

Volume I

Table of Contents

Executive Summary

ES.1 Regional Description	ES-2
ES.2 Regional Water Planning Application	ES-3
ES.3 County Summary Sheets	ES-4

Chapter 1 Description of the Region

1.1 General Introduction	1-1
1.1.1 Physical Description	1-3
1.1.2 Climate.....	1-5
1.1.3 Population	1-8
1.1.4 Economic Activity	1-9
1.2 Current Water Demands	1-11
1.3 Sources of Water	1-12
1.3.1 Groundwater	1-12
1.3.2 Springs.....	1-18
1.3.3 Surface Water.....	1-19
1.3.4 Reuse.....	1-22
1.3.5 Special Water Resources	1-22
1.3.6 Threats and Constraints on Water Supply	1-23
1.4 Water User Groups and Major Water Providers.....	1-24
1.5 Agricultural and Natural Resources.....	1-25
1.5.1 Prime Farmland	1-25
1.5.2 Forest Products and Timberland Ecosystem Services	1-30
1.5.3 Wetlands	1-31
1.5.4 Estuaries	1-35
1.5.5 Rare, Threatened and Endangered Species.....	1-38
1.5.6 Ecologically Significant River and Stream Segments	1-38
1.5.7 State and Federal Parks, Management Areas, and Preserves.....	1-38
1.5.8 Archeological Resources	1-42
1.5.9 Mineral Resources.....	1-42
1.6 Threats to Water Quality.....	1-45



	1.6.1 Surface Water Quality	1-45
1.7	Threats to Agricultural and Natural Resources	1-46
	1.7.1 Drawdown of Aquifers	1-46
	1.7.2 Insufficient Instream/Environmental Flows	1-47
	1.7.3 Inundation Due to Reservoir Development.....	1-47
1.8	Consideration of Existing Water Planning Efforts	1-49
	1.8.1 State, Regional, and Local Water Management Planning.....	1-49
	1.8.2 Comprehensive Sabine Watershed Management Plan	1-50
	1.8.3 Trinity River Basin Master Plan.....	1-50
	1.8.4 Consideration of Other Publicly Available Plans	1-51
1.9	Drought of Record.....	1-51
1.10	Current Drought Preparations	1-51
1.11	Water Loss and Water Audits	1-51
1.12	Threats Addressed or Affected by Water Management Strategies	1-52

Chapter 2 Current and Projected Population and Water Demand

	2.1 Methodology for Updating Demands.....	2-1
2.2	Population Growth Projections.....	2-2
2.3	Water Demands	2-11
	2.3.1 Municipal Demands	2-12
	2.3.2 Manufacturing Demands.....	2-22
	2.3.3 Irrigation Demands	2-26
	2.3.4 Steam Electric Power Demands.....	2-30
	2.3.5 Livestock Demands	2-34
	2.3.6 Mining Demands	2-37
	2.3.7 Sales Between Water User Groups	2-42
2.4	Demands for Major Water Providers	2-42
2.5	Sub-WUG Planning Option	2-51

Chapter 3 Evaluation of Current Water Supplies in the Region

	3.1 Surface Water Availability	3-6
	3.1.1 Trinity Basin WAM.....	3-6
	3.1.2 Neches River Basin Water Availability Model for the 2021 Plan	3-6
	3.1.3 Sabine River Basin Water Availability Model for the 2021 Plan.....	3-8
	3.1.4 Reservoir Availability	3-9
	3.1.5 Run-of-the-River Diversion Availability.....	3-11



3.1.6	Local Supply Availability.....	3-16
3.2	Groundwater Availability	3-17
3.2.1	Model Assumptions	3-18
3.2.2	Regional Groundwater Availability	3-20
3.3	Reuse Availability	3-25
3.4	Impacts on Availability.....	3-26
3.4.1	Imports and Exports.....	3-26
3.4.2	Impacts of Water Quality on Supplies.....	3-27
3.4.3	Impact of Environmental Flow Policies on Water Rights, water Availability, and Water Planning	3-28
3.5	Existing Water Supplies by Water User Group	3-29
3.6	Existing Water Supplies by Major Water Provider.....	3-30
3.6.1	Angelina and Neches River Authority	3-31
3.6.2	Angelina-Nacogdoches Water Control Improvement District No 1	3-31
3.6.3	Athens Municipal Water Authority	3-31
3.6.4	City of Beaumont.....	3-31
3.6.5	City of Carthage	3-31
3.6.6	City of Center	3-31
3.6.7	Houston County Water Control Improvement District (WCID) No. 1	3-32
3.6.8	City of Jacksonville	3-32
3.6.9	Lower Neches Valley Authority	3-32
3.6.10	City of Lufkin.....	3-32
3.6.11	City of Nacogdoches	3-32
3.6.12	Panola County Freshwater Supply District No. 1	3-32
3.6.13	City of Port Arthur	3-33
3.6.14	Sabine River Authority of Texas.....	3-33
3.6.15	City of Tyler	3-33
3.6.16	Upper Neches River Municipal Water Authority	3-33

