Trinity River Authority Clean Rivers Program 2024 Basin Highlights Report

Watershed Characterizations for Water Bodies with Aquatic Life and General Use Impairments and Concerns

Trinity River Authority of Texas

Acknowledgements

The preparation of this report was financed through funding from the Texas Commission on Environmental Quality under Agreement No. 582-24-50129. Additional cooperators include the cities of Dallas, Fort Worth, Grand Prairie, Arlington, Irving, Frisco, and Plano as well as Tarrant Regional Water District, Upper Trinity Regional Water District, Trinity River Authority Lake Livingston Project, Dallas/Fort Worth International Airport Environmental Affairs Department, and North Texas Municipal Water District, as well as members of the Trinity River Authority's Clean Rivers Program Steering Committee.

Cover Photo: Big Bear Creek at Parr Park in Grapevine

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List of Acronyms

#	Number/Count
.	No information for this cell
5c	Additional data and information will be collected or evaluated before a management strategy is selected.
5n	Water body does not meet its applicable chlorophyll-*a* criterion, but additional study is needed to verify whether exceedance is associated with causal nutrient parameters or impacts to response variables.
AD	Adequate Data
AU	Assessment Unit
BHR	Basin Highlights Report
CF	Carry Forward
cfs	Cubic feet per second
CN	Concern for Near Non-Attainment
CR	County Road
CRP	Clean Rivers Program
CS	Screening Level Concern
DO	Dissolved Oxygen
DS	Data Set
EPA	Environmental Protection Agency
FM	Farm-to-Market Road
FS	Fully Supporting
FY	Fiscal Year
GIS	Geographic Information System
ID	Inadequate Data
IH	Interstate Highway
Int LOS	Integrated Level of Support
km	kilometer
LD	Limited Data
LLC	Limited Liability Company
LOS	Level of Support
mg/L	milligrams per liter
N	Carry Forward No
N/A	Not applicable
NA	Not Assessed
NC	No Concern
NS	Not Supporting
POR	Period of Record
S.U.	Standard Units
SH	State Highway
SWQMIS	Surface Water Quality Monitoring Information System
TCEQ	Texas Commission on Environmental Quality
TMDL	Total Maximum Daily Load
TRA	Trinity River Authority
TSI	Trophic State Index
TX	Texas Road
µg/L	micrograms per liter
US	United States Highway
USGS	United States Geological Survey
Y	Carry Forward Yes

Introduction

The Texas Clean Rivers Program

The Texas Clean Rivers Program (CRP) was created in 1991 by Texas Senate Bill 818 and is administered by the Texas Commission on Environmental Quality (TCEQ) which contracts with local planning agencies such as the Trinity River Authority (TRA) to conduct the program in each river basin. The program is tasked with protecting the water quality resources of the state and improving water quality. Data collected by the TRA CRP and other river authorities are used for regulatory purposes, such as setting water quality standards, modeling for permit limits, and water quality assessments.

Trinity River Clean Rivers Program

The TRA CRP focuses on three main aspects of the program: water quality monitoring, special projects, and public outreach. Routine water quality monitoring data are vital to the success of the CRP. Data are used for regulatory purposes such as establishing water quality standards, constructing models for permit limits, and evaluating the health of waterbodies. In the Trinity River Basin, monitoring is leveraged with the existing programs of several municipalities and other entities. This partnership has allowed TRA to provide much more information to the TCEQ than would be possible with in-house resources. Currently, TRA partners with the following entities to conduct routine water quality monitoring in the basin: TRA Lake Livingston Project, Tarrant Regional Water District, Upper Trinity Regional Water District, North Texas Municipal Water District, Dallas/Fort Worth International Airport Environmental Affairs Department, two departments within the City of Dallas, the City of Fort Worth, the City of Arlington, the City of Grand Prairie, the City of Irving, the City of Frisco, and the City of Plano.

Special projects are typically short-term sampling activities focused on answering a specific water quality question. Other projects that do not generate water quality data may include in-depth analyses of existing data for various purposes and compilation of historic data sources.

Public outreach and stakeholder engagement involves annual updates to the Steering Committee which helps guide the activities of the TRA CRP. Other outreach activities include sponsorship of trash clean-ups and public education events. Education on the importance and protection of Trinity River Basin water resources is accomplished via participation in organized public and school events.

Public Involvement

The TRA CRP participates in several public involvement activities which range from trash clean-ups to public education events. Public interest in the welfare of local water bodies is vital to improving water quality in the Trinity Basin.

The TRA Clean Rivers Program Steering Committee is made up of basin stakeholders and other interested parties, including city officials and the general public. The steering committee provides input and information that is used to guide the program. Annual public meetings are held to update committee members on the activities of the program and to provide a forum to share ideas. If you are interested in participating in the Steering Committee, contact the TRA CRP at tra@trinityra.org.

Trash clean-ups are public events that are organized by cities and counties. TRA staff participates in several of these events. Volunteers at these events remove many tons of debris from water bodies and water ways. In addition to the immediate benefit of waste removal, volunteers become more aware of their impact on local water bodies.

In addition to the activities discussed above, the TRA CRP participates in several organized public outreach and education events each year. These range from local Earth Day events to educational field trips for school groups. At these events, information is presented on the Trinity River Basin as well as the Trinity River Authority. Educational materials are supplied to teach the public about how they can take a personal role in reducing and preventing water pollution.

Annual Reports

Each year, local planning agencies produce a water quality report. The content and breadth of these reports vary each year. Most years, a Basin Highlights Report is produced which can include discussion of water quality issues, activities within the basin, and watershed characterizations. Every third biennium, a Basin Summary Report is generated and discusses water quality data, issues, and potential sources in detail. TRA completed a Basin Summary Report in 2020.

The format for the following 2024 Basin Highlights Report will be a watershed characterization of Aquatic Life and General Uses impaired water bodies. A watershed characterization of Fish Consumption and Recreation Use impaired waterbodies was completed in 2022. The segments discussed in this report are based on TCEQ 2022 Texas Integrated Report which assessed data collected between December 1, 2013 and November 30, 2020. To compare the Integrated Report findings with more recently collected data, a period ranging from December 1, 2015 to November 30, 2022 will also be assessed.

Watershed Characterizations

The following watershed characterizations for waterbodies with impairments and concerns are broken into two main chapters: Aquatic Life Use and General Uses. Each of the watershed characterizations within these chapters include the information listed below.

Segment Description – A description of the classified or unclassified segment and its boundaries. Classified segments are waterbodies or portions of waterbodies that are defined in Appendix A of the Texas Surface Water Quality Standards. Unclassified segments are waterbodies that are not defined in that document and are identified by the segment number of the waterbody into which they flow followed by a letter suffix. The assessment units located within the segments are also described in these sections. Assessment units are sub-sections of a classified or unclassified segment that represent discrete areas of the segment such as arms of a reservoir or portions of a stream between tributary confluences. Water monitoring stations that have been monitored between December 1, 2015 and November 30, 2022 are also listed in this highlights report.

Hydrology – A description of the stream flow or reservoir characteristics. The stream order provides a categorical size of a stream. For example, first order streams are typically small tributaries while sixth order streams are generally larger rivers. If USGS flow or reservoir elevation gages are available, those are listed in this section. Summary statistics from these gages over the period of record for this highlights report are provided. This includes the median, minimum, and maximum stream flows or reservoir elevations. For stream, the median flows for the non-index, index, and critical periods are listed. For streams without USGS flow gages, the summary statistics are based on the flow measurements that were recorded during sampling events.

Land Use and Natural Characteristics – A description of the surface characteristics of the watershed. This includes the ecoregions found in the watershed and a description of land cover. A treemap of land cover is provided for each segment. Treemaps are used to display proportional data. For each segment's watershed, the area of land that was classified as one of six broad categories was calculated. Data from the 2016 National Land Cover Database were used for land cover calculations. The treemap categories are listed below.

- Water (Blue) – Open water.
- Developed (Red) – Open space, low intensity, medium intensity, and high intensity development which ranges from large single-family lots to dense multifamily and commercial or industrial development.
- Barren (Brown) – Areas with little to no vegetation which can include areas of bedrock, gravel mines, and sandbars.
- Forest, Shrub, Grassland (Green) – Includes deciduous, evergreen, and mixed forested areas, shrub land or areas with young trees, and areas with grasses or other herbaceous vegetation. These areas are generally not managed but may be used for grazing.
- Agriculture (Purple) – Areas that are generally planted or managed for agricultural purposes including hay fields, pasture, and cultivated crops.
- Wetlands (Orange) – Includes woody and emergent herbaceous wetlands.

Ongoing Projects – A list of any TMDLs, specials studies, or other projects in the segment (current or planned).

Description of Water Quality Issue – Identification of impairment or concern. This includes the year the impairment was first identified in the TCEQ Integrated Report and a summary of the data used in the 2022 Integrated Report. If a concern or impairment was carried forward from previous assessments, the summary data from that previous assessment is provided. Summary data for the period of record of this highlights report (12/1/2015 to 11/30/2022) is also provided if available.

Potential Causes of Water Quality Issue – A list of possible causes for the impairment or concern based on knowledge of the watershed. Any known major watershed events that may impact aquatic life or general uses will be discussed in this section.

Recommendations for Improving Water Quality – A list of activities that may provide water quality improvements based on impairments or concerns.

Potential Stakeholders – A list of companies, entities, or other groups that could serve as stakeholders in the watershed, be impacted by water quality in the segment, or be able to assist in improving water quality.

Aquatic Life Use

All waterbodies are designated to support aquatic life uses. This assessment is based on standards for several parameters including dissolved oxygen, metals and other toxic parameters in water and sediment, and assessments of habitat, benthic macroinvertebrate communities, and fish communities. Impairments or concerns for aquatic life uses were identified in 25 segments (Figure 1) – both classified and unclassified – with 23 of these being based on low dissolved oxygen. Three segments had impairments or concerns for habitat, benthic macroinvertebrate communities, or fish communities. One of the most common causes of low dissolved oxygen is excessive algal growth which can lead to low concentrations of oxygen at night and during cloudy weather. Other causes can be warm water temperatures, pollution with oxygen consuming chemicals, decaying organic matter, and salinity. Poor habitat and limited benthic macroinvertebrate and fish communities may be related to low dissolved oxygen water, natural stream conditions, time of year, and pollution. Each of these impairments and concerns are discussed in more detail in the following chapters.

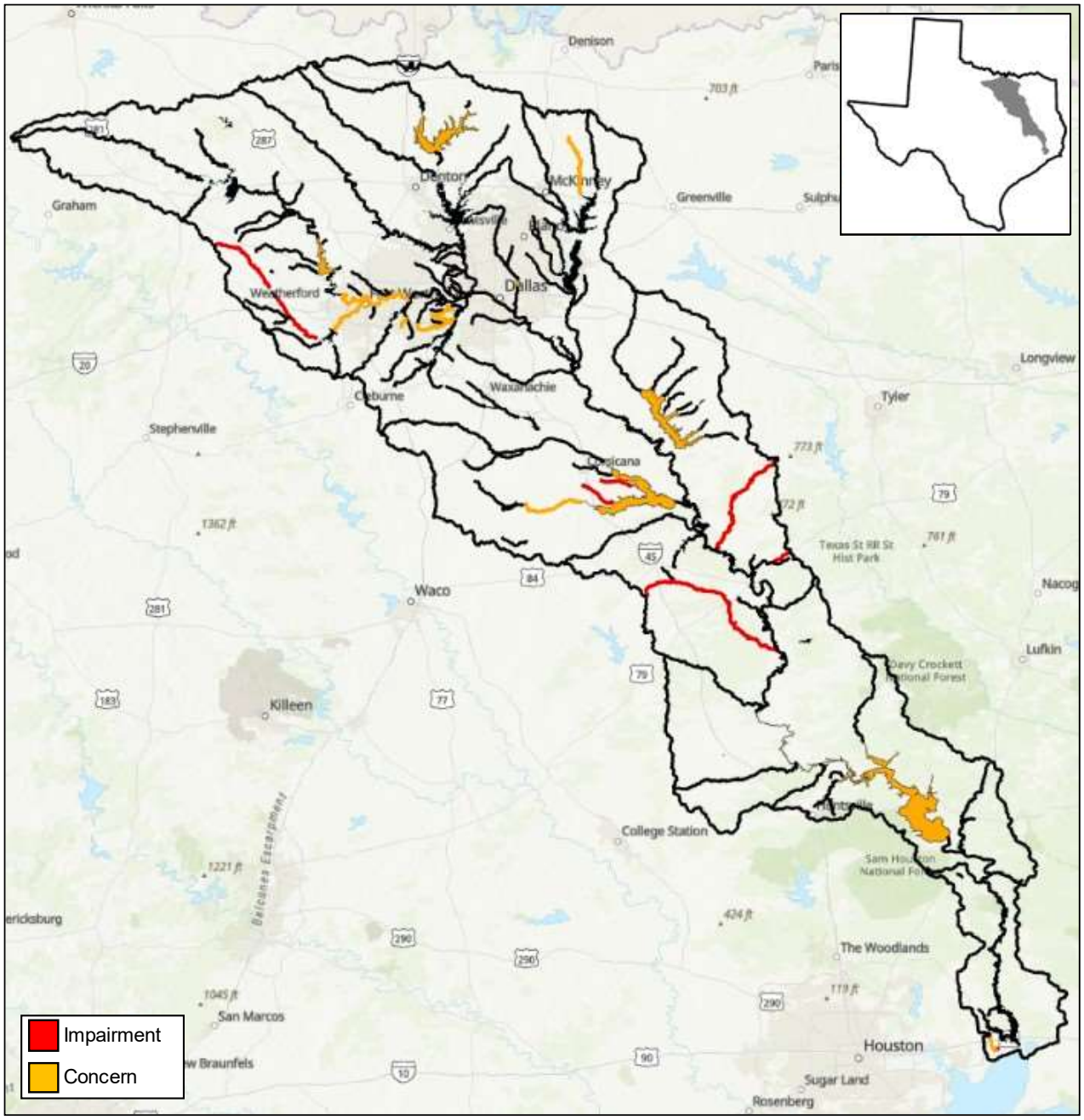

Figure 1: Map of segments with impairments or concerns for Aquatic Life Use

0801C – Cotton Bayou Tidal

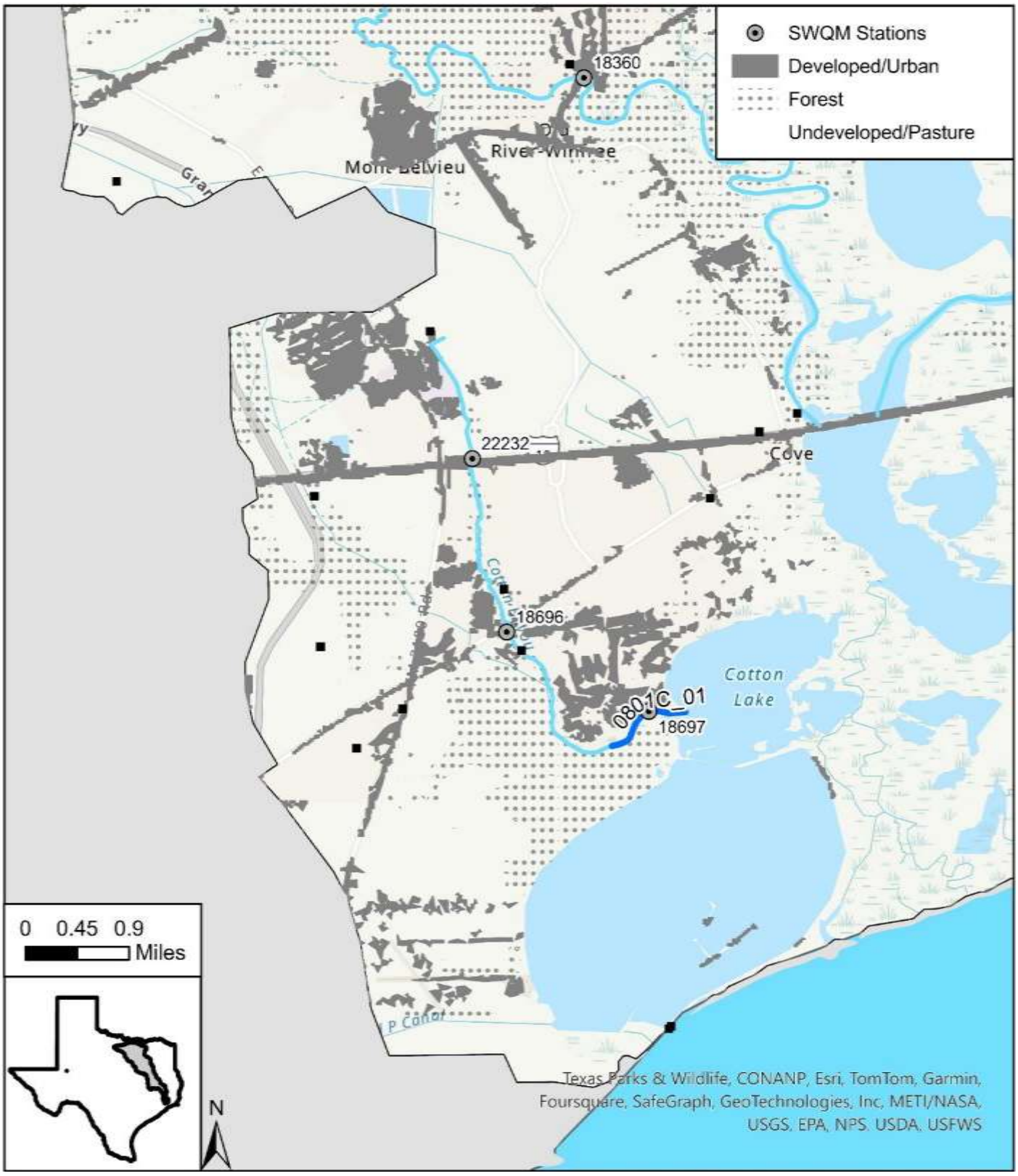

Figure 2: Map of Segment 0801C

Segment Description

This 0.74-mile unclassified segment runs from a point near The Plantation neighborhood in Chambers County to the confluence of Cotton Lake southeast of Mont Belvieu in Chambers County.

Assessment Units and Monitoring Stations

- **0801C_01** - From the confluence of Cotton Lake southeast of Mont Belvieu to a point upstream 0.74 miles, near The Plantation neighborhood in Chambers County
  - Tidal stream
  - **18697** – Cotton Bayou at boat ramp 0.46 km upstream of the confluence with Cotton Lake
    - Sampling conducted by TCEQ from 2015 to 2024

Hydrology

Unclassified segment 0801C is a second order stream at its most downstream end. There is no flow data available for this segment.

Land Use and Natural Characteristics

Anthropogenic uses in this segment are a mix of hay, pasture, and crop land as well as development around the City of Mont Belvieu. It lies within the Northern Humid Gulf Coastal Prairies and Texas-Louisiana Coastal Marshes ecoregions.

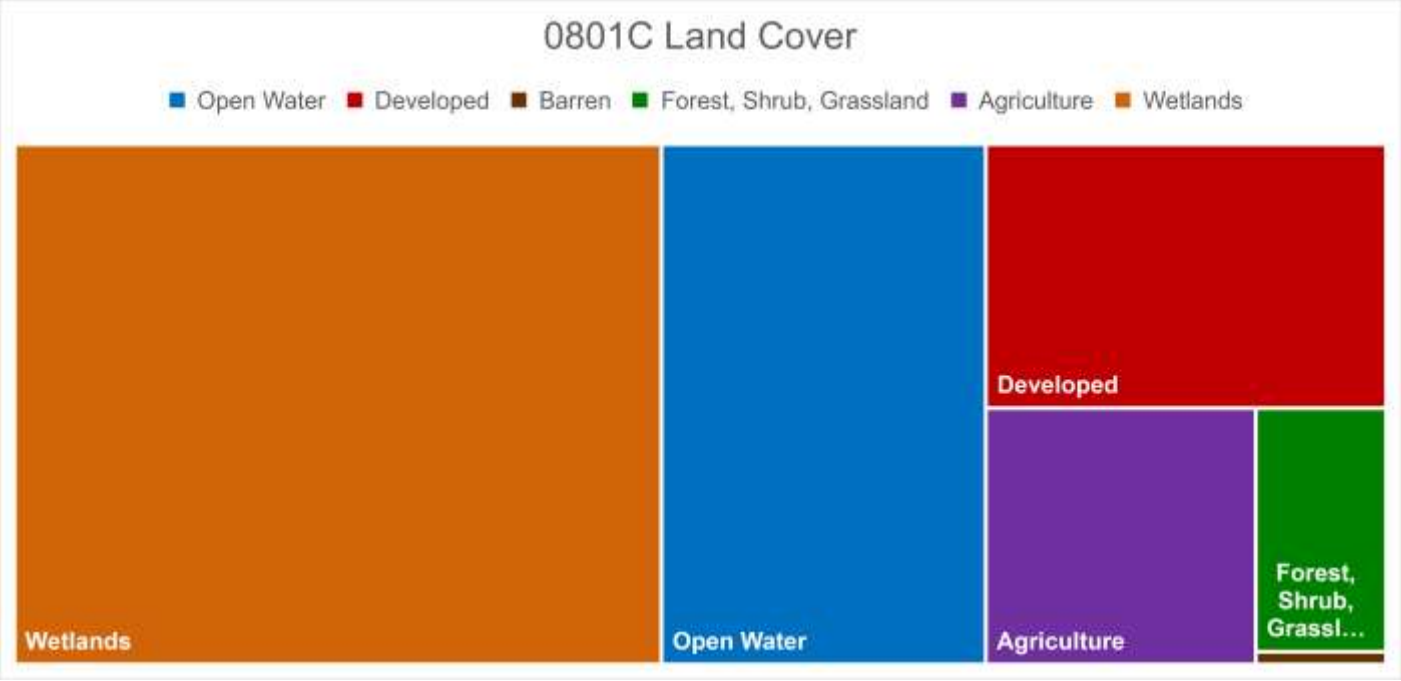

Figure 3: 0801C relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 18697 conducted by TCEQ Region 12.

Description of Water Quality Issue

This segment was found to have both an impairment and a concern due to depressed dissolved oxygen levels. Table 1 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. The impairment was identified in the 2006 Integrated Report. However,

this report indicates that it was carried forward from previous assessments and older assessments have limited data summary availability. It is unknown where the data for this impairment originated as the earliest data available in SWQMIS was collected in 2005. Recently collected data indicates that there is no impairment or concern in this segment.

Table 1: Summary of Aquatic Life Use data for Segment 0801C

	2022 Integrated Report Data		BHR POR Data	
AU	0801C_01	0801C_01	0801C_01	0801C_01
Method	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level
Criteria	3	4	3	4
# Data Assessed	22	22	18	18
# Exceedances	0	4	0	1
Mean Exceedances	.	3.48	.	3.9
DS Qualifier	AD	AD	AD	AD
LOS	FS	CS	FS	NC
CF	Y	N	.	.
Int LOS	NS (first identified 2006)	CS	.	.

Potential Causes of Water Quality Issue

There was a moderate correlation to salinity (coefficient = 0.430) which indicates that dissolved oxygen in this tidally influenced portion of the stream is being directly affected by salinity. There was a moderate inverse correlation to water temperature (coefficient = -0.506); dissolved oxygen saturation potential decreases with increasing temperature.

Algal populations may be impacting dissolved oxygen levels to some extent but the correlation to chlorophyll-*a* was weak (coefficient = 0.328). Higer concentrations of chlorophyll-*a* were generally reported in the spring and summer. Further, there was a strong correlation to days since precipitation (coefficient = 0.731); lower dissolved oxygen levels were reported after recent precipitation when weather conditions would be expected to be cloudy and respiration rather than photosynthesis would be predominant in algal populations.

Recommendations for Improving Water Quality

There are no recommendations for tidal influence or water temperature related impacts on dissolved oxygen. Reduction of algal populations may help increase dissolved oxygen levels. However, chlorophyll-*a* levels were not well correlated with nutrients in either Segment 0801C or 0801E so nutrient reductions may not impact algal populations.

Potential Stakeholders

- City of Mont Belvieu
- Barbers Hill Independent School District
- Wastewater treatment plant operators
- Homeowners Associations

0801E – Cotton Bayou Above Tidal

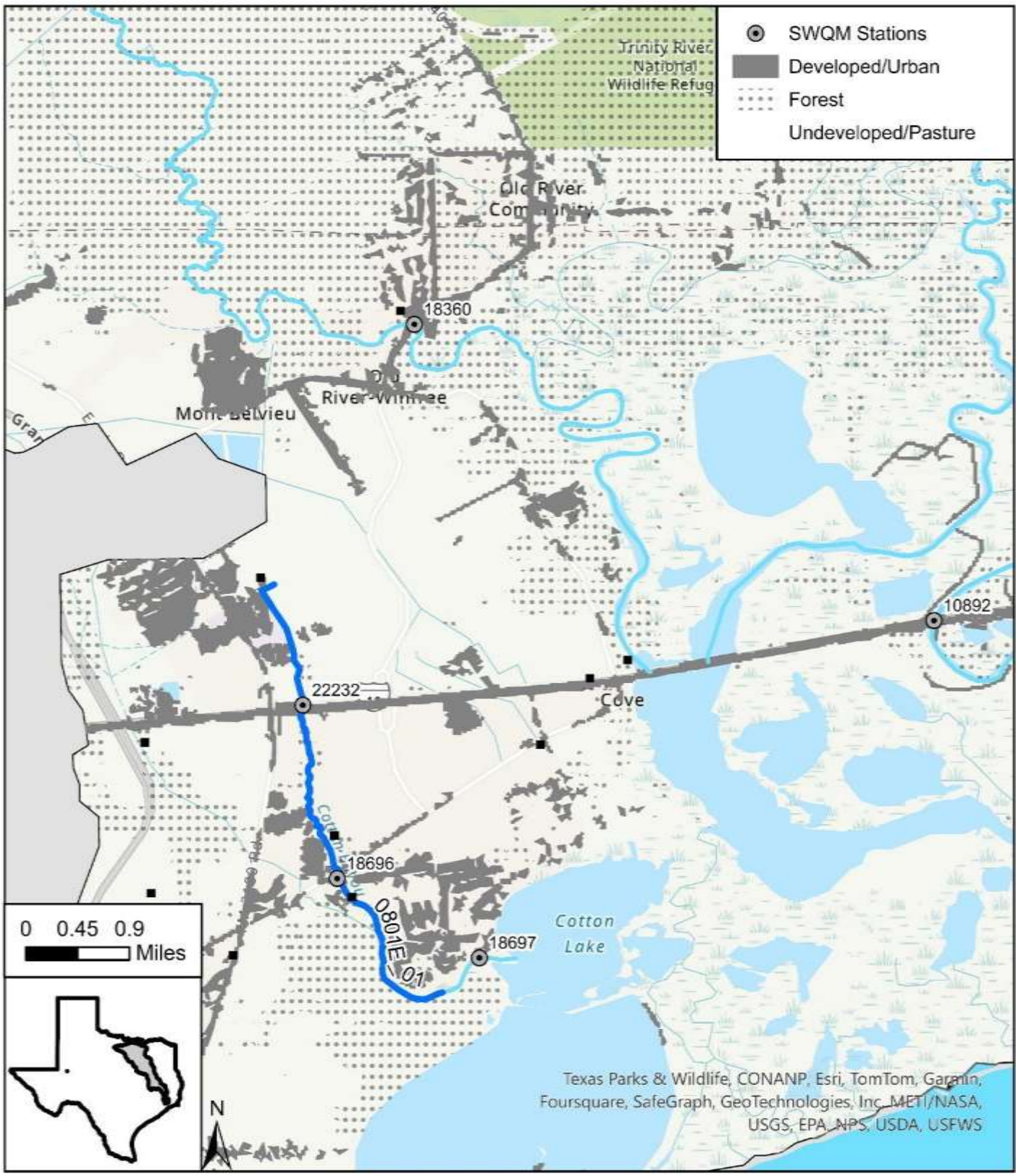

Figure 4: Map of Segment 0801E

Segment Description

This 4.35-mile unclassified segment runs from a point 1.17 miles north of IH 10 in Mont Belvieu to a point near The Plantation neighborhood in Chambers County 0.74 miles upstream of the confluence with Cotton Lake.

Assessment Units and Monitoring Stations

- **0801E_01** - From a point 0.74 miles upstream of the confluence of Cotton Lake upstream to a point 1.17 miles north of IH 10 in Mont Belvieu in Chambers County
  - Perennial freshwater stream
  - **18696** – Cotton Bayou at FM 565
    - Sampling conducted by TCEQ from 2015 to 2024
  - **22232** – Cotton Bayou 10 meters upstream of westbound IH 10 frontage road in Mont Belvieu
    - Sampling conducted by Houston-Galveston Area Council from 2020 to 2024

Hydrology

Unclassified segment 0801E is a second order stream at its most downstream end. Based on sampling at Station 22232, the median flow was 1.45 cfs with a range of 0.4 to 57 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 1.5 cfs
- Index Period – 1.4 cfs
- Critical Period – 5.3 cfs

Land Use and Natural Characteristics

This segment flows through the Texas-Louisiana Coastal Marshes ecoregion. The immediate land type is emergent herbaceous wetlands with some woody wetlands and mixed forest as well as developed land in the communities south of Mont Belvieu.

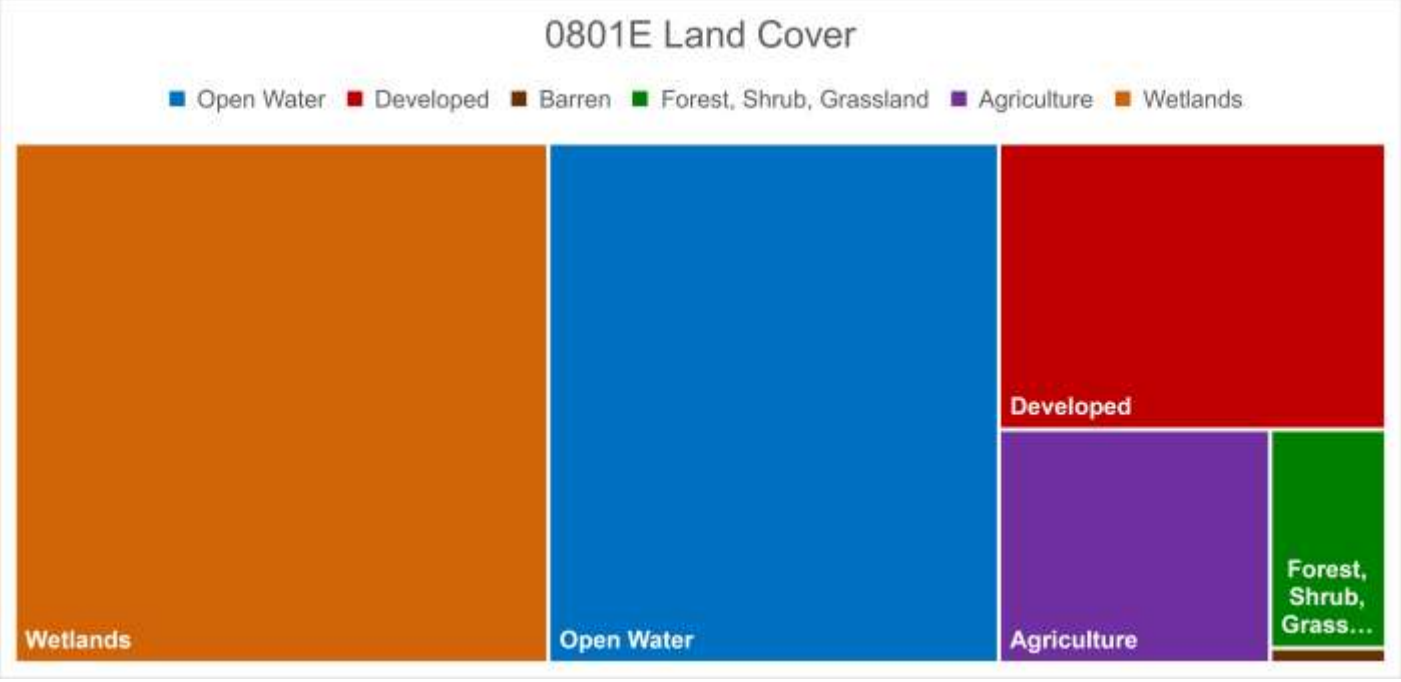

Figure 5: 0801E relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 18696 conducted by TCEQ Region 12.
- Routine monthly monitoring of conventional, bacteria, flow, and field parameters at Station 22232 conducted by University of Houston Clear Lake Environmental Institute of Houston.
- Biased to season monitoring of diel and flow parameters four times a year at Station 22232 conducted by University of Houston Clear Lake Environmental Institute of Houston.

Description of Water Quality Issue

This segment was found to have a concern due to depressed dissolved oxygen levels. Table 2 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, dissolved oxygen levels have fallen below the screening level of 5 mg/L on several occasions as shown in Figure 6.

Table 2: Summary of Aquatic Life Use data for Segment 0801E

	2022 Integrated Report Data		BHR POR Data					
AU	0801E_01	0801E_01	0801E_01 Station 18696	0801E_01 Station 18696	0801E_01 Station 22232	0801E_01 Station 22232	0801E_01 Combined	0801E_01 Combined
Method	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level
Criteria	3	5	3	5	3	5	3	5
# Data Assessed	22	22	20	20	27	27	47	47
# Exceedances	1	5	3	7	0	7	3	14
Mean Exceedances	1.7	4.08	1.69	3.39	.	4.16	1.69	3.78
DS Qualifier	AD	AD	AD	AD	AD	AD	AD	AD
LOS	FS	CS	FS	CS	FS	CS	FS	CS
CF	N	N	.	.	.	.	.	.
Int LOS	FS	CS	.	.	.	.	.	.

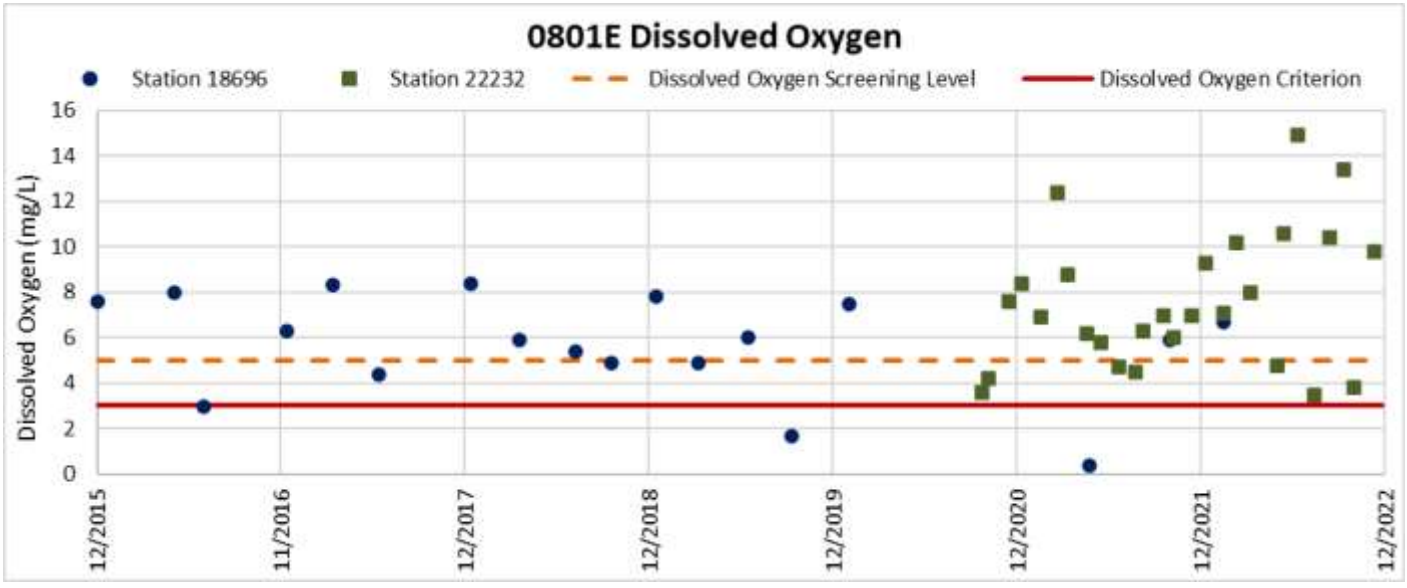

Figure 6: 0801E Dissolved Oxygen

Potential Causes of Water Quality Issue

There were several correlations that indicated failing sewage infrastructure may be causing dissolved oxygen issues in this portion of the stream. There was a strong inverse correlation to volatile suspended solids (coefficient = -0.741) and moderate to strong inverse correlations to ammonia, total Kjeldahl nitrogen, and total phosphorus (coefficients = -0.651, -0.730, and -0.553, respectively). There were also moderate to strong inverse correlations to *Enterococcus* and *E. coli* (coefficients = -0.643 and -0.953, respectively). However, the *E. coli* correlation was based on only 5 samples.

There was a strong inverse correlation to water temperature (coefficient = -0.708). Dissolved oxygen saturation potential decreases with increasing temperature.

Recommendations for Improving Water Quality

Sampling of upstream wastewater treatment facility outfalls may help determine if they are operating properly. Walking surveys of the stream and spot sampling with rapid result test kits for parameters like ammonia may help identify any broken sewage pipelines or illicit drains from septic systems.

There are no recommendations for water temperature related impacts on dissolved oxygen.

Potential Stakeholders

- City of Mont Belvieu
- Barbers Hill Independent School District
- Wastewater treatment plant operators
- Homeowners Associations

0803 – Lake Livingston

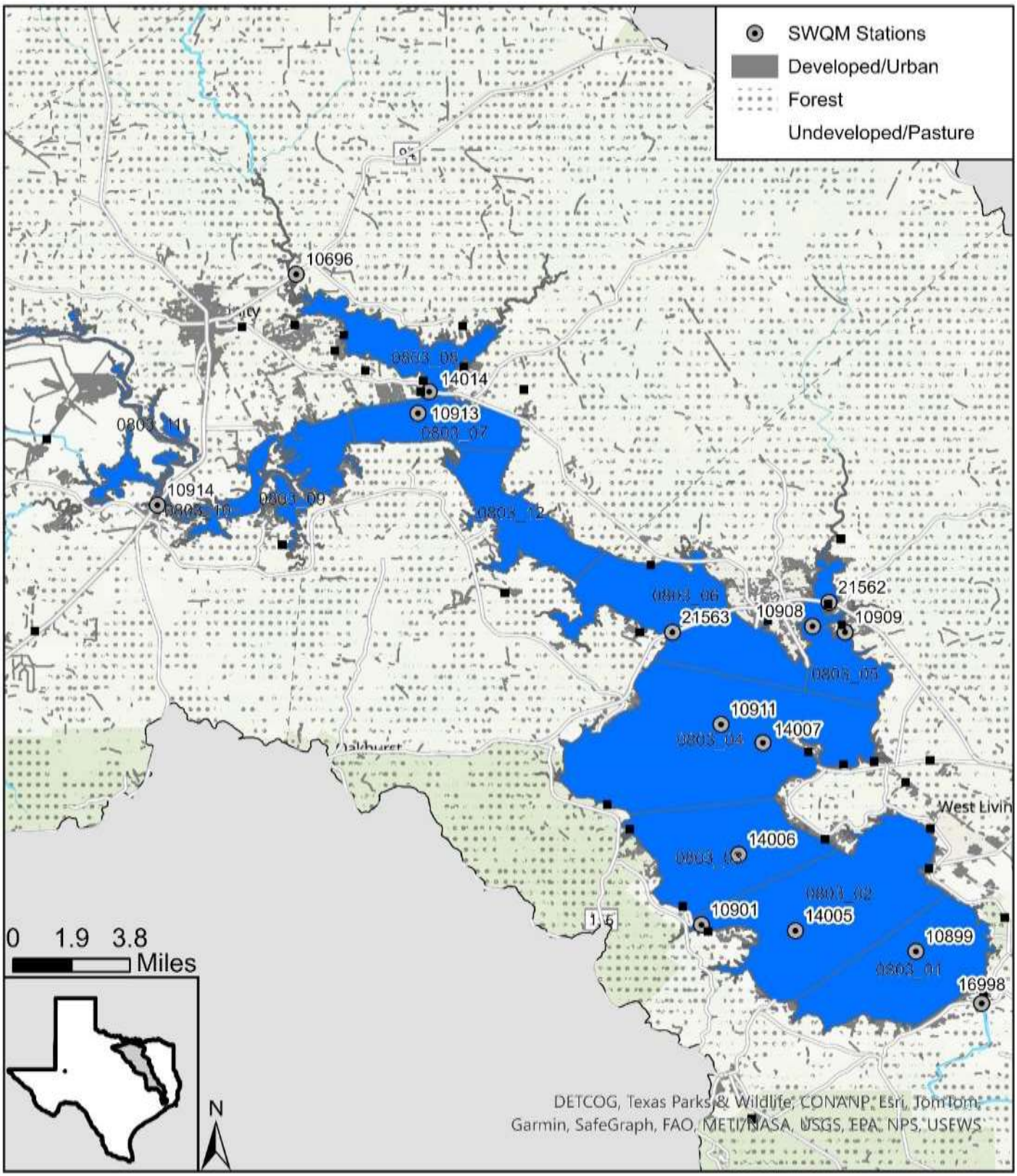

Figure 7: Map of Segment 0803

Segment Description

This 82,600-acre segment impounds 1,750,000 acre-feet of water along the Trinity River. It stretches from a point 1.1 miles upstream of Boggy Creek in Houston/Leon County to the Livingston Dam in Polk/San Jacinto County, up to a normal pool elevation of 131 feet.

Assessment Units and Monitoring Stations

- **0803_01** - Lowermost portion of reservoir, adjacent to dam
  - **10899** - Lake Livingston in main pool near dam at TRA Bouy #2 4.25 km west of intersection of FM 1988 and FM 3128
    - Sampling conducted by Lake Livingston Project from 2015 to 2024
- **0803_02** - Lower portion of reservoir, East Wolf Creek
  - **14005** - Lake Livingston USGS site BC 550 meters south and 2.32 km east of intersection of Walnut Point Driver and Cape Royale
  - **10901** - Lake Livingston at Wolf Creek confluence TRA 16 820 meters east and 150 meters south of intersection of FM 224 and Park Road 60
- **0803_03** - Lower portion of reservoir, East Willow Springs
  - **14006** - Lake Livingston USGS site CC 3.64 km west and 1.31 km south of intersection of FM 3277 and Normagene Street
- **0803_04** - Middle portion of reservoir, East Pointblank
  - **10911** - Lake Livingston 4.39 km east and 1.17 km south of intersection of US 190 and FM 980 west of Onalaska
  - **14007** - Lake Livingston USGS site DL 1.27 km north and 2.81 km west of intersection of FM 3277 and FM 2457
    - Sampling conducted by Lake Livingston Project in 2015, 2016, and 2018
- **0803_05** - Middle portion of reservoir, downstream of Kickapoo Creek
  - **10909** - Lake Livingston in Kickapoo Creek bay channel 66 meters west of intersection of Noel Point and Pinegrove Drive TRA #12
    - Sampling conducted by Lake Livingston Project in 2014
  - **21562** - Lake Livingston at US 190 in Kickapoo Creek bay channel east of Onalaska TRA #12
    - Sampling conducted by Lake Livingston Project from 2015 to 2024
  - **10908** - Lake Livingston in Kickapoo Creek bay 782 meters east and 115 meters south of intersection of Lakefront Driver and Whisperwood Drive
- **0803_06** - Middle portion of reservoir, centering on US 190
  - **21563** - Lake Livingston main body at US 190 west of Onalaska
    - Sampling conducted by Lake Livingston Project from 2015 to 2024
- **0803_07** - Upper portion of reservoir, west of Carlisle
  - **10913** - Lake Livingston 1.8 km south and 496 meters east of intersection of FM 356 and Davis Road in main channel near mouth of White Rock Creek bay TRA 6
    - Sampling conducted by Lake Livingston Project from 2015 to 2024
- **0803_08** - Cove off upper portion of reservoir, East Trinity
  - **14014** - Lake Livingston USGS site HC 280 meters south and 363 meters east of intersection of 2nd Street and FM 356
    - Sampling conducted by Lake Livingston Project from 2015 to 2018
- **0803_09** - West Carolina Creek cove, off upper portion of reservoir
- **0803_10** - Upper portion of reservoir, centering on SH 19
  - **10914** - Lake Livingston at SH 19 south of Trinity of USGS site JC
    - Sampling conducted by Lake Livingston Project from 2015 to 2024
- **0803_11** - Riverine portion of reservoir, centering on SH 21
  - **10917** - Lake Livingston headwaters at SH 21 northeast of Midway TRA 97
    - Sampling conducted by Lake Livingston Project from 2015 to 2024
- **0803_12** - Remainder of reservoir

Figure 8: Lake Livingston near Pine Island

Hydrology

Segment 0803 is a reservoir on a sixth order stream. It is a water supply reservoir and has no flood control or flood storage capacity. Therefore, it is operated as a run-of-the-river system; discharge mirrors inflows and elevations to maintain the normal pool elevation of 131 feet. Over the period of record for this report, the median elevation was 131.14 feet with a range of 126.88 to 133.45 feet. The median elevations for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 131.12 feet
- Index Period – 131.23 feet
- Critical Period – 131.14 feet

Land Use and Natural Characteristics

This segment begins in the Southern Post Oak Savanna where the land use is hay and pastureland and transitions to the forested Southern Tertiary Uplands ecoregion. There are several developed areas in the communities around the reservoir. Lake Livingston has been noted as being eutrophic by the TCEQ Trophic Classification of Texas Reservoirs report.

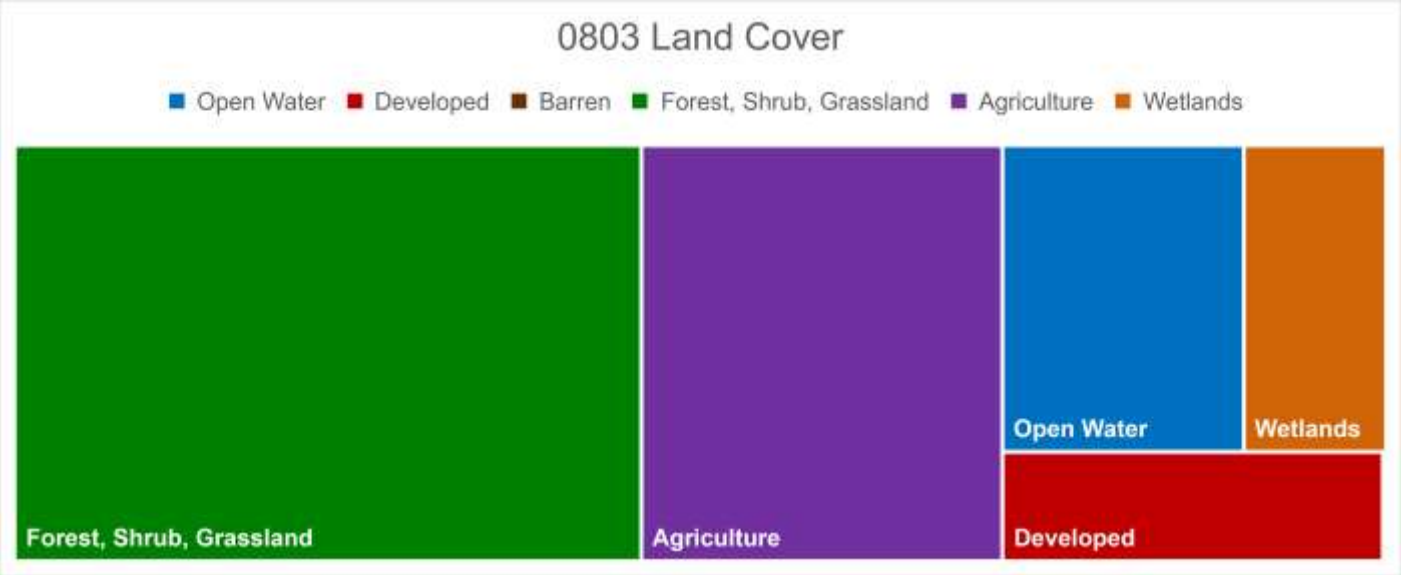

Figure 9: 0803 relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of conventional, bacteria, and field parameters and metals twice a year at Station 10899 conducted by Trinity River Authority Lake Livingston Project.
- Routine quarterly monitoring of conventional, bacteria, and field parameters and metals twice a year at Station 21562 conducted by Trinity River Authority Lake Livingston Project.
- Routine quarterly monitoring of conventional, bacteria, and field parameters and metals twice a year at Station 21563 conducted by Trinity River Authority Lake Livingston Project.
- Routine quarterly monitoring of conventional, bacteria, and field parameters and metals twice a year at Station 10913 conducted by Trinity River Authority Lake Livingston Project.
- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 10914 conducted by Trinity River Authority Lake Livingston Project.
- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 10917 conducted by Trinity River Authority Lake Livingston Project.

Description of Water Quality Issue

This segment was found to have a concern due to depressed dissolved oxygen levels in Assessment Unit 0803_09. Table 3 shows a summary of the TCEQ 2022 Texas Integrated Report. As there has been no recent monitoring, this concern has been carried forward from previous assessments. Figure 10 shows the data for the full period of record at Station 14011 in Assessment Unit 0803_09 with three samples reported below the screening level of 5 mg/L over an 11-year period.

Table 3: Summary of Aquatic Life Use data for Segment 0803

	2022 Integrated Report Data
AU	0803_09
Method	Dissolved Oxygen grab screening level
Criteria	5
# Data Assessed	0
# Exceedances	.
Mean Exceedances	.
DS Qualifier	ID
LOS	NA
CF	Y
Int LOS	CS

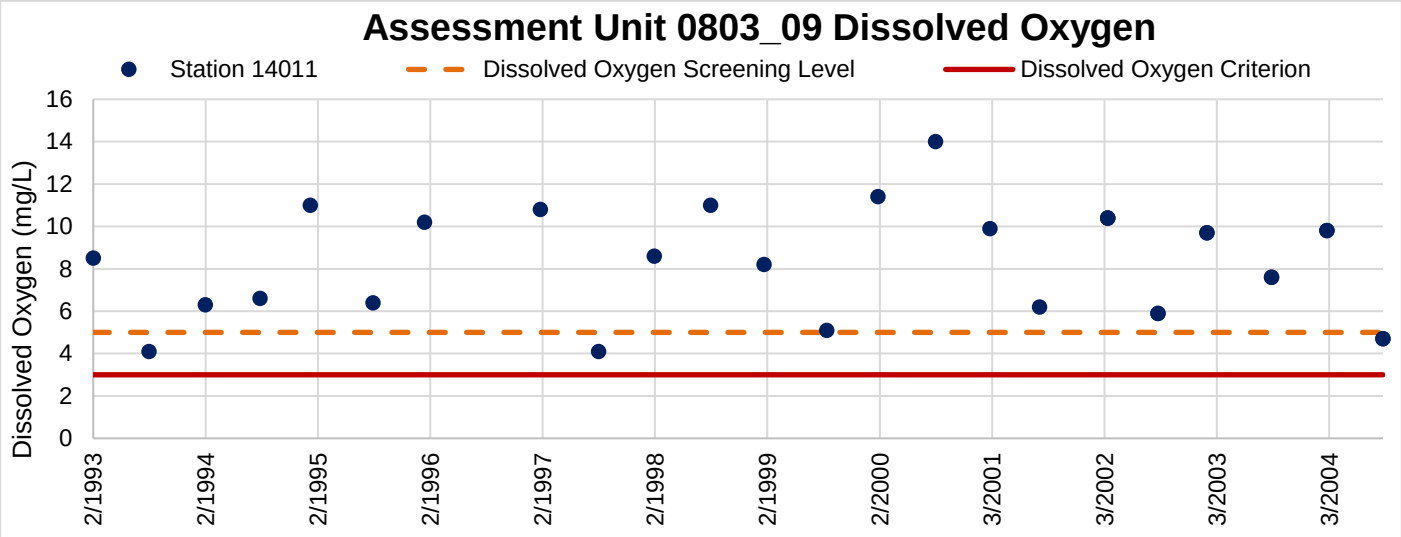

Figure 10: Assessment Unit 0803_09 Dissolved Oxygen

Potential Causes of Water Quality Issue

There are no current data available to address the carry forward concern for Dissolved Oxygen in Assessment Unit 0803_09. The most recent data collected in this area was in 2004. There was a moderate inverse correlation between dissolved oxygen and water temperature (coefficient = -0.468). This indicates that the concern is somewhat related to warmer water temperatures, however, there were only field data available at this site. This assessment unit is in the upper riverine portion of the reservoir and is represented by Station 14011. For comparison, Station 10914 is approximately six miles upstream in Assessment Unit 0803_10. The average Dissolved Oxygen level at this site was 7.96 mg/L and only 2 of the 87 data points were reported below the grab screening level of 5 mg/L. Station 10913 is approximately 5.5 miles downstream in Assessment Unit 0803_07. This is the transition zone from the riverine portion to the main body of the reservoir and the station is near the mouth of the White Rock Creek cove. The average Dissolved Oxygen level at this site was 8.88 mg/L and none of the 26 data points were reported below the grab screening level of 5 mg/L.

Recommendations for Improving Water Quality

It is recommended that monitoring be added in Assessment Unit 0803_09 to further assess this concern.

Potential Stakeholders

- Landowners
- Homeowners and homeowners associations
- City of Riverside
- Camp Olympia
- Whispering Pines Golf Club
- City of Sebastopol
- Sam Houston Electric Supply Station
- City of Point Blank
- City of Carlisle
- City of Onalaska
- Sandy Creek Resort Campground
- City of Blanchard
- Shannon Lynn Goins
- Texas Parks and Wildlife Department
- TRA Lake Livingston Project
- Communities bordering Lake Livingston

0804G – Catfish Creek

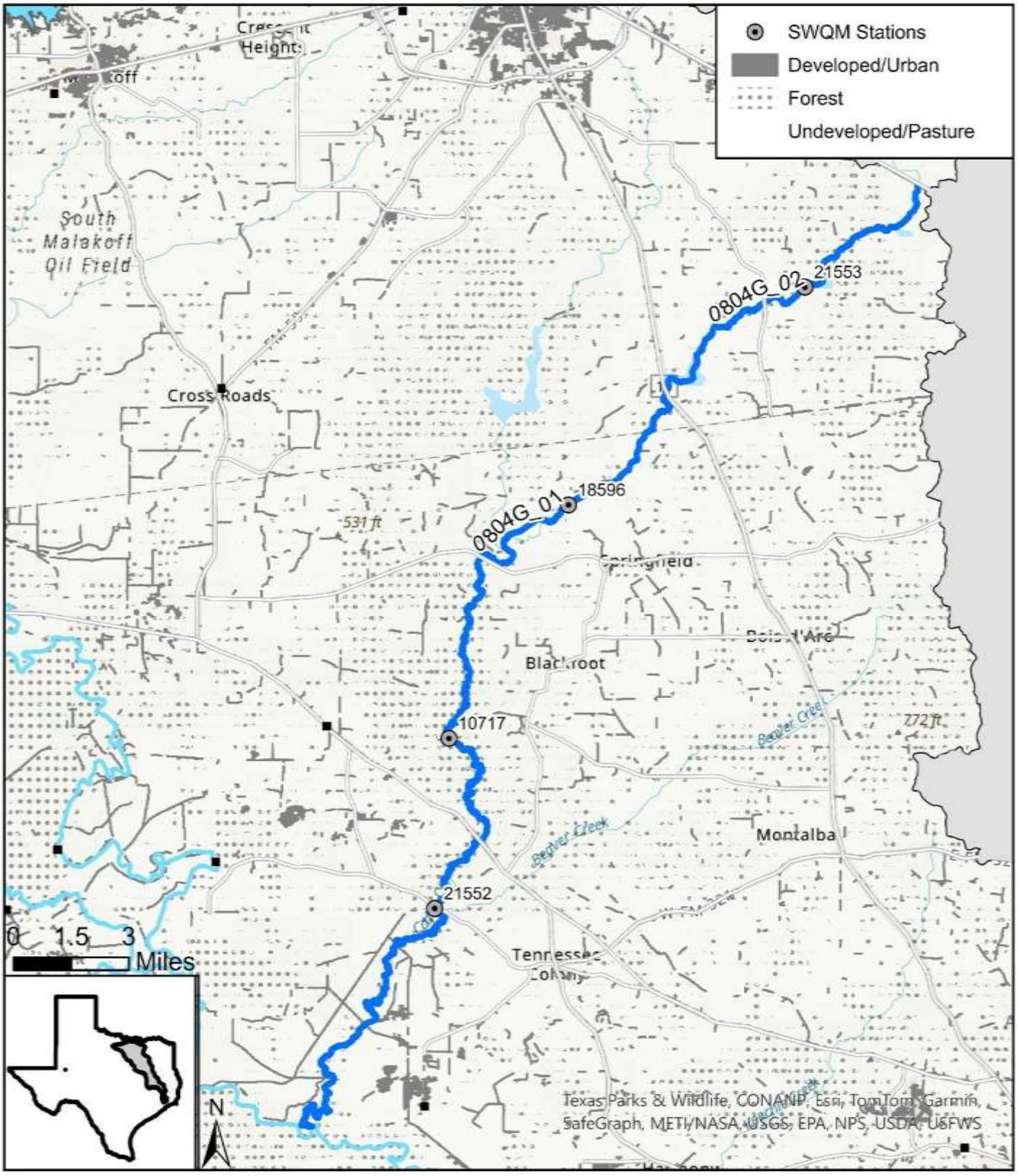

Figure 11: Map of Segment 0804G

Segment Description

This unclassified segment is a 45.5-mile stretch of Catfish Creek running from US 175E southeast of Athens in Henderson County to the confluence with the Trinity River in Freestone/Anderson Counties.

Assessment Units and Monitoring Stations

- **0804G_01** - From the confluence with Trinity River upstream to the confluence with Wolf Creek
  - Perennial freshwater stream
  - **10717** - Catfish Creek immediately downstream of unnamed road 1.70 kilometers downstream of confluence with Long Creek in Engling Wildlife Management Area at camp site #3 2.6 miles east of Bethel
    - Sampling conducted by TCEQ from 2015 to 2024
- **0804G_02** –From the confluence with Wolf Creek upstream to US 175E southeast of Athens
  - Perennial freshwater stream

Hydrology

Unclassified segment 0804G is a fourth order stream at its most downstream end. Based on sampling at Station 10717, the median flow was 10 cfs with a range of 4.2 to 26 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 16.5 cfs
- Index Period – no data
- Critical Period – 10 cfs

Land Use and Natural Characteristics

The watershed is rural and is mainly hay and pastureland with some grassland and small areas of forest. It lies within the Northern Post Oak Savanna.

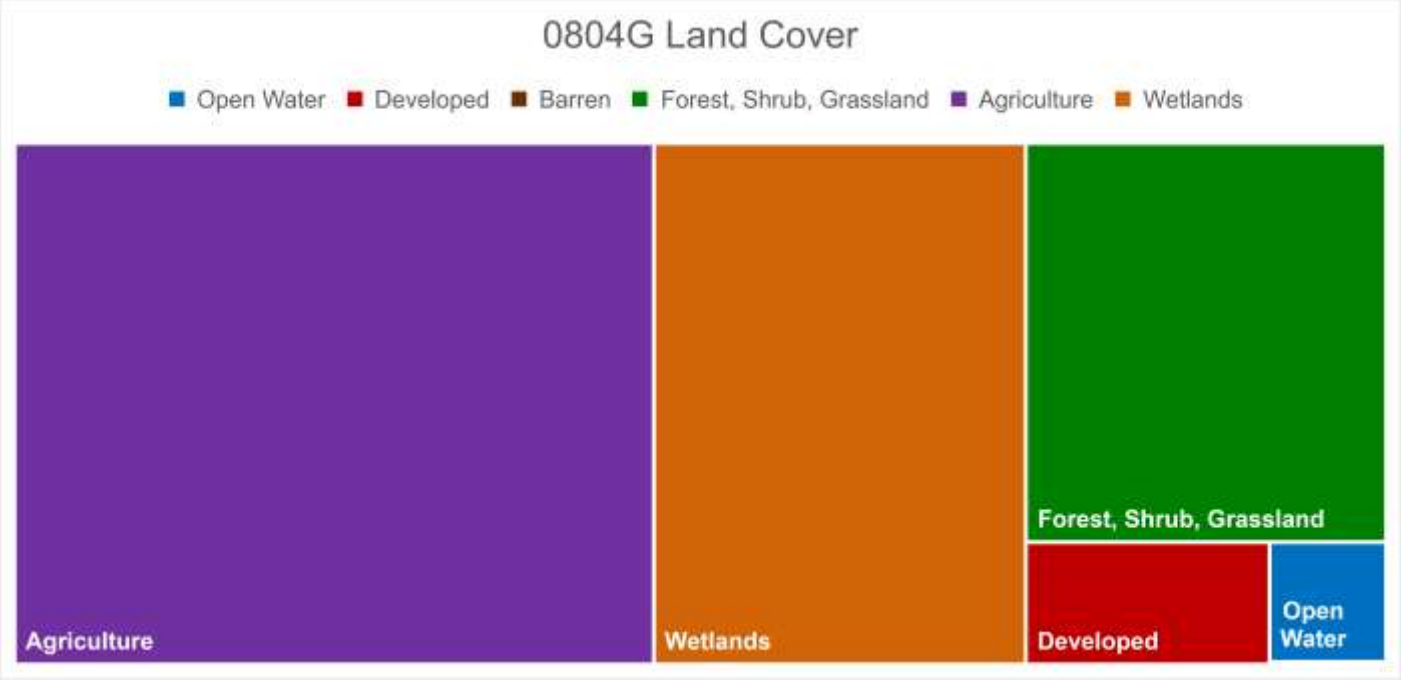

Figure 12: 0804G relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of diel, conventional, bacteria, flow, and field parameter at Station 10717 conducted by TCEQ Region 5.

Description of Water Quality Issue

This segment was found to have an impairment and a concern due to depressed dissolved oxygen levels. Table 4 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. The impairment was first identified in the 2006 Integrated Report when nine samples were assessed and seven were reported below the 24-hour average criterion of 5 mg/L. As shown in the table, this impairment may still exist as half of the more recently collected data at Station 10717 were reported below this criterion. In addition, the concern may continue to exist because 39% of the data were reported below the grab sample screening level of 5 mg/L. These data are shown in Figure 13.

Table 4: Summary of Aquatic Life Use data for Segment 0804G

	2022 Integrated Report Data		BHR POR Data			
AU	0804G_01	0804G_01	0804G_01	0804G_01	0804G_01	0804G_01
Method	Dissolved Oxygen 24hr average	Dissolved Oxygen 24hr minimum	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen 24hr average	Dissolved Oxygen 24hr minimum
Criteria	5	3	3	5	5	3
# Data Assessed	0	0	28	28	6	6
# Exceedances	.	.	2	11	3	0
Mean Exceedances	.	.	2.7	3.66	3.47	.
DS Qualifier	ID	ID	AD	AD	LD	LD
LOS	NA	NA	FS	CS	NS	NC
CF	Y	Y	.	.	.	.
Int LOS	NS (first identified 2006)	CN	.	.	.	.

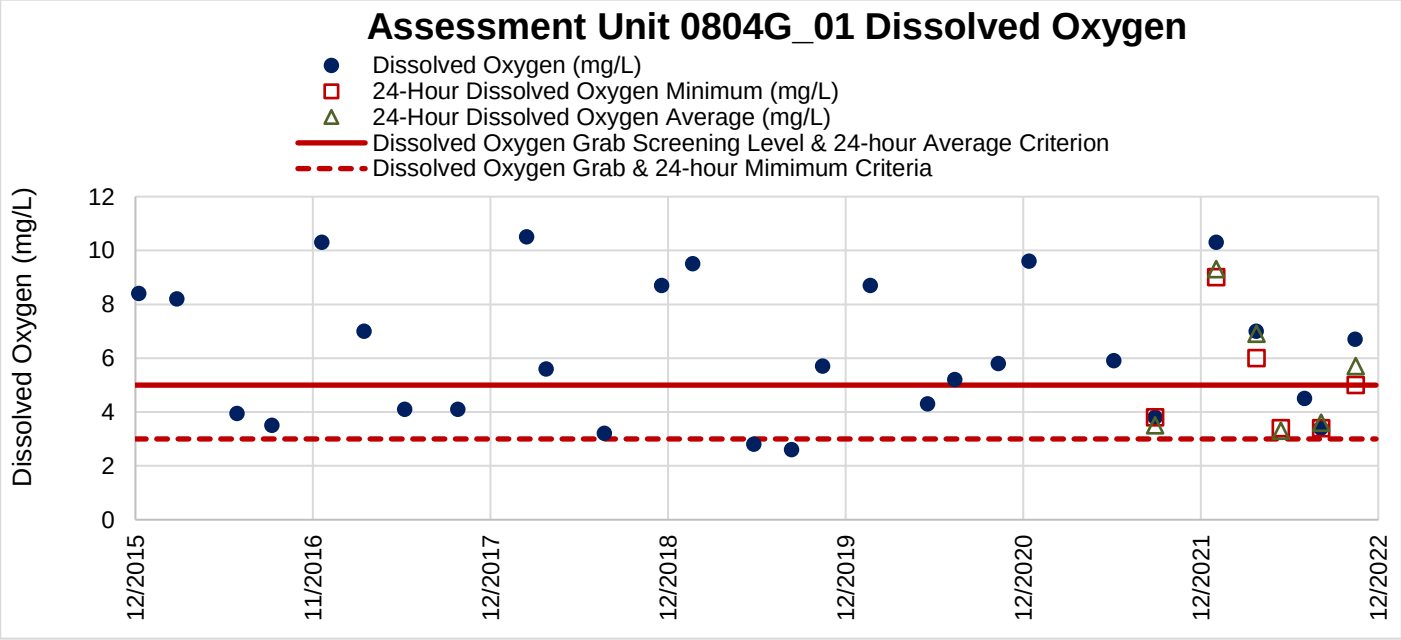

Figure 13: Assessment Unit 0804G_01 Dissolved Oxygen

Potential Causes of Water Quality Issue

The impairment may have been partially related to low stream flows; the correlation coefficient between dissolved oxygen and flow was 0.768. Flow was not reported for all events and was limited to 8 samples with an average of 11 cfs and a range of 4.2 and 26 cfs. Dissolved oxygen had a strong inverse correlation with water temperature (coefficient = -0.96). As water temperature increases, the oxygen saturation potential decreases and can lead to low dissolved oxygen levels. All dissolved oxygen values below 5 mg/L were reported between April and September. There was no correlation between dissolved oxygen and chlorophyll-*a*; it is unlikely that algal populations are affecting dissolved oxygen in this stream.

Recommendations for Improving Water Quality

There are no recommendations for water temperature and flow related impacts on dissolved oxygen. A use attainability analysis may be required to determine if the standards are appropriate for this segment.

Potential Stakeholders

- Catfish Creek Ranch
- Landowners

0804H – Upper Keechi Creek

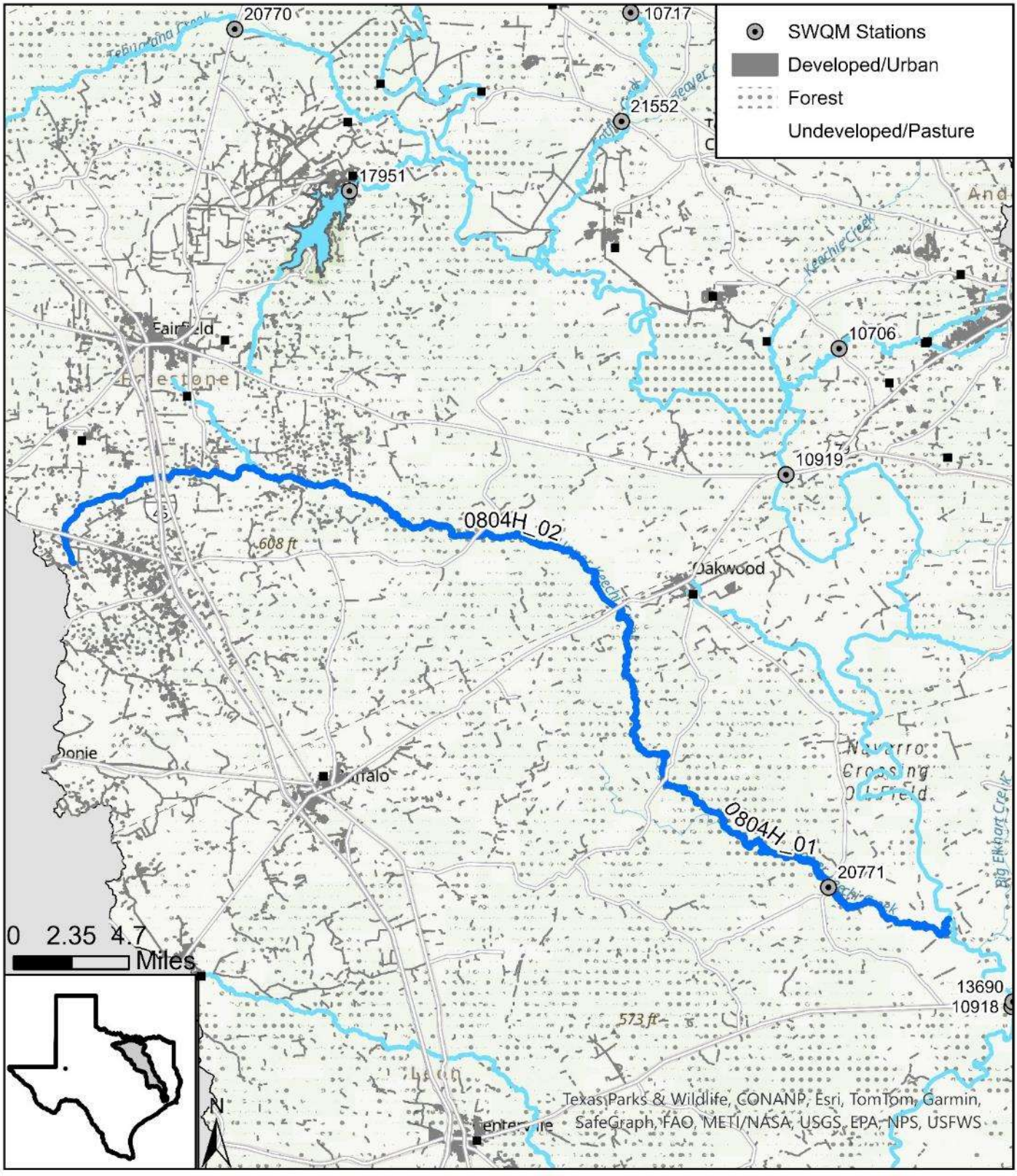

Figure 14: Map of Segment 0804H

Segment Description

This 66.5-mile unclassified segment runs from the headwaters upstream of Route 179 southwest of Fairfield to the confluence with the Trinity River.

Assessment Units and Monitoring Stations

- **0804H_01** – From the confluence with segment 0804 Trinity River up to confluence with Twin Branch
  - Perennial freshwater stream
  - **20771** - Upper Keechi Creek immediately upstream of FM 542 in Leon County
    - Sampling conducted by TCEQ from 2015 to 2024
    - Sampling conducted by Lake Livingston Project from 2021 to 2024
- **0804H_02** - From the confluence with Twin Branch to the upper end Upper Keechi Creek
  - Perennial freshwater stream

Hydrology

Unclassified segment 0804H is a fourth order stream at its most downstream end. There is one USGS flow gage in this segment: 08065200 near Oakwood. In addition, flow estimates are reported at Station 20771. The median flow at the USGS gage was 19.1 cfs with a range of 0 to 14,700 cfs. The median flow at Station 20771 was 50 cfs with a range of 1 to 640 cfs. The median flows at the USGS gage for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 22.4 cfs
- Index Period – 28.15 cfs
- Critical Period – 5.54 cfs

Land Use and Natural Characteristics

The watershed is largely rural with mostly hay and pastureland and some forested areas. There are several oil and gas drilling pads throughout the watershed. It lies within the Southern Post Oak Savanna.

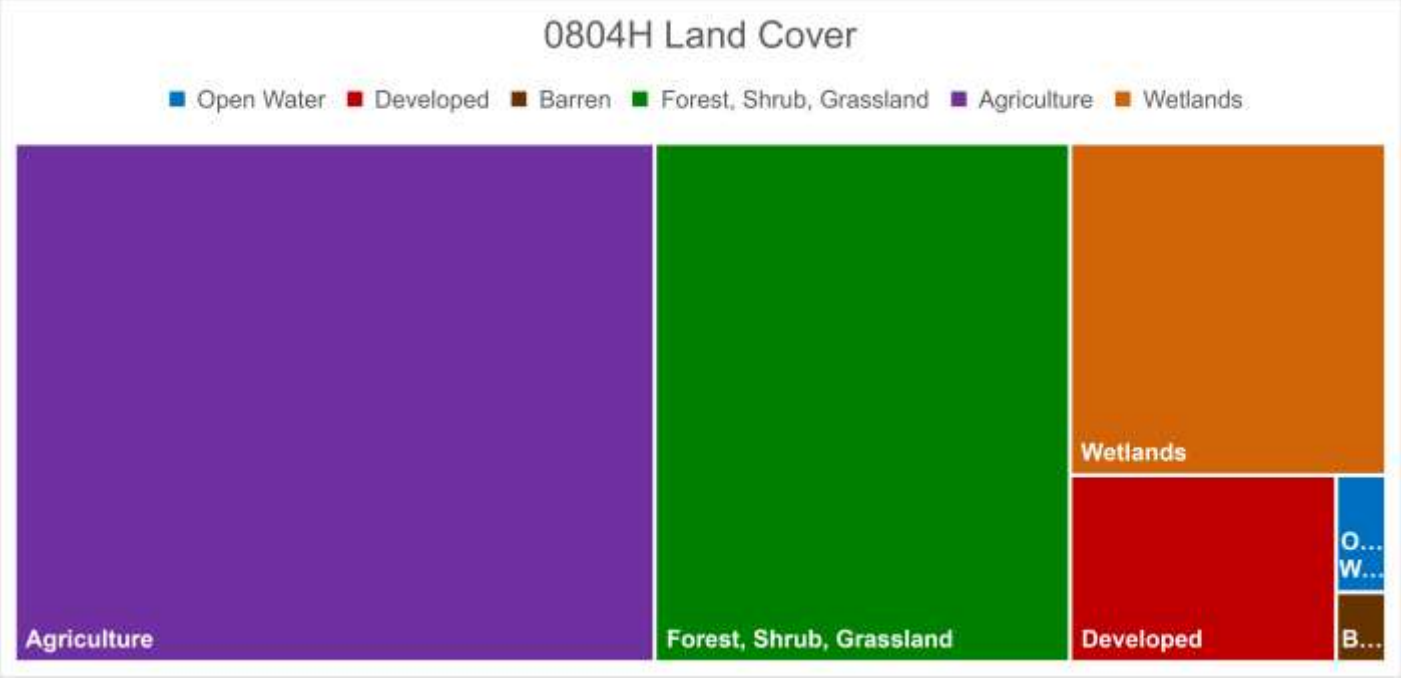

Figure 15: 0804H relative land cover totals

Ongoing Projects

- Routine monitoring of diel and flow parameters twice a year at Station 20771 conducted by Trinity River Authority Lake Livingston Project.
- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 20771 conducted by TCEQ Region 9.

Description of Water Quality Issue

This segment was found to be impaired due to depressed dissolved oxygen levels. Table 5 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. The impairment was first identified in the 2010 Integrated Report. In that assessment, 12 samples were available, and three samples were reported below both the 24-hour average criterion of 5 mg/L and the 24-hour minimum criterion of 3 mg/L. As shown in the table, recent grab sample data have not fallen below these criteria. However, no recent diel data have been collected to further assess 24-hour data.

Table 5: Summary of Aquatic Life Use data for Segment 0804H

	2022 Integrated Report Data		BHR POR Data			
AU	0804H_01	0804H_01	0804H_01	0804H_01	0804H_01	0804H_01
Method	Dissolved Oxygen 24hr average	Dissolved Oxygen 24hr minimum	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen 24hr average	Dissolved Oxygen 24hr minimum
Criteria	5	3	3	5	5	3
# Data Assessed	0	0	24	24	3	3
# Exceedances	.	.	0	0	0	0
Mean Exceedances	.	.	.	.	.	.
DS Qualifier	ID	ID	AD	AD	ID	ID
LOS	NA	NA	FS	NC	NA	NA
CF	Y	Y	.	.	.	.
Int LOS	NS (first identified 2010)	NS (first identified 2010)	.	.	.	.

Potential Causes of Water Quality Issue

It does not appear that dissolved oxygen issues exist in Assessment Unit 0804H_01. There was a weak inverse correlation between dissolved oxygen and chlorophyll-*a* (coefficient = -0.324). This indicates that algal populations may have a slight impact of dissolved oxygen.

Recommendations for Improving Water Quality

It is recommended that diel monitoring be conducted in Assessment Unit 0804H_01 to determine if 24-hour dissolved oxygen impairments remain in this portion of the stream.

Potential Stakeholders

- TRA Lake Livingston Project
- XTO Energy
- Landowners

0804M – Bassett Creek

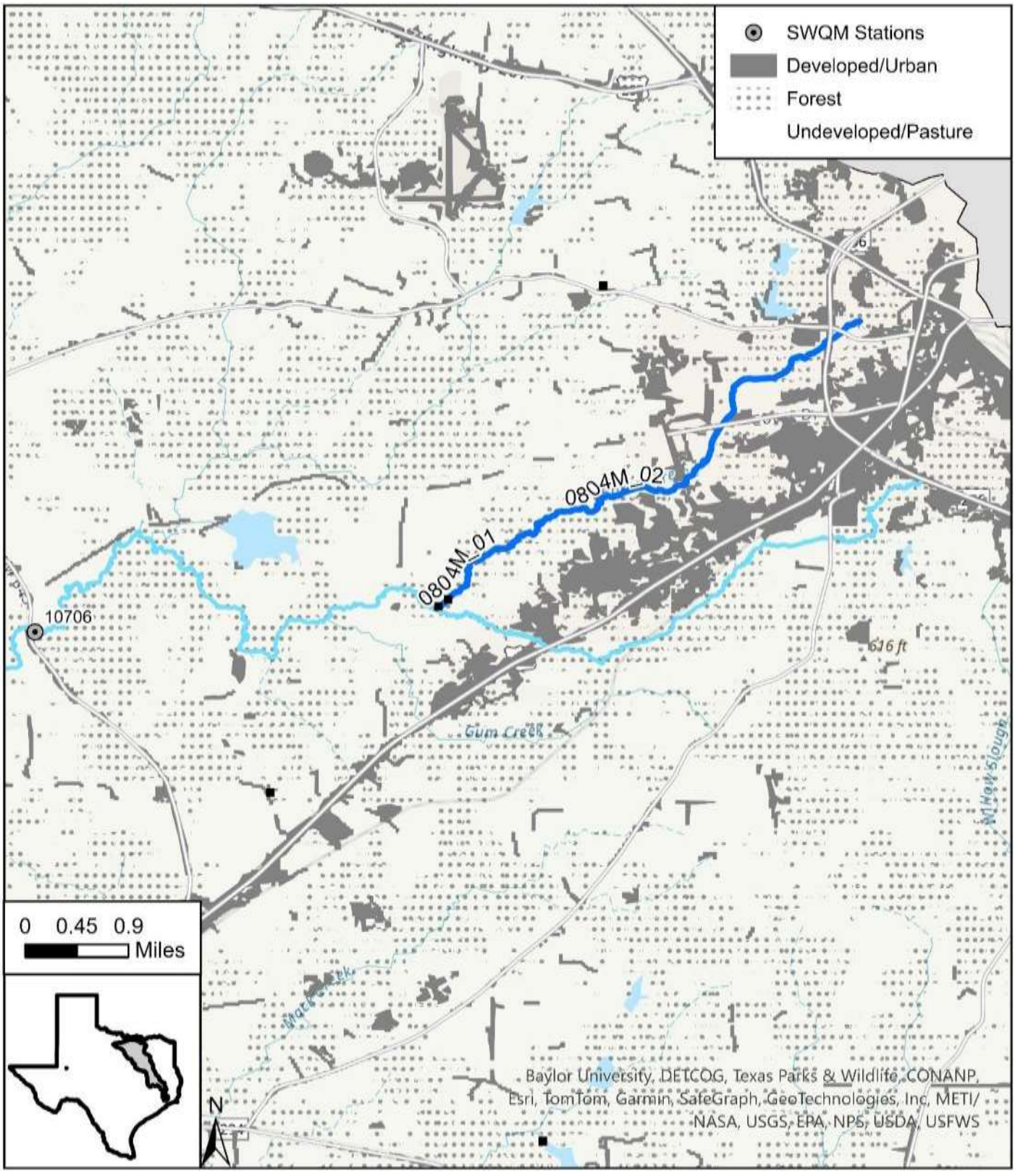

Figure 16: Map of Segment 0804M

Segment Description

This 4.8-mile unclassified segment runs from Blue Lake to the confluence with Town Creek.

Assessment Units and Monitoring Stations

- **0804M_01** - From the confluence with Town Creek upstream to approximately 15m upstream of the processing plant outfall
  - Perennial freshwater stream
- **0804M_02** - From approximately 15m upstream of the processing plant outfall upstream to Blue Lake
  - Perennial freshwater stream

Hydrology

Unclassified segment 0804M is a second order stream at its most downstream end. There are no flow data available for this segment.

Land Use and Natural Characteristics

This segment flows through the Tertiary Uplands ecoregion. Much of the watershed to the north of the stream consists of hay and pasture with some forested areas. The land to the south of the stream is more developed around the City of Palestine and along the US 79 corridor.

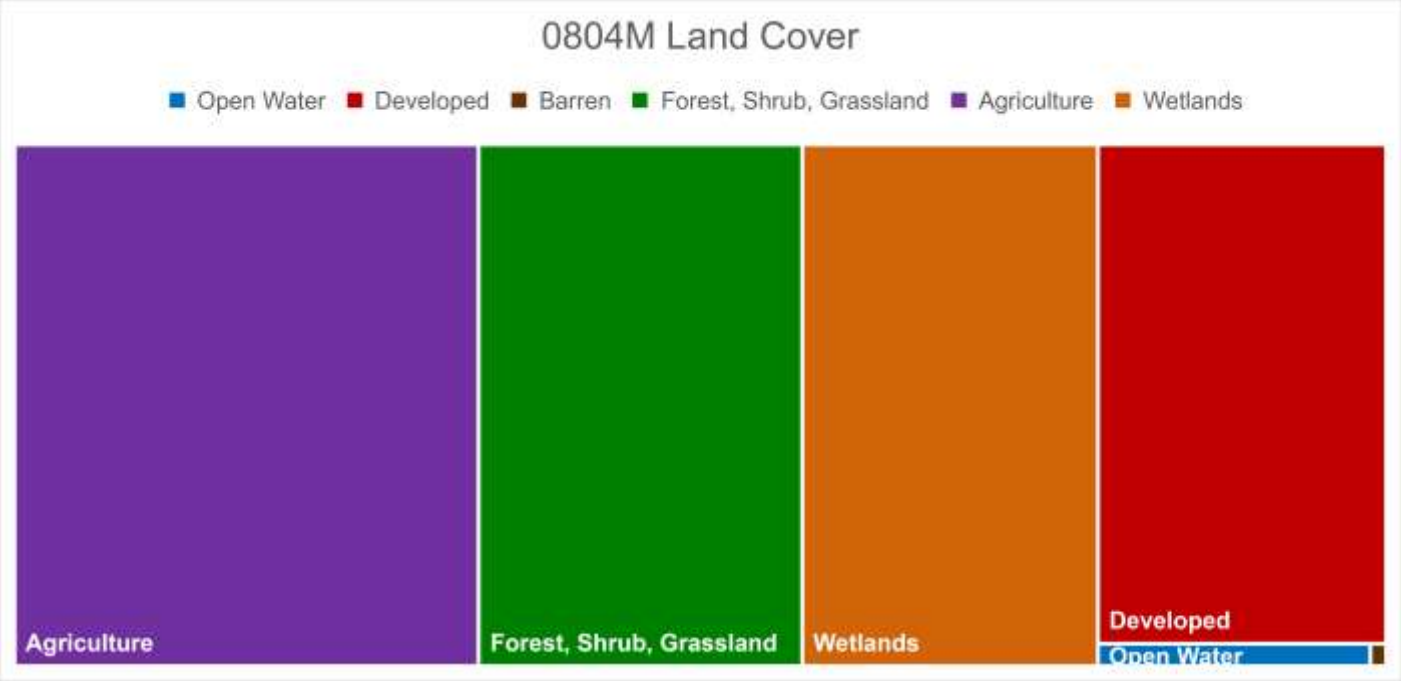

Figure 17: 0804M relative land cover totals

Ongoing Projects

No monitoring being conducted in this segment.

Description of Water Quality Issue

This segment was found to have impaired fish and macrobenthic communities in Assessment Unit 0804M_01 and a concern for the near non-attainment of the standard for macrobenthic communities in Assessment Unit 0804M_02. Table 6 shows a summary of the TCEQ 2022 Texas Integrated Report. No more recent aquatic life monitoring has been conducted.

Table 6: Summary of Aquatic Life Use data for Segment 0804M

	2022 Integrated Report Data		
AU	0804M_01	0804M_01	0804M_02
Method	Fish Community (Regional)	Macrobenthic community (Qualitative)	Macrobenthic community (Qualitative)
Criteria	42	30	30
# Data Assessed	4	4	4
Mean Data Assessed	38	29	29
# Exceedances	.	.	.
Mean Exceedances	.	.	.
DS Qualifier	AD	AD	AD
LOS	NS	NS	NS
CF	N	N	N
Int LOS	NS (first identified 2018)	NS (first identified 2018)	CN

Potential Causes of Water Quality Issue

This stream has had aquatic life monitoring conducted in the past by the Texas Parks and Wildlife Department due to receiving effluent from a chicken processing facility. TRA conducts routine water quality monitoring downstream of this facility on Town Creek (segment 0804L).

Recommendations for Improving Water Quality

It is recommended that additional aquatic life monitoring be conducted in this segment to determine if the impairments and concern still exist.

Potential Stakeholders

- City of Palestine
- City of Palestine Wastewater Treatment Facility
- Sanderson Farms Palestine Processing Plant
- Landowners

0806 – West Fork Trinity River Below Lake Worth

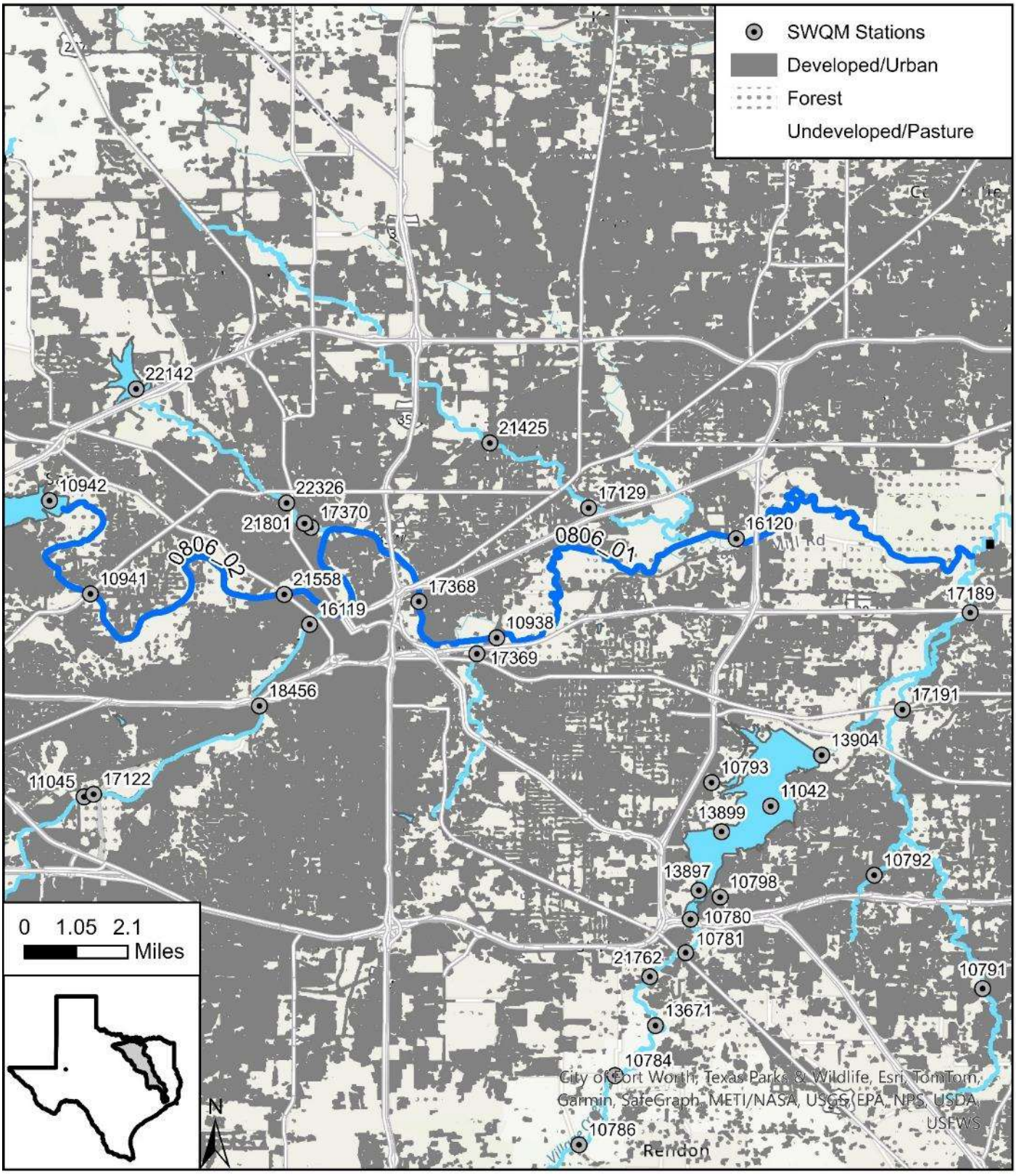

Figure 18: Map of Segment 0806

Segment Description

This 31.5-mile segment of the West Fork Trinity River travels southeast from the Lake Worth dam to the confluence of Village Creek in Tarrant County.

Assessment Units and Monitoring Stations

- **0806_01** - From confluence of Village Creek upstream to confluence of Clear Fork Trinity River
  - Perennial freshwater stream
  - **10938** - West Fork Trinity River 54 meters downstream of Beach Street in Fort Worth
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
    - Sampling conducted by Fort Worth from 2015 to 2021
  - **16120** - West Fork Trinity River 260 meters downstream of Handley Ederville Road 0.55 kilometers upstream of IH 820 in Fort Worth
    - Sampling conducted by Fort Worth from 2015 to 2024
  - **17368** - West Fork Trinity River immediately downstream of 4th Street east of Fort Worth
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
    - Sampling conducted by Fort Worth from 2015 to 2021
  - **21520** - West Fork Trinity River 1.25 kilometers upstream of East 1st Street off of the Fort Worth Branch Trinity Trails System in Gateway Park in Fort Worth
    - Sampling conducted by TRA in 2015
- **0806_02** - From confluence of Clear Fork Trinity River upstream to Lake Worth Dam
  - Perennial freshwater stream
  - **21558** - West Fork Trinity River at boat ramp immediately upstream of Jacksboro Highway/SH 199 in Fort Worth
    - Sampling conducted by Fort Worth from 2015 to 2024

Hydrology

Segment 0806 is a fifth order stream. There are three USGS flow gages in this segment: 08045550 at White Settlement Road in Fort Worth, 08048000 at Fort Worth, and 08048543 at Beach Street in Fort Worth. The median flow at these gages ranged from 11.9 cfs at the upstream White Settlement Road gage to 63.85 cfs at the downstream Beach Street gage with a range of 0 to 13,000 cfs at these gages. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these three gages are listed below.

- Non-Index Period – 13.2 to 67.7 cfs
- Index Period – 15.55 to 102 cfs
- Critical Period – 9.22 to 40.8 cfs

Land Use and Natural Characteristics

A majority of the segment is heavily developed around the cities of White Settlement, Fort Worth, Haltom City, and Arlington. There are some forested areas directly adjacent to the river. This segment begins in the Grand Prairie and ends in the Eastern Cross Timbers ecoregion.

Figure 19: 0806 relative land cover totals

Figure 20: West Fork Trinity River downstream of SH 183 in Fort Worth

Ongoing Projects

- Routine quarterly monitoring of metal, conventional, bacteria, flow, and field parameters at Station 10938 conducted by Tarrant Regional Water District.
- Routine monthly monitoring of field parameters and quarterly monitoring of bacteria at Station 16120 conducted by City of Fort Worth.
- Routine quarterly monitoring of metal, conventional, bacteria, and field parameters at Station 17368 conducted by Tarrant Regional Water District.
- Routine monthly monitoring of field parameters and quarterly monitoring of bacteria at Station 21558 conducted by City of Fort Worth.

Description of Water Quality Issue

This segment was found to have concerns for depressed dissolved oxygen levels in Assessment Units 0806_01 and 0806_02. Table 7 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on more recently collected data, the concern may still exist in Assessment Unit 0806_02 due to data collected at Station 21558 (Figure 21).

Table 7: Summary of Aquatic Life Use data for Segment 0806

	2022 Integrated Report Data				2024 BHR POR Data			
AU	0806_01	0806_01	0806_02	0806_02	0806_01 Station 10938	0806_01 Station 10938	0806_01 Station 16120	0806_01 Station 16120
Method	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level
Criteria	3	5	3	5	3	5	3	5
# Data Assessed	268	268	72	72	76	76	84	84
# Exceedances	2	27	0	11	0	6	0	4
Mean Exceedances	2.55	4.19	.	4.12	.	4.22	.	4.6
DS Qualifier	AD	AD	AD	AD	AD	AD	AD	AD
LOS	FS	CS	FS	CS	FS	NC	FS	NC
CF	N	N	N	N	.	.	.	.
Int LOS	FS	CS	FS	CS	.	.	.	.

Table 7 continued

	2024 BHR POR Data								
AU	0806_01 Station 17368	0806_01 Combined	0806_01 Combined	0806_02 Station 10941	0806_02 Station 10941	0806_02 Station 21558	0806_02 Station 21558	0806_02 Combined	0806_02 Combined
Method	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level
Criteria	5	3	5	3	5	3	5	3	5
# Data Assessed	81	241	241	1	1	83	83	84	84
# Exceedances	6	0	16	0	0	1	11	1	11
Mean Exceedances	4.17	.	4.29	.	.	0.7	3.79	0.7	3.79
DS Qualifier	AD	AD	AD	ID	ID	AD	AD	AD	AD
LOS	NC	FS	NC	NA	NA	FS	CS	FS	CS
CF	.	.	.	.	.	.	.	.	.
Int LOS	.	.	.	.	.	.	.	.	.

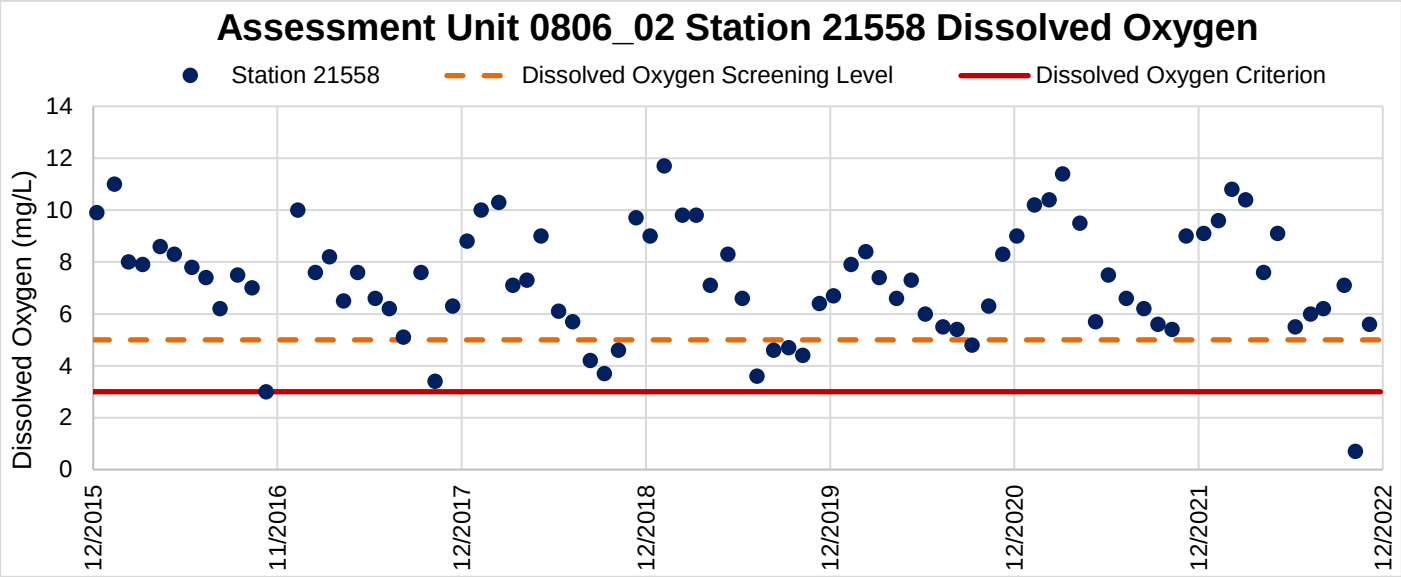

Figure 21: Assessment Unit 0806_02 Station 21558 Dissolved Oxygen

Potential Causes of Water Quality Issue

There are no chlorophyll-*a* data available for Station 21558 in Assessment Unit 0806_02 to determine if algal populations may be affecting dissolved oxygen levels. There was a strong inverse correlation between dissolved oxygen and water temperature (coefficient = -0.628). Dissolved oxygen saturation potential decreases with increasing temperature.

There is some evidence of inverse correlations between dissolved oxygen and chlorophyll-*a* at Stations 10938 and 17368 in Assessment Unit 0806_01 but these are based on 9 and 4 samples at each station, respectively. Regardless, based on the correlation coefficient of -0.624 at Station 10938, algal populations are likely affecting dissolved oxygen levels. Strong inverse correlations to water temperature were seen at all three stations in this assessment unit (coefficients between -0.719 and -0.827). Dissolved oxygen saturation potential decreases with increasing temperature.

Recommendations for Improving Water Quality

There are no recommendations for water temperature related impacts on dissolved oxygen.

Algal populations in the Trinity River, and therefore dissolved oxygen levels, may be difficult to control as there are multiple reservoirs, ponds, and streams that contribute to the system by Segment 0806. Further, nutrients were not directly correlated to chlorophyll-*a* values in this segment.

