRIGATION	RUSK	SABINE	107	107	107	107	107	107
KILGORE	RUSK	SABINE	532	520	512	503	500	500
LIVESTOCK	RUSK	NECHES	655	665	676	689	704	718
LIVESTOCK	RUSK	SABINE	516	523	531	542	553	565
MANUFACTURING	RUSK	NECHES	78	86	93	99	103	111
MANUFACTURING	RUSK	SABINE	4	4	4	4	5	5
MINING	RUSK	NECHES	961	1,048	1,099	1,149	1,199	1,246
MINING	RUSK	SABINE	579	631	662	692	722	750
MOUNT ENTERPRISE	RUSK	NECHES	71	71	70	68	69	73
NEW LONDON	RUSK	NECHES	117	119	120	119	121	129
NEW LONDON	RUSK	SABINE	108	109	110	109	111	119
OVERTON	RUSK	NECHES	44	46	46	46	48	52
OVERTON	RUSK	SABINE	369	383	388	386	399	439
SOUTHERN UTILITIES COMPANY	RUSK	NECHES	71	74	74	75	77	85
STEAM ELECTRIC POWER	RUSK	SABINE	24,760	27,458	32,102	37,762	44,663	53,074
TATUM	RUSK	SABINE	122	118	115	112	110	110
WEST GREGG WSC	RUSK	SABINE	15	15	15	15	15	16
COUNTY-OTHER	SABINE	NECHES	359	368	374	380	387	399
COUNTY-OTHER	SABINE	SABINE	90	93	94	96	98	101
G-M WSC	SABINE	SABINE	665	668	662	655	666	686
HEMPHILL	SABINE	SABINE	371	382	389	397	406	418
LIVESTOCK	SABINE	NECHES	107	114	121	131	141	153
LIVESTOCK	SABINE	SABINE	560	596	638	685	741	801
MANUFACTURING	SABINE	NECHES	359	427	490	554	611	662

Region I Water User Group Demand
(Ac-ft per Year)

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
PINELAND	SABINE	NECHES	221	227	230	232	237	244
COUNTY-OTHER	SAN AUGUSTINE	NECHES	621	619	614	610	620	633
COUNTY-OTHER	SAN AUGUSTINE	SABINE	4	4	4	4	4	4
G-M WSC	SAN AUGUSTINE	SABINE	77	75	74	74	75	76
IRRIGATION	SAN AUGUSTINE	NECHES	196	196	196	196	196	196
IRRIGATION	SAN AUGUSTINE	SABINE	29	29	29	29	29	29
LIVESTOCK	SAN AUGUSTINE	NECHES	873	941	1,020	1,111	1,218	1,334
LIVESTOCK	SAN AUGUSTINE	SABINE	131	141	153	167	182	200
MANUFACTURING	SAN AUGUSTINE	NECHES	6	7	8	9	10	11
MINING	SAN AUGUSTINE	NECHES	1,500	7,000	0	0	0	0
SAN AUGUSTINE	SAN AUGUSTINE	NECHES	915	925	939	957	979	999
CENTER	SHELBY	SABINE	1,633	1,718	1,785	1,823	1,867	1,923
COUNTY-OTHER	SHELBY	NECHES	316	329	339	342	348	360
COUNTY-OTHER	SHELBY	SABINE	1,771	1,843	1,902	1,913	1,952	2,015
IRRIGATION	SHELBY	NECHES	9	10	11	12	13	15
IRRIGATION	SHELBY	SABINE	18	20	23	25	28	31
JOAQUIN	SHELBY	SABINE	148	155	158	160	163	168
LIVESTOCK	SHELBY	NECHES	679	828	1,009	1,230	1,499	1,828
LIVESTOCK	SHELBY	SABINE	3,567	4,348	5,301	6,461	7,877	9,602
MANUFACTURING	SHELBY	SABINE	1,360	1,508	1,637	1,766	1,880	2,019
MINING	SHELBY	NECHES	500	1,500	0	0	0	0
TENAHA	SHELBY	SABINE	191	187	184	180	178	178
TIMPSON	SHELBY	NECHES	2	2	2	2	2	2
TIMPSON	SHELBY	SABINE	177	179	179	178	179	182
ARP	SMITH	NECHES	173	178	183	188	200	218
BULLARD	SMITH	NECHES	309	338	366	395	447	518
COMMUNITY WATER COMPANY	SMITH	NECHES	137	188	211	232	271	327
COUNTY-OTHER	SMITH	NECHES	929	823	726	643	572	512
CRYSTAL SYSTEMS INC	SMITH	NECHES	65	71	77	82	93	108
DEAN WSC	SMITH	NECHES	538	582	629	673	761	889
IRRIGATION	SMITH	NECHES	566	595	626	657	689	723
JACKSON WSC	SMITH	NECHES	288	333	384	431	463	499
LINDALE	SMITH	NECHES	150	148	146	145	144	144
LINDALE RURAL WSC	SMITH	NECHES	438	484	531	577	662	780
LIVESTOCK	SMITH	NECHES	660	660	660	660	660	660
MANUFACTURING	SMITH	NECHES	3,846	4,297	4,697	5,081	5,407	5,854
MINING	SMITH	NECHES	183	262	295	351	391	424
NEW CHAPEL HILL	SMITH	NECHES	118	127	137	146	163	187
NOONDAY	SMITH	NECHES	102	105	107	110	117	127

Region I Water User Group Demand
(Ac-ft per Year)

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
OVERTON	SMITH	NECHES	11	11	11	12	12	13
R P M WSC	SMITH	NECHES	32	34	36	38	42	47
SOUTHERN UTILITIES COMPANY	SMITH	NECHES	6,058	6,296	6,507	6,750	7,402	8,363
TROUP	SMITH	NECHES	286	297	311	322	351	393
TYLER	SMITH	NECHES	25,528	26,385	27,211	28,007	29,771	32,253
WHITEHOUSE	SMITH	NECHES	982	1,070	1,153	1,240	1,405	1,636
COUNTY-OTHER	TRINITY	NECHES	585	619	623	640	663	688
GROVETON	TRINITY	NECHES	114	121	122	118	113	109
LIVESTOCK	TRINITY	NECHES	194	194	194	194	194	194
COLMESNEIL	TYLER	NECHES	72	80	84	84	83	83
COUNTY-OTHER	TYLER	NECHES	1,422	1,587	1,684	1,696	1,677	1,677
IRRIGATION	TYLER	NECHES	29	29	29	29	29	29
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE CO	TYLER	NECHES	7	7	8	8	8	8
LIVESTOCK	TYLER	NECHES	274	274	274	274	274	274
MANUFACTURING	TYLER	NECHES	39	46	53	60	66	71
TYLER COUNTY WSC	TYLER	NECHES	575	633	665	663	652	652
WOODVILLE	TYLER	NECHES	661	750	802	818	814	814

Region I Wholesale Water Provider Demand
(Ac-ft per Year)

WWP Name	WUG Name	WUG County	WUG Basin	2010	2020	2030	2040	2050	2060
ANGELINA & NECHES RIVER AUTHORITY	COUNTY-OTHER	CHEROKEE	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	ARP	SMITH	NECHES	428	428	428	428	428	428
ANGELINA & NECHES RIVER AUTHORITY	COUNTY-OTHER	SMITH	NECHES	855	855	855	855	855	855
ANGELINA & NECHES RIVER AUTHORITY	COUNTY-OTHER	NACOGDOCHES	NECHES	428	428	428	428	428	428
ANGELINA & NECHES RIVER AUTHORITY	ALTO	CHEROKEE	NECHES	428	428	428	428	428	428
ANGELINA & NECHES RIVER AUTHORITY	COUNTY-OTHER	CHEROKEE	NECHES	3,848	3,848	3,848	3,848	3,848	3,848
ANGELINA & NECHES RIVER AUTHORITY	COUNTY-OTHER	JASPER	NECHES	60	65	70	70	70	70
ANGELINA & NECHES RIVER AUTHORITY	JACKSON WSC	SMITH	NECHES	855	855	855	855	855	855
ANGELINA & NECHES RIVER AUTHORITY	JACKSONVILLE	CHEROKEE	NECHES	4,275	4,275	4,275	4,275	4,275	4,275
ANGELINA & NECHES RIVER AUTHORITY	NACOGDOCHES	NACOGDOCHES	NECHES	8,551	8,551	8,551	8,551	8,551	8,551
ANGELINA & NECHES RIVER AUTHORITY	NEW LONDON	RUSK	SABINE	855	855	855	855	855	855
ANGELINA & NECHES RIVER AUTHORITY	NEW SUMMERFIELD	CHEROKEE	NECHES	2,565	2,565	2,565	2,565	2,565	2,565
ANGELINA & NECHES RIVER AUTHORITY	NORTH CHEROKEE WSC	CHEROKEE	NECHES	4,275	4,275	4,275	4,275	4,275	4,275
ANGELINA & NECHES RIVER AUTHORITY	RUSK	CHEROKEE	NECHES	4,275	4,275	4,275	4,275	4,275	4,275
ANGELINA & NECHES RIVER AUTHORITY	RUSK RURAL WSC	CHEROKEE	NECHES	855	855	855	855	855	855
ANGELINA & NECHES RIVER AUTHORITY	MANUFACTURING	ANGELINA	NECHES	8,551	8,551	8,551	8,551	8,551	8,551
ANGELINA & NECHES RIVER AUTHORITY	TROUP	SMITH	NECHES	4,275	4,275	4,275	4,275	4,275	4,275
ANGELINA & NECHES RIVER AUTHORITY	WHITEHOUSE	SMITH	NECHES	8,551	8,551	8,551	8,551	8,551	8,551
ANGELINA NACOGDOCHES WCID #1	COUNTY-OTHER	CHEROKEE	NECHES	0	0	0	0	0	0
ANGELINA NACOGDOCHES WCID #1	HENDERSON	RUSK	NECHES	2,242	0	0	0	0	0
ANGELINA NACOGDOCHES WCID #1	STEAM ELECTRIC POWER	CHEROKEE	NECHES	2,245	1,790	2,093	2,462	2,912	3,460
ANGELINA NACOGDOCHES WCID #1	STEAM ELECTRIC POWER	NACOGDOCHES	NECHES	2,240	6,721	6,721	6,721	0	0
ANGELINA NACOGDOCHES WCID #1	WHITEHOUSE	SMITH	NECHES	2,186	0	0	0	0	0
ATHENS MUNICIPAL WATER AUTHORITY	COUNTY-OTHER	HENDERSON	NECHES	0	0	0	0	0	0
ATHENS MUNICIPAL WATER AUTHORITY	ATHENS	HENDERSON	TRINITY	2,027	2,506	3,078	3,732	4,588	5,647
ATHENS MUNICIPAL WATER AUTHORITY	ATHENS	HENDERSON	NECHES	58	85	112	138	174	220
ATHENS MUNICIPAL WATER AUTHORITY	IRRIGATION	HENDERSON	NECHES	159	164	169	174	179	185
ATHENS MUNICIPAL WATER AUTHORITY	LIVESTOCK	HENDERSON	NECHES	3,023	3,023	3,023	3,023	3,023	3,023
ATHENS MUNICIPAL WATER AUTHORITY	MANUFACTURING	HENDERSON	TRINITY	100	106	120	136	155	176
BEAUMONT CITY OF	BEAUMONT	JEFFERSON	NECHES	9,853	9,713	9,574	9,434	9,341	9,341
BEAUMONT CITY OF	BEAUMONT	JEFFERSON	NECHES-TRINITY	17,187	16,944	16,701	16,458	16,295	16,295
BEAUMONT CITY OF	BEAUMONT	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
BEAUMONT CITY OF	COUNTY-OTHER	JEFFERSON	NECHES	13	17	20	23	26	31
BEAUMONT CITY OF	COUNTY-OTHER	JEFFERSON	NECHES-TRINITY	1,679	2,177	2,595	2,922	3,285	3,973
BEAUMONT CITY OF	MANUFACTURING	JEFFERSON	NECHES	1,000	1,105	1,221	1,349	1,490	1,646
BEAUMONT CITY OF	MEEKER MUD	JEFFERSON	NECHES	3	4	4	5	5	8
CARTHAGE CITY OF	CARTHAGE	PANOLA	SABINE	0	0	0	0	0	0
CARTHAGE CITY OF	CARTHAGE	PANOLA	SABINE	2,274	2,297	2,311	2,317	2,326	2,343
CARTHAGE CITY OF	COUNTY-OTHER	PANOLA	CYPRESS	5	5	5	5	5	5
CARTHAGE CITY OF	COUNTY-OTHER	PANOLA	SABINE	1,482	1,482	1,482	1,482	1,482	1,482
CARTHAGE CITY OF	MANUFACTURING	PANOLA	SABINE	1,018	1,078	1,125	1,171	1,211	1,290
CENTER CITY OF	CENTER	SHELBY	SABINE	1,633	1,718	1,785	1,823	1,867	1,923
CENTER CITY OF	MANUFACTURING	SHELBY	SABINE	1,156	1,282	1,391	1,501	1,598	1,716
CENTER CITY OF	COUNTY-OTHER	SHELBY	SABINE	167	174	179	180	184	190

Region I Wholesale Water Provider Demand
(Ac-ft per Year)

WWP Name	WUG Name	WUG County	WUG Basin	2010	2020	2030	2040	2050	2060
CENTER CITY OF	COUNTY-OTHER	SHELBY	SABINE	21	22	22	23	23	24
HOUSTON COUNTY WCID #1	CONSOLIDATED WSC	HOUSTON	NECHES	255	255	255	255	255	255
HOUSTON COUNTY WCID #1	CONSOLIDATED WSC	ANDERSON	TRINITY	79	79	79	79	79	79
HOUSTON COUNTY WCID #1	CONSOLIDATED WSC	HOUSTON	TRINITY	674	674	674	674	674	674
HOUSTON COUNTY WCID #1	CONSOLIDATED WSC	ANDERSON	NECHES	23	23	23	23	23	23
HOUSTON COUNTY WCID #1	COUNTY-OTHER	HOUSTON	TRINITY	89	90	91	93	96	100
HOUSTON COUNTY WCID #1	CROCKETT	HOUSTON	TRINITY	1,841	1,841	1,841	1,841	1,841	1,841
HOUSTON COUNTY WCID #1	GRAPELAND	HOUSTON	TRINITY	405	405	405	405	405	405
HOUSTON COUNTY WCID #1	COUNTY-OTHER	HOUSTON	TRINITY	0	0	0	0	0	0
HOUSTON COUNTY WCID #1	LOVELADY	HOUSTON	TRINITY	77	77	77	77	77	77
HOUSTON COUNTY WCID #1	MANUFACTURING	HOUSTON	TRINITY	169	190	209	227	243	263
JACKSONVILLE CITY OF	BULLARD	SMITH	NECHES	10	10	10	10	10	10
JACKSONVILLE CITY OF	COUNTY-OTHER	CHEROKEE	NECHES	226	198	154	95	68	55
JACKSONVILLE CITY OF	CRAFT-TURNEY WSC	CHEROKEE	NECHES	515	614	742	908	995	1,078
JACKSONVILLE CITY OF	JACKSONVILLE	CHEROKEE	NECHES	3,502	3,637	3,741	3,827	3,948	4,111
JACKSONVILLE CITY OF	MANUFACTURING	CHEROKEE	NECHES	718	784	839	891	934	1,007
JACKSONVILLE CITY OF	NORTH CHEROKEE WSC	CHEROKEE	NECHES	387	439	482	519	560	616
LOWER NECHES VALLEY AUTHORITY	BEAUMONT	JEFFERSON	NECHES-TRINITY	31,360	31,360	31,360	31,360	31,360	31,360
LOWER NECHES VALLEY AUTHORITY	BOLIVAR PENINSULAR SUD	GALVESTON	NECHES-TRINITY	5,549	5,499	5,449	5,399	5,349	5,299
LOWER NECHES VALLEY AUTHORITY	COUNTY-OTHER	GALVESTON	NECHES-TRINITY	1	1	1	1	1	1
LOWER NECHES VALLEY AUTHORITY	COUNTY-OTHER	JEFFERSON	NECHES-TRINITY	188	244	291	327	368	445
LOWER NECHES VALLEY AUTHORITY	MANUFACTURING	JASPER	NECHES	43,982	67,484	77,166	70,824	63,898	56,360
LOWER NECHES VALLEY AUTHORITY	GROVES	JEFFERSON	NECHES	44	43	43	42	41	41
LOWER NECHES VALLEY AUTHORITY	GROVES	JEFFERSON	NECHES-TRINITY	3,146	3,094	3,042	2,989	2,955	2,955
LOWER NECHES VALLEY AUTHORITY	IRRIGATION	CHAMBERS	NECHES-TRINITY	38,000	38,000	38,000	38,000	38,000	38,000
LOWER NECHES VALLEY AUTHORITY	IRRIGATION	LIBERTY	NECHES	2,500	2,500	2,500	2,500	2,500	2,500
LOWER NECHES VALLEY AUTHORITY	IRRIGATION	LIBERTY	NECHES-TRINITY	17,200	17,200	17,200	17,200	17,200	17,200
LOWER NECHES VALLEY AUTHORITY	IRRIGATION	JEFFERSON	NECHES	11,648	11,648	11,648	11,648	11,648	11,648
LOWER NECHES VALLEY AUTHORITY	IRRIGATION	JEFFERSON	NECHES-TRINITY	128,352	128,352	128,352	128,352	128,352	128,352
LOWER NECHES VALLEY AUTHORITY	JEFFERSON COUNTY WCID #10	JEFFERSON	NECHES	243	266	285	299	316	353
LOWER NECHES VALLEY AUTHORITY	JEFFERSON COUNTY WCID #10	JEFFERSON	NECHES-TRINITY	397	434	465	488	516	576
LOWER NECHES VALLEY AUTHORITY	COUNTY-OTHER	JEFFERSON	NECHES	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	COUNTY-OTHER	GALVESTON	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	MANUFACTURING	JASPER	NECHES	20,189	23,571	26,084	28,281	29,928	29,991
LOWER NECHES VALLEY AUTHORITY	MANUFACTURING	JEFFERSON	NECHES	32,485	101,169	146,463	75,680	158,234	164,124
LOWER NECHES VALLEY AUTHORITY	MANUFACTURING	JEFFERSON	NECHES-TRINITY	111,547	313,622	447,553	466,461	485,782	504,892
LOWER NECHES VALLEY AUTHORITY	NEDERLAND	JEFFERSON	NECHES	159	165	170	172	177	187
LOWER NECHES VALLEY AUTHORITY	NEDERLAND	JEFFERSON	NECHES-TRINITY	3,966	4,103	4,217	4,284	4,396	4,647
LOWER NECHES VALLEY AUTHORITY	NOME	JEFFERSON	NECHES	90	97	102	107	112	122
LOWER NECHES VALLEY AUTHORITY	NOME	JEFFERSON	NECHES-TRINITY	37	39	42	43	45	50
LOWER NECHES VALLEY AUTHORITY	PORT ARTHUR	JEFFERSON	NECHES	59	58	56	55	54	54
LOWER NECHES VALLEY AUTHORITY	PORT ARTHUR	JEFFERSON	NECHES-TRINITY	9,645	9,452	9,259	9,067	8,939	8,939
LOWER NECHES VALLEY AUTHORITY	PORT NECHES	JEFFERSON	NECHES	909	909	913	908	920	960
LOWER NECHES VALLEY AUTHORITY	PORT NECHES	JEFFERSON	NECHES-TRINITY	873	873	876	872	884	992

Region I Wholesale Water Provider Demand
(Ac-ft per Year)

WWP Name	WUG Name	WUG County	WUG Basin	2010	2020	2030	2040	2050	2060
LOWER NECHES VALLEY AUTHORITY	TRINITY BAY CONSERVATION DISTRICT	CHAMBERS	NECHES-TRINITY	421	479	547	623	709	807
LOWER NECHES VALLEY AUTHORITY	TRINITY BAY CONSERVATION DISTRICT	CHAMBERS	TRINITY	192	219	249	284	324	370
LOWER NECHES VALLEY AUTHORITY	WEST JEFFERSON COUNTY MWD	JEFFERSON	NECHES-TRINITY	1,029	1,148	1,264	1,345	1,436	1,631
LOWER NECHES VALLEY AUTHORITY	MANUFACTURING	JASPER	NECHES	50,000	50,000	50,000	50,000	50,000	50,000
LOWER NECHES VALLEY AUTHORITY	WOODVILLE	TYLER	NECHES	5,600	5,600	5,600	5,600	5,600	5,600
LUFKIN CITY OF	LUFKIN	ANGELINA	NECHES	7,546	8,444	9,446	10,565	11,951	13,599
LUFKIN CITY OF	COUNTY-OTHER	ANGELINA	NECHES	131	148	164	177	195	219
LUFKIN CITY OF	DIBOLL	ANGELINA	NECHES	1,940	1,940	1,940	1,940	1,940	1,940
LUFKIN CITY OF	HUNTINGTON	ANGELINA	NECHES	20	27	33	36	40	44
LUFKIN CITY OF	MANUFACTURING	ANGELINA	NECHES	9,550	17,255	18,981	20,879	22,966	25,263
LUFKIN CITY OF	REDLAND WSC	ANGELINA	NECHES	107	104	101	98	97	97
NACOGDOCHES CITY OF	APPLEBY WSC	NACOGDOCHES	NECHES	25	145	317	511	878	1,274
NACOGDOCHES CITY OF	NACOGDOCHES	NACOGDOCHES	NECHES	7,625	8,423	9,218	9,939	11,352	12,540
NACOGDOCHES CITY OF	D&M WSC	NACOGDOCHES	NECHES	406	452	491	540	652	780
NACOGDOCHES CITY OF	MANUFACTURING	NACOGDOCHES	NECHES	2,288	2,553	2,786	3,016	3,214	3,468
PANOLA COUNTY FWSD #1	CARTHAGE	PANOLA	SABINE	2,274	2,297	2,311	2,317	2,326	2,343
PANOLA COUNTY FWSD #1	COUNTY-OTHER	PANOLA	SABINE	1,487	1,487	1,487	1,487	1,487	1,487
PANOLA COUNTY FWSD #1	MANUFACTURING	PANOLA	SABINE	1,018	1,078	1,125	1,171	1,210	1,290
PANOLA COUNTY FWSD #1	MINING	PANOLA	SABINE	2,254	2,563	2,752	2,943	3,137	3,322
PANOLA COUNTY FWSD #1	COUNTY-OTHER	PANOLA	SABINE	0	0	0	0	0	0
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	578	646	714	782	850	918
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	5,327	5,954	6,581	7,208	7,835	8,460
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	78	87	96	105	114	124
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	129	144	159	174	189	205
PORT ARTHUR CITY OF	PORT ARTHUR	JEFFERSON	NECHES	59	58	56	55	54	54
PORT ARTHUR CITY OF	PORT ARTHUR	JEFFERSON	NECHES-TRINITY	9,645	9,452	9,259	9,067	8,939	8,939
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	24	27	30	33	36	38
PORT ARTHUR CITY OF	MEEKER MUD	JEFFERSON	NECHES	3	3	3	3	3	3
PORT ARTHUR CITY OF	COUNTY-OTHER	JEFFERSON	NECHES-TRINITY	5	5	5	5	5	5
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	1	1	1	1	1	1
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	224	224	224	224	224	224
SABINE RIVER AUTHORITY	ABLES SPRINGS WSC	KAUFMAN	TRINITY	992	992	992	992	992	992
SABINE RIVER AUTHORITY	ABLES SPRINGS WSC	HUNT	SABINE	119	119	119	119	119	119
SABINE RIVER AUTHORITY	ABLES SPRINGS WSC	VAN ZANDT	SABINE	9	9	9	9	9	9
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	1,120	1,120	1,120	1,120	1,120	1,120
SABINE RIVER AUTHORITY	COUNTY-OTHER	SABINE	SABINE	81	81	81	81	81	81
SABINE RIVER AUTHORITY	CASH SUD	ROCKWALL	SABINE	42	58	62	40	33	26
SABINE RIVER AUTHORITY	CASH SUD	HOPKINS	SABINE	45	51	54	56	52	48
SABINE RIVER AUTHORITY	CASH SUD	HUNT	SABINE	5,429	5,366	5,325	5,315	5,302	5,291
SABINE RIVER AUTHORITY	CASH SUD	RAINS	SABINE	86	103	115	118	117	115
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	2,240	2,240	2,240	2,240	2,240	2,240
SABINE RIVER AUTHORITY	COMMERCE	HUNT	SULPHUR	8,094	8,033	7,973	7,913	7,852	7,792
SABINE RIVER AUTHORITY	DALLAS	DALLAS	TRINITY	315,479	314,111	312,742	311,375	310,006	308,637
SABINE RIVER AUTHORITY	EDGEWOOD	VAN ZANDT	SABINE	793	787	781	776	770	764

Region I Wholesale Water Provider Demand
(Ac-ft per Year)

WWP Name	WUG Name	WUG County	WUG Basin	2010	2020	2030	2040	2050	2060
SABINE RIVER AUTHORITY	EMORY	RAINS	SABINE	1,901	1,887	1,873	1,859	1,845	1,832
SABINE RIVER AUTHORITY	GREENVILLE	HUNT	SABINE	20,515	20,363	20,210	20,057	19,904	19,751
SABINE RIVER AUTHORITY	POINT	RAINS	SABINE	422	420	416	414	410	408
SABINE RIVER AUTHORITY	QUITMAN	WOOD	SABINE	1,026	1,019	1,012	1,004	997	990
SABINE RIVER AUTHORITY	TERRELL	KAUFMAN	TRINITY	10,081	10,081	10,081	10,081	10,081	10,081
SABINE RIVER AUTHORITY	WEST TAWAKONI	HUNT	SABINE	1,080	1,072	1,064	1,056	1,047	1,039
SABINE RIVER AUTHORITY	COMBINED CONSUMERS WSC	HUNT	SABINE	1,439	1,390	1,348	1,312	1,271	1,226
SABINE RIVER AUTHORITY	COMBINED CONSUMERS WSC	VAN ZANDT	SABINE	229	266	297	321	351	384
SABINE RIVER AUTHORITY	STEAM ELECTRIC POWER	NEWTON	SABINE	13,442	13,442	13,442	13,442	13,442	13,442
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	24,643	24,643	24,643	24,643	24,643	24,643
SABINE RIVER AUTHORITY	MANUFACTURING	HARRISON	SABINE	3,206	3,184	3,161	3,139	3,116	3,094
SABINE RIVER AUTHORITY	COUNTY-OTHER	SABINE	SABINE	22	22	22	22	22	22
SABINE RIVER AUTHORITY	STEAM ELECTRIC POWER	ORANGE	NECHES	4,481	4,481	4,481	4,481	4,481	4,481
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	280	280	280	280	280	280
SABINE RIVER AUTHORITY	HEMPHILL	SABINE	SABINE	1,841	1,841	1,841	1,841	1,841	1,841
SABINE RIVER AUTHORITY	HENDERSON	RUSK	NECHES	3,922	3,922	3,922	3,922	3,922	3,922
SABINE RIVER AUTHORITY	HENDERSON	RUSK	SABINE	459	459	459	459	459	459
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	1,120	1,120	1,120	1,120	1,120	1,120
SABINE RIVER AUTHORITY	COUNTY-OTHER	SHELBY	SABINE	147	147	147	147	147	147
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	17,922	17,922	17,922	17,922	17,922	17,922
SABINE RIVER AUTHORITY	IRRIGATION	ORANGE	SABINE	2,543	2,543	2,543	2,543	2,543	2,543
SABINE RIVER AUTHORITY	COUNTY-OTHER	GREGG	SABINE	560	556	552	548	544	540
SABINE RIVER AUTHORITY	KILGORE	GREGG	SABINE	5,038	5,002	4,966	4,931	4,896	4,861
SABINE RIVER AUTHORITY	KILGORE	RUSK	SABINE	672	672	672	672	672	672
SABINE RIVER AUTHORITY	LONGVIEW	GREGG	SABINE	17,588	17,464	17,341	17,218	17,095	16,971
SABINE RIVER AUTHORITY	LONGVIEW	HARRISON	SABINE	733	728	723	717	712	707
SABINE RIVER AUTHORITY	MACBEE SUD	HUNT	SABINE	109	109	109	112	178	281
SABINE RIVER AUTHORITY	MACBEE SUD	VAN ZANDT	SABINE	822	822	822	819	753	650
SABINE RIVER AUTHORITY	MACBEE SUD	VAN ZANDT	TRINITY	1,152	1,136	1,120	1,104	1,088	1,072
SABINE RIVER AUTHORITY	MACBEE SUD	KAUFMAN	SABINE	71	75	76	76	76	76
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	NECHES	4,481	4,481	4,481	4,481	4,481	4,481
SABINE RIVER AUTHORITY	COUNTY-OTHER	SABINE	SABINE	28	28	28	28	28	28
SABINE RIVER AUTHORITY	MINING	HARRISON	SABINE	10,993	10,915	10,838	10,761	10,684	10,607
SABINE RIVER AUTHORITY	ROSE CITY	ORANGE	NECHES	478	478	478	478	478	478
SABINE RIVER AUTHORITY	SOUTH TAWAKONI WSC	VAN ZANDT	SABINE	1,056	1,048	1,041	1,033	1,025	1,018
SABINE RIVER AUTHORITY	COUNTY-OTHER	NEWTON	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	COUNTY-OTHER	KAUFMAN	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	STEAM ELECTRIC POWER	NEWTON	SABINE	17,929	17,929	17,929	17,929	17,929	17,929
SABINE RIVER AUTHORITY	WILLS POINT	VAN ZANDT	SABINE	654	654	654	654	654	654
SABINE RIVER AUTHORITY	WILLS POINT	VAN ZANDT	TRINITY	1,458	1,443	1,427	1,412	1,396	1,381
TYLER CITY OF	COUNTY-OTHER	SMITH	NECHES	445	467	491	515	541	568
TYLER CITY OF	IRRIGATION	SMITH	NECHES	300	300	300	300	300	300
TYLER CITY OF	MANUFACTURING	SMITH	NECHES	2,885	3,223	3,523	3,811	4,055	4,391
TYLER CITY OF	SOUTHERN UTILITIES COMPANY	SMITH	NECHES	303	315	325	338	370	918

Region I Wholesale Water Provider Demand
(Ac-ft per Year)

WWP Name	WUG Name	WUG County	WUG Basin	2010	2020	2030	2040	2050	2060
TYLER CITY OF	TYLER	SMITH	SABINE	358	464	567	668	844	1,081
TYLER CITY OF	TYLER	SMITH	NECHES	25,528	26,385	27,211	28,007	29,771	32,253
TYLER CITY OF	WHITEHOUSE	SMITH	NECHES	687	749	807	868	984	1,145
UPPER NECHES MWD	DALLAS	DALLAS	TRINITY	114,337	114,337	114,337	114,337	114,337	114,337
UPPER NECHES MWD	PALESTINE	ANDERSON	TRINITY	28,000	28,000	28,000	28,000	28,000	28,000
UPPER NECHES MWD	TYLER	SMITH	NECHES	67,200	67,200	67,200	67,200	67,200	67,200
UPPER NECHES MWD	COUNTY-OTHER	SMITH	NECHES	93	82	73	64	57	51
UPPER NECHES MWD	COUNTY-OTHER	SMITH	NECHES	105	105	105	105	105	105
UPPER NECHES MWD	IRRIGATION	CHEROKEE	NECHES	300	300	300	300	300	300
UPPER NECHES MWD	COUNTY-OTHER	HENDERSON	NECHES	100	100	100	100	100	100
UPPER NECHES MWD	COUNTY-OTHER	ANDERSON	NECHES	0	0	0	0	0	0

Appendix 3-A

Environmental Flows Recommendations Report Executive Summary for the Sabine and Neches Rivers and Sabine Lake Bay Basin and Bay Area Stakeholder Committee Report

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This appendix contains the Executive Summary for the Environmental Flows Recommendations Report prepared by the Sabine and Neches Rivers and Sabine Lake Bay Basin and Bay Expert Science Team. The report was issued on November 30, 2009, and contains a comprehensive report on the Sabine and Neches River Basins and Sabine Lake Estuary.

In addition, this appendix contains the Draft Recommendation Report of the Sabine and Neches Rivers and Sabine Lake Bay Basin and Bay Area Stakeholder Committee. This draft report is dated May 4, 2010, and has been submitted to the TCEQ.

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EXECUTIVE SUMMARY

The Sabine and Neches Rivers and Sabine Lake Bay Basin and Bay Expert Science Team (Sabine-Neches BBEST) was appointed by the Sabine and Neches Rivers and Sabine Lake Bay Basin and Bay Area Stakeholders Committee (Sabine-Neches BBASC) under Senate Bill 3 (Texas Legislature 2007), the third in a series of three omnibus water bills related to the State of Texas meeting the future needs for water. Under its SB 3 charge, the Sabine-Neches BBEST used the “best available science” to develop environmental flow analyses and recommend flow regimes for the Sabine and Neches Basins and the Sabine-Neches Estuary. These recommendations are provided to the Sabine-Neches BBASC, Texas Environmental Flows Advisory Group (EFAG), and the Texas Commission on Environmental Quality (TCEQ).

The Sabine-Neches BBEST held twelve monthly meetings and several workshops beginning with its initial meeting on December 8, 2009. To accomplish this task the Sabine-Neches BBEST established subcommittees for:

- gaging
- hydrology
- biology
- water quality
- geomorphology
- Recommendations Report preparation.

Two consulting firms were retained to provide modeling and research in addition to extensive committee/subcommittee work. The meetings were an open process that benefited from participation and contributions from the resource agencies – TCEQ, Texas Water Development Board (TWDB) and Texas Parks and Wildlife Department (TPWD), environmental groups such as the National Wildlife Federation (NWF), and the public.

The Sabine-Neches BBEST believes the body of work presented and discussed in the Recommendations Report (Report) has enabled it to move the Texas environmental flows process forward and to address the charge to develop environmental flow analyses and recommend an environmental flow regime in a positive manner within the limited time frame and full recognition of the best science available. The Report is comprised of:

- a <u>Preamble</u>, which outlines the charge, goal and objectives;
- <u>Summary of Recommendations, Recognitions and Rationale</u>, which highlights the report findings;
- <u>Basins and Bay Descriptions and Current Conditions</u>, which describes the Sabine River Basin (Texas and Louisiana), the Neches River Basin, Sabine Lake Estuary (Sabine-Neches Estuary, Texas and Louisiana); Regional Water Planning (SB 1 ongoing process), and Sabine-Neches Study Area Unique Issues;
- <u>Texas Environmental Flows Science Advisory Committee</u> (SAC) which provided guidance documents for this process as well as overall direction, coordination, and consistency from the broader state perspective;

- <u>Discipline Reports</u> from the four disciplines – hydrology, biology, water quality and geomorphology;
- <u>Development of Environmental Flows Recommendations/Recognitions/Unresolved Issues</u> which includes instream flow regime application, environmental flow matrices for selected stream flow gages, and inflows to Sabine-Neches Estuary; and
- <u>Appendices</u> which includes the full body of work and references that the Report is based on.

The SAC, an objective body of experts tasked to advise and make recommendations to the Environmental Flows Advisory Group, provided valuable assistance to the Trinity-San Jacinto BBEST and Sabine-Neches BBEST as the two initial BBESTs. To date, the SAC, composed of members with expertise in a number of technical fields including hydrology, hydraulics, water resources, aquatic and terrestrial biology, geomorphology, geology, water quality, and computer modeling, has developed six technical guidance documents for BBEST use. These are as follows:

- Geographic Scope of Instream Flow Recommendations;
- Use of Hydrologic Data in the Development of Instream Flow Recommendations for the Environmental Flows Allocation Process and the Hydrology-Based Environmental Flow Regime (HEFR);
- Fluvial Sediment Transport as an Overlay to Instream Flow Recommendations for the Environmental Flows Allocation Process;
- Methodologies for Establishing a Freshwater Inflow Regime for Texas Estuaries Within the Context of the Senate Bill 3 Environmental Flows Process;
- Nutrient and Water Quality Overlay on Hydrology-Based Instream Flow Recommendations; and
- Essential Steps for Biological Overlays in Developing Senate Bill 3 Instream Flow Recommendations.

Unfortunately, the Sabine-Neches BBEST was unable to take full advantage of all guidance documents since the SAC's development timeline coincided with the Sabine-Neches BBEST timeline. However, the SAC member performing as liaison to the Sabine-Neches BBEST assisted the group by providing the initial drafts of works in progress to allow the process to move forward. This resulted in an evolving process through the twelve months with the Report reflecting a transition of understanding from SAC guidance to the Sabine-Neches BBEST, to its consultants' work, its subcommittees' reports, input from the resource agencies, and the NWF studies. This input and work influenced the understanding and progress along the twelve month timeline. The final Report reflects the evolving and transitional understanding as the year unfolded and additional information and data was brought into the process.

Decision Tree – To help follow this process from start to finish, the Sabine-Neches BBEST developed a DECISION TREE (Figure 4, page 8). The Decision Tree traces the decisions made throughout the process. The decision tree was instrumental in tracking decisions and pathways and the concept should be of great value to future BBESTs.

During the course of the past year, the Sabine-Neches BBEST recognized its recommendation charge required further clarity. Taking its charge from the "theoretical" to the "practical", the Sabine-Neches BBEST was able to make some specific environmental flow recommendations, while in other cases (for example overbank flows), the group agreed to recognize (recognition) the ecological value of such flows but not recommend them. The Sabine-Neches BBEST was able to move forward with the environmental flow process by agreeing that some issues, due to the severe time constraint and limitations of available science would remain 'unresolved issues'. These unresolved issues would need 'future studies' and, ultimately, as envisioned by the SB 3 process, 'adaptive management' to resolve. Thus, over time, the path forward became:

1. Recommendations;
2. Recognitions;
3. Unresolved Issues;
4. Future Studies; and
5. Adaptive Management.

Recommendations and Recognitions

The following recommendations and recognitions are presented in the Report with qualifying language and in some cases remain unresolved issues that will need future study and adaptive management to determine if particular flow components need to be altered. The recommendations and recognitions are presented in the Report with supporting rationale based on information and data summarized from a substantial body of work in the appendices and noted references. They are summarized as follows:

Recommendations:

1. Recommendation 1: Definition of a Sound Ecological Environment.
   The Sabine-Neches BBEST recommends the SAC definition that it adopted (see Section 1.2.4, page 11) for sound ecological environment.
2. Recommendation 2: The Current Conditions of the Sabine and Neches Rivers and the Sabine-Neches Estuary are Sound.
3. Recommendation 3: Acknowledge that Flows in the Sabine and Neches Rivers and Inflow to the Sabine-Neches Estuary will Change Over Time.
4. Recommendation 4: Future Study, Data Gathering, and Adaptive Management are Necessary to Determine Whether or not Changes in Environmental Flows will Maintain a Sound Ecological Environment.
5. Recommendation 5: Applicable Hydrologic Conditions for the Entire Season are Defined on the Basis of an Assessment of Hydrologic Conditions of Storage in Selected Reservoirs at the Beginning of the First Day of the Season Thereby Recognizing Both Drought Persistence and Practical Operations.
6. Recommendation 6: Subsistence Flows.
   The Sabine-Neches BBEST recommends adoption of the seasonal subsistence flows from MBFIT /HEFR, unless:
   i. the seasonal value is less than the summer value in which case the summer value is adopted by default, and

ii. MBFIT/HEFR failed to calculate a value (this occurred usually for winter) in which case the lowest recorded flow value for that season at that gage was adopted by default.

Translation of seasonal subsistence flows into environmental flow standards and permit conditions should not result in more frequent occurrence of flows less than the recommended seasonal subsistence values as a result of the issuance of new surface water appropriations or amendments.

7. Recommendation 7: Base flows.

   Seasonal base flows represent thresholds for environmental protection based on current scientific understanding of fluvial and estuarine ecosystems. As new studies and monitoring information become available, these base flow thresholds may be revised.

8. Recommendation 8: High Flow Pulses.

   Seasonal high flow pulses have recognized ecological benefits and are recommended for protection with certain reservations associated with environmental and operational liability risks.

9. Recommendation 9: Fluvial Matrices Inflow Recommendations are Adequate to Maintain a Sound Ecological Environment in the Sabine-Neches Estuary.

   Recognizing that the Sabine-Neches Estuary is a system in transition (Tatum 2009) and that the Sabine-Neches Estuary receives the freshwater inflows determined by the flow component recommendations for the Sabine-Ruliff, Neches-Evadale, and Village Creek gages (as well as other inflows), the Sabine-Neches BBEST recommends that these inflows are adequate to maintain a sound ecological environment in the Sabine-Neches Estuary.

Recognitions

1. Recognition 1: Overbank Flows Have Recognized Ecological Benefits but are not Recommended.

   Overbank flows may cause extensive damage to private property and endanger the public. Therefore the Sabine-Neches BBEST recognizes the ecological benefits of these events, but cannot recommend such events be produced.

2. Recognition 2: Toledo Bend Reservoir FERC Relicensing.

   The relicensing of the Toledo Bend Project is ongoing at this time. The relicensing will recognize the Project's primary use as a water supply project with the capability of generating hydroelectric power. Since no major changes in operations are planned, a maintenance flow will continue to be maintained from the spillway.

3. Recognition 3: Sabine River Compact.

   The major purposes of the Sabine River Compact are to provide for the equitable apportionment between the States of Louisiana and Texas of the waters of the Sabine River and its tributaries. Texas retains free and unrestricted use of the water of the Sabine River and its tributaries above the Stateline, subject only to the provisions that the minimum flow of 36 cfs must be maintained at the Stateline. All free water (free water means all waters other than stored water) and stored water in the Stateline reach, without reference to origin, will be divided equally between the two states.

4. Recognition 4: Cutoff Bayou.
   Environmental flows as well as the diversions for the water supply canal system in Texas are adversely affected by migration of channel flow to the Old River Channel in Louisiana during low and average flow conditions.

Basins and Bay Descriptions and Current Conditions

The Study Area defined for the Sabine-Neches BBEST is the Sabine River Basin and the Neches River Basin with each having a watershed of approximately 10,000 square miles with the total drainage of some 20,000 square miles being received by the Sabine-Neches Estuary. Detail descriptions and maps are found in the Report and supporting appendices and references. SB 1 Regional Water Planning for this area is presented in Regions I, D and C plans since the geographic footprint extends into all three regions. SB 2, or Texas Instream Flow Program (TIFP), studies include only the lower Sabine River from Toledo Bend Reservoir to tidal. (The State of Louisiana owns half the flow in this stateline reach, but does not have a program similar to SB 2). Unique aspects of the Study Area include:

1. Texas/Louisiana (stateline flows, water supply reservoir and estuary);
2. Texas State Water Quality Flows (Texas – 7Q2/Louisiana – 7Q10);
3. SB 2 priority study – lower Sabine River;
4. Toledo Bend Reservoir Project Joint Operations – Federal Energy Regulatory Commission relicense of Toledo Bend hydropower facility;
5. Sabine River Compact which provides for equitable apportionment of waters between Texas and Louisiana;
6. Lower Neches River Saltwater Barrier - minimum flow requirement;
7. Cutoff Bayou – migration of water to Louisiana's Old Sabine River channel affecting environmental flows and water supply users in Texas; and
8. USACE proposed deepening of existing ship channel through the Sabine-Neches Estuary to upstream ports.

Discipline Reports

The Sabine-Neches BBEST Subcommittees submitted reports –on the disciplines of hydrology, biology, water quality and geomorphology – key components identified by the TIFP Technical Overview.

Hydrology – The Hydrology Subcommittee benefited from outside consultant work which prepared three memoranda:

1. Analysis of Sabine-Neches BBEST Stream Gages;
2. Hydrology-Based Environmental Flow Regime (HEFR) Analyses for Sabine-Neches BBEST; and
3. Water Availability Analyses for Sabine-Neches BBEST.

The subcommittee worked with the consultant in the preparation of these memos and used this baseline work to develop flow regime matrices for each of the selected gages for use by the other disciplines.

Biology – The Biology Subcommittee assisted in the selection of representative focal species for the two river basins and the estuary, and also worked with an outside consultant to prepare reports on Fluvial Focal Species and Estuarine Focal Species. The flow regime matrix produced by the HEFR statistical analyses of the historical stream gage records was used to evaluate the available biological information for the focal species related to subsistence flows, base flows, high flow pulses, and overbank flows. Using SAC guidance, the estuarine ecosystem evaluation was enhanced with the NWF analysis of habitat suitability for key estuarine species under alternative flow regimes. Changes to the estuary including the ship channel, intracoastal waterway, and secondary channels into the marshes were discussed along with a need for habitat restoration in marshes in Texas and Louisiana. Adaptive management as envisioned by the SB 3 process was considered along with the need for future studies to address the unresolved issues in the Report.

Geomorphology (Sediment Transport) – The Geomorphology Subcommittee, utilizing SAC guidance, worked with the TWDB to address sediment transport in the Study Area. The TWDB has conducted studies of sediment transport and geomorphologic characterization within Texas river systems and most recently has worked with Dr. Jonathan Phillips of the University of Kentucky to conduct studies in the lower Sabine River as part of the SB 2 study. TWDB modeling was undertaken for each of the gages as well to determine how these systems are functioning. Estuary sediment delivery was also considered.

Water Quality – The Water Quality Subcommittee evaluated water quality as an overlay application in environmental flows. Water quality is an important aspect of environmental flow recommendation development. Available water quality was compiled and evaluated for the study area along with water quality standards, flow and water quality relationships, and the integration of water quality into environmental flow recommendations.

Development of Environmental Flows Recommendations/ Recognitions/ Unresolved Issues

As illustrated in the Report's Decision Tree (Figure 4, page 8), the decision process and statistical analyses created, in effect, a statistical river which resulted in HEFR output matrices for each of the twelve gages (six in the Neches Basin and six in the Sabine Basin). These are listed with descriptions of each location and the corresponding matrix (for example – HEFR Matrix for Big Sandy Creek near Big Sandy) which presents the numbers associated with these decisions on a seasonal basis (Sabine-Neches BBEST selected Jan-Mar for winter, Apr-Jun for spring, and so on) for subsistence, base, high flow pulses and overbank flows with qualifying language regarding the interpretation of these flow components. For base flows, seasonal numbers were generated for dry, average and wet conditions which were arbitrarily chosen to be 25th /50th /75th percentiles.

The Sabine-Neches BBEST developed an example application of a flow regime to focus on key elements of a HEFR output matrix and considerations in order to understand how such flow regimes might be applied to new surface water appropriations and/or diversions. The group's understanding of potential flow regime application is summarized in a series of examples for Big Sandy Creek near Big Sandy, Texas.

The Sabine-Neches Estuary current status is summarized from the discipline reports, appendices, and reference documents. The SAC guidance, Sabine Lake history, State Methodology, percent inflow schematic documenting inflows (from the Sabine River, the Neches River, and coastal inflows), and HEFR as an estuary inflows recommendation tool are presented. The USACE's project to deepen the ship channel includes extensive studies. Hydrodynamic salinity modeling, water supply planning using the 2007 Texas Water Plan (Texas Water Development Board. 2007) data modeling current and future water use (50 year) conditions, and marsh habitat mitigation/restoration in Texas and Louisiana are included.

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Draft Recommendations Report

May 4, 2010

SABINE AND NECHES RIVERS AND SABINE LAKE BAY BASIN AND BAY AREA STAKEHOLDER COMMITTEE

Sabine-Neches BBASC Draft Recommendations Report Table of Contents

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Statutory Background

- Senate Bill 3 is the third of three omnibus water bills related to the State of Texas meeting the future needs for water
  - Senate Bill 1 (1997)
    - Established a bottom-up approach to water resource planning
  - Senate Bill 2 (2001)
    - Addresses groundwater issues
    - Established the *Texas Instream Flows Program* to develop the information to determine the needs of water for the environment
  - Senate Bill 3 (2007) – 80th Regular Session of the Texas Legislature

Senate Bill 3

- Prior to SB 3, balancing the effect of authorizing a new use of water with the need for that water to maintain a sound ecological system was done on a case-by-case basis in water rights permitting
- ***Consequence****: made water resources planning under SB 1 difficult – the effect of a water management strategy on the environment is not known at the planning stage*
- SB 3 was intended to address this by ...

Intent of Senate Bill 3

- Senate Bill 3 was intended to create a basin-by-basin process for developing "environmental flow standards"
  - to provide the appropriate amount of instream flows and freshwater inflows
  - by balancing the environmental need with the need for water for humans and other purposes.

Sabine-Neches BBASC Charge

- Review the Sabine-Neches BBEST environmental flow recommendations
- Weigh the environmental need for water with needs for other purposes, including human needs
- Make recommendations on "environmental flow standards" for the Bay-Basin complex

Study Area

- Defined as the
  - Sabine River Basin (approximately 10,000 sq. miles)
  - Neches River Basin (approximately 10,000 sq. miles)
  - Sabine-Neches Estuary (Sabine Lake)

Comments on Sabine-Neches BBEST Environmental Flows Recommendations

- Fundamental Comment
  - While SB 3 requires the BBASCs to weigh the environmental need for flows with the need for water for other purposes,
  - the Sabine-Neches BBEST developed a flow regime based on the Hydrology-Based Environmental Flow Regime (HEFR).
  - *The result is an environmental flow regime that mimics historical flows which may or may not represent the least amount of water that can be reserved for the environment and still have a sound ecological system.*

Comment: Sabine-Neches BBASC *agrees* with the Sabine-Neches BBEST that

- The current conditions of the Sabine and Neches Rivers and the Sabine Lake Estuary are sound;
- The flows in the Sabine and Neches Rivers and inflows to the Sabine Lake Estuary will change over time; and
- Future study, data gathering and adaptive management are necessary to determine whether or not changes in environmental flows will maintain a sound ecological environment.

Comment: Sabine-Neches BBASC *disagrees* with the Sabine-Neches BBEST in that

- The Sabine-Neches BBEST's definition of a sound ecological system does not focus on the current makeup of important species and does not adequately cover all of the important habitat types in the study area;
- The flow regime produced by the Sabine-Neches BBEST is more reflective of the existing flows than environmental need for flows; and
- Estuary soundness can best be addressed through physical changes to reduce saltwater intrusion into the surrounding tidal wetlands rather than imposing the HEFR-created flow regimes from the most downstream gages.

Impact of Sabine-Neches BBEST Flow Regime

- The Sabine-Neches BBEST environmental flow recommendations as applied to reservoir projects with new and/or amended permits would require releasing massive amounts of water that might otherwise be stored for future use within the project, resulting in:
  - significant affect on reservoir water levels and availability of firm yield for water supply;
  - more frequent triggering of drought contingency restrictions;
  - adverse impacts on reservoir recreation;
  - thwarting of economic development; and
  - negative affects on reservoir fisheries.

Consideration of Water Needs for Other Uses

- Water Supply
- Economic Value of Reservoir Recreation
- Reservoir Fishery Resources

Water Supply

- The Sabine-Neches BBASC study area contains substantial water resources that are important existing and projected water supplies.
- The flow regime derived using the default HEFR analysis would substantially reduce water supply (depending upon the assumptions, by as much as 70% of the Texas yield of Toledo Bend Reservoir, and as much as 50% of new reservoir projects).
  - This would reduce the economic viability of these basins, significantly reducing the long-term ability to provide for the future needs of the State of Texas.

Economic Value of Reservoir Recreation

- The Sabine-Neches BBEST flow regime recommendations, if adopted by TCEQ as environmental flow standards, would severely impact lake levels for those reservoirs requiring new and amended permits.
- The harm to Sabine and Neches Basins reservoir recreation and the resulting economic consequences, both local and state, under the estimated frequency of low water levels to accommodate the Sabine-Neches BBEST recommendations has not been studied but these consequences could be significant.
- The economic consequences could include depressed waterfront property values, decreased tourism and the resulting trickledown effect to local businesses, jobs, and the local tax base.
- *The potential economic impact of environmental flow standards on reservoirs should be studied before environmental flow standards are enacted.*

Reservoir Fishery Resources

- A sound ecological environment is one that supports a healthy diversity of fish and aquatic life in a holistic approach that includes rivers, tributaries, lakes, and estuaries.
- Reservoirs should be included, along with rivers and estuaries when assessing environmental health.

Other Factors (some unique in the Sabine and Neches Basins)

- Sabine River Compact;
- The Sabine River is shared with Louisiana;
- Federal Energy Regulatory Commission (FERC) requires relicensing of the Toledo Bend Project by 2013;
- SB 2 instream flow studies are underway in the Lower Sabine Basin;
- Legal Liability; continued ...

Other Factors, continued

- U.S. Army Corps of Engineers (USACE) Sabine-Neches Waterway (SNWW) Channel Improvement Project is underway;
- Cutoff Bayou (change in the proportion of flows to Louisiana and Texas in the Lower Sabine River);
- Lower Neches Saltwater Barrier; and
- Proposed Lower Sabine Saltwater Barrier.

Recommendations

- Based upon its review of the Sabine-Neches BBEST environmental flow analyses and environmental flow recommendations,
- and considering them in conjunction with other factors ,
- the Sabine-Neches BBASC makes the following recommendations to the Environmental Flows Advisory Group and the Texas Commission on Environmental Quality:

Recommendation 1

- *The BBASC recommends the following definition for balancing the needs of Texas citizens with a sound ecological environment for the Sabine and Neches River Basins and Sabine Lake*
- A sound ecological environment is one that:
  - supports a healthy diversity of fish and other aquatic life;
  - sustains a full complement of important species;
  - provides all major aquatic habitat types including rivers and streams, reservoirs, and estuaries;
  - sustains key ecosystem processes; and
  - maintains water quality adequate for aquatic life.

Recommendation 2

- *Neither environmental flow standards nor environmental flow set asides should be established until more information is available to determine the amount of water needed to support a sound environment.*

Recommendation 3

- *The Sabine-Neches BBASC recommends that efforts be undertaken to initiate and complete the instream flow studies required under SB 2 (2001) in order to develop the type of data required to better understand the amount of instream flow needed for a sound ecological system in order to balance the environmental need for water with other needs for water as directed by SB 3 (2007).*
- *The SB 2 studies should include the upper Sabine River Basin and Neches River Basin, in addition to the ongoing Lower Sabine River Priority Instream Flow Study.*

Recommendation 4

- *The Sabine-Neches BBASC recommends continued efforts in Texas, coordinated with Louisiana, to protect and restore Sabine Lake Estuary wetlands identified by the USACE.*

Recommendation 5

- *The Sabine-Neches BBASC and Sabine-Neches BBEST should proceed with the development of a Work Plan that:*
  - *Establishes a five-year review cycle of the basin and bay environmental flow analyses and environmental flow regime recommendations, integrated with the SB 1 Regional Planning five-year cycle;*
  - *Suggests adjustments to the SB 2 instream flow program to obtain information useful to the SB 3 process; and*
  - *Prescribes specific monitoring, studies, and activities that are closely aligned with existing programs as much as possible (e.g. Texas Clean Rivers Program).*

Recommendation 6

- *TCEQ along with the Sabine-Neches BBASC and Sabine-Neches BBEST should address the implementation of environmental flow standards and set-asides, in advance of weighing the environmental flow needs against the need for water for other purposes.*

Recommendation 7

- *The Sabine-Neches BBASC recommends that no requirement to produce overbank flows or high flow pulses be imposed on a reservoir owner until a liability shield is in place.*

Conclusion

- The Sabine-Neches River Basins and Sabine Lake Estuary have abundant uncontrolled runoff that provides plentiful and variable environmental flows.
- Texas has a strong, vibrant economy for which surface water supplies play a major role.
- *Given that Texas' population is projected to double within the 50-year SB 1 regional planning horizon, prudent water resource management suggests further studies need to be undertaken to address the gaps in our knowledge regarding environmental needs to make an informed decision in the SB 3 balancing exercise.*

Appendix 3-B

Source Data and Water Supplies from the Data Web Interface

The following appendix includes a copy of the data from the TWDB Data Web Interface. This appendix provides a summary of water supply source availability and a summary of supplies for WUGs and WWPs categorized by county and river basin.

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Region I Source Availability
(Ac-ft per Year)

Source Name	County	Basin	2010	2020	2030	2040	2050	2060
CARRIZO-WILCOX AQUIFER	ANDERSON	NECHES	5,266	5,266	5,266	5,266	5,266	5,266
CARRIZO-WILCOX AQUIFER	ANDERSON	TRINITY	4,564	4,564	4,564	4,564	4,564	4,564
LIVESTOCK LOCAL SUPPLY	ANDERSON	NECHES	599	599	599	599	599	599
LIVESTOCK LOCAL SUPPLY	ANDERSON	TRINITY	684	684	684	684	684	684
NECHES RIVER COMBINED RUN-OF-RIVER IRRIGATION	ANDERSON	NECHES	197	197	197	197	197	197
OTHER AQUIFER	ANDERSON	NECHES	85	85	85	85	85	85
OTHER AQUIFER	ANDERSON	TRINITY	195	195	195	195	195	195
QUEEN CITY AQUIFER	ANDERSON	NECHES	17,252	17,252	17,252	17,252	17,252	17,252
QUEEN CITY AQUIFER	ANDERSON	TRINITY	1,068	1,068	1,068	1,068	1,068	1,068
SPARTA AQUIFER	ANDERSON	NECHES	353	353	353	353	353	353
SPARTA AQUIFER	ANDERSON	TRINITY	247	247	247	247	247	247
TRINITY COMBINED RUN-OF-RIVER IRRIGATION	ANDERSON	TRINITY	1,060	1,060	1,060	1,060	1,060	1,060
CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	28,330	28,330	28,330	28,330	28,330	28,330
DIRECT REUSE	ANGELINA	NECHES	1,265	1,265	1,265	1,265	1,265	1,265
LIVESTOCK LOCAL SUPPLY	ANGELINA	NECHES	347	347	347	347	347	347
NECHES RIVER COMBINED RUN-OF-RIVER IRRIGATION	ANGELINA	NECHES	17	17	17	17	17	17
NECHES RIVER RUN-OF-RIVER MANUFACTURING	ANGELINA	NECHES	57	57	57	57	57	57
OTHER AQUIFER	ANGELINA	NECHES	1,450	1,450	1,450	1,450	1,450	1,450
QUEEN CITY AQUIFER	ANGELINA	NECHES	1,060	1,060	1,060	1,060	1,060	1,060
SPARTA AQUIFER	ANGELINA	NECHES	670	670	670	670	670	670
YEGUA-JACKSON AQUIFER	ANGELINA	NECHES	6,472	6,472	6,472	6,472	6,472	6,472
CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	10,870	10,870	10,870	10,870	10,870	10,870
LIVESTOCK LOCAL SUPPLY	CHEROKEE	NECHES	1,059	1,059	1,059	1,059	1,059	1,059
NECHES RIVER COMBINED RUN-OF-RIVER IRRIGATION	CHEROKEE	NECHES	182	182	182	182	182	182
OTHER LOCAL SUPPLY	CHEROKEE	NECHES	2	2	2	2	2	2
QUEEN CITY AQUIFER	CHEROKEE	NECHES	21,850	21,850	21,850	21,850	21,850	21,850
SPARTA AQUIFER	CHEROKEE	NECHES	350	350	350	350	350	350
GULF COAST AQUIFER	HARDIN	NECHES	23,480	23,480	23,480	23,479	23,479	23,478
GULF COAST AQUIFER	HARDIN	TRINITY	20	20	20	21	21	22
LIVESTOCK LOCAL SUPPLY	HARDIN	NECHES	139	139	139	139	139	139
LIVESTOCK LOCAL SUPPLY	HARDIN	TRINITY	2	2	2	2	2	2
NECHES RIVER RUN-OF-RIVER IRRIGATION	HARDIN	NECHES	57	57	57	57	57	57
CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	4,200	4,200	4,200	4,200	4,200	4,200
INDIRECT REUSE	HENDERSON	NECHES	2,872	2,872	2,872	2,872	2,872	2,872
LIVESTOCK LOCAL SUPPLY	HENDERSON	NECHES	279	279	279	279	279	279
QUEEN CITY AQUIFER	HENDERSON	NECHES	14,870	14,870	14,870	14,870	14,870	14,870
CARRIZO-WILCOX AQUIFER	HOUSTON	NECHES	1,939	1,939	1,939	1,939	1,939	1,939
CARRIZO-WILCOX AQUIFER	HOUSTON	TRINITY	3,281	3,281	3,281	3,281	3,281	3,281
LIVESTOCK LOCAL SUPPLY	HOUSTON	NECHES	388	388	388	388	388	388
LIVESTOCK LOCAL SUPPLY	HOUSTON	TRINITY	783	783	783	783	783	783
NECHES RIVER COMBINED RUN-OF-RIVER IRRIGATION	HOUSTON	NECHES	287	287	287	287	287	287
OTHER AQUIFER	HOUSTON	NECHES	400	400	400	400	400	400

Region I Source Availability
(Ac-ft per Year)

Source Name	County	Basin	2010	2020	2030	2040	2050	2060
OTHER AQUIFER	HOUSTON	TRINITY	980	980	980	980	980	980
QUEEN CITY AQUIFER	HOUSTON	NECHES	251	251	251	251	251	251
QUEEN CITY AQUIFER	HOUSTON	TRINITY	149	149	149	149	149	149
SPARTA AQUIFER	HOUSTON	NECHES	339	339	339	339	339	339
SPARTA AQUIFER	HOUSTON	TRINITY	531	531	531	531	531	531
TRINITY COMBINED RUN-OF-RIVER IRRIGATION	HOUSTON	TRINITY	1,783	1,783	1,783	1,783	1,783	1,783
YEGUA-JACKSON AQUIFER	HOUSTON	NECHES	552	552	552	552	552	552
YEGUA-JACKSON AQUIFER	HOUSTON	TRINITY	828	828	828	828	828	828
GULF COAST AQUIFER	JASPER	NECHES	28,000	28,000	28,000	28,000	28,000	28,000
GULF COAST AQUIFER	JASPER	SABINE	24,000	24,000	24,000	24,000	24,000	24,000
LIVESTOCK LOCAL SUPPLY	JASPER	NECHES	115	115	115	115	115	115
LIVESTOCK LOCAL SUPPLY	JASPER	SABINE	75	75	75	75	75	75
NECHES RIVER COMBINED RUN-OF-RIVER IRRIGATION	JASPER	NECHES	127	127	127	127	127	127
NECHES RIVER RUN-OF-RIVER MANUFACTURING	JASPER	NECHES	604	604	604	604	604	604
NECHES RIVER RUN-OF-RIVER MANUFACTURING	JASPER	NECHES	12	12	12	12	12	12
NECHES RIVER RUN-OF-RIVER PINE ISLAND BAYOU	JASPER	NECHES	381,876	381,876	381,876	381,876	381,876	381,876
OTHER AQUIFER	JASPER	NECHES	3,000	3,000	3,000	3,000	3,000	3,000
OTHER AQUIFER	JASPER	SABINE	3,000	3,000	3,000	3,000	3,000	3,000
GULF COAST AQUIFER	JEFFERSON	NECHES	780	780	780	780	780	780
GULF COAST AQUIFER	JEFFERSON	NECHES-TRINITY	1,720	1,720	1,720	1,720	1,720	1,720
INDIRECT REUSE IRRIGATION	JEFFERSON	NECHES-TRINITY	13,687	13,687	13,687	13,687	13,687	13,687
LIVESTOCK LOCAL SUPPLY	JEFFERSON	NECHES	43	43	43	43	43	43
LIVESTOCK LOCAL SUPPLY	JEFFERSON	NECHES-TRINITY	280	280	280	280	280	280
NECHES RIVER RUN-OF-RIVER	JEFFERSON	NECHES	32,111	32,111	32,111	32,111	32,111	32,111
NECHES RIVER RUN-OF-RIVER SALINE	JEFFERSON	NECHES	434,400	434,400	434,400	434,400	434,400	434,400
NECHES RIVER RUN-OF-RIVER SALINE	JEFFERSON	NECHES	4,300	4,300	4,300	4,300	4,300	4,300
NECHES RIVER RUN-OF-RIVER SALINE	JEFFERSON	NECHES	17,922	17,922	17,922	17,922	17,922	17,922
NECHES RIVER RUN-OF-RIVER SALINE	JEFFERSON	NECHES	268	268	268	268	268	268
NECHES RIVER RUN-OF-RIVER SALINE	JEFFERSON	NECHES	12,900	12,900	12,900	12,900	12,900	12,900
NECHES RIVER RUN-OF-RIVER SALINE	JEFFERSON	NECHES	279,131	279,131	279,131	279,131	279,131	279,131
NECHES RIVER RUN-OF-RIVER SALINE	JEFFERSON	NECHES	11	11	11	11	11	11
NECHES RIVER RUN-OF-RIVER SALINE	JEFFERSON	NECHES	40	40	40	40	40	40
NECHES RIVER RUN-OF-RIVER SALINE	JEFFERSON	NECHES	2,700	2,700	2,700	2,700	2,700	2,700
NECHES-TRINITY COMBINED RUN-OF-RIVER IRRIGATION	JEFFERSON	NECHES-TRINITY	44,286	44,286	44,286	44,286	44,286	44,286
NECHES-TRINITY RIVER COMBINED RUN-OF-RIVER MAN	JEFFERSON	NECHES-TRINITY	680	680	680	680	680	680
NECHES-TRINITY RIVER COMBINED RUN-OF-RIVER MINI	JEFFERSON	NECHES-TRINITY	34	34	34	34	34	34
NECHES-TRINITY RIVER RUN-OF-RIVER IRRIGATION	JEFFERSON	NECHES-TRINITY	5,139	5,139	5,139	5,139	5,139	5,139
NECHES-TRINITY RIVER RUN-OF-RIVER IRRIGATION	JEFFERSON	NECHES-TRINITY	5,321	5,321	5,321	5,321	5,321	5,321
NECHES-TRINITY RIVER RUN-OF-RIVER MANUFACTURIN	JEFFERSON	NECHES-TRINITY	480	480	480	480	480	480
OTHER LOCAL SUPPLY	JEFFERSON	NECHES	74	74	74	74	74	74
OTHER LOCAL SUPPLY	JEFFERSON	NECHES-TRINITY	168	168	168	168	168	168
CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	31,140	31,140	31,140	31,140	31,140	31,140

Region I Source Availability
(Ac-ft per Year)

Source Name	County	Basin	2010	2020	2030	2040	2050	2060
LAKE NACONICHE LAKE/RESERVOIR	NACOGDOCHES	NECHES	3,239	3,239	3,239	3,239	3,239	3,239
LIVESTOCK LOCAL SUPPLY	NACOGDOCHES	NECHES	910	910	910	910	910	910
NECHES RIVER COMBINED RUN-OF-RIVER IRRIGATION	NACOGDOCHES	NECHES	136	136	136	136	136	136
NECHES RIVER RUN-OF-RIVER MANUFACTURING	NACOGDOCHES	NECHES	2	2	2	2	2	2
OTHER AQUIFER	NACOGDOCHES	NECHES	80	80	80	80	80	80
OTHER LOCAL SUPPLY	NACOGDOCHES	NECHES	220	220	220	220	220	220
QUEEN CITY AQUIFER	NACOGDOCHES	NECHES	4,860	4,860	4,860	4,860	4,860	4,860
SPARTA AQUIFER	NACOGDOCHES	NECHES	400	400	400	400	400	400
YEGUA-JACKSON AQUIFER	NACOGDOCHES	NECHES	60	60	60	60	60	60
GULF COAST AQUIFER	NEWTON	NECHES	192	192	192	192	192	192
GULF COAST AQUIFER	NEWTON	SABINE	28,808	28,808	28,808	28,808	28,808	28,808
LIVESTOCK LOCAL SUPPLY	NEWTON	SABINE	66	66	66	66	66	66
OTHER AQUIFER	NEWTON	SABINE	1,500	1,500	1,500	1,500	1,500	1,500
OTHER LOCAL SUPPLY	NEWTON	SABINE	28	28	28	28	28	28
SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	147,100	147,100	147,100	147,100	147,100	147,100
SABINE RIVER RUN-OF-RIVER IRRIGATION	NEWTON	SABINE	50	50	50	50	50	50
SABINE RIVER RUN-OF-RIVER MANUFACTURING	NEWTON	SABINE	135	135	135	135	135	135
DIRECT REUSE	ORANGE	SABINE	15	15	15	15	15	15
GULF COAST AQUIFER	ORANGE	NECHES	4,559	4,559	4,559	4,559	4,559	4,559
GULF COAST AQUIFER	ORANGE	SABINE	15,441	15,441	15,441	15,441	15,441	15,441
LIVESTOCK LOCAL SUPPLY	ORANGE	NECHES	56	56	56	56	56	56
LIVESTOCK LOCAL SUPPLY	ORANGE	SABINE	70	70	70	70	70	70
NECHES RIVER RUN-OF-RIVER SALINE	ORANGE	NECHES	100	100	100	100	100	100
NECHES RIVER RUN-OF-RIVER SALINE	ORANGE	NECHES	17,210	17,210	17,210	17,210	17,210	17,210
OTHER LOCAL SUPPLY	ORANGE	SABINE	1	1	1	1	1	1
SABINE RIVER RUN-OF-RIVER IRRIGATION	ORANGE	SABINE	28	28	28	28	28	28
SABINE RIVER RUN-OF-RIVER SALINE	ORANGE	SABINE	267,000	267,000	267,000	267,000	267,000	267,000
CARRIZO-WILCOX AQUIFER	PANOLA	CYPRESS	27	27	27	27	27	27
CARRIZO-WILCOX AQUIFER	PANOLA	SABINE	10,343	10,343	10,343	10,343	10,343	10,343
LIVESTOCK LOCAL SUPPLY	PANOLA	CYPRESS	30	30	30	30	30	30
LIVESTOCK LOCAL SUPPLY	PANOLA	SABINE	1,828	1,828	1,828	1,828	1,828	1,828
SABINE RIVER COMBINED RUN-OF-RIVER IRRIGATION	PANOLA	SABINE	191	191	191	191	191	191
SABINE RIVER RUN-OF-RIVER MANUFACTURING	PANOLA	SABINE	129	129	129	129	129	129
SABINE RIVER RUN-OF-RIVER MANUFACTURING	PANOLA	SABINE	114	114	114	114	114	114
SABINE RIVER RUN-OF-RIVER MINING	PANOLA	SABINE	167	167	167	167	167	167
GULF COAST AQUIFER	POLK	NECHES	13,500	13,500	13,500	13,500	13,500	13,500
LIVESTOCK LOCAL SUPPLY	POLK	NECHES	122	122	122	122	122	122
OTHER AQUIFER	POLK	NECHES	1,450	1,450	1,450	1,450	1,450	1,450
YEGUA-JACKSON AQUIFER	POLK	NECHES	360	360	360	360	360	360
ATHENS LAKE/RESERVOIR	RESERVOIR	NECHES	6,064	5,983	5,903	5,822	5,741	5,660
BELLWOOD LAKE/RESERVOIR	RESERVOIR	NECHES	950	950	950	950	950	950
CENTER LAKE/RESERVOIR	RESERVOIR	SABINE	754	754	754	754	754	754

Region I Source Availability
(Ac-ft per Year)

Source Name	County	Basin	2010	2020	2030	2040	2050	2060
CHEROKEE LAKE/RESERVOIR	RESERVOIR	SABINE	28,885	28,650	28,415	28,180	27,945	27,710
COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	3,500	3,500	3,500	3,500	3,500	3,500
JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	6,200	6,200	6,200	6,200	6,200	6,200
KURTH LAKE/RESERVOIR	RESERVOIR	NECHES	18,421	18,417	18,413	18,408	18,404	18,400
MARTIN LAKE/RESERVOIR	RESERVOIR	SABINE	25,000	25,000	25,000	25,000	25,000	25,000
MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	21,792	21,203	20,615	20,027	19,438	18,850
NACOGDOCHES LAKE/RESERVOIR	RESERVOIR	NECHES	17,067	16,683	16,300	15,917	15,533	15,150
PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	207,458	205,417	203,375	201,333	199,292	197,250
PINKSTON LAKE/RESERVOIR	RESERVOIR	NECHES	3,800	3,800	3,800	3,800	3,800	3,800
RUSK CITY LAKE/RESERVOIR	RESERVOIR	NECHES	64	63	63	62	61	60
SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	820,000	820,000	820,000	820,000	820,000	820,000
SAN AUGUSTINE LAKE/RESERVOIR	RESERVOIR	NECHES	1,285	1,285	1,285	1,285	1,285	1,285
STRIKER LAKE/RESERVOIR	RESERVOIR	NECHES	20,183	19,357	18,530	17,703	16,877	16,050
TIMPSON LAKE/RESERVOIR	RESERVOIR	NECHES	350	350	350	350	350	350
TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	750,000	750,000	750,000	750,000	750,000	750,000
TYLER LAKE/RESERVOIR	RESERVOIR	NECHES	30,925	30,900	30,875	30,850	30,825	30,800
TOLEDO BEND LAKE/RESERVOIR LOUISIANA PORTION	RESERVOIR - LOUISI/	SABINE - LOUISIANA	235	235	235	235	235	235
CARRIZO-WILCOX AQUIFER	RUSK	NECHES	10,271	10,271	10,271	10,271	10,271	10,271
CARRIZO-WILCOX AQUIFER	RUSK	SABINE	10,019	10,019	10,019	10,019	10,019	10,019
LIVESTOCK LOCAL SUPPLY	RUSK	NECHES	386	386	386	386	386	386
LIVESTOCK LOCAL SUPPLY	RUSK	SABINE	308	308	308	308	308	308
NECHES RIVER COMBINED RUN-OF-RIVER IRRIGATION	RUSK	NECHES	86	86	86	86	86	86
NECHES RIVER COMBINED RUN-OF-RIVER MANUFACTUI	RUSK	NECHES	2	2	2	2	2	2
OTHER LOCAL SUPPLY	RUSK	SABINE	287	287	287	287	287	287
QUEEN CITY AQUIFER	RUSK	NECHES	1,695	1,695	1,695	1,695	1,695	1,695
QUEEN CITY AQUIFER	RUSK	SABINE	2,555	2,555	2,555	2,555	2,555	2,555
SABINE RIVER COMBINED RUN-OF-RIVER IRRIGATION	RUSK	SABINE	127	127	127	127	127	127
SABINE RIVER RUN-OF-RIVER MUNICIPAL	RUSK	SABINE	10	10	10	10	10	10
CARRIZO-WILCOX AQUIFER	SABINE	NECHES	6,048	6,048	6,048	6,048	6,048	6,048
CARRIZO-WILCOX AQUIFER	SABINE	SABINE	662	662	662	662	662	662
DIRECT REUSE MANUFACTURING	SABINE	SABINE	20	20	20	20	20	20
GULF COAST AQUIFER	SABINE	NECHES	97	97	97	97	97	97
GULF COAST AQUIFER	SABINE	SABINE	1,003	1,003	1,003	1,003	1,003	1,003
LIVESTOCK LOCAL SUPPLY	SABINE	NECHES	59	59	59	59	59	59
LIVESTOCK LOCAL SUPPLY	SABINE	SABINE	320	320	320	320	320	320
NECHES RIVER RUN-OF-RIVER MANUFACTURING	SABINE	NECHES	182	182	182	182	182	182
OTHER AQUIFER	SABINE	NECHES	115	115	115	115	115	115
OTHER AQUIFER	SABINE	SABINE	85	85	85	85	85	85
SPARTA AQUIFER	SABINE	NECHES	70	70	70	70	70	70
SPARTA AQUIFER	SABINE	SABINE	220	220	220	220	220	220
YEGUA-JACKSON AQUIFER	SABINE	NECHES	310	310	310	310	310	310

Region I Source Availability
(Ac-ft per Year)

Source Name	County	Basin	2010	2020	2030	2040	2050	2060
YEGUA-JACKSON AQUIFER	SABINE	SABINE	790	790	790	790	790	790
CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	NECHES	1,052	1,052	1,052	1,052	1,052	1,052
CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	SABINE	638	638	638	638	638	638
LIVESTOCK LOCAL SUPPLY	SAN AUGUSTINE	NECHES	490	490	490	490	490	490
LIVESTOCK LOCAL SUPPLY	SAN AUGUSTINE	SABINE	71	71	71	71	71	71
OTHER AQUIFER	SAN AUGUSTINE	NECHES	60	60	60	60	60	60
SPARTA AQUIFER	SAN AUGUSTINE	NECHES	160	160	160	160	160	160
SPARTA AQUIFER	SAN AUGUSTINE	SABINE	40	40	40	40	40	40
YEGUA-JACKSON AQUIFER	SAN AUGUSTINE	NECHES	540	540	540	540	540	540
CARRIZO-WILCOX AQUIFER	SHELBY	NECHES	5,346	5,346	5,346	5,346	5,346	5,346
CARRIZO-WILCOX AQUIFER	SHELBY	SABINE	7,404	7,404	7,404	7,404	7,404	7,404
DIRECT REUSE IRRIGATION/MANUFACTURING	SHELBY	SABINE	218	233	246	259	270	284
LIVESTOCK LOCAL SUPPLY	SHELBY	NECHES	334	334	334	334	334	334
LIVESTOCK LOCAL SUPPLY	SHELBY	SABINE	1,755	1,755	1,755	1,755	1,755	1,755
CARRIZO-WILCOX AQUIFER	SMITH	NECHES	18,400	18,400	18,400	18,400	18,400	18,400
LIVESTOCK LOCAL SUPPLY	SMITH	NECHES	416	416	416	416	416	416
NECHES RIVER COMBINED RUN-OF-RIVER IRRIGATION	SMITH	NECHES	50	50	50	50	50	50
OTHER AQUIFER	SMITH	NECHES	80	80	80	80	80	80
QUEEN CITY AQUIFER	SMITH	NECHES	17,280	17,280	17,280	17,280	17,280	17,280
CARRIZO-WILCOX AQUIFER	TRINITY	NECHES	2,161	2,161	2,161	2,161	2,161	2,161
GULF COAST AQUIFER	TRINITY	NECHES	100	100	100	100	100	100
LIVESTOCK LOCAL SUPPLY	TRINITY	NECHES	135	135	135	135	135	135
NECHES RIVER RUN-OF-RIVER IRRIGATION	TRINITY	NECHES	62	62	62	62	62	62
OTHER AQUIFER	TRINITY	NECHES	280	280	280	280	280	280
SPARTA AQUIFER	TRINITY	NECHES	600	600	600	600	600	600
YEGUA-JACKSON AQUIFER	TRINITY	NECHES	740	740	740	740	740	740
GULF COAST AQUIFER	TYLER	NECHES	30,300	30,300	30,300	30,300	30,300	30,300
LIVESTOCK LOCAL SUPPLY	TYLER	NECHES	165	165	165	165	165	165
NECHES RIVER COMBINED RUN-OF-RIVER IRRIGATION	TYLER	NECHES	123	123	123	123	123	123
OTHER AQUIFER	TYLER	NECHES	1,620	1,620	1,620	1,620	1,620	1,620
YEGUA-JACKSON AQUIFER	TYLER	NECHES	180	180	180	180	180	180

Region I Water User Group Supply
(Ac-ft per Year)

WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
BRUSHY CREEK WSC	ANDERSON	NECHES	CARRIZO-WILCOX AQUIFER	ANDERSON	NECHES	205	205	205	205	205	205
BRUSHY CREEK WSC	ANDERSON	TRINITY	CARRIZO-WILCOX AQUIFER	ANDERSON	NECHES	169	169	169	169	169	169
CONSOLIDATED WSC	ANDERSON	NECHES	CARRIZO-WILCOX AQUIFER	HOUSTON	TRINITY	15	15	15	15	15	15
CONSOLIDATED WSC	ANDERSON	NECHES	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	23	24	24	23	24	24
CONSOLIDATED WSC	ANDERSON	TRINITY	CARRIZO-WILCOX AQUIFER	HOUSTON	TRINITY	51	51	51	51	51	51
CONSOLIDATED WSC	ANDERSON	TRINITY	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	79	78	78	79	78	78
COUNTY-OTHER	ANDERSON	NECHES	CARRIZO-WILCOX AQUIFER	ANDERSON	NECHES	500	500	500	500	500	500
COUNTY-OTHER	ANDERSON	NECHES	OTHER AQUIFER	ANDERSON	NECHES	32	32	32	32	32	32
COUNTY-OTHER	ANDERSON	NECHES	QUEEN CITY AQUIFER	ANDERSON	NECHES	239	239	239	239	239	239
COUNTY-OTHER	ANDERSON	NECHES	SPARTA AQUIFER	ANDERSON	NECHES	88	88	88	88	88	88
COUNTY-OTHER	ANDERSON	TRINITY	CARRIZO-WILCOX AQUIFER	ANDERSON	NECHES	2,000	2,000	2,000	2,000	2,000	2,000
COUNTY-OTHER	ANDERSON	TRINITY	CARRIZO-WILCOX AQUIFER	ANDERSON	TRINITY	2,731	2,731	2,731	2,731	2,731	2,731
COUNTY-OTHER	ANDERSON	TRINITY	OTHER AQUIFER	ANDERSON	TRINITY	45	45	45	45	45	45
COUNTY-OTHER	ANDERSON	TRINITY	QUEEN CITY AQUIFER	ANDERSON	TRINITY	336	336	336	336	336	336
COUNTY-OTHER	ANDERSON	TRINITY	SPARTA AQUIFER	ANDERSON	TRINITY	124	124	124	124	124	124
ELKHART	ANDERSON	TRINITY	CARRIZO-WILCOX AQUIFER	ANDERSON	TRINITY	428	428	428	428	428	428
FOUR PINE WSC	ANDERSON	TRINITY	CARRIZO-WILCOX AQUIFER	ANDERSON	TRINITY	549	549	549	549	549	549
FRANKSTON	ANDERSON	NECHES	CARRIZO-WILCOX AQUIFER	ANDERSON	NECHES	558	558	558	558	558	558
IRRIGATION	ANDERSON	NECHES	CARRIZO-WILCOX AQUIFER	ANDERSON	NECHES	30	30	30	30	30	30
IRRIGATION	ANDERSON	NECHES	NECHES RIVER COMBINED RUN-OF-RIVER IRRIGATION	ANDERSON	NECHES	197	197	197	197	197	197
IRRIGATION	ANDERSON	NECHES	QUEEN CITY AQUIFER	ANDERSON	NECHES	3	3	3	3	3	3
IRRIGATION	ANDERSON	TRINITY	CARRIZO-WILCOX AQUIFER	ANDERSON	TRINITY	356	356	356	356	356	356
IRRIGATION	ANDERSON	TRINITY	TRINITY COMBINED RUN-OF-RIVER IRRIGATION	ANDERSON	TRINITY	1,060	1,060	1,060	1,060	1,060	1,060
LIVESTOCK	ANDERSON	NECHES	LIVESTOCK LOCAL SUPPLY	ANDERSON	NECHES	599	599	599	599	599	599
LIVESTOCK	ANDERSON	NECHES	QUEEN CITY AQUIFER	ANDERSON	NECHES	200	200	200	200	200	200
LIVESTOCK	ANDERSON	NECHES	SPARTA AQUIFER	ANDERSON	NECHES	75	75	75	75	75	75
LIVESTOCK	ANDERSON	TRINITY	CARRIZO-WILCOX AQUIFER	ANDERSON	TRINITY	244	244	244	244	244	244
LIVESTOCK	ANDERSON	TRINITY	LIVESTOCK LOCAL SUPPLY	ANDERSON	TRINITY	684	684	684	684	684	684
LIVESTOCK	ANDERSON	TRINITY	OTHER AQUIFER	ANDERSON	TRINITY	29	29	29	29	29	29
LIVESTOCK	ANDERSON	TRINITY	QUEEN CITY AQUIFER	ANDERSON	TRINITY	218	218	218	218	218	218
LIVESTOCK	ANDERSON	TRINITY	SPARTA AQUIFER	ANDERSON	TRINITY	80	80	80	80	80	80
MINING	ANDERSON	NECHES	CARRIZO-WILCOX AQUIFER	ANDERSON	NECHES	505	505	505	505	505	505
MINING	ANDERSON	TRINITY	CARRIZO-WILCOX AQUIFER	ANDERSON	TRINITY	33	33	33	33	33	33
PALESTINE	ANDERSON	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	2,278	2,278	2,278	2,278	2,278	2,278
PALESTINE	ANDERSON	TRINITY	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	2,053	2,053	2,053	2,053	2,053	2,053
WALSTON SPRINGS WSC	ANDERSON	NECHES	CARRIZO-WILCOX AQUIFER	ANDERSON	NECHES	833	833	833	833	833	833
ANGELINA WSC	ANGELINA	NECHES	YEGUA-JACKSON AQUIFER	ANGELINA	NECHES	674	674	674	674	674	674
CENTRAL WCID OF ANGELINA COUNTY	ANGELINA	NECHES	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	874	874	874	874	874	874
COUNTY-OTHER	ANGELINA	NECHES	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	615	600	598	597	597	598
COUNTY-OTHER	ANGELINA	NECHES	YEGUA-JACKSON AQUIFER	ANGELINA	NECHES	1,357	1,357	1,357	1,357	1,357	1,357
DIBOLL	ANGELINA	NECHES	YEGUA-JACKSON AQUIFER	ANGELINA	NECHES	936	936	936	936	936	936
FOUR WAY WSC	ANGELINA	NECHES	YEGUA-JACKSON AQUIFER	ANGELINA	NECHES	1,372	1,372	1,372	1,372	1,372	1,372
HUDSON	ANGELINA	NECHES	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	808	808	808	808	808	808
HUDSON WSC	ANGELINA	NECHES	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	991	991	991	991	991	991
HUNTINGTON	ANGELINA	NECHES	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	11	11	12	12	12	12
HUNTINGTON	ANGELINA	NECHES	YEGUA-JACKSON AQUIFER	ANGELINA	NECHES	625	625	625	625	625	625
IRRIGATION	ANGELINA	NECHES	OTHER AQUIFER	ANGELINA	NECHES	38	38	38	38	38	38

Region I Water User Group Supply
(Ac-ft per Year)

WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
LIVESTOCK	ANGELINA	NECHES	LIVESTOCK LOCAL SUPPLY	ANGELINA	NECHES	347	347	347	347	347	347
LIVESTOCK	ANGELINA	NECHES	OTHER AQUIFER	ANGELINA	NECHES	155	155	155	155	155	155
LIVESTOCK	ANGELINA	NECHES	QUEEN CITY AQUIFER	ANGELINA	NECHES	79	79	79	79	79	79
LIVESTOCK	ANGELINA	NECHES	SPARTA AQUIFER	ANGELINA	NECHES	79	79	79	79	79	79
LUFKIN	ANGELINA	NECHES	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	4,302	3,327	3,389	3,449	3,535	3,634
MANUFACTURING	ANGELINA	NECHES	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	9,345	10,699	10,709	10,716	10,693	10,651
MANUFACTURING	ANGELINA	NECHES	DIRECT REUSE	ANGELINA	NECHES	1,265	1,265	1,265	1,265	1,265	1,265
MANUFACTURING	ANGELINA	NECHES	KURTH LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
MANUFACTURING	ANGELINA	NECHES	OTHER AQUIFER	ANGELINA	NECHES	1,023	1,023	1,023	1,023	1,023	1,023
MANUFACTURING	ANGELINA	NECHES	STRIKER LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
MINING	ANGELINA	NECHES	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	28	28	28	28	28	28
REDLAND WSC	ANGELINA	NECHES	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	840	840	840	840	840	840
ZAVALLA	ANGELINA	NECHES	OTHER AQUIFER	ANGELINA	NECHES	193	193	193	193	193	193
ALTO	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	549	549	549	549	549	549
ALTO RURAL WSC	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	756	756	756	756	756	756
BULLARD	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	13	13	13	13	13	14
COUNTY-OTHER	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	1,563	1,563	1,563	1,563	1,563	1,563
COUNTY-OTHER	CHEROKEE	NECHES	JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	218	180	134	78	54	41
COUNTY-OTHER	CHEROKEE	NECHES	QUEEN CITY AQUIFER	CHEROKEE	NECHES	81	81	81	81	81	81
COUNTY-OTHER	CHEROKEE	NECHES	SPARTA AQUIFER	CHEROKEE	NECHES	12	12	12	12	12	12
CRAFT-TURNEY WSC	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	213	240	276	322	339	348
CRAFT-TURNEY WSC	CHEROKEE	NECHES	JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	497	559	643	752	790	811
IRRIGATION	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	51	51	51	51	51	51
IRRIGATION	CHEROKEE	NECHES	NECHES RIVER COMBINED RUN-OF-RIVER IRRIGATION	CHEROKEE	NECHES	182	182	182	182	182	182
IRRIGATION	CHEROKEE	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	296	293	290	287	285	282
IRRIGATION	CHEROKEE	NECHES	QUEEN CITY AQUIFER	CHEROKEE	NECHES	51	51	51	51	51	51
IRRIGATION	CHEROKEE	NECHES	SPARTA AQUIFER	CHEROKEE	NECHES	3	3	3	3	3	3
JACKSONVILLE	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	1,450	1,420	1,390	1,358	1,344	1,326
JACKSONVILLE	CHEROKEE	NECHES	JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	3,381	3,311	3,243	3,168	3,135	3,093
LIVESTOCK	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	566	566	566	566	566	566
LIVESTOCK	CHEROKEE	NECHES	LIVESTOCK LOCAL SUPPLY	CHEROKEE	NECHES	1,059	1,059	1,059	1,059	1,059	1,059
LIVESTOCK	CHEROKEE	NECHES	QUEEN CITY AQUIFER	CHEROKEE	NECHES	566	566	566	566	566	566
LIVESTOCK	CHEROKEE	NECHES	SPARTA AQUIFER	CHEROKEE	NECHES	186	186	186	186	186	186
MANUFACTURING	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	297	306	312	316	318	325
MANUFACTURING	CHEROKEE	NECHES	JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	693	714	727	738	742	758
MINING	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	101	101	101	101	101	101
MINING	CHEROKEE	NECHES	OTHER LOCAL SUPPLY	CHEROKEE	NECHES	2	2	2	2	2	2
NEW SUMMERFIELD	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	262	262	262	262	262	262
NORTH CHEROKEE WSC	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	160	171	179	184	191	199
NORTH CHEROKEE WSC	CHEROKEE	NECHES	JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	374	400	418	430	445	463
RUSK	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	1,315	1,316	1,317	1,317	1,318	1,319
RUSK	CHEROKEE	NECHES	RUSK CITY LAKE/RESERVOIR	RESERVOIR	NECHES	64	63	63	62	61	60
RUSK RURAL WSC	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	537	537	537	537	537	537
SOUTHERN UTILITIES COMPANY	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	574	603	633	665	698	733
STEAM ELECTRIC POWER	CHEROKEE	NECHES	STRIKER LAKE/RESERVOIR	RESERVOIR	NECHES	2,245	1,790	2,093	2,462	2,912	3,460
TROUP	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	8	8	8	8	8	8
WELLS	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	359	359	359	359	359	359
COUNTY-OTHER	HARDIN	NECHES	GULF COAST AQUIFER	HARDIN	NECHES	1,680	1,680	1,680	1,680	1,680	1,680

Region I Water User Group Supply
(Ac-ft per Year)

WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
COUNTY-OTHER	HARDIN	TRINITY	GULF COAST AQUIFER	HARDIN	TRINITY	20	20	20	20	20	20
IRRIGATION	HARDIN	NECHES	GULF COAST AQUIFER	HARDIN	NECHES	2,500	2,500	2,500	2,500	2,500	2,500
KOUNTZE	HARDIN	NECHES	GULF COAST AQUIFER	HARDIN	NECHES	729	729	729	729	729	729
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	HARDIN	TRINITY	GULF COAST AQUIFER	HARDIN	NECHES	8	8	8	8	8	8
LIVESTOCK	HARDIN	NECHES	GULF COAST AQUIFER	HARDIN	NECHES	18	18	18	18	18	18
LIVESTOCK	HARDIN	NECHES	LIVESTOCK LOCAL SUPPLY	HARDIN	NECHES	139	139	139	139	139	139
LIVESTOCK	HARDIN	TRINITY	LIVESTOCK LOCAL SUPPLY	HARDIN	TRINITY	2	2	2	2	2	2
LUMBERTON	HARDIN	NECHES	GULF COAST AQUIFER	HARDIN	NECHES	1,700	1,700	1,700	1,700	1,700	1,675
LUMBERTON MUD	HARDIN	NECHES	GULF COAST AQUIFER	HARDIN	NECHES	2,981	2,981	2,981	2,981	2,981	2,981
MANUFACTURING	HARDIN	NECHES	GULF COAST AQUIFER	HARDIN	NECHES	119	119	119	119	119	119
MINING	HARDIN	NECHES	GULF COAST AQUIFER	HARDIN	NECHES	28	28	28	28	28	28
NORTH HARDIN WSC	HARDIN	NECHES	GULF COAST AQUIFER	HARDIN	NECHES	1,399	1,399	1,399	1,399	1,399	1,399
SILSBEE	HARDIN	NECHES	GULF COAST AQUIFER	HARDIN	NECHES	1,608	1,608	1,608	1,608	1,608	1,608
SOUR LAKE	HARDIN	NECHES	GULF COAST AQUIFER	HARDIN	NECHES	766	766	766	766	766	766
WEST HARDIN WSC	HARDIN	NECHES	GULF COAST AQUIFER	HARDIN	NECHES	599	599	599	599	599	599
ATHENS	HENDERSON	NECHES	ATHENS LAKE/RESERVOIR	RESERVOIR	NECHES	62	33	42	50	57	65
ATHENS	HENDERSON	NECHES	CARRIZO-WILCOX AQUIFER	HENDERSON	TRINITY	19	22	24	25	25	26
BERRYVILLE	HENDERSON	NECHES	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	179	179	179	179	179	179
BETHEL-ASH WSC	HENDERSON	NECHES	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	650	650	650	650	650	650
BROWNSBORO	HENDERSON	NECHES	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	300	300	300	300	300	300
BRUSHY CREEK WSC	HENDERSON	NECHES	CARRIZO-WILCOX AQUIFER	ANDERSON	NECHES	209	209	209	209	209	209
CHANDLER	HENDERSON	NECHES	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	739	739	739	739	739	739
COUNTY-OTHER	HENDERSON	NECHES	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	1,747	1,747	1,747	1,747	1,747	1,747
COUNTY-OTHER	HENDERSON	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	99	98	97	96	95	94
COUNTY-OTHER	HENDERSON	NECHES	QUEEN CITY AQUIFER	HENDERSON	NECHES	840	840	840	840	840	840
IRRIGATION	HENDERSON	NECHES	ATHENS LAKE/RESERVOIR	RESERVOIR	NECHES	171	94	86	79	71	64
LIVESTOCK	HENDERSON	NECHES	ATHENS LAKE/RESERVOIR	RESERVOIR	NECHES	380	1,735	1,546	1,376	1,203	1,040
LIVESTOCK	HENDERSON	NECHES	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	97	97	97	97	97	97
LIVESTOCK	HENDERSON	NECHES	INDIRECT REUSE	HENDERSON	NECHES	2,872	0	0	0	0	0
LIVESTOCK	HENDERSON	NECHES	LIVESTOCK LOCAL SUPPLY	HENDERSON	NECHES	248	248	248	248	248	248
LIVESTOCK	HENDERSON	NECHES	QUEEN CITY AQUIFER	HENDERSON	NECHES	485	485	485	485	485	485
MANUFACTURING	HENDERSON	NECHES	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	12	14	16	18	20	22
MINING	HENDERSON	NECHES	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	27	27	27	27	27	27
MURCHISON	HENDERSON	NECHES	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	251	251	251	251	251	251
R P M WSC	HENDERSON	NECHES	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	122	122	122	122	122	122
CONSOLIDATED WSC	HOUSTON	NECHES	CARRIZO-WILCOX AQUIFER	HOUSTON	TRINITY	166	166	166	166	166	166
CONSOLIDATED WSC	HOUSTON	NECHES	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	255	255	255	255	255	255
CONSOLIDATED WSC	HOUSTON	TRINITY	CARRIZO-WILCOX AQUIFER	HOUSTON	TRINITY	427	427	427	427	427	427
CONSOLIDATED WSC	HOUSTON	TRINITY	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	655	655	655	655	655	655
COUNTY-OTHER	HOUSTON	NECHES	CARRIZO-WILCOX AQUIFER	HOUSTON	NECHES	144	144	144	144	144	144
COUNTY-OTHER	HOUSTON	NECHES	OTHER AQUIFER	HOUSTON	NECHES	197	197	197	197	197	197
COUNTY-OTHER	HOUSTON	NECHES	QUEEN CITY AQUIFER	HOUSTON	NECHES	164	164	164	164	164	164
COUNTY-OTHER	HOUSTON	NECHES	SPARTA AQUIFER	HOUSTON	NECHES	100	100	100	100	100	100
COUNTY-OTHER	HOUSTON	TRINITY	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	84	83	84	85	87	90
COUNTY-OTHER	HOUSTON	TRINITY	OTHER AQUIFER	HOUSTON	TRINITY	352	352	352	352	352	352
CROCKETT	HOUSTON	TRINITY	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	1,731	1,716	1,702	1,689	1,676	1,661
GRAPELAND	HOUSTON	NECHES	CARRIZO-WILCOX AQUIFER	HOUSTON	NECHES	255	255	255	255	255	255
GRAPELAND	HOUSTON	TRINITY	CARRIZO-WILCOX AQUIFER	HOUSTON	NECHES	255	255	255	255	255	255

Region I Water User Group Supply
(Ac-ft per Year)

WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
GRAPELAND	HOUSTON	TRINITY	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	381	377	374	372	369	365
IRRIGATION	HOUSTON	NECHES	NECHES RIVER COMBINED RUN-OF-RIVER IRRIGATION	HOUSTON	NECHES	287	287	287	287	287	287
IRRIGATION	HOUSTON	NECHES	QUEEN CITY AQUIFER	HOUSTON	NECHES	11	11	11	11	11	11
IRRIGATION	HOUSTON	NECHES	SPARTA AQUIFER	HOUSTON	NECHES	14	14	14	14	14	14
IRRIGATION	HOUSTON	TRINITY	CARRIZO-WILCOX AQUIFER	HOUSTON	TRINITY	51	51	51	51	51	51
IRRIGATION	HOUSTON	TRINITY	QUEEN CITY AQUIFER	HOUSTON	TRINITY	101	101	101	101	101	101
IRRIGATION	HOUSTON	TRINITY	SPARTA AQUIFER	HOUSTON	TRINITY	110	110	110	110	110	110
IRRIGATION	HOUSTON	TRINITY	TRINITY COMBINED RUN-OF-RIVER IRRIGATION	HOUSTON	TRINITY	1,783	1,783	1,783	1,783	1,783	1,783
LIVESTOCK	HOUSTON	NECHES	CARRIZO-WILCOX AQUIFER	HOUSTON	NECHES	11	11	11	11	11	11
LIVESTOCK	HOUSTON	NECHES	LIVESTOCK LOCAL SUPPLY	HOUSTON	NECHES	388	388	388	388	388	388
LIVESTOCK	HOUSTON	NECHES	QUEEN CITY AQUIFER	HOUSTON	NECHES	68	68	68	68	68	68
LIVESTOCK	HOUSTON	NECHES	SPARTA AQUIFER	HOUSTON	NECHES	159	159	159	159	159	159
LIVESTOCK	HOUSTON	TRINITY	CARRIZO-WILCOX AQUIFER	HOUSTON	TRINITY	75	75	75	75	75	75
LIVESTOCK	HOUSTON	TRINITY	LIVESTOCK LOCAL SUPPLY	HOUSTON	TRINITY	783	783	783	783	783	783
LIVESTOCK	HOUSTON	TRINITY	OTHER AQUIFER	HOUSTON	TRINITY	246	246	246	246	246	246
LIVESTOCK	HOUSTON	TRINITY	QUEEN CITY AQUIFER	HOUSTON	TRINITY	44	44	44	44	44	44
LIVESTOCK	HOUSTON	TRINITY	SPARTA AQUIFER	HOUSTON	TRINITY	306	306	306	306	306	306
LOVELADY	HOUSTON	TRINITY	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	51	51	51	51	51	51
LOVELADY	HOUSTON	TRINITY	YEGUA-JACKSON AQUIFER	HOUSTON	TRINITY	197	197	197	197	197	197
MANUFACTURING	HOUSTON	NECHES	CARRIZO-WILCOX AQUIFER	HOUSTON	NECHES	11	11	11	11	11	11
MANUFACTURING	HOUSTON	TRINITY	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	159	177	193	208	221	237
MINING	HOUSTON	NECHES	OTHER AQUIFER	HOUSTON	NECHES	94	94	94	94	94	94
MINING	HOUSTON	TRINITY	OTHER AQUIFER	HOUSTON	TRINITY	85	85	85	85	85	85
MINING	HOUSTON	TRINITY	SPARTA AQUIFER	HOUSTON	TRINITY	48	48	48	48	48	48
COUNTY-OTHER	JASPER	NECHES	GULF COAST AQUIFER	JASPER	NECHES	1,500	1,500	1,500	1,500	1,500	1,500
COUNTY-OTHER	JASPER	SABINE	GULF COAST AQUIFER	JASPER	SABINE	941	941	941	941	941	941
JASPER	JASPER	NECHES	GULF COAST AQUIFER	JASPER	NECHES	4,534	4,534	4,534	4,534	4,534	4,534
JASPER COUNTY WCID #1	JASPER	SABINE	GULF COAST AQUIFER	JASPER	SABINE	555	555	555	555	555	555
KIRBYVILLE	JASPER	SABINE	GULF COAST AQUIFER	JASPER	SABINE	600	600	600	600	600	600
LIVESTOCK	JASPER	NECHES	GULF COAST AQUIFER	JASPER	NECHES	84	84	84	84	84	84
LIVESTOCK	JASPER	NECHES	LIVESTOCK LOCAL SUPPLY	JASPER	NECHES	115	115	115	115	115	115
LIVESTOCK	JASPER	SABINE	GULF COAST AQUIFER	JASPER	SABINE	52	52	52	52	52	52
LIVESTOCK	JASPER	SABINE	LIVESTOCK LOCAL SUPPLY	JASPER	SABINE	75	75	75	75	75	75
MANUFACTURING	JASPER	NECHES	GULF COAST AQUIFER	JASPER	NECHES	21,711	21,711	21,711	21,711	21,711	21,711
MANUFACTURING	JASPER	NECHES	GULF COAST AQUIFER	JASPER	SABINE	21,715	21,714	21,713	21,711	21,711	21,711
MANUFACTURING	JASPER	NECHES	NECHES RIVER RUN-OF-RIVER MANUFACTURING	JASPER	NECHES	604	604	604	604	604	604
MANUFACTURING	JASPER	NECHES	NECHES RIVER RUN-OF-RIVER MANUFACTURING	JASPER	NECHES	12	12	12	12	12	12
MANUFACTURING	JASPER	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	20,189	23,571	26,084	28,281	29,928	29,991
MANUFACTURING	JASPER	SABINE	GULF COAST AQUIFER	JASPER	SABINE	36	38	39	41	41	41
MAURICEVILLE SUD	JASPER	SABINE	GULF COAST AQUIFER	ORANGE	SABINE	108	108	108	108	108	108
MINING	JASPER	NECHES	GULF COAST AQUIFER	JASPER	NECHES	2	2	2	2	2	2
MINING	JASPER	SABINE	GULF COAST AQUIFER	JASPER	SABINE	2	2	2	2	2	2
BEAUMONT	JEFFERSON	NECHES	GULF COAST AQUIFER	HARDIN	NECHES	3,250	3,250	3,250	3,250	3,250	3,250
BEAUMONT	JEFFERSON	NECHES	NECHES RIVER RUN-OF-RIVER	JEFFERSON	NECHES	7,187	6,966	6,770	6,603	6,418	6,108

Region I Water User Group Supply
(Ac-ft per Year)

WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
BEAUMONT	JEFFERSON	NECHES-TRINITY	GULF COAST AQUIFER	HARDIN	NECHES	5,750	5,750	5,750	5,750	5,750	5,750
BEAUMONT	JEFFERSON	NECHES-TRINITY	NECHES RIVER RUN-OF-RIVER	JEFFERSON	NECHES	12,537	12,151	11,809	11,519	11,196	10,654
BEVIL OAKS	JEFFERSON	NECHES	GULF COAST AQUIFER	JEFFERSON	NECHES	404	404	404	404	404	404
CHINA	JEFFERSON	NECHES-TRINITY	GULF COAST AQUIFER	JEFFERSON	NECHES-TRINITY	357	357	357	357	357	357
COUNTY-OTHER	JEFFERSON	NECHES	GULF COAST AQUIFER	HARDIN	NECHES	13	17	20	23	26	31
COUNTY-OTHER	JEFFERSON	NECHES-TRINITY	GULF COAST AQUIFER	HARDIN	NECHES	0	0	0	0	0	0
COUNTY-OTHER	JEFFERSON	NECHES-TRINITY	NECHES RIVER RUN-OF-RIVER	JEFFERSON	NECHES	1,679	2,177	2,595	2,922	3,285	3,973
COUNTY-OTHER	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	188	244	291	327	368	445
GROVES	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	44	43	43	42	41	41
GROVES	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	3,146	3,094	3,042	2,989	2,955	2,955
IRRIGATION	JEFFERSON	NECHES	NECHES RIVER RUN-OF-RIVER PINE ISLAND BAYOU	JASPER	NECHES	11,648	11,648	11,648	11,648	11,648	11,648
IRRIGATION	JEFFERSON	NECHES-TRINITY	INDIRECT REUSE IRRIGATION	JEFFERSON	NECHES-TRINITY	13,687	13,687	13,687	13,687	13,687	13,687
IRRIGATION	JEFFERSON	NECHES-TRINITY	NECHES RIVER RUN-OF-RIVER PINE ISLAND BAYOU	JASPER	NECHES	128,352	128,352	128,352	122,622	112,622	102,622
IRRIGATION	JEFFERSON	NECHES-TRINITY	NECHES-TRINITY COMBINED RUN-OF-RIVER IRRIGATION	JEFFERSON	NECHES-TRINITY	44,286	44,286	44,286	44,286	44,286	44,286
IRRIGATION	JEFFERSON	NECHES-TRINITY	NECHES-TRINITY RIVER RUN-OF-RIVER IRRIGATION	JEFFERSON	NECHES-TRINITY	5,139	5,139	5,139	5,139	5,139	5,139
IRRIGATION	JEFFERSON	NECHES-TRINITY	NECHES-TRINITY RIVER RUN-OF-RIVER IRRIGATION	JEFFERSON	NECHES-TRINITY	5,321	5,321	5,321	5,321	5,321	5,321
IRRIGATION	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	0	0	0	5,730	15,730	25,730
JEFFERSON COUNTY WCID #10	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	243	266	285	299	316	353
JEFFERSON COUNTY WCID #10	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	397	434	465	488	516	576
LIVESTOCK	JEFFERSON	NECHES	GULF COAST AQUIFER	JEFFERSON	NECHES	84	84	84	84	84	84
LIVESTOCK	JEFFERSON	NECHES	LIVESTOCK LOCAL SUPPLY	JEFFERSON	NECHES	43	43	43	43	43	43
LIVESTOCK	JEFFERSON	NECHES-TRINITY	GULF COAST AQUIFER	JEFFERSON	NECHES-TRINITY	430	430	430	430	430	430
LIVESTOCK	JEFFERSON	NECHES-TRINITY	LIVESTOCK LOCAL SUPPLY	JEFFERSON	NECHES-TRINITY	280	280	280	280	280	280
MANUFACTURING	JEFFERSON	NECHES	GULF COAST AQUIFER	JEFFERSON	NECHES	135	135	135	135	135	135
MANUFACTURING	JEFFERSON	NECHES	NECHES RIVER RUN-OF-RIVER SALINE	JEFFERSON	NECHES	0	0	0	0	0	0
MANUFACTURING	JEFFERSON	NECHES	NECHES RIVER RUN-OF-RIVER SALINE	JEFFERSON	NECHES	0	0	0	0	0	0
MANUFACTURING	JEFFERSON	NECHES	NECHES RIVER RUN-OF-RIVER SALINE	JEFFERSON	NECHES	0	0	0	0	0	0
MANUFACTURING	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	38,625	108,031	154,047	160,681	167,262	173,876
MANUFACTURING	JEFFERSON	NECHES-TRINITY	GULF COAST AQUIFER	JEFFERSON	NECHES-TRINITY	278	278	278	278	278	278

Region I Water User Group Supply
(Ac-ft per Year)

WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
MANUFACTURING	JEFFERSON	NECHES-TRINITY	NECHES RIVER RUN-OF-RIVER	JEFFERSON	NECHES	1,000	1,105	1,221	1,349	1,490	1,646
MANUFACTURING	JEFFERSON	NECHES-TRINITY	NECHES RIVER RUN-OF-RIVER PINE ISLAND BAYOU	JASPER	NECHES	72,016	165,916	237,606	247,606	257,606	267,606
MANUFACTURING	JEFFERSON	NECHES-TRINITY	NECHES-TRINITY RIVER COMBINED RUN-OF-RIVER MANUFACTURING	JEFFERSON	NECHES-TRINITY	680	680	680	680	680	680
MANUFACTURING	JEFFERSON	NECHES-TRINITY	NECHES-TRINITY RIVER RUN-OF-RIVER MANUFACTURING	JEFFERSON	NECHES-TRINITY	480	480	480	480	480	480
MANUFACTURING	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	39,531	147,706	209,947	218,855	228,176	237,286
MEEKER MUD	JEFFERSON	NECHES	GULF COAST AQUIFER	JEFFERSON	NECHES-TRINITY	52	61	68	74	80	93
MEEKER MUD	JEFFERSON	NECHES-TRINITY	GULF COAST AQUIFER	JEFFERSON	NECHES-TRINITY	520	511	504	498	492	479
MEEKER MUD	JEFFERSON	NECHES-TRINITY	NECHES RIVER RUN-OF-RIVER	JEFFERSON	NECHES	3	4	4	5	5	8
MINING	JEFFERSON	NECHES	GULF COAST AQUIFER	JEFFERSON	NECHES	1	1	1	1	1	1
MINING	JEFFERSON	NECHES	OTHER LOCAL SUPPLY	JEFFERSON	NECHES	74	74	74	74	74	74
MINING	JEFFERSON	NECHES-TRINITY	GULF COAST AQUIFER	JEFFERSON	NECHES-TRINITY	74	74	74	74	74	74
MINING	JEFFERSON	NECHES-TRINITY	NECHES-TRINITY RIVER COMBINED RUN-OF-RIVER MINING	JEFFERSON	NECHES-TRINITY	34	34	34	34	34	34
MINING	JEFFERSON	NECHES-TRINITY	OTHER LOCAL SUPPLY	JEFFERSON	NECHES-TRINITY	168	168	168	168	168	168
NEDERLAND	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	159	165	170	172	177	187
NEDERLAND	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	3,966	4,103	4,217	4,284	4,396	4,647
NOME	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	90	97	102	107	112	122
NOME	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	37	39	42	43	45	50
PORT ARTHUR	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	59	58	56	55	54	54
PORT ARTHUR	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	9,645	9,452	9,259	9,067	8,939	8,939
PORT NECHES	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	909	909	913	908	920	960
PORT NECHES	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	873	873	876	872	884	922
WEST JEFFERSON COUNTY MWD	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	1,029	1,148	1,264	1,345	1,436	1,631
APPLEBY WSC	NACOGDOCHES	NECHES	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	851	870	898	930	993	1,063
APPLEBY WSC	NACOGDOCHES	NECHES	NACOGDOCHES LAKE/RESERVOIR	RESERVOIR	NECHES	21	122	266	428	732	1,058
COUNTY-OTHER	NACOGDOCHES	NECHES	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	2,418	2,418	2,418	2,418	2,418	2,418
COUNTY-OTHER	NACOGDOCHES	NECHES	NACOGDOCHES LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
COUNTY-OTHER	NACOGDOCHES	NECHES	OTHER AQUIFER	NACOGDOCHES	NECHES	9	9	9	9	9	9
COUNTY-OTHER	NACOGDOCHES	NECHES	QUEEN CITY AQUIFER	NACOGDOCHES	NECHES	25	25	25	25	25	25
COUNTY-OTHER	NACOGDOCHES	NECHES	SPARTA AQUIFER	NACOGDOCHES	NECHES	29	29	29	29	29	29
CUSHING	NACOGDOCHES	NECHES	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	237	237	237	237	237	237
D&M WSC	NACOGDOCHES	NECHES	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	312	321	307	267	250	250

