Mountain Creek Lake Upstream Watersheds: A Community Project to Protect Recreational Uses

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Four TMDLs for Indicator Bacteria in the Cottonwood Creek, Fish Creek, Kirby Creek, and Crockett Branch Watersheds Upstream of Mountain Creek Lake[1]

Adopted November 2, 2016.

Approved by EPA December 7, 2016.

One TMDL for Indicator Bacteria in North Fork Fish Creek Added By Addendum I, October 2019[2]

Via the October 2019 Update to the Texas Water Quality Management Plan.

Approved by EPA March 11, 2020.

One TMDL for Indicator Bacteria in North Fork Cottonwood Creek Added by this Addendum II, April 2022

Via the April 2022 Update to the Texas Water Quality Management Plan (SFR-121/2022-03).

Approved by EPA August 11, 2022 (scroll to view or print this addendum).

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[1] https://www.tceq.texas.gov/downloads/water-quality/tmdl/greater-trinity-recreational-66/66f-mountain-creek-lake-tmdl-adopted.pdf

[2] https://www.tceq.texas.gov/downloads/water-quality/tmdl/greater-trinity-recreational-66/66-nffc-addendum-oct-2019.pdf

Appendix IX. Addendum Two to Four TMDLs for Indicator Bacteria in the Cottonwood Creek, Fish Creek, Kirby Creek, and Crockett Branch Watersheds Upstream of Mountain Creek Lake

Adding one Total Maximum Daily Load (TMDL) for AU 0841P_01

One TMDL for Indicator Bacteria in North Fork Cottonwood Creek

Introduction

Texas Commission on Environmental Quality (TCEQ) adopted *Four TMDLs for Indicator Bacteria in the Cottonwood Creek, Fish Creek, Kirby Creek, and Crockett Branch Watersheds Upstream of Mountain Creek Lake* (TCEQ, 2016) on November 2, 2016. The United States Environmental Protection Agency (EPA) approved the TMDLs on December 7, 2016. This document is the second addendum to the original TMDL report.

This second addendum includes information specific to one additional assessment unit (AU) for North Fork Cottonwood Creek (AU 0841P_01; also referred to in this addendum as the TMDL watershed). This AU is located within the watershed of the approved original TMDLs for watersheds upstream of Mountain Creek Lake. The concentration of indicator bacteria in this additional AU exceeds the criterion used to evaluate support of the primary contact recreation 1 use.

This addendum details the development of the added TMDL allocation for this additional AU, which was not specifically addressed in the original TMDL report. For background or other explanatory information, please refer to the *Technical Support Document for One Total Maximum Daily Load for Indicator Bacteria for North Fork Cottonwood Creek*[3] (Millican and Adams, 2021). Refer to the original, approved TMDL document for details about the overall project watershed as well as methods and assumptions used in developing the original TMDLs.

[3] https://www.tceq.texas.gov/downloads/water-quality/tmdl/greater-trinity-recreational-66/66-as-223-north-fork-cottonwood-creek-technical-support-document.pdf

Problem Definition

TCEQ first identified the bacteria impairment for North Fork Cottonwood Creek in the *2020 Texas Integrated Report of Surface Water Quality for Clean Water Act Sections 305(b) and 303(d)* (Texas Integrated Report; TCEQ, 2020), the latest EPA-approved edition of the Texas 303(d) List. North Fork Cottonwood Creek (0841P) contains only one AU, the impaired AU 0841P_01. The TMDL watershed is located in Tarrant and Dallas counties. Figure IX-1 shows the watershed added in this addendum in relation to the entire watershed of the original TMDLs, and also includes the area covered by the first addendum.

The Texas Surface Water Quality Standards (TCEQ, 2018) 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 addendum is the numeric criterion for indicator bacteria from the 2018 Texas Surface Water Quality Standards. *Escherichia coli* (*E. coli*) is the indicator bacteria for assessing primary contact recreation 1 use in freshwater.

Table IX-1 summarizes the ambient water quality data for the TCEQ surface water quality monitoring (SWQM) stations on AU 0841P_01, as reported in the 2020 Texas Integrated Report (TCEQ, 2020). The data from the assessment indicate nonsupport of the primary contact recreation 1 use for the AU, because the geometric mean concentration for *E. coli* exceeds the freshwater geometric mean criterion of 126 colony forming units per 100 milliliters (cfu/100 mL) of water. Figure IX-2 shows the locations of the TCEQ SWQM stations that were used in evaluating water quality in the 2020 Texas Integrated Report for the AU added by this addendum, as well as an additional station with older data.

