2018 Lavaca Basin Highlights
Clean Rivers Program Report

Bald Eagle at LNRA Volkmer Barn

Prepared by the
Lavaca-Navidad River Authority (LNRA)
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PREPARED IN COOPERATION WITH THE
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
The preparation of this report was financed in part through
funding from the Texas Commission on Environmental Quality.

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LAVACA BASIN HIGHLIGHTS REPORT 2018

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Acronyms

AU	Assessment Unit
BMP	Best Management Practice(s)
CFS	Cubic feet per second
CFU	Colony Forming Unit
CRP	Clean Rivers Program
DO	Dissolved Oxygen (in water)
EPA	Environmental Protection Agency
IR	Integrated Report
LNRA	Lavaca Navidad River Authority
mg/L	Milligrams per Liter
PPT	Parts Per Thousand
RUAA	Recreational Use Attainability Analysis
SH	State Highway
SWQM	Surface Water Quality Monitoring
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TIAER	The Texas Institute for Applied Environmental Research
TPWD	Texas Parks & Wildlife
TWRI	Texas Water Resources Institute
UAA	Use Attainability Analysis
USDA	United States Agriculture Department
USGS	United States Geological Survey
WQS	Water Quality Standards
WPP	Watershed Protection Plan

2017 Basin Highlights

- The Lavaca-Navidad River Basin receives an average annual rainfall of approximately 42 inches per year. During 2017, the Basin received above average rainfall of 45.45 inches, 1.38 inches more than the previous year's total rainfall. A single meteorological event, Hurricane Harvey, was a contributing factor to this year's rainfall total, producing an average of 16 inches across the Basin. Without this major event, the Basin would have received an average of only 29.45 inches which is indicative of the current depressed reservoir levels.

- A rural use attainability analysis (RUAA) was initiated by the Texas Commission on Environmental Quality (TCEQ) and Texas Water Resources Institute (TWRI) on Rocky Creek in Lavaca County due to the stream being placed on the states' 303d list for exceedance of the bacteriological geomean for primary contact recreation.

- A watershed protection plan (WPP) was developed for the Lavaca River Segment 1602_03 to identify best management practices to help reduce bacteria levels found in this segment to current Environmental Protection Agency (EPA) standards. The WPP was approved by TCEQ and is currently under review by the EPA.

- The control of Giant salvinia (*Salvinia molesta*) has been an on-going "battle" in the Lavaca-Navidad River Basin since its discovery in 1999. A biological control method was introduced within LNRA's Texana Park at a designated test site in 2016. As of 2017, measurements of the Salvinia Weevil's productivity have yielded outstanding results.

Hurricane Harvey

On August 25, 2017, the Texas Coast experienced Hurricane Harvey. Harvey was the first category 4 storm to hit the Texas Coast in 56 years. The last known hurricane of comparable size was the category 5+ hurricane named Carla that made landfall in Calhoun County near the City of Port Lavaca in 1961.

At the peak of flooding resulting from the Harvey event, LNRA released 70,344 cubic feet per second (CFS), with a total volumetric discharge of 478,122 acre-feet. Given Lake Texana's capacity of 161,085 acre-feet, the volume released was approximately 3-times the reservoir's capacity. While Hurricane Harvey devastated many areas with high winds and torrential rainfall, the Lavaca Basin was spared. The event did have a positive impact on Lake Texana water quality.

Water clarity in Lake Texana is normally considered turbid due to the clay substrate that embodies the impoundment. On average, secchi readings range from 0.15 - 0.25 meters. Post Harvey, secchi readings ranged from 0.65 - 0.71 meters and lasted for 3 - 4 months. Nitrates, another potential quality issue pre-Harvey, were reduced as a result of the 3x volumetric exchange of water in the reservoir. Prior to Harvey, nitrate levels were found to be in exceedance of the TCEQ nutrient criteria of 0.37 mg/L for reservoirs. For example, in the month of July, which was pre-Harvey, at Site 9 (TCEQ Site No. 15377) located near the spillway of Lake Texana, nitrate sample results were 0.72 mg/L. In October, post-Harvey, nitrate sample results taken at the same site were 0.09 mg/L.