Region I Water User Group Supply
(Ac-ft per Year)

WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
D&M WSC	NACOGDOCHES	NECHES	NACOGDOCHES LAKE/RESERVOIR	RESERVOIR	NECHES	344	381	413	453	470	470
GARRISON	NACOGDOCHES	NECHES	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	565	565	565	565	565	565
IRRIGATION	NACOGDOCHES	NECHES	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	1,396	1,396	1,396	1,396	1,396	1,396
IRRIGATION	NACOGDOCHES	NECHES	NECHES RIVER COMBINED RUN-OF-RIVER IRRIGATION	NACOGDOCHES	NECHES	136	136	136	136	136	136
LILLY GROVE SUD	NACOGDOCHES	NECHES	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	761	761	761	761	761	761
LIVESTOCK	NACOGDOCHES	NECHES	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	590	590	590	590	590	590
LIVESTOCK	NACOGDOCHES	NECHES	LIVESTOCK LOCAL SUPPLY	NACOGDOCHES	NECHES	910	910	910	910	910	910
LIVESTOCK	NACOGDOCHES	NECHES	OTHER AQUIFER	NACOGDOCHES	NECHES	69	69	69	69	69	69
LIVESTOCK	NACOGDOCHES	NECHES	QUEEN CITY AQUIFER	NACOGDOCHES	NECHES	195	195	195	195	195	195
LIVESTOCK	NACOGDOCHES	NECHES	SPARTA AQUIFER	NACOGDOCHES	NECHES	221	221	221	221	221	221
MANUFACTURING	NACOGDOCHES	NECHES	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	352	400	445	492	535	589
MANUFACTURING	NACOGDOCHES	NECHES	NACOGDOCHES LAKE/RESERVOIR	RESERVOIR	NECHES	1,936	2,153	2,341	2,524	2,679	2,879
MELROSE WSC	NACOGDOCHES	NECHES	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	827	827	827	827	827	827
MINING	NACOGDOCHES	NECHES	OTHER LOCAL SUPPLY	NACOGDOCHES	NECHES	220	220	220	220	220	220
NACOGDOCHES	NACOGDOCHES	NECHES	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	2,682	2,606	2,526	2,437	2,311	2,162
NACOGDOCHES	NACOGDOCHES	NECHES	NACOGDOCHES LAKE/RESERVOIR	RESERVOIR	NECHES	14,766	14,027	13,280	12,512	11,578	10,566
STEAM ELECTRIC POWER	NACOGDOCHES	NECHES	STRIKER LAKE/RESERVOIR	RESERVOIR	NECHES	2,240	6,721	6,721	6,721	0	0
SWIFT WSC	NACOGDOCHES	NECHES	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	666	666	666	666	666	666
WODEN WSC	NACOGDOCHES	NECHES	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	818	818	818	818	818	818
COUNTY-OTHER	NEWTON	SABINE	GULF COAST AQUIFER	NEWTON	NECHES	2	2	2	2	2	2
COUNTY-OTHER	NEWTON	SABINE	GULF COAST AQUIFER	NEWTON	SABINE	1,376	1,376	1,376	1,376	1,376	1,376
IRRIGATION	NEWTON	SABINE	GULF COAST AQUIFER	NEWTON	SABINE	2,234	2,234	2,234	2,234	2,234	2,234
IRRIGATION	NEWTON	SABINE	SABINE RIVER RUN-OF-RIVER IRRIGATION	NEWTON	SABINE	50	50	50	50	50	50
LIVESTOCK	NEWTON	SABINE	GULF COAST AQUIFER	NEWTON	SABINE	58	58	58	58	58	58
LIVESTOCK	NEWTON	SABINE	LIVESTOCK LOCAL SUPPLY	NEWTON	SABINE	66	66	66	66	66	66
MANUFACTURING	NEWTON	SABINE	GULF COAST AQUIFER	NEWTON	SABINE	394	394	394	394	394	394
MANUFACTURING	NEWTON	SABINE	SABINE RIVER RUN-OF-RIVER MANUFACTURING	NEWTON	SABINE	135	135	135	135	135	135
MAURICEVILLE SUD	NEWTON	SABINE	GULF COAST AQUIFER	ORANGE	SABINE	39	39	39	39	39	39
MINING	NEWTON	NECHES	GULF COAST AQUIFER	NEWTON	NECHES	8	8	8	8	8	8
MINING	NEWTON	SABINE	OTHER LOCAL SUPPLY	NEWTON	SABINE	28	28	28	28	28	28
NEWTON	NEWTON	SABINE	GULF COAST AQUIFER	NEWTON	SABINE	686	686	686	686	686	686
SOUTH NEWTON WSC	NEWTON	SABINE	GULF COAST AQUIFER	NEWTON	SABINE	653	653	653	653	653	653
STEAM ELECTRIC POWER	NEWTON	SABINE	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	14,179	14,179	14,179	14,179	14,179	14,179
BRIDGE CITY	ORANGE	NECHES	GULF COAST AQUIFER	ORANGE	SABINE	178	178	178	178	178	178
BRIDGE CITY	ORANGE	NECHES-TRINITY	GULF COAST AQUIFER	ORANGE	SABINE	167	167	167	167	167	167
BRIDGE CITY	ORANGE	SABINE	GULF COAST AQUIFER	ORANGE	SABINE	922	922	922	922	922	922
COUNTY-OTHER	ORANGE	NECHES	GULF COAST AQUIFER	ORANGE	NECHES	1,940	1,940	1,940	1,940	1,940	1,940
COUNTY-OTHER	ORANGE	NECHES-TRINITY	GULF COAST AQUIFER	ORANGE	NECHES	1	1	1	1	1	1
COUNTY-OTHER	ORANGE	SABINE	GULF COAST AQUIFER	ORANGE	SABINE	2,530	2,530	2,530	2,530	2,530	2,530
IRRIGATION	ORANGE	NECHES	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	2,035	2,035	2,035	2,035	2,035	2,035
IRRIGATION	ORANGE	SABINE	DIRECT REUSE	ORANGE	SABINE	15	15	15	15	15	15
IRRIGATION	ORANGE	SABINE	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	465	465	465	465	465	465
IRRIGATION	ORANGE	SABINE	SABINE RIVER RUN-OF-RIVER IRRIGATION	ORANGE	SABINE	28	28	28	28	28	28
LIVESTOCK	ORANGE	NECHES	GULF COAST AQUIFER	ORANGE	NECHES	36	36	36	36	36	36

Region I Water User Group Supply
(Ac-ft per Year)

WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
LIVESTOCK	ORANGE	NECHES	LIVESTOCK LOCAL SUPPLY	ORANGE	NECHES	56	56	56	56	56	56
LIVESTOCK	ORANGE	SABINE	GULF COAST AQUIFER	ORANGE	SABINE	52	52	52	52	52	52
LIVESTOCK	ORANGE	SABINE	LIVESTOCK LOCAL SUPPLY	ORANGE	SABINE	70	70	70	70	70	70
MANUFACTURING	ORANGE	NECHES	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	4,481	4,481	4,481	4,481	4,481	4,481
MANUFACTURING	ORANGE	SABINE	GULF COAST AQUIFER	ORANGE	SABINE	4,076	4,076	4,076	4,076	4,076	4,076
MANUFACTURING	ORANGE	SABINE	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	53,990	53,990	53,990	53,990	53,990	53,990
MAURICEVILLE SUD	ORANGE	SABINE	GULF COAST AQUIFER	ORANGE	SABINE	840	840	840	840	840	840
MINING	ORANGE	NECHES	GULF COAST AQUIFER	ORANGE	NECHES	8	8	8	8	8	8
MINING	ORANGE	SABINE	OTHER LOCAL SUPPLY	ORANGE	SABINE	1	1	1	1	1	1
ORANGE	ORANGE	SABINE	GULF COAST AQUIFER	ORANGE	SABINE	4,091	4,091	4,091	4,091	4,091	4,091
PINE FOREST	ORANGE	NECHES	GULF COAST AQUIFER	ORANGE	NECHES	128	128	128	128	128	128
PINEHURST	ORANGE	SABINE	GULF COAST AQUIFER	ORANGE	SABINE	690	690	690	690	690	690
ROSE CITY	ORANGE	NECHES	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	303	303	303	303	303	303
SOUTH NEWTON WSC	ORANGE	SABINE	GULF COAST AQUIFER	ORANGE	SABINE	194	194	194	194	194	194
STEAM ELECTRIC POWER	ORANGE	NECHES	GULF COAST AQUIFER	ORANGE	NECHES	1,085	1,085	1,085	1,085	1,085	1,085
STEAM ELECTRIC POWER	ORANGE	NECHES	NECHES RIVER RUN-OF-RIVER SALINE	ORANGE	NECHES	17,210	17,210	17,210	17,210	17,210	17,210
VIDOR	ORANGE	NECHES	GULF COAST AQUIFER	ORANGE	NECHES	1,361	1,361	1,361	1,361	1,361	1,361
VIDOR	ORANGE	SABINE	GULF COAST AQUIFER	ORANGE	SABINE	626	626	626	626	626	626
WEST ORANGE	ORANGE	SABINE	GULF COAST AQUIFER	ORANGE	SABINE	905	905	905	905	905	905
BECKVILLE	PANOLA	SABINE	CARRIZO-WILCOX AQUIFER	PANOLA	SABINE	581	581	581	581	581	581
CARTHAGE	PANOLA	SABINE	CARRIZO-WILCOX AQUIFER	PANOLA	SABINE	404	398	393	389	385	376
CARTHAGE	PANOLA	SABINE	MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	3,552	3,498	3,456	3,415	3,379	3,308
COUNTY-OTHER	PANOLA	CYPRESS	CARRIZO-WILCOX AQUIFER	PANOLA	SABINE	5	5	5	5	5	5
COUNTY-OTHER	PANOLA	SABINE	CARRIZO-WILCOX AQUIFER	PANOLA	SABINE	1,351	1,354	1,359	1,363	1,367	1,372
COUNTY-OTHER	PANOLA	SABINE	MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	1,331	1,328	1,323	1,319	1,315	1,310
GILL WSC	PANOLA	SABINE	CARRIZO-WILCOX AQUIFER	PANOLA	SABINE	113	113	113	113	113	113
LIVESTOCK	PANOLA	CYPRESS	CARRIZO-WILCOX AQUIFER	PANOLA	CYPRESS	1	1	1	1	1	1
LIVESTOCK	PANOLA	CYPRESS	LIVESTOCK LOCAL SUPPLY	PANOLA	CYPRESS	30	30	30	30	30	30
LIVESTOCK	PANOLA	SABINE	CARRIZO-WILCOX AQUIFER	PANOLA	SABINE	1,519	1,519	1,519	1,519	1,519	1,519
LIVESTOCK	PANOLA	SABINE	LIVESTOCK LOCAL SUPPLY	PANOLA	SABINE	1,828	1,828	1,828	1,828	1,828	1,828
MANUFACTURING	PANOLA	SABINE	CARRIZO-WILCOX AQUIFER	PANOLA	SABINE	107	116	124	132	140	154
MANUFACTURING	PANOLA	SABINE	MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	911	962	1,001	1,039	1,070	1,136
MANUFACTURING	PANOLA	SABINE	SABINE RIVER RUN-OF-RIVER MANUFACTURING	PANOLA	SABINE	129	129	129	129	129	129
MANUFACTURING	PANOLA	SABINE	SABINE RIVER RUN-OF-RIVER MANUFACTURING	PANOLA	SABINE	114	114	114	114	114	114
MINING	PANOLA	SABINE	CARRIZO-WILCOX AQUIFER	PANOLA	SABINE	2,434	2,434	2,434	2,434	2,434	2,434
MINING	PANOLA	SABINE	MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	2,254	2,563	2,752	2,943	3,137	3,322
TATUM	PANOLA	SABINE	CARRIZO-WILCOX AQUIFER	RUSK	SABINE	94	94	94	94	94	94
CORRIGAN	POLK	NECHES	OTHER AQUIFER	POLK	NECHES	554	554	554	554	554	554
COUNTY-OTHER	POLK	NECHES	GULF COAST AQUIFER	POLK	NECHES	736	736	736	736	736	736
COUNTY-OTHER	POLK	NECHES	OTHER AQUIFER	POLK	NECHES	166	166	166	166	166	166
IRRIGATION	POLK	NECHES	GULF COAST AQUIFER	POLK	NECHES	286	286	286	286	286	286
LIVESTOCK	POLK	NECHES	GULF COAST AQUIFER	POLK	NECHES	81	81	81	81	81	81
LIVESTOCK	POLK	NECHES	LIVESTOCK LOCAL SUPPLY	POLK	NECHES	122	122	122	122	122	122
LIVESTOCK	POLK	NECHES	OTHER AQUIFER	POLK	NECHES	20	20	20	20	20	20
MANUFACTURING	POLK	NECHES	GULF COAST AQUIFER	POLK	NECHES	93	93	93	93	93	93
MANUFACTURING	POLK	NECHES	OTHER AQUIFER	POLK	NECHES	568	568	568	568	568	568
COUNTY-OTHER	RUSK	NECHES	CARRIZO-WILCOX AQUIFER	RUSK	NECHES	1,507	1,507	1,507	1,507	1,507	1,507
COUNTY-OTHER	RUSK	NECHES	QUEEN CITY AQUIFER	RUSK	NECHES	12	12	12	12	12	12

Region I Water User Group Supply
(Ac-ft per Year)

WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
COUNTY-OTHER	RUSK	SABINE	CARRIZO-WILCOX AQUIFER	RUSK	SABINE	1,687	1,687	1,687	1,687	1,687	1,687
COUNTY-OTHER	RUSK	SABINE	QUEEN CITY AQUIFER	RUSK	SABINE	13	13	13	13	13	13
EASTON	RUSK	SABINE	CHEROKEE LAKE/RESERVOIR	RESERVOIR	SABINE	61	83	96	102	120	163
ELDERVILLE WSC	RUSK	SABINE	CARRIZO-WILCOX AQUIFER	GREGG	SABINE	107	107	107	107	107	107
ELDERVILLE WSC	RUSK	SABINE	CHEROKEE LAKE/RESERVOIR	RESERVOIR	SABINE	286	303	320	337	354	369
HENDERSON	RUSK	NECHES	CARRIZO-WILCOX AQUIFER	RUSK	NECHES	2,432	2,432	2,432	2,432	2,432	2,432
HENDERSON	RUSK	NECHES	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	3,922	3,922	3,922	3,921	3,922	3,922
HENDERSON	RUSK	SABINE	CARRIZO-WILCOX AQUIFER	RUSK	NECHES	305	305	305	305	305	305
HENDERSON	RUSK	SABINE	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	459	459	459	460	459	458
IRRIGATION	RUSK	NECHES	CARRIZO-WILCOX AQUIFER	RUSK	NECHES	93	93	93	93	93	93
IRRIGATION	RUSK	SABINE	CARRIZO-WILCOX AQUIFER	RUSK	SABINE	96	96	96	96	96	96
IRRIGATION	RUSK	SABINE	SABINE RIVER COMBINED RUN-OF-RIVER IRRIGATION	RUSK	SABINE	127	127	127	127	127	127
KILGORE	RUSK	SABINE	CARRIZO-WILCOX AQUIFER	GREGG	SABINE	460	441	423	404	382	354
KILGORE	RUSK	SABINE	SABINE RIVER RUN-OF-RIVER	WOOD	SABINE	303	290	278	266	251	233
LIVESTOCK	RUSK	NECHES	CARRIZO-WILCOX AQUIFER	RUSK	NECHES	323	323	323	323	323	323
LIVESTOCK	RUSK	NECHES	LIVESTOCK LOCAL SUPPLY	RUSK	NECHES	386	386	386	386	386	386
LIVESTOCK	RUSK	NECHES	QUEEN CITY AQUIFER	RUSK	NECHES	35	35	35	35	35	35
LIVESTOCK	RUSK	SABINE	CARRIZO-WILCOX AQUIFER	RUSK	SABINE	286	286	286	286	286	286
LIVESTOCK	RUSK	SABINE	LIVESTOCK LOCAL SUPPLY	RUSK	SABINE	308	308	308	308	308	308
MANUFACTURING	RUSK	NECHES	CARRIZO-WILCOX AQUIFER	RUSK	NECHES	121	121	121	121	121	121
MANUFACTURING	RUSK	NECHES	NECHES RIVER COMBINED RUN-OF-RIVER MANUFACTURING	RUSK	NECHES	2	2	2	2	2	2
MANUFACTURING	RUSK	SABINE	CARRIZO-WILCOX AQUIFER	RUSK	SABINE	10	10	10	10	10	10
MINING	RUSK	NECHES	CARRIZO-WILCOX AQUIFER	RUSK	NECHES	1,130	1,130	1,130	1,130	1,130	1,130
MINING	RUSK	NECHES	QUEEN CITY AQUIFER	RUSK	NECHES	124	124	124	124	124	124
MINING	RUSK	SABINE	CARRIZO-WILCOX AQUIFER	RUSK	SABINE	375	375	375	375	375	375
MINING	RUSK	SABINE	OTHER LOCAL SUPPLY	RUSK	SABINE	287	287	287	287	287	287
MOUNT ENTERPRISE	RUSK	NECHES	CARRIZO-WILCOX AQUIFER	RUSK	NECHES	371	371	371	371	371	371
NEW LONDON	RUSK	NECHES	CARRIZO-WILCOX AQUIFER	RUSK	SABINE	434	436	436	436	435	434
NEW LONDON	RUSK	SABINE	CARRIZO-WILCOX AQUIFER	RUSK	SABINE	401	399	399	399	400	401
OVERTON	RUSK	NECHES	CARRIZO-WILCOX AQUIFER	RUSK	NECHES	68	69	68	68	69	68
OVERTON	RUSK	SABINE	CARRIZO-WILCOX AQUIFER	RUSK	SABINE	548	547	548	546	544	543
SOUTHERN UTILITIES COMPANY	RUSK	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	95	95	95	95	95	95
STEAM ELECTRIC POWER	RUSK	SABINE	CARRIZO-WILCOX AQUIFER	RUSK	SABINE	240	240	240	240	240	240
STEAM ELECTRIC POWER	RUSK	SABINE	MARTIN LAKE/RESERVOIR	RESERVOIR	SABINE	25,000	25,000	25,000	25,000	25,000	25,000
STEAM ELECTRIC POWER	RUSK	SABINE	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	17,922	17,922	17,922	17,922	17,922	17,922
TATUM	RUSK	SABINE	CARRIZO-WILCOX AQUIFER	RUSK	SABINE	374	374	374	374	374	374
WEST GREGG WSC	RUSK	SABINE	CARRIZO-WILCOX AQUIFER	GREGG	SABINE	15	15	15	15	15	16
COUNTY-OTHER	SABINE	NECHES	CARRIZO-WILCOX AQUIFER	SABINE	NECHES	58	58	58	58	58	58
COUNTY-OTHER	SABINE	NECHES	GULF COAST AQUIFER	JASPER	NECHES	70	70	70	70	70	70
COUNTY-OTHER	SABINE	NECHES	OTHER AQUIFER	SABINE	NECHES	20	20	20	20	20	20
COUNTY-OTHER	SABINE	NECHES	SPARTA AQUIFER	SABINE	NECHES	58	58	58	58	58	58
COUNTY-OTHER	SABINE	NECHES	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	150	150	150	150	150	150
COUNTY-OTHER	SABINE	SABINE	CARRIZO-WILCOX AQUIFER	SABINE	SABINE	84	84	84	84	84	84
COUNTY-OTHER	SABINE	SABINE	OTHER AQUIFER	SABINE	SABINE	19	19	19	19	19	19
COUNTY-OTHER	SABINE	SABINE	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	86	86	86	86	86	86
G-M WSC	SABINE	SABINE	CARRIZO-WILCOX AQUIFER	SABINE	SABINE	19	19	19	19	19	19
G-M WSC	SABINE	SABINE	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	676	676	676	676	676	676

WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
HEMPHILL	SABINE	SABINE	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	1,088	1,088	1,088	1,088	1,088	1,088
LIVESTOCK	SABINE	NECHES	CARRIZO-WILCOX AQUIFER	SABINE	NECHES	10	10	10	10	10	10
LIVESTOCK	SABINE	NECHES	LIVESTOCK LOCAL SUPPLY	SABINE	NECHES	59	59	59	59	59	59
LIVESTOCK	SABINE	NECHES	OTHER AQUIFER	SABINE	NECHES	20	20	20	20	20	20
LIVESTOCK	SABINE	NECHES	SPARTA AQUIFER	SABINE	NECHES	10	10	10	10	10	10
LIVESTOCK	SABINE	SABINE	CARRIZO-WILCOX AQUIFER	SABINE	SABINE	105	105	105	105	105	105
LIVESTOCK	SABINE	SABINE	LIVESTOCK LOCAL SUPPLY	SABINE	SABINE	320	320	320	320	320	320
LIVESTOCK	SABINE	SABINE	OTHER AQUIFER	SABINE	SABINE	53	53	53	53	53	53
LIVESTOCK	SABINE	SABINE	SPARTA AQUIFER	SABINE	SABINE	53	53	53	53	53	53
MANUFACTURING	SABINE	NECHES	DIRECT REUSE MANUFACTURING	SABINE	SABINE	20	20	20	20	20	20
MANUFACTURING	SABINE	NECHES	NECHES RIVER RUN-OF-RIVER MANUFACTURING	SABINE	NECHES	182	182	182	182	182	182
MANUFACTURING	SABINE	NECHES	YEGUA-JACKSON AQUIFER	SABINE	SABINE	640	640	640	640	640	640
PINELAND	SABINE	NECHES	YEGUA-JACKSON AQUIFER	SABINE	NECHES	301	301	301	301	301	301
COUNTY-OTHER	SAN AUGUSTINE	NECHES	CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	NECHES	175	175	175	175	175	175
COUNTY-OTHER	SAN AUGUSTINE	NECHES	SAN AUGUSTINE LAKE/RESERVOIR	RESERVOIR	NECHES	160	160	160	160	160	160
COUNTY-OTHER	SAN AUGUSTINE	NECHES	SPARTA AQUIFER	SAN AUGUSTINE	NECHES	47	47	47	47	47	47
COUNTY-OTHER	SAN AUGUSTINE	NECHES	YEGUA-JACKSON AQUIFER	SAN AUGUSTINE	NECHES	316	316	316	316	316	316
COUNTY-OTHER	SAN AUGUSTINE	SABINE	SAN AUGUSTINE LAKE/RESERVOIR	RESERVOIR	NECHES	4	4	4	4	4	4
G-M WSC	SAN AUGUSTINE	SABINE	CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	SABINE	15	15	15	15	15	15
G-M WSC	SAN AUGUSTINE	SABINE	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	77	77	77	77	77	77
IRRIGATION	SAN AUGUSTINE	NECHES	CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	NECHES	96	96	96	96	96	96
IRRIGATION	SAN AUGUSTINE	SABINE	SPARTA AQUIFER	SAN AUGUSTINE	SABINE	39	39	39	39	39	39
LIVESTOCK	SAN AUGUSTINE	NECHES	CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	NECHES	76	76	76	76	76	76
LIVESTOCK	SAN AUGUSTINE	NECHES	LIVESTOCK LOCAL SUPPLY	SAN AUGUSTINE	NECHES	490	490	490	490	490	490
LIVESTOCK	SAN AUGUSTINE	NECHES	SPARTA AQUIFER	SAN AUGUSTINE	NECHES	70	70	70	70	70	70
LIVESTOCK	SAN AUGUSTINE	NECHES	YEGUA-JACKSON AQUIFER	SAN AUGUSTINE	NECHES	160	160	160	160	160	160
LIVESTOCK	SAN AUGUSTINE	SABINE	CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	SABINE	46	46	46	46	46	46
LIVESTOCK	SAN AUGUSTINE	SABINE	LIVESTOCK LOCAL SUPPLY	SAN AUGUSTINE	SABINE	71	71	71	71	71	71
MANUFACTURING	SAN AUGUSTINE	NECHES	CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	NECHES	9	9	9	9	9	9
SAN AUGUSTINE	SAN AUGUSTINE	NECHES	SAN AUGUSTINE LAKE/RESERVOIR	RESERVOIR	NECHES	1,082	1,082	1,082	1,082	1,082	1,082
CENTER	SHELBY	SABINE	CENTER LAKE/RESERVOIR	RESERVOIR	SABINE	542	520	502	482	466	446
CENTER	SHELBY	SABINE	PINKSTON LAKE/RESERVOIR	RESERVOIR	NECHES	2,668	2,556	2,460	2,367	2,283	2,178
COUNTY-OTHER	SHELBY	NECHES	CARRIZO-WILCOX AQUIFER	SHELBY	NECHES	246	246	246	246	246	246
COUNTY-OTHER	SHELBY	NECHES	TIMPSON LAKE/RESERVOIR	RESERVOIR	NECHES	350	350	350	350	350	350
COUNTY-OTHER	SHELBY	SABINE	CARRIZO-WILCOX AQUIFER	SHELBY	SABINE	1,142	1,142	1,142	1,142	1,142	1,142
COUNTY-OTHER	SHELBY	SABINE	CENTER LAKE/RESERVOIR	RESERVOIR	SABINE	21	22	22	23	23	24
COUNTY-OTHER	SHELBY	SABINE	PINKSTON LAKE/RESERVOIR	RESERVOIR	NECHES	167	174	179	180	184	190
COUNTY-OTHER	SHELBY	SABINE	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	280	280	280	280	280	280
COUNTY-OTHER	SHELBY	SABINE	TOLEDO BEND LAKE/RESERVOIR LOUISIANA PORTION	RESERVOIR - LOUISIANA	SABINE - LOUISIANA	35	35	35	35	35	35
IRRIGATION	SHELBY	NECHES	CARRIZO-WILCOX AQUIFER	SHELBY	NECHES	16	16	16	16	16	16
IRRIGATION	SHELBY	SABINE	CARRIZO-WILCOX AQUIFER	SHELBY	SABINE	24	24	24	24	24	24
IRRIGATION	SHELBY	SABINE	DIRECT REUSE IRRIGATION/MANUFACTURING	SHELBY	SABINE	82	82	82	82	82	82
JOAQUIN	SHELBY	SABINE	TOLEDO BEND LAKE/RESERVOIR LOUISIANA PORTION	RESERVOIR - LOUISIANA	SABINE - LOUISIANA	200	200	200	200	200	200
LIVESTOCK	SHELBY	NECHES	CARRIZO-WILCOX AQUIFER	SHELBY	NECHES	31	31	31	31	31	31
LIVESTOCK	SHELBY	NECHES	LIVESTOCK LOCAL SUPPLY	SHELBY	NECHES	334	334	334	334	334	334
LIVESTOCK	SHELBY	SABINE	CARRIZO-WILCOX AQUIFER	SHELBY	SABINE	1,349	1,349	1,349	1,349	1,349	1,349

Region I Water User Group Supply
(Ac-ft per Year)

WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
LIVESTOCK	SHELBY	SABINE	LIVESTOCK LOCAL SUPPLY	SHELBY	SABINE	1,755	1,755	1,755	1,755	1,755	1,755
MANUFACTURING	SHELBY	SABINE	CARRIZO-WILCOX AQUIFER	SHELBY	SABINE	89	89	89	89	89	89
MANUFACTURING	SHELBY	SABINE	CENTER LAKE/RESERVOIR	RESERVOIR	SABINE	191	212	230	249	265	284
MANUFACTURING	SHELBY	SABINE	DIRECT REUSE IRRIGATION/MANUFACTURING	SHELBY	SABINE	136	151	164	177	188	202
MANUFACTURING	SHELBY	SABINE	PINKSTON LAKE/RESERVOIR	RESERVOIR	NECHES	965	1,070	1,161	1,253	1,333	1,432
TENAHA	SHELBY	SABINE	CARRIZO-WILCOX AQUIFER	SHELBY	SABINE	335	335	335	335	335	335
TIMPSON	SHELBY	NECHES	CARRIZO-WILCOX AQUIFER	SHELBY	SABINE	5	5	5	5	5	5
TIMPSON	SHELBY	SABINE	CARRIZO-WILCOX AQUIFER	SHELBY	SABINE	467	467	467	467	467	467
ARP	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	297	297	297	297	297	297
BULLARD	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	312	312	312	312	312	312
BULLARD	SMITH	NECHES	JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	14	13	12	12	11	11
COMMUNITY WATER COMPANY	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	100	100	100	100	100	100
COUNTY-OTHER	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	990	891	802	722	650	585
COUNTY-OTHER	SMITH	NECHES	QUEEN CITY AQUIFER	SMITH	NECHES	17	17	17	17	17	17
CRYSTAL SYSTEMS INC	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	SABINE	65	71	77	82	93	108
DEAN WSC	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	976	976	976	976	976	976
IRRIGATION	SMITH	NECHES	BELLWOOD LAKE/RESERVOIR	RESERVOIR	NECHES	300	300	300	300	300	300
IRRIGATION	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	59	59	59	59	59	59
IRRIGATION	SMITH	NECHES	NECHES RIVER COMBINED RUN-OF-RIVER IRRIGATION	SMITH	NECHES	50	50	50	50	50	50
IRRIGATION	SMITH	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	104	103	102	101	100	99
IRRIGATION	SMITH	NECHES	QUEEN CITY AQUIFER	SMITH	NECHES	47	47	47	47	47	47
JACKSON WSC	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	341	344	346	348	345	342
LINDALE	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	219	148	146	145	144	144
LINDALE RURAL WSC	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	716	714	712	711	709	707
LIVESTOCK	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	37	37	37	37	37	37
LIVESTOCK	SMITH	NECHES	LIVESTOCK LOCAL SUPPLY	SMITH	NECHES	416	416	416	416	416	416
LIVESTOCK	SMITH	NECHES	QUEEN CITY AQUIFER	SMITH	NECHES	253	253	253	253	253	253
MANUFACTURING	SMITH	NECHES	BELLWOOD LAKE/RESERVOIR	RESERVOIR	NECHES	650	650	650	650	650	650
MANUFACTURING	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	737	770	799	827	851	883
MANUFACTURING	SMITH	NECHES	OTHER AQUIFER	SMITH	NECHES	62	62	62	62	62	62
MANUFACTURING	SMITH	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	1,085	1,212	1,325	1,434	1,526	1,652
MANUFACTURING	SMITH	NECHES	TYLER LAKE/RESERVOIR	RESERVOIR	NECHES	1,519	1,697	1,855	2,007	2,136	2,312
MINING	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	109	109	109	109	109	109
MINING	SMITH	NECHES	QUEEN CITY AQUIFER	SMITH	NECHES	27	27	27	27	27	27
NEW CHAPEL HILL	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	118	127	137	146	163	187
NOONDAY	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	102	105	107	110	117	127
OVERTON	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	RUSK	SABINE	11	11	11	12	12	13
R P M WSC	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	50	50	50	50	50	50
SOUTHERN UTILITIES COMPANY	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	7,811	7,775	7,736	7,697	7,649	7,644
SOUTHERN UTILITIES COMPANY	SMITH	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	114	118	122	127	139	345
SOUTHERN UTILITIES COMPANY	SMITH	NECHES	TYLER LAKE/RESERVOIR	RESERVOIR	NECHES	160	166	171	178	195	484
TROUP	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	432	432	432	432	432	432
TYLER	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	3,886	3,833	3,785	3,738	3,680	3,553
TYLER	SMITH	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	15,055	14,852	14,666	14,482	14,259	13,767

Region I Water User Group Supply
(Ac-ft per Year)

WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
TYLER	SMITH	NECHES	TYLER LAKE/RESERVOIR	RESERVOIR	NECHES	21,077	20,793	20,532	20,276	19,963	19,273
WHITEHOUSE	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	334	340	345	351	362	378
WHITEHOUSE	SMITH	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	259	282	304	327	370	431
WHITEHOUSE	SMITH	NECHES	TYLER LAKE/RESERVOIR	RESERVOIR	NECHES	362	394	425	457	518	603
COUNTY-OTHER	TRINITY	NECHES	GULF COAST AQUIFER	TRINITY	NECHES	96	96	96	96	96	96
COUNTY-OTHER	TRINITY	NECHES	OTHER AQUIFER	TRINITY	NECHES	272	272	272	272	272	272
COUNTY-OTHER	TRINITY	NECHES	YEGUA-JACKSON AQUIFER	TRINITY	NECHES	263	263	263	263	263	263
GROVETON	TRINITY	NECHES	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	RESERVOIR	TRINITY	114	121	122	118	113	109
LIVESTOCK	TRINITY	NECHES	LIVESTOCK LOCAL SUPPLY	TRINITY	NECHES	135	135	135	135	135	135
LIVESTOCK	TRINITY	NECHES	YEGUA-JACKSON AQUIFER	TRINITY	NECHES	141	141	141	141	141	141
COLMESNEIL	TYLER	NECHES	GULF COAST AQUIFER	TYLER	NECHES	371	371	371	371	371	371
COUNTY-OTHER	TYLER	NECHES	GULF COAST AQUIFER	TYLER	NECHES	1,445	1,445	1,445	1,445	1,445	1,445
IRRIGATION	TYLER	NECHES	GULF COAST AQUIFER	TYLER	NECHES	4	4	4	4	4	4
IRRIGATION	TYLER	NECHES	NECHES RIVER COMBINED RUN-OF-RIVER IRRIGATION	TYLER	NECHES	123	123	123	123	123	123
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	TYLER	NECHES	GULF COAST AQUIFER	TYLER	NECHES	8	8	8	8	8	8
LIVESTOCK	TYLER	NECHES	GULF COAST AQUIFER	TYLER	NECHES	146	146	146	146	146	146
LIVESTOCK	TYLER	NECHES	LIVESTOCK LOCAL SUPPLY	TYLER	NECHES	165	165	165	165	165	165
MANUFACTURING	TYLER	NECHES	GULF COAST AQUIFER	TYLER	NECHES	73	73	73	73	73	73
TYLER COUNTY WSC	TYLER	NECHES	GULF COAST AQUIFER	TYLER	NECHES	1,072	1,072	1,072	1,072	1,072	1,072
WOODVILLE	TYLER	NECHES	GULF COAST AQUIFER	TYLER	NECHES	1,921	1,921	1,921	1,921	1,921	1,921

Region I Wholesale Water Provider Supplies
(Ac-ft per Year)

WWP Name	WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
ANGELINA & NECHES RIVER AUTHORITY	COUNTY-OTHER	CHEROKEE	NECHES	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	ARP	SMITH	NECHES	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	COUNTY-OTHER	SMITH	NECHES	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	COUNTY-OTHER	NACOGDOCHES	NECHES	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	ALTO	CHEROKEE	NECHES	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	COUNTY-OTHER	CHEROKEE	NECHES	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	COUNTY-OTHER	JASPER	NECHES	GULF COAST AQUIFER	JASPER	NECHES	60	65	70	70	70	70
ANGELINA & NECHES RIVER AUTHORITY	JACKSON WSC	SMITH	NECHES	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	JACKSONVILLE	CHEROKEE	NECHES	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	NACOGDOCHES	NACOGDOCHES	NECHES	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	NEW LONDON	RUSK	SABINE	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	NEW SUMMERFIELD	CHEROKEE	NECHES	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	NORTH CHEROKEE WSC	CHEROKEE	NECHES	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	RUSK	CHEROKEE	NECHES	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	RUSK RURAL WSC	CHEROKEE	NECHES	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	MANUFACTURING	ANGELINA	NECHES	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	TROUP	SMITH	NECHES	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	WHITEHOUSE	SMITH	NECHES	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
ANGELINA NACOGDOCHES WCID #1	COUNTY-OTHER	CHEROKEE	NECHES	STRIKER LAKE/RESERVOIR	RESERVOIR	NECHES	11,270	10,846	9,716	8,520	13,965	12,590
ANGELINA NACOGDOCHES WCID #1	HENDERSON	RUSK	NECHES	STRIKER LAKE/RESERVOIR	RESERVOIR	NECHES	2,242	0	0	0	0	0
ANGELINA NACOGDOCHES WCID #1	STEAM ELECTRIC POWER	CHEROKEE	NECHES	STRIKER LAKE/RESERVOIR	RESERVOIR	NECHES	2,245	1,790	2,093	2,462	2,912	3,460
ANGELINA NACOGDOCHES WCID #1	STEAM ELECTRIC POWER	NACOGDOCHES	NECHES	STRIKER LAKE/RESERVOIR	RESERVOIR	NECHES	2,240	6,721	6,721	6,721	0	0
ANGELINA NACOGDOCHES WCID #1	WHITEHOUSE	SMITH	NECHES	STRIKER LAKE/RESERVOIR	RESERVOIR	NECHES	2,186	0	0	0	0	0
ATHENS MUNICIPAL WATER AUTHORITY	COUNTY-OTHER	HENDERSON	NECHES	ATHENS LAKE/RESERVOIR	RESERVOIR	NECHES	160	0	0	0	0	0
ATHENS MUNICIPAL WATER AUTHORITY	ATHENS	HENDERSON	TRINITY	ATHENS LAKE/RESERVOIR	RESERVOIR	NECHES	2,027	977	1,165	1,333	1,507	1,670
ATHENS MUNICIPAL WATER AUTHORITY	ATHENS	HENDERSON	NECHES	ATHENS LAKE/RESERVOIR	RESERVOIR	NECHES	62	33	42	50	57	65
ATHENS MUNICIPAL WATER AUTHORITY	IRRIGATION	HENDERSON	NECHES	ATHENS LAKE/RESERVOIR	RESERVOIR	NECHES	171	94	86	79	71	64
ATHENS MUNICIPAL WATER AUTHORITY	LIVESTOCK	HENDERSON	NECHES	ATHENS LAKE/RESERVOIR	RESERVOIR	NECHES	380	1,735	1,546	1,376	1,203	1,040
ATHENS MUNICIPAL WATER AUTHORITY	LIVESTOCK	HENDERSON	NECHES	INDIRECT REUSE	HENDERSON	NECHES	2,872	0	0	0	0	0
ATHENS MUNICIPAL WATER AUTHORITY	MANUFACTURING	HENDERSON	TRINITY	ATHENS LAKE/RESERVOIR	RESERVOIR	NECHES	100	61	61	62	62	61
BEAUMONT CITY OF	BEAUMONT	JEFFERSON	NECHES	GULF COAST AQUIFER	HARDIN	NECHES	3,300	3,300	3,300	3,300	3,300	3,300
BEAUMONT CITY OF	BEAUMONT	JEFFERSON	NECHES	NECHES RIVER RUN-OF-RIVER	JEFFERSON	NECHES	7,187	6,966	6,770	6,603	6,418	6,108
BEAUMONT CITY OF	BEAUMONT	JEFFERSON	NECHES-TRINITY	GULF COAST AQUIFER	HARDIN	NECHES	5,700	5,700	5,700	5,700	5,700	5,700
BEAUMONT CITY OF	BEAUMONT	JEFFERSON	NECHES-TRINITY	NECHES RIVER RUN-OF-RIVER	JEFFERSON	NECHES	12,537	12,151	11,809	11,519	11,196	10,654
BEAUMONT CITY OF	BEAUMONT	JEFFERSON	NECHES-TRINITY	NECHES RIVER RUN-OF-RIVER	JEFFERSON	NECHES	9,692	9,691	9,692	9,690	9,691	9,691
BEAUMONT CITY OF	COUNTY-OTHER	JEFFERSON	NECHES	GULF COAST AQUIFER	HARDIN	NECHES	0	0	0	0	0	0
BEAUMONT CITY OF	COUNTY-OTHER	JEFFERSON	NECHES	NECHES RIVER RUN-OF-RIVER	JEFFERSON	NECHES	13	17	20	23	26	31
BEAUMONT CITY OF	COUNTY-OTHER	JEFFERSON	NECHES-TRINITY	GULF COAST AQUIFER	HARDIN	NECHES	0	0	0	0	0	0
BEAUMONT CITY OF	COUNTY-OTHER	JEFFERSON	NECHES-TRINITY	NECHES RIVER RUN-OF-RIVER	JEFFERSON	NECHES	1,679	2,177	2,595	2,922	3,285	3,973
BEAUMONT CITY OF	MANUFACTURING	JEFFERSON	NECHES	NECHES RIVER RUN-OF-RIVER	JEFFERSON	NECHES	1,000	1,105	1,221	1,349	1,490	1,646
BEAUMONT CITY OF	MEEKER MUD	JEFFERSON	NECHES	NECHES RIVER RUN-OF-RIVER	JEFFERSON	NECHES	3	4	4	5	5	8
CARTHAGE CITY OF	CARTHAGE	PANOLA	SABINE	CARRIZO-WILCOX AQUIFER	PANOLA	SABINE	951	951	948	948	946	946
CARTHAGE CITY OF	CARTHAGE	PANOLA	SABINE	MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	7,030	6,646	6,275	5,908	5,541	5,154
CARTHAGE CITY OF	CARTHAGE	PANOLA	SABINE	CARRIZO-WILCOX AQUIFER	PANOLA	SABINE	423	420	418	414	412	407
CARTHAGE CITY OF	CARTHAGE	PANOLA	SABINE	MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	3,711	3,685	3,661	3,633	3,611	3,569
CARTHAGE CITY OF	COUNTY-OTHER	PANOLA	CYPRESS	CARRIZO-WILCOX AQUIFER	PANOLA	SABINE	5	5	5	5	5	5
CARTHAGE CITY OF	COUNTY-OTHER	PANOLA	SABINE	CARRIZO-WILCOX AQUIFER	PANOLA	SABINE	151	154	159	163	167	172
CARTHAGE CITY OF	COUNTY-OTHER	PANOLA	SABINE	MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	1,331	1,328	1,323	1,319	1,315	1,310
CARTHAGE CITY OF	MANUFACTURING	PANOLA	SABINE	MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	1,018	1,078	1,125	1,171	1,211	1,290
CENTER CITY OF	CENTER	SHELBY	SABINE	CENTER LAKE/RESERVOIR	RESERVOIR	SABINE	542	520	502	482	466	446
CENTER CITY OF	CENTER	SHELBY	SABINE	PINKSTON LAKE/RESERVOIR	RESERVOIR	NECHES	2,668	2,556	2,460	2,367	2,283	2,178
CENTER CITY OF	MANUFACTURING	SHELBY	SABINE	CENTER LAKE/RESERVOIR	RESERVOIR	SABINE	191	212	230	249	265	284
CENTER CITY OF	MANUFACTURING	SHELBY	SABINE	PINKSTON LAKE/RESERVOIR	RESERVOIR	NECHES	965	1,070	1,161	1,253	1,333	1,432

Region I Wholesale Water Provider Supplies
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WWP Name	WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
CENTER CITY OF	COUNTY-OTHER	SHELBY	SABINE	PINKSTON LAKE/RESERVOIR	RESERVOIR	NECHES	167	174	179	180	184	190
CENTER CITY OF	COUNTY-OTHER	SHELBY	SABINE	CENTER LAKE/RESERVOIR	RESERVOIR	SABINE	21	22	22	23	23	24
HOUSTON COUNTY WCID #1	CONSOLIDATED WSC	HOUSTON	NECHES	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	255	255	255	255	255	255
HOUSTON COUNTY WCID #1	CONSOLIDATED WSC	ANDERSON	TRINITY	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	79	79	79	79	79	79
HOUSTON COUNTY WCID #1	CONSOLIDATED WSC	HOUSTON	TRINITY	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	655	655	655	655	655	655
HOUSTON COUNTY WCID #1	CONSOLIDATED WSC	ANDERSON	NECHES	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	23	23	23	23	23	23
HOUSTON COUNTY WCID #1	COUNTY-OTHER	HOUSTON	TRINITY	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	84	83	84	85	87	90
HOUSTON COUNTY WCID #1	CROCKETT	HOUSTON	TRINITY	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	1,731	1,716	1,702	1,689	1,676	1,661
HOUSTON COUNTY WCID #1	GRAPELAND	HOUSTON	TRINITY	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	381	377	374	372	369	365
HOUSTON COUNTY WCID #1	COUNTY-OTHER	HOUSTON	TRINITY	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	82	84	84	83	84	84
HOUSTON COUNTY WCID #1	LOVELADY	HOUSTON	TRINITY	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	51	51	51	51	51	51
HOUSTON COUNTY WCID #1	MANUFACTURING	HOUSTON	TRINITY	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	159	177	193	208	221	237
JACKSONVILLE CITY OF	BULLARD	SMITH	NECHES	JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	14	13	12	12	11	11
JACKSONVILLE CITY OF	COUNTY-OTHER	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	93	77	57	34	23	18
JACKSONVILLE CITY OF	COUNTY-OTHER	CHEROKEE	NECHES	JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	218	180	134	78	54	41
JACKSONVILLE CITY OF	CRAFT-TURNEY WSC	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	218	244	280	326	342	350
JACKSONVILLE CITY OF	CRAFT-TURNEY WSC	CHEROKEE	NECHES	JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	493	555	639	747	786	807
JACKSONVILLE CITY OF	JACKSONVILLE	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	1,450	1,420	1,390	1,358	1,344	1,326
JACKSONVILLE CITY OF	JACKSONVILLE	CHEROKEE	NECHES	JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	3,381	3,311	3,243	3,168	3,135	3,093
JACKSONVILLE CITY OF	MANUFACTURING	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	297	306	312	316	318	325
JACKSONVILLE CITY OF	MANUFACTURING	CHEROKEE	NECHES	JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	693	714	727	738	742	758
JACKSONVILLE CITY OF	NORTH CHEROKEE WSC	CHEROKEE	NECHES	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	160	171	179	184	191	199
JACKSONVILLE CITY OF	NORTH CHEROKEE WSC	CHEROKEE	NECHES	JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	374	400	418	430	445	463
LOWER NECHES VALLEY AUTHORITY	BEAUMONT	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	31,360	31,360	31,360	31,360	31,360	31,360
LOWER NECHES VALLEY AUTHORITY	BOLIVAR PENINSULAR SUD	GALVESTON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	5,549	5,499	5,449	5,399	5,349	5,299
LOWER NECHES VALLEY AUTHORITY	COUNTY-OTHER	GALVESTON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	1	1	1	1	1	1
LOWER NECHES VALLEY AUTHORITY	COUNTY-OTHER	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	188	244	291	327	368	445
LOWER NECHES VALLEY AUTHORITY	MANUFACTURING	JASPER	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	43,982	67,484	77,166	70,824	63,898	56,360
LOWER NECHES VALLEY AUTHORITY	GROVES	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	44	43	43	42	41	41
LOWER NECHES VALLEY AUTHORITY	GROVES	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	3,146	3,094	3,042	2,989	2,955	2,955
LOWER NECHES VALLEY AUTHORITY	IRRIGATION	CHAMBERS	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	38,000	38,000	38,000	38,000	38,000	38,000
LOWER NECHES VALLEY AUTHORITY	IRRIGATION	LIBERTY	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	2,500	2,500	2,500	2,500	2,500	2,500
LOWER NECHES VALLEY AUTHORITY	IRRIGATION	LIBERTY	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	17,200	17,200	17,200	17,200	17,200	17,200

Region I Wholesale Water Provider Supplies
(Ac-ft per Year)

WWP Name	WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
LOWER NECHES VALLEY AUTHORITY	IRRIGATION	JEFFERSON	NECHES	NECHES RIVER RUN-OF-RIVER PINE ISLAND BAYOU	JASPER	NECHES	11,648	11,648	11,648	11,648	11,648	11,648
LOWER NECHES VALLEY AUTHORITY	IRRIGATION	JEFFERSON	NECHES-TRINITY	NECHES RIVER RUN-OF-RIVER PINE ISLAND BAYOU	JASPER	NECHES	128,352	128,352	128,352	122,622	112,622	102,622
LOWER NECHES VALLEY AUTHORITY	IRRIGATION	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	0	0	0	5,730	15,730	25,730
LOWER NECHES VALLEY AUTHORITY	JEFFERSON COUNTY WCID #	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	243	266	285	299	316	353
LOWER NECHES VALLEY AUTHORITY	JEFFERSON COUNTY WCID #	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	397	434	465	488	516	576
LOWER NECHES VALLEY AUTHORITY	COUNTY-OTHER	JEFFERSON	NECHES	NECHES RIVER RUN-OF-RIVER PINE ISLAND BAYOU	JASPER	NECHES	169,860	75,960	4,270	0	0	0
LOWER NECHES VALLEY AUTHORITY	COUNTY-OTHER	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	484,205	280,287	160,409	220,665	123,832	105,420
LOWER NECHES VALLEY AUTHORITY	MANUFACTURING	JASPER	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	20,189	23,571	26,084	28,281	29,928	29,991
LOWER NECHES VALLEY AUTHORITY	MANUFACTURING	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	32,485	101,169	146,463	75,680	158,234	164,124
LOWER NECHES VALLEY AUTHORITY	MANUFACTURING	JEFFERSON	NECHES-TRINITY	NECHES RIVER RUN-OF-RIVER PINE ISLAND BAYOU	JASPER	NECHES	72,016	165,916	237,606	247,606	257,606	267,606
LOWER NECHES VALLEY AUTHORITY	MANUFACTURING	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	39,531	147,706	209,947	218,855	228,176	237,286
LOWER NECHES VALLEY AUTHORITY	NEDERLAND	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	159	165	170	172	177	187
LOWER NECHES VALLEY AUTHORITY	NEDERLAND	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	3,966	4,103	4,217	4,284	4,396	4,647
LOWER NECHES VALLEY AUTHORITY	NOME	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	90	97	102	107	112	122
LOWER NECHES VALLEY AUTHORITY	NOME	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	37	39	42	43	45	50
LOWER NECHES VALLEY AUTHORITY	PORT ARTHUR	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	59	58	56	55	54	54
LOWER NECHES VALLEY AUTHORITY	PORT ARTHUR	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	9,645	9,452	9,259	9,067	8,939	8,939
LOWER NECHES VALLEY AUTHORITY	PORT NECHES	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	909	909	913	908	920	960
LOWER NECHES VALLEY AUTHORITY	PORT NECHES	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	873	873	876	872	884	992
LOWER NECHES VALLEY AUTHORITY	TRINITY BAY CONSERVATIO	CHAMBERS	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	421	479	547	623	709	807
LOWER NECHES VALLEY AUTHORITY	TRINITY BAY CONSERVATIO	CHAMBERS	TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	192	219	249	284	324	370
LOWER NECHES VALLEY AUTHORITY	WEST JEFFERSON COUNTY I	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	1,029	1,148	1,264	1,345	1,436	1,631
LOWER NECHES VALLEY AUTHORITY	MANUFACTURING	JASPER	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	50,000	50,000	50,000	50,000	50,000	50,000
LOWER NECHES VALLEY AUTHORITY	WOODVILLE	TYLER	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	5,600	5,600	5,600	5,600	5,600	5,600
LUFKIN CITY OF	LUFKIN	ANGELINA	NECHES	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	4,302	3,327	3,389	3,449	3,535	3,634
LUFKIN CITY OF	COUNTY-OTHER	ANGELINA	NECHES	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	75	58	59	58	58	59
LUFKIN CITY OF	DIBOLL	ANGELINA	NECHES	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	1,106	764	696	633	574	518
LUFKIN CITY OF	HUNTINGTON	ANGELINA	NECHES	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	11	11	12	12	12	12
LUFKIN CITY OF	MANUFACTURING	ANGELINA	NECHES	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	5,445	6,799	6,809	6,816	6,793	6,751
LUFKIN CITY OF	REDLAND WSC	ANGELINA	NECHES	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	61	41	36	32	29	26
NACOGDOCHES CITY OF	APPLEBY WSC	NACOGDOCHES	NECHES	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	4	23	51	83	146	216
NACOGDOCHES CITY OF	APPLEBY WSC	NACOGDOCHES	NECHES	NACOGDOCHES LAKE/RESERVOIR	RESERVOIR	NECHES	21	122	266	428	732	1,058
NACOGDOCHES CITY OF	NACOGDOCHES	NACOGDOCHES	NECHES	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	2,682	2,606	2,526	2,437	2,311	2,162
NACOGDOCHES CITY OF	NACOGDOCHES	NACOGDOCHES	NECHES	NACOGDOCHES LAKE/RESERVOIR	RESERVOIR	NECHES	14,766	14,027	13,280	12,512	11,578	10,566

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WWP Name	WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
NACOGDOCHES CITY OF	D&M WSC	NACOGDOCHES	NECHES	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	62	71	78	88	108	133
NACOGDOCHES CITY OF	D&M WSC	NACOGDOCHES	NECHES	NACOGDOCHES LAKE/RESERVOIR	RESERVOIR	NECHES	344	381	413	452	544	647
NACOGDOCHES CITY OF	MANUFACTURING	NACOGDOCHES	NECHES	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	352	400	445	492	535	589
NACOGDOCHES CITY OF	MANUFACTURING	NACOGDOCHES	NECHES	NACOGDOCHES LAKE/RESERVOIR	RESERVOIR	NECHES	1,936	2,153	2,341	2,524	2,679	2,879
PANOLA COUNTY FWSD #1	CARTHAGE	PANOLA	SABINE	MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	10,585	10,172	9,772	9,373	8,981	8,546
PANOLA COUNTY FWSD #1	COUNTY-OTHER	PANOLA	SABINE	MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	1,487	1,487	1,487	1,487	1,487	1,487
PANOLA COUNTY FWSD #1	MANUFACTURING	PANOLA	SABINE	MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	1,018	1,078	1,125	1,171	1,210	1,290
PANOLA COUNTY FWSD #1	MINING	PANOLA	SABINE	MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	2,254	2,563	2,752	2,943	3,137	3,322
PANOLA COUNTY FWSD #1	COUNTY-OTHER	PANOLA	SABINE	MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	6,448	5,903	5,479	5,053	4,623	4,205
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	578	646	714	782	850	918
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	5,327	5,954	6,581	7,208	7,835	8,460
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	78	87	96	105	114	124
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	129	144	159	174	189	205
PORT ARTHUR CITY OF	PORT ARTHUR	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	59	58	56	55	54	54
PORT ARTHUR CITY OF	PORT ARTHUR	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	9,645	9,452	9,259	9,067	8,939	8,939
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	24	27	30	33	36	38
PORT ARTHUR CITY OF	MEEKER MUD	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	3	3	3	3	3	3
PORT ARTHUR CITY OF	COUNTY-OTHER	JEFFERSON	NECHES-TRINITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	5	5	5	5	5	5
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	1	1	1	1	1	1
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	224	224	224	224	224	224
SABINE RIVER AUTHORITY	ABLES SPRINGS WSC	KAUFMAN	TRINITY	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	965	965	959	946	918	887
SABINE RIVER AUTHORITY	ABLES SPRINGS WSC	HUNT	SABINE	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	119	119	119	119	119	119
SABINE RIVER AUTHORITY	ABLES SPRINGS WSC	VAN ZANDT	SABINE	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	9	9	9	9	9	9
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	1,120	1,120	1,120	1,120	1,120	1,120
SABINE RIVER AUTHORITY	COUNTY-OTHER	SABINE	SABINE	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	81	81	81	81	81	81
SABINE RIVER AUTHORITY	CASH SUD	ROCKWALL	SABINE	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	42	58	62	40	33	26
SABINE RIVER AUTHORITY	CASH SUD	HOPKINS	SABINE	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	45	51	54	56	52	48
SABINE RIVER AUTHORITY	CASH SUD	HUNT	SABINE	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	3,980	3,963	3,949	3,929	3,911	3,894
SABINE RIVER AUTHORITY	CASH SUD	HUNT	SABINE	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	1,449	1,403	1,376	1,386	1,391	1,397
SABINE RIVER AUTHORITY	CASH SUD	RAINS	SABINE	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	86	103	115	118	117	115
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	2,240	2,240	2,240	2,240	2,240	2,240
SABINE RIVER AUTHORITY	COMMERCE	HUNT	SULPHUR	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	8,094	8,033	7,973	7,913	7,852	7,792
SABINE RIVER AUTHORITY	DALLAS	DALLAS	TRINITY	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	120,791	119,943	119,095	118,246	117,398	116,550
SABINE RIVER AUTHORITY	DALLAS	DALLAS	TRINITY	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	183,619	182,251	180,882	179,515	178,146	176,777
SABINE RIVER AUTHORITY	EDGEWOOD	VAN ZANDT	SABINE	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	793	787	781	776	770	764
SABINE RIVER AUTHORITY	EMORY	RAINS	SABINE	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	845	839	832	826	820	814

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WWP Name	WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
SABINE RIVER AUTHORITY	EMORY	RAINS	SABINE	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	1,056	1,048	1,041	1,033	1,025	1,018
SABINE RIVER AUTHORITY	GREENVILLE	HUNT	SABINE	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	20,515	20,363	20,210	20,057	19,904	19,751
SABINE RIVER AUTHORITY	POINT	RAINS	SABINE	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	211	210	208	207	205	204
SABINE RIVER AUTHORITY	POINT	RAINS	SABINE	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	211	210	208	207	205	204
SABINE RIVER AUTHORITY	QUITMAN	WOOD	SABINE	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	1,026	1,019	1,012	1,004	997	990
SABINE RIVER AUTHORITY	TERRELL	KAUFMAN	TRINITY	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	431	437	438	444	444	449
SABINE RIVER AUTHORITY	TERRELL	KAUFMAN	TRINITY	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	9,287	9,209	9,135	9,057	8,984	8,907
SABINE RIVER AUTHORITY	WEST TAWAKONI	HUNT	SABINE	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	1,080	1,072	1,064	1,056	1,047	1,039
SABINE RIVER AUTHORITY	COMBINED CONSUMERS W	HUNT	SABINE	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	1,439	1,390	1,348	1,312	1,271	1,226
SABINE RIVER AUTHORITY	COMBINED CONSUMERS W	VAN ZANDT	SABINE	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	229	266	297	321	351	384
SABINE RIVER AUTHORITY	STEAM ELECTRIC POWER	NEWTON	SABINE	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	13,442	13,442	13,442	13,442	13,442	13,442
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	24,643	24,643	24,643	24,643	24,643	24,643
SABINE RIVER AUTHORITY	MANUFACTURING	HARRISON	SABINE	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	3,206	3,184	3,161	3,139	3,116	3,094
SABINE RIVER AUTHORITY	COUNTY-OTHER	SABINE	SABINE	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	22	22	22	22	22	22
SABINE RIVER AUTHORITY	STEAM ELECTRIC POWER	ORANGE	NECHES	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	4,481	4,481	4,481	4,481	4,481	4,481
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	280	280	280	280	280	280
SABINE RIVER AUTHORITY	HEMPHILL	SABINE	SABINE	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	1,841	1,841	1,841	1,841	1,841	1,841
SABINE RIVER AUTHORITY	HENDERSON	RUSK	NECHES	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	3,922	3,922	3,922	3,922	3,922	3,922
SABINE RIVER AUTHORITY	HENDERSON	RUSK	SABINE	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	459	459	459	459	459	459
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	1,120	1,120	1,120	1,120	1,120	1,120
SABINE RIVER AUTHORITY	COUNTY-OTHER	SHELBY	SABINE	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	147	147	147	147	147	147
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	17,922	17,922	17,922	17,922	17,922	17,922
SABINE RIVER AUTHORITY	IRRIGATION	ORANGE	SABINE	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	2,543	2,543	2,543	2,543	2,543	2,543
SABINE RIVER AUTHORITY	COUNTY-OTHER	GREGG	SABINE	SABINE RIVER RUN-OF-RIVER	WOOD	SABINE	560	556	552	548	544	540
SABINE RIVER AUTHORITY	KILGORE	GREGG	SABINE	SABINE RIVER RUN-OF-RIVER	WOOD	SABINE	3,849	3,853	3,857	3,861	3,865	3,869
SABINE RIVER AUTHORITY	KILGORE	RUSK	SABINE	SABINE RIVER RUN-OF-RIVER	WOOD	SABINE	672	672	672	672	672	672
SABINE RIVER AUTHORITY	LONGVIEW	GREGG	SABINE	SABINE RIVER RUN-OF-RIVER	GREGG	SABINE	17,588	17,464	17,341	17,218	17,095	16,971
SABINE RIVER AUTHORITY	LONGVIEW	HARRISON	SABINE	SABINE RIVER RUN-OF-RIVER	GREGG	SABINE	733	728	723	717	712	707
SABINE RIVER AUTHORITY	MACBEE SUD	HUNT	SABINE	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	109	109	109	112	178	281
SABINE RIVER AUTHORITY	MACBEE SUD	VAN ZANDT	SABINE	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	822	822	822	819	753	650
SABINE RIVER AUTHORITY	MACBEE SUD	VAN ZANDT	TRINITY	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	1,152	1,136	1,120	1,104	1,088	1,072
SABINE RIVER AUTHORITY	MACBEE SUD	KAUFMAN	SABINE	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	71	75	80	86	91	95
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	NECHES	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	4,481	4,481	4,481	4,481	4,481	4,481
SABINE RIVER AUTHORITY	COUNTY-OTHER	SABINE	SABINE	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	28	28	28	28	28	28
SABINE RIVER AUTHORITY	MINING	HARRISON	SABINE	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	10,993	10,915	10,838	10,761	10,684	10,607

Region I Wholesale Water Provider Supplies
(Ac-ft per Year)

WWP Name	WUG Name	WUG County	WUG Basin	Source Name	Source County	Source Basin	2010	2020	2030	2040	2050	2060
SABINE RIVER AUTHORITY	ROSE CITY	ORANGE	NECHES	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	478	478	478	478	478	478
SABINE RIVER AUTHORITY	SOUTH TAWAKONI WSC	VAN ZANDT	SABINE	FORK LAKE/RESERVOIR	RESERVOIR	SABINE	1,056	1,048	1,041	1,033	1,025	1,018
SABINE RIVER AUTHORITY	COUNTY-OTHER	NEWTON	SABINE	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	74,026	74,026	74,026	74,026	74,026	74,026
SABINE RIVER AUTHORITY	COUNTY-OTHER	NEWTON	SABINE	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	729,952	729,952	729,952	729,952	729,952	729,952
SABINE RIVER AUTHORITY	STEAM ELECTRIC POWER	NEWTON	SABINE	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	17,929	17,929	17,929	17,929	17,929	17,929
SABINE RIVER AUTHORITY	WILLS POINT	VAN ZANDT	SABINE	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	654	654	654	654	654	654
SABINE RIVER AUTHORITY	WILLS POINT	VAN ZANDT	TRINITY	TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	1,458	1,443	1,427	1,412	1,396	1,381
TYLER CITY OF	COUNTY-OTHER	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	445	467	491	515	541	568
TYLER CITY OF	COUNTY-OTHER	SMITH	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
TYLER CITY OF	COUNTY-OTHER	SMITH	NECHES	TYLER LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
TYLER CITY OF	IRRIGATION	SMITH	NECHES	BELLWOOD LAKE/RESERVOIR	RESERVOIR	NECHES	300	300	300	300	300	300
TYLER CITY OF	MANUFACTURING	SMITH	NECHES	BELLWOOD LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0
TYLER CITY OF	MANUFACTURING	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	281	314	343	370	393	426
TYLER CITY OF	MANUFACTURING	SMITH	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	1,085	1,212	1,325	1,434	1,526	1,652
TYLER CITY OF	MANUFACTURING	SMITH	NECHES	TYLER LAKE/RESERVOIR	RESERVOIR	NECHES	1,519	1,697	1,855	2,007	2,136	2,313
TYLER CITY OF	SOUTHERN UTILITIES COMP	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	29	31	32	33	36	89
TYLER CITY OF	SOUTHERN UTILITIES COMP	SMITH	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	114	118	122	127	139	345
TYLER CITY OF	SOUTHERN UTILITIES COMP	SMITH	NECHES	TYLER LAKE/RESERVOIR	RESERVOIR	NECHES	160	166	171	178	195	484
TYLER CITY OF	TYLER	SMITH	SABINE	TYLER LAKE/RESERVOIR	RESERVOIR	NECHES	358	464	567	668	844	1,081
TYLER CITY OF	TYLER	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	3,886	3,833	3,785	3,738	3,680	3,553
TYLER CITY OF	TYLER	SMITH	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	15,055	14,852	14,666	14,482	14,259	13,767
TYLER CITY OF	TYLER	SMITH	NECHES	TYLER LAKE/RESERVOIR	RESERVOIR	NECHES	21,077	20,793	20,532	20,276	19,963	19,273
TYLER CITY OF	WHITEHOUSE	SMITH	NECHES	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	66	73	78	84	96	111
TYLER CITY OF	WHITEHOUSE	SMITH	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	259	282	304	327	370	431
TYLER CITY OF	WHITEHOUSE	SMITH	NECHES	TYLER LAKE/RESERVOIR	RESERVOIR	NECHES	362	394	425	457	518	603
UPPER NECHES MWD	DALLAS	DALLAS	TRINITY	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	112,881	111,776	110,670	109,563	108,455	107,347
UPPER NECHES MWD	PALESTINE	ANDERSON	TRINITY	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	27,643	27,373	27,102	26,831	26,560	26,288
UPPER NECHES MWD	TYLER	SMITH	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	66,344	65,694	65,045	64,394	63,743	63,092
UPPER NECHES MWD	COUNTY-OTHER	SMITH	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	91	80	69	61	54	48
UPPER NECHES MWD	COUNTY-OTHER	SMITH	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	104	103	102	101	100	99
UPPER NECHES MWD	IRRIGATION	CHEROKEE	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	296	293	290	287	285	282
UPPER NECHES MWD	COUNTY-OTHER	HENDERSON	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	99	98	97	96	95	94
UPPER NECHES MWD	COUNTY-OTHER	ANDERSON	NECHES	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	0	0	0	0	0	0

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Appendix 4A-A

Comparison of Supply and Demand by Wholesale Water Provider

This appendix provides a summary of supply versus demand by WWP for the ETRWPA. The summaries include current customer demand for each WWP by decade through 2060. Demand is then subtracted from current supplies to assess water availability.

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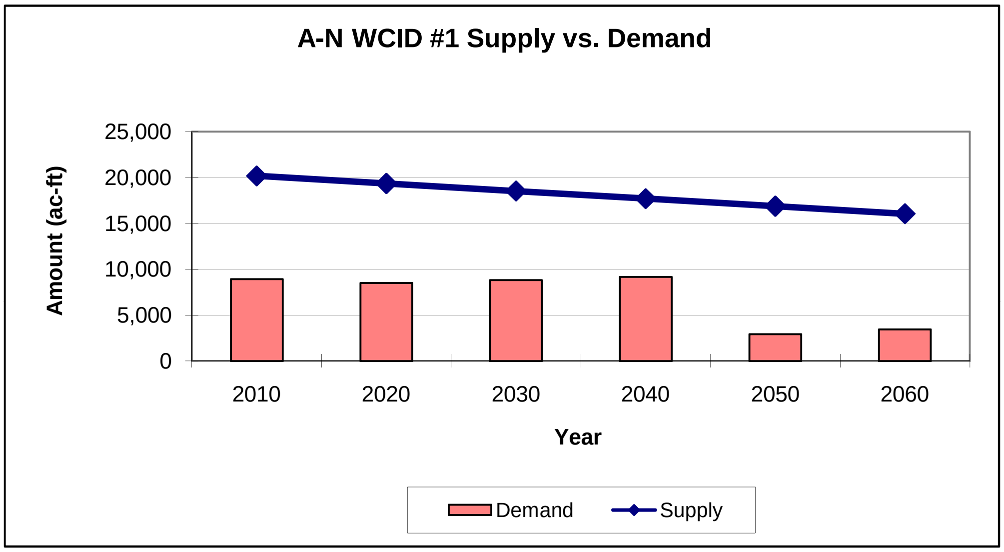
A-N WCID #1
(Units: Acre-Feet per Year)

WUGs	Recipient	2010	2020	2030	2040	2050	2060
Steam Electric Power	Luminant	2,245	1,790	2,093	2,462	2,912	3,460
Steam Electric Power	Nacogdoches Power	2,240	6,721	6,721	6,721	0	0
Whitehouse	Whitehouse	2,186	0	0	0	0	0
Henderson	Henderson	2,242	0	0	0	0	0
Total Demand		**8,913**	**8,511**	**8,814**	**9,183**	**2,912**	**3,460**

Current Supplies	Notes	2010	2020	2030	2040	2050	2060
Lake Striker	*owned by A-N WCID, wr for 20,600 ac-ft	20,183	19,357	18,530	17,703	16,877	16,050
Total Supplies		**20,183**	**19,357**	**18,530**	**17,703**	**16,877**	**16,050**

Supplies Less Current Customer Demand		**11,270**	**10,846**	**9,716**	**8,520**	**13,965**	**12,590**



ANRA
(Units: Acre-Feet per Year)

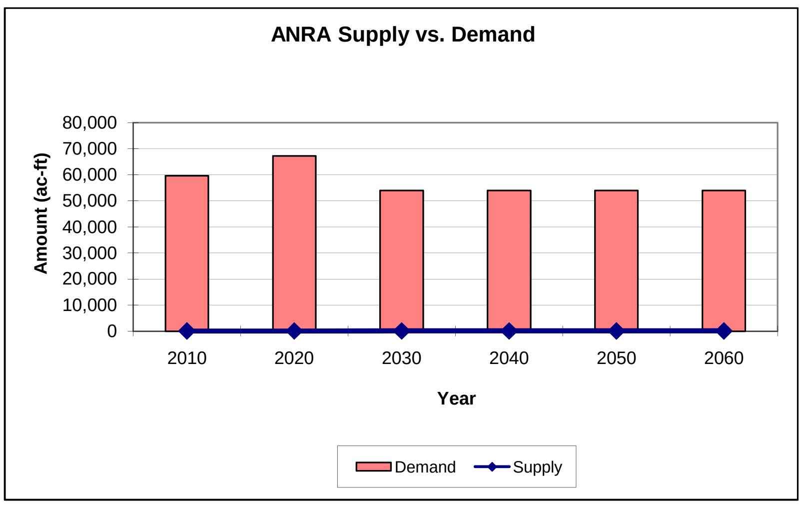
Current Customers	Recipient	% Yield	Contract Amount	2010	2020	2030	2040	2050	2060
Angelina County Manufacturing (Temple Inland)	Temple Inland	10.0%	8,551	8,551	8,551	8,551	8,551	8,551	8,551
Cherokee County-Other	Afton Grove WSC, Stryker Lake WSC, Cherokee County	4.5%	3,848	3,848	3,848	3,848	3,848	3,848	3,848
City of Jacksonville	Jacksonville	5.0%	4,275	4,275	4,275	4,275	4,275	4,275	4,275
City of New Summerfield	New Summerfield	3.0%	2,565	2,565	2,565	2,565	2,565	2,565	2,565
North Cherokee WSC	North Cherokee WSC	5.0%	4,275	4,275	4,275	4,275	4,275	4,275	4,275
City of Rusk	Rusk	5.0%	4,275	4,275	4,275	4,275	4,275	4,275	4,275
Rusk Rural WSC	Rusk Rural WSC	1.0%	855	855	855	855	855	855	855
Nacogdoches County-Other	Caro WSC	0.5%	428	428	428	428	428	428	428
City of Nacogdoches	Nacogdoches	10.0%	8,551	8,551	8,551	8,551	8,551	8,551	8,551
City of New London	New London	1.0%	855	855	855	855	855	855	855
City of Troup	Troup	5.0%	4,275	4,275	4,275	4,275	4,275	4,275	4,275
City of Arp	Arp	0.5%	428	428	428	428	428	428	428
Smith County-Other	Blackjack WSC	1.0%	855	855	855	855	855	855	855
Jackson WSC	Jackson WSC	1.0%	855	855	855	855	855	855	855
City of Whitehouse	Whitehouse	10.0%	8,551	8,551	8,551	8,551	8,551	8,551	8,551
City of Alto	City of Alto	0.5%	428	428	428	428	428	428	428
Jasper County Other	Holmwood Utility	NA	NA	60	65	70	70	70	70
Total Demand				**53,930**	**53,935**	**53,940**	**53,940**	**53,940**	**53,940**

Potential Future Customers	Recipient								
Angelina County Mining	Mining			2,000	4,000	0	0	0	0
Cherokee County Mining	Mining			500	1,500	0	0	0	0
Nacogdoches County Mining	Mining			2,500	7,000	0	0	0	0
Shelby County Mining	Mining			250	250	0	0	0	0
San Augustine County Mining	Mining			500	500	0	0	0	0
Total Potential Future Customers				**5,750**	**13,250**	**0**	**0**	**0**	**0**

Total Demand Current and Future Customers				**59,680**	**67,185**	**53,940**	**53,940**	**53,940**	**53,940**

Current Supplies				2010	2020	2030	2040	2050	2060
Lake Columbia				0	0	0	0	0	0
Jasper Aquifer				60	65	70	70	70	70
Total Supplies				**60**	**65**	**70**	**70**	**70**	**70**

Supplies Less Current Customer Demand				**-53,870**	**-53,870**	**-53,870**	**-53,870**	**-53,870**	**-53,870**
Supplies Less Current and Potential Customer Demand				**-59,620**	**-67,120**	**-53,870**	**-53,870**	**-53,870**	**-53,870**

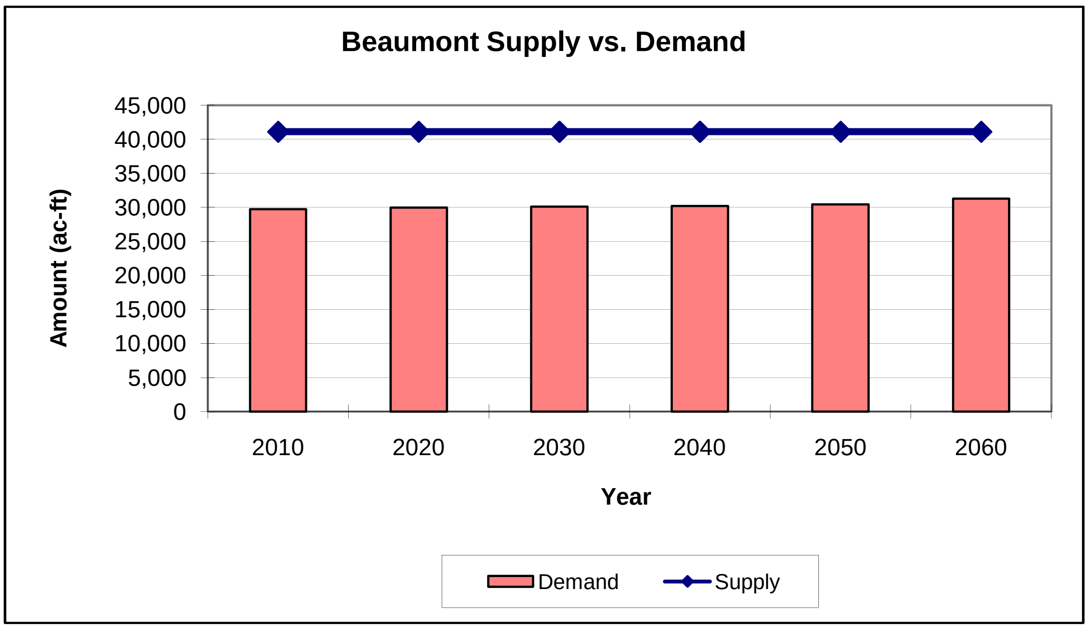


Beaumont
(Units: Acre-Feet per Year)

WUGs	Recipient	2010	2020	2030	2040	2050	2060
City of Beaumont	Beaumont	27,040	26,657	26,275	25,892	25,636	25,636
Jefferson County-Other	County-Other	1,692	2,194	2,615	2,945	3,311	4,004
Jefferson County Manufacturing	Manufacturing	1,000	1,105	1,221	1,349	1,490	1,646
Meeker MUD	Meeker MUD	3	4	4	5	5	8
Total Demand		**29,735**	**29,960**	**30,116**	**30,190**	**30,442**	**31,294**

Current Supplies	Recipient	2010	2020	2030	2040	2050	2060
Municipal Run-of-River	Municipal	29,305	29,305	29,305	29,305	29,305	29,305
Industrial Run-of-River	Industrial	2,806	2,806	2,806	2,806	2,806	2,806
Gulf Coast Aquifer		9,000	9,000	9,000	9,000	9,000	9,000
Total Supplies		**41,111**	**41,111**	**41,111**	**41,111**	**41,111**	**41,111**

Treated Supplies Less Current Customer Demand		**11,376**	**11,151**	**10,995**	**10,921**	**10,669**	**9,817**



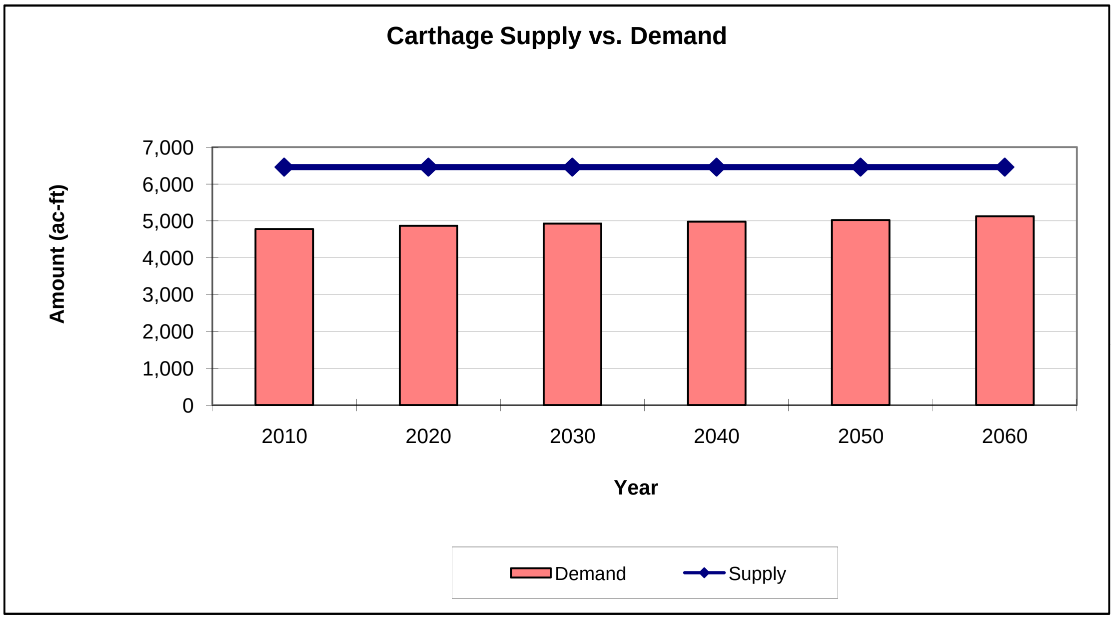
Carthage
(Units: Acre-Feet per Year)

WUGs	Recipient	2010	2020	2030	2040	2050	2060
City of Carthage	City of Carthage	2,274	2,297	2,311	2,317	2,326	2,343
Panola County-Other	County-Other	1,487	1,487	1,487	1,487	1,487	1,487
Panola County Manufacturing	Manufacturing	1,018	1,078	1,125	1,171	1,211	1,290
Total Demand		**4,779**	**4,862**	**4,923**	**4,975**	**5,024**	**5,120**

Current Supplies		2010	2020	2030	2040	2050	2060
Groundwater	Carrizo-Wilcox (Sabine Basin)	1,530	1,530	1,530	1,530	1,530	1,530
Lake Murvaul (PCFWD)		13,443	13,443	13,443	13,443	13,443	13,443
Total Supplies		**14,973**	**14,973**	**14,973**	**14,973**	**14,973**	**14,973**

Water Treatment Capacity		**6,461**	**6,461**	**6,461**	**6,461**	**6,461**	**6,461**

Supplies Less Current Customer Demand		**10,194**	**10,111**	**10,050**	**9,998**	**9,950**	**9,853**

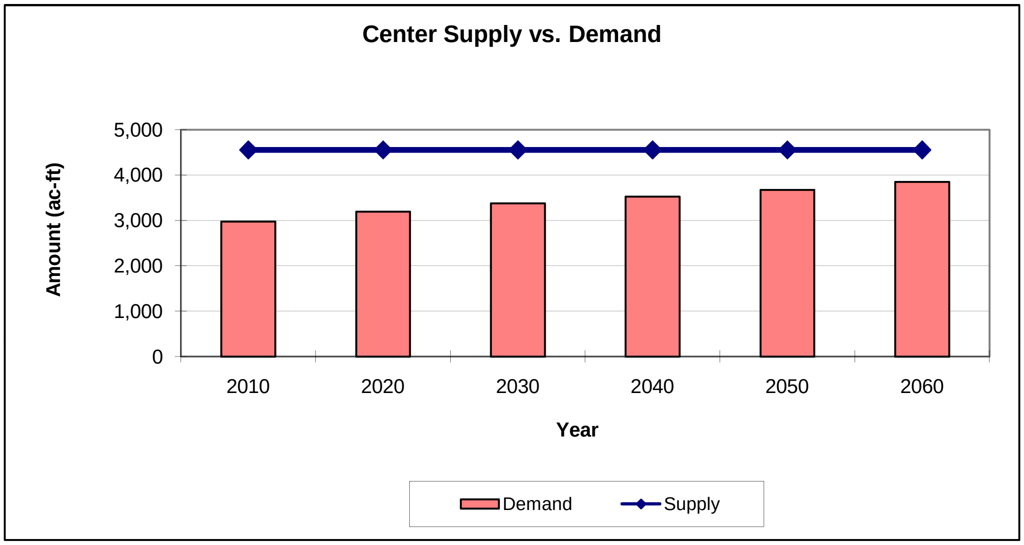


Center
(Units: Acre-Feet per Year)

Customers	Recipient	2010	2020	2030	2040	2050	2060
Shelby County-Other	Sand Hills WSC	167	174	179	180	184	190
Shelby County-Other	Shelbyville WSC	21	22	22	23	23	24
Manufacturing	Manufacturing	1,156	1,282	1,391	1,501	1,598	1,716
City of Center	Center	1,633	1,718	1,785	1,823	1,867	1,923
Total Demand		**2,977**	**3,195**	**3,378**	**3,527**	**3,672**	**3,853**

Current Supplies	Notes	2010	2020	2030	2040	2050	2060
Pinkston Reservoir	*wr to use 3,800 ac-ft/yr (COA #4404)	3,800	3,800	3,800	3,800	3,800	3,800
Lake Center		754	754	754	754	754	754
Total Supplies		**4,554**	**4,554**	**4,554**	**4,554**	**4,554**	**4,554**

Supplies Less Current Customer Demand		**1,577**	**1,359**	**1,176**	**1,027**	**882**	**701**

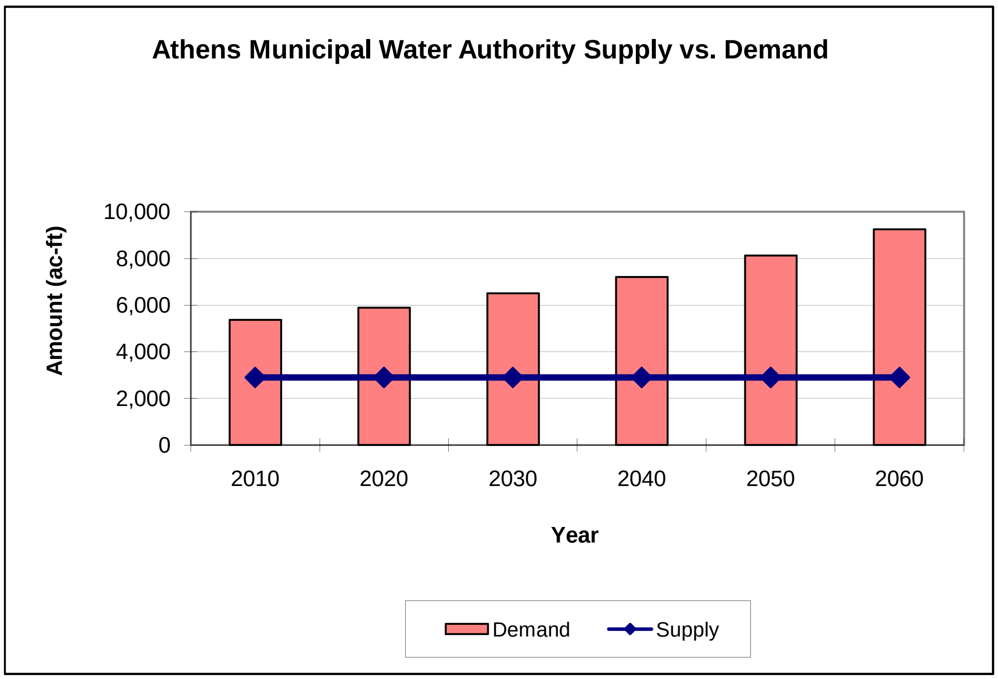


Athens Municipal Water Authority
(Units: Acre-Feet per Year)

WUGs	Recipient	2010	2020	2030	2040	2050	2060
City of Athens (less groundwater supplies)	City of Athens	2,085	2,591	3,190	3,870	4,762	5,867
Henderson Co. Irrigation	Lakeside irrigation	159	164	169	174	179	185
Henderson County Livestock	TPWD Fish Hatchery	3,023	3,023	3,023	3,023	3,023	3,023
Henderson County Manufacturing (90% - Reg C)	City of Athens	100	106	120	136	155	176
Total Demand		**5,367**	**5,884**	**6,502**	**7,203**	**8,119**	**9,251**

Current Supplies		2010	2020	2030	2040	2050	2060
Lake Athens (firm yield)		6,064	5,983	5,903	5,822	5,741	5,660
Lake Athens (safe yield)		5,172	5,084	4,996	4,908	4,820	4,730
Lake Athens (operational yield)		2,900	2,900	2,900	2,900	2,900	2,900
Reuse (limit- 2,677)		2,872	0	0	0	0	0
Total Supplies		**2,900**	**2,900**	**2,900**	**2,900**	**2,900**	**2,900**

Supplies Less Current Customer Demand		**-2,467**	**-2,984**	**-3,602**	**-4,303**	**-5,219**	**-6,351**



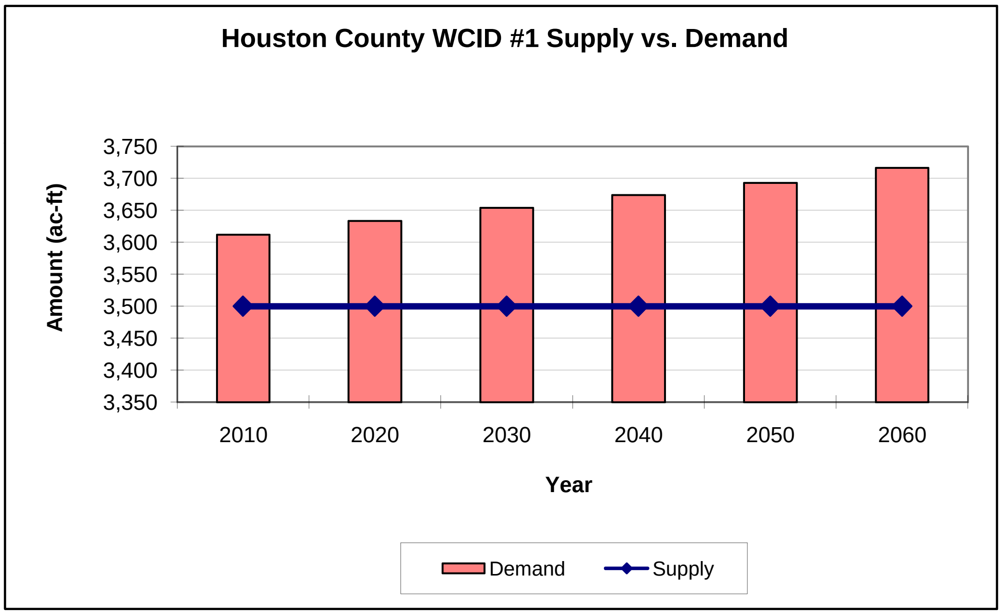
Houston County WCID #1
(Units: Acre-Feet per Year)

WUGs	Recipient	2010	2020	2030	2040	2050	2060
Grapeland	Grapeland	405	405	405	405	405	405
Houston County-Other	County-Other	89	90	91	93	96	100
Houston County Manufacturing	Manufacturing	169	190	209	227	243	263
Crockett	Crockett	1,841	1,841	1,841	1,841	1,841	1,841
Lovelady	Lovelady	77	77	77	77	77	77
Consolidated WSC	Consolidated WSC	1,031	1,031	1,031	1,031	1,031	1,031
Total Demand		**3,612**	**3,634**	**3,654**	**3,674**	**3,693**	**3,717**

Potential Future Customers							
Consolidated WSC	Consolidated WSC	1,031	1,031	1,031	1,031	1,031	1,031
Steam Electric Power	Nacogdoches Power	0	340	340	340	340	340
Total Potential Future Customers		**1,031**	**1371**	**1371**	**1371**	**1371**	**1371**

Current Supplies	Notes	2010	2020	2030	2040	2050	2060
Houston County Lake	*wr to use 3,500 ac-ft/yr	3,500	3,500	3,500	3,500	3,500	3,500
Total Supplies		**3,500**	**3,500**	**3,500**	**3,500**	**3,500**	**3,500**

Supplies Less Current Customer Demand		**-112**	**-134**	**-154**	**-174**	**-193**	**-217**
Supplies Less Potential Customer Demand		**-1,143**	**-1,505**	**-1,525**	**-1,545**	**-1,564**	**-1,588**

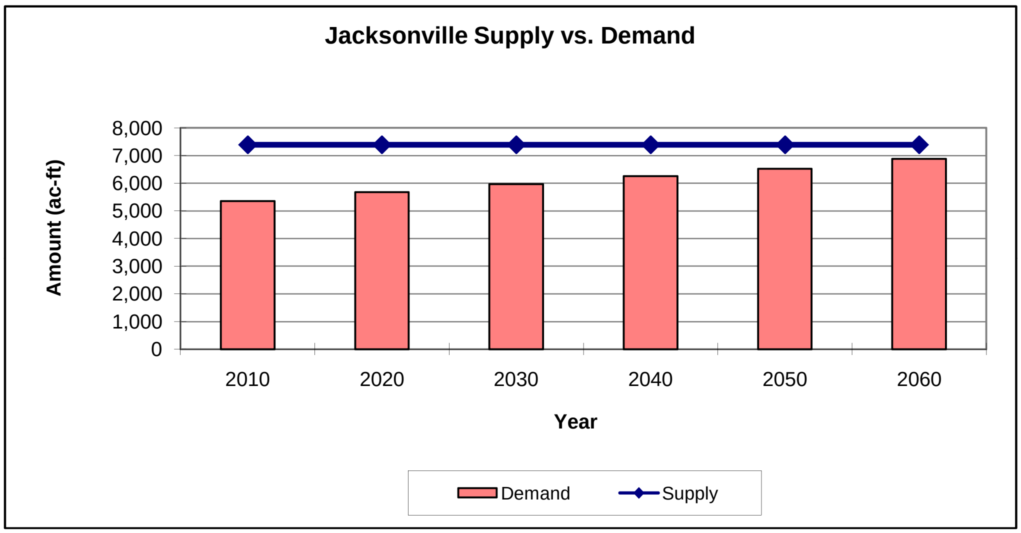


Jacksonville
(Units: Acre-Feet per Year)

WUGs	Recipient	2010	2020	2030	2040	2050	2060
City of Jacksonville	Jacksonville	3,502	3,637	3,741	3,827	3,948	4,111
Cherokee County Manufacturing	Manufacturing	718	784	839	891	934	1,007
Cherokee County-Other	County-Other	226	198	154	95	68	55
North Cherokee WSC	N. Cherokee WSC	387	439	482	519	560	616
Bullard		10	10	10	10	10	10
Craft-Turney WSC	Craft-Turney WSC	515	614	742	908	995	1,078
Total Demand		**5,358**	**5,682**	**5,968**	**6,250**	**6,515**	**6,877**

Current Supplies	Notes	2010	2020	2030	2040	2050	2060
Lake Jacksonville	*CA3274 allows cosumptive use of 6,200 ac-ft, WTP capacity - 5173	5,173	5,173	5,173	5,173	5,173	5,173
Carrizo-Wilcox		2,218	2,218	2,218	2,218	2,218	2,218
Total Supplies		**7,391**	**7,391**	**7,391**	**7,391**	**7,391**	**7,391**

Supplies Less Current Customer Demand		**2,034**	**1,710**	**1,423**	**1,142**	**876**	**515**



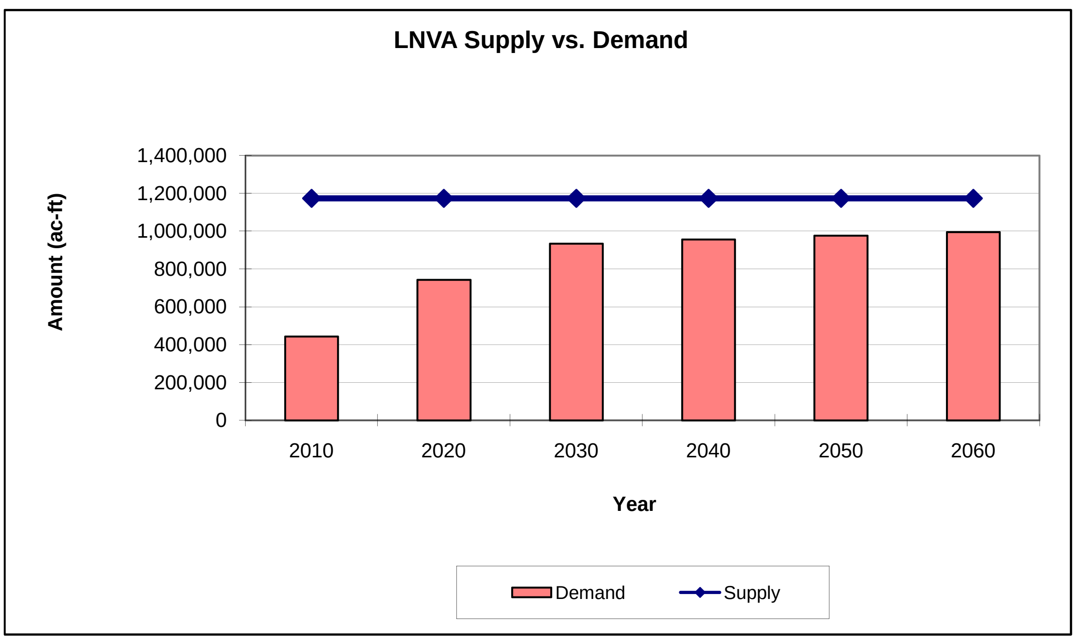
LNVA
(Units: Acre-Feet per Year)

WUGs	Recipient	2010	2020	2030	2040	2050	2060
Jasper County Manufacturing	Manufacturing	20,189	23,571	26,084	28,281	29,928	29,991
Mining - Hardin County	Mining	0	0	0	0	0	0
Groves	Groves	3,190	3,137	3,085	3,031	2,996	2,996
Nederland	Nederland	4,125	4,268	4,387	4,456	4,573	4,834
Port Arthur	Port Arthur	15,849	16,377	16,904	17,433	18,026	18,750
Port Neches	Port Neches	1,782	1,782	1,789	1,780	1,804	1,882
Jefferson County-Other	County-Other	188	244	291	327	368	445
Jefferson County Manufacturing	Manufacturing	144,032	235,566	235,566	260,566	285,566	310,566
Irrigation - Jefferson County	Irrigation	140,000	140,000	140,000	140,000	140,000	140,000
West Jefferson County MWD	West Jefferson County MWD	1,029	1,148	1,264	1,345	1,436	1,631
Jefferson County WCID #10	Jefferson County WCID #10	640	700	750	787	832	929
Nome	Nome	127	136	144	150	157	172
Trinity Bay Conservation District	Winnie & Stowell	2,688	2,688	2,688	2,688	2,688	2,688
Bolivar Pennisula SUD		6,000	6,000	6,000	6,000	6,000	6,000
Irrigation - Chambers County		37,000	37,000	37,000	37,000	37,000	37,000
Irrigation- Liberty County		23,000	23,000	23,000	23,000	23,000	23,000
Jefferson County LNG	Industry	0	179,225	358,450	358,450	358,450	358,450
Delivery Losses		43,982	67,484	77,166	70,824	63,898	56,360
Total Demand		**443,822**	**742,326**	**934,568**	**956,117**	**976,721**	**995,694**

Other Obligations		2010	2020	2030	2040	2050	2060
City of Beaumont - Reserve		31,360	31,360	31,360	31,360	31,360	31,360
West Vaco - Contract		50,000	50,000	50,000	50,000	50,000	50,000
City of Woodville - Contract		5,600	5,600	5,600	5,600	5,600	5,600
Obligation sub-total		**86,960**	**86,960**	**86,960**	**86,960**	**86,960**	**86,960**

Current Supplies		2010	2020	2030	2040	2050	2060
B. A. Steinhagen Lake/Sam Rayburn	*water right is for 792,000 ac-ft (transfer of 28,000 to Lufkin)	792,000	792,000	792,000	792,000	792,000	792,000
Pine Island Run-of-river Rights	Neches	381,876	381,876	381,876	381,876	381,876	381,876
Total Supplies		**1,173,876**	**1,173,876**	**1,173,876**	**1,173,876**	**1,173,876**	**1,173,876**

Supplies Less Current Customer Demand		**730,054**	**431,550**	**239,308**	**217,759**	**197,155**	**178,182**
Supplies Less Current Customer Demand & Other Obligations		**643,094**	**344,590**	**152,348**	**130,799**	**110,195**	**91,222**

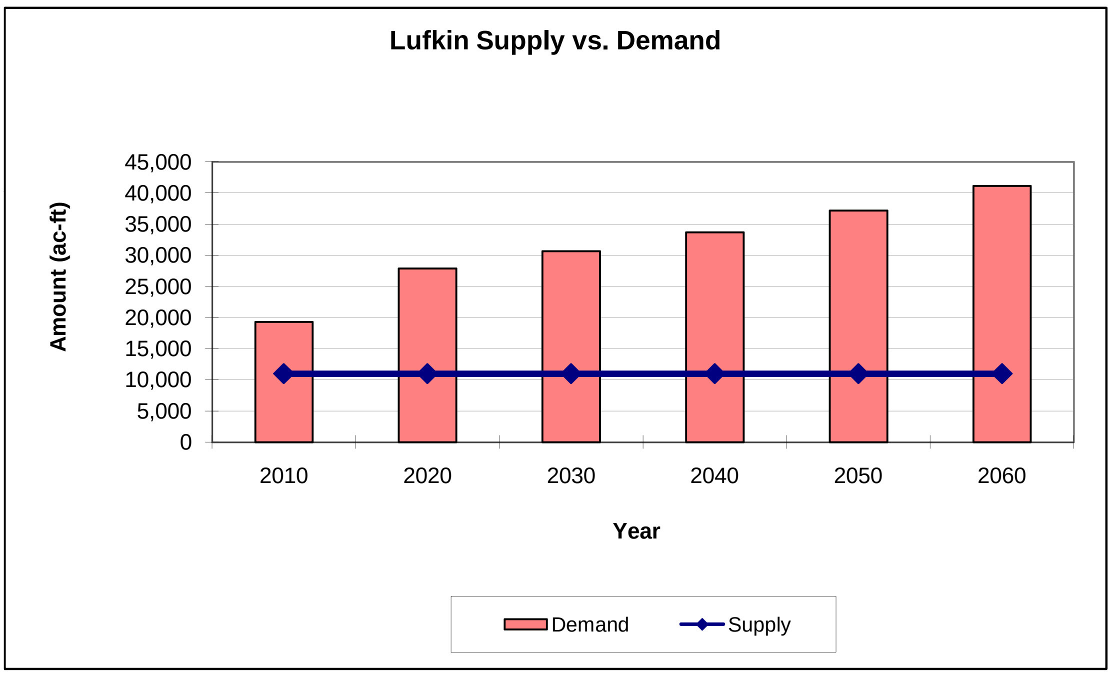


Lufkin
(Units: Acre-Feet per Year)

WUGs	Recipient	2010	2020	2030	2040	2050	2060
City of Lufkin	Lufkin	7,546	8,444	9,446	10,565	11,951	13,599
Angelina County-Other	County-Other	91	94	99	104	115	131
Angelina County Manufacturing	Manufacturing	9,550	17,255	18,981	20,879	22,966	25,263
Angelina County-Other	Redland WSC	107	104	101	98	97	97
Angelina County-Other	Angelina Fresh Water	40	54	66	72	80	88
Huntington	Huntington	20	27	33	36	40	44
City of Diboll	Diboll	1,940	1,940	1,940	1,940	1,940	1,940
Total Demand		**19,294**	**27,918**	**30,664**	**33,694**	**37,189**	**41,162**

Current Supplies		2010	2020	2030	2040	2050	2060
Carrizo-Wilcox		11,000	11,000	11,000	11,000	11,000	11,000
Lake Kurth		0	0	0	0	0	0
Sam Rayburn		0	0	0	0	0	0
Total Supplies		**11,000**	**11,000**	**11,000**	**11,000**	**11,000**	**11,000**

Supplies Less Current Customer Demand		**-8,294**	**-16,918**	**-19,664**	**-22,694**	**-26,189**	**-30,162**

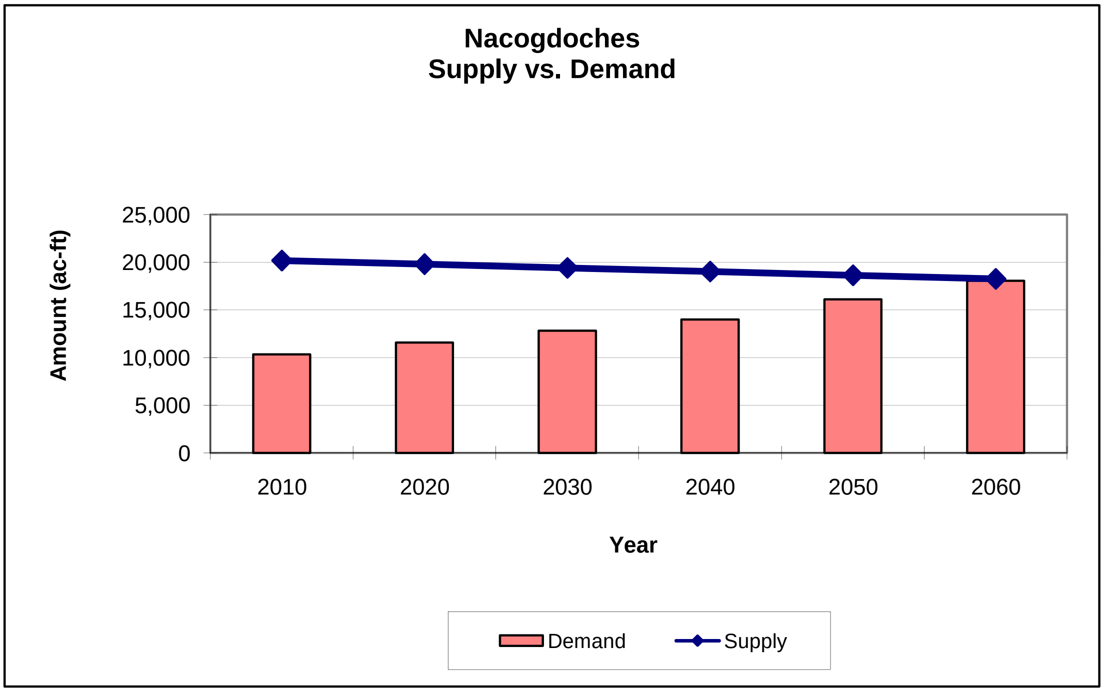


Nacogdoches
(Units: Acre-Feet per Year)

WUGs	Recipient	2010	2020	2030	2040	2050	2060
City of Nacogdoches	City of Nacogdoches	7,625	8,423	9,218	9,939	11,352	12,540
Nacogdoches County Manufacturing	Manufacturing	2,288	2,553	2,786	3,016	3,214	3,468
Nacogdoches County-Other	D&M WSC	406	452	491	540	652	780
Appleby WSC	Appleby WSC	25	145	317	511	878	1,274
Total Demand		**10,344**	**11,573**	**12,812**	**14,006**	**16,096**	**18,062**

Current Supplies	Notes	2010	2020	2030	2040	2050	2060
Lake Nacogdoches	*wr for 22,000 ac-ft	17,067	16,683	16,300	15,917	15,533	15,150
Carrizo-Wilcox		3,100	3,100	3,100	3,100	3,100	3,100
Total Supplies		**20,167**	**19,783**	**19,400**	**19,017**	**18,633**	**18,250**

Supplies Less Current Customer Demand		**9,823**	**8,210**	**6,588**	**5,010**	**2,537**	**188**



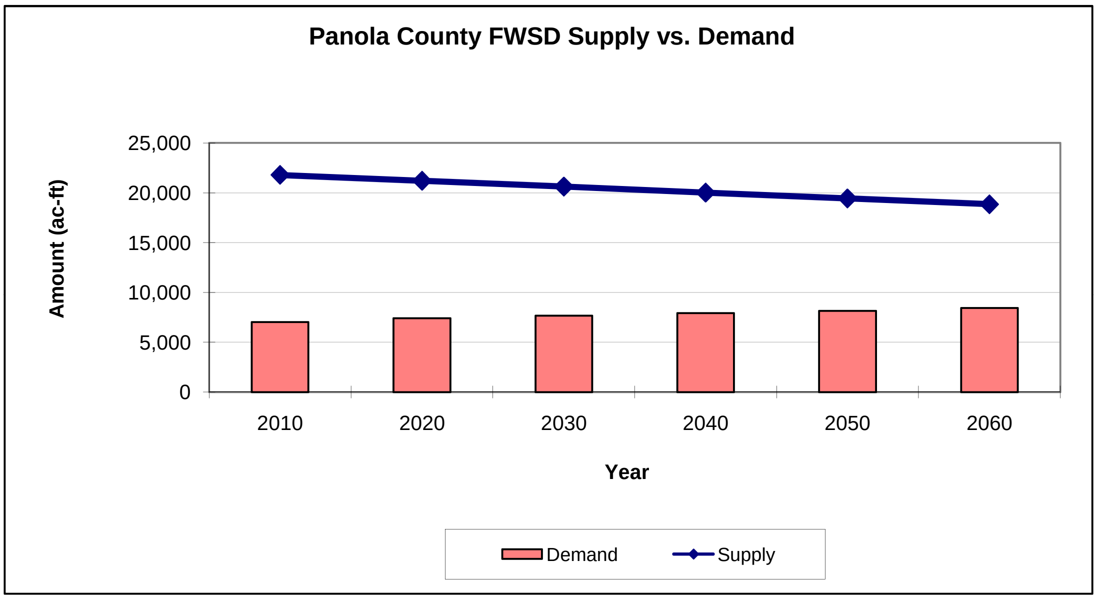
Panola County FWSD
(Units: Acre-Feet per Year)

WUGs	Recipient	2010	2020	2030	2040	2050	2060
City of Carthage*	Carthage	2,274	2,297	2,311	2,317	2,326	2,343
Panola County-Other	County-Other	1,487	1,487	1,487	1,487	1,487	1,487
Panola County Manufacturing	Manufacturing	1,018	1,078	1,125	1,171	1,211	1,290
Panola County Mining	Mining	2,254	2,563	2,752	2,943	3,137	3,322
Total Demand		**7,032**	**7,424**	**7,675**	**7,918**	**8,160**	**8,442**

* City of Carthage has a contract for 13,443 acre-feet per year.

