2014 Lavaca Basin Highlights
Clean Rivers Program Report

Aerial photo of Lake Texana, Brackenridge Recreation Complex and Texana Park near Edna, Texas

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Texas Commission on Environmental Quality (TCEQ)
CLEAN RIVERS PROGRAM
PO Box 13087, Austin, TX 78711

LAVACA BASIN HIGHLIGHTS REPORT 2014

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Acronyms

AU	Assessment Unit
B&E	Bay and Estuary
CRP	Clean Rivers Program
DO	Dissolved Oxygen (in water)
EPA	Environmental Protection Agency
IR	Texas Integrated Report of Surface Water Quality for CWA Sections 305(b) and 303(d)
LNRA	Lavaca Navidad River Authority
MPN	Most Probable Number
ROW	River Outlet Works
SWQM	Surface Water Quality Monitoring
TCEQ	Texas Commission on Environmental Quality
UAA	Use Attainability Analysis
[RUAA]	[Recreational Use Attainability Analysis]
WQS	Water Quality Standards

This Year's Highlights:

Since the historically low rainfall year of 2011 the region has seen rainfall numbers closer to normal, but some basin streams still go dry in between rain events. This year four streams went dry periodically throughout the year. The Navidad River at Strane Park (site #15380) was dry approximately half of the year. This area has not seen a substantial flood that inundates the riparian areas surrounding these streams in seven years. Overbank flow as this is called, recharges dry channels that directly flow back to the main streambed. These same flood waters help perennial streams by recharging groundwater sands that exchange back and forth between the surface channel and groundwater. Another important aspect of overbank flow is the recharge of bank storage. As stream flow decreases, bank storage helps feed the system and keep the stream flowing and viable.

Zebra mussels are an invasive species that were discovered in the Great Lakes in the late 1980's; they have since traveled southward and now inhabit numerous lakes and waterways in Texas. Adults are 1/4 - 1 1/2 inches long and have alternating yellow and brownish colored stripes. This is the only freshwater mussel that can attach to objects. The impact from these mussels can be catastrophic to native mussel species. These bivalves can kill native species by competing for food and attaching to their shells (see figure 1). Zebra mussels filter plankton from the surrounding water, possibly increasing water clarity causing denser stands of aquatic vegetation to grow at greater depths. Water supplies can be disrupted by clogged intakes and delivery systems which can increase the economic hardship on a community through higher water bills.

Without any known native predators, the main weapon against this invasive parasite is education. Boaters are the number one transporter of the organism. The LNRA has passed out pamphlets explaining zebra mussels and their destructive nature to all known bait stands and boat shops in the vicinity of Lake Texana. In cooperation with TPWD, metal signs with information on how to clean and drain water craft to prevent further infestation have been posted at all boat ramps around the lake (see figure 2). Personnel from LNRA performed a visual inspection of all boat ramps and found zero evidence of zebra mussels in Lake Texana.

Figure 1 – Invading zebra mussels

Figure 2 – Signs posted by LNRA at Lake Texana boat ramps.

When the Navidad River was impounded, it formed Lake Texana and cut off freshwater flows that might otherwise flow into Lavaca/Matagorda Bay and Estuary system. The Texas Parks and Wildlife, Texas Water Development Board and the Lavaca-Navidad River Authority developed an agreement to pass natural reservoir inflows through Lake Texana to help protect the Bay and Estuary System (B&E). When the reservoir is at 78.18% or more capacity, historical monthly median flow for certain months and historical monthly average flow for other months shall be passed through the reservoir for B&E purposes. These releases are conducted every Monday through the River Outlet Works (ROW) system, a small gate that allows the slowest possible release to help mimic, as best possible, the natural flow of the river. Approximately 39,257.21 acre feet of water were released downstream to satisfy bay and estuary requirements this past year. Freshwater releases are an effort to maintain the nursery and juvenile requirements of important species such as shrimp, crab, oysters and fish. These releases make possible a healthy estuarine system for both ecological and commercial purposes.

Figure 3 – Needle nose gar, alligator gar, and blue catfish congregated at the River Outlet Works (ROW).

Water Quality Monitoring:

LNRA currently monitors 21 sites in Lavaca Basin. Most sites (18) are monitored monthly for field data with 3 of the sites most distant from headquarters monitored quarterly. At all sites except for 4 tidally-influenced downstream Lavaca River sites in Segment 1601, LNRA gathers quarterly conventional water samples that are taken to the GBRA laboratory in Seguin for analyses. Bacterial samples are taken at 8 sites and Chlorophyll-a is measured at all 6 of the Lake Texana sites.