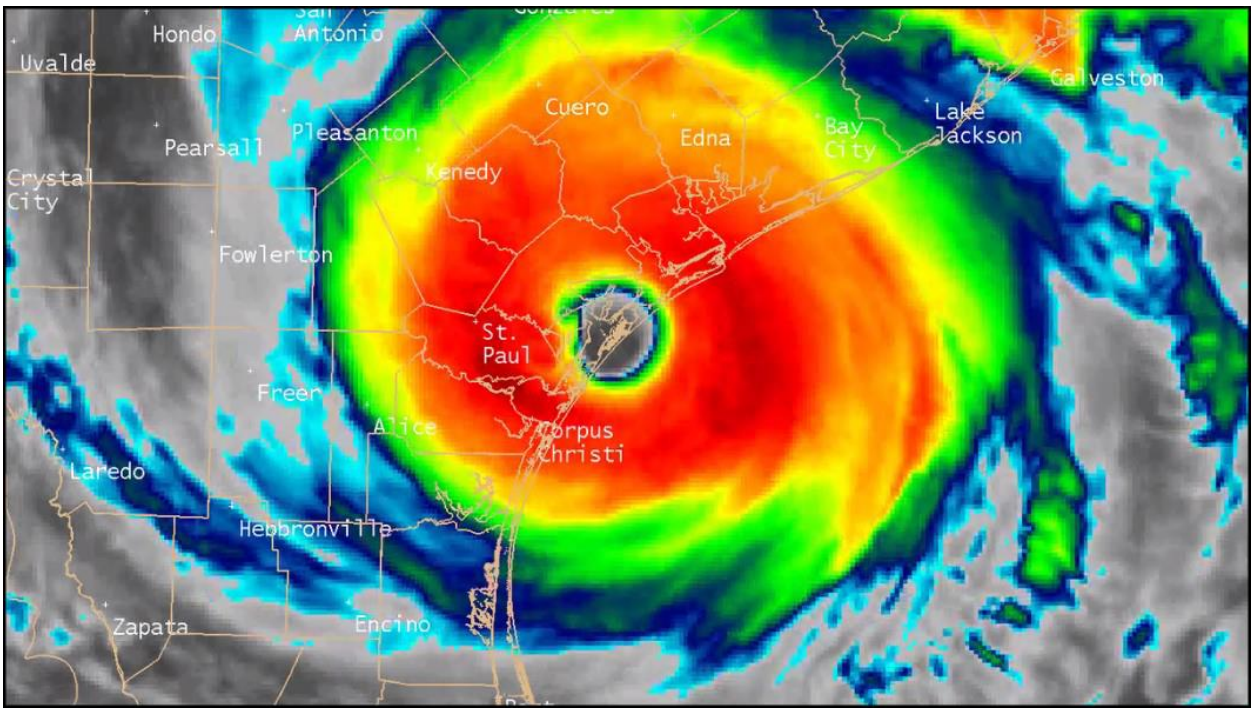

Figure 1- Image of Hurricane Harvey making landfall August 25, 2017

Figure 2- Navidad River Below Spillway

Figure 3- Water Released from Palmetto Bend Dam

Rocky Creek RUAA

Rocky Creek, a 36-mile long perennial stream with headwaters located in the southeast corner of Gonzales County, meanders through Lavaca County and the City of Shiner, until it eventually discharges into the Lavaca River below Hallettsville approximately 1.7 miles above LNRA Site 12525 located on the Lavaca River crossing with State Highway 111. Rocky Creek has been on the Texas Integrated Report (2014 IR) of impaired waterbodies since 2014 due to its exceedance of bacteriological geomean levels for primary contact recreation. The specified area of concern within Rocky Creek is Assessment Unit (AU) 1602B_01, from the confluence of the Lavaca River, upstream, to Rocky Creek's confluence with Ponton Creek. Sampling results for bacteria within this AU have consistently exceeded the bacteria standard set by the EPA.

In 2017, the TCEQ contracted with the Texas Water Resource Institute (TWRI) to conduct a Recreational Use Attainability Analysis (RUAA) of Rocky Creek to determine if the bacteria standard currently in place for Rocky Creek is suitable for this waterbody. EPA Bacteria Standards are divided into four (4) distinct categories: Primary Contact Recreation, Secondary Contact Recreation 1, Secondary Contact Recreation 2 and Noncontact Recreation. Rocky Creek has a primary contact use designation.

