

# Mountain Creek Lake Upstream Watersheds: Bacteria in Waters Used for Contact Recreation

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- **Four TMDLs Adopted November 2, 2016**  
Approved by EPA December 7, 2016
- **One TMDL Added by Addendum October 2019**  
Approved by EPA March 11, 2020 (scroll to view or print this addendum)



Water Quality Planning Division, Office of Water

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

# **Addendum One to Four Total Maximum Daily Loads for Indicator Bacteria in the Cottonwood Creek, Fish Creek, Kirby Creek, and Crockett Branch Watersheds Upstream of Mountain Creek Lake**

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## **One Total Maximum Daily Load for Indicator Bacteria in North Fork Fish Creek**

For Segment 0841Q

Assessment Unit 0841Q\_01

### **Introduction**

The Texas Commission on Environmental Quality (TCEQ) adopted *Four Total Maximum Daily Loads for Indicator Bacteria in the Cottonwood Creek, Fish Creek, Kirby Creek, and Crockett Branch Watersheds Upstream of Mountain Creek Lake: Segments 0841F, 0841K, 0841N, and 0841V* (TCEQ, 2016) on November 2, 2016. The total maximum daily loads (TMDLs) were approved by the United States Environmental Protection Agency (EPA) on December 7, 2016. This document represents an addendum to the original TMDL document.

This addendum includes information specific to one additional assessment unit (AU) of one segment located within the watershed of the approved TMDL project for bacteria in segments upstream of Mountain Creek Lake. Concentrations of indicator bacteria in this additional AU exceed the geometric mean criterion used to evaluate attainment of the water quality standard for contact recreation. This addendum presents the new information associated with the additional AU. For background or other explanatory information, please refer to the [Technical Support Document for a Total Maximum Daily Load for Indicator Bacteria for North Fork Fish Creek](#) (Millican, 2019). Refer to the original, approved TMDL document for details related to the overall Cottonwood Creek, Fish Creek, Kirby Creek, and Crockett Branch watersheds as well as the methods and assumptions used in developing the original TMDLs.

The addendum watershed was included in the original TMDL project area. This addendum provides the details related to developing the TMDL allocation for this additional AU, which was not specifically addressed in the original TMDL document.

# Problem Definition

The TCEQ first identified the bacteria impairment for North Fork Fish Creek in the 2016 *Texas Integrated Report of Surface Water Quality for Clean Water Act Sections 305(b) and 303(d)* (2016 Integrated Report; TCEQ, 2018a). Table 1 provides a summary for the EPA-approved 2016 Integrated Report. The impaired AU is 0841Q\_01, as shown in Figure 1. The impaired segment is composed of only one AU that encompasses the entire segment. The project watershed is located within Tarrant and Dallas counties. Figure 1 also shows the North Fork Fish Creek watershed in relation to the entire watershed of the original TMDLs.

Table 1. Synopsis of the 2016 Integrated Report for North Fork Fish Creek.

Integrated Report Year	Segment	AU	Parameter	Contact Recreation Use	Category
2016	0841Q	0841Q_01	<i>E. coli</i>	Nonsupport	5c

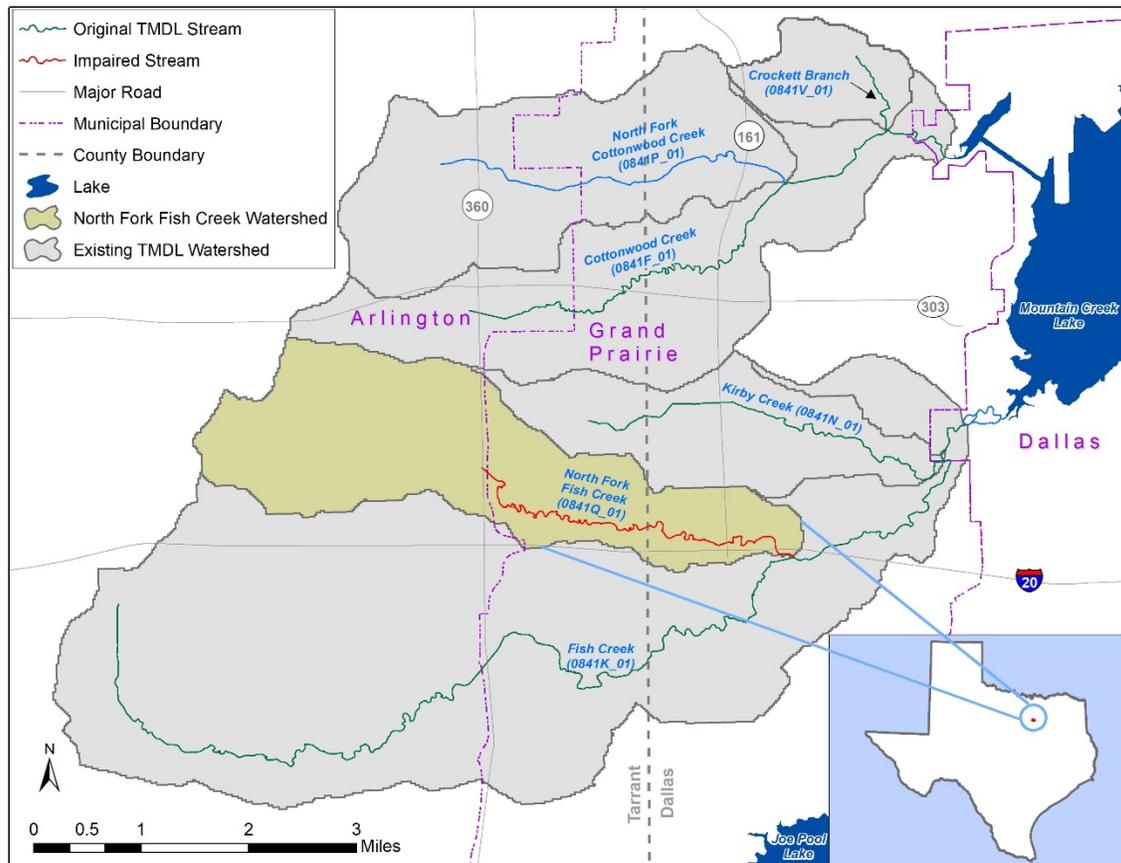


Figure 1. Approved TMDL watersheds and the North Fork Fish Creek watershed.

