



# **Sabine River Basin Lake Tawakoni Watershed Characterization Report 2022**

*Prepared in Cooperation with the Texas Commission on Environmental Quality  
The preparation of this report was financed in part through funding from the  
Texas Commission on Environmental Quality.*



Sabine River Authority of Texas

P.O. Box 579

Orange, TX 77631

Phone (409) 746-2192

## Introduction

The Sabine River Basin Lake Tawakoni Watershed Characterization Report describes the water quality in the headwater drainage basin that contains Lake Tawakoni Reservoir (LTR) as well as water quality conditions in LTR. The LTR watershed was selected for its unique characteristics, importance as a major tributary, and the segment's inclusion on the Texas Commission on Environmental Quality (TCEQ) 2022 Texas Integrated Report (IR) 303(d) list for bacteria impairment. This report encompasses, but is not limited to, the examination of water quality monitoring data, hydrological characteristics, land use, permitted discharges, and major watershed events.

Through the Texas Clean Rivers Program (CRP), the TCEQ forms partnerships with regional water authorities to coordinate and conduct water quality monitoring and to promote stakeholder interest in improving the water quality of Texas surface waters. The Sabine River Authority of Texas (SRA-TX) is the CRP planning agency within the Sabine River Basin. This report is prepared under the supervision and guidance of TCEQ as part of the CRP partnership.

### Segment 0507 – Lake Tawakoni

The Segment 0507 watershed contains the headwaters where the Sabine River originates in Hunt County and ends at the Lake Tawakoni Dam below LTR. The segment reaches across six counties: Collins, Hunt, Rains, Van Zandt, Kaufman, and Rockwall. This segment is currently monitored at the following sites:

Station 10434 (LT23A) – Lake Tawakoni in the main lake near the dam

Station 21173 (LT23DN) – Lake Tawakoni in Waco Bay equidistant from Finger and Spring Point

Station 10437 (LT23B) – Lake Tawakoni at SH 276

The LTR watershed is comprised of eight TCEQ stream segments that are listed below (Table 1), and fifteen assessment units (AUs) listed in Table 2.

**Table 1.** List of TCEQ stream segments in Lake Tawakoni Reservoir watershed.

Cowleech Fork Sabine River (Segment 0507A)	Horse Creek (Segment 0507E)
Long Branch (Segment 0507B)	Tidwell Creek (Segment 0507F)
West Caddo Creek (Segment 0507C)	South Fork of Sabine River (Segment 0507G)
Hickory Creek (Segment 0507D)	Caddo Creek (Segment 0507H)

**Table 2.** List of Assessment Units within the Lake Tawakoni Reservoir watershed.

AU ID	Assessment Unit Description
0507_01	Lake Tawakoni lowermost area of reservoir, including Cedar Cove, from Iron Bridge Dam up to a line from Sun Point near East Tawakoni to Autumn Point near the Hunt/Van Zandt County Line on the west side
0507_02	Lake Tawakoni from a line from Sun Point in East Tawakoni to Autumn Point near the Hunt/Van Zandt County Line on the west side up to a line from Cloud Point in East Tawakoni to Arm Point near West Tawakoni, including Oak Cove
0507_03	Lake Tawakoni from a line from Cloud Point in East Tawakoni to Arm Point near West Tawakoni up to a line from Thunder Point on the east side to Ice point on the west side, including Wichita Bay
0507_04	Lake Tawakoni Cowleech Fork of Sabine River arm, including Pawnee Inlet, from a line from Thunder Point on the east side to Ice Point on the west side up to the confluence of the Cowleech Fork of the Sabine River at the normal pool elevation of 437.5 ft
0507_05	Lake Tawakoni South Fork Sabine arm, including Kittsee Inlet and Waco Bay, to a line from Finger Point on the north side to Spring Point in Tawakoni State Park on the south side
0507_06	Lake Tawakoni Caddo Creek arm, including Caddo Inlet and Hickory Cove, to a line from Ice point on the north side to Rainbow Point near West Tawakoni on the south side
0507A_01	Cowleech Fork from the confluence of Lake Tawakoni upstream to the confluence of Long Branch east of Greenville.
0507A_02	Cowleech Fork from the confluence of Long Branch east of Greenville upstream to the headwater northwest of Celeste.
0507B_01	Long Branch from the confluence with Cowleech Fork Sabine River east of Greenville upstream to the headwater northeast of Greenville
0507C_01	West Caddo Creek an Appendix D intermittent stream with perennial pools from the confluence of Brushy Creek upstream to the confluence of Middle Caddo Creek northwest of Caddo Mills
0507D_01	Hickory Creek from the confluence of the Cowleech Fork Sabine River upstream to the headwater upstream of FM 272 north of Celeste
0507E_01	Horse Creek from the confluence of Cowleech Fork Sabine River upstream to the headwater to 0.95 km upstream of SH 34 north of Greenville
0507F_01	Tidwell Creek from the confluence of Cowleech Fork Sabine River upstream to the headwater 0.8 km (0.5 mi) upstream of FM 1566 east of Celeste
0507G_01	South Fork of Sabine River from the confluence of Lake Tawakoni upstream to the confluence of Parker and Sabine Creeks
0507H_01	Caddo Creek from the confluence of Lake Tawakoni at Caddo Inlet upstream to the confluence of East Caddo and West Caddo Creeks

