

Final Report
Joe Pool Lake Watershed Protection Plan Phase I - Watershed Characterization and Stakeholder Coordination

February 2021

JOE POOL LAKE
WATERSHED PROTECTION

tra
Trinity River Authority of Texas

On the cover:

Preparing for flow data collection
on the west bank of Hollings Branch near
Marker Lane in Cedar Hill, Texas.

Draft Final Report

for

The Joe Pool Lake Watershed Protection Plan Phase I – Watershed Characterization and Stakeholder Coordination

Funded by

The Texas Commission on Environmental Quality
(Contract No. 582-19-90205)

Investigating Entities

The Trinity River Authority of Texas

Prepared by

Heather Firn, Trinity River Authority

February 2021

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List of Acronyms

AR	Augmented Reality
BMP	best management practice
Chl-a	chlorophyll-a
CRP	Clean Rivers Program
DFW	Dallas-Fort Worth Metroplex
DO	dissolved oxygen
DWU	Dallas Water Utilities
E. coli	*Escherichia coli*
EPA	Environmental Protection Agency
GIS	Geographic Information System
IPL	Integrated Pipeline Project
ISD	Independent School District
JPL	Joe Pool Lake
LAMP	Lake Arlington Master Plan
LDC	load duration curve
NCTCOG	North Central Texas Council of Governments
NELAP	National Environmental Laboratory Accreditation Program
NO_2	nitrite
NO_3	nitrate
NRCS	Natural Resources Conservation Service
OB	Optical brightener
OP	orthophosphate
OSSF	on-site sewage facility
PPP	Public Participation Plan
PPT	PowerPoint
QAPP	Quality Assurance Project Plan
QPR	Quarterly Progress Report
SELECT	Spatially Explicit Load Enrichment Calculation Tool
Sp. Cond	specific conductance
St. Dev	standard deviation
SWQM	Surface Water Quality Monitoring
SWQMIS	Surface Water Quality Monitoring Information System
TAG	Technical Advisory Group
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TKN	total Kjeldahl nitrogen
TMDL	Total Maximum Daily Load
TNRIS	Texas Natural Resources Information System
TP	total phosphorous
TRA	Trinity River Authority of Texas
TRWD	Tarrant Regional Water District
TSS	total suspended solids
TSWQS	Texas Surface Water Quality Standards
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WPP	watershed protection plan

1.0 Introduction

This report provides a summary of all contract activities, findings, and the contents of all previous deliverables by TRA in conjunction with the TCEQ funded contract 582-19-90205. The purpose of the contract was to perform the Joe Pool Lake watershed characterization and stakeholder group development components required to develop a WPP which will meet EPA's nine key elements for watershed-based plans as provided in the EPA's 2014 guidelines. The data collected in this phase of the project will ensure that the WPP provides quantified objectives for water quality improvement through identified and prioritized watershed management strategies. To prepare for the watershed planning process in Phase II (Contract 582-20-10162), expansion and enhancement of the existing stakeholder group will be necessary. TRA coordinated with the technical advisory group to identify roles for various levels of involvement, defined an organizational structure, and outlined a plan for how and when the various stakeholder subgroups will be deployed or engaged.

2.0 Project Significance and Background

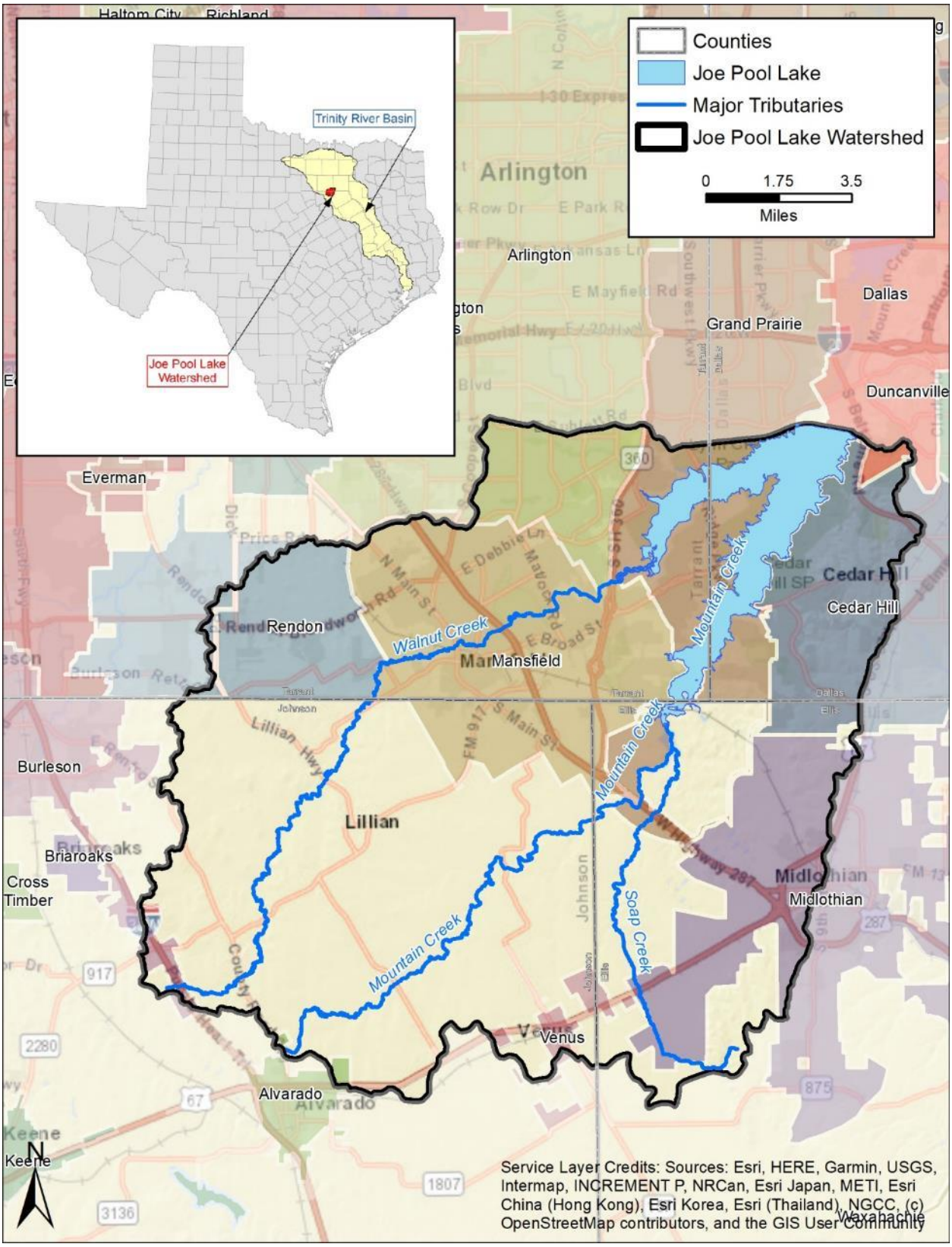
The Joe Pool Lake (JPL) Watershed Protection effort was initiated to address water quality concerns in both Joe Pool Lake and its tributaries. Drinking water from Joe Pool Lake is utilized by over forty thousand people in the City of Midlothian and the communities of Venus, Rockett, Mountain Peak, Sardis, and parts of southern Grand Prairie. In addition to this existing use by the City of Midlothian, Joe Pool Lake is expected to be further developed by the Cities of Cedar Hill, Duncanville, and Grand Prairie for their own municipal use. Joe Pool Lake has also been designated as a potential terminal storage reservoir for the Tarrant Regional Water District (TRWD) and Dallas Water Utilities (DWU) Integrated Pipeline Project (IPL), which seeks to connect three reservoirs in east Texas (Richland Chambers, Cedar Creek, and Lake Palestine) to other reservoirs in the Dallas-Fort Worth (DFW) metroplex to enhance the future water supply of the region and to provide for redundancy in the water supply system.

Walnut Creek, one of Joe Pool's two main tributaries, was listed on the 2014 TCEQ Texas Water Quality Inventory and 303(d) List due to elevated levels of E. coli, with its first listing occurring in 2006. The majority of the impaired segment flows through the city limits of Mansfield, who approached TRA in late 2015 as they were considering restoration options available for Walnut Creek. Additionally, the Mountain Creek arm of Joe Pool Lake was listed on the 2014 Water Quality Inventory—Water Bodies with Concerns for Use Attainment and Screening Levels for general use concerns due to elevated levels of nitrate. The Cities of Cedar Hill, Grand Prairie, and Mansfield all border this segment of concern. As of the 2018 TCEQ Texas Integrated Report, the Walnut Creek segment has been delisted and the Mountain Creek concern has been removed.

According to the Texas Water Development Board Population Projections identified during the 2016 Regional Water Planning process, the population of the four counties encompassed in this project are expected to increase a combined 60% from 4.9 million to 7.9 million people over the next 50-year water planning horizon. Conversion of farm land and rapid development in the watershed indicate that water quality has and will continue to be negatively affected unless more vigorous management measures are put in place. To combat this degradation, local stakeholders have elected to take a proactive approach to ensure that appropriate management measures are in place to ensure that the water quality in the lake is protected.

3.0 Study Area

The study area was Joe Pool Lake Watershed as depicted in Figure 3.1. The water quality sampling sites within Joe Pool Lake Watershed are depicted in Figure 3.2.



Basemap: ESRI World Streetmap.

Figure 3-1. Location of the Joe Pool Lake Watershed.

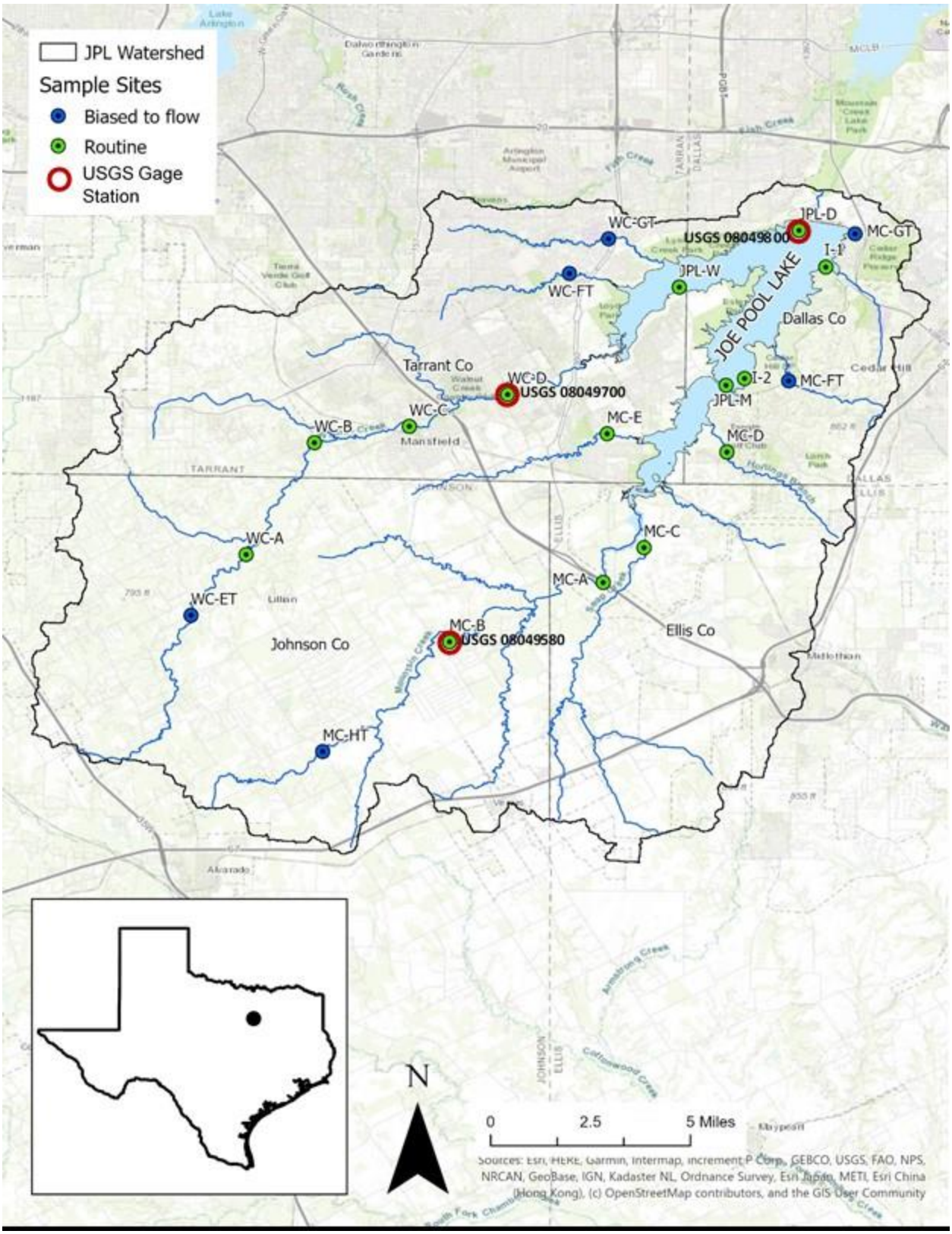


Figure 3-2 Sampling sites and USGS gage sites in the Joe Pool Lake Watershed.

4.0 Summary of all Task Reports and final approved QPR

Task 1: Project Administration

The objective of Task 1 was to effectively administer, coordinate, and monitor all work performed under this project including technical and financial supervision and preparation of status reports.

Deliverables summary:

Subtask 1.1: Project Oversight

TRA provided technical and fiscal oversight of TRA staff, ensuring that tasks and deliverables were acceptable and completed as scheduled within the budget. Project oversight status was provided quarterly in the QPRs.

Subtask 1.2: QPRs

TRA submitted seven QPRs on time, which contained documentation of activities that occurred under relevant tasks during the quarter. TRA will submit the eighth QPR on December 15, 2020 and final QPR on March 15, 2021. Submitted QPRs can be found in Appendix A.

Subtask 1.3: Reimbursement Forms

TRA submitted quarterly reimbursement forms as specified in the contract.

Subtask 1.4: Contract Communication

TRA maintained regular phone and email communication with the TCEQ project manager on the status and progress of the contract deliverables on an as needed basis. TRA completed quarterly conference calls in April and July of FY2019; November, January, March and July of FY2020; and October and January of FY2021. The conference calls addressed task status, financial status, and other matters deemed necessary at the discretion of the TCEQ project management and TRA staff. Documentation of the minutes, items discussed, and decisions made during each conference call can be found in Appendix B.

Subtask 1.5: Coordination Meeting with EPA

Meeting was not requested by EPA in Dallas and thus not conducted.

Subtask 1.6: Annual Report Article

Annual Report Article was not requested by TCEQ and thus was not completed.

Subtask 1.7: Contract Budget Updates

Quarterly budget updates for the project were submitted to the TCEQ each quarter with the Quarterly Progress Reports and an Annual Budget Update was submitted in November 2019 and December 2020.

Task 2: Quality Assurance

TRA updated the Quality Assurance Project Plan (QAPP) to ensure the data acquired was of known and acceptable quality.

Deliverables summary:

Subtask 2.1: QAPP Planning Meetings

TRA held the QAPP Planning Meeting in person with TCEQ on October 1, 2018. Minutes from the QAPP Planning Meeting can be found in Appendix C, Post-Award Orientation/QAPP Planning Meeting.

Subtask 2.2 QAPP for Data Acquisition and Monitoring

TRA developed and submitted to TCEQ a QAPP with project-specific DQOs and other components consistent with provided guidelines. TRA submitted the Final QAPP on February 21, 2019 and it was signed/fully approved by TCEQ on June 6, 2019.

Subtask 2.3 QAPP Annual Reviews and Revisions

The current QAPP was signed and executed on June 6, 2019; therefore, June 6 is the established date of the QAPP anniversary for future QAPP reviews. The current QAPP annual review certification can be found in Appendix D. The next annual review will be initiated on March 6, 2021. A new, updated QAPP is due on June 6, 2021.

Subtask 2.4 QAPP Amendments

One amendment has been completed since the full QAPP was executed to extend the contract period to 2/28/2022. This can be found in Appendix E.

Task 3: Acquisition and Analysis of Historical Data

TRA acquired and analyzed existing water quality and watershed data to assess historic and existing conditions, potential source loads, and water quality drivers. The obtained information will be used for modeling inputs for Phase II (Contract 582-20-10162) of this project.

Deliverables summary:

Subtask 3.1: Acquire, Compile, and Evaluate Existing Data

The Final Analysis of Historical Data Report, Appendix F, was accepted by the TCEQ on December 3, 2019. This report encompassed relevant watershed characteristics, Geographic Information Systems (GIS) analysis, including data from TCEQ, TNRIS, USGS, and USDA, and identified potential sources of pollution and/or causes of water quality impairments and concerns. The data and information were assembled into a data inventory for use in characterizing the watershed, determining levels and sources of pollution, and ultimately, identifying management needs. When data gaps were identified, TRA worked with stakeholders to determine how to address them. The data and information were presented to stakeholders in appropriate formats including graphs, tables, and maps.

Subtask 3.2: Pollutant Source Survey

TRA created a Preliminary Pollutant Source Survey PowerPoint that summarized the potential sources of pollutant loading in the watershed. The summary was based on acquired data and partner input. It was presented to the stakeholders on October 22, 2020, Appendix G. The PPT will be built upon as modeling progresses throughout Phase II(Contract 582-20-10162) of this project.

Subtask 3.3: Acquired Data Analysis and Report

The Final Analysis of Historical Data Report, Appendix F, was accepted by the TCEQ on December 3, 2019. The TRA used statistical and geospatial analyses to evaluate temporal and spatial trends and relationships. Specific analyses included regression of *E. Coli* concentrations against other water quality constituents, as well as flow (or a surrogate such as precipitation); evaluated occurrences of high *E. coli* values spatially within the watershed (via GIS) to determine likely sources or subwatersheds for further evaluation; and plotted data spatially to identify temporal trends.

Task 4: Surface Water Quality Monitoring

TRA collected surface water quality and flow data to supplement existing data for watershed characterization. This Task provided information to partially complete Elements A and B of the EPA's nine key elements for a watershed-based plan.

Deliverables summary:

Subtask 4.1: Water Quality Monitoring Assessment Requirements

TRA performed a desk readiness review with field staff of field sampling procedures and requirements as outlined in the QAPP and the Surface Water Quality Monitoring (SWQM) Procedures Manual. TRA submitted a brief report documenting topics discussed and attendance on May 20, 2019. TRA submitted field notes and instrument calibration sheets from first sampling on July 29, 2019. For routine monitoring, TRA scheduled and performed an internal monitoring systems audit on March 15, 2019, Appendix H.

Subtask 4.2: Water Quality Monitoring

TRA will collected additional data and information needed to support the chosen analytical method for estimating pollutant loadings. QAPPs needed to support data and information collection activities were developed and submitted for approval to the TCEQ Project Manager. Sampling sites needing a Station Location request (SLOC request) were submitted to the TCEQ Project Manager. All analyses were conducted in the TRA's National Environmental Laboratory Accreditation Program (NELAP) accredited lab, per the approved QAPP.

Data was collected from approximately 14 sites. The sites and parameters analyzed were identified in the Monitoring QAPP. The sampling schedule consisted of six bi-monthly routine samples and six flow-biased samples for a total of 12 samples taken over the course of a year.

The monitoring plan also included the flexibility to sample during high flow conditions up to an additional six sites in smaller tributaries to the lake or far upstream reaches of major tributaries that may be dry under ambient conditions. No more than three samples were collected at each of these stations. The intent of the sampling schedule was to capture a broad range of flow conditions.

The ongoing task was completed on April 30, 2020 and submitted on June 15, 2020 in QPR FY20Q3, Appendix A.

Subtask 4.3: Water Quality Data Submission

TRA maintained a master database of collected data. TRA uploaded data into the Surface Water Quality Monitoring Information System (SWQMIS) Test Environment and submit successful data set(s) to the TCEQ Project Manager quarterly. SWQMIS Data Submissions were completed in January and August FY2020. They are documented in QPRs in Appendix A.

Subtask 4.4: Water Quality Data Collection Report

TRA developed a Draft Data Collection Report detailing activities conducted under Task 4 submitted October 1, 2020. The Draft Data Collection Report was approved on 11/9/2020. A Final Data Collection Report detailing activities conducted under Task 4 was submitted on 11/16/2020(Appendix I).

Task 5: Public Participation and Stakeholder Coordination

TRA coordinated and facilitated public involvement in the established local watershed stakeholder group that provided input into the decision-making process for the development of the Joe Pool Lake WPP.

Deliverables summary:

Subtask 5.1: Public Participation Plan (PPP)

TRA developed a PPP which details the strategy for engaging the public and stakeholders in future phases of the watershed planning process. The PPP, at a minimum, included: 1) stakeholder group ground rules, 2) stakeholder group structure and membership, 3) topics and purpose for stakeholder meetings and a tentative schedule, and 4) a targeted outreach plan to increase public participation in the process. These four components may be amended by the stakeholder group once they have convened in Phase II(Contract 582-20-10162). The Final PPP was submitted on August 18, 2020 (Appendix J).

Subtask 5.2: Public Outreach

TRA facilitated communication with stakeholders to engage the public and affected entities in the watershed planning process. Outreach tools such as the project website, emails, and educational and promotional materials were used to engage stakeholders. Appendix K highlights our project website, Joe Pool Lake WPP Fact Sheet and Augmented Reality Sandbox. TRA augmented and maintained a database of watershed stakeholders and affected parties for use in engaging the public in the watershed planning process. The project website, stakeholder database and promotional materials will continue to be updated throughout Phase II(Contract 582-20-10162) of this project.

Subtask 5.3: Technical Advisory Group Meetings

TRA facilitated public participation and stakeholder involvement in the watershed characterization process by holding seven meetings of various technical advisory staff comprised of Dogwood Canyon Audubon Center, Texas Parks and Wildlife and the Cities of Cedar Hill, Grand Prairie, Mansfield and Midlothian. The meetings were held on November 6, 2018, August 13th, 2019, December 11, 2019, February 27th, 2020, May 28th, 2020, August 27, 2020 and October 22nd, 2020. The purpose of the Technical Advisory Group (TAG) meetings were to review the proposed monitoring strategy and modify it based on the perceived needs in the watershed. However, the TAG was much more involved and the meetings encompassed reviewing most deliverables for this contract, such as, the Analysis of Historical Data Report, Preliminary Pollutant Source Survey, Data Collection Report, and Public Participation Plan. TRA coordinated meetings, secured meeting locations, prepared and disseminated meeting notices and agendas. Meeting summaries were prepared and posted to the project website (Appendix L).

Subtask 5.4: Coordination Meetings

TRA attended and participated in other public meetings as appropriate in order to communicate project goals, activities, and accomplishments. TRA attended a minimum of two meetings per year. The following meetings were attended and/or participated in as of the last QPR approved on January 28, 2021, FY21Q1 P1:

- TPWD's DFW Natural Resource Manager's Meeting at the Fort Worth Nature Center to discuss regional initiatives and missions with other entities on 1/30/19
- Facilitated and attended series of three Texas Well Owner Network Workshops for homeowners with water wells/septic systems in three locations throughout the DFW Metroplex (McKinney, Southlake, Midlothian) 2/4/2019-2/6/2019
- Instructed at stream trailer station for TWA's Field Investigation Day for Mansfield ISD students on 2/26/2019
- Attended Urban Riparian Symposium in Grapevine on 2/28/2019-3/1/2019
- Attended Upper Trinity River Basin Coordinating Committee Mtg on 3/12/19
- Attended Public Education Task Force meeting on 4/3/19
- Instructed project partners on use of TRA-developed version of the EXCEL tool on 4/4/19
- Instructed at stream trailer station for TWA's Field Investigation Days for Mansfield ISD students on 4/23 & 4/25
- Covered shift at TRA's booth at the 2019 EarthX Event on 4/28/19
- Instructed at stream trailer station for TWA's Field Investigation Day for Mansfield ISD students on 5/9, rescheduled event from February
- Instructed project partners on use of TRA-developed version of the EXCEL tool on 5/24/19
- Assisted with IGNITE program for Richardson ISD on 6/13/19. Instructed students about water pollution, and helped them construct a variety of natural and man-made water filters to discuss their effectiveness
- Manned booth at Girl Scout Water Camp on 6/14/19
- Conducted mock biological sampling on 6/19/19 for students of the Vital Link program conducted through Fort Worth ISD
- Presented at NCTCOG Watershed Stakeholder meeting on 6/25/19, discussing optical brightener sampling for human influence
- Attended NCTCOG Public Education Task Force meeting on 7/17/19
- Attended and presented at EPA 2019 Stormwater Conference in Denton, TX on 7/30/2019 and 7/31/2019.
- Presented at TX Watershed Coordinators Roundtable on 8/6/19
- Represented TRA at NRCS State Technical Advisory Meeting in Austin on 9/4/2019-9/5/2019
- Presented stream trailer demonstration at Arlington Water Festival on 9/14/2019
- Presented AR Sandbox at NCTCOG's Upper Trinity River Basin Coordinating Committee meeting 9/23/2019
- Presented at Youth Robotics Club meeting on 12/12/19
- Presented AR Sandbox at Youth Future Cities competition at UT-Arlington on 1/25/2020
- Attended NCTCOG Public Education Task Force meeting on 1/29/2020
- Attended NCTCOG Upper Trinity River Basin Coordinating Committee meeting on 2/11/2020
- Attended NCTCOG Public Education Task Force meeting on 5/6/2020
- Attended NCTCOG Greater Trinity River Bacteria TMDL Implementation Plan Coordination Committee meeting on 6/30/2020
- Attended NCTCOG Pollution Prevention Task Force meeting on 7/1/2020
- Attended NCTCOG Public Education Task Force meeting on 7/15/2020
- Attended NRCS Source Water Protection meeting on 7/21/2020
- Attended and presented at Texas Watershed Steward Workshop in Mansfield, TX on 9/15/2020
- Attended NRCS Urban Ag Subcommittee meeting on 10/14/2020
- Attended NRCS STAC meeting on 10/20/2020
- Attended Texas Watershed Coordinators Roundtable on 10/21/2020
- Attended TCEQ SWQM Workshop 10/29 – 10/30/2020
- Attended EPA Trash Free Waters Webinar on 11/5/2020
- Attended Opportunities to Collaborate in the Trinity River Watershed on 11/18/2020

- Attended and presented at Watershed Protection Plans in North Central Texas: A Virtual Roundtable hosted by NCTCOG on 11/30/2020
- Attended Opportunities to Collaborate in the Trinity River Watershed 12/02/2021
- Attended TMDL Monitoring Coordination Forum Subcommittee Meeting 01/07/2021
- Attended FW Litter Summit 01/08/2021
- Attended Trinity Watershed Opportunities for Collaboration 01/13/2021
- Attended TMDL Stormwater Technical Subcommittee Meeting 01/14/2021
- Attended NCTCOG Trash Free Texas Webinar: Connecting Volunteers with Litter Cleanup Locations 01/19/2021
- Attended Virtual Watershed Partners Breakfast 01/27/2021

Task 6: Final Report

The TRA produced this Final Report that summarizes all activities completed and conclusions reached during the project. This Final Report describes project activities and identifies and discusses the extent to which project goals and purposes have been achieved, and the amount of funds spent on the project. This Final Report summarizes all the Task Reports in both the text and/or as appendices.

Final Approved QPR

Quarterly Progress Report

FY 21 Q2

Entity: Trinity River Authority

Contract No: 582-19-90205

Project Name: Joe Pool Lake Watershed Characterization

Date Submitted: _02/22/2021

Signature pages have been removed from this document.

* The TCEQ Project Manager's signature indicates that the QPR is accepted as a project deliverable and also authorizes any changes in deliverable due dates requested in the Deliverables sheet. Approved due date changes should be inserted in the "Current Due Date" column in the next QPR.

1. When ready to submit the QPR to TCEQ, the Contractor Project Manager must date and sign the cover page with an electronic signature (i.e., scanned signature). Send the signed Excel document to the TCEQ Project Manager.

2. The TCEQ Project Manager will review and either: 1) Send back with comments or 2) approve, sign, date, and e-mail a scanned copy of the approved QPR to the Contractor Project Manager.

3. After addressing comments email the updated Excel document the TCEQ Project Manager, along with a new date next to the electronic signature.

4. The TCEQ Project Manager will sign, date, scan and send the approved QPR to the Contractor Project Manager. A final version of the Excel document will also be sent.

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9821	1.2	QPR (FY19Q1)	12/15/18	n/a	No activity in FY19Q1	
9822	1.2	QPR (FY19Q2)	03/15/19	03/15/19		
9823	1.2	QPR (FY19Q3)	06/15/19	06/17/19		
9824	1.2	QPR (FY19Q4)	09/15/19	09/16/19		
9825	1.2	QPR (FY20Q1)	12/15/19	12/16/19		
9826	1.2	QPR (FY20Q2)	03/15/20	03/16/20	3/15/20 was a Sunday	
9827	1.2	QPR (FY20Q3)	06/15/20	06/15/20		
9828	1.2	QPR (FY20Q4)	09/15/20	09/11/20		
	1.2	QPR (FY21Q1)	12/15/20	12/08/20	need additional w/contract extension	
	1.2	QPR (FY21Q2)	**03/15/21**		Final QPR	
9829	1.3	Invoice (FY19Q1)	12/30/18	n/a	No activity in FY19Q1	
9830	1.3	Invoice (FY19Q2)	03/30/19	03/29/19		
9831	1.3	Invoice (FY19Q3)	06/30/19	06/26/19		
9832	1.3	Invoice (FY19Q4)	09/30/19	09/26/19		
9833	1.3	Invoice (FY20Q1)	12/31/19	12/30/19		
9834	1.3	Invoice (FY20Q2)	03/31/20	03/20/20		
9835	1.3	Invoice (FY20Q3)	06/30/20	06/18/20		
		Invoice (FY20Q4)	09/30/20	09/30/20		
		Invoice (FY21Q1)	12/31/2020	12/21/20		
		Invoice (FY21Q2)	3/31/2021	02/09/21	Final Invoice	
9836	1.3	Invoice (FY22Q1)__	1/31/2022		Not needed.	
9837	1.3	Invoice (FY20Q2)_July	2/28/2022			
9838	1.3	Invoice (FY20Q2)Aug	4/15/2022			
9840	1.4	Conference Call (FY19Q2)	01/15/19	n/a		
9841	1.4	Conference Call (FY19Q3)	04/15/19	04/11/19		
9842	1.4	Conference Call (FY19Q4)	07/15/19	07/26/19		
9843	1.4	Conference Call (FY20Q1)	10/15/19	11/18/19		
9844	1.4	Conference Call (FY20Q2)	01/15/20	01/15/20		
9845	1.4	Conference Call (FY20Q3)	04/15/20	03/27/20		
9846	1.4	Conference Call (FY20Q4)	07/15/20	07/02/20		
	1.4	Conference Call (FY21Q1)	10/15/2020	10/15/20		
	1.4	Conference Call (FY21Q2)	1/15/2021	01/28/21		
9839	1.4	Post-Award Mtg (Notes within 2 days of mtg)	10/05/18	10/22/18		
9847	1.5	EPA Coordination Mtg (Upon Request)	08/31/19	n/a	no meeting requested	
9848	1.6	Annual Report Article (If requested)	02/28/22			
9849	1.7	FY20 Annual Budget Update	10/01/19	11/04/19	See narrative for details	
		FY21 Annual Budget Update		12/18/20	See narrative for details	added
9850	2.1	QAPP Planning Mtg Notes	10/05/18	10/22/18		
9851	2.2	Draft QAPP	10/22/18	10/05/18		
9852	2.2	Final QAPP	01/15/19	02/21/19		

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9853	2.4	1st QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	03/07/20	04/23/20	No changes to QAPP requested by TRA.	
9854	2.4	2nd QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	03/07/21			
9870	3.1	Documentation of data compilation and review (In QPRs)	9/15/2020	09/15/20	See narrative for details	
9871	3.2	Preliminary Pollutant Source Survey PowerPoint	10/01/20	10/22/20	See narrative for details	
9872	3.3	Draft Analysis of Historical Data Report	10/1/2019	10/02/19	See narrative for details	
9873	3.3	Final Analysis of Historical Data Report	12/31/2019	12/03/19	See narrative for details	
9859	4	Sampling Station Location Requests, if necessary (before first sampling event)	04/26/19	02/19/19		
9855	4.1	Documentation of field monitoring readiness review (Before 1st sampling event)	05/15/19	05/20/19		
9858	4.1	Field notes and instrument calibration sheets from first sampling event (Within 30 days of first sampling event)	8/1/2019	07/29/19		
9857	4.1	Results of internal monitoring systems audit (within 30 days of audit completion)	08/31/19	07/29/19		
9856	4.1	Scheduled date of internal monitoring systems audit	11/30/18	03/15/19		
9860	4.2	Documentation of sampling events (in QPR)	11/30/21	06/15/20	Ongoing task now complete	
9861	4.3	SWQMIS Data Submission (FY19Q2)	12/15/19	NA	Still awaiting release of data from laboratory	n/a
9862	4.3	SWQMIS Data Submission (FY19Q3)	12/15/19	NA	See note above	
9863	4.3	SWQMIS Data Submission (FY19Q4)	03/15/20	04/06/20		
9864	4.3	SWQMIS Data Submission (FY20Q1)	06/15/20	NA	Still awaiting release of data from laboratory. Anticipate that remaining data will be submitted in the next quarter.	
9865	4.3	SWQMIS Data Submission (FY20Q2)	09/15/20	08/07/20		
9866	4.3	SWQMIS Data Submission (FY20Q3)	12/15/20	08/07/20		
9867	4.3	SWQMIS Data Submission (FY20Q4)	extraneous			
9868	4.4	Draft Data Collection Report	10/01/20	10/01/20	See narrative for details	
9869	4.4	Final Data Collection Report	12/01/20	11/16/20	See narrative for details	
9874	5.1	Public Participation Plan	06/01/20	08/18/20		

1st submission spanned two quarters
2nd submission will span two quarters

This will be one.