Primary Contact Recreation involves water recreation activities, such as wading, swimming, kayaking, and canoeing which puts a person at significant risk of water ingestion. Secondary Contact Recreation is defined as water activities that do not pose a significant risk of water ingestion. Activities such as fishing, recreational boating, and limited human contact with the water are all examples of secondary contact recreation.

There are three (3) parts to an RUAA, 1) interviewing stakeholders for past and present uses of the water body, 2) reviewing historical recreational use of the water body, and 3) conducting field surveys to determine the characteristics and recreational use within the waterbody. TWRI contracted with Texas Institute for Applied Environmental Research (TIAER) to provide field surveys associated with this RUAA. Under the bacteriological geomean set by the EPA and enforced by the TCEQ, bacteria levels for primary contact recreation cannot exceed 126 CFU/mL. The current geomean for bacteria levels in Rocky Creek is 178 CFU/mL. The RUAA for Rocky Creek will be used to determine if the waterbody should be classified as secondary contact recreation 1, which has a geomean of 630 CFU/mL.

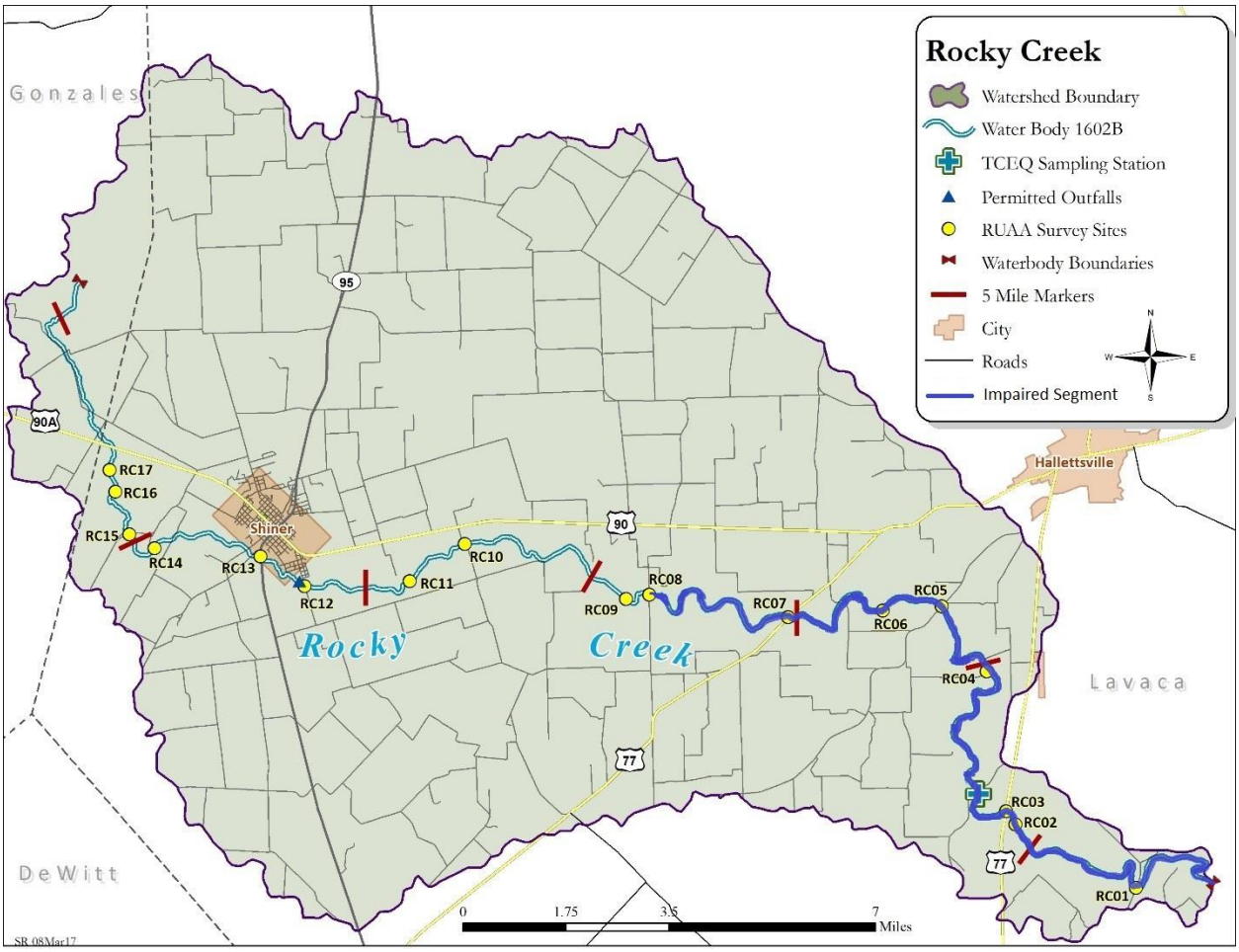

Figure 4- Sample Site Locations on Rocky Creek (Map provided by: Texas Institute for Applied Environmental Research (TIAER) at Tarleton State University)

Giant Salvinia

Giant salvinia (*Salvinia molesta*) is an invasive aquatic plant species that originated from southeastern Brazil. Salvinia is a free-floating fern like plant that gathers nutrients from its suspended root mass. The plant has become one of the most challenging invasive species in the United States. It has been documented that the growth of this aquatic species can be very rapid under ideal conditions, often outproducing and replacing native aquatic vegetation. To combat this highly invasive species, LNRA has teamed up with TPWD.

Under a special joint funding agreement with TPWD (which may or may not be funded by TPWD depending on congressional authorizations), LNRA contracts for and oversees the application of aquatic herbicide treatments on Lake Texana 4-6 times per year. Although the application of herbicides is highly effective, it is costly. Additionally, it has been found that the application of aquatic herbicides cannot be performed with the level of selectivity that is required to protect native aquatic vegetation. Given this fact, LNRA has considered the incorporation of biological alternatives as part of its Aquatic Vegetation Management Plan.

