

2020 Basin Highlights Report

Lower Neches River Basin &
Neches-Trinity Coastal Basin



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2019 Basin Highlights

LNVA Welcomes New CRP Staff

Two new Environmental Analysts joined the LNVA and the Clean Rivers Program in 2019. Craig Sterling joined the LNVA in March followed by Bethany Stanton in December. Both new analysts grew up in Southeast Texas and are very familiar with the area. Craig obtained his Bachelor of Science in Environmental Science from Stephen F. Austin in 2017. Bethany earned her Associates Degree in Natural Science from Lamar and later graduated with a Bachelor of Science in Environmental Science from Lamar with a minor in Chemistry and Biology in 2017.

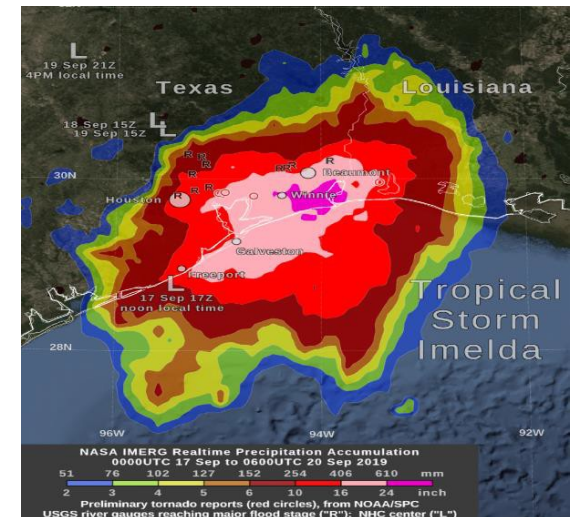
Craig and Bethany both came to the LNVA with previous lab experience. Craig worked over a year at Earth Analytical Science, a high-paced commercial lab servicing the Beaumont area. His time there has helped him become a hardworking and efficient analyst in the lab. Craig's love of hunting and fishing also gives an advantage for helping obtain samples from LNVA's boat-access only sites.

Bethany came to the LNVA after working at the City of Beaumont Wastewater Treatment lab for over a year. Her time there and her natural organization skills have helped her become a very detail-oriented and skilled lab analyst. She most looks forward to learning the fieldwork that goes into being part of LNVA's Clean Rivers Program.

Brielle Patronella started working for the LNVA in May 2018 as an Environmental Analyst. She has been part of the field staff as well as the Data Manager for the LNVA's Clean Rivers Program. In November of 2019, she accepted the position of Senior Environmental Analyst and Quality Assurance Officer for the LNVA. She is excited for her role in continuing the LNVA's involvement with the Clean River's Program.

Tropical Storm Imelda

On September 14, 2019, the National Hurricane Center began monitoring an upper pressure low off the west coast of Florida. Though it was given a low chance of development, the organization in the system rapidly increased once it reached the Texas coast. Tropical Storm Imelda made landfall on September 17, 2019. Some areas in the storm's path received 43 inches of rain, most notably the Galveston and Beaumont areas. By September 19, Tropical Storm Imelda was a remnant low that created heavy rains and several tornadoes. Imelda was the 5th wettest tropical cyclone on record in the continental United States, and 4th in the state of Texas. It caused approximately 5 billion dollars in damage. At least five deaths have been attributed to the storm. There were over 1,000 floodwater rescues during this event. Governor Greg Abbott declared a state of disaster for thirteen counties in Texas on September 19, 2019.



TPC Explosion



An explosion at the TPC chemical plant occurred in the early morning hours of November 27, 2019, in the City of Port Neches. The explosion occurred in the area of the facility that manufactures or processes butadiene, a chemical whose long-term exposure has been linked to cardiovascular disease and cancers. TCEQ and EPA investigated the explosion and monitored air quality in the area after the explosion occurred. LNVA lab staff, as well as staff from a contracted laboratory, collected water samples at several points on the canal to ensure the water supply had not been contaminated. A second explosion occurred that resulted in a tower and other debris being scattered through the area. A mandatory evacuation for residents within a half mile from the facility, and a shelter in place was instituted for the city of Groves, and for Orange County residents south of I10. In total, four towers fell, or were compromised, in the explosion. Fires continued to burn for days in the aftermath of the event. The TPC spokesperson says the group intends to eventually rebuild.

CAMS749

Continuous Ambient Monitoring Station (CAMS) 749 is located on Pine Island Bayou near the Hwy 69 bridge, right above LNVA's BI 1st Pumping Plant. The monitoring station was originally installed in June 2008 by TCEQ in cooperation with LNVA as a way to monitor water quality concerns on Pine Island Bayou. There were several changes for the CAMS749 station in 2019. The original YSI 6920 V2 sonde technology has been officially replaced with YSI EXO3 sondes. These sondes measure pH, dissolved oxygen, turbidity, conductivity, depth, and temperature. Hourly averages of these measurements are posted on TCEQ's website. During Hurricane Harvey, CAMS749 flooded, destroying the data logging equipment and causing months of data to be lost. In an attempt to mitigate this during any future flood events, the data logging equipment was moved to a higher elevation at a nearby location that allows data to still be collected during flood conditions.

CAMS749 was extremely beneficial to LNVA customers during 2019. Due to maintenance being performed on the Neches Canal, LNVA was sending Pine Island Bayou sourced water through its canal system using the BI pumping plant from July 2019 until February 2020. PIB water quality differs greatly from the Neches River, so having the data from CAMS749 available hourly on TCEQ's website allowed customers to have insight on the quality of the water they would be receiving. The station's water quality data can be viewed online at the following: https://www.tceq.texas.gov/cgi-bin/compliance/monops/water_daily_summary.pl?cams=749 .



Protected Mussels

According to biologists and wildlife agencies, the rare and state-protected Louisiana Pigtoe mussel was not believed to live in the supply canal of the LNVA. Currently under review for federal species protection, the Louisiana Pigtoe (*Pleurobema Riddellii*) was thought to have a specific, preferred habitat type; however, the discovery of 107 Louisiana Pigtoes within the LNVA canal system has raised new questions about the habitat of this species and the extent of existing populations. The Louisiana Pigtoes were collected from a section of canal that was previously drained for routine maintenance in February of 2016. The pictures below show mussel sorting activities by the LNVA's environmental consultant and the LNVA staff.

Existing data indicates intensively managed water bodies are not considered a favorable habitat for the species. Man-made canals with muddy bottoms and concrete structures were not considered suitable habitat and certainly not viewed as an area of propagation. In twelve days, LNVA's environmental consultant recorded and/or relocated 26 of the 32 known species of mussel in Southeast Texas. Of 21,766 individual specimens, 162 Louisiana Pigtoes were collected in the LNVA canal and Lower Neches Basin. Authority staff have since identified extensive preferred Louisiana Pigtoe habitats within the Neches River, Angelina River and Sabine Basin that have not been surveyed. LNVA looks forward to acting as a partner with adjacent river authorities, the Texas Comptroller, and the United States Fish and Wildlife Service in the continued efforts to learn more about the health of this and other proposed endangered species throughout this region.



Louisiana Pigtoe
(photo credit: dbarclay; inaturalist.org)



Environmental Institute of Houston Surface Water Quality Monitoring Workshop



LNVA's CRP staff attended a Surface Water Quality Monitoring (SWQM) workshop held by the Environmental Institute of Houston at the University of Houston Clear Lake in March 2019. The workshop includes focus on water quality and hydrology monitoring, and highlights the methodology of SWQM procedures. The workshop also includes biological and physical habitat monitoring, which includes the skills needed to complete an aquatic life monitoring assessment. Some of these physical skills include electroshocking and seining methods for fish collection along with five minute kick net sampling for benthic macroinvertebrates. Recognizing stream morphology, identifying instream channel characteristics, and recording biological and physical habitat data were other skills learned. At the end of the workshop LNVA staff received certificates of completion for both water quality and hydrology monitoring courses as well as the biological and physical habitat monitoring course.



Aquatic Life Monitoring on Beech and Cypress Creek



LNVA added Aquatic Life Monitoring (ALM) in fiscal years 2019 and 2020 to Beech Creek and Cypress Creek located in the Village Creek segment of 0608. A water monitoring company was contracted to monitor both creeks for habitat, benthics, nekton, 24 HR dissolved oxygen, flow, and water chemistry. LNVA assisted in the monitoring and gained valuable biological monitoring experience. ALM is a tool used to determine attainment of existing aquatic life use in a stream. Monitoring is conducted in the index period, which runs from March 15 to October 15. One round of sampling is completed during the non-critical period of the index which would be March through June or in October. This is when aquatic life would be least stressed. The critical period runs July until September when temperatures are at their highest and flows potentially at their lowest, when aquatic life would be most stressed. The contractor was able to complete a round of sampling in the critical period in August of 2019. Attempts were made to conduct the non-critical sampling in September, October, and special permission given for November, but Imelda and other rain events postponed these sampling events. Once all of the sampling required for an assessment is completed, the results, including a comprehensive list of species found, will be detailed in a future report.



Lesser Siren in Beech Creek



Largemouth Bass in Beech Creek



Yellow Bullhead in Cypress Creek



Warmouth in Cypress Creek

The Texas Clean Rivers Program

The Texas Clean Rivers Program was introduced in 1991 as a state-funded, non-regulatory program dedicated to developing a collaboration with local entities to help manage and improve water quality within each river basin in Texas. Lower Neches Valley Authority's Clean Rivers Program (CRP) is a partnership between the Texas Commission on Environmental Quality (TCEQ), Lower Neches Valley Authority (LNVA), and stakeholders working to assess, maintain, and improve the quality of surface waters within the Lower Neches Basin and Neches-Trinity Coastal Basin. The program uses a watershed management approach to identify and evaluate water quality issues, establish priorities for corrective action, and work to implement those actions.

A watershed is an area of land that water flows across, through, or under to feed streams, rivers and lakes. All of these watersheds fit together like puzzle pieces to form land masses.

Watershed management is the study of the relevant characteristics of a watershed aimed at the sustainable distribution of its resources and the process of creating and implementing plans, programs and projects to sustain and enhance watershed functions that affect the plant, animal, and human communities within the watershed boundary.

Water supply, water quality, drainage, storm water runoff, water rights and the overall planning and utilization of watersheds are features of watersheds that agencies seek to manage. Landowners, land use agencies, storm water management experts, environmental specialists, water use surveyors and communities all play an integral part in watershed management.

Specific goals for the Clean Rivers program include providing quality assured data to TCEQ for use in decision making, identifying and evaluating water quality issues, promoting cooperative watershed planning, recommending management strategies, informing and engaging stakeholders, and maintaining efficient use of public funds.

