WATER MANAGEMENT PLAN
FOR
LAKE TEXANA AND
PALMETTO BEND STAGE 2
DAM AND RESERVOIR
ON LAVACA RIVER

Lavaca-Navidad River Authority

March 2008

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Section **Page**

APPENDIX

A. Certificate of Adjudication: 16-2095; Amendments A, B, C, and D
B. LNRA Water Conservation Plan
C. LNRA Drought Contingency Plan

D. Bay and Estuary Releases Operating Procedures
E. Upstream Irrigators Compromise Settlement Agreement

List of Tables

List of Figures

With respect to the information, included in the 1997 Land and Water Resource Management Plan, that has been carried forward and included in this 2007 Water Management Plan, LNRA wishes to acknowledge the contributions made by HDR Engineering, Inc. and Paul Price Associates, Inc. LNRA also acknowledges the contributions made by Bickerstaff Heath Delgado Acosta LLP in the preparation of this 2007 Water Management Plan.

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1.0 INTRODUCTION

Lake Texana (Stage 1) is located in Jackson County on the Navidad River 7 miles southeast of Edna, Texas and the proposed Palmetto Bend Stage 2 dam and reservoir will be located in Jackson County on the Lavaca River (Figure 1-1). Legislation recently passed by the 80th Texas Legislature, recognized the Palmetto Bend Stage 2 site to be a designated site of unique value for the construction of a reservoir. The site is also recommended for designation in the recently adopted 2007 State Water Plan. Lake Texana and the Stage 2 dam and reservoir were authorized by the U.S. Congress[1] in 1968 ("Palmetto Bend Project") for the purposes of providing: (1) a dependable supply of municipal and industrial water; (2) conservation and development of fish and wildlife resources; and (3) enhancement of outdoor recreation opportunities. Lake Texana was constructed by the U.S. Bureau of Reclamation (BOR) in the late 1970's at a cost of approximately $90.7 million (about $3.0 million above the contract cost ceiling). Impoundment of water in Lake Texana began in February, 1980.

The Lavaca-Navidad River Authority ("LNRA") is a governmental agency and body politic and corporate created and existing pursuant to Article XVI, Section 59 of the Texas Constitution, and is authorized and empowered for the purposes of controlling, storing, preserving, and distributing the waters of the storm and flood waters and the waters of rivers and streams of Jackson County and their tributaries inside and outside of Jackson County for domestic, municipal, flood control, irrigation, agricultural, mining and recovery of minerals, hydroelectric power, navigation, recreation and pleasure, public parks, game preserves, and other useful purposes.[2] Protecting and improving the quality of the available water resources of the Lavaca Basin for beneficial use by the public is also an important function of LNRA.

In fiscal year 2001, the Texas Water Development Board ("TWDB") and LNRA purchased BOR's interest in the Palmetto Bend Project. In fiscal year 2002, LNRA purchased

[1] House Document 279, 89th Congress, dated August 6, 1965 contains the feasilibility report which was the basis for authorization; Public Law 90-562, 82 stat. 999.
[2] Formerly cited at Article 8280-131, Vernon's Annotated Texas Civil Statutes, as amended.

TWDB's interest in the Palmetto Bend Project. Since February 1, 2002, LNRA is the sole owner of the Palmetto Bend Project, subject to outstanding debt.

As determined in 2000, Lake Texana has a surface area of approximately 9,727 acres and a storage capacity of approximately 161,085 acre-feet of water.[3] LNRA holds Texas Commission on Environmental Quality (TCEQ) Certificate of Adjudication No. 16-2095, as amended. (*See* Appendix A). Pursuant to Certificate of Adjudication No. 16-2095, as amended, LNRA is authorized to:

IMPOUNDMENT AUTHORITY

- is authorized to impound water in a 170,300 acre-foot capacity reservoir (Lake Texana) on the Navidad River and in a 93,340 acre-foot capacity reservoir (Stage 2 reservoir) on the Lavaca River. Station 129+60 on the centerline, being a point common to the Stage 1 and Stage 2 Dams, bears N 71°27'W, 3333 feet from the northwest corner of the Stephen F. Austin Survey, Abstract No. 5, Jackson County, Texas.[4]

USE OF AUTHORITY

- use all impounded waters for recreational purposes and for construction and maintenance of the dams authorized;[5]

- divert and use from Lake Texana not to exceed 46,518 acre-feet of water per annum for municipal use and 32,482 acre-feet of water per annum for industrial use (79,000 acre-feet per annum in total);[6]

- transport not to exceed 46,590 acre-feet of water per annum of the 79,000 acre-feet of water per annum authorized for diversion from Lake Texana (includes 4,500 acre-feet of water per annum that may be used on an interruptible basis) for use in Aransas, Atascosa, Bee, Duval, Jim Wells, Kleberg, Live Oak, McMullen, Nueces, San Patricio, Victoria,

[3] Volumetric Survey of Lake Texana prepared for LNRA in cooperation with the U.S. Army Corps of Engineers prepared by Texas Water Development Board, 2001.
[4] Certificate of Adjudication No. 16-2095A.
[5] Certificate of Adjudication No. 16-2095 and 16-2095A.

Calhoun and Refugio Counties, which include land in the Lavaca-Guadalupe Coastal Basin, the San Antonio-Nueces Coastal Basin, the Nueces River Basin, the Nueces-Rio Grande Coastal Basin, the Guadalupe River Basin and the San Antonio River Basin;[7]

- divert an additional 7,500 acre-feet of water per annum from Lake Texana on an interruptible basis and an interbasin transfer authorization for the 7,500 acre-feet of water for multiple purposes (municipal and industrial use) from the Lavaca River Basin for use in these twelve (12) counties: Aransas, Atascosa, Bee, Duval, Jim Wells, Kenedy, Kleberg, Live Oak, McMullen, Nueces, San Patricio, and Willacy, located in whole or in part in the Nueces River Basin, San Antonio River Basin, Nueces-Rio Grande Coastal Basin, and the San Antonio-Nueces Coastal Basin;[8]

- upon completion of the Stage 2 dam and reservoir on the Lavaca River, use not to exceed 48,122 acre-feet of water per annum of which up to 7,150 acre-feet of water per annum shall be for municipal purposes, up to 22,850 acre-feet of water per annum shall be for industrial purposes, and at least 18,122 acre-feet of water per annum shall be for the maintenance of the Lavaca-Matagorda Bay and Estuary System.[9]

DIVERSION AUTHORITY

- Location

  1. At a point on the west bank of the service spillway of the Stage 1 dam which is N69°W, 2850 feet from the northwest corner of the S.F. Austin Survey, Abstract 5, Jackson County, Texas.

  2. At a point on the east bank of the service spillway of the Stage 1 dam which is N61°W, 2500 feet from the northwest corner of the S.F. Austin Survey, Abstract 5, Jackson County, Texas.[10]

- Maximum Combined Rate – 330 cfs (148,000 gpm).[11]

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[6] Certificate of Adjudication No. 16-2095C.
[7] *Id.*
[8] Certificate of Adjudication No. 16-2095D.
[9] Certificate of Adjudication No. 16-2095B.

