

Lavaca Basin

2023 Water Quality Update



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LAVACA BASIN WATER QUALITY REPORT 2023

Table of Contents

Preface:	4
Figure 1: Lavaca River in Jackson County	4
Basin Inventory of Events:	5
Figure 2: Cow in the Navidad River at CR 142	5
Figure 3: Cattle manure in Navidad River at CR 142	6
Giant Salvinia and Water Hyacinth treatment in Lake Texana:	6
Figure 4: Cow in Rocky Creek.....	8
Figure 5: Feral hog activity in Rocky Creek	9
Figure 6: Map of Segment 1602, Lavaca River above Tidal	10
Lavaca Basin Water Quality Monitoring:	11
Table 1: FY 2023 LNRA Water Quality Monitoring Schedule	11
24 Hour Dissolved Oxygen Study (DO):	11
Figure 7: LNRA Monitoring Sites	13
Stakeholder Participation and Public Outreach:	14
Figure 8: Michael Price teaching at a school field trip	15

Acronyms

BMP	Best Management Practice
BST	Bacterial Source Tracking
CFU	Colony Forming Unit
CRP	Clean Rivers Program
DO	Dissolved Oxygen
EPA	Environmental Protection Agency
IR	Integrated Report
LNRA	Lavaca Navidad River Authority
Mg/L	Milligram per Liter
MPN	Most Probable Number
TCEQ	Texas Commission on Environmental Quality
TPWD	Texas Parks and Wildlife
TWRI	Texas Water Resources Institute
USGS	United States Geological Survey
WPP	Watershed Protection Plan

Preface:

The Clean Rivers Program (CRP) is a water quality monitoring, assessment, and public outreach program administered and managed by the Texas Commission on Environmental Quality (TCEQ) and funded by state collected fees. CRP is a statewide program established by the Texas Legislature in 1991 to manage water quality issues throughout the state. The Lavaca Navidad River Authority (LNRA) contracts with TCEQ and coordinates and carries out the CRP efforts in the Lavaca Basin.

CRP objectives are to provide quality assured data to the TCEQ for use in decision making processes, identify and evaluate water quality issues, promote watershed planning, recommend water quality management strategies and engage stakeholders. Under the CRP, field staff conduct water quality monitoring, assessment and stakeholder outreach activities in the Lavaca Basin. The data collected and managed is used to assess the condition of water bodies in the Lavaca Basin and to determine if they meet the assigned standards for their designated use. Monitoring and assessment often provide information about land use and possible sources of pollution. Finally, the data undergoes a quality control protocol. Once approved, storing this data allows for the analysis of trends over time.

This report includes a description of major water quality events in the Lavaca Basin, public outreach and education, water quality monitoring, and watershed planning. Maps of water quality sampling sites and a review of water quality impairments and concerns found in the 2022 Texas Integrated Report are also included in this report. Combined, these reports are used to inform stakeholders, concerned citizens, and the communities LNRA serves about water quality and resource management.



Figure 1: Lavaca River in Jackson County

Basin Inventory of Events:

Lavaca Watershed Bacterial Source Tracking Study (BST):

The Lavaca River watershed covers approximately 909 square miles, with its headwaters starting north of the City of Moulton in Lavaca County before discharging into the mouth of Lavaca Bay just northwest of the City of Point Comfort in Calhoun County. The Lavaca River watershed is comprised of several smaller contributing watersheds including Rocky Creek, Big Brushy Creek, and Dry Creek.

In 2008, Segment 1602, the Lavaca River Above Tidal, was placed on the State's 303(d) list of impaired streams due to elevated bacteria levels exceeding the water quality standard for primary contact recreation. The water quality standard for primary contact recreation 1 states that bacteria levels cannot exceed 126 Colony Forming Units per 100 milliliters (CFU/100 mL). In 2014, Rocky Creek (Segment 1602B) was also identified as impaired for bacteria and placed on the State's 303(d) list.

Areas of concern lie within Segment 1602 of the Lavaca River Basin. The Lavaca River Above Tidal (Segment 1602) and Rocky Creek (Segment 1602B) are combined segments that encompass both Lavaca and Jackson counties. Segment 1602C is considered an intermittent stream with pools and runs from the confluence with Campbell Branch just above the City of Hallettsville up to approximately 3.4 miles upstream of SH 95 in Lavaca County. From Campbell Branch downstream, the Lavaca River (1602) is identified as a perennial river that meanders through Lavaca and Jackson counties before becoming tidally influenced 0.8 miles downstream of the Lavaca River crossing of County Road 306 in Jackson County. Segment 1602B, Rocky Creek, is a tributary of the Lavaca River and is described as a perennial stream that flows roughly 23.5 miles through Lavaca County before merging with the Lavaca River downstream of the City of Hallettsville.