Potential Stakeholders

- City of Fort Worth
- Tarrant Regional Water District
- YMCA Camp Carter
- City of Haltom City

0809 – Eagle Mountain Reservoir

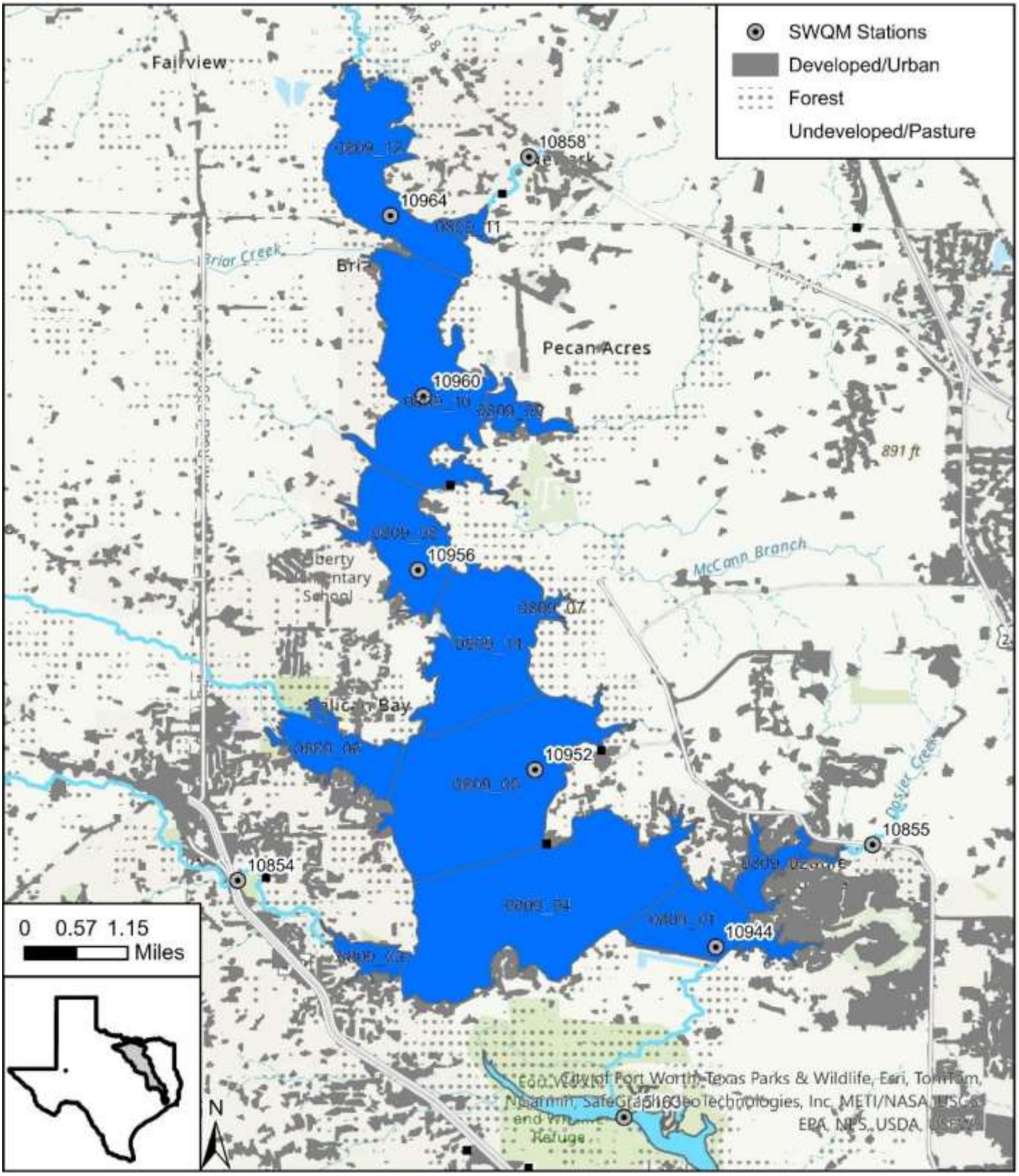

Figure 22: Map of Segment 0809

Segment Description

This 9,004-acre reservoir impounds the West Fork Trinity River from a point 0.4-miles downstream of the confluence of Oates Branch in Wise County to Eagle Mountain Dam in Tarrant County; up to the normal pool elevation of 649.1 feet.

Assessment Units and Monitoring Stations

- **0809_01** - Lowermost portion of reservoir near east end of dam
  - **10944** - Eagle Mountain Reservoir 250 meters north of east edge of dam
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0809_02** - Dosier Slough cove
- **0809_03** - Ash Creek cove
- **0809_04** - Lowermost portion of reservoir near west end of dam
- **0809_05** - Lower portion of reservoir east of Walnut Creek cove
  - **10952** - Eagle Mountain Reservoir 1.5 kilometers west and 308 meters south of intersection between Village Rd and Eagle Mountain Plant Road near Texas Electric
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0809_06** - Walnut Creek cove
- **0809_07** - Old Ranch cove
- **0809_08** - Middle portion of reservoir near Cole subdivision
  - **10956** - Eagle Mountain Reservoir 645 meters west and 485 meters south of intersection of Oakwood Lane and Peden Road near Cole subdivision
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0809_09** - Indian Creek cove
- **0809_10** - Upper portion of reservoir near Indian Creek cove
  - **10960** - Eagle Mountain Reservoir 112 meters north and 818 meters east of intersection of Miller Rd and Gantt Road near Indian Creek cove
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0809_11** - Darrett Creek cove
- **0809_12** - Upper portion of reservoir near Newark Beach
  - **10964** - Eagle Mountain Reservoir 187 meters north and 788 meters east of intersection of Briar Road and Liberty School Road near Newark Beach
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0809_14** - Mid-Lake, from just above Walnut Cr. Cove to Oakwood Rd. peninsula

Hydrology

Segment 0809 is a reservoir on a fifth order stream. It is a water supply and flood control reservoir with a conservation pool elevation of 649.1 feet and a flood pool elevation of 668 feet. Over the period of record for this report, the median elevation was 647.92 feet with a range of 639.91 to 650.98 feet. The median elevations for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 647.52 feet
- Index Period – 649.16 feet
- Critical Period – 648.02 feet

Land Use and Natural Characteristics

Much of the reservoir lies within the Western Cross Timbers with some of the coves on the east side draining the Grand Prairie ecoregion. Most of the shoreline consists of small and residential communities while the remaining watershed is largely grassland interspersed with forested areas, hay, and pasture.

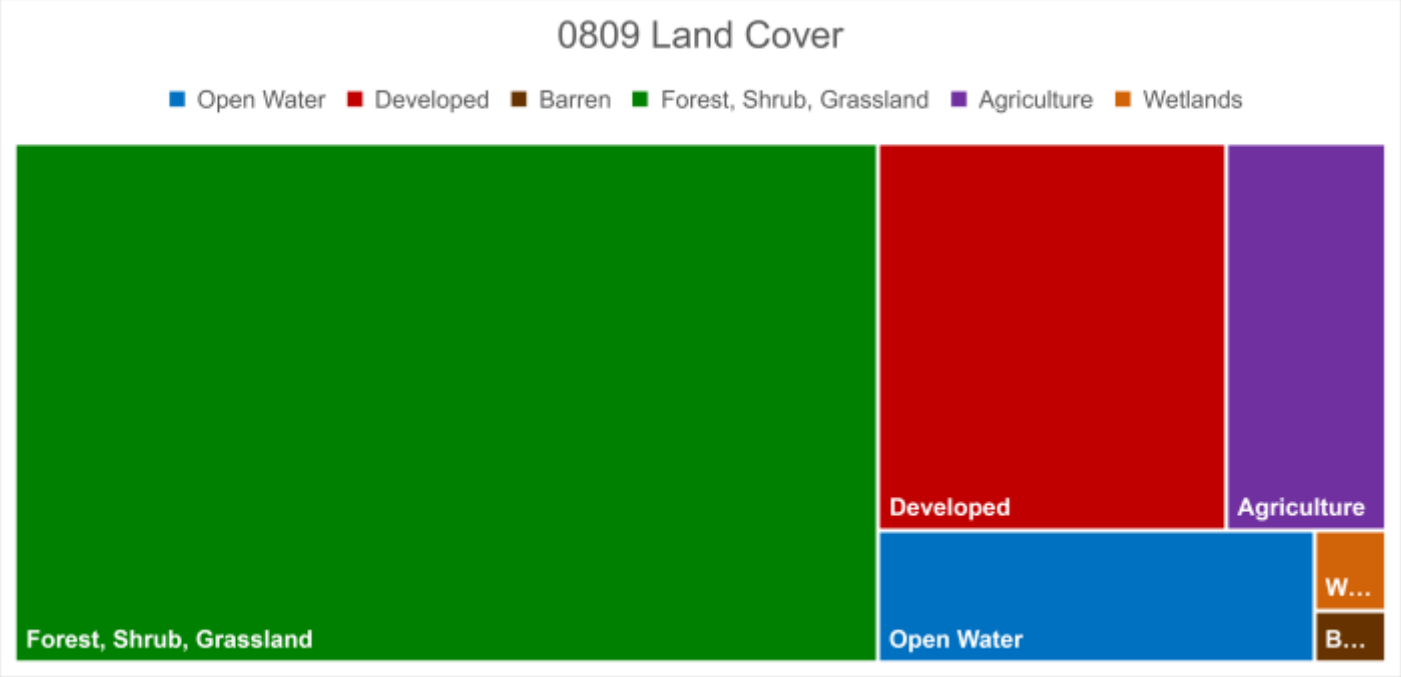

Figure 23: 0809 relative land cover totals

Ongoing Projects

- Routine monitoring of metal, conventional, and field parameters five times a year and bacteria four times a year at Station 10944 conducted by Tarrant Regional Water District.
- Biased to season monitoring of diel parameters twice a year at Station 10944 conducted by Tarrant Regional Water District.
- Routine monitoring of conventional and field parameters five times a year and bacteria four times a year at Station 10952 conducted by Tarrant Regional Water District.
- Routine monitoring of conventional and field parameters five times a year and bacteria four times a year at Station 10956 conducted by Tarrant Regional Water District.
- Routine monitoring of conventional and field parameters five times a year and bacteria four times a year at Station 10960 conducted by Tarrant Regional Water District.
- Routine monitoring of conventional and field parameters five times a year and bacteria four times a year at Station 10964 conducted by Tarrant Regional Water District.

Description of Water Quality Issue

This segment was found to have concerns for depressed dissolved oxygen levels in Assessment Unit 0809_01.

Table 8 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on more recently collected data, the concern may still exist as five samples have been reported below the screening level of 5 mg/L (Figure 24).

Table 8: Summary of Aquatic Life Use data for Segment 0809

	2022 Integrated Report Data		2024 BHR POR Data			
AU	0809_01	0809_01	0809_01	0809_01	0809_01	0809_01
Method	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen 24hr average	Dissolved Oxygen 24hr minimum
Criteria	3	5	3	5	5	3
# Data Assessed	32	32	35	35	7	7
# Exceedances	3	9	1	5	0	0
Mean Exceedances	2.6	3.87	2.5	4.16	.	.
DS Qualifier	AD	AD	AD	AD	LD	LD
LOS	FS	CS	FS	CS	NC	NC
CF	N	N	.	.	.	.
Int LOS	FS	CS	.	.	.	.

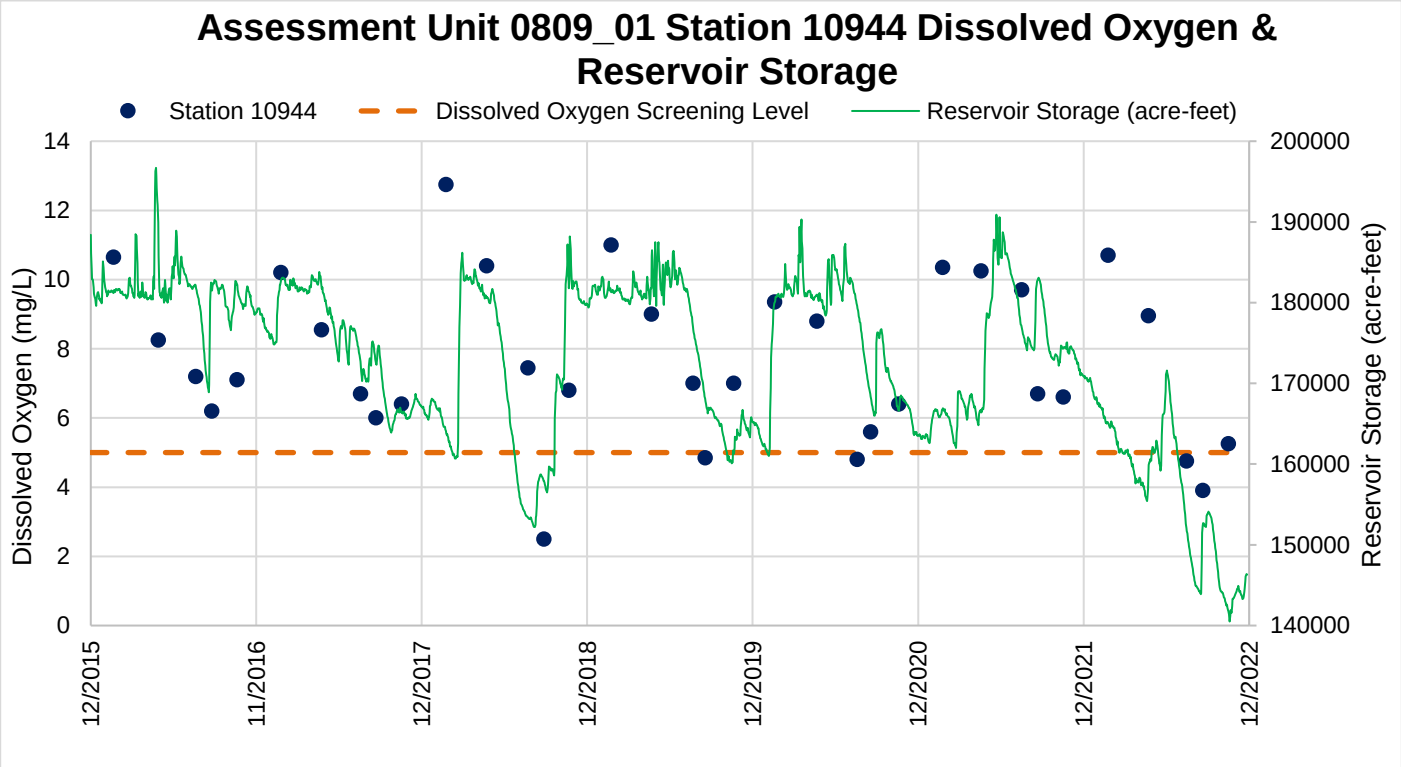

Figure 24: Assessment Unit 0809_01 Station 10944 Dissolved Oxygen & Reservoir Storage

Potential Causes of Water Quality Issue

Dissolved oxygen in Assessment Unit 0809_01 had a moderate inverse correlation to chlorophyll-*a* (coefficient = -0.354) which indicates that algal populations may have some impact on dissolved oxygen concentrations. However, chlorophyll-*a* in this assessment unit was not well correlated with nutrients. Each of the exceedances in the graph above were collected in July or August. It is likely that a mix of algal populations, warm water temperatures, and decreased reservoir storage during the summer months.

Recommendations for Improving Water Quality

There are no recommendations for water temperature or reservoir storage related impacts on dissolved oxygen.

Potential Stakeholders

- Tarrant Regional Water District
- Homeowners and homeowners associations
- Landowners
- Fort Worth Boat Club
- The Resort Golf Club
- Communities around the reservoir
- City of Azle

0818 – Cedar Creek Reservoir

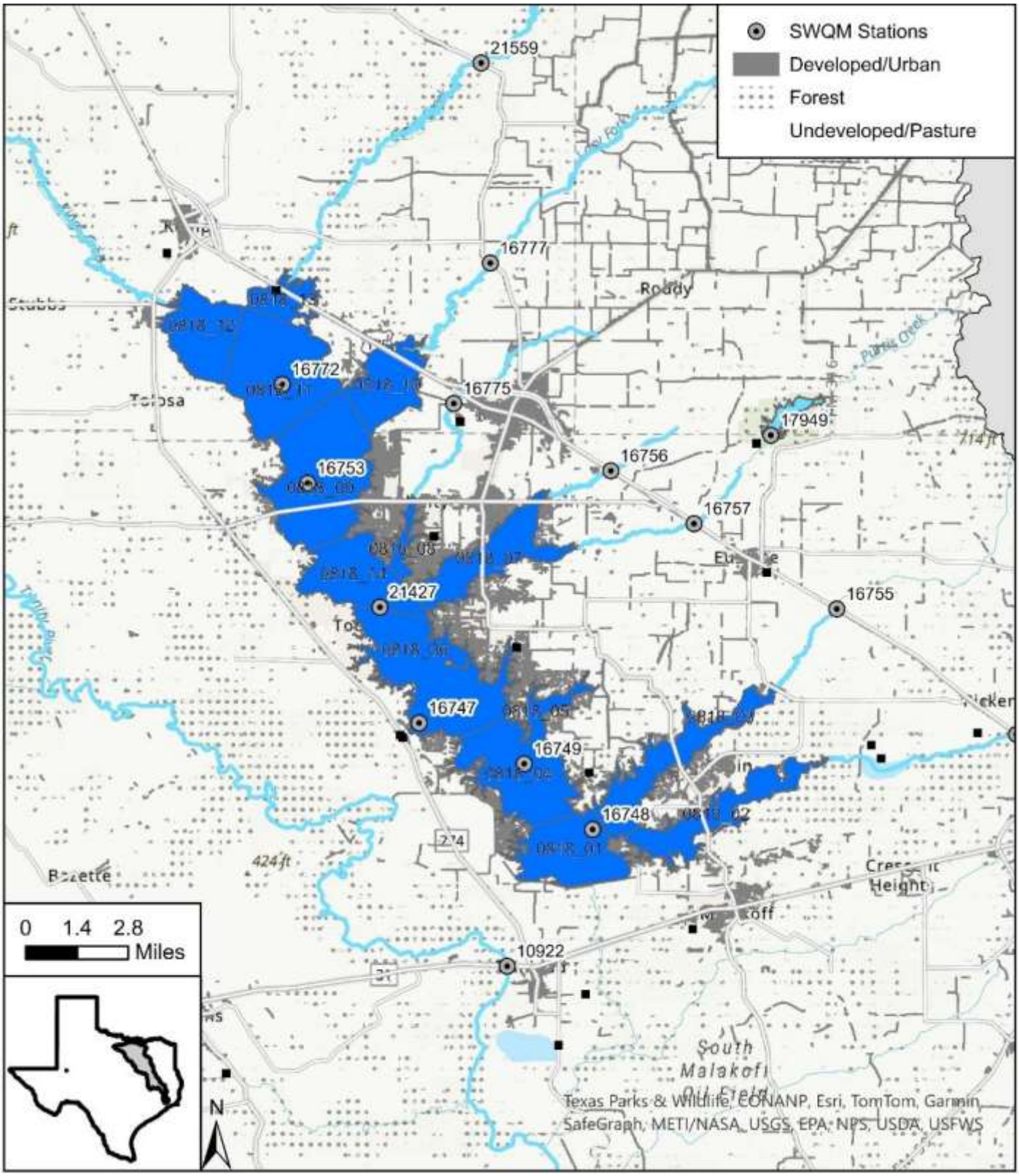

Figure 25: Map of Segment 0818

Segment Description

This 33,028-acre reservoir impounds Cedar Creek to the Joe B. Hoggsett Dam in Henderson County; up to the normal pool elevation of 322 feet.

Assessment Units and Monitoring Stations

- **0818_01** - Lowermost portion of the reservoir, adjacent to the dam
  - **16748** - Cedar Creek Reservoir 710 meters north and 1.01 kilometers west of intersection of Woodlawn Way and Sunset Blvd at confluence of Caney Creek and Clear Creek coves
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
  - **22408** - Cedar Creek Reservoir southwest corner at JCC1 pump station
    - Sampling conducted by Tarrant Regional Water District from 2023 to 2024
- **0818_02** - Caney Creek cove
- **0818_03** - Clear Creek cove
- **0818_04** - Lower portion of reservoir east of Key Ranch Estates
  - **16749** - Cedar Creek Reservoir 1.01 kilometers south and 1.34 km west of intersection of Carolynn Road and Oakview Trail
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0818_05** - Cove off lower portion of reservoir adjacent to Clearview Estates
- **0818_06** - Middle portion of reservoir downstream of Twin Creeks cove
  - **16747** - Cedar Creek Reservoir 12 meters north and 586 meters east of intersection of Ashby Lane and Burley Loop
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0818_07** - Twin Creeks cove
- **0818_08** - Prairie Creek cove
- **0818_09** - Upper portion of reservoir adjacent to Lacy Fork cove
  - **16753** - Cedar Creek Reservoir 1.42 km north and 1.37 kilometers east of intersection of Nob Hill Road and SH 334
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0818_10** - Lacy Fork cove
- **0818_11** - Upper portion of reservoir east of Tolosa
  - **16772** - Cedar Creek Reservoir north mid lake 800 m north and 2.59 kilometers east of intersection of Kaufman CR 4042 and Kaufman CR 4043
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0818_12** - Uppermost portion of reservoir downstream of Kings Creek
- **0818_13** - Cedar Creek Cove
- **0818_14** - Remainder of reservoir
  - **21427** - Cedar Creek Reservoir 1.07 kilometers east and 40 meters north of the Inner Circle upper channel near intersection of Heather Woods Drive and Leisa Place in the City of Tool
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024

Hydrology

Segment 0818 is a reservoir on a fourth order stream. It is a water supply and flood control reservoir with a conservation pool elevation of 322 feet and flood gate elevation of 325 feet. Over the period of record for this report, the median elevation was 321.41 feet with a range of 317 to 322.81 feet. The median elevations for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 321.19 feet
- Index Period – 321.97 feet
- Critical Period – 321.03 feet

Land Use and Natural Characteristics

This reservoir lies within the Northern Post Oak Savanna ecoregion. Much of the shoreline contains small and residential communities. The remainder of the watershed consists of mostly hay and pasture with some interspersed forest and smaller areas of grassland.

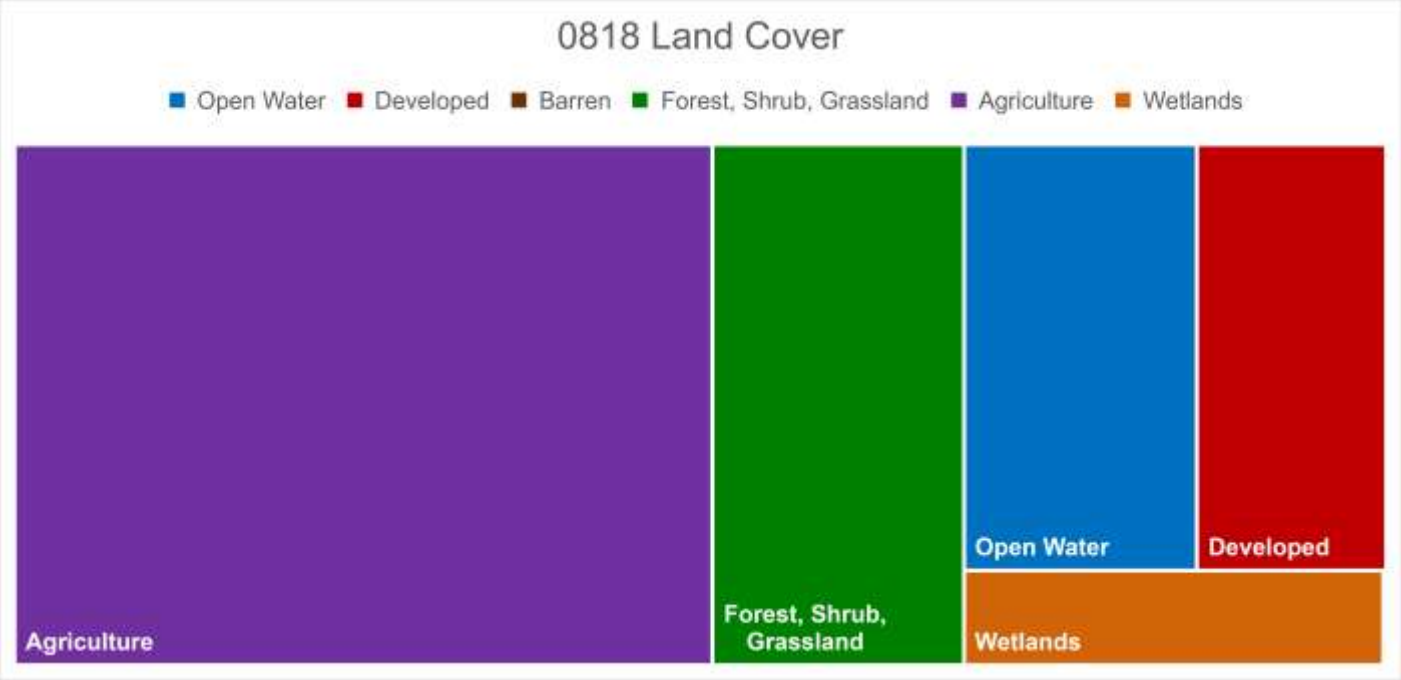

Figure 26: 0818 relative land cover totals

Ongoing Projects

- Routine monitoring of conventional and field parameters five times a year and bacteria four times a year at Station 16748 conducted by Tarrant Regional Water District.
- Routine monthly monitoring of metal, conventional, and field parameters at Station 22408 conducted by Tarrant Regional Water District.
- Routine monitoring of conventional and field parameters five times a year and bacteria four times a year at Station 16749 conducted by Tarrant Regional Water District.
- Routine monthly monitoring of metal, conventional, and field parameters and quarterly monitoring of bacteria at Station 16747 conducted by Tarrant Regional Water District.
- Biased to season monitoring of diel parameters twice a year at Station 16747 conducted by Tarrant Regional Water District.
- Routine monitoring of conventional and field parameters five times a year and bacteria four times a year at Station 16753 conducted by Tarrant Regional Water District.
- Routine monitoring of conventional and field parameters five times a year and bacteria four times a year at Station 16772 conducted by Tarrant Regional Water District.
- Routine monitoring of conventional and field parameters five times a year and bacteria four times a year at Station 21427 conducted by Tarrant Regional Water District.

Description of Water Quality Issue

Concerns for depressed dissolved oxygen levels were identified in Assessment Units 0818_06 and 0818_13. Table 9 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on more recently collected data, the concern may no longer exist in Assessment Unit 0818_06. However, data has not been collected in Assessment Unit 0818_13 since 1999 and 2000 when 50% of the data were reported below the screening level of 5 mg/L (Figure 27).

Table 9: Summary of Aquatic Life Use data for Segment 0818

	2022 Integrated Report Data			2024 BHR POR Data			
AU	0818_06	0818_06	0818_13	0818_06	0818_06	0818_06	0818_06
Method	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen 24hr average	Dissolved Oxygen 24hr minimum
Criteria	3	5	.	3	5	5	3
# Data Assessed	78	78	0	84	84	7	7
# Exceedances	3	11	.	0	7	1	1
Mean Exceedances	2.09	3.59	.	.	4.32	4.7	2.9
DS Qualifier	AD	AD	ID	AD	AD	LD	LD
LOS	FS	CS	NA	FS	NC	NC	NC
CF	N	N	Y	.	.	.	.
Int LOS	FS	CS	CS	.	.	.	.

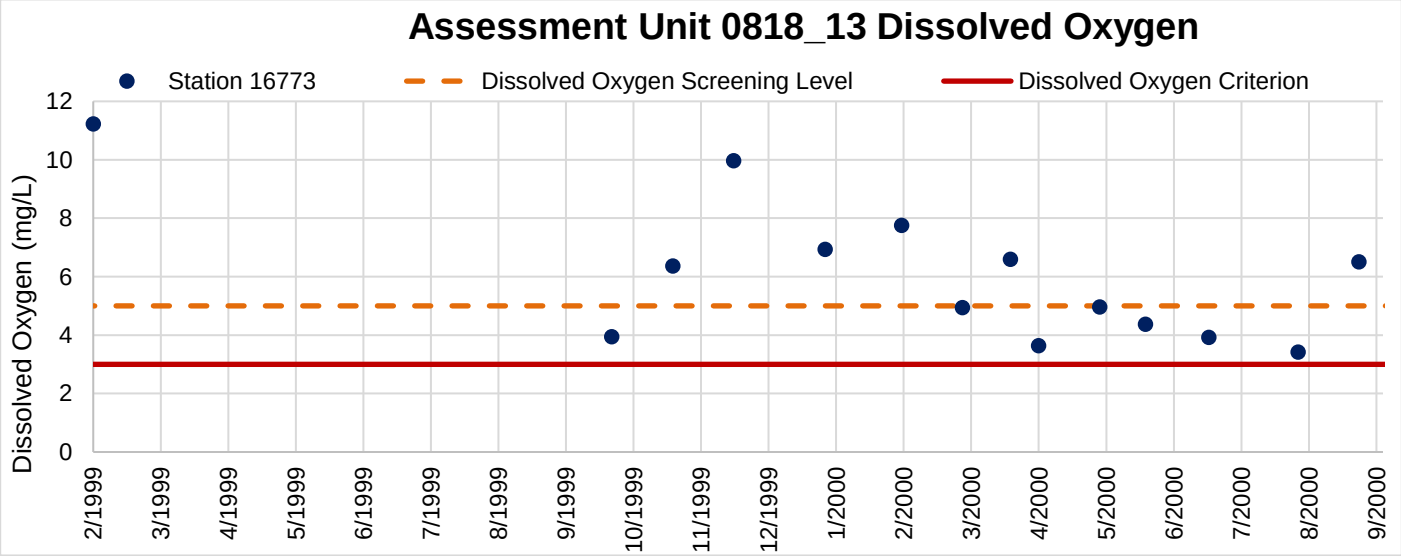

Figure 27: Assessment Unit 0818_13 Dissolved Oxygen

Potential Causes of Water Quality Issue

In Assessment Unit 0818_06, there was a weak inverse correlation between dissolved oxygen and chlorophyll-*a* (coefficient = -0.388) indicating that algal populations may be impacting dissolved oxygen levels in the reservoir. However, there were no direct correlations between chlorophyll-*a* and nutrients. As this assessment unit is located near the outlet, the water in this portion of the reservoir could reasonably be expected to have been affected by algal populations and water temperatures for the longest period of time, therefore having the lowest dissolved oxygen levels.

No data has been collected in Assessment Unit 0818_13 since 2000. Therefore, the concern has been carried forward from previous assessments.

Recommendations for Improving Water Quality

Sampling should be conducted in Assessment Unit 0818_13 to further assess this concern and determine if it still exists.

Potential Stakeholders

- Tarrant Regional Water District
- Homeowners and homeowners associations
- Landowners
- Communities around the reservoir
- Pinnacle Golf Club
- Cedar Creek Country Club

0821B – Sister Grove Creek

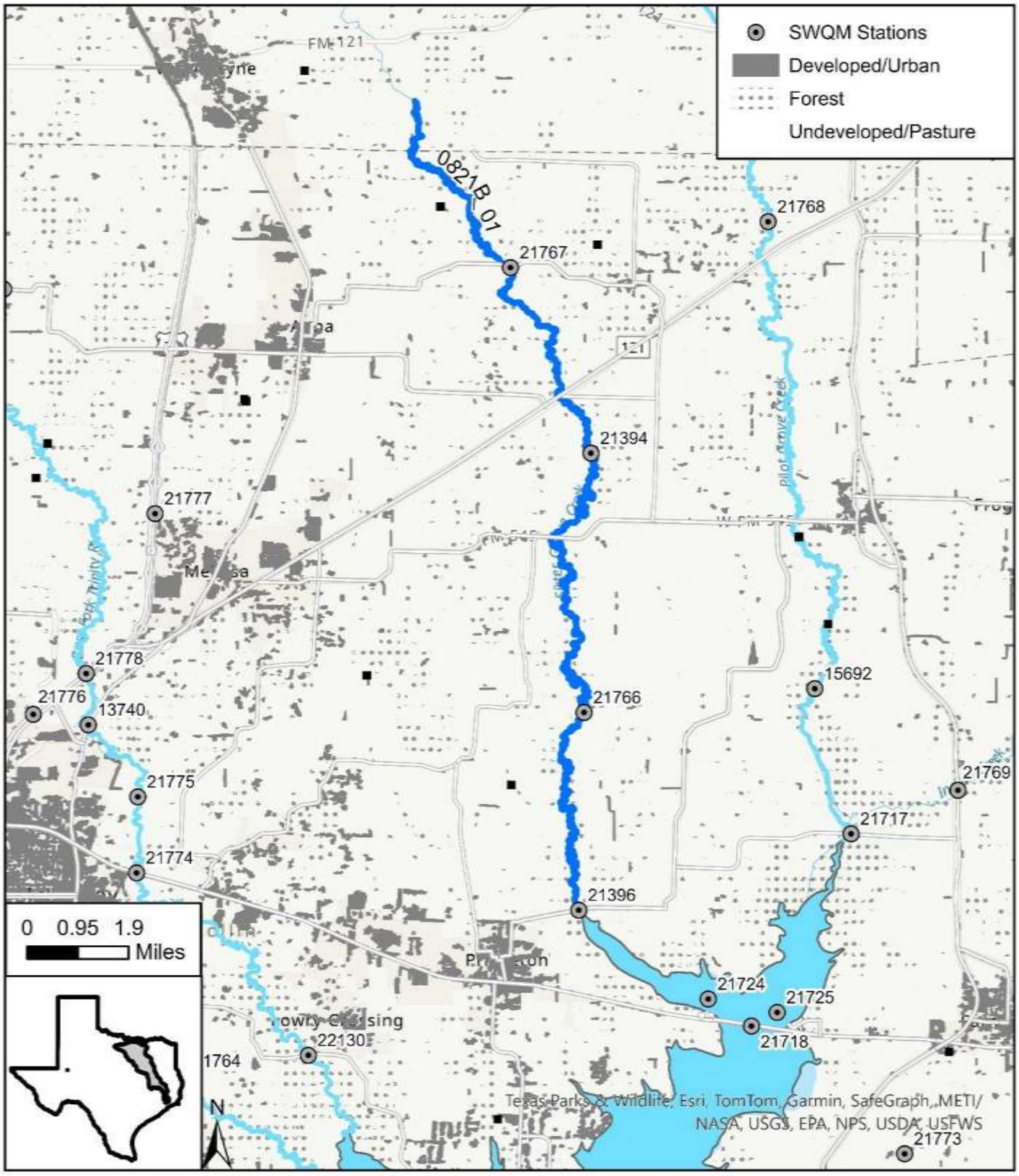

Figure 28: Map of Segment 0821B

Segment Description

This 27.4-mile unclassified segment runs from the confluence of West Prong Sister Grove Creek/East Prong Sister Grove Creek east of Van Alstyne in Grayson County to the confluence with Lake Lavon in Collin County.

Assessment Units and Monitoring Stations

- **0821B_01** - From the confluence with Lake Lavon in Collin County to the confluence of West Prong Sister Grove Creek/East Prong Sister Grove Creek east of Van Alstyne in Grayson County
  - Perennial freshwater stream
  - **21394** - Sister Grove Creek at Collin CR 476 1.8 kilometers west of East Houston Street/FM 28621
    - Sampling conducted by North Texas Municipal Water District from 2015 to 2016
  - **21396** - Sister Grove Creek downstream FM 1377/Monte Carlo Boulevard 1.6 kilometers east of intersection of 6th Street and FM 1377 near Princeton TX
    - Sampling conducted by North Texas Municipal Water District from 2016 to 2024
  - **21766** - Sister Grove Creek at CR 470; 947 meters east of Altofa Cemetery
    - Sampling conducted by North Texas Municipal Water District from 2016 to 2017
  - **21767** - Sister Grove Creek at CR 2862; 2 kilometers north and 5 kilometers east of Anna
    - Sampling conducted by North Texas Municipal Water District from 2016 to 2017 and 2019 to 2021

Hydrology

Unclassified segment 0821B is a second order stream at its most downstream end. There is one USGS flow gage in this segment: 08059400 near Blue Ridge. The median flow at this gage was 13.95 cfs with a range of 0 to 4,640 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 18 cfs
- Index Period – 31.7 cfs
- Critical Period – 0.03 cfs

Land Use and Natural Characteristics

The watershed is rural with a mix of pasture, hay, and grassland with some small areas of crop land and forest throughout. It flows through the Northern Blackland Prairie ecoregion.

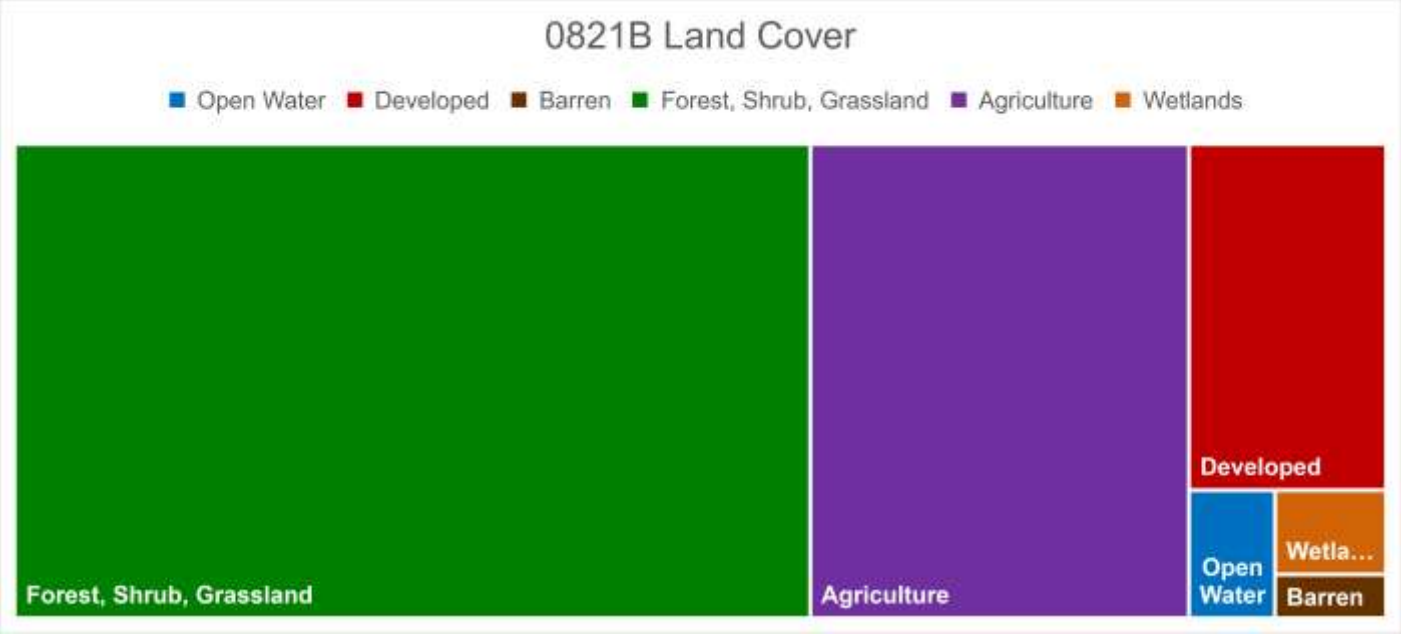

Figure 29: 0821B relative land cover totals

Ongoing Projects

- Routine monthly monitoring of conventional, bacteria, flow and field parameters and quarterly monitoring of metals at Station 21396 conducted by North Texas Municipal Water District.

Description of Water Quality Issue

This segment was found to have concerns for depressed dissolved oxygen levels. Table 10 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on more recently collected data, concerns may still exist for exceedances of the 5 mg/L screening level due to samples collected at Stations 21396 and 21766 (Figure 30). Further, an impairment due to exceedances of the 3 mg/L minimum criterion may also exist due to samples collected at Station 21396.

Table 10: Summary of Aquatic Life Use data for Segment 0821B

	2022 Integrated Report Data		2024 BHR POR Data					
AU	0821B_01	0821B_01	0821B_01 Station 21394	0821B_01 Station 21394	0821B_01 Station 21396	0821B_01 Station 21396	0821B_01 Station 21766	0821B_01 Station 21766
Method	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level
Criteria	3	5	3	5	3	5	3	5
# Data Assessed	38	38	6	6	78	78	17	17
# Exceedances	1	7	0	0	16	29	3	7
Mean Exceedances	2.8	3.73	.	.	2.11	2.86	0.97	2.99
DS Qualifier	AD	AD	LD	LD	AD	AD	AD	AD
LOS	FS	CS	NC	NC	NS	CS	CN	CS
CF	N	N	.	.	.	.	.	.
Int LOS	FS	CS	.	.	.	.	.	.

Table 10 continued

	2024 BHR POR Data			
AU	0821B_01 Station 21767	0821B_01 Station 21767	0821B_01 Combined	0821B_01 Combined
Method	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level
Criteria	3	5	3	5
# Data Assessed	30	30	131	131
# Exceedances	1	3	20	39
Mean Exceedances	2.3	3.33	1.95	2.92
DS Qualifier	AD	AD	AD	AD
LOS	FS	NC	NS	CS
CF	.	.	.	.
Int LOS	.	.	.	.

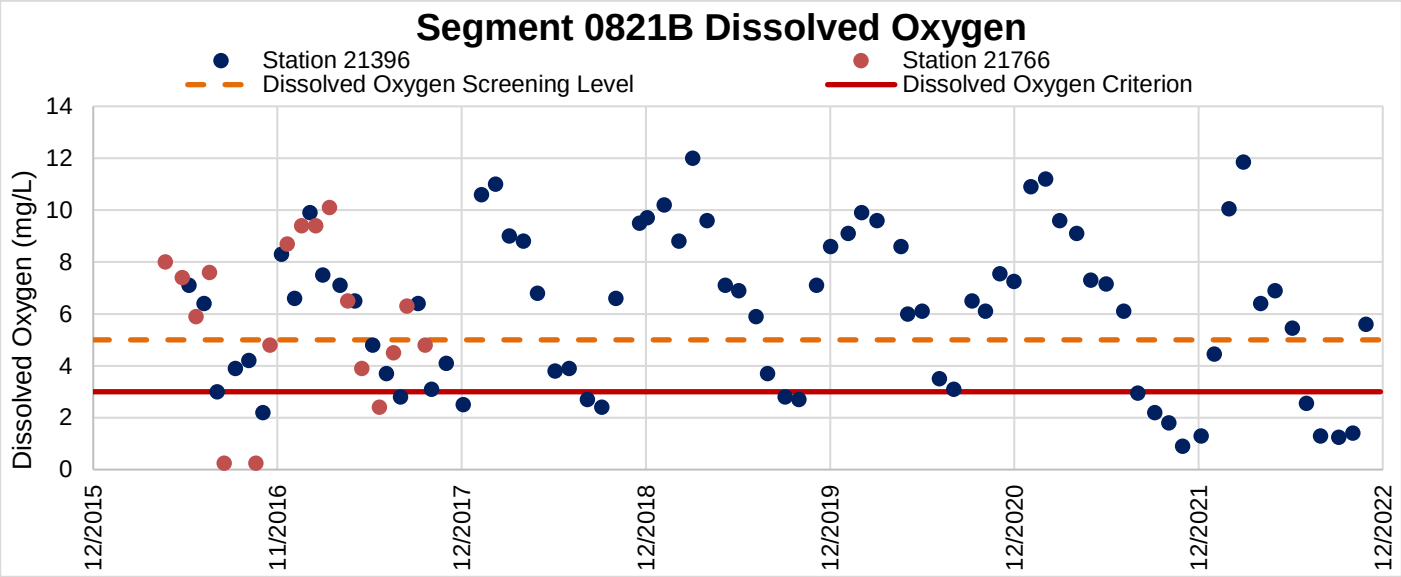

Figure 30: Segment 0821B Dissolved Oxygen

Potential Causes of Water Quality Issue

There were weak correlations with flow at Stations 21396 and 21766 (coefficients = 0.243 and 0.186) and moderate inverse correlations with chlorophyll-*a* (coefficients = -0.353 and -0.307, respectively). Overall, this segment is a relatively low flow system. The average flow at all sites in this segment was 38 cfs but 69% of flows during sample collection were below 5 cfs. It is likely that a combination of low flows and algal populations may be impacting dissolved oxygen in this segment. Chlorophyll-*a* was moderately correlated with ammonia and total Kjeldahl nitrogen at Station 21766 (coefficients = 0.432 and 0.425, respectively) but the average chlorophyll-*a* concentration across all sites was only 7.16 µg/L and was 8.95 µg/L at Station 21396. Station 21396 is located in a woody wetland area immediately upstream from the boundary of Lake Lavon. Slower flows in a backwater environment combined with the abundant vegetation of the wetland may be contributing to this concern.

Recommendations for Improving Water Quality

Continued monitoring is recommended. However, it appears that the concerns are largely based on sampling conducted at Station 21396. Backwater cove effects may be impacting dissolved oxygen at this station. If this is the case, there is little to be done to remedy this issue as it does not seem strongly correlated to algal populations.

Potential Stakeholders

- North Texas Municipal Water District
- Landowners
- PT SIX LP
- Top Fun Ranch
- Sweetin 5S Ranch

0827 – White Rock Lake

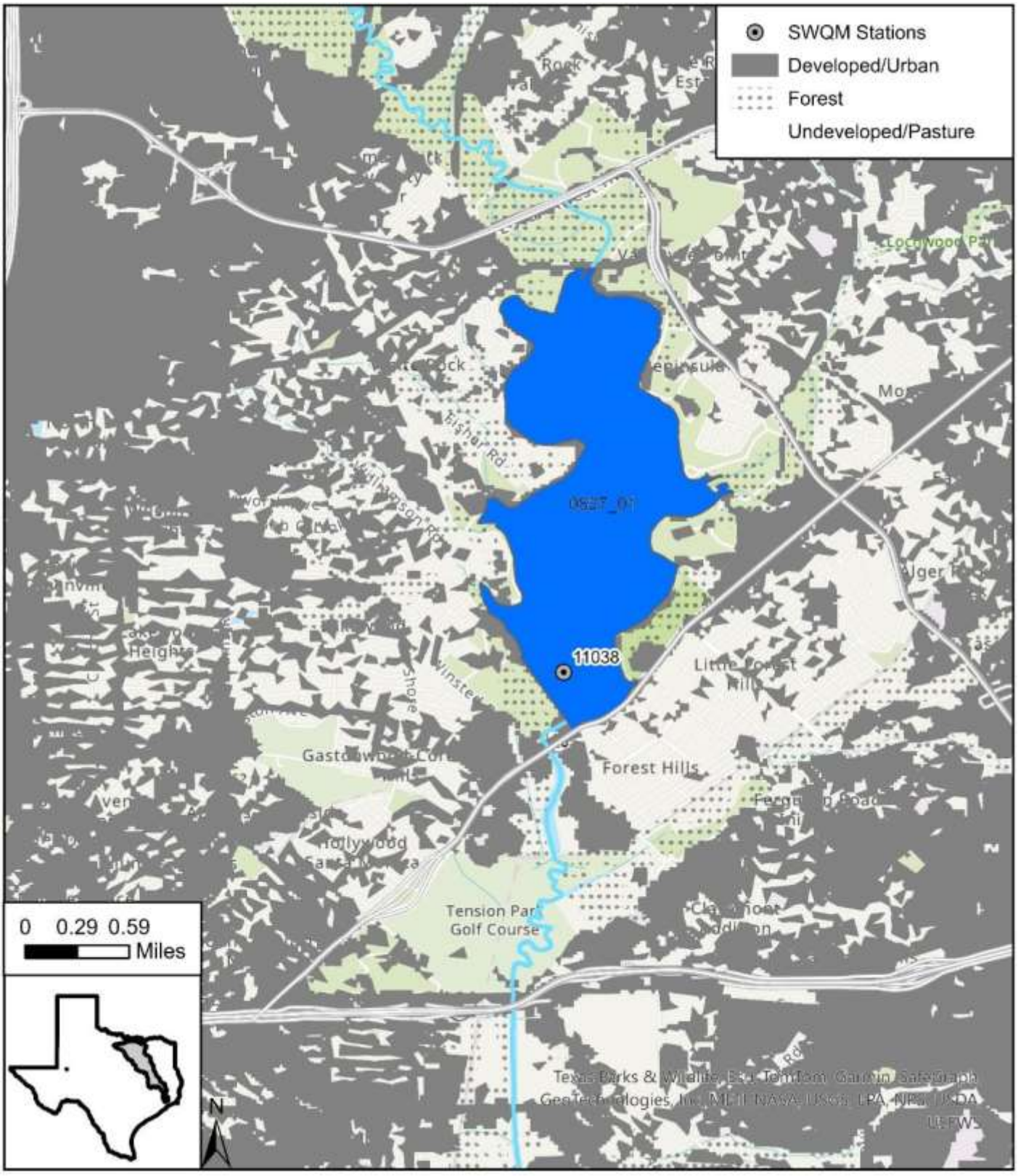

Figure 31: Map of Segment 0827

Segment Description

This 999-acre reservoir impounds White Rock Creek to White Rock Dam in Dallas County; up to the normal pool elevation of 458 feet.

Assessment Units and Monitoring Stations

- **0827_01** - From White Rock Dam in Dallas County up to the normal pool elevation of 458 feet (impounds White Rock Creek)
    - **11038** - White Rock Lake mid lake near dam 79 meters north and 597 meters west of intersection of Lawther Drive and Garland Road
        - Sampling conducted by TCEQ from 2015 and 2024

Hydrology

Segment 0827 is a reservoir on a second order stream. There are no elevation data available for this reservoir.

Land Use and Natural Characteristics

This reservoir lies within the Northern Blackland Prairie ecoregion. The watershed is heavily developed with mostly the residential communities of northeast Dallas with some small areas of forest and park land along the tributaries.

Figure 32: 0827 relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 11038 conducted by TCEQ Region 4.

Description of Water Quality Issue

This segment was found to have a concern due to depressed dissolved oxygen levels. Table 11 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on more recently collected data, the concern may no longer exist in this segment.

Table 11: Summary of Aquatic Life Use data for Segment 0827

	2022 Integrated Report Data		2024 BHR POR Data	
AU	0827_01	0827_01	0827_01	0827_01
Method	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level
Criteria	3	5	3	5
# Data Assessed	28	28	27	27
# Exceedances	0	5	0	0
Mean Exceedances	.	4.36	.	.
DS Qualifier	AD	AD	AD	AD
LOS	FS	CS	FS	NC
CF	N	N	.	.
Int LOS	FS	CS	.	.

Potential Causes of Water Quality Issue

Dissolved oxygen was not correlated to chlorophyll-*a* (coefficient = 0.107); therefore, algal populations may not be excessively impacting dissolved oxygen levels in this reservoir. There was a strong correlation between dissolved oxygen and water temperature (coefficient = -0.717). As water temperature increases, the oxygen saturation potential decreases leading to lower dissolved oxygen levels.

Recommendations for Improving Water Quality

There are no recommendations for tidal influence or water temperature related impacts on dissolved oxygen.

Potential Stakeholders

- Homeowners and homeowners associations
- City of Dallas
- The Dallas Arboretum and Botanical Garden
- White Rock Boat Club
- Dallas Paddle Club
- Dallas United Crew
- Corinthian Sailing Club

0829 – Clear Fork Trinity River Below Benbrook Lake

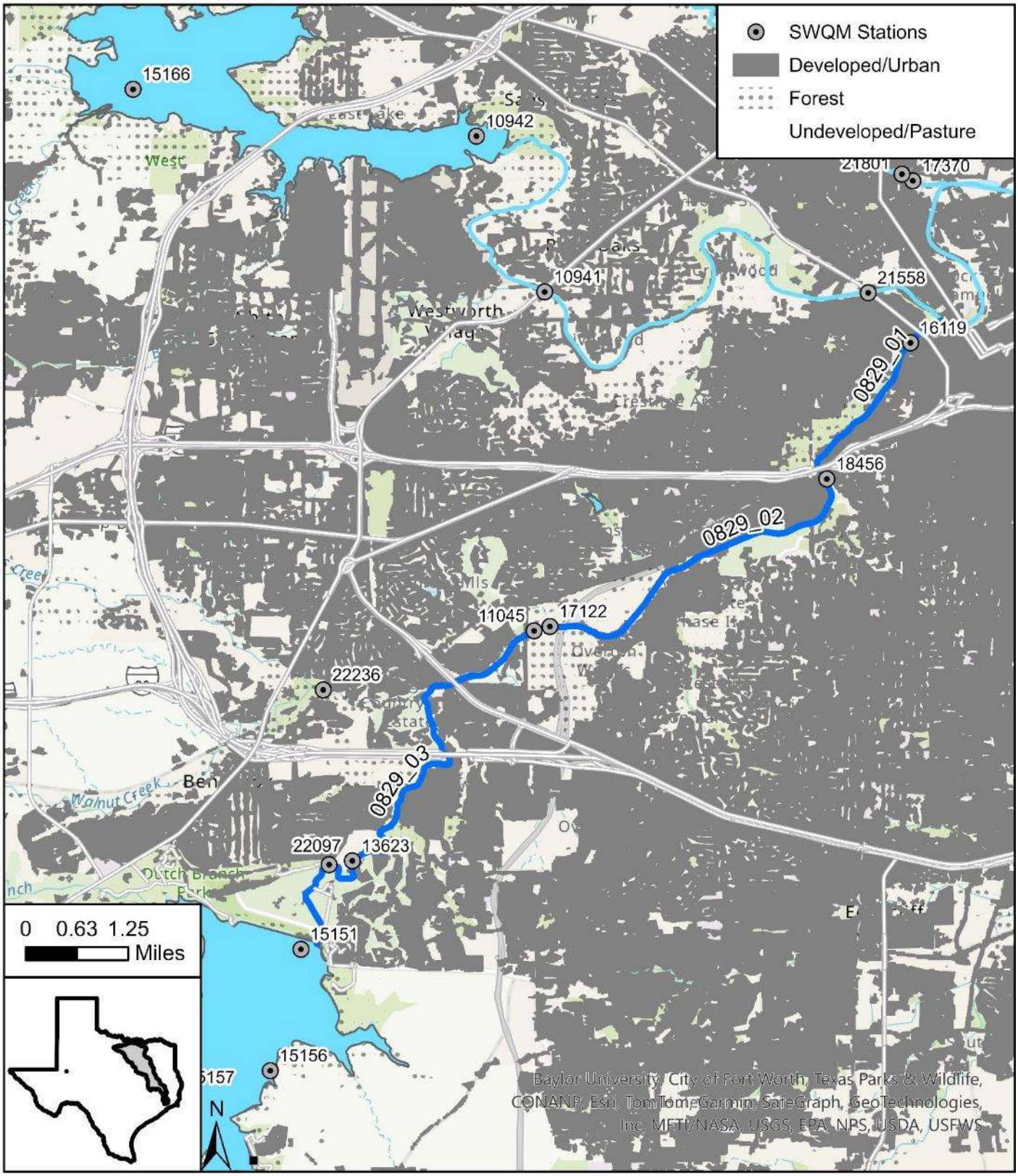

Figure 33: Map of Segment 0829

Segment Description

This 12.5-mile segment runs from the Benbrook Lake dam in Tarrant County to the confluence of the West Fork Trinity River in Tarrant County.

Assessment Units and Monitoring Stations

- **0829_01** - From the confluence with West Fork Trinity River to 1 mile upstream
  - Perennial freshwater stream
- **0829_02** - From 1 mile upstream of the confluence with West Fork Trinity River up to the confluence with Mary's Creek
  - Perennial freshwater stream
  - **11045** - Clear Fork Trinity River 161 meters downstream of Bryant-Irvin Street in Fort Worth
    - Sampling conducted by TCEQ from 2015 to 2024
  - **18456** - Clear Fork Trinity River mid channel 85 meters upstream of spillway and immediately upstream of West Rosedale Street in Fort Worth
    - Sampling conducted by Fort Worth from 2015 to 2024
- **0829_03** - From the confluence with Mary's Creek up to Benbrook Dam in Tarrant County
  - Perennial freshwater stream

Hydrology

Segment 0829 is a fourth order stream. There are two USGS flow gages in this segment: 08047000 near Benbrook and 08047500 at Fort Worth. The median flow at these gages ranged from 5.75 cfs at the upstream Benbrook gage to 20.6 cfs at the downstream Fort Worth gage with a range of 0 to 3,900 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these two gages are listed below.

- Non-Index Period – 5 to 22 cfs
- Index Period – 7.93 to 41.7 cfs
- Critical Period – 5.72 to 9.8 cfs

Land Use and Natural Characteristics

The watershed is heavily developed as it flows from the City of Benbrook and into the City of Fort Worth. It lies within the Grand Prairie ecoregion.

Figure 34: 0829 relative land cover totals

Figure 35: Clear Fork Trinity River downstream of Benbrook Lake

Ongoing Projects

- Routine monthly monitoring of flow and field parameters and quarterly monitoring of bacteria at Station 22236 conducted by City of Fort Worth.
- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 11045 conducted by TCEQ Region 4.
- Routine monthly monitoring of flow and field parameters and quarterly monitoring of bacteria at Station 18456 conducted by City of Fort Worth.
- Biased to season aquatic life monitoring consisting of diel, aquatic habitat, benthic, nekton, flow, and field parameters twice a year at Station 22097 conducted by Trinity River Authority.

Description of Water Quality Issue

This segment was found to have a concern for the near non-attainment of the standard for macrobenthic communities in Assessment Unit 0829_03.

Table 12 shows a summary of the TCEQ 2022 Texas Integrated Report. Another aquatic life monitoring event will be conducted in this assessment unit by TRA staff in the summer of 2024.

Table 12: Summary of Aquatic Life Use data for Segment 0829

	2022 Integrated Report Data
AU	0829_03
Method	Macrobenthic community (Qualitative)
Criteria	29
# Data Assessed	2
Mean Data Assessed	27
# Exceedances	.
Mean Exceedances	.
DS Qualifier	AD
LOS	NS
CF	N
Int LOS	CN

Potential Causes of Water Quality Issue

Aquatic life monitoring was conducted in Assessment Unit 0829_03 on August 30, 2019 (critical period) and October 2, 2019 (index period). Benthic macroinvertebrate index of biotic integrity scores were high and met the criteria for the critical period sample. However, the scores for the index period sample were intermediate and did not meet the criteria. This index period sample had a higher percentage of tolerant species, a higher number of individuals in a single taxon, and a higher percentage of *Hydropsychidae* than the critical period sample. It was assumed that this was due to the index period sampling being conducted later in the year and that most of the aquatic larval macroinvertebrates had already emerged.

Recommendations for Improving Water Quality

Aquatic life monitoring will be conducted again in this Assessment Unit in the summer of 2024 to determine if scores have improved. An emphasis will be placed on collecting the index period sample during a more appropriate time frame.

Potential Stakeholders

- City of Fort Worth
- TRA Technical Services and Basin Planning
- Homeowners and homeowners associations
- Ridglea Country Club
- City of Benbrook
- Pecan Valley Golf Club

0831 – Clear Fork Trinity River Below Lake Weatherford

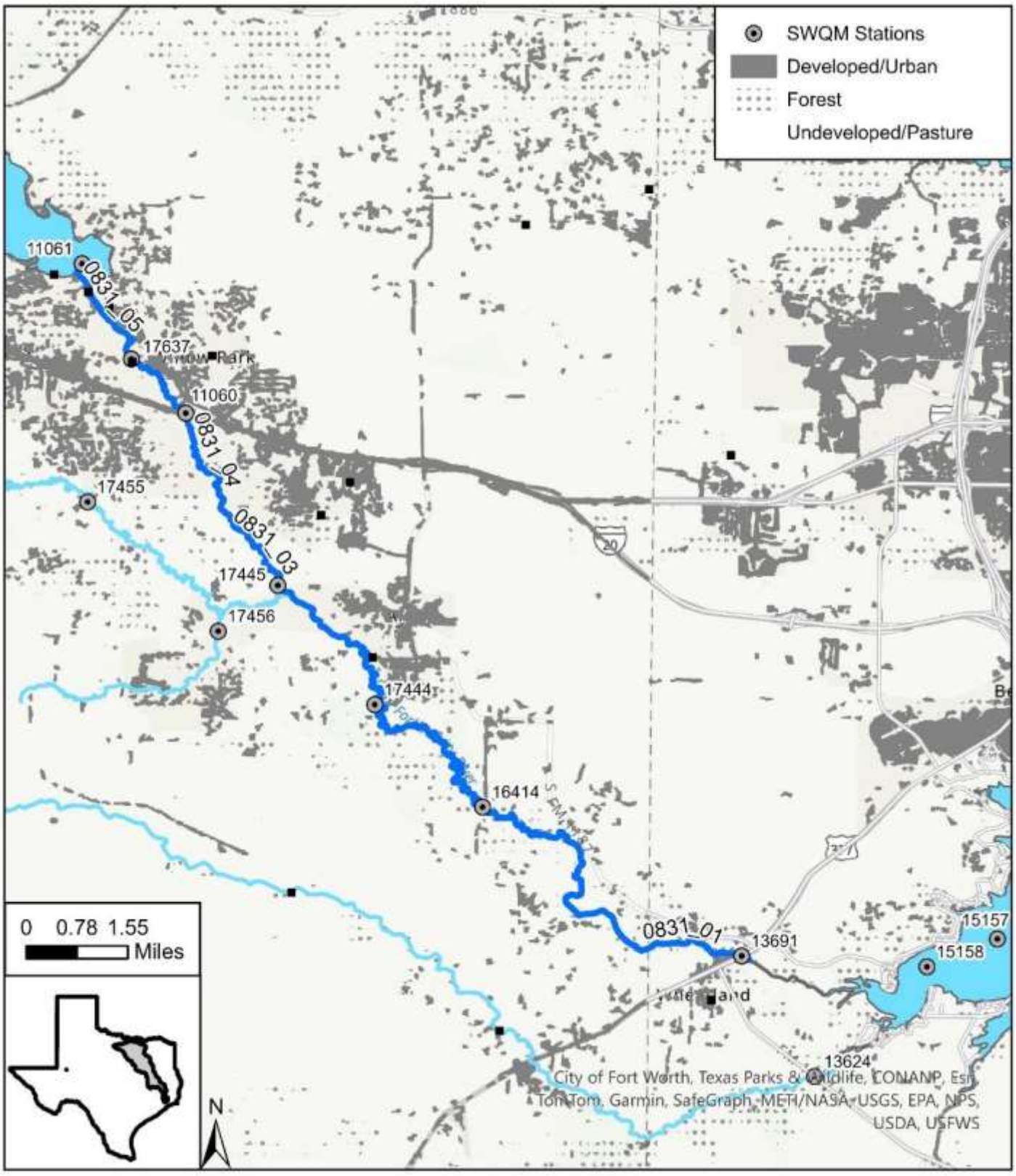

Figure 36: Map of Segment 0831

Segment Description

This 20-mile segment runs from the Lake Weatherford dam in Parker County to 220 yards downstream of US 377 in Tarrant County.

Assessment Units and Monitoring Stations

- **0831_01** - Lower 12.75 miles downstream from South Fork Trinity River confluence
  - Perennial freshwater stream
  - **16414** - Clear Fork Trinity River at Kelly Road 8.7 kilometers upstream of US 377 south of Aledo
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
  - **17444** - Clear Fork Trinity River at FM 5 3.2 kilometers downstream of confluence of Clear Fork and South Fork south of Aledo
    - Sampling conducted by TCEQ from 2015 to 2024
- **0831_03** - From the confluence with South Fork of Trinity River to a point 2 miles upstream
  - Perennial freshwater stream
  - **17445** – Clear Fork Trinity River 54 meters downstream of Underwood Road 350 meters upstream of confluence with South Fork 20.5 kilometers west of Aledo
    - Sampling conducted by TCEQ in 2024
- **0831_04** - 2 miles upstream of South Fork Trinity River confluence to Squaw Creek confluence
  - Perennial freshwater stream
  - **11060** - Clear Fork Trinity River at IH 20 west service road east of Weatherford
    - Sampling conducted by TRA in 2015 and 2016
- **0831_05** - From the confluence of Squaw Creek to Lake Weatherford Dam
  - Perennial freshwater stream
  - **17637** - Clear Fork Trinity River immediately downstream of Crown Road 2.5 kilometers downstream of Lake Weatherford Dam east of Weatherford
    - Sampling conducted by TRA in 2015 and 2016

Hydrology

Segment 0831 is a fourth order stream at its most downstream end. There are two USGS flow gages in this segment: 08045850 near Weatherford and 08045995 at Kelly Road near Aledo. Flow is also collected at Station 17444. The median flow at these locations ranged from 2.11 cfs at the upstream Weatherford gage to 21 cfs at Station 17444 with a range of 0 to 4,630 cfs at these locations. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these three locations are listed below.

- Non-Index Period – 2.09 to 21.5 cfs
- Index Period – 2.7 to 44 cfs
- Critical Period – 1.86 to 7.48 cfs

Land Use and Natural Characteristics

Most of the land use in 0831 is grassland and pasture especially along the lower half of the segment. The upper half of the segment has some development along the IH-20 corridor, including the cities of Hudson Oaks, Willow Park, and Aledo. This river flows through the Western Cross Timbers ecoregion but the surrounding watershed drains the Grand Prairie ecoregion.

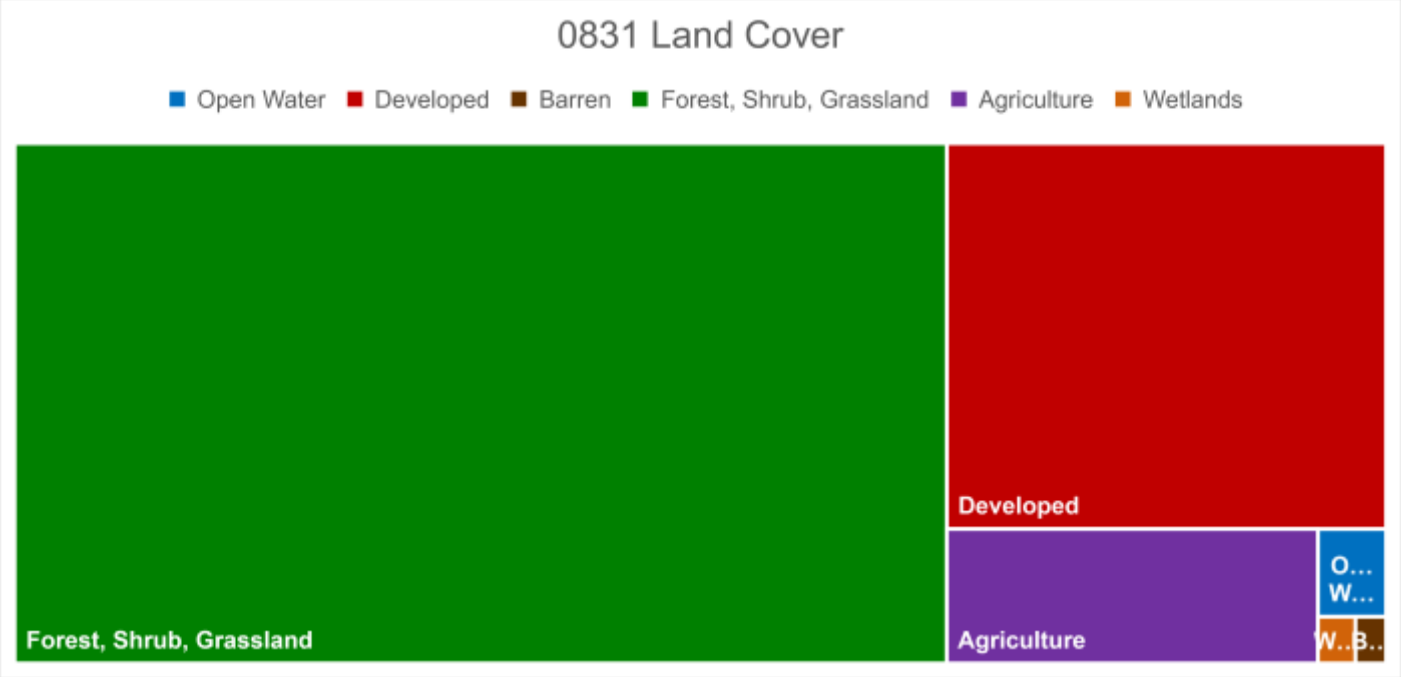

Figure 37: 0831 relative land cover totals

Ongoing Projects

- Routine monthly monitoring of conventional, flow, and field parameters at Station 16414 conducted by Tarrant Regional Water District.
- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 17444 conducted by TCEQ Region 4.
- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 17445 conducted by TCEQ Region 4.

Description of Water Quality Issue

Impairments for depressed dissolved oxygen were identified in Assessment Unit 0831_04. These impairments were first identified in 1996. Table 13 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Diel monitoring was conducted at Station 11060 in this assessment unit in fiscal years 2015 and 2016. At this station, two out of ten average dissolved oxygen values were reported below the 24-hour average standard of 5 mg/L. It is recommended that an aquatic life use attainability analysis study be conducted to determine if the standards are appropriate for this segment as it has been observed to be a low flow system.

Table 13: Summary of Aquatic Life Use data for Segment 0831

	2022 Integrated Report Data		2024 BHR POR Data	
AU	0831_04	0831_04	0831_04	0831_04
Method	Dissolved Oxygen 24hr average	Dissolved Oxygen 24hr minimum	Dissolved Oxygen 24hr average	Dissolved Oxygen 24hr minimum
Criteria	5	3	5	3
# Data Assessed	8	8	4	4
# Exceedances	2	0	0	1
Mean Exceedances	4.15	.	.	4.7
DS Qualifier	LD	LD	LD	LD
LOS	CN	NC	NC	NC
CF	Y	Y	.	.
Int LOS	NS (first identified 1996)	NS (first identified 1996)	.	.

Potential Causes of Water Quality Issue

Although this segment is downstream of Lake Weatherford, it has been observed to be a low flow system. Additionally, there is limited shading along much of Assessment Unit 0831_05, immediately upstream of Station 11060. The slow-moving water and lack of shading may allow the water to heat up during sunny weather resulting in lower dissolved oxygen levels due to decreased oxygen saturation potential.

Recommendations for Improving Water Quality

It is recommended that an aquatic life use attainability analysis study be conducted to determine if the standards are appropriate for this segment.

Potential Stakeholders

- Tarrant Regional Water District
- City of Weatherford Municipal Utility Board of Trustees
- Oeste Ranch Golf Course
- City of Weatherford
- City of Willow Park
- Homeowners and homeowners associations
- City of Annetta North
- Burnco Concrete Aledo
- Underwood Road Materials
- Clear Fork Materials, LLC
- City of Aledo
- Landowners
- City of Annetta South

0833 – Clear Fork Trinity River Above Lake Weatherford

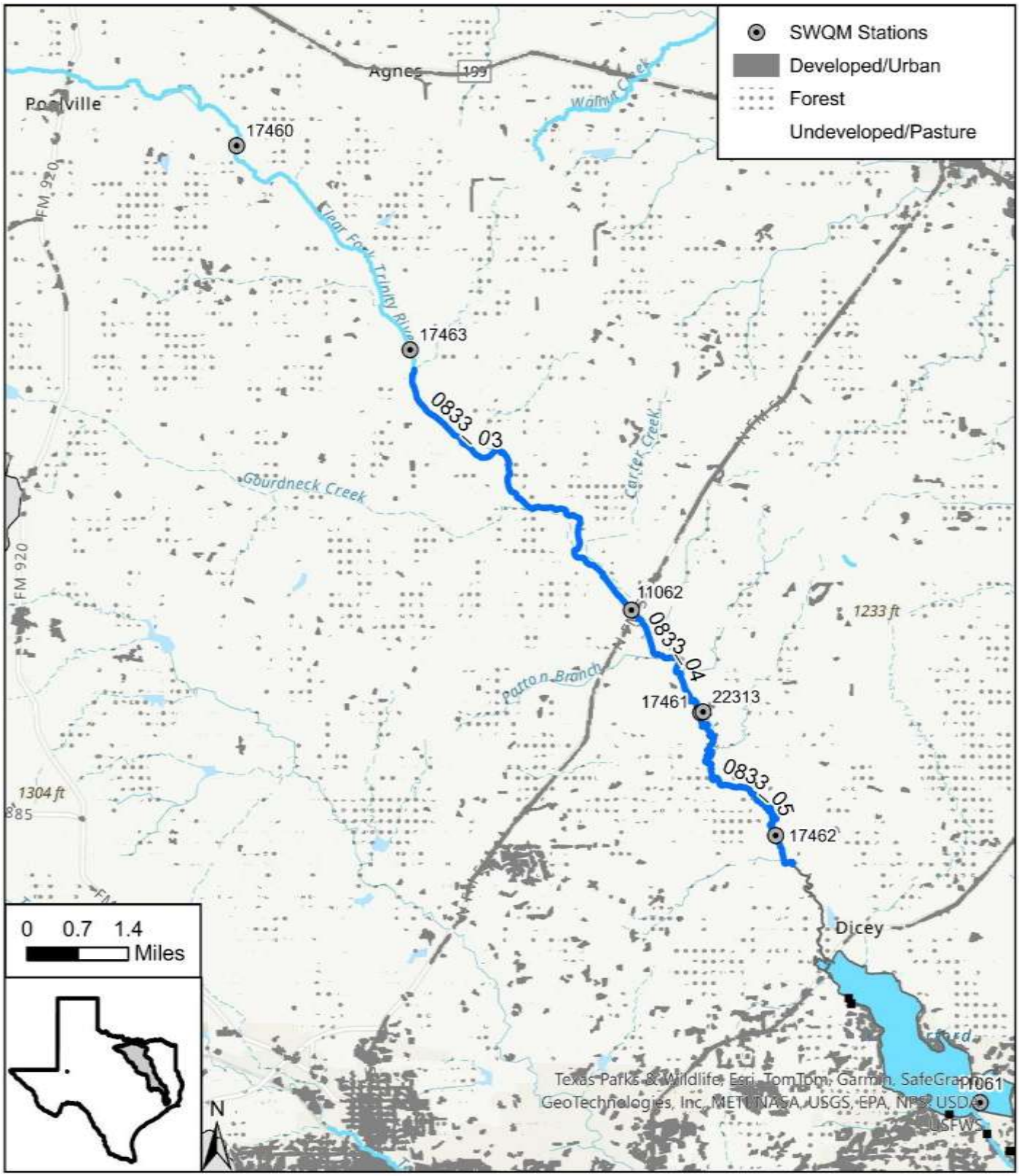

Figure 38: Map of Segment 0833

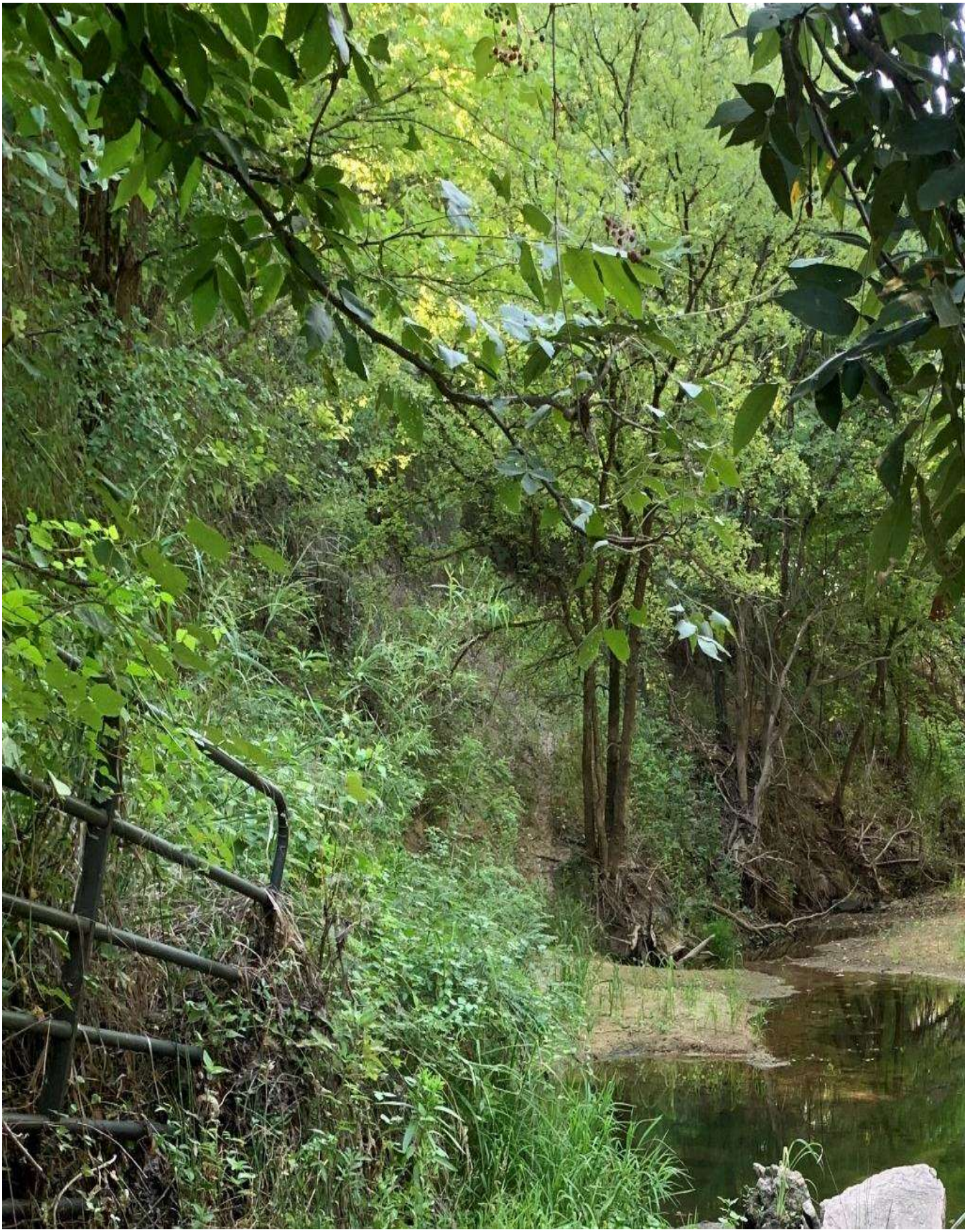

Figure 39: Clear Fork Trinity River at Friendship Road

Segment Description

This 10.5-mile segment runs from the confluence with Strickland Creek approximately 5 miles upstream of FM 51 in Parker County to a point 1.9 miles upstream of FM 730 in Parker County.

Assessment Units and Monitoring Stations

- **0833_03** - From the confluence of McKnight Branch to the confluence of Strickland Ck. approximately 8 km (5 mi) upstream of FM 51 in Parker County
    - Freshwater stream, intermittent with perennial pools
    - **11062** - Clear Fork Trinity River 98 meters upstream of FM 51 upstream Lake Weatherford northeast of Weatherford
        - Sampling conducted by TRA in 2015 and 2016
- **0833_04** - From the confluence with Dobbs Branch to confluence with McKnight Branch
    - Freshwater stream, intermittent with perennial pools
    - **17461** - Clear Fork Trinity River immediately upstream of Old Springtown Road upstream Lake Weatherford northeast of Weatherford
        - Sampling conducted by TRA in 2015 and 2016
    - **22313** - Clear Fork/Dobbs Branch at Friendship Road northeast of Weatherford
        - Sampling conducted by TRA in 2022 and 2023
- **0833_05** - From the confluence of Dobbs Branch to the lower end of segment
    - Freshwater stream, intermittent with perennial pools
    - **17462** - Clear Fork Trinity River at Upper Denton Road 3.1 kilometers upstream of FM 1707 northeast of Weatherford
        - Sampling conducted by TRA from 2015 to 2017

Hydrology

Segment 0833 is a third order stream at its most downstream end. Based on sampling at Stations 11062 and 22313, the median flow was 0.4 cfs with a range of 0.04 to 18 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these two stations are listed below.

- Non-Index Period – 0.035 - 0.5 cfs
- Index Period – 0.45 to 0.6 cfs
- Critical Period – 0.049 to 0.1 cfs

Land Use and Natural Characteristics

Most of the watershed lies within the Western Cross Timbers with the most downstream end being in the Grand Prairie ecoregion. The watershed consists largely of grasslands with interspersed forest, hay, and pasture.

Figure 40: 0833 relative land cover totals

Ongoing Projects

No monitoring being conducted in this segment.

Description of Water Quality Issue

An impairment for depressed dissolved oxygen was identified in assessment unit 0833_04. This impairment was first identified in 1998. Table 14 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Diel monitoring was conducted at Station 17461 in FY 2015 and 2016. However, the site was consistently dry during all events. It was later discovered via Google Earth that the Clear Fork had abandoned the original channel that flowed through Station 17461 and moved to an adjacent stream called Dobbs Branch. A new Station 22313 was requested along with a request to TCEQ to update the GIS layers for the Segment and Assessment Unit lines and monitoring was conducted in FY 2022 and 2023. Based on the three samples collected during the period of record for this report, there has been an exceedance of both the 24-hour minimum and average standards of 3 and 5 mg/L. It is recommended that an aquatic life use attainability analysis study be conducted to determine if the standards are appropriate for this segment as it has been observed to be a low flow system.

Table 14: Summary of Aquatic Life Use data for Segment 0833

	2022 Integrated Report Data	2024 BHR POR Data		
AU	0833_04	0833_04	0833_04	0833_04
Method	Dissolved Oxygen grab minimum	Dissolved Oxygen grab minimum	Dissolved Oxygen 24hr average	Dissolved Oxygen 24hr minimum
Criteria	3	3	5	3
# Data Assessed	0	6	3	3
# Exceedances	.	0	1	1
Mean Exceedances	.	.	4.9	2.6
DS Qualifier	ID	LD	ID	ID
LOS	NA	NC	NA	NA
CF	Y	.	.	.
Int LOS	NS (first identified 1998)	.	.	.

Potential Causes of Water Quality Issue

This segment is a low flow system. The average flow over the period of record for this report was 0.64 cfs. Although the data set is limited, there was a strong correlation between dissolved oxygen and flow (coefficient = 0.741).

Recommendations for Improving Water Quality

It is recommended that an aquatic life use attainability analysis study be conducted to determine if the standards are appropriate for this segment.

Potential Stakeholders

- Homeowners
- Landowners
- Town of Wright

0833A – Clear Fork Trinity River Above Strickland Creek

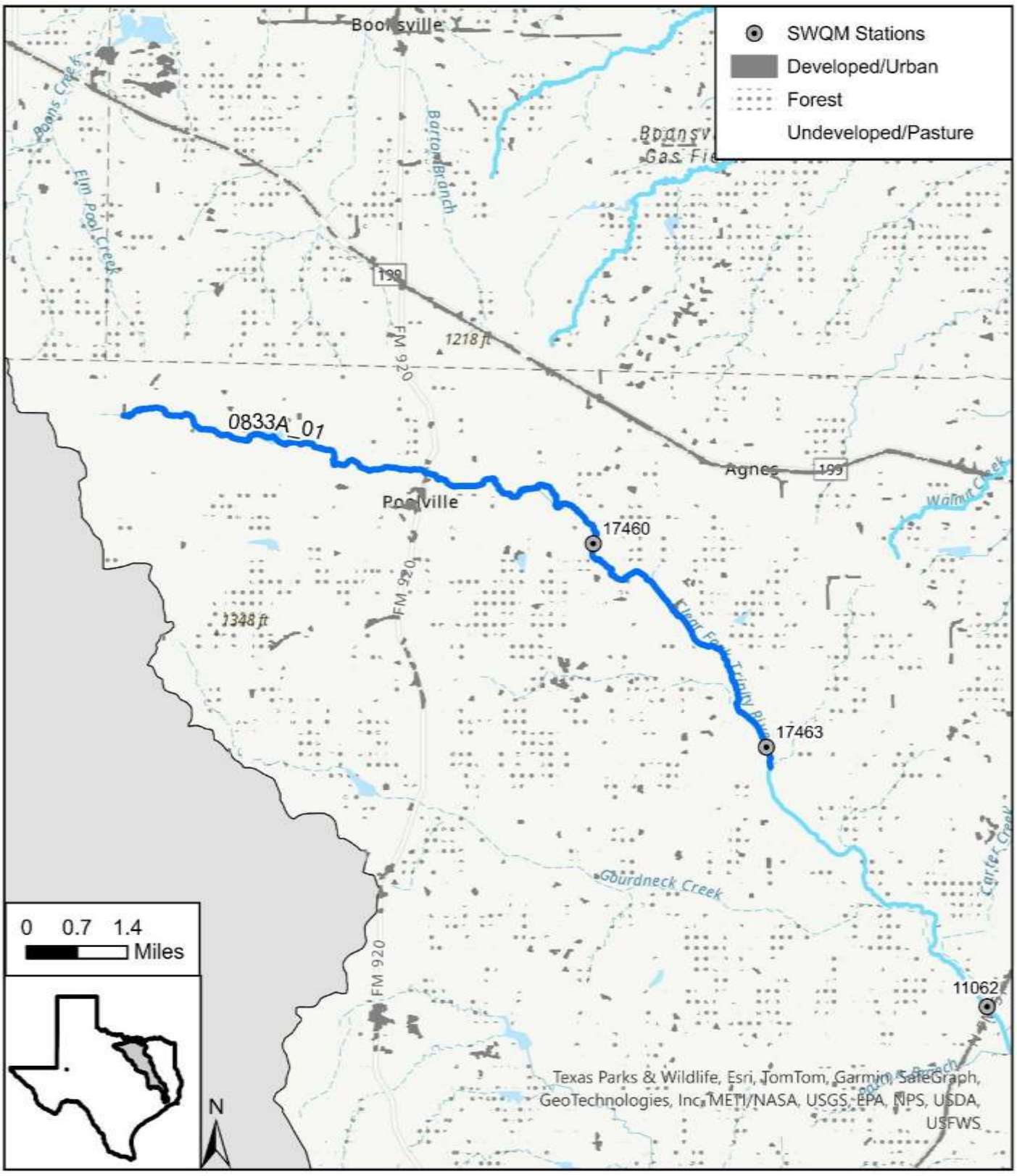

Figure 41: Map of Segment 0833A

Segment Description

This 11.9-mile unclassified segment runs from Turpin Lake Road to the confluence with Strickland Creek in Parker County.

Assessment Units and Monitoring Stations

- **0833A_01** - From the confluence with Strickland Creek up to Turpin Lake Road in Parker County
  - Perennial freshwater stream
  - **17460** - Clear Fork Trinity River at Erwin Road 3.0 kilometers downstream of FM 920 east of Pooleville
    - Sampling conducted by TRA in 2022 and 2023
  - **17463** - Clear Fork Trinity River immediately downstream of Sarra Lane 7.2 kilometers upstream of FM 51 north of Weatherford
    - Sampling conducted by TRA in 2015, 2022, and 2023

Hydrology

Unclassified segment 0833A is a second order stream at its most downstream end. Both stations have been reported as being dry on at least one occasion. Based on sampling at Stations 17460 and 17463, the median flow was 0.016 cfs with a range of 0.005 to 0.7 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these two stations are listed below.

- Non-Index Period – 0.03 to 0.21 cfs
- Index Period – 0.005 cfs
- Critical Period – no data

Land Use and Natural Characteristics

This watershed lies within the Western Cross Timbers ecoregion and consists largely of grasslands with interspersed forest, hay, and pasture.

Figure 42: 0833A relative land cover totals

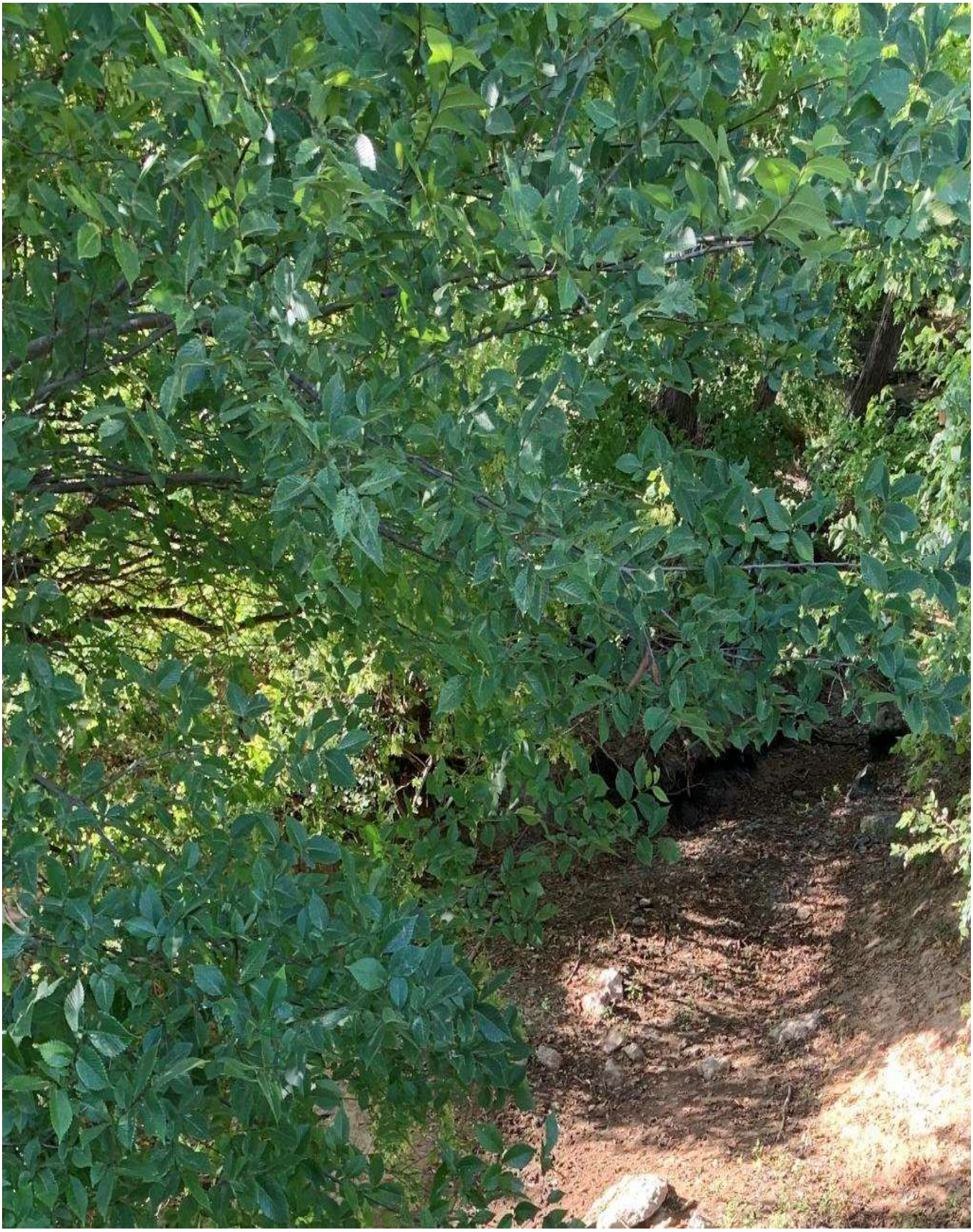

Figure 43: Clear Fork Trinity River dry channel at Sarra Lane

Ongoing Projects

No monitoring being conducted in this segment.

Description of Water Quality Issue

An impairment for depressed dissolved oxygen was identified in this segment. This impairment was first identified in 1998. Table 15 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. This is a new unclassified segment designation that was previously identified as Assessment Unit 0833_02 and the impairment from this assessment unit was carried forward into the new unclassified segment. Routine monitoring was conducted at Station 17460 and diel monitoring was conducted at Station 17463 in FY 2022 and 2023. Based on the more recently collected data, these impairments may still exist based on exceedances of the standard and screening levels (Figure 44). Additionally, the one diel sample available for the period of record for this report had an average and minimum value below the standards of 4 and 2 mg/L. It is recommended that an aquatic life use attainability analysis study be conducted to determine if the standards are appropriate for this segment as it has been observed to be a low flow system.

Table 15: Summary of Aquatic Life Use data for Segment 0833A

	2022 Integrated Report Data		2024 BHR POR Data					
AU	0833A_01	0833A_01	0833A_01 Station 17460	0833A_01 Station 17460	0833A_01 Station 17463	0833A_01 Station 17463	0833A_01 Combined	0833A_01 Combined
Method	Dissolved Oxygen 24hr average	Dissolved Oxygen 24hr minimum	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level
Criteria	.	.	2	4	2	4	2	4
# Data Assessed	0	0	3	3	4	4	7	7
# Exceedances	.	.	1	1	1	1	2	2
Mean Exceedances	.	.	1.3	1.3	1.2	1.2	1.25	1.25
DS Qualifier	ID	ID	ID	ID	LD	LD	LD	LD
LOS	NA	NA	NA	NA	NC	NC	CN	CS
CF	Y	Y	.	.	.	.	.	.
Int LOS	NS (first identified 1998)	NS (first identified 1998)	.	.	.	.	.	.

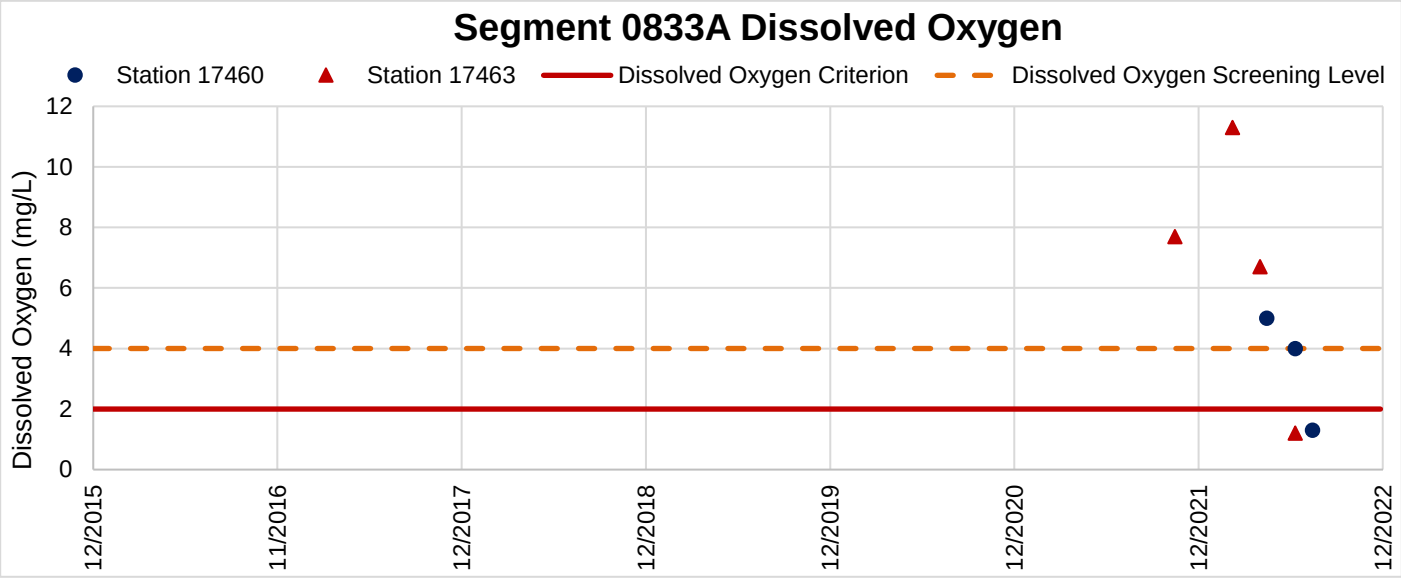

Figure 44: Segment 0833A Dissolved Oxygen

Potential Causes of Water Quality Issue

This segment is a low flow system and has been noted as being pooled on several occasions. The average flow over the period of record for this report was 0.4 cfs. Although the data set is limited, there was a strong inverse correlation between dissolved oxygen and chlorophyll-*a* (coefficient = -0.606). This indicates that algal populations, in addition to the low flows and pooled nature of the stream, are impacting dissolved oxygen levels.

Recommendations for Improving Water Quality

It is recommended that an aquatic life use attainability analysis study be conducted to determine if the standards are appropriate for this segment.

Potential Stakeholders

- Homeowners and landowners
- Town of Poolville

0836 – Richland-Chambers Reservoir

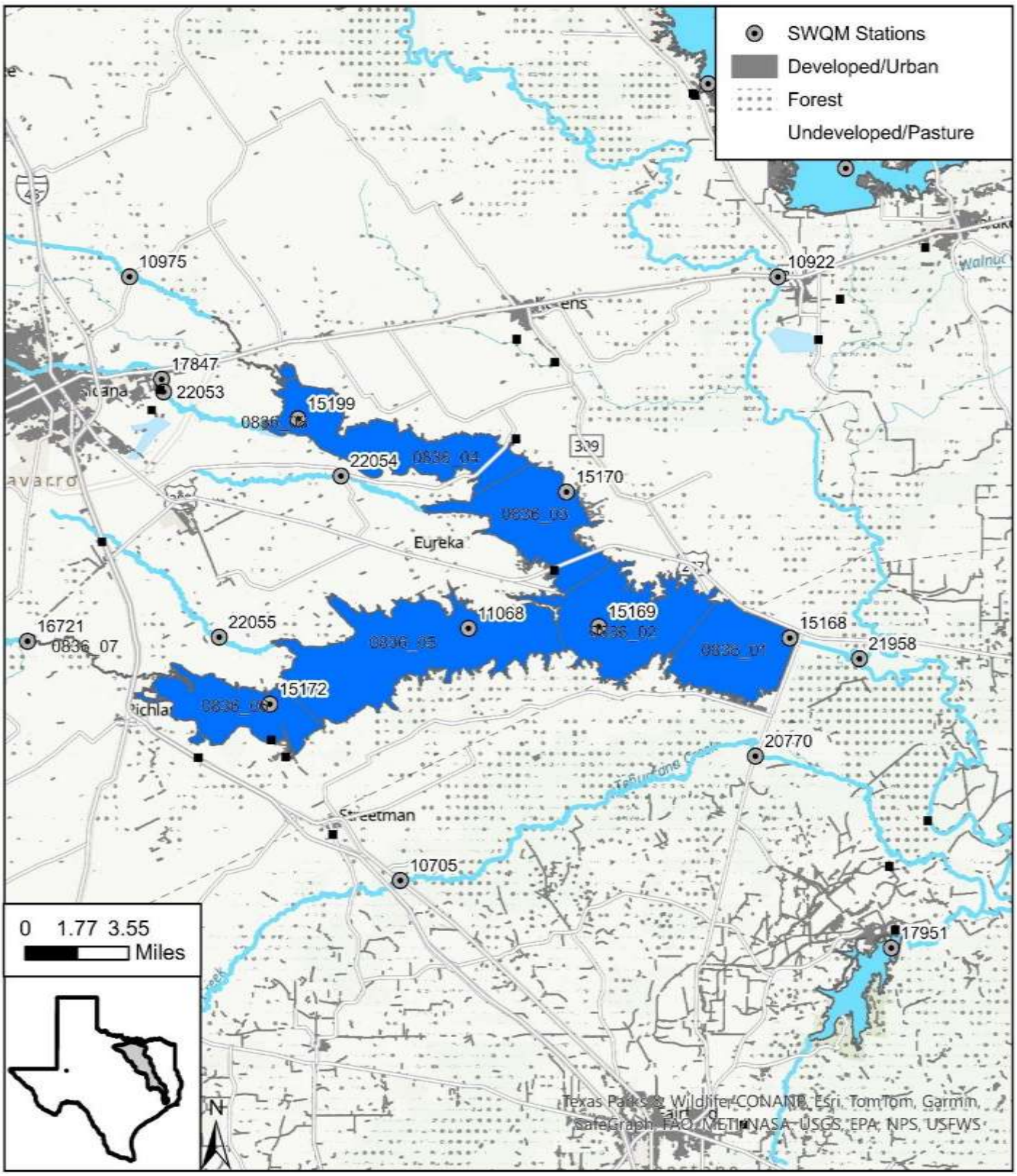

Figure 45: Map of Segment 0836

Segment Description

This 43,153-acre reservoir runs from a point immediately upstream of the confluence of Pin Oak Creek on the Richland Creek Arm and from a point 2.5 miles downstream of Tupelo Branch on the Chambers Creek Arm to the Richland-Chambers Dam. It impounds Richland and Chambers Creeks up to the normal pool elevation of 315 feet.