The Texas Surface Water Quality Standards (TSWQS; TCEQ, 2010) identify uses for surface waters and numeric and narrative criteria to evaluate attainment of those uses. The basis for the water quality target for the TMDL developed in this report is the numeric criterion for indicator bacteria from the 2010 TSWQS.

*Escherichia coli* (*E. coli*) is the indicator bacteria for assessing primary contact recreation use in freshwater.

Table 2 summarizes the ambient water quality data for the TCEQ surface water quality monitoring (SWQM) stations on North Fork Fish Creek, as reported in the 2016 Integrated Report. The data from the assessment indicate nonsupport of the primary contact recreation use for North Fork Fish Creek, because the geometric mean concentration for *E. coli* exceeds the geometric mean criterion of 126 colony forming units (cfu)/100 milliliters (mL) of water. Surface water quality monitoring within the North Fork Fish Creek watershed has occurred at TCEQ SWQM stations 10724, 17678, and 20838 (Figure 2).

Table 2. 2016 Integrated Report summary for the North Fork Fish Creek watershed.

AU	Parameter	Stations	Number of Samples	Date Range	<i>E. coli</i> Geometric Mean (cfu/100 mL)
0841Q_01	<i>E. coli</i>	10724; 17678; 20838	84	2007-2014	183

## Description of the Study Area

North Fork Fish Creek (Segment 0841Q) is a tributary to Fish Creek (Segment 0841K) and is approximately five miles in length, with portions in both Tarrant and Dallas counties (Figure 1). North Fork Fish Creek is a perennial, unclassified, freshwater stream. The North Fork Fish Creek watershed drains an area of approximately 3,663 acres.

The 2016 Integrated Report (TCEQ, 2018a) provides the following segment and AU description for North Fork Fish Creek:

- North Fork Fish Creek (AU 0841Q\_01): North Fork Fish Creek from confluence with Fish Creek in Dallas County upstream to State Highway 360 in Tarrant County.

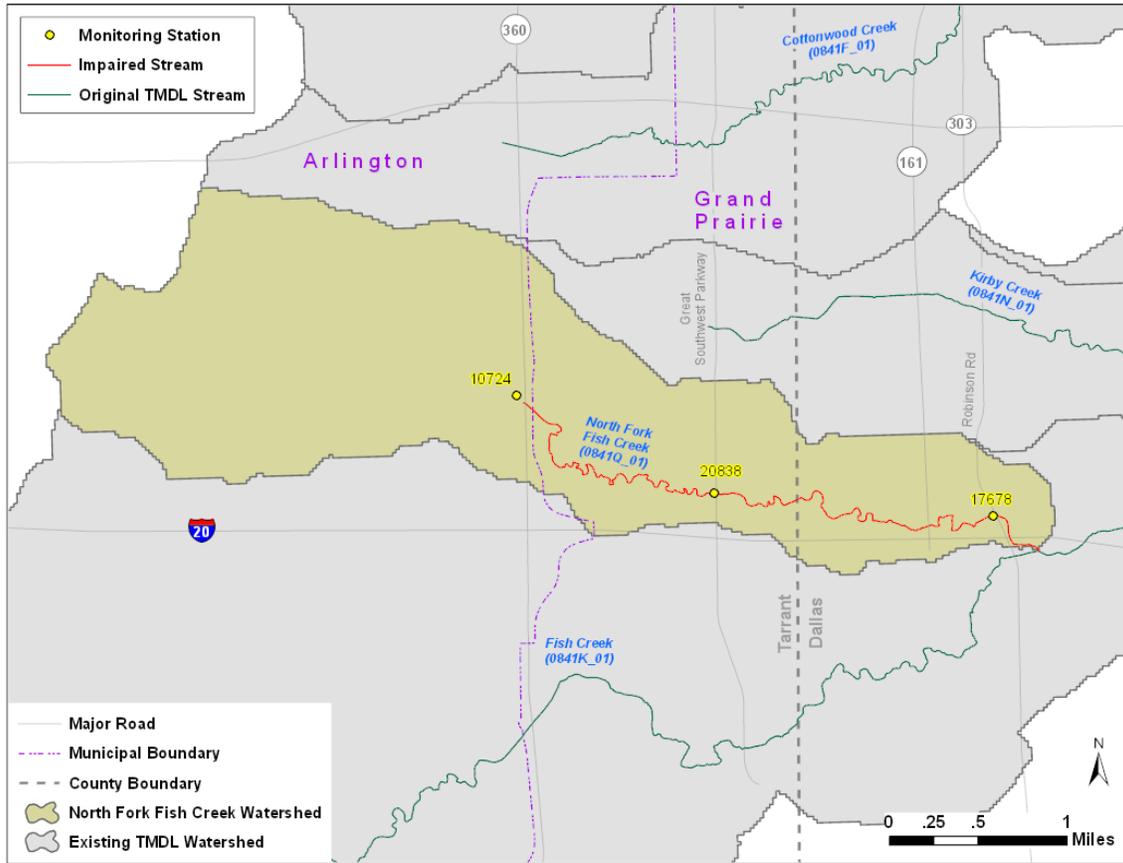


Figure 2. North Fork Fish Creek watershed showing TCEQ SWQM stations.

## Watershed Climate

The North Fork Fish Creek watershed is located near the center of the Dallas/Fort Worth metroplex, which is described as having a humid subtropical climate (NOAA, 2009). Weather data spanning a period from 2003 through 2017 were obtained from the National Climatic Data Center for the Arlington Municipal Airport station located in the western portion of the Fish Creek (Segment 0841K) watershed (NOAA, 2018; Figure 3). The average annual precipitation was 34.9 inches. The wettest month is typically May (4.5 inches), while August (1.7 inches) is normally the driest month, with rainfall occurring throughout the year. The average high temperatures typically peak in August (96.5 °F) with highs above 100 °F occurring from June through August. During winter, the average low temperature reaches a minimum of 35.7 °F in January.