In 2022 LNRA was contracted by Texas Water Resources Institute (TWRI) to monitor four (4) designated sample sites for twelve (12) months, targeting areas of the River that had historical data for *E. coli*. In January 2023, LNRA personnel will begin collecting up to 100 fecal samples, which will include 10 fecal

Figure 2: Cow in the Navidad River at CR 142

samples from 10 specific fecal sources throughout the Basin, and water samples at selected locations along the river. Bacterial source tracking is a valuable tool that can identify and rule out significant sources of *E. coli* pollution in a watershed. The goal of the Lavaca Watershed BST study is to identify primary sources of *E. coli*, illustrate the relative abundance of *E. coli* from identified sources, determine the presence or absence of major watershed sources, help make informed watershed management decisions, and allow resources to be used wisely and focused where pollutant reductions are needed most.

There are a variety of factors that may contribute to elevated bacteria levels within the stream. Examples include livestock, wildlife, failure of onsite sewage facilities, and stormwater runoff. This BST study is working in conjunction with the ongoing Lavaca Watershed Protection Plan (WPP) to reduce the bacteria level below the State's criteria.

Stakeholders and landowners have access to programs which are available to them to help implement best management practices (BMPs) along Segment 1602 of the Lavaca River. If BMPs are implemented and sustained, the overall water quality of the stream in which stakeholders and landowners rely on for their livelihoods will improve.



Figure 3: Cattle manure in Navidad River at CR 142

Giant Salvinia and Water Hyacinth treatment in Lake Texana:

Invasive water plants have a direct impact on Texas lakes and thrive when introduced into areas where they have no predators or disease control. Two such non-native species are the floating Water Hyacinth (*Eichhornia crassipes*), which can be deceivingly pretty with its showy lavender flowers, and the Giant Salvinia (*Salvinia molesta*). These invasive plants, if left to grow freely, have the ability to hinder native vegetation growth and negatively affect fish communities by lowering light penetration and dissolved oxygen levels. These two invasive species can form huge mats which can impede boat traffic on lakes and waterways and clog intake pumps. Besides interfering with recreational boaters, water hyacinth and giant salvinia are huge consumers of

water. For example, water hyacinth has an evaporation rate three to 12 times that of open water. Currently, herbicides, shredding and physical removal are the only integrated pest management techniques that provide effective control of the plant.

Giant Salvinia, a floating fern originating from southern Brazil, is currently one of the most problematic aquatic plants in Texas, according to Texas Parks and Wildlife Department (TPWD). The plant growth can expand rather quickly, with a doubling of biomass rate of 7 days under ideal conditions. Like Water Hyacinth, Giant Salvinia can form dense mats on the water surface that inhibit angling, boating, and other water related recreational activities. The large mats also impact light transmission and DO. Eradication of infestations generally require the use of commercially available herbicides, but there is an effective biological control organism that TPWD has introduced—Salvinia Weevil. The weevil is very host specific and only feeds on plants from the salvinia family. The salvinia weevil was first introduced in the United States in two lakes in Texas, Toledo Bend Reservoir and Lake Texana. Since the initial weevil release, Lake Texana has been the recipient of more weevil releases, aiding in the control of this invasive species. It is illegal to transport Giant Salvinia and Water Hyacinth on boat trailers, boat motors, or live wells. Game Wardens are authorized to issue citations and assess fines for transport or possession of salvinia species. This past year LNRA utilized airboat spraying to help manage invasive aquatic species on Lake Texana. A broad spectrum water approved herbicide was sprayed in areas of gross infestation totaling 57 acres to suppress growth and allow boater access to prime fishing areas.

2022 Texas Integrated Report (IR)

With only three waterbodies included in the 2022 Texas §303(d) List, the Lavaca River Basin maintains some of the highest water quality in the State. The 2022 Texas Integrated Report evaluated waterbodies based upon samples collected from December 1, 2013, through November 30, 2020. TCEQ evaluated these sample results to determine if the waterbodies met their



associated designated uses which included Aquatic Life, General, Recreation, and Domestic Water Supply uses. Of the 148 assessments performed, seven were found to either not meet the associated designated use or have a screening level concern. This included three impairments for bacteria and two for low dissolved oxygen while one concern each was identified for low dissolved oxygen grab and for total phosphorus. All other evaluations revealed that the waterbodies fully supported their designated uses.

