

LAVACA BASIN

2008 Basin Highlights Report



Lavaca River at SH 111 in Lavaca County

Prepared by the

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in cooperation with the

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LAVACA BASIN HIGHLIGHTS REPORT 2008

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Summary of Highlights from the Last Year:

- No major water quality problems have arisen within the last year. Water quality continues to be in relatively good condition. Concerns do include continuing nutrients elevated beyond screening criteria in Lake Texana and a new 2008 Texas Water Quality Inventory bacterial listing in the Lavaca River as sufficient data became available for assessment. See **Table 1** below:

SegID: 1602 Lavaca River Above Tidal		Category	Carryforward	Year First Listed
From a point 8.6 km (5.3 miles) downstream of US 59 in Jackson County to a point 5.5 km (3.4 miles) upstream of SH 95 in Lavaca County				
Area				
1602_01	Upper 29 miles of segment			
	depressed dissolved oxygen	5b	No	2004
1602_02	Middle 34 miles of segment between SH111 and US90			
	bacteria	5c	No	New
1602_03	Lower 31 miles of segment			
	bacteria	5c	No	New

- The upper 29 miles of Segment 1602, Lavaca River above tidal, have been listed since 2004 for depressed dissolved oxygen. The TCEQ Water Quality Standards Team instituted a Use Attainability Analysis (UAA) in cooperation with LNRA and Texas Parks and Wildlife (TPWD) staff. Field work on this UAA was completed in August 2006. Per Gregg Easley of the TCEQ Water Quality Standards Team, all the data has now been worked up, and the analysis and recommendations are yet to be completed. LNRA anticipates that the recommendations may include a re-classification of the upper portion of the Lavaca River to the more appropriate “intermittent” flow classification with its associated revised dissolved oxygen criteria to bring standards more in line with actual ambient conditions.

- LNRA staff members continue to make presentations to groups and students re:



Figure 1
Bald Eagle

protection of water quality for the continued recovery of bald eagles. There are 2 nesting pairs of bald eagles on LNRA project property, and LNRA is proud to provide protection for the eagles and their habitat, nests, and progeny. The picture to the left shows one of “our” eagles in a winter-bare tree surveying the river for fish.

- The Watershed Coordination Steering Committee (WCSC) for the Texas State Soil and Water Conservation Board (Wharton Regional Office) developed criteria to prioritize regional watersheds for Watershed Protection Plan (WPP) development. In 2005 the Plum Creek watershed in the Guadalupe-Blanco Basin was chosen for a pilot project Watershed Protection Plan. In December 2007 the Steering Committee again ran regional watersheds through the criteria matrix and chose the Mustang Creek Watershed (inflows to Lake Texana) as the second project. More information about this appears later in this report under “Water Quality Conditions—Proposed Work in the Watershed”.
- In the last year LNRA has expanded its distribution of Major Rivers water education materials for fourth-grade level classes to include St. Joseph Catholic School in Yoakum and Northside Elementary in El Campo. LNRA intends to reach every 4th grade class in Lavaca Basin. Please contact sbalentine@LNRA.org for more information.
- The Lavaca Basin continues to support Texas Watch water quality volunteers.
- Water quality monitoring by LNRA continues in Rocky Creek, the Lavaca River, Lake Texana, the Navidad River, Sandy and East and West Mustang Creeks.
- 2007 was a higher than average rainfall year. **Table 2** shows the record of monthly rainfall totals (in inches) collected near LNRA offices off FM 3131 near Lake Texana since 1973. **Table 3** shows the record of monthly freshwater releases (in acre feet) via Bay and Estuary releases and flood releases into the Lavaca/Matagorda Bay system.