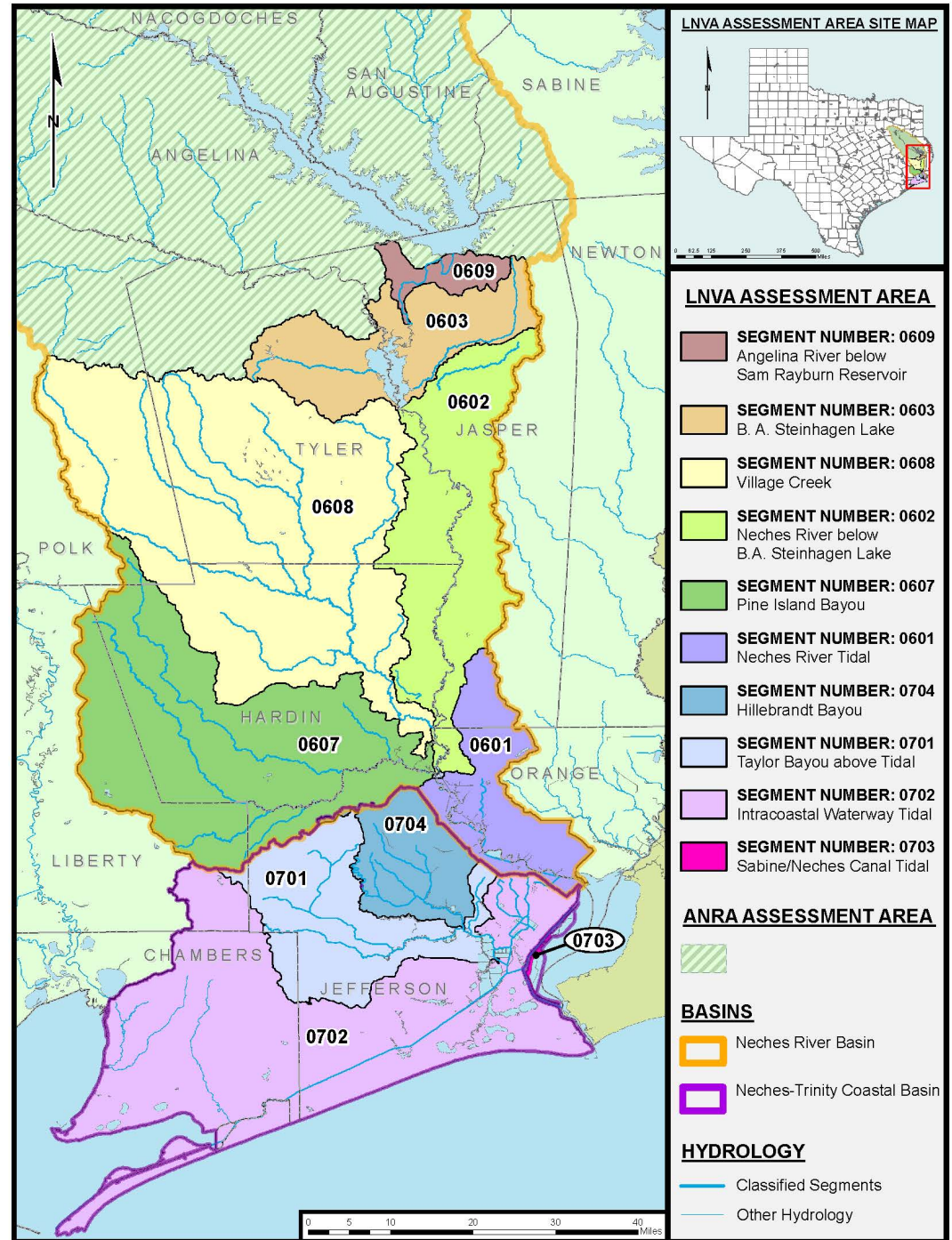
Creating a Basin Highlights Report is one of the ways used to inform stakeholders of Clean Rivers Program activities in the watersheds of their basin. The format for LNVA's 2020 Basin Highlights Report is a standard report. This type of report provides an overview of the basin's water quality monitoring, the water quality issues in the basin, a description of water quality conditions for each segment, special study findings, maps for each segment, as well as community outreach, steering committee and website information.

Lower Neches Basin and Neches-Trinity Coastal Basin Monitoring Programs

LNVA's basin-wide CRP monitoring program includes 23 routine stations in the Lower Neches River Basin. The sample sites are located in Segment 0601: Neches River Tidal, Segment 0602: Neches River below B.A. Steinhagen Lake, Segment 0603: Steinhagen Lake, Segment 0607: Pine Island Bayou, Segment 0608: Village Creek, Segment 0609: Angelina River below Sam Rayburn Reservoir, and Segment 0610: Sam Rayburn Reservoir. Routine monitoring is conducted four times a year and the parameters collected can be found in Appendix A on page 31.

TCEQ Region 10 in Beaumont is monitoring 19 stations in the Lower Neches River and Neches-Trinity Coastal Basins. These segments include sites on Pine Island Bayou, the Neches River Tidal, Star Lake Canal, the lower Neches river above tidal, Taylor Bayou above tidal, Intracoastal waterway tidal, Sabine-Neches canal, and Hillebrandt Bayou.

The Coordinated Monitoring Schedule (CMS) website at <https://cms.lcra.org> provides detailed information about each of these stations on the monitoring schedule. A description of each segment in the lower Neches Basin and Neches-Trinity Coastal basins as well as maps detailing sample locations, the monitoring agency, and details about any special studies being conducted in that segment will follow in this report.



The Texas Integrated Report

In order to determine monitoring priorities within the lower Neches basin, LNVA references the Texas Integrated Report of Surface Water Quality, which describes the status of the state's waters and the extent to which they attain the Texas Surface Water Quality Standards, as required by Sections 305(b) and 303(d) of the federal Clean Water Act. This report summarizes the condition of the state's surface waters, including concerns for public health, quality for support of aquatic species and other wildlife, and specific pollutants and their possible sources. The Integrated Report consists of the Texas Water Quality Inventory and 303(d) List of impaired water bodies based on historical water quality data. TCEQ includes data collected during a seven year period; however, up to ten years of data can be included to attain a minimum number of samples for assessment.

State water quality assessment reports are completed every two years, in even numbered years. They are generated by TCEQ and must be approved by the Environmental Protection Agency (EPA).

Water bodies included on the 303(d) List are not meeting current water quality standards and, therefore, do not support their designated uses. The Texas Surface Water Quality Standards (TSWQS) are state rules (Texas Administrative Code, Title 30, Chapter 307) written and adopted by the TCEQ under authority of the Clean Water Act. The Standards establish goals for the quality of streams, lakes, and bays throughout Texas. The Standards also identify appropriate uses for the states' surface waters that include aquatic life, contact or non-contact recreation, and source of public water supply. Water bodies may have concerns for use attainment and established screening levels which is part of the Texas Integrated Report.

For more information about the Texas Integrated Report and to view the most current version and versions under review by the EPA, please visit the link on TCEQ's website, <https://www.tceq.texas.gov/waterquality/assessment> .

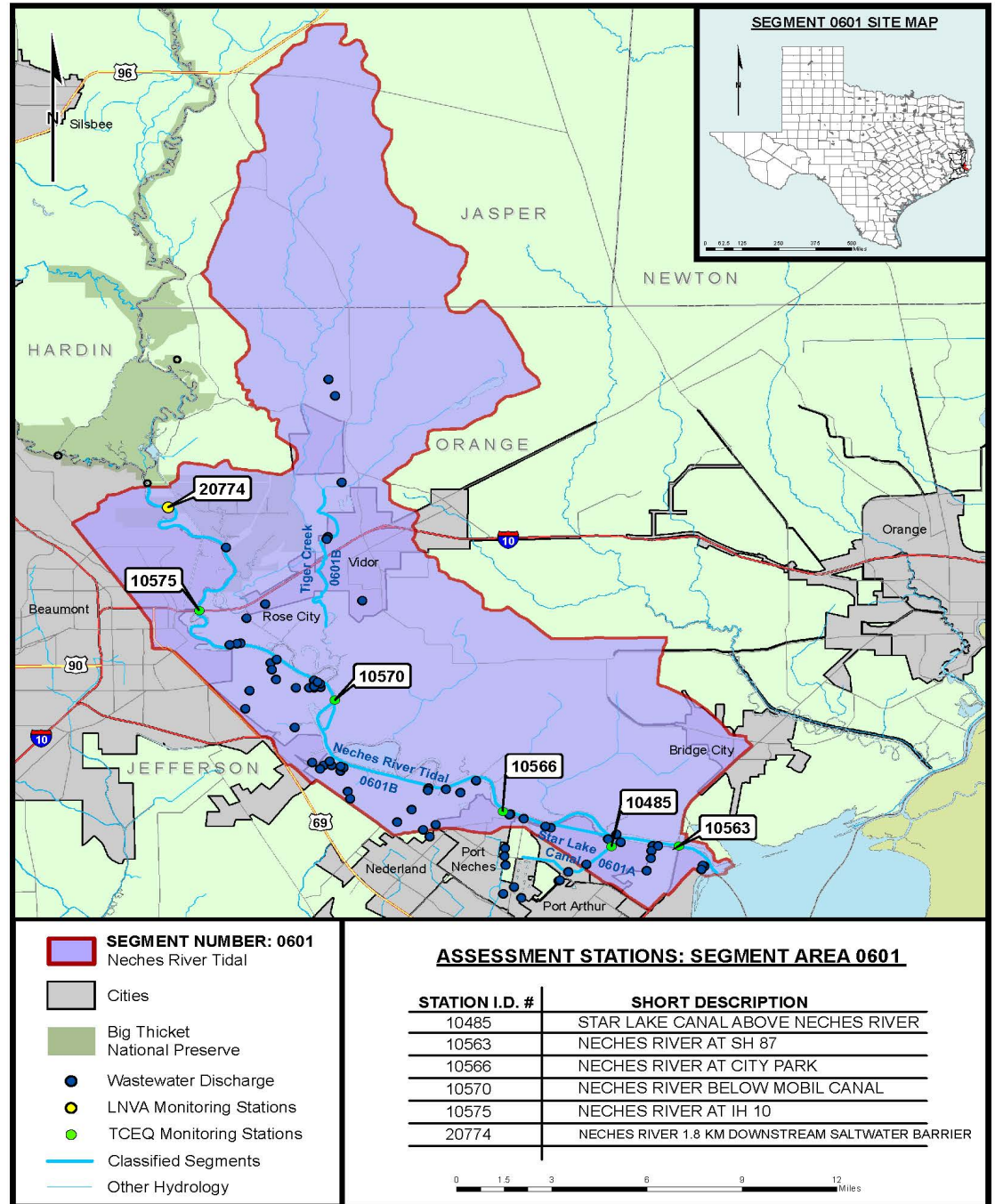


Stream Segments in Review

Segment 0601: Neches River Tidal

The Neches River Tidal (0601) is the segment of the Neches River from Sabine Lake in Orange County to the Neches River Saltwater Barrier, which is a half mile downstream of the confluence of Pine Island Bayou. Segment 0601 is classified as a tidal stream segment with intermediate aquatic life use and primary contact recreation use designations. The hydrologic influences in this segment include tidal exchange and fresh water inflows. The substrates in this area consist of primarily of sand, silt, and clay. Along waters edges, there are areas of fill and spoil dredging materials. A dredged navigation channel from the mouth of the river to the Port of Beaumont is maintained by the U.S. Army Corps of Engineers (USACE). The navigation channel is currently dredged to 40 feet deep and 400 feet wide in order to accommodate marine traffic and large vessels. The land in the segment consists of low, flat plains with some of the area being tidal marshes with bayous. Land use is primarily oil and gas production, along with marshland, wildlife and waterfowl habitat, cropland, and urban/ industrial. Cities located along Segment 0601 include Beaumont, Port Neches, and Groves.

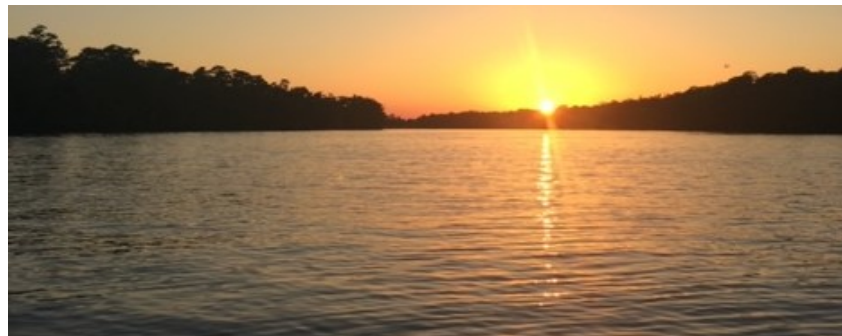
Star Lake Canal (Segment 0601A) is a tidally influenced, dredged canal that receives industrial effluents, which discharge into the Neches River. The canal was constructed after 1948 as an industrial wastewater and storm water outfall, and is currently used by local industries and manufacturing facilities.



The primary flow in Star Lake Canal is due to tidal fluctuations and industrial discharges (wastewater/stormwater outfalls) into the canal.