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9875	5.2	Educational and promotional materials (as developed)	02/28/22	06/01/20	Ongoing task - see narrative for details	
9877	5.2	Project Website, mainted by Performing Party (as developed, updates documented in QPRs)	02/28/22	02/22/21	Ongoing task - see narrative for details	
9876	5.2	Stakeholder Database (Updated as needed)	08/01/19	02/09/21	Ongoing task - see narrative for details	End of contract
9878	5.3	Technical Advisory Mtg (FY19Q2)	02/28/19	11/06/18		
9879	5.3	Technical Advisory Mtg (FY19Q3)	08/31/19	08/13/19		
9880	5.3	Technical Advisory Mtg (FY19Q4)	11/30/19	12/11/19		
9881	5.3	Technical Advisory Mtg (FY20Q1)	02/29/20	02/27/20		
9882	5.3	Technical Advisory Mtg (FY20Q2)	05/31/20	05/28/20		
9883	5.3	Technical Advisory Mtg (FY20Q3)	08/31/20	08/27/20	See narrative for details	
9884	5.3	Technical Advisory Mtg (FY20Q4)	11/30/20	10/22/20		
9885	5.4	Coordination Mtg (1 of 4)	02/28/19	02/28/19		
9886	5.4	Coordination Mtg (2 of 4)	08/31/19	08/31/19		
9887	5.4	Coordination Mtg (3 of 4)	02/29/20	12/15/19		
9888	5.4	Coordination Mtg (4 of 4)	08/31/20	08/31/20	Ongoing task - see narrative for details on meetings attended	
9889	6.1	Draft Final Report	11/01/20	11/05/20	See narrative for details	
9890	6.2	Final Report	03/01/21	02/22/21		

Task/Issue	Additional Description of Quarterly Activities, Milestones, and Issues
1-Project Administration	Quarterly call held 1/28/21 (ATTACHMENT A).
Training	No activity to report.
Invoice	Final invoice sent 02/9/21, FY21Q2
Annual Budget	FY21 Annual Budget sent 12/18/2020
2-Quality Assurance	No activity to report.
3-Analysis of Historical Data	
3.1 Documentation of data compilation and review (In QPRs)	Task Complete.
3.2 Preliminary Pollutant Source Survey PowerPoint	Task Complete.
3.3 Draft Analysis of Historical Data Report	Task complete.
3.3 Final Analysis of Historical Data Report	Task complete.
4-Water Quality Data Collection	
4.1 Water Quaity Monitoring Assessment Requirements	Task complete.
4.2 Water Quality Monitoring	Task complete.
4.3 Water Quality Data Submission	Task complete.
4.4 Draft Data Collection Report	Task complete.
4.4 Final Data Collection Report	Task complete.
5-Public Participation	
5.1 Public Participation Plan (PPP)	Task Complete
Stakeholder Database	Updated with interested parties from email solicitation for interest in Steering Committee 02/09/21
5.2 Project Website	Updated website with upcoming Public Stakeholder Meeting to be held on March 3rd, 2021
5.2 Educational Materials	Task Complete
5.3 TAG Meetings	Task Complete
5.4 Community Meetings	Attended Opportunities to Collaborate in the Trinity River Watershed 12/02/2021, TMDL Monitoring Coordination Forum Subcommittee Meeting 01/07/2021, FW Litter Summit 01/08/2021, Trinity Watershed Opportunities for Collaboration 01/13/2021, TMDL Stormwater Technical Subcommittee Meeting 01/14/2021, Trash Free Texas ebinar 01/19/2021, Virtual Watershed Partners Breakfast 01/27/2021 (ATTACHMENT B).

6-Final Report	
6.1 Draft Final Report	Task Complete
6.2 Final Report	Submitted 02/22/2021

Note: The purpose of this sheet is to provide for an ongoing discussion of tasks to document overall progress and to raise any overall issues that don't relate to specific deliverables.

Note: Please address activities and issues related to contract amendments, budget revisions, and other administrative matters under Task 1.

TCEQ uses this information for budget planning. It is important this form is completed to avoid rush requests from the TCEQ Project Manager.

Section I: Current Budget by FY			
	Federal		
	TCEQ encumbered	Contractor *Estimate*	FY Paid Amount
FY19:	$66,889	$44,015	$44,014.47
FY20:	$85,000	$82,112	$76,591.35
FY21:	$18,000	$15,088	$11,343.00
Total:	$169,889	$141,215	$131,949

Section II: Current FY Quarterly Spending:		
FY21	**Match**	**Federal**
Q1:	*$6,376.00*	*$9,563*
Q2:	*$1,186.00*	*$1,780*
Q3:		
Q4:		
Total:	$7,562.00	$11,343.00

Section III: Is the Contractor Estimate in Section I still accurate? **Yes or No:** Yes

Tracks changes in the fiscal year budgets. Changes may be an increase or a decrease in spending from original estimate. After the current Progress Report is approved the new fiscal year estimates should be moved from Section III to Section I.

If answer is NO, provide new budget by fiscal year estimates and justification for the change in the table below.

New Budget by FY		Justification
	Federal	
FY18:		
FY19:		
FY20:		
FY21:		Estimate was $43,873, due to change staffing and overestimation of salaries, the contractor estimate was $15,088. We will be returning $38,051.
FY22:		
Total:		

Please provide a listing of deliverables provided along with the QPR, and delete attachment references from prior quarters. Reference the "Deliverables Report" to get the Deliverable ID, Subtask #, and Deliverable Name.

Deliverable ID	Subtask #	Deliverable Name	Attachment File Name
9842	1.4	FY21 Q2 Quarterly Call Minutes	A-2021-Q2 P2 & Q1 P1 Quarterly Call Minutes-20210128.pdf
9885	5.4	Community Meetings Packet (see narrative for details)	B-Community Meetings.pdf

5.0 Project Budget

The Joe Pool Lake Watershed Protection Plan Phase I – Watershed Characterization and Stakeholder Coordination project had a total budget of $283,333.33. Federal monies totaled $170,000.00 to be reimbursed for work performed over three years. TRA had a non-federal match requirement of $113,333.00 for the project.

A breakdown of the budget by fiscal year is provided in Table 1. Due to shift in start date from 9/1/2018 to 1/9/2019, funding was pushed into 2021 resulting in lower spending overall in 2019. Further, due to change in staffing and overestimation of salaries less funding was spent overall. Remaining Federal funds totaling $38,051 will be returned to TCEQ. To date, $131,949 Federal funds have been dispersed for reimbursement.

Table 5-1 Project Budget

	MATCH ESTIMATE	MATCH ACTUAL	FEDERAL ESTIMATE	FEDERAL ACTUAL
FY2019	$29,343	$29,343	$44,015	$44,014
FY2020	$54,741	$51,061	$82,112	$76,592
FY2021	$29,249	$7,562	$43,873	$11,343
TOTAL	$113,333	$87,966	$170,000	$131,949

Local match of 40% for the project came from several entities. The cities of Cedar Hill, Grand Prairie, Mansfield, Midlothian and TRA each contributed $22,667 over two years.

6.0 Discussion

The FY2018 contract was successful in developing and fostering relationships with interested parties in the watershed as well as completing the Analysis of Historical Data Report, Data Collection Report, and Public Participation Plan. Over the course of the two years, stakeholders formed the Technical Advisory Group to utilize local knowledge and expertise to guide the planning process, discuss monitoring strategies, identify potential pollutant sources, and assess and produce reports that will support the development of a watershed protection plan in Phase II (Contract 582-20-10162). The results from Phase I, along with significant stakeholder coordination, will be used to develop load duration curves (LDCs) to quantify loadings of Escherichia (*E.coli*), nitrite (NO_2), nitrate (NO_3), total kjeldahl nitrogen (TKN), total phosphorus (TP), orthophosphate (OP) and other water quality parameters of importance identified by the stakeholder group. Stakeholder involvement in Phase II will build upon the recommendations made during the preliminary technical advisory group stakeholder meetings conducted in Phase I. Stakeholder meetings in Phase II will focus on the iterative steps necessary for the creation of a WPP with specific targets and strategies for water quality improvements. TRA, in collaboration with project partners, will have developed a WPP for Joe Pool Lake watershed at the conclusion of Phase II (Contract 582-20-10162).

Appendix A: Quarterly Progress Reports

Quarterly Progress Report

FY 19 Q2

Entity: Trinity River Authority

Contract No: 582-19-90205

Project Name: Joe Pool Lake Watershed Characterization

Date Submitted: 03/13/19

Signature pages have been removed from this document.

* The TCEQ Project Manager's signature indicates that the QPR is accepted as a project deliverable and also authorizes any changes in deliverable due dates requested in the Deliverables sheet. Approved due date changes should be inserted in the "Current Due Date" column in the next QPR.

1. When ready to submit the QPR to TCEQ, the Contractor Project Manager must date and sign the cover page with an electronic signature (i.e., scanned signature). Send the signed Excel document to the TCEQ Project Manager.

2. The TCEQ Project Manager will review and either: 1) Send back with comments or 2) approve, sign, date, and e-mail a scanned copy of the approved QPR to the Contractor Project Manager.

3. After addressing comments email the updated Excel document the TCEQ Project Manager, along with a new date next to the electronic signature.

4. The TCEQ Project Manager will sign, date, scan and send the approved QPR to the Contractor Project Manager. A final version of the Excel document will also be sent.

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9821	1.2	QPR (FY19Q1)	12/15/18	n/a	No activity in FY19Q1	
9822	1.2	QPR (FY19Q2)	03/15/19	03/15/19		
9823	1.2	QPR (FY19Q3)	06/15/19			
9824	1.2	QPR (FY19Q4)	09/15/19			
9825	1.2	QPR (FY20Q1)	12/15/19			
9826	1.2	QPR (FY20Q2)	03/15/20			
9827	1.2	QPR (FY20Q3)	06/15/20			
9828	1.2	QPR (FY20Q4)	09/15/20			
9829	1.3	Invoice (FY19Q1)	12/30/18	n/a	No activity in FY19Q1	
9830	1.3	Invoice (FY19Q2)	03/30/19			
9831	1.3	Invoice (FY19Q3)	06/30/19			
9832	1.3	Invoice (FY19Q4)	09/30/19			
9833	1.3	Invoice (FY20Q1)	12/31/19			
9834	1.3	Invoice (FY20Q2)	03/31/20			
9835	1.3	Invoice (FY20Q3)	06/30/20			
9836	1.3	Invoice (FY20Q4)__June	07/30/20			
9837	1.3	Invoice (FY20Q4)_July	08/30/20			
9838	1.3	Invoice (FY20Q4)Aug	11/15/20			
9840	1.4	Conference Call (FY19Q2)	01/15/19	n/a	No activity in FY19Q1	
9841	1.4	Conference Call (FY19Q3)	04/15/19			
9842	1.4	Conference Call (FY19Q4)	07/15/19			
9843	1.4	Conference Call (FY20Q1)	10/15/19			
9844	1.4	Conference Call (FY20Q2)	01/15/20			
9845	1.4	Conference Call (FY20Q3)	04/15/20			
9846	1.4	Conference Call (FY20Q4)	07/15/20			
9839	1.4	Post-Award Mtg (Notes within 2 days of mtg)	10/05/18	10/22/18		
9847	1.5	EPA Coordination Mtg (Upon Request)	08/31/19			
9848	1.6	Annual Report Article (If requested)	08/01/20			

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9849	1.7	FY20 Annual Budget Update	10/01/19			
9850	2.1	QAPP Planning Mtg Notes	10/05/18	10/22/18		
9851	2.2	Draft QAPP	10/22/18	10/05/18		
9852	2.2	Final QAPP	01/15/19	02/21/19		
9853	2.4	1st QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	01/15/20			
9854	2.4	2nd QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	01/15/21			
9870	3.1	Documentation of data compilation and review (In QPRs)	12/15/19			
9871	3.2	Preliminary Pollutant Source Survey PowerPoint	06/01/20			
9872	3.3	Draft Analysis of Historical Data Report	06/01/19			
9873	3.3	Final Analysis of Historical Data Report	09/01/19			
9859	4	Sampling Station Location Requests, if necessary (before first sampling event)	04/26/19	02/19/19		
9855	4.1	Documentation of field monitoring readiness review (Before 1st sampling event)	05/15/19		Suspended due to project delay	
9858	4.1	Field notes and instrument calibration sheets from first sampling event (Within 30 days of first sampling event)	05/15/19			

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9857	4.1	Results of internal monitoring systems audit (within 30 days of audit completion)	08/31/19			
9856	4.1	Scheduled date of internal monitoring systems audit	11/30/18	03/15/19	Suspended due to project delay - date set for 3/20/19	
9860	4.2	Documentation of sampling events (in QPR)	11/30/21			
9861	4.3	SWQMIS Data Submission (FY19Q2)	12/15/19			
9862	4.3	SWQMIS Data Submission (FY19Q3)	06/15/19			
9863	4.3	SWQMIS Data Submission (FY19Q4)	09/15/19			
9864	4.3	SWQMIS Data Submission (FY20Q1)	12/15/19			
9865	4.3	SWQMIS Data Submission (FY20Q2)	03/15/20			
9866	4.3	SWQMIS Data Submission (FY20Q3)	06/15/20			
9867	4.3	SWQMIS Data Submission (FY20Q4)	09/15/20			
9868	4.4	Draft Data Collection Report	06/01/20			
9869	4.4	Final Data Collection Report	08/01/20			
9874	5.1	Public Participation Plan	02/01/20			
9875	5.2	Educational and promotional materials (as developed)	08/31/20			
9877	5.2	Project Website, mainted by Performing Party (as developed, updates documented in QPRs)	05/15/18	TBD	Suspended due to project delay - expect to build project website the week of 3/18	
9876	5.2	Stakeholder Database (Updated as needed)	04/01/19			
9878	5.3	Technical Advisory Mtg (FY19Q2)	02/28/19	11/06/18	Discussed monitoring plan with TAG members	
9879	5.3	Technical Advisory Mtg (FY19Q3)	05/31/19			
9880	5.3	Technical Advisory Mtg (FY19Q4)	08/31/19			
9881	5.3	Technical Advisory Mtg (FY20Q1)	11/30/19			
9882	5.3	Technical Advisory Mtg (FY20Q2)	02/29/20			

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9883	5.3	Technical Advisory Mtg (FY20Q3)	05/31/20			
9884	5.3	Technical Advisory Mtg (FY20Q4)	08/31/20			
9885	5.4	Coordination Mtg (1 of 4)	02/28/19	02/28/19	See narrative for details on meetings attended	
9886	5.4	Coordination Mtg (2 of 4)	08/31/19			
9887	5.4	Coordination Mtg (3 of 4)	02/29/20			
9888	5.4	Coordination Mtg (4 of 4)	08/31/20			
9889	6.1	Draft Final Report	06/01/20			
9890	6.2	Final Report	08/01/20			

Task/Issue	Additional Description of Quarterly Activities, Milestones, and Issues
1-Project Administration	Quarterly call held 2/8/19 (notes in ATTACHMENT A).
	Amendment #1 to extend Phase I end date in process with JJ. Also requested to modify Phase II contract end date to match, per correspondence w/ Faith Hambleton on 2/19/19.
Training	Attended Texas Watershed Coordinators Roundtable in Waco on 1/31/19 (ATTACHMENT B).
2-Quality Assurance	Draft QAPP sent to TCEQ on 10/5/18. Comments addressed, returned Final QAPP to TCEQ on 2/21.
3-Analysis of Historical Data	
3.1 Documentation of data compilation and review (In QPRs)	Began collecting spatial and literature data for the watershed characterization process, including data from TCEQ, TNRIS, USGS, and USDA.
3.2 Preliminary Pollutant Source Survey PowerPoint	
3.3 Draft Analysis of Historical Data Report	
4-Water Quality Data Collection	All activities suspended until approved QAPP is in hand.
5-Public Participation	
5.1 Public Participation Plan	
5.2 Public Outreach	
5.3 TAG Meetings	Hosted project partners and TAG members for a review of the proposed monitoring plan and to discuss billing obligations on 11/6/18 (ATTACHMENT C).
5.4 Community Meetings	Attended TPWD's DFW Natural Resource Manager's Meeting at the Fort Worth Nature Center to discuss regional initiatives and missions with other entitites on 1/30/19 (ATTACHMENT D).
	Facilitated and attended series of three Texas Well Owner Network Workshops for homeowners with water wells/septic systems in three locations throughout the DFW Metroplex (McKinney, Southlake, Midlothian, see ATTACHMENT E).
	Instructed at stream trailer station for TWA's Field Investigation Day for Mansfield ISD students on 2/26 (ATTACHMENT F).
	Attended Urban Riparian Symposium in Grapevine on 2/28-3/1 (ATTACHMENT G).
6-Final Report	

Note: The purpose of this sheet is to provide for an ongoing discussion of tasks to document overall progress and to raise any overall issues that don't relate to specific deliverables.
Note: Please address activities and issues related to contract amendments, budget revisions, and other administrative matters under Task 1.

This tab is used for budget planning purposes. The TCEQ uses the information quarterly for program budget planning. It is important this form is completed to avoid rush requests from the TCEQ Project Manager.
Section I tracks the current budget by fiscal year. This information is from the Annual Budget Update. This is a high-level overview of planned spending for each year of the project. Changes to fiscal year estimates are noted in Section III. After the current QPR is approved the new fiscal year estimates should be moved from Section III to Section I.
Section II tracks the current fiscal year's invoicing. Include invoices that have been approved by TCEQ and estimates for upcoming invoices.
Section III tracks changes in the fiscal year budgets. Changes may be an increase or a decrease in spending from original estimate. After the current QPR is approved the new fiscal year estimates should be moved from Section III to Section I.

Section I: Current Budget by FY

	Match	Federal
FY19:	$43,194	$64,791
FY20:	$54,377	$81,565
FY21:	$15,763	$23,644
Total:	$113,333	$170,000

Section II: Current FY Quarterly Spending:

	Match	Federal	
Q1:	$0	$0	(project delayed)
Q2:	$5,640	$8,460	(estimated)
Q3:			
Q4:			
Total:	$5,640	$8,460	

Section III: Has the total budget for this fiscal year changed?	Yes

If so, provide new budget by fiscal year estimates and justification for the change in the table below.

New Budget by FY:

	Match	Federal	Justification
FY19:	$43,194	$64,791	Shift in start date from 9/1/18 to 1/9/19 delayed spending that will push some funding into 2021, resulting in lower spending overall in FY19. Total project budget remains unchanged.
FY20:			
FY21:			
Totals:			

Please provide a listing of deliverables provided along with the QPR, and delete attachment references from prior quarters. Reference the "Deliverables Report" to get the Deliverable ID, Subtask #, and Deliverable Name.

Deliverable ID	Subtask #	Deliverable Name	Attachment File Name
9840	1.4	Q2 Quarterly Call Minutes	A-Q02 Quarterly Call Minutes-20190208.pdf
Training		TX Watershed Coortinators Roundtable - Meeting Notes	B-TX WC Roundtable-Notes-20190131.pdf
9878	5.3	Agenda - JPLWPP Monitoring Plan Review Meeting	C-Agenda-20181106.docx
9885	5.4	TPWD DFW Natural Resource Managers Meeting	D-TPWD NR Managers-Notes-20190130.pdf
9885	5.4	News Release for TWON DFW Workshop Series	E-News Release-DFW-TWON-Training.pdf
9885	5.4	Correspondence for TWA Field Day - Mansfield ISD	F-TWA Mansfield-20190226.pdf
9885	5.4	Announcement for Urban Riparian Symposium	G-Urban Riparian Symposium February 27-March 1.pdf

Quarterly Progress Report

FY 19 Q3

Entity: Trinity River Authority

Contract No: 582-19-90205

Project Name: Joe Pool Lake Watershed Characterization

Date Submitted: 06/17/19

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* The TCEQ Project Manager's signature indicates that the QPR is accepted as a project deliverable and also authorizes any changes in deliverable due dates requested in the Deliverables sheet. Approved due date changes should be inserted in the "Current Due Date" column in the next QPR.

1. When ready to submit the QPR to TCEQ, the Contractor Project Manager must date and sign the cover page with an electronic signature (i.e., scanned signature). Send the signed Excel document to the TCEQ Project Manager.

2. The TCEQ Project Manager will review and either: 1) Send back with comments or 2) approve, sign, date, and e-mail a scanned copy of the approved QPR to the Contractor Project Manager.

3. After addressing comments email the updated Excel document the TCEQ Project Manager, along with a new date next to the electronic signature.

4. The TCEQ Project Manager will sign, date, scan and send the approved QPR to the Contractor Project Manager. A final version of the Excel document will also be sent.

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9821	1.2	QPR (FY19Q1)	12/15/18	n/a	No activity in FY19Q1	
9822	1.2	QPR (FY19Q2)	03/15/19	03/15/19		
9823	1.2	QPR (FY19Q3)	06/15/19	06/17/19	6/15 was Saturday	
9824	1.2	QPR (FY19Q4)	09/15/19			
9825	1.2	QPR (FY20Q1)	12/15/19			
9826	1.2	QPR (FY20Q2)	03/15/20			
9827	1.2	QPR (FY20Q3)	06/15/20			
9828	1.2	QPR (FY20Q4)	09/15/20			
9829	1.3	Invoice (FY19Q1)	12/30/18	n/a	No activity in FY19Q1	
9830	1.3	Invoice (FY19Q2)	03/30/19	03/29/19		
9831	1.3	Invoice (FY19Q3)	06/30/19	06/26/19		
9832	1.3	Invoice (FY19Q4)	09/30/19			
9833	1.3	Invoice (FY20Q1)	12/31/19			
9834	1.3	Invoice (FY20Q2)	03/31/20			
9835	1.3	Invoice (FY20Q3)	06/30/20			
9836	1.3	Invoice (FY20Q4)__June	07/30/20			
9837	1.3	Invoice (FY20Q4)_July	08/30/20			
9838	1.3	Invoice (FY20Q4)Aug	11/15/20			
9840	1.4	Conference Call (FY19Q2)	01/15/19	n/a	No activity in FY19Q1	
9841	1.4	Conference Call (FY19Q3)	04/15/19	04/11/19	Call on 4/11, notes sent to JJ on 4/15	
9842	1.4	Conference Call (FY19Q4)	07/15/19	07/26/19		
9843	1.4	Conference Call (FY20Q1)	10/15/19			
9844	1.4	Conference Call (FY20Q2)	01/15/20			
9845	1.4	Conference Call (FY20Q3)	04/15/20			
9846	1.4	Conference Call (FY20Q4)	07/15/20			
9839	1.4	Post-Award Mtg (Notes within 2 days of mtg)	10/05/18	10/22/18		
9847	1.5	EPA Coordination Mtg (Upon Request)	08/31/19			
9848	1.6	Annual Report Article (If requested)	08/01/20			
9849	1.7	FY20 Annual Budget Update	10/01/19			

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9850	2.1	QAPP Planning Mtg Notes	10/05/18	10/22/18		
9851	2.2	Draft QAPP	10/22/18	10/05/18		
9852	2.2	Final QAPP	01/15/19	02/21/19		
9853	2.4	1st QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	03/07/20		QAPP approved 6/7/2019	
9854	2.4	2nd QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	03/07/21			
9870	3.1	Documentation of data compilation and review (In QPRs)	9/15/2020			
9871	3.2	Preliminary Pollutant Source Survey PowerPoint	10/01/20			
9872	3.3	Draft Analysis of Historical Data Report	10/1/2019			
9873	3.3	Final Analysis of Historical Data Report	12/31/2019			
9859	4	Sampling Station Location Requests, if necessary (before first sampling event)	04/26/19	02/19/19		
9855	4.1	Documentation of field monitoring readiness review (Before 1st sampling event)	05/15/19	05/20/19	Approved per JJ on 5/20	
9858	4.1	Field notes and instrument calibration sheets from first sampling event (Within 30 days of first sampling event)	8/1/2019			
9857	4.1	Results of internal monitoring systems audit (within 30 days of audit completion)	08/31/19		Should occur on schedule	

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9856	4.1	Scheduled date of internal monitoring systems audit	11/30/18	03/15/19	Date moved to 7/2020 monitoring event	
9860	4.2	Documentation of sampling events (in QPR)	11/30/21			
9861	4.3	SWQMIS Data Submission (FY19Q2)	09/15/19		moved forward 3 quarters	
9862	4.3	SWQMIS Data Submission (FY19Q3)	12/15/19		moved forward 2 quarters [2]	
9863	4.3	SWQMIS Data Submission (FY19Q4)	03/15/20		[2]	
9864	4.3	SWQMIS Data Submission (FY20Q1)	06/15/20		[2]	
9865	4.3	SWQMIS Data Submission (FY20Q2)	09/15/20		[2]	9/15/2020
9866	4.3	SWQMIS Data Submission (FY20Q3)	12/15/20		[2]	
9867	4.3	SWQMIS Data Submission (FY20Q4)	03/15/20		[2]	
9868	4.4	Draft Data Collection Report	10/01/20		[1]	
9869	4.4	Final Data Collection Report	12/01/20		[1]	
9874	5.1	Public Participation Plan	06/01/20		[1]	
9875	5.2	Educational and promotional materials (as developed)	02/28/22		moved to project end date [3]	
9877	5.2	Project Website, mainted by Performing Party (as developed, updates documented in QPRs)	02/28/22	05/15/19	This deliverable is continuous with future website updates	
9876	5.2	Stakeholder Database (Updated as needed)	08/01/19		[1]	
9878	5.3	Technical Advisory Mtg (FY19Q2)	02/28/19	11/06/18	Discussed monitoring plan with TAG members	
9879	5.3	Technical Advisory Mtg (FY19Q3)	08/31/19			
9880	5.3	Technical Advisory Mtg (FY19Q4)	11/30/19			
9881	5.3	Technical Advisory Mtg (FY20Q1)	02/29/20			
9882	5.3	Technical Advisory Mtg (FY20Q2)	05/31/20			
9883	5.3	Technical Advisory Mtg (FY20Q3)	08/31/20			
9884	5.3	Technical Advisory Mtg (FY20Q4)	11/30/20			
9885	5.4	Coordination Mtg (1 of 4)	02/28/19	02/28/19		
9886	5.4	Coordination Mtg (2 of 4)	08/31/19	06/15/19	with FY19Q3 QPR	

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.						
ID#	**Sub Task #**	**Deliverable**	**Current Due Date**	**Date Sent**	**Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)**	**Proposed New Due Date**
9887	5.4	Coordination Mtg (3 of 4)	02/29/20			
9888	5.4	Coordination Mtg (4 of 4)	08/31/20			
9889	6.1	Draft Final Report	10/01/20		[1]	
9890	6.2	Final Report	12/01/20		[1]	

Task/Issue	Additional Description of Quarterly Activities, Milestones, and Issues
1-Project Administration	Quarterly call held 4/11/19 (notes in ATTACHMENT A).
	Amendment #1 to extend Phase I end date approved, along with request to modify Phase II contract end date to match, per correspondence w/ Faith Hambleton on 2/19/19. Both dates confirmed for 2/28/22.
Training	Logged into Water Research Foundation's Pepper Mild Mottle Virus webinar on 5/31/19 (ATTACHMENT B).
2-Quality Assurance	Monitoring QAPP fully executed on 6/7/19.
3-Analysis of Historical Data	
3.1 Documentation of data compilation and review (In QPRs)	Continued collecting spatial and literature data for the watershed characterization process, including data from TCEQ, TNRIS, USGS, and USDA.
3.2 Preliminary Pollutant Source Survey PowerPoint	
3.3 Draft Analysis of Historical Data Report	
4-Water Quality Data Collection	Scheduled to begin data collection in 7/2019.
4.1 Documentation of field monitoring readiness review	Task complete.
5-Public Participation	
5.1 Public Participation Plan	
5.2 Project Website	Project website live on 5/20. Will report traffic statistics in next QPR.
5.2 Educational Materials	Work on Augmented Reality Sandbox is nearly complete.
5.3 TAG Meetings	No activity to report.
5.4 Community Meetings	Attended Urban Riparian Symposium in Grapevine on 2/28-3/1 (ATTACHMENT C).
	Attended Upper Trinity River Basin Coordinating Committee Mtg on 3/12/19 (ATTACHMENT D).
	Attended Public Education Task Force meeting on 4/3/19 (ATTACHMENT E).
	Instructed project partners on use of TRA-developed version of the EXCEL tool on 4/4/19 (ATTACHMENT G).
	Instructed at stream trailer station for TWA's Field Investigation Days for Mansfield ISD students on 4/23 & 4/25.(ATTACHMENT H).
	Covered shift at TRA's booth at the 2019 EarthX Event on 4/28/19 (ATTACHMENT I)
	Instructed at stream trailer station for TWA's Field Investigation Day for Mansfield ISD students on 5/9, rescheduled event from February (ATTACHMENT J).
	Instructed project partners on use of TRA-developed version of the EXCEL tool on 5/24/19 (ATTACHMENT K).

6-Final Report	

Note: The purpose of this sheet is to provide for an ongoing discussion of tasks to document overall progress and to raise any overall issues that don't relate to specific deliverables.
Note: Please address activities and issues related to contract amendments, budget revisions, and other administrative matters under Task 1.

This tab is used for budget planning purposes. The TCEQ uses the information quarterly for program budget planning. It is important this form is completed to avoid rush requests from the TCEQ Project Manager.
Section I tracks the current budget by fiscal year. This information is from the Annual Budget Update. This is a high-level overview of planned spending for each year of the project. Changes to fiscal year estimates are noted in Section III. After the current QPR is approved the new fiscal year estimates should be moved from Section III to Section I.
Section II tracks the current fiscal year's invoicing. Include invoices that have been approved by TCEQ and estimates for upcoming invoices.
Section III tracks changes in the fiscal year budgets. Changes may be an increase or a decrease in spending from original estimate. After the current QPR is approved the new fiscal year estimates should be moved from Section III to Section I.

Section I: Current Budget by FY

	Match	Federal
FY19:	$43,194	$64,791
FY20:	$54,377	$81,565
FY21:	$15,763	$23,644
Total:	$113,333	$170,000

Section II: Current FY Quarterly Spending:

	Match	Federal	
Q1:	$0	$0	(project delayed)
Q2:	$4,151	$6,226	
Q3:	$11,426	$17,139	(estimated)
Q4:			
Total:	$15,577	$23,365	

Section III: Has the total budget for this fiscal year changed?	Yes

If so, provide new budget by fiscal year estimates and justification for the change in the table below.

New Budget by FY:

	Match	Federal	Justification
FY19:	$43,194	$64,791	Shift in start date from 9/1/18 to 1/9/19 delayed spending that will push some funding into 2021, resulting in lower spending overall in FY19. Total project budget remains unchanged.
FY20:			
FY21:			
Totals:			

Have any nonconformances occurred in the previous quarter? Yes/No	
Add any nonconformances and the corresponding corrective actions to the Corrective Action Status Table below. Nonconformances must be communicated to the NPS Project Manager immediately via email and a Corrective Action Plan submitted within 14 days of the nonconformance occurring.	

Corrective Action Status Table

Corrective Action #	Date Issued	Description of Deficiency	Action Taken	Date Closed

Please provide a listing of deliverables provided along with the QPR, and delete attachment references from prior quarters. Reference the "Deliverables Report" to get the Deliverable ID, Subtask #, and Deliverable Name.

Deliverable ID	Subtask #	Deliverable Name	Attachment File Name
9840	1.4	Q3 Quarterly Call Minutes	A-Q15-Q03 Quarterly Call Minutes-20190411.pdf
Training		Registration Confirmation - Water Research Foundation Webinar - Pepper Mild Mottle Virus as bacterial indicator	B-Pepper Mild Mottle Virus.pdf
9885	5.4	Announcement for Urban Riparian Symposium	C-Urban Riparian Symposium February 27-March 1.pdf
9885	5.4	Email confirmation-Scout Badge Day Participation	D-Scout Badge Day-20190302.pdf
9885	5.4	Agenda - Upper Trinity River Basin Coordinating Committee Mtg	E-Agenda_UTRB-CC_03-12-19.pdf
9885	5.4	Agenda - Public Education Task Force Mtg	F-04-03-19-PETF-Agenda.pdf
9885	5.4	Email correspondence re: Training for SELECT tool modules provided to project partners	G-SELECT Training-20190404.pdf
9885	5.4	Schedule - Mansfield ISD Field Investigation Days	H-2019 FID Game Plan_MansfieldISD_Cross Timbers.pdf
9885	5.4	Email correspondence re: booth duties for EarthX 2019 event	I-EarthX 2019 Details.pdf
9885	5.4	Email correspondence re: rescheduled Mansfield ISD Field Investigation Day for May 9	J-Rescheduled Mansfield ISD Student Field Investigation.pdf
9885	5.4	Email correspondence re: Training for SELECT tool modules provided to project partners	K-SELECT Training-20190524.pdf

Quarterly Progress Report

FY 19 Q4

Entity: Trinity River Authority

Contract No: 582-19-90205

Project Name: Joe Pool Lake Watershed Characterization

Date Submitted: 09/16/19

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* The TCEQ Project Manager's signature indicates that the QPR is accepted as a project deliverable and also authorizes any changes in deliverable due dates requested in the Deliverables sheet. Approved due date changes should be inserted in the "Current Due Date" column in the next QPR.

1. When ready to submit the QPR to TCEQ, the Contractor Project Manager must date and sign the cover page with an electronic signature (i.e., scanned signature). Send the signed Excel document to the TCEQ Project Manager.

2. The TCEQ Project Manager will review and either: 1) Send back with comments or 2) approve, sign, date, and e-mail a scanned copy of the approved QPR to the Contractor Project Manager.

3. After addressing comments email the updated Excel document the TCEQ Project Manager, along with a new date next to the electronic signature.

4. The TCEQ Project Manager will sign, date, scan and send the approved QPR to the Contractor Project Manager. A final version of the Excel document will also be sent.