Chapter 4 Comparison of Water Demands with Water Supplies to Determine Needs

4.1	Regional Comparison of Supplies and Demands	4-1
4.2	First Tier Water Needs by County	4-3
4.3	First Tier Water Needs by Water User Group.....	4-7
4.3.1	Identified Needs for Manufacturing.....	4-9
4.3.2	Identified Needs for Municipal	4-9
4.3.3	Identified Needs for Mining	4-9



4.3.4	Identified Needs for Livestock	4-9
4.3.5	Identified Needs for Steam Electric Power	4-9
4.3.6	Identified Needs for Irrigation	4-9
4.4	First Tier Water Needs by Major Water Provider	4-10
4.4.1	Angelina and Neches River Authority (ANRA)	4-11
4.4.2	Athens Municipal Water Authority (AMWA)	4-12
4.4.3	City of Beaumont.....	4-12
4.4.4	City of Lufkin.....	4-12
4.4.5	Upper Neches River Municipal Water Authority (UNRMWA)	4-12
4.5	Second Tier Water Needs Analysis.....	4-12

Chapter 5A Identification of Potentially Feasible Water Management Strategies

5A.1	Water Conservation	5A-2
5A.2	Water Reuse	5A-4
5A.3	Expanded Use of Existing Supplies	5A-4
5A.3.1	Expanded Use of Groundwater.....	5A-5
5A.3.2	Expanded Local Supplies	5A-7
5A.3.3	Voluntary Redistribution	5A-8
5A.4	New Supply Development	5A-12
5A.4.1	New Reservoirs	5A-12
5A.4.2	Aquifer Storage and Recovery (ASR).....	5A-16

Chapter 5B Evaluation of Potentially Feasible, Recommended, and Alternative Water Management Strategies

5B.1	Water Management Strategy Evaluation	5B-1
5B.2	Water User Groups with Water Management Strategies	5B-2
5B.2.1	Anderson County	5B-3
5B.2.2	Angelina County.....	5B-6
5B.2.3	Cherokee County	5B-10
5B.2.4	Hardin County.....	5B-15
5B.2.5	Henderson County	5B-18
5B.2.6	Houston County	5B-25
5B.2.7	Jasper County.....	5B-28
5B.2.8	Jefferson County.....	5B-31
5B.2.9	Nacogdoches County.....	5B-36



5B.2.10	Newton County	5B-41
5B.2.11	Orange County	5B-44
5B.2.12	Panola County	5B-46
5B.2.13	Polk County	5B-49
5B.2.14	Rusk County	5B-51
5B.2.15	Sabine County	5B-56
5B.2.16	San Augustine County	5B-59
5B.2.17	Shelby County	5B-62
5B.2.18	Smith County	5B-66
5B.2.19	Trinity County	5B-78
5B.2.20	Tyler County	5B-80
5B.3	Wholesale Water Providers	5B-82
5B.3.1	Angelina and Neches River Authority	5B-82
5B.3.2	Angelina Nacogdoches WCID #1 (AN WCID #1)	5B-88
5B.3.3	Athens Municipal Water Authority	5B-90
5B.3.4	City of Beaumont.....	5B-94
5B.3.5	City of Carthage	5B-96
5B.3.6	City of Center	5B-98
5B.3.7	Houston County WCID #1.....	5B-101
5B.3.8	City of Jacksonville	5B-103
5B.3.9	Lower Neches Valley Authority	5B-106
5B.3.10	City of Lufkin.....	5B-109
5B.3.11	City of Nacogdoches	5B-112
5B.3.12	Panola County Fresh Water Supply District.....	5B-115
5B.3.13	City of Port Arthur	5B-116
5B.3.14	Sabine River Authority	5B-118
5B.3.15	City of Tyler	5B-120
5B.3.16	Upper Neches River Municipal Authority	5B-123
5B.4	Unmet Needs	5B-127
5B.5	Texas Water Development Board Database.....	5B-127
5B.6	Summary of Recommended and Alternative Water Management Strategies	5B-127

Chapter 5C Water Conservation Recommendations

5C.1	Water Conservation Practices and Trends in the East Texas Regional Water Planning Area ..	5C-1
5C.1.1	Water Use in the East Texas Regional Water Planning Area.....	5C-2
5C.1.2	Water Loss in the East Texas Regional Water Planning Area.....	5C-5



5C.2 Water Conservation Plans5C-7

5C.3 Recommended Water Conservation Strategies in the East Texas Regional Water Planning Area
.....5C-11

