


2018 BASIN HIGHLIGHTS REPORT

Trinity River Authority
Clean Rivers Program




Acknowledgements

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Contents

Acronyms

AU - Assessment Unit

CFS - Cubic feet per second

CRP - Clean Rivers Program

DO - Dissolved Oxygen

EPA - Environmental Protection Agency

mg/L - milligrams/Liter

MPN - Most Probable Number

N - Nitrogen

NELAP - National Environmental Laboratory Accreditation Program

NH3 - Ammonia

NTMWD - North Texas Municipal Water District

OP - Orthophosphate

P - Phosphorus

PCB's - Polychlorinated Biphenyl

SU - Standard Units

SWQMIS - Surface Water Quality Monitoring Information System

TCEQ - Texas Commission on Environmental Quality

TDS - Total Dissolved Solids

TMDL - Total Maximum Daily Load

TKN - Total Kjeldahl Nitrogen

TP - Total Phosphorous

TRA – Trinity River Authority

TRWD - Tarrant Regional Water District

ug/L - micrograms/Liter

USGS - United States Geological Survey

WWTF - Waste Water Treatment Facility

Background

Introduction

The Texas Clean Rivers Program

In 1991, Texas Senate Bill 818 created the Clean Rivers Program (CRP). This program is administered by the Texas Commission on Environmental Quality (TCEQ) and is conducted in each of the major river basins by local planning agencies such as the Trinity River Authority. The CRP is funded, in part, by fees assessed to water and wastewater permits. The goals of the program are to protect the water resources of the state and to improve water quality.

Annual Reports

Each year, the local planning agencies produce a Basin Highlights Report which summarizes the CRP activities in their basin. This report may include information on events effecting water quality, a summary of water quality data, and an overview of public outreach activities and special projects. Every fifth year, a greatly expanded Basin Summary Report provides a detailed analysis of water quality data and potential sources, as well as offering recommendations for future basin activities. All past reports are available on TRA's website at http://www.trinityra.org/default.asp?contentID=97.

Goals and Objectives of the TRA CRP

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 setting water quality standards and constructing models for permit limits, as well as for assessment purposes such as evaluating the health of waterbodies. In the Trinity 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.

Special projects are typically geared toward 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 involves annually updating 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 water resources is accomplished via participation in organized public and school events.

Trinity Basin and Water Quality Characteristics

The Trinity River extends approximately 715 miles and drains about 18,000 square miles of the state before ending at Trinity Bay near Anahuac. A majority of the basin topography is flat to gently rolling. A large portion of the watershed flows through the Blackland Prairies which lends the river its characteristic muddy brown color. This ecoregion is made up of soil types that, while excellent for row crop agriculture, are highly erodible.

The northern portion of the basin is dominated by the Dallas-Fort Worth (DFW) Metroplex. Legacy pollutants from persistent banned chemicals are a concern. Other results of urban life include storm water runoff that is polluted by oil and grease, pesticides, fertilizers, and animal waste. During the summer months, the native flow of the river in this area is reduced to a trickle generally made up of seeps from groundwater and occasional rainfall events. The larger fraction of summer flow is made up of effluent from wastewater dischargers. This allows the river to maintain a habitat far greater in flow and better water quality than historical levels.

The far northern and middle reaches of the basin are characterized by agriculture. These activities can result in elevated nutrient levels from fertilizer use, bacteria from concentrated animal feeding operations (CAFOs), and soil erosion. Many areas of the basin are also experiencing increased oil and gas drilling activities which can have negative impacts on water quality.

Public Involvement

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

The TRA Clean Rivers 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 meetings, which are open to the public, 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. The TRA CRP helps fund these events which include Trash Bash, Navarro County Clean-Up Day, and Walker County Proud. Volunteers at these events remove many tons of debris from waterbodies and waterways. In addition to the immediate benefit of the waste removal, volunteers become more aware of their impact on local waterbodies.

The Texas Stream Team utilizes a network of trained volunteers to monitor the quality of waterbodies in Texas. Texas State University administers this program in cooperation with the Texas Commission on Environmental Quality (TCEQ) and the Environmental Protection Agency (EPA). The TRA CRP supports this program through funding for replacement supplies in existing kits.

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 Gator Fest in Anahuac to water quality presentations for elementary school groups. At these events, information is presented on the Trinity basin as well as the Trinity River Authority. Educational materials are supplied in order to teach the public how they can take a personal role in reducing and preventing water pollution.

TRA Special Projects

Special projects are typically studies or activities that look at specific issues in-depth. The Trinity River Authority Clean Rivers Program either participates in or administers several special projects during the course of its biennial contracts with TCEQ. Final reports for past special projects are available on the TRA CRP website. The following sections discuss special projects undertaken in FY 2017 and those planned for FY 2018.

Biological Monitoring

Each year, TRA conducts Aquatic Life Monitoring in one or more streams. This monitoring consists of an assessment of the benthic macroinvertebrate and fish populations as well as the available habitat in and around the stream for up to a 500-meter reach in wadeable streams. This information is used to determine if aquatic life uses are being supported.

Aquatic Life Monitoring takes place during the index and critical periods of a single year. The index period is from March 15 to October 15 with the critical period being from July 1 to September 30. These time periods represent the warmer times of the year and the portion of the summer where the lowest stream flows, highest temperatures, and lowest dissolved oxygen levels are expected to occur. These time periods are targeted because it is assumed that if aquatic life uses are being met under these conditions, then they are also being met during the remainder of the year.

The data that are collected are summarized into a score that represents an aquatic life use level of Exceptional, High, Intermediate, or Limited. Table 1 details the metrics for Exceptional and Limited use scores.

In the summer of 2017, monitoring was conducted on Walnut Creek at Katherine Rose Park in Mansfield. Because this stream is intermittent with perennial pools, it has a presumed Limited aquatic life use. Sampling took place on May 31, 2017 (Index Period) and August 1, 2017 (Critical Period). Based on this sampling, it was determined that this stream is supporting its aquatic life uses. Fish scores were High for the Index Period and Intermediate for the Critical Period. Benthic macroinvertebrate scores were Intermediate for the Index Period and High for the Critical Period. Habitat scores were High for both the Index and Critical Periods. For photos taken during these sampling events, see Images 1 and 2,

Aquatic Life Monitoring is planned for three sites in FY 2018: Fish Creek in Grand Prairie, White Rock Creek in Dallas, and the West Fork Trinity River near Jacksboro.

Table 1: Scoring Metrics for Aquatic Life Monitoring

	Exceptional	Limited
Fish	1. Large number of species relative to basin size 2. Large number of native cyprinid species 3. Larger number of benthic invertivore species 4. Large number of native sunfish species 5. Lower percentage of individuals as tolerant species 6. Lower percentage of individuals as omnivores 7. Higher percentage of individuals as invertivores 8. Higher percentage of individuals as piscivores 9. Higher number of individuals per seine haul 10. Higher number of individuals per minute of electrofishing 11. Lower percentage of individuals as non-native species 12. Lower percentage of individuals with disease or other anomaly	1. Small number of species relative to basin size 2. Few native cyprinid species 3. No benthic invertivore species 4. Few native sunfish species 5. Higher percentage of individuals as tolerant species 6. Higher percentage of individuals as omnivores 7. Lower percentage of individuals as invertivores 8. Lower percentage of individuals as piscivores 9. Lower number of individuals per seine haul 10. Lower number of individuals per minute of electrofishing 11. Higher percentage of individuals as non-native species 12. Higher percentage of individuals with disease or other anomaly
Benthic Macroinvertebrates *EPT-Ephemeroptera, Plecoptera, and Tricoptera	1. Large number of species overall 2. Large number of species within the orders EPT* 3. Lower Hilsenhoff Biotic Integrity score (higher relative abundance of intolerant taxa) 4. Lower percentage of individuals as Chironomidae 5. Lower ratio of individuals in the dominant taxon to the total number of individuals 6. Lower ratio of individuals in the dominant functional feeding group to the total number of individuals 7. Lower ratio of predator individuals to the total number of individuals 8. Higher ratio of individuals in intolerant taxa to those in tolerant taxa 9. Lower percentage of total Tricoptera individuals as Hydropsychidae 10. Higher number of non-insect taxa 11. Lower ratio of collector-gatherer individuals to the total number of individuals 12. Lower ratio of Elmidae individuals to the total number of individuals	1. Small number of species overall 2. Few species within the orders EPT* 3. Higher Hilsenhoff Biotic Integrity score (higher relative abundance of tolerant taxa) 4. Higher percentage (or extremely low percentage) of individuals as Chironomidae 5. Higher ratio of individuals in the dominant taxon to the total number of individuals 6. Higher ratio of individuals in the dominant functional feeding group to the total number of individuals 7. Higher ratio (or extremely low ratio) of predator individuals to the total number of individuals 8. Lower ratio of individuals in intolerant taxa to those in tolerant taxa 9. Higher percentage of total Tricoptera individuals as Hydropsychidae (or no Trichoptera individuals) 10. Lower number of non-insect taxa 11. Higher ratio (or extremely low ratio) of collector-gatherer individuals to the total number of individuals 12. Higher ratio (or extremely low ratio) of Elmidae individuals to the total number of individuals
Habitat	1. Large amount and many types of substrate that provides instream cover or habitat 2. Higher substrate stability (dominant substrate is gravel or larger) 3. Higher number of riffles 4. Higher dimensions for largest pool 5. Higher water level within the channel 6. Highly stable banks 7. Higher channel sinuosity 8. Wide natural riparian buffer strips 9. Undeveloped surrounding area	1. Low amount or very few types of substrate that provides instream cover or habitat 2. Low substrate stability (dominant substrate sand/silt/clay or bedrock) 3. Lower number of riffles 4. Lower dimensions for largest pool 5. Lower water level within the channel 6. Unstable banks 7. Lower channel sinuosity 8. Narrow natural riparian buffer strips 9. Highly developed surrounding area

Image 1: Riffle at upstream transect during Index Period (top) and Critical Period (bottom).

Image 2: Fish collected during Aquatic Life Monitoring.

PCBs, Dioxins, and Furans in Sediments

In 1990, the Texas Department of State Health Services (TxDSHS) issued an aquatic life order (AL-2) for the Trinity River from the Clear Fork at the 7th Street Bridge in Fort Worth to the West Fork and downstream to the IH-20 bridge southeast of Dallas. This order prohibited the possession of fish due to unsafe levels of Chlordane in tissue. In 2002, this order was extended to the SH 34 bridge in Kaufman/Ellis counties by AL-14. An additional fish consumption advisory (ADV-25) was placed on the river between SH 34 and the discharge canal from Cedar Creek Reservoir in 2002 due to the presence of polychlorinated biphenyls (PCBs) and chlorinated pesticides in tissue. Possession bans AL-2 and AL-14 were rescinded with AL-17 in 2010 and were downgraded to a fish consumption advisory (ADV-43) in 2010. ADV-43 also extended the upstream boundary of the advisory for the West Fork up to Lake Worth Dam and defined the advisory as being due to elevated levels of PCBs and dioxins/furans in tissue. ADV-45 was released in 2010 and

Image 3: SDI VibeCore system being used by Arroyo Environmental Consultants, LLC in Lake Livingston at site 10914.

included a fish consumption advisory due to PCBs for Lake Worth in Fort Worth upstream to the dam of Eagle Mountain Reservoir.

ADV-43 and ADV-45 have been in place since 2010. In December of 2015, the downstream boundary of the advisories for PCBs and dioxins/furans was extended to the US 90 bridge in Liberty County with ADV-53. This advisory includes the whole of Lake Livingston, a large on-channel reservoir in the southern portion of the Trinity River basin that serves as a water supply and an extensive recreational fishery. Due to the downstream progress of the fish consumption advisories and the hydrophobic nature of PCBs and dioxins/furans, it was determined that sediment samples should be collected at several locations throughout the basin. These sediment samples may be used to determine if there are any "hot-spots" where these contaminants are entering the system and to what extent the contaminants still exist in the upstream reaches of the advisory area.

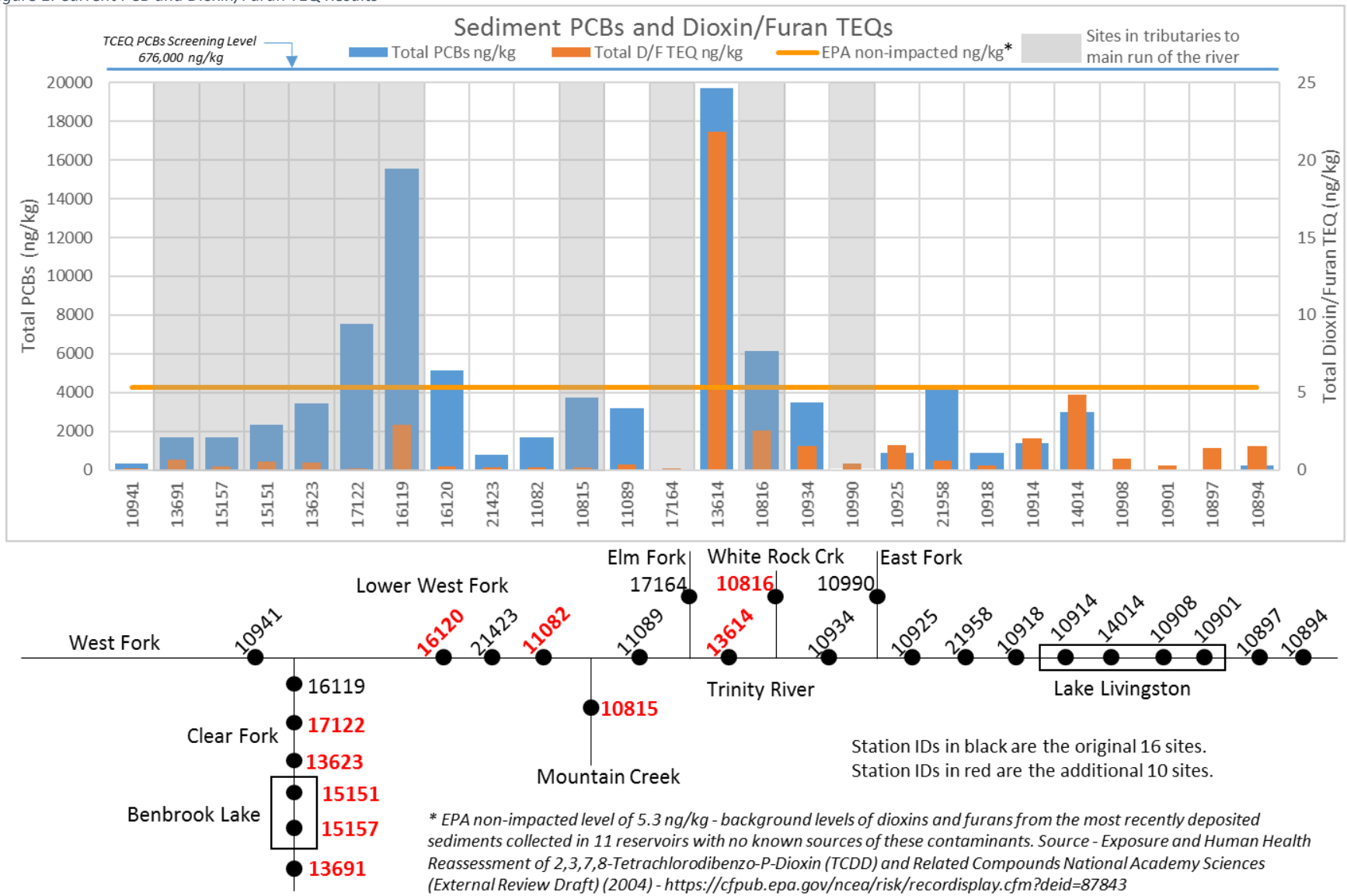
In the summer of 2017, sediment samples were collected at ten sites upstream of Lake Livingston and at two sites downstream of the lake. Four sites were sampled within Lake Livingston. Core samples were collected at the reservoir samples in addition to the surface samples (see Image 3). However, the core samples yielded little information about the changes in these pollutants over time.

The initial round of sampling indicated that there were elevated levels of PCBs and dioxins/furans in the Clear Fork and in the Trinity River downstream of Mountain Creek and downstream of White Rock Creek as shown in Figure 1. The diagram below the graph provides a simplified view of the sites sampled during this project and their relative locations in the basin. An additional 10 sites were then sampled across the northern portion of the basin. These sites were selected in order to bracket potential inputs as determined from the results of the previously sampled sites.

Based on the results of the first and second rounds of sampling, there appear to be significant inputs of these pollutants on the Clear Fork downstream of Benbrook Lake, on the Trinity River between the Elm Fork and White Rock Creek, and in the White Rock Creek arm of Lake Livingston (site 14014).

A third round of sampling is scheduled for the summer of 2018 to further narrow down and potentially locate the source of pollutants into these waterbodies.

Figure 1: Current PCB and Dioxin/Furan TEQ Results



** EPA non-impacted level of 5.3 ng/kg - background levels of dioxins and furans from the most recently deposited sediments collected in 11 reservoirs with no known sources of these contaminants. Source - Exposure and Human Health Reassessment of 2,3,7,8-Tetrachlorodibenzo-P-Dioxin (TCDD) and Related Compounds National Academy Sciences (External Review Draft) (2004) - https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=87843*

E. coli in Sediments

During the development of the Village Creek-Lake Arlington Watershed Protection Plan, stakeholders expressed interest in understanding factors that influence bacteria levels in the water column. There are many sources in scientific literature that indicate that sediments can be a significant reservoir of bacteria in waterbodies. Most studies have focused on swimming beaches of reservoirs and coastal areas; little work has been conducted on flowing/eroding systems. To more fully understand bacterial impairment issues in the streams of the Trinity basin, a study will be undertaken starting in FY 2018 to identify the extent to which bacteria in sediments may affect water column concentrations. The initial phase of this project will focus on sediment and water column *E. coli* enumeration. The scope of future phases of this study may be expanded based on the results of this first phase.

Sampling will take place bimonthly at seven sites spread across four streams. Sampling will take place at low to normal flows in order to reduce any background noise in the resultant data set from non-point source runoff and in-stream sediment disturbance. Each event will consist of a standard water column *E. coli* and sediment *E. coli* sample. Following the collection of these samples, a set of sediment samples will be collected to determine particle sizes and total organic carbon. The sediment across the width of the stream will then be disturbed and another water column *E. coli* sample will be collected.

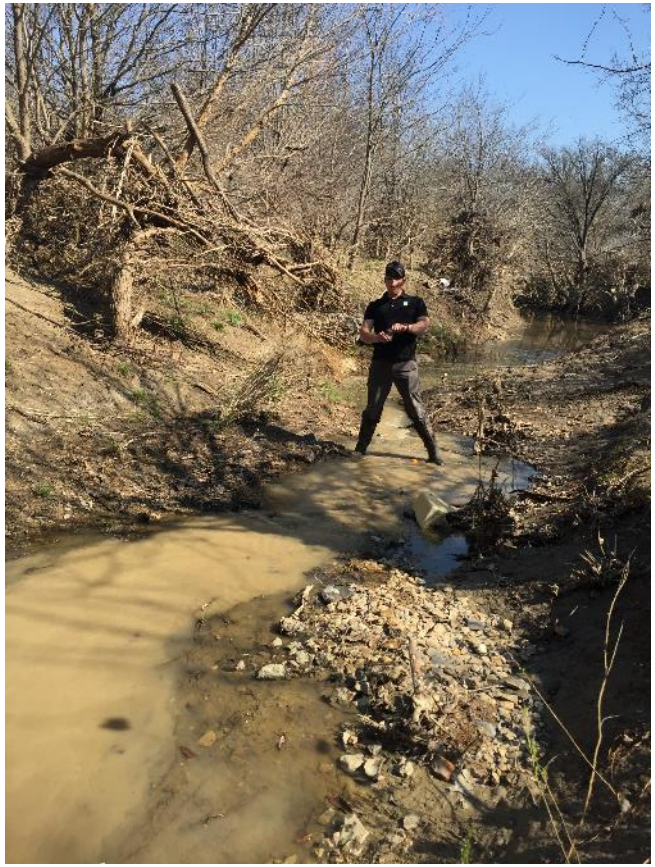


Image 4: Post-disturbance water column E. coli sampling.

The goals of this project are to 1) characterize how *E. coli* in sediments may affect water column *E. coli* under conditions in which the sediments are disturbed, 2) establish a baseline for *E. coli* without the influence of nonpoint source stormwater inputs from the watershed, and 3) determine if there are any correlations between sediment *E. coli* levels and specific sediment particle sizes.

White Rock Creek *E. coli* Source Identification

White Rock Creek above White Rock Lake has been identified as not supporting the Contact Recreation Use due to elevated levels of E. coli. TRA is planning a study for FY 2018 that will attempt to determine if there is an identifiable source of bacteria in this stream. As noted in the Watershed Updates section of this report, there are numerous sources of bacteria. These can include runoff from pets, wildlife, livestock and failing septic systems as well as broken infrastructure such as sewage lines.

This study will involve two initial rounds of sampling; one during dry weather and another during wet weather. Sampling will be conducted at each bridge crossing upstream from I-635 near Addison. If an area is identified where E. coli appears to be increasing, additional finer scale sampling and ground work will take place in order to locate any potential sources.

Image 5: White Rock Creek at I-635 near Addison.

Water Quality

Monitoring

Water quality monitoring is being conducted by ten partner entities as well as TRA. Sampling is being conducted at frequencies of monthly to annually at 218 sites throughout the basin. Routine monitoring accounts for 192 of these sites. These partner entities have contributed their monitoring efforts to the Clean Rivers Program and greatly increased the range of the program in the basin. With the cooperation of these partners, TRA has received a four to one return for each dollar spent on monitoring activities.

Table 2 provides a summary of the FY 2017 and 2018 monitoring by entity. Images 6 to 22 show the sampling locations for the currently planned FY 2018 monitoring activities.

The following list is a generalized summary of the parameters included in each parameter group shown in Table 2. The specific parameters collected by each entity vary.

- **Bacteria** – *E. coli*
- **Flow** – flow severity, instantaneous flow, and flow measurement method
- **Field** – Air and water temperature, dissolved oxygen, pH, specific conductance, drought parameters, Secchi depth, and turbidity
- **24-Hour DO** – 24-hour deployment summary data for water temperature, dissolved oxygen, pH, and specific conductance
- **Conventionals** – Total alkalinity, biochemical oxygen demand, total and dissolved organic carbon, chlorophyll-a, hardness, nitrogen series, phosphorus series, residues, chloride, and sulfate
- **Metals in Water** – total and/or dissolved aluminum, arsenic, barium, cadmium, chromium, copper, iron, lead, magnesium, manganese, nickel, silver, and zinc

- **Organics in Water** – total petroleum hydrocarbons
- **Organics in Sediment** – PCBs, dioxins, and furans
- **Aquatic Habitat** – riparian vegetation types and percentages, bank angles and erosion potential, stream bend and riffle counts, pool width and depth, stream reach characteristics
- **Benthics** – benthic macroinvertebrate species identification and counts, sample collection method, population characteristics
- **Nekton** – fish species identification and counts, sample collection method, population characteristics

Table 2: FY 2017 and FY 2018 Monitoring Summary

Entity	Type of Sampling	FY 2017 # of Sites	FY 2017 Frequency and Parameters	FY 2018 # of Sites	FY 2018 Frequency and Parameters
City of Arlington	Routine	8	**Monthly** - Bacteria, Flow, and Field **Quarterly** - Metals in Water (at all sites) and Conventionals (at 4 sites)	No Change	
City of Dallas	Routine	30	**Monthly** – Field **Semiannually** - Metals in Water	No Change	
DFW Airport Environmental Affairs Department	Routine	6	**Quarterly** - Metals in Water, Organics in Water, Conventionals, Bacteria, Flow, and Field	No Change	
City of Dallas Trinity Watershed Group	Routine	3	**Quarterly** - Bacteria, Flow, and Field	No Change	
City of Fort Worth	Routine	7	**Monthly** - Flow (at 6 sites) and Field **Quarterly** - Bacteria	7	**Monthly** - Flow (at 4 sites) and Field **Quarterly** - Bacteria

Entity	Type of Sampling	FY 2017 # of Sites	FY 2017 Frequency and Parameters	FY 2018 # of Sites	FY 2018 Frequency and Parameters
City of Grand Prairie	Routine	7	**Monthly** - Bacteria, Flow (at 4 sites), and Field **Quarterly** - Conventionals **Annually** - Metals in Water	No Change	
City of Irving	Routine	9	**Bimonthly** - Conventionals (at 4 sites), Bacteria, Flow (at 7 sites), and Field **Semiannually** - Metals in Water (at 4 sites)	No Change	
TRA Lake Livingston Project	Diurnal	3	**Semiannually** – 24-hour DO	No Change	
	Routine	4	**Monthly** - Conventionals, Bacteria (at 3 sites), Flow (at 2 sites), and Field **Semiannually** - Metals in Water (at 3 sites)	No Change	
		1	**Quarterly** - Field	No Change	
		5	**Quarterly** - Conventionals, Bacteria, Flow (at 1 site), and Field **Semiannually** - Metals in Water	No Change	
		12	**Semiannually** - Metals in Water (at 3 sites), Conventionals, Bacteria (at 8 sites), Flow (at 8 sites), and Field	No Change	
North Texas Municipal Water District	Routine	16	**Monthly** - Metals in Water, Conventionals, Bacteria, Flow (at 2 sites), and Field	No Change	

Entity	Type of Sampling	FY 2017 # of Sites	FY 2017 Frequency and Parameters	FY 2018 # of Sites	FY 2018 Frequency and Parameters
Tarrant Regional Water District	Diurnal	7	**Semiannually** – 24-hour DO	No Change	
	Routine	4	**Monthly** - Metals in Water, Conventionals, Bacteria, Flow (at 3 sites), and Field	No Change	
		2	**Monthly** - Metals in Water, Conventionals, and Field **Quarterly** - Bacteria	No Change	
		8	**Monthly** - Field (6 of these events will consist of flow severity only) **Bimonthly** - Metals in Water, Conventionals, Bacteria, and Flow (at 2 sites)	No Change	
		2	**Monthly** - Field (6 of these events will consist of flow severity only) **Bimonthly** - Conventionals and Bacteria	No Change	
		9	**Monthly** - Conventionals, Bacteria (at 6 sites), Flow (at 6 sites), and Field	No Change	
		5	**5 times a year** - Metals in Water, Conventionals, and Field **Quarterly** - Bacteria	No Change	
		25	**5 times a year** - Conventionals and Field **Quarterly** - Bacteria	No Change	
		3	**Quarterly** - Metals in Water, Conventionals, Bacteria, Flow (at 2 sites), and Field	2	**Quarterly** - Metals in Water, Conventionals, Bacteria, Flow (at 1 site), and Field
				1	**Semiannually** - Metals in Water, Conventionals, Bacteria, Flow, and Field
		10	**Quarterly** - Bacteria, Flow (at 2 sites), and Field	No Change	

Entity	Type of Sampling	FY 2017 # of Sites	FY 2017 Frequency and Parameters	FY 2018 # of Sites	FY 2018 Frequency and Parameters
TRA General Office	Diurnal	1	**5 times a year** – 24-hour DO	No Change	
	Aquatic Life Monitoring	1	**2 times a year** – 24-hour DO, Aquatic Habitat, Benthics, Nekton, Flow, and Field	3	**2 times a year** – 24-hour DO, Aquatic Habitat, Benthics, Nekton, Flow, and Field
	Routine	1	**5 times a year** - Conventionals, Bacteria, Flow, and Field	No Change	
		4	**Quarterly** - Conventionals, Bacteria, Flow (at 2 sites), and Field	5	**Quarterly** - Conventionals, Bacteria, Flow (at 3 sites), and Field
		2	**Quarterly** - Bacteria, Flow, and Field	No Change	
		9	**Quarterly** - Conventionals, Bacteria, Flow, and Field **Semiannually** - Metals in Water	8	**Quarterly** - Conventionals, Bacteria, Flow, and Field **Semiannually** - Metals in Water
	Biased to Flow Watershed Characterization	26	**1 time** - Organics in Sediment, Field	Approx. 12	**1 time** - Organics in Sediment, Field

Image 6: City of Arlington Sample Sites

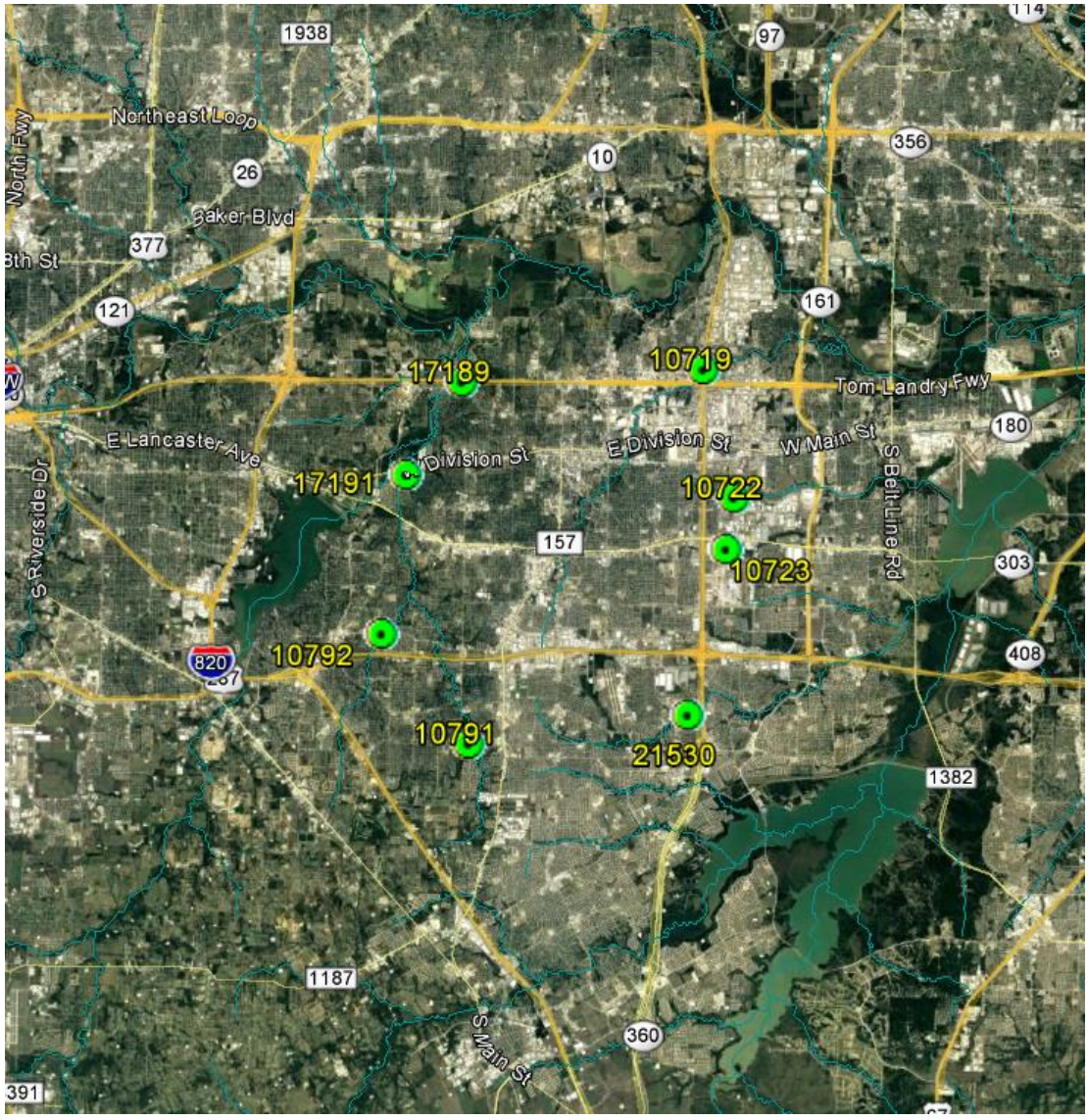


Image 7: City of Dallas Sample Sites

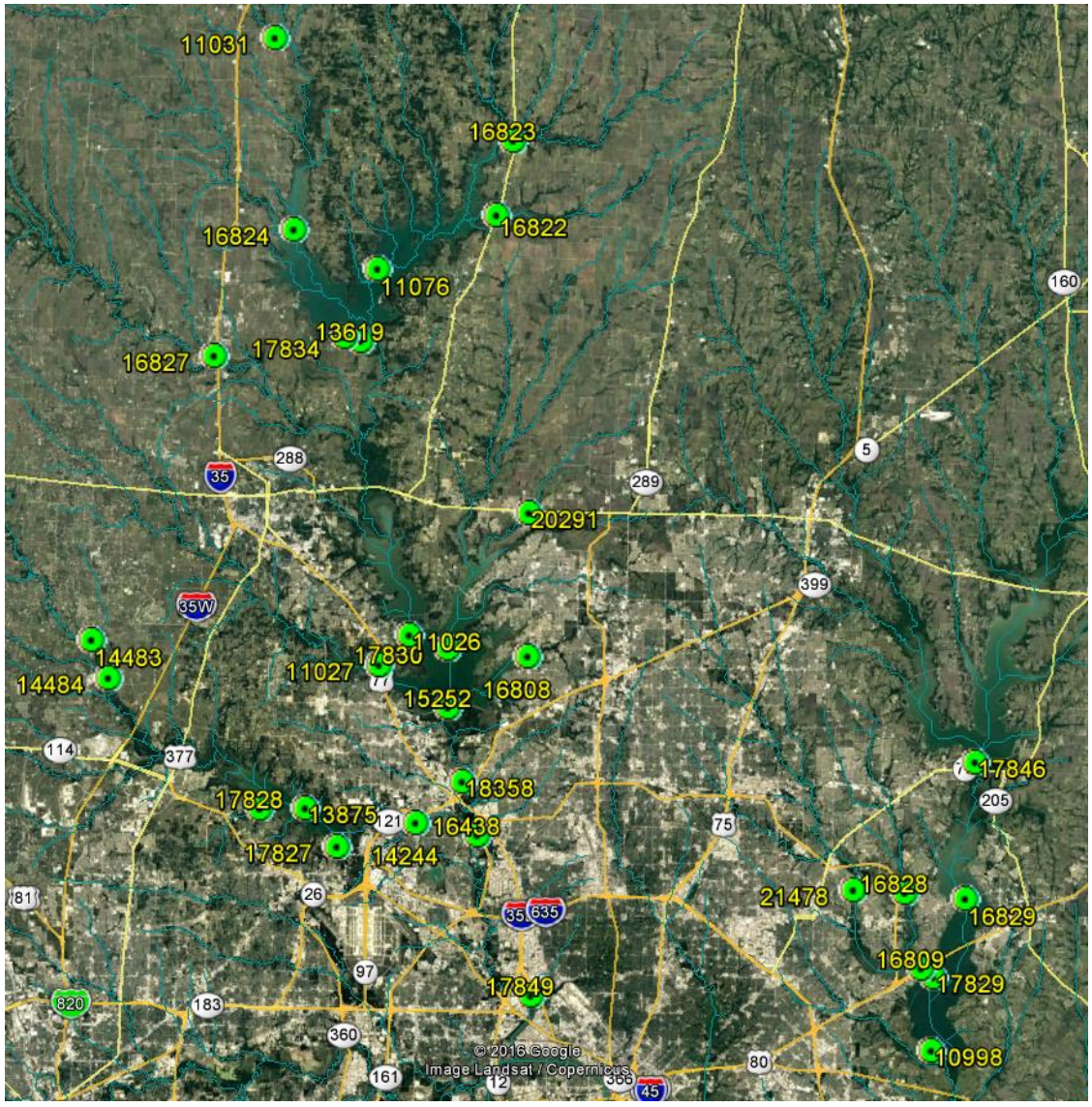


Image 8: DFW Airport Environmental Affairs Department Sample Sites

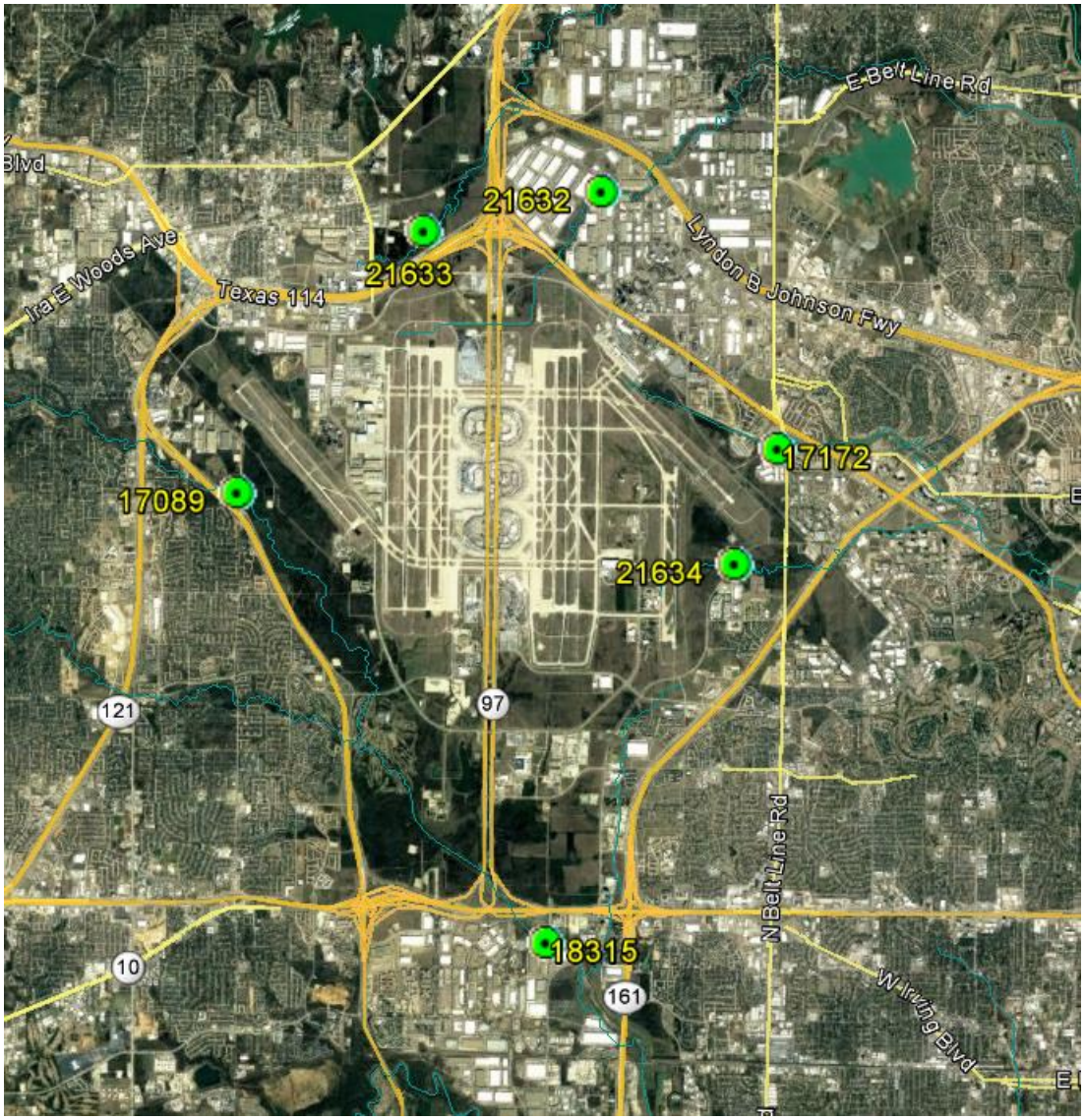


Image 9: City of Dallas Trinity Watershed Group Sample Sites

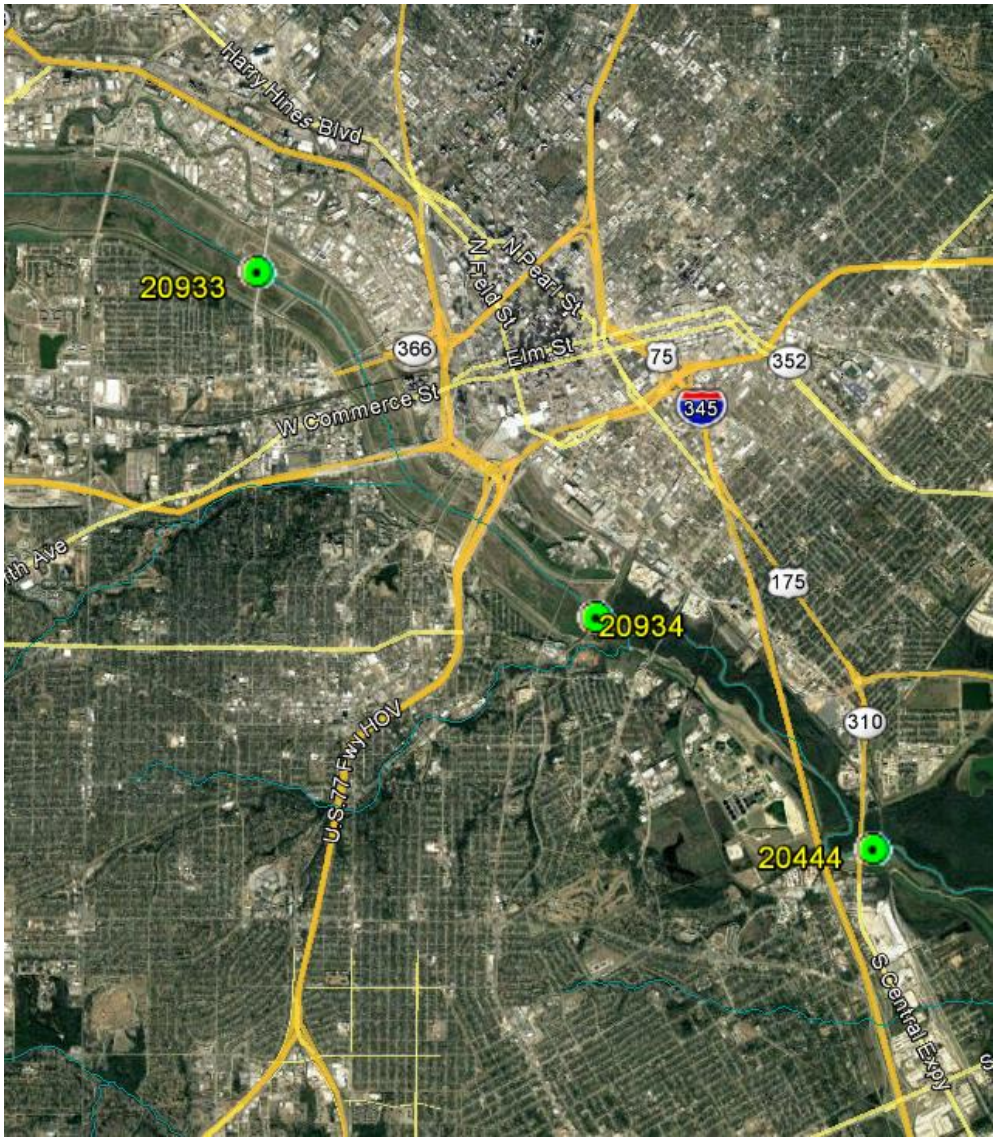


Image 10: City of Fort Worth Sample Sites

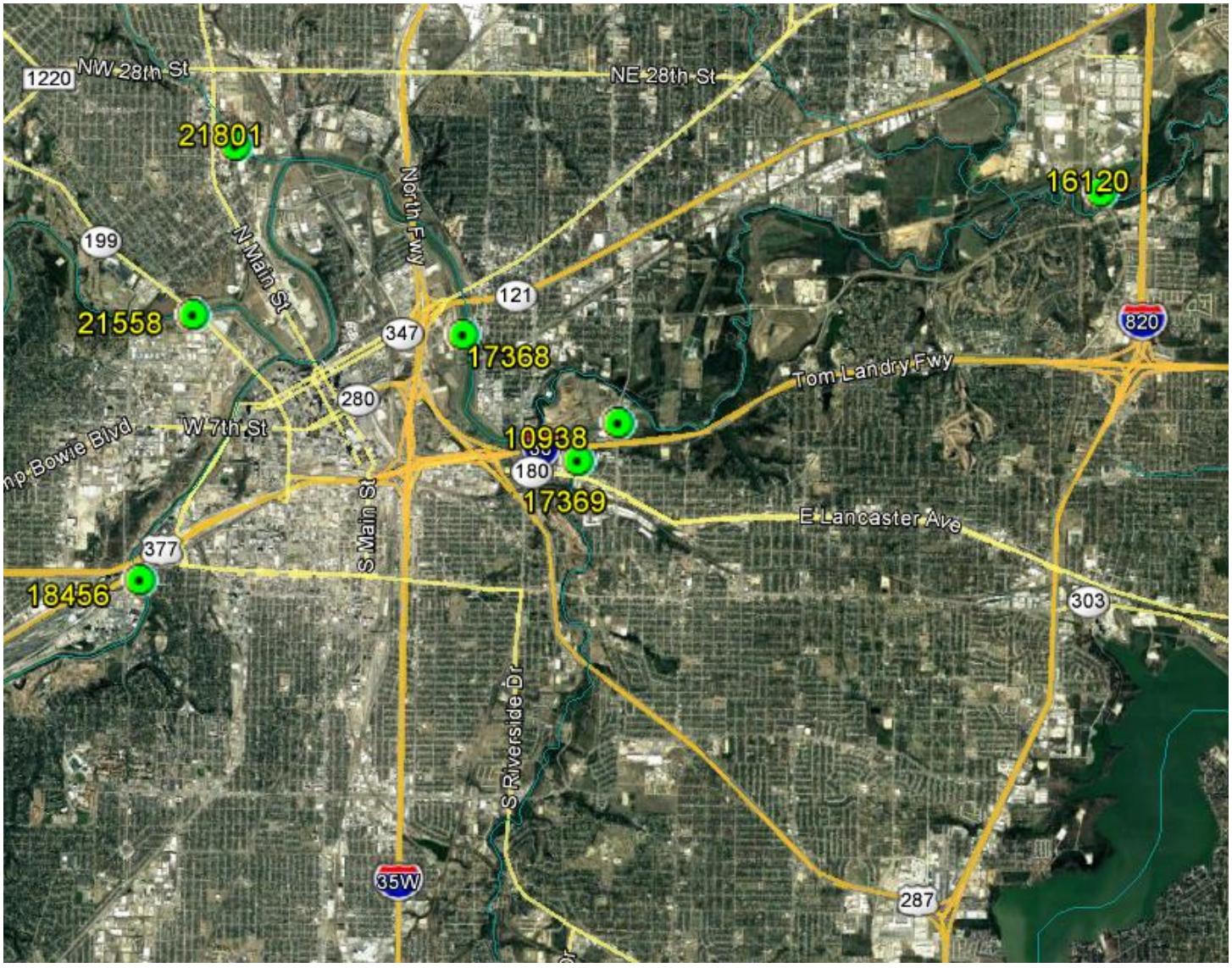


Image 11: City of Grand Prairie Sample Sites

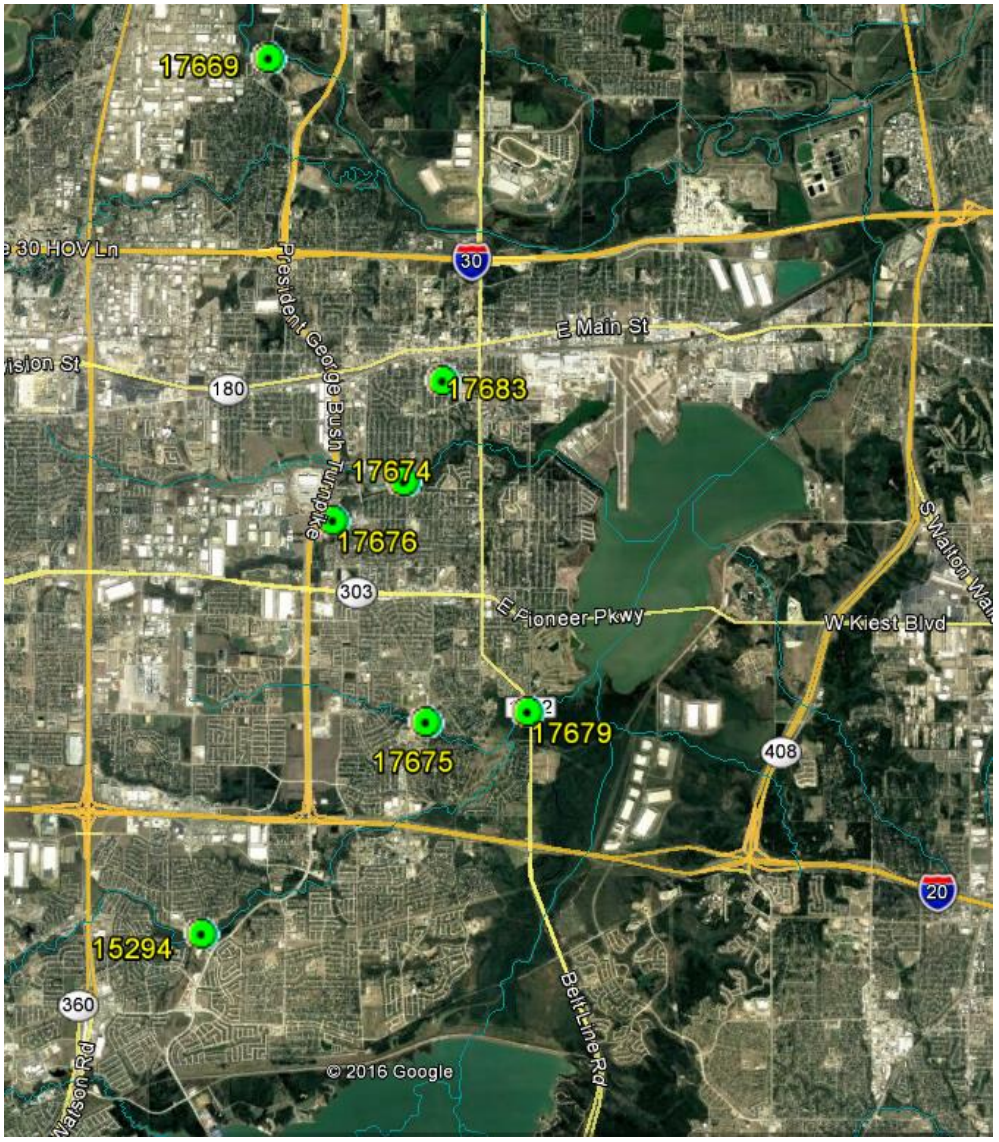


Image 12: City of Irving Sample Sites

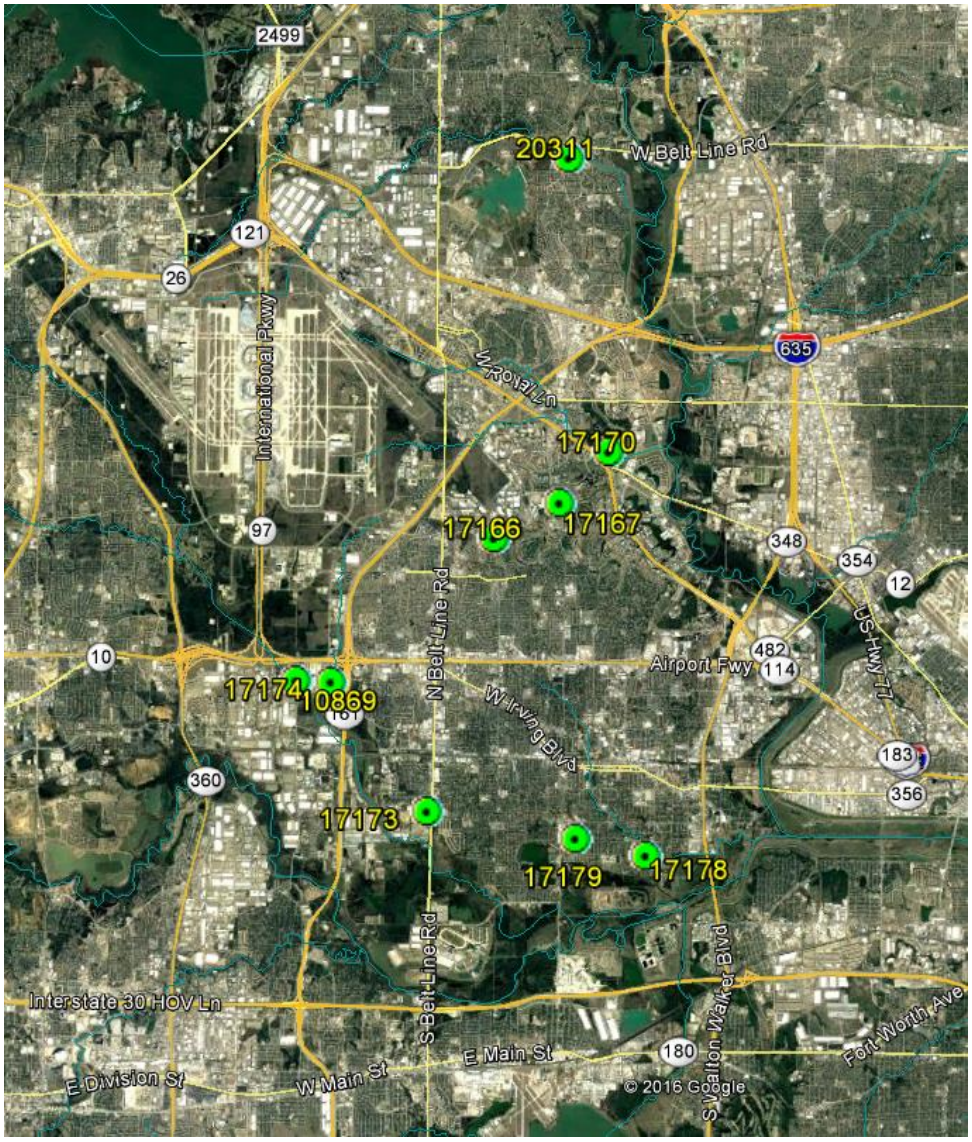


Image 13: TRA Lake Livingston Project Sample Sites

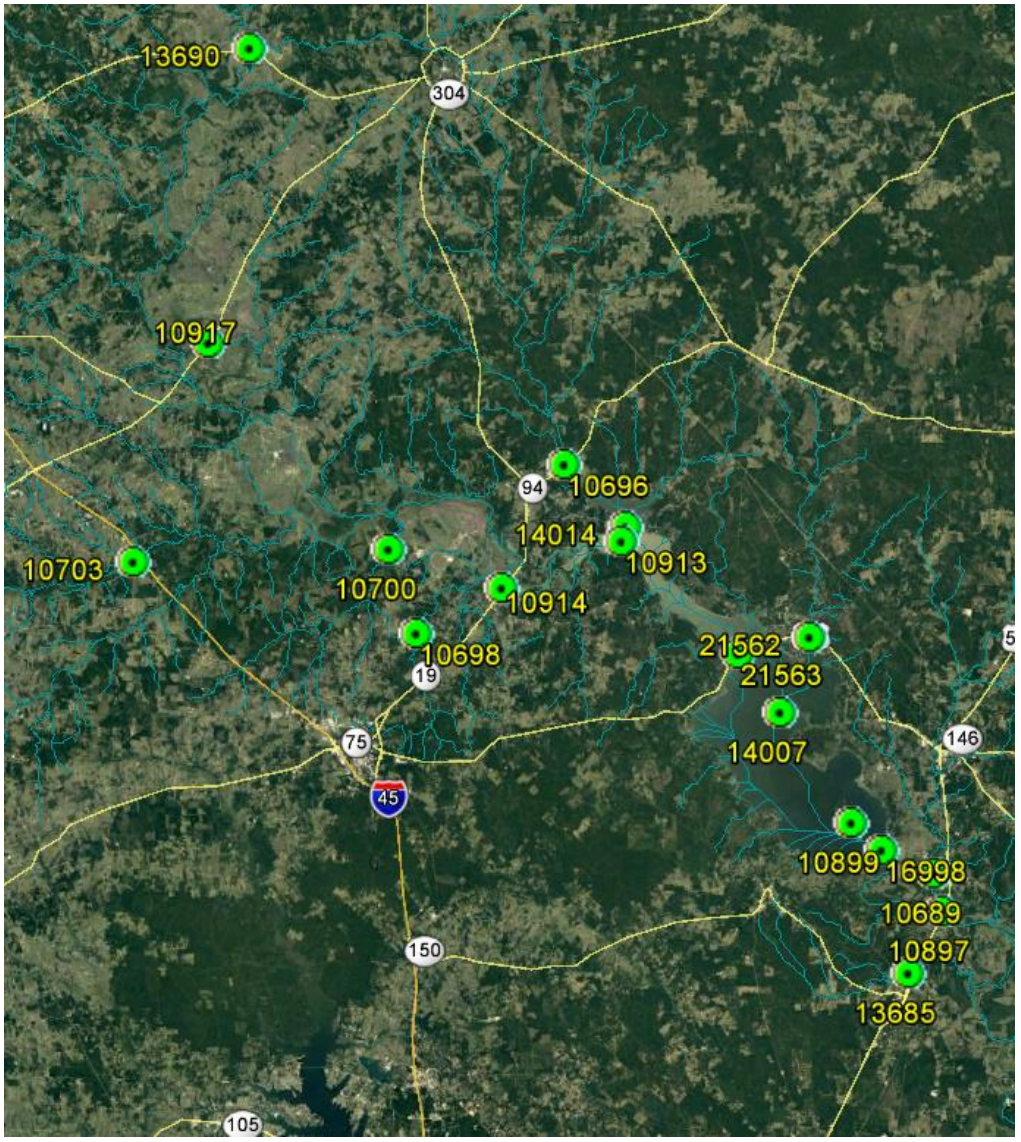


Image 14: TRA Lake Livingston Project Sample Sites (continued)

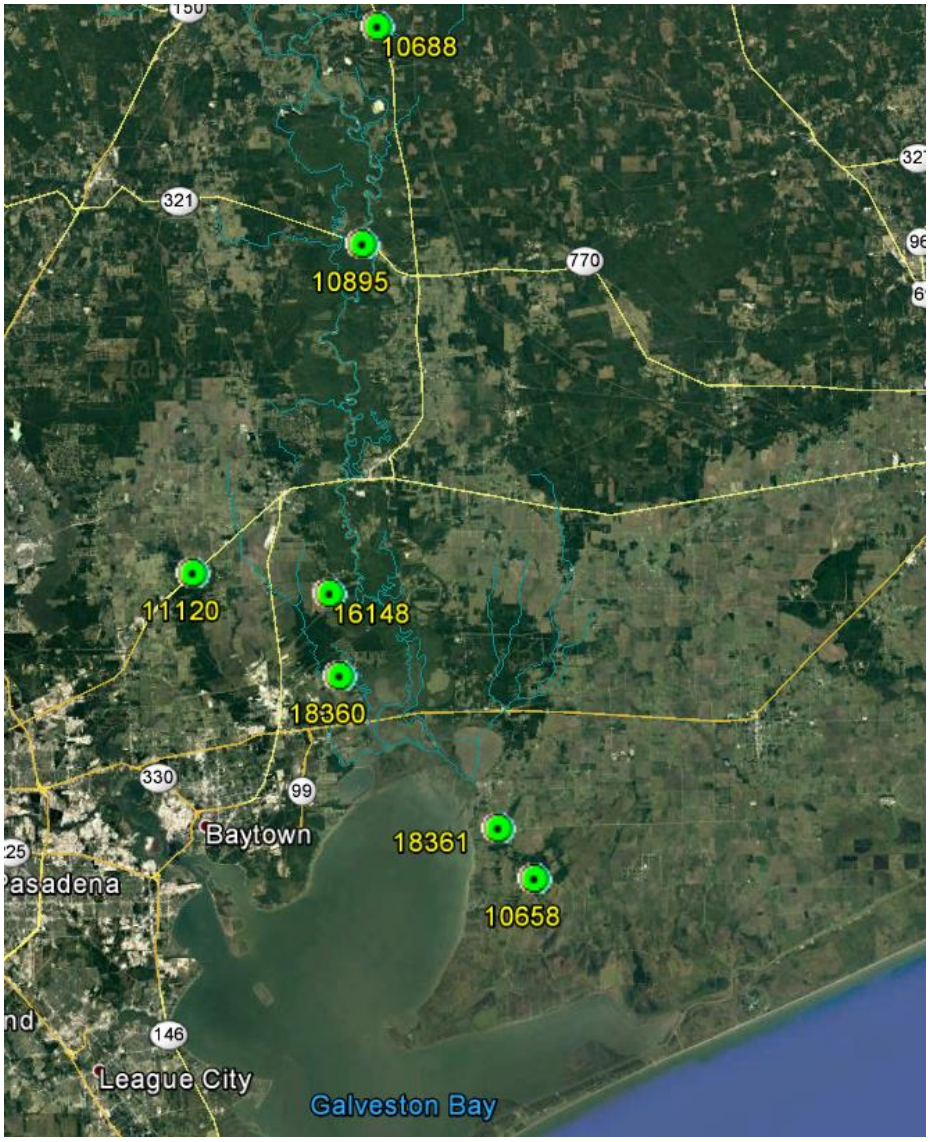


Image 15: North Texas Municipal Water District Sample Sites

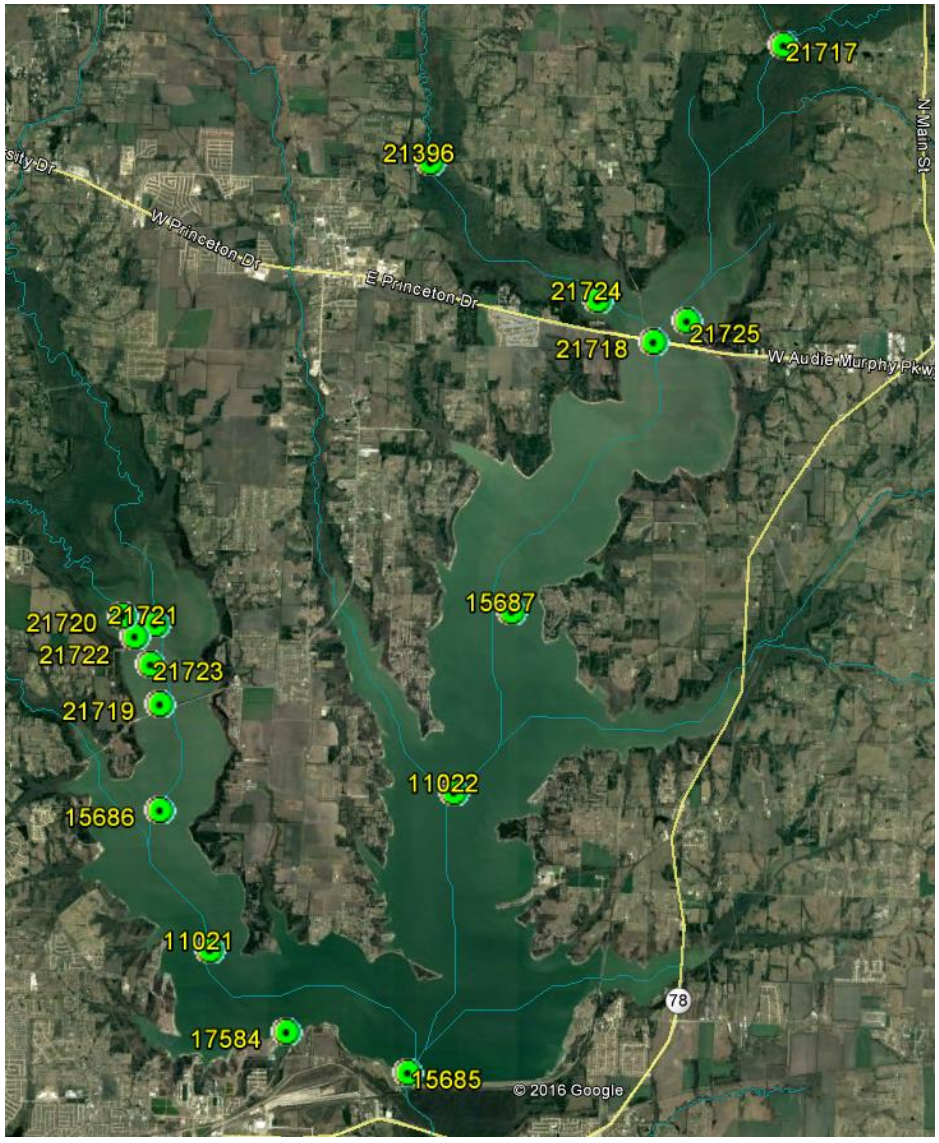


Image 16: Tarrant Regional Water District Sample Sites

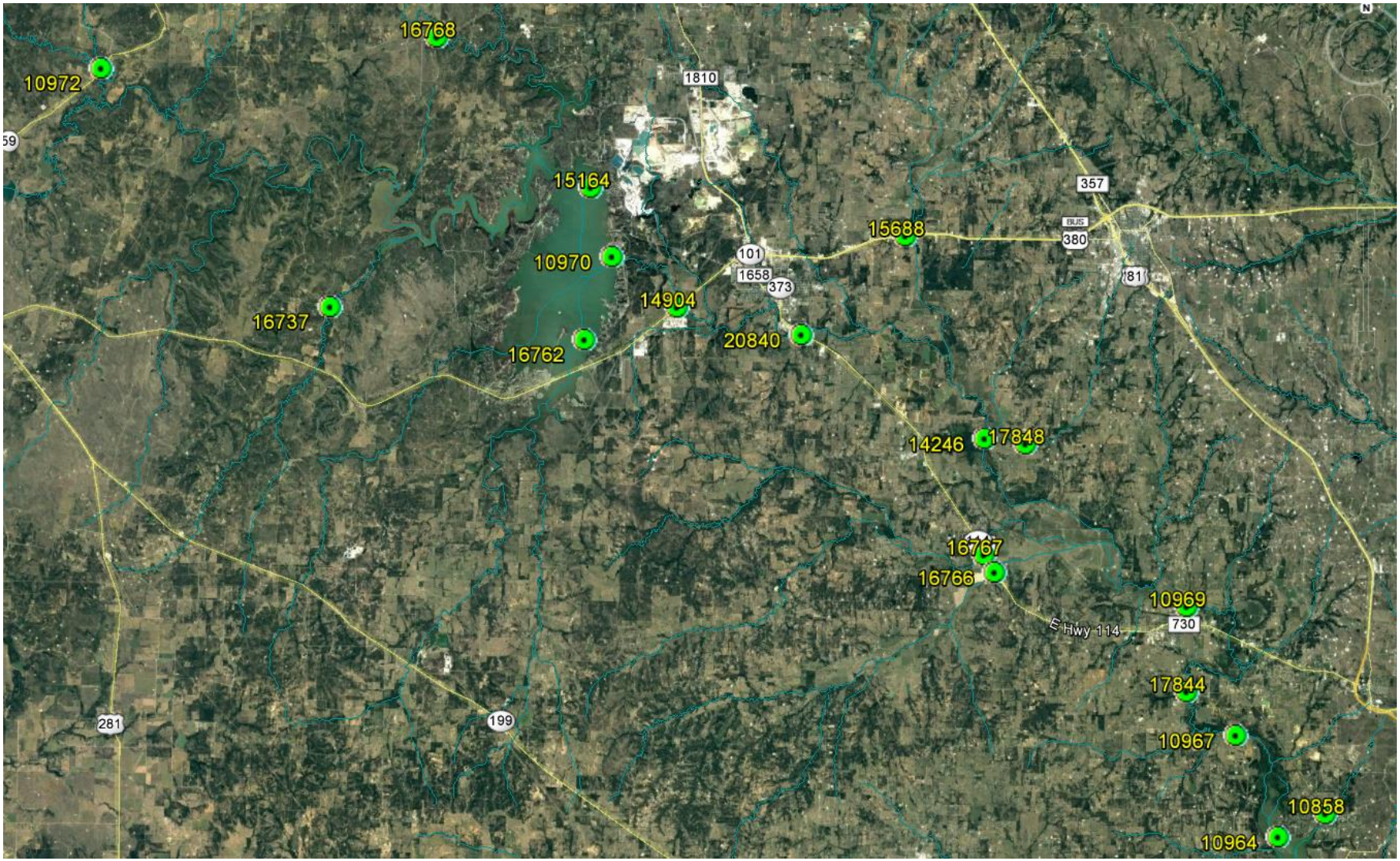


Image 17: Tarrant Regional Water District Sample Sites (continued)

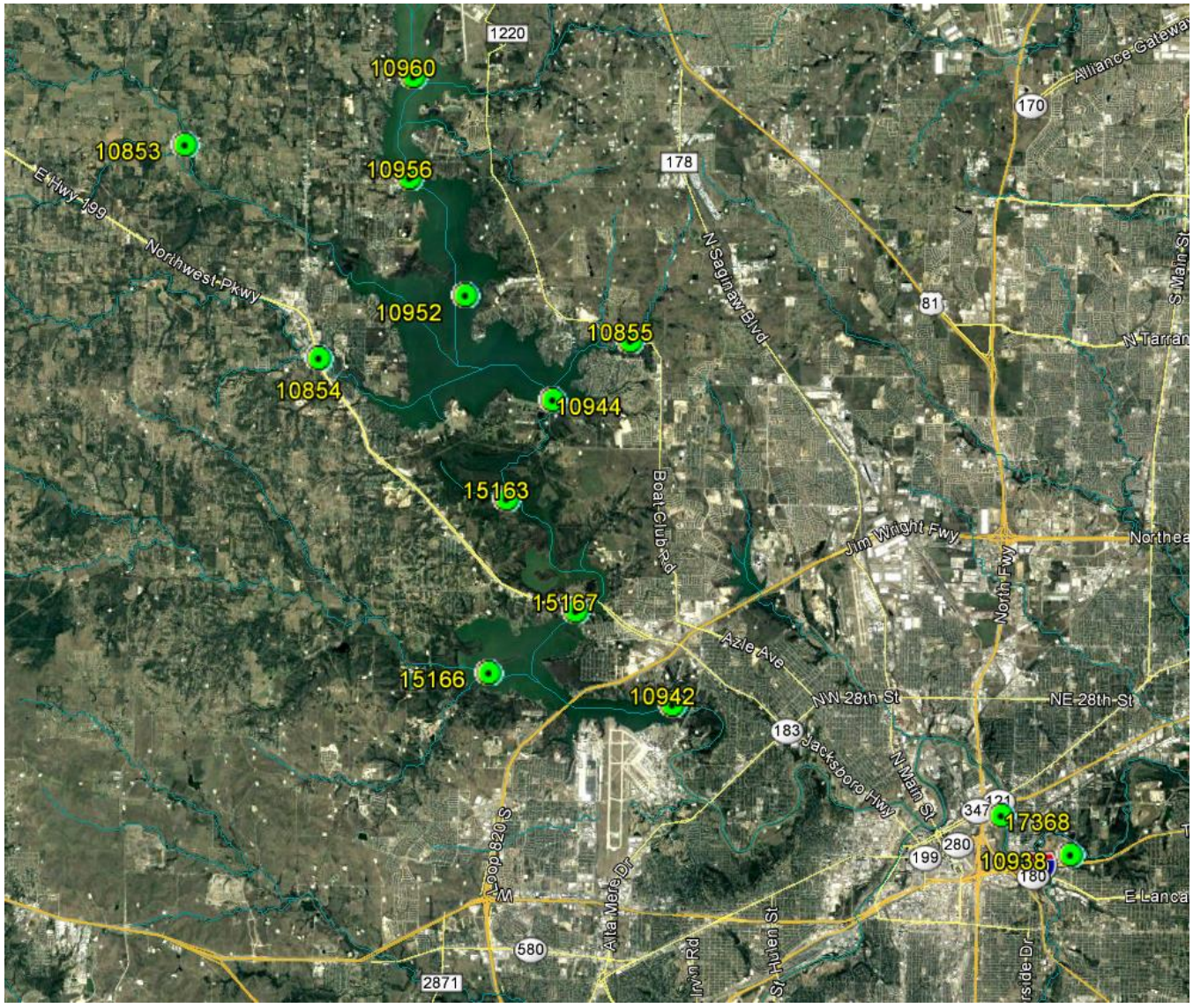


Image 18: Tarrant Regional Water District Sample Sites (continued)

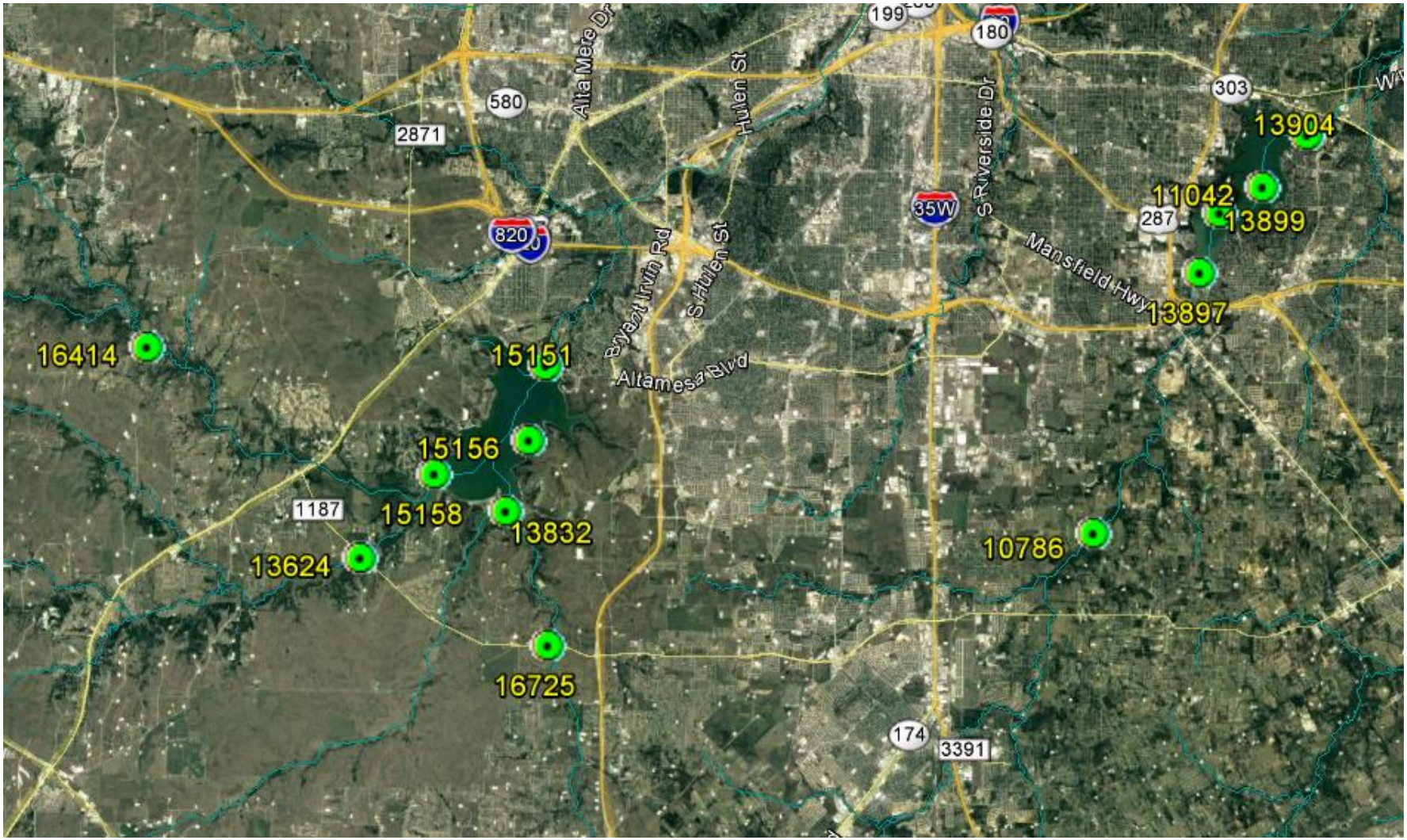


Image 19: Tarrant Regional Water District Sample Sites (continued)

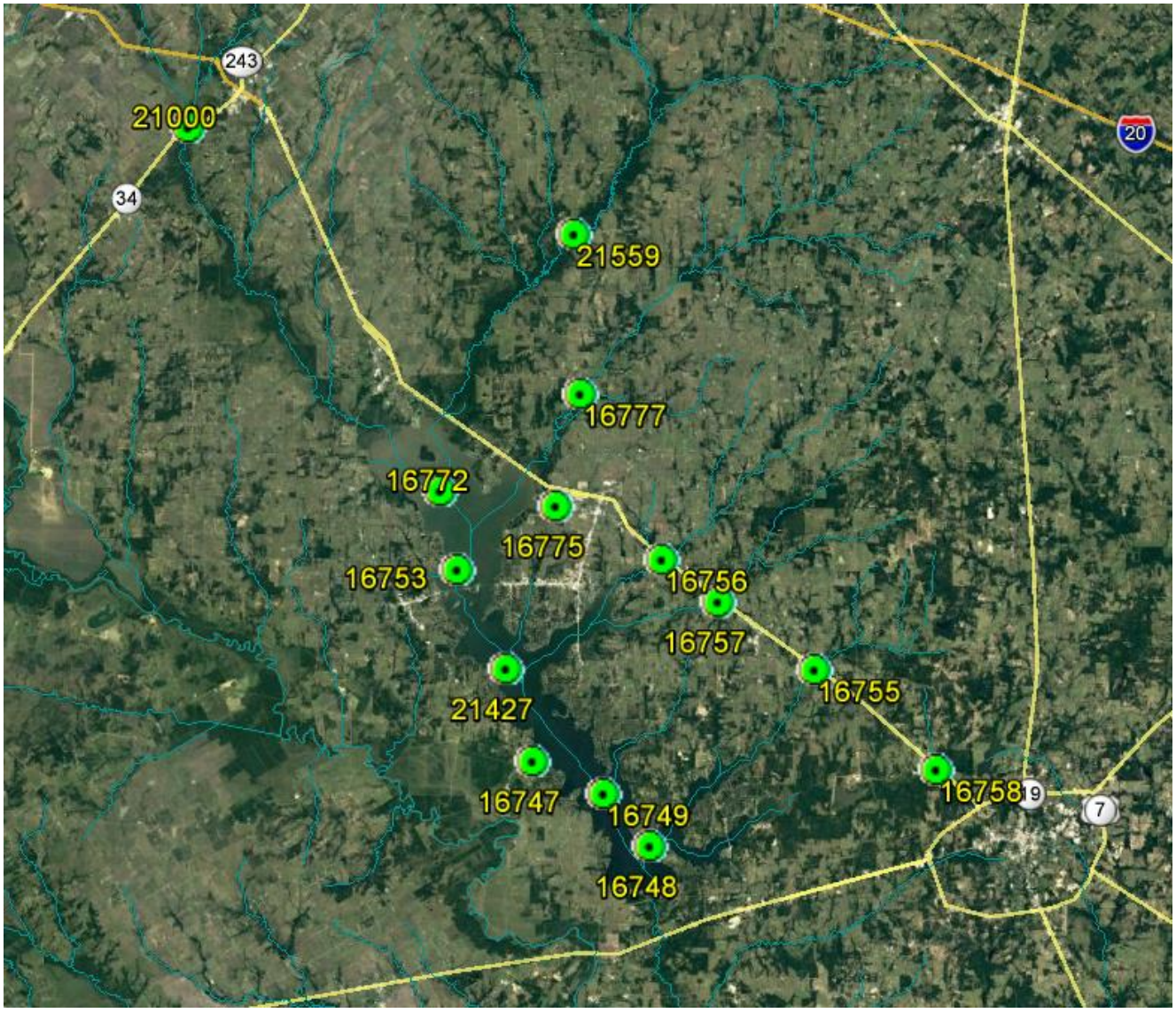


Image 20: Tarrant Regional Water District Sample Sites (continued)

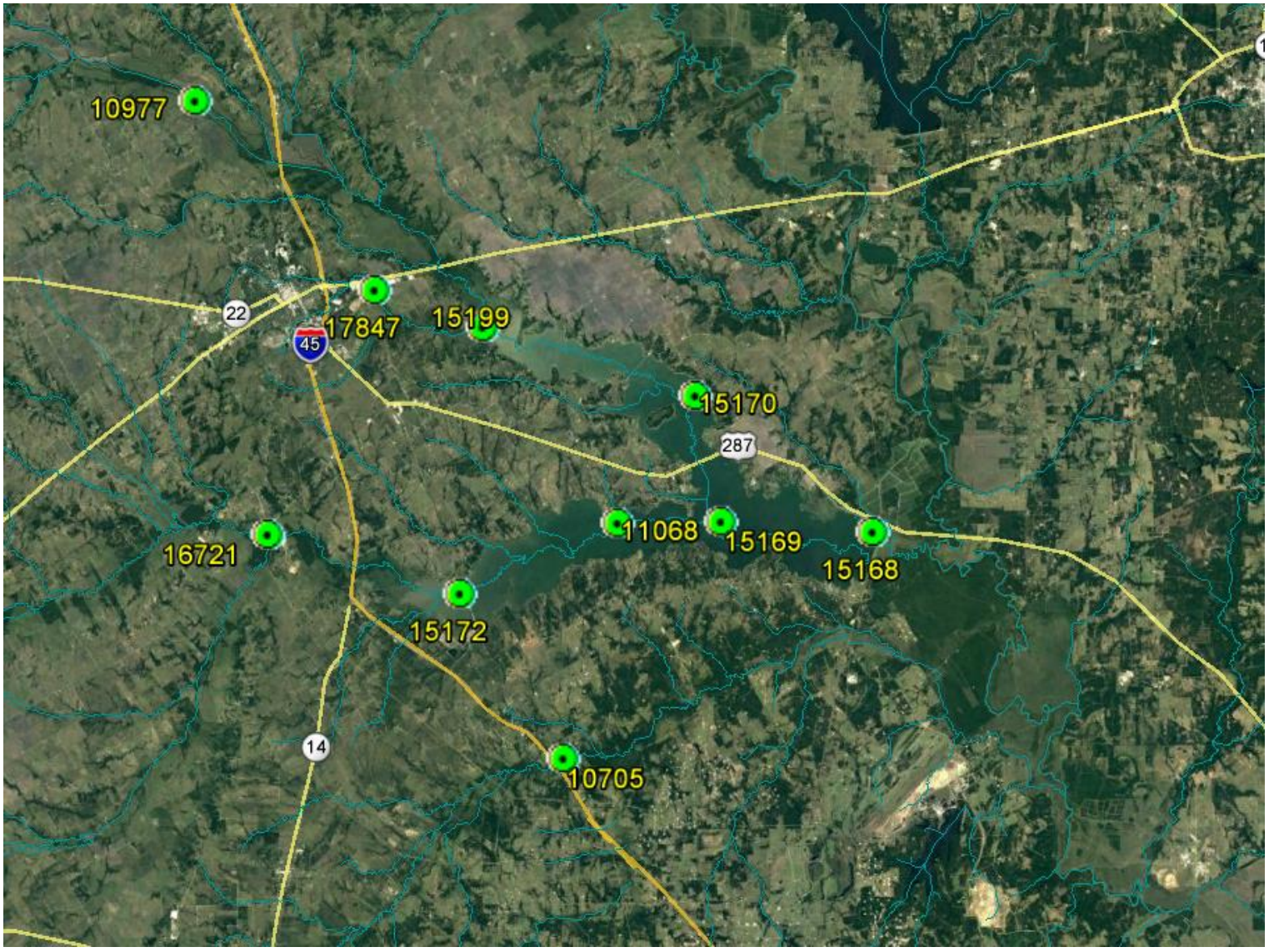


Image 21: Trinity River Authority Sample Sites

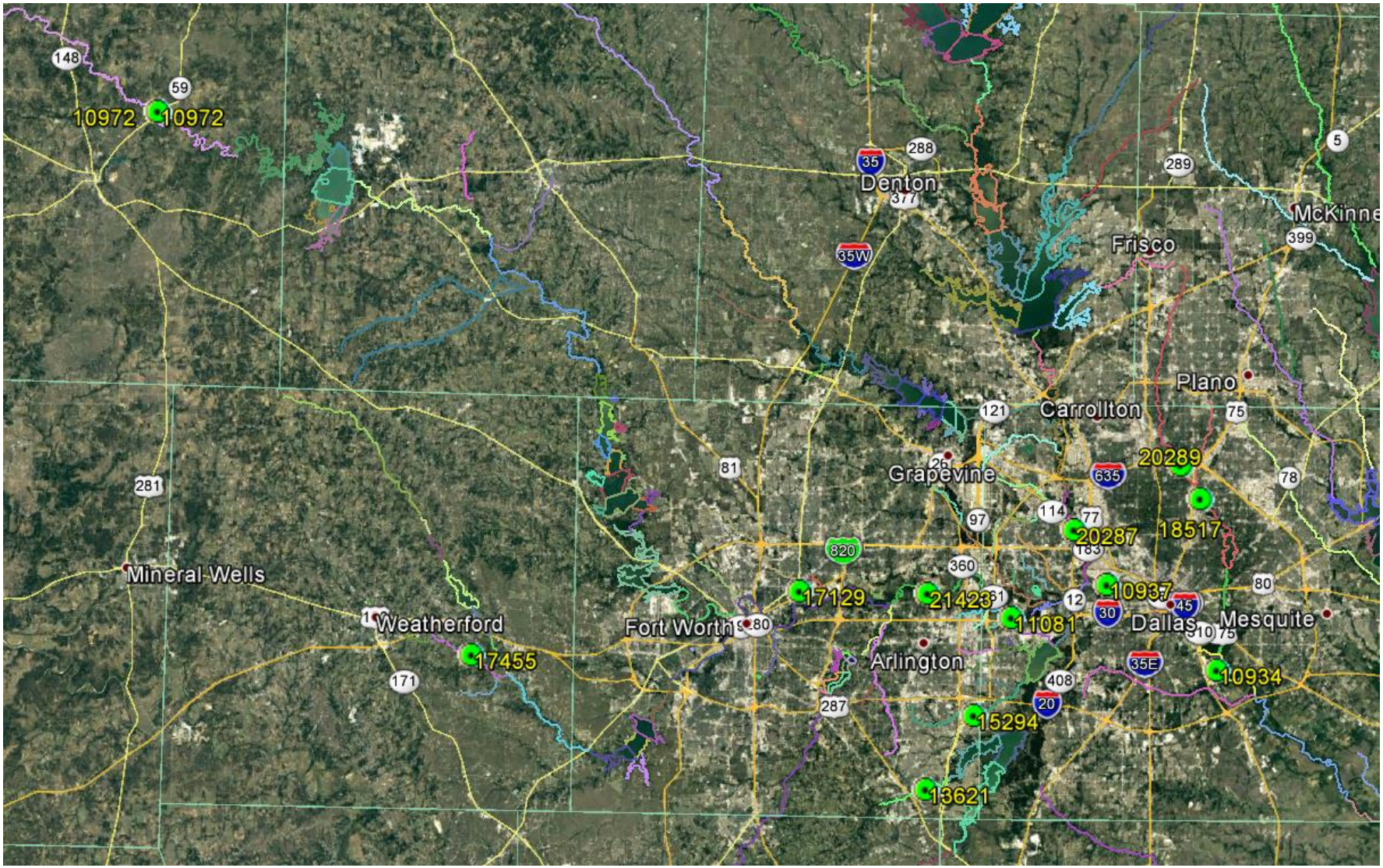
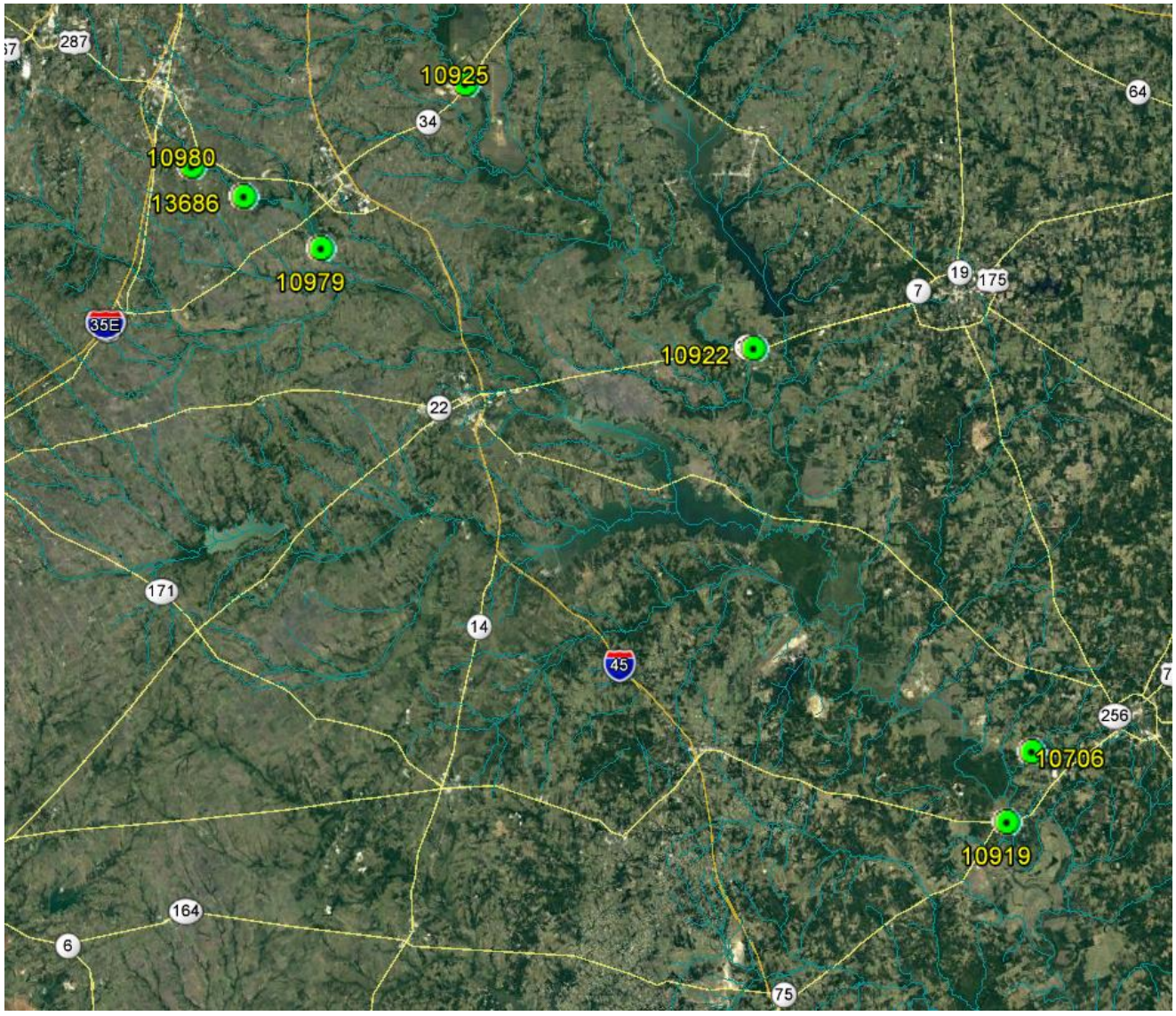


Image 22: Trinity River Authority Sample Sites (continued)



Assessments

TCEQ typically releases an assessment of all waterbodies in the state every two years which can be found at https://www.tceq.texas.gov/waterquality/assessment. This assessment, the Integrated Report (IR), describes the attainment of designated uses by each waterbody. Designated uses include Aquatic Life, Contact Recreation, Public Water Supply, Fish Consumption, and General Uses. Attainment of designated uses are classified as Fully Supporting, Not Supporting, No Concern, or Concern. Below is a simplified outline of the requirements for each of these classifications. A full description of the assessment process is available in the 2014 Guidance for Assessing and Reporting Surface Water Quality in Texas which is located at https://www.tceq.texas.gov/assets/public/waterquality/swqm/assess/14txir/2014_guidance.pdf.