TCEQ Region 10 currently monitors five stations and LNVA monitors one station in tidal segment 0601. This segment is currently listed on the 2018 Texas Integrated Report with the following concerns: a recreation use impairment for bacteria, a use concern for Malathion, and a screening level concern for ammonia specifically on Segment 0601A, Star Lake Canal. There is also currently a fish consumption advisory for the Neches River from the Department of Safety and Health Services for mercury and dioxins. Advisory 51 states it unsafe to consume blue catfish >30 inches, flathead catfish, gar, largemouth bass > 16 inches, small mouth buffalo, and spotted bass >16 inches. Women of childbearing age and children under 12 should not consume at all. Women past child bearing age and grown men should limit consumption to 1 meal a month (8 ounces of fish is one meal) of the gar and flathead catfish. The blue catfish, largemouth bass, and spotted bass should be limited to two meals a month. The small mouth buffalo should not be consumed at all. Mercury is naturally found in the sediment as a result of normal breakdown of the earth's crust by wind and water. Inorganic mercury can enter the environment from ore deposits, burning of fuels or trash, or emissions from factories. The main source of dioxins is incineration and unintentional by-products of chlorine bleaching. The 2018 Integrated Report lists non-point source pesticide use as the potential cause for the Malathion.

To address the bacteria concerns in segment 0601, the Texas State Soil & Water Conservation Board, the Texas A&M AgriLife Extension, and the Texas Water Resources Institute have entered a partnership with TCEQ to begin a Texas Watershed Steward program for stakeholders in the Neches River Tidal watershed. This program will engage area stakeholders in using a watershed approach to identify the potential sources of the bacterial issues, increase public awareness and involvement, coordinate agency efforts in the watershed, and measure success through monitoring. Through this process, stakeholders will help decide if a Total Maximum Daily Load (TMDL) project or a watershed protection plan is the best approach to help manage the bacterial issues. A TMDL is a plan developed by TCEQ for restoring impaired waters that identifies the maximum amount of a pollutant that can enter a water body while still meeting water quality standards. The TMDL is submitted to EPA for approval, then an implementation plan, also called an I-Plan, is developed and submitted to TCEQ and initiated. This process can take two to three years. In contrast, a watershed protection plan is a community driven management plan that uses the watershed approach to address the bacterial concerns. A watershed protection plan is developed and approved by stakeholders, and implementation begins. As a living document, it can be revised as needed. A watershed protection plan can also take two to three years to develop. LNVA staff are participating in the development of this project on the Neches River Tidal Segment.

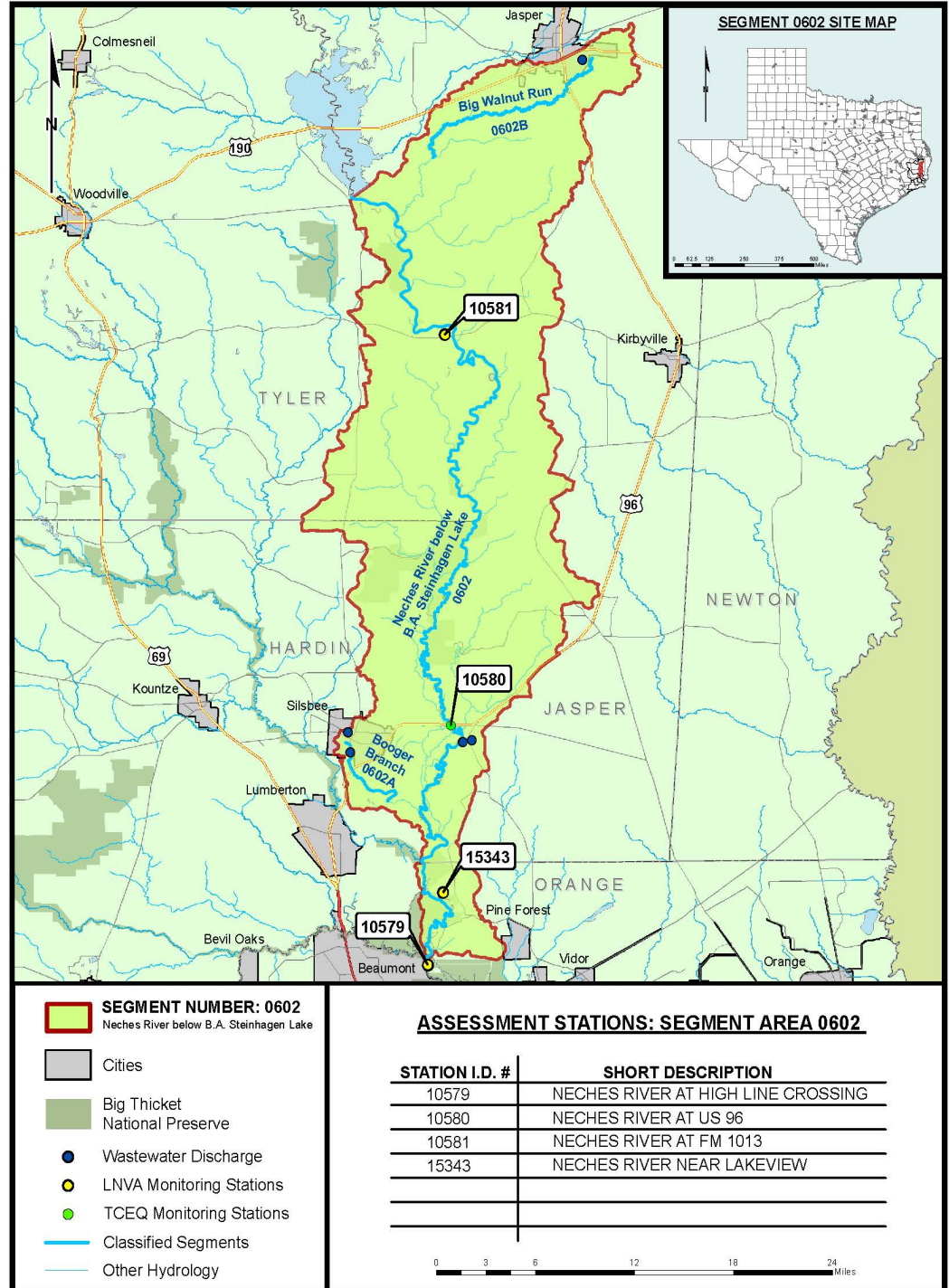


Segment 0602: Neches River below B.A. Steinhagen Reservoir

The Neches River below B.A. Steinhagen Reservoir (0602) is a river segment from the Neches River Saltwater Barrier, which is at a point 0.5 miles downstream of the confluence of Pine Island Bayou, to Town Bluff Dam in Jasper/Tyler County. The segment is 84 miles long and major tributaries include Village Creek and Pine Island Bayou. River discharge is regulated by the Town Bluff Dam at B.A. Steinhagen Lake and the Neches River Saltwater Barrier.

Segment 0602 is situated in an area known as the piney woods. Substrates are sand, clay, silt, and organic matter with poorly drained soils in the floodplains, flatwoods, and low terraces. Land use includes livestock agriculture, hunting leases, timber production, pasture production, recreation, wildlife habitat, oil and gas production, and some public land that is part of the Big Thicket National Preserve. Land cover includes mixed forest, evergreen forest, deciduous forest, pine plantations, and forested wetlands.

Segment 0602 is designated for high aquatic life use, primary contact recreation use, and public water supply. Three routine Surface Water Quality Monitoring (SWQM) stations are monitored quarterly by LNVA and one station is monitored by TCEQ Region 10. The 2018 Integrated Report lists use concerns for mercury and non-supporting of fish consumption. The Texas Department of State Health Services (DSHS) has issued a fish consumption advisory (ADV-51) for mercury and dioxin in this segment on the Neches River. Sources of these pollutants are listed as atmospheric deposition and industrial point source discharge as well as other unknown sources. Additional Information on the fish consumption advisories can be found on the DSHS website at: <https://www.dshs.texas.gov/seafood/advisories-bans.aspx>.

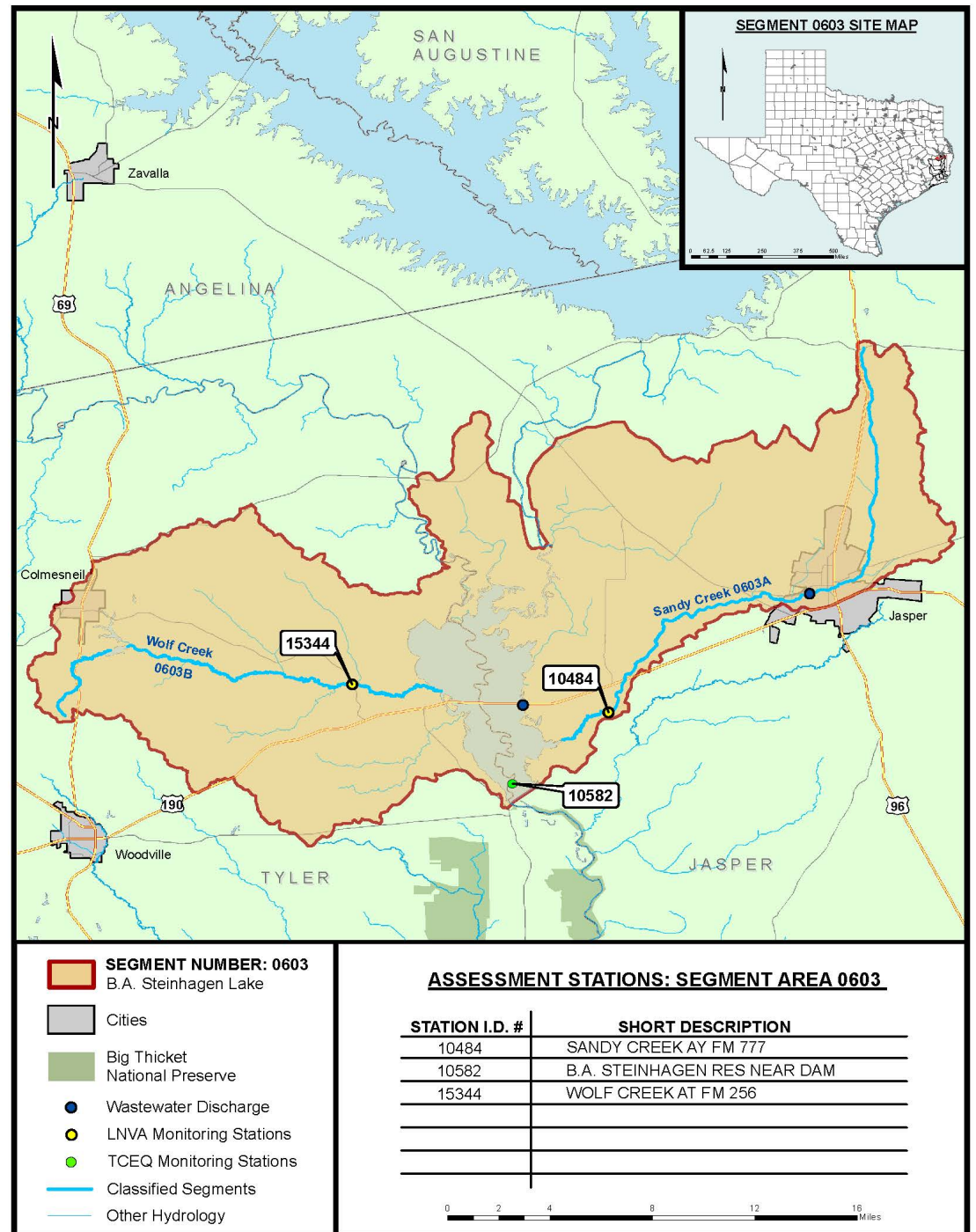


Segment 0603: B.A. Steinhagen Lake

B.A. Steinhagen is a reservoir managed by the U.S. Army Corps of Engineers (USACE) and covers approximately 13,000 surface acres. It is situated in the piney woods area located along U.S. Hwy. 190 between Woodville and Jasper where it impounds the Neches River near the confluence with the Angelina River. Along with Sam Rayburn Reservoir, it provides flood control for the lower Neches River Basin and generates hydroelectric power at the USACE Town Bluff Dam or “Dam B” which supplies freshwater downstream to LNVA and other users along the Neches River.