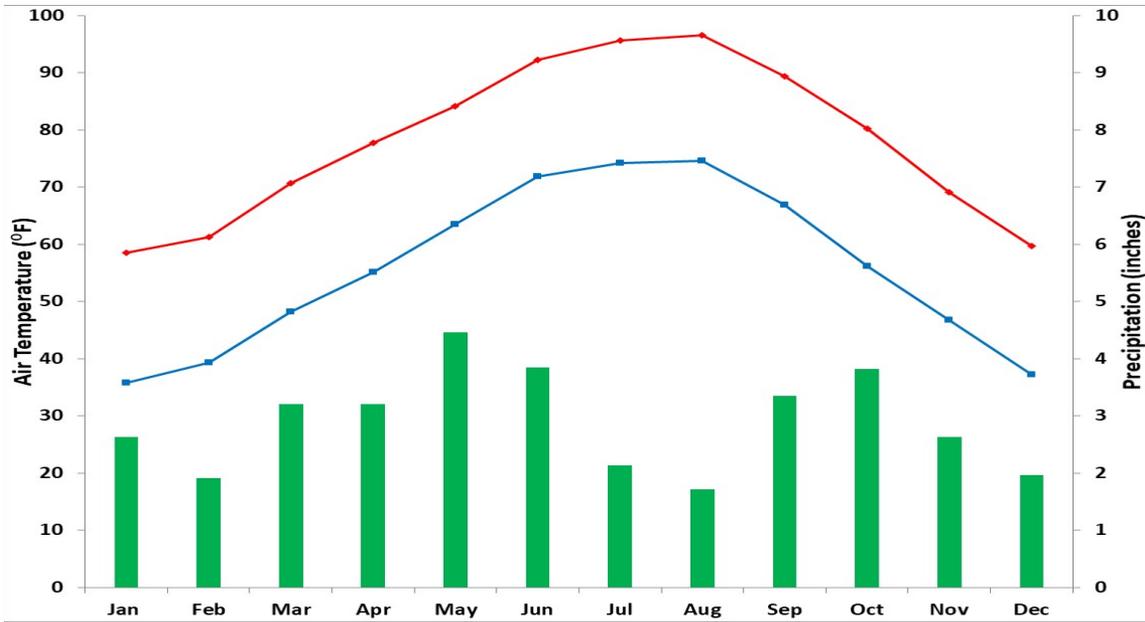


Figure 3. Average minimum and maximum air temperature and total precipitation by month from January 2003 through December 2017 for Arlington Municipal Airport.

## Land Use

The land use/land cover data for the North Fork Fish Creek watershed were obtained from the North Central Texas Council of Governments (NCTCOG, 2017a) and represent land use/land cover estimates for 2015. The 2015 land use/land cover data from the NCTCOG for the North Fork Fish Creek watershed is shown in Figure 4. A summary of the land use/land cover data is provided in Table 3 and indicates that residential land use is the dominant land cover, comprising approximately 41 percent of the North Fork Fish Creek watershed.

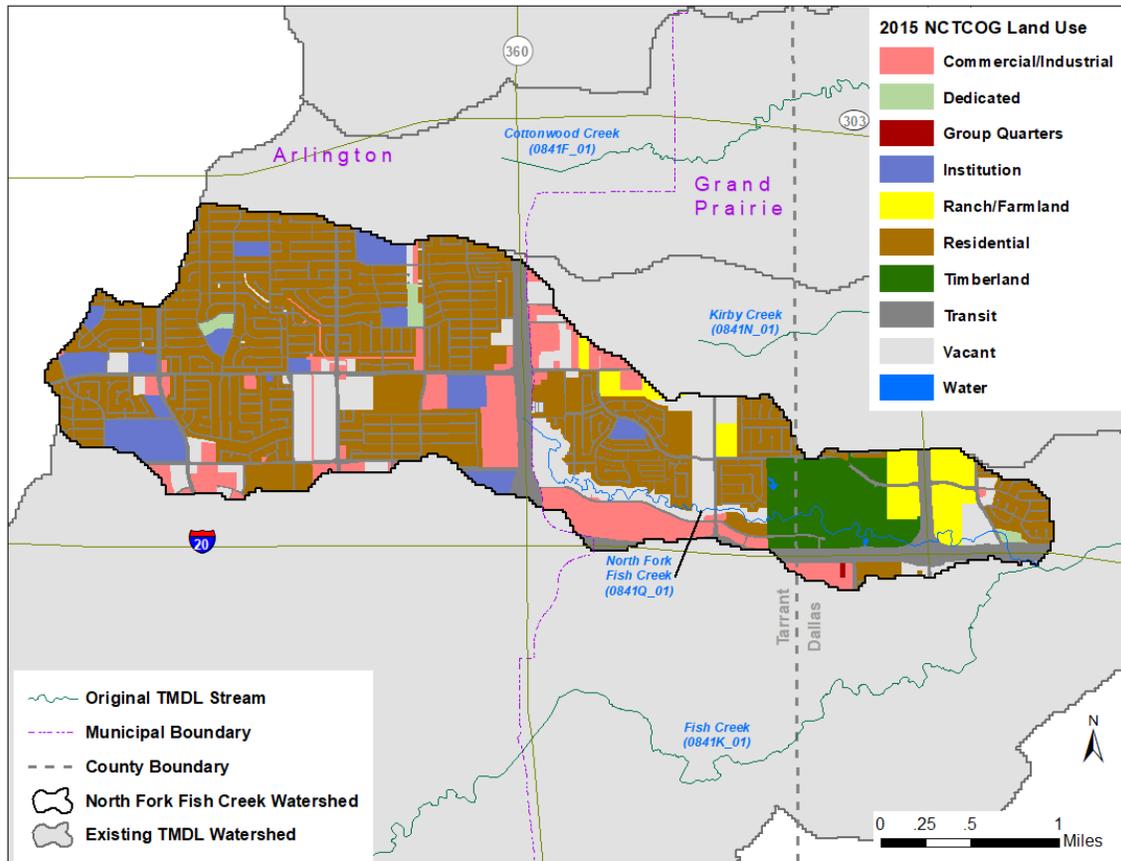


Figure 4. 2015 land use/land cover within the North Fork Fish Creek watershed.

Table 3. Land use/land cover within the North Fork Fish Creek watershed.