Current Supplies	Notes	2010	2020	2030	2040	2050	2060
Lake Murvaul	*owned by PCFWSD and has right for 22,400 ac-ft (COA #4654)	21,792	21,203	20,615	20,027	19,438	18,850
Total Supplies		**21,792**	**21,203**	**20,615**	**20,027**	**19,438**	**18,850**

Supplies Less Current Customer Demand		**14,759**	**13,779**	**12,940**	**12,109**	**11,278**	**10,408**

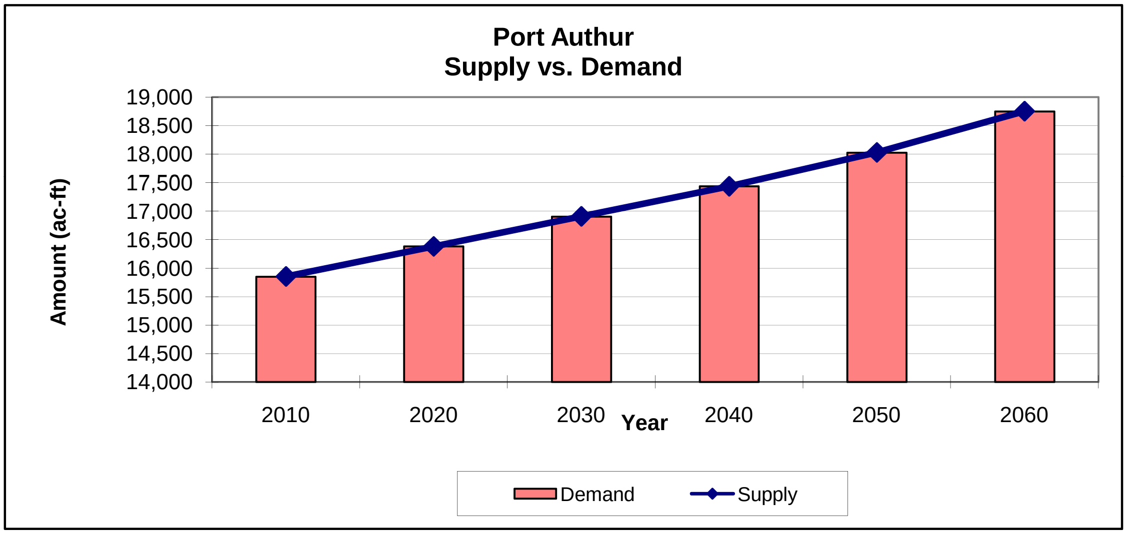


Port Arthur
(Units: Acre-Feet per Year)

WUGs	Recipient	2010	2020	2030	2040	2050	2060
City of Port Arthur	Port Arthur	9,704	9,510	9,315	9,122	8,993	8,993
Jefferson County Other	Texas Parks and Wildlife	5	5	5	5	5	5
Manufacturing	Motiva	129	144	159	174	189	205
Manufacturing	Std Alloys & Mfg	3	3	3	3	3	5
Manufacturing	Transit Mix Concrete	1	1	1	1	1	2
Manufacturing	Signal International TX	24	27	30	33	36	38
Manufacturing	Great Lakes Carbon	578	646	714	782	850	918
Manufacturing	Huntsman Corp	5,327	5,954	6,581	7,208	7,835	8,460
Manufacturing	KMTEX Inc.	78	87	96	105	114	124
Total Demand		**15,849**	**16,377**	**16,904**	**17,433**	**18,026**	**18,750**

Current Supplies		2010	2020	2030	2040	2050	2060
LNVA (Sam Rayburn)		15,849	16,377	16,904	17,433	18,026	18,750
Treated effluent	Std Alloys & Mfg	3	3	3	3	3	3
Total Supplies		**15,852**	**16,380**	**16,907**	**17,436**	**18,029**	**18,753**

Supplies Less Current Customer Demand		**3**	**3**	**3**	**3**	**3**	**3**

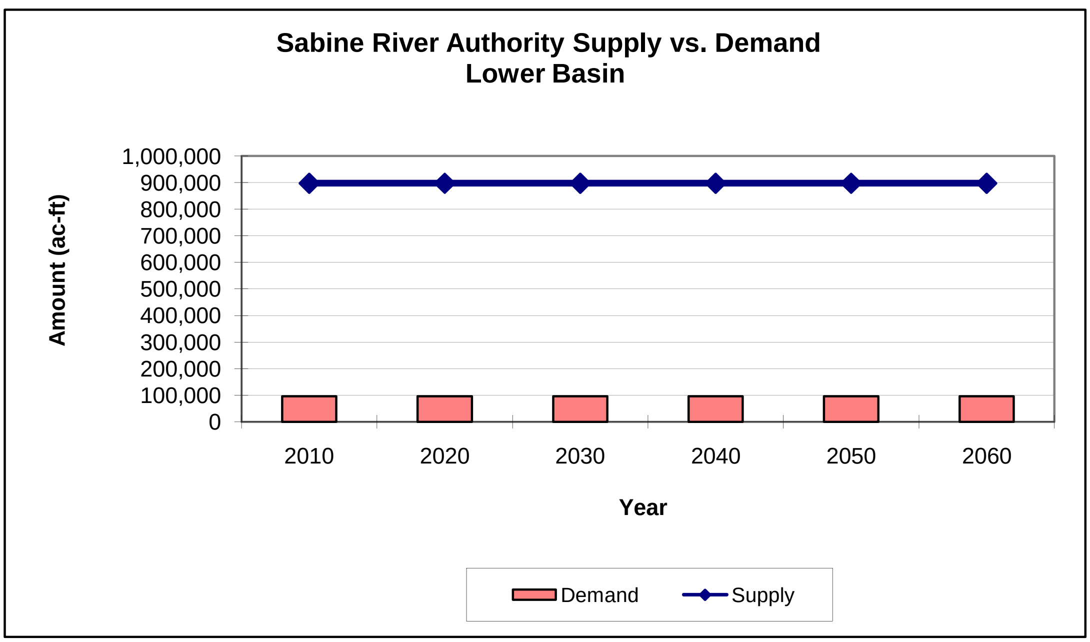


Sabine River Authority
(Units: Acre-Feet per Year)

Lower Basin Customers	Contract Amount	2010	2020	2030	2040	2050	2060
Toledo Bend:							
Hemphill	1,841	1,841	1,841	1,841	1,841	1,841	1,841
Huxley	280	280	280	280	280	280	280
Tenaska	17,922	17,922	17,922	17,922	17,922	17,922	17,922
Beechwood WSC	190	190	190	190	190	190	190
El Camino WS	18	18	18	18	18	18	18
Pendleton Utility Corp	28	28	28	28	28	28	28
Canal (Gulf Coast Division)							
Honeywell	1,120	1,120	1,120	1,120	1,120	1,120	1,120
Bayer	1,120	1,120	1,120	1,120	1,120	1,120	1,120
Chevron Phillips	2,240	2,240	2,240	2,240	2,240	2,240	2,240
E.I. DuPont	24,643	24,643	24,643	24,643	24,643	24,643	24,643
Entergy	4,481	4,481	4,481	4,481	4,481	4,481	4,481
Firestone	737	737	737	737	737	737	737
Temple Inland	22,403	22,403	22,403	22,403	22,403	22,403	22,403
Gerdau Ameristeel US Inc. (Neches)	1,120	1,120	1,120	1,120	1,120	1,120	1,120
Lanxess	1,120	1,120	1,120	1,120	1,120	1,120	1,120
A. Schulman, Inc.	224	224	224	224	224	224	224
Cottonwood Energy	13,442	13,442	13,442	13,442	13,442	13,442	13,442
Rose City (Neches)	478	478	478	478	478	478	478
Irrigation (Orange Co. demands)	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Total demands - Lower basin		**95,907**	**95,907**	**95,907**	**95,907**	**95,907**	**95,907**

Current Supplies - Lower basin		2010	2020	2030	2040	2050	2060
Toledo Bend		750,000	750,000	750,000	750,000	750,000	750,000
Sabine River, Run-of-the-River supplies		147,100	147,100	147,100	147,100	147,100	147,100
Total Supplies		**897,100**	**897,100**	**897,100**	**897,100**	**897,100**	**897,100**

Supplies Less Current Customer Demand		**801,193**	**801,193**	**801,193**	**801,193**	**801,193**	**801,193**



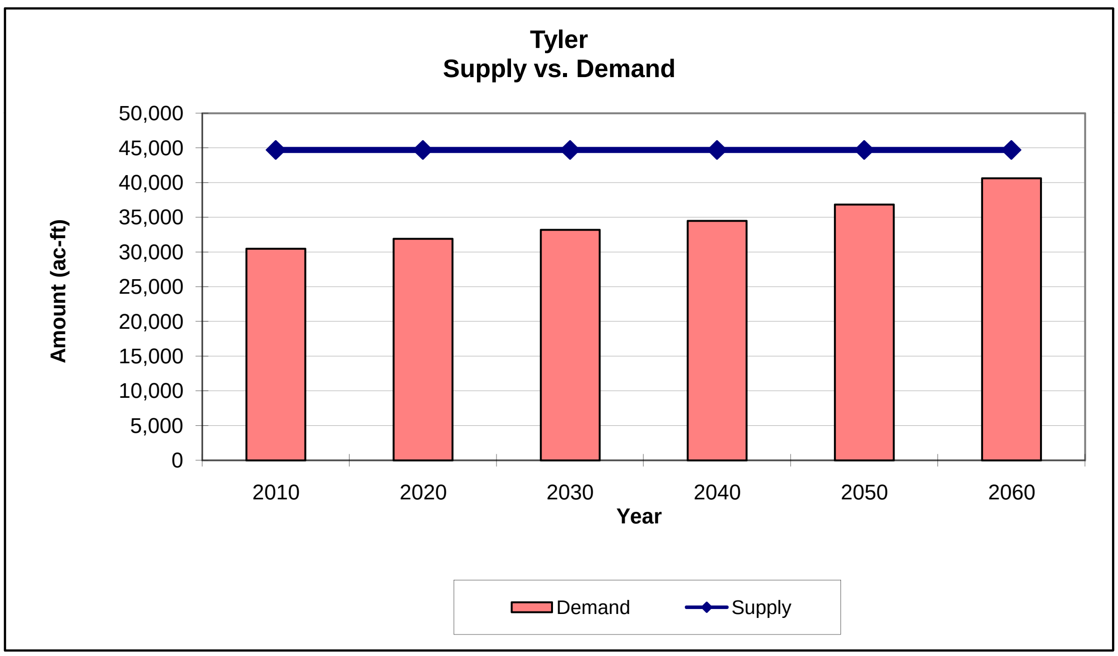
Tyler
(Units: Acre-Feet per Year)

WUGs	Recipient	2010	2020	2030	2040	2050	2060
Tyler	Tyler (Region I)	25,528	26,385	27,211	28,007	29,771	32,253
Tyler	Tyler (Region D)	358	464	567	668	844	1,081
Smith County Manufacturing	Manufacturing	2,885	3,223	3,523	3,811	4,055	4,391
Whitehouse	Whitehouse	687	749	807	868	984	1,145
Southern Utilities Company	Southern Utilities Company	303	315	325	338	370	918
Smith County Other	Walnut Grove	445	467	491	515	541	568
Smith County Irrigation	Irrigation/Golf courses	300	300	300	300	300	300
Total Demand		**30,506**	**31,903**	**33,224**	**34,506**	**36,865**	**40,656**

Current Supplies	Notes	2010	2020	2030	2040	2050	2060
Lake Tyler/Tyler East		23,541	23,541	23,541	23,541	23,541	23,541
Lake Bellwood	*Tyler has wr to use 2,100 ac-ft (CA 3237)	0	0	0	0	0	0
Lake Palestine	limited to infrastructure (30 mgd)	16,815	16,815	16,815	16,815	16,815	16,815
Carrizo-Wilcox	reduced supplies due to aquifer limits	4,340	4,340	4,340	4,340	4,340	4,340
Total Supplies		**44,696**	**44,696**	**44,696**	**44,696**	**44,696**	**44,696**

* Lake Bellwood is used only for manufacturing directly from the lake.

Supplies Less Current Customer Demand		**14,190**	**12,793**	**11,472**	**10,190**	**7,831**	**4,040**

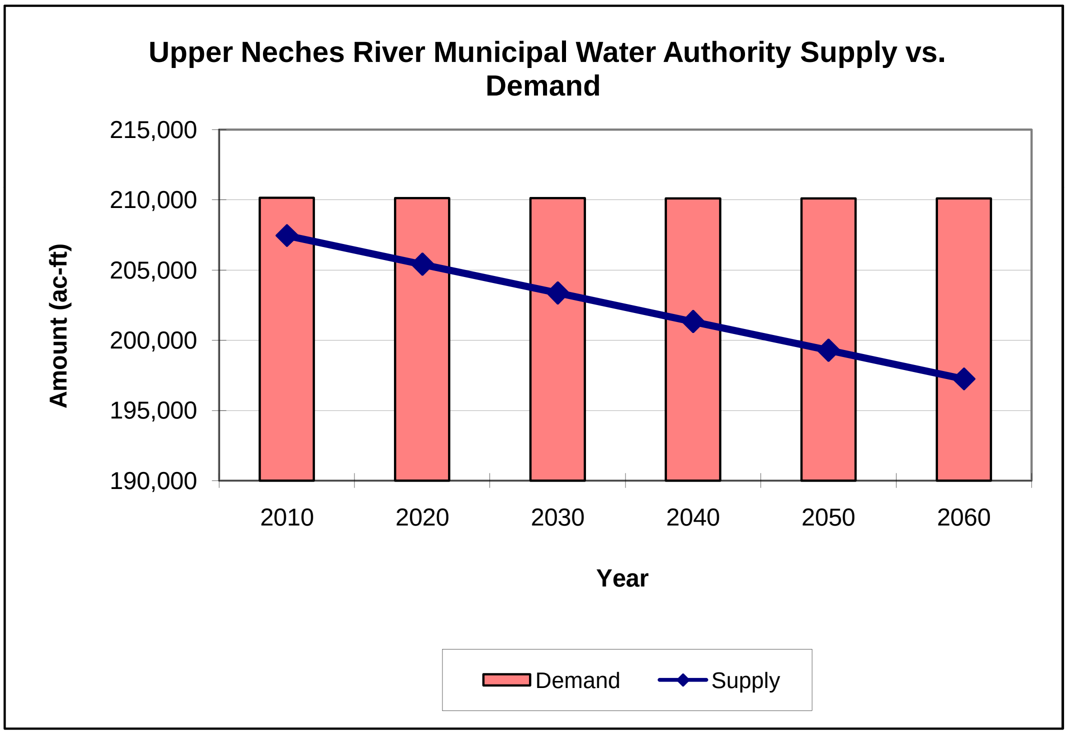


Upper Neches River Municipal Water Authority
(Units: Acre-Feet per Year)

WUGs	Recipient	2010	2020	2030	2040	2050	2060
City of Dallas (not connected)		114,337	114,337	114,337	114,337	114,337	114,337
City of Tyler		67,200	67,200	67,200	67,200	67,200	67,200
City of Palestine		28,000	28,000	28,000	28,000	28,000	28,000
Smith County-Other (1%)		93	82	73	64	57	51
Super Tree Farm for International Paper (Cherokee County irrigation)		300	300	300	300	300	300
TECON (Henderson County-Other)		100	100	100	100	100	100
Emerald Bay Golf Course (Smith County irrigation)		105	105	105	105	105	105
Total Demand		**210,135**	**210,124**	**210,115**	**210,106**	**210,099**	**210,093**

Current Supplies		2010	2020	2030	2040	2050	2060
Lake Palestine System		207,458	205,417	203,375	201,333	199,292	197,250
Total Supplies		**207,458**	**205,417**	**203,375**	**201,333**	**199,292**	**197,250**

Supplies Less Current Customer Demand		**-2,677**	**-4,708**	**-6,740**	**-8,773**	**-10,808**	**-12,843**



Appendix 4A-B

Socioeconomic Impact Analysis

A socioeconomic impact analysis of not meeting water needs was conducted by the TWDB. The full report entitled, *Socioeconomic Impacts of Projected Water Shortages for the East Texas Regional Water Planning Area (Region I)*, is included in this appendix.

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Socioeconomic Impacts of Projected Water Shortages for the East Texas Regional Water Planning Area (Region I)

Prepared in Support of the 2011 East Texas Regional Water Plan

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May 2010

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Introduction

Water shortages during drought would likely curtail or eliminate economic activity in business and industries reliant on water. For example, without water farmers cannot irrigate; refineries cannot produce gasoline, and paper mills cannot make paper. Unreliable water supplies would not only have an immediate and real impact on existing businesses and industry, but they could also adversely affect economic development in Texas. From a social perspective, water supply reliability is critical as well. Shortages would disrupt activity in homes, schools and government and could adversely affect public health and safety. For all of the above reasons, it is important to analyze and understand how restricted water supplies during drought could affect communities throughout the state.

Administrative rules require that regional water planning groups evaluate the impacts of not meeting water needs as part of the regional water planning process, and rules direct TWDB staff to provide technical assistance: "*The executive administrator shall provide available technical assistance to the regional water planning groups, upon request, on water supply and demand analysis, including methods to evaluate the social and economic impacts of not meeting needs*" [(§357.7 (4)(A)]. Staff of the TWDB's Water Resources Planning Division designed and conducted this report in support of the Northeast Texas Regional Water Planning Group (Region I).

This document summarizes the results of our analysis and discusses the methodology used to generate the results. Section 1 outlines the overall methodology and discusses approaches and assumptions specific to each water use category (i.e., irrigation, livestock, mining, steam-electric, municipal and manufacturing). Section 2 presents the results for each category where shortages are reported at the regional planning area level and river basin level. Results for individual water user groups are not presented, but are available upon request.

1. Methodology

Section 1 provides a general overview of how economic and social impacts were measured. In addition, it summarizes important clarifications, assumptions and limitations of the study.

1.1 Economic Impacts of Water Shortages

1.1.1 General Approach

Economic analysis as it relates to water resources planning generally falls into two broad areas. Supply side analysis focuses on costs and alternatives of developing new water supplies or implementing programs that provide additional water from current supplies. Demand side analysis concentrates on impacts or benefits of providing water to people, businesses and the environment. Analysis in this report focuses strictly on demand side impacts. When analyzing the economic impacts of water shortages as defined in Texas water planning, three potential scenarios are possible:

1) Scenario 1 involves situations where there are physical shortages of raw surface or groundwater due to drought of record conditions. For example, City A relies on a reservoir with average conservation storage of 500 acre-feet per year and a firm yield of 100 acre feet. In 2010, the city uses about 50 acre-feet per year, but by 2030 their demands are expected to increase to 200 acre-feet. Thus, in 2030 the reservoir would not have enough water to meet the city's demands,

and people would experience a shortage of 100 acre-feet assuming drought of record conditions. Under normal or average climatic conditions, the reservoir would likely be able to provide reliable water supplies well beyond 2030.

2) Scenario 2 is a situation where despite drought of record conditions, water supply sources can meet existing use requirements; however, limitations in water infrastructure would preclude future water user groups from accessing these water supplies. For example, City B relies on a river that can provide 500 acre-feet per year during drought of record conditions and other constraints as dictated by planning assumptions. In 2010, the city is expected to use an estimated 100 acre-feet per year and by 2060 it would require no more than 400 acre-feet. But the intake and pipeline that currently transfers water from the river to the city's treatment plant has a capacity of only 200 acre-feet of water per year. Thus, the city's water supplies are adequate even under the most restrictive planning assumptions, but their conveyance system is too small. This implies that at some point – perhaps around 2030 - infrastructure limitations would constrain future population growth and any associated economic activity or impacts.

3) Scenario 3 involves water user groups that rely primarily on aquifers that are being depleted. In this scenario, projected and in some cases existing demands may be unsustainable as groundwater levels decline. Areas that rely on the Ogallala aquifer are a good example. In some communities in the region, irrigated agriculture forms a major base of the regional economy. With less irrigation water from the Ogallala, population and economic activity in the region could decline significantly assuming there are no offsetting developments.

Assessing the social and economic effects of each of the above scenarios requires various levels and methods of analysis and would generate substantially different results for a number of reasons; the most important of which has to do with the time frame of each scenario. Scenario 1 falls into the general category of static analysis. This means that models would measure impacts for a small interval of time such as a drought. Scenarios 2 and 3, on the other hand imply a dynamic analysis meaning that models are concerned with changes over a much longer time period.

Since administrative rules specify that planning analysis be evaluated under drought of record conditions (a static and random event), socioeconomic impact analysis developed by the TWDB for the state water plan is based on assumptions of Scenario 1. Estimated impacts under scenario 1 are point estimates for years in which needs are reported (2010, 2020, 2030, 2040, 2050 and 2060). They are independent and distinct "what if" scenarios for a particular year and shortages are assumed to be temporary events resulting from drought of record conditions. Estimated impacts measure what would happen if water user groups experience water shortages for a period of one year.

The TWDB recognize that dynamic models may be more appropriate for some water user groups; however, combining approaches on a statewide basis poses several problems. For one, it would require a complex array of analyses and models, and might require developing supply and demand forecasts under "normal" climatic conditions as opposed to drought of record conditions. Equally important is the notion that combining the approaches would produce inconsistent results across regions resulting in a so-called "apples to oranges" comparison.

A variety tools are available to estimate economic impacts, but by far, the most widely used today are input-output models (IO models) combined with social accounting matrices (SAMs). Referred to as IO/SAM models, these tools formed the basis for estimating economic impacts for agriculture (irrigation and livestock water uses) and industry (manufacturing, mining, steam-electric and commercial business activity for municipal water uses).

Since the planning horizon extends through 2060, economic variables in the baseline are adjusted in accordance with projected changes in demographic and economic activity. Growth rates for municipal water use sectors (i.e., commercial, residential and institutional) are based on TWDB population forecasts. Future values for manufacturing, agriculture, and mining and steam-electric activity are based on the same underlying economic forecasts used to estimate future water use for each category.

The following steps outline the overall process.

Step 1*: Generate IO/SAM Models and Develop Economic Baseline*

IO/SAM models were estimated using propriety software known as IMPLAN PRO™ (Impact for Planning Analysis). IMPLAN is a modeling system originally developed by the U.S. Forestry Service in the late 1970s. Today, the Minnesota IMPLAN Group (MIG Inc.) owns the copyright and distributes data and software. It is probably the most widely used economic impact model in existence. IMPLAN comes with databases containing the most recently available economic data from a variety of sources.[1] Using IMPLAN software and data, transaction tables conceptually similar to the one discussed previously were estimated for each county in the region and for the region as a whole. Each transaction table contains 528 economic sectors and allows one to estimate a variety of economic statistics including:

- **total sales -** total production measured by sales revenues;
- **intermediate sales -** sales to other businesses and industries within a given region;
- **final sales –** sales to end users in a region and exports out of a region**;**
- **employment -** number of full and part-time jobs (annual average) required by a given industry including self-employment;
- **regional income -** total payroll costs (wages and salaries plus benefits) paid by industries, corporate income, rental income and interest payments; and
- **business taxes -** sales, excise, fees, licenses and other taxes paid during normal operation of an industry (does not include income taxes).

TWDB analysts developed an economic baseline containing each of the above variables using year 2000 data. Since the planning horizon extends through 2060, economic variables in the baseline were allowed to change in accordance with projected changes in demographic and economic activity. Growth rates for municipal water use sectors (i.e., commercial, residential and institutional) are based on TWDB population forecasts. Projections for manufacturing, agriculture, and mining and steam-electric activity are based on the same underlying economic forecasts used to estimate future water use for each category. Monetary impacts in future years are reported in constant year 2006 dollars.

It is important to stress that employment, income and business taxes are the most useful variables when comparing the relative contribution of an economic sector to a regional economy. Total sales as reported in IO/SAM models are less desirable and can be misleading because they include sales to other industries in the region for use in the production of other goods. For example, if a mill buys grain from local farmers and uses it to produce feed, sales of both the processed feed and raw corn are counted as "output" in an IO model. Thus, total sales double-count or overstate the true economic value of goods

[1]The IMPLAN database consists of national level technology matrices based on benchmark input-output accounts generated by the U.S. Bureau of Economic Analysis and estimates of final demand, final payments, industry output and employment for various economic sectors. IMPLAN regional data (i.e. states, a counties or groups of counties within a state) are divided into two basic categories: 1) data on an industry basis including value-added, output and employment, and 2) data on a commodity basis including final demands and institutional sales. State-level data are balanced to national totals using a matrix ratio allocation system and county data are balanced to state totals.

and services produced in an economy. They are not consistent with commonly used measures of output such as Gross National Product (GNP), which counts only final sales.

Another important distinction relates to terminology. Throughout this report, the term *sector* refers to economic subdivisions used in the IMPLAN database and resultant input-output models (528 individual sectors based on Standard Industrial Classification Codes). In contrast, the phrase *water use category* refers to water user groups employed in state and regional water planning including irrigation, livestock, mining, municipal, manufacturing and steam electric. Each IMPLAN sector was assigned to a specific water use category.

Step 2: *Estimate Direct and Indirect Economic Impacts of Water Needs*

Direct impacts are reductions in output by sectors experiencing water shortages. For example, without adequate cooling and process water a refinery would have to curtail or cease operation, car washes may close, or farmers may not be able to irrigate and sales revenues fall. Indirect impacts involve changes in inter-industry transactions as supplying industries respond to decreased demands for their services, and how seemingly non-related businesses are affected by decreased incomes and spending due to direct impacts. For example, if a farmer ceases operations due to a lack of irrigation water, they would likely reduce expenditures on supplies such as fertilizer, labor and equipment, and businesses that provide these goods would suffer as well.

Direct impacts accrue to immediate businesses and industries that rely on water and without water industrial processes could suffer. However, output responses may vary depending upon the severity of shortages. A small shortage relative to total water use would likely have a minimal impact, but large shortages could be critical. For example, farmers facing small shortages might fallow marginally productive acreage to save water for more valuable crops. Livestock producers might employ emergency culling strategies, or they may consider hauling water by truck to fill stock tanks. In the case of manufacturing, a good example occurred in the summer of 1999 when Toyota Motor Manufacturing experienced water shortages at a facility near Georgetown, Kentucky.[2] As water levels in the Kentucky River fell to historic lows due to drought, plant managers sought ways to curtail water use such as reducing rinse operations to a bare minimum and recycling water by funneling it from paint shops to boilers. They even considered trucking in water at a cost of 10 times what they were paying. Fortunately, rains at the end of the summer restored river levels, and Toyota managed to implement cutbacks without affecting production, but it was a close call. If rains had not replenished the river, shortages could have severely reduced output.[3]

To account for uncertainty regarding the relative magnitude of impacts to farm and business operations, the following analysis employs the concept of elasticity. Elasticity is a number that shows how a change in one variable will affect another. In this case, it measures the relationship between a percentage reduction in water availability and a percentage reduction in output. For example, an elasticity of 1.0 indicates that a 1.0 percent reduction in water availability would result in a 1.0 percent reduction in economic output. An elasticity of 0.50 would indicate that for every 1.0 percent of unavailable water, output is reduced by 0.50 percent and so on. Output elasticities used in this study are:[4]

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[2] Royal, W. "*High And Dry - Industrial Centers Face Water Shortages*." in Industry Week, Sept, 2000.

[3] The efforts described above are not planned programmatic or long-term operational changes. They are emergency measures that individuals might pursue to alleviate what they consider a temporary condition. Thus, they are not characteristic of long-term management strategies designed to ensure more dependable water supplies such as capital investments in conservation technology or development of new water supplies.

[4] Elasticities are based on one of the few empirical studies that analyze potential relationships between economic output and water shortages in the United States. The study, conducted in California, showed that a significant number of industries would suffer reduced output during water shortages. Using a survey based approach researchers posed two scenarios to different industries. In

- if water needs are 0 to 5 percent of total water demand, no corresponding reduction in output is assumed;

- if water needs are 5 to 30 percent of total water demand, for each additional one percent of water need that is not met, there is a corresponding 0.50 percent reduction in output;

- if water needs are 30 to 50 percent of total water demand, for each additional one percent of water need that is not met, there is a corresponding 0.75 percent reduction in output; and

- if water needs are greater than 50 percent of total water demand, for each additional one percent of water need that is not met, there is a corresponding 1.0 percent (i.e., a proportional reduction).

In some cases, elasticities are adjusted depending upon conditions specific to a given water user group.

Once output responses to water shortages were estimated, direct impacts to total sales, employment, regional income and business taxes were derived using regional level economic multipliers estimating using IO/SAM models. The formula for a given IMPLAN sector is:

$D_{i,t} = Q_{i,t} *_{,} S_{i,t} * E_Q * RFD_i * DM_{i(Q, L, I, T)}$

where:

$D_{i,t}$ = direct economic impact to sector *i* in period *t*

$Q_{i,t}$ = total sales for sector *i* in period *t* in an affected county

$RFD_{i,}$ = ratio of final demand to total sales for sector *i* for a given region

$S_{i,t}$ = water shortage as percentage of total water use in period *t*

E_Q = elasticity of output and water use

$DM_{i(L, I, T)}$ = direct output multiplier coefficients for labor (L), income (I) and taxes (T) for sector *i*.

Secondary impacts were derived using the same formula used to estimate direct impacts; however, indirect multiplier coefficients are used. Methods and assumptions specific to each water use sector are discussed in Sections 1.1.2 through 1.1.4.

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the first scenario, they asked how a 15 percent cutback in water supply lasting one year would affect operations. In the second scenario, they asked how a 30 percent reduction lasting one year would affect plant operations. In the case of a 15 percent shortage, reported output elasticities ranged from 0.00 to 0.76 with an average value of 0.25. For a 30 percent shortage, elasticities ranged from 0.00 to 1.39 with average of 0.47. For further information, see, California Urban Water Agencies, "*Cost of Industrial Water Shortages,*" Spectrum Economics, Inc. November, 1991.

General Assumptions and Clarification of the Methodology

As with any attempt to measure and quantify human activities at a societal level, assumptions are necessary and every model has limitations. Assumptions are needed to maintain a level of generality and simplicity such that models can be applied on several geographic levels and across different economic sectors. In terms of the general approach used here several clarifications and cautions are warranted:

1. Shortages as reported by regional planning groups are the starting point for socioeconomic analyses.

2. Estimated impacts are point estimates for years in which needs are reported (i.e., 2010, 2020, 2030, 2040, 2050 and 2060).They are independent and distinct "what if" scenarios for each particular year and water shortages are assumed to be temporary events resulting from severe drought conditions combined with infrastructure limitations. In other words, growth occurs and future shocks are imposed on an economy at 10-year intervals and resultant impacts are measured. Given, that reported figures are not cumulative in nature, it is inappropriate to sum impacts over the entire planning horizon. Doing so, would imply that the analysis predicts that drought of record conditions will occur every ten years in the future, which is not the case. Similarly, authors of this report recognize that in many communities needs are driven by population growth, and in the future total population will exceed the amount of water available due to infrastructure limitations, regardless of whether or not there is a drought. This implies that infrastructure limitations would constrain economic growth. However, since needs as defined by planning rules are based upon water supply and demand under the assumption of drought of record conditions, it improper to conduct economic analysis that focuses on growth related impacts over the planning horizon. Figures generated from such an analysis would presume a 50-year drought of record, which is unrealistic. Estimating lost economic activity related to constraints on population and commercial growth due to lack of water would require developing water supply and demand forecasts under "normal" or "most likely" future climatic conditions.

3. While useful for planning purposes, this study is not a benefit-cost analysis. Benefit cost analysis is a tool widely used to evaluate the economic feasibility of specific policies or projects as opposed to estimating economic impacts of unmet water needs. Nevertheless, one could include some impacts measured in this study as part of a benefit cost study if done so properly. Since this is not a benefit cost analysis, future impacts are not weighted differently. In other words, estimates are not discounted. If used as a measure of economic benefits, one should incorporate a measure of uncertainty into the analysis. In this type of analysis, a typical method of discounting future values is to assign probabilities of the drought of record recurring again in a given year, and weight monetary impacts accordingly. This analysis assumes a probability of one.

4. IO multipliers measure the strength of backward linkages to supporting industries (i.e., those who sell inputs to an affected sector). However, multipliers say nothing about forward linkages consisting of businesses that purchase goods from an affected sector for further processing. For example, ranchers in many areas sell most of their animals to local meat packers who process animals into a form that consumers ultimately see in grocery stores and restaurants. Multipliers do not capture forward linkages to meat packers, and since meat packers sell livestock purchased from ranchers as "final sales," multipliers for the ranching sector do fully account for all losses to a region's economy. Thus, as mentioned previously, in some cases closely linked sectors were moved from one water use category to another.

5. Cautions regarding interpretations of direct and secondary impacts are warranted. IO/SAM multipliers are based on "fixed-proportion production functions," which basically means that input use - including labor - moves in lockstep fashion with changes in levels of output. In a

scenario where output (i.e., sales) declines, losses in the immediate sector or supporting sectors could be much less than predicted by an IO/SAM model for several reasons. For one, businesses will likely expect to continue operating so they might maintain spending on inputs for future use; or they may be under contractual obligations to purchase inputs for an extended period regardless of external conditions. Also, employers may not lay-off workers given that experienced labor is sometimes scarce and skilled personnel may not be readily available when water shortages subside. Lastly people who lose jobs might find other employment in the region. As a result, direct losses for employment and secondary losses in sales and employment should be considered an upper bound. Similarly, since projected population losses are based on reduced employment in the region, they should be considered an upper bound as well.

6. IO models are static. Models and resultant multipliers are based upon the structure of the U.S. and regional economies in 2006. In contrast, water shortages are projected to occur well into the future. Thus, the analysis assumes that the general structure of the economy remains the same over the planning horizon, and the farther out into the future we go, this assumption becomes less reliable.

7. Impacts are annual estimates. If one were to assume that conditions persisted for more than one year, figures should be adjusted to reflect the extended duration. The drought of record in most regions of Texas lasted several years.

8. Monetary figures are reported in constant year 2006 dollars.

1.1.2 Impacts to Agriculture

Irrigated Crop Production

The first step in estimating impacts to irrigation required calculating gross sales for IMPLAN crop sectors. Default IMPLAN data do not distinguish irrigated production from dry-land production. Once gross sales were known other statistics such as employment and income were derived using IMPLAN direct multiplier coefficients. Gross sales for a given crop are based on two data sources:

1) county-level statistics collected and maintained by the TWDB and the USDA Farm Services Agency (FSA) including the number of irrigated acres by crop type and water application per acre, and

2) regional-level data published by the Texas Agricultural Statistics Service (TASS) including prices received for crops (marketing year averages), crop yields and crop acreages.

Crop categories used by the TWDB differ from those used in IMPLAN datasets. To maintain consistency, sales and other statistics are reported using IMPLAN crop classifications. Table 1 shows the TWDB crops included in corresponding IMPLAN sectors, and Table 2 summarizes acreage and estimated annual water use for each crop classification (five-year average from 2003-2007). Table 3 displays average (2003-2007) gross revenues per acre for IMPLAN crop categories.

Table 1: Crop Classifications Used in TWDB Water Use Survey and Corresponding IMPLAN Crop Sectors	
IMPLAN Category	**TWDB Category**
Oilseeds	Soybeans and “other oil crops”
Grains	Grain sorghum, corn, wheat and “other grain crops”
Vegetable and melons	“Vegetables” and potatoes
Tree nuts	Pecans
Fruits	Citrus, vineyard and other orchard
Cotton	Cotton
Sugarcane and sugar beets	Sugarcane and sugar beets
All “other” crops	“Forage crops”, peanuts, alfalfa, hay and pasture, rice and “all other crops”

Table 2: Summary of Irrigated Crop Acreage and Water Demand for the East Texas Regional Water Planning Area (average 2003-2007)

Sector	Acres (1000s)	Distribution of acres	Water use (1000s of AF)	Distribution of water use
Grains	<1	<1%	<1	<1%
Vegetable and melons	<1	3%	<1	<1%
Fruits	<1	<1%	<1%	<1%
Cotton	<1	2%	0.58	1%
Rice	22	93%	108	99%
Total	23	100%	109	100%

Source: Water demand figures are a 5- year average (2003-2007) of the TWDB’s annual Irrigation Water Use Estimates. Statistics for irrigated crop acreage are based upon annual survey data collected by the TWDB and the Farm Service Agency. Values do not include acreage or water use for the TWDB categories classified by the Farm Services Agency as “failed acres,” “golf course” or “waste water.”

Table 3: Average Gross Sales Revenues per Acre for Irrigated Crops for the East Texas Regional Water Planning Area (2003-2007)		
IMPLAN Sector	**Gross revenues per acre**	**Crops included in estimates**
Grains	$442	Based on five-year (2003-2007) average weighted by acreage for “irrigated grain sorghum,” “irrigated corn”, “irrigated wheat” and “irrigated ‘other’ grain crops.”
Vegetable and melons	$6,184	Based on five-year (2003-2007) average weighted by acreage for “irrigated shallow and deep root vegetables”, “irrigated Irish potatoes” and “irrigated melons.”
Fruits	$3,502	Based on five-year (2003-2007) average weighted by acreage for “irrigated citrus”, “irrigated vineyards” and “irrigated ‘other’ orchard.”
Cotton	$400	Based on five-year (2003-2007) average weighted by acreage for “irrigated cotton.”
All Other Crops	$500	Irrigated figure is based on five-year (2003-2007) average weighted by acreage for “irrigated ‘forage’ crops”, “irrigated peanuts”, “irrigated alfalfa”, “irrigated ‘hay’ and pasture” and “irrigated ‘all other’ crops.”

*Figures are rounded. Source: Based on data from the Texas Agricultural Statistics Service, Texas Water Development Board, and Texas A&M University.

An important consideration when estimating impacts to irrigation was determining which crops are affected by water shortages. One approach is the so-called rationing model, which assumes that farmers respond to water supply cutbacks by fallowing the lowest value crops in the region first and the highest valued crops last until the amount of water saved equals the shortage.[5] For example, if farmer A grows vegetables (higher value) and farmer B grows wheat (lower value) and they both face a proportionate cutback in irrigation water, then farmer B will sell water to farmer A. Farmer B will fallow her irrigated acreage before farmer A fallows anything. Of course, this assumes that farmers can and do transfer enough water to allow this to happen. A different approach involves constructing farm-level profit maximization models that conform to widely-accepted economic theory that farmers make decisions based on marginal net returns. Such models have good predictive capability, but data requirements and complexity are high. Given that a detailed analysis for each region would require a substantial amount of farm-level data and analysis, the following investigation assumes that projected shortages are distributed equally across predominant crops in the region. Predominant in this case are crops that comprise at least one percent of total acreage in the region.

The following steps outline the overall process used to estimate direct impacts to irrigated agriculture:

1. *Distribute shortages across predominant crop types in the region*. Again, unmet water needs were distributed equally across crop sectors that constitute one percent or more of irrigated acreage.

2. *Estimate associated reductions in output for affected crop sectors*. Output reductions are based on elasticities discussed previously and on estimated values per acre for different crops. Values per acre stem from the same data used to estimate output for the year 2006 baseline. Using multipliers, we then generate estimates of forgone income, jobs, and tax revenues based on reductions in gross sales and final demand.

Livestock

The approach used for the livestock sector is basically the same as that used for crop production. As is the case with crops, livestock categorizations used by the TWDB differ from those used in IMPLAN datasets, and TWDB groupings were assigned to a given IMPLAN sector (Table 4). Then we:

1) *Distribute projected water needs equally among predominant livestock sectors and estimate lost output*: As is the case with irrigation, shortages are assumed to affect all livestock sectors equally; however, the category of "other" is not included given its small size. If water needs were small relative to total demands, we assume that producers would haul in water by truck to fill stock tanks. The cost per acre-foot ($24,000) is based on 2008 rates charged by various water haulers in Texas, and assumes that the average truck load is 6,500 gallons at a hauling distance of 60 miles.

3) *Estimate reduced output in forward processors for livestock sectors*. Reductions in output for livestock sectors are assumed to have a proportional impact on forward processors in the region such as meat packers. In other words, if the cows were gone, meat-packing plants or fluid milk manufacturers) would likely have little to process. This is not an unreasonable premise. Since the

[5] The rationing model was initially proposed by researchers at the University of California at Berkeley, and was then modified for use in a study conducted by the U.S. Environmental Protection Agency that evaluated how proposed water supply cutbacks recommended to protect water quality in the Bay/Delta complex in California would affect farmers in the Central Valley. See, Zilberman, D., Howitt, R. and Sunding, D. "*Economic Impacts of Water Quality Regulations in the San Francisco Bay and Delt*a." Western Consortium for Public Health. May 1993.

1950s, there has been a major trend towards specialized cattle feedlots, which in turn has decentralized cattle purchasing from livestock terminal markets to direct sales between producers and slaughterhouses. Today, the meat packing industry often operates large processing facilities near high concentrations of feedlots to increase capacity utilization.[6] As a result, packers are heavily dependent upon nearby feedlots. For example, a recent study by the USDA shows that on average meat packers obtain 64 percent of cattle from within 75 miles of their plant, 82 percent from within 150 miles and 92 percent from within 250 miles.[7]

Table 4: Description of Livestock Sectors

IMPLAN Category	TWDB Category
Cattle ranching and farming	Cattle, cow calf, feedlots and dairies
Poultry and egg production	Poultry production.
Other livestock	Livestock other than cattle and poultry (i.e., horses, goats, sheep, hogs)
Milk manufacturing	Fluid milk manufacturing, cheese manufacturing, ice cream manufacturing etc.
Meat packing	Meat processing present in the region from slaughter to final processing

1.1.3 Impacts to Municipal Water User Groups

Disaggregation of Municipal Water Demands

Estimating the economic impacts for the municipal water user groups is complicated for a number of reasons. For one, municipal use comprises a range of consumers including commercial businesses, institutions such as schools and government and households. However, reported water needs are not distributed among different municipal water users. In other words, how much of a municipal need is commercial and how much is residential (domestic)?

The amount of commercial water use as a percentage of total municipal demand was estimated based on "GED" coefficients (gallons per employee per day) published in secondary sources.[8] For example, if year 2006 baseline data for a given economic sector (e.g., amusement and recreation services) shows employment at 30 jobs and the GED coefficient is 200, then average daily water use by that sector is (30 x

[6] Ferreira, W.N. "*Analysis of the Meat Processing Industry in the United States*." Clemson University Extension Economics Report ER211, January 2003.

[7] Ward, C.E. "*Summary of Results from USDA's Meatpacking Concentration Study*." Oklahoma Cooperative Extension Service, OSU Extension Facts WF-562.

[8] Sources for GED coefficients include: Gleick, P.H., Haasz, D., Henges-Jeck, C., Srinivasan, V., Wolff, G. Cushing, K.K., and Mann, A. "*Waste Not, Want Not*: *The Potential for Urban Water Conservation in California*." Pacific Institute. November 2003. U.S. Bureau of the Census. 1982 Census of Manufacturers: Water Use in Manufacturing. USGPO, Washington D.C. See also: "*U.S. Army Engineer Institute for Water Resources, IWR Report 88-R-6.*," Fort Belvoir, VA. See also, Joseph, E. S., 1982, "*Municipal and Industrial Water Demands of the Western United States*." Journal of the Water Resources Planning and Management Division, Proceedings of the American Society of Civil Engineers, v. 108, no. WR2, p. 204-216. See also, Baumann, D. D., Boland, J. J., and Sims, J. H., 1981, "*Evaluation of Water Conservation for Municipal and Industrial Water Supply*." U.S. Army Corps of Engineers, Institute for Water Resources, Contract no. 82-C1.

200 = 6,000 gallons) or 6.7 acre-feet per year. Water not attributed to commercial use is considered domestic, which includes single and multi-family residential consumption, institutional uses and all use designated as “county-other.” Based on our analysis, commercial water use is about 5 to 35 percent of municipal demand. Less populated rural counties occupy the lower end of the spectrum, while larger metropolitan counties are at the higher end.

After determining the distribution of domestic versus commercial water use, we developed methods for estimating impacts to the two groups.

Domestic Water Uses

Input output models are not well suited for measuring impacts of shortages for domestic water uses, which make up the majority of the municipal water use category. To estimate impacts associated with domestic water uses, municipal water demand and needs are subdivided into residential, and commercial and institutional use. Shortages associated with residential water uses are valued by estimating proxy demand functions for different water user groups allowing us to estimate the marginal value of water, which would vary depending upon the level of water shortages. The more severe the water shortage, the more costly it becomes. For instance, a 2 acre-foot shortage for a group of households that use 10 acre-feet per year would not be as severe as a shortage that amounted to 8 acre-feet. In the case of a 2 acre-foot shortage, households would probably have to eliminate some or all outdoor water use, which could have implicit and explicit economic costs including losses to the horticultural and landscaping industry. In the case of an 8 acre-foot shortage, people would have to forgo all outdoor water use and most indoor water consumption. Economic impacts would be much higher in the latter case because people, and would be forced to find emergency alternatives assuming alternatives were available.

To estimate the value of domestic water uses, TWDB staff developed marginal loss functions based on constant elasticity demand curves. This is a standard and well-established method used by economists to value resources such as water that have an explicit monetary cost.

A constant price elasticity of demand is estimated using a standard equation:

$$w = kc^{(-\varepsilon)}$$

where:

- w is equal to average monthly residential water use for a given water user group measured in thousands of gallons;
- k is a constant intercept;
- c is the average cost of water per 1,000 gallons; and
- ε is the price elasticity of demand.

Price elasticities (-0.30 for indoor water use and -0.50 for outdoor use) are based on a study by Bell et al.[9] that surveyed 1,400 water utilities in Texas that serve at least 1,000 people to estimate demand elasticity for several variables including price, income, weather etc. Costs of water and average use per month per household are based on data from the Texas Municipal League's annual water and

[9] Bell, D.R. and Griffin, R.C. “*Community Water Demand in Texas as a Century is Turned*.” Research contract report prepared for the Texas Water Development Board. May 2006.

wastewater rate surveys - specifically average monthly household expenditures on water and wastewater in different communities across the state. After examining variance in costs and usage, three different categories of water user groups based on population (population less than 5,000, cities with populations ranging from 5,000 to 99,999 and cities with populations exceeding 100,000) were selected to serve as proxy values for municipal water groups that meet the criteria (Table 5).[10]

Table 5: Water Use and Costs Parameters Used to Estimated Water Demand Functions (average monthly costs per acre-foot for delivered water and average monthly use per household)

Community Population	Water	Wastewater	Total monthly cost	Avg. monthly use (gallons)
Less than or equal to 5,000	$1,335	$1,228	$2,563	6,204
5,000 to 100,000	$1,047	$1,162	$2,209	7,950
Great than or equal to 100,000	$718	$457	$1,190	8,409

Source: Based on annual water and wastewater rate surveys published by the Texas Municipal League.

As an example, Table 6 shows the economic impact per acre-foot of domestic water needs for municipal water user groups with population exceeding 100,000 people. There are several important assumptions incorporated in the calculations:

1) Reported values are net of the variable costs of treatment and distribution such as expenses for chemicals and electricity since using less water involves some savings to consumers and utilities alike; and for outdoor uses we do not include any value for wastewater.

2) Outdoor and "non-essential" water uses would be eliminated before indoor water consumption was affected, which is logical because most water utilities in Texas have drought contingency plans that generally specify curtailment or elimination of outdoor water use during droughts.[11] Determining how much water is used for outdoor purposes is based on several secondary sources. The first is a major study sponsored by the American Water Works Association, which surveyed cities in states including Colorado, Oregon, Washington, California, Florida and Arizona. On average across all cities surveyed 58 percent of single family residential water use was for outdoor activities. In cities with climates comparable to large metropolitan areas of Texas, the average was 40 percent.[12] Earlier findings of the U.S. Water Resources Council showed a national

[10] Ideally, one would want to estimate demand functions for each individual utility in the state. However, this would require an enormous amount of time and resources. For planning purposes, we believe the values generated from aggregate data are more than sufficient.

[11] In Texas, state law requires retail and wholesale water providers to prepare and submit plans to the Texas Commission on Environmental Quality (TCEQ). Plans must specify demand management measures for use during drought including curtailment of "non-essential water uses." Non-essential uses include, but are not limited to, landscape irrigation and water for swimming pools or fountains. For further information see the Texas Environmental Quality Code §288.20.

[12] See, Mayer, P.W., DeOreo, W.B., Opitz, E.M., Kiefer, J.C., Davis, W., Dziegielewski, D., Nelson, J.O. "*Residential End Uses of Water*." Research sponsored by the American Water Works Association and completed by Aquacraft, Inc. and Planning and Management Consultants, Ltd. (PMCL@CDM).

average of 33 percent. Similarly, the United States Environmental Protection Agency (USEPA) estimated that landscape watering accounts for 32 percent of total residential and commercial water use on annual basis.[13] A study conducted for the California Urban Water Agencies (CUWA) calculated average annual values ranging from 25 to 35 percent.[14] Unfortunately, there does not appear to be any comprehensive research that has estimated non-agricultural outdoor water use in Texas. As an approximation, an average annual value of 30 percent based on the above references was selected to serve as a rough estimate in this study.

3) As shortages approach 100 percent values become immense and theoretically infinite at 100 percent because at that point death would result, and willingness to pay for water is immeasurable. Thus, as shortages approach 80 percent of monthly consumption, we assume that households and non-water intensive commercial businesses (those that use water only for drinking and sanitation would have water delivered by tanker truck or commercial water delivery companies. Based on reports from water companies throughout the state, we estimate that the cost of trucking in water is around $21,000 to $27,000 per acre-feet assuming a hauling distance of between 20 to 60 miles. This is not an unreasonable assumption. The practice was widespread during the 1950s drought and recently during droughts in this decade. For example, in 2000 at the heels of three consecutive drought years Electra - a small town in North Texas - was down to its last 45 days worth of reservoir water when rain replenished the lake, and the city was able to refurbish old wells to provide supplemental groundwater. At the time, residents were forced to limit water use to 1,000 gallons per person per month - less than half of what most people use - and many were having water delivered to their homes by private contractors.[15] In 2003 citizens of Ballinger, Texas, were also faced with a dwindling water supply due to prolonged drought. After three years of drought, Lake Ballinger, which supplies water to more than 4,300 residents in Ballinger and to 600 residents in nearby Rowena, was almost dry. Each day, people lined up to get water from a well in nearby City Park. Trucks hauling trailers outfitted with large plastic and metal tanks hauled water to and from City Park to Ballinger.[16]

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[13] U.S. Environmental Protection Agency. *"Cleaner Water through Conservation*." USEPA Report no. 841-B-95-002. April, 1995.

[14] Planning and Management Consultants, Ltd. "*Evaluating Urban Water Conservation Programs: A Procedures Manual*." Prepared for the California Urban Water Agencies. February 1992.

[15] Zewe, C. "*Tap Threatens to Run Dry in Texas Town*." July 11, 2000. CNN Cable News Network.

[16] Associated Press, "*Ballinger Scrambles to Finish Pipeline before Lake Dries Up*." May 19, 2003.

Table 6: Economic Losses Associated with Domestic Water Shortages in Communities with Populations Exceeding 100,000 people				
Water shortages as a percentage of total monthly household demands	**No. of gallons remaining per household per day**	**No of gallons remaining per person per day**	**Economic loss (per acre-foot)**	**Economic loss (per gallon)**
1%	278	93	$748	$0.00005
5%	266	89	$812	$0.0002
10%	252	84	$900	$0.0005
15%	238	79	$999	$0.0008
20%	224	75	$1,110	$0.0012
25%	210	70	$1,235	$0.0015
30%[a]	196	65	$1,699	$0.0020
35%	182	61	$3,825	$0.0085
40%	168	56	$4,181	$0.0096
45%	154	51	$4,603	$0.011
50%	140	47	$5,109	$0.012
55%	126	42	$5,727	$0.014
60%	112	37	$6,500	$0.017
65%	98	33	$7,493	$0.02
70%	84	28	$8,818	$0.02
75%	70	23	$10,672	$0.03
80%	56	19	$13,454	$0.04
85%	42	14	$18,091 ($24,000)[b]	$0.05 ($0.07)[b]
90%	28	9	$27,363 ($24,000)	$0.08 ($0.07)
95%	14	5	$55,182 ($24,000)	$0.17 ($0.07)
99%	3	0.9	$277,728 ($24,000)	$0.85 ($0.07)
99.9%	1	0.5	$2,781,377 ($24,000)	$8.53 ($0.07)
100%	0	0	Infinite ($24,000)	Infinite ($0.07)

[a] The first 30 percent of needs are assumed to be restrictions of outdoor water use; when needs reach 30 percent of total demands all outdoor water uses would be restricted. Needs greater than 30 percent include indoor use

[b] As shortages approach 100 percent the value approaches infinity assuming there are not alternatives available; however, we assume that communities would begin to have water delivered by tanker truck at an estimated cost of $24,000 per acre-foot when shortages breached 85 percent.

Commercial Businesses

Effects of water shortages on commercial sectors were estimated in a fashion similar to other business sectors meaning that water shortages would affect the ability of these businesses to operate. This is particularly true for "water intensive" commercial sectors that are need large amounts of water (in addition to potable and sanitary water) to provide their services. These include:

- car-washes,
- laundry and cleaning facilities,
- sports and recreation clubs and facilities including race tracks,
- amusement and recreation services,
- hospitals and medical facilities,
- hotels and lodging places, and
- eating and drinking establishments.

A key assumption is that commercial operations would not be affected until water shortages were at least 50 percent of total municipal demand. In other words, we assume that residential water consumers would reduce water use including all non-essential uses before businesses were affected.

An example will illustrate the breakdown of municipal water needs and the overall approach to estimating impacts of municipal needs. Assume City A experiences an unexpected shortage of 50 acre-feet per year when their demands are 200 acre-feet per year. Thus, shortages are only 25 percent of total municipal use and residents of City A could eliminate needs by restricting landscape irrigation. City B, on the other hand, has a deficit of 150 acre-feet in 2020 and a projected demand of 200 acre-feet. Thus, total shortages are 75 percent of total demand. Emergency outdoor and some indoor conservation measures could eliminate 50 acre-feet of projected needs, yet 50 acre-feet would still remain. To eliminate" the remaining 50 acre-feet water intensive commercial businesses would have to curtail operations or shut down completely.

Three other areas were considered when analyzing municipal water shortages: 1) lost revenues to water utilities, 2) losses to the horticultural and landscaping industries stemming for reduction in water available for landscape irrigation, and 3) lost revenues and related economic impacts associated with reduced water related recreation.

Water Utility Revenues

Estimating lost water utility revenues was straightforward. We relied on annual data from the "*Water and Wastewater Rate Survey*" published annually by the Texas Municipal League to calculate an average value per acre-foot for water and sewer. For water revenues, average retail water and sewer rates multiplied by total water needs served as a proxy. For lost wastewater, total unmet needs were adjusted for return flow factor of 0.60 and multiplied by average sewer rates for the region. Needs reported as "county-other" were excluded under the presumption that these consist primarily of self-supplied water uses. In addition, 15 percent of water demand and needs are considered non-billed or "unaccountable" water that comprises things such as leakages and water for municipal government functions (e.g., fire departments). Lost tax receipts are based on current rates for the "miscellaneous gross receipts tax, "which the state collects from utilities located in most incorporated cities or towns in Texas. We do not include lost water utility revenues when aggregating impacts of municipal water shortages to regional and state levels to prevent double counting.

Horticultural and Landscaping Industry

The horticultural and landscaping industry, also referred to as the "green Industry," consists of businesses that produce, distribute and provide services associated with ornamental plants, landscape and garden supplies and equipment. Horticultural industries often face big losses during drought. For example, the recent drought in the Southeast affecting the Carolinas and Georgia horticultural and landscaping businesses had a harsh year. Plant sales were down, plant mortality increased, and watering costs increased. Many businesses were forced to close locations, lay off employees, and even file for bankruptcy. University of Georgia economists put statewide losses for the industry at around $3.2 billion during the 3-year drought that ended in 2008.[17] Municipal restrictions on outdoor watering play a significant role. During drought, water restrictions coupled with persistent heat has a psychological effect on homeowners that reduces demands for landscaping products and services. Simply put, people were afraid to spend any money on new plants and landscaping.

In Texas, there do not appear to be readily available studies that analyze the economic effects of water shortages on the industry. However, authors of this report believe negative impacts do and would result in restricting landscape irrigation to municipal water consumers. The difficulty in measuring them is two-fold. First, as noted above, data and research for these types of impacts that focus on Texas are limited; and second, economic data provided by IMPLAN do not disaggregate different sectors of the green industry to a level that would allow for meaningful and defensible analysis.[18]

Recreational Impacts

Recreational businesses often suffer when water levels and flows in rivers, springs and reservoirs fall significantly during drought. During droughts, many boat docks and lake beaches are forced to close, leading to big losses for lakeside business owners and local communities. Communities adjacent to popular river and stream destinations such as Comal Springs and the Guadalupe River also see their business plummet when springs and rivers dry up. Although there are many examples of businesses that have suffered due to drought, dollar figures for drought-related losses to the recreation and tourism industry are not readily available, and very difficult to measure without extensive local surveys. Thus, while they are important, economic impacts are not measured in this study.

Table 7 summarizes impacts of municipal water shortages at differing levels of magnitude, and shows the ranges of economic costs or losses per acre-foot of shortage for each level.

[17] Williams, D. *"Georgia landscapers eye rebound from Southeast drought."* Atlanta Business Chronicle, Friday, June 19, 2009

[18] Economic impact analyses prepared by the TWDB for 2006 regional water plans did include estimates for the horticultural industry. However, year 2000 and prior IMPLAN data were disaggregated to a finer level. In the current dataset (2006), the sector previously listed as "Landscaping and Horticultural Services" (IMPLAN Sector 27) is aggregated into "Services to Buildings and Dwellings" (IMPLAN Sector 458).

Table 7: Impacts of Municipal Water Shortages at Different Magnitudes of Shortages		
Water shortages as percent of total municipal demands	Impacts	Economic costs per acre-foot*
0-30%	✓ Lost water utility revenues ✓ Restricted landscape irrigation and non-essential water uses	$730 - $2,040
30-50%	✓ Lost water utility revenues ✓ Elimination of landscape irrigation and non-essential water uses ✓ Rationing of indoor use	$2,040 - $10,970
>50%	✓ Lost water utility revenues ✓ Elimination of landscape irrigation and non-essential water uses ✓ Rationing of indoor use ✓ Restriction or elimination of commercial water use ✓ Importing water by tanker truck	$10,970 - varies
*Figures are rounded		

1.1.4 Industrial Water User Groups

Manufacturing

Impacts to manufacturing were estimated by distributing water shortages among industrial sectors at the county level. For example, if a planning group estimates that during a drought of record water supplies in County A would only meet 50 percent of total annual demands for manufactures in the county, we reduced output for each sector by 50 percent. Since projected manufacturing demands are based on TWDB Water Uses Survey data for each county, we only include IMPLAN sectors represented in the TWBD survey database. Some sectors in IMPLAN databases are not part of the TWDB database given that they use relatively small amounts of water - primarily for on-site sanitation and potable purposes. To maintain consistency between IMPLAN and TWDB databases, Standard Industrial Classification (SIC) codes both databases were cross referenced in county with shortages. Non-matches were excluded when calculating direct impacts.

Mining

The process of mining is very similar to that of manufacturing. We assume that within a given county, shortages would apply equally to relevant mining sectors, and IMPLAN sectors are cross referenced with TWDB data to ensure consistency.

In Texas, oil and gas extraction and sand and gravel (aggregates) operations are the primary mining industries that rely on large volumes of water. For sand and gravel, estimated output reductions are straightforward; however, oil and gas is more complicated for a number of reasons. IMPLAN does not necessarily report the physical extraction of minerals by geographic local, but rather the sales revenues reported by a particular corporation.

For example, at the state level revenues for IMPLAN sector 19 (oil and gas extraction) and sector 27 (drilling oil and gas wells) totals $257 billion. Of this, nearly $85 billion is attributed to Harris County. However, only a very small fraction (less than one percent) of actual production takes place in the county. To measure actual potential losses in well head capacity due to water shortages, we relied on county level production data from the Texas Railroad Commission (TRC) and average well-head market prices for crude and gas to estimate lost revenues in a given county. After which, we used to IMPLAN ratios to estimate resultant losses in income and employment.

Other considerations with respect to mining include:

1) Petroleum and gas extraction industry only uses water in significant amounts for secondary recovery. Known in the industry as enhanced or water flood extraction, secondary recovery involves pumping water down injection wells to increase underground pressure thereby pushing oil or gas into other wells. IMPLAN output numbers do not distinguish between secondary and non-secondary recovery. To account for the discrepancy, county-level TRC data that show the proportion of barrels produced using secondary methods were used to adjust IMPLAN data to reflect only the portion of sales attributed to secondary recovery.

2) A substantial portion of output from mining operations goes directly to businesses that are classified as manufacturing in our schema. Thus, multipliers measuring backward linkages for a given manufacturer might include impacts to a supplying mining operation. Care was taken not to double count in such situations if both a mining operation and a manufacturer were reported as having water shortages.

Steam-electric

At minimum without adequate cooling water, power plants cannot safely operate. As water availability falls below projected demands, water levels in lakes and rivers that provide cooling water would also decline. Low water levels could affect raw water intakes and outfalls at electrical generating units in several ways. For one, power plants are regulated by thermal emission guidelines that specify the maximum amount of heat that can go back into a river or lake via discharged cooling water. Low water levels could result in permit compliance issues due to reduced dilution and dispersion of heat and subsequent impacts on aquatic biota near outfalls.[19] However, the primary concern would be a loss of head (i.e., pressure) over intake structures that would decrease flows through intake tunnels. This would affect safety related pumps, increase operating costs and/or result in sustained shut-downs. Assuming plants did shutdown, they would not be able to generate electricity.

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[19] Section 316 (b) of the Clean Water Act requires that thermal wastewater discharges do not harm fish and other wildlife.

Among all water use categories steam-electric is unique and cautions are needed when applying methods used in this study. Measured changes to an economy using input-output models stem directly from changes in sales revenues. In the case of water shortages, one assumes that businesses will suffer lost output if process water is in short supply. For power generation facilities this is true as well. However, the electric services sector in IMPLAN represents a corporate entity that may own and operate several electrical generating units in a given region. If one unit became inoperable due to water shortages, plants in other areas or generation facilities that do not rely heavily on water such as gas powered turbines might be able to compensate for lost generating capacity. Utilities could also offset lost production via purchases on the spot market.[20] Thus, depending upon the severity of the shortages and conditions at a given electrical generating unit, energy supplies for local and regional communities could be maintained. But in general, without enough cooling water, utilities would have to throttle back plant operations, forcing them to buy or generate more costly power to meet customer demands.

Measuring impacts end users of electricity is not part of this study as it would require extensive local and regional level analysis of energy production and demand. To maintain consistency with other water user groups, impacts of steam-electric water shortages are measured in terms of lost revenues (and hence income) and jobs associated with shutting down electrical generating units.

1.2 Social Impacts of Water Shortages

As the name implies, the effects of water shortages can be social or economic. Distinctions between the two are both semantic and analytical in nature – more so analytic in the sense that social impacts are harder to quantify. Nevertheless, social effects associated with drought and water shortages are closely tied to economic impacts. For example, they might include:

- demographic effects such as changes in population,
- disruptions in institutional settings including activity in schools and government,
- conflicts between water users such as farmers and urban consumers,
- health-related low-flow problems (e.g., cross-connection contamination, diminished sewage flows, increased pollutant concentrations),
- mental and physical stress (e.g., anxiety, depression, domestic violence),
- public safety issues from forest and range fires and reduced fire fighting capability,
- increased disease caused by wildlife concentrations,
- loss of aesthetic and property values, and
- reduced recreational opportunities.[21]

[20] Today, most utilities participate in large interstate "power pools" and can buy or sell electricity "on the grid" from other utilities or power marketers. Thus, assuming power was available to buy, and assuming that no contractual or physical limitations were in place such as transmission constraints; utilities could offset lost power that resulted from waters shortages with purchases via the power grid.

[21] Based on information from the website of the National Drought Mitigation Center at the University of Nebraska Lincoln. Available online at: http://www.drought.unl.edu/risk/impacts.htm. See also, Vanclay, F. "*Social Impact Assessment*." in Petts, J. (ed) International Handbook of Environmental Impact Assessment. 1999.

Social impacts measured in this study focus strictly on demographic effects including changes in population and school enrollment. Methods are based on demographic projection models developed by the Texas State Data Center and used by the TWDB for state and regional water planning. Basically, the social impact model uses results from the economic component of the study and assesses how changes in labor demand would affect migration patterns in a region. Declines in labor demand as measured using adjusted IMPLAN data are assumed to affect net economic migration in a given regional water planning area. Employment losses are adjusted to reflect the notion that some people would not relocate but would seek employment in the region and/or public assistance and wait for conditions to improve. Changes in school enrollment are simply the proportion of lost population between the ages of 5 and 17.

2. Results

Section 2 presents the results of the analysis at the regional level. Included are baseline economic data for each water use category, and estimated economics impacts of water shortages for water user groups with reported deficits. According to the 2011 *Rio Grande Regional Water Plan*, during severe drought irrigation, livestock, municipal, manufacturing, mining and steam-electric water user groups would experience water shortages in the absence of new water management strategies.

2.1 Overview of Regional Economy

On an annual basis, the East Texas regional economy generates $34 billion in gross state product for Texas ($32 billion in income and $2 billion worth of business taxes) and supports 481,393 jobs (Table 8). Generating about $12 billion worth of income per year, agriculture, manufacturing, and mining are the primary base economic sectors in the region.[22] Municipal sectors also generate substantial amounts of income and are major employers. However, while municipal sectors are the largest employer and source of wealth, many businesses that make up the municipal category such as restaurants and retail stores are non-basic industries meaning they exist to provide services to people who work would in base industries such as manufacturing, agriculture and mining. In other words, without base industries such agriculture, many municipal jobs in the region would not exist.

[22] Base industries are those that supply markets outside of the region. These industries are crucial to the local economy and are called the economic base of a region. Appendix A shows how IMPLAN's 529 sectors were allocated to water use category, and shows economic data for each sector.

Table 8: The East Texas Regional Economy by Water User Group ($millions)*						
Water Use Category	**Total sales**	**Intermediate sales**	**Final sales**	**Jobs**	**Income**	**Business taxes**
Irrigation	$78.03	$8.73	$69.30	618	$20.24	$0.85
Livestock	$2,637.85	$1,339.95	$1,297.90	16,521	$499.23	$21.09
Manufacturing	$62,475.81	$19,826.73	$42,649.08	80,609	$9,096.38	$255.38
Mining	$3,693.95	$1,475.81	$2,218.13	7,862	$1,831.54	$200.96
Steam-electric	$990.40	$278.62	$711.78	1,893	$687.65	$117.45
Municipal	$33,562.37	$9,053.48	$24,508.89	373,890	$19,618.82	$1,723.75
Regional total	$103,438.41	$31,983.32	$71,455.08	481,393	$31,753.86	$2,319.48

[a] Appendix 1 displays data for individual IMPLAN sectors that make up each water use category. Based on data from the Texas Water Development Board, and year 2006 data from the Minnesota IMPLAN Group, Inc.

2.2 Impacts of Agricultural Water Shortages

According to the 2011 *East Texas Regional Water Plan*, during severe drought the counties of Hardin, Houston, San Augustine and Smith would experiences shortages of irrigation water. In 2010, shortages range from about 1 to 48 percent of annual irrigation demands, and farmers would be short nearly 1,675 acre-feet in 2010 and nearly 3,420 acre-feet in 2060. Shortages of these magnitudes would reduce gross state product (income plus state and local business taxes) by less than $1 million per year in each decade.

Table 9: Economic Impacts of Water Shortages for Irrigation Water User Groups ($millions)			
Decade	**Lost income from reduced crop production [a]**	**Lost state and local tax revenues from reduced crop production**	**Lost jobs from reduced crop production**
2010	$0.18	$0.03	2
2020	$0.19	$0.03	2
2030	$0.23	$0.03	2
2040	$0.40	$0.04	2
2050	$0.48	$0.05	2
2060	$0.57	$0.05	3

*Changes to income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

Shortages for livestock producers are reported for Angelina, Henderson, Houston, Nacogdoches, Sabine, San Augustine, and Shelby counties. Shortages of these magnitudes would reduce gross state product (income plus state and local business taxes) by $14 million per year in 2010, and $551 million in 2060 (Table 10).

Table 10: Economic Impacts of Water Shortages for Livestock Water User Groups ($millions)[a]

Decade	Lost income from reduced livestock production[b]	Lost state and local tax revenues from reduced livestock production	Lost jobs from reduced livestock crop production
2010	$13.22	$0.60	124
2020	$53.29	$2.43	500
2030	$92.78	$4.23	873
2040	$266.31	$12.12	2,495
2050	$390.77	$17.79	3,660
2060	$527.74	$24.02	4,942

[a] Includes impacts to forward processors (meat packing and poultry processing).

[b] Changes to income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

2.3 Impacts of Municipal Water Shortages

Water shortages are projected to occur in a significant number of communities in the region. Deficits range from approximately 1 to roughly 75 percent of total annual water use. At the regional level, the estimated economic value of domestic water shortages totals $19 million in 2010 and $157 million in 2060 (Table 11). Due to curtailment of commercial business activity operation, municipal shortages would reduce gross state product (income plus taxes) by an estimated $34 million in 2020 and $162 million in 2060.

Table 11: Economic Impacts of Water Shortages for Municipal Water User Groups ($millions)					
Decade	Monetary value of domestic water shortages	Lost income from reduced commercial business activity*	Lost state and local taxes from reduced commercial business activity	Lost jobs from reduced commercial business activity	Lost water utility revenues
2010	$19.03	$0.00	$0.00	0	$6.16
2020	$65.60	$33.91	$3.61	754	$10.21
2030	$84.52	$42.30	$4.50	941	$12.92
2040	$102.76	$51.89	$5.53	1,156	$16.54
2050	$193.14	$129.22	$13.84	2,898	$22.23
2060	$162.16	$162.23	$17.55	3,683	$29.75

*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

2.4 Impacts of Manufacturing Water Shortages

Manufacturing water shortages in the region are projected to occur in Angelina, Henderson, Houston, Nacogdoches, Sabine, San Augustine, and Shelby counties. In 2010, the East Texas planning group estimates that these manufacturers would be short about 3,400 acre-feet; and by 2060, this figure increases to nearly 50,000 acre-feet. Shortages of these magnitudes would reduce gross state product (income plus taxes) by an estimated $41 million in 2010 and $1.2 billion in 2060 (Table 12).

Table 12: Economic Impacts of Water Shortages for Manufacturing Water User Groups ($millions)			
Decade	Lost income due to reduced manufacturing output	Lost state and local business tax revenues due to reduced manufacturing output	Lost jobs due to reduced manufacturing output
2010	$40.43	$1.28	79
2020	$292.52	$9.01	651
2030	$397.41	$12.09	1,114
2040	$878.32	$26.94	2,038
2050	$1,026.90	$31.44	2,516
2060	$1,188.24	$36.33	3,046

*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

2.5 Impacts of Mining Water Shortages

Ming water shortages in Region I are projected to occur in San Augustine, Angelina, Jefferson, Nacogdoches, Newton and Rusk counties, and would primarily affect extraction of gas in the Haynesville shale formation. Combined shortages for each county would result in estimated losses in gross state product totaling $1.2 billion dollars in 2010, and about $900 million 2060 (Table 13).

Table 13: Economic Impacts of Water Shortages for Mining Water User Groups ($millions)

Decade	Lost income due to reduced mining output	Lost state and local business tax revenues due to reduced mining output	Lost jobs due to reduced mining output
2010	$1,105.82	$99.40	8,178
2020	$2,226.70	$222.67	16,468
2030	$701.19	$70.12	5,186
2040	$749.60	$74.96	5,544
2050	$797.20	$79.72	5,896
2060	$834.13	$83.41	6,169

*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

2.6 Impacts of Steam-electric Water Shortages

Water shortages for electrical generating units are projected to occur in Anderson, Angelina, Jefferson, Nacogdoches, Newton, and Rusk counties, and would result in estimated losses of gross state product totaling $119 million dollars in 2020, and $3.7 billion 2060 (Table 14).

Table 14: Economic Impacts of Water Shortages for Steam-electric Water User Groups ($millions)			
Decade	Lost income due to reduced electrical generation	Lost state and local business tax revenues due to reduced electrical generation	Lost jobs due to reduced electrical generation
2010	$104.61	$15.01	356
2020	$640.67	$91.96	2,178
2030	$853.57	$122.52	2,902
2040	$1,662.28	$238.59	5,651
2050	$2,682.62	$385.05	9,119
2060	$3,244.45	$465.69	11,029
*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.			

2.7 Social Impacts of Water Shortages

As discussed previously, estimated social impacts focus on changes in population and school enrollment in the region. In 2010, estimated population losses total 10,511 with corresponding reductions in school enrollment of 2,965 students (Table 15). In 2060, population in the region would decline by 34,773 and school enrollment would fall by 9,865.

Table 15: Social Impacts of Water Shortages (2010-2060)		
Year	Population Losses	Declines in School Enrollment
2010	10,511	2,965
2020	24,754	7,023
2030	13,269	3,764
2040	20,337	5,770
2050	29,015	8,232
2060	34,773	9,865

2.8 Distribution of Impacts by Major River Basin

Administrative rules require that impacts are presented by both planning region and major river basin. To meet rule requirements, impacts were allocated among basins based on the distribution of water shortages in relevant basins. For example, if 50 percent of water shortages in River Basin A and 50 percent occur in River Basin B, then impacts were split equally among the two basins. Table 16 displays the results.

Table 16: Distribution of Impacts by Major River Basin (2010-2060)						
Water Use	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Irrigation						
Neches	100%	100%	90%	82%	76%	70%
Trinity	0%	0%	10%	18%	24%	30%
Livestock						
Neches	48%	36%	38%	38%	39%	38%
Sabine	52%	61%	57%	56%	56%	56%
Trinity	<1%	4%	5%	5%	6%	5%
Manufacturing						
Neches	93%	66%	54%	48%	45%	42%
Sabine	6%	33%	45%	51%	54%	57%
Trinity	<1%	<1%	<1%	<1%	<1%	<1%
Mining						
Neches	>99%	>99%	>99%	>99%	99%	99%
Neches-Trinity	0%	0%	0%	0%	<1%	<1%
Sabine	0%	0%	0%	<1%	1%	1%
Trinity	<1%	<1%	<1%	<1%	<1%	<1%
Municipal						
Neches	96%	96%	96%	96%	97%	97%
Sabine	4%	4%	4%	4%	3%	3%
Trinity	<1%	<1%	<1%	<1%	<1%	<1%
Steam-electric						
Neches	100%	100%	93%	88%	84%	73%
Sabine	0%	0%	7%	12%	16%	27%

Appendix 1: Economic Data for Individual IMPLAN Sectors for the East Texas Regional Water Planning Area

Economic Data for Agricultural Water User Groups ($millions)									
Water Use Category	**IMPLAN Sector**	**IMPLAN Code**	**Total Sales**	**Intermediate Sales**	**Final Sales**	**Jobs**	**Income**	**Business Taxes**
Irrigation	Rice milling	49	$52.89	$0.40	$52.48	88	$6.26	$0.38
Irrigation	Rice	10	$11.49	$7.41	$4.08	164	$5.62	$0.22
Irrigation	Fruit Farming	5	$9.66	$0.81	$8.86	269	$5.53	$0.21
Irrigation	Vegetable and Melon Farming	3	$3.72	$0.10	$3.62	92	$2.73	$0.04
Irrigation	Cotton Farming	8	$0.22	$0	$0.22	3	$0.08	$0.00
Irrigation	Grain Farming	2	$0.05	$0.01	$0.04	2	$0.02	$0.00
	Total irrigation		**$78.03**	**$8.73**	**$69.30**	**618**	**$20.24**	**$0.85**
Livestock	Poultry processing	70	$1,085.13	$345.26	$739.86	4,772	$171.09	$7.77
Livestock	Poultry and egg production	12	$746.27	$584.87	$161.39	2,459	$251.12	$2.53
Livestock	Meat processed from carcasses	68	$380.67	$112.30	$268.36	867	$42.62	$2.18
Livestock	Cattle ranching and farming	11	$378.89	$262.72	$116.17	6,997	$29.93	$7.96
Livestock	Animal production- except cattle and poultry	13	$38.71	$32.82	$5.89	1,412	$3.76	$0.60
Livestock	Fluid milk manufacturing	62	$8.19	$1.97	$6.22	14	$0.71	$0.04
	Total livestock		**$2,637.85**	**$1,339.95**	**$1,297.90**	**16,521**	**$499.23**	**$21.09**
	Total agriculture		**$2,715.88**	**$1,348.69**	**$1,367.20**	**17,139**	**$519.46**	**$21.93**

Based on year 2006 data from the Minnesota IMPLAN Group, Inc.

Economic Data for Mining and Steam-electric Water User Groups ($millions)									
Water Use Category	**IMPLAN Sector**	**IMPLAN Code**	**Total Sales**	**Intermediate Sales**	**Final Sales**	**Jobs**	**Income**	**Business Taxes**
Mining	Drilling oil and gas wells	27	$1,443.30	$7.20	$1,436.09	2,304	$419.03	$55.25
Mining	Oil and gas extraction	19	$1,377.01	$1,278.81	$98.20	1,902	$791.16	$84.41
Mining	Support activities for oil and gas operations	28	$532.90	$74.02	$458.88	2,706	$482.88	$22.17
Mining	Coal mining	20	$298.50	$111.86	$186.64	734	$115.80	$37.78
Mining	Sand- gravel- clay- and refractory mining	25	$20.75	$2.19	$18.56	138	$12.09	$0.62
Mining	Other nonmetallic mineral mining	26	$11.66	$1.17	$10.50	36	$6.17	$0.44
Mining	Stone mining and quarrying	24	$5.57	$0.57	$5.00	29	$3.07	$0.07
Mining	Iron ore mining	21	$4.26	-$0.01	$4.27	13	$1.34	$0.23
	Total mining		**$3,693.95**	**$1,475.81**	**$2,218.13**	**7,862**	**$1,831.54**	**$200.96**
Steam-electric	**Power generation and supply**	**30**	**$990.40**	**$278.62**	**$711.78**	**1,893**	**$687.65**	**$117.45**
Based on year 2006 data from the Minnesota IMPLAN Group, Inc.								

Economic Data for Manufacturing Water User Groups ($millions)									
Water Use Category	**IMPLAN Sector**	**IMPLAN Code**	**Total Sales**	**Intermediate Sales**	**Final Sales**	**Jobs**	**Income**	**Business Taxes**
Manufacturing	Petroleum refineries	142	$35,420.78	$13,165.92	$22,254.85	4,227	$1,693.35	$71.73
Manufacturing	Petrochemical manufacturing	147	$7,340.32	$3,363.10	$3,977.22	903	$823.05	$46.91
Manufacturing	New residential 1-unit structures- all	33	$1,488.13	$0.00	$1,488.13	9,677	$519.58	$8.18
Manufacturing	Plastics material and resin manufacturing	152	$1,297.60	$51.39	$1,246.21	902	$248.53	$8.15
Manufacturing	Paper and paperboard mills	125	$1,199.74	$0.28	$1,199.46	1,922	$394.51	$10.43
Manufacturing	AC- refrigeration- and forced air heating	278	$947.25	$0.00	$947.24	2,853	$234.89	$5.77
Manufacturing	Synthetic rubber manufacturing	153	$899.08	$22.05	$877.03	1,061	$263.14	$6.33
Manufacturing	Commercial and institutional buildings	38	$855.47	$0.00	$855.47	8,436	$445.87	$5.48
Manufacturing	Pesticide and other agricultural chemical man	159	$724.82	$121.45	$603.37	460	$218.41	$3.81
Manufacturing	Other basic organic chemical manufacturing	151	$706.58	$131.74	$574.84	621	$103.32	$4.05
Manufacturing	Other basic inorganic chemical manufacturing	150	$662.12	$145.88	$516.24	1,201	$213.52	$2.43
Manufacturing	Reconstituted wood product manufacturing	114	$578.60	$242.21	$336.39	1,216	$312.29	$2.90
Manufacturing	Sawmills	112	$524.45	$465.15	$59.30	1,810	$173.11	$3.00
Manufacturing	Industrial gas manufacturing	148	$489.53	$257.41	$232.12	490	$193.08	$2.93
Manufacturing	Sheet metal work manufacturing	236	$460.57	$25.10	$435.47	1,924	$225.10	$2.97
Manufacturing	Logging	14	$448.42	$335.08	$113.34	1,805	$117.91	$3.97
Manufacturing	Iron and steel mills	203	$443.31	$31.93	$411.38	519	$92.33	$3.50
Manufacturing	Ferrous metal foundries	221	$384.48	$0.38	$384.10	1,900	$148.93	$2.96
Manufacturing	Other new construction	41	$374.53	$0.00	$374.53	3,869	$206.68	$1.62
Manufacturing	Fabricated structural metal manufacturing	233	$335.65	$17.38	$318.27	1,183	$132.54	$2.13
Manufacturing	Tire manufacturing	179	$325.28	$0.07	$325.21	1,148	$104.18	$10.68
Manufacturing	Ship building and repairing	357	$320.54	$1.86	$318.69	1,673	$129.83	$1.45
Manufacturing	New residential additions and alterations-all	35	$213.35	$0.00	$213.35	1,151	$82.45	$1.16
Manufacturing	Forest nurseries- forest products- and timber	15	$209.23	$3.23	$206.01	260	$62.29	$9.46
Manufacturing	Metal valve manufacturing	248	$199.73	$21.63	$178.10	698	$91.21	$1.18
Manufacturing	Plastics plumbing fixtures and all other plastics	177	$194.82	$141.13	$53.68	1,068	$66.44	$1.14
Manufacturing	**All other manufacturing**		**$4,280.97**	**$1,186.11**	**$3,094.87**	**22,438**	**$1,451.56**	**$26.15**
Manufacturing	**Total manufacturing**		**$62,475.81**	**$19,826.73**	**$42,649.08**	**80,609**	**$9,096.38**	**$255.38**
Based on year 2006 data from the Minnesota IMPLAN Group, Inc.								

Economic Data for Municipal Water User Groups ($millions)								
Water Use Category	**IMPLAN Sector**	**IMPLAN Code**	**Total Sales**	**Intermediate Sales**	**Final Sales**	**Jobs**	**Income**	**Business Taxes**
Manufacturing	Owner-occupied dwellings	509	$2,769.76	$0.00	$2,769.76	0	$2,145.64	$327.51
Manufacturing	Wholesale trade	390	$1,979.48	$947.70	$1,031.78	12,668	$1,042.46	$292.48
Manufacturing	State & Local Education	503	$1,884.71	$0.00	$1,884.70	46,257	$1,884.71	$0.00
Manufacturing	Hospitals	467	$1,727.97	$0.00	$1,727.96	15,876	$892.06	$11.37
Manufacturing	Offices of physicians- dentists- and other he	465	$1,682.35	$0.00	$1,682.35	12,751	$1,205.26	$10.56
Manufacturing	Food services and drinking places	481	$1,324.54	$169.14	$1,155.40	27,969	$537.72	$62.79
Manufacturing	Monetary authorities and depository credit in	430	$1,099.85	$362.24	$737.61	5,913	$772.33	$14.07
Manufacturing	Architectural and engineering services	439	$1,009.63	$636.44	$373.19	8,507	$531.11	$4.42
Manufacturing	State & Local Non-Education	504	$958.83	$0.00	$958.83	17,038	$958.83	$0.00
Manufacturing	Telecommunications	422	$942.90	$323.87	$619.03	2,611	$390.63	$65.05
Manufacturing	Motor vehicle and parts dealers	401	$866.67	$94.24	$772.43	7,972	$447.32	$126.86
Manufacturing	Legal services	437	$771.37	$489.56	$281.81	5,986	$486.47	$15.24
Manufacturing	Real estate	431	$737.30	$291.86	$445.44	4,444	$426.85	$90.59
Manufacturing	General merchandise stores	410	$729.87	$76.93	$652.94	12,607	$335.61	$106.88
Manufacturing	Lessors of nonfinancial intangible assets	436	$688.93	$375.69	$313.23	39	$323.18	$31.68
Manufacturing	Truck transportation	394	$676.79	$366.46	$310.33	5,415	$299.17	$6.80
Manufacturing	Pipeline transportation	396	$582.34	$254.68	$327.66	925	$168.62	$35.48
Manufacturing	Other State and local government enterprises	499	$490.03	$159.57	$330.46	2,341	$179.70	$0.06
Manufacturing	Food and beverage stores	405	$478.57	$63.98	$414.58	8,897	$240.01	$52.64
Manufacturing	Nursing and residential care facilities	468	$448.72	$0.00	$448.72	10,615	$265.53	$6.25
Manufacturing	Building material and garden supply stores	404	$435.38	$67.52	$367.86	5,102	$205.30	$62.45
Manufacturing	Home health care services	464	$390.02	$0.00	$390.02	11,031	$236.27	$1.39
Manufacturing	Management of companies and enterprises	451	$388.18	$365.05	$23.13	1,671	$243.23	$3.88
Manufacturing	Securities- commodity contracts- investments	426	$373.14	$247.80	$125.34	3,209	$128.28	$3.80
Manufacturing	Automotive repair and maintenance- except car	483	$344.16	$81.75	$262.41	4,607	$127.97	$25.40
Manufacturing	Waste management and remediation services	460	$320.28	$180.02	$140.26	1,915	$152.72	$12.34
Manufacturing	All other municipal		$9,460.62	$3,498.97	$5,961.65	137,524	$4,991.87	$353.80
Manufacturing	**Total**		**$33,562.37**	**$9,053.48**	**$24,508.89**	**373,890**	**$19,618.82**	**$1,723.75**

Based on year 2006 data from the Minnesota IMPLAN Group, Inc.

Appendix 2: Impacts by Water User Group

Irrigation ($millions)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Hardin County						
Reduced income from lost crop production	$0.10	$0.10	$0.10	$0.10	$0.10	$0.10
Reduced business taxes from lost crop production	$0.03	$0.03	$0.03	$0.03	$0.03	$0.03
Reduced jobs from lost crop production	2	2	2	2	2	2
Houston County						
Reduced income from lost crop production	$0.058	$0.068	$0.100	$0.271	$0.349	$0.436
Reduced business taxes from lost crop production	$0.004	$0.004	$0.006	$0.017	$0.022	$0.027
Reduced jobs from lost crop production	0	0	0	0	0	0
San Augustine County						
Reduced income from lost crop production	$0.020	$0.020	$0.020	$0.020	$0.020	$0.020
Reduced business taxes from lost crop production	$0.001	$0.001	$0.001	$0.001	$0.001	$0.001
Reduced jobs from lost crop production	0	0	0	0	0	0
Smith						
Reduced income from lost crop production	$0.001	$0.004	$0.007	$0.010	$0.013	$0.017
Reduced business taxes from lost crop production	$0.000	$0.000	$0.000	$0.001	$0.001	$0.001
Reduced jobs from lost crop production	0	0	0	0	0	0

Livestock ($millions)						
	2010	2020	2030	2040	2050	2060
Angelina County						
Reduced income from lost livestock production	$0.00	$0.00	$0.00	$0.08	$0.23	$0.40
Reduced business taxes from lost livestock production	$0.00	$0.00	$0.00	$0.00	$0.01	$0.02
Reduced jobs from lost crop livestock production	0	0	0	1	3	5
Henderson County						
Reduced income from lost livestock production	$0.00	$0.13	$0.98	$1.75	$2.53	$3.27
Reduced business taxes from lost livestock production	$0.00	$0.01	$0.05	$0.09	$0.13	$0.17
Reduced jobs from lost crop livestock production	0	2	12	22	31	40
Houston County						
Reduced income from lost livestock production	$0.33	$0.95	$1.82	$2.76	$3.77	$4.87
Reduced business taxes from lost livestock production	$0.02	$0.05	$0.09	$0.14	$0.19	$0.25
Reduced jobs from lost crop livestock production	4	12	22	34	46	60
Nacogdoches County						
Reduced income from lost livestock production	$0.00	$0.00	$3.45	$7.97	$26.40	$38.40
Reduced business taxes from lost livestock production	$0.00	$0.00	$0.16	$0.36	$1.20	$1.74
Reduced jobs from lost crop livestock production	0	0	32	74	246	358
Sabine County						
Reduced income from lost livestock production	$0.53	$1.14	$1.84	$2.65	$7.18	$9.24
Reduced business taxes from lost livestock production	$0.02	$0.05	$0.08	$0.12	$0.33	$0.42
Reduced jobs from lost crop livestock production	5	11	17	25	67	86
San Augustine County						
Reduced income from lost livestock production	$1.30	$2.41	$3.71	$10.40	$13.88	$17.70
Reduced business taxes from lost livestock production	$0.06	$0.11	$0.17	$0.47	$0.63	$0.80
Reduced jobs from lost crop livestock production	12	22	35	97	129	165
Shelby County						
Reduced income from lost livestock production	$11.07	$48.66	$80.98	$240.70	$336.76	$453.86
Reduced business taxes from lost livestock production	$0.50	$2.21	$3.68	$10.93	$15.30	$20.62
Reduced jobs from lost crop livestock production	103	453	754	2,243	3,137	4,228

Manufacturing ($millions)						
	2010	2020	2030	2040	2050	2060
Angelina County						
Reduced income from lost manufacturing	$37.70	$254.28	$314.02	$749.13	$858.12	$975.28
Reduced business taxes from lost manufacturing	$1.18	$7.93	$9.79	$23.36	$26.75	$30.41
Reduced jobs from lost crop livestock manufacturing	45	305	376	898	1,028	1,169
Hardin County						
Reduced income from lost manufacturing	$0.38	$0.65	$1.78	$2.29	$2.74	$3.22
Reduced business taxes from lost manufacturing	$0.02	$0.03	$0.08	$0.10	$0.12	$0.14
Reduced jobs from lost crop livestock manufacturing	4	6	17	22	26	31
Houston County						
Reduced income from lost manufacturing	$0.10	$0.16	$0.23	$0.29	$0.39	$0.49
Reduced business taxes from lost manufacturing	$0.00	$0.01	$0.01	$0.01	$0.02	$0.02
Reduced jobs from lost crop livestock manufacturing	1	2	2	3	4	5
Newton County						
Reduced income from lost manufacturing	$1.16	$2.06	$5.76	$7.43	$8.94	$10.39
Reduced business taxes from lost manufacturing	$0.01	$0.02	$0.06	$0.08	$0.09	$0.11
Reduced jobs from lost crop livestock manufacturing	7	13	36	47	56	65
Orange County						
Reduced income from lost manufacturing	$0.00	$33.43	$72.49	$111.43	$146.00	$184.89
Reduced business taxes from lost manufacturing	$0.00	$0.92	$1.99	$3.06	$4.01	$5.07
Reduced jobs from lost crop livestock manufacturing	0	294	637	979	1,282	1,624
Panola County						
Reduced income from lost manufacturing	$1.10	$1.33	$1.51	$1.68	$1.84	$2.14
Reduced business taxes from lost manufacturing	$0.07	$0.09	$0.10	$0.11	$0.12	$0.14
Reduced jobs from lost crop livestock manufacturing	22	27	30	34	37	43
Polk County						
Reduced income from lost manufacturing	$0.00	$0.61	$1.56	$5.11	$6.93	$8.53
Reduced business taxes from lost manufacturing	$0.00	$0.02	$0.06	$0.19	$0.26	$0.32
Reduced jobs from lost crop livestock manufacturing	0	6	14	47	64	79
San Augustine County						
Reduced income from lost manufacturing	$0.00	$0.00	$0.00	$0.00	$0.01	$0.04
Reduced business taxes from lost manufacturing	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Reduced jobs from lost crop livestock manufacturing	0	0	0	0	0	0

Manufacturing cont. ($millions)						
	2010	2020	2030	2040	2050	2060
Shelby County						
Reduced income from lost manufacturing	$0.00	$0.00	$0.00	$0.00	$0.19	$0.46
Reduced business taxes from lost manufacturing	$0.00	$0.00	$0.00	$0.00	$0.01	$0.02
Reduced jobs from lost crop livestock manufacturing	0	0	0	0	2	4
Smith County						
Reduced income from lost manufacturing	$0.00	$0.00	$0.06	$0.96	$1.73	$2.80
Reduced business taxes from lost manufacturing	$0.00	$0.00	$0.00	$0.04	$0.06	$0.10
Reduced jobs from lost crop livestock manufacturing	0	0	1	9	16	26

Mining ($millions)						
	2010	2020	2030	2040	2050	2060
Anderson County						
Reduced income from lost mining output	$0.34	$0.41	$0.84	$1.31	$1.78	$2.23
Reduced business taxes from lost mining output	$0.03	$0.04	$0.08	$0.13	$0.18	$0.22
Reduced jobs from lost mining output	2	3	6	10	13	16
Angelina County						
Reduced income from lost mining output	$149.06	$298.79	$0.00	$0.56	$1.12	$1.65
Reduced business taxes from lost mining output	$3.73	$29.88	$0.00	$0.06	$0.11	$0.16
Reduced jobs from lost mining output	1,102	2,210	0	4	8	12
Cherokee County						
Reduced income from lost mining output	$36.70	$111.91	$0.00	$0.00	$0.00	$0.15
Reduced business taxes from lost mining output	$3.67	$11.19	$0.00	$0.00	$0.00	$0.01
Reduced jobs from lost mining output	271	828	0	0	0	1
Hardin County						
Reduced income from lost mining output	$582.15	$645.67	$688.44	$731.06	$773.98	$806.71
Reduced business taxes from lost mining output	$58.22	$64.57	$68.84	$73.11	$77.40	$80.67
Reduced jobs from lost mining output	4,305	4,775	5,091	5,407	5,724	5,966
Jefferson County						
Reduced income from lost mining output	$0.00	$0.00	$0.00	$0.00	$0.09	$0.17
Reduced business taxes from lost mining output	$0.00	$0.00	$0.00	$0.00	$0.01	$0.02
Reduced jobs from lost mining output	0	0	0	0	1	1
Nacogdoches County						
Reduced income from lost mining output	$186.88	$523.80	$0.00	$0.00	$0.00	$0.00
Reduced business taxes from lost mining output	$18.69	$52.38	$0.00	$0.00	$0.00	$0.00
Reduced jobs from lost mining output	1,382	3,874	0	0	0	0
Rusk County						
Reduced income from lost mining output	$0.00	$0.00	$0.00	$0.56	$1.12	$1.65
Reduced business taxes from lost mining output	$0.00	$0.00	$0.00	$0.06	$0.11	$0.16
Reduced jobs from lost mining output	0	0	0	4	8	12
Shelby County						
Reduced income from lost mining output	$112.36	$524.33	$0.00	$0.00	$0.00	$0.00
Reduced business taxes from lost mining output	$11.24	$52.43	$0.00	$0.00	$0.00	$0.00
Reduced jobs from lost mining output	831	3,878	0	0	0	0

Mining cont. ($millions)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Smith County						
Reduced income from lost manufacturing	$0.88	$9.44	$11.91	$16.10	$19.10	$21.57
Reduced business taxes from lost manufacturing	$0.09	$0.94	$1.19	$1.61	$1.91	$2.16
Reduced jobs from lost crop livestock manufacturing	7	70	88	119	141	160

Steam-electric ($millions)						
	2010	2020	2030	2040	2050	2060
Anderson County						
Reduced income from lost electrical generation	$0.00	$179.52	$209.88	$246.90	$292.01	$347.00
Reduced business taxes from lost electrical generation	$0.00	$25.77	$30.13	$35.44	$41.91	$49.81
Reduced jobs from lost electrical generation	0	610	713	839	993	1,180
Angelina County						
Reduced income from lost electrical generation	$63.51	$31.76	$63.51	$63.51	$63.51	$63.51
Reduced business taxes from lost electrical generation	$9.12	$4.56	$9.12	$9.12	$9.12	$9.12
Reduced jobs from lost electrical generation	216	108	216	216	216	216
Jefferson County						
Reduced income from lost electrical generation	$0.00	$426.37	$498.46	$1,172.73	$1,387.03	$1,648.27
Reduced business taxes from lost electrical generation	$0.00	$61.20	$71.55	$168.33	$199.09	$236.58
Reduced jobs from lost electrical generation	0	1,449	1,694	3,987	4,715	5,603
Nacogdoches County						
Reduced income from lost electrical generation	$41.09	$3.02	$21.56	$44.19	$713.97	$848.43
Reduced business taxes from lost electrical generation	$5.90	$0.43	$3.10	$6.34	$102.48	$121.78
Reduced jobs from lost electrical generation	140	10	73	150	2,427	2,884
Newton County						
Reduced income from lost electrical generation	$0.00	$0.00	$60.14	$134.94	$226.10	$337.25
Reduced business taxes from lost electrical generation	$0.00	$0.00	$8.63	$19.37	$32.45	$48.41
Reduced jobs from lost electrical generation	0	0	204	459	769	1,146

Municipal ($millions)						
	2010	2020	2030	2040	2050	2060
Athens						
Monetary value of domestic water shortages	$0.00	$1.25	$1.68	$1.34	$1.76	$2.32
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.09	$0.13	$0.18
Lost jobs due to reduced commercial business activity	0	0	0	3	5	7
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.01	$0.02	$0.03
Lost utility revenues	$0.00	$0.09	$0.12	$0.15	$0.21	$0.27
Brownsboro						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.00	$0.06
Lost utility revenues	$0.00	$0.00	$0.00	$0.00	$0.00	$0.01
Bullard						
Monetary value of domestic water shortages	$0.00	$0.01	$0.05	$0.11	$0.25	$0.40
Lost utility revenues	$0.00	$0.02	$0.07	$0.13	$0.22	$0.34
Community Water Company						
Monetary value of domestic water shortages	$0.08	$0.97	$1.22	$1.84	$2.74	$4.27
Lost utility revenues	$0.07	$0.15	$0.20	$0.23	$0.30	$0.40
County-other (Anderson)						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.00	$0.07
County-other (Angelina)						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.00	$0.11
County-other (Hardin)						
Monetary value of domestic water shortages	$0.16	$0.30	$0.33	$0.35	$0.41	$0.55
County-other (Henderson)						
Monetary value of domestic water shortages	$0.11	$0.26	$0.44	$0.59	$0.93	$1.62
County-other (Jasper)						
Monetary value of domestic water shortages	$0.10	$0.19	$0.23	$0.15	$0.13	$0.13
County-other (Orange)						
Monetary value of domestic water shortages	$0.12	$0.08	$0.04	$0.01	$0.00	$0.00

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
County-other (Polk)						
Monetary value of domestic water shortages	$0.27	$0.68	$5.21	$3.93	$4.73	$5.83
County-other (Sabine)						
Monetary value of domestic water shortages	$1.26	$1.34	$1.39	$1.44	$1.49	$1.74
County-other (San Augustine)						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.00	$0.01
County-other (Shelby)						
Monetary value of domestic water shortages	$0.31	$0.40	$0.53	$0.55	$0.61	$0.69
County-other (Trinity)						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.01	$0.03	$0.07
County-other (Tyler)						
Monetary value of domestic water shortages	$0.00	$0.15	$0.27	$0.29	$0.27	$0.27
D&M WSC						
Monetary value of domestic water shortages	$0.00	$0.02	$0.07	$0.14	$0.29	$1.89
Lost utility revenues	$0.00	$0.00	$0.04	$0.12	$0.32	$0.55
Diboll						
Monetary value of domestic water shortages	$0.03	$0.24	$0.61	$3.57	$5.99	$10.75
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$2.28	$4.21
Lost jobs due to reduced commercial business activity	0	0	0	0	72	133
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.33	$0.60
Lost utility revenues	$0.06	$0.33	$0.66	$1.09	$1.70	$2.54
Four Way WSC						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.00	$0.31
Lost utility revenues	$0.00	$0.00	$0.00	$0.00	$0.00	$0.40
Frankston						
Monetary value of domestic water shortages	$0.00	$0.00	$0.01	$0.03	$0.05	$0.07
Lost utility revenues	$0.00	$0.00	$0.01	$0.04	$0.07	$0.10

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Hudson						
Monetary value of domestic water shortages	$0.00	$0.00	$0.14	$0.58	$5.00	$9.31
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$3.35
Lost jobs due to reduced commercial business activity	0	0	0	0	0	106
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.48
Lost utility revenues	$0.00	$0.00	$0.22	$0.63	$1.25	$2.07
Hudson WSC						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.11	$0.60	$4.67
Lost utility revenues	$0.00	$0.00	$0.00	$0.18	$0.65	$1.29
Jackson WSC						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.03	$0.09
Lost utility revenues	$0.00	$0.00	$0.07	$0.15	$0.21	$0.28
Lilly Grove SUD						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.24	$0.64
Lost utility revenues	$0.00	$0.00	$0.00	$0.00	$0.39	$0.82
Lindale Rural WSC						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.00	$0.09
Lost utility revenues	$0.00	$0.00	$0.00	$0.00	$0.00	$0.13
Lufkin						
Monetary value of domestic water shortages	$16.57	$59.57	$71.97	$86.30	$165.27	$112.62
Lost income from reduced commercial business activity	$0.00	$33.91	$42.30	$51.80	$126.81	$154.49
Lost jobs due to reduced commercial business activity	0	754	941	1,152	2,821	3,437
Lost state and local taxes from reduced commercial business activity	$0.00	$3.61	$4.50	$5.51	$13.49	$16.44
Lost utility revenues	$5.99	$9.45	$11.18	$13.14	$15.54	$18.40
Mauriceville SUD						
Monetary value of domestic water shortages	$0.00	$0.03	$0.08	$0.10	$0.18	$0.26
Lost utility revenues	$0.00	$0.07	$0.14	$0.17	$0.28	$0.36

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
New Summerfield WSC						
Monetary value of domestic water shortages	$0.00	$0.07	$0.18	$1.12	$1.63	$2.34
Lost utility revenues	$0.00	$0.00	$0.07	$0.13	$0.21	$0.29
Rusk WSC						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.04	$0.12	$0.24
Lost utility revenues	$0.00	$0.00	$0.00	$0.07	$0.20	$0.37
Swift WSC						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.06	$0.24	$0.49
Lost utility revenues	$0.00	$0.00	$0.00	$0.11	$0.42	$0.75
Whitehorse						
Monetary value of domestic water shortages	$0.02	$0.05	$0.07	$0.11	$0.16	$0.26
Lost utility revenues	$0.05	$0.10	$0.14	$0.18	$0.27	$0.39

Appendix 4B-A

Screening Criteria for Strategies

The screening criteria used to assess the feasibility of potential strategies in the ETRWPA is provided as follows. These criteria were adopted as guidelines, and strategies could be retained or dismissed at the discretion of the ETRWPG.

4B-A.1 General

- Feasible strategy must have an identified sponsor or authority.
- Feasible strategy must consider the end use. This includes water quality, distance to end use, etc. For example, long transmission systems with pumping are not likely to be economically feasible for irrigation use.
- Strategy should provide a reasonable percentage of the projected need (except conservation, which will be evaluated for all needs).
- Strategy must meet existing federal and state regulations.
- Strategies must be based on proven technology.
- Strategy must be able to be implemented.
- Strategy must be appropriate for regional water planning.

4B-A.2 Evaluation by Water Strategy Type

In accordance with 31 TAC Chapter 357.7, the ETRWPG must evaluate all WMSs the regional water planning group determines to be potentially feasible. The types of WMSs to be evaluated are described below.

4B-A.2.1 Water Conservation. The guidelines for water planning require that water conservation be considered as a strategy for every identified need. If water conservation is not adopted, the reason must be documented. Water conservation in the ETRWPA is driven more by economics than lack of readily available supply and therefore not every user will have the need to implement conservation. Additional screening criteria for conservation strategies was adopted to comply with this general policy. The criteria are outlined below.

- Municipal conservation strategies will be evaluated for municipal WUGs that have a need identified during the planning period and a current per capita water use greater than 140 gpcd. This is the TWDB recommended goal for municipal users based on the Conservation Task Force recommendations. Municipal conservation will not be evaluated for WUGs with less than 140 gpcd.

- Industrial, commercial and institutional (ICI) conservation strategies will be considered for cities with ICI use that exceeds 20 percent of the city's total water use.

- Industrial conservation will be evaluated for counties with manufacturing demands greater than 1,000 ac-ft per year and/or have identifiable industries with water use greater than 500 ac-ft per year.

- Steam-electric power water demands consider a high level of conservation in the development of the projections. No additional conservation measures will be considered for steam-electric power.

- Irrigation conservation measures will be considered by crop type and water source.

- Conservation will not be considered for livestock water demands.

- Conservation will not be considered for mining demands.

4B-A.2.2 Drought Management Measures. Drought management WMSs are implemented in response to drought conditions. These strategies provide a safety factor for water users during drought. Drought management measures will not be adopted as strategies to meet long-range needs.

4B-A.2.3 Wastewater Reuse. Reuse projects will be considered on a case-by-case basis. Both direct and indirect reuse will be considered, as appropriate.

4B-A.2.4 Expanded Use of Existing Supplies. Use of existing supplies should be optimized, where possible, to meet new demands. Following is a discussion of how various types of existing supplies might be expanded.

Connection of Existing Supplies. The connection of existing supplies will be considered on a case-by-case basis. In general, supplies should be owned by the water group with a need for additional supply or available to that group for purchase or permitting.

System Operation. New or additional system operations may be considered if they are feasible and the owner wishes to adopt such strategies. Existing operating policies will be considered during evaluation of available supplies.

Conjunctive Use of Groundwater and Surface Water. The conjunctive use of groundwater and surface water supplies may be considered when groundwater supplies are available. Applicable groundwater conservation district rules will be considered for such conjunctive systems.

Reallocation of Reservoir Storage. Reallocation of reservoir storage will be considered if the owner is amenable to reallocation and, where reallocation in federal reservoirs is being considered (such as from flood to conservation storage), an appropriate and willing local sponsor can be found to sponsor a federal study.

Voluntary Redistribution of Water Resources. Voluntary redistribution with the involved parties will be considered and the ETRWPG will come to a consensus on an approach. If the involved parties are not interested, this option will not be pursued.

Voluntary Subordination of Existing Water Rights. Voluntary subordination of existing water rights will be considered if the involved parties are amenable to the strategy. Alternatively, the ETRWPG may recommend that the water right holder consider selling water under their water right to the willing buyer.

Yield Enhancement. ETRWPG will consider yield enhancement projects, as appropriate, for the water source and identified need.

Water Quality Improvement. Water quality improvement projects will be considered for municipal supplies that bring the existing water supply into compliance with state and federal regulations. General water quality projects may be considered if they improve the usability of the water source to help meet demands.

4B-A.2.5 New Supply Development. The development of new water supplies may be necessary to meet new water demands. A discussion of the development of new water supplies follows.

Surface Water Resources. New surface water resources that can be permitted will be considered, provided a reasonable amount of supply to meet the identified need is located within a reasonable distance of the end users, and recommended new sources would be expected to provide water supplies at a reasonable cost.

Groundwater Resources. The ETRWPG will consider groundwater supplies in areas where additional groundwater is available.

Brush Control. Brush control is not considered a cost effective water supply strategy in the ETRWPA due to the large amount of rainfall and lack of invasive brush species, and will not be considered as a WMS.

Precipitation Enhancement. The ETRWPA has an abundance of precipitation. Precipitation enhancement will not be considered as a WMS.

Desalination. The ETRWPG will consider desalination on a case-by-case basis.

Water Right Cancellation. The ETRWPG will generally not pursue water right cancellation as a means of obtaining additional water supplies. Instead, the ETRWPG will recommend that the water right holder consider selling water under their water right to the willing buyer.

Aquifer Storage and Recovery. Aquifer storage and recovery (ASR) will be considered where the structure of the aquifer is such that this method is applicable. An ASR study must have already been performed to consider an area feasible for an ASR project.

4B-A.2.6 Interbasin Transfers. The ETRWPG will recommend interbasin transfers when necessary to transport water from the source to its destination. Interbasin transfers will be evaluated in accordance with current regulations**.** The process for selection of the WMSs is described as follows:

1. Define groupings or common areas with supply deficiencies
2. Develop comprehensive list of potentially feasible strategies, per screening process
3. Contact potential suppliers/WUGs to determine current strategies under consideration
4. Prepare qualitative rating based on cost, reliability, environmental impact, impacts on other water resources, impacts on agricultural and natural resources, and political acceptability for the various strategies.

5. Select one or more strategies as appropriate for each need or group.

6. Contact each WUG with a need and confirm the selected strategies are acceptable.

7. Present proposed WMSs to the ETRWPG in a public meeting for discussion, modification, and approval.

Appendix 4C-A

Cost Estimates

As part of the 2006 East Texas Region Water Plan, cost estimates were developed for each of the recommended water management strategies in the East Texas Region. As appropriate, these cost estimates have been updated for the 2011 regional water plan. In accordance with the Texas Water Development Board guidance the costs for water management strategies are to be updated from second quarter 2002 dollars to September 2008 dollars. The methodology used to develop the 2011 costs is described in the following sections. Where updated unit costs were not available, the Engineering News Record (ENR) Index for construction was used to increase the costs from second quarter 2002 (March) costs to September 2008 costs. An increase of 134% from March 2002 to September 2008 was determined using the ENR Index method. For strategies that do not rely heavily on construction, such as conservation, costs were updated based on an annual inflation rate of 3 percent.

4C-A.1 Introduction

1. The evaluation of water management strategies requires developing cost estimates. Guidance for cost estimates may be found in the TWDB's "General Guidelines for Regional Water Plan Development (2007-2012)", Section 4.1.2. Costs are to be reported in September 2008 dollars.
2. Standard unit costs for installed pipe, pump stations and standard treatment facilities were developed from actual bid data from similar projects throughout the State of Texas. These estimates were used for all SB1 projects, unless more detailed costing is available. All unit costs include the contractors' mobilization, overhead and profit. The unit costs **do not** include engineering, contingency, financial and legal services, costs for land and rights-of-way, permits, environmental and archeological studies, or mitigation. The costs for these items are determined separately in the cost tables.

3. The information presented in this section is intended to be 'rule-of-thumb' guidance. Specific situations may call for alteration of the procedures and costs. Note that the costs in this memorandum provide a planning level estimate for comparison purposes.
4. It is important that when comparing alternatives that the cost estimates be similar and include similar items. If an existing reliable cost estimate is available for a project it should be used where appropriate. All cost estimates must meet the requirements set forth in the TWDB's "General Guidelines for Regional Water Plan Development (2007-2012)".
5. The cost estimates have two components:
   - Initial capital costs, including engineering and construction costs, and
   - Average annual costs, including annual operation and maintenance costs and debt service.

TWDB does not require the consultant to determine life cycle or present value analysis. For most situations annual costs are sufficient for comparison purposes and a life-cycle analysis is not required.

4C-A.2 Assumptions For Capital Costs

4C-A.2.1 Conveyance Systems. Standard pipeline costs used for these cost estimates are shown in Table 4C-A.1. Pump station costs are based on required Horsepower capacity and are listed in Table 4C-A.2. The power capacity is to be determined from the hydraulic analyses conducted from a planning level hydraulic grade line evaluation (or detailed analysis if available). Pipelines and pump stations are to be sized for peak pumping capacity.

- Pump efficiency is assumed to be 75 percent.
- Peaking factor of 2 times the average demand is to be used for strategies when the water is pumped directly to a water treatment plant. (or historical peaking factor, if available)

Table 4C-A.1

Pipeline Costs (does not include ROW)

Diameter (Inches)	Base Installed Cost ($/Foot)	Rural Cost with Appurtenances ($/Foot)	Urban Cost with Appurtenances ($/Foot)	Assumed ROW Width (Feet)	Assumed Temporary Easement Width (Feet)
6	24	26	39	15	50
8	31	34	52	15	50
10	39	43	65	20	60
12	47	52	77	20	60
14	55	60	90	20	60
16	62	69	103	20	60
18	70	77	116	20	60
20	82	90	135	20	60
24	105	116	174	20	60
30	132	145	215	20	60
36	167	184	276	20	60
42	196	215	323	30	70
48	244	269	374	30	70
54	288	317	435	30	70
60	332	366	495	30	70
66	401	441	591	30	70
72	469	516	697	30	70
78	538	591	799	40	80
84	616	677	914	40	80
90	704	774	1,045	40	80
96	782	860	1,161	40	80
102	870	957	1,290	40	80
108	977	1,075	1,451	40	80
114	1,075	1,183	1,596	50	100
120	1,212	1,333	1,801	50	100
132	1,466	1,613	2,177	50	100
144	1,730	1,903	2,569	50	100

Notes:
- a Costs are based on PVC class 150 pipe for the smaller long, rural pipelines.
- b Appurtenances assumed to be 10% of installed pipe costs.
- c For urban pipelines, costs were increased by 35% for cost with appurtenances. For pipes 42"and smaller, additional costs were added.
- d Adjust costs for obstacles (rock, forested areas) and easy conditions (soft soil in flat country).

Table 4C-A.2
Pump Station Costs for Transmission Systems

Horsepower	Booster PS Costs	Lake PS with Intake Costs
5	$516,000	
10	$538,000	
20	$564,000	
25	$591,000	
50	$645,000	
100	$742,000	
200	$1,118,000	$1,484,000
300	$1,441,000	$1,914,000
400	$1,795,000	$2,387,000
500	$2,032,000	$2,698,000
600	$2,150,000	$2,860,000
700	$2,268,000	$3,021,000
800	$2,516,000	$3,343,000
900	$2,634,000	$3,505,000
1,000	$2,870,000	$3,817,000
2,000	$4,182,000	$5,562,000
3,000	$5,020,000	$6,677,000
4,000	$6,095,000	$8,107,000
5,000	$6,988,000	$9,293,000
6,000	$8,063,000	$10,723,000
7,000	$8,923,000	$11,867,000
8,000	$9,890,000	$13,154,000
9,000	$10,965,000	$14,583,000
10,000	$12,255,000	$16,299,000
20,000	$20,425,000	$27,165,000
30,000	$26,875,000	$35,744,000
40,000	$33,325,000	$44,322,000
50,000	$38,700,000	$51,471,000
60,000	$44,075,000	$58,620,000
70,000	$49,450,000	$65,769,000

Note:
1. Lake PS with intake costs include intake and pump station.
2. Adjust pump station costs upward if the pump station is designed to move large quantities of water at a low head (i.e. low horsepower).
3. Assumed multiple pump setup for all pump stations.

- Peaking factor of 1.2 to 1.5 is to be used if there are additional water sources and/or the water is transported to a terminal storage facility.

- Ground storage is to be provided at each booster pump station along the transmission line unless there is a more detailed design.

- Ground storage tanks should provide sufficient storage for 2.5 to 4 hours of pumping at peak capacity. Costs for ground storage are shown in Table 4C-A.3. Covered storage tanks are used for all strategies transporting treated water.

4C-A.2.2 Water Treatment Plants. Water treatment plants are to be sized for peak day capacity (assume peaking factor of 2 if no specific data is available). Costs estimated for new conventional surface water treatment facilities and expansions of existing facilities are listed in Table 4C-A.4. Conventional treatment does not include advanced technologies, such as ozone or UV treatment. All treatment plants are to be sized for finished water capacity.

- For reverse osmosis plants for surface water, increase construction costs shown on Table 4C-A.4 by the amount shown on Table 4C-A.5 for the appropriate size plant that will be used for RO. If groundwater is the raw water source, use only the costs in Table 4C-A.5. These costs were based on actual cost estimates of similar facilities.

- The amount of reject water generated by reverse osmosis treatment is dependent upon the incoming quality of the raw water. Final treatment goals should be between 600 and 800 mg/l of TDS. (This provides a safety margin in meeting secondary treatment standards.) For reverse osmosis treatment of brackish water (1,000 – 3,000 mg/l of TDS), assume that 20 percent of the raw water treated with membranes is discharged as reject water, unless project-specific data is available. For brackish water with TDS concentrations between 3,000 and 10,000 mg/l, assume 30% reject water. Desalination of seawater or very high TDS water will have a higher percent of reject water (50 to 60%). Minimal losses are assumed for conventional treatment facilities.

Table 4C-A.3
Ground Storage Tanks

Size (MG)	With Roof	Without Roof
0.05	$125,000	$106,000
0.1	$183,000	$156,000
0.5	$438,000	$333,000
1	$634,000	$469,000
1.5	$796,000	$591,000
2	$957,000	$714,000
2.5	$1,086,000	$821,000
3	$1,215,000	$928,000
3.5	$1,355,000	$1,023,000
4	$1,505,000	$1,118,000
5	$1,720,000	$1,303,000
6	$2,075,000	$1,505,000
7	$2,446,000	$1,740,000
8	$2,822,000	$2,069,000
10	$3,746,000	$2,752,000
12	$4,671,000	$3,419,000
14	$5,595,000	$4,085,000

Note: Costs assume steel tanks smaller than 1 MG, concrete tanks 1 MG and larger.

Table 4C-A.4
Conventional Water Treatment Plant Costs

Plant Capacity (MGD)	New Conventional Plants	Conventional Plant Expansions
1	$5,800,000	$2,900,000
3	$10,600,000	$7,400,000
7	$17,500,000	$12,900,000
10	$22,400,000	$16,000,000
15	$29,100,000	$20,900,000
20	$35,400,000	$26,100,000
30	$47,600,000	$35,700,000
40	$60,000,000	$45,500,000
50	$72,600,000	$54,400,000
60	$84,900,000	$63,500,000
70	$96,600,000	$72,200,000
80	$107,900,000	$81,400,000
90	$118,500,000	$90,500,000
100	$130,200,000	$100,200,000

Note: Plant is sized for finished peak day capacity.