Substrates in this hilly segment are acidic and sandy which supports upland longleaf pine woodlands, longleaf pine savannas, and hardwood slope forests. Land use is primarily for timber production, public lands, pasture and livestock production, recreation and wildlife habitat. The land is covered by mixed forest, evergreen forest, deciduous forest, and pine plantations. Tributaries in the segment include Wolf Creek and Sandy Creek. Wolf Creek drains areas of pine forest and pastureland, while Sandy Creek is a forested sub-watershed with pasturelands and its upper reaches drain the City of Jasper.

Three stations are monitored in this segment: one by TCEQ Region 10 and two by LNVA including routine water quality monitoring on Sandy Creek and Wolf Creek. Sandy Creek and Wolf Creek historically have elevated bacteria levels. The sources of the bacteria are listed as nonpoint source agricultural and livestock grazing or feeding operations. The fish consumption Advisory 51 mentioned in segments 0601 and 0602 also includes the B.A. Steinhagen Reservoir in Segment 0603.

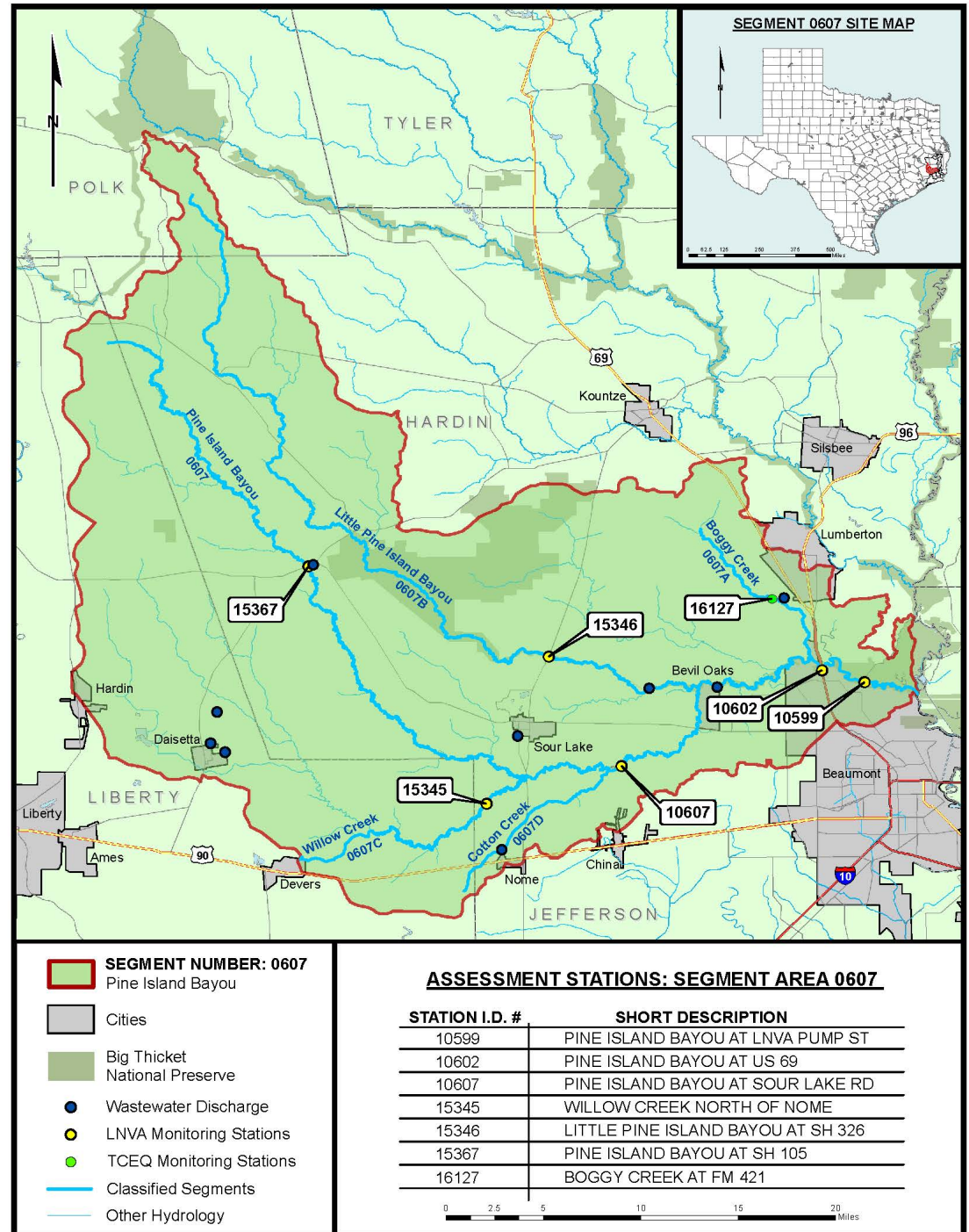


Segment 0607: Pine Island Bayou

Pine Island Bayou (PIB) is located from the confluence of the Neches River in Hardin/Jefferson County and FM 787 in Hardin County and is approximately 81 miles in length. Two major tributaries include Little Pine Island Bayou (LPIB), Segment 0607B, and Willow Creek, Segment 0607C. LPIB runs from the confluence of PIB southwest of Lumberton in Hardin County to the upstream perennial portion of the stream west of Kountze in Hardin County. Willow Creek runs from the confluence of PIB north of Nome in Jefferson County to the upstream perennial portion of the stream east of Devers in Liberty County. Another tributary of PIB is Boggy Creek, Segment 0607A, that runs from the confluence of PIB upstream to the confluence with an unnamed tributary downstream of the crossing of the Southern Pacific Railroad.

Pine Island Bayou has a drainage area of 657 square miles. The upper portions of this segment are comprised of mostly forestland. The lower portions drain the communities of Sour Lake, Pinewood Estates, Bevil Oaks, and the northern section of the City of Beaumont.

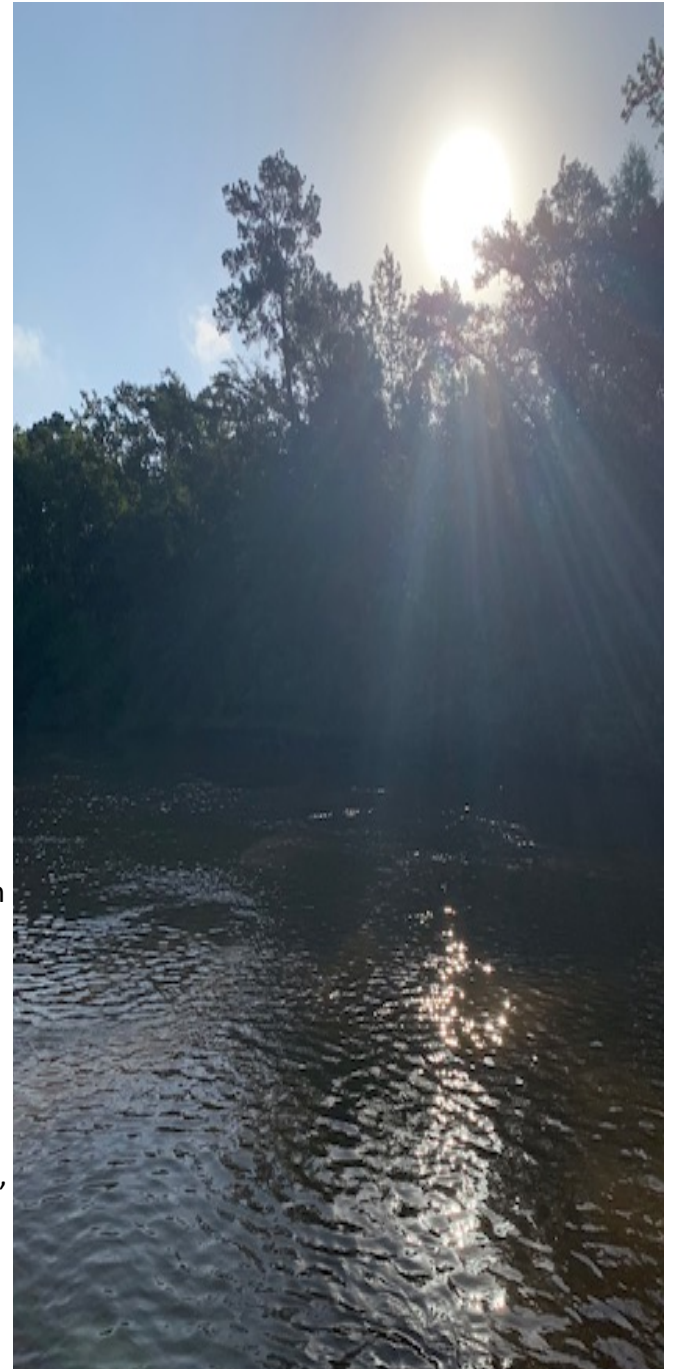
The bayou is slow moving and consists of cypress/tupelo swamps and mixed pine hardwood forests. The stream bed consists of sand and clay substrate. The soils around PIB are acidic and drain poorly after heavy rainfall events. Land use in the PIB watershed is primarily timber production, pastureland, cattle production, crops, and oil and gas production. Stakeholders of the PIB watershed include land owners, industry, local ranchers and farmers, oil and gas companies, and several municipalities. Other stakeholders include citizens and business owners in the PIB watershed.



As mentioned in the 2019 Highlights section of this report, the Continuous Water Quality Monitoring Network (CWQMN) station (CAMS 749) on Pine Island Bayou near the Hwy 69 bridge at LNVA's BI canal pump station is located in this segment. In addition to the CAMS 749 project, a variety of other projects to address impairments have taken place on Pine Island Bayou. A Use Attainability Analysis (UAA) took place on PIB from 2005-2011. TCEQ sampled for 24 hour dissolved oxygen, habitat, benthics, nekton, conventionals, flow, and field parameters. A UAA was also conducted on Willow Creek (0607C) and Boggy Creek (0607A) from 2007-2010. The results from the PIB UAA as well as 24 hour dissolved oxygen data were used in these UAA's. The time length of the UAA's were due to several heavy rainfall events that would have delayed sampling. A UAA is a two year study conducted to find out if established aquatic life use designation and dissolved oxygen criterion are suitable for a particular segment. If not, it can be recommended that the stream standard be adjusted accordingly after review and approval by the EPA.

Based on the results of the UAA's conducted in PIB, it was recommended that there be a dissolved oxygen standard change from 5 mg/L to 3 mg/L in the 2014 Texas Surface Water Quality Standards. The Environmental Protection Agency is in process of reviewing this standard change. In order to obtain information on current dissolved oxygen conditions in Pine Island Bayou, LNVA is working with TCEQ to obtain additional 24 hour dissolved oxygen monitoring data. LNVA added 24 hour dissolved oxygen collection quarterly to the monitoring schedule for FY 20 to this site on Boggy Creek. A 24 hour DO collection was also added to the sites at PIB@105 and LPIB@326. Pine Island Bayou has been on the 303(d) list since 2000 for dissolved oxygen. The low dissolved oxygen levels are likely due to natural causes that are influenced by high ambient summer temperatures, low flow conditions, and decaying organic material present in the water. If the EPA approves the standard change, the additional dissolved oxygen monitoring may demonstrate that the new standard is being attained.

The Pine Island Bayou segment near the confluence with Willow Creek was added to the list of 303(d) impairments in 2008 for bacteria from unknown sources. Willow Creek is located in a large, rural area dominated by cattle grazing and oil/gas productions. Wildlife is abundant in this area as well. Deer, hogs, and otters have been observed at or near the CRP monitoring stations on this stream. Boggy Creek is also listed for unknown sources of bacteria. Based on recent assessment and data analysis, water quality standards were met and the 2018 Integrated Report has Segment 0607 Pine Island Bayou de-listed for bacteria concerns.