Table 2 – Monthly Rainfall 1973-2007

PALMETTO BEND PROJECT

TOTAL MONTHLY RAINFALL AT LNRA WEATHER STATION

Rainfall shown in inches

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL TOTAL
1973	3.03	3.58	1.08	7.66	2.13	12.27	0.54	4.32	13.76	7.02	1.89	2.32	59.60
1974	2.51	0.80	4.00	1.90	9.21	1.45	2.35	6.90	5.18	1.06	5.86	2.93	44.15
1975	2.02	1.29	0.66	1.35	3.41	4.66	2.20	3.35	2.60	3.04	1.70	7.15	33.43
1976	0.50	0.06	0.85	4.08	3.40	3.61	7.21	1.97	4.55	6.19	3.90	4.44	40.76
1977	2.27	1.47	0.87	5.17	1.91	11.62	1.50	0.88	4.10	3.78	3.61	0.55	37.73
1978	3.64	3.30	0.48	2.53	0.88	5.88	1.86	1.96	18.32	1.65	4.12	2.48	47.10
1979	6.43	3.07	3.20	5.05	5.97	3.06	7.90	5.55	10.97	2.33	0.80	3.93	58.26
1980	2.57	1.63	3.26	0.34	7.72	0.16	1.86	2.35	8.42	1.56	1.45	0.00	31.32
1981	2.16	0.70	1.14	2.26	4.15	8.52	5.40	3.18	1.87	5.21	8.07	1.21	43.87
1982	0.75	5.78	0.54	1.25	9.50	0.73	0.24	7.03	2.08	4.00	10.24	2.22	44.36
1983	4.06	3.56	4.25	0.00	2.17	3.69	4.75	3.60	3.64	9.91	2.36	2.04	44.03
1984	3.20	2.11	0.95	0.03	5.52	2.05	3.10	1.77	3.68	3.68	1.34	1.54	28.97
1985	2.39	2.90	7.39	7.97	1.36	2.67	2.38	0.46	3.72	2.35	1.80	5.11	40.50
1986	1.46	0.43	1.36	0.43	7.64	7.24	1.70	1.18	3.99	7.96	3.76	5.12	42.27
1987	2.43	4.47	0.55	0.00	4.41	15.23	4.97	0.66	1.53	0.43	7.95	1.58	44.21
1988	0.78	0.29	1.31	0.51	3.61	5.00	2.27	0.48	3.24	0.65	0.64	1.63	20.41
1989	4.88	0.30	0.99	0.73	1.18	4.79	3.23	1.88	2.14	2.32	1.58	1.02	25.04
1990	2.36	3.63	4.25	4.97	2.74	1.05	5.62	0.82	2.65	1.21	2.72	2.07	34.09
1991	6.54	4.32	2.16	7.93	3.53	2.16	4.53	1.40	5.15	2.15	1.92	8.40	50.19
1992	4.70	7.80	2.13	5.60	4.83	5.87	2.37	3.16	2.48	2.17	5.66	3.25	50.02
1993	4.58	4.33	3.24	3.26	11.49	8.40	0.04	1.21	1.18	4.13	2.26	4.57	48.69
1994	1.33	1.06	4.05	2.55	4.40	5.68	0.73	6.08	4.13	11.55	0.58	2.46	44.60
1995	2.44	0.79	4.99	3.95	6.19	3.07	1.10	8.51	4.04	4.75	2.11	7.48	49.42
1996	0.36	0.34	1.01	1.19	0.12	7.14	0.73	0.02	4.46	1.40	2.23	2.51	21.51
1997	4.13	2.54	11.62	5.48	16.13	2.63	2.50	0.60	6.02	8.96	2.62	2.30	65.53
1998	2.29	5.29	2.30	0.81	0.03	0.49	0.53	4.92	15.36	6.80	10.83	1.70	51.35
1999	0.00	0.00	0.00	0.82	6.91	3.82	4.53	0.49	1.41	0.88	0.93	2.44	22.23
2000	2.28	1.35	3.18	2.21	7.89	2.66	0.54	1.08	1.67	2.49	8.89	2.39	36.63
2001	3.26	.84	2.47	0.14	1.41	2.61	1.2	9.29	8.85	5.87	7.59	5.63	49.16
2002	1.07	.57	.45	3.29	1.69	3.18	9.22	2.55	12.49	8.79	5.35	4.41	53.06
2003	4.25	2.29	1.48	.22	.27	6.52	5.04	0.53	8.91	5.24	2.43	1.29	38.47
2004	3.37	2.63	1.310	5.800	12.090	12.360	4.970	3.290	1.240	4.310	6.400	.560	58.330
2005	1.840	4.000	4.110	.990	5.380	.810	6.131	1.310	1.690	3.680	5.280	1.550	36.771
2006	0.971	1.460	.540	2.140	6.660	3.680	5.540	1.250	4.910	3.020	.420	2.090	32.681
2007	6.250	.310	7.200	2.810	6.680	3.950	15.720	5.780	1.670	2.080	2.880	0.980	56.310
AVG.	2.810	2.295	2.660	2.726	4.932	4.820	3.557	2.852	5.203	4.075	3.776	2.924	42.632

Table 3 - Lake Texana Releases 1982-2007
LAVACA-NAVIDAD RIVER AUTHORITY
Lake Texana - Palmetto Bend Project
Historical Spillway & R.O.W. Releases

YEAR	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL
1982	~	~	~	~	267,600.50	945.20	3,989.80	178.78	1,832.31	13,434.55	114,253.76	17,292.00	419,526.90
1983	33,280.19	143,037.92	121,552.05	1,656.41	46,527.94	8,430.07	152,900.68	15,482.09	86,402.71	178,306.04	66,650.49	4,836.28	859,062.87
1984	47,642.28	14,699.28	3,548.34	171.24	38,536.98	4,883.02	7,995.81	2,083.76	10,271.51	161,573.58	11,831.87	4,514.60	307,752.27
1985	67,276.29	51,853.98	148,386.86	172,763.09	5,759.61	9,849.83	21,003.84	195.17	5,979.83	29,810.42	170,115.99	42,915.06	725,909.97
1986	1,726.00	4,319.00	374.40	247.80	6,316.46	144,962.32	110.00	180.00	14,587.55	34,682.37	9,675.68	146,793.15	363,974.73
1987	35,761.15	83,636.93	31,399.98	115.06	42,194.70	323,861.22	30,783.73	981.47	111.14	122.33	57,154.23	55,693.37	661,815.31
1988	1,224.72	102.55	2,160.76	9,640.83	9,106.77	9,782.97	3,895.26	6,061.80	5,987.91	734.19	111.33	109.57	48,918.66
1989	79,958.55	11,303.11	132.72	103.29	94,365.59	8,845.71	4,858.12	103.29	106.91	103.27	104.83	101.71	200,087.10
1990	101.71	1,957.97	21,695.20	27,202.12	14,493.18	103.28	7,774.73	1,002.65	10,401.01	103.29	1,385.63	103.29	86,324.06
1991	114,263.24	43,069.12	6,782.82	219,981.80	359.69	9,199.12	22,506.92	2,990.86	26,296.03	932.25	973.96	213,196.82	660,552.63
1992	218,393.94	538,594.87	81,716.10	250,068.18	285,312.94	133,270.09	11,784.64	3,532.13	7,647.47	3,976.64	51,874.21	34,909.29	1,621,080.50
1993	61,044.28	90,741.43	84,432.13	92,291.56	286,489.84	400,762.75	8,549.77	726.05	2,903.11	15,476.37	5,427.50	2,149.40	1,050,994.19
1994	2,113.28	2,728.80	11,331.66	10,497.72	114,352.62	72,512.54	6,769.66	9,011.63	18,316.85	605,237.42	5,521.48	65,866.78	924,260.44
1995	84,809.61	5,152.05	82,363.09	50,322.48	24,060.69	41,849.17	24,175.23	11,154.52	8,086.18	10,406.96	3,042.78	54,525.78	399,948.54
1996	2,274.75	584.38	732.91	1,723.86	1,875.32	15,767.98	5,260.07	31,505.97	110,836.15	6,021.53	5,000.15	22,648.39	204,231.46
1997	128,935.74	54,089.79	356,741.32	373,085.86	200,127.80	203,083.84	5,461.32	6,975.50	21,359.28	316,779.94	31,953.84	50,157.72	1,748,751.95
1998	36,582.31	117,269.36	43,887.96	6,639.60	33,123.89	2,090.10	4,621.25	30,263.35	286,566.45	513,640.74	404,607.14	50,906.29	1,530,198.44
1999	16,085.26	4,019.35	29,743.40	3,635.30	23,471.17	104,181.33	18,531.94	4,258.17	1,039.79	2,377.62	439.09	558.27	208,340.69
2000	546.22	510.98	546.22	12,344.12	53,378.50	31,928.66	3,596.36	2,904.16	1,553.11	4,577.42	101,114.00	17,489.54	230,489.29
2001	66,291.12	2,613.68	87,892.09	3,644.57	32,124.96	3,272.15	5,111.66	30,028.81	284,698.83	37,968.21	31,882.28	104,699.71	690,228.07
2002	3,584.85	2,085.62	1,139.12	35,672.49	3,007.01	1,636.46	104,076.73	5,601.71	94,109.56	192,695.52	279,421.87	139,890.93	862,921.87
2003	64,852.00	40,578.47	12,385.65	7,633.01	2,110.78	2,816.42	43,177.72	1,100.13	28,862.14	47,385.62	38,292.84	2,623.47	291,818.25
2004	26,257.31	78,913.38	45,311.96	95,512.21	282,843.11	355,774.18	79,296.32	5,587.51	11,413.77	50,514.88	697,503.09	11,954.61	1,740,882.33
2005	15,506.17	141,853.74	117,298.72	7,599.82	55,022.14	17,184.33	34,390.24	5,535.89	4,483.60	11,466.07	2,648.32	3,851.40	416,840.44
2006	1,927.86	1,809.30	693.41	1,132.68	20,947.59	5,797.94	27,002.36	1,648.40	12,506.95	73,496.35	2,051.44	2,328.17	151,342.45
2007	152,841.68	7,796.93	120,101.08	60,947.00	177,220.85	15,398.53	490,567.72	80,724.48	47,821.97	40,091.57	13,672.93	2,676.52	1,209,861.26