Assessment Units and Monitoring Stations

- **0836_01** - Lowermost portion of reservoir adjacent to dam
  - **15168** - Richland-Chambers Reservoir at north end of dam 332 meters south and 555 meters west of intersection of US 287 and Ranch Road 488
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0836_02** - Confluence of Richland and Chambers Creek arms
  - **15169** - Richland-Chambers Reservoir 1.95 kilometers north and 2.26 kilometers west of intersection of Southeast CR 3190 Road and Old Highway 287
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0836_03** - Lower portion of Chambers Creek arm
  - **15170** - Richland-Chambers Reservoir Chambers Creek arm near Travis County Water Control and Improvement District 1 pump station 570 meters south and 1.16 kilometers west of intersection of Southeast CR 3240 and Southeast CR 3250
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0836_04** - Upper portion of Chambers Creek arm
  - **15199** - Richland-Chambers Reservoir upper end of Chambers Creek arm 2.52 kilometers north and 329 meters west of intersection of Wichita Trail and FM 637
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0836_05** - Lower portion of Richland Creek arm
  - **11068** - Richland-Chambers Reservoir Richland Creek arm mid lake 2.24 kilometers south and 276 meters east of intersection of Petty Road and Southeast CR 2230 Road
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0836_06** - Upper portion of Richland Creek arm
  - **15172** - Richland-Chambers Reservoir in upper end of Richland Creek arm 2.01 kilometers south and 150 meters east of intersection of Navarro Slab and Southeast CR 1095
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0836_07** - Remainder of reservoir
  - **16721** - Richland Creek at Southwest CR 0030 Road upstream of Richland-Chambers Reservoir
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0836_08** - Post Oak Creek Arm off of Chambers Creek Arm of Richland Chambers Reservoir

Hydrology

Segment 0836 is a reservoir with one arm on a fourth order stream and another arm on a fifth order stream. It is a water supply and flood control reservoir with a conservation pool elevation of 315 feet and flood gate elevation of 317.34 feet. Over the period of record for this report, the median elevation was 314.36 feet with a range of 309.41 to 316.6 feet. The median elevations for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 313.82 feet
- Index Period – 315.05 feet
- Critical Period – 314.4 feet

Land Use and Natural Characteristics

The majority of the watershed is hay and pastureland. There are some areas of crop land to the north of the Chambers Creek arm and forest to the south of the Richland Creek arm. The City of Corsicana lies upstream of the Chambers Creek arm. The reservoir lies within the Northern Blackland Prairie ecoregion with a small portion of the downstream

end of the reservoir in the Floodplains and Low Terraces. Richland-Chambers Reservoir has been noted as being eutrophic by the TCEQ Trophic Classification of Texas Reservoirs report.

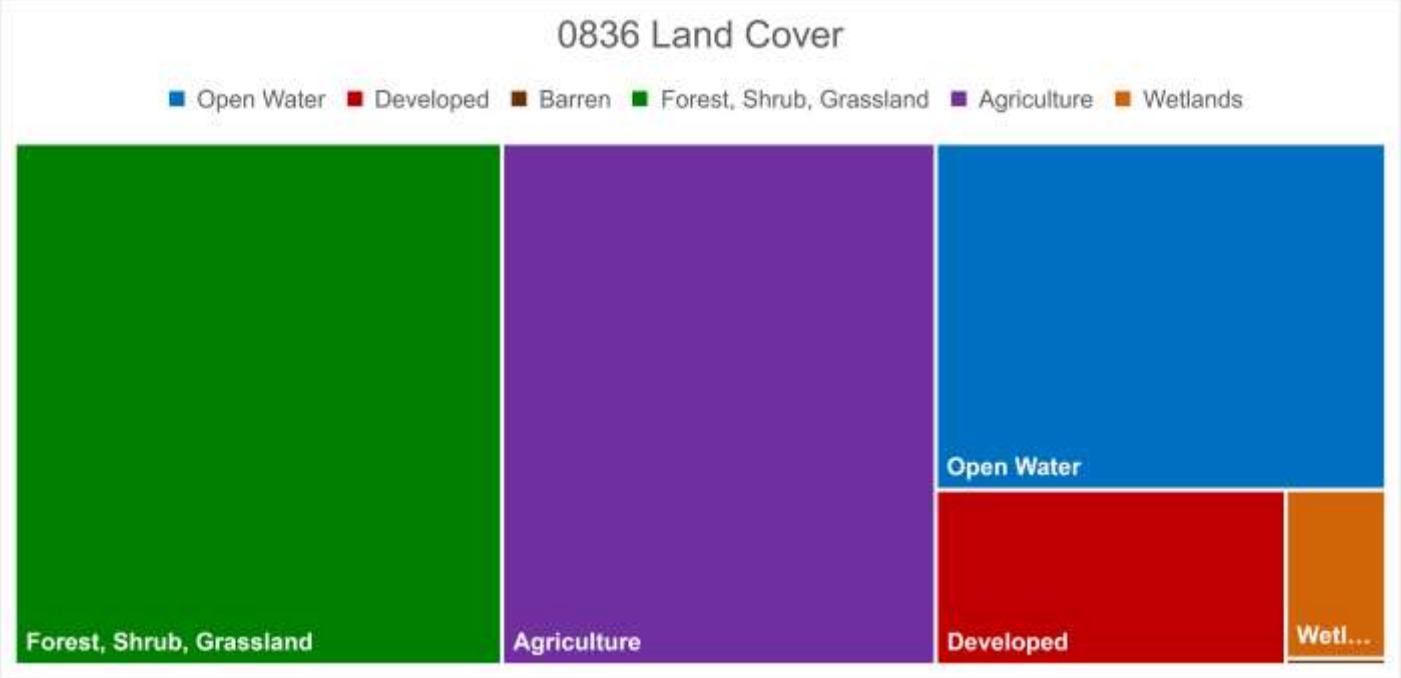

Figure 46: 0836 relative land cover totals

Ongoing Projects

- Routine monitoring of conventional and field parameters five times a year and bacteria four times a year at Station 15168 conducted by Tarrant Regional Water District.
- Routine monitoring of conventional and field parameters five times a year and bacteria four times a year at Station 15169 conducted by Tarrant Regional Water District.
- Routine monthly monitoring of metal, conventional, and field parameters and quarterly monitoring of bacteria at Station 15170 conducted by Tarrant Regional Water District.
- Biased to season monitoring of diel parameters twice a year at Station 15170 conducted by Tarrant Regional Water District.
- Routine monitoring of conventional and field parameters five times a year and bacteria four times a year at Station 15199 conducted by Tarrant Regional Water District.
- Routine monitoring of conventional and field parameters five times a year and bacteria four times a year at Station 11068 conducted by Tarrant Regional Water District.
- Routine monitoring of conventional and field parameters five times a year and bacteria four times a year at Station 15172 conducted by Tarrant Regional Water District.
- Routine monthly monitoring of metal, conventional, bacteria, and field parameters at Station 16721 conducted by Tarrant Regional Water District.

Description of Water Quality Issue

A concern due to depressed dissolved oxygen was identified in Assessment Unit 0836_07.

Table 16 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on more recently collected data, concerns may still exist for exceedances of the 5 mg/L screening level due to samples collected at Station 16721 (Figure 47).

Table 16: Summary of Aquatic Life Use data for Segment 0836

	2022 Integrated Report Data		2024 BHR POR Data	
AU	0836_07	0836_07	0836_07	0836_07
Method	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level
Criteria	3	5	3	5
# Data Assessed	44	44	55	55
# Exceedances	3	10	3	14
Mean Exceedances	2.23	3.73	2.23	3.96
DS Qualifier	AD	AD	AD	AD
LOS	FS	CS	FS	CS
CF	N	N	.	.
Int LOS	FS	CS	.	.

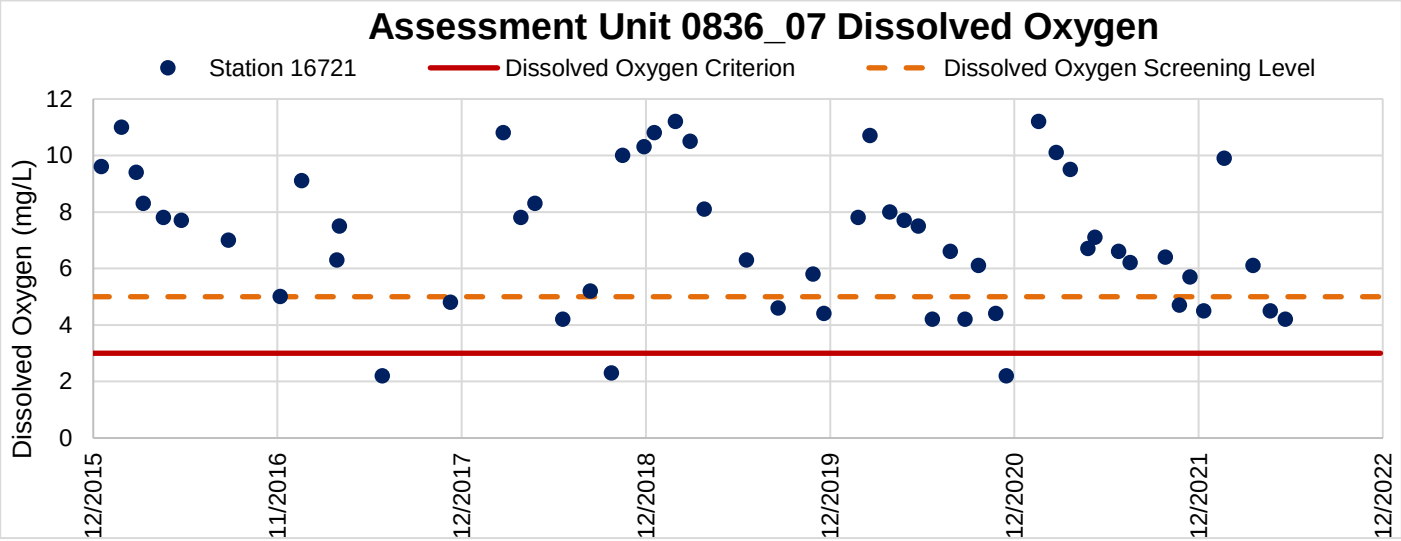

Figure 47: Assessment Unit 0836_07 Dissolved Oxygen

Potential Causes of Water Quality Issue

Station 16721 in Assessment Unit 0836_07 is located at the upper end of the assessment unit at the interface between the reservoir and Richland Creek. During periods of low reservoir elevation, this site likely behaves as a stream. There was a weak correlation between dissolved oxygen and flow (coefficient = 0.333). However, there were no chlorophyll-*a* data available to determine if there may have been a relationship between dissolved oxygen and algal populations. It is likely that low flows were the main factor influencing dissolved oxygen in this portion of the reservoir.

Recommendations for Improving Water Quality

There are no recommendations for water temperature related impacts on dissolved oxygen. It is recommended that chlorophyll-*a* be collected to more fully address this concern.

Potential Stakeholders

- Tarrant Regional Water District
- Landowners
- Goodalta Power Center, LLC
- White Rock Homeowners Association Inc
- Bosque Utilities Corp
- Texas Department of Transportation
- Arcosa LWS, LLC

0836B – Cedar Creek

Figure 48: Map of Segment 0836B

Segment Description

This 11.2-mile unclassified segment runs from the upper end of the creek to the confluence with Richland Chambers Reservoir.

Assessment Units and Monitoring Stations

- **0836B_01** - From the confluence with Richland Chambers Reservoir to the upper end of the creek
  - Perennial freshwater stream
  - **22054** - Cedar Creek at FM 637 southeast of Corsicana
    - Sampling conducted by TRA from 2018 to 2021 and 2024

Hydrology

Unclassified segment 0836B is a first order stream at its most downstream end. Based on sampling at Station 22054, the median flow was 0.35 cfs with a range of 0 to 4.7 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 0.9 cfs
- Index Period – 0.4 cfs
- Critical Period – 0.1 cfs

Land Use and Natural Characteristics

This watershed lies within the Northern Blackland Prairie ecoregion with much of the land being hay, pasture, and grassland with some small areas of forest.

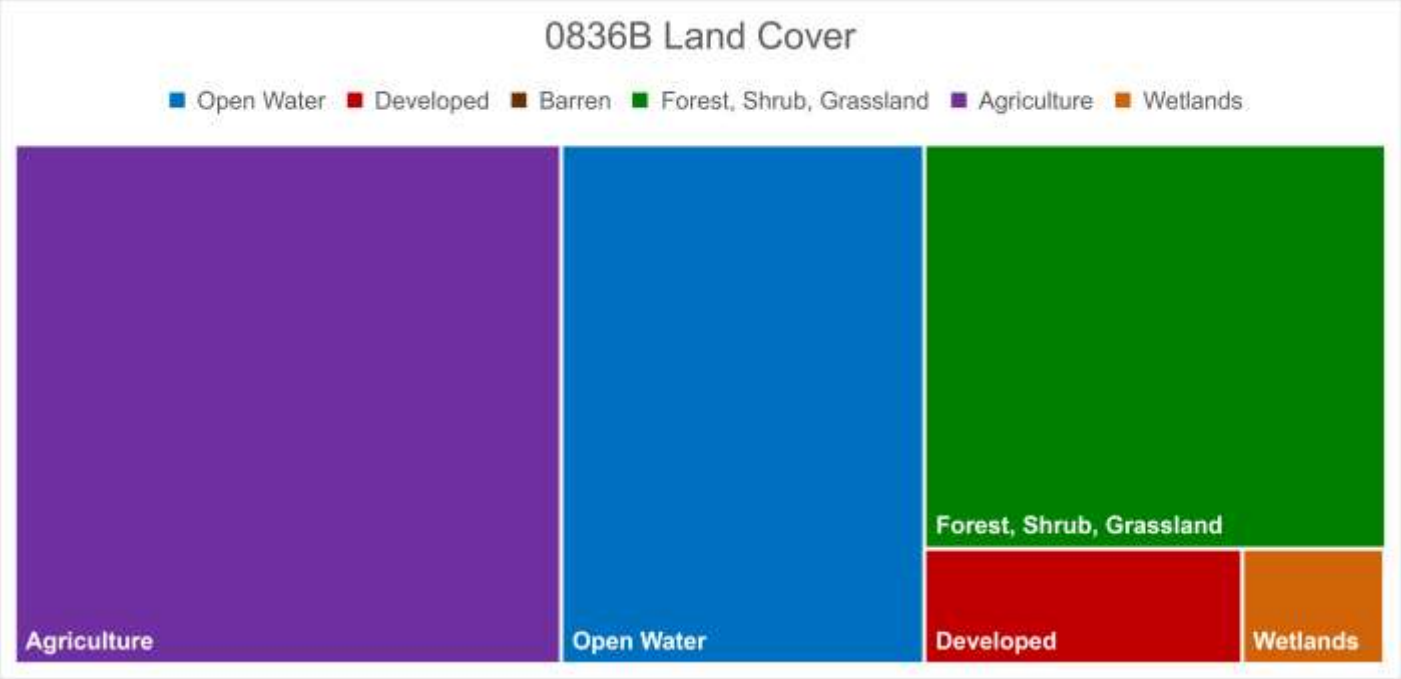

Figure 49: 0836B relative land cover totals

Ongoing Projects

- Routine monitoring of diel and flow parameters five times a year at Station 22054 conducted by Trinity River Authority.

Description of Water Quality Issue

An impairment and a concern for near non-attainment of a standard due to depressed dissolved oxygen was identified in this segment. Table 17 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. The impairment was first identified in the 2010 Integrated Report when 15 data points were available and 12 samples fell below the screening level of 5 mg/L. Additionally, 15 diel data points were available and 5 of those samples fell below the 24-hour average criterion of 5 mg/L. Although a limited data set is available for the period of record of this report, the issues may no longer exist. However, as current the data set may not be sufficient to delist the impairment, TRA staff will be conducting diel monitoring in FY 2024 and 2025.

Table 17: Summary of Aquatic Life Use data for Segment 0836B

	2022 Integrated Report Data		2024 BHR POR Data	
AU	0836B_01	0836B_01	0836B_01	0836B_01
Method	Dissolved Oxygen 24hr average	Dissolved Oxygen 24hr minimum	Dissolved Oxygen 24hr average	Dissolved Oxygen 24hr minimum
Criteria	3	2	3	2
# Data Assessed	10	10	8	8
# Exceedances	2	2	0	0
Mean Exceedances	1.65	0.4	.	.
DS Qualifier	AD	AD	LD	LD
LOS	CN	CN	NC	NC
CF	Y	N	.	.
Int LOS	NS (first identified 2010)	CN	.	.

Potential Causes of Water Quality Issue

Diel dissolved oxygen was well correlated with flow at Station 22054 (coefficient = 0.665 for 24-hour minimum and 0.619 for 24-hour average). There were strong inverse correlations with water temperature as well (coefficient = -0.923 for 24-hour minimum and -0.977 for 24-hour average). Warmer water has a lower oxygen saturation potential that can result in lower dissolved oxygen levels.

Recommendations for Improving Water Quality

There are no recommendations for water temperature and low flow related impacts on dissolved oxygen.

Potential Stakeholders

- Tarrant Regional Water District
- TRA Technical Services and Basin Planning
- Landowners
- City of Corsicana
- Town of Mildred

0836C – Grape Creek

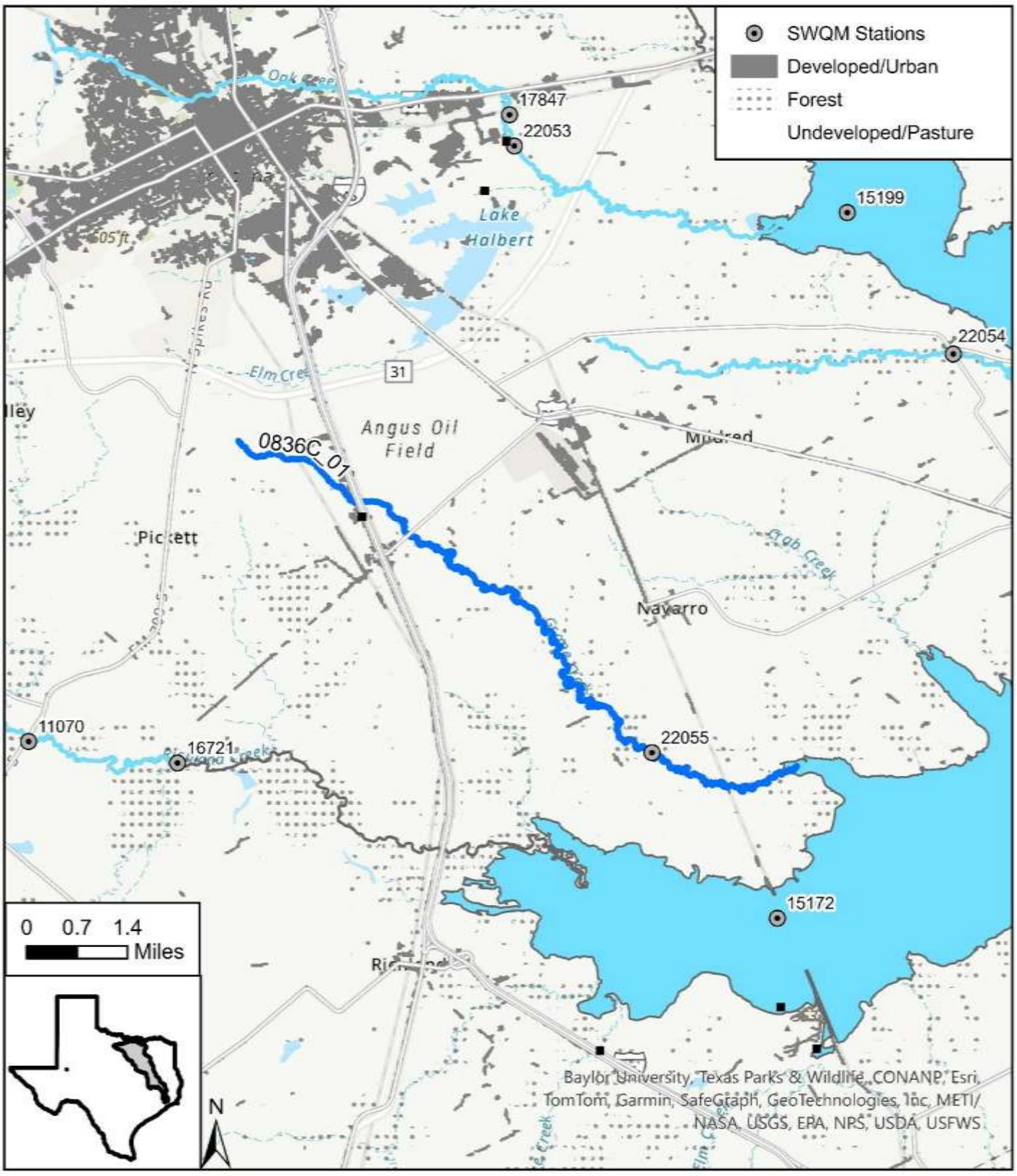

Figure 50: Map of Segment 0836C

Segment Description

This 12.8-mile unclassified segment runs from the upper end of the creek southwest of Corsicana to the confluence with Richland Chambers Reservoir in Navarro County.

Assessment Units and Monitoring Stations

- **0836C_01** - From the confluence with Richland Chambers Reservoir to the upper end of the creek southwest of Corsicana in Navarro County
    - Freshwater stream, intermittent with perennial pools
    - **22055** - Grape Creek at Navarro County Road Southeast CR 1080 southeast of Corsicana
        - Sampling conducted by TRA from 2018 to 2021 and 2024

Hydrology

Unclassified segment 0836C is a first order stream at its most downstream end. Based on sampling at Station 22055, the median flow was 0.75 cfs with a range of 0 to 12 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 0.7 cfs
- Index Period – 1 cfs
- Critical Period – 0.4 cfs

Land Use and Natural Characteristics

This watershed lies within the Northern Blackland Prairie ecoregion with much of the land being hay, pasture, and grassland with some small areas of forest.

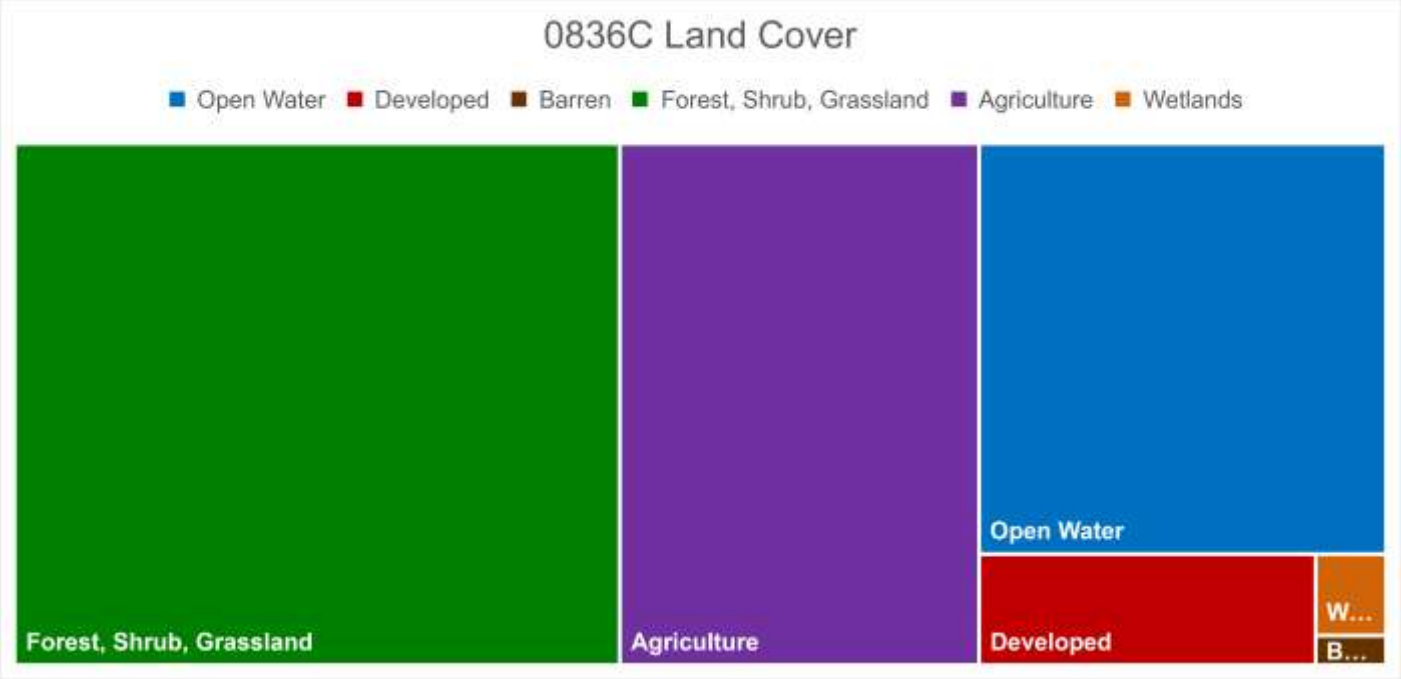

Figure 51: 0836C relative land cover totals

Ongoing Projects

- Routine monitoring of diel and flow parameters five times a year at Station 22055 conducted by Trinity River Authority.

Description of Water Quality Issue

An impairment due to depressed dissolved oxygen was identified in this segment. Table 18 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Although a limited data set is available for the period of record of this report, it appears that the impairment still exists as three samples each were reported below the 24-hour average and minimum criteria (Figure 52). TRA staff will be conducting diel monitoring in FY 2024 and 2025 to further assess this impairment.

Table 18: Summary of Aquatic Life Use data for Segment 0836C

	2022 Integrated Report Data		2024 BHR POR Data	
AU	0836C_01	0836C_01	0836C_01	0836C_01
Method	Dissolved Oxygen 24hr average	Dissolved Oxygen 24hr minimum	Dissolved Oxygen 24hr average	Dissolved Oxygen 24hr minimum
Criteria	3	2	3	2
# Data Assessed	10	9	8	8
# Exceedances	5	4	3	3
Mean Exceedances	1.48	0.5	1.9	0.53
DS Qualifier	AD	LD	LD	LD
LOS	NS	NS	NS	NS
CF	N	N	.	.
Int LOS	NS	NS	.	.

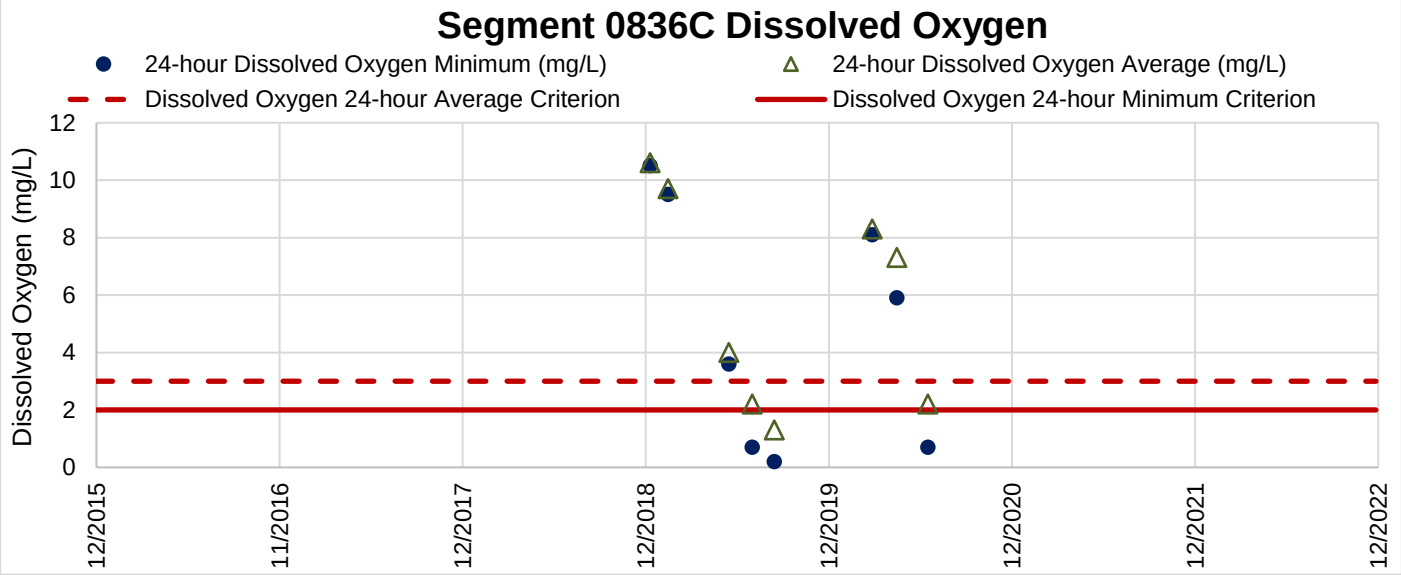

Figure 52: Segment 0836C Dissolved Oxygen

Potential Causes of Water Quality Issue

Diel dissolved oxygen was moderately correlated with flow at Station 22055 (coefficient = 0.583 for 24-hour minimum and 0.586 for 24-hour average). There were strong inverse correlations with water temperature as well (coefficient = -0.993 for 24-hour minimum and -0.994 for 24-hour average). Warmer water has a lower oxygen saturation potential that can result in lower dissolved oxygen levels.

Recommendations for Improving Water Quality

There are no recommendations for water temperature and low flow related impacts on dissolved oxygen.

Potential Stakeholders

- Tarrant Regional Water District
- TRA Technical Services and Basin Planning
- Landowners
- Town of Angus
- Town of Navarro

0837 – Richland Creek Above Richland-Chambers Reservoir

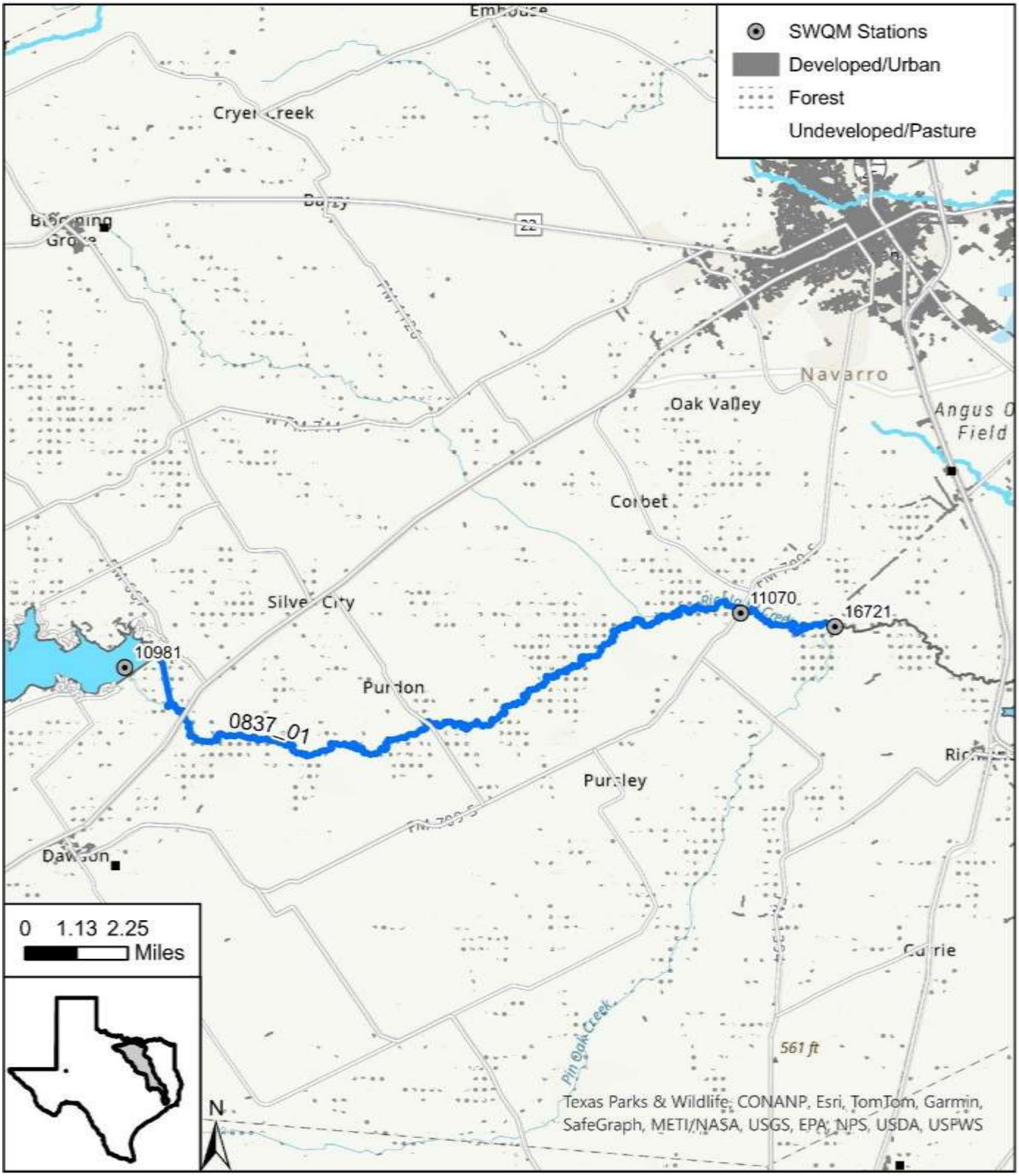

Figure 53: Map of Segment 0837

Segment Description

This 22.6-mile segment runs from Navarro Mills Dam to the confluence of Pin Oak.

Assessment Units and Monitoring Stations

- **0837_01** - From the confluence of Pin Oak Creek in Navarro County to Navarro Mills Dam in Navarro County
  - Perennial freshwater stream
  - **11070** - Richland Creek 60 meters downstream of FM 709 2.8 kilometers upstream of Richland-Chambers Reservoir
    - Sampling conducted by TCEQ from 2015 to 2024

Hydrology

Segment 0837 is a fourth order stream at its most downstream end. There are two USGS flow gages in this segment: 08063100 near Dawson and 08063460 at CR 0030 near Richland. The median flow at these two gages ranged from 1.83 cfs at the upstream Dawson gage to 5.59 cfs at the downstream Richland gage with a range of 0 to 8,270 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these two gages are listed below.

- Non-Index Period – 1.81 to 4.8 cfs
- Index Period – 7.51 to 14.4 cfs
- Critical Period – 0.92 to 1.18 cfs

Land Use and Natural Characteristics

Much of the watershed is a mix of hay, pasture, and grassland. There are some areas of crop land to the south of the stream and woody wetland riparian areas. The stream flows through the Northern Blackland Prairie ecoregion.

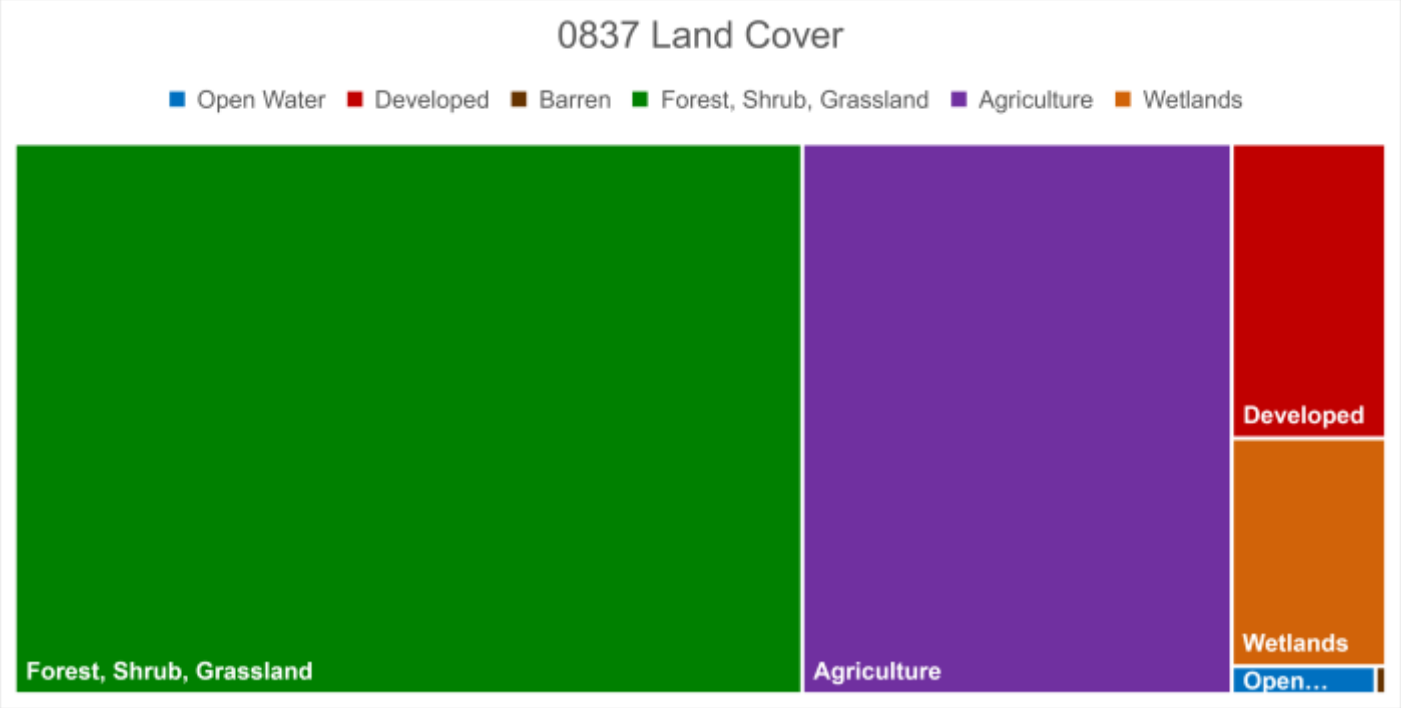

Figure 54: 0837 relative land cover totals

Ongoing Projects

- Biased to season monitoring of diel parameters five times a year at Station 11070 conducted by TCEQ Region 4.

- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 11070 conducted by TCEQ Region 4.

Description of Water Quality Issue

This segment was found to have concerns for depressed dissolved oxygen levels. Table 19 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on more recently collected data, the concern may no longer exist.

Table 19: Summary of Aquatic Life Use data for Segment 0837

	2022 Integrated Report Data		2024 BHR POR Data			
AU	0837_01	0837_01	0837_01	0837_01	0837_01	0837_01
Method	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen 24-hr average	Dissolved Oxygen 24-hr minimum
Criteria	3	5	3	5	5	3
# Data Assessed	30	30	30	30	4	4
# Exceedances	0	7	0	4	1	0
Mean Exceedances	.	4.5	.	4.4	4.6	.
DS Qualifier	AD	AD	AD	AD	LD	LD
LOS	FS	CS	FS	NC	NC	NC
CF	N	N	.	.	.	.
Int LOS	FS	CS	.	.	.	.

Potential Causes of Water Quality Issue

Dissolved oxygen was moderately correlated with flow in this segment (coefficient = 0.456). There was no correlation with chlorophyll-*a*. This segment does not appear to be a low flow system; the average flow was 58 cfs with a range of 0.1 to 800 cfs.

Recommendations for Improving Water Quality

No recommendations at this time as the concern may no longer exist.

Potential Stakeholders

- City of Navarro Mills
- Navarro Mills Water Supply Corporation
- Landowners

0840 – Ray Roberts Lake

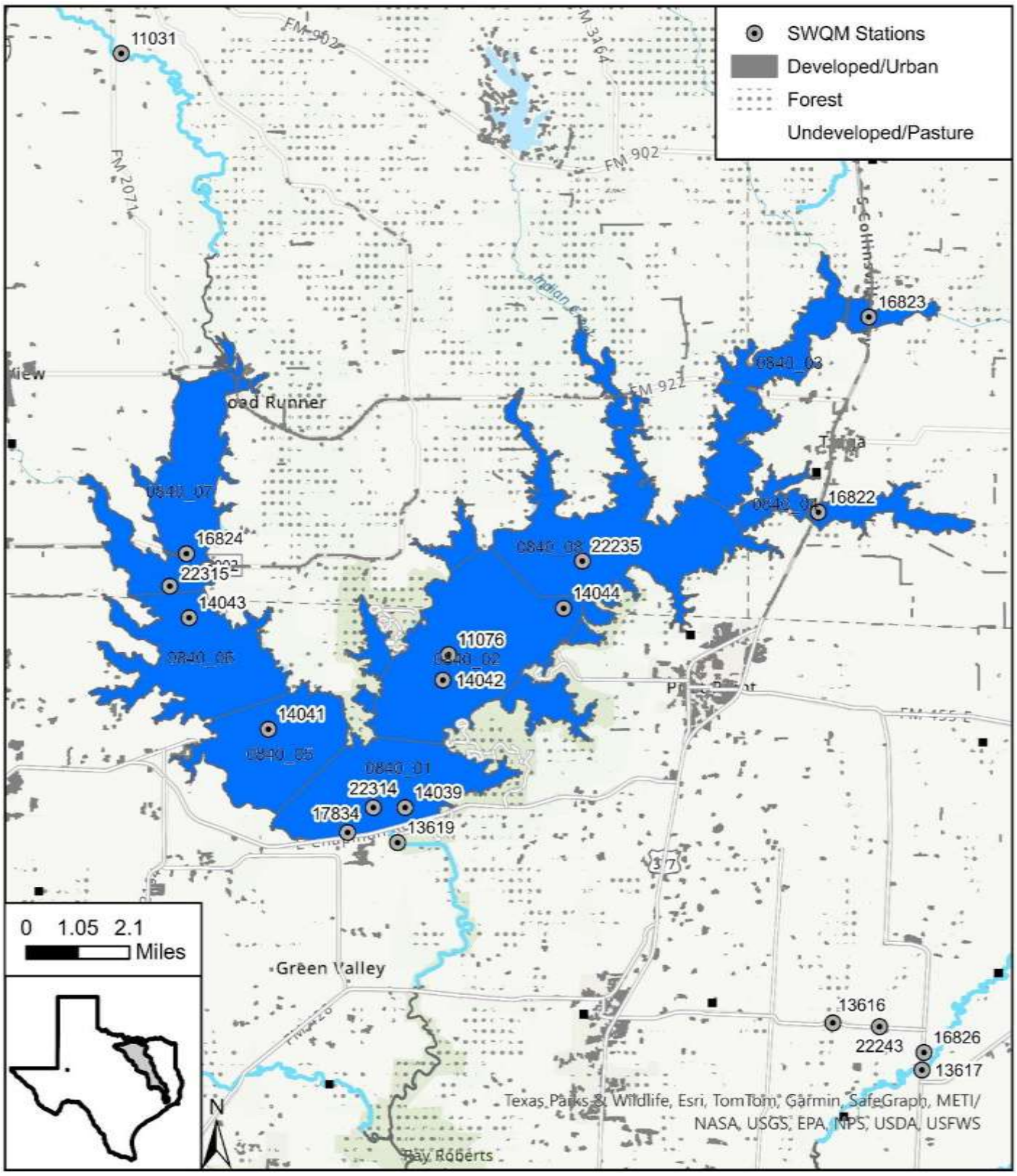

Figure 55: Map of Segment 0840

Segment Description

This 28,453-acre reservoir impounds Elm Fork Trinity River from a point 5.9 miles downstream of the confluence of Pecan Creek in Cooke County to Ray Roberts Dam in Denton County; up to the normal pool elevation of 632.5 feet.

Assessment Units and Monitoring Stations

- **0840_01** - Lowermost portion of reservoir adjacent to dam
  - **14039** - Ray Roberts Lake USGS Site AC 98 meters north and 1.26 kilometers west of intersection of FM 455 and Lake Ray Roberts Road
    - Sampling conducted by TCEQ from 2015 and 2024
  - **17834** - Ray Roberts Lake at Dallas Water Utilities intake west side of dam 1.02 kilometers north and 232 meters east of intersection of Burger Rd and FM 2153
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2015 to 2021
  - **22314** - Ray Roberts Lake near the dam 600 meters north and 395 meters west of the outlet works
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2022 to 2024
- **0840_02** - Lower portion of Jordan Creek arm west of Pilot Point
  - **11076** - Ray Roberts Lake Isle Du Bois Creek arm west of Jordan Park 2.84 kilometers north and 599 meters west of intersection of Isle Du Bois Park Rd and Quail Run
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2015 to 2021
  - **14044** - Ray Roberts Lake USGS Site EC 399 meters north and 2.61 kilometers west of intersection of Jack Gray Road and Alexander Road
    - Sampling conducted by TCEQ from 2015 and 2024
  - **14042** - Ray Roberts Lake USGS Site CC 1.99 kilometers north and 737 meters west of intersection of Quail Run Circle and Isle Du Bois State Park Road
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2022 to 2024
- **0840_03** - Upper portion of Jordan Creek arm
  - **16823** - Ray Roberts Lake in Range Creek cove at US 377 bridge 600 meters south and 57 meters west of intersection of Patton Rd and US 377 southwest of Sherman
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2015 to 2024
- **0840_04** - Buck Creek cove
  - **16822** - Ray Roberts Lake Buck Creek cove at US 377 bridge 1.06 kilometers north and 428 meters east of intersection of US 377 and Emberson Chapel Rd southwest of Sherman
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2015 to 2024
- **0840_05** - Lower portion of Elm Fork arm
  - **14041** - Ray Roberts Lake USGS Site BC 444 meters north and 2.21 kilometers east of intersection of FM 1190 and Jones Road
    - Sampling conducted by TRA from 2021 to 2024
- **0840_06** - Middle portion of Elm Fork arm
  - **14043** - Ray Roberts Lake USGS Site DC 778 meters north and 2.42 kilometers west of intersection of Tyson Lane and Hemming Road
    - Sampling conducted by TCEQ from 2015 and 2024
- **0840_07** - Upper portion of Elm Fork arm
  - **16824** - Ray Roberts Lake at FM 3002 377 meters north and 1.25 kilometers east of intersection of FM 3002 and Mann Road 13 miles south of Gainesville
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2015 to 2021
  - **22315** - Ray Roberts Lake at Elm Fork arm 1 kilometer south of East Lone Oak Road/FM 3002
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2022 to 2024
- **0840_08** - Remainder of reservoir
  - **22235** - Ray Roberts Lake upper portion of Jordan Creek arm 1.87 kilometers south and 2.11 kilometers east of intersection of Bloomfield Road and FM 372
    - Sampling conducted by TRA from 2021 to 2024

Hydrology

Segment 0840 is a reservoir on a fifth order stream. It is a water supply and flood control reservoir with a conservation pool elevation of 632.5 feet and flood pool elevation of 640.5 feet. Over the period of record for this report, the median elevation was 632.48 feet with a range of 630.02 to 640.78 feet. The median elevations for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 632.45 feet
- Index Period – 632.63 feet
- Critical Period – 632.26 feet

Land Use and Natural Characteristics

The Elm Fork arm of the reservoir flows through the Grand Prairie ecoregion. Most of the Jordan Creek arm flows through the Eastern Cross Timbers ecoregion with the uppermost portion of the Jordan Creek and Buck Creek coves lying within the Northern Blackland Prairie. To the west and east of the reservoir, the land is mainly grassland, cultivated crops, hay, and pasture. The land between the two arms of the reservoir is a mix of grassland, hay and pasture, and forest.

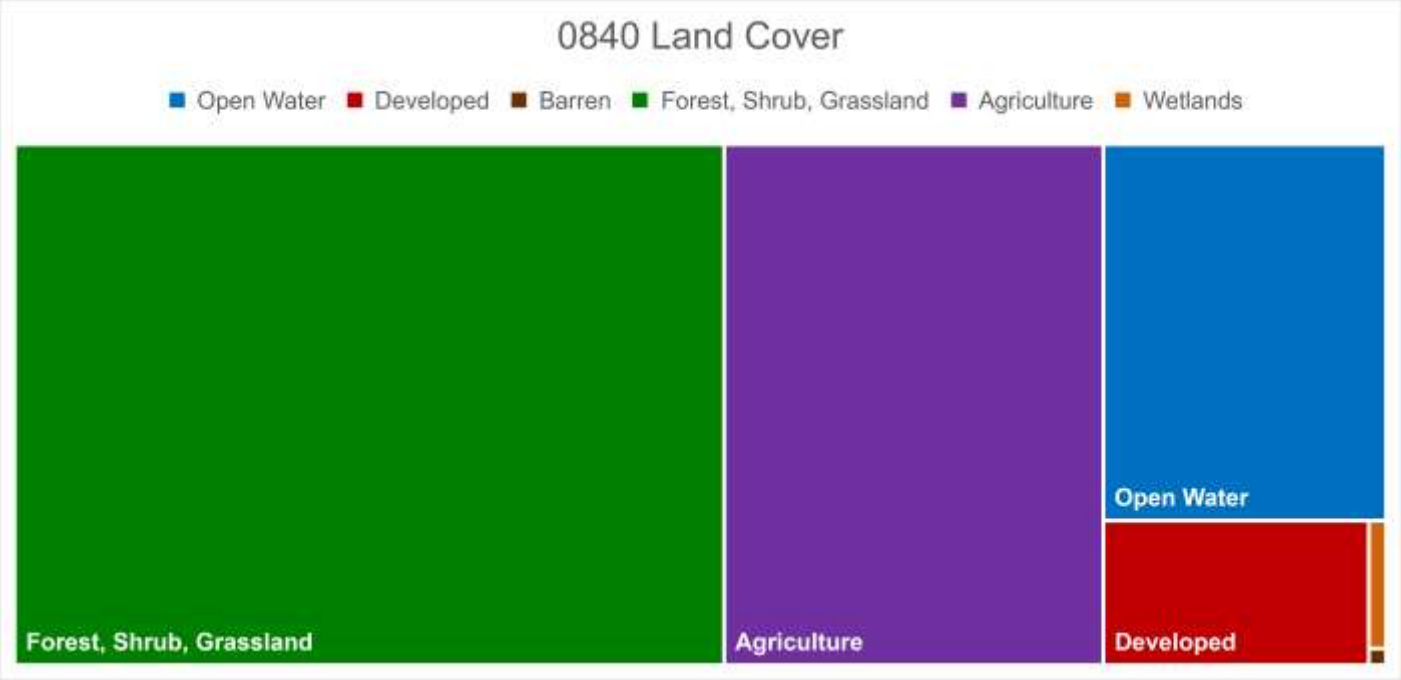

Figure 56: 0840 relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 14039 conducted by TCEQ Region 4.
- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 22314 conducted by City of Dallas.
- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 14042 conducted by City of Dallas.
- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 14044 conducted by TCEQ Region 4.
- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 16823 conducted by City of Dallas.

- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 16822 conducted by City of Dallas.
- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 14041 conducted by Trinity River Authority.
- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 14043 conducted by TCEQ Region 4.
- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 22315 conducted by City of Dallas.
- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 22235 conducted by Trinity River Authority.

Description of Water Quality Issue

This segment was found to have concerns for depressed dissolved oxygen levels. Table 20 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Although it is a limited data set, the concern may no longer exist based on more recently collected data.

Table 20: Summary of Aquatic Life Use data for Segment 0840

	2022 Integrated Report Data	2024 BHR POR Data
AU	0840_08	0840_08
Method	Dissolved Oxygen grab screening level	Dissolved Oxygen grab screening level
Criteria	5	5
# Data Assessed	0	9
# Exceedances	.	0
Mean Exceedances	.	.
DS Qualifier	ID	LD
LOS	NA	NC
CF	Y	.
Int LOS	CS	.

Potential Causes of Water Quality Issue

Dissolved oxygen levels at Station 22235 in Assessment Unit 0840_08 ranged from 7.2 to 12.8 mg/L between 2020 and 2022. However, there was a strong inverse correlation between chlorophyll-*a* and dissolved oxygen (coefficient = -0.829). Algal cells will consume oxygen at night and during cloudy weather when respiration occurs which can result in low dissolved oxygen levels.

Recommendations for Improving Water Quality

No recommendations at this time as the concern may no longer exist. Monitoring should continue to further evaluate the relationship between chlorophyll-*a* and dissolved oxygen.

Potential Stakeholders

- City of Dallas
- TRA Technical Services and Basin Planning
- Ray Roberts Lake State Parks
- Town of Valley View
- Homeowners and homeowners associations
- Landowners
- Ray Roberts Nature Center
- Communities around the reservoir

0841F – Cottonwood Creek

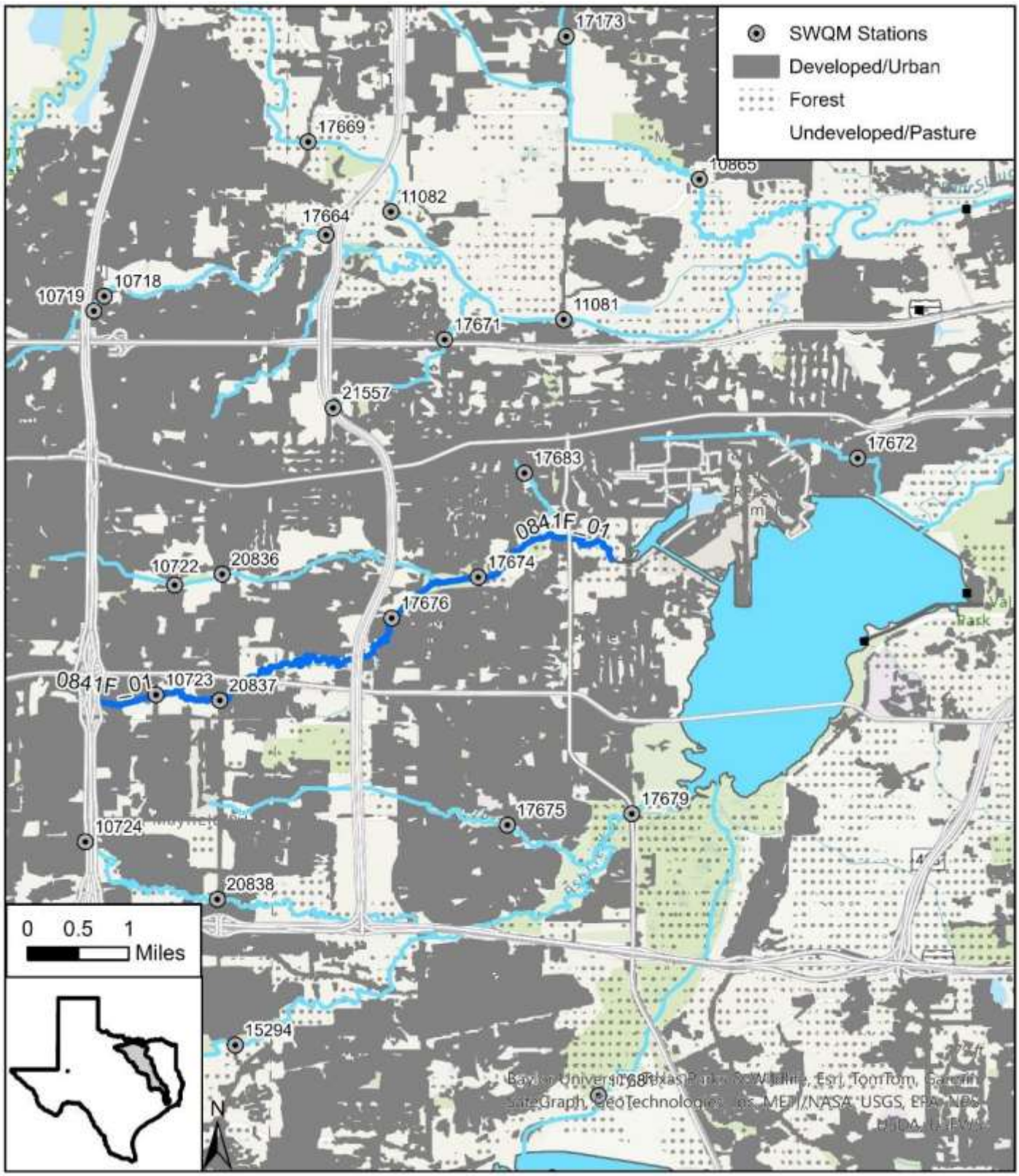

Figure 57: Map of Segment 0841F

Segment Description

This unclassified segment is a 6.5-mile stretch of Cottonwood Creek running from SH 360 in Arlington to approximately 0.1-miles upstream of Mountain Creek Reservoir in Grand Prairie.

Assessment Units and Monitoring Stations

- **0841F_01** - A 6.5 mile stretch of Cottonwood Creek running upstream from approximately 0.1 miles upstream of Mountain Creek Reservoir in Dallas County to SH 360 in Tarrant County
    - Perennial freshwater stream
    - **10723** - Unnamed tributary of Cottonwood Creek at north bound direction of Forum Drive in Arlington
        - Sampling conducted by Arlington from 2015 to 2024
    - **17674** - Cottonwood Creek immediately upstream of Southwest 3rd Street in Grand Prairie
        - Sampling conducted by Grand Prairie from 2015 to 2024
    - **17676** - South Fork Cottonwood Creek at Robinson Road in Grand Prairie
        - Sampling conducted by Grand Prairie from 2015 to 2024

Hydrology

Unclassified segment 0841F is a second order stream at its most downstream end. Based on sampling at Stations 10723 and 17676, the median flow was 0.3 cfs at the upstream Station 10723 and 1.3 cfs at the downstream Station 17676 with a range of 0 to 13 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for the two stations are listed below.

- Non-Index Period – 0.3 to 1.5 cfs
- Index Period – 0.7 to 1.5 cfs
- Critical Period – 0.3 to 0.95 cfs

Land Use and Natural Characteristics

The watershed is heavily developed with industrial areas at the upstream end and residential development downstream. It lies within the Northern Blackland Prairie ecoregion.

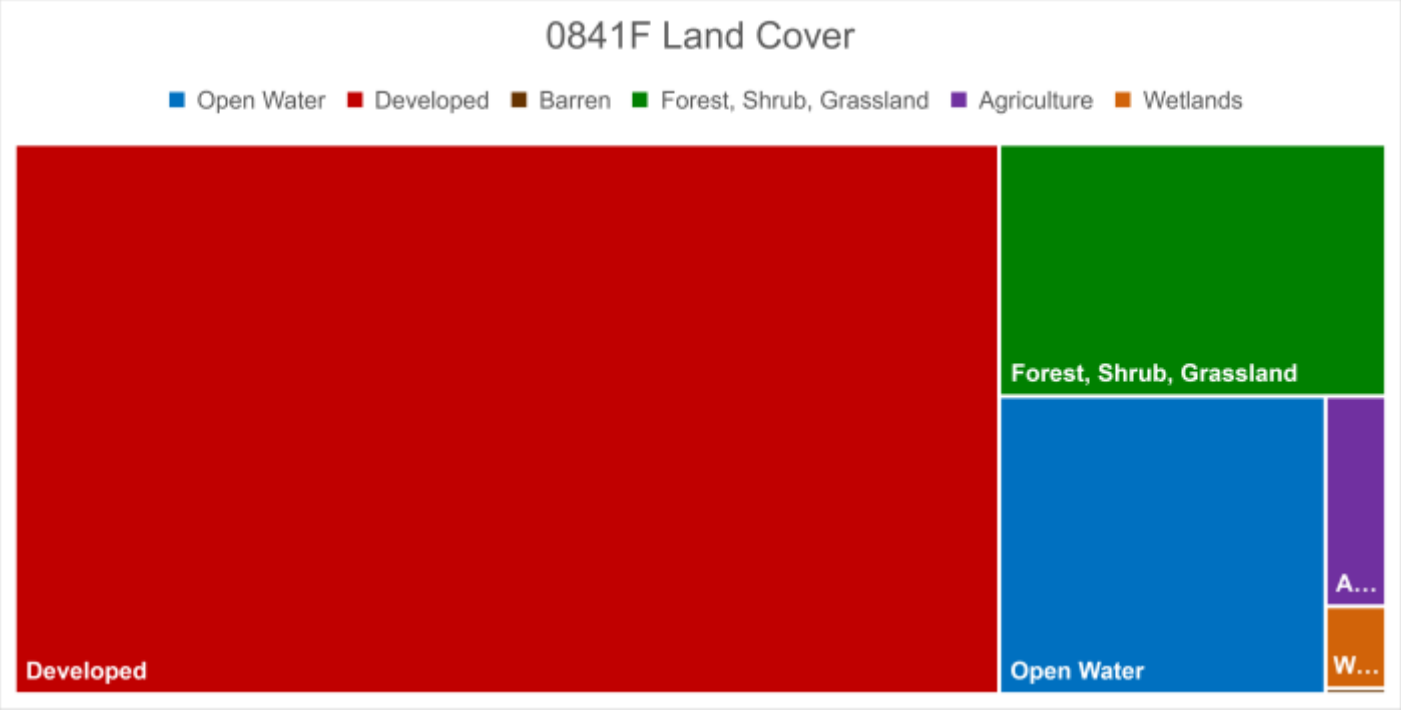

Figure 58: 0841F relative land cover totals

Figure 59: Cottonwood Creek at South Beltline Road in Grand Prairie

Ongoing Projects

- Routine quarterly monitoring of metal, bacteria, flow, and field parameters at Station 10723 conducted by City of Arlington.
- Routine monthly monitoring of bacteria and field parameters, quarterly monitoring of conventional parameters, and metals once a year at Station 17674 conducted by City of Grand Prairie.
- Routine monthly monitoring of bacteria, flow, and field parameters; quarterly conventionals; and metals once a year at Station 17676 conducted by City of Grand Prairie.

Description of Water Quality Issue

This segment was found to have concerns due to depressed dissolved oxygen levels.

Table 21 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on sampling at three stations in this segment, these concerns may still exist as 15% of samples collected over the period of record for this report fell below the screening level of 5 mg/L (Figure 60).

Table 21: Summary of Aquatic Life Use data for Segment 0841F

	2022 Integrated Report Data	2024 BHR POR Data							
AU	0841F_01	0841F_01 Station 10723	0841F_01 Station 10723	0841F_01 Station 17674	0841F_01 Station 17674	0841F_01 Station 17676	0841F_01 Station 17676	0841F_01 Combined	0841F_01 Combined
Method	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level
Criteria	5	3	5	3	5	3	5	3	5
# Data Assessed	186	35	35	84	84	78	78	197	197
# Exceedances	30	2	11	1	11	1	7	4	29
Mean Exceedances	3.87	1.75	3.87	1.2	4.01	2.5	4.1	1.8	3.98
DS Qualifier	AD	AD	AD	AD	AD	AD	AD	AD	AD
LOS	CS	FS	CS	FS	CS	FS	NC	FS	CS
CF	N	.	.	.	.	.	.	.	.
Int LOS	CS	.	.	.	.	.	.	.	.

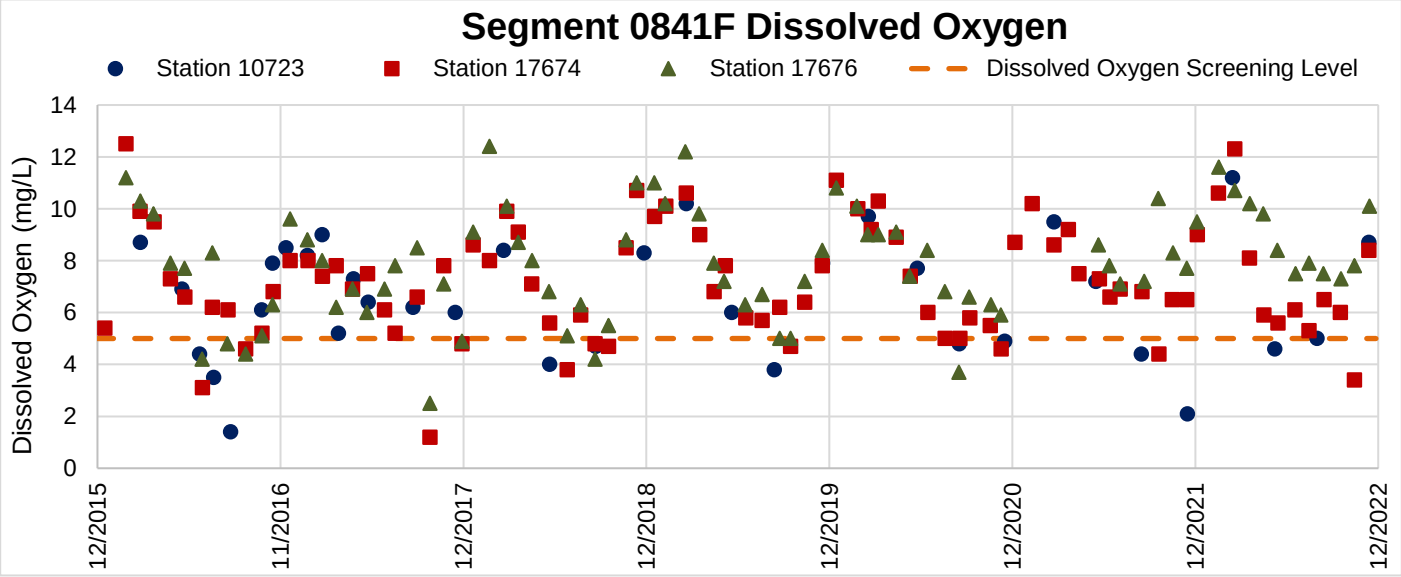

Figure 60: Segment 0841F Dissolved Oxygen

Potential Causes of Water Quality Issue

Dissolved oxygen in this segment was not well correlated with flow or chlorophyll-*a*. The average flow across the three stations in this segment was 1.43 cfs with a range of 0.057 and 13 cfs. The average chlorophyll-*a* was 4.83 µg/L with a range of 0.5 to 53 µg/L. All dissolved oxygen values that fell below 5 mg/L occurred between May and November with water temperatures between 13.4 and 30.4 °C. There were strong inverse correlations between water temperature and dissolved oxygen (correlations between -0.706 and -0.740). As water temperature increases, the solubility potential for oxygen decreases. It is likely that a combination of low flows and water temperatures caused the concerns in this segment.

Recommendations for Improving Water Quality

There are no recommendations for flow or water temperature related impacts on dissolved oxygen. A use attainability analysis may be required to determine if the standards are appropriate for this segment.

Potential Stakeholders

- City of Arlington
- City of Grand Prairie
- Lockheed Martin – Grand Prairie
- Homeowners and homeowners associations
- Landowners
- City of Dallas

0841K – Fish Creek

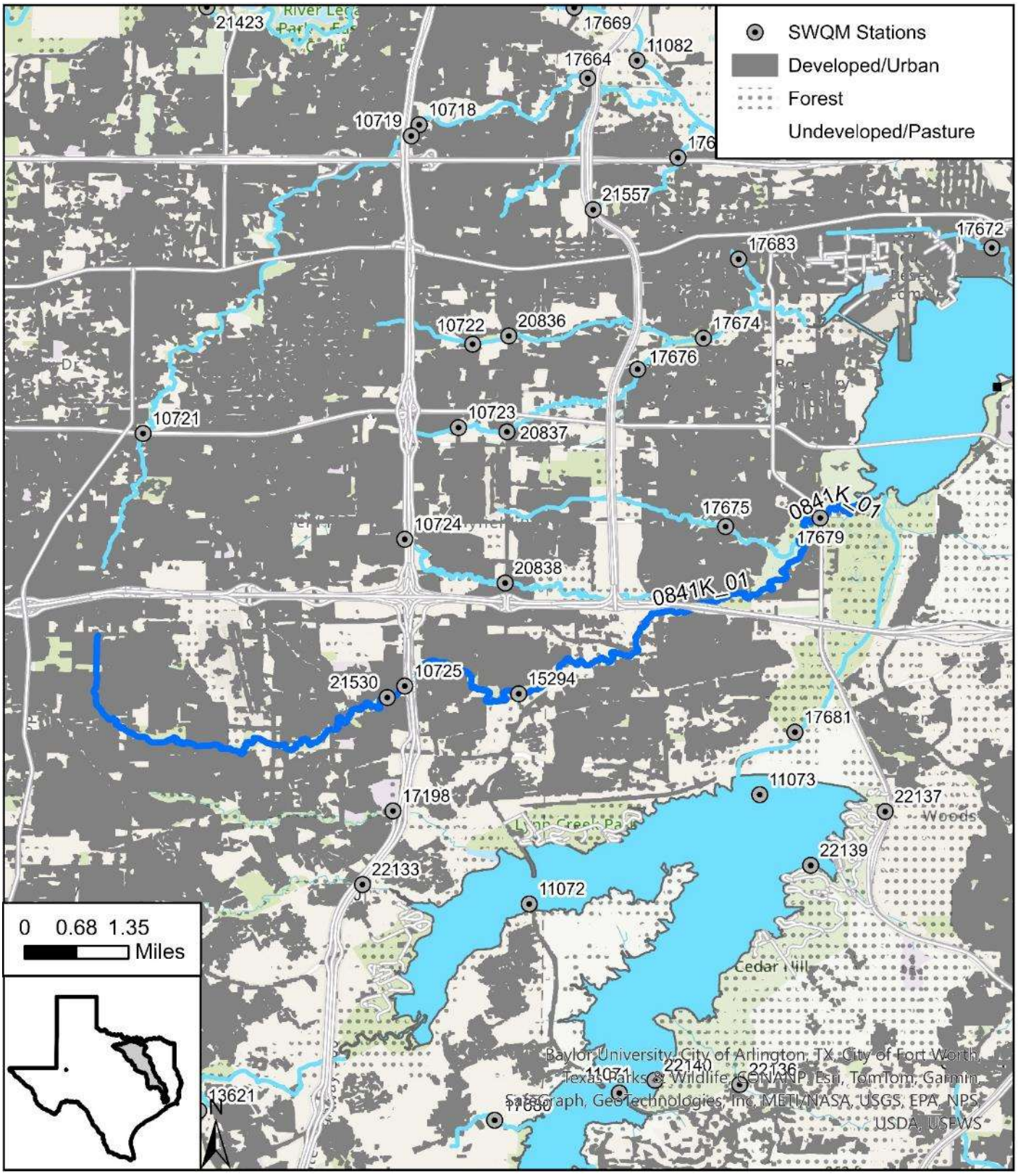

Figure 61: Map of Segment 0841K

Segment Description

Fish Creek is a 15-mile stream running from the headwaters of the creek in Arlington to the confluence with Mountain Creek Reservoir in Grand Prairie.

Assessment Units and Monitoring Stations

- **0841K_01** - A 15 mile stretch of Fish Creek running upstream from the confluence with Mountain Creek Reservoir in Grand Prairie in Dallas County to the upper end of the creek in Arlington in Tarrant County
    - Perennial freshwater stream
    - **15294** - Fish Creek South Branch at Great Southwest Parkway/Lakeridge Parkway in Grand Prairie
        - Sampling conducted by Grand Prairie from 2015 to 2024
        - Aquatic life monitoring conducted by TRA in 2018 and 2023
        - Sampling conducted by TRA in 2023 and 2024
    - **17679** - Fish Creek at Beltline Road/FM 1382 approximately 205 meters south of the intersection of Southeast 14th Street
        - Sampling conducted by Grand Prairie from 2015 to 2024
    - **21530** - Fish Creek South Branch 433 meters upstream of SH 360 southbound service road in natural channel immediately upstream of concrete lined channel
        - Sampling conducted by Arlington from 2015 to 2024

Figure 62: Fish Creek in Grand Prairie

Hydrology

Unclassified segment 0841K is a second order stream at its most downstream end. Based on sampling at Stations 21530 and 15294, the median flow was 0.6 cfs at the upstream Station 21530 and 1.2 cfs at the downstream Station 15294 with a range of 0.043 to 20 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for the two stations are listed below.

- Non-Index Period – 0.6 to 1.6 cfs
- Index Period – 1.1 to 1.45 cfs
- Critical Period – 0.45 to 0.55 cfs

Land Use and Natural Characteristics

The watershed consists of mostly residential development with some wooded riparian areas and lies within the Northern Blackland Prairie ecoregion.

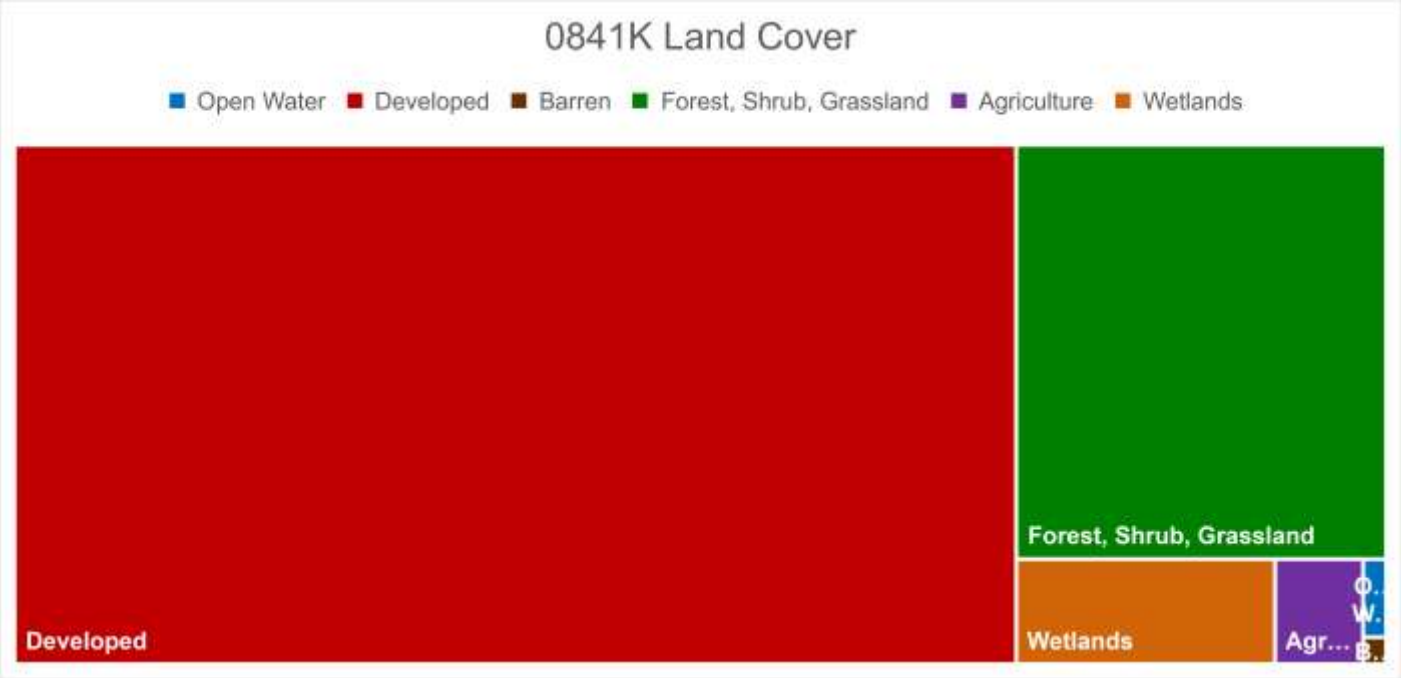

Figure 63: 0841K relative land cover totals

Ongoing Projects

- Routine monitoring of diel and flow parameters five times a year at Station 15294 conducted by Trinity River Authority.
- Routine monthly monitoring of bacteria, flow, and field parameters; quarterly conventionals; and metals once a year at Station 15294 conducted by City of Grand Prairie.
- Routine monthly monitoring of bacteria and field parameters, quarterly monitoring of conventional parameters, and metals once a year at Station 17679 conducted by City of Grand Prairie.
- Routine quarterly monitoring of metal, conventional, bacteria, flow, and field parameters at Station 21530 conducted by City of Arlington.

Description of Water Quality Issue

This segment was found to have concerns due to depressed dissolved oxygen levels. Table 22 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on sampling at three stations in this segment, these concerns may still exist as 16% of samples collected over the period of record for this report fell below the screening level of 5 mg/L (Figure 64). Additionally, concerns were identified due to degraded habitat and macrobenthic communities based on aquatic life monitoring in 2018. During the summer of 2023, TRA staff conducted another aquatic life monitoring event in this segment and found that habitat met the criterion. Macrobenthic communities based on statewide scoring metrics also met the criterion. However, based on regionalized scoring metrics, macrobenthic communities may remain a concern.

Table 22: Summary of Aquatic Life Use data for Segment 0841K

	2022 Integrated Report Data				2024 BHR POR Data				
AU	0841K_01	0841K_01	0841K_01	0841K_01	0841K_01 Station 15294	0841K_01 Station 15294	0841K_01 Station 15294	0841K_01 Station 15294	0841K_01 Station 15294
Method	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Habitat	Macrobenthic community (Qualitative)	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Habitat	Macrobenthic community (Qualitative) Statewide	Macrobenthic community (Qualitative) Regionalized
Criteria	3	5	20	29	3	5	20	29	29
# Data Assessed	179	179	2	2	84	84	2	2	2
Mean Data Assessed	.	.	18	24	.	.	24	31	27
# Exceedances	3	23	.	.	0	3	.	.	.
Mean Exceedances	2.77	3.85	.	.	.	3.83	.	.	.
DS Qualifier	AD	AD	AD	AD	AD	AD	AD	AD	AD
LOS	FS	CS	CS	NS	FS	NC	NC	NC	CN
CF	N	N	N	N	.	.	.		.
Int LOS	FS	CS	CS	CN	.	.	.		.

Table 22 continued

	2024 BHR POR Data					
AU	0841K_01 Station 17679	0841K_01 Station 17679	0841K_01 Station 21530	0841K_01 Station 21530	0841K_01 Combined	0841K_01 Combined
Method	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level
Criteria	3	5	3	5	3	5
# Data Assessed	83	83	35	35	202	202
Mean Data Assessed	.	.	.	.	.	.
# Exceedances	7	26	0	3	7	32
Mean Exceedances	2.64	3.66	.	4.2	2.64	3.73
DS Qualifier	AD	AD	AD	AD	AD	AD
LOS	FS	CS	FS	NC	FS	CS
CF	.	.	.	.	.	.
Int LOS	.	.	.	.	.	.

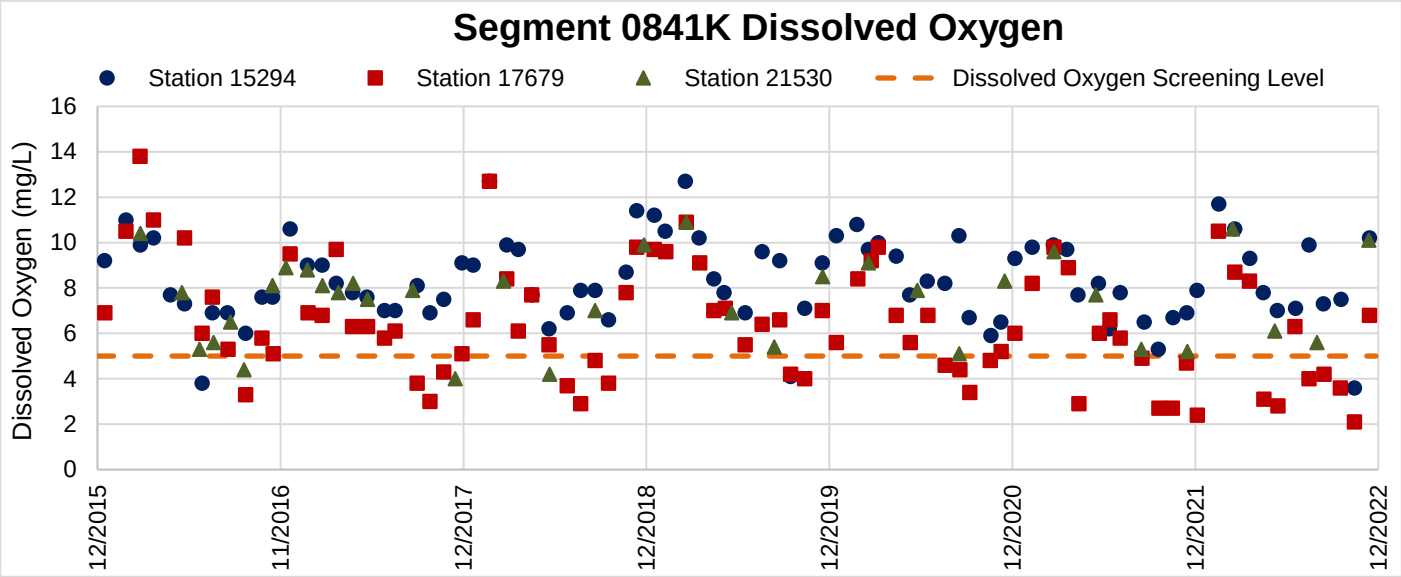

Figure 64: Segment 0841K Dissolved Oxygen

Potential Causes of Water Quality Issue

Dissolved oxygen in this segment was not well correlated with flow. The average flows measured at Stations 15294 and 21530 was 2.01 cfs with a range of 0.043 to 20 cfs. The average chlorophyll-*a* was 3.34 µg/L with a range of 0.5 to 47 µg/L. All dissolved oxygen values that fell below 5 mg/L occurred between May and early-December with water temperatures between 13.4 and 31.1 °C. There were strong inverse correlations between water temperature and dissolved oxygen (correlations between -0.573 and -0.743). As water temperature increases, the solubility potential for oxygen decreases. It is likely that a combination of low flows and water temperatures caused the concerns in this segment. There was a weak correlation between dissolved oxygen at Station 17679 (coefficient = -0.333). Chlorophyll-*a* was not correlated with nutrients at this station. However, this station is downstream of a golf course and woody wetland area. Algal populations may be washed in from the golf course, but it is more likely that dissolved oxygen levels are being impacted by the slow-moving water in the wetland.

Low scores for habitat and macroinvertebrate communities sampled in 2018 were likely due to a less than ideal placement of the reach. This reach was located downstream of South Great Southwest Parkway in Grand Prairie. Much of the reach was straight and impacted by a powerline easement which reduced tree canopy and riparian vegetation which may have lead to increased scouring of the reach and degraded habitat for macroinvertebrates. This stream was resampled in 2023 at a location upstream of South Great Southwest Parkway just over 400 meters upstream of the previous reach. This portion of the stream was more sinuous and had more tree canopy than the downstream reach. The 2023 reach also appeared to be more representative of the steam as a whole than the 2018 reach and resulted in higher scores for both habitat and macroinvertebrate communities.

Recommendations for Improving Water Quality

There are no recommendations for flow or water temperature related impacts on dissolved oxygen. A use attainability analysis may be required to determine if the standards are appropriate for this segment.

Potential Stakeholders

- City of Arlington
- Arlington Municipal Airport
- City of Grand Prairie
- Fish Creek – Dallas County Nature Preserve
- Grand Oaks Golf Course
- City of Dallas
- Prairie Lakes Golf Course

0841M – Kee Branch

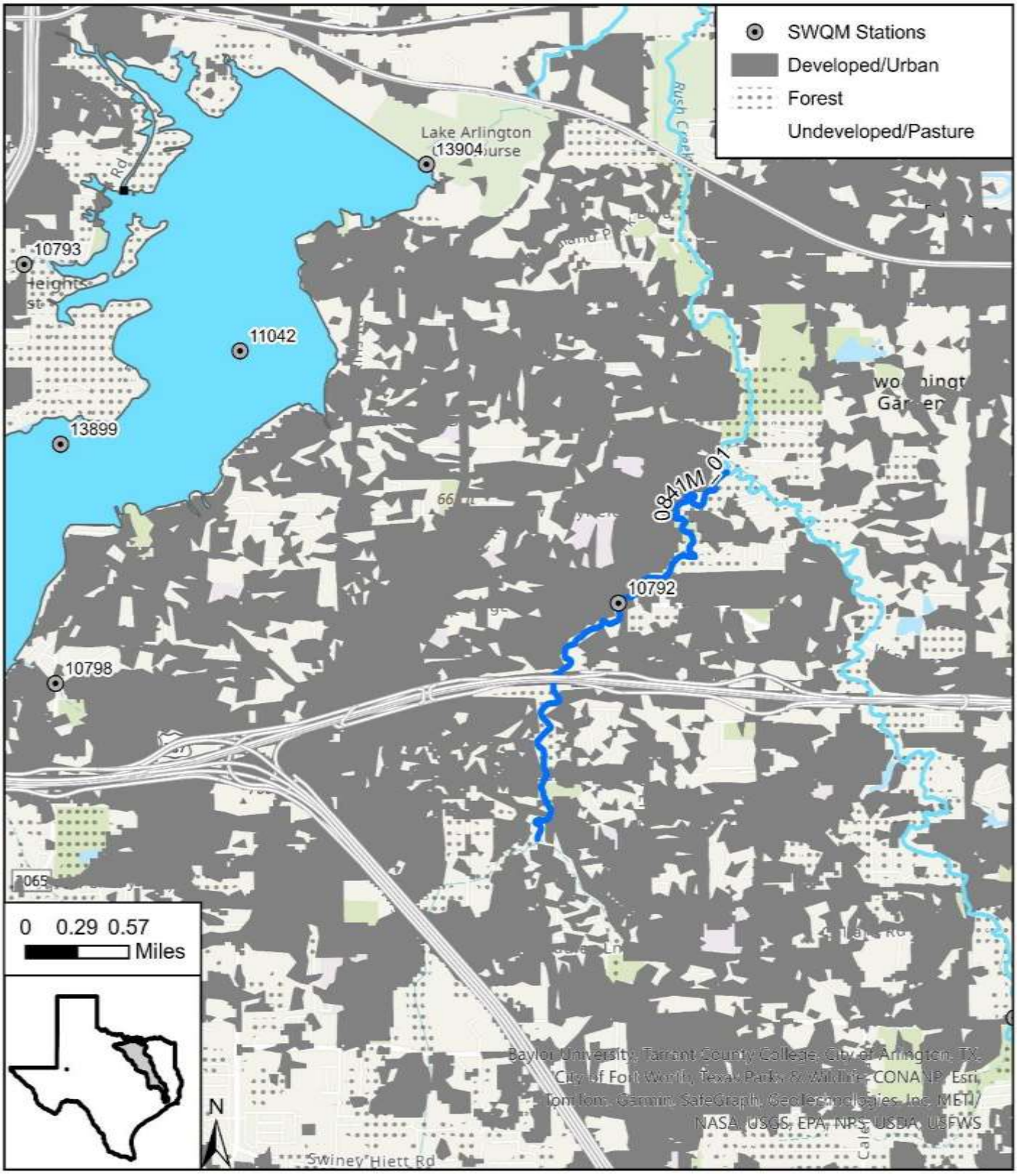

Figure 65: Map of Segment 0841M

Segment Description

This unclassified segment is a 6-mile stretch of Kee Branch running from the headwaters to the confluence with Rush Creek.

Assessment Units and Monitoring Stations

- **0841M_01** - Six mile stretch of Kee Branch running upstream from confluence with Rush Creek to upper end of the creek
    - Perennial freshwater stream
    - **10792** - Kee Branch at West Pleasant Ridge Road in Arlington
        - Sampling conducted by Arlington from 2015 to 2024

Hydrology

Unclassified segment 0841M is a first order stream at its most downstream end. Based on sampling at Station 10792, the median flow was 0.6 cfs with a range of 0.014 to 81 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 0.5 cfs
- Index Period – 0.9 cfs
- Critical Period – 0.2 cfs

Land Use and Natural Characteristics

The watershed is mostly residential with a narrow wooded riparian buffer and lies entirely within the Eastern Cross Timbers.

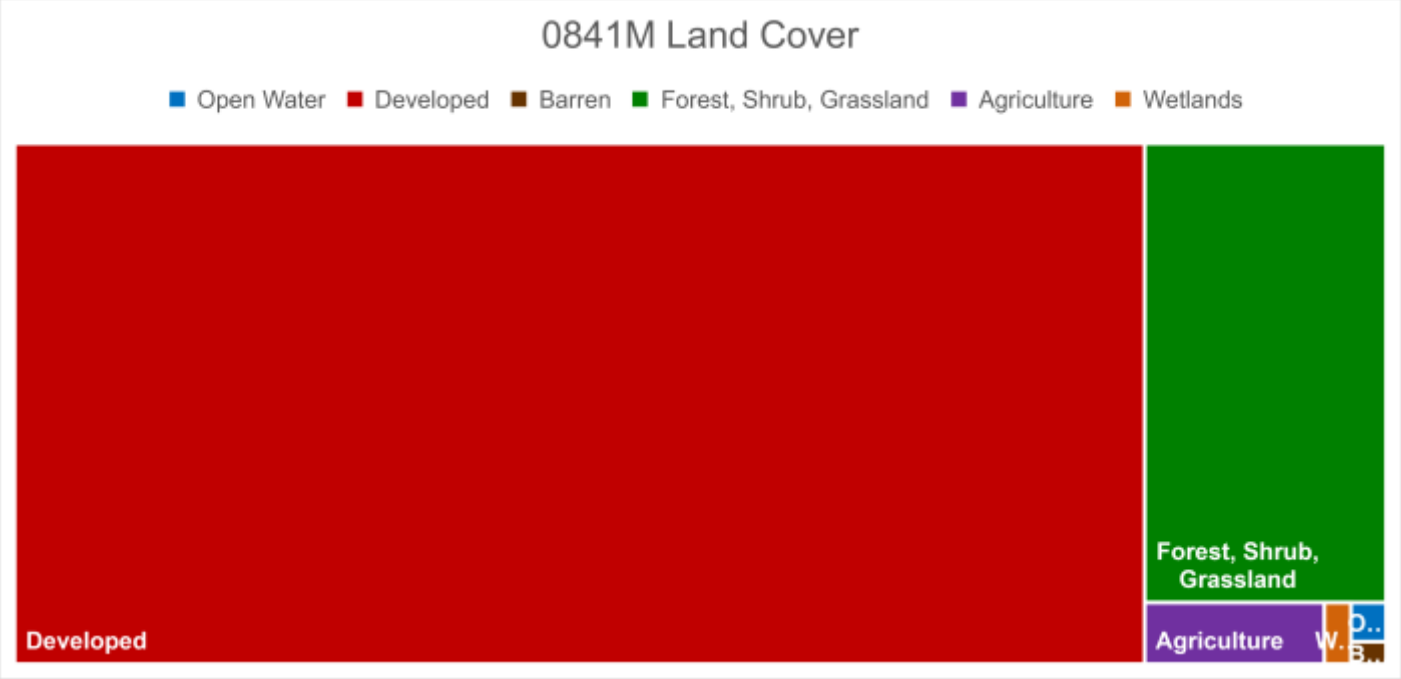

Figure 66: 0841M relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of metal, bacteria, flow, and field parameters at Station 10792 conducted by City of Arlington.

Description of Water Quality Issue

This segment was found to have concerns for depressed dissolved oxygen levels. Table 23 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on more recently collected data, the concern may no longer exist.

Table 23: Summary of Aquatic Life Use data for Segment 0841M

	2022 Integrated Report Data		2024 BHR POR Data	
AU	0841M_01	0841M_01	0841M_01	0841M_01
Method	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level
Criteria	3	5	3	5
# Data Assessed	30	30	36	36
# Exceedances	0	5	0	4
Mean Exceedances	.	4.68	.	4.63
DS Qualifier	AD	AD	AD	AD
LOS	FS	CS	FS	NC
CF	N	N	.	.
Int LOS	FS	CS	.	.

Potential Causes of Water Quality Issue

It appears that the concern for low dissolved oxygen may be related to low flows and high water temperatures. Dissolved oxygen was well correlated to water temperature and moderately correlated to flow (coefficients = -0.820 and 0.449, respectively). As water temperature increases, the saturation potential of oxygen decreases which generally results in lower dissolved oxygen levels. Higher dissolved oxygen levels were reported at higher flows.

Recommendations for Improving Water Quality

There are no recommendations for flow or water temperature related impacts on dissolved oxygen.

Potential Stakeholders

- City of Arlington
- Homeowners and homeowners associations

0841N – Kirby Creek

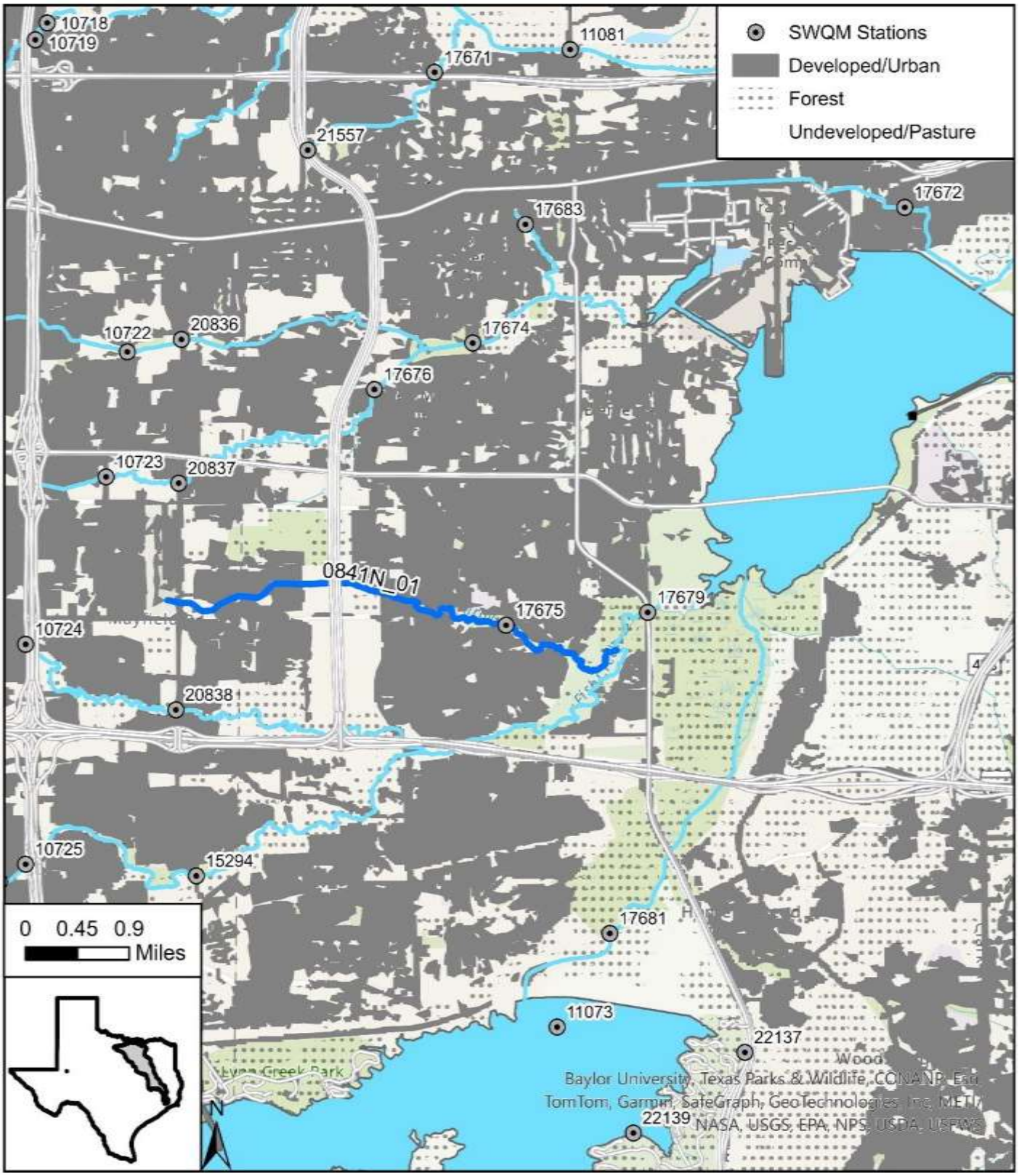

Figure 67: Map of Segment 0841N

Segment Description

This unclassified segment is a 4-mile stretch of Kirby Creek running from just upstream of Great Southwest Parkway in Arlington to the confluence with Fish Creek in Grand Prairie.

Assessment Units and Monitoring Stations

- **0841N_01** - Four mile stretch of Kirby Creek running upstream from confluence with Fish Creek in Grand Prairie in Dallas County to just upstream of Great Southwest Parkway in Arlington in Tarrant County
    - Perennial freshwater stream
    - **17675** - Kirby Creek at Corn Valley Road in Grand Prairie
        - Sampling conducted by Grand Prairie from 2015 to 2024

Hydrology

Unclassified segment 0841N is a first order stream at its most downstream end. Based on sampling at Station 17675, the median flow was 0.5 cfs with a range of 0.013 to 8.5 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 0.5 cfs
- Index Period – 0.6 cfs
- Critical Period – 0.5 cfs

Land Use and Natural Characteristics

The upstream end of this watershed is a mix of residential and commercial uses while the downstream end is mostly residential. There are some wooded riparian areas and crop land. It lies within the Northern Blackland Prairie ecoregion.

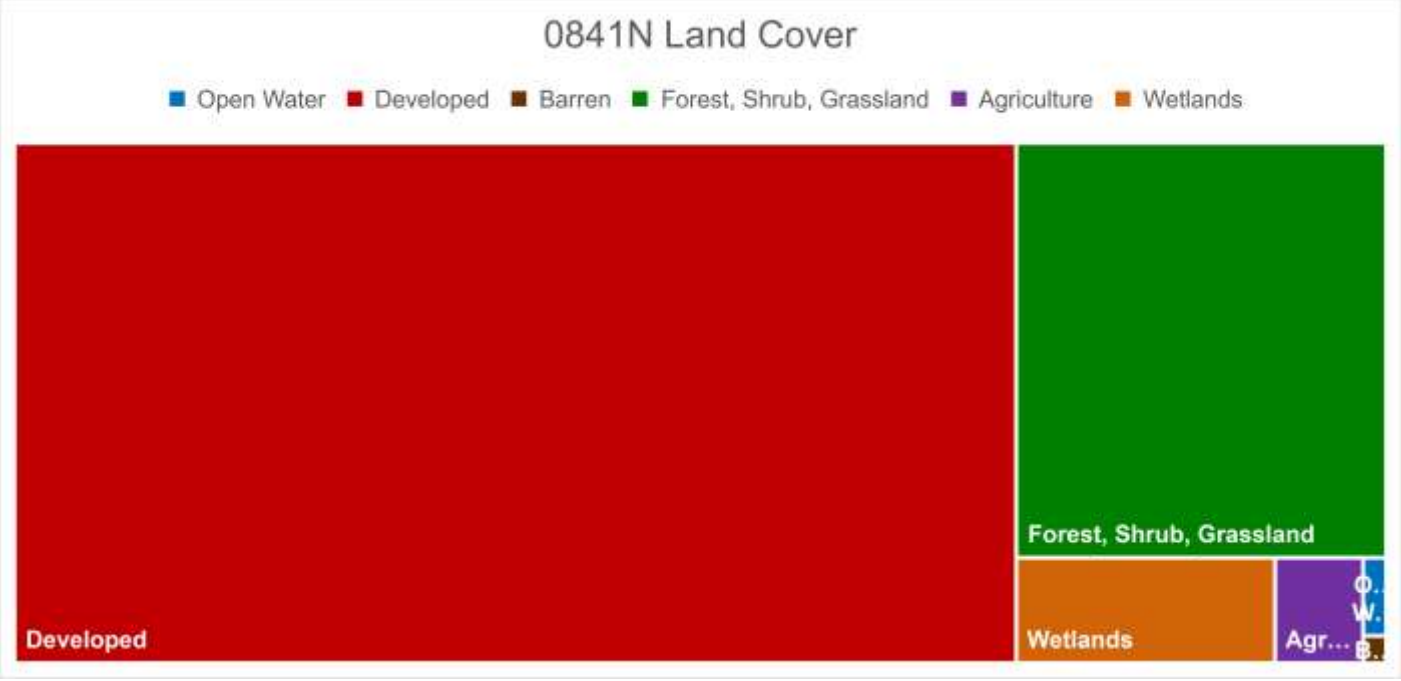

Figure 68: 0841N relative land cover totals

Ongoing Projects

- Routine monthly monitoring of bacteria, flow, and field parameters; quarterly conventionals; and metals once a year at Station 17675 conducted by City of Grand Prairie.

Description of Water Quality Issue

This segment was found to have concerns for depressed dissolved oxygen levels. Table 24 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on more recently collected data, the concern may no longer exist.

Table 24: Summary of Aquatic Life Use data for Segment 0841N

	2022 Integrated Report Data		2024 BHR POR Data	
AU	0841N_01	0841N_01	0841N_01	0841N_01
Method	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level
Criteria	3	5	3	5
# Data Assessed	75	75	83	83
# Exceedances	0	10	0	9
Mean Exceedances	.	4.3	.	4.2
DS Qualifier	AD	AD	AD	AD
LOS	FS	CS	FS	NC
CF	N	N	.	.
Int LOS	FS	CS	.	.

Potential Causes of Water Quality Issue

The concern for dissolved oxygen in this segment was not well correlated to flow or chlorophyll-*a* (coefficients = 0.174 and -0.153, respectively). Dissolved oxygen had a moderate inverse correlation with water temperature (-0.542). This segment is a low flow system. The average flow was 0.84 cfs with a range of 0.013 to 8.7 cfs. Therefore, the low flow nature of the stream and warm water temperatures likely lead to the concern. As water temperature increases, the saturation potential of oxygen decreases which generally results in lower dissolved oxygen levels.

Recommendations for Improving Water Quality

There are no recommendations for flow or water temperature related impacts on dissolved oxygen. A use attainability analysis may be required to determine if the standards are appropriate for this segment.