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9821	1.2	QPR (FY19Q1)	12/15/18	n/a	No activity in FY19Q1	
9822	1.2	QPR (FY19Q2)	03/15/19	03/15/19		
9823	1.2	QPR (FY19Q3)	06/15/19	06/17/19		
9824	1.2	QPR (FY19Q4)	09/15/19	09/16/19	15th was Sunday.	
9825	1.2	QPR (FY20Q1)	12/15/19			
9826	1.2	QPR (FY20Q2)	03/15/20			
9827	1.2	QPR (FY20Q3)	06/15/20			
9828	1.2	QPR (FY20Q4)	09/15/20			
9829	1.3	Invoice (FY19Q1)	12/30/18	n/a	No activity in FY19Q1	
9830	1.3	Invoice (FY19Q2)	03/30/19	03/29/19	Unpaid - see narrative for details	
9831	1.3	Invoice (FY19Q3)	06/30/19	06/26/19	Unpaid - see narrative for details	
9832	1.3	Invoice (FY19Q4)	09/30/19	09/26/19		
9833	1.3	Invoice (FY20Q1)	12/31/19			
9834	1.3	Invoice (FY20Q2)	03/31/20			
9835	1.3	Invoice (FY20Q3)	06/30/20			
9836	1.3	Invoice (FY20Q4)__June	07/30/20			
9837	1.3	Invoice (FY20Q4)_July	08/30/20			
9838	1.3	Invoice (FY20Q4)Aug	11/15/20			
9840	1.4	Conference Call (FY19Q2)	01/15/19	n/a	No activity in FY19Q1	
9841	1.4	Conference Call (FY19Q3)	04/15/19	04/11/19		
9842	1.4	Conference Call (FY19Q4)	07/15/19	07/26/19	Call rescheduled from earlier date, notes sent to JJ on 7/30	
9843	1.4	Conference Call (FY20Q1)	10/15/19			
9844	1.4	Conference Call (FY20Q2)	01/15/20			
9845	1.4	Conference Call (FY20Q3)	04/15/20			
9846	1.4	Conference Call (FY20Q4)	07/15/20			
9839	1.4	Post-Award Mtg (Notes within 2 days of mtg)	10/05/18	10/22/18		
9847	1.5	EPA Coordination Mtg (Upon Request)	08/31/19	n/a	no meeting requested	
9848	1.6	Annual Report Article (If requested)	08/01/20			
9849	1.7	FY20 Annual Budget Update	10/01/19			
9850	2.1	QAPP Planning Mtg Notes	10/05/18	10/22/18		
9851	2.2	Draft QAPP	10/22/18	10/05/18		
9852	2.2	Final QAPP	01/15/19	02/21/19		
9853	2.4	1st QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	01/15/20		QAPP approved 6/7/2019	3/7/2020

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9854	2.4	2nd QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	01/15/21			3/7/2021
9870	3.1	Documentation of data compilation and review (In QPRs)	12/15/19		Data collection will conclude in 6/2020	9/15/2020
9871	3.2	Preliminary Pollutant Source Survey PowerPoint	06/01/20		Added 4 months to account for late start [1]	10/1/2020
9872	3.3	Draft Analysis of Historical Data Report	10/01/19		Postponed at contractor's request 7/26/19	
9873	3.3	Final Analysis of Historical Data Report	12/31/19		Postponed at contractor's request.	
9859	4	Sampling Station Location Requests, if necessary (before first sampling event)	04/26/19	02/19/19		
9855	4.1	Documentation of field monitoring readiness review (Before 1st sampling event)	05/15/19	05/20/19	Approved per JJ on 5/20	
9858	4.1	Field notes and instrument calibration sheets from first sampling event (Within 30 days of first sampling event)	05/15/19	07/29/19	Event dates - 6/24/19 to 6/26/19	7/29/2019
9857	4.1	Results of internal monitoring systems audit (within 30 days of audit completion)	08/31/19	07/29/19	Audit completed 8/1/19, sent to JJ same day	8/1/2019
9856	4.1	Scheduled date of internal monitoring systems audit	11/30/18	03/15/19	Date moved to 7/2020 monitoring event	
9860	4.2	Documentation of sampling events (in QPR)	11/30/21	09/15/19	Ongoing task - see narrative for details	
9861	4.3	SWQMIS Data Submission (FY19Q2)	12/15/19		moved forward 3 quarters	n/a
9862	4.3	SWQMIS Data Submission (FY19Q3)	12/15/2019		moved forward 2 quarters [2]	
9863	4.3	SWQMIS Data Submission (FY19Q4)	3/15/2020		[2]	
9864	4.3	SWQMIS Data Submission (FY20Q1)	6/15/2020		[2]	
9865	4.3	SWQMIS Data Submission (FY20Q2)	9/15/2020		[2]	
9866	4.3	SWQMIS Data Submission (FY20Q3)	12/15/2020		[2]	
9867	4.3	SWQMIS Data Submission (FY20Q4)	3/15/2021		[2]	

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date	
9868	4.4	Draft Data Collection Report	10/1/2020		[1]		
9869	4.4	Final Data Collection Report	12/1/2020		[1]		
9874	5.1	Public Participation Plan	6/1/2020		[1]		
9875	5.2	Educational and promotional materials (as developed)	2/28/2022		moved to project end date [3] - Ongoing task - see narrative for details		
9877	5.2	Project Website, mainted by Performing Party (as developed, updates documented in QPRs)	05/15/19	05/15/19	Ongoing task - see narrative for details		
9876	5.2	Stakeholder Database (Updated as needed)	04/01/19	08/01/19	[1] - See narrative for details	2/28/2022	Details? Show me sometime
9878	5.3	Technical Advisory Mtg (FY19Q2)	02/28/19	11/06/18			
9879	5.3	Technical Advisory Mtg (FY19Q3)	8/31/2019	08/13/19	See narrative for details		
9880	5.3	Technical Advisory Mtg (FY19Q4)	11/30/2019				
9881	5.3	Technical Advisory Mtg (FY20Q1)	2/29/2020				
9882	5.3	Technical Advisory Mtg (FY20Q2)	5/31/2020				
9883	5.3	Technical Advisory Mtg (FY20Q3)	8/31/2020				
9884	5.3	Technical Advisory Mtg (FY20Q4)	11/30/2020				
9885	5.4	Coordination Mtg (1 of 4)	02/28/19	02/28/19			
9886	5.4	Coordination Mtg (2 of 4)	08/31/19	08/31/19	Ongoing task - see narrative for details on meetings attended		
9887	5.4	Coordination Mtg (3 of 4)	02/29/20				
9888	5.4	Coordination Mtg (4 of 4)	08/31/20				
9889	6.1	Draft Final Report	10/1/2020		[1]		
9890	6.2	Final Report	12/1/2020		[1]		

Task/Issue	Additional Description of Quarterly Activities, Milestones, and Issues
1-Project Administration	Quarterly call held 7/26/19 (notes in ATTACHMENT A).
	Closing date for Phase II confirmed for 2/28/22.
	No-cost extension for Phase I to 2/28/22 in process with EPA.
	TRA has still not received payment for Q2 and Q3 expenses. Our billing/admin staff are currently in contact with Camille Laosebikan at TCEQ regarding the issue.
Training	No activity to report.
2-Quality Assurance	Discussions regarding use of electronic data sheets are on hold until similar requirements outlined in basin-wide QAPP for CRP are agreed upon and approved.
3-Analysis of Historical Data	
3.1 Documentation of data compilation and review (In QPRs)	Continued collecting spatial and literature data for the watershed characterization process, including data from TCEQ, TNRIS, USGS, and USDA.
3.2 Preliminary Pollutant Source Survey PowerPoint	No activity to report.
3.3 Draft Analysis of Historical Data Report	No activity to report.
4-Water Quality Data Collection	
	First event conducted 6/24/19 - 6/26/19. Routine parameters and sites collected. Significant amount of recent rain, resulting in high flows, which were especially notable at upstream sites within Walnut Creek. It is worth noting that access became difficult at WC-A and WC-B during these higher-than-normal flow conditions. (*Below right: looking downstream at WC-A on 6/24; Below left: upstream at MC-D on 6/26.)*  
	Second event conducted 7/22/19 - 7/24/19. Low-flow parameters and sites collected (same as routine). Walnut Creek sites maintaned moderate to minimal flow, Mountain Creek sites had minimal flow. Notable illegal dumping occuring at WC-A and MC-B sites, will continue to monitor activity. (*Below: Upstream at MC-D, for comparison to photo above.)* 

	Third event conducted 8/19/19 - 8/20/19. Routine parameters and sites collected. Lack of rain in recent weeks yielded dry conditions at many sites, prompting pool sampling at sites WC-A, WC-B, MC-A, MC-B, and MC-D. Where pools were too large to ascertain flow condition, USGS gages exist, and zero flow was confirmed. Minimal flow encountered at all other stream sites. Illegal dumping activity persisted at WC-A and MC-B sites. (*Below left: Dry conditions at WC-A; below right: illegal dumping at MC-B).*  
5-Public Participation	
5.1 Public Participation Plan	Updated with new municipal personnel from Grand Prairie and Cedar Hill.
5.2 Project Website	Project website live on 5/20, but having similar site visit tracking issues that were encountered with previous WPP project website. Will contact analytics website for more information.
5.2 Educational Materials	AR Sandbox is complete. Demonstrated to TRA's Board of Directors on 8/28/19. Coordinating with NCTCOG to schedule a 'traveling roadshow' to spread awareness and interest amongst municipal/school district staff in Fall 2019.
5.3 TAG Meetings	Provided short project update to Joe Pool Lake Advisory Committee on 8/13/19. Since the majority of members were present, data was not yet ready to present/discuss, and no TAG guidance was being sought, members agreed that this would serve as a short update for the TAG. Agreed to reconvene in late November to discuss the data collected so far (Agenda provided in ATTACHMENT B).
5.4 Community Meetings	Assisted with IGNITE program for Richardson ISD on 6/13/19. Instructed students about water pollution, and helped them construct a variety of natural and man-made water filters to discuss their effectiveness (Email correspondence in ATTACHMENT C).
	Manned booth at Girl Scout Water Camp on 6/14/19 (Email correspondence in ATTACHMENT C).
	Conducted mock biological sampling on 6/19/19 for students of the Vital Link program conducted through Fort Worth ISD (Agenda in ATTACHMENT C).
	Presented at NCTCOG Watershed Stakeholder meeting on 6/25/19, discussing optical brightener sampling for human influence (Agenda in ATTACHMENT C).
	Attended NCTCOG Public Education Task Force meeting on 7/17/19 (Agenda in ATTACHMENT C).
	Attended and presented at EPA 2019 Stormwater Conference in Denton, TX on 7/30 and 7/31. (Agenda in ATTACHMENT C).
	Presented at TX Watershed Coordinators Roundtable on 8/6/19 (Agenda in ATTACHMENT C).
6-Final Report	No activity to report.

Note: The purpose of this sheet is to provide for an ongoing discussion of tasks to document overall progress and to raise any overall issues that don't relate to specific deliverables.
Note: Please address activities and issues related to contract amendments, budget revisions, and other administrative matters under Task 1.

This tab is used for budget planning purposes. The TCEQ uses the information quarterly for program budget planning. It is important this form is completed to avoid rush requests from the TCEQ Project Manager.
Section I tracks the current budget by fiscal year. This information is from the Annual Budget Update. This is a high-level overview of planned spending for each year of the project. Changes to fiscal year estimates are noted in Section III. After the current QPR is approved the new fiscal year estimates should be moved from Section III to Section I.
Section II tracks the current fiscal year's invoicing. Include invoices that have been approved by TCEQ and estimates for upcoming invoices.
Section III tracks changes in the fiscal year budgets. Changes may be an increase or a decrease in spending from original estimate. After the current QPR is approved the new fiscal year estimates should be moved from Section III to Section I.

Section I: Current Budget by FY

	Match	Federal
FY19:	$43,194	$64,791
FY20:	$54,377	$81,565
FY21:	$15,763	$23,644
Total:	$113,333	$170,000

Section II: Current FY Quarterly Spending:

	Match	Federal	
Q1:	$0	$0	(project delayed)
Q2:	$4,151	$6,226	
Q3:	$11,426	$17,139	
Q4:	$17,248	$25,873	(estimated)
Total:	$32,825	$49,238	

Section III: Has the total budget for this fiscal year changed?	Yes

If so, provide new budget by fiscal year estimates and justification for the change in the table below.

New Budget by FY:

	Match	Federal	Justification
FY19:	$43,194	$64,791	Shift in start date from 9/1/18 to 1/9/19 delayed spending that will push some funding into 2021, resulting in lower spending overall in FY19. Total project budget remains unchanged.
FY20:			
FY21:			
Totals:			

Have any nonconformances occurred in the previous quarter? Yes/No	
Add any nonconformances and the corresponding corrective actions to the Corrective Action Status Table below. Nonconformances must be communicated to the NPS Project Manager immediately via email and a Corrective Action Plan submitted within 14 days of the nonconformance occurring.	

Corrective Action Status Table

Corrective Action #	Date Issued	Description of Deficiency	Action Taken	Date Closed

Please provide a listing of deliverables provided along with the QPR, and delete attachment references from prior quarters. Reference the "Deliverables Report" to get the Deliverable ID, Subtask #, and Deliverable Name.

Deliverable ID	Subtask #	Deliverable Name	Attachment File Name
9842	1.4	Q4 Quarterly Call Minutes	A - Q04 Quarterly Call Minutes-20190726.docx
9879	5.3	Joe Pool Lake WS Project Advisory Committee Meeting - Agenda	C-Urban Riparian Symposium February 27-March 1.pdf
9885	5.4	Community Meetings Packet (see narrative for details)	D-Scout Badge Day-20190302.pdf

Quarterly Progress Report

FY 20 Q1

Entity: Trinity River Authority

Contract No: 582-19-90205

Project Name: Joe Pool Lake Watershed Characterization

Date Submitted: 12/16/19

Signature pages have been removed from this document.

* The TCEQ Project Manager's signature indicates that the QPR is accepted as a project deliverable and also authorizes any changes in deliverable due dates requested in the Deliverables sheet. Approved due date changes should be inserted in the "Current Due Date" column in the next QPR.

1. When ready to submit the QPR to TCEQ, the Contractor Project Manager must date and sign the cover page with an electronic signature (i.e., scanned signature). Send the signed Excel document to the TCEQ Project Manager.

2. The TCEQ Project Manager will review and either: 1) Send back with comments or 2) approve, sign, date, and e-mail a scanned copy of the approved QPR to the Contractor Project Manager.

3. After addressing comments email the updated Excel document the TCEQ Project Manager, along with a new date next to the electronic signature.

4. The TCEQ Project Manager will sign, date, scan and send the approved QPR to the Contractor Project Manager. A final version of the Excel document will also be sent.

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9821	1.2	QPR (FY19Q1)	12/15/18	n/a	No activity in FY19Q1	
9822	1.2	QPR (FY19Q2)	03/15/19	03/15/19		
9823	1.2	QPR (FY19Q3)	06/15/19	06/17/19		
9824	1.2	QPR (FY19Q4)	09/15/19	09/16/19		
9825	1.2	QPR (FY20Q1)	12/15/19	12/16/19	12/15 was Sunday	
9826	1.2	QPR (FY20Q2)	03/15/20			
9827	1.2	QPR (FY20Q3)	06/15/20			
9828	1.2	QPR (FY20Q4)	09/15/20			
9829	1.3	Invoice (FY19Q1)	12/30/18	n/a	No activity in FY19Q1	
9830	1.3	Invoice (FY19Q2)	03/30/19	03/29/19		
9831	1.3	Invoice (FY19Q3)	06/30/19	06/26/19		
9832	1.3	Invoice (FY19Q4)	09/30/19	09/26/19		
9833	1.3	Invoice (FY20Q1)	12/31/19			
9834	1.3	Invoice (FY20Q2)	03/31/20			
9835	1.3	Invoice (FY20Q3)	06/30/20			
9836	1.3	Invoice (FY20Q4)__June	07/30/20			
9837	1.3	Invoice (FY20Q4)_July	08/30/20			
9838	1.3	Invoice (FY20Q4)Aug	11/15/20			
9840	1.4	Conference Call (FY19Q2)	01/15/19	n/a	No activity in FY19Q1	
9841	1.4	Conference Call (FY19Q3)	04/15/19	04/11/19		
9842	1.4	Conference Call (FY19Q4)	07/15/19	07/26/19		
9843	1.4	Conference Call (FY20Q1)	10/15/19	11/18/19	Notes sent 11/26/19	
9844	1.4	Conference Call (FY20Q2)	01/15/20			
9845	1.4	Conference Call (FY20Q3)	04/15/20			
9846	1.4	Conference Call (FY20Q4)	07/15/20			
9839	1.4	Post-Award Mtg (Notes within 2 days of mtg)	10/05/18	10/22/18		
9847	1.5	EPA Coordination Mtg (Upon Request)	08/31/19	n/a	no meeting requested	
9848	1.6	Annual Report Article (If requested)	08/01/20			

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9849	1.7	FY20 Annual Budget Update	10/01/19	11/04/19	See narrative for details	
9850	2.1	QAPP Planning Mtg Notes	10/05/18	10/22/18		
9851	2.2	Draft QAPP	10/22/18	10/05/18		
9852	2.2	Final QAPP	01/15/19	02/21/19		
9853	2.4	1st QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	03/07/20			
9854	2.4	2nd QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	03/07/21			
9870	3.1	Documentation of data compilation and review (In QPRs)	9/15/2020			
9871	3.2	Preliminary Pollutant Source Survey PowerPoint	10/01/20			
9872	3.3	Draft Analysis of Historical Data Report	10/1/2019	10/02/19	See narrative for details	
9873	3.3	Final Analysis of Historical Data Report	12/31/2019	12/03/19	See narrative for details	
9859	4	Sampling Station Location Requests, if necessary (before first sampling event)	04/26/19	02/19/19		
9855	4.1	Documentation of field monitoring readiness review (Before 1st sampling event)	05/15/19	05/20/19		
9858	4.1	Field notes and instrument calibration sheets from first sampling event (Within 30 days of first sampling event)	8/1/2019	07/29/19		

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9857	4.1	Results of internal monitoring systems audit (within 30 days of audit completion)	08/31/19	07/29/19		
9856	4.1	Scheduled date of internal monitoring systems audit	11/30/18	03/15/19		
9860	4.2	Documentation of sampling events (in QPR)	11/30/21	12/15/19	Ongoing task - see narrative for details	
9861	4.3	SWQMIS Data Submission (FY19Q2)	12/15/19		Still awaiting release of data from laboratory	n/a
9862	4.3	SWQMIS Data Submission (FY19Q3)	12/15/19		See note above	
9863	4.3	SWQMIS Data Submission (FY19Q4)	03/15/20			
9864	4.3	SWQMIS Data Submission (FY20Q1)	06/15/20			
9865	4.3	SWQMIS Data Submission (FY20Q2)	09/15/20			
9866	4.3	SWQMIS Data Submission (FY20Q3)	12/15/20			
9867	4.3	SWQMIS Data Submission (FY20Q4)	03/15/20			
9868	4.4	Draft Data Collection Report	10/01/20			
9869	4.4	Final Data Collection Report	12/01/20			
9874	5.1	Public Participation Plan	06/01/20			
9875	5.2	Educational and promotional materials (as developed)	02/28/22	12/15/19	Ongoing task - see narrative for details	
9877	5.2	Project Website, mainted by Performing Party (as developed, updates documented in QPRs)	02/28/22	12/15/19	Ongoing task - see narrative for details	
9876	5.2	Stakeholder Database (Updated as needed)	08/01/19	12/15/19	Ongoing task - see narrative for details	End of contract
9878	5.3	Technical Advisory Mtg (FY19Q2)	02/28/19	11/06/18		
9879	5.3	Technical Advisory Mtg (FY19Q3)	08/31/19	08/13/19		
9880	5.3	Technical Advisory Mtg (FY19Q4)	11/30/19	12/11/19	See narrative for details	
9881	5.3	Technical Advisory Mtg (FY20Q1)	02/29/20			
9882	5.3	Technical Advisory Mtg (FY20Q2)	05/31/20			

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9883	5.3	Technical Advisory Mtg (FY20Q3)	08/31/20			
9884	5.3	Technical Advisory Mtg (FY20Q4)	11/30/20			
9885	5.4	Coordination Mtg (1 of 4)	02/28/19	02/28/19		
9886	5.4	Coordination Mtg (2 of 4)	08/31/19	08/31/19		
9887	5.4	Coordination Mtg (3 of 4)	02/29/20	12/15/19	Ongoing task - see narrative for details on meetings attended	
9888	5.4	Coordination Mtg (4 of 4)	08/31/20			
9889	6.1	Draft Final Report	10/01/20			
9890	6.2	Final Report	12/01/20			

Task/Issue	Additional Description of Quarterly Activities, Milestones, and Issues
1-Project Administration	Quarterly call held 11/18/19 (notes in ATTACHMENT A).
	Closing date for Phase II confirmed for 2/28/22.
	No-cost extension for Phase I to 2/28/22 received, signed by TRA on 12/8, sent to TCEQ on 12/16.
	Payment received for Q2 and Q3 invoices.
Training	Attended stream restoration project construction training in Asheville, NC from 10/4-10/8 (Attachment D).
	Attended NPS Post-Award Workshop for JPL Phase II grant on 9/30 (ATTACHMENT D).
2-Quality Assurance	No further changes will be made to the QAPP regarding electronic data sheets at this time.
3-Analysis of Historical Data	
3.1 Documentation of data compilation and review (In QPRs)	Final Historical Data report accepted by TCEQ, will continue to compile data on potential pollutant sources in future QPRs.
3.2 Preliminary Pollutant Source Survey PowerPoint	No activity to report.
3.3 Draft Analysis of Historical Data Report	Sent draft report to TCEQ on 10/2. Received comments from JJ on 11/26, Returned revised report on 12/3.
3.3 Final Analysis of Historical Data Report	TCEQ accepted Draft report as Final on 12/3.
4-Water Quality Data Collection	
	Fourth event conducted 9/9/19 - 9/11/19. Low-flow parameters and sites collected (same as routine). Continued pattern of limited rainfall around sampling dates continues, several dry or pooled sites as a result. Difficult to capture flow-biased events, even with schedule flexibility. WC-B continues to be used for illegal dumping purposes. (*Below right: looking upstream at WC-A on 9/9; Below left: Downstream at WC-B on 9/9.)*  
	Fifth event conducted 10/14/19 - 10/16/19. Routine parameters and sites collected. Although Walnut Creek was dry at its A and B sites, there was measureable flow and elevated *E. coli* (324-1642 MPN/100 mL) at the downstream sites that warrants closer inspection. TRA staff has several prospective sources that will be researched in the coming months. Mountain Creek sites had minimal flow, also with several dry sites. *E. coli* was only slightly elevated (142 MPN/100 mL) at one site.

	Sixth event conducted 11/12/19, 11/14/19, and 11/19/19. Low-flow parameters and sites collected (same as routine). Pooled samples collected from several sites. Still awaiting release of laboratory data. (*Below left: Growing debris snag at footbridge in Katherine Rose Park, WC-C).* 
5-Public Participation	
5.1 Public Participation Plan (PPP)	Discussed stakeholder group structure at Tech Advisory Group (TAG) meeting on 12/11. Will begin adapting TAG's feedback into the first draft of the PPP.
Stakeholder Database	Proposal to move due date to end of contract to reflect ongoing task, per conversation on 10/2. This should've been done at project outset, most likely an oversight on TRA's end. TRA concurs w/ proposal to move. Latest update for contacts list sent to JJ on 10/24.
5.2 Project Website	TRA Communications has received no updates from contractor hired to migrate website to new content management system (CMS) will continue to do offline stress tests to discern whether new content is being posted to site.
5.2 Educational Materials	Developed slideshow incorporating technology (GIS/Photogrammetry/drones) into the water quality/quantity profession for presentation to a robotics club at TA Howard School Jr High School in Arlington.
5.3 TAG Meetings	Provided mid-term data collection update to TAG on 12/11/19. Also discussed 1) branding for WPP, 2) structure for the stakeholder group, as well as 3) in-process and upcoming grant opportunities (Agenda provided in ATTACHMENT B).
5.4 Community Meetings	Represented TRA at NRCS State Technical Advisory Meeting in Austin on 9/4-9/5 (ATTACHMENT C).
	Presented stream trailer demonstration at Arlington Water Festival on 9/14 (ATTACHMENT C).
	Presented AR Sandbox at NCTCOG's Upper Trinity River Basin Coordinating Committee meeting (Attachment C).
6-Final Report	No activity to report.

Note: The purpose of this sheet is to provide for an ongoing discussion of tasks to document overall progress and to raise any overall issues that don't relate to specific deliverables.
Note: Please address activities and issues related to contract amendments, budget revisions, and other administrative matters under Task 1.

This tab is used for budget planning purposes. The TCEQ uses the information quarterly for program budget planning. It is important this form is completed to avoid rush requests from the TCEQ Project Manager.
Section I tracks the current budget by fiscal year. This information is from the Annual Budget Update. This is a high-level overview of planned spending for each year of the project. Changes to fiscal year estimates are noted in Section III. After the current QPR is approved the new fiscal year estimates should be moved from Section III to Section I.
Section II tracks the current fiscal year's invoicing. Include invoices that have been approved by TCEQ and estimates for upcoming invoices.
Section III tracks changes in the fiscal year budgets. Changes may be an increase or a decrease in spending from original estimate. After the current QPR is approved the new fiscal year estimates should be moved from Section III to Section I.

Section I: Current Budget by FY

	Match	Federal
FY19:	$43,194	$64,791
FY20:	$54,377	$81,565
FY21:	$15,763	$23,644
Total:	$113,333	$170,000

Section II: Current FY Quarterly Spending:

	Match	Federal	
Q1:	$0	$0	(project delayed)
Q2:	$4,151	$6,226	
Q3:	$11,426	$17,139	
Q4:	$13,766	$20,650	(estimated)
Total:	$29,343	$44,015	

Section III: Has the total budget for this fiscal year changed?	Yes

If so, provide new budget by fiscal year estimates and justification for the change in the table below.

New Budget by FY:

	Match	Federal	Justification
FY19:	$43,194	$64,791	Shift in start date from 9/1/18 to 1/9/19 delayed spending that will push some funding into 2021, resulting in lower spending overall in FY19. Total project budget remains unchanged.
FY20:			
FY21:			
Totals:			

Have any nonconformances occurred in the previous quarter? Yes/No	
Add any nonconformances and the corresponding corrective actions to the Corrective Action Status Table below. Nonconformances must be communicated to the NPS Project Manager immediately via email and a Corrective Action Plan submitted within 14 days of the nonconformance occurring.	

Corrective Action Status Table

Corrective Action #	Date Issued	Description of Deficiency	Action Taken	Date Closed

Please provide a listing of deliverables provided along with the QPR, and delete attachment references from prior quarters. Reference the "Deliverables Report" to get the Deliverable ID, Subtask #, and Deliverable Name.

Deliverable ID	Subtask #	Deliverable Name	Attachment File Name
9842	1.4	FY20 Q1 Quarterly Call Minutes	A-Q01-2020 Quarterly Call Minutes-20191118.pdf
9879	5.3	Joe Pool Lake WPP-Tech Advisory Meeting Agenda	B-Agenda-20191211.pdf
9885	5.4	Community Meetings Packet (see narrative for details)	C-Community_Meetings.pdf
n/a	n/a	Training Meetings Packet	D-Training.pdf

Quarterly Progress Report

FY 20 Q2

Entity: Trinity River Authority

Contract No: 582-19-90205

Project Name: Joe Pool Lake Watershed Characterization

Date Submitted: 03/16/20

Signature pages have been removed from this document.

* The TCEQ Project Manager's signature indicates that the QPR is accepted as a project deliverable and also authorizes any changes in deliverable due dates requested in the Deliverables sheet. Approved due date changes should be inserted in the "Current Due Date" column in the next QPR.

1. When ready to submit the QPR to TCEQ, the Contractor Project Manager must date and sign the cover page with an electronic signature (i.e., scanned signature). Send the signed Excel document to the TCEQ Project Manager.

2. The TCEQ Project Manager will review and either: 1) Send back with comments or 2) approve, sign, date, and e-mail a scanned copy of the approved QPR to the Contractor Project Manager.

3. After addressing comments email the updated Excel document the TCEQ Project Manager, along with a new date next to the electronic signature.

4. The TCEQ Project Manager will sign, date, scan and send the approved QPR to the Contractor Project Manager. A final version of the Excel document will also be sent.

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9821	1.2	QPR (FY19Q1)	12/15/18	n/a	No activity in FY19Q1	
9822	1.2	QPR (FY19Q2)	03/15/19	03/15/19		
9823	1.2	QPR (FY19Q3)	06/15/19	06/17/19		
9824	1.2	QPR (FY19Q4)	09/15/19	09/16/19		
9825	1.2	QPR (FY20Q1)	12/15/19	12/16/19		
9826	1.2	QPR (FY20Q2)	03/15/20	03/16/20	3/15/20 was a Sunday	
9827	1.2	QPR (FY20Q3)	06/15/20			
9828	1.2	QPR (FY20Q4)	09/15/20			
9829	1.3	Invoice (FY19Q1)	12/30/18	n/a	No activity in FY19Q1	
9830	1.3	Invoice (FY19Q2)	03/30/19	03/29/19		
9831	1.3	Invoice (FY19Q3)	06/30/19	06/26/19		
9832	1.3	Invoice (FY19Q4)	09/30/19	09/26/19		
9833	1.3	Invoice (FY20Q1)	12/31/19	12/30/19		
9834	1.3	Invoice (FY20Q2)	03/31/20	04/06/20	resubmitted with BRR	
9835	1.3	Invoice (FY20Q3)	06/30/20			
9836	1.3	Invoice (FY20Q4)__June	07/30/20			
9837	1.3	Invoice (FY20Q4)_July	08/30/20			
9838	1.3	Invoice (FY20Q4)Aug	11/15/20			
9840	1.4	Conference Call (FY19Q2)	01/15/19	n/a		
9841	1.4	Conference Call (FY19Q3)	04/15/19	04/11/19		
9842	1.4	Conference Call (FY19Q4)	07/15/19	07/26/19		
9843	1.4	Conference Call (FY20Q1)	10/15/19	11/18/19		
9844	1.4	Conference Call (FY20Q2)	01/15/20	01/15/20		
9845	1.4	Conference Call (FY20Q3)	04/15/20	03/27/20	Awaiting notes 4/7	
9846	1.4	Conference Call (FY20Q4)	07/15/20			
9839	1.4	Post-Award Mtg (Notes within 2 days of mtg)	10/05/18	10/22/18		
9847	1.5	EPA Coordination Mtg (Upon Request)	08/31/19	n/a	no meeting requested	
9848	1.6	Annual Report Article (If requested)	08/01/20			

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9849	1.7	FY20 Annual Budget Update	10/01/19	11/04/19	See narrative for details	
9850	2.1	QAPP Planning Mtg Notes	10/05/18	10/22/18		
9851	2.2	Draft QAPP	10/22/18	10/05/18		
9852	2.2	Final QAPP	01/15/19	02/21/19		
9853	2.4	1st QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	03/07/20		Awaiting certification letter from TRA 4/7/20	
9854	2.4	2nd QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	03/07/21			
9870	3.1	Documentation of data compilation and review (In QPRs)	9/15/2020			
9871	3.2	Preliminary Pollutant Source Survey PowerPoint	10/01/20			
9872	3.3	Draft Analysis of Historical Data Report	10/1/2019	10/02/19	See narrative for details	
9873	3.3	Final Analysis of Historical Data Report	12/31/2019	12/03/19	See narrative for details	
9859	4	Sampling Station Location Requests, if necessary (before first sampling event)	04/26/19	02/19/19		
9855	4.1	Documentation of field monitoring readiness review (Before 1st sampling event)	05/15/19	05/20/19		
9858	4.1	Field notes and instrument calibration sheets from first sampling event (Within 30 days of first sampling event)	8/1/2019	07/29/19		

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9857	4.1	Results of internal monitoring systems audit (within 30 days of audit completion)	08/31/19	07/29/19		
9856	4.1	Scheduled date of internal monitoring systems audit	11/30/18	03/15/19		
9860	4.2	Documentation of sampling events (in QPR)	11/30/21	12/15/19	Ongoing task - see narrative for details	
9861	4.3	SWQMIS Data Submission (FY19Q2)	NA	delayed	Still awaiting release of data from laboratory	
9862	4.3	SWQMIS Data Submission (FY19Q3)	NA	delayed	See note above	
9863	4.3	SWQMIS Data Submission (FY19Q4)	03/15/20	01/29/20		
9864	4.3	SWQMIS Data Submission (FY20Q1)	06/15/20			
9865	4.3	SWQMIS Data Submission (FY20Q2)	09/15/20			
9866	4.3	SWQMIS Data Submission (FY20Q3)	12/15/20			
9867	4.3	SWQMIS Data Submission (FY20Q4)	03/15/20			
9868	4.4	Draft Data Collection Report	10/01/20			
9869	4.4	Final Data Collection Report	12/01/20			
9874	5.1	Public Participation Plan	06/01/20			
9875	5.2	Educational and promotional materials (as developed)	02/28/22	12/15/19	Ongoing task - see narrative for details	
9877	5.2	Project Website, mainted by Performing Party (as developed, updates documented in QPRs)	02/28/22	12/15/19	Ongoing task - see narrative for details	
9876	5.2	Stakeholder Database (Updated as needed)	08/01/19	03/13/20	Ongoing task - see narrative for details	End of contract
9878	5.3	Technical Advisory Mtg (FY19Q2)	02/28/19	11/06/18		
9879	5.3	Technical Advisory Mtg (FY19Q3)	08/31/19	08/13/19		
9880	5.3	Technical Advisory Mtg (FY19Q4)	11/30/19	12/11/19	See narrative for details	
9881	5.3	Technical Advisory Mtg (FY20Q1)	02/29/20	2/11/20???		
9882	5.3	Technical Advisory Mtg (FY20Q2)	05/31/20			

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ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9883	5.3	Technical Advisory Mtg (FY20Q3)	08/31/20			
9884	5.3	Technical Advisory Mtg (FY20Q4)	11/30/20			
9885	5.4	Coordination Mtg (1 of 4)	02/28/19	02/28/19		
9886	5.4	Coordination Mtg (2 of 4)	08/31/19	08/31/19		
9887	5.4	Coordination Mtg (3 of 4)	02/29/20	12/15/19	Ongoing task - see narrative for details on meetings attended	
9888	5.4	Coordination Mtg (4 of 4)	08/31/20			
9889	6.1	Draft Final Report	10/01/20			
9890	6.2	Final Report	12/01/20			

Task/Issue	Additional Description of Quarterly Activities, Milestones, and Issues
1-Project Administration	Quarterly call held 1/15/20 (notes in ATTACHMENT A).
Training	No activity to report.
2-Quality Assurance	No activity to report.
3-Analysis of Historical Data	
3.1 Documentation of data compilation and review (In QPRs)	No activity to report.
3.2 Preliminary Pollutant Source Survey PowerPoint	No activity to report.
3.3 Draft Analysis of Historical Data Report	Task complete.
3.3 Final Analysis of Historical Data Report	Task complete.
4-Water Quality Data Collection	
	Seventh event conducted 12/16/19 - 12/18/19. Routine parameters and sites collected. Continued pattern of limited rainfall around sampling dates continues, several dry or pooled sites as a result. Significant illegal dumping occurred at Hollings Branch site since last sampling event. Riparian zone was cleared at Mountain Creek @ US-287 site. (*Below left: illegal dumping at MC-D; Below right: Riparian vegetation cleared at MC-B, both on 12/17.)*  
	Eighth event conducted 1/21/20 - 1/23/20. High-flow and routine parameters and sites collected. Despite raining before and during event, most upstream Walnut Creek site remained dry. Flow present at all sites on Mountain Creek. Continued illegal dumping at Mountain Creek @ SH-157 bridge. Also noted an illicit discharge near Lynn Creek site. Alerted Arlington Code Enforcement, and they noted that they will begin discussions w/ landowner *(Below left: Chronic illegal dumping at MC-A Below right: PVC sewage pipe discharging to Lynn Creek (MC-ET).)*  

	Ninth event conducted 2/3/20 - 2/4/20. Routine parameters and sites collected. Failure of bank stabilization rip-rap on northern bank of Walnut Creek at Retta Road has accelerated the accretion in the northernmost concrete box culvert. Heavy debris snag continues to grow in front of other three box culverts, and the concrete shelf on the downstream side of bridge has collapsed. (*Below left: failure of bank stabilization at WC-B, Below right: Growing debris snag at same site.)*  
5-Public Participation	
5.1 Public Participation Plan (PPP)	Finalized group structure at TAG meeting on 2/27/20.
Stakeholder Database	Added new contacts for Dogwood Audubon Society, Cedar Hill State Park, and several updates to municipal staff.
5.2 Project Website	Met with TRA Communications staff to ensure that content can be posted to website during transition of new watershed coordinator.
5.2 Educational Materials	Developed slideshow incorporating technology (GIS/Photogrammetry/drones) into the water quality/quantity profession for presentation to a robotics club at TA Howard School Jr High School in Arlington.
5.3 TAG Meetings	Provided mid-term data collection update to TAG on 2/27/20. Also discussed 1) branding for WPP, 2) finalized structure for the stakeholder group (Agenda provided in ATTACHMENT B).
5.4 Community Meetings	Presented at Youth Robotics Club meeting on 12/12/19 (covered in previous QPR)
	Presented AR Sandbox at Youth Future Cities competition at UT-Arlington on 1/25/20 (ATTCHMENT C).
	Attended NCTCOG Public Education Task Force meeting on 1/29/20 (ATTACHMENT C).
	Attended NCTCOG Upper Trinity River Basin Coordinating Committee meeting on 2/11/20 (ATTACHMENT C).
6-Final Report	No activity to report.

