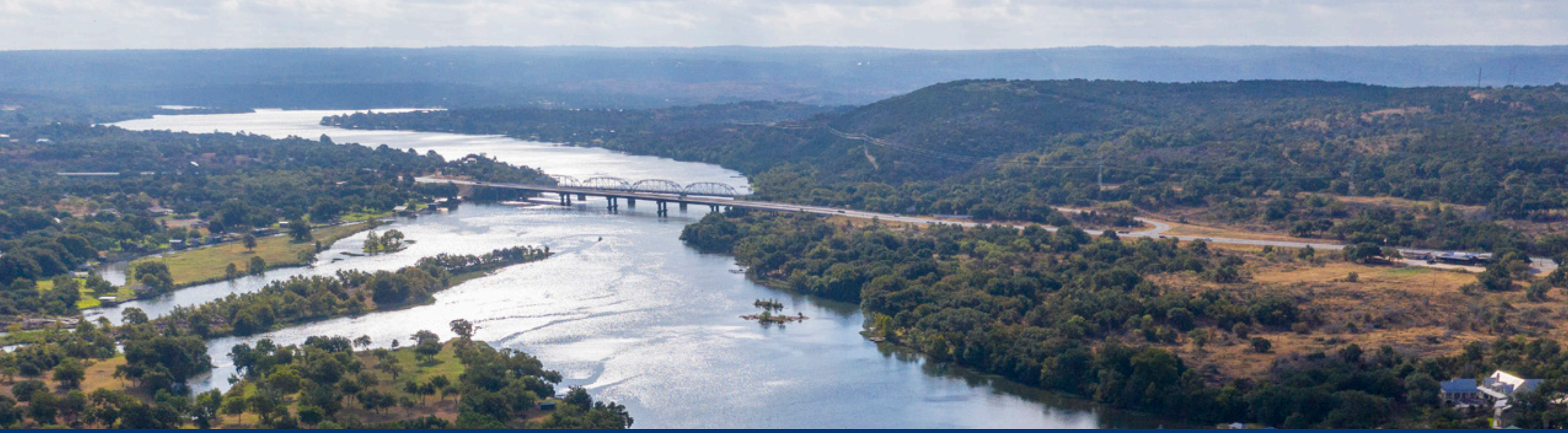

2022 Colorado River Basin Highlights Report

An overview of water quality in the Colorado River Basin

Prepared by the Lower Colorado River Authority and the Upper Colorado River Authority in cooperation with the Texas Commission on Environmental Quality under the authorization of the Texas Clean Rivers Act.

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I. Executive Summary

The Texas Clean Rivers Program is a statewide water quality monitoring and assessment program that provides funding and resources for regional watershed protection efforts. The program is administered by the Texas Commission on Environmental Quality (TCEQ) in partnership with river authorities and other regional governments. As Clean Rivers Program partners, the Lower Colorado River Authority (LCRA) and Upper Colorado River Authority (UCRA) monitor 106 sites and coordinate with the City of Austin Watershed Protection Department, United States Geological Survey and TCEQ regional offices to ensure efficient use of monitoring resources in the Colorado River basin. The data collected by these agencies are used to determine if water bodies in the state meet Texas Surface Water Quality Standards (TSWQS).

For the 2022 assessment by TCEQ (Draft 2022 Integrated Report), close to 90 water bodies were assessed in the Colorado River basin. Based on this assessment, the overall water quality in the basin is good. However, 16 of the assessed water bodies did not meet surface water quality standards. High bacteria levels, low levels of dissolved oxygen, and excessive algae growth in water were among the causes of the impairments.

In 2021, LCRA and its Clean Rivers Program partners continued to reach out to the public to educate and help resolve local water quality issues. Two Water Quality Advisory Committee meetings were held in the basin. These meetings provided a venue for local stakeholders to learn about water in their region and provide input on projects in their communities.

II. Introduction

The Texas Clean Rivers Program is a statewide monitoring and assessment program developed to maintain and improve Texas' surface water. The program is administered by the TCEQ and regional partners such as river authorities. In the Colorado River basin, LCRA and UCRA implement the program. The City of Austin contributes data and expertise to help assess water quality in Austin.

This report describes water quality in the Colorado River basin during 2021 and is based upon the TCEQ 2022 Draft Integrated Report.

Figure 1. Clean Rivers Program partner regions

III. Water Quality Overview

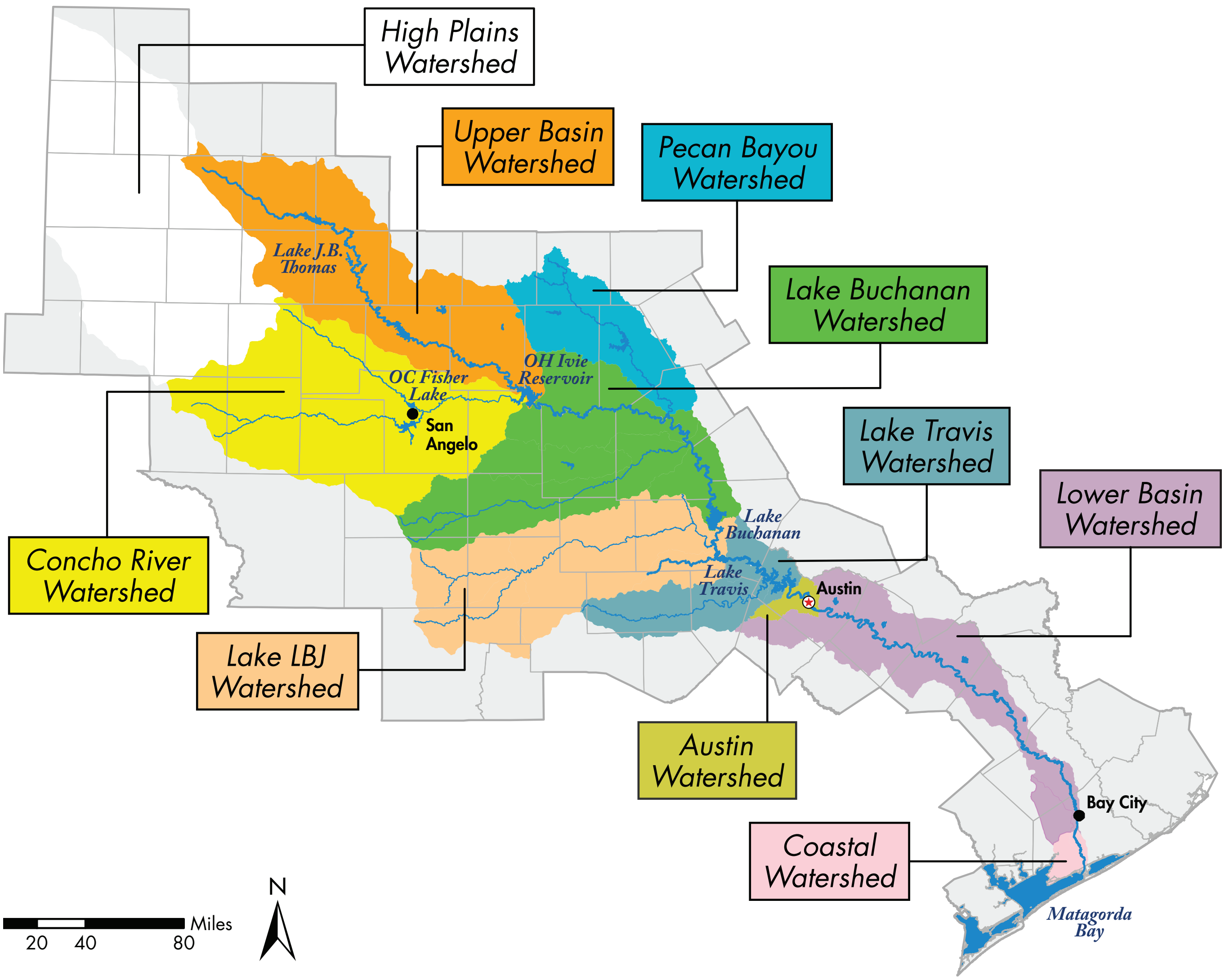


Figure 2. The Colorado River basin is divided into eight contributing watersheds. The uppermost watershed in far West Texas rarely flows.

The Colorado River basin encompasses about 40,000 square miles from the Texas Panhandle to Matagorda Bay. Geology, soils, climate and human activities influence the river as it traverses the state. Mineralized soils in the upper Colorado and Concho river basins contribute to elevated chloride and sulfate levels in the water. Some reservoirs in the upper basin have salinity levels comparable to Matagorda Bay because of the long-term effects of drought and a concentration of minerals. Major springs south of San Angelo create stable flows for the South Concho River and provide much needed water for the region.

The middle portion of the basin includes the Highland Lakes: Buchanan, Inks, LBJ, Marble Falls, Travis and Austin. The major tributaries to the Highland Lakes include the Pedernales, Llano and San Saba rivers. During a typical year, these tributaries provide stable flows that play an important role in diluting salinity and suspended sediments from upstream. In drought years, inflows into the Highland Lakes and Colorado River decrease, which can cause changes in water quality, such as increases in total dissolved solids. As of May 2022 according to the U.S. Drought Monitor, 19.6% of Texas is considered in exceptional drought conditions and 50.3% of the state is in extreme drought conditions. This includes portions of the middle and upper Colorado River basin. Table 1 provides a snapshot of current reservoir levels from the upper and middle portion of the Colorado River basin.

Table 1. Reservoir levels in the Colorado River Basin on May 3, 2022
Info from: www.waterdatafortexas.org and hydromet.lcra.org/riverreport

Reservoir	Percent Full	Watershed
Lake J.B. Thomas	34.9	Upper Colorado River
E.V. Spence Reservoir	23	Upper Colorado River
O.C. Fisher Lake	5.3	Concho River
Twin Buttes Reservoir	48.7	Concho River
O.H. Ivie Reservoir	50.3	Upper Colorado River
Lake Brownwood	85.1	Pecan Bayou
Lake Buchanan	87	Lower Colorado River
Lake Travis	63.3	Lower Colorado River

The limestone canyons of the Hill Country give way to deep clay soils downstream of Austin as the Colorado River winds its way through the Blackland Prairies, Lost Pines, and Post Oak Savannah ecoregions. Water in this part of the basin tends to be more turbid due to high amounts of suspended solids from the soils of the area.

REVISIONS TO TEXAS SURFACE WATER QUALITY STANDARDS

TCEQ is in the process of revising the TSWQS that were last updated in 2018. The 2022 TSWQS are expected to be in effect beginning in September 2022.

For more information regarding TSWQS stakeholder work group meetings, please visit the Surface Water Quality Standards Advisory Work Group webpage.

IV. Water Quality Monitoring

Water quality monitoring typically includes physical and chemical measurements, such as levels of dissolved oxygen, suspended sediments, nutrients, temperature or pesticides in water. It can also include the collection of fish, aquatic insects and habitat data to measure aquatic life and assess the health of streams and reservoirs.

Monitoring data collected by Clean Rivers Program partners is collected under a TCEQ-approved quality assurance project plan (QAPP) to ensure that it is consistent with regulatory requirements. The data have many uses, including the development of the surface water quality standards, determining if water bodies meet those standards and development of wastewater permit limits. The following entities perform monitoring under an approved QAPP in the Colorado River basin:

- TCEQ
- LCRA
- UCRA
- City of Austin
- U.S. Geological Survey (USGS)

In addition to professionally collected data, more than 80 volunteers collect data in the basin through the Colorado River Watch Network, a program administered by LCRA. Volunteers often monitor in areas not routinely sampled by professionals, and their data serves as an important screening tool.