## Hydrologic Characteristics

Three creek systems originate in Segment 0507: South Fork Sabine River (South Fork) (**Figure 1**), Caddo Creek, and Cowleech Fork Sabine River (Cowleech). These unclassified water bodies drain approximately 710 square miles of watershed before flowing into LTR. Located about 50 miles east of Dallas, LTR impounds 37,880 surface acres of water at a conservation pool elevation of 437.5 feet mean sea level. LTR is impounded by a rolled earth embankment with an uncontrolled concrete spillway (**Figure 2**). LTR has over 200 total miles of shoreline in Hunt, Van Zandt, and Rains counties. South Fork flows perennially, while Caddo Creek and Cowleech flow intermittently in their upper reaches. South Fork, Cowleech, and Caddo Creek flow approximately 12.5 miles, 40 miles, and 6.5 miles respectively before emptying into LTR. These drainage systems flow through generally flat terrain with clay and sandy loams soils. The region averages forty-four inches of rainfall annually. There are two USGS gauges in the watershed, one on the South Fork near Quinlan (08017300) and one on Cowleech near Greenville (8017200) (**Figure 3**). The median flow for the South Fork and Cowleech is 3.4 cubic feet per second (cfs) and 2.3 cfs, respectively. Due to the slow permeability of the clay soils, this is a flashy watershed. The streams typically have low baseflows with short-lived spikes in flow following major rain events. For example, following a rain event last year, Cowleech rose from 1 cfs of to over 6,000 cfs in one day. This dramatic hydrograph rise leveled off to 1 cfs in less than a week following the rain event. Similarly, South Fork rose from 2 cfs to over 2,000 cfs in one day and returned to 2 cfs in less than a week following the same rain event (<https://waterdata.usgs.gov/nwis/>).



**Figure 1.** South Fork Sabine River at FM 1565.



## Land Use

This watershed lies in the Blackland Prairie eco-region, which is characterized by low rolling hills with black, calcareous, alkaline, heavy clay soils that support areas of post oaks, elms, and pines. Approximately half of the watershed is hay pasture and grasslands, with post oak savannas and cultivated crops covering just over a quarter of the watershed area (**Figure 4**). Cattle farming and agriculture are the primary land use in Segment 0507. Predominantly rural, less than 10 percent of the watershed is developed. According to the 2020 U.S. Census, Segment 0507 has a population of approximately 125,243 people with a density of 162 people per square mile. Greenville and Royse City are the two largest cities within the LTR watershed with populations of 29,374 and 15,277 respectively. Housing developments, recreational parks, marinas, and restaurants are located on lands adjacent to the reservoir. There are 33 permitted discharges (**Figure 5**) and 14 raw water intakes (**Figure 6**) contained in the watershed.