Note: The purpose of this sheet is to provide for an ongoing discussion of tasks to document overall progress and to raise any overall issues that don't relate to specific deliverables.
Note: Please address activities and issues related to contract amendments, budget revisions, and other administrative matters under Task 1.

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Section III tracks changes in the fiscal year budgets. Changes may be an increase or a decrease in spending from original estimate. After the current QPR is approved the new fiscal year estimates should be moved from Section III to Section I.

Section I: Current Budget by FY

	Match	Federal
FY19:	$29,343	$44,015
FY20:	$54,741	$82,112
FY21:	$29,249	$43,873
Total:	$113,333	$170,000

Section II: Current FY Quarterly Spending:

	Match	Federal	
Q1:	$17,428	$26,142	
Q2:	$11,219	$16,829	(actuals)
Q3:			
Q4:			
Total:	$28,647	$42,970	

Section III: Has the total budget for this fiscal year changed?	Yes

If so, provide new budget by fiscal year estimates and justification for the change in the table below.

New Budget by FY:

	Match	Federal	Justification
FY19:	$29,343	$44,015	Shift in start date from 9/1/18 to 1/9/19 delayed spending that will push some funding into 2021, resulting in lower spending overall in FY19. Total project budget remains unchanged.
FY20:	$54,741	$82,112	Aborbed some costs from FY19, rest will need to be pushed to FY21 or returned to TCEQ.
FY21:			
Totals:			

Have any nonconformances occurred in the previous quarter? Yes/No	
Add any nonconformances and the corresponding corrective actions to the Corrective Action Status Table below. Nonconformances must be communicated to the NPS Project Manager immediately via email and a Corrective Action Plan submitted within 14 days of the nonconformance occurring.	

Corrective Action Status Table

Corrective Action #	Date Issued	Description of Deficiency	Action Taken	Date Closed

Please provide a listing of deliverables provided along with the QPR, and delete attachment references from prior quarters. Reference the "Deliverables Report" to get the Deliverable ID, Subtask #, and Deliverable Name.

Deliverable ID	Subtask #	Deliverable Name	Attachment File Name
9842	1.4	FY20 Q2 Quarterly Call Minutes	A-2020-Q02 Quarterly Call Minutes-20200115.pdf
9879	5.3	Joe Pool Lake WPP-Tech Advisory Meeting Minutes	B-JPLWPP Meetings Notes-20200227.pdf
9885	5.4	Community Meetings Packet (see narrative for details)	C-Community_Meetings.pdf

Quarterly Progress Report

FY 20 Q3

Entity: Trinity River Authority

Contract No: 582-19-90205

Project Name: Joe Pool Lake Watershed Characterization

Date Submitted: 06/15/20

Signature pages have been removed from this document.

* The TCEQ Project Manager's signature indicates that the QPR is accepted as a project deliverable and also authorizes any changes in deliverable due dates requested in the Deliverables sheet. Approved due date changes should be inserted in the "Current Due Date" column in the next QPR.

1. When ready to submit the QPR to TCEQ, the Contractor Project Manager must date and sign the cover page with an electronic signature (i.e., scanned signature). Send the signed Excel document to the TCEQ Project Manager.

2. The TCEQ Project Manager will review and either: 1) Send back with comments or 2) approve, sign, date, and e-mail a scanned copy of the approved QPR to the Contractor Project Manager.

3. After addressing comments email the updated Excel document the TCEQ Project Manager, along with a new date next to the electronic signature.

4. The TCEQ Project Manager will sign, date, scan and send the approved QPR to the Contractor Project Manager. A final version of the Excel document will also be sent.

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9821	1.2	QPR (FY19Q1)	12/15/18	n/a	No activity in FY19Q1	
9822	1.2	QPR (FY19Q2)	03/15/19	03/15/19		
9823	1.2	QPR (FY19Q3)	06/15/19	06/17/19		
9824	1.2	QPR (FY19Q4)	09/15/19	09/16/19		
9825	1.2	QPR (FY20Q1)	12/15/19	12/16/19		
9826	1.2	QPR (FY20Q2)	03/15/20	03/16/20	3/15/20 was a Sunday	
9827	1.2	QPR (FY20Q3)	06/15/20	06/15/20		
9828	1.2	QPR (FY20Q4)	09/15/20			
9829	1.3	Invoice (FY19Q1)	12/30/18	n/a	No activity in FY19Q1	
9830	1.3	Invoice (FY19Q2)	03/30/19	03/29/19		
9831	1.3	Invoice (FY19Q3)	06/30/19	06/26/19		
9832	1.3	Invoice (FY19Q4)	09/30/19	09/26/19		
9833	1.3	Invoice (FY20Q1)	12/31/19	12/30/19		
9834	1.3	Invoice (FY20Q2)	03/31/20	03/20/20		
9835	1.3	Invoice (FY20Q3)	06/30/20	06/18/20		
		Invoice (FY20Q4)Aug				9/30/2020
		Invoice (FY21Q1)				12/31/2020
		Invoice (FY21Q2)				3/31/2021
9836	1.3	Invoice (FY22Q1)__	07/30/20			1/31/2022
9837	1.3	Invoice (FY20Q2)_July	08/30/20			2/28/2022
9838	1.3	Invoice (FY20Q2)Aug	11/15/20			4/15/2022
9840	1.4	Conference Call (FY19Q2)	01/15/19	n/a		
9841	1.4	Conference Call (FY19Q3)	04/15/19	04/11/19		
9842	1.4	Conference Call (FY19Q4)	07/15/19	07/26/19		
9843	1.4	Conference Call (FY20Q1)	10/15/19	11/18/19		
9844	1.4	Conference Call (FY20Q2)	01/15/20	01/15/20		
9845	1.4	Conference Call (FY20Q3)	04/15/20	03/27/20		
9846	1.4	Conference Call (FY20Q4)	07/15/20	07/02/20		
9839	1.4	Post-Award Mtg (Notes within 2 days of mtg)	10/05/18	10/22/18		

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9847	1.5	EPA Coordination Mtg (Upon Request)	08/31/19	n/a	no meeting requested	
9848	1.6	Annual Report Article (If requested)	08/01/20			
9849	1.7	FY20 Annual Budget Update	10/01/19	11/04/19	See narrative for details	
9850	2.1	QAPP Planning Mtg Notes	10/05/18	10/22/18		
9851	2.2	Draft QAPP	10/22/18	10/05/18		
9852	2.2	Final QAPP	01/15/19	02/21/19		
9853	2.4	1st QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	03/07/20	04/23/20	No changes to QAPP requested by TRA.	
9854	2.4	2nd QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	03/07/21			
9870	3.1	Documentation of data compilation and review (In QPRs)	9/15/2020			
9871	3.2	Preliminary Pollutant Source Survey PowerPoint	10/01/20			
9872	3.3	Draft Analysis of Historical Data Report	10/1/2019	10/02/19	See narrative for details	
9873	3.3	Final Analysis of Historical Data Report	12/31/2019	12/03/19	See narrative for details	
9859	4	Sampling Station Location Requests, if necessary (before first sampling event)	04/26/19	02/19/19		
9855	4.1	Documentation of field monitoring readiness review (Before 1st sampling event)	05/15/19	05/20/19		
9858	4.1	Field notes and instrument calibration sheets from first sampling event (Within 30 days of first sampling event)	8/1/2019	07/29/19		

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9857	4.1	Results of internal monitoring systems audit (within 30 days of audit completion)	08/31/19	07/29/19		
9856	4.1	Scheduled date of internal monitoring systems audit	11/30/18	03/15/19		
9860	4.2	Documentation of sampling events (in QPR)	11/30/21	12/15/19	Ongoing task - see narrative for details	
9861	4.3	SWQMIS Data Submission (FY19Q2)	12/15/19	NA	Still awaiting release of data from laboratory	n/a
9862	4.3	SWQMIS Data Submission (FY19Q3)	12/15/19	NA	See note above	
9863	4.3	SWQMIS Data Submission (FY19Q4)	03/15/20	01/29/20		
9864	4.3	SWQMIS Data Submission (FY20Q1)	06/15/20	NA	Still awaiting release of data from laboratory. Anticipate that remaining data will be submitted in the next quarter.	
9865	4.3	SWQMIS Data Submission (FY20Q2)	09/15/20	08/07/20		
9866	4.3	SWQMIS Data Submission (FY20Q3)	12/15/20	08/07/20		
9867	4.3	SWQMIS Data Submission (FY20Q4)	03/15/20			not needed
9868	4.4	Draft Data Collection Report	10/01/20			
9869	4.4	Final Data Collection Report	12/01/20			
9874	5.1	Public Participation Plan	06/01/20	06/01/20	draft submitted via email	
9875	5.2	Educational and promotional materials (as developed)	02/28/22	06/01/20	Ongoing task - see narrative for details	
9877	5.2	Project Website, mainted by Performing Party (as developed, updates documented in QPRs)	02/28/22	05/21/20	Ongoing task - see narrative for details	
9876	5.2	Stakeholder Database (Updated as needed)	08/01/19	03/13/20	Ongoing task - see narrative for details	End of contract
9878	5.3	Technical Advisory Mtg (FY19Q2)	02/28/19	11/06/18		
9879	5.3	Technical Advisory Mtg (FY19Q3)	08/31/19	08/13/19		
9880	5.3	Technical Advisory Mtg (FY19Q4)	11/30/19	12/11/19	See narrative for details	
9881	5.3	Technical Advisory Mtg (FY20Q1)	02/29/20	02/27/20		

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9882	5.3	Technical Advisory Mtg (FY20Q2)	05/31/20	05/28/20		
9883	5.3	Technical Advisory Mtg (FY20Q3)	08/31/20			
9884	5.3	Technical Advisory Mtg (FY20Q4)	11/30/20			
9885	5.4	Coordination Mtg (1 of 4)	02/28/19	02/28/19		
9886	5.4	Coordination Mtg (2 of 4)	08/31/19	08/31/19		
9887	5.4	Coordination Mtg (3 of 4)	02/29/20	12/15/19	Ongoing task - see narrative for details on meetings attended	
9888	5.4	Coordination Mtg (4 of 4)	08/31/20			
9889	6.1	Draft Final Report	10/01/20			
9890	6.2	Final Report	12/01/20			

Task/Issue	Additional Description of Quarterly Activities, Milestones, and Issues
1-Project Administration	Quarterly call held 3/27/20 (notes in ATTACHMENT A).
Training	No activity to report.
2-Quality Assurance	No activity to report.
3-Analysis of Historical Data	Approved with FY19Q2 QPR; continued collecting spatial and temporal - 03/28/2019; 7/26/2019; 08/1/2019; FY20Q1 - will continue to collect potential pollutant sources in QPRs
3.1 Documentation of data compilation and review (In QPRs)	No activity to report. Task Complete
3.2 Preliminary Pollutant Source Survey PowerPoint	No activity to report.
3.3 Draft Analysis of Historical Data Report	Task complete.
3.3 Final Analysis of Historical Data Report	Task complete.
4-Water Quality Data Collection	
	Tenth event conducted 02/10/2020. Routine parameters and lake sites collected.
	Eleventh event conducted 03/11/20 - 03/17/20. High-flow and routine parameters and all sites collected.

	Twelfth event conducted 04/13/20 - 04/30/20. High-flow and routine parameters and all sites collected. (*Below left: April 28th, Site 22135 Site Below right: April 28th, Site 22137.)*  
5-Public Participation	
5.1 Public Participation Plan (PPP)	Draft submitted 6/1/2020
Stakeholder Database	No activity to report.
5.2 Project Website	Updated website to reflect new watershed coordinator.
5.2 Educational Materials	Developed JPL Fact Sheet and was submitted with draft PPP 06/01/2020. Conducted imagery scouting for JPL Fact Sheet on 5/21/2020
5.3 TAG Meetings	Provided data collection update to TAG on 5/28/20. Also discussed 1) branding for WPP, 2)Public Participation Plan, 3) Texas Watershed Steward Workshop (ATTACHMENT B).
5.4 Community Meetings	Attended NCTCOG Public Education Task Force meeting on 5/6/20 (ATTACHMENT C).
6-Final Report	No activity to report.

Note: The purpose of this sheet is to provide for an ongoing discussion of tasks to document overall progress and to raise any overall issues that don't relate to specific deliverables.
Note: Please address activities and issues related to contract amendments, budget revisions, and other administrative matters under Task 1.

This tab is used for budget planning purposes. The TCEQ uses the information quarterly for program budget planning. It is important this form is completed to avoid rush requests from the TCEQ Project Manager.
Section I tracks the current budget by fiscal year. This information is from the Annual Budget Update. This is a high-level overview of planned spending for each year of the project. Changes to fiscal year estimates are noted in Section III. After the current QPR is approved the new fiscal year estimates should be moved from Section III to Section I.
Section II tracks the current fiscal year's invoicing. Include invoices that have been approved by TCEQ and estimates for upcoming invoices.
Section III tracks changes in the fiscal year budgets. Changes may be an increase or a decrease in spending from original estimate. After the current QPR is approved the new fiscal year estimates should be moved from Section III to Section I.

Section I: Current Budget by FY

	Match	Federal
FY19:	$29,343	$44,015
FY20:	$54,741	$82,112
FY21:	$29,249	$43,873
Total:	$113,333	$170,000

Section II: Current FY Quarterly Spending:

	Match	Federal	
Q1:	$17,428	$26,142	
Q2:	$11,219	$16,829	
Q3:	$12,843	$19,264	(actuals)
Q4:			
Total:	$41,490	$62,234	

Section III: Has the total budget for this fiscal year changed?	No

If so, provide new budget by fiscal year estimates and justification for the change in the table below.

New Budget by FY:

	Match	Federal	Justification
FY19:			
FY20:			
FY21:			
Totals:			

Have any nonconformances occurred in the previous quarter? Yes/No	
Add any nonconformances and the corresponding corrective actions to the Corrective Action Status Table below. Nonconformances must be communicated to the NPS Project Manager immediately via email and a Corrective Action Plan submitted within 14 days of the nonconformance occurring.	

Corrective Action Status Table

Corrective Action #	Date Issued	Description of Deficiency	Action Taken	Date Closed

Please provide a listing of deliverables provided along with the QPR, and delete attachment references from prior quarters. Reference the "Deliverables Report" to get the Deliverable ID, Subtask #, and Deliverable Name.

Deliverable ID	Subtask #	Deliverable Name	Attachment File Name
9842	1.4	FY20 Q3 Quarterly Call Minutes	A-2020-Q03 P2 & Q6 P1 Quarterly Call Minutes - 20200327.pdf
9879	5.3	Joe Pool Lake WPP-Tech Advisory Meeting Minutes	B-JPLWPP Meetings Notes-20200528.pdf
9885	5.4	Community Meetings Packet (see narrative for details)	C-Community_Meetings.pdf

Quarterly Progress Report

FY 20 Q4

Entity: Trinity River Authority

Contract No: 582-19-90205

Project Name: Joe Pool Lake Watershed Characterization

Date Submitted: 09/11/20

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* The TCEQ Project Manager's signature indicates that the QPR is accepted as a project deliverable and also authorizes any changes in deliverable due dates requested in the Deliverables sheet. Approved due date changes should be inserted in the "Current Due Date" column in the next QPR.

1. When ready to submit the QPR to TCEQ, the Contractor Project Manager must date and sign the cover page with an electronic signature (i.e., scanned signature). Send the signed Excel document to the TCEQ Project Manager.

2. The TCEQ Project Manager will review and either: 1) Send back with comments or 2) approve, sign, date, and e-mail a scanned copy of the approved QPR to the Contractor Project Manager.

3. After addressing comments email the updated Excel document the TCEQ Project Manager, along with a new date next to the electronic signature.

4. The TCEQ Project Manager will sign, date, scan and send the approved QPR to the Contractor Project Manager. A final version of the Excel document will also be sent.

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9821	1.2	QPR (FY19Q1)	12/15/18	n/a	No activity in FY19Q1	
9822	1.2	QPR (FY19Q2)	03/15/19	03/15/19		
9823	1.2	QPR (FY19Q3)	06/15/19	06/17/19		
9824	1.2	QPR (FY19Q4)	09/15/19	09/16/19		
9825	1.2	QPR (FY20Q1)	12/15/19	12/16/19		
9826	1.2	QPR (FY20Q2)	03/15/20	03/16/20	3/15/20 was a Sunday	
9827	1.2	QPR (FY20Q3)	06/15/20	06/15/20		
9828	1.2	QPR (FY20Q4)	09/15/20	09/11/20		
	1.2	QPR (FY21Q1)	12/15/20		need additional w/contract extension	
9829	1.3	Invoice (FY19Q1)	12/30/18	n/a	No activity in FY19Q1	
9830	1.3	Invoice (FY19Q2)	03/30/19	03/29/19		
9831	1.3	Invoice (FY19Q3)	06/30/19	06/26/19		
9832	1.3	Invoice (FY19Q4)	09/30/19	09/26/19		
9833	1.3	Invoice (FY20Q1)	12/31/19	12/30/19		
9834	1.3	Invoice (FY20Q2)	03/31/20	03/20/20		
9835	1.3	Invoice (FY20Q3)	06/30/20	06/18/20		
		Invoice (FY20Q4)	09/30/20	09/30/20		
		Invoice (FY21Q1)	12/31/2020			
		Invoice (FY21Q2)	3/31/2021			
9836	1.3	Invoice (FY22Q1)__	1/31/2022			
9837	1.3	Invoice (FY20Q2)_July	2/28/2022			
9838	1.3	Invoice (FY20Q2)Aug	4/15/2022			
9840	1.4	Conference Call (FY19Q2)	01/15/19	n/a		
9841	1.4	Conference Call (FY19Q3)	04/15/19	04/11/19		
9842	1.4	Conference Call (FY19Q4)	07/15/19	07/26/19		
9843	1.4	Conference Call (FY20Q1)	10/15/19	11/18/19		
9844	1.4	Conference Call (FY20Q2)	01/15/20	01/15/20		
9845	1.4	Conference Call (FY20Q3)	04/15/20	03/27/20		
9846	1.4	Conference Call (FY20Q4)	07/15/20	07/02/20		
	1.4	Conference Call (FY21Q1)	10/15/2020	10/15/20		

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9839	1.4	Post-Award Mtg (Notes within 2 days of mtg)	10/05/18	10/22/18		
9847	1.5	EPA Coordination Mtg (Upon Request)	08/31/19	n/a	no meeting requested	
9848	1.6	Annual Report Article (If requested)	02/28/22			
9849	1.7	FY20 Annual Budget Update	10/01/19	11/04/19	See narrative for details	
9850	2.1	QAPP Planning Mtg Notes	10/05/18	10/22/18		
9851	2.2	Draft QAPP	10/22/18	10/05/18		
9852	2.2	Final QAPP	01/15/19	02/21/19		
9853	2.4	1st QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	03/07/20	04/23/20	No changes to QAPP requested by TRA.	
9854	2.4	2nd QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	03/07/21			
9870	3.1	Documentation of data compilation and review (In QPRs)	9/15/2020	09/15/20	See narrative for details	
9871	3.2	Preliminary Pollutant Source Survey PowerPoint	10/01/20			new?
9872	3.3	Draft Analysis of Historical Data Report	10/1/2019	10/02/19	See narrative for details	
9873	3.3	Final Analysis of Historical Data Report	12/31/2019	12/03/19	See narrative for details	
9859	4	Sampling Station Location Requests, if necessary (before first sampling event)	04/26/19	02/19/19		
9855	4.1	Documentation of field monitoring readiness review (Before 1st sampling event)	05/15/19	05/20/19		

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9858	4.1	Field notes and instrument calibration sheets from first sampling event (Within 30 days of first sampling event)	8/1/2019	07/29/19		
9857	4.1	Results of internal monitoring systems audit (within 30 days of audit completion)	08/31/19	07/29/19		
9856	4.1	Scheduled date of internal monitoring systems audit	11/30/18	03/15/19		
9860	4.2	Documentation of sampling events (in QPR)	11/30/21	06/15/20	Ongoing task now complete	
9861	4.3	SWQMIS Data Submission (FY19Q2)	12/15/19	NA	Still awaiting release of data from laboratory	n/a
9862	4.3	SWQMIS Data Submission (FY19Q3)	12/15/19	NA	See note above	
9863	4.3	SWQMIS Data Submission (FY19Q4)	03/15/20	01/29/20		
9864	4.3	SWQMIS Data Submission (FY20Q1)	06/15/20	NA	Still awaiting release of data from laboratory. Anticipate that remaining data will be submitted in the next quarter.	
9865	4.3	SWQMIS Data Submission (FY20Q2)	09/15/20	08/07/20		
9866	4.3	SWQMIS Data Submission (FY20Q3)	12/15/20	08/07/20		
9867	4.3	SWQMIS Data Submission (FY20Q4)	extraneous			
9868	4.4	Draft Data Collection Report	10/01/20	10/01/20		
9869	4.4	Final Data Collection Report	12/01/20			
9874	5.1	Public Participation Plan	06/01/20	08/18/20		
9875	5.2	Educational and promotional materials (as developed)	02/28/22	06/01/20	Ongoing task - see narrative for details	
9877	5.2	Project Website, mainted by Performing Party (as developed, updates documented in QPRs)	02/28/22	05/21/20	Ongoing task - see narrative for details	
9876	5.2	Stakeholder Database (Updated as needed)	08/01/19	03/13/20	Ongoing task - see narrative for details	End of contract

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9878	5.3	Technical Advisory Mtg (FY19Q2)	02/28/19	11/06/18		
9879	5.3	Technical Advisory Mtg (FY19Q3)	08/31/19	08/13/19		
9880	5.3	Technical Advisory Mtg (FY19Q4)	11/30/19	12/11/19		
9881	5.3	Technical Advisory Mtg (FY20Q1)	02/29/20	02/27/20		
9882	5.3	Technical Advisory Mtg (FY20Q2)	05/31/20	05/28/20		
9883	5.3	Technical Advisory Mtg (FY20Q3)	08/31/20	08/27/20	See narrative for details	
9884	5.3	Technical Advisory Mtg (FY20Q4)	11/30/20		planned for 10/22/20	
9885	5.4	Coordination Mtg (1 of 4)	02/28/19	02/28/19		
9886	5.4	Coordination Mtg (2 of 4)	08/31/19	08/31/19		
9887	5.4	Coordination Mtg (3 of 4)	02/29/20	12/15/19		
9888	5.4	Coordination Mtg (4 of 4)	08/31/20	08/31/20	Ongoing task - see narrative for details on meetings attended	
9889	6.1	Draft Final Report	11/01/20			new?
9890	6.2	Final Report	01/01/20			new?

Task/Issue	Additional Description of Quarterly Activities, Milestones, and Issues
1-Project Administration	Quarterly call held 7/2/20 (notes in ATTACHMENT A).
Training	No activity to report.
Invoice	Anticipate sending close out invoice in March 2021, FY21Q2
2-Quality Assurance	No activity to report.
3-Analysis of Historical Data	
3.1 Documentation of data compilation and review (In QPRs)	Task Complete. FY19Q2 QPR approved 3/28/2019: Began collecting spatial and literature data for the watershed characterization process, including data from TCEQ, TNRIS, USGS, and USDA. FY19Q3 approved 7/26/2019: continued collecting spatial and literature data. FY19Q4 approved 10/01/2019: continued collecting spatial and literature data. FY20Q1 approved: Final Historical Data report accepted by TCEQ on 12/3/2019.
3.2 Preliminary Pollutant Source Survey PowerPoint	No activity to report.
3.3 Draft Analysis of Historical Data Report	Task complete.
3.3 Final Analysis of Historical Data Report	Task complete.
4-Water Quality Data Collection	
4.1 Water Quaity Monitoring Assessment Requirements	Task complete.
4.2 Water Quality Monitoring	Task complete.
4.3 Water Quality Data Submission	Task complete.
5-Public Participation	
5.1 Public Participation Plan (PPP)	Final submitted 8/18/2020
Stakeholder Database	No activity to report.
5.2 Project Website	No activity to report.
5.2 Educational Materials	Final JPL Fact Sheet was submitted with final PPP 08/18/2020.
5.3 TAG Meetings	Provided data collection update to TAG on 8/27/20. Also discussed 1)Texas Watershed Steward Workshop, 2)Kick-off Stakeholder Meeting (ATTACHMENT B).
5.4 Community Meetings	Attended NCTCOG Greater Trinity River Bacteria TMDL Implementation Plan Coordination Committee meeting on 6/30/2020, NCTCOG Pollution Prevention Task Force meeting on 7/1/2020, NCTCOG Public Education Task Force meeting on 7/15/20, NRCS Source Water Protection meeting on 7/21/2020 (ATTACHMENT C).

6-Final Report	No activity to report.

Note: The purpose of this sheet is to provide for an ongoing discussion of tasks to document overall progress and to raise any overall issues that don't relate to specific deliverables.
Note: Please address activities and issues related to contract amendments, budget revisions, and other administrative matters under Task 1.

TCEQ uses this information for budget planning. It is important this form is completed to avoid rush requests from the TCEQ Project Manager.

Section I: Current Budget by FY			
	Federal		
	TCEQ encumbered	Contractor *Estimate*	FY Paid Amount
FY19:	$66,889	$44,015	$44,014.47
FY20:	$85,000	$82,112	$76,591.35
FY21:	$18,000	$19,800	
Total:	$169,889	$145,927	$120,606

Section II: Current FY Spending:		
Federal		
FY21	*Estimated*	Paid Amount
Q1:	*$13,774.00*	
Q2:	*$6,026.00*	
Q3:	*$0.00*	
Q4:	*$0.00*	
Total:	$19,800.00	$0.00

Section III: Is the Contractor Estimate in Section I still accurate? **Yes or No:** Yes

Tracks changes in the fiscal year budgets. Changes may be an increase or a decrease in spending from original estimate. After the current Progress Report is approved the new fiscal year estimates should be moved from Section III to Section I.

If answer is NO, provide new budget by fiscal year estimates and justification for the change in the table below.

New Budget by FY		Justification
Federal		
FY18:		
FY19:		
FY20:		Estimate was $82,112, due to change in staffing and overestimation of salaries, the true spent amount was $76,591
FY21:		Estimate was $43,873, due to change staffing and overestimation of salaries, the contractor estimate is $19,800. We expect to be returning $29,594.
FY22:		
Total:		

Have any nonconformances occurred in the previous quarter? Yes/No	
Add any nonconformances and the corresponding corrective actions to the Corrective Action Status Table below. Nonconformances must be communicated to the NPS Project Manager immediately via email and a Corrective Action Plan submitted within 14 days of the nonconformance occurring.	

Corrective Action Status Table

Corrective Action #	Date Issued	Description of Deficiency	Action Taken	Date Closed

Please provide a listing of deliverables provided along with the QPR, and delete attachment references from prior quarters. Reference the "Deliverables Report" to get the Deliverable ID, Subtask #, and Deliverable Name.

Deliverable ID	Subtask #	Deliverable Name	Attachment File Name
9842	1.4	FY20 Q4 Quarterly Call Minutes	A-2020-Q04 P2 & Q7 P1 Quarterly Call Minutes-20200702.pdf
9879	5.3	Joe Pool Lake WPP-Tech Advisory Meeting Minutes	B-JPLWPP Meeting Notes-20200827.pdf
9885	5.4	Community Meetings Packet (see narrative for details)	C-Community Meetings.pdf

Quarterly Progress Report

FY 21 Q1

Entity: Trinity River Authority

Contract No: 582-19-90205

Project Name: Joe Pool Lake Watershed Characterization

Date Submitted: 12/08/20

Signature pages have been removed from this document.

-

* The TCEQ Project Manager's signature indicates that the QPR is accepted as a project deliverable and also authorizes any changes in deliverable due dates requested in the Deliverables sheet. Approved due date changes should be inserted in the "Current Due Date" column in the next QPR.

1. When ready to submit the QPR to TCEQ, the Contractor Project Manager must date and sign the cover page with an electronic signature (i.e., scanned signature). Send the signed Excel document to the TCEQ Project Manager.

2. The TCEQ Project Manager will review and either: 1) Send back with comments or 2) approve, sign, date, and e-mail a scanned copy of the approved QPR to the Contractor Project Manager.

3. After addressing comments email the updated Excel document the TCEQ Project Manager, along with a new date next to the electronic signature.

4. The TCEQ Project Manager will sign, date, scan and send the approved QPR to the Contractor Project Manager. A final version of the Excel document will also be sent.

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9821	1.2	QPR (FY19Q1)	12/15/18	n/a	No activity in FY19Q1	
9822	1.2	QPR (FY19Q2)	03/15/19	03/15/19		
9823	1.2	QPR (FY19Q3)	06/15/19	06/17/19		
9824	1.2	QPR (FY19Q4)	09/15/19	09/16/19		
9825	1.2	QPR (FY20Q1)	12/15/19	12/16/19		
9826	1.2	QPR (FY20Q2)	03/15/20	03/16/20	3/15/20 was a Sunday	
9827	1.2	QPR (FY20Q3)	06/15/20	06/15/20		
9828	1.2	QPR (FY20Q4)	09/15/20	09/11/20		
	1.2	QPR (FY21Q1)	12/15/20	12/08/20	need additional w/contract extension	
	1.2	QPR (FY21Q2)	**03/15/21**		Final QPR	
9829	1.3	Invoice (FY19Q1)	12/30/18	n/a	No activity in FY19Q1	
9830	1.3	Invoice (FY19Q2)	03/30/19	03/29/19		
9831	1.3	Invoice (FY19Q3)	06/30/19	06/26/19		
9832	1.3	Invoice (FY19Q4)	09/30/19	09/26/19		
9833	1.3	Invoice (FY20Q1)	12/31/19	12/30/19		
9834	1.3	Invoice (FY20Q2)	03/31/20	03/20/20		
9835	1.3	Invoice (FY20Q3)	06/30/20	06/18/20		
		Invoice (FY20Q4)	09/30/20	09/30/20		
		Invoice (FY21Q1)	12/31/2020	12/21/20		
		Invoice (FY21Q2)	3/31/2021			
9836	1.3	Invoice (FY22Q1)__	1/31/2022		Not needed.	
9837	1.3	Invoice (FY20Q2)_July	2/28/2022			
9838	1.3	Invoice (FY20Q2)Aug	4/15/2022			
9840	1.4	Conference Call (FY19Q2)	01/15/19	n/a		
9841	1.4	Conference Call (FY19Q3)	04/15/19	04/11/19		
9842	1.4	Conference Call (FY19Q4)	07/15/19	07/26/19		
9843	1.4	Conference Call (FY20Q1)	10/15/19	11/18/19		
9844	1.4	Conference Call (FY20Q2)	01/15/20	01/15/20		
9845	1.4	Conference Call (FY20Q3)	04/15/20	03/27/20		
9846	1.4	Conference Call (FY20Q4)	07/15/20	07/02/20		
	1.4	Conference Call (FY21Q1)	10/15/2020	10/15/20		
	1.4	Conference Call (FY21Q2)	1/15/2021	01/28/21		
9839	1.4	Post-Award Mtg (Notes within 2 days of mtg)	10/05/18	10/22/18		
9847	1.5	EPA Coordination Mtg (Upon Request)	08/31/19	n/a	no meeting requested	
9848	1.6	Annual Report Article (If requested)	02/28/22			
9849	1.7	FY20 Annual Budget Update	10/01/19	11/04/19	See narrative for details	
9850	2.1	QAPP Planning Mtg Notes	10/05/18	10/22/18		
9851	2.2	Draft QAPP	10/22/18	10/05/18		
9852	2.2	Final QAPP	01/15/19	02/21/19		
9853	2.4	1st QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	03/07/20	04/23/20	No changes to QAPP requested by TRA.	

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9854	2.4	2nd QAPP Certification (due within 90 days of annivesary date)*Date will be adjusted once QAPP executed	03/07/21			
9870	3.1	Documentation of data compilation and review (In QPRs)	9/15/2020	09/15/20	See narrative for details	
9871	3.2	Preliminary Pollutant Source Survey PowerPoint	10/01/20	10/22/20	See narrative for details	
9872	3.3	Draft Analysis of Historical Data Report	10/1/2019	10/02/19	See narrative for details	
9873	3.3	Final Analysis of Historical Data Report	12/31/2019	12/03/19	See narrative for details	
9859	4	Sampling Station Location Requests, if necessary (before first sampling event)	04/26/19	02/19/19		
9855	4.1	Documentation of field monitoring readiness review (Before 1st sampling event)	05/15/19	05/20/19		
9858	4.1	Field notes and instrument calibration sheets from first sampling event (Within 30 days of first sampling event)	8/1/2019	07/29/19		
9857	4.1	Results of internal monitoring systems audit (within 30 days of audit completion)	08/31/19	07/29/19		
9856	4.1	Scheduled date of internal monitoring systems audit	11/30/18	03/15/19		
9860	4.2	Documentation of sampling events (in QPR)	11/30/21	06/15/20	Ongoing task now complete	
9861	4.3	SWQMIS Data Submission (FY19Q2)	12/15/19	NA	Still awaiting release of data from laboratory	n/a
9862	4.3	SWQMIS Data Submission (FY19Q3)	12/15/19	NA	See note above	
9863	4.3	SWQMIS Data Submission (FY19Q4)	03/15/20	04/06/20		
9864	4.3	SWQMIS Data Submission (FY20Q1)	06/15/20	NA	Still awaiting release of data from laboratory. Anticipate that remaining data will be submitted in the next quarter.	
9865	4.3	SWQMIS Data Submission (FY20Q2)	09/15/20	08/07/20		
9866	4.3	SWQMIS Data Submission (FY20Q3)	12/15/20	08/07/20		
9867	4.3	SWQMIS Data Submission (FY20Q4)	extraneous			
9868	4.4	Draft Data Collection Report	10/01/20	10/01/20	See narrative for details	
9869	4.4	Final Data Collection Report	12/01/20	11/16/20	See narrative for details	
9874	5.1	Public Participation Plan	06/01/20	08/18/20		
9875	5.2	Educational and promotional materials (as developed)	02/28/22	06/01/20	Ongoing task - see narrative for details	

1st submission spanned two quarters
2nd submission will span two quarters

This will be one.

If a deliverable is or will be late, a new due date must be proposed. If this is the case, a justification describing the circumstances necessitating the new due date must be provided.