1. Fully Supporting
    a. Data are assessed against a water quality standard
    b. A sufficient number of data points are available for assessment (for example: 10 data points)
    c. A majority of the data set is meeting the water quality standard
2. Not Supporting
    a. Data are assessed against a water quality standard
    b. A sufficient number of data points are available for assessment (for example: 10 data points)
    c. A specified number of data points (dependent on the total number of data points in the sample set) are not meeting the water quality standard
3. No Concern
    a. For Near Non-Attainment
        i. Data are assessed against a water quality standard

ii. Less than a sufficient number of data points are available for assessment (for example: 4 to 9 data points)

iii. A majority of the data set is meeting the water quality standard

b. For Screening Level

i. Data are assessed against a screening level

ii. A sufficient number of data points are available for assessment (for example: 4 data points)

iii. A majority of the data set is meeting the screening level

4. Concern

a. For Near Non-Attainment

i. Data are assessed against a water quality standard

ii. Less than a sufficient number of data points are available for assessment (for example: 4 to 9 data points)

iii. A specified number of data points (dependent on the total number of data points in the sample set) are not meeting the water quality standard

b. For Screening Level

i. Data are assessed against a screening level

ii. A sufficient number of data points are available for assessment (for example: 4 data points)

iii. A specified number of data points (dependent on the total number of data points in the sample set) are not meeting the screening level

The 2014 Integrated Report was discussed in great detail in the 2015 Basin Summary Report. However, the 2016 Integrated Report has not yet been released by the TCEQ and therefore, this report will focus on providing updates to information presented in the 2015 Basin Summary Report considering more recently collected data.

Data Collection

A large portion of the data used in this report was generated by the TRA CRP partners. Current partners include the cities of Dallas, Fort Worth, Grand Prairie, Arlington, and Irving, as well as Tarrant Regional Water District, TRA Lake Livingston Project, Dallas/Fort Worth International Airport Environmental Affairs Department, and North Texas Municipal Water District. These partner entities have monitoring programs that have been in place for many years for reasons such as storm water permitting and water supply protection. The entities have agreed to provide their data to the CRP on a voluntary basis. In return, TRA CRP staff provide the partner entities with data quality assurance, sampling supplies and equipment, funding for analytical costs, and additional manpower on an as-needed and negotiated basis. This voluntary partner network has allowed the TRA CRP to leverage funding for more than a four to one return on the dollar. The result has been the ability to collect a large amount of data covering a large portion of the basin which would be impossible using only in-house resources. Data are collected in compliance with both the biennial quality assurance project plans and the TCEQ Surface Water Quality Monitoring Procedures Manuals.

Data Preparation

Data from both the Surface Water Quality Monitoring Information System (SWQMIS) database as well as the TRA in-house database were compiled to obtain the dataset used for trend analysis in this report. The TRA in-house database contains data that has been submitted to TCEQ. However, due to the TCEQ review and approval process, there is a lag between when the data has been submitted and when it is uploaded to SWQMIS. Using the TRA in-house database ensures that the most recently collected data are included in trend analysis. Additionally, data that do not meet all TCEQ requirements for data quality may be maintained in the TRA in-house database. For example, there are data sets that were collected by the cities of Fort Worth and Dallas but were analyzed by labs that were not National Environmental Laboratory Accreditation Program (NELAP) accredited that are maintained in this database. These data sets meet all other data quality requirements but because they are not analyzed by a NELAP accredited lab, the data are not submitted to TCEQ. Because these data sets can still provide insight for trend analyses, they were included in the data set used for this report. Data for the period from December 1, 2007 to November 30, 2017 were selected in order to provide updates to the information presented in the 2015 Basin Summary Report. Data collected at greater than 1.01 meters in depth were removed in order to prevent at-depth samples from biasing the dataset.

All data that were reported as greater than a given value were censored to that given value. All data that were reported as less than a given value were censored to ½ of the lowest less than value in the data set for each parameter. The reason for this censoring method is detailed in the Data Preparation section of the 2015 Basin Summary Report. After censoring, the data were then averaged by station, sample date, and parameter code to reduce multiple samples collected at different depths less than 1.01 meters and at different times of the day to one value. Next, related parameters were grouped together and renamed based upon the parameter hierarchy that is provided in Table DRM-1 on pages 35 and 36 of the 2015 Basin Highlights Report. However, no related parameters were averaged together. For example, if dissolved ammonia (parameter code 00608) and total ammonia (00610) were both available for Site X on a particular date, then the total ammonia was used and dissolved ammonia was deleted because total ammonia has priority over dissolved ammonia. If only dissolved ammonia was available, the parameter code was updated from 00608 to 00610 for further data analysis. This method is similar to that used by TCEQ during data analysis for the Integrated Report.

The resulting data set was then used to provide the following watershed updates.

Bacteria

E. coli and *Enterococcus* are the two parameters used by TCEQ to assess the waterbodies of the state for their ability to support the Contact Recreation Use. The standard for these parameters is based on a geomean of the sample set – 126 most probable number (MPN)/100 mL for *E. coli* and 35 MPN/100 mL for *Enterococcus*. In many of the waterbodies of the Trinity River basin, bacteria levels tend to increase during wet weather when runoff from precipitation carries bacteria from the land to nearby waterbodies. Although there are some strains of these two bacteria species that can cause illness, higher levels of these bacteria can indicate a higher likelihood of other pathogens that can infect humans are present in the water. See the Bacteria section of the 2015 Basin Summary Report for more discussion on this topic.

The following Table 3 shows the bacteria geomeans by assessment unit (AU) for the data used in the development of this report. The geomeans highlighted in yellow indicate an exceedance of the standard. Please note that, as discussed in the Data Preparation section, this data may encompass up to a 10-year period for each segment or assessment unit. The TCEQ Integrated Reports typically use a 7-year period but may include an additional 3 years if needed to increase the number of data points required for assessment.

Table 3: Bacteria Geomeans

	AU	Geomean
Clear Fork	0832_01	4.3
	0831_01	290.9
	0831A_01	457.7
	0830_01	3.4
	0830_02	2.4
	0830_03	6.1
	0830_05	3.3
	0829_02	190.6
West Fork	0812_01	586.5
	0811_01	1.0
	0811A_01	521.8
	0811B_01	755.5

	AU	Geomean
West Fork	0810_01	273.4
	0812_01	586.5
	0811_01	1.0
	0811A_01	521.8
	0811B_01	755.5
	0810_01	273.4
	0810_02	57.9
	0810A_01	181.9
	0810C_01	557.3
	0810D_01	69.1
	0809_01	2.4
	0809_05	2.1

	AU	Geomean
West Fork	0809_08	2.5
	0809_10	2.6
	0809_12	5.8
	0809A_01	96.3
	0809B_01	355.7
	0809C_01	466.7
	0809D_01	448.4
	0807_01	5.3
	0834_01	1.1
Elm Fork	0824_01	191.8
	0824_03	228.9
	0839_01	3.7

	AU	Geomean
Elm Fork	0840_01	1.7
	0840_02	1.8
	0840_03	19.4
	0840_04	3.7
	0840_06	1.5
	0840_07	1.0
	0823_02	71.1
	0823_03	5.5
	0823_04	4.5
	0823_05	5.7
	0823A_01	150.8
	0823C_01	117.2

	AU	Geomean
Elm Fork	0823D_01	94.3
	0825_01	119.3
	0825? - Cottonwood Branch	85.1
	0822_01	80.7
	0822_02	89.2
	0822_03	94.9
	0822_04	7.5
	0822A_01	31.7
	0822A_02	243.6
	0822B_01	146.5
	0822C_01	58.9
	0822C_? - South Fork Hackberry Creek	107.3
	0822D_01	35.8
	0826_01	3.1
	0826_05	3.8
	0826_06	2.4
	0826A_01	76.7
	0826A_02	169.1
East Fork	0821_01	2.8
	0821_02	4.2
	0821_03	2.5
	0821_04	4.4
	0821A_01	172.5
	0821B_01	172.7
	0821C_01	234.2
	0821D_01	203.7
	0820_02	2.3
	0820_04	4.9

	AU	Geomean
East Fork	0820_05	4.8
	0820_06	12.0
	0820B_01	222.0
	0820C_01	140.7
	0819_01	117.7
Main Stem	0806_01	78.5
	0806_02	154.6
	0806D_01	194.6
	0806E_01	301.8
	0806F_01	258.5
	0841_01	138.4
	0841B_01	88.1
	0841D_01	100.8
	0841E_01	82.2
	0841F_01	236.8
	0841G_01	529.5
	0841H_01	119.2
	0841I_01	346.5
	0841J_01	115.4
	0841K_01	213.7
	0841L_01	158.5
	0841M_01	231.0
	0841N_01	403.3
	0841O_01	82.0
	0841P_01	183.6
	0841Q_01	190.2
	0841R_01	155.3
	0841S_01	15.0

	AU	Geomean
Main Stem	0841T_01	171.5
	0841U_01	268.8
	0841V_01	578.1
	0841W_01	23.9
	0805_02	58.9
	0805_03	270.7
	0805_04	203.4
	0804_01	74.4
	0804_04	72.4
	0804_07	54.3
	0804F_01	87.0
	0804F_02	2785.3
	0804G_01	195.6
	0804H_01	83.9
	0804J_01	1.7
	0804K_01	185.2
	0804L_01	373.7
	0803_01	0.9
	0803_04	0.5
	0803_05	3.3
	0803_06	1.9
	0803_07	6.8
	0803_08	16.7
	0803_10	17.1
	0803_11	58.9
	0803? - Salt Creek	2400.0
	0803A_01	40.7
	0803E_01	67.5

	AU	Geomean
Main Stem	0803F_01	65.4
	0803G_01	5.7
	0827_01	9.9
	0827A_01	355.2
	0813_01	1.3
Village Creek	0828_02	4.4
	0828_05	35.4
	0828_06	9.1
	0828_07	113.2
	0828? - Wildcat Branch	523.7
	0828? - Unnamed Trib of Lake Arlington	713.0
	0828A_01	335.9
	0828? - Deer Creek	171.3
	0828? - Quil Miller Creek	222.1
Mountain Creek	0838_02	30.4
	0838B_01	28.5
	0838C_01	101.3
	0838D_01	26.2
	0838E_01	66.3
	0838F_01	98.6

	AU	Geomean
Richland Chambers	0816_01	2.1
	0815_01	2.2
	0815A_01	203.7
	0814_01	133.4
	0814_02	1471.6
	0817_01	1.4
	0837_01	126.5
	0836_01	1.3
	0836_02	0.8
	0836_03	1.3
	0836_04	3.3
	0836_05	1.0
	0836_06	3.0
	0836_07	1574.9
	0836D_01	3788.7
Cedar Creek	0818_01	1.1
	0818_04	1.1
	0818_06	1.2
	0818_09	1.4
	0818_11	1.7

	AU	Geomean
Cedar Creek	0818_14	1.5
	0818B_01	2021.3
	0818C_01	1418.4
	0818D_01	2394.0
	0818E_01	3005.9
	0818G_01	4149.6
	0818H_01	1570.9
	0818? - Purtis Creek	0.5
	0818I_01	979.3
Lower Trinity	0802_01	15.6
	0802_03	22.5
	0802_04	21.8
	0802_05	7.7
	0802B_02	105.9
	0802D_01	101.8
	0802E_01	216.2
	0801_01	4.8 (Enterococcus)
	0801C_01	1867.9
	0801C_01	167.9 (Enterococcus)
	0801D_01	11.9

Nitrogen-Phosphorus Limitation

Algal cells typically contain between 10 to 16 Nitrogen (N) atoms for every Phosphorus (P) atom. When the N:P ratio in water is less than 10, Nitrogen is the nutrient that limits algal growth. When this ratio is greater than 16, Phosphorus is the limiting nutrient. Values between 10 and 16 are weakly Phosphorus limited. It is important to note that there may be other limiting factors for algal growth in waterbodies such as light penetration, temperature, and other water chemistry constituents. However, a generalized statement can be made that if concentrations of the limiting nutrient in a waterbody were to increase, then algal blooms may occur. The resulting algal blooms could have negative impacts on water quality including decreased clarity, large diurnal swings in dissolved oxygen levels that could lead to fish kills, and taste and odor issues in waterbodies that supply drinking water treatment plants.

Using the data set described in the previous section, N/P ratios were calculated for all reservoir assessment units (AU) for which there was data. Individual N/P ratios were calculated based on station and sample date. The resultant data were then averaged by assessment unit and the limiting nutrient was then identified. Table 4 shows this summary information.

Table 4: Nitrogen-Phosphorus Ratios

AU	Min Date	Max Date	Average of TN	Average of TP	Average of N/P Ratio	Average of Chlorophyll-a (ug/L)	Limiting Factor
0803_01	1/29/2009	6/26/2017	0.96	0.10	30.06	23.70	Phosphorus
0803_05	1/29/2009	6/26/2017	1.11	0.12	10.71	47.31	Phosphorus (weak)
0803_06	1/29/2009	6/26/2017	1.41	0.23	8.45	38.19	Nitrogen
0803_07	1/29/2009	6/26/2017	2.74	0.38	8.00	39.08	Nitrogen
0803_10	1/29/2008	8/21/2017	3.50	0.38	9.64	19.58	Nitrogen
0803_11	2/14/2008	8/21/2017	4.16	0.57	7.83	23.94	Nitrogen
0807_01	1/15/2008	4/12/2017	0.89	0.08	18.01	24.19	Phosphorus
0809_01	1/23/2008	4/24/2017	0.78	0.06	16.49	19.68	Phosphorus
0809_05	1/23/2008	4/24/2017	0.82	0.06	19.46	24.10	Phosphorus
0809_08	1/23/2008	4/24/2017	0.80	0.09	12.71	25.52	Phosphorus (weak)
0809_10	1/23/2008	4/24/2017	0.83	0.09	14.92	27.60	Phosphorus (weak)
0809_12	1/23/2008	4/24/2017	0.87	0.14	8.67	27.31	Nitrogen

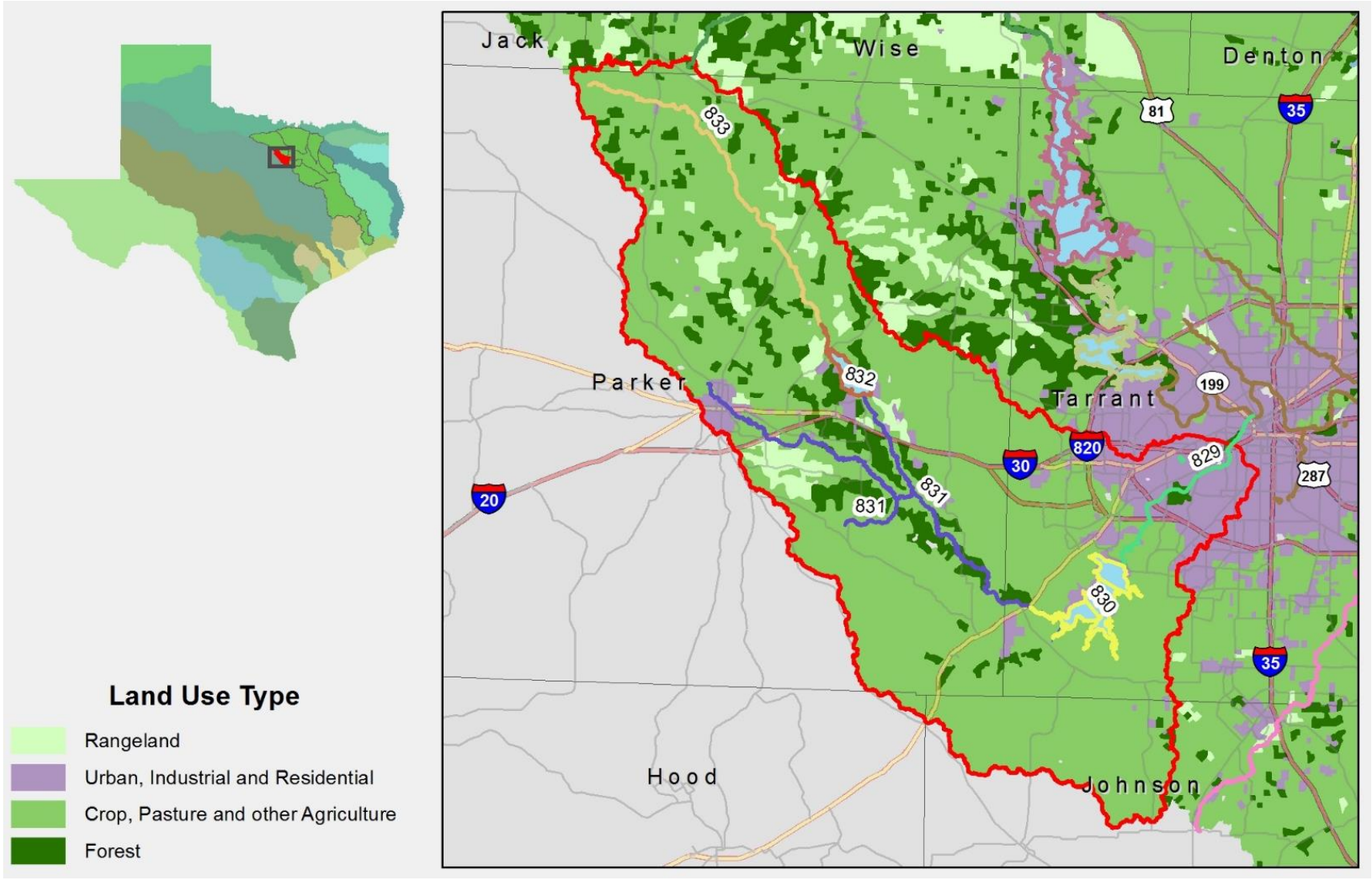
AU	Min Date	Max Date	Average of TN	Average of TP	Average of N/P Ratio	Average of Chlorophyll-a (ug/L)	Limiting Factor
0811_01	1/9/2008	5/2/2017	0.46	0.04	17.87	5.55	Phosphorus
0811_02	1/9/2008	12/11/2008	0.49	0.06	10.45	6.95	Phosphorus (weak)
0811_03	1/9/2008	5/2/2017	0.48	0.03	16.37	7.73	Phosphorus
0811_04	1/9/2008	5/2/2017	0.46	0.04	15.03	7.10	Phosphorus (weak)
0811_05	1/9/2008	12/11/2008	0.59	0.11	7.45	10.92	Nitrogen
0813_01	1/17/2008	7/18/2017	0.63	0.02	68.66	12.91	Phosphorus
0815_01	1/23/2008	7/31/2017	1.00	0.05	30.00	17.96	Phosphorus
0816_01	1/23/2008	7/31/2017	0.85	0.03	53.65	16.22	Phosphorus
0817_01	1/23/2008	9/25/2017	1.48	0.06	51.62	17.14	Phosphorus
0818_01	2/11/2008	4/20/2017	0.86	0.05	20.12	19.60	Phosphorus
0818_04	2/11/2008	4/20/2017	0.84	0.06	20.07	22.81	Phosphorus
0818_06	2/11/2008	4/20/2017	0.87	0.08	13.44	27.62	Phosphorus (weak)
0818_09	2/11/2008	1/19/2017	0.97	0.13	10.18	33.81	Phosphorus (weak)
0818_11	2/11/2008	1/19/2017	1.08	0.11	10.88	28.52	Phosphorus (weak)
0818_14	1/16/2014	4/20/2017	0.87	0.06	18.90	17.45	Phosphorus
0820_01	2/8/2012	8/21/2013	0.93	0.06	19.76	24.53	Phosphorus
0820_02	2/4/2009	7/26/2017	0.88	0.04	52.60	23.19	Phosphorus
0820_04	2/4/2009	7/26/2017	0.86	0.04	49.58	20.93	Phosphorus
0820_05	2/8/2012	8/21/2013	0.94	0.06	16.77	19.00	Phosphorus
0821_01	9/1/2015	8/4/2017	1.07	0.06	19.91	23.42	Phosphorus
0821_02	9/1/2015	8/4/2017	2.76	0.15	25.69	40.06	Phosphorus
0821_03	9/1/2015	8/3/2017	0.86	0.07	13.04	25.59	Phosphorus (weak)
0821_04	9/1/2015	8/3/2017	1.03	0.12	12.92	30.97	Phosphorus (weak)
0823_03	2/7/2012	8/14/2013	0.96	0.04	49.87	12.02	Phosphorus
0823_04	2/7/2012	8/14/2013	0.84	0.03	37.36	11.38	Phosphorus
0823_05	2/7/2012	8/14/2013	1.16	0.07	16.62	23.34	Phosphorus
0826_01	5/20/2008	7/25/2017	0.86	0.04	46.35	17.03	Phosphorus
0826_05	5/20/2008	8/12/2013	0.88	0.05	29.81	17.89	Phosphorus
0826_06	11/12/2009	7/25/2017	0.86	0.04	57.03	21.50	Phosphorus

AU	Min Date	Max Date	Average of TN	Average of TP	Average of N/P Ratio	Average of Chlorophyll-a (ug/L)	Limiting Factor
0826_07	5/20/2008	9/9/2009	0.85	0.11	25.51	27.89	Phosphorus
0827_01	2/4/2009	5/8/2017	1.06	0.06	54.20	32.26	Phosphorus
0828_02	2/13/2008	5/9/2017	0.92	0.07	16.38	26.46	Phosphorus
0828_05	2/13/2008	2/8/2017	0.98	0.09	16.62	28.70	Phosphorus
0828_06	2/13/2008	5/9/2017	0.85	0.06	18.67	29.61	Phosphorus
0828_07	2/13/2008	2/8/2017	1.11	0.14	14.66	13.12	Phosphorus (weak)
0830_01	12/13/2007	3/8/2017	0.86	0.05	21.75	18.45	Phosphorus
0830_02	12/13/2007	3/8/2017	0.79	0.05	20.38	20.41	Phosphorus
0830_03	12/13/2007	3/8/2017	0.81	0.08	11.84	22.49	Phosphorus (weak)
0830_05	3/11/2008	3/8/2017	0.86	0.07	15.41	22.15	Phosphorus (weak)
0832_01	2/28/2008	7/25/2017	0.97	0.04	59.84	28.70	Phosphorus
0834_01	6/11/2008	2/1/2017	0.79	0.02	81.36	10.92	Phosphorus
0836_01	12/18/2007	3/8/2017	0.91	0.04	31.39	13.32	Phosphorus
0836_02	12/18/2007	3/8/2017	0.82	0.05	24.36	16.32	Phosphorus
0836_03	12/18/2007	3/8/2017	0.84	0.05	20.01	17.09	Phosphorus
0836_04	12/18/2007	3/8/2017	1.16	0.21	7.53	30.61	Nitrogen
0836_05	12/18/2007	3/8/2017	0.80	0.05	22.24	17.99	Phosphorus
0836_06	12/18/2007	3/8/2017	1.04	0.13	10.40	21.91	Phosphorus (weak)
0838_02	5/20/2008	5/20/2008	1.71	0.18	9.50	17.80	Nitrogen
0840_01	2/25/2010	6/7/2017	0.72	0.03	61.76	6.48	Phosphorus
0840_02	8/4/2010	6/7/2017	0.66	0.03	70.95	6.36	Phosphorus
0840_06	2/25/2010	6/7/2017	0.64	0.03	87.38	8.11	Phosphorus
0840_07	2/7/2012	8/8/2013	0.86	0.06	44.20	6.59	Phosphorus

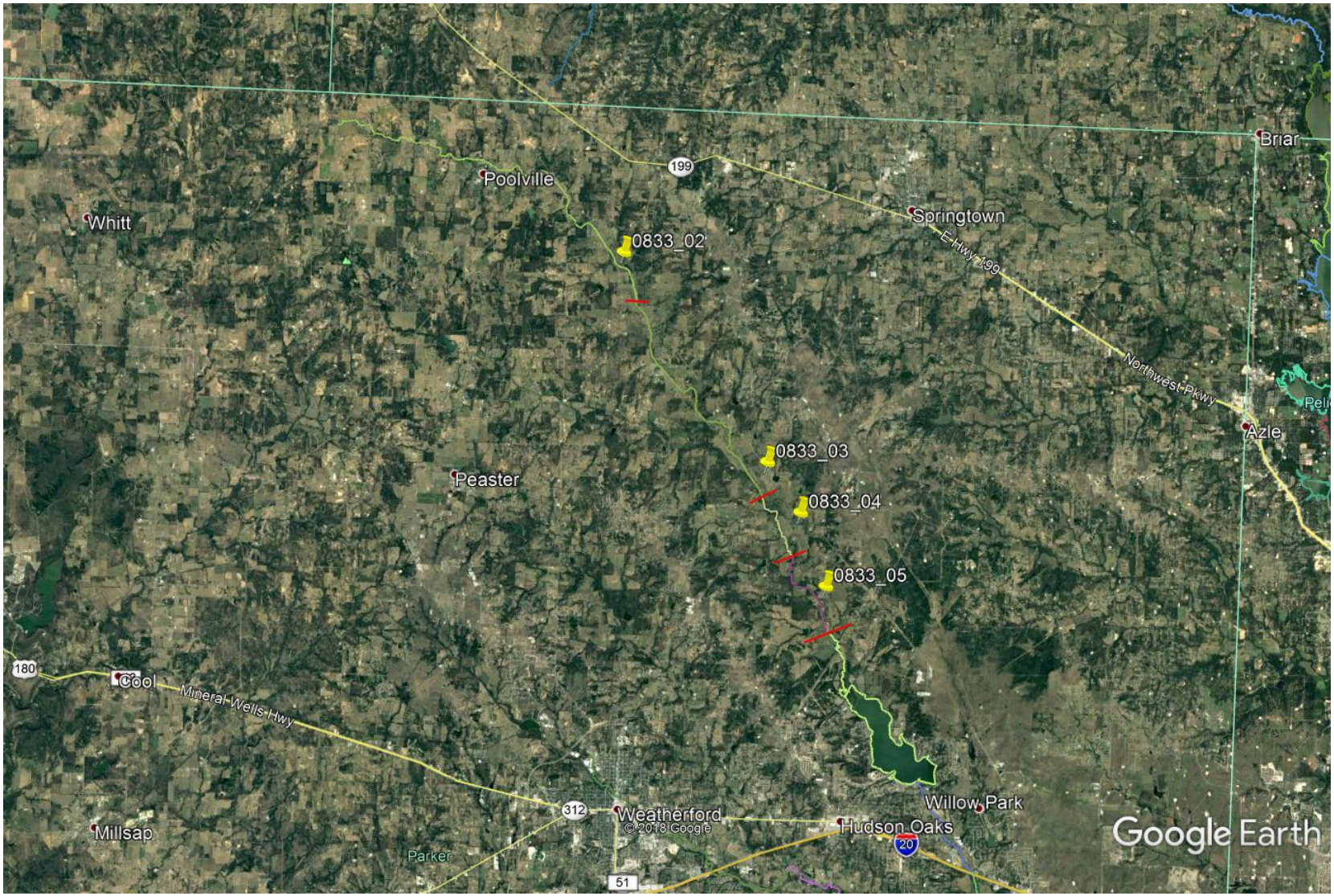
Watershed Updates

As noted in the Water Quality section, the following sections will focus on updates to the 2015 Basin Summary Report for each segment.

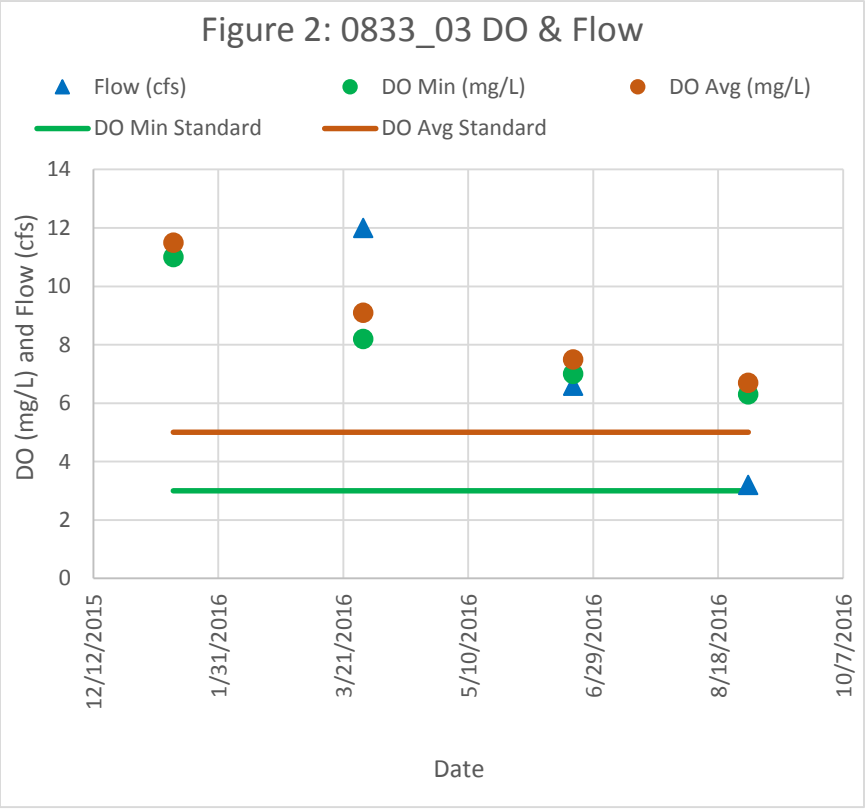
Clear Fork Trinity River

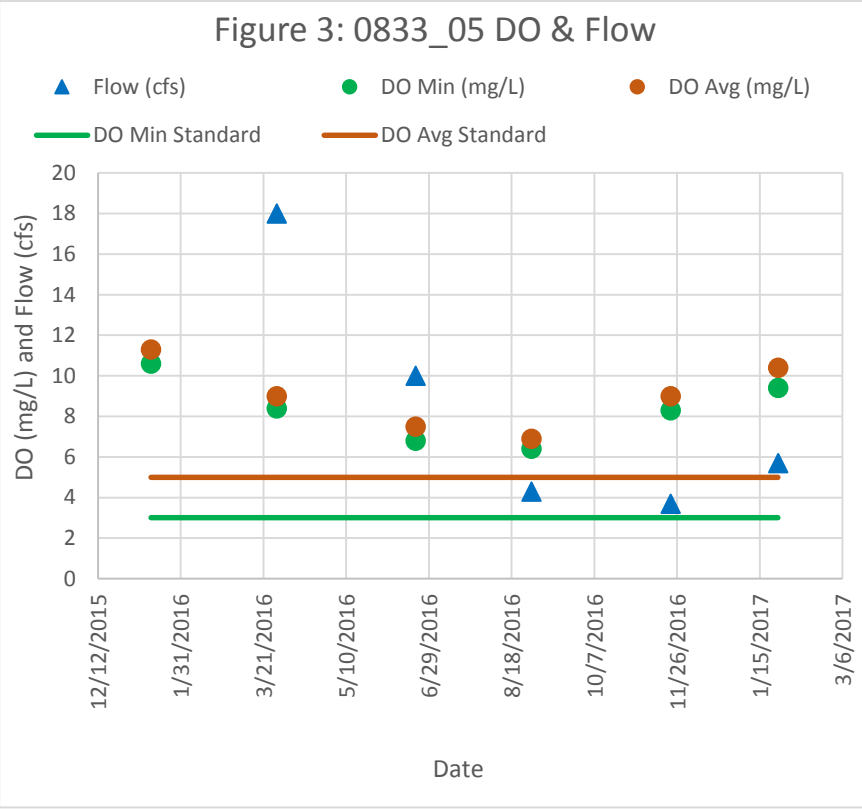


0833 — Clear Fork Trinity River above Lake Weatherford

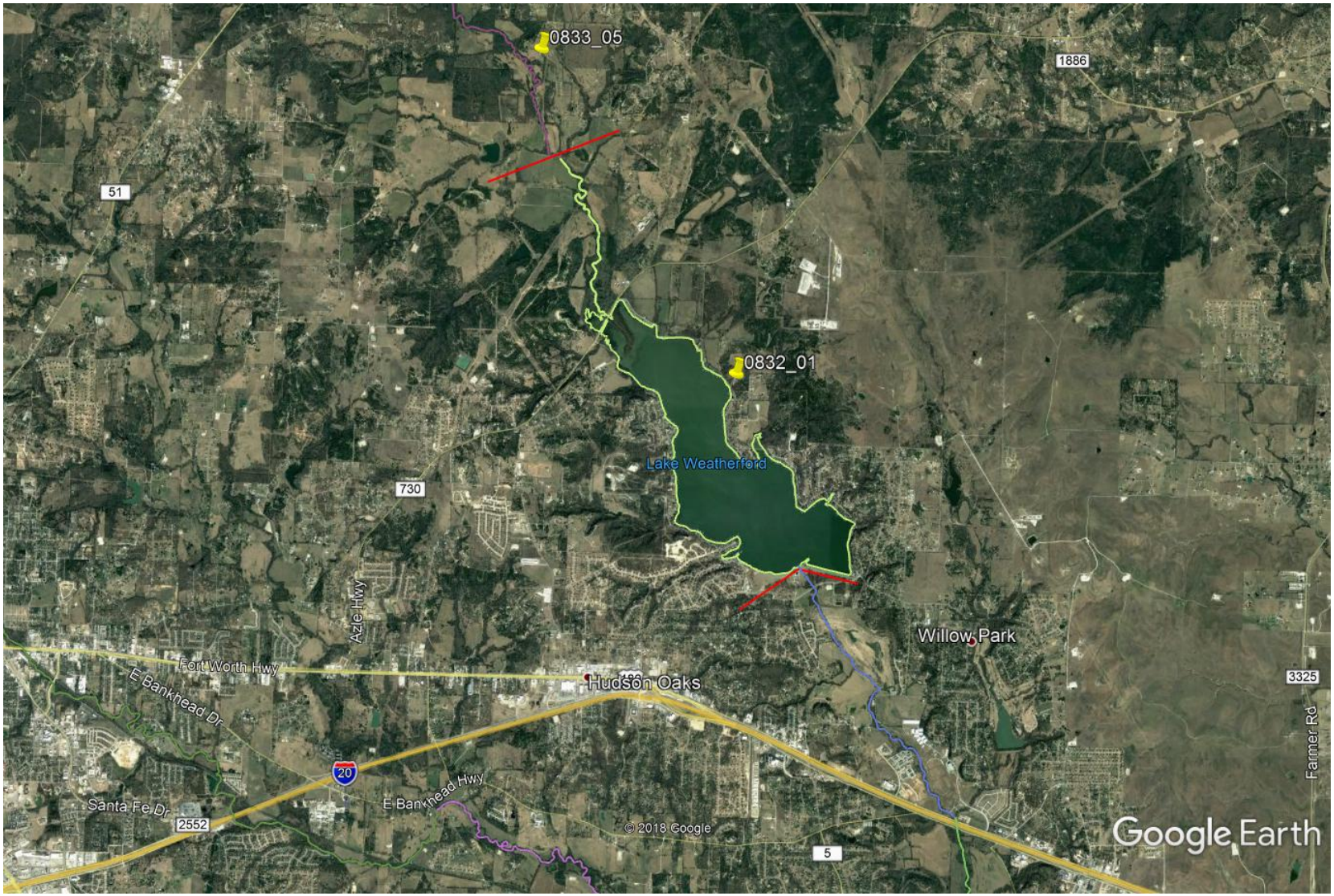


0833_03, 0833_04, and 0833_05 were identified as not supporting Aquatic Life Use due to depressed dissolved oxygen (DO) levels by the 2014 Integrated Report (IR). TRA has recently completed 24-hour DO monitoring in these areas. Based on the information currently uploaded to SWQMIS, it appears that DO issues in this segment are flow related as suggested in the 2015 Basin Summary Report. Figures 2 and 3 below for 0833_03 and 0833_05 illustrate this point. At lower flows, the minimum and average DO levels decrease. 0833_04 was consistently dry during all sample events therefore no DO data are available to further assess this portion of the segment. Overall, this portion of the Clear Fork is relatively flashy with flows increasing and decreasing rapidly during and after precipitation events. Some locations were seen to be completely dry the day after large storms moved through the area.





0832 – Lake Weatherford



0832 was found to have concerns for chlorophyll-a by the 2014 IR. Recently collected data shows that chlorophyll-a levels in Lake Weatherford are still elevated (see Figure 4). As noted in the 2015 Basin Summary Report, it appears that these elevated levels may stem from nutrient enrichment from agricultural fertilizers, livestock waste, or failing septic systems in the watershed above the reservoir.

The increasing trend for sulfate that was identified in the 2015 Basin Summary Report has reversed to a rather shallow decreasing trend (see Figure 5). This is likely due to dilution by the freshwater inflows during the floods of 2015 and 2016 and the resultant recovery of the reservoir stage.

Figure 4: 0832 Chlorophyll-a and Reservoir Stage

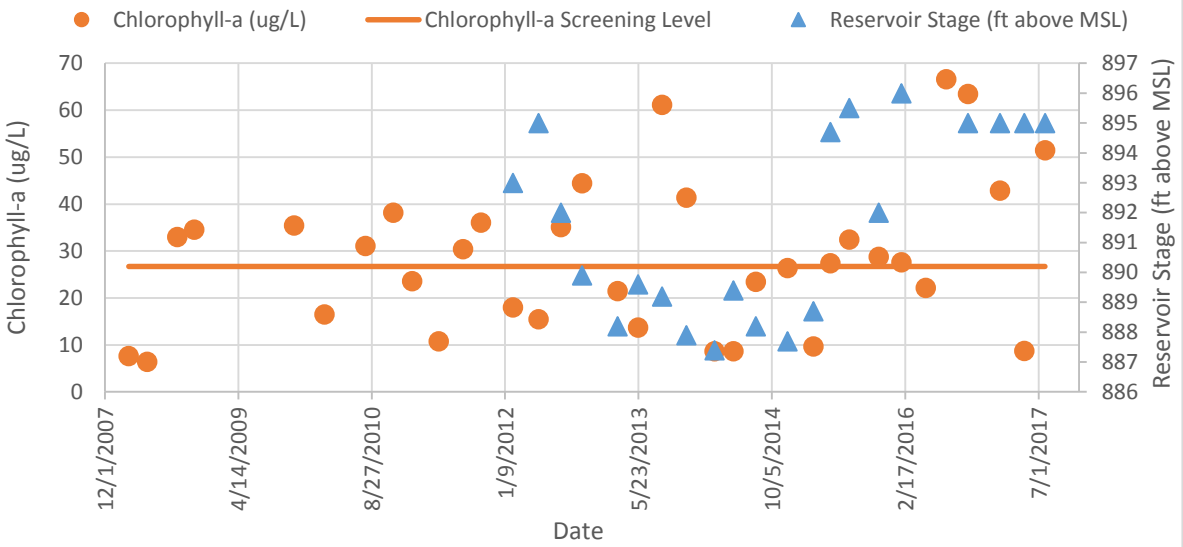
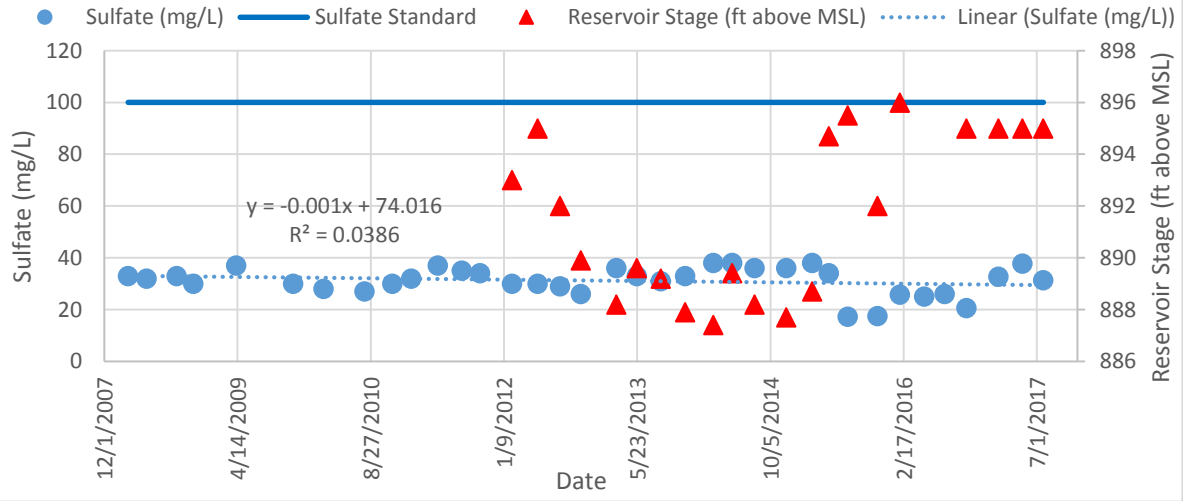
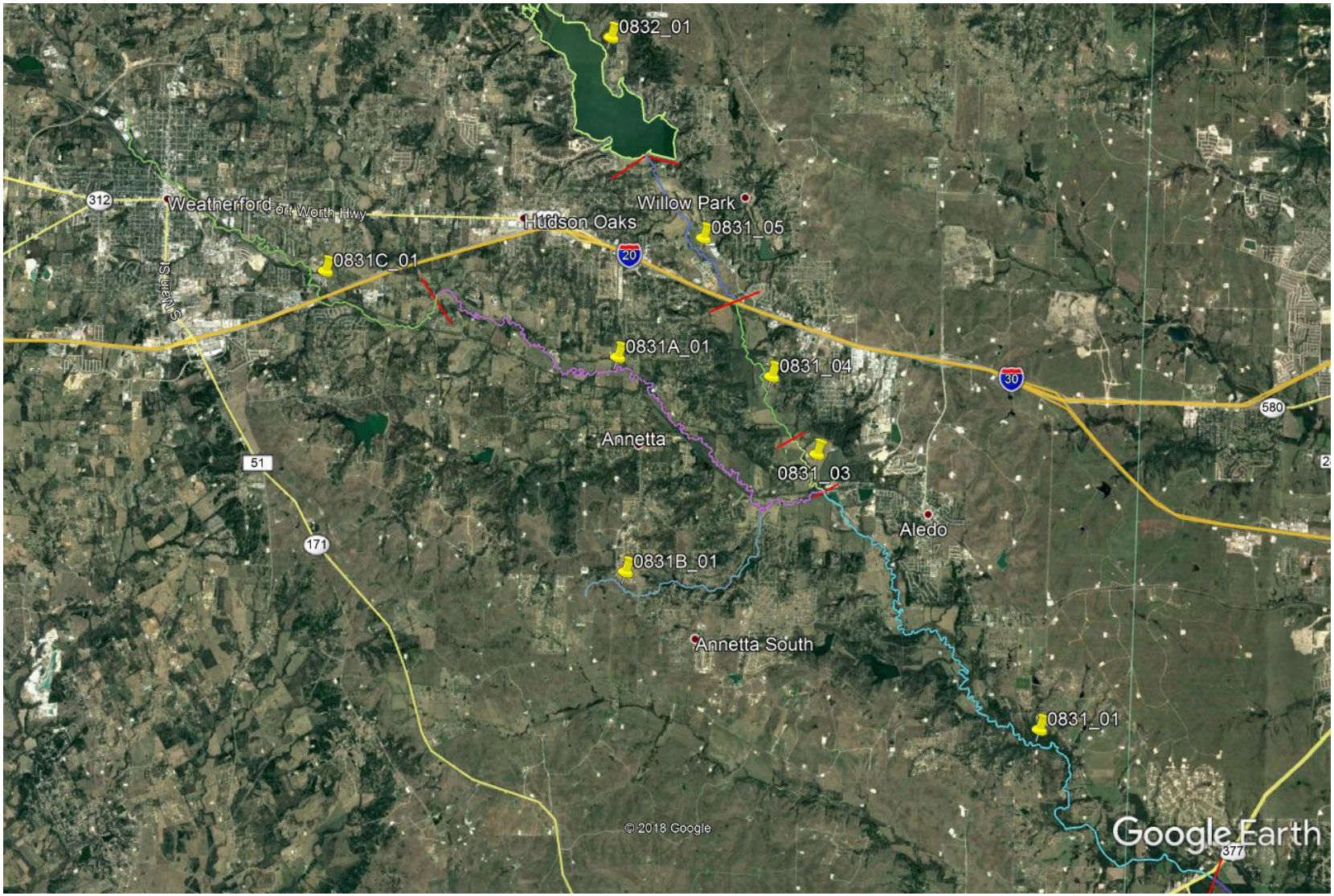


Figure 5: 0832 Sulfate

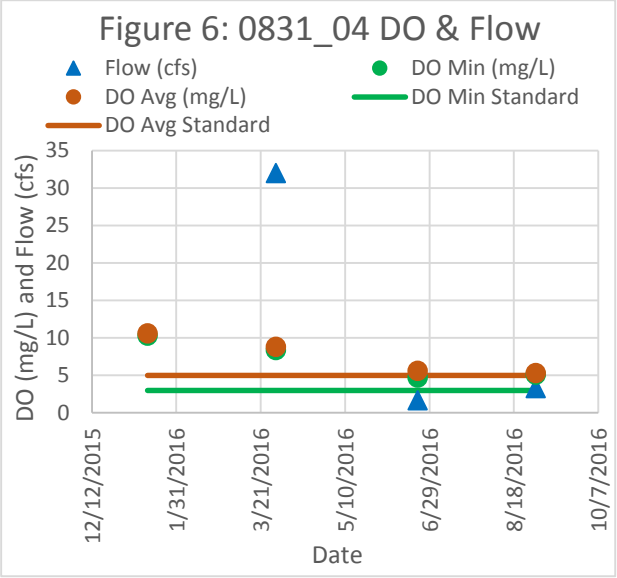


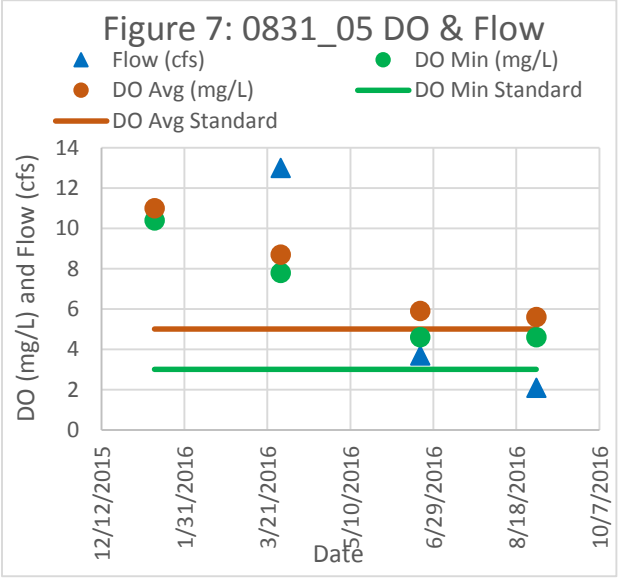
0831 – Clear Fork Trinity River Below Lake Weatherford

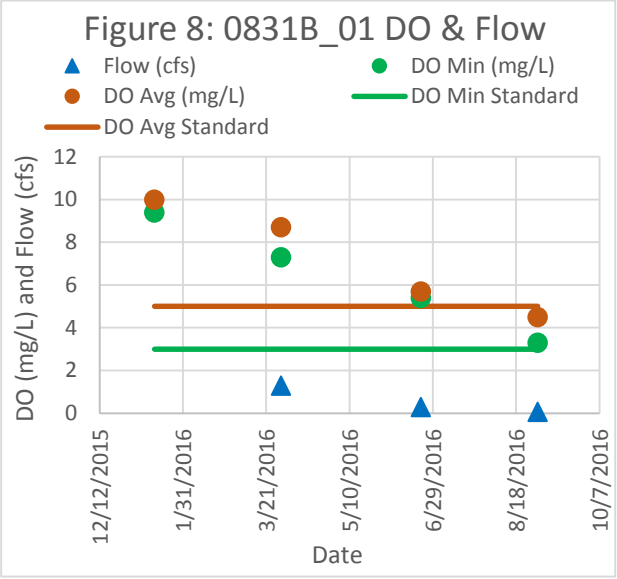


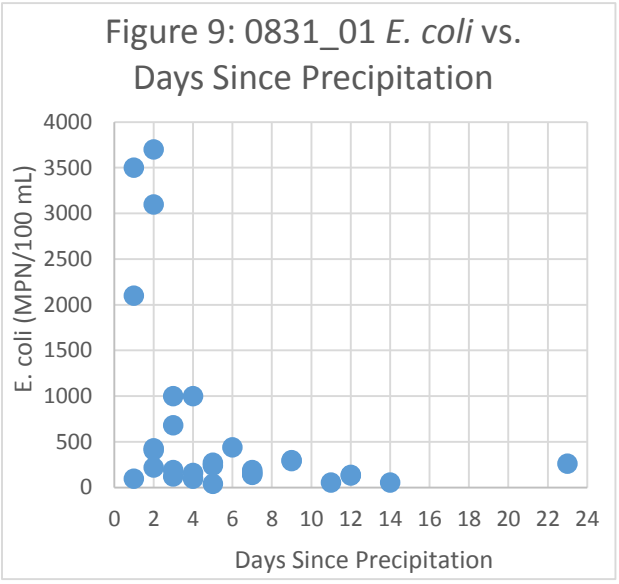
0831_04, 0831_05, and 831B_01 were identified as not supporting the Aquatic Life Use due to depressed DO by the 2014 IR. As discussed for segment 0833, these DO issues appear to be related to low flows (see Figures 6, 7 & 8).

The 2014 IR identified concerns for nutrients in 0831_01. More recently collected data shows that nutrient levels in this assessment unit remain elevated. See the 2015 Basin Summary Report for more details on these concerns. Also, as noted in the 2015 Basin Summary Report, elevated *E. coli* levels in this assessment unit appear to be related to runoff during precipitation events and this is supported by more recently collected data. As shown in Figure 9, *E. coli* levels are elevated when sampling coincides with recent precipitation.

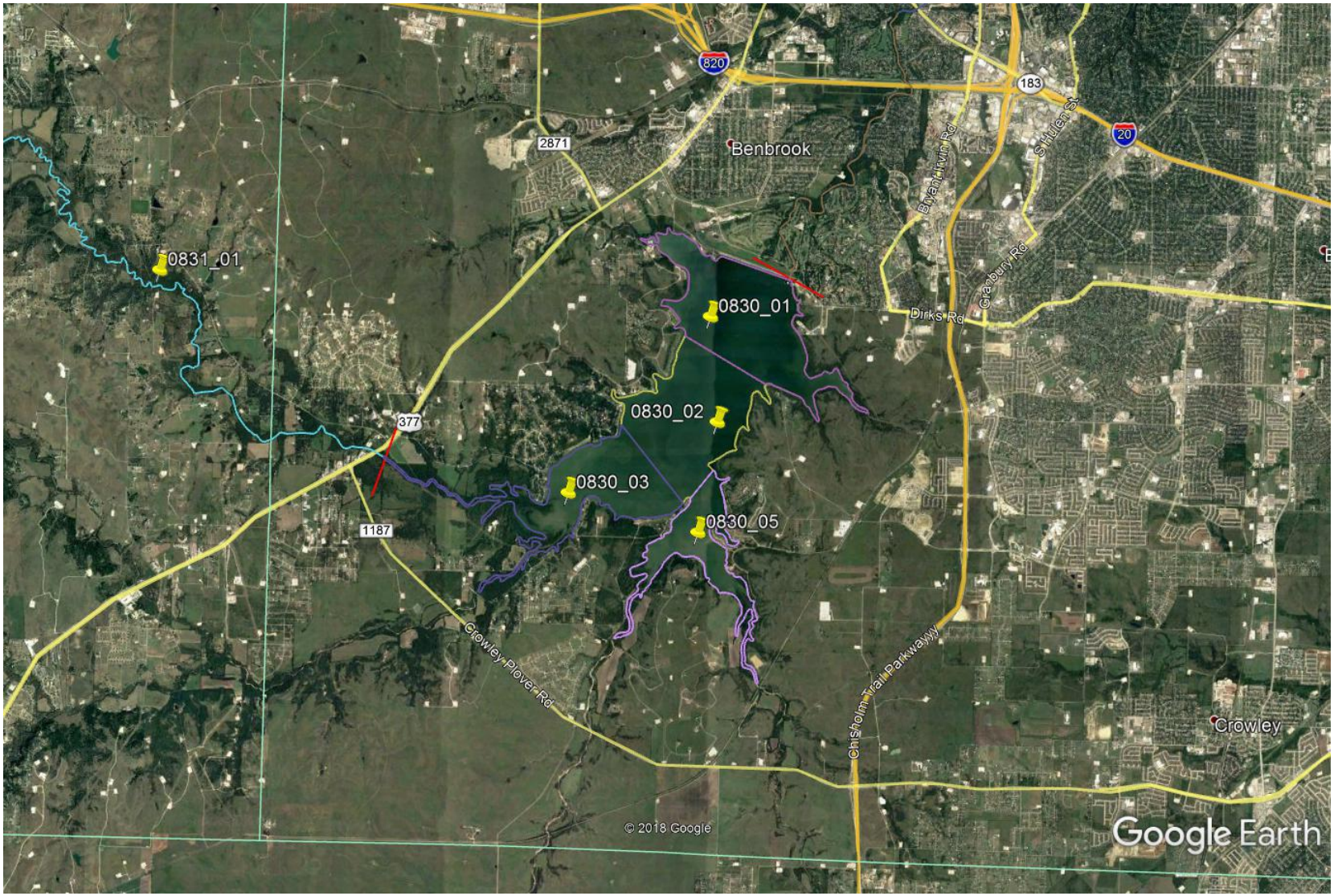








0830 – Benbrook Lake



Concerns for depressed DO were identified for 0830_01 in the 2014 IR. More recent data shows that DO levels increased with the recovery of reservoir levels during and after the floods of 2015 and 2016 (see Figure 10).

All portions of the reservoir were identified as having concerns for chlorophyll-a in the 2014 IR. However, many of the more recently collected samples have chlorophyll-a values below the screening level and, like DO, coincides with the recovery of lake levels (see Figure 11). Reduced chlorophyll-a levels may be due to decreased residence time of water in the reservoir which reduces the amount of time that algal populations have to take advantage of increased water clarity and nutrient levels, therefore potentially reducing populations. Another possible cause for reduced chlorophyll-a levels could be reduced water clarity (see Figure 12). There is a general decrease in Secchi depth that appears to coincide with the decrease in chlorophyll-a. A reduction in water clarity can reduce the ability of algal populations to reproduce.

Figure 10: 0830_01 DO and Reservoir Stage

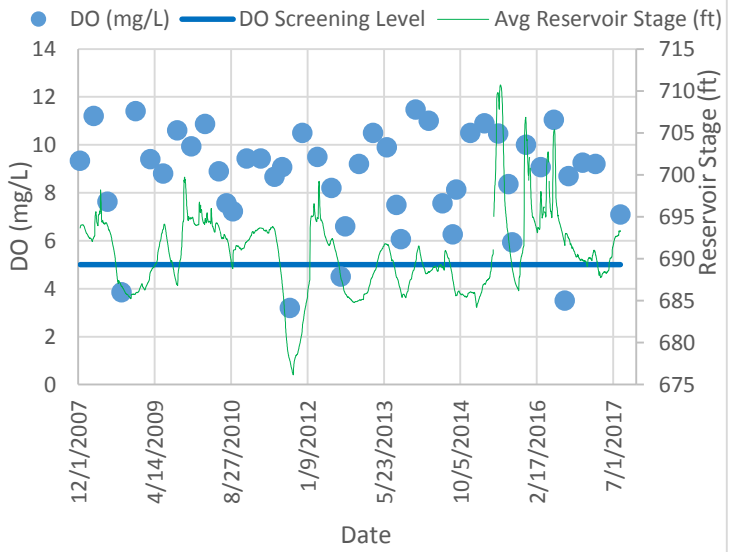


Figure 11: 0830 Chlorophyll-a

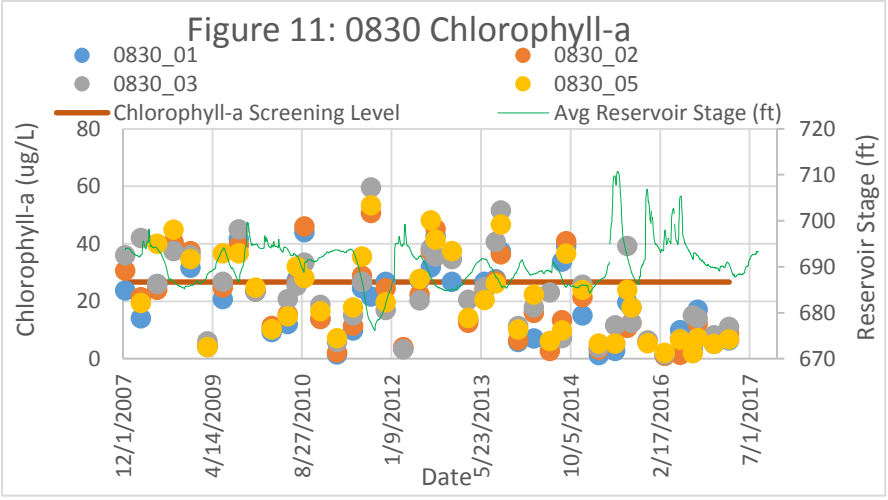
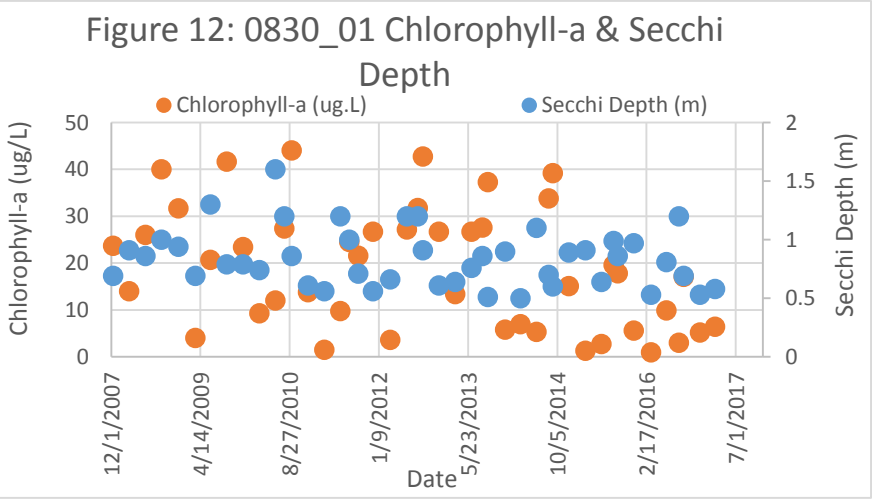
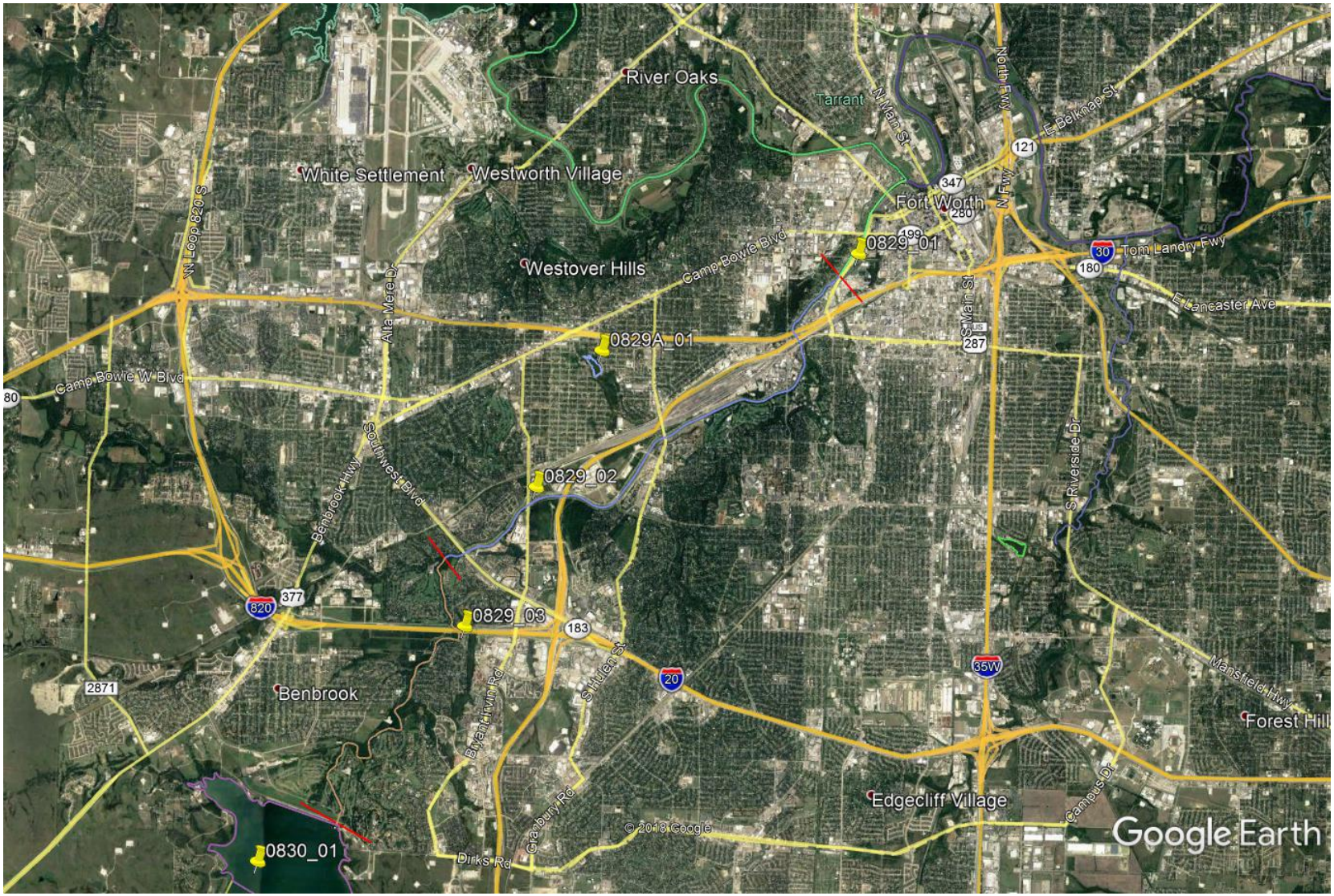


Figure 12: 0830_01 Chlorophyll-a & Secchi Depth

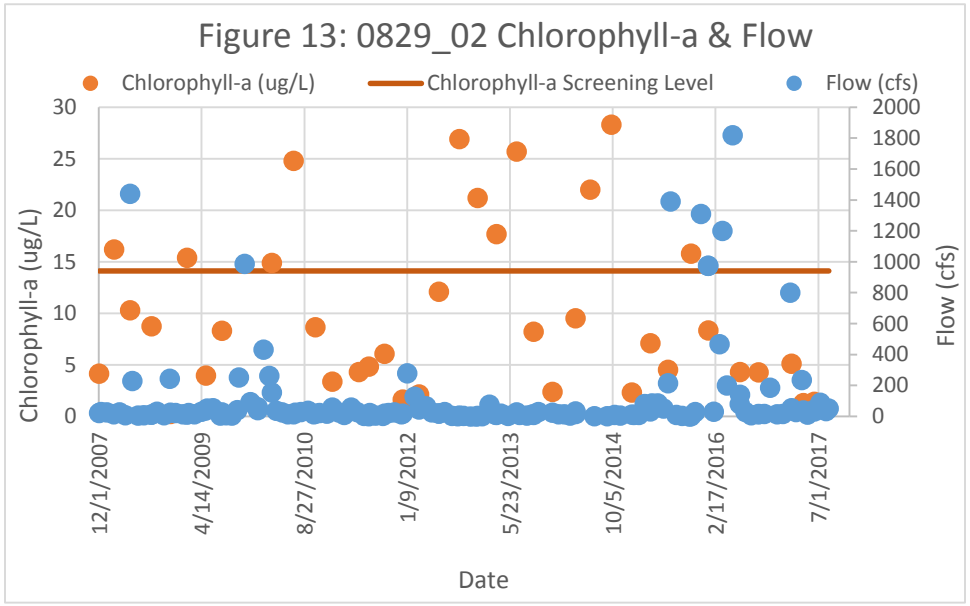


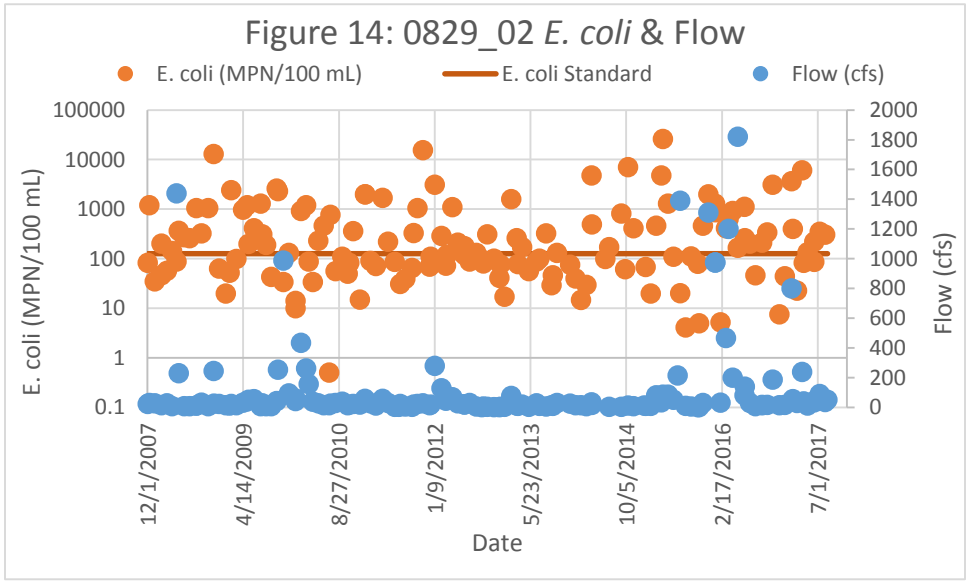
0829 – Clear Fork Trinity River Below Benbrook Lake



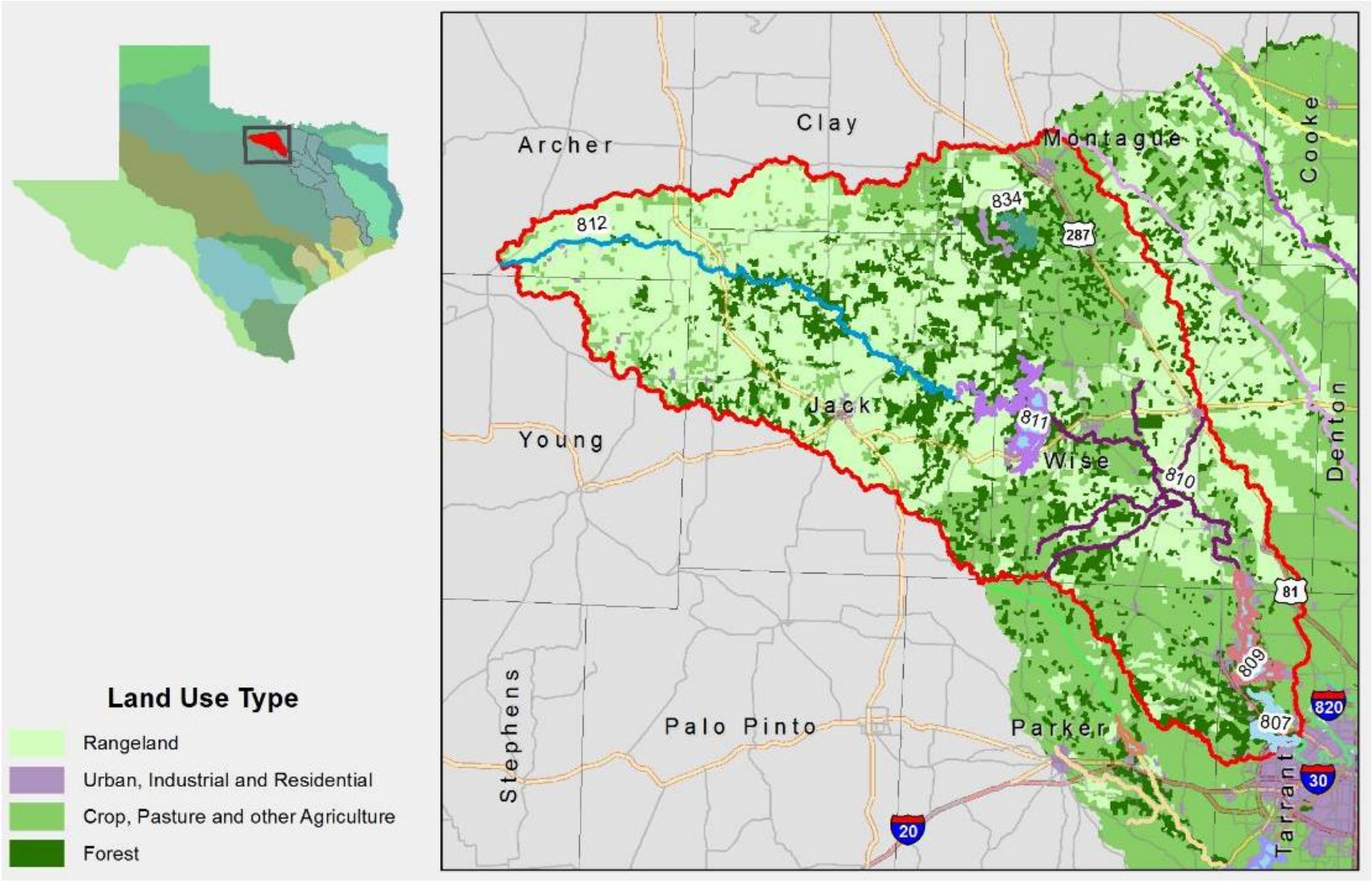
Concerns were found for chlorophyll-a in 0829_02 by the 2015 in-house 5-year assessment. More recently collected data shows that chlorophyll-a levels remain elevated (see Figure 13). As noted in the 2015 Basin Summary Report, this segment is a relatively low flow system and elevated chlorophyll-a levels may be due to long residence times in the stream.