COMMENTS:

Shown in AC-FT.

Releases are from the Spillway & River Outlet Works and include: Operational testing, Seepage, Bay & Estuary, and Flood.

First recorded freshwater release ~ May 1982.

Bay & Estuary releases began in 1994.

Water Quality Monitoring:

Field data can include: dissolved oxygen, pH, temperature, specific conductivity, flow, salinity, Secchi disk to measure water clarity, depth.

Conventional water analyses include: Total alkalinity, chloride, ammonia, total organic carbon, turbidity, total hardness, sulfate, nitrate-nitrogen, total suspended solids, total phosphorus and chlorophyll-a at the reservoir sites.

Bacterial analysis is conducted for *E. coli* with the IDEXX Colilert system. More details on monitoring parameters follow at the end of this section.

The list below gives the water quality sites monitored along with the parameter sets and frequency: (On the following page is **Figure 2** showing locations and site numbers.) A detailed coordinated monitoring schedule with aerial maps for Lavaca Basin can be accessed from www.LNRA.org as follows: from the “Education & Programs” pull-down menu choose “Water Quality Program” and click on “FY 2008 Coordinated Monitoring Schedule”.

- **East and West Mustang Creeks** – monthly field data and quarterly conventional.
- **Sandy Creek** – monthly field data and quarterly conventional.
- **Dry Creek** – monitored 2 times annually (USGS) for metals and organics
- **Navidad River at Speaks** – quarterly field and conventional.
- **Navidad River at Strane Park** – monthly field data and quarterly conventional.
- **Lake Texana** – 6 sites monitored for field data monthly and quarterly for conventional and chlorophyll a. Four (4) Lake sites are sampled quarterly for *E.coli* bacteria.
- **Navidad River below spillway and above confluence with Lavaca** – monthly field data and quarterly conventional.
- **Rocky Creek** – quarterly field, conventional, and bacterial.
- **Lavaca River at Hallettsville** – quarterly field, conventional, and bacterial.
- **Lavaca River at Hwy 59 and at SH 111** -- monthly field data and quarterly conventional and bacterial.
- **Lavaca River at 5 sites between confluence with Navidad River below spillway and Lavaca Bay** – monthly field data at 5 sites and quarterly conventional data at one site.
- **In addition, Lake Texana and its inflows:** Navidad River and Sandy and East and West Mustang Creeks are monitored by contract with USGS (United States Geological Survey) for pesticides, herbicides, and metals.