Classification	Area (Acres)	Percent of Total
Commercial/Industrial	369.0	10.08%
Group Quarters	1.5	0.04%
Residential	1,509.8	41.22%
Institution	216.1	5.90%
Transit	780.8	21.32%
Dedicated	26.1	0.71%
Vacant	382.8	10.45%
Ranch/Farmland	149.0	4.07%
Timberland	225.5	6.16%
Water	1.9	0.05%
<b>Total</b>	<b>3,662.5</b>	<b>100%</b>

## Watershed Population and Population Projections

As depicted in Figure 1, the North Fork Fish Creek watershed is geographically located within the municipal incorporated boundaries of Arlington and Grand Prairie. Population estimates were developed using 2010 United States Census Bureau (USCB) Block data allocated to the area within the North Fork Fish Creek watershed. Population projections for the year 2045 were developed by the NCTCOG by utilizing traffic survey zone allocations approximated to city boundaries. The projected populations were then allocated based on proportion of the area within the North Fork Fish Creek watershed. The projected population increase was then determined based on the increase from the 2010 population to the projected 2045 population. This indicates that the population within the North Fork Fish Creek watershed is projected to increase by 62.4 percent (Table 4; USCB, 2018 and NCTCOG, 2017b).

Table 4. 2010 Population and 2045 population projection for the North Fork Fish Creek watershed.

Water Body	Segment	2010 U.S. Census Population	2045 Projected Population	Projected Population Increase	Percent Change (2010–2045)
North Fork Fish Creek	0841Q	30,749	49,926	19,177	62.4%

## Endpoint Identification

The endpoint for the TMDL is to maintain the concentration of *E. coli* below the geometric mean criterion of 126 cfu/100mL in the 2010 TSWQS.

## Source Analysis

### Regulated Sources

Permitted sources are regulated under the Texas Pollutant Discharge Elimination System (TPDES) and the National Pollutant Discharge Elimination System (NPDES) programs.

### Domestic and Industrial Wastewater Treatment Facilities

There are no permitted domestic wastewater treatment facilities (WWTfs) or industrial dischargers within the North Fork Fish Creek watershed. Domestic wastewater is collected by and transported to the Trinity River Authority (TRA) Central Regional Wastewater System located outside the study area (Figure 5).

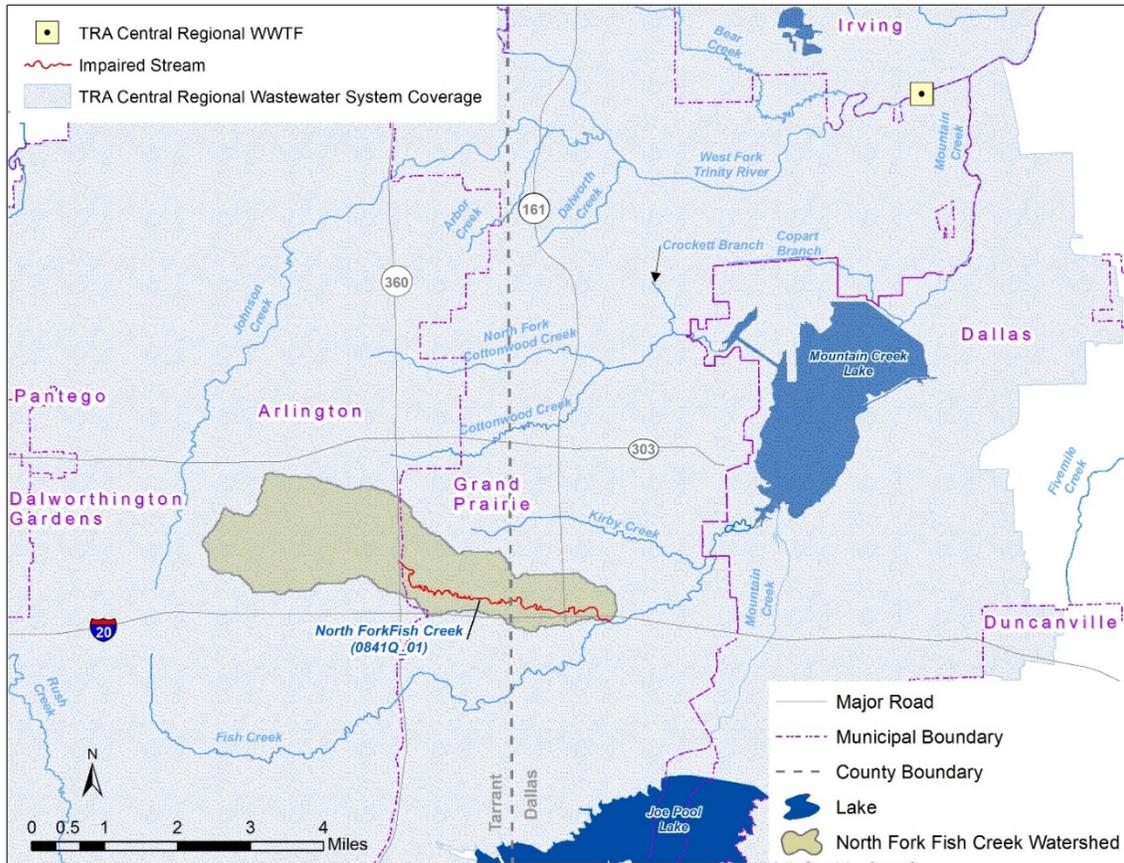


Figure 5. Coverage area of the TRA Central Regional Wastewater System in the TMDL study area.

### Sanitary Sewer Overflows

Information regarding reported sanitary sewer overflow (SSO) incidents in the North Fork Fish Creek watershed was acquired through the NCTCOG and represented incidents that occurred from 2007 through 2015. Reported SSO incidents that occurred from 2007 through 2015 were refined by the NCTCOG by assigning latitude and longitude coordinates to each SSO event and plotted using Geographic Information System software in an effort to characterize the frequency and magnitude of SSO events within the North Fork Fish Creek watershed (Figure 6). A summary of the NCTCOG-refined data within the North Fork Fish Creek watershed is shown in Table 5.