Potential Stakeholders

- City of Grand Prairie
- Grand Prairie Country Club

0841V – Crockett Branch

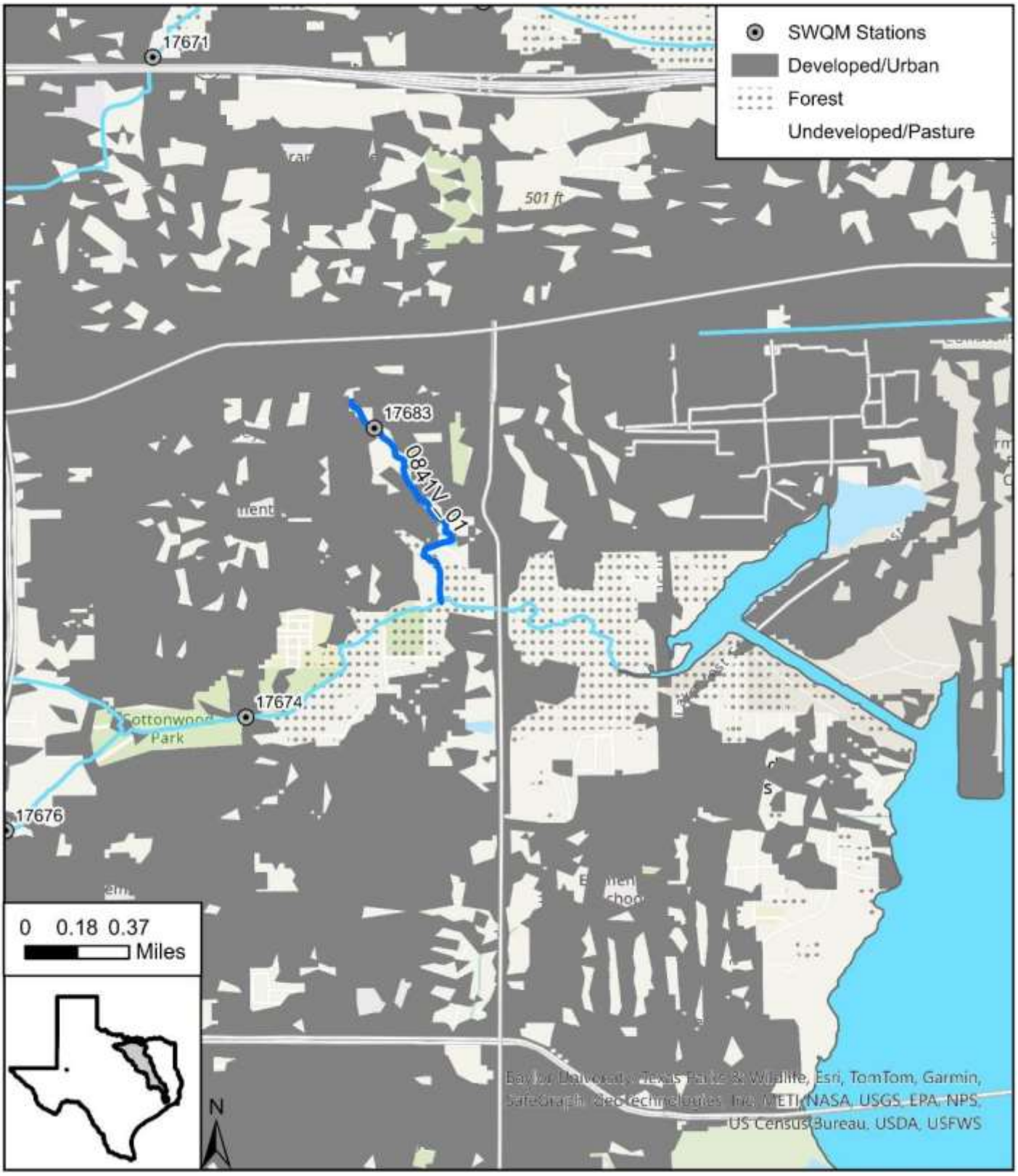

Figure 69: Map of Segment 0841V

Segment Description

Crockett Branch is a 1-mile stream running from the headwaters in Grand Prairie to the confluence with Cottonwood Creek.

Assessment Units and Monitoring Stations

- **0841V_01** - A 1 mile stretch of Crockett Branch extending upstream from the confluence with Cottonwood Creek to the upper end of the creek
    - Perennial freshwater stream
    - **17683** - Crockett Branch Cottonwood Creek 179 meters downstream of East Grand Prairie Road in Grand Prairie
        - Sampling conducted by Grand Prairie from 2015 to 2024

Hydrology

Unclassified segment 0841V is a first order stream at its most downstream end. Based on sampling at Station 17683, the median flow was 0.051 cfs with a range of 0 to 2.6 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 0.084 cfs
- Index Period – 0.058 cfs
- Critical Period – 0.048 cfs

Land Use and Natural Characteristics

The watershed consists of residential development with a school and parks to the east of the stream and lies within the Northern Blackland Prairie ecoregion.

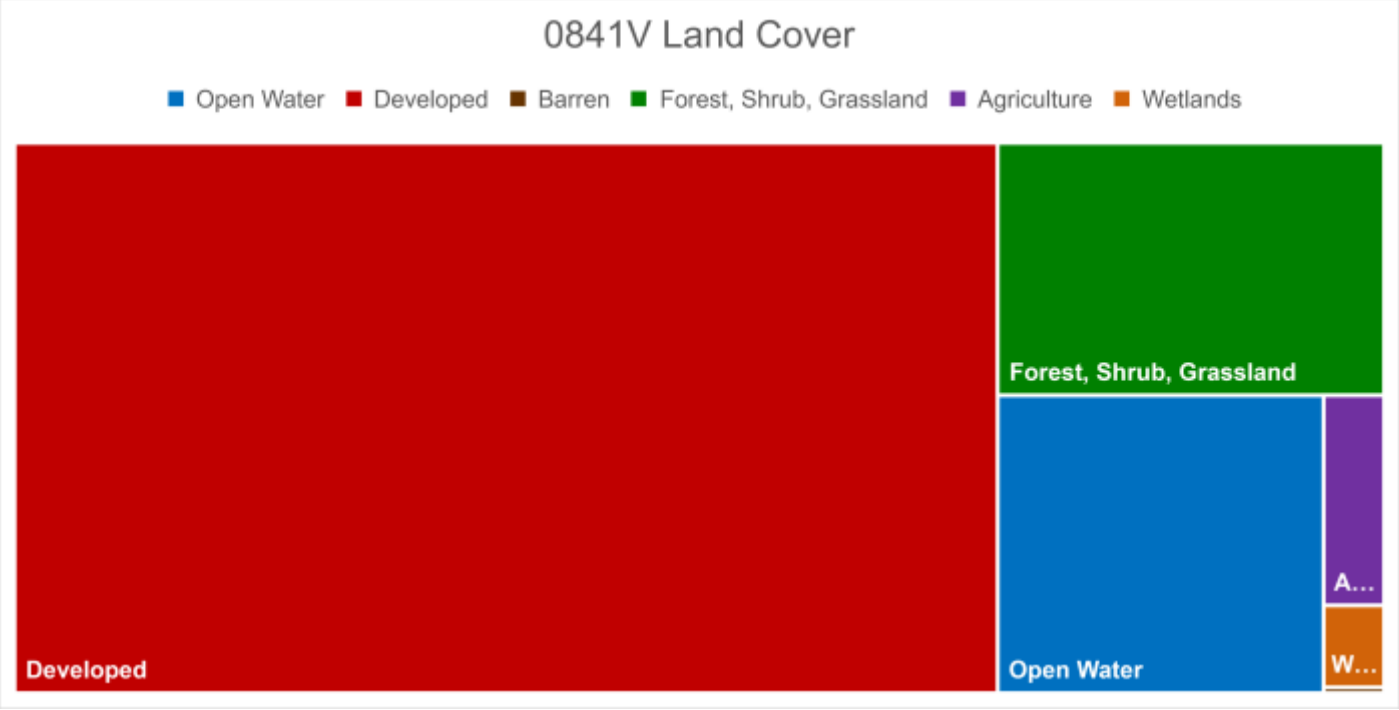

Figure 70: 0841V relative land cover totals

Figure 71: Crockett Branch at Brannon Street in Grand Prairie

Ongoing Projects

- Routine monthly monitoring of bacteria, flow, and field parameters; quarterly conventionals; and metals once a year at Station 17683 conducted by City of Grand Prairie.

Description of Water Quality Issue

This segment was found to have concerns for depressed dissolved oxygen levels.

Table 25 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on more recently collected data, the concern may still exist as 38% of samples have been reported below the screening level of 5 mg/L (Figure 72).

Table 25: Summary of Aquatic Life Use data for Segment 0841V

	2022 Integrated Report Data		2024 BHR POR Data	
AU	0841V_01	0841V_01	0841V_01	0841V_01
Method	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level	Dissolved Oxygen grab minimum	Dissolved Oxygen grab screening level
Criteria	3	5	3	5
# Data Assessed	27	27	82	82
# Exceedances	1	5	9	31
Mean Exceedances	2.7	4.18	2.04	3.44
DS Qualifier	AD	AD	AD	AD
LOS	FS	CS	FS	CS
CF	N	N	.	.
Int LOS	FS	CS	.	.

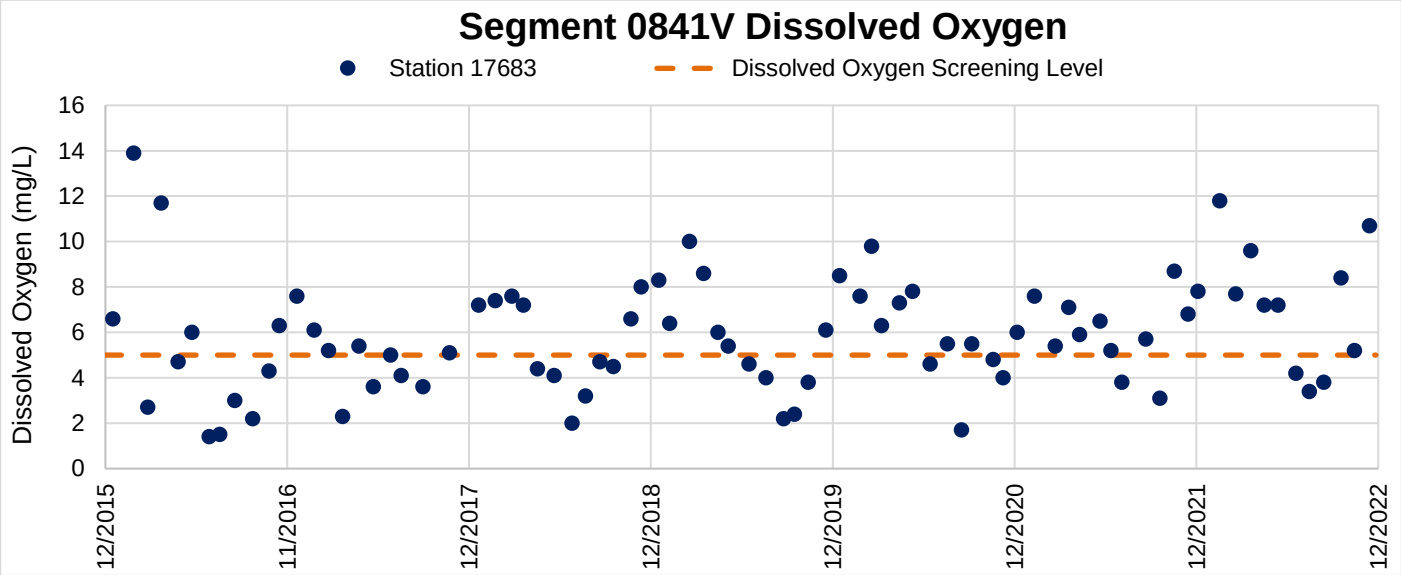

Figure 72: Segment 0841V Dissolved Oxygen

Potential Causes of Water Quality Issue

This segment appears to be a low flow system. The average flow was 0.15 cfs with a range of 0 to 2.6 cfs. The correlation between dissolved oxygen and water temperature was -0.692. As Water Temperature increases, the solubility potential for oxygen decreases. There was a weak correlation to chlorophyll-*a* (coefficient = 0.344). The combination of the low flow system, warm water temperatures, and algal populations may be impacting dissolved oxygen levels in this stream. Chlorophyll-*a* levels were not well correlated with nutrients.

Recommendations for Improving Water Quality

There are no recommendations for water temperature and low flow related impacts on dissolved oxygen. Because there is no correlation between chlorophyll-*a* and nutrients, there may be little that can be done to reduce algal populations and their potential impact on dissolved oxygen.

Potential Stakeholders

- City of Grand Prairie
- Homeowners and homeowners associations

General Uses

All waterbodies are designated to support general uses. Assessment of this category encompasses parameters that support multiple other uses including aquatic life, recreation, fish consumption, and water supply. These parameters include water temperature, pH, total dissolved solids, chloride, sulfate, nutrients (nitrate, ammonia, and total phosphorus), chlorophyll-*a*, and fish kill reports. Impairments or concerns for general uses were identified in 43 segments (Figure 73) – both classified and unclassified – with 38 of these being based on nutrients or chlorophyll-*a*. Two segments had impairments for total dissolved solids, chloride, or sulfate. Two segments had impairments for pH and one segment had a concern based on a fish kill report. Nutrient enrichment and resultant algal growth may be related to upstream wastewater treatment facilities, failing wastewater infrastructure, fertilizer use, and waste runoff from livestock. pH impairments may be related to algal growth. Elevated dissolved solids are commonly related to drought and concentration due to evaporation. Each of these impairments and concerns are discussed in more detail in the following chapters.

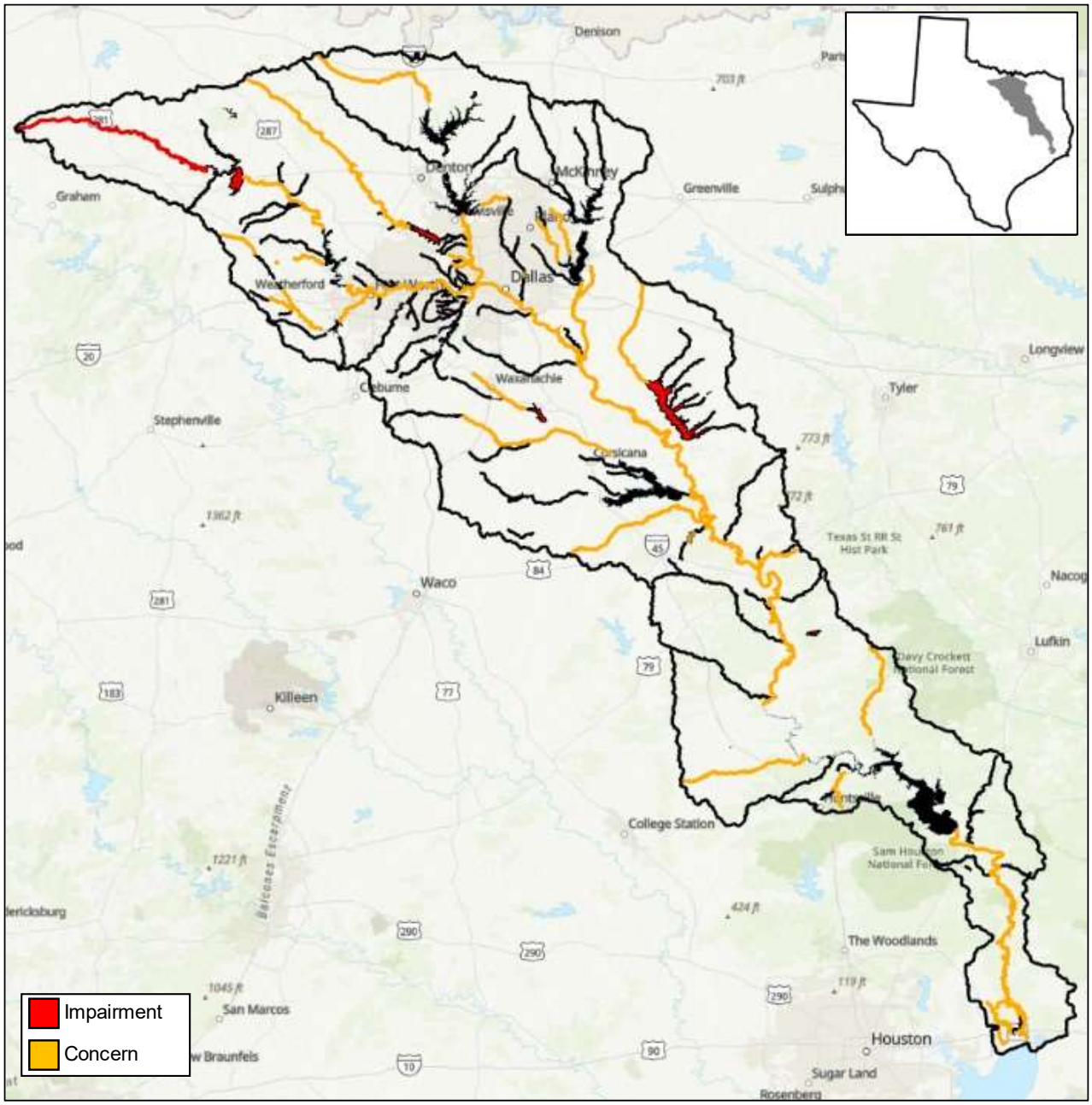

Figure 73: Map of segments with impairments or concerns for General Uses

Assessment of Chlorophyll-*a* in Reservoirs

TCEQ uses a "line-of-evidence framework" to assess chlorophyll-*a* in many reservoirs. This framework provides a robust methodology to determine the nutrient enrichment status of a reservoir by assessing not only causative parameters – nitrogen and phosphorus – but also response parameters including chlorophyll-*a*, Secchi depth, and dissolved oxygen. A total of 14 reservoirs in the Trinity River basin have nutrient criteria that have been developed by TCEQ. Numeric nutrient criteria for four of these reservoirs have been approved by EPA: 0811 Bridgeport Reservoir, 0813 Houston County Lake, 0816 Lake Waxahachie, and 0817 Navarro Mills Lake. Assessment of these reservoirs follows the framework shown in Figure 74. Narrative chlorophyll-*a* criteria is used for the remaining ten reservoirs which had numeric nutrient criteria no approved by the EPA and their assessment follows the framework in Figure 75Figure 74. These reservoirs include 0803 Lake Livingston, 0807 Lake Worth, 0809 Eagle Mountain Reservoir, 0815 Bardwell Reservoir, 0818 Cedar Creek Reservoir, 0823 Lewisville Lake, 0826 Grapevine Lake, 0827 White Rock Lake, 0830 Benbrook Lake, and 0836 Richland-Chambers Reservoir. A detailed discussion of this assessment methodology can be found in Appendix F of the TCEQ 2022 Guidance for Assessing and Reporting Surface Water Quality in Texas.

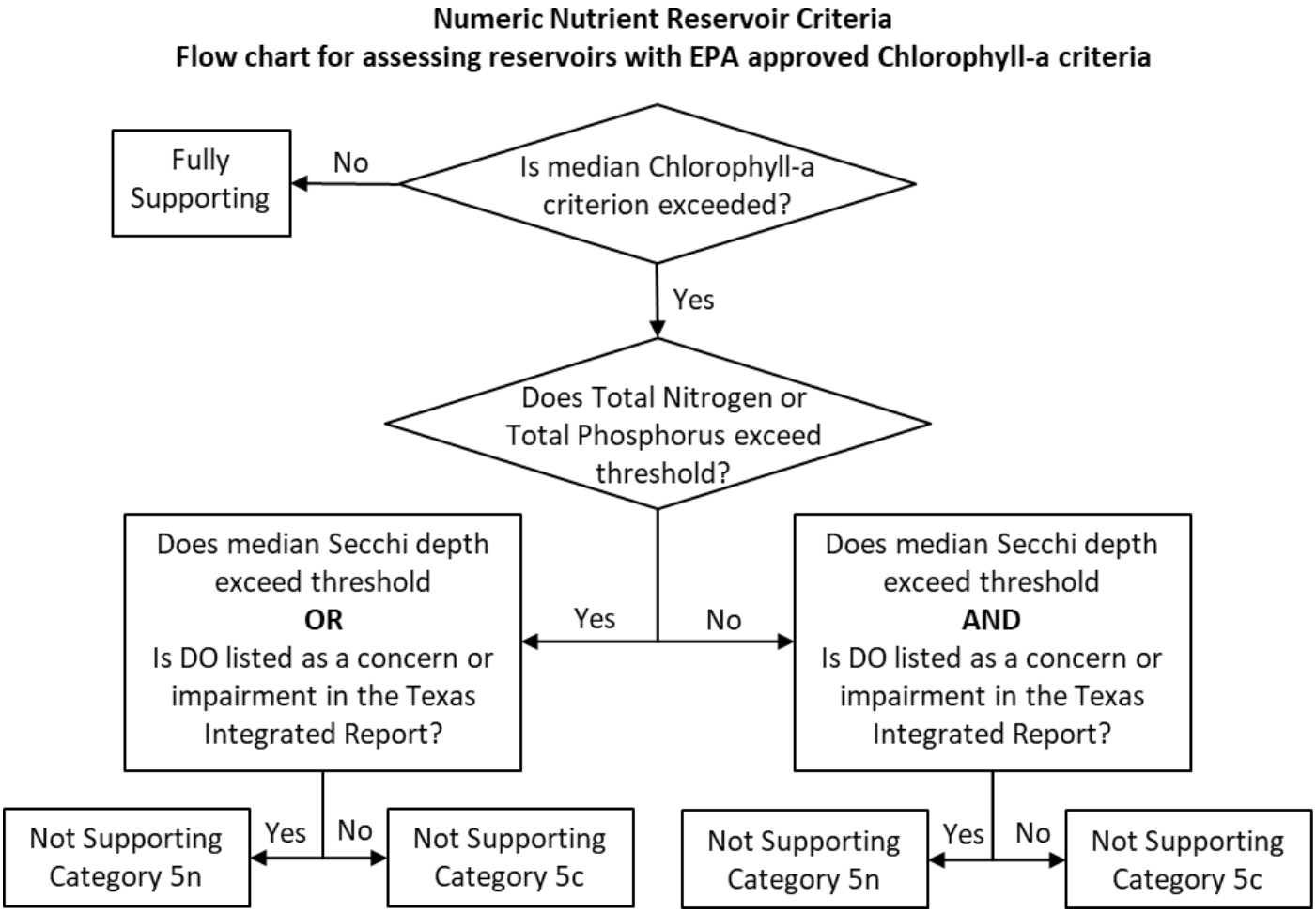

Figure 74: TCEQ flowchart for line of evidence assessment of chlorophyll-a in reservoirs with EPA approved criteria

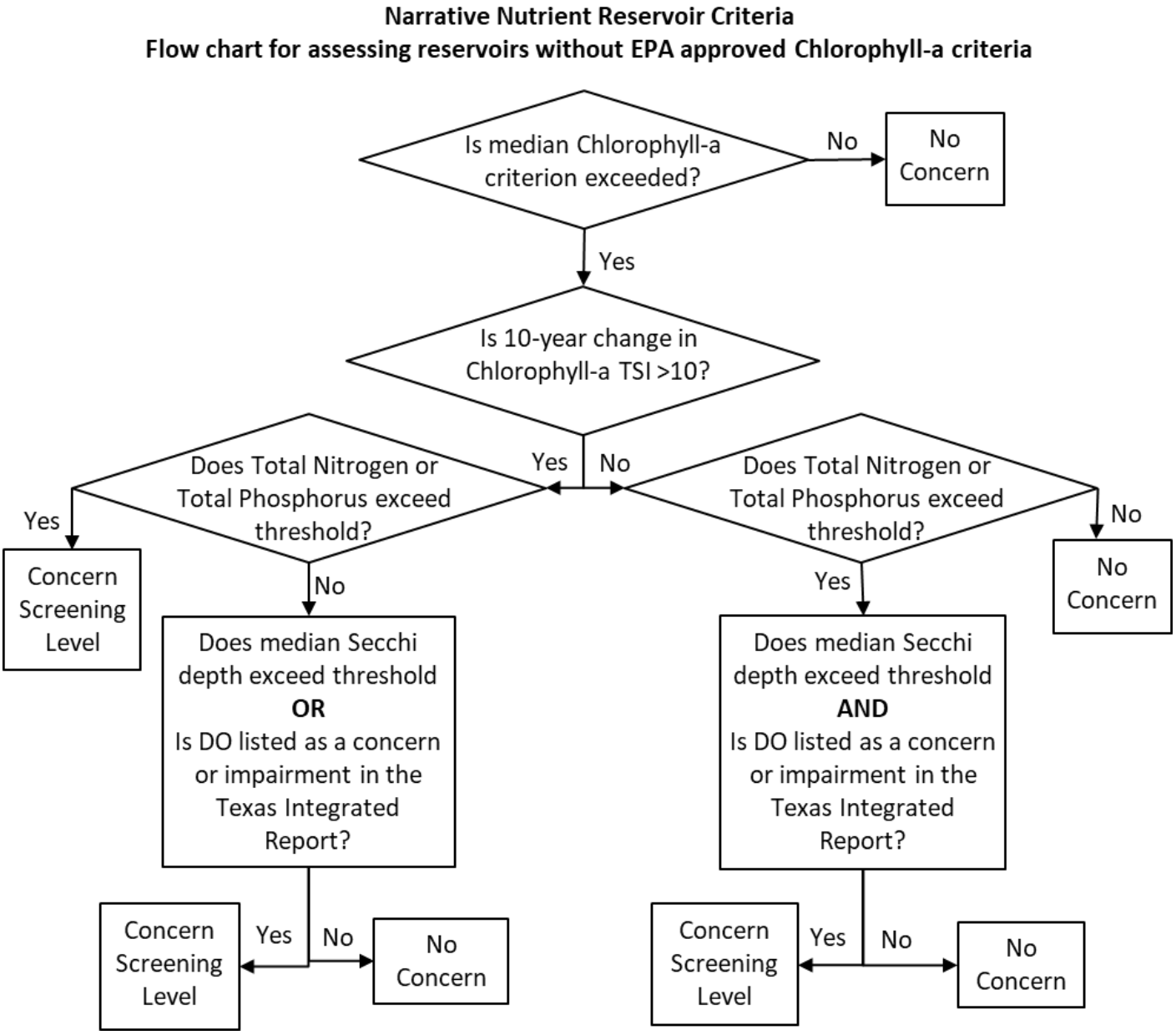

Figure 75: TCEQ flowchart for line of evidence assessment of chlorophyll-a in reservoirs without EPA approved criteria

0801 – Trinity River Tidal

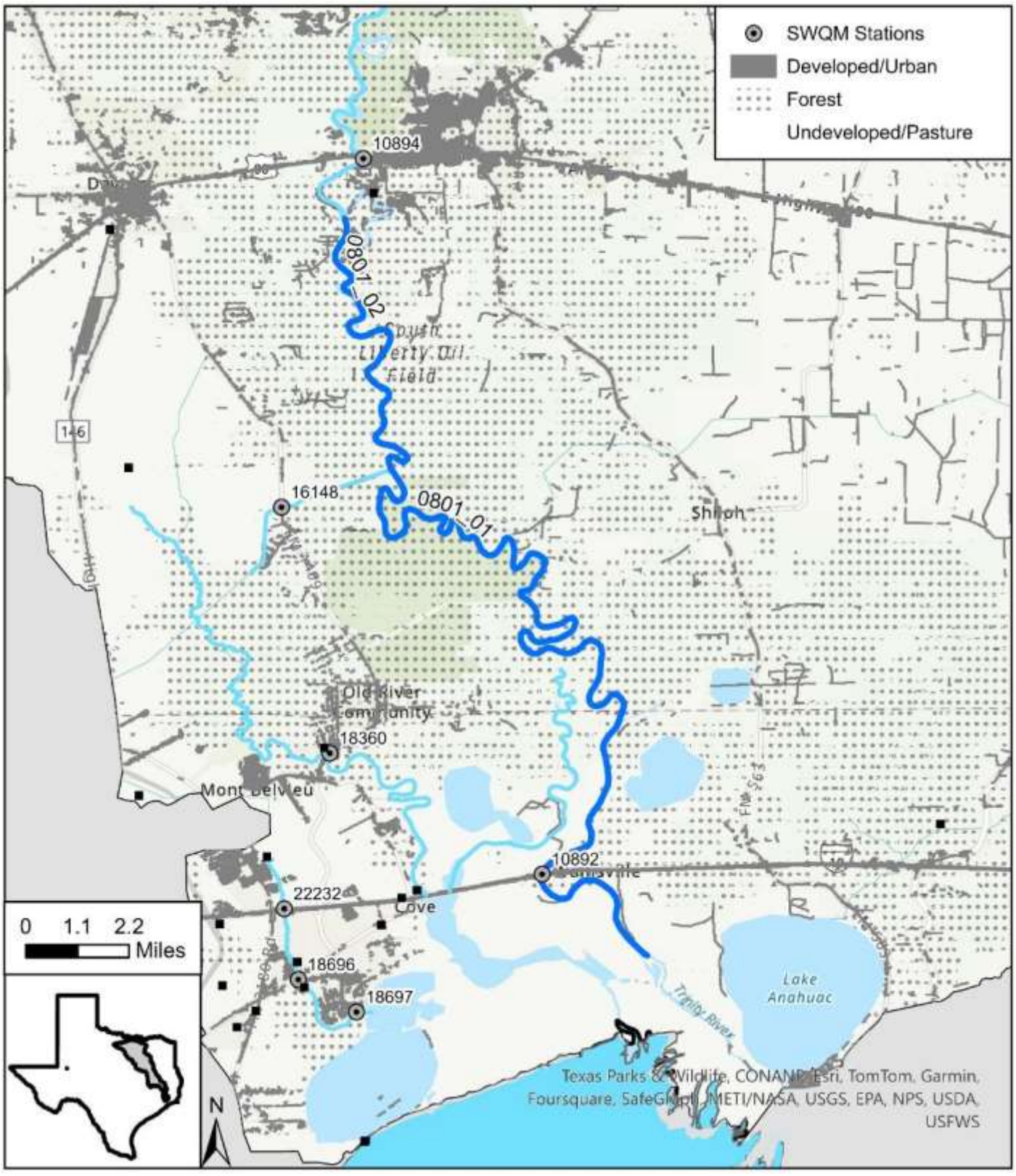

Figure 76: Map of Segment 0801

Segment Description

This 31.4-mile segment runs from a point 1.9 miles downstream of US 90 in Liberty County to the saltwater barrier, 3.4 miles downstream of IH 10, in Chambers County.

Assessment Units and Monitoring Stations

- **0801_01** - From the saltwater barrier, which is 5.5 km (3.4 mi) downstream of IH 10, in Chambers County upstream to the Lynchburg Canal in Liberty County
    - Tidal Stream
    - **10892** - Trinity River Tidal at IH 10 near Liberty TRA #35
        - Sampling conducted by TCEQ from 2015 and 2024
- **0801_02** - From the Lynchburg Canal in Liberty County upstream to a point 3.1 km (1.9 mi) downstream of US 90 in Liberty County
    - Tidal Stream

Hydrology

Segment 0801 is a sixth order stream at its most downstream end. There are two USGS gages in this segment: 08067100 near Moss Bluff which measures gage height and 08067250 at IH 10 near Wallisville which reports tidally filtered flow. The median gage height at the Moss Bluff gage was 2.78 feet with a range of -0.79 to 18.68 feet. The median flow at the Wallisville gage was 2,820 cfs with a range of -628 to 34,700 cfs. The median gage heights and flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these gages are listed below.

- 08067100 near Moss Bluff
    - Non-Index Period – 2.76 feet
    - Index Period – 5.34 feet
    - Critical Period – 2.19 feet
- 08067250 at IH 10 near Wallisville
    - Non-Index Period – 1,780 cfs
    - Index Period – 6,595 cfs
    - Critical Period – 710.5 cfs

Land Use and Natural Characteristics

This watershed flows through the Floodplains and Low Terraces and Texas-Louisiana Coastal Marshes ecoregions. Much of the watershed adjacent to the river is emergent herbaceous and woody wetlands. The outlying land is mostly hay and pasture with some area of cultivated crops. The cities of Dayton and Liberty lie just upstream of the northern boundary of the segment.

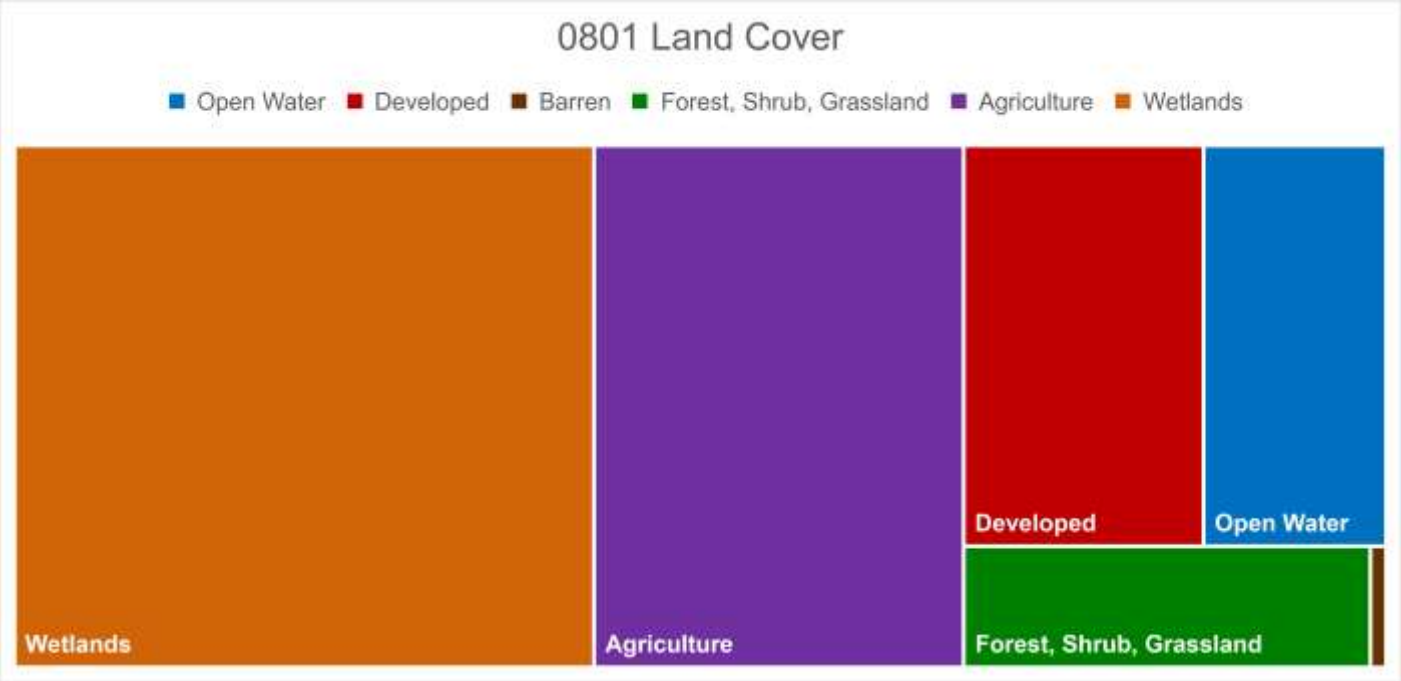

Figure 77: 0801 relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 10892 conducted by TCEQ Region 12.

Description of Water Quality Issue

This segment was found to have a concern due to elevated chlorophyll-*a* concentrations. Table 26 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, this concern may still exist as 33% of the data exceeded the screening level of 21 µg/L (Figure 78).

Table 26: Summary of General Use data for Segment 0801

	2022 Integrated Report Data	BHR POR Data
AU	0801_01	0801_01
Method	Chlorophyll-*a*	Chlorophyll-*a*
Criteria	21	21
# Data Assessed	19	15
# Exceedances	7	5
Mean Exceedances	30.36	28.36
DS Qualifier	AD	AD
LOS	CS	CS
CF	N	.
Int LOS	CS	.

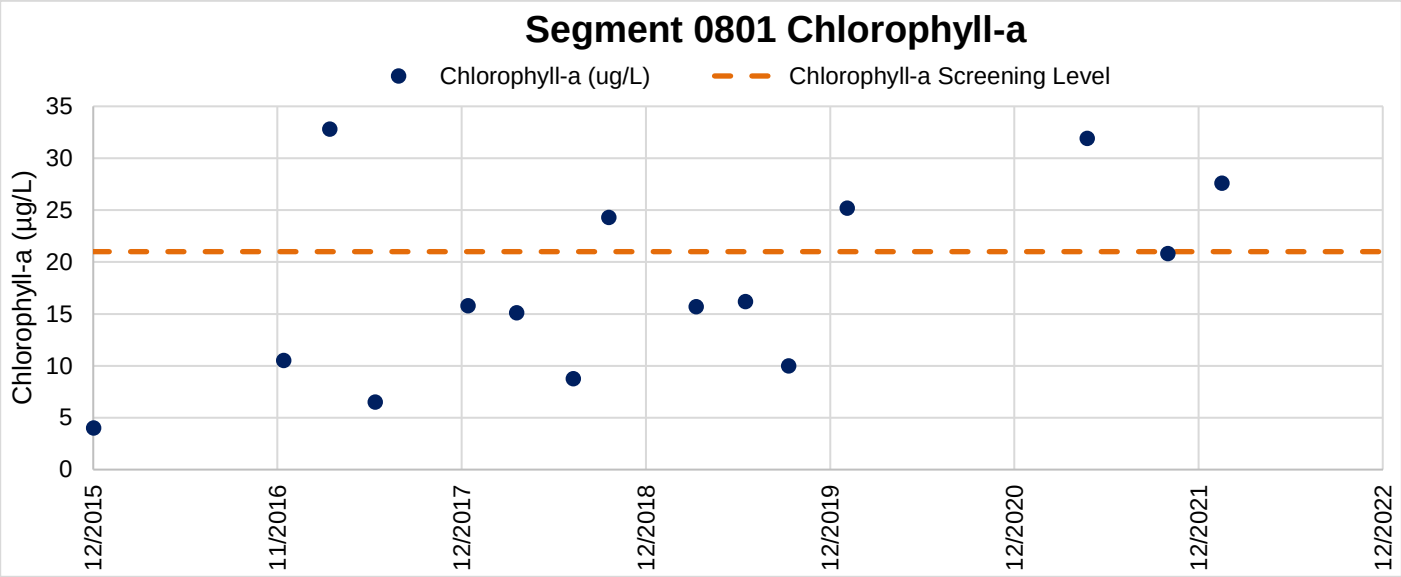

Figure 78: Segment 0801 Chlorophyll-a

Potential Causes of Water Quality Issue

Based on the short period of record for this report, there was a weak correlation between chlorophyll-*a* and days since precipitation (coefficient = 0.374) indicating that algal populations increase in drier weather. This segment is wide, flat, meandering, and unshaded. In drier weather, flows generally decrease and the slower moving water in these physical stream conditions would allow algal populations to increase.

Recommendations for Improving Water Quality

Upstream improvements in nutrient levels may provide some benefit to downstream algal populations and chlorophyll-*a* concentrations. However, a significant portion of the nutrient enrichment in the Trinity River comes from wastewater treatment facility effluent. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- United States Army Corps of Engineers
- Town of Wallisville
- Town of Moss Bluff
- Coastal Water Authority
- Landowners
- City of Liberty
- City of Dayton

0801B – Old River

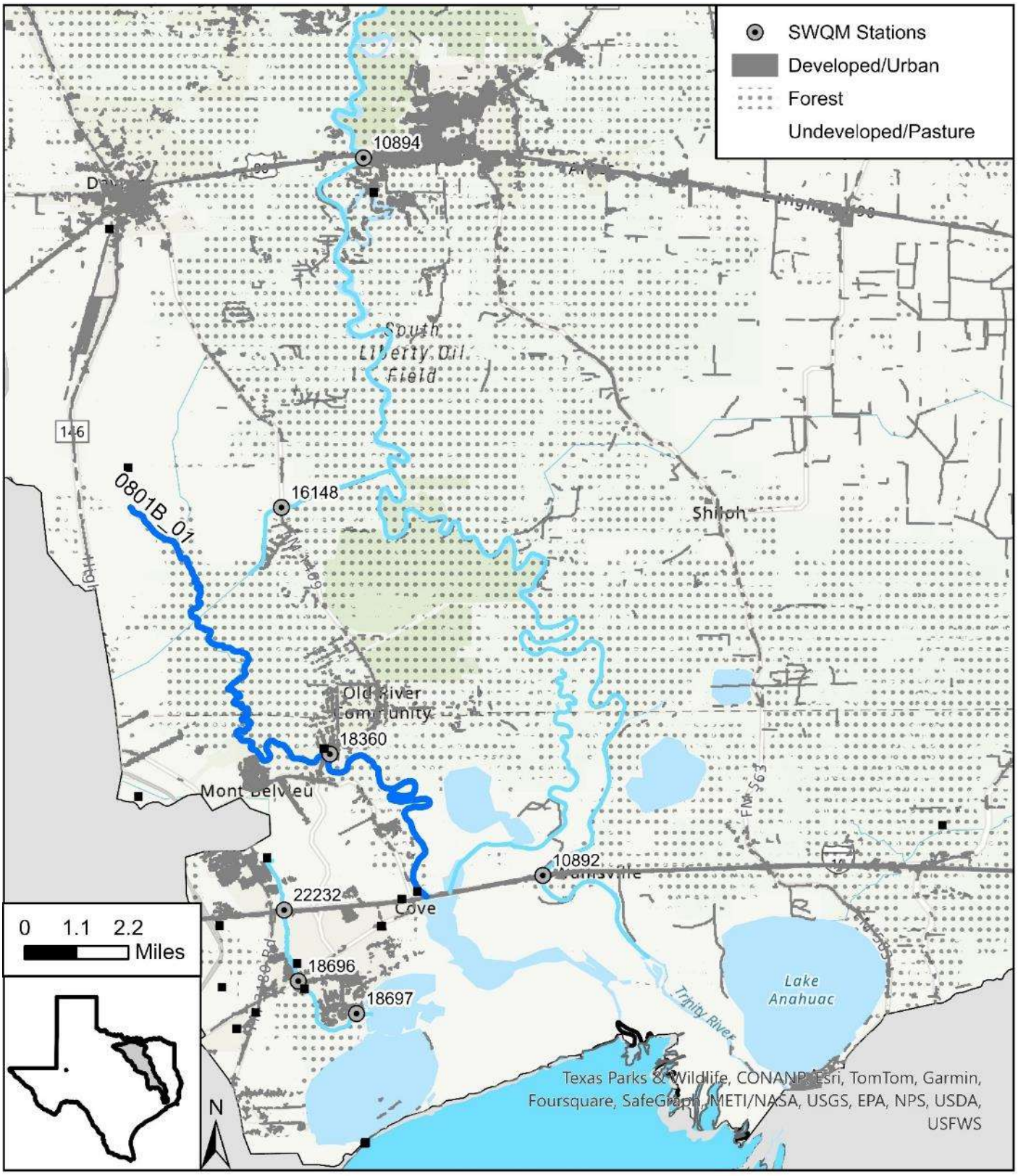

Figure 79: Map of Segment 0801B

Segment Description

This 17.3-mile unclassified segment runs from the confluence with East Prong Old River and West Prong Old River approximately 4.4 miles north of Mont Belvieu to IH 10 in Chambers County.

Assessment Units and Monitoring Stations

- **0801B_01** - From IH 10 in Chambers County upstream to the confluence with East Prong Old River and West Prong Old River approximately 4.4 mi (7.0 km) north of Mont Belvieu
    - Perennial freshwater stream
    - **18360** - Old River at FM 1409 southwest of Winfree
        - Sampling conducted by TRA Lake Livingston Project from 2015 to 2024

Hydrology

Unclassified segment 0801B is a third order stream at its most downstream end. There is no flow data available for this segment.

Land Use and Natural Characteristics

The upper end of this watershed lies within the Northern Humid Gulf Coastal Prairies while the lower end is in the Texas-Louisiana Coastal Marshes ecoregion. Most of the watershed, especially to the east, is emergent herbaceous and woody wetland. The upper and western portions of the watershed contain cultivated crops, hay, and pasture. There is some development around the City of Mont Belvieu.

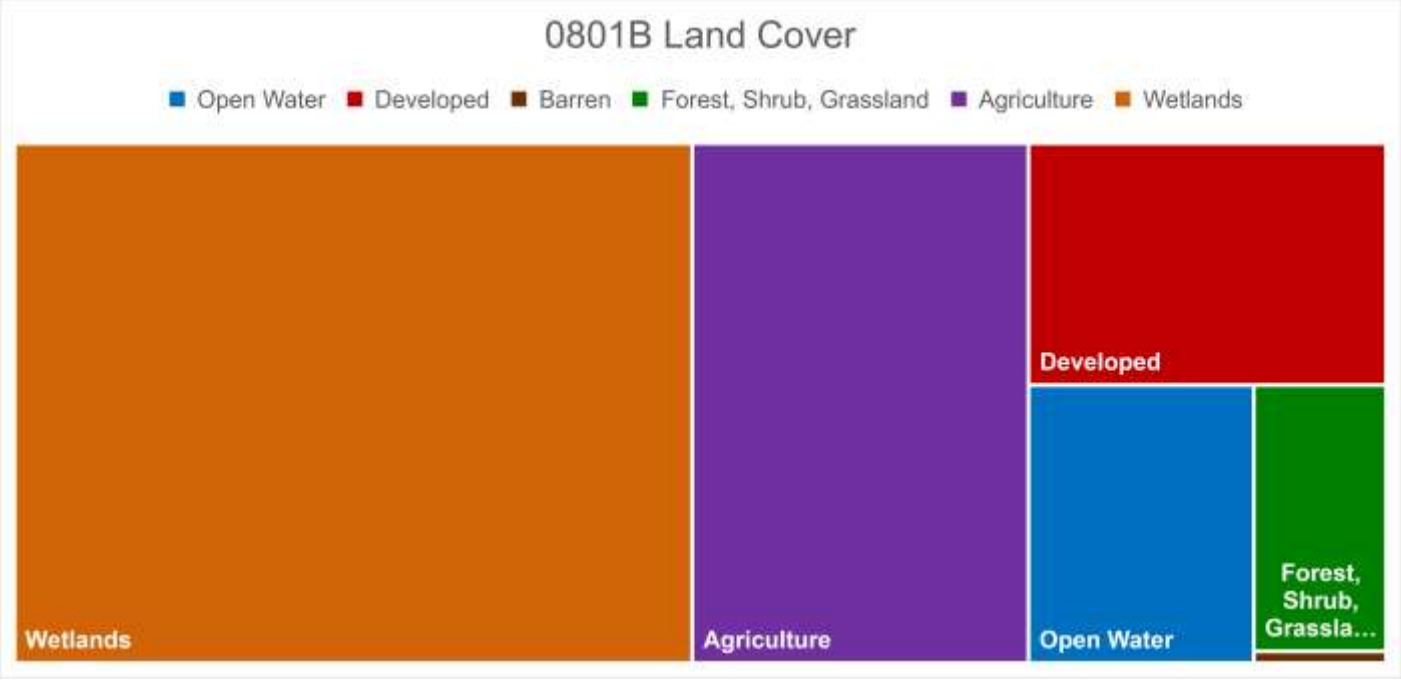

Figure 80: 0801B relative land cover totals

Ongoing Projects

- Routine monitoring of conventional and field parameters twice a year at Station 18360 conducted by Trinity River Authority Lake Livingston Project.

Description of Water Quality Issue

This segment was found to have a concern due to elevated chlorophyll-*a* concentrations. Table 27 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and

November 30, 2022. Based on recently collected data, this concern may still exist as 55% of the data exceeded the screening level of 14.1 µg/L (Figure 81).

Table 27: Summary of General Use data for Segment 0801B

	2022 Integrated Report Data	BHR POR Data
AU	0801B_01	0801B_01
Method	Chlorophyll-*a*	Chlorophyll-*a*
Criteria	14.1	14.1
# Data Assessed	12	11
# Exceedances	9	6
Mean Exceedances	40.11	36.33
DS Qualifier	AD	AD
LOS	CS	CS
CF	N	.
Int LOS	CS	.

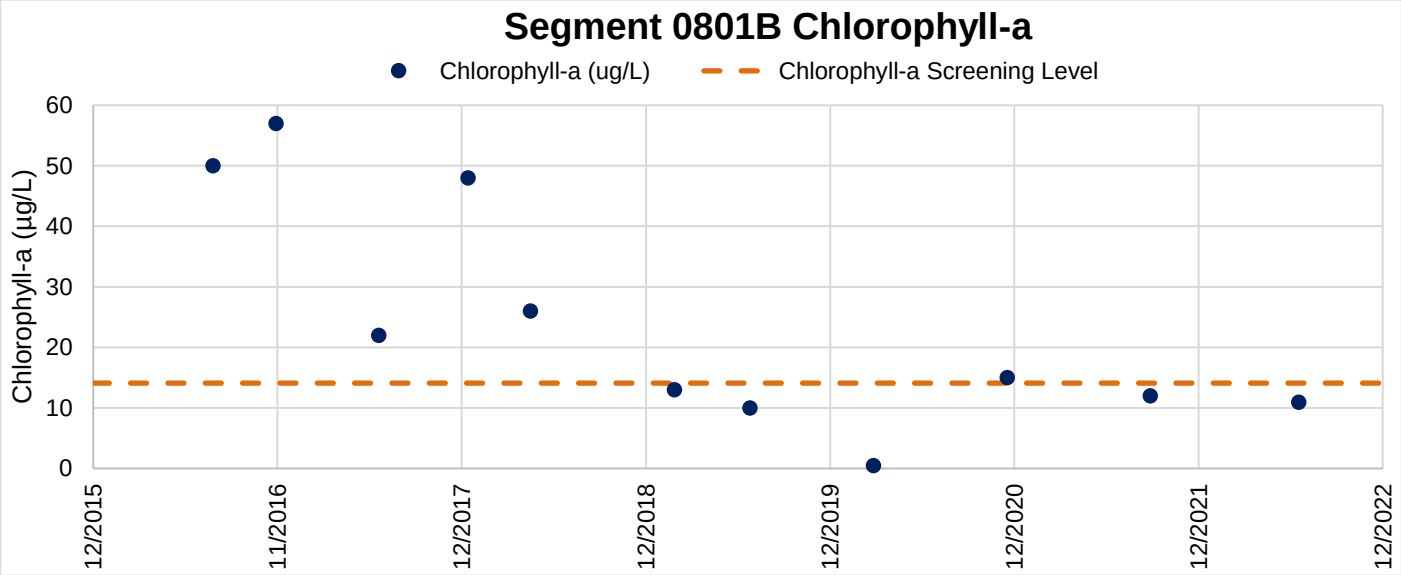

Figure 81: Segment 0801B Chlorophyll-a

Potential Causes of Water Quality Issue

Based on this short data set, there was a moderate correlation between chlorophyll-*a* and nitrate (coefficient = 0.576). There is a wastewater discharger upstream of Station 18360 which may be the source of nitrate. There is also a golf course and residential communities upstream that may be contributing nutrients from turf and lawn fertilizers.

Recommendations for Improving Water Quality

Landowner and homeowner education and associated fertilizer best management practices may help limit nutrient availability for algal populations.

Potential Stakeholders

- TRA Lake Livingston Project
- City of Mont Belvieu
- Homeowners and landowners

0801C – Cotton Bayou Tidal

Segment Description

See Aquatic Life Use Segment 0801C Segment Description.

Hydrology

See Aquatic Life Use Segment 0801C Hydrology.

Land Use and Natural Characteristics

See Aquatic Life Use Segment 0801C Land Use and Natural Characteristics.

Ongoing Projects

See Aquatic Life Use Segment 0801C Ongoing Projects.

Description of Water Quality Issue

This segment was found to have a concern for elevated chlorophyll-*a* concentrations. Table 28 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. The impairment was identified in the 2006 Integrated Report. Based on recently collected data, this concern may still exist as 39% of chlorophyll-*a* data have been reported above the screening level of 21 µg/L (Figure 82).

Table 28: Summary of General Use data for Segment 0801C

	2022 Integrated Report Data	BHR POR Data
AU	0801C_01	0801C_01
Method	Chlorophyll-*a*	Chlorophyll-*a*
Criteria	21	21
# Data Assessed	22	18
# Exceedances	8	7
Mean Exceedances	33.9	43.19
DS Qualifier	AD	AD
LOS	CS	CS
CF	N	.
Int LOS	CS	.

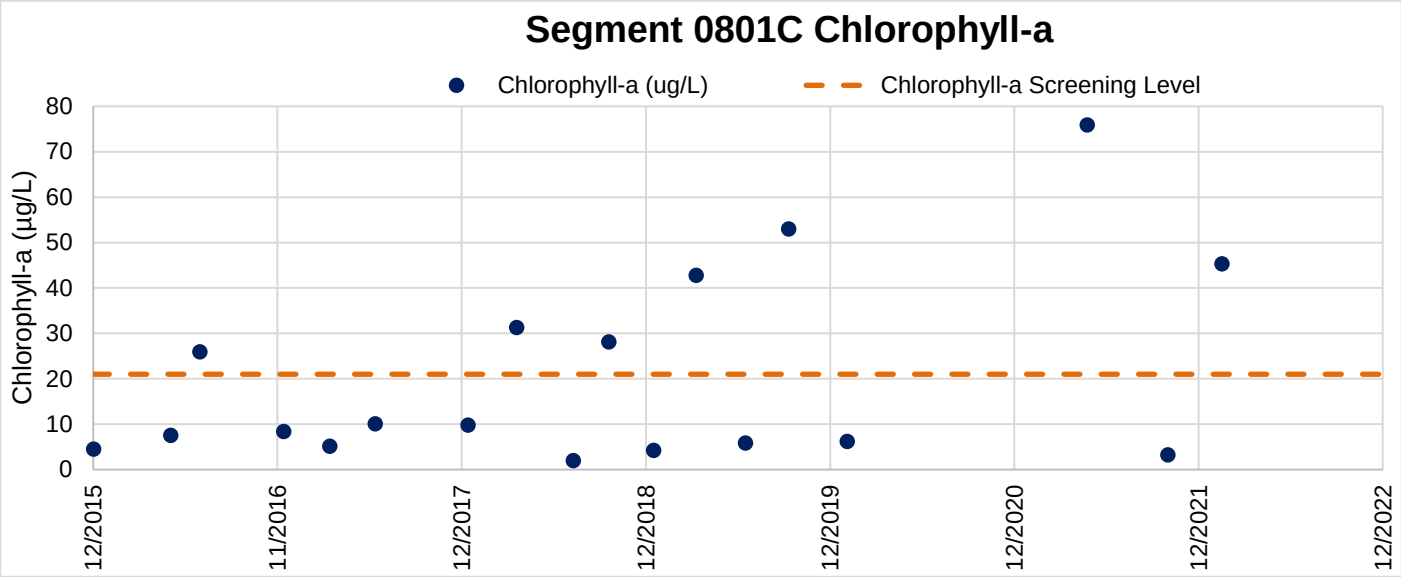

Figure 82: Segment 0801C Chlorophyll-a

Potential Causes of Water Quality Issue

Algal populations are likely being washed down from the upstream Segment 0801E as there was a moderate correlation to days since precipitation (coefficient = 0.415). There are no direct correlations between nutrients and chlorophyll-*a* in Segment 0801C.

Recommendations for Improving Water Quality

Reduction of algal populations in upstream Segment 0801E.

Potential Stakeholders

See Aquatic Life Use Segment 0801C Potential Stakeholders.

0801D – Lynchburg Canal

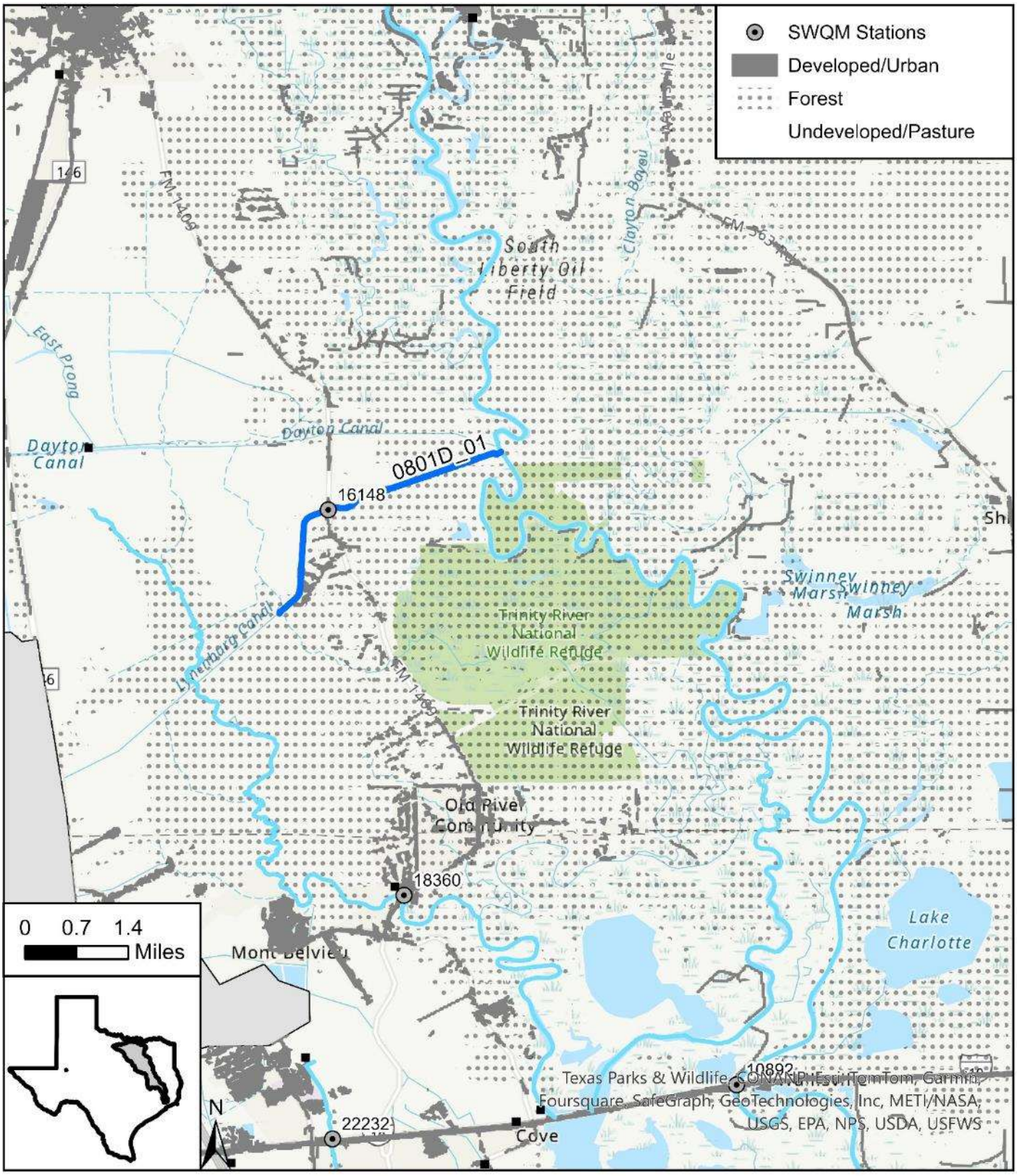

Figure 83: Map of Segment 0801D

Segment Description

This 3.9-miles unclassified segment runs from the confluence with Big Caney Creek to the confluence with Trinity River Tidal.

Assessment Units and Monitoring Stations

- **0801D_01** - From confluence with Trinity River Tidal upstream to confluence with Big Caney Creek
  - Perennial freshwater stream
  - **16148** - Coastal Water Authority Canal/Lynchburg Canal 533 meters upstream of FM 1409 3.6 kilometers downstream of confluence with Trinity River south of Liberty
    - Sampling conducted by TRA Lake Livingston Project from 2015 to 2024

Hydrology

Unclassified segment 0801D is a canal that carries water from the Trinity River Pump Station to the Lynchburg Reservoir adjacent to the Houston Ship Channel. The median flow at USGS gage 08067070 over the period of record for this report was 918 cfs with a range of 253 to 1230 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for this gage is listed below.

- Non-Index Period – 861 cfs
- Index Period – 940 cfs
- Critical Period – 1,010 cfs

Land Use and Natural Characteristics

The extreme upstream end of this watershed, at the pump station, lies within the Floodplains and Low Terraces while the rest of the watershed flows through the Northern Humid Gulf Coastal Prairies ecoregion. The eastern portion of the watershed is in the emergent herbaceous and woody wetlands and the western portion contains mostly hay, pasture, and cultivated crops.

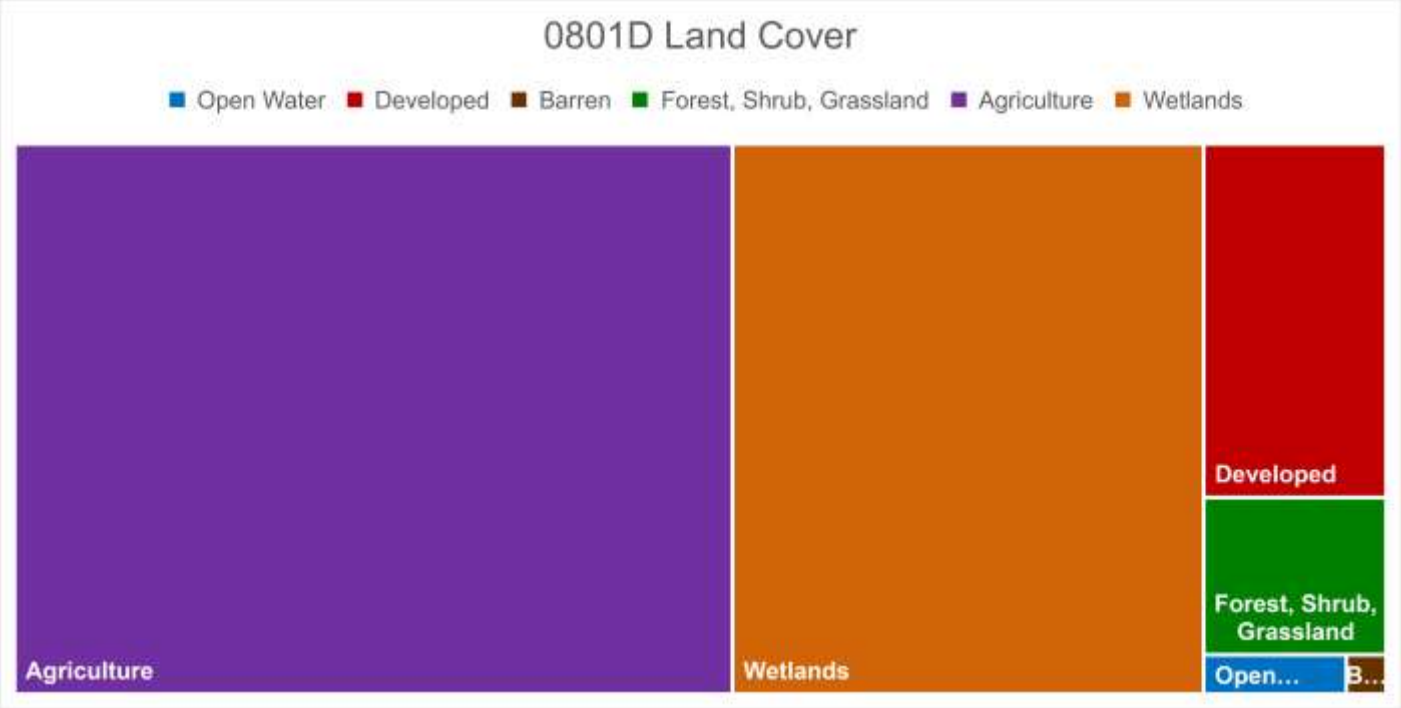

Figure 84: 0801D relative land cover totals

Ongoing Projects

- Routine monitoring of conventional, bacteria, flow, and field parameters twice a year at Station 16148 conducted by Trinity River Authority Lake Livingston Project.

Description of Water Quality Issue

This segment was found to have a concern due to elevated chlorophyll-*a* concentrations. Table 29 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, this concern may still exist as 67% of the data exceeded the screening level of 21 µg/L (Figure 85).

Table 29: Summary of General Use data for Segment 0801D

	2022 Integrated Report Data	BHR POR Data
AU	0801D_01	0801D_01
Method	Chlorophyll-*a*	Chlorophyll-*a*
Criteria	14.1	14.1
# Data Assessed	11	12
# Exceedances	7	8
Mean Exceedances	26.57	27.25
DS Qualifier	AD	AD
LOS	CS	CS
CF	N	.
Int LOS	CS	.

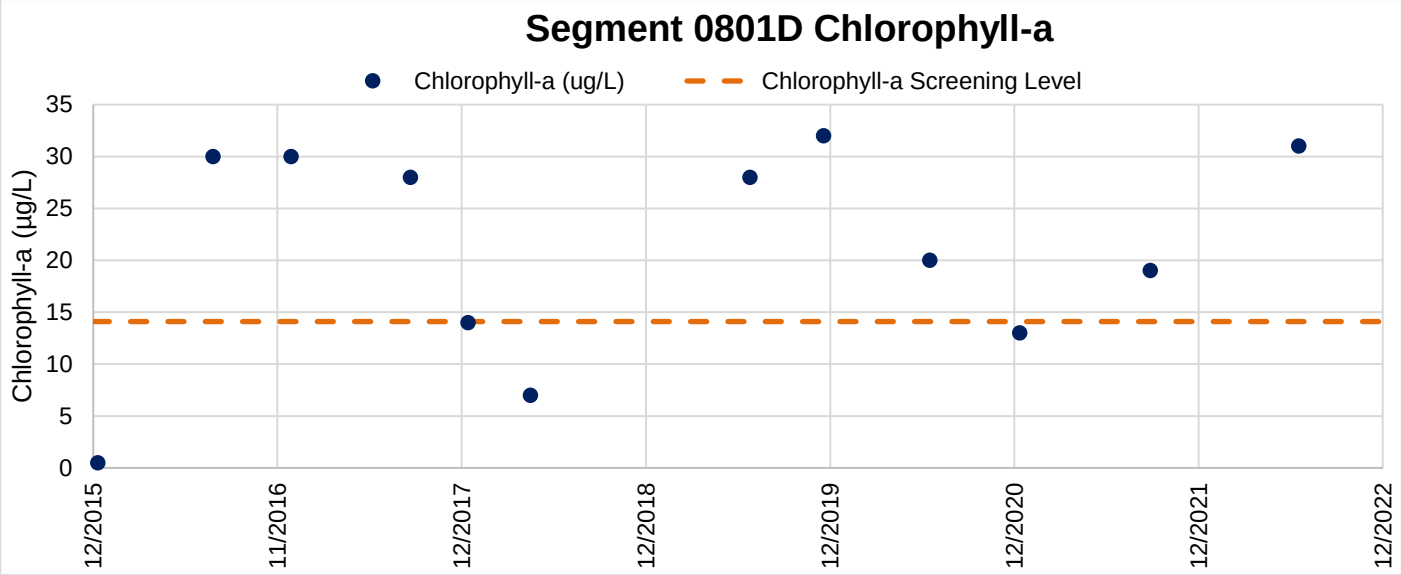

Figure 85: Segment 0801D Chlorophyll-a

Potential Causes of Water Quality Issue

There was a moderate correlation between chlorophyll-*a* and flow (coefficient = 0.467). The water in this canal is pulled from Segment 0801 which would provide the initial algal populations that may be increasing along the course of the canal.

Recommendations for Improving Water Quality

Upstream improvements in nutrient levels may provide some benefit to algal populations and chlorophyll-*a* concentrations in the canal. However, a significant portion of the nutrient enrichment in the Trinity River comes from wastewater treatment facility effluent. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. This concern will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- TRA Lake Livingston Project
- City of Houston
- Coastal Water Authority

0801E – Cotton Bayou Above Tidal

Segment Description

See Aquatic Life Use Segment 0801E Segment Description.

Hydrology

See Aquatic Life Use Segment 0801E Hydrology.

Land Use and Natural Characteristics

See Aquatic Life Use Segment 0801E Land Use and Natural Characteristics.

Ongoing Projects

See Aquatic Life Use Segment 0801E Ongoing Projects.

Description of Water Quality Issue

This segment was found to have concerns for nitrate, total phosphorus, and chlorophyll-*a*. Table 30 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, concerns for nitrate and total phosphorus may still exist as, overall, 66% and 75% of these data exceeded the screening levels of 0.69 mg/L and 1.95 mg/L, respectively (Figure 86). The concern for chlorophyll-*a* may no longer exist.

Table 30: Summary of General Use data for Segment 0801E

	2022 Integrated Report Data			BHR POR Data			
AU	0801E_01	0801E_01	0801E_01	0801E_01 Station 18696	0801E_01 Station 18696	0801E_01 Station 18696	0801E_01 Station 22232
Method	Chlorophyll-*a*	Total phosphorus	Nitrate	Chlorophyll-*a*	Total phosphorus	Nitrate	Total phosphorus
Criteria	14.1	0.69	1.95	14.1	1.95	0.69	1.95
# Data Assessed	21	20	23	18	19	17	25
# Exceedances	9	12	17	4	14	10	19
Mean Exceedances	45.61	1.66	8.86	34.53	7.05	1.76	13.85
DS Qualifier	AD	AD	AD	AD	AD	AD	AD
LOS	CS	CS	CS	NC	CS	CS	CS
CF	N	N	N	.	.	.	.
Int LOS	CS	CS	CS	.	.	.	.

Table 30 continued

	BHR POR Data			
AU	0801E_01 Station 22232	0801E_01 Combined	0801E_01 Combined	0801E_01 Combined
Method	Nitrate	Chlorophyll-*a*	Total phosphorus	Nitrate
Criteria		14.1	1.95	0.69
# Data Assessed	27	18	44	44
# Exceedances	19	4	33	29
Mean Exceedances	3.54	34.53	10.97	2.93
DS Qualifier	AD	AD	AD	AD
LOS	CS	NC	CS	CS
CF	.	.	.	.
Int LOS	.	.	.	.

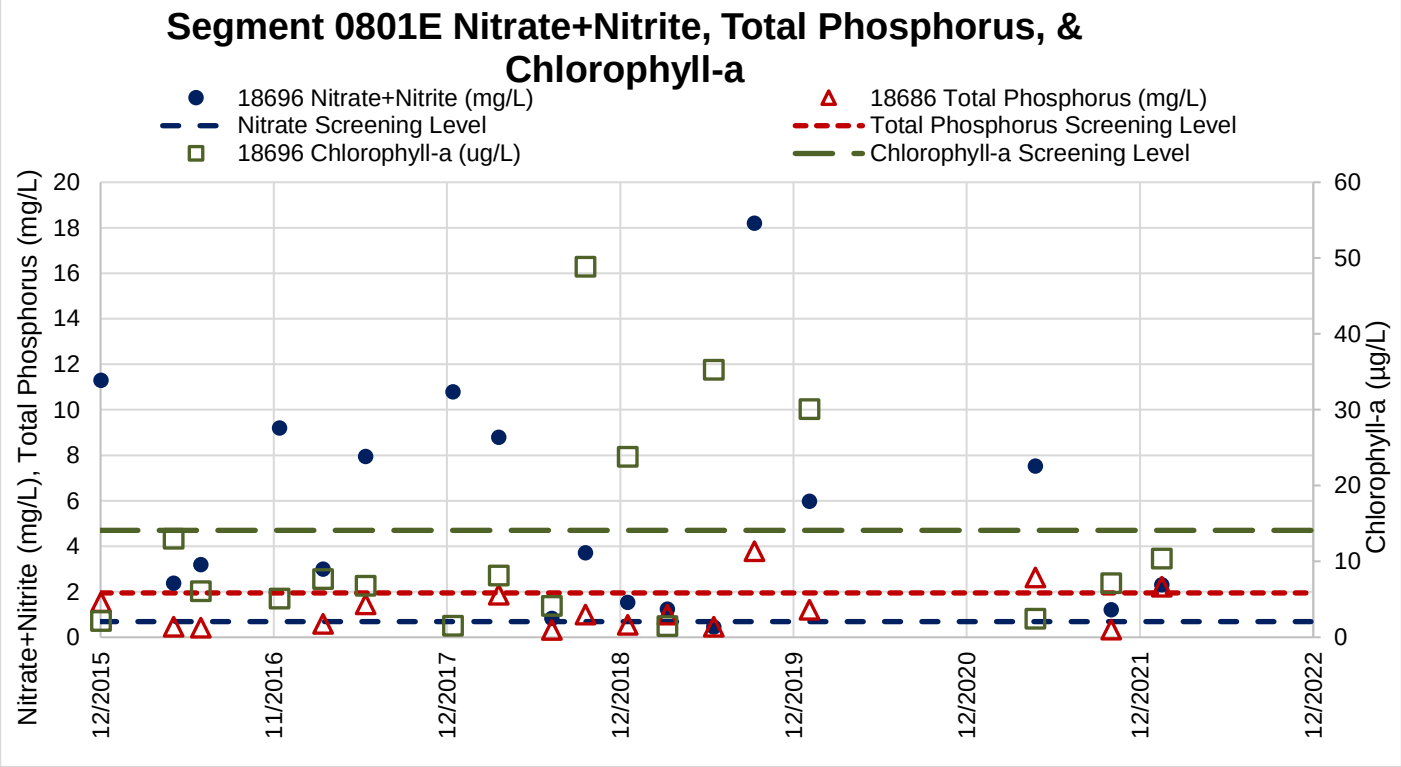

Figure 86: Segment 0801E Nitrate+Nitrite, Total Phosphorus, & Chlorophyll-a

Potential Causes of Water Quality Issue

Nutrients are likely related to wastewater treatment facility effluent as most wastewater treatment facilities do not yet have advanced nutrient removal technology. There were moderate inverse correlations between flow and nitrate and total phosphorus at Station 22232 (coefficients = -0.472 and -0.515, respectively).

No chlorophyll-*a* data were available at the upstream Station 22232 and there are no direct correlations between chlorophyll-*a* and nutrients at the downstream Station 18696. However, it is likely that algal populations are increasing due to nutrients in the slow-moving, unshaded nature of the stream. Average flow at Station 22232 was 7.76 cfs.

As discussed in the Aquatic Life Use section for Segment 0801E, there could be wastewater infrastructure failures that could contribute nutrients to the stream that could also lead to chlorophyll-*a* concerns.

Recommendations for Improving Water Quality

Because advanced nutrient removal technology is not widely used at most wastewater treatment facilities so reductions in nutrient concentrations may not be possible if effluent is the only source of nutrients in the stream. However, as noted in Aquatic Life Use section for Segment 0801E, sampling upstream of outfalls, walking surveys of the stream, and spot testing may identify if effluent, broken pipelines, or illicit septic system drains are contributing to the concerns. If these items are identified and repaired, the resultant reductions in nutrient concentrations may help reduce chlorophyll-*a* levels.

Potential Stakeholders

See Aquatic Life Use Segment 0801E Potential Stakeholders.

0802 – Trinity River Below Lake Livingston

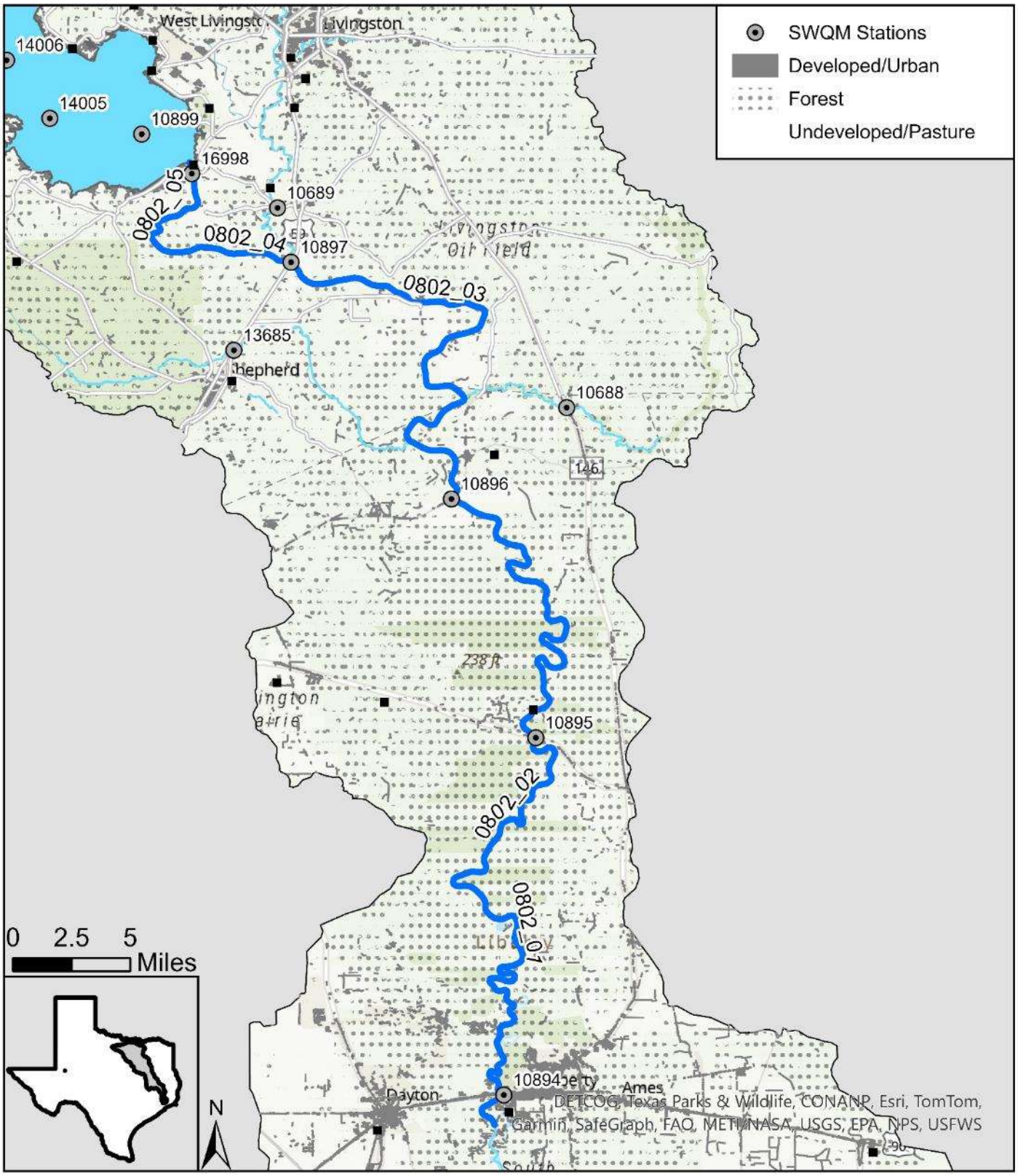

Figure 87: Map of Segment 0802

Segment Description

This 76-mile segment runs from the Livingston Dam in Polk/San Jacinto Counties to a point 1.9 miles downstream of US 90 in Liberty County.

Assessment Units and Monitoring Stations

- **0802_01** - Lower 17 miles of segment
  - Perennial freshwater Stream
  - **10894** – Trinity River at US 90 in Liberty TRA #33
    - Sampling conducted by TCEQ from 2015 to 2024
    - Sampling conducted by USGS from 2022 to 2024
- **0802_02** - Approximately 9 miles upstream to approximately 15 miles downstream of SH 105
  - Perennial freshwater Stream
  - **10895** – Trinity River at SH 105 near Moss Hill TRA #32
    - Sampling conducted by Lake Livingston Project from 2015 to 2021
- **0802_03** - 11 miles upstream to approximately 9 miles downstream of FM 787
  - Perennial freshwater Stream
  - **10896** – Trinity River 125 meters upstream of FM 787 near Romayor
    - Sampling conducted by TCEQ from 2015 to 2024
- **0802_04** - 5 miles upstream to 11 miles downstream of US 59
  - Perennial freshwater Stream
  - **10897** – Trinity River at US 59 south of Goodrich TRA #30
    - Sampling conducted by Lake Livingston Project from 2015 to 2024
- **0802_05** - Upper 6 miles of segment
  - Perennial freshwater Stream
  - **16998** – Trinity River at FM 3278 775 meters downstream of Lake Livingston and 8 miles east of Coldspring
    - Sampling conducted by Lake Livingston Project from 2015 to 2024

Hydrology

Segment 0802 is a sixth order stream. There are three USGS flow gages in this segment: 08066250 near Goodrich, 08066500 at Romayor, and 08067000 at Liberty. The median flow at these gages ranged from 3,440 cfs at the upstream Goodrich gage to 5,050 cfs at the downstream Liberty gage with a range of 953 to 124,000 cfs at these gages. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these three gages are listed below.

- Non-Index Period – 2,430 to 3,270 cfs
- Index Period – 8,240 to 8,670 cfs
- Critical Period – 1,640 to 1,720 cfs

Land Use and Natural Characteristics

This watershed is largely rural with a mix of hay and pasturelands, woody wetlands, and forest. There is some development around the cities of Goodrich, Romayor, and Liberty. The river flows through the Floodplains and Low Terraces ecoregion.

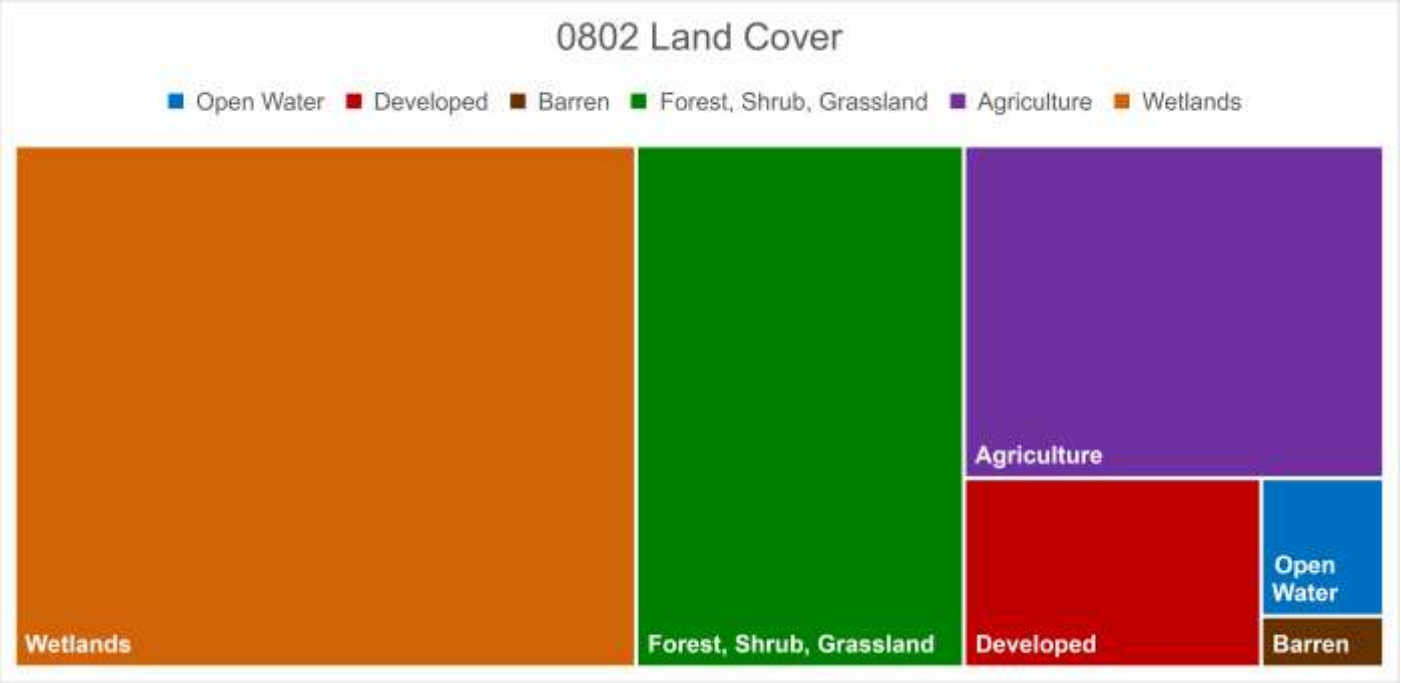

Figure 88: 0802 relative land cover totals

Figure 89: Railroad construction on Lower Trinity River upstream of US 90

Ongoing Projects

- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 10894 conducted by TCEQ Region 12.
- Routine monthly monitoring of metal, organic, conventional, bacteria, flow and field parameters at Station 10894 conducted by USGS.
- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 10896 conducted by TCEQ Region 12.
- Routine quarterly monitoring of conventional, bacteria, flow, and field parameters and metals twice a year at Station 10897 conducted by Trinity River Authority Lake Livingston Project.
- Routine monthly monitoring of conventional, bacteria, flow, and field parameters at Station 16998 conducted by Trinity River Authority Lake Livingston Project.

Description of Water Quality Issue

This segment was found to have concerns due to elevated chlorophyll-*a* concentrations in Assessment Units 0802_01, 0802_03, 0802_04, and 0802_05. Table 31 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, this concern may still exist as a total of 50% of the data across the entire segment exceeded the screening level of 14.1 µg/L (Figure 90).

Table 31: Summary of General Use data for Segment 0802

	2022 Integrated Report Data				BHR POR Data			
AU	0802_01	0802_03	0802_04	0802_05	0802_01	0802_03	0802_04	0802_05
Method	Chlorophyll-*a*	Chlorophyll-*a*	Chlorophyll-*a*	Chlorophyll-*a*	Chlorophyll-*a*	Chlorophyll-*a*	Chlorophyll-*a*	Chlorophyll-*a*
Criteria	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1
# Data Assessed	21	22	23	76	20	20	26	82
# Exceedances	13	11	7	35	11	11	11	41
Mean Exceedances	27.73	26.45	23.71	21.71	25.62	25.57	26.45	24.41
DS Qualifier	AD	AD	AD	AD	AD	AD	AD	AD
LOS	CS	CS	CS	CS	CS	CS	CS	CS
CF	N	N	N	N	.	.	.	.
Int LOS	CS	CS	CS	CS	.	.	.	.

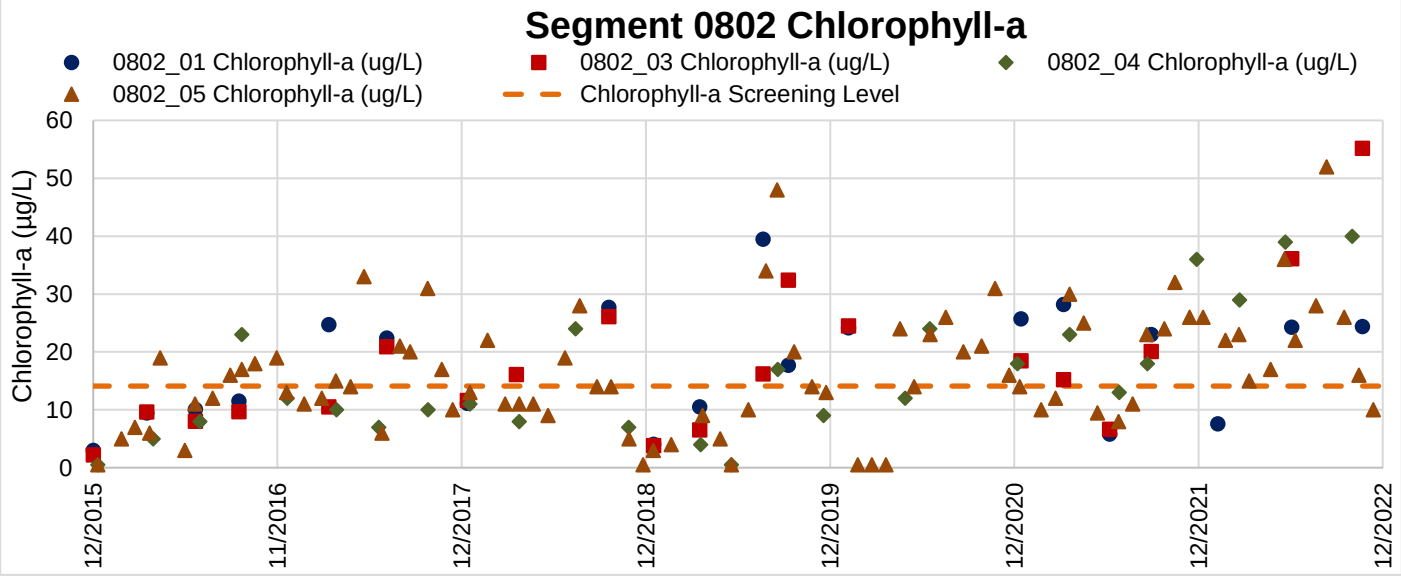

Figure 90: Segment 0802 Chlorophyll-a

Potential Causes of Water Quality Issue

There were moderate inverse correlations between chlorophyll-*a* and flow in these assessment units (coefficients between -0.597 and -0.512). The upstream Assessment Unit 0802_05 is dominated by releases from Lake Livingston which has a nutrient narrative threshold for chlorophyll-*a* of 20.64 µg/L. The Lake Livingston dam is operated as a run of the river dam; releases match the flow coming into the reservoir. At low flows, the algal populations in the river were likely seeded by the populations in the reservoir. The river along this segment is wide with little change in elevation and no shading from overarching tree canopy. These slow meandering flows with plenty of sunlight are ideal conditions for algal populations to increase and this appears to be the cause of the concerns.

Recommendations for Improving Water Quality

Upstream improvements in nutrient levels may provide some benefit to downstream algal populations and chlorophyll-*a* concentrations. However, a significant portion of the nutrient enrichment in the Trinity River comes from wastewater treatment facility effluent. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- TRA Lake Livingston Project
- City of Ace
- City of Romayor
- City of Liberty
- Taylor Lake homeowners, and homeowners' associations
- ABLA Farm & Nursery
- United States Fish and Wildlife
- United States Army Corps of Engineers
- Homeowners and homeowners associations
- Landowners

0803A – Harmon Creek

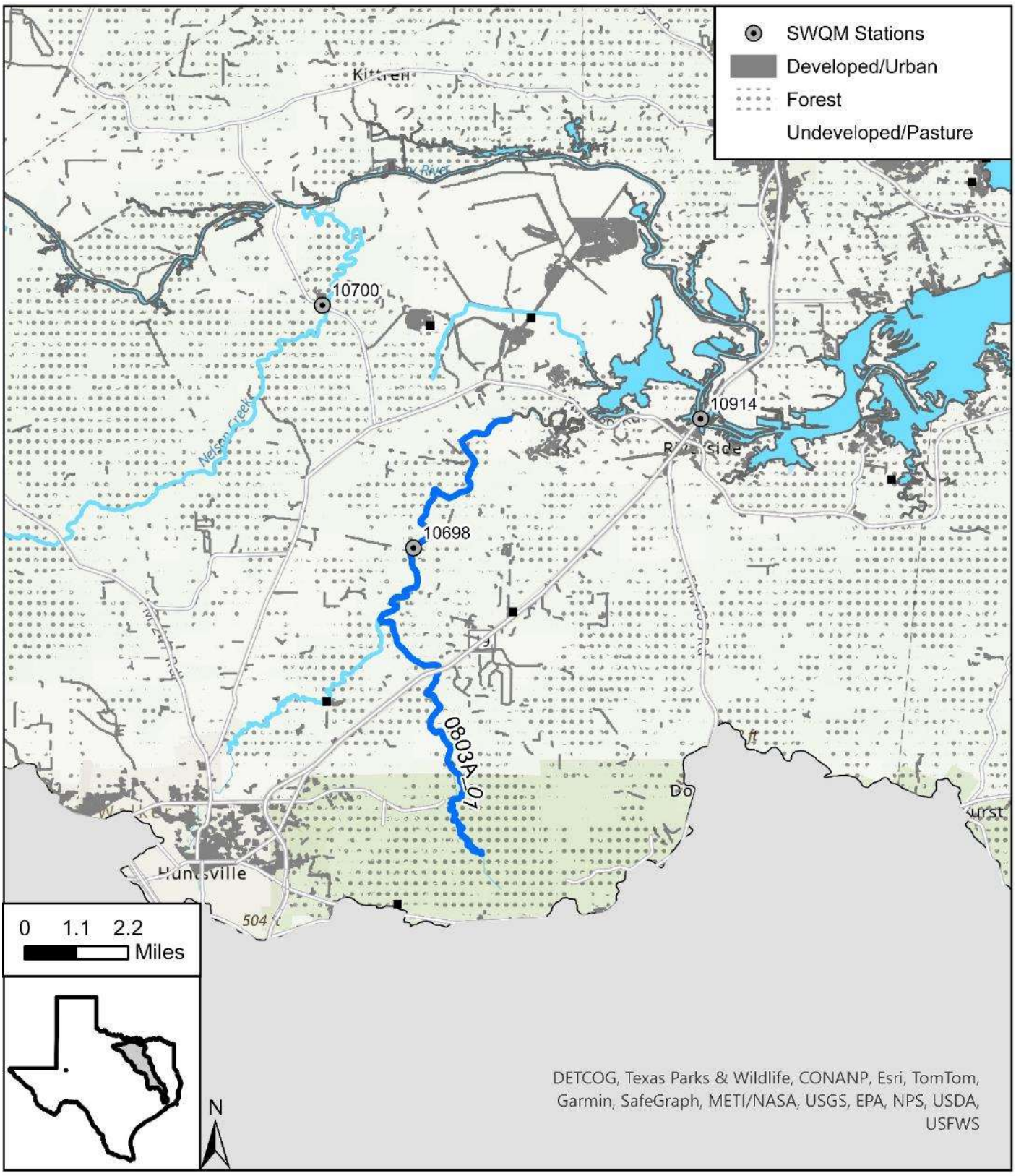

Figure 91: Map of Segment 0803A

Segment Description

This 13.8-miles unclassified segment runs from the confluence of East Fork Harmon Creek east of Huntsville in Walker County to the normal pool elevation of 131 feet at the confluence with Lake Livingston.

Assessment Units and Monitoring Stations

- **0803A_01** - A 16 mi (25.7 km) stretch of Harmon Creek extending from Lake Livingston (normal pool elevation of 131 feet) upstream to the confluence of East Fork Harmon Creek
    - Perennial freshwater stream
    - **10698** - Harmon Creek 509 meters upstream from intersection with Otter Rd east of FM 980 and 7.6 miles northeast of Huntsville
        - Sampling conducted by TRA Lake Livingston Project from 2015 to 2017 and 2019 to 2024

Hydrology

Unclassified segment 0803A is a fourth order stream at its most downstream end. Based on sampling at Station 10698, the median flow was 8.25 cfs with a range of 6.1 to 16 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 8.35 cfs
- Index Period – 8.5 cfs
- Critical Period – 7.65 cfs

Land Use and Natural Characteristics

This watershed lies within the Southern Tertiary Uplands ecoregion. Much of the land cover is forest, hay, and pasture. Development includes the outskirts of the City of Huntsville and the communities along State Route 19.

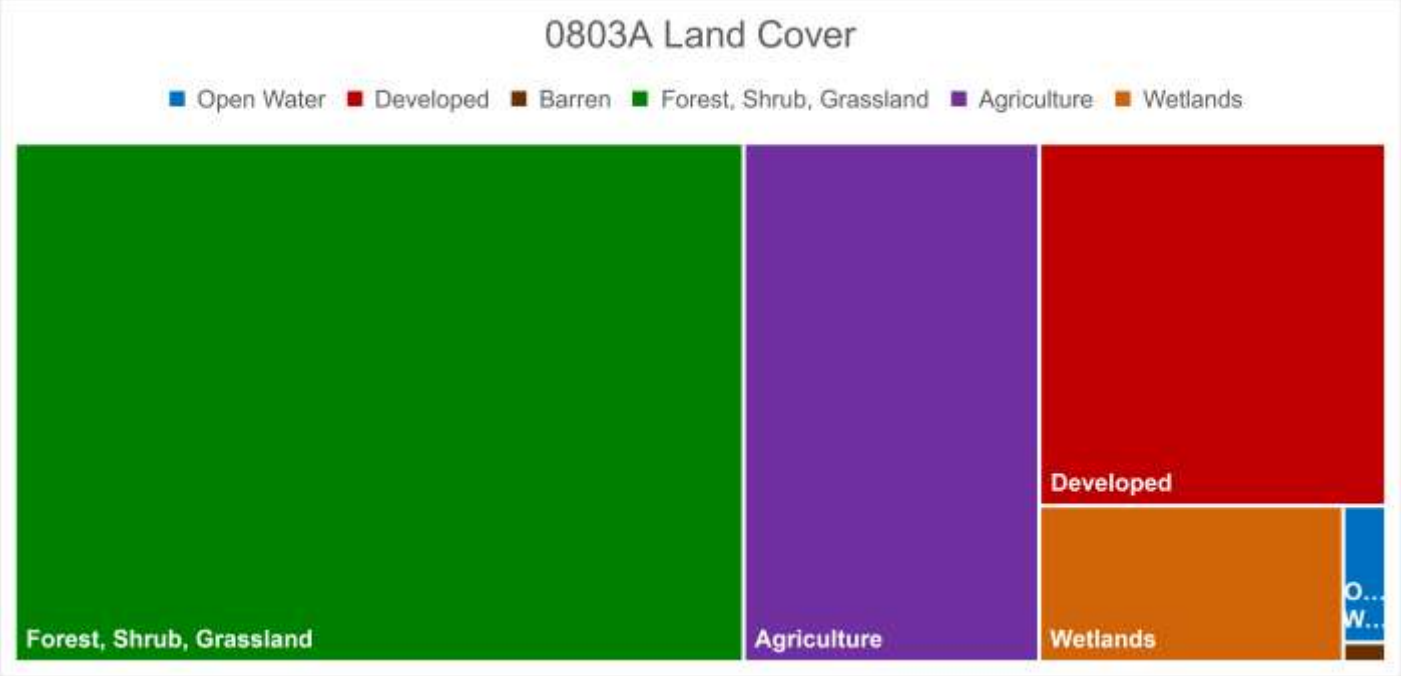

Figure 92: 0803A relative land cover totals

Ongoing Projects

- Routine monitoring of conventional, bacteria, flow, and field parameters twice a year at Station 10698 conducted by Trinity River Authority Lake Livingston Project.

Description of Water Quality Issue

Concerns were identified for total phosphorus and nitrate in this segment. Table 32 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, these concerns may still exist as 93% of the total phosphorus data exceeded the screening level of 0.69 mg/L and 75% of the nitrate data exceeded the screening level of 1.95 mg/L (Figure 93).

Table 32: Summary of General Use data for Segment 0803A

	2022 Integrated Report Data		BHR POR Data	
AU	0803A_01	0803A_01	0803A_01	0803A_01
Method	Total phosphorus	Nitrate	Total phosphorus	Nitrate
Criteria	0.69	1.95	0.69	1.95
# Data Assessed	13	11	14	12
# Exceedances	11	9	13	9
Mean Exceedances	1.06	4.9	1.1	5.2
DS Qualifier	AD	AD	AD	AD
LOS	CS	CS	CS	CS
CF	N	N	.	.
Int LOS	CS	CS	.	.