Current and historical water quality monitoring data are available at these websites:

- http://waterquality.lcra.org – professional water quality data
- http://cms.lcra.org – professional monitoring schedule
- http://crwn.lcra.org – volunteer water quality data

V. Water Quality Assessment

Every two years, TCEQ compares all available quality-assured data to the surface water quality standards – or to screening levels when no standards have been established – and publishes the results in the Texas Integrated Report for Surface Water Quality for Clean Water Act Sections 305(b) and 303(d) (Integrated Report). The Integrated Report defines the status of each water body as one of the following:

1. Meets or Supports – Sufficient data are available to assess. The water body meets all applicable surface water quality standards and fully supports its uses.
2. Concern – a) Sufficient data are not available to perform a full assessment and the limited data indicate surface water quality standards are not being met, or b) Surface water quality standards have not yet been established. If water quality data indicate a concern, resources are allocated to collect more data and verify the concern.
3. Impaired – Sufficient data are available and show that the water body does not meet surface water quality standards. TCEQ publishes a list of impaired water bodies. If monitoring data indicate a water body does not support one or more of its designated uses, then it is said to be impaired. Details of the impairment are published in the TCEQ Integrated Report and 303(d) List.

This report focuses on numbers 1 and 3 above and does not include details of water bodies with a concern status. In the 2023 Basin Summary Report, which will be published in May 2023, a comprehensive review of all waterbodies will be provided.

As of this writing, TCEQ has completed the public comment period for the Draft 2022 Integrated Report and is in the process of making any necessary changes. The final draft of the report is expected to be on the TCEQ Commissioner's agenda in the summer of 2022 and will then be sent to the EPA for review and approval.

This Basin Highlights Report outlines the results of the 2022 Draft Integrated Report for the Colorado River basin. The draft 2022 Integrated Report included an evaluation of 138 water bodies in the Colorado River basin and of these 89 had enough data to assess. Sixteen were considered to have impairments which may be suitable for a Total Maximum Daily Load (TMDL) or Category 5 (Table 2) from TCEQ. Water quality data collected from December 2013 through November 2020 were assessed for the draft 2022 Integrated Report.

Table 2. Impaired water bodies which may be suitable for a TMDL in the Colorado River basin according to the draft 2022 Integrated Report

Segment ID	Waterbody	County	Assessment Unit	Impairment	Year First Listed	Category
1402C	Buckners Creek	Fayette	1402C_01	Dissolved Oxygen	2010	5c
1402H	Skull Creek	Colorado	1402H_01	Dissolved Oxygen	2008	5b
1403A	Bull Creek	Travis	1403A_04	Dissolved Oxygen	2010	5c
1405	Lake Marble Falls	Burnet	1405_01	Excessive algal growth in water	2022	5c
			1405_02	Excessive algal growth in water	2022	5c

Segment ID	Waterbody	County	Assessment Unit	Impairment	Year First Listed	Category
1406	Lake LBJ	Burnet, Llano	1406_01	Excessive algal growth in water	2022	5c
			1406_02	Excessive algal growth in water	2022	5c
			1406_03	Excessive algal growth in water	2022	5c
			1406_04	Excessive algal growth in water	2022	5c
			1406_05	Excessive algal growth in water	2022	5c
			1406_06	Excessive algal growth in water	2022	5c
1407A	Clear Creek	Burnet	1407A_01	Aluminum in water	2010	5c
				Copper in water	2018	5c
				Nickel in water	2014	5c
				Sulfate in water	2010	5c
				Total dissolved solids in water	2010	5c
				Zinc in water	2014	5c
				pH	2010	5c
1411	E.V. Spence Reservoir	Coke	1411_01	Chloride in water	2014	5c
			1411_02	Bacteria in water	2022	5c
				Chloride in water	2014	5c
1412	Colorado River Below Lake J.B. Thomas	Coke, Scurry	1412_02	Bacteria	2008	5b
1412B	Beals Creek	Mitchell, Howard	1412B_03	Bacteria	2010	5b
1416	San Saba River	San Saba, Schleicher	1416_01	Bacteria	2008	5c
1416A	Brady Creek	San Saba, McCulloch	1416A_03	Dissolved Oxygen	2004	5c
1419	Lake Coleman	Coleman	1419_01	Excessive algal growth in water	2022	5c
1421	Concho River	Concho, Tom Green	1421_08	Dissolved Oxygen	2008	5c
1429	Lady Bird Lake	Travis	1429_01	Excessive algal growth in water	2022	5c
			1429_02	Excessive algal growth in water	2022	5c
1429C	Waller Creek	Travis	1429C_01	Bacteria in water	2004	5c
				Impaired macrobenthic community	2002	5c
1501	Tres Palacios Creek Tidal	Matagorda	1501_01	Dissolved Oxygen	1999	5b

VI. Restoring Impaired Water Bodies

TCEQ and the Texas State Soil and Water Conservation Board (TSSWCB) prioritize impaired water bodies and set goals for improving water quality through the Watershed Action Planning (WAP) process. Clean Rivers Program partners and local stakeholders help identify potential causes for impairments and gauge community support of watershed improvement projects. The WAP database, which is managed by TCEQ, tracks progress as work is performed on the prioritized water bodies.

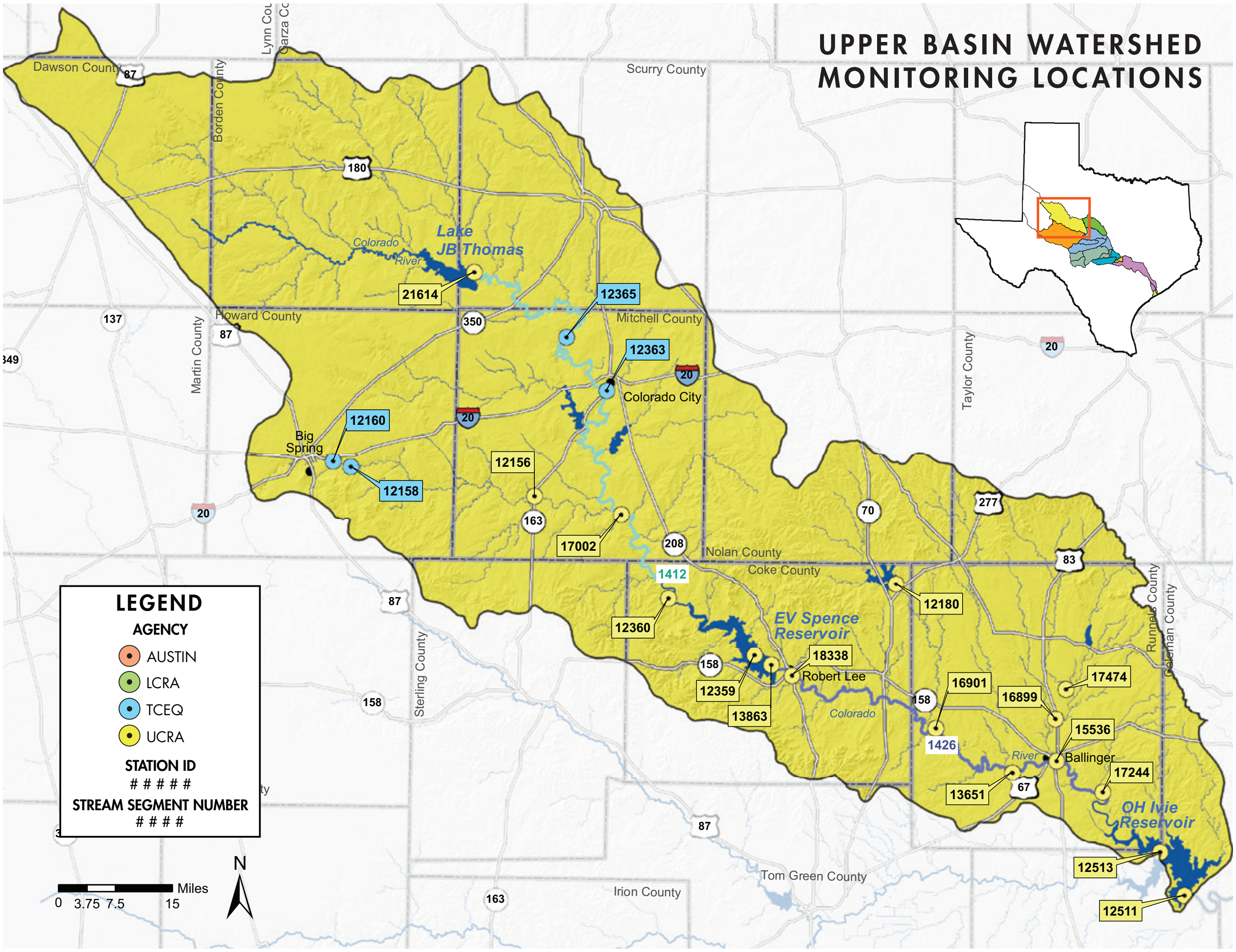
Once a water body is selected through the WAP process, the first step to restoring it is to determine the cause(s) of the impairment. This usually involves verification monitoring or a special study that includes a historical water quality data review, targeted monitoring or a detailed watershed analysis. One of the following projects may be initiated to address the impairment once the cause of the impairment is identified:

- Total Maximum Daily Load (TMDL) – a scientific model used to determine the amount or "load" of a pollutant that a water body can receive yet still support its designated uses. Once the load is allocated among all potential sources, an implementation plan outlines strategies to reduce pollutants. Implementation plans are enforceable through regulatory compliance.
- Watershed Protection Plan (WPP) – A stakeholder-driven process to address causes of the identified impairments and develop strategies to reduce pollutant loads. Compliance with WPP strategies is voluntary rather than regulatory.
- Use Attainability Analysis (UAA) - Where TMDL and WPP strategies are designed to improve water quality by limiting pollutants, a UAA can help determine whether the level of use originally assigned to the water body is appropriate. For example, in the late 1980s most perennial rivers and streams were assigned a high aquatic life use. Since then, routinely collected data have shown that some water bodies do not meet a high aquatic life use, not because of pollution but because of natural conditions that prevent high aquatic life use from being attained. TCEQ performs UAAs to establish an appropriate level of aquatic life use in the Texas Surface Water Quality Standards.
- Recreational Use Attainability Analysis (RUAA) – Similar to a UAA, it confirms the level of recreational use that takes place in a stream. UAAs and RUAAs can result in a revision to the Texas Surface Water Quality Standards.

Specific TMDLs, WPPs, UAAs, and RUAAs within the Colorado Basin will be discussed more in the following section, Water Quality Review by Watershed.

VII. Water Quality Review by Watershed

This section highlights water quality in the eight major contributing watersheds in the Colorado River basin with emphasis on major water bodies, impairments and efforts to bring water bodies into compliance with TSWQS.