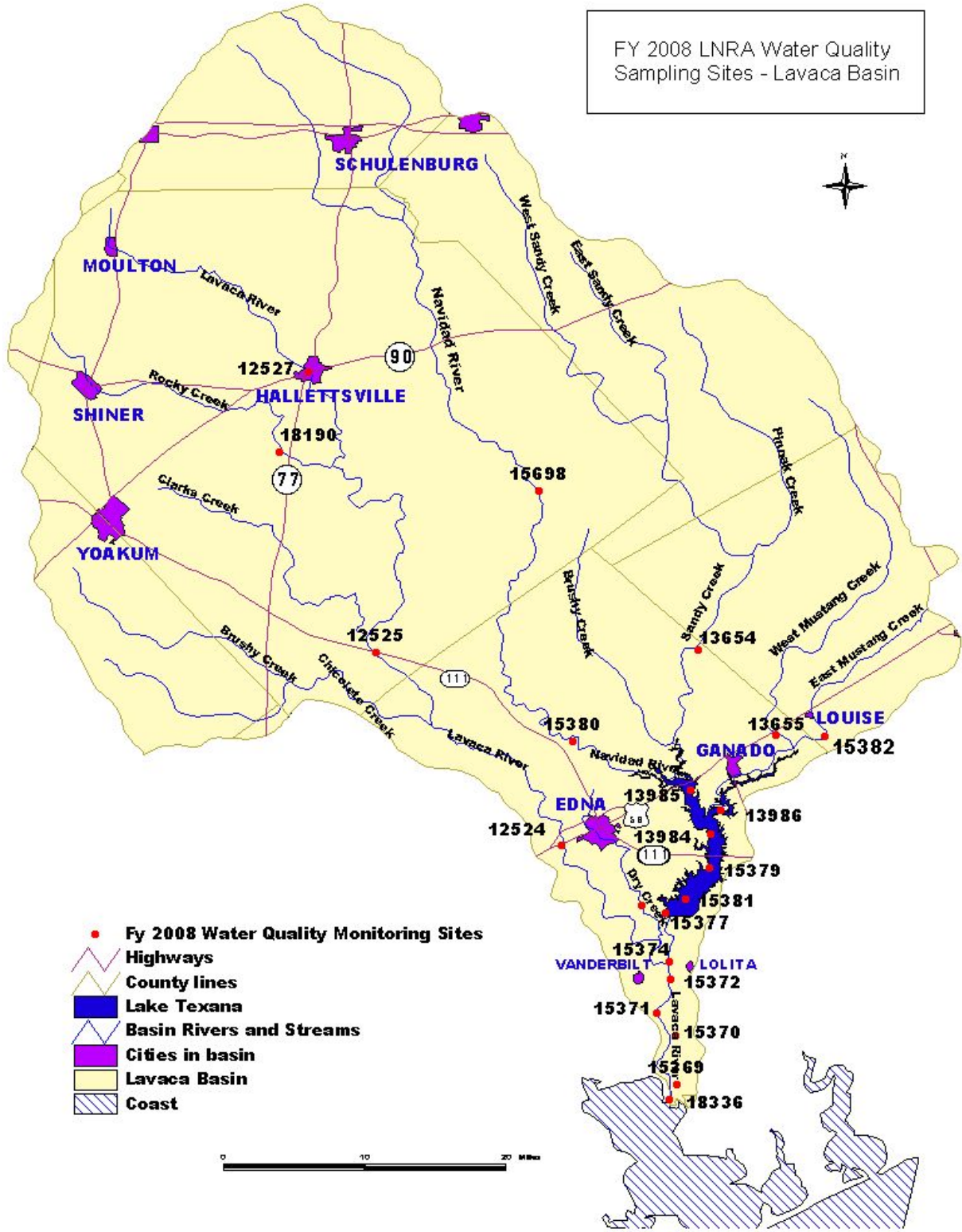


Figure 2 – Water Quality Monitoring Sites for 2008

Field parameters:

Secchi disk – physical measurement of water clarity via visibility

Water temperature – measured in °C

Dissolved oxygen - oxygen dissolved in water column available to aquatic organisms

Specific conductivity – measure of electrical current carrying capacity of water. This indicates the amount of dissolved solids and salts in the water. Total Dissolved Solids (TDS) can be derived from specific conductance by multiplying its $\mu\text{S}/\text{cm}$ value by .65 to obtain mg/L TDS.

pH – Measure of whether water is acidic, basic or neutral

Salinity – reported in tidally influenced waters

Depth – depth of water column where measurement occurs

Flow – measured in cubic feet per second (cfs).

Conventional parameters:

Total Suspended Solids (TSS) – all particles suspended in water which will not pass through a filter—commonly results from erosion of soils, run-off, sediment.

Sulfate – an abundant water soluble sulfur-containing compound.

Chloride – can be high from salt water intrusion near the coast or from gas and oil drilling operations where brine water is not contained properly.

Ammonia – occurs naturally in surface waters through decomposition of organic nitrogen, but may be elevated from agricultural runoff, human and/or animal wastes.

Total Hardness – a measurement of the amount of calcium and magnesium in association with carbonates.

Nitrate-Nitrogen – if elevated can be harmful to both fish and humans. Elevated levels can be result of agricultural and/or feedlot runoff or improperly treated wastewaters or septic tanks. Nitrate is highly soluble & can be transported to surface and groundwater during precipitation events.

Total Phosphorus – a measure of all chemical forms of phosphorus in the water. Phosphorus can be the limiting factor to plant growth, and elevated levels can lead to eutrophication of surface waters via increased algal growth resulting in depleted dissolved oxygen when the plant material is decomposed by bacterial activity.

Total Alkalinity – measure of the buffering capacity (ability to resist changes in pH when acids or bases are added) of water

Total Organic Carbon – measured by the amount of carbon dioxide produced when a water sample is atomized in a combustion chamber---gives indication of the amount of carbon covalently bound in organic compounds in the water. Important to drinking water treatment planning.

Turbidity – laboratory measurement of suspended particles in water affecting clarity.

Chlorophyll-a – photosynthetic pigment found in all green plants, algae and cyanobacteria – concentration used to estimate phytoplankton biomass in surface water.

Water Quality Conditions:

The Surface Water Quality Monitoring (SWQM) Team of TCEQ assesses water quality data using techniques appropriate for each of the various parameters measured. For more information on specific guidelines and methods for assessing water quality you can visit:

<http://www.tceq.state.tx.us/compliance/monitoring/water/quality/data/wqm/mtr/swqm.html>.

The latest water quality assessment is the **2008 Texas Water Quality Inventory (TWQI) and 303(d) List** which can be accessed on-line at:

<http://www.tceq.state.tx.us/compliance/monitoring/water/quality/data/08twqi/twqi08.html>

For water quality assessment purposes, TCEQ divides the Lavaca Basin into 5 main segments:

Segment 1601 – Lavaca River tidal portion (including Redfish and Swan Bays):

This 23 mile segment runs from the confluence with Lavaca Bay northwest to a point 8.6 km (5.3 miles) downstream of US 59 in Jackson County. Wastewater treatment plants include Vanderbilt at a flow not to exceed 45,000 gallons per day.

Assessment: The aquatic life and general uses are fully supported. The contact recreation and fish consumption uses were not assessed.

* * *

Segment 1602 – Lavaca River above tidal:

This long 94 mile segment runs from a point 8.6 km (5.3 miles) downstream of US 59 in Jackson County to a point 5.5 km (3.4 miles) upstream of SH 95 in Lavaca County. Wastewater plants in this segment include Hallettsville, Shiner, Yoakum, and Moulton.