All impairments and concerns occurred in Segment 1602 – Lavaca River above Tidal.

Assessment Units 1602_02 and 1602_03 had bacteria geometric means in excess of the 126 MPN/100 mL criterion with 197.95 MPN/100 mL and 188.83 MPN/100 mL, respectively.

Figure 4: Cow in Rocky Creek

Unclassified Segment 1602B – Rocky Creek was added to the §303(d) List for bacteria in 2014; the 2022 IR reported a geometric mean of 339.8 MPN/100 mL. Cattle are a regular sighting in the stream and could be a likely source of bacteria through direct deposition. While feral hogs have not been sighted in the river, evidence of activity has been seen.

The Lavaca River Watershed Protection Plan commenced in 2016 and was developed to address water quality issues throughout the entire length of the Lavaca River and its tributary

streams. The WPP determined that no single source of bacteria was the primary cause of the impairment.

Bacteria source tracking has been identified as a valuable tool for identifying the different sources of fecal pollution. In 2021, TWRI was awarded funding to include the Lavaca Watershed in a BST study to further refine the state's *E. Coli* BST library.

These two beneficial resources will help lower the bacteria values and provide greater insight into bacterial sources in this segment.

Both assessment units of Unclassified Segment 1602C – Lavaca River Above Campbell Branch were included on the §303(d) List for 24-Hour Dissolved Oxygen Average. In FY 2021, LNRA began a 24-hour dissolved oxygen study to address the impairment and to provide data for the assessment. Unfortunately, data collection was hampered by extreme drought conditions in 2021 and much of 2022.