Table 4C-A. 5
Additional Cost for Reverse Osmosis Treatment

Plant Capacity (MGD)	Reverse Osmosis Facilities Cost
0.5	$1,300,000
1	$1,600,000
3	$3,200,000
7	$7,200,000
10	$9,800,000
15	$14,200,000
20	$18,300,000
30	$25,500,000
40	$31,400,000
50	$36,600,000
60	$40,700,000

Note: Plant is sized for finished water capacity.

- Costs for ion exchange facilities are shown on Table 4C-A.6. For these facilities it is assumed that 2 to 3 percent of the raw water would be discharged as reject water.

4C-A.2.3 New Groundwater Wells. Cost estimates required for water management strategies that include additional wells or well fields can be roughly estimated from the relationships in Table 4C-A.7. These cost relationships are "rule-of-thumb" in nature and are only appropriate in the broad context of the cost evaluations for the RWP process.

Table 4C-A. 6
Groundwater Nitrate Treatment

Treatment Capacity (MGD)	Ion Exchange Plant Cost
0.25	$800,000
1.0	$1,700,000
3.0	$3,900,000

Note: Plant is sized for finished water capacity.

Table 4C-A.7
Cost Elements for Water Wells

Well Diameter (inches)	Typical Production Range (gpm)	Estimated Cost a=production rate (gpm), b= well depth (feet)
6	25-150	9500 + 93a + 82b
8	150-300	13600 + 89a + 191b
10	300-500	20400 + 86a + 245b
12	500-800	27300 + 82a + 307b
16	800-2000	30000 + 82a + 436b

For well uses other than municipal, the total well cost estimated from Table 7 should be multiplied by 0.70.

The cost relationships assume construction methods required for public water supply wells, including carbon steel surface casing and pipe-based, stainless steel, and wire-wrap screen. The cost estimates assume that wells would be gravel-packed in the screen sections and the surface casing cemented to their total depth. Estimates include the cost of drilling, completion, well development, well testing, pump, motor, motor controls, column pipe, installation and mobilization. The cost relationships do not include engineering, contingency, financial and legal services, land costs, or permits. A more detailed cost analysis should be completed prior to developing a project.

The generic cost relationships were developed for wells of different well casing diameter. A cost relationship was developed for wells ranging from 6 to 16 inches in diameter and each relationship includes the variables for discharge and well depth. The pump costs assume that the pump is set at 300 feet below ground surface. Pump depth and lift requirements will vary in each situation and may need to be adjusted for individual projects.

Using the cost relationships in Table 4C-A.7, a 700-gpm well with a total depth of 1,000 feet would cost approximately $391,000. For well uses other than municipal, the total well cost estimated from Table 4C-A.1 should be multiplied by 0.70.

The costs associated with conveyance systems for multi-well systems can vary widely based on the distance between wells, terrain characteristics, well production, and distance to the treatment facility. These costs should be estimated using standard engineering approaches and site-specific information.

4C-A.2.4 New Reservoirs. Site-specific cost estimates will be made for reservoir sites. The elements required for reservoir sites are included in Table 4C-A.8. Lake intake structures for new reservoirs will be determined on a case-by-case basis. Generally, costs for construction of such facilities prior to filling of the reservoir will be less than shown on Table 4C-A.2.

4C-A.2.5 Other Costs. Engineering, contingency, construction management, financial and legal costs are to be estimated at 30 percent of construction cost for pipelines and 35 percent of construction costs for pump stations, treatment facilities and reservoir projects. (This is in accordance with TWDB guidance.)

- Permitting and mitigation for transmission and treatment projects are to be estimated at 1 percent of the total construction costs. For reservoirs, mitigation and permitting costs are assumed equal to twice the land purchase cost, unless site specific data is available.
- Right-of-way (ROW) costs for transmission lines are estimated at $2,000 per acre of rural ROW. Urban ROW will be higher. If no data is available, assume $20,000 per acre. If a small pipeline follows existing right-of-ways (such as highways), no additional right-of-way cost may be assumed. Large pipelines will require ROW costs regardless of routing.

Interest during construction is the total of interest accrued at the end of the construction period using a 6 percent annual interest rate on total borrowed funds, less a 4 percent rate of return on investment of unspent funds. This is calculated assuming that the total estimated project cost (excluding interest during construction) would be drawn down at a constant rate per month during the construction period. Factors were determined for different lengths of time for project construction. These factors were used in cost estimating and are presented in Table 4C-A. 9.

Table 4C-A.8
Cost Elements for Reservoir Sites

Capital Costs	Studies and Permitting
Embankment	Environmental and archeological studies
Spillway	Permitting
Outlet works	Terrestrial mitigation tracts
Site work	Engineering and contingencies
Land	Construction management
Administrative facilities	
Supplemental pumping facilities	
Flood protection	

Table 4C-A. 9
Factors for Interest During Construction

Construction Period	Factor
6 months	0.02167
12 months	0.04167
18 months	0.06167
24 months	0.08167
36 month construction	0.12167

4C-A.3 Assumptions for Annual Costs

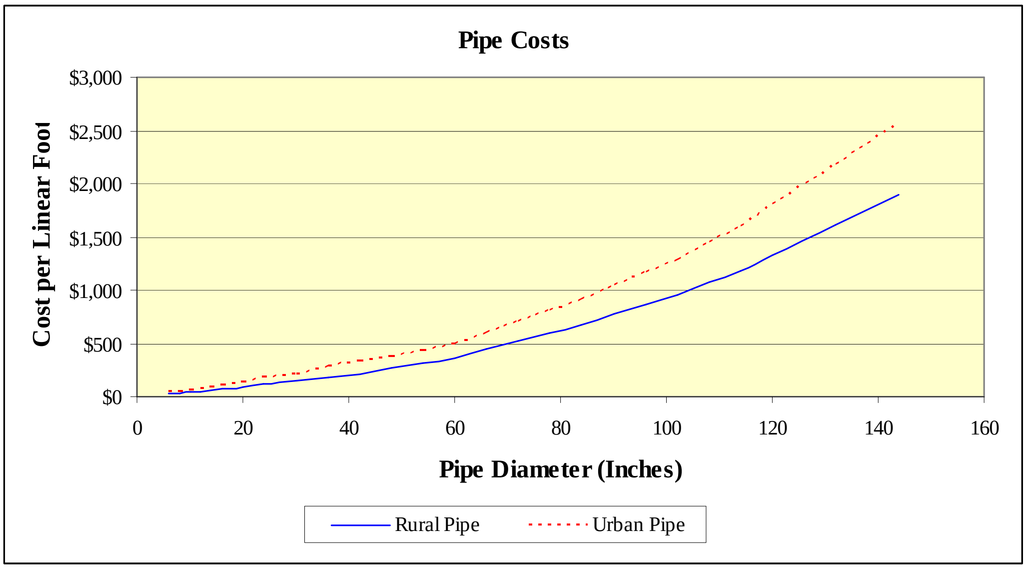
Annual costs are to be estimated using the following assumptions:

- Debt service for all transmission and treatment facilities is to be annualized over 20 years, but not longer than the life of the project. [Note: uniform amortization periods should be used when evaluating similar projects for an entity.]
- Annual interest rate for debt service is 6 percent.
- Water purchase costs are to be based on wholesale rates reported by the selling entity when possible. In lieu of known rates, a typical regional cost for treated water and raw water will be developed. For planning purposes, treated water costs are $3 per 1,000 gallons and raw water is $0.50 per 1,000 gallons. Actual costs are negotiated between the buyer and seller.
- Operation and Maintenance costs are to be calculated based on the construction cost of the capital improvement. Engineering, permitting, etc. should not be included as a basis for this calculation. However, a 20% allowance for construction contingencies should be included for all O&M calculations. Per the "General Guidelines for Regional Water Plan Development (2007-2012)", O&M should be calculated at:
    - 1 percent of the construction costs for pipelines
    - 1.5 percent for dams
    - 2.5 percent of the construction costs for pump stations, storage tanks, meters and SCADA systems
    - Assume O&M costs for treatment facilities are included in the treatment cost
- Surface water treatment costs are estimated at $0.70 per 1,000 gallons for conventional plants and $1.24 per 1,000 gallons of finished water for surface water plants with reverse osmosis. Assume cost for treatment of groundwater by reverse osmosis is $0.75 per 1,000 gallons. If only a portion of the water will be treated with RO, apply costs proportionately. Treatment for nitrates is estimated at $0.40 per 1,000 gallons. Treatment for groundwater (assuming disinfection and labor only) is estimated at $0.30 per 1,000 gallons. These costs include chemicals, labor and electricity for treatment and should be applied to amount of finished water receiving the treatment. Electricity

associated with moving raw water to the treatment facility is calculated separately (this includes electricity associated with groundwater well fields).

- Reject water disposal for treatment of brackish water is to be estimated on a case-by-case basis depending on disposal method. If no method is defined, assume a cost of $0.35 per 1,000 gallons of reject water. [This value represents a moderate cost estimate. If the water were returned to a brackish surface water source, the costs would be negligible. If evaporation beds or deep well injection were used, the costs could be much higher.]
- Pumping costs are to be estimated using an electricity rate of $0.09 per Kilowatt Hour. If local data is available, this can be used.

Figure 1



WUGNAME: **Anderson_County-Other**
STRATEGY: **New Wells in Queen City Aquifer**
AMOUNT (ac-ft/yr): **100**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**		**Cost**	
Water Well Construction		2	ea	$	29,473	$	58,947
Connection to Water System		2	ea	$	50,000	$	100,000
Subtotal						**$**	**158,947**
Engineering and Contingencies (30%)						$	47,684
Mitigation and Permitting (1%)						$	1,589
Subtotal						**$**	**208,220**
Interest During Construction						$	4,512
TOTAL CAPITAL COST						***$***	***212,732***
ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**		**Cost**	
Debt Service						$	18,547
Pipeline O&M (1%)						$	1,000
Pump O&M (2.5%)						$	1,474
Chemicals			1000 gal	$	0.30	$	9,776
Electricity						$	1,314
TOTAL ANNUAL COST w/ AMORTIZATION						***$***	***32,110***
TOTAL ANNUAL COST AFTER AMORTIZATION						$	13,563
UNIT COSTS (Until Amortized)							
Cost per acre-ft						$	321
Cost per 1000 gallons						$	0.99
UNIT COSTS (After Amortization)							
Cost per acre-ft						$	136
Cost per 1000 gallons						$	0.42

WUGNAME: **Anderson_County-Other**
STRATEGY: **New Wells in Carizzo-Wilcox Aquifer**
AMOUNT (ac-ft/yr): **100**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Water Well Construction		1	ea	$ 95,900	$ 95,900
Connection to Water System		1	ea	$ 100,000	$ 100,000
Subtotal					**$ 195,900**
Engineering and Contingencies (30%)					$ 58,770
Mitigation and Permitting (1%)					$ 1,959
Subtotal					**$ 256,629**
Interest During Construction					$ 5,560
TOTAL CAPITAL COST					***$ 262,189***
ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Debt Service					$ 22,859
Pipeline O&M (1%)					$ 1,000
Pump O&M (2.5%)					$ 2,398
Chemicals			1000 gal	$ 0.30	$ 9,776
Electricity					$ 4,599
TOTAL ANNUAL COST w/ AMORTIZATION					***$ 40,631***
TOTAL ANNUAL COST AFTER AMORTIZATION					$ 17,772
UNIT COSTS (Until Amortized)					
Cost per acre-ft					$ 406
Cost per 1000 gallons					$ 1.25
UNIT COSTS (After Amortization)					
Cost per acre-ft					$ 178
Cost per 1000 gallons					$ 0.55

WUGNAME: **Frankston**
STRATEGY: **New Wells in Carizzo-Wilcox Aquifer**
AMOUNT (ac-ft/yr): **120**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Water Well Construction		1	ea	$ 91,239	$ 91,239
Connection to Water System		1	ea	$ 100,000	$ 100,000
Subtotal					**$ 191,239**
Engineering and Contingencies (30%)					$ 57,372
Mitigation and Permitting (1%)					$ 1,912
Subtotal					**$ 250,523**
Interest During Construction					$ 5,428
TOTAL CAPITAL COST					***$ 255,951***
ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Debt Service					$ 22,315
Pipeline O&M (1%)					$ 1,000
Pump O&M (2.5%)					$ 2,281
Chemicals			1000 gal	$ 0.30	$ 11,731
Electricity					$ 5,519
TOTAL ANNUAL COST w/ AMORTIZATION					***$ 42,846***
TOTAL ANNUAL COST AFTER AMORTIZATION					***$ 20,531***
UNIT COSTS (Until Amortized)					
Cost per acre-ft					$ 357
Cost per 1000 gallons					$ 1.10
UNIT COSTS (After Amortization)					
Cost per acre-ft					$ 171
Cost per 1000 gallons					$ 0.53

WUGNAME: **Anderson_Mining**
STRATEGY: **New Wells in Carizzo-Wilcox Aquifer**
AMOUNT (ac-ft/yr): **120**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Water Well Construction		1	ea	$ 70,900	$ 70,900
Connection to Water System		1	ea	$ 100,000	$ 100,000
Subtotal					**$ 170,900**
Engineering and Contingencies (30%)					$ 51,270
Mitigation and Permitting (1%)					$ 1,709
Subtotal					**$ 223,879**
Interest During Construction					$ 4,851
TOTAL CAPITAL COST					***$ 228,730***

ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Debt Service					$ 19,942
Pipeline O&M (1%)					$ 1,000
Pump O&M (2.5%)					$ 1,773
Chemicals			1000 gal	NA	$ -
Electricity					$ 5,519
TOTAL ANNUAL COST w/ AMORTIZATION					***$ 28,233***
TOTAL ANNUAL COST AFTER AMORTIZATION					***$ 8,292***

UNIT COSTS (Until Amortized)	
Cost per acre-ft	$ 233
Cost per 1000 gallons	$ 0.72
UNIT COSTS (After Amortization)	
Cost per acre-ft	$ 68
Cost per 1000 gallons	$ 0.21

WUGNAME: **Anderson_Steam Electric Power_1**
STRATEGY: **Lake Palestine**
AMOUNT (ac-ft/yr): **21,853** 19.50 MGD

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Transmission Facilities					
Pipeline	42 in.	58080	ft	$ 215	$ 12,487,200
Right of Way Easements		40	AC	$ 2,000	$ 80,000
Terminal Storage	5.00 MG	1	LS	$ 1,303,000	$ 1,303,000
Contingencies (10%, engineering done)					$ 1,256,720
		11	miles		
Pipeline Subtotal					**$ 15,126,920**
Pump Station					$ 4,345,875
Contingencies (10%, engineering done)					$ 434,587
Pump Station Subtotal					**$ 4,780,462**
Environmental and Permitting		0	ft	$ 0.57	$ 199,074
Additional Engineering (20%)					$ 3,981,476
Interest During Construction					$ 829,481
TOTAL CAPITAL COST					***$ 24,917,413***

ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Debt Service					$ 2,172,414
Raw Water Cost		7,120,822	1000 gal	$ 0.65	$ 4,628,534
Pipeline O&M (1%)					$ 124,872
Pump O&M (2.5%)					$ 152,087
Chemicals			1000 gal	$ -	$ -
Electricity					$ 422,708
TOTAL ANNUAL COST					***$ 7,500,615***
UNIT COSTS (Until Amortized)					
Cost per acre-ft					$ 343
Cost per 1000 gallons					$ 1.05
UNIT COSTS (After Amortization)					
Cost per acre-ft					$ 244
Cost per 1000 gallons					$ 0.75

WUGNAME: **Angelina_County-Other_Phase1**
STRATEGY: **New Wells in Yegua-Jackson Aquifer**
AMOUNT (ac-ft/yr): **150**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**	
Water Well Construction			1 ea	$ 56,800	$	56,800
Connection to Water System			1 ea	$ 100,000	$	100,000
Subtotal					**$**	**156,800**
Engineering and Contingencies (30%)					$	47,040
Mitigation and Permitting (1%)					$	1,568
Subtotal					**$**	**205,408**
Interest During Construction					$	4,451
TOTAL CAPITAL COST					***$***	***209,859***

ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**	
Debt Service					$	18,296
Pipeline O&M (1%)					$	1,000
Pump O&M (2.5%)					$	1,420
Chemicals			1000 gal	$ 0.30	$	14,661
Electricity					$	5,913
TOTAL ANNUAL COST w/ AMORTIZATION					***$***	***41,291***
TOTAL ANNUAL COST AFTER AMORTIZATION					***$***	***22,994***
UNIT COSTS (Until Amortized)						
Cost per acre-ft					$	275
Cost per 1000 gallons					$	0.84
UNIT COSTS (After Amortization)						
Cost per acre-ft					$	153
Cost per 1000 gallons					$	0.47

WUGNAME: **Angelina_County-Other_Phase2**
STRATEGY: **New Wells in Yegua-Jackson Aquifer**
AMOUNT (ac-ft/yr): **150**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Water Well Construction			1 ea	$ 56,800	$ 56,800
Connection to Water System			1 ea	$ 100,000	$ 100,000
Subtotal					**$ 156,800**
Engineering and Contingencies (30%)					$ 47,040
Mitigation and Permitting (1%)					$ 1,568
Subtotal					**$ 205,408**
Interest During Construction					$ 4,451
TOTAL CAPITAL COST					***$ 209,859***

ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Debt Service					$ 18,296
Pipeline O&M (1%)					$ 1,000
Pump O&M (2.5%)					$ 1,420
Chemicals			1000 gal	$ 0.30	$ 14,661
Electricity					$ 5,913
TOTAL ANNUAL COST w/ AMORTIZATION					***$ 41,291***
TOTAL ANNUAL COST AFTER AMORTIZATION					***$ 22,994***

UNIT COSTS (Until Amortized)	
Cost per acre-ft	$ 275
Cost per 1000 gallons	$ 0.84

UNIT COSTS (After Amortization)	
Cost per acre-ft	$ 153
Cost per 1000 gallons	$ 0.47

WUGNAME:	**Angelina County-Other**	
STRATEGY:	**Purchase Water from Lufkin**	
AMOUNT (ac-ft/yr):	**1,100**	2.0 MGD

Expand Treated Water Supply	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline					
Pipeline to Angelina County customers	12 in.	66,000	LF	$52	$3,432,000
Pipeline to Angelina County customers	8 in.	66,000	LF	$34	$2,244,000
Right of Way Easements Rural (ROW)		45.5	ACRE	$2,000	$91,000
Engineering and Contingencies (30%)					$1,703,000
Subtotal of Pipeline					**$7,470,000**
Pump Station(s)					
Pump Station	470 HP	1	LS	$1,961,000	$1,961,000
Engineering and Contingencies (35%)					$686,000
Subtotal of Pump Station(s)					**$2,647,000**
CONSTRUCTION TOTAL					**$10,117,000**
Permitting and Mitigation					**$65,000**
Interest During Construction			**(12 months)**		**$422,000**
TOTAL COST					**$10,604,000**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$925,000
Electricity ($0.09 kWh)					$48,000
Operation & Maintenance					$100,000
Treated Water Purchase			Kgal	$2.00	$717,000
Total Annual Costs					**$1,790,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,627
Per 1,000 Gallons					$4.99
UNIT COSTS (After Amortization)					
Per Acre-Foot					$786
Per 1,000 Gallons					$2.41

WWPNAME:	**Diboll**				
STRATEGY:	**Purchase from Lufkin**				
Quantity:	**800** AF/Y		1.25 MGD		

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline to Lake Nacogdoches	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	14 in.	61,250	LF	$60	$3,675,000
Right of Way Easements Rural (ROW)		28.1	ACRE	$2,000	$56,000
Engineering and Contingencies (30%)					$1,103,000
Subtotal of Pipeline					**$4,834,000**
Pump Station(s)					
Pump with intake & building	50 HP	1	LS	$871,000	$871,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$305,000
Subtotal of Pump Station(s)					**$1,176,000**
CONSTRUCTION TOTAL					**$6,010,000**
Permitting and Mitigation					**$55,000**
Interest During Construction			**(6 months)**		**$130,000**
TOTAL COST					**$6,195,000**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$540,100
Electricity ($0.09 kWh)					$13,600
Operation & Maintenance					$70,200
Treated Water Purchase			Kgal	$2.00	$521,000
Treatment			Kgal	$0.00	$0
Total Annual Costs					**$1,144,900**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,431
Per 1,000 Gallons					$4.39
UNIT COSTS (After Amortization)					
Per Acre-Foot					$756
Per 1,000 Gallons					$2.32

WUGNAME: **Diboll_Phase1**
STRATEGY: **New Wells in Yegua-Jackson Aquifer**
AMOUNT (ac-ft/yr): **600**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Water Well Construction		2	ea	$ 115,400	$ 230,800
Connection to Water System		2	ea	$ 100,000	$ 200,000
Subtotal					**$ 430,800**
Engineering and Contingencies (30%)					$ 129,240
Mitigation and Permitting (1%)					$ 4,308
Subtotal					**$ 564,348**
Interest During Construction					$ 12,228
TOTAL CAPITAL COST					***$ 576,576***

ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Debt Service					$ 50,268
Pipeline O&M (1%)					$ 2,000
Pump O&M (2.5%)					$ 5,770
Chemicals			1000 gal	$ 0.30	$ 58,653
Electricity					$ 23,652
TOTAL ANNUAL COST w/ AMORTIZATION					***$ 140,344***
TOTAL ANNUAL COST AFTER AMORTIZATION					***$ 90,075***

UNIT COSTS (Until Amortized)	
Cost per acre-ft	$ 234
Cost per 1000 gallons	$ 0.72
UNIT COSTS (After Amortization)	
Cost per acre-ft	$ 150
Cost per 1000 gallons	$ 0.46

WUGNAME: **Four Way WSC**
STRATEGY: **Purchase water from Lufkin**
AMOUNT (ac-ft/yr): **225**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Connection to Water System		1	ea	$ 500,000	$ 500,000
Subtotal					**$ 500,000**
Engineering and Contingencies (30%)					$ 150,000
Mitigation and Permitting (1%)					$ 5,000
Subtotal					**$ 655,000**
Interest During Construction					$ 14,192
TOTAL CAPITAL COST					***$ 669,192***
ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Debt Service					$ 58,343
Pipeline O&M (1%)					$ 5,000
Purchase cost		73,300	Kgal	$ 2	$ 146,600
Electricity					$ 1,478
TOTAL ANNUAL COST w/ AMORTIZATION					***$ 211,421***
TOTAL ANNUAL COST AFTER AMORTIZATION					***$ 153,078***
UNIT COSTS (Until Amortized)					
Cost per acre-ft					$ 940
Cost per 1000 gallons					$ 2.88
UNIT COSTS (After Amortization)					
Cost per acre-ft					$ 680
Cost per 1000 gallons					$ 2.09

WUGNAME: **Hudson WSC_Phase1**
STRATEGY: **New Wells in Carrizo-Wilcox Aquifer**
AMOUNT (ac-ft/yr): **600**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Water Well Construction		2	ea	$ 264,052	$ 528,103
Connection to Water System		2	ea	$ 100,000	$ 200,000
Subtotal					**$ 728,103**
Engineering and Contingencies (30%)					$ 218,431
Mitigation and Permitting (1%)					$ 7,281
Subtotal					**$ 953,815**
Interest During Construction					$ 20,666
TOTAL CAPITAL COST					***$ 974,482***

ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Debt Service					$ 84,960
Pipeline O&M (1%)					$ 2,000
Pump O&M (2.5%)					$ 13,203
Chemicals			1000 gal	$ 0.30	$ 58,653
Electricity					$ 31,536
TOTAL ANNUAL COST w/ AMORTIZATION					***$ 190,352***
TOTAL ANNUAL COST AFTER AMORTIZATION					***$ 105,392***

UNIT COSTS (Until Amortized)	
Cost per acre-ft	$ 317
Cost per 1000 gallons	$ 0.97

UNIT COSTS (After Amortization)	
Cost per acre-ft	$ 176
Cost per 1000 gallons	$ 0.54

WUGNAME: **Hudson WSC_Phase2**
STRATEGY: **New Wells in Carrizo-Wilcox Aquifer**
AMOUNT (ac-ft/yr): **1400**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Water Well Construction		4	ea	$ 329,568	$ 1,318,274
Connection to Water System		4	ea	$ 100,000	$ 400,000
Subtotal					**$ 1,718,274**
Engineering and Contingencies (30%)					$ 515,482
Mitigation and Permitting (1%)					$ 17,183
Subtotal					**$ 2,250,939**
Interest During Construction					$ 48,771
TOTAL CAPITAL COST					***$ 2,299,710***

ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Debt Service					$ 200,499
Pipeline O&M (1%)					$ 4,000
Pump O&M (2.5%)					$ 32,957
Chemicals			1000 gal	$ 0.30	$ 136,857
Electricity					$ 73,584
TOTAL ANNUAL COST w/ AMORTIZATION					***$ 447,897***
TOTAL ANNUAL COST AFTER AMORTIZATION					***$ 247,398***

UNIT COSTS (Until Amortized)	
Cost per acre-ft	$ 320
Cost per 1000 gallons	$ 0.98
UNIT COSTS (After Amortization)	
Cost per acre-ft	$ 177
Cost per 1000 gallons	$ 0.54

SBLIV-1
Angelina County Livestock
Increase Supply from Local Sources

Owner:	Angelina County Livestock	
Quantity:	90	AF/Y

Item	Size	Quantity	Unit	Unit Price	Cost
Capital Costs					
Stock Ponds					
Stock Ponds	25 AF/Y	4	Ea.	$34,000	$122,400
Engineering and Contingencies					$42,800
Subtotal for Local Supply					**$165,200**
TOTAL CONSTRUCTION COST					**$165,200**
Interest During Construction			**(6 months)**		**$3,600**
Permitting and Mitigation					**$0**
TOTAL CAPITAL COST					**$168,800**
Annual Costs					
Debt Service (6 percent for 20 years)					$14,700
Total Annual Cost					**$14,700**
UNIT COSTS (Until Amortized)					
Water Cost ($ per ac-ft)					**$163**
Water Cost ($ per 1,000 gallons)					**$0.50**
UNIT COSTS (After Amortization)					
Water Cost ($ per ac-ft)					**$0**
Water Cost ($ per 1,000 gallons)					**$0.00**

WUGNAME:	**Angelina Manufacturing**				
STRATEGY:	**Lake Columbia**				
Quantity:	**8,551** AF/Y		11.44 MGD		

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	30 in.	15,840	LF	$145	$2,297,000
Pipeline Urban	30 in.	0	LF	$215	$0
Right of Way Easements Rural (ROW)		7.3	ACRE	$2,000	$15,000
Right of Way Easements Urban (ROW)		0.0	ACRE	$20,000	$0
Engineering and Contingencies (30%)					$689,000
Subtotal of Pipeline					**$3,001,000**
Pump Station(s)					
Pump with intake & building	400 HP	1	LS	$2,423,000	$2,423,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$848,050
Subtotal of Pump Station(s)					**$3,271,050**
Terminal Storage					
Storage	2 MG	1	LS	$714,000	**$714,000**
Engineering and Contingencies (35%)					$249,900
Subtotal of WTP					**$963,900**
CONSTRUCTION TOTAL					**$7,235,950**
Permitting and Mitigation					**$65,000**
Interest During Construction			**(12 months)**		**$302,000**
TOTAL COST					**$7,602,950**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$663,000
Electricity ($0.09 kWh)					$133,000
Operation & Maintenance					$101,000
Raw Water Purchase			Kgal	$0.66	$1,839,000
Treatment			Kgal	$0.00	$0
Total Annual Costs					**$2,736,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of water					$320
Per 1,000 Gallons					$0.98
UNIT COSTS (After Amortization)					
Per Acre-Foot					$242
Per 1,000 Gallons					$0.74

WUGNAME:	**Angelina Manufacturing**				
STRATEGY:	**Purchase from Lufkin**				
Raw Water Quantity:	**11,800** AF/Y		15.79 MGD		
Treated Water Quantity:	**7,000** AF/Y		9.37 MGD		

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	36 in.	52,800	LF	$184	$9,715,000
Pipeline Urban	36 in.	0	LF	$276	$0
Right of Way Easements Rural (ROW)		24.2	ACRE	$2,000	$48,000
Right of Way Easements Urban (ROW)		0.0	ACRE	$20,000	$0
Engineering and Contingencies (30%)					$2,915,000
Subtotal of Pipeline					**$12,678,000**
Pump Station(s)					
Pump with building	315 HP	2	LS	$1,494,000	$2,988,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$1,045,800
Subtotal of Pump Station(s)					**$4,033,800**
Terminal Storage					
Storage	2 MG	1	LS	$714,000	**$714,000**
Engineering and Contingencies (35%)					$250,000
Subtotal of Storage					**$964,000**
CONSTRUCTION TOTAL					**$17,675,800**
Permitting and Mitigation					**$161,000**
Interest During Construction			**(12 months)**		**$737,000**
TOTAL COST					**$18,573,800**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$1,619,000
Electricity ($0.09 kWh)					$225,000
Operation & Maintenance					$207,000
Raw Water Purchase			Kgal	$0.50	$1,923,000
Treated Water Purchase			Kgal	$2.00	$4,562,000
Total Annual Costs					**$8,536,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of water					$454
Per 1,000 Gallons					$1.39
UNIT COSTS (After Amortization)					
Per Acre-Foot					$368
Per 1,000 Gallons					$1.13

WUGNAME:	**Angelina Mining**				
STRATEGY:	**Angelina River/ Lake Columbia**				
Quantity:	**4,000** AF/Y		5.35 MGD		

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	20 in.	26,400	LF	$90	$2,376,000
Right of Way Easements Rural (ROW)		12.1	ACRE	$2,000	$24,000
Engineering and Contingencies (30%)					$713,000
Subtotal of Pipeline					**$3,113,000**
Pump Station(s)					
Pump with intake	200 HP	1	LS	$1,509,000	$1,509,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$528,150
Subtotal of Pump Station(s)					**$2,037,150**
Terminal Storage	**1.0 MG**	**1**	**LS**	**$469,000**	**$469,000**
CONSTRUCTION TOTAL					**$5,619,150**
Permitting and Mitigation					**$52,000**
Interest During Construction			**(6 months)**		**$122,000**
TOTAL COST					**$5,793,150**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$505,000
Electricity ($0.09 kWh)					$74,000
Operation & Maintenance					$88,000
Raw Water Purchase			Kgal	$0.66	$860,000
Treatment			Kgal	$0.00	$0
Total Annual Costs					**$1,527,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$382
Per 1,000 Gallons					$1.17
UNIT COSTS (After Amortization)					
Per Acre-Foot					$256
Per 1,000 Gallons					$0.78

WUGNAME: **Angelina_Steam Electric Power**
STRATEGY: **New Wells in Carizzo-Wilcox**
AMOUNT (ac-ft/yr): **1000**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Water Well Construction		3	ea	$ 329,600	$ 988,800
Connection to Water System		3	ea	$ 100,000	$ 300,000
Subtotal					**$ 1,288,800**
Engineering and Contingencies (30%)					$ 386,640
Mitigation and Permitting (1%)					$ 12,888
Subtotal					**$ 1,688,328**
Interest During Construction					$ 36,581
TOTAL CAPITAL COST					***$ 1,724,909***

ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Debt Service					$ 150,385
Pipeline O&M (1%)					$ 3,000
Pump O&M (2.5%)					$ 24,720
Chemicals			1000 gal	$ -	$ -
Electricity					$ 52,560
TOTAL ANNUAL COST w/ AMORTIZATION					***$ 230,665***
TOTAL ANNUAL COST AFTER AMORTIZATION					***$ 80,280***

UNIT COSTS (Until Amortized)	
Cost per acre-ft	$ 1,538
Cost per 1000 gallons	$ 4.72

UNIT COSTS (After Amortization)	
Cost per acre-ft	$ 535
Cost per 1000 gallons	$ 1.64

WUGNAME: **New Summerfield**
STRATEGY: **New Wells - Carrizo Wilcox Aquifer**
AMOUNT (ac-ft/yr): **242**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**		**Cost**	
Water Well Construction		1	ea	$	123,742	$	123,742
Connection to Water System		1	ea	$	100,000	$	100,000
Subtotal						**$**	**223,742**
Engineering and Contingencies (30%)						$	67,122
Mitigation and Permitting (1%)						$	2,237
Subtotal						**$**	**293,101**
Interest During Construction						$	6,351
TOTAL CAPITAL COST						***$***	***299,452***

ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**		**Cost**	
Debt Service						$	26,108
Pipeline O&M (1%)						$	1,000
Pump O&M (2.5%)						$	3,094
Chemicals			1000 gal	$	0.30	$	23,667
Electricity						$	9,461
TOTAL ANNUAL COST w/ AMORTIZATION						***$***	***63,329***
TOTAL ANNUAL COST AFTER AMORTIZATION						***$***	***37,221***

UNIT COSTS (Until Amortized)		
Cost per acre-ft	$	262
Cost per 1000 gallons	$	0.80

UNIT COSTS (After Amortization)		
Cost per acre-ft	$	154
Cost per 1000 gallons	$	0.47

WUGNAME: **Rusk**
STRATEGY: **New Wells - Carrizo Wilcox Aquifer**
AMOUNT (ac-ft/yr): **212**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Water Well Construction		1	ea	$ 123,742	$ 123,742
Connection to Water System		1	ea	$ 100,000	$ 100,000
Subtotal					**$ 223,742**
Engineering and Contingencies (30%)					$ 67,122
Mitigation and Permitting (1%)					$ 2,237
Subtotal					**$ 293,101**
Interest During Construction					$ 6,351
TOTAL CAPITAL COST					***$ 299,452***
ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Debt Service					$ 26,108
Pipeline O&M (1%)					$ 1,000
Pump O&M (2.5%)					$ 3,094
Chemicals			1000 gal	$ 0.30	$ 20,724
Electricity					$ 9,461
TOTAL ANNUAL COST w/ AMORTIZATION					***$ 60,386***
TOTAL ANNUAL COST AFTER AMORTIZATION					***$ 34,279***
UNIT COSTS (Until Amortized)					
Cost per acre-ft					$ 285
Cost per 1000 gallons					$ 0.87
UNIT COSTS (After Amortization)					
Cost per acre-ft					$ 162
Cost per 1000 gallons					$ 0.50

WUGNAME:	**City of Rusk**				
STRATEGY:	**Lake Columbia**				
Quantity:	**3,000** AF/Y		5.00 MGD		
CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	20 in.	50,160	LF	$90	$4,514,000
Pipeline Urban	20 in.	0	LF	$135	$0
Right of Way Easements Rural (ROW)		23.0	ACRE	$2,000	$46,000
Right of Way Easements Urban (ROW)		0.0	ACRE	$20,000	$0
Engineering and Contingencies (30%)					$1,354,000
Subtotal of Pipeline					**$5,914,000**
Pump Station(s)					
Pump with intake & building	225 HP	1	LS	$1,618,000	$1,618,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$566,300
Subtotal of Pump Station(s)					**$2,184,300**
Water Treatment Facility					
New Water Treatment Plant	5 MGD	1	LS	$14,050,000	**$14,050,000**
Engineering and Contingencies (35%)					$4,917,500
Subtotal of WTP					**$18,967,500**
CONSTRUCTION TOTAL					**$27,065,800**
Permitting and Mitigation					**$242,000**
Interest During Construction			**(12 months)**		**$1,128,000**
TOTAL COST					**$28,435,800**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$2,479,000
Electricity ($0.09 kWh)					$57,000
Operation & Maintenance					$103,000
Raw Water Purchase			Kgal	$0.66	$645,000
Treatment			Kgal	$0.70	$684,000
Total Annual Costs					**$3,968,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,323
Per 1,000 Gallons					$4.06
UNIT COSTS (After Amortization)					
Per Acre-Foot					$496
Per 1,000 Gallons					$1.52

WUGNAME: **Cherokee Mining**
STRATEGY: **Angelina River/ Lake Columbia**
Quantity: **1,500** AF/Y 2.01 MGD

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	12 in.	26,400	LF	$52	$1,373,000
Right of Way Easements Rural (ROW)		12.1	ACRE	$2,000	$24,000
Engineering and Contingencies (30%)					$412,000
Subtotal of Pipeline					**$1,809,000**
Pump Station(s)					
Pump with intake	115 HP	1	LS	$1,078,000	$1,078,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$377,300
Subtotal of Pump Station(s)					**$1,455,300**
Terminal Storage	**0.2 MG**	**1**	**LS**	$247,000	**$247,000**
CONSTRUCTION TOTAL					**$3,511,300**
Permitting and Mitigation					**$32,000**
Interest During Construction			**(6 months)**		**$76,000**
TOTAL COST					**$3,619,300**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$316,000
Electricity ($0.09 kWh)					$34,000
Operation & Maintenance					$55,000
Raw Water Purchase			Kgal	$0.66	$323,000
Treatment			Kgal	$0.00	$0
Total Annual Costs					**$728,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$485
Per 1,000 Gallons					$1.49
UNIT COSTS (After Amortization)					
Per Acre-Foot					$275
Per 1,000 Gallons					$0.84

Hardin County
County - Other

	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		153	306	306	306	459	459
Well Design, gpm (2*Reqd)		190	379	379	379	569	569
Supplied groundwater, MGD		0.1366	0.2732	0.2732	0.2732	0.4098	0.4098
County GW Parameters							
All. GPM/well	200						
Well Depth	800						
Cost /Well	**184200**						
No. of Wells		0.9485	1.8969	1.8969	1.8969	2.8454	2.8454
Phasing of Wells		1	1	0	0	1	0
Well Cost		$ 184,200.00	$ 184,200.00	$ -	$ -	$ 184,200.00	$ -
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	10						
Head Loss/100 feet	0.213						
Depth to Water Surface	400						
Total Head Required	491						
Total Horsepower	35						
Cost of Pipeline	**43**	$ 227,040.00	$ 227,040.00	$ -	$ -	$ 227,040.00	$ -
1 MG ground storage and elev	0	0	0		0	0	0
Total Capital Cost		$ 411,240.00	$ 411,240.00	$ -	$ -	$ 411,240.00	$ -
Engineering & Cont. (30%)		$123,372	$123,372	$0	$0	$123,372	$0
Interest During Construction		$22,276	$22,276	$0	$0	$22,276	$0
Total Cost		$556,888	$556,888	$0	$0	$556,888	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$48,552	$48,552	$0	$0	$48,552	$0
New Plus Existing		$48,552	$97,104	$48,552	$0	$48,552	$48,552
O&M Cost							
Electricity		10,430	20,859	20,859	20,859	31,289	31,289
O&M		$4,605	$9,210	$9,210	$9,210	$13,815	$13,815
Transmission Line		$2,270	$4,541	$4,541	$4,541	$6,811	$6,811
Total Annual Cost		$65,857	$131,714	$83,162	$34,610	$100,467	$100,467
Unit Cost, $/1000 gallons		$1.32	$1.32	$0.83	$0.35	$0.67	$0.67
Unit Cost, $/acft		$430.44	$430.44	$271.77	$113.11	$218.88	$218.88
							$286.96
							$0.88

Hardin County Manufacturing

	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		114	114	114	114	114	114
Well Design, gpm (2*Reqd)		141	141	141	141	141	141
Supplied groundwater, MGD		0.1018	0.1018	0.1018	0.1018	0.1018	0.1018
County GW Parameters							
All. GPM/well (200)	140						
Well Depth	700						
Cost /Well	**79920**						
No. of Wells		1.0096	1.0096	1.0096	1.0096	1.0096	1.0096
Phasing of Wells		1	0	0	0	0	0
Well Cost		$ 79,920.00	$ -	$ -	$ -	$ -	$ -
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	**6**						
Head Loss/100 feet	0.176						
Depth to Water Surface	20						
Total Head Required	109						
Total Horsepower	6						
Cost of Pipeline	**26**	$ 137,280.00	0	0	0	0	0
Booster Station and Ground							
Storage per 3 wells	$ 100,000.00	$ 100,000.00	0	0	0	0	0
Total Capital Cost		$ 317,200.00	0	0	0	0	0
Engineering & Cont. (30%)		$95,160	$0	$0	$0	$0	$0
Interest During Construction		$17,182	$0	$0	$0	$0	$0
Total Cost		$429,542	$0	$0	$0	$0	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$37,449	$0	$0	$0	$0	$0
New Plus Existing		$37,449	$37,449	$0	$0	$0	$0
O&M Cost							
Electricity		1,624	1,624	1,624	1,624	1,624	1,624
O&M		$1,998	$1,998	$1,998	$1,998	$1,998	$1,998
Transmission Line		$2,373	$2,373	$2,373	$2,373	$2,373	$2,373
Total Annual Cost		$43,444	$43,444	$5,995	$5,995	$5,995	$5,995
Unit Cost, $/1000 gallons		$1.17	$1.17	$0.16	$0.16	$0.16	$0.16

Hardin County
Irrigation

		2010	2020	2030	2040	2050	2060
Required water, af/y		1002	1002	1002	1002	1002	1002
Distribution Design, gpm (1.5*Reqd)		932	932	932	932	932	932
Supplied water, MGD		0.89	0.89	0.89	0.89	0.89	0.89
Distribution Cost							
Length Dist. Pipe	12500						
Pumping Rate, gpm	3451						
Pipe Diameter, in	20						
Head Loss/100 feet	0.18						
Depth to Water Surface	20						
Total Head Required	42.5						
Total Horsepower	53						
Cost of Pipeline per foot	$90						
Pump Station	$651,000		0				
Total Capital Cost		$1,776,000	0	0	0	0	0
Engineering & Cont. (30%)		$532,800	$0	$0	$0	$0	$0
Interest During Construction		$96,201	$0	$0	$0	$0	$0
Total Cost		$2,405,001	$0	$0	$0	$0	$0
Annual Cost							
New Debt Service,6%, 20yrs.		($209,679)	$0	$0	$0	$0	$0
New Plus Existing		($209,679)	($209,679)		$0	$0	$0
O&M Cost							
Electricity		(5,605)	(5,605)	(5,605)	(5,605)	(5,605)	(5,605)
O&M		$0	$0	$0	$0	$0	$0
Transmission Line		$0	$0	$0	$0	$0	$0
Raw Water Cost $0.25/1000 gallons		($81,636)	($81,636)	($81,636)	($81,636)	($81,636)	($81,636)
Total Annual Cost		($296,920)	($296,920)	($87,241)	($87,241)	($87,241)	($87,241)
Unit Cost, $/1000 gallons		($0.91)	($0.91)	($0.27)	($0.27)	($0.27)	($0.27)

Table
Henderson County-Other
Purchase Water from UNRMWA

Probable Owner:	County-Other				
Quantity:	500 AF/Y	0.78 MGD			

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	10 in.	26,400	LF	$43	$1,135,000
Pipeline Urban	10 in.	0	LF	$65	$0
Right of Way Easements Rural (ROW)		12.1	ACRE	$2,000	$24,000
Right of Way Easements Urban (ROW)		0.0	ACRE	$20,000	$0
Engineering and Contingencies (30%)					$341,000
Subtotal of Pipeline					**$1,500,000**
Pump Station(s)					
Pump with intake & building	30 HP	1	LS	$602,000	$602,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$210,700
Subtotal of Pump Station(s)					**$812,700**
Ground Storage					
Ground Storage Tanks at Booster	0.25 MG	1	LS	$279,000	$279,000
Engineering and Contingencies (35%)					$97,650
Subtotal of Ground Storage					**$376,650**
Surface Water Treatment					
Water treatment plant	1 MGD	1	LS	$5,800,000	$5,800,000
CONSTRUCTION TOTAL					**$8,489,350**
Permitting and Mitigation					**$94,000**
Interest During Construction			**(12 months)**		**$354,000**
TOTAL COST					**$8,937,350**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$779,000
Electricity ($0.09 kWh)					$8,000
Operation & Maintenance					$40,000
Raw Water Purchase			Kgal	$0.25	$41,000
Treatment			Kgal	$0.70	$114,000
Total Annual Costs					**$982,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,964
Per 1,000 Gallons					$6.02
UNIT COSTS (After Amortization)					
Per Acre-Foot					$406

Per 1,000 Gallons	$1.25

Table
Henderson County-Other
Install New Wells in Queen City

Owner:	County-Other	
Quantity:	500	AF/Y

Item	Size	Quantity	Unit	Unit Price	Cost
Capital Costs					
Wellfield and Treatment					
Wells	50 gpm	12	Ea.	$19,070	$228,800
Connection to Existing Distribution System		12	Ea.	$10,000	$120,000
Storage Tank (Closed)	10,000 Gal	12	Ea.	$10,050	$120,600
Engineering and Contingencies (35% for well field)					$164,300
Subtotal for Wellfield					**$633,700**
Transmission System					
Pipeline - Rural	6 inch	31,680	LF	$26	$823,700
Pipeline - Urban	6 inch	0	LF	$39	$0
Pump Station	30 HP	3	LS	$602,000	$1,806,000
Easement - Rural	15 Feet	11	AC	$2,000	$21,800
Easement - Urban	15 Feet	0	AC	$20,000	$0
Engineering and Contingencies (30% for pipleines, 35% for other items)					$879,200
Subtotal for Transmission					**$3,530,700**
TOTAL CONSTRUCTION COST					**$4,164,400**
Interest During Construction			**(6 months)**		**$90,200**
Permitting and Mitigation					**$15,500**
Groundwater Rights/ Purchase					**$150,000**
TOTAL CAPITAL COST					**$4,420,100**
Annual Costs					
Debt Service (6 percent for 20 years)					$385,400
Electricity (Transmission)					$6,000
Well operation and treatment					$48,900
Operation and Maintenance of transmission					$64,100
Total Annual Cost					**$504,400**
UNIT COSTS (Until Amortized)					
Water Cost ($ per ac-ft)					**$1,009**
Water Cost ($ per 1,000 gallons)					**$3.10**
UNIT COSTS (After Amortization)					
Water Cost ($ per ac-ft)					**$238**
Water Cost ($ per 1,000 gallons)					**$0.73**

Table
Henderson County-Other
Install New Wells in Carrizo-Wilcox

Owner: County-Other
Quantity: 50 AF/Y

Item	Size	Quantity	Unit	Unit Price	Cost
Capital Costs					
Wellfield and Treatment					
Wells	50 gpm	1	Ea.	$48,590	$48,600
Connection to Existing Distribution System		1	Ea.	$10,000	$10,000
Storage Tank (Closed)	10,000 Gal	0	Ea.	$10,050	$0
Engineering and Contingencies (35% for well field)					$20,500
Subtotal for Wellfield					**$79,100**
Transmission System					
Pipeline - Rural	6 inch	10,560	LF	$26	$274,600
Pipeline - Urban	6 inch	0	LF	$39	$0
Pump Station	2 HP	1	LS	$100,000	$100,000
Easement - Rural	15 Feet	4	AC	$2,000	$7,300
Easement - Urban	15 Feet	0	AC	$20,000	$0
Engineering and Contingencies (30% for pipleines, 35% for other items)					$117,400
Subtotal for Transmission					**$499,300**
TOTAL CONSTRUCTION COST					**$578,400**
Interest During Construction			**(6 months)**		**$12,500**
Permitting and Mitigation					**$4,000**
Groundwater Rights/ Purchase					**$15,000**
TOTAL CAPITAL COST					**$609,900**
Annual Costs					
Debt Service (6 percent for 20 years)					$53,200
Electricity (Transmission)					$500
Well operation and treatment					$4,900
Operation and Maintenance of transmission					$6,300
Total Annual Cost					**$64,900**
UNIT COSTS (Until Amortized)					
Water Cost ($ per ac-ft)					**$1,298**
Water Cost ($ per 1,000 gallons)					**$3.98**
UNIT COSTS (After Amortization)					
Water Cost ($ per ac-ft)					**$234**
Water Cost ($ per 1,000 gallons)					**$0.72**

Houston County
Irrigation

	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		766	766	766	873	1149	1149
Well Design, gpm (2*Reqd)		950	950	950	1082	1425	1425
Supplied groundwater, MGD		0.6839	0.6839	0.6839	0.7795	1.0259	1.0259
County GW Parameters							
All. GPM/well	475						
Well Depth	800						
Cost /Well	**257250**						
No. of Wells		1.9994	1.9994	1.9994	2.2787	2.9991	2.9991
Phasing of Wells		2	0	0	0	1	0
Well Cost		$ 514,500.00	$ -	$ -	$ -	$ 257,250.00	$ -
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	6						
Head Loss/100 feet	0.213						
Depth to Water Surface	400						
Total Head Required	491						
Total Horsepower	84						
Cost of Pipeline	**26**	$ 274,560.00	$ -	$ -	$ -	$ 137,280.00	$ -
1 MG ground storage and elev	0	0	0		0	0	0
Total Capital Cost		$ 789,060.00	$ -	$ -	$ -	$ 394,530.00	$ -
Engineering & Cont. (30%)		$236,718	$0	$0	$0	$118,359	$0
Interest During Construction		$42,741	$0	$0	$0	$21,371	$0
Total Cost		$1,068,519	$0	$0	$0	$534,260	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$93,158	$0	$0	$0	$46,579	$0
New Plus Existing		$93,158	$93,158	$0	$0	$46,579	$46,579
O&M Cost							
Electricity		49,541	49,541	49,541	49,541	74,311	74,311
O&M		$12,863	$12,863	$12,863	$12,863	$19,294	$19,294
Transmission Line		$2,746	$2,746	$2,746	$2,746	$4,118	$4,118
Total Annual Cost		$158,307	$158,307	$65,149	$65,149	$144,303	$144,303
Unit Cost, $/1000 gallons		$0.63	$0.63	$0.26	$0.23	$0.39	$0.39
Unit Cost, $/acft		$206.67	$206.67	$85.05	$74.63	$125.59	$125.59
							$125.59
							$0.39

Houston County
Livestock

	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		211	231	462	693	924	1180
Well Design, gpm (2*Reqd)		262	286	573	859	1146	1463
Supplied groundwater, MGD		0.1884	0.2063	0.4125	0.6188	0.8250	1.0536
County GW Parameters							
All. GPM/well	275						
Well Depth	800						
Cost /Well	**190875**						
No. of Wells		0.9513	1.0415	2.0829	3.1244	4.1658	5.3200
Phasing of Wells		1	0	1	1	1	1
Well Cost		$ 257,250.00	$ -	$ 257,250.00	$ 257,250.00	$ 257,250.00	$ 257,250.00
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	6						
Head Loss/100 feet	0.213						
Depth to Water Surface	400						
Total Head Required	491						
Total Horsepower	49						
Cost of Pipeline	**26**	$ 137,280.00	$ -	$ 137,280.00	$ 137,280.00	$ 137,280.00	$ 137,280.00
1 MG ground storage and elev	0	0	0		0	0	0
Total Capital Cost		$ 394,530.00	$ -	$ 394,530.00	$ 394,530.00	$ 394,530.00	$ 394,530.00
Engineering & Cont. (30%)		$118,359	$0	$118,359	$118,359	$118,359	$118,359
Interest During Construction		$21,371	$0	$21,371	$21,371	$21,371	$21,371
Total Cost		$534,260	$0	$534,260	$534,260	$534,260	$534,260
Annual Cost							
New Debt Service,6%, 20yrs.		$46,579	$0	$46,579	$46,579	$46,579	$46,579
New Plus Existing		$46,579	$46,579	$46,579	$93,158	$93,158	$93,158
O&M Cost							
Electricity		24,770	24,770	49,541	74,311	99,082	123,852
O&M		$6,431	$6,431	$12,863	$19,294	$25,725	$32,156
Transmission Line		$1,373	$1,373	$2,746	$4,118	$5,491	$6,864
Total Annual Cost		$79,154	$79,154	$111,728	$190,882	$223,456	$256,031
Unit Cost, $/1000 gallons		$1.15	$1.05	$0.74	$0.85	$0.74	$0.67
Unit Cost, $/acft		$375.14	$342.66	$241.84	$275.44	$241.84	$216.98

Jasper County
County - Other

Neches	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		550	550	550	550	550	550
Well Design, gpm (2*Reqd)		682	682	682	682	682	682
Supplied groundwater, MGD		0.4911	0.4911	0.4911	0.4911	0.4911	0.4911
County GW Parameters							
All. GPM/well (125)	800						
Well Depth	1600						
Cost /Well	**584100**						
No. of Wells		0.8524	0.8524	0.8524	0.8524	0.8524	0.8524
Phasing of Wells		1	0	0	0	0	0
Well Cost		584100	0	0	0	0	0
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	6						
Head Loss/100 feet	0.176						
Depth to Water Surface	1500						
Total Head Required	1589						
Total Horsepower	459						
Cost of Pipeline	**26**	$ 137,280.00	$ -	$ -	$ -	$ -	$ -
Booster Station and Ground							
Storage per 3 wells			0		0	0	0
Total Capital Cost		$ 721,380.00	$ -	$ -	$ -	$ -	$ -
Engineering & Cont. (30%)		$216,414	$0	$0	$0	$0	$0
Interest During Construction		$39,075	$0	$0	$0	$0	$0
Total Cost		$976,869	$0	$0	$0	$0	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$85,168	$0	$0	$0	$0	$0
New Plus Existing		$85,168	$85,168	$0	$0	$0	$0
O&M Cost							
Electricity		134,969	134,969	134,969	134,969	134,969	134,969
O&M		$14,603	$14,603	$14,603	$14,603	$14,603	$14,603
Transmission Line		$1,373	$1,373	$1,373	$1,373	$1,373	$1,373
Total Annual Cost		$236,113	$236,113	$150,945	$150,945	$150,945	$150,945
Unit Cost, $/1000 gallons		$1.32	$1.32	$0.84	$0.84	$0.84	$0.84
Unit Cost, $/acft		$429.30	$429.30	$274.44	$274.44	$274.44	$274.44
							$429.30
							$1.32

Sabine	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		82	82	82	82	82	82
Well Design, gpm (2*Reqd)		102	102	102	102	102	102
Supplied groundwater, MGD		0.0732	0.0732	0.0732	0.0732	0.0732	0.0732
County GW Parameters							
All. GPM/well (125)	125						
Well Depth	1600						
Cost /Well	152622						
No. of Wells		0.1271	0.1271	0.1271	0.1271	0.1271	0.1271
Phasing of Wells		1		0	0	0	0
Well Cost		153000	0	0	0	0	0
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	6						
Head Loss/100 feet	0.176						
Depth to Water Surface	1500						
Total Head Required	1589						
Total Horsepower	72						
Cost of Pipeline	26	$ 137,280.00	$ -	$ -	$ -	$ -	$ -
Booster Station and Ground							
Storage per 3 wells			0		0	0	0
Total Capital Cost		$ 290,280.00	$ -	$ -	$ -	$ -	$ -
Engineering & Cont. (30%)		$87,084	$0	$0	$0	$0	$0
Interest During Construction		$15,724	$0	$0	$0	$0	$0
Total Cost		$393,088	$0	$0	$0	$0	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$34,271	$0	$0	$0	$0	$0
New Plus Existing		$34,271	$34,271	$0	$0	$0	$0
O&M Cost							
Electricity		134,969	134,969	134,969	134,969	134,969	134,969
O&M		$3,825	$3,825	$3,825	$3,825	$3,825	$3,825
Transmission Line		$1,373	$1,373	$1,373	$1,373	$1,373	$1,373
Total Annual Cost		$174,438	$174,438	$140,167	$140,167	$140,167	$140,167
Unit Cost, $/1000 gallons		$6.53	$6.53	$5.25	$5.25	$5.25	$5.25
Unit Cost, $/acft		$2,127.30	$2,127.30	$1,709.36	$1,709.36	$1,709.36	$1,709.36
							$2,127.30
							$6.53

Jefferson County
Steam Electric

	2000	2010	2020	2030	2040	2050	2060
Required water, af/y			25951	25951	25951	25951	25951
Distribution Design, gpm (1.5*Reqd)		0	24131	24131	24131	24131	24131
Supplied water, MGD		0	23.17	23.17	23.17	23.17	23.17
Distribution Cost							
Length Dist. Pipe	25000						
Pumping Rate	18000						
Pipe Diameter, in	42						
Head Loss/100 feet	0.104						
Depth to Water Surface	20						
Total Head Required	126						
Total Horsepower	818						
Cost of Pipeline	215						
Booster Station and Ground Storage (5 MG)	$4,703,000		$10,078,000				
Total Capital Cost	$10,078,000		$10,078,000	0	0	0	0
Engineering & Cont. (30%)		$0	$3,023,400	$0	$0	$0	$0
Interest During Construction		$0	$545,896	$0	$0	$0	$0
Total Cost		$0	$13,647,296	$0	$0	$0	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$0	$1,189,833	$0	$0	$0	$0
New Plus Existing		$0	$1,189,833	$1,189,833		$0	$0
O&M Cost							
Electricity		0	430,358	430,358	430,358	430,358	430,358
O&M		$0	$117,575	$117,575	$117,575	$117,575	$117,575
Transmission Line		$0	$53,750	$53,750	$53,750	$53,750	$53,750
Raw Water Cost $0.15/1000 gallons			$1,268,587	$1,268,587	$1,268,587	$1,268,587	$1,268,587
Total Annual Cost		$0	$3,060,104	$3,060,104	$1,870,270	$1,870,270	$1,870,270
Unit Cost, $/1000 gallons			$0.36	$0.36	$0.22	$0.22	$0.22
Unit Cost, $/acft			$117.92	$117.92	$72.07	$72.07	$72.07
							$117.92
							$0.36

Mining-Jefferson

	2000	2010	2020	2030	2040		2050	2060
Required groundwater, af/y							4	9
Well Design, gpm (2*Reqd)		0	0	0	0		5.0	11
Supplied groundwater, MGD		0	0	0	0		0.0	0.0080
County GW Parameters								
All. GPM/well	11							
Well Depth	800							
Cost /Well	**76123**							
No. of Wells		0.0000	0.0000	0.0000	0.0000		0.5	1.0144
Phasing of Wells		0	0	0	0		1.0	0
Well Cost		$ -	$ -	$ -	$ -		76123.0	$ -
Distribution Cost								
Length Dist. Pipe/Well	0							
Total Length								
Pipe Diameter, in	0							
Head Loss/100 feet	0.176							
Depth to Water Surface	1500							
Total Head Required	1580							
Total Horsepower	6							
Cost of Pipeline	0	$ -	$ -	$ -	$ -	$	-	$ -
Booster Station and Ground								
Storage per 3 wells			0		0		0	0
Total Capital Cost		$ -	$ -	$ -	$ -	$	76,123.00	$ -
Engineering & Cont. (30%)		$0	$0	$0	$0		$22,837	$0
Interest During Construction		$0	$0	$0	$0		$4,123	$0
Total Cost		$0	$0	$0	$0		$103,083	$0
Annual Cost								
New Debt Service,6%, 20yrs.		$0	$0	$0	$0		$8,987	$0
New Plus Existing		$0	$0	$0	$0		$8,987	$8,987
O&M Cost								
Electricity		0	0	0	0		0	0
O&M		$0	$0	$0	$0		$1,903	$1,903
Transmission Line		$0	$0	$0	$0		$0	$0
Total Annual Cost		$0	$0	$0	$0		$10,890	$10,890
Unit Cost, $/1000 gallons								$3.71

WUGNAME:	**Nacgodoches County-Other**		
STRATEGY:	**Lake Naconiche Regional Water System - Phase 1**		
AMOUNT (ac-ft/yr):	**1,700**	3.0 MGD	

Expand Treated Water Supply	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline					
Pipeline Segment A	16 in.	13,200	LF	$69	$911,000
Pipeline Segment B	16 in.	26,400	LF	$69	$1,822,000
Pipeline Segment C	12 in.	15,840	LF	$52	$824,000
Pipeline Segment D	10 in.	21,120	LF	$43	$908,000
Pipeline Segment E	12 in.	5,280	LF	$52	$275,000
Pipeline Segment F	10 in.	36,960	LF	$43	$1,589,000
Pipeline Segment G	6 in.	29,040	LF	$26	$755,000
Subtotal of Pipeline		147,840			7,084,000
Right of Way Easements Rural (ROW)		50.9	ACRE	$2,000	$102,000
Engineering and Contingencies (30%)					$2,125,000
Subtotal of Pipeline					**$9,311,000**
Pump Station(s)					
Pump Station	375 HP	1	LS	$1,707,000	$1,707,000
Lake Intake	3.0 MGD	1	LS		$500,000
Engineering and Contingencies (35%)					$772,000
Subtotal of Pump Station(s)					**$2,979,000**
Water Treatment Plant					
Water Treatment Plant	3.0 MGD	1	LS	$10,600,000	**$10,600,000**
CONSTRUCTION TOTAL					**$22,890,000**
Permitting and Mitigation - infrastructure					**$233,000**
Water rights Permitting					**$500,000**
Interest During Construction			**(12 months)**		**$954,000**
TOTAL COST					**$24,577,000**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$2,143,000
Electricity ($0.09 kWh)					$46,000
Operation & Maintenance					$151,000
Raw Water Purchase			Kgal	$0.25	$138,000
Treatment Cost			Kgal	$0.70	$388,000
Total Annual Costs					**$2,866,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,686
Per 1,000 Gallons					$5.17
UNIT COSTS (After Amortization)					
Per Acre-Foot					$425
Per 1,000 Gallons					$1.30

WUGNAME:	**Nacogdoches Mining**				
STRATEGY:	**Angelina River/ Lake Columbia**				
Quantity:	**7,000** AF/Y		9.37 MGD		

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	36 in.	26,400	LF	$184	$4,858,000
Right of Way Easements Rural (ROW)		12.1	ACRE	$2,000	$24,000
Engineering and Contingencies (30%)					$1,457,000
Subtotal of Pipeline					**$6,339,000**
Pump Station(s)					
Pump with intake	250 HP	1	LS	$1,727,000	$1,727,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$604,450
Subtotal of Pump Station(s)					**$2,331,450**
Terminal Storage	**1.0 MG**	**1**	**LS**	$634,000	**$634,000**
CONSTRUCTION TOTAL					**$9,304,450**
Permitting and Mitigation					**$87,000**
Interest During Construction			**(6 months)**		**$202,000**
TOTAL COST					**$9,593,450**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$836,000
Electricity ($0.09 kWh)					$104,000
Operation & Maintenance					$129,000
Raw Water Purchase			Kgal	$0.66	$1,505,000
Treatment			Kgal	$0.00	$0
Total Annual Costs					**$2,574,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$368
Per 1,000 Gallons					$1.13
UNIT COSTS (After Amortization)					
Per Acre-Foot					$248
Per 1,000 Gallons					$0.76

Table
Nacogdoches County Steam Electric
Purchase Water from ANRA

Probable Owner: Nacogdoches County Steam Electric Power
Quantity: 13,400 AF/Y 17.93 MGD

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	36 in.	26,400	LF	$184	$4,858,000
Right of Way Easements Rural (ROW)		12.1	ACRE	$2,000	$24,000
Engineering and Contingencies (30%)					$1,457,000
Subtotal of Pipeline					**$6,339,000**
Pump Station(s)					
Pump with intake & building	600 HP	1	LS	$2,860,000	$2,860,000
Engineering and Contingencies (35%)					$1,001,000
Subtotal of Pump Station(s)					**$3,861,000**
CONSTRUCTION TOTAL					**$10,200,000**
Permitting and Mitigation					**$93,000**
Interest During Construction			**(12 months)**		**$425,000**
TOTAL COST					**$10,718,000**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$934,000
Electricity ($0.09 kWh)					$265,000
Operation & Maintenance					$144,000
Raw Water Purchase			Kgal	$0.66	$2,882,000
Treatment			Kgal	$0.00	$0
Total Annual Costs					**$4,225,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$315
Per 1,000 Gallons					$0.97
UNIT COSTS (After Amortization)					
Per Acre-Foot					$246
Per 1,000 Gallons					$0.75

Table
Nacogdoches County Steam Electric
Purchase Water from Houston County WCID

Probable Owner: Nacogdoches County Steam Electric Power
Quantity: 340 AF/Y 0.45 MGD

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	8 in.	26,400	LF	$34	$898,000
Right of Way Easements Rural (ROW)		12.1	ACRE	$2,000	$24,000
Engineering and Contingencies (30%)					$269,000
Subtotal of Pipeline					**$1,191,000**
Pump Station(s)					
Pump	20 HP	1	LS	$564,000	$564,000
Engineering and Contingencies (35%)					$197,400
Subtotal of Pump Station(s)					**$761,400**
CONSTRUCTION TOTAL					**$1,952,400**
Permitting and Mitigation					**$18,000**
Interest During Construction			**(6 months)**		**$42,000**
TOTAL COST					**$2,012,400**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$175,000
Electricity ($0.09 kWh)					$5,000
Operation & Maintenance					$28,000
Raw Water Purchase			Kgal	$0.50	$55,000
Treatment			Kgal	$0.00	$0
Total Annual Costs					**$263,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$774
Per 1,000 Gallons					$2.37
UNIT COSTS (After Amortization)					
Per Acre-Foot					$259
Per 1,000 Gallons					$0.79

Nacogdoches County
D&M WSC

	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		0	0	310	310	310	310
Well Design, gpm (2*Reqd)		0	0	384	384	384	384
Supplied groundwater, MGD		0.0000	0.0000	0.2768	0.2768	0.2768	0.2768
County GW Parameters							
All. GPM/well	400						
Well Depth	700						
Cost /Well	**226300**						
No. of Wells		0.0000	0.0000	0.9609	0.9609	0.9609	0.9609
Phasing of Wells			0	1	0	0	0
Well Cost		$0	$0	$226,300	$0	$0	$0
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	6						
Head Loss/100 feet	0.134						
Depth to Water Surface	1100						
Total Head Required	1187						
Total Horsepower	171						
Cost of Pipeline	**26**	$0	$0	$137,280	$0	$0	0
Ground Storage and Pressure		$0	$0	$0	$0	$0	$0
Total Capital Cost		$0	$0	$363,580	$0	$0	$0
Engineering & Cont. (30%)		$0	$0	$109,074	$0	$0	$0
Interest During Construction		$0	$0	$19,694	$0	$0	$0
Total Cost		$0	$0	$492,348	$0	$0	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$0	$0	$42,925	$0	$0	$0
New Plus Existing		$0	$0	$42,925	$42,925	$0	$0
O&M Cost							
Electricity		0	0	50,406	50,406	50,406	50,406
O&M		$0	$0	$5,658	$5,658	$5,658	$5,658
Transmission Line		$0	$0	$1,373	$1,373	$1,373	$1,373
Total Annual Cost		$0	$0	$100,361	$100,361	$57,436	$57,436
Unit Cost, $/1000 gallons			#DIV/0!	$0.99	$0.99	$0.57	$0.57
Unit Cost, $/acft				$323.75	$323.75	$185.28	$185.28
							$323.75
							0.994

Nacogdoches County
Lily Grove WSC

	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y			0	0	0	250	500
Well Design, gpm (2*Reqd)		0	0	0	0	310	620
Supplied groundwater, MGD		0.0000	0.0000	0.0000	0.0000	0.2232	0.4464
County GW Parameters							
All. GPM/well	600						
Well Depth	700						
Cost /Well	**291400**						
No. of Wells		0.0000	0.0000	0.0000	0.0000	0.5166	1.0332
Phasing of Wells			0			1	0
Well Cost		$0	$0	$0	$0	$291,400	$0
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	6						
Head Loss/100 feet	0.134						
Depth to Water Surface	1100						
Total Head Required	1187						
Total Horsepower	257						
Cost of Pipeline	**26**	$0	$0	$0	$0	$137,280	0
Ground Storage and Pressure		$0	$0	$0	$0	$0	$0
Total Capital Cost		$0	$0	$0	$0	$428,680	0
Engineering & Cont. (30%)		$0	$0	$0	$0	$128,604	$0
Interest During Construction		$0	$0	$0	$0	$23,220	$0
Total Cost		$0	$0	$0	$0	$580,504	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$0	$0	$0	$0	$50,611	$0
New Plus Existing		$0	$0	$0	$0	$50,611	$50,611
O&M Cost							
Electricity		0	0	0	0	75,609	75,609
O&M		$0	$0	$0	$0	$7,285	$7,285
Transmission Line		$0	$0	$0	$0	$1,373	$1,373
Total Annual Cost		$0	$0	$0	$0	$134,877	$134,877
Unit Cost, $/1000 gallons						$1.66	$0.83
Unit Cost, $/acft						540	270
							270
							0.83

Nacogdoches County
Swift WSC

	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		350	350	350	350	350	350
Well Design, gpm (2*Reqd)		434	434	434	434	434	434
Supplied groundwater, MGD		0.3125	0.3125	0.3125	0.3125	0.3125	0.3125
County GW Parameters							
All. GPM/well	450						
Well Depth	700						
Cost /Well	**230600**						
No. of Wells		0.9643	0.9643	0.9643	0.9643	0.9643	0.9643
Phasing of Wells		1	0	0	0	0	0
Well Cost		$230,600	$0	$0	$0	$0	$0
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	6						
Head Loss/100 feet	0.134						
Depth to Water Surface	1100						
Total Head Required	1187						
Total Horsepower	193						
Cost of Pipeline	**26**	$137,280	$0	$0	$0	$0	0
Ground Storage and Pressure		$0	$0	$0	$0	$0	$0
Total Capital Cost		$367,880	$0	$0	$0	$0	0
Engineering & Cont. (30%)		$110,364	$0	$0	$0	$0	$0
Interest During Construction		$19,927	$0	$0	$0	$0	$0
Total Cost		$498,171	$0	$0	$0	$0	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$43,433	$0	$0	$0	$0	$0
New Plus Existing		$43,433	$43,433	$0	$0	$0	$0
O&M Cost							
Electricity		56,706	56,706	56,706	56,706	56,706	56,706
O&M		$5,765	$5,765	$5,765	$5,765	$5,765	$5,765
Transmission Line		$1,373	$1,373	$1,373	$1,373	$1,373	$1,373
Total Annual Cost		$107,277	$107,277	$63,844	$63,844	$63,844	$63,844
Unit Cost, $/1000 gallons		$0.94	$0.94	$0.56	$0.56	$0.56	$0.56
Unit Cost, $/acft		$306.51	$306.51	$182.41	$182.41	$182.41	$182.41
							182
							0.560

Nacogdoches County
Livestock

	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		0	0	322	644	966	1350
Well Design, gpm (2*Reqd)		0	0	399	798	1198	1674
Supplied groundwater, MGD		0.0000	0.0000	0.2875	0.5750	0.8625	1.2054
County GW Parameters							
All. GPM/well	400						
Well Depth	700						
Cost /Well	**226300**						
No. of Wells		0.0000	0.0000	0.9981	1.9961	2.9942	4.1844
Phasing of Wells		0	0	1	1	1	1
Well Cost		$0	$0	$226,300	$226,300	$226,300	$226,300
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	6						
Head Loss/100 feet	0.134						
Depth to Water Surface	1100						
Total Head Required	1187						
Total Horsepower	171						
Cost of Pipeline	**26**	$0	$0	$137,280	$137,280	$137,280	137280
Ground Storage and Pressure		$0	$0	$0	$0	$0	$0
Total Capital Cost		$0	$0	$363,580	$363,580	$363,580	363580
Engineering & Cont. (30%)		$0	$0	$109,074	$109,074	$109,074	$109,074
Interest During Construction		$0	$0	$19,694	$19,694	$19,694	$19,694
Total Cost		$0	$0	$492,348	$492,348	$492,348	$492,348
Annual Cost							
New Debt Service,6%, 20yrs.		$0	$0	$42,925	$42,925	$42,925	$42,925
New Plus Existing		$0	$0	$42,925	$85,850	$85,850	$85,850
O&M Cost							
Electricity		0	0	50,406	100,811	151,217	201,623
O&M		$0	$0	$5,658	$11,315	$16,973	$22,630
Transmission Line		$0	$0	$1,373	$2,746	$4,118	$5,491
Total Annual Cost		$0	$0	$100,361	$200,722	$258,158	$315,594
Unit Cost, $/1000 gallons				$0.96	$0.96	$0.82	$0.72
Unit Cost, $/acft				312	312	267	234
							$233.77
							$0.72

Newton County
Manufacturing

	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		400	400	400	800	800	800
Well Design, gpm (2*Reqd)		496	496	496	992	992	992
Supplied groundwater, MGD		0.3571	0.3571	0.3571	0.7143	0.7143	0.7143
County GW Parameters							
All. GPM/well (125)	450						
Well Depth	700						
Cost /Well	**191900**						
No. of Wells		1.1021	1.1021	1.1021	2.2042	2.2042	2.2042
Phasing of Wells		1	0	0	1	0	0
Well Cost		$ 191,900.00	$ -	$ -	$ 191,900.00	$ -	$ -
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	6						
Head Loss/100 feet	0.176						
Depth to Water Surface	1500						
Total Head Required	1589						
Total Horsepower	258						
Cost of Pipeline	**26**	$ 137,280.00	$ -	$ -	$ 137,280.00	$ -	$ -
Booster Station and Ground							
Storage per 3 wells			0		0	0	0
Total Capital Cost		$ 329,180.00	$ -	$ -	$ 329,180.00	$ -	$ -
Engineering & Cont. (30%)		$98,754	$0	$0	$98,754	$0	$0
Interest During Construction		$17,831	$0	$0	$17,831	$0	$0
Total Cost		$445,765	$0	$0	$445,765	$0	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$38,864	$0	$0	$38,864	$0	$0
New Plus Existing		$38,864	$38,864	$0	$38,864	$38,864	$0
O&M Cost							
Electricity		75,920	75,920	75,920	151,841	151,841	151,841
O&M		$4,798	$4,798	$4,798	$9,595	$9,595	$9,595
Transmission Line		$1,373	$1,373	$1,373	$2,746	$2,746	$2,746
Total Annual Cost		$120,954	$120,954	$82,091	$203,045	$203,045	$164,181
Unit Cost, $/1000 gallons		$0.93	$0.93	$0.63	$0.78	$0.78	$0.63

WUGNAME:	**Newton Steam Electric Power**				
STRATEGY:	**Purchase from SRA**				
Quantity:	**15,000** AF/Y		20.07 MGD		

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	36 in.	26,400	LF	$184	$4,858,000
Right of Way Easements Rural (ROW)		12.1	ACRE	$2,000	$24,000
Engineering and Contingencies (30%)					$1,457,000
Subtotal of Pipeline					**$6,339,000**
Pump Station(s)					
Pump with intake	700 HP	1	LS	$3,021,000	$3,021,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$1,057,350
Subtotal of Pump Station(s)					**$4,078,350**
Terminal Storage	**5.0 MG**	**1**	**LS**	$1,720,000	**$1,720,000**
CONSTRUCTION TOTAL					**$12,137,350**
Permitting and Mitigation					**$115,000**
Interest During Construction			**(6 months)**		**$263,000**
TOTAL COST					**$12,515,350**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$1,091,000
Electricity ($0.09 kWh)					$255,000
Operation & Maintenance					$201,000
Raw Water Purchase			Kgal	$0.50	$2,444,000
Treatment			Kgal	$0.00	$0
Total Annual Costs					**$3,991,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$266
Per 1,000 Gallons					$0.82
UNIT COSTS (After Amortization)					
Per Acre-Foot					$193
Per 1,000 Gallons					$0.59

WUGNAME: **Orange_County-Other**
STRATEGY: **New Wells in Gulf Coast Aquifer**
AMOUNT (ac-ft/yr): **140**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**		**Cost**	
Water Well Construction		2	ea	$	61,472	$	122,943
Connection to Water System		2	ea	$	100,000	$	200,000
Subtotal						**$**	**322,943**
Engineering and Contingencies (30%)						$	96,883
Mitigation and Permitting (1%)						$	3,229
Subtotal						**$**	**423,055**
Interest During Construction						$	9,166
TOTAL CAPITAL COST						***$***	***432,222***
ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**		**Cost**	
Debt Service						$	37,683
Pipeline O&M (1%)						$	2,000
Pump O&M (2.5%)						$	3,074
Chemicals			1000 gal	$	0.30	$	13,686
Electricity						$	1,314
TOTAL ANNUAL COST w/ AMORTIZATION						***$***	***57,756***
TOTAL ANNUAL COST AFTER AMORTIZATION						$	20,073
UNIT COSTS (Until Amortized)							
Cost per acre-ft						$	413
Cost per 1000 gallons						$	1.27
UNIT COSTS (After Amortization)							
Cost per acre-ft						$	143
Cost per 1000 gallons						$	0.44

Orange County
Mauriceville

Neches	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		0	203	203	203	203	203
Well Design, gpm (2*Reqd)		0	252	252	252	252	252
Supplied groundwater, MGD		0.0000	0.1813	0.1813	0.1813	0.1813	0.1813
County GW Parameters							
All. GPM/well (125)	300						
Well Depth	1200						
Cost /Well	**269500**						
No. of Wells		0.0000	0.8390	0.8390	0.8390	0.8390	0.8390
Phasing of Wells		0	1	0	0	0	0
Well Cost		0	269500	0	0	0	0
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	6						
Head Loss/100 feet	0.176						
Depth to Water Surface	1500						
Total Head Required	1589						
Total Horsepower	172						
Cost of Pipeline	**26**	$ -	$ 137,280.00	$ -	$ -	$ -	$ -
Booster Station and Ground Storage per 3 wells			0		0	0	0
Total Capital Cost		$ -	$ 406,780.00	$ -	$ -	$ -	$ -
Engineering & Cont. (30%)		$0	$122,034	$0	$0	$0	$0
Interest During Construction		$0	$22,034	$0	$0	$0	$0
Total Cost		$0	$550,848	$0	$0	$0	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$0	$48,025	$0	$0	$0	$0
New Plus Existing		$0	$48,025	$48,025	$0	$0	$0
O&M Cost							
Electricity		0	50,614	50,614	50,614	50,614	50,614
O&M		$0	$6,738	$6,738	$6,738	$6,738	$6,738
Transmission Line		$0	$1,373	$1,373	$1,373	$1,373	$1,373
Total Annual Cost		$0	$106,749	$106,749	$58,724	$58,724	$58,724
Unit Cost, $/1000 gallons			$1.61	$1.61	$0.89	$0.89	$0.89
Unit Cost, $/acft			$525.86	$525.86	$289.28	$289.28	$289.28

Polk County
County Other

	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		208	417	624	832	832	832
Well Design, gpm (2*Reqd)		258	517	774	1032	1032	1032
Supplied groundwater, MGD		0.1857	0.3723	0.5571	0.7429	0.7429	0.7429
County GW Parameters							
All. GPM/well	260						
Well Depth	450						
Cost /Well	122690						
No. of Wells		0.9919	1.9885	2.9756	3.9675	3.9675	3.9675
Phasing of Wells		1	1	1	1		0
Well Cost		$122,690	$122,690	$122,690	$122,690	$0	$0.00
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	8						
Head Loss/100 feet	0.134						
Depth to Water Surface	20						
Total Head Required	107						
Total Horsepower	10						
Cost of Pipeline	**34**	$179,520	$179,520	$179,520	$179,520	$0	0
Ground Storage and Pressure	250000	$250,000	$250,000	$250,000	$250,000	$0	$0
Total Capital Cost		$552,210	$552,210	$552,210	$552,210	$0	0
Engineering & Cont. (30%)		$165,663	$165,663	$165,663	$165,663	$0	$0
Interest During Construction		$29,912	$29,912	$29,912	$29,912	$0	$0
Total Cost		$747,785	$747,785	$747,785	$747,785	$0	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$65,195	$65,195	$65,195	$65,195	$0	$0
New Plus Existing		$65,195	$130,391	$130,391	$130,391	$65,195	$0
O&M Cost							
Electricity		2,955	5,911	8,866	11,821	11,821	11,821
O&M		$3,067	$6,135	$9,202	$12,269	$12,269	$12,269
Transmission Line		$4,295	$8,590	$12,886	$17,181	$17,181	$17,181
Total Annual Cost		$75,513	$151,026	$161,344	$171,662	$106,466	$41,271
Unit Cost, $/1000 gallons		$1.11	$1.11	$0.79	$0.63	$0.39	$0.15
Amount Provided	63			63	126	126	126
				$2,561	$1,362	$845	$328
Unit Cost, $/acft		$363.04	$362.17	$258.56	$206.32	$127.96	$49.60
							$194
							$0.60

Polk County Manufacturing

	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y			225	225	450	450	450
Well Design, gpm (2*Reqd)		0	279	279	558	558	558
Supplied groundwater, MGD		0.0000	0.2009	0.2009	0.4018	0.4018	0.4018
County GW Parameters							
All. GPM/well (250)	300						
Well Depth	450						
Cost /Well	**126250**						
No. of Wells		0.0000	0.9299	0.9299	1.8598	1.8598	1.8598
Phasing of Wells		0	1	0	1	0	0
Well Cost		$0	$126,250	$0	$126,250	$0	$0.00
Distribution Cost							
Length Dist. Pipe/Well	2600						
Total Length							
Pipe Diameter, in	8						
Head Loss/100 feet	0.134						
Depth to Water Surface	20						
Total Head Required	103						
Total Horsepower	11						
Cost of Pipeline	**34**	$0	$88,400	$0	$88,400	$0	0
Booster Station and Ground							
Storage per 3 wells		$0	$0	$0	$0	$0	0
Total Capital Cost		$0	$214,650	$0	$214,650	$0	0
Engineering & Cont. (30%)		$0	$64,395	$0	$64,395	$0	$0
Interest During Construction		$0	$11,627	$0	$11,627	$0	$0
Total Cost		$0	$290,672	$0	$290,672	$0	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$0	$25,342	$0	$25,342	$0	$0
New Plus Existing		$0	$25,342	$25,342	$25,342	$25,342	$0
O&M Cost							
Electricity		0	3,296	3,296	6,591	6,591	6,591
O&M		$0	$3,156	$3,156	$6,313	$6,313	$6,313
Transmission Line		$0	$884	$884	$1,768	$1,768	$1,768
Total Annual Cost		$0	$32,678	$32,678	$40,014	$40,014	$14,672
Unit Cost, $/1000 gallons			$0.45	$0.45	$0.27	$0.27	$0.10

WUGNAME: **Rusk_Mining**
STRATEGY: **New Wells Queen City Aquifer**
AMOUNT (ac-ft/yr): **158**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**	
Water Well Construction		1	ea	$ 104,850	$	104,850
Pipeline Connection to Water System	6 in.	200	LF	$ 26	$	5,200
Ground Storage Tank					$	67,000
Subtotal					**$**	**177,050**
Engineering and Contingencies (30%)					$	53,115
Mitigation and Permitting (1%)					$	1,771
Subtotal					**$**	**231,936**
Interest During Construction					$	9,664
TOTAL CAPITAL COST					***$***	***241,600***

ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**	
Debt Service					$	21,064
Pipeline O&M (1%)					$	52
Pump O&M (2.5%)					$	4,296
Chemicals			1000 gal		$	-
Electricity					$	2,138
TOTAL ANNUAL COST w/ AMORTIZATION					***$***	***27,550***
TOTAL ANNUAL COST AFTER AMORTIZATION					***$***	***6,486***

UNIT COSTS (Until Amortized)		
Cost per acre-ft	$	174
Cost per 1000 gallons	$	0.54

UNIT COSTS (After Amortization)		
Cost per acre-ft	$	41
Cost per 1000 gallons	$	0.13

Table
Rusk County Steam Electric
Purchase Water from ANRA

Probable Owner:	Rusk County Steam Electric				
Quantity:	8,500 AF/Y		11.37 MGD		
CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	30 in.	26,400	LF	$145	$3,828,000
Right of Way Easements Rural (ROW)		12.1	ACRE	$2,000	$24,000
Engineering and Contingencies (30%)					$1,148,000
Subtotal of Pipeline					**$5,000,000**
Pump Station(s)					
Pump with intake & building	400 HP	1	LS	$2,387,000	$2,387,000
Engineering and Contingencies (35%)					$835,450
Subtotal of Pump Station(s)					**$3,222,450**
CONSTRUCTION TOTAL					**$8,222,450**
Permitting and Mitigation					**$75,000**
Interest During Construction			**(12 months)**		**$343,000**
TOTAL COST					**$8,640,450**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$753,000
Electricity ($0.09 kWh)					$140,000
Operation & Maintenance					$118,000
Raw Water Purchase			Kgal	$0.50	$1,385,000
Treatment			Kgal	$0.00	$0
Total Annual Costs					**$2,396,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$282
Per 1,000 Gallons					$0.86
UNIT COSTS (After Amortization)					
Per Acre-Foot					$193
Per 1,000 Gallons					$0.59

Table
Rusk County Steam Electric
Purchase Water from SRA

Probable Owner:	Rusk County Steam Electric				
Quantity:	1,500 AF/Y		2.01 MGD		
CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pump Station(s)					
Infrastructure improvements	150 HP	1	LS	$930,000	$930,000
Engineering and Contingencies (35%)					$325,500
Subtotal of Pump Station(s)					**$1,255,500**
CONSTRUCTION TOTAL					**$1,255,500**
Permitting and Mitigation					**$11,000**
Interest During Construction			**(12 months)**		**$52,000**
TOTAL COST					**$1,318,500**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$115,000
Electricity ($0.09 kWh)					$40,000
Operation & Maintenance					$28,000
Raw Water Purchase			Kgal	$0.25	$122,000
Treatment			Kgal	$0.00	$0
Total Annual Costs					**$305,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$203
Per 1,000 Gallons					$0.62
UNIT COSTS (After Amortization)					
Per Acre-Foot					$127
Per 1,000 Gallons					$0.39

Sabine County
County - Other

Neches	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		32	32	32	64	64	64
Well Design, gpm (2*Reqd)		40	40	40	79	79	79
Supplied groundwater, MGD		0.0286	0.0286	0.0286	0.0571	0.0571	0.0571
County GW Parameters							
All. GPM/well (125)	40						
Well Depth	1200						
Cost /Well	**111620**						
No. of Wells		0.9919	0.9919	0.9919	1.9837	1.9837	1.9837
Phasing of Wells		1	0	0	1	0	0
Well Cost		$ 111,620.00	$ -	$ -	$ 111,620.00	$ -	$ -
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	2						
Head Loss/100 feet	0.176						
Depth to Water Surface	1000						
Total Head Required	1089						
Total Horsepower	16						
Cost of Pipeline	**10**	$ 52,800.00	$ -	$ -	$ 52,800.00	$ -	$ -
Booster Station and Ground							
Storage per 3 wells			0		0	0	0
Total Capital Cost		$ 164,420.00	$ -	$ -	$ 164,420.00	$ -	$ -
Engineering & Cont. (30%)		$49,326	$0	$0	$49,326	$0	$0
Interest During Construction		$8,906	$0	$0	$8,906	$0	$0
Total Cost		$222,652	$0	$0	$222,652	$0	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$19,412	$0	$0	$19,412	$0	$0
New Plus Existing		$19,412	$19,412	$0	$19,412	$19,412	$0
O&M Cost							
Electricity		4,625	4,625	4,625	9,251	9,251	9,251
O&M		$2,791	$2,791	$2,791	$5,581	$5,581	$5,581
Transmission Line		$528	$528	$528	$1,056	$1,056	$1,056
Total Annual Cost		$27,356	$27,356	$7,944	$35,300	$35,300	$15,888
Unit Cost, $/1000 gallons		$2.62	$2.62	$0.76	$1.69	$1.69	$0.76
							$124.12
							$0.38

Sabine County
Livestock

Neches	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		50	50	50	100	100	100
Well Design, gpm (2*Reqd)		62	62	62	124	124	124
Supplied groundwater, MGD		0.0446	0.0446	0.0446	0.0893	0.0893	0.0893
County GW Parameters							
All. GPM/well (125)	70						
Well Depth	1200						
Cost /Well	**114410**						
No. of Wells		0.8856	0.8856	0.8856	1.7712	1.7712	1.7712
Phasing of Wells		1		0	1		
Well Cost		$ 114,410.00	$ -	$ -	$ 114,410.00	$ -	$ -
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	2						
Head Loss/100 feet	0.176						
Depth to Water Surface	1000						
Total Head Required	1089						
Total Horsepower	28						
Cost of Pipeline	**10**	$ 52,800.00	$ -	$ -	$ 52,800.00	$ -	$ -
Booster Station and Ground Storage per 3 wells			0		0	0	0
Total Capital Cost		$ 167,210.00	$ -	$ -	$ 167,210.00	$ -	$ -
Engineering & Cont. (30%)		$50,163	$0	$0	$50,163	$0	$0
Interest During Construction		$9,057	$0	$0	$9,057	$0	$0
Total Cost		$226,430	$0	$0	$226,430	$0	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$19,741	$0	$0	$19,741	$0	$0
New Plus Existing		$19,741	$19,741	$0	$19,741	$19,741	$0
O&M Cost							
Electricity		8,094	8,094	8,094	16,189	16,189	16,189
O&M		$2,860	$2,860	$2,860	$5,721	$5,721	$5,721
Transmission Line		$528	$528	$528	$1,056	$1,056	$1,056
Total Annual Cost		$31,224	$31,224	$11,483	$42,707	$42,707	$22,965
Unit Cost, $/1000 gallons		$1.92	$1.92	$0.70	$1.31	$1.31	$0.70

SBCTY-3
Sabine County - Other
Purchase Water from City of Hemphill

Probable Owner: Sabine County Other
Quantity: 100 AF/Y

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	6 in.	26,400	LF	$ 26	$686,000
Pipeline Urban	6 in.	0	LF		$0
Right of Way Easements Rural (ROW)		9.1	ACRE	$2,000	$18,000
Right of Way Easements Urban (ROW)		0.0	ACRE	$20,000	$0
Engineering and Contingencies (30%)					$206,000
Subtotal of Pipeline					**$910,000**
Pump Station(s)					
Pump	3 HP	1	LS	$60,000	$60,000
Booster Pump Station	0 HP	0	LS	$0	$0
Engineering and Contingencies (35%)					$21,000
Subtotal of Pump Station(s)					**$81,000**
CONSTRUCTION TOTAL					**$991,000**
Permitting and Mitigation					**$9,000**
Interest During Construction			**(6 months)**		**$21,000**
TOTAL COST					**$1,021,000**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$89,000
Electricity ($0.09 kWh)					$300
Operation & Maintenance					$10,000
Water Purchase Agreement with City			Kgal	$1.50	$48,900
Total Annual Costs					**$148,200**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,482
Per 1,000 Gallons					$4.55
UNIT COSTS (After Amortization)					
Per Acre-Foot					$592
Per 1,000 Gallons					$1.82

Notes: Cost for buying treated water is assumed to be $1.50 per 1,000 gallons

SBLIV-1
Sabine County Livestock
Increase Supply from Local Sources

Owner:	Sabine County Livestock
Quantity:	300 AF/Y

Item	Size	Quantity	Unit	Unit Price	Cost
Capital Costs					
Stock Ponds					
Stock Ponds	25 AF/Y	12	Ea.	$34,000	$408,000
Engineering and Contingencies					$142,800
Subtotal for Local Supply					**$550,800**
TOTAL CONSTRUCTION COST					**$550,800**
Interest During Construction			**(6 months)**		**$11,900**
Permitting and Mitigation					**$0**
TOTAL CAPITAL COST					**$562,700**
Annual Costs					
Debt Service (6 percent for 20 years)					$49,100
Total Annual Cost					**$49,100**
UNIT COSTS (Until Amortized)					
Water Cost ($ per ac-ft)					**$164**
Water Cost ($ per 1,000 gallons)					**$0.50**
UNIT COSTS (After Amortization)					
Water Cost ($ per ac-ft)					**$0**
Water Cost ($ per 1,000 gallons)					**$0.00**

SBLIV-1
San Augustine County Livestock
Increase Supply from Local Sources

Owner: San Augustine County Livestock
Quantity: 300 AF/Y

Item	Size	Quantity	Unit	Unit Price	Cost
Capital Costs					
Stock Ponds					
Stock Ponds	25 AF/Y	12	Ea.	$34,000	$408,000
Engineering and Contingencies					$142,800
Subtotal for Local Supply					**$550,800**
TOTAL CONSTRUCTION COST					**$550,800**
Interest During Construction			**(6 months)**		**$11,900**
Permitting and Mitigation					**$0**
TOTAL CAPITAL COST					**$562,700**
Annual Costs					
Debt Service (6 percent for 20 years)					$49,100
Total Annual Cost					**$49,100**
UNIT COSTS (Until Amortized)					
Water Cost ($ per ac-ft)					**$164**
Water Cost ($ per 1,000 gallons)					**$0.50**
UNIT COSTS (After Amortization)					
Water Cost ($ per ac-ft)					**$0**
Water Cost ($ per 1,000 gallons)					**$0.00**

WUGNAME:	**San Augustine Mining**				
STRATEGY:	**Angelina River**				
Quantity:	**500** AF/Y		0.67 MGD		

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	8 in.	26,400	LF	$34	$898,000
Right of Way Easements Rural (ROW)		12.1	ACRE	$2,000	$24,000
Engineering and Contingencies (30%)					$269,000
Subtotal of Pipeline					**$1,191,000**
Pump Station(s)					
Pump with intake	50 HP	1	LS	$871,000	$871,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$304,850
Subtotal of Pump Station(s)					**$1,175,850**
Terminal Storage	**0.1 MG**	**1**	**LS**	$183,000	**$183,000**
CONSTRUCTION TOTAL					**$2,549,850**
Permitting and Mitigation					**$23,000**
Interest During Construction			**(6 months)**		**$55,000**
TOTAL COST					**$2,627,850**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$229,000
Electricity ($0.09 kWh)					$11,000
Operation & Maintenance					$42,000
Raw Water Purchase			Kgal	$0.50	$81,000
Treatment			Kgal	$0.00	$0
Total Annual Costs					**$363,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$726
Per 1,000 Gallons					$2.23
UNIT COSTS (After Amortization)					
Per Acre-Foot					$268
Per 1,000 Gallons					$0.82

WUGNAME:	**San Augustine Mining**				
STRATEGY:	**Purchase from LNVA**				
Quantity:	**6,500** AF/Y		8.70 MGD		

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	30 in.	26,400	LF	$145	$3,828,000
Right of Way Easements Rural (ROW)		12.1	ACRE	$2,000	$24,000
Engineering and Contingencies (30%)					$1,148,000
Subtotal of Pipeline					**$5,000,000**
Pump Station(s)					
Pump with intake	250 HP	1	LS	$1,727,000	$1,727,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$604,450
Subtotal of Pump Station(s)					**$2,331,450**
Terminal Storage	**1.0 MG**	**1**	**LS**	$634,000	**$634,000**
CONSTRUCTION TOTAL					**$7,965,450**
Permitting and Mitigation					**$74,000**
Interest During Construction			**(6 months)**		**$173,000**
TOTAL COST					**$8,212,450**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$716,000
Electricity ($0.09 kWh)					$101,000
Operation & Maintenance					$117,000
Raw Water Purchase			Kgal	$0.50	$1,059,000
Treatment			Kgal	$0.00	$0
Total Annual Costs					**$1,993,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$307
Per 1,000 Gallons					$0.94
UNIT COSTS (After Amortization)					
Per Acre-Foot					$196
Per 1,000 Gallons					$0.60

San Augustine
Irrigation

		2010	2020	2030	2040	2050	2060
Neches							
Required groundwater, af/y		100	100	100	100	100	100
Well Design, gpm (2*Reqd)		124	124	124	124	124	124
Supplied groundwater, MGD		0.0893	0.0893	0.0893	0.0893	0.0893	0.0893
County GW Parameters							
All. GPM/well (125)	125						
Well Depth	800						
Cost /Well	**86725**						
No. of Wells		0.9919	0.9919	0.9919	0.9919	0.9919	0.9919
Phasing of Wells		1	0	0	0	0	0
Well Cost		86725	0	0	0	0	0
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	4						
Head Loss/100 feet	0.176						
Depth to Water Surface	1500						
Total Head Required	1589						
Total Horsepower	72						
Cost of Pipeline	**15**	$ 79,200.00	$ -	$ -	$ -	$ -	$ -
Booster Station and Ground							
Storage per 3 wells			0		0	0	0
Total Capital Cost		$ 165,925.00	$ -	$ -	$ -	$ -	$ -
Engineering & Cont. (30%)		$49,778	$0	$0	$0	$0	$0
Interest During Construction		$8,988	$0	$0	$0	$0	$0
Total Cost		$224,690	$0	$0	$0	$0	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$19,590	$0	$0	$0	$0	$0
New Plus Existing		$19,590	$19,590	$0	$0	$0	$0
O&M Cost							
Electricity		21,089	21,089	21,089	21,089	21,089	21,089
O&M		$2,168	$2,168	$2,168	$2,168	$2,168	$2,168
Transmission Line		$792	$792	$792	$792	$792	$792
Total Annual Cost		$43,639	$43,639	$24,049	$24,049	$24,049	$24,049
Unit Cost, $/1000 gallons		$1.34	$1.34	$0.74	$0.74	$0.74	$0.74
							$436.39

$1.34

San Augustine
Manufacturing

	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		2	3	4	5	6	7.25
Well Design, gpm (2*Reqd)		2	4	5	6	7	9
Supplied groundwater, MGD		0.0018	0.0027	0.0036	0.0045	0.0054	0.0065
County GW Parameters							
All. GPM/well (125)	10						
Well Depth	800						
Cost /Well	**76030**						
No. of Wells		0.2480	0.3720	0.4959	0.6199	0.7439	0.8989
Phasing of Wells		1	0	0	0	0	0
Well Cost		$ 76,030.00	$ -	$ -	$ -	$ -	$ -
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	2						
Head Loss/100 feet	0.176						
Depth to Water Surface	1500						
Total Head Required	1589						
Total Horsepower	6						
Cost of Pipeline	**10**	$ 52,800.00	$ -	$ -	$ -	$ -	$ -
Booster Station and Ground Storage per 3 wells			0		0	0	0
Total Capital Cost		$ 128,830.00	$ -	$ -	$ -	$ -	$ -
Engineering & Cont. (30%)		$38,649	$0	$0	$0	$0	$0
Interest During Construction		$6,978	$0	$0	$0	$0	$0
Total Cost		$174,457	$0	$0	$0	$0	$0
Annual Cost							
New Debt Service,6%, 30yrs.		($12,674)	$0	$0	$0	$0	$0
New Plus Existing		($12,674)	($12,674)	($12,674)	$0	$0	$0
O&M Cost							
Electricity		(1,687)	(1,687)	(1,687)	(1,687)	(1,687)	(1,687)
O&M		($1,901)	($1,901)	($1,901)	($1,901)	($1,901)	($1,901)
Transmission Line		($528)	($528)	($528)	($528)	($528)	($528)
Total Annual Cost		($16,790)	($16,790)	($16,790)	($4,116)	($4,116)	($4,116)
Unit Cost, $/1000 gallons		($25.76)	($17.17)	($12.88)	($2.53)	($2.10)	($1.74)

San Augustine
County Other

Neches	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		1	0	0	0	0	13
Well Design, gpm (2*Reqd)		1	0	0	0	0	16
Supplied groundwater, MGD		0.0009	0.0000	0.0000	0.0000	0.0000	0.0116
County GW Parameters							
All. GPM/well (125)	20						
Well Depth	800						
Cost /Well	**76960**						
No. of Wells		0.0620	0.0000	0.0000	0.0000	0.0000	0.8059
Phasing of Wells		0	0	0	0	0	1
Well Cost		$ -	$ -	$ -	$ -	$ -	$ 76,960.00
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	2						
Head Loss/100 feet	0.176						
Depth to Water Surface	1500						
Total Head Required	1589						
Total Horsepower	11						
Cost of Pipeline	**10**	$ -	$ -	$ -	$ -	$ -	$ 52,800.00
Booster Station and Ground							
Storage per 3 wells			0		0	0	0
Total Capital Cost		$ -	$ -	$ -	$ -	$ -	$129,760.00
Engineering & Cont. (30%)		$0	$0	$0	$0	$0	$38,928
Interest During Construction		$0	$0	$0	$0	$0	$7,029
Total Cost		$0	$0	$0	$0	$0	$175,717
Annual Cost							
New Debt Service,6%, 30yrs.		$0	$0	$0	$0	$0	($12,766)
New Plus Existing		$0	$0	$0	$0	$0	($12,766)
O&M Cost							
Electricity		0	0	0	0	0	(3,374)
O&M		$0	$0	$0	$0	$0	($1,924)
Transmission Line		$0	$0	$0	$0	$0	($528)
Total Annual Cost		$0	$0	$0	$0	$0	($18,592)
Unit Cost, $/1000 gallons							($4.39)

San Augustine
Livestock

Neches	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		150	150	250	300	400	400
Well Design, gpm (2*Reqd)		186	186	310	372	496	496
Supplied groundwater, MGD		0.1339	0.1339	0.2232	0.2679	0.3571	0.3571
County GW Parameters							
All. GPM/well (125)	130						
Well Depth	800						
Cost /Well	**87190**						
No. of Wells		1.4306	1.4306	2.3843	2.8612	3.8149	3.8149
Phasing of Wells		1		1		1	
Well Cost		$ 87,190.00	$ -	$ 87,190.00	$ -	$ 87,190.00	$ -
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	2						
Head Loss/100 feet	0.176						
Depth to Water Surface	1500						
Total Head Required	1589						
Total Horsepower	75						
Cost of Pipeline	**10**	$ 52,800.00	$ -	$ 52,800.00	$ -	$ 52,800.00	$ -
Booster Station and Ground							
Storage per 3 wells			0		0	0	0
Total Capital Cost		$ 139,990.00	$ -	$ 139,990.00	$ -	$ 139,990.00	$ -
Engineering & Cont. (30%)		$41,997	$0	$41,997	$0	$41,997	$0
Interest During Construction		$7,583	$0	$7,583	$0	$7,583	$0
Total Cost		$189,570	$0	$189,570	$0	$189,570	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$16,528	$0	$16,528	$0	$16,528	$0
New Plus Existing		$16,528	$16,528	$16,528	$16,528	$16,528	$16,528
O&M Cost							
Electricity		21,933	21,933	43,865	43,865	65,798	65,798
O&M		$2,180	$2,180	$4,360	$4,360	$6,539	$6,539
Transmission Line		$528	$528	$1,056	$1,056	$1,584	$1,584
Total Annual Cost		$41,168	$41,168	$65,808	$65,808	$90,448	$90,448
Unit Cost, $/1000 gallons		$0.84	$0.84	$0.81	$0.67	$0.69	$0.69

SHCTY-2
Shelby County Other
Increase Supply from Carrizo-Wilcox Aquifer

Owner:	Shelby County Other	
Quantity:	350	AF/Y

Item	Size		Quantity	Unit	Unit Price	Cost
Capital Costs						
Wellfield and Treatment						
Wells	150	gpm	3	Ea.	$80,964	$242,900
Connection to Pump Station			3	Ea.	$20,000	$60,000
Storage Tank (Closed)	25,000	Gal	3	Ea.	$20,000	$60,000
Engineering and Contingencies (35% for well field)						$127,000
Subtotal for Wellfield and Treatment						**$489,900**
Transmission System						
Pipeline - Rural	6	inch	26,400	LF	$26	$686,400
Pipeline - Urban	6	inch	0	LF	$39	$0
Pump Station	22.0	HP	1	LS	$575,000	$575,000
Easement - Rural	15	Feet	9	AC	$2,000	$18,200
Easement - Urban	15	Feet	0	AC	$20,000	$0
Engineering and Contingencies (30% for pipleines, 35% for other items)						$407,200
Subtotal for Transmission						**$1,686,800**
TOTAL CONSTRUCTION COST						**$2,176,700**
Interest During Construction				**(6 months)**		**$36,600**
Permitting and Mitigation						**$12,600**
Groundwater Rights/ Purchase						**$52,500**
TOTAL CAPITAL COST						**$2,278,400**
Annual Costs						
Debt Service (6 percent for 20 years)						$198,600
Electricity (Transmission)						$16,797
Well operation and treatment				Kgal	$0.30	$34,200
Operation and Maintenance of transmission						$25,500
Total Annual Cost						**$275,097**
UNIT COSTS (Until Amortized)						
Water Cost ($ per ac-ft)						**$786**
Water Cost ($ per 1,000 gallons)						**$2.41**
UNIT COSTS (After Amortization)						
Water Cost ($ per ac-ft)						**$219**
Water Cost ($ per 1,000 gallons)						**$0.67**

SHCTY-3
Shelby County - Other
Purchase Water from Sabine River Authority

Probable Owner: Shelby County Other
Quantity: 150 AF/Y

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	6 in.	26,400	LF	$26	$686,000
Pipeline Urban	6 in.	0	LF	$39	$0
Right of Way Easements Rural (ROW)		9.1	ACRE	$2,000	$18,000
Right of Way Easements Urban (ROW)		0.0	ACRE	$20,000	$0
Engineering and Contingencies (30%)					$206,000
Subtotal of Pipeline					**$910,000**
Pump Station(s)					
Pump Station and Intake	8 HP	1	LS	$529,000	$529,000
Booster Pump Station	0 HP	0	LS	$0	$0
Engineering and Contingencies (35%)					$185,150
Subtotal of Pump Station(s)					**$714,150**
Surface Water Treatment					
Water treatment plant	0.25 MGD	1	LS	$1,250,000	$1,250,000
CONSTRUCTION TOTAL					**$2,874,150**
Permitting and Mitigation					**$30,000**
Interest During Construction			**(12 months)**		**$120,000**
TOTAL COST					**$3,024,150**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$263,700
Electricity ($0.09 kWh)					$1,100
Operation & Maintenance					$24,000
Water Purchase Agreement with SRA			Kgal	$0.50	$24,400
Treatment Costs			Kgal	$0.70	$34,200
Total Annual Costs					**$347,400**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$2,316
Per 1,000 Gallons					$7.10
UNIT COSTS (After Amortization)					
Per Acre-Foot					$558
Per 1,000 Gallons					$1.01

Notes: Cost for buying treated water is assumed to be $1.50 per 1,000 gallons

SHLIV-1
Shelby County Livestock
Increase Supply from Carrizo-Wilcox Aquifer (Sabine Basin)

Owner: Shelby County Livestock
Quantity: 2,000 AF/Y

Item	Size	Quantity	Unit	Unit Price	Cost
Capital Costs					
Wellfield and Treatment					
Wells	300 gpm	8	Ea.	$72,331	$578,600
Engineering and Contingencies (35% for well field)					$202,500
Subtotal for Wellfield and Treatment					**$781,100**
Transmission System	**ASSUME NO NEW TRANSMISSION**				
TOTAL CONSTRUCTION COST					**$781,100**
Interest During Construction			**(2 months)**		**$6,500**
Permitting and Mitigation					**$0**
Groundwater Rights/ Purchase					**$600,000**
TOTAL CAPITAL COST					**$1,387,600**
Annual Costs					
Debt Service (6 percent for 20 years)					$121,000
Electricity				$0.09	$92,000
Total Annual Cost					**$213,000**
UNIT COSTS (Until Amortized)					
Water Cost ($ per ac-ft)					**$107**
Water Cost ($ per 1,000 gallons)					**$0.33**
UNIT COSTS (After Amortization)					
Water Cost ($ per ac-ft)					**$46**
Water Cost ($ per 1,000 gallons)					**$0.14**

SHLIV-1
Shelby County Livestock
Increase Supply from Carrizo-Wilcox Aquifer (Neches Basin)

Owner:	Shelby County Livestock
Quantity:	1,500 AF/Y

Item	Size	Quantity	Unit	Unit Price	Cost
Capital Costs					
Wellfield and Treatment					
Wells	300 gpm	6	Ea.	$72,331	$434,000
Engineering and Contingencies (35% for well field)					$151,900
Subtotal for Wellfield and Treatment					**$585,900**
Transmission System	**ASSUME NO NEW TRANSMISSION**				
TOTAL CONSTRUCTION COST					**$585,900**
Interest During Construction			**(2 months)**		**$4,900**
Permitting and Mitigation					**$0**
Groundwater Rights/ Purchase					**$450,000**
TOTAL CAPITAL COST					**$1,040,800**
Annual Costs					
Debt Service (6 percent for 20 years)					$90,700
Electricity				$0.09	$69,000
Total Annual Cost					**$159,700**
UNIT COSTS (Until Amortized)					
Water Cost ($ per ac-ft)					**$106**
Water Cost ($ per 1,000 gallons)					**$0.33**
UNIT COSTS (After Amortization)					
Water Cost ($ per ac-ft)					**$46**
Water Cost ($ per 1,000 gallons)					**$0.14**

SHLIV-2
Shelby County - Livestock
Purchase Water from Toledo Bend Reservoir

Probable Owner: Shelby County Livestock
Quantity: 4,000 AF/Y

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	20 in.	26,400	LF	$90	$2,376,000
Pipeline Urban	20 in.	0	LF	$135	$0
Right of Way Easements Rural (ROW)		12.1	ACRE	$2,000	$24,000
Right of Way Easements Urban (ROW)		0.0	ACRE	$20,000	$0
Engineering and Contingencies (30%)					$713,000
Subtotal of Pipeline					**$3,113,000**
Pump Station(s)					
Pump with intake & building	110 HP	1	LS	$1,052,000	$1,052,000
Booster Pump Station	0 HP	0	LS	$0	$0
Engineering and Contingencies (35%)					$368,200
Subtotal of Pump Station(s)					**$1,420,200**
CONSTRUCTION TOTAL					**$4,533,200**
Permitting and Mitigation					**$41,000**
Interest During Construction			**(12 months)**		**$189,000**
TOTAL COST					**$4,763,200**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$415,000
Electricity ($0.09 kWh)				$0.09	$49,000
Operation & Maintenance					$61,000
Raw Water Purchase			Kgal	$0.50	$652,000
Total Annual Costs					**$1,177,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of raw water					$294
Per 1,000 Gallons					$0.90
UNIT COSTS (After Amortization)					
Per Acre-Foot					$191
Per 1,000 Gallons					$0.58

SALIV-1
Shelby County Livestock
Increase Supply from Local Sources

Owner:	Shelby County Livestock
Quantity:	500 AF/Y

Item	Size	Quantity	Unit	Unit Price	Cost
Capital Costs					
Stock Ponds					
Stock Ponds	50 AF/Y	10	Ea.	$50,000	$500,000
Engineering and Contingencies					$175,000
Subtotal for Local Supply					**$675,000**
TOTAL CONSTRUCTION COST					**$675,000**
Interest During Construction			**(6 months)**		**$14,600**
Permitting and Mitigation					**$0**
TOTAL CAPITAL COST					**$689,600**
Annual Costs					
Debt Service (6 percent for 20 years)					$60,100
Total Annual Cost					**$60,100**
UNIT COSTS (Until Amortized)					
Water Cost ($ per ac-ft)					**$120**
Water Cost ($ per 1,000 gallons)					**$0.37**
UNIT COSTS (After Amortization)					
Water Cost ($ per ac-ft)					**$0**
Water Cost ($ per 1,000 gallons)					**$0.00**

WUGNAME:	**Shelby Mining**				
STRATEGY:	**Angelina River**				
Quantity:	**250** AF/Y		0.33 MGD		

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	6 in.	10,560	LF	$26	$275,000
Right of Way Easements Rural (ROW)		4.8	ACRE	$2,000	$10,000
Engineering and Contingencies (30%)					$83,000
Subtotal of Pipeline					**$368,000**
Pump Station(s)					
Pump with intake	15 HP	1	LS	$744,000	$744,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$260,400
Subtotal of Pump Station(s)					**$1,004,400**
Terminal Storage	**0.05 MG**	**1**	**LS**	$125,000	**$125,000**
CONSTRUCTION TOTAL					**$1,497,400**
Permitting and Mitigation					**$14,000**
Interest During Construction			**(6 months)**		**$32,000**
TOTAL COST					**$1,543,400**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$135,000
Electricity ($0.09 kWh)					$4,000
Operation & Maintenance					$29,000
Raw Water Purchase			Kgal	$0.50	$41,000
Treatment			Kgal	$0.00	$0
Total Annual Costs					**$209,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$836
Per 1,000 Gallons					$2.56
UNIT COSTS (After Amortization)					
Per Acre-Foot					$296
Per 1,000 Gallons					$0.91

WUGNAME:	**Shelby Mining**					
STRATEGY:	**Purchase from SRA**					
Quantity:	**1,250** AF/Y			1.67 MGD		

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	14 in.	26,400	LF	$60	$1,584,000
Right of Way Easements Rural (ROW)		12.1	ACRE	$2,000	$24,000
Engineering and Contingencies (30%)					$475,000
Subtotal of Pipeline					**$2,083,000**
Pump Station(s)					
Pump with intake	60 HP	1	LS	$897,000	$897,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$313,950
Subtotal of Pump Station(s)					**$1,210,950**
Terminal Storage	**0.5 MG**	**1**	**LS**	$438,000	**$438,000**
CONSTRUCTION TOTAL					**$3,731,950**
Permitting and Mitigation					**$35,000**
Interest During Construction			**(6 months)**		**$81,000**
TOTAL COST					**$3,847,950**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$335,000
Electricity ($0.09 kWh)					$21,000
Operation & Maintenance					$59,000
Raw Water Purchase			Kgal	$0.50	$204,000
Treatment			Kgal	$0.00	$0
Total Annual Costs					**$619,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$495
Per 1,000 Gallons					$1.52
UNIT COSTS (After Amortization)					
Per Acre-Foot					$227
Per 1,000 Gallons					$0.70

SMITH COUNTY

Bullard

	2000	2010	2020	2030	2040	2050	2060	
Required groundwater, af/y			13	42	71	124	195	
Well Design, gpm (2*Reqd)		0	16	52	88	154	242	
Supplied groundwater, MGD		0.0000	0.0116	0.0375	0.0634	0.1107	0.1741	
County GW Parameters								
All. GPM/well	125							
Well Depth	800							
Cost /Well	86725							
No. of Wells		0	0.1289429	0.4165848	0.7042266	1.2299169	1.9341436	
Phasing of Wells			1			1		
Well Cost		$0	$86,725	$0	$0	$86,725	$0.00	$173,450
Distribution Cost								
Length Dist. Pipe/Well	5280							
Total Length								
Pipe Diameter, in	6							
Head Loss/100 feet	0.132							
Depth to Water Surface	800							
Total Head Required	887							
Total Horsepower	40							
Cost of Pipeline	26	$0	$137,280	$0	$0	$137,280	0	$274,560
Ground Storage and Pressure	0	$0	$0	$0	$0	$0	$0	
Total Capital Cost		$0	$224,005	$0	$0	$224,005	0	448010
Engineering & Cont. (30%)		$0	$67,202	$0	$0	$67,202	$0	$134,403
Interest During Construction		$0	$12,134	$0	$0	$12,134	$0	$24,267
Total Cost		$0	$303,340	$0	$0	$303,340	$0	$606,680
Annual Cost								
New Debt Service,6%, 30yrs.		$0	($22,037)	$0	$0	($22,037)	$0	($44,075)
New Plus Existing		$0	($22,037)	($22,037)	($22,037)	($22,037)	($22,037)	
O&M Cost								
Electricity		0	(7,846)	(7,846)	(7,846)	(15,693)	(15,693)	
O&M		$0	($2,168)	($2,168)	($2,168)	($4,336)	($4,336)	
Transmission Line		$0	($1,373)	($1,373)	($1,373)	($2,746)	($2,746)	
Total Annual Cost		$0	($33,425)	($33,425)	($33,425)	($44,812)	($44,812)	
Unit Cost, $/1000 gallons			($7.89)	($2.44)	($1.44)	($1.11)	($0.71)	

Community Water Co.