5C.3.1 Municipal Water Conservation Strategies.....5C-11

5C.3.2 Other Water User Groups.....5C-15

Chapter 6 Impacts of the Regional Water Plan and Consistency with Protection of Resources

6.1 Impacts of Water Management Strategies.....6-1

6.1.1 Key Water Quality Parameters in the State.....6-2

6.1.2 Moving Water from Agricultural and Rural Areas.....6-2

6.2 Consistency with the Long-term Protection of the State6-2

6.2.1 Protection of Water Resources6-2

6.2.2 Consistency with Protection of Agricultural Resources6-4

6.2.3 Consistency with Protection of Natural Resources6-4

6.3 Unmet Municipal Needs6-5

6.4 Socioeconomic Impacts of Not Meeting Identified Needs6-5

Chapter 7 Drought Response Information, Activities, and Recommendations

7.1 Droughts of Record7-1

7.1.1 Historical Droughts of Record7-1

7.1.2 Recent Droughts in the Region7-2

7.2 Current Drought Preparations and Responses in Drought Contingency Plans7-7

7.2.1 Summary of Current Drought Triggers, Goals, and Response Measures7-7

7.2.2 Drought Contingency Plan Recommendations.....7-15

7.3 Existing and Potential Emergency Interconnects.....7-17

7.4 Emergency Responses to Local Drought Conditions or Loss of Municipal Supply7-18

7.4.1 Additional Local Groundwater Wells7-19

7.4.2 Brackish Groundwater.....7-19

7.4.3 Voluntary Redistribution.....7-21

7.4.4 Emergency Interconnect7-23

7.4.5 Trucked-In Water7-26

7.5 Region-Specific Recommendations Regarding Triggers and Actions to be Taken in Drought .7-30

7.5.1 Drought Trigger Conditions for Reservoirs.....7-30

7.5.2 Drought Trigger Conditions for Run-of-River and Ground Water Supplies7-47

7.6 Region-Specific Model Drought Contingency Plans7-49



7.7 Drought Management Water Management Strategies 7-49

7.8 Other Drought Related Considerations and Recommendations 7-49

7.8.1 Drought Preparedness Council..... 7-49

Chapter 8 Unique Stream Segments, Unique Reservoir Sites, and Legislative and Regulatory Recommendations

8.1 Unique Stream Segments..... 8-1

8.2 Unique Reservoir Sites..... 8-6

8.2.1 Lake Columbia..... 8-7

8.2.2 Ponta Reservoir 8-8

8.2.3 Rockland Reservoir 8-8

8.2.4 Big Cow Reservoir 8-8

8.2.5 Bon Wier Reservoir 8-8

8.2.6 Carthage Reservoir 8-9

8.2.7 Kilgore Reservoir 8-9

8.2.8 Rabbit Creek Reservoir 8-9

8.2.9 State Highway 322 Stage I..... 8-10

8.2.10 State Highway 322 Stage II 8-10

8.2.11 Stateline Reservoir..... 8-10

8.2.12 Socagee Reservoir 8-11

8.2.13 Fastrill Reservoir..... 8-11

8.3 Legislative and Regulatory Recommendations 8-11

8.3.1 Flexibility in Determining Water Plan Consistency 8-12

8.3.2 Continued Funding by the State of the Regional Water Planning Process on a Five-Year Cycle..... 8-13

8.3.3 Unique Reservoir Designation..... 8-13

8.3.4 Water Reuse 8-13

8.3.5 Funding 8-13

8.3.6 Uncommitted Surface Water 8-14

8.3.7 Standardized Processes for Regional Water Plan Development 8-14

8.3.8 Funding for Additional Groundwater Modeling 8-14

8.3.9 Clarification of Unique Stream Segment Criteria..... 8-14

8.3.10 Recommendations Regarding Water Management Strategy Prioritization 8-15

8.3.11 Allow Groundwater Supplies to Exceed the Modeled Available Groundwater 8-16



Chapter 9 Infrastructure Financing Report

Chapter 10 Public Participation and Adoption of Plan

10.1	East Texas Regional Water Planning Group Members	10-1
10.2	Preplanning for the 2021 Plan	10-2
10.3	Opportunities for Public Input	10-3
10.3.1	Contact with Water User Groups.....	10-3
10.3.2	East Texas Regional Water Planning Website	10-3
10.3.3	Regular Meetings of the East Texas Regional Water Planning Group	10-4
10.3.4	Public Hearings for the Initially Prepared Plan	10-4
10.4	Public Comment	10-5
10.5	Final Adoption of the 2021 Plan.....	10-5