Figure 5, Table 1, and the lists that follow give the water quality sites monitored for FY 2014 along with the parameter sets and frequency. A detailed coordinated monitoring schedule with maps for Lavaca Basin can be accessed from www.LNRA.com as follows: from the "Programs" pull-down menu choose "Water Quality" and click on "FY 2014 Coordinated Monitoring Schedule".

Figure 4 – Alligator in Lake Texana

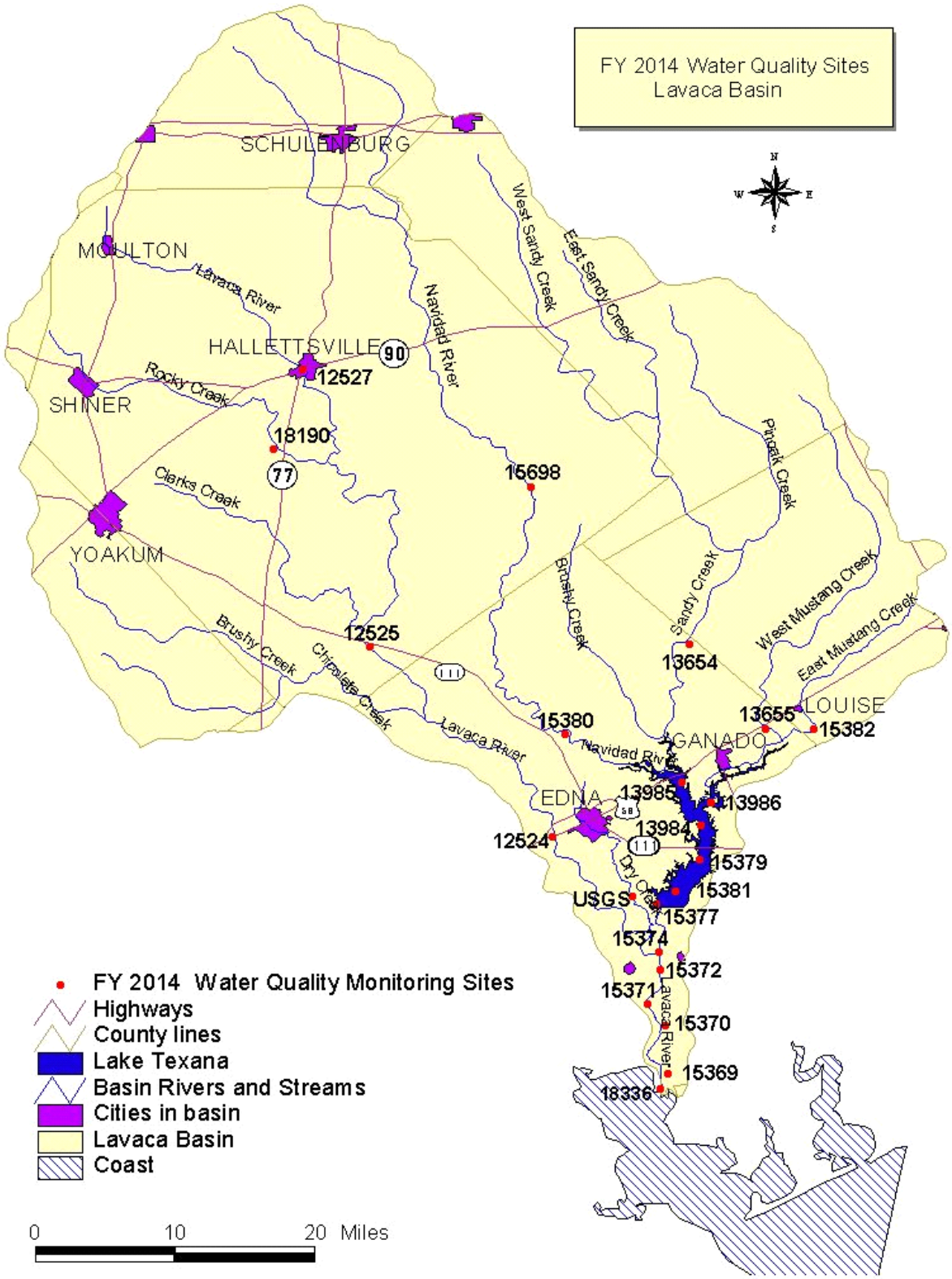

Figure 5 – FY 2014 Lavaca Basin Monitoring Sites

Table 1 -- Monitoring Sites for FY 2014

Seg-ment	Latitude	Longitude	Long Description	Station Id	Moni-toring Resp	Moni-toring Type	24 HR	Aq Hab	Ben-thics	Nek-ton	Metals Water	Org Water	Metals Sediment	Org Sed	Conven tional	Amb Tox Wat	Amb Tox Sed	Bacteria	Flow	Fish Tissue	Field
1601	28.8233	96.5752	Lavaca River @ Frels Landing	15372	LN/LN	RT															12
1601	28.7876	96.5891	Lavaca River @ Mobil Dock	15371	LN/LN	RT															12
1601	28.7651	96.5701	Lavaca River @ Mouth of Redfish Lake	15370	LN/LN	RT															12
1601	28.7150	96.5682	Lavaca River @ Mouth of Swan Lake	15369	LN/LN	RT															12
1601	28.6995	95.5758	Lavaca River near Lavaca Bay mouth	18336	LN/LN	RT									4						12
1602	29.1567	96.8750	Lavaca River @ SH 111 bridge	12525	LN/LN	RT									4			4	12		12
1602	28.9603	96.6864	Lavaca River @ Highway 59 bridge	12524	LN/LN	RT									4			4	12		12
1602	29.3609	96.9743	Rocky Creek at Lavaca CR 387	18190	LN/LN	RT									4			4			4
1602	29.4431	96.9442	Lavaca River at Hwy 90A Hallettsville	12527	LN/LN	RT									4			4	4		4
1603	28.8358	96.5800	Navidad River 30 m above confluence with Lavaca River	15374	LN/LN	RT									4						12
1604	28.8909	96.5794	Lake Texana near spillway	15377	LN/LN	RT									4						12
1604	28.9040	96.5595	Lake Texana near dam	15381	LN/LN	RT									4						12
1604	28.9362	96.5347	Lake Texana south of SH 111	15379	LN/LN	RT									4			4			12
1604	28.9715	96.5340	Lake Texana north of SH 111	13984	LN/LN	RT									4			4			12
1604	29.0163	96.5541	Lake Texana main body near highway 59	13985	LN/LN	RT									4			4			12
1604	28.9957	96.5239	Lake Texana Mustang Creek arm	13986	LN/LN	RT									4			4			12
1604	29.1595	96.5462	Sandy Creek @ FM 710	13654	LN/LN	RT									4				12		12
1604	29.0714	96.4172	East Mustang Creek @ FM 647	15382	LN/LN	RT									4				12		12
1604	29.0720	96.4676	West Mustang Creek @ highway 59	13655	LN/LN	RT									4				12		12
1605	29.0658	96.6745	Navidad River @ Strane Park bridge	15380	LN/LN	RT									4				12		12
1605	29.3220	96.7090	Navidad River @ Speaks bridge	15698	LN/LN	RT									4						4