	2000	2010	2020	2030	2040	2050	2060	
Required groundwater, af/y		37	88	111	132	171	227	
Well Design, gpm (2*Reqd)		46	109	138	164	212	281	
Supplied groundwater, MGD		0.0330	0.0786	0.0991	0.1179	0.1527	0.2027	
County GW Parameters								
All. GPM/well	150							
Well Depth	1000							
Cost /Well	105450							
No. of Wells		0.3058261	0.7273702	0.9174784	1.0910553	1.4134126	1.8762846	
Phasing of Wells		1					1	
Well Cost		$105,450	$0	$0	$0	$0	$105,450	$210,900
Distribution Cost								
Length Dist. Pipe/Well	5280							
Total Length								
Pipe Diameter, in	6							
Head Loss/100 feet	0.226							
Depth to Water Surface	20							
Total Head Required	112							
Total Horsepower	6							
Cost of Pipeline	26	$137,280	$0	$0	$0	$0	137280	$274,560
Ground Storage and Pressure	200000	$200,000	$0	$0	$0	$0	$200,000	
Total Capital Cost		$442,730	$0	$0	$0	$0	442730	485460
Engineering & Cont. (30%)		$132,819	$0	$0	$0	$0	$132,819	$145,638
Interest During Construction		$23,981	$0	$0	$0	$0	$23,981	$26,296
Total Cost		$599,530	$0	$0	$0	$0	$599,530	$657,394
Annual Cost								
New Debt Service,6%, 30yrs.		($43,555)	$0	$0	$0	$0	($43,555)	($47,759)
New Plus Existing		($43,555)	($43,555)	($43,555)	$0	$0	($43,555)	
O&M Cost								
Electricity		(1,188)	(1,188)	(1,188)	(1,188)	(1,188)	(2,376)	-7793.28221
O&M		($2,636)	($2,636)	($2,636)	($2,636)	($2,636)	($5,273)	-3060.4
Transmission Line		($3,373)	($3,373)	($3,373)	($3,373)	($3,373)	($6,746)	-3168
Total Annual Cost		($50,753)	($50,753)	($50,753)	($7,197)	($7,197)	($57,950)	($61,781)
Unit Cost, $/1000 gallons		($4.21)	($1.77)	($1.40)	($0.17)	($0.13)	($0.78)	
Amount Provided								

Jackson WSC

	2000	2010	2020	2030	2040	2050	2060	
Required groundwater, af/y						28	68	
Well Design, gpm (2*Reqd)		0	0	0	0	35	84	
Supplied groundwater, MGD		0.0000	0.0000	0.0000	0.0000	0.0250	0.0607	
County GW Parameters								
All. GPM/well	85							
Well Depth	900							
Cost /Well	91205							
No. of Wells		0	0	0	0	0.4084164	0.9918685	
Phasing of Wells						1		
Well Cost		$0	$0	$0	$0	$91,205	$0.00	$91,205
Distribution Cost								
Length Dist. Pipe/Well	5280							
Total Length								
Pipe Diameter, in	6							
Head Loss/100 feet	0.062							
Depth to Water Surface	20							
Total Head Required	103							
Total Horsepower	3							
Cost of Pipeline	26	$0	$0	$0	$0	$137,280	0	$137,280
Ground Storage and Pressure	250000	$0	$0	$0	$0	$250,000	$0	
Total Capital Cost		$0	$0	$0	$0	$478,485	0	228485
Engineering & Cont. (30%)		$0	$0	$0	$0	$143,546	$0	$68,546
Interest During Construction		$0	$0	$0	$0	$25,918	$0	$12,376
Total Cost		$0	$0	$0	$0	$647,949	$0	$309,407
Annual Cost								
New Debt Service,6%, 30yrs.		$0	$0	$0	$0	($47,073)	$0	($22,478)
New Plus Existing		$0	$0	$0	$0	($47,073)	($47,073)	
O&M Cost								
Electricity		0	0	0	0	(621)	(621)	-7793.28221
O&M		$0	$0	$0	$0	($2,280)	($2,280)	-3060.4
Transmission Line		$0	$0	$0	$0	($3,873)	($3,873)	-3168
Total Annual Cost		$0	$0	$0	$0	($53,847)	($53,847)	($36,500)
Unit Cost, $/1000 gallons						($5.90)	($2.43)	
Amount Provided								

Lindale

	2000	2010	2020	2030	2040	2050	2060	
Required groundwater, af/y					8	33	59	
Well Design, gpm (2*Reqd)		0	0	0	10	41	73	
Supplied groundwater, MGD		0.0000	0.0000	0.0000	0.0071	0.0295	0.0527	
County GW Parameters								
All. GPM/well	60							
Well Depth	1200							
Cost /Well	113480							
No. of Wells		0	0	0	0.1653114	0.6819096	1.2191717	
Phasing of Wells							1	
Well Cost		$0	$0	$0	$0	$0	$113,480	$113,480
Distribution Cost								
Length Dist. Pipe/Well	5280							
Total Length								
Pipe Diameter, in	6							
Head Loss/100 feet	0.062							
Depth to Water Surface	1100							
Total Head Required	1183							
Total Horsepower	26							
Cost of Pipeline	26	$0	$0	$0	$0	$0	137280	$137,280
Ground Storage and Pressure		$0	$0	$0	$0	$0	$0	
Total Capital Cost		$0	$0	$0	$0	$0	250760	250760
Engineering & Cont. (30%)		$0	$0	$0	$0	$0	$75,228	$75,228
Interest During Construction		$0	$0	$0	$0	$0	$13,583	$13,583
Total Cost		$0	$0	$0	$0	$0	$339,571	$339,571
Annual Cost								
New Debt Service,6%, 30yrs.		$0	$0	$0	$0	$0	($24,669)	($24,669)
New Plus Existing		$0	$0	$0	$0	$0	($24,669)	
O&M Cost								
Electricity		0	0	0	0	0	(5,024)	-7793.28221
O&M		$0	$0	$0	$0	$0	($2,837)	-3060.4
Transmission Line		$0	$0	$0	$0	$0	($1,373)	-3168
Total Annual Cost		$0	$0	$0	$0	$0	($33,904)	($38,691)
Unit Cost, $/1000 gallons					$0.00	$0.00	($1.76)	
Amount Provided								

Lindale Rural WSC

	2000	2010	2020	2030	2040	2050	2060	
Required groundwater, af/y							74	
Well Design, gpm (2*Reqd)		0	0	0	0	0	92	
Supplied groundwater, MGD		0.0000	0.0000	0.0000	0.0000	0.0000	0.0661	
County GW Parameters								
All. GPM/well	100							
Well Depth	1200							
Cost /Well	117200							
No. of Wells		0	0	0	0	0	0.9174784	
Phasing of Wells							1	
Well Cost		$0	$0	$0	$0	$0	$117,200	$117,200
Distribution Cost								
Length Dist. Pipe/Well	5280							
Total Length								
Pipe Diameter, in	6							
Head Loss/100 feet	0.094							
Depth to Water Surface	1100							
Total Head Required	1185							
Total Horsepower	43							
Cost of Pipeline	26	$0	$0	$0	$0	$0	137280	$137,280
Ground Storage and Pressure		$0	$0	$0	$0	$0	$0	
Total Capital Cost		$0	$0	$0	$0	$0	254480	254480
Engineering & Cont. (30%)		$0	$0	$0	$0	$0	$76,344	$76,344
Interest During Construction		$0	$0	$0	$0	$0	$13,784	$13,784
Total Cost		$0	$0	$0	$0	$0	$344,608	$344,608
Annual Cost								
New Debt Service,6%, 30yrs.		$0	$0	$0	$0	$0	($25,035)	($25,035)
New Plus Existing		$0	$0	$0	$0	$0	($25,035)	
O&M Cost								
Electricity		0	0	0	0	0	(8,386)	-7793.28221
O&M		$0	$0	$0	$0	$0	($2,930)	-3060.4
Transmission Line		$0	$0	$0	$0	$0	($1,373)	-3168
Total Annual Cost		$0	$0	$0	$0	$0	($37,724)	($39,057)
Unit Cost, $/1000 gallons							($1.56)	
Amount Provided								

Smith County Irrigation

	2000	2010	2020	2030	2040	2050	2060	
Required groundwater, af/y		5	34	65	96	128	162	
Well Design, gpm (2*Reqd)		6	42	81	119	159	201	
Supplied groundwater, MGD		0.0045	0.0304	0.0580	0.0857	0.1143	0.1446	
County GW Parameters								
All. GPM/well	50							
Well Depth	500							
Cost /Well	55150							
No. of Wells		0.1239836	0.8430882	1.6117863	2.3804844	3.1739792	4.0170674	
Phasing of Wells		1		1	1	1		
Well Cost		$55,150	$0	$55,150	$55,150	$55,150	$0.00	$220,600
Distribution Cost								
Length Dist. Pipe/Well	400							
Total Length								
Pipe Diameter, in	6							
Head Loss/100 feet	0.027							
Depth to Water Surface	500							
Total Head Required	580							
Total Horsepower	10							
Cost of Pipeline	26	$10,400	$0	$10,400	$10,400	$10,400	0	$41,600
Ground Storage and Pressure		$0	$0	$0	$0	$0	$0	
Total Capital Cost		$65,550	$0	$65,550	$65,550	$65,550	0	262200
Engineering & Cont. (30%)		$19,665	$0	$19,665	$19,665	$19,665	$0	$78,660
Interest During Construction		$3,551	$0	$3,551	$3,551	$3,551	$0	$14,203
Total Cost		$88,766	$0	$88,766	$88,766	$88,766	$0	$355,063
Annual Cost								
New Debt Service,6%, 30yrs.		($6,449)	$0	($6,449)	($6,449)	($6,449)	$0	($25,795)
New Plus Existing		($6,449)	($6,449)	($12,897)	($12,897)	($19,346)	($12,897)	
O&M Cost								
Electricity		(2,053)	(2,053)	(4,105)	(6,158)	(8,211)	(8,211)	-7793.28221
O&M		($1,379)	($1,379)	($2,758)	($4,136)	($5,515)	($5,515)	-3060.4
Transmission Line		($104)	($104)	($208)	($312)	($416)	($416)	-3168
Total Annual Cost		($9,984)	($9,984)	($19,968)	($23,504)	($33,488)	($27,039)	($39,817)
Unit Cost, $/1000 gallons		($6.13)	($0.90)	($0.94)	($0.75)	($0.80)	($0.51)	
Amount Provided								

WUGNAME: **Smith_Bullard Phase 1**
STRATEGY: **New Wells Carrizo-Wilcox Aquifer**
AMOUNT (ac-ft/yr): **100**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Water Well Construction		1	ea	$ 86,725	$ 86,725
Pipeline Connection to Water System	6 in.	5280	ea	$ 26	$ 137,280
Subtotal					**$ 224,005**
Engineering and Contingencies (30%)					$ 67,202
Mitigation and Permitting (1%)					$ 2,240
Subtotal					**$ 293,447**
Interest During Construction					$ 12,227
TOTAL CAPITAL COST					***$ 305,674***

ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Debt Service					$ 26,650
Pipeline O&M (1%)					$ 1,373
Pump O&M (2.5%)					$ 2,168
Chemicals			1000 gal	$ 0.30	$ 9,776
Electricity					$ 11,770
TOTAL ANNUAL COST w/ AMORTIZATION					***$ 51,736***
TOTAL ANNUAL COST AFTER AMORTIZATION					***$ 25,086***

UNIT COSTS (Until Amortized)	
Cost per acre-ft	$ 517
Cost per 1000 gallons	$ 1.59

UNIT COSTS (After Amortization)	
Cost per acre-ft	$ 251
Cost per 1000 gallons	$ 0.77

WUGNAME: **Smith_Community Water Company**
STRATEGY: **Purchase Water From the City of Tyler**
AMOUNT (ac-ft/yr): **227**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Pipeline Connection to Water System	6 in.	26400	ea	$ 26	$ 686,400
Booster Pump Station	5 HP	1	ea	$ 516,000	$ 516,000
Subtotal					**$ 1,202,400**
Engineering and Contingencies (30%)					$ 360,720
Mitigation and Permitting (1%)					$ 12,024
Subtotal					**$ 1,575,144**
Interest During Construction					$ 65,632
TOTAL CAPITAL COST					***$ 1,640,776***
ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Debt Service					$ 143,050
Pipeline O&M (1%)					$ 6,864
Pump O&M (2.5%)					$ 17,160
Chemicals			1000 gal		$ -
Electricity					$ 6,582
Treated Water Purchase		73,968	1000 gal	$ 3.00	$ 221,905
TOTAL ANNUAL COST w/ AMORTIZATION					***$ 395,561***
TOTAL ANNUAL COST AFTER AMORTIZATION					***$ 252,511***
UNIT COSTS (Until Amortized)					
Cost per acre-ft					$ 1,743
Cost per 1000 gallons					$ 5.35
UNIT COSTS (After Amortization)					
Cost per acre-ft					$ 1,112
Cost per 1000 gallons					$ 3.41

WUGNAME: Smith_Lindale WSC
STRATEGY: New Wells Carrizo-Wilcox Aquifer
AMOUNT (ac-ft/yr): 80

CAPITAL COSTS	Size	Quantity	Units	Unit Price	Cost	
Water Well Construction		1	ea	$ 117,200	$	117,200
Pipeline Connection to Water System	6 in.	5280	ea	$ 26	$	137,280
Subtotal					**$**	**254,480**
Engineering and Contingencies (30%)					$	76,344
Mitigation and Permitting (1%)					$	2,545
Subtotal					**$**	**333,369**
Interest During Construction					$	13,890
TOTAL CAPITAL COST					***$***	***347,259***

ANNUAL COSTS	Size	Quantity	Units	Unit Price	Cost	
Debt Service					$	30,276
Pipeline O&M (1%)					$	1,373
Pump O&M (2.5%)					$	2,930
Chemicals			1000 gal	$ 0.30	$	7,820
Electricity					$	23,539
TOTAL ANNUAL COST w/ AMORTIZATION					***$***	***65,938***
TOTAL ANNUAL COST AFTER AMORTIZATION					***$***	***35,662***

UNIT COSTS (Until Amortized)		
Cost per acre-ft	$	824
Cost per 1000 gallons	$	2.53

UNIT COSTS (After Amortization)		
Cost per acre-ft	$	446
Cost per 1000 gallons	$	1.37

WUGNAME: **Smith_Irrigation**
STRATEGY: **New Wells Queen City Aquifer**
AMOUNT (ac-ft/yr): **168**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**	
Water Well Construction		4	ea	$ 55,150	$	220,600
Pipeline Connection to Water System	6 in.	1600	ea	$ 26	$	41,600
Subtotal					**$**	**262,200**
Engineering and Contingencies (30%)					$	78,660
Mitigation and Permitting (1%)					$	2,622
Subtotal					**$**	**343,482**
Interest During Construction					$	14,312
TOTAL CAPITAL COST					***$***	***357,794***
ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**	
Debt Service					$	31,194
Pipeline O&M (1%)					$	416
Pump O&M (2.5%)					$	5,515
Chemicals			1000 gal		$	-
Electricity					$	2,208
TOTAL ANNUAL COST w/ AMORTIZATION					***$***	***39,333***
TOTAL ANNUAL COST AFTER AMORTIZATION					***$***	***8,139***
UNIT COSTS (Until Amortized)						
Cost per acre-ft					$	234
Cost per 1000 gallons					$	0.72
UNIT COSTS (After Amortization)						
Cost per acre-ft					$	48
Cost per 1000 gallons					$	0.15

WUGNAME: **Smith_Manufacturing**
STRATEGY: **Purchase Water From the City of Tyler**
AMOUNT (ac-ft/yr): **294**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**		**Cost**	
Pipeline Connection to Water System	8 in.	15840	ea	$	34	$	538,560
Booster Pump Station	12 HP	1	ea	$	543,200	$	543,200
Subtotal						**$**	**1,081,760**
Engineering and Contingencies (30%)						$	324,528
Mitigation and Permitting (1%)						$	10,818
Subtotal						**$**	**1,417,106**
Interest During Construction						$	59,047
TOTAL CAPITAL COST						***$***	***1,476,152***
ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**		**Cost**	
Debt Service						$	128,698
Pipeline O&M (1%)						$	5,386
Pump O&M (2.5%)						$	13,464
Chemicals			1000 gal			$	-
Electricity						$	3,863
Treated Water Purchase		95,800	1000 gal	$	3.00	$	287,401
TOTAL ANNUAL COST w/ AMORTIZATION						***$***	***438,811***
TOTAL ANNUAL COST AFTER AMORTIZATION						***$***	***310,113***
UNIT COSTS (Until Amortized)							
Cost per acre-ft						$	1,493
Cost per 1000 gallons						$	4.58
UNIT COSTS (After Amortization)							
Cost per acre-ft						$	1,055
Cost per 1000 gallons						$	3.24

WUGNAME: **Smith_Mining**
STRATEGY: **New Wells Queen City Aquifer**
AMOUNT (ac-ft/yr): **329**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**	
Water Well Construction		7	ea	$ -	$	-
Pipeline Connection to Water System	6 in.	3500	ea	$ 26	$	91,000
Subtotal					**$**	**91,000**
Engineering and Contingencies (30%)					$	27,300
Mitigation and Permitting (1%)					$	910
Subtotal					**$**	**119,210**
Interest During Construction					$	4,967
TOTAL CAPITAL COST					***$***	***124,177***

ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**	
Debt Service					$	10,826
Pipeline O&M (1%)					$	910
Pump O&M (2.5%)					$	-
Chemicals			1000 gal		$	-
Electricity					$	4,323
TOTAL ANNUAL COST w/ AMORTIZATION					***$***	***16,059***
TOTAL ANNUAL COST AFTER AMORTIZATION					***$***	***5,233***

UNIT COSTS (Until Amortized)		
Cost per acre-ft	$	49
Cost per 1000 gallons	$	0.15

UNIT COSTS (After Amortization)		
Cost per acre-ft	$	16
Cost per 1000 gallons	$	0.05

Trinity County
County - Other

Neches	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y		0	0	0	60	60	60
Well Design, af/y (2*Reqd)		0	0	0	120	120	120
Well Design, gpm (2*Reqd)		0	0	0	74	74	74
Supplied groundwater, MGD		0.0000	0.0000	0.0000	0.0536	0.0536	0.0536
County GW Parameters							
All. GPM/well (125)	75						
Well Depth	375						
Cost /Well	**47225**						
No. of Wells		0.0000	0.0000	0.0000	0.9919	0.9919	0.9919
Phasing of Wells		0	0	0	1	0	0
Well Cost		$ -	$ -	$ -	$ 47,225.00	$ -	$ -
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	6						
Head Loss/100 feet	0.176						
Depth to Water Surface	1500						
Total Head Required	1589						
Total Horsepower	43						
Cost of Pipeline	**26**	$ -	$ -	$ -	$ 137,280.00	$ -	$ -
Booster Station and Ground							
Storage per 3 wells			0		0	0	0
Total Capital Cost		$ -	$ -	$ -	$ 184,505.00	$ -	$ -
Engineering & Cont. (30%)		$0	$0	$0	$55,352	$0	$0
Interest During Construction		$0	$0	$0	$9,994	$0	$0
Total Cost		$0	$0	$0	$249,851	$0	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$0	$0	$0	$21,783	$0	$0
New Plus Existing		$0	$0	$0	$21,783	$21,783	$21,783
O&M Cost							
Electricity		0	0	0	12,653	12,653	12,653
O&M			$0	$0	$1,181	$1,181	$1,181
Transmission Line		$0	$0	$0	$1,373	$1,373	$1,373
Total Annual Cost		$0	$0	$0	$36,990	$36,990	$36,990
Unit Cost, $/1000 gallons					$1.89	$1.89	$1.89
Unit Cost, $/ac-ft							$616.50

TYLER COUNTY

County Other

	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y			251	251	251	251	251
Well Design, gpm (2*Reqd)		0	311	311	311	311	311
Supplied groundwater, MGD		0.0000	0.2241	0.2241	0.2241	0.2241	0.2241
County GW Parameters							
All. GPM/well (100)	300						
Well Depth	355						
Cost /Well	**133175**						
No. of Wells		0.0000	1.0373	1.0373	1.0373	1.0373	1.0373
Phasing of Wells		0	1	0	0	0	0
Well Cost		$0	$133,175	$0	$0	$0	$0.00
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	6						
Head Loss/100 feet	0.42						
Depth to Water Surface	300						
Total Head Required	402						
Total Horsepower	44						
Cost of Pipeline	**26**	$0	$137,280	$0	$0	$0	0
Booster Station and Ground Storage per 3 wells		$0	$0	$0	$0	$0	0
Total Capital Cost		$0	$270,455	$0	$0	$0	$0
Engineering & Cont. (30%)		$0	$81,137	$0	$0	$0	$0
Interest During Construction		$0	$14,650	$0	$0	$0	$0
Total Cost		$0	$366,241	$0	$0	$0	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$0	$31,931	$0	$0	$0	$0
New Plus Existing		$0	$31,931	$31,931	$0	$0	$0
O&M Cost							
Electricity		0	12,808	12,808	12,808	12,808	12,808
O&M		$0	$3,329	$3,329	$3,329	$3,329	$3,329
Transmission Line		$0	$1,373	$1,373	$1,373	$1,373	$1,373
Total Annual Cost		$0	$49,441	$49,441	$17,510	$17,510	$17,510
Unit Cost, $/1000 gallons			$0.60	$0.60	$0.21	$0.21	$0.21

TYLER COUNTY
City of Woodville

	2000	2010	2020	2030	2040	2050	2060
Required groundwater, af/y			300	300	300	300	300
Well Design, gpm (2*Reqd)		0	372	372	372	372	372
Supplied groundwater, MGD		0.0000	0.2679	0.2679	0.2679	0.2679	0.2679
County GW Parameters							
All. GPM/well (100)	500						
Well Depth	550						
Cost /Well	**198150**						
No. of Wells		0.0000	0.7439	0.7439	0.7439	0.7439	0.7439
Phasing of Wells		0	1	0	0	0	0
Well Cost		$0	$198,150	$0	$0	$0	$0.00
Distribution Cost							
Length Dist. Pipe/Well	5280						
Total Length							
Pipe Diameter, in	8						
Head Loss/100 feet	0.42						
Depth to Water Surface	300						
Total Head Required	402						
Total Horsepower	73						
Cost of Pipeline	**34**	$0	$179,520	$0	$0	$0	0
Booster Station and Ground							
Storage per 3 wells		$0	$0	$0	$0	$0	0
Total Capital Cost		$0	$377,670	$0	$0	$0	$0
Engineering & Cont. (30%)		$0	$113,301	$0	$0	$0	$0
Interest During Construction		$0	$20,457	$0	$0	$0	$0
Total Cost		$0	$511,428	$0	$0	$0	$0
Annual Cost							
New Debt Service,6%, 20yrs.		$0	$44,589	$0	$0	$0	$0
New Plus Existing		$0	$44,589	$44,589	$0	$0	$0
O&M Cost							
Electricity		0	21,347	21,347	21,347	21,347	21,347
O&M		$0	$4,954	$4,954	$4,954	$4,954	$4,954
Transmission Line		$0	$1,795	$1,795	$1,795	$1,795	$1,795
Total Annual Cost		$0	$72,684	$72,684	$28,095	$28,095	$28,095
Unit Cost, $/1000 gallons			$0.74	$0.74	$0.29	$0.29	$0.29

WWPNAME:	**ANRA**
STRATEGY:	**Lake Columbia**
AMOUNT (ac-ft/yr):	**75,700**

Dam	**Cost**
Embankment	$27,097,000
Internal Drainage	$575,000
Soil Cement Slope Protection	$3,092,000
Service Spillway	$5,657,000
Outlet Works	$1,166,000
Miscellaneous Items	$4,970,000
Engineering and Contingencies	$14,895,000
Geotechnical Investigations	$585,000
Subtotal for Dam	$58,036,000
Conflict Resolution	
Communications	$2,361,000
Electric Utilities	$14,485,000
Oil and Gas	$3,671,000
Water Utilities	$155,000
State and County Roads1	$35,144,000
Railroad	$27,609,000
Road and Railroad Erosion Protection	$4,019,000
Engineering and Contingencies	$27,505,000
Subtotal for Conflicts	$114,949,000
Land	
Land and Easement Purchase	$23,496,000
Survey, Appraisal, Legal costs	$2,603,000
Contingencies	$5,220,000
Subtotal for Land	$31,319,000
Mitigation	
Archeological/Historical Resources	$11,026,000
Aquatic/Terrestrial Resources	$16,535,000
Subtotal for Mitigation	$27,561,000
TOTAL COST	**$231,865,000**

ANNUAL COSTS	
Debt Service (6% for 40 years)	$15,410,000
Operation & Maintenance	$870,500
Total Annual Costs	**$16,280,500**
UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$215
Per 1,000 Gallons	$0.66
UNIT COSTS (After Amortization)	
Per Acre-Foot	$11.50
Per 1,000 Gallons	$0.04

WWPNAME: **ANRA**
STRATEGY: **Regional Water Treatment Facililties**
Quantity: **5,100 AF/Y** 10.00 MGD

CONSTRUCTION COSTS

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Segment A: WTP to Troup	24 in.	63,360	LF	$116	$7,350,000
Segment B: Troup to Arp	12 in.	34,320	LF	$52	$1,785,000
Segment C: Troup to Whitehouse	16 in.	39,600	LF	$69	$2,732,000
Segment D: Arp to New London	8 in.	36,960	LF	$34	$1,257,000
Segment E: WTP to New Summerfield	12 in.	13,200	LF	$52	$686,000
Right of Way Easements Rural (ROW)		86.1	ACRE	$2,000	$172,000
Engineering and Contingencies (30%)					$4,143,000
Subtotal of Pipeline					**$4,315,000**
Pump Station(s)					
Pump with intake & building	1400 HP	1	LS	$4,515,000	$4,515,000
Engineering and Contingencies (35%)					$1,580,250
Subtotal of Pump Station(s)					**$6,095,250**
Water Treatment Plant	10 MGD	1	LS	$22,400,000	**$22,400,000**
Storage Tanks	0.5 MG	1	LS	$438,000	**$438,000**
CONSTRUCTION TOTAL					**$33,248,250**
Permitting and Mitigation					**$494,000**
Interest During Construction			**(12 months)**		**$1,385,000**
TOTAL COST					**$35,127,250**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$3,063,000
Electricity ($0.09 kWh)					$234,000
Operation & Maintenance					$311,950
Raw Water Purchase			Kgal	$0.66	$1,097,000
Treatment			Kgal	$0.70	$1,163,000
Total Annual Costs					**$5,868,950**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,151
Per 1,000 Gallons					$3.53
UNIT COSTS (After Amortization)					
Per Acre-Foot					$550
Per 1,000 Gallons					$1.69

Notes: Cost for buying raw water is assumed to be the unit costs for developing Lake Columbia.

Athens - New Wells in Carrizo-Wilcox Aquifer
Henderson County, Carrizo-Wilcox Aquifer

Supply	1400	Ac-ft/yr	868	gpm
Depth to Water	106			
Well Depth	490			
Well Yield	434	gpm		
Well Size	12	in		
Wells Needed	4			

Construction Costs

	Number	Unit Cost	Total Cost
Water Wells	4	$250,000	$1,000,000
Connection to Transmission System	4	$50,000	$200,000
Engineering and Contingencies (30%)			$360,000
Subtotal of Well(s)			**$1,560,000**

Transmission System	Size	Quantity	Unit	Unit Cost	Total Cost
Pipeline - Rural	14 in.	15,840	LF	$60	$950,000
Pump Station	66 HP	1	EA	$500,000	$500,000
Ground Storage Tank	0.25MG	1	EA	$219,000	$219,000
Easement - Rural		7.3	ACRE	$2,000	$15,000
Engineering and Contingencies (30% for pipelines, 35% for other items)					$460,000
Subtotal for Transmission					**2,144,000**

Permitting and Mitigation				$14,000
Construction Total				$3,718,000
Interest During Construction	6	months		$81,000
Total Capital Cost				**$3,799,000**
Debt Service - Total Capital				$276,000
O&M				
Transmission	1%			$14,000
Well(s) and Pump Station	2.5%			$45,000
Add Chemicals etc.	456,191	$0.30	per 1000 gal	$136,900
Pumping Costs				$42,000
		Total Annual Cost		**$513,900**

UNIT COSTS (First 30 Years)

Cost per ac-ft	$367
Cost per 1000 gallons	$1.13

UNIT COSTS (After 30 Years)

Cost per ac-ft	$170
Cost per 1000 gallons	$0.52

Table

Obtain Water from Forest Grove Reservoir and Transport to New 4 MGD WTP Near Athens

WWPNAME: Athens MWA
STRATEGY: Forest Grove Reservoir/ TRWD
Quantity: 2240 ac-ft/yr

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	24 in.	21,120	LF	$116	$2,450,000
Pipeline Urban	24 in.	5,280	LF	$174	$919,000
Right of Way Easements		See Region C costs estimate			$254,000
Engineering and Contingencies (30%)					$1,011,000
Subtotal of Pipeline					**$4,634,000**
Intake and Pump Station	450 HP	1	EA	$2,540,000	$2,540,000
Engineering and Contingencies (35%)					$889,000
Subtotal of Pump Station(s)					**$3,429,000**
Water Treatment plant					
Water Treatment plant	4.0 MGD	1	EA		$12,325,000
Engineering and Contingencies (35%)					$4,314,000
Subtotal					**$16,639,000**
Permitting and Mitigation		1	LS		$182,000
CONSTRUCTION TOTAL					**$24,884,000**
Interest During Construction			**(18 months)**		**$1,535,000**
Permitting associated with water rights transfer					$200,000
TOTAL CAPITAL COST					**$26,619,000**
ANNUAL COSTS TREATED WATER					
Debt Service (6% for 30 years)					$1,934,000
Treatment			Kgal	$0.70	$510,900
Electricity ($0.09 kWh)					$59,000
Facility Operation & Maintenance					$124,700
Total Annual Costs					**$2,628,600**
Per Acre-Foot of raw water					$1,173
Per 1,000 Gallons of raw water					$3.60
UNIT COSTS - (After Amortization)					
Per Acre-Foot of raw water					$310
Per 1,000 Gallons of raw water					$0.95

Table

Water Treatment Plant Expansion at City of Athens - Forest Grove

Probable Owner: Athens MWA
Amount: 2,240 Acre-Feet/Year

CONSTRUCTION COSTS					
WATER TREATMENT FACILITIES					
New Treatment Plant at City	4.0 MGD	1	LS	$12,325,000	$12,325,000
Engineering and Contingencies (35%)					$4,314,000
Subtotal of Treatment					**$16,639,000**
Permitting of treatment plant					$147,900
CONSTRUCTION TOTAL					**$16,786,900**
Interest During Construction			**(18 months)**		**$1,035,000**
TOTAL CAPITAL COST					**$17,821,900**
ANNUAL COSTS TREATED WATER					
Debt Service (6% for 30 years)					$1,294,700
Electricity ($0.09 kWh)					$59,000
Facility Operation & Maintenance					$0
Water Treatment ($.70/1,000 gal finished water)		2,240	af/y		$510,900
Total Annual Costs					**$1,864,600**
UNIT COSTS (During Amortization)					
Per Acre-Foot of treated water					$951
Per 1,000 Gallons of treated water					$2.92
UNIT COSTS (After Amortization)					
Per Acre-Foot of treated water					$291
Per 1,000 Gallons of treated water					$0.89

WWPNAME:	**Jacksonville**				
STRATEGY:	**Lake Columbia**				
Quantity:	**1,700** AF/Y		2.65 MGD		

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	16 in.	23,400	LF	$69	$1,615,000
Pipeline Urban	16 in.	3,000	LF	$103	$309,000
Right of Way Easements Rural (ROW)		10.7	ACRE	$2,000	$21,000
Right of Way Easements Urban (ROW)		1.4	ACRE	$20,000	$28,000
Engineering and Contingencies (30%)					$577,000
Subtotal of Pipeline					**$2,550,000**
Pump Station(s)					
Pump with intake & building	100 HP	1	LS	$1,002,000	$1,002,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$350,700
Subtotal of Pump Station(s)					**$1,352,700**
Water Treatment Facility					
New Water Treatment Plant	3 MGD	1	LS	$10,600,000	**$10,600,000**
Engineering and Contingencies (35%)					$3,710,000
Subtotal of WTP					**$14,310,000**
CONSTRUCTION TOTAL					**$18,212,700**
Permitting and Mitigation					**$162,000**
Interest During Construction			**(12 months)**		**$759,000**
TOTAL COST					**$19,133,700**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$1,668,000
Electricity ($0.09 kWh)					$28,000
Operation & Maintenance					$53,000
Raw Water Purchase			Kgal	$0.66	$366,000
Treatment			Kgal	$0.70	$388,000
Total Annual Costs					**$2,503,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,472
Per 1,000 Gallons					$4.52
UNIT COSTS (After Amortization)					
Per Acre-Foot					$491
Per 1,000 Gallons					$1.51

WWPNAME:	**LNVA**				
STRATEGY:	**Purchase from SRA**				
Quantity:	**36,000** AF/Y		41.75 MGD		

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	54 in.	77,000	LF	$317	$24,409,000
Right of Way Easements Rural (ROW)		35.4	ACRE	$2,000	$71,000
Engineering and Contingencies (30%)					$7,323,000
Subtotal of Pipeline					**$31,803,000**
Pump Station(s)					
Pump with intake	1100 HP	1	LS	$4,052,000	$4,052,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$1,418,200
Subtotal of Pump Station(s)					**$5,470,200**
CONSTRUCTION TOTAL					**$37,273,200**
Permitting and Mitigation					**$342,000**
Interest During Construction			**(12 months)**		**$1,553,000**
TOTAL COST					**$39,168,200**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$3,415,000
Electricity ($0.09 kWh)					$377,000
Operation & Maintenance					$415,000
Raw Water Purchase			Kgal	$0.15	$1,760,000
Treatment			Kgal	$0.00	$0
Total Annual Costs					**$5,967,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$166
Per 1,000 Gallons					$0.51
UNIT COSTS (After Amortization)					
Per Acre-Foot					$71
Per 1,000 Gallons					$0.22

WWPNAME:		**Lufkin**			
STRATEGY:		**Increase Groundwater - Carrizo-Wilcox**			
Quantity:		**4,650**	AF/Y		8.30 MGD
CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Groundwater Water Treatment Plant Improvments					
Remove Existing Plant Piping		1	LS	$ 54,000	$54,000
Replace Plant Piping		1	LS	$ 433,000	$433,000
Rehabilitate Ground Storage Tanks	2.1 MGD	2	EA	$ 633,500	$1,267,000
Decommision Clarifier		1	LS	$ 65,000	$65,000
Construct Chlorine Building		1	LS	$ 542,000	$542,000
Construct Booster Pump Building		1	LS	$ 1,354,000	$1,354,000
Water Main to Existing City Main on Loop 287	16 -inch	7,000	LF	$ 43	$303,000
Construct All-weather access road to FM 842		2,500	LF	$ 136	$341,000
Site Fencing		1	LS	$ 76,000	$76,000
SCADA Station		1	LS	$ 54,000	$54,000
Electrical (Including flow meters)		4	EA	$ 74,500	$298,000
Aerators		2	EA	$ 189,500	$379,000
Subtotal Ground Water Treatment Plant Improvments					***$5,166,000***
Auxillary Booster Station Improvments					
Upgrade Station Bypass	24 -inch	200	LF	$ 270	$54,000
Renovate Pump Station Building		1	LS	$ 32,000	$32,000
SCADA Station		1	LS	$ 54,000	$54,000
Electrical (Including flow meter)		1	EA	$233,000	$233,000
Subtotal Auxillary Booster Station Improvments					***$373,000***
Water Well Improvments					
Plug Wells # 1 and #3		2	EA	$81,000	$162,000
SCADA Stations		6	EA	$54,000	$325,000
Electrical (Including flow meters)		6	EA	$39,667	$238,000
Subtotal Water Well Improvments					***$725,000***
Pipeline					
Pipeline	24 -inch	48000	LF	$ 82	$3,936,000
Values		15	EA	$ 8,840	$133,000
Subtotal Pipeline					***$4,069,000***
Project Subtotal					**$10,333,000**
Engineering & Contingency (30%)					**$3,100,000**
Total Project without Easements					**$13,433,000**
Easements					$100,000
Total Project with Easements					**$13,533,000**
Interest during construction				(12 months)	$564,000
Total Capital Costs					**$14,097,000**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$1,229,000
Electricity					$244,000
Treatment ($0.30/ kgal)					$455,000
Operation & Maintenance					$58,800
Total Annual Costs					**$1,986,800**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$427
Per 1,000 Gallons					$1.31
UNIT COSTS (After Amortization)					
Per Acre-Foot					$163
Per 1,000 Gallons					$0.50

WWPNAME:	**Lufkin**				
STRATEGY:	**Develop Lake Kurth**				
Raw Water Quantity:	**6,800** AF/Y				
Treated Water Quantity	**11,600**	15.0 MGD			
Phase 1: Raw Water Improvements:					
Angelina River Intake and Pump Station	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
New Stop Logs		3	EA	$5,333	$16,000
Replace Slide Gate		1	EA	$43,000	$43,000
SCADA Station		1	EA	$54,000	$54,000
Electrical (Including flow meter)		1	EA	$76,000	$76,000
Subtotal Angelina River Intake and Pump Station					***$189,000***
Kurth Lake Intake and Pump Station					
Rebuild Linkbelt Screen		1	LS	$162,000	$162,000
Rebuild Trash Bar Screens		2	EA	$11,000	$22,000
SCADA Station		1	EA	$54,000	$54,000
Electrical (Including flow meter)		1	EA	$119,000	$119,000
Subtotal Kurth Lake Intake					***$357,000***
Engineering and Contingencies (35%)					***$191,100***
CONSTRUCTION TOTAL					**$737,100**
Permitting and Mitigation					**$7,000**
Interest During Construction			**(6 months)**		**$16,000**
TOTAL COST					**$760,100**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$66,000
Operation & Maintenance					$361,700
Total Annual Costs					**$427,700**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$63
Per 1,000 Gallons					$0.19
UNIT COSTS (After Amortization)					
Per Acre-Foot					$53
Per 1,000 Gallons					$0.16

Phase 2: Treated Water Supply Pipeline from WTP to Lufkin	Size	Quantity	Unit	Unit Price	Cost
Pipeline Rural	36 in.	31,680	LF	$184	$5,829,000
Pipeline Urban	36 in.	5,280	LF	$276	$1,457,000
Right of Way Easements Rural (ROW)		14.5	ACRE	$2,000	$29,000
Right of Way Easements Urban (ROW)		2.4	ACRE	$20,000	$48,000
Engineering and Contingencies (30%)					$2,186,000
Subtotal of Pipeline					**$9,549,000**
Storage Facilities					
Ground Storage	3	1	EA	$1,215,000	$1,215,000
Engineering and Contingencies (35%)					$425,000
Subtotal of Storage					**$1,640,000**
Pump Station(s)					
Pump Station	600 HP	1	LS	$2,150,000	$2,150,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$752,500
Subtotal of Pump Station(s)					**$2,902,500**
Water Treatment Facility					
New Water Treatment Plant	15 MGD	1	LS	$29,100,000	**$29,100,000**
Engineering and Contingencies (35%)					$10,185,000
Subtotal of WTP					**$39,285,000**
CONSTRUCTION TOTAL					**$53,376,500**
Permitting and Mitigation					**$128,000**
Interest During Construction			**(12 months)**		**$2,224,000**
TOTAL COST					**$55,728,500**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$4,859,000
Electricity ($0.09 kWh)					$193,000
Operation & Maintenance					$188,000
Raw Water Purchase			Kgal	$0.50	$0
Treatment			Kgal	$0.70	$2,646,000
Total Annual Costs					**$7,886,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$680
Per 1,000 Gallons					$2.09
UNIT COSTS (After Amortization)					
Per Acre-Foot					$261
Per 1,000 Gallons					$0.80

WWPNAME:	**Lufkin**				
STRATEGY:	**Develop Water from Sam Rayburn**				
Quantity to Customers	**0**	2.0 MGD			
Treated Water Quantity	**11,210**	15.0 MGD			

Expand Treated Water Supply	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline					
Pipeline to Angelina County customers	12 in.	0	LF	$52	$0
Pipeline to Angelina County customers	6 in.	0	LF	$26	$0
Pipeline from Sam Rayburn	36 in.	65,500	LF	$276	$18,078,000
Right of Way Easements Rural (ROW)		30.1	ACRE	$2,000	$60,000
Engineering and Contingencies (30%)					$5,423,000
Subtotal of Pipeline					**$23,561,000**
Storage Facilities					
Additional Storage at WTP	5.00 MG	1	EA	$1,303,000	$1,303,000
Engineering and Contingencies (35%)					$456,000
Subtotal of Storage					**$1,759,000**
Pump Station(s)					
Lake Intake and Pump Station	600 HP	1	LS	$2,860,000	$2,860,000
Booster Pump Station	500 HP	0	LS	$2,032,000	$0
Engineering and Contingencies (35%)					$1,001,000
Subtotal of Pump Station(s)					**$3,861,000**
Water Treatment Facility					
Expand Water Treatment Plant	10 MGD	1	LS	$16,000,000	**$16,000,000**
Engineering and Contingencies (35%)					$5,600,000
Subtotal of WTP					**$21,600,000**
CONSTRUCTION TOTAL					**$50,781,000**
Permitting and Mitigation					**$267,000**
Interest During Construction			**(12 months)**		**$2,116,000**
TOTAL COST					**$53,164,000**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$4,635,000
Electricity ($0.09 kWh)					$10,145,000
Operation & Maintenance					$342,000
Raw Water Purchase			Kgal	$0.00	$0
Treatment			Kgal	$0.70	$2,557,000
Total Annual Costs					**$17,679,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,577
Per 1,000 Gallons					$4.84
UNIT COSTS (After Amortization)					
Per Acre-Foot					$1,164
Per 1,000 Gallons					$3.57

WWPNAME:	**Nacogdoches**				
STRATEGY:	**Lake Columbia**				
Quantity:	**8,551** AF/Y		11.44 MGD		

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline to Lake Nacogdoches	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	30 in.	21,120	LF	$145	$3,062,000
Right of Way Easements Rural (ROW)		9.7	ACRE	$2,000	$19,000
Engineering and Contingencies (30%)					$919,000
Subtotal of Pipeline					**$4,000,000**
Pump Station(s)					
Pump with intake & building	400 HP	1	LS	$2,423,000	$2,423,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$848,050
Subtotal of Pump Station(s)					**$3,271,050**
Water Treatment Facility					
Expand Existing Water Treatment Plant	15 MGD	1	LS	$20,900,000	**$20,900,000**
Engineering and Contingencies (35%)					$7,315,000
Subtotal of WTP					**$28,215,000**
CONSTRUCTION TOTAL					**$35,486,050**
Permitting and Mitigation					**$317,000**
Interest During Construction			**(12 months)**		**$1,479,000**
TOTAL COST					**$37,282,050**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$3,250,000
Electricity ($0.09 kWh)					$138,000
Operation & Maintenance					$110,000
Raw Water Purchase			Kgal	$0.66	$1,839,000
Treatment			Kgal	$0.70	$1,950,000
Total Annual Costs					**$7,287,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$852
Per 1,000 Gallons					$2.61
UNIT COSTS (After Amortization)					
Per Acre-Foot					$472
Per 1,000 Gallons					$1.45

Nacogdoches - Toledo Bend via Center

TRANSMISSION	Combined Cost
New Water Plant-10 mgd	$22,400,000
Pump Station	
Intake at Logansport (600 HP)	$2,860,000
Center (800 HP)	$2,516,000
Storage at Swift	
Transmission	
30" line, 359,600 ft.	$52,142,000
ROW Costs	$495,000
Total Capital Cost	$80,413,000
Engineering & Cont.	$25,364,000
Interest During Construction	$8,641,981
Total Cost	**$114,418,981**
Annual Cost	
Debt Service,6%, 30yrs.	$8,312,414
O&M Cost	
Treatment Plant	$1,180,395
Pump Station	
Electricity	453,176
O&M	$134,400
Transmission Line	$521,420
Total Annual Cost	**$10,601,806**
Capacity (af/y)	5,175
Unit Cost/AF	$2,049
Unit Cost/1000 gallons	$6.29

WWPNAME: **City of Nacogdoches**
STRATEGY: **New Wells in Carizzo-Wilcox Aquifer**
AMOUNT (ac-ft/yr): **2800**

CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Water Well Construction	12 in.	5	ea	$ 307,500	$ 1,537,500
Connection to Water System		5	ea	$ 100,000	$ 500,000
Subtotal					**$ 2,037,500**
Engineering and Contingencies (30%)					$ 611,250
Mitigation and Permitting (1%)					$ 20,375
Subtotal					**$ 2,669,125**
Interest During Construction					$ 57,832
TOTAL CAPITAL COST					***$ 2,726,957***

ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Debt Service					$ 237,749
Pipeline O&M (1%)					$ 5,000
Pump O&M (2.5%)					$ 38,438
Chemicals			1000 gal	$ 0.30	$ 273,680
Electricity					$ 169,769
TOTAL ANNUAL COST w/ AMORTIZATION					***$ 724,635***
TOTAL ANNUAL COST AFTER AMORTIZATION					***$ 486,887***

UNIT COSTS (Until Amortized)	
Cost per acre-ft	$ 259
Cost per 1000 gallons	$ 0.79
UNIT COSTS (After Amortization)	
Cost per acre-ft	$ 174
Cost per 1000 gallons	$ 0.53

WWPNAME:	**City of Tyler**				
STRATEGY:	**Lake Palestine Expansion**				
Quantity:	**16,815** AF/Y		30.00 MGD		

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	36 in.	23,400	LF	$184	$4,306,000
Pipeline Urban	36 in.	3,000	LF	$276	$828,000
Right of Way Easements Rural (ROW)		10.7	ACRE	$2,000	$21,000
Right of Way Easements Urban (ROW)		1.4	ACRE	$20,000	$28,000
Engineering and Contingencies (30%)					$1,540,000
Subtotal of Pipeline					**$6,723,000**
Pump Station(s)					
Booster Pump Station	1400 HP	1	LS	$3,395,000	$3,395,000
Engineering and Contingencies (35%)					$1,188,250
Subtotal of Pump Station(s)					**$4,583,250**
Water Treatment Facility					
Expand Water Treatment Plant	30 MGD	1	LS	$47,600,000	**$47,600,000**
Engineering and Contingencies (35%)					$16,660,000
Subtotal of WTP					**$64,260,000**
CONSTRUCTION TOTAL					**$75,566,250**
Permitting and Mitigation					**$674,000**
Interest During Construction			**(12 months)**		**$3,149,000**
TOTAL COST					**$79,389,250**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$6,922,000
Electricity ($0.09 kWh)					$296,000
Operation & Maintenance					$164,000
Raw Water Purchase			Kgal	$0.50	$2,740,000
Treatment			Kgal	$0.70	$3,835,000
Total Annual Costs					**$13,957,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$830
Per 1,000 Gallons					$2.55
UNIT COSTS (After Amortization)					
Per Acre-Foot					$418
Per 1,000 Gallons					$1.28

WWPNAME: **Sabine River Authority**
STRATEGY: **Toledo Bend Pipeline Project**
Quantity: **500,000 Ac-ft per year**

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**No.**	**Size**	**Quantity**	**Unit**	**Cost**
Segment A	2x	102 in.	1,129,920	LF	$1,081,333,000
Segment B	2x	96 in.	168,425	LF	$144,845,000
Segment C	1x	90 in.	502,495	LF	$431,858,000
Segment D	1x	90 in.	172,995	LF	$180,780,000
Segment E	1x	102 in.	224,077	LF	$214,441,000
Segment F	1x	96 in.	63,231	LF	$54,378,000
Engineering and Contingencies (30%)					$632,291,000
Subtotal of Pipeline					**$2,739,926,000**
Right of Way					
Rural ROW			1773	AC	$17,730,000
Urban ROW			304	AC	$18,240,000
Pump Station(s)					
Lake Intake - Toledo Bend			1		$19,866,000
Booster Pump Station 1		35000 HP	2	EA	$60,200,000
Booster Pump Station 2		30000 HP	2	EA	$53,750,000
Booster Pump Station 3		32500 HP	2	EA	$56,975,000
Booster Pump Station 4		13000 HP	1	EA	$14,706,000
Booster Pump Station 5		19000 HP	1	EA	$19,608,000
Booster Pump Station 6		26000 HP	1	EA	$24,295,000
Booster Pump Station 7		22000 HP	1	EA	$21,715,000
Booster Pump Station 8		15000 HP	1	EA	$16,340,000
Booster Pump Station 9		12000 HP	1	EA	$13,889,000
Engineering and Contingencies (35%)					$105,470,000
Subtotal of Pump Station(s)					**$406,814,000**
Storage					
Ground Storage Tank 1		70.0 MG	2	EA	$12,954,000
Ground Storage Tank 2		63.0 MG	1	EA	$6,158,000
Ground Storage Tank 3		28.0 MG	5	EA	$17,235,000
Engineering and Contingencies (35%)					$12,721,000
Subtotal of Storage					**$49,068,000**
CONSTRUCTION TOTAL					**$3,231,778,000**
Permitting and Mitigation					**$24,813,000**
Interest During Construction					**$396,231,000**
TOTAL COST					**$3,652,822,000**

Capital Cost by User:		
SRA	100,000 AF/Y	**$475,648,000**
NTMWD	200,000 AF/Y	**$1,239,758,000**
TRWD	200,000 AF/Y	**$1,937,416,000**

ANNUAL COSTS for SRA	
Debt Service (6% for 30 years)	$34,555,000
Electricity ($0.09 kWh)	$15,718,800
Operation & Maintenance	$4,403,511
Raw Water Purchase	$0
Total Annual Costs	**$54,677,311**
UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$547
Per 1,000 Gallons	$1.68
UNIT COSTS (After Amortization)	
Per Acre-Foot	$201
Per 1,000 Gallons	$0.62

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Appendix 4C-B

Needs and Costs Data from the Data Web Interface

The following appendix includes a copy of the data from the TWDB Data Web Interface. This appendix provides a summary of needs analyses and cost estimates for implementing WMSs for WUGs and WWPs in the ETRWPA.

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Region I Water User Group Needs
(Ac-ft per year)

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
BRUSHY CREEK WSC	ANDERSON	NECHES	55	53	51	52	50	46
BRUSHY CREEK WSC	ANDERSON	TRINITY	47	45	43	44	42	39
CONSOLIDATED WSC	ANDERSON	NECHES	9	9	9	9	9	8
CONSOLIDATED WSC	ANDERSON	TRINITY	32	30	30	32	29	27
COUNTY-OTHER	ANDERSON	NECHES	59	28	9	-10	-31	-53
COUNTY-OTHER	ANDERSON	TRINITY	577	395	285	173	51	-79
ELKHART	ANDERSON	TRINITY	251	245	243	240	236	232
FOUR PINE WSC	ANDERSON	TRINITY	266	257	253	248	243	235
FRANKSTON	ANDERSON	NECHES	34	11	-6	-24	-40	-54
IRRIGATION	ANDERSON	NECHES	216	216	216	216	216	216
IRRIGATION	ANDERSON	TRINITY	1,218	1,218	1,218	1,218	1,218	1,218
LIVESTOCK	ANDERSON	NECHES	71	71	71	71	71	71
LIVESTOCK	ANDERSON	TRINITY	350	350	350	350	350	350
MINING	ANDERSON	NECHES	43	3	-20	-43	-65	-87
MINING	ANDERSON	TRINITY	-18	-22	-25	-27	-30	-32
PALESTINE	ANDERSON	NECHES	323	260	216	172	122	68
PALESTINE	ANDERSON	TRINITY	291	234	195	155	110	61
STEAM ELECTRIC POWER	ANDERSON	NECHES	0	-11,306	-13,218	-15,549	-18,390	-21,853
WALSTON SPRINGS WSC	ANDERSON	NECHES	406	395	392	389	381	369
ANGELINA WSC	ANGELINA	NECHES	250	234	214	187	137	65
CENTRAL WCID OF ANGELINA COUNTY	ANGELINA	NECHES	198	188	172	150	96	12
COUNTY-OTHER	ANGELINA	NECHES	153	71	-20	-135	-349	-661
DIBOLL	ANGELINA	NECHES	-32	-187	-374	-618	-965	-1,441
FOUR WAY WSC	ANGELINA	NECHES	1,004	871	699	486	180	-225
HUDSON	ANGELINA	NECHES	229	76	-123	-360	-710	-1,174
HUDSON WSC	ANGELINA	NECHES	337	223	89	-104	-367	-735
HUNTINGTON	ANGELINA	NECHES	393	374	349	312	257	180
IRRIGATION	ANGELINA	NECHES	8	8	8	8	8	8
LIVESTOCK	ANGELINA	NECHES	62	40	13	-17	-52	-89
LUFKIN	ANGELINA	NECHES	-3,244	-5,117	-6,057	-7,116	-8,416	-9,965
MANUFACTURING	ANGELINA	NECHES	-3,117	-10,513	-12,983	-15,486	-17,739	-20,161
MINING	ANGELINA	NECHES	-1,990	-3,989	11	11	11	11
REDLAND WSC	ANGELINA	NECHES	553	542	529	511	477	428
STEAM ELECTRIC POWER	ANGELINA	NECHES	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000
ZAVALLA	ANGELINA	NECHES	107	109	111	113	115	115
ALTO	CHEROKEE	NECHES	316	301	288	276	263	245
ALTO RURAL WSC	CHEROKEE	NECHES	363	352	347	345	332	309
BULLARD	CHEROKEE	NECHES	0	0	0	0	0	0

Region I Water User Group Needs
(Ac-ft per year)

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
COUNTY-OTHER	CHEROKEE	NECHES	972	1,046	1,173	1,356	1,438	1,479
CRAFT-TURNEY WSC	CHEROKEE	NECHES	195	185	177	166	134	81
IRRIGATION	CHEROKEE	NECHES	262	259	256	253	251	248
JACKSONVILLE	CHEROKEE	NECHES	1,329	1,094	892	699	531	308
LIVESTOCK	CHEROKEE	NECHES	612	612	612	612	612	612
MANUFACTURING	CHEROKEE	NECHES	272	236	200	163	126	76
MINING	CHEROKEE	NECHES	-490	-1,494	4	2	0	-2
NEW SUMMERFIELD	CHEROKEE	NECHES	54	4	-40	-76	-117	-165
NORTH CHEROKEE WSC	CHEROKEE	NECHES	147	132	115	95	76	46
RUSK	CHEROKEE	NECHES	185	96	27	-42	-116	-212
RUSK RURAL WSC	CHEROKEE	NECHES	179	165	156	149	136	114
SOUTHERN UTILITIES COMPANY	CHEROKEE	NECHES	153	145	147	152	155	150
STEAM ELECTRIC POWER	CHEROKEE	NECHES	0	0	0	0	0	0
TROUP	CHEROKEE	NECHES	2	2	1	1	0	0
WELLS	CHEROKEE	NECHES	237	238	240	242	244	243
COUNTY-OTHER	HARDIN	NECHES	-154	-263	-284	-304	-357	-429
COUNTY-OTHER	HARDIN	TRINITY	1	0	0	-1	-1	-2
IRRIGATION	HARDIN	NECHES	-1,002	-1,002	-1,002	-1,002	-1,002	-1,002
KOUNTZE	HARDIN	NECHES	423	406	403	401	393	381
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	HARDIN	TRINITY	2	1	1	1	1	1
LIVESTOCK	HARDIN	NECHES	3	3	3	3	3	3
LIVESTOCK	HARDIN	TRINITY	0	0	0	0	0	0
LUMBERTON	HARDIN	NECHES	270	185	156	127	85	2
LUMBERTON MUD	HARDIN	NECHES	1,052	908	856	802	736	656
MANUFACTURING	HARDIN	NECHES	-27	-46	-63	-81	-97	-114
MINING	HARDIN	NECHES	-7,772	-8,620	-9,191	-9,760	-10,333	-10,770
NORTH HARDIN WSC	HARDIN	NECHES	714	683	685	679	663	637
SILSBEE	HARDIN	NECHES	536	472	459	447	415	373
SOUR LAKE	HARDIN	NECHES	590	582	583	584	580	573
WEST HARDIN WSC	HARDIN	NECHES	284	274	274	274	269	257
ATHENS	HENDERSON	NECHES	4	-52	-70	-88	-117	-155
BERRYVILLE	HENDERSON	NECHES	53	45	37	30	17	0
BETHEL-ASH WSC	HENDERSON	NECHES	400	347	299	246	182	94
BROWNSBORO	HENDERSON	NECHES	142	118	94	68	37	-4
BRUSHY CREEK WSC	HENDERSON	NECHES	137	130	123	118	109	95
CHANDLER	HENDERSON	NECHES	330	286	245	201	143	65
COUNTY-OTHER	HENDERSON	NECHES	-75	-216	-348	-479	-683	-964

Region I Water User Group Needs
(Ac-ft per year)

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
IRRIGATION	HENDERSON	NECHES	161	84	76	69	61	54
LIVESTOCK	HENDERSON	NECHES	1,488	-29	-218	-388	-561	-724
MANUFACTURING	HENDERSON	NECHES	0	0	0	0	0	0
MINING	HENDERSON	NECHES	13	13	13	13	13	13
MURCHISON	HENDERSON	NECHES	112	103	94	85	72	55
R P M WSC	HENDERSON	NECHES	53	47	42	36	27	16
CONSOLIDATED WSC	HOUSTON	NECHES	114	119	121	123	116	103
CONSOLIDATED WSC	HOUSTON	TRINITY	294	307	310	316	297	266
COUNTY-OTHER	HOUSTON	NECHES	572	572	571	570	569	568
COUNTY-OTHER	HOUSTON	TRINITY	291	289	288	286	283	280
CROCKETT	HOUSTON	TRINITY	293	267	222	177	123	46
GRAPELAND	HOUSTON	NECHES	155	155	153	151	148	144
GRAPELAND	HOUSTON	TRINITY	472	467	461	456	448	437
IRRIGATION	HOUSTON	NECHES	-567	-659	-761	-873	-997	-1,134
IRRIGATION	HOUSTON	TRINITY	185	-8	-225	-461	-723	-1,012
LIVESTOCK	HOUSTON	NECHES	-72	-130	-194	-262	-336	-416
LIVESTOCK	HOUSTON	TRINITY	37	-81	-209	-348	-499	-662
LOVELADY	HOUSTON	TRINITY	173	173	172	172	170	167
MANUFACTURING	HOUSTON	NECHES	4	3	2	1	1	0
MANUFACTURING	HOUSTON	TRINITY	-3	-5	-7	-9	-12	-15
MINING	HOUSTON	NECHES	32	33	34	35	36	36
MINING	HOUSTON	TRINITY	32	34	35	36	37	38
COUNTY-OTHER	JASPER	NECHES	-334	-395	-406	-368	-350	-350
COUNTY-OTHER	JASPER	SABINE	-40	-75	-82	-62	-53	-53
JASPER	JASPER	NECHES	2,932	2,852	2,820	2,835	2,846	2,846
JASPER COUNTY WCID #1	JASPER	SABINE	231	226	230	243	249	249
KIRBYVILLE	JASPER	SABINE	126	106	94	99	101	101
LIVESTOCK	JASPER	NECHES	2	2	2	2	2	2
LIVESTOCK	JASPER	SABINE	7	7	7	7	7	7
MANUFACTURING	JASPER	NECHES	0	1	1	1	1	1
MANUFACTURING	JASPER	SABINE	0	0	0	0	0	0
MAURICEVILLE SUD	JASPER	SABINE	8	4	4	5	5	5
MINING	JASPER	NECHES	0	0	0	0	0	0
MINING	JASPER	SABINE	0	0	0	0	0	0
BEAUMONT	JEFFERSON	NECHES	584	503	446	419	327	17
BEAUMONT	JEFFERSON	NECHES-TRINITY	1,100	957	858	811	651	109
BEVIL OAKS	JEFFERSON	NECHES	267	271	276	280	283	283

Region I Water User Group Needs
(Ac-ft per year)

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
CHINA	JEFFERSON	NECHES-TRINITY	192	200	206	212	217	221
COUNTY-OTHER	JEFFERSON	NECHES	0	0	0	0	0	0
COUNTY-OTHER	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
GROVES	JEFFERSON	NECHES	0	0	0	0	0	0
GROVES	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
IRRIGATION	JEFFERSON	NECHES	3,809	3,809	3,809	3,809	3,809	3,809
IRRIGATION	JEFFERSON	NECHES-TRINITY	64,624	64,624	64,624	64,624	64,624	64,624
JEFFERSON COUNTY WCID #10	JEFFERSON	NECHES	0	0	0	0	0	0
JEFFERSON COUNTY WCID #10	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
LIVESTOCK	JEFFERSON	NECHES	22	22	22	22	22	22
LIVESTOCK	JEFFERSON	NECHES-TRINITY	8	8	8	8	8	8
MANUFACTURING	JEFFERSON	NECHES	0	0	0	0	0	0
MANUFACTURING	JEFFERSON	NECHES-TRINITY	1,073	1,073	1,073	893	1,073	1,073
MEEKER MUD	JEFFERSON	NECHES	0	0	0	0	0	0
MEEKER MUD	JEFFERSON	NECHES-TRINITY	251	197	153	116	79	0
MINING	JEFFERSON	NECHES	8	6	4	3	1	0
MINING	JEFFERSON	NECHES-TRINITY	20	11	6	0	-5	-9
NEDERLAND	JEFFERSON	NECHES	0	0	0	0	0	0
NEDERLAND	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
NOME	JEFFERSON	NECHES	0	0	0	0	0	0
NOME	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
PORT ARTHUR	JEFFERSON	NECHES	0	0	0	0	0	0
PORT ARTHUR	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
PORT NECHES	JEFFERSON	NECHES	0	0	0	0	0	0
PORT NECHES	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0

Region I Water User Group Needs
(Ac-ft per year)

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
STEAM ELECTRIC POWER	JEFFERSON	NECHES	0	-13,426	-15,696	-18,464	-21,838	-25,951
WEST JEFFERSON COUNTY MWD	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
APPLEBY WSC	NACOGDOCHES	NECHES	109	47	47	47	47	47
COUNTY-OTHER	NACOGDOCHES	NECHES	1,361	1,282	1,216	1,131	940	723
CUSHING	NACOGDOCHES	NECHES	108	102	97	90	75	58
D&M WSC	NACOGDOCHES	NECHES	0	0	-21	-70	-182	-310
GARRISON	NACOGDOCHES	NECHES	416	418	421	424	426	426
IRRIGATION	NACOGDOCHES	NECHES	1,230	1,230	1,230	1,230	1,230	1,230
LILLY GROVE SUD	NACOGDOCHES	NECHES	338	228	120	9	-221	-463
LIVESTOCK	NACOGDOCHES	NECHES	266	31	-242	-559	-926	-1,347
MANUFACTURING	NACOGDOCHES	NECHES	0	0	0	0	0	0
MELROSE WSC	NACOGDOCHES	NECHES	441	413	391	362	296	221
MINING	NACOGDOCHES	NECHES	-2,495	-6,993	8	9	10	11
NACOGDOCHES	NACOGDOCHES	NECHES	9,823	8,210	6,588	5,010	2,537	188
STEAM ELECTRIC POWER	NACOGDOCHES	NECHES	-2,588	-190	-1,358	-2,783	-11,241	-13,358
SWIFT WSC	NACOGDOCHES	NECHES	183	99	26	-64	-237	-427
WODEN WSC	NACOGDOCHES	NECHES	528	508	490	469	419	363
COUNTY-OTHER	NEWTON	SABINE	250	246	275	278	258	224
IRRIGATION	NEWTON	SABINE	1,917	1,917	1,917	1,917	1,917	1,917
LIVESTOCK	NEWTON	SABINE	14	14	14	14	14	14
MANUFACTURING	NEWTON	SABINE	-149	-264	-370	-477	-574	-667
MAURICEVILLE SUD	NEWTON	SABINE	2	2	2	2	1	0
MINING	NEWTON	NECHES	2	2	2	2	2	2
MINING	NEWTON	SABINE	2	2	2	2	2	2
NEWTON	NEWTON	SABINE	206	191	197	189	177	162
SOUTH NEWTON WSC	NEWTON	SABINE	396	394	400	400	396	388
STEAM ELECTRIC POWER	NEWTON	SABINE	8,255	47	-2,343	-5,257	-8,808	-13,138
BRIDGE CITY	ORANGE	NECHES	43	41	43	47	47	45
BRIDGE CITY	ORANGE	NECHES-TRINITY	40	38	41	44	44	42
BRIDGE CITY	ORANGE	SABINE	219	211	223	242	240	233
COUNTY-OTHER	ORANGE	NECHES	-132	-93	-53	-7	1	-6
COUNTY-OTHER	ORANGE	NECHES-TRINITY	0	0	0	0	0	0
COUNTY-OTHER	ORANGE	SABINE	44	91	139	194	203	195
IRRIGATION	ORANGE	NECHES	3	3	3	3	3	3
IRRIGATION	ORANGE	SABINE	31	31	31	31	31	31

Region I Water User Group Needs
(Ac-ft per year)

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
LIVESTOCK	ORANGE	NECHES	0	0	0	0	0	0
LIVESTOCK	ORANGE	SABINE	4	4	4	4	4	4
MANUFACTURING	ORANGE	NECHES	3,239	3,092	2,963	2,834	2,720	2,592
MANUFACTURING	ORANGE	SABINE	1,684	-5,006	-10,855	-16,686	-21,863	-27,686
MAURICEVILLE SUD	ORANGE	SABINE	119	-37	-81	-96	-158	-202
MINING	ORANGE	NECHES	1	0	0	0	0	0
MINING	ORANGE	SABINE	0	0	0	0	0	0
ORANGE	ORANGE	SABINE	290	353	416	478	520	520
PINE FOREST	ORANGE	NECHES	55	57	59	61	63	63
PINEHURST	ORANGE	SABINE	354	361	369	377	382	382
ROSE CITY	ORANGE	NECHES	219	220	222	224	225	225
SOUTH NEWTON WSC	ORANGE	SABINE	97	85	81	82	78	74
STEAM ELECTRIC POWER	ORANGE	NECHES	12,067	13,329	12,490	11,466	10,218	8,697
VIDOR	ORANGE	NECHES	58	66	85	112	111	103
VIDOR	ORANGE	SABINE	300	302	307	314	314	312
WEST ORANGE	ORANGE	SABINE	375	389	403	417	426	426
BECKVILLE	PANOLA	SABINE	448	448	449	450	450	449
CARTHAGE	PANOLA	SABINE	1,682	1,599	1,538	1,487	1,438	1,341
COUNTY-OTHER	PANOLA	CYPRESS	0	0	0	0	0	0
COUNTY-OTHER	PANOLA	SABINE	989	1,006	1,031	1,062	1,080	1,068
GILL WSC	PANOLA	SABINE	19	17	16	14	13	13
LIVESTOCK	PANOLA	CYPRESS	0	0	0	0	0	0
LIVESTOCK	PANOLA	SABINE	282	282	282	282	282	282
MANUFACTURING	PANOLA	SABINE	-96	-116	-132	-147	-161	-187
MINING	PANOLA	SABINE	932	726	599	472	343	220
TATUM	PANOLA	SABINE	65	66	66	66	67	66
CORRIGAN	POLK	NECHES	284	234	196	176	165	146
COUNTY-OTHER	POLK	NECHES	-208	-417	-578	-681	-745	-828
IRRIGATION	POLK	NECHES	151	151	151	151	151	151
LIVESTOCK	POLK	NECHES	21	21	21	21	21	21
MANUFACTURING	POLK	NECHES	42	-64	-164	-269	-365	-449
COUNTY-OTHER	RUSK	NECHES	294	261	249	276	236	97
COUNTY-OTHER	RUSK	SABINE	265	225	211	243	196	34
EASTON	RUSK	SABINE	53	72	84	89	105	142
ELDERVILLE WSC	RUSK	SABINE	69	57	58	66	61	20
HENDERSON	RUSK	NECHES	4,190	4,209	4,235	4,265	4,277	4,249
HENDERSON	RUSK	SABINE	511	513	516	520	521	517
IRRIGATION	RUSK	NECHES	74	74	74	74	74	74

Region I Water User Group Needs
(Ac-ft per year)

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
IRRIGATION	RUSK	SABINE	116	116	116	116	116	116
KILGORE	RUSK	SABINE	231	211	189	167	133	87
LIVESTOCK	RUSK	NECHES	89	79	68	55	40	26
LIVESTOCK	RUSK	SABINE	78	71	63	52	41	29
MANUFACTURING	RUSK	NECHES	45	37	30	24	20	12
MANUFACTURING	RUSK	SABINE	6	6	6	6	5	5
MINING	RUSK	NECHES	293	206	155	105	55	8
MINING	RUSK	SABINE	83	31	0	-30	-60	-88
MOUNT ENTERPRISE	RUSK	NECHES	300	300	301	303	302	298
NEW LONDON	RUSK	NECHES	317	317	316	317	314	305
NEW LONDON	RUSK	SABINE	293	290	289	290	289	282
OVERTON	RUSK	NECHES	24	23	22	22	21	16
OVERTON	RUSK	SABINE	179	164	160	160	145	104
SOUTHERN UTILITIES COMPANY	RUSK	NECHES	24	21	21	20	18	10
STEAM ELECTRIC POWER	RUSK	SABINE	18,402	15,704	11,060	5,400	-1,501	-9,912
TATUM	RUSK	SABINE	252	256	259	262	264	264
WEST GREGG WSC	RUSK	SABINE	0	0	0	0	0	0
COUNTY-OTHER	SABINE	NECHES	-3	-12	-18	-24	-31	-43
COUNTY-OTHER	SABINE	SABINE	99	96	95	93	91	88
G-M WSC	SABINE	SABINE	30	27	33	40	29	9
HEMPHILL	SABINE	SABINE	717	706	699	691	682	670
LIVESTOCK	SABINE	NECHES	-8	-15	-22	-32	-42	-54
LIVESTOCK	SABINE	SABINE	-29	-65	-107	-154	-210	-270
MANUFACTURING	SABINE	NECHES	483	415	352	288	231	180
PINELAND	SABINE	NECHES	80	74	71	69	64	57
COUNTY-OTHER	SAN AUGUSTINE	NECHES	77	79	84	88	78	65
COUNTY-OTHER	SAN AUGUSTINE	SABINE	0	0	0	0	0	0
G-M WSC	SAN AUGUSTINE	SABINE	15	17	18	18	17	16
IRRIGATION	SAN AUGUSTINE	NECHES	-100	-100	-100	-100	-100	-100
IRRIGATION	SAN AUGUSTINE	SABINE	10	10	10	10	10	10
LIVESTOCK	SAN AUGUSTINE	NECHES	-77	-145	-224	-315	-422	-538
LIVESTOCK	SAN AUGUSTINE	SABINE	-14	-24	-36	-50	-65	-83
MANUFACTURING	SAN AUGUSTINE	NECHES	3	2	1	0	-1	-2
MINING	SAN AUGUSTINE	NECHES	-1,500	-7,000	0	0	0	0
SAN AUGUSTINE	SAN AUGUSTINE	NECHES	167	157	143	125	103	83
CENTER	SHELBY	SABINE	1,577	1,358	1,177	1,026	882	701
COUNTY-OTHER	SHELBY	NECHES	280	267	257	254	248	236
COUNTY-OTHER	SHELBY	SABINE	-126	-190	-244	-253	-288	-344

Region I Water User Group Needs
(Ac-ft per year)

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
IRRIGATION	SHELBY	NECHES	7	6	5	4	3	1
IRRIGATION	SHELBY	SABINE	88	86	83	81	78	75
JOAQUIN	SHELBY	SABINE	52	45	42	40	37	32
LIVESTOCK	SHELBY	NECHES	-314	-463	-644	-865	-1,134	-1,463
LIVESTOCK	SHELBY	SABINE	-463	-1,244	-2,197	-3,357	-4,773	-6,498
MANUFACTURING	SHELBY	SABINE	21	14	7	2	-5	-12
MINING	SHELBY	NECHES	-500	-1,500	0	0	0	0
TENAHA	SHELBY	SABINE	144	148	151	155	157	157
TIMPSON	SHELBY	NECHES	3	3	3	3	3	3
TIMPSON	SHELBY	SABINE	290	288	288	289	288	285
ARP	SMITH	NECHES	124	119	114	109	97	79
BULLARD	SMITH	NECHES	17	-13	-42	-71	-124	-195
COMMUNITY WATER COMPANY	SMITH	NECHES	-37	-88	-111	-132	-171	-227
COUNTY-OTHER	SMITH	NECHES	78	85	93	96	95	90
CRYSTAL SYSTEMS INC	SMITH	NECHES	0	0	0	0	0	0
DEAN WSC	SMITH	NECHES	438	394	347	303	215	87
IRRIGATION	SMITH	NECHES	-6	-36	-68	-100	-133	-168
JACKSON WSC	SMITH	NECHES	53	11	-38	-83	-118	-157
LINDALE	SMITH	NECHES	69	0	0	0	0	0
LINDALE RURAL WSC	SMITH	NECHES	278	230	181	134	47	-73
LIVESTOCK	SMITH	NECHES	46	46	46	46	46	46
MANUFACTURING	SMITH	NECHES	207	94	-6	-101	-182	-295
MINING	SMITH	NECHES	-47	-126	-159	-215	-255	-288
NEW CHAPEL HILL	SMITH	NECHES	0	0	0	0	0	0
NOONDAY	SMITH	NECHES	0	0	0	0	0	0
OVERTON	SMITH	NECHES	0	0	0	0	0	0
R P M WSC	SMITH	NECHES	18	16	14	12	8	3
SOUTHERN UTILITIES COMPANY	SMITH	NECHES	2,027	1,763	1,522	1,252	581	110
TROUP	SMITH	NECHES	146	135	121	110	81	39
TYLER	SMITH	NECHES	14,490	13,093	11,772	10,489	8,131	4,340
WHITEHOUSE	SMITH	NECHES	-27	-54	-79	-105	-155	-224
COUNTY-OTHER	TRINITY	NECHES	46	12	8	-9	-32	-57
GROVETON	TRINITY	NECHES	0	0	0	0	0	0
LIVESTOCK	TRINITY	NECHES	82	82	82	82	82	82
COLMESNEIL	TYLER	NECHES	299	291	287	287	288	288
COUNTY-OTHER	TYLER	NECHES	23	-142	-239	-251	-232	-232
IRRIGATION	TYLER	NECHES	98	98	98	98	98	98

Region I Water User Group Needs
(Ac-ft per year)

WUG Name	County	Basin	2010	2020	2030	2040	2050	2060
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	TYLER	NECHES	1	1	0	0	0	0
LIVESTOCK	TYLER	NECHES	37	37	37	37	37	37
MANUFACTURING	TYLER	NECHES	34	27	20	13	7	2
TYLER COUNTY WSC	TYLER	NECHES	497	439	407	409	420	420
WOODVILLE	TYLER	NECHES	1,260	1,171	1,119	1,103	1,107	1,107

Region I Wholesale Water Supplier Needs
(Ac-ft per Year)

WWP Name	WUG Name	WUG County	WUG Basin	2010	2020	2030	2040	2050	2060
ANGELINA & NECHES RIVER AUTHORITY	COUNTY-OTHER	CHEROKEE	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	ARP	SMITH	NECHES	-428	-428	-428	-428	-428	-428
ANGELINA & NECHES RIVER AUTHORITY	COUNTY-OTHER	SMITH	NECHES	-855	-855	-855	-855	-855	-855
ANGELINA & NECHES RIVER AUTHORITY	COUNTY-OTHER	NACOGDOCHES	NECHES	-428	-428	-428	-428	-428	-428
ANGELINA & NECHES RIVER AUTHORITY	ALTO	CHEROKEE	NECHES	-428	-428	-428	-428	-428	-428
ANGELINA & NECHES RIVER AUTHORITY	COUNTY-OTHER	CHEROKEE	NECHES	-3,848	-3,848	-3,848	-3,848	-3,848	-3,848
ANGELINA & NECHES RIVER AUTHORITY	COUNTY-OTHER	JASPER	NECHES	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	JACKSON WSC	SMITH	NECHES	-855	-855	-855	-855	-855	-855
ANGELINA & NECHES RIVER AUTHORITY	JACKSONVILLE	CHEROKEE	NECHES	-4,275	-4,275	-4,275	-4,275	-4,275	-4,275
ANGELINA & NECHES RIVER AUTHORITY	NACOGDOCHES	NACOGDOCHES	NECHES	-8,551	-8,551	-8,551	-8,551	-8,551	-8,551
ANGELINA & NECHES RIVER AUTHORITY	NEW LONDON	RUSK	SABINE	-855	-855	-855	-855	-855	-855
ANGELINA & NECHES RIVER AUTHORITY	NEW SUMMERFIELD	CHEROKEE	NECHES	-2,565	-2,565	-2,565	-2,565	-2,565	-2,565
ANGELINA & NECHES RIVER AUTHORITY	NORTH CHEROKEE WSC	CHEROKEE	NECHES	-4,275	-4,275	-4,275	-4,275	-4,275	-4,275
ANGELINA & NECHES RIVER AUTHORITY	RUSK	CHEROKEE	NECHES	-4,275	-4,275	-4,275	-4,275	-4,275	-4,275
ANGELINA & NECHES RIVER AUTHORITY	RUSK RURAL WSC	CHEROKEE	NECHES	-855	-855	-855	-855	-855	-855
ANGELINA & NECHES RIVER AUTHORITY	MANUFACTURING	ANGELINA	NECHES	-8,551	-8,551	-8,551	-8,551	-8,551	-8,551
ANGELINA & NECHES RIVER AUTHORITY	TROUP	SMITH	NECHES	-4,275	-4,275	-4,275	-4,275	-4,275	-4,275
ANGELINA & NECHES RIVER AUTHORITY	WHITEHOUSE	SMITH	NECHES	-8,551	-8,551	-8,551	-8,551	-8,551	-8,551
ANGELINA NACOGDOCHES WCID #1	COUNTY-OTHER	CHEROKEE	NECHES	11,270	10,846	9,716	8,520	13,965	12,590
ANGELINA NACOGDOCHES WCID #1	HENDERSON	RUSK	NECHES	0	0	0	0	0	0
ANGELINA NACOGDOCHES WCID #1	STEAM ELECTRIC POWER	CHEROKEE	NECHES	0	0	0	0	0	0
ANGELINA NACOGDOCHES WCID #1	STEAM ELECTRIC POWER	NACOGDOCHES	NECHES	0	0	0	0	0	0
ANGELINA NACOGDOCHES WCID #1	WHITEHOUSE	SMITH	NECHES	0	0	0	0	0	0
ATHENS MUNICIPAL WATER AUTHORITY	COUNTY-OTHER	HENDERSON	NECHES	160	0	0	0	0	0
ATHENS MUNICIPAL WATER AUTHORITY	ATHENS	HENDERSON	TRINITY	0	-1,529	-1,913	-2,399	-3,081	-3,977
ATHENS MUNICIPAL WATER AUTHORITY	ATHENS	HENDERSON	NECHES	4	-52	-70	-88	-117	-155
ATHENS MUNICIPAL WATER AUTHORITY	IRRIGATION	HENDERSON	NECHES	12	-70	-83	-95	-108	-121
ATHENS MUNICIPAL WATER AUTHORITY	LIVESTOCK	HENDERSON	NECHES	229	-1,288	-1,477	-1,647	-1,820	-1,983
ATHENS MUNICIPAL WATER AUTHORITY	MANUFACTURING	HENDERSON	TRINITY	0	-45	-59	-74	-93	-115
BEAUMONT CITY OF	BEAUMONT	JEFFERSON	NECHES	634	553	496	469	377	67
BEAUMONT CITY OF	BEAUMONT	JEFFERSON	NECHES-TRINITY	1,050	907	808	761	601	59
BEAUMONT CITY OF	BEAUMONT	JEFFERSON	NECHES-TRINITY	9,692	9,691	9,692	9,690	9,691	9,691
BEAUMONT CITY OF	COUNTY-OTHER	JEFFERSON	NECHES	0	0	0	0	0	0
BEAUMONT CITY OF	COUNTY-OTHER	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
BEAUMONT CITY OF	MANUFACTURING	JEFFERSON	NECHES	0	0	0	0	0	0
BEAUMONT CITY OF	MEEKER MUD	JEFFERSON	NECHES	0	0	0	0	0	0
CARTHAGE CITY OF	CARTHAGE	PANOLA	SABINE	7,981	7,597	7,223	6,856	6,487	6,100
CARTHAGE CITY OF	CARTHAGE	PANOLA	SABINE	1,860	1,808	1,768	1,730	1,697	1,633
CARTHAGE CITY OF	COUNTY-OTHER	PANOLA	CYPRESS	0	0	0	0	0	0
CARTHAGE CITY OF	COUNTY-OTHER	PANOLA	SABINE	0	0	0	0	0	0
CARTHAGE CITY OF	MANUFACTURING	PANOLA	SABINE	0	0	0	0	0	0
CENTER CITY OF	CENTER	SHELBY	SABINE	1,577	1,358	1,177	1,026	882	701

Region I Wholesale Water Supplier Needs
(Ac-ft per Year)

WWP Name	WUG Name	WUG County	WUG Basin	2010	2020	2030	2040	2050	2060
CENTER CITY OF	MANUFACTURING	SHELBY	SABINE	0	0	0	1	0	0
CENTER CITY OF	COUNTY-OTHER	SHELBY	SABINE	0	0	0	0	0	0
CENTER CITY OF	COUNTY-OTHER	SHELBY	SABINE	0	0	0	0	0	0
HOUSTON COUNTY WCID #1	CONSOLIDATED WSC	HOUSTON	NECHES	0	0	0	0	0	0
HOUSTON COUNTY WCID #1	CONSOLIDATED WSC	ANDERSON	TRINITY	0	0	0	0	0	0
HOUSTON COUNTY WCID #1	CONSOLIDATED WSC	HOUSTON	TRINITY	-19	-19	-19	-19	-19	-19
HOUSTON COUNTY WCID #1	CONSOLIDATED WSC	ANDERSON	NECHES	0	0	0	0	0	0
HOUSTON COUNTY WCID #1	COUNTY-OTHER	HOUSTON	TRINITY	-5	-7	-7	-8	-9	-10
HOUSTON COUNTY WCID #1	CROCKETT	HOUSTON	TRINITY	-110	-125	-139	-152	-165	-180
HOUSTON COUNTY WCID #1	GRAPELAND	HOUSTON	TRINITY	-24	-28	-31	-33	-36	-40
HOUSTON COUNTY WCID #1	COUNTY-OTHER	HOUSTON	TRINITY	82	84	84	83	84	84
HOUSTON COUNTY WCID #1	LOVELADY	HOUSTON	TRINITY	-26	-26	-26	-26	-26	-26
HOUSTON COUNTY WCID #1	MANUFACTURING	HOUSTON	TRINITY	-10	-13	-16	-19	-22	-26
JACKSONVILLE CITY OF	BULLARD	SMITH	NECHES	4	3	2	2	1	1
JACKSONVILLE CITY OF	COUNTY-OTHER	CHEROKEE	NECHES	85	59	37	17	9	4
JACKSONVILLE CITY OF	CRAFT-TURNEY WSC	CHEROKEE	NECHES	196	185	177	165	133	79
JACKSONVILLE CITY OF	JACKSONVILLE	CHEROKEE	NECHES	1,329	1,094	892	699	531	308
JACKSONVILLE CITY OF	MANUFACTURING	CHEROKEE	NECHES	272	236	200	163	126	76
JACKSONVILLE CITY OF	NORTH CHEROKEE WSC	CHEROKEE	NECHES	147	132	115	95	76	46
LOWER NECHES VALLEY AUTHORITY	BEAUMONT	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	BOLIVAR PENINSULAR SUD	GALVESTON	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	COUNTY-OTHER	GALVESTON	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	COUNTY-OTHER	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	MANUFACTURING	JASPER	NECHES	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	GROVES	JEFFERSON	NECHES	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	GROVES	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	IRRIGATION	CHAMBERS	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	IRRIGATION	LIBERTY	NECHES	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	IRRIGATION	LIBERTY	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	IRRIGATION	JEFFERSON	NECHES	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	IRRIGATION	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	JEFFERSON COUNTY WCID #10	JEFFERSON	NECHES	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	JEFFERSON COUNTY WCID #10	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	COUNTY-OTHER	JEFFERSON	NECHES	654,065	356,247	164,679	220,665	123,832	105,420
LOWER NECHES VALLEY AUTHORITY	COUNTY-OTHER	GALVESTON	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	MANUFACTURING	JASPER	NECHES	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	MANUFACTURING	JEFFERSON	NECHES	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	MANUFACTURING	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	NEDERLAND	JEFFERSON	NECHES	0	0	0	0	0	0

Region I Wholesale Water Supplier Needs
(Ac-ft per Year)

WWP Name	WUG Name	WUG County	WUG Basin	2010	2020	2030	2040	2050	2060
LOWER NECHES VALLEY AUTHORITY	NEDERLAND	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	NOME	JEFFERSON	NECHES	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	NOME	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	PORT ARTHUR	JEFFERSON	NECHES	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	PORT ARTHUR	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	PORT NECHES	JEFFERSON	NECHES	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	PORT NECHES	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	TRINITY BAY CONSERVATION DISTRICT	CHAMBERS	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	TRINITY BAY CONSERVATION DISTRICT	CHAMBERS	TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	WEST JEFFERSON COUNTY MWD	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	MANUFACTURING	JASPER	NECHES	0	0	0	0	0	0
LOWER NECHES VALLEY AUTHORITY	WOODVILLE	TYLER	NECHES	0	0	0	0	0	0
LUFKIN CITY OF	LUFKIN	ANGELINA	NECHES	-3,244	-5,117	-6,057	-7,116	-8,416	-9,965
LUFKIN CITY OF	COUNTY-OTHER	ANGELINA	NECHES	-56	-90	-105	-119	-137	-160
LUFKIN CITY OF	DIBOLL	ANGELINA	NECHES	-834	-1,176	-1,244	-1,307	-1,366	-1,422
LUFKIN CITY OF	HUNTINGTON	ANGELINA	NECHES	-9	-16	-21	-24	-28	-32
LUFKIN CITY OF	MANUFACTURING	ANGELINA	NECHES	-4,105	-10,456	-12,172	-14,063	-16,173	-18,512
LUFKIN CITY OF	REDLAND WSC	ANGELINA	NECHES	-46	-63	-65	-66	-68	-71
NACOGDOCHES CITY OF	APPLEBY WSC	NACOGDOCHES	NECHES	0	0	0	0	0	0
NACOGDOCHES CITY OF	NACOGDOCHES	NACOGDOCHES	NECHES	9,823	8,210	6,588	5,010	2,537	188
NACOGDOCHES CITY OF	D&M WSC	NACOGDOCHES	NECHES	0	0	0	0	0	0
NACOGDOCHES CITY OF	MANUFACTURING	NACOGDOCHES	NECHES	0	0	0	0	0	0
PANOLA COUNTY FWSD #1	CARTHAGE	PANOLA	SABINE	8,311	7,875	7,461	7,056	6,655	6,203
PANOLA COUNTY FWSD #1	COUNTY-OTHER	PANOLA	SABINE	0	0	0	0	0	0
PANOLA COUNTY FWSD #1	MANUFACTURING	PANOLA	SABINE	0	0	0	0	0	0
PANOLA COUNTY FWSD #1	MINING	PANOLA	SABINE	0	0	0	0	0	0
PANOLA COUNTY FWSD #1	COUNTY-OTHER	PANOLA	SABINE	6,448	5,903	5,479	5,053	4,623	4,205
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	0	0	0	0	0	0
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	0	0	0	0	0	0
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	0	0	0	0	0	0
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	0	0	0	0	0	0
PORT ARTHUR CITY OF	PORT ARTHUR	JEFFERSON	NECHES	0	0	0	0	0	0
PORT ARTHUR CITY OF	PORT ARTHUR	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	0	0	0	0	0	0
PORT ARTHUR CITY OF	MEEKER MUD	JEFFERSON	NECHES	0	0	0	0	0	0
PORT ARTHUR CITY OF	COUNTY-OTHER	JEFFERSON	NECHES-TRINITY	0	0	0	0	0	0
PORT ARTHUR CITY OF	MANUFACTURING	JEFFERSON	NECHES	0	0	0	0	0	0

Region I Wholesale Water Supplier Needs
(Ac-ft per Year)

WWP Name	WUG Name	WUG County	WUG Basin	2010	2020	2030	2040	2050	2060
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	ABLES SPRINGS WSC	KAUFMAN	TRINITY	-27	-27	-33	-46	-74	-105
SABINE RIVER AUTHORITY	ABLES SPRINGS WSC	HUNT	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	ABLES SPRINGS WSC	VAN ZANDT	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	COUNTY-OTHER	SABINE	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	CASH SUD	ROCKWALL	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	CASH SUD	HOPKINS	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	CASH SUD	HUNT	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	CASH SUD	RAINS	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	COMMERCE	HUNT	SULPHUR	0	0	0	0	0	0
SABINE RIVER AUTHORITY	DALLAS	DALLAS	TRINITY	-11,069	-11,917	-12,765	-13,614	-14,462	-15,310
SABINE RIVER AUTHORITY	EDGEWOOD	VAN ZANDT	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	EMORY	RAINS	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	GREENVILLE	HUNT	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	POINT	RAINS	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	QUITMAN	WOOD	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	TERRELL	KAUFMAN	TRINITY	-363	-435	-508	-580	-653	-725
SABINE RIVER AUTHORITY	WEST TAWAKONI	HUNT	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	COMBINED CONSUMERS WSC	HUNT	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	COMBINED CONSUMERS WSC	VAN ZANDT	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	STEAM ELECTRIC POWER	NEWTON	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	MANUFACTURING	HARRISON	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	COUNTY-OTHER	SABINE	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	STEAM ELECTRIC POWER	ORANGE	NECHES	0	0	0	0	0	0
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	HEMPHILL	SABINE	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	HENDERSON	RUSK	NECHES	0	0	0	0	0	0
SABINE RIVER AUTHORITY	HENDERSON	RUSK	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	COUNTY-OTHER	SHELBY	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	IRRIGATION	ORANGE	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	COUNTY-OTHER	GREGG	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	KILGORE	GREGG	SABINE	-1,189	-1,149	-1,109	-1,070	-1,031	-992
SABINE RIVER AUTHORITY	KILGORE	RUSK	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	LONGVIEW	GREGG	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	LONGVIEW	HARRISON	SABINE	0	0	0	0	0	0

Region I Wholesale Water Supplier Needs
(Ac-ft per Year)

WWP Name	WUG Name	WUG County	WUG Basin	2010	2020	2030	2040	2050	2060
SABINE RIVER AUTHORITY	MACBEE SUD	HUNT	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	MACBEE SUD	VAN ZANDT	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	MACBEE SUD	VAN ZANDT	TRINITY	0	0	0	0	0	0
SABINE RIVER AUTHORITY	MACBEE SUD	KAUFMAN	SABINE	0	0	4	10	15	19
SABINE RIVER AUTHORITY	MANUFACTURING	ORANGE	NECHES	0	0	0	0	0	0
SABINE RIVER AUTHORITY	COUNTY-OTHER	SABINE	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	MINING	HARRISON	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	ROSE CITY	ORANGE	NECHES	0	0	0	0	0	0
SABINE RIVER AUTHORITY	SOUTH TAWAKONI WSC	VAN ZANDT	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	COUNTY-OTHER	NEWTON	SABINE	803,978	803,978	803,978	803,978	803,978	803,978
SABINE RIVER AUTHORITY	COUNTY-OTHER	KAUFMAN	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	STEAM ELECTRIC POWER	NEWTON	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	WILLS POINT	VAN ZANDT	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	WILLS POINT	VAN ZANDT	TRINITY	0	0	0	0	0	0
TYLER CITY OF	COUNTY-OTHER	SMITH	NECHES	0	0	0	0	0	0
TYLER CITY OF	IRRIGATION	SMITH	NECHES	0	0	0	0	0	0
TYLER CITY OF	MANUFACTURING	SMITH	NECHES	0	0	0	0	0	0
TYLER CITY OF	SOUTHERN UTILITIES COMPANY	SMITH	NECHES	0	0	0	0	0	0
TYLER CITY OF	TYLER	SMITH	SABINE	0	0	0	0	0	0
TYLER CITY OF	TYLER	SMITH	NECHES	14,490	13,093	11,772	10,489	8,131	4,340
TYLER CITY OF	WHITEHOUSE	SMITH	NECHES	0	0	0	0	0	0
UPPER NECHES MWD	DALLAS	DALLAS	TRINITY	-1,456	-2,561	-3,667	-4,774	-5,882	-6,990
UPPER NECHES MWD	PALESTINE	ANDERSON	TRINITY	-357	-627	-898	-1,169	-1,440	-1,712
UPPER NECHES MWD	TYLER	SMITH	NECHES	-856	-1,506	-2,155	-2,806	-3,457	-4,108
UPPER NECHES MWD	COUNTY-OTHER	SMITH	NECHES	-2	-2	-4	-3	-3	-3
UPPER NECHES MWD	COUNTY-OTHER	SMITH	NECHES	-1	-2	-3	-4	-5	-6
UPPER NECHES MWD	IRRIGATION	CHEROKEE	NECHES	-4	-7	-10	-13	-15	-18
UPPER NECHES MWD	COUNTY-OTHER	HENDERSON	NECHES	-1	-2	-3	-4	-5	-6
UPPER NECHES MWD	COUNTY-OTHER	ANDERSON	NECHES	0	0	0	0	0	0

Region I Water User Group Potentially Feasible Water Management Strategy Supply
(Ac-ft per Year)

WUG Name	WUG County	WUG Basin	Project Name	Source Name	Source County	Source Basin	Selected	2010	2020	2030	2040	2050	2060
COUNTY-OTHER	ANDERSON	TRINITY	NEW WELLS - QUEEN CITY AQUIFER	QUEEN CITY AQUIFER	ANDERSON	TRINITY	Recommended	0	0	0	0	0	100
COUNTY-OTHER	ANDERSON	NECHES	OVERDRAFT CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	ANDERSON	NECHES	Recommended	0	0	0	100	100	100
FRANKSTON	ANDERSON	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	ANDERSON	NECHES	Recommended	0	0	6	7	8	9
FRANKSTON	ANDERSON	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	ANDERSON	NECHES	Recommended	0	0	121	121	121	121
MINING	ANDERSON	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	ANDERSON	NECHES	Recommended	0	86	86	86	86	87
MINING	ANDERSON	TRINITY	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	ANDERSON	TRINITY	Recommended	18	34	34	34	34	33
STEAM ELECTRIC POWER	ANDERSON	NECHES	PURCHASE WATER FROM PROVIDER (2)	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	0	21853	21853	21853	21853	21853
COUNTY-OTHER	ANGELINA	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	Considered	404	404	404	404	404	1211
COUNTY-OTHER	ANGELINA	NECHES	NEW WELLS - YEGUA JACKSON AQUIFER	YEGUA-JACKSON AQUIFER	ANGELINA	NECHES	Recommended	0	0	150	150	300	300
COUNTY-OTHER	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (2)	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	Recommended	0	0	1100	1100	600	600
COUNTY-OTHER	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (2)	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	Recommended	0	0	0	0	500	500
DIBOLL	ANGELINA	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	ANGELINA	NECHES	Recommended	11	20	26	34	53	72
DIBOLL	ANGELINA	NECHES	NEW WELLS - YEGUA JACKSON AQUIFER	YEGUA-JACKSON AQUIFER	ANGELINA	NECHES	Recommended	600	600	600	600	600	600
DIBOLL	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (2)	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	Recommended	800	800	800	800	1600	1600
FOUR WAY WSC	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (2)	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	Recommended	0	0	0	0	0	225
HUDSON	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (1)	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	Recommended	0	0	125	400	800	1200
HUDSON WSC	ANGELINA	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	Recommended	0	0	600	600	2000	2000
LIVESTOCK	ANGELINA	NECHES	EXPAND LOCAL SURFACE WATER SUPPLIES	LIVESTOCK LOCAL SUPPLY	ANGELINA	NECHES	Recommended	0	0	0	90	90	90
LUFKIN	ANGELINA	NECHES	LAKE KURTH REGIONAL SYSTEM	KURTH LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	0	5600	5600	4300	5600	5600
LUFKIN	ANGELINA	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	ANGELINA	NECHES	Recommended	50	117	189	249	319	408
LUFKIN	ANGELINA	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	Recommended	2955	2555	2465	2384	2301	2215
LUFKIN	ANGELINA	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	Recommended	750	750	750	750	750	750
LUFKIN	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (3)	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	Recommended	0	0	0	0	7200	5200
MANUFACTURING	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	0	8551	8551	8551	8551	8551
MANUFACTURING	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (2)	KURTH LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	6800	12800	12800	14100	12800	12800
MANUFACTURING	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (2)	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	Recommended	0	0	0	0	4000	6000
MINING	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	2000	4000	0	0	0	0
STEAM ELECTRIC POWER	ANGELINA	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	Recommended	1000	1000	1000	1000	1000	1000
JACKSONVILLE	CHEROKEE	NECHES	INFRASTRUCTURE IMPROVEMENTS	JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	1000	1000	1000	1000	1000	1000
JACKSONVILLE	CHEROKEE	NECHES	PURCHASE WATER FROM PROVIDER (3)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	0	1700	1700	1700	1700	1700
MINING	CHEROKEE	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	500	1500	0	0	0	0
NEW SUMMERFIELD	CHEROKEE	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	CHEROKEE	NECHES	Recommended	0	10	18	21	23	26
NEW SUMMERFIELD	CHEROKEE	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	Considered	0	0	121	242	242	242
NEW SUMMERFIELD	CHEROKEE	NECHES	PURCHASE WATER FROM PROVIDER (1)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	0	1000	1000	1000	1000	1000
RUSK	CHEROKEE	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	CHEROKEE	NECHES	Recommended	0	0	0	51	66	76
RUSK	CHEROKEE	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	Alternate	0	0	0	212	212	212
RUSK	CHEROKEE	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	0	3000	3000	3000	3000	3000
COUNTY-OTHER	HARDIN	TRINITY	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	HARDIN	TRINITY	Recommended	0	0	0	1	1	2
COUNTY-OTHER	HARDIN	NECHES	OVERDRAFT GULF COAST AQUIFER	GULF COAST AQUIFER	HARDIN	NECHES	Recommended	154	306	306	306	459	459
IRRIGATION	HARDIN	NECHES	PURCHASE WATER FROM PROVIDER (2)	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	Recommended	1002	1002	1002	1002	1002	1002
MANUFACTURING	HARDIN	NECHES	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	HARDIN	NECHES	Recommended	114	114	114	114	114	114
ATHENS	HENDERSON	TRINITY	FOREST GROVE RESERVOIR PROJECT	FOREST GROVE LAKE/RESERVOIR	RESERVOIR	TRINITY	Recommended	0	0	0	0	0	0
ATHENS	HENDERSON	NECHES	INDIRECT REUSE	INDIRECT REUSE	HENDERSON	NECHES	Recommended	0	19	29	42	65	94
ATHENS	HENDERSON	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	HENDERSON	NECHES	Recommended	1	6	12	17	22	30
BROWNSBORO	HENDERSON	NECHES	OVERDRAFT CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	Recommended	0	0	0	0	0	40
COUNTY-OTHER	HENDERSON	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	HENDERSON	NECHES	Recommended	31	57	74	92	108	129
COUNTY-OTHER	HENDERSON	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	Recommended	50	50	50	50	50	50
COUNTY-OTHER	HENDERSON	NECHES	NEW WELLS - QUEEN CITY AQUIFER	QUEEN CITY AQUIFER	HENDERSON	NECHES	Recommended	50	50	50	100	200	500
COUNTY-OTHER	HENDERSON	NECHES	OVERDRAFT CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	Recommended	100	0	0	0	0	0
COUNTY-OTHER	HENDERSON	NECHES	PURCHASE WATER FROM PROVIDER (2)	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	0	150	200	300	400	500
IRRIGATION	HENDERSON	NECHES	INDIRECT REUSE	INDIRECT REUSE	HENDERSON	NECHES	Recommended	0	70	83	95	108	121
LIVESTOCK	HENDERSON	NECHES	INDIRECT REUSE	INDIRECT REUSE	HENDERSON	NECHES	Recommended	0	1288	1477	1647	1820	1983
CONSOLIDATED WSC	HOUSTON	TRINITY	PURCHASE WATER FROM PROVIDER (1)	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	Recommended	1050	1050	1050	1050	1050	1050

WUG Name	WUG County	WUG Basin	Project Name	Source Name	Source County	Source Basin	Selected	2010	2020	2030	2040	2050	2060
IRRIGATION	HOUSTON	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	HOUSTON	NECHES	Recommended	766	766	766	873	1149	1149
IRRIGATION	HOUSTON	TRINITY	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	HOUSTON	TRINITY	Recommended	0	383	383	766	766	1149
LIVESTOCK	HOUSTON	TRINITY	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	HOUSTON	TRINITY	Recommended	111	111	221	363	542	665
LIVESTOCK	HOUSTON	NECHES	NEW WELLS - YEGUA JACKSON AQUIFER	YEGUA-JACKSON AQUIFER	HOUSTON	NECHES	Recommended	110	130	221	300	342	416
MANUFACTURING	HOUSTON	TRINITY	PURCHASE WATER FROM PROVIDER (1)	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	Recommended	30	30	30	30	30	30
COUNTY-OTHER	JASPER	SABINE	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	JASPER	SABINE	Recommended	82	82	82	82	82	82
COUNTY-OTHER	JASPER	NECHES	OVERDRAFT GULF COAST AQUIFER	GULF COAST AQUIFER	JASPER	NECHES	Recommended	550	550	550	550	550	550
KIRBYVILLE	JASPER	SABINE	MUNICIPAL CONSERVATION	CONSERVATION	JASPER	SABINE	Recommended	3	4	5	6	7	7
MINING	JEFFERSON	NECHES-TRINITY	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	JEFFERSON	NECHES-TRINITY	Recommended	0	0	0	0	5	9
STEAM ELECTRIC POWER	JEFFERSON	NECHES	PURCHASE WATER FROM PROVIDER (1)	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	Recommended	0	25951	25951	25951	25951	25951
APPLEBY WSC	NACOGDOCHES	NECHES	LAKE NACONICHE REGIONAL WATER SUPPLY SYSTEM	LAKE NACONICHE LAKE/RESERVOIR	NACOGDOCHES	NECHES	Recommended	0	300	300	300	300	300
APPLEBY WSC	NACOGDOCHES	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	NACOGDOCHES	NECHES	Recommended	0	0	0	22	39	62
COUNTY-OTHER	NACOGDOCHES	NECHES	LAKE NACONICHE REGIONAL WATER SUPPLY SYSTEM	LAKE NACONICHE LAKE/RESERVOIR	NACOGDOCHES	NECHES	Recommended	0	500	500	500	500	500
COUNTY-OTHER	NACOGDOCHES	NECHES	PURCHASE WATER FROM PROVIDER (1)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	0	428	428	428	428	428
D&M WSC	NACOGDOCHES	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	Recommended	0	0	310	310	310	310
LILLY GROVE SUD	NACOGDOCHES	NECHES	LAKE NACONICHE REGIONAL WATER SUPPLY SYSTEM	LAKE NACONICHE LAKE/RESERVOIR	NACOGDOCHES	NECHES	Recommended	0	0	0	0	500	500
LILLY GROVE SUD	NACOGDOCHES	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	Recommended	0	0	0	0	500	500
LIVESTOCK	NACOGDOCHES	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	Recommended	0	0	322	644	966	1350
MINING	NACOGDOCHES	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	2500	7000	0	0	0	0
NACOGDOCHES	NACOGDOCHES	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	NACOGDOCHES	NECHES	Recommended	0	229	425	514	654	787
NACOGDOCHES	NACOGDOCHES	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	Recommended	2800	2800	2800	2800	2800	2800
NACOGDOCHES	NACOGDOCHES	NECHES	PURCHASE WATER FROM PROVIDER (3)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	0	8551	8551	8551	8551	8551
NACOGDOCHES	NACOGDOCHES	NECHES	PURCHASE WATER FROM PROVIDER (3)	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	Recommended	0	0	0	0	5175	5175
STEAM ELECTRIC POWER	NACOGDOCHES	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	0	5000	5000	5000	13400	13400
STEAM ELECTRIC POWER	NACOGDOCHES	NECHES	PURCHASE WATER FROM PROVIDER (2)	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	Recommended	0	340	340	340	340	340
SWIFT WSC	NACOGDOCHES	NECHES	LAKE NACONICHE REGIONAL WATER SUPPLY SYSTEM	LAKE NACONICHE LAKE/RESERVOIR	NACOGDOCHES	NECHES	Recommended	0	0	400	400	400	400
SWIFT WSC	NACOGDOCHES	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	Recommended	350	350	350	350	350	350
SWIFT WSC	NACOGDOCHES	NECHES	PURCHASE WATER FROM PROVIDER (1)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	Alternate	0	688	688	688	688	688
MANUFACTURING	NEWTON	SABINE	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	NEWTON	SABINE	Recommended	400	400	400	800	800	800
MANUFACTURING	NEWTON	SABINE	PURCHASE WATER FROM PROVIDER (2)	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	Considered	700	700	700	700	700	700
STEAM ELECTRIC POWER	NEWTON	SABINE	PURCHASE WATER FROM PROVIDER (2)	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	Recommended	0	0	15000	15000	15000	15000
COUNTY-OTHER	ORANGE	NECHES	OVERDRAFT GULF COAST AQUIFER	GULF COAST AQUIFER	ORANGE	NECHES	Recommended	140	140	140	140	140	140
MANUFACTURING	ORANGE	SABINE	PURCHASE WATER FROM PROVIDER (1)	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	Recommended	5000	15000	20000	25000	25000	28000
MANUFACTURING	ORANGE	SABINE	PURCHASE WATER FROM PROVIDER (2)	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	Recommended	0	0	0	0	5000	8000
MAURICEVILLE SUD	ORANGE	SABINE	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	NEWTON	SABINE	Recommended	0	203	203	203	203	203
MANUFACTURING	PANOLA	SABINE	PURCHASE WATER FROM PROVIDER (1)	MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	Recommended	96	116	132	147	161	187
COUNTY-OTHER	POLK	NECHES	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	POLK	NECHES	Recommended	208	417	624	832	832	832
MANUFACTURING	POLK	NECHES	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	POLK	NECHES	Recommended	0	225	225	450	450	450
MINING	RUSK	SABINE	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	RUSK	SABINE	Recommended	0	0	0	158	158	158
STEAM ELECTRIC POWER	RUSK	SABINE	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	0	0	0	0	0	8500
STEAM ELECTRIC POWER	RUSK	SABINE	PURCHASE WATER FROM PROVIDER (2)	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	Recommended	0	0	0	0	1501	1500
COUNTY-OTHER	SABINE	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	SABINE	NECHES	Recommended	32	32	32	64	64	64
COUNTY-OTHER	SABINE	NECHES	PURCHASE WATER FROM PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	Alternate	100	100	100	100	100	100
LIVESTOCK	SABINE	SABINE	EXPAND LOCAL SURFACE WATER SUPPLIES	LIVESTOCK LOCAL SUPPLY	SABINE	SABINE	Recommended	50	100	107	200	210	300
LIVESTOCK	SABINE	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	SABINE	SABINE	Recommended	50	50	50	100	100	100
IRRIGATION	SAN AUGUSTINE	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	NECHES	Recommended	100	100	100	100	100	100
LIVESTOCK	SAN AUGUSTINE	NECHES	EXPAND LOCAL SURFACE WATER SUPPLIES	LIVESTOCK LOCAL SUPPLY	SAN AUGUSTINE	NECHES	Recommended	0	50	100	200	200	300
LIVESTOCK	SAN AUGUSTINE	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	NECHES	Recommended	100	100	200	200	300	300
LIVESTOCK	SAN AUGUSTINE	SABINE	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	SABINE	Recommended	50	50	50	100	100	100
MANUFACTURING	SAN AUGUSTINE	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	NECHES	Recommended	10	10	10	10	10	10
MINING	SAN AUGUSTINE	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	500	500	0	0	0	0

Region I Water User Group Potentially Feasible Water Management Strategy Supply
(Ac-ft per Year)