Chapter 11 Implementation and Comparison to the Previous Regional Water Plan

11.1	Implementation of Previous Regional Water Plan.....	11-1
11.1.1	Texas Water Development Board Implementation Survey	11-1
11.2	Comparison to Previous Regional Water Plan	11-1
11.2.1	Water Demand Projections.....	11-2
11.2.2	Drought of Record	11-4
11.2.3	Water Availability.....	11-4
11.2.4	Existing Supplies of Water User Groups and Wholesale Water Providers	11-6
11.2.5	Identified Needs	11-11
11.2.6	Water Management Strategies and Water Management Strategy Projects.....	11-16
11.2.7	Simplified Planning	11-17

References

Texas Water Development Board List of Definitions



List of Tables

1.1	East Texas Regional Water Planning Group Members	1-2
1.2	Economic Sectors Heavily Dependent on Water Resources	1-10
1.3	Major Demand Centers.....	1-11
1.4	U.S. Department of Agriculture 2017 Agricultural Statistics	1-28
1.5	Texas Wetland Types and Characteristics	1-32
1.6	1980 Geographical Distribution of Bottomland	1-33
1.7	Texas Parks and Wildlife Department Ecologically Significant Segments in East Texas	1-39
1.8	State and Federal Parks, Management Areas, and Preserves.....	1-41
1.9	Potential Impacts of Development on Land.....	1-48
2.1	Distribution of Population for the East Texas Regional Water Planning Area by County.....	2-4
2.2	Summary of Water Usage for the East Texas Regional Water Planning Area by Use Category and Decade (ac-ft/yr)	2-11
2.3	Demand Projection Percentages for the East Texas Regional Water Planning Area by Category	2-11
2.4	Historical Water Use and Projected Municipal Water Demand in the East Texas Regional Water Planning Area by County (ac-ft/yr).....	2-13
2.5	Municipal Demand Projection Percentages in the East Texas Regional Water Planning Area by County	2-20
2.6	Historical and Projected Manufacturing Water Demand in the East Texas Regional Water Planning Area by County (ac-ft/yr).....	2-23
2.7	Manufacturing Demand Projection Percentages in the East Texas Regional Water Planning Area by County.....	2-24
2.8	Historical and Projected Irrigation Water Demand in the East Texas Regional Water Planning Area by County (ac-ft/yr)	2-27
2.9	Irrigation Demand Projection Percentages in the East Texas Regional Water Planning Area by County	2-28
2.10	Historical and Projected Steam Electric Power Water Demand in the East Texas Regional Water Planning Area by County (ac-ft/yr).....	2-31
2.11	Steam Electric Power Demand Projection Percentages in the East Texas Regional Water Planning Area by County	2-31
2.12	Historical and Projected Livestock Water Demand in the East Texas Regional Water Planning Area by County (ac-ft/yr)	2-34
2.13	Livestock Demand Projection Percentages in the East Texas Regional Water Planning Area by County	2-36
2.14	Historical and Projected Mining Water Demand in the East Texas Regional Water Planning Area by County (ac-ft/yr)	2-38
2.15	Mining Demand Projection Percentages in the East Texas Regional Water Planning Area by County	2-39
2.16	Contractual Obligations of Water User Groups in the East Texas Regional Water Planning Area (ac-ft/yr)	2-42
2.17	Expected Demands for each Major Water Provider in the East Texas Regional Water Planning Area (ac-ft/yr)	2-43
2.18	2020 Major Water Provider Demands in the East Texas Regional Water Planning Area by Water Use Category	2-51
3.1	Summary of Currently Available Water Supplies in the East Texas Regional Water Planning Area (ac-ft/yr)	3-5
3.2	Sedimentation Rates and Projected Storage Capacity of Major Reservoirs in the Neches River Basin.....	3-7
3.3	Sedimentation Rates and Projected Storage Capacity of Major Reservoirs in the Sabine River Basin.....	3-9