PRIORITIES

- Impoundment – May 15, 1972.[12]
- Diversion – May 15, 1972.[13]
- Use

1. 42,518 acre-feet per annum for municipal use from Lake Texana – May 15, 1972.[14]
2. 32,482 acre-feet per annum for industrial use from Lake Texana – May 15, 1972.[15]
3. 4,000 acre-feet per annum for municipal and industrial use from Lake Texana – May 24, 1982.[16]
4. 7,500 acre-feet per annum for municipal and industrial uses on interruptible basis from Lake Texana – July 1, 2002.[17]
5. 7,150 acre-feet per annum for municipal use from Stage 2 – May 15, 1972.[18]
6. 22,850 acre-feet per annum for industrial use from Stage 2 – May 15, 1972.[19]
7. 18,122 acre-feet per annum for bay/estuary from Stage 2 – Oct. 6, 1993.[20]
8. All impounded waters for recreational purposes and for construction and maintenance of the authorized dams – May 15, 1972.[21]

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[10] Certificate of Adjudication Nos. 16-2095, 16-2095A and 16-2095D.
[11] Certificate of Adjudication Nos. 16-2095, 16-2095A and 16-2095D.
[12] Certificate of Adjudication No. 16-2095A.
[13] Certificate of Adjudication Nos. 16-2095 and 16-2095A.
[14] Certificate of Adjudication Nos. 16-2095A and 16-2095C.
[15] Certificate of Adjudication Nos. 16-2095A and 16-2095C.
[16] Certificate of Adjudication Nos. 16-2095B and 16-2095C.
[17] Certificate of Adjudication No. 16-2095D.
[18] Certificate of Adjudication Nos. 16-2095, 16-2095A, and 16-2095B.
[19] Certificate of Adjudication Nos. 16-2095, 16-2095A and 16-2095B.
[20] Certificate of Adjudication No. 16-2095B.
[21] Certificate of Adjudication No. 16-2095.

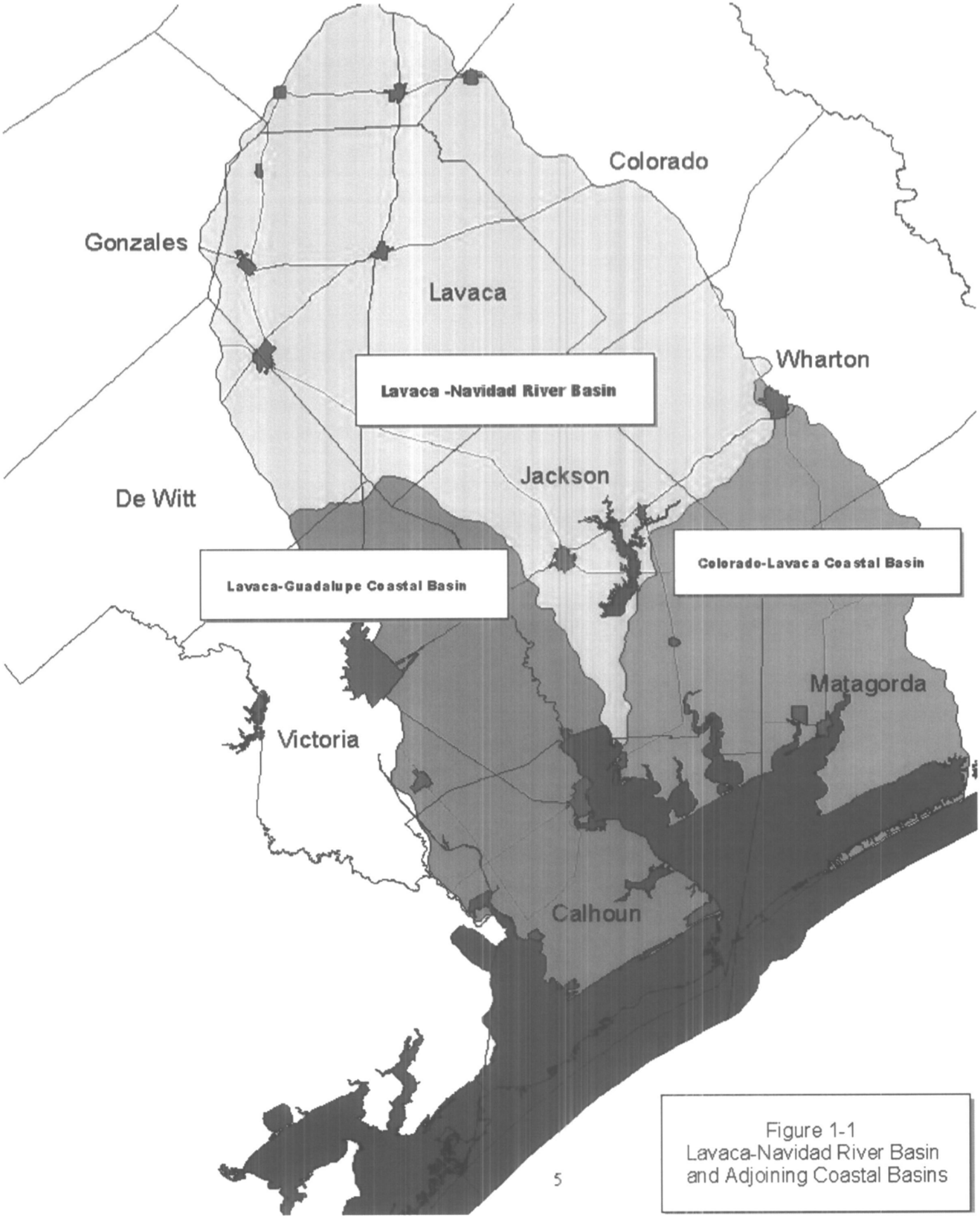

Figure 1-1
Lavaca-Navidad River Basin
and Adjoining Coastal Basins

2.0 OBJECTIVES

The major objective is to develop a water management plan to address:

- the potential of water conservation and reuse to enhance existing water supplies and the potential impact of such practices on the timing of construction of Stage 2,
- a drought contingency plan in accordance with TCEQ rules,
- an assessment of environmental water needs (instream needs, water quality, aquatic and wildlife habitat, and beneficial inflows to affected bays and estuaries) and potential responses to address such needs, particularly as related to Stage 2, and
- the management of water supply, including timing and planning of construction of Stage 2.[22]

3.0 LAVACA RIVER BASIN

The Lavaca River Basin consists of the Lavaca and Navidad Rivers and their tributaries which drain all or portions of Fayette, Lavaca, Jackson, DeWitt, Colorado and Wharton Counties. The headwaters of these streams arise within the Western Gulf Coastal Plain and in the Blackland Prairie Ecoregion to the north, primarily in Fayette County. The Lavaca and Navidad Rivers join about two miles east of Vanderbilt, four river miles below Palmetto Bend Dam which impounds the Navidad River to create Lake Texana (Figure 1-1).

Groundwater from the Gulf Coast Aquifer provides most of the present municipal, industrial, and agricultural water needs in the basin. The aquifer ranges from 200 feet to 800 feet in thickness and extends to a maximum depth of approximately 1,800 feet beneath the land surface. Overdrafting in some areas has led to declining groundwater levels. Some areas of the Gulf Coast Aquifer are surrounded by extensive deposits that contain saline waters resulting in a potential for saline water encroachment as overdrafting occurs.