UPPER COLORADO RIVER WATERSHED

The upper Colorado River watershed encompasses about 6,000 square miles. Annual average precipitation ranges from 14 inches in the western portion of the watershed to 21 inches in the eastern portion. Because of the semiarid conditions and prolonged drought in the region, many tributaries and drainage features are ephemeral or intermittent. Lakes J.B. Thomas, E.V. Spence and other reservoirs in the upper basin contained only a fraction of their capacity. In 2021, UCRA and TCEQ monitored sites in the following water bodies:

- Segment 1411 – E.V. Spence Reservoir
- Segment 1412 – Colorado River below Lake J.B. Thomas including Beals Creek
- Segment 1413 – Lake J.B. Thomas
- Segment 1426 – Colorado River below E.V. Spence Reservoir including Oak Creek Reservoir, Elm Creek, Bluff Creek, and Coyote Creek
- Segment 1433 – O.H. Ivie Reservoir

Segment 1411 – E.V. Spence Reservoir

E.V. Spence Reservoir is an impoundment on the Colorado River near the town of Robert Lee. The reservoir has a history of high total dissolved solids (TDS) and sulfate and in 1998, TCEQ placed it on the 303(d) List for these two parameters.

A TMDL was adopted by TCEQ in 2000 and approved by EPA in 2003. The TMDL implementation plan includes measurements for brush management, management of diversions from the reservoir and plugging leaking oil wells. The management measures continue to be implemented. Prior to the drought of 2010–2014, the levels of saline contaminants were dropping in E.V. Spence Reservoir and the Colorado River watershed below it. Then, due to persistent drought, water levels in the reservoir dropped drastically and led to concentrations of chloride, sulfate and TDS. Segment 1411 remains impaired for chloride, and in the draft 2022 Integrated Report is also identified as being impaired for bacteria. For more information on the E.V. Spence TMDL, visit the TCEQ website at http://www.tceq.texas.gov/waterquality/tmdl.

Golden algae (*Prymnesium parvum*) blooms are common in E.V. Spence Reservoir. Texas Parks and Wildlife Department (TPWD) conducts routine sampling on the reservoir, along with several other waterbodies in the upper Colorado River basin. Golden algae numbers remained at relatively low concentrations in the reservoir in 2021 according to data collected by TPWD, and these monitoring efforts will continue into 2022.

E.V. Spence Reservoir near Silver, Texas

Since 1985, golden algae has caused a number of fish kills in Texas water bodies. While golden algae can occur in stock tanks and reservoirs, it is usually kept in check by competition with other algal species. A bloom of golden algae is often triggered by significant temperature swings, cloudy weather or rising salinity levels. A minor bloom may kill or harm some fish, but serious kills can result when golden algae increases dramatically and produces toxins that coat fish gills, leading to asphyxiation. For more information, visit https://tpwd.texas.gov/landwater/water/environconcerns/hab/ga/.

Segment 1412 – Colorado River below Lake J.B. Thomas, including Beals Creek

This segment of the Colorado River is impaired for contact recreation because of high levels of *E. coli*. Potential sources of bacteria at the monitoring site near Colorado City include urban runoff, leaking wastewater lines and failing septic systems. A portion of the area upstream of the monitoring site consists of farms and rangeland. Runoff from these operations – and wildlife in the area – are believed to be a source of bacteria in the river as well. Routine monitoring is scheduled to continue in 2022.

Beals Creek, a tributary that enters the river downstream of Colorado City, also is impaired for contact recreation due to high levels of *E. coli*. Potential sources of bacteria include wildlife and failing septic systems located along the creek in Big Spring.

A RUAA was conducted on the Colorado River below Lake J.B. Thomas and Beals Creek in the summer of 2016 to determine the appropriate recreational use and numeric criteria for the waterbody. TCEQ recommended that the contact recreation use for this segment (1412) remain as primary contact recreation. Monitoring will continue in 2022.

Beals Creek

Segment 1413 – Lake J.B. Thomas

Lake J.B. Thomas is impounded on the Colorado River in Scurry County. Soils in the watershed are highly mineralized and dissolution of these minerals into surface water occurs readily. During times of drought, evaporation coupled with low precipitation will concentrate minerals in the reservoir and in the past, have caused impairments for TDS, sulfate and chloride. High precipitation in 2015 and 2016 resulted in a sharp increase in reservoir elevation allowing for dissolution of the concentrated contaminants. The water level has fluctuated since this period of high rainfall, but Lake J.B. Thomas is set to be delisted for TDS and chlorides in the 303d List.

The lake's watershed contains oil and gas deposits in production since the 1930s. Seeps resulting from oil and gas production, including abandoned or inadequately plugged wells, have been identified in the watershed. These seeps typically contain highly saline water, which can contaminate surface water.

Based on 2018-2021 data provided by the Railroad Commission of Texas, five unused oil wells have been plugged in Scurry County. These wells are located adjacent to the watershed boundaries of Lake J.B. Thomas.

Segment 1426 – Colorado River below E.V. Spence Reservoir

The Colorado River below E.V. Spence Reservoir has a history of high chloride and TDS. In 2000, TCEQ placed it on the 303(d) List. A TMDL was performed to address the problem. It was adopted by TCEQ and approved by EPA in 2007. A TMDL implementation plan was completed in October 2007 and updated in 2014. The plan uses point source controls, reservoir operations, brush control and oil well plugging to reduce pollutants.

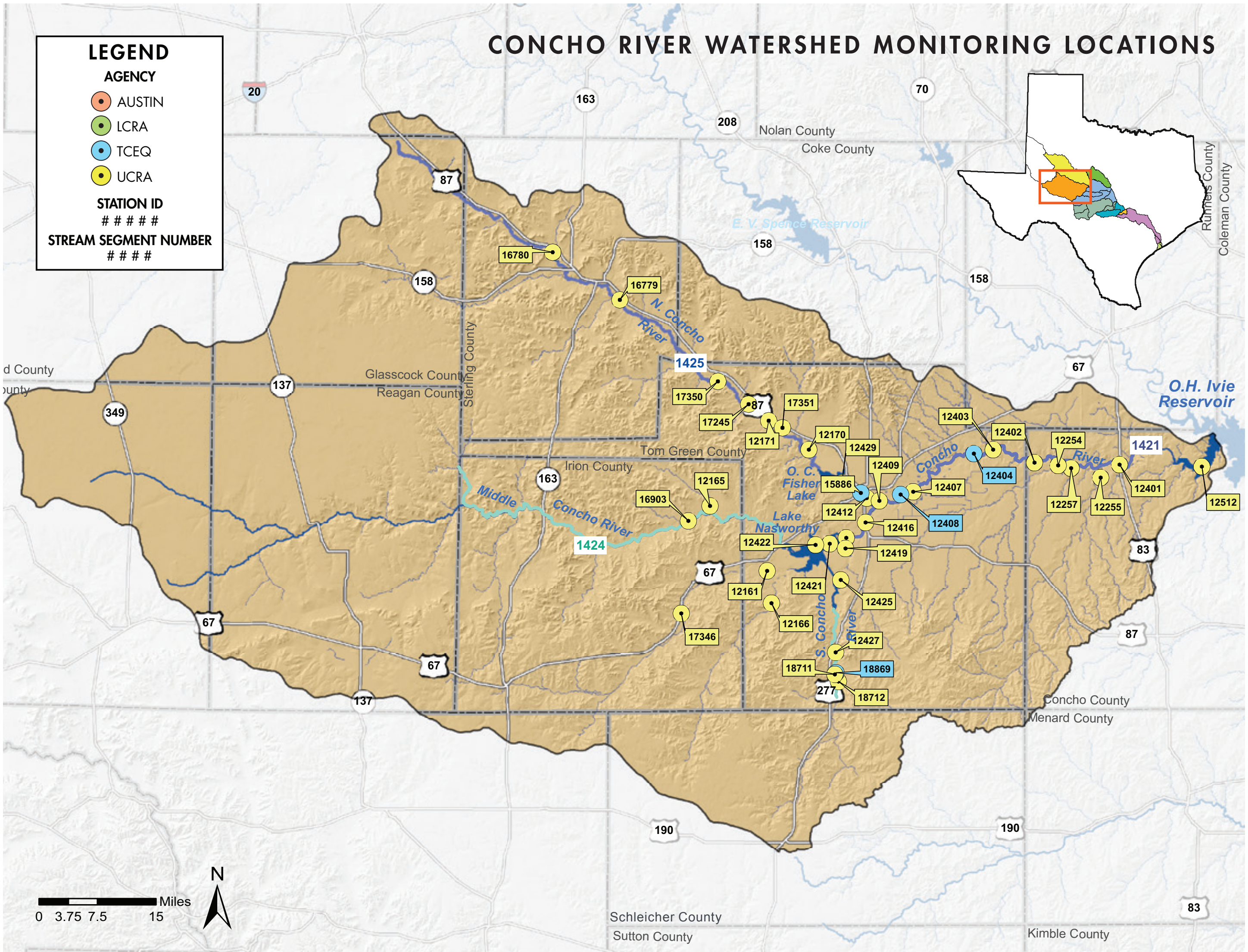
Based on data collected from December 2011 through November 2018, concentrations of dissolved solids in the river segment are now within the criteria of the TSWQS. Therefore, Segment 1426 was removed from the index of impaired waters in the 2020 Integrated Report. The TMDL remains in effect.

There were no impairments noted for Oak Creek Reservoir, Elm Creek, Bluff Creek, or Coyote Creek.

Colorado River below E.V. Spence Reservoir

Segment 1433 – O.H. Ivie Reservoir

O.H. Ivie Reservoir is an impoundment at the confluence of the Colorado and Concho rivers. When full, the reservoir holds 554,335 acre-feet of water. Water in O.H. Ivie Reservoir meets all surface water quality standards.



CONCHO RIVER WATERSHED

The Concho River watershed is the largest in the Colorado River basin, with an area of approximately 6,700 square miles. Semiarid conditions exist in most of the watershed and many of the tributaries are ephemeral or intermittent.

The principal rivers are the North, Middle and South Concho rivers, and the main Concho River downstream of San Angelo. The rivers are impounded near San Angelo to form O.C. Fisher Reservoir, Twin Buttes Reservoir and Lake Nasworthy.

Below San Angelo, the Concho River flows intermittently past irrigated fields into O.H. Ivie Reservoir, about 60 miles downstream. The North, Middle and main Concho river valleys are characterized by broad floodplains that contain fluvial deposits of gravel, sand and clay and form shallow aquifers. The South Concho River, including Spring and Dove creeks, is characterized by much narrower and steeper valleys. Baseflow for these waterways originates from springs on the northern edge of the Edwards-Trinity Aquifer. Based on the draft 2022 Integrated Report, the Concho River is impaired for low dissolved oxygen. During the reporting period, 28 sites were routinely monitored on the following water bodies:

- Segment 1421 – Concho River including Dry Hollow, Kickapoo Creek, and Lipan Creek
- Segment 1422 – Lake Nasworthy
- Segment 1423 – Twin Buttes Reservoir including Spring Creek and Dove Creek
- Segment 1424 – Middle Concho and South Concho rivers including West Rocky Creek and Cold Creek
- Segment 1425 – Lake O.C. Fisher including the North Concho River

Segment 1421 – Concho River

Segment 1421 includes the Concho River downstream of San Angelo and parts of the north and south forks of the Concho River in San Angelo up to O.C. Fisher Lake and Twin Buttes Reservoir. Below San Angelo, the segment extends downstream approximately 45 river miles to Paint Rock in an area known as the Lipan Flats. The area is comprised of rich farmland and sits atop of the Lipan Aquifer, known for groundwater with high nitrogen concentrations.