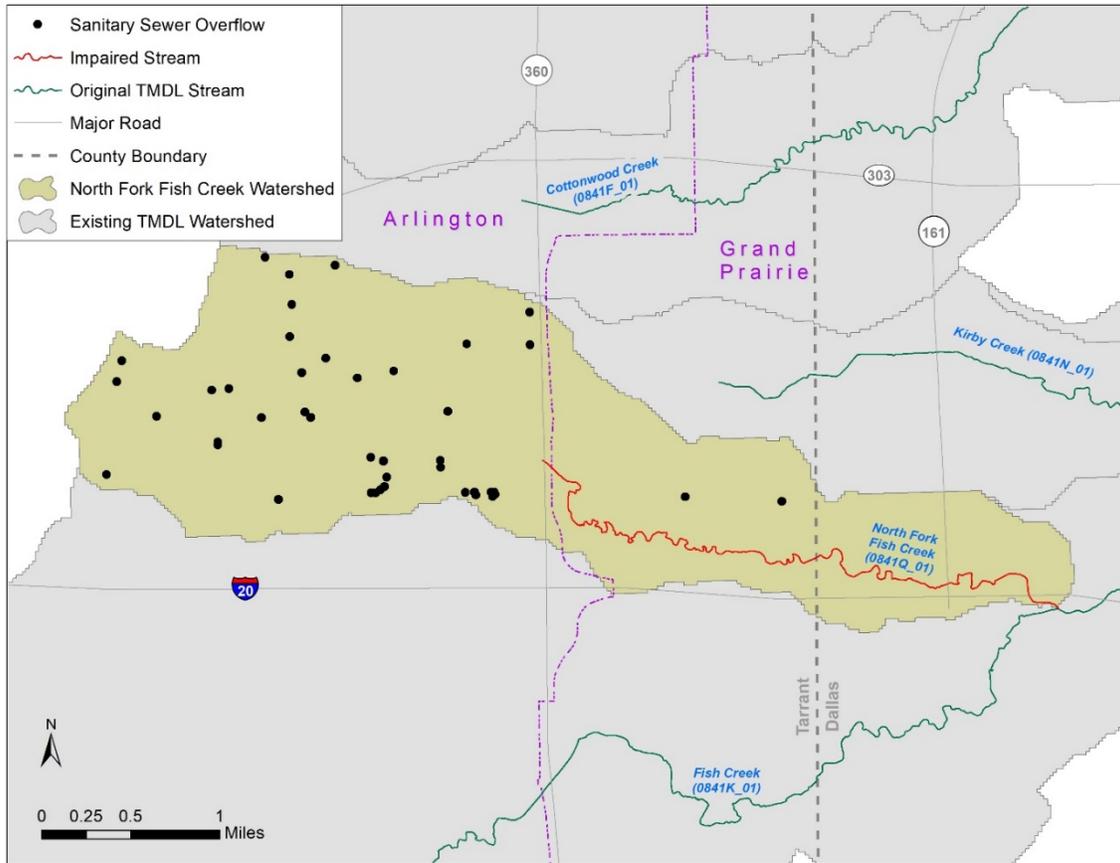


Figure 6. SSOs that occurred from 2007 through 2015 within the North Fork Fish Creek watershed.

Table 5. Summary of SSO incidences reported in the North Fork Fish Creek Watershed from 2007 through 2015.

No. of Incidents	Total Volume (gallons)	Average Volume (gallons)	Minimum Volume (gallons)	Maximum Volume (gallons)
45	22,166	493	7	6,000

### TPDES-Regulated Stormwater

When evaluating stormwater for a TMDL allocation, a distinction must be made between stormwater originating from an area under a TPDES- or NPDES-regulated discharge permit and stormwater originating from areas not under a TPDES- or NPDES-regulated discharge permit. Stormwater discharges fall into two categories:

- 1) stormwater subject to regulation, which is any stormwater originating from TPDES/NPDES regulated municipal separate storm sewer system (MS4) entities, industrial facilities, and construction activities; and

2) stormwater runoff not subject to regulation.

The TPDES/NPDES MS4 Phase I and II rules require municipalities and certain other entities in urban areas to obtain permit coverage for their stormwater systems. A regulated MS4 is a publicly owned system of conveyances and includes ditches, curbs, gutters, and storm sewers that do not connect to a wastewater collection system or treatment facility. Phase I permits are individual permits for large and medium-sized communities with populations of 100,000 or more based on the 1990 U.S. Census, whereas the Phase II general permit regulates smaller communities within a USCB-defined urbanized area. The purpose of an MS4 permit is to reduce discharges of pollutants in stormwater to the “maximum extent practicable” by developing and implementing a Stormwater Management Program (SWMP). The SWMP describes the stormwater control practices that will be implemented consistent with permit requirements to minimize the discharge of pollutants from the MS4. The permits require that the SWMPs specify the best management practices to meet several minimum control measures (MCMs) that, when implemented in concert, are expected to result in significant reductions of pollutants discharged into receiving waterbodies. Phase II MS4 MCMs include:

- Public education, outreach, and involvement;
- Illicit discharge detection and elimination;
- Construction site stormwater runoff control;
- Post-construction stormwater management in new development and redevelopment;
- Pollution prevention and good housekeeping for municipal operations; and
- Industrial stormwater sources.

Phase I MS4 individual permits have similar MCMs organized a little differently and are further required to perform water quality monitoring.

The geographic region of the TMDL watershed covered by Phase I and II MS4 permits is that portion of the area within the jurisdictional boundaries of the regulated entities. For Phase I permits the jurisdictional area is defined by the city limits and for Phase II permits the jurisdictional area is defined as the intersection or overlapping areas of the city limits and the 2000 or 2010 USCB urbanized area.

The area under the jurisdiction of Phase II general permits and Phase I individual permits was used to estimate the regulated stormwater areas for construction, industrial, and MS4 permits. In this report, the regulated area for the Phase II permits was based on the 2010 urbanized area from the U.S. Census.

A review of active stormwater general permits coverage and a review of the central registry for Phase I MS4 permit coverage (TCEQ, 2018b) in the study area

revealed that existing Phase I and Phase II permits (Table 6) provide 100 percent MS4 coverage for the North Fork Fish Creek watershed (Figure 7).

Table 6. TPDES and NPDES MS4 permits associated with the North Fork Fish Creek watershed.