3.1 The Palmetto Bend Project

Palmetto Bend Dam, Stage I, was constructed on the Navidad River approximately 4 miles above its confluence with the Lavaca River by the BOR to supply water to municipal and industrial customers in the coastal bend area. Impoundment to form Lake Texana was initiated

in February, 1980. At conservation pool elevation 44 feet msl, Lake Texana has a storage capacity of approximately 161,085 acre-feet of water and a surface area of 9,727 acres. At maximum flood pool (47 feet msl), an additional 1,500 acres is inundated. Lake Texana is fairly shallow with an average depth of approximately 16 feet and a maximum depth of 62.9 feet. The lake is located in a rural area remote from urban centers and no residential or industrial development has occurred on property adjacent to the project, except for recreational facilities on project lands. Such recreational facilities include public boat ramps, the Mustang Wilderness Campground, the Brackenridge Plantation Park & Campground with such amenities as hike and bike trails, nature trails, camping sites, Hafernick Recreation Center, historic Texana church, marina boat slips, Texas birding trail sites, miniature golf, sport court, recently completed equestrian and mountain bike trail and the Brackenridge Recreation Complex (construction commenced in 2007) and the Lake Texas State Park.

3.1.1 Lake Texana

Prior to construction, the combined annual discharge of the Lavaca and Navidad Rivers (gaged inflow) was estimated to average 593,000 acre-feet for the period of record 1941-1968.[23] Of this, Lake Texana was estimated to be capable of providing a firm yield of about 75,000 acre-feet per year, considering that on the average, about 17,000 acre-feet would be lost to evaporation. The BOR's yield studies were based upon projected 50-year inflow and reservoir conditions. More recent studies by the TWDB, using the 1941-1987 period and initial reservoir conditions which took into account additional water rights permits issued after 1972 for irrigation diversions, have estimated combined annual discharge of the Lavaca and Navidad Rivers to average 635,972 acft/yr, with Lake Texana capable of capturing a firm yield of 80,984 acft/yr.[24] TCEQ has estimated a somewhat lower firm yield of 79,000 acft/yr in full capture mode (no downstream flow maintenance releases).[25]

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[22] *See* Paragraph 5, Special Condition in Certificate of Adjudication No. 16-2095B.

[23] BOR. 1974. Palmetto Bend Project - Texas Final Environmental Impact Statement. Bureau of Reclamation, U.S. Department of the Interior.

[24] R.J. Brandes Company and M. Sullivan and Assoc. 1991. Evaluation of the Effects of Proposed Release Operation Plans for Lake Texana on Lavaca Bay Salinities. Prepared for Texas Parks and Wildlife Department, Austin, Texas.

[25] Krishna, H. 1994. Hydrologic Analysis of Application to Amend Certificate of Adjudication 16-2095A. TNRCC memo to Tom Weber, Permitting Section, May 04, 1994.

Certificate of Adjudication No. 16-2095B, which requires releases for bay and estuary needs, reduces the annual yield available for municipal and industrial use by 4,500 acft/yr to 74,500 acft/yr.

3.1.2 Fisheries

Lake Texana is classified by the TCEQ as supporting high quality aquatic habitat, as suitable for contact recreation, and for use as public water supply. Aquatic vegetation, particularly hyacinth and hydrilla, is a problem in shallow areas, particularly in shoreline recreational areas where it may interfere with swimming or boating activities. On the other hand, aquatic vegetation also provides important fish habitat, particularly for gamefish.[26]

There are 59 fish species that have been reported to occur in the Lavaca-Navidad River Basin (Table 3-1). Many of these fish, including the marine and brackish species (denoted in the table), the American eel, which migrates from the sea into freshwater to reproduce, and several species that are primarily adapted to life in flowing streams are not expected to occur in Lake Texana. The stream adapted species (for example, speckled chub, mimic shiner, darters, and river carpsucker) may only be present in the upper Navidad River and other tributaries to the lake. Other fish species may use the lake for part of their life cycle, but migrate into the tributary streams to reproduce (i.e., smallmouth and Guadalupe bass).

The Texas Parks and Wildlife Department ("TPWD") conducts periodic studies of Lake Texana to determine the health and viability of aquatic populations. LNRA works with TPWD's inland fisheries division to restock targeted species and improve spawning habitat.

[26] Durocher,P.P., W.C. Provine, J.E. Kraai. 1984. Relationship Between Abundance of Largemouth Bass and Submerged Vegetation in Texas Reservoirs. North American Journal of Fisheries Management 4, 84-88.

Table 3-1
Fish Species Reported From the Lavaca River Basin[1]

Scientific Name	Common Name	Scientific Name	Common Name
Lepisosteus oculatus	Spotted gar	*F. pulvereus*	Bayou killifish*
L. spatula	Alligator gar	*Gambusia affinis*	Mosquitofish
Elops saurus	Ladyfish*	*Poecilia lattipinna*	Sailfin molly
Anguilla rostrata	American eel	*Membras martinica*	Rough silverside*
Brevoortia patronis	Gulf menhaden*	*Menedia beryllina*	Inland silverside
Dorosoma cepedianum	Gizzard shad	*Lepomis cyanellus*	Green sunfish
Anchoa mitchilli	Bay anchovy*	*L. gulosus*	Warmouth
Cyprinella lutrensis	Red shiner	*L. macrochirus*	Bluegill sunfish
C. venusta	Blacktail shiner	*L. megalotis*	Longear sunfish
Cyprinis carpio	Common carp	*Micropterus dolomieu*	Smallmouth bass
Lythrurus fumeus	Ribbon shiner	*M. salmoides*	Largemouth bass
Macrhybopsis aestivalis	Speckled chub	*M. treculi*	Guadalupe bass
Notemigonus chrysoleucas	Golden shiner	*Pomoxis annularis*	White crappie
Notropis amnis	Pallid shiner	*P. nigromaculatus*	Black crappie
Notropis buchanani	Ghost shiner	*Etheostoma gracile*	Slough darter
Notropis shumardi	Silverband shiner	*E. lepidum*	Greenthroat darter
Notropis texanus	Weed shiner	*Lagodon rhoimboides*	Pinfish*
Notropis volucellus	Mimic shiner	*Cynoscion arenarius*	Sand seatrout*
Opsopoeodus emiliae	Pugnose minnow	*C. nebulosus*	Spotted seatrout*
Pimephales promelas	Fathead minnow	*Micropogonais undulatus*	Atlantic croaker*
Carpiodes carpio	River carpsucker	*Sciaenops ocellatus*	Redfish*
Ictiobus bubalus	Smallmouth buffalo	*Stellifer lanceolatus*	Star drum*
Ameiurus melas	Black bullhead	*Agonostomus monticola*	Mountain mullet*
A. natalis	Yellow bullhead	*Mugil cephalus*	Stripped mullet*
Ictalurus furcatus	Blue catfish	*Gobionellus shufeldti*	Freshwater goby
I. punctatus	Channel catfish	*Gobiosoma bosc*	Naked goby*
Pylodictis olivaris	Flathead catfish	*G. robustum*	Code goby*
Cyprinodon variegatus	Sheepshead minnow*	*Microgobius thalassinus*	Green goby*
Fundulus chrysotus	Golden topminnow	*Citharichthys spilopterus*	Bay whiff*
		Paralichthys lethostigma	Southern flounder*

[1] Hubbs, C., J.D. McEachran, and C.R. Smith. 1994. Freshwater and marine fishes of Texas and the northwestern Gulf of Mexico. Texas System of Natural Laboratories Index Series No. FTX/NWGM-94, Austin, TX

*Marine or brackish species.