**Figure 2.** Lake Tawakoni ungated concrete spillway.

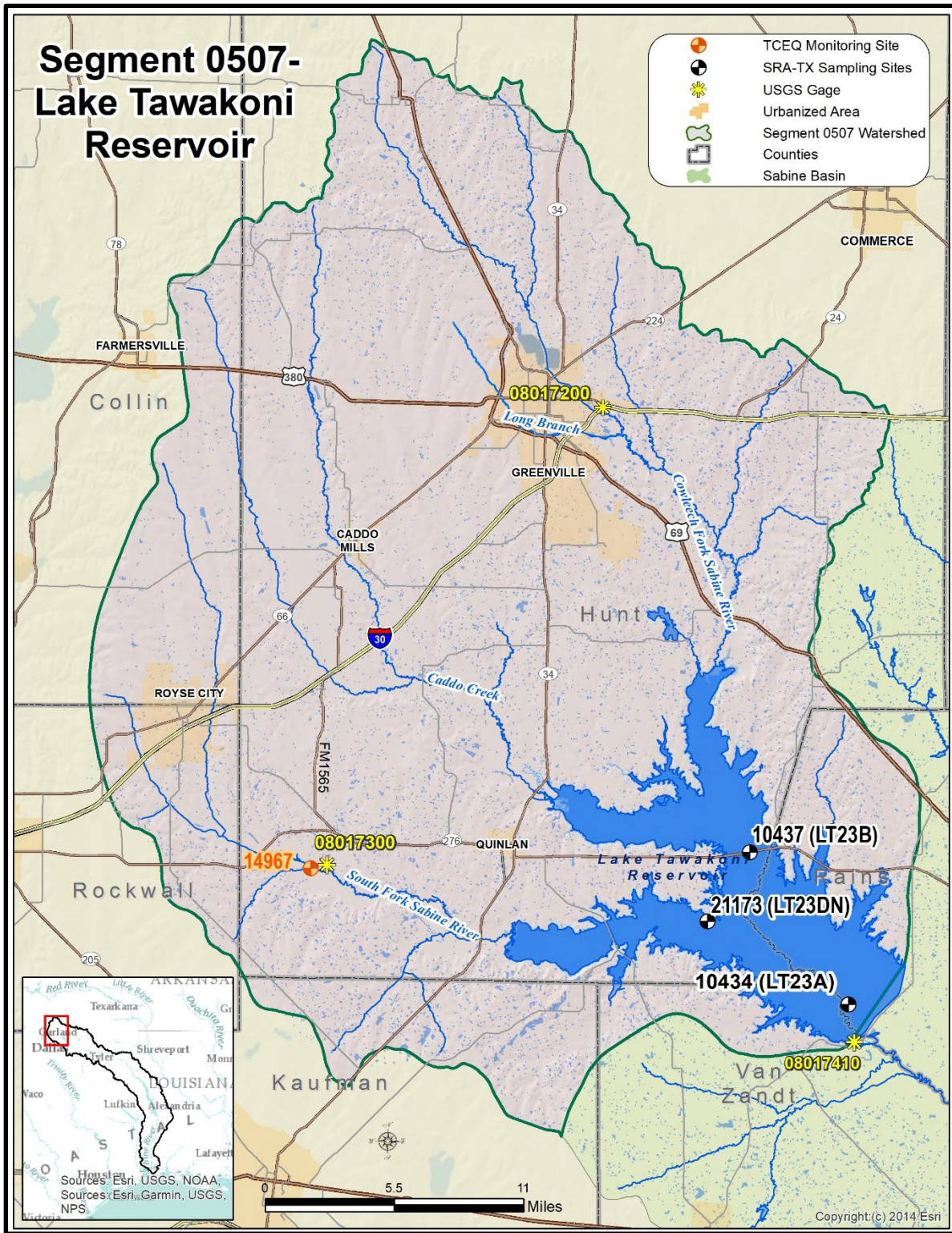
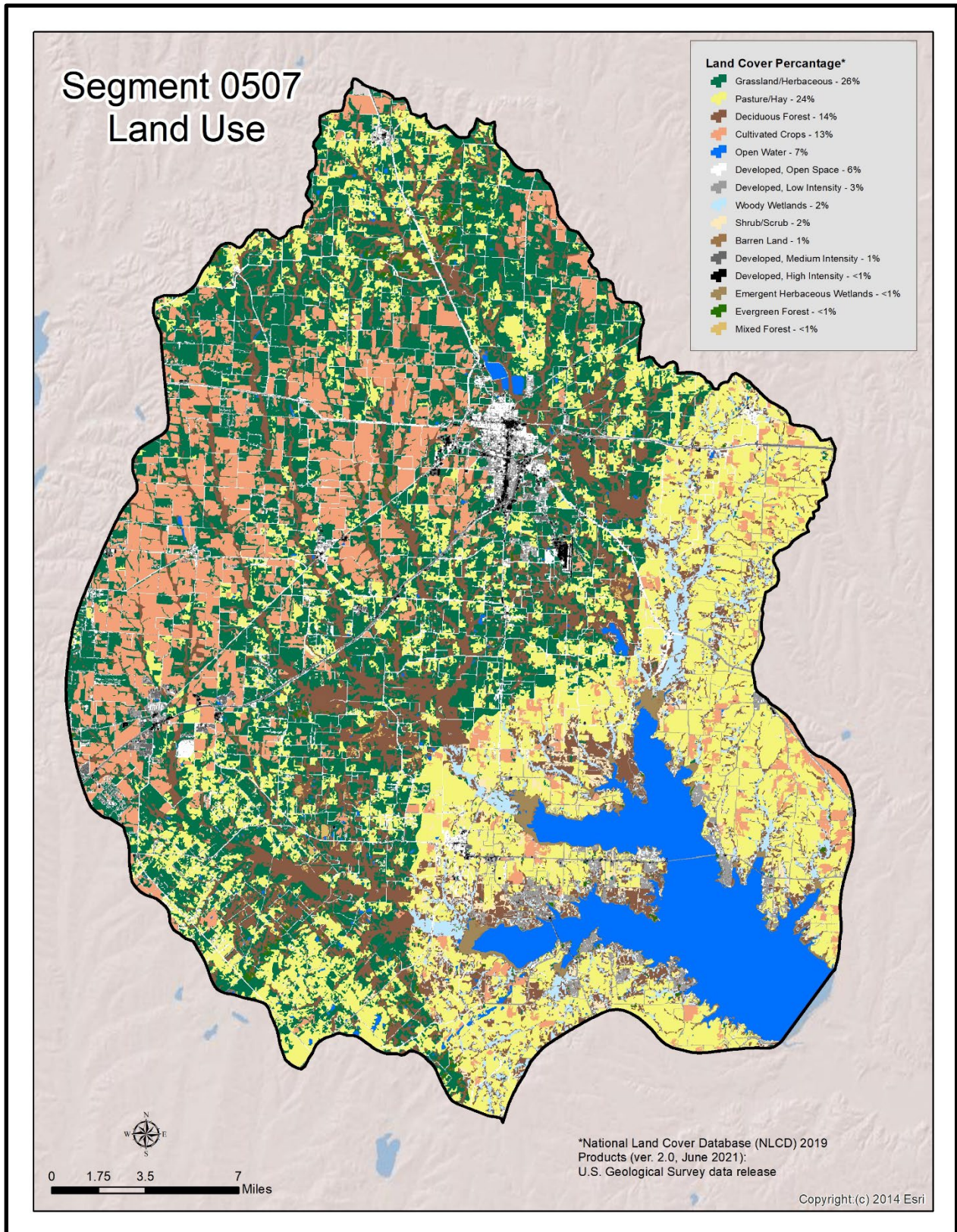