The *E. coli* geomean for 0829_02 for the period of record used in this report is 191 MPN/100 mL which exceeds the standard of 126 MPN/100 mL. As discussed in the 2015 Basin Summary Report, there is no clear indication of the cause; elevated *E. coli* levels occur even during low flows (see Figure 14). Low flow could be increasing residence times allowing populations to increase or there could be continuous sources into the stream such as failing infrastructure.

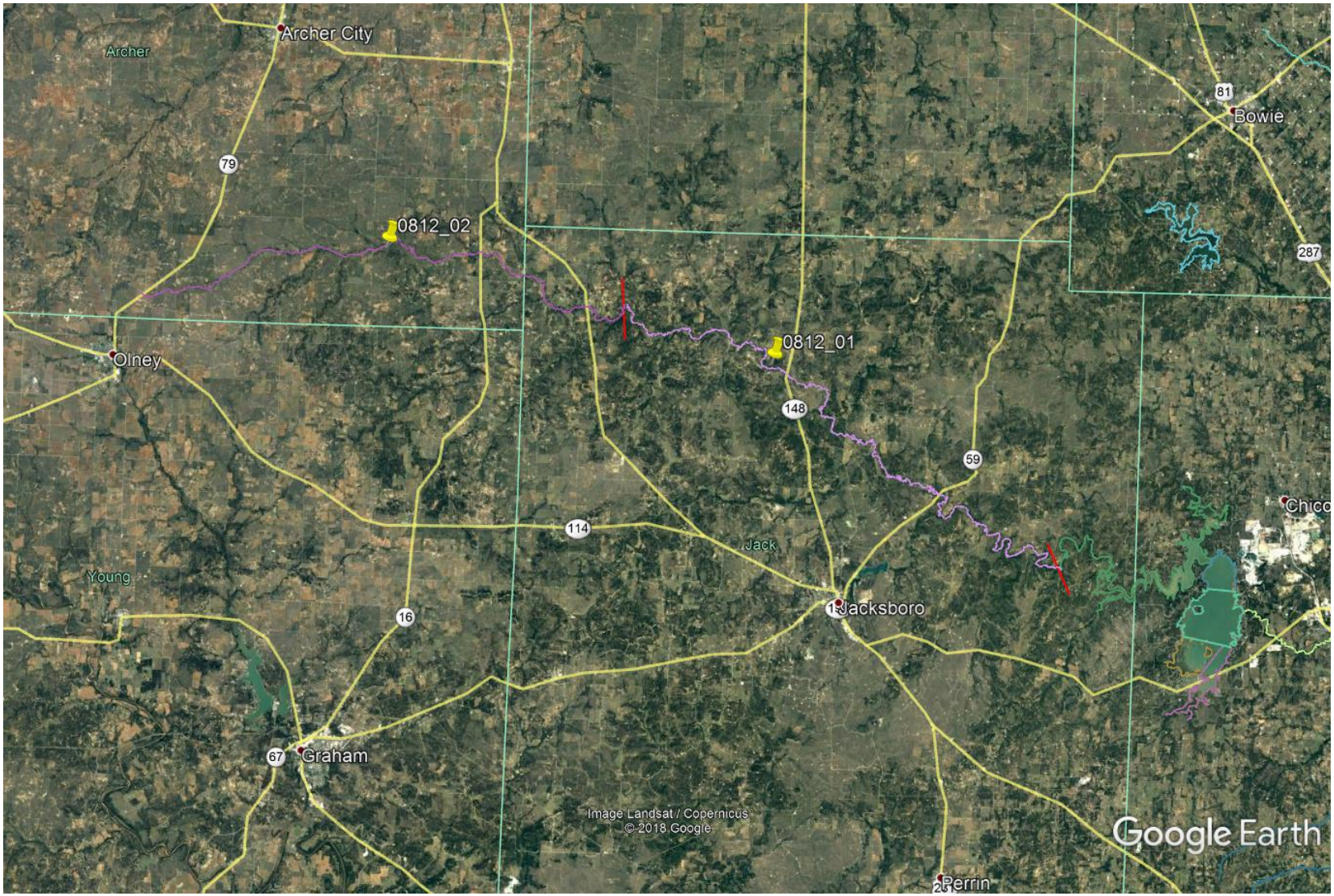




West Fork Trinity River

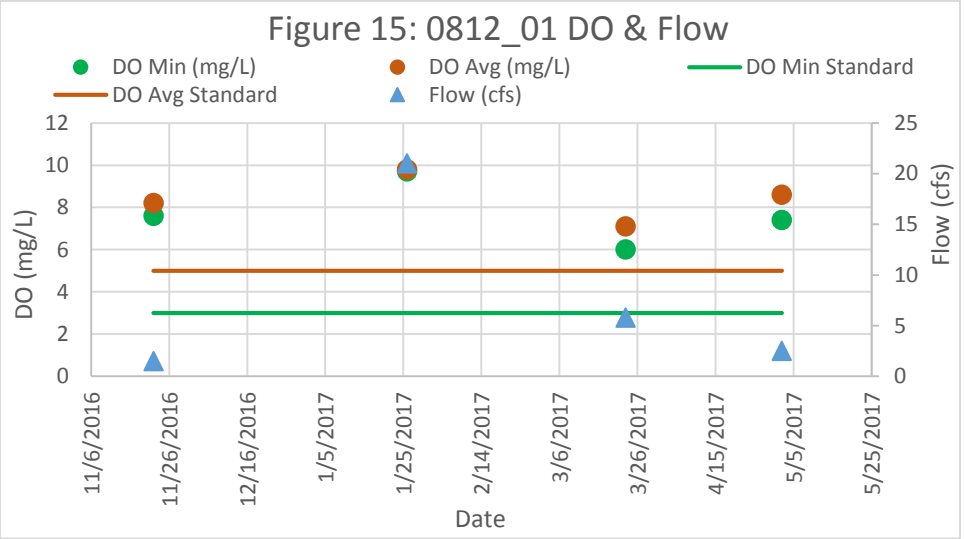


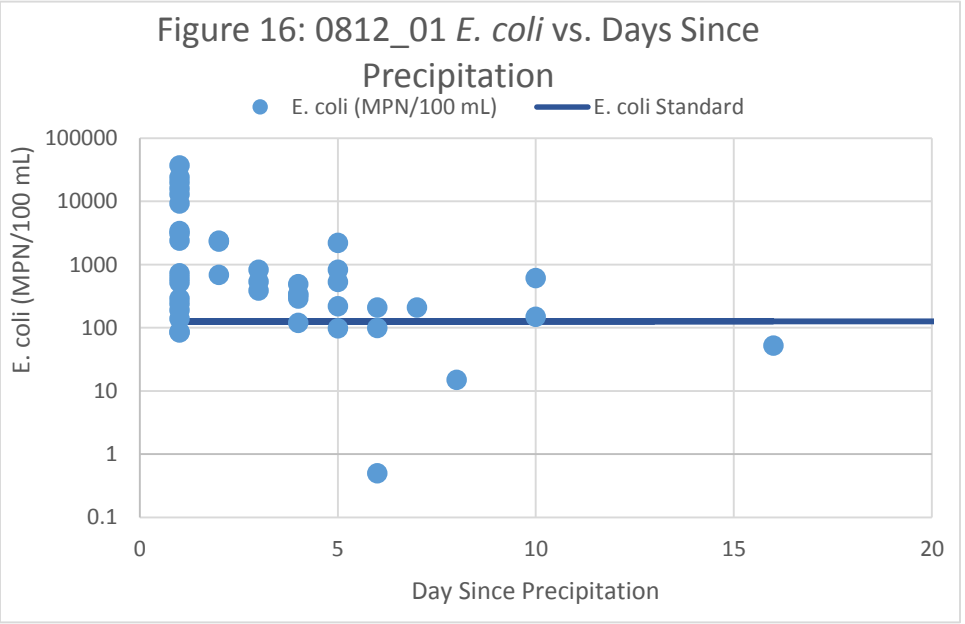
0812 – West Fork Trinity River Above Bridgeport



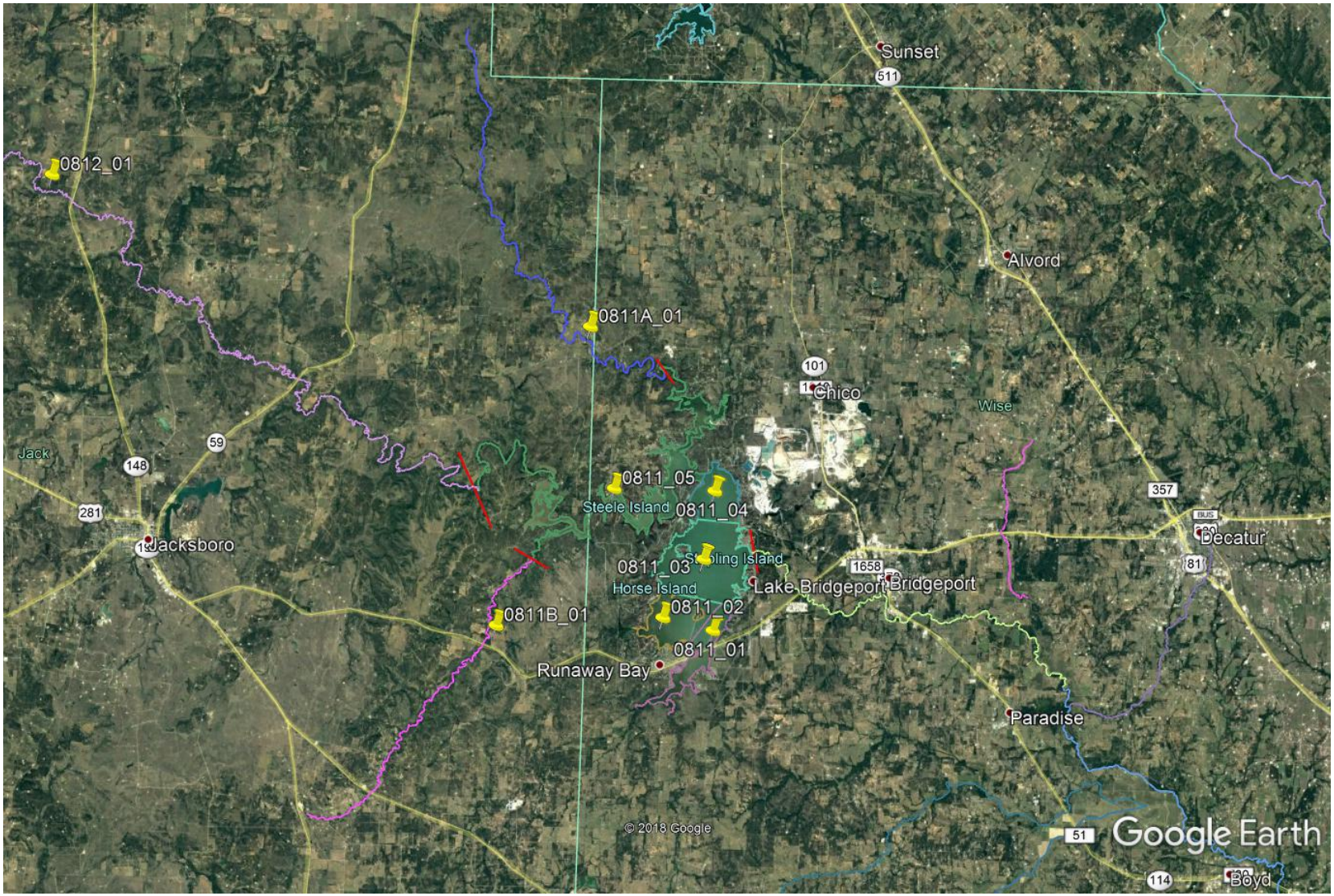
0812_01 was identified as not supporting the Aquatic Life Use due to depressed DO by the 2014 IR. TRA has recently begun sampling for 24-hour DO in this assessment unit. Based on the available data (see Figure 15), this segment appears to be supporting this use. However, there is still one more year of data to be collected before this portion of the river can be fully assessed.

The geomean for *E. coli* in 0812_01 is 586 MPN/100 mL. As noted in the 2015 Basin Summary Report and as shown in Figure 16, elevated *E. coli* levels are typically found during precipitation events.





0811 – Bridgeport Reservoir



The geomeans for *E. coli* in 0811A_01 and 0811B_01 are 522 and 756 MPN/100 mL, respectively. As shown in Figures 17 and 18, many of the data points are well above the standard with the highest values occurring during precipitation events. Both streams flow through rural areas so higher *E. coli* value may be due to the presence of livestock, wildlife, or failing septic systems. There is a lack of flow data for these streams which prevents determining if elevated levels of *E. coli* are occurring during periods of low flow which may suggest that there are continuous sources of *E. coli* to the stream.

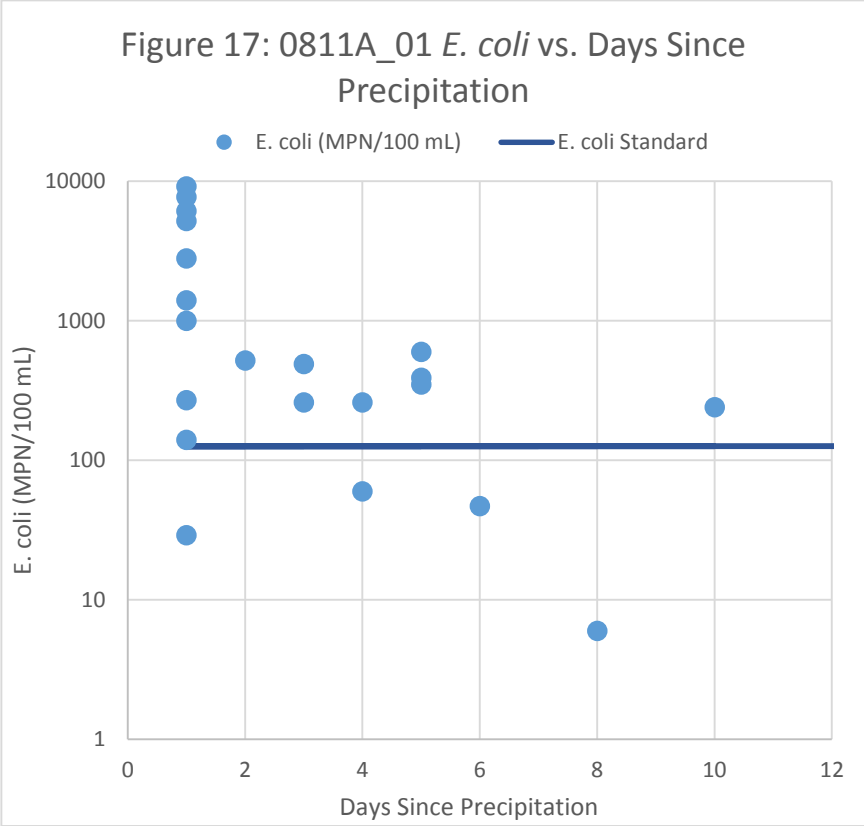


Figure 17: 0811A_01 *E. coli* vs. Days Since Precipitation

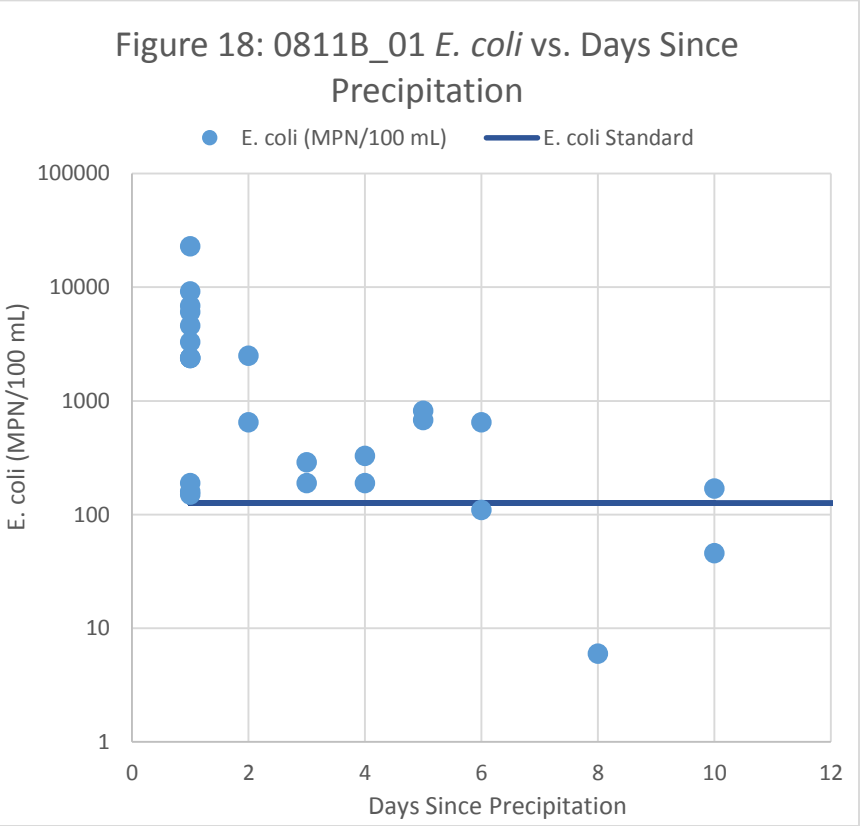
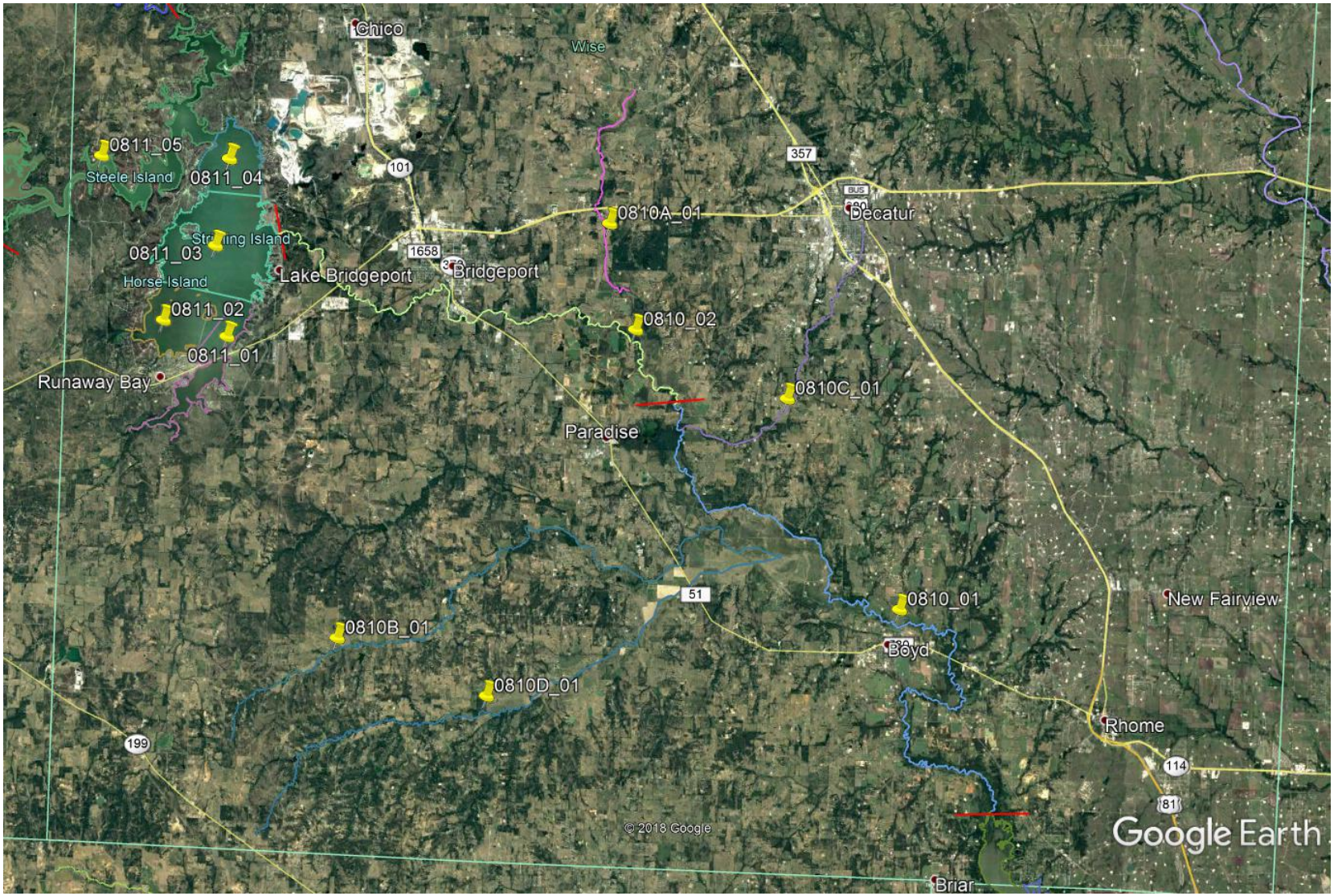
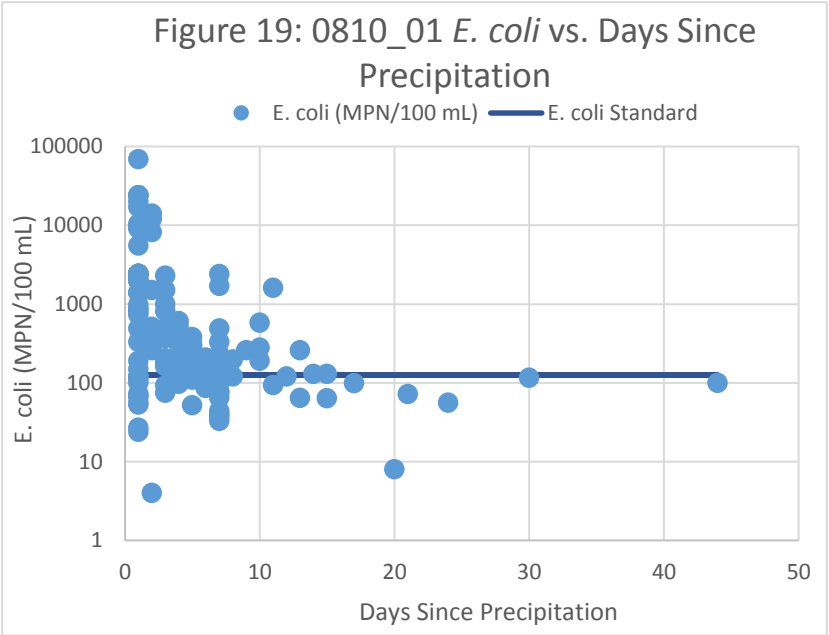


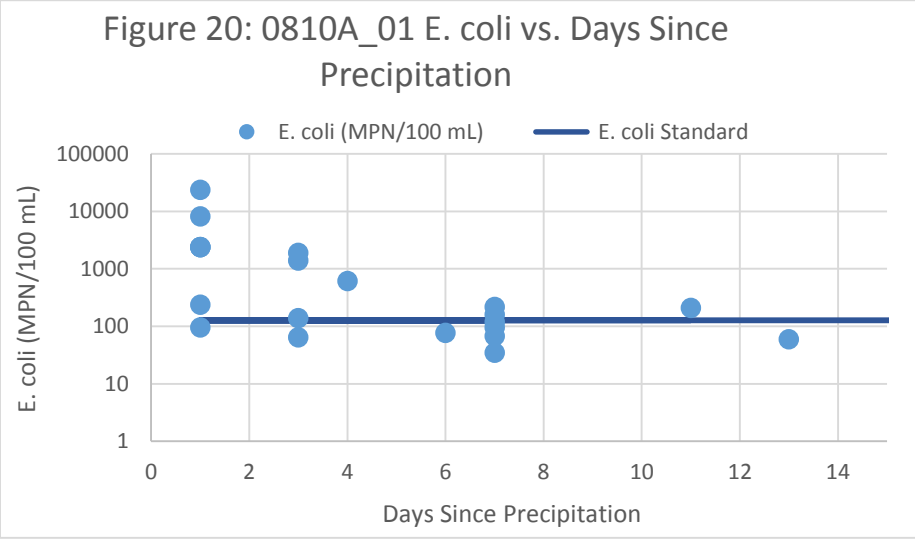
Figure 18: 0811B_01 *E. coli* vs. Days Since Precipitation

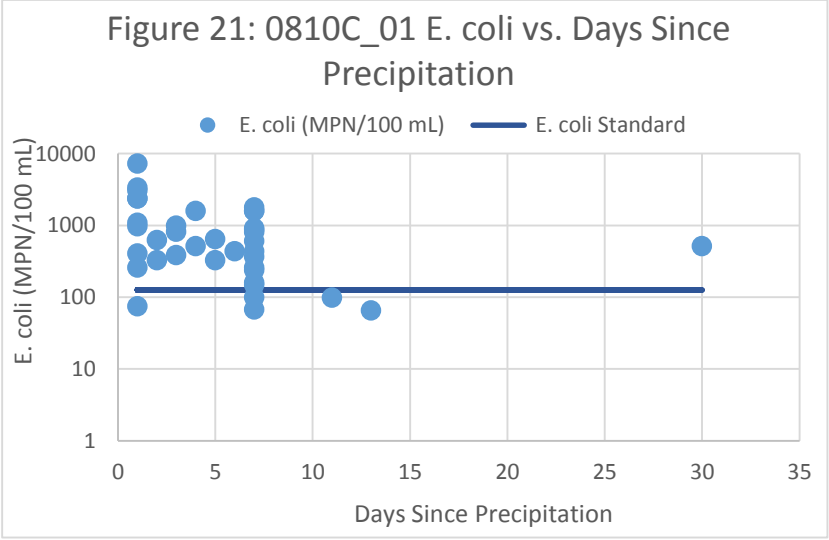
0810 – West Fork Trinity River Below Bridgeport



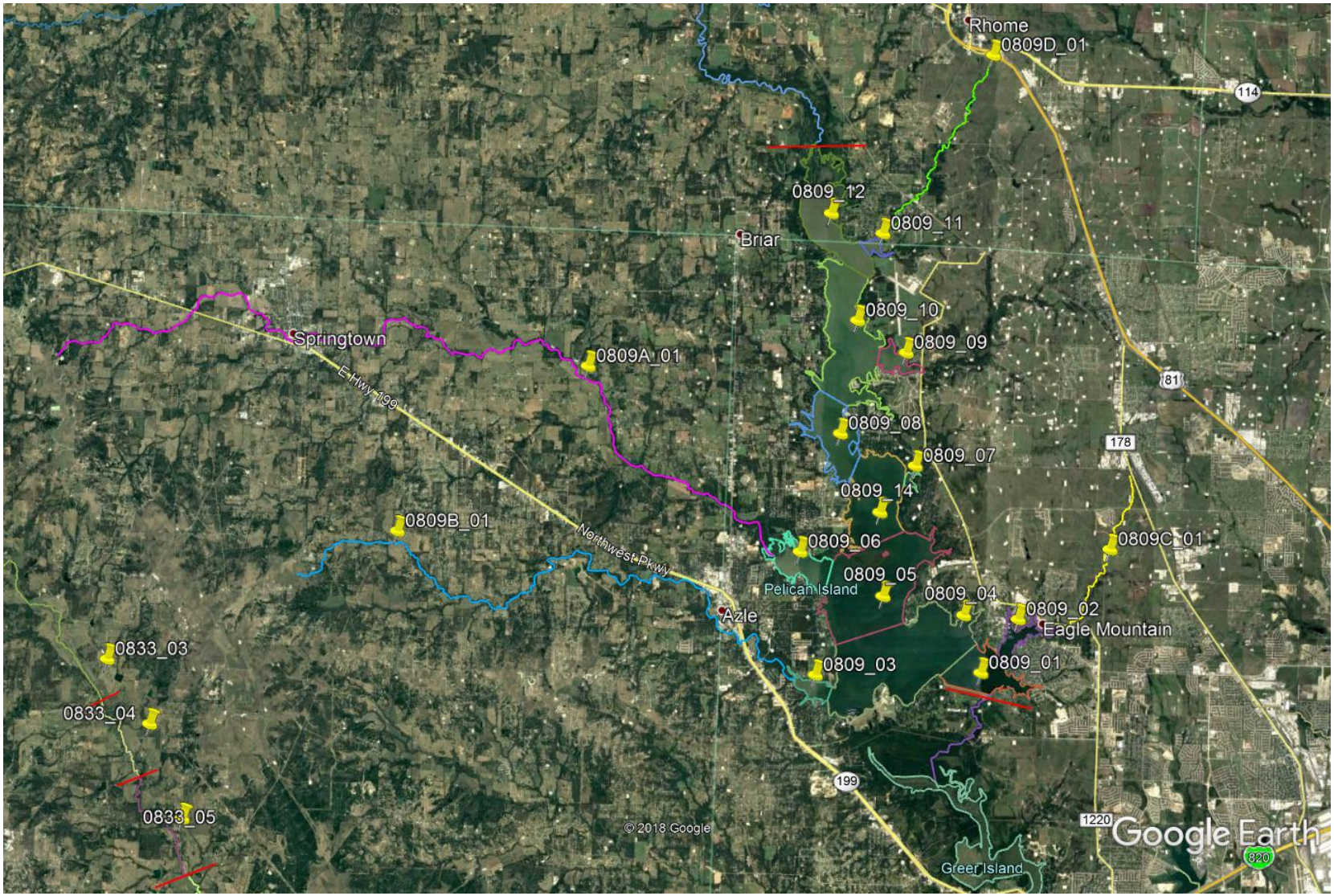
0810_01, 0810A_01, and 0810C_01 were identified as not supporting the Contact Recreation Use due to elevated levels of *E. coli* by the 2014 IR (0810_01) and the 2015 in-house 5-year assessment (0810A_01 and 0810C_01). The geomeans for the period of record used in this report are 273, 182, and 557 MPN/100 mL, respectively. As shown in Figures 19, 20, and 21, a majority of the elevated *E. coli* values coincide with precipitation events. However, it should be noted that there is an artifact in the data sets that makes further evaluation of the data difficult. Prior to 2011, days since precipitation greater than one week were reported as >7. When looking at *E. coli* against flow, there is no clear pattern. This indicates that in addition to precipitation runoff related increases, there appears to be a continuous source of *E. coli* into the stream. As the watershed is largely rural, these sources could include failing septic systems or drainage from agricultural animal waste containment systems.







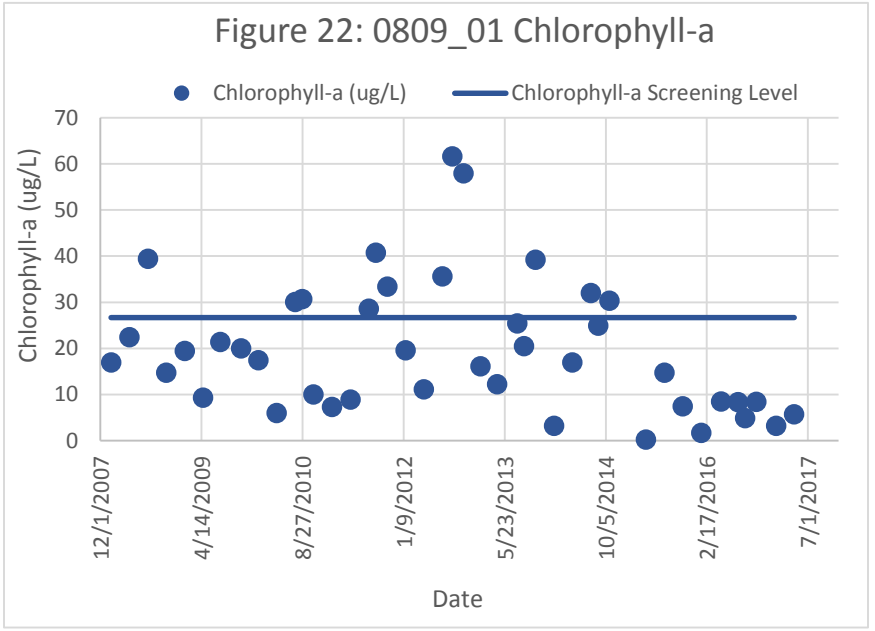
0809 – Eagle Mountain Reservoir

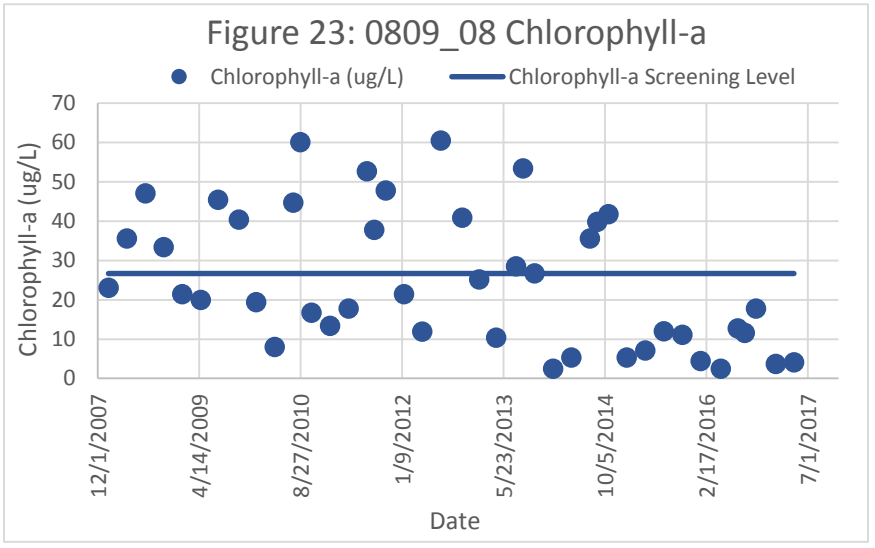


There were concerns for chlorophyll-a throughout much of the reservoir identified in the 2014 IR and the 2015 in-house 5-year assessment. Chlorophyll-a levels throughout the period of record used for this report remain elevated (see Figures 22 & 23). However, much of the data collected after 2014 shows that chlorophyll-a levels have dropped below the screening level. As noted in the 2015 Basin Summary Report, there appears to be a relationship between chlorophyll-a and Total Phosphorus (TP). This agrees with the indication that much of the reservoir is phosphorus limited (see Table 4).

There were issues identified for Total Dissolved Solids (TDS) in 0809A, 0809B, 0809C, and 0809D by the 2015 in-house 5-year assessment. Based on more recently collected data, TDS levels are still elevated. Evaporation or geology and land use may be causing this issue. The watershed for this reservoir spans in the Western Cross Timbers and Grand Prairie soil types. Land use in these soil types is largely agricultural. Agricultural practices can cause erosion which can contribute suspended sediments to a waterbody. Additionally, dissolved solids can increase in soils that are irrigated; as the water evaporates, the dissolved minerals and salts are left behind. Erosion and runoff from over-irrigation or precipitiation can then transfer these dissolved solids into nearby waterbodies. As shown in Figure 24, elevated TDS levels typically occur at lower flows in each of these streams.

0809B, 0809C, and 0809D were found to be not supporting the Contact Recreation Use due to elevated levels of *E. coli* by the 2015 in-house 5-year assessment. The geomeans for the period of record used in this report are 356, 467, and 448





MPN/100 mL, respectively. *E. coli* levels in these streams are typically high but it appears that the elevated *E. coli* levels are generally reported at elevated flows (see Figures 25, 26, and 27). The watersheds around 0809C and 0809D are a mix of rural and suburban so additional sources in these streams could be wildlife and pets. Failing infrastructure or septic systems could be contributing *E. coli* loads at lower stream flows. The watershed around 0809B is more populated and developed so it is more likely that failing infrastructure or septic systems are contributing to the elevated *E. coli* levels at lower flows.

Figure 24: 0809A, B, C, & D TDS vs. Flow

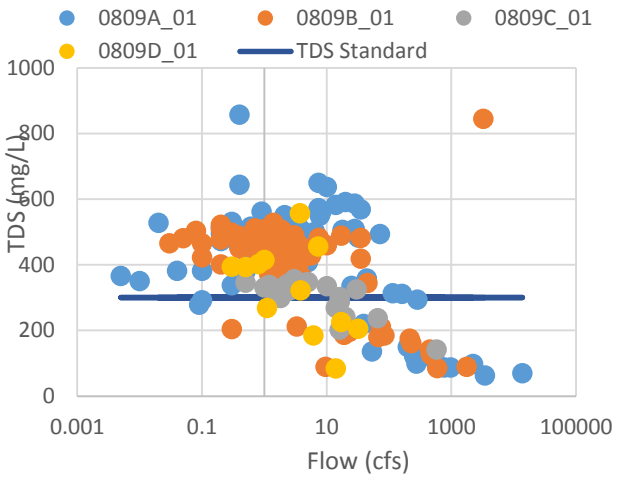


Figure 25: 0809B *E. coli* vs. Flow

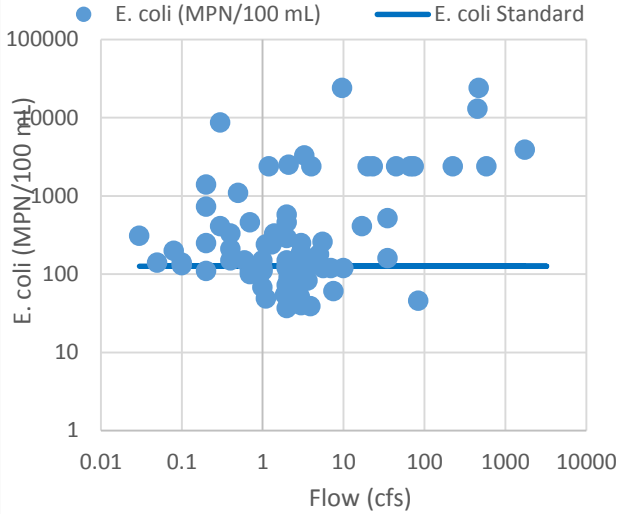


Figure 26: 0809C *E. coli* vs. Flow

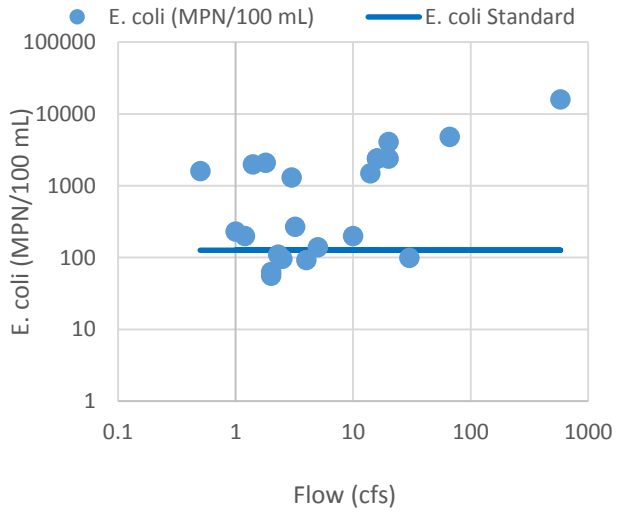
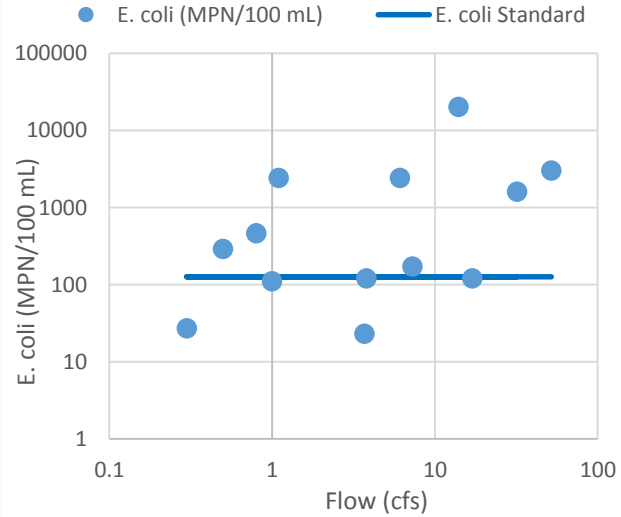
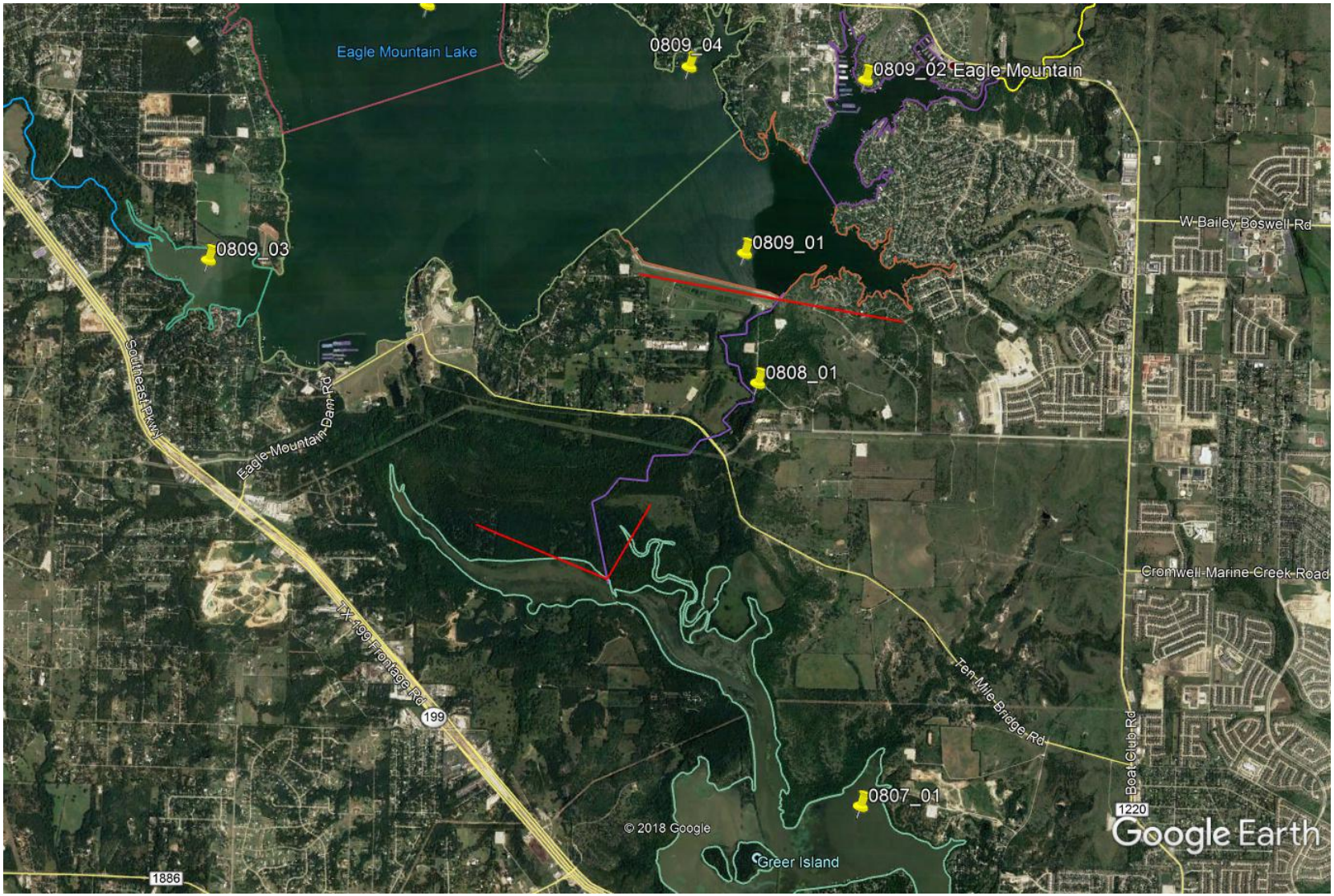


Figure 27: 0809D *E. coli* vs. Flow

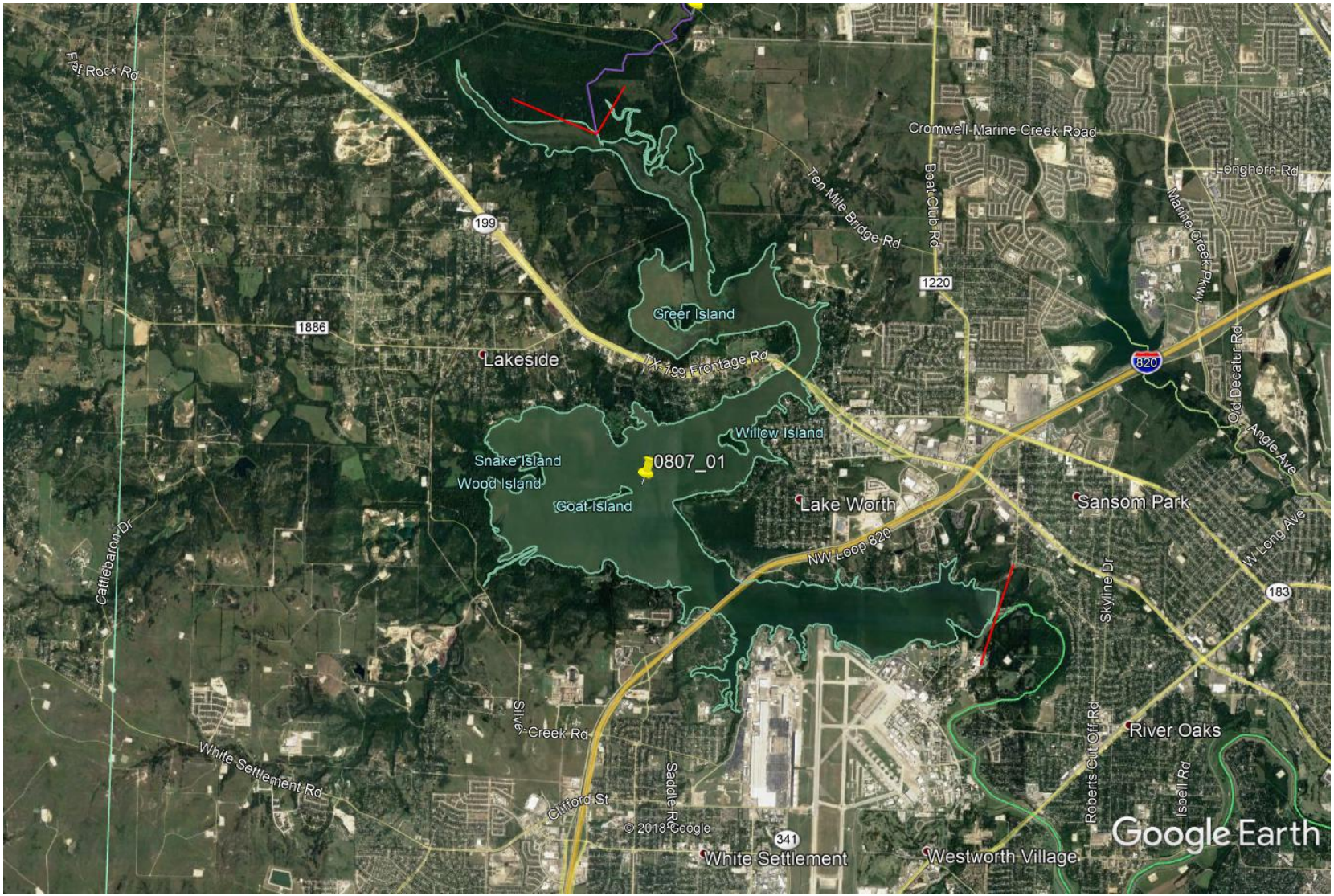


0808 – West Fork Trinity River Below Eagle Mountain Reservoir

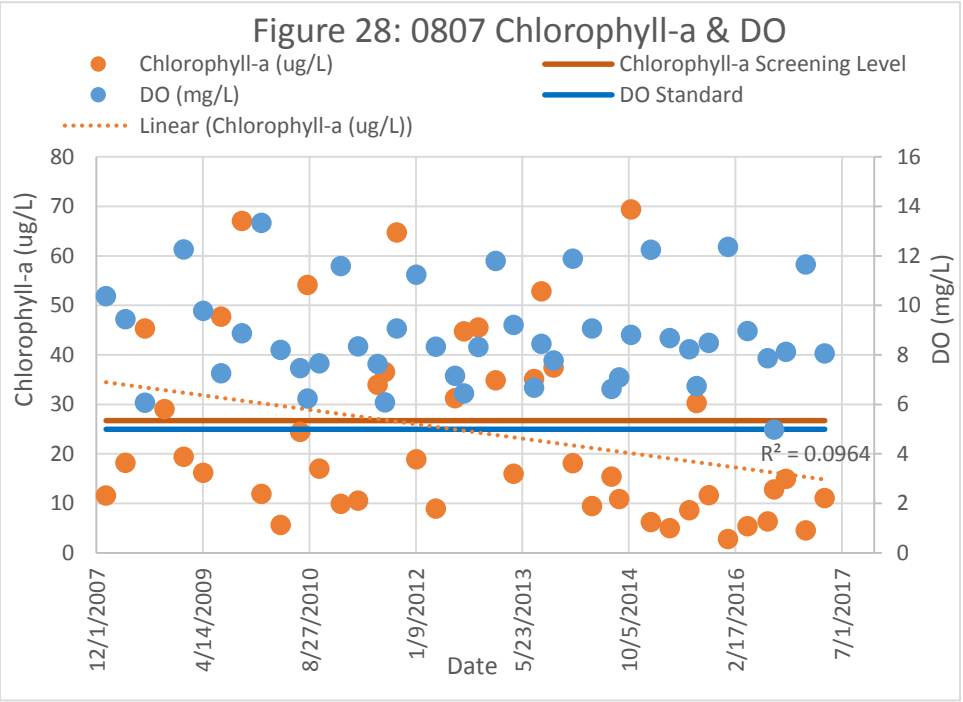


No new data is available for this segment.

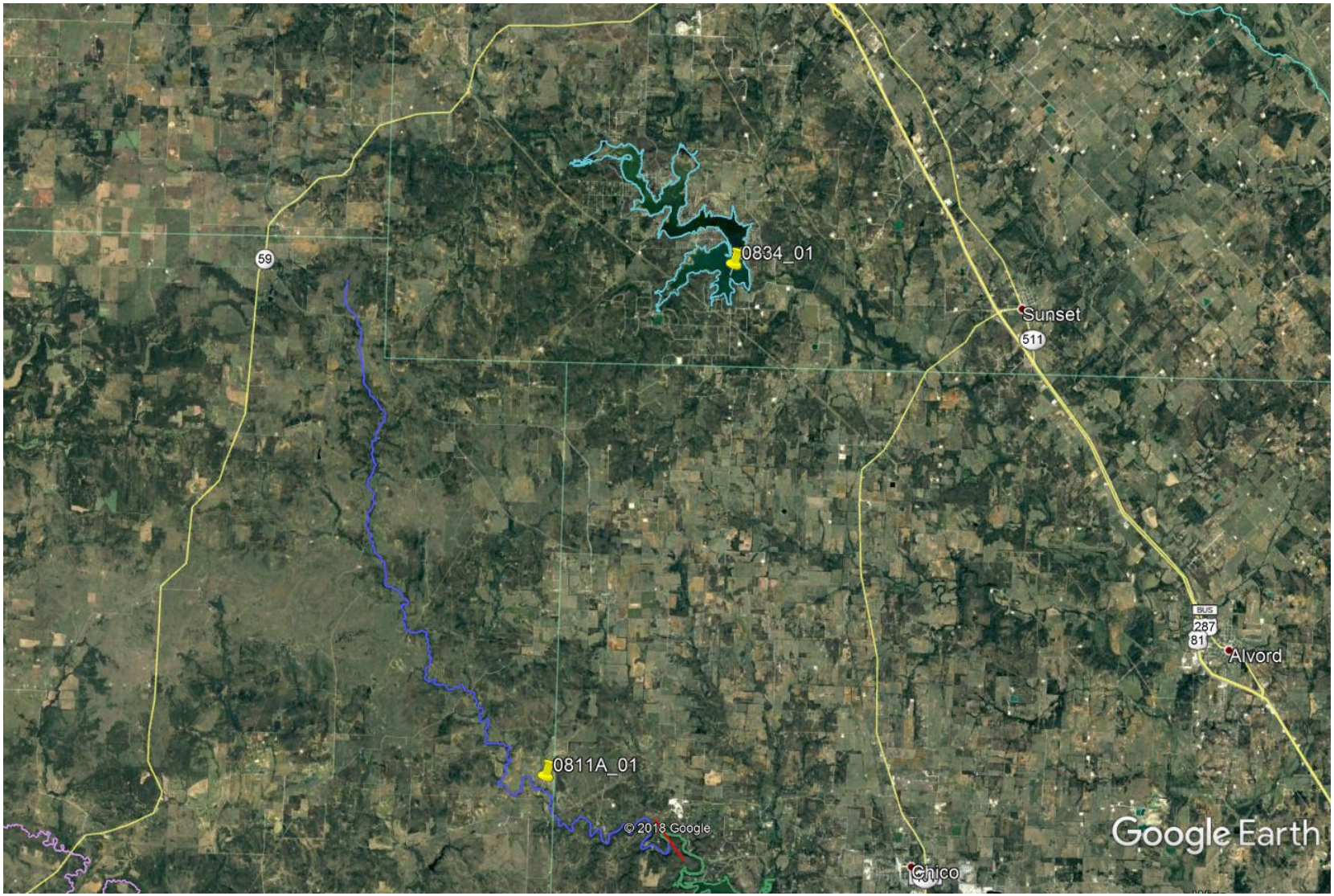
0807 – Lake Worth



The 2015 Basin Summary Report noted that 0807 had concerns for chlorophyll-a as identified by the 2014 IR. As shown in Figure 28, chlorophyll-a levels remain elevated. However, the increasing trend that was identified in the 2015 Basin Summary Report has moved to a decreasing trend. Much of the recently collected data are at levels below the chlorophyll-a screening level. Also, as noted in the 2015 Basin Summary Report, the elevated chlorophyll-a levels – and by extension, the algal population – are not negatively impacting DO levels in the reservoir. The majority of the data are reported above 6 mg/L.

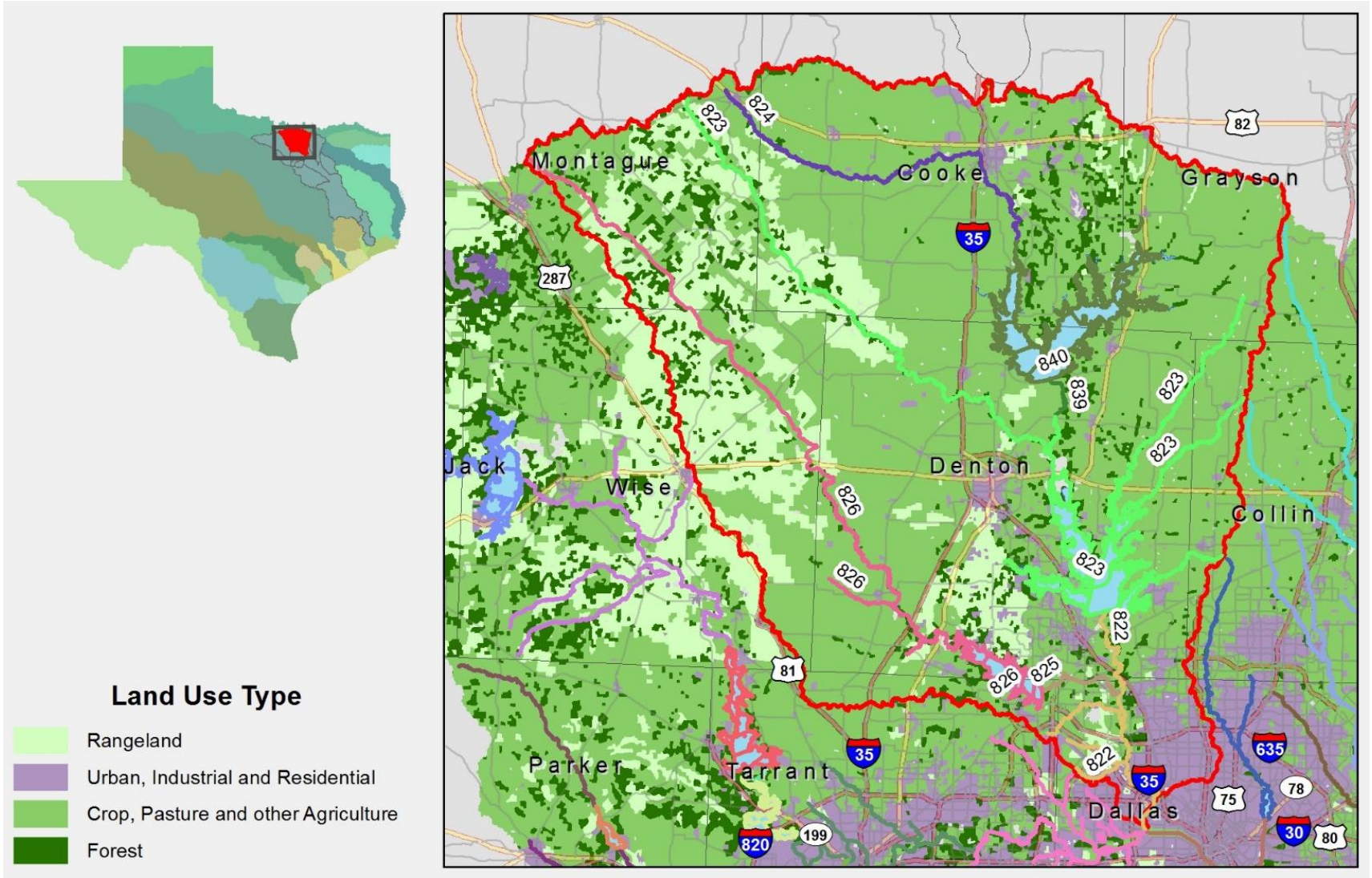


0834 – Lake Amon G. Carter

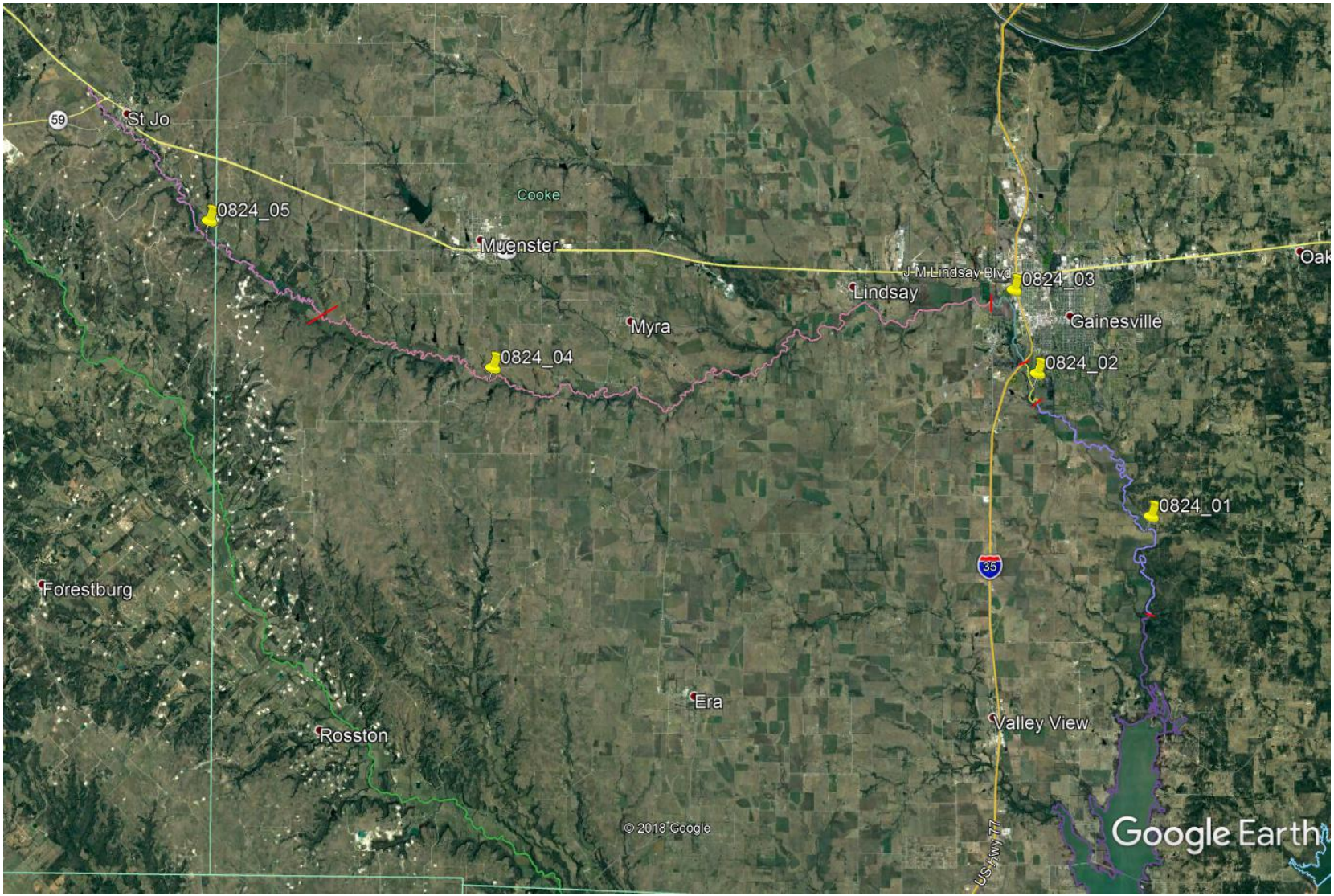


No additional discussion for this segment.

Elm Fork Trinity River



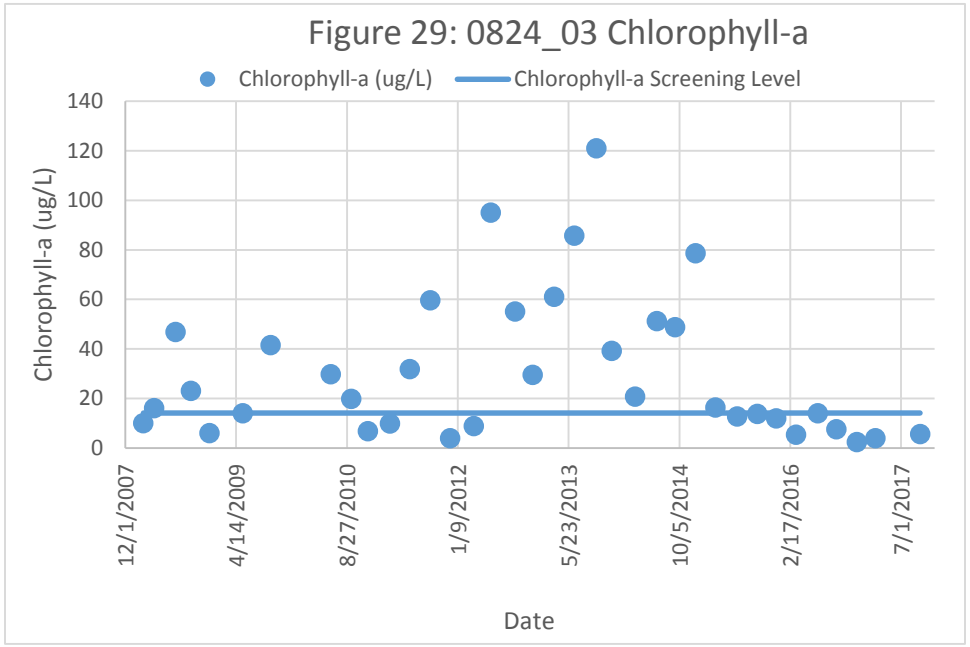
0824 – Elm Fork Trinity River Above Ray Roberts

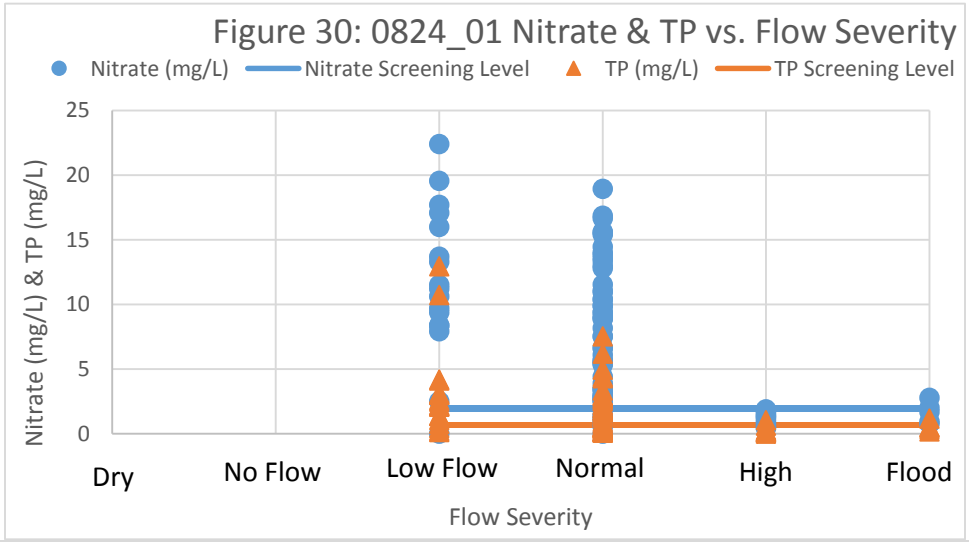


0824_01 and 0824_03 were found to have concerns for chlorophyll-a by the 2014 IR. There is no current monitoring data for chlorophyll-a in 0824_01 to further evaluate this concern. Data for 0824_03 shows that chlorophyll-a levels are still elevated. However, data for the most recent years is near or below the screening level as shown in Figure 29. As discussed for several other segments in this report, this decrease is believed to be due to the floods of 2015 and 2016. Chlorophyll-a in this assessment unit is well correlated to both TKN and TP (correlation coefficients = 0.74 and 0.51, respectively). There is a wastewater treatment facility upstream of 0824_03 that is the likely source of nutrients in this assessment unit and which may be feeding algal growth.

0824_01 and 0824_02 were both found to have concerns for General Uses by the 2014 IR due to elevated levels of nitrate. 0824_01 was also found to have concerns for TP. There is no current monitoring data in 0824_02 but it is believed that upstream wastewater treatment facilities are the source of nutrients in these assessment units. As shown in Figure 30 for 0824_01, higher nutrient values are reported at lower flows which is indicative of a stream that is effluent dominated. Lower values are reported at higher flows when precipitation dilutes the nutrients that are present in the stream.

0824_01 and 0824_3 were found to be not supporting the Contact Recreation Use due to elevated levels of *E.*





coli by the 2015 in-house 5-year assessment. Both of these assessment units still have high *E. coli* levels as shown in Figure 31. Elevated values appear to be somewhat correlated to recent precipitation events indicating that the impairment is partially runoff related. However, there are some high values reported during dry weather; greater than seven days since precipitation. This suggests that there are either constant sources of bacteria into the stream such as failing infrastructure or that wildlife or livestock are visiting the stream.

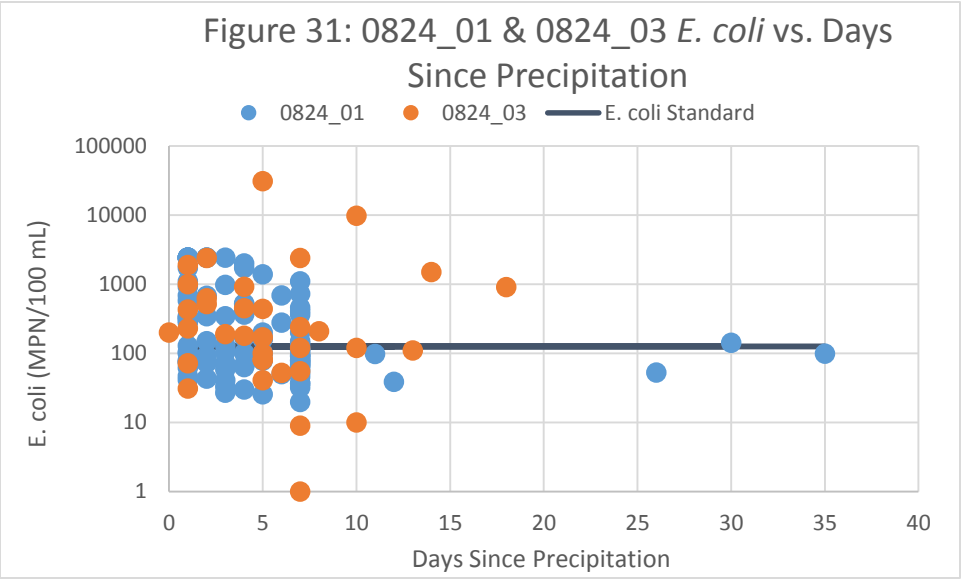
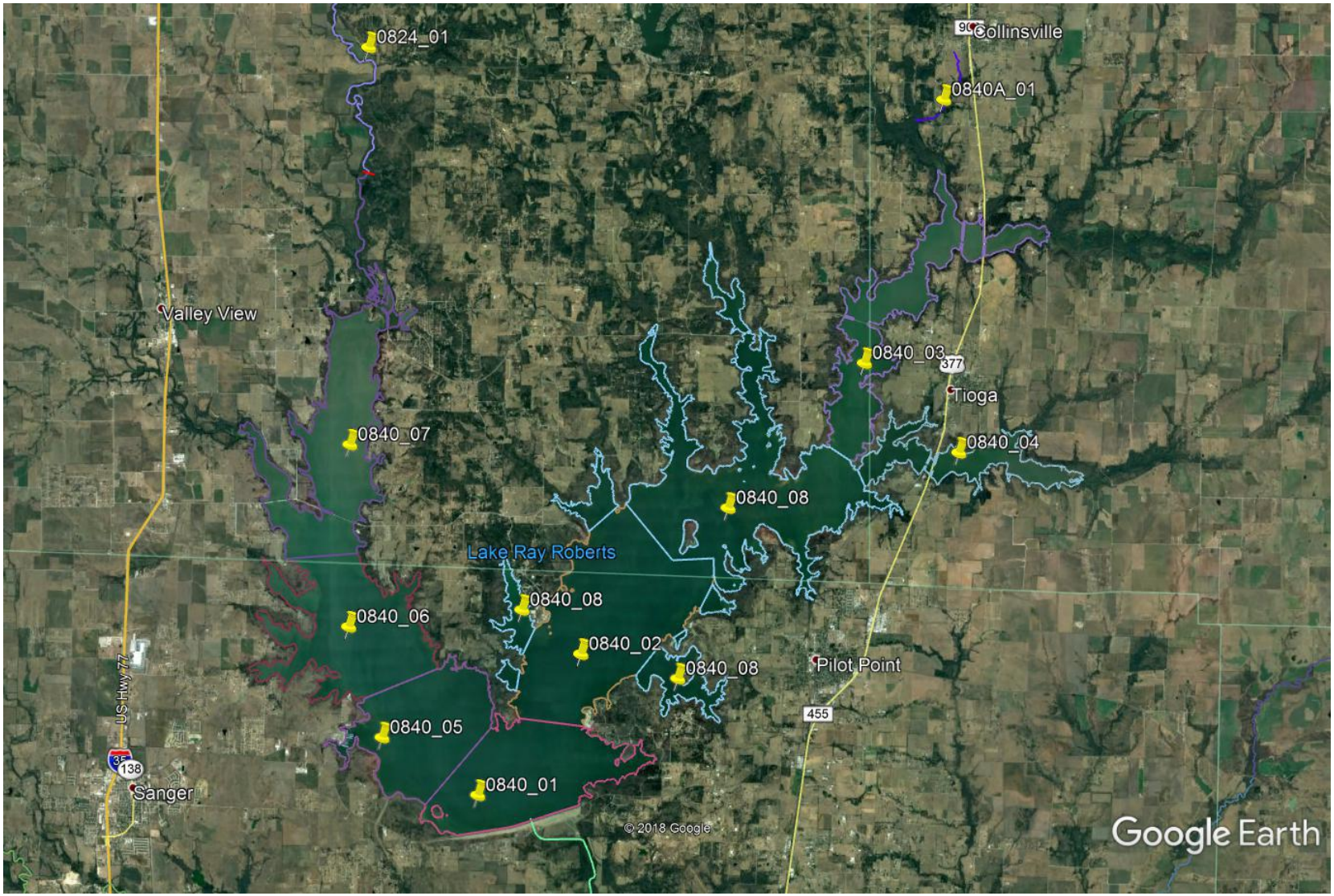


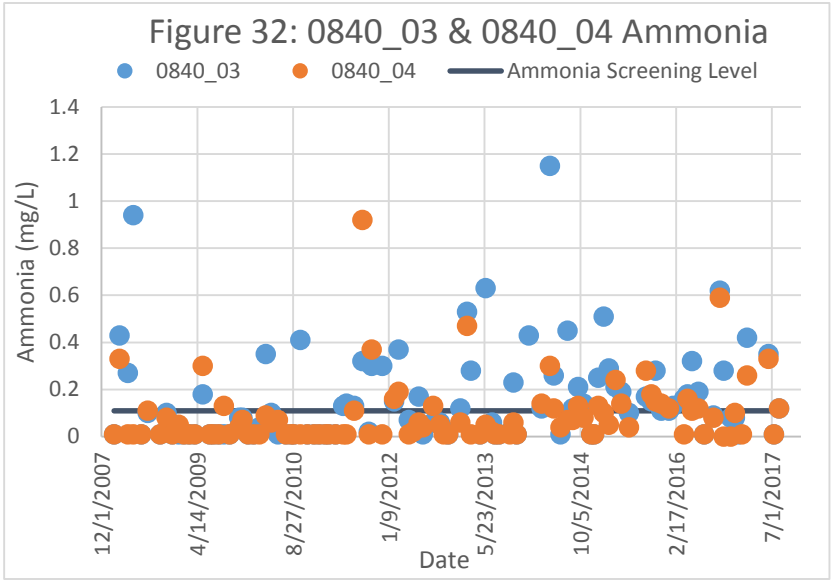
Figure 31: 0824_01 & 0824_03 *E. coli* vs. Days Since Precipitation

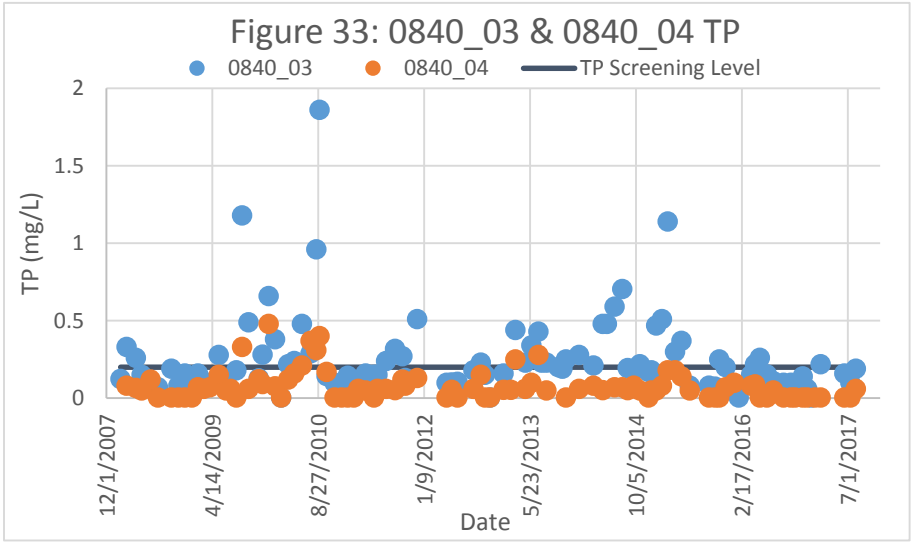
0840 – Ray Roberts Lake

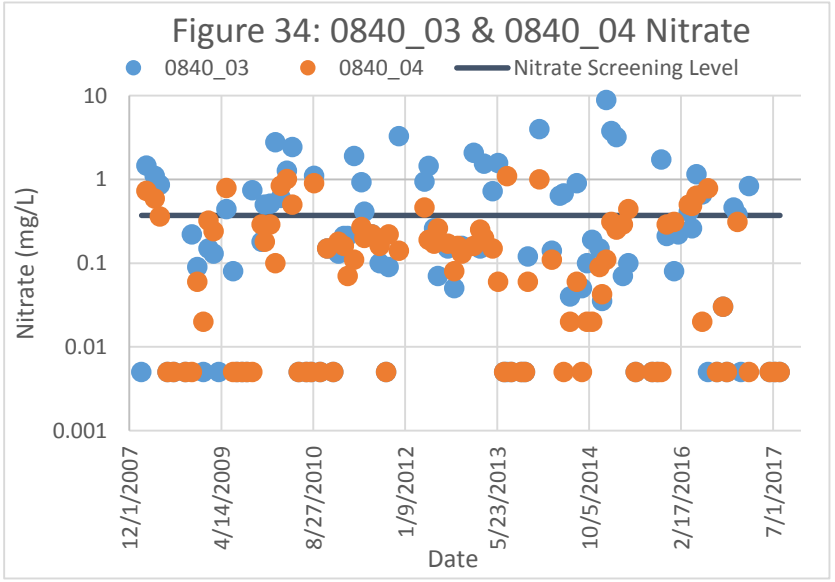


0840_08 was found to have concerns for Aquatic Life Use due to depressed DO by the 2014 IR. However, there is no current data available to further evaluate this concern.