Narrative list of sites with parameters:

- **East Mustang Creek** -- monthly field data and quarterly conventional.
- **West Mustang Creek** -- monthly field data and quarterly conventional.
- **Sandy Creek** -- monthly field data and quarterly conventional.
- **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, flow 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 organics (pesticides and herbicides) and metals.
- **Dry Creek** -- monitored 2 times annually by USGS for organics and field and 1 time annually for metals.

Field parameters:

Secchi disk -- physical measurement of water clarity via visibility.

Water temperature -- For CRP purposes water temperature is measured in degrees Celsius. Higher temperature waters can hold less DO.

Dissolved oxygen (DO) -- oxygen dissolved in water column readily available to aquatic organisms.

Specific conductance -- 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 µS/cm value by 0.65 to obtain mg/L TDS.

pH -- measure of whether water is acidic, basic or neutral.

Salinity -- the amount of dissolved salts in a body of water. Salinity is usually low in fresh water and higher in tidally influenced water, bays, and oceans. Usually measured in parts per thousand (ppt). Average ocean water is ~35 ppt.

Depth -- depth of water column where measurement occurs.

Flow -- The volume of water flowing through a point in a stream -- measured in cubic feet per second (cfs).

Bacterial analysis is conducted for *E. coli* with the IDEXX Colilert system.

Conventional parameters:

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

Sulfate -- an abundant water soluble sulfur-containing compound.

Chloride -- Chlorides 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 -- a compound of nitrogen and hydrogen in the formula NH3 that occurs naturally in surface waters through decomposition of organic nitrogen, but may be elevated from agricultural runoff, human and/or animal wastes. Wastewater effluent can potentially contain high levels. Ammonia also occurs in trace amounts in the atmosphere and in rainwater.

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

Nitrate-Nitrogen -- Nitrate is a nutrient that stimulates plant growth, but too much in the water can be harmful to both fish and humans. Elevated levels can be the result of agricultural and/or feedlot runoff or improperly treated wastewaters or septic tanks. Nitrate is highly soluble and can be transported to surface and groundwater during precipitation events.