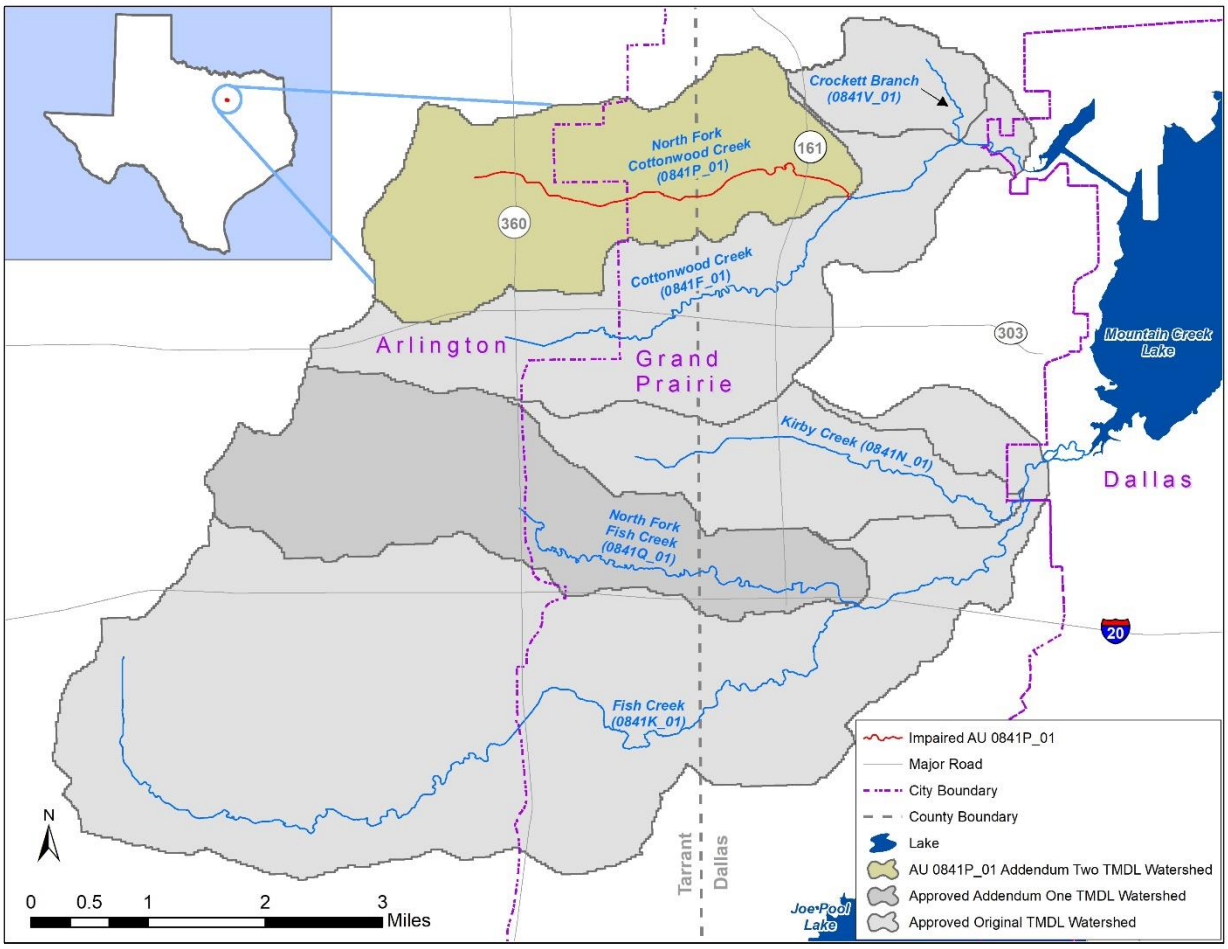

Figure IX-1. Map showing the previously approved TMDL watersheds and the North Fork Cottonwood Creek AU 0841P_01 watershed added by this addendum

Table IX-1. 2020 Texas Integrated Report summary for TMDL addendum watershed

AU	Station	Parameter	Number of Samples	Date Range	*E. coli* Geometric Mean (cfu/100 mL)
0841P_01	10722, 20836	*E. coli*	49	12/01/2011 – 11/30/2018	258

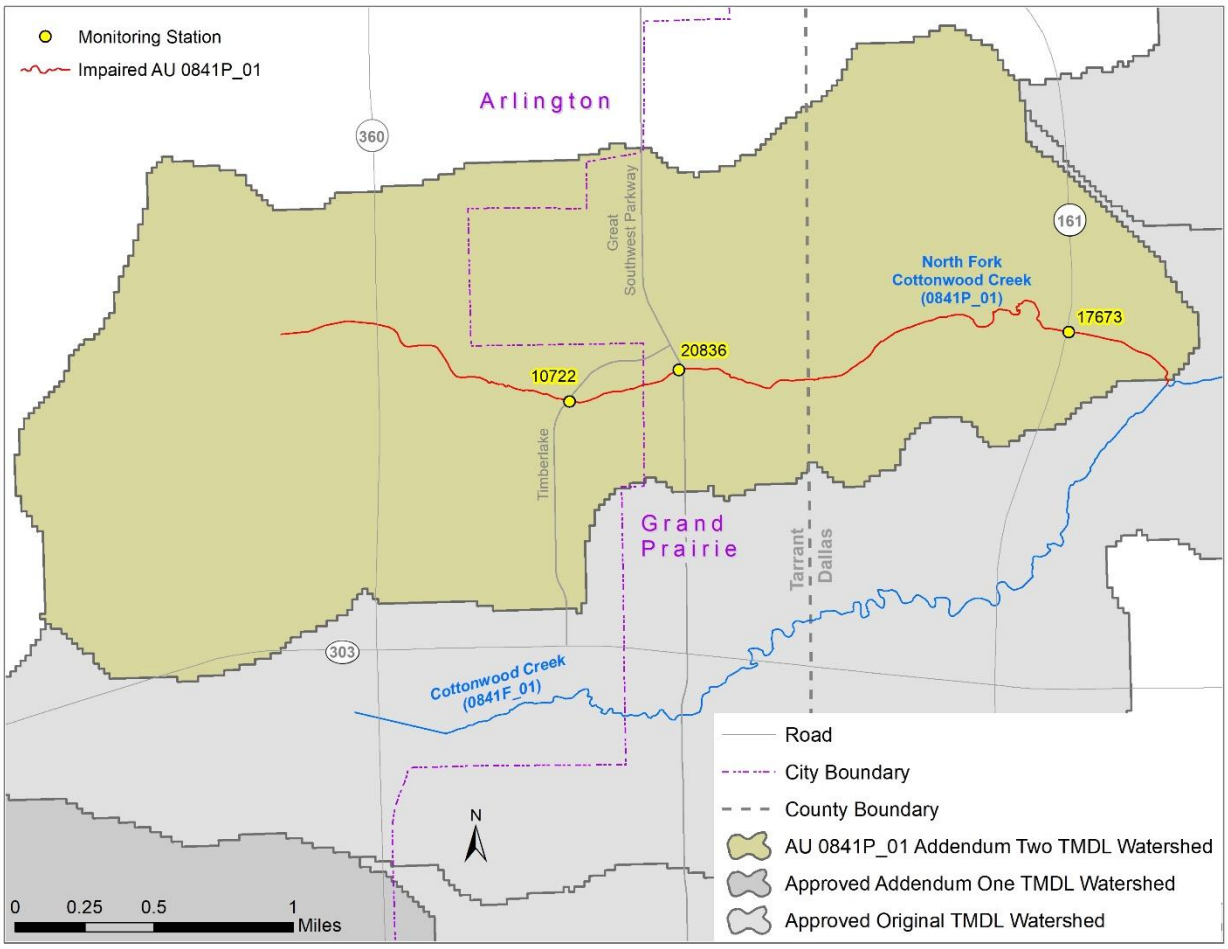

Figure IX-2. AU 0841P_01 watershed showing the TCEQ SWQM stations

Watershed Overview

North Fork Cottonwood Creek (0841P) is a tributary of Cottonwood Creek (0841F) and flows approximately 4.4 miles. The total drainage area for the TMDL watershed is 5.5 square miles.

The 2020 Texas Integrated Report (TCEQ, 2020) provides the following water body and AU description:

- 0841P (North Fork Cottonwood Creek; AU 0841P_01) – A 4.4 mile stretch of North Fork Cottonwood Creek running upstream from confluence with the South Fork Cottonwood Creek in Grand Prairie, Dallas County, to approximately 0.3 miles upstream of Carter Street in Arlington, Tarrant County.

Watershed Climate

Weather data were obtained for the 21-year period from January 1999 through December 2019 from the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center Database. The Arlington Municipal Airport weather station (USW00053907) located in the western portion of the nearby Fish Creek (0841K) watershed was used to retrieve the precipitation and temperature data (NOAA, 2021; Figure IX-3). Data from this 21-year period indicate that the average monthly high temperature typically reaches a maximum of 96.8 °F in August, and the average monthly low temperature reaches a minimum of 35.6 °F in January. Annual rainfall averages 34.3 inches. The wettest month is May (4.4 inches), while August (1.6 inches) is the driest month, with rainfall occurring throughout the year.