ID#	Sub Task #	Deliverable	Current Due Date	Date Sent	Discussion of Progress Last Quarter (Delete info from prior QPRs, and leave blank if no progress occurred)	Proposed New Due Date
9877	5.2	Project Website, mainted by Performing Party (as developed, updates documented in QPRs)	02/28/22	11/16/20	Ongoing task - see narrative for details	
9876	5.2	Stakeholder Database (Updated as needed)	08/01/19	11/13/20	Ongoing task - see narrative for details	End of contract
9878	5.3	Technical Advisory Mtg (FY19Q2)	02/28/19	11/06/18		
9879	5.3	Technical Advisory Mtg (FY19Q3)	08/31/19	08/13/19		
9880	5.3	Technical Advisory Mtg (FY19Q4)	11/30/19	12/11/19		
9881	5.3	Technical Advisory Mtg (FY20Q1)	02/29/20	02/27/20		
9882	5.3	Technical Advisory Mtg (FY20Q2)	05/31/20	05/28/20		
9883	5.3	Technical Advisory Mtg (FY20Q3)	08/31/20	08/27/20	See narrative for details	
9884	5.3	Technical Advisory Mtg (FY20Q4)	11/30/20	10/22/20		
9885	5.4	Coordination Mtg (1 of 4)	02/28/19	02/28/19		
9886	5.4	Coordination Mtg (2 of 4)	08/31/19	08/31/19		
9887	5.4	Coordination Mtg (3 of 4)	02/29/20	12/15/19		
9888	5.4	Coordination Mtg (4 of 4)	08/31/20	08/31/20	Ongoing task - see narrative for details on meetings attended	
9889	6.1	Draft Final Report	11/01/20	11/05/20	See narrative for details	
9890	6.2	Final Report	03/01/21			

Task/Issue	Additional Description of Quarterly Activities, Milestones, and Issues
1-Project Administration	Quarterly call held 10/15/20 (notes in ATTACHMENT A).
Training	No activity to report.
Invoice	Anticipate sending close out invoice in March 2021, FY21Q2
2-Quality Assurance	No activity to report.
3-Analysis of Historical Data	
3.1 Documentation of data compilation and review (In QPRs)	Task Complete.
3.2 Preliminary Pollutant Source Survey PowerPoint	Task Complete. Presented virtually to TAG 10/22/2020. No comments received (ATTACHMENT B).
3.3 Draft Analysis of Historical Data Report	Task complete.
3.3 Final Analysis of Historical Data Report	Task complete.
4-Water Quality Data Collection	
4.1 Water Quaity Monitoring Assessment Requirements	Task complete.
4.2 Water Quality Monitoring	Task complete.
4.3 Water Quality Data Submission	Task complete.
4.4 Draft Data Collection Report	Task complete. TCEQ approved on 11/9/2020
4.4 Final Data Collection Report	Task complete. Submitted to TCEQ 11/16/2020
5-Public Participation	
5.1 Public Participation Plan (PPP)	Task Complete
Stakeholder Database	Updated with interested parties from JPL Kickoff meeting on 11/12/2020
5.2 Project Website	Updated website with a stakeholder interest survey, past meeting agendas, the JPL Kickoff meeting presentation, and approved Final Data Collection Report.
5.2 Educational Materials	Task Complete
5.3 TAG Meetings	Provided next steps and preliminary pollutant source survey ppt update to TAG on 10/22/20. Also discussed 1)Texas Watershed Steward Workshop, 2)Kick-off Stakeholder Meeting (ATTACHMENT B).
5.4 Community Meetings	Attended and briefly presented at Texas Watershed Steward Workshop in Mansfield on 9/15/20. Attended NRCS Urban Ag Subcomittee 10/14/20, NRCS STAC meeting 10/20/20, Texas Watershed Coordinators Roundtable 10/21/2020, TCEQ SWQM Workshop 10/29-10/30/20, EPA Trash Free Waters Webinar 11/5/20, Opportunities to Collaborate in the Trinity River Watershed 11/18/20. Attended and presented at Watershed Protection Plans in North Central Texas: A Virtual Roundtable 11/30/20 (ATTACHMENT C).

6-Final Report	
6.1 Draft Final Report	Draft Final Report submitted via sharepoint and email 11/5/2020. Approved as is 11/29/2020
6.2 Final Report	Will submit after invoices have been finalized in FY21Q2

Note: The purpose of this sheet is to provide for an ongoing discussion of tasks to document overall progress and to raise any overall issues that don't relate to specific deliverables.

Note: Please address activities and issues related to contract amendments, budget revisions, and other administrative matters under Task 1.

TCEQ uses this information for budget planning. It is important this form is completed to avoid rush requests from the TCEQ Project Manager.

Section I: Current Budget by FY			
	Federal		
	TCEQ encumbered	Contractor *Estimate*	FY Paid Amount
FY19:	$66,889	$44,015	$44,014.47
FY20:	$85,000	$82,112	$76,591.35
FY21:	$18,000	$15,088	
Total:	$169,889	$141,215	$120,606

Section II: Current FY Quarterly Spending:		
FY21	**Match**	**Federal**
Q1:	*$4,835.00*	*$7,253*
Q2:		
Q3:		
Q4:		
Total:	$4,835.00	$7,253.00

Section III: Is the Contractor Estimate in Section I still accurate? **Yes or No:** Yes

Tracks changes in the fiscal year budgets. Changes may be an increase or a decrease in spending from original estimate. After the current Progress Report is approved the new fiscal year estimates should be moved from Section III to Section I.

If answer is NO, provide new budget by fiscal year estimates and justification for the change in the table below.

New Budget by FY		Justification
	Federal	
FY18:		
FY19:		
FY20:		
FY21:		Estimate was $43,873, due to change staffing and overestimation of salaries, the contractor estimate is $15,088. We expect to be returning $40,341.
FY22:		
Total:		

Appendix B: Quarterly Conference Calls

VCLA/JPL WPPs Joint Meeting

Attachment A
Meeting Minutes-Q14 (VCLA) &Q1 (JPL) Combined Conference Call
2/8/2019

VCLA – Q14

Administrative Updates

- Contract close-out strategy
  - Approved by RG on 12/11/18
  - Monthly invoicing (Mar-Apr-May '19)
  - Remaining balance on grant - < $1k

Deliverables Updates

Task 2: QAPP

- QAPP for data collection set to expire on May 5, with one month left on contract
- TCEQ has process in place to avoid re-certification being necessary for that interim period

Task 4: Water Quality Monitoring

- Additional Water Quality Monitoring
  - Completed final event in November 2018
  - Will have no WQ events to cover in March QPR
- Illegal Dumping Survey – will discuss in QPR

Task 6: Public Participation & Upcoming Meetings/Events

- Pet waste digester demonstration video
  - 680 views in 4 months, most of them in the past 30 days as Youtube algorithms adjusted
  - Now #1 in search results for several permutations of related search terms
  - Usually in top 3 for other permutations

Task 7: WPP

- Proposed WPP meeting/review schedule
  - Public comment period active from 12/31/18 – 1/31/19
  - No substantial comments received, will add minor comments and return to TCEQ on 2/8
  - Expectations for future review at TCEQ/EPA

Task 8: Final Report

- New due dates: first draft 3/15/19, final by 4/15/19
- Include new monitoring as much as practical/possible

JPLWPP – Q1

Administrative Updates

- Status of Phase I SOW
  - Phase I Contract received from Sam Davis on 1/9/19
  - Signed by L. Stepney on 12/19/18
  - No plans to back-charge time from 1/9/19 to 12/19/18

    - No-cost extension
        - Will be needed to absorb costs from first quarter, at a minimum
        - TRA proposes to extend end date to concurrent with Phase II grant
        - Will submit contract revision to TRA BoD together along with Phase II contract approval
- Status of Phase II application
    - Comments back from EPA, on track for September 2019 start date

Deliverables Updates

Task 2: QAPP

- TCEQ will return first round of comments in mid-February
- Return w/comments to TCEQ for final review
- Potential to begin sampling in March 2019

Task 3: Historical Data & Analysis

- Already combing through GIS Data and old reports

Task 4: Monitoring

- Desk Readiness Review (Task 4.1)
    - Can begin preparations now, no need to wait on QAPP
- Internal audit – required by Contract for Q1
    - RG has already proposed new date, but need to wait for QAPP to be signed before picking a date

Task 5: Public Outreach

- Texas Well Owner Network – DFW Series
    - Coordinated w/ Ag Extension, TRWD, NTMWD, and multiple GCDs for 3 events in DFW
    - Midlothian event served stakeholders in JPL, VCLA, and Richland-Chambers watersheds
    - Decent (but not great) turnout – haven't had time to compile contacts list for the watershed yet, affected ability to spread the word
    - Feb 27 – Mar 1 – attending Urban Riparian Symposium
    - Feb 26, 28 – Youth education events in Mansfield (Stream trailer)
    - Feb 16, March 1 – Youth education events at River Legacy in Arlington (Scout Badge Day, hands-on watershed model)
    - March 5 – BST Meeting at NCTCOG – TRA plans to attend

General Discussion

- Future 319(h) opportunities – White Rock Creek/White Rock Lake characterization
    - TRA proposes to perform data collection components of the watershed characterization activity under 319(h) program, but at present does not plan to act as coordinator for planning activities
    - Will begin to solicit interest from Dallas Water Utilities on possibility of them being lead on the planning end of the grant
    - North Texas Municipal Water District has already indicated support for project

VCLA/JPL WPPs Joint Meeting

Attachment A
Meeting Minutes-Q15 (VCLA) &Q3 (JPL) Combined Conference Call
4/11/2019

VCLAWPP – Q15

Administrative Updates

- Zero balance on grant as of 3/31
- Will continue to monitor internal accounts to make sure there aren't any stray charges rolling in

Deliverables Updates

Task 2: QAPP

- TCEQ process to avoid re-certification
  - Still on track now that draft Final Report has been submitted

Task 4: Water Quality Monitoring

- Additional Water Quality Monitoring – Task Complete
- Illegal Dumping Survey – Task Complete

Task 6: Public Participation & Upcoming Meetings/Events

- Pet waste digester demonstration video
  - 680 views from October 2018 – February 2019
  - Video took off in February – has over 5700 views as of 4/15

Task 7: WPP

- Currently under review at EPA
  - Expedited review requested by TCEQ to avoid recertification of QAPPs
  - EPA has provided assurance that timeline will be met for May 5 deadline

Task 8: Final Report

- Sent to RG/JJ on 4/1/19
- Will send Executive Summary if TCEQ approves of format

JPLWPP – Q3

Administrative Updates

- Phase I/II contract end date reconcilitation
  - No Cost Extension for Phase I approved for 2/28/22
  - FH changed Phase II end date to match before sending off to EPA
- Status of Phase II application
  - Expect to have back by July 15 (drop date for August TRA BoD approval
  - Should keep us on track for September 2019 start date

Deliverables Updates

Task 2: QAPP

- Comments received from all TCEQ departmental personnel, returned to JJ on 4/11

Task 3: Historical Data & Analysis

- Partners are particularly interested in algal blooms that are appearing with increasing frequency in Mountain Creek arm
- Will provide some additional focus on this aspect in addition to nutrient concerns and bacteria impairment

Task 4: Monitoring

- Desk Readiness Review (Task 4.1)
  - Will begin prep for DRR week of 4/22
  - TRA requested that TCEQ provide any guidance on conducting DRR – JJ will check to see if any exists, as it's not provided in SWQM Manual (DMRG-415)
- Internal audit – required by Contract for Q1
  - Dates moved, discussion of whether this can occur on active site visit (e.g., first monitoring event) or if must be a separate event – JJ to verify

Task 5: Public Outreach

- AR Sandbox – construction of box complete
  - Will be finishing aesthetic touches and building computer in mid/late April
  - Plan to do two or three "Demonstration Days" throughout the metroplex to spread awareness about this outreach tool
- Meetings w/Real Estate and Titles Professionals
  - Began discussions to develop and deliver real estate agent/realtor training module for continuing education credits
  - Will begin with 3-4 "lunch and learn" meetings throughout Fort Worth/Arlington area, with expectation to expand throughout DFW region

General Discussion

- Future 319(h) opportunities – White Rock Creek/White Rock Lake characterization
  - TRA proposes to perform data collection components of the watershed characterization activity under 319(h) program, but at present does not plan to act as coordinator for planning activities
  - Dallas Water Utilities has expressed interest in being lead on the planning end of the grant
  - North Texas Municipal Water District has already indicated support for project

JPL WPP Quarterly Meeting – Q4

Attachment A
Meeting Minutes
7/26/2019

Administrative Updates

- Status of Phase II application
  - Might receive draft for BoD purposes sometime in September
  - Present to BoD for October meeting
  - Still sticking with 2/28/22 close date
- No –cost extension for Phase I is in process w/ EPA

Deliverables Updates

Task 2: QAPP

- Approved Monitoring QAPP received mid-July
- Amendment #1 – Electronic Data Collection
  - TCEQ supports move from paper logs to electronic, but will need to monitor the transition closely to ensure the state's needs are met regarding data retention
  - TCEQ suggests waiting until comments are addressed in current CRP QAPP for same activities
  - Use those recommendations to inform 319 QAPP changes and re-submit

Task 3: Historical Data & Analysis

- Partners are particularly interested in algal blooms that are appearing with increasing frequency in Mountain Creek arm
  - Will provide some additional focus on this aspect in addition to nutrient concerns and bacteria impairment
  - Incorporate available data from separate Padera Lake Study (chl-a and DO data)
  - Proposal to move due date to 10/1 approved

Task 4: Monitoring

- Desktop Readiness Review – approved on 5/20
- Field notes and calibration worksheets from first event – send to JJ
- Internal audit – conducted during 6/2019 event
  - Will send results along with notes and worksheets
- Conducted July (low flow) event week of 7/22
- Next routine event scheduled for late August

Task 5: Public Outreach

- Plan to schedule Tech Advisory meeting for late August
  - Discuss data collection so far
  - Contemplating set location or roaming between partner cities for meetings
- AR Sandbox "Demonstration Roadshow"
  - Also late August/early September
  - 3-4 locations across metroplex
  - Schools, cities, counties?

    - Demonstrate use, construction, and costs of unit
- Meetings w/Real Estate and Titles Professionals
    - Begin with meeting provided to largest title company in DFW area
    - Goal – begin developing education modules designed around OSSF education, cost savings benefits of building with green infrastructure

General Discussion

- Future 319(h) opportunities – White Rock Creek/White Rock Lake characterization
    - TRA proposes to perform data collection components of the watershed characterization activity under 319(h) program, but at present does not plan to act as coordinator for planning activities
    - Dallas Water Utilities has expressed interest in being lead on the planning end of the grant
    - JJ will check on status, report back with any updates

JPL WPP Quarterly Meeting – Q1 2020

Attachment A
Meeting Minutes
11/18/2020

Administrative Updates

- Phase I Amendment – still in process
- Status of Phase II application
  - Executed SOW received – 11/12/19
  - Signed 11/1
  - TRA will not spend down on the grant until beginning of Q2 (December 1)
  - TCEQ agreed that no invoice would be necessary for Q1, only need to send JJ and general WQMP account a general notification email stating that no spending occurred
  - JJ sending QPR template soon – requested TRA review dates for applicability to new schedule

Deliverables Updates

Task 2 (Phase I/Phase II): QAPP

- Monitoring QAPP for Phase I
  - Plan to leave as-is, no further amendments at this point
  - Will not incorporate electronic data collection techniques for this grant
- Modeling QAPP for Phase II
  - Will develop in coordination with subcontractor (still TBD)

Task 3 (Phase I): Historical Data & Analysis

  - Sent to JJ on 11/1
  - Will incorporate comments sent 11/25 and return ASAP

Task 3 (Phase II): Modeling

- Concerns w/TAMU's schedule based on feedback from other partners
  - TRA entertaining the option of using another university, or perhaps private firm
  - Limited options for universities in DFW area familiar with SWAT/HAWQS/CE-QUAL-W2 models
  - UNT and TCU as potential alternatives (unsure if SMU has modeling expertise)
- Contractual obligation to partner with a university/state entity
  - Constraint imposed by budget
  - Funds placed in "Other" vs. "Contractual" per TCEQ consultation
  - Would need to do full budget revision to allow hiring of a private contractor
  - This would be preferred method (we have good relationships with experienced modelers)
  - However, wary of the time commitment needed to push budget amendment through
  - Could cause a guaranteed delay greater than that of TAMU's potential delay

Task 4: Monitoring

- Still no opportunities for high flow events – uncharacteristically dry since project inception
- Several "dry sites" encountered on nearly every run - will likely result in excess funds
- Alternative uses of funds?
  - Sandbox updates will absorb small amount
  - No foreseeable need for large equipment purchases

- Extending monitoring is easiest approach
  - TRA has packed schedule starting Spring 2020 – uneasy about additional monitoring
  - JJ has questions about limitations for extended monitoring in the QAPP that need to be addressed

Task 5: Public Outreach

- Contacts list sent 10/24 – can provide updated versions on request
- August Tech Advisory meeting
  - Provided project partners w/ brief update on project
  - Next meeting – 2nd week December (tentative)
- Website up on 5/15
  - Migrating to new Content Management System
  - Should provide more flexibility and functionality
  - Site migration by contractor results in dead links, but trying to keep them updated
- AR Sandbox
  - "DFW Demo Days"
    - 3-4 locations across metroplex
    - Schools, cities, counties?
    - Demonstrate use, construction, and costs of unit
    - Need to make a few adjustments to unit to make it "travel worthy"
    - On hold until design is updated
  - Showcased at several events held on TRA property
    - Excellent feedback, several requests for assistance from other entities to build their own
- Meetings w/ Real Estate and Title Professionals – Sept 11-13
  - 40+ attendees, good buy-in
  - Potential for future collaboration
    - Using RE agents/realtors/construction firms to encourage green infrastructure
    - Standardizing county practices for OSSF regulation
    - Requirements for inspection/pumpout on title change?
  - Question from JJ regarding TRA's scope on real estate collaboration
    - TRA is looking well past JPL and VCLA watersheds
    - Working w/NCTCOG to approach the issue from private angle as well as county

General Discussion

- EPA Trash Free Waters Grant – submitted on 11/22
  - TRA submitting in partnership w/ Presbyterian Night Shelter in Fort Worth
    - Clean Slate Program – watershed cleanup crew
    - Dedicated cleanup for JPL and VCLA watersheds
    - No match requirement
    - Received 13 Support Letters (regional entities, cities, citizen groups, private businesses)
  - Also a stakeholder on NCTCOG's regional grant application
    - TRA providing support for litter assessment surveys

JPL WPP Quarterly Meeting – Q2 FY20

Attachment A
Combined Meeting Minutes for Phase I (582-19-90205) and Phase II (582-20-10162)
1/15/2020

Administrative Updates

- 2020 Budget Update – received
  - Include updates for both Phase I and II
- Interlocal Agreement (IA) w/ TAMU
  - Inclusion of SELECT
    - Added benefit, added cost
    - Originally planned to do in-house
    - Will need a BRR to transfer from salary to Other category
- Phase II QPR updates – will base off Phase I benchmarks and Dec 1 start date

Deliverables Updates

Task 2 (Phase I/Phase II): QAPP

- Monitoring QAPP for Phase I
  - Plan to leave as-is, no further amendments at this point
  - Will not incorporate electronic data collection techniques for this grant
- Modeling QAPP for Phase II
  - Will develop in coordination with subcontractor (TAMU)

Task 3 (Phase I): Historical Data & Analysis

  - Approved as final on 12/3/19

Task 3 (Phase II): Modeling

- Chose to move forward w/ TAMU as subcontractor
- Recent addition of SELECT to HAWQS modeling suite
  - Will move planned in-house SELECT analysis to TAMU
  - Makes better use of shared data between SWAT/SELCT (staff time savings)
  - Avoids duplication of efforts, will likely result in a cost savings vs. in-house SELECT

Task 4 (Phase I): Monitoring

- Potential to grab first "high flow" event later in January – will be 1st high flow event of project
- Excess funds from dry sites – ideas
  - No foreseeable equipment needs at present
  - Lake profile study – focused on nutrients, algal impacts, lake turnover
  - Extend routine monitoring – bimonthly or quarterly samples
    - Full QAPP amendment necessary, will need to start preparing paperwork now
  - Additional modeling components
  - AR Sandbox updates to improve resiliency & portability
- SWQMIS Data submission
  - Will submit data for June through November at end of January

Task 5 (Phase I): Public Outreach

- December Tech Advisory Meeting

    - Partners discussed first 6 months of monitoring data
    - Agreed to go with a project-specific logo
        - Get feedback (design ideas, project goal perceptions) using a survey
        - Compile results, work with Grand Prairie on preliminary designs
        - Present preliminary designs for final selection at February meeting
    - Put together a project "wish list" to start thinking about for Implementation
- Website
    - Have an interim solution in place to make sure stability of files linked on website
    - Working with IT to get a more firm date on a final solution once new content management system migration is complete
- AR Sandbox
    - Educational Event at UT-Arlington on 1/25
        - Future Cities Youth Competition
        - Combination of structured learning periods with free-form learning in between
- Meetings w/ Real Estate and Title Professionals
    - 1/7 - Presented to the Board of Directors for a development with interests in Joe Pool Lake and Lake Arlington watersheds
    - 1/16 – Discussion w/ Arlington Chamber of Commerce CEO on presenting to chamber members in the future

General Discussion

- EPA Trash Free Waters Grant – outcome expected in February

JPL WPP Quarterly Meeting

Q3 FY20 Phase 2

Q6 FY20 Phase 1

Combined Conference Call Minutes for Phase I (582-19-90205) and Phase II (582-20-10162)
3/27/2020

Administrative Updates

- Phase 2 typo in Travel category has been corrected via a BRR – approved on 3/19/2020
- Phase 1 Supply category budget has been amended via a BRR
  - There was a negative balance of $4.57 in the last invoice
  - Also added funds to cover the purchase of a new computer
  - Moved funds from Salary, Fringe, and Indirect into Supplies for a total increase of $3,000 in Supplies
  - Submitted to TCEQ on 4/2/2020, approved on 4/7/2020
- Interlocal Agreement (IA) w/ TAMU
  - Will go to TRA April Board Meeting for Approval
- Predicting that funding for Phase 1 will not be fully spent down
  - Based on current sampling schedule, spending on Phase 1 should be complete by August 2020
  - Initial estimate about $90,000 to $95,000 will not be spent and will be sent back to TCEQ

Deliverables Updates

Task 2 (Phase I/Phase II): QAPP

- Monitoring QAPP for Phase I
  - Annual Review Certification submitted with this Quarterly Call Minutes email on 4/8/2020
  - No revisions necessary at this time
    - Revisions will be made to replace Aaron Hoff with new staff member via amendment at a later date
- Modeling QAPP for Phase II
  - Will develop in coordination with subcontractor (TAMU)
    - Work will begin on this task after approval of the subcontract between TRA and TAMU – after the TRA April Board meeting

Task 3 (Phase I/Phase II): Historical Data & Analysis

- No updates this quarter

Task 4 (Phase I): Monitoring

- 2 of 3 planned high flow events have been conducted.
  - Third high flow event will be conducted if conditions are present.
- If left over funding must be spent, a QAPP amendment will need to be developed
  - Development will need to start soon to make sure there's not an extended delay in work starting up again
- SWQMIS Data submission
  - Next data submission planned after sampling is completed in May
    - Potential June/July delivery timeframe

Task 5 (Phase I): Public Outreach

  - No activity this quarter

General Discussion

- EPA Trash Free Waters Grant – TRA did not receive this grant

JPL WPP Quarterly Meeting

Q4 FY20 Phase 2

Q7 FY20 Phase 1

Combined Conference Call Minutes for Phase I (582-19-90205) and Phase II (582-20-10162)
07/02/2020

Administrative Updates

- Interlocal Agreement (IA) w/ TAMU approved, contract signed
- Predicting that funding for Phase 1 will not be fully spent down
  - Based on current sampling schedule, spending on Phase 1 should be complete by August 2020
  - Initial estimate about $90,000 to $95,000 will not be spent and will be sent back to TCEQ
- Amendment for Phase 2 in process
- P2 invoice for next quarter will be similar to this quarter

Task 2 (Phase I/Phase II): QAPP

- Monitoring QAPP for Phase 1
  - Certification should still be conducted in case TRA needs it, defer to TCEQ for more information
- Modeling QAPP for Phase 2
  - TAMU/IA Contract signed
  - Modeling Draft QAPP submitted

Task 3 (Phase I/Phase II): Historical Data & Analysis

- No updates this quarter

Task 4 (Phase I): Monitoring

- All sampling has been completed
- SWQMIS Data submission
  - April 2020 data is not yet fully approved by lab
  - 1st data submittal was for two quarters
  - Next submittal will be for the last two quarters
  - Last quarter submittal on QPR not needed (ID#9867)

Task 5 (Phase I): Public Outreach

  - Public Participation Plan Draft submitted
  - Waiting on JPL logo finalization
  - Website updated to reflect new staff member
  - Meeting with Technical Advisory Group May 28th, 2020

General Discussion

- Upcoming this quarter:
  - Submit Final Public Participation Plan
  - Submit Final Modeling QAPP
  - JPL TAG meeting scheduled last week of August 2020
  - Prepping for Texas Watershed Stewards Workshop on September 15th, 2020

JPL WPP Quarterly Meeting

Q5 FY20 Phase 2

Q8 FY20 Phase 1

Combined Conference Call Minutes for Phase I (582-19-90205) and Phase II (582-20-10162)
10/15/2020

Administrative Updates (Phase I/Phase II):

- Annual budget update template will be provided by TCEQ
- TRA has actual monies spent for FY2020 therefore JJ requested we provide estimates for FY2021 and FY2022 for PI and PII
- Discussed extending PII contract another year to prevent last minute amendments due to delays. WM approved.
- Draft Final Report for Phase I in progress

Task 2 (Phase I/Phase II): QAPP

- Phase I Task 2 complete
- Phase II Modeling QAPP still with QA for review

Task 3 (Phase I/Phase II): Historical Data & Analysis

- Phase I Preliminary Pollutant Source Survey PowerPoint draft will be presented to TAG meeting scheduled on 10/22/2020
- Phase II no update

Task 4 (Phase I): Monitoring

- Phase I Submitted Draft Data Collection Report 10/01/2020

Task 4 (Phase II): Public Participation and Stakeholder Coordination

- Phase II Kick-off Stakeholder Meeting scheduled for 11/12/2020

Task 5 (Phase I): Public Outreach

- Final JPL TAG Meeting with Technical Advisory Group 10/22/2020

General Discussion

- Upcoming this quarter:
  - Draft Final Report Phase I
  - Final Data Collection Report Phase I
  - Phase II Kick-off Stakeholder Meeting 11/12/2020
  - Phase II Final Modeling QAPP

JPL WPP Quarterly Meeting

Q2 FY21 Phase 1

Q2 FY21 Phase 2

Combined Conference Call Minutes for Phase I (582-19-90205) and Phase II (582-20-10162)
01/28/2021

Administrative Updates (Phase I/Phase II):

- Approved QPRs from Q1?
- TRA has actual monies spent for FY2020 therefore JJ requested we provide estimates for FY2021 and FY2022 for PI and PII
- Discussed extending PII contract another year to prevent last minute amendments due to delays. WM approved.
- PI has been closed out – waiting on approval of invoices – estimated balance of $38,051
- Final Report for Phase I will be submitted after approval of invoices

Task 2 (Phase II): QAPP

- Phase I Task 2 complete
- Phase II Modeling QAPP still with QA for review

Task 3 (Phase II): Modeling & Data Analysis

- Scheduled biweekly meetings with TAMU – they have started

Task 4 (Phase II): Public Participation and Stakeholder Coordination

- Phase II 2nd Stakeholder Meeting scheduled for 02/17/2020 – Press release will go out next week
- Presentation will be sent to you by Feb 3rd for review – covering review of WPP,SC, Ground Rules, Voting, Dr. Srini will give an overview of modeling
- Still navigating workshops
- Main to reevaluate PPP timeline
- SC most likely will meet in march – haven't received that many nominations via the electronic survey
- Solicitation for participants in TAG/SC ongoing

Task 5 (Phase II): WPP Development

- Writing has commenced
- WPP timeline and document review plan needs to be moved to March? What does this consist of? A Draft? Review plan will include submittal of multiple interim partial drafts for review by stakeholders and the TCEQ – timeline what is in the PPP
  - delays/stakeholder meetings/general participation/modeling QAPP delays – Dr. Srini knows the draft modeling is due 05/21

General Discussion

- Upcoming this quarter:
  - Final Report Phase I
  - Phase II 2nd Stakeholder Meeting 02/17/2020
  -

Appendix C: QAPP Planning Meeting

Post-Award Orientation/QAPP Planning Meeting

Meeting Notes
10/1/2018
12:30 pm
TCEQ Building F, Rooms 2210 & 4201

Participants

TCEQ	TRA
Sandra Arismendez	Aaron Hoff
Robert Grudier	Web Mangham

General Orientation Meeting

Nonpoint Source Project Basics

- TCEQ requested photos of project work to include in its own internal/public/agency reports for nonpoint source projects

Quality Assurance for Nonpoint Source Projects

- Other Common Contractor QA Audit Findings not noted in packet:
  - Clarify how (which method) you're using to retrieve SWQMIS Data - online tool or direct database access?
  - Ensure that your lab has reviewed Table A7.1 for details about AWRLs, LOQs, etc.
  - If special training or certification is identified in A8, ensure that those training needs are indeed addressed
  - Section C1 contains language for the new "desktop audit" and describes the required deliverables (calibration logs, field data sheets, etc.) that TCEQ will request for review

Project/QAPP Planning Meeting

Contract Period

- Contract start date delayed until TRA Board of Directors meeting later in October
- Once approved, TRA will begin work on project after consent to proceed is given by TCEQ

QA Strategy

- TRA will need to provide QA procedures for both Data Acquisition and Monitoring tasks
- Sandra recommended that both tasks be combined under a single QAPP, similar to that of the Village Creek-Lake Arlington WPP
- No modeling QAPP is necessary – modeling tasks will be performed under a future grant phase
- No subcontractor for this grant phase – only signatures will be for TCEQ and TRA employees
- OK to turn in draft QAPP before project begins (per Sandra and Robert)

Data Acquisition

- Will record all known geospatial datasets to be used in the project, including those expected to be used for modeling tasks (source, specific use, and effective date range or collection date)

Monitoring

- Will continue to use the same tag numbering system for events (i.e., "TR####N) previously used for other NPS projects
- Intention with early submittal is to have QAPP approved ASAP so that monitoring can begin in December 2018

Quarterly Progress Report Modifications

- Robert noted that the scope of work (SOW) passes through several hands as it is turned into a QPR, so the intent of some subtasks and deliverables may become "lost in translation"
- Example: Meetings described in Section 5.3 and 5.4
  - Due to funding and staff time limitations, bulk of public participation task has been moved to a future phase of the project.
  - Subtask 5.3 is intended to reflect, at a minimum, one meeting with the project partners and technical advisory group members to verify the validity and usefulness of the selected monitoring sites and monitoring plan. This was not intended to be a recurring meeting, but a second meeting could be called if group members felt it necessary.
  - Subtask 5.4 concerns public/community coordination meetings not hosted by TRA, where the watershed coordinator attends as a speaker or simply as an attendee. As such, there is no set schedule and 5.4 should be considered a general, "ongoing" task similar to those described in 5.2 of this QPR.
- Any deliverables with due dates set before project kickoff will need to be modified to reflect the new project kickoff date.
- Sampling is expected to begin well in advance of the 3/30 deadline described in 4.1, but TCEQ elected not to change this date, along with those of other associated tasks in 4.1 and 4.2.

Appendix D: QAPP Annual Revision

Annual Review Certification

for

Joe Pool Lake Watershed Characterization

Quality Assurance Project Plan

(QAPP)

For Monitoring and Data Acquisition

Federal ID # 99614623

QTRAK #19-299

Original QAPP Effective Period – 6/6/2019 – 6/6/2022

Year – 1 of 3

Signatures below document certification of the annual review of Nonpoint Source Program Clean Water Act 319(h) Joe Pool Lake Watershed Characterization Quality Assurance Project Plan (QAPP) For Monitoring and Data Acquisition by Trinity River Authority (TRA) and the Texas Commission on Environmental Quality (TCEQ) Project Manager. The original QAPP was approved by the TCEQ on June 6, 2019. This is the first annual review for this QAPP. One amendment has been completed since the full QAPP was executed to extend the contract period to 2/28/2022.

The TRA and TCEQ Project Managers have verified that the original QAPP accurately reflects current project requirements. Organizational changes have occurred and are documented below. Aaron Hoff is no longer the Project Manager and Field Supervisor. Angela Kilpratrick is Acting Project Manager until a replacement is hired and trained. Scott Kisner was hired as the TRA Lab Manager and Acting QA Manager. The QAPP is now approved until June 6, 2021.

The next annual review will be initiated on March 6, 2021.

Signature pages have been removed from this document.

_____
Webster Mangham, TRA Project Manager Date
Trinity River Authority

_____
Jessica Johnstone, TCEQ Project Manager Date
Nonpoint Source Program, TCEQ

cc: Anthony Suttice, Project Officer, EPA
Sharon Coleman, Acting Lead QA Specialist, TCEQ

Cathy Anderson, Data Management and Analysis Team Leader, TCEQ

Section(s) affected	Description of Change	Justification for Change
Sections A1, A3, and A4	All instances of TRA Project Manager "Aaron Hoff" have been removed	Documentation of TRA staff changes
Section A1	Scott Kisner was hired as TRA Lab Manager and Acting QA Officer	Documentation of TRA staff changes

Appendix E: QAPP Amendment

Amendment #1
Update to the Joe Pool Lake Watershed Characterization QAPP for Monitoring and Data Acquisition

Prepared by the Trinity River Authority (TRA) in Cooperation with the Texas Commission on Environmental Quality (TCEQ)

Effective: Immediately upon approval by all parties

Questions concerning this amendment should be directed to:
Angela Kilpatrick
Trinity River Authority
5300 South Collins
Arlington, TX 76018
(817) 493-5179
kilpatricka@trinityra.org

Justification

This document details the changes made to the monitoring Quality Assurance Project Plan (QAPP) to reflect staff changes and to incorporate the use of separate electronic field data sheets and handwritten chain of custody (COC) forms for monitoring events.

Summary of Changes

Section	Sub-section/ Figure/ Table	Page in QAPP or previous amendments	Change	Justification	Affected Entity	Page in this Amendment
A1 Approval Page	Trinity River Authority Central Regional Wastewater System Laboratory	QAPP page 3	Replace Craig Harvey as the interim lab QAO with Scott Kisner.	Staffing changes	TRA CRWS Laboratory	4
A3 Distribution List	TRA-CRWS	QAPP page 9	Replace Craig Harvey as the interim lab QAO with Scott Kisner.	Staffing changes	TRA CRWS Laboratory	5
A4 Project/Task Organization	Trinity River Authority Central Regional Wastewater System	QAPP page 12	Replace Craig Harvey as the interim lab QAO with Scott Kisner.	Staffing changes	TRA CRWS Laboratory	6
A4 Project/Task Organization	Trinity River Authority Central Regional Wastewater System	QAPP page 13	Replace Craig Harvey as the interim lab QAO with Scott Kisner.	Staffing changes	TRA CRWS Laboratory	7
A4 Project/Task Organization	Figure A4.1 Organization Chart - Lines of Communication	QAPP page 14	Replace Craig Harvey as the interim lab QAO with Scott Kisner.	Staffing changes	TRA CRWS Laboratory	8
B2 Sampling Methods	Documentation of Field Sampling Activities	QAPP page 39	Reference new electronic data sheet (EDS) format in Appendix D	Transition to electronic field data sheets	TRA	9
B3 Sample Handling and Custody	Sample Handling	QAPP page 41	Reference separation of new EDS format in Appendix D from chain of custody (COC) form, now in Appendix H	Transition to electronic field data sheets	TRA	10
C2 Reports to Management	Reports to TRA Project Management	QAPP page 68	Clarify form submission process after implementation of separate EDS and COC forms	Transition to electronic field data sheets	TRA	11
Appendix D	n/a	QAPP page 109	Updated title to reflect separation of new EDS format in Appendix D from COC form, now in Appendix H	Transition to electronic field data sheets	TRA	12
Appendix D	n/a	QAPP page 110	Added example EDS from handheld equipment display	Transition to electronic field data sheets	TRA	13
Appendix H	n/a	QAPP page 121	Added updated COC form	Transition to electronic field data sheets	TRA	14
Appendix H	n/a	QAPP page 122	Added updated COC form	Transition to electronic field data sheets	TRA	15

Detail of Changes

Details of the changes listed above are shown on the following pages. These pages are intended as direct replacements for existing pages in the QAPP.