Assessment: The public water supply and general uses are fully supported. The fish consumption uses were not assessed. Since the 2004 TWQI, the upper 29 miles of Segment 1602 have been listed for non-support of the high Aquatic Life Use (ALU) classification's concomitant dissolved oxygen (DO) criteria of 5.0mg/L due to depressed DO at low to no flow times. It is listed as a Category 5b, meaning that the standards for this segment are being re-assessed via the UAA discussed in the first "Summary of Highlights" section. The UAA will determine if this long segment should be broken into 2 divisions: the lower perennial section and the upper intermittent flow section. There had never been sufficient bacterial data to assess this segment for contact recreation uses before the 2008 TWQI. As of 2008 this Segment is now listed for exceeding the bacterial geomean of 126 MPN (most probable number of colony-forming units) per 100 milliliters of water. Rural streams in most basins experience higher bacterial counts after heavy rains, but these numbers recede after a short time. It only takes a couple of precipitation spikes to exceed the rather low geomean criteria. More information about this segment will be found later in this section.

Segment 1603 – Navidad River (tidally influenced portion):

This 9 mile segment runs from the confluence with the Lavaca River in Jackson County north to Palmetto Bend Dam in Jackson County.

Assessment: The aquatic life and general uses are fully supported. The contact recreation and fish consumption uses were not assessed.

Segment 1604 – Lake Texana and its proximate inflows:

From Palmetto Bend Dam in Jackson County to a point 100 meters (~110 yards) downstream of FM 530 in Jackson County, up to normal pool elevation of 44 feet. Lake Texana is a 10,000 acre reservoir impounding waters from the Navidad River, Sandy Creek, and East and West Mustang Creeks. The treated wastewaters from Ganado, Louise, and two parks eventually discharge to this segment.

Assessment: This segment was removed from the 303(d) list for depressed dissolved oxygen as a result of 24-hour monitoring data gathered by LNRA from 2001 to 2003. The aquatic life, contact recreation, general uses and public water supply uses are fully supported. The fish consumption use was not assessed.

Nutrient enrichment is a listed “concern” in Lake Texana due to the levels of phosphorus and nitrate nitrogen exceeding TCEQ screening levels. Lavaca Basin is an agricultural area, and the inflows (especially East and West Mustang Creeks) carry nutrients lost from fields during run-off. However, nutrient levels in Lake Texana appear to be somewhat stable and have not increased in recent years. Algal blooms do not appear to be a problem in Lake Texana, but invasive aquatic vegetation (e.g. water hyacinth and *Salvinia molesta*) is an ongoing problem in the Lake. LNRA operates an aquatic vegetation control program and cooperates with TPWD and the United States Department of Agriculture (USDA) on an integrated biological control program. TCEQ is currently working to develop nutrient standards for the state of Texas in cooperation with the EPA. More information on nutrient concerns will follow later in this section.

Segment 1605 – Navidad River above Lake Texana:

This 62 mile segment runs from above Lake Texana north to the confluence of the East Navidad River and the West Navidad River near the border of Colorado and Lavaca Counties and south of the City of Schulenburg. Wastewater treatment plants discharging in this segment include the communities of Schulenburg and Sheridan.

Assessment: The aquatic life, public water supply and general uses are fully supported. The contact recreation and fish consumption uses were not assessed.

* * * * *

Extended information on Segment 1602 dissolved oxygen in upper reaches:

With publication of the 2004 Texas Water Quality Inventory and 303(d) List, TCEQ placed Segment 1602 on the list for occasional depressed dissolved oxygen as a result of 24-hour monitoring conducted by both LNRA and Texas Parks and Wildlife over recent years. In 1999 TPWD began random 24-hour monitoring as a result of a tardily reported possible fish kill in the highest reaches of the upper Lavaca River. This incident was not reported to TPWD until a few weeks after TCEQ received the report, and by that time there were no fish to examine when TPWD arrived on the scene. After another 2 years TPWD reported their activities in this area to LNRA. LNRA staff assisted TPWD with equipment and monitoring, and TPWD reported the data to TCEQ. Most of this data, however, was collected by TPWD at flow stages well below what was considered the 7Q2 (seven-day, two-year low flow) for Segment 1602 at that time (0.7 cfs based on historical flow at a USGS flow gage in Hallettsville maintained from 1939 to 1993). Water quality data collected below the 7Q2 is customarily not considered during assessment as it is non-representative data. At the request of TPWD new (and lower) 7Q2's were calculated by TCEQ on a per site basis so that more of the data could be considered for assessment.

Segment 1602 is a very long river segment (94 miles). Both streambed size and flow differ greatly over this long segment, and upper portions of the Lavaca have little in common with the lower portions of the river. Despite these facts, the entire Segment is classified by TCEQ as High Aquatic Life Use (ALU). It is extremely doubtful that the intermittent flows of the upper portion of the Lavaca River can sustain the dissolved oxygen criteria of >5mg/L associated with "High" ALU. LNRA applied to the Clean Rivers Program (CRP) for help in funding a Special Study to gather flow, field and 24-hour monitoring data in the previously understudied upper Lavaca. The idea was that TCEQ and TPWD could then use the results of this study to reassess whether the upper Lavaca should be reclassified as intermittent with either an "Intermediate" or "Limited" ALU and criteria. LNRA completed this initial study in September 2003 and submitted the report to TCEQ in order that a Use Attainability Analysis (UAA) might be undertaken to potentially divide the non-tidal portion of the Lavaca River into two or more appropriate Segments. It is this 24-hour monitoring data which has placed the upper 29 miles of Segment 1602 on the 2004 303(d) List.

In 2004 LNRA added water quality sampling and monitoring to two sites in Segment 1602: Rocky Creek, site #18190 and additional parameters to site #12527, Lavaca River at Highway 90A in Hallettsville. LNRA began this additional quarterly monitoring in March 2004. Dissolved oxygen levels are consistently high at these sites. The dissolved oxygen depletion is occasionally seen only in the upper reaches of Segment 1602, the areas above Hallettsville where the flow is intermittent.