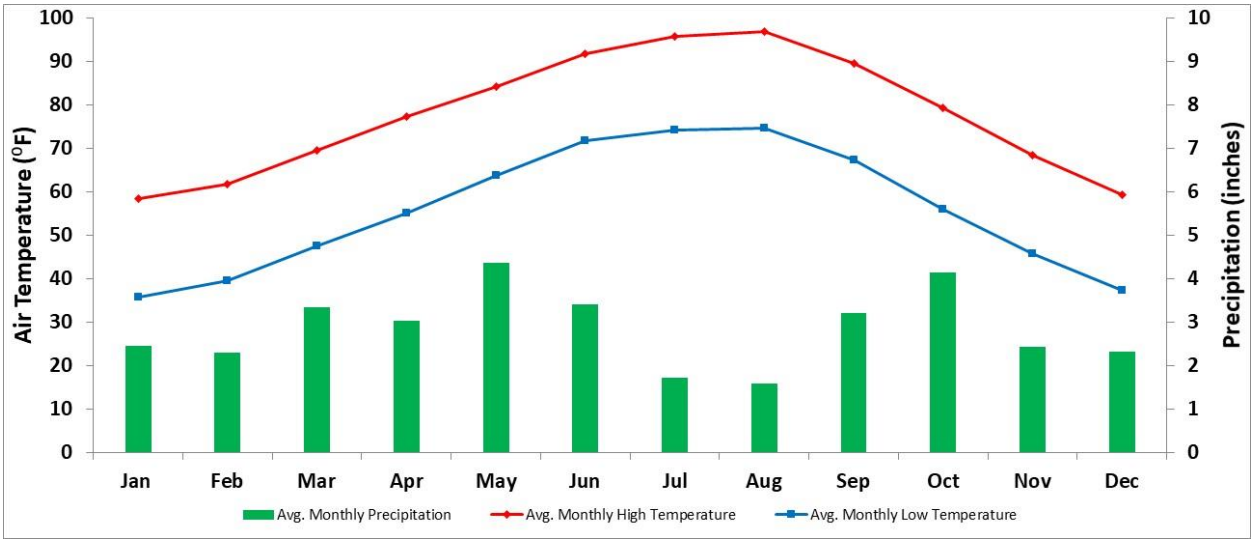

Figure IX-3. Average monthly temperature and precipitation (1999–2019) at the Arlington Municipal Airport weather station

Watershed Population and Population Projections

The TMDL watershed is primarily located within the municipal boundaries of Arlington and Grand Prairie. According to the United States Census Bureau (USCB) 2010 Census (USCB, 2010), the TMDL watershed had an estimated population of 32,252 people in 2010.

The population projection in Table IX-2 was estimated using data developed by North Central Texas Council of Governments (NCTCOG) by using traffic survey zone allocations (NCTCOG, 2017a). Traffic survey zones are planning areas used by NCTCOG to provide for more analysis at a local scale. NCTCOG modeled the 2045 projected populations using inputs such as number of households, household populations, land cover changes, and future land use plans.

Table IX-2. Estimated 2010 population and 2045 population projection for the TMDL watershed

Area	2010 Estimated Population	2045 Projected Population	Projected Population Increase	Percentage Change
North Fork Cottonwood Creek (AU 0841P_01) Watershed	32,252	44,643	12,391	38.4%

The following steps detail the method used to estimate the 2010 and projected 2045 populations in the TMDL watershed.

1. Obtained 2010 U.S. Census data at the block level.
2. Developed 2010 watershed populations using the block level data for the portion of the census blocks located within the watershed.
3. Obtained population projections for the year 2045 from the NCTCOG traffic survey zone allocations.
4. Developed population projections using traffic survey zone data for the portion of the traffic survey zones located within the watershed.
5. Subtracted the 2010 watershed population from the 2045 population projection to determine the projected population increase. Subsequently, divided the projected population increase by the 2010 watershed population to determine the percentage population increase for the North Fork Cottonwood Creek watershed.

Land Cover

The land cover data were obtained from NCTCOG and represent land cover estimates for 2015 (NCTCOG, 2017b). The land cover for the TMDL watershed is shown in Figure IX-4. A summary of the land cover data is provided in Table IX-3 and indicates that the dominant land cover in the TMDL watershed is Residential (34.76%).