3.2 Existing Management Programs

3.2.1 Water Conservation, Drought Contingency and Water Quality Management

The LNRA developed a Water Conservation Plan (*see* Appendix B) and a Drought Contingency Plan (*see* Appendix C) in 2005 pursuant to TCEQ rules for the Lavaca River Basin including Lake Texana. Such plans were also developed pursuant to requirements in LNRA's water rights.[27] In addition, each of LNRA's major water customers (Formosa Plastics Corporation, Corpus Christi, Texas, and Point Comfort, Texas) has a TCEQ approved water conservation and drought management plan.[28] Water quality monitoring data have been routinely collected by the U.S. Geologic Survey, LNRA and TCEQ in Lake Texana since 1988. In 1992, annual pesticide monitoring was begun for USGS monitoring stations at Lake Texana.

Most of the project lands are in agricultural use, and are managed to control and/or prevent non-point source pollution from agriculture and silviculture.

3.2.2 Fishery Management

The LNRA, with the Texas Parks and Wildlife Department ("TPWD"), has developed a fisheries management plan to increase largemouth bass and sunfish populations and angler utilization of native fishes, white bass, white crappie and catfish.[29] The primary objective of this program is to improve spawning and nursery habitat for largemouth bass and bluegill by planting cypress and willow trees along eroded portions of the shoreline. Although Lake Texana has abundant littoral habitat along the shoreline, the wind driven erosion causes silting and turbidity in shallow water nurseries.

The reservoir has had a problem with water hyacinth growth blocking access to public boat ramps, piers and fishing areas. LNRA has historically used contractors to treat large areas

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[27] The Water Conservation Plan and the Drought Contingency Plan, as revised on May 1, 2005, were approved by the LNRA Board in April 2005; Certificate of Adjudication Nos. 16-2095B, 16-2095C, 16-2095D.

[28] "The Formosa Plastics Corporation Revised Water Conservation Plan," Point Comfort, Texas 2005; "Water Conservation and Drought Contingency Plan," Corpus Christi, Texas, 2005; and "The Point Comfort Water Conservation and Drought Management Plan," Point Comfort, Texas, 1995.

[29] Reed, Mike and Galen Jons. 1994. Survey Report for Lake Texana, 1993. Texas Parks and Wildlife Department, Inland Fisheries Branch, District 1-E, Mathis, Texas. Statewide Freshwater Fisheries Monitoring and Management Program Federal Aid in Sport Fish Restoration Act for Project F-30-R.

of water hyacinth with aquatic herbicide, usually with aerial and/or boat applications. Isolated coves and boat ramps are treated by LNRA licensed herbicide applicators.

4.0 WATER DEMAND AND SUPPLY PROJECTIONS

The 2006 Regional Water Plan for Region P[30] projected water demands and supplies are presented in this section. The water demands include municipal, manufacturing, irrigation, mining, livestock, and releases and pass through to the estuaries.

4.1 Water Demand Projections

Water demand projections for municipal purposes are based upon population projections for each respective area, and per capita water use projections (gallons per person per day) of the population of the area, according to the following formula:

$$\begin{pmatrix}\text{Municipal Water Demand} \\ \text{in acre - feet per year}\end{pmatrix} = \frac{(\text{Population}) \times (\text{gcpd}) \times (365)}{325{,}851}$$

Quantities of releases for the maintenance of the Lavaca-Matagorda Bay and Estuary System are computed as specified in TCEQ Certificate of Adjudication No. 16-2095B.

4.1.1 Region P

In 2000, the population of Region P area was 48,068, with 40.0 percent in Lavaca County, 29 percent in Jackson County, and 31 percent in the adjoining portion of Wharton County (Table 4.1-1). Projected year 2060 population is 49,663 with 30 percent in Lavaca County, 36 percent in Jackson County, and 34 percent in the adjoining portion of Wharton County (Table 4.1-1).

[30] Region P consists of all of Lavaca and Jackson Counties and a portion of Wharton County.

Table 4.1-1

2006 Regional Water Plan Population Projections for 2000 - 2060:
Region P

REGION	WATER USER GROUP	COUNTY NAME	2000 [1]	2010	2020	2030	2040	2050	2060	Region Split Pop. [2]	County Split Pop. [3]
P	COUNTY-OTHER	JACKSON	6,577	7,029	7,491	7,778	7,943	8,006	8,008		
P	EDNA	JACKSON	5,899	6,331	6773	7,048	7,206	7,266	7,267		
P	GANADO	JACKSON	1,915	2,081	2,251	2,357	2,418	2,441	2,441		
		JACKSON Total	**14,391**	**15,441**	**16,515**	**17,183**	**17,567**	**17,713**	**17,716**		
P	COUNTY-OTHER	LAVACA	10,257	10,012	10,002	9,728	9,244	8,684	8,041		
P	HALLETTS-VILLE	LAVACA	2,345	2,289	2,287	2,224	2,114	1,985	1,839		
P	MOULTON	LAVACA	944	921	920	895	851	799	740		
P	SHINER	LAVACA	2,070	2,020	2,018	1,963	1,866	1,753	1,623		
P	YOAKUM	LAVACA	3,594	3,508	3,504	3,409	3,239	3,043	2,818	P	P
		LAVACA Total	**19,210**	**18,750**	**18,731**	**18,219**	**17,314**	**16,264**	**15,061**		
P	COUNTY-OTHER	WHARTON	3,522	3,725	3,937	4,074	4,153	4,155	4,111	P	
P	EL CAMPO	WHARTON	10,945	11,575	12,236	12,662	12,906	12,912	12,775		
		WHARTON Total	**14,467**	**15,300**	**16,173**	**16,736**	**17,059**	**17,067**	**16,886**	**P**	
		REGION P TOTAL	**48,068**	**49,491**	**51,419**	**52,138**	**51,940**	**51,044**	**49,663**		

1) The year 2000 population for cities and county totals are from the 2000 Census. For utilities, TWDB staff estimated the population served by the utility in 2000. Some of the 2000 population estimates for utilities were revised by the Regional Water Planning Groups. The County-Other population was derived by summing all of the city and utility population within a county and subtracting it from the county total population.

2) If "P" is present in this column, the Water User Group (WUG) is located in more than one Region and the projections listed in the row represent only the WUG's population projections within that particular Region, not the WUG's total population projections. If the "P" is present for a county total entry, then the county has been split by Regional boundaries and the projections listed in the row represent only the county's populations within the particular Region, not the county's total population projections.

3) If "P" is present in this column, the Water User Group (WUG) is located in more than one county and the projections listed in the row represent only the WUG's population projections within that particular county, not the WUG's total population projections.

Total water use for municipal, manufacturing, , irrigation, mining, livestock, and bay and estuaries purposes in Region P was 230,061 acft in 2010 (Table 4.1-2). Projected total water demand for these purposes in 2060 in Region P is estimated to decline to 211,408 acft (Table 4.1-2). Most of the downward trend in projected total water demand is due to expected improvements in irrigation water use efficiencies that are projected to result in less water required per acre irrigated. However, the trend in manufacturing and mining water demand is projected to increase over the next 50 years.