3.4	Currently Available Supplies from Permitted Reservoirs Serving the East Texas Regional Water Planning Area (ac-ft/yr).....	3-10
3.5	Summary of the Available Supply from Run-of-River Diversions (ac-ft/yr).....	3-12
3.6	Summary of Available Local Supply (ac-ft/yr).....	3-16
3.7	Desired Future Conditions in Groundwater Management Area-11 Modeled Drawdowns (in feet) by County and Aquifer	3-19
3.8	Desired Future Conditions in Groundwater Management Area-14 Modeled Drawdowns (in feet) by County and Aquifer	3-20
3.9	Modeled Available Groundwater by Aquifer (ac-ft/yr).....	3-21
3.10	Modeled Available Groundwater Aquifer Totals (ac-ft/yr)	3-24
3.11	Groundwater Availability from Other Undifferentiated Aquifers.....	3-25
3.12	Summary of Available Reuse Supply (ac-ft/yr)	3-26
3.13	Summary of Existing Exports and Imports in East Texas Regional Water Planning Area	3-27
3.14	Summary of Existing Water Supplies of Water User Groups by County (ac-ft/yr)	3-29
3.15	Summary of Existing Water Supplies for Major Water Provider (ac-ft/yr)	3-30
4.1	Summary of Supply and Demand for the East Texas Regional Water Planning Area (ac-ft/yr) ...	4-2
4.2	Summary of Projected Regional Needs by Water Use Type (ac-ft/yr).....	4-3
4.3	Summary of Projected First Tier Water Needs by County (ac-ft/yr)	4-4
4.4	Summary of Projected First Tier Water Needs by County (Percentage of Demand).....	4-5
4.5	Water User Groups with Projected Needs (ac-ft/yr)	4-7
4.6	Major Water Providers with Projected Regional Needs for Current Customers (ac-ft/yr).....	4-10
4.7	Major Water Providers with Projected Regional Surpluses for Current Customers (ac-ft/yr).....	4-11
5A.1	Potential Environmental Issues Associated with Water Conservation	5A-3
5A.2	Comparison of Water Conservation	5A-4
5A.3	Summary of Unallocated Supplies in the East Texas Regional Water Planning Area	5A-5
5A.4	Water User Groups with Water Management	5A-6
5A.5	Potential Environmental issues Associated	5A-7
5A.6	Comparison of Expanded Use of Groundwater to Plan Development Criteria	5A-8
5A.7	List of Needs Met by Voluntary Redistribution	5A-9
5A.8	Potential Environmental Impacts Associated with Voluntary Redistribution.....	5A-10
5A.9	Comparison of Voluntary Redistribution to Plan Development Criteria.....	5A-11
5A.10	Potential Reservoirs for Designation as Unique Reservoir Sites.....	5A-13
5A.11	List of Participants for the Lake Columbia Project.....	5A-14
5A.12	Demands Supplied by Lake Fastrill Replacement Project.....	5A-14
5A.13	Environmental Issues Associated with Development of New Reservoirs	5A-15
5A.14	Comparison of Development of New Reservoirs to Plan Development Criteria	5A-16
5B.1	2021 Needs, Recommended, and Alternative Water Management Strategies for Water User Groups	5B-128
5B.2	2021 Needs and Water Management Strategies for Wholesale Water Providers (ac-ft per year)....	5B-133
5C.1	Texas Water Development Board Base Per Capita Water Use in the East Texas Regional Water Planning Area by Water User Group	5C-3
5C.2	Reported 2017 Water Loss Accounting in the East Texas Regional Water Planning Area	5C-6
5C.3	Water Users and Types of Use that are Required to Develop, Implement, and Submit Water Conservation Plans.....	5C-8
5C.4	Primary Water Conservation Strategies Documented in Water Conservation Plans.....	5C-10
5C.5	Summary of Measures in Water Conservation Plans	5C-11
5C.6	Water Conservation Efficiencies for Enhanced Public and School Education.....	5C-12
5C.7	Enhanced Water Loss Control Program Targets.....	5C-12
5C.8	Water Conservation Savings for Selected Water User Groups.....	5C-13
7.1	Historical Droughts of Record for Major Water Supply Reservoirs	7-2
7.2	East Texas Regional Water Planning Area Water Suppliers Required to Submit Drought Contingency Plans.....	7-8



7.3	Drought Trigger Conditions and Strategies Documented in Drought Contingency Plans	7-9
7.4	Summary of Drought Response Measures.....	7-13
7.5	Potential Brackish Groundwater Sources for Subject Water User Groups.....	7-20
7.6	Summary of East Texas Regional Water Planning Area Potential Emergency.....	7-21
7.7	Potential Supplies from Releases from an Upstream Reservoir for Subject Water User Groups	7-22
7.8	Potential Emergency Interconnect Sources for Subject Water User Groups	7-23
7.9	Summary of Potential Emergency Supplies for Subject Water User Groups	7-27
7.10	Lake Athens Triggers and Potential Actions.....	7-31
7.11	Lake Center and Lake Pinkston Triggers and Potential Actions	7-32
7.12	Houston County Lake Triggers and Potential Actions	7-33
7.13	Lake Jacksonville Triggers and Potential Actions	7-34
7.14	Lake Murvaul Triggers and Potential Actions	7-36
7.15	Lake Nacogdoches Triggers and Potential Actions	7-38
7.16	Lake Palestine Triggers and Potential Actions.....	7-39
7.17	Rusk City Lake Triggers and Potential Actions	7-40
7.18	Sam Rayburn/B. A. Steinhagen System Triggers and Potential Actions	7-41
7.19	Lake Striker Triggers and Potential Actions	7-42
7.20	Toledo Bend Reservoir Triggers and Potential Actions	7-43
7.21	Lake Tyler/Lake Tyler East/Lake Bellwood Triggers	7-44
7.22	Recommended Triggers and Potential Actions for Lakes Without Site-Specific Drought Contingency Plans.....	7-46
7.23	Drought Severity Classification.....	7-48
8.1	Texas Parks and Wildlife Department Ecologically Significant River and Stream Segments	8-4
8.2	Texas Parks and Wildlife Department Threatened and Endangered Species/Unique Communities	8-5
8.3	Land with a Special Protective Status	8-6
8.4	Potential Reservoirs for Designation as Unique Reservoir Sites.....	8-7
10.1	Voting Members of the East Texas Regional Water Planning Group and Group Representation	10-2
11.1	Summary of Projected Water Demands from the East Texas Regional Water Planning Area by Use Category and Decade.....	11-4
11.2	Summary of Available Supply in the East Texas Regional Water Planning Area by Decade	11-6
11.3	Summary of Existing Supplies of Water User Groups in the East Texas Regional Water Planning Area by Decade	11-7
11.4	Summary of Existing Supplies of Wholesale Water Providers in the East Texas Regional Water Planning Area by Decade.....	11-9
11.5	Summary of Identified Water User Group Needs from the East Texas Regional Water Planning Area by Use Category and Decade	11-13
11.6	Summary of Identified Wholesale Water Provider Needs from the East Texas Regional Water planning Area by Use Category and Decade.....	11-15
11.7	Summary of Water Management Strategies in the East Texas Regional Water planning Area by Decade.....	11-17