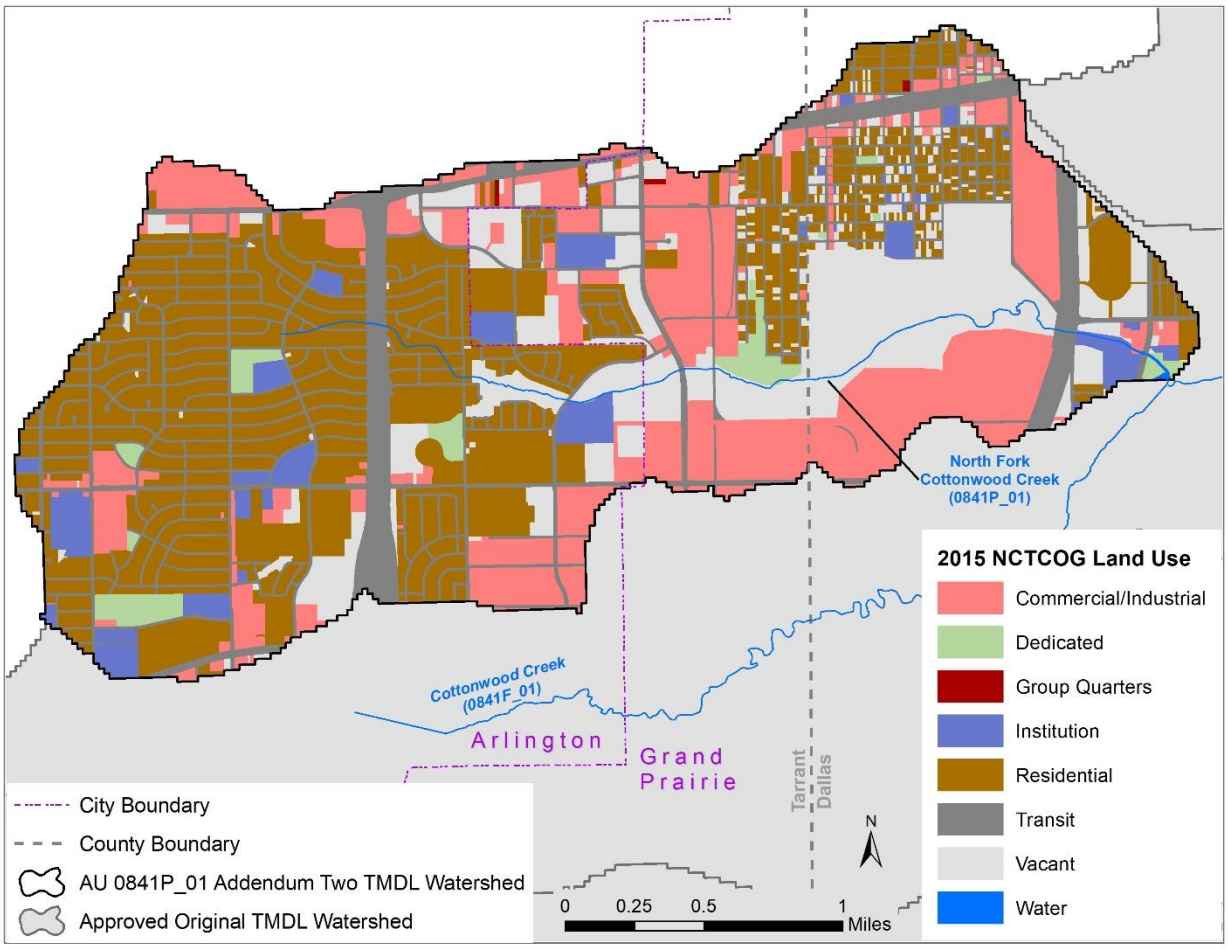

Figure IX-4. 2015 land cover

Table IX-3. Land cover summary

2015 NCTCOG Classification	Area (Acres)	Percentage of Total
Commercial/Industrial	776.9	21.91%
Group Quarters	2.7	0.08%
Residential	1,232.6	34.76%
Institution	163.7	4.62%
Transit	657.9	18.56%
Dedicated	76.4	2.15%
Vacant	633.4	17.86%
Water	2.0	0.06%
Total	**3,545.6**	**100%**

Endpoint Identification

The endpoint for the TMDL is to maintain the concentration of *E. coli* below the geometric mean criterion of 126 cfu/100 mL, which is protective of the primary contact recreation 1 use in freshwater.

Source Analysis

Pollutants may come from several sources, both regulated and unregulated. Pollutants in regulated discharges, referred to as "point sources," come from a single definable point, such as a pipe, and are regulated by permit under the Texas Pollutant Discharge Elimination System (TPDES) program. Wastewater treatment facilities (WWTFs) and stormwater discharges from industries, construction activities, and the separate storm sewer systems of cities are considered point sources of pollution.

Unregulated sources are typically nonpoint source in origin, meaning the pollutants originate from multiple locations and rainfall runoff washes them into surface waters. Nonpoint sources are not regulated by permit.

Except for WWTFs, which receive individual wasteload allocations (WLAs; see the Wasteload Allocation section), the regulated and unregulated sources in this section are presented to give a general account of the different sources of bacteria expected in the watershed. These are not meant to be used for allocating bacteria loads or interpreted as precise inventories and loadings.

Regulated Sources

Regulated sources are controlled by permit under the TPDES program. The regulated sources in the TMDL watershed include stormwater discharges from industries, regulated construction activities, and municipal separate storm sewer systems (MS4s).

Domestic and Industrial WWTFs

No permitted WWTFs exist in the TMDL study area. Domestic wastewater is collected by and transported to the Trinity River Authority (TRA) Central Regional Wastewater System, which is outside the study area (Figure IX-5).

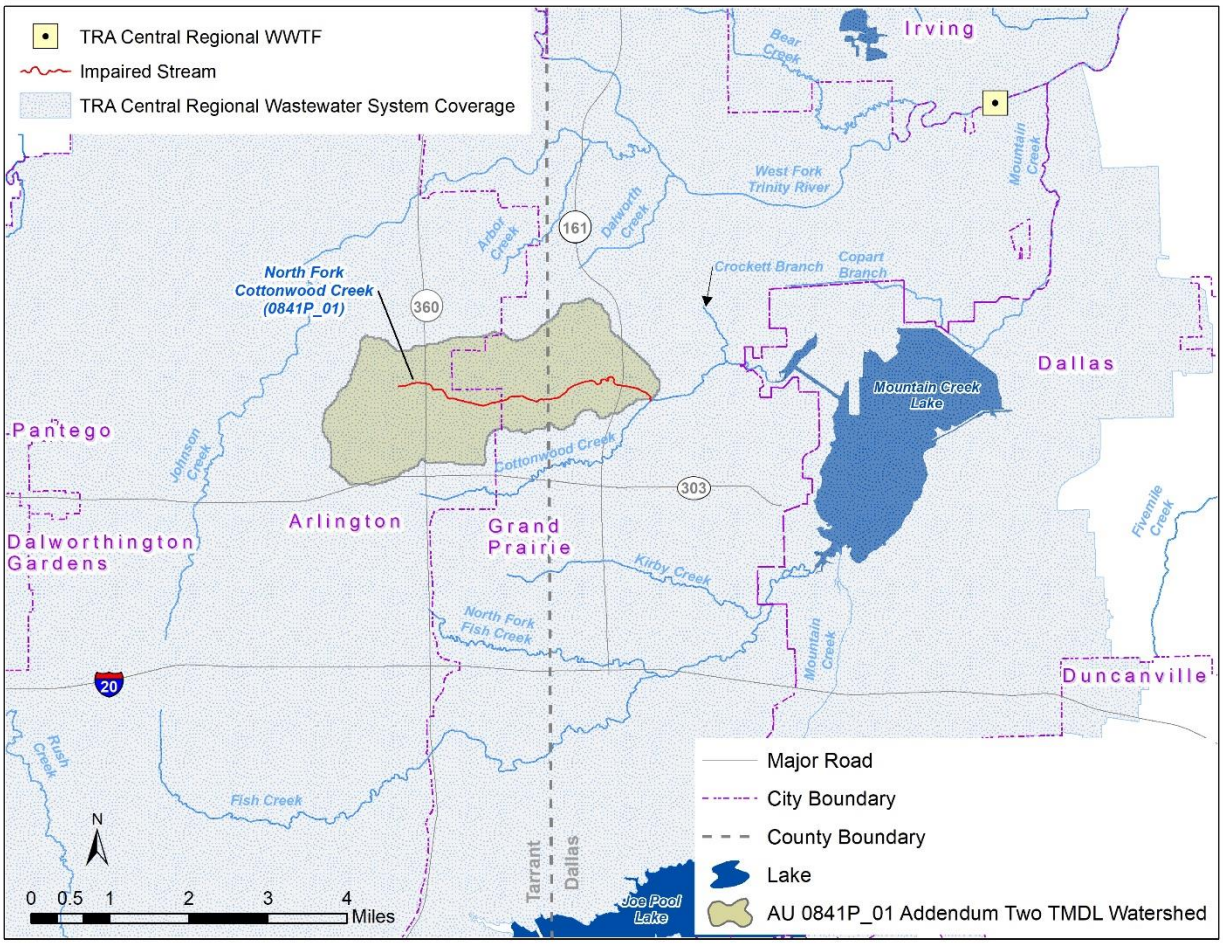

Figure IX-5. Coverage area of the TRA Central Regional Wastewater System within the TMDL study area