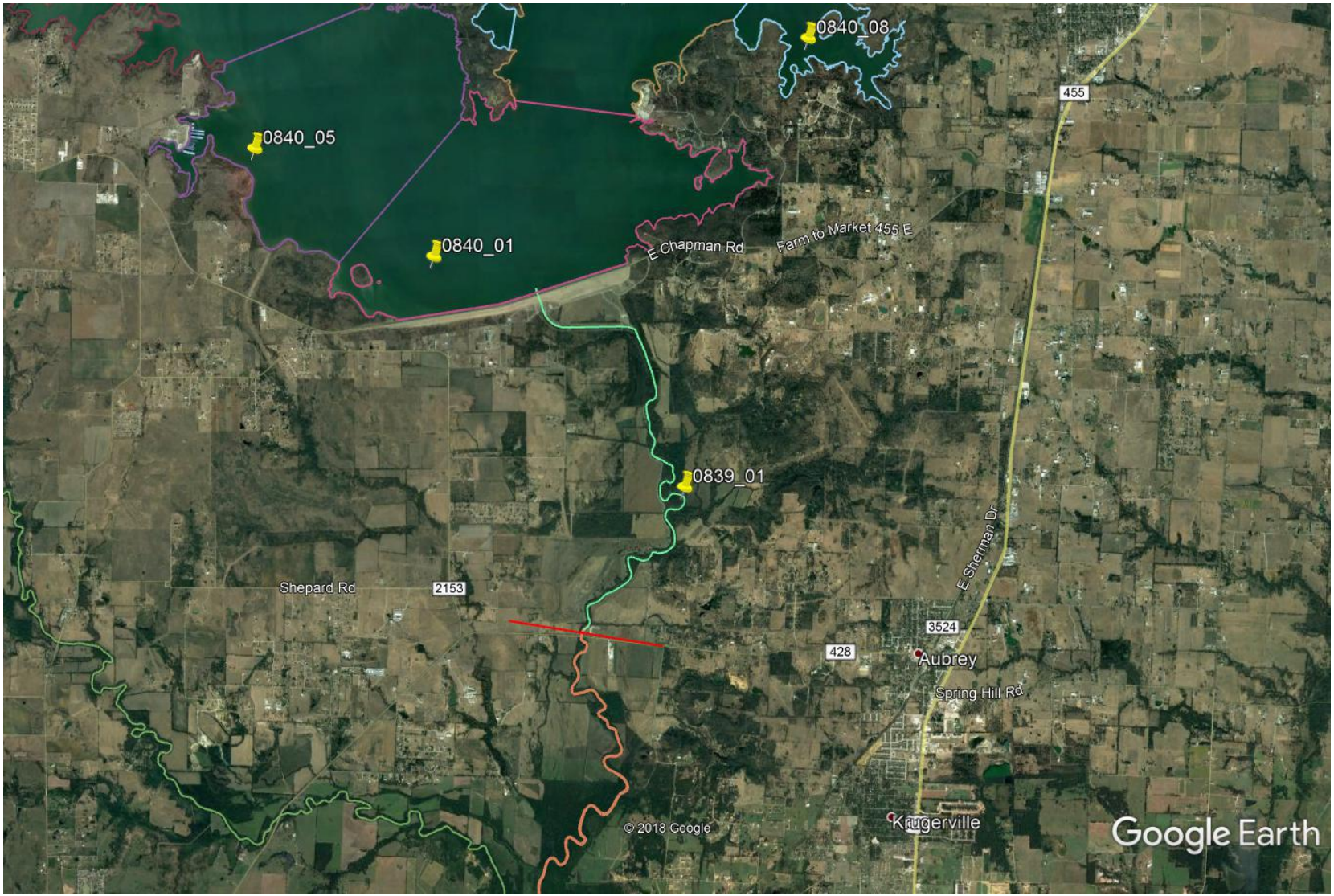
0840_03 and 0840_04 were both found to have concerns for General Uses due to elevated nutrient levels by the 2014 IR. Both assessment units had concerns for ammonia and nitrate. The 2015 in-house 5-year assessment also identified concerns for TP in 0840_03. As shown in Figures 32, 33, and 34, concentrations for these nutrients remain elevated. Both assessment units are in the upper reaches of the eastern arm of the reservoir. The watersheds are largely agricultural so livestock and fertilizers may be contributing nutrient loads to the reservoir. There are some wastewater treatment facilities in the watersheds as well which will contribute nutrients to the reservoir.





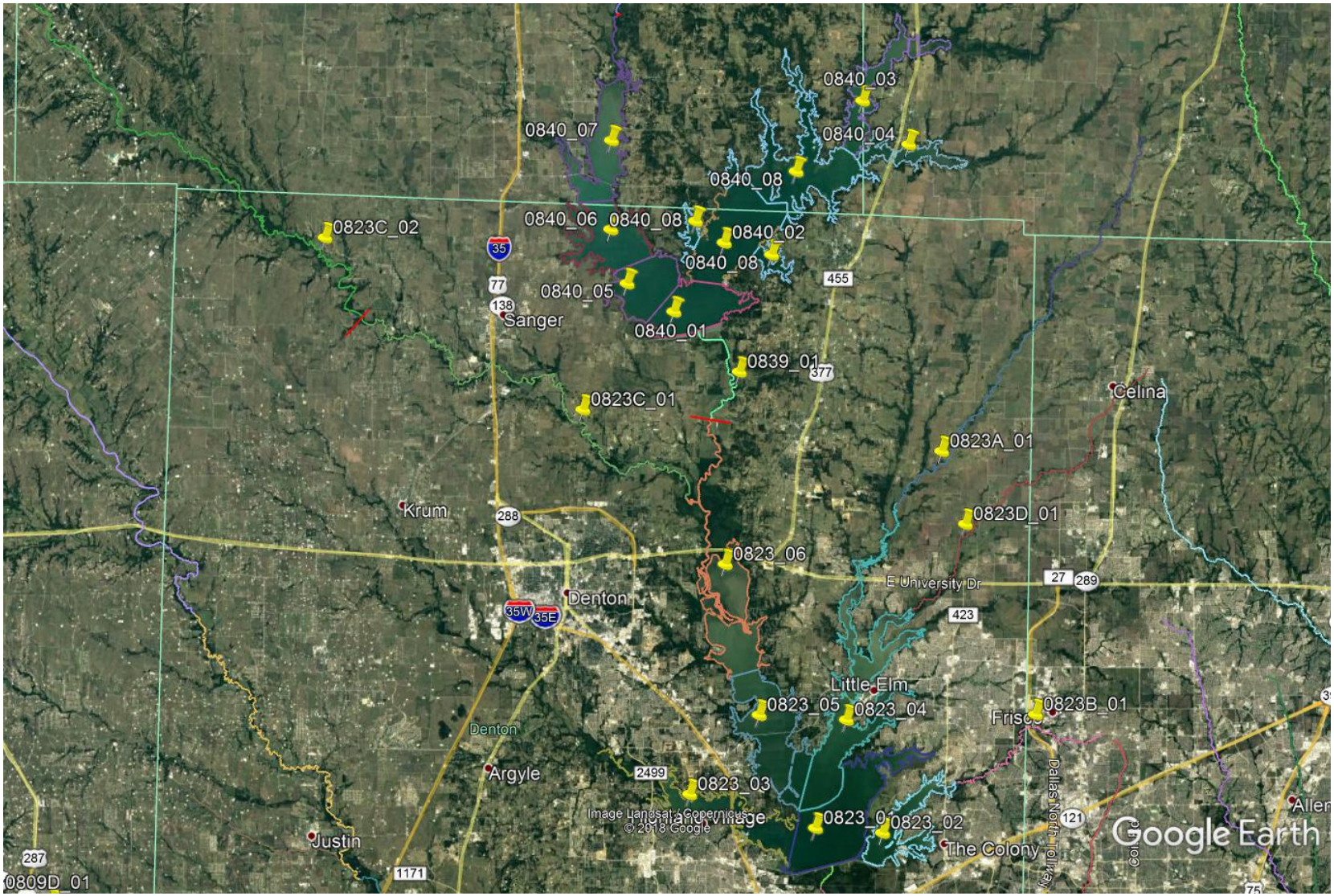


0839 – Elm Fork Trinity River Below Ray Roberts



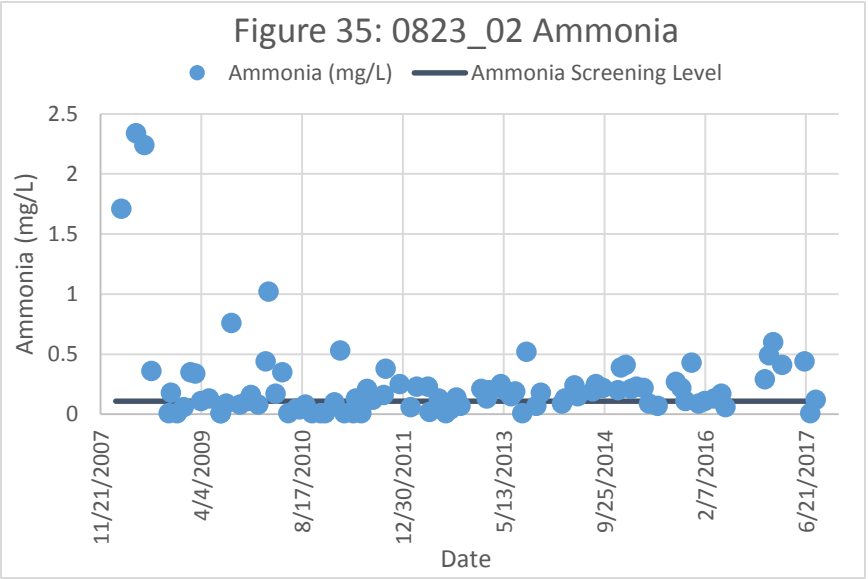
No additional discussion for this segment.

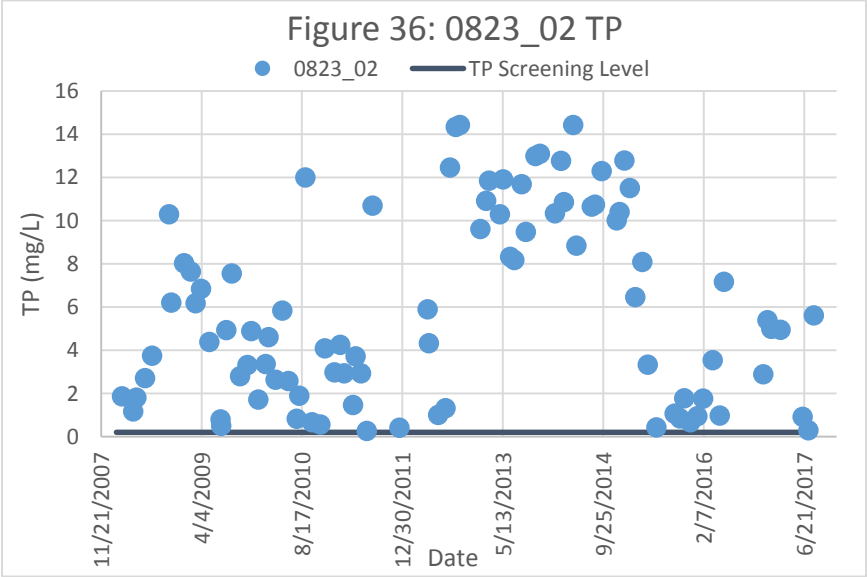
0823 – Lewisville Lake

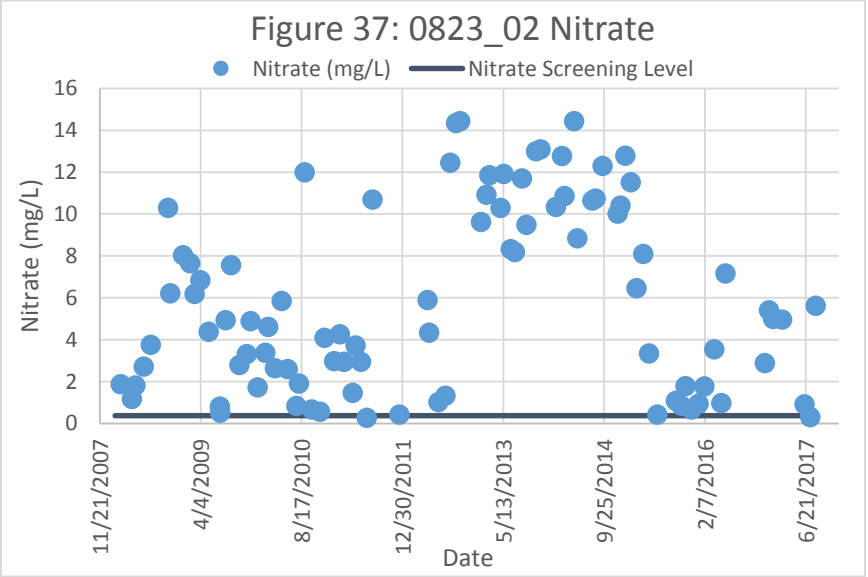


0823_02 was found to have concerns for General Uses due to elevated levels of ammonia, nitrate, and TP by the 2014 IR. It also identified concerns for TP in 0823_05. As shown in Figures 35, 36, and 37, more recent data shows that nutrient levels remain elevated in 0823_02. This arm of the reservoir is heavily developed and is largely residential. Therefore, sources of nutrients into this assessment unit may include wastewater treatment facilities, failing infrastructure, and residential fertilizers.

TP levels in 0823_05 appears to have decreased in recent years. There have been only two samples above the screening level since 2010.







0823_02 and 0823_05 were found to have concerns for chlorophyll-a by the 2014 IR. As shown in Figure 38, much of the recent data is reported above the screening level. There appears to weak increasing trends. However, the trends are weighted by a few very high data points in each assessment unit. These could be due to actual algal blooms or a piece of leaf that was accidentally included in the sample container. If these were actual algal bloom samples, they did not appear to be negatively influencing the DO in those assessment units as shown in Figure 39.

0823B was found to have concerns for General Uses due to elevated levels of nitrate and TP by the 2014 IR. This concern was carried forward from previous assessments and there is no current monitoring data to further evaluate these concerns.

0823C_01 was found to be not supporting the Contact Recreation Use due to elevated levels of *E. coli* by the 2015 in-house 5-year assessment. The geomean for more recent data is 117 MPN/100 mL which is below the standard. As shown in Figure 40, elevated levels of *E. coli* are generally reported when sampling coincides with recent precipitation indicating that runoff from wildlife or livestock may be introducing bacteria to the stream.

Figure 38: 0823_02 & 0823_05 Chlorophyll-a

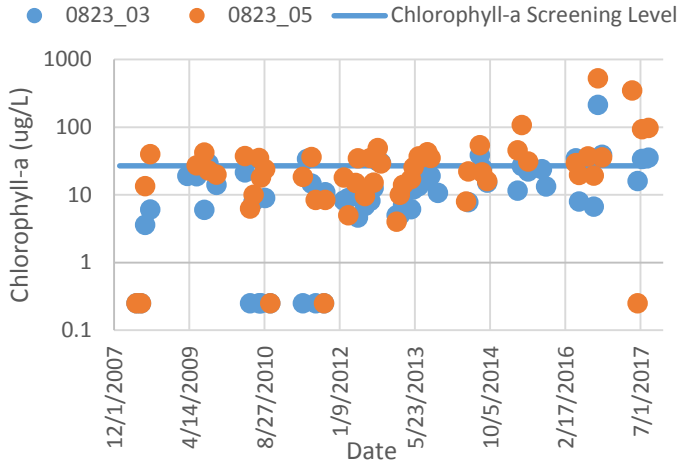


Figure 39: 0823_02 & 0823_05 DO vs Chlorophyll-a

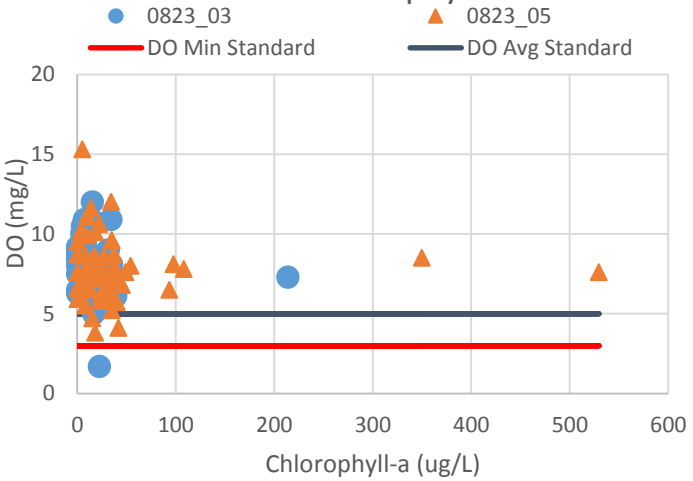
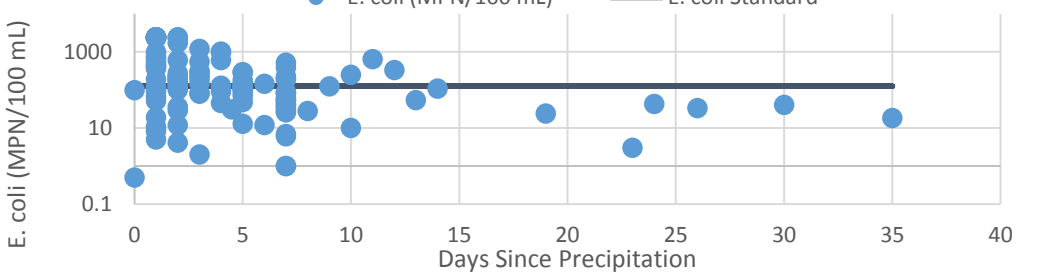
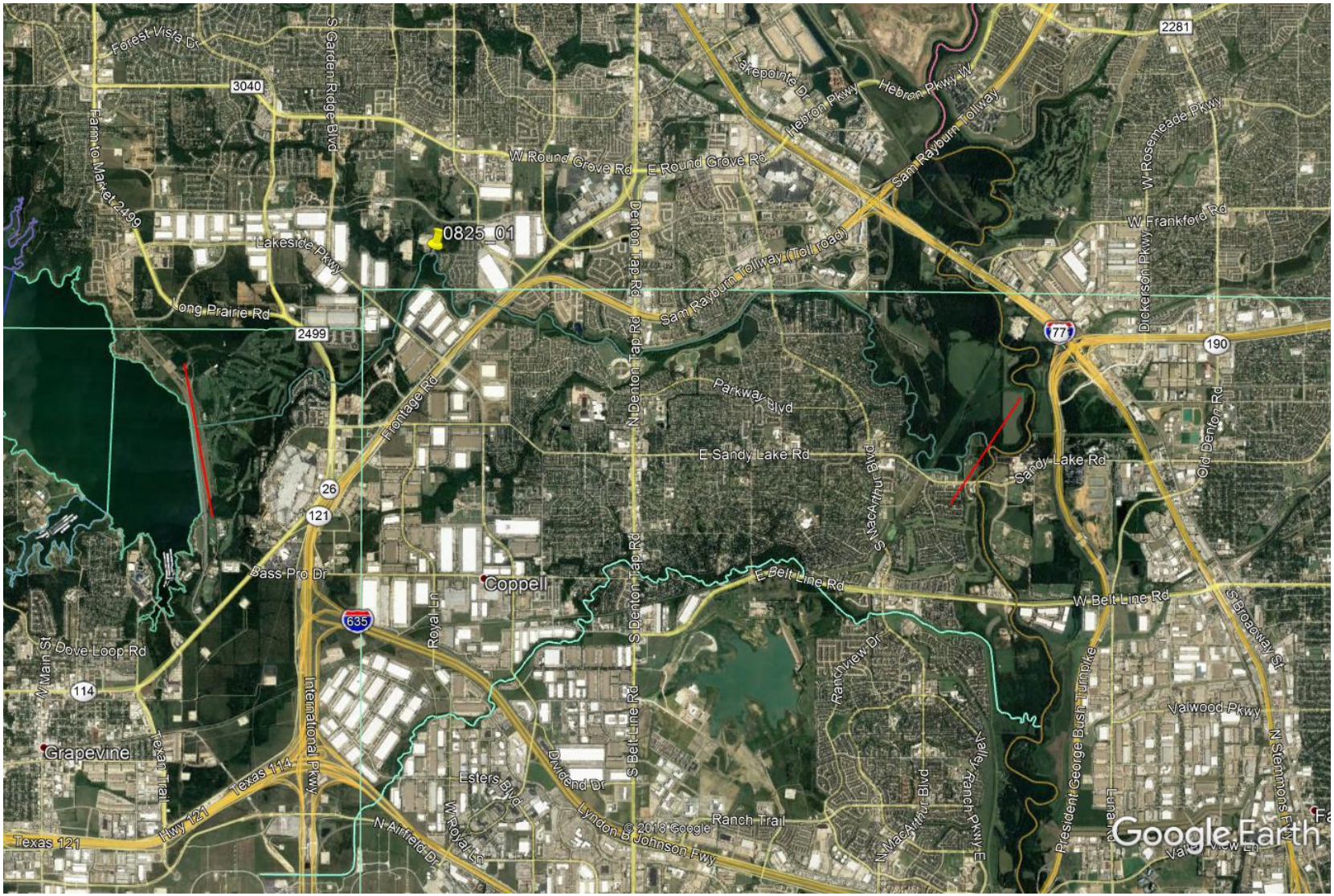


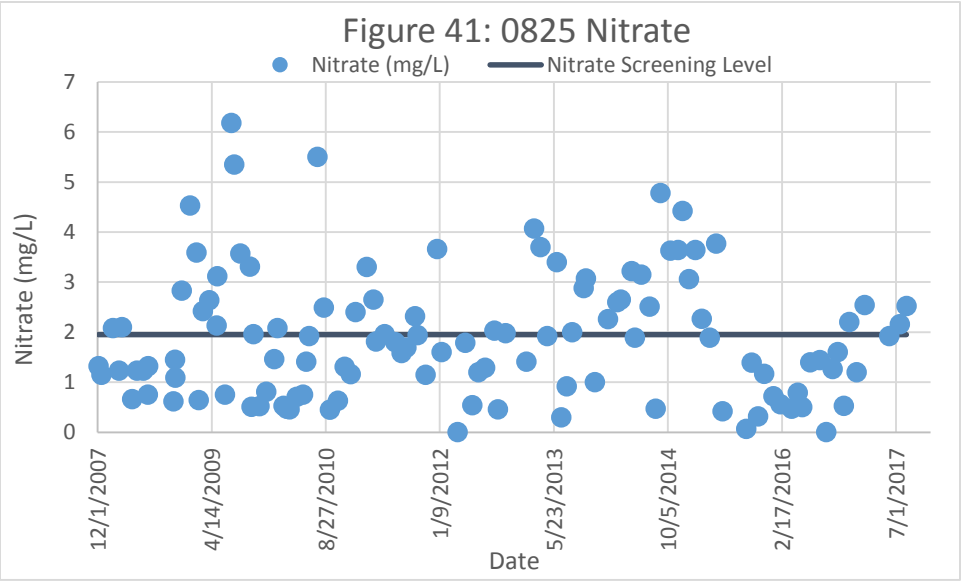
Figure 40: 0823C_01 *E. coli* vs. Days Since Precipitation



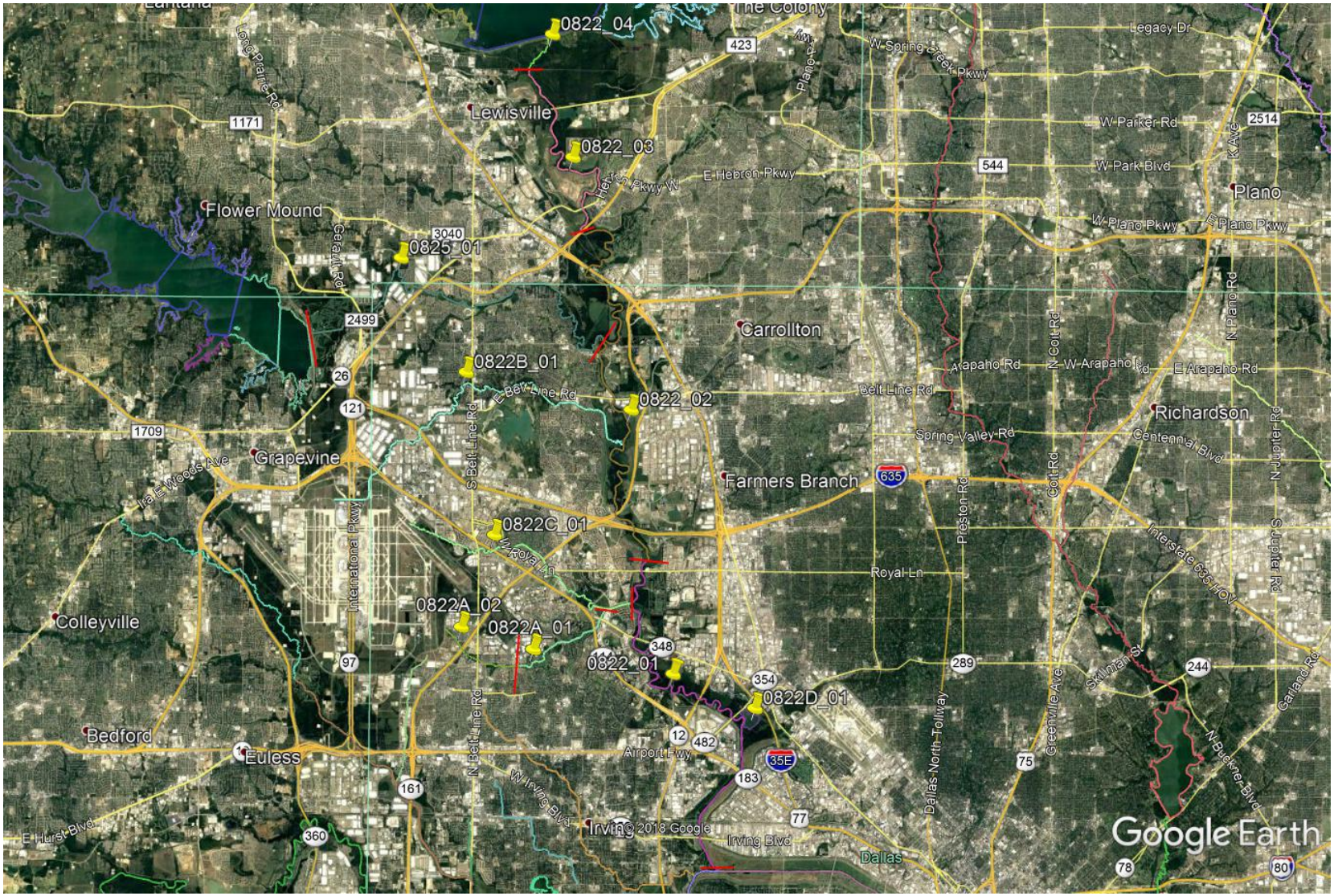
0825 – Denton Creek



This segment was found to have concerns for General Uses due to elevated levels of chlorophyll-a and nitrate by the 2015 in-house 5-year assessment. There is no current monitoring data to further evaluate the concern for chlorophyll-a. However, based on more recent monitoring data, nitrate frequently exceeds the screening level as shown in Figure 41. There is no strong correlation between nitrate and days since precipitation which indicates that there may be a constant source of nitrate into the stream. There is a golf course and a wastewater treatment facility upstream of the monitoring site in this segment which are the likely source of nutrients.



0822 – Elm Fork TR Below Lewisville



0822_01 and 0822_02 were found to have concerns for Aquatic Life Use due to depressed DO by the 2014 IR. More recent data shows that DO levels appear to have increased as shown in Figure 42.

0822_01, 0822_02, and 0822_04 were found to have concerns for General Uses due to elevated levels of chlorophyll-a by the 2014 IR. There are no current monitoring data to further evaluate the concern in 0822_04. However, as shown in Figure 43, chlorophyll-a levels for 0822_01 and 0822_02 are elevated. Chlorophyll-a is fairly well correlated with Total Kjeldahl Nitrogen (TKN) in assessment units 0822_01 and 0822_02 with the correlation coefficients being 0.41 and 0.39, respectively. Upstream wastewater treatment facilities may be providing nutrients that are being used by algal populations to reproduce. In addition, it is very likely that releases from the upstream reservoirs – Grapevine Lake and Lewisville Lake – are introducing algal populations to the river.

0822A_01 and 0822A_02, 0822B, and 0822C were found to be not supporting the Aquatic Life Use due to depressed DO by the 2015 in-house 5-year assessment. There is no current monitoring data in 0822A_01, however, based on data for 0822A_02, the depressed DO levels are related to low flows in the stream (see Figure 44). DO levels have increased above the standards in 0822B but are also generally lower at low flows as shown in Figure 45. Depressed

Figure 42: 0822_01 and 0822_02 Dissolved Oxygen

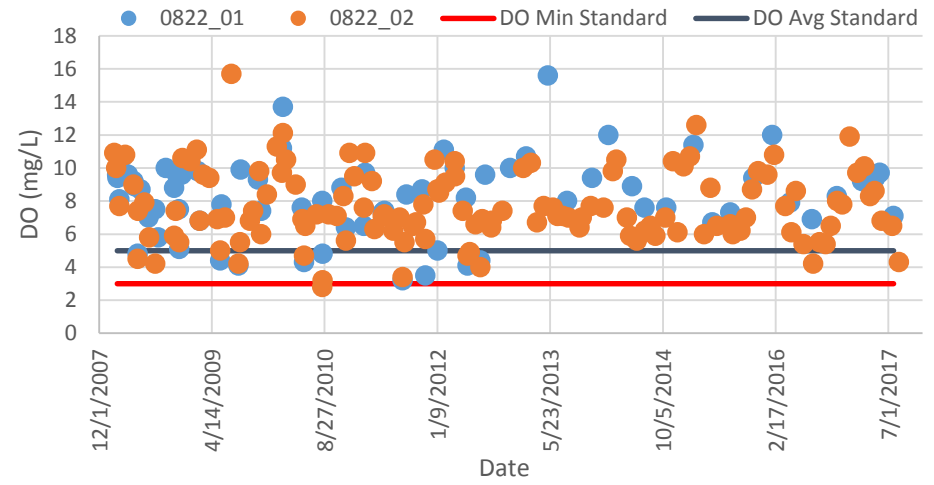
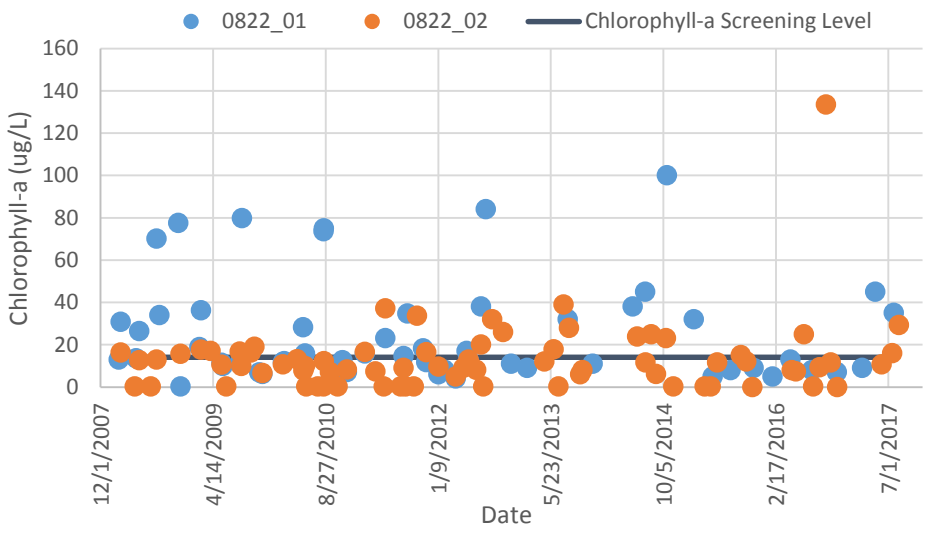
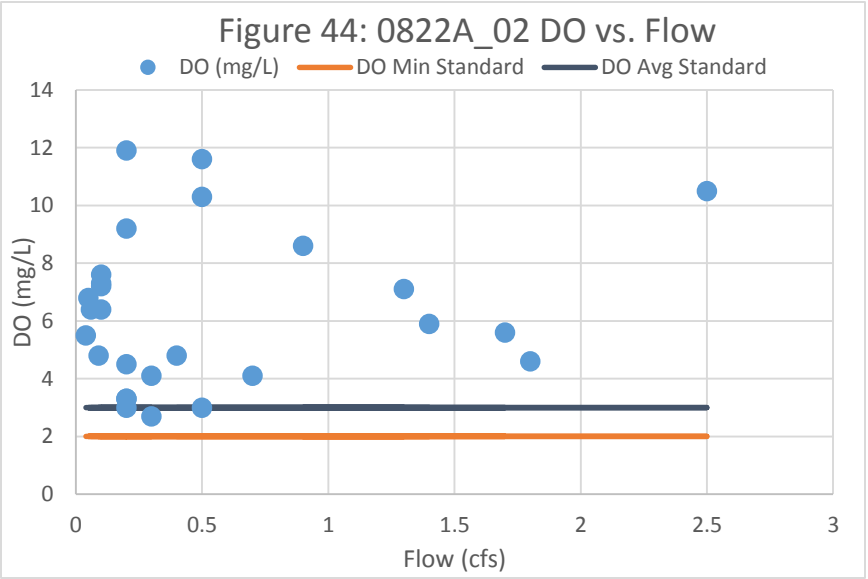


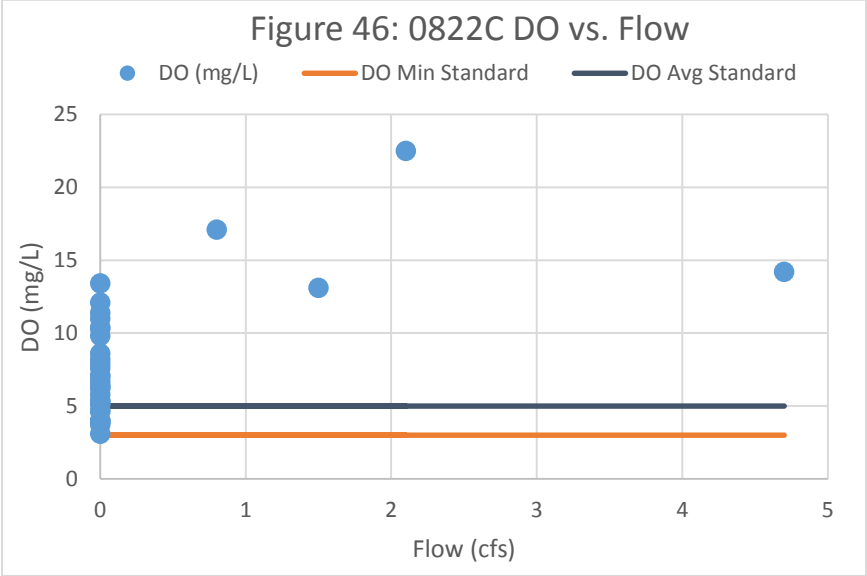
Figure 43: 0822_01 & 0822_02 Chlorophyll-a

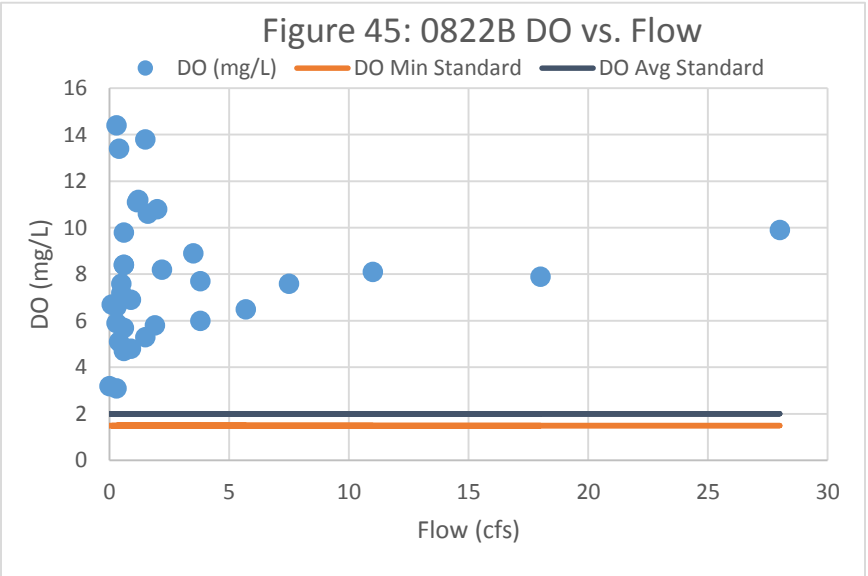


DO levels in 0822C are still being reported in 0822C, however, like 0822A and 0822B, this is a very low flow system which is affecting DO levels (see Figure 46).

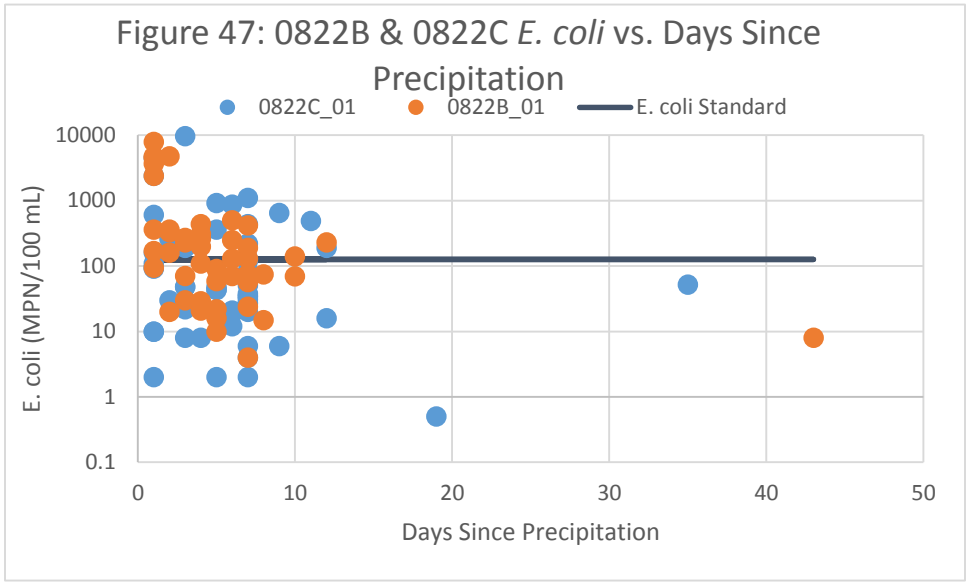
Concerns for chlorophyll-a were identified for 0822C and 0822D by the 2014 IR. More recently collected data shows that chlorophyll-a levels are still elevated. Chlorophyll-a is strongly correlated to TKN in 0822C with a correlation coefficient of 0.68. The sample location is downstream from a large residential golf course so it is presumed that fertilizers may be the source of nutrients which are feeding algal growth. No strong correlations exist in 0822D. However, this segment is a small reservoir so longer residence times are the likely reason for elevated levels of chlorophyll-a.



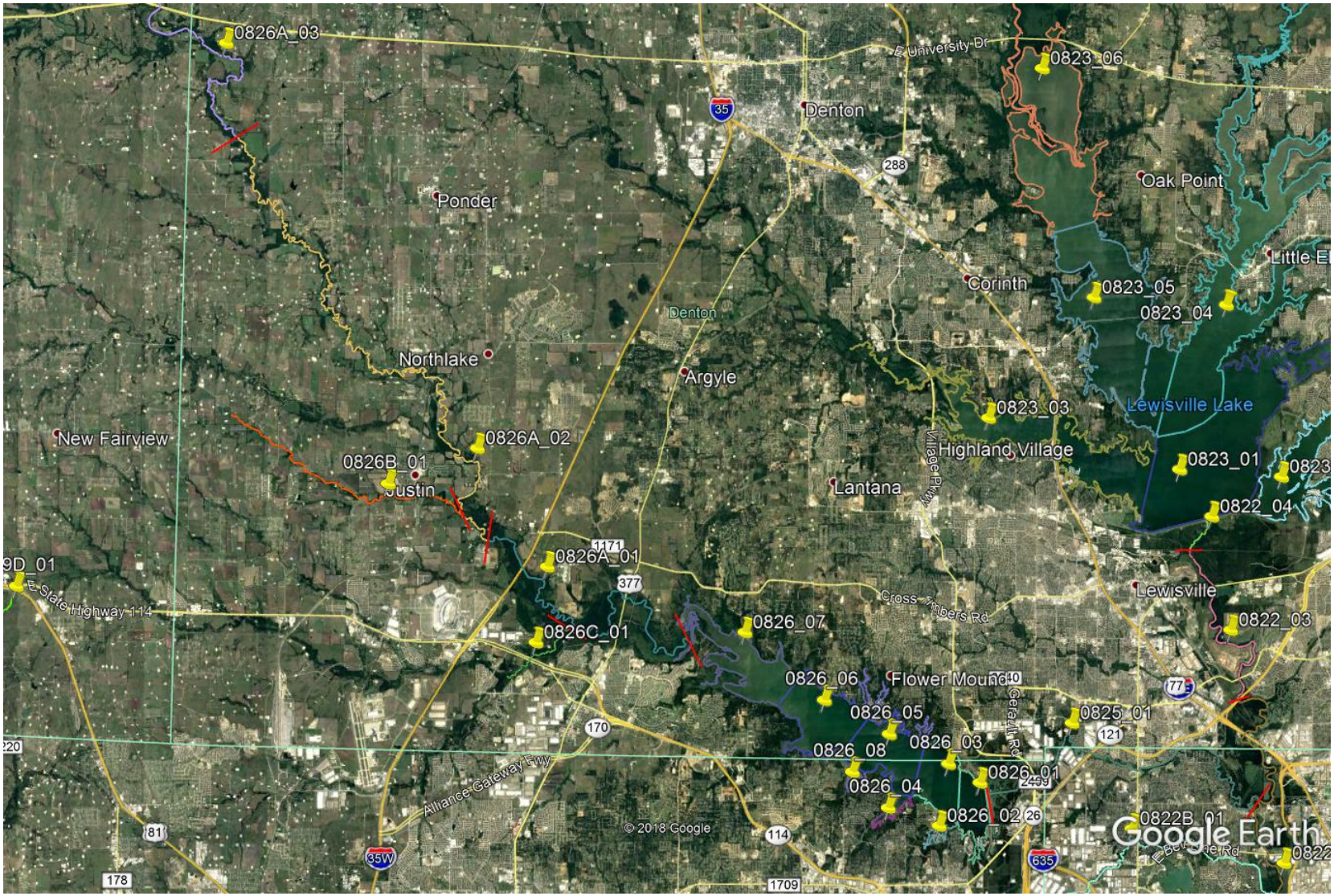




0822A_02 and 0822B were found to be not supporting the Contact Recreation Use due to elevated *E. coli* levels by the 2014 IR. Based on more recent data; the geomeans are 244 and 146 MPN/100 mL, respectively. It appears that elevated *E. coli* levels are largely runoff related in these assessment units. Higher levels of *E. coli* are generally seen when sampling coincides with a recent precipitation event (see Figure 47).



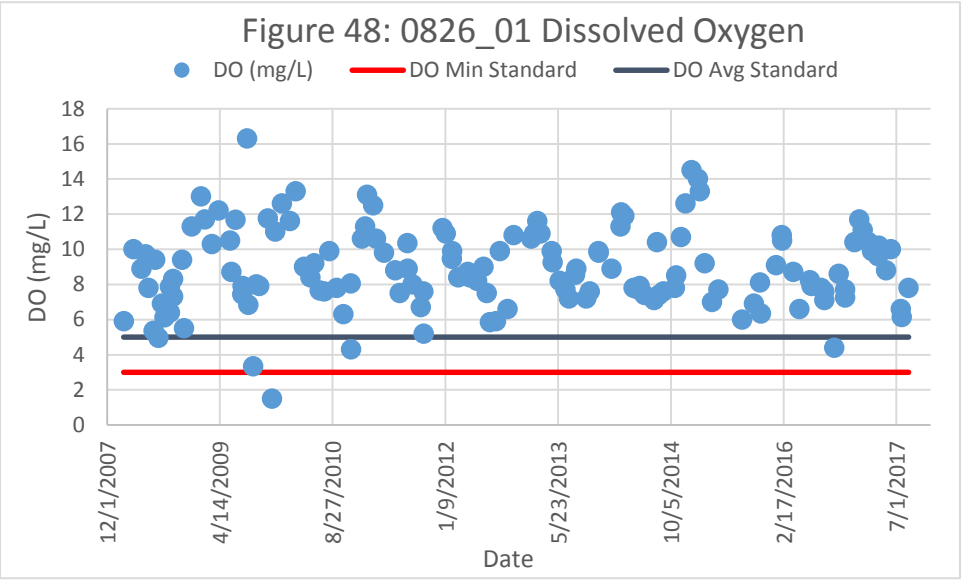
0826 – Grapevine Lake

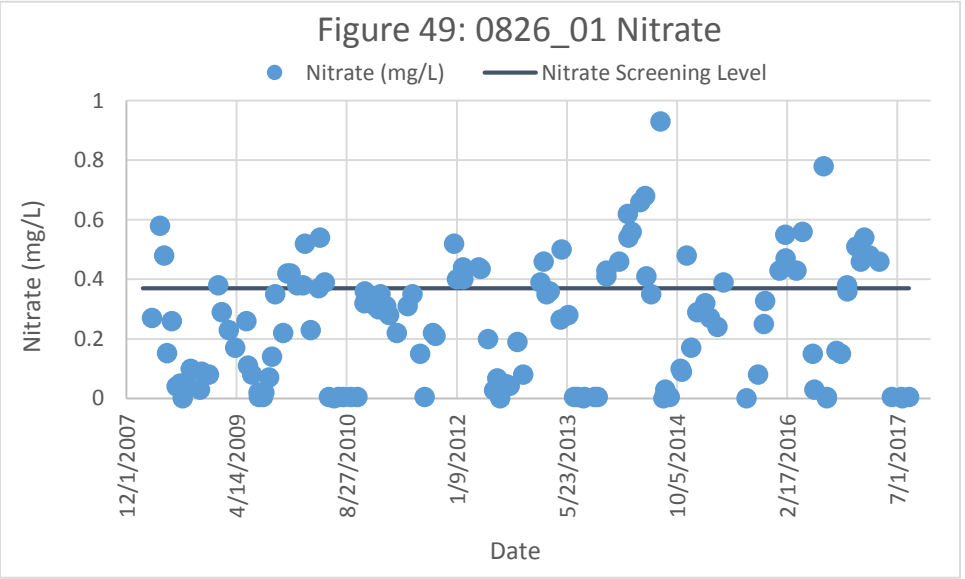


0826_01 was found to have concerns for Aquatic Life Use due to depressed DO by the 2014 IR. As shown in Figure 48, DO levels have increased in recent years. This assessment unit was also found to have concerns for General Uses due to elevated nitrate levels by the 2015 in-house 5-year assessment. Figure 49 shows that much of the recent data is reported above the screening level. This assessment unit is located in the most downstream end of the reservoir near the dam. The watershed immediately surrounding this portion of the reservoir is highly developed. Likely sources of nitrate into the lake may include residential fertilizers as well as upstream wastewater treatment facilities.

0826_07 was found to have concerns for Aquatic Life Use due to depressed DO by the 2014 IR and for General Uses due to elevated nitrate levels by the 2015 in-house 5-year assessment. It was also found to be not supporting the General Use due to high pH levels by the 2014 IR. There is no current monitoring data in 0826_07 to further evaluate these issues.

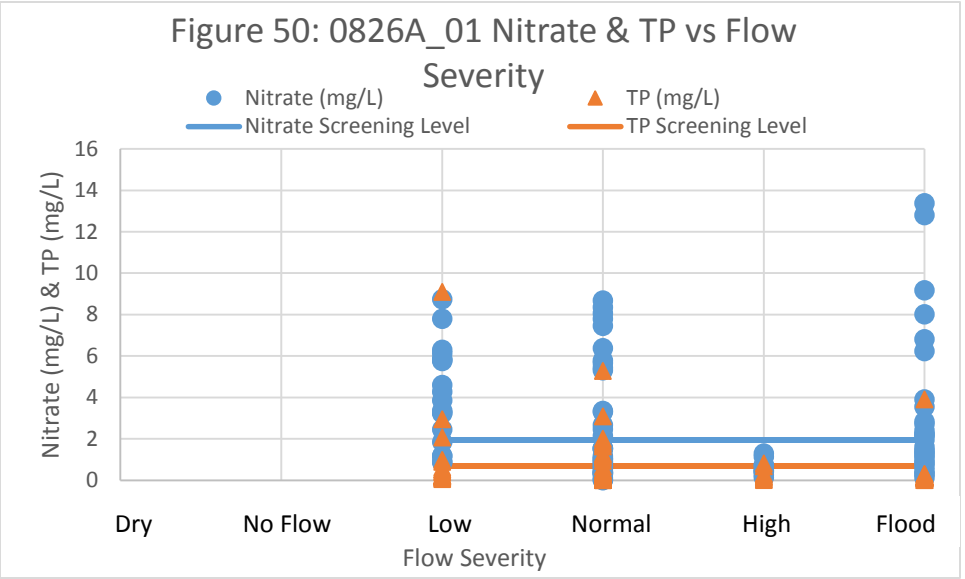
0826A_01 had concerns for General Uses due to elevated levels of nitrate by the 2014 IR and TP by the 2015 in-house 5-year assessment. As shown in Figure 50, concentrations of these parameters are frequently reported above their respective screening levels. Both nutrients are relatively high at low and normal flows which is indicative of streams that are effluent dominated. There are several upstream wastewater treatment facilities which are potential sources. Nitrate

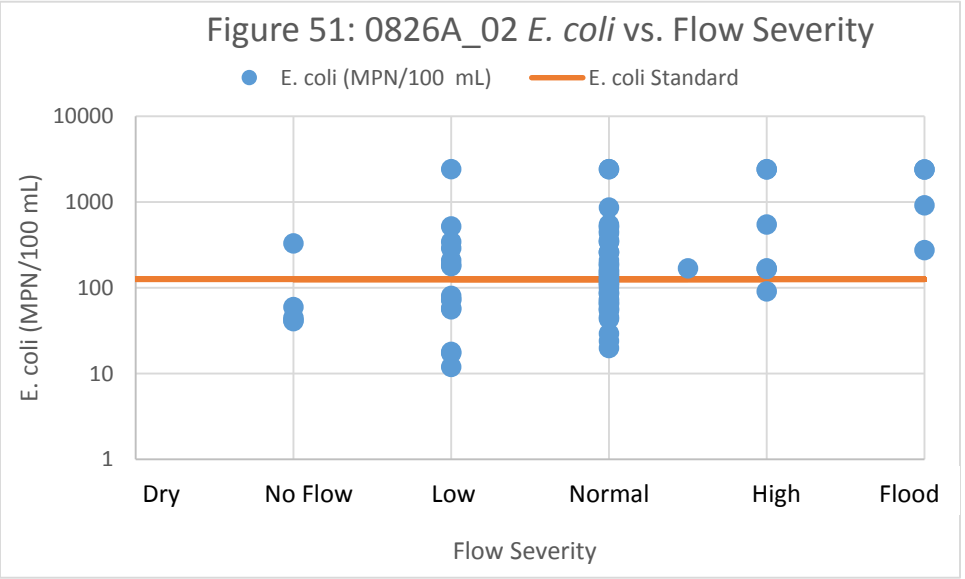




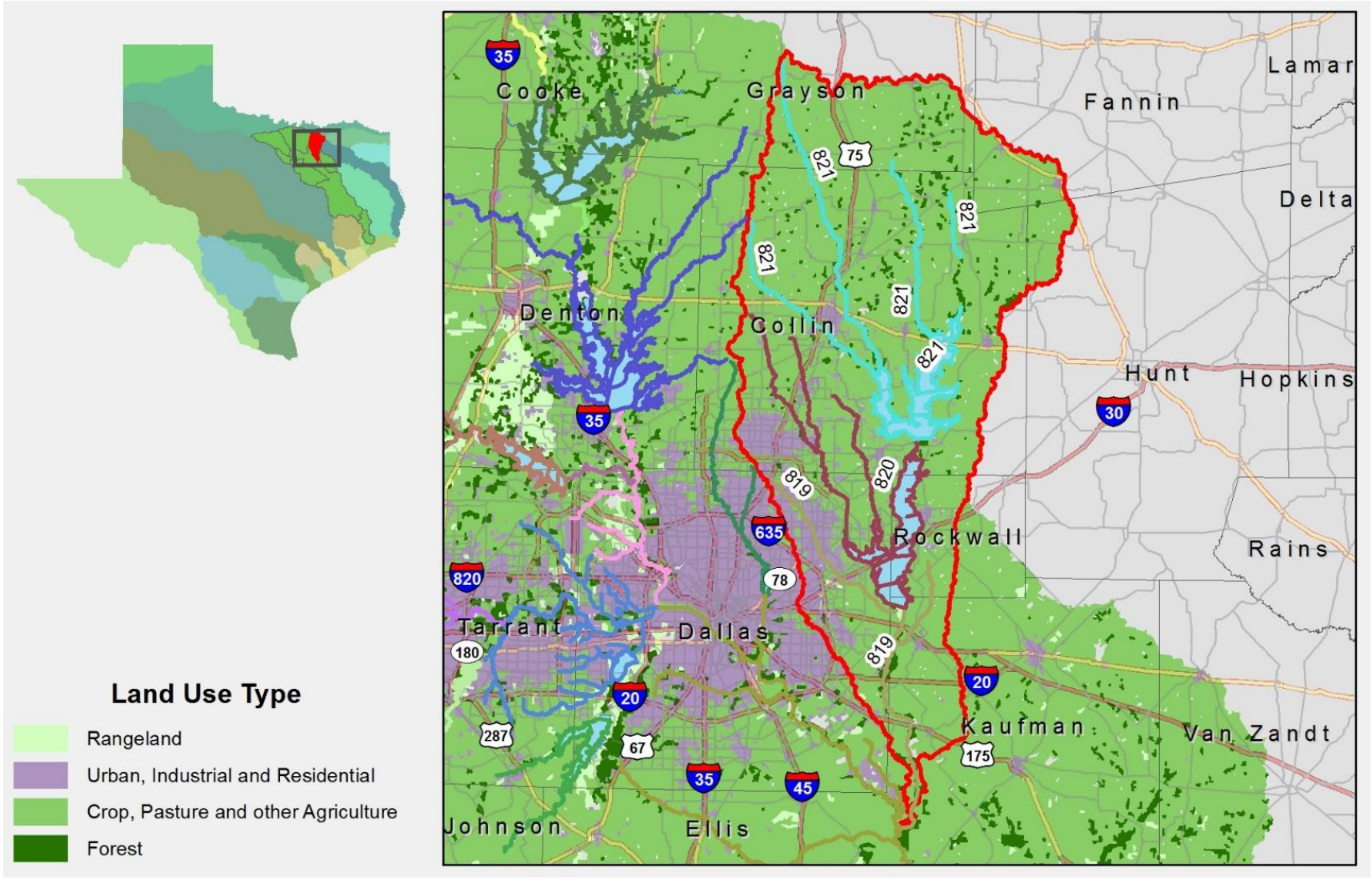
also shows some elevation during flood flows. Much of the watershed is rural with crop and range land. Therefore, agricultural fertilizers may be contributing nitrates as well.

0826A_02 was found to be not supporting the Contact Recreation Use due to elevated levels of *E. coli* by the 2015 in-house 5-year assessment. As shown in Figure 51, higher values are generally reported at higher flows. The geomean for this assessment unit is 169 MPN/100 mL which exceeds the standard of 126 MPN/100 mL. The watershed is largely rural with potential bacteria sources including failing septic systems, livestock, and wildlife.

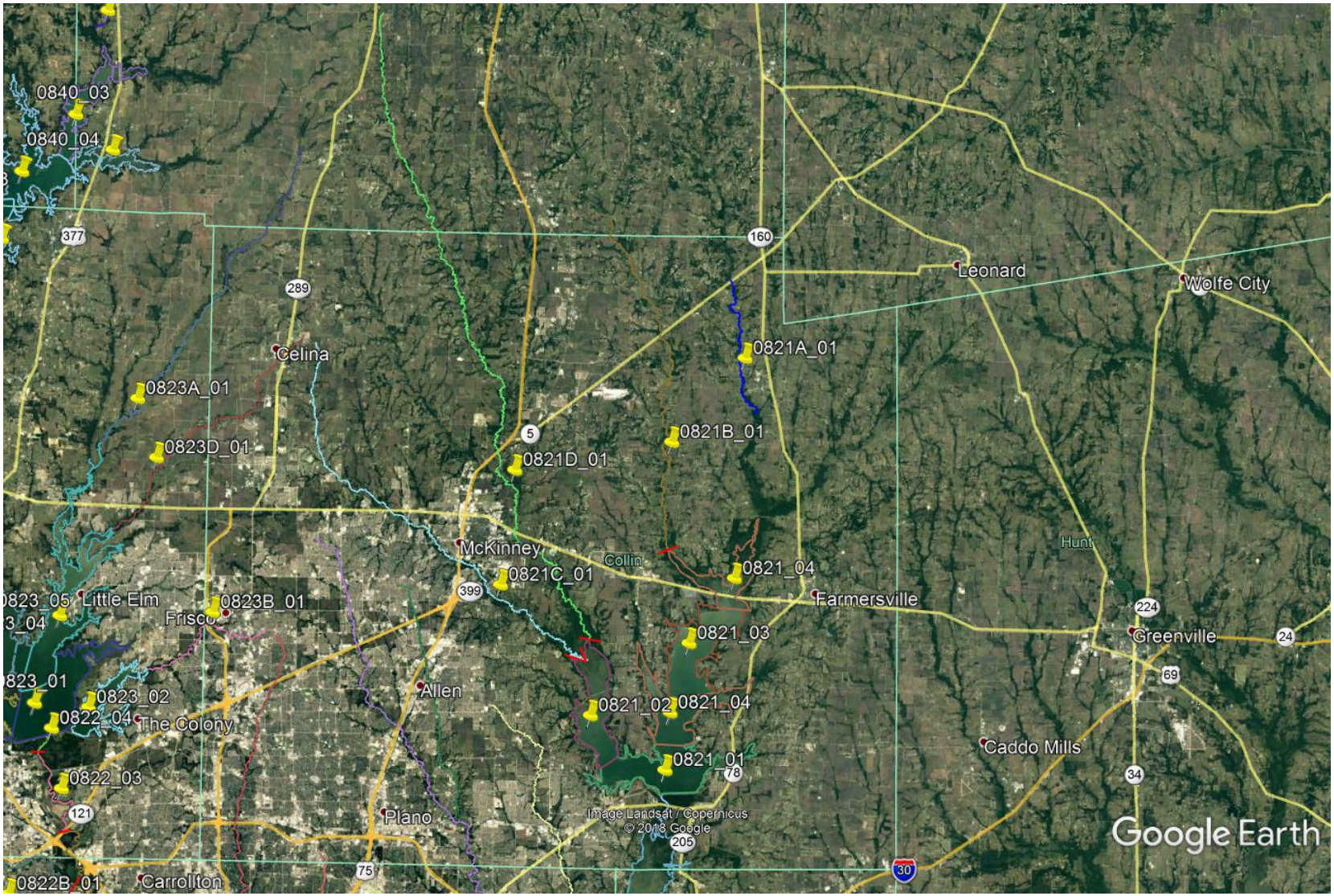




East Fork Trinity River

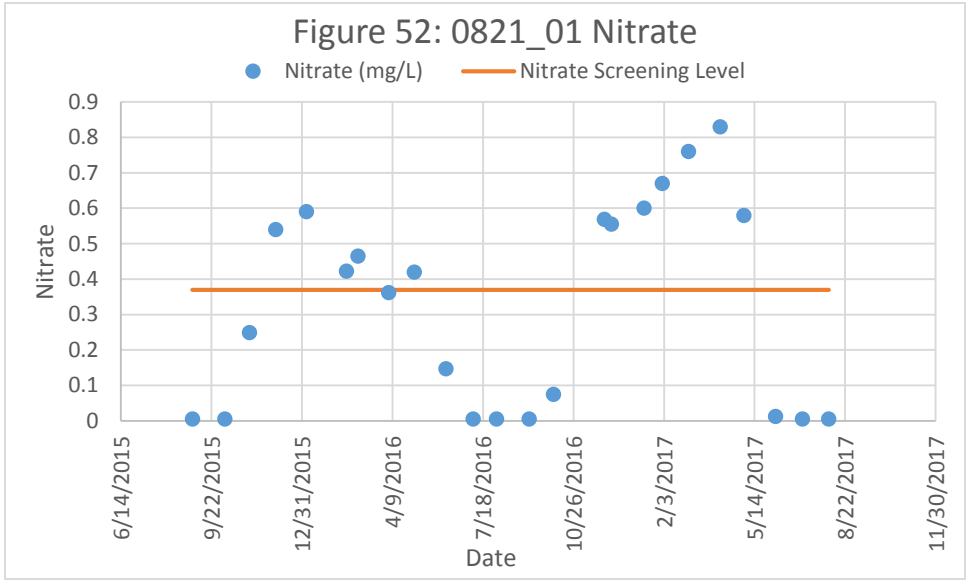


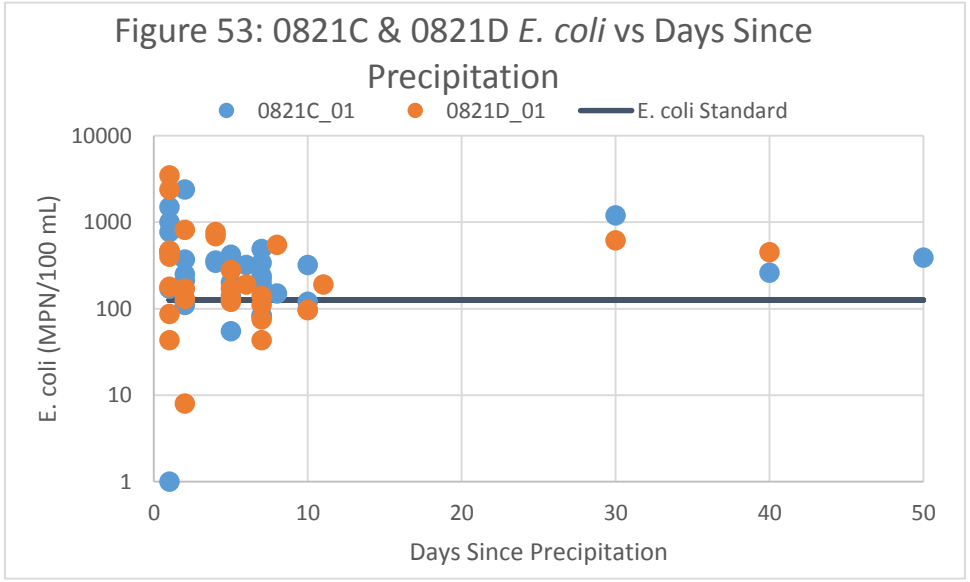
0821 – Lake Lavon



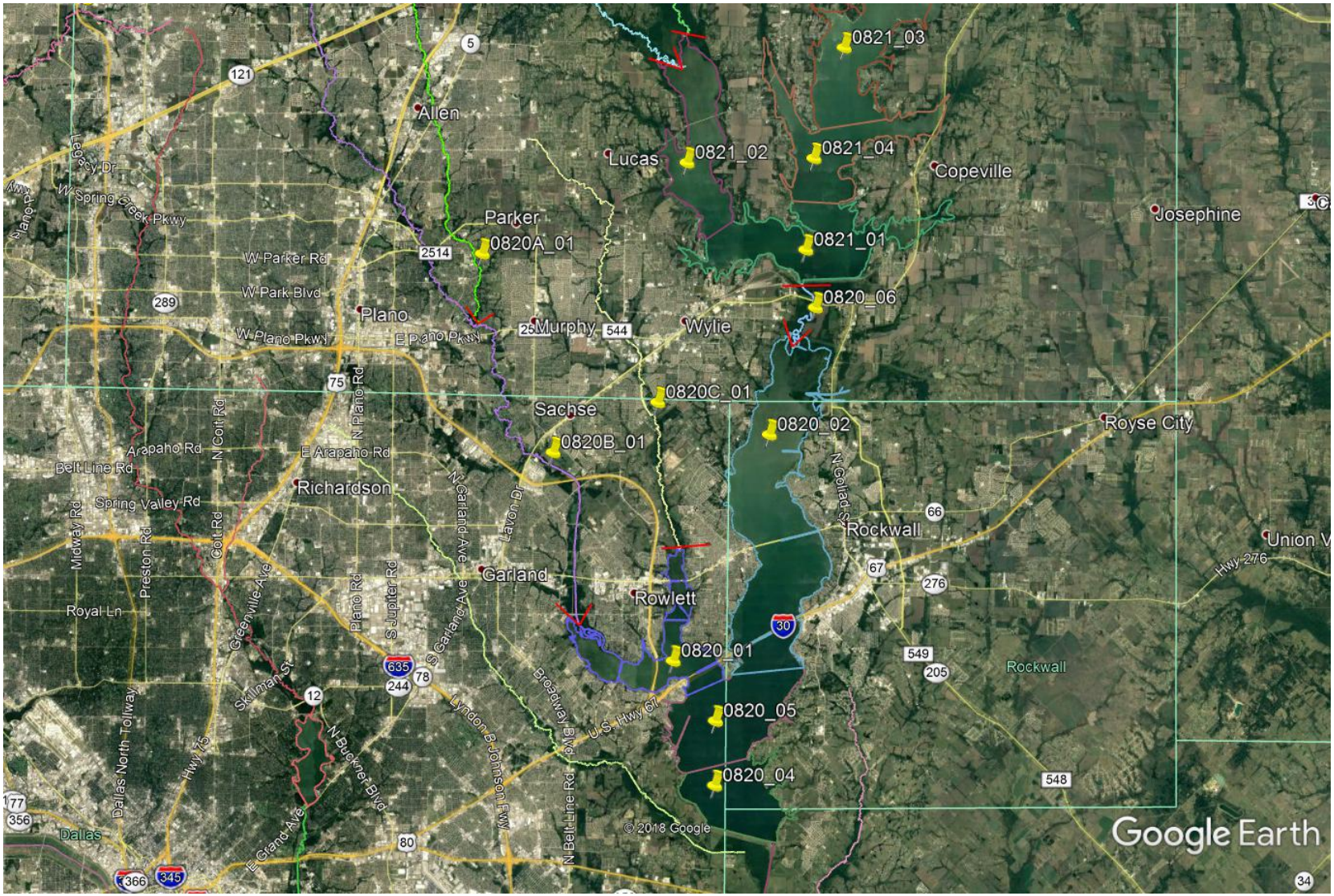
0821_01 was found to have concerns for General Uses due to elevated levels of nitrate by the 2014 IR. As shown in Figure 52, nitrate is often reported above the screening level. There does appear to be a seasonal aspect to the nitrate levels with higher values occurring winter and spring and lower values in summer and fall. This seems to suggest that agricultural fertilizers may be the source of nitrates in the reservoir.

0821C and 0821D were both found to be not supporting the Contact Recreation Use due to elevated levels of *E. coli* by the 2014 IR. Based on more recently collected data, the geomeans for these assessment units are 234 and 204 MPN/100 mL, respectively. As shown in Figure 53, higher values are generally reported with sampling that coincides with recent precipitation. These segments are relatively rural which indicates runoff from livestock, wildlife, and failing septic systems may be likely sources. In addition, the city of McKinney is located in the middle of these two watersheds so pet waste and failing infrastructure could also contribute bacteria to the streams.

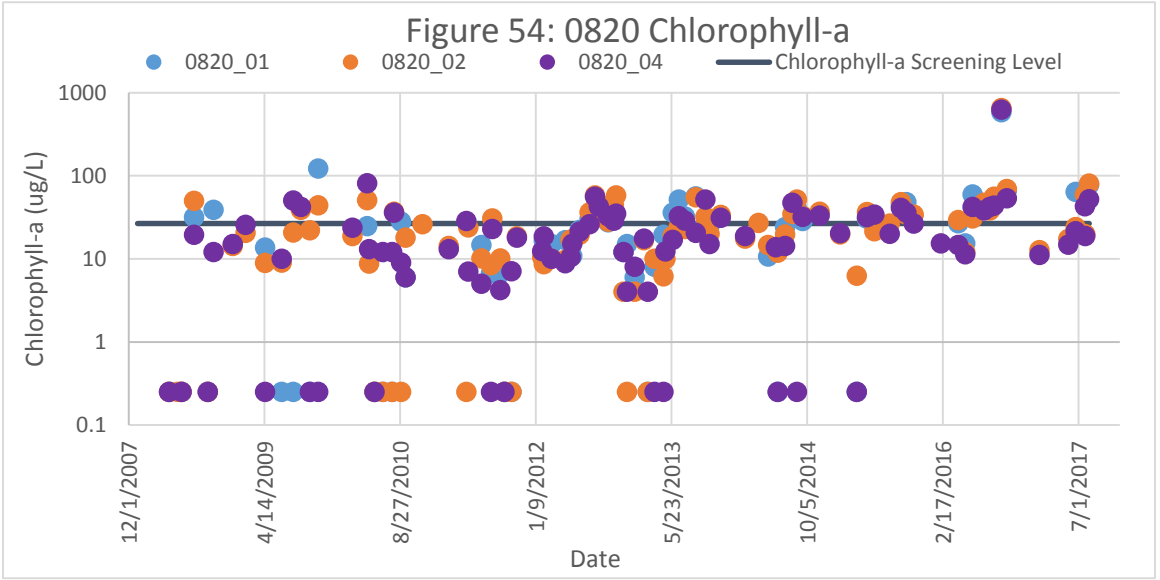




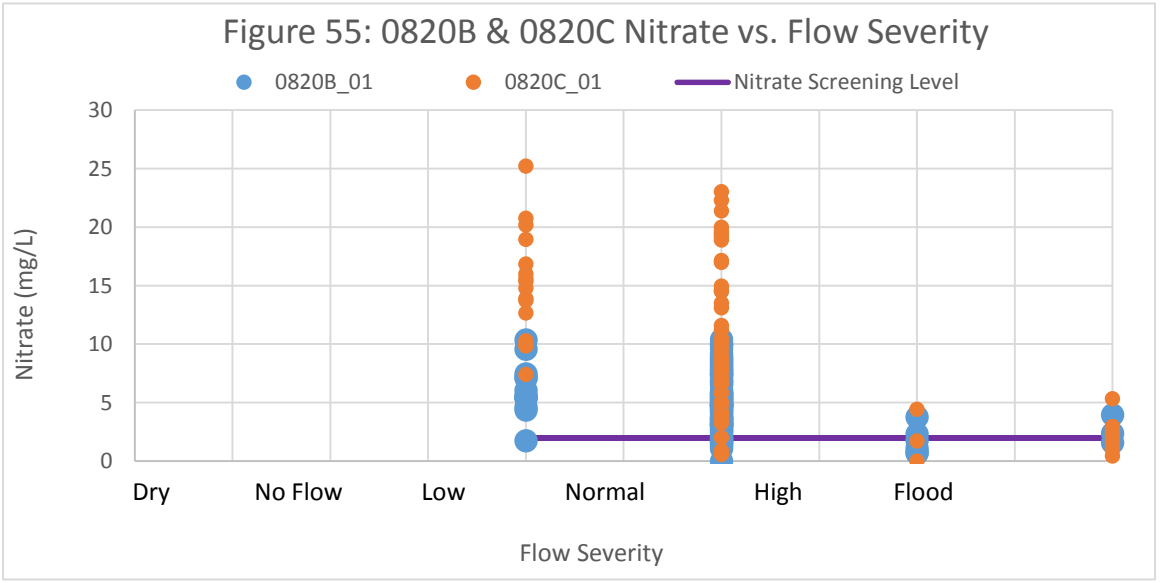
0820 – Lake Ray Hubbard



0820_01, 0820_02, and 0820_04 were found to have concerns for General Uses due to elevated levels of chlorophyll-a by the 2014 IR. As shown in Figure 54, chlorophyll-a in these assessment units remain elevated. The 2015 Basin Summary Report notes that Lake Ray Hubbard is classified as hypereutrophic. In addition, there are several wastewater treatment facilities that introduce nutrients to the reservoir that can be utilized by algal populations.



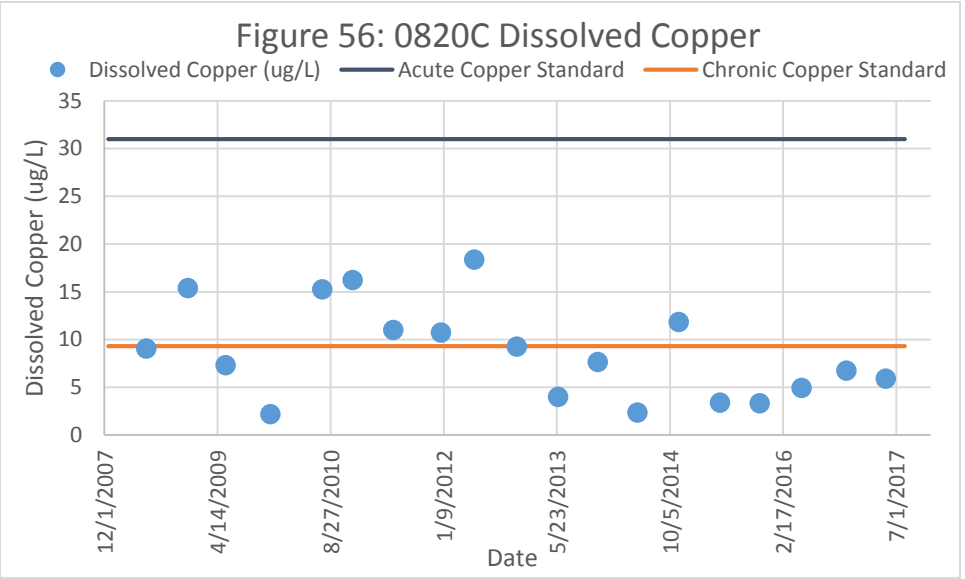
0820B and 0820C were both found to have concerns for elevated levels of nitrate by the 2014 IR. Based on more recently collected data, nitrate levels frequently exceed the screening level. As shown in Figure 55, elevated values of nitrate are seen at low and normal flows with much lower values being reported at higher flows. This is consistent with effluent dominated streams and there are wastewater treatment facilities in the watersheds for these streams.

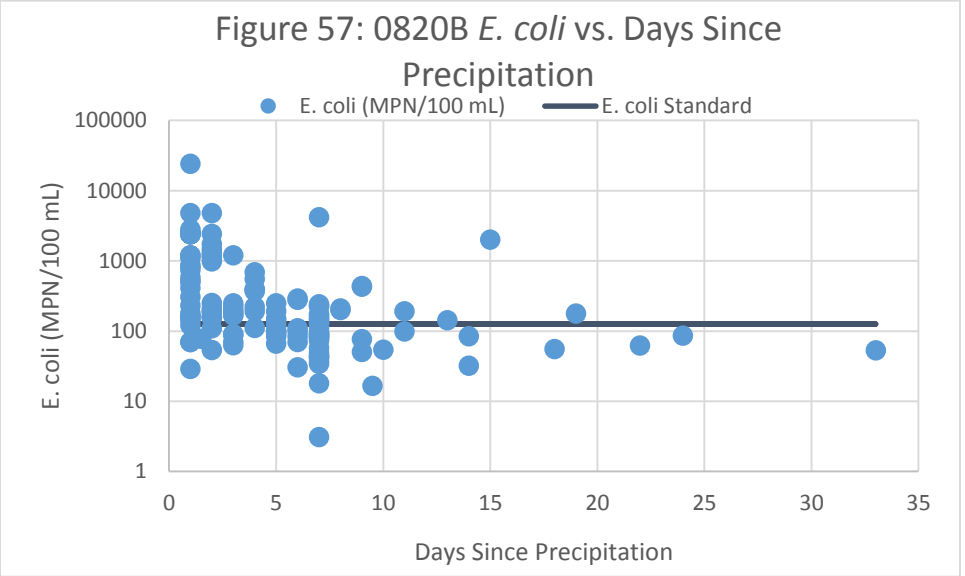


0820C was found to have concerns for Aquatic Life Use due to elevated copper levels by the 2015 in-house 5-year assessment. As shown in Figure 56, elevated levels of copper have been

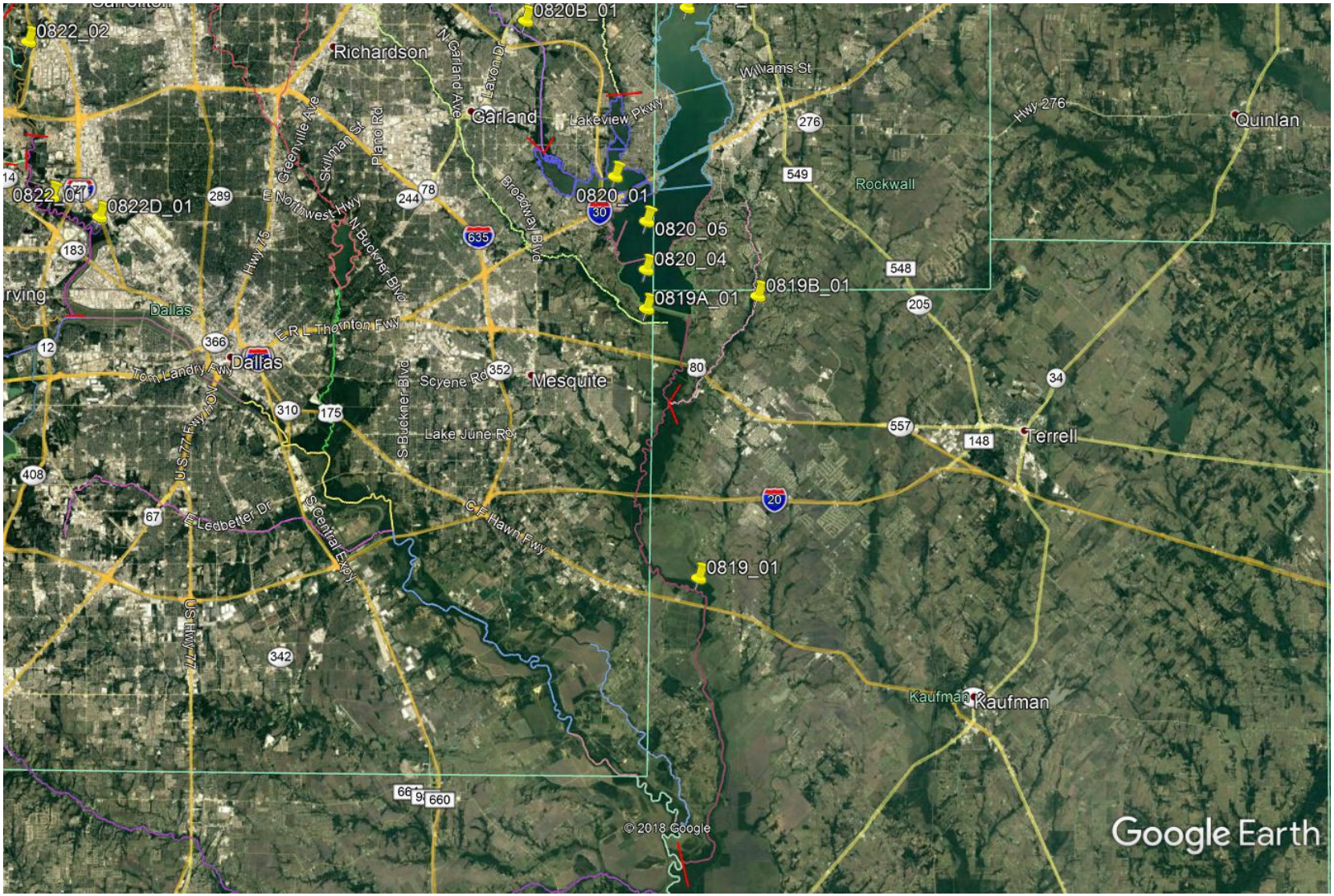
reported up through 2014. Like nitrate in this stream, copper is found at higher levels during low and normal flows and at lower levels under higher flows. This suggests that there is a constant source of copper into the stream. However, it is not known at this time if the potential source is natural or anthropegenic. Additional sampling would be required in order to identify a source.

0820B was found to be not supporting the Contact Recreation Use due to elevated levels of *E. coli* by the 2014 IR. The geomean for more recently collected data is 222 MPN/100 mL. As shown in Figure 57, *E. coli* levels are typically higher when sampling coincides with recent precipitation. This indicates that the impairment is likely runoff related. The watershed for this stream is heavily developed so sources for bacteria may include pets and wildlife.