In 2016, LNRA was contacted by TPWD to discuss the development of a Salvinia Weevil brood area. The Salvinia Weevil exclusively targets the Salvinia plant species as its sole food source. In 2002, in partnership with the United States Department of Agriculture (USDA) and Texas Parks and Wildlife, LNRA worked to introduce the Salvinia Weevil to the United States.

In September 2016, TPWD delivered 11,939 adult Salvinia Weevils to Lake Texana where they were placed in a designated test site within LNRA's Texana Park. The test site was a secluded cove, separated from the main body of the reservoir. The chosen site was infested with adult and juvenile Salvinia plants and was considered an ideal location to establish a viable Salvinia Weevil population.

Beginning in December 2016, LNRA conducted monthly visual inspections of the test site to observe Salvinia degradation and inspected plants to verify the presence of weevils. With each inspection, it was observed that the overall mass of Salvinia was being reduced and the weevil population was thriving. As the reader will note from the photos in Figures 5 and 6, the introduction of Salvinia weevils, when used as a management tool, can be highly productive in controlling this challenging invasive plant species. To this day, the Salvinia has not recovered in the cove.
If you would like more information about Salvinia Weevils visit: http://lubbock.tamu.edu/files/2015/06/Mass_Rearing_Salvinia_Weevil-10-15-2012.pdf

Figure 5-Giant Salvinia at Texana Cove Before Weevil Release

Figure 6- Texana Cove 2 Years After Weevil Release

Figure 7-Adult Salvinia Weevil

Lavaca River WPP

The Lavaca River is a 116-mile long perennial river whose headwaters are located in Lavaca County at a point above Moulton Texas. The river travels through Lavaca County and the Cities of Hallettsville and Edna, until it eventually discharges into Lavaca Bay below its confluence with the Navidad River approximately 9-miles below United States Geological Survey (USGS) Site 08164000 located on the Lavaca River crossing with U.S. Highway 59 (I 69) near Edna. The Lavaca River has been on the Texas Integrated Report 303(d) list of impaired waterbodies since 2008 due to its exceedance of bacteriological geomean levels for primary contact recreation. The specified area of concern within the Lavaca River watershed is within Segment 1602, AU 1602_03, from a point in Jackson County approximately 0.8 miles downstream of the Lavaca River crossing of County Road 306, upstream to the Lavaca River confluence with Beard Branch (see Figure 8). Sampling results for bacteria within this AU have consistently exceeded the bacteria standard set by the EPA.