Total Phosphorous -- 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 – TOC levels are useful for 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:

Water quality remains good in Lavaca Basin. Being the smallest and least industrialized basin in the state relegates a rather tranquil atmosphere. The basin constitutes a rural landscape and agricultural background that help water quality issues remain low. As evidenced by the 2012 Integrated Report, the few impairments in the segments (see Figure 7 on page 16) appear to be correlated with non-point sources, mainly livestock and wildlife. Every 2 years TCEQ conducts an assessment of water quality per each basin in the State of Texas. This report is fully named the *Texas Integrated Report (IR) of Surface Water Quality for CWA [Clean Water Act] Sections 305(b) and 303(d)*. TCEQ assesses all available data and produces this report on the quality of the water. Water bodies not meeting screening levels are considered as a concern or as an impairment if not meeting established standards, and this is what is known as the 303(d) list.

The Surface Water Quality Monitoring (SWQM) Team is the division of TCEQ that 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 please visit:
http://www.tceq.state.tx.us/compliance/monitoring/water/quality/data/wqm/mtr/index.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. Several small tributaries, the Menefee Lakes, Redfish Lake, Swan Lake, Redfish Bayou, and Catfish Bayou are included in this segment. The Redfish and Swan Lakes are important nursery grounds for marine organisms. 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 segment runs from a point 8.6 km (5.3 miles) downstream of US 59 in Jackson County upstream to the confluence with the West Prong of the Lavaca River in Lavaca County. Assessment Unit (AU) 1602_01 is now considered intermittent with pools and runs from the confluence with Campbell Branch just above Hallettsville up to the end of the segment at the West Prong confluence. The small portion of the Lavaca above the West Prong confluence is now considered unclassified and intermittent with a DO criteria of 2.0 mg/L average and 1.5 mg/L minimum. This portion has been dry much of the time in recent years due to drought. Many tributaries drain into the Lavaca River. Wastewater effluent from Shiner drains into Rocky Creek (which combines with the Lavaca River south of Hallettsville), while Yoakum effluent flows into Big Brushy and Clarks Creeks and eventually into the Lavaca River. Moulton and Hallettsville release their treated effluents into the Lavaca River.

Assessment: The public water supply and general uses are fully supported. The fish consumption uses were not assessed. The 2004 Texas Water Quality Inventory (now called the IR) listed the upper portion of the Lavaca River (above Hallettsville) for non-support of the high Aquatic Life Use (ALU) classification's concomitant dissolved oxygen (DO) criteria due to depressed DO at times of low to no flow. It is listed as a Category 5b, meaning that the standards for this upper portion of the river were re-assessed via a Use Attainability Analysis (UAA). The UAA has determined that this long segment should be broken into 2 basic divisions: the lower perennial flow section and the upper intermittent with pools section with the division point being the confluence with Campbell Branch just northwest of Hallettsville. This division would result in new WQS being proposed.

Although the Environmental Protection Agency (EPA) did not approve the TCEQ-recommended seasonal dissolved oxygen (DO) standard change for AU 1602_1, they did give guidance for intermittent streams with perennial pools. A response letter from the EPA included the following: "The seasonal site specific criteria in Appendix D will not protect a high aquatic life community from March 15th through October 15th because the spawning period occurs in early spring and higher levels of dissolved oxygen are needed for reproduction and survival of early life stages. The State can resolve this disapproval action by removing footnote 10 from the Texas WQS [Water Quality Standards] in the next revision or by adopting alternative criteria, such as those values previously established in the Texas WQS for intermittent streams with perennial pools of 3.0 mg/L (24-average) and 2.0 mg/L (24-hour minimum)." This change is currently under consideration by EPA.

Bacterial standards are intended to protect the health of people who use water bodies for various recreational activities. The freshwater *E. coli* (indicator bacteria) standard for streams considered as Primary Contact Recreation is a geomean of <126 most probable number (mpn) per 100 milliliters of water. Primary Contact Recreation includes activities that involve a significant risk of ingestion of water, e.g. swimming, water skiing, diving, tubing etc. The Lavaca River in Segment 1602 is far too shallow for these types of activity, and there is limited public

access. This Segment was listed for exceeding the Primary Contact Recreation bacterial geomean. Rural streams in most basins experience higher bacterial counts after heavy rains due to the organics picked up from pastureland and wildlife during overland flow, but these numbers recede after a short time. It only takes a couple of precipitation spikes to exceed this rather low geomean criteria. The 2012 Integrated Report found a bacterial (*E. coli*) geomean in AU 1602_02 at 142 mpn and in AU 1602_03 at 209 mpn. There is an effort at this time to perhaps conduct a Recreational Use Attainability Analysis (RUAA) to study the appropriateness of this segment being classed as used for Primary Contact Recreation.