Figure 3. Map of Segment 0507 watershed, water quality sampling sites and USGS gage locations





**Figure 4.** Map showing USDA NLCD land use percentage in segment 0507 watershed.



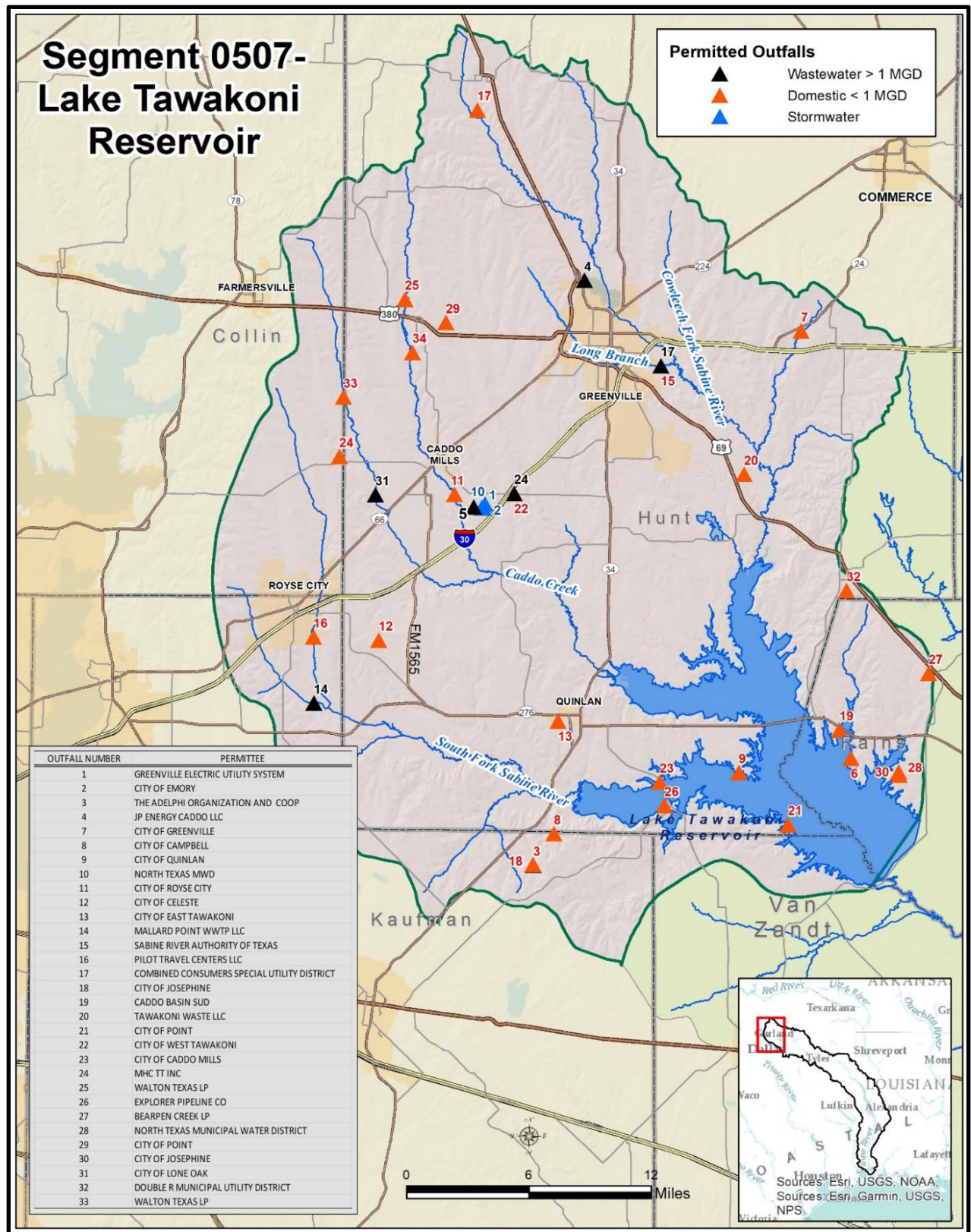


Figure 5. Map showing TCEQ permitted discharges within the segment 0507 watershed.