Figure 5: Feral hog activity in Rocky Creek

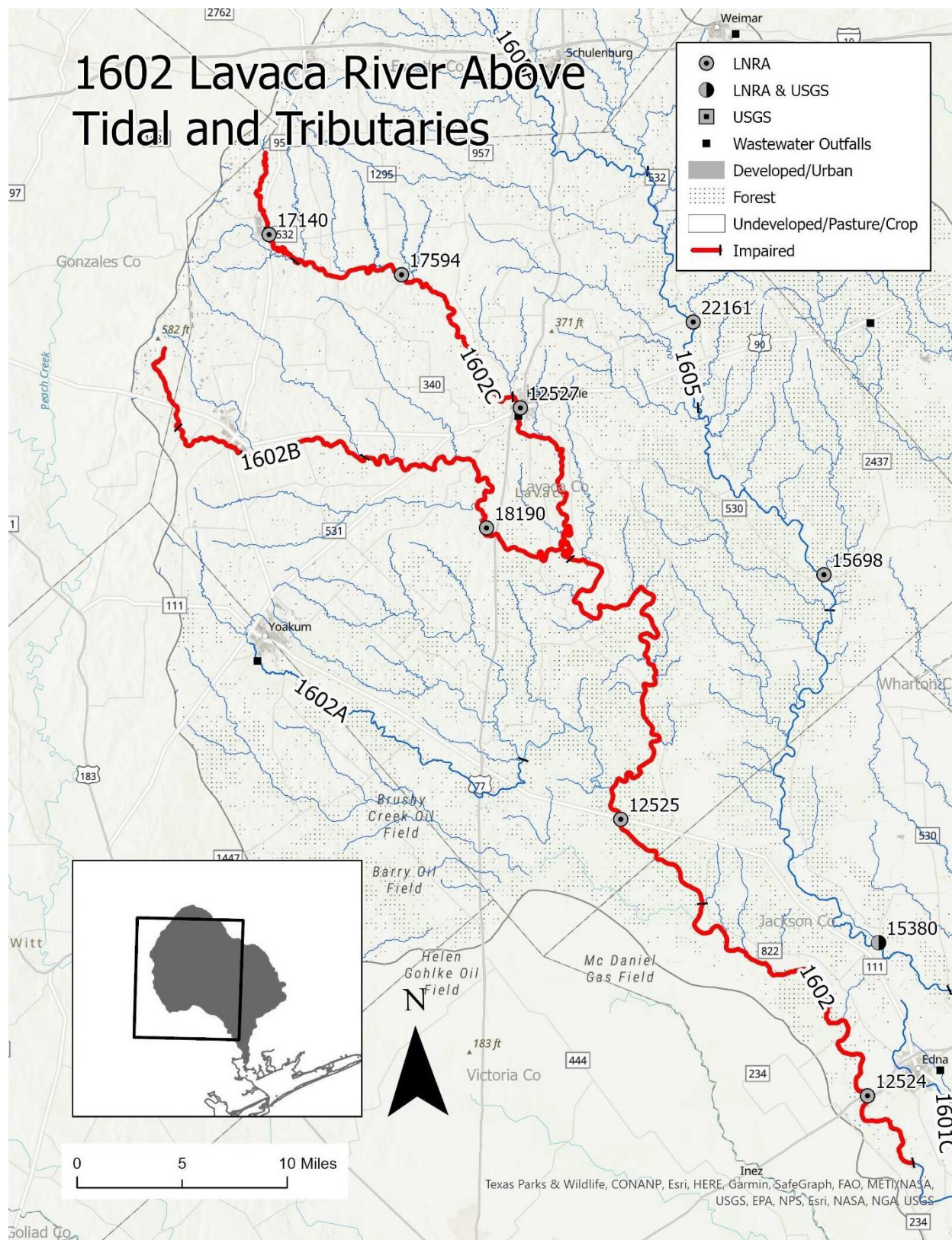


Figure 6: Map of Segment 1602, Lavaca River above Tidal

Lavaca Basin Water Quality Monitoring:

LNRA holds a coordinated monitoring meeting with entities collecting water quality data in the Basin annually to coordinate efforts and maximize limited resources available. Table 1 is a layout of the types and amounts of water quality monitoring that will be conducted in the Lavaca Basin. The data acquired includes a mixture of field, conventional, bacteriological, organics, and metals in water collected by LNRA and the United States Geological Survey (USGS). Data collected under the CRP can be found on the TCEQ CRP public viewer at <https://www80.tceq.texas.gov/SwqmisWeb/public/crpweb.faces>.

FY 2023 LNRA Water Quality Monitoring Schedule (includes USGS Metals and Organics in water sampling)											Pesticides & herbicides		***	**	*
Segment #	TCEQ #	LNRA#	Description	Latitude	Longitude	Metals in Water	Organics in Water	24 HR DO	Conv.	Bact	Flow	Field			
1601	15372	215	Lavaca River @ Frels Landing	28.82332366	-96.57524068	(dissolved)						12			
1601	15371	220	Lavaca River @ Mobil dock	28.78765308	-96.58911447							12			
1601	15370	225	Lavaca River @ mouth of RedfishLk	28.76513236	-96.57006427							12			
1601	15369	230	Lavaca River @ mouth of Swan lake	28.71502277	-96.56822295							12			
1601	18336	232	Lavaca River near Lavaca Bay mouth	28.699474	-96.575817				4			12			
1602	12525	111	Lavaca River @ SHwy 111 bridge	29.15666667	-96.875				4	4	12	12			
1602	12524	110	Lavaca River @ Hwy 59 bridge	28.96027	-96.68638889				4	4	12	12			
1602	12527		Lavaca River @ Hallettsville 90A	29.44305611	-96.94416809				4	4	4	4			
1602	18190	Rocky	Rocky Creek @ Lavaca CR 387	29.360900	-96.974300				4	4	4	4			
1602	17594	Komensky	Lavaca River near Komensky					6	4	4	10	4			
1602	17140	Moulton	Lavaca River @ FM 532 in Moulton					6			6	6			
1603	15374	210	Navidad River 30m above Lavaca	28.84111110	-96.57666666				4			12			
1604	15377	9	Lake Texana near spillway	28.89090639	-96.57940983	4			4			12			
1604	15381	8	Lake Texana near dam	28.90405586	-96.55949577				4			12			
1604	15379	7	Lake Texana south of Hwy 111	28.93615191	-96.53466189				4	4		12			
1604	13984	6	Lake Texana north of Hwy 111	28.97145679	-96.53404139		2		4	4		12			
1604	13985	5	Lake Texana main body near Hwy 59	29.01625988	-96.5540756		2		4	4		12			
1604	13986	4	Lake Texana - Mustang Creek arm	28.99573954	-96.52387541		2		4	4		12			
1604	13654	2	Sandy Creek @ FM 710	29.15951741	-96.54622804	1	2		4			12	12		
1604	15382	10	East Mustang @ FM 647	29.07138889	-96.41722222	1	2		4			12	12		
1604	13655	1	West Mustang @ Hwy 59	29.07200754	-96.46762824	1	2		4			12	12		
1605	22161	Sublime	Navidad River @ Lavaca CR 142						4	4	4	4			
1605	15380	3	Navidad River @ Strane Park bridge	29.06578707	-96.67453325	1	2		4			12	12		
1605	15698	Speaks	Navidad River @ Speaks bridge	29.322	-96.709				4			4	4		