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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. Dry Creek is a non-tidal subsegment that drains treated wastewater effluent from Edna. The drains along the east and west dikes of Lake Texana also channel water into this segment.

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

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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 161,085 acre foot reservoir with 9,727 surface acres impounding waters from the Navidad River, East and West Mustang Creeks, and Sandy Creek. Wastewater effluent from Ganado drains into Lake Texana, the city of Louise waste water drains into East Mustang Creek, and two LNRA parks discharge treated effluent into Lake Texana.

Assessment: 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 assessed as a "concern" in Lake Texana due to the levels of phosphorus and nitrate nitrogen exceeding TCEQ screening levels. Elevated nutrients can sometimes cause excessive plant growth. Thus LNRA began testing for chlorophyll-a in 2004, and so far the levels remain below screening levels of concern. The sampling site closest to the spillway (#15377) is where chlorophyll-a screening levels are applied. The general screening level for chlorophyll-a in a reservoir is < 26.7 µg/L; the current (through January 2014) average for Lake Texana at site #15377 is 4.12 µg/L, well below the screening level. 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. LNRA continues to collect data and is watching the trends, and

criteria may be developed in the future. 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 in cooperation with TPWD. Graphs of nitrate, total phosphorus and chlorophyll-a will follow later in this section.

Figure 6 – 4 wheeler tracks in the streambed at Sandy Creek.

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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 just southeast of the City of Schulenburg. Wastewater treatment plants discharging into unnamed tributaries 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.

Figure 7 is a map graphically representing the impairments and concerns described above.