Replaces Section A1, page 3 of the JPL WC Monitoring QAPP

Trinity River Authority

_____	_____
Webster Mangham Date	Aaron Hoff Date
Senior Project Manager	Project Manager & Field Supervisor
_____	
Angela Kilpatrick Date	
Data Manager & QA Officer	

Trinity River Authority Central Regional Wastewater System Laboratory

_____	_____
Craig Harvey Date	**Scott Kisner Date**
Lab Manager ~~**and Acting QA Officer**~~	**Lab QA Officer**

Sub-tier participants (e.g., subcontractors, subparticipants, or other units of government) will sign the QAPP, indicating the organization's awareness of, and commitment to requirements contained in this quality assurance project plan and any amendments or added appendices of this plan. Signatures in section A1 will eliminate the need for adherence letters to be maintained.

Replaces Section A3, page 9 of the JPL WC Monitoring QAPP

The TRA will provide copies of this project plan and any amendments or revisions of this plan to each project participant defined in the list below. The TRA will document receipt of the plan by each participant and maintain this documentation as part of the project's quality assurance records. This documentation will be available for review.

Trinity River Authority
5300 South Collins
Arlington, TX 76018

Webster Mangham, Senior Project Manager
817-493-5127
manghamw@trinityra.org

Aaron Hoff, Project Manager & Field Supervisor
817-493-5581
hoffa@trinityra.org

Angela Kilpatrick, Data Manager & Quality Assurance Officer
817-493-5179
kilpatricka@trinityra.org

Trinity River Authority - Central Regional Wastewater System Laboratory (TRA CRWS)
6500 Singleton Boulevard
Dallas, Texas 75212

Craig Harvey, Laboratory Manager
972-263-2251
harveyc@trinityra.org

Scott Kisner, QA Officer
972-263-2251
kisnersl@trinityra.org

Replaces Section A4, page 12 of the JPL WC Monitoring QAPP

field. Responsible for the collection of water samples and field data measurements in a timely manner that meet the quality objectives specified in Section A7, as well as the requirements of Sections B1 through B8. Responsible for field scheduling, staffing, and ensuring that staff is appropriately trained as specified in Section A8. Responsible for adhering to SWQM Procedures and all updates as appropriate.

Angela Kilpatrick
TRA Data Manager & QAO
Responsible for the acquisition, verification, and transfer of data to the TCEQ. Oversees data management for the QAPP. Performs data quality assurances prior to transfer of data to TCEQ. Responsible for transferring data to the TCEQ in the Event/Result file format specified in the DMRG. Ensures data are submitted according to QAPP and work plan specifications. Provides the point of contact for the TCEQ NPS Data Manager to resolve issues related to the data. Responsible for coordinating development and implementation of the QA program. Responsible for ensuring the most recent version of the NPS QAPP shell document is acquired from the TCEQ NPS Project Manager and used for writing and maintaining the QAPP. Responsible for maintaining records of QAPP distribution, including appendices and amendments. Responsible for maintaining written records of sub-tier commitment to requirements specified in this QAPP. Responsible for identifying, receiving, and maintaining project quality assurance records. Responsible for coordinating with the TCEQ NPS Project Manager to resolve QA-related issues. Notifies the TRA Project Manager and TCEQ NPS Project Manager and documents particular circumstances which may adversely affect the quality of data. Responsible for validation and verification of all data collected and acquired. Coordinates the research and review of technical QA material and data related to water quality monitoring system design and analytical techniques. Facilitates, conducts, and documents readiness reviews, monitoring, and/or technical systems audits.

Trinity River Authority Central Regional Wastewater System

Craig Harvey
Laboratory Manager ~~& Acting Quality Assurance Officer~~
Responsible for supervision of laboratory personnel involved in generating analytical data for this project. Responsible for ensuring the lab is TCEQ-accredited for the matrix, method, and parameter combinations listed in A7 Quality Objectives and Criteria. Responsible for ensuring that laboratory personnel involved in generating analytical data have adequate training and a thorough knowledge of the analytical requirements in the QAPP and all SOPs specific to the analyses or task performed and/or supervised. Responsible for oversight of all operations, ensuring that all QA/Quality Control (QC) requirements are met, and documentation related to the analysis is completely and accurately reported. Enforces corrective action, as required.

Replaces Section A4, page 13 of the JPL WC Monitoring QAPP

Scott Kisner

Laboratory Quality Assurance Officer

Monitors the implementation of the Laboratory Quality Assurance Manual (QAM) and the QAPP within the laboratory to ensure complete compliance with QA objectives as defined by the contract and in the QAPP. Conducts internal audits to identify potential problems and ensure compliance with QAPP, lab-accreditation requirements, and written SOPs. Responsible for supervising and verifying all aspects of the QA/QC in the laboratory. Performs validation and verification of data and compliance with A7 Quality Objectives and Criteria before the report is sent to the contractor. Insures that all QA reviews are conducted in a timely manner from real-time review at the bench during analysis to final submittal of data to the TRA QA officer.

U.S. EPA Region 6

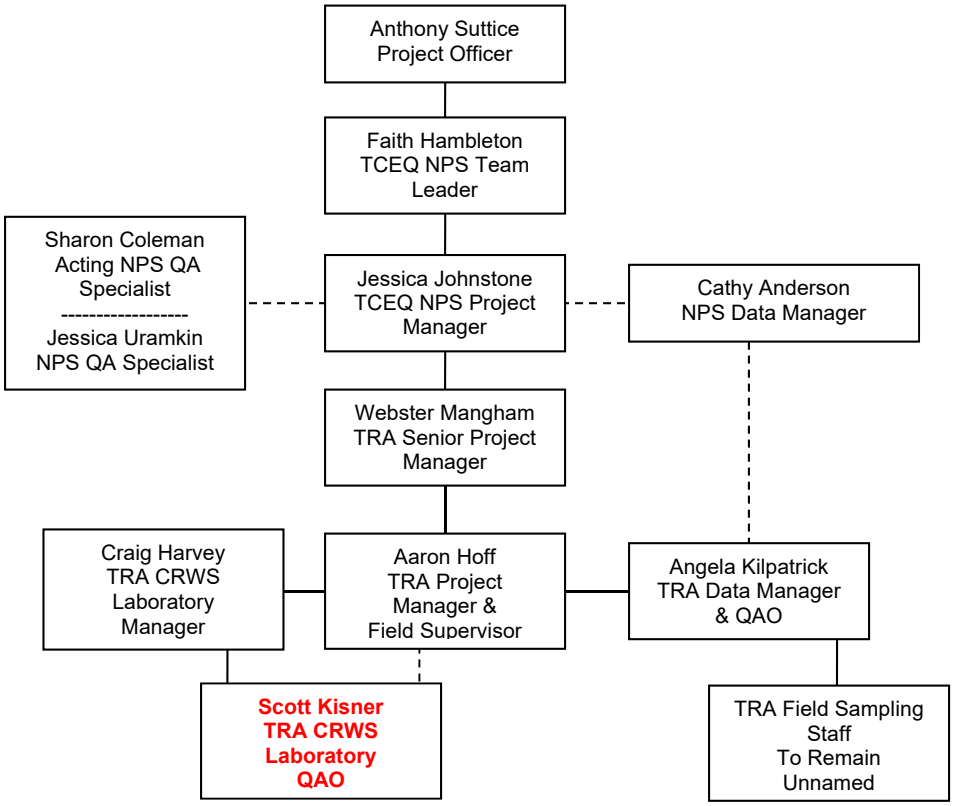
Anthony Suttice

EPA Project Officer

Responsible for managing the CWA Section 319 funded grant on behalf of EPA. Assists the TCEQ in approving projects that are consistent with the management goals designated under the State's NPS management plan and meet federal guidance. Coordinates the review of project work plans, draft deliverables, and works with the State in making these items approvable. Meets with the State at least annually to evaluate the progress of each project and, when conditions permit, participates in project site visits. Fosters communication within EPA by updating management and others, both verbally and in writing, on the progress of the State's program and on other issues as they arise. Assists in grant close-out procedures ensuring all deliverables have been satisfied prior to closing a grant.

Replaces Section A4, page 14 of the JPL WC Monitoring QAPP

Figure A4.1 Organization Chart - Lines of Communication



Replaces Section B2, page 39 of the JPL WC Monitoring QAPP

Processes to Prevent Contamination

Procedures outlined in SWQM Procedures outline the necessary steps to prevent contamination of samples. These include direct collection into sample containers, when possible, and triple rinsing equipment such as buckets used for sample collection with ambient water or deionized water when the use of ambient water for rinsing is not feasible.

Documentation of Field Sampling Activities

Field sampling activities are documented on electronic field data sheets as presented in Appendix D. Flow worksheets may be either handwritten or printed out from the equipment based on which instrument is used. Examples of flow worksheets are shown in Appendix E. The following will be recorded for all sampling events:

- Station ID
- Sampling Date
- Location
- Sampling Depth
- Sampling Time
- Sample Collector's name and signature
- Values for all field parameters
- Notes containing detailed observational data not captured by field parameters, including;
    - Water appearance
    - Weather
    - Biological activity
    - Recreational activity
    - Unusual odors
    - Flow severity
    - Instantaneous flow from gage, flow meter, or weir
    - Pertinent observations related to water quality or stream uses (e.g., exceptionally poor water quality conditions/standards not met; stream uses such as swimming, boating, fishing, irrigation pumps, etc.)
    - Watershed or instream activities (events impacting water quality, e.g., bridge construction, livestock watering upstream, etc.)
    - Specific sample information (number of sediments grabs, type/number of fish in a tissue sample, etc.)
    - Missing parameters (i.e., when a scheduled parameter or group of parameters is not collected)

Replaces Section B3, page 41 of the JPL WC Monitoring QAPP

B3 Sample Handling and Custody

Sample Labeling

Samples from the field are labeled with a pre-printed label affixed to the container. The sample date and time are written on the label with an indelible marker. Label information includes:

1. Site identification or Station ID
2. Date and time of sample collection
3. Type of preservative added, if applicable
4. Indication of field-filtration as applicable
5. Sample type (i.e., analysis(es) to be performed, matrix)

Sample Handling

Field data sheets will be used to document field conditions and sample collection. Electronic data loggers may also be used for flow measurements. **An example of the electronic field data sheet used for this project can be found in Appendix D. All samples are handled and transported under chain of custody forms from the sampling location to the laboratory. An example of the chain of custody form is provided in Appendix H.**

Samples are collected by field crews using appropriate sampling methodologies, preserved by acidification or other appropriate methods if necessary, placed in coolers packed with ice, and delivered to laboratories within holding times.

Upon arrival at the laboratory, transfer of custody is documented on chain of custody forms and samples are placed in coolers and logged into the laboratories' LIM Systems. Laboratory personnel accepting samples will confirm that samples were placed on ice, and that there is still ice remaining around sample containers, indicating that an attempt was made to maintain the temperature of the samples at 6°C. Samples which are required to be cooled but are not received on ice will not be analyzed. In addition, laboratory personnel will confirm that all samples were received as indicated on the chain of custody (COC) forms and that they are preserved as needed (i.e. they will confirm that acidified samples have been lowered to pH <2).

Sample Tracking

Proper sample handling and custody procedures ensure the custody and integrity of samples beginning at the time of sampling and continuing through transport, sample receipt, preparation, and analysis.

Replaces Section C2, page 68 of the JPL WC Monitoring QAPP

C2 Reports to Management

Reports to TRA Project Management

Copies of chain of custody forms are made upon submittal of samples to TRA Central Regional Wastewater System (CRWS) laboratory. TRA field staff will submit electronic field data sheets to the TRA Data Manager in a format appropriate for the QA/QC process. CRWS submits lab data and lab QC information in both CSV format and in hardcopy.

Reports to TCEQ Project Management

All reports detailed in this section are contract deliverables and are transferred to the TCEQ in accordance with contract requirements.

Quarterly Progress Report - Summarizes the TRA's activities for each task; reports monitoring status, problems, delays, and corrective actions; and outlines the status of each task's deliverables.

Monitoring System Audit Response - The TRA will respond in writing to the TCEQ within 30 days upon receipt of a monitoring system audit report to address corrective actions.

Task Reports - Summarize the activities conducted under individual Tasks for the project period including a description and documentation of major Task activities and the evaluation any results.

Final Project Report - Summarizes the TRA's activities for the entire project period including a description and documentation of major project activities; evaluation of the project results and environmental benefits; and a conclusion.

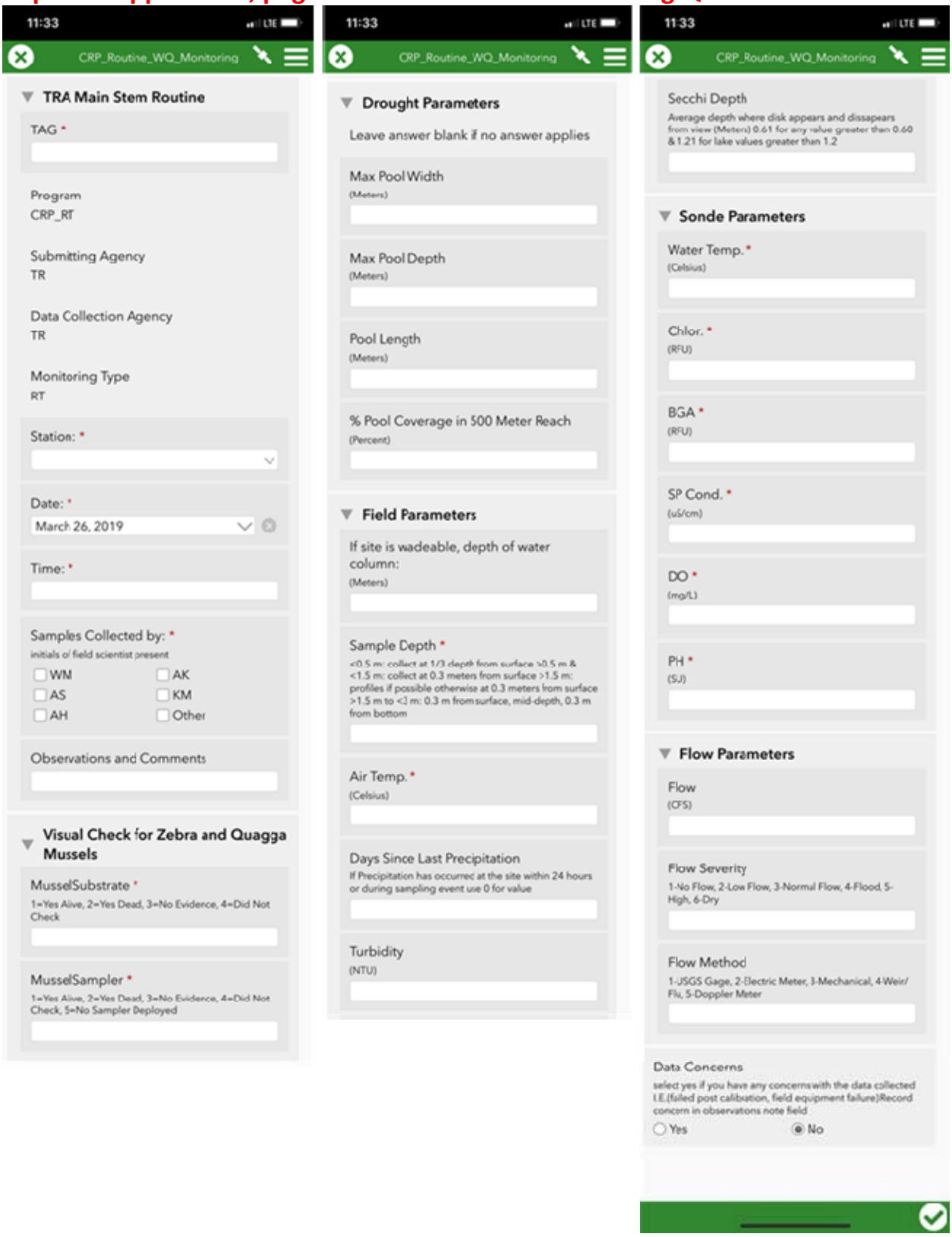
Reports by TCEQ Project Management

Contractor Evaluation - The TRA participates in a Contractor Evaluation by the TCEQ annually for compliance with administrative and programmatic standards. Results of the evaluation are submitted to the TCEQ Financial Administration Division, Procurement and Contracts Section.

Replaces Appendix D, page 109 of the JPL WC Monitoring QAPP

Appendix D Electronic Field Data Sheet

Replaces Appendix D, page 110 of the JPL WC Monitoring QAPP



Adds Appendix H, page 121 to the JPL WC Monitoring QAPP

Appendix H Chain of Custody Form

Adds Appendix H, page 122 to the JPL WC Monitoring QAPP

LIMS # (TRA Lab No.):_____

LIMS Text ID (TRA Lab ID):_____

WC-A PEM CRP

Joe Pool WPP

Tag No: TR1434N
Station: 22131 - WALNUT CREEK AT FM 2738 IN JOHNSON COUNTY
Lat/Long: 32.522905, -97.196734

Date:_____ **Sample pH:**_____

Time:_____

Collected By:_____

Notes:_____

Analyses to be conducted
E. coli
Chlorophyll-a
TP
TKN
NO3
D-OPO4-P
NO2
TDS
TSS
VSS

Quantity	Volume	Matrix	Preservative	Filtered	Parameters
1	100ML NaThic	Water	ICE	NO	E. coli
1	1000ML amber plastic	Water	ICE	NO	Chlorophyll-a
1	1000 ML	Water	H2SO4	NO	TP, TKN
1	4000 ML	Water	ICE	NO	NO3, D-OPO4-P, NO2, TDS, TSS, VSS

Relinquished By:_____
Date/Time:_____
Received By:_____
Date/Time:_____

Relinquished By:_____
Date/Time:_____
Received By:_____
Date/Time:_____

Customer: Environmental Planning and Management
Attention: Angela Kilpatrick
Trinity River Authority Clean Rivers Program
5300 South Cellins, Arlington, TX 76018

Corrections must be made with a single strike-thru and initialed/dated. No writeovers, scratchouts, or whiteout.

Distribution

QAPP Amendments and Revisions to Appendices will be distributed to all personnel on the distribution list maintained by the Planning Agency.

These changes will be incorporated into the QAPP document and TCEQ and the Trinity River Authority will acknowledge and accept these changes by signing this amendment.

Texas Commission on Environmental Quality

Monitoring Division
Laboratory and Quality Assurance Section

_____	_____
Sharon R. Coleman Date	Sharon R. Coleman Date
TCEQ Quality Assurance (QA) Manager	Acting Lead NPS QA Specialist

Water Quality Planning Division

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Faith Hambleton, Team Leader Date	Cathy Anderson, Team Leader Date
NPS Program	Data Management and Analysis
_____	_____
Jessica Uramkin, QA Coordinator Date	Jessica Johnstone, Project Manager Date
NPS Program	NPS Program

Trinity River Authority

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Senior Project Manager	Project Manager & Field Supervisor
_____	
Angela Kilpatrick Date	
Data Manager & QA Officer	

Trinity River Authority Central Regional Wastewater System Laboratory

_____	_____
Craig Harvey Date	Scott Kisner Date
Lab Manager	Lab QA Officer

Sub-tier participants (e.g., subcontractors, subparticipants, or other units of government) will sign the QAPP, indicating the organization's awareness of, and commitment to requirements contained in this quality assurance project plan and any amendments or added appendices of this plan. Signatures in section A1 will eliminate the need for adherence letters to be maintained.

Appendix F: Analysis of Historical Data Report



Analysis of Historical Data

for the

Joe Pool Lake Watershed Characterization Project

October 2019

Trinity River Authority of Texas

On the cover:
Looking downstream at a historical data collection site on Low Branch at the Holland Road crossing.

Analysis of Historical Data

for the

Joe Pool Lake Watershed Characterization Project

Funded by

The Texas Commission on Environmental Quality
(Contract No. 582-19-90205)

Investigating Entities



The Trinity River Authority of Texas

Prepared by

Aaron Hoff, Trinity River Authority
Angela Kilpatrick, Trinity River Authority

TR-1901

October 2019





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List of Acronyms

AU	Assessment Unit
BMP	best management practice
BOD5	5-day biochemical oxygen demand
BSR	Basin Summary Report
CCN	Certificate of Convenience and Necessity
Cl^-	chloride
CRP	Clean Rivers Program
DO	dissolved oxygen
DOQQ	Digital Orthogonal Quarter Quadrangle
DFW	Dallas-Fort Worth metropolitan area
E. coli	*Escherichia coli*
EPA	U.S. Environmental Protection Agency
ESRI	Environmental Systems Research Institute
FEMA	Federal Emergency Management Agency
FWS	U.S. Fish & Wildlife Service
GIS	geographic information system
GLO	General Land Office
JPLWPP	Joe Pool Lake Watershed Protection Plan
LDC	load duration curve
LULC	land use/land cover
MSL	mean sea level
NAIP	National Aerial Imagery Program
NASS	National Agricultural Statistics Service
NH_3	ammonia
NHD	National Hydrography Dataset
NO_2^-	nitrite
NO_3^-	nitrate
NCTCOG	North Central Texas Council of Governments
NRCS	U.S. Department of Agriculture - Natural Resource Conservation Service
NWS	National Weather Service
OP	orthophosphate
OSSF	on-site sewage facility
POR	period of record
RUAA	Recreational Use Attainability analysis
RRC	Texas Railroad Commission
SELECT	Spatially Explicit Load Enrichment Calculation Tool
SO_4^{-2}	sulfate
SWCD	Soil & Water Conservation District
SWQM	Surface Water Quality Monitoring
SWQMIS	Surface Water Quality Monitoring Information System
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TKN	total Kjeldahl nitrogen
TNRIS	Texas Natural Resource Information System
TOP	Texas Orthoimagery Program
TP	total phosphorous
TPWD	Texas Parks and Wildlife Service

TRA	Trinity River Authority of Texas
TSS	total suspended solids
TSSWCB	Texas State Soil & Water Conservation Board
TSWQS	Texas Surface Water Quality Standards
TWDB	Texas Water Development Board
TXDOT	Texas Department of Transportation
USDOT	U.S. Department of Transportation
USGS	U.S. Geological Survey
WPP	watershed protection plan
WWTF	wastewater treatment facilities

1.0 Introduction

1.1 Project Overview and Objectives

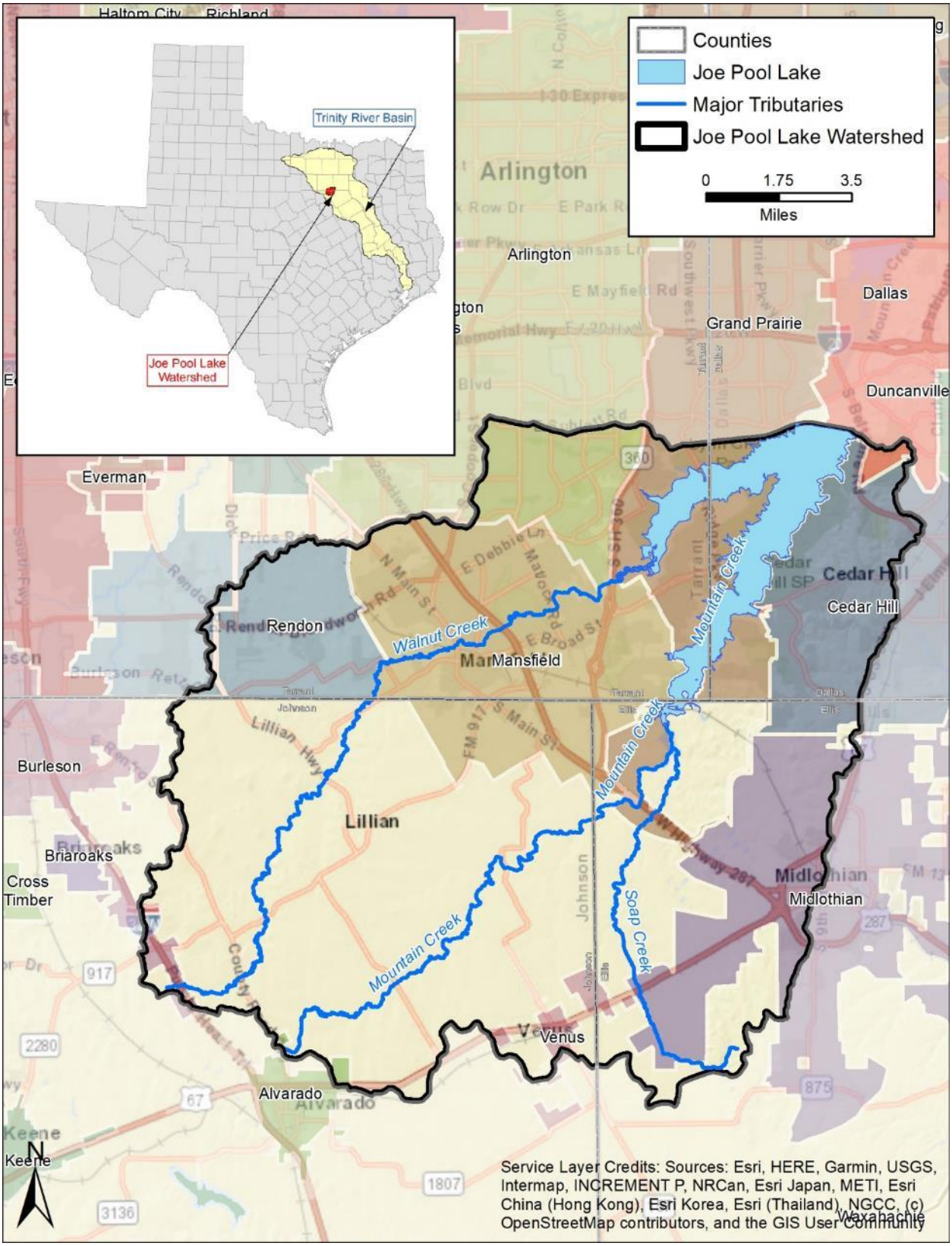
This analysis of historical data was performed as part of an effort to restore water quality within Walnut Creek, which is a tributary of Joe Pool Lake (JPL). The effort has further goals of protecting water quality in Joe Pool Lake, along with its other tributaries, Soap Creek and Mountain Creek. This analysis will support the development of the Joe Pool Lake Watershed Protection Plan (JPLWPP) by assessing existing water quality data in the watershed and analyzing it within the context of various watershed characteristics (e.g., climate, land use, land cover, geology, ecology) to ascertain current and historical conditions, as well as any trends in this data.

Due to Walnut Creek's classification as an impaired waterbody due to elevated levels of bacteria, there will be an emphasis on that constituent throughout the report. However, several other constituents of interest have also been identified through historical data review and stakeholder interaction. These include several nutrients, as well as other in-stream parameters that may indicate concerns for one or more designated uses of Joe Pool Lake and other waterbodies within its contributing watershed. Quality-assured data retrieved from the Texas Commission on Environmental Quality (TCEQ) Surface Water Quality Monitoring Information System (SWQMIS) database will be processed with the use of statistical and geospatial analyses to evaluate temporal/spatial trends and relationships. Specific analyses to be run will include:

1) Regression of *Escherichia coli* (*E. coli*) concentrations with/against other water quality constituents as well as flow (or a surrogate such as precipitation);
2) Evaluation of occurrences of high *E. coli* values and other constituents of interest spatially within the watershed via geographic information systems (GIS) analysis to determine likely sources or subwatersheds for further evaluation; and
3) Plotting data spatially to identify temporal trends.

In pursuit of the overall watershed protection plan (WPP) goals outlined above, the analyses conducted using the results of this historical data report will be used to achieve several objectives, which include:

1) Developing a dataset to support modeling and assessment activities for quantifying pollutant loadings to the lake, especially for those constituents of interest where water quality standards are not being met;
2) Performing the modeling and assessment activities necessary to identify potential pollutant sources and quantifying the loadings of the constituents of interest for all segments;
3) Providing watershed stakeholders with the tools needed to take a proactive approach to watershed protection by engaging them through public outreach and education efforts; and
4) Utilizing stakeholder recommendations and expert technical knowledge within the watershed to develop a WPP that describes specific best management practices (BMPs) intended to reduce pollutant loadings and achieve target reductions for the watershed.



Basemap: ESRI World Streetmap.

Figure 1. Location of the Joe Pool Lake watershed.

1.2 Review of the Watershed and Impairments

The JPL watershed is formed by two major sub-watersheds, Walnut Creek to the west, and Mountain Creek to the east. Walnut Creek's headwaters are located south of the town of Burleson, draining to the northeast. Mountain Creek's headwaters are located north of Alvarado, draining northward to meet Walnut Creek to form Joe Pool Lake. The watershed spans four counties, occupying the adjoining corners of Dallas, Ellis, Johnson, and Tarrant counties (Figure 1). Urban and suburban areas dominate the northern end of the watershed, along with some areas industrial and municipal complexes. The east side of the lake is home to a state park and is thus less developed, although some housing subdivisions are scattered though the area. Land use trends more towards agricultural use in the southern extent, with the exception of some large industrial complexes inside the Midlothian city limits on the southeast perimeter of the watershed. During peak use, JPL currently serves as a drinking water source for up to 40,000 people, primarily serving the community of Midlothian. When demand is high, Midlothian may also provide water to the communities of Venus, Rockett, Mountain Peak, Sardis, and parts of southern Grand Prairie.

Walnut Creek is one of Joe Pool Lake's two main tributaries, listed on TCEQ's *2016 Texas Water Quality Inventory-303(d) List* (TCEQ, 2019a) as impaired for bacteria (first listed in 2006). The Mountain Creek arm of Joe Pool Lake itself was listed on TCEQ's *2014 Water Quality Inventory—Water Bodies with Concerns for Use Attainment and Screening Levels* (TCEQ, 2015b) for nitrate. However, since the onset of this project, the Mountain Creek arm has since been removed, according to the *2016 Water Quality Inventory—Water Bodies with Concerns for Use Attainment and Screening Levels* (TCEQ, 2019b)

2.0 Data Inventory

2.1 Geographic and Spatial Data

Data from a wide variety of sources will be used to characterize the JPL watershed and support the development of the WPP. Data related to water quality/quantity, potential point sources, land use/land cover, soils/geology, and climate were identified, with relevant datasets compiled. In addition to watershed characterization, the datasets listed in Table 1 will be used to characterize potential pollutant sources throughout the watershed, to be analyzed using one or several watershed models or other related analysis tools. More information about this analysis is provided in Section 8.3.

Table 1. Geospatial data sources used for source assessment analysis

Geospatial Data Type	Source	Date(s)	Analysis and/or Processing	Data Use
Aerial imagery	National Aerial Imagery Program (NAIP), Texas Orthoimagery Program (TOP)	2018, 1996	Mosaic and clip raster files to watershed	Determine ground conditions of watershed
Topographic maps (1:24,000 scale)	U.S. Geological Survey (USGS)	1996	Isolate DOQQs situated inside/tangent to watershed boundary	Characterize watershed, reference for hydrologic features
Detailed streets and highways	Environmental Systems Research Institute (ESRI)	2016	None	Public outreach component, orient map viewers to watershed extents
City boundaries	Texas Dept. of Transportation (TXDOT)	2014	Clip features to watershed boundary	Public outreach component
County boundaries	TXDOT	2014	Clip features to watershed boundary	Public outreach component
Joe Pool Lake Watershed	National Hydrography Dataset (NHD)	2009	Aggregate of HUC 12 subwatersheds upstream of the Joe Pool Lake dam and outlet structure, additional hand-delineation to correct for addition of lake	Clipping boundary for isolating other data sources
Census data	U.S. Census Bureau	2010	Distribute population density characteristics appropriately to watershed	Determine population characteristics, base data for several *E.coli* loading components
911 address structures points	North Central Texas Council of Governments (NCTCOG)	2015	Clip source points to watershed boundary	Determine location, density of structures
SWQM stations	Trinity River Authority (TRA), TCEQ	Varies (2012)	Relate to surface water quality data sampling results	Document locations of surface water quality monitoring stations
County Soils Maps	Natural Resource Conservation Service (NRCS) Soil Survey Geographic Database (SSURGO)	2014	Identify areas that may prove problematic for modeling and/or pollutant transport	Characterize watershed, watershed delineation
General Soils Maps	NRCS State Soil Geographic Database (STATSGO)	1997	Identify areas that may prove problematic for modeling and/or pollutant transport	Characterize watershed, watershed delineation

Geospatial Data Type	Source	Date(s)	Analysis and/or Processing	Data Use
National Land Cover Database (NLCD)	Texas Natural Resource Information System (TNRIS)	2016	Clip database to watershed boundary, identify areas that may prove problematic for modeling and/or pollutant transport	Determine land use/land cover in watershed, watershed delineation
LULC field verification points	TRA	2019-2020	Compare to NLCD data	Determine accuracy of NLCD data
Soil/Water Conservation District (SWCD) boundaries	Texas State Soil & Water Conservation Board (TSSWCB)	2014	Isolate Dalworth/Johnson SWCDs	Public outreach strategy
List of steering committee member locations	TRA	2020	Gather geographic information at stakeholder meetings, personal communication, email	Determine distribution of committee member locations to ensure adequate watershed representation
Recreational Use Attainability Analysis (RUAA) sampling locations	TCEQ	2011 (Walnut Creek)	Generalize sampling location results to applicable extents within watershed	Determine extent of recreational use in watershed for bacteria standards applicability
Digital Elevation Models (DEMs)	USGS	2015	Mosaic and clip raster files to watershed mask, process to develop stream network.	Watershed delineation
Weather data	National Weather Service (NWS)	2008-2019	Isolate precipitation, evaporation, and temperature data; isolate for time period dictated by modeling constraints	Watershed delineation
Hydrology - existing lakes and reservoirs	NHD	2009	Ground truth feature margins for accuracy	Watershed delineation
Hydrology – streams	NHD	2009	Clip NHD features to watershed boundary	Watershed delineation
Named streams	NHD	2009	Generalize NHD data for streams, isolate named streams to new layer	Public outreach – use for general information maps
TCEQ stream segments	TCEQ	2016	Clip features to watershed boundary	Watershed delineation
TCEQ assessment units (AUs)	TCEQ	2016	Clip features to watershed boundary	Watershed delineation
Aquifers – major and minor	Texas Water Development Board (TWDB)	2006	None	Public outreach component

Geospatial Data Type	Source	Date(s)	Analysis and/or Processing	Data Use
New TCEQ surface water quality monitoring stations	TRA/TCEQ	Created through project	Identify new/existing station locations at strategic points along stream path	Watershed delineation
Floodplain data	National Flood Hazard Layer – Federal Emergency Management Agency (FEMA)	2015	Compare and adjust land use/land cover (LULC) maps as appropriate	Used to update LULC maps as necessary, public outreach component
Oil & natural gas wells, pipelines, leases	Railroad Commission (RRC) of Texas; Texas General Land Office (GLO)	Varies	Clip features to watershed boundary	Locate and determine density of oil/natural gas wells for potential pollutant point source identification
Public water system wells & surface water intakes	TCEQ	2016	Append well constituent tables to spatial network of wells	Determine if wells may be subject to pollution from nearby sources
Bridge locations	National Bridge Inventory, U.S Dept. of Transportation (USDOT)	2012	Append bridge location data to well information tables, apply to watershed	Component of approximating *E. coli* loading rate from avian sources
Municipal solid waste (MSW) sites/landfills	TCEQ	2007	Verify activity & history of sites clipped to watershed	Potential pollutant point source identification
Solid waste sites/landfills/ illegal dump site field verification	TRA	Created through project	Compare to MSW/landfill database points, add points for illegal dump sites found in watershed	Determine accuracy of municipal solid waste sites/landfills data, identify other dump site point sources
Water control structures database	NRCS/TRA	Created through project	Comparison and integration of TRA and NRCS records	Identify and verify significant impoundments in watershed
Superfund sites	TCEQ	2015	Clip database to watershed boundary	Potential pollutant point source identification
Petroleum storage tanks	TCEQ	2014	Clip database to watershed boundary	Potential pollutant point source identification
Permitted industrial/ hazardous waste sites	TCEQ	n/a	Clip database to watershed boundary	Locate sites for potential pollutant point source identification
Concentrated Animal Feeding Operations (CAFOs)	TCEQ	n/a	Clip database to watershed boundary – **none in watershed**	Locate sites for potential pollutant point source identification
Cattle – population density	USGS National Agricultural Statistics Service (NASS)	2016	Clip database to watershed boundary	*E. Coli* load calculation

Geospatial Data Type	Source	Date(s)	Analysis and/or Processing	Data Use
Sheep – population density	USGS NASS	2015	Clip database to watershed boundary	*E. Coli* load calculation
Goats – population density	USGS NASS	2015	Clip database to watershed boundary	*E. Coli* load calculation
Horses – population density	USGS NASS	2012	Clip database to watershed boundary	*E. Coli* load calculation
Deer – population density	Texas Parks & Wildlife Department (TPWD) deer density study (Lockwood 2007)	2007	Clip database to watershed boundary	*E. Coli* load calculation
Waterfowl – population density	Stakeholder input, using other WPP data as benchmarks	Created through project	Bias to riparian buffers, other areas of interest identified by stakeholders	*E. Coli* load calculation
Other avian – population density	Stakeholder input, using other WPP data as benchmarks	Created through project	Bias to bridge crossings, other areas of interest identified by stakeholders	*E. Coli* load calculation
Feral Hogs – population density	Stakeholder input, using peer-reviewed literature and other WPP data as benchmarks	Created through project	Bias to riparian buffers, other areas of interest identified by stakeholders	*E. Coli* load calculation
Wastewater treatment facilities (WWTFs)	TCEQ	2016	Clip to watershed boundary, verify operational state	*E. Coli* load calculation
Certificates of Convenience and Necessity (CCNs)	Public Utility Commission of Texas (PUC)	2014	Clip to watershed, verify extents	*E. Coli* load calculation
On-site sewage facilities (OSSFs)	Census Bureau	2010	census data, total households – CCNs = total households w/OSSFs	*E. Coli* load calculation
Domestic dogs	Census Bureau and stakeholder input	2010	Census data, households *0.8 = dogs	*E. Coli* load calculation

Note: Metadata that contains the Federal Geographic Data Committee (FGDC) minimum documentation requirements will be created for any acquired spatial data manipulated through data analysis and/or processing.