*Field = Dissolved oxygen, temperature, specific conductance, pH, salinity (in tidally influenced are: Secchi disk (water clarity)

**Bact = Indicator Bacteria = Idexx *E.coli*

***Conv Conventional = Total Alkalinity, Chloride, Ammonia, Total Organic Carbon, Turbidity, Total hardness, Sulfate, Nitrate, TKN, TSS, Total Phosphorus

And conventional includes Chlorophyll-A at reservoir sites only (#15377, 15381, 15379, 13984, 13985, 13986)

Table 1: FY 2023 LNRA Water Quality Monitoring Schedule

24 Hour Dissolved Oxygen Study (DO):

In 2004, the Texas Commission on Environmental Quality (TCEQ) placed Segment 1602C on the State's 303(d) list for depressed dissolved oxygen levels as a result of 24-hour dissolved oxygen monitoring conducted by both LNRA and Texas Parks and Wildlife. The 24-hour dissolved oxygen study stemmed from a possible fish kill that was reported in the highest reaches of the Lavaca River. Segment 1602 is a long river segment; approximately ninety-four (94) miles. Upper reaches of the Lavaca River differ greatly with the lower reaches, with differences including streambed size and flow. In 2014, the Environmental Protection Agency (EPA) revised the

dissolved oxygen criteria for the upper portion of the Lavaca River. The upper portion was approved for a seasonal change in dissolved oxygen criteria for the period of March 15 through October 15 to greater than or equal to 3.0 mg/L average and 2.0 mg/L for minimum 24-hour oxygen content.

In August of 2020, LNRA initiated routine 24-hour dissolved oxygen monitoring at two locations that were studied in 2002 to gather data and work towards delisting this section from the State's 303(d) for depressed dissolved oxygen. The water quality stations are located on the upper reaches of the Lavaca River. To date, only six independent 24-hour DO sets have been conducted during the Index (March 15-October 15) and Critical (July 1-September 30) Periods. The *Index Period* represent the months that are considered warm weather seasons for the year. The *Critical Period* represents minimum streamflow, maximum temperatures, and minimal DO concentrations within our streams. Severe drought conditions plagued the upper portion of the Lavaca Basin for much of 2021 and 2022 rendering the intermittent stream dry for most of the extended period. Early winter rains in 2022 finally released the area of its severe drought status. Data for dissolved oxygen levels will continue to be collected in the upper reaches of the Lavaca River over the next year.