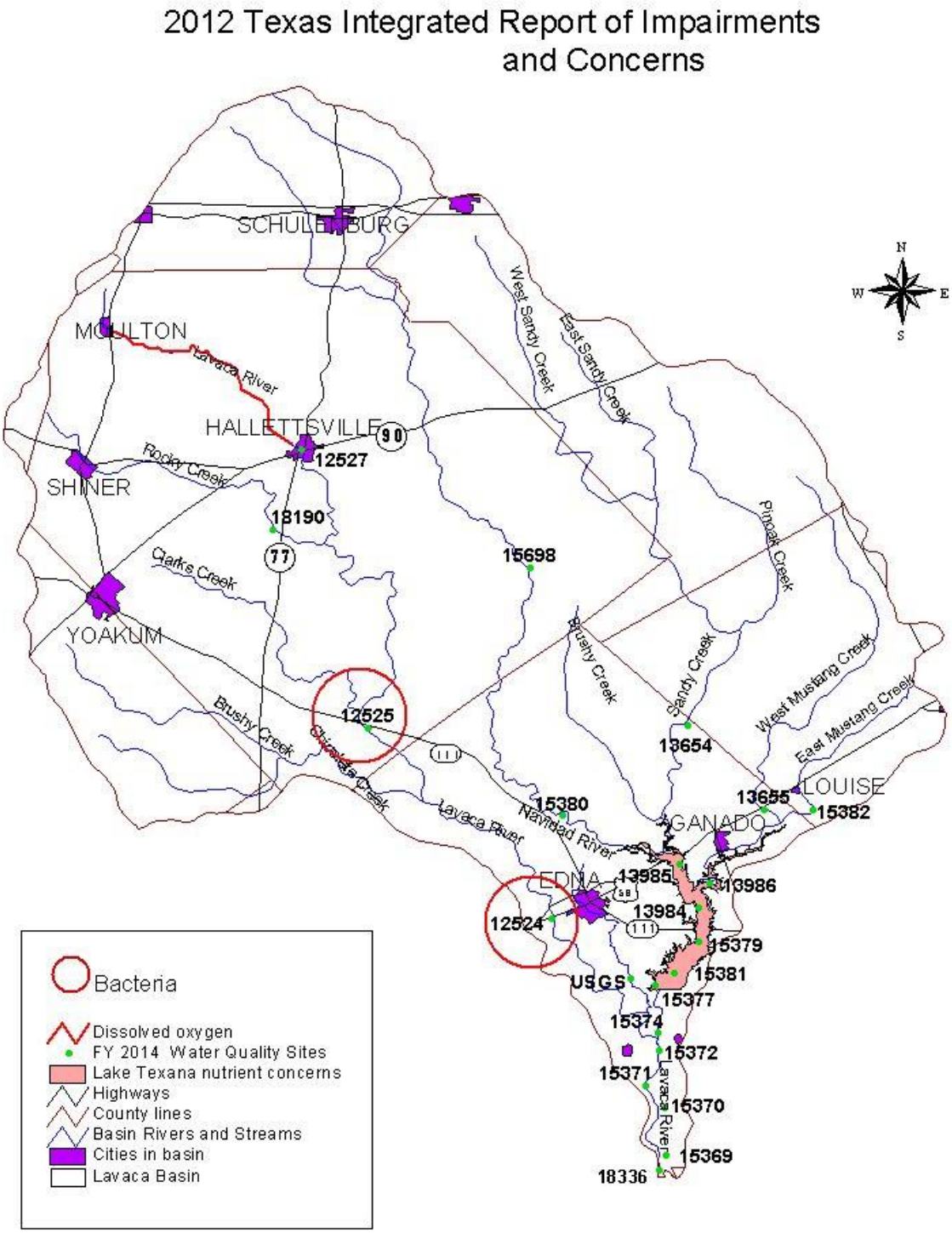

Figure 7 - Lavaca Basin Impairments and Concerns

Next are graphs (**Figures 8, 9 and 10**) showing updated nutrient levels through FY 2013 for Lake Texana site #15377, the site closest to the spillway and the municipal and industrial intake. The current screening levels for each parameter are shown as a red line on the graphs.