Table 4.1-2
2006 Regional Water Plan
Water Demand Projections for 2010-2060 (in acft)
Region P

Water Use Category	2010	2020	2030	2040	2050	2060
Municipal	7,171	7,260	7,169	6,952	6,738	6,541
Manufacturing	1,089	1,162	1,223	1,281	1,331	1,425
Mining	164	172	177	182	188	192
Steam-Electric	0	0	0	0	0	0
Livestock	3,499	3,499	3,499	3,499	3,499	3,499
Irrigation	213,638	209,646	205,806	202,120	198,568	195,251
Region P Subtotal	225,561	221,739	217,874	214,034	210,324	206,908
Bays and Estuaries (Lake Texana)	4,500	4,500	4,500	4,500	4,500	4,500
Region P Total	**230,061**	**226,239**	**222,374**	**218,534**	**214,824**	**211,408**

4.1.2 Bay and Estuary

Following joint studies, LNRA, TWDB, and the TPWD agreed on an operating regime for Lake Texana to provide freshwater inflows for the bay and estuary. At their request, Certificate of Adjudication No. 16-2095B was issued by TCEQ's predecessor, which specifies the agreed upon release schedule to benefit downstream bays and estuaries. In general, the special provisions require that when Lake Texana is at a capacity of 78.18 percent or more, all inflows into the reservoir up to: (1) the equivalent of the historical monthly median flows in the Navidad River for the months of November through March and July, and (2) the equivalent of the respective historical monthly mean flows during the remaining months, shall be passed

through the reservoir and shall not be subject to diversion for other purposes. When the reservoir is less than 78.18 percent of capacity, all inflows up to the annual median daily flow of the Navidad River during the historical critical drought period from January, 1954, through December, 1956, (5.0 cfs) shall be passed through the reservoir and shall not be subject to diversion for other uses. This release schedule has been shown to significantly reduce the frequency and extent of high salinity episodes in Lavaca Bay that would occur with Lake Texana operating in full capture mode. Projected quantities of releases from Lake Texana for Lavaca Bay reduce the firm yield by 4,500 acft/yr, in accordance with Certificate of Adjudication No. 16-2095B.

In issuing Certificate of Adjudication No. 16-2095B, TCEQ found, " ... that releases for the bay and estuary system could impact the firm yield of Lake Texana (Stage 1) by reducing it by up to 4,500 acft/yr, from 79,000 acft/yr to 74,500 acft/yr...[and] that the entire remaining firm yield of Stage 2 is 48,122 acft/yr."[31] The bay and estuary release schedule approved by TCEQ for Lake Texana (Stage 1) is set forth in Certificate of Adjudication No. 16-2095B and provides as follows: "This certificate of adjudication is issued subject to all superior and senior water rights in the Lavaca River and to the release of water from Stage I for the maintenance of Lavaca-Matagorda Bay and Estuary System as follows:

1. When 78.18% or more of the reservoir's capacity contains stored inflows, all inflows into the reservoir up to the historical monthly median flow during the months of January (84.5 cfs), February (142.4 cfs), March 86.8 cfs), July (126.5 cfs), November (68.3 cfs), and December (79.3 cfs), and all inflows up to the historical monthly average flow of the months of April (806.8 cfs), May (1,169.3 cfs), June (1,191.4 cfs), August (265.7 cfs), September (1,027.3 cfs), and October (708.3 cfs) shall be passed through the reservoir and shall not be subject to diversion for other uses.

2. When less than 78.18 % of the reservoir's capacity contains stored inflows, all inflows up to the annual median daily flow for the drought period January 1954 through December 1956 (5 cfs) shall be passed through the reservoir and shall not be subject to diversion for other uses.

As used in this provision, the term "inflows" refers to naturally occurring in-basin inflows. It does not include water supplies imported from out of the basin, unless those supplies are imported by a junior permittee upstream of Lake Texana for the purpose of replacing naturally occurring in-basin inflows in order to avoid impairment of water rights granted pursuant to Certificate of Adjudication No. 16-2095, as amended, including required freshwater inflows.

[31] Certificate of Adjudication No. 16-2095B.

"Lavaca-Navidad River Authority, Texas Water Development Board, and Texas Parks and Wildlife Department shall cooperate in developing operating procedures to implement the release schedule and provide such procedures to the TNRCC for review and approval as part of the Water Management Plan. Such procedures shall in part assist in the determination of when priority calls on water can be made by the certificate holder on a daily, monthly, or other appropriate schedule. Additional gages needed to measure inflows and outflows in connection with the release schedule shall be installed within one year following LNRA's issue of "Texana Bonds" to finance acquisition of TWDB's interest. LNRA shall notify the TNRCC in writing of the issuance of such bonds not later than thirty (30) days from date of issuance."

Based on the above-mentioned release schedule, the firm yield of Lake Texana is reduced from 79,000 acft/yr to 74,500 acft/yr. This difference in yield, attributed to bay and estuary releases, can be considered an interruptible water supply, and is further discussed in Section 5.0.

Since the approval of Certificate of Adjudication No. 16-2095B, LNRA has continued to follow a freshwater release program, recognizing the provisions of the 1992 agreement with TPWD, TWDB, and the Lone Star Chapter of the Sierra Club. The operating procedures currently utilized incorporate a one week delay in making the actual release, and were developed in cooperation with TWDB and TPWD. They are provided in Appendix D and are made a part of this Water Management Plan, as required in Certificate of Adjudication No. 16-2095B.

Since the 1992 agreement, there have been several freshwater inflow needs studies regarding the Matagorda Bay system. Flows from the Lavaca and Navidad Rivers are a critical component of the freshwater inflows into the Matagorda Bay system. The first of these studies is the December 31, 1997 study by the Lower Colorado River Authority (LCRA). In the 1997 study, the critical freshwater inflow needs contributed by the Lavaca River Basin was 2260 acft/mo (27,120 acft/yr) and the annual target freshwater inflows needs contributed by the Lavaca River Basin was 346,300 acft/yr. The 1997 Study was updated and supplemented by an August 2006 freshwater inflow needs study by the LCRA, TCEQ, TPWD and TWDB. The critical inflows needs contributed by the Lavaca River Basin increased from 2260 acft/mo to 4290 acft/mo (27,120 acft/yr to 51,480 acft/yr). Likewise the annual target freshwater inflows needs contributed by the Lavaca River Basin increased from 346,300 acft/yr to 592,800 acft/yr. Additional freshwater inflow needs studies are presently being conducted by LCRA and the San Antonio Water System (SAWS) as part of the feasibility analysis of their proposed project to transfer surface water from the Colorado River Basin to San Antonio for an extended period of

time. It is an open question as to what effect, if any, these studies will have upon the freshwater inflows release schedule for Lake Texana and/or a potential freshwater inflows release schedule for Stage 2. LNRA will conduct its own study of the Matagorda Bay system upon implementation of Stage 2.

4.1.3 Corpus Christi Service Area

The Corpus Christi water supply service area is located in coastal areas of the Nueces River Basin, and the San Antonio-Nueces-Rio Grande Coastal Basins, and includes 10 counties, as follows: Aransas, Atascosa, Bee, Duval, Jim Wells, Kleberg, Live Oak, McMullen, Nueces, and San Patricio. Water supplies for parts of the area are obtained from the Carrizo and Gulf Coast Aquifers and are limited in relation to present and future needs. In addition, the quality of available groundwater is marginal to poor, with high concentrations of chlorides, sulfates, and total dissolved solids. For these reasons, over the past four decades, numerous cities and water suppliers of the area have switched from groundwater to surface water from the Choke Canyon/Lake Corpus Christi Reservoir System.