TCEQ/TPDES Water Quality General Permits

Certain types of activities are required to be covered by one of several TCEQ/TPDES wastewater general permits:

- TXG110000 – concrete production facilities
- TXG130000 – aquaculture production
- TXG340000 – petroleum bulk stations and terminals
- TXG640000 – conventional water treatment plants
- TXG670000 – hydrostatic test water discharges
- TXG830000 – water contaminated by petroleum fuel or petroleum substances
- TXG870000 – pesticides (application only)
- TXG920000 – concentrated animal feeding operations
- WQG100000 – wastewater evaporation
- WQG200000 – livestock manure compost operations (irrigation only)

A review of active general permit coverage (TCEQ, 2021) in the TMDL watershed, as of February 25, 2021, revealed two pesticide permittees covered by the general permit. These pesticide management areas do not have bacteria reporting requirements or limits in their permits. Pesticide application in the pesticide management areas is assumed to contain inconsequential amounts of indicator bacteria; therefore, it was unnecessary to allocate bacteria loads to them. No other active wastewater general permit authorizations were found in the TMDL watershed.

Sanitary Sewer Overflows

A summary of sanitary sewer overflow (SSO) incidents that occurred during a 10-year period from 2010 through 2019 in the TMDL watershed was obtained from NCTCOG. The SSO data was originally collected by TCEQ Region 4 and was refined by NCTCOG by assigning latitude and longitude coordinates to each SSO event. The summary data indicated 37 SSO incidents had been reported within the TMDL watershed. The SSOs had a total discharge of 17,074 gallons with a minimum of seven gallons and a maximum of 5,560 gallons.

TPDES-Regulated Stormwater

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

1. Stormwater subject to regulation, which is any stormwater originating from TPDES-regulated MS4 entities, stormwater discharges associated with regulated industrial activities, and construction activities.
2. Stormwater runoff not subject to regulation.

Discharges of stormwater from a Phase II MS4 area, regulated industrial facility, construction area, or other facility involved in certain activities must be covered under the following TCEQ/TPDES general permits:

- TXR040000 – Phase II MS4 General Permit for MS4s located in urbanized areas
- TXR050000 – Multi-sector General Permit (MSGP) for industrial facilities
- TXR150000 – Construction General Permit (CGP) for construction activities disturbing more than one acre or are part of a common plan of development disturbing more than one acre

A review of active stormwater general permit authorizations (TCEQ, 2021) in the TMDL watershed as of March 30, 2021, found one active MSGP authorization within the watershed and several CGP authorizations. The areas of these were not quantified since

MS4s accounted for 100% of the watershed. There are currently one Phase I MS4 permit, one Phase II MS4 authorization, and one combined Phase I/Phase II permit within the TMDL watershed (Table IX-4). Figure IX-6 shows the urbanized area defined by USCB that accounts for MS4 coverage within the North Fork Cottonwood Creek watershed.

Table IX-4. TPDES MS4 permits associated with the TMDL watershed

Entity	TPDES Permit	NPDES Permit	Authorization Type
City of Arlington	WQ0004635000	TXS000301	Phase I
Texas Department of Transportation	WQ0005011000	TXS002101	Combined Phase I/II
City of Grand Prairie	General Permit (TXR040000)	TXR040065	Phase II

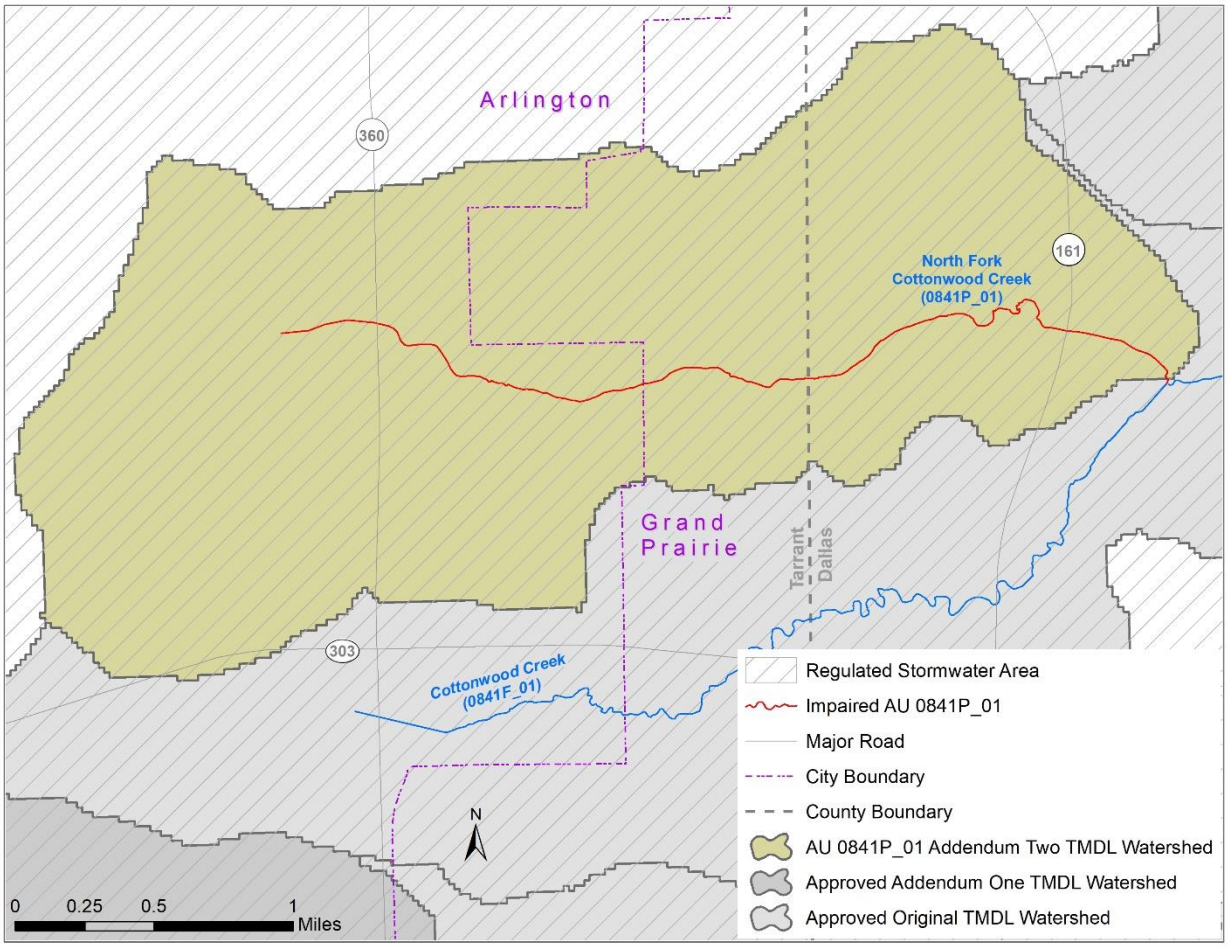

Figure IX-6. Regulated stormwater area based on urbanized area within the TMDL watershed