Extended information on Segment 1604 nutrient concerns:

The 2006 Lavaca Basin Highlights Report included a look at nutrient data through the year 2004 in the Navidad and Mustang arms of Lake Texana. In this report we will update that look with data through July 2007. **Figures 3-5** illustrate first the location of sites on an aerial photo followed by 2 graphs showing nitrate and phosphorus levels over time in the 2 arms of upper Lake Texana.

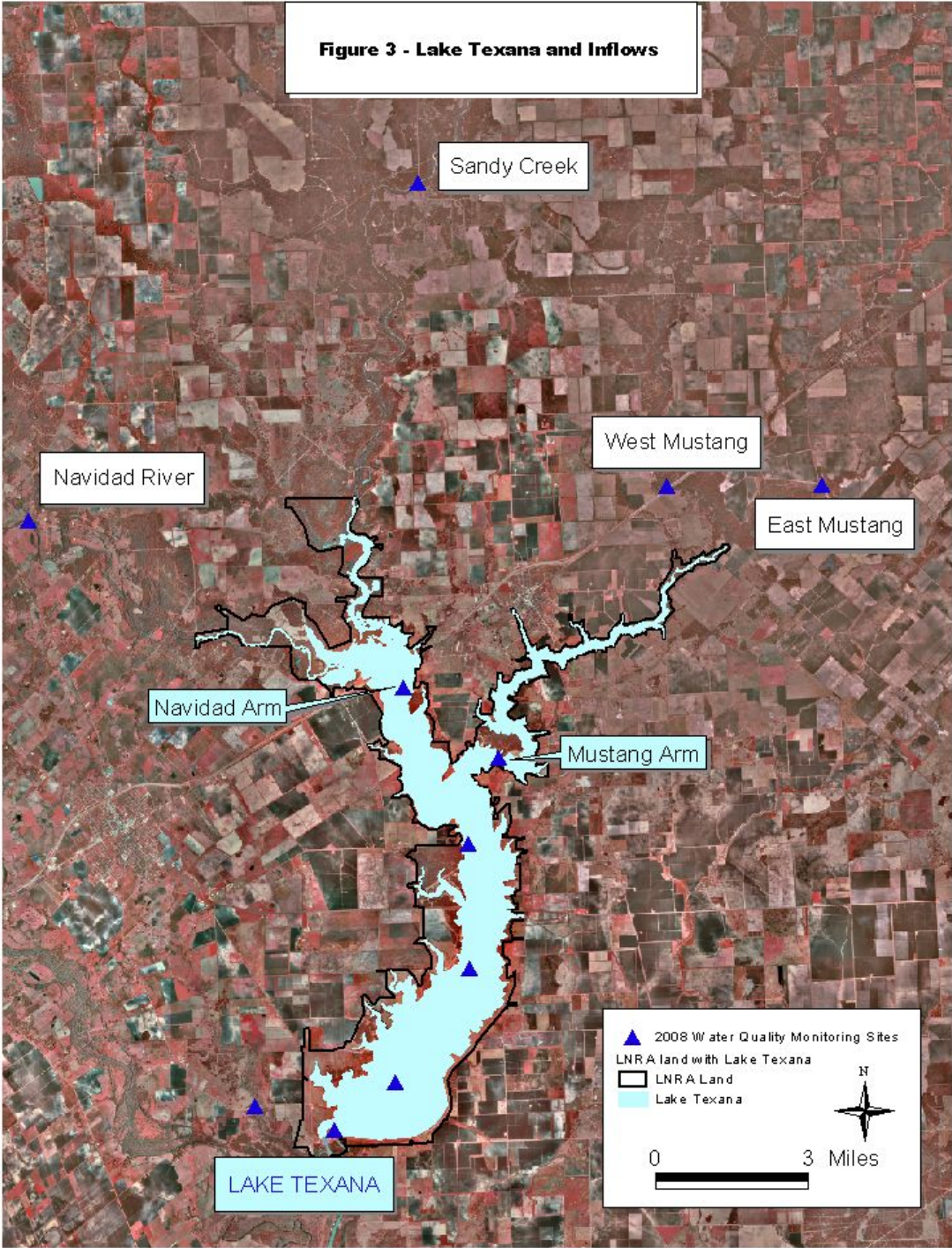


Figure 4 – Graph of Nitrate Concentrations

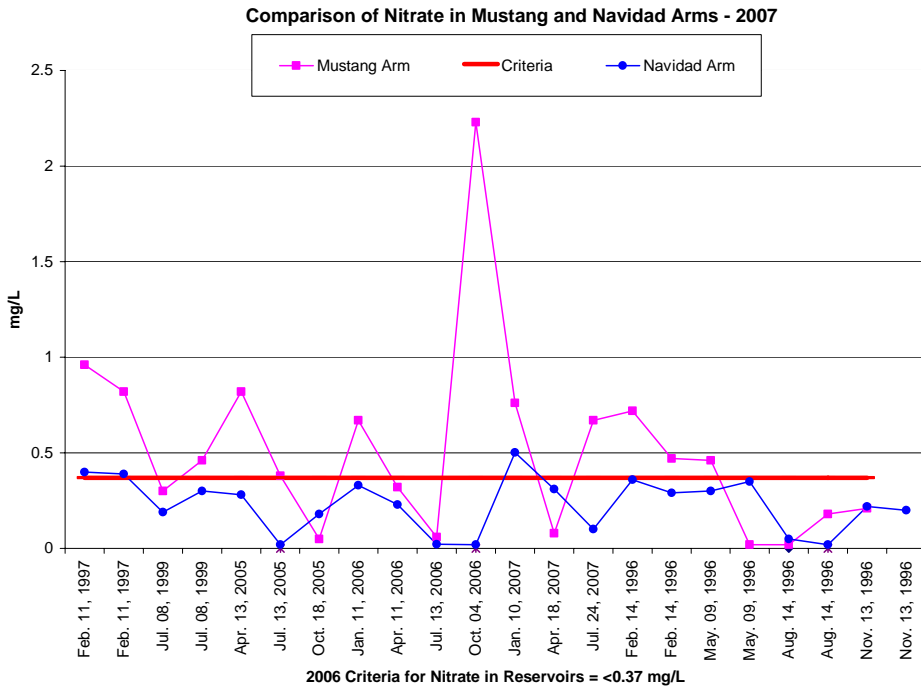
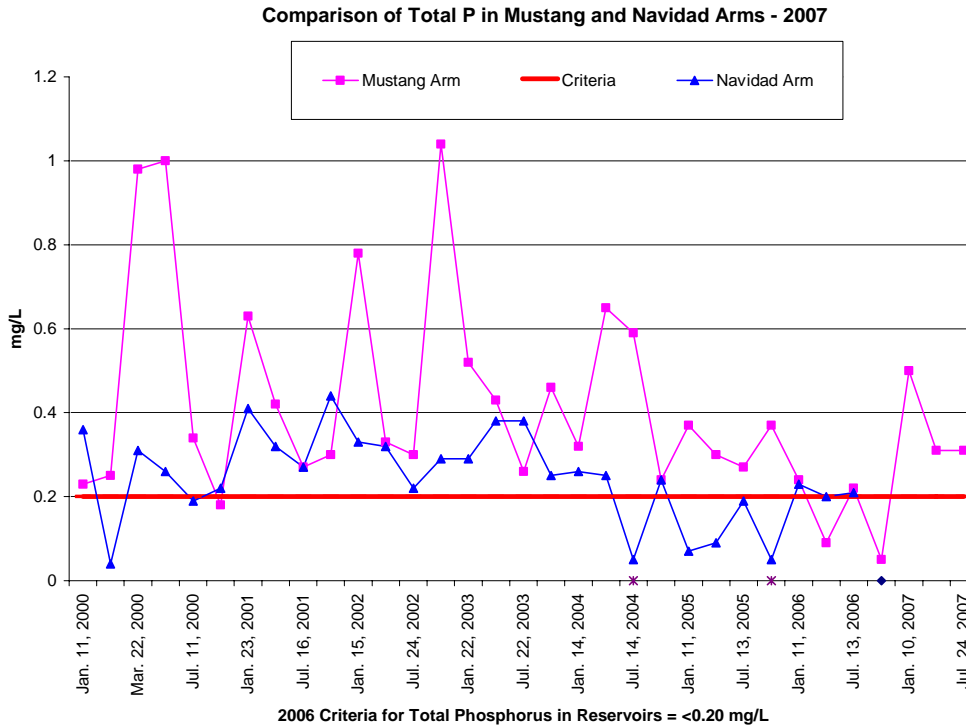


Figure 5 – Graph of Phosphorus Concentrations



Levels of nitrate and phosphorus are higher in the Mustang Arm than in the Navidad Arm. This is to be expected since these nutrients also run higher in the East and West Mustang Creeks flowing into the Mustang Arm of the Lake than they do in the Navidad River and Sandy Creek flowing into the Navidad Arm of Lake Texana.

Proposed Work in the Watershed:

The Texas State Soil and Water Conservation Board (TSSWCB) Wharton Regional Watershed Coordinator established the Regional Watershed Coordination Steering Committee (WCSC) in January 2005. The WCSC quantified criteria to prioritize watersheds in southeast and south central Texas for Watershed Protection Plan (WPP) development, and first selected Plum Creek (Segment 1810 in the Guadalupe-Blanco Basin) in December 2005. In March 2007 the WCSC began the process of re-evaluating the criteria for selecting a second regional watershed for WPP development.

Discussions among WCSC members led to a consensus in December 2007 that the Mustang Creek Watershed (Segments 1604A, 1604B in Lavaca Basin) had the highest potential to produce a successfully developed and implemented WPP. Key factors included the water quality issues (nutrient enrichment), static agricultural land use in the watershed, potential for additional agriculture BMP implementation, and potential for agricultural nonpoint source pollution. However, through further discussion, it was found that there is potential for point sources (small wastewater treatment plants [WWTPs]) to be major contributors, and available water quality data would probably not be sufficient to uphold stakeholder buy-in. These events led to proposing an additional two years of monthly surface water quality monitoring (SWQM) data collection and evaluation before starting any stakeholder process.