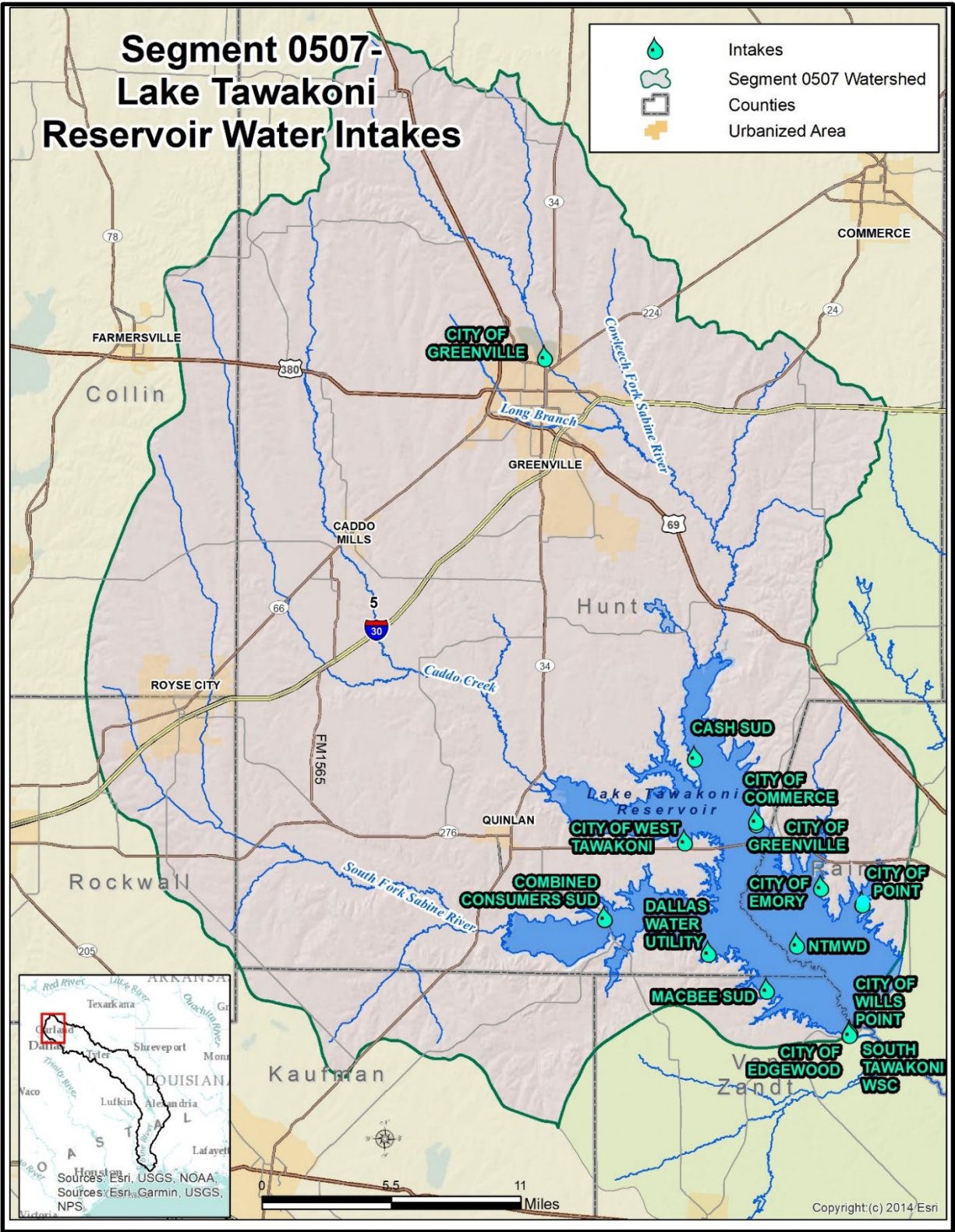


Figure 6. Map showing raw water intakes within the segment 0507 watershed.