Entity	TPDES Permit	NPDES Permit
City of Arlington	WQ0004635-000	TXS000301
Texas Department of Transportation	WQ0005011-000	TXS002101
City of Grand Prairie	Phase II General Permit (TXR040000)	TXR040065

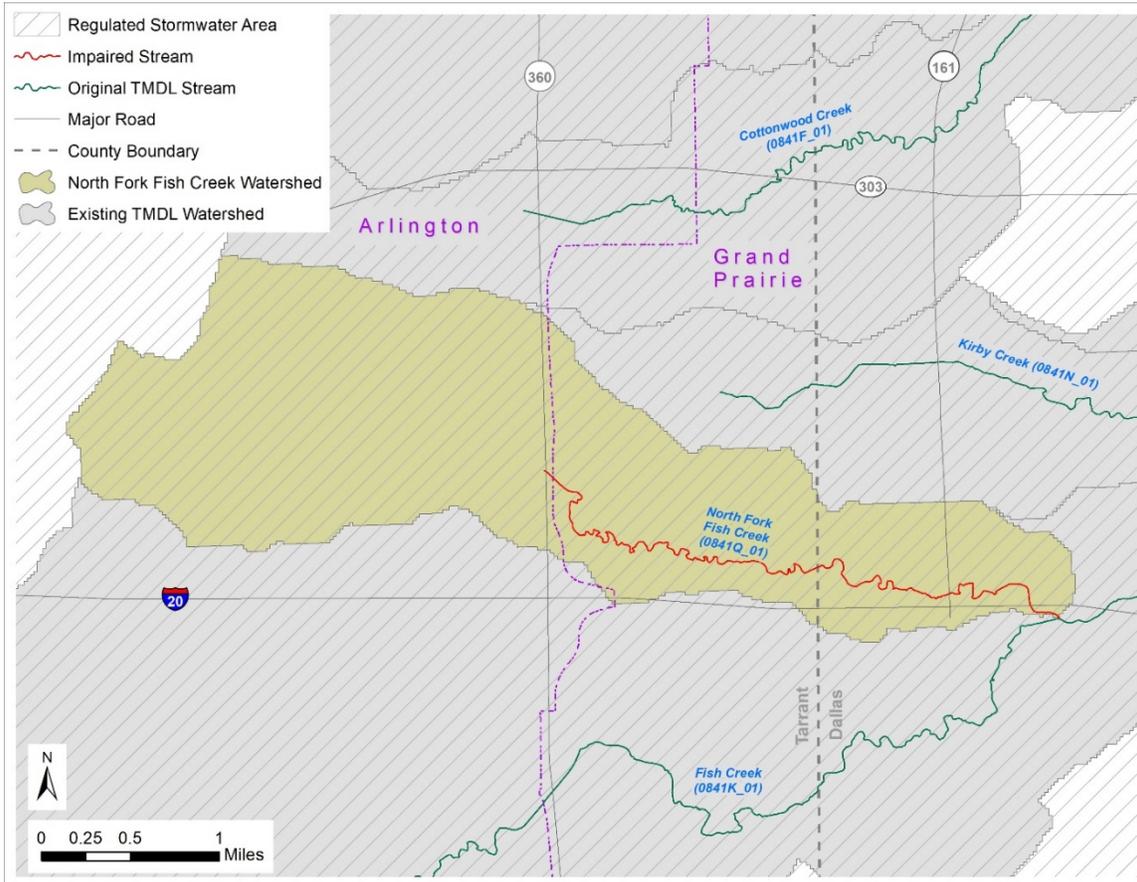


Figure 7. Regulated stormwater area based on Phase I and Phase II MS4 permits within the North Fork Fish Creek watershed.

### TPDES General Wastewater Permits

Discharges of processed wastewater from certain types of facilities are required to be covered by one of several TPDES general permits:

- TXG110000 – concrete production facilities
- TXG130000 – aquaculture production facilities
- TXG340000 – petroleum bulk stations and terminals

- TXG500000 – quarries in John Graves Scenic Riverway
- TXG670000 – hydrostatic test water
- TXG830000 – petroleum fuel or petroleum substances
- TXG870000 – pesticides
- TXG920000 – concentrated animal feeding operations
- TXG100000 – wastewater evaporation
- WQG20000 – livestock manure compost operations (irrigation only)

A review of active general permit coverage (TCEQ, 2018b) in the North Fork Fish Creek watershed as of November 6, 2018, found no operations or facilities of the types described above.

## **Unregulated Sources**

Unregulated sources of indicator bacteria are generally nonpoint and can originate from wildlife and feral hogs, various agricultural activities, agricultural animals, land application fields, urban runoff not covered by a permit, failing on-site sewage facilities (OSSFs), and domestic pets.

### **Wildlife and Unmanaged Animal Contributions**

*E. coli* bacteria are common inhabitants of the intestines of all warm-blooded animals, including feral hogs and wildlife such as mammals and birds. In developing bacteria TMDLs, it is important to identify by watershed the potential for bacteria contributions from wildlife and feral hogs. Wildlife and feral hogs are naturally attracted to the riparian corridors of streams and rivers. With direct access to the stream channel, the direct deposition of wildlife and feral hog waste can be a concentrated source of bacteria loading to a water body. Fecal bacteria from wildlife and feral hogs are also deposited onto land surfaces, where they may be washed into nearby streams by rainfall runoff. The *E. coli* contribution from feral hogs and wildlife in North Fork Fish Creek could not be determined based on existing information.

### **Domesticated Animals**

Due to the highly urbanized nature of the North Fork Fish Creek watershed, livestock were not considered a significant source of bacteria loading. Fecal bacteria from dogs and cats are transported to streams by runoff in both urban and rural areas and can be a potential source of bacteria loading. Table 7 summarizes the estimated number of dogs and cats within the North Fork Fish Creek watershed. Pet population estimates were calculated as the estimated number of dogs (0.584) and cats (0.638) per household according to data from the American Veterinary Medical Association 2012 U.S Pet Statistics (AVMA, 2015). The number of households in the watershed was estimated using 2010 USCB data (USCB, 2018). The actual contribution and significance of bacteria loads from pets in the North Fork Fish Creek watershed is unknown.

Table 7. Estimated households and pet populations for the North Fork Fish Creek watershed.