On February 1, 2008, LNRA submitted a Proposal to the TSSWCB Clean Water Act §319(h) Agricultural/Silvicultural Nonpoint Source Grant Program for partial funding for the proposed two years of intense monitoring in the watershed. The proposal includes adding 7 monthly sites in the East and West Mustang Creeks and increasing sampling at the established sites on the creeks from quarterly to monthly. Also added would be wet weather monitoring to try to capture nutrient run-off as well as herbicide and pesticide run-off. Sampling is proposed monthly for nutrients from the 4 WWTPs in the watershed.

Moving forward with this project is contingent upon funding. If approved for funding assistance, this work would begin September 1, 2008 and run through August 31, 2010.

Special Studies: Currently there are no Special Studies being conducted in the Lavaca Basin.

Stakeholder Participation and Public Outreach:

Public outreach efforts by LNRA include seeking guidance for water quality issues and activities from the Lavaca Basin Steering Committee, education and assistance in water conservation and drought contingency planning, news releases, public meetings, attendance at water quality issues meetings, providing water education materials (*Major Rivers*) to elementary schools throughout the Basin, presentations to groups, and support of the Texas Watch volunteer water quality monitoring program. In addition LNRA distributes a quarterly Water Conservation Newsletter containing water quality information to area businesses and individuals. LNRA staff members are available to answer questions or give assistance with water quality information to Basin students, stakeholders, members of the public and to respond to calls from concerned citizens. LNRA staff investigate information provided by citizens and contact the appropriate regulatory agency to address the issue. This cooperation between citizens, LNRA, and regulatory agencies has resulted in effective response to potential water quality problems in the Basin.