In the coastal counties (Nueces and San Patricio), it was necessary to develop surface water supplies from the Nueces River beginning in the early 1900's.[32] The present surface water system is composed of Lake Corpus Christi, Choke Canyon Reservoir, and Calallen Diversion Dam. During a severe drought in the mid 1980's, Corpus Christi contracted to use Lake Texana as an emergency supply, and in 1985, the Lake Texana water rights permit was amended to authorize this use on an interim basis.

Corpus Christi began additional studies of its long term water supply alternatives, including a study of Lake Texana initiated in 1990 with San Antonio (Alamo Conservation and Reuse District). As a result of these studies, on June 18, 1992, LNRA and the Port of Corpus Christi Authority executed an 18 month option to purchase Texana water for use in the Corpus Christi service area. Following the South Central Trans-Texas Study[33] and transfer of this option from the Port Authority to the City, Corpus Christi exercised the option and entered into a Water

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[32] Records of Certified Filings, Texas Water Commission, Austin, Texas, Book 1, pp. 227-245, December 13, 1913.
[33] Trans-Texas Water Program, Corpus Christi Study Area, Phase II, Volumes 1 & 2, September, 1995.

Delivery and Conveyance Contract ("water supply agreement") with LNRA on December 14, 1993.[34]

The population of the 10-county Corpus Christi service area was 571,422 in 2000. The projected population of the 10-county Corpus Christi service area is 653,573 in 2010 and is projected to be 947,357 in 2060 (Table 4.1-3).

In 2000, total water use in the Corpus Christi 10-county service area was 251,985 acft (Table 4.1-4). The 2007 State Water Plan projected water demands are 362,456 acft in 2060 (Table 4.1-4). Of total water use in 2000, in the 10-county area, 41 percent was for municipal purposes, 21 percent was for industry, 23 percent was for irrigation, and the remaining 15 percent was for steam-electric power generation, mining, and livestock.

[34] The water supply agreement contains a condition which is essential to the contract's permanent validity. LNRA was required to amend the Lake Texana water right (Certificate of Adjudication No. 16-2095) to obtain authorization to make a trans-basin diversion allowing for use of the water in the Corpus Christi service area. This amendment was granted on October 21, 1996 (Certificate of Adjudication No. 16-2095C).

Table 4.1-3
Population Projections for 10-County Corpus Christi Service Area

COUNTY NAME	2010	2020	2030	2040	2050	2060
Aransas	26,863	30,604	32,560	32,201	30,422	28,791
Atascosa	45,504	52,945	59,598	64,844	69,320	72,578
Bee	34,298	36,099	37,198	37,591	37,598	36,686
Duval	13,881	14,528	14,882	14,976	14,567	13,819
Jim Wells	42,434	45,303	47,149	47,955	47,615	46,596
Kleberg	36,959	40,849	43,370	44,989	47,118	47,212
Live Oak	13,735	14,929	15,386	15,018	13,808	12.424
McMullen	920	957	918	866	837	793
Nueces	358,278	405,492	447,014	483,692	516,265	542,327
San Patricio	80,701	95,381	109,518	122,547	134,806	146,131
TOTAL	**653,573**	**737,087**	**807,593**	**864,679**	**912,356**	**947,357**

Table 4.1-4
Water Demand Projections by County for 10-County Corpus Christi Service Area

	2000	2060
Atascosa	49,972	58,938
Aransas	3,653	4,335
Bee	8,043	6,609
Duval	12,264	15,713
Jim Wells	13,704	12,764
Kleberg	10,444	11,562
Live Oak	11,594	12,858
McMullen	1,010	1,029
Nueces	114,499	196,690
San Patricio	26,802	41,958
TOTAL	251,985	362,456

Table 4.1-5 Water Demand Projections for 10-County Corpus Christi Service Area [35]							
Purpose	Use in 2000 acft	WATER DEMAND PROJECTIONS					
		2010 acft	2020 acft	2030 acft	2040 acft	2050 acft	2060 acft
municipal	104,164	116,071	127,884	137,488	145,187	15,229	158,042
industrial (manufacturing)	54,487	63,826	69,261	73,867	78,377	82,289	88,128
steam-electric power	14,613	13,200	20,266	23,695	27,872	32,965	39,174
irrigation	56,892	60,826	57,989	55,132	52,485	50,028	47,739
mining	12,894	15,560	16,995	17,877	18,755	19,639	20,438
livestock	8,935	8,935	8,935	8,935	8,935	8,935	8,935
Totals	251,985	278,418	301,330	316,994	331,611	346,085	362,456

In 2000, municipal water use for the 10-county service area was reported at 104,164 acft, with industrial use at 54,487 (Table 4.1-5). The total of municipal and industrial (M&I) use in 2000 was 158,651 acft (Table 4.1-5). For the 10-county area, M&I use in 2060 is projected at 246,170 acft (Table 4.1-5).

4.2 Water Supply Projections

4.2.1 Present Supplies

Water supplies of the Lavaca River Basin and the adjoining Colorado-Lavaca and Lavaca-Guadalupe Coastal Basins include groundwater, run-of-the river surface water, the dependable yield of Lake Texana, and surface water that is imported from the neighboring Colorado and Guadalupe River Basins. Groundwater is predominately obtained from the Gulf Coast Aquifer, which underlies all of the Lavaca River Basin and the Colorado-Lavaca and Lavaca-Guadalupe Coastal Basins except a small part of the northwestern Lavaca River Basin in Fayette and Lavaca Counties and a small part from the Carrizo Aquifer. The Gulf Coast Aquifer has been a major source of water for irrigation and municipal purposes, with water for irrigation being obtained from beneath the land to which it has been applied. Municipal water supplies for

[35] TWDB approved water demand projections for use in 2006 Region Water Plans.

the communities of the area have also been obtained from well fields located in or near the respective cities which use the water. TWDB projections indicate that the Gulf Coast Aquifer can continue to supply water throughout the 50-year projection period of year 2010 through 2060. In the case of groundwater, it is projected that these quantities will be available to meet local irrigation and municipal needs within the Lavaca River Basin and adjoining Colorado-Lavaca and Lavaca-Colorado Coastal Basins.

The current primary surface water supplies in the Lavaca River Basin are the Lavaca River, the Navidad River and Lake Texana. Additional surface water supplies have been and are projected to continue to be imported into the Lavaca River Basin and adjoining Colorado-Lavaca and Lavaca-Guadalupe Coastal Basins from the neighboring Colorado and Guadalupe River Basins, in accordance with permits issued by TCEQ and predecessor state regulatory agencies. Water rights permits for these purposes are among the most senior in these basins, with the Lower Colorado River Authority (LCRA) permit (formerly held by Garwood Irrigation Co.) (Certificate of Adjudication No. 14-5434C) being recognized a right to divert and use 133,000 acft of water annually from the Colorado River for irrigation, municipal and industrial purposes, with a priority date of November 1, 1900. The irrigation area served by the LCRA irrigation district is located in Colorado County, with about 90 percent of the area being located in the Lavaca River Basin. In recent years, the annual use of the LCRA (Garwood) supply has averaged about 85,000 acft annually, of which about 90 percent or 76,500 acft is estimated to be transferred for use in the Lavaca River Basin.