Figure 8 - Total Phosphorus in Lake Texana at site #15377

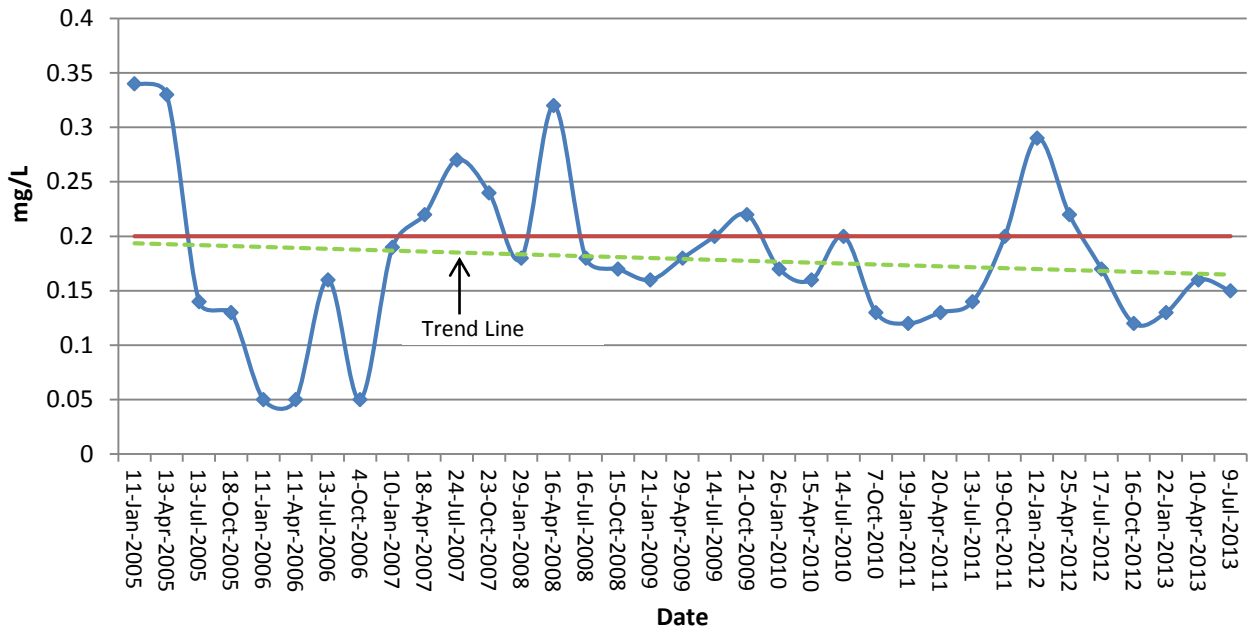

Figure 9 -- Nitrate Nitrogen in Lake at site #15377

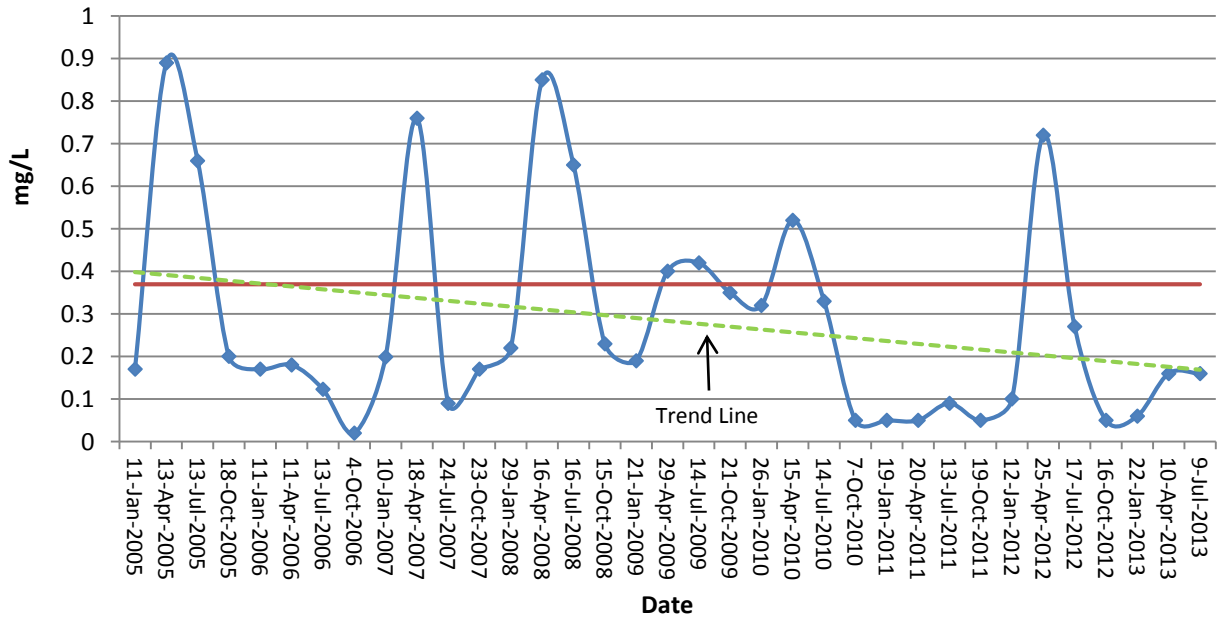

Figure 10 - Chlorophyl-a in Lake Texana at site #15377

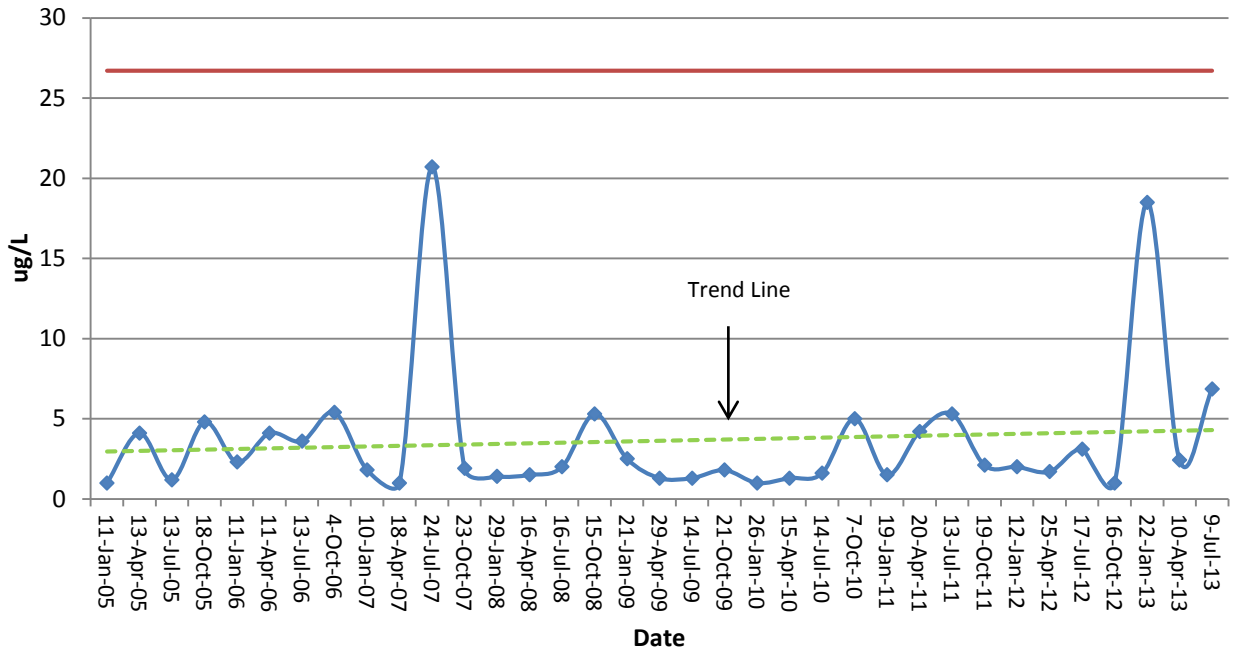

Figure 8 graph of phosphorus at site #15377 is an updated graph with the past nine years demonstrated. Levels vary between <0.05 and 0.34 over the nine year period, and the current screening level in reservoirs is <0.2 mg/L. The linear trend range for the data set is downward from 0.18 mg/L to 0.14 mg/L, and only 25% of the data points (9 out of 35) are over the screening level.