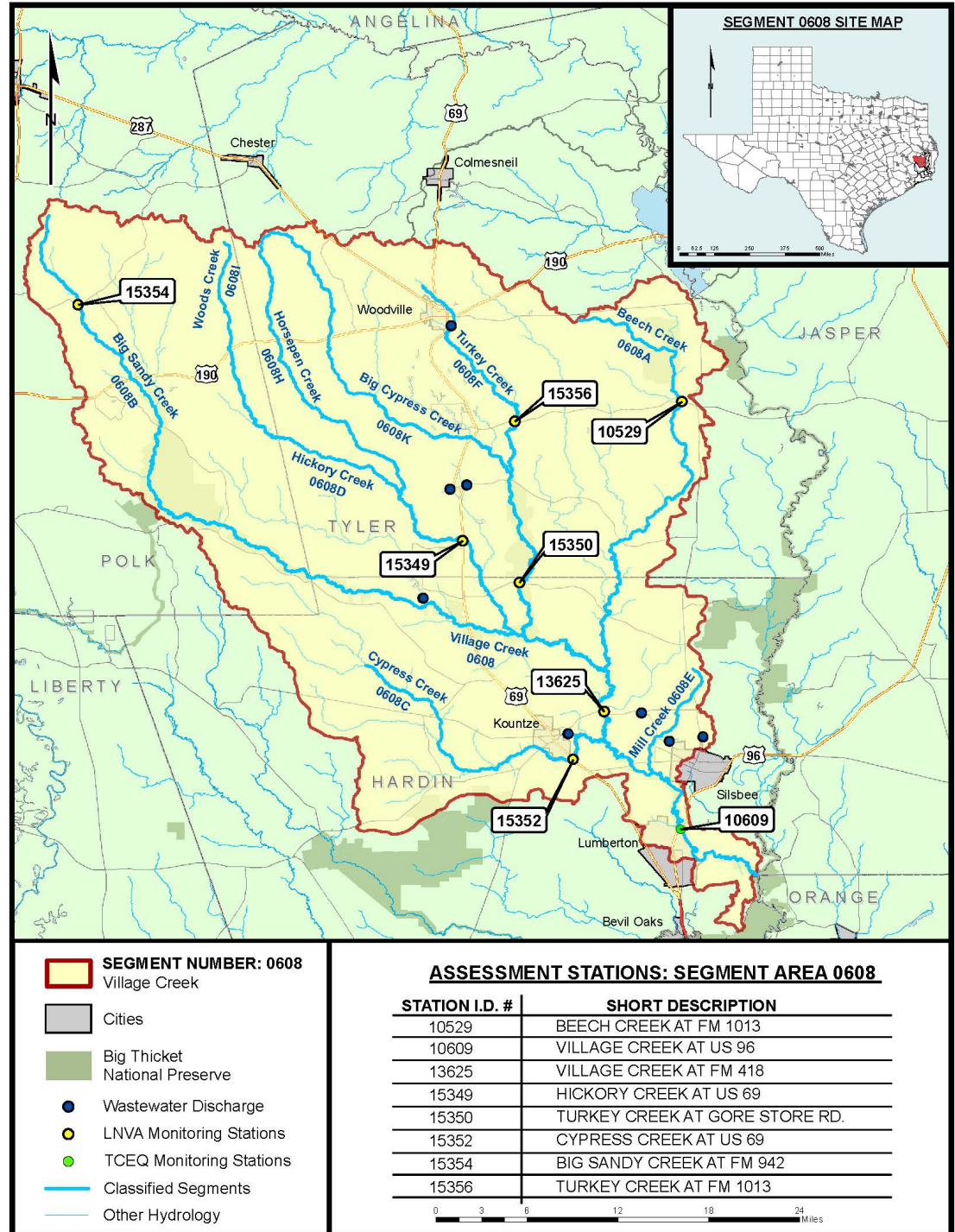


Segment 0608: Village Creek

The Village Creek classified stream segment is from the confluence with the Neches River in Hardin County to the confluence of Lake Kimball Dam in Hardin County. This segment is broad and covers over 200 miles in stream length. The Village Creek watershed has many tributaries draining approximately 1,113 square miles as it flows southeasterly to its confluence with the Neches River. Segment 0608 includes the following tributaries or unclassified segments: Beech Creek (0608A), Big Sandy Creek (0608B), Cypress Creek (0608C), Mill Creek (0608E), Turkey Creek (0608F), and Lake Kimball (0608G).

The Village Creek watershed lies entirely within the region of Southeast Texas known as the Big Thicket. Segment 0608 is similar to Segment 0602 and 0603, in that it falls under the same South Central Plains, or “Piney Woods” ecoregion. Once covered in pine and hardwood forests, now most of the area is covered by loblolly and shortleaf pine plantations. Village Creek State Park is located in Hardin County and covers more than 1,000 acres of thick forests. Land use is timber production, oil and gas extraction, pastureland, cattle production, recreational areas, public lands, and wildlife habitat.

In this segment, LNVA monitors seven routine SWQM stations quarterly and TCEQ Region 10 monitors one station on Village Creek. Historical data assessments found a correlation between water quality concerns and stream flows in the segment. Low dissolved oxygen concentrations correlated with low stream flows during the summer months while low pH levels during increased stream flows indicated the presence of tannins and acidic soils.



In 2009, the Texas DSHS issued a fish consumption advisory (ADV-39) for Village Creek. The advisory warns the public to limit their consumption due to elevated levels of mercury in fish tissue samples taken from three species. There is also a not supporting fish consumption on Lake Kimball due to mercury levels in edible tissue. More information about these fish advisory can be found at:

<https://www.dshs.texas.gov/seafood/advisories-bans.aspx> .

The 2018 Integrated Report lists impairments and concerns for habitat, copper, dissolved oxygen and bacteria. Beech Creek is listed for impaired habitat and bacteria concerns. Its also listed for not supporting aquatic life use due to elevated copper. Cypress Creek is listed for concerns for impaired habitat and bacteria as well as not supporting aquatic life use due to depressed dissolved oxygen. Big Sandy Creek lists a screening level concern for dissolved oxygen. Mill Creek is listed for not supporting aquatic life use due to depressed dissolved oxygen. The concern for dissolved oxygen on Mill Creek is thought be caused by both natural and industrial/municipal point source discharges. As described in 2019 Highlights section of this report, LNVA has added aquatic life monitoring to the coordinated monitoring schedule on Beech and Cypress Creeks to determine whether or not there is high aquatic life use in this segment in spite of the concerns for oxygen. This information will assist assessment of these streams when the Use Attainability Analysis (UAA) recommended in the Texas Integrated Report for Cypress Creek is scheduled by TCEQ. As stated earlier in this report, a UAA is a two year study conducted to find out if established aquatic life use designation and dissolved oxygen criterion are suitable for a particular segment.



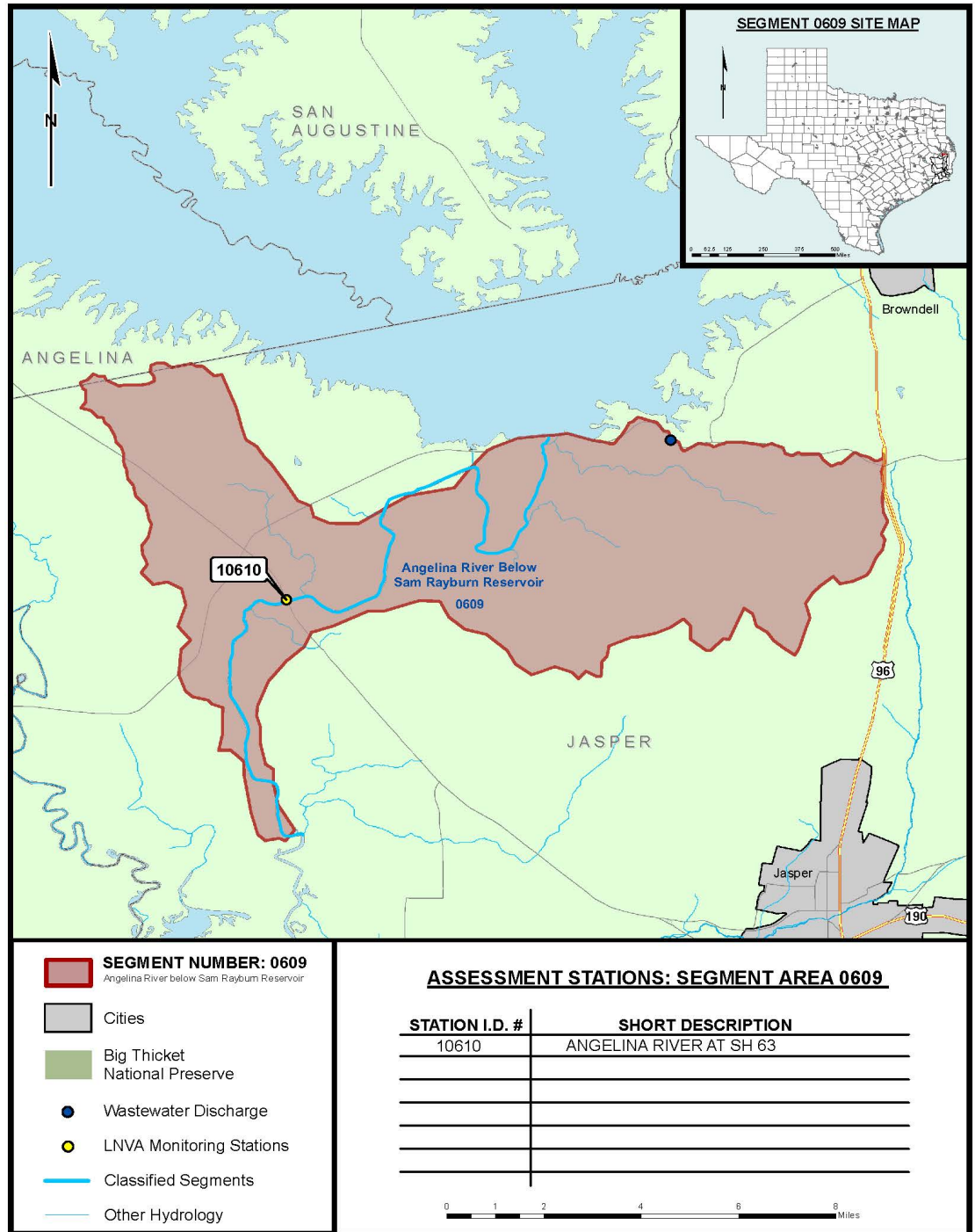
Segment 0609: Angelina River below Sam Rayburn Reservoir

The Angelina River below Sam Rayburn Reservoir is defined in the TSWQS as from a point immediately upstream of its confluence with Indian Creek to the Sam Rayburn Reservoir Dam in Jasper County. The Angelina River ranges from 75-150 feet in width through this segment as it meanders through the rolling hills of the East Texas Piney Woods.

The segment extends thirteen river miles from below Sam Rayburn Dam towards the headwaters of B.A. Steinhagen Reservoir. The drainage area of Segment 0609 is 107 square miles, with land use characterized as sparsely populated and heavily forested with minimal area of non-irrigated cropland located in the southeast quadrant of the watershed.

The 153,000 acre Angelina National Forest borders the upper part of Segment 0609, and the land use includes recreational activities on public lands in the area. Flows are generally very high compared to other segments in the basin, especially during the almost daily water releases from the Sam Rayburn Dam. Fishing, boating, swimming and water skiing are very common in this segment. Segment 0609 is designated for primary contact recreation use, high aquatic life use, and public water supply.

LNVA monitors one SWQM station in this segment. The Integrated Report lists a restricted fish consumption advisory due to atmospheric deposition and industrial point source discharge. See Advisory 51 for more detail at <https://dshs.texas.gov/seafood/advisories-bans.aspx>.