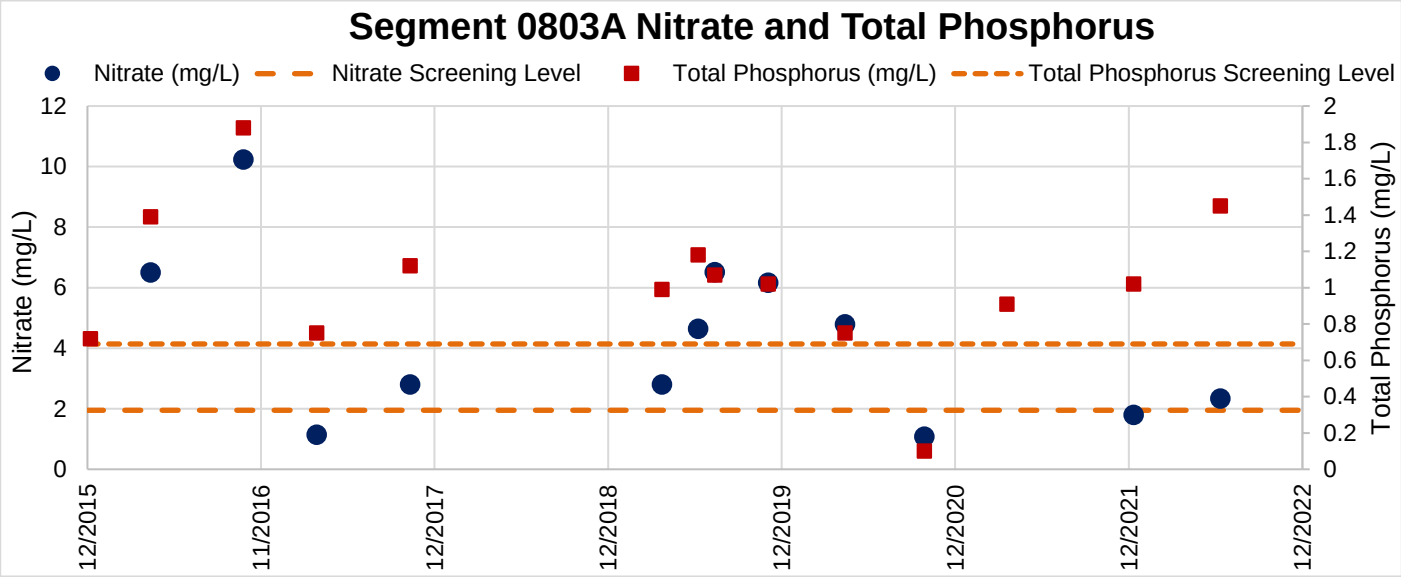

Figure 93: Segment 0803A Nitrate and Total Phosphorus

Potential Causes of Water Quality Issue

Concerns for Nitrate and Total Phosphorus appear to be related to upstream wastewater treatment facilities. Data were limited; however, there were weak inverse correlations to flow (coefficients = -0.368 for nitrate and -0.163 for total phosphorus). This pattern is commonly seen in waterbodies downstream of wastewater treatment facilities.

Recommendations for Improving Water Quality

There are no recommendations for decreasing nutrients and chlorophyll-*a* levels at this time. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- TRA Lake Livingston Project
- City of Huntsville
- Landowners
- Town of Arizona

0803B – White Rock Creek

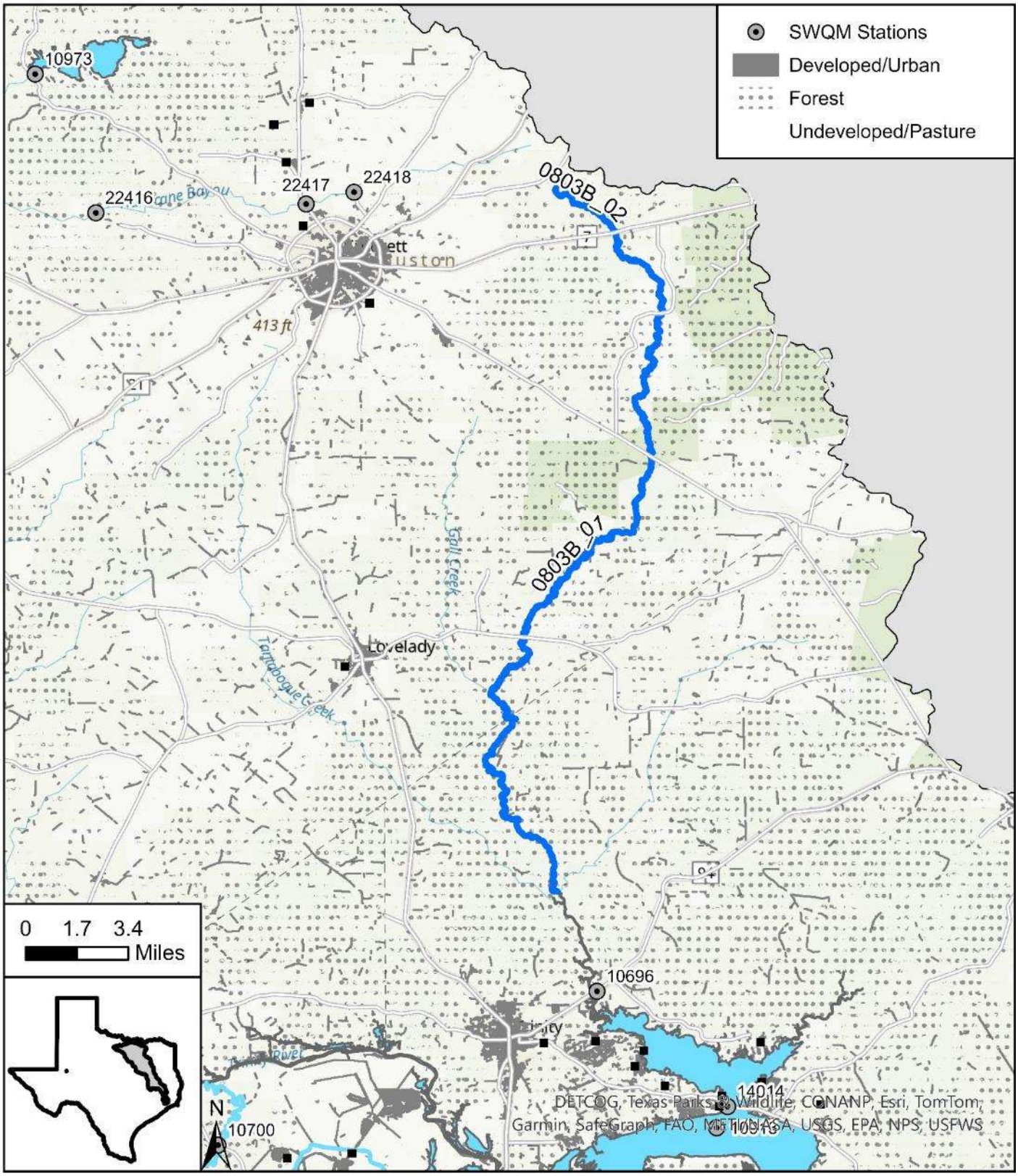

Figure 94: Map of Segment 0803B

Segment Description

This 41.8-mile unclassified segment runs from the upstream perennial portion of the stream east of Lovelady in Houston County to the confluence of Lake Livingston northeast of Trinity in Trinity County.

Assessment Units and Monitoring Stations

- **0803B_01** - Lower 25 mi of segment
  - Perennial freshwater stream
  - **10696** - White Rock Creek at SH 94 northeast of Trinity TRA #21
    - Sampling conducted by TRA Lake Livingston Project from 2015 to 2018 and 2020 to 2024
- **0803B_02** - Upper 13 mi of segment
  - Perennial freshwater stream

Hydrology

Unclassified segment 0803B is a fourth order stream at its most downstream end. There are no flow data available in this segment.

Land Use and Natural Characteristics

The far upstream end of this watershed lies within the Tertiary Uplands with the remainder flowing through the Southern Tertiary Uplands ecoregion. The watershed is largely forested interspersed with hay and pasture and woody wetlands along the stream and tributaries.

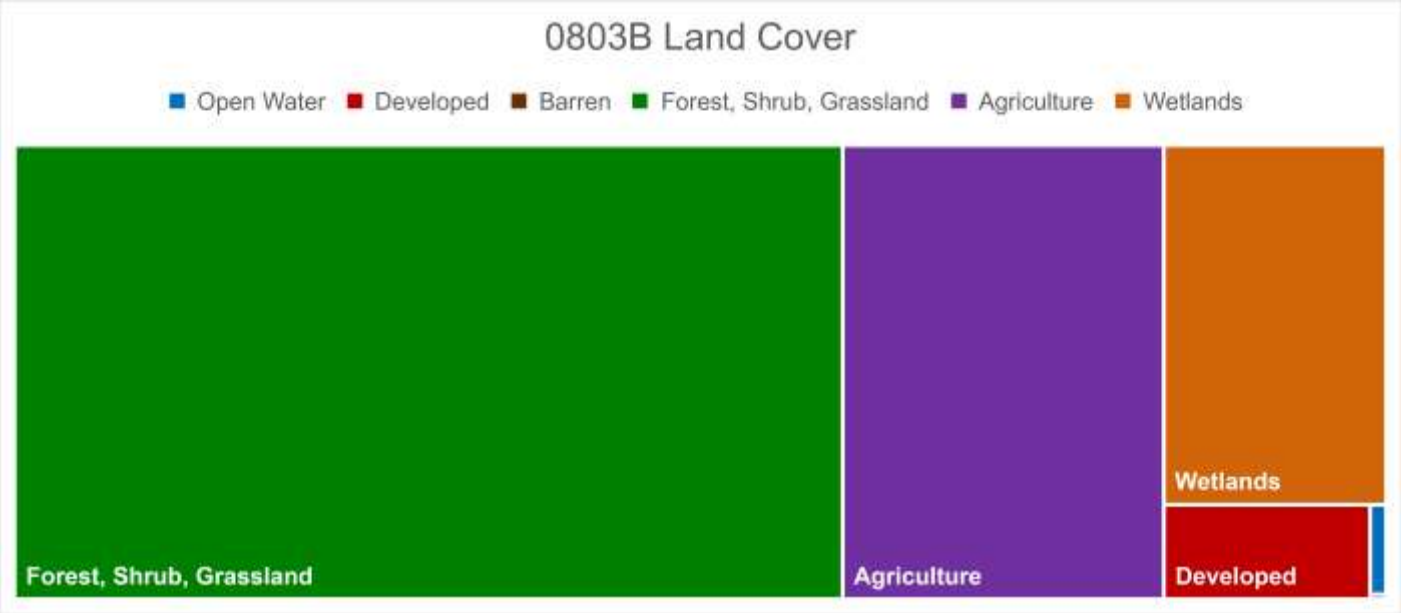

Figure 95: 0803B relative land cover totals

Ongoing Projects

- Routine monitoring of conventional, bacteria, and field parameters twice a year at Station 10696 conducted by Trinity River Authority Lake Livingston Project.

Description of Water Quality Issue

This segment was found to have a concern due to elevated chlorophyll-*a* concentrations. Table 33 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, this concern may still exist as 69% of the data exceeded the screening level of 14.1 µg/L (Figure 96).

Table 33: Summary of General Use data for Segment 0803B

	2022 Integrated Report Data	BHR POR Data
AU	0803B_01	0803B_01
Method	Chlorophyll-*a*	Chlorophyll-*a*
Criteria	14.1	14.1
# Data Assessed	10	13
# Exceedances	5	9
Mean Exceedances	27.2	37.31
DS Qualifier	AD	AD
LOS	CS	CS
CF	N	.
Int LOS	CS	.

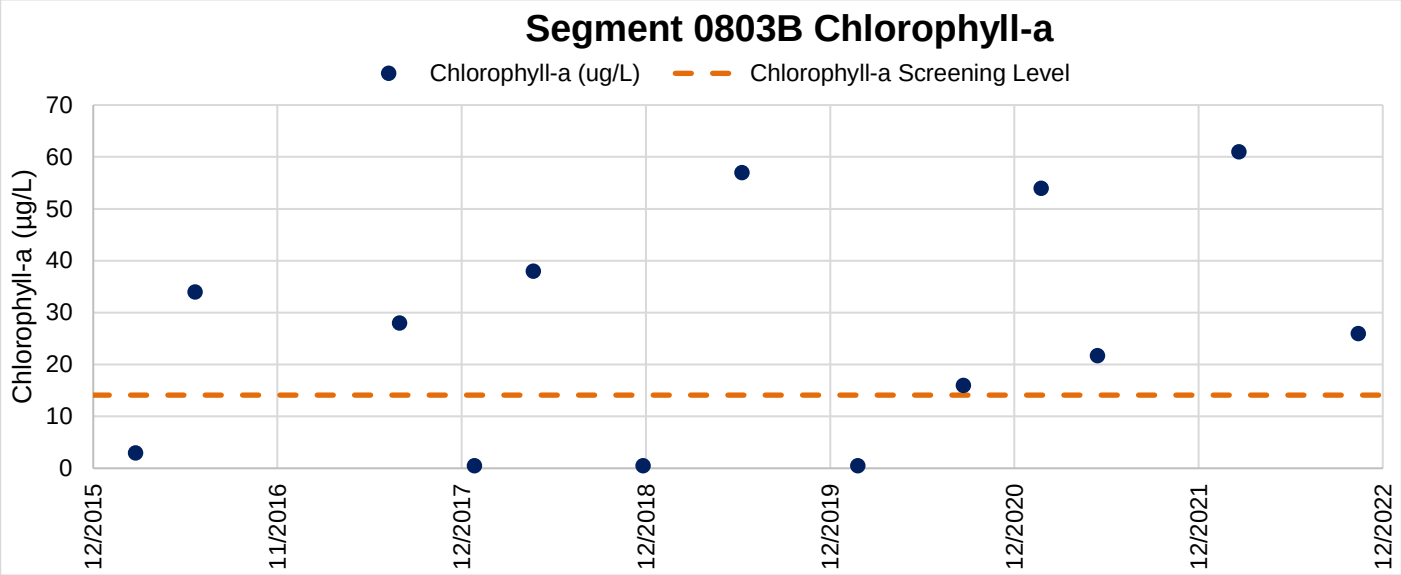

Figure 96: Segment 0803B Chlorophyll-a

Potential Causes of Water Quality Issue

The chlorophyll-*a* concern in this segment did not appear to be related to nutrients as there were no positive correlations for these parameters. The monitoring station in this segment, Station 10696, is located in a backwater area of Lake Livingston and was likely influenced by both algal populations in the reservoir as well as low stream flows in a backwater environment. Increased residence times can allow algal populations to increase.

Recommendations for Improving Water Quality

If the source of algal populations observed at Station 10696 are due to backwater from Lake Livingston, reduction of chlorophyll-*a* levels in Segment 0803 may reduce levels observed at this station. However, there are several wastewater dischargers around the White Rock Creek cove in Lake Livingston. Nutrients from these facilities may be impacting algal populations in this cove. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. This concern will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- TRA Lake Livingston Project
- City of Crockett
- Landowners
- City of Trinity

0803F – Bedias Creek

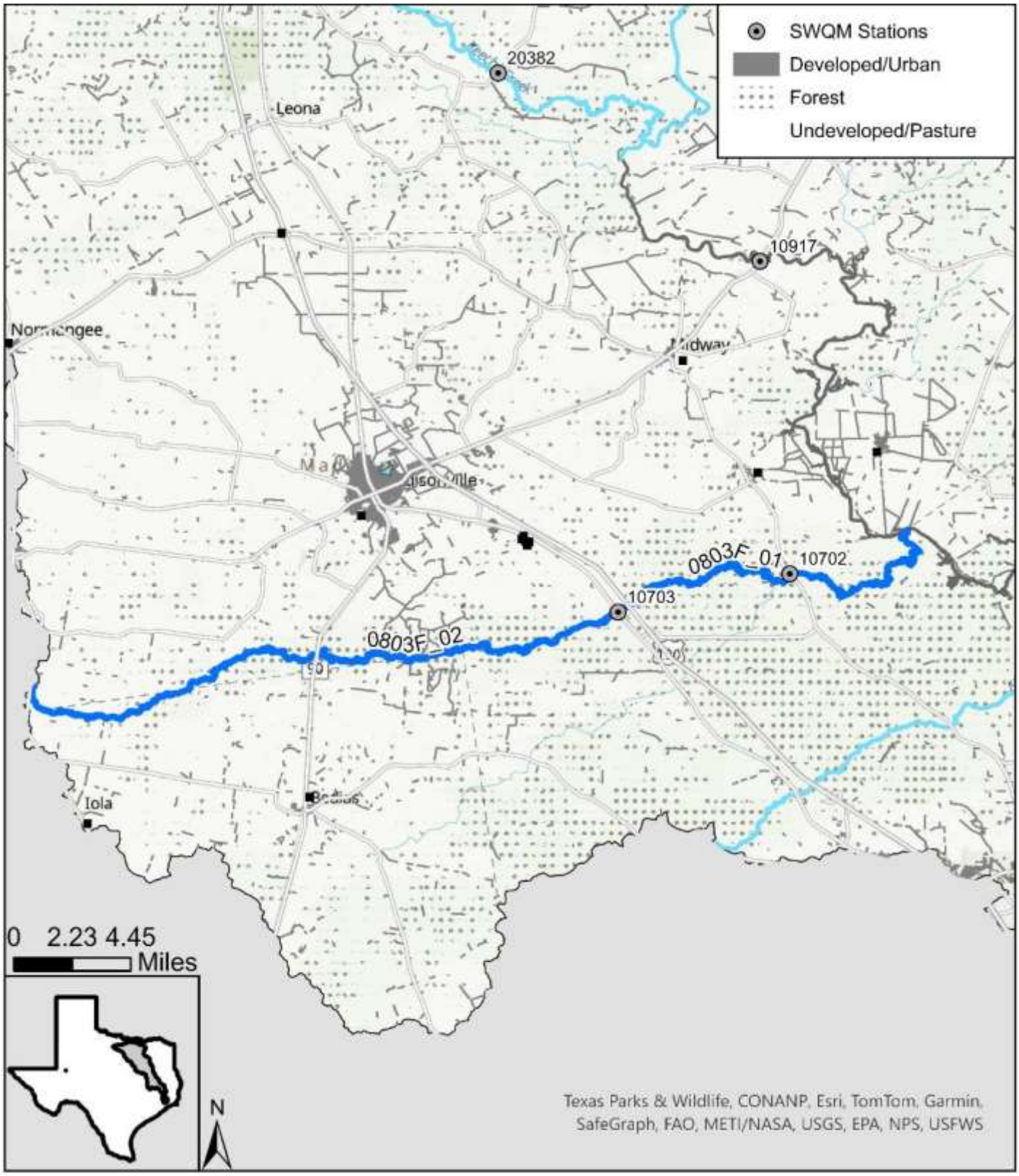

Figure 97: Map of Segment 0803F

Segment Description

This 54-mile unclassified segment runs from the headwaters near Route 39 southwest of Madisonville to the confluence with Lake Livingston.

Assessment Units and Monitoring Stations

- **0803F_01** - From the confluence with segment 0803 Trinity River up to confluence with Poole Creek
  - Perennial freshwater stream
- **0803F_02** - From the confluence with Poole Creek to upper end of Bedias Creek
  - Perennial freshwater stream
  - **10703** - Bedias Creek immediately downstream of US 75 southeast of Madisonville
    - Sampling conducted by Lake Livingston Project from 2015 to 2024

Hydrology

Unclassified segment 0803F is a fifth order stream at its most downstream end. There is one USGS flow gage in this segment: 08065800 near Madisonville. The median flow at this gage was 9.31 cfs with a range of 0 to 30,600 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 11.2 cfs
- Index Period – 20.1 cfs
- Critical Period – 0.74 cfs

Land Use and Natural Characteristics

The watershed is largely hay and pastureland with forested areas near the downstream end. It lies within the Southern Post Oak Savanna ecoregion.

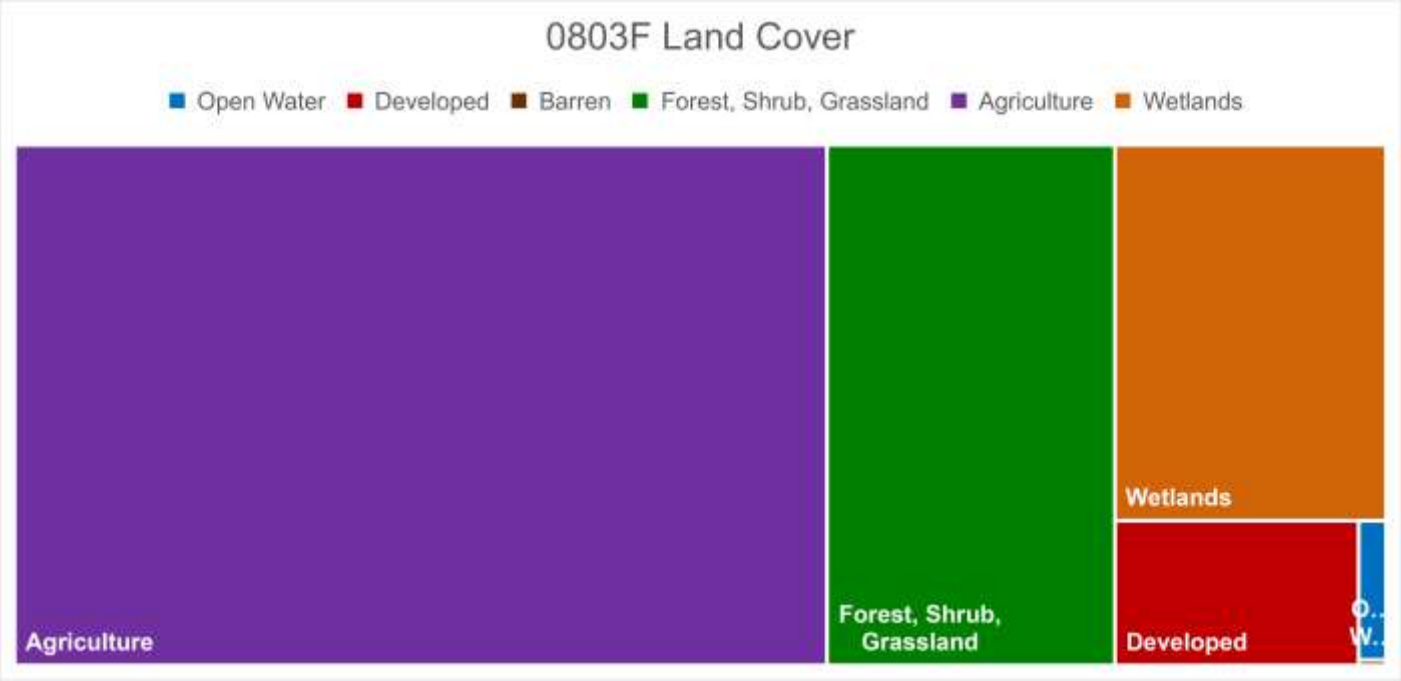

Figure 98: 0803F relative land cover totals

Ongoing Projects

- Routine monitoring of metal, conventional, bacteria, flow, and field parameters twice a year at Station 10703 conducted by Trinity River Authority Lake Livingston Project.

Description of Water Quality Issue

A concern due to elevated chlorophyll-*a* concentrations was identified in Assessment Unit 0803F_01. Table 34 shows a summary of the TCEQ 2022 Texas Integrated Report. This concern was carried forward from previous assessments as no sampling has been conducted in this assessment unit since 2014. It was first found in the 2016 Integrated Report when 11 samples were assessed, and 7 samples exceeded the screening level of 14.1. Figure 99 shows data collected between 2000 and 2014; 57% of the data exceeded the screening level.

Table 34: Summary of General Use data for Segment 0803F

	2022 Integrated Report Data
AU	0803F_01
Method	Chlorophyll-*a*
Criteria	14.1
# Data Assessed	2
# Exceedances	1
Mean Exceedances	35
DS Qualifier	ID
LOS	NA
CF	Y
Int LOS	CS

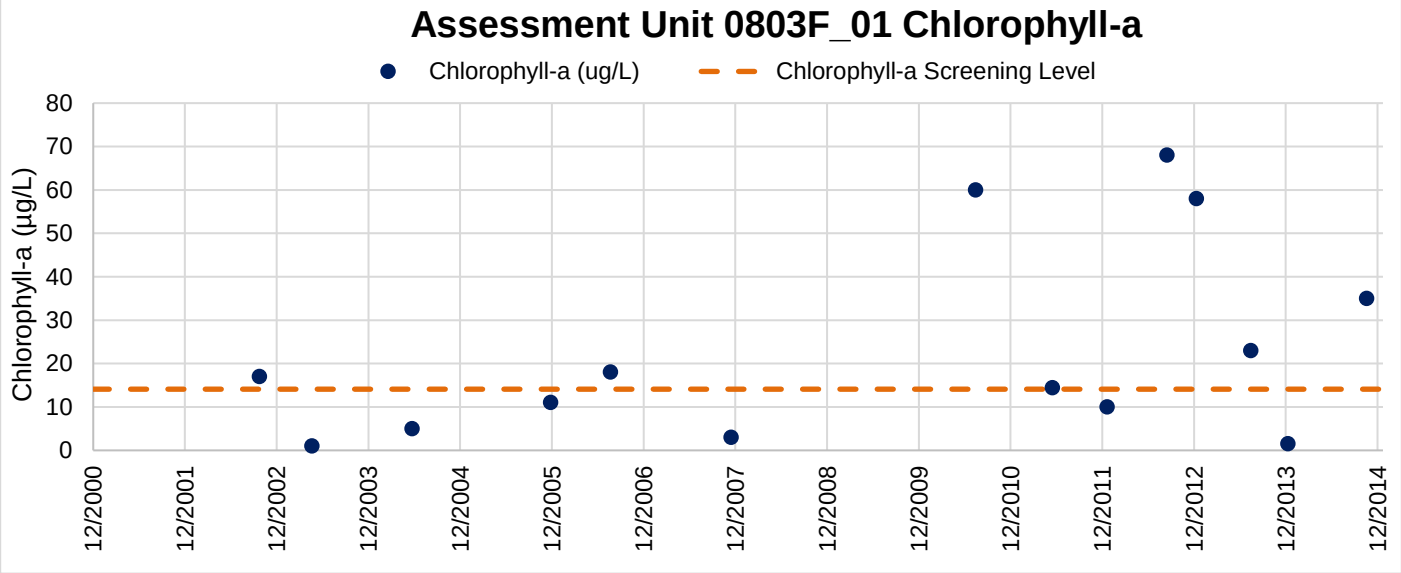

Figure 99: Assessment Unit 0803F_01 Chlorophyll-a

Potential Causes of Water Quality Issue

The cause of elevated chlorophyll-*a* levels in Assessment Unit 0803F_01 are unknow as there is no recent monitoring. There were no strong correlations with nutrients in the historic data. However, there are several wastewater treatment facilities in this watershed that may be impacting upstream chlorophyll-*a* levels. There was a moderate correlation between chlorophyll-*a* and orthophosphate at Station 10703 in Assessment Unit 0803F_02(coefficient = 0.404). Further, nutrients at Station 10703 were inversely correlated with flow which is common in effluent dominated streams.

Recommendations for Improving Water Quality

It is recommended that monitoring be conducted in Assessment Unit 0803F_01 to further assess this concern. However, if chlorophyll-*a* levels are related to upstream wastewater treatment facilities, this concern may remain as most wastewater treatment facilities do not yet have advanced nutrient removal technology.

Potential Stakeholders

- TRA Lake Livingston Project
- City of Cross
- HN Cattle
- Landowners

0804 – Trinity River Above Lake Livingston

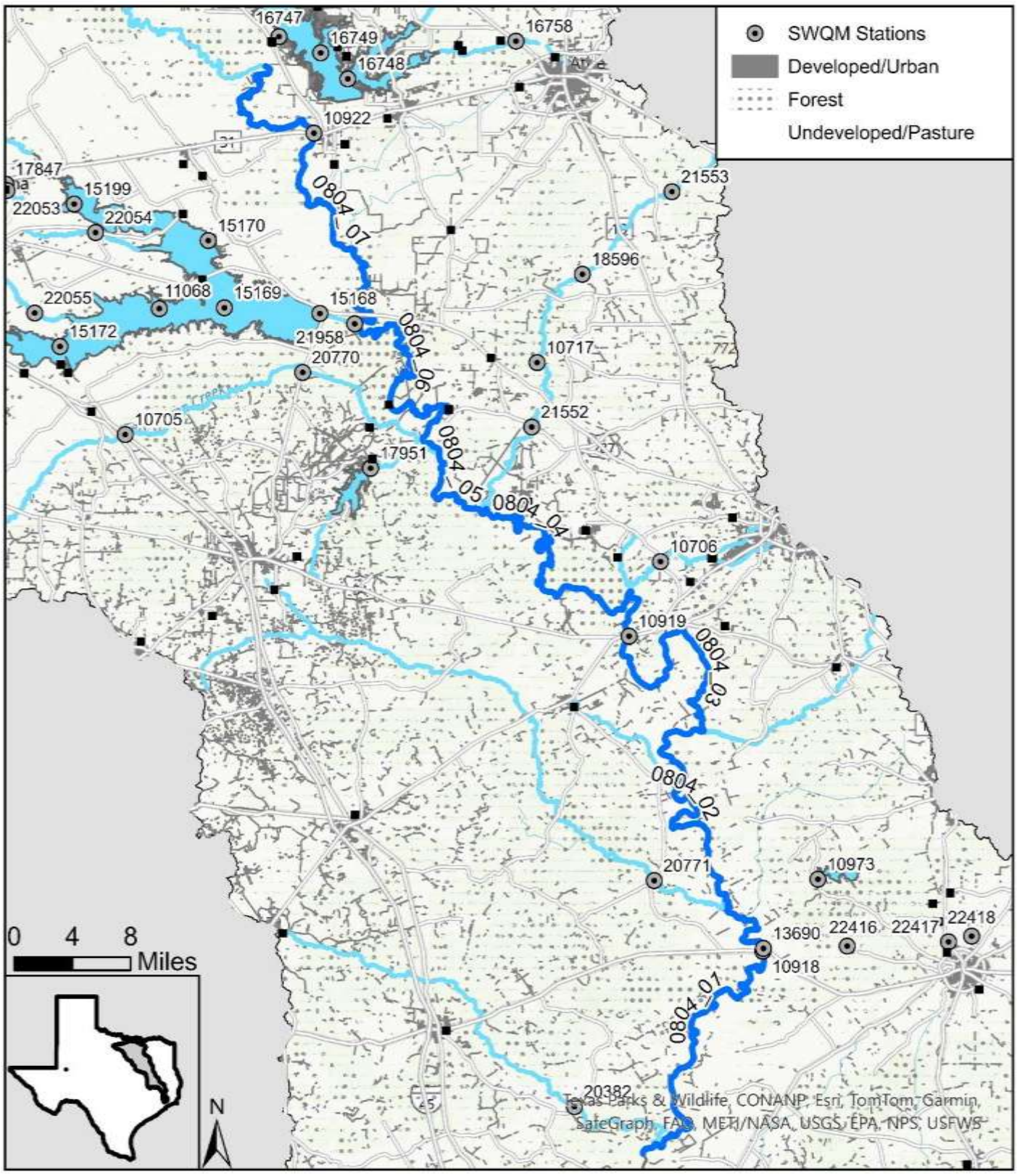

Figure 100: Map of Segment 0804

Segment Description

This 160-mile portion of the Trinity River begins at a point immediately upstream of the confluence with the Cedar Creek Reservoir discharge canal in Henderson/Navarro Counties and ends at a point 1.1-miles upstream of Boggy Creek in Houston/Leon Counties.

Assessment Units and Monitoring Stations

- **0804_01** - From the lower end of the segment up to just above the confluence with Hurricane Bayou in Houston County
    - Perennial freshwater stream
    - **13690** - Trinity River 304 meters upstream of SH 7 11.9 miles west of Crockett
        - Sampling conducted by Lake Livingston Project from 2016 to 2024
- **0804_02** - From just upstream of the confluence with Hurricane Bayou up to just above the confluence with Boons Creek
    - Perennial freshwater stream
- **0804_03** - From just upstream of the confluence with Boons Creek up to just above the confluence with Caney Creek
    - Perennial freshwater stream
- **0804_04** - From the confluence with Caney Creek up to just above the confluence with Indian Creek in Anderson County
    - Perennial freshwater stream
    - **10919** - Trinity River immediately downstream of US 79 northeast of Oakwood
        - Sampling conducted by TRA from 2015 to 2024
- **0804_05** - From just above the confluence with Indian Creek in Anderson County up to just above the confluence with Tehuacana Creek
    - Perennial freshwater stream
- **0804_06** - From just above the confluence with Tehuacana Creek to just above the confluence with Richland Creek
    - Perennial freshwater stream
- **0804_07** - From just above the confluence with Richland Creek in Henderson County, up to the upper end of the segment
    - Perennial freshwater stream
    - **10922** - Trinity River at SH 31 in Trinidad
        - Sampling conducted by TRA from 2015 to 2024

Hydrology

Segment 0804 is a sixth order stream. There are three USGS flow gages in this segment: 08062700 at Trinidad, 08065000 near Oakwood, and 08065350 near Crockett. The median flow at these gages ranged from 2,030 cfs at the upstream Trinidad gage to 2,945 cfs at the downstream Crockett gage with a range of 414 to 71,200 cfs at these gages. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these three gages are listed below.

- Non-Index Period – 1,980 to 2,700 cfs
- Index Period – 4,450 to 6,470 cfs
- Critical Period – 1,085 to 1,260 cfs

Land Use and Natural Characteristics

This segment is generally considered the “Middle Trinity” and runs through the Northern and Southern Post Oak Savanna as well as the Tertiary Uplands ecoregions. The watershed is largely rural with some larger communities including Athens, Palestine, Fairfield, and Crockett. Land use in the watershed is largely hay and pastureland with some small pockets of crop land, grassland, and forest.

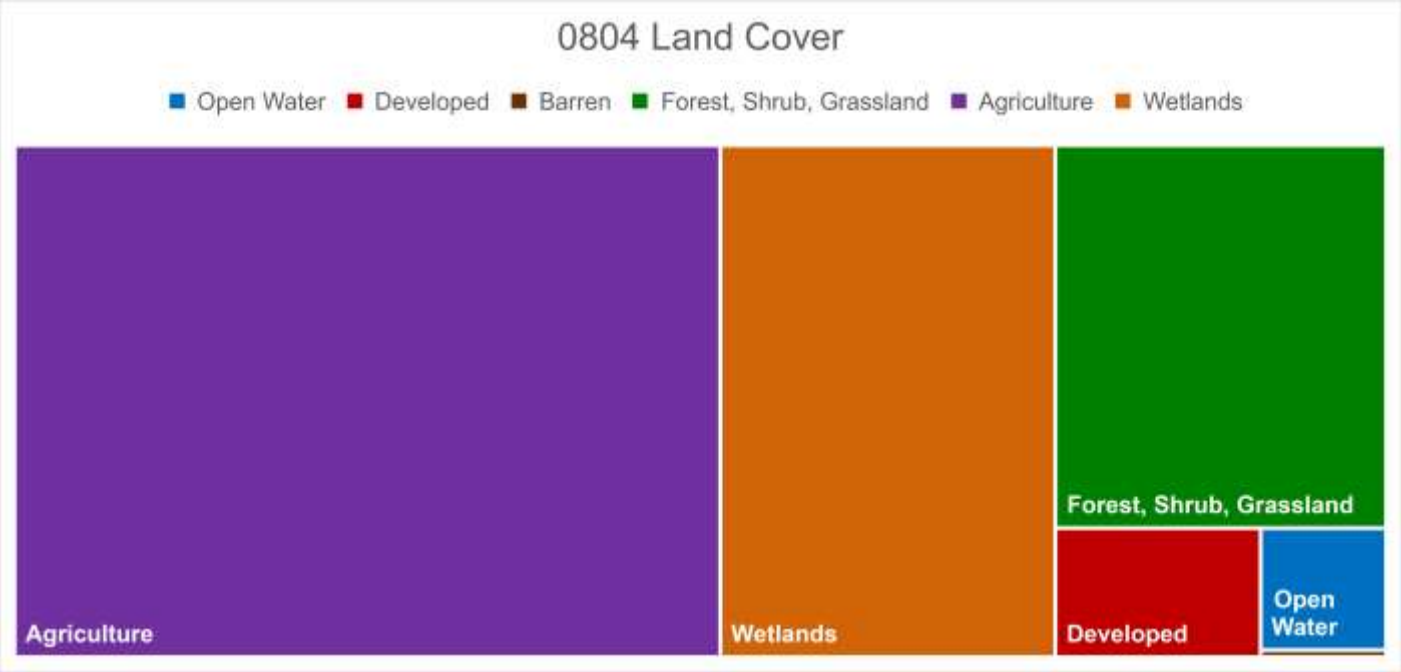

Figure 101: 0804 relative land cover totals

Ongoing Projects

- Routine monthly monitoring of conventional, bacteria, flow and field parameters and metals twice a year at Station 13690 conducted by Trinity River Authority Lake Livingston Project.
- Routine quarterly monitoring of conventional, bacteria, flow, and field parameters and metals twice a year at Station 10919 conducted by Trinity River Authority.
- Routine quarterly monitoring of conventional, bacteria, flow, and field parameters and metals twice a year at Station 10922 conducted by Trinity River Authority.

Description of Water Quality Issue

Concerns were identified for total phosphorus, nitrate, and chlorophyll-*a* in this segment. Table 35 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. There is no monitoring in Assessment Units 0804_02 and 0804_03 due to lack of access so these concerns will likely continue to be carried forward. However, because both upstream and downstream assessment units also had concerns for these parameters, it is reasonable to assume that any monitoring in 0804_02 and 0804_03 would continue to have concerns identified. Based on recently collected data in Assessment Units 0804_01, 0804_04, and 0804_07 these concerns may still exist as, overall, 25% of the total phosphorus data exceeded the screening level of 0.69 mg/L, 60% of the nitrate data exceeded 1.95 mg/L, and 56% of chlorophyll-*a* data exceeded 14.1 µg/L (Figure 102 and Figure 103).

Table 35: Summary of General Use data for Segment 0804

	2022 Integrated Report Data						
AU	0804_01	0804_01	0804_01	0804_02	0804_02	0804_02	0804_03
Method	Total phosphorus	Nitrate	Chlorophyll-*a*	Total phosphorus	Nitrate	Chlorophyll-*a*	Nitrate
Criteria	0.69	1.95	14.1	0.69	1.95	14.1	1.95
# Data Assessed	79	76	76	0	0	0	0
# Exceedances	20	38	29	.	.	.	.
Mean Exceedances	0.96	4.52	53.97	.	.	.	.
DS Qualifier	AD	AD	AD	ID	ID	ID	ID
LOS	CS	CS	CS	NA	NA	NA	NA
CF	N	N	N	Y	Y	Y	Y
Int LOS	CS	CS	CS	CS	CS	CS	CS

Table 35 continued

	2022 Integrated Report Data					
AU	0804_04	0804_04	0804_04	0804_07	0804_07	0804_07
Method	Total phosphorus	Nitrate	Chlorophyll-*a*	Total phosphorus	Nitrate	Chlorophyll-*a*
Criteria	0.69	1.95	14.1	0.69	1.95	14.1
# Data Assessed	27	25	26	27	25	26
# Exceedances	9	12	11	12	17	15
Mean Exceedances	0.89	5.43	50.18	1.21	6.25	34.8
DS Qualifier	AD	AD	AD	AD	AD	AD
LOS	CS	CS	CS	CS	CS	CS
CF	N	N	N	N	N	N
Int LOS	CS	CS	CS	CS	CS	CS

Table 35 continued

	BHR POR Data								
AU	0804_01	0804_01	0804_01	0804_04	0804_04	0804_04	0804_07	0804_07	0804_07
Method	Total phosphorus	Nitrate	Chlorophyll-*a*	Total phosphorus	Nitrate	Chlorophyll-*a*	Total phosphorus	Nitrate	Chlorophyll-*a*
Criteria	0.69	1.95	14.1	0.69	1.95	14.1	0.69	1.95	14.1
# Data Assessed	83	80	82	27	26	26	27	26	27
# Exceedances	13	47	43	8	14	13	13	18	19
Mean Exceedances	1	4.19	64.58	0.92	4.88	52.77	1.12	5.91	34.42
DS Qualifier	AD	AD	AD	AD	AD	AD	AD	AD	AD
LOS	NC	CS	CS	CS	CS	CS	CS	CS	CS
CF	.	.	.	.	.	.	.	.	.
Int LOS	.	.	.	.	.	.	.	.	.

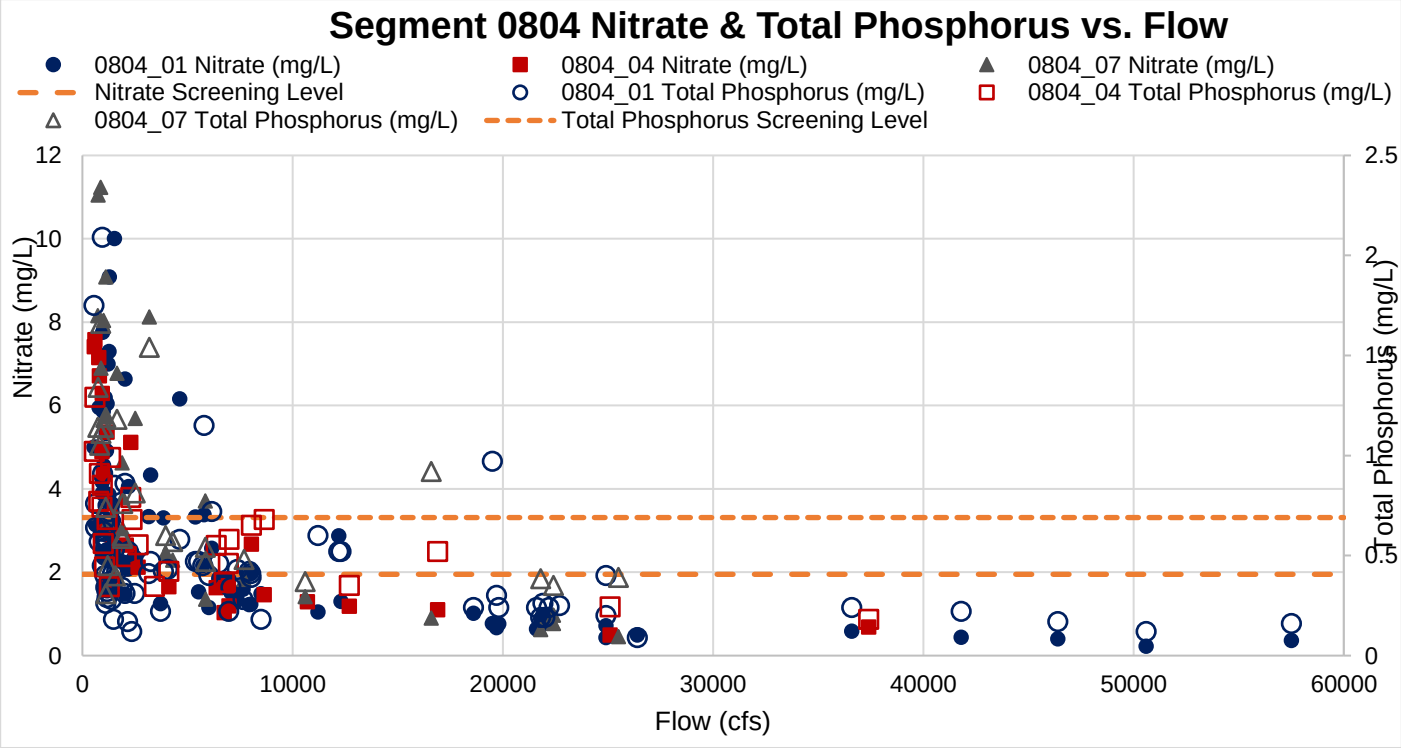

Figure 102: Segment 0804 Nitrate & Total Phosphorus vs. Flow

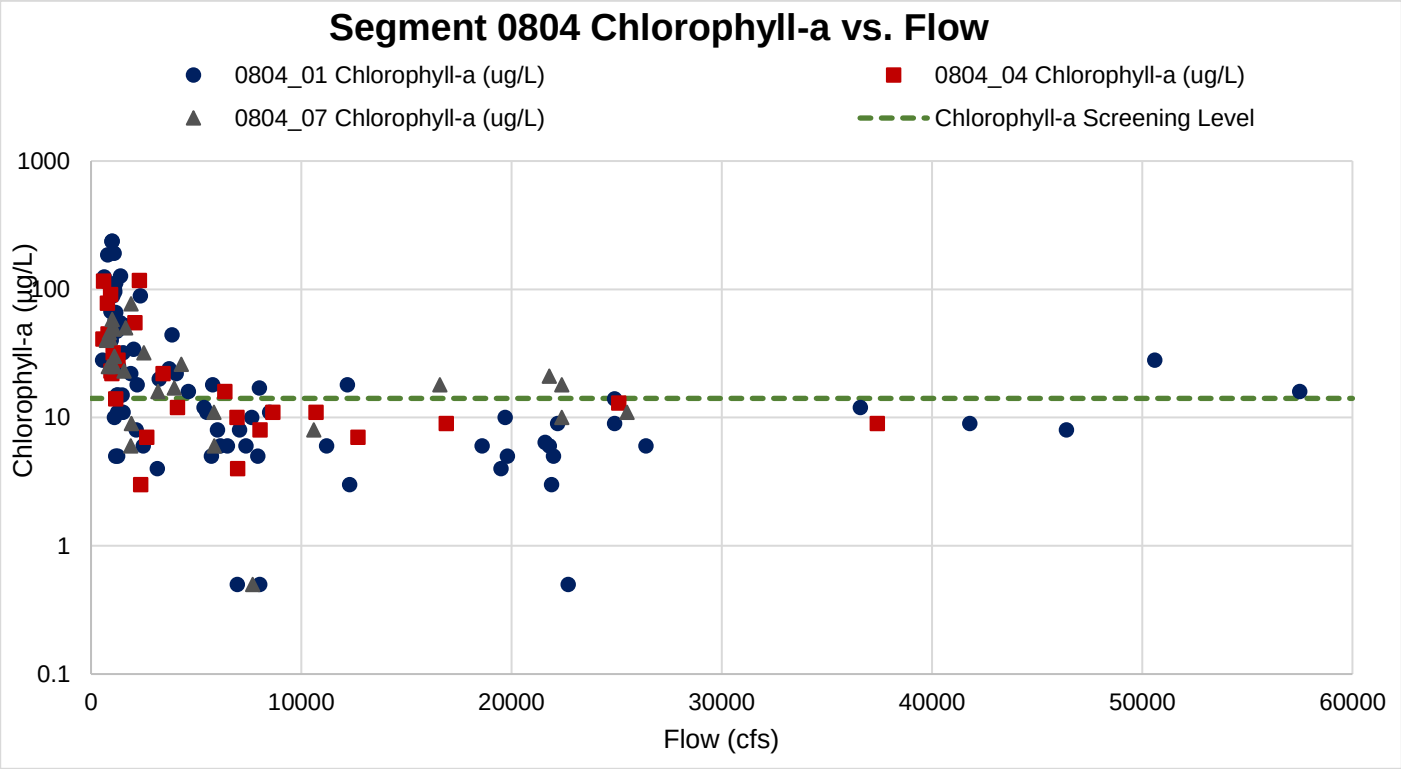

Figure 103: Segment 0804 Chlorophyll-a vs. Flow

Potential Causes of Water Quality Issue

Nitrate and total phosphorus concerns were related to flows. Correlation coefficients for nitrate ranged from -0.580 to -0.678 and from -0.386 to -0.573 for total phosphorus. At lower flows, concentrations of these parameters were elevated then decreased with increasing flow as freshwater inflows from precipitation provide dilution. This pattern is common for effluent-dominated streams. There are several large wastewater treatment facilities upstream of and in this segment. Chlorophyll-*a* values were weakly to moderately correlated to flows as well (correlation coefficients = -0.335 to -0.446). Correlations coefficients with nutrients ranged from 0.679 upstream to 0.142 downstream. This indicates that algal populations are responding to nutrients to varying extents at upstream stations but are likely being washed in from upstream at the downstream stations.

Recommendations for Improving Water Quality

There are no recommendations for decreasing nutrients and chlorophyll-*a* levels at this time. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- TRA Lake Livingston Project
- TRA Technical Services and Basin Planning
- Landowners
- Hodge Family Land
- City of Trinidad
- King Sand and Gravel
- Texas Power and Light Company
- Texas Department of Criminal Justice – Tennessee Colony, Texas
- Crockett Sand & Gravel

0804F – Tehuacana Creek

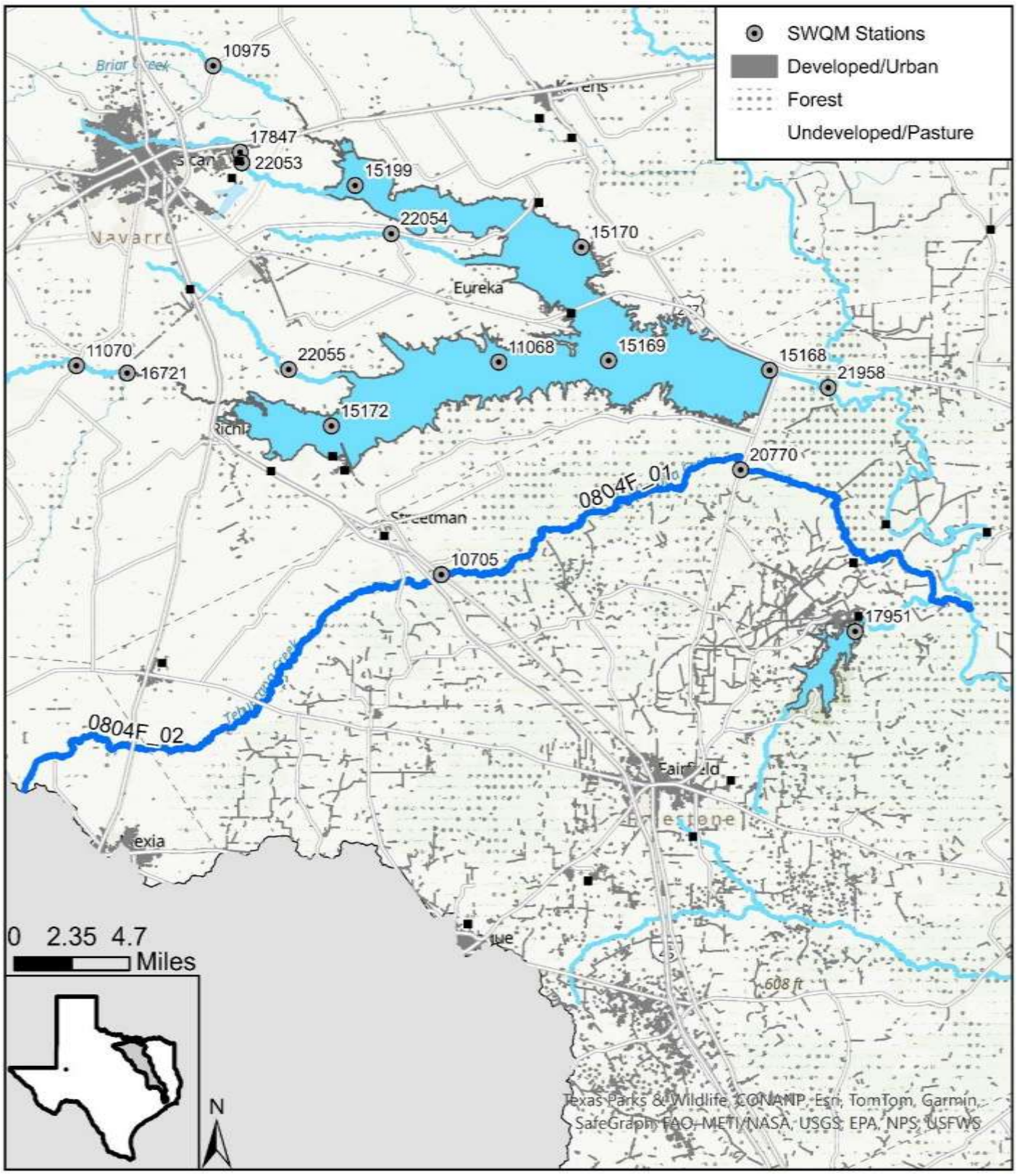

Figure 104: Map of Segment 0804F

Segment Description

This 61-mile unclassified segment runs from the headwaters northwest of Mexia in Limestone County to the confluence with the Trinity River northeast of Fairfield in Freestone County.

Assessment Units and Monitoring Stations

- **0804F_01** - A 27 mile stretch of Tehuacana Creek extending from the confluence with 0804 of the Trinity River up to the confluence with Caney Creek
    - Freshwater stream, intermittent with perennial pools
- **0804F_02** - A 28.4 mile stretch of Tehuacana Creek extending from the confluence with Caney Creek to the upper end of Tehuacana Creek
    - Freshwater stream, intermittent with perennial pools
    - **10705** - Tehuacana Creek 20 meters downstream of SH 75 southeast of Streetman
        - Sampling conducted by Tarrant Regional Water District from 2015 to 2024

Hydrology

Unclassified segment 0804F is a fourth order stream at its most downstream end. There is one USGS flow gage in this segment: 08064700 near Streetman. The median flow at this gage was 1.84 cfs with a range of 0 to 27,100 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 2.84 cfs
- Index Period – 3.98 cfs
- Critical Period – 0.06 cfs

Land Use and Natural Characteristics

The watershed is largely rural with hay, pasture, and grassland and flows through the Northern Blackland Prairie and Southern Post Oak Savanna ecoregions.

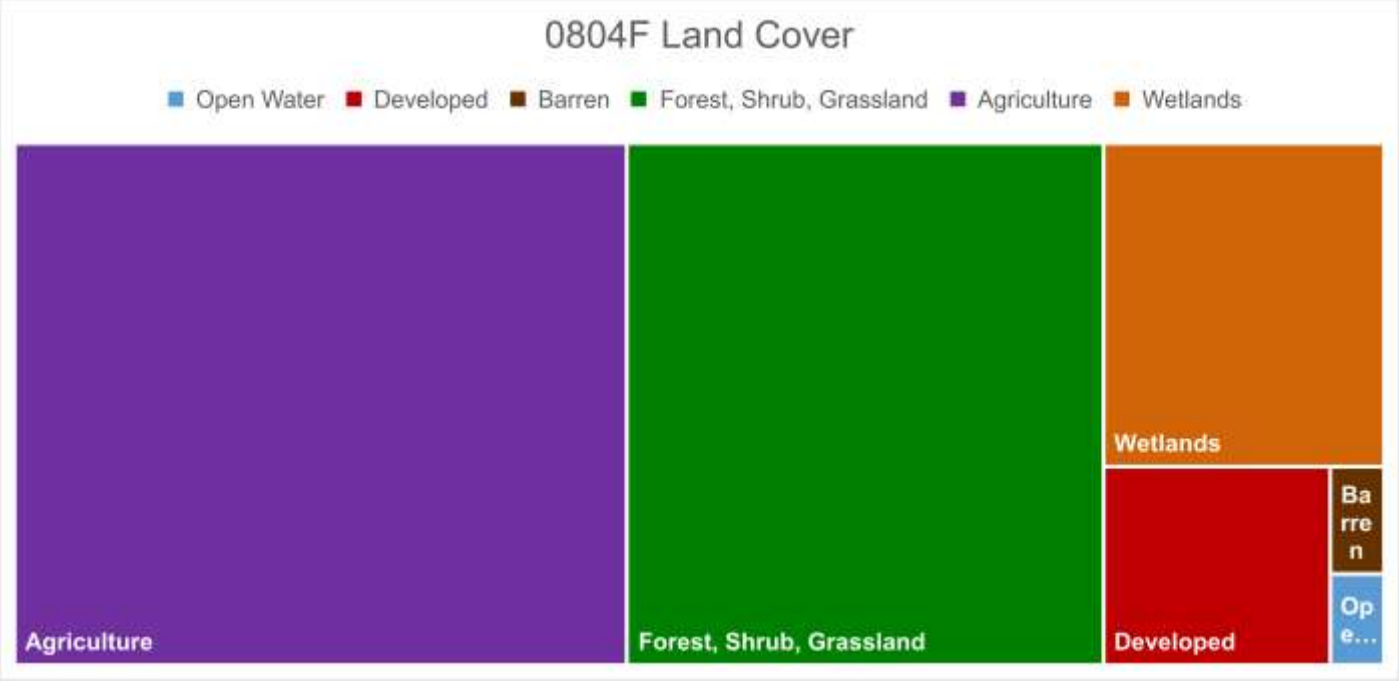

Figure 105: 0804F relative land cover totals

Ongoing Projects

- Routine monitoring of metal, conventional, bacteria, flow, and field parameters twice a year at Station 10705 conducted by Tarrant Regional Water District.

Description of Water Quality Issue

This segment was found to have a concern due to elevated chlorophyll-*a* concentrations in Assessment Unit 0804F_01. Table 36 shows a summary of the TCEQ 2022 Texas Integrated Report. There has been no monitoring in this assessment unit since 2014. However, as shown in Figure 106, 40% of the data were reported above the screening level of 14.1 µg/L.

Table 36: Summary of General Use data for Segment 0804F

	2022 Integrated Report Data
AU	0804F_01
Method	Chlorophyll-*a*
Criteria	14.1
# Data Assessed	2
# Exceedances	0
Mean Exceedances	.
DS Qualifier	ID
LOS	NA
CF	Y
Int LOS	CS

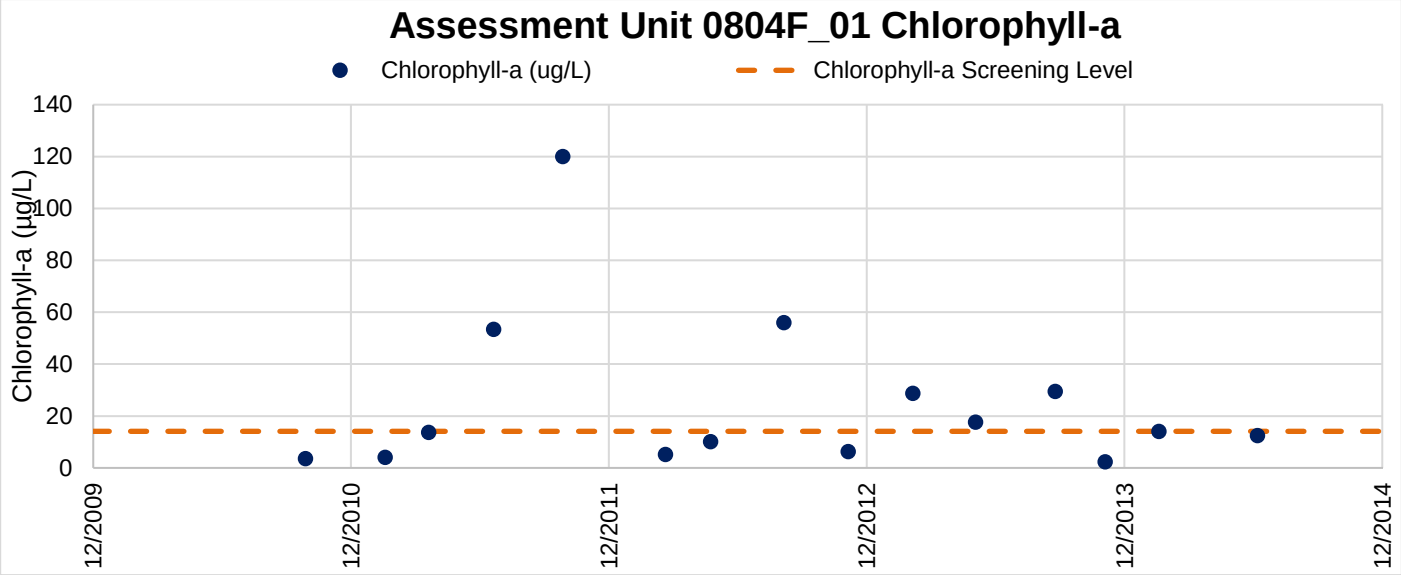

Figure 106: Assessment Unit 0804F_01 Chlorophyll-a

Potential Causes of Water Quality Issue

It is unknown what the cause of this concern may be; however, chlorophyll-*a* was strongly correlated with total Kjeldahl nitrogen (coefficient = 0.775) and had a weak inverse correlation to flow (coefficient = -0.333). The immediate watershed around Station 20770 is woody wetland and pasture. There is evidence of livestock activity in the pastures and in the stream. Decaying matter from the wetland and waste from livestock may be the source of nitrogen that are fueling algal growth. This stream is intermittent with pools. The low flows and pooled nature of the stream may have allowed algal populations to increase due to long residence times.

Recommendations for Improving Water Quality

It is recommended that monitoring take place in this assessment unit to further address this concern. If chlorophyll-*a* are related to livestock activity, landowner education and livestock best management practices such as exclusionary fencing and alternative water sources may help limit nutrient availability for algal growth.

Potential Stakeholders

- Tarrant Regional Water District
- City of Tehuacana
- Landowners
- Freestone Raceway National Track
- Luminant Mining Co, LLC

0804J – Fairfield Lake

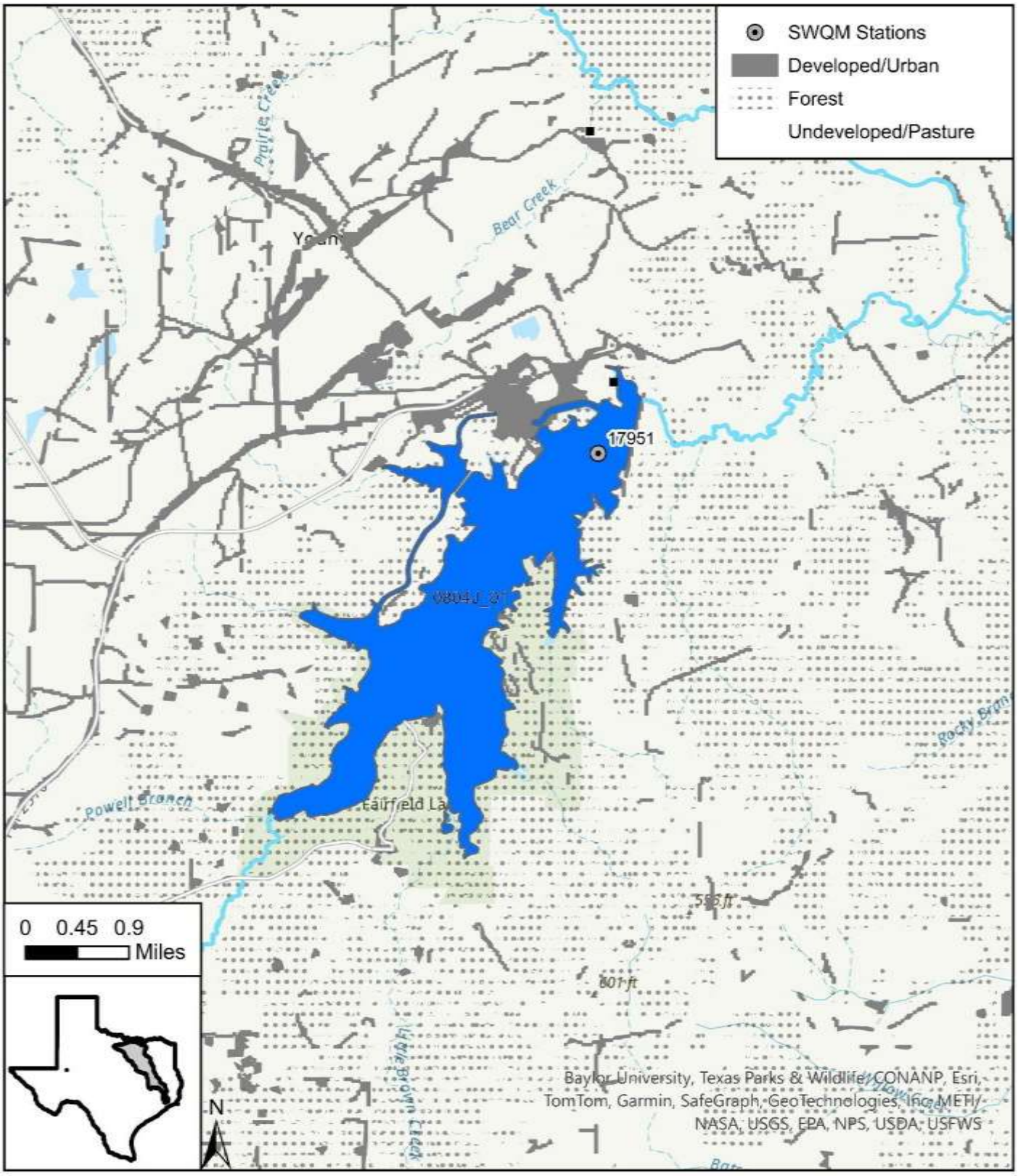

Figure 107: Map of Segment 0804J

Segment Description

This 2,181-acre unclassified reservoir impounds Big Brown Creek in Freestone County.

Assessment Units and Monitoring Stations

- **0804J_01** - Impounded Big Brown Creek in Freestone County
  - **17951** - Fairfield Lake in main pool 751 meters south and 503 meters west of north end of dam 12.9 kilometers northeast of Fairfield
    - Sampling conducted by TCEQ from 2015 and 2024

Hydrology

Unclassified segment 0804J is a reservoir on a third order stream. There is no elevation data available for this reservoir.

Land Use and Natural Characteristics

This reservoir lies within the Southern Post Oak Savanna ecoregion. Much of the watershed consists of hay, pasture, and forest. Development adjacent to the reservoir is related to electricity generation. The remaining land around the reservoir is woody wetland.

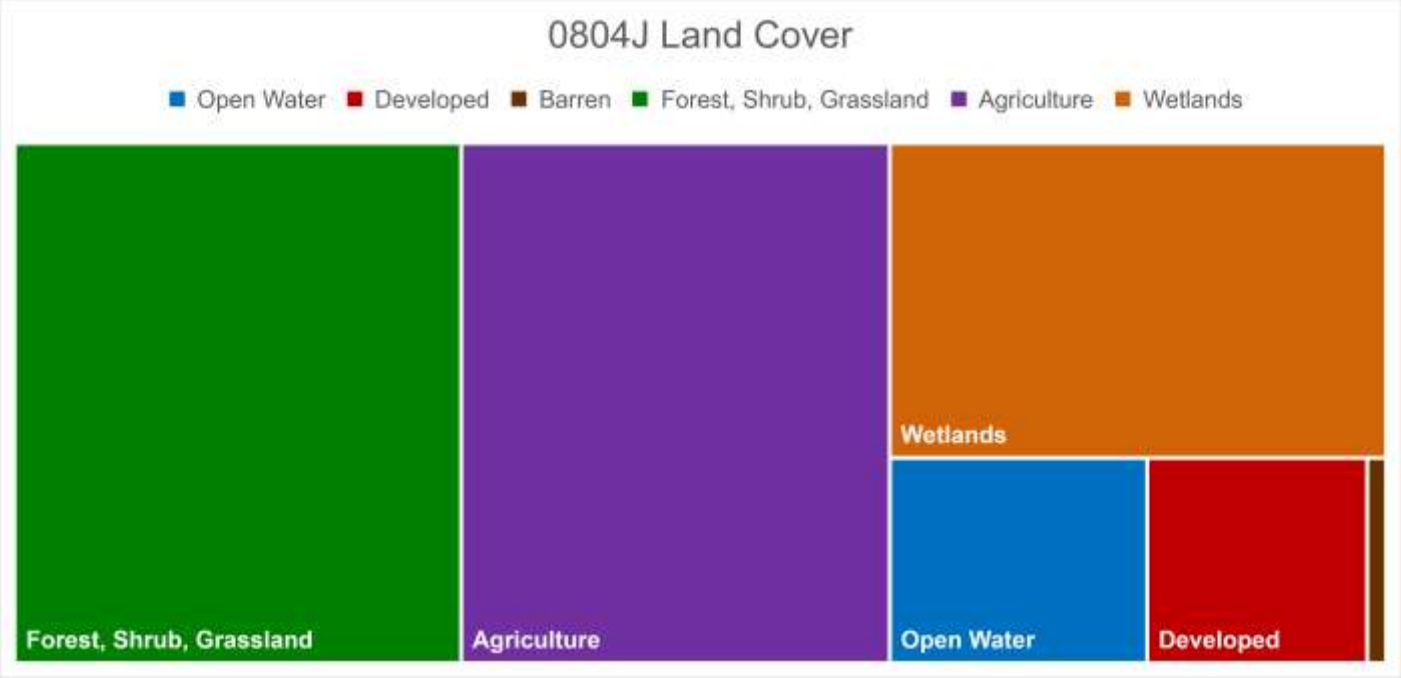

Figure 108: 0804J relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 17951 conducted by TCEQ Region 9.

Description of Water Quality Issue

Concerns for fish kills have been identified in Fairfield Lake (Table 37). Several fish kills have been reported since 2003. The reports indicate that low dissolved oxygen due to algal blooms and water temperature were the cause of these fish kills which has lead Texas Parks and Wildlife to discontinue stocking of this lake in 2015.

Table 37: Summary of General Use data for Segment 0804J

	2022 Integrated Report Data
AU	0804J_01
Method	Fish Kill Reports
Criteria	.
# Data Assessed	0
Mean Data Assessed	.
# Exceedances	.
Mean Exceedances	.
DS Qualifier	OE
LOS	CN
CF	N
Int LOS	CN

Potential Causes of Water Quality Issue

The average chlorophyll-*a* concentration from 2015 to 2022 was 30.2 µg/L with a range of 9.4 to 93.3 µg/L. Dissolved oxygen over this period averaged 8.9 mg/L with a range of 4.6 to 13.2 mg/L. However, this was based on grab sampling as no diel dissolved oxygen monitoring has been conducted during this period. Chlorophyll-*a* was directly correlated with both total Kjeldahl nitrogen and total phosphorus (coefficients = 0.751 and 0.505, respectively). The watershed directly around the lake and the upstream Segment 0804I is a mix of forest, woody wetland, and hay and pastureland. In addition to a domestic wastewater discharger in Segment 0804I, livestock and wildlife activity may have contributed nutrients to the reservoir which are leading to algal blooms.

Recommendations for Improving Water Quality

Limiting nutrients flowing into the reservoir may help reduce algal blooms. Limiting nutrients from wastewater effluent may not be possible in the short term because most treatment facilities do not yet have advanced nutrient removal technologies. Limiting nutrients from wildlife sources is also difficult in many cases. Nutrients from livestock sources may be the best way to reduce nutrients and algal blooms. Landowner education and livestock best management practices such as exclusionary fencing and alternative water sources may be beneficial.

Potential Stakeholders

- Big Brown Mines
- Encore Electric

0804L – Town Creek

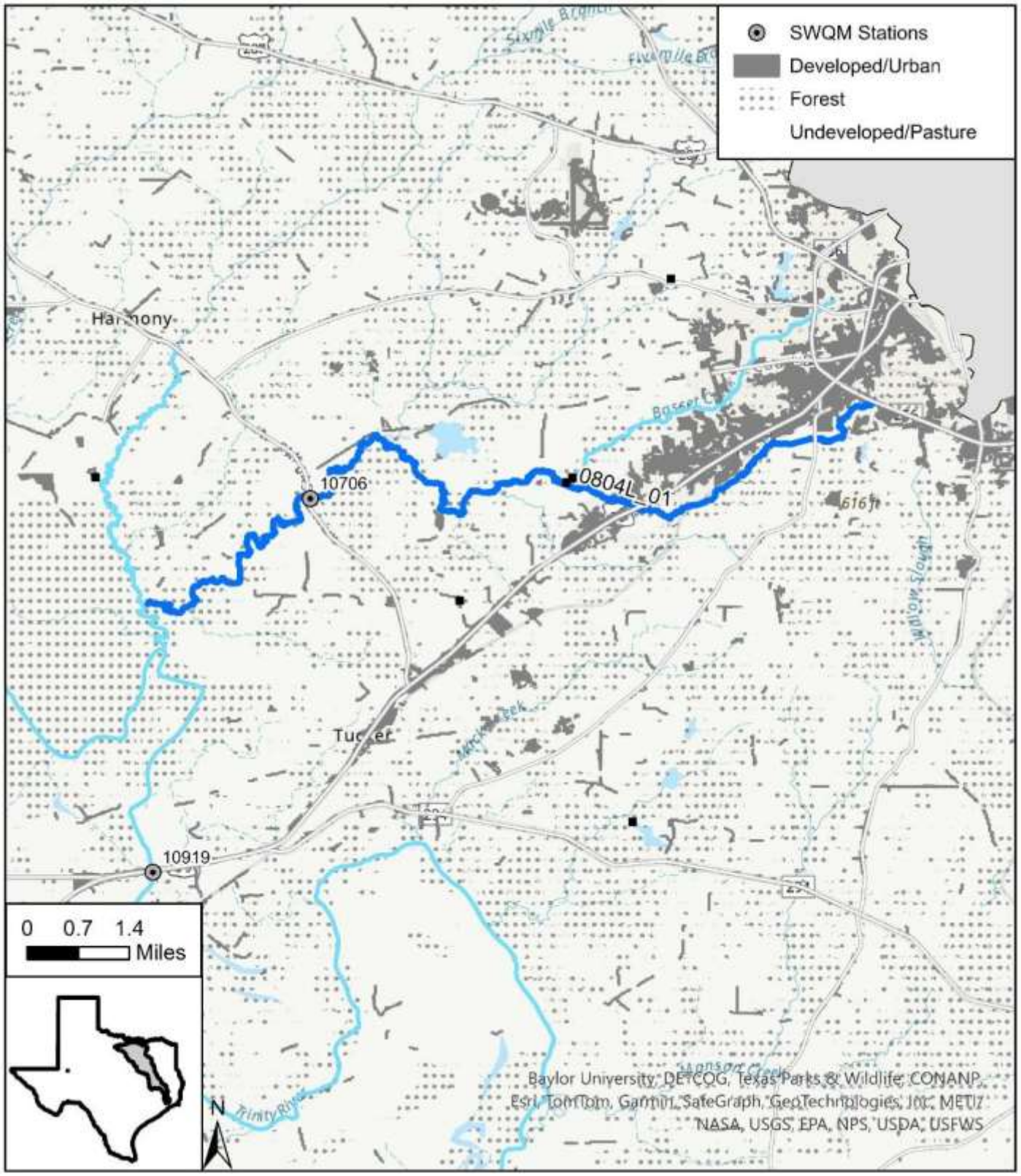

Figure 109: Map of Segment 0804L

Segment Description

This 16-mile unclassified segment runs from SH 256 in Palestine to the confluence with Keechi Creek.

Assessment Units and Monitoring Stations

- **0804L_01** - Perennial stream from the confluence with Keechi Creek upstream to SH 256
  - Perennial freshwater stream
  - **10706** - Town Creek 73 meters upstream of FM 645 southwest of Palestine
    - Sampling conducted by TRA from 2015 to 2024

Hydrology

Unclassified segment 0804L is a fourth order stream at its most downstream end. Based on sampling at Station 10706, the median flow was 11 cfs with a range of 4.1 to 225 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 12 cfs
- Index Period – 15 cfs
- Critical Period – 6.75 cfs

Land Use and Natural Characteristics

The watershed is developed to the north and rural to the south with pasture, hay, and grassland with some forested areas. It flows through the Tertiary Uplands and Northern Post Oak Savanna ecoregions.

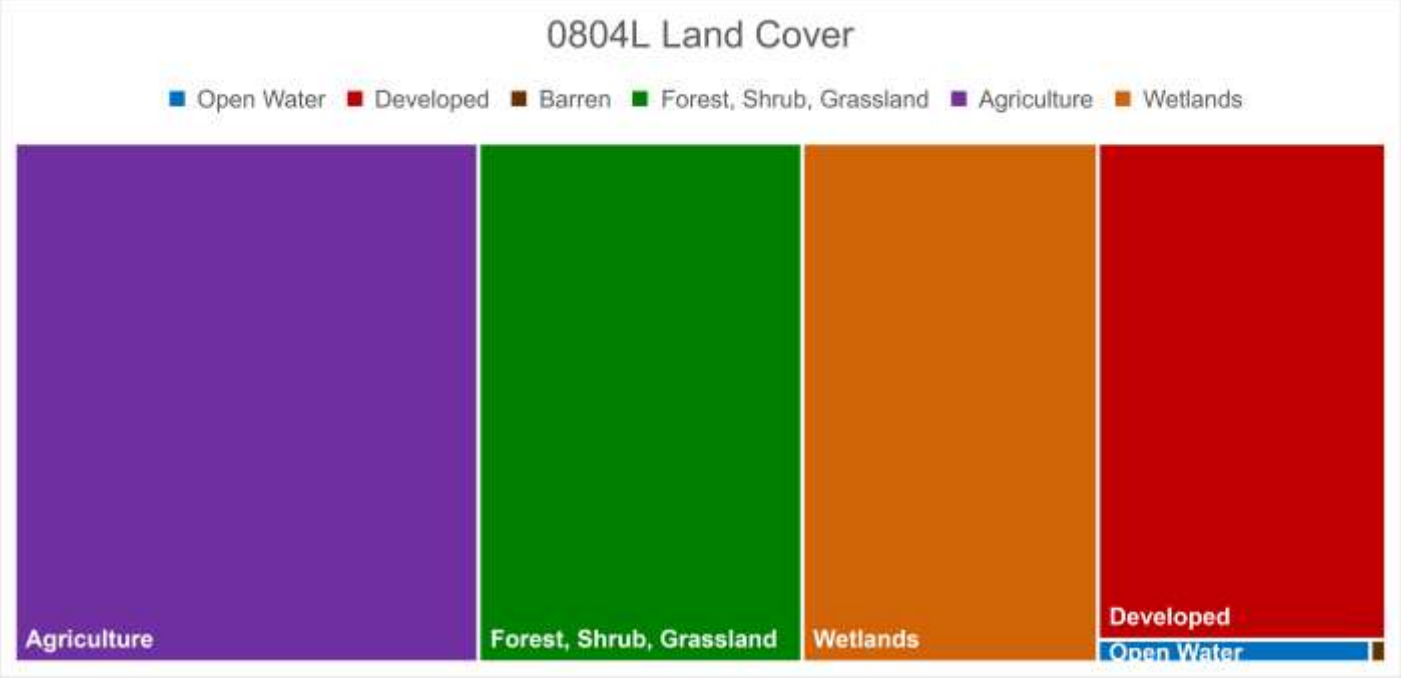

Figure 110: 0804L relative land cover totals

Ongoing Projects

Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 10706 conducted by Trinity River Authority.

Description of Water Quality Issue

Concerns were identified for total phosphorus and nitrate in this segment. Table 38 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, these concerns may still exist as 88% of the total phosphorus data exceeded the screening level of 0.69 mg/L and 59% of the nitrate data exceeded the screening level of 1.95 mg/L (Figure 111).

Table 38: Summary of General Use data for Segment 0804L

	2022 Integrated Report Data		BHR POR Data	
AU	0804L_01	0804L_01	0804L_01	0804L_01
Method	Total phosphorus	Nitrate	Total phosphorus	Nitrate
Criteria	0.69	1.95	0.69	1.95
# Data Assessed	26	26	26	27
# Exceedances	15	14	23	16
Mean Exceedances	4.26	5.8	4.01	6.23
DS Qualifier	AD	AD	AD	AD
LOS	CS	CS	CS	CS
CF	N	N	.	.
Int LOS	CS	CS	.	.

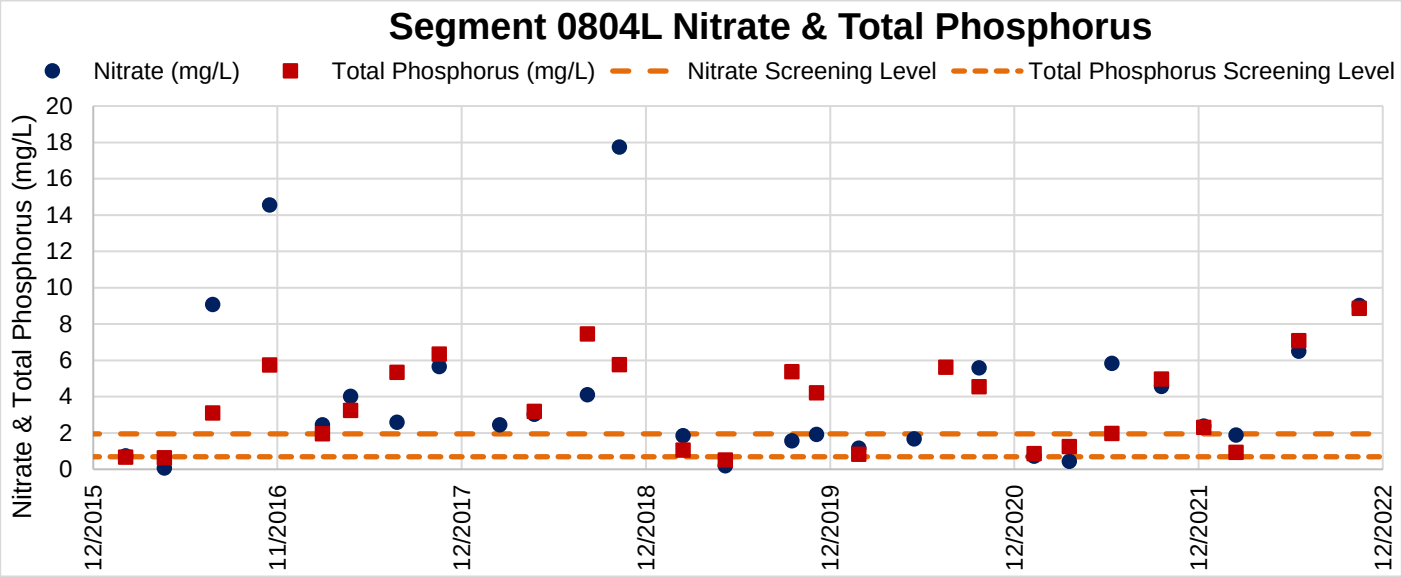

Figure 111: Segment 0804L Nitrate & Total Phosphorus

Potential Causes of Water Quality Issue

Concerns for nitrate and total phosphorus were related to upstream wastewater treatment facilities. There was a weak inverse correlation to flow for nitrate and a moderate correlation for total phosphorus (coefficients = -0.285 and -0.409, respectively). This pattern is common in streams that are effluent dominated. The relatively weak correlations between these nutrients and flow is expected because the wastewater treatment facilities are relatively small and are located several miles upstream from the monitoring station.

Recommendations for Improving Water Quality

Most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- TRA Technical Services and Basin Planning
- City of Palestine
- Sanderson Farms Palestine Processing Plant
- Landowners

0805 – Upper Trinity River

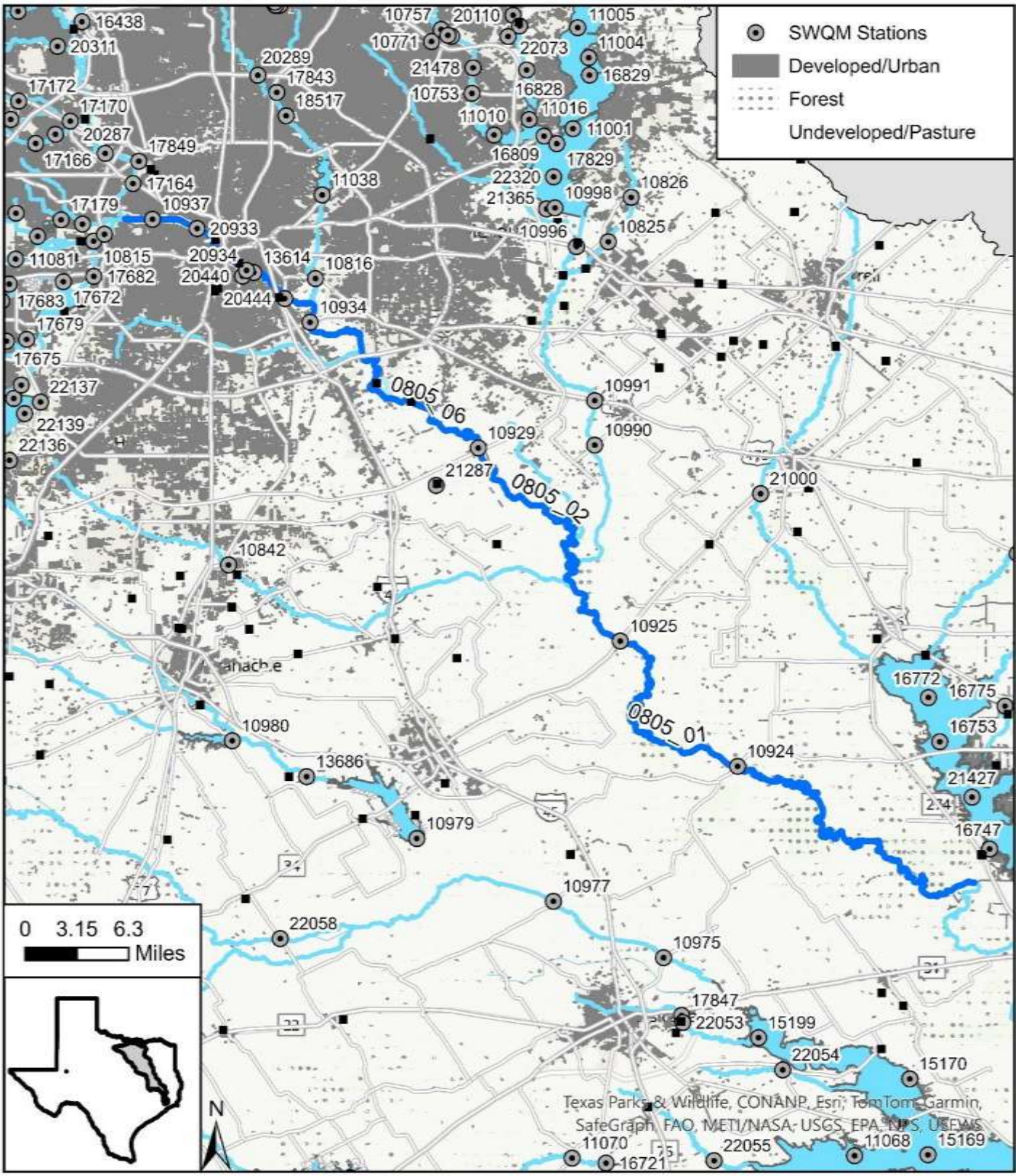

Figure 112: Map of Segment 0805

Segment Description

This 97-mile segment runs from a point immediately upstream of the confluence of the Elm Fork Trinity River in Dallas County to a point immediately upstream of the confluence of the Cedar Creek Reservoir discharge canal in Henderson/Navarro County.

Assessment Units and Monitoring Stations

- **0805_01** - From confluence of the Cedar Creek Reservoir discharge canal upstream to confluence of Smith Creek
  - Perennial freshwater stream
  - **10924** - Trinity River 24 meters downstream of FM 85 west of Seven Points
    - Sampling conducted by TRA from 2020 to 2022
- **0805_02** - From confluence of Smith Creek upstream to confluence of Tenmile Creek
  - Perennial freshwater stream
  - **10925** - Trinity River 50 meters downstream of SH 34 northeast of Ennis
    - Sampling conducted by TRA from 2015 to 2024
- **0805_03** - From the confluence of Fivemile Creek upstream to the confluence of Cedar Creek
  - Perennial freshwater stream
  - **10934** - Trinity River at South Loop SH 12 south of Dallas
    - Sampling conducted by TRA from 2015 to 2024
  - **20444** - Upper Trinity River 190 meters downstream of South Central Expressway/SH 310 and 105 meters upstream of railroad bridge
    - Sampling conducted by Dallas from 2015 to 2024
- **0805_04** - From confluence of Cedar Creek upstream to confluence of Elm Fork Trinity River
  - Perennial freshwater stream
  - **10937** - Trinity River 46 meters upstream of North Westmoreland Road in Dallas
    - Sampling conducted by TRA from 2015 to 2024
  - **20933** - Upper Trinity River at Sylvan Avenue in Dallas
    - Sampling conducted by Dallas from 2015 to 2024
  - **20934** - Upper Trinity River at Santa Fe Avenue in Dallas under Dallas Area Rapid Transit rail bridge
    - Sampling conducted by Dallas from 2015 to 2024
- **0805_06** - From confluence of Tenmile Creek upstream to confluence of Fivemile Creek
  - Perennial freshwater stream
  - **10929** – Trinity River immediately downstream of Malloy Bridge Road east of Wilmer
    - Sampling conducted by TRA in 2023 and 2024

Hydrology

Segment 0805 is a sixth order stream. There are three USGS flow gages in this segment: 08057000 at Dallas, 08057410 below Dallas, and 08062500 near Rosser. The median flow at these gages ranged from 1,060 cfs at the upstream Dallas gage to 1,730 cfs at the downstream Rosser gage with a range of 186 to 47,000 cfs at these gages. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these three gages are listed below.

- Non-Index Period – 1,055 to 1,610 cfs
- Index Period – 2,370 to 3,600 cfs
- Critical Period – 556.5 to 964.5 cfs

Figure 113: Lock and dam on the Trinity River upstream of SH 34

Land Use and Natural Characteristics

The upper 15 miles of the watershed are highly urbanized and the lower 82 miles are mostly rural crop land and pasture. The flow in this section can be almost 100% wastewater effluent from the Dallas-Fort Worth Metroplex during the hot, dry summer months and periods of drought. Prior to the development of the large regional wastewater treatment facilities found along this segment, the Trinity River was known to go dry in the summer. The wastewater treatment facilities release high quality effluent that has provided the flow necessary for downstream aquatic life. Water here is generally very turbid as it flows through the Northern Blackland Prairie and into Northern Post Oak Savanna.

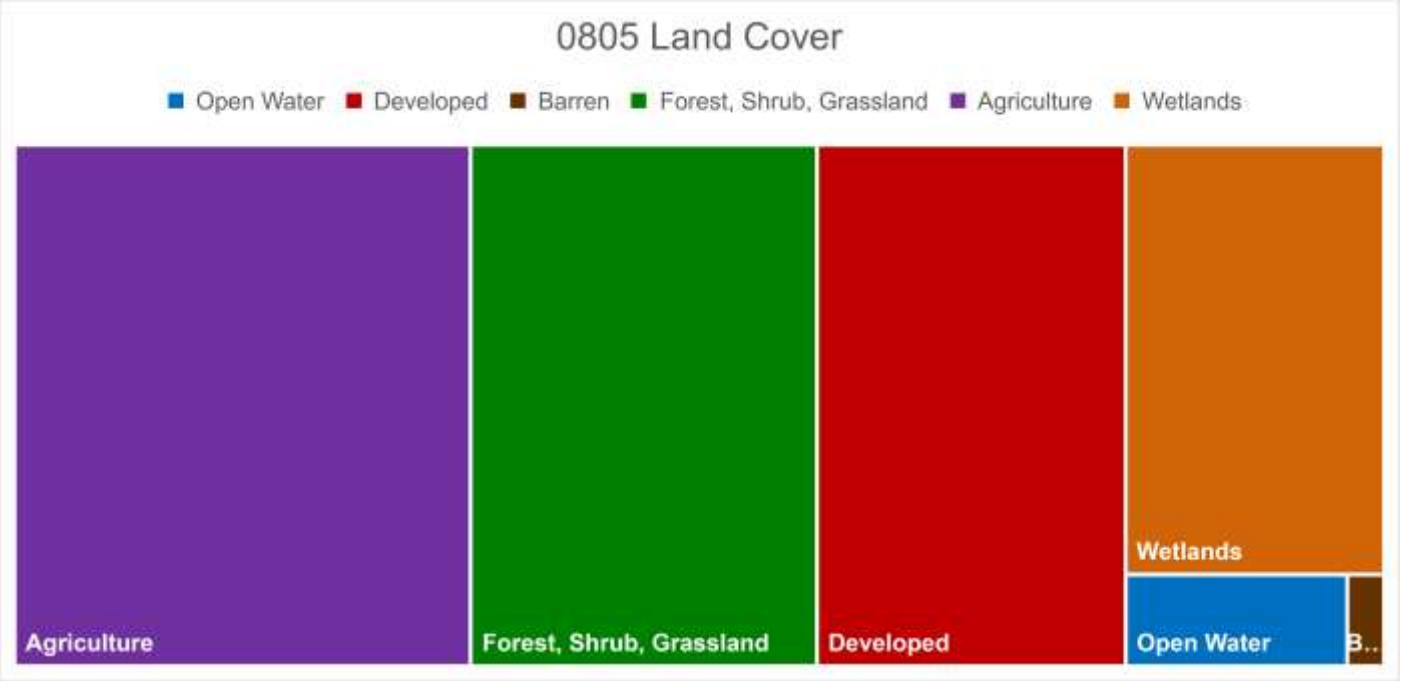

Figure 114: 0805 relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of flow and field parameters at Station 17840 conducted by TCEQ Region 4.
- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 21287 conducted by Trinity River Authority.
- Routine quarterly monitoring of conventional, bacteria, flow, and field parameters and metals twice a year at Station 10925 conducted by Trinity River Authority.
- Routine quarterly monitoring of conventional, bacteria, flow, and field parameters and metals twice a year at Station 10934 conducted by Trinity River Authority.
- Routine quarterly monitoring of bacteria, flow, and field parameters at Station 20444 conducted by City of Dallas.
- Routine quarterly monitoring of conventional, bacteria, flow, and field parameters and metals twice a year at Station 10937 conducted by Trinity River Authority.
- Routine quarterly monitoring of bacteria, flow, and field parameters at Station 20933 conducted by City of Dallas.
- Routine quarterly monitoring of bacteria, flow, and field parameters at Station 20934 conducted by City of Dallas.
- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 10929 conducted by Trinity River Authority.

Description of Water Quality Issue

Concerns were identified for total phosphorus, nitrate, and chlorophyll-*a* at several assessment units in this segment. Table 39 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, these concerns may still exist. 70% of nitrate data in Assessment Units 0805_01, 0805_02, 0805_03, and 0805_04 exceeded the screening level of 1.95 mg/L (Figure 115). 49% of total phosphorus data in Assessment Units 0805_01 and 0805_02 exceeded the screening level of 0.69 mg/L (Figure 116). 63% of chlorophyll-*a* data in Assessment Units 0805_01 and 0805_02 exceeded 14.1 µg/L (Figure 117). There is no recent monitoring for Assessment 0805_06 so these concerns may be carried forward until monitoring is conducted.

Table 39: Summary of General Use data for Segment 0805

	2022 Integrated Report Data						
AU	0805_01	0805_01	0805_01	0805_02	0805_02	0805_02	0805_03
Method	Nitrate	Chlorophyll-*a*	Total phosphorus	Total phosphorus	Nitrate	Chlorophyll-*a*	Nitrate
Criteria	1.95	14.1	0.69	0.69	1.95	14.1	1.95
# Data Assessed	0	0	0	27	27	27	27
# Exceedances	.	.	.	14	21	16	15
Mean Exceedances	.	.	.	1.24	6.86	24.19	8.26
DS Qualifier	ID	ID	ID	AD	AD	AD	AD
LOS	NA	NA	NA	CS	CS	CS	CS
CF	Y	Y	Y	N	N	N	N
Int LOS	CS	CS	CS	CS	CS	CS	CS

Table 39 continued

	2022 Integrated Report Data			BHR POR Data		
AU	0805_04	0805_06	0805_06	0805_01	0805_01	0805_01
Method	Nitrate	Total phosphorus	Nitrate	Nitrate	Chlorophyll-*a*	Total phosphorus
Criteria	1.95	0.69	1.95	1.95	14.1	0.69
# Data Assessed	27	0	0	12	12	11
# Exceedances	17	.	.	9	8	6
Mean Exceedances	7.14	.	.	5.89	24.13	1
DS Qualifier	AD	ID	ID	AD	AD	AD
LOS	CS	NA	NA	CS	CS	CS
CF	N	Y	Y	.	.	.
Int LOS	CS	CS	CS	.	.	.

Table 39 continued

	BHR POR Data						
AU	0805_02	0805_02	0805_02	0805_03	0805_04	0805_06	0805_06
Method	Total phosphorus	Nitrate	Chlorophyll-*a*	Nitrate	Nitrate	Total phosphorus	Nitrate
Criteria	0.69	1.95	14.1	1.95	1.95	0.69	1.95
# Data Assessed	28	28	28	28	28	1	1
# Exceedances	13	21	17	18	19	0	0
Mean Exceedances	1.07	6.06	24.06	6.9	5.9	.	.
DS Qualifier	AD	AD	AD	AD	AD	ID	ID
LOS	CS	CS	CS	CS	CS	NA	NA
CF	.	.	.	.	.	.	.
Int LOS	.	.	.	.	.	.	.

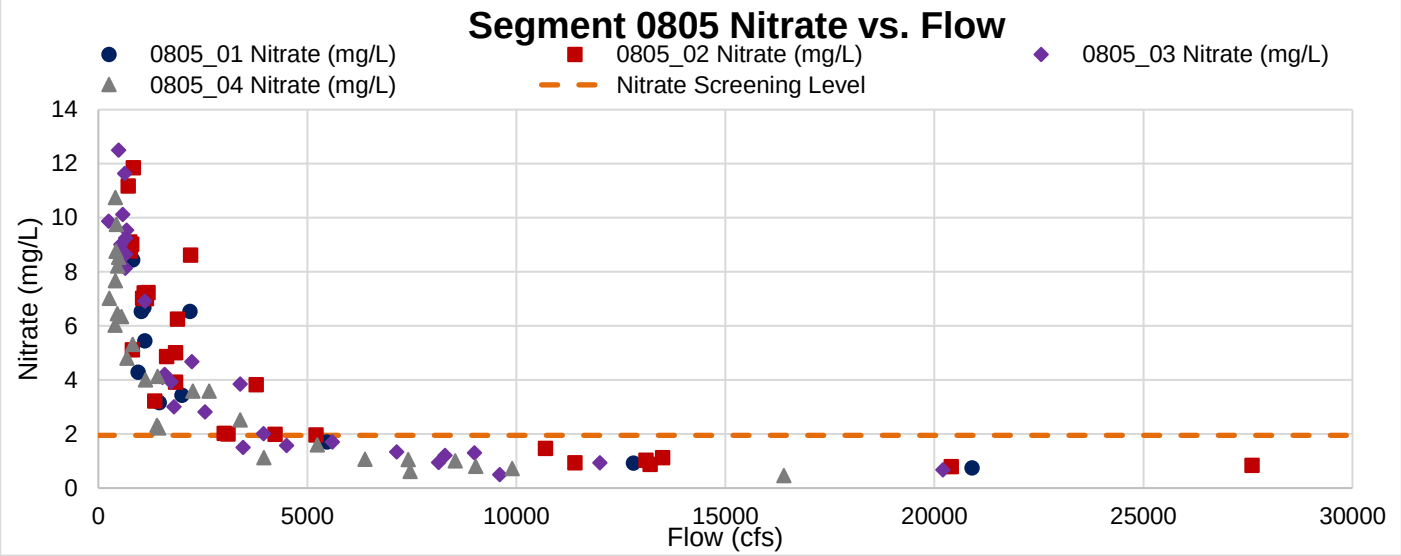

Figure 115: Segment 0805 Nitrate vs. Flow

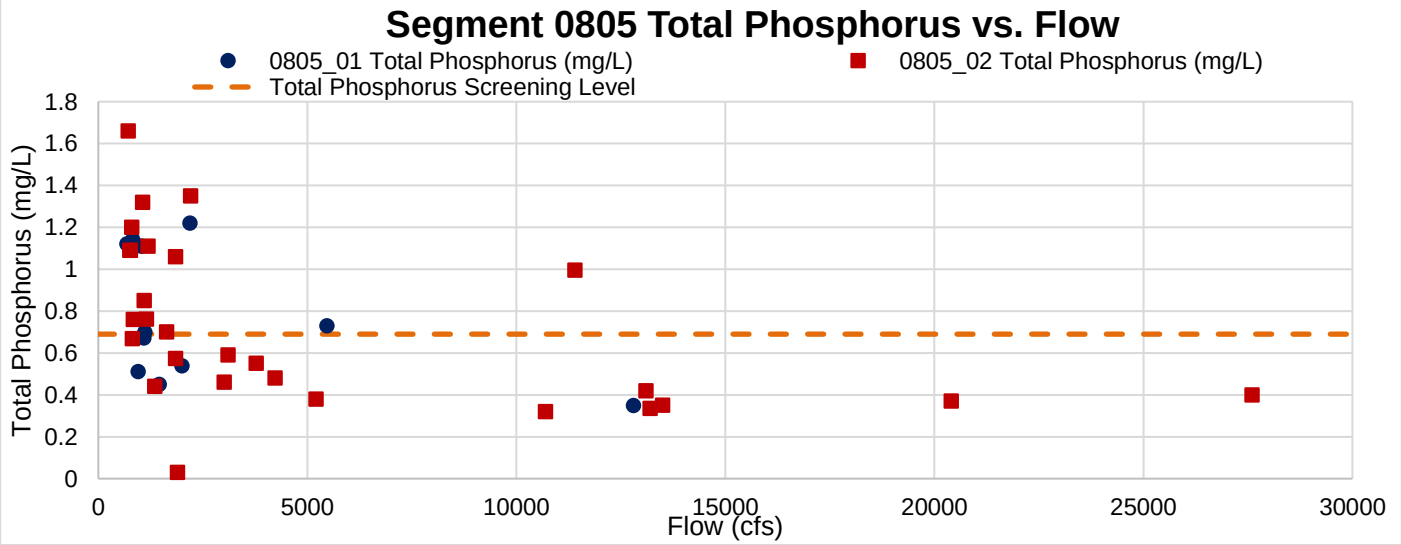

Figure 116: Segment 0805 Total Phosphorus vs. Flow

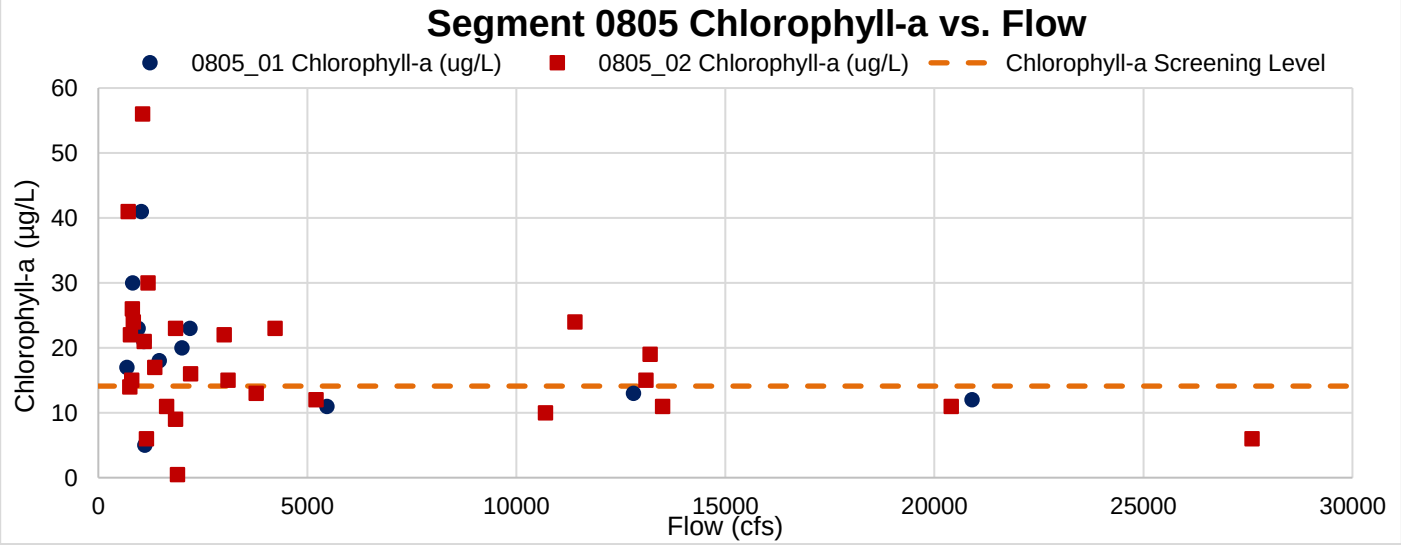

Figure 117: Segment 0805 Chlorophyll-a vs. Flow

Potential Causes of Water Quality Issue

These concerns are related to flow. Correlation coefficients for nitrate were strong, ranging from -0.679 to -0.749. Total phosphorus and chlorophyll-*a* were moderately correlated to flow with coefficients ranging from -0.327 to -0.465. At lower flows, concentrations of these parameters were higher and decreased with increasing flow due to dilution from precipitation inflows. This pattern for nutrients is common for effluent-dominated streams; there are several large wastewater treatment facilities upstream of and in this segment. For chlorophyll-*a*, the correlations to flow were found at the downstream Assessment Units 0805_02 and 0805_01 which is expected due to inflows from various tributaries and the additional time for algae to use nutrients in the river and increase their populations.