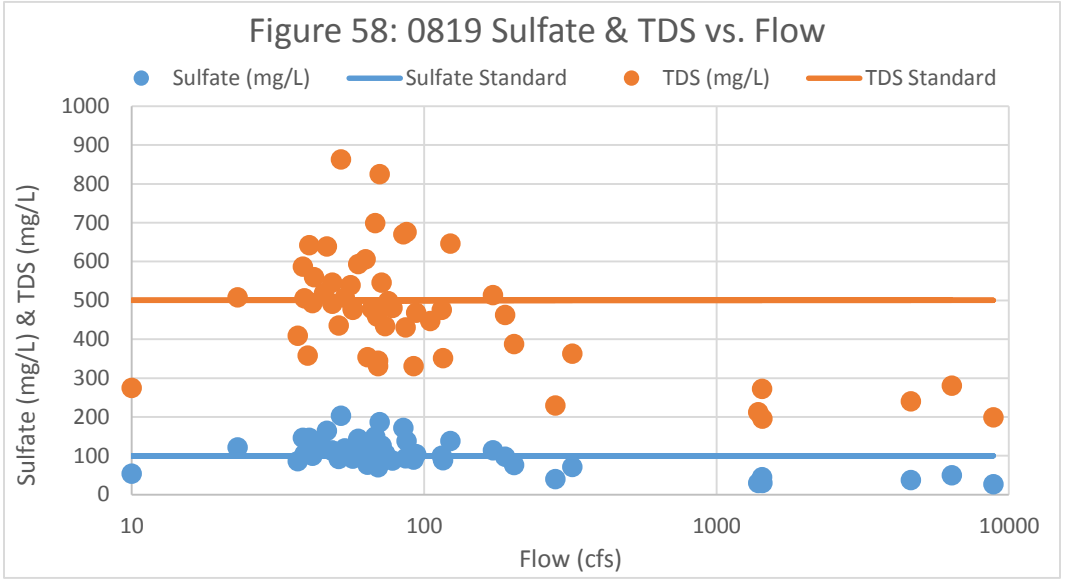




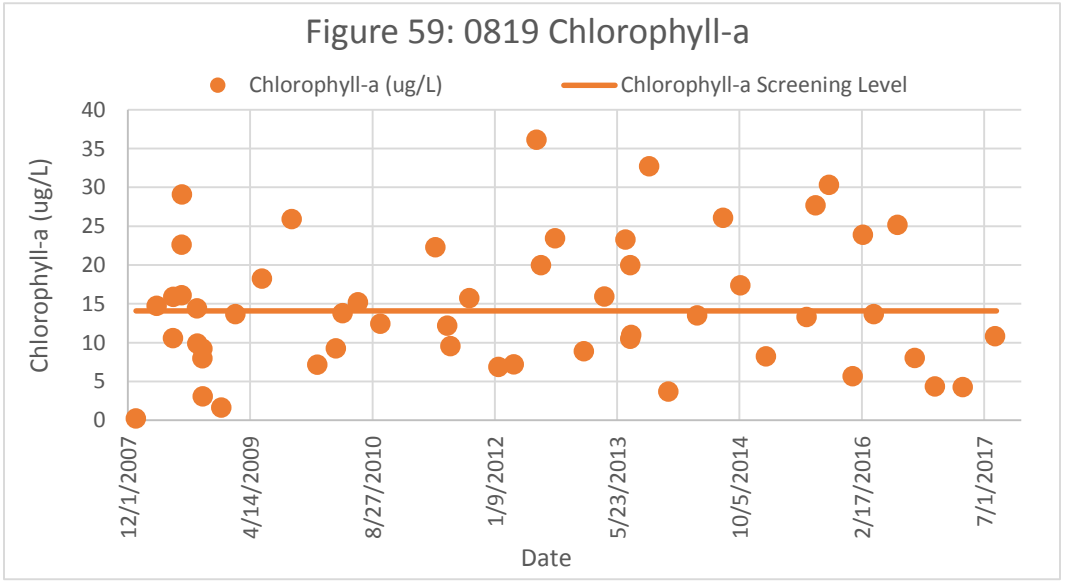
0819 – East Fork Trinity River



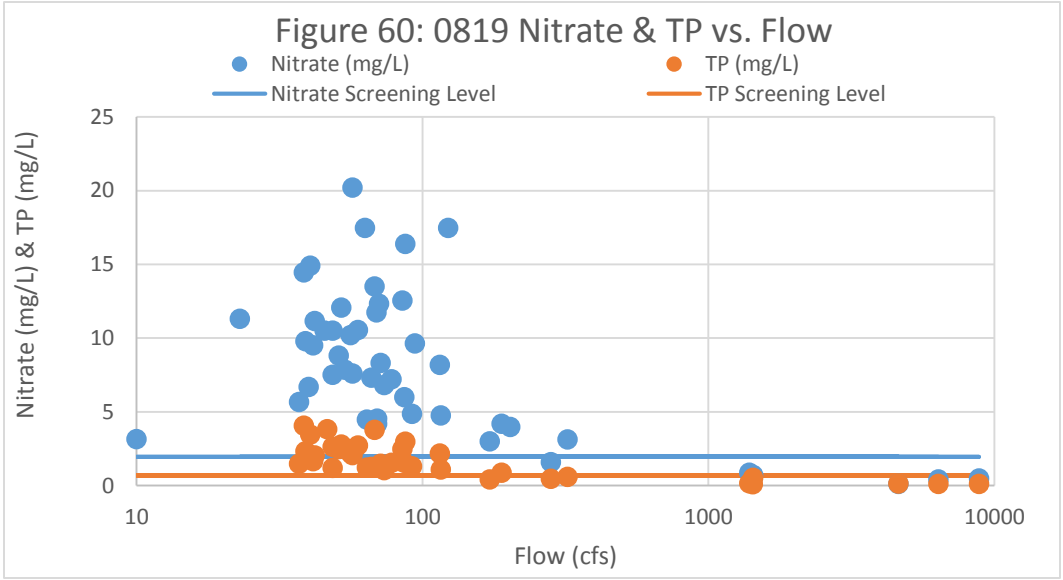
0819 was found to be not supporting General Uses due to elevated levels of sulfate and TDS by the 2014 IR. More recently collected data indicate that sulfate and TDS levels remain elevated. As shown in Figure 58, high levels of these parameters appear to be related to low stream flows. Evaporation or geology and land use may be causing this issue. The watershed for this segment lies largely within the Blackland Prairies soil type and is heavily utilized for agriculture. As discussed for the Western Cross Timbers and Grand Prairie soil types in segment 0809, agricultural practices can contribute dissolved solids to a waterbody by erosion and irrigation.



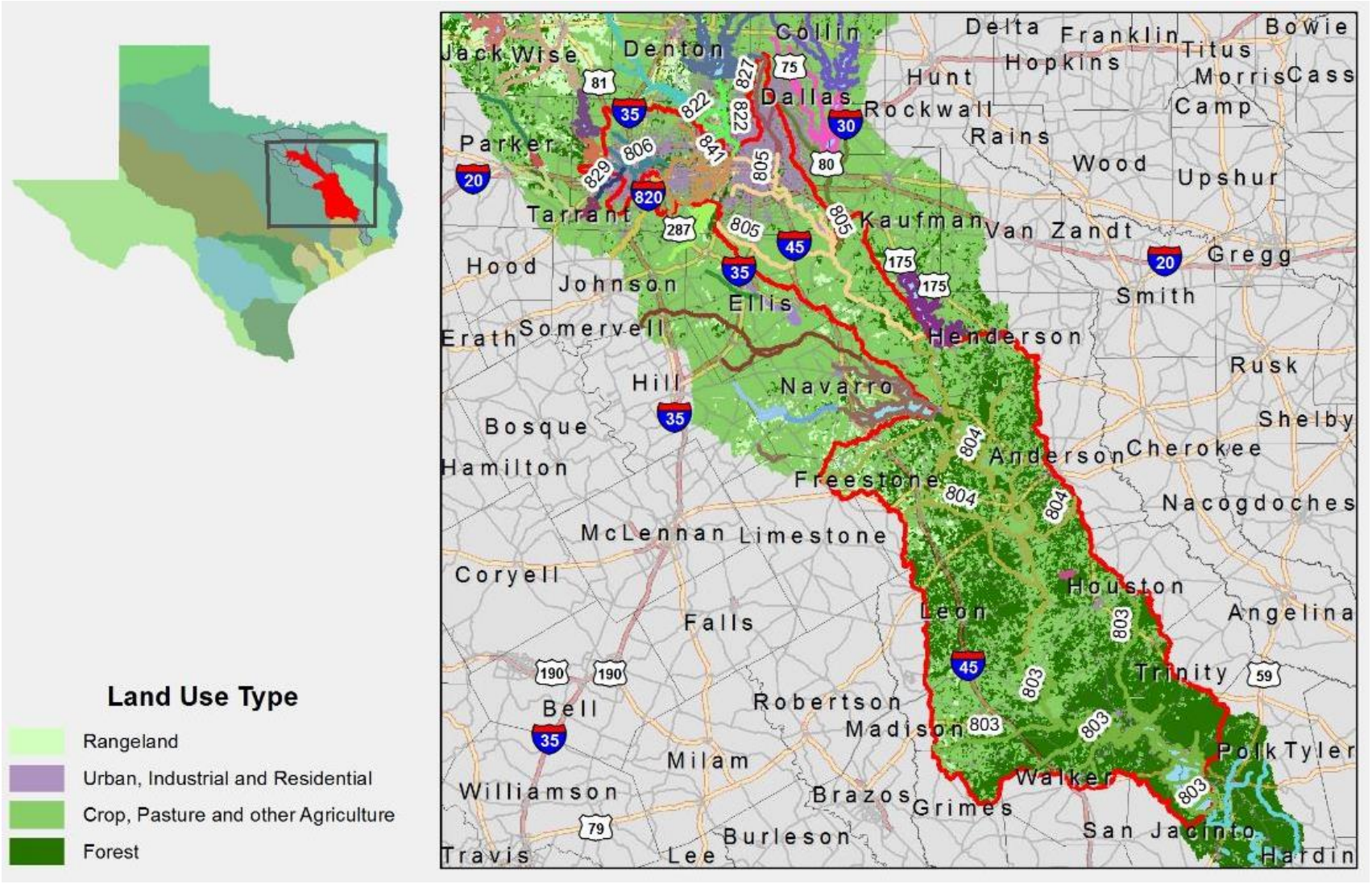
0819 was also found to have concerns for chlorophyll-a, nitrate, and TP by the 2014 IR. As shown in Figures 59 and 60, the concentrations of these parameters remain elevated. Nitrate and TP are negatively correlated with flow as shown in Figure 60 with correlation coefficients of -0.46 and -0.48, respectively. This indicates that upstream wastewater treatment facilities are the likely source of nutrients in this segment. Chlorophyll-a is not strongly correlated with nutrients. Releases from the upstream reservoirs may be contributing to the chlorophyll-a seen in this segment.



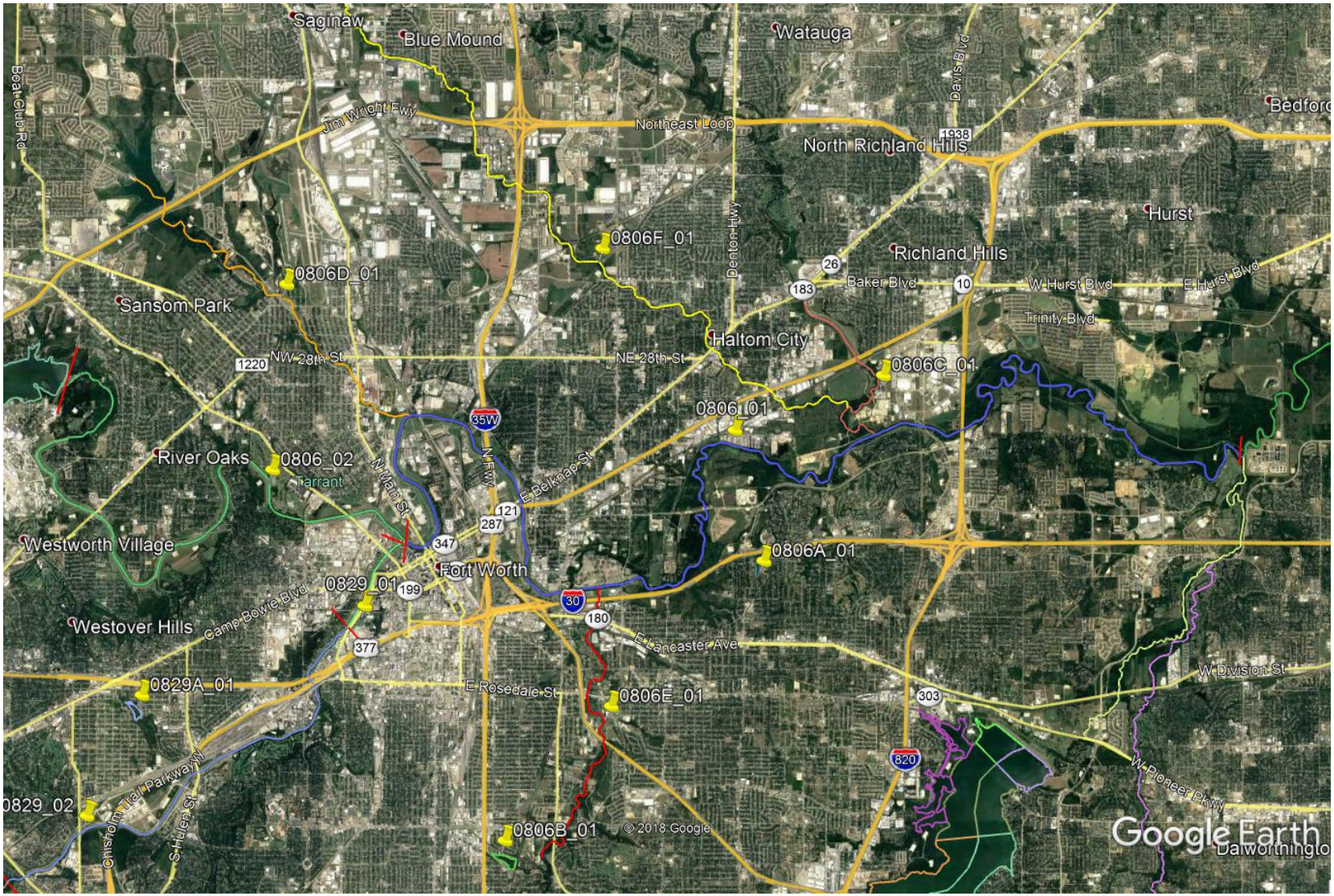
0819B was found to have concerns for nitrate and TP by the 2014 IR. However, these concerns were carried forward from previous assessments. There is no current monitoring data in this segment to further evaluate the concerns.



Main Stem Trinity River

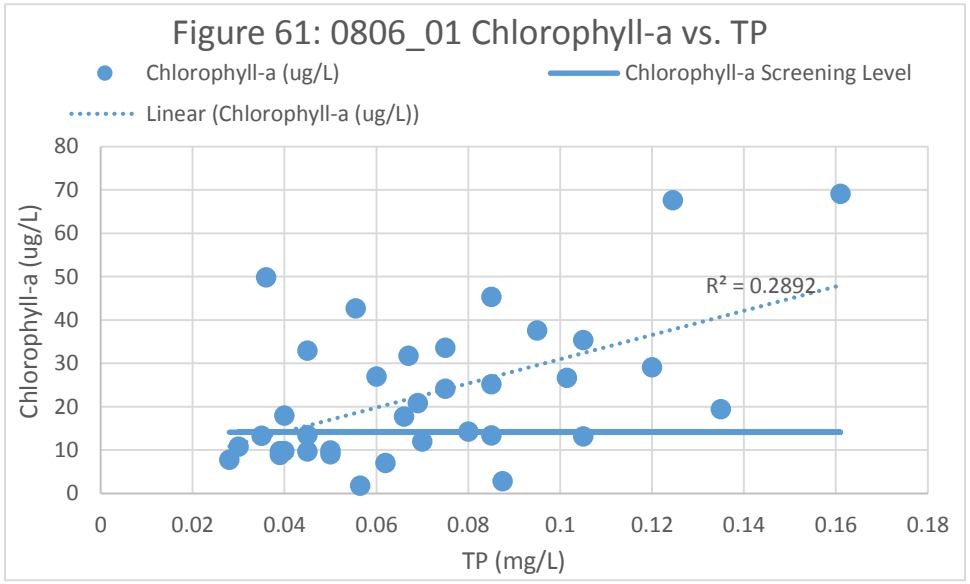


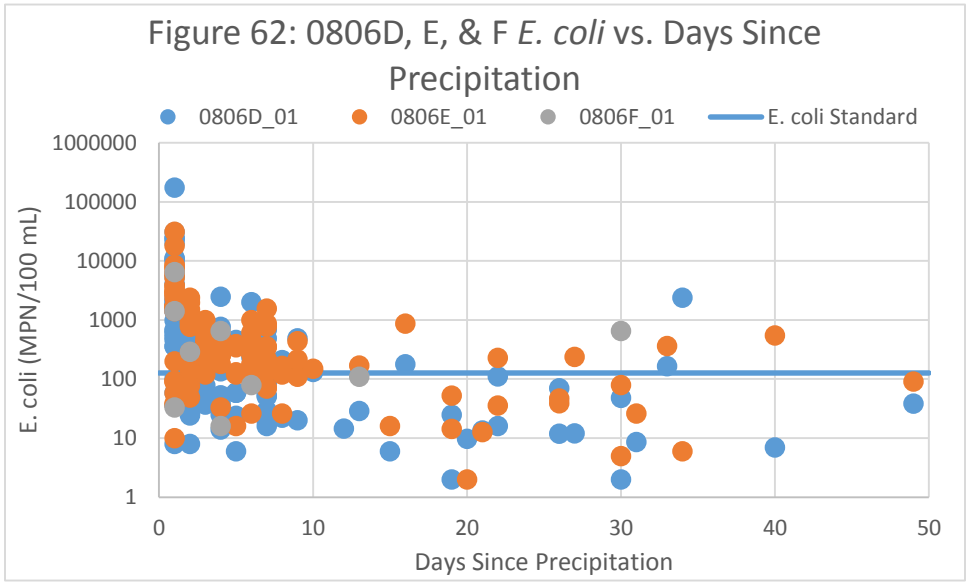
0806 – West Fork Trinity River Below Lake Worth



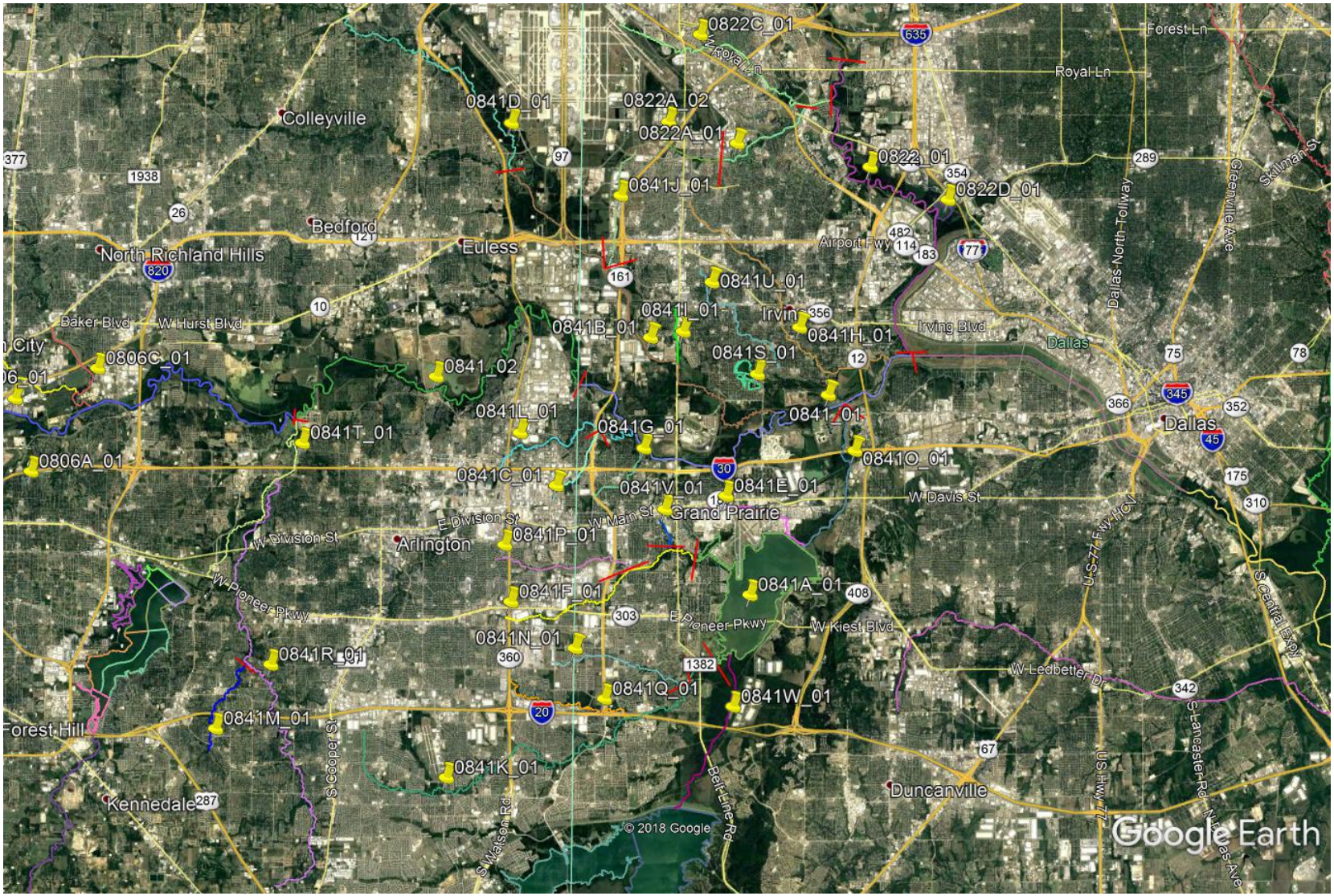
0806_01 was found to have concerns for chlorophyll-a by the 2014 IR. More recent data shows that chlorophyll-a frequently exceeds the screening level (see Figure 61). There does appear to be a correlation between chlorophyll-a and TP as the correlation coefficient is 0.538. This correlation was not present in the data set used for the 2015 Basin Summary Report. However, this correlation may be expected as this assessment unit is downstream of Lake Worth and Lake Benbrook. These two lakes are both phosphorus limited (see Table 4).

0806D, 0806E, and 0806F were found to be not supporting the Contact Recreation Use due to elevated *E. coli* levels by the 2014 IR and 2015 in-house 5-year assessment. These segments have geomeans of 195, 302, and 258 MPN/100 mL, respectively, which exceed the standard of 126 MPN/100 mL. As seen in Figure 62, a majority of the elevated values occur during periods of recent precipitation which suggests that the issues are runoff related. As noted in the 2015 Basin Summary Report, 0806D is downstream of the Fort Worth Stockyards and there is horse stable and riding trail immediately adjacent to the stream. 0806E is in a wooded riparian area with golf courses and residential areas that may be influenced by wildlife and pet wastes. 0806F drains a largely residential area that may be contributing pet wastes to the stream.





0841 – Lower West Fork Trinity River



0841_01 and 0841_02 were found to have concerns for TP and nitrate by the 2014 IR. 0841_01 had concerns for chlorophyll-a as identified by the 2014 IR. There are no recent data for 0841_02 to evaluate the concerns in this assessment unit. Figure 63 shows that recent chlorophyll-a, nitrate, and TP data are generally reported above the associated screening levels. As discussed in the 2015 Basin Summary Report, nutrient values are negatively correlated to flow which indicates that upstream wastewater treatment facilities are the source for nutrients in this segment.

0841_01 and 0841_02 were found to be not supporting the Contact Recreation Use due to elevated *E. coli* levels by the 2014 IR. There is not current data for 0841_02 to further evaluate this impairment. For 0841_01, the geomean is 138 MPN/100 mL and, as shown in Figure 64, many of the individual values are above the standard. However, as seen in Figure 65, there is a rather strong correlation between flow and E. coli with a correlation coefficient of 0.604.

Figure 63: 0841_01 Chlorophyll-a, Nitrate, & TP

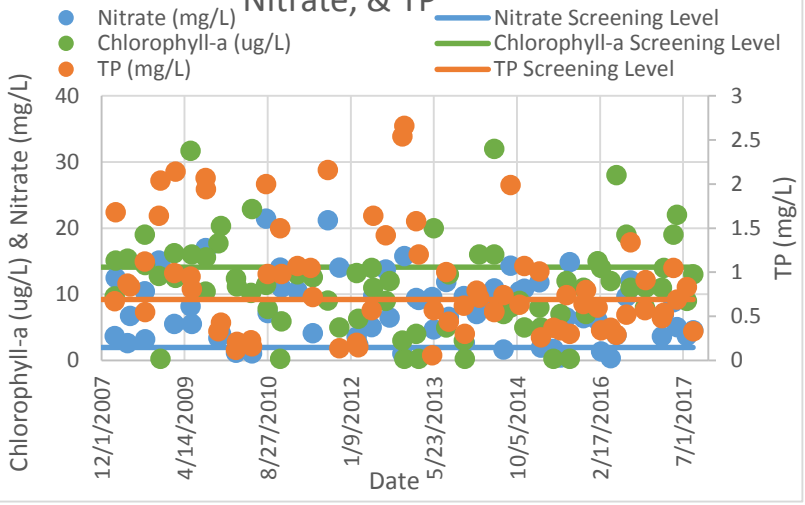


Figure 64: 0841_01 E. coli

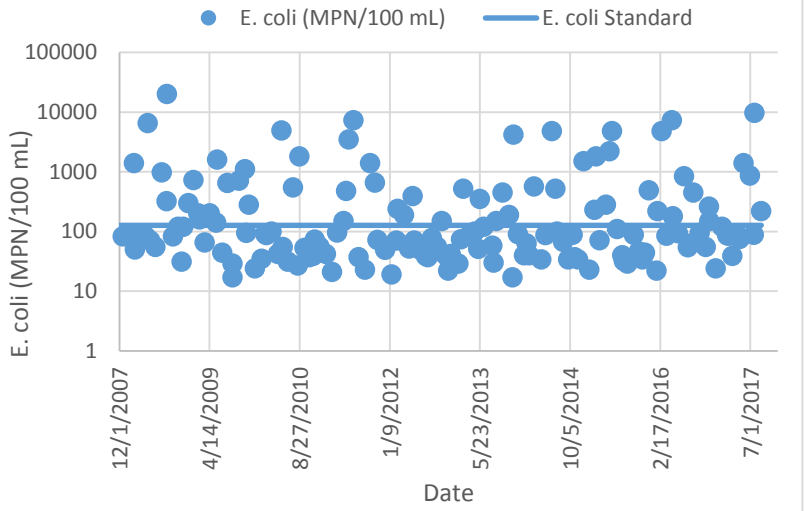
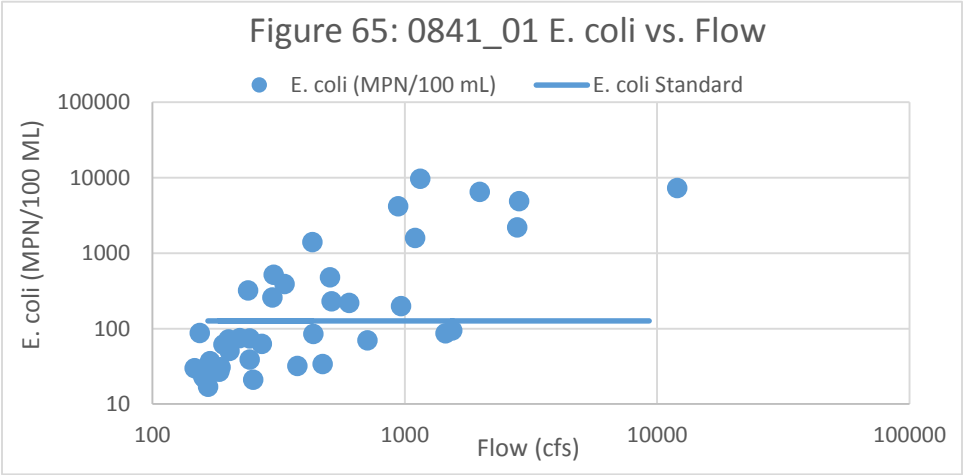


Figure 65: 0841_01 E. coli vs. Flow



0841F, 0841G, 0841J, 0841K, 0841L, 0841N, 0841O, 0841P, 0841Q, 0841U, and 0841V were found to have concerns or to have been impaired for Aquatic Life Use due to depressed DO by either the 2014 IR or the 2015 in-house 5-year assessment. Based on more recent data, depressed DO levels remain in 0841F, 0841G, 0841K, 0841L, 0841N, 0841O, 0841P, 0841Q, and 0841V. As discussed in the 2015 Basin Summary Report, many of these streams are shallow, low flow systems; some of which are intermittent.

0841F, 0841G, 0841H, 0841J, 0841K, 0841L, 0841M, 0841N, 0841P, 0841Q, 0841R, 0841T, 0841U, and 0841V were found to have concerns or to have been impaired for Contact Recreation Use due to elevated *E. coli* levels by the 2014 IR. Based on recent data, geomeans for 0841H and 0841J are no longer exceeding the standard of 126 MPN/100 mL (see Table 5). As shown in Figure 66, many of the higher *E. coli* values occur during recent precipitation events indicating that the impairments are mostly runoff related.

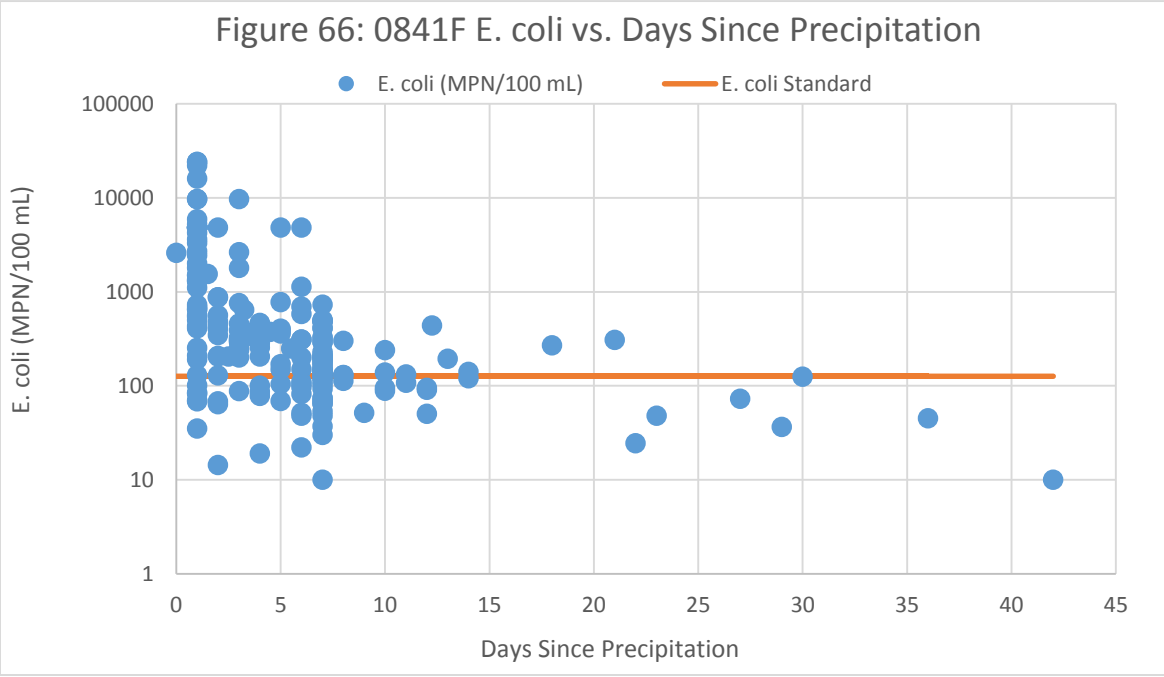
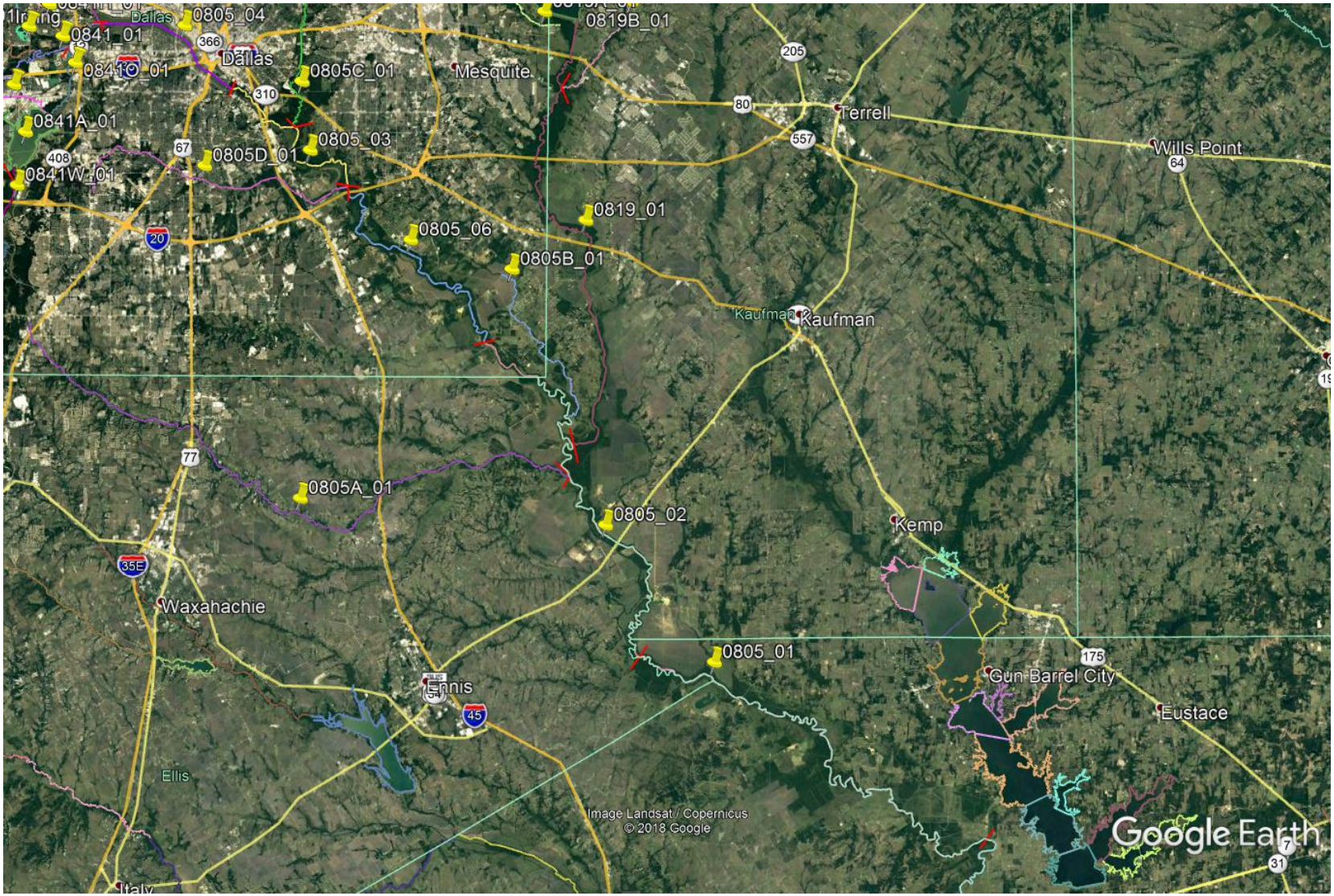


Figure 66: 0841F E. coli vs. Days Since Precipitation

Table 5: Bacteria geomeans (excerpt from Table 3).

Segment	E. coli Geomean
0841F_01	236.8
0841G_01	529.5
0841H_01	119.2
0841J_01	115.4
0841K_01	213.7
0841L_01	158.5
0841M_01	231.0
0841N_01	403.3
0841P_01	183.6
0841Q_01	190.2
0841R_01	155.3
0841T_01	171.5
0841U_01	268.8
0841V_01	578.1

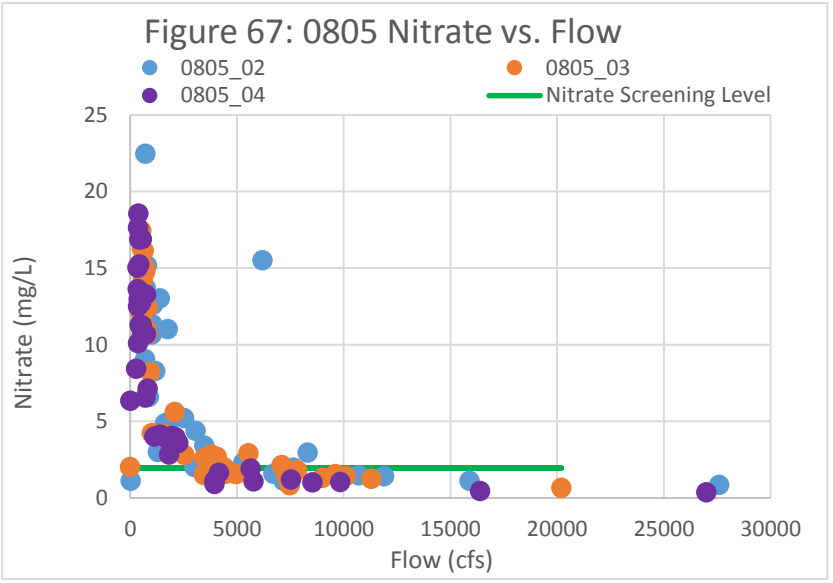
0805 – Upper Trinity River

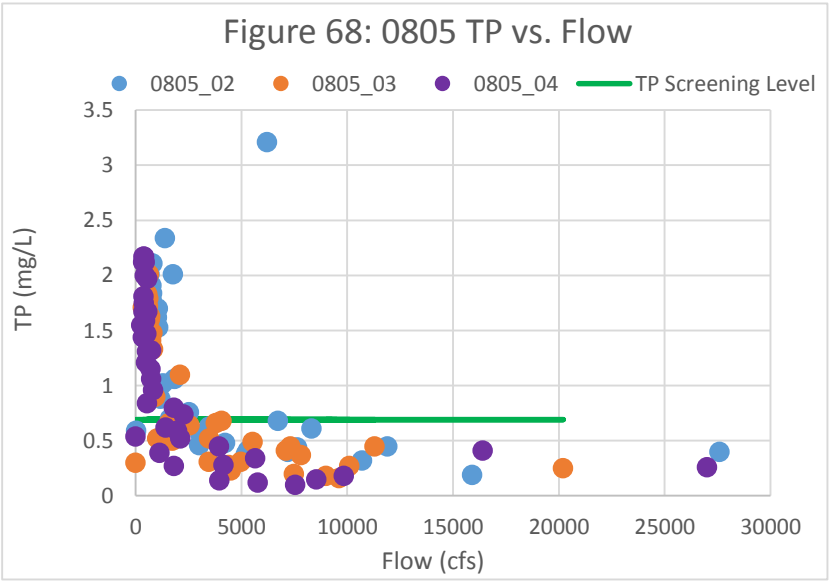


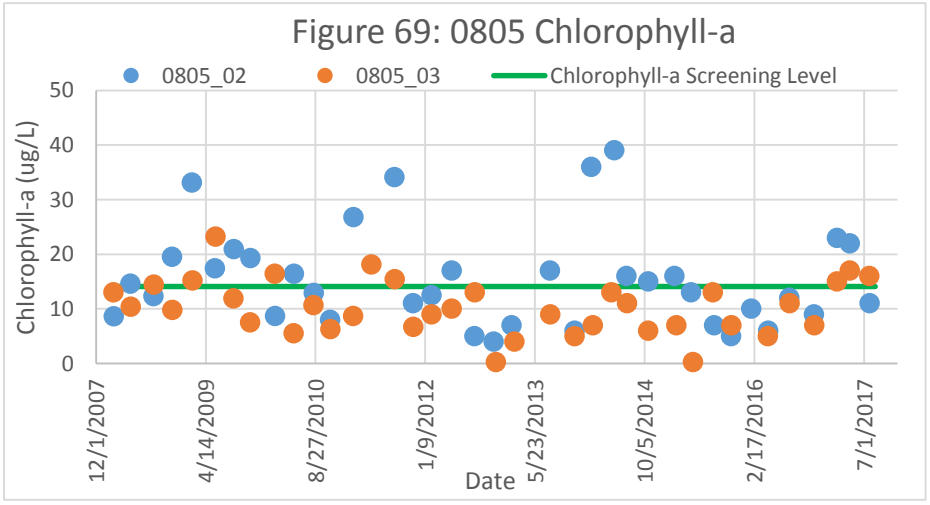
All portions of segment 0805 were found to have concerns for General Uses due to elevated nitrate and TP levels by the 2014 IR. 0805_01, 0805_02, and 0805_03 also had concerns for elevated chlorophyll-a levels as identified by the 2014 IR. There is no current data in 0805_01 and 0805_06 to evaluate the concerns in these assessment units.

Based on more recently collected data, elevated levels of nitrate and TP still exist. As shown in Figures 67 and 68, elevated nutrient levels occur during lower flows. As discussed in the 2015 Basin Summary Report, upstream wastewater treatment facilities are the likely source of nutrient loadings in this segment. As flows increase due to precipitation, the instream nutrients are diluted.

Elevated chlorophyll-a levels for 0805_02 and 0805_03 still exist as shown in Figure 69 but are not well correlated to nutrients. This was discussed in the 2015 Basin Summary Report.







0805_03 and 0804_04 were found to be not supporting the Contact Recreation Use due to elevated levels *of E. coli* by the 2014 IR. Figure 70 shows that individual *E. coli* samples frequently exceed the standard. The geomeans for these data sets are 271 and 203 MPN/100 mL, respectively. *E. coli* in these assessment units are not well correlated to flow with correlation coefficients less than 0.27. The watershed for this segment is so large that it would be difficult to determine a source for the impairment. Runoff could introduce bacteria to waterbodies from pets and livestock. Livestock and wildlife visiting the stream and broken sewer lines could introduce bacteria directly into the waterbody.

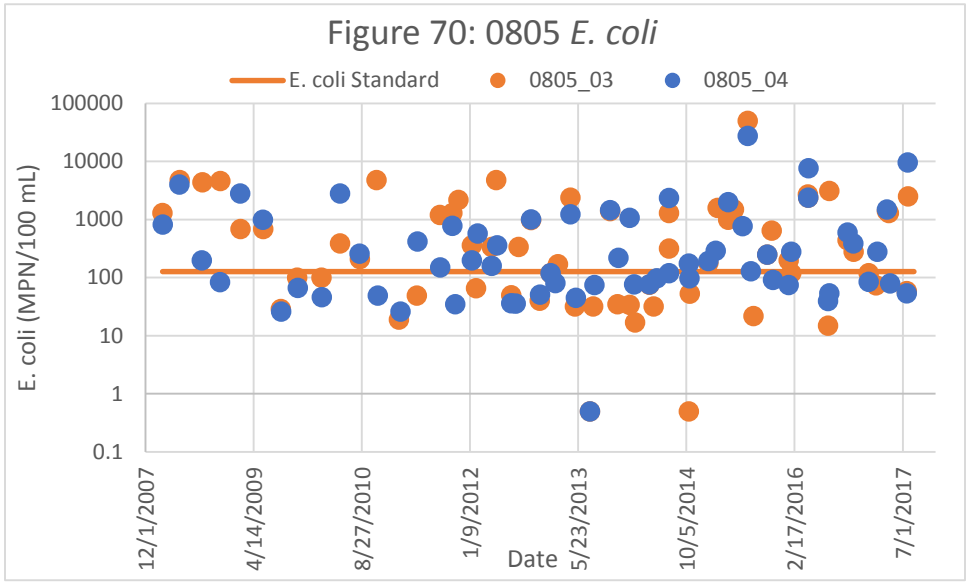
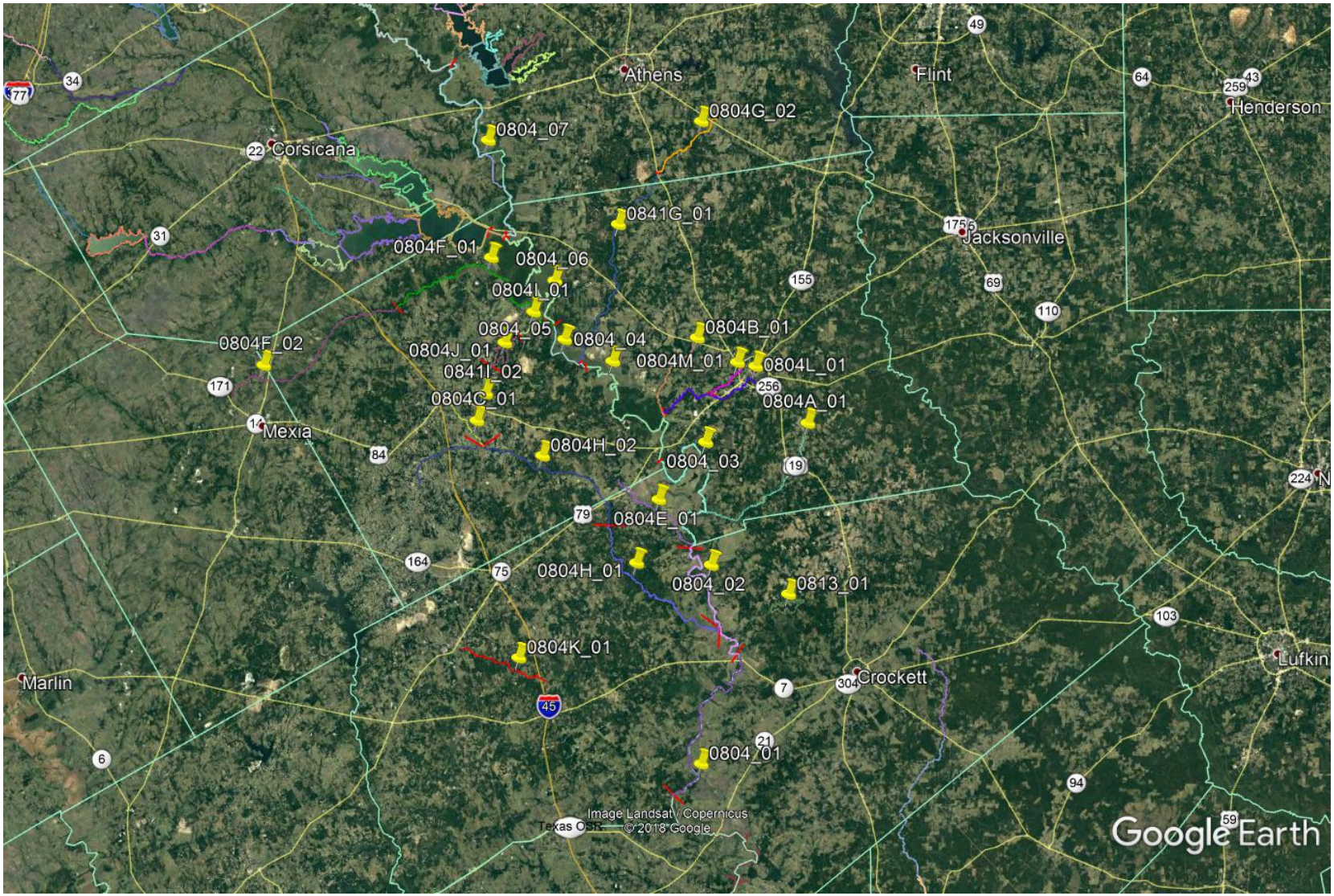


Figure 70: 0805 *E. coli*

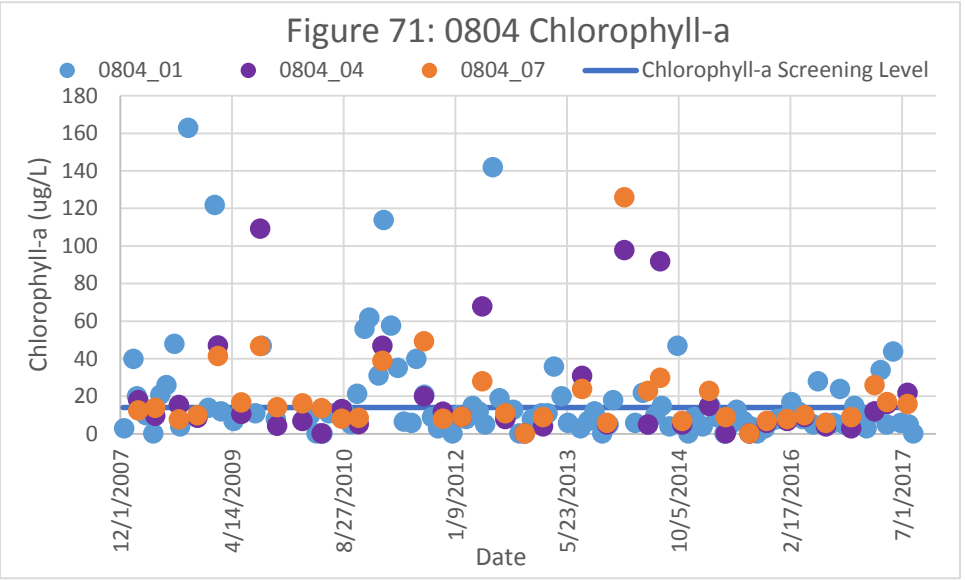
0835 – Richland Creek below Richland-Chambers Reservoir

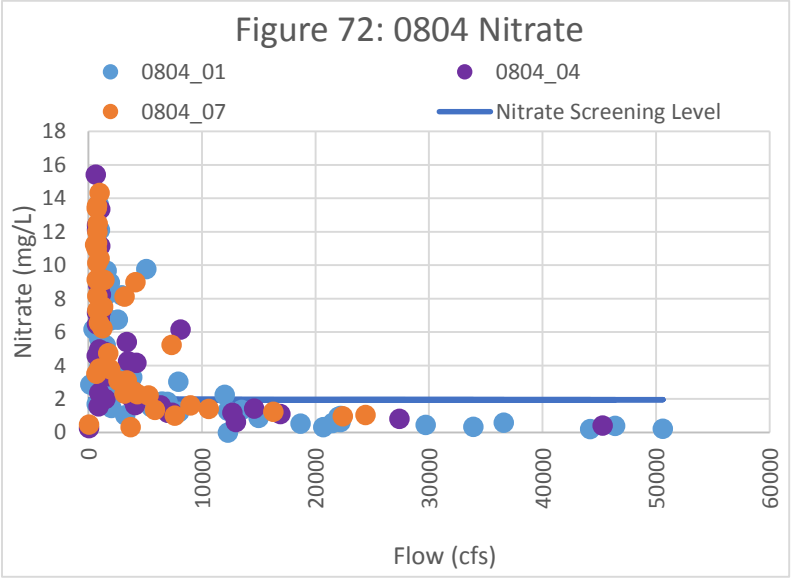
No new data is available for this segment.

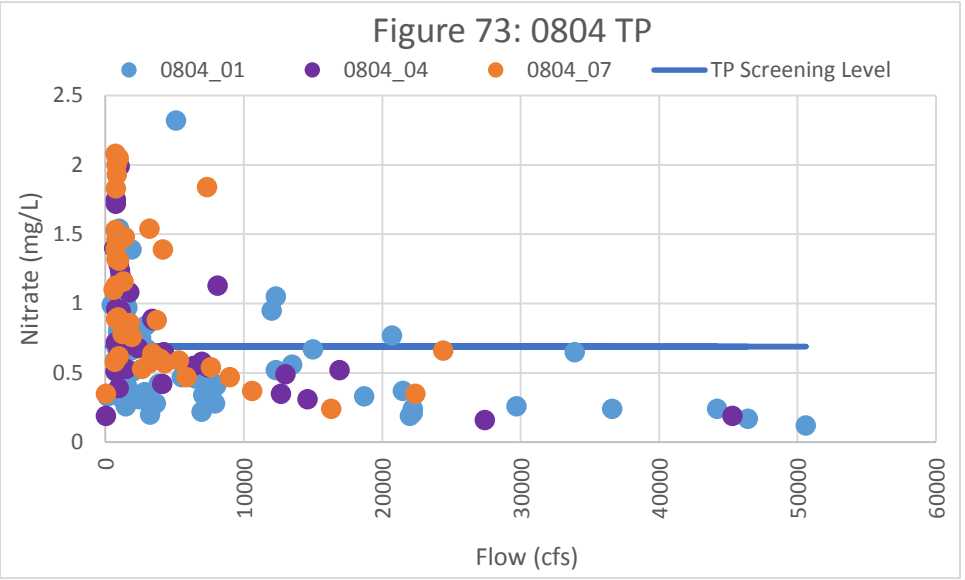
0804 – Trinity River Above Lake Livingston



0804_01, 0804_04, and 0807_07 were found to have concerns for elevated levels of chlorophyll-a, nitrate, and TP by the 2015 in-house 5-year assessment. As shown in Figures 71, 72, and 73, concentrations of these parameters remain elevated. Chlorophyll-a is not well correlated to nutrients in this segment. Nitrate and TP are negatively correlated to flow as shown in Figures 72 and 73. Nutrient loadings come from upstream wastewater treatment facilities. At base flows this segment is effluent dominated and has high levels of nutrients. Inflows from precipitation will dilute these nutrient loads and decrease levels at higher flows.







0804F, 0804G, 0804H, 0804J, and 0804K were found to have concerns or impairments for Aquatic Life Use due to depressed DO by either the 2014 IR or the 2015 in-house 5-year assessment. Based on more recently collected data, depressed DO levels still exist in 0804G and 0804K. Algal blooms do not appear to be causing issues with DO as shown in Figure 74. Rather, it appears that the issues are related to low flow in these streams (see Figure 75).

0804G was found to be not supporting General Uses due to low pH levels by the 2015 in-house 5-year assessment. As shown in Figure 76, it does not appear that low pH is related to algae. Based on Google Earth imagery, this stream appears to be tannin stained (see Image 23). There is a distinct difference in color between 0804G and 0804_05 that persists throughout the years. The humic acid that causes staining may be the cause of the low pH in this stream.

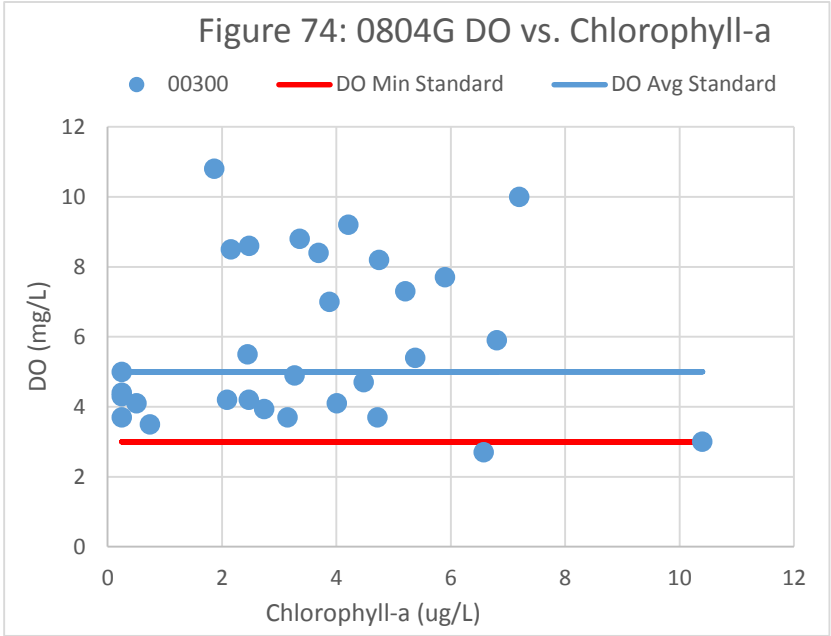


Figure 74: 0804G DO vs. Chlorophyll-a

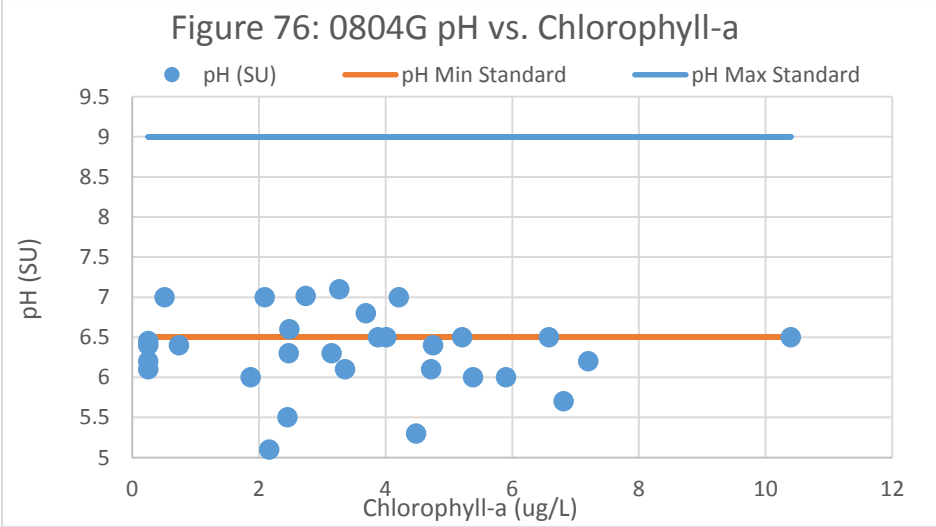


Figure 76: 0804G pH vs. Chlorophyll-a

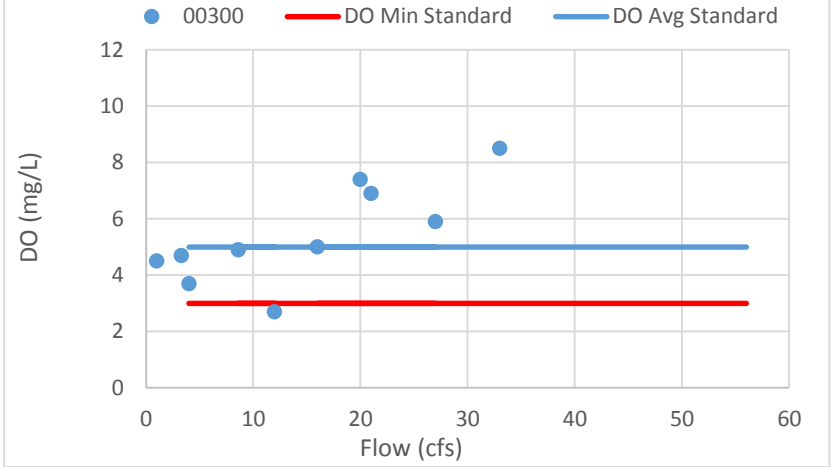
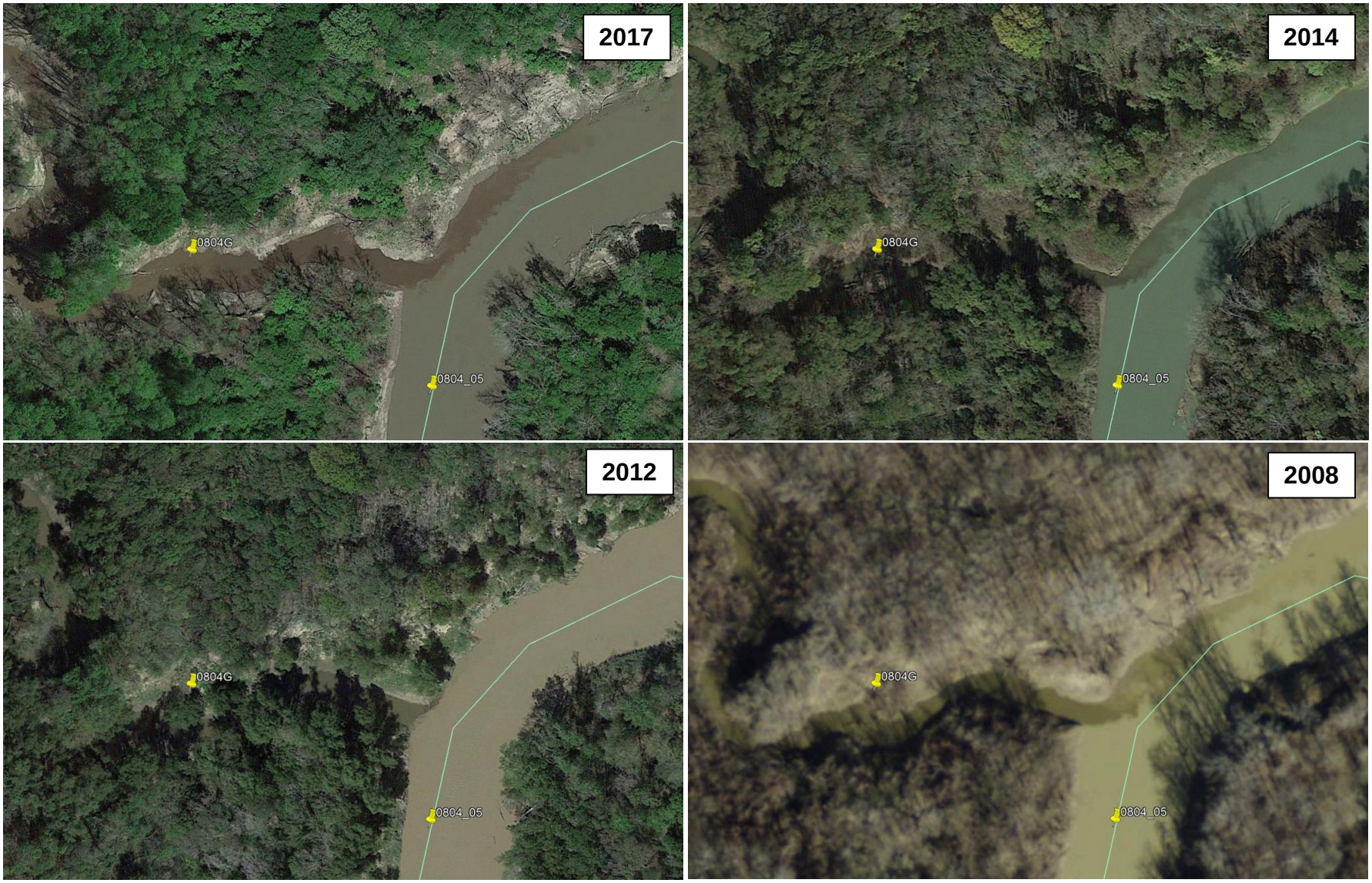


Figure 75: 0804G DO vs. Flow

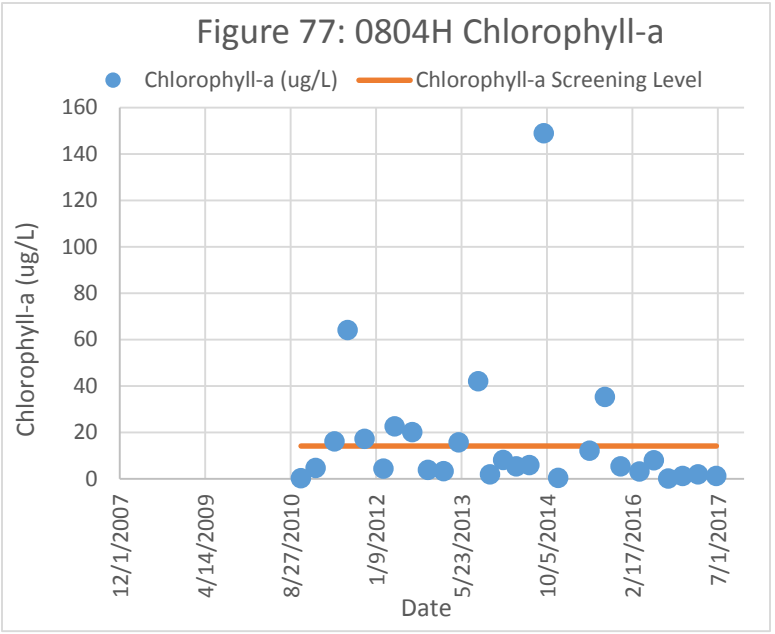
Image 23: Confluence of 0804G and 0804_05

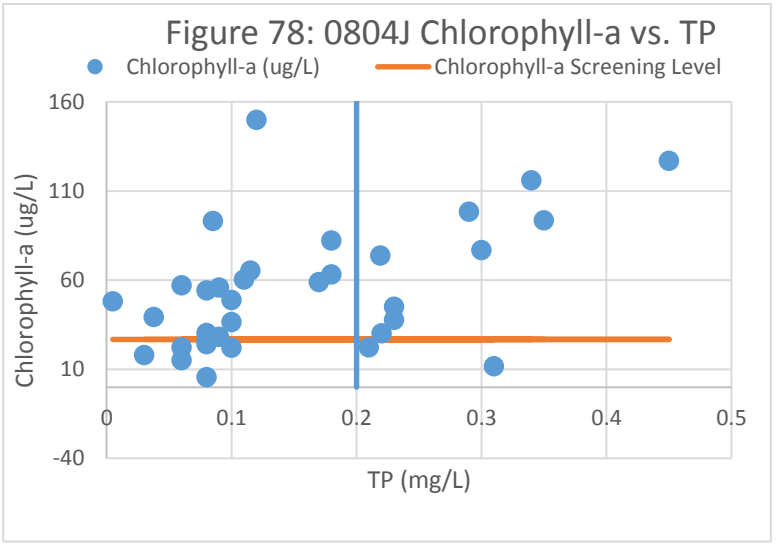


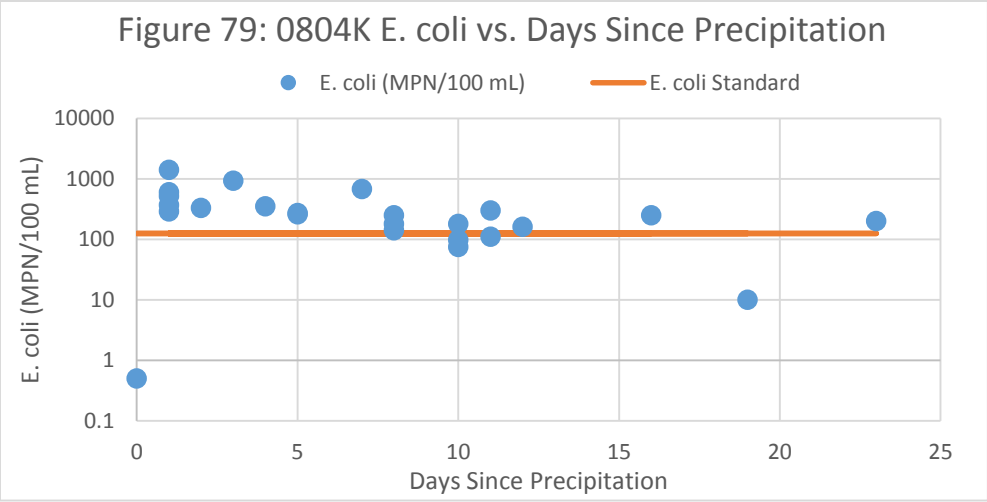
0804H was found to have concerns for chlorophyll-a by the 2014 IR. As shown in Figure 77, elevated chlorophyll-a are still common. However, chlorophyll-a is not well correlated to nutrients.

0804J was found to have concerns for both chlorophyll-a and TP by the 2014 IR. More recently collected data shows that concentrations of these parameters are remain elevated. Chlorophyll-a is well correlated with TP as shown in Figure 78 and has a correlation coefficient of 0.5. TP levels in this waterbody are generally higher when sampling coincides with recent precipitation which indicates that runoff may be introducing nutrients into the reservoir.

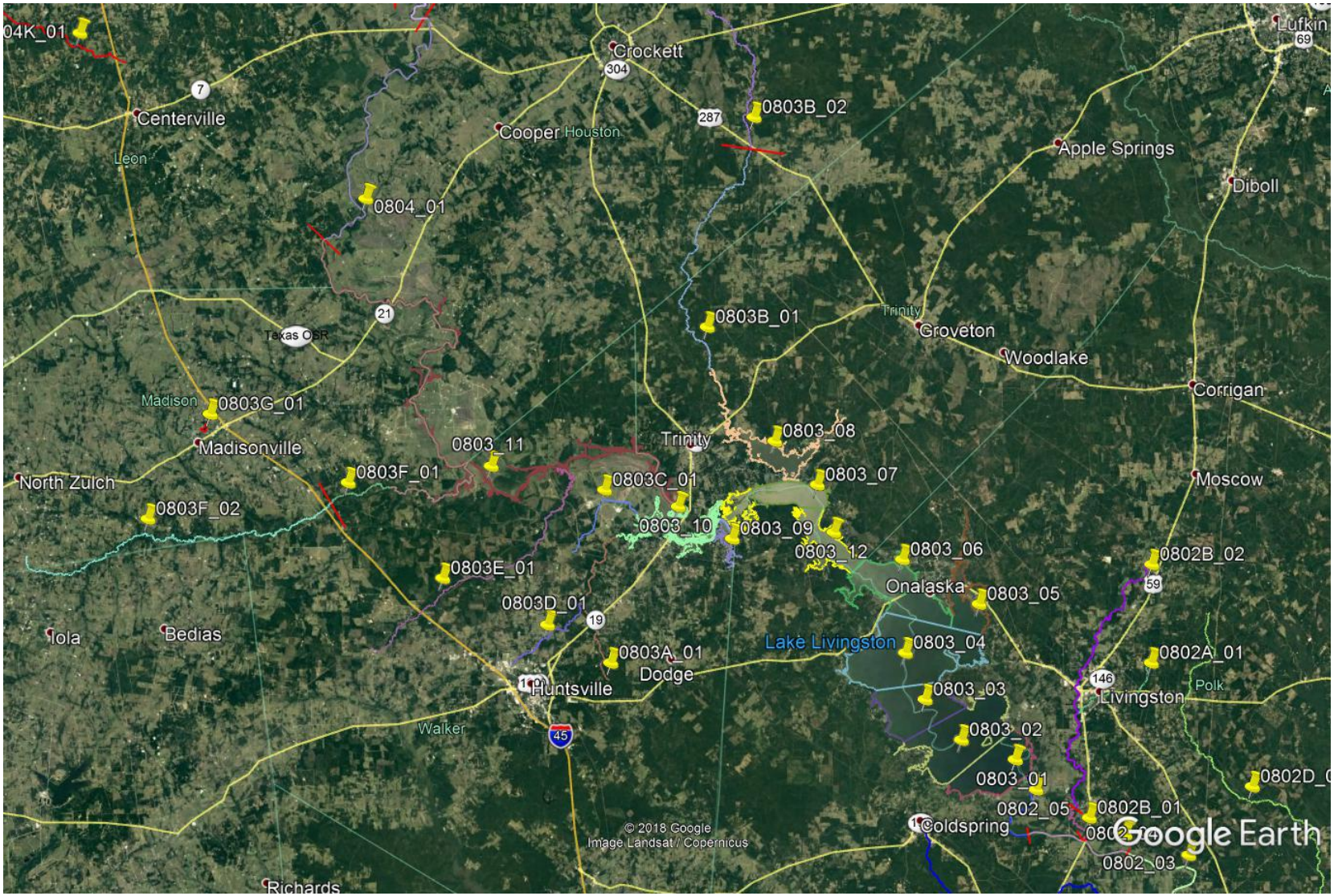
0804K was found to be not supporting the Contact Recreation Use due to elevated levels of *E. coli* by the 2015 in-house 5-year assessment. The current geomean is 185 MPN/100 mL. It appears that this impairment is runoff related as higher *E. coli* levels are reported when sampling coincides with recent precipitation (see Figure 79).





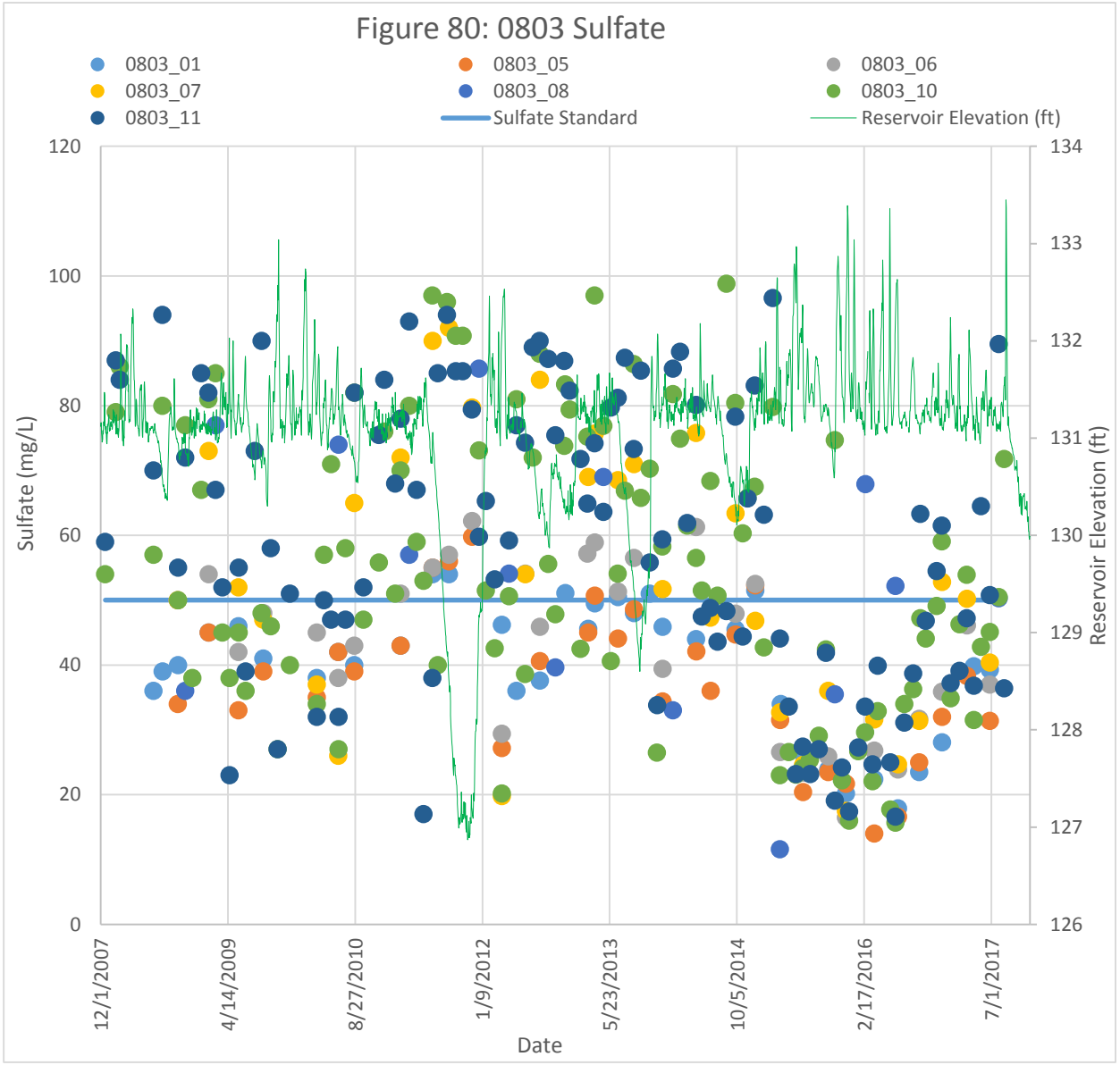


0803 – Lake Livingston

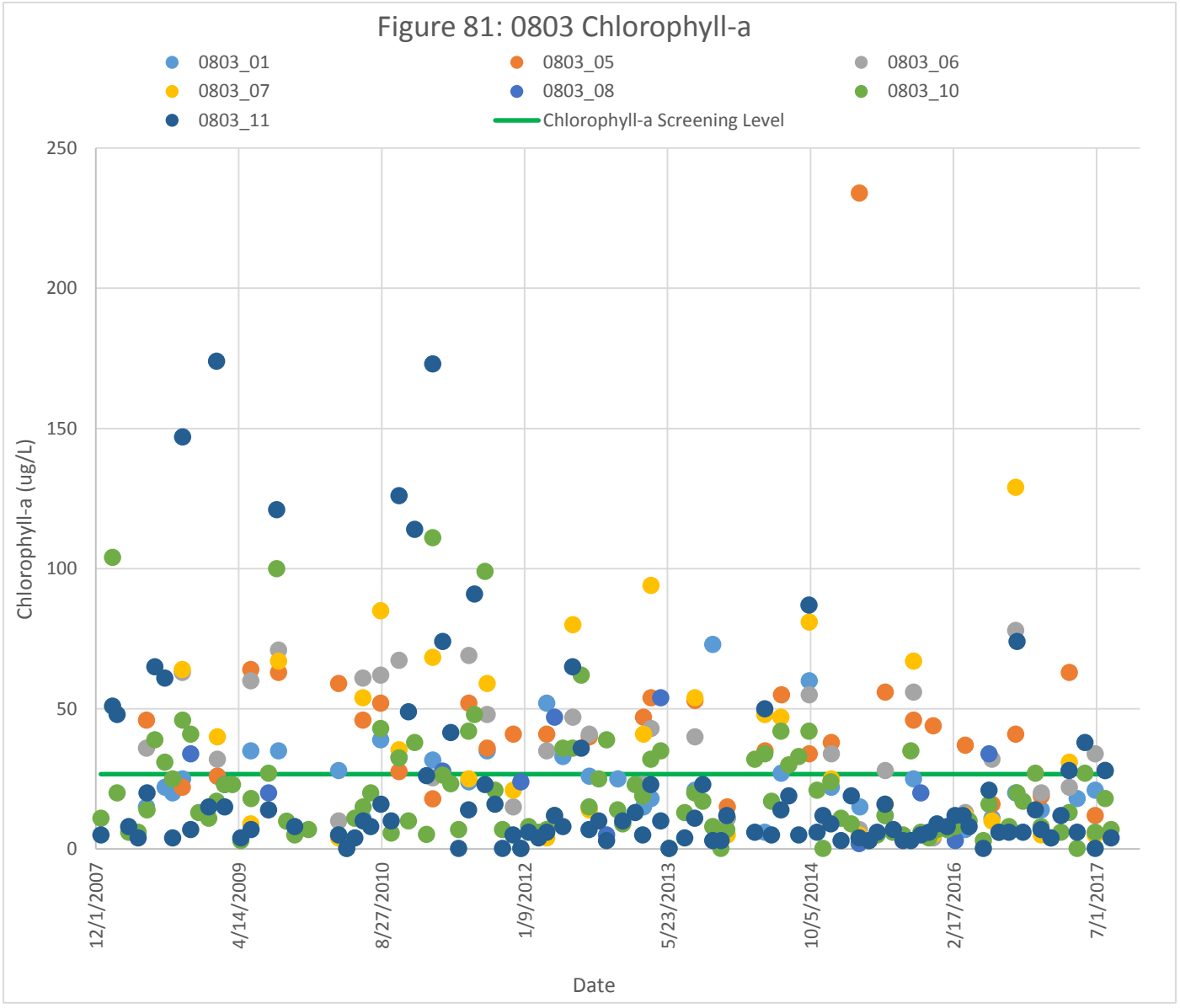


0803_09 was found to have concerns for Aquatic Life Use due to depressed DO by the 2014 IR. This finding was carried forward from previous assessments as there is no current monitoring in this assessment unit.

All portions of the reservoir were found to be not supporting General Uses due to elevated levels of sulfate by the 2014 IR. The sulfate standard is applied as an average of all values within the segment. Based on more recently collected data, the average sulfate value is 52 mg/L which exceeds the standard of 50 mg/L. As shown in Figure 80, it appears that this issue may be related to dry weather and evaporation. The most recent years of data show a strong decline that coincides with the recovery of lake elevations during the floods of 2015 and 2016. The levels have begun to rise again as the lake elevation decreases.



Several portions of the reservoir were found to have concerns for elevated levels of chlorophyll-a by the 2014 IR. As shown in Figure 81, chlorophyll-a levels are generally above the screening level. As discussed in the 2015 Basin Summary Report, Lake Livingston is classified as being hypereutrophic. Upstream nutrients and algal populations enter the reservoir and the long residence time in the reservoir allow algal populations to grow larger.



Several portions of the reservoir were found to have concerns for elevated nitrate and TP by the 2014 IR. Based on more recently collected data, concentrations of these parameters remain elevated. The issue is most pronounced in the most upstream assessment units of the reservoir – 0803_11 and 0803_10 – as shown in Figures 82 and 83. As discussed in the 2015 Basin Summary Report, it is theorized that nutrient levels decrease moving toward the dam because they are being taken up by algae in the upper reaches of the reservoir or because they are adsorbing onto sediment particles and falling out of the water column. Both of these cases are plausible as chlorophyll-a levels decrease and Secchi depths increase moving toward the dam. See pages 250 and 251 of the of 2015 Basin Summary Report for more details. Because the watershed above Lake Livingston is so vast, sources for nutrients in the reservoir can include effluent from upstream wastewater treatment facilities, agricultural and residential fertilizers, and failing infrastructure such as sewer lines and septic systems.