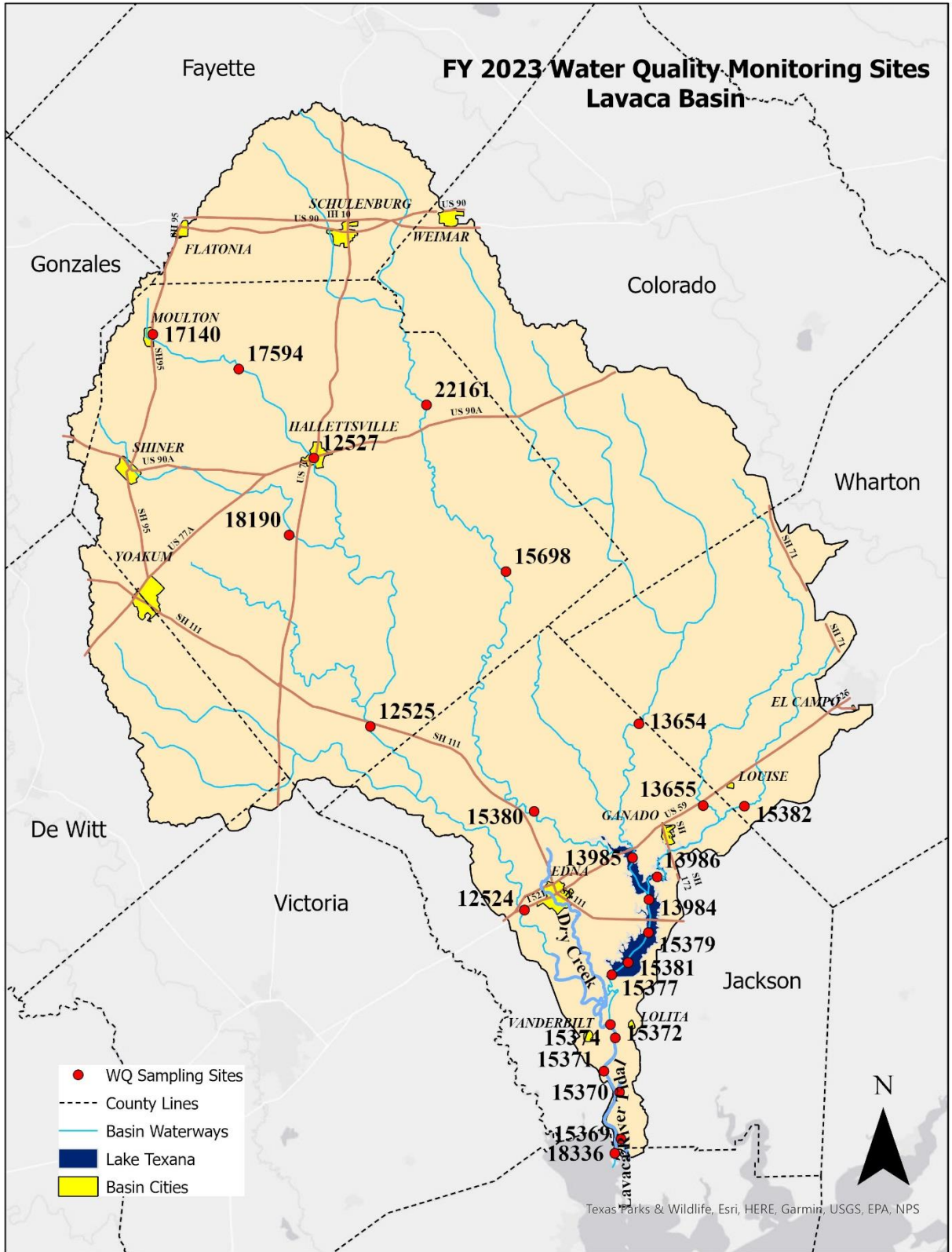


Figure 7: LNRA Monitoring Sites

Stakeholder Participation and Public Outreach:

An important aspect of the CRP and to LNRA is the participation of citizens, public and private entities, and other interested parties in the overall health of the Basin. Public outreach efforts by LNRA include seeking the input of the Lavaca Basin Steering Committee about in-basin water quality issues and activities, education outreach, 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 and near to the Basin, presentations to groups, and supporting the efforts of the Texas Stream Team volunteer water quality monitoring program.

LNRA hosts a Basin-wide steering committee meeting annually each summer. Meeting participants include state and local agencies, industry, agriculture, communities, municipalities, environmental organizations, and private citizens. Input from the committee members allows LNRA to prioritize water quality issues and to determine the most effective water quality monitoring program for the Basin. 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. LNRA places notices of the meeting in all local newspapers (Edna, Hallettsville, Moulton, Schulenburg, Shiner, Yoakum) inviting the public to attend. 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.

The *Major Rivers* initiative, a 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 standards. LNRA provides these new materials (which include student workbooks, water conservation take-home information brochures, pre- and post-tests, teacher workbooks, and an introductory video) to participating public and private schools in the Basin.

LNRA provides support to the Texas Stream Team, a volunteer water quality monitoring program, by providing equipment, 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. Anyone wishing to become involved with Texas Stream Team may contact the Texas Stream Team at 1-877-506-1401, by contacting Chad Kinsfather ckinsfather@lnra.org at LNRA, or by visiting the LNRA website www.lnra.org and clicking on the Stream Team, or at the Texas Stream Team site: <http://txstreamteam.meadowscenter.txstate.edu/>

LNRA staff members are available to answer questions or give assistance with water quality information to students, stakeholders, members of the public, and to respond to calls from concerned citizens. LNRA staff investigates reports of water related issues/observances provided by citizens and communicate these to the appropriate regulatory agency in order to most effectively address the issue. This cooperation between citizens, LNRA, and regulatory agencies has resulted

in effective response to potential water quality concerns in the Lavaca Basin. Michael Price is LNRA's public outreach coordinator and directs the activities of LNRA's Texana Community Education Center. Mr. Price teaches nature crafts and programs at Texana Park and is also available to travel to schools and libraries to present various environmental education programs. In many instances, LNRA covers the cost of these programs. You may contact Michael Price by phone, 361-308-0153 or via e-mail at mprice@lnra.org.



Figure 8: Michael Price teaching at a school field trip

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