List of Figures

ES.1	Region I Reference Map	ES-3
1.1	Location Map	1-1
1.2	Natural Geographic Regions.....	1-4
1.3	Mean Annual Temperature	1-6
1.4	Mean Annual Precipitation	1-7
1.5	Gross Reservoir Evaporation	1-8
1.6	Historical Populations of Major Cities	1-9
1.7	Major Aquifers	1-13
1.8	Minor Aquifers	1-14
1.9	Groundwater Conservation Districts and Groundwater Management Areas.....	1-18
1.10	U.S. Geographical Survey Identified Springs	1-19
1.11	Surface Water Sources	1-21
1.12	Percent Prime Farmland	1-27
1.13	Texas A&M Forest Service Northeast and Southeast Regions	1-31
1.14	Mitigation Banks	1-34
1.15	Wetland Area.....	1-35
1.16	Sabine Lake Estuary and Vicinity	1-37
1.17	Ecologically Significant Stream Segments	1-40
1.18	Top Producing Oil Wells.....	1-43
1.19	Top Producing Gas Wells	1-44
1.20	Lignite Coal Resources	1-45
2.1	Population Projections for the East Texas Regional Water Planning Area by County (2020-2070) ..	2-2
2.2	Population Annual Growth Rate.....	2-3
2.3	Water Usage in the East Texas Regional Water Planning Area by Use Category	2-12
2.4	Municipal Demand Projections in the East Texas Regional Water Planning Area Greater than 20,000 ac-ft/yr by County.....	2-21
2.5	Municipal Demand Projections in the East Texas Regional Water Planning Area Less than 20,000 ac-ft/yr by County.....	2-21
2.6	Municipal Demand Annual Growth Rate.....	2-22
2.7	Manufacturing Demand Projections in the East Texas Regional Water Planning Area Greater than 10,000 ac-ft/yr by County.....	2-25
2.8	Manufacturing Demand Projections in the East Texas Regional Water Planning Area Less than 10,000 ac-ft/yr by County.....	2-25
2.9	Manufacturing Demand Annual Growth Rate.....	2-26
2.10	Irrigation Demand Projections in the East Texas Regional Water Planning Area Greater than 1,000 ac-ft/yr by County	2-29
2.11	Irrigation Demand Projections in the East Texas Regional Water Planning Area Less than 1,000 ac-ft/yr by County	2-29
2.12	Irrigation Demand Annual Growth Rate	2-30
2.13	Steam Electric Power Demand Projections in the East Texas Regional Water Planning Area by County	2-32
2.14	Steam Electric Power Demands Annual Growth Rate	2-33
2.15	Livestock Demand Projections in the East Texas Regional Water Planning Area Greater than 2,000 ac-ft/yr by County	2-35
2.16	Livestock Demand Projections in the East Texas Regional Water Planning Area Less than by 2,000 ac-ft/yr by County	2-35