TCEQ placed the river on the 303(d) List in 2008 for low dissolved oxygen, and this has remained in the draft 2022 Integrated Report. Monitoring data collected near San Angelo indicate low levels of dissolved oxygen. However, no impairments were noted for Dry Hollow, Kickapoo Creek, or Lipan Creek.

In 2008, the UCRA partnered with the City of San Angelo to oversee the North Concho River Improvement Project, which is part of an on-going bank stabilization project along the river. A total of 1.43 million cubic feet of silt was removed during the dredging phase, adding an increase in storage capacity to the river of over 10 million gallons. In 2011, work began to stabilize the banks along public lands from Oakes Street upstream to the vicinity of Sulphur Draw.

Concho River

Additional trails and improvements, new lighting, an outdoor exercise area, public art, new irrigation systems, shaded seating areas, water features, and significant bank stabilization throughout the area also were completed. All improvements were part of a bigger plan to create a downtown river corridor in the City of San Angelo that is full of recreational opportunities and to provide a unique place for residents and visitors, with an emphasis on water quality protection.

A portion of the funding for this project came from an EPA 319(h) Nonpoint Source Pollution (NPS) grant managed by TCEQ and administered by UCRA.

UCRA received additional NPS funding from the EPA in 2020 to continue bank stabilization along the North Concho River, in partnership with the City of San Angelo. The project is being managed by TCEQ. It is anticipated that work will commence in 2022.

Segment 1422 – Lake Nasworthy

Lake Nasworthy is an impoundment on the South Concho River, just below Twin Buttes Reservoir. Water released from Twin Buttes Reservoir is the primary source of water for the lake. The lake holds approximately 14,000 acre-feet of water when it's at conservation pool level and is one of the few lakes in the region that contains water. Lake Nasworthy met all applicable surface water quality standards, according to the draft 2022 Integrated Report.

Segment 1423 – Twin Buttes Reservoir

Twin Buttes Reservoir is an impoundment on the south and middle forks of the Concho River and on Spring and Dove creeks. Monitoring data show that water quality in Twin Buttes Reservoir is good and meets applicable surface water quality standards.

Segment 1423A, Spring Creek

Segment 1424 – Middle and South Concho Rivers

Although the South Concho and Middle Concho rivers are included in the same segment, the two rivers have very different characteristics. The South Concho River is a perennial spring-fed stream created by several large springs that form its headwaters. The Middle Concho River flows intermittently and can be completely dry during drought periods. No impairments have been identified for either water body.

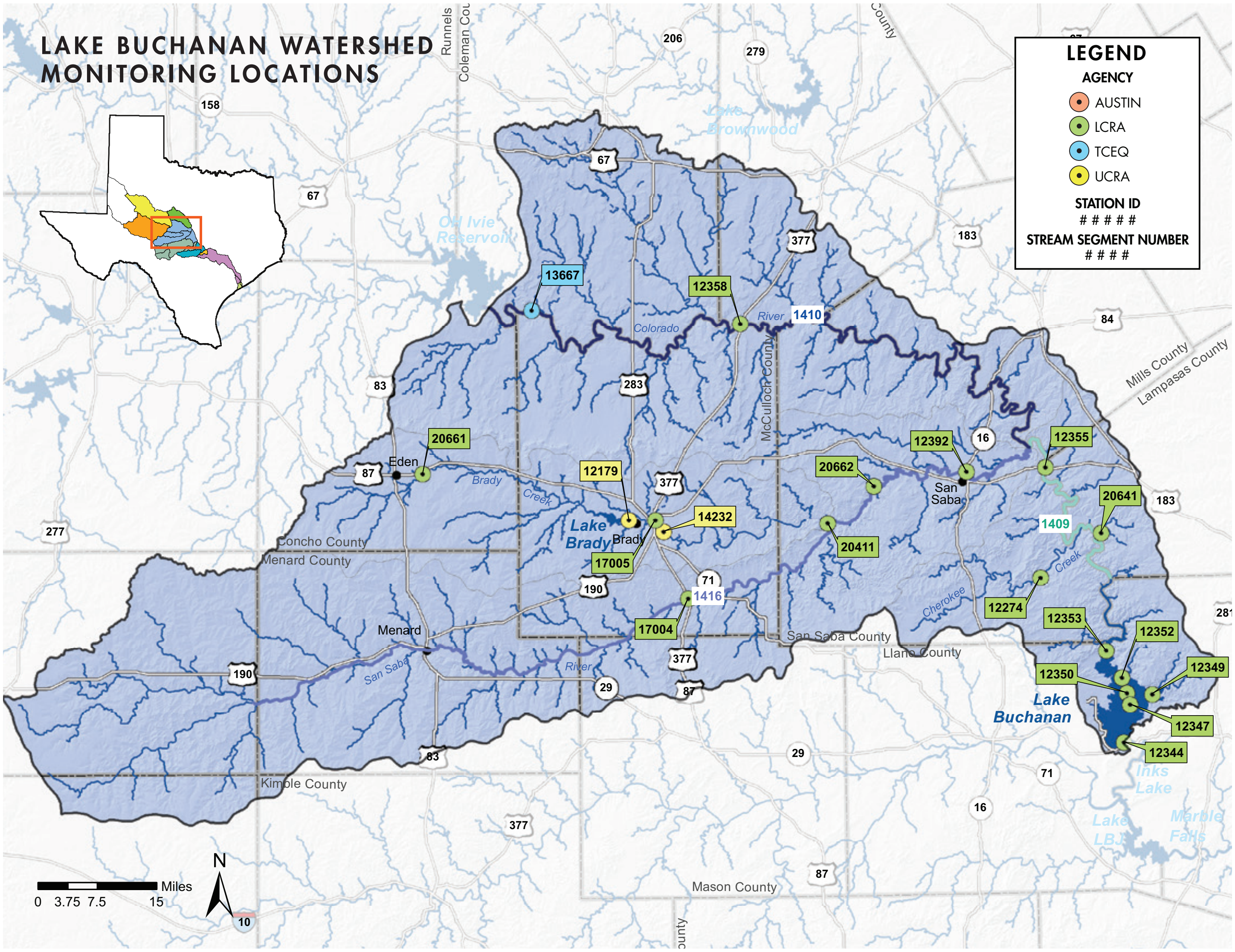
Anson Springs on the South Concho River

Segment 1425 – O.C. Fisher Lake including the North Concho River

O.C. Fisher Lake is an impoundment on the North Concho River west of San Angelo. The river is intermittent and during times of drought can become completely dry, as it was during most of 2011-2014. Both O.C. Fisher Lake and the North Concho River currently meet all surface water quality standards according to the 2022 Integrated Report.

Segment 1425, Site 12171

North Concho River at San Angelo



LAKE BUCHANAN WATERSHED

The Lake Buchanan watershed begins where the Colorado River flows from the dam at O.H. Ivie Reservoir. Freshwater from Pecan Bayou, the San Saba River and small perennial streams dilute the dissolved solids common in the upper basin. Water quality in the majority of the watershed meets surface water quality standards. The three exceptions are the San Saba River, Brady Creek and Lake Coleman. The San Saba River has elevated bacteria levels and Brady Creek contains low levels of dissolved oxygen. Lake Coleman is impaired for excessive algae growth. In 2021, LCRA and TCEQ routinely monitored 26 sites in the following water bodies:

- Segment 1408 – Lake Buchanan
- Segment 1409 – Colorado River above Lake Buchanan including Cherokee Creek
- Segment 1410 – Colorado River below O.H. Ivie Reservoir
- Segment 1416 – San Saba River including Brady Creek and Brady Creek Reservoir
- Segment 1417 – Lower Pecan Bayou

- Segment 1418 – Lake Brownwood including Hord's Creek and Hord's Creek Reservoir
- Segment 1419 – Lake Coleman
- Segment 1420 – Pecan Bayou above Lake Brownwood
- Segment 1431 – Mid Pecan Bayou
- Segment 1432 – Upper Pecan Bayou

Segment 1408 – Lake Buchanan

Lake Buchanan is an impoundment of the Colorado River in Burnet and Llano counties. At 22,335 surface acres, it is the largest of the Highland Lakes. Monitoring data indicate that the lake meets all applicable surface water quality standards.

Lake Buchanan and Buchanan Dam

Segment 1409 – Colorado River above Lake Buchanan

The Colorado River above Lake Buchanan begins at the confluence with the San Saba River in San Saba County. Chloride and TDS are diluted as the San Saba River and smaller perennial streams supply fresh water into the Colorado River. Bedrock is the dominant substrate, and water in this region tends to be clearer than upstream. This stretch of the river met all designated uses, according to the draft 2022 Integrated Report.

Segment 1410 – Colorado River below O.H. Ivie Reservoir

The Colorado River below O.H. Ivie Reservoir is located between the confluence of the Colorado and San Saba rivers and the O.H. Ivie Reservoir Dam. The segment is approximately 138 miles long. Water is released from O.H. Ivie Reservoir to slowly flow through farmland and ranches where it is used to irrigate hay, wheat, cotton and pecan orchards. Segment 1410 met all designated uses, according to the draft 2022 Integrated Report.

Colorado River above Lake Buchanan

Segment 1416 – San Saba River including Brady Creek and Brady Creek Reservoir

The San Saba River begins in Schleicher County where the river's North Valley Prong and Middle Valley Prong converge. It flows approximately 168 miles downstream to the confluence with the Colorado River in San Saba County. It does not support contact recreation based on *E. coli* data collected near the City of San Saba.

TCEQ first placed the river on the 303(d) List in 2008. In 2012, to determine if the source was local, TCEQ added another monitoring site approximately 20 miles upstream of the existing site. Data collected in 2012 and 2013 indicated the upstream site met surface water quality standards while the data collected at the original site continued to exceed surface water quality standards. LCRA conducted a bacteria study on the waterway in 2016, but results on sources of the impairment were inconclusive. Bacteria sources may include leaking septic systems and/or municipal lines, stormwater runoff from the streets and properties in the town of San Saba, or agricultural and wildlife nonpoint sources. For the past several years, LCRA has applied for a 319(h) grant from both TCEQ and the TSSWCB to do bacterial source tracking to locate the major sources of bacteria, but has not received funding to date. Monitoring will continue in 2022.

The Brady Creek watershed in Concho, McCulloch and San Saba counties is approximately 784 square miles. Water quality monitoring performed by UCRA in the early 2000s indicated persistently low levels of dissolved oxygen that were not supportive of aquatic life. The low oxygen levels have been linked to the construction of Brady Lake in the 1960s, which interrupted the previous flow pattern in the river below the dam. TCEQ designated the creek as impaired and placed it on the 303(d) List in 2004 due to the low dissolved oxygen levels.

This prompted UCRA and local partners to initiate a WPP for the creek. After years of additional monitoring and stakeholder input, UCRA completed the WPP for Brady Creek (Segments 1416A, 1416B, and 1416C) in 2016, which EPA accepted the same year. The primary goal of the WPP is to improve dissolved oxygen to levels that fully support aquatic life in the stream. For more information on the Brady Creek WPP, visit https://www.tceq.texas.gov/waterquality/nonpoint-source/projects/brady-creek-watershed-protection-plan.