As is the case of projected imports to the Lavaca Basin, projected imports to the Colorado-Lavaca Coastal Basin of approximately 80,000 acft/yr would be a continuation of long-term practice of importing water from the Lower Colorado River Basin for irrigation purposes in the Colorado-Lavaca Coastal Basin. In the case of the Lavaca-Guadalupe Coastal Basin, which includes eastern Victoria and western Calhoun Counties, both groundwater and surface water supplies are quite limited. In order to meet the needs of these areas, beginning in the early 1940's water rights permits were obtained from agencies predecessor to TCEQ to import and use water from the Guadalupe River Basin for municipal, industrial, and irrigation purposes. The total of these run-of-river permits for use in Calhoun County in the Lavaca-Guadalupe Coastal Basin exceeds 200,000 acft/yr. Thus, the projected annual supply of imported water for the Lavaca-Guadalupe Coastal Basin from the Guadalupe River Basin is set at approximately 75,000 acft/yr,

or the quantity that is projected to be needed to meet the 2060 projected demands of the Lavaca-Guadalupe Coastal Basin that cannot be met from in-basin supplies of groundwater and surface water.

4.2.2 Palmetto Bend Stage 2

Certificate of Adjudication No. 16-2095B provides that upon completion of the Palmetto Bend Stage 2 dam and reservoir on the Lavaca River, LNRA is authorized to use a total of 48,122 acft/yr, of which 7,150 acft/yr shall be for municipal purposes, up to 22,850 acft/yr shall be for industrial purposes, and at least 18,122 acft/yr shall be for the maintenance of the Lavaca-Matagorda Bay and Estuary System.[36] However, the entire Stage 2 appropriation remains subject to release of water for the maintenance of the bay and estuary system until a release schedule is developed pursuant to Section 4.B of the appropriation. Prior to commencement of construction of the Stage 2 dam and reservoir, or any diversion of water from the Stage 2 reservoir, upon the joint recommendation of LNRA, TWDB and TPWD, LNRA shall submit an application to the TCEQ to establish a schedule for the release of freshwater inflows from Stage 2 for the maintenance of the bay and estuary system. In establishing the Stage 2 release schedule, TCEQ may consider, upon the motion of any party, modification of the Lake Texana release schedule; provided, however, LNRA shall retain the right to withdraw its application without prejudice at any time prior to the final decision by the TCEQ and shall pay reasonable costs incurred by protesting parties. In the event that the application to set the release schedule for Stage 2 is withdrawn, the Lake Texana release schedule shall remain unchanged. Should LNRA initiate plans of construction for the Stage 2 reservoir or the diversion of water under the Stage 2 appropriation, TCEQ may consider a modified freshwater release schedule which may include an intermediate trigger for a more gradual reduction of freshwater releases from either Lake Texana or the Stage 2 reservoir for bay and estuary purposes. For purposes of this Water Management Plan, present available information about the Palmetto Bend Stage 2 yield potentials are summarized below.

[36] Certificate of Adjudication No. 16-2095B.

Palmetto Bend Stage 2, as planned by the BOR in 1965, included a reservoir at elevation 44 feet-msl covering 6,900 surface acres and storing 93,000 acre-feet of water. The BOR calculated that after accumulating 100 years of sediment (22,000 acre-feet), the project would yield 30,000 acft/yr. In 1991, HDR Engineering, Inc. updated the 1965 BOR studies of Palmetto Bend Stage 2.[37] The 1991 updated firm yield of Stage 2 for initial conditions (year one) was 48,171 acft/yr, and after 40 years of sediment accumulation was estimated at 43,355 acft/yr. The 1991 evaluations were for a Palmetto Bend Stage 2 dam site which corresponded to the location studied by the BOR, which was essentially a westward extension of the existing Lake Texana dam. Neither of these evaluations considered releases for bay and estuary needs.

The 1991 study showed that Palmetto Bend Stage 2 could be constructed more economically if operated separately from Lake Texana and located further upstream on the Lavaca River. An alternative site location approximately 1.4 miles upstream of previous dam site was evaluated.

This alternative site was assumed to be the site for construction of the Stage 2 dam and reservoir in a recently completed TWDB Reservoir Site Protection Study prepared by HDR Engineering, Inc., Freese & Nichols, Inc., and R.J. Brandes Company.[38] The Stage 2 dam and reservoir is a recommended water management strategy in the 2006 Coastal Bend Regional Water Plan. Assuming construction at the alternative site, the Stage 2 reservoir, at a conservation pool elevation of 44 feet-msl, would have an initial conservation pool capacity of 52,046 acft, and a top of conservation pool surface area of 4,564 acres. Assuming a conservation pool elevation of 44 feet msl, the firm yield of this alternate site is approximately 30,606 acft/yr without any pass through of environmental flows. With environmental pass throughs included, the firm yield is reduced to 22,964 acft/yr. The estimated cost of construction of the alternate site Stage 2 project is approximately $159,190,827. The estimated annual cost is approximately $11,837,146.

[37] "Regional Water Planning Study, Cost Update for Palmetto Bend Stage II, and Yield Enhancement Alternative for Lake Texana and Palmetto Bend Stage II," Lavaca-Navidad River Authority, Alomo Conservation and Reuse District, and City of Corpus Christi May, 1991.

[38] Reservoir Site Protection Study, TWDB – February 2007.

4.3 Water Demand and Supply Comparisons

Projected 2060 total water demands of the Region P area is 206,908 acft/yr. The total surface water and groundwater is estimated to remain constant from 2010 to 2060 at 209,431 acft/yr.[39]

5.0 WATER QUALITY

Water quality in the Lavaca River Basin continues to be of high quality due to several factors including: (i) low density of human population and industry development; (ii) investments in wastewater treatment improvements by municipalities and local industry; and (iii) high priority placed on watershed protection, and public involvement with protecting water resources.

Since the Texas Legislature passed the Clean Rivers Act in 1991, LNRA has partnered with TCEQ. The Clean Rivers Program is a statewide effort, administered by TCEQ, to encourage the assumption of responsibility for water quality monitoring by local entities on a river basin by river basin basis.

The TCEQ is required by the federal Clean Water Act to do an assessment of Texas water bodies every two years. Impaired waters (those not statistically meeting water quality standards) are placed on a list called the Texas Water Quality Inventory and § 303(d) List.

Results of water quality monitoring have remained relatively stable in recent years, and no adverse trends were detected in the most recent assessment covering 2005 and 2006. The latest Texas Water Quality Inventory lists only two segments in the Lavaca River Basin as concerns:

- The upper reaches of the Lavaca River for occasional low dissolved oxygen concentrations usually associated with low or no flow and high summer temperatures. TCEQ conducted a Use Attainability Analysis (UAA) to study the feasibility of this sub-segment of the Lavaca River's ability to sustain high aquatic

[39] Summary of Lavaca (P) Region. 2007 State Water Plan.

life use standards. A more realistic adjustment in the standards for this sub-segment may be forthcoming.