Illicit Discharges

Pollutant loads can enter water bodies from MS4 outfalls that carry authorized sources as well as illicit discharges under both dry- and wet-weather conditions. The term "illicit discharge" is defined in TPDES General Permit TXR040000 for Phase II or small MS4s as "Any discharge to a municipal separate storm sewer system that is not entirely composed of stormwater, except discharges pursuant to this general permit or a separate authorization and discharges resulting from emergency firefighting activities." Illicit discharges can be categorized as either direct or indirect contributions.

Unregulated Sources

Unregulated sources of bacteria are 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.

Unregulated Agricultural Activities and Domesticated Animals

A number of agricultural activities that do not require permits can be potential sources of fecal bacteria loading. Agricultural activities were not a source in this highly urbanized watershed.

Fecal bacteria from dogs and cats is transported to streams by runoff in both urban and rural areas and can be a potential source of bacteria loading. Table IX-5 summarizes the estimated number of dogs and cats within the TMDL watershed. Pet population estimates were calculated as the estimated number of dogs (0.614) and cats (0.457) per household (AVMA, 2018). The number of households in the TMDL watershed was estimated using 2010 Census data (USCB, 2010). The actual contribution and significance of bacteria loads from pets reaching the water bodies in the watershed is unknown.

Table IX-5. Estimated households and pet population

Estimated Households	Estimated Dog Population	Estimated Cat Population
10,056	6,175	4,596

Wildlife and Unmanaged Animals

Fecal bacteria are common inhabitants of the intestines of all warm-blooded animals, including wildlife such as mammals and birds. In developing bacteria TMDLs, it is important to identify by watershed the potential for bacteria contributions from wildlife. Wildlife are naturally attracted to riparian corridors of water bodies. With direct access

to the stream channel, the direct deposition of wildlife waste can be a concentrated source of bacteria loading to a water body. Fecal bacteria from wildlife are also deposited onto land surfaces, where they may be washed into nearby water bodies by rainfall runoff.

The *E. coli* contribution from feral hogs and wildlife in the TMDL watershed cannot be determined based on existing information. However, due to the urbanized nature of the watershed it is assumed that the contribution is minimal.

Onsite Sewage Facilities

Failing OSSFs were not considered a major source of bacteria loading in the North Fork Cottonwood Creek watershed, because the entire watershed area is served by the TRA wastewater collection and treatment system. A review of OSSF information received from NCTCOG indicates that there are no known OSSFs in the TMDL 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 as regulated and from the landscape as unregulated sources. Further, this one-to-one relationship was also inherently assumed when using the LDC 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 or nonpoint source), and provides a means to allocate allowable loadings. The technical support document for this addendum (Millican and Adams, 2021) provides details about the linkage analysis along with the LDC method and its application.

LDCs for the three SWQM stations were developed for informational purposes, while the LDC for the watershed outlet was constructed for developing the TMDL allocation for North Fork Cottonwood Creek. Based on the LDCs developed for the three SWQM station locations with historical *E. coli* data added to the graph, the following broad linkage statements can be made. For this TMDL watershed, the historical *E. coli* data show that elevated bacteria loadings occur under all three flow regimes. The geometric means of the measured data exceed the geomean criterion under all three flow regimes for SWQM Stations 10722 and 20836 (Figures IX-7 and IX-8). Geometric means measured at SWQM Station 17673 (Figure IX-9) indicate a slight moderation of the elevated loadings under Mid-Range and Low Flow conditions; however, this may not

represent current conditions since data has not been collected at this station in over 10 years. The allowable load at the single sample criterion (399 cfu/100 mL) is included on the LDCs for comparison with individual *E. coli* samples, although it is not used for assessment or allocation purposes. The LDC for the watershed outlet (Figure IX-10) has no bacteria data plotted on it, as no sampling took place at that location.