In October 2016, the TCEQ contracted with the Texas Water Resource Institute (TWRI) to develop a Watershed Protection Plan (WPP) for the impaired segment of the Lavaca River. The goal of a WPP is to identify potential impairment sources, conduct focused water quality monitoring and develop best management practices (BMPs) that can be voluntarily implemented to facilitate the reduction of bacteria levels in the segment.

TWRI facilitated multiple public stakeholder meetings to inform the public of the issue, gather information on possible contaminant sources, solicit best management practice ideas and gather information on possible funding sources to implement the WPP.

Recommendations for voluntary management strategies from stakeholders include:

- Water Quality Management Plans or Conservation Plans for livestock operations,
- promote feral hog control,
- identify and repair failing on-site sewage facilities,
- increase proper pet waste management,
- implement urban stormwater BMPs,
- reduce sewer system inflow and infiltration,
- reduce illicit dumping

LNRA participated as a stakeholder and contributor to the WPP process. In late 2017, LNRA and TWRI negotiated a monitoring plan that includes agreed upon water quality sampling parameters at four (4) sites along AU 1602_03 to be conducted monthly over a 24-month period.

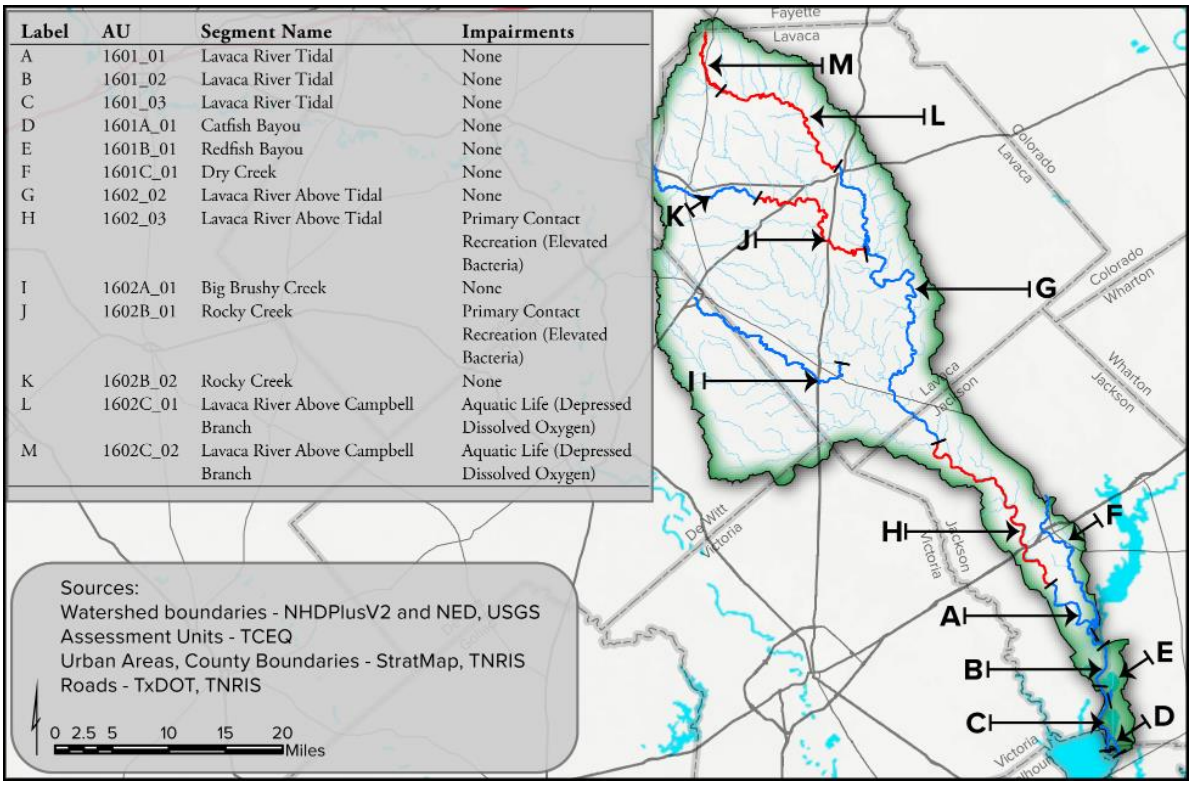

Figure 8- Map of Impaired Streams(Red) in the Lavaca River
Map Credit: Texas Water Resources Institute

Water Quality Monitoring

Field parameters

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

Water temperature -- the degree of heat in a body of water. For CRP purposes water temperature is measured in degrees Celsius.