Brady Creek

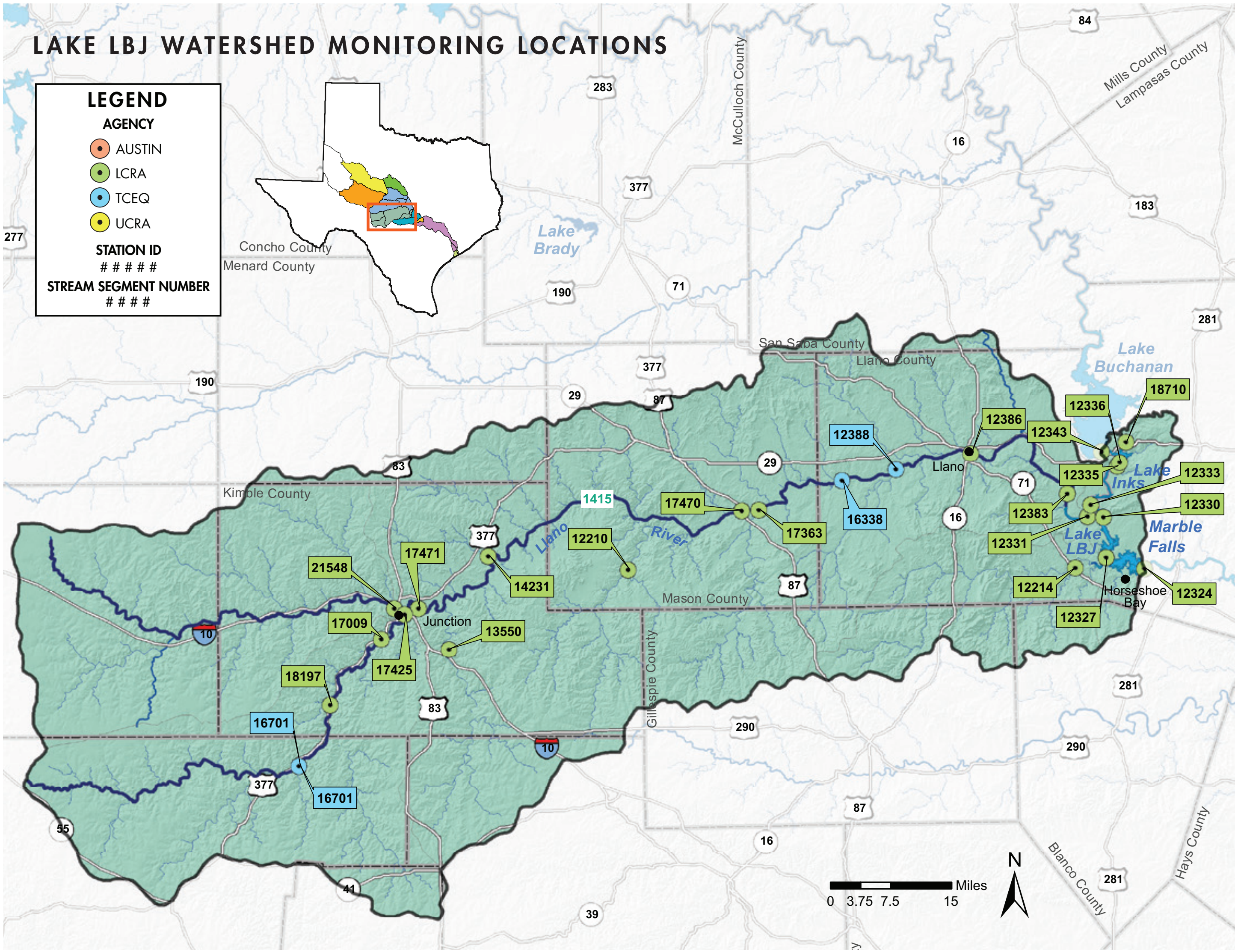
Lake Brownwood, Lake Coleman, and Pecan Bayou above Lake Brownwood

The Pecan Bayou headwaters are southeast of Abilene. The flat terrain in the 2,200-square-mile watershed creates sluggish flows. Several small tributaries provide intermittent flows to the bayou. Jim Ned Creek is an unclassified segment which stretches from Lake Coleman and merges with Pecan Bayou to form Lake Brownwood near the City of Brownwood. According to the draft 2022 Integrated Report, Lake Coleman is impaired for excessive algal growth in water while the other two water bodies continue to meet surface water quality standards.

Upper, Mid, and Lower Pecan Bayou

Upper, Mid, and Lower Pecan Bayou stretch from Lake Brownwood to the confluence with the Colorado River. These segments are largely surrounded by agricultural land use and meet all TSWQS according to the draft 2022 Integrated Report.

Pecan Bayou at Highway 67 in Brownwood



LAKE LBJ WATERSHED

The Lake LBJ watershed encompasses about 5,000 square miles beginning where the Colorado River is released from Buchanan Dam. Immediately below Buchanan Dam, the river flows into Inks Lake, a pass-through reservoir. Below Inks Dam, the river flows about 10 miles to the community of Kingsland, where it merges with the Llano River before flowing into Lake LBJ.

The rock and limestone geology of the Edwards Plateau creates clear-flowing streams like the Llano and James rivers. Water quality in the watershed is good with the exception of Clear Creek, a tributary of Inks Lake that does not meet several surface water quality standards. In 2021, LCRA routinely monitored 14 sites on the following water bodies:

- Segment 1406 – Lake LBJ including Sandy Creek
- Segment 1407 – Inks Lake including Clear Creek
- Segment 1415 – Llano River including the north and south forks, Johnson Fork, and James River

Segment 1406 – Lake LBJ

Lake LBJ is impounded where the Colorado and Llano rivers converge in Burnet and Llano counties. The reservoir was completed in 1951 to supply hydroelectric power to the area. Development around the lake is constant, and the communities of Granite Shoals, Sunrise Beach, Horseshoe Bay and Kingsland have grown into small cities. The HLWO and OSSF programs, which are administered by LCRA, help reduce the impact of development around the lake. However, in the draft 2022 Integrated Report, Lake LBJ received its first impairment (Category 5c) for excessive algae in water. Monitoring will continue in 2022.

Nutrient Criteria

TCEQ assesses nutrient standards attainment using the approved numeric criterion for chlorophyll-a. There are 39 reservoirs across the state that have approved numerical nutrient criteria. When assessing other water bodies, TCEQ screens in-stream concentrations of phosphorous, nitrate nitrogen and chlorophyll-a to indicate areas of possible concern for nutrient enrichment as reported in the biennial Integrated Report. TCEQ is currently conducting and evaluating additional studies to develop numerical nutrient criteria for freshwater streams and rivers, estuaries, and tidal streams, as well as for reservoirs without approved numerical nutrient criteria.

On-Site Sewage Facilities (OSSF) Program

On-site sewage facilities or septic systems are an integral part of rural America. They can be an efficient way to remove household waste and protect the environment when properly designed and maintained. In 1971, TCEQ delegated regulatory authority of such sewage facilities in the Highland Lakes to LCRA. Since then, LCRA has regulated the installation and operation of tens of thousands of systems in the four-county area. This oversight ensures the best available technology is used to treat septic wastes so pollutants, such as bacteria, phosphorus and nitrogen, don't leach into surface water.

Highland Lakes Watershed Ordinance

Stormwater runoff carries pollution — pesticides, soil, nutrients, toxics and other residues from everyday human activities. LCRA actively manages stormwater runoff around the Highland Lakes through the Highland Lakes Watershed Ordinance (HLWO). Through a permitting process, the ordinance requires developers to stabilize land and minimize sediment migration. Water quality is protected by limiting stormwater runoff, creating buffer zones and installing erosion and sediment controls. New quarries and mines also are covered under the ordinance and must implement measures similar to other development.

Segment 1407 – Inks Lake including Clear Creek

Inks Lake is a 777-acre impoundment immediately downstream of Buchanan Dam. The lake is home to Inks Lake State Park and is a popular destination for water recreation. Monitoring data indicate the lake met all applicable surface water quality standards based on the draft 2022 Integrated Report.

Clear Creek is an intermittent tributary of Inks Lake. The creek is about 4.5 miles long and is impaired for aluminum, copper, nickel, sulfate, zinc and TDS in water, as well as pH. The source of the pollutants is runoff from property that once was a graphite mine. A 23-acre tailings pile – a remnant of the abandoned mine – is located on the banks of the creek. Stormwater runoff from the pile has resulted in low pH and heavy metals in the creek. The property is owned by Greensmiths, Inc., which purchased the facility in 2000 and began using reclaimed tailings materials to landscape golf courses. Greensmiths has engineered structures to prevent runoff and has received a zero-discharge permit from TCEQ. Monitoring will continue in 2022.

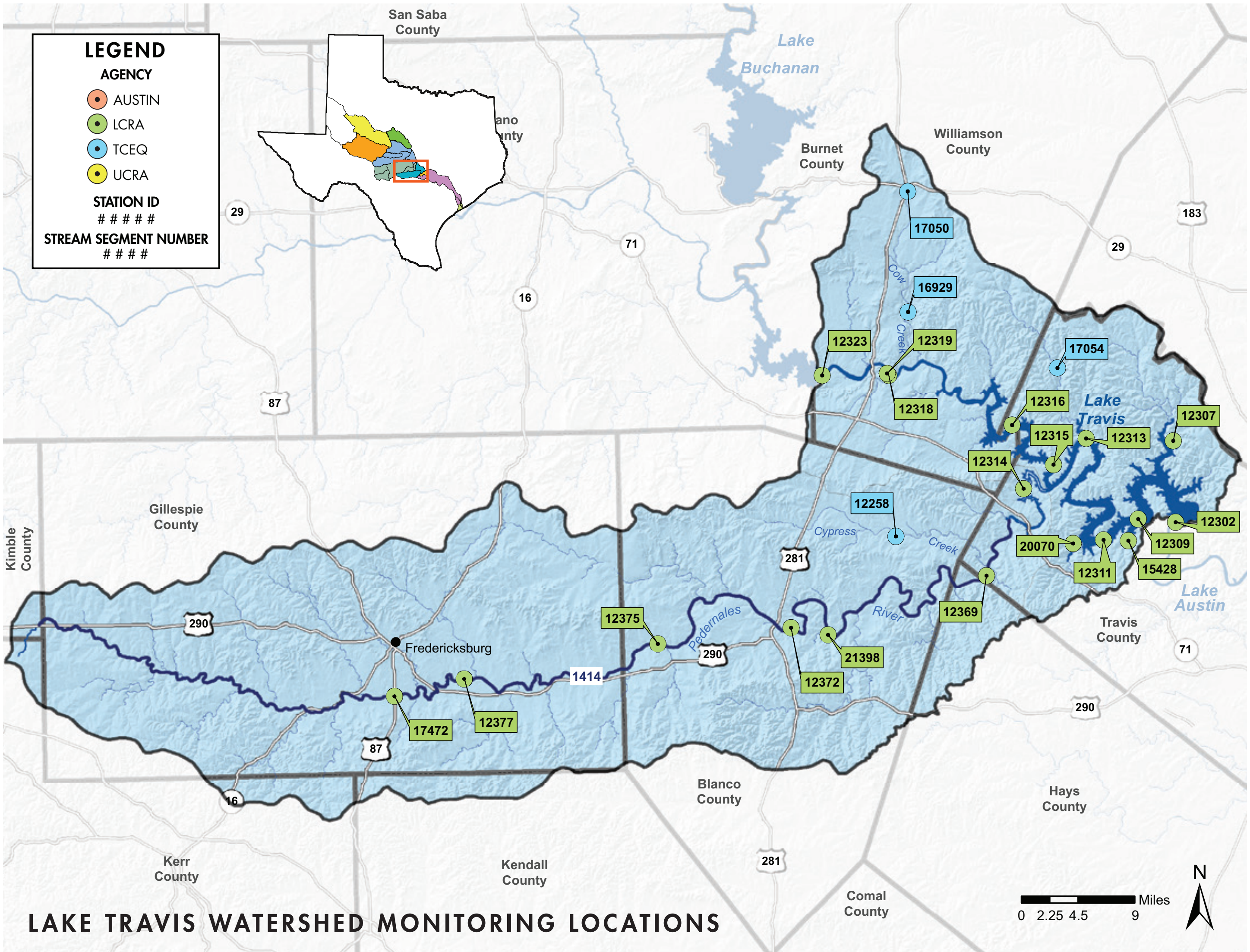
Inks Lake

Llano River

Segment 1415 – Llano River including the north and south forks, Johnson Fork, and James River

The Llano River begins in Junction, where the North Llano and South Llano rivers converge. With an average annual flow of 40 cubic feet per second, the North Llano River remains perennial, but flow is sluggish during most summers. Flows in the South Llano River have historically been about double those in the North Llano River because of large springs west of Junction.