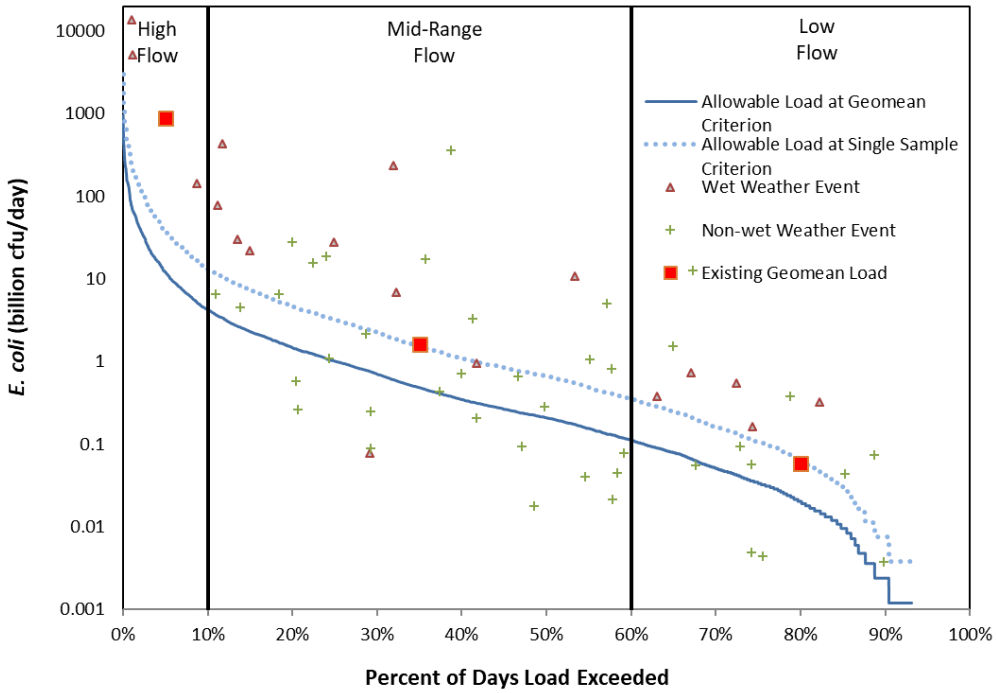

Figure IX-7. LDC at SWQM Station 10722

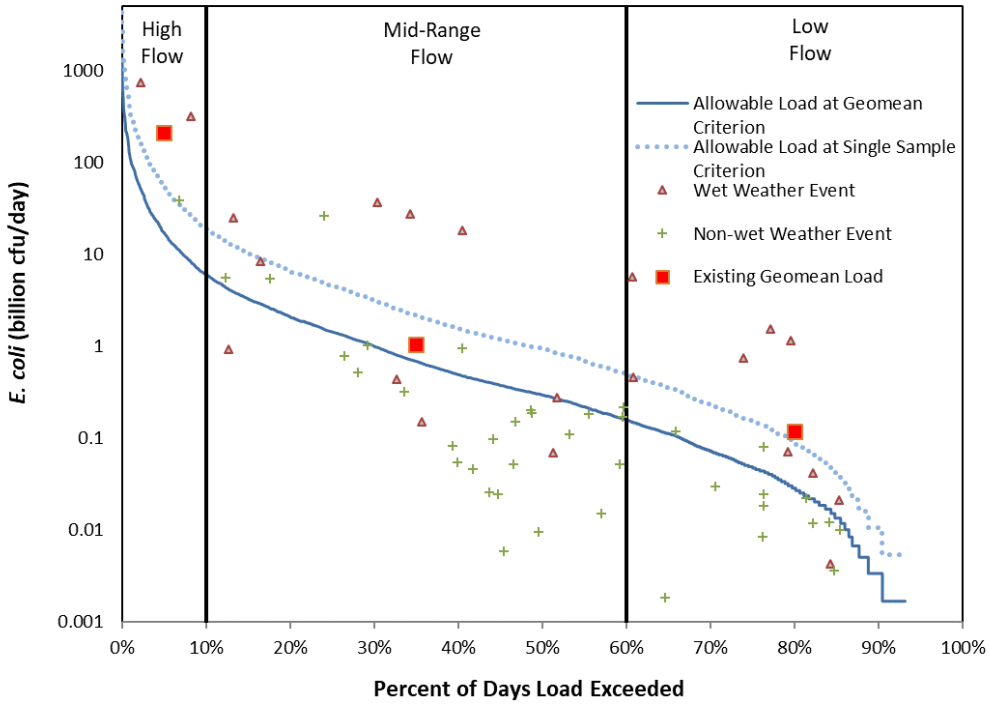

Figure IX-8. LDC at SWQM Station 20836

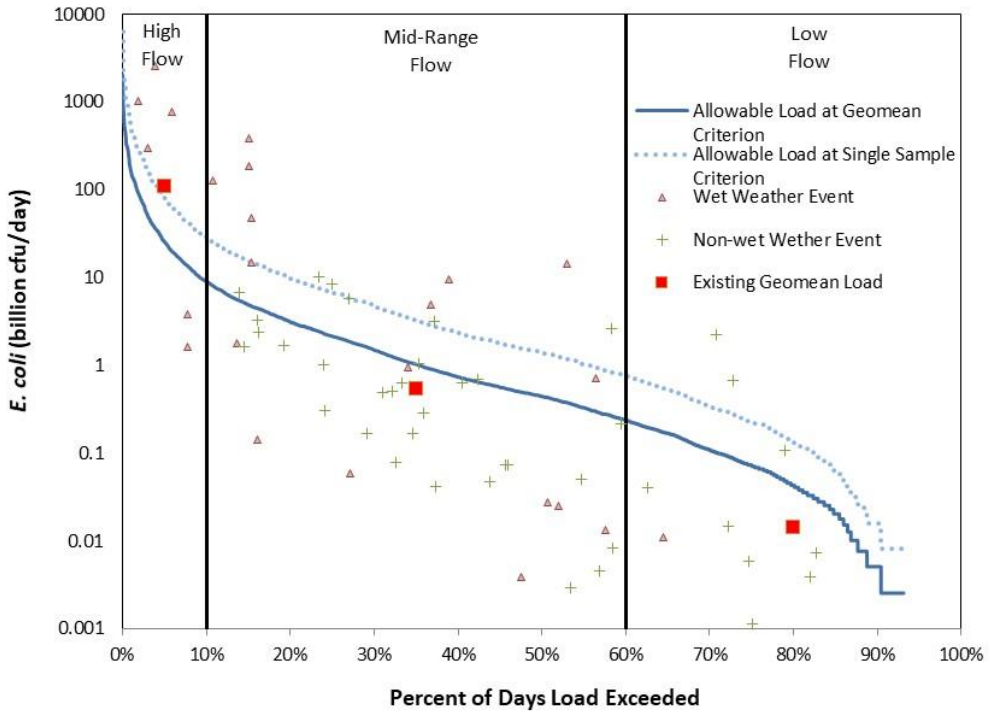

Figure IX-9. LDC at SWQM Station 17673

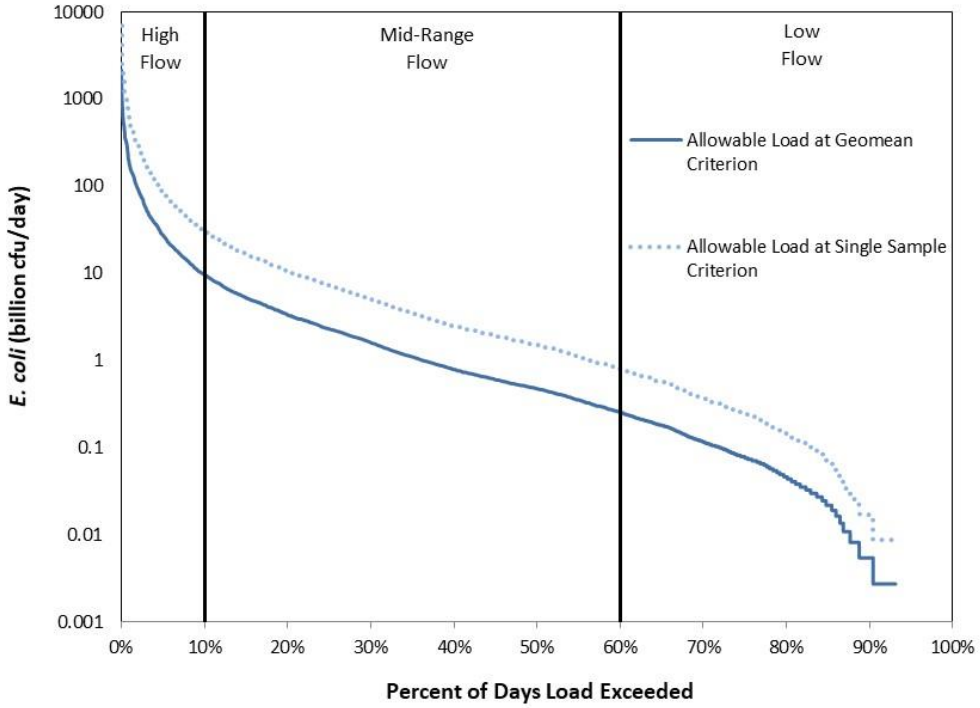

Figure IX-10. LDC for the outlet of North Fork Cottonwood Creek

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 in this report incorporates an explicit MOS of 5% of the total TMDL allocation.