Dissolved oxygen -- 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).

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, and sediment**.**

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

Chloride -- can be defined as a chemical compound in which one or more chlorine atoms are covalently bonded in the molecule. Chlorides can be either inorganic or organic compounds. Also, the salts of hydrochloric acid are called chlorides. 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 NH_3 that occurs naturally in surface waters through decomposition of organic nitrogen, but may be elevated from agricultural runoff, human and/or animal wastes. Ammonia occurs in trace amounts in the atmosphere and in rainwater. The kidneys secrete ammonia to neutralize excess acid; thus, it can be found in urine.

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

Nitrate-Nitrogen -- Nitrate is the compound of nitrogen and oxygen in the formula of NO_3. Too much nitrate in 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 (TP) -- 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) -- 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. Only sampled at site 15377.

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.

***E. coli* (*Escherichia coli*)** -- is used as an indicator organism for fecal or sewage contamination. Detection of total coliform and E. coli in water indicates possible presence of pathogenic organisms.

Figure 9, Table 1, and the lists that follow show the water quality sites monitored for FY 2017 along with the parameter sets and frequency. A detailed coordinated monitoring schedule with aerial maps for Lavaca Basin can be accessed from www.lnra.org as follows: from the "Programs" pull-down menu choose "Water Quality" and click on "FY 2017 Coordinated Monitoring Schedule".