Below Junction, the Llano River flows through the Llano Uplift, an area that contains granite and limestone outcrops that produce clear flowing streams. The Llano River, including Johnson Fork and James River, met all applicable surface water quality standards according to the draft 2022 Integrated Report.



LAKE TRAVIS WATERSHED

The Lake Travis watershed in the Texas Hill Country includes the Pedernales River and lakes Travis and Marble Falls. It is approximately 1,830 square miles. The watershed lies within the Edwards Plateau, a region distinguished by rocky terrain and clear perennial streams. Growth and development have dramatically changed the landscape in the region during the last 30 years. There are no water quality impairments in the watershed.

In 2021, LCRA and TCEQ routinely monitored sites on the following segments:

- Segment 1404 – Lake Travis including Hamilton Creek and Cow Creek
- Segment 1405 – Lake Marble Falls
- Segment 1414 – Pedernales River including Cypress Creek

Segment 1404 – Lake Travis

Mansfield Dam impounds Lake Travis on the Colorado River in western Travis County. The reservoir, which is about 18,929 surface acres, was originally designed to contain floodwaters. Historically, it is one of the clearest reservoirs in the state and is a popular recreation destination. Lake Travis meets all applicable surface water quality standards. Ongoing LCRA initiatives to protect the lake include the HLWO and OSSF programs and the Colorado River Environmental Models.

In February 2021, toxic levels of harmful algae were detected in Lake Travis after a dog death was reported and investigated by LCRA biologists. The algal toxin responsible for the dog death was confirmed to be dihydroanatoxin-a. Since then, LCRA developed a routine algae toxin monitoring program. For more information, visit www.lcra.org/algae.

Lake Travis and Mansfield Dam

Colorado River Environmental Models

The Highland Lakes provide water storage, recreational opportunities and a livelihood for many Central Texans. Recognizing their importance to the region, LCRA began developing models to evaluate water quality issues, discern trends and predict the impacts of various decisions, actions and future scenarios on the Highland Lakes. The first model was completed on Lake Travis in 2009 followed by lakes Inks, Marble Falls and LBJ in 2011. The Lake Buchanan model was completed in 2013.

The environmental models have been used to demonstrate the impact of different discharge scenarios and help establish wastewater permit limits in the Highland Lakes watersheds. LCRA worked with the cities of Burnet and Fredericksburg during their TCEQ wastewater permit amendment to develop protective measures based on model output. LCRA will continue to develop the models as lake conditions change and to work with Highland Lakes communities to develop reasonable treatment options that protect water quality. For more information on Colorado River Environmental Models visit http://www.lcra.org/water/quality/water-quality-permit-review-program/Pages/water-quality-models.aspx.

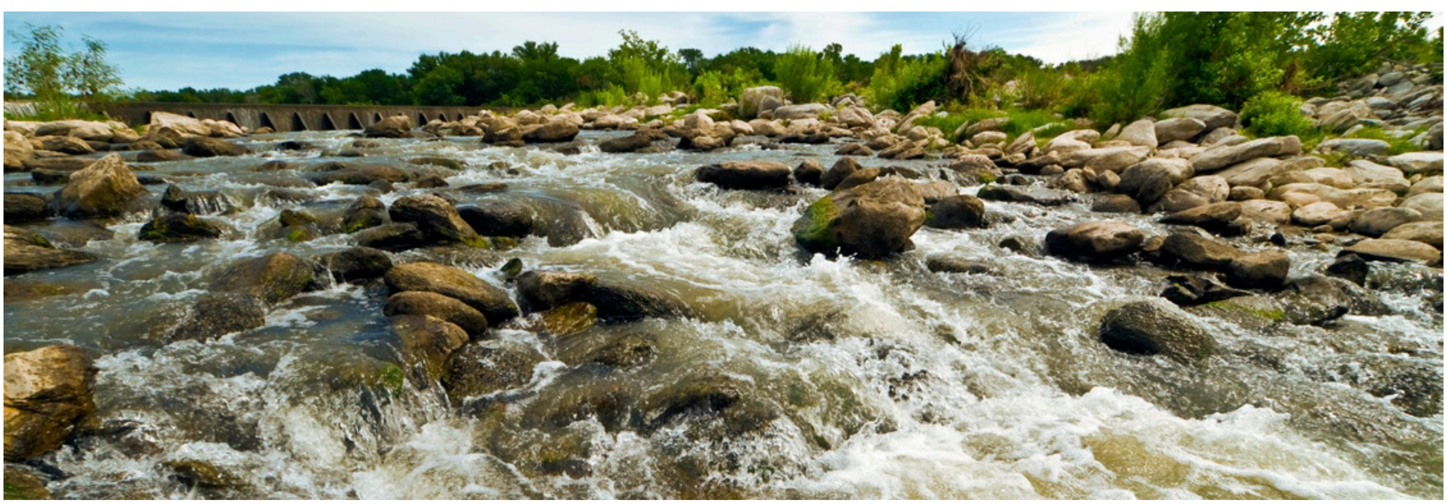
Segment 1405 – Lake Marble Falls

Max Starcke Dam forms Lake Marble Falls on the Colorado River near the City of Marble Falls. With a surface area of 545 acres, it is the smallest reservoir in the Highland Lakes chain. In the draft 2022 Integrated Report, Lake Marble Falls was designated as impaired for excessive algae in water (Category 5c). Monitoring will continue in 2022.

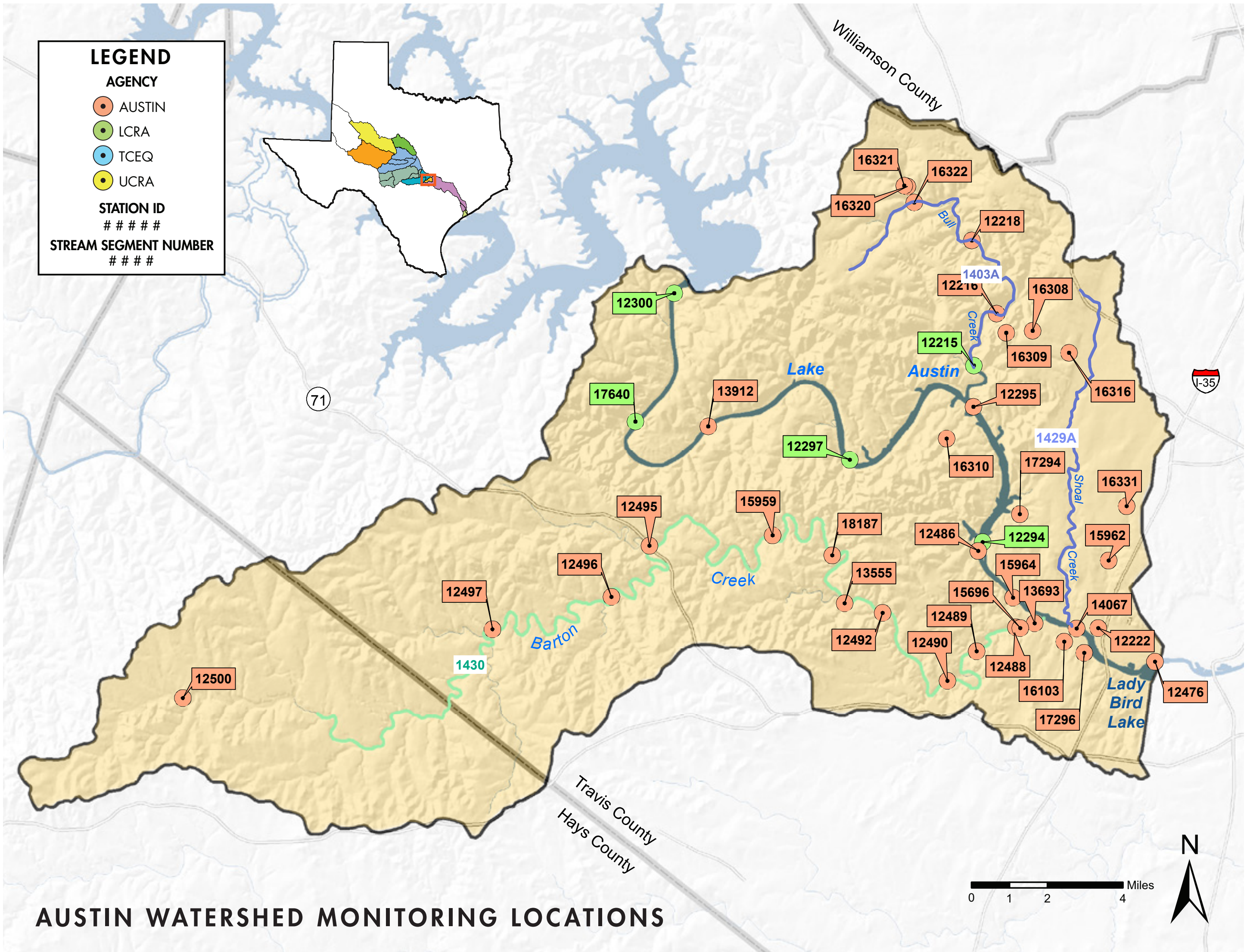
Lake Marble Falls and Starcke Dam

Segment 1414 – Pedernales River including Cypress Creek

The headwaters of the Pedernales River are located near Harper in Gillespie County. The river flows 125 miles through Fredericksburg, Stonewall and Johnson City before reaching Lake Travis. Monitoring data collected from sites near Fredericksburg and Johnson City show that the river meets all applicable TSWQS.



Pedernales River in Blanco County



AUSTIN WATERSHED MONITORING LOCATIONS

AUSTIN WATERSHED

The Austin Metropolitan watershed encompasses about 700 square miles on the eastern edge of the Edwards Plateau. The City of Austin's population is estimated at close to 1 million people, making it the most urbanized watershed in the basin. Lake Austin and Lady Bird Lake are narrow and shallow in comparison to the Highland Lakes. They resemble large rivers that cut through Austin and create a natural boundary that bisects and defines the city. The Edwards Aquifer surfaces intermittently in the watershed to form springs, clear streams and groundwater recharge features. Some urban creeks have elevated bacteria levels.