Pollutant Load Allocation

The TMDL represents the maximum amount of a pollutant that the stream can receive in a single day without exceeding water quality standards. The pollutant load allocations for the selected scenarios were calculated using the following equation:

TMDL = WLA + LA + FG + MOS

Where:

WLA = wasteload allocations, the amount of pollutant allowed by regulated dischargers

LA = load allocations, the amount of pollutant allowed by unregulated sources

FG = loadings associated with future growth from potential regulated facilities

MOS = margin of safety load

AU-Level TMDL Calculation

To be consistent with previously completed TMDLs in the original watershed, the TMDL for North Fork Cottonwood Creek AU 0841P_01 was derived using the median flow within the High Flow regime (or 5% load duration exceedance) of the LDC developed for the watershed outlet. The watershed outlet was used because the most downstream station within North Fork Cottonwood Creek AU 0841P_01 has not had *E. coli* monitoring since 2008.

Margin of Safety Calculation

The TMDL in this report incorporates an explicit MOS of 5%.

Wasteload Allocation

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

Wastewater Treatment Facilities

TPDES-permitted WWTFs are allocated a daily wasteload (WLA_{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 the original TMDL report. Due to the absence of any permitted dischargers in the North Fork Cottonwood Creek watershed, the WLA_{WWTF} component is zero.

Regulated Stormwater

Stormwater discharges from MS4, industrial, and construction areas 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 TMDL watershed that is under the jurisdiction of stormwater permits 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.

The North Fork Cottonwood Creek watershed is covered 100% by MS4 permits. However, even in highly urbanized areas such as the North Fork Cottonwood Creek watershed, there remain some areas of potential direct deposition of bacteria loadings

from unregulated sources such as wildlife. To account for these unregulated areas, the stream length based on the TCEQ definition of AU 0841P_01 and average channel width as calculated based on aerial imagery was used to compute an area of unregulated stormwater contribution. The percentage of land under the jurisdiction of stormwater permits in the TMDL watershed is 98.9%.

Load Allocation

The load allocation (LA) component of the TMDL corresponds to runoff or direct deposition from unregulated sources.

Allowance for Future Growth

The future growth (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. Specifically, this TMDL component takes into account the probability that new flows from WWTF discharges may occur in the future. The assimilative capacity of water bodies increases as the amount of flow increases. The allowance for FG in this TMDL report will result in protection of existing uses and conform to Texas' antidegradation policy.

Due to the absence of any existing WWTFs and the fact that it is highly unlikely that any new WWTFs will be established within the North Fork Cottonwood Creek watershed (TRA, 2021), the FG component is zero.

FG of existing or new point sources is not limited by this TMDL as long as the sources do not cause bacteria to exceed the limits. The assimilative capacity of water bodies increases as the amount of flow increases. Consequently, increases in flow allow for increased loadings. The LDC and tables in this TMDL report will guide determination of the assimilative capacity of the water body under changing conditions, including FG.

Summary of TMDL Calculations

Table IX-6 summarizes the TMDL calculations for the TMDL watershed. The TMDL was calculated based on the median flow in the 0-10 percentile range (5% exceedance, High Flow regime) from the LDC developed for the outlet of the North Fork Cottonwood Creek watershed. Allocations are based on the current geometric mean criterion for *E. coli* of 126 cfu/100 mL for each component of the TMDL (with the exception of the WLA_{WWTF} and FG terms, which would be based on one-half the criterion if they applied).

Table IX-6. TMDL allocation summary for AU 0841P_01

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

Water Body	AU	TMDL	MOS	WLA_{WWTF}	WLA_{SW}	LA	FG
North Fork Cottonwood Creek	0841P_01	27.492	1.375	0	25.830	0.287	0

The final TMDL allocations (Table IX-7) needed to comply with federal requirements include the FG component within the WLA_{WWTF} (40 CFR Section 103.7).

Table IX-7. Final TMDL allocation for AU 0841P_01

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

Water Body	AU	TMDL	MOS	WLA_{WWTF}	WLA_{SW}	LA
North Fork Cottonwood Creek	0841P_01	27.492	1.375	0	25.830	0.287

Seasonal Variation

Federal regulations require that TMDLs account for seasonal variation in watershed conditions and pollutant loading [40 CFR Section 130.7(c)(1)]. Analysis of the seasonal differences in indicator bacteria concentrations were assessed by comparing *E. coli* concentrations obtained from 19 years (2001 through 2019) of routine monitoring data collected at three SWQM stations (10722, 20836, and 17673) in the warmer months (May-September) against those collected during cooler months (November-March). The months of April and October were considered transitional between warm and cool seasons and were excluded from the seasonal analysis. Differences in seasonal concentrations were then evaluated with a Wilcoxon Rank Sum test (also known as the "Mann-Whitney" test). The analysis of *E. coli* data indicated that there was no significant difference in indicator bacteria between the cool and warm weather seasons (α=0.05) for North Fork Cottonwood Creek. Seasonal variation was also addressed by using all available flow and *E. coli* records (covering all seasons) from the period of record used in LDC development for this project.

Public Participation

TCEQ maintains an inclusive public participation process. From the inception of TMDL development, the project team 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 and Adams, 2021) was published on the TCEQ website on December 7, 2021. Project staff presented

information about this addendum at the annual meeting of the Greater Trinity River Bacteria TMDL Implementation Plan Coordination Committee hosted by NCTCOG (held online) on July 1, 2021. The public had an opportunity to comment on this addendum during the public comment period (May 6 through June 7, 2022) for the Water Quality Management Plan (WQMP) update in which this addendum is included. Notice of the public comment period for this addendum was emailed to stakeholders and posted on the TCEQ's TMDL Program TMDL Program News webpage.[4] Notice of the comment period, along with the document, was also posted on the WQMP Updates webpage.[5] TCEQ accepted public comments on the original TMDL report from May 27 through June 27, 2016. No comments were submitted.

Implementation and Reasonable Assurance

The AU covered by this addendum is within the existing bacteria TMDL watershed for Cottonwood Creek, Fish Creek, Kirby Creek, and Crockett Branch. That TMDL watershed, including North Fork Cottonwood Creek AU 0841P_01, is within the area covered by the implementation plan (I-Plan) developed by stakeholders for the TMDL watershed, which was approved by the Commission on December 11, 2013. The I-Plan outlines an adaptive management approach in which measures are assessed annually by the stakeholders 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.

[4] https://www.tceq.texas.gov/waterquality/tmdl/tmdlnews.html
[5] https://www.tceq.texas.gov/permitting/wqmp/WQmanagement_updates.html

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