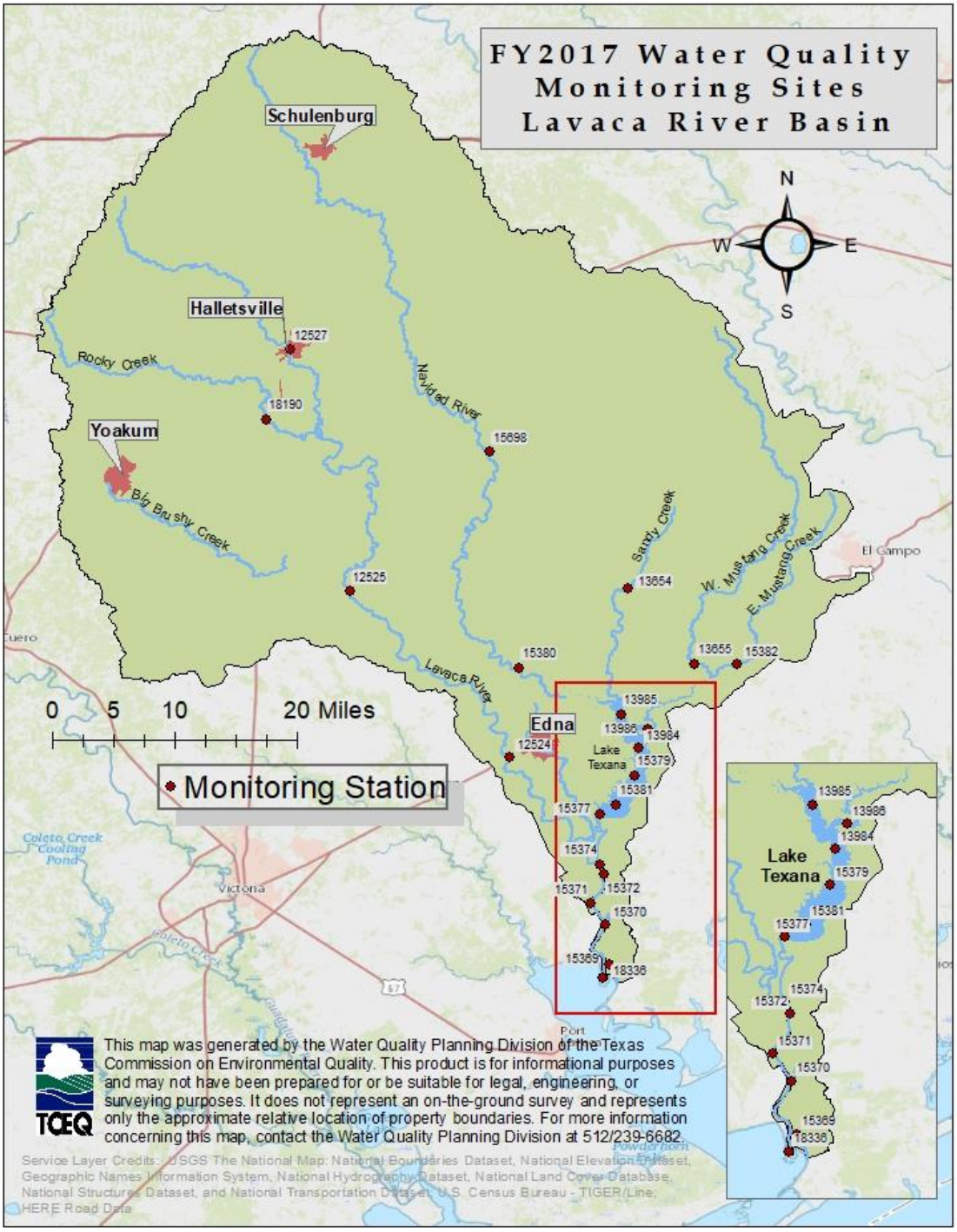

Figure 9 - FY 2017 Lavaca Basin Monitoring Sites

Segment #	Station ID	LNRA ID	Long Description	Latitude	Longitude	Conv.	Bact	Flow	Field
1601	15372	215	Lavaca River @ Frels Landing	28.8233	-96.5752				12
1601	15371	220	Lavaca River @ Mobil dock	28.7876	-96.5891				12
1601	15370	225	Lavaca River @ mouth of RedfishLk	28.7651	-96.5700				12
1601	15369	230	Lavaca River @ mouth of Swan lake	28.7150	-96.5682				12
1601	18336	232	Lavaca River near Lavaca Bay mouth	28.6994	-96.5758	4			12
1602	12525	111	Lavaca River @ SHwy 111 bridge	29.1566	-96.875	4	4	12	12
1602	12524	110	Lavaca River @ Hwy 59 bridge	28.9602	-96.6863	4	4	12	12
1602	12527		Lavaca River @ Hallettsville 90A	29.4430	-96.9441	4	4	4	4
1602	18190		Rocky Creek @ Lavaca CR 387	29.3609	-96.9743	4	4	4	4
1603	15374	210	Navidad River 30m above Lavaca	28.8411	-96.5766	4			12
1604	15377	9	Lake Texana near spillway	28.8909	-96.5794	4			12
1604	15381	8	Lake Texana near dam	28.9040	-96.5594	4			12
1604	15379	7	Lake Texana south of Hwy 111	28.9361	-96.5346	4	4		12
1604	13984	6	Lake Texana north of Hwy 111	28.9714	-96.5340	4	4		12
1604	13985	5	Lake Texana main body near Hwy 59	29.0162	-96.5540	4	4		12
1604	13986	4	Lake Texana - Mustang Creek arm	28.9957	-96.5238	4	4		12
1604	13654	2	Sandy Creek @ FM 710	29.1595	-96.5462	4		12	12
1604	15382	10	East Mustang @ FM 647	29.0713	-96.4172	4		12	12
1604	13655	1	West Mustang @ Hwy 59	29.0720	-96.4676	4		12	12
1605	15380	3	Navidad River @ Strane Park bridge	29.0657	-96.6745	4		12	12
1605	15698	Speaks	Navidad River @ Speaks bridge	29.3220	-96.709	4			4

Table 1-Monitoring Sites for FY 2017

Monitoring Frequency by Site:

- **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.
- **Dry Creek** -- monitored 1 time annually by United States Geological Survey (USGS) for metals and field and 2 times annually for 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, 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 for pesticides, herbicides, and metals.