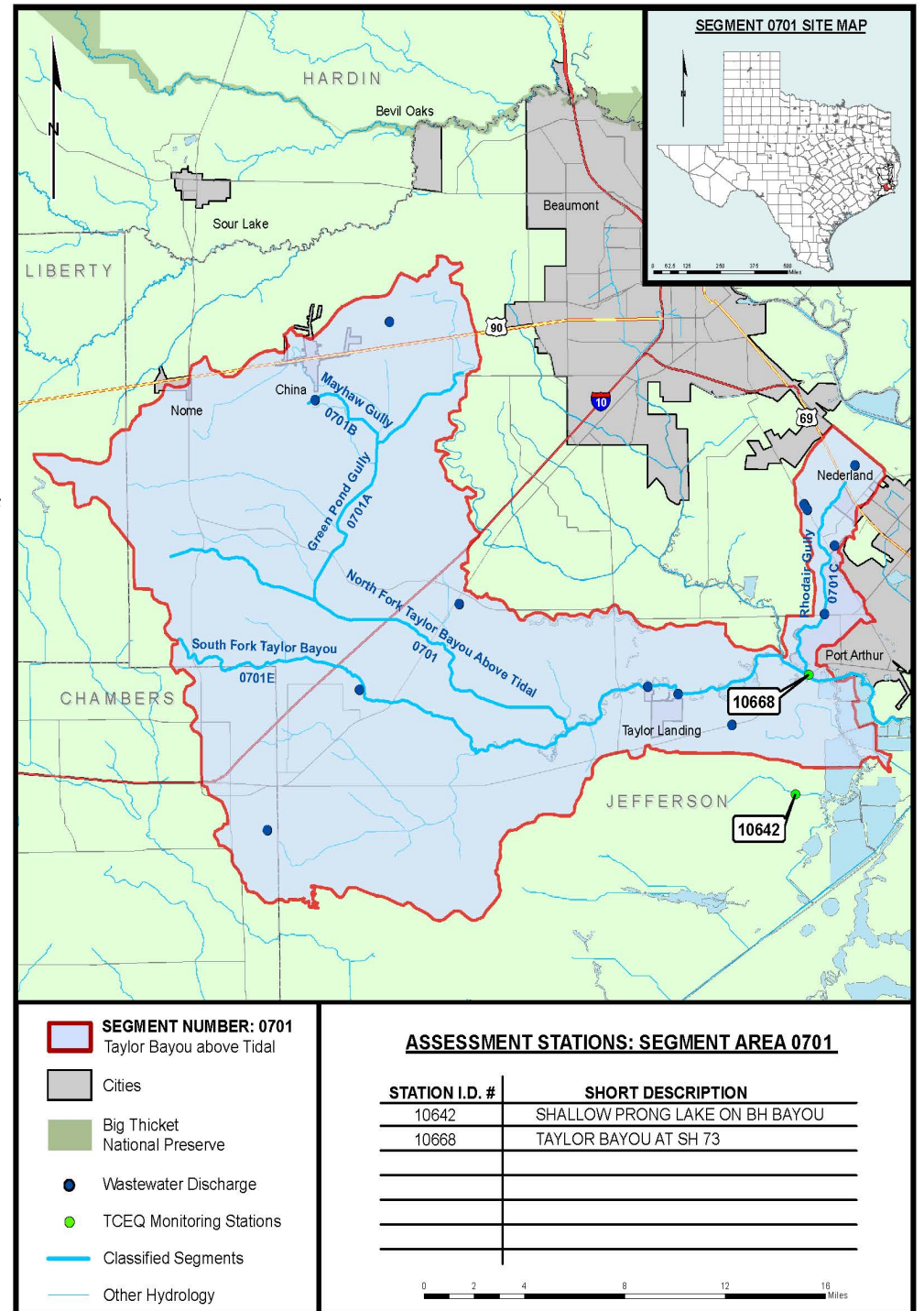
Segment 0701: Taylor Bayou above Tidal

Taylor Bayou above Tidal, Segment 0701, is from the salt water lock 4.8 miles downstream of SH 73 in Jefferson County to the confluence with Hillebrandt Bayou, and includes Shallow Prong Lake on Big Hill Bayou. Taylor Bayou is 34 feet long and is characterized as low gradient with sluggish flow. Shallow Prong Lake (0701D) is a small reservoir that is 150 surface acres.

Soils drain poorly and much of the segment stays wet for most of the year. Substrates are fine textured and made up of sands, silts, and clays, and some salt domes. Segment 0701 is generally flat plains with most of the area covered by standing water, and tidal marshes with bayous, lakes, and canals. Land use is largely agricultural with farming of rice, grain, sorghum, cotton, and soybeans common. There is also cattle production, pasture land, urban and industrial uses, oil and gas production, waterfowl hunting, marshland, and wildlife habitat.

The segment is designated for primary contact recreation use and intermediate aquatic life use. Irrigation return flows from rice fields, storm water runoff and municipal and industrial discharges are the principle sources of flow in the segment and its major tributary, Hillebrandt Bayou. A saltwater lock near the mouth of the bayou minimizes tidal impact and saltwater intrusion, but the segment is still highly tidally influenced.

TCEQ Region 10 monitors two SWQM stations on Taylor Bayou and one station on Shallow Prong Lake. Taylor Bayou is impaired for dissolved oxygen. Shallow Prong Lake has a use concern for dissolved oxygen. Both cases are attributed to natural conditions. There is a concern for chlorophyll-a due to unknown sources on Taylor Bayou. Chlorophyll-a is used as an indicator of the amount of algae present. Algae in high concentrations can lead to decreased dissolved oxygen. Shallow Prong Lake has a concern for arsenic due to unknown sources. A UAA is recommended for Segment 0701.

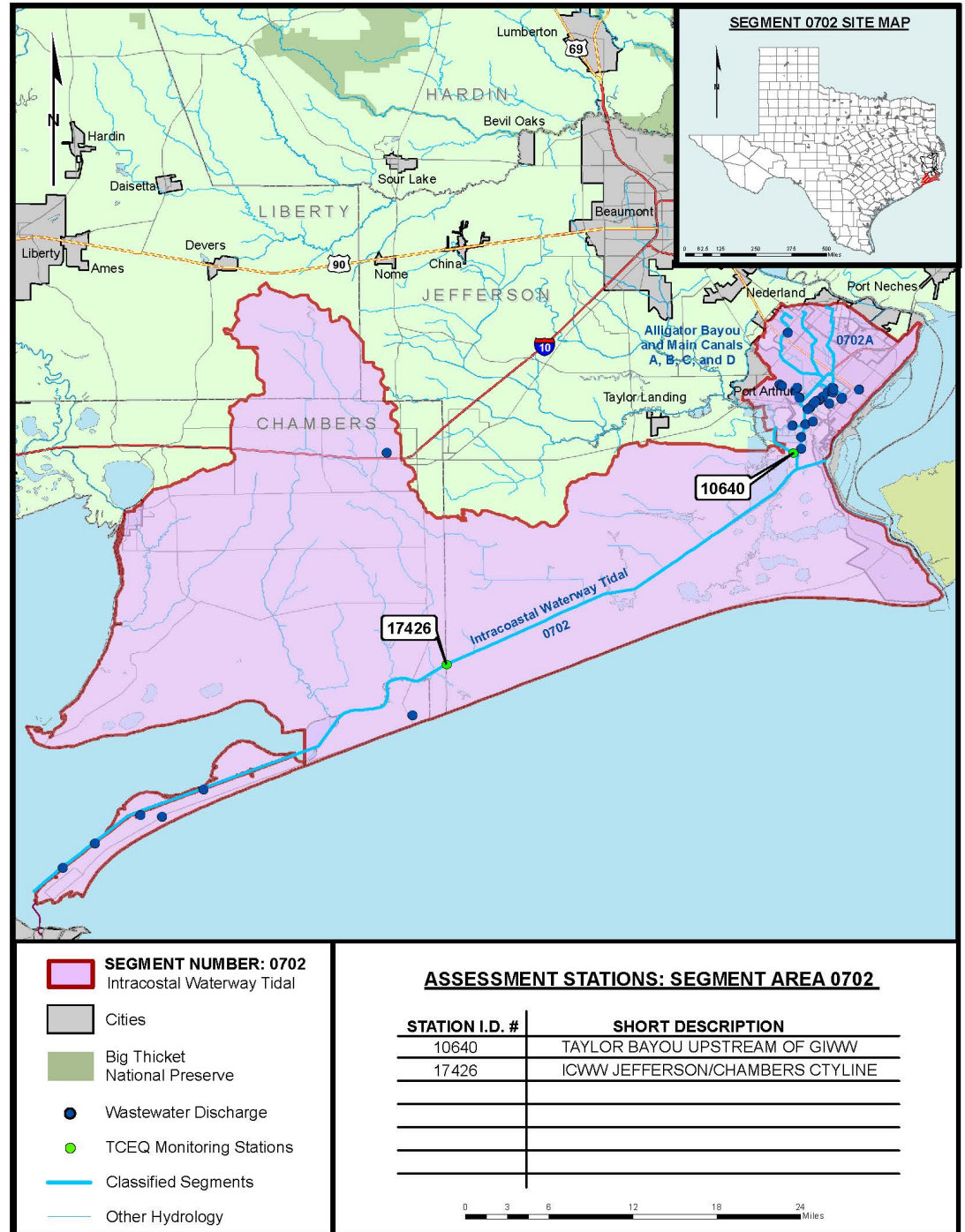


Segment 0702: Intracoastal Waterway Tidal

The Intracoastal Waterway Tidal, Segment 0702, is from the confluence with Galveston Bay at Port Bolivar in Galveston County to the confluence with the Sabine-Neches/Port Arthur Canal in Jefferson County including Taylor Bayou Tidal from the confluence with the Intracoastal Waterway up to the saltwater lock 4.8 miles downstream of SH 73 in Jefferson County. This tidal segment is 63 miles long and includes the unclassified segment, Alligator Bayou (0702A). Segment 0702 is 539 square miles, and is comprised of flat plains with most of the land covered in standing water, beach ridges, cheniers, canals, and tidal marshes with bayous meandering through.

Elevation is anywhere from sea level to 30 feet, and the substrate is made up of clay and silt with some shell fragments and sand on cheniers/beach ridges. The highest point in the segment is at High Island (30 feet) which is situated atop an old salt dome. This ecoregion has many freshwater and saltwater coastal marshes, and a wet, humid climate.

Land use includes marshland, wildlife and waterfowl habitat, oil and gas production, and extensive industrial activity. The marshes in this segment provide wintering grounds for ducks and geese and breeding and rearing grounds for fish and shrimp such as brown shrimp, white shrimp, blue crab, red drum, southern flounder, and spotted sea trout. Due to the ecologically rich areas in Segment 0702, fishing is both recreationally popular as well as commercially important. Two SWQM stations in this segment are routinely monitored by TCEQ Region 10 in Beaumont.



Alligator Bayou is a freshwater tributary of Taylor Bayou Tidal, with a watershed of approximately 40 square miles located upstream from the saltwater locks on Taylor Bayou. Discharges to the waterbody are primarily from municipal and industrial facilities, with a small amount from agriculture. An interim assessment of the presence and causes of water acute toxicity and sediment toxicity in Alligator Bayou, Segment 0702A, was conducted by the TMDL program in 2001—2002. A Total Maximum Daily Load, or TMDL, was not recommended at that time because a single pollutant could not be identified as a cause of the sediment toxicity or the water toxicity so that a TMDL could be developed. Periodic monitoring was recommended in both cases by TCEQ. A TMDL is a plan that identifies the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards.

In June 2013, the Texas DSHS issued a revised fish consumption advisory (ADV-50) for Galveston Bay. The DSHS has removed the consumption advisory for spotted sea-trout from a portion of Galveston and Trinity Bays and all of East and West Bays. Laboratory testing of spotted sea trout from these areas indicated that concentrations of dioxins and PCBs have decreased to acceptable levels and no longer pose a significant health risk. An advisory for all species of catfish remains in effect for all of the Galveston Bay System due to Dioxins and PCBs. This advisory includes a portion of the Intracoastal Waterway Tidal from the eastern most boundary of East Bay to Port Bolivar in Segment 0702.