In 2021, the City of Austin, TCEQ and LCRA monitored 15 sites on the following water bodies:

- Segment 1403 – Lake Austin including Bull Creek and Taylor Slough
- Segment 1429 – Lady Bird Lake including Waller Creek and the Spicewood Tributary to Shoal Creek
- Segment 1430 – Barton Creek including Barton Springs

Segment 1403 – Lake Austin including Bull Creek and Taylor Slough

Tom Miller Dam impounds the Colorado River to form Lake Austin. It's a narrow and shallow lake that, by size and fluvial properties, is more akin to a river than the upstream Highland Lakes. Water moves through the lake relatively quickly, retained only a few hours in the 20 miles between Mansfield Dam and Tom Miller Dam. Land around the lake is developed and has little natural riparian corridor. The lake, which is approximately 1,830 surface acres, is used extensively for recreation. The reservoir meets all standards according to the draft 2022 Integrated Report.

Bull Creek is a perennial, spring-fed tributary of Lake Austin. About 40% of the watershed is developed. The remaining 60% is owned by the City of Austin and is maintained as a preserve protected from further development. Monitoring data show that the upper portion of the stream frequently exhibits low dissolved oxygen levels. It was placed on the 303(d) List in 2010. Water in the upper end of the creek is strongly influenced by groundwater that typically contains low dissolved oxygen. Benthic macroinvertebrate data collected by the City of Austin indicate that Bull Creek maintains high aquatic life use. Monitoring will continue in 2022.

Loop 360 overlook and Pennybacker Bridge over Lake Austin

Bull Creek

The Taylor Slough watershed is located on the north side of Lake Austin upstream from Tom Miller Dam. It is in a dense urban landscape composed mostly of single-family residences. Sewer lines cross the creek at several locations in the watershed. Water quality data collected from Reed Park in the downstream portion of the stream indicate elevated levels of bacteria. TCEQ placed it on the 303(d) List in 2002. Segment 1403K is included in the Improving Austin Streams I-Plan to address the bacteria impairment.

Taylor Slough South

Improving Austin Streams: Bacteria TMDL for four Austin Creeks

In 2012, TCEQ initiated a bacteria TMDL for Spicewood Tributary of Shoal Creek, Taylor Slough, Waller Creek and Walnut Creek (in the lower Colorado River watershed). TCEQ contracted with the University of Texas Center for Public Policy Dispute Resolution to facilitate public input and develop a TMDL Implementation Plan (I-Plan). Through this process, the City of Austin Watershed Protection Department, Texas Department of Transportation, City of Pflugerville, City of Round Rock, LCRA, and other stakeholders developed an I-Plan to reduce bacteria in the creeks. This plan provides a road map for improving water quality in the affected streams. Strategies include riparian zone restoration, wastewater infrastructure maintenance, domestic pet waste education, resident outreach and stormwater treatment. In June 2021, a group of stakeholders was formed to update the I-Plan for bacteria in Austin-area streams for a second five-year period through 2027.

For more information visit https://www.tceq.texas.gov/waterquality/tmdl/nav/101-austinwatershedsbacteria/austin-area-watersheds-i-plan-stakeholder-group.

(Note that the creeks covered under this I-Plan are not listed in the tables within this Basin Highlights Report because they are not in Category 5c of the draft 2022 Integrated Report. Rather, they are in Category 4a, meaning a TMDL has been completed and is being implemented.)

Segment 1429 – Lady Bird Lake including Waller Creek and the Spicewood Tributary to Shoal Creek

Lady Bird Lake is formed by Longhorn Dam in Austin. The lake extends upstream approximately 5 miles to Tom Miller Dam, and it has a surface area of approximately 500 acres. Lady Bird Lake has been designated as impaired due to excessive algal growth in the 2022 Integrated Report.

The Waller Creek watershed is on the north side of Lady Bird Lake in downtown Austin. The headwaters begin in north Austin and the stream flows about 5 miles to its confluence with Lady Bird Lake. Waller Creek is heavily urbanized. Monitoring data collected from several sites on the creek showed elevated levels of bacteria and in 2002, it was placed on the 303(d) List. Potential sources of bacteria include pet and human waste, leaking wastewater infrastructure, and urban runoff.

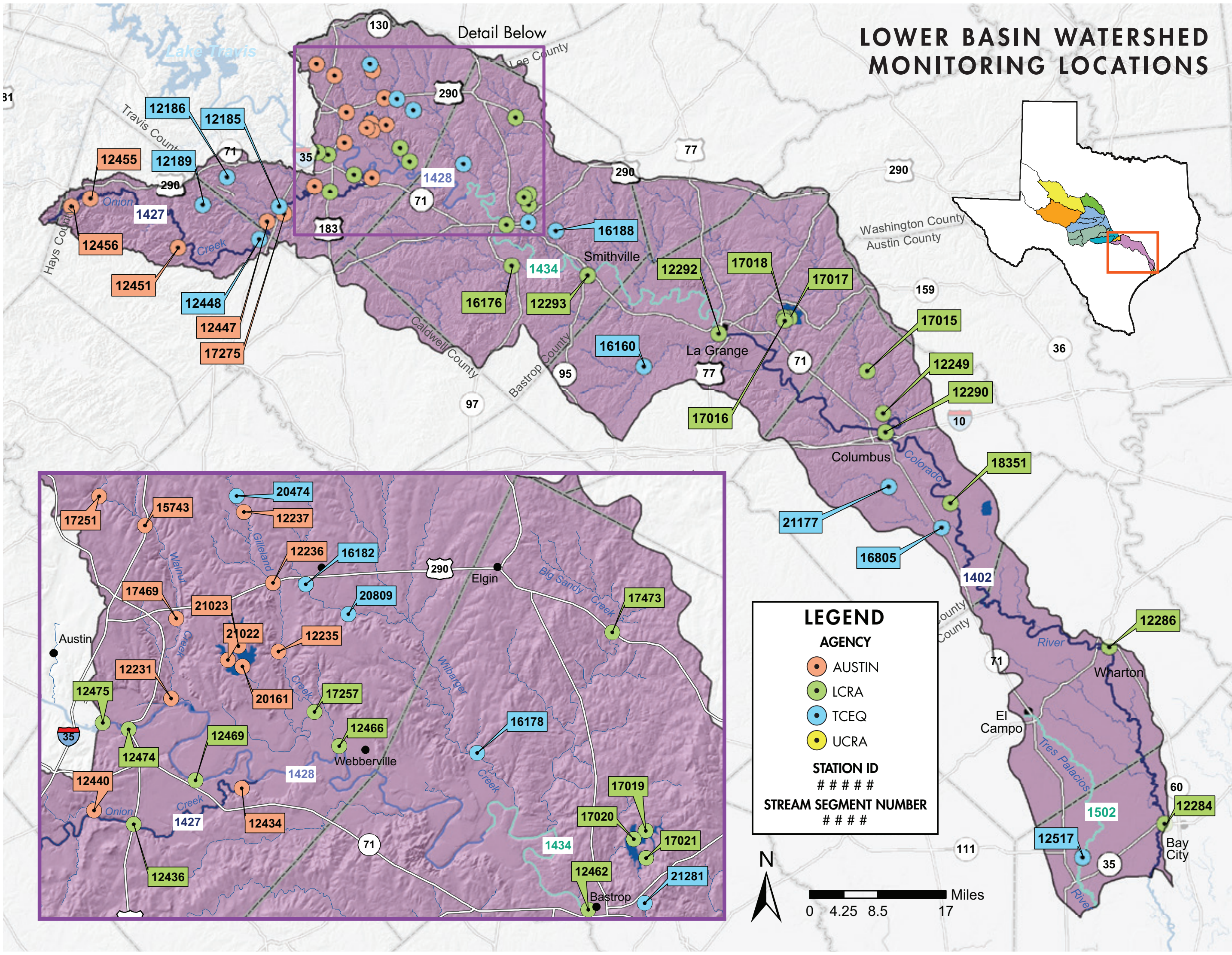
Construction of the Waller Creek Tunnel, a major channelization project, began in 2011 and is ongoing. Once complete, the project will alter the original flow and habitat in the creek. The tunnel will be used to circulate water from Lady Bird Lake through Waller Creek during non-storm conditions. The tunnel project, in combination with significant redevelopment, will dramatically alter lower Waller Creek in the future. Segment 1429C is included in the Improving Austin Streams I-Plan to address the bacteria impairment.

This small tributary to Shoal Creek, known as Spicewood Springs Tributary, is in the upper portion of the Shoal Creek watershed on the north side of Lady Bird Lake in Austin. It begins near the west side of Loop 1 (MoPac Expressway) in north Austin, where Spicewood Springs discharges. The shallow, spring-fed stream is only about a half mile long, but it is important habitat for a small population of threatened Jollyville Plateau salamanders (*Eurycea nana*). The creek is in an established residential area where wastewater lines traverse the stream's banks. It was first listed as impaired for bacteria in the 303(d) List in 2002. Segment 1403J is included in the Improving Austin Streams I-Plan to address the impairment.

Segment 1430 – Barton Creek including Barton Springs

Barton Creek is the largest tributary to Lady Bird Lake. The headwaters are located near Dripping Springs. The creek flows intermittently about 38 miles to its confluence with the lake. Eight square miles of the watershed are in the Edwards Aquifer Recharge Zone where water travels into caves and sinkholes, recharging the aquifer. Groundwater resurfaces near Barton Springs Pool in Austin. No impairments for Barton Creek or Barton Springs are noted in the 2022 Integrated Report.

Barton Creek at Sculpture Falls



LOWER COLORADO RIVER WATERSHED

The lower Colorado River watershed below Austin encompasses an area of about 2,195 square miles. Water typically flows more slowly here than in the river above Austin because of the relatively flat terrain. When not in severe drought, LCRA releases water from the Highland Lakes for downstream agricultural customers. The releases, which routinely take place in the spring and summer, help flush the river and dilute nutrient loading from effluent downstream of Austin.

In 2021, LCRA, TCEQ and the City of Austin monitored 30 sites on the following water bodies:

- Segment 1402 – Colorado River below La Grange including Fayette Reservoir, Buckners Creek, and Skull Creek
- Segment 1427 – Onion Creek including Slaughter Creek
- Segment 1428 – Colorado River below Austin including Walnut Creek, Gilleland Creek, and Walter E. Long Lake
- Segment 1434 – Colorado River between Utley and La Grange including Lake Bastrop

Segment 1427 – Onion Creek including Slaughter Creek

The headwaters of Onion Creek are located in Blanco County. The creek flows intermittently about 78 miles to the east to its confluence with the Colorado River in Travis County. The stream interacts with groundwater as it flows over and into limestone fissures in the Edwards Aquifer Recharge Zone southwest of Austin. The 2022 Integrated Report did not include any impairment for Onion Creek.

Located in southern Travis County, the Slaughter Creek watershed is approximately 31 square miles and largely urban. The lower watershed consists primarily of densely clustered residential housing. From the headwaters near U.S. 290, the stream flows to the east about 17 miles to the confluence with Onion Creek. A six-mile section of the creek near MoPac Expressway lies over the Edwards Aquifer recharge zone and this mid-reach portion of the creek does not maintain baseflow under normal conditions. The creek was placed on the 303(d) List in 2002 for not meeting a high aquatic life use based on biological samples. Since that time, it has been removed from the 303(d) List.