## Impairment/Area of Interest

There is one assessment unit listed as impaired in the 2022 Integrated Report: South Fork Sabine River (AU 0507G\_01) (**Figure 7**). A total of 33 samples were collected in this assessment unit and analyzed for *E. coli* bacteria by the TCEQ field office in Tyler, Texas from 12/01/13 to 11/30/20. In this time period, one of the 33 samples assessed exceeded the stream standard criteria of 126 most probable number (MPN) for safe recreational use. The Geomean of these *E. coli* assessments was 401.82 MPN, resulting in this segment being listed on the 303(d) list. The *E. coli* impairment is currently classified as 5b, meaning a review of the standards for this segment will be conducted before a management strategy is selected. A completed recreation use attainability assessment (RUAA) supports the revision of this segment from primary contact recreation (PCR) to secondary contact recreation 1 (SCR1). A PCR classification is intended to protect people from illness due to recreation activities that involve the potential ingestion of water. PCR



**Figure 7.** South Fork Sabine River.

includes swimming, water-skiing, diving, or other activities involving immersion. An SCR1 designation use denotes recreation activities that do not involve a significant risk of water ingestion.

There are three assessment units listed as concerns in the Segment 0507 watershed: Cowleech Fork Sabine River (0507A\_01, 0507A\_02), Long Branch (0507B\_01), and Caddo Creek (0507H\_01). Cowleech Fork has a concern for Chlorophyll-a, depressed Dissolved Oxygen (DO) and nitrate. Long Branch has a concern for nitrite and Caddo Creek has a concern for depressed DO. Cowleech, Long Branch, South Fork, and Caddo Creek are all unclassified waterbodies.



## Possible Causes of Impairment

Nonpoint source runoff from both natural and urban areas is a probable source of bacterial impairment in the South Fork. Nonpoint bacteria sources within this watershed include agriculture practices such as livestock grazing, the use of chicken litter and cow manure to fertilize hay pastures, wildlife including feral hogs, beaver, otter, and deer, and private septic systems. Elevated bacteria levels in surface water often occurs with significant rainfall events that produce surface runoff. As runoff subsides and river levels return to base flows, bacteria levels decrease. Another possible source of bacterial impairment for this stream segment may come from two upstream wastewater discharges near Royse City.

Low dissolved oxygen levels are a common occurrence in small, forested, intermittent, low gradient streams. Forested creeks that flow seasonally through low gradient terrain often experience long periods of little to no velocity and become a series of small, isolated pools of water. Since much of the Sabine Basin is heavily forested, these pools of water are seasonally loaded with leaf litter. The predominately humid subtropical climate throughout the basin facilitates the rapid decomposition of organic matter in the water, which in turn, lowers the DO. During hot, dry periods, isolated pools can become nearly anoxic. When a large runoff event occurs, these pools of extremely low DO water are flushed down the watershed, resulting in short-lived isolated sections of low DO water moving through larger stream systems. Nonpoint source runoff is a probable contributor to the Concern for Screening Level assessment for Chlorophyll-a, nitrate, and nitrite. Upstream wastewater discharges may also be contributing factors in these water quality issues.