2.17	Livestock Demand Annual Growth Rate	2-37
2.18	Mining Demand Projections in the East Texas Regional Water Planning Area Greater than 600 ac-ft/yr by County	2-40
2.19	Mining Demand Projections in the East Texas Regional Water Planning Area Less than 600 ac-ft/yr by County	2-40
2.20	Mining Demand Annual Growth Rate	2-41
3.1	Major Aquifers	3-2
3.2	Minor Aquifers	3-3
3.3	Surface Water Sources	3-4
3.4	Year 2020 Available Supplies by Source Type	3-5
3.5	Groundwater Conservation Districts and Groundwater Management Areas.....	3-18
4.1	Comparison of Regional Water Supplies to Demands.....	4-2
4.2	Projected Regional Needs by Water Use Type (ac-ft/yr)	4-3
4.3	Unallocated Supplies	4-6
4.4	Regional Secondary Needs Comparison	4-13
5A.1	Aquifer Storage and Recovery Screening Criteria.....	5A-17
7.1	Composite Drought Monitor Index for Counties in the East Texas Regional Water Planning Area... ..	7-4
7.2	Palmer Hydrological Drought Index for the East Texas Climatic Zone	7-5
7.3	Composite Reservoir Storage in the East Texas Regional Water Planning Area	7-6
7.4	Range of Percentage Water Savings Goals East Texas Regional Water Planning Area Drought Contingency Plans.....	7-12
7.5	Summary of Sole-Source Water Supplies for Municipal Water User Groups with Population Less Than 7,500.....	7-19
8.1	Texas Parks and Wildlife Department Ecologically Significant Stream Segments	8-3
11.1	Total Projected Demand for the East Texas Regional Water Planning Area from the 2016 and 2021 Plans.....	11-3
11.2	Total Available Supply for the East Texas Regional Water Planning Area from the 2016 and 2021 Plans.....	11-5
11.3	Total Existing Supplies of Water User Groups in the East Texas Regional Water Planning Area from the 2016 and 2021 Plans	11-7
11.4	Total Existing Supplies of Wholesale Water Providers in the East Texas Regional Water Planning Area from the 2016 and 2021 Plans	11-9
11.5	Total Identified Water User Group Needs for the East Texas Regional Water Planning Area in the 2016 and 2021 Plans.....	11-12
11.6	Total Identified Wholesale Water Provider Needs for the East Texas Regional Water Planning Area in the 2016 and 2021 Plans.....	11-14
11.7	Total Supply of Recommended Water Management Strategies for the East Texas Regional Water Planning Area in the 2016 and 2021 Plans	11-16



List of Appendices

Appendix ES-A	Required 2022 Regional Water Planning Application Web Interface Reports	
Report 1.	WUG Population Projections	ES-A-3
Report 2.	WUG Water Demands	ES-A-10
Report 3.	WUG Category - Summary	ES-A-20
Report 4.	Source Water Availability	ES-A-21
Report 5.	WUG Existing Water Supplies	ES-A-26
Report 6.	WUG Identified Water Needs/Surpluses	ES-A-42
Report 7.	WUG Second-Tier Identified Water Need	ES-A-51
Report 8.	WUG Second-Tier Identified Water Need - Summary	ES-A-60
Report 9.	Source Water Balance	ES-A-61
Report 10. (a)	Comparison of Availability, Supply, Demands, and need to 2016 RWP	ES-A-66
Report 10. (b)	Source Data Comparison to 2016 RWP	ES-A-78
Report 11.	WUG Unmet Needs	ES-A-80
Report 12.	WUG Unmet Needs - Summary	ES-A-81
Report 13.	WUG Recommended Water Management Strategies	ES-A-82
Report 14.	Recommended Projects Associated with Water Management Strategies .	ES-A-89
Report 15.	WUG Alternative Water Management Strategies	ES-A-92
Report 16.	Alternative Projects Associated with Water Management Strategies93	ES-A-93
Report 17.	WUG Management Supply Factor	ES-A-94
Report 18.	Recommended Water Management Strategies Requiring a New or Amended IBT Permit.....	ES-A-100
Report 19.	WUG Recommended Conservation WMS Associated with Recommended IBT WMS	ES-A-101
Report 20.	Recommended WMS Supplies Unallocated to WUGs	ES-A-102
Report 21.	Summary of WMS Users by WMS Type	ES-A-103
Report 22.	Summary of WMS Users by Source	ES-A-104
Report 23.	MWP Existing Sales and Transfers	ES-A-105
Report 24.	MWP WMP Recommended WMS and Projects.....	ES-A-108
Appendix 1-A	Species of Special Concern in the East Texas Regional Water Planning Area	
Appendix 1-B	Water Loss Audits	
Appendix 2-A	Correspondence of the East Texas Regional Water Planning Group Chair to the Texas Water Development Board	
Appendix 2-B	Historical Estimates for Utility Water User Group in Region I	
Appendix 3-A	Desired Future Conditions And Modeled Available Groundwater Report(s)	
Appendix 3-B	Water Availability Technical Memorandum	
Appendix 4-A	Water Demands, Supplies, and Needs for Major Water Providers	
Appendix 5A-A	Screening Criteria for Potentially Feasible Water Management Strategies	
Appendix 5A-B	Potentially Feasible Water Management Strategies	
Appendix 5B-A	Technical Memorandums of Water Management Analysis	
Appendix 5B-B	Quantification of Environmental Impacts of Water Management Strategies and Strategy Evaluation Matrix	
Appendix 5B-C	Management Supply Factors for Major Water Providers	
Appendix 5C-A	Plumbing Code Savings	
Appendix 6-A	Title 31 Texas Administrative Code Chapters 357 and 358 Regulations Pertaining to	