Recommendations for Improving Water Quality

There are no recommendations for decreasing nutrients and chlorophyll-*a* levels at this time. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- City of Dallas
- TRA Technical Services and Basin Planning
- KDC McLemmon Investments One LP
- Central Wastewater Treatment Plant
- Dallas County Nature Preserve
    - McCommas Bluff
    - Joppa Preserve
- Trinity River Audubon Center
- McCommas Bluff Landfill
- City of Hutchins
- D Bar B Water Wastewater Supply
- Dallas Hunting and Fishing Club
- Landowners
- Arcosa Aggregates – Cottonwood
- City of Mankin

0806 – West Fork Trinity River Below Lake Worth

Segment Description

See Aquatic Life Use Segment 0806 Segment Description.

Hydrology

See Aquatic Life Use Segment 0806 Hydrology.

Land Use and Natural Characteristics

See Aquatic Life Use Segment 0806 Land Use and Natural Characteristics.

Ongoing Projects

See Aquatic Life Use Segment 0806 Ongoing Projects.

Description of Water Quality Issue

Concerns for elevated levels of chlorophyll-*a* were identified in Assessment Unit 0806_01. Table 40 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, these concerns may still exist as 69% of the chlorophyll-*a* values were reported above the screening level of 14.1 µg/L.

Table 40: Summary of General Use data for Segment 0806

	2022 Integrated Report Data	BHR POR Data		
AU	0806_01	0806_01 Station 10938	0806_01 Station 17368	0806_01 Combined
Method	Chlorophyll-*a*	Chlorophyll-*a*	Chlorophyll-*a*	Chlorophyll-*a*
Criteria	14.1	14.1	14.1	14.1
# Data Assessed	2	9	4	13
# Exceedances	1	6	3	9
Mean Exceedances	18.7	29.45	31.73	30.21
DS Qualifier	ID	LD	LD	AD
LOS	NA	CS	CS	CS
CF	Y	.	.	.
Int LOS	CS	.	.	.

Potential Causes of Water Quality Issue

It is likely that algal populations are being washed into this segment from upstream reservoirs, ponds, and tributaries. There are no direct correlations between chlorophyll-*a* and nutrients in Assessment Unit 0806_01 so it does not appear that nutrient availability were impacting chlorophyll-*a* levels. The river upstream of these sampling stations is channelized and has a series of low water dams that slow down the movement of water under low and normal flows. The channel is wide and lacks shading from riparian vegetation. These conditions – ample sunlight and long residence times – likely allowed algal populations to increase to these levels.

Recommendations for Improving Water Quality

Algal populations in the Trinity River may be difficult to control as there are multiple reservoirs, ponds, and streams that contribute to the system by Segment 0806.

Potential Stakeholders

See Aquatic Life Use Segment 0806 Potential Stakeholders.

0809B – Ash Creek

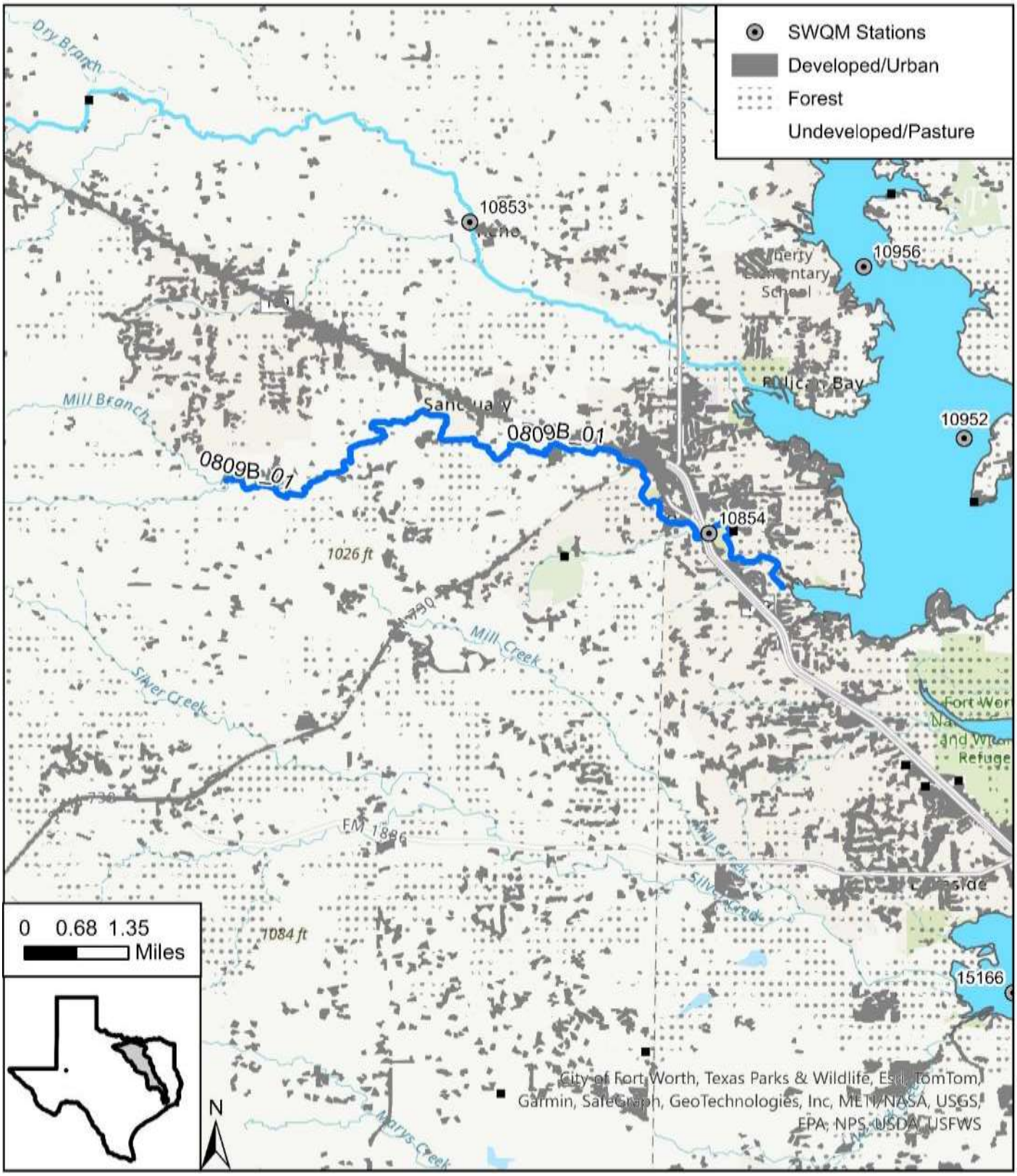

Figure 118: Map of Segment 0809B

Segment Description

This 10.5-mile unclassified segment runs from the confluence with Mill Branch in Parker County to normal pool elevation of Eagle Mountain Reservoir in Tarrant County.

Assessment Units and Monitoring Stations

- **0809B_01** - From Eagle Mountain Lake in Tarrant County upstream to its confluence with Mill Branch in Parker County
    - Freshwater stream, intermittent with perennial pools
    - **10854** - Ash Creek 56 meters downstream of SH 199 northbound service road
        - Sampling conducted by Tarrant Regional Water District from 2015 to 2024

Hydrology

Unclassified segment 0809B is a second order stream at its most downstream end. Based on sampling at Station 10854, the median flow was 3.6 cfs with a range of 0.1 to 1,455 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 3.15 cfs
- Index Period – 3.5 cfs
- Critical Period – 4 cfs

Land Use and Natural Characteristics

The downstream end flows through the City of Azle but the remainder of the stream flows through grassland and forested areas.

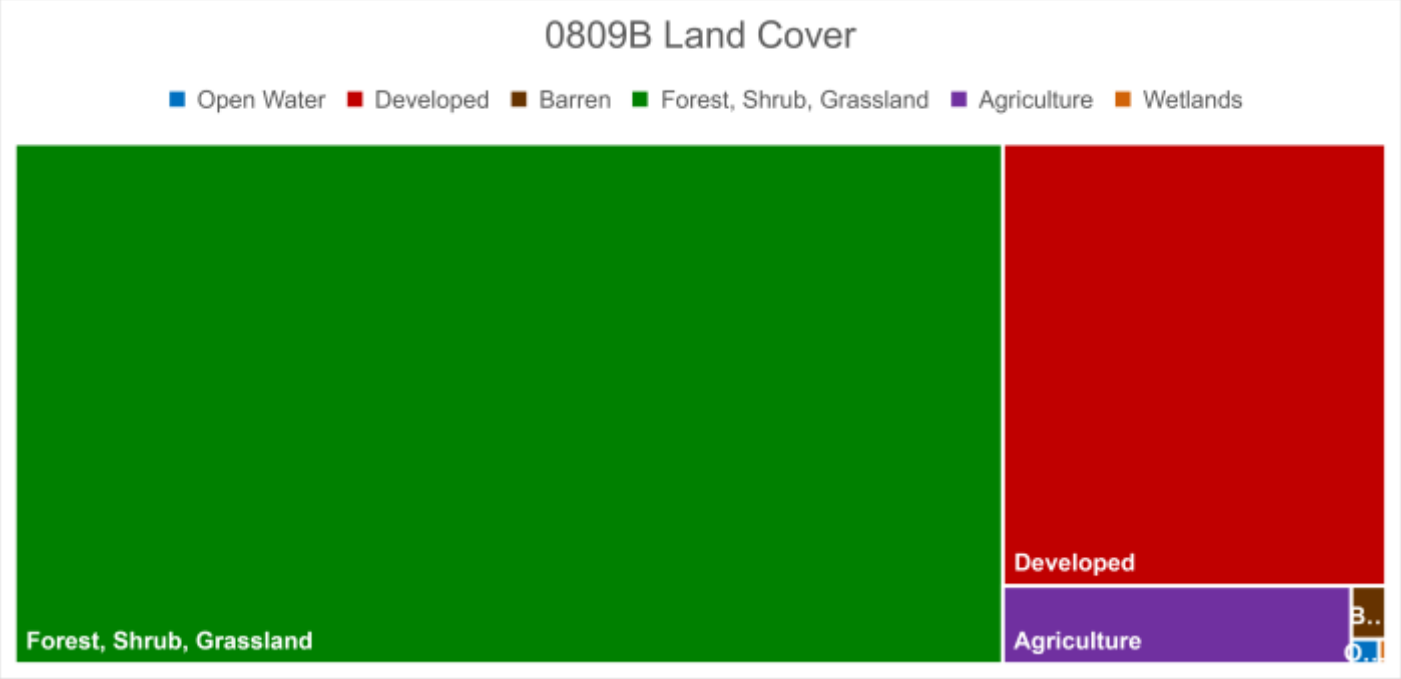

Figure 119: 0809B relative land cover totals

Ongoing Projects

- Routine monthly monitoring of conventional, bacteria, flow, and field parameters at Station 10854 conducted by Tarrant Regional Water District.

Description of Water Quality Issue

This segment was found to have a concern due to elevated nitrate concentrations. Table 41 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, this concern may still exist as 49% of the data exceeded the screening level of 1.95 mg/L (Figure 120). Nitrate plus nitrite data is used for the assessment when nitrate as a single species is not available. In most cases, nitrite concentrations are either low or non-detectable.

Table 41: Summary of General Use data for Segment 0809B

	2022 Integrated Report Data	BHR POR Data
AU	0809B_01	0809B_01
Method	Nitrate	Nitrate
Criteria	1.95	1.95
# Data Assessed	64	73
# Exceedances	28	36
Mean Exceedances	3.17	3.3
DS Qualifier	AD	AD
LOS	CS	CS
CF	N	.
Int LOS	CS	.

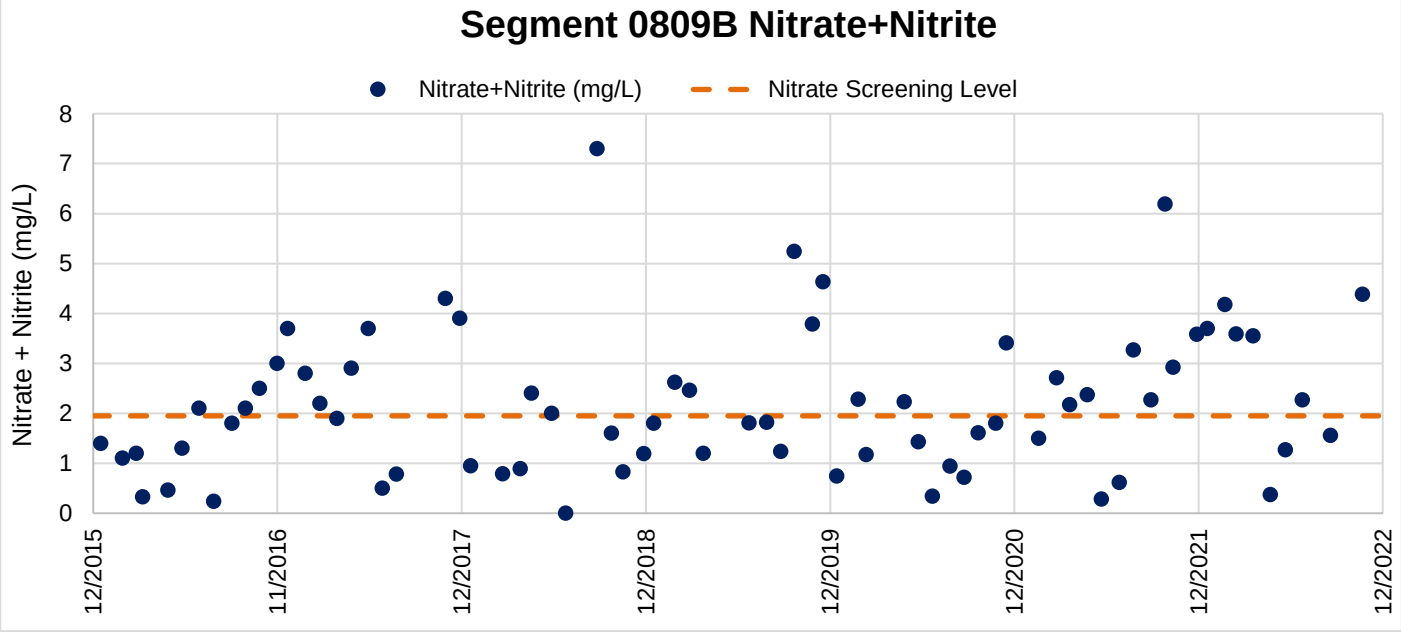

Figure 120: Segment 0809B Nitrate + Nitrite

Potential Causes of Water Quality Issue

There were no strong correlations between nitrate and flow or days since precipitation which indicates that the concern may be due to a mix of point and runoff related sources. There is a discharge point for the City of Azle on Reynolds Branch which confluences with Ash Creek just upstream of Station 10854. Wastewater treatment facilities typically release elevated levels of nutrients as most wastewater treatment facilities do not yet have advanced nutrient removal systems. Nutrient levels in receiving streams can become elevated especially during drought periods due to effluent releases but will generally decrease during elevated flows via dilution from precipitation. However, because nitrate levels were consistently high, runoff from either over-irrigation or precipitation could have washed nitrate into the stream from animal waste or agricultural or residential fertilizer use.

Recommendations for Improving Water Quality

There are no recommendations for decreasing nutrients from wastewater treatment facilities at this time. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. If these concerns are predominantly related to effluent, they will likely remain until such technology is widely available and cost effective. However, landowner and homeowner education, fertilizer best management practices, and livestock best management practices may help reduce nitrate levels from fertilizer and livestock sources.

Potential Stakeholders

- Tarrant Regional Water District
- Landowners
- Homeowners and homeowners associations
- City of Sanctuary
- The Orchard Event Venue
- Wise Ready Mix
- City of Azle

0810 – West Fork Trinity River Below Bridgeport Reservoir

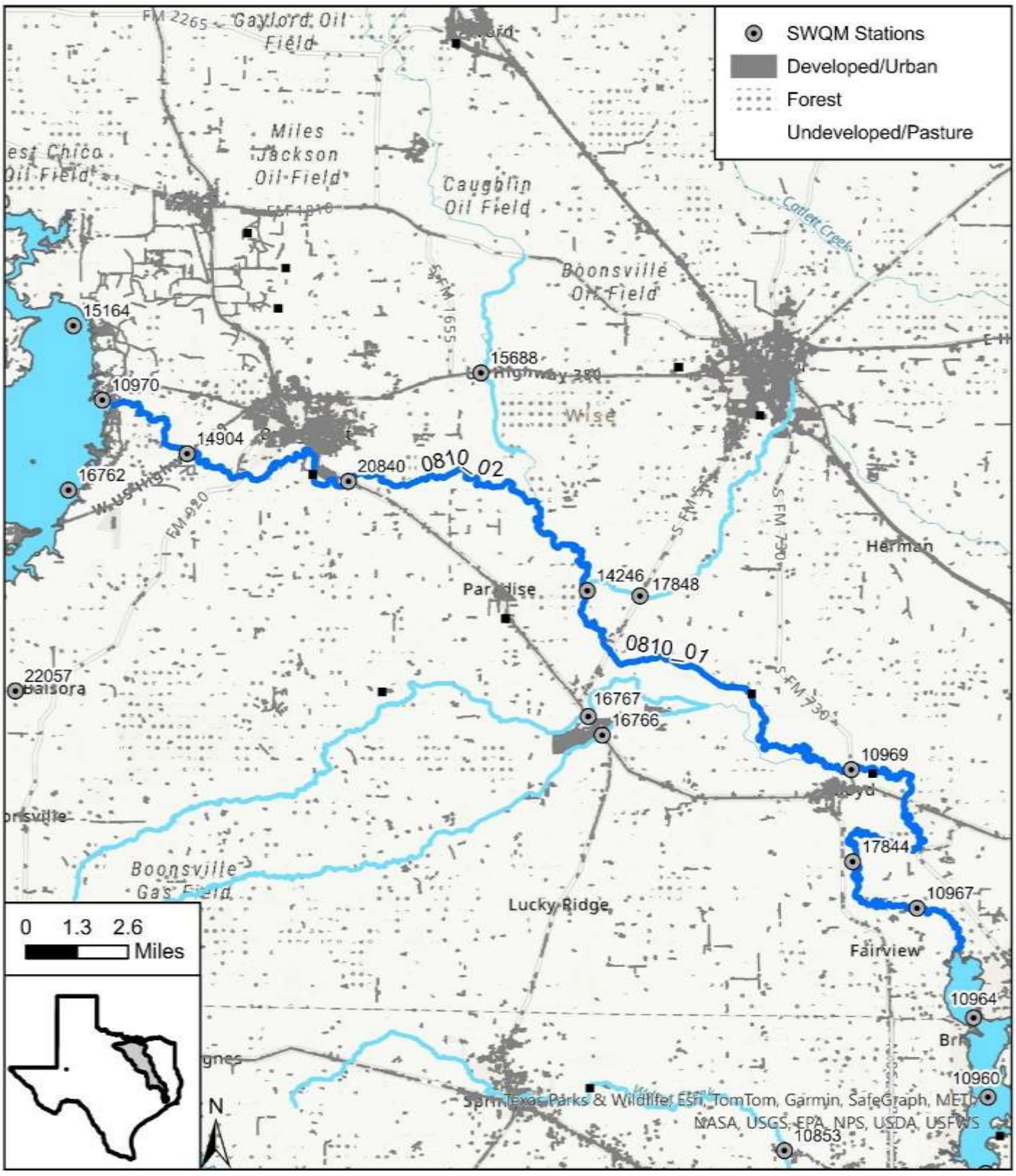

Figure 121: Map of Segment 0810

Segment Description

This 43-mile segment begins at Bridgeport Dam in Wise County and continues to 0.4 miles downstream of the confluence of Oates Branch in Wise County.

Assessment Units and Monitoring Stations

- **0810_01** - Lower 25 miles of segment
  - Perennial freshwater stream
  - **10967** - West Fork Trinity River at Wise CR 4757/Van Meter Bridge
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
  - **10969** - West Fork Trinity River 30 meters downstream of FM 730 northeast of Boyd
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
  - **14246** - West Fork Trinity River 281 meters downstream of confluence with Martin Branch 2.2 miles southeast of Paradise
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
  - **17844** - West Fork Trinity River at Bobo Bridge on Wise CR 4668 south of Boyd
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0810_02** - Upper 11 miles of segment
  - Perennial freshwater stream
  - **14904** - West Fork Trinity River immediately downstream of US 380 1.8 miles southwest of Bridgeport
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
  - **20840** - West Fork Trinity River below Bridgeport Reservoir at SH 114 approximately 333 meters south and 647 meters east of the intersection of SH 114 and Industrial Boulevard in Wise County
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024

Hydrology

Segment 0810 is a fifth order stream at its most downstream end. There is one USGS flow gage in this segment: 08044500 near Boyd. The median flow at this gage was 101 cfs with a range of 0 to 10,400 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 72.55 cfs
- Index Period – 110.5 cfs
- Critical Period – 189 cfs

Land Use and Natural Characteristics

It flows through the Western Cross Timbers ecoregion. Land use in this segment is a mixture of pasture, hay, and crop lands with smaller areas of grasslands and forest. Developed areas in the watershed are centered mainly around the cities of Chico, Bridgeport, Decatur, Boyd, and Rhome.

Figure 122: 0810 relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of bacteria and field parameters at Station 10967 conducted by Tarrant Regional Water District.
- Routine monthly monitoring of conventional, bacteria, flow, and field parameters at Station 10969 conducted by Tarrant Regional Water District.
- Routine quarterly monitoring of bacteria and field parameters at Station 14246 conducted by Tarrant Regional Water District.
- Routine quarterly monitoring of bacteria and field parameters at Station 17844 conducted by Tarrant Regional Water District.
- Routine quarterly monitoring of bacteria and field parameters at Station 14904 conducted by Tarrant Regional Water District.
- Routine quarterly monitoring of bacteria and field parameters at Station 20840 conducted by Tarrant Regional Water District.

Description of Water Quality Issue

A concern due to elevated chlorophyll-*a* concentrations was identified in Assessment Unit 0810_01. Table 42 shows a summary of the TCEQ 2022 Texas Integrated Report. This assessment unit is monitored at Station 10969. However, no chlorophyll-*a* data has been collected since 2011 and the concern has been carried forward from previous assessments. Figure 123 shows chlorophyll-*a* data collected between 2006 and 2011; 28% of the data exceeded the screening level of 14.1 µg/L.

Table 42: Summary of General Use data for Segment 0810

	2022 Integrated Report Data
AU	0810_01
Method	Chlorophyll-*a*
Criteria	14.1
# Data Assessed	0
# Exceedances	.
Mean Exceedances	.
DS Qualifier	ID
LOS	NA
CF	Y
Int LOS	CS

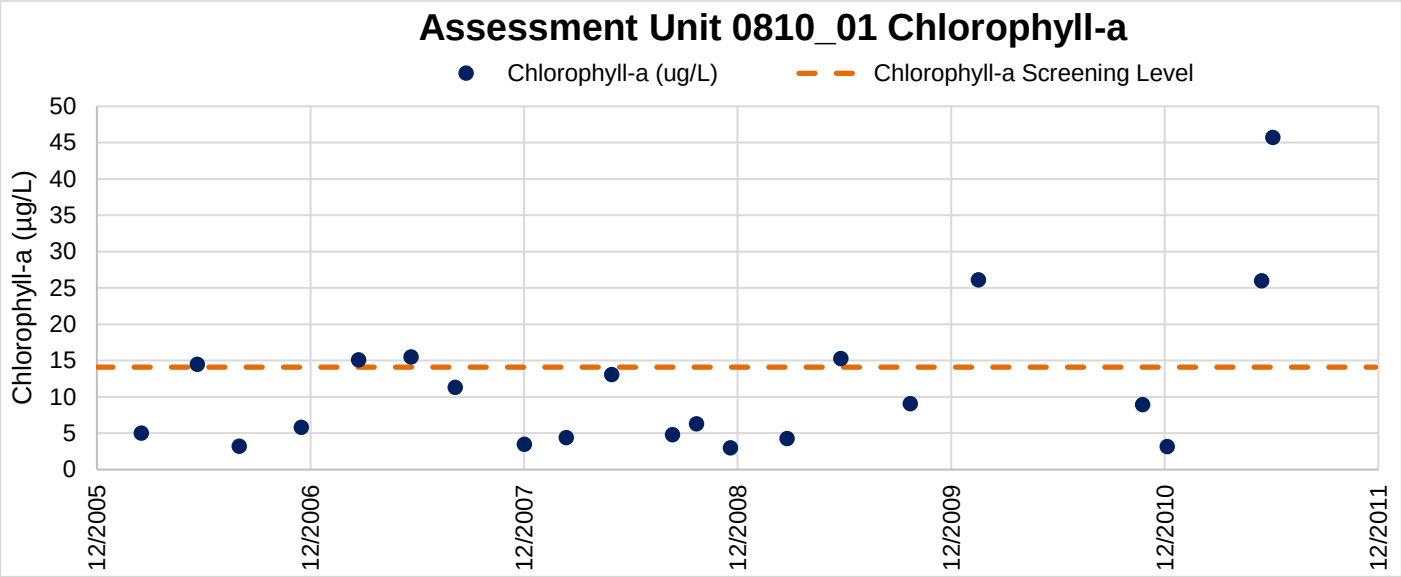

Figure 123: Assessment Unit 0810_01 Chlorophyll-a

Potential Causes of Water Quality Issue

There were no strong correlations between chlorophyll-*a* and nutrients; the strongest correlation was with total Kjeldahl nitrogen (coefficient = 0.430). The immediate watershed upstream of Station 10969 is grassland and pasture. There is evidence of livestock activity in the pastures around the river and in a tributary that confluences with the river just upstream of Station 10969. Waste from livestock may be the source of nitrogen that was fueling algal growth.

Recommendations for Improving Water Quality

It is recommended that monitoring take place in this assessment unit to further address this concern. If chlorophyll-*a* are related to livestock activity, landowner education and livestock best management practices such as exclusionary fencing and alternative water sources may help limit nutrient availability for algal growth.

Potential Stakeholders

- Tarrant Regional Water District
- West Wise Special Utility District
- Landowners
- EnLink Midstream
- City of Bridgeport
- Bridgeport Country Club
- Ivy Valley Utilities
- City of Boyd
- Demases Farm

0811 – Bridgeport Reservoir

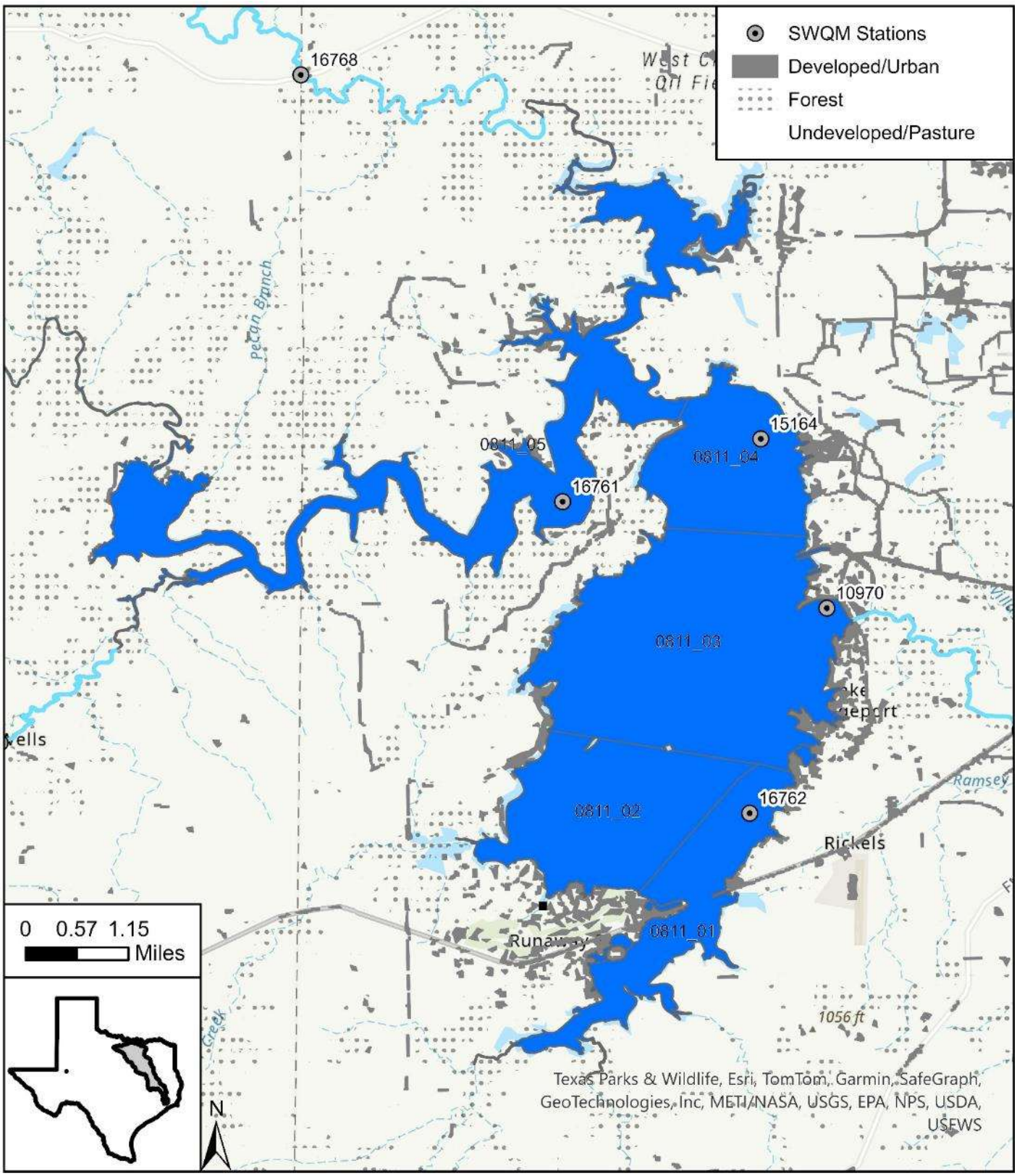

Figure 124: Map of Segment 0811

Segment Description

This 10,816-acre reservoir impounds West Fork Trinity River from a point immediately upstream of the confluence of Bear Hollow in Jack County to Bridgeport Dam in Wise County; up to the normal pool elevation of 836 feet.

Assessment Units and Monitoring Stations

- **0811_01** - Southeast portion of main body of reservoir
  - **16762** - Lake Bridgeport main channel 0.8 kilometers east of Rattlesnake Island 636 meters north and 180 meters west of intersection of E Bay Dr and Private Rd 1505
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0811_02** - Southwest portion of main body of reservoir
- **0811_03** - Central portion of main body of reservoir
  - **10970** - Lake Bridgeport 178 meters west and 187 meters south of north edge of dam
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0811_04** - Northern portion of main body of reservoir
  - **15164** - Lake Bridgeport at north end of main body of reservoir 10 meters north and 1.21 kilometers west of intersection of Valley Street and FM 2952
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0811_05** - Remainder of reservoir
  - **16761** - Lake Bridgeport west fork channel 27 meters west of Steele Island 1.07 kilometers north and 400 meters west of intersection of El Lago Rd and Betty Dr
    - Sampling conducted by Tarrant Regional Water District from 2020 to 2024

Figure 125: Bridgeport Reservoir

Hydrology

Segment 0811 is a reservoir on a fifth order stream. It is a water supply and flood control reservoir with a conservation pool elevation of 836 feet and a flood pool elevation of 851 feet. Over the period of record for this report, the median elevation was 834.09 feet with a range of 820.74 to 840.88 feet. The median elevations for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 832.81 feet
- Index Period – 835.96 feet
- Critical Period – 835.33 feet

Land Use and Natural Characteristics

This reservoir lies within the Western Cross Timbers ecoregion. There is a pocket of Carbonate Cross Timbers to the west of the reservoir. There are residential communities along the shores of the reservoir, but the bulk of the watershed consists of grassland interspersed with forest.

Figure 126: 0811 relative land cover totals

Ongoing Projects

- Routine monitoring of conventional, bacteria, flow, and field parameters six times a year at Station 22057 conducted by Tarrant Regional Water District.
- Routine monitoring of conventional and field parameters five times a year and bacteria four times a year at Station 16762 conducted by Tarrant Regional Water District.
- Routine monitoring of metal, conventional, and field parameters five times a year and bacteria four times a year at Station 10970 conducted by Tarrant Regional Water District.
- Biased to season monitoring of diel parameters twice a year at Station 10970 conducted by Tarrant Regional Water District.
- Routine monitoring of conventional and field parameters five times a year and bacteria four times a year at Station 15164 conducted by Tarrant Regional Water District.
- Routine monitoring of conventional and field parameters five times a year and bacteria four times a year at Station 16761 conducted by Tarrant Regional Water District.

Description of Water Quality Issue

An impairment of the numeric nutrient reservoir criteria resulting in excessive algal growth was identified in this segment (Table 43. Monitoring conducted at Station 10970 in Assessment Unit 0811_03 near the dam is used to characterize the reservoir for this assessment method. Because this reservoir has an EPA approved chlorophyll-*a* criterion, any exceedance of the criterion results in an impairment. Further lines of evidence for exceedances of the nutrients or Secchi depth thresholds inform the category of the exceedance; either 5c (additional data collection) or 5n (additional nutrient-specific data is needed before a TMDL or watershed protection plan is initiated). For Segment 0811, the impairment is category 5c. As shown in Figure 127, 56% of the chlorophyll-*a* values exceeded the criterion of 5.32 µg/L.

Table 43: Numeric Nutrient Reservoir Criteria data for Segment 0811

Segment 0811 Station 10970		2022 Integrated Report Data			BHR POR Data		
Parameter	Criteria Threshold	Samples Assessed	Median	Exceedance	Samples Assessed	Median	Exceedance
Chlorophyll-*a*	5.32	30	5.34	Yes	34	5.34	Yes
Total Nitrogen	0.8	31	0.623	No	33	0.5707	No
Total Phosphorus	0.06	31	0.025	No	34	0.005	No
Secchi Depth	1.01	31	0.86	Yes	33	1.1	No
Dissolved Oxygen issues in any AU?	N/A	N/A	N/A	No	N/A	N/A	No
10 Year Change in TSI	10	0	N/A	N/A	N/A	N/A	N/A
			DS Qualifier	AD		DS Qualifier	AD
			Int LOS	NS (first identified 2022)		Int LOS	NS

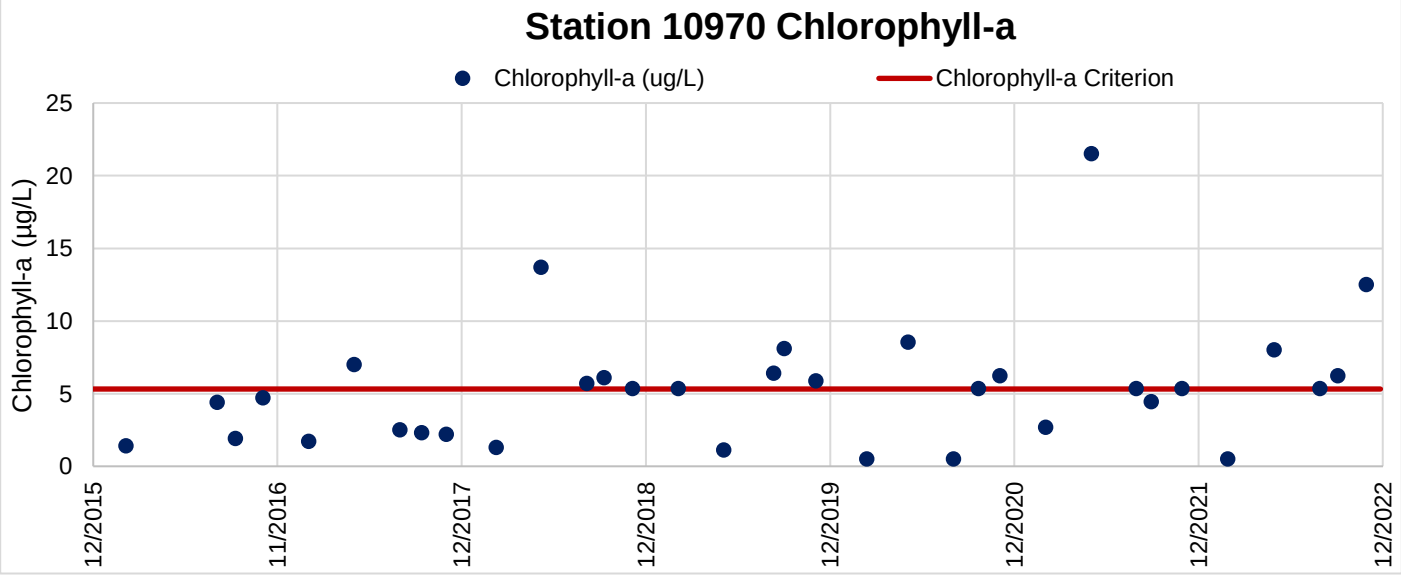

Figure 127: Station 10970 Chlorophyll-a

Potential Causes of Water Quality Issue

The median chlorophyll-*a* value in Assessment Unit 0811_03, which represents the station used for the assessment, was 5.34 µg/L. The median value for the other assessments units were 5.23 µg/L for 0811_01, 4.45 µg/L for 0811_04, and 7.12 µg/L for 0811_05. Assessment Unit 0811_05 is the riverine portion of the reservoir. This could suggest an influence of the river flowing into the reservoir but there is currently no chlorophyll-*a* data for the Trinity River above Bridgeport Reservoir. Future collection of chlorophyll-*a* data could help determine if algal populations are being introduced to the reservoir from the river.

Recommendations for Improving Water Quality

It is recommended that additional data upstream of the reservoir be collected to determine if elevated chlorophyll-*a* levels originate in the reservoir or in the river.

Potential Stakeholders

- Tarrant Regional Water District
- City of Runaway Bay
- Homeowners and homeowners associations
- Landowners
- Boy Scouts of America
- Town of Wizard Wells
- Martin Marietta, North Bridgeport - Chico Plant
- City of Bridgeport
- Communities around the reservoir

0812 – West Fork Trinity River Above Bridgeport Reservoir

Figure 128: Map of Segment 0812

Segment Description

This 97-mile segment begins at State Highway 79 in Archer County and continues to immediately upstream of the confluence of Bear Hollow in Jack County.

Assessment Units and Monitoring Stations

- **0812_01** - Lower 25 miles of segment
  - Freshwater stream, intermittent with perennial pools
  - **10972** - West Fork Trinity River 30 meters downstream of SH 59 northeast of Jacksboro
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
    - Sampling conducted by TRA from 2016 to 2018
    - Aquatic life monitoring conducted by TRA in 2018
- **0812_02** - Upper 60 miles of segment
  - Freshwater stream, intermittent with perennial pools

Figure 129: West Fork Trinity River disconnected pools upstream of SH 59

Hydrology

Segment 0812 is a fourth order stream at its most downstream end. There are two USGS gages in this segment: 08042600 at US 281 near Windthorst which measures gage height and 08042800 near Jacksboro which reports flow. The median gage height at the Windthorst gage was 2.24 feet with a range of 0.77 to 12.19 feet. The median flow at

the Jacksboro gage was 1.6 cfs with a range of 0 to 13,000 cfs. The median gage heights and flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these gages are listed below.

- 08042600 at US 281 near Windthorst
  - Non-Index Period – 2.12 feet
  - Index Period – 2.37 feet
  - Critical Period – 1.82 feet
- 08042800 near Jacksboro
  - Non-Index Period – 0.64 cfs
  - Index Period – 7.22 cfs
  - Critical Period – 0.12 cfs

Land Use and Natural Characteristics

Segment 0812 has its headwaters in the Broken Red Plains and flows into the Western Cross Timbers. Most of this segment is rural with the predominant land use being grassland.

Figure 130: 0812 relative land cover totals

Ongoing Projects

- Routine monthly monitoring of conventional, bacteria, flow, and field parameters at Station 10972 conducted by Tarrant Regional Water District.

Description of Water Quality Issue

Impairments for total dissolved solids and chloride were identified in this segment. Table 44 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. The standards for these parameters are applied as a comparison of the average value for all stations in the segment to the criterion. Monitoring is being conducted at Station 10972 in Assessment Unit 0812_01. Based on recently collected data, the impairment for chloride may still exist as the average of 116 mg/L exceeds the criterion of 100 mg/L. Figure 131 shows that 28% of the individual chloride values exceeded this criterion. The impairment for total dissolved solids may no longer exist as the average value of 464.5 mg/L is below the criterion of 500 mg/L. However,

total dissolved solids are not collected at this station and the data used for assessment are converted from specific conductance.

Table 44: Summary of General Use data for Segment 0812

	2022 Integrated Report Data				BHR POR Data			
AU	0812_01	0812_01	0812_02	0812_02	0812_01	0812_01	0812_02	0812_02
Method	Total dissolved solids	Chloride	Total dissolved solids	Chloride	Total dissolved solids	Chloride	Total dissolved solids	Chloride
Criteria	500	100	500	100	500	100	500	100
# Data Assessed	41	25	41	25	36	32	36	32
Mean Data Assessed	645.64	113.32	645.64	113.32	464.5	116	464.5	116
# Exceedances	1	1	1	1	0	1	0	1
DS Qualifier	AD	AD	AD	AD	AD	AD	AD	AD
LOS	NS	NS	NS	NS	NC	NS	NC	NS
CF	N	N	N	N	.	.	.	.
Int LOS	NS (first identified 1998)	NS (first identified 1998)	NS (first identified 1998)	NS (first identified 1998)	.	.	.	.

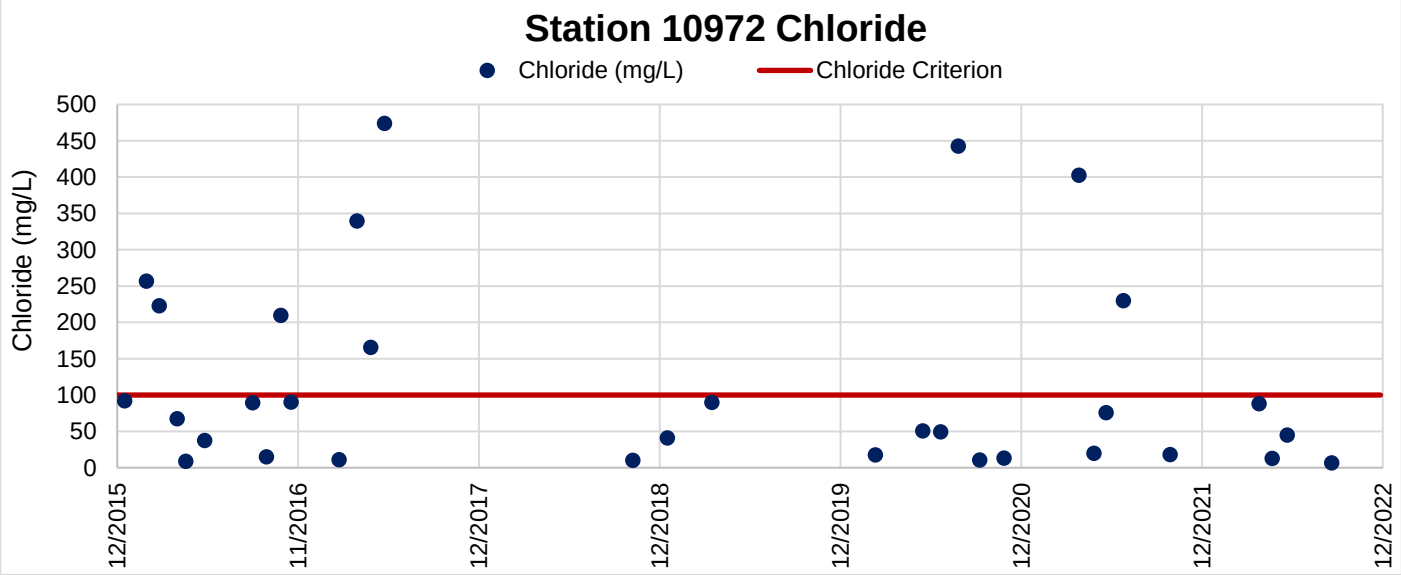

Figure 131: Station 10972 Chloride

Potential Causes of Water Quality Issue

There was a weak inverse correlation between both specific conductance, chloride, and flow (coefficients = -0.281 for specific conductance and -0.263 for chloride). This indicates that low flows may be the cause of the impairments. There are no wastewater treatment facilities that discharge to this segment so all flows in the river are native flows. Therefore, lower flows would be caused by drought conditions.

Recommendations for Improving Water Quality

There are no recommendations for decreasing total dissolved solids and chloride levels that are elevated due to climate conditions. It is recommended that total dissolved solids be collected in this segment to determine if the conversion from specific conductance is appropriate.

Potential Stakeholders

- Tarrant Regional Water District
- Landowners
- Shady Trell Ranch
- Squaw Mountain Ranch

0813 – Houston County Lake

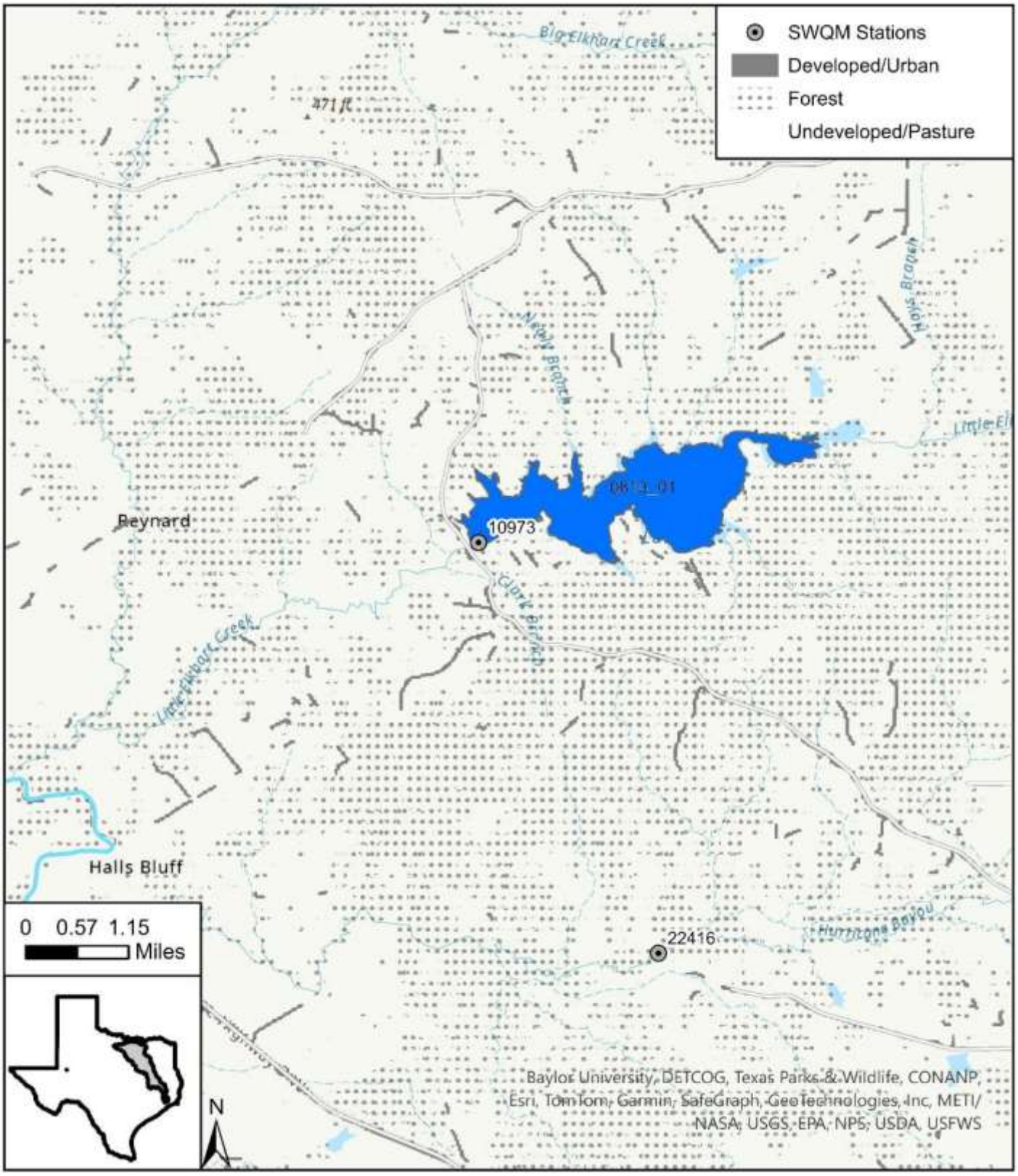

Figure 132: Map of Segment 0813

Segment Description

This 1,315-acre reservoir impounds Little Elkhart Creek to the Houston County Dam in Houston County; up to the normal pool elevation of 260 feet.

Assessment Units and Monitoring Stations

- **0813_01** - From Houston County Dam in Houston County up to the normal pool elevation of 260 feet (impounds Little Elkhart Creek)
    - **10973** - Houston County Lake near dam overflow
        - Sampling conducted by TCEQ from 2015 and 2024

Hydrology

Segment 0813 is a reservoir on a third order stream. It is a water supply and flood control reservoir and has a conservation pool elevation of 260 feet and emergency spillway elevation of 265 feet. Over the period of record for this report, the median elevation was 260.08 feet with a range of 257.52 to 262.8 feet. The median elevations for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 260.1 feet
- Index Period – 260.14 feet
- Critical Period – 259.76 feet

Land Use and Natural Characteristics

This reservoir lies within the Tertiary Uplands ecoregion. There is residential development along the shores of the downstream end of the reservoir. The watershed on the south side of the reservoir is largely forested with shrub- and shrub-land. The north side is a mix of hay, pasture, and forest.

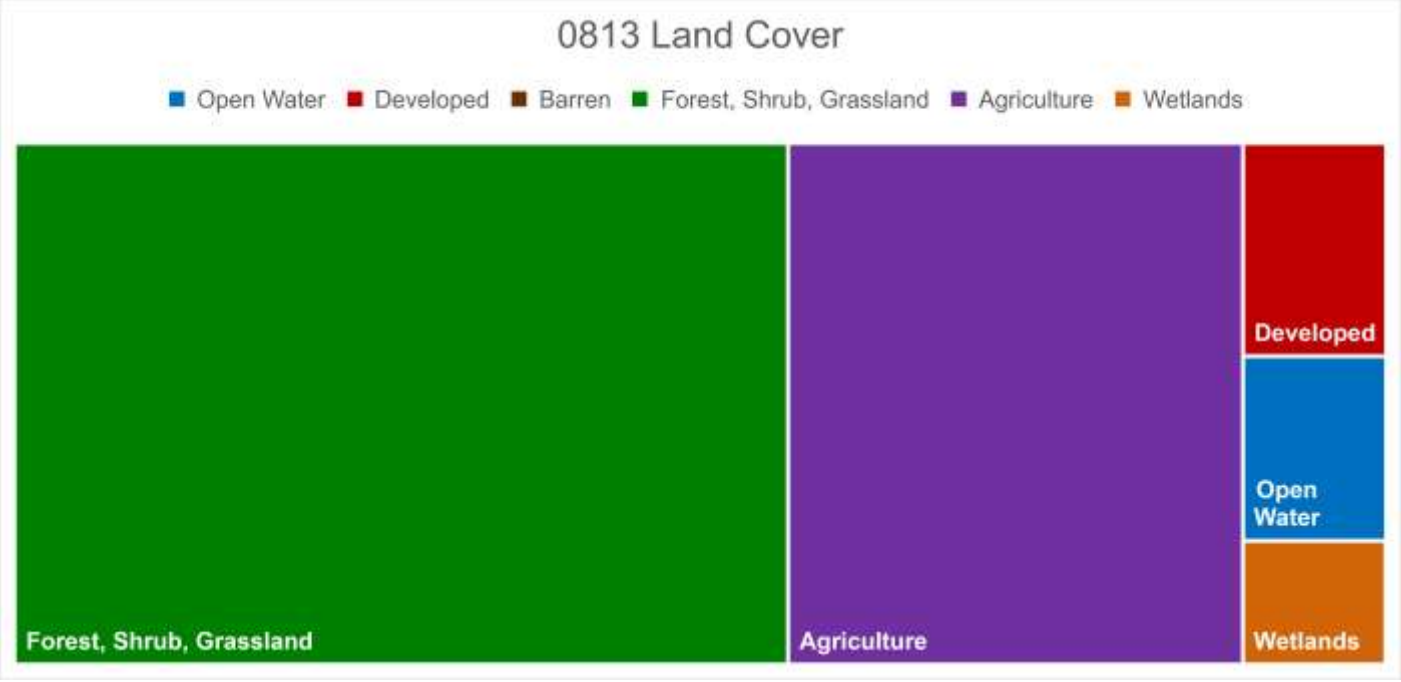

Figure 133: 0813 relative land cover totals

Ongoing Projects

Routine quarterly monitoring of conventional, bacteria, and field parameters and two additional samples consisting of field parameters only at Station 10973 conducted by TCEQ Region 10.

Description of Water Quality Issue

An impairment of the numeric nutrient reservoir criteria resulting in excessive algal growth was identified in this segment (Table 45). Monitoring conducted at Station 10973 near the dam is used to characterize the reservoir for this assessment method. Because this reservoir has an EPA approved chlorophyll-*a* criterion, any exceedance of the criterion results in an impairment. Further lines of evidence for exceedances of the nutrients or Secchi depth thresholds inform the category of the exceedance; either 5c (additional data collection) or 5n (additional nutrient-specific data is needed before a TMDL or watershed protection plan is initiated). For Segment 0813, the impairment is category 5c. As shown in Figure 134, 87% of the chlorophyll-*a* values exceeded the criterion of 11.1 µg/L.

Table 45: Numeric Nutrient Reservoir Criteria data for Segment 0813

Segment 0813 Station 10973		2022 Integrated Report Data			BHR POR Data		
Parameter	Criteria Threshold	Samples Assessed	Median	Exceedance	Samples Assessed	Median	Exceedance
Chlorophyll-*a*	11.1	22	18.6	Yes	23	17.4	Yes
Total Nitrogen	0.8	20	0.722	No	23	0.5925	No
Total Phosphorus	0.03	23	0.03	No	25	0.0204	No
Secchi Depth	1.27	27	1.1	Yes	25	1.1	Yes
Dissolved Oxygen issues in any AU?	N/A	N/A	N/A	No	N/A	N/A	No
10 Year Change in TSI	10	34	4.64	No	N/A	N/A	N/A
			DS Qualifier	AD		DS Qualifier	AD
			Int LOS	NS (first identified 2022)		Int LOS	NS

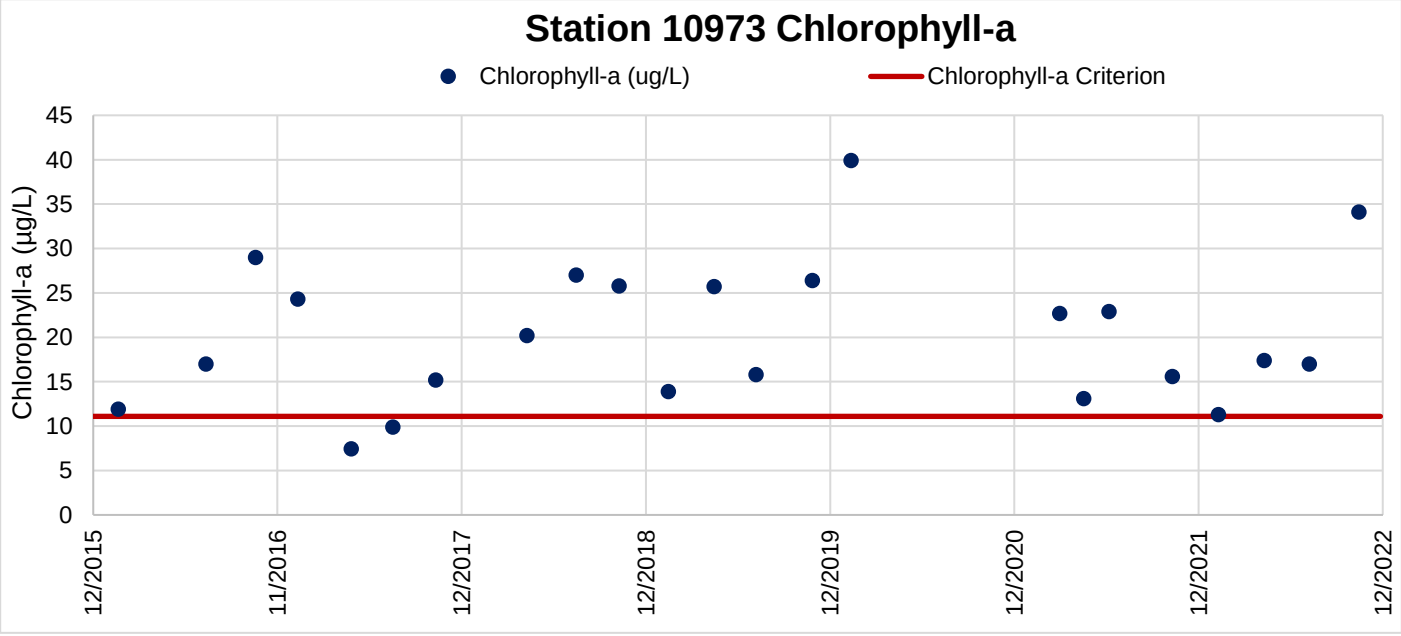

Figure 134: Station 10973 Chlorophyll-a

Potential Causes of Water Quality Issue

The median chlorophyll-*a* value at Station 10973 was 17.4 µg/L. Chlorophyll-*a* was strongly correlated to total Kjeldahl nitrogen (correlation coefficient = 0.707) but there were no correlations to nitrate or total phosphorus. The watershed is largely undeveloped with a mix of forest and pastureland. The area directly adjacent to much of the shoreline has residential developments. The source of nitrogen that could be affecting Chlorophyll-*a* levels may be from residential fertilizers or failing septic systems.

Recommendations for Improving Water Quality

Homeowner education and fertilizer best management practices may reduce chlorophyll-*a* levels in this reservoir. Additionally, a survey of septic systems in the communities along the shoreline should be conducted to determine if any are failing and in need of repair.

Potential Stakeholders

- Homeowners and homeowners associations
- Landowners
- Communities around the reservoir

0814 – Chambers Creek Above Richland-Chambers Reservoir

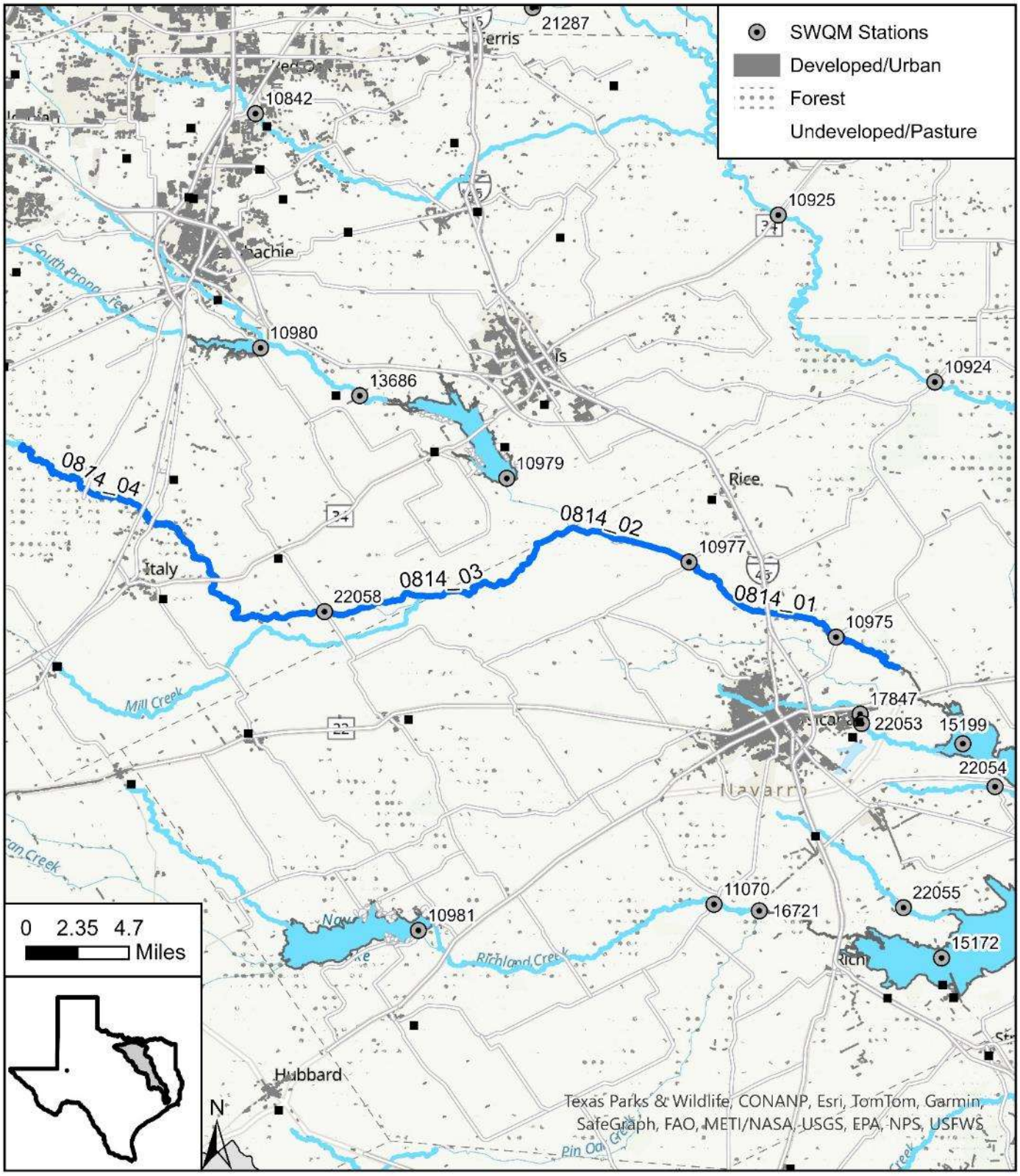

Figure 135: Map of Segment 0814

Segment Description

This 50-mile segment runs from the confluence of the North Fork Chambers Creek and South Fork Chambers Creek to a point 2.5 miles downstream of Tupelo Branch in Navarro County.

Assessment Units and Monitoring Stations

- **0814_01** - From the lower end of the segment up to just above the confluence with Cummins Creek
  - Perennial freshwater stream
  - **10975** - Chambers Creek at FM 3041
    - Sampling conducted by TCEQ from 2015 to 2024
- **0814_02** - From just above the confluence with Cummins Creek up to just above the confluence with Waxahachie Creek
  - Perennial freshwater stream
  - **10977** - Chambers Creek at FM 1126
    - Sampling conducted by Tarrant Regional Water District from 2015 to 2024
- **0814_03** - From just above the confluence with Waxahachie Creek up to just above the confluence with Mill Branch
  - Perennial freshwater stream
  - **22058** - Chambers Creek at Ellis County Road 55 east of Italy
    - Sampling conducted by Tarrant Regional Water District from 2019 to 2024
- **0814_04** - From just above the confluence with Mill Branch to the upper end of the segment
  - Perennial freshwater stream

Hydrology

Segment 0814 is a fourth order stream at its most downstream end. There are two USGS flow gages in this segment: 08063562 at FM 55 near Avalon and 08064100 near Rice. The median flow at these gages were 17.7 cfs at the upstream Avalon gage to 31.5 cfs at the downstream Rice gage with a range of 0 to 17,500 cfs at these gages. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these two gages are listed below.

- Non-Index Period – 13.3 to 17.6 cfs
- Index Period – 61.85 to 145.5 cfs
- Critical Period – 5.3 to 9.14 cfs

Land Use and Natural Characteristics

The upper portion of the stream drains mostly grassland and forest to the south and grass and crop lands to the north. The lower portion of the stream flows through mostly crop land to the north, and hay, pasture, and grassland to the south. It flows through the Northern Blackland Prairie ecoregion.

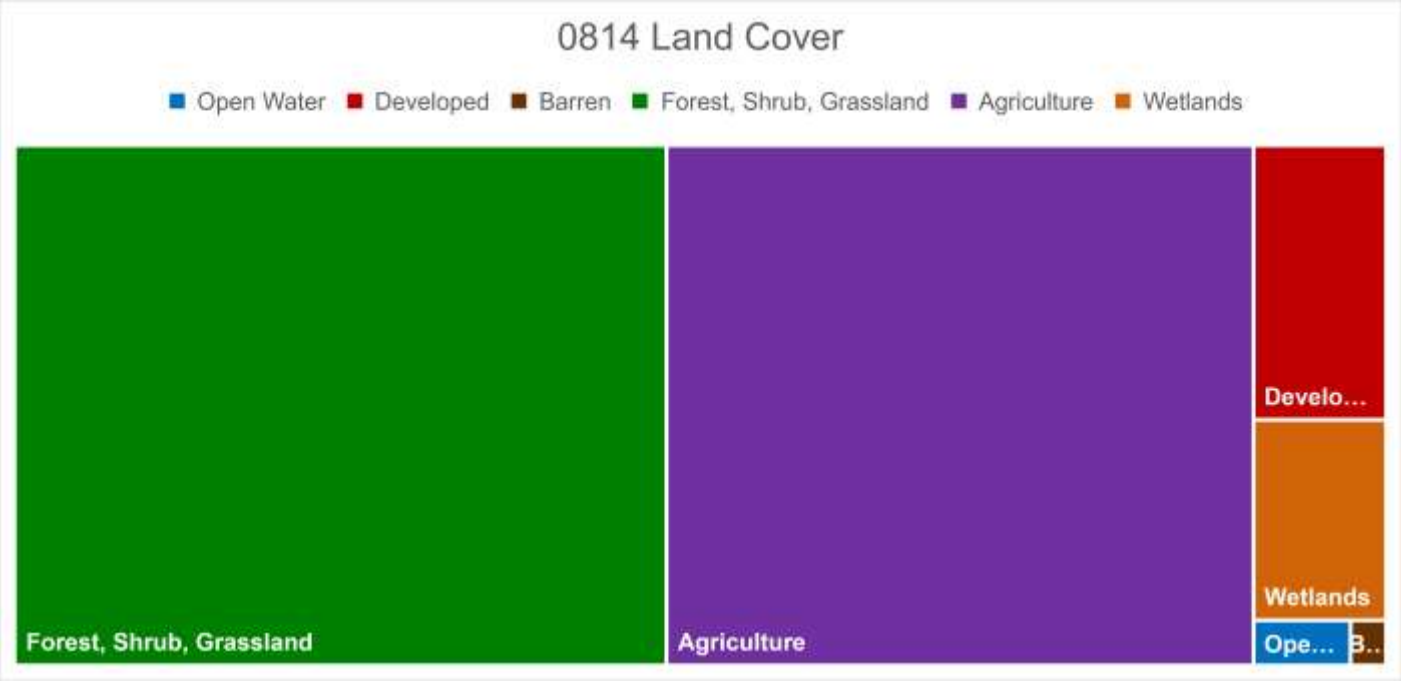

Figure 136: 0814 relative land cover totals

Ongoing Projects

- Biased to season monitoring of diel parameters five times a year at Station 10975 conducted by TCEQ Region 4.
- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 10975 conducted by TCEQ Region 4.
- Routine monthly monitoring of metal, conventional, bacteria, flow and field parameters at Station 10977 conducted by Tarrant Regional Water District.
- Routine monitoring of metal, conventional, bacteria, flow, and field parameters six times a year at Station 22058 conducted by Tarrant Regional Water District.

Description of Water Quality Issue

A concern due to elevated chlorophyll-*a* concentrations was identified in Assessment Unit 0814_01. Table 46 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, this concern may still exist as 42% of the data exceeded the screening level of 14.1 µg/L (Figure 137).

Table 46: Summary of General Use data for Segment 0814

	2022 Integrated Report Data	BHR POR Data
AU	0814_01	0814_01
Method	Chlorophyll-*a*	Chlorophyll-*a*
Criteria	14.1	14.1
# Data Assessed	28	26
# Exceedances	9	11
Mean Exceedances	21.07	20.97
DS Qualifier	AD	AD
LOS	CS	CS
CF	N	.
Int LOS	CS	.

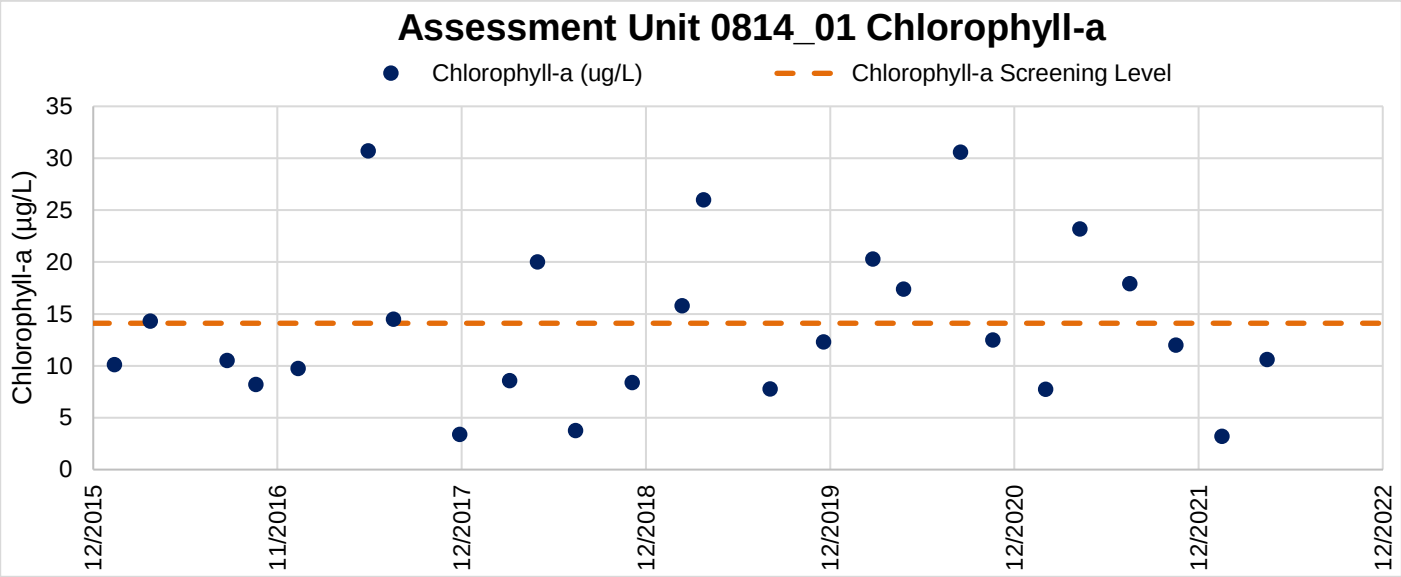

Figure 137: Assessment Unit 0814_01 Chlorophyll-a

Potential Causes of Water Quality Issue

Chlorophyll-*a* in Assessment Unit 0814_01 was not directly correlated with nutrients and was only weakly correlated with flow (coefficient = 0.268). This suggests that algal population may be washed in from upstream. Segment 0815 Bardwell Reservoir is located upstream of this assessment unit and may be the source of algal populations in this area.

Recommendations for Improving Water Quality

There is no chlorophyll-*a* data available from Station 10977 in Assessment Unit 0814_02, downstream of the Bardwell Reservoir influence, or from Station 22058 in Assessment Unit 0814_03, upstream of the influence. It is recommended that chlorophyll-*a* monitoring be conducted at these stations to determine if Bardwell Reservoir is influencing downstream algal populations or if the source is further upstream on Chambers Creek.

Potential Stakeholders

- Tarrant Regional Water District
- Landowners
- City of Forreston

0815 – Bardwell Reservoir

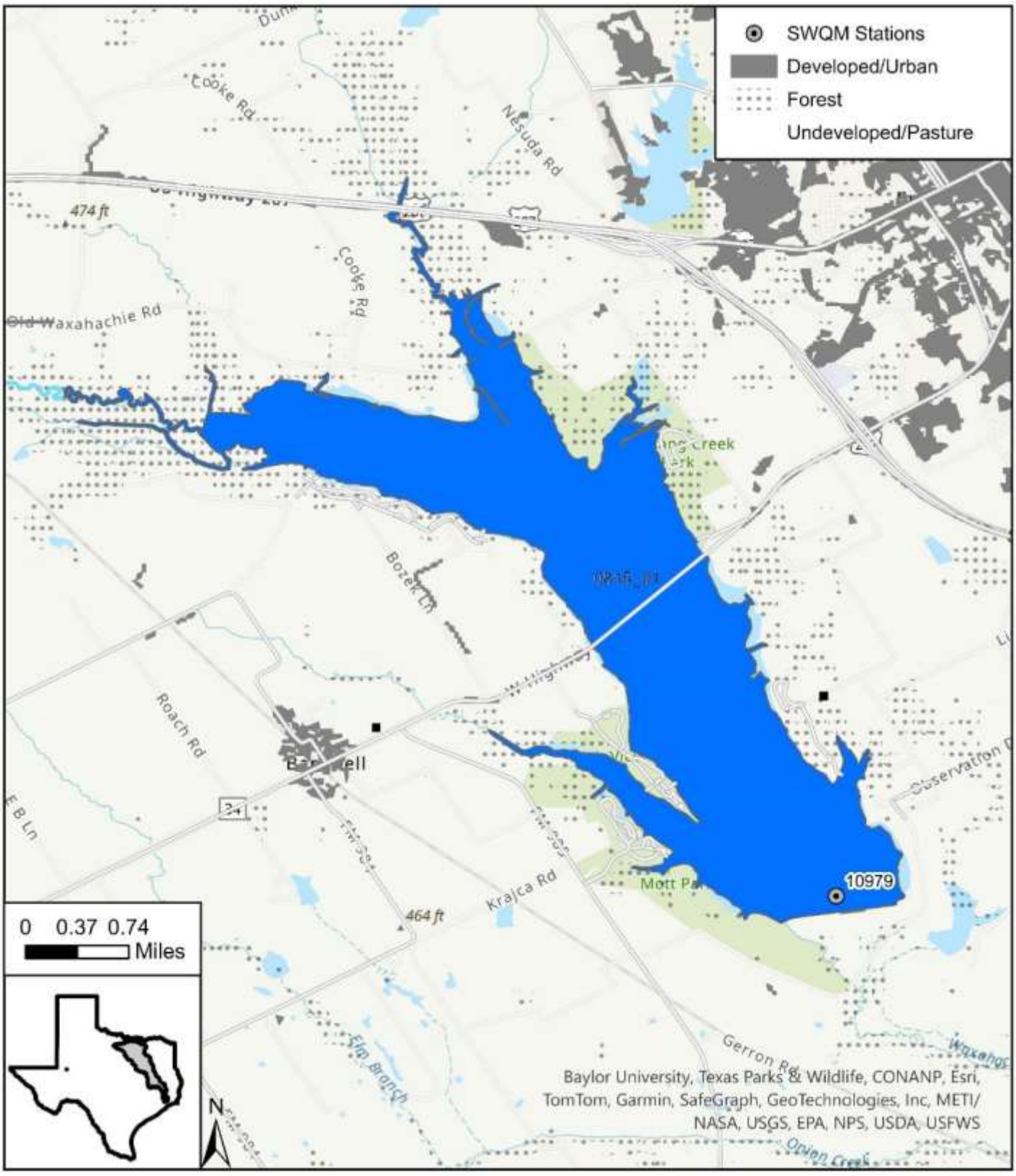

Figure 138: Map of Segment 0815

Segment Description

This 3,293-acre reservoir impounds Waxahachie Creek to the Bardwell Dam in Ellis County; up to the normal pool elevation of 421 feet.

Assessment Units and Monitoring Stations

- **0815_01** - From Bardwell Dam in Ellis County up to the normal pool elevation of 421 feet (impounds Waxahachie Creek)
    - **10979** - Bardwell Reservoir 1.91 kilometers east and 787 meters north of intersection of Bardwell Dam Rd and FM 985 mid lake near dam USGS Site AC
        - Sampling conducted by TRA from 2015 to 2024

Hydrology

Segment 0815 is a reservoir on a third order stream. It is a water supply and flood control reservoir with a conservation pool elevation of 421 feet and a flood pool elevation of 439 feet. Over the period of record for this report, the median elevation was 421.01 feet with a range of 418.08 to 437.45 feet. The median elevations for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 420.91 feet
- Index Period – 421.32 feet
- Critical Period – 420.62 feet

Land Use and Natural Characteristics

This reservoir lies within the Northern Blackland Prairie ecoregion. Land cover to the west of the reservoir is largely cultivated crops, hay, and pasture interspersed with grassland. To the east, development includes the City of Ennis, hay, pasture, and some small areas of grassland,

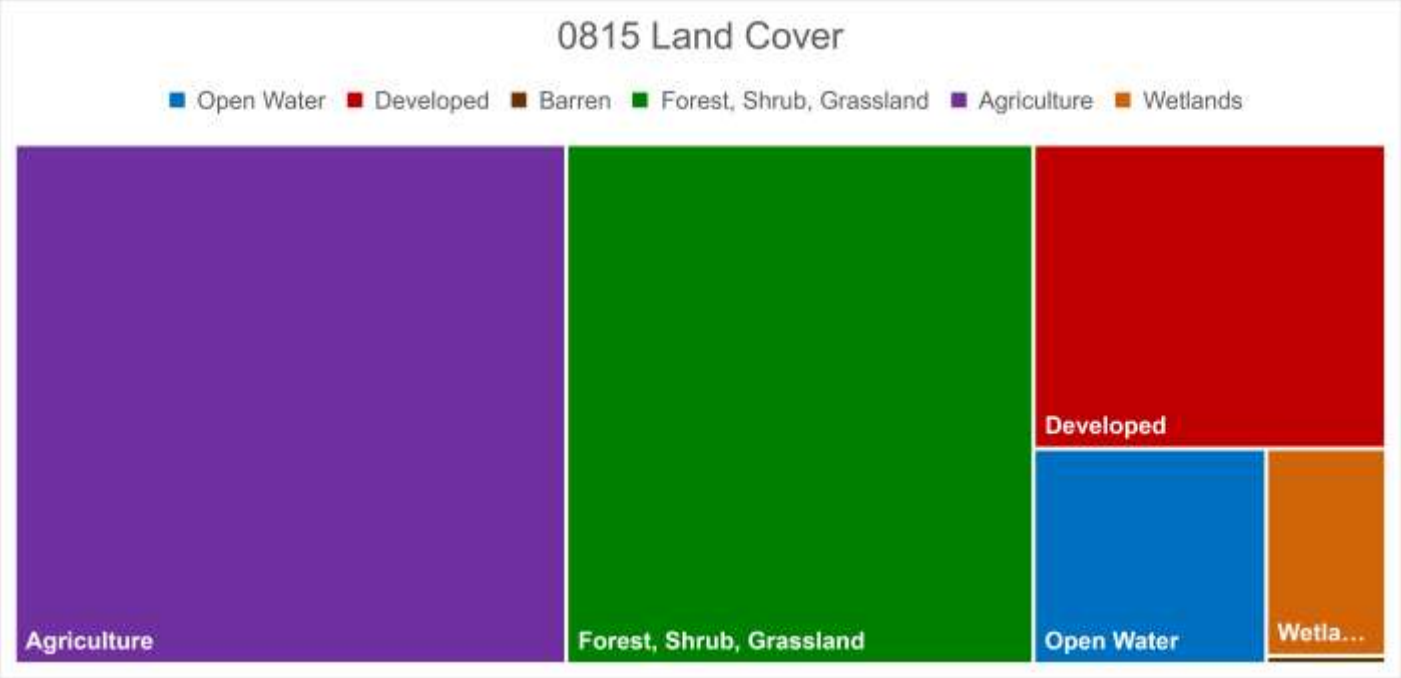

Figure 139: 0815 relative land cover totals

Figure 140: Sampling on Bardwell Reservoir

Ongoing Projects

- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 10979 conducted by Trinity River Authority.

Description of Water Quality Issue

An impairment for sulfate was identified in this segment. Table 47 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. The standards for this parameter is applied as a comparison of the average value for all stations in the segment to the criterion. Monitoring is being conducted at Station 10979 near the dam. Based on recently collected data, the impairment may no longer exist as the average of 44.57 mg/L is below the criterion of 50 mg/L. Figure 141 shows that 26% of the individual sulfate values exceeded this criterion.

Table 47: Summary of General Use data for Segment 0815

	2022 Integrated Report Data	BHR POR Data
AU	0815_01	0815_01
Method	Sulfate	Sulfate
Criteria	50	50
# Data Assessed	26	27
Mean Data Assessed	50.75	44.57
# Exceedances	1	0
DS Qualifier	AD	AD
LOS	NS	NC
CF	N	.
Int LOS	NS (first identified 2016)	.

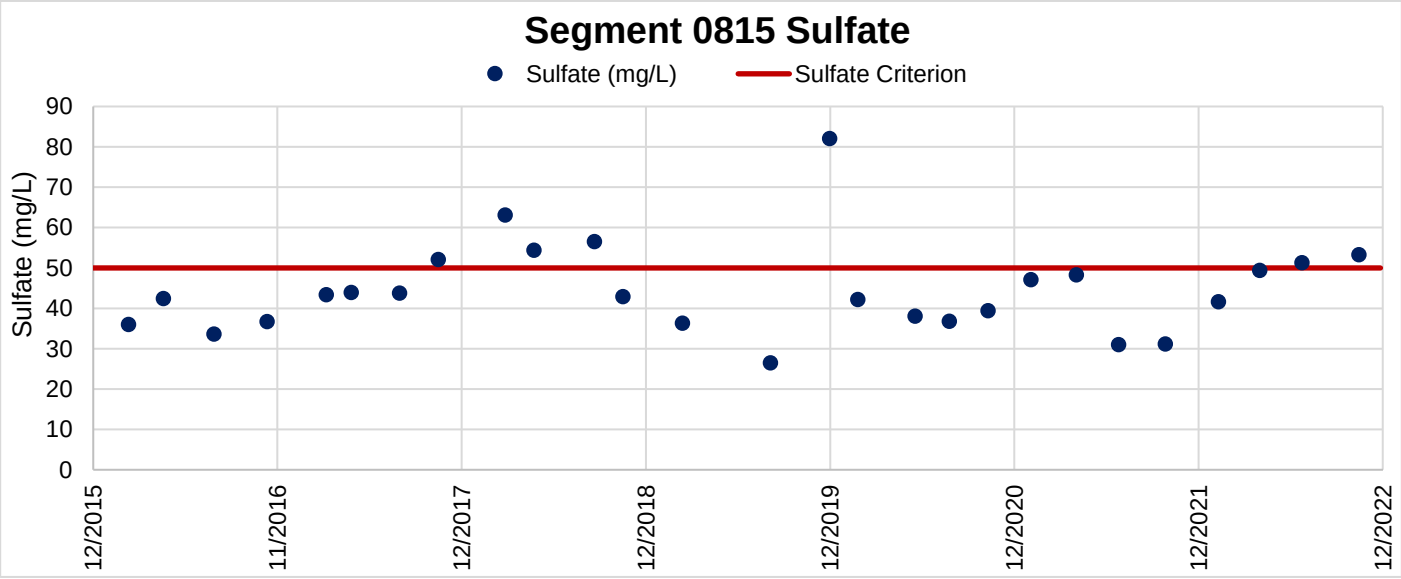

Figure 141: Segment 0815 Sulfate

Potential Causes of Water Quality Issue

It appears that this impairment was related to decreased reservoir elevations likely due to drought conditions. There was a weak inverse correlation between sulfate and reservoir stage (coefficient = -0.368). During drought conditions, as water in the streams and reservoirs evaporate, the remaining constituents in the water begin to concentrate. Then these concentrations will decrease due to dilution from precipitation during the drought recovery periods.

Recommendations for Improving Water Quality

There are no recommendations for decreasing sulfate levels that are elevated due to climate conditions.

Potential Stakeholders

- TRA Technical Services and Basin Planning
- Town of Bardwell
- Homeowners and landowners
- City of Ennis
- Town of Reagor Springs
- United States Army Corps of Engineers

0815A – Waxahachie Creek

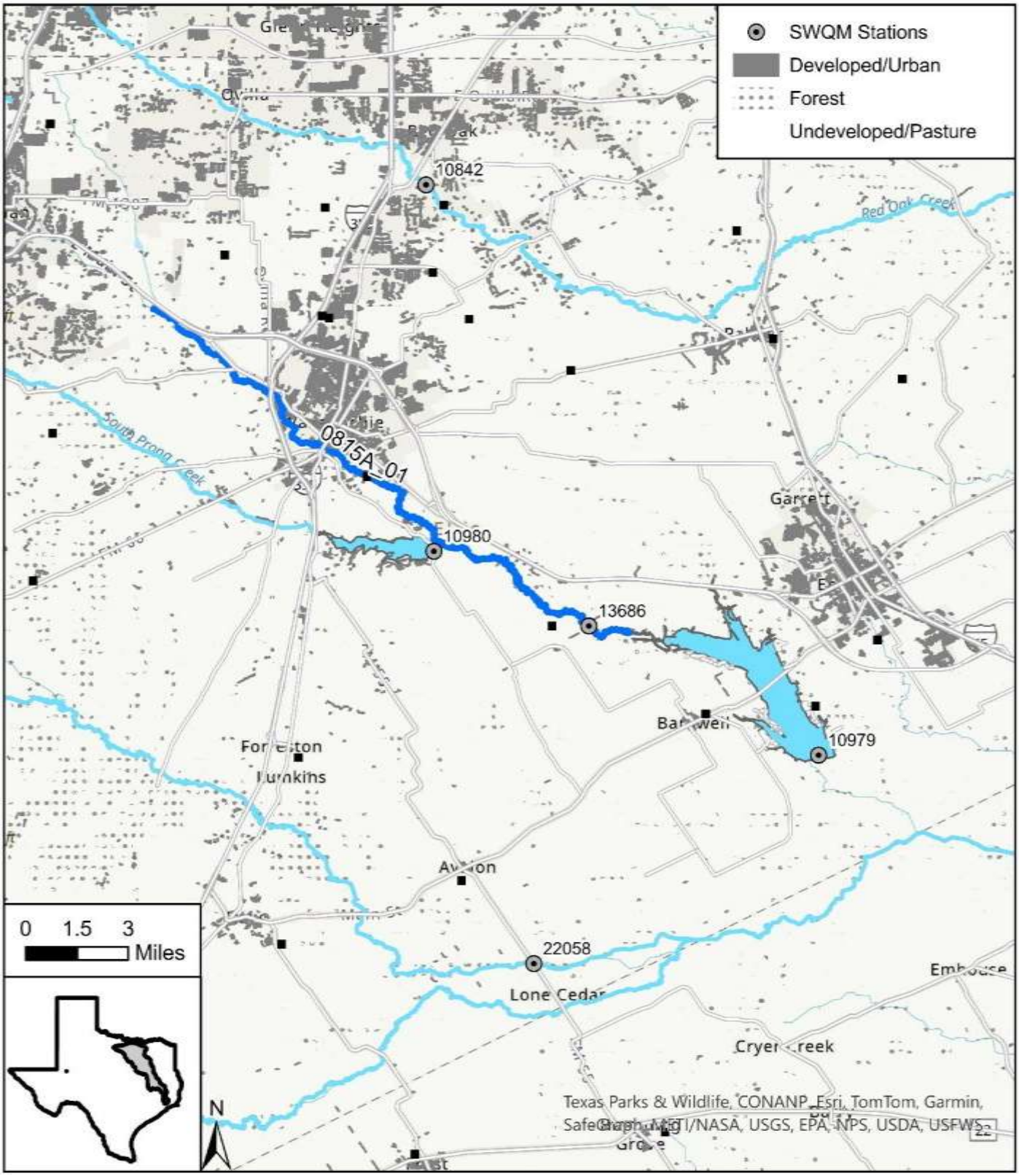

Figure 142: Map of Segment 0815A

Segment Description

This 24.2-mile unclassified segment runs from the confluence with North Prong Creek to the confluence with the normal pool elevation of Bardwell Reservoir.

Assessment Units and Monitoring Stations

- **0815A_01** - From the confluence with the normal pool elevation of Bardwell Reservoir upstream to the confluence with North Prong Creek
    - Perennial freshwater stream
    - **13686** - Waxahachie Creek at Gelzendaner Road
        - Sampling conducted by TRA from 2020 to 2024

Hydrology

Unclassified segment 0815A is a second order stream at its most downstream end. There is one USGS gage in this segment: 08063590 at Waxahachie. Flow is also measured at Station 13686. The median flow at these locations was 11.5 cfs at the upstream USGS gage and 18.5 cfs at the downstream Station 13686 with a range of 0 to 1,450 cfs at these locations. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these two locations are listed below.

- Non-Index Period – 11.25 to 19 cfs
- Index Period – 22.2 to 30 cfs
- Critical Period – 1.8 to 8.6 cfs

Land Use and Natural Characteristics

The upper portion of the stream drains the developed areas in the cities of Midlothian and Waxahachie. Between these two cities, the watershed is a mix of grass, hay, pasture, and crop land. Downstream of Waxahachie, the watershed is largely crop land. The stream flows through the Northern Blackland Prairie ecoregion.

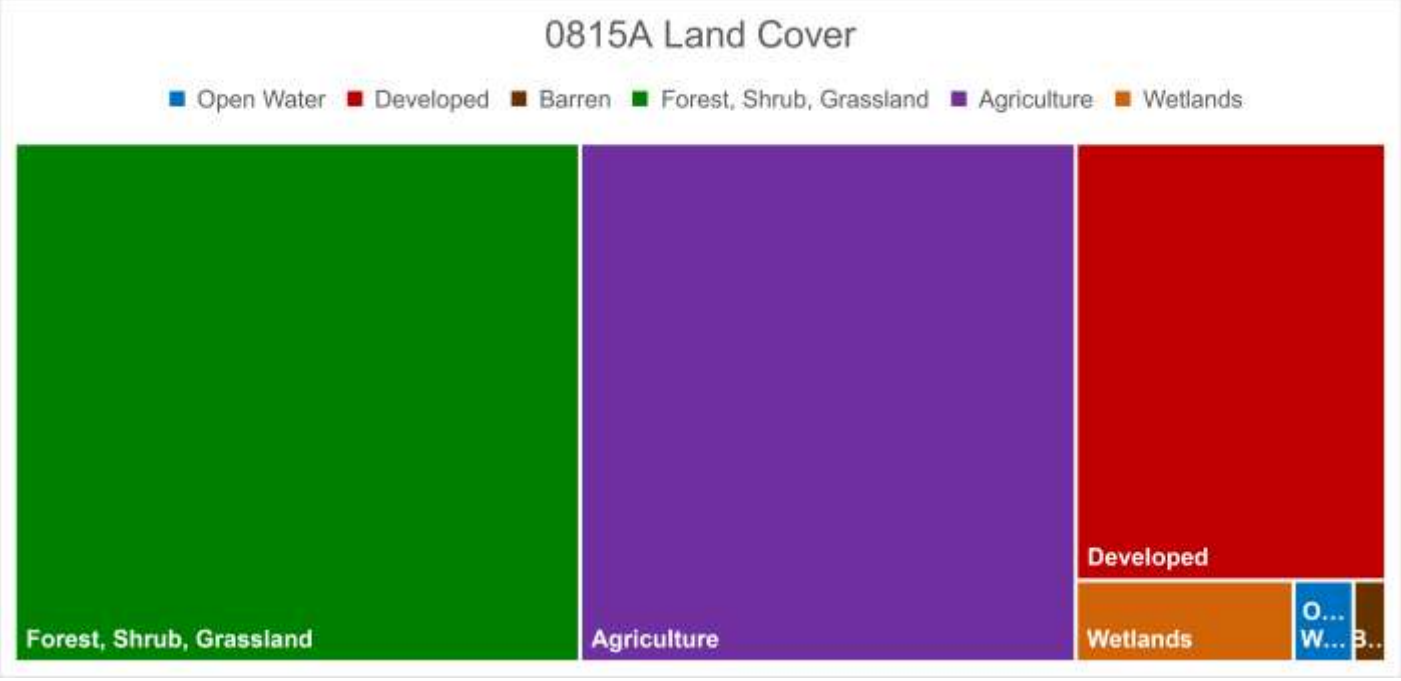

Figure 143: 0815A relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 13686 conducted by Trinity River Authority.

Description of Water Quality Issue

This segment was found to have a concern due to elevated nitrate concentrations. Table 48 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, this concern may still exist as 76% of the data exceeded the screening level of 1.95 mg/L (Figure 144).

Table 48: Summary of General Use data for Segment 0815A

	2022 Integrated Report Data	BHR POR Data
AU	0815A_01	0815A_01
Method	Nitrate	Nitrate
Criteria	1.95	1.95
# Data Assessed	15	25
# Exceedances	13	19
Mean Exceedances	4.47	4.29
DS Qualifier	AD	AD
LOS	CS	CS
CF	N	.
Int LOS	CS	.

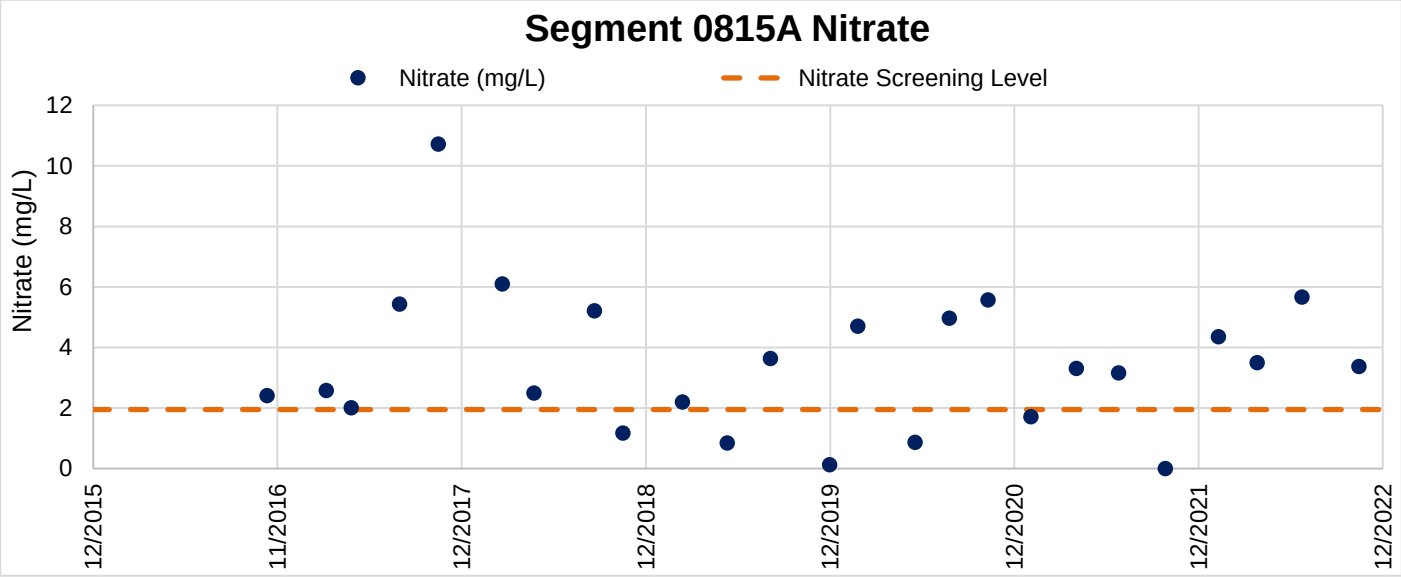

Figure 144: Segment 0815A Nitrate

Potential Causes of Water Quality Issue

There was a moderate inverse correlation between nitrate and flow (coefficient = -0.406). This pattern is common in effluent dominated streams as most wastewater treatment facilities do not have advanced nutrient removal technology. At lower flows, concentrations of these parameters were higher and decreased with increasing flow due to dilution from precipitation inflows. Station 13686 is approximately 10 miles downstream of a discharger outfall.

Recommendations for Improving Water Quality

There are no recommendations for decreasing nitrate levels at this time. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- TRA Technical Services and Basin Planning
- Landowners
- City of Waxahachie

0818 – Cedar Creek Reservoir

Segment Description

See Aquatic Life Use Segment 0818 Segment Description.