Water Quality Conditions:

Water quality in the Lavaca River Basin remains positive. Two key contributing factors that result in few segment violations are size of the basin and the dominant work force. The Lavaca Basin is the smallest and least industrialized river basin in the state. Due to the geographic placement of the basin, it encompasses a very rural landscape with a heavy agriculture background. With these key factors in place, water within the basin sustains a healthy ecosystem.

The Surface Water Quality Monitoring (SWQM) team at the TCEQ assesses water quality data. For more information on specific guidelines and methods for assessing water quality please visit:

https://www.tceq.texas.gov/waterquality/standards/eq_swqs.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 includes the unincorporated community of 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 considered intermittent with a DO criterion of 3.0 mg/L average and 2.0 mg/L minimum. Many tributaries drain into the Lavaca River. Wastewater effluent from Shiner drains into Rocky Creek, while Yoakum effluent flows into Big Brushy and Clarks Creeks. Moulton and Hallettsville dispose of their effluent directly into the Lavaca River.

Assessment: The public water supply and general uses are fully supported. The fish consumption uses were not assessed. Since the 2004 Texas Water Quality Inventory (TWQI), the upper portion of the Lavaca River (above Hallettsville) has been listed 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 the 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.

The freshwater bacterial geometric mean standard for Primary Contact Recreation streams remains at 126 colony forming units (cfu) per 100 milliliters of water. Segment 1602_03 has been listed for elevated bacterial levels since 2008 and segment 1602B_01 (Rocky Creek) since 2014. These two segments are subject to long periods of low flow followed by brief periods of high flow which can contribute to elevated bacteria levels. In addition to the affect caused by overland flow, cattle and feral hogs have been seen soaking in the shallow waters in this segment. Both are listed as a category 5c which means more data and information will be collected before a TMDL is scheduled. This rural tributary receives wastewater from Shiner and meets the Lavaca River below Hallettsville.

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 drains wastewater effluent from Edna into this segment. The east and west drains along the east and west dikes of Lake Texana also drain water into this segment.

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

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.

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, providing education and assistance in water conservation and drought contingency planning, disseminating news releases, attending public and water quality issue meetings, distributing water education materials (*Major Rivers*) to elementary schools throughout the Basin, 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 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 responses to potential water quality problems in the Basin. In addition, LNRA retained the former TPWD Nature Interpreter, Cindy Baker, from previously Lake Texana State Park (now Texana Park) to provide public outreach services for LNRA. Cindy Baker 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. Cindy can be reached at 361-308-0153 or via e-mail at cbaker@lnra.org.

Figure 10 – Nature Camp

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.

Clean Rivers Program 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 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 or Director of Environmental Services Chad Kinsfather.

Contact information:

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PO Box 429
Edna, Texas 77957

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

	Email Addresses:
General Manager: Patrick Brzozowski	pbrzozowski@lnra.org
Environmental Department: Chad Kinsfather	ckinsfather@lnra.org
Environmental Technician: Brandon Byler	bbyler@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 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 Brandon Byler 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 Website:

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 the TCEQ webpage, 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 Rivers", 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:

2017 Basin Summary Report

2016 Lavaca Basin Highlights Report

2015 Lavaca Basin Highlights Report

Water Quality Links:

FY 2018 Coordinated Monitoring Schedule

FY 2018 Water Quality Monitoring Site Map

FY 2018-2019 CRP Work Plan

FY 2018 - 2019 CRP QAPP

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 entering a Station ID or site number (shown on map). These Station ID numbers are assigned by TCEQ and are called Surface Water Quality Monitoring (SWQM) site numbers. The sites are described under the "County" and "Segment" listings.

Water quality data can be displayed as an HTML page or as an ASCII delimited text file that can be imported into a spreadsheet or database. Once a sampling site is chosen, data can be retrieved either by sampling date or by parameter—both of which are displayed in pull-down menus. Water quality parameters, e.g. dissolved oxygen, pH, salinity, etc. are posted with a storet code, but since the names of the parameters are listed one does not need to know the storet code to access the data. Also available in the pull-down parameter menu are the metals, herbicides and pesticides analyzed by contract with the United States Geological Survey (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.