Segment 0702 is designated for primary contact recreation use and high aquatic life use. Historically, Segment 0702 has been listed on the state's 303(d) List for bacteria impairments, ambient toxicity in water, toxicity in sediment, and impaired fish community. The 2018 Integrated Report lists nonsupport of the water quality standards for bacteria, a fish advisory, and a concern for chlorophyll-a in Segment 0702, Intracoastal Waterway Tidal. Segment 0702A, Alligator Bayou, has a concern for lead in sediment and a not supporting aquatic life use impairment for acute toxicity in water and sediment toxicity. Sources are linked to nonpoint source petroleum and natural gas activities, industrial point source discharges, and sources unknown.

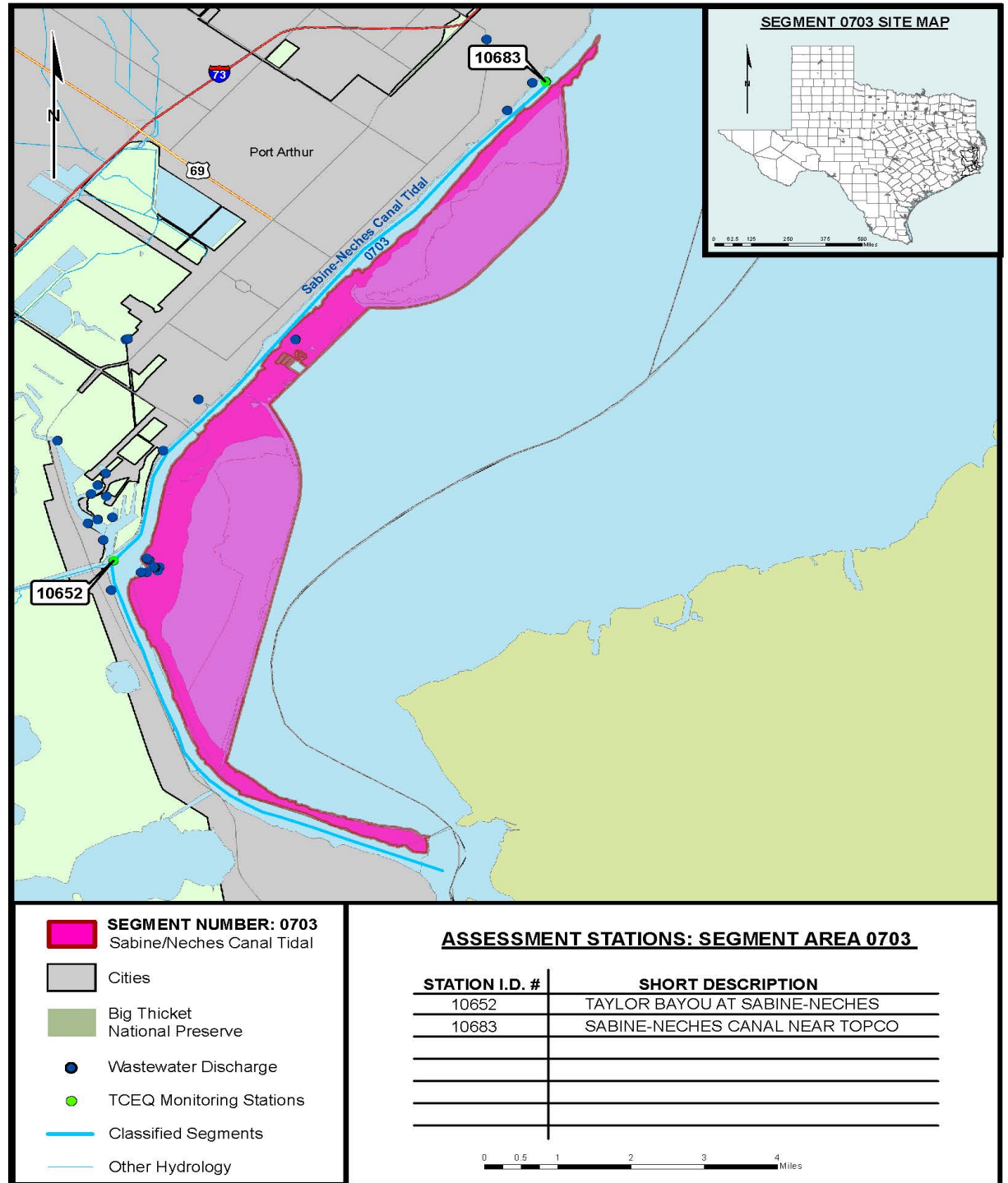


Segment 0703: Sabine-Neches Canal Tidal

The Sabine-Neches Canal Tidal, Segment 0703, is from the confluence with Sabine Pass at the southern tip of Pleasure Island in Jefferson County to the Sabine Lake seawall at the northern tip of Pleasure Island in Jefferson County. This tidal segment is 16 miles in length. The Sabine-Neches Canal exchanges water with Sabine Lake, and a large amount of marine traffic navigates between the Port of Houston and Port Arthur, including both large vessels and smaller recreational boats.

Land use includes oil and gas production, as well as marsh-land, wildlife, and waterfowl habitat. There is extensive fresh-water and saltwater coastal marshes consisting of grasses, sedges, and rushes. Few trees are found in this segment, and substrates consist of clay and silt, with sand and shell fragments on cheniers or beach ridges. Most of the area is covered by standing water as bayous, lakes, or canals in low lying areas.

Two SWQM stations are routinely monitored by TCEQ Region 10 in Beaumont. According to the 2018 Integrated Report, this segment is not supporting contact recreation use due to bacteria from sources that are unknown.

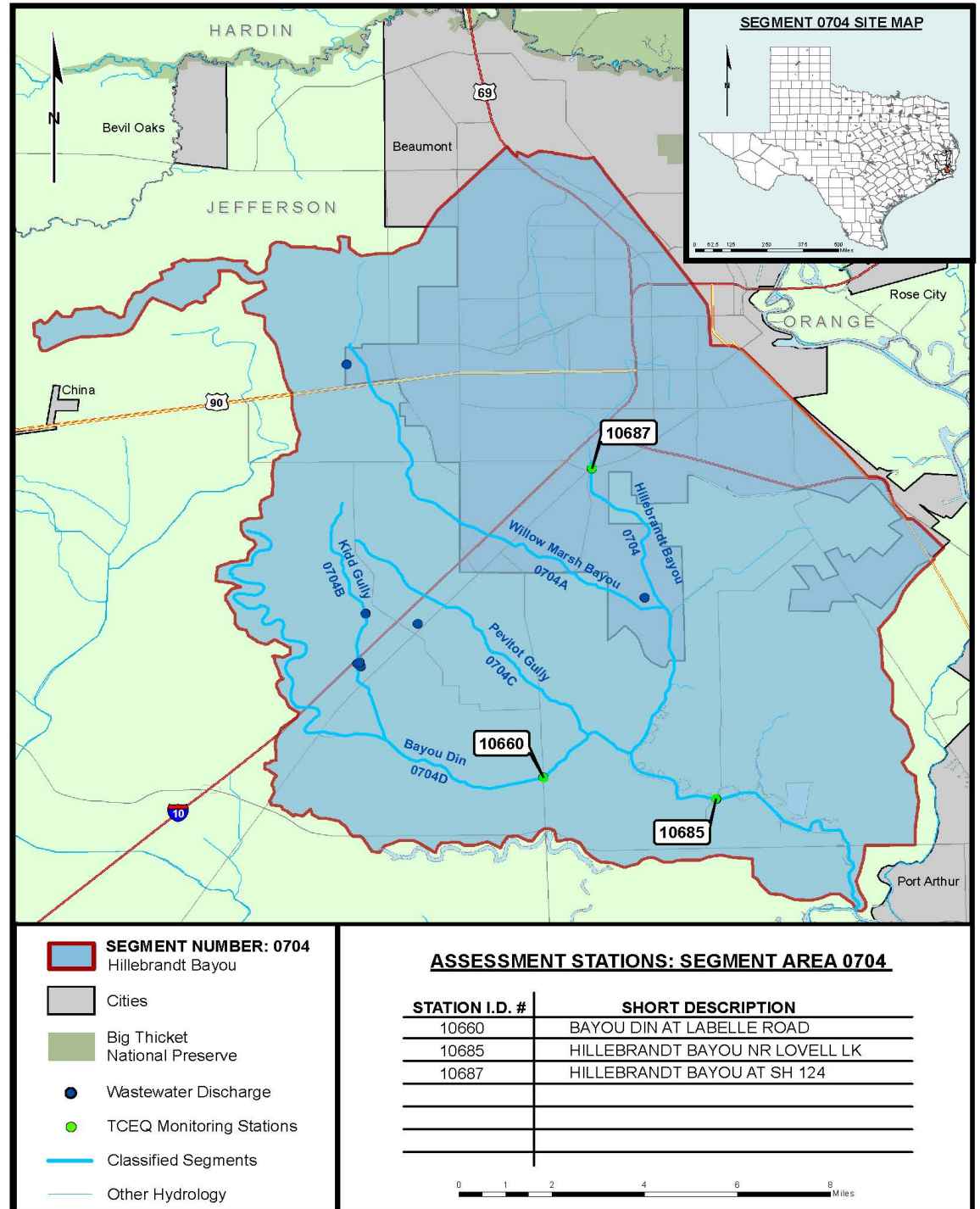


Segment 0704: Hillebrandt Bayou

Hillebrandt Bayou, Segment 0704, is defined as a freshwater stream from the confluence of Taylor Bayou in Jefferson County to a point 100 meters (110 yards) upstream of SH 124 in Jefferson County. Hillebrandt Bayou is 14 miles in length, and extends from the southern part of the South Central Plains Ecoregion (35) to the Northern Humid Gulf Coastal Prairies Ecoregion (34a). Segment 0704 tributaries or unclassified segments include Willow Marsh Bayou (0704A), Kidd Gully (0704B), Pevitot Gully (0704C), and Bayou Din (0704D).

Substrates consist of fine-textured sands, silt, and clay, and low gradient rivers, streams, and bayous are common. Drainage near Hillebrandt Bayou is generally poor due to the substrate types, and soils remain wet most of the year. Land use is pastureland, cropland, urban and industrial, oil and gas production, waterfowl hunting, and recreational use (golf course).

Hillebrandt Bayou serves as the primary receiving stream for the storm water drainage system in the City of Beaumont. A wastewater discharge includes effluent which is treated in the final stages by man made and natural wetlands south of Beaumont along Hillebrandt Bayou. These wetlands comprise over 900 acres. Willow Marsh Bayou, Kidd Gully and Pevitot Gully convey additional flows from agricultural land, and Bayou Din is located along a public golf course. In addition, flows in Hillebrandt Bayou are regulated by saltwater gates and barge locks on Taylor Bayou in Port Arthur.



Segment 0704 is designated for primary contact recreation use and intermediate aquatic life use. Three SWQM stations are routinely monitored by TCEQ Region 10 in Beaumont.

According to the 2018 Integrated Report, this segment is not supporting contact recreation use due to bacteria, and is not supporting aquatic life use due to depressed dissolved oxygen, a concern for chlorophyll-a and a screening level concern for nitrate, and a concern for depressed dissolved oxygen for the 24 hour minimum and 24 hour grab parameters. The bacteria is attributed to urban runoff and storm water runoff. The cause of the dissolved oxygen concerns are listed to be natural conditions with a UAA needed to re-evaluate the segments designated use. Ammonia and chlorophyll-a have unknown sources. This stream segment is included with the planned bacteria monitoring and the watershed stewardship program being conducted on the Neches River Tidal Segment by the Texas Soil & Water Development Board and the Texas A&M Extension.