Hydrology

See Aquatic Life Use Segment 0818 Hydrology.

Land Use and Natural Characteristics

See Aquatic Life Use Segment 0818 Land Use and Natural Characteristics.

Ongoing Projects

See Aquatic Life Use Segment 0818 Ongoing Projects.

Description of Water Quality Issue

Impairments for elevated pH was identified for several assessment units in this reservoir, several of which were carried forward from previous assessments (Table 49). Sampling has not been conducted in Assessment Units 0818_02, 0818_03, 0818_05, 0818_07, 0818_08, and 0818_12 since 2000 to 2006. The high pH criterion in this reservoir is 8.5 S.U. as opposed to 9 S.U. for other reservoirs in the Trinity basin. Based on recently collected data in Assessment Units 0818_04, 0818_09, and 0818_11, the impairments no longer exist in these portions of the reservoir.

Table 49: Summary of General Use data for Segment 0818

	2022 Integrated Report Data					
AU	0818_02	0818_03	0818_04	0818_05	0818_07	0818_08
Method	High pH	High pH	High pH	High pH	High pH	High pH
Criteria	8.5	8.5	8.5	8.5	8.5	8.5
# Data Assessed	0	0	32	0	0	0
# Exceedances	.	.	4	.	.	.
Mean Exceedances	.	.	8.76	.	.	.
DS Qualifier	ID	ID	AD	ID	ID	ID
LOS	NA	NA	FS	NA	NA	NA
CF	Y	Y	Y	Y	Y	Y
Int LOS	NS (first identified 2002)	NS (first identified 2002)	NS (first identified 2002)	NS (first identified 2002)	NS (first identified 2002)	NS (first identified 2002)

Table 49 continued

	2022 Integrated Report Data			BHR POR Data		
AU	0818_09	0818_11	0818_12	0818_04	0818_09	0818_11
Method	High pH	High pH	High pH	High pH	High pH	High pH
Criteria	8.5	8.5	8.5	8.5	8.5	8.5
# Data Assessed	32	32	0	34	34	34
# Exceedances	6	8	.	4	7	6
Mean Exceedances	8.87	8.83	.	8.76	8.8	8.88
DS Qualifier	AD	AD	ID	AD	AD	AD
LOS	NS	NS	NA	NC	NC	NC
CF	N	N	Y	.	.	.
Int LOS	NS (first identified 2002)	NS (first identified 2002)	NS (first identified 2002)	.	.	.

Potential Causes of Water Quality Issue

pH in Assessment Units 0818_01, 0818_04, 0818_06, 0818_11, and 0818_14 was weakly to strongly correlated to chlorophyll-*a* (coefficients = 0.251 to 0.627) which indicated that algal populations are affecting pH levels in this reservoir. However, chlorophyll-*a* was not well correlated to nutrients; with the exception of total phosphorus in Assessment Unit 0818_11 (coefficient = 0.865) although this correlation to total phosphorus was based on only 9 samples. This is not unexpected as long residence times in reservoirs allow algal populations to increase and there are several wastewater treatment facilities in the watershed.

Recommendations for Improving Water Quality

Sampling for field parameters, at a minimum, should be conducted in Assessment Units 0818_01, 0818_04, 0818_06, 0818_11, and 0818_14 to further assess these impairments and determine if they still exist.

Potential Stakeholders

See Aquatic Life Use Segment 0818 Potential Stakeholders.

0818C – Kings Creek

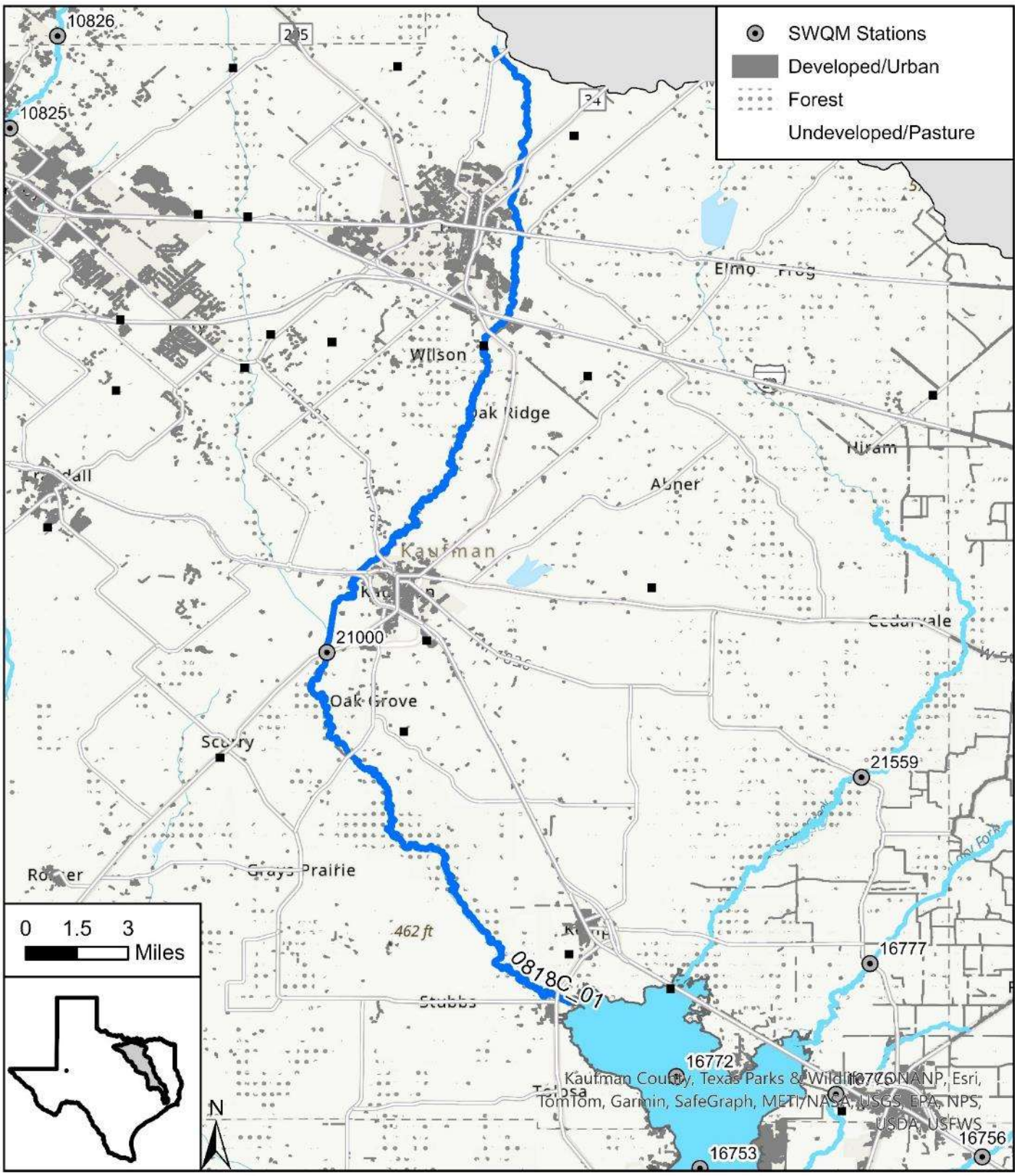

Figure 145: Map of Segment 0818C

Segment Description

This 46.5-mile unclassified segment runs from the headwaters adjacent to FM 986 approximately 5 km north of Terrell in Kaufman County to the confluence with Cedar Creek Reservoir at normal pool elevation upstream.

Assessment Units and Monitoring Stations

- **0818C_01** - From the confluence with Cedar Creek Reservoir at normal pool elevation upstream to the headwaters adjacent to FM 986 approximately 5 km north of Terrell in Kaufman County
    - Freshwater stream, intermittent with perennial pools
    - **21000** - Kings Creek at SH34 upstream of Cedar Creek Reservoir southwest of Kaufman 3.44 kilometers southwest on SH34 from US175
        - Sampling conducted by Tarrant Regional Water District from 2015 to 2024

Hydrology

Unclassified segment 0818C is a third order stream at its most downstream end. There is one USGS flow gage in this segment: 08062895 at SH 34 near Kaufman. The median flow at this gage was 9.44 cfs with a range of 0 to 10,000 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 12.3 cfs
- Index Period – 17.75 cfs
- Critical Period – 3.3 cfs

Land Use and Natural Characteristics

A majority of the watershed is rural with pasture and hay land being the predominate land use. There are a few crop fields located toward the middle of the watershed and some development around the cities of Terrell, Kaufman, and Kemp. The stream flows through the Northern Blackland Prairie ecoregion.

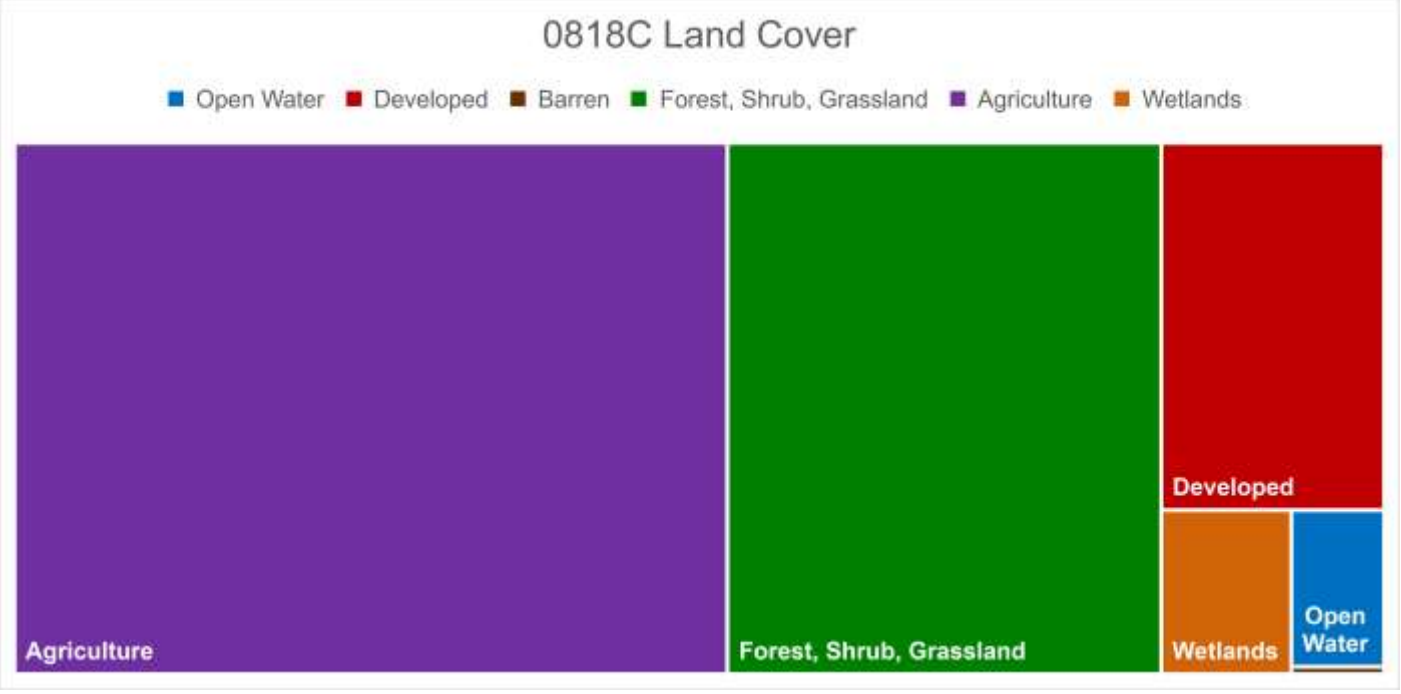

Figure 146: 0818C relative land cover totals

Ongoing Projects

- Routine monitoring of metal, conventional, bacteria, flow, and field parameters six times a year and flow severity an additional six times a year. at Station 21000 conducted by Tarrant Regional Water District.

Description of Water Quality Issue

Concerns were identified for total phosphorus and nitrate in this segment. Table 50 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, these concerns may still exist as 36% of the total phosphorus data exceeded the screening level of 0.69 mg/L and 47% of the nitrate data exceeded the screening level of 1.95 mg/L (Figure 147). Nitrate plus nitrite data is used for the assessment when nitrate as a single species is not available. In most cases, nitrite concentrations are either low or non-detectable.

Table 50: Summary of General Use data for Segment 0818C

	2022 Integrated Report Data		BHR POR Data	
AU	0818C_01	0818C_01	0818C_01	0818C_01
Method	Total phosphorus	Nitrate	Total phosphorus	Nitrate
Criteria	0.69	1.95	0.69	1.95
# Data Assessed	39	39	55	55
# Exceedances	12	16	20	26
Mean Exceedances	1.05	4.65	3.12	5.29
DS Qualifier	AD	AD	AD	AD
LOS	CS	CS	CS	CS
CF	N	N	.	.
Int LOS	CS	CS	.	.

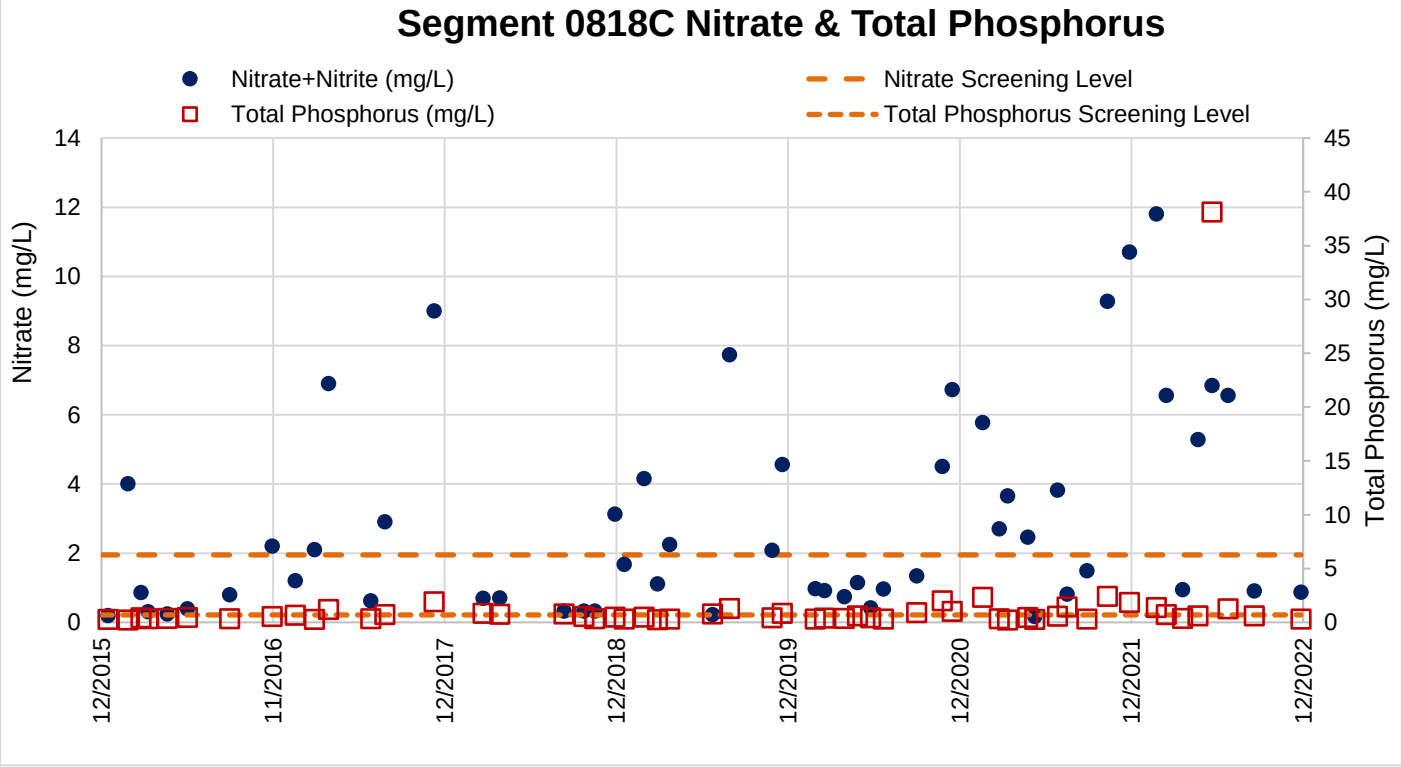

Figure 147: Segment 0818C Nitrate & Total Phosphorus

Potential Causes of Water Quality Issue

There was a moderate inverse correlation between nitrate plus nitrite and flow (coefficient = -0.429). This pattern is common in effluent dominated streams as most wastewater treatment facilities do not have advanced nutrient removal technology. At lower flows, concentrations of these parameters were higher and decreased with increasing flow due to dilution from precipitation inflows. Station 21000 is approximately 11 miles downstream of a discharger outfall. There was no correlation between total phosphorus and flow. However, the lack of correlation for total phosphorus may be due to the distance between the upstream discharger and Station 21000, the confluence of two additional streams upstream of the monitoring station, and runoff from fertilizers used on the cultivated crop land located directly to the northwest of the station (Figure 148).

Figure 148: Land use adjacent to Station 21000

Recommendations for Improving Water Quality

There are no recommendations for decreasing nitrate levels at this time. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely remain until such technology is widely available and cost effective. If the source of total phosphorus is related to fertilizers, landowner education and fertilizer best management practices may help address this concern. Sampling upstream of these agricultural areas may help verify if these are the source of total phosphorus.

Potential Stakeholders

- Tarrant Regional Water District
- Poetry Water Supply Corporation
- Tawakoni Balancing Reservoir
- Landowners
- City of Terrel
- Terrel Texas Municipal Airport
- Homeowners and homeowners associations
- City of Post Oak Bend
- City of Kaufman

0819 – East Fork Trinity River

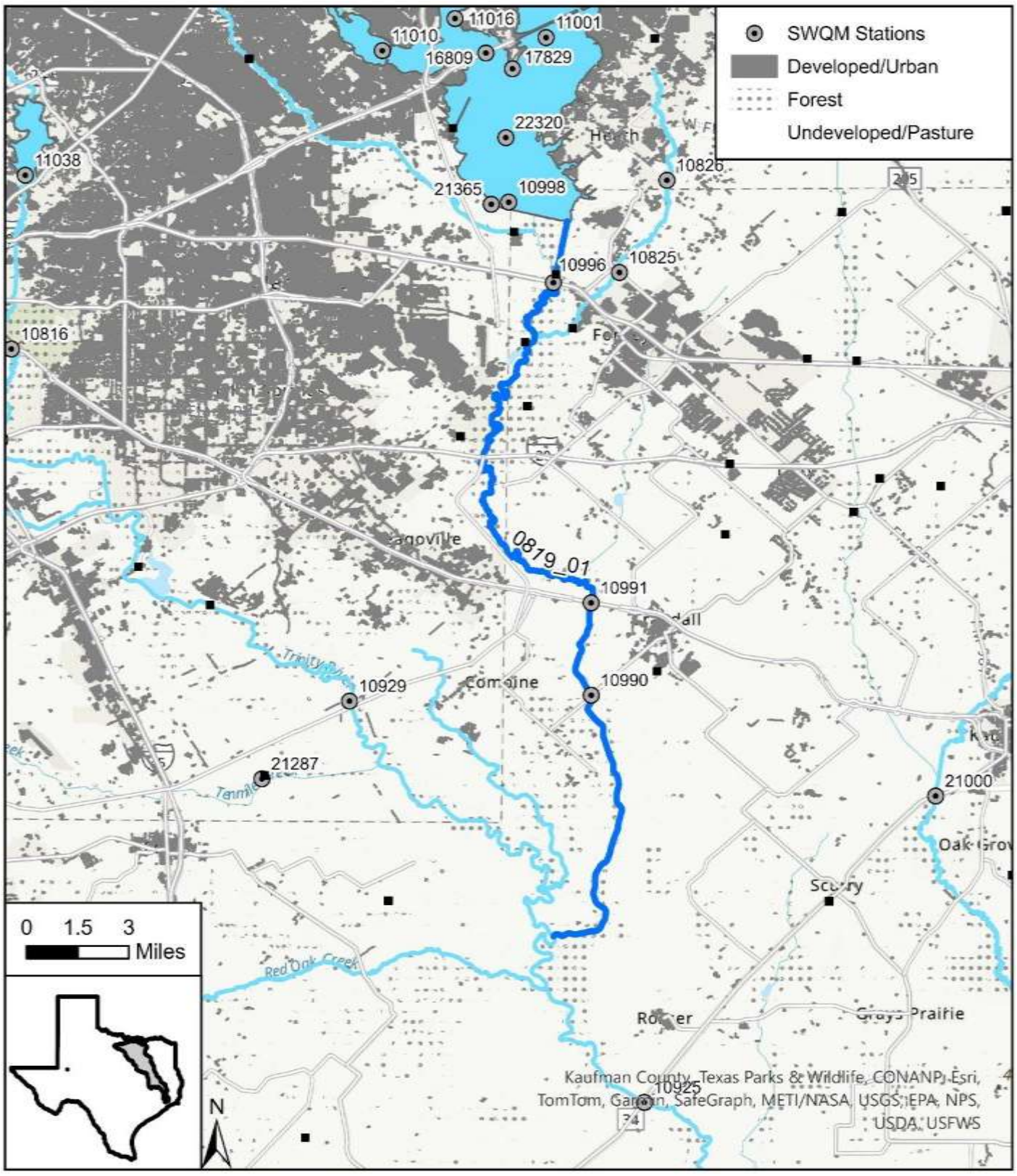

Figure 149: Map of Segment 0819

Segment Description

This 29.3-mile segment stretches from the Rockwall-Forney Dam in Kaufman County to the confluence of the Trinity River in Kaufman County.

Assessment Units and Monitoring Stations

- **0819_01** - From the confluence with the Trinity River in Kaufman County to Rockwall-Forney Dam in Kaufman County
    - Perennial freshwater stream
    - **10991** - East Fork Trinity River at US 175 northwest of Crandall river Kilometer 20.3
        - Sampling conducted by TCEQ from 2015 to 2024
    - **10996** - East Fork Trinity River at US 80 northwest of Forney
        - Sampling conducted by TCEQ from 2015 to 2024

Hydrology

Segment 0819 is a fourth order stream at its most downstream end. There are two USGS flow gages in this segment: 08061750 near Forney and 08062000 near Crandall. The median flow at these gages were 82.65 cfs at the upstream Forney gage to 105 cfs at the downstream Crandall gage with a range of 25.4 to 16,300 cfs at these gages. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these two gages are listed below.

- Non-Index Period – 86.1 to 106 cfs
- Index Period – 99.8 to 183 cfs
- Critical Period – 73.75 to 80.15 cfs

Land Use and Natural Characteristics

Hay, pasture, and crop land make up most of the land use in the watershed. There are also woody wetlands adjacent to the river. There are some areas of development in the cities of Mesquite, Balch Springs, Forney, Seagoville, Crandall, and Combine. The Floodplains and Low Terraces ecoregion makes up the immediate watershed around the river while the tributaries flow through the Northern Blackland Prairie.

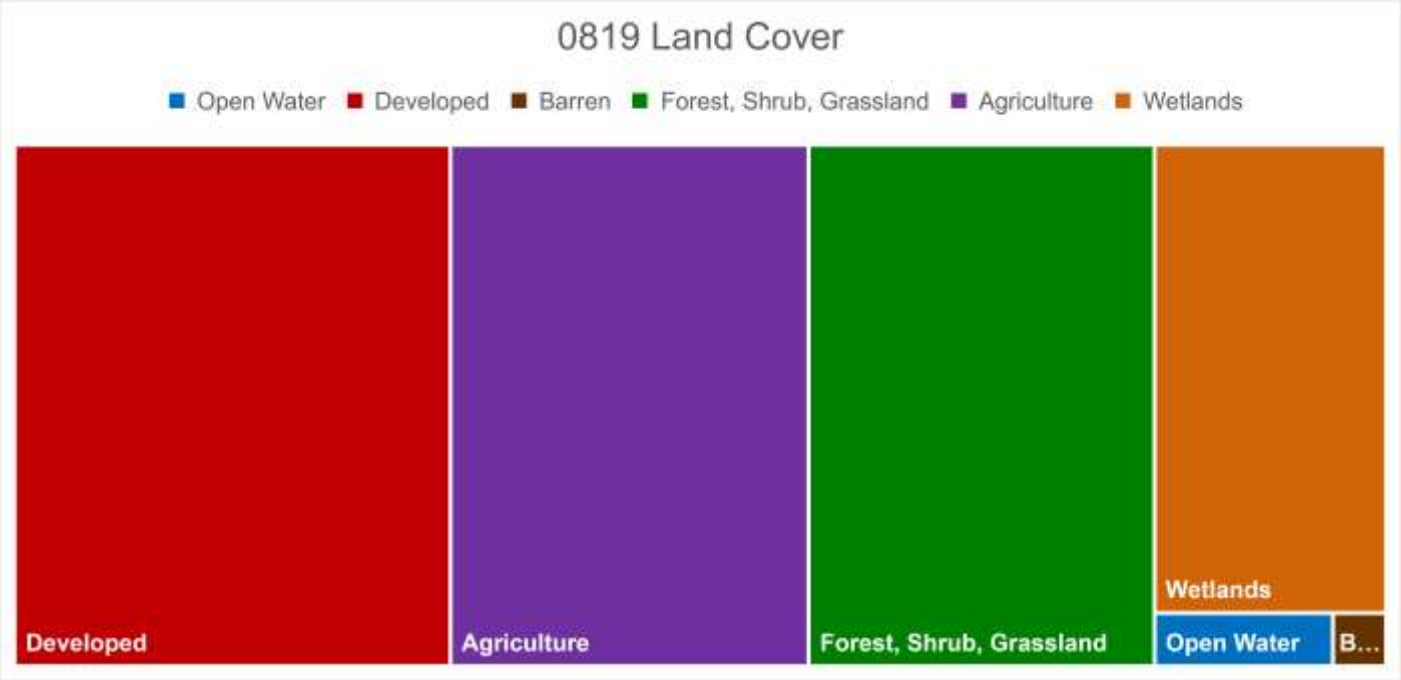

Figure 150: 0819 relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of conventional, bacteria, flow, and field parameters and metals in water and sediment twice a year at Station 10991 conducted by TCEQ Region 4.
- Routine quarterly monitoring of conventional, bacteria, flow, and field parameters and metals in water and sediment twice a year at Station 10996 conducted by TCEQ Region 4.

Description of Water Quality Issue

Concerns were identified for total phosphorus, nitrate, and chlorophyll-*a* in this segment. Table 51 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Monitoring in this segment has been conducted at Station 10996, downstream of the Lake Ray Hubbard dam, and at Station 10991, near the middle of the segment. Based on recently collected data, these concerns may still exist as 68% of the total phosphorus data exceeded the screening level of 0.69 mg/L, 74% of the nitrate data exceeded the screening level of 1.95 mg/L, and 28% of chlorophyll-*a* data exceeded 14.1 µg/L (Figure 151, Figure 152, and Figure 153). Nitrate plus nitrite data is used for the assessment when nitrate as a single species is not available. In most cases, nitrite concentrations are either low or non-detectable.

Table 51: Summary of General Use data for Segment 0819

	2022 Integrated Report Data			BHR POR Data		
AU	0819_01	0819_01	0819_01	0819_01 Station 10991	0819_01 Station 10991	0819_01 Station 10991
Method	Nitrate	Total phosphorus	Chlorophyll-*a*	Nitrate	Total phosphorus	Chlorophyll-*a*
Criteria	1.95	0.69	14.1	1.95	0.69	14.1
# Data Assessed	53	47	49	27	25	25
# Exceedances	40	34	16	17	16	4
Mean Exceedances	8.7	1.89	25.27	7.58	1.67	17.13
DS Qualifier	AD	AD	AD	AD	AD	AD
LOS	CS	CS	CS	CS	CS	NC
CF	N	N	N	.	.	.
Int LOS	CS	CS	CS	.	.	.

Table 51 continued

	BHR POR Data					
AU	0819_01 Station 10996	0819_01 Station 10996	0819_01 Station 10996	0819_01 Combined	0819_01 Combined	0819_01 Combined
Method	Nitrate	Total phosphorus	Chlorophyll-*a*	Nitrate	Total phosphorus	Chlorophyll-*a*
Criteria	1.95	0.69	14.1	1.95	0.69	14.1
# Data Assessed	27	25	25	54	50	50
# Exceedances	20	18	10	37	34	14
Mean Exceedances	8.99	2.36	23.18	8.35	2.04	21.45
DS Qualifier	AD	AD	AD	AD	AD	AD
LOS	CS	CS	CS	CS	CS	CS
CF	.	.	.	.	.	.
Int LOS	.	.	.	.	.	.

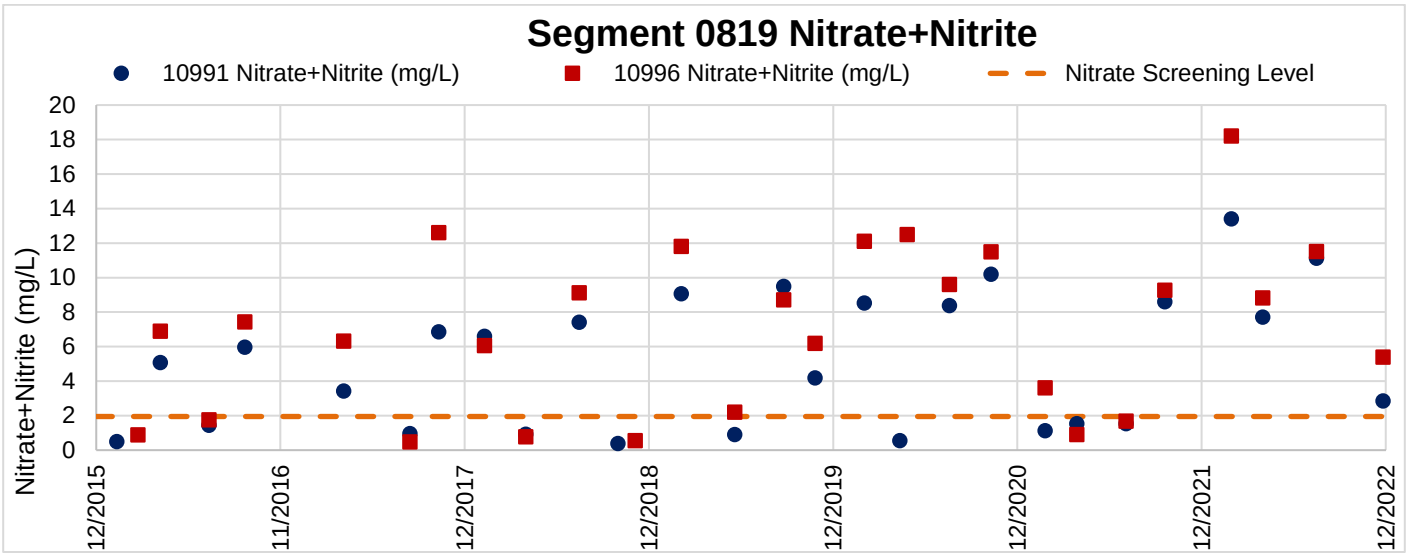

Figure 151: Segment 0819 Nitrate + Nitrite

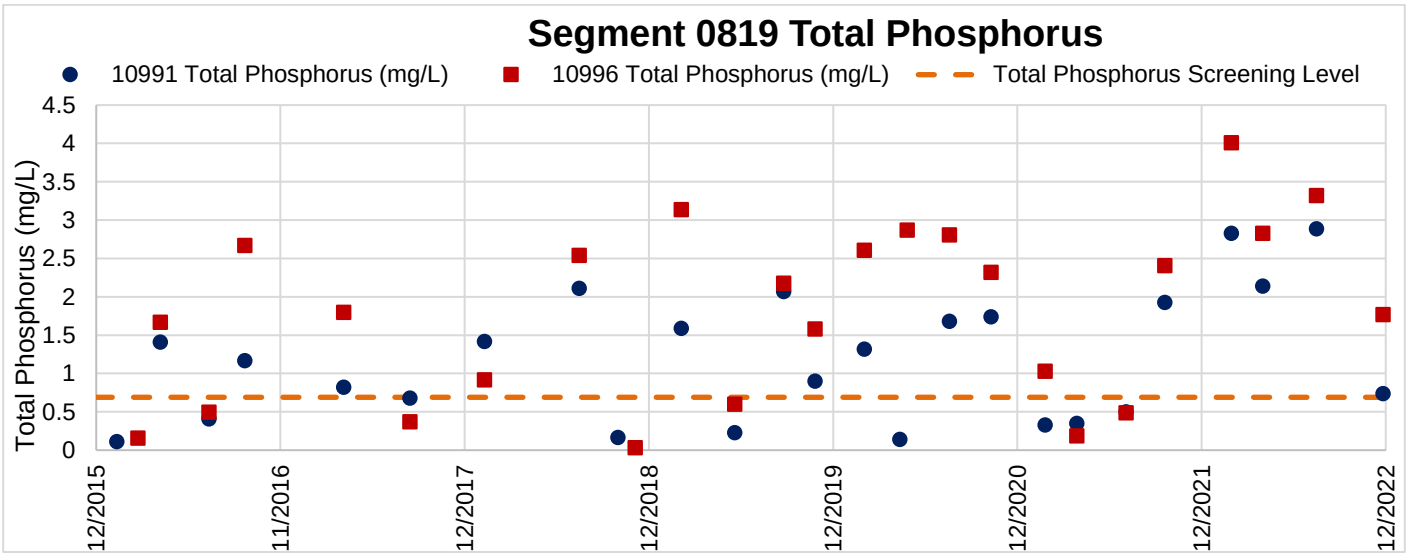

Figure 152: Segment 0819 Total Phosphorus

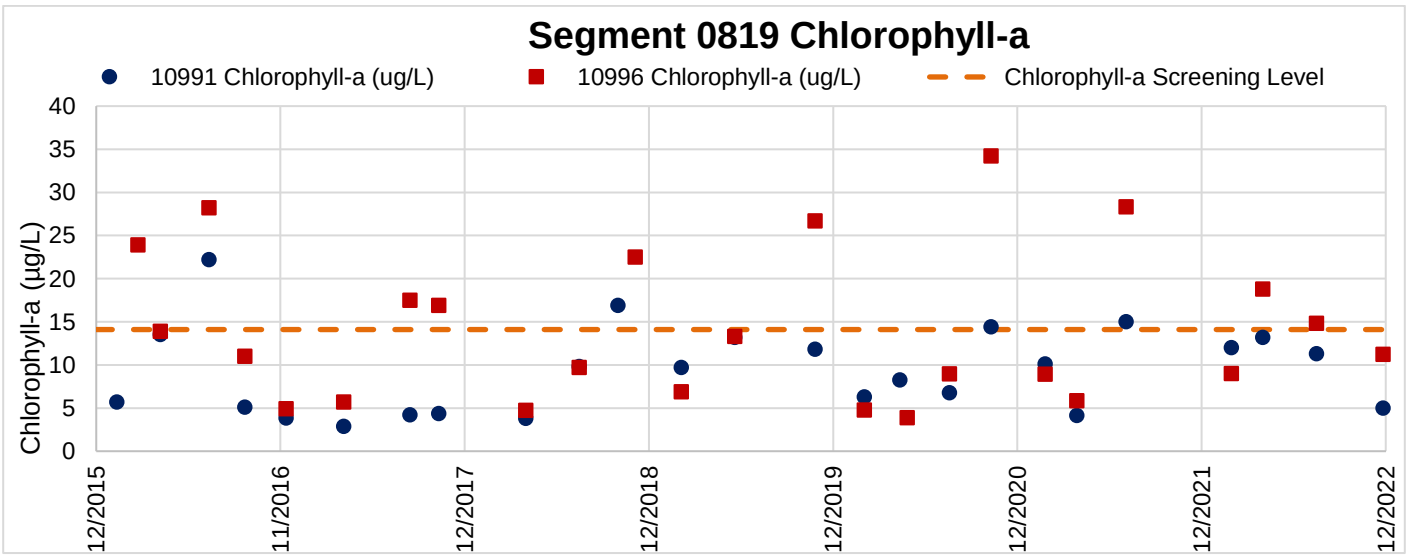

Figure 153: Segment 0819 Chlorophyll-a

Potential Causes of Water Quality Issue

Nitrate plus nitrite and total phosphorus were inversely correlated with flow (coefficients = -0.578 for nitrate+nitrite and -0.578 for total phosphorus at Station 10991 and -0.621 for nitrate+nitrite and -0.622 for total phosphorus at Station 10996). This pattern is commonly seen in effluent-dominated streams as many wastewater treatment facilities do not have advanced nutrient removal. There are several wastewater treatment facilities upstream of both stations that are contributing to these concerns. Chlorophyll-*a* was not correlated with nutrients at either station. It is possible that the source of chlorophyll-*a* in this segment are releases from Segment 0820 Lake Ray Hubbard.

Recommendations for Improving Water Quality

There are no recommendations for decreasing nitrate levels at this time. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- City of Forney
- City of Sunnyvale
- City of Mesquite
- City of Garland
- LA Frontera Holdings, LLC
- City of Dallas
- North Texas Municipal Water District
- Landowners
- City of Seagoville
- John Bunker Sands Wetland Center

0819B – Buffalo Creek

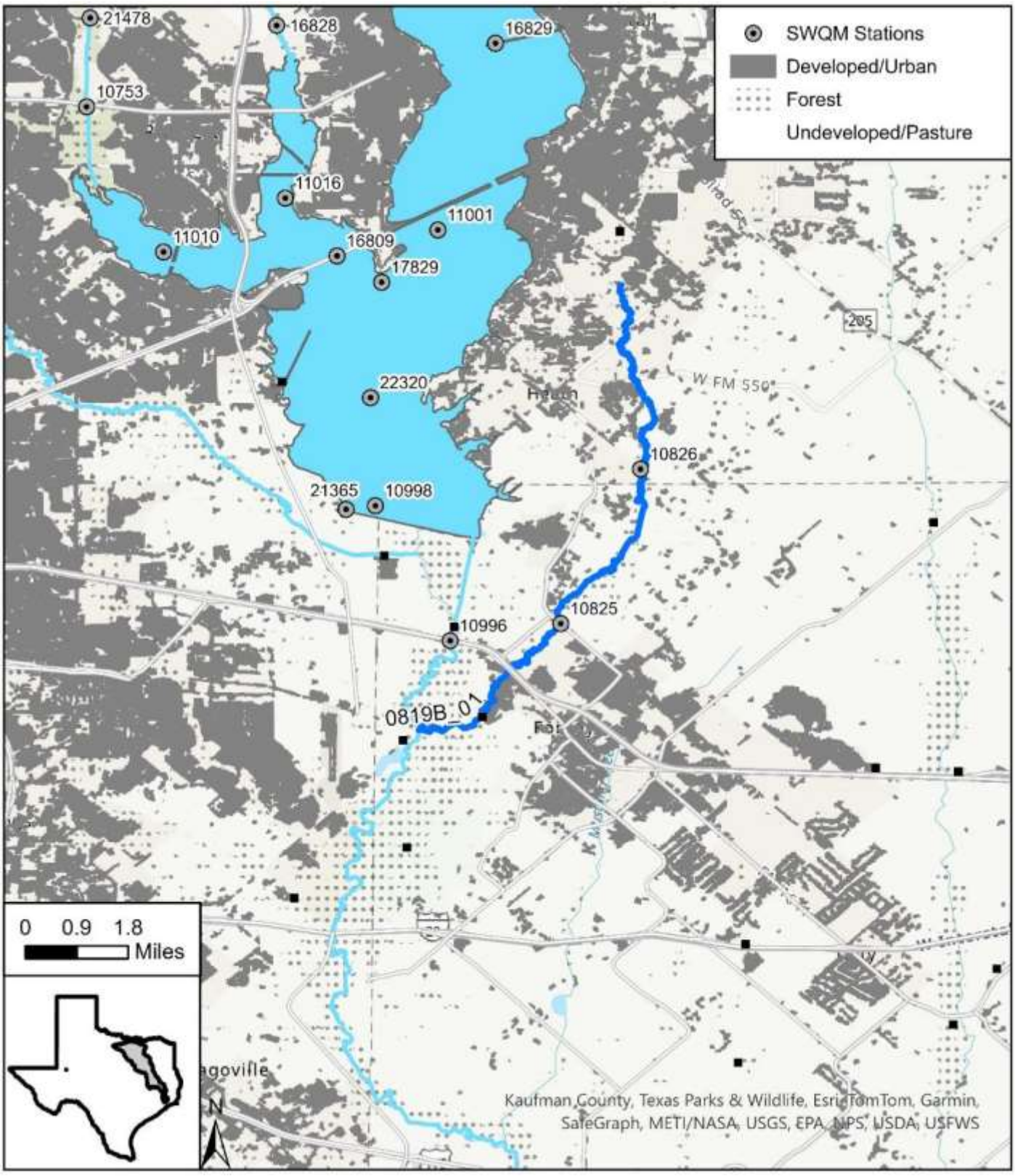

Figure 154: Map of Segment 0819B

Segment Description

This 13.2-mile unclassified segment runs from 0.6 kilometers above the confluence of Little Buffalo Creek to the confluence with the East Fork Trinity River.

Assessment Units and Monitoring Stations

- **0819B_01** - Perennial stream from the confluence with the East Fork Trinity River up to 0.6 km above the confluence of Little Buffalo Creek
    - Perennial freshwater stream
    - **10825** - Buffalo Creek at FM 740
        - Sampling conducted by TRA in 2022
    - **10826** - Buffalo Creek at King Street
        - Sampling conducted by TRA from 2022 to 2024

Hydrology

Unclassified segment 0819B is a first order stream at its most downstream end. Based on sampling at Station 10825, the median flow was 2.5 cfs with a range of 0.017 to 16 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 2.5 cfs
- Index Period – 2.35 cfs
- Critical Period – 5.15 cfs

Land Use and Natural Characteristics

Most of this stream flows through the Northern Blackland Prairie ecoregion with the lower end in the Floodplains and Low Terraces. Much of the development is on the west side of the stream and consists of residential communities. To the east of the stream, grassland, hay, and pastures are predominant. There are woody wetlands near the confluence with the East Fork.

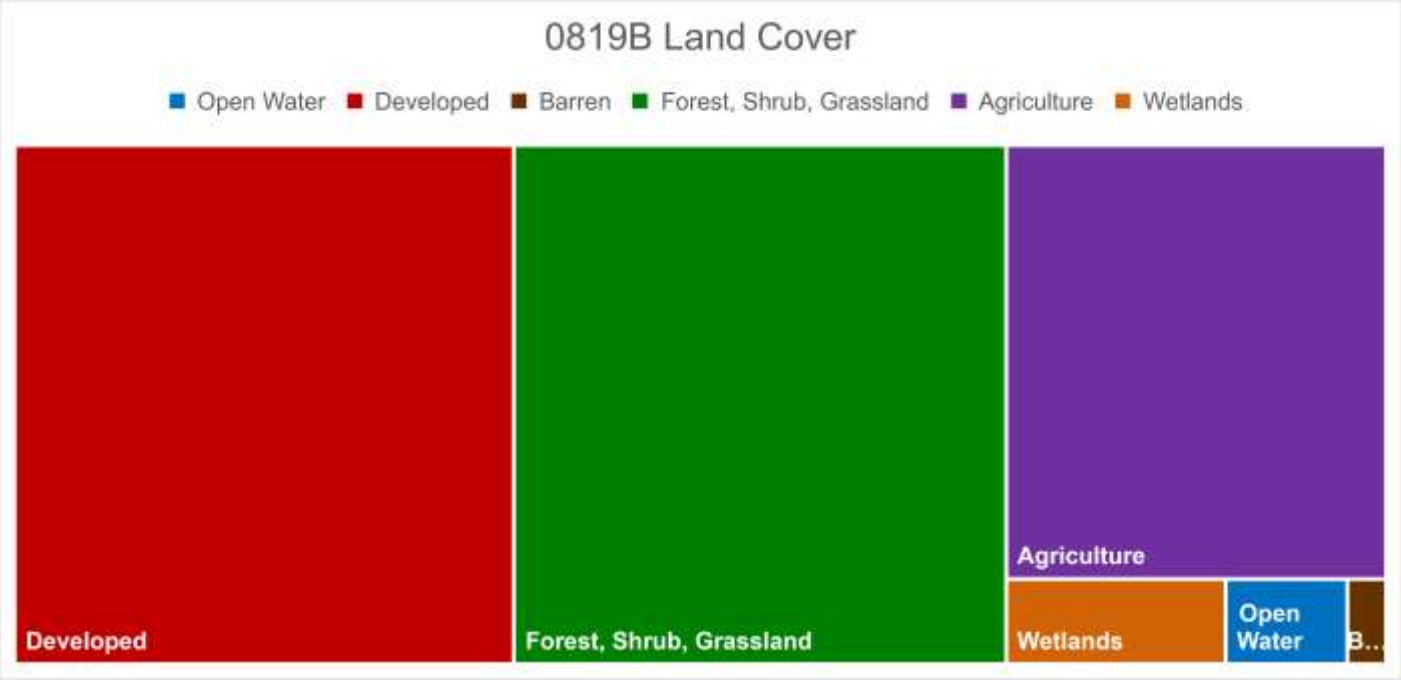

Figure 155: 0819B relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 10826 conducted by Trinity River Authority.

Description of Water Quality Issue

Concerns were identified for total phosphorus and nitrate in this segment. Table 52 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, these concerns may no longer exist. However, sampling has been conducted at two sites: first at Station 10825 before moving to Station 10826. There was a single exceedance at Station 10826 for both parameters (Figure 156).

Table 52: Summary of General Use data for Segment 0819B

	2022 Integrated Report Data		BHR POR Data					
AU	0819B_01	0819B_01	0819B_01 Station 10825	0819B_01 Station 10825	0819B_01 Station 10826	0819B_01 Station 10826	0819B_01 Combined	0819B_01 Combined
Method	Total phosphorus	Nitrate	Total phosphorus	Nitrate	Total phosphorus	Nitrate	Total phosphorus	Nitrate
Criteria	0.69	1.95	0.69	1.95	0.69	1.95	0.69	1.95
# Data Assessed	0	0	3	3	4	4	7	7
# Exceedances	.	.	0	0	1	1	1	1
Mean Exceedances	.	.	.	.	1.17	3.74	1.17	3.74
DS Qualifier	ID	ID	ID	ID	LD	LD	LD	LD
LOS	NA	NA	NA	NA	CS	CS	NC	NC
CF	Y	Y	.	.	.	.	.	.
Int LOS	CS	CS	.	.	.	.	.	.

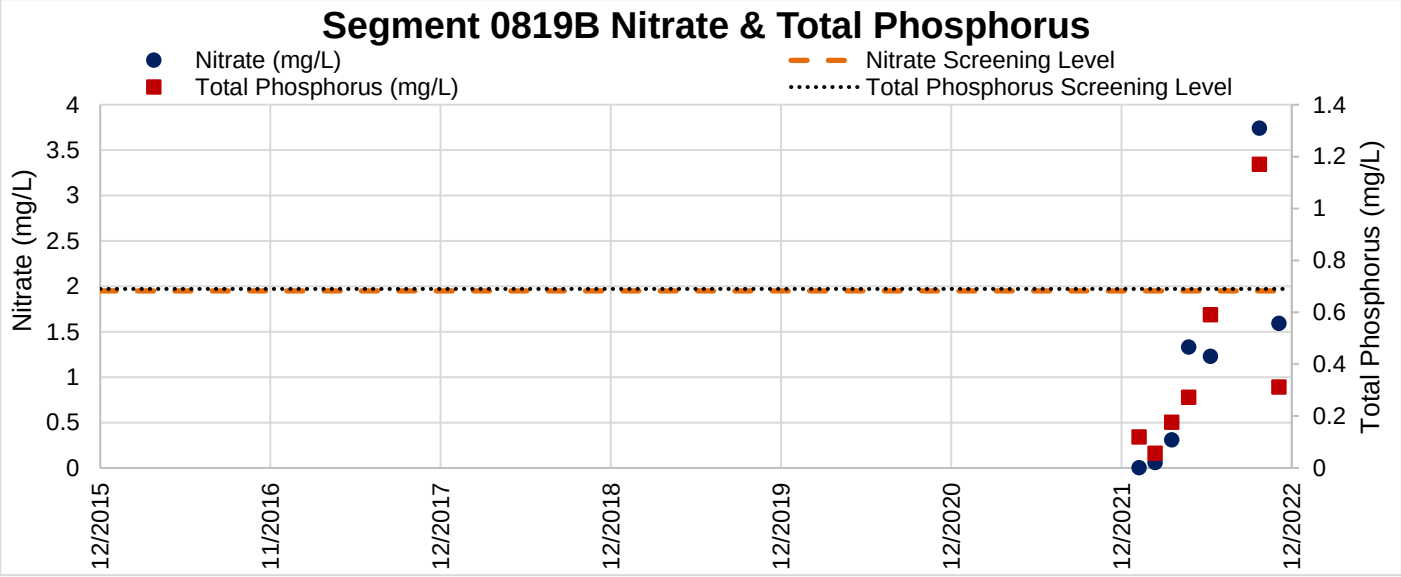

Figure 156: Segment 0819B Nitrate & Total Phosphorus

Potential Causes of Water Quality Issue

Although there is a wastewater treatment facility upstream of Station 10826, there was no correlation between nutrients and flow. There is too little data available to fully address the previously identified concerns.

Recommendations for Improving Water Quality

There are no recommendations for decreasing nutrient levels at this time. If it is determined in the future that the wastewater treatment facility is the source of nutrients, most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- TRA Technical Services and Basin Planning
- Homeowners and homeowners associations
- Landowners
- Buffalo Creek Golf Club
- City of Forney
- Luminant Forney Station

0820B – Rowlett Creek

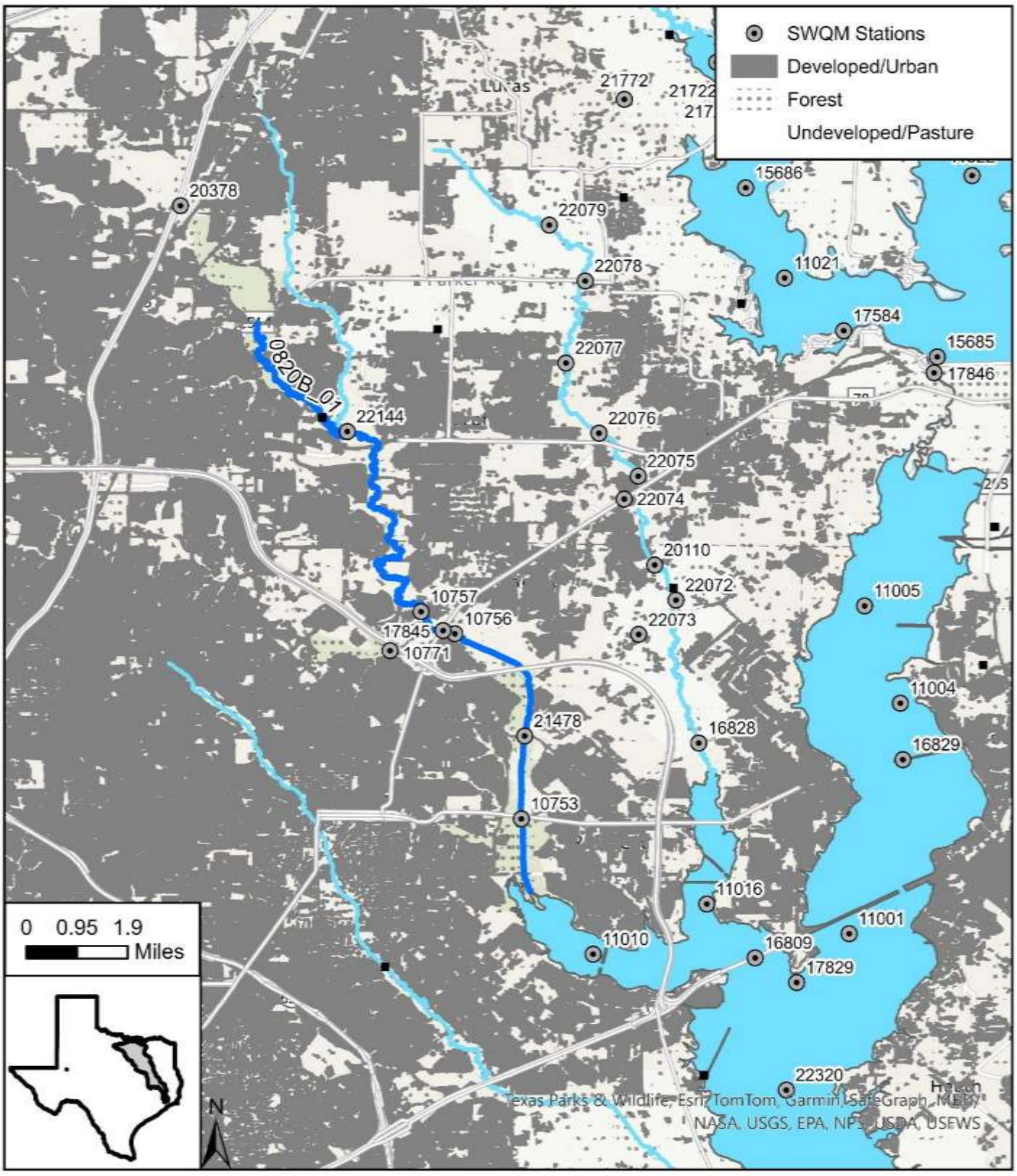

Figure 157: Map of Segment 0820B

Segment Description

This 17.3-mile segment runs from the Parker Road crossing to the normal pool elevation of Lake Ray Hubbard.

Assessment Units and Monitoring Stations

- **0820B_01** - From the normal pool elevation of Lake Ray Hubbard upstream to the Parker Road crossing
  - Perennial freshwater stream
  - **10756** - Rowlett Creek 45 meters downstream of Ben Davis/Damascus Road river Kilometer 8.5
    - Sampling conducted by TRA from 2020 to 2024
    - Sampling conducted by Dallas from 2022 to 2024
  - **17845** - Rowlett/Cottonwood Creek at SH 78 1.06 kilometers north of SH 190 southwest of Sachse
    - Sampling conducted by TRA from 2014 to 2019
  - **21478** - Rowlett Creek at Firewheel Parkway near Rowlett
    - Sampling conducted by Dallas from 2015 to 2020
    - Sampling conducted by A&M in 2020 and 2021
  - **22283** - West Rowlett Creek at Hwy 121 westbound access road in Frisco
    - Sampling conducted by Frisco from 2022 to 2024
  - **22284** - Rowlett Creek immediately downstream of Custer Road in Frisco
    - Sampling conducted by Frisco from 2022 to 2024
  - **10757** - Rowlett Creek at Brand Road river kilometer 10.3
    - Sampling conducted by AgriLife in 2020 and 2021
  - **10764** - Rowlett Creek immediately downstream of 14th Street/SH 544 river Kilometer 19.2
    - Sampling conducted by Plano from 2022 to 2024
  - **20378** - Rowlett Creek 100 meters downstream of US 75 in Allen/Plano
    - Sampling conducted by Plano from 2022 to 2024
    - Sampling conducted by AgriLife in 2020 and 2021

Hydrology

Unclassified segment 0820B is a third order stream at its most downstream end. Based on sampling at Stations 22284, 22283, and 20378 and data from USGS gage 08061540 near Sachse, median flows ranged from 0.2 cfs at the upstream Station 22284 to 94.45 cfs at the downstream USGS gage with a range from 0.024 cfs to 19,300 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these locations are listed below.

- Non-Index Period – 0.2 to 104.5 cfs
- Index Period – 0.25 to 109 cfs
- Critical Period – 0.35 to 64.4 cfs

Land Use and Natural Characteristics

A majority of the watershed is heavily developed by the cities of Allen, Plano, Sachse, Garland, and Rowlett. There are some forested riparian areas throughout the watershed. The stream flows through the Northern Blackland Prairie ecoregion. A watershed protection plan is under development for this segment.

Figure 158: 0820B relative land cover totals

Figure 159: Rowlett Creek at Los Rios Boulevard in Plano

Ongoing Projects

- Rowlett Creek Watershed Protection Plan.
- Routine quarterly monitoring of bacteria, flow, and field parameters at Station 20378 conducted by City of Plano.
- Routine quarterly monitoring of bacteria, flow, and field parameters at Station 22250 conducted by City of Plano.
- Routine quarterly monitoring of bacteria, flow, and field parameters at Station 22254 conducted by City of Plano.
- Routine quarterly monitoring of flow and field parameters at Station 22283 conducted by City of Frisco.
- Routine quarterly monitoring of flow and field parameters at Station 22284 conducted by City of Frisco.
- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 10756 conducted by City of Dallas.
- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 10756 conducted by Trinity River Authority.
- Routine quarterly monitoring of bacteria, flow, and field parameters at Station 10764 conducted by City of Plano.

Description of Water Quality Issue

A concern was identified for nitrate in this segment. Table 53 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data at Stations 10756, 17845, and 21478, this concern may still exist as 84% of the nitrate data exceeded the screening level of 1.95 mg/L (Figure 160).

Table 53: Summary of General Use data for Segment 0820B

	2022 Integrated Report Data	BHR POR Data			
AU	0820B_01	0820B_01 Station 10756	0820B_01 Station 17845	0820B_01 Station 21478	0820B_01 Combined
Method	Nitrate	Nitrate	Nitrate	Nitrate	Nitrate
Criteria	1.95	1.95	1.95	1.95	1.95
# Data Assessed	19	26	11	55	92
# Exceedances	16	25	8	44	77
Mean Exceedances	5.87	6.01	4.64	5.2	5.4
DS Qualifier	AD	AD	AD	AD	AD
LOS	CS	CS	CS	CS	CS
CF	N	.	.	.	.
Int LOS	CS	.	.	.	.

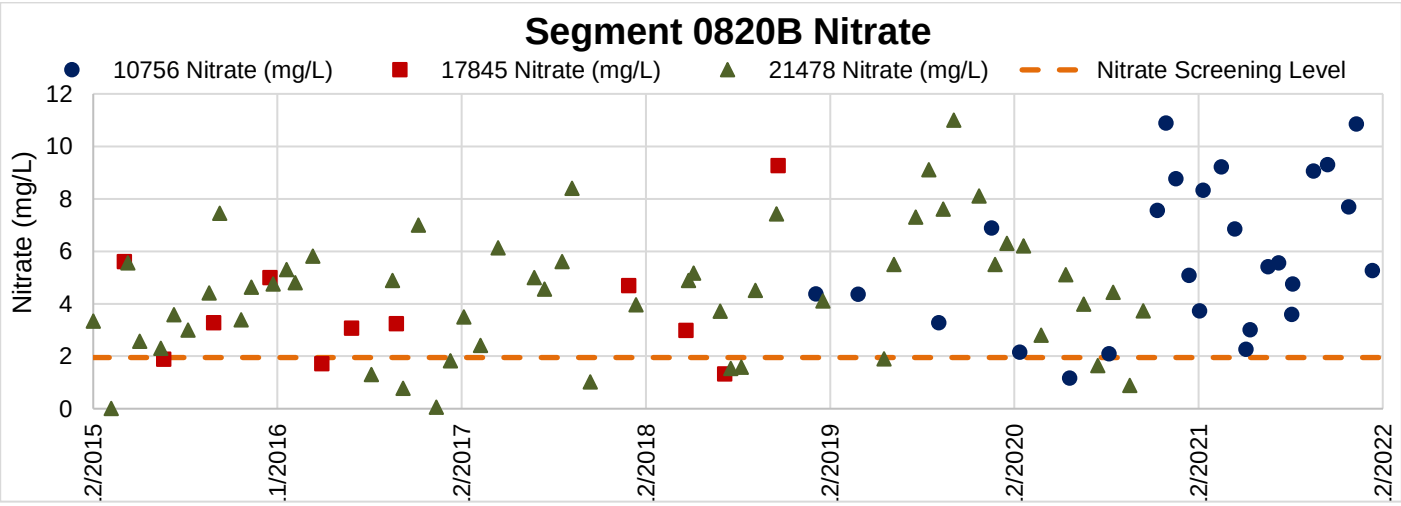

Figure 160: Segment 0820B Nitrate

Potential Causes of Water Quality Issue

There were moderate inverse correlations between nitrate and flow at these stations (coefficients between -0.487 and -0.634). This pattern is common in effluent dominated streams as most wastewater treatment facilities do not have advanced nutrient removal technology. At lower flows, concentrations of these parameters were higher and decreased with increasing flow due to dilution from precipitation inflows. There is a discharger approximately six miles upstream of Station 17845.

Recommendations for Improving Water Quality

There are no recommendations for decreasing nitrate levels at this time. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- City of Dallas
- City of Frisco
- Oak Point Park and Nature Preserve
- City of Plano
- North Texas Municipal Water District
- TRA Technical Services and Basin Planning
- Homeowners and homeowners associations
- Landowners
- City of Richardson
- City of Garland
- Firewheel Golf Park
- City of Rowlett

0820C – Muddy Creek

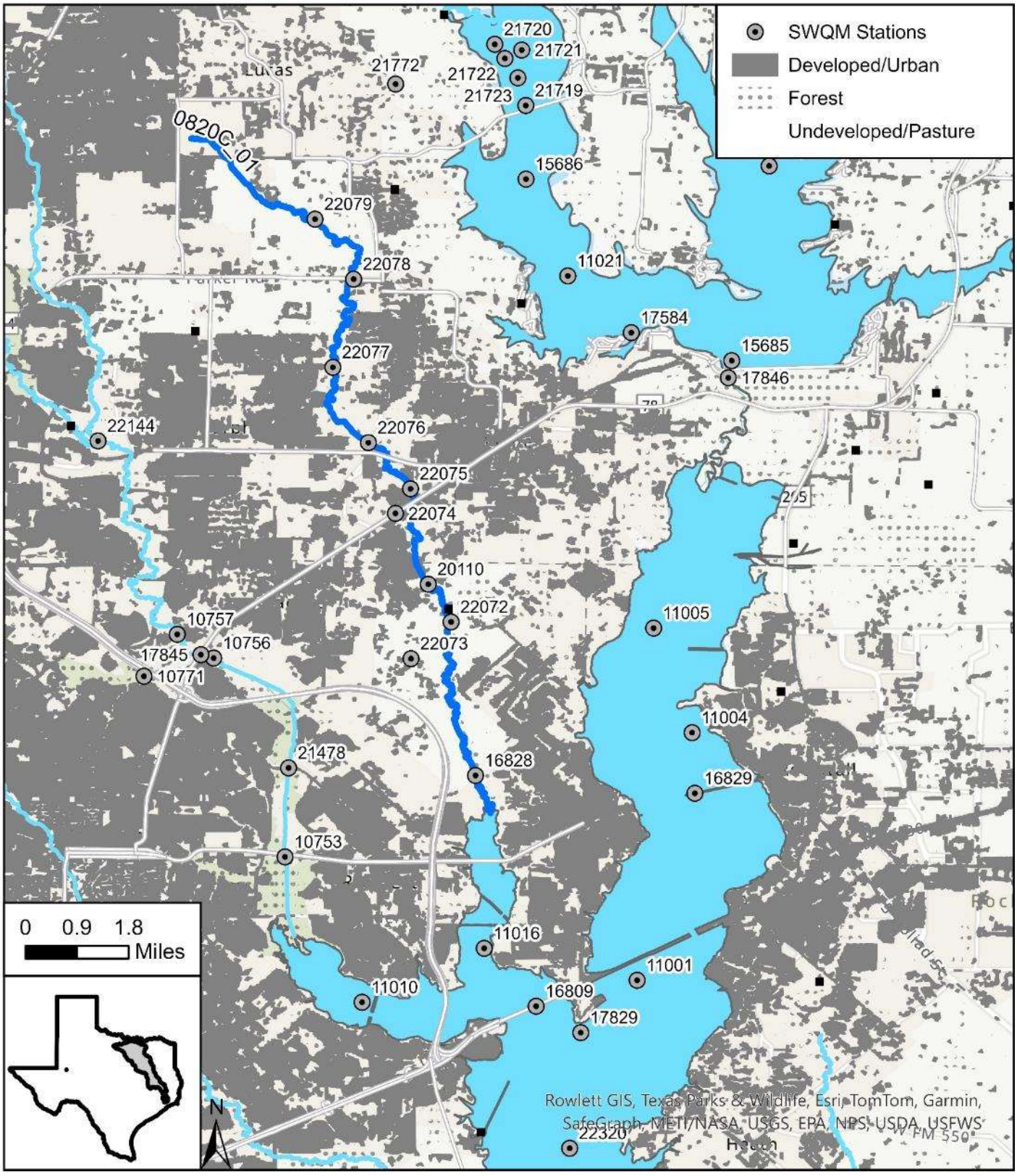

Figure 161: Map of Segment 0820C

Segment Description

This 18.4-mile unclassified segment runs from the headwaters east of Allen in Collin County to the confluence with Lake Ray Hubbard in Dallas County.

Assessment Units and Monitoring Stations

- **0820C_01** - From the confluence with Lake Ray Hubbard, in Dallas County, to the headwaters east of Allen, in Collin County
    - Perennial freshwater stream
    - **16828** - Muddy Creek at Liberty Grove Road 0.65 kilometers upstream of Lake Ray Hubbard
        - Sampling conducted by the City of Dallas (collecting entity code DA) from 2015 to 2024

Hydrology

Unclassified segment 0820C is a second order stream at its most downstream end. There is one USGS flow gage in this segment: 08061548 at Creek Crossing Lane near Sachse. The median flow at this gage was 11.1 cfs with a range of 0 to 1,790 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 15.4 cfs
- Index Period – 17.7 cfs
- Critical Period – 2.28 cfs

Land Use and Natural Characteristics

This stream flows through the Northern Blackland Prairie ecoregion and is heavily developed with mostly residential communities and some small commercial and light industrial areas. There are some areas of grassland that are mostly limited to parks and pockets of hay, pasture, and cultivated crops along the far upstream and downstream portions of the watershed.

Figure 162: 0820C relative land cover totals

Figure 163: Muddy Creek at Liberty Grove Road

Ongoing Projects

- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 16828 conducted by City of Dallas.

Description of Water Quality Issue

A concern was identified for nitrate in this segment. Table 54 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, this concern may still exist as 82% of the nitrate data exceeded the screening level of 1.95 mg/L (Figure 164).

Table 54: Summary of General Use data for Segment 0820C

	2022 Integrated Report Data	BHR POR Data
AU	0820C_01	0820C_01
Method	Nitrate	Nitrate
Criteria	1.95	1.95
# Data Assessed	0	71
# Exceedances	.	58
Mean Exceedances	.	11.4
DS Qualifier	ID	AD
LOS	NA	CS
CF	Y	.
Int LOS	CS	.

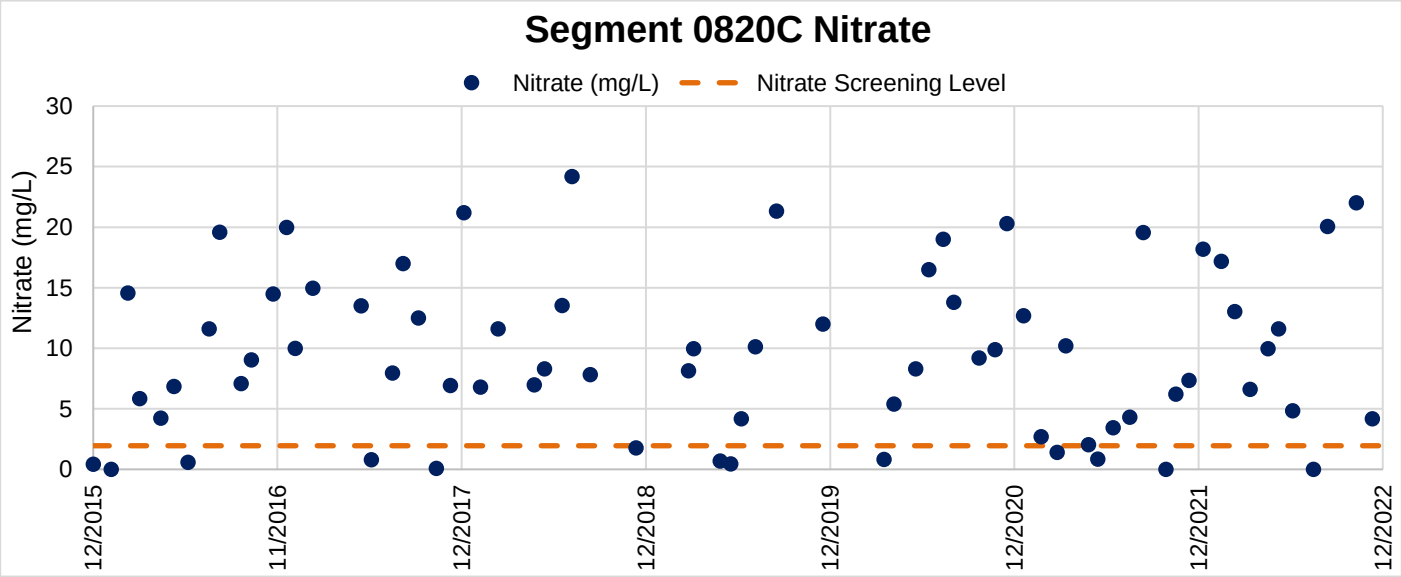

Figure 164: Segment 0820C Nitrate

Potential Causes of Water Quality Issue

There was a moderate inverse correlation between nitrate and recategorized flow severity (coefficient = -0.347). This pattern is common in effluent dominated streams as most wastewater treatment facilities do not have advanced nutrient removal technology. At lower flows, concentrations of these parameters were higher and decreased with increasing flow due to dilution from precipitation inflows. There is a discharger approximately 3.5 miles upstream of Station 16828.

Recommendations for Improving Water Quality

There are no recommendations for decreasing nitrate levels at this time. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- City of Dallas
- Homeowners and homeowners associations
- City of Lucas
- City of Wylie
- North Texas Municipal Water District

0822 – Elm Fork Trinity River Below Lewisville Lake

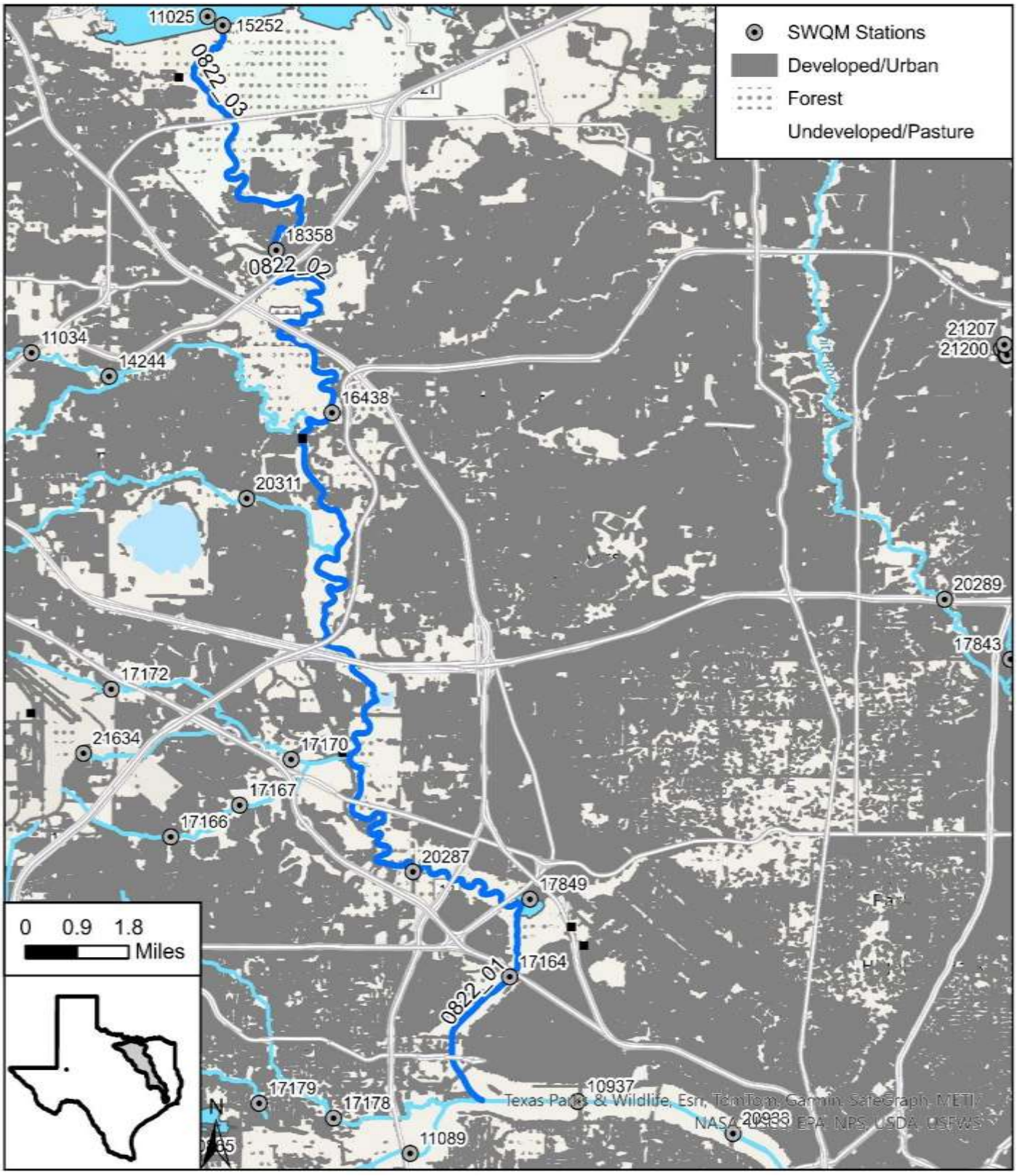

Figure 165: Map of Segment 0822

Segment Description

This 30-mile segment runs from Lewisville Dam in Denton County to the confluence with the West Fork Trinity River in Dallas County.

Assessment Units and Monitoring Stations

- **0822_01** - Lower 11 mi of segment
  - Perennial freshwater stream
  - **20287** - Elm Fork Trinity River at Wildwood Drive-TomBraniff Drive in Dallas
    - Sampling conducted by TRA from 2015 to 2024
- **0822_02** - 4.5 mi upstream to 7.5 mi downstream Dallas Water Utilities intake
  - Perennial freshwater stream
  - **16438** - Elm Fork Trinity River at intake of Dallas Water Utilities Elm Fork Treatment Plant 738 meters downstream of confluence with Denton Creek in Carrollton
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2015 to 2024
- **0822_03** - 1.0 mi upstream to 4.5 mi downstream SH 121
  - Perennial freshwater stream
- **18358** - Elm Fork Trinity River immediately downstream of Hebron Parkway southeast of Lewisville
  - Sampling conducted by the City of Dallas (collecting entity code DA) from 2015 to 2024
- **0822_04** - Upper 1.5 mi of segment
  - Perennial freshwater stream
- **15252** - Elm Fork Trinity River at Lewisville Lake spillway 3 miles northeast of Lewisville
  - Sampling conducted by the City of Dallas (collecting entity code DA) from 2015 to 2024

Figure 166: Elm Fork Trinity River upstream of SH 356

Hydrology

Segment 0822 is a sixth order stream at its most downstream end. There are three USGS flow gages in this segment: 08053000 near Lewisville, 08055500 near Carrollton, and 08055560 at Spur 348 in Irving. Flow is also collected at Station 20287. The median flow at these gages ranged from 379 cfs at the upstream Lewisville gage to 847 cfs at the downstream Station 20287 with a range of 0 to 12,500 cfs at these locations. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these four locations are listed below.

- Non-Index Period – 313 to 745 cfs
- Index Period – 596.5 to 2,087 cfs
- Critical Period – 200.5 to 377 cfs

Land Use and Natural Characteristics

This watershed flows through the Northern Blackland Prairie ecoregion. It is heavily developed and includes the cities of Lewisville, Carrollton, Irving, and west and northwest Dallas. Most of the development is industrial, especially on the east side of the river, but there is considerable residential development as well. Along the river corridor, there are woody and emergent herbaceous wetlands, forest, and grasslands.

Figure 167: 0822 relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of bacteria, flow, and field parameters at Station 22258 conducted by City of Plano.
- Routine quarterly monitoring of conventional, bacteria, flow, and field parameters and metals twice a year at Station 20287 conducted by Trinity River Authority.
- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 16438 conducted by City of Dallas.
- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 18358 conducted by City of Dallas.
- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 15252 conducted by City of Dallas.

Description of Water Quality Issue

This segment was found to have a concern due to elevated chlorophyll-*a* concentrations in Assessment Unit 0822_01. Table 55 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, this concern may still exist as 44% of the data exceeded the screening level of 14.1 µg/L (Figure 168). No recent chlorophyll-*a* sampling has been conducted in Assessment Unit 0822_04 and this concern has been carried forward from previous assessments.

Table 55: Summary of General Use data for Segment 0822

	2022 Integrated Report Data		BHR POR Data	
AU	0822_01	0822_04	0822_01	0822_04
Method	Chlorophyll-*a*	Chlorophyll-*a*	Chlorophyll-*a*	Chlorophyll-*a*
Criteria	14.1	14.1	14.1	14.1
# Data Assessed	25	0	27	1
# Exceedances	12	.	12	0
Mean Exceedances	41.83	.	35.83	.
DS Qualifier	AD	ID	AD	ID
LOS	CS	NA	CS	NA
CF	N	Y	.	.
Int LOS	CS	CS	.	.

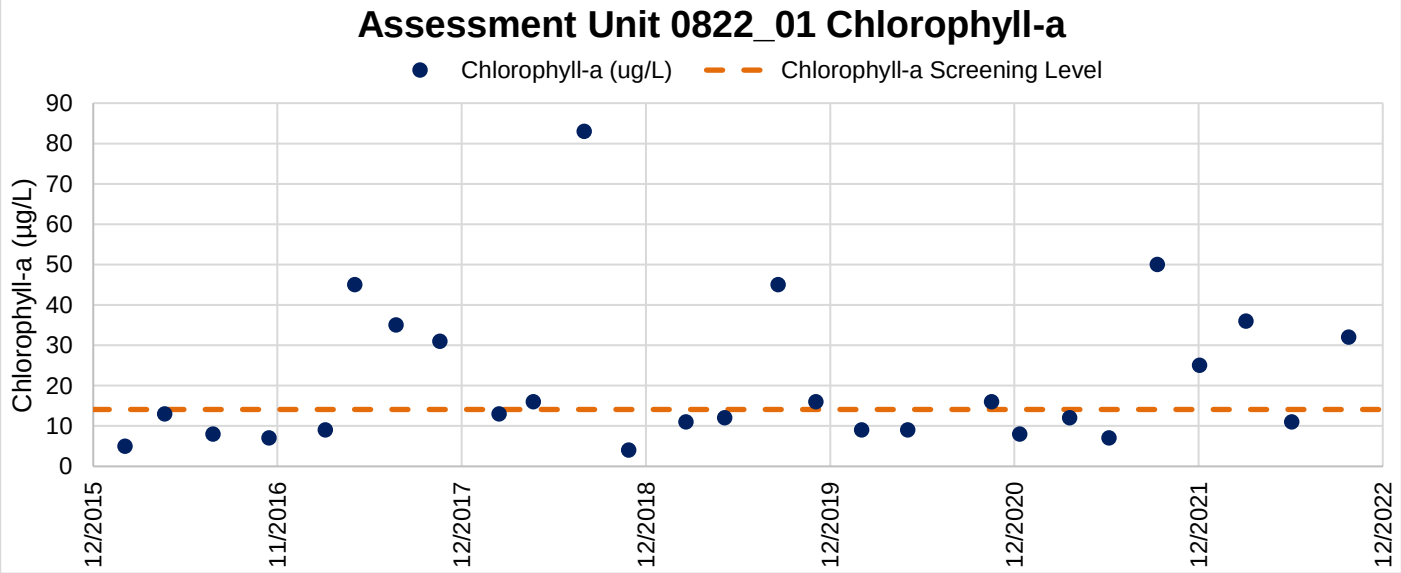

Figure 168: Assessment Unit 0822_01 Chlorophyll-a

Potential Causes of Water Quality Issue

Chlorophyll-*a* was negatively correlated to flow (coefficient = -0.504). This indicates that higher chlorophyll-*a* levels were observed at lower flows which may be due to drought conditions. There were moderate correlations between chlorophyll-*a*, total Kjeldahl nitrogen, and total phosphorus (coefficients = 0.467 for total Kjeldahl nitrogen and 0.41 for total phosphorus). Nutrient availability and longer residence times at lower flows may have been allowing algal populations to increase in the river. There are several wastewater treatment plants located upstream of Assessment Unit 0822_01 that may be contributing nutrients because most facilities do not yet have advanced nutrient removal technology.

Recommendations for Improving Water Quality

It is recommended that chlorophyll-*a* data be collected in Assessment Unit 0822_04 to further address this concern. However, it may be difficult to reduce chlorophyll-*a* levels by reducing nutrients as most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- City of Plano
- City of Lewisville
- Llela Nature Preserve
- Homeowners and homeowners associations
- TC Rice Jr. Natural Area
- City of Dallas
- TRA Technical Services and Basin Planning
- McInnish Sports Complex
- Riverchase Golf Club
- City of Valley Ranch
- City of Carrollton
- City of Irving

0822A – Cottonwood Branch

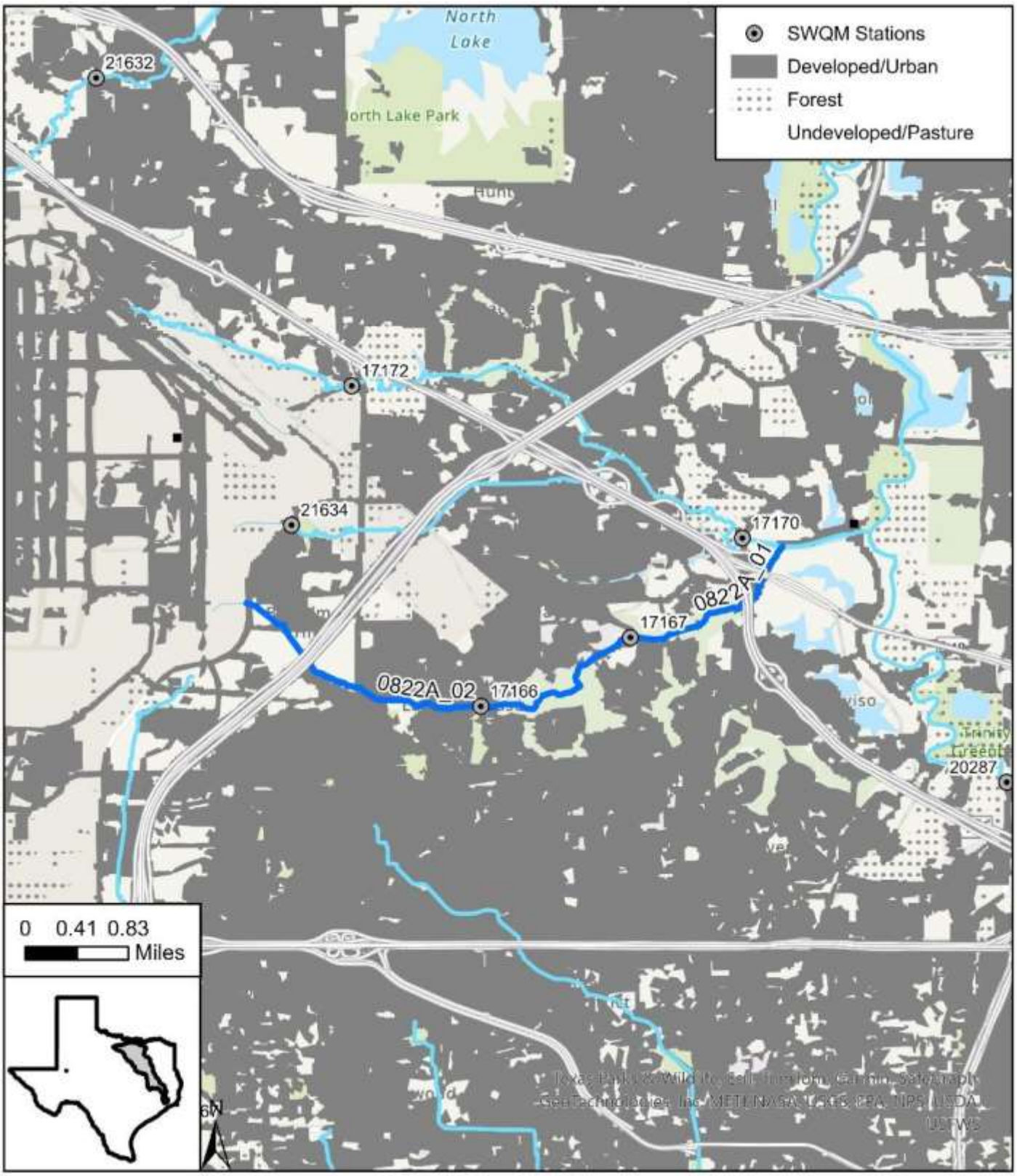

Figure 169: Map of Segment 0822A

Segment Description

This 6-mile unclassified segment runs from Valley View Road in Dallas County to the confluence with Hackberry Creek.

Assessment Units and Monitoring Stations

- **0822A_01** - A 2.5 mile stretch of Cottonwood Branch running upstream from confluence with Hackberry Creek to approx. 0.5 miles downstream of North Story Road in Dallas County
    - Freshwater stream, intermittent with perennial pools
    - **17167** - Cottonwood Branch 71 meters upstream of North MacArthur Boulevard in Irving
        - Sampling conducted by Irving from 2015 to 2024
- **0822A_02** - A 3.5 mile stretch of Cottonwood Branch running upstream from approximately 0.5 miles downstream of North Story Road to Valley View Road in Dallas County
    - Freshwater stream, intermittent with perennial pools
    - **17166** - Cottonwood Branch at North Story Road in Irving
        - Sampling conducted by Irving from 2015 to 2024

Hydrology

Unclassified segment 0822A is a first order stream at its most downstream end. Based on sampling at Station 17166, the median flow was 0.5 cfs with a range of 0.01 to 3.3 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 0.7 cfs
- Index Period – 0.6 cfs
- Critical Period – 0.2 cfs

Land Use and Natural Characteristics

The watershed is heavily developed, beginning at Dallas-Fort Worth International Airport and flowing through the City of Irving. It lies within the Northern Blackland Prairie ecoregion.

Figure 170: 0822A relative land cover totals

Ongoing Projects

- Routine monitoring of conventional, bacteria, and field parameters six times a year and metals twice a year at Station 17167 conducted by City of Irving.
- Routine monitoring of bacteria, flow, and field parameters six times a year at Station 17166 conducted by City of Irving.

Description of Water Quality Issue

A concern due to elevated chlorophyll-*a* concentrations was identified in Assessment Unit 0822A_01. Table 56 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, this concern may still exist as 48% of the data exceeded the screening level of 14.1 µg/L (Figure 171).

Table 56: Summary of General Use data for Segment 0822A

	2022 Integrated Report Data	BHR POR Data
AU	0822A_01	0822A_01
Method	Chlorophyll-*a*	Chlorophyll-*a*
Criteria	14.1	14.1
# Data Assessed	36	41
# Exceedances	14	20
Mean Exceedances	27.71	31.65
DS Qualifier	AD	AD
LOS	CS	CS
CF	N	.
Int LOS	CS	.

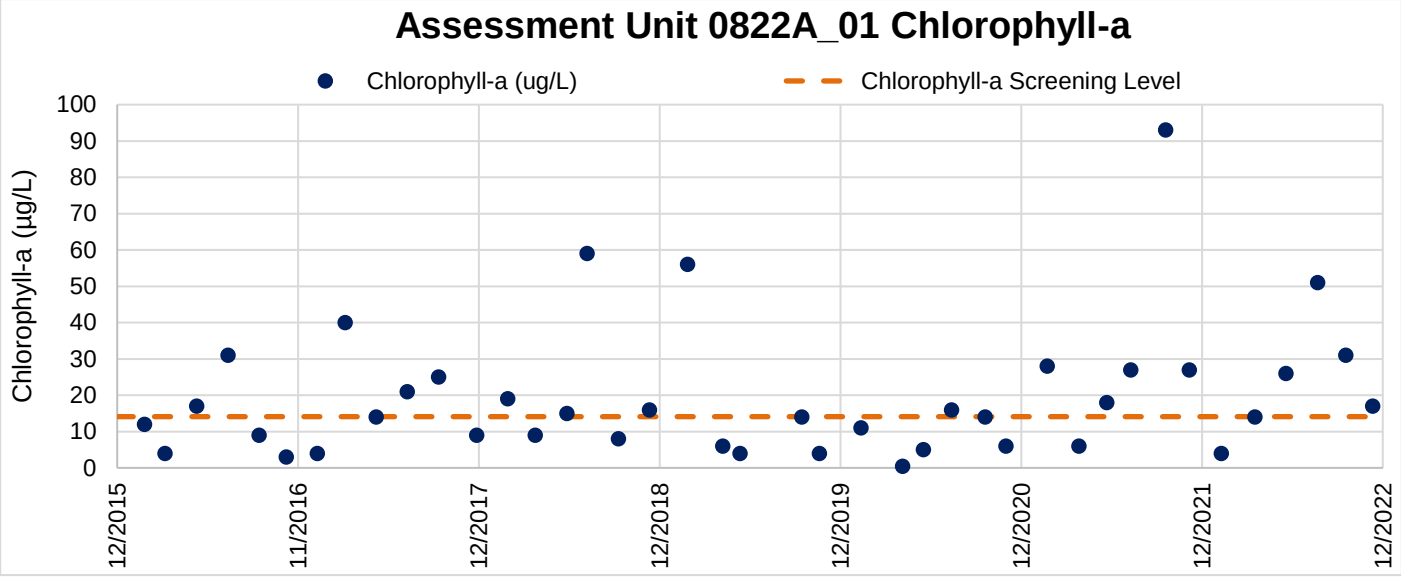

Figure 171: Assessment Unit 0822A_01 Chlorophyll-a

Potential Causes of Water Quality Issue

This portion of the stream flows through a golf course and has a widened channel with several low water dams, little tree cover, and relatively clear water with an average Secchi Depth of 0.44 meters. There were no strong correlations to nutrients. It is likely that the long residence times and clarity of the stream were responsible for the concern in this assessment unit.

Recommendations for Improving Water Quality

Continued monitoring of this assessment unit is recommended. It does not appear that algal populations are currently excessively affecting dissolved oxygen levels. The average dissolved oxygen at Station 17167 was 6.12 mg/L with only two samples reported below the screening level of 3 mg/L and none reported below the minimum criterion of 2 mg/L.

Potential Stakeholders

- City of Irving
- Homeowners and homeowners associations
- Cottonwood Valley Golf Course
- Dallas College North Lake
- Irving Convention Center at Las Colinas
- Dallas/Fort Worth International Airport Environmental Affairs Department

0822C – Hackberry Creek

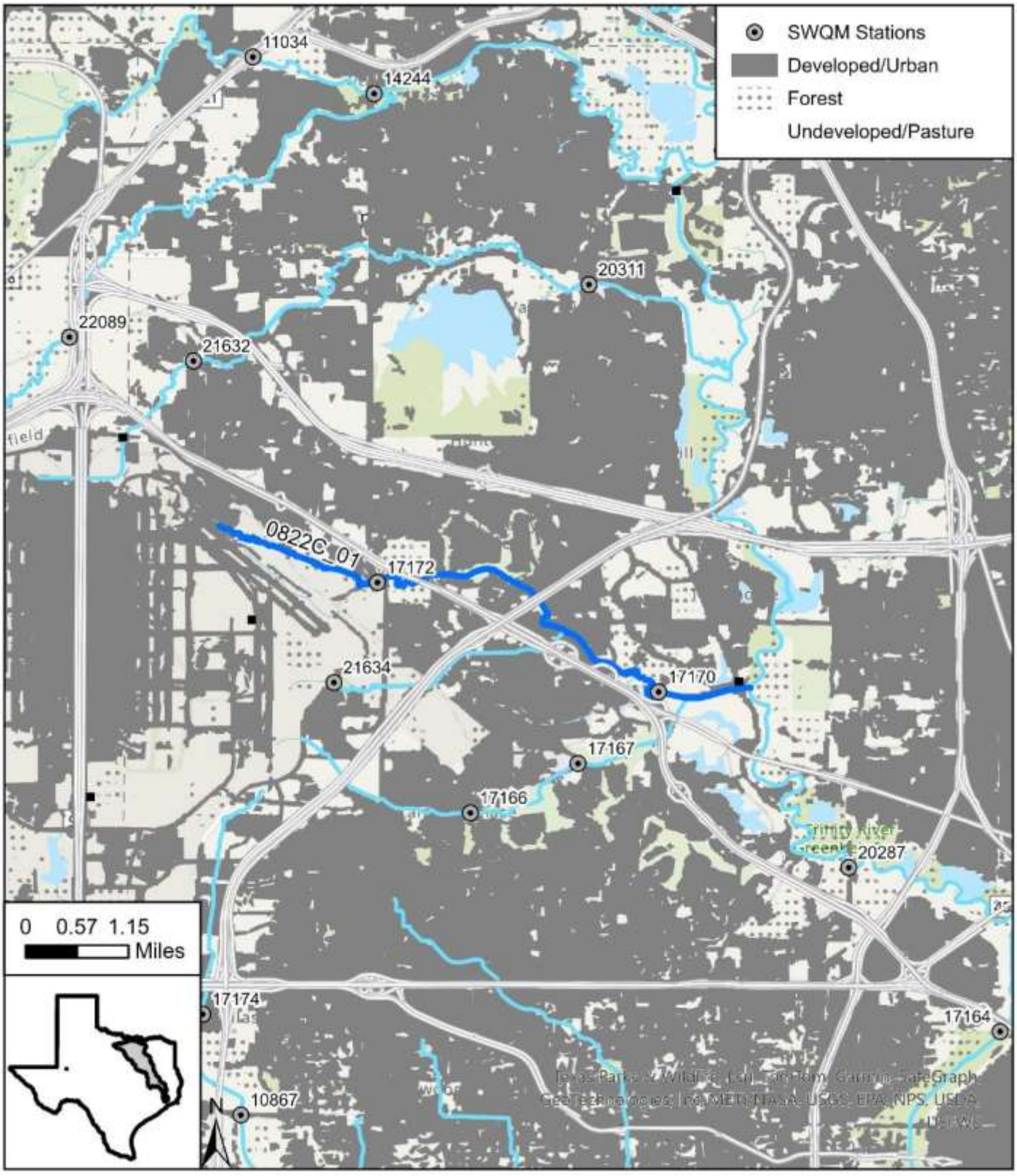

Figure 172: Map of Segment 0822C

Segment Description

This 5.5-mile unclassified segment runs from approximately 2.4 miles upstream of SH 114 in Irving to the confluence with Cottonwood Branch in Dallas County.

Assessment Units and Monitoring Stations

- **0822C_01** - A 5.5 mi stretch of Hackberry Creek running upstream from confluence with S. Fork Hackberry Creek to approximately 2.4 mi upstream of SH 114 in Irving in Dallas County
    - Perennial freshwater stream
    - **17170** - Hackberry Creek at Colwell Boulevard in Irving
        - Sampling conducted by the City of Irving from 2015 to 2024
    - **17172** - Hackberry Creek at Cabell Road in Irving
        - Sampling conducted by Dallas/Fort Worth International Airport Environmental Affairs Department from 2015 to 2024

Hydrology

Unclassified segment 0822C is a second order stream at its most downstream end. Based on sampling at Station 17172, the median flow was 1.15 cfs with a range of 0.06 to 51 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 1.1 cfs
- Index Period – 1.4 cfs
- Critical Period – 0.3 cfs

Land Use and Natural Characteristics

This stream flows through the Northern Blackland Prairie ecoregion. It is heavily developed and includes Dallas/Fort Worth International Airport and the commercial and residential areas around the City of Irving suburb of Las Colinas.

Figure 173: 0822C relative land cover totals

Figure 174: Hackberry Creek at Colwell Road in Irving

Ongoing Projects

- Routine monitoring of conventional, bacteria, flow, and field parameters six times a year and metals twice a year at Station 17170 conducted by City of Irving.
- Routine quarterly monitoring of metal, organic, conventional, bacteria, flow, and field parameters at Station 17172 conducted by Dallas/Fort Worth International Airport Environmental Affairs Department.

Description of Water Quality Issue

This segment was found to have a concern due to elevated chlorophyll-*a* concentrations.

Table 57 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, this concern may still exist as 35% of the data exceeded the screening level of 21 µg/L (Figure 175).

Table 57: Summary of General Use data for Segment 0822C

	2022 Integrated Report Data	BHR POR Data		
AU	0822C_01	0822C_01 Station 17170	0822C_01 Station 17172	0822C_01 Combined
Method	Chlorophyll-*a*	Chlorophyll-*a*	Chlorophyll-*a*	Chlorophyll-*a*
Criteria	14.1	14.1	14.1	14.1
# Data Assessed	42	41	7	48
# Exceedances	18	17	0	17
Mean Exceedances	25.06	24.47	.	24.47
DS Qualifier	AD	AD	LD	AD
LOS	CS	CS	NC	CS
CF	N	.	.	.
Int LOS	CS	.	.	.

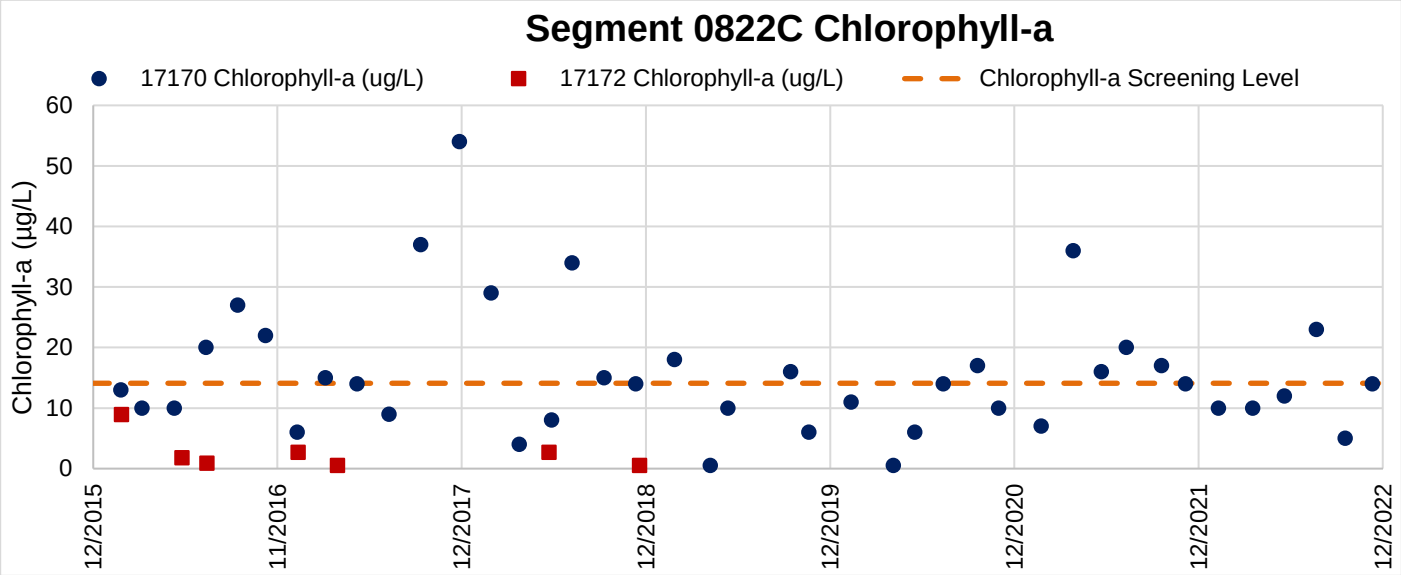

Figure 175: Segment 0822C Chlorophyll-a

Potential Causes of Water Quality Issue

Chlorophyll-*a* was weakly correlated to nitrate (correlation coefficient = 0.324). This stream has low water dams and low flows with a wide channel and little tree cover. These conditions provide ideal conditions for algal growth - sufficient nutrients, sunlight, and high residence times. The watershed contains several dense residential developments and a golf course which may be contributing nitrate via the use of residential and turf fertilizers.