Figure 82: 0803 Nitrate

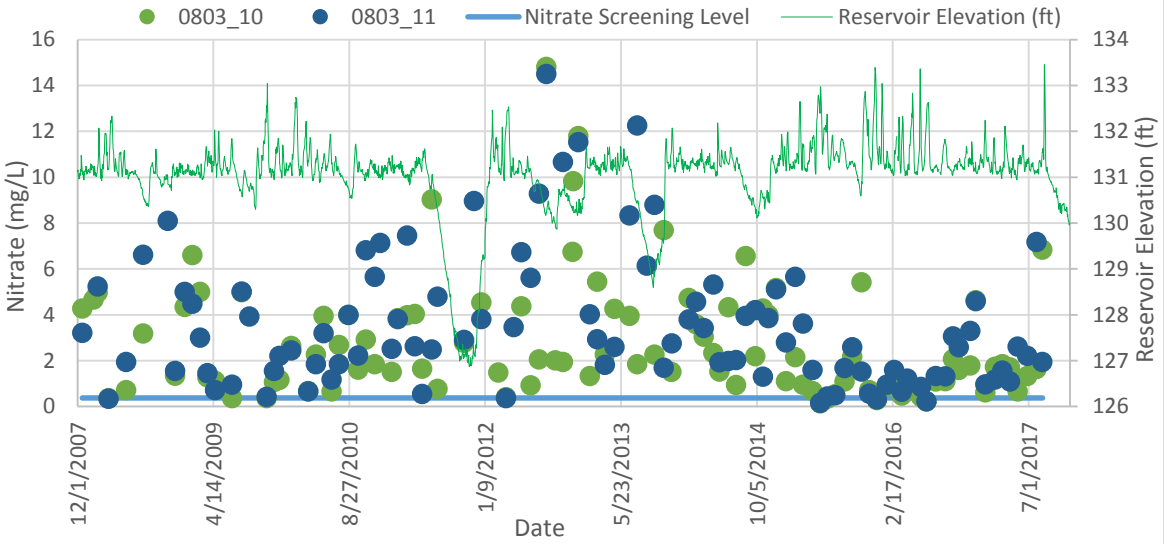
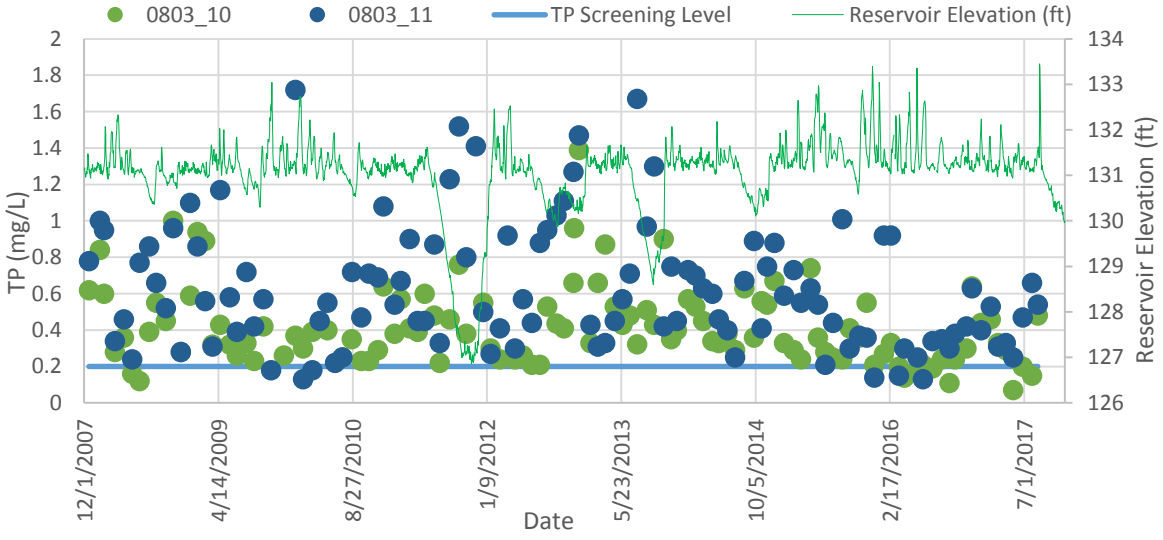


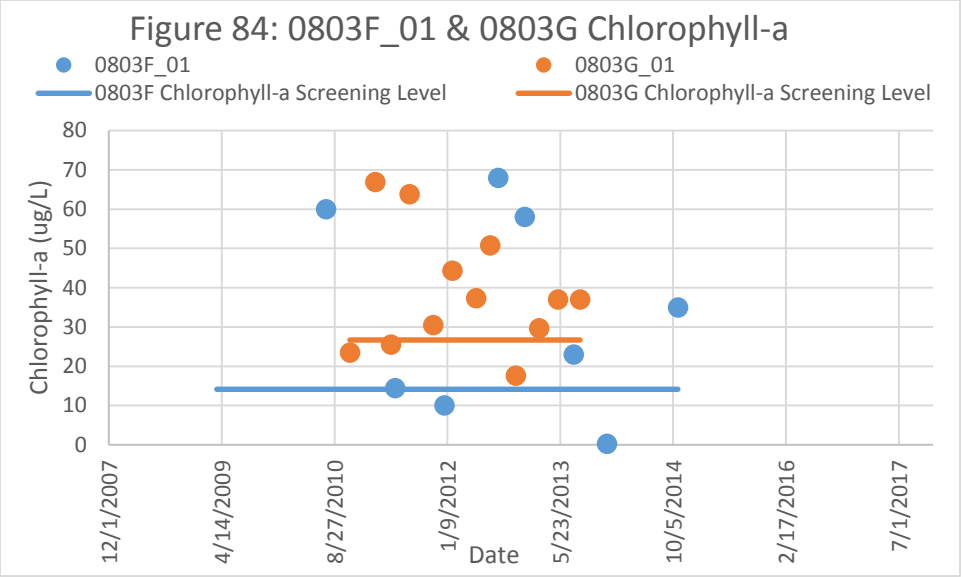
Figure 83: 0803 TP

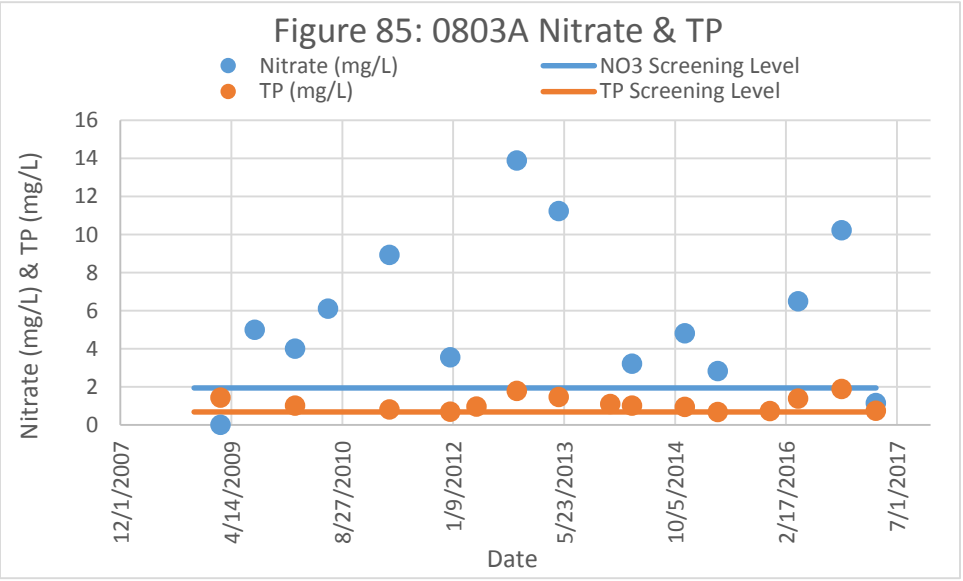


0803F_02 was found to have concerns for Aquatic Life Use due to elevated levels of zinc by the 2014 IR. This concern was carried forward from previous assessments. There is a very limited data set of more recently collected samples that suggests zinc levels have decreased. There are five data points with values between 2 and 8 ug/L. The chronic toxic standard is 91.97 ug/L and the acute toxic standard is 151.28 ug/L. Additional sampling will be needed to fully evaluate this concern.

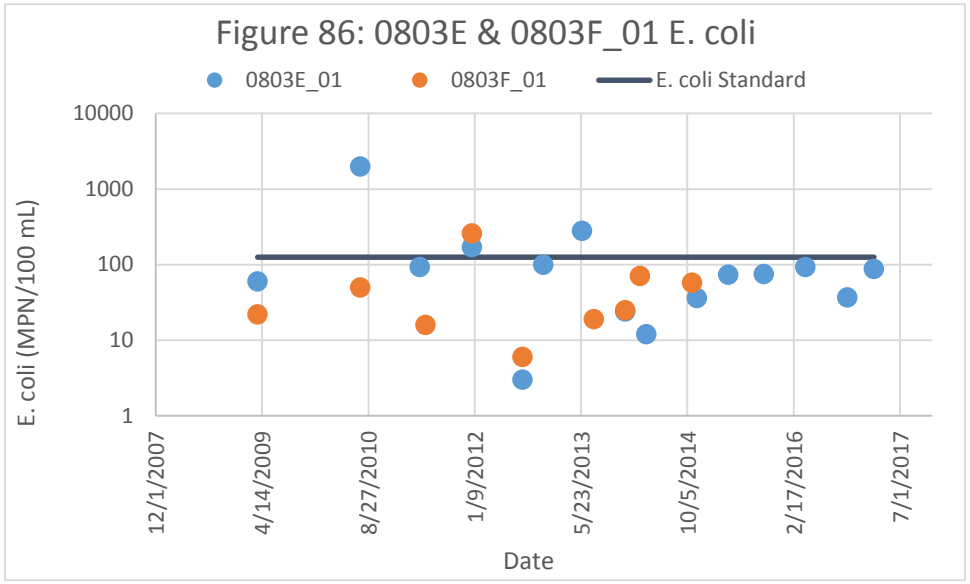
0803B, 0803F_01, and 0803G were found to have concerns for chlorophyll-a by the 2014 IR or the 2015 in-house 5-year assessment. There is no current monitoring in these streams but the last data collected indicates levels are still elevated (see Figure 84) for 0803F_01 and 0803G. Chlorophyll-a in these two waterbodies is somewhat correlated to TP with correlation coefficients of 0.41 and 0.37, respectively.

0803A was found to have concerns for nitrate and TP by the 2014 IR. As shown in Figure 85, concentrations of these parameters remain elevated. Flow data is only available for the last four years but indicates that flow is negatively correlated to both nitrate and TP. While this dataset is currently limited, it suggests that there are constant sources of nutrients in watershed. There is a wastewater treatment facility upstream of the sampling site which may be the source of nutrients in this watershed.

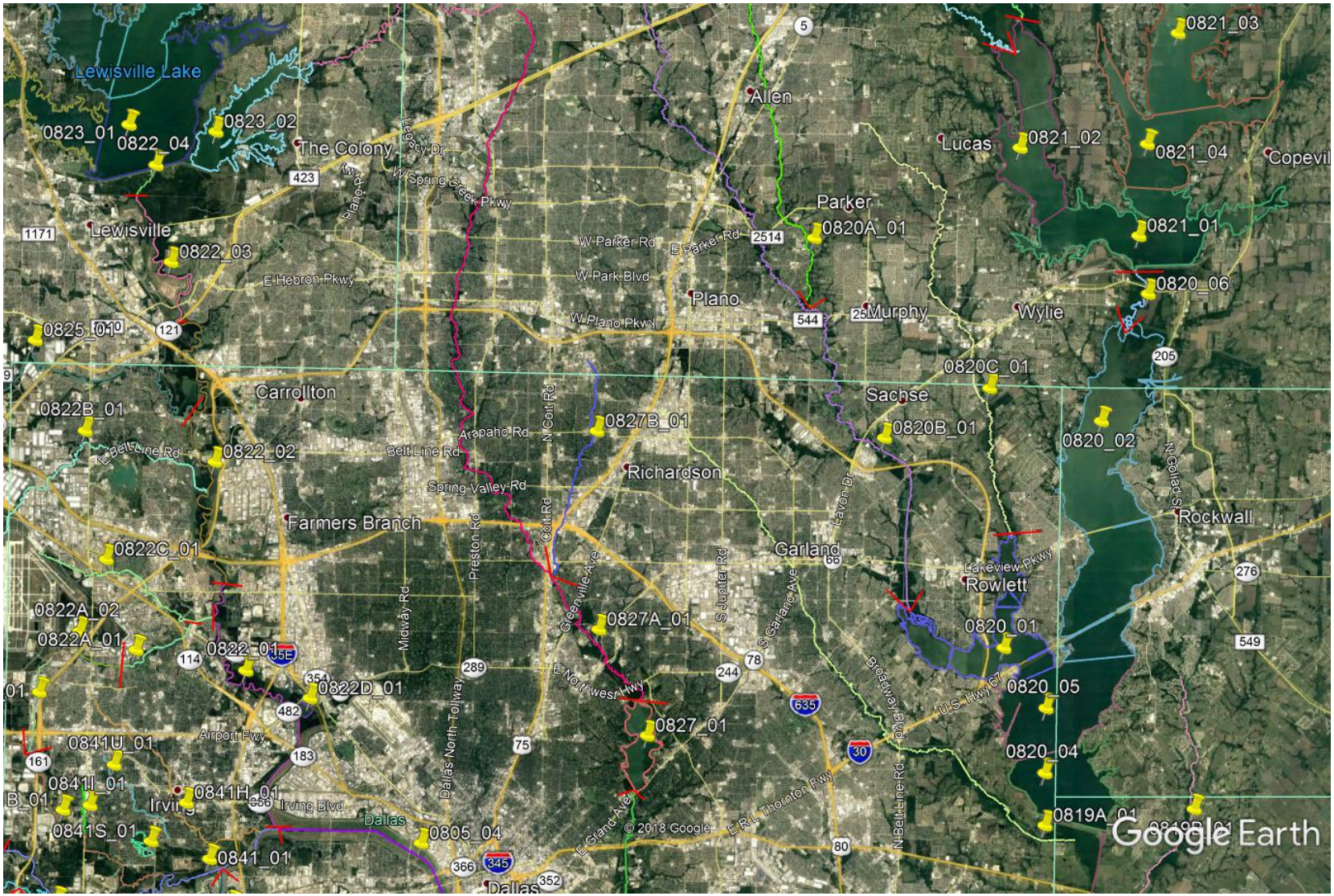




0803E and 0803F_01 were found to have concerns for Contact Recreation Use due to elevated *E. coli* levels by the 2014 IR. As shown in Figure 86, *E. coli* levels have decreased in more recent years. The geomeans for these streams are 68 and 65 MPN/100 mL, respectively.

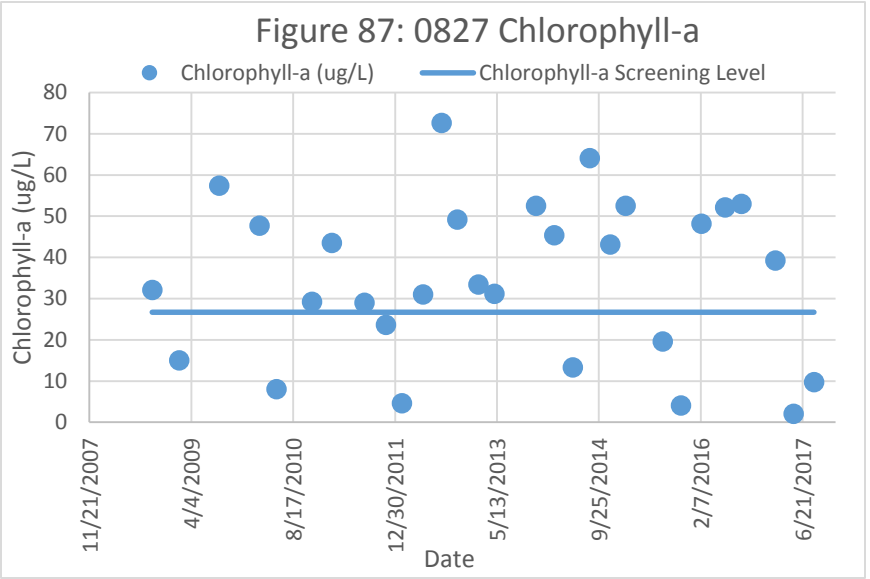


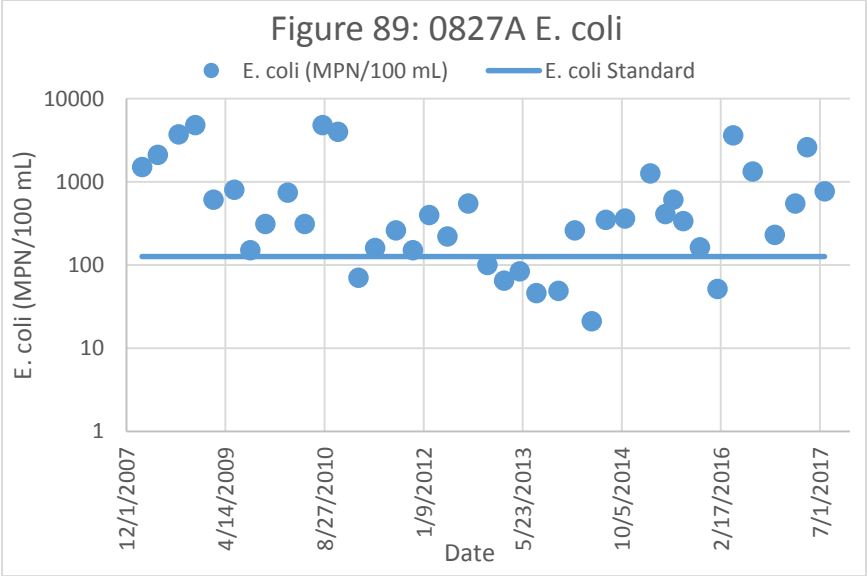
0827 – White Rock Lake

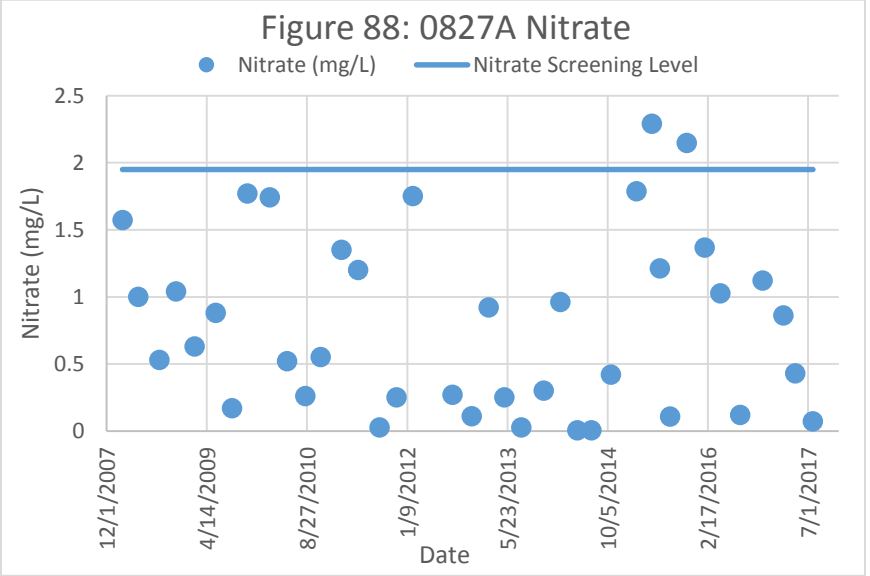


0827 was found to have concerns for chlorophyll-a by the 2014 IR. Based on more recently collected data, chlorophyll-a levels remain elevated (see Figure 87). There is no strong correlation between nutrients and chlorophyll-a in this data set. It is likely that the longer residence time in the reservoir is allowing algal populations to increase.

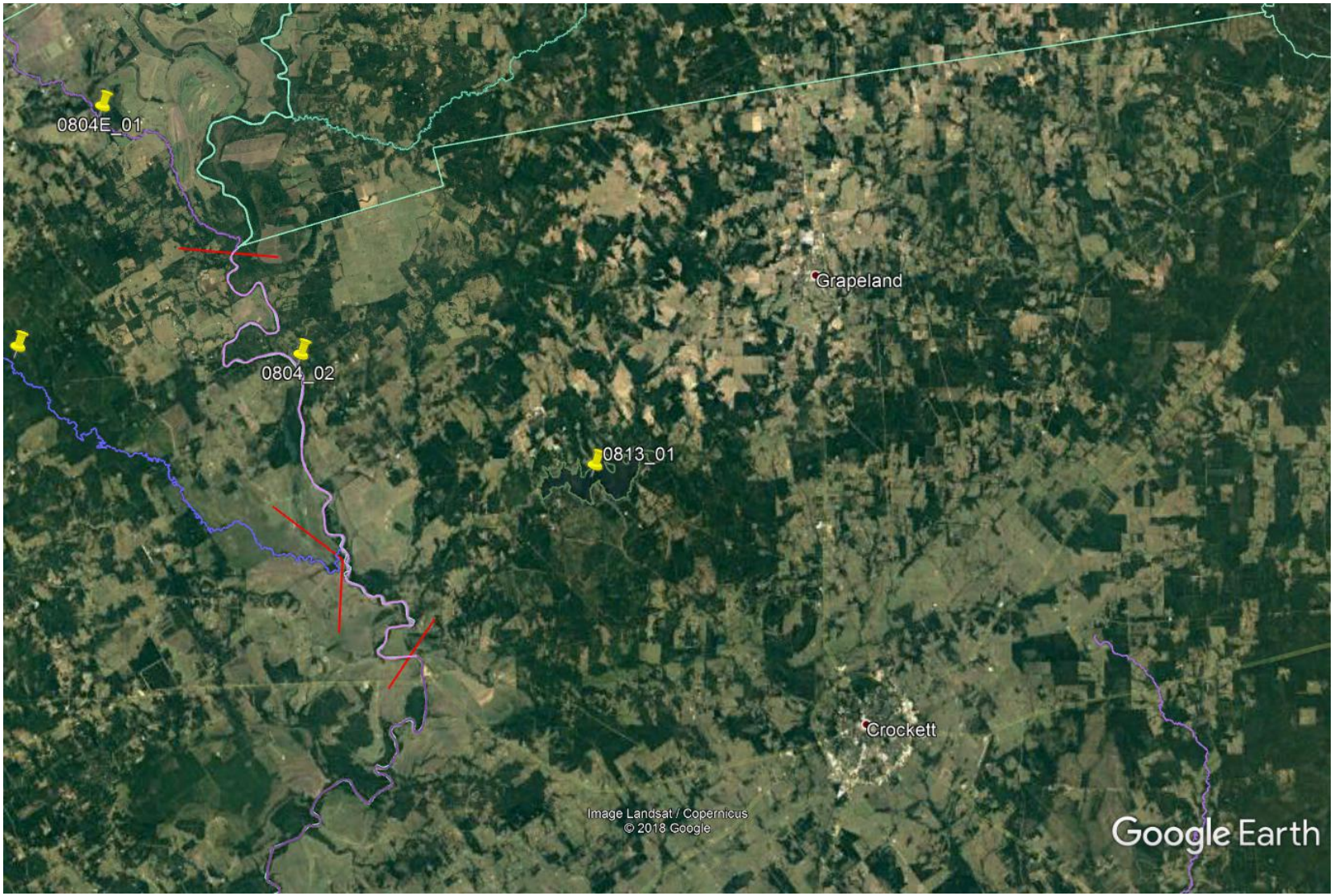
0827A was found to have concerns for both nitrate and *E. coli* by the 2014 IR. As shown in Figure 88, the nitrate levels have decreased below the screening level. However, the *E. coli* levels remain elevated as shown in Figure 89. The *E. coli* geomean is 355 MPN/100 mL. *E. coli* is not well correlated with flow with a correlation coefficient of -0.04. This indicates that there may be a constant source of bacteria into the stream such as failing infrastructure.





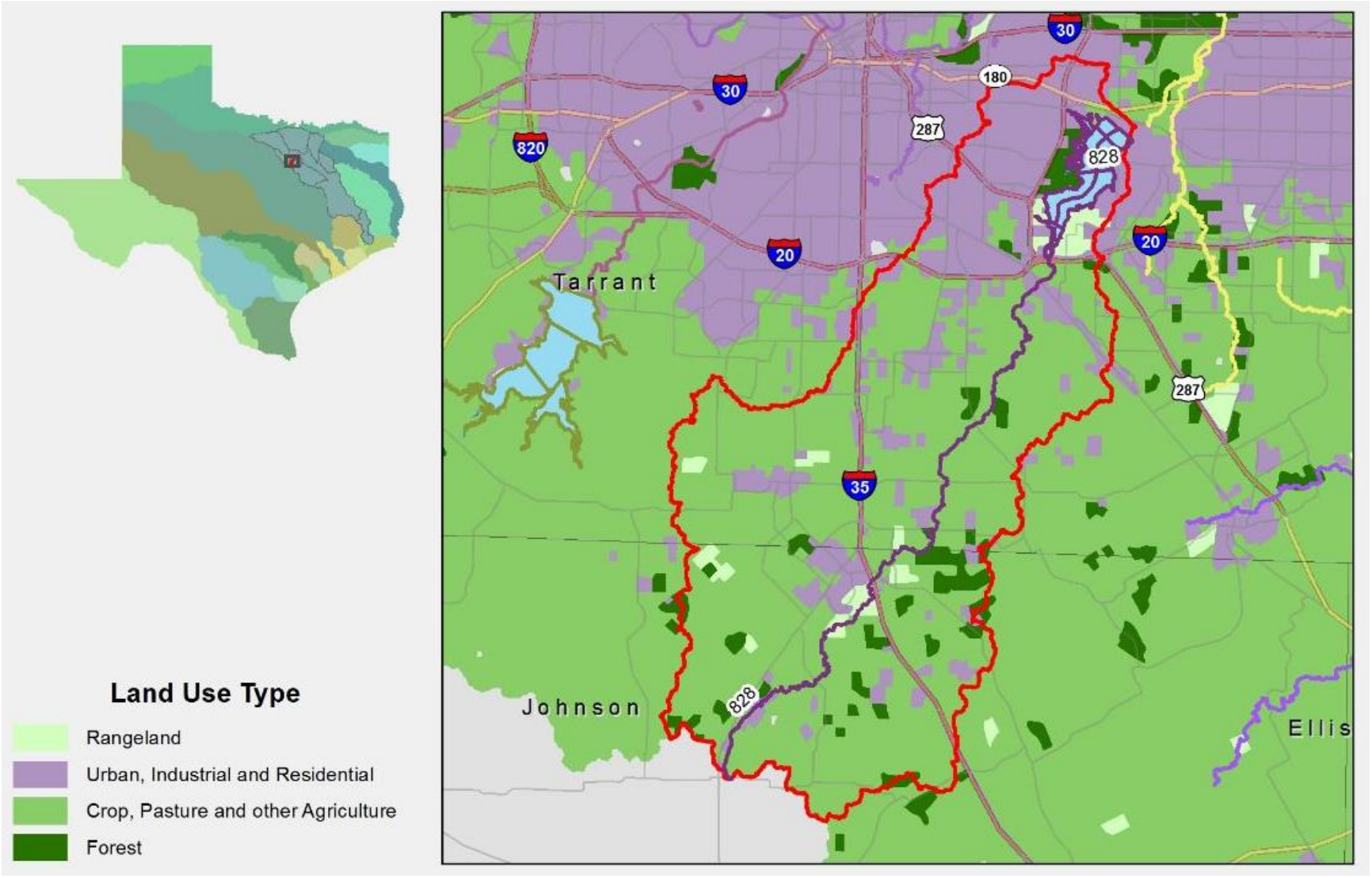


0813 – Houston County Lake

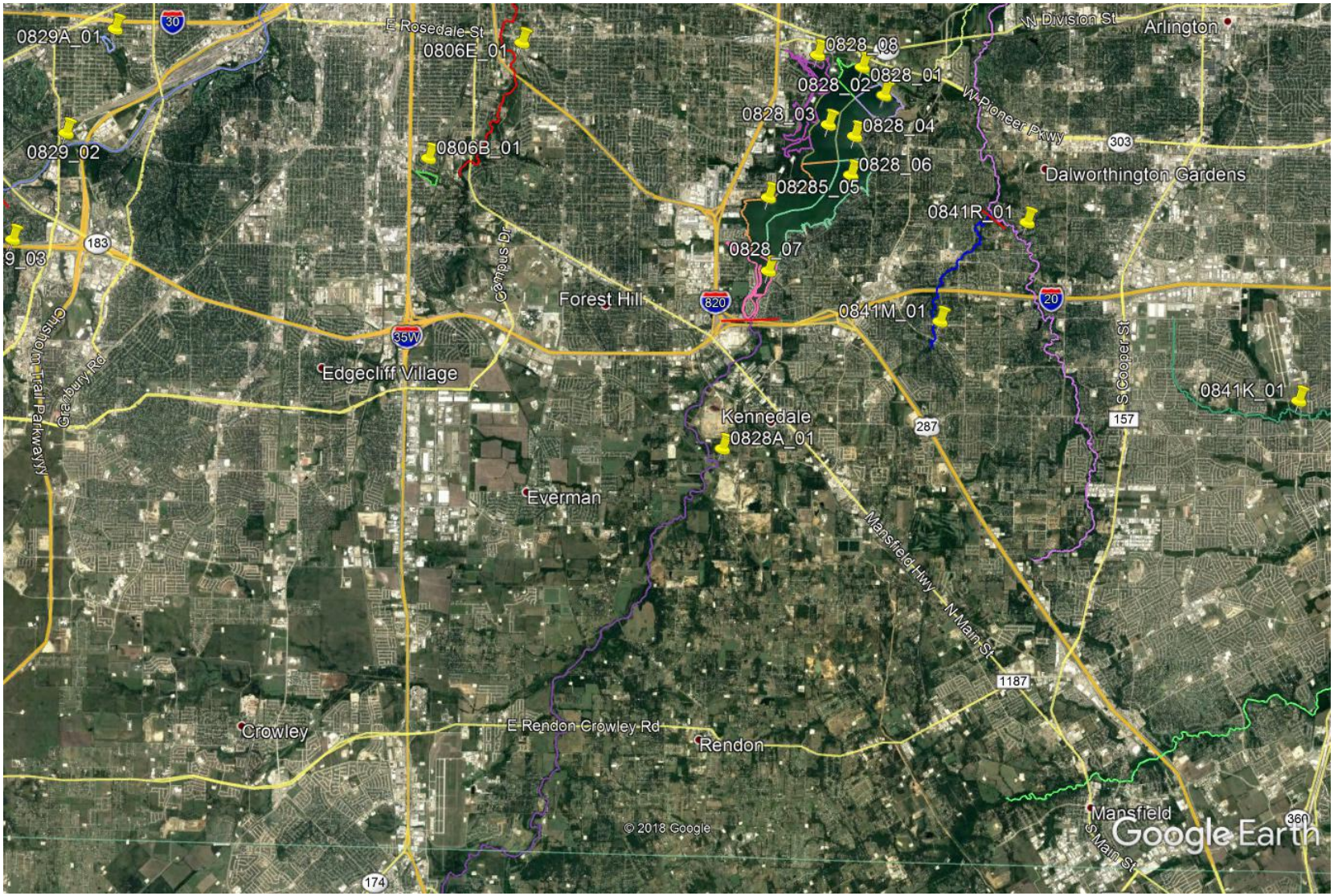


No additional discussion for this segment.

VILLAGE CREEK

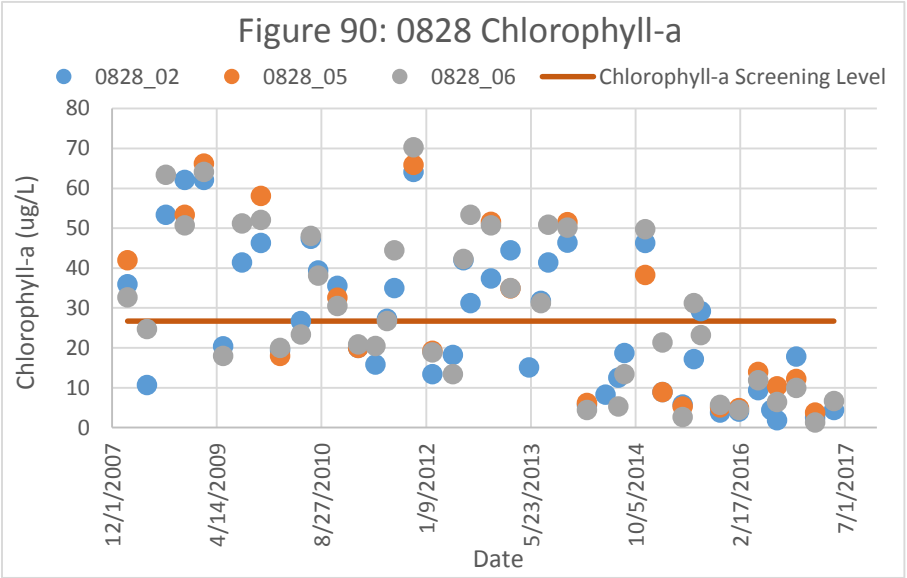


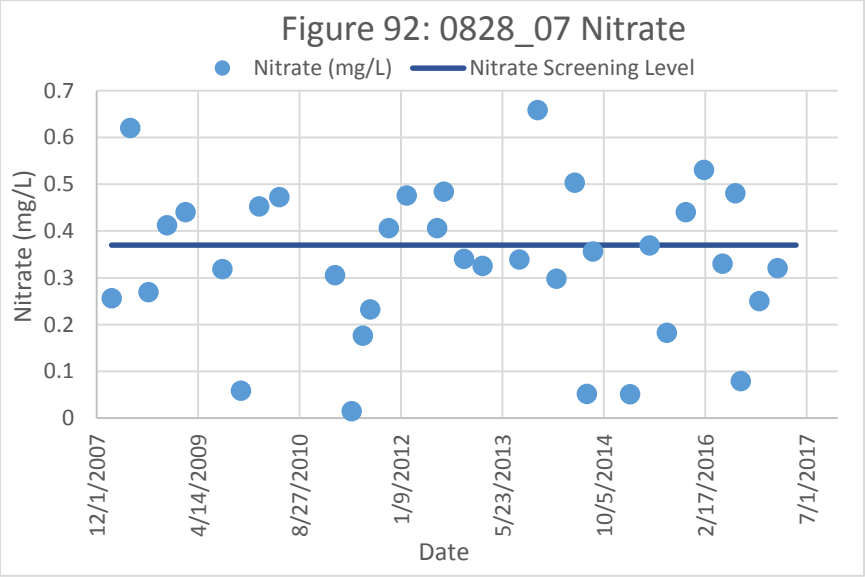
0828 – Lake Arlington

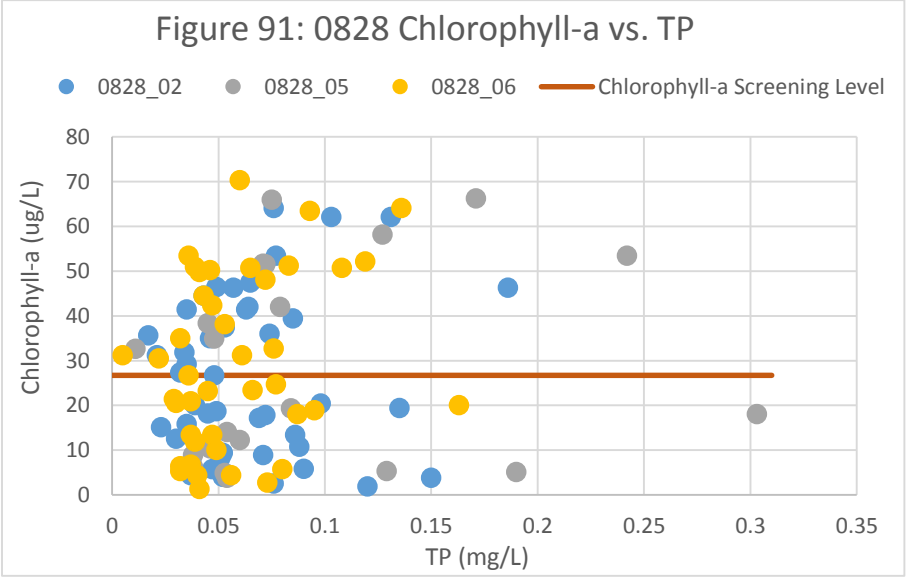


Chlorophyll-a concerns were identified for 0828_02, 0828_05, and 0825_06 by the 2014 IR. More recently collected data shows that chlorophyll-a levels are generally elevated (see Figure 90). However, all data collected after late 2015 have reported values below the screening level. The 2015 Basin Summary Report also indicated that there was a relationship between chlorophyll-a and TP in these segments and this relationship remains (see Figure 91). Table 4 shows that Lake Arlington is Phosphorus limited.

There was a concern identified for nitrate in 0828_07 by the 2014 IR. Based on more recently collected data, nitrate levels are still elevated (see Figure 92).







0828A was identified as not supporting the General Use due to elevated levels of TDS by the 2015 in-house 5-year assessment. It was also identified as not supporting the Contact Recreation Use due to elevated levels of *E. coli* by the 2014 IR. In addition to normal routine monitoring, this segment was heavily sampled in 2016 and 2017 for the Village Creek-Lake Arlington Watershed Protection Plan. Based on this more recently collected data, both TDS and *E. coli* levels remain elevated. Both parameters are correlated with flow (see Figures 93 and 94). TDS decreases with increasing flow indicating that low flows and evaporation may be causing TDS levels to increase. *E. coli* increases with flow which indicates that the issue is largely runoff related.

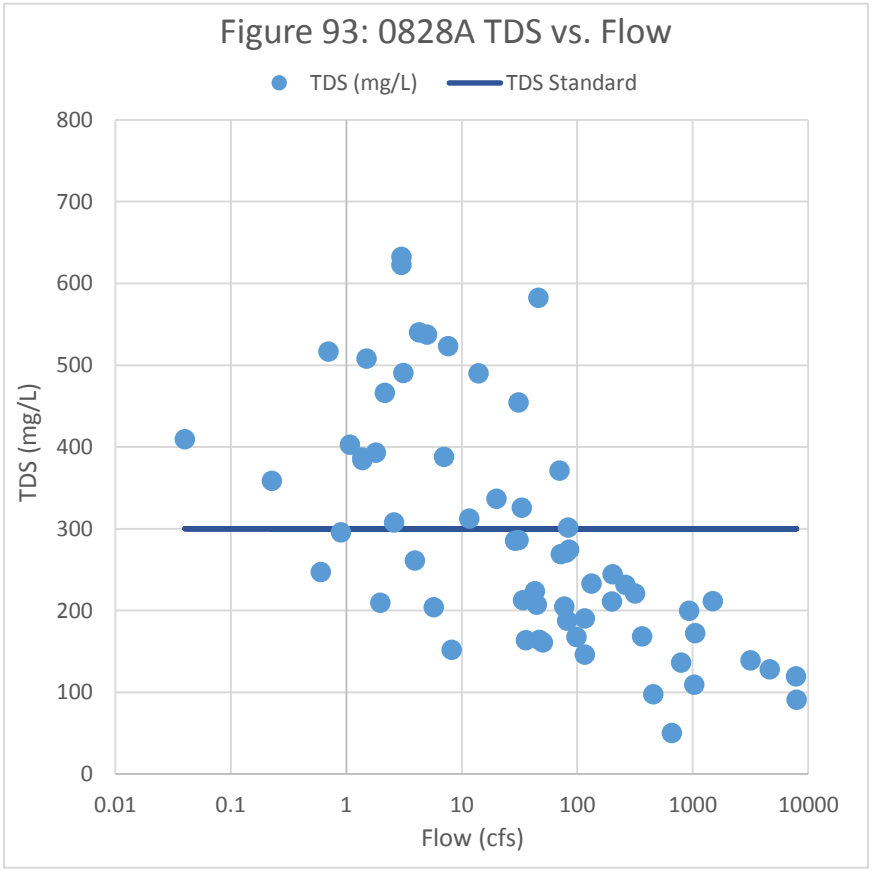


Figure 93: 0828A TDS vs. Flow

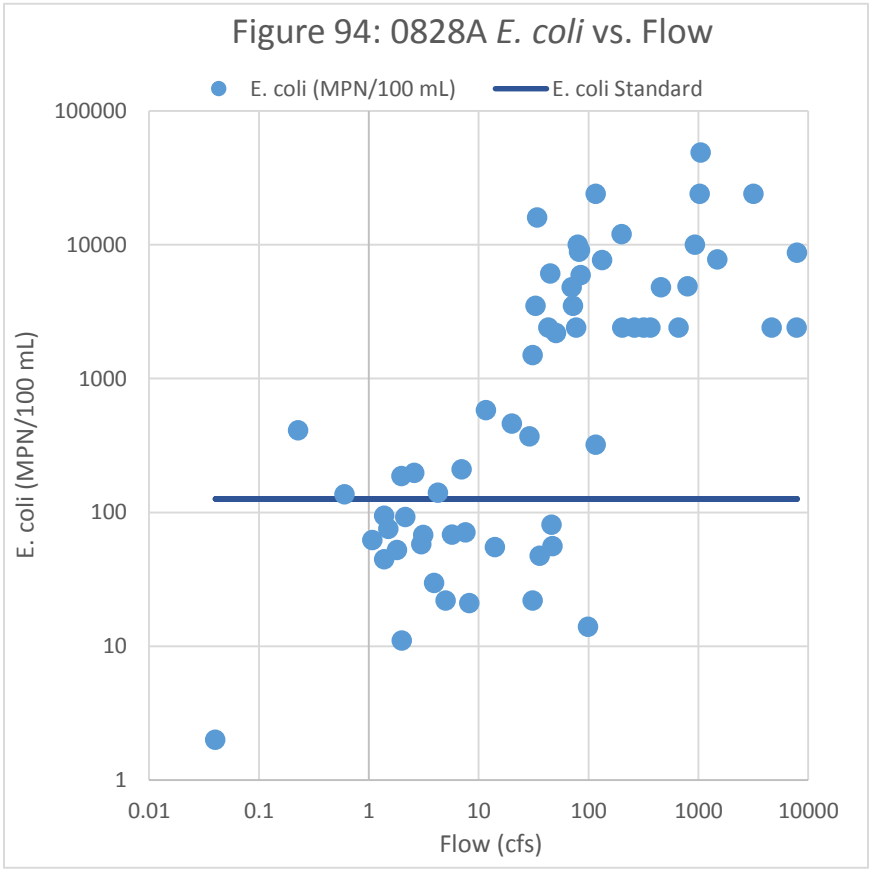
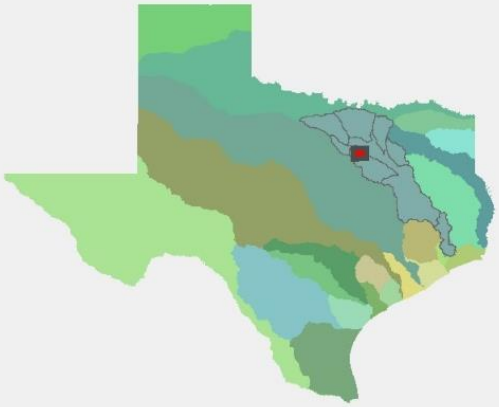
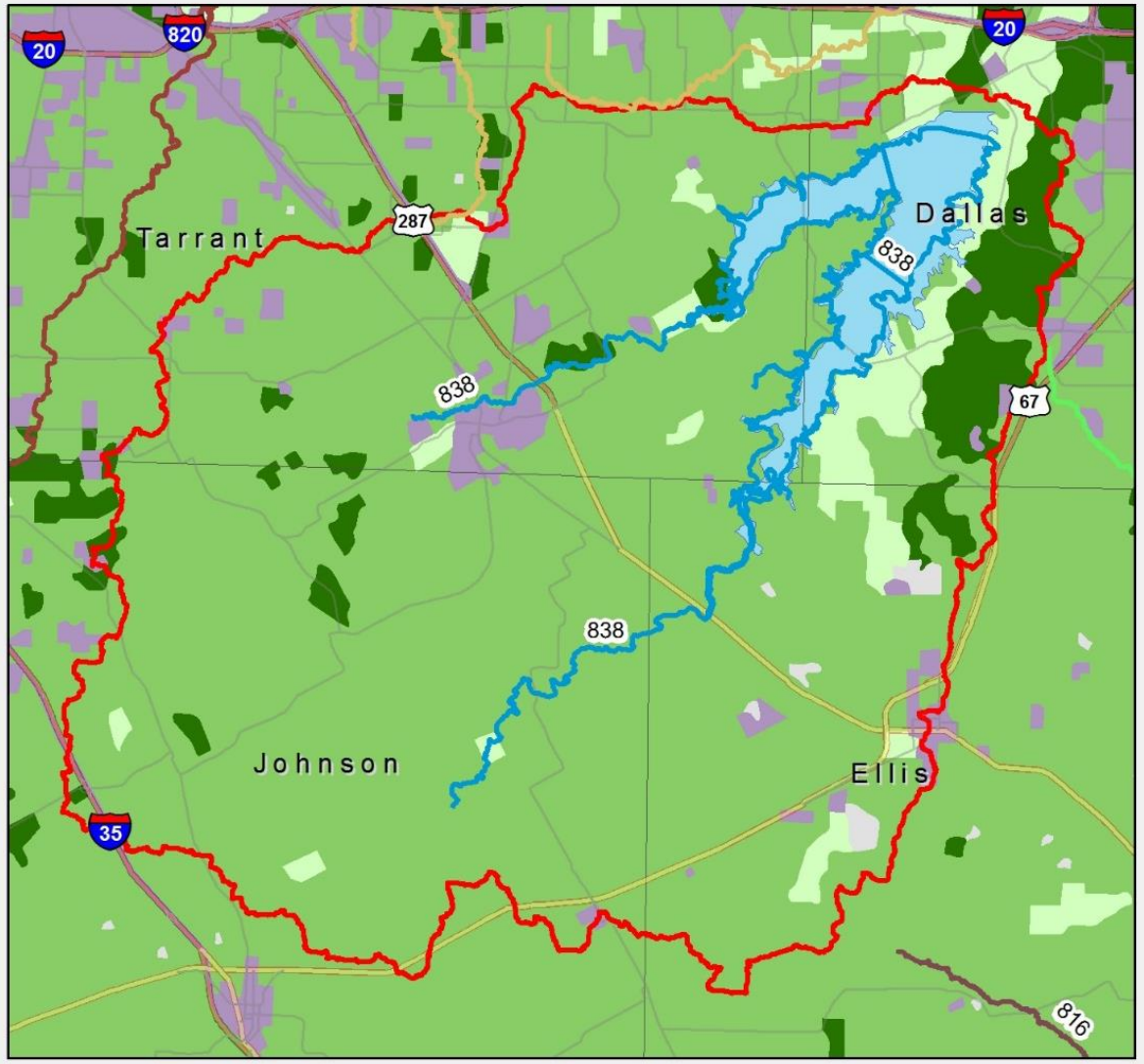


Figure 94: 0828A *E. coli* vs. Flow

MOUNTAIN CREEK

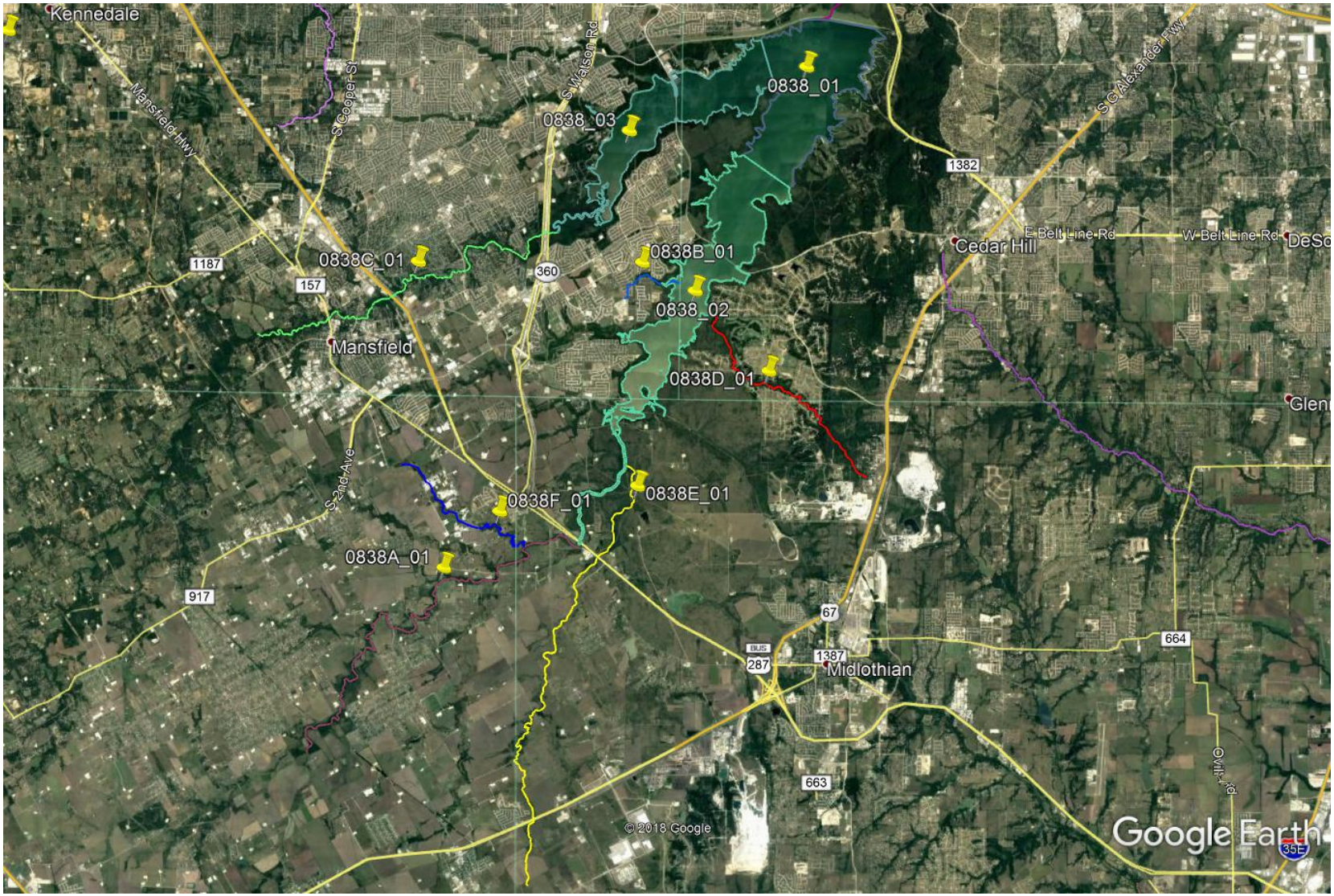




Land Use Type

- Rangeland
- Urban, Industrial and Residential
- Crop, Pasture and other Agriculture
- Forest

0838 – Joe Pool Lake

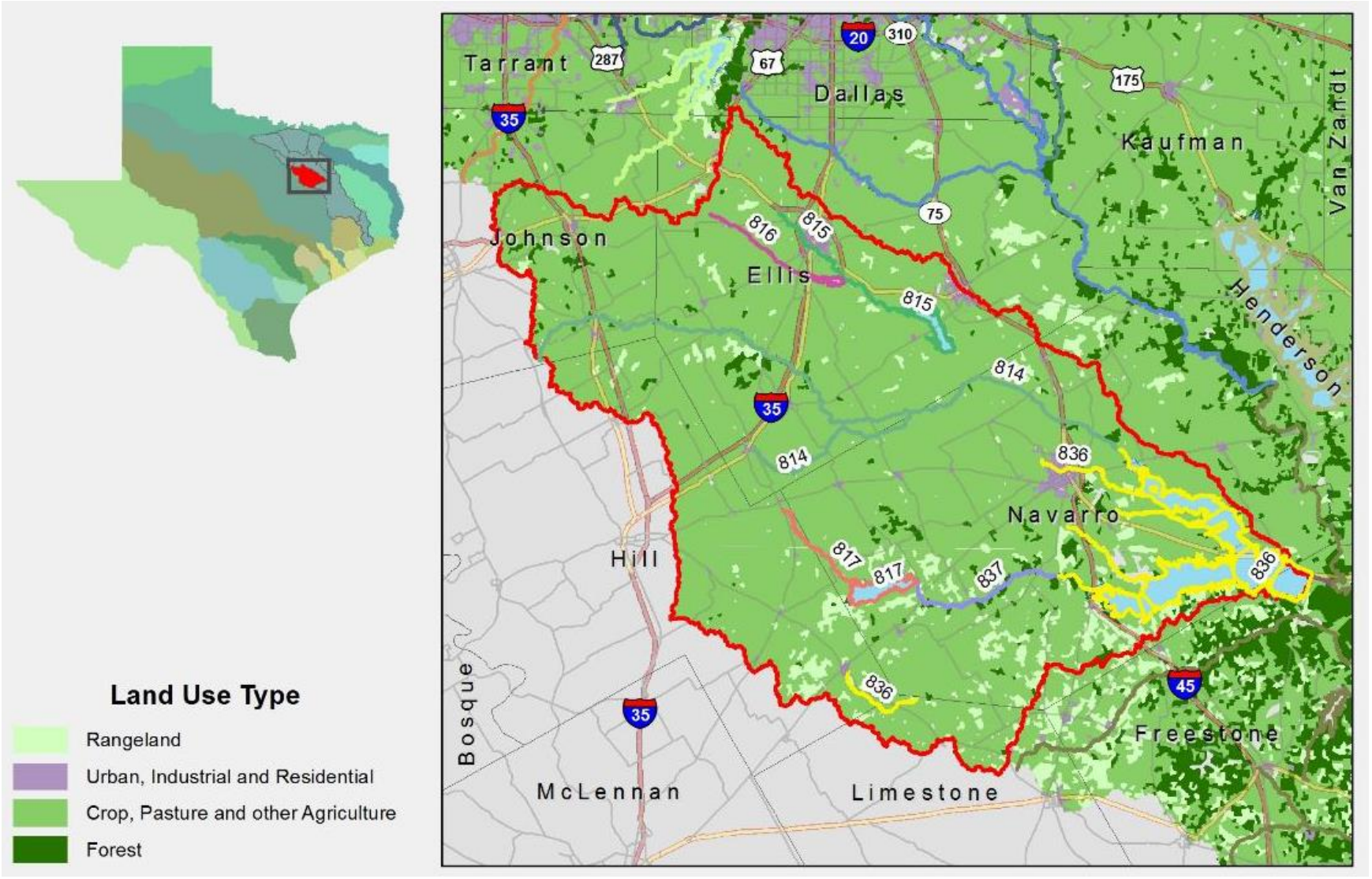


0828_02 was found to have concerns for nitrate by the 2014 IR. No new data is available for segment 0838 in order to further evaluate this concern.

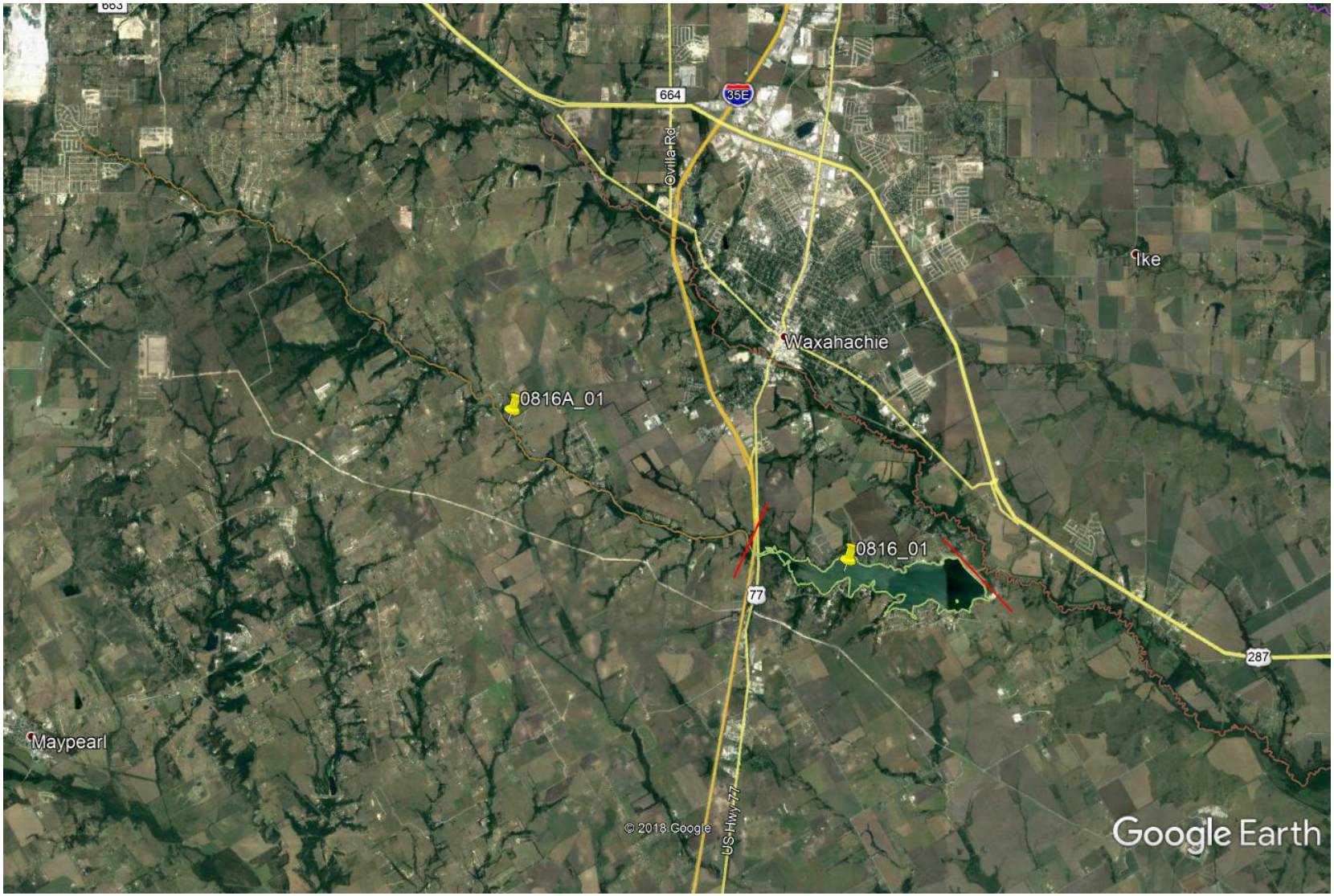
0838C was found to be not supporting General Uses due to elevated TDS levels by the 2015 in-house 5-year assessment. There are only four new data points for TDS in 0838C. The values are between 559 and 635 mg/L. Two of these data points had associated flow values indicating that the samples were collected under very low flow conditions. Based on the results of data analysis conducted for the 2015 Basin Summary Report, it appears that elevated TDS levels may be related to evaporation or geology and land use. The watershed for this stream crosses the Eastern Cross Timbers and the Blackland Prairies. As discussed in previous sections for the Western Cross Timbers and Grand Prairies in 0809 and the Blackland Prairies in 0819, land uses in these soil types are largely agricultural. Agricultural practices can cause erosion which can contribute suspended sediments to a waterbody. Additionally, dissolved solids can increase in soils that are irrigated; as the water evaporates, the dissolved minerals and salts are left behind. Erosion and runoff from over-irrigation or precipitiation can then transfer these dissolved solids into nearby waterbodies.

There are no new data for E. coli in segment 0838C.

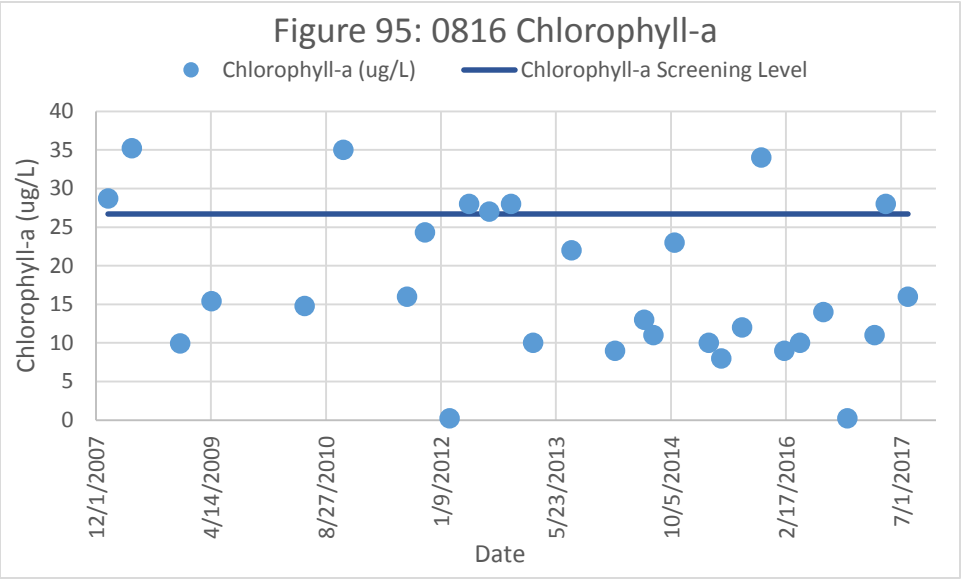
RICHLAND CHAMBERS



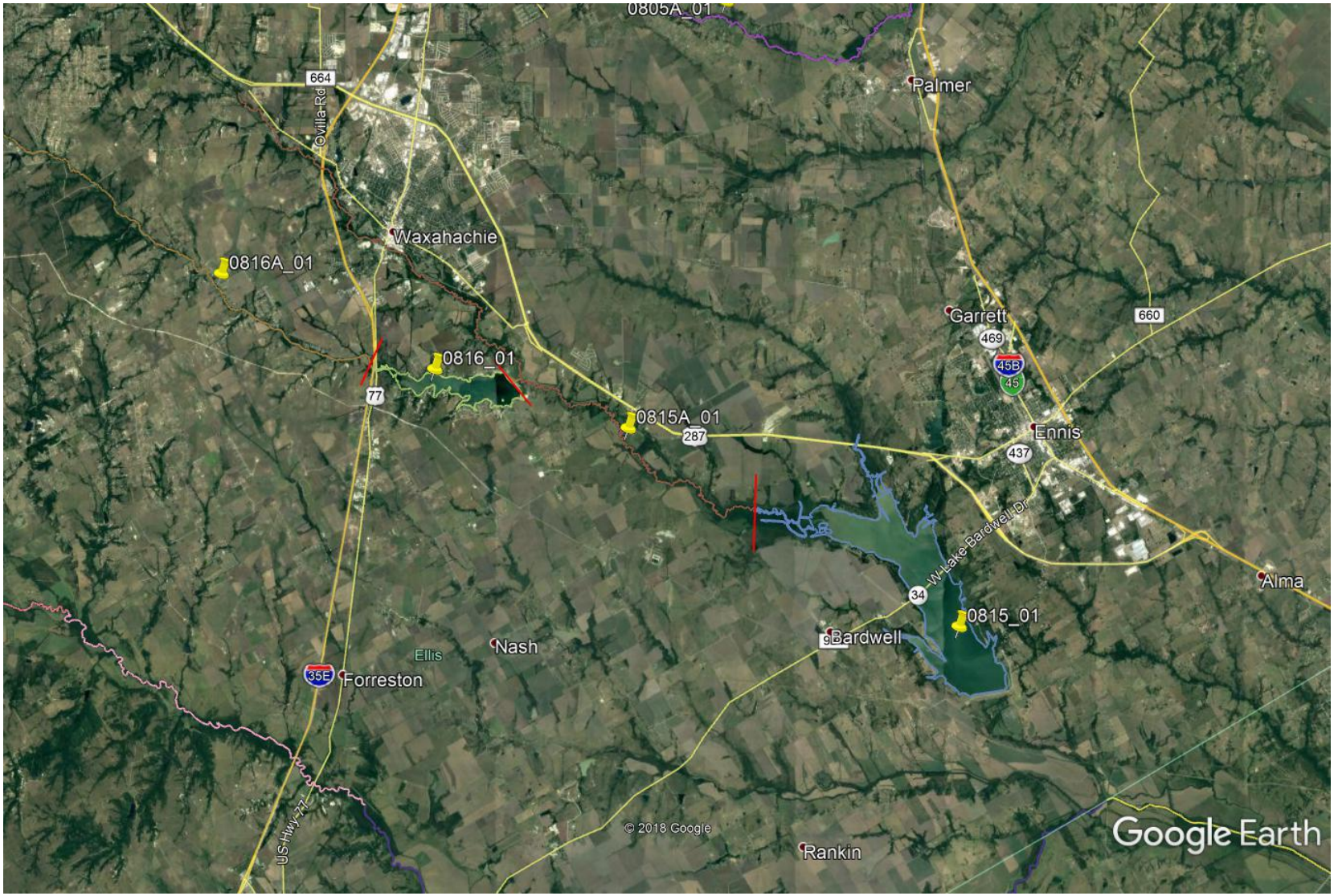
0816 – Lake Waxahachie



This segment was found to have concerns for chlorophyll-a by the 2014 IR. Based on more recently collected data, reported results still exceed the screening level occasionally (see Figure 95).



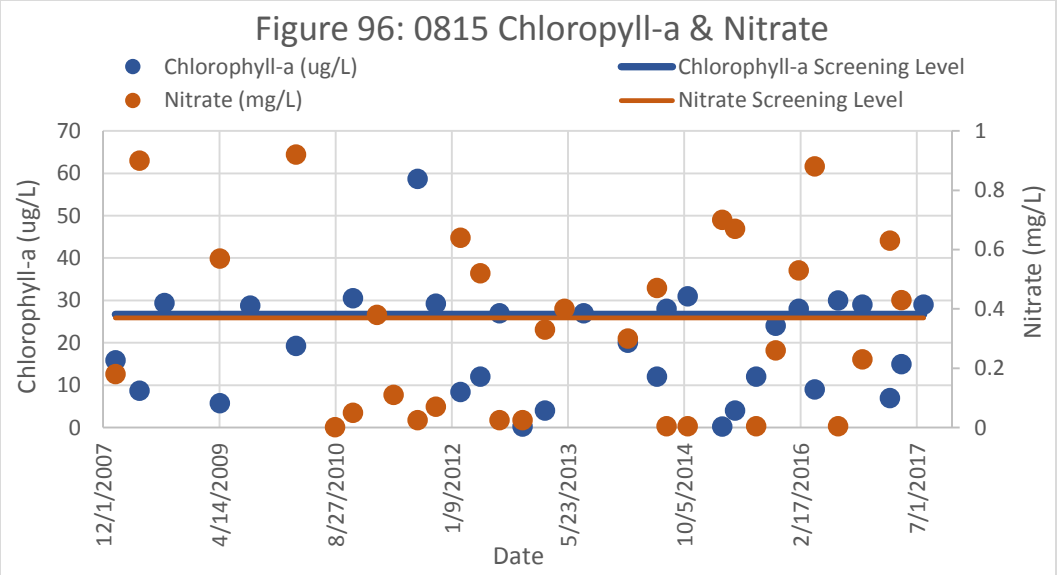
0815 – Bardwell Reservoir

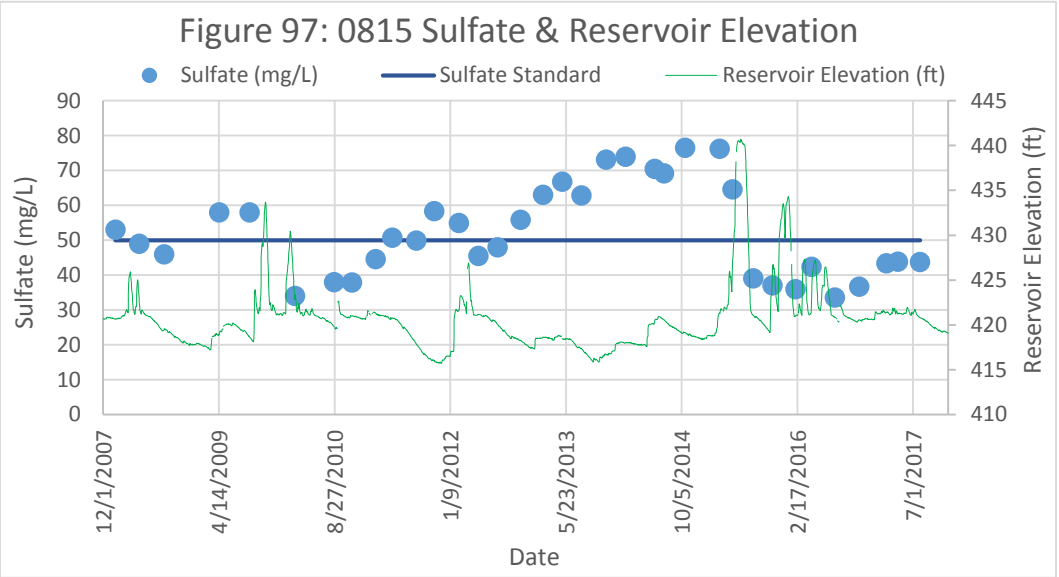


This segment was found to have concerns for chlorophyll-a and nitrate by the 2015 in-house 5-year assessment. Based on recent data, concentrations of these parameters frequently exceed their screening levels (see Figure 96). As noted in the 2015 Basin Summary Report, this reservoir is hypereutrophic and the correlation between nitrate and rainfall remains. This indicates that fertilizers from the surrounding watershed may be introducing nutrients to the reservoir.

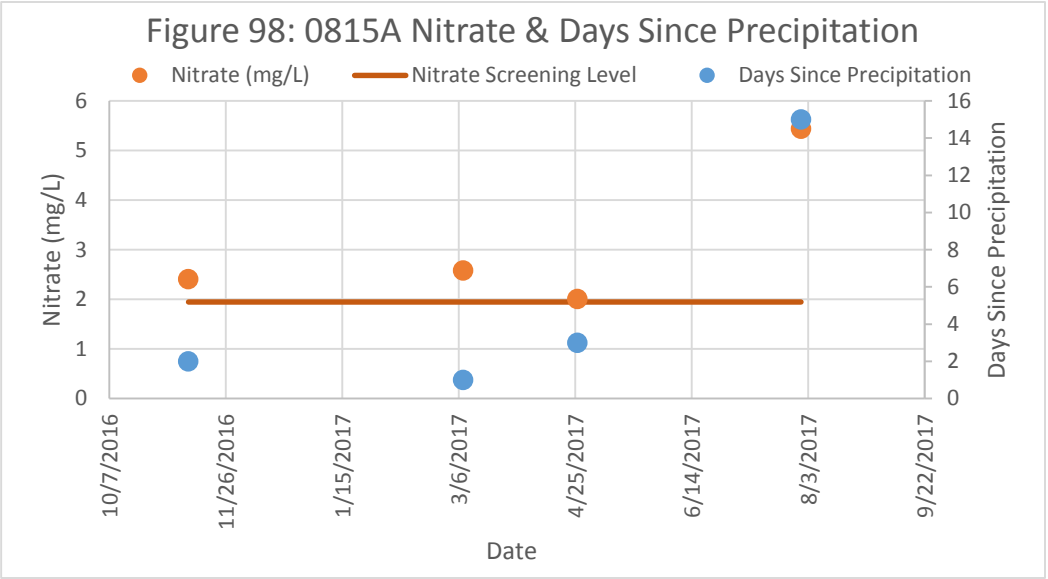
This reservoir was also found to be not supporting the General Use due to elevated sulfate levels by the 2015 in-house 5-year assessment. Sulfate issues may be caused by evaporation. As seen in Figure 97, sulfate levels stayed elevated throughout 2012 to 2015. Freshwater inflows from the flooding in 2015 and 2016 reduced sulfate levels to below the standard. However, the most recent data shows that as drier conditions have reduced lake levels, the sulfate levels are beginning to rise again.

0815A was found to have concerns for nitrate by the 2014 IR. However, this finding was carried forward from previous assessments as there was no active sampling in the segment at the time of the 2014 IT. TRA has recently begun sampling in this segment in order to evaluate this concern. As shown in Figure 98, nitrate levels are

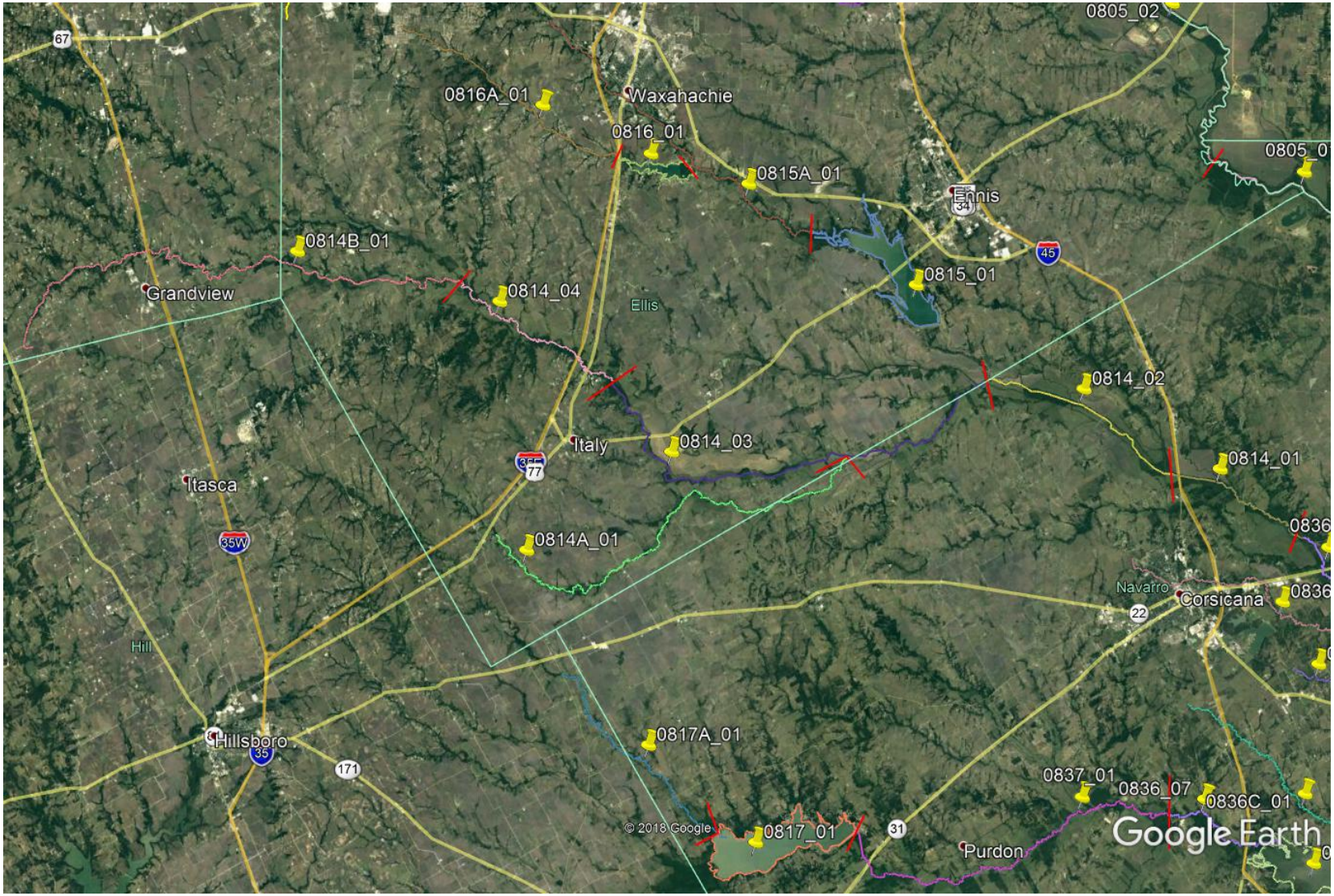




consistently high. Levels appear to be somewhat correlated to rainfall with higher levels occurring during recent precipitation events which indicates that nitrate levels may be runoff related. However, the highest value was reported when the most recent precipitation occurred two weeks prior to sampling. Sampling will continue in this segment. Future evaluations of the data may provide more insight on the source nitrate in this segment.



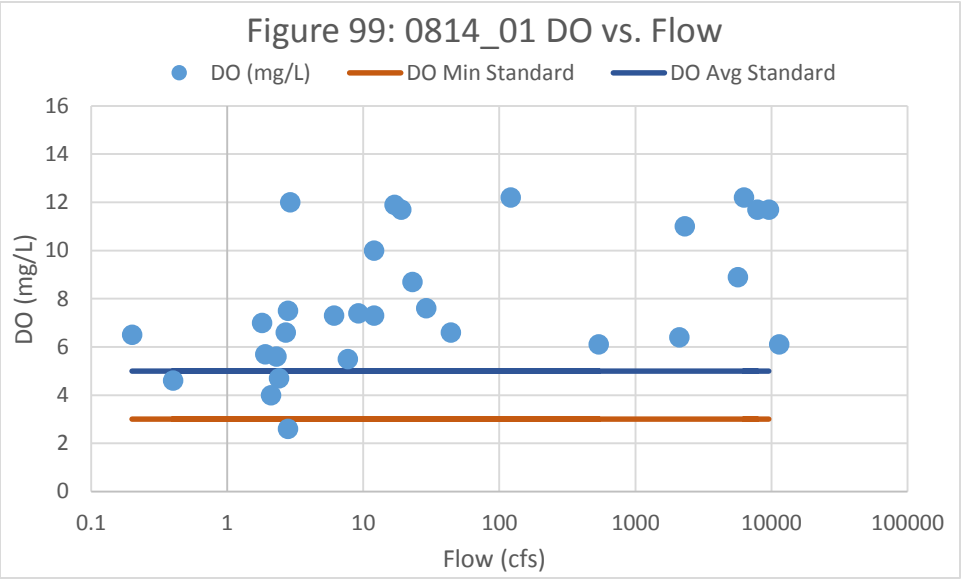
0814 – Chambers Creek Above Richland-Chambers Reservoir

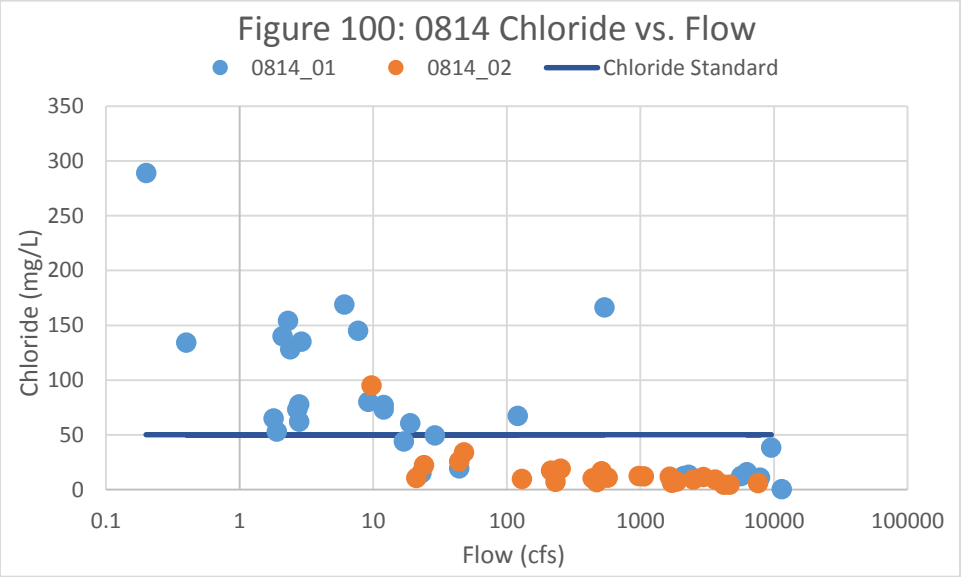


0814_01 and 0814_03 were found to have concerns for depressed DO by the 2014 IR. There is no current data available for 0814_03 to further evaluate this concern. More recently collected data for 0814_01 that much of the data is reported above the standards. However, as shown in Figure 99, all data with values below the standards were collected at lower flows.

All portions of the segment were found to be not supporting the General Use due to elevated chloride levels by the 2014 IR. Current monitoring data only exists for 0814_01 and 0814_02 (see Figure 100) and shows that much of the data in 0814_01 exceeds the standard. It appears that this issue is related to drought conditions as a majority of the elevated chloride samples were collected at low flows.

0814_01 was found to have concerns for TP and chlorophyll-a by the 2014 IR. Current data shows that these parameters frequently exceed their screening levels (see Figure 101). However, much of the most recent data have been reported below the screening level. It is believed that this apparent decrease is due to the flooding in 2015 and 2016 and not a true change in water quality. As noted in the 2015 Basin Summary Report, it is likely that upstream wastewater treatment facilities may be contributing in part to the TP concern. Chlorophyll-a concerns may be fed by releases from lakes Waxahachie and Bardwell.





Concerns were identified for *E. coli* in 0814_01 by the 2015 in-house 5-year assessment. Current sampling for both 0814_01 and 0814_02 resulted in geomeans of 133 and 1472 MPN/100 mL, respectively (see Figure 102). While both of portions of the stream exceed the standard, much of the exceedance data were collected during high flow events. As noted in the 2015 Basin Summary Report, this segment is largely rural and livestock are the likely source of *E. coli* into the stream.