	the 2021 Plan
Appendix 6-B	Socioeconomic Impact Analysis
Appendix 8-A	Proposed Reservoir Site Locations
Appendix 8-B	2011 Prioritization Comments & Concerns Memorandum
Appendix 9-A	Infrastructure Financing Report – Contact Information
Appendix 9-B	Infrastructure Financing Report – Survey Results
Appendix 10-A	Media and Public Outreach
Appendix 10-B	Transcripts, Presentations, and Minutes from Public Hearings
Appendix 10-C	Initially Prepared Plan Public Comments
Appendix 10-D	Initially Prepared Plan Submittal Letter
Appendix 11-A	Texas Water Development Board Implementation Survey



List of Abbreviations and Acronyms

°F	degrees Fahrenheit
µg/L	micrograms per liter
2011 Plan	2011 East Texas Regional Water Plan
2016 Plan	2016 East Texas Regional Water Plan
2021 IPP	2021 East Texas Initially Prepared Plan
2021 Plan	2021 East Texas Regional Water Plan
ac-ft/yr	acre-feet per year
amsl	annual mean sea level
AMWA	Athens Municipal Water Authority
AN WCID#1	Angelina-Nacogdoches Water Control & Improvement District No. 1
ANRA	Angelina and Neches River Authority
AWWA	American Water Works Association
bgl	below ground level
BMP	Best Management Practices
CCN	Certificate of Convenience and Necessity
cfs	cubic feet per second
CRP	Texas Clean Rivers Program
CWA	Clean Water Act
DB22	2022 Regional Water Planning Application Web Interface
DCP	drought contingency plan
DFC	desired future condition
EDAP	Economically Distressed Areas Program
EIS	environmental impact study
ES	Executive Summary
ETRWA	East Texas Regional Water Planning Area, or Region I
ETRWPG	East Texas Regional Water Planning Group
GAM	groundwater availability model
GCD	groundwater conservation district
GMA	groundwater management areas
gpcd	gallons per capita per day
gpm	gallons per minute
HB 1763	2005 Texas House Bill 1763
HCWCID #1	Houston County Water Control & Improvement District No. 1
IFR	Infrastructure Financing Report
IPP	Initially Prepared Plan
IWA	International Water Association
LNG	liquid natural gas
LNVA	Lower Neches Valley Authority
MAG	modeled available groundwater
mg/L	milligrams per liter
MGD	million gallons per day
MSA	Metropolitan Statistical Area
msl	mean sea level
MUD	municipal utility district
MWA	municipal water authority
MWD	municipal water district
MWP	major water provider
NEPA	National Environmental Policy Act



No.	number
NRCS	National Resources Conservation Service
PCFWSO No. 1	Panola County Freshwater Supply District No. 1
pCi/L	picocuries per liter
PHDI	Palmer Hydrological Drought Index
ppm	parts per million
ppt	parts per thousand
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
SB 1	1997 Texas Legislature Senate Bill 1
SB 2	2001 Texas Legislature Senate Bill 2
SB 3	2007 Texas Legislature Senate Bill 3
SDWA	Safe Drinking Water Act
SFA	Stephen F. Austin State University
SRA	Sabine River Authority of Texas
STATSGO	State Soil Geographic Database
SUD	special utility district
SWIFT	State Water Implementation Fund for Texas
SWP	State Water Plan
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TCRP	Texas Clean Rivers Program
TDS	total dissolved solids
TDSHS	Texas Department of State Health Services
THC	Texas Historical Commission
TIFP	Texas Instream Flow Program
TMDL	total maximum daily load
TPWD	Texas Parks and Wildlife Department
TRA	Trinity River Authority
TSDC	Texas State Data Center
TTWP	Trans-Texas Water Program
TWC	Texas Workforce Commission
TWDB	Texas Water Development Board
TXBCD	Texas Biological and Conservation Data System
UNRMWA	Upper Neches River Municipal Water Authority
USACE	United States Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UWCD	underground water conservation district
WAM	Water Availability Model
WCID	water control & improvement district
WCITF	Water Conservation Implementation Task Force
WIF	Water Infrastructure Fund
WMA	wildlife management area
WMS	water management strategy
WSC	water supply corporation
WTP	water treatment plant
WUG	water user group
WWP	wholesale water provider



List of Water Measurement Conversions

1 ac-ft	=	325,851 gallons
1 cfs	=	448.8 gpm
1 liter per second	=	15.85 gpm
1 MGD	=	1,120 ac-ft per year
1 MGD	=	694.444 gpm