- In Lake Texana nutrient levels remain high enough to be listed as a concern, but the dissolved oxygen levels remain more than adequate to support aquatic life, and chlorophyll-a levels are not a concern.[40]

Levels of metals, herbicides and pesticides remain below concentrations of concern, but the herbicide Atrazine concentrations tend to be higher than other substances. The herbicides and pesticides detected in Lake Texana and its inflows (Navidad River, East and West Mustang Creeks, Sandy Creek) are the same chemicals used on the agricultural crops grown in this area: corn, maize, soybeans, cotton and rice. Aerial crop dusting remains popular in Jackson County. Heavy rains can leach fertilizers, herbicides and pesticides from agricultural fields, and LNRA encourages the agricultural community to establish buffer zones between their fields and drainage ditches or surface waters.[41]

A land use map/database has been developed and is currently maintained on paper map/overlay and computer database files. LNRA is working toward maintaining these databases on a Geographic Information System. Information on residential development, industrial facilities, intensive agricultural activity such as fertilized and pesticide treated cropland or improved pasture, rice acreage, or concentrated feeding/aquaculture facilities discharges, point sources, and other activities having potential water quality impacts are collected for entry into the database. Information is collected by regularly querying the following sources:

- County commissioners;
- City managers and utility directors from Edna, Ganado, Hallettsville, and other communities in the basin;
- Texas Department of Transportation district office;
- Texas State Soil and Water Conservation Board regional office in Wharton;
- County health department files for on site waste disposal applications;
- County records of subdivision plat applications;
- Water supply (including irrigation) districts and corporations; and
- Local and regional newspapers.

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[40] Lavaca Basin Summary Report FY2007 prepared by LNRA and HDR Engineering, Inc. in cooperation with TCEQ under authorization of the Clean Rivers Act.
[41] *Ibid.*

LNRA is notified of TCEQ discharge permit applications, including TCEQ TPDES applications for point source discharges and industrial stormwater runoff permits. These are reviewed by LNRA and appropriate actions taken (i.e., submission of written comments, negotiation with applicants, requests for hearings and party status) to assure protection of Lake Texana water quality.

LNRA currently provides water supply and waste management services for the Brackenridge Plantation Park & Campground (BPPC) and waste management services for the Lake Texana State Park. The BPPC has 134 campsites: all with electricity and water, and 105 with wastewater hook-ups. Amenities for campers include 2 wastewater dumping stations and 4 comfort stations with bathrooms and one with laundry. The Lake Texana State Park has 140 campsites with water, 1 wastewater dumping station and 6 public bathrooms. Both campgrounds are served by the newly constructed Brackenridge Wastewater Treatment Plant.

LNRA also provides operating services at the Point Comfort Water Treatment Plant.

6.0 WATER CONTRACT ADMINISTRATION

6.1 Lake Texana Firm-Yield Water Sales Contracts

Water sales contracts for Lake Texana currently total 74,444 acft/yr. Formosa Plastics Corporation, Inteplast, Inc., Calhoun County Navigation District, and the City of Point Comfort, Texas have contracted for 32,604 acft/yr. The City of Corpus Christi, Texas has contracted for 31,440 acft/yr on a permanent basis, plus 10,400 acft/yr on a temporary basis. This amount (10,400 acft/yr) can be withdrawn from the Corpus Christi contract if it is needed in Jackson County. The LNRA Board of Directors has directed that 5,000 acft/yr of this Jackson County reserve be solely for municipal use, leaving 5,400 acft/yr of the Jackson County reservation for industrial use. 56 acre-feet of the Lake Texana firm yield water supply is available for future water sales contracts.

6.2 Use of Interruptible Water Supply

Certificate of Adjudication No. 16-2095B recognizes that the total firm yield of Lake Texana is 79,000 acft/yr, and authorizes use of that amount of water annually for municipal and industrial purposes. The bay and estuary pass through schedule required by Certificate of

Adjudication No. 16-2095B, however, reduces Lake Texana's firm yield to 74,500 acft/yr. Thus, the water right authorizes use of up to 4,500 acft/yr in excess of the dependable yield, provided the required releases have been made. Therefore, when Lake Texana is spilling water in excess of bay and estuary requirements, up to 4,500 acft/yr of the excess could be used by LNRA water customers that are seeking additional supplies. In early 2003, TCEQ granted LNRA additional rights to divert and use up to 7,500 acft of water annum from Lake Texana on an interruptible basis and to transfer such water for use in the Corpus Christi service area. (See Certificate of Adjudication No. 16-2095D in Appendix A).

In July 2001, LNRA and Corpus Christi entered into an interruptible water supply contract wherein LNRA agreed to sell and Corpus Christi agreed to purchase 4,500 acre-feet of water on an interruptible basis. In July 2003, LNRA and Corpus Christi entered into the 1st amendment to the interruptible water supply contract wherein LNRA agreed to sell and Corpus Christi agreed to purchase an additional 7,500 acre-feet of water on an interruptible basis for a total of 12,000 acre-feet of interruptible water on an annual basis. The annual cost for interruptible water will vary from year to year. LNRA has set the water rate to be one-half of the firm-yield water rate. LNRA's firm water cost for the year 2008 is $107.00 and the interruptible water cost for the 2008 is one/half or $53.50.

6.3 Resale of Committed Water

As set forth above, LNRA has entered "take or pay" contracts for almost all of the firm annual yield of Lake Texana. All customers have not yet begun to use all of the water they have purchased. Although customers may not resell raw water, the LNRA Board has adopted Board Policy as 601 – Water Resources Management, which states that LNRA may contract with any of its raw surface water customers that have reserved at least a 25-year firm supply of surface water to market and re-sell any portion of the customer's firm supply to another customer on a limited term basis for a management fee and under terms mutually acceptable to LNRA and the raw surface water customer. To the extent authorized by existing water rights, LNRA would on an annual basis transfer such available water supplies at the existing contractual price (to be paid to the selling customer) plus LNRA's management fee and transaction costs. If an amendment were required to enable the transaction, and it could be accomplished without jeopardizing existing

financial obligations, LNRA would obtain such authorization as part of the transaction costs if requested by its customers.[42]

7.0 UPSTREAM IRRIGATORS COMPROMISE SETTLEMENT AGREEMENT

LNRA's and TWDB's[43] application for permit amendment to authorize delivery of water to Corpus Christi was opposed by a group of seventeen upstream irrigators. The irrigators were holders of term (10-year) permits and objected on the grounds that authorization of the transbasin diversion would result in termination of their permits. Although TCEQ rejected the legal objections advanced by the upstream irrigators, on November 13, 1996 LNRA, TWDB and the upstream irrigators entered into a compromise settlement agreement to address their concerns. It provides generally that the irrigators can continue to divert water following approval of the LNRA amendment, but that diversions would be restricted to times when Lake Texana's level was above 43 feet above mean sea level (i.e., when the level is no more that one foot below full). Reservoir modeling indicates that diversions under these conditions will not impair the reservoir's firm annual yield. Additionally, LNRA agreed that it would not object to conversion of the term permits into permanent permits, with the 43 feet msl diversion limitation, after the Lavaca River Basin was included within a TCEQ water master program. A copy of the Compromise Settlement Agreement is attached as Appendix E.

8.0 ACQUISITION OF WATER RIGHTS

The LNRA Board of Directors has adopted Board Policy 603 – Acquisition of Water Rights. Policy 603 authorizes LNRA's General Manager or his designee to negotiate and execute purchase and sale agreements for LNRA to acquire additional water rights located within the Lavaca Basin and its adjoining coastal basins. The Board has determined that it is sound public policy for LNRA to purchase additional water rights to enhance LNRA's total surface water supply; increase the firm-yield of Lake Texana; increase LNRA's operational flexibility; and/or minimize possible adverse impacts to LNRA's existing water rights.

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[42] LNRA Board Policy 601.204.

[43] In 2002, LNRA purchased all of the TWDB's ownership interest in Lake Texana, including all water rights in Lake Texana.