Figure 101: 0814_01 TP & Chlorophyll-a

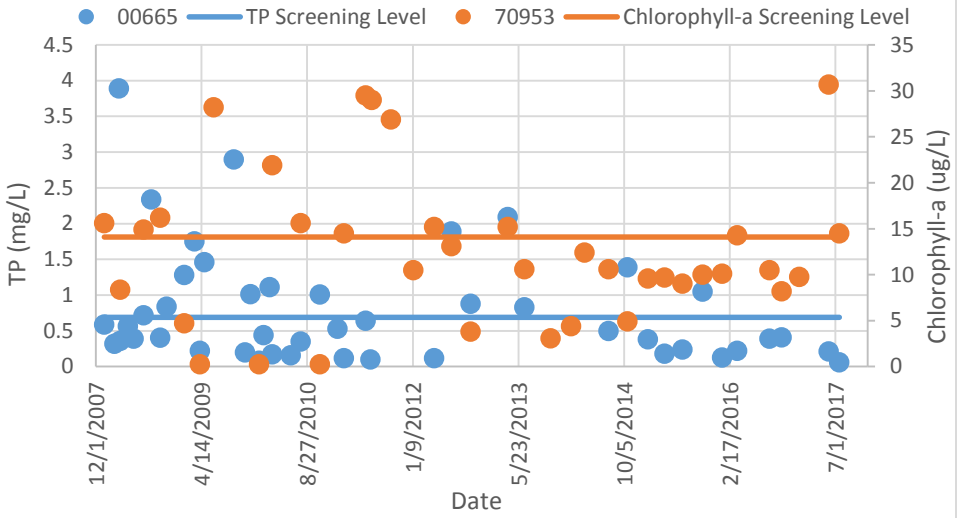
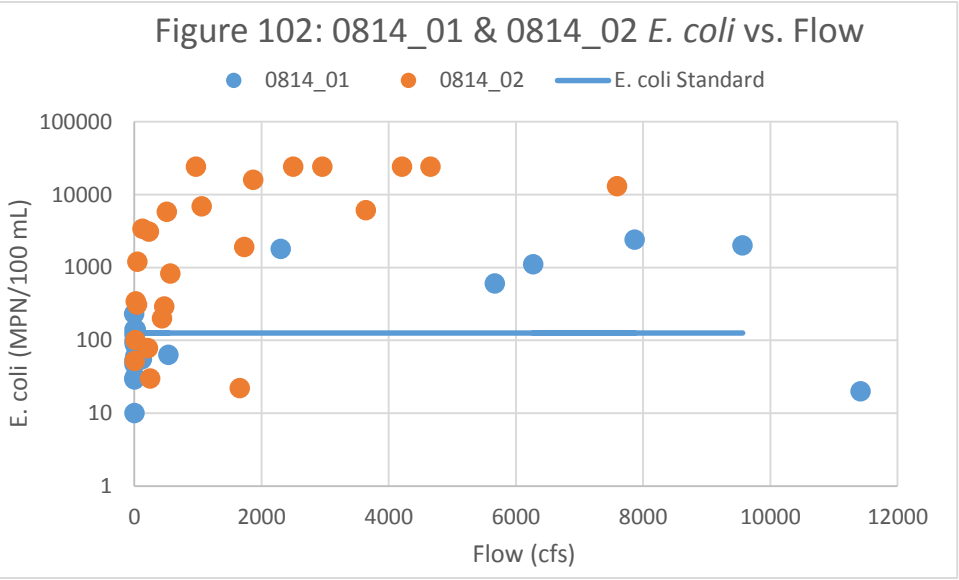
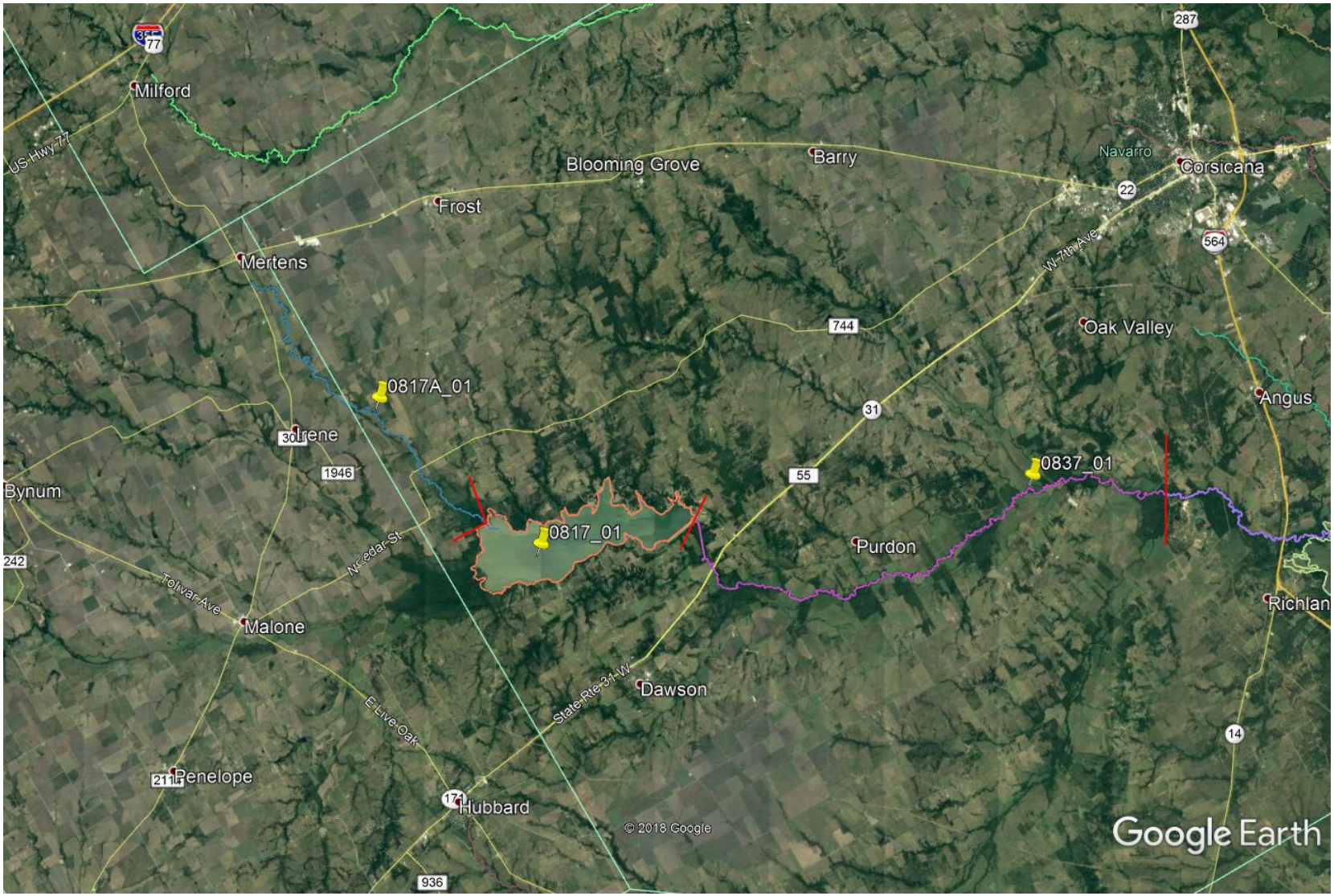


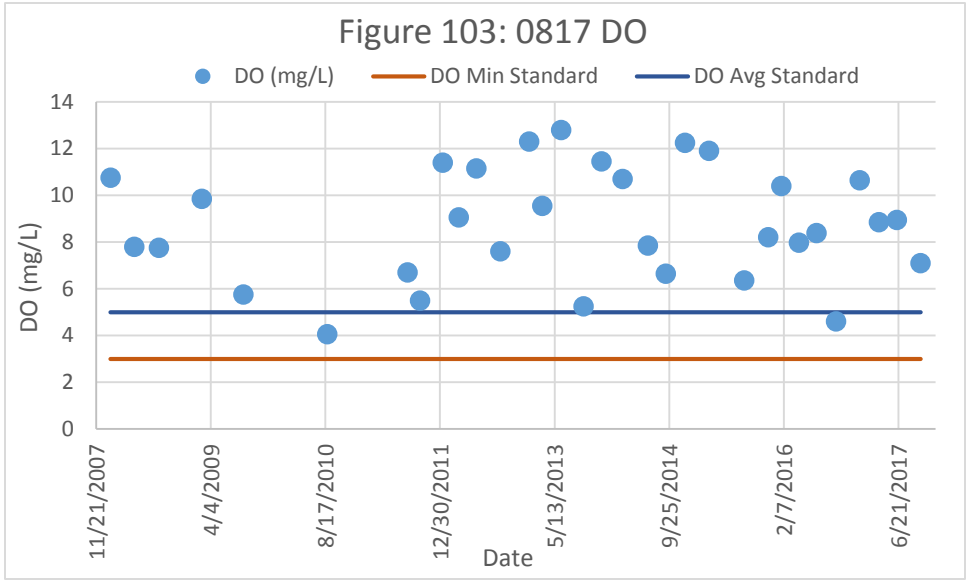
Figure 102: 0814_01 & 0814_02 *E. coli* vs. Flow

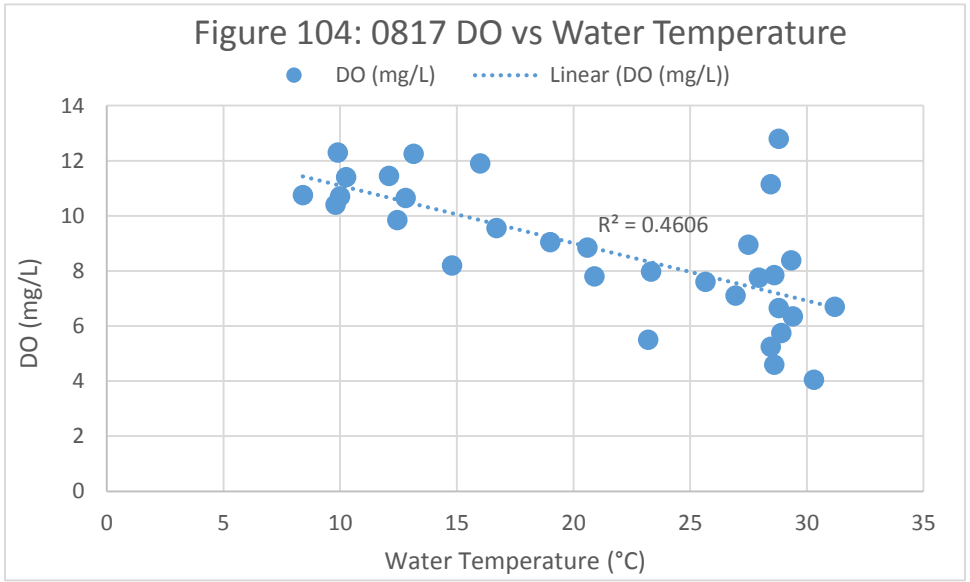


0817 – Navarro Mills Lake

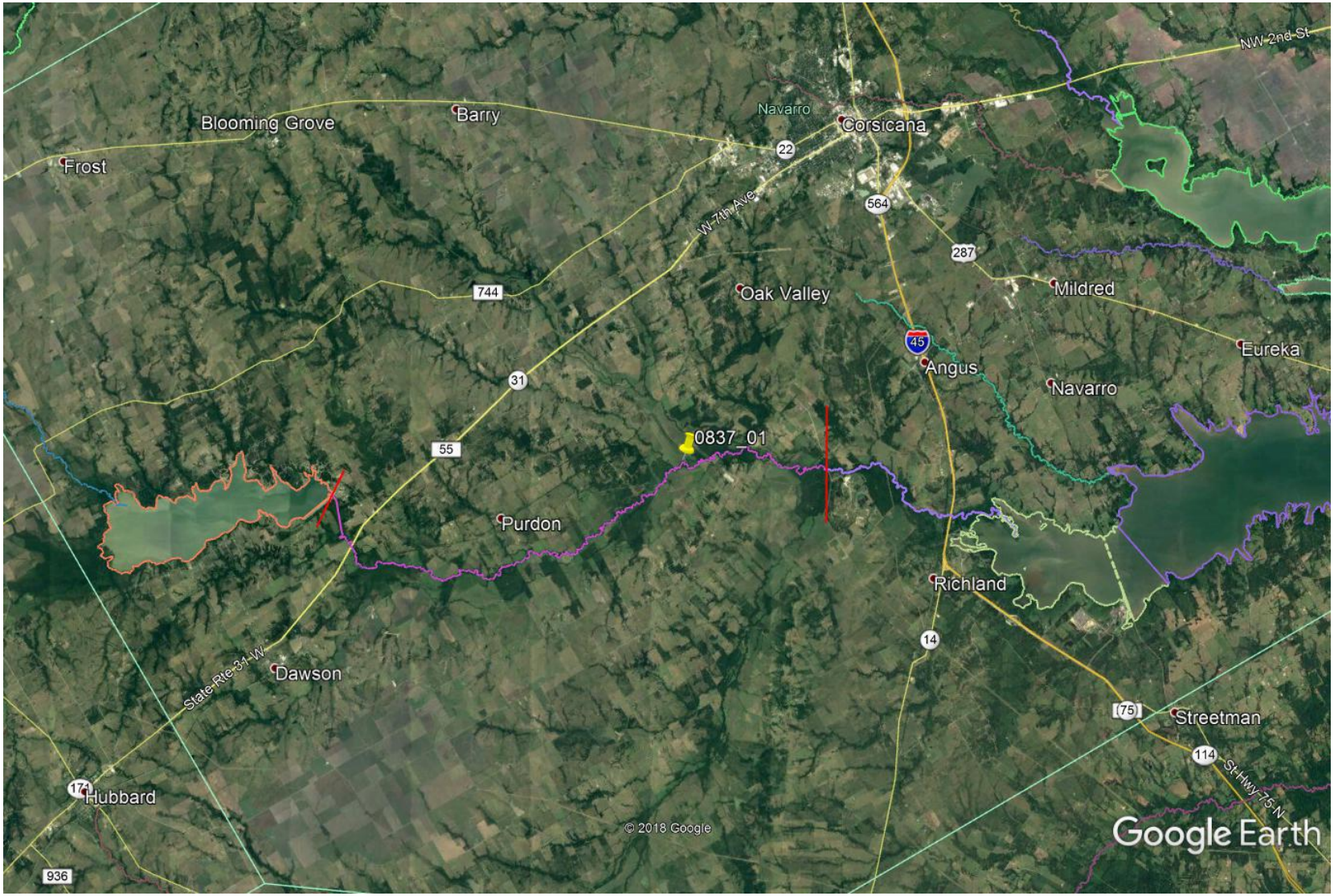


This reservoir was found to have concerns for Aquatic Life Use due to depressed DO by the 2014 IR. More recently collected data shows DO levels have increased (see Figure 103). As discussed in the 2015 Basin Summary Report, there is still a relatively strong relationship between DO and water temperature (see Figure 104).



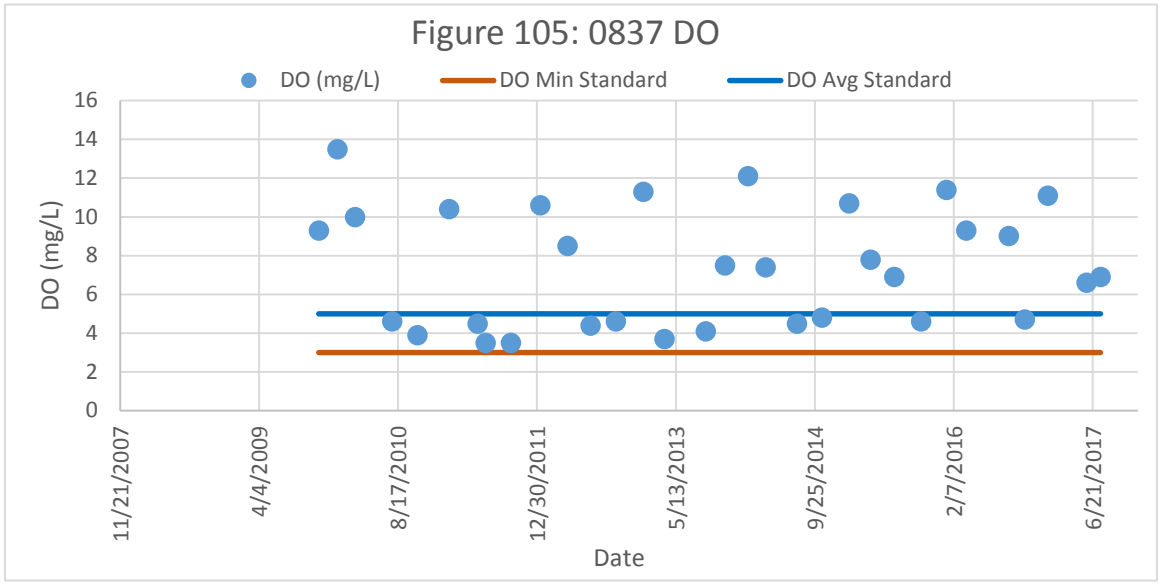


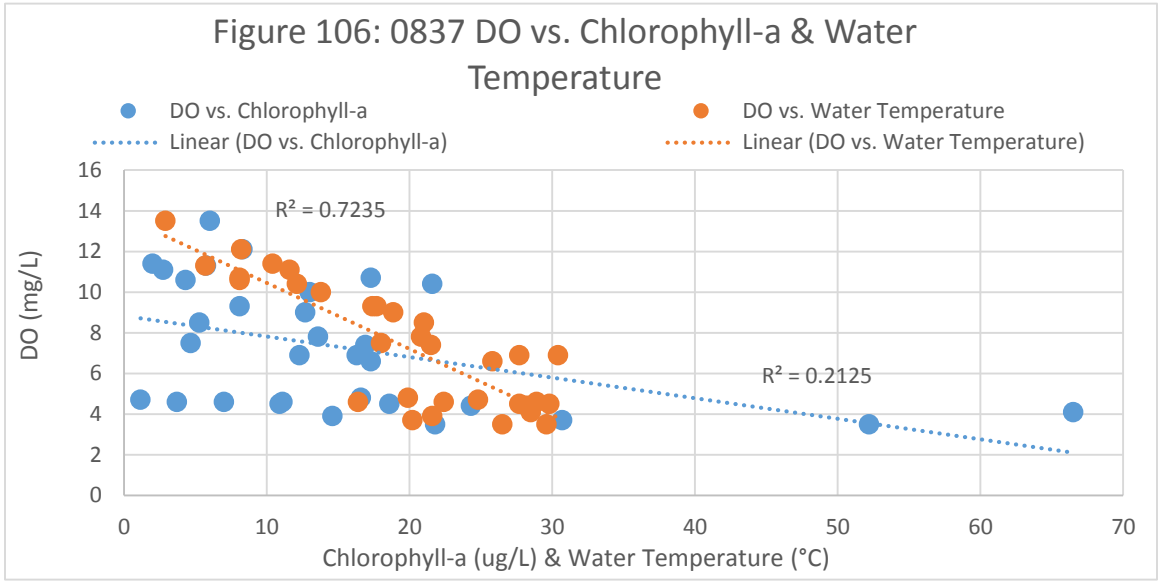
0837 – Richland Creek Above Richland-Chambers Reservoir



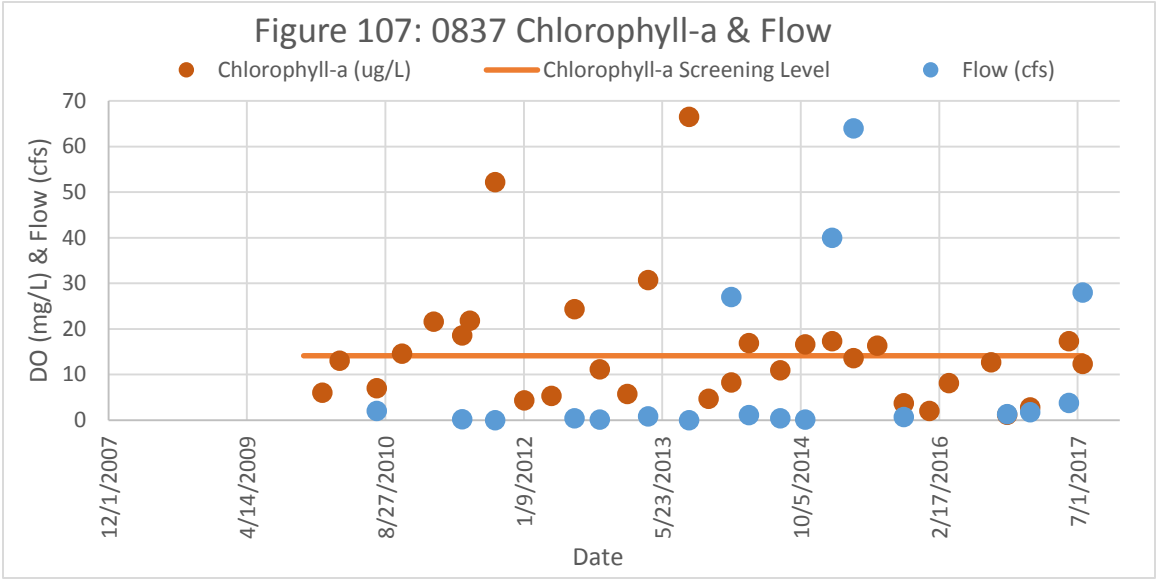
This segment was found to be not supporting the Aquatic Life Use due to depressed DO by the 2015 in-house 5-year assessment. As shown in Figure 105, DO levels frequently fall below the standard. However, there appears to be a slight increase in the lowest values over the past few years. DO is fairly well correlated with both water temperature and chlorophyll-a as shown in Figure 106. This indicates that the seasonal increases in chlorophyll-a and water temperatures may be having negative impacts in DO in the stream.

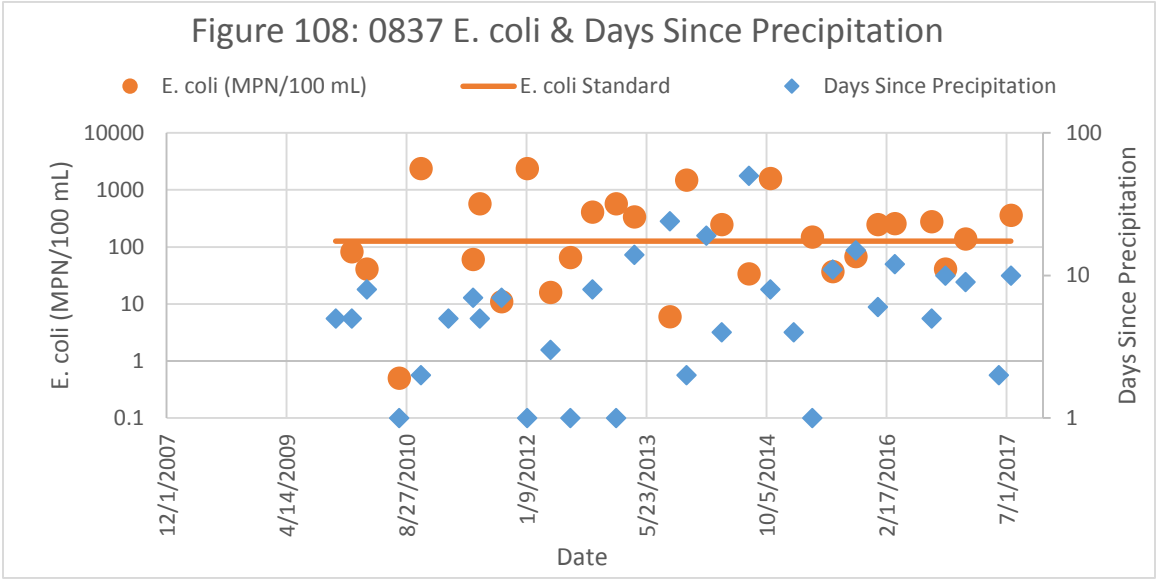
This stream had concerns for chlorophyll-a as identified by the 2014 IR. As shown in Figure 107, concentrations frequently exceed the screening level. As discussed in the 2015 Basin Summary Report, chlorophyll-a was fairly well correlated with TKN. Based on the rural nature of the watershed, it is believed that livestock and agricultural fertilizers are contributing nitrogen to the stream. This, in conjunction with the low flows in the stream, may be providing algal populations with the nutrients and residence times needed to increase.



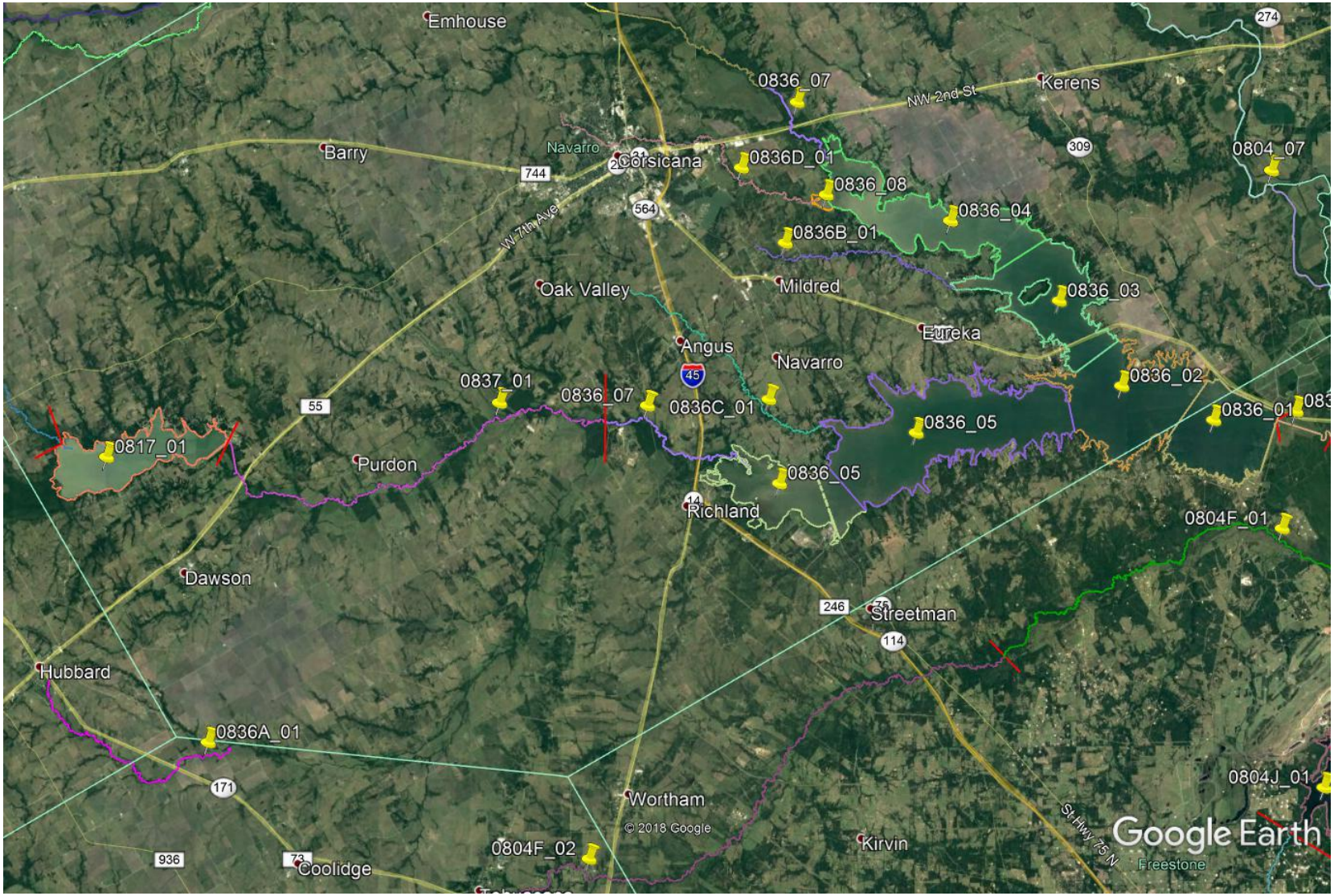


Richland Creek was found to have concerns for the Contact Recreation Use due to elevated *E. coli* levels by the 2015 in-house 5-year assessment. Current data shows that *E. coli* levels are commonly above the standard. The *E. coli* geomean for this segment is 126 MPN/100 mL which is the same as the standard. As shown in Figure 108, most, but not all, of the highest values occur during periods of recent rainfall. This indicates that the issue is largely runoff related. As the watershed for this stream is mainly agricultural with some wooded areas, livestock and wildlife may be the source for *E. coli* in the stream. High *E. coli* values during dry weather could potentially be explained by livestock and wildlife entering the stream for watering.





0836 – Richland-Chambers Reservoir



0836_07 was found to be not supporting the Aquatic Life Used due to depressed DO by the 2015 in-house 5-year assessment. As shown in Figure 109, several DO data points were reported at or below the standards. The site used to represent this portion of the reservoir is in the very upper reaches of the assessment unit. As noted in the 2015 Basin Summary Report, when lake levels are lower than the normal conservation pool elevation of 315 feet, DO levels decrease. Based on Google Earth imagery (see Image 24), this site is disconnected from the reservoir at low reservoir elevations. Site 16721 is used to represent assessment unit 0836_07. The lake elevation at the time of this image was 305 ft. There appears to be a structure just downstream of the bridge that is pooling up water on the upstream side of the bridge. Low flows and standing water could result in algal blooms that are negatively impacting the DO levels at this site. However, there are no available chlorophyll-a data to evaluate this hypothesis.

0836_02, 0836_03, 0836_04, and 0836_05 were identified as having concerns for chlorophyll-a by the 2014 IR or the 2015 in-house 5-year assessment. Figure 110 shows that much of the more recent data are reported above the screening level. However, as discussed for other reservoirs in this report, it appears that there is a decreasing trend in the data for the last few years. This decrease in chlorophyll-a coincides with the recovery of reservoir levels during the floods of 2015 and 2016. Shorter residence times in the reservoir may be causing the decrease in algal populations.

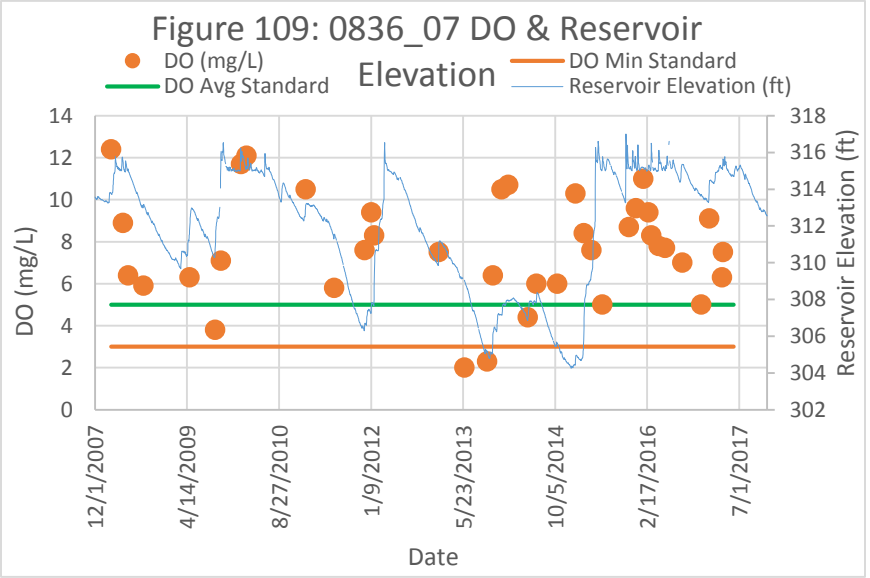
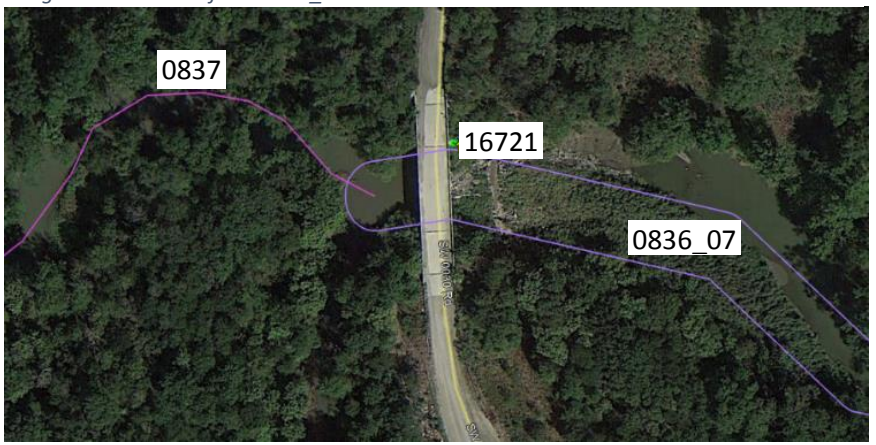


Image 24: Transition from 0836_07 to 0837



0836_07 was identified as having concerns for elevated nutrient levels by the 2015 in-house 5-year assessment. As shown in Figure 111, nutrient concentrations remain elevated. Many of the high values are reported at higher lake elevations which indicates that nutrients are being washed in during precipitation events.

0836_07 was also identified as not supporting the Contact Recreation Use due to elevated *E. coli* levels by the 2015 in-house 5-year assessment. The current geomean is 1575 MPN/100 mL which exceeds the standard of 126 MPN/100 mL. As shown in Figure 112, most of the highest reported values occur during recent precipitation events. The watershed upstream of this site is mostly agriculture and pasture land so livestock are the likely source of *E. coli* in this assessment unit.

Figure 110: 0836 Chlorophyll-a & Reservoir Elevation

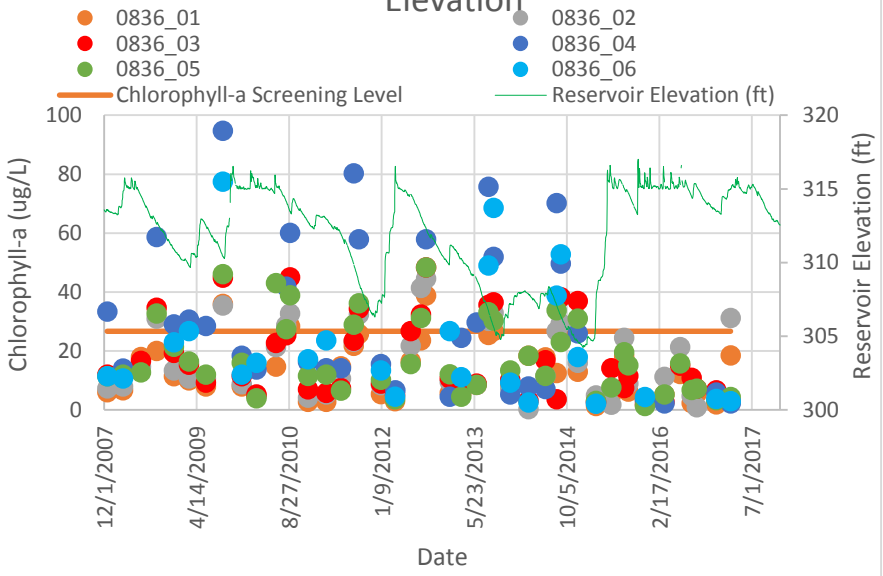


Figure 112: 0836_07 E. coli vs. Days Since Precipitation

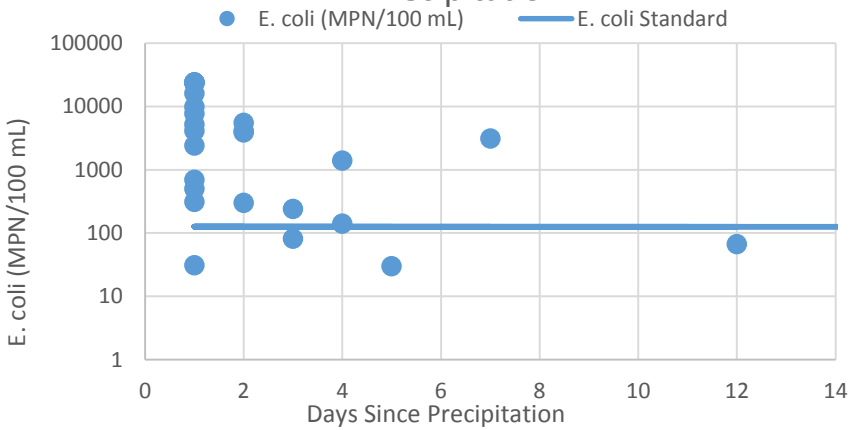
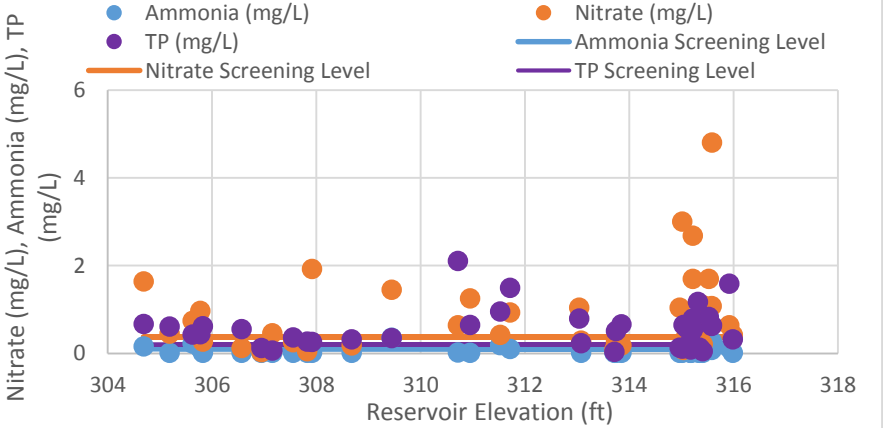
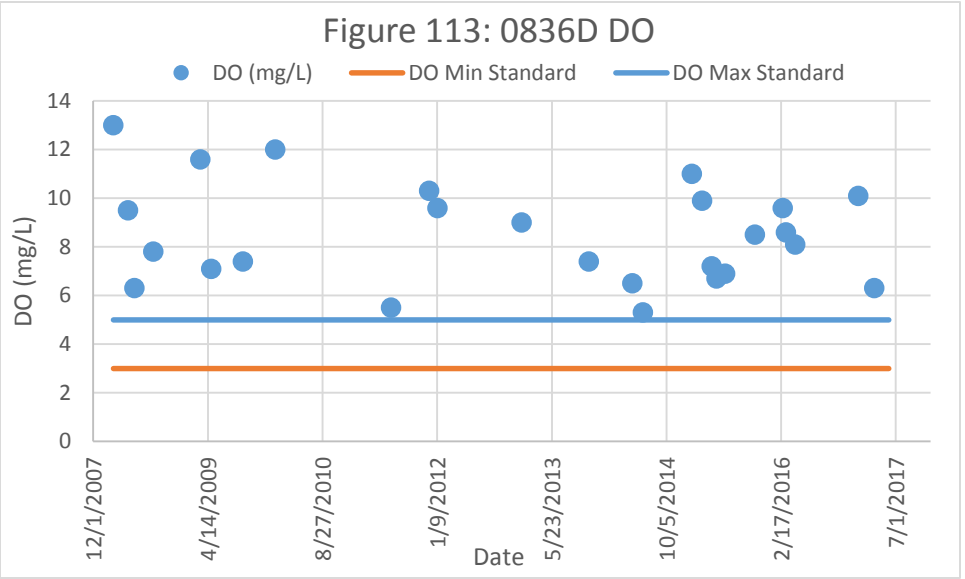


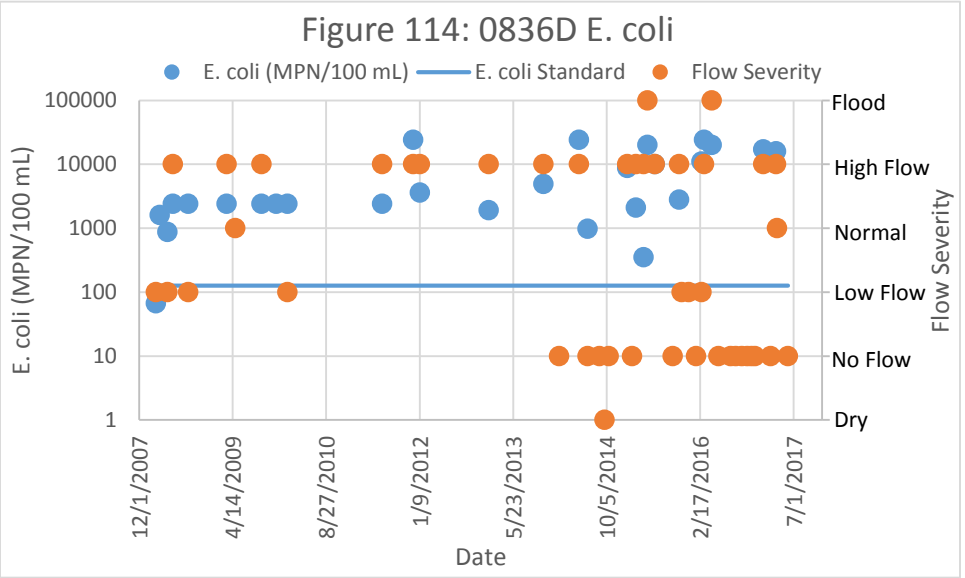
Figure 111: 0836_07 Nitrate, Ammonia, & TP vs. Reservoir Elevation



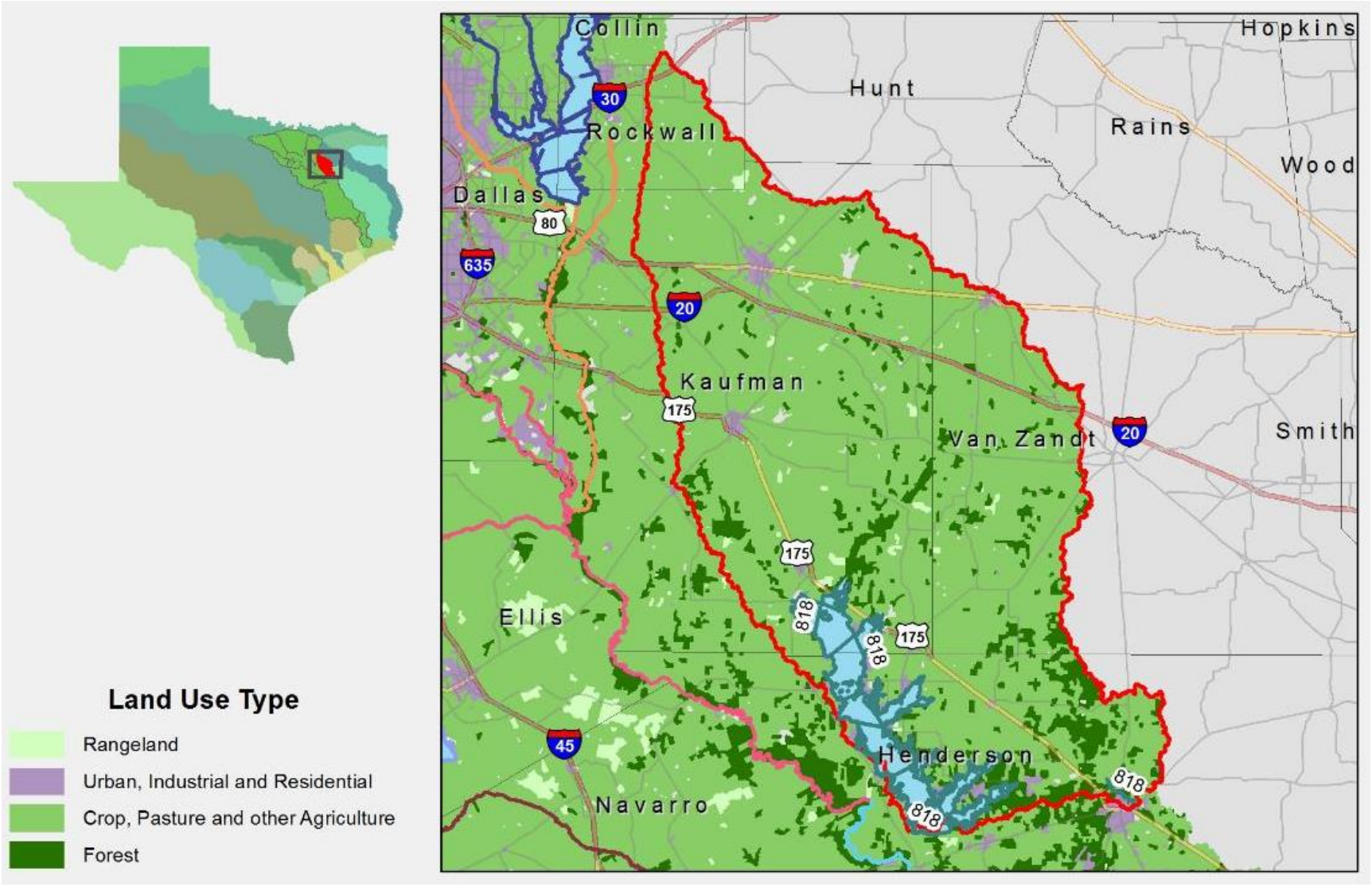
0836B, 0836C, and 0836D were found to have concerns for Aquatic Life Use due to depressed DO by the 2014 IR. The findings were carried forward from previous assessments for 0836B and 0836D as there was no current data available at the time the 2014 IR. Based on more recently collected data for 0836D, DO levels have increased to levels above the standards (see Figure 113).

0836D was found to be not supporting the Contact Recreation Use due to elevated levels of *E. coli* by the 2015 in-house 5-year assessment. The current geomean is 3789 MPN/100 mL which exceeds the standard of 126 MPN/100 mL. Figure 114 shows that all *E. coli* values, except for one, were reported above the standard. Many of the highest values were collected within one or two days after a precipitation event and at high flows. However, flow data are not available at the higher flow severities as this data is difficult to collect without specialized equipment. The 2015 Basin Summary Report notes that this watershed has agricultural and pasture land to the north and the City of Corsicana to the south. This indicates that likely sources of bacteria are pets and livestock.

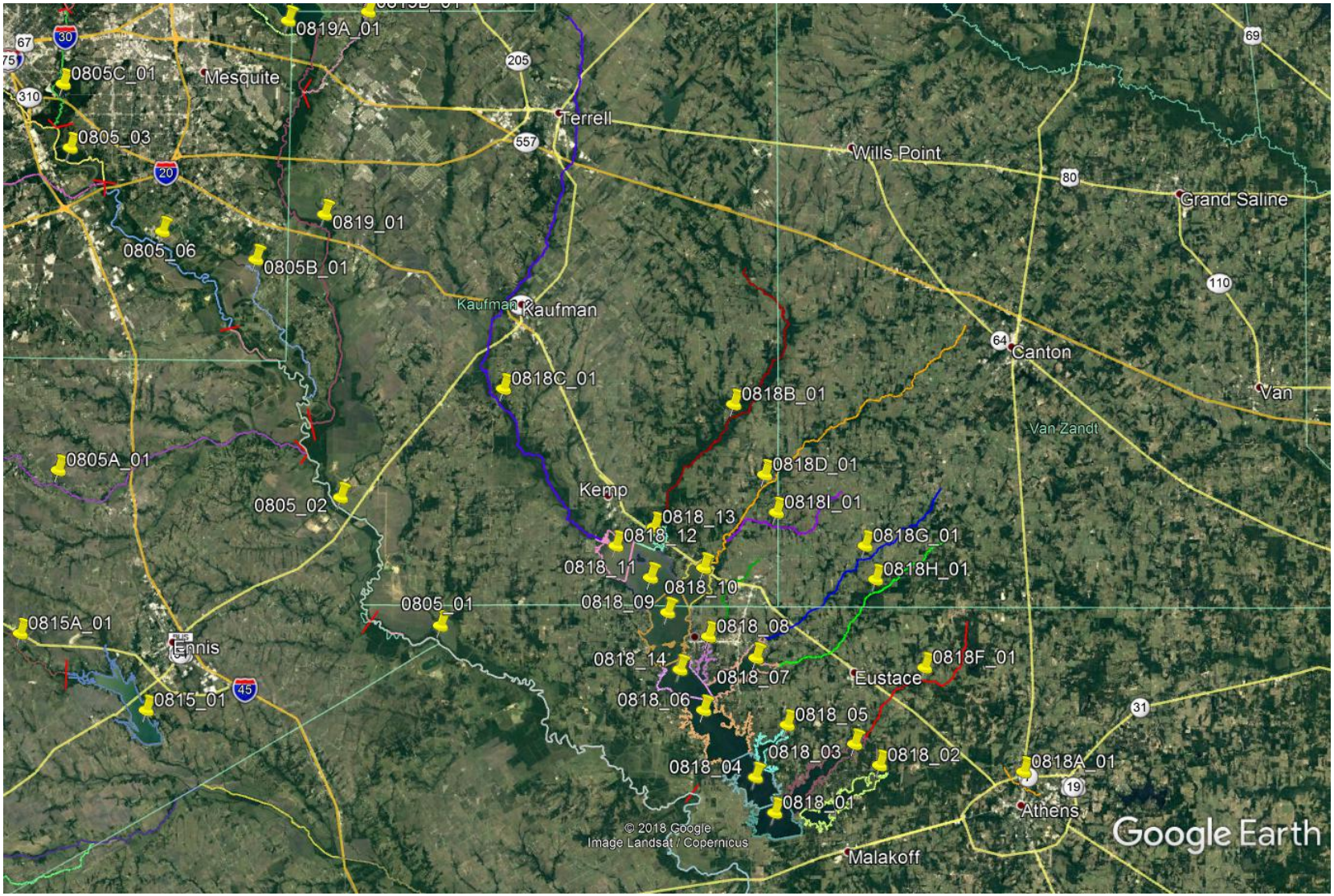




CEDAR CREEK

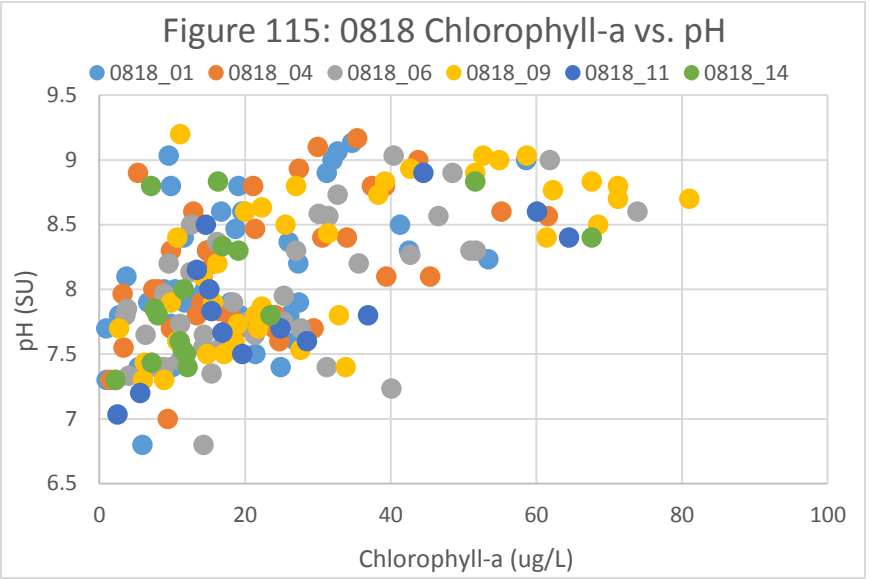

Land Use Type
Rangeland
Urban, Industrial and Residential
Crop, Pasture and other Agriculture
Forest
Collin
Hunt
Hopkins
Rockwall
Rains
Wood
Dallas
Kaufman
Van Zandt
Smith
Ellis
Henderson
Navarro
30
80
635
20
175
45
818

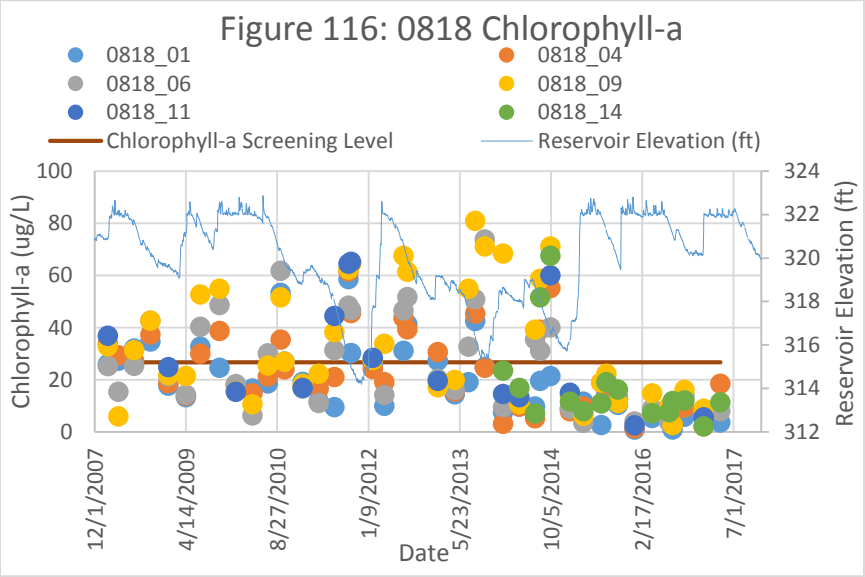
0818 – Cedar Creek Reservoir

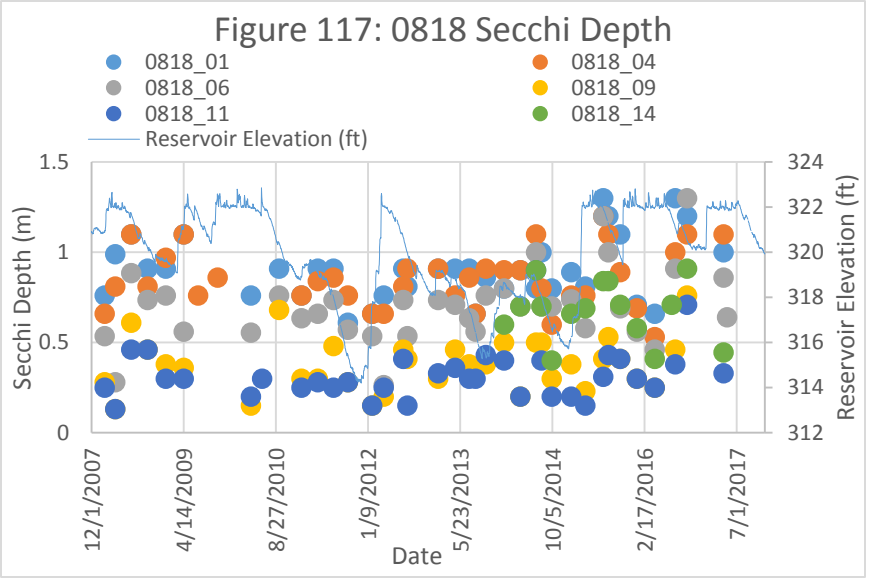


Concerns for ammonia were identified in 0818_02, 0818_05, 0818_08, and 0818_13 and for TP 0818_13 by the 2014 IR. There is no current data for these assessment units to further evaluate these concerns.

Several portions of 0818 were identified as having concerns for chlorophyll-a in addition to not supporting the General Use due to high pH by the 2014 IR (see Figure 115). As noted in the 2015 Basin Summary Report, Cedar Creek Reservoir has a pH standard of 6 to 8.5 standard units (SU) while all other waterbodies in the basin have a standard of 6.5 to 9 SU. Chlorophyll-a affects pH levels during the course of photosynthesis and respiration, with pH levels increasing during the day when photosynthesis takes place. While much of the chlorophyll-a data are reported above the screening





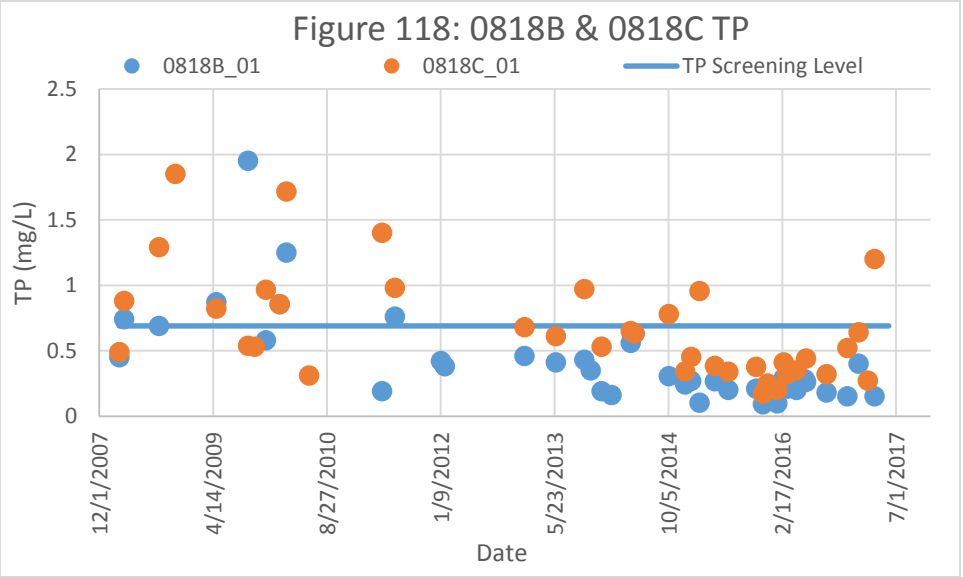


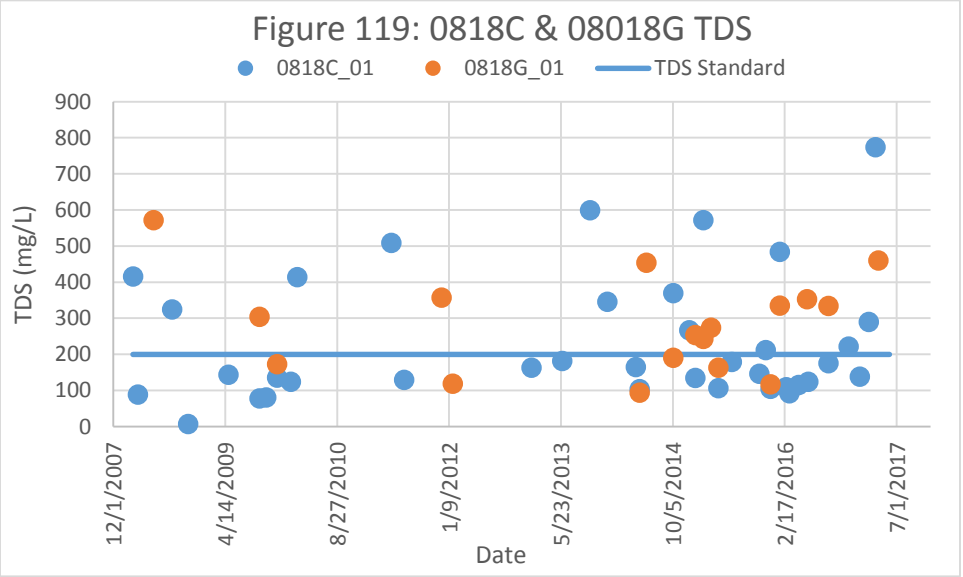
level, there is a distinct decrease in the last few years of the data set (see Figure 116). As discussed for other reservoirs in this report, this decrease coincides with the recovery of lake levels during the floods of 2015 and 2016. This may be due to an increase in turbidity in the reservoir as shown by Secchi depths in Figure 117. Flood inflows to the reservoir can bring in suspended materials from the watershed. These suspended materials reduce the clarity of the reservoir which reduces algal cells' ability to reproduce.

A concern for TP was identified for 0818B and 0818C by the 2015 in-house 5-year assessment. Based on more recently collected data, concentrations of TP in 0818B have decreased. However, TP remains somewhat elevated in 0818C (see Figure 118).

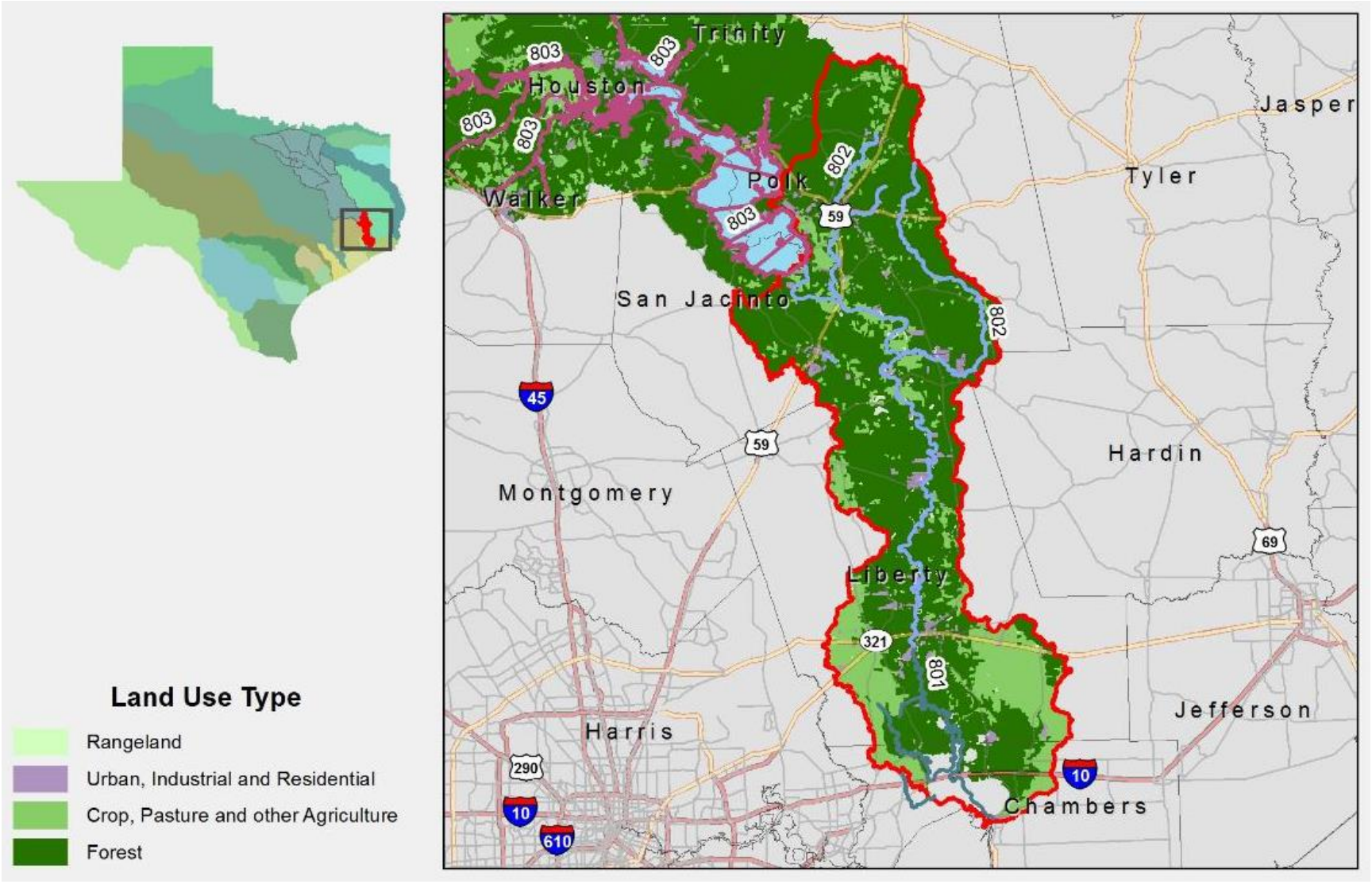
Concerns for TDS were identified in 0818C and 0818G by the 2015 in-house 5-year assessment. As shown in Figure 119, TDS levels remain elevated in these streams.

0818B, 0818C, 0818D, and 0818G were found to be not supporting the Contact Recreation Use due to elevated levels of *E. coli* by the 2015 in-house 5-year assessment. The geomeans for these segments are 2022, 1418, 2394, and 4150 MPN/100 mL, respectively, which exceed the standard of 126 MPN/100 mL. As expected, the highest values coincide with recent precipitation indicating that these are runoff related issues.

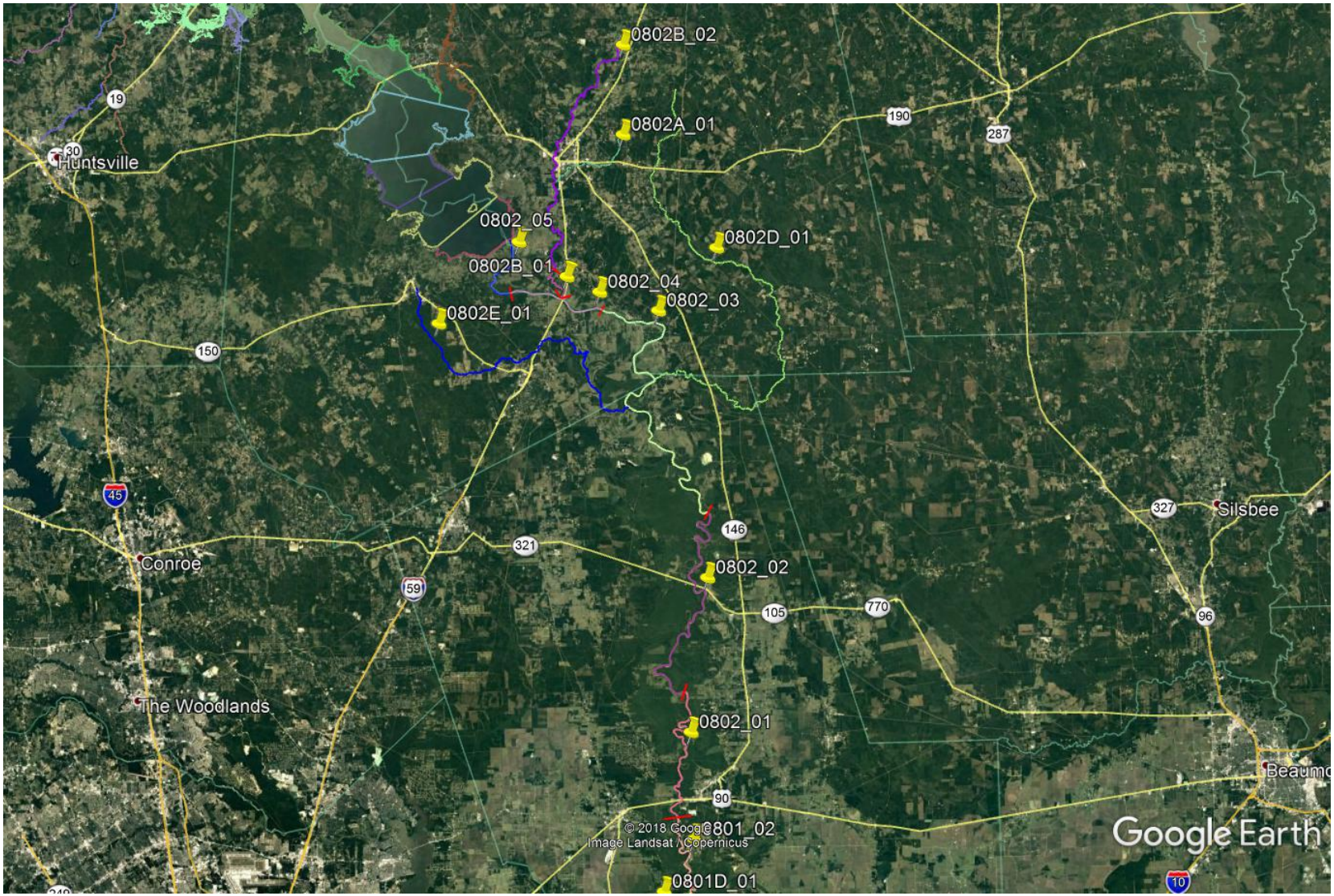




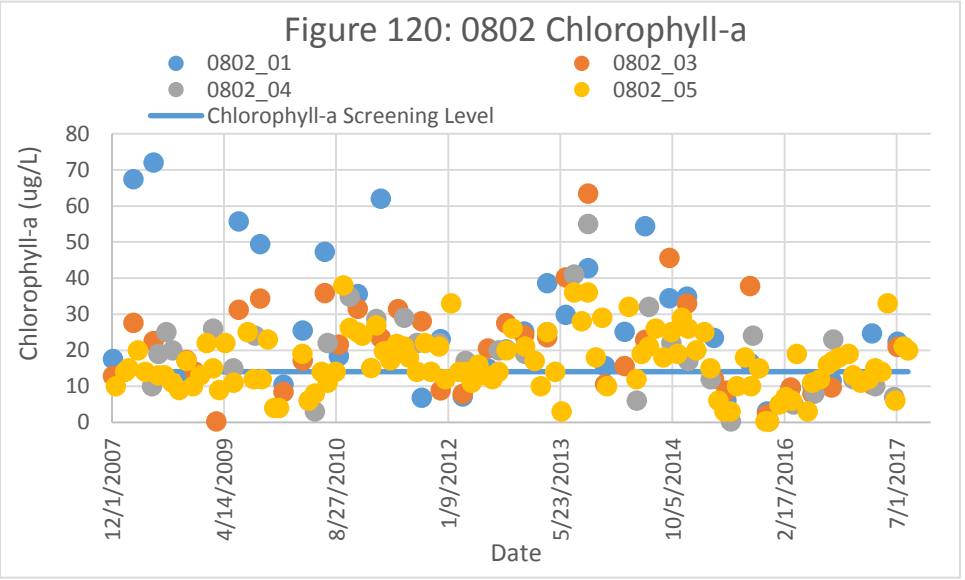
LOWER TRINITY RIVER



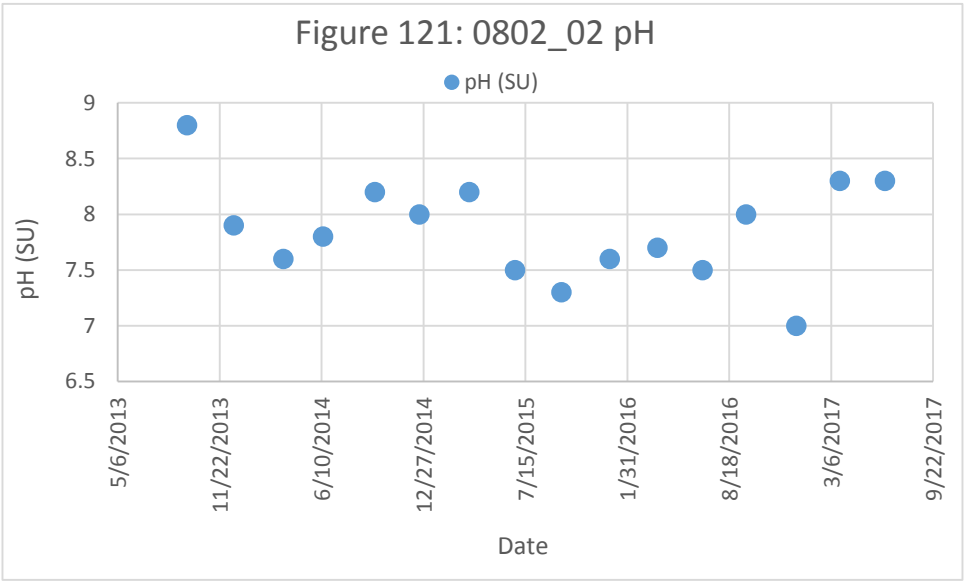
0802 – Trinity River Below Lake Livingston



All portions of 0802 were found to have concerns for elevated chlorophyll-a levels by the 2014 IR. As shown in Figure 120, chlorophyll-a levels frequently exceed the screening level. As noted in the 2015 Basin Summary Report, it is believed that these elevated chlorophyll-a levels are driven by releases from Lake Livingston which is hypereutrophic and has concerns for chlorophyll-a. In addition, this segment of the river is rather wide and has very little overhanging tree canopy. This allows plenty of sunlight to the surface of the river and aid in algal reproduction.



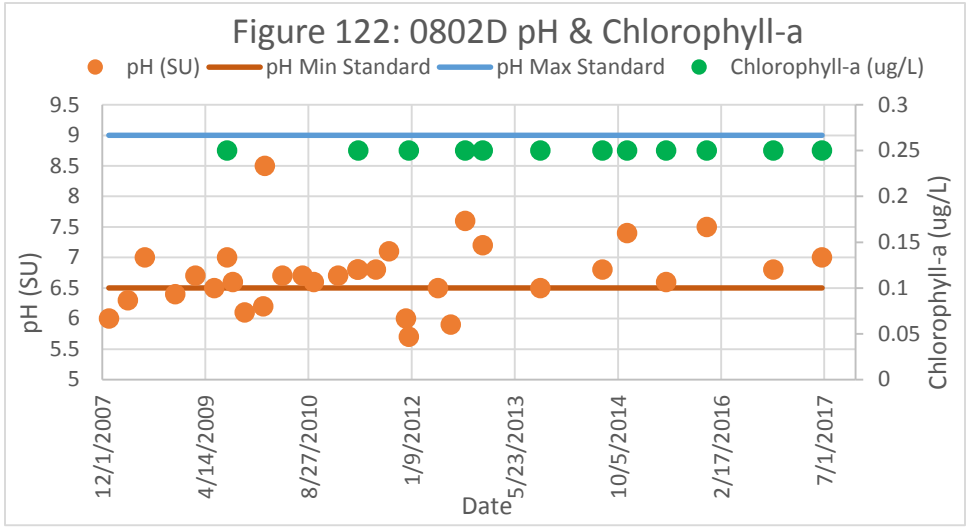
High pH concerns for identified for 0802_02 by the 2014 IR. Recent data shows that pH levels have decreased and all data are reported between the standards of 6.5 to 9 SU (see Figure 121).



0802D was noted as not supporting the General Use due to low pH levels by the 2015 in-house 5-year assessment. Figure 122 shows that pH in this segment remains low. However, the most recent data has increased above the minimum pH standard. Chlorophyll-a is consistently very low so the issue is not related to excessive algal growth. As described in the 2015 Basin Summary Report, this stream drains an area of pine forest and is tannin stained (see Image 25). The humic acid that stains the water is the likely cause for low pH levels in this stream.

0802E was found to be not supporting the Contact Recreation Use due to elevated *E. coli* by the 2015 in-

house 5-year assessment. Based on more recently collected data, *E. coli* levels remain elevated (see Figure 123). The geomean for this data is 216 MPN/100 mL. Flow has been collected during sampling events since 2014 and shows that *E. coli* increases with flow. This indicates that the issue may be related to runoff. As noted in the 2015 Basin Summary Report, the upstream watershed is heavily wooded with some rural communities. Therefore, wildlife and failing septic systems may be the source of *E. coli* in this stream.



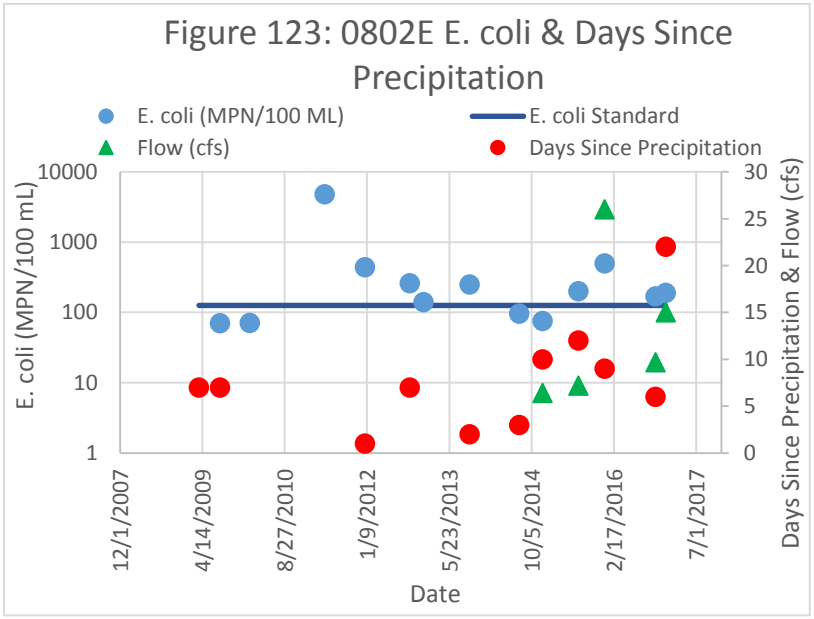
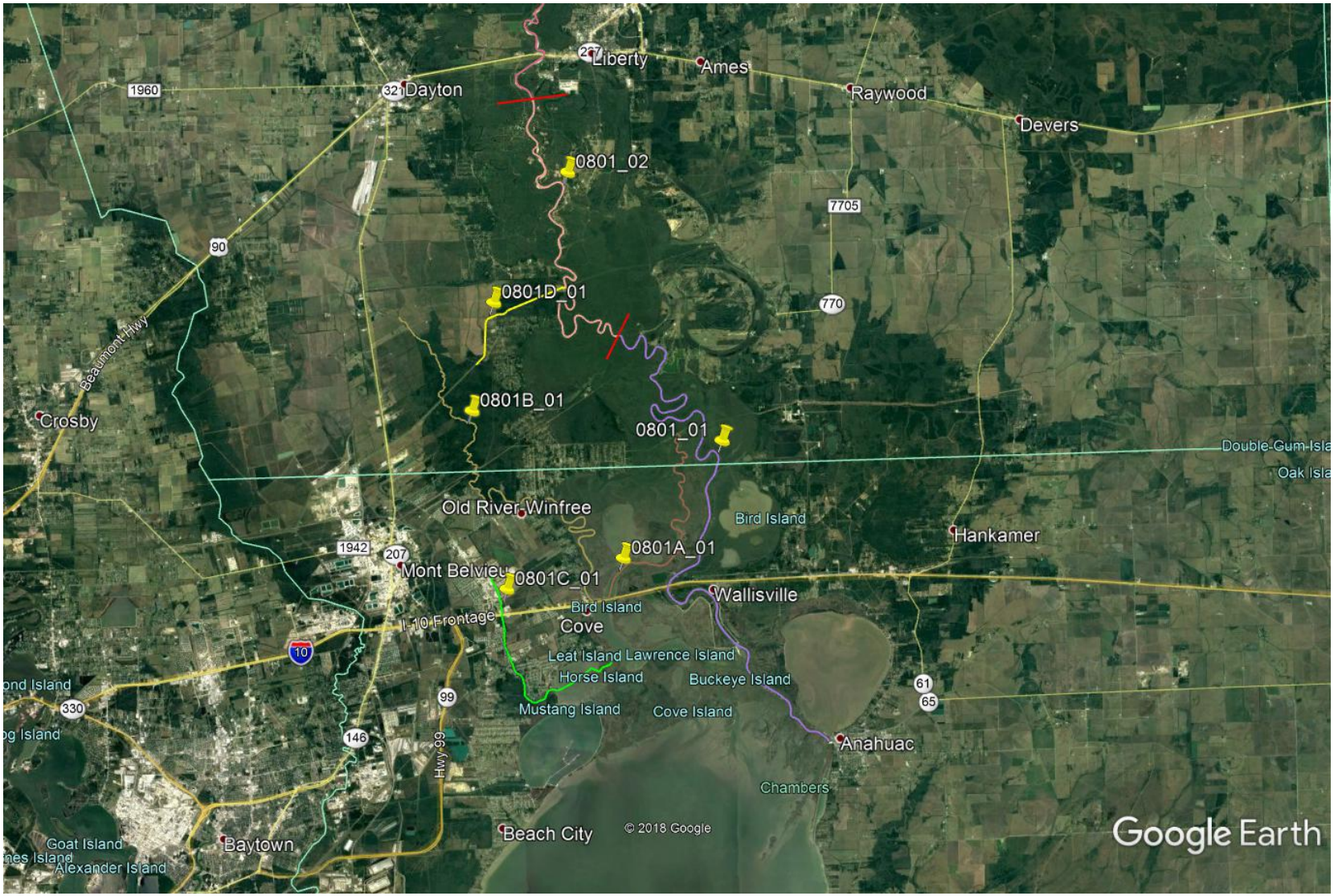


Image 25: Confluence of 0802D and 0802_03

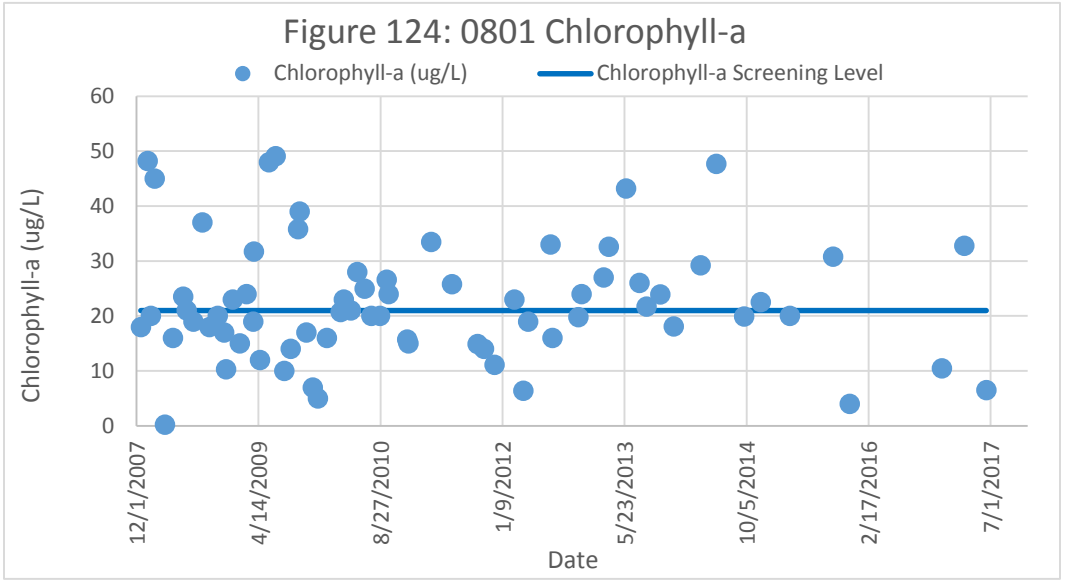
0801 – Trinity River Tidal

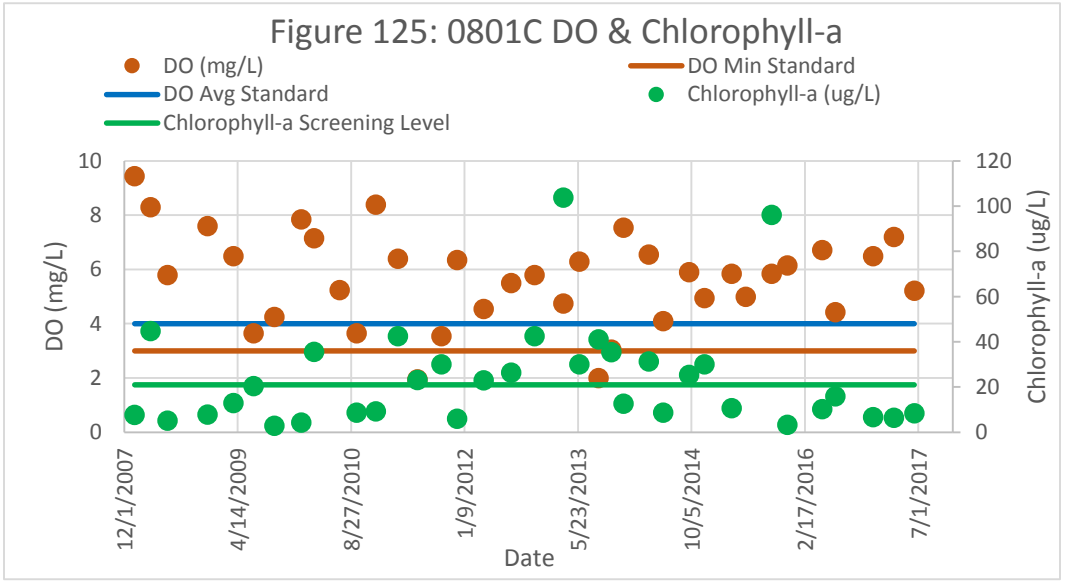


This segment was found to have concerns for chlorophyll-a by the 2014 IR. Figure 124 shows that chlorophyll-a levels remain elevated. As noted in the 2015 Basin Summary Report, because 0801 is downstream of Lake Livingston and segment 0802, this is to be expected. Like 0802, this segment is wide with very little overhead tree canopy which allows sunlight to feed algal growth.