Figure 9 graph of total nitrogen at the same site seems to show loading of nitrogen in the month of April. During the period of record shown, two-thirds of high readings were measured in this month. Levels varied between <0.02 and 0.89 mg/L; current screening level for nitrate in reservoirs is <0.37 mg/L. Again there were 9 samples over screening level and 26 under the screening level, same as phosphorus. The linear trend range for the data set is downward from 0.4 mg/L to 0.17 mg/L.

Figure 10 graph of chlorophyll-a in Lake Texana at site #15377 shows all samples under the current general screening level of <26.7 µg/L. The linear trend line is upward for this parameter, from 2.5 µg/L to 4 µg/L, with two large outliers; this is still well below the screening level.

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 (*MajorRivers*) to elementary schools throughout and near the Basin, presentations to groups, and support of the Texas Stream Team volunteer water quality monitoring program. 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. In addition, LNRA retained the Nature Interpreter from the previous Lake Texana State Park to do public outreach for LNRA. Her name is Cindy Baker, and she teaches nature crafts and programs at Texana Park and is also available to travel to schools and libraries to present various environmental education programs. LNRA covers the cost of these programs. Her cell phone is 361-308-0153, and she can be reached via e-mail at cbaker@lnra.org.

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, privatelandowners, representatives of industry and agriculture, and interested 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:

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Manager of Water Resources Doug Anders danders@LNRA.org

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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 Stream Team, 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 in the summer. 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. Contact information and a map to the meeting site are found under the "Programs" tab then choose "Clean Rivers". 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 Stream Team (formerly named Texas Watch): LNRA provides support to the Texas Stream Team volunteer water quality monitoring program by providing equipment, monitoring supplies and reagents, quality assurance, and environmental data to the volunteers. The Texas Stream Team 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 Texas Stream Team volunteer, Ken Barton, is the former science teacher at the Edna High School and still uses Texas Stream Team monitoring as a tool for environmental education.

Anyone wishing to become involved with Texas Stream Team monitoring may contact Sylvia Balentine at LNRA or contact Texas Stream Team directly by calling toll-free 1-877-506-1401, or by visiting the LNRA Web site www.lnra.org and clicking on the Stream Team link, or by visiting the Texas Stream Team Web site at http://txstreamteam.meadowscenter.txstate.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 TCEQ, to information about the Clean Rivers Program, to Stream Flow information and much more. Under the "Programs" pull-down menu at the top of the LNRA home page are links to the "Clean Rivers", "Major River", and the "Water Quality" pages. Here is how the links on the "Water Quality" page will appear:

LNRA Water Quality Database

SWQMIS Data Viewer

Annual Water Quality Reports

NEW 2013 Lavaca Basin Highlights Update Report
2012 Lavaca Basin Summary Report
2011 Lavaca Basin Highlights Update Report
2010 Lavaca Basin Highlights Report
2009 Lavaca Basin Highlights Update Report
2008 Lavaca Basin Highlights Report
2007 Lavaca Basin Summary Report
2006 Lavaca Basin Highlights Report
2005 Lavaca Basin Highlights Report
2004 Lavaca Basin Highlights Report
2003 Lavaca Basin Highlights Report
2002 Lavaca Basin Executive Summary
2001 Lavaca Basin Highlights Report

Water Quality Links

FY 2014-2015 Work Plan

FY 2014-2015 Quality Assurance Project Plan (QAPP)

FY 2014 Coordinated Monitoring Schedule

FY 2014 Water Quality Monitoring Site Map

FY 2013 Coordinated Monitoring Schedule

Texas Water Quality Inventory and 303(d) List --now named Texas integrated Report [IR] of Surface Water Quality for CWA Sections 305(b) and 303(d)

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 clicking on a site on the interactive map, or by county, segment, or a Texas Surface Water Quality Monitoring (SWQM) site number. These site numbers are listed 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 codes—both of which are displayed in pull-down menus. Water quality parameters, e.g. dissolved oxygen, pH, salinity, etc. are posted via a parameter code, but the names of the parameters gathered in Lavaca Basin are listed on the pull-down menu to the right of the page. Also available on the drop-down list are the metal and herbicide and pesticide 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.