WUG Name	WUG County	WUG Basin	Project Name	Source Name	Source County	Source Basin	Selected	2010	2020	2030	2040	2050	2060
MINING	SAN AUGUSTINE	NECHES	PURCHASE WATER FROM PROVIDER (2)	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	Recommended	1000	6500	0	0	0	0
CENTER	SHELBY	SABINE	MUNICIPAL CONSERVATION	CONSERVATION	HENDERSON	NECHES	Recommended	15	34	47	60	67	75
COUNTY-OTHER	SHELBY	SABINE	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	SHELBY	SABINE	Recommended	100	200	300	300	350	350
COUNTY-OTHER	SHELBY	SABINE	PURCHASE WATER FROM PROVIDER (1)	CENTER LAKE/RESERVOIR	RESERVOIR	SABINE	Recommended	50	50	50	50	50	50
COUNTY-OTHER	SHELBY	SABINE	PURCHASE WATER FROM PROVIDER (2)	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	Recommended	150	150	150	150	150	150
LIVESTOCK	SHELBY	SABINE	EXPAND LOCAL SURFACE WATER SUPPLIES	LIVESTOCK LOCAL SUPPLY	SHELBY	SABINE	Recommended	0	0	500	500	500	500
LIVESTOCK	SHELBY	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	SHELBY	NECHES	Recommended	500	500	1000	1000	1500	1500
LIVESTOCK	SHELBY	SABINE	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	SHELBY	SABINE	Recommended	1000	2000	2000	2000	2000	2000
LIVESTOCK	SHELBY	SABINE	PURCHASE WATER FROM PROVIDER (2)	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	Recommended	0	0	0	4000	4000	4000
MANUFACTURING	SHELBY	SABINE	PURCHASE WATER FROM PROVIDER (1)	CARRIZO-WILCOX AQUIFER	SHELBY	SABINE	Recommended	0	0	0	0	5	12
MINING	SHELBY	NECHES	PURCHASE WATER FROM PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	Recommended	250	1250	0	0	0	0
MINING	SHELBY	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	250	250	0	0	0	0
BULLARD	SMITH	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	SMITH	NECHES	Recommended	0	3	4	5	6	8
BULLARD	SMITH	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	Recommended	0	100	100	100	200	200
COMMUNITY WATER COMPANY	SMITH	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	Recommended	121	121	121	227	227	227
IRRIGATION	SMITH	NECHES	NEW WELLS - QUEEN CITY AQUIFER	QUEEN CITY AQUIFER	HENDERSON	NECHES	Recommended	40	40	80	120	168	168
JACKSON WSC	SMITH	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	0	600	600	600	600	600
LINDALE RURAL WSC	SMITH	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	SMITH	NECHES	Recommended	0	0	5	7	9	12
LINDALE RURAL WSC	SMITH	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	SMITH	NECHES	Recommended	0	0	0	0	0	80
MANUFACTURING	SMITH	NECHES	PURCHASE WATER FROM PROVIDER (2)	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	0	0	294	294	294	295
MINING	SMITH	NECHES	NEW WELLS - QUEEN CITY AQUIFER	QUEEN CITY AQUIFER	HENDERSON	NECHES	Recommended	47	141	188	235	282	329
TYLER	SMITH	NECHES	LAKE PALESTINE INFRASTRUCTURE	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	0	0	16815	16815	16815	16815
WHITEHOUSE	SMITH	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	0	1200	1200	1200	1200	1200
WHITEHOUSE	SMITH	NECHES	PURCHASE WATER FROM PROVIDER (3)	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	Recommended	27	0	0	0	0	0
COUNTY-OTHER	TRINITY	NECHES	NEW WELLS - YEGUA JACKSON AQUIFER	YEGUA-JACKSON AQUIFER	TRINITY	NECHES	Recommended	0	0	0	60	60	60
COUNTY-OTHER	TYLER	NECHES	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	TYLER	NECHES	Recommended	0	251	251	251	251	251
WOODVILLE	TYLER	NECHES	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	TYLER	NECHES	Recommended	0	300	300	300	300	300

Region I Wholesale Water Provider Potentially Feasible Water Managment Strategy Supply
(Ac-ft per Year)

WWP Name	Project Name	Source Name	Source County	Source Basin	WUG Name	Selected	2010	2020	2030	2040	2050	2060
ANGELINA & NECHES RIVER AUTHORITY	ANRA TREATMENT AND DISTRIBUTION SYSTEM	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	ARP	Recommended	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	ANRA TREATMENT AND DISTRIBUTION SYSTEM	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	COUNTY-OTHER	Recommended	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	ANRA TREATMENT AND DISTRIBUTION SYSTEM	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	COUNTY-OTHER	Recommended	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	ANRA TREATMENT AND DISTRIBUTION SYSTEM	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	JACKSON WSC	Recommended	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	ANRA TREATMENT AND DISTRIBUTION SYSTEM	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	NEW LONDON	Recommended	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	ANRA TREATMENT AND DISTRIBUTION SYSTEM	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	NEW SUMMERFIELD	Recommended	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	ANRA TREATMENT AND DISTRIBUTION SYSTEM	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	TROUP	Recommended	0	0	0	0	0	0
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	COUNTY-OTHER	Recommended	0	21,830	21,830	21,830	21,830	21,830
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	ARP	Recommended	0	428	428	428	428	428
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	COUNTY-OTHER	Recommended	0	855	855	855	855	855
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	COUNTY-OTHER	Recommended	0	428	428	428	428	428
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	ALTO	Recommended	0	428	428	428	428	428
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	COUNTY-OTHER	Recommended	0	3,848	3,848	3,848	3,848	3,848
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	JACKSON WSC	Recommended	0	855	855	855	855	855
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	JACKSONVILLE	Recommended	0	4,275	4,275	4,275	4,275	4,275
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	NACOGDOCHES	Recommended	0	8,551	8,551	8,551	8,551	8,551
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	NEW LONDON	Recommended	0	855	855	855	855	855
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	NEW SUMMERFIELD	Recommended	0	2,565	2,565	2,565	2,565	2,565
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	NORTH CHEROKEE WSC	Recommended	0	4,275	4,275	4,275	4,275	4,275
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	RUSK	Recommended	0	4,275	4,275	4,275	4,275	4,275
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	RUSK RURAL WSC	Recommended	0	855	855	855	855	855
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	MANUFACTURING	Recommended	0	8,551	8,551	8,551	8,551	8,551
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	TROUP	Recommended	0	4,275	4,275	4,275	4,275	4,275
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	WHITEHOUSE	Recommended	0	8,551	8,551	8,551	8,551	8,551
CENTER CITY OF	MUNICIPAL CONSERVATION	CONSERVATION	HENDERSON	NECHES	CENTER	Recommended	15	34	47	60	67	75
HOUSTON COUNTY WCID #1	PERMIT AMENDMENT - HOUSTON COUNTY LAKE	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	CONSOLIDATED WSC	Recommended	0	0	0	0	0	0
HOUSTON COUNTY WCID #1	PERMIT AMENDMENT - HOUSTON COUNTY LAKE	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	CONSOLIDATED WSC	Recommended	1,050	1,050	1,050	1,050	1,050	1,050
HOUSTON COUNTY WCID #1	PERMIT AMENDMENT - HOUSTON COUNTY LAKE	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	COUNTY-OTHER	Recommended	10	10	10	10	10	10
HOUSTON COUNTY WCID #1	PERMIT AMENDMENT - HOUSTON COUNTY LAKE	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	CROCKETT	Recommended	194	194	194	194	194	194
HOUSTON COUNTY WCID #1	PERMIT AMENDMENT - HOUSTON COUNTY LAKE	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	GRAPELAND	Recommended	40	40	40	40	40	40
HOUSTON COUNTY WCID #1	PERMIT AMENDMENT - HOUSTON COUNTY LAKE	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	COUNTY-OTHER	Recommended	2,150	2,150	2,150	2,150	2,150	2,150
HOUSTON COUNTY WCID #1	PERMIT AMENDMENT - HOUSTON COUNTY LAKE	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	LOVELADY	Recommended	26	26	26	26	26	26
HOUSTON COUNTY WCID #1	PERMIT AMENDMENT - HOUSTON COUNTY LAKE	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	MANUFACTURING	Recommended	30	30	30	30	30	30
JACKSONVILLE CITY OF	INFRASTRUCTURE IMPROVEMENTS	JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	JACKSONVILLE	Recommended	1,000	1,000	1,000	1,000	1,000	1,000
JACKSONVILLE CITY OF	PURCHASE WATER FROM PROVIDER (3)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	JACKSONVILLE	Recommended	0	1,700	1,700	1,700	1,700	1,700
LOWER NECHES VALLEY AUTHORITY	PERMIT AMMENDMENT FOR SAM RAYBURN	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	COUNTY-OTHER	Recommended	0	28,000	28,000	28,000	28,000	28,000
LOWER NECHES VALLEY AUTHORITY	PURCHASE WATER FROM PROVIDER (2)	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	COUNTY-OTHER	Recommended	0	0	0	0	36,000	36,000
LOWER NECHES VALLEY AUTHORITY	REALLOCATION OF FLOOD STORAGE (RAYBURN)	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	COUNTY-OTHER	Recommended	0	0	0	0	122,000	122,000
LOWER NECHES VALLEY AUTHORITY	SALTWATER BARRIER CONJUNCTIVE OPERATION WITH RAYBURN/STEINHAGEN	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	COUNTY-OTHER	Recommended	0	111,000	111,000	111,000	111,000	111,000
LOWER NECHES VALLEY AUTHORITY	SEDIMENT REDUCTION	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	COUNTY-OTHER	Recommended	0	0	0	0	5,000	5,000
LOWER NECHES VALLEY AUTHORITY	WHOLESALE CUSTOMER CONSERVATION	NECHES RIVER RUN-OF-RIVER PINE ISLAND BAYOU	JASPER	NECHES	IRRIGATION	Recommended	20,000	30,000	33,000	35,000	40,000	40,000
LUFKIN CITY OF	ANGELINA COUNTY REGIONAL PROJECT	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	LUFKIN	Recommended	0	0	0	7,210	7,210	5,210
LUFKIN CITY OF	ANGELINA COUNTY REGIONAL PROJECT	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	MANUFACTURING	Recommended	0	0	0	4,000	4,000	6,000
LUFKIN CITY OF	LAKE KURTH REGIONAL SYSTEM	KURTH LAKE/RESERVOIR	RESERVOIR	NECHES	LUFKIN	Recommended	0	5,600	5,600	4,300	5,600	5,600
LUFKIN CITY OF	LAKE KURTH REGIONAL SYSTEM	KURTH LAKE/RESERVOIR	RESERVOIR	NECHES	MANUFACTURING	Recommended	6,800	12,800	12,800	14,100	12,800	12,800
LUFKIN CITY OF	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	LUFKIN	Recommended	2,955	2,555	2,464	2,384	2,301	2,215
LUFKIN CITY OF	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	COUNTY-OTHER	Recommended	56	90	106	119	137	160
LUFKIN CITY OF	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	DIBOLL	Recommended	834	1,176	1,244	1,307	1,366	1,422
LUFKIN CITY OF	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	HUNTINGTON	Recommended	9	16	21	24	28	32
LUFKIN CITY OF	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	MANUFACTURING	Recommended	0	0	0	0	0	0
LUFKIN CITY OF	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	REDLAND WSC	Recommended	46	63	65	66	68	71
LUFKIN CITY OF	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	LUFKIN	Recommended	750	750	750	750	750	750
NACOGDOCHES CITY OF	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	NACOGDOCHES	Recommended	2,800	2,800	2,800	2,800	2,800	2,800
NACOGDOCHES CITY OF	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	MANUFACTURING	Recommended	0	0	0	0	0	0
NACOGDOCHES CITY OF	PURCHASE WATER FROM PROVIDER (3)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	APPLEBY WSC	Recommended	0	0	0	0	0	0
NACOGDOCHES CITY OF	PURCHASE WATER FROM PROVIDER (3)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	NACOGDOCHES	Recommended	0	8,551	8,551	8,551	8,551	8,551

Region I Wholesale Water Provider Potentially Feasible Water Managment Strategy Supply
(Ac-ft per Year)

WWP Name	Project Name	Source Name	Source County	Source Basin	WUG Name	Selected	2010	2020	2030	2040	2050	2060
NACOGDOCHES CITY OF	PURCHASE WATER FROM PROVIDER (3)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	MANUFACTURING	Recommended	0	0	0	0	0	0
NACOGDOCHES CITY OF	PURCHASE WATER FROM PROVIDER (3)	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	NACOGDOCHES	Alternative	0	0	0	0	5,175	5,175
TYLER CITY OF	LAKE PALESTINE INFRASTRUCTURE	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	TYLER	Recommended	0	0	16,815	16,815	16,815	16,815
ATHENS MUNICIPAL WATER AUTHORITY	FOREST GROVE RESERVOIR PROJECT	FOREST GROVE LAKE/RESERVOIR	RESERVOIR	TRINITY	ATHENS	Recommended	0	0	0	155	933	1,894
ATHENS MUNICIPAL WATER AUTHORITY	FOREST GROVE RESERVOIR PROJECT	FOREST GROVE LAKE/RESERVOIR	RESERVOIR	TRINITY	MANUFACTURING	Recommended	0	0	0	0	0	0
ATHENS MUNICIPAL WATER AUTHORITY	FOREST GROVE RESERVOIR PROJECT	FOREST GROVE LAKE/RESERVOIR	RESERVOIR	TRINITY	COUNTY-OTHER	Recommended	0	0	0	2,085	1,307	346
ATHENS MUNICIPAL WATER AUTHORITY	FOREST GROVE RESERVOIR PROJECT	FOREST GROVE LAKE/RESERVOIR	RESERVOIR	TRINITY	ATHENS	Recommended	0	0	0	0	0	0
ATHENS MUNICIPAL WATER AUTHORITY	FOREST GROVE RESERVOIR PROJECT	FOREST GROVE LAKE/RESERVOIR	RESERVOIR	TRINITY	IRRIGATION	Recommended	0	0	0	0	0	0
ATHENS MUNICIPAL WATER AUTHORITY	FOREST GROVE RESERVOIR PROJECT	FOREST GROVE LAKE/RESERVOIR	RESERVOIR	TRINITY	LIVESTOCK	Recommended	0	0	0	0	0	0
ATHENS MUNICIPAL WATER AUTHORITY	INDIRECT REUSE	INDIRECT REUSE	HENDERSON	NECHES	ATHENS	Recommended	0	621	829	1,013	786	554
ATHENS MUNICIPAL WATER AUTHORITY	INDIRECT REUSE	INDIRECT REUSE	HENDERSON	NECHES	MANUFACTURING	Recommended	0	45	59	74	93	119
ATHENS MUNICIPAL WATER AUTHORITY	INDIRECT REUSE	INDIRECT REUSE	HENDERSON	NECHES	COUNTY-OTHER	Recommended	0	829	395	1	0	1
ATHENS MUNICIPAL WATER AUTHORITY	INDIRECT REUSE	INDIRECT REUSE	HENDERSON	NECHES	ATHENS	Recommended	0	19	29	42	65	94
ATHENS MUNICIPAL WATER AUTHORITY	INDIRECT REUSE	INDIRECT REUSE	HENDERSON	NECHES	IRRIGATION	Recommended	0	70	83	95	108	121
ATHENS MUNICIPAL WATER AUTHORITY	INDIRECT REUSE	INDIRECT REUSE	HENDERSON	NECHES	LIVESTOCK	Recommended	0	1,288	1,477	1,647	1,820	1,983
ATHENS MUNICIPAL WATER AUTHORITY	MUNICIPAL CONSERVATION	CONSERVATION	HENDERSON	NECHES	ATHENS	Recommended	1	6	12	17	22	30
ATHENS MUNICIPAL WATER AUTHORITY	NEW WTP	FOREST GROVE LAKE/RESERVOIR	RESERVOIR	TRINITY	ATHENS	Recommended	0	0	0	0	0	0
ATHENS MUNICIPAL WATER AUTHORITY	NEW WTP	FOREST GROVE LAKE/RESERVOIR	RESERVOIR	TRINITY	MANUFACTURING	Recommended	0	0	0	0	0	0
ATHENS MUNICIPAL WATER AUTHORITY	NEW WTP	FOREST GROVE LAKE/RESERVOIR	RESERVOIR	TRINITY	COUNTY-OTHER	Recommended	0	0	0	0	0	2,240
ATHENS MUNICIPAL WATER AUTHORITY	NEW WTP	FOREST GROVE LAKE/RESERVOIR	RESERVOIR	TRINITY	ATHENS	Recommended	0	0	0	0	0	0
ATHENS MUNICIPAL WATER AUTHORITY	OVERDRAFT CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	ATHENS	Recommended	0	803	801	801	800	799
ATHENS MUNICIPAL WATER AUTHORITY	OVERDRAFT CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	MANUFACTURING	Recommended	0	0	0	0	0	0
ATHENS MUNICIPAL WATER AUTHORITY	OVERDRAFT CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	COUNTY-OTHER	Recommended	0	570	570	570	570	570
ATHENS MUNICIPAL WATER AUTHORITY	OVERDRAFT CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	ATHENS	Recommended	0	27	29	29	30	31

WUG Name	WUG County	WUG Basin	Project Name	Source Name	Capital Cost	AC 2010	AC 2020	AC 2030	AC 2040	AC 2050	AC 2060
COUNTY-OTHER	ANDERSON	TRINITY	NEW WELLS - QUEEN CITY AQUIFER	QUEEN CITY AQUIFER	$212,732	$0	$0	$0	$0	$0	$3,211,000
COUNTY-OTHER	ANDERSON	NECHES	OVERDRAFT CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$262,189	$0	$0	$0	$40,631	$40,631	$17,772
FRANKSTON	ANDERSON	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	$0	$0	$0	$1,600	$1,600	$1,600	$1,600
FRANKSTON	ANDERSON	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$255,951	$0	$0	$42,846	$42,846	$20,531	$20,531
MINING	ANDERSON	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$168,417	$0	$20,610	$20,610	$6,053	$6,053	$6,053
MINING	ANDERSON	TRINITY	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$60,313	$7,623	$7,623	$2,239	$2,239	$2,239	$2,239
STEAM ELECTRIC POWER	ANDERSON	NECHES	PURCHASE WATER FROM PROVIDER (2)	PALESTINE LAKE/RESERVOIR	$24,917,413	$0	$7,500,615	$7,500,615	$5,328,201	$5,328,201	$5,328,201
COUNTY-OTHER	ANGELINA	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$911,640	$83,395	$83,395	$56,901	$56,901	$223,690	$223,690
COUNTY-OTHER	ANGELINA	NECHES	NEW WELLS - YEGUA JACKSON AQUIFER	YEGUA-JACKSON AQUIFER	$419,717	$0	$0	$41,291	$41,291	$64,285	$64,285
COUNTY-OTHER	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (2)	CARRIZO-WILCOX AQUIFER	$10,604,000	$0	$0	$1,790,000	$1,790,000	$865,000	$865,000
COUNTY-OTHER	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (2)	SAM RAYBURN-STEINHAGEN LAK	$0	$0	$0	$0	$0	$0	$0
DIBOLL	ANGELINA	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	$0	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500
DIBOLL	ANGELINA	NECHES	NEW WELLS - YEGUA JACKSON AQUIFER	YEGUA-JACKSON AQUIFER	$576,576	$140,344	$140,344	$90,075	$90,075	$90,075	$90,075
DIBOLL	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (2)	CARRIZO-WILCOX AQUIFER	$6,195,000	$1,144,900	$1,144,900	$604,800	$604,800	$1,749,700	$1,749,700
FOUR WAY WSC	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (2)	SAM RAYBURN-STEINHAGEN LAK	$669,192	$0	$0	$0	$0	$0	$211,421
HUDSON	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (1)	CARRIZO-WILCOX AQUIFER	$0	$0	$0	$39,657	$126,901	$140,522	$210,784
HUDSON WSC	ANGELINA	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$3,274,192	$0	$0	$190,352	$190,352	$553,289	$553,289
LIVESTOCK	ANGELINA	NECHES	EXPAND LOCAL SURFACE WATER SUPPLIES	LIVESTOCK LOCAL SUPPLY	$168,800	$0	$0	$0	$14,700	$14,700	$0
LUFKIN	ANGELINA	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	$0	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000
LUFKIN	ANGELINA	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$0	$0	$0	$0	$0	$0	$0
LUFKIN	ANGELINA	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$0	$0	$0	$0	$0	$0	$0
LUFKIN	ANGELINA	NECHES	LAKE KURTH REGIONAL SYSTEM	KURTH LAKE/RESERVOIR	$0	$0	$0	$0	$0	$0	$0
LUFKIN	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (3)	SAM RAYBURN-STEINHAGEN LAK	$0	$0	$0	$0	$0	$0	$0
MANUFACTURING	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	$7,602,950	$0	$2,736,000	$2,736,000	$2,073,000	$2,073,000	$2,073,000
MANUFACTURING	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (2)	KURTH LAKE/RESERVOIR	$18,573,800	$3,015,000	$4,554,000	$2,935,000	$3,798,000	$2,935,000	$2,935,000
MANUFACTURING	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (2)	SAM RAYBURN-STEINHAGEN LAK	$0	$0	$0	$0	$0	$2,655,000	$3,982,000
MINING	ANGELINA	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	$5,793,150	$1,060,000	$1,527,000	$0	$0	$0	$0
STEAM ELECTRIC POWER	ANGELINA	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$1,724,909	$230,665	$230,665	$80,280	$80,280	$80,280	$80,280
JACKSONVILLE	CHEROKEE	NECHES	INFRASTRUCTURE IMPROVEMENTS	JACKSONVILLE LAKE/RESERVOIR	$0	$0	$0	$0	$0	$0	$0
JACKSONVILLE	CHEROKEE	NECHES	PURCHASE WATER FROM PROVIDER (3)	COLUMBIA LAKE/RESERVOIR	$0	$0	$0	$0	$0	$0	$0
MINING	CHEROKEE	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	$3,619,300	$490,000	$728,000	$0	$0	$0	$0
NEW SUMMERFIELD	CHEROKEE	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	$0	$0	$2,000	$2,000	$2,000	$2,000	$2,000
NEW SUMMERFIELD	CHEROKEE	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$299,452	$0	$0	$63,329	$63,329	$37,221	$37,221
NEW SUMMERFIELD	CHEROKEE	NECHES	PURCHASE WATER FROM PROVIDER (1)	COLUMBIA LAKE/RESERVOIR	$0	$0	$1,140,000	$1,140,000	$1,140,000	$1,140,000	$1,140,000
RUSK	CHEROKEE	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	$0	$0	$0	$0	$8,000	$8,000	$8,000
RUSK	CHEROKEE	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$299,452	$0	$0	$0	$60,386	$60,386	$34,279
RUSK	CHEROKEE	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	$28,435,800	$0	$3,968,000	$3,968,000	$1,489,000	$1,489,000	$1,489,000
COUNTY-OTHER	HARDIN	TRINITY	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	$0	$0	$0	$0	$0	$0	$0
COUNTY-OTHER	HARDIN	NECHES	OVERDRAFT GULF COAST AQUIFER	GULF COAST AQUIFER	$556,888	$65,857	$131,714	$83,162	$34,610	$100,467	$100,467
IRRIGATION	HARDIN	NECHES	PURCHASE WATER FROM PROVIDER (2)	SAM RAYBURN-STEINHAGEN LAK	$2,405,001	$296,920	$296,920	$0	$0	$0	$0
MANUFACTURING	HARDIN	NECHES	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	$429,542	$43,444	$43,444	$5,995	$5,995	$5,995	$5,995
ATHENS	HENDERSON	NECHES	INDIRECT REUSE	INDIRECT REUSE	$0	$0	$4,400	$6,600	$9,600	$15,000	$21,500
ATHENS	HENDERSON	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	$0	$0	$1,694	$2,776	$3,516	$4,197	$4,985
ATHENS	HENDERSON	TRINITY	FOREST GROVE RESERVOIR PROJECT	FOREST GROVE LAKE/RESERVOIR	$0	$0	$0	$0	$106,900	$647,600	$523,200
BROWNSBORO	HENDERSON	NECHES	OVERDRAFT CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$148,600	$0	$0	$0	$0	$0	$16,100
COUNTY-OTHER	HENDERSON	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	$0	$3,600	$6,700	$8,700	$10,800	$12,600	$15,100
COUNTY-OTHER	HENDERSON	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$609,900	$64,900	$64,900	$11,700	$11,700	$11,700	$11,700
COUNTY-OTHER	HENDERSON	NECHES	NEW WELLS - QUEEN CITY AQUIFER	QUEEN CITY AQUIFER	$4,420,100	$84,067	$84,067	$19,833	$103,900	$272,033	$375,933
COUNTY-OTHER	HENDERSON	NECHES	OVERDRAFT CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$0	$4,900	$0	$0	$0	$0	$0
COUNTY-OTHER	HENDERSON	NECHES	PURCHASE WATER FROM PROVIDER (2)	PALESTINE LAKE/RESERVOIR	$8,937,350	$0	$867,900	$884,200	$137,800	$170,400	$203,000
IRRIGATION	HENDERSON	NECHES	INDIRECT REUSE	INDIRECT REUSE	$0	$0	$2,300	$2,100	$3,100	$3,500	$4,000
LIVESTOCK	HENDERSON	NECHES	INDIRECT REUSE	INDIRECT REUSE	$0	$0	$42,000	$48,000	$53,700	$59,300	$64,600
CONSOLIDATED WSC	HOUSTON	TRINITY	PURCHASE WATER FROM PROVIDER (1)	HOUSTON COUNTY LAKE/RESERV	$0	$684,000	$384,000	$684,000	$684,000	$684,000	$684,000
IRRIGATION	HOUSTON	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$1,602,780	$158,307	$158,307	$65,150	$66,150	$144,304	$144,304

WUG Name	WUG County	WUG Basin	Project Name	Source Name	Capital Cost	AC 2010	AC 2020	AC 2030	AC 2040	AC 2050	AC 2060
IRRIGATION	HOUSTON	TRINITY	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$1,602,780	$0	$79,154	$79,154	$111,729	$111,729	$144,304
LIVESTOCK	HOUSTON	TRINITY	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$1,335,649	$39,577	$39,577	$55,864	$95,441	$111,728	$128,016
LIVESTOCK	HOUSTON	NECHES	NEW WELLS - YEGUA JACKSON AQUIFER	YEGUA-JACKSON AQUIFER	$1,335,649	$39,577	$39,577	$55,864	$95,441	$111,728	$128,016
MANUFACTURING	HOUSTON	TRINITY	PURCHASE WATER FROM PROVIDER (1)	HOUSTON COUNTY LAKE/RESERV	$0	$19,500	$19,500	$19,500	$19,500	$19,500	$19,500
COUNTY-OTHER	JASPER	SABINE	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	$393,088	$174,438	$174,438	$140,167	$140,167	$140,167	$140,167
COUNTY-OTHER	JASPER	NECHES	OVERDRAFT GULF COAST AQUIFER	GULF COAST AQUIFER	$1,369,957	$236,113	$236,113	$150,945	$150,945	$150,945	$150,945
KIRBYVILLE	JASPER	SABINE	MUNICIPAL CONSERVATION	CONSERVATION	$0	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000
MINING	JEFFERSON	NECHES-TRINITY	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	$103,083	$0	$0	$0	$0	$12,746	$12,746
STEAM ELECTRIC POWER	JEFFERSON	NECHES	PURCHASE WATER FROM PROVIDER (1)	SAM RAYBURN-STEINHAGEN LAK	$13,647,296	$0	$3,060,104	$3,060,104	$1,870,270	$1,870,270	$2,346,204
APPLEBY WSC	NACOGDOCHES	NECHES	LAKE NACONICHE REGIONAL WATER SUPPLY SYS	LAKE NACONICHE LAKE/RESERVO	$4,392,350	$0	$505,765	$505,765	$127,500	$127,500	$127,500
APPLEBY WSC	NACOGDOCHES	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	$0	$0	$0	$0	$0	$0	$0
COUNTY-OTHER	NACOGDOCHES	NECHES	LAKE NACONICHE REGIONAL WATER SUPPLY SYS	LAKE NACONICHE LAKE/RESERVO	$7,320,600	$0	$843,000	$843,000	$212,500	$212,500	$212,500
COUNTY-OTHER	NACOGDOCHES	NECHES	PURCHASE WATER FROM PROVIDER (1)	COLUMBIA LAKE/RESERVOIR	$0	$0	$327,848	$327,848	$327,848	$327,848	$327,848
D&M WSC	NACOGDOCHES	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$492,348	$0	$0	$100,361	$100,361	$57,436	$57,436
LILLY GROVE SUD	NACOGDOCHES	NECHES	LAKE NACONICHE REGIONAL WATER SUPPLY SYS	LAKE NACONICHE LAKE/RESERVO	$7,320,600	$0	$0	$0	$0	$843,000	$843,000
LILLY GROVE SUD	NACOGDOCHES	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$580,504	$0	$0	$0	$0	$134,877	$134,877
LIVESTOCK	NACOGDOCHES	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$1,969,392	$0	$0	$100,361	$200,722	$258,158	$315,594
MINING	NACOGDOCHES	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	$9,593,450	$1,539,643	$2,574,000	$0	$0	$0	$0
NACOGDOCHES	NACOGDOCHES	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	$0	$0	$40,000	$40,000	$40,000	$40,000	$40,000
NACOGDOCHES	NACOGDOCHES	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$0	$0	$0	$0	$0	$0	$0
NACOGDOCHES	NACOGDOCHES	NECHES	PURCHASE WATER FROM PROVIDER (3)	COLUMBIA LAKE/RESERVOIR	$0	$0	$0	$0	$0	$0	$0
NACOGDOCHES	NACOGDOCHES	NECHES	PURCHASE WATER FROM PROVIDER (3)	TOLEDO BEND LAKE/RESERVOIR	$0	$0	$0	$0	$0	$0	$0
STEAM ELECTRIC POWER	NACOGDOCHES	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	$10,718,000	$0	$2,252,254	$2,252,254	$1,318,254	$3,291,000	$3,291,000
STEAM ELECTRIC POWER	NACOGDOCHES	NECHES	PURCHASE WATER FROM PROVIDER (2)	HOUSTON COUNTY LAKE/RESERV	$2,012,400	$0	$263,000	$263,000	$88,000	$88,000	$88,000
SWIFT WSC	NACOGDOCHES	NECHES	LAKE NACONICHE REGIONAL WATER SUPPLY SYS	LAKE NACONICHE LAKE/RESERVO	$5,856,500	$0	$0	$674,370	$674,370	$170,000	$170,000
SWIFT WSC	NACOGDOCHES	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$498,171	$107,277	$107,277	$63,844	$63,844	$63,844	$63,844
SWIFT WSC	NACOGDOCHES	NECHES	PURCHASE WATER FROM PROVIDER (1)	COLUMBIA LAKE/RESERVOIR	$0	$0	$784,649	$784,649	$784,649	$784,649	$784,649
MANUFACTURING	NEWTON	SABINE	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	$891,529	$120,954	$120,954	$82,091	$203,045	$203,045	$164,181
MANUFACTURING	NEWTON	SABINE	PURCHASE WATER FROM PROVIDER (2)	TOLEDO BEND LAKE/RESERVOIR	$1,389,500	$199,500	$199,500	$78,400	$78,400	$78,400	$78,400
STEAM ELECTRIC POWER	NEWTON	SABINE	PURCHASE WATER FROM PROVIDER (2)	TOLEDO BEND LAKE/RESERVOIR	$12,515,350	$0	$0	$3,991,000	$3,991,000	$2,900,000	$2,900,000
COUNTY-OTHER	ORANGE	NECHES	OVERDRAFT GULF COAST AQUIFER	GULF COAST AQUIFER	$432,222	$57,756	$57,756	$20,073	$20,073	$20,073	$20,073
MANUFACTURING	ORANGE	SABINE	PURCHASE WATER FROM PROVIDER (1)	SABINE RIVER RUN-OF-RIVER	$0	$407,500	$1,222,500	$1,630,000	$2,037,500	$2,037,500	$2,282,000
MANUFACTURING	ORANGE	SABINE	PURCHASE WATER FROM PROVIDER (2)	TOLEDO BEND LAKE/RESERVOIR	$0	$0	$0	$0	$0	$407,500	$652,000
MAURICEVILLE SUD	ORANGE	SABINE	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	$550,848	$0	$106,749	$106,749	$58,724	$58,724	$58,724
MANUFACTURING	PANOLA	SABINE	PURCHASE WATER FROM PROVIDER (1)	MURVAUL LAKE/RESERVOIR	$0	$93,845	$113,396	$129,037	$143,700	$156,408	$182,802
COUNTY-OTHER	POLK	NECHES	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	$2,991,138	$75,513	$151,026	$161,344	$171,662	$106,466	$41,271
MANUFACTURING	POLK	NECHES	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	$581,344	$0	$32,678	$32,678	$40,014	$40,014	$14,672
MINING	RUSK	SABINE	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$241,600	$0	$0	$0	$27,550	$27,550	$6,486
STEAM ELECTRIC POWER	RUSK	SABINE	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	$8,640,450	$0	$0	$0	$0	$0	$2,396,000
STEAM ELECTRIC POWER	RUSK	SABINE	PURCHASE WATER FROM PROVIDER (2)	TOLEDO BEND LAKE/RESERVOIR	$1,318,500	$0	$0	$0	$0	$305,000	$305,000
COUNTY-OTHER	SABINE	NECHES	PURCHASE WATER FROM PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR	$1,021,000	$148,200	$148,200	$59,200	$59,200	$59,200	$59,200
COUNTY-OTHER	SABINE	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$328,840	$27,356	$27,356	$7,944	$35,300	$35,300	$15,888
LIVESTOCK	SABINE	SABINE	EXPAND LOCAL SURFACE WATER SUPPLIES	LIVESTOCK LOCAL SUPPLY	$562,700	$8,200	$16,400	$8,200	$16,400	$16,400	$16,400
LIVESTOCK	SABINE	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$226,430	$31,224	$31,224	$11,483	$42,707	$42,707	$22,965
IRRIGATION	SAN AUGUSTINE	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$224,690	$43,639	$43,639	$24,049	$24,049	$24,049	$24,049
LIVESTOCK	SAN AUGUSTINE	NECHES	EXPAND LOCAL SURFACE WATER SUPPLIES	LIVESTOCK LOCAL SUPPLY	$562,700	$0	$8,200	$16,400	$24,600	$16,400	$16,400
LIVESTOCK	SAN AUGUSTINE	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$379,140	$30,875	$30,875	$49,356	$49,356	$67,836	$67,836
LIVESTOCK	SAN AUGUSTINE	SABINE	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$189,570	$10,293	$10,293	$16,452	$16,452	$22,612	$22,612
MANUFACTURING	SAN AUGUSTINE	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$33,300	$3,130	$3,130	$230	$230	$230	$230
MINING	SAN AUGUSTINE	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	$2,627,850	$363,000	$363,000	$0	$0	$0	$0
MINING	SAN AUGUSTINE	NECHES	PURCHASE WATER FROM PROVIDER (2)	SAM RAYBURN-STEINHAGEN LAK	$8,212,450	$1,011,462	$1,993,000	$0	$0	$0	$0
CENTER	SHELBY	SABINE	MUNICIPAL CONSERVATION	CONSERVATION	$0	$11,200	$11,200	$11,200	$11,200	$11,200	$11,200
COUNTY-OTHER	SHELBY	SABINE	PURCHASE WATER FROM PROVIDER (1)	CENTER LAKE/RESERVOIR	$0	$48,878	$48,878	$48,878	$48,878	$48,878	$48,878
COUNTY-OTHER	SHELBY	SABINE	PURCHASE WATER FROM PROVIDER (2)	TOLEDO BEND LAKE/RESERVOIR	$3,024,150	$347,400	$347,400	$83,700	$83,700	$83,700	$83,700

WUG Name	WUG County	WUG Basin	Project Name	Source Name	Capital Cost	AC 2010	AC 2020	AC 2030	AC 2040	AC 2050	AC 2060
COUNTY-OTHER	SHELBY	SABINE	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$2,278,400	$91,699	$183,398	$208,898	$142,699	$76,497	$76,497
LIVESTOCK	SHELBY	SABINE	PURCHASE WATER FROM PROVIDER (2)	TOLEDO BEND LAKE/RESERVOIR	$4,763,200	$0	$0	$0	$1,177,000	$1,177,000	$762,000
LIVESTOCK	SHELBY	SABINE	EXPAND LOCAL SURFACE WATER SUPPLIES	LIVESTOCK LOCAL SUPPLY	$689,600	$0	$0	$60,100	$60,100	$60,100	$60,100
LIVESTOCK	SHELBY	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$1,040,800	$53,233	$53,233	$83,900	$83,900	$114,567	$114,567
LIVESTOCK	SHELBY	SABINE	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$1,387,600	$106,500	$213,000	$152,500	$92,000	$92,000	$92,000
MANUFACTURING	SHELBY	SABINE	PURCHASE WATER FROM PROVIDER (1)	CARRIZO-WILCOX AQUIFER	$0	$0	$0	$0	$0	$4,888	$11,731
MINING	SHELBY	NECHES	PURCHASE WATER FROM PROVIDER (1)	TOLEDO BEND LAKE/RESERVOIR	$3,847,950	$455,700	$619,000	$0	$0	$0	$0
MINING	SHELBY	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	$1,543,400	$209,000	$209,000	$0	$0	$0	$0
BULLARD	SMITH	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	$0	$0	$2,000	$2,000	$2,000	$2,000	$2,000
BULLARD	SMITH	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$305,674	$0	$51,736	$51,736	$25,086	$76,822	$76,822
COMMUNITY WATER COMI	SMITH	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$1,640,776	$197,781	$197,781	$126,255	$324,036	$324,036	$252,511
IRRIGATION	SMITH	NECHES	NEW WELLS - QUEEN CITY AQUIFER	QUEEN CITY AQUIFER	$357,794	$9,833	$9,833	$11,868	$21,701	$23,736	$15,937
JACKSON WSC	SMITH	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	$0	$0	$741,000	$741,000	$741,000	$741,000	$741,000
LINDALE RURAL WSC	SMITH	NECHES	MUNICIPAL CONSERVATION	CONSERVATION	$0	$0	$0	$3,000	$3,000	$3,000	$3,000
LINDALE RURAL WSC	SMITH	NECHES	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	$347,259	$0	$0	$0	$0	$0	$65,938
MANUFACTURING	SMITH	NECHES	PURCHASE WATER FROM PROVIDER (2)	PALESTINE LAKE/RESERVOIR	$1,476,152	$0	$0	$438,811	$438,811	$310,113	$310,113
MINING	SMITH	NECHES	NEW WELLS - QUEEN CITY AQUIFER	QUEEN CITY AQUIFER	$655,416	$10,301	$30,903	$33,041	$27,016	$29,154	$31,292
TYLER	SMITH	NECHES	LAKE PALESTINE INFRASTRUCTURE	PALESTINE LAKE/RESERVOIR	$0	$0	$0	$0	$0	$0	$0
WHITEHOUSE	SMITH	NECHES	PURCHASE WATER FROM PROVIDER (2)	COLUMBIA LAKE/RESERVOIR	$0	$0	$1,368,000	$1,368,000	$1,368,000	$1,368,000	$1,368,000
WHITEHOUSE	SMITH	NECHES	PURCHASE WATER FROM PROVIDER (3)	PALESTINE LAKE/RESERVOIR	$0	$26,394	$0	$0	$0	$0	$0
COUNTY-OTHER	TRINITY	NECHES	NEW WELLS - YEGUA JACKSON AQUIFER	YEGUA-JACKSON AQUIFER	$249,851	$0	$0	$0	$36,990	$36,990	$15,207
COUNTY-OTHER	TYLER	NECHES	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	$366,241	$0	$49,441	$49,441	$17,510	$17,510	$17,510
WOODVILLE	TYLER	NECHES	NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER	$511,400	$0	$72,700	$72,700	$28,100	$28,100	$28,100

Region I Wholesale Water Provider Water Managment Strategy Cost

WWP Name	Project Name	Source Name	Source County	Source Basin	Capital Cost	AC 2010	AC 2020	AC 2030	AC 2040	AC 2050	AC 2060
LUFKIN CITY OF	ANGELINA COUNTY REGIONAL PROJECT	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	$53,164,000	$0	$0	$0	$17,679,000	$17,679,000	$13,044,000
ANGELINA & NECHES RIVER AUTHORITY	ANRA TREATMENT AND DISTRIBUTION SYSTEM	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	$35,127,250	$0	$5,868,950	$5,868,950	$2,805,950	$2,805,950	$2,805,950
ATHENS MUNICIPAL WATER AUTHORITY	FOREST GROVE RESERVOIR PROJECT	FOREST GROVE LAKE/RESERVOIR	RESERVOIR	TRINITY	$26,619,000	$0	$0	$0	$2,628,600	$2,628,600	$694,600
ATHENS MUNICIPAL WATER AUTHORITY	INDIRECT REUSE	INDIRECT REUSE	HENDERSON	NECHES	$0	$0	$93,600	$93,600	$93,600	$93,600	$93,600
JACKSONVILLE CITY OF	INFRASTRUCTURE IMPROVEMENTS	JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	$1,000,000	$97,200	$97,200	$97,200	$97,200	$97,200	$97,200
LUFKIN CITY OF	LAKE KURTH REGIONAL SYSTEM	KURTH LAKE/RESERVOIR	RESERVOIR	NECHES	$56,488,600	$8,387,700	$837,700	$5,777,600	$5,777,600	$5,777,600	$5,777,600
TYLER CITY OF	LAKE PALESTINE INFRASTRUCTURE	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	$79,389,250	$0	$0	$13,957,000	$13,957,000	$7,035,000	$7,035,000
ATHENS MUNICIPAL WATER AUTHORITY	MUNICIPAL CONSERVATION	CONSERVATION	HENDERSON	NECHES	$0	$0	$0	$0	$0	$0	$0
CENTER CITY OF	MUNICIPAL CONSERVATION	CONSERVATION	HENDERSON	NECHES	$0	$0	$0	$0	$0	$0	$0
ANGELINA & NECHES RIVER AUTHORITY	NEW SOURCE - LAKE COLUMBIA	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	$231,865,000	$0	$16,280,500	$16,280,500	$16,280,500	$16,280,500	$870,500
LUFKIN CITY OF	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	$14,097,000	$1,986,800	$1,986,800	$757,800	$757,800	$757,800	$757,800
LUFKIN CITY OF	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	$0	$0	$0	$0	$0	$0	$0
NACOGDOCHES CITY OF	NEW WELLS - CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	$2,727,000	$724,600	$724,600	$486,887	$486,887	$486,887	$486,887
ATHENS MUNICIPAL WATER AUTHORITY	NEW WTP	FOREST GROVE LAKE/RESERVOIR	RESERVOIR	TRINITY	$12,387,000	$0	$0	$0	$0	$0	$1,254,220
ATHENS MUNICIPAL WATER AUTHORITY	OVERDRAFT CARRIZO WILCOX AQUIFER	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	$3,799,000	$0	$513,900	$513,900	$237,900	$237,900	$237,900
HOUSTON COUNTY WCID #1	PERMIT AMENDMENT - HOUSTON COUNTY LAKE	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	$0	$0	$0	$0	$0	$0	$0
LOWER NECHES VALLEY AUTHORITY	PERMIT AMMENDMENT FOR SAM RAYBURN	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	$0	$0	$4,312,000	$4,312,000	$4,312,000	$4,312,000	$4,312,000
LOWER NECHES VALLEY AUTHORITY	PURCHASE WATER FROM PROVIDER (2)	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	$39,168,200	$0	$0	$0	$0	$5,967,000	$5,967,000
JACKSONVILLE CITY OF	PURCHASE WATER FROM PROVIDER (3)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	$19,133,700	$0	$2,503,000	$2,503,000	$835,000	$835,000	$835,000
NACOGDOCHES CITY OF	PURCHASE WATER FROM PROVIDER (3)	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	$37,282,050	$7,287,000	$7,287,000	$4,037,000	$4,037,000	$4,037,000	$4,037,000
NACOGDOCHES CITY OF	PURCHASE WATER FROM PROVIDER (3)	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	$114,418,981	$0	$0	$0	$0	$10,602,000	$10,602,000
LOWER NECHES VALLEY AUTHORITY	REALLOCATION OF FLOOD STORAGE (RAYBURN)	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	$0	$0	$0	$0	$0	$3,090,260	$3,090,260
LOWER NECHES VALLEY AUTHORITY	SALTWATER BARRIER CONJUNCTIVE OPERATION WITH RAYBURN/STEINHAGEN	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	$0	$0	$0	$0	$0	$9,768,000	$9,768,000
LOWER NECHES VALLEY AUTHORITY	SEDIMENT REDUCTION	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	$161,333,000	$0	$0	$0	$0	$14,066,000	$14,066,000
LOWER NECHES VALLEY AUTHORITY	WHOLESALE CUSTOMER CONSERVATION	NECHES RIVER RUN-OF-RIVER PINE ISLAND BAYOU	JASPER	NECHES	$1,400,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000

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Appendix 4D-A

Water Management Strategy Evaluation

Water management strategies identified to meet water needs during the planning period were evaluated based on criteria described in Chapter 4D.

The evaluation was undertaken through the development of a matrix to rate the above consideration from most desirable (1) to least desirable (5). Rating of the Environmental Factors was evaluated using a separate matrix with consideration of nine factors; total acres impacted, wetland acres, environmental water needs, habitat, threatened and endangered species, cultural resources, bays and estuaries, environmental water quality and other noted factors.

Table 4D-A.1 depicts the summary of evaluation of WMSs in the ETRWPA. Table 4D-A.2 depicts the summary of environmental assessment.

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Table 4D-A.1 Summary of Evaluation of Water Management Strategies

County	Entity	Basin Used	Strategy	Strategy Key	Quantity (Ac-Ft/Yr)	Reliability	Cost ($/Ac-Ft)	Impacts of Strategy on:					Political Feasibility	Implementation Issues	Comments
								Environmental Factors	Water Resources and Other WMS	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters			
Name	Name(s)	Name	Name	Name	#	(1-5)	$	(1-5)	(1-5)	(1-5)	(1-5)	(1-5)	(1-5)		
Anderson	County-Other	Neches	Increase supply from Queen City	ADC-1	100	3	$321	1	1	1	2	2	1		
Anderson	County-Other	Neches	Increase supply from Carrizo-Wilcox	ADC-2	100	2	$406	1	3	1	2	2	1		
Anderson	Frankston	Neches	Increase supply from Carrizo-Wilcox	FR-1	120	2	$357	1	3	1	2	1	1		
Anderson	Mining	Neches	Increase supply from Carrizo-Wilcox	ADN-1	120	2	$233	1	2	1	2	1	1		
Anderson	Steam-Electric	Neches	Water from Lake Palestine	ADS-1	21,853	2	$343	1	1	1	2	2	2	Requires agreement with City of Palestine	
Anderson	Steam-Electric	Neches	Water from Lake Fastrill Replacement Project	ADS-2	21,853	1	$343	See UNRMWA Lake Fastrill Strategy						Requires agreement with UNRMWA	
Angelina	County-Other	Neches	Voluntary Redistribution from City of Lufkin	ANC-1	1,100	1	$1,627	1	1	1	1	1	2	Requires contract with Lufkin	
Angelina	County-Other	Neches	Increase supply from Yegua-Jackson	ANC-2A	300	2	$214	1	1	1	2	1	1		
Angelina	Diboll	Neches	Purchase water from the City of Lufkin (Phase I-II)	DI-1	1,600	1	$1,431	1	1	1	1	1	1		
Angelina	Diboll	Neches	Increase supply from Yegua-Jackson	DI-3	600	3	$234	1	1	1	2	2	2		
Angelina	Four Way WSC	Neches	Obtain water from the City of Lufkin	FW-1	225	1	$940	1	1	1	1	1	2	Requires contract with Lufkin	
Angelina	Hudson	Neches	Purchase Water from Hudson WSC	HU-1A	1,200	2	$317	1	1	1	2	1	1		
Angelina	Hudson WSC	Neches	Increase supply from Carrizo-Wilcox (Phase I)	HW-1A	600	2	$317	1	1	1	2	1	1		
Angelina	Hudson WSC	Neches	Increase supply from Carrizo-Wilcox (Phase II)	HW-1B	1,400	2	$320	1	1	1	2	1	1		
Angelina	Manufacturing	Neches	Obtain water from City of Lufkin	ANM-1	18,800	1	$454	1	1	1	1	1	2		
Angelina	Manufacturing	Neches	Obtain raw water from Lake Columbia via contract with ANRA	ANM-2	8,551	1	$320	See ANRA Lake Columbia Strategy							
Angelina	Livestock	Neches	Increase stock Ponds	ANL-1	90	3	$163	1	1	2	1	1	1		
Angelina	Mining	Neches	Obtain Water from ANRA (Lake Columbia or Angelina River)	ANMI-1	4,000	1	$382	2	1	1	1	1	3		
Angelina	Mining	Neches	Obtain water from Lufkin (Lake Kurth)	ANMI-2	4,000	1		1	1	1	1	1	1		
Angelina	Steam-Electric	Neches	New wells in the Carrizo-Wilcox	ANP-1	1,000	1	$1,538	1	1	1	2	2	1		
Cherokee	Mining	Neches	Purchase water from ANRA (Lake Columbia or Angelina River)	CHMI-1	1,500	1	$485	2	1	1	1	1	3	Requires contract with ANRA	
Cherokee	New Summerfield	Neches	Obtain treated water from Lake Columbia via contract with ANRA	NS-1	1,000	1	$1,140	See ANRA Lake Columbia Strategy						Requires contract with ANRA	
Cherokee	New Summerfield	Neches	Increase supply from Carrizo-Wilcox	NS-3	242	1	$262	1	1	1	2	1	1		
Cherokee	Rusk	Neches	Obtain treated water from Lake Columbia via contract with ANRA	RU-1	3,000	1	$1,323	See ANRA Lake Columbia Strategy						Requires contract with ANRA	
Cherokee	Rusk	Neches	Increase supply from Carrizo-Wilcox	RU-3	212	1	$285	1	1	1	2	1	1		
Hardin	County-Other	Neches	Increase supply from Gulf Coast Aquifer (Phases I-III)	HAC-1	459	2	$430	1	3	1	2	1	1		May place additional stress on aquifer
Hardin	Manufacturing	Neches	Use additional water from Gulf Coast Aquifer	HAM-1	114	2	$381	1	3	1	2	1	1		
Hardin	Irrigation	Neches	Use surface water sources	HAI-1	1,002	2	$296	1	1	1	3	2	1		
Henderson	Athens	Neches	Water from Athens MWA	AT-3	See Athens MWA Below.										
Henderson	County-Other	Neches	Expand use of Carrizo-Wilcox	HECo-2	50	3	$1,298	1	3	1	3	1	3	Requires coordination with Neches	May place additional stress on aquifer
Henderson	County-Other	Neches	Expand use of Queen City	HECo-3	500	3	$1,009	1	1	1	1	2	2	Requires coordination with Neches	
Henderson	County-Other	Neches	Water from UNRMWA	HECo-4	500	5	$1,964	1	1	1	1	1	1	Requires agreement with UNRMWA	
Henderson	Irrigation	Neches	Obtain water Lake Athens	HEI-1	121	1	$163	1	1	1	1	1	1		
Henderson	Livestock	Neches	Fish Hatchery Reuse	HEL-1	2,872	1	$0	1	1	1	1	1	1		
Houston	Irrigation	Neches/Trinity	Increase supply from Carrizo-Wilcox (Phase I-VI)	HOI-1	2,298	2	$207	1	1	1	2	1	1		
Houston	Livestock	Neches/Trinity	Increase supply from Carrizo-Wilcox (Phase I-V)	HOL-1	1,080	2	$375	1	1	1	2	1	1		
Houston	Manufacturing	Neches/Trinity	Obtain water from Houston County WCID	HOMa-1	15	1	$163	1	1	1	1	1	1		
Jasper	County-Other	Neches	Use additional supply from Gulf Coast Aquifer	JAC-1	632	3	$650	1	3	1	2	1	1		May place additional stress on aquifer
Jefferson	Mining	Neches	Use additional supply from Gulf Coast Aquifer	JEM-1	9	2	$1,416	1	3	1	1	1	1		May place additional stress on aquifer
Jefferson	Steam-Electric	Neches	Use water from the Neches River	JESE-1	25,951	3	$92	2	1	2	3	2	2		
Nacogdoches	D&M WSC	Neches	Increase supply from Carrizo-Wilcox	DM-1	310	1	$324	1	1	1	1	1	1		
Nacogdoches	Lilly Grove SUD	Neches	Increase supply from Carrizo-Wilcox	LG-2	500	1	$270	1	1	1	2	1	1		
Nacogdoches	Livestock	Neches	Increase supply from Carrizo-Wilcox	NCL-1	1,350	2	$234	1	1	1	2	1	1		
Nacogdoches	Mining	Neches	Purchase water from ANRA (Lake Columbia or Angelina River)	NCMI-1	7,000	1	$368	2	1	1	1	1	3		
Nacogdoches	Mining	Neches	Purchase water from LNVA	NCMI-2	7,000	1		1	1	1	1	1	1		
Nacogdoches	Nacogdoches	Neches	Additional groundwater from Carrizo-Wilcox	NA-1	2,800	1	$259	1	1	1	1	1	2		Minimal impacts to downstream water rights
Nacogdoches	Nacogdoches	Neches	Obtain and treat water from Lake Columbia	NA-3	8,551	1	$852	See ANRA Lake Columbia Strategy						Requires contract with ANRA	
Nacogdoches	Nacogdoches	Sabine	Obtain and treat water from Toledo Bend	NA-4	5,175	1	$2,049	2	1	1	2	1	1	Requires agreement with SRA	Highly renewable resource should minimize impacts.
Nacogdoches	Steam-Electric	Neches	Obtain raw water from Lake Columbia	NCS-1	13,358	1	$315	See ANRA Lake Columbia Strategy						Requires contract with ANRA	
Nacogdoches	Steam-Electric	Neches	Obtain raw water from Houston County Lake	NCS-2	340	2	$774	1	1	1	1	1	1		
Nacogdoches	Swift WSC	Neches	Increase supply from Carrizo-Wilcox	SW-1	350	2	$307	1	1	1	2	1	1		
Nacogdoches	Swift WSC	Neches	Obtain Treated water from Lake Columbia via contract with ANRA	SW-3	688	1	$1,140	See ANRA Lake Columbia Strategy							
Nacogdoches	Multiple	Neches	Lake Naconiche Regional System	Multiple	3,239	1	$1,686	2	2	1	1	1	2	Requires WR permit amendment	
Newton	Manufacturing	Sabine	Additional groundwater Well Gulf Coast Aquifer	NWM-1	800	1	$254	1	1	1	1	1	2	Requires coordination with Southeast Texas GCD	
Newton	Manufacturing	Sabine	Purchase water from SRA	NWM-2	700	1	$285	1	1	1	1	1	1	Requires agreement with SRA.	Highly renewable resource should minimize impacts.
Newton	Steam-Electric	Sabine	Purchase water from SRA	NWP-1	15,000	1	$266	1	1	1	1	1	1		
Orange	County-Other	Sabine	Use additional supply from Gulf Coast Aquifer	ORC-1	140	2	$413	1	3	1	1	1	1		May place additional stress on aquifer
Orange	Manufacturing	Sabine	Raw surface water supply from SRA Canal	OR-1SRA	36,000	1	$82	1	1	1	1	1	1	Requires agreement with SRA.	Highly renewable resource should minimize impacts.
Orange	Manufacturing	Sabine	Raw Water from Toledo Bend Reservoir	ORM-2	5,000	1	$81	1	1	1	1	1	1		
Orange	Mauriceville WSC	Sabine	New well in Gulf Coast aquifer	ORMa-1	203	2	$526	1	3	1	1	1	2	Requires coordination with Southeast Texas GCD	Highly renewable resource should minimize impacts.
Panola	Manufacturing		Purchase water from Carthage		187	1	$978	1	1	1	1	1	1		May place additional stress on aquifer
Polk	County-Other	Neches	Use additional supply from Gulf Coast Aquifer (Phase I-IV)	POC-1	832	2	$363	1	1	1	2	1	1		
Polk	Manufacturing	Neches	Expand existing supplies form Gulf-Coast aquifer (Phase I-II)	POM-1	450	2	$884	1	1	1	3	2	1		

Table 4D-A.1 Summary of Evaluation of Water Management Strategies (Cont.)

County	Entity	Basin Used	Strategy	Strategy Key	Quantity (Ac-Ft/Yr)	Reliability	Cost ($/Ac-Ft)	Impacts of Strategy on: Environmental Factors	Water Resources and Other WMS	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Political Feasibility	Implementation Issues	Comments
Rusk	Mining	Neches	Increase supply from Carrizo-Wilcox	RUL-1	158	2	$174	1	1	1	2	1	1		
Rusk	Steam-Electric	Neches	Supply from SRA, Toledo Bend Reservoir	RUSE-1	1,500	1	$203	1	1	1	2	1	3		
Rusk	Steam-Electric	Neches	Supply from ANRA (Lake Columbia)	RUSE-2	8,500	1	$282	See ANRA Lake Columbia Strategy							
Sabine	County-Other	Sabine	Increase supply from Carrizo-Wilcox, Additional groundwater (Phase I-II)	SBC-1	64	1	$552	1	1	1	1	1	1		
Sabine	County-Other	Sabine	Purchase water from Hemphill	SBC-2	100	1	$1,482	1	1	1	1	1	1	Requires water contract with City of Hemphill	
Sabine	Livestock	Sabine	Expand Carrizo-Wilcox supplies (Sabine)	SBL-1	100	1	$427	1	1	1	1	1	1		
Sabine	Livestock	Sabine	Expand local surface water (stock ponds)	SBL-2	300	2	$164	1	1	1	2	1	1	Implemented by local users	
San Augustine	Irrigation	Neches	Obtain Water from Carrizo-Wilcox Aquifer	SAI-1	100	1	$485	1	1	1	1	1	1		
San Augustine	Livestock	Neches	Increase local surface water supplies (stock ponds)	SAL-1	300	3	$164	1	1	2	1	1	1		
San Augustine	Livestock	Sabine	Increase groundwater supply from Carrizo-Wilcox Aquifer (Sabine)	SAL-2	100	1	$528	1	1	1	1	1	1		
San Augustine	Livestock	Neches	Increase groundwater supply from Carrizo-Wilcox Aquifer (Neches)	SAL-3	300	1	$528	1	1	1	1	1	1		
San Augustine	Mining	Neches	Purchase water from ANRA (Angelina river)	SAMi-1	500	2	$726	2	1	1	1	1	1		
San Augustine	Mining	Neches	Purchase water from LNVA (Sam Rayburn)	SAMi-2	6,500	1	$307	1	1	1	1	1	1		
Shelby	County-Other	Sabine	Expand groundwater from Carrizo-Wilcox (wells)	SHCo-1	350	1	$786	1	1	1	1	1	1		
Shelby	County-Other	Sabine	Purchase water from City of Center	SHCo-2	50	1	$978	1	1	1	1	1	1	Requires water contract with City of Center	
Shelby	County-Other	Sabine	Purchase water from SRA (Toledo Bend Reservoir)	SHCo-3	150	1	$2,316	1	1	1	1	1	1	Requires agreement with SRA.	Highly renewable resource should minimize impacts.
Shelby	Livestock	Sabine	Additional groundwater wells (Sabine Basin)	SHL-1	2,000	2	$107	1	1	1	1	1	1		
Shelby	Livestock	Neches	Additional groundwater wells (Neches Basin)	SHL-2	1,500	2	$106	1	1	1	1	1	1		
Shelby	Livestock	Sabine	Increase local supplies	SHL-3	500	2	$120	1	1	1	2	1	1	Implemented by local users	
Shelby	Livestock	Sabine	Purchase raw water from SRA (Toledo Bend)	SHL-4	4,000	1	$294	1	1	1	1	1	1	Requires agreement with SRA.	Highly renewable resource should minimize impacts.
Shelby	Manufacturing	Sabine	Purchase surface water from City of Center	SHM-1	12	1	$978	1	1	1	1	1	1	Requires water contract with City of Center	
Shelby	Mining	Neches	Purchase water from ANRA (Attoyac Bayou)	SHMi-1	250	2	$836	3	1	1	1	1	1		
Shelby	Mining	Sabine	Purchase water from SRA (Toledo Bend)	SHMi-2	1,250	1	$495	1	1	1	1	1	1		
Smith	Bullard	Neches	Increase supply from Carrizo-Wilcox	BU-1A	200	3	$517	1	3	1	2	1	1		May place additional stress on aquifer
Smith	Community Water Co.	Neches	Purchase water from the City of Tyler or other local provider	CW-1A	227	1	$1,743	1	1	1	2	1	1		
Smith	Jackson WSC	Neches	Purchase water from ANRA (Lake Columbia)	JA-1	600	1	$1,235	See ANRA Lake Columbia Strategy							
Smith	Lindale Rural WSC	Neches	Increase supply from Carrizo-Wilcox	LIR-1	80	3	$824	1	3	1	2	1	1		
Smith	Irrigation	Neches	Increase supply from Queen City	SMI-1	168	2	$234	1	1	1	2	2	1		May place additional stress on aquifer
Smith	Manufacturing	Neches	Purchase water from City of Tyler	SMMa-1	295	1	$1,493	1	1	1	1	1	1		
Smith	Mining	Neches	Increase supply from Queen City	SMM-1	329	2	$219	1	1	1	2	2	1		
Smith	Whitehouse	Neches	Purchase water from ANRA	WH-1	1,200	1	$1,140	See ANRA Lake Columbia Strategy							
Smith	Whitehouse	Neches	Purchase additional water from Tyler	WH-2	27	1		1	1	1	1	1	1		
Trinity	County-Other	Neches/Trinity	Increase supply from Yegua-Jackson	TRC-1	60	2	$616	1	2	1	2	2	2		
Tyler	County-Other	Neches	Increase supply from Gulf Coast Aquifer	TYC-1	251	1	$197	1	1	1	2	1	1		
Tyler	Woodville	Neches	Increase supply from Gulf Coast Aquifer	WDV-1	300	1	$242	1	1	1	1	1	2		
Multiple	ANRA	Neches	Lake Columbia Reservoir	ANRA-1	75,700	1	$215	3	2	2	2	1	3		
Multiple	ANRA	Neches	Water Treatment Plant and Distribution	ANRA-2	5,100	1	$1,151	1	1	1	1	1	3		
Henderson	Athens MWA	Multiple	Fish Hatchery Reuse to Lake Athens	AMWA-1	2,872	1	$0	1	1	1	1	1	1	Requires agreement with Fish Hatchery	
Henderson	Athens MWA	Multiple	Water from Forest Grove	AMWA-2	2,240	1	$1,173	2	2	1	1	1	2	Requires agreement with Luminant, TRWD and modification of water rights permit	
Henderson	Athens MWA	Multiple	Additional Lake Athens	AMWA-3	1,000	1	$643	1	1	1	1	1	2	Requires modification of hatchery intake	
Cherokee	Jacksonville	Neches	Water from Lake Columbia	JAC-02	1,700	1	$1,472	1	1	1	1	1	3		
Multiple	LNVA	Neches	Saltwater Barrier conjunctive operation with Rayburn/Steinhagen	LNVA-2	111,000	2	$5	1	1	1	1	2	3		
Multiple	LNVA	Neches	Permit Amendment for Sam Rayburn	LNVA-3	28,000	1	$0	1	1	1	1	1	2		
Multiple	LNVA	Neches	Sediment Reduction	LNVA-5	5,000	2	$2,813	2	2	1	2	2	3		
Multiple	LNVA	Neches	Purchase of water from SRA	LNVA-6	36,000	1	$166	1	1	1	1	1	2		
Multiple	LNVA	Neches	Rockland Reservoir	LNVA-7	614,400	2	$115	4	4	3	2	2	3		
Multiple	LNVA	Neches	Reallocation of Flood Storage	LNVA-4	122,000	1	$25	2	1	1	1	1	1		
Angelina	Lufkin	Neches	Develop Sam Rayburn Reservoir Water Rights	LU-1	11,200	1	$1,577	1	1	1	1	1	1		
Angelina	Lufkin	Neches	Develop additional groundwater Carrizo-Wilcox	LU-2	4,650	1	$427	1	1	1	1	1	1		
Angelina	Lufkin	Neches	Develop Lake Kurth Surface Water	LU-3	18,400	1	$455	1	1	1	1	1	2	Requires water right ammendment	
Multiple	SRA	Sabine	Toledo Bend Pipeline Project	SRA-1	100,000	2	$598	2	1	2	1	1	3		
Tyler	Tyler	Neches/Sabine	Lake Palestine	TYL-2	16,815	1	$830	1	1	1	1	1	1		
Multiple	UNRMWA	Neches/ Trinity	Lake Fastrill Replacement Project		134,500	1	$1,437	3	2	2	3	1	5		

1 **Most desirable**
5 **Least desirable**

Table 4D-A.2 Summary of Environmental Assessment

County	Entity	Basin	Strategy	Strategy Key	Environmental Factors										Comments
					Total Acres Impacted	Wetland Acres[1]	Environmental Water Needs	Habitat	Threatened & Endangered Species	Cultural Resources	Bays & Estuaries	Environmental Water Quality	Other	Overall Environmental Impacts	
Name	Name(s)	Name	Name	Name	#	#	(1-5)	(1-5)	#	(1-5)	(1-5)	(1-5)	(1-5)	(1-5)	
Anderson	County-Other	Neches	Increase supply from Queen City	ADC-1	0	NA	1	1	5	1	1	2	1	1	Pending water quality of Queen City, may increase TDS of wastewater discharges
Anderson	County-Other	Neches	Increase supply from Carrizo-Wilcox	ADC-2	0	NA	1	1	5	1	1	1	1	1	
Anderson	Frankston	Neches	Increase supply from Carrizo-Wilcox	FR-1	0	NA	1	1	5	1	1	1	1	1	
Anderson	Mining	Neches	Increase supply from Carrizo-Wilcox	ADN-1	0	NA	1	1	5	1	1	1	1	1	
Anderson	Steam-Electric	Neches	Water from Lake Palestine	ADS-1	40	NA	2	1	5	1	2	1	1	1	
Anderson	Steam-Electric	Neches	Water from Lake Fastrill	ADS-2	NA	NA	See UNRMWA Lake Fastrill Srategy								
Angelina	County-Other	Neches	Voluntary Redistribution from City of Lufkin	ANC-1	46	NA	1	1	8	1	1	1	1	1	
Angelina	County-Other	Neches	Increase supply from Yegua-Jackson	ANC-2A	0	NA	1	1	8	1	1	1	1	1	
Angelina	Diboll	Neches	Purchase water from the City of Lufkin (Phase I-II)	DI-1	28	NA	1	1	8	1	1	1	1	1	
Angelina	Diboll	Neches	Increase supply from Yegua-Jackson	DI-3	0	NA	1	1	8	1	1	1	1	1	
Angelina	Four Way WSC	Neches	Obtain water from the City of Lufkin	FW-1	0	NA	1	1	8	1	1	1	1	1	
Angelina	Hudson	Neches	Purchase Water from Hudson WSC	HU-1A	0	NA	1	1	8	1	1	1	1	1	
Angelina	Hudson WSC	Neches	Increase supply from Carrizo-Wilcox (Phase I)	HW-1A	0	NA	1	1	8	1	1	1	1	1	
Angelina	Hudson WSC	Neches	Increase supply from Carrizo-Wilcox (Phase II)	HW-1B	0	NA	1	1	8	1	1	1	1	1	
Angelina	Manufacturing	Neches	Obtain water from City of Lufkin	ANM-1	24	NA	1	1	8	1	1	1	1	1	
Angelina	Manufacturing	Neches	Obtain raw water from Lake Columbia via contract with ANRA	ANM-2	7	NA	See ANRA Lake Columbia Strategy								
Angelina	Livestock	Neches	Increase stock Ponds	ANL-1	3	NA	1	1	8	1	1	1	1	1	
Angelina	Mining	Neches	Obtain Water from ANRA (Lake Columbia or Angelina River)	ANMI-1	12	NA	2	2	8	2	2	2	2	2	
Angelina	Mining	Neches	Obtain water from Lufkin (Lake Kurth)	ANMI-2	0	NA	1	1	8	1	1	1	1	1	
Angelina	Steam-Electric	Neches	New wells in the Carrizo-Wilcox	ANP-1	0	NA	1	1	8	1	1	1	1	1	
Cherokee	Mining	Neches	Purchase water from ANRA (Lake Columbia or Angelina River)	CHMI-1	12	NA	2	2	4	2	2	2	2	2	
Cherokee	New Summerfield	Neches	Obtain treated water from Lake Columbia via contract with ANRA	NS-1	6	NA	See ANRA Lake Columbia Strategy								
Cherokee	New Summerfield	Neches	Increase supply from Carrizo-Wilcox	NS-3	0	NA	1	1	4	2	2	1	1	1	
Cherokee	Rusk	Neches	Obtain treated water from Lake Columbia via contract with ANRA	RU-1	23	NA	See ANRA Lake Columbia Strategy								
Cherokee	Rusk	Neches	Increase supply from Carrizo-Wilcox	RU-3	0	NA	1	1	4	1	1	1	1	1	
Hardin	County-Other	Neches	Increase supply from Gulf Coast Aquifer (Phases I-III)	HAC-1	2	NA	1	1	6	1	1	1	3	1	May place additional stress on aquifer
Hardin	Manufacturing	Neches	Use additional water from Gulf Coast Aquifer	HAM-1	2	NA	1	1	6	1	1	1	1	1	
Hardin	Irrigation	Neches	Use surface water sources	HAI-1	6	NA	2	2	6	1	2	1	1	1	
Henderson	Athens	Neches	Water from Athens MWA	AT-3	NA	NA	see Athen MWA strategies							1	
Henderson	County-Other	Neches	Expand use of Carrizo-Wilcox	HECo-2	4	NA	1	1	7	1	1	1	3	1	May place additional stress on aquifer
Henderson	County-Other	Neches	Expand use of Queen City	HECo-3	11	NA	1	1	7	1	1	1	2	1	Pending water quality of Queen City, may increase TDS of wastewater discharges
Henderson	County-Other	Neches	Water from UNRMWA	HECo-4	12	NA	1	1	7	1	1	1	1	1	
Henderson	Irrigation	Neches	Obtain water Lake Athens	HEI-1	see Athens MWA	NA	1	1	7	1	1	1	1	1	
Henderson	Livestock	Neches	Fish Hatchery Reuse	HEL-1	0	NA	1	1	7	1	1	2	1	1	
Houston	Irrigation	Neches/Trinity	Increase supply from Carrizo-Wilcox (Phase I-VI)	HOI-1	2	NA	1	1	8	1	1	1	1	1	
Houston	Livestock	Neches/Trinity	Increase supply from Carrizo-Wilcox (Phase I-V)	HOL-1	2	NA	1	1	8	1	1	1	1	1	
Houston	Manufacturing	Neches/Trinity	Obtain water from Houston County WCID	HOMa-1	0	NA	1	1	8	1	1	1	1	1	
Jasper	County-Other	Neches	Use additional supply from Gulf Coast Aquifer	JAC-1	2	NA	1	1	7	1	1	1	3	1	May place additional stress on aquifer
Jefferson	Mining	Neches	Use additional supply from Gulf Coast Aquifer	JEM-1	0	NA	1	1	7	1	1	1	3	1	May place additional stress on aquifer
Jefferson	Steam-Electric	Neches	Use water from the Neches River	JESE-1	12	NA	2	2	9	1	2	1	1	2	
Nacogdoches	D&M WSC	Neches	Increase supply from Carrizo-Wilcox	DM-1	0	NA	1	1	8	1	1	1	1	1	
Nacogdoches	Lilly Grove SUD	Neches	Increase supply from Carrizo-Wilcox	LG-2	0	NA	1	1	8	1	1	1	1	1	
Nacogdoches	Livestock	Neches	Increase supply from Carrizo-Wilcox	NCL-1	0	NA	1	1	8	1	1	1	1	1	
Nacogdoches	Mining	Neches	Purchase water from ANRA (Lake Columbia or Angelina River)	NCMI-1	12	NA	2	2	8	2	2	2	2	2	
Nacogdoches	Mining	Neches	Purchase water from LNVA	NCMI-2	12	NA	1	1	8	1	1	1	1	1	
Nacogdoches	Nacogdoches	Neches	Additional groundwater from Carrizo-Wilcox	NA-1	0	NA	1	1	8	1	1	1	1	1	
Nacogdoches	Nacogdoches	Neches	Obtain and treat water from Lake Columbia	NA-3	0	NA	See ANRA Lake Columbia Strategy								
Nacogdoches	Nacogdoches	Sabine	Obtain and treat water from Toledo Bend	NA-4	165	NA	2	2	8	1	2	1	1	2	
Nacogdoches	Steam-Electric	Neches	Obtain raw water from Lake Columbia	NCS-1	12	NA	See ANRA Lake Columbia Strategy								
Nacogdoches	Steam-Electric	Neches	Obtain raw water from Houston County Lake	NCS-2	12	NA	1	1	12	1	1	1	1	1	
Nacogdoches	Swift WSC	Neches	Increase supply from Carrizo-Wilcox	SW-1	0	NA	1	1	8	1	1	1	1	1	
Nacogdoches	Swift WSC	Neches	Obtain Treated water from Lake Columbia via contract with ANRA	SW-3		NA	See ANRA Lake Columbia Strategy								
Nacogdoches	Multiple	Neches	Lake Naconiche Regional System	Multiple	0	NA	1	1	1	1	1	1	1	1	
Newton	Manufacturing	Sabine	Additional Groundwater Well Gulf Coast Aquifer	NWM-1	2	NA	1	1	6	1	1	1	1	1	

Table 4D-A.2 Summary of Environmental Assessment (Cont.)

County	Entity	Basin	Strategy	Strategy Key	Environmental Factors										Comments
					Total Acres Impacted	Wetland Acres[1]	Environmental Water Needs	Habitat	Threatened & Endangered Species	Cultural Resources	Bays & Estuaries	Environmental Water Quality	Other	Overall Environmental Impacts	
Name	Name(s)	Name	Name	Name	#	#	(1-5)	(1-5)	#	(1-5)	(1-5)	(1-5)	(1-5)	(1-5)	
Newton	Manufacturing	Sabine	Purchase water from SRA	NWM-2	12	NA	1	2	6	1	1	1	1	1	
Newton	Steam-Electric	Sabine	Purchase water from SRA	NWP-1		NA	1	1	6	1	1	1	1	1	
Orange	County-Other	Sabine	Use additional supply from Gulf Coast Aquifer	ORC-1	0	NA	1	1	8	1	1	1	3	1	May place additional stress on aquifer
Orange	Manufacturing	Sabine	Raw surface water supply from SRA Canal	OR-1SRA	0	NA	2	1	8	1	2	1	1	1	
Orange	Manufacturing	Sabine	Raw Water from Toledo Bend Reservoir	ORM-2	2	NA	1	1	8	1	1	1	1	1	
Orange	Mauriceville WSC	Sabine	New well in Gulf Coast aquifer	ORMa-1	0	NA	1	1	8	1	1	1	3	1	May place additional stress on aquifer
Panola	Manufacturing		Purchase water from Carthage		0	NA	1	1	4	1	1	1	1	1	
Polk	County-Other	Neches	Use additional supply from Gulf Coast Aquifer (Phase I-IV)	POC-1	2	NA	1	1	8	1	1	1	1	1	
Polk	Manufacturing	Neches	Expand existing supplies form Gulf-Coast aquifer	POM-1	0	NA	1	1	8	1	1	1	1	1	
Rusk	Mining	Neches	Increase supply from Carrizo-Wilcox	RUL-1	0	NA	1	1	8	1	1	1	1	1	
Rusk	Steam-Electric	Neches	Supply from SRA, Toledo Bend Reservoir	RUSE-1	0	NA	1	1	8	1	1	1	1	1	
Rusk	Steam-Electric	Neches	Supply from ANRA (Lake Columbia)	RUSE-2	NA	NA	See ANRA Lake Columbia Strategy								
Sabine	County-Other	Sabine	Increase supply from Carrizo-Wilcox (Neches)	SBC-1	0	NA	1	1	5	1	1	1	1	1	
Sabine	County-Other	Sabine	Purchase water from Hemphill	SBC-2	9	NA	1	1	5	1	1	1	1	1	
Sabine	Livestock	Sabine	Expand Carrizo-Wilcox supplies (Sabine)	SBL-1	0	NA	1	1	5	1	1	1	1	1	
Sabine	Livestock	Sabine	Expand current surface water supplies (Neches and Sabine)	SBL-2	20	NA	2	2	5	1	1	1	1	1	
San Augustine	Irrigation	Neches	Obtain Water from Carrizo-Wilcox Aquifer	SAI-1	12	NA	1	1	8	1	1	1	1	1	
San Augustine	Livestock	Neches	Increase local surface water supplies (stock ponds)	SAL-1	3	NA	1	1	8	1	1	1	1	1	
San Augustine	Livestock	Sabine	Increase groundwater supply from Carrizo-Wilcox Aquifer (Sabine)	SAL-2	0	NA	1	1	8	1	1	1	1	1	
San Augustine	Livestock	Neches	Increase groundwater supply from Carrizo-Wilcox Aquifer (Neches)	SAL-3	0	NA	1	1	8	1	1	1	1	1	
San Augustine	Mining	Neches	Purchase water from ANRA (Angelina river)	SAMI-1	12	NA	2	2	8	2	2	2	2	2	Run of River
San Augustine	Mining	Neches	Purchase water from LNVA (Sam Rayburn)	SAMI-2	12	NA	1	1	8	1	1	1	1	1	
Shelby	County-Other	Sabine	Expand groundwater from Carrizo-Wilcox (Sabine)	SHCo-1	12	NA	1	1	8	1	1	1	1	1	
Shelby	County-Other	Sabine	Purchase water from City of Center	SHCo-2	0	NA	1	1	8	1	1	1	1	1	
Shelby	County-Other	Sabine	Purchase water from SRA (Toledo Bend Reservoir)	SHCo-3	9	NA	1	1	8	1	1	1	1	1	
Shelby	Livestock	Sabine	Additional groundwater wells (Sabine Basin)	SHL-1	0	NA	1	1	8	1	1	1	1	1	Potential impacts to stream flows.
Shelby	Livestock	Neches	Additional groundwater wells (Neches Basin)	SHL-2	0	NA	1	1	8	1	1	1	1	1	Potential impacts to stream flows.
Shelby	Livestock	Sabine	Increase local supplies	SHL-3	33	NA	2	2	8	1	1	1	1	1	May decrease runoff to local streams
Shelby	Livestock	Sabine	Purchase raw water from SRA (Toledo Bend)	SHL-4	12	NA	1	1	8	1	2	1	1	1	
Shelby	Manufacturing	Sabine	Purchase surface water from City of Center	SHM-1	0	NA	1	1	8	1	1	1	1	1	
Shelby	Mining	Neches	Purchase water from ANRA (Attoyac Bayou)	SHMI-1	5	NA	3	4	8	3	3	2	3	3	Run of River
Shelby	Mining	Sabine	Purchase water from SRA (Toledo Bend)	SHMI-2	12	NA	1	1	8	1	1	1	1	1	
Smith	Bullard	Neches	Increase supply from Carrizo-Wilcox	BU-1A	2	NA	1	1	8	1	1	1	3	1	May place additional stress on aquifer
Smith	Community Water Co.	Neches	Purchase water from the City of Tyler or other local provider	CW-1A	2	NA	1	1	8	1	1	1	1	1	
Smith	Jackson WSC	Neches	Purchase water from ANRA (Lake Columbia)	JA-1	2	NA	See ANRA Lake Columbia Strategy								
Smith	Lindale Rural WSC	Neches	Increase supply from Carrizo-Wilcox	LIR-1	2	NA	1	1	8	1	1	1	1	1	
Smith	Irrigation	Neches	Increase supply from Queen City	SMI-1	0	NA	1	1	8	1	1	1	3	1	May place additional stress on aquifer
Smith	Manufacturing	Neches	Purchase water from City of Tyler	SMMA-1	7	NA	1	1	8	1	1	1	1	1	
Smith	Mining	Neches	Increase supply from Queen City	SMM-1	0	NA	1	1	8	1	1	1	1	1	
Smith	Whitehouse	Neches	Purchase water from ANRA	WH-1		NA	See ANRA Lake Columbia Strategy								
Smith	Whitehouse	Neches	Purchase additional water from Tyler	WH-2		NA	1	1	8	1	1	1	1	1	
Trinity	County-Other	Neches/Trinity	Increase supply from Yegua-Jackson	TRC-1	2	NA	1	1	8	1	1	1	1	1	
Tyler	County-Other	Neches	Increase supply from Gulf Coast Aquifer	TYC-1	2	NA	1	1	5	1	1	1	1	1	
Multiple	ANRA	Neches	Lake Columbia Reservoir	ANRA-1	10,200	5,900	3	4	12	3	2	2	2	3	
Multiple	ANRA	Neches	Water Treatment Plant and Distribution	ANRA-2	86	NA	1	2	12	1	1	1	1	1	
Henderson	Athens MWA	Multiple	Fish Hatchery Reuse to Lake Athens	AMWA-1	0	NA	2	1	7	1	1	1	1	1	Will decrease flows in current receiving stream and increase flows in Lake Athens watershed
Henderson	Athens MWA	Multiple	Water from Forest Grove	AMWA-2	9	NA	2	2	7	1	2	2	1	2	
Henderson	Athens MWA	Multiple	Additional Lake Athens	AMWA-3	0	NA	2	1	7	1	1	1	1	1	
Cherokee	Jacksonville	Neches	Water from Lake Columbia	JAC-02	12	NA	1	2	12	1	1	1	1	1	
Multiple	LNVA	Neches	Saltwater Barrier conjunctive operation with Rayburn/Steinhagen	LNVA-2	0	NA	2	1	8	1	2	1	1	1	
Multiple	LNVA	Neches	Permit Amendment for Sam Rayburn	LNVA-3	0	NA	1	1	8	1	1	1	1	1	
Multiple	LNVA	Neches	Sediment Reduction	LNVA-4	0	N/A	3	3	2	1	1	2	2	2	
Multiple	LNVA	Neches	Purchase of water from SRA	LNVA-6	35	NA	1	1	13	1	1	1	1	1	
Multiple	LNVA	Neches	Rockland Reservoir	LNVA-7	99,102	NA	3	5	8	3	5	3	5	4	
Multiple	LNVA	Neches	Reallocation of Flood Storage	LNVA-4		NA	3	3	8	1	3	2	2	2	
Angelina	Lufkin	Neches	Develop Sam Rayburn Reservoir Water Rights	LU-1	30	NA	1	1	8	1	2	1	1	1	
Angelina	Lufkin	Neches	Develop additional groundwater Carrizo-Wilcox	LU-2	22	NA	1	1	8	1	1	1	1	1	
Angelina	Lufkin	Neches	Develop Lake Kurth Surface Water	LU-3	17	NA	2	1	8	1	1	1	1	1	
Multiple	SRA	Sabine	Toledo Bend Pipeline Project	SRA-1	2,077	NA	2	2	13	2	2	2	1	2	
Smith	Tyler	Neches/Sabine	Lake Palestine	TYL-2	12	NA	1	1	7	1	1	1	1	1	
Multiple	UNRMWA	Neches/ Trinity	Lake Fastrill Replacement Project		24,948	2,377	3	5	9	3	3	2	3	3	
Multiple	Multiple	Multiple	Water Conservation	Multiple	0	NA	1	1	0	1	1	1	1	1	

Appendix 8-A

Proposed Reservoir Site Locations

Appendix 8-A provides a description of proposed reservoirs in the ETRWPA. This appendix includes maps showing the locations of these proposed reservoirs.

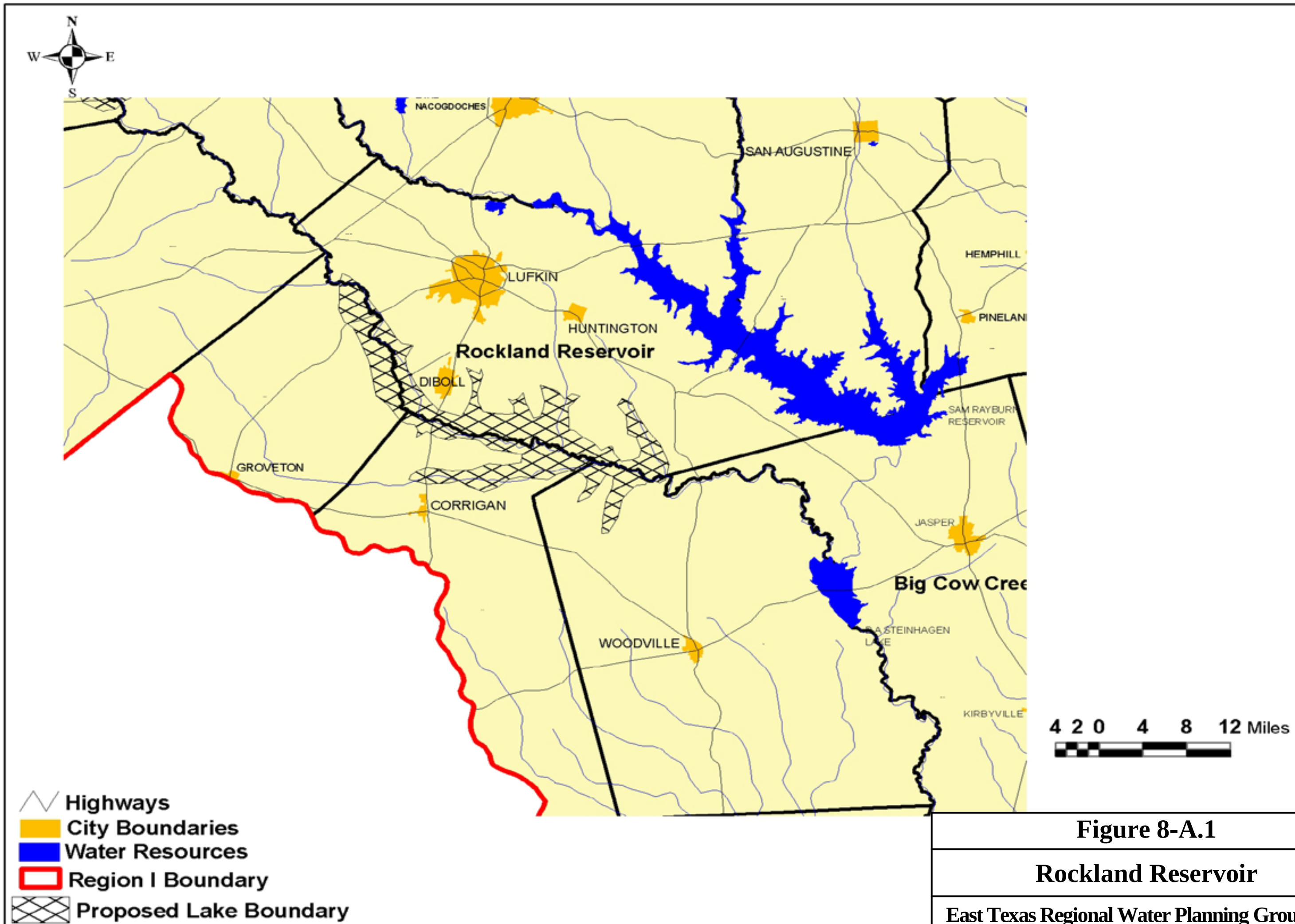

Figure 8-A.1

Rockland Reservoir

East Texas Regional Water Planning Group 1/10

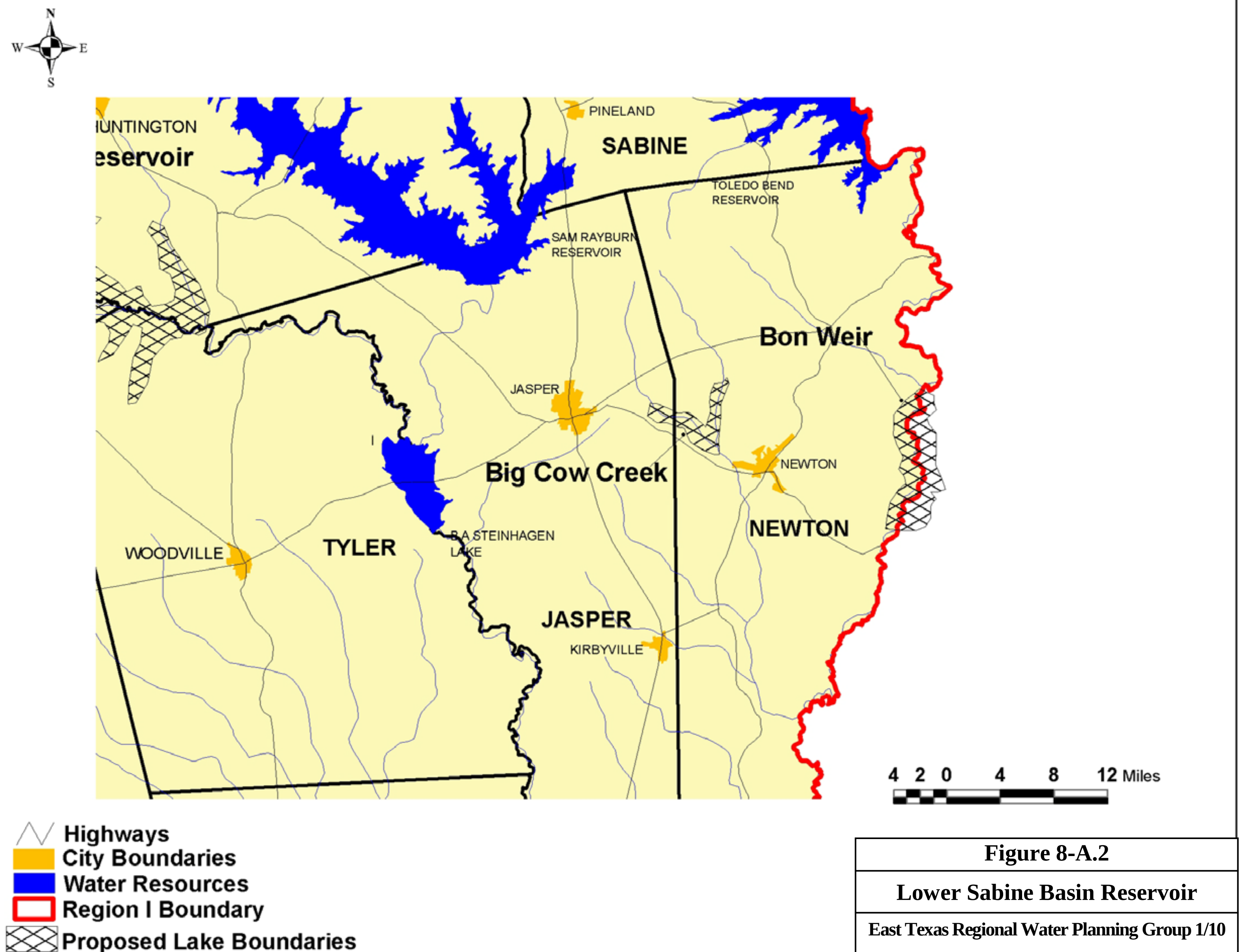

Figure 8-A.2
Lower Sabine Basin Reservoir
East Texas Regional Water Planning Group 1/10

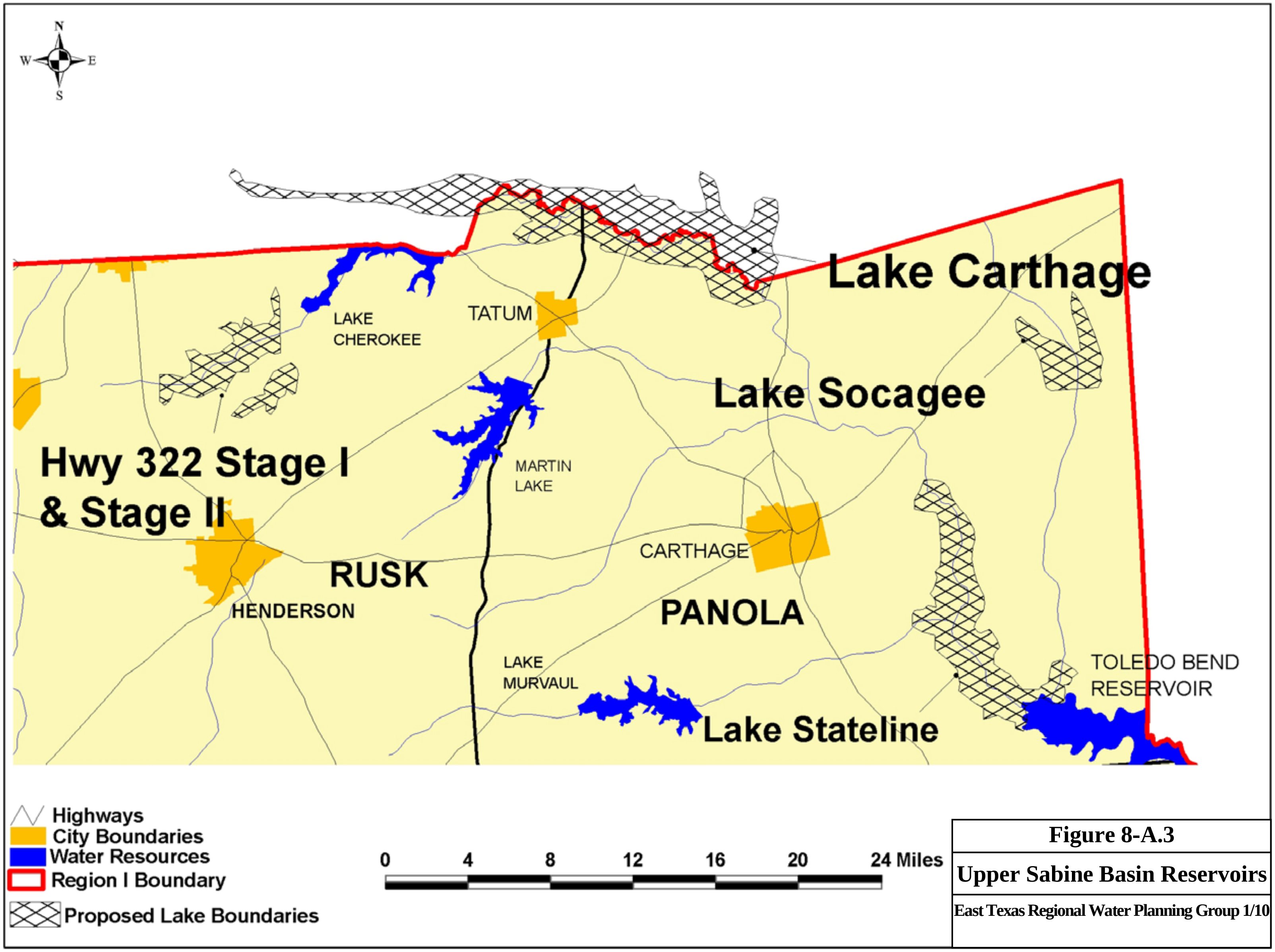

Figure 8-A.3

Upper Sabine Basin Reservoirs

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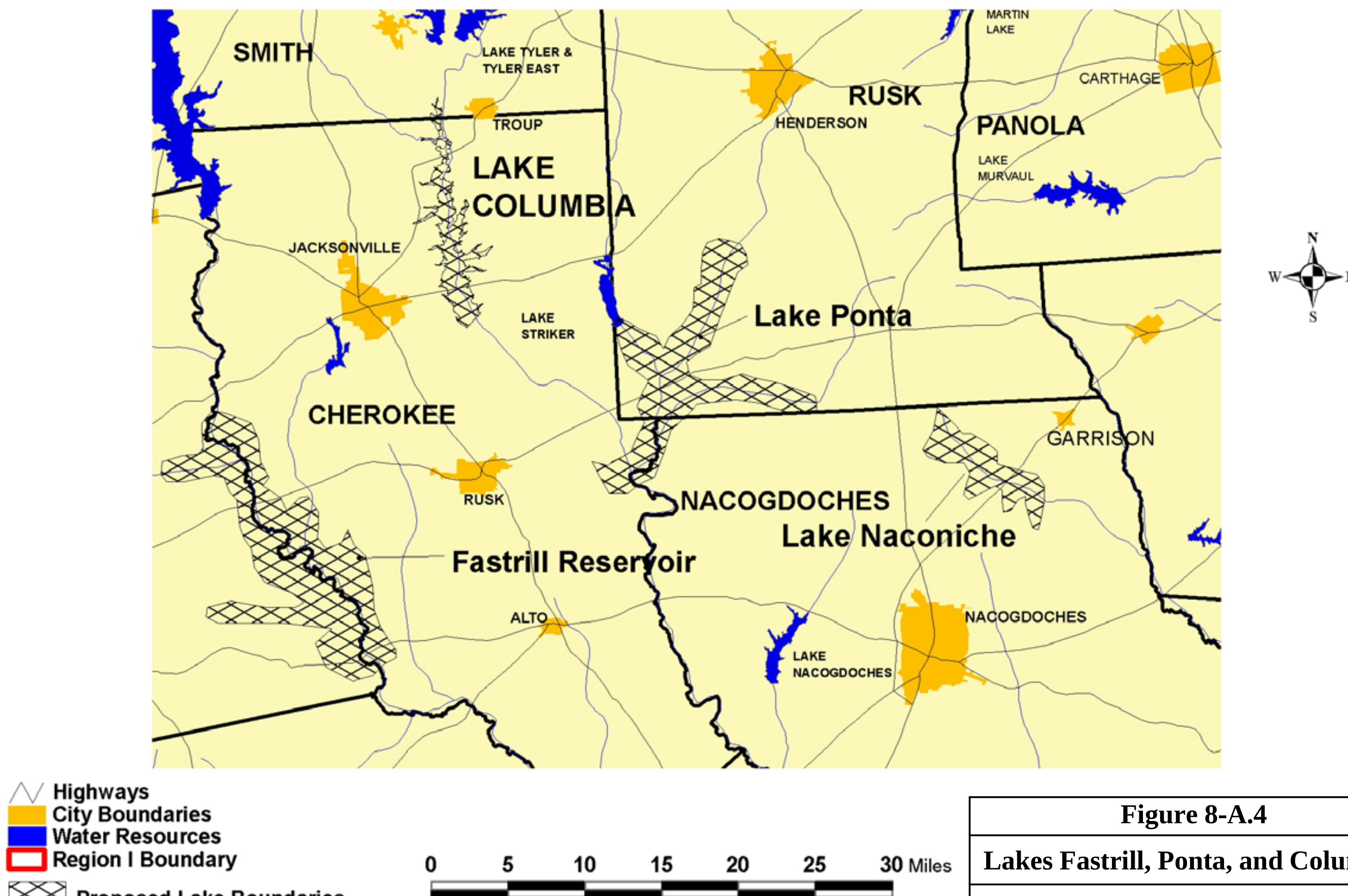

Figure 8-A.4

Lakes Fastrill, Ponta, and Columbia

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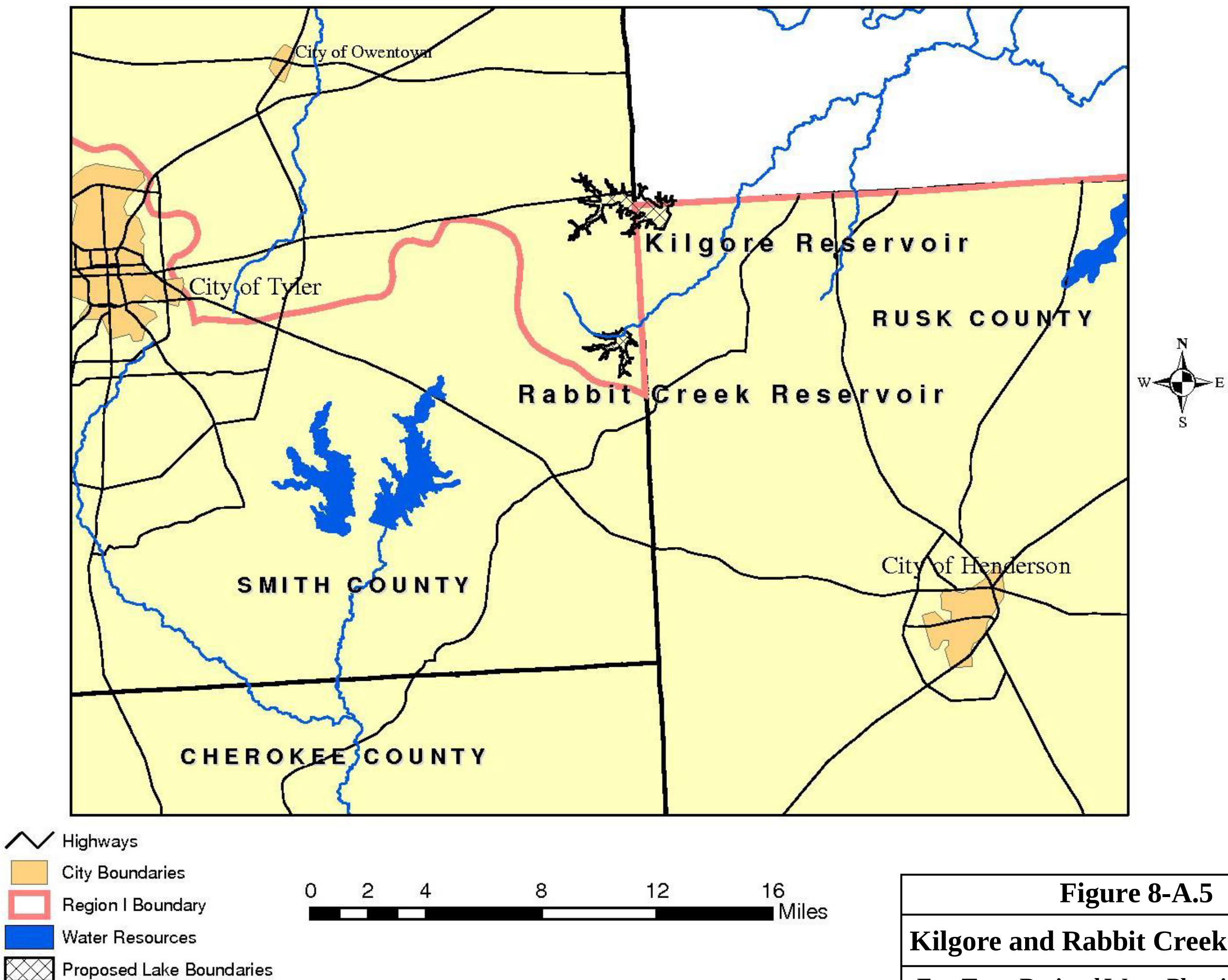

Figure 8-A.5

Kilgore and Rabbit Creek Reservoirs

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Appendix 9-A

Infrastructure Financing Survey Results

A survey of WUGs with identified needs was conducted to determine infrastructure costs and potential funding sources for infrastructure projects. Survey results are included in this appendix.