Estimated Number of Households	Estimated Dog Population	Estimated Cat Population
9,962	5,818	6,356

### **On-site Sewage Facilities**

Failing OSSFs were not considered a major source of bacteria loading in the North Fork Fish Creek watershed, because the entire watershed area is served by TRA. Areas serviced by centralized treatment and collection systems typically contain very few OSSFs, and this is the situation for the TMDL watershed. NCTCOG information indicates that only two OSSFs exist in the North Fork Fish Creek watershed.

## **Linkage Analysis**

The load duration curve (LDC) method was used to examine the relationship between instream water quality and the source of indicator bacteria loads. Inherent to the use of LDCs as the mechanism of linkage analysis is the assumption of a one-to-one relationship between instream loadings and loadings originating from point sources and the landscape as regulated and non-regulated sources. Further, this one-to-one relationship was also inherently assumed when using LDCs to define the TMDL pollutant load allocation. The LDC method allows for estimation of TMDL loads by utilizing the cumulative frequency distribution of streamflow and measured pollutant concentration data (Cleland, 2003). In addition to estimating stream loads, this method allows for the determination of the hydrologic conditions under which impairments are typically occurring, can give indications of the broad origins of the bacteria (i.e., point source and stormwater), and provides a means to allocate allowable loadings. The technical support document (Millican, 2019) provides details about the linkage analysis and the LDC method and its application.

## **Margin of Safety**

The margin of safety (MOS) is designed to account for any uncertainty that may arise in specifying water quality control strategies for the complex environmental processes that affect water quality. Quantification of this uncertainty, to the extent possible, is the basis for assigning an MOS. The TMDL incorporates an explicit MOS of five percent of the total TMDL allocation.

## **Pollutant Load Allocation**

The TMDL for North Fork Fish Creek was derived using the median flow within the high flow regime (or five percent flow) of the LDC developed for Station 17678, the most downstream station in the watershed (Figure 8).

With historical *E. coli* data added to this LDC, the following broad linkage statements can be made. For the North Fork Fish Creek watershed, the historical *E. coli* data indicate that elevated bacteria loadings occur under all three flow regimes. However, the geometric means of the measured data for each flow regime generally indicate decreasing concentration with decreasing flow. The allowable load at the single sample criterion (399 cfu/100 mL) is included on the LDC for comparison with individual *E. coli* samples, although it is not used for assessment or allocation purposes.

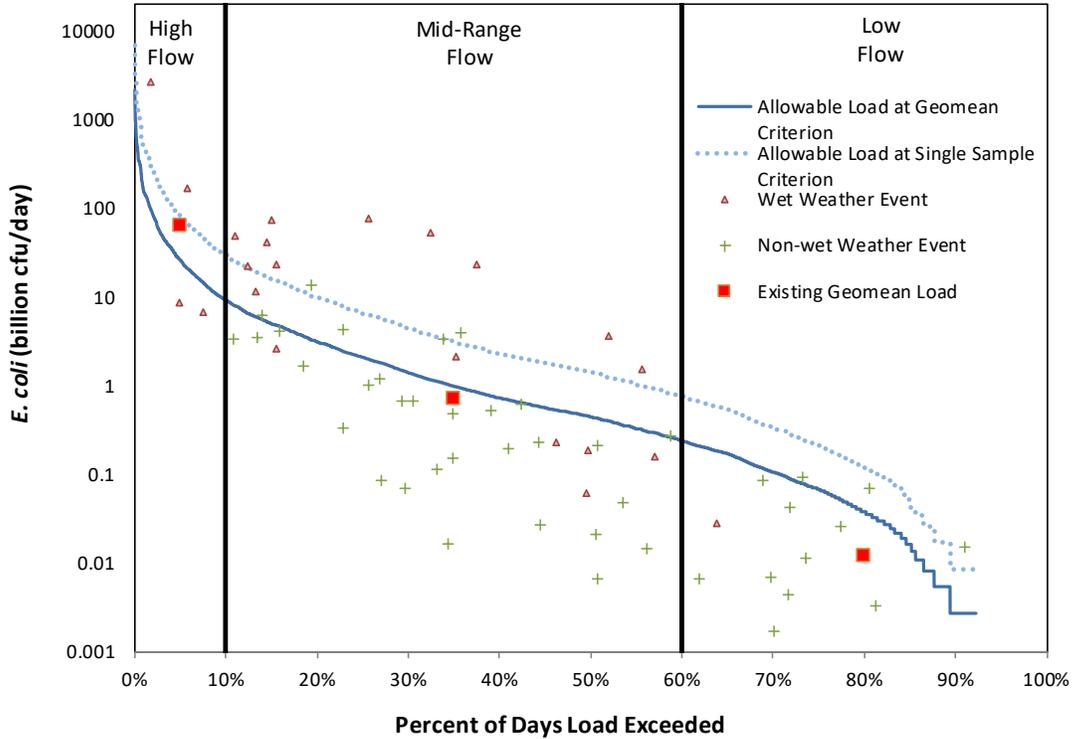


Figure 8. LDC for North Fork Fish Creek (Station 17678).

## Wasteload Allocation

The wasteload allocation (WLA) is the sum of loads from regulated sources, which are WWTFs and regulated stormwater.

### Wastewater Treatment Facilities

TPDES-permitted WWTFs would be allocated a daily wasteload ( $WLA_{\text{WWTF}}$ ) calculated as their full permitted discharge flow rate multiplied by one-half the instream geometric mean criterion. One-half of the water quality criterion (63 cfu/100 mL *E. coli*) is used as the WWTF target to provide instream and downstream load capacity and to be consistent with previously developed TMDLs. Due to the absence of any permitted dischargers in the North Fork Fish Creek watershed, and to remain consistent with the previous TMDLs, the  $WLA_{\text{WWTF}}$  component is zero.

## Regulated Stormwater

Stormwater discharges from MS4, industrial, and construction sites are also considered regulated point sources. Therefore, the WLA calculations must also include an allocation for regulated stormwater discharges ( $WLA_{sw}$ ). The percentage of the land area included in the project watershed that is under the jurisdiction of stormwater permits (defined as the area designated as urbanized area in the 2010 U.S. Census) is used to estimate the amount of the overall runoff load that should be allocated as the permitted stormwater contribution in the  $WLA_{sw}$  component of the TMDL. As noted earlier, Phase I and Phase II permits provide 100 percent MS4 coverage for the North Fork Fish Creek watershed.