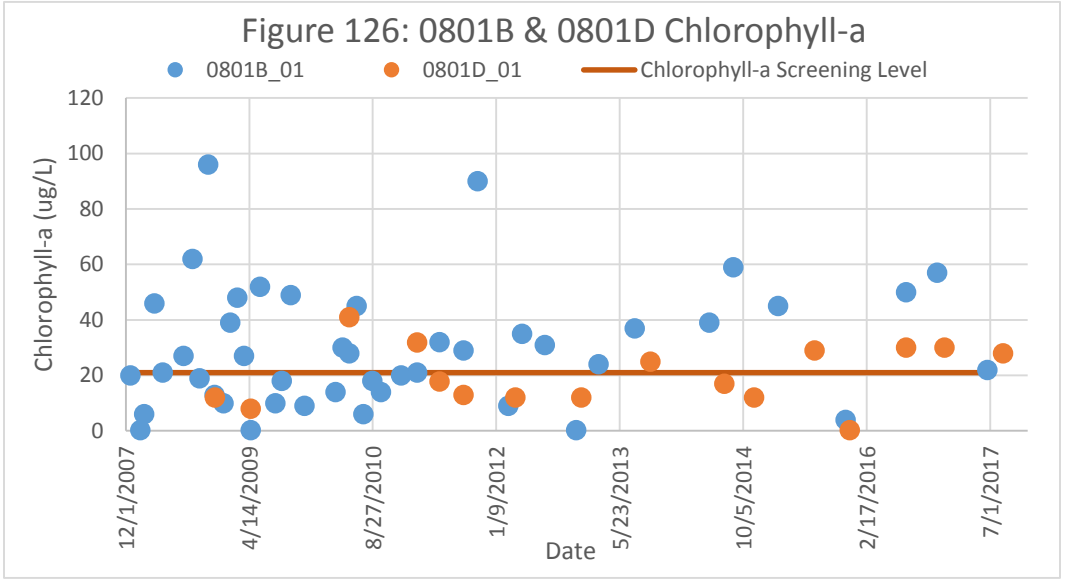
Concerns for depressed DO and elevated chlorophyll-a were identified for 0801C by the 2014 IR. Chlorophyll-a levels remain elevated (see Figure 125). DO levels have increased in recent years. These increases appear to coincide with decreases in chlorophyll-a in the last few years of the data set.

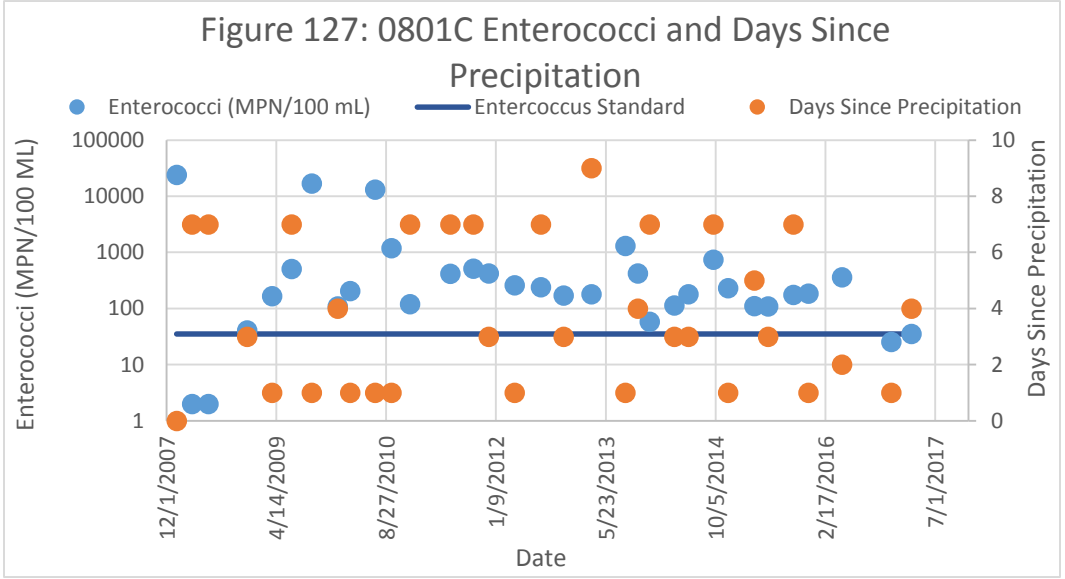
0801B and 0801D were also identified as having concerns for chlorophyll-a by the 2014 IR and the 2015 in-house 5-year assessment, respectively. As shown in Figure 126, chlorophyll-a in these segments are still elevated. The 2015 Basin Summary Report notes that the most likely cause for the elevated levels of chlorophyll-a seen in these segments are long residence times and light penetration which allows algae to reproduce. In addition, 0801D is a canal that receives its water from segment 0801 which has concerns for chlorophyll-a as discussed above.





0801C was found to be not supporting the Contact Recreation Use due to elevated levels of *Enterococci* by the 2014 IR. More recently collected data shows that *Enterococci* levels are commonly reported above the standard (see Figure 127). The *Enterococci* geomean is 168 MPN/100 mL which exceeds the standard of 35 MPN/100 mL. The highest reported values in this dataset occur during recent precipitation events which indicates that the issue is largely runoff related. However, there are moderately high values reported when there has not been recent precipitation which may indicate that there are also continuous sources of *Enterococci* to this segment. The watershed for this segment is largely residential so failing infrastructure may be introducing bacteria into the stream.





Appendices

Glossary

A

algae - Aquatic plants that are either attached or free floating in the water. Can affect DO and PH levels through photosynthesis and respiration.

algal blooms - Increase in algal population which can be caused by excessive nutrients and can lead to DO depletion.

ammonia (NH3) - Substance found in water and wastewater that is a nutrient for algal growth. Sources can include human and animal waste and fertilizers.

C

chloride (Cl) - One of the major ions in water and wastewater. Concentrations can be increased by industrial processes. High chloride concentrations can affect metallic objects and growing plants.

chlorophyll-a - Photosynthetic pigment that is found in all green plants. The concentration of chlorophyll-a is used to estimate phytoplankton biomass in surface water.

conventionals - A grouping of water chemistry parameters which does not include field, nutrients, bacteria, or metals. Includes parameters such as solids, sulfate, turbidity, chlorophyll-a, hardness, and alkalinity.

D

dissolved oxygen (DO) - The measure of the amount of oxygen that is freely available in water. It is vital to fish and other aquatic life. DO is widely accepted as the single most important indicator of a water body's ability to support desirable aquatic life.

(DSHS) Texas Department of State Health Services - ecoregion - State agency which conducts tissue surveys and issues fish consumption bans in order to protect the public health as part of their many state health services.

E

Environmental Protection Agency (EPA) - Federal regulatory agency responsible for protection of human and environmental health.

Escherichia coli (E. coli) - A gram negative rod-shaped bacterium that can be an ideal indicator of environmental samples for fecal contamination. 0157:H7 is the illness causing strain of E. Coli.

eutrophic - Nutrient rich body of water which typically has high algal concentration and poor water quality.

F

flow - Quantity of water moving through a stream at a given point measured in cubic feet per second.

G

Geographic Information System (GIS) - Used in special analysis of water quality and data.

H

hypereutrophic - highest classification of eutrophication.

L

legacy pollutants - Contaminants which have been banned from production sale or use but which may persist in the environment.

M

most probable number (MPN) - Unit for E. coli values based on a statistical range for the analytical method.

N

nitrate (NO3) - The fraction of nitrogen that is readily available for plants and algae. High levels of nitrate in drinking water can cause methemoglobinemia, especially in infants.

nitrite (NO2) - Reduction of nitrate. Nitrite is the intermediate that oxidizes iron in the blood to methemoglobin and reduces oxygen-carrying capacity.

non-point source (NPS) - All sources of pollution not discharged from a pipe, includes runoff, atmospheric deposition, and precipitation.

North Texas Municipal Water District (NTMWD) - A conservation and reclamation district and political subdivision of the State of Texas. Authorized to acquire, treat, and distribute potable water, and to collect, treat and dispose of wastes, both liquid and solid, in order to reduce pollution, conserve and develop the natural resources of Texas.

nutrient - Any substance used by living things to promote growth.

O

orthophosphate (OP) - The inorganic fraction of phosphorous most commonly found in water, generally the limiting nutrient for plant growth.

P

photosynthetic - The process of photosynthesis which is the conversion of sunlight and carbon dioxide and water into carbohydrates used for plant growth.

polychlorinated biphenyl (PCB's) - Highly toxic class of organic compounds that were banned in by the United States Congress in 1979. PCB's were widely used as dielectric fluids in transformers, capacitors, and coolants.

S

screening level - Water quality criterion for parameters which do not have standards.

sediment - Bottom layers composed of particles of sand, clay, silt, and plant or animal matter carried in water which are deposited in reservoirs and slow-moving areas of streams and rivers.

standard units (SU) - Unit of measurement for pH. Usually ranges from 0 to 14 with 7 as neutral.

subwatershed - A portion of a larger watershed.

sulfate (SO4) - A naturally occurring substance commonly found in the water column that may cause digestive issues when in drinking water at high concentration levels.

T

Tarrant Regional Water District (TRWD) - A raw water supplier for the north central Texas area covering an eleven-county area. Maintains dams for reservoirs and more than 150 miles of pipeline. Also manages a flood control system in Tarrant county.

Texas Commission on Environmental Quality (TCEQ) - Environmental Agency for the State of Texas.

total dissolved solids (TDS) - The total amount of inorganic and organic material dissolved in water.

total phosphorus (TP) - The total of all phosphorus and can lead to eutrophication.

total maximum daily load (TMDL) - A value of the maximum amount of a pollutant that a body of water can receive and still meet water quality standards.

tributary - A stream or river that flows into a larger stream or river.

trophic state index (TSI) - Quantification of the eutrophication of reservoirs ranging from oligotrophic with low nutrient levels hyper eutrophic with high nutrient levels.

turbidity - A measure of water clarity which can be due to algae and other suspended particles.

U

United States Geological Survey (USGS) - Federal scientific research agency that gathers information on biology, geography, geology, and hydrology.

W

watershed - The area of land from which precipitation drains to a particular stream, river, or lake.

waste water treatment facility (WWTF) - Regional or local facility that treats municipal and industrial waste to acceptable levels which is then released into receiving waterbodies.

Segment/Assessment Unit Dictionary

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Tidal Stream	**0801**	**Trinity River Tidal - from the saltwater barrier, which is 5.5 km (3.4 mi) downstream of IH 10, in Chambers County to a point 3.1 km (1.9 mi) downstream of US 90 in Liberty County**	
	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	10892, 10893, 15037, 20839
Tidal Stream	0801A	Lost River - From IH 10 in Chambers County to approx 6 KM upstream of confluence with John Wiggins Bayou.	
	0801A_01	From IH 10 in Chambers County to approx 6 KM upstream of confluence with John Wiggins Bayou.	17879, 17880, 17881
Tidal Stream	0801B	Old River - From IH 10 in Chambers County to approx 9 mi upstream of confluence with Cherry Point Gully.	
	0801B_01	From IH 10 in Chambers County to approx 9 mi upstream of confluence with Cherry Point Gully.	18360
Tidal Stream	0801C	Cotton Bayou - From the confluence of Cotton Lake southeast of Mont Belvieu in Chambers County upstream to a point approx 1 mi north of IH 10 in Chambers County	
	0801C_01	From the confluence of Cotton Lake southeast of Mont Belvieu in Chambers County upstream to a point approx 1 mi north of IH 10 in Chambers County	17628, 17629, 17632, 17633, 18696, 18697, 20003
Tidal Stream	0801D	Lynchburg Canal - Lynchburg Canal from confluence with Trinity River Tidal to confluence with Cedar Point lateral	
	0801D_01	From confluence with Trinity River Tidal upstream to confluence with Big Caney Creek.	16148
Perennial	**0802**	**Trinity River Below Lake Livingston - From a point 3.1 km (1.9 mi) downstream of US 90 in Liberty County to Livingston Dam in Polk/San Jacinto County**	
	0802_01	Lower 17 miles of segment	10894
	0802_02	Approx. 9 miles upstream to approx. 15 miles downstream of SH 105	10895
	0802_03	11 miles upstream to approx. 9 miles downstream of FM 787	10896
	0802_04	5 miles upstream to 11 miles downstream of US 59	10897
	0802_05	Upper 6 miles of segment	10898, 16998
Perennial	0802A	Choates Creek - From the confluence with Long King Creek upstream to the confluence with an unnamed tributary approx 3.0 km upstream of SH 146 near the City of Livingston	
	0802A_01	From the confluence with Long King Creek upstream to the confluence with an unnamed tributary approx 3.0 km upstream of SH 146 near the City of Livingston	10690, 10691, 10692
Perennial	0802B	Long King Creek - From the confluence with the Trinity River upstream to the confluence with an unnamed tributary approx 1.2 km upstream of FM 350 near the City of Livingston	
	0802B_02	From just upstream of confluence with unnamed tributary up to confluence w/ Mud Creek, in Polk Co.	10689
Perennial	0802D	Menard Creek - From the confluence with segment 0802 of the Trinity River up to the confluence with Meetinghouse Creek.	
	0802D_01	From the confluence w/ segment 0802 of Trinity River up to the confluence w/ Meetinghouse Creek.	10688, 15693
Perennial	0802E	Big Creek - From the confluence with the Trinity River in Liberty County upstream to the confluence of Double Lake Branch and Henry Lake Branch in San Jacinto County	
	0802E_01	From the confluence with the Trinity River in Liberty County upstream to the confluence of Double Lake Branch and Henry Lake Branch in San Jacinto County	13685

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Reservoir	**0803**	**Lake Livingston - From Livingston Dam in Polk/San Jacinto County to a point 1.8 km (1.1 mi) upstream of Boggy Creek in Houston/Leon County, up to normal pool elevation of 131 feet (impounds Trinity River)**	
	0803_01	Lowermost portion of reservoir, adjacent to dam	10899, 10900, 14003, 14004, 17109
	0803_02	Lower portion of reservoir, East Wolf Creek	10693, 10901, 10902, 10903, 14005, 16738, 17104, 17668
	0803_03	Lower portion of reservoir, East Willow Springs	10904, 10905, 14006
	0803_04	Middle portion of reservoir, East Pointblank	10906, 10907, 10911, 14007, 14008
	0803_05	Middle portion of reservoir, downstream of Kickapoo Creek	10908, 10909, 14009, 17107, 21562
	0803_06	Middle portion of reservoir, centering on US 190	10910, 14010, 17106, 17108, 21563
	0803_07	Upper portion of reservoir, west of Carlisle	10913, 14013
	0803_08	Cove off upper portion of reservoir, East Trinity	13484, 14014, 17105, 10696
	0803_09	West Carolina Creek cove, off upper portion of reservoir	14011
	0803_10	Upper portion of reservoir, centering on SH 19	10914, 10915, 14012
	0803_11	Riverine portion of reservoir, centering on SH 21	10916, 10917
	0803_12	Remainder of reservoir	10912
Perennial	0803A	Harmon Creek - From the confluence with Lake Livingston (normal pool elevation of 131 feet) to the confluence of East Fork Harmon Creek east of Huntsville in Walker County	
	0803A_01	A 16 mile (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.	10698, 16441
Perennial	0803B	White Rock Creek - From the confluence of Lake Livingston northeast of Trinity in Trinity County to the upstream perennial portion of the stream east of Lovelady in Houston County	
	0803B_01	Lower 25 miles of segment	
Perennial	0803D	Parker Creek - From the confluence with Harmon Creek upstream to the confluence with Town Branch	
	0803D_01	From the confluence with Harmon Creek upstream to the confluence with Town Branch	10699, 16442
Intermittent w/pools	0803E	Nelson Creek - From the confluence with segment 0803 Trinity River, to upper end of Nelson Creek	
	0803E_01	From the confluence with segment 0803 Trinity River, to upper end of Nelson Creek	10700, 10701
Perennial	0803F	Bedias Creek - From the confluence with segment 0803 Trinity River, to upper end of Bedias Creek	
	0803F_01	From the confluence with segment 0803 Trinity River up to confluence with Poole Creek	10702
	0803F_02	From the confluence with Poole Creek to upper end of Bedias Creek	10703
Reservoir	0803G	Lake Madisonville - From Lake Madisonville Dam in Madison County up to the normal pool elevation of 285 feet (impounds Town Branch)	
	0803G_01	From Lake Madisonville Dam in Madison County up to the normal pool elevation of 285 feet (impounds Town Branch)	16953

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Perennial	**0804**	**Trinity River Above Lake Livingston - From a point 1.8 km (1.1 mi) upstream of Boggy Creek in Houston/Leon County to a point immediately upstream of the confluence of the Cedar Creek Reservoir discharge canal in Henderson/Navarro County**	
	0804_01	From the lower end of segment up to just above the confluence w/ Hurricane Bayou in Houston Co.	10918, 13690
	0804_02	From just upstream of the confluence with Hurricane Bayou up to just above the confluence with Boons Creek.	
	0804_03	From just upstream of confluence w/ Boons Creek up to just above the confluence w/ Caney Creek.	
	0804_04	From confluence w/ Caney Creek up to just above the confluence w/ Indian Creek in Anderson Co.	10919
	0804_05	From just above the confluence with Indian Creek in Anderson County up to just above the confluence with Tehuacana Creek.	
	0804_06	From just above the confluence with Tehuacana Creek to just above the confluence with Richland Creek.	
	0804_07	From just above the confluence with Richland Creek in Henderson County, up to the upper end of the segment.	10920, 10921, 10922, 10923
Perennial	0804A	Box Creek - From the confluence of Elkhart Creek upstream to the Elkhart Lake dam northeast of the City of Elkhart	
	0804A_01	From the confluence of Elkhart Creek upstream to the Elkhart Lake dam northeast of the City of Elkhart	16715
Perennial	0804B	Keechi Creek - From the confluence with the Trinity River to a point 0.05 km upstream of FM 645	
	0804B_01	From the confluence with the Trinity River to a point 0.05 km upstream of FM 645	
Perennial	0804C	Mims Creek - From the confluence with Upper Keechi Creek upstream to the confluence of an unnamed tributary approx 2.1 km upstream of FM 1580 near the City of Fairfield	
	0804C_01	From the confluence with Upper Keechi Creek upstream to the confluence of an unnamed tributary approx 2.1 km upstream of FM 1580 near the City of Fairfield	16834
Intermittent w/pools	0804F	Tehuacana Creek - From the confluence with the Trinity River northeast of Fairfield in Freestone County to the headwaters northwest of Mexia in Limestone County	
	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.	10704
	0804F_02	A 28.4 mile (45.7 KM) stretch of Tehuacana Creek extending from the confluence with Caney Creek to the upper end of Tehuacana Creek.	10705, 18572
Perennial	0804G	Catfish Creek - Twenty mile stretch of Catfish Creek running upstream from US 287 in Anderson Co., to Catfish Creek Ranch Lake just upstream of SH 19 in Henderson Co.	
	0804G_01	Twenty mile stretch of Catfish Creek running upstream from US 287 in Anderson Co., to Catfish Creek Ranch Lake just upstream of SH 19 in Henderson Co.	10717, 18596, 21552
	0804G_02	Catfish Creek upstream of Catfish Creek Ranch Lake dam	18597, 21553
Perennial	0804H	Upper Keechi Creek - From confluence with segment 0804 Trinity River to the upper end of Upper Keechi Creek	
	0804H_01	From the confluence with segment 0804 Trinity River up to confluence with Twin Branch	18401, 20771
	0804H_02	From the confluence with Twin Branch to the upper end of Upper Keechi Creek.	18520
Reservoir	0804J	Fairfield Lake - Impounded Big Brown Creek in Freestone County	
	0804J_01	Impounded Big Brown Creek in Freestone County	17951
Perennial	0804K	Lower Keechi Creek - From confluence with the Trinity River in Leon Co. upstream to the headwaters in Jewett in Leon Co.	
	0804K_01	From confluence with the Trinity River in Leon Co. upstream to the headwaters in Jewett in Leon Co.	10822, 20382

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Perennial	0804L	Town Creek - From the confluence with the Trinity River upstream to SH 256	
	0804L_01	From the confluence with the Trinity River upstream to SH 256	10706, 10708, 10710, 10711, 10712, 16836, 21543, 21544
Perennial	0804M	Basset Creek - From the confluence with Town Creek upstream to Blue Lake	
	0804M_01	From the confluence with Town Creek upstream to Blue Lake	10714, 16837, 21545
Perennial	**0805**	**Upper Trinity River - From a point immediately upstream of the confluence of Cedar Creek Reservoir discharge canal in Henderson/Navarro Co. to a point immediately upstream of the confluence of Elm Fork Trinity River in Dallas Co.**	
	0805_01	From confluence of Cedar Creek Reservoir discharge canal upstream to confluence of Smith Creek.	10924
	0805_02	From confluence of Smith Creek upstream to confluence of Tenmile Creek.	10925, 10926, 10927, 10928, 10985, 16121
	0805_03	From the confluence of Fivemile Creek upstream to the confluence of Cedar Creek.	10934, 10935, 13614, 17161, 20444, 20567, 21424
	0805_04	From confluence of Cedar Creek upstream to confluence of Elm Fork Trinity River	10936, 10937, 16088, 20933, 20934
	0805_06	From confluence of Tenmile Creek upstream to confluence of Fivemile Creek	10929, 10930, 10931, 10932, 20566
Perennial	0805A	Red Oak Creek - From confluence with segment 0805 Trinity River 12 mi upstream to I 45.	
	0805A_01	From confluence with segment 0805 Trinity River 12 mi upstream to I 45.	10840, 10841, 10842, 17506, 18569, 20379, 21285, 21286
Intermittent w/pools	0805B	Parsons Slough - From confluence w/ segment 0805 Trinity River in Kaufman County, 11 miles upstream to Malloy Bridge Road in Dallas Co.	
	0805B_01	From confluence w/ 0805 Trinity River in Kaufman Co., 11 miles upstream to Malloy Bridge Road in Dallas Co.	10839
Perennial	0805C	White Rock Creek below White Rock Lake - From the confluence with segment 0805 of the Trinity River up to the confluence with 0827 White Rock Lake.	
	0805C_01	From confluence w/ segment 0805 of the Trinity River up to the confluence w/ 0827 White Rock Lake.	10816, 15279, 18458
Perennial	0805D	Fivemile Creek - A 17 mi stretch of Fivemile Creek extending from confluence with segment 0805 Trinity River upstream to upper end of Fivemile Creek.	
	0805D_01	A 17 mi stretch of Fivemile Creek extending from confluence with segment 0805 Trinity River upstream to upper end of Fivemile Creek.	10817, 18575
Perennial	**0806**	**West Fork Trinity River Below Lake Worth - From a point immediately upstream of the confluence of Village Creek in Tarrant County to Lake Worth Dam in Tarrant County**	
	0806_01	From confluence of Village Creek upstream to confluence of Clear Fork Trinity River	10938, 10939, 10940, 11085, 16120, 17368, 17662, 17863, 18459, 20292, 20336, 20422, 21520
	0806_02	From confluence of Clear Fork Trinity River upstream to Lake Worth Dam	10941, 18460, 20424, 20425, 21558

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Reservoir	0806A	Fosdic Lake - From Fosdic Lake Dam to the reservoir headwaters in Oakland Lake Park in Tarrant County	
	0806A_01	From Fosdic Lake Dam to the reservoir headwaters in Oakland Lake Park in Tarrant County	16818, 16819, 16820, 16821
Reservoir	0806B	Echo Lake - From Echo Lake Dam to the reservoirs headwaters in Tarrant County	
	0806B_01	From Echo Lake Dam to the reservoirs headwaters in Tarrant County	16810, 16811, 16812, 16813
Perennial	0806C	Big Fossil Creek - From confluence with Little Fossil Creek in Haltom City, to HWY 183 in Tarrant Co.	
	0806C_01	From confluence with Little Fossil Creek in Haltom City, to HWY 183 in Tarrant Co.	10814, 17133
Perennial	0806D	Marine Creek - Two mi stretch of Marine Creek running upstream from confluence w/ W. Fork of Trinity River to Tenmile Bridge Road in Fort Worth.	
	0806D_01	Two mi stretch of Marine Creek from confluence w/ W. Fork of Trinity River to Tenmile Bridge Road	17370, 20428
Perennial	0806E	Sycamore Creek - Five mi stretch of Sycamore Creek running upstream from confluence with the W. Fork of Trinity River to confluence with Echo Lake Tributary in Fort Worth.	
	0806E_01	Five mile stretch of Sycamore Creek running upstream from confluence with the W. Fork of Trinity River to confluence with Echo Lake Tributary in Fort Worth	17131, 17369, 20431
Perennial	0806F	Little Fossil Creek - A 13.7 mi stretch of Little Fossil Creek running upstream from confluence with segment 0806 W. Fork Trinity River upstream to upper end Little Fossil Creek.	
	0806F_01	A 13.7 mi stretch of Little Fossil Creek running upstream from confluence with segment 0806 W. Fork Trinity River upstream to upper end Little Fossil Creek.	17129, 20433, 21425
Reservoir	**0807**	**Lake Worth - From Lake Worth Dam in Tarrant County to a point 4.0 km (2.5 mi) downstream of Eagle Mountain Dam in Tarrant County, up to normal pool elevation of 594 feet (impounds West Fork Trinity River)**	
	0807_01	From Lake Worth Dam in Tarrant County to a point 4.0 km (2.5 miles) downstream of Eagle Mountain Dam in Tarrant County, up to normal pool elevation of 594 feet (impounds West Fork Trinity River)	10942, 15163, 15166, 15167, 17387, 20081, 20082, 20083, 20084, 20085, 20086, 20087, 20088
Perennial	**0808**	**West Fork Trinity River Below Eagle Mountain Reservoir - From a point 4.0 km (2.5 mi) downstream of Eagle Mountain Dam in Tarrant County to Eagle Mountain Dam in Tarrant County**	
	0808_01	From a point 4.0 km (2.5 mi) downstream of Eagle Mountain Dam in Tarrant County to Eagle Mountain Dam in Tarrant County	10943

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Reservoir	**0809**	**Eagle Mountain Reservoir - From Eagle Mountain Dam in Tarrant County to a point 0.6 km (0.4 mi) downstream of the confluence of Oates Branch in Wise County up to normal pool elevation of 649.1 feet (impounds West Fork Trinity River)**	
	0809_01	Lowermost portion of reservoir near east end of dam	10944
	0809_02	Dosier Slough cove	10946, 10947, 10948, 15797
	0809_03	Ash Creek cove	10949, 10950, 10951
	0809_04	Lowermost portion of reservoir near west end of dam	10945
	0809_05	Lower portion of reservoir east of Walnut Creek cove	10952
	0809_06	Walnut Creek cove	10953, 10954, 10955, 15737
	0809_07	Old Ranch cove	10958, 10959
	0809_08	Middle portion of reservoir near Cole subdivision	10956, 10957, 15264, 15793
	0809_09	Indian Creek cove	10961, 10962, 10963, 16716
	0809_10	Upper portion of reservoir near Indian Creek cove	10960
	0809_11	Darrett Creek cove	10965, 15265
	0809_12	Upper portion of reservoir near Newark Beach	10964, 10966
	0809_14	Mid-Lake, from just above Walnut Cr. Cove to Oakwood Rd. peninsula	17667
Perennial	0809A	Walnut Creek - From the normal pool elevation of Eagle Mountain Reservoir up to the headwaters approx 2.1 mi upstream of State Highway 199 in Parker County.	
	0809A_01	From the normal pool elevation of Eagle Mountain Reservoir up to the headwaters approx 2.1 mi upstream of State Highway 199 in Parker County.	10853, 16830
Intermittent w/pools	0809B	Ash Creek - From Eagle Mountain Lake in Tarrant County upstream to its confluence with Mill Branch in Parker County	
	0809B_01	From Eagle Mountain Lake in Tarrant County upstream to its confluence with Mill Branch in Parker County	10854, 16835
Perennial	0809C	Dosier Creek - From confluence of Dosier Slough cove upstream to confluence w/ an intermittent stream 1 km upstream of Boat Club Road	
	0809C_01	From confluence of Dosier Slough cove upstream to confluence w/ intermittent stream 1 km upstream of Boat Club Rd	10855
Perennial	0809D	Derrett Creek - From the confluence w/ Derrett Creek cove to 0.22 km upstream of FM 718 where the waterbody meets an intermittent stream	
	0809D_01	From the confluence with Derrett Creek cove to 0.22 km upstream of FM 718 where the waterbody meets an intermittent stream	10858
Perennial	**0810**	**West Fork Trinity River Below Bridgeport Reservoir - From a point 0.6 km (0.4 mi) downstream of the confluence of Oates Branch in Wise County to Bridgeport Dam in Wise County**	
	0810_01	Lower 25 miles of segment	10967, 10968, 10969, 14246, 17844
	0810_02	Upper 11 miles of segment	14904, 20840
Perennial	0810A	Big Sandy Creek - Fifteen mi stretch of Sycamore Creek running upstream from confluence with Waggoner Creek to FM 1810, west of Alvord, Wise County	
	0810A_01	Fifteen mile stretch of Big Sandy Creek running from confluence with Waggoner Creek to FM 1810 West of Alvord, Wise Co.	15688, 18347

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Intermittent w/pools	0810B	Garrett Creek - Eighteen mi stretch of Garrett Creek running upstream from confluence with Salt Creek to Wise County Road approx 14 mi upstream of SH114, Wise County	
	0810B_01	Eighteen mile stretch of Garrett Creek running upstream from confluence with Salt Creek to Wise County Road approx 14 miles upstream of SH114, Wise Co.	16767
Perennial	0810C	Martin Branch - Eight mi stretch of Martin Branch running upstream from confluence w/ Center Creek to FM 730 south of Decatur, Wise Co.	
	0810C_01	Eight mile stretch of Martin Branch running upstream from confluence with Center Creek to FM 730 south of Decatur, Wise County.	17848
Intermittent w/pools	0810D	Salt Creek - Eleven mi stretch of Salt Creek running upstream from confluence with Garrett Creek, Wise County.	
	0810D_01	Eleven mile stretch of Salt Creek running upstream from confluence with Garrett Creek, Wise County.	16766
Reservoir	**0811**	**Bridgeport Reservoir - From Bridgeport Dam in Wise County to a point immediately upstream of the confluence of Bear Hollow in Jack County, up to normal pool elevation of 836 feet (impounds West Fork Trinity River)**	
	0811_01	Southeast portion of main body of reservoir	16762, 16764
	0811_02	Southwest portion of main body of reservoir	15165, 16763
	0811_03	Central portion of main body of reservoir	10970
	0811_04	Northern portion of main body of reservoir	10971, 15164
	0811_05	Remainder of reservoir	16736, 16759, 16760, 16761, 16765
Perennial	0811A	Big Creek - From the confluence with Bridgeport Reservoir at normal pool elevation upstream to the headwaters adjacent to FM 2127 in Jack County	
	0811A_01	From the confluence with Bridgeport Reservoir at normal pool elevation upstream to the headwaters adjacent to FM 2127 in Jack County	16768
Perennial	0811B	Beans Creek - From the confluence with Bridgeport Reservoir at normal pool elevation upstream to the headwaters approx 4.4 km north of Perrin in Jack County	
	0811B_01	From the confluence with Bridgeport Reservoir at normal pool elevation upstream to the headwaters approx 4.4 km north of Perrin in Jack County	16737
Intermittent w/pools	**0812**	**West Fork Trinity River Above Bridgeport Reservoir - From a point immediately upstream of the confluence of Bear Hollow in Jack County to SH 79 in Archer County**	
	0812_01	Lower 25 mi of segment	10972, 18058, 18059
	0812_02	Upper 60 mi of segment	18060
Reservoir	**0813**	**Houston County Lake - From Houston County Dam in Houston County up to the normal pool elevation of 260 feet (impounds Little Elkhart Creek)**	
	0813_01	From Houston County Dam in Houston County up to the normal pool elevation of 260 feet (impounds Little Elkhart Creek)	10973
Perennial	**0814**	**Chambers Creek Above Richland-Chambers Reservoir - From a point 4.0 km (2.5 mi) downstream of Tupelo Branch in Navarro County to the confluence of North Fork Chambers Creek and South Fork Chambers Creek**	
	0814_01	From the lower end of the segment up to just above the confluence with Cummins Creek.	10846, 10974, 10975, 10976
	0814_02	From just above the confluence with Cummins Creek up to just above the confluence with Waxahachie Creek.	10977, 20000
	0814_03	From just above the confluence with Waxahachie Creek up to just above the confluence with Mill Branch.	
	0814_04	From just above the confluence with Mill Branch to the upper end of the segment.	10978

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Perennial	0814A	Mill Creek - Twenty-five mile stretch of Mill Creek running upstream from confluence with Chambers Creek in Navarro Co. to Union Pacific RR in Milford, Ellis Co.	
	0814A_01	Twenty-five mile stretch of Mill Creek running upstream from confluence with Chambers Creek in Navarro Co. to Union Pacific RR in Milford, Ellis Co.	18566
Perennial	0814B	South Fork Chambers Creek - A Twenty-nine mi stretch of the South Fork of Chambers creek stretching from the confluence with Chambers Creek (Segment 0814) to the upper end of South Fork Chambers Creek	
	0814B_01	A Twenty-nine mi stretch of the South Fork of Chambers creek stretching from the confluence with Chambers Creek (Segment 0814) to the upper end of South Fork Chambers Creek	18570
Reservoir	**0815**	**Bardwell Reservoir - From Bardwell Dam in Ellis County up to the normal pool elevation of 421 feet (impounds Waxahachie Creek)**	
	0815_01	From Bardwell Dam in Ellis County up to the normal pool elevation of 421 feet (impounds Waxahachie Creek)	10979, 16700, 17582, 18437, 18549, 18550
Perennial	0815A	Waxahachie Creek - From the confluence with the normal pool elevation of Bardwell Reservoir upstream to the confluence with North Prong Creek	
	0815A_01	From the confluence with the normal pool elevation of Bardwell Reservoir upstream to the confluence with North Prong Creek	13686, 16262, 16263, 16264, 16265, 20380
Reservoir	**0816**	**Lake Waxahachie - From South Prong Dam in Ellis County up to normal pool elevation of 531.5 feet (impounds South Prong Creek)**	
	0816_01	From South Prong Dam in Ellis County up to normal pool elevation of 531.5 feet (impounds South Prong Creek)	10980, 17583
Perennial	0816A	South Prong Creek - A 12.2 mi stretch of South Prong Creek running upstream from the confluence with Segment 0816 (Lake Waxahachie) to the upper end of the creek, in Midlothian, Ellis County, TX.	
	0816A_01	A 12.2 mi stretch of South Prong Creek running upstream from the confluence with Segment 0816 (Lake Waxahachie) to the upper end of the creek, in Midlothian, Ellis County, TX.	18571
Reservoir	**0817**	**Navarro Mills Lake - From Navarro Mills Dam in Navarro County up to normal pool elevation of 424.5 feet (impounds Richland Creek)**	
	0817_01	From Navarro Mills Dam in Navarro County up to normal pool elevation of 424.5 feet (impounds Richland Creek)	10981, 17442, 18545, 18546, 18547, 18548, 20633
Perennial	0817A	Richland Creek - Ten mile stretch of Richland Creek running upstream from 0.5 miles downstream of FM 744 in Navarro Co., to FM 308 South of Mertens, Hill Co.	
	0817A_01	Ten mile stretch of Richland Creek running upstream from 0.5 miles downstream of FM 744 in Navarro Co., to FM 308 South of Mertens, Hill Co.	18518

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Reservoir	**0818**	**Cedar Creek Reservoir - From Joe B. Hoggsett Dam in Henderson County up to normal pool elevation of 322 feet (impounds Cedar Creek)**	
	0818_01	Lowermost portion of the reservoir, adjacent to the dam.	13844, 13845, 13846, 16745, 16748
	0818_02	Caney Creek cove	16744
	0818_03	Clear Creek cove	13847, 16743
	0818_04	Lower portion of reservoir east of Key Ranch Estates	13848, 16749
	0818_05	Cove off lower portion of reservoir adjacent to Clearview Estates	16746
	0818_06	Middle portion of reservoir downstream of Twin Creeks cove	10982, 13849, 15812, 16741, 16742, 16747, 16750, 17090, 18472, 18473
	0818_07	Twin Creeks cove	13850, 16739, 16740
	0818_08	Prairie Creek cove	16751, 16752
	0818_09	Upper portion of reservoir adjacent to Lacy Fork cove	10983, 13852, 13854, 16753
	0818_10	Lacy Fork cove	16771
	0818_11	Upper portion of reservoir east of Tolosa	16772, 18471
	0818_12	Uppermost portion of reservoir downstream of Kings Creek	10984, 16774, 18469, 18470
	0818_13	From Joe B. Hoggsett Dam in Henderson County up to normal pool elevation of 322 feet (impounds Cedar Creek)	16773
	0818_14	Remainder of reservoir	13851, 21427
Perennial	0818A	One Mile Creek - From the confluence with Valley View Reservoir upstream to the confluence with an unnamed tributary 0.8 km upstream of SH 19 Reservoir upstream to the confluence with an unnamed tributary 0.8 km upstream of SH 19	
	0818A_01	From the confluence with Valley View Reservoir upstream to the confluence with an unnamed tributary 0.8 km upstream of SH 19 Reservoir upstream to the confluence with an unnamed tributary 0.8 km upstream of SH 19	21001
Perennial	0818B	Cedar Creek above Cedar Creek Reservoir - From the confluence with Cedar Creek Reservoir at normal pool elevation upstream to the confluence of Muddy Cedar Creek and Rocky Cedar Creek in Kaufman County	
	0818B_01	From the confluence with Cedar Creek Reservoir at normal pool elevation upstream to the confluence of Muddy Cedar Creek and Rocky Cedar Creek in Kaufman County	16776, 17842, 21559
Intermittent w/pools	0818C	Kings Creek - From the confluence with Cedar Creek Reservoir at normal pool elevation upstream to the headwaters adjacent to FM 986 approx 5 km north of Terrell in Kaufman County	
	0818C_01	From the confluence with Cedar Creek Reservoir at normal pool elevation upstream to the headwaters adjacent to FM 986 approx 5 km north of Terrell in Kaufman County	16778, 21000
Intermittent w/pools	0818D	Lacy Fork - From the confluence with Cedar Creek Reservoir at normal pool elevation upstream to the confluence of Dry Lacy Fork and Wet Lacy Fork in Van Zandt County	
	0818D_01	From the confluence with Cedar Creek Reservoir at normal pool elevation upstream to the confluence of Dry Lacy Fork and Wet Lacy Fork in Van Zandt County	16777

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Intermittent w/pools	0818E	Prairie Creek - From the confluence with Cedar Creek Reservoir at normal pool elevation upstream to the headwaters adjacent to SH 198 in Van Zandt County	
	0818E_01	Fools from the confluence with Cedar Creek Reservoir at normal pool elevation upstream to the headwaters adjacent to SH 198 in Van Zandt County	16775
Perennial	0818F	Clear Creek - From the confluence with Clear Creek Cove upstream to the north edge of the highway 175.	
	0818F_01	From the confluence with Clear Creek Cove upstream to the north edge of the highway 175.	16755
Perennial	0818G	North Twin Creek - From the confluence with Twin Creeks cove to 3 km northeast of the intersection of highway 175	
	0818G_01	From the confluence with Twin Creeks cove to 3 km northeast of the intersection of highway 175	16756
Perennial	0818H	South Twin Creek - From the confluence with Twin Creeks cove upstream to 3.15 km northeast of where the waterbody intersects highway 175	
	0818H_01	From the confluence with Twin Creeks cove upstream to 3.15 km northeast of where the waterbody intersects highway 175	16757
Intermittent w/pools	0818I	Caney Creek - From the confluence with Cedar Creek Reservoir upstream to the dam on Third Caney Creek approx 1.8 km north of the intersection of SH 7 and US 175 in Athens	
	0818I_01	From the confluence with Cedar Creek Reservoir upstream to the dam on Third Caney Creek approx 1.8 km north of the intersection of SH 7 and US 175 in Athens	16758
Perennial	**0819**	**East Fork Trinity River - From the confluence with the Trinity River in Kaufman County to Rockwall-Forney Dam in Kaufman County**	
	0819_01	From the confluence with the Trinity River in Kaufman County to Rockwall-Forney Dam in Kaufman County	10986, 10987, 10988, 10989, 10990, 10991, 10992, 10993, 10994, 10995, 10996, 10997, 13612, 20285, 20286
Perennial	0819A	Duck Creek - From the confluence with the East Fork Trinity River in Kaufman County upstream to the confluence of an unnamed tributary 0.6 km upstream of Jupiter Road in Dallas County	
	0819A_01	From the confluence with the East Fork Trinity River in Kaufman County upstream to the confluence of an unnamed tributary 0.6 km upstream of Jupiter Road in Dallas County	10739, 10740, 10743, 10829, 10830, 10831, 10832, 16281, 18558
Perennial	0819B	Buffalo Creek - From the confluence with the East Fork Trinity River up to 0.6 km above the confluence of Little Buffalo Creek	
	0819B_01	From the confluence with the East Fork Trinity River up to 0.6 km above the confluence of Little Buffalo Creek	10823, 10824, 10825, 10826, 10827

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Reservoir	**0820**	**Lake Ray Hubbard - From Rockwall-Forney Dam in Kaufman County to Lavon Dam in Collin County, up to normal pool elevation of 435.5 feet (impounds East Fork Trinity River)**	
	0820_01	Lower portion of East Fork arm, centering on IH 30	11008, 11009, 11010, 11011, 11012, 11013, 11016, 11017, 11018, 11019, 16809, 21360, 21361
	0820_02	Middle portion of East Fork arm, centering on SH 66	11001, 11002, 11003, 11004, 11005, 11006, 16829, 21355, 21356, 21358, 21359, 21362
	0820_04	Lower portion of main body of reservoir extending up from dam to Yankee Cr. Arm.	10998, 20194, 21363, 21365
	0820_05	Mid-reservoir, I30 crossing Rowlett Cr. Arm to Yankee Cr. Arm	10999, 11000, 17829, 21357, 21364
	0820_06	Outfall canal from Lake Lavon Dam	11007, 17846
Perennial	0820A	Cottonwood Creek - From the confluence with Rowlett Creek up to SH 5 (near Greenville Road)	
	0820A_01	From the confluence with Rowlett Creek up to SH 5 (near Greenville Road)	10767, 10768, 20377
Perennial	0820B	Rowlett Creek - From the normal pool elevation of Lake Ray Hubbard upstream to the Parker Road crossing	
	0820B_01	From the normal pool elevation of Lake Ray Hubbard upstream to the Parker Road crossing	10753, 10754, 10755, 10756, 10757, 10758, 10759, 10760, 10761, 10762, 10763, 10764, 10765, 10766, 11014, 11015, 15615, 17845, 20378, 21478
Perennial	0820C	Muddy Creek - From the confluence with Lake Ray Hubbard, in Dallas County, to the headwaters east of Allen, in Collin County	
	0820C_01	From the confluence with Lake Ray Hubbard, in Dallas County, to the headwaters east of Allen, in Collin County	16828, 20110
Reservoir	**0821**	**Lake Lavon - From Lavon Dam in Collin County, up to normal pool elevation of 492 feet (impounds East Fork Trinity River)**	
	0821_01	Lowermost portion of reservoir	11020, 15684, 15685, 17584, 21374, 21375
	0821_02	East Fork arm	11021, 15686, 21376, 21719, 21720, 21721, 21722, 21723
	0821_03	Middle portion of Sister Grove Creek arm	14249, 15687, 21377, 21378
	0821_04	Remainder of segment	11022, 21379, 21380, 21718, 21724, 21725
Perennial	0821A	Pilot Grove Creek - From confluence of Desert Creek up to FM 121 near Blue Ridge	
	0821A_01	From confluence of Desert Creek up to FM 121 near Blue Ridge	14247

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Perennial	0821B	Sister Grove Creek - 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	
	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	13613, 21393, 21394, 21396
Intermittent w/pools	0821C	Wilson Creek - From the confluence with Lake Lavon in Collin County up to West FM 455, just east of Celina, Collin Co., TX.	
	0821C_01	From the confluence with Lake Lavon in Collin County up to West FM 455, just east of Celina, Collin Co., TX.	10777, 15040, 15041, 15610, 15611
Intermittent w/pools	0821D	East Fork Trinity River above Lake Lavon - A portion of the East Fork Trinity River extending from the confluence with Lake Lavon (segment 0821) to the upper end of the water body in Grayson County, Texas.	
	0821D_01	A portion of the East Fork Trinity River extending from the confluence with Lake Lavon (segment 0821) to the upper end of the water body in Grayson County, Texas.	13740
Perennial	**0822**	**Elm Fork Trinity River Below Lewisville Lake - From the confluence with the West Fork Trinity River in Dallas County to Lewisville Dam in Denton County**	
	0822_01	Lower 11 miles of segment	11023, 16436, 17163, 17164, 18310, 18648, 20287, 20438
	0822_02	4.5 miles upstream to 7.5 miles downstream DWU intake	11024, 15255, 16438, 17162, 17850
	0822_03	1.0 mi upstream to 4.5 miles downstream SH 121	13615, 18358
	0822_04	Upper 1.5 miles of segment	15252, 16437
Intermittent w/pools	0822A	Cottonwood Branch - A 6 mi stretch of Cottonwood Branch running upstream from confluence with Hackberry Creek, to Valley View Road in Dallas County.	
	0822A_01	A 2.5 mile stretch of Cottonwood Branch running upstream from confluence with Hackberry Creek to approx. 0.5 miles downstream of N. Story Rd., Dallas Co.	10876, 17167, 17168, 18359, 20320
	0822A_02	A 3. 5 mile stretch of Cottonwood Branch running upstream from approx 0.5 miles downstream of N. Story Rd. to Valley View Rd, Dallas, Co.	10877, 10878, 17165, 17166
Intermittent	0822B	Grapevine Creek - From the confluence with Elm Fork Trinity River in Dallas County upstream to its headwaters west of International Parkway at DFW Airport in Tarrant County	
	0822B_01	From the confluence with Elm Fork Trinity River in Dallas County upstream to its headwaters west of International Parkway at DFW Airport in Tarrant County	17169, 17531, 17939, 20311, 21188, 21632
Perennial	0822C	Hackberry Creek - A 5.5 mi stretch of Hackberry Creek running upstream from confluence with Cottonwood Branch, to approx 2.4 mi upstream of SH 114, in Irving, Dallas County.	
	0822C_01	A 5.5 mile stretch of Hackberry Creek running upstream from confluence with S. Fork Hackberry Creek to approx 2.4 miles upstream of SH 114 in Irving, Dallas Co.	17170, 17171, 17172, 17532, 17938
Reservoir	0822D	Ski Lake - A 65 acre reservoir locate just south of the intersection of US 35E and spur 482 in Irving.	
	0822D_01	A 65 acre reservoir locate just south of the intersection of US 35E and spur 482 in Irving.	17849

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Reservoir	**0823**	**Lewisville Lake - From Lewisville Dam in Denton County to a point 100 meters (110 yards) upstream of US 380 in Denton County, up to normal pool elevation of 515 feet (impounds Elm Fork Trinity River)**	
	0823_01	Lowermost portion of reservoir	11025, 13995, 13996, 21383
	0823_02	Stewart Creek arm	11028, 13997, 16808, 21386
	0823_03	Hickory Creek arm	11027, 13998, 18475, 18476, 18477, 18478, 18479, 20893, 21381, 21382
	0823_04	Little Elm Creek arm	14000, 14002, 17830, 21385
	0823_05	Middle portion of reservoir east of Lake Dallas	11026, 13999, 14001, 21384, 21387
	0823_06	Remainder of reservoir	13533, 16419, 17838, 17839, 18480, 18481, 21349
Perennial	0823A	Little Elm Creek - From confluence with Lake Lewisville in Denton Co., up to 1.4 km above FM 453 in Collin Co.	
	0823A_01	From the confluence with Lake Lewisville in Denton Co., up to FM 455 in Collin Co. (Lower 12 miles of segment).	13617, 16826
Perennial	0823B	Stewart Creek - From the confluence with Lake Lewisville in Denton County to the headwaters near Frisco in Collin County.	
	0823B_01	From the confluence with Lake Lewisville in Denton County to the headwaters near Frisco in Collin County.	10860, 10861, 10862
Perennial	0823C	Clear Creek - From the confluence with Lake Lewisville in Denton County to the headwaters west of Montague in Montague County	
	0823C_01	Lower 25 mi of segment	10859, 13618, 16827
Intermittent	0823D	Doe Branch - From the confluence with Lake Lewisville/Elm Fork Trinity in Denton County to the headwaters northeast of Celina, Collin Co., TX.	
	0823D_01	From the confluence with Lake Lewisville/Elm Fork Trinity in Denton County to the headwaters northeast of Celina, Collin Co., TX.	18560, 20291
Perennial	**0824**	**Elm Fork Trinity River Above Ray Roberts Lake - From a point 9.5 km (5.9 mi) downstream of the confluence of Pecan Creek in Cooke County to US 82 in Montague County**	
	0824_01	Lower 7.5 miles of segment	10891, 11029, 11030, 11031, 11032
	0824_02	2 mile reach near unmarked county road, 1.4 km downstream Gainesville WWTP	11033, 15607
	0824_03	3.5 mile reach near SH 51	15635, 17670
	0824_04	25 mile reach near FM 3108	14250, 16432
	0824_05	Upper 48 miles of segment	
Perennial	**0825**	**Denton Creek - From the confluence with the Elm Fork Trinity River in Dallas County to Grapevine Dam in Tarrant County**	
	0825_01	From the confluence with the Elm Fork Trinity River in Dallas County to Grapevine Dam in Tarrant County	11034, 14244, 21328

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Reservoir	**0826**	**Grapevine Lake - From Grapevine Dam in Tarrant County up to normal pool elevation of 535 feet (impounds Denton Creek)**	
	0826_01	Lowermost portion of reservoir	11035, 13873, 13874, 16113, 17827, 20889, 20890, 20891, 21353
	0826_02	Morehead Creek cove	11036, 11037, 16118, 20886
	0826_03	Lower portion of reservoir north of Oak Grove Park	16114
	0826_04	North Main Slough cove	16116, 16117, 20887, 20888
	0826_05	Middle portion of reservoir east of Meadowmere Park	13875, 16115, 21350, 21352
	0826_06	Middle portion of reservoir southeast of Walnut Grove Park	13876, 16112, 17828
	0826_07	Upper portion of reservoir east of Marshall Creek Park	13877, 13878, 16111, 20290, 20401, 20882
	0826_08	Remainder of reservoir	20880, 20881, 20883, 20884, 21351, 21354
Perennial	0826A	Denton Creek - From the confluence with Grapevine Lake in Denton County upstream to 2.3 km upstream of TX-59	
	0826A_01	From the headwaters of Grapevine Lake upstream to the confluence of Trail Creek near the City of Justin	14485, 20391, 21295, 21296
	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	14483, 14484
	0826A_03	9.3 miles upstream to 15.7 miles downstream of Greenwood Rd.	14482
Perennial	0826C	Henrietta Creek - A 3 km stretch of Henrietta Creek, running upstream from the confluence with Denton Creek to confluence with Elizabeth Creek.	
	0826C_01	A 3 km stretch of Henrietta Creek, running upstream from the confluence with Denton Creek to confluence with Elizabeth Creek.	16825
Reservoir	**0827**	**White Rock Lake - From White Rock Dam in Dallas County up to the normal pool elevation of 458 feet (impounds White Rock Creek)**	
	0827_01	From White Rock Dam in Dallas County up to the normal pool elevation of 458 feet (impounds White Rock Creek)	11038, 13485, 14415, 15702
Perennial	0827A	White Rock Creek above White Rock Lake - From the headwaters of White Rock Lake upstream to the headwaters at Hilcrest Road in Frisco	
	0827A_01	From the headwaters of White Rock Lake upstream to the confluence with McKamy Branch east of the City of Addison	16261, 15280, 18517, 20289, 21556
Perennial	0827B	Cottonwood Creek - From the confluence with White Rock Creek upstream to the confluence with an unnamed tributary approx 0.25 km upstream of Campbell road in the City of Richardson	
	0827B_01	From the confluence with White Rock Creek upstream to the confluence with an unnamed tributary approx 0.25 km upstream of Campbell road in the City of Richardson	10731, 10732, 10734, 10735, 16260, 17843

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Reservoir	**0828**	**Lake Arlington - From Arlington Dam in Tarrant County up to the normal pool elevation of 550 feet (impounds Village Creek)**	
	0828_01	Lowermost portion of lake along western half of dam	11040, 11041, 13905
	0828_02	Lowermost portion of lake along eastern half of dam	13904
	0828_03	Western half of lower portion of lake	13903
	0828_04	Eastern half of lower portion of lake	13901
	0828_05	Western half of upper portion of lake	11043, 13899
	0828_06	Eastern half of upper portion of lake	11042, 13898
	0828_07	Uppermost portion of lake	13897, 21707
	0828_08	Remainder of lake	10800, 11039, 13900, 13902
Intermittent w/pools	0828A	Village Creek - From the confluence with Lake Arlington in Tarrant County to the headwaters east of Joshua in Johnson County	
	0828A_01	From Lake Arlington to the headwaters	10780, 10781, 10782, 10783, 10784, 10785, 10786, 10787, 13671, 15173
Perennial	**0829**	**Clear Fork Trinity River Below Benbrook Lake - From the confluence with the West Fork Trinity River in Tarrant County to Benbrook Dam in Tarrant County**	
	0829_01	From the confluence with West Fork Trinity River to 1 mile upstream.	16119, 20427
	0829_02	From 1 mile upstream of the confluence with West Fork Trinity River up to the confluence with Mary's Creek.	11044, 11045, 15042, 15606, 16122, 17122, 18456
	0829_03	From the confluence with Mary's Creek up to Benbrook Dam in Tarrant County, TX.	13623
Reservoir	0829A	Lake Como - From Lake Como Dam to the reservoir headwaters in Lake Como Park in Tarrant County	
	0829A_01	From Lake Como Dam to the reservoir headwaters in Lake Como Park in Tarrant County	16814, 16815, 16816, 16817
Reservoir	**0830**	**Benbrook Lake - From Benbrook Dam in Tarrant County to a point 200 meters (220 yards) downstream of US 377 in Tarrant County, up to normal pool elevation of 694 feet (impounds Clear Fork Trinity River)**	
	0830_01	Lower portion of reservoir	11046, 13829, 13830, 15151, 15155, 15161, 15162
	0830_02	Middle portion of reservoir	11047, 11048, 11049, 11050, 13831, 15156, 15157
	0830_03	Upper portion of reservoir	13834, 15158, 15705, 15706
	0830_05	Rock/Mustang Creek arm of Benbrook Lake.	11051, 11052, 11053, 11054, 11055, 11056, 11057, 11058, 13832, 13833, 15159, 15160

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Intermittent w/pools	0830A	Rock Creek - From the confluence with Benbrook Lake at normal pool elevation upstream to the headwaters near FM 917 approx 2.8 km west of Burleson in Johnson County	
	0830A_01	From the confluence with Benbrook Lake at normal pool elevation upstream to the headwaters near FM 917 approx 2.8 km west of Burleson in Johnson County	16725
Intermittent w/pools	0830B	Bear Creek - From the confluence with Benbrook Lake at normal pool elevation upstream to the headwaters adjacent to SH 171 approx 7.8 km southeast of Weatherford in Parker County	
	0830B_01	From the confluence with Benbrook Lake at normal pool elevation upstream to the headwaters adjacent to SH 171 approx 7.8 km southeast of Weatherford in Parker County	13624
Perennial	**0831**	**Clear Fork Trinity River Below Lake Weatherford - From a point 200 meters (220 yards) downstream of US 377 in Tarrant County to Weatherford Dam in Parker County**	
	0831_01	Lower 12.75 miles, downstream from South Fork Trinity River confluence	13691, 16414, 17444
	0831_03	From the confluence with South Fork of Trinity R. to a point 2 mi upstream	17445
	0831_04	2 mi upstream of South Fork Trinity River confluence to Squaw Ck. Confluence	11060
	0831_05	From the confluence of Squaw Ck. to Lake Weatherford Dam	16413, 17446, 17450, 17637
Perennial	0831A	South Fork Trinity River - Eleven mi stretch of South Fork Trinity River running upstream from confluence with Clear Fork Trinity River to confluence with Willow Creek, Parker Co.	
	0831A_01	Eleven mile stretch of S. Fork Trinity River running upstream from confluence with Clear Fork Trinity River to confluence with Willow Creek, Parker Co.	17048, 17454, 17455
Perennial	0831B	Unnamed Tributary of South Fork Trinity River - A 4.4 mi (7.1 KM) stretch of unnamed tributary to South Fork Trinity River stretching from the confluence to the upper end of the creek	
	0831B_01	A 4.4 mi (7.1 KM) stretch of unnamed tributary to South Fork Trinity River stretching from the confluence to the upper end of the creek	17456
Perennial	0831C	Town Creek - A 12.3 mile (19.8 KM) stretch of Town Creek extending from the confluence with the South Fork Trinity River up to the confluence with Pogue Branch in Weatherford, Parker County, TX.	
	0831C_01	A 12.3 mile (19.8 KM) stretch of Town Creek extending from the confluence with the South Fork Trinity River up to the confluence with Pogue Branch in Weatherford, Parker County, TX.	14486, 14487, 17046, 17449, 17451, 17457
Reservoir	**0832**	**Lake Weatherford - From Weatherford Dam in Parker County to a point 3.1 km (1.9 mi) upstream of FM 730 in Parker County, up to the normal pool elevation of 896 feet (impounds Clear Fork Trinity River)**	
	0832_01	From Weatherford Dam in Parker County to a point 3.1 km (1.9 miles) upstream of FM 730 in Parker County, up to the normal pool elevation of 896 feet (impounds Clear Fork Trinity River)	11061
Intermittent w/pools	**0833**	**Clear Fork Trinity River Above Lake Weatherford - From a point 3.1 km (1.9 mi) upstream of FM 730 in Parker County, to the confluence with Strickland Creek approx 8 km (5 mi) upstream of FM 51 in Parker County**	
	0833_02	Upper 11 miles of segment	16415, 17459, 17460, 17463
	0833_03	From the confluence of McKnight Branch to the confluence of Strickland Ck. approx 8 km (5 mi) upstream of FM 51 in Parker County.	11062
	0833_04	From the confluence with Dobbs Branch to confluence with McKnight Branch	17461
	0833_05	From the confluence of Dobbs Branch to the lower end of segment	17462

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Reservoir	**0834**	**Lake Amon G. Carter - From Amon G. Carter Dam in Montague County up to the normal pool elevation of 920 feet (impounds Big Sandy Creek)**	
	0834_01	From Amon G. Carter Dam in Montague County up to the normal pool elevation of 920 feet (impounds Big Sandy Creek)	11063
Perennial	**0835**	**Richland Creek Below Richland-Chambers Reservoir - From the confluence with the Trinity River in Freestone County to Richland-Chambers Dam in Freestone County**	
	0835_01	From the confluence with the Trinity River in Freestone County to Richland-Chambers Dam in Freestone County	
Reservoir	**0836**	**Richland-Chambers Reservoir - From Richland-Chambers Dam in Freestone County to a point immediately upstream of the confluence of Pin Oak Creek on the Richland Creek Arm in Navarro County and to a point 4.0 km (2.5 mi) downstream of Tupelo Branch on the Chambers Creek Arm**	
	0836_01	Lowermost portion of reservoir, adjacent to dam	11065, 15168
	0836_02	Confluence of Richland and Chambers Creek arms	15169
	0836_03	Lower portion of Chambers Creek arm	15170, 18717, 18720, 21231, 21248, 21447, 21448, 21449, 21450, 21451
	0836_04	Upper portion of Chambers Creek arm	10883, 10884, 11066, 15199, 18724, 21452, 21454, 21455, 21456, 21457, 21458, 21459, 21460, 21461, 21464, 21485
	0836_05	Lower portion of Richland Creek arm	10851, 10886, 11068, 21235, 21247, 21441, 21442, 21443, 21444, 21445, 21446, 21233, 21234
	0836_06	Upper portion of Richland Creek arm	15172, 18727
	0836_07	Remainder of reservoir	10885, 10887, 11067, 11069, 16721, 18725, 18726, 21236, 21237, 21238, 21239, 21240, 21241
	0836_08	Post Oak Creek Arm off of Chambers Creek Arm of Richland Chambers Reservoir.	
Perennial	0836A	Pin Oak Creek - From the confluence with the North Fork of Pin Oak Creek in Limestone County upstream to the confluence with Pin Oak Creek and an unnamed tributary flowing from the west approx 2.8 km downstream of SH 171 near the City of Hubbard	
	0836A_01	From the confluence with the North Fork of Pin Oak Creek in Limestone County upstream to the confluence with Pin Oak Creek and an unnamed tributary flowing from the west approx 2.8 km downstream of SH 171 near the City of Hubbard	18568

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Perennial	0836B	Cedar Creek - From the confluence with Richland Chambers Reservoir to the upper end of the creek	
	0836B_01	From the confluence with Richland Chambers Reservoir to the upper end of the creek	18716, 18718, 18719, 21229, 21230
Intermittent w/pools	0836C	Grape Creek - From the confluence with Richland Chambers Reservoir to the upper end of the creek southwest of Corsicana, Navarro County, TX.	
	0836C_01	From the confluence with Richland Chambers Reservoir to the upper end of the creek southwest of Corsicana, Navarro County, TX.	18721, 21232
Perennial	0836D	Post Oak Creek - From the confluence with Richland Chambers Reservoir to the upper end of the creek	
	0836D_01	From the confluence with Richland Chambers Reservoir to the upper end of the creek	10850, 17847, 18722, 18723, 21242, 21243, 21244, 21245, 21246
Perennial	**0837**	**Richland Creek Above Richland-Chambers Reservoir - From the confluence of Pin Oak Creek in Navarro County to Navarro Mills Dam in Navarro County**	
	0837_01	From the confluence of Pin Oak Creek in Navarro County to Navarro Mills Dam in Navarro County	11070, 18344
Reservoir	**0838**	**Joe Pool Lake - From Joe Pool Dam in Dallas County up to the normal pool elevation of 522 feet (impounds Mountain Creek)**	
	0838_01	Lowermost portion of reservoir adjacent to the dam	11073, 13890, 13891, 13893, 13894
	0838_02	Mountain Creek arm	11071, 13895, 13896, 16434, 17684
	0838_03	Walnut Creek arm	11072, 13892
Intermittent w/pools	0838A	Mountain Creek - Ten mile stretch of Mountain Creek running upstream from US 287 in Ellis Co., to confluence with Fish Spring Branch in Johnson County.	
	0838A_01	Ten mile stretch of Mountain Creek running upstream from US 287 in Ellis Co., to confluence with Fish Spring Branch in Johnson County.	13622
Intermittent w/pools	0838B	Sugar Creek - A 1.6 mi stretch of Sugar Creek running upstream from Tarrant/Dallas County line, to just upstream of Britton Road in Mansfield, Tarrant County.	
	0838B_01	A 1.6 mi stretch of Sugar Creek running upstream from Tarrant/Dallas County line, to just upstream of Britton Road in Mansfield, Tarrant County.	17680
Intermittent w/pools	0838C	Walnut Creek - From the confluence with Joe Pool Lake up to the headwaters at Spring Street in Burleson.	
	0838C_01	From the confluence with Joe Pool Lake up to the headwaters at Spring Street in Burleson.	13621, 20790
Intermittent	0838D	Hollings Branch - Hollings Branch from the confluence of the Mountain Creek arm of Joe Pool Lake upstream to the headwater 500 m downstream of US 67 in Midlothian	
	0838D_01	Hollings Branch from the confluence of the Mountain Creek arm of Joe Pool Lake upstream to the headwater 500 m downstream of US 67 in Midlothian	16433
Intermittent	0838E	Soap Creek - Soap Creek from the confluence of the Mountain Creek arm of Joe Pool Lake upstream to the headwater 6.6 km (3.98 mi) upstream of US 67 in Midlothian	
	0838E_01	Soap Creek from the confluence of the Mountain Creek arm of Joe Pool Lake upstream to the headwater 6.6 km (3.98 miles) upstream of US 67 in Midlothian	16435

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Intermittent	0838F	Unnamed tributary of Mountain Creek - Intermittent stream from the confluence with Mountain Creek south of Mansfield upstream to the headwaters approx 2.0 km upstream of FM 157 in Mansfield	
	0838F_01	Intermittent stream from the confluence with Mountain Creek south of Mansfield upstream to the headwaters approx 2.0 km upstream of FM 157 in Mansfield	21123
Perennial	**0839**	**Elm Fork Trinity River Below Ray Roberts Lake - From a point 100 meters (110 yards) upstream of US 380 in Denton County to Ray Roberts Dam in Denton County**	
	0839_01	From a point 100 meters (110 yards) upstream of US 380 in Denton County to Ray Roberts Dam in Denton County	13619, 21348
Reservoir	**0840**	**Ray Roberts Lake - From Ray Roberts Dam in Denton County to a point 9.5 km (5.9 mi) upstream of the confluence of Pecan Creek in Cooke County, up to the normal pool elevation of 632.5 feet (impounds Elm Fork Trinity River)**	
	0840_01	Lowermost portion of reservoir adjacent to dam	11075, 14039, 14040, 15691, 17388, 17834, 21390
	0840_02	Lower portion of Jordan Creek arm west of Pilot Point	11076, 13705, 14042, 14044, 21392
	0840_03	Upper portion of Jordan Creek arm	14047, 16823
	0840_04	Buck Creek cove	14045, 16822
	0840_05	Lower portion of Elm Fork arm	10888, 11077, 14041, 21389
	0840_06	Middle portion of Elm Fork arm	14043
	0840_07	Upper portion of Elm Fork arm	10889, 10890, 11078, 14046, 16824
	0840_08	Remainder of reservoir	20894, 20895, 20896, 20897, 20898, 20899, 21391
Intermittent w/pools	0840A	Unnamed Tributary of Jordan Creek - From the confluence with Jordan Creek south of CR 226 to the headwaters near South Neathery Street in Collinsville in Grayson County	
	0840A_01	From the confluence with Jordan Creek south of CR 226 to the headwaters near South Neathery Street in Collinsville in Grayson County	13620
Perennial	**0841**	**Lower West Fork Trinity River - 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 Village Creek in Tarrant County**	
	0841_01	From confluence of the Elm Fork Trinity River to the confluence with Johnson Creek.	11079, 11080, 11081, 11082, 11089, 17669
	0841_02	From the confluence with Johnson Creek upstream to the confluence of Village Creek.	11083, 11084, 11086, 11087, 11088, 17160, 21423
Reservoir	0841A	Mountain Creek Lake - From Mountain Creek Lake Dam to the reservoir headwater at the confluence of Mountain and Fish Creeks, in Dallas County (impounds Mountain Creek)	
	0841A_01	From Mountain Creek Lake Dam to the reservoir headwater at the confluence of Mountain and Fish Creeks, in Dallas County (impounds Mountain Creek)	17336, 20089, 20090, 20091, 20092, 20093, 20094

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Intermittent w/pools	0841B	Bear Creek - A 12 mi stretch of Bear Creek running upstream from confluence with West Fork Trinity River, to the confluence with Little Bear Creek just upstream of HWY 183 in Euless, Tarrant County, TX.	
	0841B_01	A 12 mi stretch of Bear Creek running upstream from confluence with West Fork Trinity River, to the confluence with Little Bear Creek just upstream of HWY 183 in Euless, Tarrant County, TX.	10864, 10865, 10866, 10867, 10868, 10869, 15616, 17663, 18313, 18315, 20610
Perennial	0841C	Arbor Creek - A 2.2 mile stretch of Arbor Creek running upstream from confluence with Johnson Creek, to approx. 0.5 miles upstream of Tarrant/Dallas county line.	
	0841C_01	A 2.2 mile stretch of Arbor Creek running upstream from confluence with Johnson Creek, to approx. 0.5 miles upstream of Tarrant/Dallas county line.	17192, 17666
Intermittent w/pools	0841D	Big Bear Creek - An 8 mi stretch of Big Bear Creek running upstream from confluence with Little Bear Creek to SH 26, Tarrant Co.	
	0841D_01	From the confluence with Little Bear Creek to SH 26, Tarrant County.	17089
Intermittent w/pools	0841E	Copart Branch Mountain Creek - A 2.8 mi stretch of Copart Branch running upstream from confluence with Mountain Creek to approx 0.3 miles upstream of Camden Road on Dallas Naval Academy, Dallas County.	
	0841E_01	A 2.8 mi stretch of Copart Branch running upstream from confluence with Mountain Creek to approx 0.3 miles upstream of Camden Road on Dallas Naval Academy, Dallas County.	17672
Perennial	0841F	Cottonwood Creek - A 6.5 mi stretch of Cottonwood Creek running upstream from approx. 0.1 mi upstream of Mountain Creek Reservoir in Dallas Co., to SH 360 in, Tarrant Co.	
	0841F_01	A 6.5 mi stretch of Cottonwood Creek running upstream from approx. 0.1 mi upstream of Mountain Creek Reservoir in Dallas Co., to SH 360 in, Tarrant Co.	10723, 17185, 17674, 17676, 20402, 20837
Perennial	0841G	Dalworth Creek - A 2.2 mi stretch of Dalworth Creek running upstream from confluence with Lower W. Fork Trinity to County Line Road in Grand Prairie, Dallas Co.	
	0841G_01	A 2.2 mi stretch of Dalworth Creek running upstream from confluence with Lower W. Fork Trinity to County Line Road in Grand Prairie, Dallas Co.	17671, 21557
Intermittent w/pools	0841H	Delaware Creek - An 8.5 mi stretch of Delaware Creek running upstream from confluence with Lower W. Fork Trinity to Finley Road in Irving.	
	0841H_01	An 8.5 mi stretch of Delaware Creek running upstream from confluence with Lower W. Fork Trinity to Finley Road in Irving.	10870, 10871, 10872, 10873, 10874, 10875, 15617, 17175, 17176, 17177, 17178, 18314
Intermittent	0841I	Dry Branch Creek - An 1.5 mi stretch of Dry Branch Creek running upstream from confluence with Lower W. Fork Trinity to Rock Island Road in Irving, Dallas County.	
	0841I_01	An 1.5 mi stretch of Dry Branch Creek running upstream from confluence with Lower W. Fork Trinity to Rock Island Road in Irving, Dallas County.	17173
Intermittent	0841J	Estelle Creek - A 4 mi stretch of Estelle Creek running upstream from confluence with Bear Creek to Valley View Lane in Irving, Dallas Co.	
	0841J_01	A 4 mi stretch of Estelle Creek running upstream from confluence with Bear Creek to Valley View Lane in Irving, Dallas County.	17174

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Perennial	0841K	Fish Creek - A 15 mi stretch of Fish Creek running upstream from the confluence with Mountain Creek Reservoir in Grand Prairie, Dallas Co., to the upper end of the creek in Arlington, Tarrant Co.	
	0841K_01	From South Belt Line Road (FM 1382) upstream to the upper end of the creek south of West Bardin Road in Arlington, Tarrant County.	10725, 15294, 17197, 17677, 17679, 20342, 21530
Perennial	0841L	Johnson Creek - Four mi stretch of Johnson Creek running upstream from confluence with the Arbor Creek to just upstream of I30 in Grand Prairie, Tarrant Co.	
	0841L_01	From the confluence with the Lower West Fork Trinity River, upstream to just south of Mayfield Road in Arlington, Tarrant, Co.	10718, 10719, 10720, 10721, 17193, 17194, 17195, 17664, 17665, 18311
Perennial	0841M	Kee Branch - Six mi stretch of Kee Branch running upstream from confluence with Rush Creek to upper end of the creek.	
	0841M_01	Six mi stretch of Kee Branch running upstream from confluence with Rush Creek to upper end of the creek.	10792, 15103, 16896
Perennial	0841N	Kirby Creek - Four mi stretch of Kirby Creek running upstream from confluence with Fish Creek in Grand Prairie, Dallas Co., to just upstream of Great Southwest Parkway in Arlington, Tarrant Co.	
	0841N_01	Four mi stretch of Kirby Creek running upstream from confluence with Fish Creek in Grand Prairie, Dallas Co., to just upstream of Great Southwest Parkway in Arlington, Tarrant Co.	17675
Perennial	0841O	Mountain Creek - Four mi stretch of Mountain Creek running upstream from confluence with West Fork Trinity, to approx 0.3 mi downstream of Mountain Creek Lake in Grand Prairie, Dallas Co.	
	0841O_01	Four mi stretch of Mountain Creek running upstream from confluence with West Fork Trinity, to approx 0.3 mi downstream of Mountain Creek Lake in Grand Prairie, Dallas Co.	10815, 17682
Perennial	0841P	North Fork Cottonwood Creek - A 4.4 mi stretch of North Fork Cottonwood Creek running upstream from confluence with the S. Fork Cottonwood Creek in Grand Prairie, Dallas Co., to approx. 0.3 mi upstream of Carter St. in Arlington, Tarrant Co.	
	0841P_01	A 4.4 mi stretch of North Fork Cottonwood Creek running upstream from confluence with the S. Fork Cottonwood Creek in Grand Prairie, Dallas Co., to approx. 0.3 mi upstream of Carter St. in Arlington, Tarrant Co.	10722, 17673, 20836, 17186
Perennial	0841Q	North Fork Fish Creek - North Fork Fish Creek from confluence with Fish Creek in Dallas Co. upstream to SH 360 in Tarrant Co.	
	0841Q_01	North Fork Fish Creek from confluence with Fish Creek in Dallas Co. upstream to SH 360 in Tarrant Co.	10724, 17188, 17678, 20838
Intermittent w/pools	0841R	Rush Creek - A 5 mi stretch of Rush Creek running upstream from confluence with Village Creek to confluence with Kee Branch in Arlington, Tarrant Co.	
	0841R_01	A 5 mi stretch of Rush Creek running upstream from confluence with Village Creek to confluence with Kee Branch in Arlington, Tarrant Co.	10788, 10789, 10790, 10791, 15689, 16889, 16897, 17190, 17191, 17200, 17201
Reservoir	0841S	Vilbig Lakes - A 5 acre area in NW corner of Vilbig Lakes, near confluence with unnamed creek, approx. 100 m south of intersection of Rusdell Rd./Marvel Dr. in Irving, Dallas, Co.	
	0841S_01	A 5 acre area in NW corner of Vilbig Lakes, near confluence with unnamed creek, approx. 100 m south of intersection of Rusdell Rd./Marvel Dr. in Irving, Dallas, Co.	15618, 15619, 15620, 15621, 15622, 15623, 15625, 15624, 20793, 20794, 20795, 20796

Waterbody Type	Segment / AU	Segment/AU Description	Stations
Intermittent w/pools	0841T	Village Creek - A 7 mi stretch of Village Creek running upstream from confluence with West Fork Trinity River to SH 303 approx. 0.75 mi downstream of Lake Arlington.	
	0841T_01	A 7 mile stretch of Village Creek running upstream from confluence with West Fork Trinity River to SH 303 approx. 0.75 mi. downstream of Lake Arlington.	10778, 10779, 17189
Intermittent	0841U	West Irving Creek - A 4 mi stretch of West Irving Branch running upstream from approx. 0.4 mi downstream of Oakdale Rd. to just south of Sowers Road in Irving, Dallas Co.	
	0841U_01	A 4 mile stretch of West Irving Branch running upstream from approx. 0.4 mi. downstream of Oakdale Rd. to just south of Sowers Road in Irving, Dallas Co.	17179
Perennial	0841V	Crockett Branch - A 1 mi (1.5 KM) stretch of Crockett Branch extending upstream from the confluence with Cottonwood Creek to the upper end of the creek	
	0841V_01	A 1 mi (1.5 KM) stretch of Crockett Branch extending upstream from the confluence with Cottonwood Creek to the upper end of the creek	15295, 17683
Perennial	0841W	Mountain Creek above Mountain Creek Lake - From the confluence with Mountain Creek Lake upstream to the Joe Pool Lake dam	
	0841W_01	From the confluence with Mountain Creek Lake upstream to the Joe Pool Lake dam	13672, 13673, 17681, 20095