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Table 9-A.1 WMS Cost Summary

County	Entity		Basin Used	Strategy		Strategy Key	Capital Cost		Municipal Cost	Surface Water
Name	Name(s)		Name	Name		Name				
Anderson	County-Other	1	Neches	Expanded use of Queen City		ADC-1	$ 212,732.00		$ 212,732.00	$ -
Anderson	County-Other	1	Neches	Expanded use of Carrizo		ADC-2	$ 262,189.00		$ 262,189.00	$ -
Anderson	Frankston	1	Neches	Increase supply from Carrizo-Wilcox		FR-1	$ 42,846.00		$ 42,846.00	$ -
Anderson	Mining		Neches	Increase supply from Carrizo-Wilcox		AND-1	$ 228,730.00		$ -	$ -
Anderson	Steam-Electric		Neches	Water from Lake Palestine	1	ADS-1	$ 24,917,400.00		$ -	$ 24,917,400.00
Angelina	County-Other	1	Neches	Obtain water from Lufkin	1	ANC-1A	$ 10,604,000.00	$ 10,604,000.00	$ 10,604,000.00	$ 10,604,000.00
Angelina	County-Other	1	Neches	Increase supply from Carrizo-Wilcox		ANC-2A	$ 419,717.00		$ 419,717.00	$ -
Angelina	Diboll	1	Neches	Purchase Water from Lufkin	1	DI-1	$ 6,195,000.00	$ 6,195,000.00	$ 6,195,000.00	$ 6,195,000.00
Angelina	Diboll	1	Neches	Increase supply from Yegua		DI-3	$ 576,576.00		$ 576,576.00	$ -
Angelina	Four Way WSC	1	Neches	Obtain water from Lufkin	1	FW-1	$ 669,192.00		$ 669,192.00	$ 669,192.00
Angelina	Hudson	1	Neches	Increase supply from Carrizo-Wilcox		HU-1A	$ 380,703.00		$ 380,703.00	$ -
Angelina	Hudson WSC	1	Neches	Increase supply from Carrizo-Wilcox		HW-1A	$ 974,482.00		$ 974,482.00	$ -
Angelina	Lufkin	1	Neches	Construct pipeline to Sam Rayburn Reservoir	1	LU-1			$ -	$ -
Angelina	Manufacturing		Neches	Obtain water from City of Lufkin	1	ANM-1	$ 15,609,700.00	$ 15,609,700.00	$ -	$ 15,609,700.00
Angelina	Manufacturing		Neches	Obtain raw water from Lake Columbia	1	ANM-2	$ 7,603,000.00		$ -	$ 7,603,000.00
Angelina	Live Stock			Stock Ponds			$ 168,000.00		$ -	$ -
Angelina	Mining			Lake Columbia	1		$ 5,793,150.00		$ -	$ 5,793,150.00
Angelina	Steam & Electric			Wells			$ 1,724,909.00		$ -	$ -
Cherokee	Irrigation		Neches	Queen City		CH-1			$ -	$ -
Cherokee	Manufacturing		Neches	Obtain water from City of Jacksonville		CHM-1			$ -	$ -
Cherokee	Mining		Neches	Lake Columbia	1	CHN-1	$ 3,619,300.00		$ -	$ 3,619,300.00
Cherokee	New Summerfield	1	Neches	Obtain treated water from Lake Columbia	1	NS-1			$ -	$ -
Cherokee	New Summerfield	1	Neches	Increase supply from Carrizo-Wilcox		NS-3	$ 299,452.00		$ 299,452.00	$ -
Cherokee	Rusk	1	Neches	Obtain treated water from Lake Columbia	1	RU-1	$ 28,435,800.00	$ 28,435,800.00	$ 28,435,800.00	$ 28,435,800.00
Cherokee	Rusk	1	Neches	Increase supply from Carrizo-Wilcox		RU-3	$ 299,452.00		$ 299,452.00	$ -
Hardin	County-Other	1	Neches	Use additional water from Gulf Coast Aquifer		HAC-1A	$ 1,670,664.00		$ 1,670,664.00	$ -
									$ -	$ -
									$ -	$ -
Hardin	Manufacturing		Neches	Use additional water from Gulf Coast Aquifer		HAM-1	$ 429,542.00		$ -	$ -
Hardin	Irrigation		Neches	Use surface water sources	1	HAI-1	$ 2,405,001.00		$ -	$ 2,405,001.00
Henderson	Athens	1	Neches	Purchase water from Athens MWA	1	AT-2			$ -	$ -
Henderson	Bethel Ash WSC	1	Neches	Overdraft and drill new well in Carrizo-Wilcox		BA-1			$ -	$ -
Henderson	County-Other	1	Neches	Overdraft Carrizo-Wilcox		HECo-2	$ 609,900.00		$ 609,900.00	$ -
Henderson	County-Other	1	Neches	Expanded use of Queen City		HECo-3	$ 4,420,100.00		$ 4,420,100.00	$ -
Henderson	County-Other	1	Neches	Water from UNRMWA	1	HECo-4	$ 8,937,350.00		$ 8,937,350.00	$ 8,937,350.00
									$ -	$ -
Henderson	Irrigation		Neches	Obtain water through Athens MWA strategies	1	HEI-1			$ -	$ -
Henderson	Livestock		Neches	Temporary Pumping		HEL-1	$ -		$ -	$ -
Henderson	Livestock		Neches	Obtain water through Athens MWA strategies	1	AMWA-1			$ -	$ -
Houston	Irrigation		Neches/Trinity	Increase supply from Carrizo-Wilcox		HOI-1	$ 3,205,560.00		$ -	$ -
Houston	Livestock		Neches/Trinity	Increase supply from Carrizo-Wilcox		HOL-1	$ 2,671,300.00		$ -	$ -
Jasper	County-Other	1	Neches	Use of additional water from Gulf Coast Aquifer		JAC-1	$ 1,369,957.00		$ 1,369,957.00	$ -
									$ -	$ -
Jefferson	Mining		Neches	Use additional supply from Gulf Coast Aquifer		JEM-1	$ 103,083.00		$ -	$ -
Jefferson	Steam-Electric		Neches	Use additional water from the Neches River	1	JESE-1	$ 13,647,296.00		$ -	$ 13,647,296.00
Nacogdoches	Appleby WSC	1	Neches	Increase supply from Carrizo-Wilcox		AP-1	$ 4,392,350.00		$ 4,392,350.00	$ -
Nacogdoches	D&M WSC	1	Neches	Increase supply from Carrizo-Wilcox		DM-1	$ 492,348.00		$ 492,348.00	$ -
Nacogdoches	County-Other	1	Neches	Obtain raw water from Lake Columbia	1	NC-2			$ -	$ -

Table 9-A.1 WMS Cost Summary

County	Entity		Basin Used	Strategy		Strategy Key	Capital Cost		Municipal Cost	Surface Water
Nacogdoches	Lilly Grove SUD	1	Neches	Increase supply from Carrizo-Wilcox		LG-2	$ 580,504.00		$ 580,504.00	$ -
	Lilly Grove SUD	1	Neches	Lake Naconiche		LG-1	$ 7,320,600.00	$ 7,320,600.00	$ 7,320,600.00	$ -
Nacogdoches	Livestock		Neches	Increase supply from Carrizo-Wilcox		NCL-1	$ 1,969,392.00		$ -	$ -
Nacogdoches	Mining		Neches	Water from ANRA	1	NCMI-1	$ 9,593,450.00		$ -	$ 9,593,450.00
Nacogdoches	Nacogdoches		Neches	Acquire agreement w/ downstream water rights holders		NA-1			$ -	$ -
Nacogdoches	Nacogdoches		Neches	Obtain and treat water from Lake Columbia	1	Alt. Str. NA-3			$ -	$ -
Nacogdoches	Nacogdoches		Neches	Obtain and treat water from Toledo Bend	1	Alt. Str. NA-4			$ -	$ -
Nacogdoches	Steam-Electric		Neches	Obtain raw water from Lake Columbia	1	NCS-1	$ 10,718,000.00	$ 10,718,000.00	$ -	$ 10,718,000.00
Nacogdoches	Steam-Electric		Neches	Obtain raw water from Houston County Lake	1	NCS-1	$ 2,012,400.00		$ -	$ 2,012,400.00
Nacogdoches	Swift WSC	1	Neches	Increase supply from Carrizo-Wilcox		SW-1	$ 498,171.00		$ 498,171.00	$ -
Nacogdoches	Swift WSC	1	Neches	Lake Naconiche	1	SW-2	$ 5,856,500.00	$ 5,856,500.00	$ 5,856,500.00	$ 5,856,500.00
Nacogdoches	Swift WSC	1	Neches	Lake Columbia	1	SW-3			$ -	$ -
Newton	Manufacturing		Sabine	Purchase additional water from SRA (Toledo Bend)	1	NWM-2	$ 1,389,500.00	$ 1,389,500.00	$ -	$ 1,389,500.00
Newton	Manufacturing		Sabine	Install Wells in Gulf Coast Aquifer		NWM-1	$ 891,529.00		$ -	$ -
Newton	Steam & Electric		Sabine	Water from SRA	1	NWP-1	$ 12,515,350.00		$ -	$ 12,515,350.00
Orange	Manufacturing		Sabine	Water from SRA	1	OR-1	$ -		$ -	$ -
Orange	County-Other	1	Sabine	Additional Wells		ORC-1	$ 432,222.00		$ 432,222.00	$ -
Orange	Mauriceville WSC	1	Sabine	Increase groundwater supply (install well in Jasper County)		ORMa-1	$ 550,848.00		$ 550,848.00	$ -
Polk	County-Other	1	Neches	Use additional supply from Gulf Coast Aquifer		POC-1A	$ 2,991,140.00		$ 2,991,140.00	$ -
Polk	Manufacturing		Neches	Expand existing supplies		POM-1	$ 581,344.00		$ -	$ -
Polk	City of Woodville	1	Neches	New Wells Gulf Coast Aquifer			$ 511,400.00		$ 511,400.00	$ -
Rusk	Mining		Neches	Increase supply from Carrizo-Wilcox		RUL-1	$ 241,600.00		$ -	$ -
Rusk	Steam-Electric		Neches	Toledo Bend	1	RUSE-1	$ 1,318,500.00		$ -	$ 1,318,500.00
Rusk	Steam-Electric		Neches	Obtain water from Lake Columbia	1	RUSE-2	$ 8,640,450.00		$ -	$ 8,640,450.00
Sabine	County-Other	1	Sabine	Increase groundwater supply from Carrizo-Wilcox Aquifer		SBC-1	$ 328,840.00		$ 328,840.00	$ -
Sabine	County-Other	1	Sabine	Purchase water from City of Hemphill	1	SBC-2	$ 809,000.00		$ 809,000.00	$ 809,000.00
Sabine	Livestock		Sabine	Increase groundwater supply from Carrizo-Wilcox Aquifer		SBL-1	$ 226,430.00		$ -	$ -
Sabine	Livestock		Sabine	Increase supply from local sources		SBL-2	$ 562,700.00		$ -	$ -
San Augustine	County-Other	1	Neches	Increase groundwater supply from Carrizo-Wilcox Aquifer		SAC-1			$ -	$ -
San Augustine	County-Other	1	Neches	Expand contracts with San Augustine		SAC-2			$ -	$ -
San Augustine	Irrigation		Neches	Increase groundwater supply from Carrizo-Wilcox Aquifer		SAL-1	$ 224,690.00		$ -	$ -
San Augustine	Livestock		Sabine	Stock Ponds		SAL-1	$ 562,700.00		$ -	$ -
San Augustine	Livestock		Sabine	Increase groundwater supply from Carrizo-Wilcox Aquifer		SAL-2	$ 189,570.00		$ -	$ -
San Augustine	Livestock		Neches	Increase groundwater supply from Carrizo-Wilcox Aquifer		SAL-3	$ 379,140.00		$ -	$ -
San Augustine	Mining		Neches	From ANRA	1	SAMi-1	$ 2,627,850.00		$ -	$ 2,627,850.00
San Augustine	Mining		Neches	From LNVA	1	SAMi-2	$ 8,212,450.00	$ 8,212,450.00	$ -	$ 8,212,450.00
Shelby	City of Center	1	Sabine	Agreements with senior downstream water rights holders		SHC-2			$ -	$ -
Shelby	County-Other	1	Sabine	Purchase water from City of Center		SHCo-2			$ -	$ -
Shelby	County-Other	1	Sabine	Increase groundwater supply from Carrizo-Wilcox Aquifer		SHCo-1	$ 2,278,400.00		$ 2,278,400.00	$ -
Shelby	County-Other	1	Sabine	Purchase water from SRA	1	SHCo-3	$ 3,024,150.00		$ 3,024,150.00	$ 3,024,150.00
Shelby	Livestock		Sabine	Increase groundwater supply from Carrizo-Wilcox Aquifer		SHL-1	$ 1,387,600.00		$ -	$ -
Shelby	Livestock		Neches	Increase groundwater supply from Carrizo-Wilcox Aquifer		SHL-2	$ 1,040,800.00		$ -	$ -

Table 9-A.1 WMS Cost Summary

County	Entity		Basin Used	Strategy		Strategy Key	Capital Cost		Municipal Cost	Surface Water
Shelby	Livestock		Sabine	Purchase additional water from SRA (Toledo Bend)	1	SHL-4	$ 4,763,200.00		$ -	$ 4,763,200.00
Shelby	Livestock		Sabine	Increase local supplies		SHL-3	$ 689,600.00		$ -	$ -
Shelby	Mining		Neches	Attoyac Water	1	SHMi-1	$ 1,543,400.00		$ -	$ 1,543,400.00
Shelby	Mining		Sabine	Toledo Bend Water	1	SHMi-2	$ 3,847,950.00		$ -	$ 3,847,950.00
Shelby	Manufacturing		Sabine	Purchase water from City of Center		SHM-1	$ -		$ -	$ -
Smith	Bullard	1	Neches	Increase supply from Carrizo-Wilcox		BU-1	$ 305,640.00		$ 305,640.00	$ -
Smith	ommunity Water Co	1	Neches	Increase supply from Carrizo-Wilcox		CW-1A	$ 1,640,776.00		$ 1,640,776.00	$ -
Smith	Dean WSC	1	Neches	Increase supply from Carrizo-Wilcox		DE-1A			$ -	$ -
Smith	Jackson WSC	1	Neches	Increase supply from Carrizo-Wilcox		JA-1	$ 741,000.00		$ 741,000.00	$ -
Smith	City of Lindale	1	Neches	Increase supply from Carrizo-Wilcox		LI-1	$ -		$ -	$ -
Smith	Lindale Rural WSC	1	Neches	Increase supply from Carrizo-Wilcox		LIR-1	$ 347,259.00		$ 347,259.00	$ -
Smith	Whitehouse	1	Neches	Tyler Water	1	WH-2	$ -		$ -	$ -
Smith	Whitehouse	1	Neches	Lake Columbia Water	1	WH-1			$ -	$ -
Smith	Irrigation		Neches	Increase supply from Queen City		LI-1	$ 357,794.00		$ -	$ -
Smith	Manufacturing		Neches	City of Tyler Water	1	SMMa-1	$ 1,476,152.00		$ -	$ 1,476,152.00
Smith	Mining		Neches	Increase supply from Queen City		SMM-1	$ 655,416.00		$ -	$ -
Trinity	County-Other	1	Neches	Increase supply from Yegua-Jackson		TRC-1	$ 249,851.00		$ 249,851.00	$ -
Tyler	County-Other	1	Neches	Increase supply from Gulf Coast Aquifer		TYC-1	$ 366,241.00		$ 366,241.00	$ -
						WUG Total	**$ 260,842,280.00**			
								Muni-Total	**$ 100,097,352.00**	
									WUG Surface	**$ 206,784,491.00**
Wholesale Water Providers				**WWP Recommended WMS**			**WWP WMS Cost**			**WWP Surface Water WMS Cost**
ANRA					1		$ 266,992,250.00			$ 266,992,250.00
Athens MWA				Forest Grove Reservoir	1		$ 26,619,000.00			$ 26,619,000.00
Athens MWA				New WTP	1		$ 12,387,000.00			$ 12,387,000.00
Athens MWA				Overdraft Carrizo Wilcox			$ 3,799,000.00			$ -
City of Jacksonville				Infrastructure Imp	1		$ 1,000,000.00			$ 1,000,000.00
City of Jacksonville				Purchase Water	1		$ 19,133,700.00			$ 19,133,700.00
LNVA				Purchase Water from SRA	1		$ 39,168,200.00			$ 39,168,200.00
City of Lufkin				Rayburn Water System	1		$ 53,164,000.00			$ 53,164,000.00
City of Lufkin				Lake Kurth System	1		$ 56,488,600.00			$ 56,488,600.00
City of Lufkin				New Well Carrizo Wilcox			$ 14,097,000.00			
City of Nacogdoches				New Wells			$ 2,727,000.00			$ -
City of Nacogdoches				Purchase Water from Provider	1		$ 37,282,050.00			
Sabine River Authority				Toledo Water to Upper Sabine Basin	1		$ 475,648,000.00			$ 475,648,000.00
City of Tyler				Lake Palestine Infrastructure	1		$ 79,389,250.00			$ 79,389,250.00
UNRMWA										
						Wholesale Total	**$ 1,087,895,050.00**		**Wholesale Surface**	**$ 1,029,990,000.00**
						Grand Total	**$ 1,348,737,330.00**		**Surface Water**	**$ 1,236,774,491.00**
									Other than Surface	**$ 111,962,839.00**

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Table 9-A.2 2011 WMS Summary

Sum of sumCapCost		EarliestOnline / entityType														
		2010		2010 Total	2020		2020 Total	2030	2030 Total	2040	2040 Total	2050	2050 Total	2060	2060 Total	Grand Total
Entity Name	Project Name	WUG	WWP		WUG	WWP		WWP		WWP		WWP		WWP		
ANGELINA & NECHES RIVER AUTHORITY	ANRA TREATMENT AND DISTRIBUTION SYSTEM					$ 35,127,250.00	$ 35,127,250.00									$ 35,127,250.00
	NEW SOURCE - LAKE COLUMBIA					$ 231,865,000.00	$ 231,865,000.00									$ 231,865,000.00
ANGELINA & NECHES RIVER AUTHORITY Total						$ 266,992,250.00	$ 266,992,250.00									$ 266,992,250.00
APPLEBY WSC	LAKE NACONICHE REGIONAL WATER SUPPLY SYSTEM				$ 4,392,350.00		$ 4,392,350.00									$ 4,392,350.00
APPLEBY WSC Total					$ 4,392,350.00		$ 4,392,350.00									$ 4,392,350.00
ATHENS MUNICIPAL WATER AUTHORITY	FOREST GROVE RESERVOIR PROJECT									$ 26,619,000.00	$ 26,619,000.00					$ 26,619,000.00
	NEW WTP													$ 12,387,000.00	$ 12,387,000.00	$ 12,387,000.00
	OVERDRAFT CARRIZO WILCOX AQUIFER		$ 3,799,000.00	$ 3,799,000.00												$ 3,799,000.00
ATHENS MUNICIPAL WATER AUTHORITY Total			$ 3,799,000.00	$ 3,799,000.00						$ 26,619,000.00	$ 26,619,000.00			$ 12,387,000.00	$ 12,387,000.00	$ 42,805,000.00
BROWNSBORO	OVERDRAFT CARRIZO WILCOX AQUIFER	$ 148,600.00		$ 148,600.00												$ 148,600.00
BROWNSBORO Total		$ 148,600.00		$ 148,600.00												$ 148,600.00
BULLARD	NEW WELLS - CARRIZO WILCOX AQUIFER	$ 305,674.00		$ 305,674.00												$ 305,674.00
BULLARD Total		$ 305,674.00		$ 305,674.00												$ 305,674.00
CONSOLIDATED WSC	EXPANDED USE OF GW	$ 2,357.00		$ 2,357.00												$ 2,357.00
CONSOLIDATED WSC Total		$ 2,357.00		$ 2,357.00												$ 2,357.00
D&M WSC	NEW WELLS - CARRIZO WILCOX AQUIFER	$ 492,348.00		$ 492,348.00												$ 492,348.00
D&M WSC Total		$ 492,348.00		$ 492,348.00												$ 492,348.00
DIBOLL	NEW WELLS - YEGUA JACKSON AQUIFER	$ 576,576.00		$ 576,576.00												$ 576,576.00
	PURCHASE WATER FROM PROVIDER (2)	$ 6,195,000.00		$ 6,195,000.00												$ 6,195,000.00
DIBOLL Total		$ 6,771,576.00		$ 6,771,576.00												$ 6,771,576.00
FOUR WAY WSC	PURCHASE WATER FROM PROVIDER (2)	$ 669,192.00		$ 669,192.00												$ 669,192.00
FOUR WAY WSC Total		$ 669,192.00		$ 669,192.00												$ 669,192.00
FRANKSTON	NEW WELLS - CARRIZO WILCOX AQUIFER	$ 255,951.00		$ 255,951.00												$ 255,951.00
FRANKSTON Total		$ 255,951.00		$ 255,951.00												$ 255,951.00
HUDSON WSC	NEW WELLS - CARRIZO WILCOX AQUIFER	$ 3,274,192.00		$ 3,274,192.00												$ 3,274,192.00
HUDSON WSC Total		$ 3,274,192.00		$ 3,274,192.00												$ 3,274,192.00
JACKSONVILLE	INFRASTRUCTURE IMPROVEMENTS		$ 1,000,000.00	$ 1,000,000.00												$ 1,000,000.00
	PURCHASE WATER FROM PROVIDER (3)		$ 19,133,700.00	$ 19,133,700.00												$ 19,133,700.00
JACKSONVILLE Total			$ 20,133,700.00	$ 20,133,700.00												$ 20,133,700.00
LILLY GROVE SUD	LAKE NACONICHE REGIONAL WATER SUPPLY SYSTEM				$ 7,320,600.00		$ 7,320,600.00									$ 7,320,600.00
	NEW WELLS - CARRIZO WILCOX AQUIFER	$ 580,504.00		$ 580,504.00												$ 580,504.00
LILLY GROVE SUD Total		$ 580,504.00		$ 580,504.00	$ 7,320,600.00		$ 7,320,600.00									$ 7,901,104.00
LINDALE RURAL WSC	DRILL NEW WELL	$ 413,194.29		$ 413,194.29												$ 413,194.29
	NEW WELLS - CARRIZO WILCOX AQUIFER	$ 347,259.00		$ 347,259.00												$ 347,259.00
LINDALE RURAL WSC Total		$ 760,453.29		$ 760,453.29												$ 760,453.29
LOWER NECHES VALLEY AUTHORITY	PURCHASE WATER FROM PROVIDER (2)		$ 39,168,200.00	$ 39,168,200.00												$ 39,168,200.00
	SEDIMENT REDUCTION		$ 161,333,000.00	$ 161,333,000.00												$ 161,333,000.00
	WHOLESALE CUSTOMER CONSERVATION		$ 1,400,000.00	$ 1,400,000.00												$ 1,400,000.00
LOWER NECHES VALLEY AUTHORITY Total			$ 201,901,200.00	$ 201,901,200.00												$ 201,901,200.00
LUFKIN	ANGELINA COUNTY REGIONAL PROJECT									$ 53,164,000.00	$ 53,164,000.00					$ 53,164,000.00
	LAKE KURTH REGIONAL SYSTEM		$ 56,488,600.00	$ 56,488,600.00												$ 56,488,600.00
	NEW WELLS - CARRIZO WILCOX AQUIFER		$ 14,097,000.00	$ 14,097,000.00												$ 14,097,000.00
LUFKIN Total			$ 70,585,600.00	$ 70,585,600.00						$ 53,164,000.00	$ 53,164,000.00					$ 123,749,600.00
MAURICEVILLE SUD	NEW WELLS - GULF COAST AQUIFER	$ 550,848.00		$ 550,848.00												$ 550,848.00
MAURICEVILLE SUD Total		$ 550,848.00		$ 550,848.00												$ 550,848.00
NACOGDOCHES	NEW WELLS - CARRIZO WILCOX AQUIFER		$ 2,727,000.00	$ 2,727,000.00												$ 2,727,000.00
	PURCHASE WATER FROM PROVIDER (3)		$ 37,282,050.00	$ 37,282,050.00												$ 37,282,050.00
NACOGDOCHES Total			$ 40,009,050.00	$ 40,009,050.00												$ 40,009,050.00
RUSK	PURCHASE WATER FROM PROVIDER (2)	$ 28,435,800.00		$ 28,435,800.00												$ 28,435,800.00
RUSK Total		$ 28,435,800.00		$ 28,435,800.00												$ 28,435,800.00
SABINE RIVER AUTHORITY	TOLEDO BEND PROJECT (500,000)											$ 475,648,000.00	$ 475,648,000.00			$ 475,648,000.00
SABINE RIVER AUTHORITY Total												$ 475,648,000.00	$ 475,648,000.00			$ 475,648,000.00
SWIFT WSC	LAKE NACONICHE REGIONAL WATER SUPPLY SYSTEM				$ 5,856,500.00		$ 5,856,500.00									$ 5,856,500.00
	NEW WELLS - CARRIZO WILCOX AQUIFER	$ 498,171.00		$ 498,171.00												$ 498,171.00
SWIFT WSC Total		$ 498,171.00		$ 498,171.00	$ 5,856,500.00		$ 5,856,500.00									$ 6,354,671.00
TYLER	LAKE PALESTINE INFRASTRUCTURE							$ 79,389,250.00	$ 79,389,250.00							$ 79,389,250.00
TYLER Total								$ 79,389,250.00	$ 79,389,250.00							$ 79,389,250.00
WEST HARDIN WSC	EXPANDED USE OF GW	$ 80,123.00		$ 80,123.00												$ 80,123.00
WEST HARDIN WSC Total		$ 80,123.00		$ 80,123.00												$ 80,123.00
WOODVILLE	NEW WELLS - GULF COAST AQUIFER	$ 511,400.00		$ 511,400.00												$ 511,400.00
WOODVILLE Total		$ 511,400.00		$ 511,400.00												$ 511,400.00
Grand Total		$ 43,337,189.29	$ 336,428,550.00	$ 379,765,739.29	$ 17,569,450.00	$ 266,992,250.00	$ 284,561,700.00	$ 79,389,250.00	$ 79,389,250.00	$ 79,783,000.00	$ 79,783,000.00	$ 475,648,000.00	$ 475,648,000.00	$ 12,387,000.00	$ 12,387,000.00	$ 1,311,534,689.29

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Appendix 10-A

Media and Public Outreach

The ETRWPG utilized various media outlets to keep the public informed of the Regional Water Planning Process in the ETRWPA. Included in this appendix copies of the following:

- Newspaper Articles
- Press Releases
- Newsletters

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PRESS RELEASE FROM OCTOBER 4, 2007, MEETING

Directors of the East Texas Regional Water Planning Group have given their approval to sixteen recommendations for a new round of planning for twenty counties in the region.

Outlined by Gary Graham of Beaumont, the Group's engineering consultant, at a meeting in Nacogdoches, the recommendations include:

- A review of population, water demands and supplies, and the proposal of new water management strategies
- A new review of water conservation strategies.
- An examination of a Texas Water Development Board (TWDB) study on electrical generation with amendments to the new East Texas water plan.
- Completion of a study comparing TWDB and Texas Commission on Environmental Quality databases for small water suppliers in an attempt to reconcile differences.
- A review of new TWDB work on environmental resources with possible amendments to the East Texas plan.
- The updating of groundwater availability for the Gulf Coast aquifer.
- A study of environmental protection strategies for wetlands and fresh water associated with bays and estuaries.
- The evaluation of the effects of in-stream environmental flows on water planning.
- A review of alternatives for capturing, treating and storing flood flows.
- A review of water bodies impacted by water quality and the impact on surface water treatment facilities.
- A study of the role of reusing water in water conservation strategies.
- The study of the impact of environmental flows on existing water rights permits.
- A review of groundwater management predictive data.

- Consideration of the formation of groundwater conservation districts in areas uncovered by existing districts.

- A review and updating of agriculture water needs.

- The refinement of groundwater availability impacted by water quality and geographic restrictions.

The Planning Group also suggested sixteen nominees to the TWDB's new river basin and bay area stake holders committee.

Nominated were Mel Swoboda, agriculture and irritation; Josh W. David,free-range livestock; David Alders, concentrated animal feeding; George Goehringer, recreational water usage; Mike Norris, municipalities; Jerry D. Nichols, soil and water conservation; Darla Smith, refining; Olan Webb, chemical manufacturing; Dale Peddy, electrical generation; Mike Harbordt, paper products or timber; Wade Butler, commercial fishermen; John D. Stover, public interest groups; Kelley Holcomb, regional water planning; Walter Glenn, groundwater conservation districts; Jerry Clark, river authorities; and Dr. Matthew McBroom, environmental interests.

The Planning Group also acknowledged receipt of the resignation of the Deep East Texas Council of Governments of Jasper as its administrative agent and authorized the Group's executive committee to begin the process of negotiation with a new agent..

January 23, 2008

PRESS RELEASE FROM JANUARY 23 MEETING

Officials of the Lower Neches River Authority have told members of the East Texas Regional Water Planning Group that the authority does not seek to control water rights in the upper river basin, but does want to protect its existing rights to serve planned industrial development in the Beaumont area.

Robert Stroder, LNVA's general manager, and members of his staff told the Group at a meeting in Nacogdoches "it was never our intent to damage existing water rights in the upper basin, but we don't want to step back from our own rights."

The Angelina & Neches River Authority, joined by municipalities and other water users above Sam Rayburn Reservoir, announced last year that it would take legal action to protect the water rights it holds for participants in the Lake Columbia project on Mud Creek in Cherokee and Smith counties.

In documents filed with the Texas Commission on Environmental Quality, the LNVA sought to make its 1963 water rights to water flowing into Rayburn Reservoir override the rights of other users, including municipalities, after 1963.

Stroder said LNVA has filed an amendment to its TCEQ request that he said should alleviate upstream concerns.

Members of the Planning Group had numerous questions for LNVA. "We need to work out something that's fair to the entire Neches basin," said Monty Shank, a Group member, "because there is an impact to what was proposed."

Kelley Holcomb of Lufkin, chairman of the Planning Group, said the concerns by the water planners "are examples of competing water interests all over Texas, but I hope we can find common answers to solve all of the water needs in East Texas."

"As planners, we need to look at our entire region and keep in mind that our job is to assure that everyone has adequate water supplies for the future," said Holcomb.

He said the LNVA's amended request to the TCEQ does not require the approval of the Planning Group because it affects an existing rights permit.

As it began its new round of planning for twenty East Texas counties, the Planning Group appointed the City of Nacogdoches as its new administrative entity, replacing the Deep East Texas Council of Governments of Jasper, which resigned the position.

The Group also elected a new slate of officers, including Holcomb as chairman again; Worth Whitehead of Henderson as first vice-chairman, Mike Harbordt of Diboll as second vice-chairman; Jerry Clark of Orange, secretary; David Brock of Jacksonville, assistant secretary; and Leon Young and David Alders, both of Nacogdoches, at- large members of the executive committee.

George Campbell of Nacogdoches will chair the nominating committee, David Alders will chair the by-laws committee; Darla Smith of Beaumont will head the finance committee, and Harbordt will chair the technical committee.

Gary Graham of Beaumont, the Planning Group's engineering consultant, said engineers are working on several tasks assigned by the Group.

Terry Stelly of the Texas Parks and Wildlife Department told the Group that biologists have a growing concern about a "dead zone" in the Gulf of Mexico, which he said is affecting marine life and commercial fishing.

He said the dead zone is the result of oxygen depletions ultimately caused by excessive nitrate levels carried into the gulf by the Mississippi River . Storm water discharges from farming operations upstream from the Gulf of Mexico carry the nutrients into the gulf which eventually results in depressed dissolved oxygen levels off of the Texas and Louisiana coastlines.

The Group's next meeting will be on April 9 in Nacogdoches. The Group serves all or parts of Anderson, Angelina, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity and Tyler counties.

East Texas Regional Water Planning Group (Region I)
April 9, 2008
Contact: Kelley Holcomb, 936-632-7795

FOR IMMEDIATE RELEASE

The East Texas Regional Water Planning Group (Region I) will submit to the Texas Water Development Board a $231,510 budget for planning purposes in 2008 and 2009.

The budget includes $88,050 for population and water demand projections, the identification of water needs, the selection of water management strategies, and the impact of the strategies on water quality.

The 20-county region's planning efforts will also include $10,000 for conservation and drought management, $10,000 for ways to achieve consistency in long-term protection of natural resources, $15,000 for the identification of unique reservoir and stream segments, $9,400 for water infrastructure and funding, and $109,000 for the adoption of the plan, administration and public participation.

The Group also discussed ways to identify "small water users" in a category of their own, but agreed the region needs more information. Group chairman Kelley Holcomb of Lufkin said the challenge "is that there is no cohesive strategy to track small water groups or their usage."

Temple McKinnon of the Texas Water Development Board said the state agency is "getting better" at tracking small water usage, but doesn't survey the users and doesn't have sufficient information.

Group members agreed there isn't enough data from farming, poultry, cattle uses and other agriculture users to develop strategies.

In outlining the Group's seventeen planning strategies, engineering consultant Gary Graham of Beaumont said he has identified 186 water users in the region. He said 56 of the users have deficiencies in water supplies and 18 have deficiencies in water storage facilities.

The $231,510 budget will be submitted to the state agency, but the Legislature will have to approve the funds during its 2009 session starting in January.

In other business, the Group:

- Heard a presentation on groundwater management from Len Luscomb of the Rusk County Groundwater Conservation District. Luscomb said groundwater planning is difficult "because it is only an approximation" and depends on variables such as rainfall amounts, evaporation, transpiration, spring flows, pumpage, and the aquifers' recharge abilities.

- Gave approval to the City of Diboll for seeking an amendment to its water management strategies. City Manager Kenneth Williams said the city wants to seek permission to use groundwater from the Yegua-Jackson groundwater aquifer at Eason Lake northwest of the city to supplement the city's current water supplies.

- Reviewed copies of water management strategies by the TWDB. Group chairman Holcomb said "while the strategies may be good for other parts of the state, but are not necessarily good for East Texas."

Holcomb also introduced Lila Fuller and Stacey Corley from the City of Nacogdoches, which has become the Group's administrator, replacing the Deep East Texas Council of Government in Jasper.

Holcomb also called the Group's attention to its new web site: etexwaterplan.org, and selected Wednesday, June 4 for its next meeting at the Nacogdoches Recreation Center.

Region I serves all or parts of Anderson, Angelina, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity and Tyler counties.

East Texas water group submits $231,000 budget

20-county region's planning effort includes conservation and drought measurements

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Diboll to tap aquifer to aid water shortage

Posted: Tuesday, August 26, 2008 1:00 am | Updated: 3:10 pm, Thu Jan 21, 2010.

STEVEN ALFORD The Lufkin Daily News **jalford@coxnews.com**

A draft by the East Texas Region I Water Planning Group allowing the city to tap into the large underground aquifer is an amendment to the original 2006 regional water plan. "The regional water plan that was currently in place and approved by us showed that the city of Diboll was to use surface water to meet their future needs," said Kelly Holcomb, chairman of group. "This new amendment requested that they be able to use additional groundwater as well as surface water to meet current and future needs." A pre-existing agreement with the city of Lufkin to share surface water was pushed out because of rising costs, forcing Diboll to look for other means to supply their future water needs, Holcomb said. According to a group press release, preliminary work on the Yegua wells shows they can produce 200 to 300 gallons of water per minute for the city. John Nelson, a hydrologist from the firm L.B. Guyton & Associates in Austin, who was hired to test the wells, said "the aquifer appears to be capable of sustaining the additional pumping required to meet Diboll's needs." The Yegua Aquifer, which currently provides more than 10 counties with water, runs from the Louisiana border in East Texas down to the bottom tip of the state near Brownsville. Diboll City Manager Kenneth Williams said the change in the Regional Water Plan was aimed to add the city's ideas into current strategies for their water supply. "We wanted to be included in the Region I water plan. There had not been an identified source for the city of Diboll," Williams said. "There were some things put into plan, but the input didn't come from us. We're looking at future needs and development and we need it for now." Williams said the city is operating at close to peak levels for daily demand, and that a new source is needed soon. Due to a lack of supply and summertime demands, Diboll is currently operating under the state's Water Conservation and Emergency Water Demand Management Plan. According to the city Web site, the current conditions require citizens to look for ways to voluntarily reduce water usage, if not, they may face fines for wasting water. Voluntary reduction includes limiting residential car washing, window washing and pavement washing, unless a bucket is used, and cutting out non-essential water usage such as street washing, filling pools and athletic field watering. Williams said the current conservation efforts were a result of two of the city's wells being out, with one back up and running and another one on the way pending data from water tests. "As Diboll continues to grow we're just going to have to find additional water sources," Williams said. "We're being proactive to plan for the future and to find water sources that will sustain us for the next fifty years."

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EAST TEXAS REGIONAL WATER PLANNING GROUP

Board hears proposal to transfer water from Toledo Bend to North Texas in 2060

Members of the East Texas Regional Water Planning Group (Region I) recently heard a series of reports focusing on planning projects underway in the 20-county area.

The reports were part of the group's continuing work on Round 3 of Phase I of regional planning in East Texas.

The group also authorized its administrative agent, the City of Nacogdoches, to solicit requests for qualifications for consulting engineering services. The region's current consultant is the Schaumburg & Polk engineering firm of Beaumont.

David Meesey of the Texas Water Development Board said the region has been allocated $300,000 by the TWDB for Round 3 planning. The region had requested $345,000.

A report by Simone Keil dealt with a proposal to transfer water from Toledo Bend Reservoir on the Sabine River to North Texas. The proposal would carry water via a pipeline from the middle of Toledo Bend to lakes serving the Dallas Water Utility System, the Tarrant Regional Water System and the North Texas Municipal Water System. The project is not expected to be completed until around 2060.

Terry Steely of the Texas Parks & Wildlife Department said the transfers of Toledo Bend water could affect the ecology and fisheries of Sabine Lake, which is fed by the Sabine and Neches Rivers.

Rex Hunt reported that additional studies are needed on mitigation factors involved in moving water from one river basin to another.

He said a certain quality of freshwater is needed to support a sound ecology for Sabine Lake, near Beaumont and Orange, but he said the recommended targets for freshwater inflows have not been determined.

George P. Campbell of Nacogdoches, a Region I member, said Rayburn Lake, in the Neches-Angelina river basin would likely have to be emptied two times a year to meet the goals of Sabine Lake.

In another report, Rick Borque said a study of regional solutions for small water suppliers has been hampered by responses from only 30 percent of the suppliers. He said regional solutions for small water suppliers can produce lower costs and greater efficiencies.

A report by Stuart Norvell discussed water needs for a new liquified natural gas facility for electricity generation in the Beaumont area. For every kilowatt of power, he said 258,000 gallons of water may be needed.

The next meeting of the Region I group is expected to be in early February, but an exact date has not been set.

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NACOGDOCHES

East Texas water group plans 'tasks' for 2009-10

Engineering consultant will guide 20-county region

NACOGDOCHES – Engineers for the East Texas Regional Water Planning Group last week outlined proposed planning tasks for the 20-county region in 2009-10.

Meeting in Nacogdoches, the group heard a summary of the tasks from Rex Hunt of Allan Plummer Associates, Inc., which was chosen to lead the engineering consulting team.

Tasks include an update of the group's 2006 regional plan, the incorporation of special studies undertaken in 2008 and other factors which could include the outcome of the planning work.

Tasks also include:

• A description of the region, which will include new population projections, incorporation of new water users and water demands for steam electric needs.

• Update of water supply numbers from the previous plan including groundwater availability models and changes due to water transmission, surface water rights, the effects of environmental flow policies and water quality impacts and direct and indirect water reuse.

• Water management strategies focused on new water usage.

• Impacts of water management strategies on key parameters of water quality and the impacts of moving water from rural and agricultural areas.

• Water conservation and drought management recommendations.

• A description of how the regional water plan is consistent with long-term protection of the state's overall water resources, agricultural resources and natural resources.

• Unique stream segments and reservoir sites and legislative recommendations.

• Infrastructure financing recommendations and funding mechanisms for groups with no political subdivision, such as livestock, mining and irrigation.

• Public participation in the adoption of the final plan.

The East Texas Group also agreed to make a formal request to the Texas Water Development Board to use a revised water availability model and use water supply yields other than the firm yield of reservoirs in East Texas for surface water supply.

The group also agreed to hold planning group meetings or technical committee conference calls in March, April, June, July, August, September, October, November and December in 2009 and January and February in 2010, as well as other meetings which may be needed. The group plans to adopt its final water plan in September of 2010.

The group's next scheduled meeting will be on April 8 in Nacogdoches.

Region I includes all or portions of Anderson, Angelina, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity and Tyler counties.

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Beaumont Enterprise

A thirsty Texas looks to region's water, and local advocates want to keep it here

By LLUVIA RUEDA

March 1, 2009
Posted: February 27, 2009, 6:53 PM CST

Hardin County has faced its fair share of "dry county" battles, but the latest doesn't revolve around alcohol.

Instead, water is the hot topic for this 81st Texas legislative session, as urban areas face off against rural regions regarding property rights.

But it's not the first time the topic has boiled over. The fight began when northern parts of Texas experienced dwindling water supplies, local officials said.

"The problem is that the water in some of the surrounding areas, such as Houston or even farther such as San Antonio, Austin, Fort Worth and Dallas, are experiencing a lack in water resources.

"We have more than we need, since we have both groundwater and surface water. As a result, they take some of our resources and we experience negative consequences," County Judge Billy Caraway said.

During the 80th Texas legislative session in 2007 and 2008, lawmakers debated the advantages of the State Water Plan, which proposed that water supplies should be distributed voluntarily.

The high cost of redistribution and required technologies, combined with the reluctance of local governments, discouraged most proposals. As the need for water continues to increase, however, governments in parched areas of Texas continue to pursue the issue.

On Jan. 13, a $3.4 billion pipeline was listed as a top priority on the legislative agenda by some Central Texas officials, an item local governments view, along with the push for water redistribution, as a possible threat to Southeast Texas.

Caraway and a group of officials from Hardin, Jasper, Tyler and Newton counties recently went to Austin to defend local concerns, but some believe any agreement that is passed ultimately will not favor rural areas.

"Originally, ground water belongs to the property owner and surface water belongs to the state, unless there are water shortages. In that case, the water rights go to local governments," said Walter Glenn, president of the Southeast Texas Groundwater Conservation District.

"But laws have been developing and changing for years," he said.

And water shortages have become a dramatic factor in the race to obtain water because of persistent droughts, Glenn said.

According to the state and the U.S. Drought Monitor, more than 100 of the state's 254 counties now are rated "abnormally dry," and more than 24 Central Texas counties are struggling with extreme drought. About 90 counties have outdoor burn bans in place as a result.

Since the future of an available water supply is questionable, Hardin County officials took action to preserve local groundwater reserves in 2003 by forming the groundwater conservation district, Glenn said.

Evolution of water rights

In 1967, the state began to control surface water and issued permits for its use.

Those with permits were considered to have "senior" water rights.

But those rights became subordinate, or "junior" to the rights of users in the basin of origin, such as rivers and lakes in East Texas and Southeast Texas, without consent of all the permit holders, or users, within the basin.

Scott Hall, general manager of the Lower Neches Valley Authority, said junior rights safeguard the region's water supply.

"It helps maintain the instream flow and (keeps) the surrounding estuaries healthy, which is vital to the ecological (water) health of the area. It also safeguards the region from people who are in it (the water industry) for profit, or those who do not use the water supply safely," Hall stated.

"I think that we need to have it, and we need to consider all the ecological effects, make sure local needs are met and find future estimates for available water levels before we can go to Congress or the Legislature and provide water for the rest of the state."

The Lower Neches Valley Authority provides fresh water - mostly from Lake Sam Rayburn - to municipalities, agriculture and industry in Jefferson County, the Bolivar Peninsula and toward Trinity Bay.

Although current estimates remain murky, the 2007 Texas State Water Plan predicts that water demand will increase by 18 percent over the next 50 years from 18.3 million acre-feet to 21.6 million acre-feet per year in 2060.

An acre-foot is equal to 325,851 gallons of water, according to the Texas Water Development Board. It's figured as the amount of water needed to cover an acre of land by a foot of water.

A family of four would use an acre-foot of water per year if each person used 223 gallons per day.

Southeast Texas needs water to continue growth

Regina Lindsey, Silsbee Economic Development Corp. executive director, said continuing local development depends on water.

"We are just going to have to go before the Legislature and fight for these rights. The population is increasing in the cities that are requesting the water, but our own populations are increasing, and we have to make sure our own water supplies don't run out in the future," she said.

Kelley Holcomb, interim general manager for Angelina and Neches River Authority, and chairman for the Region I Water Planning Group, said responses to surveys the group sends out are a trickle that should be a torrent.

Just 27 percent of the surveys are returned, he said.

Because of it, the needs of some counties go unaddressed, Holcomb said.

"Local governments and their water suppliers need to be involved in the planning. Otherwise, we don't know what they need or how many individuals to plan for and problems ensue," Holcomb said.

In one case, a municipality that had not been involved in the planning process needed more groundwater resources. Its attempt to get them ended up costing the planning group $8,100 and four months of extra labor, according to Holcomb.

The Region I chairman also said the districts need to realize the true need for water and the power of political clout.

"The first issue is that nobody really owns available water resources. The state of Texas acts as the 'caretaker,' if you will, and it takes a bottoms-up approach as to where the demand is and how to go about solving it," Holcomb said.

So far, the biggest contenders are the bigger districts, since rural areas of Texas have little to no representation, Holcomb said.

"If you have enough political connections, you can get that water in your area in some point in the process," Holcomb said.

The Texas Legislature is scrambling to address the issue and Washington is also keeping up with the situation, U.S. Rep. Kevin Brady, R-The Woodlands, said.

"Protecting Southeast Texas water is really the highest priority at the moment. That's your growth, that's your quality of life, that's your everything. The Legislature has really pushed regions to start addressing their water needs and resources," Brady said, when asked about its importance.

Where the water is

About two-thirds of the available, unclaimed water resources exist in the Region I area. Two-thirds of the Texas population in need of that water exists outside of that region, according to estimates by the Texas Water Development Board.

That is alarming, considering the fact that the Texas population is predicted to double over the next few years, Holcomb said.

Water volumes and dollars also are at stake.

"This is what presents a major portion of the problem. We got it, they need it. The questions that local governments should have are: How do we - Region I - have to get fairly compensated for the use of our resources, and are we going to be allowed to allocate a portion of the available water supply to meet unidentified future needs?" Holcomb said.

After that issue is resolved, questions then surface around the transportation of those volumes of water and the money required to move them.

Holcomb offered the example of the pipeline to illustrate the problem.

"The idea for the pipeline came from a study we did for the Sabine River Authority for the transportation of water from the Toledo Bend area to the Dallas-Fort Worth metropolis area. Over 70 percent of the cost results from the electricity needed to generate the movement of the water," he said.

Brady agreed, and said that most of the solutions presented to the Legislature and Congress lacked practicality.

"Right now, they (the Legislature) put procedures in place for local communities to be engaged, and I want to encourage more of that in the area. As for the dry states, I don't know what's going to happen. It's very costly to shift water from one area to another. The answers that we have been seeing lately, like new reservoirs, lakes, pipelines and canals can drive the cost of water through the roof. They are trying to come up with better plans."

The Texas Legislature approved a water plan for the state in 2001, but a lack of funding has stopped the plan from being carried out. About $260 million dollars would be required to kick start construction for the 16 allotted reservoir sites, according to a recent press release from Gov. Rick Perry's office.

Other options for water reserves include desalinization, which some experts say might still remain too pricey for most local governments.

All officials and organizations involved in the dispute agree that there is no set solution so the fight for water rights continues.

"All we can do right now is to keep a close eye on the matter and make sure that the county is taken care of," Cara-way said.

Find this article at:
http://www.beaumontenterprise.com/news/local/a_thirsty_texas_looks_to_region_s_water__and_local_advocates_want_to_keep_it_here_02-27-2009.html?showFullArticle=y

EAST TEXAS
Regional Water Planning Group

April/May/June, 2009

Region I WPG

Region I group focuses on water issues

Members of the East Texas Regional Water Planning Group (Region I) are focusing on population trends, groundwater usage, unique stream segments, and potential reservoir sites.

During a meeting in Nacogdoches April 8, the group, for planning purposes, approved population projections made for the region earlier during the planning process, but agreed to adjust some population figures in Smith, Franklin, Jasper, Shelby and Angelina counties, if the water usage rises among some groups.

Group chairman Kelley Holcomb of Lufkin suggested a broader look at water usage and growth in the region as the group's planning continues.

Group to designate stream and reservoir sites

Engineering consultant Rex Hunt of Alan Plummer Associates, Inc. of Austin said the Texas Legislature has included provisions in water planning laws that regional planning groups designate unique stream segments and unique reservoir sites. In July, he said, Region I will be asked for decisions on the two segments.

Unique stream segments, he said, have five criteria: biological functions, hydraulic functions, riparian conservation, high water quality, and high aesthetic values.

He said Region I consultants will define each steam segment using locations, maps, photos and site characteristics.

The designation of unique stream segments will start when Region I identifies potential segments, followed by its submissions to the Texas Parks and Wildlife Department, evaluation of each segment by the Department, and incorporation of the segments into the state water plan.

The designation of unique reservoir sites will begin when Region I identifies unique sites for potential construction, followed by incorporation of the sites into the regional water plan, incorporation of the plan by the Texas Water Development Board into the state water plan, and designation of the sites by the Texas Legislature.

Groundwater issues explained

James Beach of LBG Guyton, Region I's groundwater consultant, gave the regional group a history of groundwater management in Texas. He recommended that Region I continue to work with groundwater conservation districts in East Texas, summarize the desired future conditions for each district, and develop estimates for the groundwater management area within the region.

Following the presentations, final approval of Region I's population projections were approved. The group also approved steam electric water demands for the region, excluding Angelina County, where a new biomass power plant is being proposed.

The group also gave its final approval of Round III of Phase I Special Studies.

Chairman Kelley Holcomb appointed George Campbell as chair of the nominating committee, David Alders as chair of the bylaws committee, Darla Smith as finance chair, and Michael Harbordt as chair of the technical committee.

East Texas Regional Water Planning Group (RWPG I)

Officers

Kelley Holcomb, Lufkin, Chair
Worth Whitehead, Henderson, First Vice-Chair
Michael Harbordt, Diboll, Second Vice-Chair
Jerry Clark, Orange, Secretary
David Brock, Jacksonville, Assistant Secretary
David Alders, Nacogdoches, At-Large Executive Committee Member
Leon Young, Nacogdoches, At-Large Executive Committee Member

Directors and Group Representation

David Alders, Nacogdoches, Agriculture
Jeff Branick, Beaumont, Counties
David Brock, Jacksonville, Municipalities
George P. Campbell, Nacogdoches, Other
Jerry Clark, Orange, River Authorities
Josh Wilson David, Chester, Other
Chris Davis, Rusk, Counties
Scott Hall, Beaumont, River Authorities
Michael Harbordt, Diboll, Industries
William Heugel, Hemphill, Public
Kelley Holcomb, Lufkin, Water Utilities
Bill Kimbrough, Beaumont, Other
Glenda Kindle, Frankston, Public
Duke Lyons, San Augustine, Municipalities
Dale R. Peddy, Beaumont, Electric Power
Harmon Reed, Carthage, Agriculture
Monty D. Shank, Palestine, River Authorities
Darla Smith, Beaumont, Industries
Melvin Swoboda, Orange, Industries
Worth Whitehead, Henderson, Water Districts
John Windham, Center, Small Business
Dr. J. Leon Young, Nacogdoches, Environmental

Region I includes all or parts of Anderson, Angelina, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity and Tyler counties.

Meetings planned

The Planning Group agreed that in order to complete the tasks outlined, it would be necessary to meet frequently in order to consider various elements of the plan. The following meeting schedule for the RWPG is planned:

Proposed Meeting/ Conference Call	Purpose	Proposed Time Frame
Technical Committee Conference Call	Review draft Chapters 1, 2, and 3	June 2009
RWPG Meeting	Approve Chapters 1, 2, and 3	July 2009
Technical Committee Conference Call	Review draft Chapter 4	August 2009
Technical Committee Conference Call	Review draft Chapters 5 and 6	September 2009
RWPG Meeting	Approve chapters 4 through 6	October 2009
Technical Committee Conference Call	Review draft Chapters 7 through 9	November 2009
RWPG Meeting	Approve Chapters 7 through 9	December 2009
Technical Committee Conference Call	Review Initially Prepared Plan	January 2010
RWPG Meeting	Adopt Initially Prepared Plan	February 2010
Public Meetings	Discuss the Initially Prepared Plan and receive comments.	As needed from March through August 2010
RWPG Meeting	Adopt 2010 Regional Water Plan	September 2010

The Planning Group's next scheduled meeting will be on July 8 in Nacogdoches at the Nacogdoches Recreational Center at 1112 North Street, starting at 10 a.m.

Windham, Hall Named Directors

The group also named Center Mayor John Windham to succeed Edwin McCoy of Anderson County as a voting member, representing small businesses, and named Scott Hall to succeed Robert Stroder of Beaumont, who resigned. Hall will represent river authorities, as did Stroder.

Lila Fuller
PO Box 635030
Nacogdoches TX 75963

East Texas Regional Water Planning Group (RWPG I)
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2009

April 8, 2009

East Texas Regional Water Planning Group (Region I)
Contact: Bob Bowman, 936-634-7444, or Kelley Holcomb, 936-632-7795

FOR IMMEDIATE RELEASE

Engineers for the East Texas Regional Water Planning Group Wednesday outlined proposed planning tasks for the 20-county region in 2009 and 2010. Meeting at Nacogdoches, the Group heard a summary of the tasks from Rex Hunt of Allan Plummer Associates, Inc., which was chosen to lead the engineering consulting team.

The tasks will include an update of the Group's 2006 regional plan, the incorporation of special studies undertaken in 2008, and other factors which could include the outcome of the planning work.
The tasks will also include:

• A description of the region, which will include new population projections, the incorporation of new water users, and water demands for steam electric needs.

• An update of water supply numbers from the previous plan, the updating of groundwater availability models, and changes due to water transmission, surface water rights, the effects of environmental flow policies and water quality impacts, and direct and indirect water reuse.

• Water management strategies focused on new water usage.

• Impacts of water management strategies on key parameters of water quality and the impacts of moving water from rural and agricultural areas.

• Water conservation and drought management recommendations.

• A description of how the regional water plan is consistent with long-term protection of the state's overall water resources, agricultural resources and natural resources.

• Unique stream segments and reservoir sites and legislative recommendations.

• Infrastructure financing recommendations and funding mechanisms for groups with no political subdivision, such as livestock, mining and irrigation.

• Public participation in the adoption of the final plan.

The East Texas Group also agreed to make a formal request to the Texas Water Development Board to use a revised water availability model and use water supply yields other than the firm yield of reservoirs in East Texas for surface water supply.

The Group also agreed to hold Planning Group meetings or Technical Committee conference calls in March, April June, July, August, September, October, November, and December in 2009 and January and February in 2010, as well as other meetings which may be needed. The Group plans to adopt its final water plan in September of 2010.

The Group's next scheduled meeting will be on April 8 in Nacogdoches
Region I includes all or portions of Anderson, Angelina, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity and Tyler counties.

NACOGDOCHES

Region I group tackles stream, reservoir designations

Updated population estimates and 13 new water user groups discussed by board members

◄ Rex Hunt, an engineer with Alan Plummer Associates, explains a PowerPoint slide show to board members on the Region I water group. Unique stream and unique reservoir designations will be discussed at the July 6 meeting.

Members of the East Texas Regional Water Planning Group (Region I) focused on population estimates, groundwater, unique stream segments and unique sites for construction of reservoirs during their meeting in Nacogdoches April 8.

The group discussed population projections including the addition of 13 new water user groups from six counties in Region I: Anderson, Angelina, Jasper, Nacogdoches, Shelby and Smith Counties.

Incorporation of the new population projections into the 2011 Regional Water Plan will be considered at the July meeting.

Group chairman Kelley Holcomb of Lufkin suggested a broader look at water uses and growth in the region as the group's planning continues.

Engineering consultant Rex Hunt of Alan Plummer Associates, Inc. said the Texas Legislature originally approved the designation of unique stream segments and unique reservoir sites by regional water planning groups.

He said the Region I group will decide whether to recommend unique stream segments or unique reservoir sites in July.

"Recommendations of unique stream segments are based on five criteria," he said. "Biological function, hydrologic function, riparian conservation areas, high water quality/exceptional aquatic life/high aesthetic value and threatened or endangered species/unique communities."

He said the regional water planning group may elect to submit a recommendation package to the Texas Parks and Wildlife Department (TPWD), identifying each recommended stream segment by location with maps, photos and site characteristics.

TPWD will return an evaluation of each segment to the group, which will be incorporated into the regional water plan in addition to the stream segment recommendations. Upon approval by the Texas Water Development Board, the regional water plan will be incorporated into the state water plan.

Hunt explained that, like unique stream segments, unique reservoir sites are designated by the Texas Legislature.

James Beach, Region I's groundwater consultant of LBG-Guyton, reviewed the history of groundwater management in Texas. He recommended that Region I continue to work with groundwater conservation districts in East Texas, summarize the desired future conditions and develop groundwater availability estimates for the groundwater management area within the region.

Following the presentations, final approval of the Round III, Phase I special studies were approved.

The group also approved steam electric water demand projections for the region, including new Angelina County water demands where a new biomass power plant is scheduled to be built.

The group chairman reappointed George Campbell as chair of the nominating committee, David Alders as chair of the by-laws committee, Darla Smith as finance chair, and Michael Harbordt as chair of the technical committee.

The group named Center Mayor John Windham to succeed Edwin McCoy of Anderson County as a voting member, representing small businesses, and named Scott Hall to succeed Robert Stroder of Beaumont, who resigned. Hall will represent river authorities, as did Stroder.

The next Region I meeting will be July 8 at the Nacogdoches Recreation Center at 1112 North Street in Nacogdoches. The public is invited to attend. For more information, call (936)560-2505 or visit www.etexwaterplan.org.

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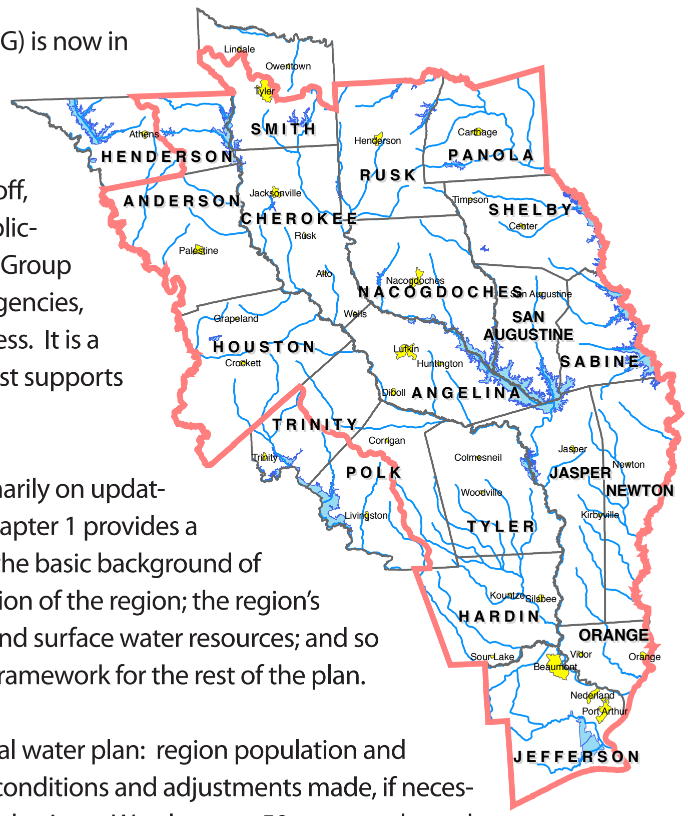
EAST TEXAS
Regional Water Planning Group

VOL. 3, NO. 4 Region I JULY 2009

WHAT'S UP IN REGIONAL WATER PLANNING?



The East Texas Regional Water Planning Group (ETRWPG) is now in the fifth month of the third round of water planning for Region I. This process began in February of this year and will culminate in a new, updated regional water plan in January 2011. That sounds like a long way off, but there is a lot to do in the interim. This is, by law, a public-oriented planning process. The Regional Water Planning Group must seek out comments from water providers, public agencies, environmental groups, and citizens throughout the process. It is a time-consuming effort, but one that yields a plan that best supports the people and resources of the region.

Since February 2009, the ETRWPG has been focused primarily on updating the first three chapters of the regional water plan. Chapter 1 provides a general description of the region. This chapter provides the basic background of the area, including region population; a physical description of the region; the region's climate; a description of its natural, agricultural, ground and surface water resources; and so on. The information provided in this chapter provides a framework for the rest of the plan.

Chapter 2 describes two essential elements of the regional water plan: region population and water demand. These elements are updated for current conditions and adjustments made, if necessary, to projections out to the end of the current planning horizon. We plan on a 50+ year cycle, and currently out to the year 2060. For this update, population and water demand projections have not changed much since the previous plan. We expect more significant changes in the next round, which will include the results of the 2010 United States Census.

Water availability – that is, ground water and surface water supplies in the region – are reviewed and updated in Chapter 3 of the plan. Efforts are underway at this time to ensure that an accurate picture of the condition of the region's water resources is reflected in this chapter.

It is the intent of the ETRWPG to consider preliminary drafts of these chapters at the July 8 meeting. Once consensus is reached on the content of these chapters, work on matching water demands and water supplies can begin. In addition, the ETRWPG will begin to consider wider issues, such as water conservation, unique stream segments, potential threats to water resources, and recommendations for legislative action relative to regional water supplies and water planning. The goal of the ETRWPG is to have a draft of the regional water plan by January 2010. This draft will go through an extensive public comment process, as well as a review by the Texas Water Development Board. The final plan should be adopted by January 2011.

THE REGION CONTINUES WATER PLANNING ON JULY 8

The East Texas Regional Water Planning Group will meet again soon to continue the process of updating the current water plan for the region. At this meeting, several important issues will be addressed. These include the preliminary approval of the first three chapters of the updated plan and approval of changes to population projections and water demand projections for the region. The chapters under consideration provide a description of the region, projections of population and water demand, and a discussion of available surface water and groundwater resources. In addition, the RWPG will deliberate its approach to the issue of identification of unique stream segments and unique reservoir sites for this round.

The next meeting will be held on July 8, 2009, beginning at 10 a.m. It will be held in Nacogdoches, at the Nacogdoches Recreation Center, located at 1112 North Street. For more information, contact Lila Fuller, City of Nacogdoches, at (936) 559-2504 or lfuller@ci.nacogdoches.tx.us.

Lila Fuller, City Secretary
City of Nacogdoches
PO Box 635030
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EAST TEXAS REGION CONDUCTS SPECIAL STUDY OF MUNICIPAL WATER USE

As part of the current round of regional water planning, the East Texas region conducted several special studies authorized by the Regional Water Planning Group and the Texas Water Development Board. Among these was a study of municipal water use in the region, known as Study No. 3. This study included a survey of water user groups (WUGs) in Region I. The survey was intended to provide a better understanding of current water conservation practices in the region. The findings could be used in the development of conservation strategies and projections of water conservation savings in the region.

In August 2008, surveys were mailed to 65 WUGs in Region I with 1,000 connections or more. Of the surveys submitted to the WUGs, a total of 27 were completed and returned information, constituting a 42% response rate.

From the information provided in the returned surveys, water use for each WUG was determined. The State of Texas has recommended a goal for Texas water suppliers of an average water use of 140 gallons per capita per day (gpcd). Median water use per resident for Region I in 2006 and 2007 was calculated based on total water production and on water delivered for residential use. For total water production, the median water use per resident was 86 gpcd. For residential use, the median water use per resident was found to be 68 gpcd. Based on the responding WUGs, Region I falls below the municipal water conservation goal set by the task force. The survey results indicate that current municipal water use among responding WUGs in Region I is relatively low. The survey suggests that water use is generally efficient and lower than other areas of the state on a per capita basis. The following recommendations were made as a result of this study:

- The region's WUGs should continue implementing existing water conservation plans.
- WUGs should consider implementation of additional water conservation efforts recommended by the Water Conservation Implementation Task Force, if implementation can be accomplished in a cost-effective manner.
- Water conservations efforts should be re-assessed after additional data become available, including data from the next Census.

While the survey indicates good news for water use in the Region, it should be noted that participation in the survey could have been much better. Greater participation in the regional water planning process through these types of surveys will improve the process of water planning in the region. The East Texas Regional Water Planning Group will continue to gather new information and data about water use within the region in order to improve planning for this critical resource.

COMPREHENSIVE TEXAS DROUGHT INFORMATION WEB SITE LAUNCHED

Source: The Aquifer Monitor, a publication of the Texas Water Development Board

The Drought Joint Information Center made up of state and federal agency public information officers from Texas AgriLife Extension Service, Texas Water Development Board, Texas Parks and Wildlife Department, U.S. Department of Agriculture, Texas Forest Service, Texas Animal Health Commission, Texas Department of Agriculture, Texas Department of Public Safety, Texas Department of Transportation and Texas Commission on Environmental Quality have created a comprehensive Texas drought information Web site.

The Web site is divided into two distinct areas: "Resources on Drought" provides static and changing information on drought ranging from stream flow data and weather information to links provided by the participating agencies; and "News Updates/Situational Reports" features the latest items provided by the participating agencies.

All information on the Web site is public information and is available for producers, industry groups, county officials, the media and anyone needing creditable, consistent Texas drought-related information.
The new web site can be found at http://agrilife.tamu.edu/drought/

Cherokeean Herald

4A ■ Wednesday, July 15, 2009

NACOGDOCHES

Revisions to state's water plan discussed

Region I planning group examines unique stream, unique reservoir site recommendations

NACOGDOCHES – The East Texas Regional Water Planning Group (ETRWPG) met July 8 at the Nacogdoches Recreation Center to discuss revisions to the Regional Water Plan for Region I.

Among the topics discussed at the meeting were population and water demand revisions, Draft Chapters 1-3 of the Regional Plan, future plan revisions, unique stream segment and unique reservoir site recommendations and the 2010 annual budget.

Members from the engineering team and the Texas Water Development Board (TWDB) reviewed upcoming additions to the 2011 Regional Water Plan and new legislation from the 81st session of the Texas Legislature.

Engineering consultant Rex Hunt of Alan Plummer Associates, Inc., discussed anticipated changes to three chapters of the Regional Water Plan to be presented to the ETRWPG at the next meeting. Chapters 4-6 will address water management strategies within the region and their effect on water quality and give recommendations on water conservation and drought management strategies.

"For these chapters, we will look at current water conservation and management strategies already in place. We will refer to Special Study #3, which analyzed water use in Region I. The study was conducted last October and found that Region I has a much lower water use per person than other water planning regions," said Rex Hunt.

Temple McKinnon, Texas Water Development Board, gave an educational presentation on recent legislation from the 2009 Legislative Session impacting the water planning process.

The engineering consultant team also presented drafts of the first three chapters to the ETRWPG for consideration and approval.

"We will only be voting on the drafts of Chapters 1-3 today. In February 2011, we will have the opportunity to give final approval on these chapters before we adopt the entire plan," said Kelley Holcomb, chairperson of the ETRWPG.

The group approved Draft Chapter 1, "Description of the East Texas Region" and Draft Chapter 2, "Current and Projected Population and Water Demand."

The group took no action regarding Draft Chapter 3, "Evaluation of Current Water Supplies in the Region." The consultant team will finalize water supply availability and present Chapter 3 again at the next meeting.

The ETRWPG also approved the 2010 annual budget and methodology for adopting water management strategies and alternative management strategies for the 2011 Regional Water Plan.

The group discussed possible identification of unique stream segments and unique reservoir sites within the region. For this round of planning, no streams will be recommended by the group for designation as a unique stream segment. The group did not take action on unique reservoir sites, but instructed the consulting team to prepare a recommendation package for consideration by the group at a future meeting.

The Regional Water Planning Group meets once every three months to discuss revisions to the 2011 East Texas Regional Water Plan. Once the plan is adopted by the ETRWPG in February, it will be considered for approval by the TWDB to be incorporated into the State Water Plan.

The 20-county regional water planning area includes all or parts of Henderson, Smith, Anderson, Cherokee, Rusk, Nacogdoches, Panola, Shelby, San Augustine, Sabine, Angelina, Houston, Trinity, Polk, Tyler, Jasper, Newton, Orange Hardin and Jefferson counties.

The next meeting is scheduled for 10 a.m. Oct. 7 at the Nacogdoches Recreation Center, 1112 North Street. The public is encouraged to attend and participate. For more information, visit www.etexwaterplan.org or call Lila Fuller at (936) 559-2504.

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EAST TEXAS
Regional Water Planning Group

VOL. 3, NO. 5 | Region I | SEPTEMBER 2009

EAST TEXAS REGIONAL WATER PLAN UPDATE

The Regional Water Planning Group will convene in October to discuss updates to Chapters 4, 5 and 6 of the 2011 East Texas Regional Water Plan. The consulting team has been preparing these three chapters since July and will present them at the next meeting.

Chapter 4 identifies water needs based on changed conditions in demand or supply as described in Chapter 2. Chapter 4 also updates recommended water management strategies and cost estimates for each strategy.

The consulting team has also been preparing Chapter 5. This chapter assesses water quality impacts of the water management strategies outlined in Chapter 4. The chapter includes an analysis of moving water from agricultural areas to urban areas.

Chapter 6 consolidates water conservation recommendations and reviews water conservation and drought contingency strategies employed by water users in Region I. The chapter incorporates water use findings from a water conservation study prepared by Region I last year and suggests strategies for water conservation.

The next meeting will be held on October 14, 2009, at 10am at the Nacogdoches Recreation Center, located at 1112 North Street in Nacogdoches. A detailed agenda will be available on the region's website etexwaterplan.org prior to the October meeting. For more information, contact Lila Fuller, City of Nacogdoches, at (936) 559-2504 or lfuller@ci.nacogdoches.tx.us.

SCIENCE ADVISORY GROUP WEIGHS ISSUES OF ENVIRONMENTAL FLOWS

Environmental flows include river flows that are necessary to support an ecologically sound environment. Senate Bill 3, passed in 2007, called for the development of stakeholder groups for various river basins in the state to consider development of recommendations for environmental flows. A stakeholder's group for the Sabine and Neches Rivers and Sabine Lake Estuary was appointed in the summer of 2008. The group is comprised of a wide range of stakeholders, including Region I Regional Water Planning Group members Kelley Holcomb and Jerry Clark. Mr. Clark serves as the stakeholder group's chairman.

The Sabine and Neches Rivers and Sabine Lake Bay Basin and Bay Expert Science Team (SNBBEST) is a science advisory group appointed by the stakeholders group in November 2008 to consider recommendations for environmental flows for the Sabine and Neches Rivers and for Sabine Lake Estuary. The SNBBEST has been working diligently toward a goal of making such recommendations since that time.

The SNBBEST includes hydrologists, engineers, aquatic biologists, and other scientists. The East Texas Regional Water Planning Group is well represented on this committee, including planning group member Scott Hall and consultant team members Gary Graham and Rex Hunt.

The SNBBEST is currently evaluating flow data at selected locations in the Neches and Sabine Rivers. Hydrologic analyses of flow data along with biological and water quality data will be used to develop appropriate flow scenarios throughout the year that will be adequate to support sound ecological environments in the basins and in Sabine Lake estuary. Over the next two months, a report will emerge providing recommendations for environmental flows to be presented to the stakeholder's group for consideration.

This is not an easy task. Despite extensive daily flow data throughout both river basins, biological, sediment transport, and water quality data are more limited at this time. Specific recommendations will need to consider the limitations of data. The recommendations may include further studies to obtain additional data to refine recommendations in the future.

Preliminary results of the SNBBEST's work might be incorporated into the 2011 Region I planning update, which is underway at this time. Final recommendations by the stakeholders may be incorporated into future water planning.

DID YOU KNOW ?

- *It takes 3 liters of water to produce 1 liter of plastic bottled water?*
- *The average 1 liter bottle of water costs $0.87? That's equivalent to paying $3,293.31 per 1,000 gallons of water!*
- *1,000 gallons of water from your faucet costs on average $2.35. That's over 1,400 times less expensive than the same amount of bottled water! Even with the added cost of a filter, water from the faucet is much less expensive than buying bottled water from the store.*

UPCOMING EVENTS

- *East Texas (Region I) Regional Water Planning Group Meeting will be held at 10am on October 14, 2009, at the Nacogdoches Recreation Center in Nacogdoches.*
- *Water for Texas forum hosted by Senator Averitt, Representative Ritter, and the Texas Water Foundation will be held on November 16 and 17, 2009, at the Omni Hotel in Ft. Worth. More information is available at www.texaswater.org/waterfortexas.*
- *The River Systems Institute will hold their "Land, Water, People" conference at the San Marcos Convention Center on November 16 through 18, 2009. More information is available at www.rivers.txstate.edu/projects/conferences/Land-Water-People-09.html*

Lila Fuller, City Secretary
City of Nacogdoches
PO Box 635030
Nacogdoches, TX 75963-5030

ZEBRA MUSSELS SPREADING IN TEXAS: INVASIVE THREAT BELIEVED TO BE ENTERING TRINITY RIVER VIA LAKE LAVON

By Tom Harvey, TPWD

Invasive zebra mussels have been confirmed to have spread from Lake Texoma into the head waters of Lake Lavon, and experts fear they could eventually spread throughout the Red River and Trinity River watersheds.

Zebra mussels multiply rapidly and can block water treatment plant intakes and pipes as well as attach themselves to boats, ropes or anything else left in the water. They can cause declines in fish populations, native mussels and birds. They can also restrict water flow in pipes, foul swimming beaches, damage boat engine cooling systems and cause navigation buoys to sink. The financial cost of controlling and removing zebra mussels from fouled water intake structures can be significant.

Since 2006, there have been five documented cases of zebra mussels being found on boats at Lake Texoma that were trailered in from other states. All five boats were quarantined and cleaned of all mussels prior to being allowed to launch into Lake Texoma. However, April 3 of this year marked the first time that an adult zebra mussel was documented as living in Texas waters. Since that time, additional live specimens have been reported in Lake Texoma and are now believed to be well-established.

According to the online National Atlas of the United States, "Once zebra mussels become established in a water body, they are impossible to eradicate with the technology currently available. The cost of dealing with zebra mussels varies widely, [but] for many plants, costs average hundreds of thousands of dollars a year."

Zebra mussels originated in the Balkans, Poland, and the former Soviet Union and were first introduced in North America in 1988 in Lake St. Clair, a small water body connecting Lakes Huron and Erie.

Boaters and anglers can help slow the spread of zebra mussels from one water body to another by practicing the following steps when leaving any water suspected of having zebra mussels.

- Drain all water from the boat, such as the engine, bilge, livewells and bait buckets before leaving the lake.
- Inspect the boat and trailer and remove any zebra mussels, vegetation or foreign objects that are found.
- Wash your boat and trailer at a commercial carwash using high pressure and hot (140-degree) soapy water. Hot water will kill zebra mussel larvae.
- Open all compartments and livewells and allow the boat and trailer to dry for a week before entering another water body. Boaters and anglers can also help by reporting sightings of suspected zebra mussels to the Operation Game Thief toll-free hotline at (800) 792-4263.

This August news release is republished in-part with permission from the Texas Parks and Wildlife Department.

EL NIÑO AND IMPACTS IN TEXAS IN 2009-2010

Scientists at the National Oceanic and Atmospheric Administration announced in July the arrival of El Niño, a climate phenomenon causing global influences on weather, oceanic conditions and marine fisheries.

El Niño occurs every two to five years and is characterized by the warming of central and eastern tropical Pacific waters. The warming of these waters can cause some parts of the globe to be inundated with water, while turning other areas into deserts.

Scientists are predicting strengthening of El Niño in the upcoming months, becoming most intense from December through March.

For Texans, this means more rain and cooler than normal temperatures could be headed in their direction during Winter of 2009-2010. Historically, precipitation totals average from 130% to 160% of normal. In south Texas, precipitation amounts could be almost two times the normal rainfall amount. In east Texas, rainfall totals are typically 115% of normal. East Texas could see 1-3 inches more rain from December through March. Colder temperatures usually accompany El Niño events. East Texas could see average temperatures decrease by 1 to 3 degrees Fahrenheit.

East Texas Regional Water Planning Group
Contact: Kelley Holcomb (936) 633-7543

NACOGDOCHES – (October 14, 2009) – The East Texas Regional Water Planning Group (ETRWPG) met at the Nacogdoches Recreation Center on Wednesday to discuss updates to the 2011 East Texas Regional Water Plan.

Among the topics discussed at the meeting were future revisions to the Regional Plan, status and methodology of Chapter 4 updates, population and water demand projections, Draft Chapters 3, 5, and 6 of the Regional Water Plan, and amendments to the contract between the City of Nacogdoches and Texas Water Development Board (TWDB).

Engineering consultant Rex Hunt of Alan Plummer Associates, Inc., discussed anticipated changes to Chapters 7-9 of the Regional Water Plan to be presented to the ETRWPG at the next meeting in December. These chapters will address how the plan is consistent with protection of natural resources, provide recommendations regarding unique stream segments and reservoir sites, and outline anticipated infrastructure funding requirements for the region.

“Chapter 7 will describe consistency of the plan with protection of water resources, agricultural resources and natural resources. Chapter 8 addresses ETRWPG recommendations for Unique Stream Segments and Unique Sites for reservoir construction. Chapter 9 tasks include sending surveys to water user groups in the region to determine infrastructure development and funding sources,” said Mr. Hunt.

Consultant Simone Kiel of Freese and Nichols, Inc., explained the status of Draft Chapter 4 and methodology for evaluation of water user groups’ (WUGs) supply and demand and projected needs.

Current projections for the region indicate an anticipated shortfall on meeting water demands of approximately 174,000 acre-feet per year by the year 2060. This projected shortage will be met by implementation of water management strategies, which will be implemented by the region’s WUGs.

“There are currently 63 individual WUGs in Region I with water shortages. Approximately half of the projected shortfall is due to anticipated steam-electric power water demands in the planning cycle,” said Mrs. Kiel.

The ETRWPG heard and approved a request to include an allocation of 3,500 acre-feet per year of additional water supply for Houston County Water Control and Improvement District No. 1 in the 2011 Regional Water Plan. This action enables the District to proceed with a request to the Texas Commission on Environmental Quality for additional water rights in Houston County Lake.

The consultant team presented information on population and water demand revisions to the ETRWPG and requested approval. The group approved the addition of new WUGs in Angelina and Nacogdoches Counties to the 2011 Plan, along with population and municipal water demand projections associated with the new WUGs. In addition, the group approved changes to manufacturing water demands in Angelina and Jefferson Counties, and to irrigation demands in Hardin, Orange and Jefferson Counties.

Revisions to Chapters 3, 5 and 6 of the plan were described by Mr. Hunt. The group approved Draft Chapter 3 "Evaluation of Current Water Supplies in the Region," Draft Chapter 5, "Impacts of Selected Water Management Strategies on Key Parameters of Water Quality and Impacts of Moving Water from Rural and Agricultural Areas" and Draft Chapter 6 "Water Conservation and Drought Management Recommendations."

The next meeting is scheduled for 10 a.m. Dec. 9 at the Nacogdoches Recreation Center, 1112 North Street. The public is encouraged to attend and participate. For more information, visit www.etexwaterplan.org or call Lila Fuller at 936-559-2504.

Regional water group considers updates to 2011 plan

Board members review chapters that will become part of state water plan

NACOGDOCHES – The East Texas Regional Water Planning Group (ETRWPG) met at the Nacogdoches Recreation Center on Oct. 14 to discuss updates to the 2011 East Texas Regional Water Plan.

Among the topics discussed at the meeting were future revisions to the Regional Plan, status and methodology of Chapter 4 updates, population and water demand projections, Draft Chapters 3 and 5-6 of the Regional Water Plan, and amendments to the contract between the City of Nacogdoches and Texas Water Development Board (TWDB).

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The next meeting is scheduled for 10 a.m. Dec. 9 at the Nacogdoches Recreation Center, 1112 North St. The public is invited. For more information, visit www.etexwaterplan.org or call Lila Fuller at (936) 559-2504.

REGION I

continued from pg. 1A

for made many in this group uncomfortable."

LNVA wants to keep construction options viable for 2nd plant

Scott Hall, LNVA general manager, asked the group to accept the water demand revisions "as an opportunity for today" to keep "a viable project still moving forward."

He distributed copies of a letter he received from the director of commercial Development at Sempra, regarding the company's interest in constructing a LNG and crude oil terminal. Marvin L. Ivey wrote, "The availability of LNVA-supplied water is part of the attraction to develop theses projects in SE Texas. We would encourage LNVA to preserve industry's access to quality water resources in the region."

LNVA proposed increased water allocation to these facilities as a heat transfer fluid for warming the LNG. LNG facilities store liquid natural gas at -260 degrees F because in its liquid form, it takes up 1/600th of the volume compared to its gaseous state. These plants will require water to warm liquid natural gas at transfer points and return it to a gaseous state for pipeline movement.

Because of the significant temperature increase required, LNVA estimated that approximately 179,225 acre-feet per year of water will be necessary for each of the two plants. According to LNVA, the Golden Pass plant will need this volume of water annually by 2020. LNVA estimates that the Sempra plant will need this annual volume by 2030.

A Sept. 21 memorandum which served as a public notice of demand revisions, discussed Jefferson County's 151,672 acre-feet of water usage for 2010. After the first LNG plant goes on-line, the 2020 water needs increase to 423,258 acre-feet.

Once the second plant begins operations in 2030, that demand jumps to 603,321 acre-feet a year, representing a 397 percent increase over 2010 anticipated usage. That volume of water would cover a 940 square-mile area with one foot of water, representing an area approximately 2/3 the size of Rhode Island.

Open loop vs. closed loop systems

Both LNG plants are permitted for water use in a closed loop network which burns natural gas to warm a heat transfer fluid, such as water, which then warms the LNG into a gaseous state.

In the noticed memorandum, the discrepancy between the LNG plants and LNVA's request was noted: "... neither of the LNG plants is currently planning to utilize water to warm the LNG in the manner proposed by LNVA.

Mr. Campbell asked for further clarification on why LNVA's request did not match the design plan of the LNG plants, which currently call for a closed-loop piping system to re-circulate a heat transfer fluid through the LNG.

Mr. Campbell continued, "In the Sept. 21 memo, the consultants indicated that LNG facilities were not using water in the manner that the Lower Neches Valley Authority proposed. If we are taking their word for that fact, then we should use another method for heat transfer."

Monty Shanks, general manager of the Upper Neches River Authority, read from a prepared statement suggesting that if the LNG plants change the method used for heat generation, then a new permit and environmental impact statement would be required.

LNVA attempted to plug in numbers at the regional water planning group level which would allocate massive amounts of freshwater from the Neches basin instead of a relatively small amount of water for a closed loop system.

Cherokee County Judge Chris Davis, who was unable to attend the quarterly meeting, anticipated the controversial agenda and assigned a proxy vote to Mr. Campbell to protect water interests in the upper basin and to vote against the LNVA request to get increased water allotments for industrial use.

LNVA's current water rights extend north as far as Cherokee County and include Pine Island Bayou, the Neches River, Sam Rayburn Reservoir and B.A. Steinhagen Lake.

"Basically, the Lower Neches Valley Authority is trying to take our water," said Mr. Davis. "They want our fresh drinking water to warm the liquefied natural gas, and then they are just going to dump it into the gulf. This is not a good use of our fresh water."

On a vote near the end of the meeting, the group accepted the increased irrigation and manufacturing projections with a caveat that Jefferson County cannot use more water than the current water rights permit allows.

If LNVA pursues water that exceeds amounts allocated in their current permit, members of Region I said they will attend the contested case hearing at TCEQ in Austin to explain their concerns.

"They have a huge petro complex down there and the largest (agricultural) irrigation network in the area," said Mr. Campbell. "I am sensitive to that and appreciative of that. But we need to make sure that decisions materially benefit the entire area in the long run. Jefferson County shouldn't rule the roost."

The drafts and recommendations made by Region I at the local level will become integrated into the 2012 State Water Plan.

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Update has county needing less water for manufacturing

Posted: Wednesday, October 21, 2009 1:00 am | Updated: 2:42 pm, Thu Jan 21, 2010.

ANDY ADAMS

A proposed update to the 2011 Texas water plan has Angelina County needing much less water for manufacturing needs in the coming years □ something Lufkin officials hope to change. A consultant hired by the East Texas Regional Water Planning Group has recommended that Angelina County's proposed manufacturing water demand for the year 2020 be lowered from 34,359 acre feet to 9,082 acre feet □ a drop of 74 percent from the 2006 Texas water plan □ and that Jefferson County's demand be increased by 58 percent, to 423,258 acre feet, in the same year. Projections for 2030, 2040, 2050 and 2060 have similar drops for Angelina County and increases for Jefferson County, where Beaumont is the county seat. While the projections do not represent limits on the amount of water the counties can use, they are important because they could affect financing and/or permitting on new water projects. The decrease in Lufkin's proposed manufacturing demand changes is the result of the closure of the AbitibiBowater paper mill, according to a technical memorandum prepared by Rex Hunt of Alan Plummer Associates, Inc., for the regional water group. Lufkin purchased the company's water rights earlier this year. City officials said they hope the regional planning group reconsiders changing Lufkin's proposed manufacturing water demands when it meets Dec. 9. "We are in disagreement with that," said Keith Wright, assistant city manager for Lufkin. "We've contacted them, asking them to up those numbers. We feel like it's a real possibility we can have an industrial user at the old Abitibi site within five years and another one at the industrial park that is being planned out state Highway 103 east." Wright said he e-mailed the engineer working on the 2011 water plan to ask that Lufkin's figure be increased by 13,500 acre feet by 2020. "Hopefully they'll change it," Wright said. "We'll see." Nobody spoke on behalf of Lufkin's water interests at the East Texas Regional Water Planning Group's meeting last Wednesday in Nacogdoches. The city of Lufkin does not have a representative on the group, which is a regional entity of the Texas Water Development Board and includes all or parts of Anderson, Angelina, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity and Tyler counties. Wright said the city is trying to get a representative on the panel. Attempts to reach Kelley Holcomb of Lufkin, the chairman of the group, for comment have been unsuccessful. Holcomb is general manager of the Angelina and Neches River Authority.

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East Texas Regional Water Planning Group
Contact: Kelley Holcomb (936) 633-7543

NACOGDOCHES – (December 9, 2009) - The East Texas Regional Water Planning Group (ETRWPG) met on Wednesday at the Nacogdoches Recreation Center to discuss updates to the 2011 Regional Water Plan.

The group heard reports from standing committees and engineering consultants, and comments from the public.

Engineering consultants Rex Hunt of Alan Plummer Associates, Inc., and Simone Kiel, of Freese and Nichols, Inc., presented changes to population and water demands projections, and discussed updates to Chapters 4, 7, 8, and 9 of the East Texas Regional Water Plan.

"Population and water demands projections through 2060 have been modified since the 2006 Plan for municipal, manufacturing, irrigation, and mining uses," said Rex Hunt. "Today, the group must consider final proposed changes to water demands developed as a result of public comments received during the 14-day comment period following the October 14th ETRWPG meeting.

The group received comments from four entities during the comment period. These comments and proposed demand changes were presented in a Technical Memorandum dated November 13, 2009.

Comments received from Lufkin Deputy City Manager, Keith Wright, requested Angelina County Manufacturing demands be increased to account for new industrial projects slated for the city. The group voted to approve this request and increased demand for Angelina County.

Based on comments received from Lower Neches Valley Authority General Manager, Scott Hall, the group voted to decrease Irrigation demands in Jefferson County to 140,000 acre-feet per year through 2060.

Angelina & Neches River Authority General Manager, Kelley Holcomb, requested a change to Mining demands for Angelina, Cherokee, Nacogdoches, Shelby and San Augustine Counties. The additional demand reflects a need for water to support increased gas production in these counties. The group approved this request.

In addition, the group voted to retain Irrigation water demands from the 2006 Plan for Orange County. The Executive Committee will prepare a transmittal letter to the TWDB requesting these changes.

Mrs. Kiel gave a status update to Chapter 4 of the Regional Water Plan. "Based on direction given on October 14th by the ETRWPG, we have looked at demand data and no additional shortages have been identified in the region," said Mrs. Kiel. "We have coordinated with Wholesale Water Providers and are continuing to update cost estimates and text of this report.

Mr. Hunt presented Draft Chapter 7 to the group for consideration and approval. The chapter outlines how the plan is consistent with the protection of natural resources in the region and demonstrates how the plan complies with current regulations. The group approved Draft Chapter 7.

Mrs. Kiel gave an update to Chapter 8 regarding potential legislative recommendations to be submitted by the ETRWPG. The Executive Committee will develop legislative recommendations to be presented at the February meeting of the ETRWPG.

Mr. Hunt presented a list of proposed reservoirs for consideration of the group to recommend for designation as unique reservoir sites. The group voted to not recommend unique reservoir sites in the 2011 Regional Water Plan. The plan will retain language from the 2006 plan regarding unique reservoir sites.

Mr. Hunt also discussed Chapter 9 of the Regional Water Plan. The chapter includes an infrastructure needs survey developed by the Texas Water Development Board (TWDB), which will be sent to water user groups with needs. This chapter will be completed after the Initially Prepared Plan (IPP) is submitted.

The IPP is to be submitted to the TWDB prior to March 1, 2010. Following submittal of the IPP, there is a 6-month public comment period where meetings will be held and comments received from the public. Following the comment period, the East Texas Regional Water Plan may be adopted by the group.

ETRWPG member David Alders proposed an amendment to the group's by-laws and the group approved the motion.

The ETRWPG will meet Feb. 17th, 2010, at 10 a.m. at the Nacogdoches Recreation Center at 1112 North Street to discuss further updates and to consider approval of the IPP. The public is encouraged to attend and participate. For more information, visit www.etexwaterplan.org or call Lila Fuller at 936-559-2504.

February 10, 2010

East Texas Regional Water Planning Group, Region I
Contact: Kelley Holcomb (936) 633 - 7543

FOR IMMEDIATE RELEASE

NACOGDOCHES - The East Texas Regional Water Planning Group (ETRWPG) met Wednesday morning at the Nacogdoches Recreation Center to discuss revisions to the 2011 Regional Water Plan for Region I.

Among the topics discussed at the meeting were population and water demand revisions, updates to the first three chapters of the Regional Plan, future revisions to the Regional Plan and the 2010 annual budget.

Members from the engineering team and the Texas Water Development Board gave presentations on the upcoming additions to the 2011 Regional Water Plan and the 2009 Legislative Session.

Engineering consultant Rex Hunt of Alan Plummer Associates, Inc., discussed three chapters to be presented to the ETRWPG at the next meeting. Chapters 4, 5 and 6 will address water management strategies within the region and their effect on water quality and give recommendations on water conservation and drought management strategies.

"For these chapters, we will look at current water conservation and management strategies already in place. For these chapters, we will be referring to Special Study #3 which analyzed water use in Region I. The study was conducted in October of last year and found that Region I has a much lower water use per person than other water planning regions." said Rex Hunt.

Temple McKinnon of the Texas Water Development Board, gave an educational presentation on recent legislation impacting the water planning process during the 2009 Legislative Session.

The engineering consultant team presented drafts of the first three chapters to the ETRWPG for consideration and approval.

"We will only be voting on the drafts of Chapters 1-3 today. In February, 2011, we will have the opportunity to give final approval on these chapters before we adopt the entire plan," said Kelley Holcomb, chairperson of the ETRWPG.

The group approved Draft Chapter 1 entitled "Description of the East Texas Region." Draft Chapter 2 "Current and Projected Population and Water Demand" and also Draft Chapter 3 "Evaluation of Current Water Supplies in the Region" were approved as well.

The ETRWPG also approved the 2010 annual budget and methodology for adopting management strategies and alternative management strategies for the 2011 Regional

Water Plan. The group discussed and approved methodologies for recommending unique stream segments and unique reservoir sites.

The group voted to not recommend any unique stream segments in the 2011 Regional Water Plan. The group, however, would like further review of potential reservoirs within the region and will vote on the recommendation of unique reservoir sites in October when the consulting team presents this information.

The Regional Water Planning Group meets once every three months to discuss revisions to the 2011 East Texas Regional Water Plan. Once the plan is adopted by the ETRWPG in February, it will then be considered for approval by the Texas Water Development Board to be incorporated into the State Water Plan.

The 20-county regional water planning area includes all or parts of Henderson, Smith, Anderson, Cherokee, Rusk, Nacogdoches, Panola, Shelby, San Augustine, Sabine, Angelina, Houston, Trinity, Polk, Tyler, Jasper, Newton, Orange Hardin and Jefferson Counties.

The next meeting is scheduled for October 7, 2009, at the Nacogdoches Recreation Center at 1112 North Street at 10 a.m. The public is encouraged to attend and participate. For more information, visit www.etexwaterplan.org or call Lila Fuller at (936) 559-2504.

East Texas Regional Water Planning Group
Contact: Kelley Holcomb (936) 633-7543

NACOGDOCHES – (February 17, 2010) – The East Texas Regional Water Planning Group (ETRWPG) met at the Nacogdoches Recreation Center on Wednesday and adopted the initially prepared 2011 East Texas Regional Water Plan.

Among the topics discussed at the meeting were changes to the Regional Plan, adoption of the initially prepared plan (IPP), public comment period and public hearing, and a request for the Texas Water Development Board (TWDB) to conduct a socio-economic analysis.

Engineering consultant Rex Hunt of Alan Plummer Associates, Inc., discussed changes to the 2011 Plan since the last update in 2006. Since February 2009, ten chapters have been developed for the Regional Plan. Over the past year, the ETRWPG has considered and approved seven of the chapters, leaving Chapters 4, 9, and 10 to finalize.

Mr. Hunt presented Chapter 4 and reviewed changes, including modified water management strategies for entities in the region, updated cost analyses for water management strategies, and revised impacts of water management strategies. He also discussed anticipated changes to Chapters 9 and 10.

“The TWDB will develop a survey and the planning group will distribute surveys to entities in the region with identified water needs. The responses to this survey will be included in Chapter 9: Infrastructure Financing Report. Chapter 10 is a summary of public involvement in the planning process and will be completed once all public comments are received,” said Mr. Hunt.

The consultant team presented the upcoming schedule for the public comment period and suggested dates for the public hearing.

“The plan is to have one hearing held on consecutive evenings at three locations. This public hearing is another opportunity for the public to submit comments on the 2011 Region I Water Plan,” said Mr. Hunt.

The ETRWPG chose to schedule the hearing for April 20, 21 and 22 in Jacksonville, Nacogdoches, and Beaumont. Times and building locations are to be determined at a later date.

The group considered and approved a request to the TWDB to conduct a socio-economic analysis of the impact of not meeting water needs in the region. Temple McKinnon of the TWDB said, “The plan requires a socio-economic analysis be conducted. If the group would like for the TWDB to conduct this analysis, we have to receive a request from the Group.” ETRWPG Chairman Kelley Holcomb pointed out that the analysis should be conducted considering the specific needs of East Texas. While the model used by the TWDB is the same throughout the State, Ms. McKinnon indicated that it would take into account the needs of the East Texas Region.

The group considered and approved appointments to the FY 2010 Executive Committee and other committee appointments. The ETRWPG also approved the addition of a new member of the ETRWPG. George Campbell, chair of the Nominations Committee, reported that Dr. Joseph Holcomb of Houston County has met the criteria to fill one of two Small Business vacancies. The group unanimously approved the appointment of Dr. Holcomb.

The next regularly scheduled meeting of the ETRPWG will be10 a.m. May 12 at the Nacogdoches Recreation Center, 1112 North Street. A public hearing is scheduled for April 20, 21 and 22 in Jacksonville, Nacogdoches, and Beaumont. Exact times and locations will be announced in a public notice. The public is encouraged to attend and participate. For more information, visit www.etexwaterplan.org or call Lila Fuller at 936-559-2504.

6A ■ Wednesday, February 24, 2010 ■ Cherokeean Herald ■ thecherokeean.com

Preliminary regional water plan adopted

NACOGDOCHES – After almost a year of work involving review of a single chapter at a time, the East Texas Regional Water Planning Group (ETRWPG) adopted the initially prepared 2011 East Texas Regional Water Plan.

The final document is more than 500 pages with another 300 pages of appendices and documentation. It will eventually be incorporated into the five-year State Water Plan, which will be presented to the Texas Legislature in 2011 for review and adoption.

The next phase after the board's adoption is a comment period.

Copies will be placed at local libraries and at court houses in the 19-county region.

Three public hearings will be held April 20-22 in Jacksonville, Nacogdoches and Beaumont. Times and dates will be finalized and released at a later date.

Among the topics discussed at the Feb. 17 meeting were changes to the Regional Plan, adoption of the initially prepared plan (IPP), public comment period and public hearing, and a request for the Texas Water Development Board (TWDB) to conduct a socio-economic analysis.

Engineering consultant Rex Hunt of Alan Plummer Associates, Inc., discussed changes to the 2011 Plan since the last update in 2006. Since February 2009, 10 chapters have been developed for the Regional Plan. Over the past year, the ETRWPG has considered and approved seven of the chapters, leaving Chapters 4, 9, and 10 to finalize.

Mr. Hunt presented Chapter 4 and reviewed changes, including modified water management strategies for entities in the region, updated cost analyses for water management strategies and revised impacts of water management strategies. He also discussed anticipated changes to Chapters 9 and 10.

"The TWDB will develop a survey and the planning group will distribute surveys to entities in the region with identified water needs.

The responses to this survey will be included in Chapter 9: Infrastructure Financing Report. Chapter 10 is a summary of public involvement in the planning process and will be completed once all public comments are received," said Mr. Hunt.

The consultant team presented the upcoming schedule for the public comment period and suggested dates for the public hearing.

"The plan is to have one hearing held on consecutive evenings at three locations. This public hearing is another opportunity for the public to submit comments on the 2011 Region I Water Plan," said Mr. Hunt.

The group considered and approved a request to the TWDB to conduct a socio-economic analysis of the impact of not meeting water needs in the region. Temple McKinnon of the TWDB said, "The plan requires a socio-economic analysis be conducted. If the group would like for the TWDB to conduct this analysis, we have to receive a request from the group." ETRWPG Chairman Kelley Holcomb pointed out that the analysis should be conducted considering the specific needs of East Texas. While the model used by the TWDB is the same throughout the state, Ms. McKinnon indicated that it would take into account the needs of the East Texas Region.

The group considered and approved appointments to the FY 2010 executive committee and other committee appointments.

The ETRWPG also approved the addition of a new member of the ETRWPG. George Campbell, chair of the nominations committee, reported that Dr. Joseph Holcomb of Houston County met the criteria to fill one of two small business vacancies.

The group unanimously approved the appointment.

Cherokee County Judge Chris Davis is a member of the group, and he attended the Feb. 17 meeting.

County Attorney Craig Caldwell also attended.

The next meeting of the ETRPWG will be10 a.m. May 12 at the Nacogdoches Recreation Center, 1112 North Street.

For more information, visit www.etexwaterplan.org or call Lila Fuller at (936) 559-2504.

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NOTICE OF PUBLIC HEARING

THE EAST TEXAS REGIONAL WATER PLANNING GROUP 2011 INITIALLY PREPARED REGIONAL WATER PLAN

The East Texas Regional Water Planning Group (ETRWPG) Region I is providing notice that a public hearing will be held to accept written and oral public comment on the 2011 Initially Prepared Plan (IPP) for the East Texas Regional Water Planning area. The public hearing will be held from **5:30 p.m. to 8:30 p.m.** as follows:

Tuesday, April 20, 2010 – Norman Center, 526 E. Commerce St., **Jacksonville, TX**

Wednesday, April 21, 2010 – Nacogdoches County Courthouse Annex, 203 W. Main, **Nacogdoches, TX**

Wednesday, April 22, 2010 – Beaumont Convention Center, 701 Main Street, **Beaumont, TX**

The East Texas RWPG was established under provisions of Texas Senate Bill 1 (7th Texas Legislature) to develop a regional water plan for the East Texas Regional Water Planning Area (TWDB Region I) which includes the following counties: Angelina, Anderson, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity and Tyler.

Copies of the IPP are available for review at the following County Clerk offices:

Angelina County, 215 E. Lufkin Avenue, Lufkin, TX 75901

Anderson County, 500 N. Church Street #10, Palestine, TX 75801

Cherokee County Clerk, 502 N. Main St, Rusk, TX 75785

Hardin County, 300 Monroe, Kountze, TX 77625

Henderson County, 100 East Tyler, Athens, TX 75751

Houston County, 401 E Houston, Crockett, TX 75835

Jasper County, 121 N. Austin, Jasper, TX 75951

Jefferson County, 1149 Pearl Street, Beaumont, TX 77701

Nacogdoches County, 101 W. Main Street, Nacogdoches, TX 75961

Newton County, 115 Court Street, Newton, TX 75966

Orange County, 123 S. 6th Street, Orange, TX 77630

Panola County, 110 S. Sycamore Street #201, Carthage, TX 75633

Polk County, 101 W. Church Street, #100, Livingston, TX 77351

Rusk County, 115 N. Main Street, #206, Henderson, TX 75652

Sabine County, 201 Main Street, Hemphill, TX 75948

San Augustine County, 100 W. Columbia, Room 106, San Augustine, TX 75972

Shelby County, 124 Austin Street, Center, TX 75935

Smith County, 200 E. Ferguson, Suite 300, Tyler, TX 75702

Trinity County, 162 W. First Street, Groveton, TX 75845

Tyler County, 116 S. Charlton, Woodville, TX 75979

Copies of the IPP are also available for review at the following public libraries:

Kurth Memorial Library, 706 S. Raguet, Lufkin, TX 75904

Palestine Public Library, 1101 N. Cedar St., Palestine TX 75801

Singleton Memorial Library, 207 E. 6th Street, Rusk, TX 75785

Kountze Public Library, 835 Redwood, Kountze, TX 77625

Clint W. Murchison Memorial Library, 121 S. Prairieville St, Athens, TX 75751

J.H. Wooters Crockett Public Library, 709 E. Houston, Crockett, TX 75835

Jasper Public Library, 175 E Water Street, Jasper, TX 75951

Beaumont Public Library, 801 Pearl Street, Beaumont, TX 77701

Nacogdoches Public Library, 1112 North Street, Nacogdoches, TX 75961

Newton County Library, 212 High Street, Newton, TX 75966

Orange Public Library, 220 N. 5th St, Orange, TX 77630

Sammy Brown Public Library, 522 W. College St, Carthage, TX 75633

Murphy Memorial Library, 601 W. Church St, Livingston, TX 77351

Rusk County Library, 106 E. Main St, Henderson, TX 75652

J.R. Huffman Public Library, Hwy 87 N. Hemphill, TX 75948

San Augustine Public Library, 413 E. Columbia, San Augustine, TX 75972

Fannie Brown Booth Memorial Library, 619 Tenaha St, Center, TX 75935

Tyler Public Library, 201 S. College Ave, Tyler, TX 75702

Ethel R. Reese Public Library, 115 Front Street, Groveton, TX 75845

Allan Shivers Library, 302 N. Charlton, Woodville, TX 75979

Copies of the IPP are also available for review on the East Texas Regional Water Planning Group website at www.etexwaterplan.org and at the City of Nacogdoches, Office of the City Secretary, 202 E. Pilar Street, Room 315, Nacogdoches, TX 75961. Written and oral comments will be accepted at the public hearing. Written comments will also be accepted through June 22, 2010 and may be emailed to rhunt@apaienv.com or mailed to the address below:

FOR MORE INFORMATION CONTACT:

Rex H. Hunt, P.E.

Alan Plummer and Associates, Inc.

6300 La Calma, Suite 400

Austin, Texas 78752

Phone: 512.452.5905 or rhunt@apaienv.com

Public hearing scheduled for regional water planning

The East Texas Regional Water Planning Group (ETRWPG) Region I has announced that public hearings will be held from 5:30-8:30 p.m. Tuesday, April 20 at the Norman Center, 526 E. Commerce, Jacksonville; Apil 21 at the Nacogdoches County Courthouse Annex and April 22 at the Beaumont Convention Center. The hearings are being held to accept written and oral public comment on the 2011 Initially Prepared Plan (IPP) for the East Texas Regional Water Planning area.

The East Texas RWPG was established under provisions of Texas Senate Bill 1 (7th Texas Legislature) to develop a regional water plan for the East Texas Regional Water Planning Area (TWDB Region I) which includes the following counties: Angelina, Anderson, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity and Tyler.

Copies of the IPP are available at the county clerk's offices in the participating counties and county libraies including the Singletary Memorial Library in Rusk.

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April 18, 2010

Tyler Paper

Public Input On Water Plan Requested
By KELLY GOOCH

Staff Writer

JACKSONVILLE -- Officials with the East Texas Regional Water Planning Group Region I are seeking written and oral public comments on the 2011 Initially Prepared Plan for its regional water planning area.

The ETRWPG, a regional entity of the Texas Water Development Board, is responsible for putting together a regional water plan for multiple East Texas counties, including Angelina, Anderson, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity and Tyler.

Members of the public can give input on the group's plan at a public hearing next week.

The hearing is scheduled for 5:30 to 8:30 p.m. Tuesday at the Norman Activity Center in Jacksonville, 526 E. Commerce St.; Wednesday at the Nacogdoches County Courthouse Annex in Nacogdoches, 203 W. Main St.; and Thursday in Beaumont at the Beaumont Convention Center, 701 Main St.

"The planning process is designed where there is public input, and this is one of the opportunities for the public to voice their opinion and get involved in the process," said Lauren Gonzalez, with the regional water planning consulting team Alan Plummer Associates.

Ms. Gonzalez said the IPP looks at water supply in the region and compares those numbers to water demand.

From that, the group can establish what water needs will be in the next 50 years.

"Generally speaking, as we go forward in time, population in the state of Texas is expected to double and, as a result, we're going to have to spread the water resources around to an ever-increasing population," ETRWPG Chairman Kelley Holcomb said. That "means it is vital the water providers use this planning process to meet the demands of a growing population. Essentially, that is what the water planning process is all about."

Lake Columbia, a proposed regional water supply project, is one of the items in the regional water plan.

The lake is projected to be 10,000 surface acres and about 14 miles long, with the dam site about 2 miles east of Jacksonville.

Its anticipated yield is 85,507 acre-feet annually for use by water supply customers.

The IPP "talks about what the plans are and where it stands right now in the planning process ... and with participants," Ms. Gonzalez said.

She said the plan also looks at population projections through 2060.

Those population projections are based on Texas Water Development Board guidelines and helps the ETRWPG determine what water demands will be, she said.

Additionally, the plan contains information on steam electric power demand and Lake Fastrill -- a reservoir the city of Dallas had planned to build in the same area as the Neches River National Wildlife Refuge.

In February, U.S. Supreme Court justices rejected petitions for writ of certiorari from Dallas and the Texas Water Development Board, which had been filed in efforts to appeal a March 2009 ruling in favor of the refuge.

The ETRWPG already was finished with the plan when the ruling came down, so Lake Fastrill remains part of it.

Ms. Gonzalez said that once the IPP public comment period closes, group members will respond to all of the comments they receive, and those that are deemed appropriate can be incorporated into the plan.

The final adoption of the IPP is expected to take place in mid-August so it can be submitted to the Texas Water Development Board by Sept. 1.

For those who can't make it to the public hearing next week, there are other opportunities to view the document.

Copies of the IPP are available at county clerk offices in the group's coverage area and at local libraries, including the Palestine Public Library and the Tyler Public Library.

Copies are also available for review on the East Texas Regional Water Planning Group website, www.etexwaterplan.org

Written comments will be accepted through June 22 and may be e-mailed to rhunt@apaienv.com or mailed to Rex H. Hunt, P.E. Alan Plummer and Associates, Inc., 6300 La Calma, Suite 400 Austin, TX 78752.

For more information, call 512-452-5905.

The Daily Sentinel

Group seeking public input on water plan

Posted: Wednesday, April 21, 2010 2:00 am | Updated: 10:18 pm, Tue Apr 20, 2010.

Erin McKeon |

Nacogdoches County residents will have a chance tonight to comment publicly on the East Texas Water Planning Group Region I 2011 Initially Prepared Regional Water Plan, which outlines the projected water use in East Texas for the next 50 years, officials said.

The meeting is from 5:30 to 8:30 p.m. in the Nacogdoches County Courthouse Annex at 203 S. Main.

The plan includes demands in the region, cities, water development boards and more and compares them with the supplies, whether groundwater or surface water, to make sure the demands are met, said Rex Hunt, the project manager for the consulting team on the project.

"They meet every five years and produce a regional water plan that, once it's finalized, goes to the state," he said. "Then the state plans a statewide water plan based off the regional plans altogether."

The planning group also meets with all the entities in the area to develop alternatives that might be used to meet the shortages.

"It's really a night for public comments ... to hear from the people for whom the plan is prepared," he said. "This is a local plan, and we encourage people to participate in that process as much as possible."

Copies of the water plan are available for review at the Nacogdoches County Clerk's Office, 101 W. Main, and in the Nacogdoches Public Library, 1112 North Street.

Copies are also available for review at www.etexwaterplan.org.

Written and oral comments will be accepted at the public hearing, and written comments will be accepted through June 22 and may be e-mailed to rhunt@apaienv.com or mailed to Rex H. Hunt, P.E., Allan Plummer and Associates, Inc., 6300 La Calma, Suite 400, Austin, Texas 78752.

Erin McKeon's e-mail address is emckeon@dailysentinel.com.

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Daily Progress, Jacksonville, TX

April 21, 2010

Region water plan presented

Nathan Straus
Jacksonville Daily Progress

JACKSONVILLE — The Region I water planning group presented its plan for the region to Jacksonville Tuesday evening. Jacksonville Public Works Utilities Director David Brock said the plan covering an area of most of East Texas was presented in the form of a public hearing.

"This is the plan for ensuring the region's water needs are met," Brock said. "A public hearing was held to determine if anyone had any comments about it."

Brock said though the meeting at the Norman Activity Center was open to the public, only the planning members and their spouses attended.

Public Works Director Will Cole said the meetings, which will be repeated throughout the rest of the large region, don't often bring a lot of people in.

"These are not hot button issues," Cole said. "Our region's water supply is in good shape. There is less demand and more water."

Cole also said the public hearings for the plan such as those conducted in Jacksonville and Nacogdoches are required by law.

Brock said the water plan deals with a lot of information put out by the Texas Water Development Board, such as the population of the region in question and the demands of the area.

"We make a plan to see if the water needs are met," Brock added. "The water needs are varied."

He added some of the issues facing Region I's water supply involve the city of Dallas and its water needs coming from Lake Palestine and negotiations about where the water in Region I goes. He also said Dallas has around 60 percent of the water rights to Lake Palestine and, once the city of Dallas installs a pipeline to the lake, will begin using a great deal of the lake's water.

"It's about ensuring Region I has enough water to ensure its growth and its industries," Brock said.

Brock also said all 16 of the state's water regions go through the same process of completing a water plan, holding public hearings on it and submitting it to the water development board.

The process, he added, started when the finished plan was accepted to go to public hearing on Feb. 17. From there the plan travels through the region as citizens are given a chance to comment on it either orally or by written means. The plan is then submitted to the water development board. Brock said it must get there by May 22.

“If they have any questions the plan will be presented back to us,” he added. “If all goes well the plan should be accepted by 2011.”

Cole said the water regions were established by the Texas legislature and are regulated so they do not come into conflict with each other.

Any wanting more information about the region or commenting on the water plan may contact a Region I consultant, Rex Hunt, by e-mailing him at rhunt@apaienv.com.

Cole added the region’s water plan information is available at the county courthouses within the region.

Attendance sparse at water planning meeting

Posted: Thursday, April 22, 2010 2:00 am | Updated: 9:56 pm, Wed Apr 21, 2010.

Erin McKeon |

Either East Texas folks aren't interested or they really trust the water planning board that's making decisions 50 years into the future, officials said following Wednesday's public hearing in Nacogdoches in which none of the mere handful of residents chose to comment.

The public hearing of the East Texas Regional Water Planning Group Region I for the 2011 Initially Prepared Regional Water Plan, one of three such hearings in the region, brought low attendance, said Temple McKinnon, the Texas Water Development Board's project manager over the Water Resources Planning Division in Austin.

Meetings in the Houston area region had a higher turnout because of a controversial project that would effect the area, but San Antonio area region meetings brought small crowds also, McKinnon said.

The water plan, which includes demands, supplies and shortages in the region from municipalities, agriculture, industry and other water user groups, is part of a statewide plan for the next 50 years, said Rex Hunt, the project manager for the consulting team on the project.

"It's kind of like government for the people, of the people, by the people," said Kelley Holcomb, the Region I Planning group chair. "Well, this is water by the water professionals and we're providing for the public - and to not have any public input certainly doesn't complete the process."

The 2011 plan is updating the 2006 plan with regard to new industrial projects, mining projects, population demands, irrigation demands and steam-electric water demands, Hunt said.

The water planning group, which meets quarterly each year, had more public comments and input in previous years when people weren't sure what was going on, Holcomb said.

The East Texas Region does have a projected water shortage of 179,300 acre feet per year scattered throughout the region. But while that's a significant number, it's nowhere near the deficit other regions are facing, Hunt said.

"I think this region is very fortunate in the amount of water it has," he said.

Ways to correct or compensate for the shortage might be to dig wells, build reservoirs or simply funnel the water from outlying areas to those in need, said Mike Harbordt, who is a member of the water planning group.

"It's not that the water's not here, it's just not developed in some areas," he said.

There is a final meeting for public comment Thursday at the Beaumont Convention Center, 701 Main St. from 5:30 to 8:30 p.m.

The final plan will be submitted in September, and the water development board will use the plan to compile the statewide water plan.

Copies of the water plan are available for review at the Nacogdoches County clerk's office, 101 W. Main, and at the Nacogdoches Public Library, 1112 North St.

Copies are also available for review at www.etexwaterplan.org.

Written and oral comments will be accepted through June 22 by e-mailing rhunt@apaienv.com or by mailing Rex Hunt, P.E., Allan Plummer and Associates, Inc.,

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Appendix 10-B

Public Hearing Transcripts

A fundamental element of the planning process is input from the public. A public hearing was scheduled to provide the public with a forum to comment on the IPP. The public hearing was held on three consecutive days in three cities in the upper, central, and lower portions of the ETRWPA. Provided in this appendix are transcripts from the public hearing in the following cities:

- April 20 – Jacksonville, Texas
- April 21 – Nacogdoches, Texas
- April 22 – Beaumont, Texas

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EAST TEXAS REGIONAL WATER PLANNING GROUP

PUBLIC HEARING

APRIL 20, 2010

JACKSONVILLE, TEXAS

5:35 P.M.

MR. HOLCOMB: Okay. I have 5:35. I'd like to go ahead and call this public hearing to order. We don't have much of a turnout tonight from the general public, so I think I would like to deviate somewhat and have us go around the room and introduce ourselves. And the reason for that is that everyone here is either with Region I or a resource agency, so I think it's important to have that documentation for the record.

My name is Kelley Holcomb. I'm the chair of Region I, Regional Water Planning Group. So I'd like to go ahead and start. I introduced myself. Rex, go ahead.

MR. HUNT: My name is Rex Hunt. I'm with Alan Plummer Associates located in Austin, Texas and we are part of the consulting team for the Region I.

MS. GONZALEZ: I'm Lauren Gonzalez. I also work for Alan Plummer Associates on the consulting team.

MR. HOLCOMB: We'll let you introduce yourself, Terrie.

MS. GONZALEZ: I'm Terrie Gonzalez with the Cherokeean Herold Newspaper in Rusk.

MR. HOLCOMB: Worth?

MR. WHITEHEAD: I'm Worth Whitehead. I'm from Henderson. I'm a member of the board of Region I.

MR. HOLCOMB: Jackie?

MS. HARPER: I'm Jackie Harper and I'm Mike's traveling companion.

MR. HARPER: I'm Mike Harper, Region I.

MR. BLANCHARD: Paul Blanchard, with the Northwest Bank out of Vancouver, Washington.

MR. BOOKOUT: Lann Bookout with the water public work planning group.

MS. KIEL: I'm Simone Kiel. I'm with Freese & Nichols. I'm on the consulting team.

MR. KIEL: I'm Dave Kiel. I'm Simone's traveling companion.

MS. MCKINNON: Temple McKinnon. I'm with the water development board.

MR. SHANK: Monty Shank. I'm with Region I.

MR. BROCK: David Brock with Region I.

MR. HOLCOMB: And Stacy?

MS. CORLEY: Stacy Corley with the City of Nacogdoches.

MR. HOLCOMB: Thank you, ma'am. I think that takes care of all of our introductions.

David, since I don't see anyone from the city here, you're representing the city as well tonight. If you would, thank the city manager and the mayor for allowing us to use the facilities tonight. We do appreciate it. Our funds are limited, so all the free gratis we can stand is always good.

For any of you, the restrooms are out this way. We have no elected officials here tonight. I'd like to remind everyone to sign in.

If you're a member of the general public, if you would like to speak, we have a comment sheet that we would like you to fill out so that we can have a record of your attendance and as well a record of your comments or at least generally what you're wanting to talk about.

I would like to remind everyone that we will be receiving written comments on our draft -- 2010 draft regional water plan until June 22nd, correct, Lauren?

MS. GONZALEZ: Yes, sir.

MR. HOLCOMB: So you can make those comments in writing to Rex Hunt. We'll provide information to any of those that request it.

Again, we don't have a very big crowd tonight, so we're probably not going to go through the formal process.

Sir, no comments? We'd let you. We'd be happy for somebody to comment.

All right. Well, at this time, I am going to suspend the rest of the introductions and activities and make a call for public comments. Do we have anyone wishing to speak, Stacy?

MS. CORLEY: No.

MR. HOLCOMB: No? Do not have any members of the public at this time who are wishing to speak.

Any comments from the planning group members? Last call for a request to make a public comment.

Hearing none, we'll recess this meeting. We will recess it to the City of Nacogdoches at the parks and rec facility tomorrow night 5:30 where we will reconvene this public hearing. We'll do so -- we'll recess that meeting and reconvene in Beaumont. If any of you need this information, we've got lots of details in the back.

Thank you. You-all have a good evening.

(End of Proceedings.)

THE STATE OF TEXAS

COUNTY OF CHEROKEE

I, Liesa Kliman, Certified Shorthand Reporter in and for the State of Texas, do hereby certify that the above and foregoing contains a true and correct transcription of my shorthand notes taken during the Public Hearing on April 20, 2010.

WITNESS my hand on this 30th day of April, 2010.

LIESA KLIMAN, CSR#2248
P.O. BOX 151601
Lufkin, Texas 75915
(936)632-2442
Expires: 12/31/11
Firm Registration #290

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EAST TEXAS REGIONAL WATER PLANNING GROUP

PUBLIC HEARING

APRIL 21, 2010

NACOGDOCHES, TEXAS

5:55 P.M.

MR. HOLCOMB: I'd like to go ahead and call the public hearing to order. It is 5:55. I do apologize for starting late, but we are all waiting around waiting for the public to come join us.

As I understand in talking around the room tonight, we don't have anyone that wants to make public comments. We're looking for a dry run on the activities tonight. We had same turnout last night. No one showed up, no one wanted to make comments, so we want to have a dry run tonight.

We have no elected officials in the room? No? Planning group members -- oh, I'm sorry. Judge --

JUDGE BLANCHETTE: Blanchette.

MR. HOLCOMB: I'm sorry. Judge Blanchette from Tyler County. Forgive me.

I want to go around the room and acknowledge the regional planning group members and I'll start with me. My name is Kelley Holcomb. I'm chair of Region I planning group. Duke?

MR. LYONS: Duke Lyons, City of San Augustine.

MR. HARBORDT: I'm Mike Harbordt, Region I.

MR. DAVID: Josh David, Chester, Texas.

MR. YOUNG: I'm Leon Young. I live here in Nacogdoches.

MR. CAMPBELL: George Campbell, Nacogdoches.

MR. HOLCOMB: Thank you all. I would like to remind you, if you would like to sign in so we have a record of your attendance. Again, we -- if you're planning on making a public comment, there is a comment sheet we would like you to fill out so we can have a record of what you would like to comment about. I would also like to remind you that written comments can be submitted to the planning group until June 22nd of 2010.

Rex Hunt with Alan Plummer Associates will be making a presentation in a few minutes and will give you some more information on that, on where to submit those.

We're here tonight to receive public comments, not necessarily to discuss the plan. As I alluded to a moment ago, Rex Hunt is going to be making a brief presentation. I can assure you that we're going to break with tradition since we have some students with us tonight. Jeri, I forgot to mention you, shame on me, with Lane Christian's office. We're going to break from tradition tonight and do a little bit of discussion and so forth just to help you-all understanding what we're talking about, regional planning. That is a good thing because most people do not know what we do and do not know why we're here.

So in lieu of any public comments you're wanting to make, we'll take care of those activities.

The order of events tonight are that Rex Hunt is going to give us a short presentation. We will recess this meeting tonight and we'll reconvene tomorrow night 5:30 in Beaumont, Texas to have our third in a series of three public hearings.

When we start the public comment portion of the meeting, we will basically follow a standardized process. I'll call your name, you come to the podium. When you state your name for the record, your three minute time limit will begin. We would also like you to state any organization or affiliations that you have.

Once we -- Lila will be our timekeeper, by the way. Once we start that countdown of three minutes, when you have one minute remaining, Lila will hold up a card stating that you have one minute remaining. When your time has expired, she'll hold the card time expired. We would ask that you acknowledge that and respect the process and take your seat. We'll continue on until we've taken all the public comments that are desired to be presented and then we will recess the meeting promptly at 8:30, if not sooner.

So with that, I want to introduce Rex Hunt. Rex Hunt is with Alan Plummer Associates. Alan Plummer Associates is the lead firm providing consulting services to the planning group, and he will go through a short presentation for us. Rex.

MR. HUNT: Thank you. Good evening, everybody.

I am going to give a short presentation and I think anybody that's on the water planning group could probably give this same presentation. Because as I was telling Dr. Young earlier that this -- I've only taken slides from previous presentations and brought them together, so pretty much it's all stuff that we've seen before. But for those of you who haven't been a part of this, maybe this will be not too boring.

Just a quick note on the regional water planning process. In Texas, water planning is done by region rather than at a state level. The state is divided back in -- just in the turn of the century and divided the state into 16 different regions. Region I is one of those. You can see this slightly squashed map here. I didn't adjust my thing here. It's slightly squashed.

You can see the shape of the region here in East Texas is basically everything from Tyler down to Beaumont among the eastern boundary of the State of Texas, from pretty much the Trinity River over. It includes both the Neches and Sabine watersheds in East Texas. So this region, along with the other regions, every five years does an update on their regional water plan. This is the second update, the third incarnation of the plan.