**Figure 8.** Recreation at South Tawakoni State Park.

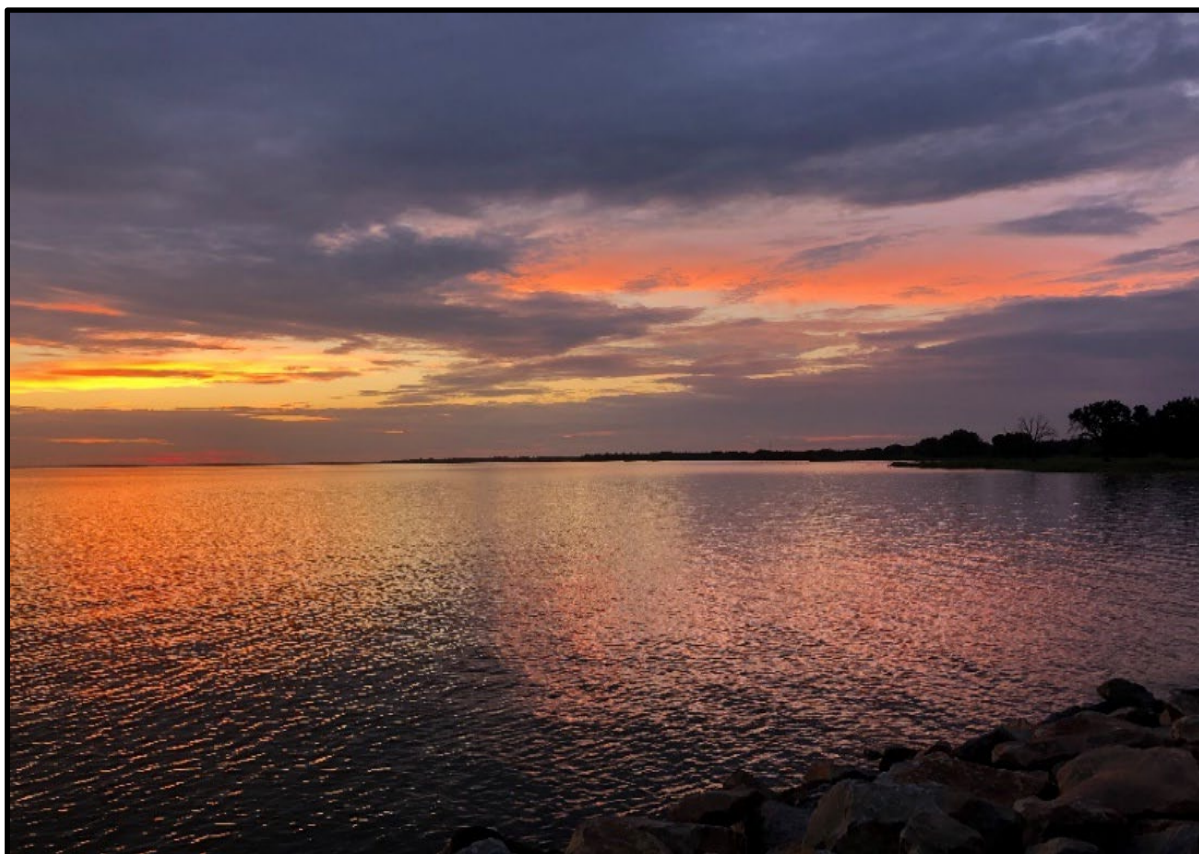
## Potential Stakeholders

- Dallas Water Utility
- Cash SUC
- MacBee SUD
- Combined Consumers SUD
- City of Dallas
- City of Emory
- City of Point
- City of Wills Point
- City of Edgewood
- City of Como
- City of Kaufman
- City of West Tawakoni
- City of Greenville
- Tawakoni WTP
- North Texas MWD
- Commercial Marina / RV Park Operators
- Fishing Clubs / Anglers
- Hopkins County Officials
- Landowners / Citizens
- Permitted Dischargers
- Railroad Commission of Texas
- Collin County Officials
- Hunt County Officials
- Rains County Officials
- Rockwall County Officials
- Kaufman County Officials
- Van Zandt County Officials
- SRA-TX
- TCEQ
- Texas Department of Agriculture
- Texas Department of Transportation
- Texas Forest Service
- Texas Parks and Wildlife Department
- Texas Soil and Water Conservation Board
- Texas Water Development Board
- USDA Natural Resource Conservation Service
- United States Environmental Protection Agency
- United States Geological Survey
- Wood County Industrial Commission
- Wood County Officials
- Wood - Rains and Hopkins Soil and Water Conservation District



## Recommendations

The SRA-TX will continue to monitor LTR monthly at TCEQ stations 10437 (LT23B), 21173 (LT23DN), and 10434 (LT23A). TCEQ Station 16691 (LF7) is scheduled to be monitored quarterly by TCEQ Region 5 personnel. Running Creek and Elm Creek are scheduled for monthly bacteria sampling by TCEQ Region 5 personnel. Monitoring plans for the LTR watershed will be discussed during the 2023 Coordinated Monitoring Meeting.



**Figure 9.** Sunset on Lake Tawakoni Reservoir.