Major Rivers: The *Major Rivers* water education program for Texas fourth-grade classrooms was revised and updated with additional activities and learning opportunities to better correlate with Texas Essential Knowledge and Skills (TEKS) and Texas Assessment of Knowledge and Skills (TAKS) standards. LNRA provides these new materials (which include student workbooks, water conservation take-home information brochures, pre- and post-tests, teacher workbooks with color overhead transparencies, and an introductory video) to schools in Lavaca Basin.

CRP Steering Committee: LNRA works with the Clean Rivers Program (CRP) Steering Committee to seek public input, disseminate water quality information, and set priorities for water quality monitoring in the Lavaca Basin. Membership in the Committee is open to staff from state and local governments, private landowners, representatives of industry and agriculture, and concerned citizens. Anyone interested in participating as a member of the Steering Committee may contact the offices of LNRA and speak to General Manager Patrick Brzozowski, Water Resources Manager Doug Anders or Water Quality personnel, Sylvia Balentine or Chad Kinsfather. **Contact information** follows:

Lavaca-Navidad River Authority
PO Box 429
Edna, Texas 77957

Telephone: 361-782-5229
Fax: 361-782-5310

E-mail addresses:

General Manager Patrick Brzozowski pbrzozowski@LNRA.org
Manager of Water Resources Doug Anders danders@LNRA.org

Water Quality Department:

Sylvia Balentine sbalentine@LNRA.org
Chad Kinsfather chadk@LNRA.org

The Lavaca Basin Steering Committee provides guidance on the use of resources from the Clean Rivers Program. The Steering Committee allows LNRA to gain insight from local stakeholders and expertise from such members as Texas Parks and Wildlife (TPWD), Texas Commission on Environmental Quality (TCEQ), United States Geological Survey (USGS), Natural Resources Conservation Service (NRCS), Texas Watch, Texas Department of Agriculture, Texas State Soil and Water Conservation Board, and the County Agricultural Extension Service. Input from the Committee allows LNRA to prioritize water quality issues and to determine the most effective water quality monitoring program.

CRP Steering Committee Meetings are held annually -- usually in July. Meeting notices are mailed out three weeks in advance to Committee members, and notices of the meetings are posted on the LNRA home page calendar at www.LNRA.org. Under “Clean Rivers Program” on the LNRA web site can be found contact information and a map to the meeting site. Agendas and minutes of the meetings are also posted on-line. In addition, LNRA places notices of the meetings in all the Basin newspapers (Edna, Hallettsville, Moulton, Schulenburg, Shiner, Yoakum) inviting the public to attend.

Texas Watch: LNRA provides support to the Texas Watch volunteer water quality monitoring program by providing equipment, monitoring supplies and reagents, quality assurance, and environmental data to the volunteers. The Texas Watch Program is a statewide network of concerned volunteers, partners, and institutions collaborating to promote a healthy and safe environment through environmental education, data collection, and community action. A long-time TX Watch volunteer, Ken Barton, is the science teacher at the Edna High School and uses Texas Watch monitoring as a tool for environmental education.

Anyone wishing to become involved with Texas Watch monitoring may contact Sylvia Balentine at LNRA or contact Texas Watch directly by calling toll-free 1-877-506-1401, or by visiting the LNRA Web site www.LNRA.org and clicking on the Texas Watch link, or by visiting the Texas Watch Web site at www.texaswatch.geo.swt.edu.

LNRA Web Site:

Extensive water quality information for the Lavaca Basin is available via the Lavaca-Navidad Web site at www.LNRA.org. The LNRA home page provides links to information about the Clean Rivers Program. Under the “Education & Programs” pull-down menu at the top of the LNRA home page are links to the “Clean Rivers Program”, “Major Rivers Program”, and the “Water Quality” pages”

Water Quality Program / Clean Rivers Program

[LNRA Water Quality Database](#)

[SWQMIS Data Viewer](#)

[2008 Texas Water Quality Inventory and 303\(d\) List](#)

[FY 2007-2008 Water Monitoring Map](#)

[FY2008 LNRA Monitoring Schedule](#)

[FY2008 Coordinated Monitoring Schedule](#)

[FY2007 Coordinated Monitoring Schedule](#)

[FY2008-2009 Work Plan](#)

[2007 Lavaca Basin Summary Report](#)

[FY2008-2009 Quality Assurance Project Plan \(QAPP\)](#)

[Minutes of 2007 CRP Annual Steering Committee Meeting \(7-26-07\)](#)

[2006 Basin Highlights Report](#)

[2005 Basin Highlights Report](#)

[2004 Basin Highlights Report](#)

[2003 Basin Highlights Report](#)

[2002 Basin Summary Executive Summary](#)

[2001 Highlights Report](#)

[2000 Highlights Report](#)

[2001 Special Study Executive Summary](#)

[2001 Special Study Results](#)

[2006 Texas Water Quality Inventory and 303\(d\) List](#)

[2004 Texas Water Quality Inventory and 303\(d\) List](#)

[2002 Texas Water Quality Inventory and 303\(d\) List](#)

The “LNRA Water Quality Database” link (listed first) connects to a dedicated server storing all state-approved water quality data for the Lavaca Basin, both historical and recent. The data may be accessed by county, segment, or a Texas Surface Water Quality Monitoring (SWQM) site number. These site numbers are available by looking first under “County” or “Segment” where the sites are described and SWQM numbers are given. Site numbers are also available from the LNRA water quality monitoring schedule or site map posted at the “Water Quality” site.

Water quality data can be displayed as an HTML page, as an ASCII delimited text file that can be imported into a spreadsheet or database, or in graph format. Once a sampling site (also called “station”) is chosen, data can be retrieved either by sampling date or by parameter storet codes—both of which are displayed in pull-down menus. Water quality parameters, e.g. dissolved oxygen, pH, salinity, etc. are posted via a storet code, but the names of the parameters gathered in Lavaca Basin are listed on the pull-down menu to the right of the page. Recently added to this drop-down list are the storet codes for the metal and organic parameters (analyses contracted to USGS). Once a parameter is chosen, a date range can be entered, as instructed. If no date range is entered the query will produce all available data for that site and parameter. This is an excellent tool for students or anyone needing to access historical or current water quality information for the Lavaca Basin.