What you have with you today is the executive summary from that draft plan and a couple of other tables. The entire plan -- there's a copy of the entire plan over here if you want to see that. I've got another copy over here if you want to see it afterwards. It's fairly thick. But at any rate, it's just one of the 16 plans that are coming together for the state.

Tonight I want to talk just a little bit -- give you just a brief description of the 2011 or what we call the Initially Prepared Plan or the IPP, and then talk a little bit about the updates of this plan since 2006. I want to talk about the tasks that we have remaining to be done to complete this process and then a quick schedule and milestones here for the rest of the plan.

This is what we call an off census cycle. The first plan that was done used population data from 2000 census that had just been done. Since then we've used that same data trying to update it as the -- as we could between census -- between the census taking. But it's not as good as having the real data, so at this next incarnation in the next five years, the census that we're taking now will be fairly new information and we'll update populations more in a greater way than what we've done for this plan.

This plan is just really an update. That's not to say that we haven't done a lot of work, but we have tried to minimize the amount of work in preparation for this next cycle.

There were some studies that were done prior to this -- to this process back in 2008. There was one on small systems and one on some industrial applications down in the Port Arthur area, and another study on the Toledo Bend pipeline project. And these are all special studies that have been incorporated into this update.

The plan includes ten chapters, and you can see a discussion of those in the executive summary. I'm not going to go through all of these, the names, but basically the first chapter is a description of the region, the second chapter discusses the demands, the water demands in the region, the third chapter goes into supplies that are available, and then in the fourth chapter, which is really kind of the guts of the whole plan, tries to bring the demands and the supplies together to see where the shortages are. And then we work on developing strategies to meet any shortages that we identify.

The rest of the chapters after Chapter 4 -- 5 through 8 are various discussions of different aspects, environmental issues and conservation issues and issues related to the -- whether the plan meets the regulations or not. So I'll go through those as we get to them. And then the last two chapters actually have not been done yet. The infrastructure financing and recommendation has to be completed with the survey that's being done now. And then Chapter 10 is -- is just where we gather all the information about things like this meeting tonight, the public participation process.

So as I said, Chapter 1 is the general

description of the region. What we've done is updated the descriptions of the watersheds and ground water resources in the region, updated some of the wholesale water providers and that sort of thing. We've changed -- changed a lot of numbers in this plan. It's just a process of getting everything right. There's always things that need to be changed. We've updated the maps. But there's nothing really massive about the change in Chapter 1.

Chapter 2, which was the demand. This is where we look at for the next 50 years what the water demands for the various water supply entities, cities, water supply corporations, water authorities in the region, where those -- where those demands are.

What we've done in this plan is after looking at everything, we've increased steam electric demands in Angelina County for a proposed power plant there. We added some new water user groups, what we call WUGs, water user groups in Angelina and Nacogdoches County. These are small systems. They were there before, but they have to be a certain size before we actually start identifying them individually. So these are ones that have grown.

We've changed the manufacturing demands for Angelina County and Jefferson County. We've reduced irrigation demands for Hardin and Jefferson Counties. In other words, we found after talking to some of the water providers in these regions that they weren't providing as much irrigation water in these two counties as we thought they were, so we made those adjustments. And then we've added or increased new -- or provided new mining demands for Angelina, Cherokee, Nacogdoches, Shelby and San Augustine counties.

These are primarily -- these new demands for mining are primarily associated with the natural gas drilling that's going on in East Texas. The shale -- I don't know the name of the shale, but there's a shale formation here that they are using water to fracture the formation, so we've added some demands in these counties to account for that.

Chapter 3, this is where we look at the supplies, the surface water supplies and the ground water supplies in the region. The handout that you have has some graphs that show some of the -- has a summary of all the ground water and surface water supplies in the region. We've updated those numbers.

We've assessed impacts of water quality on these supplies in the region. We've discussed the affects of environmental flow policies. And I can go into that in more detail later. We're starting to have to look at environmental flows, the flow that's left in the river, in more detail now. And we've refind the ground water availability based on water quality and geographic restrictions in the region.

Chapter 4, again, this is where we bring the demands and the supplies together. You look at who's got water and who doesn't have water over the next 50 years. And where there are shortages, we've tried to identify water management strategies that will meet those shortages. In other words, in 2030 if a particular town shows that they're going to start having a shortage in water in that period, we start looking at, well, maybe they could drill another well, maybe they could bring in some surface water from somebody else, maybe they could purchase water from a larger city. Those are different water management strategies. So this is where we bring those together.

Haven't been a lot of changes in that in this update, but we did identify 68 water user groups that have needs. We have a total shortage in 2060 of approximately -- well, not quite 180,000 acre feet per year. That's scattered throughout the region. And we found some new mining shortages now that we've identified some new mining demands, and some water user groups that no longer have needs were identified, and we took those off as far as having shortages.

Just a word on this 180,000 acre feet of shortage. That sounds like a lot of water. It is a lot of water. But I was at a meeting with Region H, which is the Houston area, and their shortages are huge compared to here, so I think this region is very fortunate in the amount of water that it has.

Some other changes to Chapter 4. We've updated a list of water management strategies under each category. We've removed a -- some reuse opportunities in Athens because they've decided they're not going to do that. And we've added -- we said we added Fastill two new reservoirs. I probably should have taken that off because Fastill probably will be coming out of the picture here. So that's one of the things that we have added in there right now.

And then other changes. The cost of water management strategies were updated. We have to do costs for all these water management strategies. So we updated it to September 2008, the cost levels, and provided new strategies for water user groups with needs and developed new strategies for what we call wholesale water providers. And those are typically large providers that provided water to other cities or other industries or entities on a wholesale basis.

Chapter 5 -- as I said, after Chapter 4 we get into some of the more specifics of the plan. Chapter 5 talks about the impact of water management strategies and water quality and impacts of moving water from rural areas into urban uses. And not many changes in this chapter. We've expanded the discussion of some of these impacts on water quality, provided some new tabular information and updated descriptions of these impacts of moving water from rural areas.

In East Texas, there's a lot of water. There's not a lot of impacts that we've seen from moving water from agricultural uses into urban areas. That typically is a problem -- gets to be more of a problem in the dryer areas.

Chapter 6 has to do with water conservation. Water conservation is an important concept in making sure that we have enough water. It's not the only thing we do, but it is -- it is an important strategy for insuring a sufficient amount of water. So this chapter talks about water conservation that's being done in this region.

We've updated the water users that are required to submit water conservation and drought contingency plans. That's a requirement pretty much of all the water user groups in this region.

We've updated conservation strategies. We have to do a tabulation of the different strategies that are being used. We have to do a tabulation of the triggers for drought contingency. In other words, a trigger is what causes you to go into a particular drought contingency. You know, when they tell you to quit watering your lawn because it's dry, those are different triggers that happened. So we had to update those in the plan. And we included the results of this special study concerning water conservation trends in the -- that ETRWPA -- that stands for East Texas Regional Water Planning Area.

Chapter 7 is just the chapter where we look at how the plan is consistent with the protection of water resources in the state. There are several issues that we have to look at. There's very few changes in this chapter from the 2006 plan. We've just updated the text. We've looked at modifying regulations to make sure that we're still in compliance with the new changes to the regulations. And so that's pretty much all we did in this chapter.

Chapter 8 has really three things it looks at. One issue, the extreme segments; another issue, unique reservoir sites; and the third is legislative recommendations that we end up sending to the state representatives for them to consider.

The Regional Water Planning Group elected to not identify any unique stream segments in the region in this round and made no recommendations for new unique reservoir sites either, so that's pretty much as it was in the last plan, so we've made no real changes there.

We also updated and provided new legislative recommendations bringing those forward. We used some of the ones from last time that haven't been acted on but had a few additional ones from the -- since the previous plans. And I think that those are all summarized in the handout as well.

Chapter 9 is the infrastructure financing report. What we're doing now is we're preparing to do a survey of the water users in this -- in this area to see what kind of financing they are intending to use, what kind of financing needs they have in the next -- in the planning horizon. And this survey will be used to bring back into Chapter 9 to summarize these issues related to financing.

This is important for the water development board because they provide a lot of the money that is out there to help make improvements to water systems. And so this is important information for them.

And so that chapter, obviously, can't be finalized at this point. It will be done during this process of finalizing this draft plan.

And, finally, as I said, Chapter 10 is just a compilation of all the public input. We will summarize all of the public comments. If you were to make comments tonight, those would be summarized and responded to in the plan. If you make written comments or if I get written comments from anybody, we will respond to every comment that comes in and try to consider those comments and how they might affect the plan. And we will bring all that back to the Regional Water Planning Group for their consideration as well.

So the remaining tasks, as I said, is this infrastructure financing survey and to receive public comments from citizens, from agencies, such as other cities and other water user groups, and from other state agencies as well, and also comments from the water development board. Lann said there was nothing wrong with it. And we will -- as I said, we'll include all these responses in Chapter 10.

Just some dates here. The public comment period for citizens to comment, the period lasts from March 15th through June 22nd. The water development board will be commenting through the end of June or almost the end of June. Other public agencies have until July 14th to comment. And so we'll bring all of these written comments together.

And in July and August we will be working with our technical committee, and Dr. Harbordt here is the chairman of the technical committee for the Regional Water Planning Group. We will be working with them to work out, you know, what changes we might need to make to the draft plan to respond to these comments.

And then we will finalize the plan during July and August. On August 12th, the Regional Water Planning Group will meet and hopefully adopt the plan. If they don't, I don't know what I'm going to do. And then by -- we will make any final changes. And on September 1st, we intend to submit this plan to the water development board for their final review and finishing up.

So with that, it's public comment time. If any of you have decided you would like to make comments, you're welcome to do so. It's your turn.

MR. HOLCOMB: Thank you, Rex.

At this time I'd like to enter into our public comment portion of the meeting. Because we're a small crowd and you're all over here, if you have -- does anyone have any public comments that they would like to enter into the record? No? Okay.

JUDGE BLANCHETTE: How about questions?

MR. HOLCOMB: No, sir. The public comment period is to receive comments from the general public. What we will do is we are now going to take a very long break and we will go into a one-on-one where we'll be happy to answer any questions that you might have. Thank you.

(Recess from 6:18 to 7:02.)

MR. HOLCOMB: It's 7:00. I'm going to call the meeting back to order, the public hearing back to order.

We have last call for public comments. Last call for public comments. Hearing none, I'll declare this meeting recessed. We'll reconvene this meeting tomorrow night 5:30 at the Beaumont Convention Center in Beaumont.

Thank you. You-all have a nice night.

(End of Proceedings.)

THE STATE OF TEXAS

COUNTY OF NACOGDOCHES

I, Liesa Kliman, Certified Shorthand Reporter in and for the State of Texas, do hereby certify that the above and foregoing contains a true and correct transcription of my shorthand notes taken during the Public Hearing on April 21, 2010.

WITNESS my hand on this 30th day of April, 2010.

Liesa Kliman

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EAST TEXAS REGIONAL WATER PLANNING GROUP

PUBLIC COMMENTS HEARING

REGION I

APRIL 22, 2010

BEAUMONT, TEXAS

REPORTED BY:

Cristy Burnett, CSR, RPR
Certificate No. 3568
Orange County Courthouse
801 W. Division
Orange, Texas 77630
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COPY

(APRIL 22, 2010 - 5:32 P.M.)

MR. HOLCOMB: Good afternoon -- evening. Glad to be here in Beaumont tonight. I would like to go ahead and call this public hearing to order at 5:32. I want to thank you all for coming. We are here tonight to receive comments -- public comments on our 2010 Draft Region I Water Plan. I did not have any elected officials, that I know of, that came into the room.

Again, it's a small crowd. So, I'm going to deviate just a little bit. I want to introduce everybody in the room and have you introduce yourself. We've got several planning group members here tonight. We'll start with him, Scott Hall. Stand up. Everybody knows you. I know they all know you already. Thank you.

Darla Smith. Thanks, Darla.

And myself.

MR. HARREL: Let's have what these people do when they introduce themselves. It don't do much good just to get a name.

MR. HOLCOMB: Scott Hall and Darla, both, are members of the Region I Planning Group. Scott's the general manager for the Neches Valley Authority and Darla works for --

MS. SMITH: Chemical plant.

MR. HARREL: Which one?
MS. SMITH: Does it matter?
MR. HARREL: Yes.
MS. SMITH: Why?
MS. HARREL: I just want to know.
MS. SMITH: BASF. I'm just giving you a hard time.
MR. HOLCOMB: Represents Industry for the planning group.
MS. SMITH: I represent everybody.
MR. HOLCOMB: So, we also have members of the Texas Water Development Board here tonight, Lann Bookout, who is our representative, our -- Texas Water Development Board. We also have Temple McKinnon from the Texas Water Development Board. And we also have Terry Stelly. Terry is with Texas Parks & Wildlife. Everybody knows him, as well.

I also want to introduce Rex Hunt. Rex Hunt is the principal for Alan Plummer Associates. Alan Plummer Associates does the work -- the bulk of the work for the Region I Planning Group.

We also have Lila Fuller. Lila Fuller works for the City of Nacogdoches, and she represents our administration with regard to the planning group. She takes care of making sure we all get to where we need to go, when we need to be there, and has the right information upon our arrival.

With that being said, I would like to remind everybody to sign in. I know most of you have. It's a small crowd tonight. If you do wish to make a public comment, we have a form that we would like you to fill out. We only have one comment at this time -- or one individual wishing to make a public comment at this time. We will be receiving public comments, written public comments through June 22nd of this year when Rex goes through his presentation. He will have an address for you to send those written comments in to.

Also, we would look to remind everyone that we're here to receive public comments tonight. This is our opportunity to hear from you. It's not a question and answer type event, and that we will be following the standardized three-minute rule for public comments. When we get to that portion of the event, I'll call your name. Once you come up to the microphone in the middle, you'll have three minutes. State your name for the court reporter so we can get that on the official record. State your affiliation, organization affiliation, if you have one. When you are down to one minute remaining, Lila Fuller will hold up a card, "one minute remaining." When your time expires, she'll hold up a card, "time expired." We would ask you to respect that process and move on and allow other individuals to make their comments.

With that being said, we're going to move on. We're going to have a short presentation from Rex Hunt regarding a brief overview of the water plan. And then we'll move into the public comment portion of the hearing. Rex?

MR. HUNT: I'm going to operate from over here. Every place we've gone, the facilities have gotten better with each night; but each one you have to do a little bit differently. So, this one I get to do it from here. And Lila has promised she'll hold up the "time expired" if I go too long. So, I have -- hopefully she'll give me more than three minutes, but it shouldn't take too much longer.

I think that most people here are quite familiar with the planning process, but some of you aren't. So, what I'm going to do tonight is a brief overview of this process that we've gone through, primarily pointing to some of the changes we've made in the plans since the last time. And then, as Kelley was saying, comments are welcome.

We do have this handout that I think most of you have gotten, which is the executive summary of the plan. There is one copy of the plan outside on the table if you want to look at that. And there's also on the East Texas Regional Planning web site there's a copy of the plan if you want to look at it electronically.

The agenda for tonight, we're going to talk about -- I'm going to give, as I said, a brief description of what we call the 2011 Initially Prepared Plan, that's region water planning speak for draft plan, and the updates to that plan since 2006, which is the last time we did that. And then we'll talk about the remaining tasks that we have left to do this plan -- planning process and then the plan development schedule and milestones that are coming up.

Before I launch into this too much, let me just say briefly that the planning process in Texas, the water planning process in Texas is a regional process now. It used to be done at a state level, but they've now broken the state into regions. And one of those regions -- let me back up here. You can see this map of East Texas, basically; and that red line encompasses the Region I. It's 20 some-odd counties and it covers basically the eastern boundary of Texas over to pretty much the Trinity River. So, that includes obviously the Neches River Basin and the Lower Sabine River Basin, as well.

This 2011 update is -- it's the third incarnation of this plan. It's the second revision of the original plan that was done ten years ago. It's what we call an off-census site. In other words, we are taking this census data from 2000 and without really making a lot of changes to it -- obviously, we don't have any new data yet. They have just done the census. So, we have done the basic update through the Texas database -- population database but nothing more than that for the population changes. That's caused a few problems with people because there's obviously some cities out there who think that their population is different, probably is, than what the State shows. But we're not going to try to address all of those problems until this next cycle.

The planning horizon we're looking at is 2010 through 2060, a 50-year planning horizon. And in this cycle -- this off-census cycle, the changes were intended to be limited to some basic updating of water management strategies and demands and supplies and that sort of thing. There are ten chapters in this plan, and I'm going to briefly go through each one of them and talk about the changes.

The first chapter is a description of the region. It provides just the general physical and economic description of this East Texas region as it is today. It talks about groundwater and surface water.

Chapter 2 is the population and water demand projections. This is where we talk about what the demands in the region are for water from cities, from water supply corporations, from wholesale water providers. People who need water out there, we get these demands put into this chapter.

For municipal demands it's based on the population projections; but then there's other categories of water usage, as well, industrial and -- industrial irrigation and so on and so forth.

Chapter 3 is the chapter where we look at the supplies in the region, groundwater and surface water supplies.

Chapter 4 is where we take those supplies and demands that we looked at in Chapters 2 and 3 and we marry those together and come up with what the shortages are in the region. And there are shortages in the region. There's a lot of water in the East Texas region; but in any particular location, there will be shortages. And if you look at this handout that you've got, there's a graph in there that does a pretty good job of showing out the region overall has plenty of water but not all of that water is developed yet so that there are shortages in particular places.

So, those first four chapters are really the guts of this plan. The Chapters 5 through 10 provide important information, but they are ancillary issues to the overall planning process.

Chapter 5 is where we look at the impact of water management strategies and water quality and the impacts of moving water from rural areas into urban areas.

Chapter 6 we look at water conservation throughout management strategies in the region. Every entity in the region of any size has to have a water management or a conservation plan and a drought management plan. So, we look at what those plans are in this chapter.

Chapter 7 is where we review the plan that we put together and determine its consistency with protecting the natural resources in the State -- or the region, anyhow, and its consistency of the plan with the regulations.

Chapter 8 we look at extreme segments, unique reservoir sites, and then legislative recommendations that the Region Water Planning Group would like to make for the Legislature to consider in the interim before the next planning site.

Chapter 9 is the chapter we call infrastructure financing recommendations and it's -- all of this water planning -- all of this implementation of water management strategies costs money; and so, this infrastructure financing chapter, we go out to the various cities and try to determine what kind of financing needs they have. And that's all information that goes back to the Board and they use that to help them make their plans for financing in the future.

And then finally Chapter 10 is just a compilation of all the public input that we have that -- you folks that are here that make comments, all of those comments get put into this plan and responded to, written comments will get put into the plan. So, this chapter just kind of describes that process and describes our responses to comments.

So, going through the -- briefly through the chapters: Chapter 1, Description. We really have just updated the description of the region. We changed some numbers for supplies where we needed to. We've updated the maps, tried to improve on those a little bit and we've included information that -- compiled by the Water Development Board from their water moss pods that they do periodically.

Chapter 2, again, this is the demand chapter.

In this region, in this cycle, we've increased steam-electric demands in Angelina County on the basis of a proposed power plant in that region -- in that county. We've added water user groups -- that's the WUGs there -- in Angelina and Nacogdoches County. Now, these are water user groups. They were there before, but they've grown large enough to actually be named specifically. We've made changes to manufacturing demands in Angelina and Jefferson County -- increases, in fact.

We've reduced irrigation demands for Hardin and Jefferson County on the basis of new information and we've increased mining demands -- or added new mining demands for Angelina, Cherokee, Nacogdoches, Shelby and San Augustine counties. This mining demand increases -- associated with the natural gas -- primarily associated with the natural gas drilling that's going on in East Texas. The shale formation drilling requires water for fracturing the formation; and so, we've added some demands in there that we expect to occur within these counties in the coming next decade or two.

Chapter 3, we've -- again, the supply chapter. This is where we look at groundwater and surface water supplies that are existing. We've updated water supply volumes for surface water and groundwater, the wholesale water providers and local supplies and reuse categories of water supplies.

We've also assessed the impact of water quality on supplies; and that gets translated into one of the later chapters, as well. And we've discussed the effects of environmental flow policies. The last round is Senate Bill 3. I had a lengthy requirement for looking at environmental flows; and so, while the recommendations have come from late -- too late to incorporate into this plan, we've tried to acknowledge that process here. And then we've refined groundwater availability based on water quality and geographic restrictions in the region.

Chapter 4 began to marry the supplies and demands and tried to come up with where the shortages are. We also -- once we've identified shortages in this chapter, we developed water management strategies to meet those shortages. So, we've updated water shortages. Again, there are water shortages in the region. There's 68 water user groups in the region that leads total shortage by 2060, that's about 180,000 acre-feet per year. That sounds like a lot. It is a lot, but it is a lot less than most other -- many of the other regions that are out there. We've identified some new mining shortages for mining -- the mining category.

We've updated costs for all the water management strategies. That's one of the things we have to do is to prepare a cost -- a cost analysis for these strategies. And so, we've updated this cost to new numbers, to more recent inflation factors. And we've developed new strategies for these water user groups with needs where we needed to do that. There's been a few out there. And then we've developed new strategies for the wholesale water providers where we needed to do so.

Chapter 5, that, again, is the chapter where we talk about the impacts of water management strategies and water quality and the impacts of moving water from agricultural areas into urban areas. Very little changes here as far as water quality issues because the basic water management strategies didn't change just a whole lot, but we did update that a little bit. As far as moving water from agricultural areas to urban areas, in this region we found it's not really much of an issue. There's plenty of water out there for irrigation, and it continues. So, while some water does get moved into urban areas, it's not going to impact any agriculture at this point and not expected to.

Chapter 6 is water conservation. We updated the list of water user groups that are required to submit conservation and drought contingency plans. We've updated those strategies in the plans, and we've updated the triggers. When you have a drought contingency plan, you know, if you -- if your water provider tells you you can't water in the afternoons, that's based on a drought trigger, a certain amount of drought and you have to start restricting your water use. So, we have to update what those triggers are that the water user groups have established.

Chapter 7, again, this is the consistency of the plan with protection of resources in the state and consistency with regulations. Almost no changes to this chapter other than we went back and reviewed everything. There are a few new regulations out there. So, we had to update the regulations and then make sure they are consistent with that.

Chapter 8 is the ecologically -- the unique stream segments. The region elected -- or the Regional Water Planning Group elected to not recommend any stream segments as unique this time, this round. They also chose not to recommend any sites as unique reservoir sites. So, both of those issues were tabled at this point.

And then as far as legislative recommendations, we've brought forward some of the recommendations from the last plan that had not been acted on and added some new ones in there and the recommendation -- the recommended -- the recommendations to the Legislature are listed in the -- in the handout in that executive summary.

Chapter 9 has not been done yet. We have to do this chapter during this process of review of the plan. So, what we will be doing is sending a survey out to the various water user groups that have needs and asking what their expectations for financing are. The survey says it will be ready approximately March 1st. I know it was ready, but I'm not sure that we've been able to fully get it out yet. So, we will be getting that out pretty soon. And then once that survey is completed, we can complete this chapter.

And then, finally, Chapter 10, again, we will be summarizing your comments and putting them into this plan and then responding to each and every one of the comments that comes through.

Dates, June 22nd -- as Kelley indicated, June 22nd is the end of the public comment period. The Water Development Board has basically until June 29th to comment on the plan. I'm sure they will make that deadline.

And July 14th, other agencies such as the cities -- the city and state agencies and that sort of other agencies have until July 14th to complete their comments. So, during July and August, we will be preparing responses to each of the comments that we receive, updating the plan as we need to based on those comments and getting it ready for this August 12th meeting of the East Texas Regional Water Planning Group where it is my hope that they will adopt the final plan so that I can take a vacation.

And then on September 1st -- we will spend the rest of August finalizing anything we need to on the plan and then submitting it to the Water Development Board on September 1st.

That's pretty much it. Kelley, back to you.

MR. HOLCOMB: Thanks, Rex. Rex, I mentioned earlier about an address of where to send public written comments to.

MR. HUNT: The address is on the bottom of the comment form, and it's also -- it's on the notice, I'm sure, right?

And so, the notice is on the East Texas Water Planning Group web site, if they want to go to that; but the address is on the bottom of this comment form.

MR. STELLY: How about e-mail? Do you take e-mail?

MR. HUNT: I will take any sort of written comments or e-mails, if you want to send me an e-mail; but I do need something in writing so I would know what -- how to respond.

MR. STELLY: E-mail would work?

MR. HUNT: It could be handwritten. It could be typed. It could be e-mailed, whatever you want to do.

MR. HOLCOMB: Thanks, Rex. We'll now hear the public comment portion of the public hearing. One last call for public comment requests. Are there any? Nobody else has come in the room except John Stover. John, are you going to make a comment tonight?

MR. STOVER: It's been a pretty day.

MR. HOLCOMB: All right. We do have one from Richard Harrel -- Dr. Harrell. I'm sorry. So...

MR. HARREL: My name is Richard Harrel. I'm the president of Clean Air & Water, Inc.

MR. HOLCOMB: Sir, can we get you the microphone, please?

MR. HARREL: No.

MR. HOLCOMB: Please.

MR. HARREL: Where is it?

MR. HOLCOMB: It's right behind you.

MR. HUNT: I moved it.

MR. HOLCOMB: Rex snuck it out.

MR. HARREL: My name is Richard Harrel, and I am the president of the citizen's environmental organization, Clean Air & Water, Inc. And Clean Air & Water, Inc., has been active since 1966. And Clean Air & Water, Inc., the Board of Directors, is opposed to construction of any new reservoirs in either of the drainage basins concerned. We think that construction of reservoirs, which would include -- especially Fastrill reservoir but also the old Rockland reservoir, would have untold environmental affects that would all be harmful. And so, we want to go down on the record that we are opposed to taking water from our upper basins and moving it to Houston, Dallas or the Fort Worth area. We need the water. There are shortages in this region; and we will need the water, especially during those times. That's all.

MR. HOLCOMB: Thank you, sir. The last call for public comments. Hearing none -- having none, we will adjourn the public hearing at 5:55. Thank you.

MR. HARREL: Aren't you supposed to be here until 8:30?

MR. HOLCOMB: We're going to stay here, yes, sir.

MR. HOLMES: If you stay, so are we.

Thank you.

* * * * *

REPORTER'S CERTIFICATE

THE STATE OF TEXAS)
COUNTY OF JEFFERSON)

I, Cristy Burnett, Official Court Reporter in and for the County Court At Law No. 2 of Orange County, State of Texas, do hereby certify that the above and foregoing hearing held in Beaumont, Jefferson County, Texas, contains a true and correct transcription of all portions of evidence and other proceedings requested by the East Texas Regional Water Planning Group.

WITNESS MY OFFICIAL HAND this the 12th day of May, 2010.

Cristy Burnett

Cristy Burnett, RPR, CSR No. 3568
Expiration Date: 12/31/2011
Official Court Reporter
County Court At Law No. 2
801 Division
Orange County, Texas
(409) 670-4192

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Appendix 10-C

Public Comments

Opportunities for public comment are provided throughout the regional water planning process. The public are invited to provide comments at regularly scheduled meetings of the ETRWPG. Comments may be received in person, as well as in the form of letters, emails, or by telephone. During an official comment period, comments regarding the IPP were received from entities or individuals. This appendix includes copies of all written comments, and a transcript of one oral comment. Chapter 10, Section 4 includes responses to all comments received during the 2011 IPP comment period.

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EAST TEXAS
Regional Water Planning Group
Region I WPG

PUBLIC COMMENT REQUEST FORM
East Texas Regional Water Planning Area

I would like to offer public comments during the public comment sessions on April 20, 21 and 22, 2010.

My comments will be (check one or both) X delivered in person ____written and submitted.

Name: Richard C Harrel

Title: Citizen

Entity/Organization Represented: Clean Air + Water, Inc

Mailing Address: 750 Wade
Beaumont, TX 97706

Telephone: 409 892-4764 **Email:** ———

Hearing you are attending (check): ________ **Jacksonville, TX (April 20)**

________ **Nacogdoches, TX (April 21)**

X **Beaumont, TX (April 22)**

My comments are regarding:

Please use additional pages or the back of this page for additional comments. If you choose to mail your comments, please mail to: Rex H. Hunt, P.E., Alan Plummer Associates, Inc., 6300 La Calma, Suite 400, Austin, TX 78752 or to rhunt@apaienv.com.

EAST TEXAS REGIONAL WATER PLANNING AREA (REGION I)
PUBLIC COMMENTS HEARING ON THE 2011 INTIALLY PREPARED PLAN
APRIL 22, 2010
BEAUMONT, TEXAS

The following is an excerpt of the transcript from the April 22, 2010 public hearing in Beaumont, Texas. Oral comment provided by Richard Harrel, President of Clean Air and Water, Inc.

"My name is Richard Harrel, and I am the president of the citizen's environmental organization, Clean Air & Water, Inc. And Clean Air & Water, Inc., has been active since 1966. And Clean Air & Water, Inc., the Board of Directors, is opposed to construction of any new reservoirs in either of the drainage basins concerned. We think that construction of reservoirs, which would include – especially Fastrill reservoir but also the old Rockland reservoir, would have untold environmental affects that would all be harmful. And so, we want to go down on the record that we are opposed to taking water from our upper basins and moving it to Houston, Dallas or the Fort Worth area. We need the water. There are shortages in this region; and we will need the water, especially during those times. That's all."

Q
002

EAST TEXAS
Regional Water Planning Group
Region I WPG

PUBLIC COMMENT REQUEST FORM
East Texas Regional Water Planning Area

I would like to offer public comments during the public comment sessions on April 20, 21 and 22, 2010.

My comments will be (check one or both) _____ delivered in person ✓ written and submitted.

Name: Bruce Drury

Title: Pres. Big Thicket Association

Entity/Organization Represented: BTA

Mailing Address: 3555 Long
Beaumont, TX 77706

Telephone: 409 892 9108 **Email:** bdrury@gt.rr.com

Hearing you are attending (check): ___________ **Jacksonville, TX (April 20)**

___________ **Nacogdoches, TX (April 21)**

✓ **Beaumont, TX (April 22)**

My comments are regarding:

Strike the provisions for Fastrill & Rockland. Impoundment of the Neches will do great harm to the floodplain — the core of the Big Thicket

Please use additional pages or the back of this page for additional comments. If you choose to mail your comments, please mail to: Rex H. Hunt, P.E., Alan Plummer Associates, Inc., 6300 La Calma, Suite 400, Austin, TX 78752 or to rhunt@apaienv.com.

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EAST TEXAS
Regional Water Planning Group
Region I WPG

PUBLIC COMMENT REQUEST FORM
East Texas Regional Water Planning Area

I would like to offer public comments during the public comment sessions on April 20, 21 and 22, 2010 or through the end of the public comment period to June 22, 2010.

Name: Fred Manhart

Title: Manager, Environmental Support

Entity/Organization Represented: Entergy Texas, Inc.

Mailing Address: 10055 Grogans Mill Road, Suite 4B
The Woodlands, TX 77380

Telephone: (281) 297-3304 **Email:** fmanhar@entergy.com

My comments are regarding: Please see attached in re: Regional Water Planning Group IPP-2011 Water Plan

Please use additional pages or the back of this page for additional comments. If you choose to mail your comments, please mail to: Rex H. Hunt, P.E., Alan Plummer Associates, Inc., 6300 La Calma, Suite 400, Austin, TX 78752 or to rhunt@apaienv.com.

Entergy®

Fossil Operations
Entergy Services, Inc.
10055 Grogans Mill Road
Parkwood Two, Suite 4B
The Woodlands, TX 77380
Tel. 281-297-3304
Fax 281-297-3251

Fred Manhart
Manager
Environmental Support

Via Courier: Fed Ex #7936 4612 1771

June 17, 2010

East Texas Regional Water Planning Group
Region I WGP
c/o Rex H. Hunt, P.E. rhunt@apainv.com
Alan Plummer Associates, Inc.
6300 La Calma
Suite 400
Austin, Texas 78752

RE: Comments to the Regional Water Planning Group IPP-2011 Water Plan

Dear Mr. Hunt:

In accordance with the public comment provisions of the Texas Administrative Code and as allowed by the Initially Prepared Plan (IPP) for the East Texas Regional Water Planning Group (ETRWPA), Entergy Texas, Inc. hereby respectfully submits its comments for Region I's consideration.

Entergy Texas, Inc. (ETI) is an investor owned public utility providing generation, transmission and distribution electric utility service to residential, commercial and industrial customers in southeast Texas. As a regulated electric utility company, ETI is subject to the regulations of the Public Utility Commission of Texas.

While reserving the right to submit additional comments to the IPP at a future date, ETI submits at this time its comment to Executive Summary Section 8.3 (ES.8.3) as found on ES-20. In the first bullet found on ES-20, the ETRWPG "...encourages all areas in the ETRWPG not presently a part of a Groundwater Management District to either create one or join an existing district."

ETI is concerned with this recommendation and its "one-size-fits-all approach". Region I covers a twenty county area that is very diverse in its accessibility to and use of its water resources. Several of the counties within the ETRWPG already are members of groundwater conservation districts. To the extent that some of the counties are not members of groundwater conservation districts, one must conclude that the individual counties have determined that such are not necessary or desired.

While ETI fully supports the protection of all natural resources, including groundwater resources, ETI believes that individual areas should be responsible for selecting the methods by which the area is best able to address the existing and future use of its resources and the protection of those natural resources. Whether the protection of groundwater resources is left in the hands of the individual residents within the area or submitted to the auspices of a groundwater conservation district, the means by which the local area chooses to protect its resources, particularly those that do not fall within the ETRWPG, should be left to the local area's choosing.

ETI greatly appreciates this opportunity to provide these comments and is willing to discuss in greater detail the information contained herein.

Sincerely,

Fred Manhart

Fred Manhart

Cc: East Texas Regional Water Planning Group, Region I Fed Ex #
Attn. Mr. Kelley Holcomb, Chairman 7987 6883 5835
P.O. Box 635030
Nacogdoches, TX 75963-5030

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KNOWLEDGE • SERVICE • ANSWERS

107 W. Lufkin Avenue, Suite 200
P.O. Box 151508
Lufkin, Texas 75915-1508
T 936.637.6061 F 936.637.6239 www.ksaeng.com

KSA ENGINEERS

June 21, 2010

Rex H. Hunt, P.E.
Alan Plummer and Associates, Inc.
6300 La Calma, Suite 400
Austin, Texas 78752

Re: Region I 2011 IPP Comments:

Dear Mr. Hunt:

I represent the City of Woodville as a consultant engineer for their water supply. Due to his absence and that comments are due tomorrow, I have been asked by Chuck Comte, City Administrator, to comment on the Region I IPP. The City of Woodville is in need of a new water well. However, the Region I IPP does not identify the need for the well. This is due primarily to the plan not including 2, 1500 bed prisons in its water demand. The demand also is a yearly demand which is an average daily demand. Although this is what the aquifer sees, TCEQ regulations require that well capacity meet maximum day demands or 0.6 gpm per tap equivalent. According to TCEQ regulation 290.38(41), if there is a lack of verifiable historical data, this maximum day factor should be 2.4. When this factor is applied to the average daily demands it will exceed their well production capabilities. Therefore, we disagree with the projected water demands and request that the plan be changed to more accurately reflect our water demand and our need for a new well in the Jasper aquifer.

Also, the East Texas Electric Cooperative (ETEC) is currently planning to construct a bio-mass power plant south of Woodville in Tyler County. ETEC will need 920,000 gpd or 1040 ac-ft/year of water. The current plan is to provide most of that need with effluent reuse from the city's wastewater treatment plant. An additional supply will be two new water wells to be drilled by ETEC in the Jasper aquifer. Currently the Region I IPP does not include any demands for power production in Tyler County. The City requests that the Region I Plan be revised to include this power production demand in Tyler County.

If you have any questions, please contact me or Chuck Comte, City Administrator of Woodville.

Sincerely,

Billy D. Sims

Billy D. Sims, P.E.
Senior Project Manger

Cc: Chuck Comte, City of Woodville
Dan Wittliff, P.E., GDS Associates
File: WV020 Correspondence

Longview
Tyler
Lufkin
Austin
Dallas
Sugar Land

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TEXAS PARKS & WILDLIFE

Life's better outside.®

June 21, 2010

Mr. Kelley Holcomb
Angelina & Neches River Authority
P.O. Box 387
Lufkin, Texas 75902-0387

Re: 2010 East Texas Region I Initially Prepared Plan

Dear Mr. Holcomb:

Thank you for the opportunity to review and comment on the 2010 Initially Prepared Regional Water Plan (IPP) for Region I. Texas Parks and Wildlife (TPW) acknowledges the time, money and effort required to produce the regional water plan as mandated by Senate Bill 1 of the 75th Legislature. A number of positive steps have been taken since the first planning cycle to advance the issue of environmental protection. For example, the regional water planning groups are required by TAC §357.7(a)(8)(A), to perform a "quantitative reporting of environmental factors including effects on environmental water needs, wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico" when evaluating water management strategies (WMS). Quantification of environmental impacts is a critical step in planning for our state's future water needs while also protecting environmental resources.

TPW staff has reviewed the IPP with a focus on the following questions:

- Does the plan include a quantitative reporting of environmental factors including the effects on environmental water needs, and habitat?
- Does the plan include a description of natural resources and threats to natural resources due to water quantity or quality problems?
- Does the plan discuss how these threats will be addressed?
- Does the plan describe how it is consistent with long-term protection of natural resources?
- Does the plan include water conservation as a water management strategy? Reuse?
- Does the plan recommend any stream segments be nominated as ecologically unique?
- If the plan includes strategies identified in the 2006 regional water plan, does it address concerns raised by TPW at that time?

The East Texas Region I IPP includes a limited quantitative reporting of environmental factors. Appendix 4D-A presents a table entitled "Summary of Environmental Assessment" that scores different categories of environmental impact on a scale of 1-5, with 5 being the greatest impact. The acreage of habitat impacted is also included. Appendix 3-A presents the SB3 "Environmental

Flows Recommendations Report Executive Summary for the Sabine and Neches Rivers and Sabine Lake Bay Basin and Bay Area Stakeholders Committee" which includes numeric recommendations for instream and freshwater inflows.

The East Texas Region I IPP also includes a description of natural resources. Aquatic resources (Neches River, Sabine River, Neches-Trinity River Coastal Basin, Sabine Lake, aquifers, springs), terrestrial habitats (Piney Woods, Oak Woods and Prairies, Coastal Prairies, Blackland Prairies, State/federal parkland/preserves, farmland, and wetlands), natural resources (oil, natural gas, sand and gravel, lignite, salt and clay), archeological resources, endangered and threatened species, and ecologically significant streams are discussed. Several mollusk species included in Table 1-A.1 Species of Special Concern should be denoted as state threatened. These species include Texas pigtoe, Louisiana pigtoe, Texas heelsplitter, Triangle pigtoe, Sandbank pocketbook and Southern hickorynut. These species should also be included in Table 1.13.

Threats to natural resources due to water quantity or quality problems are also discussed, including aquifer depletion, saltwater intrusion and mercury contamination. Conversion from groundwater sources to surface water was suggested as a means to address aquifer depletion and saltwater contamination. It should be noted that fish consumption advisories due to mercury contamination have been issued by Texas Department of State Health Services for Village Creek in Hardin County and the Neches River in Angelina, Hardin, Houston, Jasper, Polk, Trinity and Tyler counties.

Water conservation and drought management as well as wastewater reuse were considered and evaluated as water management strategies. According to the IPP, 57% of municipal water user groups currently meet the Water Conservation Task Force goal of 140 gallons per person per day. In addition, since municipal use accounts for only about 20% of the total regional demand, expected savings from advanced conservation would be relatively small.

The East Texas Region I IPP discusses Ecologically Significant Stream Segments. TPW notes that the plan does not recommend nomination of any stream segments as ecologically unique. TPW has identified several stream segments in the region that meet at least one of the criteria for classification as ecologically unique should the regional planning group decide to pursue nomination of an ecologically significant stream in the future.

The East Texas Region I IPP recommends Lake Columbia and Fastrill Reservoir as strategies for meeting future water needs. TPWD recognizes the value of Lake Columbia in meeting certain local water supply needs and is committed to assisting the Angelina-Neches River Authority (ANRA) in attenuating impacts to fish and wildlife from reservoir construction, as well as working with ANRA to develop compatible recreational and natural resources plans for the reservoir once constructed. Given the recent court rulings related to Fastrill Reservoir, TPWD does wonder whether that particular reservoir strategy should continue to be recommended as a viable one.

TPWD does wish to reiterate its perspective that there are other conservation alternatives that are favorable to wildlife and the environment, such as water conservation, wastewater reuse, full use of existing supplies, and good land stewardship, to name a few. Construction of off-channel reservoirs can also help to minimize wildlife impacts if reservoirs are located to minimize inundation of habitats and diversions are modified to avoid impacts to environmental flows.

Thank you for your consideration of these comments. TPW looks forward to continuing to work with the planning group to develop water supply strategies that not only meet the future water supply needs of the region but also preserve the ecological health of the region's aquatic resources. Please contact Cindy Loeffler at (512) 389-8715 if you have any questions or comments.

Sincerely,

Ross Melinchuk,
Deputy Executive Director, Natural Resources

RM:CL:ch

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006

Nacogdoches

the oldest town in Texas

By U.S. Mail and email: Rhunt@apaienv.com

June 22, 2010

Rex H. Hunt, P.E.
Alan Plummer and Associates, Inc.
6300 La Calma, Suite 400
Austin, Texas 78752

Re: Region I 2011 IPP Comments:

Dear Mr. Hunt

The City of Nacogdoches requests that Section 4C.2.7 of the Region I draft 2011 IPP be revised to more accurately reflect the alternative water management strategies that the city plans to pursue. The city's proposed revision to Section 4C.2.7 would delete Toledo Bend Reservoir as an alternate water supply for the City of Nacogdoches and replace the proposed Toledo Bend project with a proposed project from Lake Sam Rayburn as an alternate water supply. This supply should begin in 2020 and provide the same amount as Columbia, that is 8,551 ac-ft, through the planning period.

The reasons for the requested change are:

1. Sam Rayburn Reservoir is in the same watershed as Nacogdoches and is a closer source of water supply than Toledo Bend Reservoir.
2. A Sam Rayburn project is significantly less costly than a Toledo Bend project. See the attached cost estimate and map. Toledo Bend water in the IPP is very expensive at $6.29/1,000 gals. Sam Rayburn water would cost $3.39/ 1,000 gals.
3. Although Columbia is the recommended strategy, it does not currently exist and is still in the 404 permitting process. There is a chance it could not be permitted and, therefore, not constructed. Sam Rayburn Reservoir is an existing water supply project and based on Table 3.3 of the 2011 Region I IPP has unpermitted yields of 108,290 acre feet. Should Columbia not get built, the City would want to develop a water supply from Sam Rayburn Reservoir of at least as much as it would get from Lake Columbia if it were constructed. That is 8,551 ac-ft. The City would seek that amount of water right from the unpermitted yield identified in Table 3.3 of the Region I Plan or through contracting with the Corps of Engineers for the right to storage of water in the reservoir and a water rights permit for the yield provided from the contractual storage right.

To assist in making the changes, this letter transmits to you the following documents:

1. A revised section 4C.2.7 in both a clean and redline format.

2. Cost estimate for City's Lake Sam Rayburn alternative based on the methodology used in the draft IPP at **Chapter 4C, Appendix A: East Texas Region Cost Estimates.**

3. A proposed figure IV-10 showing the Sam Rayburn Reservoir alternative.

We also think the water demand projections for Nacogdoches in the draft 2011 IPP are too low. We understand that the TWDB policy is to not make changes to projections in this planning cycle but that projections will be reviewed in the next planning cycle when 2010 census data are available. We wanted to be on record as not agreeing with the projections.

The City of Nacogdoches respectfully requests approval of the changes described herein. If you have any questions, please feel free to contact me.

Sincerely,

Jim Jeffers, City Manager
City of Nacogdoches

Enclosures (4)

TEXAS WATER DEVELOPMENT BOARD

June 28, 2010

Mr. Kelley Holcomb
Chairman, East Texas Regional Water
Planning Group
c/o Angelina & Neches River Authority
P.O. Box 387
Lufkin, Texas 75902-0387

Mr. Jim Jeffers, City Manager
City of Nacogdoches
P.O. Box 635030
Nacogdoches, Texas 75963-5030

Re: Texas Water Development Board Comments for the East Texas Regional Water Planning Group (Region I) Initially Prepared Plan, Contract No. 0904830868

Dear Mr. Holcomb and Mr. Jeffers:

Texas Water Development Board (TWDB) staff completed a review of the Initially Prepared Plan (IPP) submitted by March 1, 2010 on behalf of the Region I Regional Water Planning Group. The attached comments (Attachments A and B) follow this format:

- Level 1: Comments, questions, and online planning database revisions that must be satisfactorily addressed in order to meet statutory, agency rule, and/or contract requirements; and
- Level 2: Comments and suggestions for consideration that may improve the readability and overall understanding of the regional plan.

The TWDB's statutory requirement for review of potential interregional conflicts under Title 31, Texas Administrative Code (TAC) §357.14 will not be completed until submittal and review of adopted regional water plans.

Title 31, TAC §357.11(b) requires the Regional Water Planning Group to consider timely agency and public comment. Section 357.10(a)(3) of the TAC requires the final adopted plan include summaries of all timely written and oral comments received, along with a response explaining any resulting revisions or why changes are not warranted.

Copies of TWDB's Level 1 and 2 written comments and the region's responses must be included in the final, adopted regional water plan.

If you have any questions, please do not hesitate to contact Mr. Lann Bookout of my staff at (512) 936-9439.

Sincerely,

Carolyn L. Brittin
Deputy Executive Administrator
Water Resources Planning and Information

Attachments (3)

c w/att: Mr. Rex Hunt, APAI Environmental

ATTACHMENT A

TWDB Comments on Initially Prepared 2011 Region I Regional Water Plan

LEVEL 1. Comments and questions must be satisfactorily addressed in order to meet statutory, agency rule, and/or contract requirements.

Chapter 1

1. Please describe the plan's impact to navigation. *[Title 31 Texas Administrative Code (TAC) §357.5(e)(8)]*

2. Please describe how the plan considered existing regional water plans, existing recommendations in state water plan and existing local water plans. *[31 TAC 31§357.7(a)(1)(I), (J), and (K)]*

3. Provide a list of potentially feasible water management strategies that were considered and evaluated by the planning group. *[Contract Exhibit "C" Section 11.1]*

4. Page 1-24, Figure 1.12; Page 3-15, Figure 3.5: Complete outcrop areas of minor aquifers in the region are not displayed and sub-crop areas overlap and cover the outcrop areas of younger units. Please review plan text to reflect the accurate locations. For example: In chapter 1, page 1-26, although the Yegua-Jackson aquifer is located in the southern portion of Houston county it is not shown on the map (Figure 1.12) or discussed in text. *[31 TAC §357.7(a)(1)(D)]*

Chapter 2

5. Water demand projections are not split out by river basins. Please present water demand projections by river basin for each county. *[31 TAC §357.7(a)(2)(A)(iv)]*

6. The plan does not include categories of water demands for wholesale water providers by river basins. Please present water demands for wholesale water providers by river basin. *[31 TAC §357.7(a)(2)(B)]*

Chapter 3

7. Page 3-10, Table 3.4: It appears that the Trinity County-Neches Basin-Irrigation water supply is mislabeled as "mining". Please revise if appropriate.

8. Page 3-17, Table 3.5: Water supply sources are not summarized by county and river basin. Please revise to summarize by county and river basin. *[31 TAC § 357.7(a)(4)(B) ; Contract Exhibit "D" Section 3.0]*

9. Page 3-28, second paragraph: A reference is made to "Appendix 3-B". The referenced appendix was not included in plan. Please include appendix or revise text.

10. Pages 3-29 and 3-30, Tables 3.9 and 3-10: Please revise tables to summarize water supplies by county and river basin. *[31 TAC § 357.7(a)(4)(B)]*

Chapter 4A

11. Page 4A-5, Table 4A.3: It appears that total county surplus and shortage (water need) volumes were calculated incorrectly by subtracting total [county-wide] supply from total [county-wide] demand. Please revise to reflect total county water needs as the sum of the individual needs of each water user group in the county; needs that are calculated based on each water user group's own demands and supplies. Please also delete region totals at bottom of table as this further mis-aggregates water needs (shortages) region-wide.

Chapter 4B

12. Please include a table with recommended and, if applicable, alternative water management strategies with project capital costs and water supply by decade. *[31 TAC §357.7(a)(7)(H); Contract Exhibit "C" Sections 4.3, 11.1]*

Chapter 4C

13. Please explain how the region considered emergency transfers of non-municipal use surface water without causing unreasonable damage to the property of the non-municipal water rights holder pursuant to Texas Water Code §11.139. *[TAC 31 §357.5(i)]*

14. P lease describe how alternative water management strategies were evaluated using environmental criteria. *[31 TAC §358.3(b)(180]*

15. Please confirm that capital costs are based on September 2008 dollars as required, or revise as appropriate. *[Contract Exhibit "C" Section 4.1.2]*

16. In instances when conservation was considered but not recommended as a water management strategy, please indicate why conservation was not recommended. *[31 TAC §357.7(a)(4)]*

Chapter 6

17. Please include a summary of information regarding water loss audits specific to Region I. *[31 TAC § 357.7 (a)(1)(M)]*

18. Page 6-3, paragraph 3: Plan does not include a model water conservation/drought contingency plan. Please include a model water conservation/drought contingency plan. *[31 TAC §357.7(c)]*

19. Page 6-8, first paragraph: Plan does not include a model drought contingency plan from an affected water user group. Please include a model drought contingency plan for an affected water user group. *[31 TAC §357.7(d)]*

20. *(Attachment B)* Comments on the online planning database (i.e. DB12) are herein being provided in spreadsheet format. These Level 1 comments are based on a direct comparison of the online planning database against the Initially Prepared Regional Water Plan document as submitted. The table only includes numbers that do not reconcile between the plan (left side of spreadsheet) and online database (right side of spreadsheet). An electronic version of this spreadsheet will be provided upon request.

21. *(Attachment C)* Based on the information provided to date by the regional water planning groups, TWDB has also attached a summary, in spreadsheet format, of apparent unmet water needs that were identified during the review of the online planning database and Initially Prepared Regional Water Plan. *[Additional TWDB comments regarding the general conformance of the online planning database (DB12) format and content to the Guidelines for Regional Water Planning Data Deliverables (Contract Exhibit D) are being provided by TWDB staff under separate cover as 'Exception Reports']*

LEVEL 2. Comments and suggestions that might be considered to clarify or enhance the plan.

Chapter 1

1. Page 1-27, Section 1.6.1: "Springs" appears to incorrectly refer to Section 1.9.8. Please consider revising reference as appropriate (i.e. to "Section 1.9.7")

2. Page 1-42, Section 1.9: Please consider including assessment of the importance of recreational uses of natural resources (fishing, boating, etc.).

Chapter 3

3. Page 3-7: A reference is made in the "Reservoirs" paragraph to a summary of "firm yields" in Table 3.2. The Table is titled "Currently Available Supplies from Permitted Reservoirs…" Please consider clarifying in Table 3.2 that it presents firm yields, if applicable.

4. Page 3-17, Table 3.5: Please consider revising two of the table headings from "Yegua" to "Yegua-Jackson" and from "Carizzo" to "Carrizo-Wilcox."

Chapter 4C

5. Page 4C-62, table: Table is referenced in the text as "4C.A". Please consider adding the missing table number "4C.A" to the table title to be consistent with other tables.

6. Appendix 4C-A: Project cost estimates are presented in two different formats (e.g. Anderson County Other, page 4C-A-3 format vs. Hardin County-Other, page 4C-A-28 format). Please consider using a consistent format for presenting "Cost Estimate" worksheets.

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REGION I

Non-matching numbers

		IPP document reference:		IPP document number							Online Planning Database (DB12) number						
Region IPP	Item	Page number	Table number	non-decadal number	2010	2020	2030	2040	2050	2060	non-decadal number	2010	2020	2030	2040	2050	2060
I	Manufacturing Water Demands	ES-6			379,524	600,887	636,975	673,081	704,797	737,105		299,992	591,904	784,140	821,841	857,902	893,476
I	Mining Water Demands	ES-6			14,662	16,297						21,662	37,297				
I	Irrigation Water Demands	ES-6			222,846	223,163	223,517	223,899	224,321	224,786		151,100	151,417	151,771	152,153	152,575	153,040
I	Total Demands for Region	ES-6			875,189	1,143,278	1,201,998	1,263,584	1,329,909	1,405,971		730,911	1,083,549	1,277,417	1,340,598	1,411,268	1,490,596
I	City of Jacksonville 2010 Municipal Water Use	ES-7			7,546							3,502					
I	City of Tyler 2010 Municipal Water Use	ES-7			25,886							25,528					
I	HCWID No. 1 Demand	ES-7			612							NA					
I	Source of Supply - Groundwater	ES-8			442,270	442,270	442,270	442,270	442,270	442,270		446,044	446,044	446,044	446,044	446,044	446,044
I	Source of Supply - Surface Water Total	ES-8										3,638,252	3,634,066	3,629,882	3,625,695	3,617,323	3,621,509
I	Source of Supply - Indirect Reuse	ES-8			13,687	13,687	13,687	13,687	13,687	13,687		18,111	18,126	18,139	18,152	18,177	18,163
I	Source of Supply - Direct Reuse	ES-8			253	268	281	294	305	319		18,111	18,126	18,139	18,152	18,177	18,163
I	Source of Supply - Total	ES-8			4,435,454	4,422,273	4,409,085	4,395,898	4,382,708	4,369,516		4,102,407	4,098,236	4,094,065	4,089,891	4,081,544	4,085,716
I	Anderson Co. Shortages	ES-11			4,229	-7,509	-9,689	-12,285	-15,429	-19,219		-18	-11328	-13269	-15653	-18556	-22158
I	Angelina Co. Shortages	ES-11			-4,993	-17,313	-17,671	-22,429	-27,748	-34,118		-9383	-20806	-20557	-24836	-29598	-35451
I	Cherokee Co. Shortages	ES-11			4,790	3,374	4,595	4,393	4,065	3,532		-490	-1494	-40	-118	-233	-379
I	Hardin Co. Shortages	ES-11			-5,081	-6,418	-7,121	-7,831	-8,646	-9,435		-8955	-9931	-10540	-11148	-11790	-12317
I	Henderson Co. (P) Shortages	ES-11			676	232	-190	-607	-1,154	-1,849		-75	-297	-636	-955	-1361	-1847
I	Houston Co. Shortages	ES-11			1,988	1,512	949	346	-363	-1,178		-642	-883	-1396	-1953	-2567	-3239
I	Jasper Co. Shortages	ES-11			3,383	3,183	3,130	3,222	3,268	3,268		-374	-470	-488	-430	-403	-403
I	Jefferson Co. Shortages	ES-11			71,245	57,542	55,076	52,199	48,538	43,491		0	-13426	-15696	-18464	-21843	-25960
I	Nacogdoches Co. Shortages	ES-11			9,720	5,385	9,013	5,305	-6,827	-12,638		-5083	-7183	-1621	-3476	-12807	-15905
I	Newton Co. Shortages	ES-11			10,894	2,550	95	-2,931	-6,616	-11,097		-149	-264	-2713	-5734	-9382	-13805
I	Orange Co. Shortages	ES-11			19,080	13,507	6,860	111	-6,421	-13,977		-132	-5136	-10989	-16789	-22021	-27894
I	Panola Co. Shortages	ES-11			4,704	4,411	4,233	4,070	3,896	3,636		-96	-116	-132	-147	-161	-187
I	Polk Co. (P) Shortages	ES-11			290	-75	-374	-602	-773	-959		-208	-481	-742	-950	-1110	-1277
I	Rusk Co. Shortages	ES-11			26,110	23,165	18,405	12,725	5,594	-3,381		0	0	0	-30	-1561	-10000
I	Sabine Co. Shortages	ES-11			1,261	1,118	995	863	706	529		-40	-92	-147	-210	-283	-367
I	San Augustine Co. Shortages	ES-11			-1,422	-7,007	-107	-227	-383	-552		-1691	-7269	-360	-465	-588	-723
I	Shelby Co. Shortages	ES-11			927	-1,317	-1,206	-2,755	-4,637	-6,961		-1403	-3397	-3085	-4475	-6200	-8317
I	Smith Co. (P) Shortages	ES-11			17,874	15,669	13,708	11,742	8,161	3,165		-117	-317	-503	-807	-1138	-1627
I	Trinity Co. (P) Shortages	ES-11			194	160	156	139	116	91		0	0	0	-9	-32	-57
I	Tyler Co. Shortages	ES-11			2,249	1,922	1,729	1,696	1,725	1,720		0	-142	-239	-251	-232	-232
I	Regional Total Shortages	ES-11			168,118	94,091	82,586	47,144	-2,928	-55,932		-28856	-83032	-83153	-106900	-141866	-182145
I	Lake Naconiche reservoir availability	3-8	3.2		NA	NA	NA	NA	NA	NA		3,239	3,239	3,239	3,239	3,239	3,239
I	Jefferson Co. Neches Basin LNVA Supply	3-10	3.4		381,876	381,876	381,876	381,876	381,876	381,876		NA	NA	NA	NA	NA	NA
I	Jefferson Co. Neches-Trinity, Industrial Supply	3-10	3.4		680	680	680	680	680	680		1,160	1,160	1,160	1,160	1,160	1,160
I	Jefferson Co. Total supply	3-10	3.4		1,221,599	1,221,599	1,221,599	1,221,599	1,221,599	1,221,599		840,288	840,288	840,288	840,288	840,288	840,288
I	Angelina Co. Yegua Availability	3-17	3.5	4,860							6,472						
I	Orange Co. Gulf Coast Availability	3-17	3.5	20,000							20,001						
I	Trinity Co. Carrizo Availability	3-17	3.5	NA							2,161						
I	Angelina County, Yegua-Jackson Aquifer	3-17	3.5	4,860							6,472						
I	Trinity Co(P), Carrizo-Wilcox Aquifer	3-17	3.5	-							2,161						
I	Orange Co. Gulf Coast Aquifer	3-17	3.5	20,000							20,001						
I	N. Regional subtotal, Yegua-Jackson Aquifer	3-17	3.5	8,680							10,292						
I	N. Regional subtotal, Carrizo-Wilcox Aquifer	3-17	3.5	159,800							161,961						
I	S. Regional subtotal, Gulf Coast Aquifer	3-17	3.5	170,800							170,801						
I	Aquifer Totals, Yegua-Jackson Aquifer	3-17	3.5	9,220							10,832						
I	Aquifer Totals, Carrizo-Wilcox Aquifer	3-17	3.5	159,800							161,961						
I	Aquifer Totals, Gulf Coast	3-17	3.5	172,000							172,001						
I	Grand Total	3-17	3.5	442,270							446,044						
I	Hardin Co. Trinity Basin Livestock Supply	3-18	3.6	1							2						
I	Henderson Co. Neches Basin Livestock Supply	3-18	3.6	248							279						
I	Jefferson Co. Neches Basin Mining Supply	3-18	3.6	242							74						
I	Panola Co. Cypress Basin Livestock Supply	3-18	3.6	2							30						
I	Panola Co. Sabine Basin Livestock Supply	3-18	3.6	1,856							1,828						
I	Polk Co. Neches Basin Livestock Supply	3-18	3.6	202							122						
I	Smith Co. Neches Basin Livestock Supply	3-18	3.6	671							416						
I	Trinity Co. Neches Basin Livestock Supply	3-18	3.6	243							135						
I	Angelina Co. Neches Basin Direct Reuse	3-19	3.7	NA							1,265						
I	Hardin Co. Neches Basin Direct Reuse	3-19	3.7	NA							31						
I	Henderson Co. Neches Basin Indirect Reuse	3-19	3.7	NA							2,872						

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I	Jefferson Co. Neches Basin Direct Reuse	3-19	3.7	NA							3						
I	Shelby Co. Sabine Basin Direct Reuse	3-19	3.7	197							218						
I	Sabine Co. Neches Basin Direct Reuse	3-19	3.7	20							NA						
I	Anderson Co. Available Supply	3-29	3.9		17,648	17,648	17,648	17,648	17,648	17,648		17,649	17,649	17,649	17,649	17,649	17,649
I	Angelina Co. Available Supply	3-29	3.9		25,956	26,320	26,391	26,457	26,520	26,578		25,957	26,321	26,392	26,458	26,521	26,579
I	Cherokee Co. Available Supply	3-29	3.9		18,686	18,274						18,684	18,273				
I	Hardin Co. Available Supply	3-29	3.9		14,295	14,295	14,295	14,295	14,295	14,270		14,296	14,296	14,296	14,296	14,296	14,271
I	Henderson Co. Available Supply	3-29	3.9		7,367	7,246	7,128	7,020	6,911	6,811		9,509	7,890	7,705	7,538	7,365	7,205
I	Houston Co. Available Supply	3-29	3.9		10,224	10,222	10,222	10,223	10,222	10,222		10,223	10,221	10,221	10,222	10,221	10,221
I	Jasper Co. Available Supply	3-29	3.9		73,286	76,673	79,191	81,388	83,035	83,098		72,835	76,218	78,731	80,928	82,575	82,638
I	Jefferson Co. Available Supply	3-29	3.9		414,190	685,812	865,858	891,554	917,437	943,882		414,903	686,525	866,571	892,088	918,150	944,597
I	Newton Co. Available Supply	3-29	3.9		19,907	19,907	19,907	19,907	19,907	19,907		19,908	19,908	19,908	19,908	19,908	19,908
I	Orange Co. Available Supply	3-29	3.9		98,454	98,454	98,454	98,454	98,454	98,454		111,926	111,926	111,926	111,926	111,926	111,926
I	Panola Co. Available Supply	3-29	3.9		17,141	17,450	17,640	17,832	18,025	18,210		16,758	17,067	17,256	17,448	17,641	17,826
I	Rusk Co. Available Supply	3-29	3.9		60,647	60,654	60,655	60,645	60,641	60,653		60,725	60,732	60,732	60,722	60,719	60,729
I	Sabine Co. Available Supply	3-29	3.9		4,098	4,098	4,098	4,098	4,098	4,098		4,101	4,101	4,101	4,101	4,101	4,101
I	San Augustine Co. Available Supply	3-29	3.9		2,930	2,930	2,930	2,930	2,930	2,930		2,933	2,933	2,933	2,933	2,933	2,933
I	Shelby Co. Available Supply	3-29	3.9		11,431	11,443	11,457	11,470	11,482	11,495		11,430	11,445	11,458	11,471	11,482	11,496
I	Smith Co. Available Supply	3-29	3.9				58,712	58,482	58,184	57,840				58,711	58,485	58,186	57,842
I	Trinity Co. Available Supply	3-29	3.9		1,087	1,094	1,095	1,091	1,086	1,082		1,021	1,028	1,029	1,025	1,020	1,016
I	Athens MWA Supply	3-30	3.10		2,900							5,772					
I	Beaumont Supply	3-30	3.10		31,420	31,420	31,420	31,420	31,420	31,420		41,111	41,111	41,111	41,111	41,111	41,111
I	Carthage Supply	3-30	3.10		6,461	6,461	6,461	6,461	6,461	6,461		14,620	14,267	13,914	13,561	13,208	12,853
I	Houston Co. WCID 1 Supply	3-30	3.10		3500	3500	3500	3500	3500	3500		3,393	3,391	3,391	3,392	3,391	3,391
I	Lufkin Supply	3-30	3.10				11,000		11,000					11,001		11,001	
I	Motiva Enterprises Supply	3-30	3.10		NA	NA	NA	NA	NA	NA		39,825	53,467	54,046	57,125	62,705	70,783
I	Nacogdoches Supply	3-30	3.10					19,017							19,016		
I	Panola Co. FWSD-1 Supply	3-30	3.10		34,882	33,940	32,999	32,058	31,116	30,173		21,792	21,203	20,615	20,027	19,438	18,850
I	Port Arthur Supply	3-30	3.10		15,849	16,377	16,904	17,433	18,026	18,750		15,852	16,380	16,907	17,436	18,029	18,750
I	SRA Supply	3-30	3.10		1,299,942	1,297,013	1,294,085	1,291,157	1,288,228	1,285,300		1,301,815	1,298,937	1,296,054	1,293,164	1,290,254	1,287,348
I	Tyler Supply	3-30	3.10					44,696							44,997		
I	UNRMWA Supply	3-30	3.10		232,420	219,667	218,440	217,133	215,867	221,020		207,458	205,417	203,375	201,333	199,292	197,250
I	Anderson County (County-Other) Needs	4A-8	4A.5					0	0						(10)	(31)	
I	Anderson County (Mining) Needs	4A-8	4A.5		0	(19)						(18)	(22)				
I	Anderson County (Anderson County Total) Needs	4A-8	4A.5		0	(11,325)		(15,643)	(18,525)			(18)	(11,328)		(15,653)	(18,556)	
I	Angelina County (County-Other) Needs	4A-8	4A.5				(16)	(133)	(347)	(659)				(20)	(135)	(349)	(661)
I	Angelina County (Lufkin) Needs	4A-8	4A.5		(2,763)	(4,869)	(5,829)	(6,905)	(8,222)	(9,785)		(3,244)	(5,117)	(6,057)	(7,116)	(8,416)	(9,965)
I	Angelina County (Manufacturing) Needs	4A-8	4A.5		(2,509)	(10,006)	(12,523)	(15,070)	(17,365)	(19,827)		(3,117)	(10,513)	(12,983)	(15,486)	(17,739)	(20,161)
I	Angelina County (Angelina County Total) Needs	4A-8	4A.5		(8,294)	(20,051)	(19,865)	(24,207)	(29,028)	(34,935)		(9,383)	(20,806)	(20,557)	(24,836)	(29,598)	(35,451)
I	Hardin County (County-Other) Needs	4A-8	4A.5		(153)							(154)					
I	Hardin County (Hardin County Total) Needs	4A-8	4A.5		(8,954)							(8,955)					
I	Henderson County (Athens) Needs	4A-8	4A.5		(21)	(36)	(56)	(77)	(107)	(147)		0	(52)	(70)	(88)	(117)	(155)
I	Henderson County (Irrigation)Needs	4A-8	4A.5		(3)	(4)	(5)	(5)	(6)	(6)		0	0	0	0	0	0
I	Henderson County (Livestock) Needs	4A-8	4A.5		(466)	(601)	(729)	(843)	(959)	(1,066)		0	(29)	(218)	(388)	(561)	(724)
I	Henderson Co.(Henderson County Total) Needs	4A-8	4A.5		(565)	(857)	(1,138)	(1,404)	(1,755)	(2,187)		(75)	(297)	(636)	(955)	(1,361)	(1,847)
I	Houston County (Irrigation) Needs	4A-8	4A.5		(382)	(667)	(986)	(1,334)	(1,720)	(2,146)		(567)	(667)	(986)	(1,334)	(1,720)	(2,146)
I	Houston County (Manufacturing) Needs	4A-8	4A.5		0	(2)	(5)	(8)	(11)	(15)		(3)	(5)	(7)	(9)	(12)	(15)
I	Houston County (Livestock) Needs	4A-8	4A.5		(34)	(210)	(402)	(609)	(834)	(1,077)		(72)	(211)	(403)	(610)	(835)	(1,078)
I	Houston County (Houston County Total) Needs	4A-8	4A.5		(416)	(879)	(1,393)	(1,951)	(2,565)	(3,238)		(642)	(883)	(1,396)	(1,953)	(2,567)	(3,239)
I	Jasper County (County-Other) Needs	4A-8	4A.5		(309)	(405)	(423)	(365)	(338)	(338)		(374)	(470)	(488)	(430)	(403)	(403)
I	Jasper County (Jasper County Total) Needs	4A-8	4A.5		(309)	(405)	(423)	(365)	(338)	(338)		(374)	(470)	(488)	(430)	(403)	(403)
I	Jefferson County (Mining) Needs	4A-9	4A.5						(4)							(5)	
I	Jefferson County (Jefferson County Total) Needs	4A-9	4A.5						(21,842)							(21,843)	
I	Orange County (County-Other) Needs	4A-9	4A.5		(88)	(2)	0	0		0		(132)	(93)	(53)	(7)		(6)
I	Orange County (Manufacturing) Needs	4A-9	4A.5			(1,914)	(7,892)	(13,852)	(19,143)	(25,094)			(5,006)	(10,855)	(16,686)	(21,863)	(27,686)
I	Orange County (Orange County Total) Needs	4A-9	4A.5		(88)	(1,953)	(7,973)	(13,948)	(19,301)	(25,296)		(132)	(5,136)	(10,989)	(16,789)	(22,021)	(27,894)
I	Panola County (Manufacturing) Needs	4A-9	4A.5						(160)							(161)	
I	Panola County (Panola County Total) Needs	4A-9	4A.5						(160)							(161)	
I	Rusk County (Mining) Needs	4A-9	4A.5					(3)	(83)	(158)					(30)	(60)	(88)
I	Rusk County (Rusk County Total) Needs	4A-9	4A.5					(3)	(1,584)	(10,070)					(30)	(1,561)	(10,000)
I	Sabine County (County-Other) Needs	4A-9	4A.5		(11)	(23)	(30)	(38)	(47)	(62)		(3)	(12)	(18)	(24)	(31)	(43)

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Region IPP	Item	Page number	Table number	non-decadal number	2010	2020	2030	2040	2050	2060	non-decadal number	2010	2020	2030	2040	2050	2060
I	Sabine County (Livestock) Needs	4A-9	4A.5		(38)	(81)	(130)	(187)	(253)	(325)		(37)	(80)	(129)	(186)	(252)	(324)
I	Sabine County (Sabine County Total) Needs	4A-9	4A.5		(49)	(104)	(160)	(225)	(300)	(387)		(40)	(92)	(147)	(210)	(283)	(367)
I	San Augustine County (Irrigation) Needs	4A-9	4A.5		(90)	(90)	(90)	(90)	(90)	(90)		(100)	(100)	(100)	(100)	(100)	(100)
I	San Augustine County (Livestock) Needs	4A-9	4A.5		(90)	(168)	(259)	(364)	(486)	(620)		(91)	(169)	(260)	(365)	(487)	(621)
I	San Augustine Co. (San Augustine Total) Needs	4A-9	4A.5		(1,680)	(7,258)	(349)	(454)	(577)	(712)		(1,691)	(7,269)	(360)	(465)	(588)	(723)
I	Shelby County (County-Other) Needs	4A-9	4A.5		0	(57)	(120)	(132)	(173)	(242)		(126)	(190)	(244)	(253)	(288)	(344)
I	Shelby County (Shelby County Total) Needs	4A-9	4A.5		(1,277)	(3,264)	(2,961)	(4,354)	(6,085)	(8,215)		(1,403)	(3,397)	(3,085)	(4,475)	(6,200)	(8,317)
I	Smith County (Lindale Rural WSC) Needs	4A-10	4A.5							(74)							(73)
I	Smith County (Manufacturing) Needs Needs	4A-10	4A.5				(5)		(183)	(294)				(6)		(182)	(295)
I	Smith County (Smith County Total) Needs	4A-10	4A.5				(502)		(1,139)					(503)		(1,138)	
I	TOTAL Regional Shortage	4A-10	4A.5		(27,775)	(79,450)	(79,756)	(103,658)	(138,785)	(179,282)		(28,856)	(83,032)	(83,153)	(106,900)	(141,866)	(182,145)
I	ANRA Needs	4A-10	4A.6		(53,869)	(53,869)	(53,869)	(53,869)	(53,869)	(53,869)		(53,870)	(53,870)	(53,870)	(53,870)	(53,870)	(53,870)
I	Athens MWA Needs	4A-10	4A.6		(2,674)	(3,190)	(3,803)	(4,499)	(5,408)	(6,533)		0	(2,154)	(2,772)	(3,473)	(4,389)	(5,530)
I	Lufkin Needs	4A-10	4A.6		(6,354)	(14,978)	(17,725)	(20,755)	(24,249)	(28,222)		(8,294)	(16,918)	(19,664)	(22,695)	(26,188)	(30,162)
I	UNRMWA Needs	4A-10	4A.6			(4,708)			(10,808)				(4,707)			(10,807)	
I	Sabine River Authority Needs	4A-10	4A.6		NA	NA	NA	NA	NA	NA		(12,648)	(13,528)	(14,415)	(15,310)	(16,220)	(17,132)
I	Lufkin, Mfg (Angelina Co.) Redistribution WMS	4B-17	4B.13			15,800	15,800	15,800	15,800	15,800			21,351	21,351	22,651	25,351	27,351
I	LNVA, Mining (San Augustine) Redistribution WMS	4B-17	4B.13		1,000	6,500						1,500	7,000				
I	SRA, Steam-Electric (Rusk) Redistribution WMS	4B-17	4B.13						1,500	1,500						1,501	10,000
I	Carthage, Mfg (Panola) Redistribution WMS	4B-17	4B.13						160							161	
I	Tyler, Mfg (Smith) Redistribution WMS	4B-17	4B.13				294	294	294	294				6	101	183	295
I	Center, C-O (Shelby Co.) Redistribution WMS	4B-17	4B.13		50	50	50	50	50	50		150	150	150	150	150	150
I	HCWCID, Mfg (Houston Co.) Redistribution WMS	4B-17	4B.13		-	2	5	8	11	15		30	30	30	30	30	30
I	HCWCID, S-E Power (Nacogdoches Co.) Redistribution WMS	4B-17	4B.13			340	340	340	340	340			5,340	5,340	5,340	13,740	13,740
I	Livestock - Sabine Co. Expand local supp. WMS	4B-20	4B.16		-	50	50	100	200			50	100	107	200	210	
I	Livestock - San Augustine Co. Expand local supp. WMS	4B-20	4B.16			-	-	-	-				50	100	200	200	
I	Anderson County-Other WMS volume	4C-2	unnumbered					-	-						100	100	
I	Anderson Co. Mining - Carrizo-Wilcox WMS volume	4C-3	unnumbered			120	120	120	120	120		18	154	154	154	154	154
I	Angelina County Manufacturing WMS volume	4C-11	unnumbered			24,351	24,351	24,351	24,351	24,351			21,351	21,351	22,651	25,351	27,351
I	New Summerfield, Water Conservation WMS volume	4C-14	unnumbered			-							10				
I	Rusk, Alternate Strategy RU-3 WMS volume	4C-15	unnumbered					212							-		
I	Hardin County Other, HAC-1A WMS volume	4C-17	unnumbered		153							154					
I	Purchase water from Athens MWA WMS volume	4C-20	unnumbered		20	30	44	60	85	117	NA	NA	NA	NA	NA	NA	NA
I	Henderson Co. - Irrigation, Lake Athens WMS volume	4C-22	unnumbered		152	158	164	169	175	181	NA	NA	NA	NA	NA	NA	NA
I	Henderson Co. - Livestock, Fish Hatchery Reuse WMS volume	4C-22	unnumbered		-	2,872	2,872	2,872	2,872	2,872		-	1,288	1,477	1,647	1,820	1,983
I	Houston Co. Mfg, Water from Houston Co WCID WMS volume	4C-23	unnumbered		-	2	5	8	11	15		30	30	30	30	30	30
I	Houston Co. Irrig., Increase Carrizo-Wilcox WMS volume	4C-24	unnumbered		383	766	1,149	1,532	1,915	2,298		766	1,149	1,149	1,639	1,915	2,298
I	Houston Co. Livestock, Increase Carrizo-Wilcox WMS volume	4C-24	unnumbered		221	221	442	663	884	1,080		111	111	221	363	542	665
I	Jefferson County, Mining, Gulf Coast Aquifer WMS volume	4C-26	unnumbered						9							5	
I	Jefferson Co. S-E Power, Neches River WMS volume	4C-27	unnumbered						25,591	25,591						25,959	25,960
I	Nacogdoches, Swift WSC, Carrizo Wilcox WMS volume	4C-29	unnumbered					350	350	350					700	700	700
I	Sabine Co., Lvstk, Expand Surface Water Supplies WMS volume	4C-45	unnumbered		-	50	50	100	200	300		50	100	107	200	210	300
I	San Augustine Co., Irrigation, Carrizo-Wilcox WMS volume	4C-46	unnumbered		90	90	90	90	90	90		100	100	100	100	100	100
I	San Augustine Co., Mining, LNVA WMS volume	4C-48	unnumbered		1,000	6,500						1,500	7,000				
I	Smith Co., Community Water Co. City of Tyler WMS volume	4C-54	unnumbered		121							105					
I	Tyler County, County-Other, Gulf Coast Aquifer WMS volume	4C-60	unnumbered			150							251				
I	ANRA, New Run-of-River Diversions WMS volume	4C-63	Table 4C.2		750						NA	NA	NA	NA	NA	NA	NA
I	ANRA Treatment Plant and Distribution System WMS volume	4C-64	Table 4C.2	5,100							-						
I	Conservation, City of Athens WMS volume	4C-67	Table 4C.2			209	344	452	589	761		47	215	357	469	611	791
I	Forest Grove w/WTP at City WMS volume	4C-67	Table 4C.2					2,240	2,240						-	-	

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I	Conservation, Irrigation WMS volume	4C-74	Table 4C.2		20,000	30,000	33,000	35,000	40,000	40,000	NA	NA	NA	NA	NA	NA	NA
I	System Operation with Saltwater Barrier WMS volume	4C-74	Table 4C.2			55,500	55,500	55,500	55,500	55,500			111,000	111,000	111,000	111,000	111,000
I	Sediment reduction - Steinhagen WMS volume	4C-74	Table 4C.2						5,000	5,000	NA	NA	NA	NA	NA	NA	NA
I	Total Supplies from WMS	4C-74	Table 4C.2		20,000	113,500	116,500	118,500	286,500	286,500		16	139,023	139,026	139,029	297,033	297,037
I	Sam Rayburn Reservoir/Angelina County Regional Project WMS volume	4C-79	Table 4C.2					11,210	11,240	11,240					11,200	11,200	11,200
I	Lake Columbia WMS volume	4C-82	Table 4C.2						8,551	8,551						13,726	13,726
I	Permit Amendment WMS volume	4C-86	Table 4C.2		219,900	215,300	210,800	206,200	201,600	197,000	NA	NA	NA	NA	NA	NA	NA
I	Toldeo Bend Project WMS volume	4C-86	Table 4C.2						500,000	500,000						100,000	100,000
I	Lake Palestine WMS volume	4C-88	Table 4C.2		16,815	16,815						-	-				
I	AND-1: Increase Supply from Carrizo-Wilcox Total Capital Cost	4C-4	Table 4C.2	$ 228,730							$ 289,043						
I	ADS-1: Water from Lake Palestine Total Capital Cost	4C-5	Table 4C.2	$ 24,917,400							$ 24,917,413						
I	Increase Supply from Carrizo-Wilcox-Phase I & II Total Capital Cost	4C-9	Table 4C.2	$ 3,274,191							$ 3,274,19?						
I	Purchase water fro Provider (ANM-1 & ANM-2)Total Capital Cost	4C-11	Table 4C.2	$ 23,212,700							$ 26,176,750						
I	Houston County Irrigation, HOI-1 Total Capital Cost	4C-24	Table 4C.2	$ 3,205,560							$ 3,205,600						
I	Houston County Livestock, HOL-1: Increase Supply from Carrizo-Wilcox Total Capital Cost	4C-25	Table 4C.2	$ 2,671,300							$ 2,671,298						
I	JAC-2: Use of additional water from Gulf Coast Aquifer Total Capital Cost	4C-25	Table 4C.2	No Values							$ 393,088						
I	SW-1 Increase supply from Carrizo-Wilcox Total Capital Cost	4C-30	Table 4C.2	$ 498,171							$ 996,342						
I	Appleby WSC, APL-1 Lake Naconiche regional system Total Capital Cost	4C-31	Table 4C.2	No Values							$ 4,392,350						
I	Nacogdoches, County-Other, NaCo-1: Lake Naconiche regional system Total Capital Cost	4C-31	Table 4C.2	$ 4,392,350							$ 7,320,600						
I	Sabine County Other, SBC-1 Total Capital Cost	4C-44	Table 4C.2	$ 328,840							$ 445,304						
I	Sabine County Other, SBC-2 Total Capital Cost	4C-44	Table 4C.2	$ 809,000							$ -						
I	Sabine County Livestock SBL-2: Stock Ponds Total Capital Cost	4C-45	Table 4C.2	$ 562,700							$ 551,700						
I	San Augustine County Livestock, SAL-1 Stock Ponds Total Capital Cost	4C-47	Table 4C.2	$ 562,700							$ 413,800						
I	San Augustine County Livestock, SAL-2 & SAL-3 Total Capital Cost	4C-47	Table 4C.2	$ 568,710							$ 653,610						
I	Bullard, Strategy BU-1A: Increase supply from Carrizo-Wilcox Total Capital Cost	4C-54	Table 4C.2	$ 305,674							$ 305,767						
I	Athens MWA, Forest Grove water Total Capital Cost	4C-68	Table 4C.2	$ 16,575,556							$ 25,569,000						
I	Additiona Lake Athens/ New WTP Total Capital Cost	4C-68	Table 4C.2	$ 5,943,300							$ 12,387,000						
I	LNVA-1 to LNVA-5 Total Capital Cost	4C-75	Table 4C.2	Multiple values							NA						
I	New Groundwater Total Capital Cost	4C-80	Table 4C.2	$ 14,097,000							$ -						
I	Lake Columbia/ Purchase Water from Provider Total Capital Cost	4C-83	Table 4C.2	$ 37,282,000							$ 151,701,031						
I	Angelina Co , Other, Phase 1, New Wells in Yegua-Jackson Aquifer Total Capital Cost	4C-A-8	Appendix 4C-A	$158,947							NA						
I	Hudson, Phase 1, New Wells in Carrizo -Wilcox Total Capital Cost	4C-A-14	Appendix 4C-A	$429,568							NA						
I	Rusk Co. Mining Total Capital Cost	4C-A-50	Appendix 4C-A	$177,050							NA						
I	Rusk Co. Steam Electric Total Capital Cost	4C-A-51	Appendix 4C-A	$4,984,650							NA						
I	Nacogdoches Co. Total Capital Cost	4C-A-88	Appendix 4C-A				$363,580	$363,580	$363,580	$363,580	NA						
I	Tyler Co. Total Capital Cost	4C-A-90	Appendix 4C-A			$270,455					NA						
	Alternate Strategy ADS-1: water from Lake Fastrill WMS volume	4C-4			21,835	21,835	21,835	21,835	21,835	21,835	NA	NA	NA	NA	NA	NA	NA

REGION I

WATER USER GROUPS WITH APPARENT UNMET NEEDS

WUG Name	WUG Region	WUG County	WUG Basin
MINING	I	CHEROKEE	NECHES
MINING	I	HARDIN	NECHES
STEAM ELECTRIC POWER	I	NACOGDOCHES	NECHES

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008

dallas water utilities
city of dallas

June 28, 2010

Mr. Kelley Holcomb
Chair East Texas Regional Water Planning Group
%City of Nacogdoches
P.O. Box 635030
Nacogdoches, Texas 75963-5030

Re: East Texas Regional Water Planning Area 2011 Initially Prepared Plan

Dear Mr. Holcomb:

Upon review of the *East Texas Regional Water Planning Area 2011Update of the Region Water Plan Initially Prepared Plan*, (2011 East Texas RWPA IPP), I have noticed several inconsistencies between the 2011 East Texas RWPA IPP, and the *2011 Region C Initially Prepared Water Plan* (2011 Region C IPP) with regard to Lake Fastrill and the City of Dallas. I have also included some additional detail regarding Dallas connection of Lake Palestine, and a few editorial comments. My comments are as follows:

- On page 1-38 in the discussion of Lake Palestine, the report states "The City of Dallas anticipates constructing the necessary importation facilities by 2015." The following is a more detailed description of Dallas' proposed connection to Lake Palestine for your consideration for inclusion in the East Texas RWPA IPP.

  Dallas Water Utilities (DWU) and The Tarrant Regional Water District (TRWD) are cooperating to construct the Integrated Pipeline, which will deliver water to Dallas and Tarrant Counties from Lake Palestine, as well as Cedar Creek Lake, and Richland-Chambers Reservoir. The pipeline will have a capacity of approximately 350 mgd, with 150 mgd for Dallas and 200 mgd for TRWD. Dallas' contract with the Upper Neches River Municipal Water Authority and an interbasin transfer permit allowing the use of water from Lake Palestine in the Trinity River Basin provides Dallas 114,337 acre-feet per year (102 mgd) of water from Lake Palestine. TRWD's capacity in the Integrated Pipeline will deliver about 179,000 acre-feet per year (160 mgd) from Cedar Creek Lake and Richland-Chambers Lake.

- There are multiple references to Lake Fastrill as a water management strategy for the City of Dallas in the East Texas RWPA IPP. The U.S. Supreme Court's decision on February 22, 2010, not to hear the appeals of the State of Texas and Dallas, effectively supported the creation of the Neches River National Wildlife Refuge (NRNWR). This decision rendered the development of Lake Fastrill extremely unlikely. The City of Dallas is

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currently considering alternatives to Lake Fastrill inadvertently causing inconsistencies between the 2011 East Texas RWPA IPP and the 2011 Region C IPP. The following are two excerpts from the Region C IPP entitled *Lake Fastrill Replacement* and *Neches River Run-of-the-River Diversion* that describe Dallas' strategy in light of the timing of the U.S. Supreme Court's decision. I am providing these excerpts from the 2011 Region C IPP for your information and consideration in making the appropriate modifications in the 2011 East Texas RWPA IPP for consistency.

The *Lake Fastrill Replacement* excerpt below can be found in the 2011 Region C IPP in section *4E.1 Recommended Strategies for Regional Wholesale Water Providers* under "Dallas Water Utilities." This paragraph briefly describes Lake Fastrill, the U.S. Supreme Court's Decision and the alternative strategies the City of Dallas is considering to replace the 112,100 acre-feet per year that would have been provided by Lake Fastrill. Several of the alternate strategies are located in the East Texas Regional Water Planning Area while other are located in other regional water planning areas. The excerpt also includes the references identified in the excerpt.

> "**Lake Fastrill Replacement.** The Lake Fastrill Water Management Strategy would have allowed the Upper Neches River Municipal Water Authority (UNRMWA) and the City of Dallas (Dallas) to operate Lake Fastrill and Lake Palestine as a system due to its proximity to Lake Palestine resulting in increased operational flexibility, efficiencies, and associated economies of scale. Lake Fastrill was a recommended water management strategy in the approved 2006 Region C Water Plan [9] and the 2007 State Water Plan [10] and was designated by the Texas Legislature as a unique site for reservoir development. The lake was intended to meet projected water supply needs for the Dallas and water user groups in Anderson, Cherokee, Henderson, and Smith Counties in Region I. A decision of the United States Supreme Court on February 22, 2010 not to hear the appeals of the State of Texas and Dallas has effectively supported the creation of the Neches River National Wildlife Refuge (NRNWR) and rendered the development of Lake Fastrill extremely unlikely. As Dallas and the Upper Neches River Municipal Water Authority (UNRMWA) were planning on a firm water supply of at least 120 mgd (100 mgd for Dallas and 20 mgd for Region I) from the Lake Fastrill project, a new water management alternative strategy identified as the Lake Fastrill Replacement project is discussed herein.
>
> Since it is now unlikely that Lake Fastrill will ever be built, Dallas will need to find the additional 112,100 acre feet of water supply Dallas and its customer cities need from other sources. Due to the timing of the recent Supreme Court decision, the City of Dallas has not had an opportunity to reevaluate its alternative water management strategies to determine the best replacement for Dallas. The alternative strategies that are being considered by DWU as the Lake Fastrill Replacement include but are not limited to additional water conservation, Lake Texoma, Toledo Bend Reservoir, Lake O' the Pines, Lake Livingston, Ogallala groundwater in Roberts County (Region A), Marvin Nichols Reservoir, Lake

Columbia, George Parkhouse Reservoir (North), George Parkhouse Reservoir (South), Oklahoma Water and Neches River Run-of-the-River.

(9) Freese and Nichols, Inc., Alan Plummer Associates, Inc., Chiang, Patel & Yerby, Inc., and Cooksey Communications, Inc.: 2006 Region C Water Plan, prepared for the Region C Water Planning Group, Fort Worth, January 2006.

(10) Texas Water Development Board: Water for Texas 2007. [Online] Available URL: http://www.twdb.state.tx.us/wrpi/swp/swp.htm, April 2006."

The *Neches River Run-of-the-River Diversion* excerpt below can be found in the 2011 Region C IPP in section *4D.13 Neches River Run-of-the-River Diversion*. This paragraph describes a new alternative strategy involving a run-of-the-river diversion point downstream of the proposed Lake Fastrill dam site. The *Neches River Run-of-the-River Diversion Project Preliminary Technical Information* is attached for your reference. The excerpt also includes the references identified in the excerpt.

"Neches River Run-of-the-River Diversion

Lake Fastrill was a recommended water management strategy in the approved 2006 Region C Water Plan [12] and the 2007 State Water Plan [14] and was designated by the Texas Legislature as a unique site for reservoir development. The lake was intended to meet projected water supply needs for the Dallas and water user groups in Anderson, Cherokee, Henderson, and Smith Counties in Region I. A decision of the United States Supreme Court on February 22, 2010 not to hear the appeals of the State of Texas and Dallas has effectively supported the creation of the Neches River National Wildlife Refuge (NRNWR) and rendered the development of Lake Fastrill extremely unlikely.

The Neches Run-of-the-River Diversion strategy is one potential alternative to Lake Fastrill. It would involve run-of-the-river diversions from the Neches River in Anderson and Cherokee Counties downstream of Lake Palestine and the Neches River National Wildlife Refuge and upstream of the Weches Dam site. The run-of-the-river diversions would be subject to senior water rights and environmental flow restrictions and would not be available at all times. Hence, the run-of-the-river project would include one or more "off-channel" storage reservoirs located on tributaries of the Neches River in Anderson and Cherokee Counties which would be refilled during periods when water is available for diversion from the Neches River. Based on an off-channel storage capacity of about 540,000 acre-foot firm water supplies of approximately 134,500 acre-foot per year would be available from the off-channel reservoirs to meet Dallas and Region I needs. A firm supply of 112,100 acre-feet per year would be delivered from off-channel storage to the proposed pump station at Lake Palestine and then on to Dallas and firm supplies of 22,400 acre-feet per year from the off-channel storage for Region I [13].

[12] Freese and Nichols, Inc., Alan Plummer Associates, Inc., Chiang, Patel & Yerby, Inc., and Cooksey Communications, Inc.: 2006 Region C Water Plan, prepared for the Region C Water Planning Group, Fort Worth, January 2006.

[13]HDR, Inc.: "Neches River Run-of-the-River Diversions Project Preliminary Technical Information for 2011 Region C Regional Water Plan," Austin, March 2010.

[14]Texas Water Development Board: *Water for Texas 2007*. [Online] Available URL: http://www.twdb.state.tx.us/wrpi/swp/swp.htm, April 2006."

- Lake Fastrill was identified as a "Unique Reservoir Site" in *Water for Texas 2007*, the State water plan, and designated a "Unique Reservoir Site" in Senate Bill 3 of the 80th Legislature which was signed into law by Governor Perry on June 16, 2007. As such Lake Fastrill should remain in the 2011 East Texas RWPA IPP as a Unique Reservoir Site" in the event conditions change and it becomes favorable to proceed with Lake Fastrill. Due to the Supreme Court decision, discussed above, Dallas has identified alternatives to Lake Fastrill, also discussed above, but is not proposing that Lake Fastrill be removed from the 2011 East Texas RWPA IPP, but rather modify references to Dallas and its strategies for meeting the 112,100 acre-feet per year demand from the East Texas Regional Water Planning Area.

- Table 4.B.18 - Demands by Lake Fastrill. The demands identified for Dallas were left blank. The demand supplied by Lake Fastrill would have been 112,100 ac-ft per year (100 MGD). Even though this demand may not be met by Lake Fastrill it is currently anticipated the demand will be met through the Upper Neches River Municipal Water Authority.

- On Page 4C-90 in the "Demands" section of the table "Demand (Potential Future)" shows "112,000" ac-ft per year beginning in 2040, in the text above the table there is a discussion of Dallas obtaining "112,100" ac-ft per year. These numbers should be consistent (112,100 ac-ft per year) if referring to the same water.

- In section <u>1.16.4 Special Study No. 4: Lake Murvaul Study</u> there is a discussion of an impending contract between Dallas and Luminent Energy. The section states "Luminant Energy has exercised its contract option with the City of Dallas and can now transfer 13,000 acre-feet per year from Lake Fork to the station at Martin Lake."

  Luminant is currently in the process of exercising its option with Dallas. Luminant's proposed contract is based on a maximum of 12,000 ac-ft/year. It is anticipated that Dallas' City Council will consider the Luminant Contract in August or September 2010.

- The Tables and Figures in Section 4C of the report are not identified with names or numbers making references to the figures and tables difficult.

If you have any questions or need additional information, please call Denis Qualls, the Interim Planning Division Manager for the City's Water Utilities Department at (214) 670-3843.

Sincerely,

FOR Jo M. (Jody) Puckett, P.E.
Director, Water Utilities Department

JMP:dwq
Enclosures

cc: Monty Shank, Upper Neches River Municipal Water Authority
Jim Parks, P.E., Region C Water Planning Group
Rex Hunt, P.E., Alan Plummer and Associates, Inc.
Tom Gooch, P.E., Freese & Nichols, Inc.

Neches River Run-of-the-River Diversions Project
Preliminary Technical Information for
2011 Region C Regional Water Plan

HDR Engineering, Inc.
March 9, 2010

Description

Lake Fastrill was a recommended water management strategy in the approved 2006 Region C Water Plan and 2007 State Water Plan and was intended to meet projected water supply needs for the City of Dallas (Dallas) and water user groups in Anderson, Cherokee, Henderson, and Smith Counties in Region I. A decision of the United States Supreme Court on February 22, 2010 not to hear the appeals of the State of Texas and Dallas has effectively supported the creation of the Neches River National Wildlife Refuge (NRNWR) and rendered the development of Lake Fastrill extremely unlikely. As Dallas and the Upper Neches River Municipal Water Authority (UNRMWA) were planning on a firm water supply of at least 120 mgd (100 mgd for Dallas and 20 mgd for Region I) from the Lake Fastrill project, a new water management strategy identified as the Neches River Run-of-the-River Diversions project is discussed herein.

The proposed Neches River Run-of-the-River Diversions project would involve run-of-the-river diversions from the Neches River in Anderson and Cherokee Counties downstream of Lake Palestine and the NRNWR and upstream of the Weches Dam site. Subject to senior water rights and environmental flow restrictions, however, such run-of-the-river diversions would not be available at all times. Hence, the Neches River Run-of-the-River Diversions project includes one or more "off-channel" storage reservoirs located on tributaries of the Neches River in Anderson and Cherokee Counties which would be refilled during periods when water is available for diversion from the Neches River. Based on off-channel storage capacity of about 540,000 acft, firm water supplies of 120 mgd (~134,500 acft/yr) would be available from the off-channel reservoirs to meet Dallas and Region I needs. For regional water planning purposes, it is assumed that a firm supply of 100 mgd (~112,100 acft/yr) would be delivered from off-channel storage to the proposed pump station site at Lake Palestine and then on to the Dallas Eastside Water Treatment Plant (WTP). Firm Region I supplies of 20 mgd (~22,400 acft/yr) from the Neches River Run-of-the-River Diversions project are assumed to be available at one of the proposed off-channel reservoirs.

Available Yield

Water available for run-of-the-river diversion from the Neches River at the Fastrill Dam site downstream of State Highway 294 was calculated subject to senior water rights and Consensus Criteria for Environmental Flow Needs (CCEFN) using the Neches River Basin Water Availability Model (Neches WAM) and a daily operations model in MS Excel generally as described in the Fastrill Reservoir Preliminary Yield & Feasibility Study.[1] A maximum

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[1] HDR Engineering, Inc., "Fastrill Reservoir Preliminary Yield & Feasibility Study," Upper Neches River Municipal Water Authority, Dallas Water Utilities, September 2006.

diversion rate of 4,455 cfs from the Neches River to off-channel storage and off-channel storage capacity of about 540,000 acft were assumed for the purposes of this preliminary technical evaluation. Off-channel reservoir operations were simulated using composite elevation-area-capacity relationships assuming no impoundment of local runoff, net evaporation rates associated with Lake Fastrill, and uniform diversion of the firm yield.

Preliminary Estimate of Project Cost

A preliminary estimate of cost for the Neches River Run-of-the-River Diversions project based on standard procedures and unit prices developed by HDR Engineering, Inc. and Freese & Nichols, Inc. for use in regional water planning studies pursuant to Texas Water Development Board and Region C guidance is summarized in Table 1. Project facilities include: a) an intake and pump station on the Neches River; b) high capacity pipelines for transmission of Neches River diversions into off-channel storage; c) dams and off-channel reservoirs; d) intake(s), pump station(s), collector pipeline(s), and a transmission pipeline for delivery of water from off-channel storage to the Lake Palestine pump station site; and e) a transmission pipeline from Lake Palestine to the Dallas Eastside WTP. Total cost for the Neches River Run-of-the-River Diversions project is estimated to be $1.981 billion. Annual debt service with all facilities financed over 30 years at 6 percent interest totals $143.9 million. Annual costs for operations and maintenance, including power, are estimated at $49.4 million. Hence, the total annual cost for the project subject to full debt service is $193.3 million. Dividing this total annual cost by the estimated firm yield of 134,500 acft/yr results in an annual unit cost of $1,437/acft or $4.41/kgal. These preliminary cost estimates may be refined by optimization of project size and associated firm yield and through use of site-specific information compiled in future feasibility studies.

Table Q-55
Cost of Neches River Run-of-the-River Diversions Project for Dallas Water Utilities

Probable Owner:	DWU		
Quantity:	134,500	AF/Y	20% Retained for Local Use (~20 MGD)
Quantity for DWU:	112,100	AF/Y	

CONSTRUCTION COSTS	Size	Quantity	Unit	Unit Price	Cost
Dam and Reservoir					
Dams and Reservoirs Construction		1	LS	$193,450,000	$193,450,000
Engineering and Contingencies (35%)					$67,708,000
Land Acquisition and Mitigation		1	LS	$65,969,000	$65,969,000
Total Dams and Reservoirs					**$327,127,000**
Transmission Systems					
Intake and Pump Station at River	235808 HP	1	LS	$308,292,000	$308,292,000
Diversion Pipelines to DWU OCRs (Rural)	144 in	148,000	LF	$1,903	$281,644,000
Diversion Pipeline to Local OCR (Rural)	114 in	17,400	LF	$1,183	$20,584,000
Intake and Pump Station at DWU OCRs	10370 in	1	LS	$26,452,000	$26,452,000
Booster Pump Stations from DWU OCRs	Varies	3	LS	$17,105,000	$51,315,000
Transmission Pipeline from DWU OCRs (Rural)	72 in	536,838	LF	$530	$284,524,000
Transmission Pipeline from DWU OCRs (Urban)	72 in	156,546	LF	$714	$111,774,000
ROW Easements					$7,588,000
					$1,092,173,000
Engineering and Contingencies (30% for pipelines, 35% for other)					$344,678,000
Permitting & Mitigation - Conveyance System					$4,095,000
Construction					**$1,768,073,000**
Interest During Construction (36 months)					**$212,205,000**
TOTAL CAPITAL COST					**$1,980,278,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$143,865,000
Electricity ($0.09 per kWh)					$30,021,000
Operation & Maintenance					$19,415,000
Total Annual Costs					**$193,301,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot					$1,437
Per 1,000 Gallons					$4.41
UNIT COSTS (After Amortization)					
Per Acre-Foot					$368
Per 1,000 Gallons					$1.13

Cost estimates provided by HDR, Inc.

Appendix 10-D

Water Management Strategies Source Exceptions and Responses

The TWDB provided comments to the ETRWPG regarding the online planning database (DB12) based on a direct comparison of the DB12 against the 2011 IPP. Data which did not reconcile between the plan and the online database were provided to the ETRWPG. This appendix includes responses to TWDB comments regarding the DB12.

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WMS SOURCE EXCEPTIONS

Response

Exception Description: The sum of the WMS Source does not equal the sum of the strategy supplies for all of the WUGs and WWPs attached to this source. Please verify that this is correct.

	DBPROJECTID	PROJECT RWPG	PROJECT NAME	PROJECT INFRASTRUCTURE	PROJECT TYPE	WMS PROJECT ID	Response
1.	742	H	LNVA TO WUG CONTRACT	OTHER INFRASTRUCTURE	EXISTING SOURCE OR EXPANDED USE OF AN EXISTING SOURCE (SURFACE WATER OR GROUNDWATER)	H07-WUGC11	Region H strategy
	DBSOID	SOURCE RWPG	SOURCE NAME	SOURCE COUNTY	SOURCE BASIN	SOURCE ID	
1.	629	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	060A0	

	DBPROJECTID	PROJECT RWPG	PROJECT NAME	PROJECT INFRASTRUCTURE	PROJECT TYPE	WMS PROJECT ID	Response
2.	443	I	NEW WELLS - CARRIZO WILCOX AQUIFER	OTHER INFRASTRUCTURE	NEW SURFACE WATER OR NEW GROUNDWATER SOURCE	I03.1CW	
	DBSOID	SOURCE RWPG	SOURCE NAME	SOURCE COUNTY	SOURCE BASIN	SOURCE ID	
1.	1466	I	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	00310	Correct. Supplies shown on WWP.
2.	1483	I	CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	17410	Correct. Supplies shown on WWP.

	DBPROJECTID	PROJECT RWPG	PROJECT NAME	PROJECT INFRASTRUCTURE	PROJECT TYPE	WMS PROJECT ID	Response
3.	440	I	PURCHASE WATER FROM PROVIDER (1)	NO INFRASTRUCTURE	EXISTING SOURCE OR EXPANDED USE OF AN EXISTING SOURCE (SURFACE WATER OR GROUNDWATER)	I02.1PUR	
	DBSOID	SOURCE RWPG	SOURCE NAME	SOURCE COUNTY	SOURCE BASIN	SOURCE ID	
1.	565	I	CENTER LAKE/RESERVOIR	RESERVOIR	SABINE	05260	Correct. Supplies shown on WWP.
2.	643	I	HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	08280	Correct. Supplies shown on WWP.
3.	567	I	MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	05160	Correct. Supplies shown on WWP.
4.	541	I	SABINE RIVER RUN-OF-RIVER	NEWTON	SABINE	3460504662	Correct. Supplies shown on WWP.
5.	566	I	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	05170	Correct. Supplies shown on WWP.

	DBPROJECTID	PROJECT RWPG	PROJECT NAME	PROJECT INFRASTRUCTURE	PROJECT TYPE	WMS PROJECT ID	Response
4.	441	I	PURCHASE WATER FROM PROVIDER (2)	PIPELINE	EXISTING SOURCE OR EXPANDED USE OF AN EXISTING SOURCE (SURFACE WATER OR GROUNDWATER)	I02.2PUR	
	DBSOID	SOURCE RWPG	SOURCE NAME	SOURCE COUNTY	SOURCE BASIN	SOURCE ID	
1.	1466	I	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	00310	Correct. Supplies shown on WWP.
2.	628	I	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	06180	Correct. Supplies shown on WWP.
3.	626	I	KURTH LAKE/RESERVOIR	RESERVOIR	NECHES	06290	Correct. Supplies shown on WWP.
4.	629	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	060A0	Correct. Supplies shown on WWP.
5.	566	I	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	05170	Correct. Supplies shown on WWP.

	DBPROJECTID	PROJECT RWPG	PROJECT NAME	PROJECT INFRASTRUCTURE	PROJECT TYPE	WMS PROJECT ID	Response
5.	442	I	PURCHASE WATER FROM PROVIDER (3)	PIPELINE AND WATER TREATMENT PLANT	EXISTING SOURCE OR EXPANDED USE OF AN EXISTING SOURCE (SURFACE WATER OR GROUNDWATER)	I02.3PUR	
	DBSOID	SOURCE RWPG	SOURCE NAME	SOURCE COUNTY	SOURCE BASIN	SOURCE ID	
1.	622	I	PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	06020	Correct. Supplies shown on WWP.

Location on Interface: WMS SOURCE Module

WMS SOURCE EXCEPTIONS

Response

Exception Description: The sum of the WMS Source does not equal the sum of the costs for all of the WUGs and WWPs attached to this source. Please verify that this is correct.

	DBPROJECTID	PROJECT RWPG	PROJECT NAME	PROJECT INFRASTRUCTURE	PROJECT TYPE	WMS PROJECT ID	Response
1.	443	I	NEW WELLS - CARRIZO WILCOX AQUIFER	OTHER INFRASTRUCTURE	NEW SURFACE WATER OR NEW GROUNDWATER SOURCE	I03.1CW	
	DBSOID	SOURCE RWPG	SOURCE NAME	SOURCE COUNTY	SOURCE BASIN	SOURCE ID	
1.	1466	I	CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	00310	Correct. Costs are shown for WWP.
	DBPROJECTID	PROJECT RWPG	PROJECT NAME	PROJECT INFRASTRUCTURE	PROJECT TYPE	WMS PROJECT ID	
2.	440	I	PURCHASE WATER FROM PROVIDER (1)	NO INFRASTRUCTURE	EXISTING SOURCE OR EXPANDED USE OF AN EXISTING SOURCE (SURFACE WATER OR GROUNDWATER)	I02.1PUR	
	DBSOID	SOURCE RWPG	SOURCE NAME	SOURCE COUNTY	SOURCE BASIN	SOURCE ID	
1.	566	I	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	05170	Alternative strategy set to No. Correct.
	DBPROJECTID	PROJECT RWPG	PROJECT NAME	PROJECT INFRASTRUCTURE	PROJECT TYPE	WMS PROJECT ID	
3.	441	I	PURCHASE WATER FROM PROVIDER (2)	PIPELINE	EXISTING SOURCE OR EXPANDED USE OF AN EXISTING SOURCE (SURFACE WATER OR GROUNDWATER)	I02.2PUR	
	DBSOID	SOURCE RWPG	SOURCE NAME	SOURCE COUNTY	SOURCE BASIN	SOURCE ID	
1.	566	I	TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	05170	Alternative strategy set to No. Correct.
	DBPROJECTID	PROJECT RWPG	PROJECT NAME	PROJECT INFRASTRUCTURE	PROJECT TYPE	WMS PROJECT ID	
4.	442	I	PURCHASE WATER FROM PROVIDER (3)	PIPELINE AND WATER TREATMENT PLANT	EXISTING SOURCE OR EXPANDED USE OF AN EXISTING SOURCE (SURFACE WATER OR GROUNDWATER)	I02.3PUR	
	DBSOID	SOURCE RWPG	SOURCE NAME	SOURCE COUNTY	SOURCE BASIN	SOURCE ID	
1.	628	I	COLUMBIA LAKE/RESERVOIR	RESERVOIR	NECHES	06180	Corrected Nacogdoches WWP. All costs are shown on WWP.

Location on Interface: WMS SOURCE Module

WMS SOURCE EXCEPTIONS

Response

Exception Description: The WMS Source Sum is greater than zero for strategies and/or costs. However, the Include in State Water Plan flag is set to No. Please verify that this is correct.

	DBPROJECTID	PROJECT RWPG	PROJECT NAME	PROJECT INFRASTRUCTURE	PROJECT TYPE	WMS PROJECT ID	Response
1.	428	C	PURCHASE FROM WATER PROVIDER (2)	NO INFRASTRUCTURE	REUSE	C50.2	
	DBSOID	SOURCE RWPG	SOURCE NAME	SOURCE COUNTY	SOURCE BASIN	SOURCE ID	Region C strategy
1.	4406	I	INDIRECT REUSE	HENDERSON	NECHES	3506107	
	DBPROJECTID	PROJECT RWPG	PROJECT NAME	PROJECT INFRASTRUCTURE	PROJECT TYPE	WMS PROJECT ID	
2.	429	C	PURCHASE FROM WATER PROVIDER (3)	NO INFRASTRUCTURE	NEW SURFACE WATER OR NEW GROUNDWATER SOURCE	C50.3	
	DBSOID	SOURCE RWPG	SOURCE NAME	SOURCE COUNTY	SOURCE BASIN	SOURCE ID	Region C strategy
1.	4162	I	FASTRILL LAKE/RESERVOIR	RESERVOIR	NECHES	06090	
	DBPROJECTID	PROJECT RWPG	PROJECT NAME	PROJECT INFRASTRUCTURE	PROJECT TYPE	WMS PROJECT ID	
3.	443	I	NEW WELLS - CARRIZO WILCOX AQUIFER	OTHER INFRASTRUCTURE	NEW SURFACE WATER OR NEW GROUNDWATER SOURCE	I03.1CW	
	DBSOID	SOURCE RWPG	SOURCE NAME	SOURCE COUNTY	SOURCE BASIN	SOURCE ID	
1.	1472	I	CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	10710	Corrected in DB12
	DBPROJECTID	PROJECT RWPG	PROJECT NAME	PROJECT INFRASTRUCTURE	PROJECT TYPE	WMS PROJECT ID	
4.	890	I	SEDIMENT REDUCTION	NO INFRASTRUCTURE	EXISTING SOURCE OR EXPANDED USE OF AN EXISTING SOURCE (SURFACE WATER OR GROUNDWATER)	I21	Corrected in DB12
	DBSOID	SOURCE RWPG	SOURCE NAME	SOURCE COUNTY	SOURCE BASIN	SOURCE ID	
1.	629	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	060A0	
	DBPROJECTID	PROJECT RWPG	PROJECT NAME	PROJECT INFRASTRUCTURE	PROJECT TYPE	WMS PROJECT ID	
5.	889	I	WHOLESALE CUSTOMER CONSERVATION	NO INFRASTRUCTURE	CONSERVATION	I01ACON	Corrected in DB12
	DBSOID	SOURCE RWPG	SOURCE NAME	SOURCE COUNTY	SOURCE BASIN	SOURCE ID	
1.	582	I	NECHES RIVER RUN-OF-RIVER PINE ISLAND BAYOU	JASPER	NECHES	3460604411B	

Location on Interface: WMS SOURCE Module

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WMS PROJECT EXCEPTIONS

Response

Exception Description: The following WMS Projects are a combination of Recommended, Considered and Alternative. Please verify that this is correct.

	DBPROJECTID	PROJECT RWPG	PROJECT NAME	PROJECT INFRASTRUCTURE	PROJECT TYPE	WMS PROJECT ID	Response
1.	443	I	NEW WELLS - CARRIZO WILCOX AQUIFER	OTHER INFRASTRUCTURE	NEW SURFACE WATER OR NEW GROUNDWATER SOURCE	I03.1CW	Correct
2.	440	I	PURCHASE WATER FROM PROVIDER (1)	NO INFRASTRUCTURE	EXISTING SOURCE OR EXPANDED USE OF AN EXISTING SOURCE (SURFACE WATER OR GROUNDWATER)	I02.1PUR	Correct
3.	441	I	PURCHASE WATER FROM PROVIDER (2)	PIPELINE	EXISTING SOURCE OR EXPANDED USE OF AN EXISTING SOURCE (SURFACE WATER OR GROUNDWATER)	I02.2PUR	Correct. Changed to alternate.
4.	442	I	PURCHASE WATER FROM PROVIDER (3)	PIPELINE AND WATER TREATMENT PLANT	EXISTING SOURCE OR EXPANDED USE OF AN EXISTING SOURCE (SURFACE WATER OR GROUNDWATER)	I02.3PUR	Correct

Location on Interface: WMS Module

Exception Description: The WMS Project Sum is greater than zero for strategies and/or costs. However, the Include in State Water Plan flag is set to No. Please verify that this is correct.

	DBPROJECTID	PROJECT RWPG	PROJECT NAME	PROJECT INFRASTRUCTURE	PROJECT TYPE	WMS PROJECT ID	Response
1.	890	I	SEDIMENT REDUCTION	NO INFRASTRUCTURE	EXISTING SOURCE OR EXPANDED USE OF AN EXISTING SOURCE (SURFACE WATER OR GROUNDWATER)	I21	Changed to include in SWP
2.	889	I	WHOLESALE CUSTOMER CONSERVATION	NO INFRASTRUCTURE	CONSERVATION	I01ACON	Changed to include in SWP

Location on Interface: WMS Module