Slaughter Creek at 1826 (Photo courtesy of City of Austin)

Segment 1428 – Colorado River below Austin including Walnut Creek, Gilleland Creek, and Walter E. Long Lake

The Colorado River below Lady Bird Lake begins at Longhorn Dam and ends 41 miles downstream near the river's intersection with FM 969 northwest of Bastrop. The upper end of the segment is urban. About 113 million gallons of treated wastewater effluent flow into the segment each day. The segment meets surface water quality standards according to the draft 2022 Integrated Report.

Walnut Creek is a tributary of the Colorado River below Longhorn Dam. Data collected from several sites in the creek indicate elevated levels of bacteria, and as a result, the stream was placed on the 303(d) List in 2002. Walnut Creek is a part of the Austin Watersheds TMDL.

Gilleland Creek, a tributary of the Colorado River downstream of Austin, was placed on the 303(d) List in 1999 due to elevated bacteria levels. Flow in the creek is predominantly from treated wastewater. LCRA developed the Gilleland Creek TMDL through a contract with TCEQ. It was adopted by TCEQ in 2007 and approved by EPA in 2009. The TMDL I-Plan – including waste load allocations, stormwater prevention and education – was approved by TCEQ in 2011. Monitoring indicates bacteria levels are lower at some sites, but remain above surface water quality standards. Implementation and verification monitoring is ongoing. For more information about the Gilleland Creek TMDL, visit http://www.tceq.texas.gov/waterquality/tmdl/nav/69-gillelandcreekbacteria.

Walnut Creek at Metric Boulevard (Photo courtesy of Donna Blumberg)

Gilleland Creek at Webberville Road

Segments 1434 and 1402 – Colorado River from Utley to Bay City

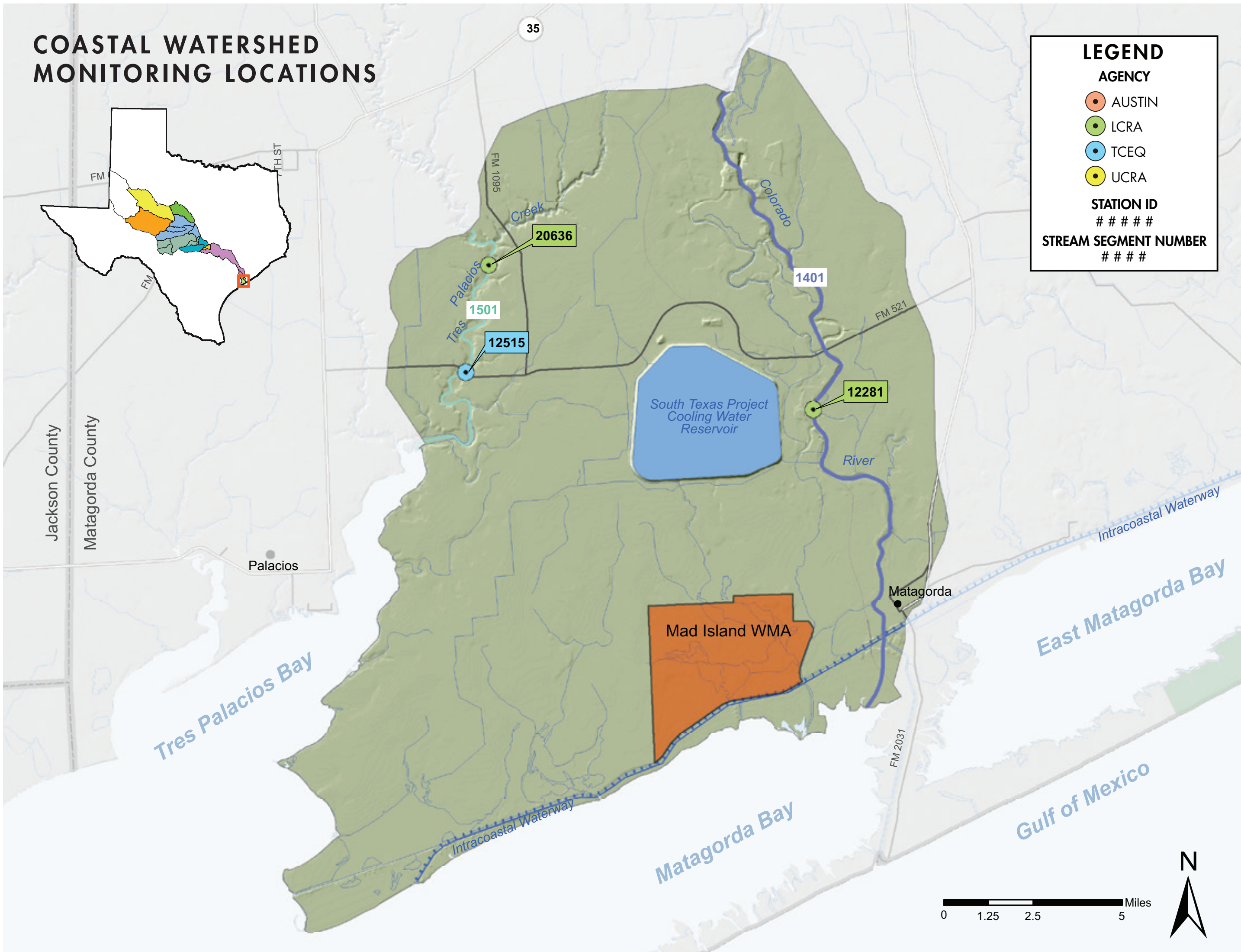
These two segments of the Colorado River begin at FM 969 near Bastrop and end downstream near Bay City. The water in this section of the river is usually turbid due to sandy loam and clay soils of the region. Based on the draft 2022 Integrated Report, all this segment meets all surface water quality standards.

Located on the south side of the Colorado River near La Grange, the Buckners Creek watershed is about 176 square miles. The stream's headwaters are near the community of Rosanky in Bastrop County. It ends 26 miles downstream at its confluence with the Colorado River. The Buckners Creek watershed is rural. Monitoring data indicated impairment for low levels of dissolved oxygen, and TCEQ placed it on the 2010 303(d) List. LCRA performed a UAA in 2019. As a result, TCEQ recommended revisions to TSWQS to remove the most upstream portion of Buckners Creek from Appendix D due to an intermittent flow regime. The section of the creek that starts from the confluence with Pin Oak Creek and upstream to the confluence with Live Oak Creek was recommended for an intermediate aquatic life use due to an "intermittent with pools" flow regime designation. Revisions are still pending.

The Skull Creek watershed is located downstream of Columbus on the south side of the Colorado River. It is approximately 112 square miles. Much of the riparian area in the upper watershed has been cleared and is used for grazing pastures. Several gravel operations are located in the lower part of the watershed.

Data collected near the confluence with the Colorado River indicate impairments for low levels of dissolved oxygen. Potential causes of low dissolved oxygen include decomposition of organic matter and sluggish flow regimes. TCEQ completed an aquatic life monitoring project that concluded the creek supports a diverse aquatic community despite chronic low dissolved oxygen levels. Fish, macroinvertebrate and habitat samples indicate a high aquatic life use.

Colorado River at Bay City Dam



COASTAL WATERSHED

The coastal watershed of the Colorado River basin begins downstream of Columbus in Colorado County. From Columbus, the Colorado River flows to the east through Wharton and Bay City before entering Matagorda Bay where brackish waters create a productive spawning ground for estuarine species. In 2021, LCRA and TCEQ routinely monitored 3 sites in the following segments:

- Segment 1401 – Colorado River Tidal
- Segment 1501 – Tres Palacios Creek Tidal
- Segment 1502 – Tres Palacios Creek Above Tidal

Segment 1401 – Colorado River Tidal

The tidal portion of the Colorado River begins downstream of Bay City and ends where it flows into Matagorda Bay. Monitoring data collected about 12 miles upstream of the Intracoastal Waterway indicate elevated levels of bacteria are meeting state standards.

Segment 1401 of the Colorado River

Matagorda Bay

Matagorda Bay depends on freshwater from the Colorado River to help maintain a productive environment. LCRA is required by the state-approved water management plan to ensure a certain amount of freshwater flows to the bay. The requirements are based on the amount of water flowing into the Highland Lakes and the amount of water flowing into Matagorda Bay. Flow requirements are lower during drought, but critical flows must be maintained to provide a low salinity area near the mouth of the Colorado River for oysters and other important estuarine species.

Segment 1501 – Tres Palacios Creek Tidal

Segment 1501 is the tidally influenced portion of the Tres Palacios River. It begins below State Highway 35 and ends approximately 8 miles downstream where the river flows into Tres Palacios Bay. Monitoring data collected near the confluence of Tres Palacios Bay indicate impairment for bacteria and dissolved oxygen. In an effort to determine if the bacteria was coming from a local source(s), LCRA added a monitoring site upstream of the historical site in 2010. Two years of monitoring showed high bacteria levels were common at both sites, but did not help determine causes.

Potential sources include failing septic systems in a nearby subdivision, stormwater runoff, livestock, wildlife or the application of *Enterococcus* as an indicator organism as discussed in Segment 1401. Dissolved oxygen levels are likely a function of tidal influence (salt water does not retain dissolved oxygen as well as fresh water) and sluggish flows. A study done by TPWD in 2007 found dissolved oxygen concentrations were not a major factor in determining the biological structure and ecosystem health. TCEQ plans a TSWQS review, with the potential to assign a new aquatic life use standard.

Tres Palacios Creek (Photo by Michael Schram, Texas Water Resources Institute)

Segment 1502 – Tres Palacios Creek Above Tidal

The headwaters of the Tres Palacios River are located near El Campo. The upper end of Segment 1502 is narrow with steep banks, more reminiscent of a small creek than a river. A narrow riparian area is maintained as the stream winds through cultivated farmland. The segment meets all applicable surface water quality standards.

VIII. Public Participation

Public participation is a cornerstone of the Clean Rivers Program. Since the early 1990s, LCRA and its Clean Rivers Program partners have held annual steering committee meetings in the basin. These meetings provide a venue for local stakeholders to learn about water in their region and provide input on projects in their communities. In recent years, LCRA has renamed this group the Water Quality Advisory Committee. The meetings are open to the public. If you or someone you know is interested in getting involved with water quality protection, we welcome landowners, recreationists, civic leaders and the regulated community. Contact information and minutes from past meetings can be found on the LCRA Clean Rivers web page at https://www.lcra.org/water/quality/texas-clean-rivers-program/.

HELP PROTECT WATER QUALITY IN THE LOWER COLORADO RIVER!

The Clean Rivers Program depends on stakeholders like you to identify water quality issues that may otherwise be overlooked. Join the effort to protect water quality by participating in the Clean Rivers Program Water Quality Advisory Committee. Your participation will enable us to have a more comprehensive understanding of the waterways in your area, and will give you a chance to help characterize and improve water quality.

Member Opportunities:

- Attend one committee meeting per year.
- Provide occasional feedback via email.
- Identify and prioritize water quality issues.
- Provide input on the LCRA Clean Rivers Program work plan.
- Review water quality reports.
- Learn more and share your knowledge about water quality in your community.

For more information, visit:

https://www.lcra.org/water/quality/texas-clean-rivers-program/public-outreach/.