Summary of Impairments in the Lower Neches and Neches-Trinity Coastal Basins

Segment #	Segment Name	Impairment/Concern Listed in 2018 Texas Integrated Report	Reason for Impairment
0601	Neches River Tidal	Not support contact recreation use due to bacteria in Neches River Tidal	Source Unknown
		Not supporting fish consumption due to polychlorinated biphenyls in edible tissue	Source Unknown
		Concern for aquatic life use due to malathion (lower segment only)	Source Unknown
0601A	Star Lake Canal	Not supporting contact recreation use due to bacteria	Source Unknown
		Concern for aquatic life use due to malathion	Source Unknown
		Concern for Ammonia	Non-Point Source; Pesticide Application
0602	Neches River below B.A. Steinhagen	Not supporting fish consumption use due to mercury and dioxins in edible tissue	Atmospheric Deposition-Toxics; Industrial Point Source Discharge; Unknown Source
		Concern for mercury in edible tissue	Source Unknown
0603	B.A. Steinhagen	Not supporting fish consumption use due to mercury and dioxins in edible tissue	Atmospheric Deposition-Toxics; Industrial Point Source Discharge; Other Unknown Source
0603A	Sandy Creek	Not supporting contact recreation use due to bacteria	Non-Point Source-Agriculture and Grazing in Riparian Zone or Shoreline Zones
0603B	Wolf Creek	Not supporting contact recreation use due to bacteria	Non-Point Source-Agriculture and Livestock Grazing or Feeding Operations
0607	Pine Island Bayou	Not supporting aquatic life use due to depressed dissolved oxygen and concern for dissolved oxygen	Natural Conditions-Water Quality Standards Use Attainability Analyses Needed; Natural Sources
0607A	Boggy Creek	Not supporting aquatic life use due to depressed dissolved oxygen	Natural Conditions-Water Quality Standards Use Attainability Analyses Needed; Natural Sources; Streambank Modifications/Destablization; Unknown Source
		Concern for bacteria	Source Unknown; Non-Point Source
		Concern for impaired habitat in Boggy Creek	Non-Point Source-Loss of Riparian Habitat
0607B	Little Pine Island Bayou	Not supporting aquatic life use due to depressed dissolved oxygen and concern for dissolved oxygen	Natural Conditions-Water Quality Standards Use Attainability Analyses Needed; Natural Sources; Source Unknown
		Concern for bacteria	Non-Point Source; Source Unknown
0607C	Willow Creek	Not supporting aquatic life use due to depressed dissolved oxygen	Natural Conditions-Water Quality Standards Use Attainability Analyses Needed; Natural Sources; Source Unknown
0608	Village Creek	Not supporting fish consumption use due to mercury in edible tissue	Atmospheric Deposition-Toxics; Natural Sources; Unknown Source
0608A	Beech Creek	Not supporting aquatic life use due to elevated copper	Source Unknown
		Concern for impaired habitat and bacteria	Source Unknown
0608B	Big Sandy Creek	Screening level concern for dissolved oxygen	Source Unknown; Non-Point Source

0608C	Cypress Creek	Not supporting aquatic life use due to depressed dissolved oxygen	Natural Conditions-Water Quality Standards Use Attainability Analyses Needed; Source Unknown
		Concern for impaired habitat	Unknown Source
		Concern for bacteria	Unknown Source; Non-Point Source
0608E	Mill Creek	Not supporting aquatic life use due to depressed dissolved oxygen	Natural Sources; Industrial Point Source Discharge; Municipal Point Source Discharge
0608G	Lake Kimball	Not supporting fish consumption use due to mercury in edible tissue	Atmospheric Deposition-Toxics; Unknown Source
0609	Angelina River below Sam Rayburn Reservoir	Not supporting fish consumption use due to mercury and dioxins in edible tissue	Atmospheric Deposition-Toxics; Industrial Point Source Discharge; Source Unknown
0701	Taylor Bayou Above Tidal	Not supporting aquatic life use due to depressed dissolved oxygen	Natural Conditions-Water Quality Standards Use Attainability Analyses Needed; Natural Sources; Source Unknown
		Concern for chlorophyll-a	Source Unknown
0701D	Shallow Prong Lake	Concern for arsenic in edible tissue	Source Unknown
		Concern for dissolved oxygen	Source Unknown; Non-Point Source
0702	Intracoastal Waterway Tidal	Not supporting contact recreation use due to bacteria	Non-Point Source; Source Unknown
		Not supporting fish consumption due to polychlorinated biphenyls in edible tissue	Industrial Point Source Discharge; Unknown Source
		Concern for chlorophyll-a in Taylor Bayou Tidal	Source Unknown
0702A	Alligator Bayou	Not supporting aquatic life use due to acute toxicity in water and sediment toxicity	Petroleum/Natural Gas Activities; Industrial Point Source Discharge; Source Unknown
		Concern for lead in sediment	Petroleum/Natural Gas Activities; Industrial Point Source Discharge; Source Unknown
		Concern for chlorophyll-a	Source Unknown
0703	Sabine-Neches Canal Tidal	Not supporting contact recreation use due to bacteria	Source Unknown
0704	Hillebrandt Bayou	Not supporting contact recreation use due to bacteria	Urban Runoff/Storm Sewers
		Not supporting aquatic life use due to depressed dissolved oxygen	Natural Conditions-Water Quality Standards Use Attainability Analyses Needed; Unspecified Urban Stormwater; Source Unknown
		Concern for chlorophyll-a	Source Unknown
0704D	Bayou Din	Concern for depressed dissolved oxygen (screening level/DO minimum)	Natural Conditions-Water Quality Standards Use Attainability Analyses Needed; Source Unknown
		Concern for dissolved oxygen screening level	Source Unknown; Non-Point Source
		Screening level concern for nitrate	Source Unknown
		Concern for chlorophyll-a	Source Unknown

Public Outreach

Neches River Festival

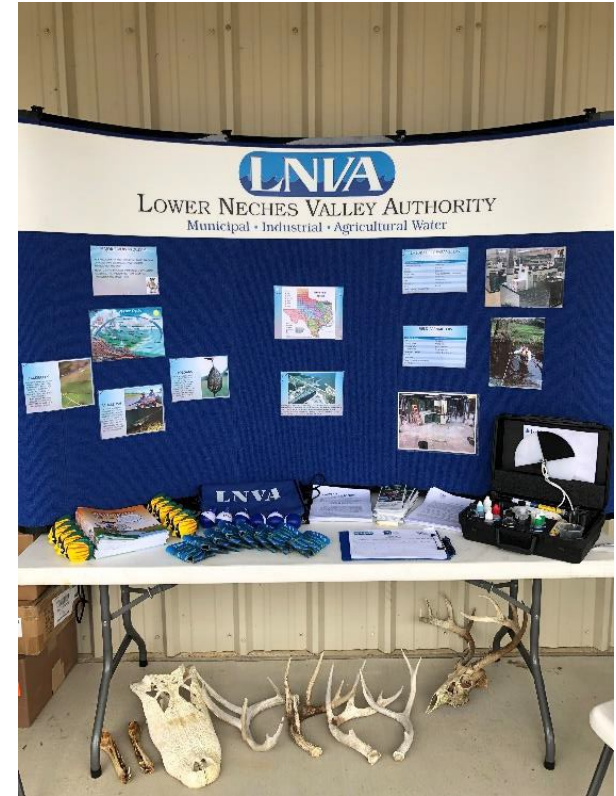
The Neches River Festival (NRF) has been a part of Southeast Texas' history since 1949. The NRF works to recognize and celebrate the Southeast Texas area and its greatest natural resource, the Neches River. Each year a festival week is held to bring local businesses and the community together while focusing on the area's high school seniors. One day of this festival week is a science day when different organizations in the area set up interactive and informative booths. These booths provide an opportunity to learn about the contributions these organizations are making to improve the environment in and around the Neches River. The theme of LNVA's booth was the importance of water quality and its involvement in the Clean Rivers Program. LNVA CRP staff are pictured to the right in front of their booth at the 2019 Neches River Day Festival at Cattail Marsh Visitor Center in Beaumont.



The 2019 Neches River Festival was held at Cattail Marsh in Beaumont, TX. Photo was taken with Panono 360 camera.

Outdoor Exposition

Crestwood Baptist Church held an Outdoor Expo for the families of Southeast Texas in Kountze, Texas. The event featured a chili cook off, an archery tournament, and several educational booths aimed at teaching youth about the great outdoors. LNVA staff set up a booth that highlighted the importance of water quality and their involvement in the Clean Rivers Program. Major Rivers work books were made available for the youth that visited the booth. Major Rivers is a water education program designed to teach 4th and 5th grade students about the major water resources in Texas. The event also served as an opportunity to recruit new members for LNVA's Texas Stream Team. The Stream Team Program trains citizen scientists to monitor water and environmental quality across Texas.



Neches River Rally

September 2019 marked the 6th Annual Neches River Rally held by the Big Thicket Association. The Rally begins at the LNVA Salt Water Barrier boat launch and paddlers follow the 4 mile Cooks Lake Paddling Trail that loops back to where they start. During this event the Salt Water Barrier opened its doors and allowed participants to tour the laboratory and gain information on LNVA, the Clean Rivers Program, and the Texas Stream Team.

"Big Thicket Association." Event, www.bigthicket.org/events/2019-05-05-neches-river-rally-2019/.

Stakeholder Participation and LNVA's Steering Committee

LNVA's stakeholder participation process includes the basin steering committee, which consists of stakeholders representing local industry and municipalities, state and federal agencies, tribal groups, environmental groups, and the general public. A diverse basin-wide CRP steering committee ensures different interests and priorities of each watershed are represented. The objectives of the committee are to assist with the creation of realistic water quality objectives and basin priorities, review basin water quality reports and recommended actions, and establish monitoring priorities. Members are encouraged to voice any local or regional concerns they may have, as well as consider the interests of the basin as a whole. LNVA staff recently reached out to area organizations to expand the current membership of this committee to ensure the needs of the entire basin are being met.

For more information on LNVA's CRP Steering Committee and how to become involved, please contact Jeannie Bowlen at LNVA, (409) 892-4011.

LNVA Website Updates

LNVA's web page provides an overview of the CRP statewide water quality program, and includes LNVA Basin Reports, Quality Assurance documents, Steering Committee Meeting minutes, and links to websites such as the Texas Stream Team Volunteer Monitoring Program and the TCEQ Surface Water Quality Data Viewer. The website also includes a link to the Southeast Texas Regional Alerting & Information Network (SE Texas R.A.I.N.). This site was created by a cooperative of government agencies after Hurricane Harvey as a public service to provide information necessary to help make important decisions during threatening weather conditions. It displays rainfall, stream flow, and water levels in major streams, bayous, and reservoirs. The information is compiled from United States Geological Survey and the National Weather Service. Links to the Clean Rivers Program coordinated monitoring schedule and the Continuous Ambient Monitoring Station on Pine Island Bayou were added to the website in 2019. To learn more about SE Texas R.A.I.N., LNVA and the Clean Rivers Program, please visit our website at: <https://lnva.dst.tx.us/>.



Appendix A: LNVA CRP Parameters

The following is a list of Clean Rivers Program sampling parameters by type. The types are field, conventional, and bacteria. LNVA currently samples four times per year at each of its monitoring stations for the parameters listed. They are not all inclusive and may vary by sample site.

Field Parameters

Dissolved oxygen—mg/L and % saturation
Temperature
Specific conductance
pH
Salinity (tidal waters only)
Secchi-disk transparency
Days since last precipitation (significant enough to influence water quality)
Flow severity (freshwater streams and rivers)
Flow Method (gage, electric, mechanical, weir, doppler)
Stream discharge (freshwater streams and rivers)
Method of stream discharge measurement (freshwater streams and rivers)

Conventional Parameters

Total Alkalinity
Sulfate
Chloride
Total Hardness
Total Suspended Solids
Turbidity
Ammonia
Nitrate + Nitrite
Total Phosphorus

Bacteria

E.coli (freshwater streams and rivers)
Enterococcus (tidal waters only)