2.2 Other Studies and Reports

The proposed project seeks to build upon several past and ongoing initiatives in the watershed with water quality improvement components. These projects will be supported and/or progressed by developing an effective WPP. This WPP is expected to identify and provide the groundwork for implementation of strategies to address the current water quality issues of bacteria in Walnut Creek, along with other potential constituents of interest identified by stakeholders during the project and sampling activities. The watershed stakeholders have

demonstrated a long-term commitment towards this goal and have asked TRA to work with them to produce such a WPP. The JPLWPP will not only provide specific direction towards meeting current challenges, but will also provide a holistic framework for protecting water quality as the watershed develops.

2.2.1 Joe Pool Lake Customer Reports

TRA, in association with its member cities, collects additional water quality monitoring data, though this data is not submitted for inclusion in the SWQMIS database. This monitoring is paid for directly by the cities of Cedar Hill, Duncanville, Grand Prairie, and Midlothian, all of whom have water supply interests in the lake. The goal of this monitoring, is similar to that of the Clean Rivers Program (CRP), with the intent to assess, monitor, and protect the many uses of water in Joe Pool Lake, including water supply, aquatic life support, and recreation. TRA compiles this data each year and produces annual reports for the participating cities. Every fifth year, a comprehensive report is prepared, with the latest version, published in 2017, focused on the 2013-2016 period, but including data from as far back as 1997 for examination of long-term trends. This report will summarize the findings of both the 2013-2016 comprehensive report (TRA, 2017), as well as the 2017 annual report (TRA, 2018b).

2.2.2 *E. coli* in Sediments – CRP Special Report

There is local 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. However, 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 River Basin, a study is currently being conducted to identify the extent to which bacteria in sediments may affect water column concentrations. The initial phase of this project focuses on sediment and water column E. coli enumeration. Joe Pool Lake's two primary tributaries (Mountain and Walnut Creeks) are included in the study (TRA, 2019).

2.2.3 CRP Biological Monitoring – Walnut Creek

Each year, TRA conducts Aquatic Life Monitoring in one or more streams. In 2017, this form of monitoring was conducted on Walnut Creek at Katherine Rose Park in Mansfield (TRA, 2018a). 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 wadable streams. This information is used to determine if aquatic life uses are being supported.

3.0 Data Review Methods

3.1 TCEQ Water Quality Standards

TCEQ is responsible for establishing numeric and narrative goals for water quality in the state of Texas. These goals are described in TCEQ's Texas Surface Water Quality Standards (TSWQS) and are approved by the U.S. Environmental Protection Agency (EPA). These standards are codified in the Texas Administrative Code (TAC), Title 30, Chapter 307, hereto referred to as TAC 307 (TCEQ, 2018) and are used by TCEQ regulatory programs to establish reasonable methods of assessing water bodies of the state with the intent of implementing targeted strategies aimed at specific water quality goals. Site-specific water quality criteria for Joe Pool Lake (Segment 0838) and its unclassified tributaries (Segments 0838A through 0838F), as defined in TAC 307, are presented in Table 2. Known deviations from these criteria are noted below the table, although others may exist. For additional information about the collection, preservation, and laboratory analysis of samples collected for these parameters, please consult TCEQ's *Surface Water Quality Monitoring (SWQM) Procedures Manual, Volume 1: Physical and Chemical Monitoring Methods* (TCEQ, 2012).

Table 2. Site-specific water quality criteria for the Joe Pool Lake watershed.

Parameter	Segment ID	
	0838	0838A-F
Cl^- (mg/L)	100	100
SO_4^{2-} (mg/L)	250	-
TDS (mg/L)	500	300
DO (mg/L) 24-hr minimum	3.0	1.5[a]
DO (mg/L) 24-hr average	5.0	2.0[a]
pH range	6.5-9.0	6.5-9.0
E. coli (#/100ml) geomean	126	126[b]
Temperature (°F; °C)	95; 35	95; 35

(a) Tributaries 0838B and 0838C use a DO 24-hr minimum and average of 2.0 mg/L and 3.0 mg/L, respectively.

(b) Walnut Creek (0838C) is designated for Primary Contact 2 with an E. coli geomean criteria of 630 MPN/100 mL)

3.2 Nutrient Screening Levels and Reference Criteria

Currently, no numeric criteria exist for nutrients in streams in the state of Texas. Numeric criteria for chlorophyll-a have been approved by EPA for 75 reservoirs in the state; however, Joe Pool Lake is not one of these reservoirs. In such situations where no water quality standards exist or are in the process of being developed, controls such as narrative criteria and antidegradation considerations are often used. Despite this lack of narrative criteria, TCEQ continues to screen for parameters such as nitrogen, phosphorus, and chlorophyll-a as preliminary indicators in waterbodies of possible concern for 303(d) impairments. To support this effort, nutrient screening levels and reference conditions are often used to compare a waterbody to reference values at a local, regional, or national level. Table 3 provides screening values from various sources. The Texas Nutrient Screening Levels are based on statistical analyses of SWQM monitoring data (TCEQ, 2015a) and the EPA Reference Criteria are regional values based on data from reservoirs and streams within specific ecoregion units and subunits (USEPA, 2000a, 2000b). It is worth noting that these Reference Criteria differ from the Texas Nutrient Screening Levels in that EPA developed the Reference Criteria using conditions that are indicative of minimally impacted (or in some cases, pristine) waterbodies, attainment of which would result in protection of all designated uses within those specific units and subunits. As such, Reference Criteria thresholds are much lower than those for state screening levels, and surpassing them may not necessarily indicate a concern, as is the case with the state thresholds. Where state screening levels or national reference criteria were non-existent, other sources were used. In particular, other sources were used as a reference for screening values of nitrite (NO_2^-) (Mesner & Geiger, 2010).

Table 3. Texas Nutrient Screening Levels and EPA Nutrient Reference Criteria.

Parameter		TCEQ Screening Levels		EPA Reference Criteria				Other Sources
		Lake/Reservoir	Stream	Lake/Reservoir		Stream		
TKN	(mg/L)	-	-	0.38[a]	0.41[b]	0.3[a]	0.4[b]	
NO_2^-	(mg/L)	-	-	-	-	-	-	0.02[c]
NO_3^-	(mg/L)	0.37	1.95	-	-	-	-	
NO_2^-+NO_3^-	(mg/L)	-	-	0.017[a]	0.01[b]	0.125[a]	0.078[b]	
TP	(mg/L)	0.20	0.69	0.02[a]	0.019[b]	0.037[a]	0.038[b]	
OP[d]	(mg/L)	0.05	0.37	-	-	-	-	
Chlorophyll a[e]	(µg/L)	26.7	14.1	5.18[a]	2.875[b]	0.93[a]	1.238[b]	

(a) Reference conditions for aggregate Ecoregion IX waterbodies, upper 25th percentile of data from all seasons, 1990-1999.

(b) Reference conditions for level III Ecoregion 29 waterbodies, upper 25th percentile of data from all seasons.

(c) For nitrite, concentrations above 0.02 mg/L (ppm) usually indicate polluted waters (Mesner, N., J. Geiger. 2010. Understanding Your Watershed: Nitrogen. Utah State University, Water Quality Extension.

(d) OP is no longer used for TCEQ screening purposes, as of the 2014 Texas Integrated Report.

(e) Chlorophyll a, as measured by Spectrophotometric method with acid correction.

3.3 Description of Assessments

3.3.1 TCEQ 2016 Texas Integrated Report

The TCEQ 2016 Texas Integrated Report covers a seven-year assessment period from December 1, 2007 to November 30, 2014. In cases where additional data was needed to make an informed assessment, data from an additional three-year segment beginning December 1, 2005 were used. The methods used for this assessment are described in the TCEQ's 2014 *Guidance for Assessing and Reporting Surface Water Quality in Texas* (TCEQ, 2015a).

Findings of the Integrated Report are classified as Fully Supporting, No Concern, Use Concern, Screening Level Concern, and Not Supporting. To simplify data presentation in this report, the Use Concern and Screening Level Concern classifications were combined into a single "Concern" category. Use Concern findings are given for assessments against designated use standards for water quality parameters such as dissolved oxygen (DO) and *E. coli*. Use Concerns can apply to datasets with limited data where the threshold number of exceedances are met or to datasets with adequate data where there are less than the threshold number of exceedances required for a Not Supporting finding. Screening Level Concerns apply to General Use parameters, such as nutrients and chlorophyll-a, as well as a few other parameters for other designated uses. These parameters have screening levels rather than standards.

3.3.2 TRA In-house Assessment

As part of the 2015 Basin Summary Report (BSR) (TRA, 2015), TRA conducted an in-house assessment using the most recent available and complete data. This includes data collected between December 1, 2008 and November 30, 2013. Data were compared to standards and screening levels in a manner similar to TCEQ methods. A trends analysis was included with the assessment, which may provide information on emerging issues that may not be readily apparent in the results of the TCEQ Integrated Report or the other reports when reviewed separately.

3.3.3 TRA Joe Pool Lake Customer Water Quality Reports

As noted in Section 2.2.1, TRA prepares annual reports for the customer cities of Joe Pool Lake, with a more comprehensive report prepared on a 5-year cycle. The 2013-2016 report will be the primary focus within this document (TRA, 2017), but analyses conducted as part of the 2017 annual report (TRA, 2018b) will be briefly explored.

3.4 Data Collection

Data represented in this report prior to 2012 was collected and submitted to TCEQ under the SWQMIS program, generated either by TRA staff or through TRA's partners within the Clean Rivers Program (CRP). Data collected after that date was still collected under the sampling protocols dictated in SWQM Procedures Manual (TCEQ, 2012), but was not submitted to TCEQ for inclusion in the SWQMIS database. Use of this data will be noted in futures sections, as appropriate, as a caveat.

3.5 Water Quality Trends

Trend analyses were conducted as part of the TRA BSR In-house Assessment (TRA, 2015) and the Joe Pool Lake Customer Reports (TRA, 2017, 2018b). Trend analyses were conducted on all datasets determined to be adequately normal. Those datasets that passed significance testing were determined to have trends that warranted further discussion and investigation. The methods used for data preparation and trend analysis are discussed in detail in the 2015 BSR (TRA 2015). Please consult the corresponding reports for additional information regarding normality, significance, and trends.

4.0 Watershed Characteristics

4.1 General Information

The Joe Pool Lake watershed extends from its headwaters near the cities of Burleson in Johnson County and southern Midlothian in Ellis County to the Joe Pool Lake dam in Dallas County. The watershed consists of several TCEQ-monitored segments, including Joe Pool Lake (0838), a classified segment, and six unclassified segments: Mountain Creek (0838A), Sugar Creek (0838B), Walnut Creek (0838C), Soap Creek (0838D), Hollings Branch (0838E), and an unnamed tributary (0838F), known locally as Low Branch.

4.2 Climate

Mean annual daily temperature from the National Weather Service database for the Dallas/Fort Worth Metroplex (https://www.weather.gov/fwd/dfwclimo) is 66.2°F for the entire period of record (POR) between 1981 and 2010. Temperatures are generally lowest in January and highest in August, with POR daily annual averages of 45.9 °F and 85.6 °F, respectively.

The mean annual precipitation for the Dallas/Fort Worth Metropolitan area is 36.14 inches for the entire POR between 1981 and 2010. The lowest yearly total came in 1921, with only 17.9 inches, with the highest yearly total occurring in 2015, when prolonged storms brought 62.61 inches of rain, along with historic flooding.

4.3 Geology

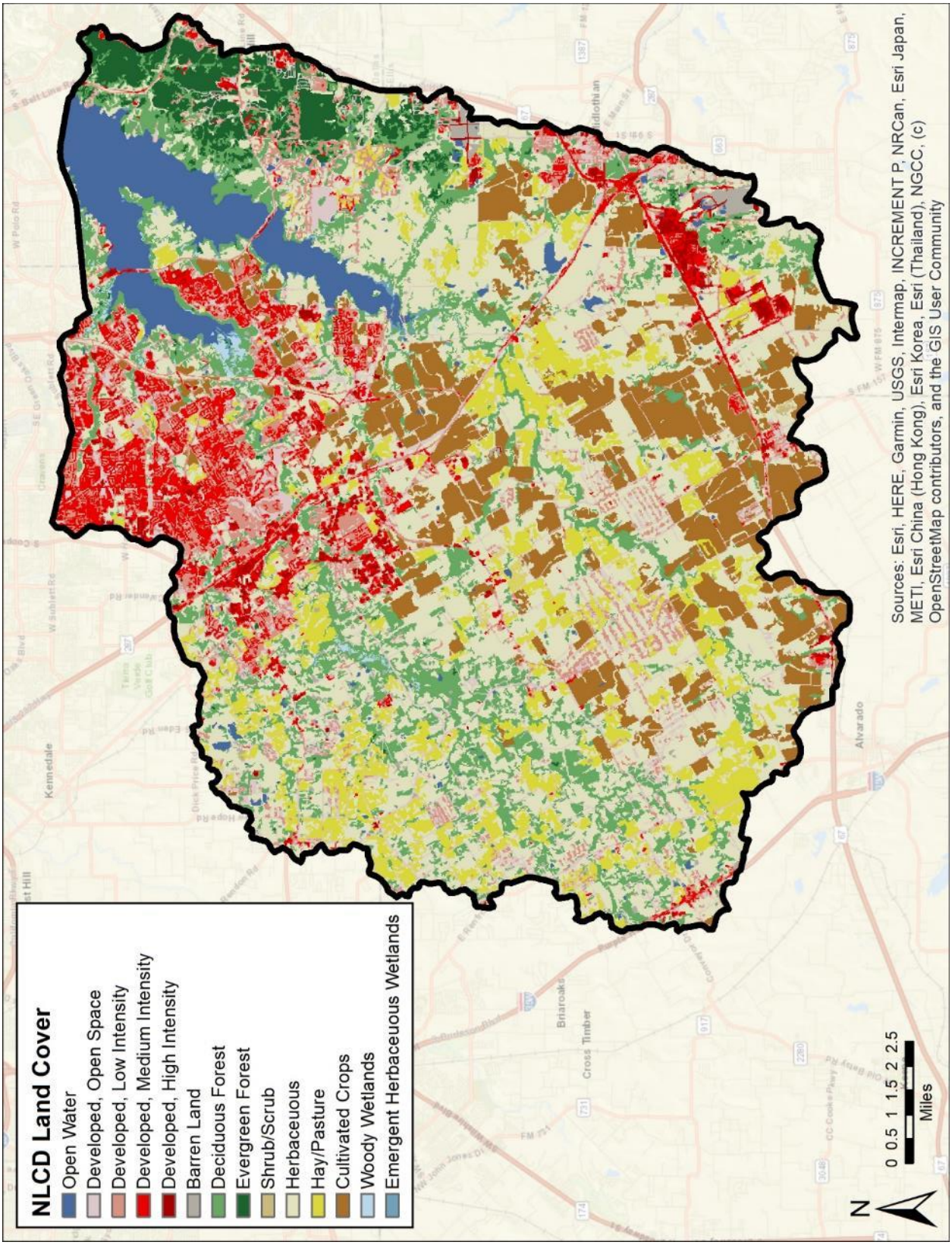
The Joe Pool Lake watershed is generally located within the Grand Prairie physiographic province according to the Physiographic Map of Texas(BEG, 1996). The majority of the watershed is underlain by units from the Austin Chalk, Eagle Ford (undivided), and Woodbine groups, with some fluviatile terrace deposits and alluvial floodplain deposits in areas underlying or near larger waterbodies.

4.4 Soils

Soils in the vicinity of the lake are composed mainly of fine sandy loams and silty clays. Some of the more common upland soil groups in the watershed include Crosstell fine sandy loams, Heiden clays, Houston black clays, and Rader fine sandy loams. Several hydric soils occupy the bottom land areas of the watershed, with Trinity clays, Tinn clays, and Pulexas fine sandy loams being most common. A complete soils list and map are provided in Appendix A.

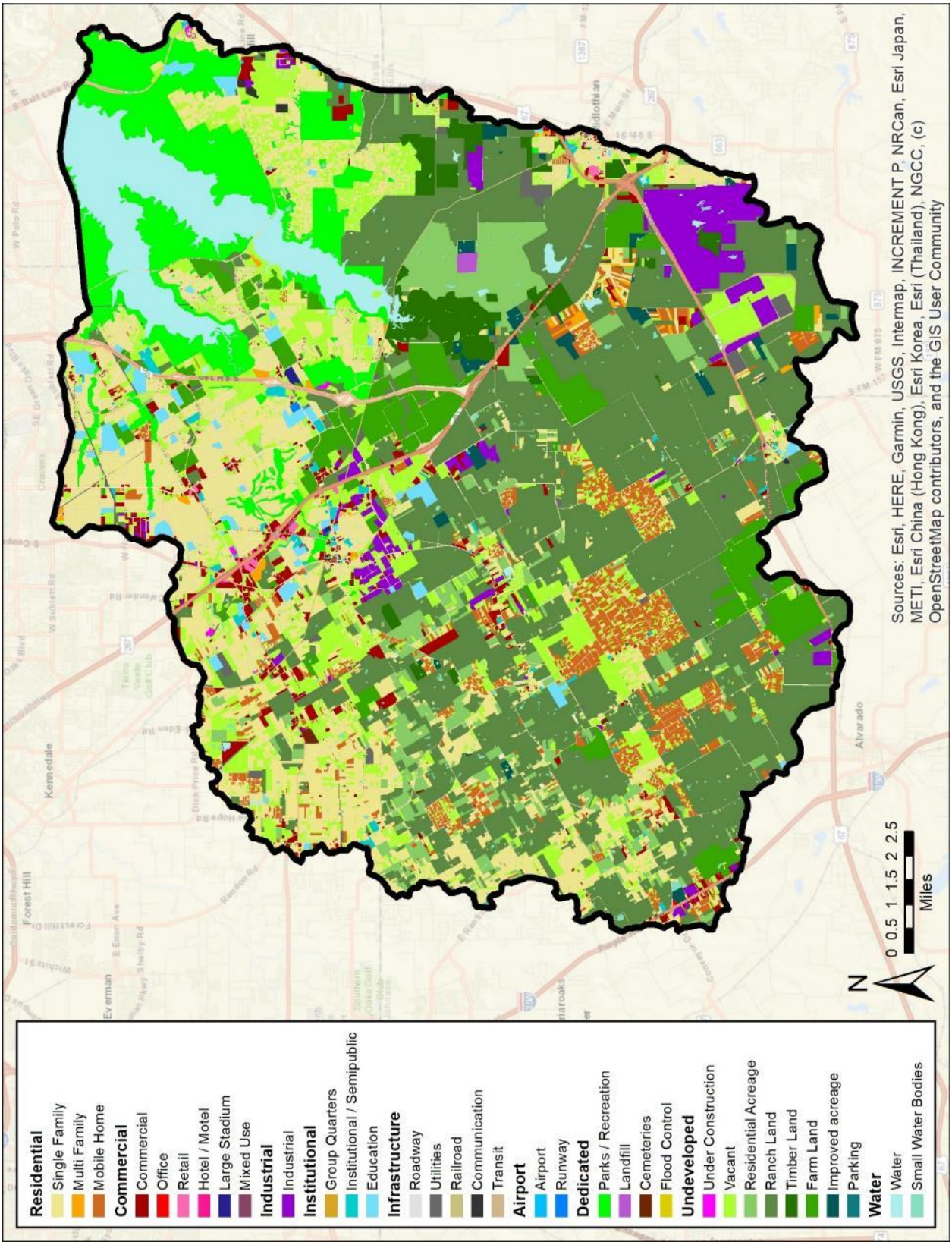
4.5 Land Use and Land Cover

The northern-central and southeastern portions of the subwatershed surrounding the lake are urbanized, while the upstream, southwestern portions of the subwatershed have remained generally rural, dominated by herbaceous cover, with some pastureland and row-crop agriculture. Much of the area east of the lake remains forested, due to the existence of Cedar Hill State Park. Major population centers include the City of Midlothian and the communities of the southwest Dallas-Fort Worth (DFW) Metroplex, which includes portions of Mansfield, Arlington, Grand Prairie, and Cedar Hill. These population centers compose the majority of the developed land in the area, which is shown at as red areas in Figure 2. Land use within the watershed from 2013 is depicted in Figure 3, which relates a use category (residential, industrial, undeveloped, etc.) to the land cover information. The urban centers previously mentioned are characterized by a high percentage of single-family homes, but a significant percentage of industrial complexes appear in the vicinity of Midlothian, with smaller examples near the center of the watershed. Outside of these urbanized areas, ranch land is dominant, with pockets of farm land and undeveloped open lots being typical. The majority of the state park area to the west of the lake is categorized accordingly as parks/recreation land.



Data source: Multi-Resolution Land Characteristics Consortium; Basemap: ESRI World Streetmap.

Figure 2. 2015 NLCD land cover classes in the Joe Pool Lake watershed.



Data source: NCTCOG; Basemap: ESRI World Streetmap.

Figure 3. 2013 NCTCOG land use classifications in the Joe Pool Lake watershed.

4.6 Ecology

The watershed is shared between the Texas Blackland Prairie and Cross Timbers ecoregions. The southwestern extent of the watershed is in the Eastern Cross Timbers ecoregion (29b). Here, post oak (*Quercus stellata*) and blackjack oak (*Q. marilandica*) are common overstory trees, with minor representation from species like black hickory (*Carya texana*), plateau live oak (*Quercus fusiformis*), eastern redcedar (*Juniperus virginiana*), and various sumac species (*Rhus* spp.). with native grasses such as bluestem (*Schizachyrium* spp.), yellow Indiangrass (*Sorghastrum nutans*), and tall dropseed (*Sporobolus asper*) in the understory and within prairie inclusions. In disturbed areas, honey mesquite (*Prosopis glandulosa*) and prickly pear (*Opuntia* spp.) are common.

The eastern extent of the watershed is within the Northern Blackland prairie ecoregion (32a). The area was once dominated by tallgrass prairie species in upland areas, but extensive urbanization has occurred in this ecoregion. In undisturbed areas, this includes big bluestem (*Andropogon gerardii*), yellow Indiangrass, little bluestem (*Schizachyrium scoparium*), and tall dropseed. The remaining forested areas include woody species such as oak (*Quercus macrocarpa, Quercus shumardii*), ash (*Fraxinus* spp.), sugar hackberry (*Celtis laevigata*) elm (*Ulmus* spp.), pecan (*Carya illinoensis*), and eastern cottonwood (*Populus* deltoides) are common (Griffith 2007).

Although no instances of critical habitat occur within the watershed for any federally-listed threatened and endangered species, a U.S. Fish and Wildlife Service (FWS) Information, Planning, and Consultation (IPaC) report indicated the possible presence of several threatened and endangered species that may occur intermittently throughout the watershed. Of note were several endangered avian species, including the Golden-cheeked Warbler (*Dendroica chrysoparia*), Least Tern (*Sterna antillarum*), Piping Plover (*Charadrius melodus*), and Red Knot (*Calidris canutus rufa)*. The list also included one species of clam, the Texas Fawnsfoot (*Truncilla macrodon*), which is currently listed as a Candidate species. The full IPaC report is provided in Appendix B.

In most cases, state lists of threatened and endangered species are more robust, given the increased specificity for critical populations and habitats afforded by the smaller scope of study inherent to state boundaries. As a result of this refined scope, additional avian and mollusk species appear within the state list produced by the TPWD is provided in Appendix C. The state list also includes several fish, mammal, reptilian, and plant species, which are not shown in the Federal list.

5.0 Reservoir Characteristics

5.1 General Information

Named after Congressman Joe Pool of Oak Cliff, the lake is operated by the Trinity River Authority for conservation, flood control, recreation, and water supply purposes Originally designated as Lakeview Reservoir, the lake is formed by a rolled earthen dam structure, with its spillway elevation of 536 ft above mean sea level (MSL). Construction on the dam was completed in December 1985, and the lake was filled by January 1989. (Dallas Times Herald, 1989).

Several recreational areas utilize a significant portion of the 64 miles of lakeshore provided by the reservoir. The largest of these is Cedar Hill State Park, which encompasses much of the eastern lakeshore of the Mountain Creek arm. Pleasant Valley Park exists just south of the State Park. Loyd Park and Lynn Creek Park are located on the lake's northwestern shores on the Walnut Creek arm, while Estes Park can be found between the two arms of the lake (Dallas Times Herald, 1989).

5.2 Hydraulics

Joe Pool Lake receives 100% of its yield from natural tributaries, draining an area of approximately 232 square miles. These incoming flows are comprised of stormwater runoff, as well as treated wastewater effluent from two WWTFs and several smaller domestic sewage discharges within the watershed (Table 4). Databases

maintained by USEPA did not identify any discharges of cooling water, mining effluent, or concentrated animal feeding operation effluent in the watershed.

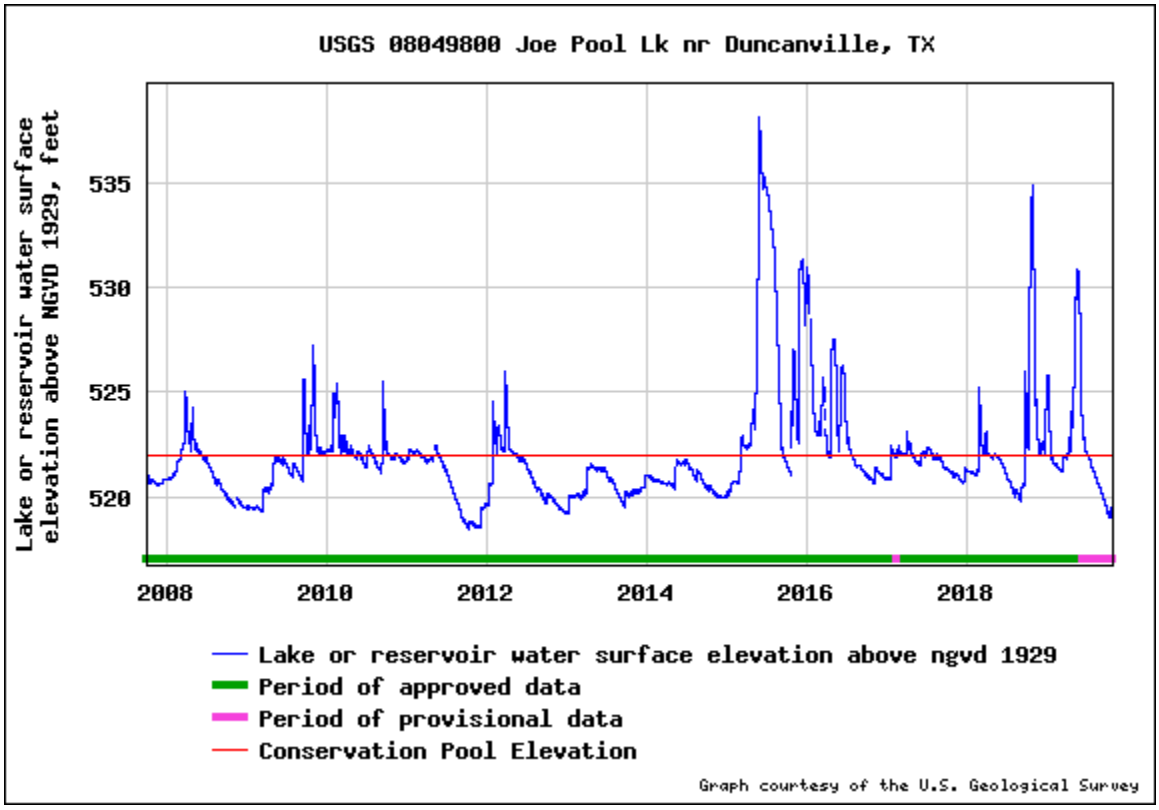
Table 4. Discharges in the Joe Pool Lake watershed, by type and count.

County	Domestic Sewage <1 MGD	Wastewater Dischargers >1 MGD	Total
Ellis	2	2	4
Johnson	5		5
Tarrant	1		1
Total	**8**	**2**	**10**

No discharge permits for cooling water, concentrated animal feeding operations, or mining exist in the watershed.

Withdrawals in the lake for public water supply purposes are currently limited to the City of Midlothian's activities. Midlothian withdraws anywhere from 1 MGD during winter months, up to 9 MGD during peak demand in the summer. Summer withdrawals by the City may also include sales of the water to other communities, including southern Grand Prairie, Venus, Mountain Peak, and Sardis to supplement their water supplies during peak demand. Midlothian withdraws their water from an intake structure in the southern extent of the Mountain Creek arm of the lake. The TRA has a separate structure to the north, located off the shoreline of Cedar Hill State Park. This structure is currently inactive. Likewise, several other entities have interests in developing the water resources of the lake, but have yet to tap into those resources.

The normal conservation pool level of 522 MSL (red line in Figure 4) creates an impoundment of 7,400 acres (USACE, n.d.), with a maximum depth of 75 ft. Joe Pool Lake has a conservation storage capacity of 176,900 acre-feet. Historical lake elevations from 2007 to 2019 are provided in Figure 4 below.

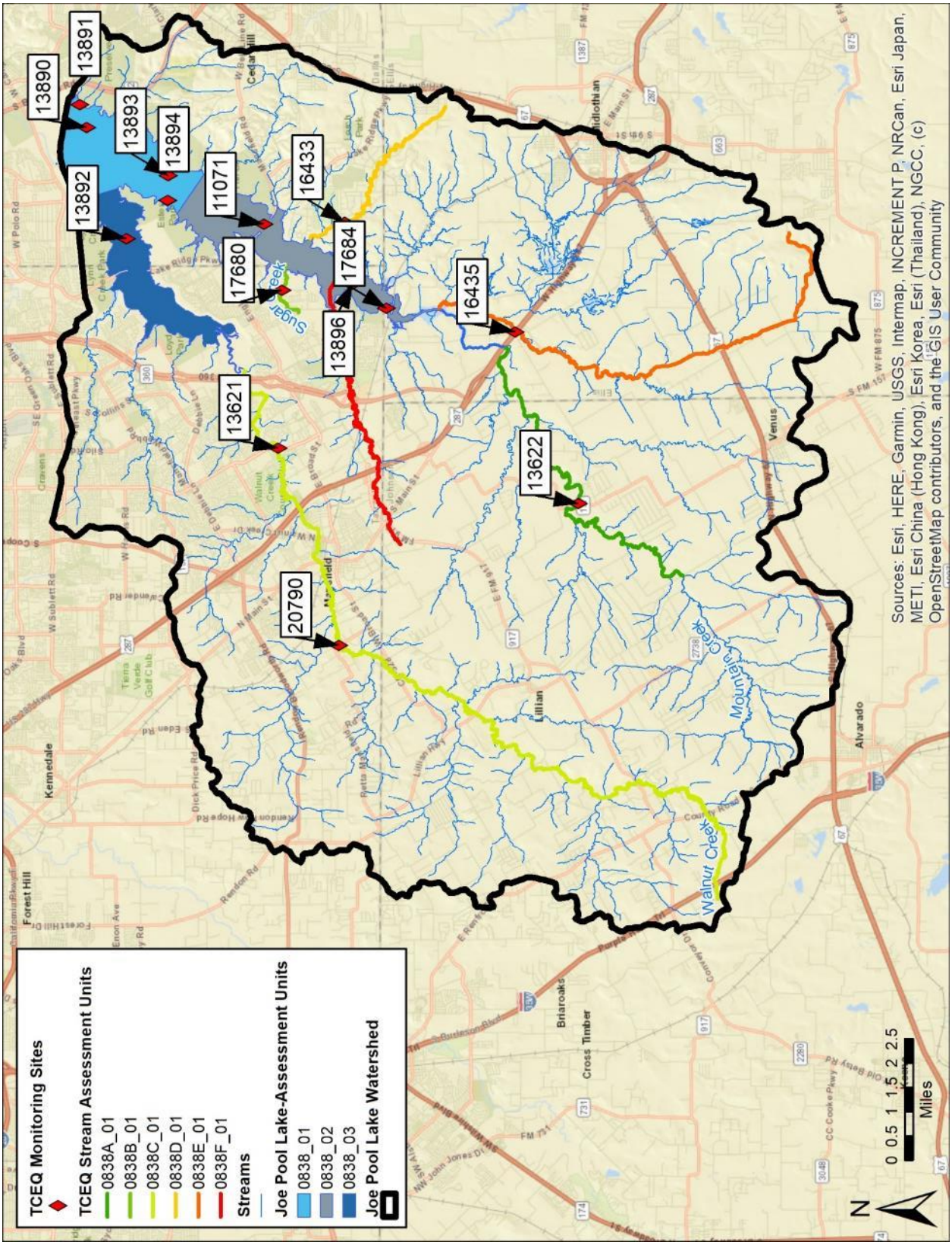


Data source: USGS.