However, even in highly urbanized areas such as the North Fork Fish Creek watershed, there remain small areas of streams within each watershed that are not strictly regulated, and which may receive bacteria loadings from unregulated sources such as wildlife. To account for these small unregulated areas, the stream length based on the TCEQ description of Segment 0841Q and a stream width estimated from measurements recorded as part of a recreational use attainability analysis on North Fork Fish Creek (TIAER, 2010) were used to calculate an area of unregulated stormwater contribution, totaling 4.2 acres. The resulting percentage of land under the jurisdiction of stormwater permits in the North Fork Fish Creek watershed was 99.9 percent.

## Load Allocation

The load allocation (LA) component of the TMDL corresponds to runoff from unregulated sources. It is calculated by subtracting the sum of the  $WLA_{wwtf}$ ,  $WLA_{sw}$ , MOS, and future growth (FG) allocations from the total TMDL allocation.

## Future Growth

The FG component of the TMDL equation addresses the requirement of TMDLs to account for future loadings that might occur as a result of population growth, changes in community infrastructure, and development. The assimilative capacity of streams increases as the amount of flow increases. Increases in flow allow for additional indicator bacteria loads if the concentrations are at or below the primary contact recreation standard (126 cfu/100 mL).

As noted previously, the North Fork Fish Creek watershed is entirely within the collection system area of the TRA Central Regional Wastewater System. Additionally, there are no WWTFs within the North Fork Fish Creek watershed and there are no plans to build a new WWTF within the watershed (TRA, 2019). Due to 100 percent coverage of wastewater collection by the TRA Central Regional Wastewater System and the absence of WWTFs in the North Fork Fish Creek watershed, the FG component for impaired AU 0841Q\_01 is zero. This approach for FG also remains consistent with the previous TMDLs.

The three-tiered antidegradation policy in the TSWQS prohibits an increase in loading that would cause or contribute to degradation of an existing use. The antidegradation policy applies to both point and nonpoint source pollutant discharges. In general, antidegradation procedures establish a process for reviewing individual proposed actions to determine if the activity will degrade water quality. The TMDL in this document will result in protection of existing uses and conform to Texas' antidegradation policy.

## TMDL Calculations

Table 8 summarizes the TMDL calculation for North Fork Fish Creek AU 0841Q\_01. The TMDL was calculated based on the median flow in the 0-10 percentile range (five percent exceedance, high flow regime) for flow exceedance from the LDC developed for the monitoring station 17678. Allocations are based on the current geometric mean criterion for *E. coli* of 126 cfu/100 mL for each component of the TMDL (although one-half the criterion would have been used to calculate the  $WLA_{wwTF}$  and FG terms, had these terms not been zero).

Table 8. TMDL allocation summary for North Fork Fish Creek.

Water Body	AU	TMDL	$WLA_{wwTF}$	$WLA_{sw}$	LA	FG	MOS
North Fork Fish Creek	0841Q_01	26.08	0	24.75	0.03	0	1.30

All loads expressed as billion cfu/day *E. coli*

The final TMDL allocations (Table 9) needed to comply with the requirements of 40 Code of Federal Regulations (CFR) Section 103.7 include the FG component within the  $WLA_{wwTF}$ .

Table 9. Final TMDL allocations for North Fork Fish Creek.

Water Body	AU	TMDL	$WLA_{wwTF}$	$WLA_{sw}$	LA	MOS
North Fork Fish Creek	0841Q_01	26.08	0	24.75	0.03	1.30

All loads expressed as billion cfu/day *E. coli*

## Seasonal Variation

Federal regulations in 40 CFR Section 130.7(c)(1) require that TMDLs account for seasonal variation in watershed conditions and pollutant loading. Analysis of the seasonal differences in indicator bacteria concentrations were assessed by comparing *E. coli* concentrations obtained from seventeen years (2001 through 2017) of routine monitoring collected in the warmer months (April through September) against those collected during the cooler months (October through March). Differences in *E. coli* concentrations obtained in warmer versus cooler months were then evaluated by performing a t-test on the natural log transformed dataset. This analysis of *E. coli* data indicated that there was a significant difference ( $\alpha=0.05$ ) in indicator bacteria between cool and warm weather seasons for North Fork Fish Creek ( $\alpha=0.008$ ), with the warm season having higher concentrations. Seasonal variation was also addressed by using all

available flow and bacteria records (covering all seasons) from the period of record used in LDC development for this project.

## Public Participation

The TCEQ maintains an inclusive public participation process. From the inception of the TMDL study, the TCEQ sought to ensure that stakeholders were informed and involved. Communication and comments from the stakeholders in the watershed strengthen TMDL projects and their implementation.

The [technical support document](#) for this TMDL addendum (Millican, 2019) was posted on the TCEQ website on July 17, 2019. A presentation on this addendum was given at the annual meeting of the Greater Trinity River Bacteria TMDL Implementation Plan Coordination Committee in Arlington on June 13, 2019. The public will have an opportunity to comment on this addendum during the official Water Quality Management Plan update public comment period (November 8 through December 12, 2019). This is an ongoing process, so notice of the public comment period for this addendum will be sent to the stakeholders and posted on the TCEQ's TMDL Program [News webpage](#), and the document will be posted on the [WQMP Updates webpage](#). TCEQ accepted public comments on the original TMDL from May 27 through June 27, 2016. No comments were submitted related to North Fork Fish Creek.

## Implementation and Reasonable Assurance

The segment covered by this addendum is within the existing bacteria TMDL watersheds of Cottonwood Creek, Fish Creek, Kirby Creek, and Crockett Branch. Those TMDL watersheds including North Fork Fish Creek are within the area covered by the implementation plan developed by the NCTCOG (in collaboration with the Coordination Committee of the Greater Trinity River Bacteria TMDL Implementation Project) for bacteria TMDLs throughout the greater Dallas/Fort Worth area, approved by the TCEQ on December 11, 2013. It outlines an adaptive management approach in which measures are periodically assessed for efficiency and effectiveness. The iterative process of evaluation and adjustment ensures continuing progress toward achieving water quality goals and expresses stakeholder commitment to the process. Please refer to the original TMDL document for additional information regarding implementation and reasonable assurance.

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