Recommendations for Improving Water Quality

Homeowner and business education and fertilizer best management practices may help reduce nutrient and Chlorophyll-*a* levels in this segment.

Potential Stakeholders

- Dallas/Fort Worth International Airport Environmental Affairs Department
- Community of Hackberry Creek
- City of Irving

0823B – Stewart Creek

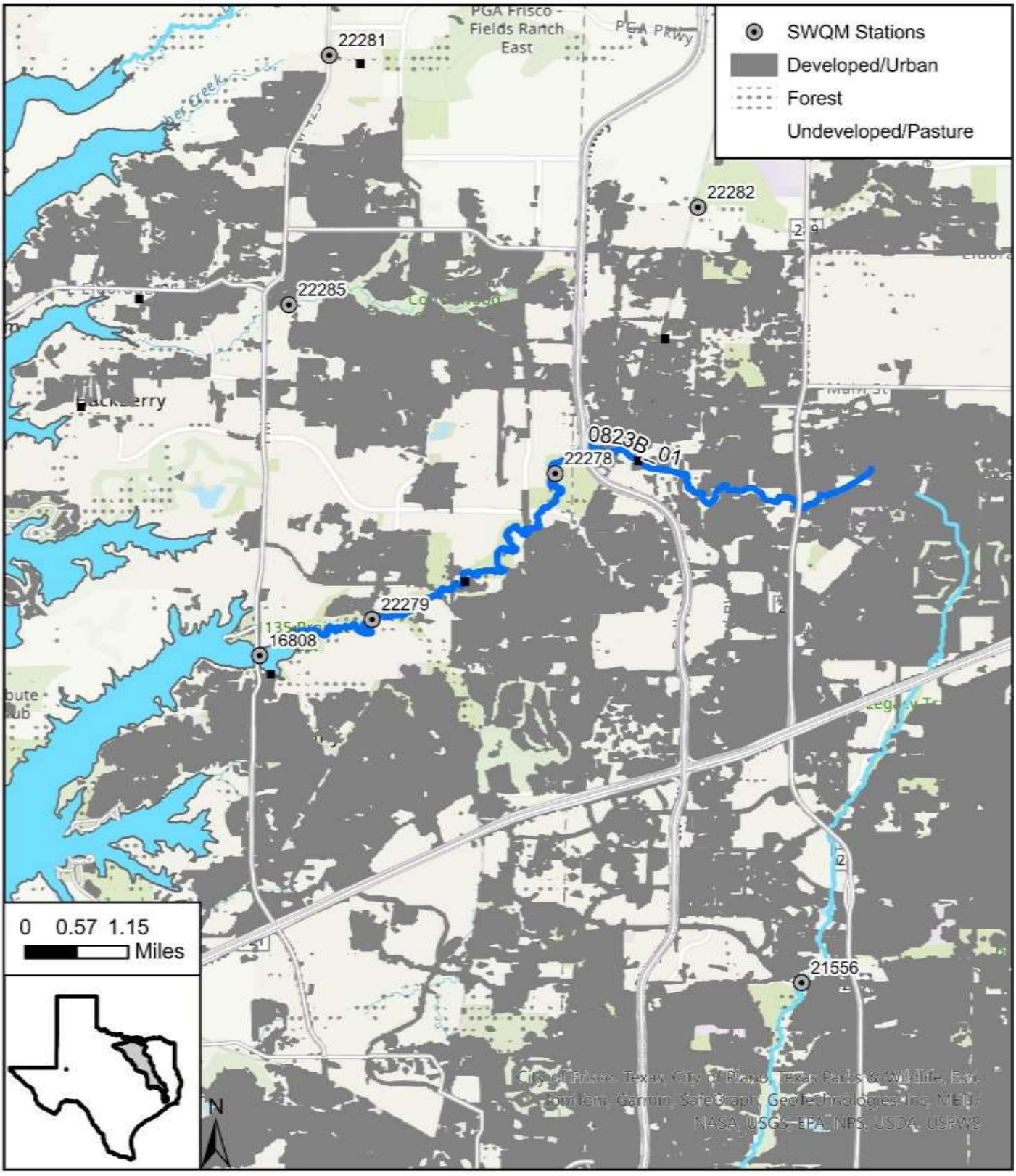

Figure 176: Map of Segment 0823B

Segment Description

This 9.8-mile unclassified segment runs from the headwaters near Frisco in Collin County to the confluence with Lake Lewisville in Denton County.

Assessment Units and Monitoring Stations

- **0823B_01** - From the confluence with Lake Lewisville in Denton County to the headwaters near Frisco in Collin County
    - Perennial freshwater stream
    - **22278** - Stewart Creek east of intersection of Argyle Lane and Legacy Drive in Frisco 700 meters downstream of Dallas North Tollway
        - Sampling conducted by the City of Frisco from 2022 to 2024
    - **22279** - Stewart Creek south of end of Teel Parkway in Frisco 1.68 kilometers downstream of Lebanon Road
        - Sampling conducted by the City of Frisco from 2022 to 2024
        - Aquatic life monitoring conducted by TRA in 2023

Hydrology

Unclassified segment 0823B is a first order stream at its most downstream end. Based on sampling at Stations 22278 and 22279, the median flow was 0.8 cfs at upstream Station 22278 and 3.9 cfs at downstream Station 22279 with a range of 0.071 to 7.5 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these two stations are listed below.

- Non-Index Period – 0.8 to 3.2 cfs
- Index Period – 0.55 to 5.7 cfs
- Critical Period – 0.44 to 3.75 cfs

Land Use and Natural Characteristics

This stream flows through the Northern Blackland Prairie ecoregion. Land use is mostly residential development with forest and grassland along the stream corridor.

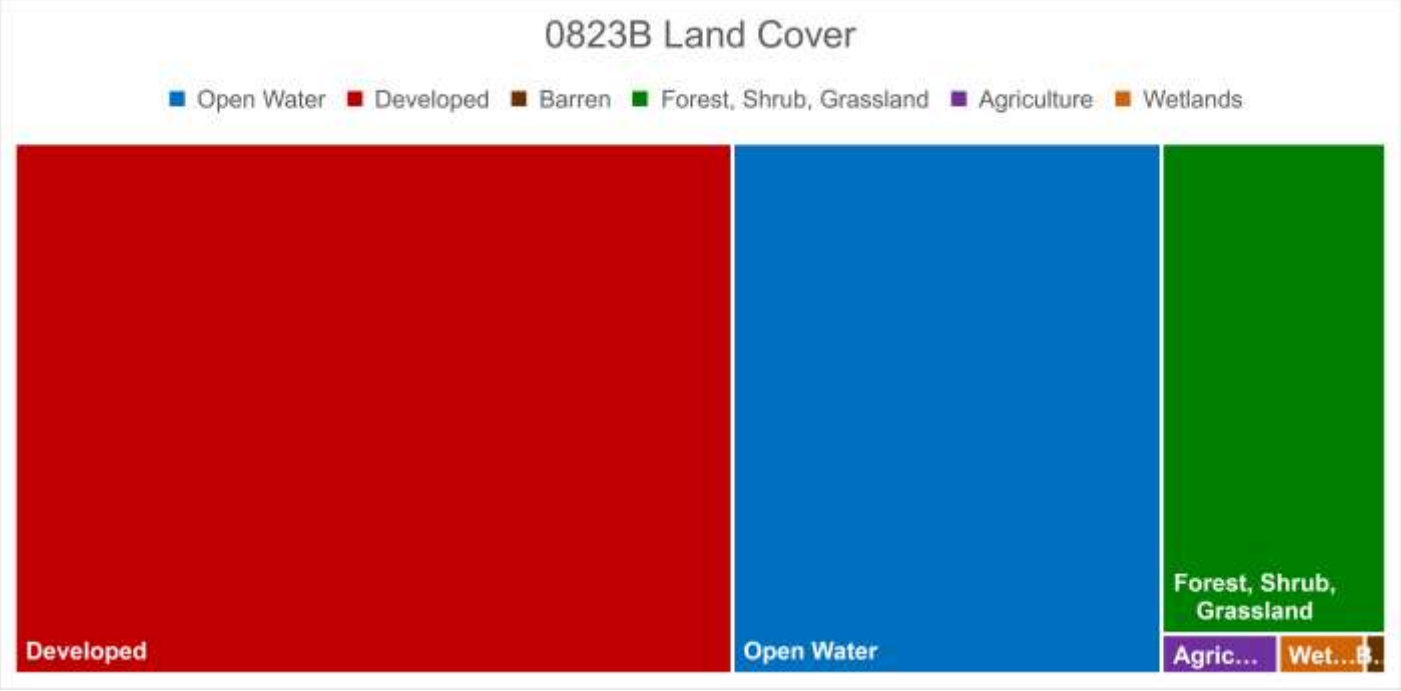

Figure 177: 0823B relative land cover totals

Figure 178: Seining in Stewart Creek 2022

Ongoing Projects

- Routine quarterly monitoring of flow and field parameters at Station 22278 conducted by City of Frisco.
- Routine quarterly monitoring of flow and field parameters at Station 22279 conducted by City of Frisco.

Description of Water Quality Issue

Concerns were identified for total phosphorus and nitrate in this segment.

Table 58 shows a summary of the TCEQ 2022 Texas Integrated Report. No nitrate data has been collected since 2004 and no total phosphorus data has been collected since 2007. These concerns have been carried forward from previous assessments.

Table 58: Summary of General Use data for Segment 0823B

	2022 Integrated Report Data	
AU	0823B_01	0823B_01
Method	Total phosphorus	Nitrate
Criteria	0.69	1.95
# Data Assessed	0	0
# Exceedances	.	.
Mean Exceedances	.	.
DS Qualifier	ID	ID
LOS	NA	NA
CF	Y	Y
Int LOS	CS	CS

Potential Causes of Water Quality Issue

The City of Frisco joined the TRA Clean Rivers Program in FY 2022 and began providing field data for two stations in this segment: Station 22278 and 22279. Station 22279 is located downstream of a wastewater treatment facility so it is likely that any nutrient monitoring in this segment would continue to show elevated levels of these parameters. Nutrients are typically elevated below wastewater treatment facilities as many locations do not have advanced nutrient removal technology. It is important to note that there does not appear to be an algal growth issue in this stream as the Dissolved Oxygen levels for the first year of sampling have ranged between 5.2 and 9.4 mg/L.

Recommendations for Improving Water Quality

There are no recommendations for decreasing nutrient levels at this time. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. Monitoring of these parameters may be added in the future; however, these concerns will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- North Texas Municipal Water District
- Homeowners and homeowners associations
- City of Frisco

0824 – Elm Fork Trinity River Above Ray Roberts Lake

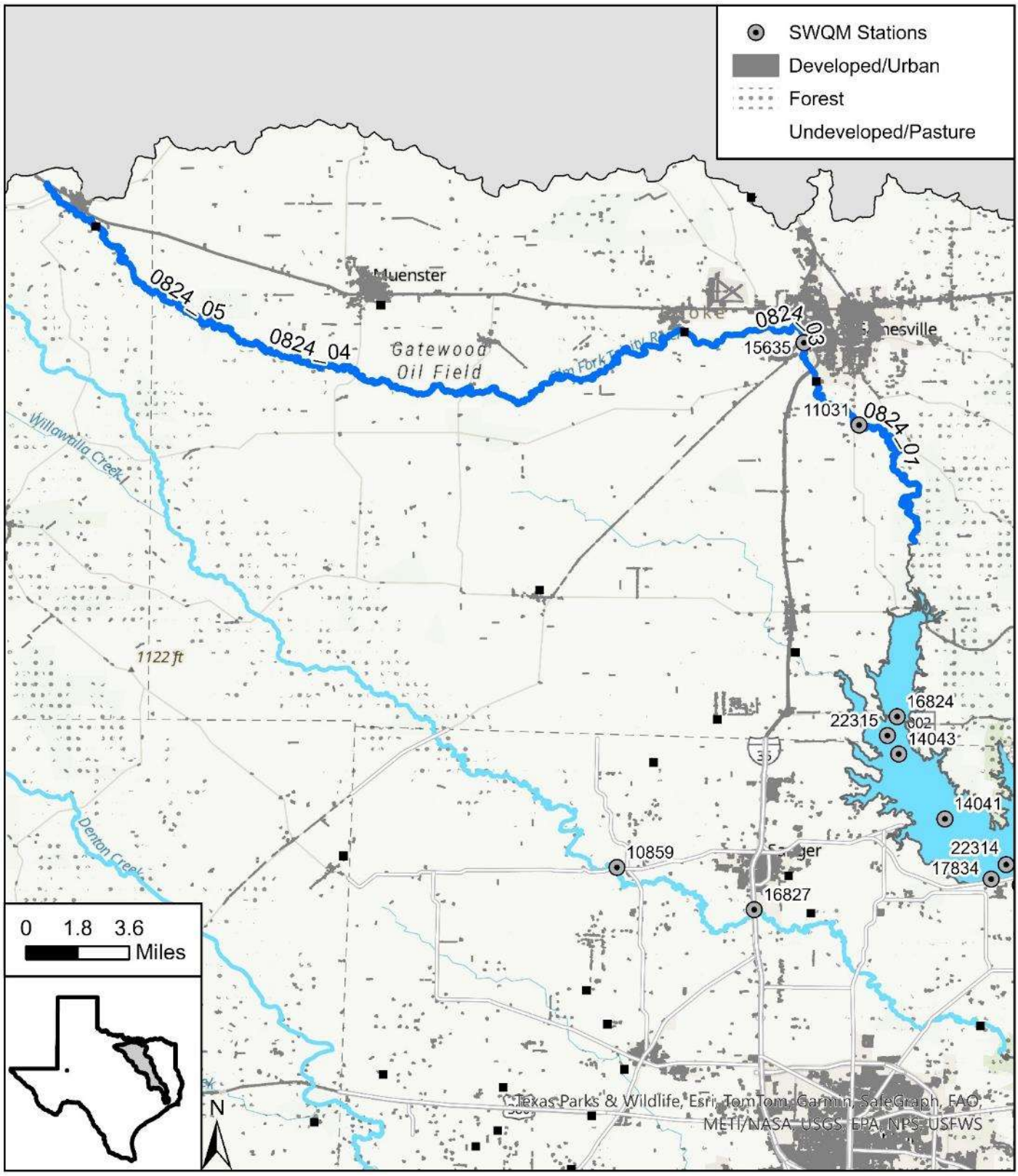

Figure 179: Map of Segment 0824

Segment Description

This 51-mile segment runs from US 82 in Montague County to 5.9 miles downstream of the confluence of Pecan Creek in Cooke County.

Assessment Units and Monitoring Stations

- **0824_01** - Lower 7.5 miles of segment
  - Perennial freshwater stream
  - **11031** - Elm Fork Trinity River immediately downstream of FM 2071 south of Gainesville
    - Sampling conducted by Dallas from 2015 to 2024
- **0824_02** – 2-mile reach near unmarked county road 1.4 km downstream Gainesville wastewater treatment plant
  - Perennial freshwater stream
- **0824_03** - 3.5-mile reach near SH 51
  - Perennial freshwater stream
  - **15635** - Elm Fork Trinity River 59 meters downstream of FM 51 in Gainesville
    - Sampling conducted by TCEQ from 2015 to 2024
- **0824_04** – 25-mile reach near FM 3108
  - Perennial freshwater stream
- **0824_05** - Upper 48 miles of segment
  - Perennial freshwater stream

Hydrology

Segment 0824 is a fourth order stream at its most downstream end. There are two USGS flow gages in this segment: 08050350 at FM 1198 near Myra and 08050400 at Gainesville. The median flow at these gages ranged from 3.55 cfs at the upstream Myra gage to 11.3 cfs at the downstream Gainesville gage with a range of 0 to 5,570 cfs at these locations. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these two gages are listed below.

- Non-Index Period – 3.88 to 18.15 cfs
- Index Period – 11.35 to 32.7 cfs
- Critical Period – 0.3 to 2.5 cfs

Land Use and Natural Characteristics

The entire segment runs through the Grand Prairie ecoregion with almost all land use classified as pasture and crop land with more grassland in the upstream portion of the segment. Oil production has been heavy in the area over the last century and natural gas drilling has increased tremendously in the last 20 years.

Figure 180: 0824 relative land cover totals

Ongoing Projects

- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 11031 conducted by City of Dallas.
- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 15635 conducted by TCEQ Region 4.

Description of Water Quality Issue

Concerns were identified for nitrate and chlorophyll-*a* at various assessment units in this segment. Table 59 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, the concerns for nitrate and chlorophyll-*a* in Assessment Unit 0824_01 and chlorophyll-*a* in Assessment Unit 0824_03 no longer exist. No nitrate data has been collected in Assessment Unit 0824_02 since 2003.

Table 59: Summary of General Use data for Segment 0824

	2022 Integrated Report Data				BHR POR Data		
AU	0824_01	0824_01	0824_02	0824_03	0824_01	0824_01	0824_03
Method	Nitrate	Chlorophyll-*a*	Nitrate	Chlorophyll-*a*	Nitrate	Chlorophyll-*a*	Chlorophyll-*a*
Criteria	1.95	14.1	1.95	14.1	1.95	14.1	14.1
# Data Assessed	0	0	0	27	74	3	27
# Exceedances	.	.	.	9	17	2	4
Mean Exceedances	.	.	.	35.83	8.8	33.38	21.33
DS Qualifier	ID	ID	ID	AD	AD	ID	AD
LOS	NA	NA	NA	CS	NC	NA	NC
CF	Y	Y	Y	N	.	.	.
Int LOS	CS	CS	CS	CS	.	.	.

Potential Causes of Water Quality Issue

There are several wastewater treatment facilities located throughout the watershed that are the likely sources of the nitrate concern. Nutrients are typically elevated below wastewater treatment facilities as many locations do not have advanced nutrient removal technology. It is likely that these nutrients lead to algal growth in the river. Correlations between chlorophyll-*a* and nutrients were weak in the upstream Assessment Unit 0824_03 (coefficient = 0.441 for total phosphorus) but were much stronger in the downstream Assessment Unit 0824_01 (coefficients = 0.667 for nitrate and 0.984 for total phosphorus). Longer residence times may have allowed algal populations to use the available nutrients and increase their concentrations from the upstream to the downstream assessment unit.

Recommendations for Improving Water Quality

If nitrate concerns are found in future assessments, there are no recommendations to decrease nitrate levels due to wastewater effluent. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- City of Dallas
- City of St Jo
- Landowners
- City of Lindsay
- City of Gainesville
- Frank Buck Zoo

0826 – Grapevine Lake

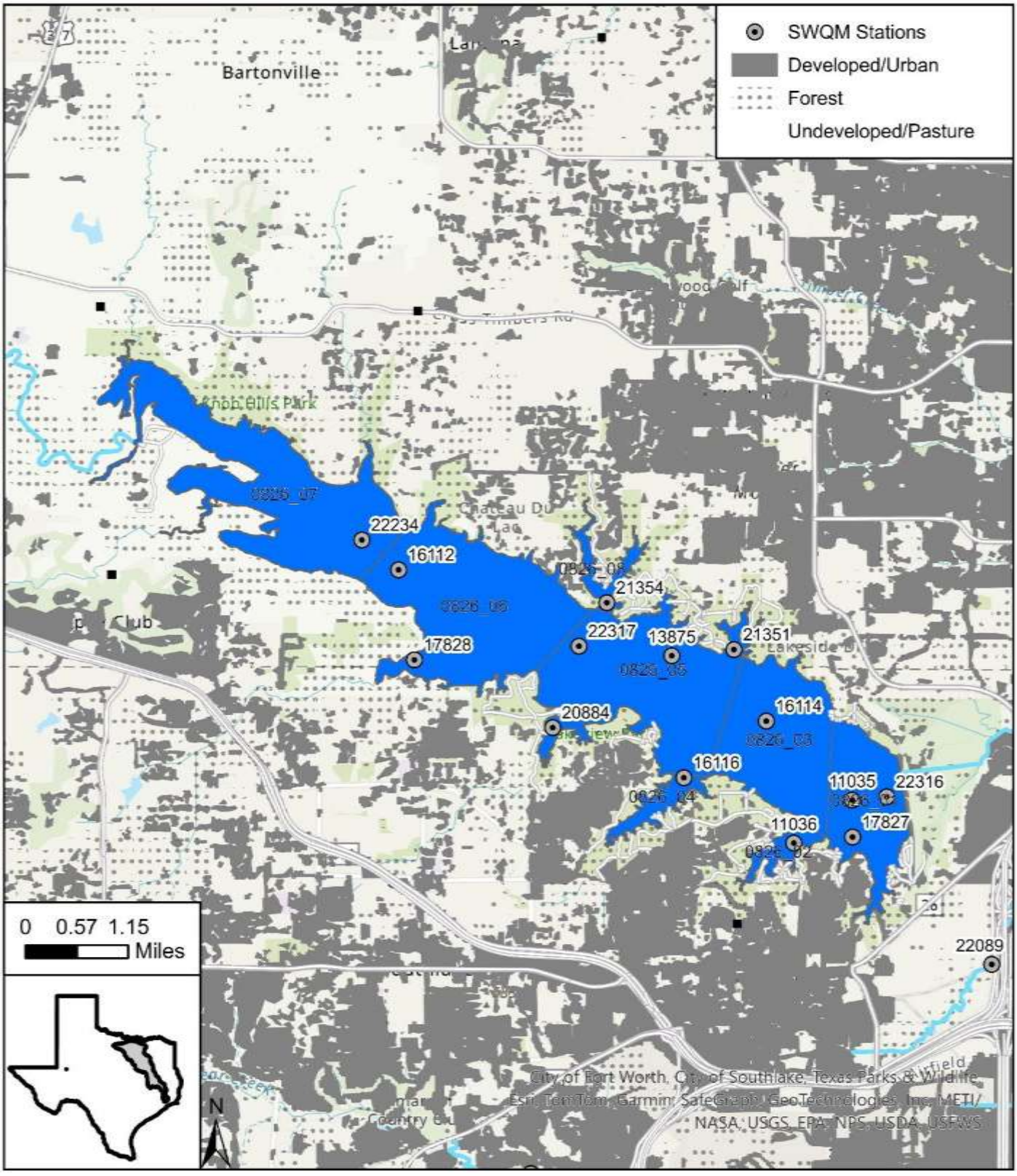

Figure 181: Map of Segment 0826

Segment Description

This 6,639-acre reservoir impounds Denton Creek to the Grapevine Dam in Tarrant County; up to the normal pool elevation of 535 feet.

Assessment Units and Monitoring Stations

- **0826_01** - Lowermost portion of reservoir
  - **11035** - Grapevine Reservoir mid lake near dam 1.01 kilometers north and 318 meters east of intersection of Park Road 7 and Silverside Drive
    - Sampling conducted by TCEQ from 2015 and 2024
  - **17827** - Grapevine Lake at Dallas Water Utilities intake 349 meters north and 328 meters east of intersection of Silverside Dr and Park Road 7
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2015 to 2021
  - **22316** - Grapevine Lake near the dam 450 meters southwest of the outlet works
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2022 to 2024
- **0826_02** - Morehead Creek cove
  - **11036** - Grapevine Reservoir at Morehead Creek cove 443 meters north and 120 meters east of intersection of Park Road 8 and Dooley Street
    - Sampling conducted by TRA from 2022 to 2024
- **0826_03** - Lower portion of reservoir north of Oak Grove Park
  - **16114** - Grapevine Lake mid lake north of Oak Grove Park 1.26 kilometers north and 269 meters east of intersection of Mesquite Bend and Park Road
    - Sampling conducted by TRA from 2021 to 2024
- **0826_04** - North Main Slough cove
  - **16116** - Grapevine Lake at mouth of North Main Slough cove 749 meters north and 149 meters west of intersection of Oak Grove Park Rd and Dove Loop Rd
    - Sampling conducted by TRA from 2022 to 2024
- **0826_05** - Middle portion of reservoir east of Meadowmere Park
  - **13875** - Grapevine Lake USGS Site BC 753 meters south and 484 meters west of intersection of West Murrel Park Road and Simmons Road
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2015 to 2021
  - **22317** - Grapevine Lake at midlake 860 meters southwest of end of Murrell Park Road
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2022 to 2024
- **0826_06** - Middle portion of reservoir southeast of Walnut Grove Park
  - **16112** - Grapevine Lake mid lake between Walnut Grove Park and Red Bud Pt 882 meters north and 1.39 kilometers east of intersection of Bob Jones Rd and Saddle Ridge
    - Sampling conducted by TCEQ from 2015 and 2024
  - **17828** - Grapevine Lake at Little Petes Marina 392 meters north and 136 meters east of intersection of Thousand Oaks Court and Carmel Court
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2015 to 2021
- **0826_07** - Upper portion of reservoir east of Marshall Creek Park
  - **22234** - Grapevine Lake upstream end mid lake 1.37 kilometers north and 1.18 kilometers east of intersection of White Chapel Road and Bob Jones Road
    - Sampling conducted by TRA from 2021 to 2024
- **0826_08** - Remainder of reservoir
  - **21354** - Grapevine Lake at Twin Coves Park 270 meters south and 30 meters east of the southernmost boat ramp at the end of Twin Coves Park Road near Grapevine
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2022 to 2024
  - **21351** - Grapevine Lake at Murrell Park East 60 meters east and 40 meters south of Boat Ramp 1 near Grapevine
    - Sampling conducted by TRA from 2022 to 2024
  - **20884** - Grapevine Lake Dove Creek Cove middle of cove approx 250 meters south and 280 meters east of the intersection of Perch E Lane and Meadowmere Lane-Snakey Road
    - Sampling conducted by TRA from 2022 to 2024

Hydrology

Segment 0826 is a reservoir on a fifth order stream. It is a water supply and flood control reservoir with a conservation pool elevation of 535 feet and a flood pool elevation of 560 feet. Over the period of record for this report, the median elevation was 535.3 feet with a range of 529.68 to 555.5 feet. The median elevations for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 535.28 feet
- Index Period – 535.67 feet
- Critical Period – 535.16 feet

Land Use and Natural Characteristics

This reservoir lies within the Eastern Cross Timbers ecoregion. Suburban and residential communities surround the reservoir with considerable areas of forest along the shores and tributaries.

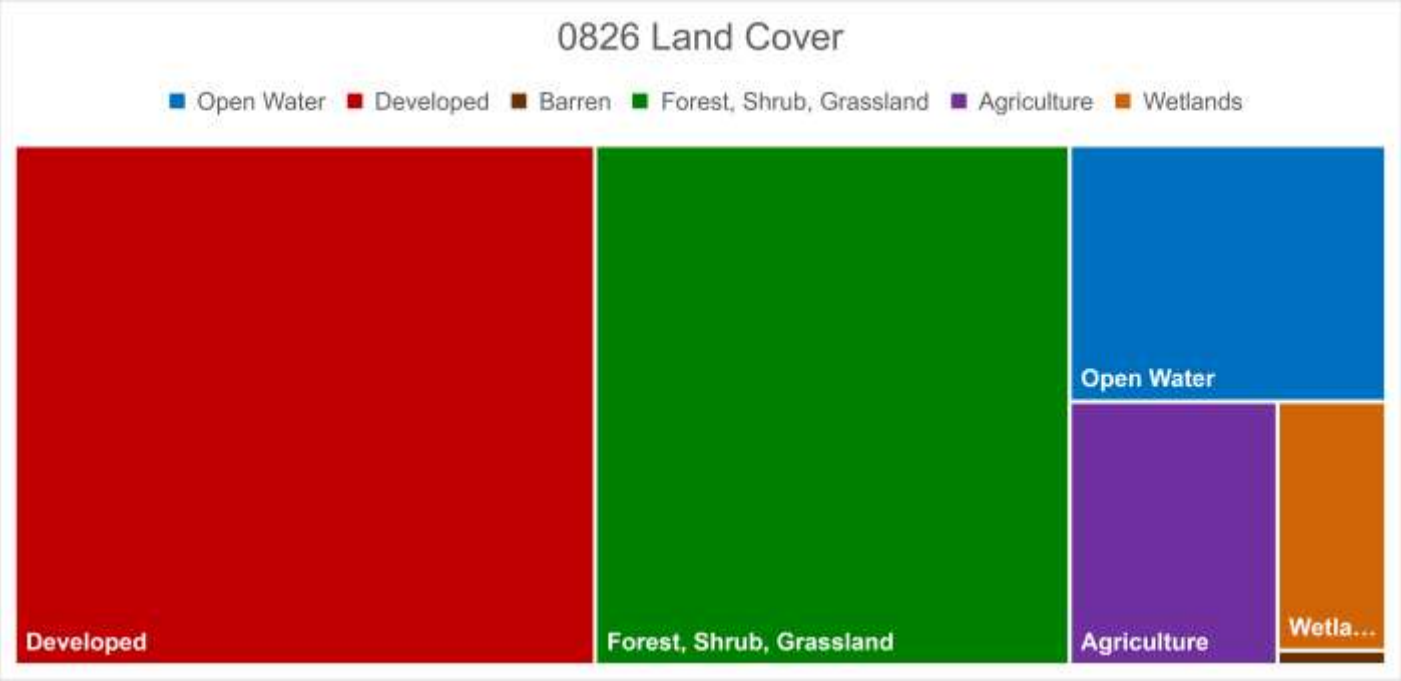

Figure 182: 0826 relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 11035 conducted by TCEQ Region 4.
- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 22316 conducted by City of Dallas.
- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 11036 conducted by Trinity River Authority.
- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 16114 conducted by Trinity River Authority.
- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 16116 conducted by Trinity River Authority.
- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 22317 conducted by City of Dallas.
- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 16112 conducted by TCEQ Region 4.

- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 22234 conducted by Trinity River Authority.
- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 20884 conducted by Trinity River Authority.
- Routine quarterly monitoring of conventional, bacteria, and field parameters at Station 21351 conducted by Trinity River Authority.
- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 21354 conducted by City of Dallas.

Figure 183: Sampling on Grapevine Lake

Description of Water Quality Issue

An impairment due to high pH levels was identified in Assessment Unit 0826_07. This impairment was first identified in the 2012 Integrated Report and carried forward.

Table 60 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, this impairment no longer exists as all recently collected data have been below the criterion of 9 mg/L.

Table 60: Summary of General Use data for Segment 0826

	2022 Integrated Report Data	BHR POR Data
AU	0826_07	0826_07
Method	High pH	High pH
Criteria	9	9
# Data Assessed	0	9
# Exceedances	.	0
Mean Exceedances	.	.
DS Qualifier	ID	LD
LOS	NA	NC
CF	Y	.
Int LOS	NS (first identified 2012)	.

Potential Causes of Water Quality Issue

TRA staff began monitoring in this assessment unit in FY 2021. Sampling will continue through FY 2025 after which time it will be re-evaluated for continued monitoring.

Recommendations for Improving Water Quality

There are no recommendations as current sampling appears to show the impairment may no longer exist. However, continued monitoring will be required to collect sufficient data for assessment and possible delisting.

Potential Stakeholders

- City of Dallas
- TRA Technical Services and Basin Planning
- Homeowners and homeowners associations
- City of Trophy Club
- City of Flower Mound
- City of Southlake
- City of Grapevine
- Trophy Club County Club
- Bob Jones Nature Center and Preserve
- Grapevine Recreational Area

0826A – Denton Creek

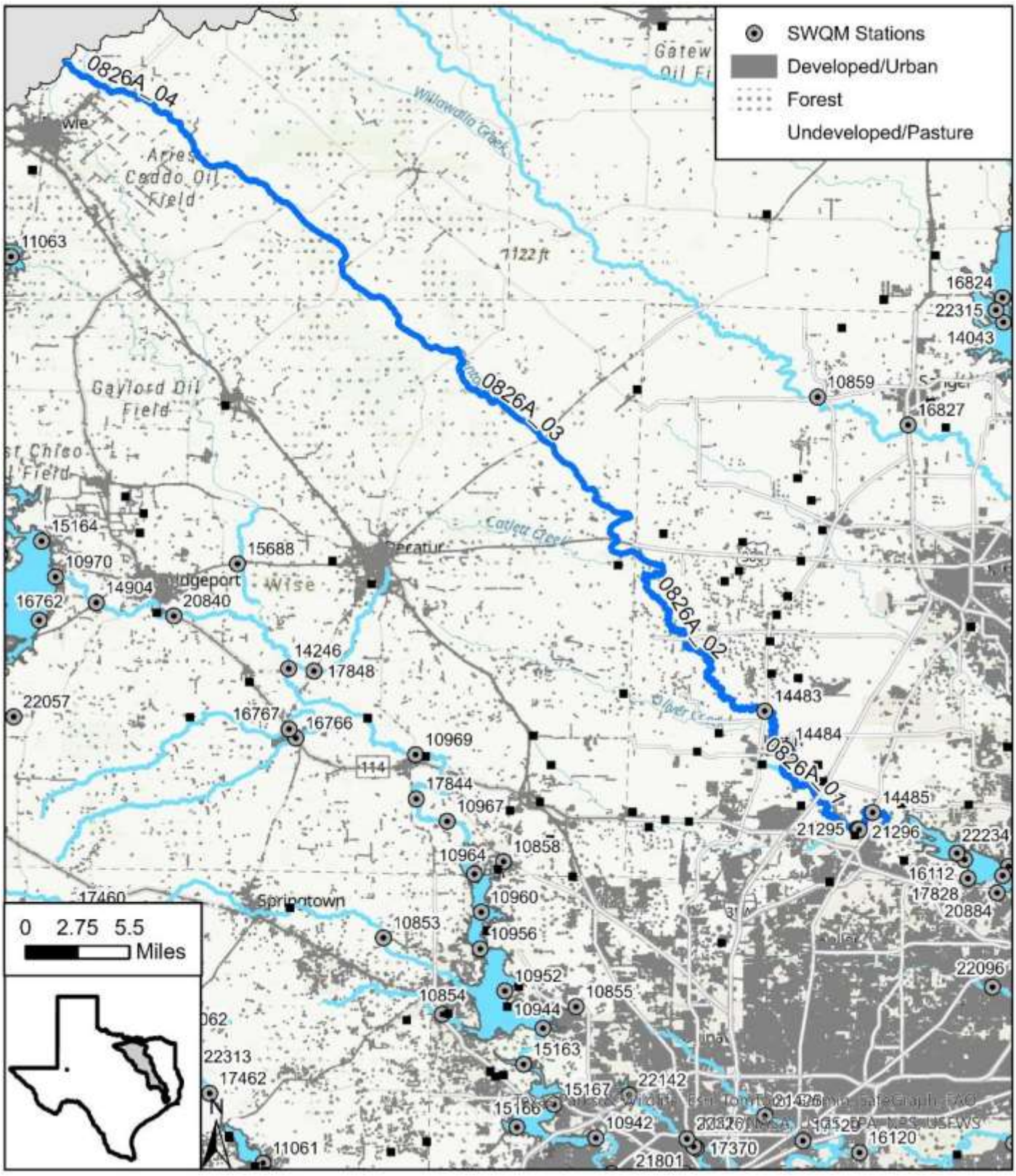

Figure 184: Map of Segment 0826A

Segment Description

This 85.7-mile unclassified segment runs from 2.3 kilometers upstream of TX-59 to the confluence with Grapevine Lake in Denton County.

Assessment Units and Monitoring Stations

- **0826A_01** - Perennial stream from the headwaters of Grapevine Lake upstream to the confluence of Trail Creek near the City of Justin
  - Perennial freshwater stream
  - **14485** - Denton Creek at US 377 west of Lake Grapevine
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2015 to 2017
  - **21296** - Denton Creek 100 meters downstream of the confluence with Cade Branch below the mixing zone
    - Sampling conducted by TRA from 2022 to 2024
  - **21295** - Denton Creek 30 meters upstream of the confluence with Cade Branch above the mixing zone
    - Sampling conducted by TRA from 2022 to 2024
- **0826A_02** - From the confluence of Trail Creek near the City of Justin to the confluence with an unnamed tributary 6.3 km upstream of FM-2449
  - Perennial freshwater stream
  - **14483** - Denton Creek at FM 156 2.4 miles north of Justin
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2015 to 2024
  - **14484** - Denton Creek at FM 407 1.2 miles east of Justin
    - Sampling conducted by the City of Dallas (collecting entity code DA) from 2017 to 2024
- **0826A_03** - From the confluence with an unnamed tributary 6.3 km upstream of FM-2449 to 1.7 km upstream of County Road 2675
  - Perennial freshwater stream
- **0826A_04** - From 1.7 km upstream of County Road 2675 to 2.3 km upstream of TX-59
  - Perennial freshwater stream

Hydrology

Unclassified segment 0826A is a fifth order stream at its most downstream end. There are two USGS flow gages in this segment: 08053430 at CR 2513 near Decatur and 08053500 near Justin. Flow is also collected at Stations 21295 and 21296. The median flow at these locations ranged from 16.05 cfs at the upstream Decatur gage to 22 cfs at the downstream Station 21296 with a range of 0 to 7,530 cfs at these locations. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these four locations are listed below.

- Non-Index Period – 17.6 to 28 cfs
- Index Period – 28.7 to 45.95 cfs
- Critical Period – 5.48 to 5.82 cfs

Land Use and Natural Characteristics

This watershed begins in the Western Cross Timbers and flows into the Grand Prairie ecoregion with a small portion of the downstream end being in the Eastern Cross Timbers. Development is mostly limited to the downstream end as it approaches the outskirts of the Dallas/Fort Worth Metroplex. The upper half of the watershed consists of grassland and forest. The middle of the watershed is a mix of hay, pasture, and cultivated crops.

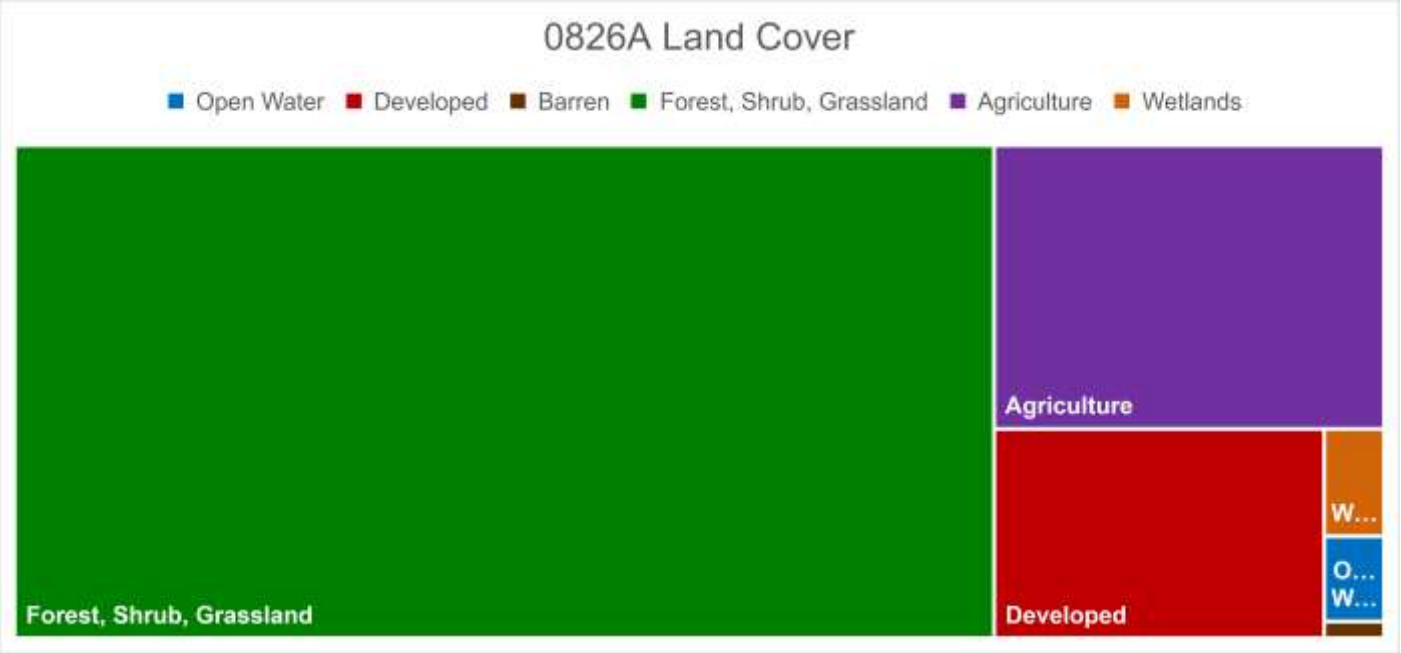

Figure 185: 0826A relative land cover totals

Figure 186: Fisherman in Denton Creek

Ongoing Projects

- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 21295 conducted by Trinity River Authority.

- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 21296 conducted by Trinity River Authority.
- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 14483 conducted by City of Dallas.
- Routine monthly monitoring of conventional, bacteria, and field parameters; and metals twice a year at Station 14484 conducted by City of Dallas.

Description of Water Quality Issue

A concern was identified for nitrate in this Assessment Unit 0826A_01. Table 61 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, this concern may no longer exist.

Table 61: Summary of General Use data for Segment 0826A

	2022 Integrated Report Data	BHR POR Data		
AU	0826A_01	0826A_01 Station 14485	0826A_01 Station 21295	0826A_01 Combined
Method	Nitrate	Nitrate	Nitrate	Nitrate
Criteria	1.95	1.95	1.95	1.95
# Data Assessed	0	15	14	29
# Exceedances	.	1	2	3
Mean Exceedances	.	2.71	5.63	4.66
DS Qualifier	ID	AD	AD	AD
LOS	NA	NC	NC	NC
CF	Y	.	.	.
Int LOS	CS	.	.	.

Potential Causes of Water Quality Issue

There was a strong inverse correlation between flow and nitrate at Station 21295 (coefficient = -0.683). This pattern is common in effluent dominated streams as most wastewater treatment facilities do not have advanced nutrient removal technology. There are several dischargers upstream of Assessment Unit 0826A_01. It is likely that this concern may recur in future assessments.

Recommendations for Improving Water Quality

There are no recommendations for decreasing nitrate levels at this time. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely recur and remain until such technology is widely available and cost effective.

Potential Stakeholders

- City of Dallas
- TRA Technical Services and Basin Planning
- Knob Hill Bike Trail
- Airport Sand and Gravel
- Town of Northlake
- Landowners
- Homeowners and homeowners associations
- City of Justin
- Town of Dish
- Town of Allison
- City of Bowie

0827 – White Rock Lake

Segment Description

See Aquatic Life Use Segment 0827 Segment Description.

Hydrology

See Aquatic Life Use Segment 0827 Hydrology.

Land Use and Natural Characteristics

See Aquatic Life Use Segment 0827 Land Use and Natural Characteristics.

Ongoing Projects

See Aquatic Life Use Segment 0827 Ongoing Projects.

Description of Water Quality Issue

A concern for nutrients was identified in this segment (Table 62). Nutrients in this reservoir are assessed against a narrative criteria based on lines of evidence that includes median Secchi depth, chlorophyll-*a*, total nitrogen, and total phosphorus levels as described in the TCEQ 2022 Guidance for Assessing and Reporting Surface Water Quality in Texas. 60% of the chlorophyll-*a* data were reported above the threshold of 29.73 µg/L and the median was 33.3 µg/L. However, based on the flow chart in Figure 75 and the values below, the concern may no longer exist.

Table 62: Narrative Nutrient Reservoir Criteria data for Segment 0827

Segment 0827 Station 11038		2022 Integrated Report Data			BHR POR Data		
Parameter	Criteria Threshold	Samples Assessed	Median	Exceedance	Samples Assessed	Median	Exceedance
Chlorophyll-*a*	29.73	25	33.3	Yes	25	33.3	Yes
10 Year Change in TSI	10	35	0.56	No	N/A	0.56	No
Total Nitrogen	0.8	22	1.0895	Yes	24	1.036	Yes
Total Phosphorus	0.1	26	0.6825	Yes	27	0.07	No
Secchi Depth	0.4	28	0.6	No	27	0.6	No
Dissolved Oxygen issue in any AU?	N/A	N/A	N/A	Yes	N/A	N/A	No
			DS Qualifier	AD		DS Qualifier	AD
			Int LOS	CS		Int LOS	NC

Potential Causes of Water Quality Issue

There were no correlations between chlorophyll-*a* and nutrients. The median Total Nitrogen concentration was 1.036 mg/L which exceeded the threshold of 0.8 mg/L. Total Phosphorus did not exceed the threshold of 0.1 mg/L. It is likely that residence times in the reservoir were allowing algal populations to increase.

Recommendations for Improving Water Quality

There is one wastewater treatment facility upstream of the reservoir that may be introducing nutrients to the reservoir. However, the reservoir and much of the upstream watershed is heavily developed with many multiple residences, parks, and golf courses. These sources may be contributing large amounts of nutrients through the use of fertilizers. A watershed protection plan may be beneficial in reducing nutrients and, potentially, chlorophyll-*a* in the reservoir.

Potential Stakeholders

See Aquatic Life Use Segment 0827 Potential Stakeholders.

0829 – Clear Fork Trinity River Below Benbrook Lake

Segment Description

See Aquatic Life Use Segment 0829 Segment Description.

Hydrology

See Aquatic Life Use Segment 0829 Hydrology.

Land Use and Natural Characteristics

See Aquatic Life Use Segment 0829 Land Use and Natural Characteristics.

Ongoing Projects

See Aquatic Life Use Segment 0829 Ongoing Projects.

Description of Water Quality Issue

A concern for chlorophyll-*a* was identified in Assessment Unit 0829_02. Table 63 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, the chlorophyll-*a* concern may no longer exist.

Table 63: Summary of General Use data for Segment 0829

	2022 Integrated Report Data	BHR POR Data
AU	0829_02	0829_02
Method	Chlorophyll-*a*	Chlorophyll-*a*
Criteria	14.1	14.1
# Data Assessed	27	26
# Exceedances	8	7
Mean Exceedances	18.38	15.97
DS Qualifier	AD	AD
LOS	CS	NC
CF	N	.
Int LOS	CS	.

Potential Causes of Water Quality Issue

There were no correlations between chlorophyll-*a* and nutrients. Assessment Unit 0829_02 is a channelized portion of the river. The wetted width of the river averages approximately 50 meters during normal flow conditions and is relatively shallow and clear. Additionally, there is no wooded riparian area along most of this assessment unit. It is likely that the channel morphology as well as the clear water and lack of shade allows algal populations to increase.

Recommendations for Improving Water Quality

Algal populations in the Clear Fork Trinity River may be difficult to control as there are multiple reservoirs, ponds, and streams that contribute to the system by Segment 0829.

Potential Stakeholders

See Aquatic Life Use Segment 0829 Potential Stakeholders.

0831 – Clear Fork Trinity River Below Lake Weatherford

Segment Description

See Aquatic Life Use Segment 0831 Segment Description.

Hydrology

See Aquatic Life Use Segment 0831 Hydrology.

Land Use and Natural Characteristics

See Aquatic Life Use Segment 0831 Land Use and Natural Characteristics.

Ongoing Projects

See Aquatic Life Use Segment 0831 Ongoing Projects.

Description of Water Quality Issue

Concerns for total phosphorus and nitrate were identified in Assessment Unit 0831_01. Table 64 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, these concerns may still exist. As shown in Figure 187 and Figure 188, 33% of nitrate data exceeded the screening level of 1.95 mg/L and 38% of total phosphorus data exceeded 0.69 mg/L.

Table 64: Summary of General Use data for Segment 0831

	2022 Integrated Report Data		BHR POR Data					
AU	0831_01	0831_01	0831_01 Station 16414	0831_01 Station 16414	0831_01 Station 17444	0831_01 Station 17444	0831_01 Combined	0831_01 Combined
Method	Total phosphorus	Nitrate	Total phosphorus	Nitrate	Total phosphorus	Nitrate	Total phosphorus	Nitrate
Criteria	0.69	1.95	0.69	1.95	0.69	1.95	0.69	1.95
# Data Assessed	95	97	77	77	28	28	105	105
# Exceedances	32	32	28	26	12	9	40	35
Mean Exceedances	0.99	3.33	0.93	2.67	1.45	3.11	1.08	2.78
DS Qualifier	AD	AD	AD	AD	AD	AD	AD	AD
LOS	CS	CS	CS	CS	CS	CS	CS	CS
CF	N	N	.	.	.	.	.	.
Int LOS	CS	CS	.	.	.	.	.	.

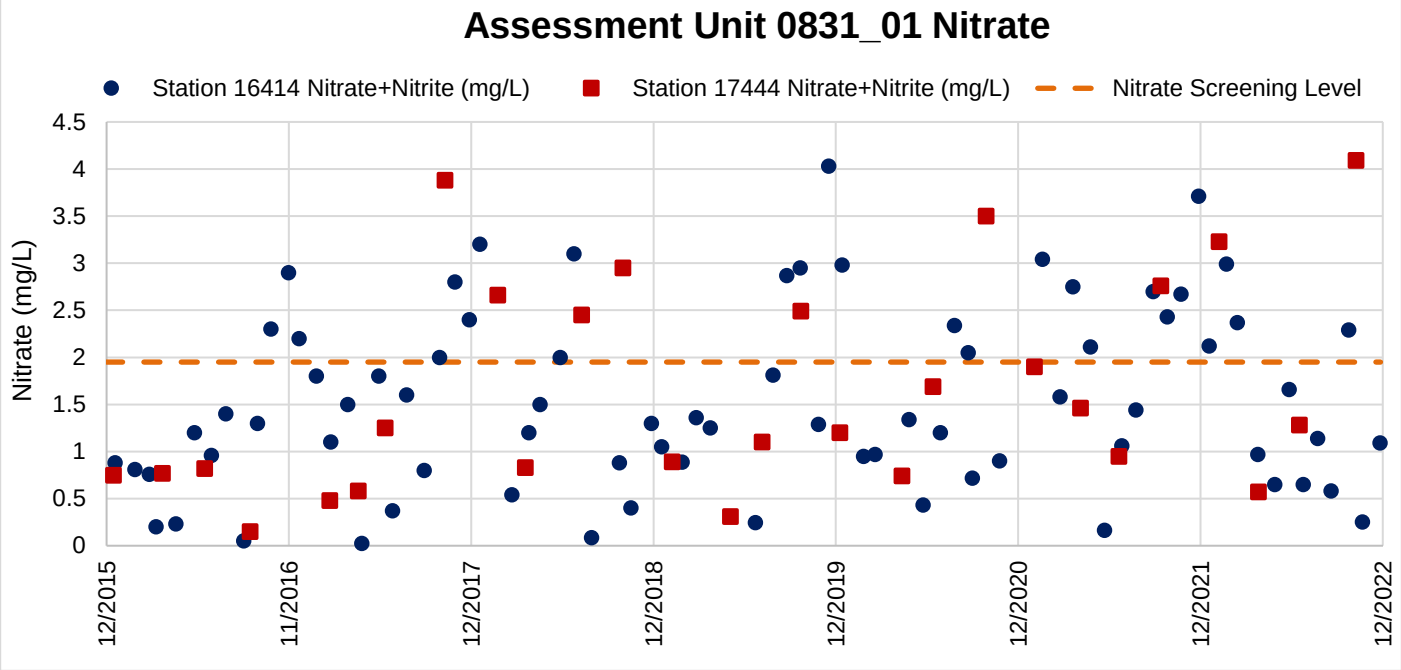

Figure 187: Assessment Unit 0831_01 Nitrate

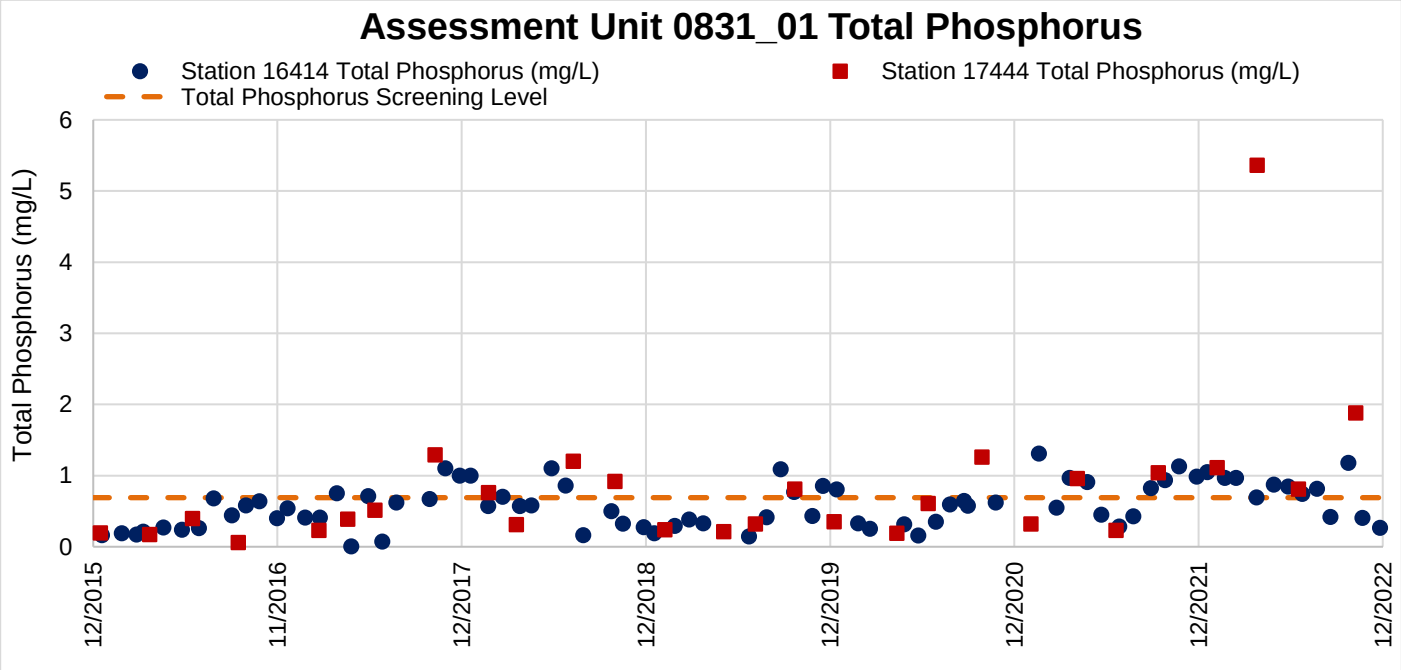

Figure 188: Assessment Unit 0831_01 Total Phosphorus

Potential Causes of Water Quality Issue

Station 17444 is just over 1 mile downstream of a wastewater treatment facility outfall. Nitrate and total phosphorus had strong inverse correlations to flow (coefficients = -0.693 and -0.711, respectively). This pattern is common in effluent dominated streams as most wastewater treatment facilities do not have advanced nutrient removal technology. Station 16414 is approximately 5 miles downstream of the outfall. Inverse correlations to flow still exist at this station but they are much weaker (coefficients = -0.331 and -0.156, respectively). The weakening of correlations between Stations 17444 and 16414 is likely due to the additional distance and the confluence of Turkey Creek approximately halfway between the two stations.

Recommendations for Improving Water Quality

There are no recommendations for decreasing nutrient levels at this time. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

See Aquatic Life Use Segment 0831 Potential Stakeholders.

0831A – South Fork Trinity River

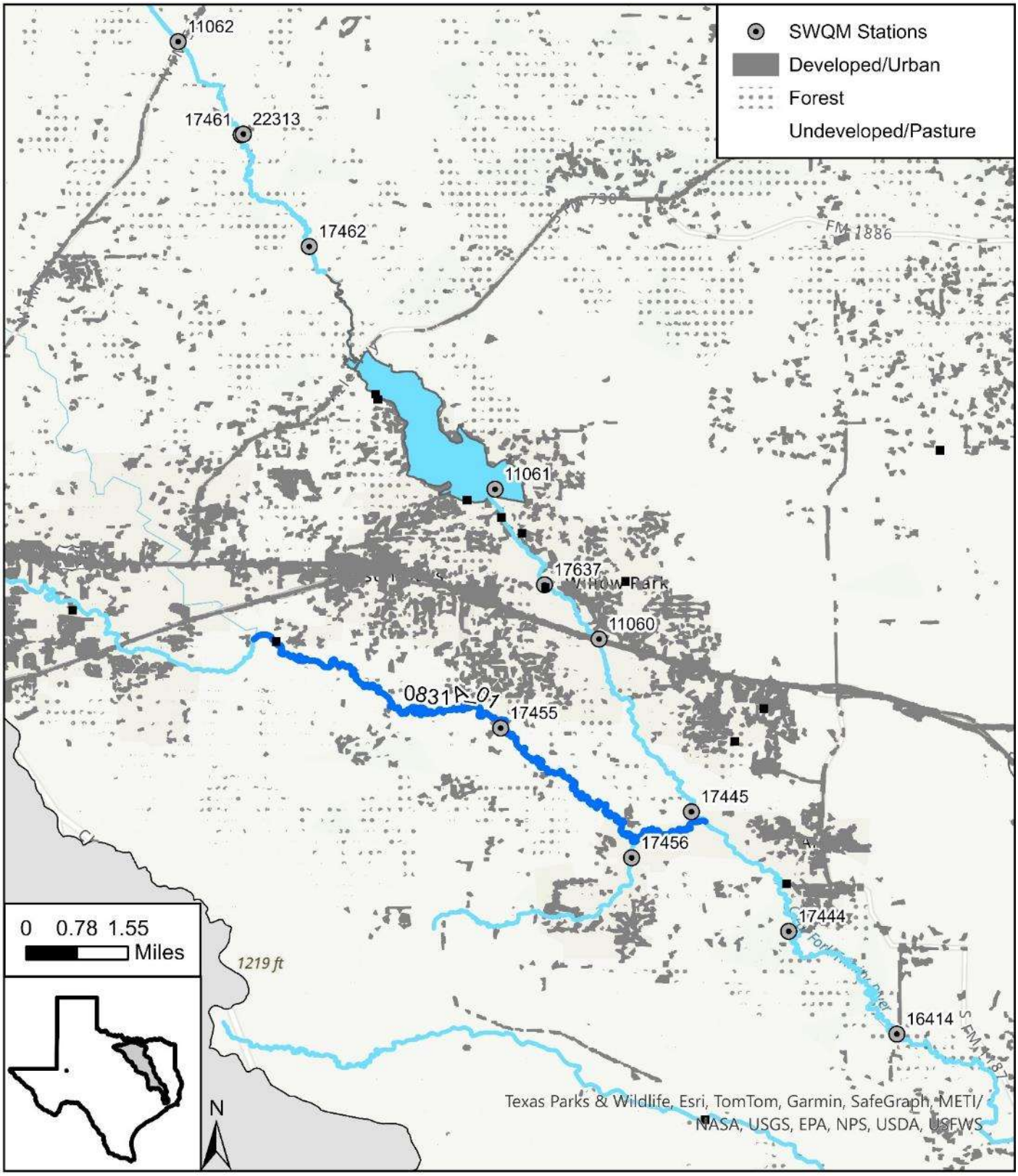

Figure 189: Map of Segment 0831A

Segment Description

This 12-mile stretch of the South Fork Trinity River runs from the confluence with Willow Creek in Parker County to the confluence with the Clear Fork Trinity River.

Assessment Units and Monitoring Stations

- **0831A_01** - Eleven mile stretch of South Fork Trinity River running upstream from confluence with Clear Fork Trinity River to confluence with Willow Creek in Parker County
    - Perennial freshwater stream
    - **17455** - South Fork Trinity River at FM 5 4.1 kilometers upstream of confluence with Clear Fork Trinity River north of Anneta
        - Sampling conducted by TRA from 2016 to 2018 and 2022 to 2023
        - Sampling conducted by TCEQ in 2024

Hydrology

Unclassified segment 0831A is a third order stream at its most downstream end. Based on sampling at Station 17455, the median flow was 5.7 cfs with a range of 0.2 to 13 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 9.4 cfs
- Index Period – 7 cfs
- Critical Period – 1.45 cfs

Land Use and Natural Characteristics

Much of the watershed is rural with grassland and pasture being the predominant land use. There are some forested areas spread throughout the watershed and some development along the IH-20 corridor on the north side of the river. The river flows through the Western Cross Timbers with a small portion of the Grand Prairie ecoregion along the southwestern edge of the watershed.

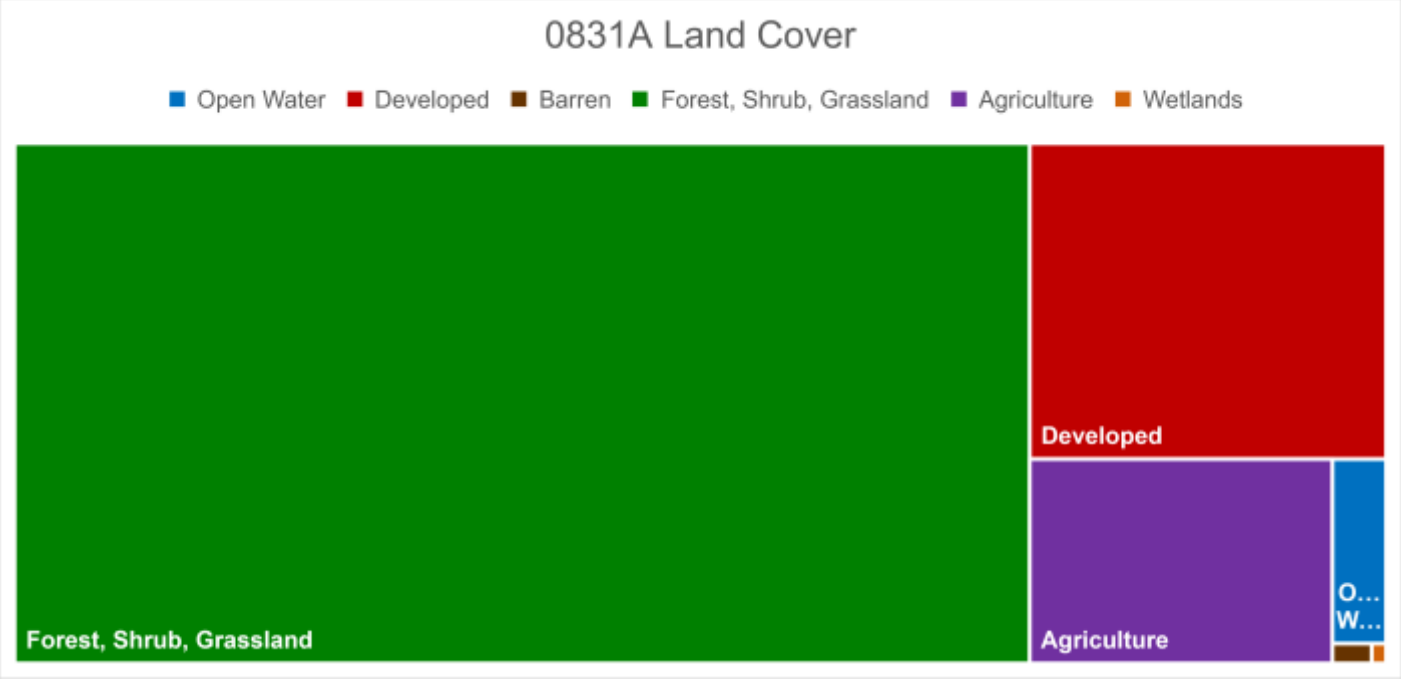

Figure 190: 0831A relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 17455 conducted by TCEQ Region 4.

Description of Water Quality Issue

Concerns for total phosphorus and nitrate were identified in this segment. Table 65 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, these concerns may still exist. As shown in Figure 191, 89% of nitrate data exceeded the screening level of 1.95 mg/L and 83% of total phosphorus data exceeded 0.69 mg/L.

Table 65: Summary of General Use data for Segment 0831A

	2022 Integrated Report Data		BHR POR Data	
AU	0831A_01	0831A_01	0831A_01	0831A_01
Method	Total phosphorus	Nitrate	Total phosphorus	Nitrate
Criteria	0.69	1.95	0.69	1.95
# Data Assessed	10	10	18	18
# Exceedances	8	9	15	16
Mean Exceedances	1.56	4.49	1.73	4.74
DS Qualifier	AD	AD	AD	AD
LOS	CS	CS	CS	CS
CF	N	N	.	.
Int LOS	CS	CS	.	.

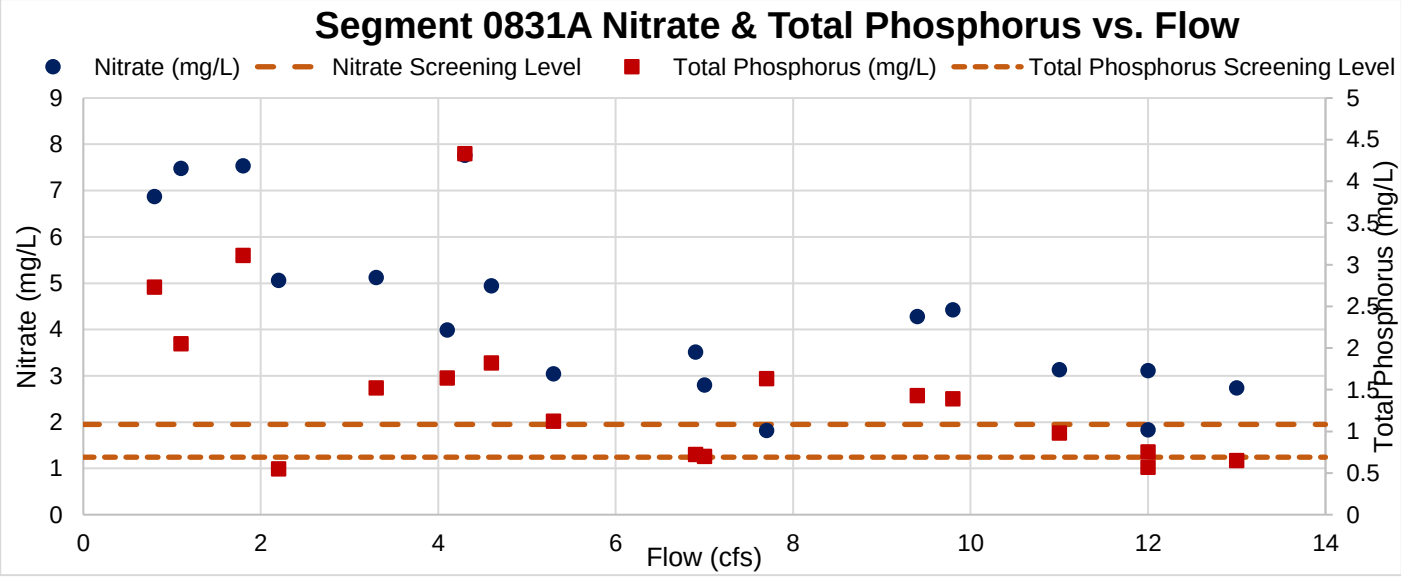

Figure 191: Segment 0831A Nitrate & Total Phosphorus vs. Flow

Potential Causes of Water Quality Issue

These concerns appear to be related to upstream wastewater treatment facilities. There were moderate and strong inverse correlations between these parameters and flow (coefficients = -0.756 for nitrate and -0.560 for total phosphorus). Levels of these parameters were higher at lower flows and decreased as flows increased due to dilution from precipitation and runoff inflows. This is commonly seen in streams receiving effluent from wastewater treatment facilities as most facilities do not have advanced nutrient removal technology.

Recommendations for Improving Water Quality

There are no recommendations for decreasing nutrient levels at this time. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- Landowners
- October Hill Farm
- City of Annetta North
- Split Rail Links and Golf Club

0833A – Clear Fork Trinity River Above Strickland Creek

Segment Description

See Aquatic Life Use Segment 0833A Segment Description.

Hydrology

See Aquatic Life Use Segment 0833A Hydrology.

Land Use and Natural Characteristics

See Aquatic Life Use Segment 0833A Land Use and Natural Characteristics.

Ongoing Projects

See Aquatic Life Use Segment 0833A Ongoing Projects.

Description of Water Quality Issue

A concern for chlorophyll-*a* was identified in this segment and was carried forward from previous assessments. Table 66 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, this concern may still exist. Although it is a limited data set, Figure 192 shows that 4 of the 7 data points exceeded the screening level of 14.1 µg/L.

Table 66: Summary of General Use data for Segment 0833A

	2022 Integrated Report Data	BHR POR Data		
AU	0833A_01	0833A_01 Station 17460	0833A_01 Station 17463	0833A_01 Combined
Method	Chlorophyll-*a*	Chlorophyll-*a*	Chlorophyll-*a*	Chlorophyll-*a*
Criteria	14.1	14.1	14.1	14.1
# Data Assessed	0	3	4	7
# Exceedances	.	2	2	4
Mean Exceedances	.	25.5	26	25.75
DS Qualifier	ID	ID	LD	LD
LOS	NA	NA	CS	CS
CF	Y	.	.	.
Int LOS	CS	.	.	.

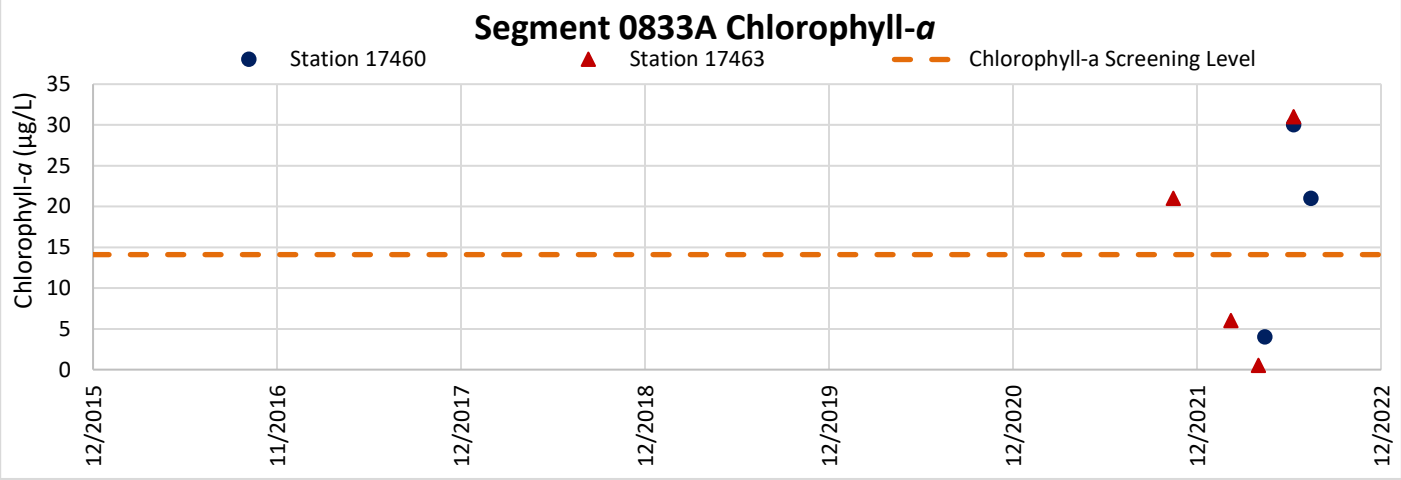

Figure 192: Segment 0833A Chlorophyll-a

Potential Causes of Water Quality Issue

Chlorophyll-*a* levels were well correlated with flow, days since precipitation, and total phosphorus. Levels were elevated at lower flows and longer periods since precipitation (coefficients = -0.835 and 0.704, respectively). Higher chlorophyll-*a* values were also reported at higher total phosphorus concentrations (coefficient = 0.786). As noted above, the data set is limited so correlations may not be as strong as they appear. However, flows at both Station 17460 and 17463 were less than 1 cfs and much of the stream is unshaded. In addition to nutrients that may be introduced to the stream via livestock visiting for watering, these conditions may be allowing algal populations to increase.

Recommendations for Improving Water Quality

Limiting nutrients in this stream may be beneficial in reducing chlorophyll-*a* levels. There is considerable evidence of livestock trails entering the stream upstream of both stations. Therefore, livestock best management practices such as exclusionary fencing and alternative water sources may reduce nutrient and chlorophyll-*a* levels in the stream.

Potential Stakeholders

See Aquatic Life Use Segment 0833A Potential Stakeholders.

0841 – Lower West Fork Trinity River

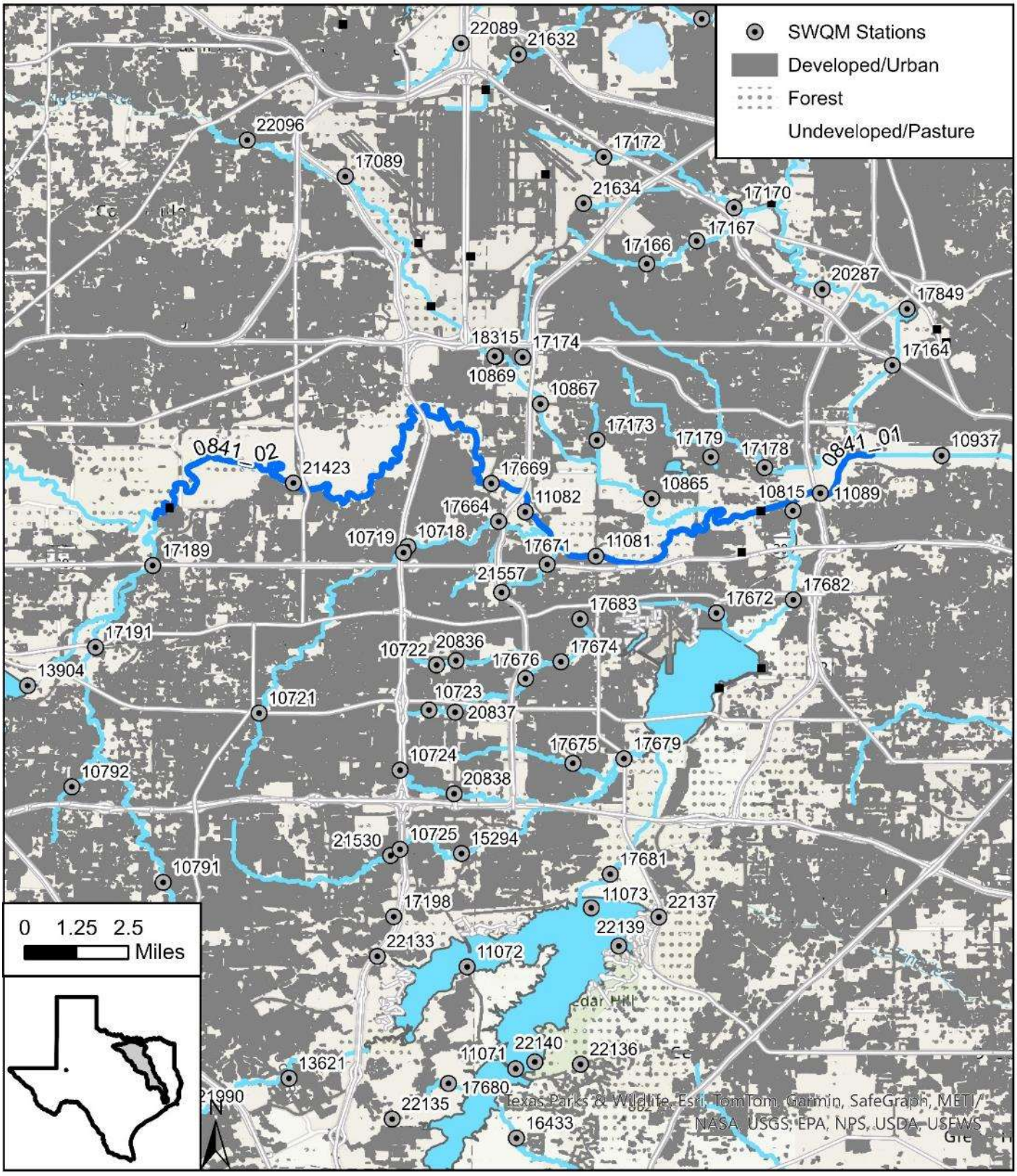

Figure 193: Map of Segment 0841

Segment Description

This 26.7-mile segment runs from a point immediately upstream of the confluence of Village Creek in Tarrant County to a point immediately upstream of the confluence of the Elm Fork Trinity River in Dallas County.

Assessment Units and Monitoring Stations

- **0841_01** - From confluence of the Elm Fork Trinity River to the confluence with Johnson Creek
  - Perennial freshwater stream
  - **11081** - Lower West Fork Trinity River at Belt Line Road in Grand Prairie
    - Sampling conducted by USGS from 2015 to 2018
    - Sampling conducted by TRA from 2015 to 2024
- **0841_02** - From the confluence with Johnson Creek upstream to the confluence of Village Creek
  - Perennial freshwater stream
  - **17669** - Lower West Fork Trinity River at Roy Orr Boulevard in Grand Prairie
    - Sampling conducted by Grand Prairie from 2015 to 2024
  - **21423** - West Fork Trinity River at River Legacy Park footbridge 557 meters upstream of North Collins Street
    - Sampling conducted by TRA from 2017 to 2022

Hydrology

Segment 0841 is a fifth order stream. There are two USGS flow gages in this segment: 08049300 at Greenbelt Road in Fort Worth and 08049500 at Grand Prairie. Flow has also been measured at Station 21423. The median flow at these locations ranged from 218 cfs at Station 21423 to 319 cfs at the downstream Grand Prairie gage with a range of 60 to 19,400 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) for these two gages are listed below.

- Non-Index Period – 185 to 333 cfs
- Index Period – 392 to 522 cfs
- Critical Period – 150 to 221 cfs

Land Use and Natural Characteristics

The upper half of this highly urbanized watershed is in the Eastern Cross Timbers and the lower half is in the Northern Blackland Prairie ecoregion. There are some areas of wooded and grassy riparian zones.

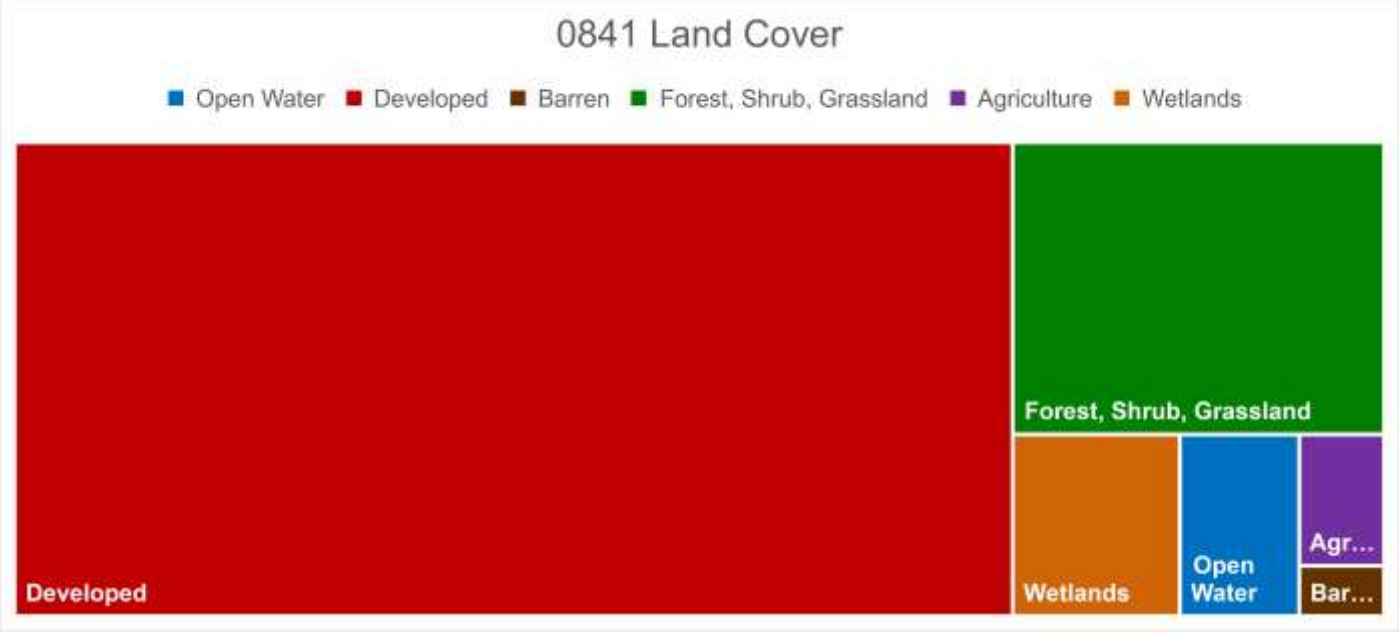

Figure 194: 0841 relative land cover totals

Figure 195: Lower West Fork Trinity River at Roy Orr Boulevard in Grand Prairie

Ongoing Projects

- Routine quarterly monitoring of conventional, bacteria, flow, and field parameters and metals twice a year at Station 11081 conducted by Trinity River Authority.
- Routine monthly monitoring of bacteria and field parameters, quarterly monitoring of conventional parameters, and metals once a year at Station 17669 conducted by City of Grand Prairie.

Description of Water Quality Issue

Concerns were identified for total phosphorus and nitrate in Assessment Units 0841_01 and 0841_02.

Table 67 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, these concerns may still exist. Sampling has been conducted at Stations 11081 and 17669 in Assessment Unit 0841_01 and at Station 21423 in Assessment Unit 0841_02 (Figure 196 and Figure 197). Measured flow was not collected at Station 17669. Overall, 29% of total phosphorus data in this segment exceeded the screening level of 0.69 mg/L and 71% of nitrate data exceeded 1.95 mg/L.

Table 67: Summary of General Use data for Segment 0841

	2022 Integrated Report Data				BHR POR Data	
AU	0841_01	0841_01	0841_02	0841_02	0841_01 Station 11081	0841_01 Station 11081
Method	Total phosphorus	Nitrate	Total phosphorus	Nitrate	Total phosphorus	Nitrate
Criteria	0.69	1.95	0.69	1.95	0.69	1.95
# Data Assessed	26	24	36	35	28	25
# Exceedances	10	20	15	31	8	21
Mean Exceedances	1	8.9	1.12	8.83	1.05	8.39
DS Qualifier	AD	AD	AD	AD	AD	AD
LOS	CS	CS	CS	CS	CS	CS
CF	N	N	N	N	.	.
Int LOS	CS	CS	CS	CS	.	.

Table 67 continued

	BHR POR Data					
AU	0841_01 Station 17669	0841_01 Station 17669	0841_01 Combined	0841_01 Combined	0841_02	0841_02
Method	Total phosphorus	Nitrate	Total phosphorus	Nitrate	Total phosphorus	Nitrate
Criteria	0.69	1.95	0.69	1.95	0.69	1.95
# Data Assessed	27	27	55	52	20	18
# Exceedances	5	22	13	43	9	15
Mean Exceedances	1.06	7.15	1.05	7.76	1.07	10.32
DS Qualifier	AD	AD	AD	AD	AD	AD
LOS	NC	CS	NC	CS	CS	CS
CF	.	.	.	.	.	.
Int LOS	.	.	.	.	.	.

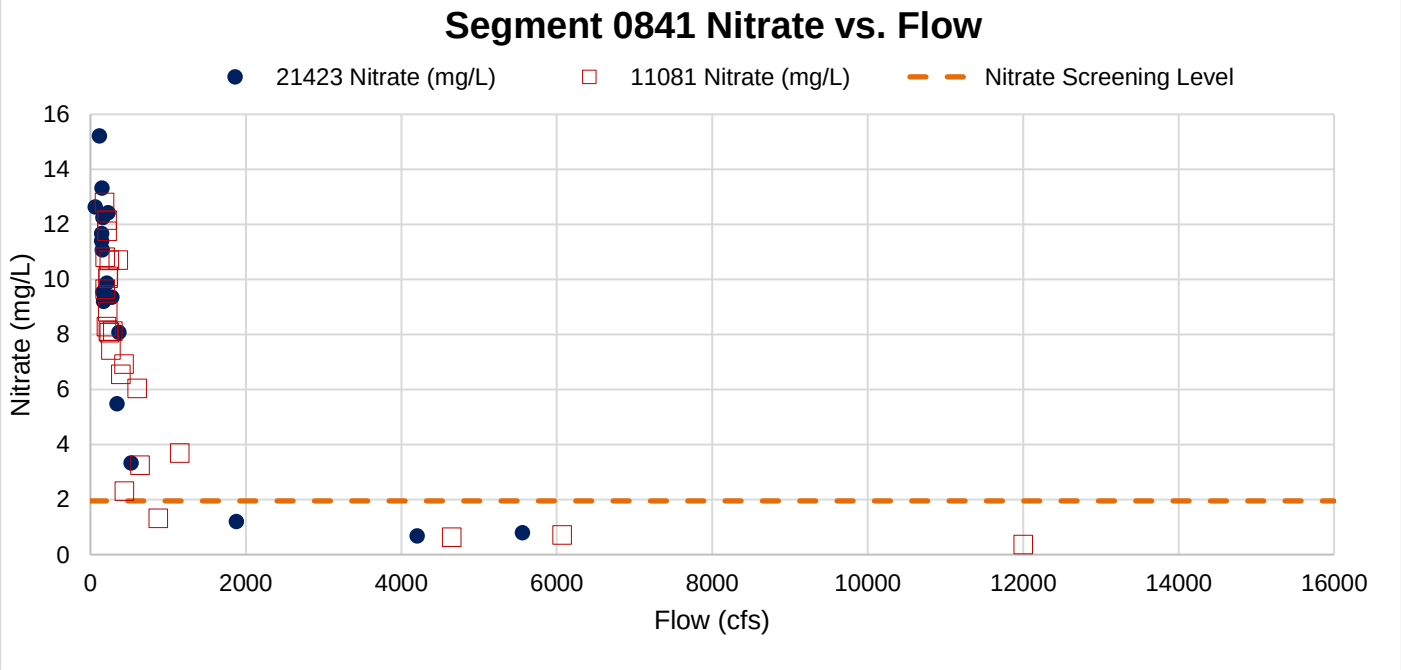

Figure 196: Segment 0841 Nitrate vs. Flow

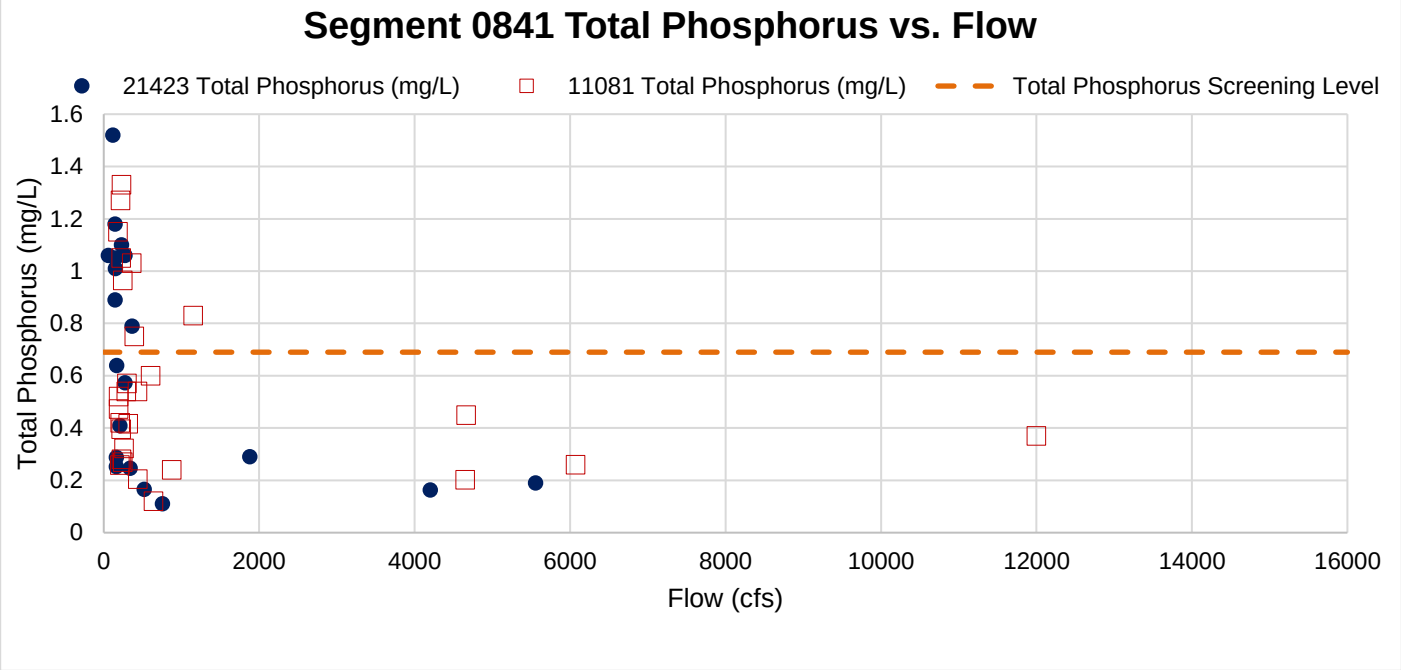

Figure 197: Segment 0841 Total Phosphorus vs. Flow

Potential Causes of Water Quality Issue

These concerns are related to flow or flow severity. Correlation coefficients for nitrate at all three stations were strong: ranging from -0.602 to -0.765. Total phosphorus was weakly to moderately correlated to flow conditions with coefficients ranging from -0.261 to -0.488. At lower flows, concentrations of these parameters were higher and decreased with increasing flow due to dilution from precipitation inflows. This pattern for nutrients is common for effluent-dominated streams; there are several large wastewater treatment facilities upstream of and in this segment.

Recommendations for Improving Water Quality

There are no recommendations for decreasing nutrients at this time. Most wastewater treatment facilities do not yet have advanced nutrient removal technology. These concerns will likely remain until such technology is widely available and cost effective.

Potential Stakeholders

- City of Fort Worth
- Homeowners and homeowners associations
- Village Creek Wastewater Treatment Plant
- City of Arlington
- Big City Crushed Concrete
- City of Grand Prairie
- TRA Technical Services and Basin Planning
- Riverside Golf Club
- Grand Prairie Gun Club
- City of Irving
- Irving Golf Club

0841O – Mountain Creek

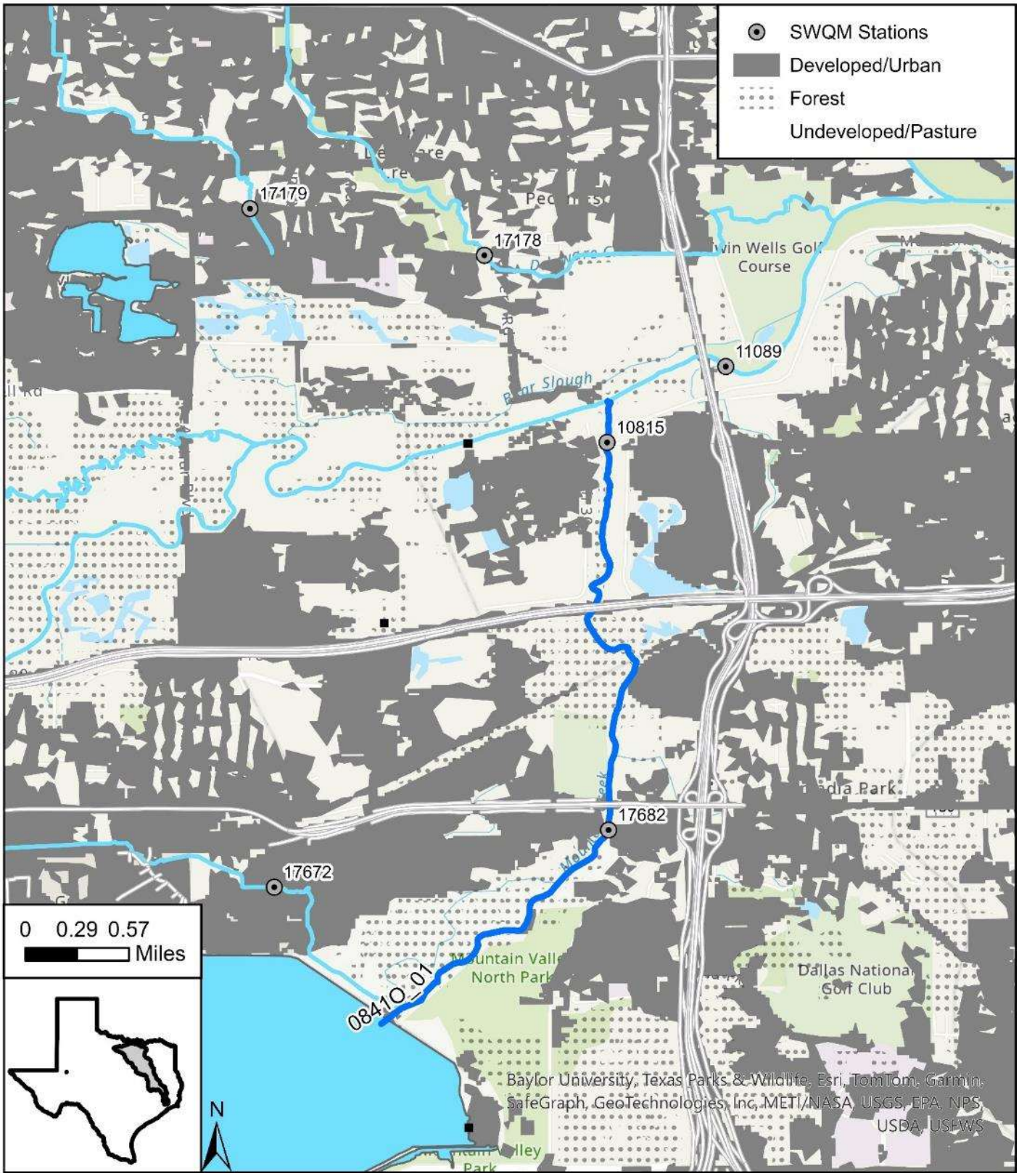

Figure 198: Map of Segment 0841O

Segment Description

This unclassified segment is a 4-mile stretch of Mountain Creek running from approximately 0.3-miles downstream of Mountain Creek Lake in Grand Prairie to the confluence with the Lower West Fork Trinity River.

Assessment Units and Monitoring Stations

- **0841O_01** - Four mile stretch of Mountain Creek running upstream from confluence with West Fork Trinity River to approximately 0.3 miles downstream of Mountain Creek Lake in Grand Prairie in Dallas County
    - Perennial freshwater stream
    - **10815** - Mountain Creek immediately downstream of Singleton Boulevard in Grand Prairie
        - Sampling conducted by TRA from 2020 to 2024

Hydrology

Unclassified segment 0841O is a third order stream at its most downstream end. There is one USGS flow gage in this segment: 08050100 at Grand Prairie. The median flow at this gage was 6.04 cfs with a range of 0.08 to 9,250 cfs. The median flows for the non-index period (October 16 to March 14), index period (March 15 to June 30 and October 1 to October 15), and critical period (July 1 to September 30) are listed below.

- Non-Index Period – 5.29 cfs
- Index Period – 9.1 cfs
- Critical Period – 4.12 cfs

Land Use and Natural Characteristics

The watershed is heavily developed with some wooded and wetland riparian areas and lies within the Northern Blackland Prairie ecoregion.

Figure 199: 0841O relative land cover totals

Ongoing Projects

- Routine quarterly monitoring of conventional, bacteria, field, and flow parameters at Station 10815 conducted by Trinity River Authority.

Description of Water Quality Issue

Concerns for chlorophyll-*a* and ammonia were identified in this segment. The concern for ammonia was carried forward from previous assessments. Table 68 shows a summary of the TCEQ 2022 Texas Integrated Report and a summary of the data collected between December 1, 2015 and November 30, 2022. Based on recently collected data, the chlorophyll-*a* concern may still exist. Although it is a limited data set, Figure 200 shows that 4 of the 5 data points exceeded the screening level of 14.1 µg/L.

Table 68: Summary of General Use data for Segment 0841O

	2022 Integrated Report Data		BHR POR Data	
AU	0841O_01	0841O_01	0841O_01	0841O_01
Method	Chlorophyll-*a*	Ammonia	Chlorophyll-*a*	Ammonia
Criteria	14.1	0.33	14.1	0.33
# Data Assessed	6	6	5	5
# Exceedances	4	2	4	2
Mean Exceedances	26.75	1.3	22.25	0.63
DS Qualifier	LD	LD	LD	LD
LOS	CS	NC	CS	NC
CF	N	Y	.	.
Int LOS	CS	CS	.	.

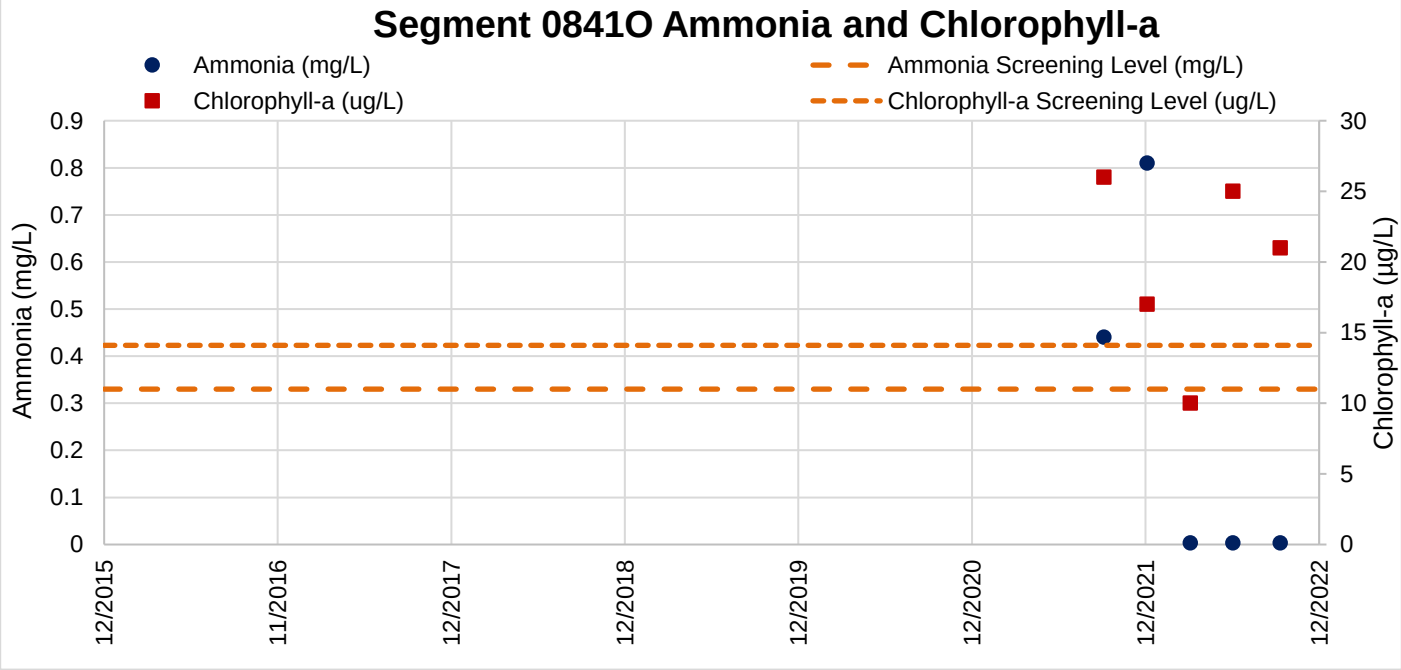

Figure 200: Segment 0841O Ammonia and Chlorophyll-a

Potential Causes of Water Quality Issue

The carry forward concern for ammonia may have been due to a previous long-term wastewater pipeline break that was identified and repaired in March 2015. There have been other issues with wastewater infrastructure in this area that have been identified and repaired in more recent years. The concern for chlorophyll-*a* may be due to releases from Mountain Creek Reservoir Segment 0841A. However, there is no public boat access on this reservoir to collect representative main body samples that would confirm this assumption. Any monitoring would be limited to shoreline sampling which is not representative of open water conditions. Further, the nearest accessible location on Mountain Creek is just over 1.5 miles downstream of the reservoir outfall. This portion of the stream is approximately 50 feet

wide and unshaded. Any algal populations released from the reservoir would have the opportunity to increase by Station 10815.

Recommendations for Improving Water Quality

TRA staff began sampling in this segment in 2020 and will continue through at least 2026 to further assess these concerns.

Potential Stakeholders

- TRA Technical Services and Basin Planning
- City of Grand Prairie
- City of Dallas