Figure 4. Daily Observed Water Surface Elevation in Joe Pool Lake, 2007-2019.

5.3 Water Quality Monitoring Data

The lake is composed of 3 assessment units (AUs) that are analyzed for water quality, as part of TCEQ's SWQMIS. These assessment units and their location descriptions are listed in Table 5 below, as well as in all other use assessment results tables that follow. Each assessment unit contains one or more SWQMIS monitoring station, from which data is analyzed to evaluate the unit's use assessment. The locations of these monitoring stations, as well as the locations of the assessment units, are provided in Figure 5. It is important to note that while information from each unit's station is listed separately in the reporting database, the lake is evaluated as a whole segment, compounding data from all 3 assessment units for analysis. Stream segments are evaluated separate from one another, but likewise may be composed of data from several monitoring stations. All stream segments discussed in this report are composed of a single AU.



Basemap: ESRI World Streetmap.

Figure 5. Water quality monitoring stations, hydrography, and Lake Assessment Units.

5.3.1 Aquatic Life Use Assessments

Adequate aquatic life use data was only available for assessment unit 0838_02 (Table 5). The water quality parameter associated with aquatic life assessments is DO. The available data showed that the segment was fully supporting aquatic life uses.

Table 5. Aquatic life use assessment results for Joe Pool Lake.

Waterbody	AU	2016 TCEQ Report
Joe Pool Lake: Lowermost portion of reservoir adjacent to the dam	0838_01	Not Assessed (No Data)
Joe Pool Lake: Mountain Creek arm	0838_02	Fully Supporting
Joe Pool Lake: Walnut Creek arm	0838_03	Not Assessed (No Data)

5.3.2 Contact Recreation Use Assessments

Adequate recreational use data was only available for assessment unit 0838_02. The water quality parameter associated with this assessment is *E. coli.* This segment was found to have no concern based on the TCEQ 2016 Integrated Report (Table 6).

Table 6. Contact recreation use assessment results for Joe Pool Lake.

Waterbody	AU	2016 TCEQ Report
Joe Pool Lake: Lowermost portion of reservoir adjacent to the dam	0838_01	Not Assessed (No Data)
Joe Pool Lake: Mountain Creek arm	0838_02	No Concern
Joe Pool Lake: Walnut Creek arm	0838_03	Not Assessed (No Data)

5.3.3 General Use Assessments

Adequate general use data was available for assessment units 0838_01 and 0838_02. The water quality parameters associated with this assessment are temperature, pH, dissolved solids, and several nutrients. Both assessment units were found to be fully supportive of general uses (Table 7).

Table 7. General use assessment results for Joe Pool Lake.

Waterbody	AU	2016 TCEQ Report
Joe Pool Lake: Lowermost portion of reservoir adjacent to the dam	0838_01	Fully Supporting
Joe Pool Lake: Mountain Creek arm	0838_02	Fully Supporting
Joe Pool Lake: Walnut Creek arm	0838_03	Not Assessed (No Data)

5.3.4 Fish Consumption Use Assessments

Adequate fish consumption use data was unavailable for all assessment units within Joe Pool Lake (Table 8). As such, no support assessment for the fish consumption use can be made at this time.

Table 8. Fish consumption use assessment results for Joe Pool Lake.

Waterbody	AU	2016 TCEQ Report
Joe Pool Lake: Lowermost portion of reservoir adjacent to the dam	0838_01	Not Assessed (Inadequate Data)
Joe Pool Lake: Mountain Creek arm	0838_02	Not Assessed (Inadequate Data)
Joe Pool Lake: Walnut Creek arm	0838_03	Not Assessed (Inadequate Data)

5.3.5 Public Water Supply Use Assessments

Adequate public water supply use data was unavailable for all assessment units within Joe Pool Lake (Table 9). As such, no support assessment for public water supply use can be made at this time.

Table 9. Public water supply use assessment results for Joe Pool Lake.

Waterbody	AU	2016 TCEQ Report
Joe Pool Lake: Lowermost portion of reservoir adjacent to the dam	0838_01	Not Assessed (No Data)
Joe Pool Lake: Mountain Creek arm	0838_02	Not Assessed (No Data)
Joe Pool Lake: Walnut Creek arm	0838_03	Not Assessed (No Data)

6.0 Stream Characteristics

6.1 Flow

Flow data for Walnut Creek is tracked continuously by a USGS gaging station at the Walnut Creek bridge on Matlock Rd (USGS Gage #08049700), with data back to July 2007. Mountain Creek is also gaged (USGS Gage #08049580), with data back to 1987. Other flow data exist at other stations throughout the watershed within SWQMIS that will be used to supplement the USGS dataset, where appropriate.

6.2 Water Quality Monitoring Data

Six stream AUs in the Joe Pool Lake watershed have been monitored by TCEQ through 2012. With the exception of Walnut Creek, all AUs contain a single station used for use attainment analyses. It is important to note that data taken at sites 13621 and 13622 are sampled where the previously-mentioned USGS gages are located for Walnut and Mountain Creeks, respectively. Data in SWQMIS is available from 1997 to 2012.

6.2.1 Aquatic Life Use Assessments

Adequate aquatic life use data was available for all assessment units aside from 0838A (Table 10). As with Joe Pool Lake, DO was the water quality parameter used in the assessment. The available data showed that all AUs with available data fully supported aquatic life uses.

Table 10. Aquatic life use assessment results for unclassified segments.

Waterbody	AU	2016 TCEQ Report
Entire segment	0838A_01	Not Assessed (No Data)
Entire segment	0838B_01	Fully Supporting
From the confluence with Joe Pool Lake up to the headwaters at Spring Street in Burleson	0838C_01	Fully Supporting
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	Fully Supporting
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	0838E_01	Fully Supporting
Intermittent stream from the confluence with Mountain Creek south of Mansfield upstream to the headwaters approximately 2.0 km upstream of FM 157 in Mansfield	0838F_01	No Concern

6.2.2 Contact Recreation Use Assessments

This segment was found to be not supportive of contact recreation uses due to elevated *E. coli* geometric means (Table 11). Current standards for *E. coli* are 399 MPN/100 mL for a single grab sample and 126 MPN/100 mL for

the geometric mean of samples over time. Data from the 2016 Integrated Report suggest that 0838C was only slightly out of compliance, reporting at 126.62 MPN/100 mL, just barely above the quality criteria of 126 MPN/100 mL. As discussed above, elevated *E. coli* and stream flow values typically occur in tandem due to nonpoint source inputs of incoming stormwater runoff from the surrounding watershed. A residential subdivision with a golf course is located immediately upstream of the sampling station, but is wooded along the channel. Further upstream, this wooded riparian zone continues through rural areas. The *E. coli* impairment is therefore assumed to be caused either by wildlife or pet waste. Failing septic systems from further upstream are also suspect.

Table 11. Contact recreation use assessment results for unclassified segments.

Waterbody	AU	2016 TCEQ Report
Entire segment	0838A_01	Not Assessed (No Data)
Entire segment	0838B_01	Fully Supporting
From the confluence with Joe Pool Lake up to the headwaters at Spring Street in Burleson	0838C_01	Not Supporting
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	Fully Supporting
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	0838E_01	Fully Supporting
Intermittent stream from the confluence with Mountain Creek south of Mansfield upstream to the headwaters approximately 2.0 km upstream of FM 157 in Mansfield	0838F_01	No Concern

6.2.3 General Use Assessments

Adequate data for general use determinations was unavailable for all assessment units within Joe Pool Lake tributaries (Table 12).

Table 12. General use assessment results for unclassified segments.

Waterbody	AU	2016 TCEQ Report
Entire segment	0838A_01	Not Assessed (No Data)
Entire segment	0838B_01	Not Assessed (No Data)
From the confluence with Joe Pool Lake up to the headwaters at Spring Street in Burleson	0838C_01	Not Assessed (No Data)
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	Not Assessed (No Data)
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	0838E_01	Not Assessed (No Data)
Intermittent stream from the confluence with Mountain Creek south of Mansfield upstream to the headwaters approximately 2.0 km upstream of FM 157 in Mansfield	0838F_01	Not Assessed (No Data)

6.2.4 Fish Consumption Use Assessments

For the TCEQ Integrated Report, Adequate fish consumption data were available for the assessment unit 0838A and 0838D, as reviewed under the TCEQ Integrated Report. The available data showed that these segments were all fully supporting aquatic life uses (Table 13).

Table 13. Fish consumption use assessment results for unclassified segments.

Waterbody	AU	2016 TCEQ Report
Entire segment	0838A_01	Not Assessed (No Data)
Entire segment	0838B_01	Fully Supporting
From the confluence with Joe Pool Lake up to the headwaters at Spring Street in Burleson	0838C_01	Not Assessed (No Data)
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	No Concern
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	0838E_01	Not Assessed (No Data)
Intermittent stream from the confluence with Mountain Creek south of Mansfield upstream to the headwaters approximately 2.0 km upstream of FM 157 in Mansfield	0838F_01	Not Assessed (No Data)

6.2.5 Public Water Supply Use Assessments

Typically, streams are not used for public water supplies. However, since these segments are tributaries to a water supply reservoir, it may prove beneficial to continue monitoring public water supply use parameters and compare them to those from the lake (Table 10), in the event that any trends or predictive variables develop.

Table 14. Public water supply use assessment results for unclassified segments.

Waterbody	AU	2016 TCEQ Report
Entire segment	0838A_01	Not Assessed (No Data)
Entire segment	0838B_01	Not Assessed (No Data)
From the confluence with Joe Pool Lake up to the headwaters at Spring Street in Burleson	0838C_01	Not Assessed (No Data)
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	Not Assessed (No Data)
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	0838E_01	Not Assessed (No Data)
Intermittent stream from the confluence with Mountain Creek south of Mansfield upstream to the headwaters approximately 2.0 km upstream of FM 157 in Mansfield	0838F_01	Not Assessed (No Data)

7.0 Trend Analysis

There were 32 significant trends identified for this segment as summarized in Table 15. Four sites were analyzed for responses for trends, 0838_2 for the lake, and 0838B, C, and E for tributaries. For additional detail on trend methods, please see the Data Review Methodology section in the 2015 BSR (TRA, 2015).

Additional years of data were included in the trend analysis undertaken in the 2013-2016 Joe Pool Lake Water Quality Report, using data from various parameters taken as far back as 1997. The results of these analyses are provided in Table 16. Do recall that portions of datasets used to produce these trend analyses may not have been submitted to TCEQ for inclusion in the SWQMIS database, but were still collected using proper SWQM collection procedures (TRA, 2017). In the graph, increasing trends are noted in orange, with decreasing trends noted in green.

7.1 Trends in Joe Pool Lake

To supplement the summary provided in Table 15, Table 17 is provided for a detailed analysis of the significant trends within Joe Pool Lake. Overall, trends in this segment have R^2 values equal to/less than 0.2. Secchi depth appears to be the lone constituent of interest with respect to increasing trends, while it would appear that pH is slowly decreasing.

The long-term trend analysis in Table 16 revealed that statistically significant increasing trends exist in Joe Pool Lake for DO, total suspended solids (TSS), and chlorophyll-a. However, decreases were observed for long-term trends of pH, nitrate/nitrite, ortho-phosphate, and hardness.

Table 15. Trend analysis results summary for Joe Pool Lake (0838) and its tributaries (0838A-0838E).

Assessment Unit		Flow			Secchi Depth			Water Temp			pH			Sp Cond			*E. coli*			TDS			Chloride		
Seg_AU	Site	A	S	W	A	S	W	A	S	W	A	S	W	A	S	W	A	S	W	A	S	W	A	S	W
0838_02	17684						UP						DN												
0838B_01	17680					UP	UP							DN		DN	DN	DN		DN		DN			
0838C_01	13621		DN				DN																DN	DN	DN
0838E_01	16435									UP															

Assessment Unit		SO4			BOD5			NH3			NO3			TKN			TP			Hardness		
Seg_AU	Site	A	S	W	A	S	W	A	S	W	A	S	W	A	S	W	A	S	W	A	S	W
0838_02	17684																					
0838B_01	17680	DN		DN					UP			DN		DN	DN	DN				DN	DN	
0838C_01	13621					UP											UP	UP	UP	DN	DN	DN
0838E_01	16435																					

Trends Key

A-All Months

S-Summer/Growing Season (May-October)

W-Winter/Dormant Season (November-April)

UP Increasing Trends

DN Decreasing Trends

Table 16. Long-term trends (1997-2016) in the main body of Joe Pool Lake and in its tributaries.

Site	Parameter	MEAN	MAXIMUM	MINIMUM	DATA #	Trend of Test (p=0.05)
Main Body	TEMPERATURE, WATER DEG C	20.19	33.59	6.08	618	No Trend
	OXYGEN, DISSOLVED mg/L	8.33	16.49	ND	598	Increasing
	PH s.u.	8.16	10.53	5.16	615	Decreasing
	TSS mg/L	7.84	42.00	ND	239	Increasing
	NO2 + NO3 mg/l	0.16	0.98	ND	270	Decreasing
	NH3 mg/L	0.03	0.19	ND	266	Decreasing
	TKN mg/L	0.48	1.40	ND	266	No Trend
	TP mg/L	0.03	0.94	ND	265	No Trend
	HARDNESS mg/L	159.28	316.00	ND	540	Decreasing
	E. COLI MPN/100 mL	18.48	649.00	ND	102	No Trend
	CHLOROPHYLL-A ug/L	6.82	27.00	ND	222	Increasing
	OP mg/L	ND	0.10	ND	269	Decreasing
Tributary	HARDNESS mg/L	339.85	777.00	66.00	392	No Trend
	E. COLI MPN/100 mL	964.91	41100.00	2.00	98	Decreasing
	TDS mg/L	670.36	2260.00	169.00	391	No Trend

Table 17. Detailed trend analysis results for Joe Pool Lake (0838).

Segment	Station	Parameter	Season	R^2	Slope	P	Std Dev	T	Skewness /SES	Kurtosis/ SEK	N	Mean	Max	Q75	Median	Q25	Min	IQR	Min Date	Max Date
0838_02	17684	Secchi	Winter	0.2	0.2	0.04	0.09	2.23	0.94	0.3	22	0.13	0.34	0.15	0.1	0.08	0.04	0.07	11/15/2004	4/22/2008
0838_02	17684	pH	Winter	0.16	-0.09	0.04	0.04	-2.17	0.36	-0.47	27	8.03	8.6	8.2	8	7.9	7.5	0.3	12/15/2003	4/22/2008

Table 18. Detailed Trend Analysis Result for three Joe Pool Lake tributaries (0838B, 0838C, and 0838E).

Segment	Station	Parameter	Season	R^2	Slope	P	Std Dev	T	Skewness /SES	Kurtosis/ SEK	N	Mean	Max	Q75	Median	Q25	Min	IQR	Min Date	Max Date
0838B_01	17680	Secchi Depth	Summer	0.31	0.04	0	0.01	5.02	-1.25	-2.32	58	0.41	0.6	0.6	0.46	0.21	0.02	0.39	5/24/2004	10/30/2013
0838B_01	17680	Secchi Depth	Winter	0.22	0.03	0	0.01	3.71	1.28	-1.33	51	0.34	0.76	0.52	0.34	0.19	0.08	0.33	11/15/2004	11/19/2013
0838B_01	17680	Sp Cond	POR	0.15	-0.05	0	0.01	-4.51	0.06	1.01	##	717.85	1590	790	659	536	214	254	12/15/2003	11/19/2013
0838B_01	17680	Sp Cond	Winter	0.22	-0.07	0	0.02	-4.06	-0.13	0.26	59	761.98	1590	990	678	537	214	453	12/15/2003	11/19/2013
0838B_01	17680	NH3	Summer	0.33	0.01	0.01	0	3	0.88	-0.45	20	0.08	0.17	0.11	0.07	0.04	0	0.07	5/24/2004	8/20/2013
0838B_01	17680	NO3	Summer	0.43	-0.26	0	0.07	-3.49	0.73	-0.28	18	0.22	1.45	0.23	0.1	0.03	0.03	0.21	5/24/2004	8/20/2013
0838B_01	17680	TKN	POR	0.2	-0.08	0.01	0.03	-2.93	1.1	0.77	36	0.73	2.3	0.9	0.6	0.49	0.22	0.41	2/23/2004	11/19/2013
0838B_01	17680	TKN	Summer	0.26	-0.08	0.03	0.03	-2.43	1.27	0.64	19	0.85	2.3	0.95	0.69	0.6	0.3	0.35	5/24/2004	8/20/2013
0838B_01	17680	TKN	Winter	0.19	-0.04	0.08	0.02	-1.88	1.87	0.88	17	0.6	1.3	0.6	0.6	0.4	0.22	0.2	2/23/2004	11/19/2013
0838B_01	17680	Hardness	POR	0.13	-0.03	0.03	0.01	-2.29	0.14	1.03	37	133.78	272	148	132	120	74	28	2/23/2004	11/19/2013
0838B_01	17680	Hardness	Summer	0.28	-5.29	0.03	2.18	-2.42	0.17	-1.15	17	116.76	164	140	120	88	74	52	5/24/2004	8/20/2013
0838B_01	17680	SO4	POR	0.14	-0.05	0.03	0.02	-2.34	0.31	1.38	37	166.68	420	191	146.1	124	54	67	2/23/2004	11/19/2013
0838B_01	17680	SO4	Winter	0.19	-8.48	0.07	4.32	-1.96	1.74	0.88	18	165.29	306	195	153	128	77.3	67	2/23/2004	11/19/2013
0838B_01	17680	E. coli	POR	0.12	-0.22	0	0.05	-3.99	0.88	-0.83	##	264.68	2800	160	52	17	0.5	143	12/15/2003	11/19/2013
0838B_01	17680	E. coli	Summer	0.27	-0.33	0	0.07	-4.58	1.3	-0.87	59	303.97	2600	160	46	17	2	143	5/24/2004	10/30/2013
0838B_01	17680	TDS	POR	0.15	-0.05	0	0.01	-4.58	-0.33	1.28	##	468.5	1034	514	422.58	355.6	139	158.5	12/15/2003	11/19/2013
0838B_01	17680	TDS	Winter	0.24	-0.07	0	0.02	-4.22	-0.3	0.78	59	502.42	1034	643.5	444.41	358.2	139	285.4	12/15/2003	11/19/2013
0838C_01	13621	Air Temp	Summer	0.11	-1.51	0.05	0.75	-2	-0.36	0.08	33	25.44	38	28.5	25	23	11	5.5	5/24/2004	10/21/2008
0838C_01	13621	Flow	Summer	0.26	-0.47	0.09	0.25	-1.87	-0.53	-0.67	16	7.15	73	6.6	0.45	0.01	0	6.6	6/15/2004	9/18/2012
0838C_01	13621	Secchi Depth	Winter	0.13	-0.06	0.08	0.03	-1.82	-0.93	-1.17	24	0.4	0.6	0.6	0.45	0.25	0.08	0.35	11/15/2004	11/18/2008
0838C_01	13621	BOD5	Summer	0.21	0.23	0.06	0.11	2.03	1.81	-0.22	17	2.02	7	3	1	1	1	2	5/24/2004	8/19/2008
0838C_01	13621	TKN	Summer	0.27	0.2	0.07	0.1	2.01	1.2	1.57	13	0.73	1.9	0.7	0.6	0.6	0.3	0.1	5/24/2004	5/20/2008
0838C_01	13621	TP	POR	0.45	0.8	0	0.19	4.31	-0.41	-1.4	25	0.1	0.62	0.13	0.06	0.01	0.01	0.13	2/23/2004	11/18/2008
0838C_01	13621	TP	Summer	0.42	0.78	0.02	0.29	2.67	-0.33	-0.7	12	0.13	0.62	0.17	0.06	0.02	0.01	0.15	5/24/2004	8/19/2008
0838C_01	13621	TP	Winter	0.52	0.04	0.01	0.01	3.48	1.12	-0.55	13	0.08	0.23	0.11	0.04	0.01	0.01	0.11	2/23/2004	11/18/2008
0838C_01	13621	Hardness	POR	0.3	-69.4	0	18.5	-3.76	-0.68	-0.95	35	432.46	730	564	458	290	112	274	1/22/2004	11/18/2008
0838C_01	13621	Hardness	Summer	0.34	-82.7	0.01	29.7	-2.78	-0.87	-0.79	17	440.94	700	576	470	308	120	268	5/24/2004	8/19/2008
0838C_01	13621	Hardness	Winter	0.27	-58.9	0.03	24.1	-2.44	-0.04	-0.27	18	424.44	730	516	449	290	112	226	1/22/2004	11/18/2008
0838C_01	13621	Chloride	POR	0.22	-8.53	0	2.81	-3.03	-0.94	-0.95	35	65.89	104	86	67	44.9	14.7	41.1	1/22/2004	11/18/2008
0838C_01	13621	Chloride	Summer	0.22	-9.05	0.06	4.45	-2.03	-1.36	-0.18	17	66.04	100	83	72.6	47	14.7	36	5/24/2004	8/19/2008
0838C_01	13621	Chloride	Winter	0.22	-8.12	0.05	3.8	-2.13	0.03	-1.08	18	65.74	104	86	63	43	23	43	1/22/2004	11/18/2008
0838E_01	16435	Water Temp	Winter	0.12	1.15	0.09	0.65	1.78	0.2	-0.93	25	13.41	21.1	16.6	12.8	11	6	5.6	1/13/2009	4/23/2013

7.2 Trends in Joe Pool Lake Tributaries

Table 18 provides a detailed analysis of the significant trends within the Joe Pool Lake tributaries. Most trends within the unclassified segments are decreasing and do not present a concern There are increasing trends for both Secchi depth and ammonia (NH3) in 0838B, while Biochemical Oxygen Demand (BOD5) and total phosphorus (TP) are on the increase in 0838C.

The trends for the period of record have an R^2 of 0.32 with shallow slopes, although trends are only present in the summer months. However, trends across all time periods exist for TP in 0838C and have R^2 values greater than 0.42. The correlation coefficient for TP and stream flow is 0.88, indicating
that TP is being washed into the stream during rain events.

For total dissolved solids (TDS), the average of all the data in this assessment unit is very close to the 300 mg/L standard at 283 mg/L. For this reason, continued monitoring of TDS in the stream will be conducted to determine if the source of high TDS levels are natural or anthropogenic. Of the remaining trends with R^2 values greater than 0.4, three are decreasing trends for nutrients including ammonia and total Kjeldahl nitrogen (TKN) and one is a decreasing trend for pH. Decreases in nutrient trends are of no concern, given that the watershed is expected to continue urbanizing.

8.0 Source Identification Analysis

Segment 0838C is currently listed on the 2016 Texas 303(d) list for a recreation use impairment due to bacteria, i.e., elevated concentrations of *E. coli*. The objective of this section is to describe the planned modeling approach for identifying the sources of pollution that contribute to this impairment, and developing pollutant load reduction targets required to gain attainment for the recreation use. The following subsections will describe the suite of source identification strategies that will be used in the watershed.

8.1 Baseline Watershed Monitoring

Source identification will involve 15 sampling locations spatially representative of the Joe Pool Lake watershed, along with 5 locations in the lake itself. Sites will be positioned to identify contributions from major tributaries and suspected areas of pollutant loading. Sampling will include 12 total events at 14 stations, including six bi-monthly routine events and six flow-biased events. One flow-biased event is expected to occur in the two-month period between each routine event. Once complete, this monitoring effort is expected to provide spatial specificity to potential areas of high influence, providing a “bracketing” effect with which we can discern whether one particular type of land use, tributary, or geographic area is contributing a greater pollutant load than others.

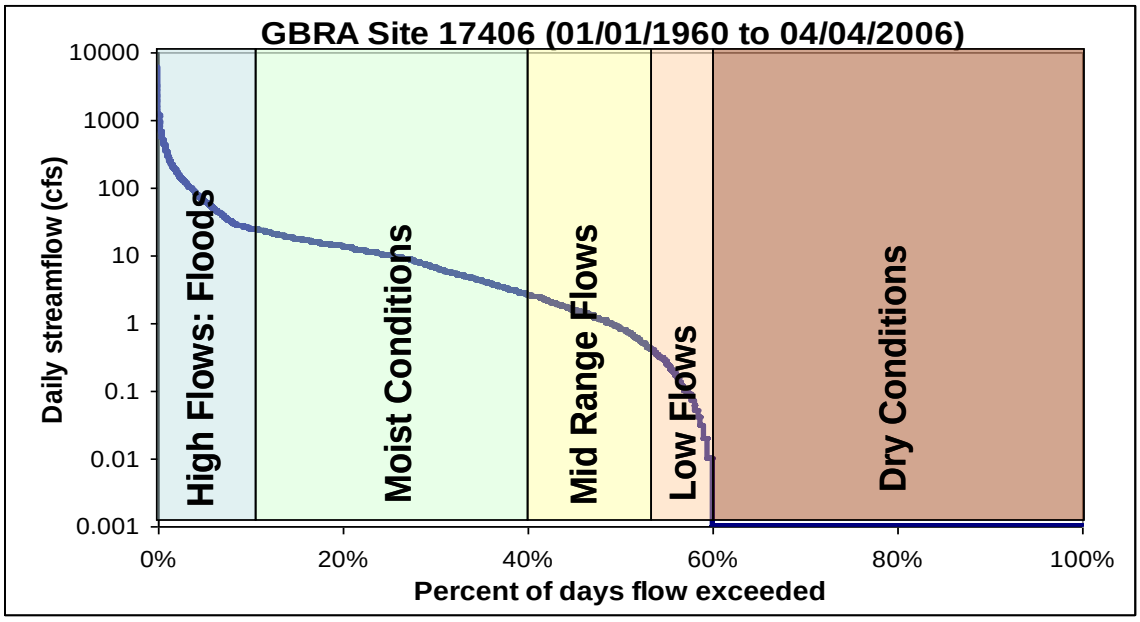
The remaining six sites will only be sampled during high flow situations, as they are located in more remote, ephemeral areas. The goal of this monitoring subset is to characterize the pollutant loads from dryer, upland areas when they are flushed during heavier rainfall events.

8.2 Flow and Load Duration Curves

Once completed, the flow and *E. coli* datasets can then be used to build flow duration curves and load duration curves to further evaluate the contaminant sources. First, all flow values are aggregated and ranked from lowest to highest. This data is then graphically depicted to show the general flow regime, complete with the percentage of time that the water body is expected to be dry, as well as its response to storm flows (Figure 6).

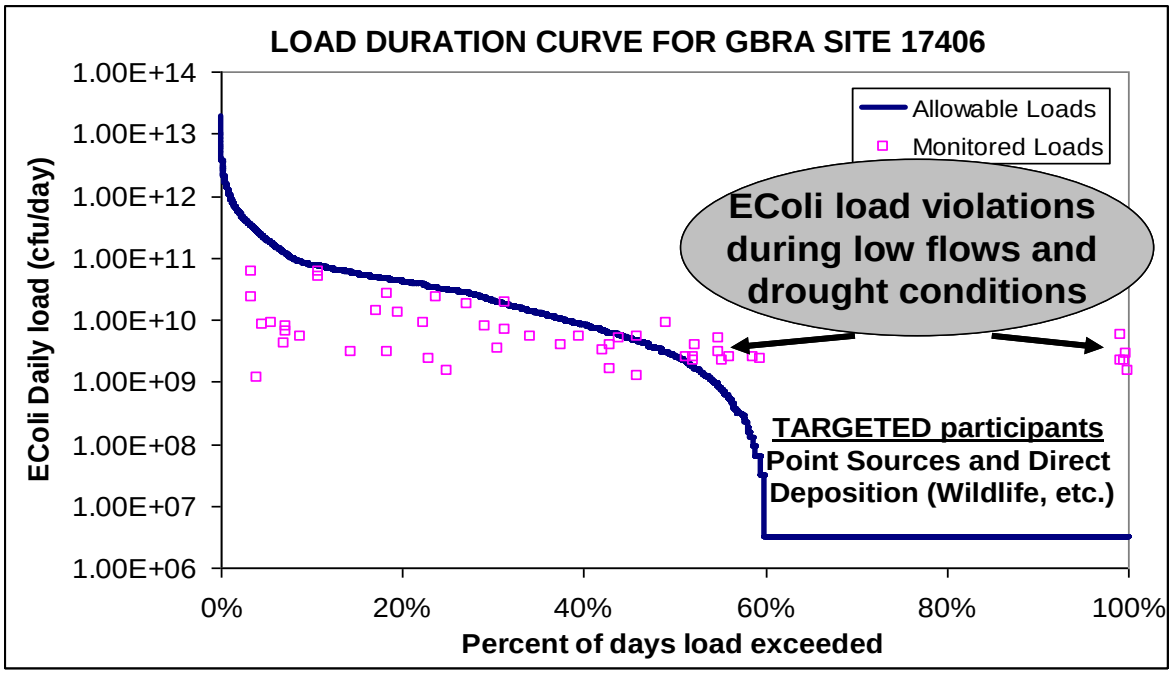
The flow duration curve can then be used to develop a load duration curve (LDC) for a specific pollutant of interest, given that there is pollutant concentration data that complements the flow data. Figure 7 depicts an

example LDC based on the FDC shown in Figure 6. The first step in the process is to apply the pollutant's allowable limit concentration to all available flow values to produce the allowable load limit curve. In the case of bacteria, this value is 126 MPN/100 mL (blue line in Figure 7). Then, the baseline monitoring data values for *E. coli* (also in MPN/100 mL) are also multiplied by their associated flow values to get loads for each data point (pink squares in Figure 7).



Source: Flow Duration Curve (FDC) for streamflow conditions at GBRA monitoring station 17406 on Plum Creek, near Uhland, TX.

Figure 6. Flow duration curve example from Plum Creek watershed (log scale Y-axis).



Source: Load Duration Curve for E. coli at GBRA monitoring station 17406 on Plum Creek, near Uhland, TX.

Figure 7. Load duration curve example from Plum Creek watershed (log scale Y-axis).

This can be developed further by performing regression analysis on the monitored data points, as depicted in Figure 8. Here, the allowable load limit is depicted in red, while the regression line for the data points is depicted

in blue. For each of the different flow regimes (High Flows, Moist Conditions, Mid-range Flows, etc.), a load reduction estimate can be calculated. Achieving these reductions will become the primary targets for success once the WPP moves into the implementation stage.

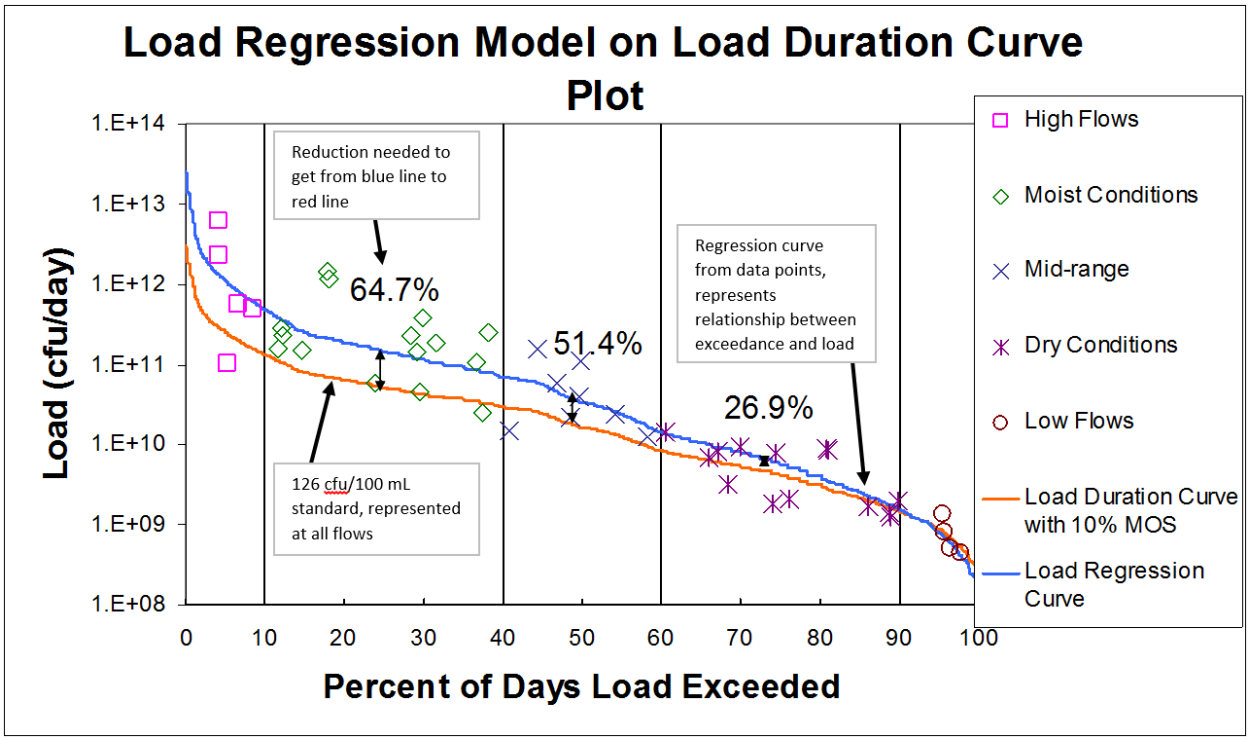


Figure 8. Load duration curve example for E. coli, with flow condition breakdowns and load reduction estimates (log scale Y-axis).

However, it is worth noting that some of these reductions, specifically those within the "High Flows" range, may not be achievable due to feasibility of applying management measures to storm flows that fall within the extreme range. It is therefore customary to focus efforts on the load reductions identified at the lower flow conditions, where it becomes easier to separate potential point source contributors from nonpoint source contributors. In most cases, if a water body exhibits high pollutant loads on the extreme right of the graph where low flows are represented (Figure 9), it is highly likely that this may be attributable to a point source, such as a malfunctioning WWTF or leaking/failing wastewater infrastructure somewhere in the watershed. These types of contributions can typically be easily addressed, and are worth investigating early on in the process. Conversely, if pollutant loads tend towards the middle of the graph, it is likely that they are attributed to stormwater runoff during periods of normal or moderate rainfall. While typically not as easily addressed as point sources, load reductions in these areas may also be targeted for watershed pollutant load reductions through BMP recommendations.

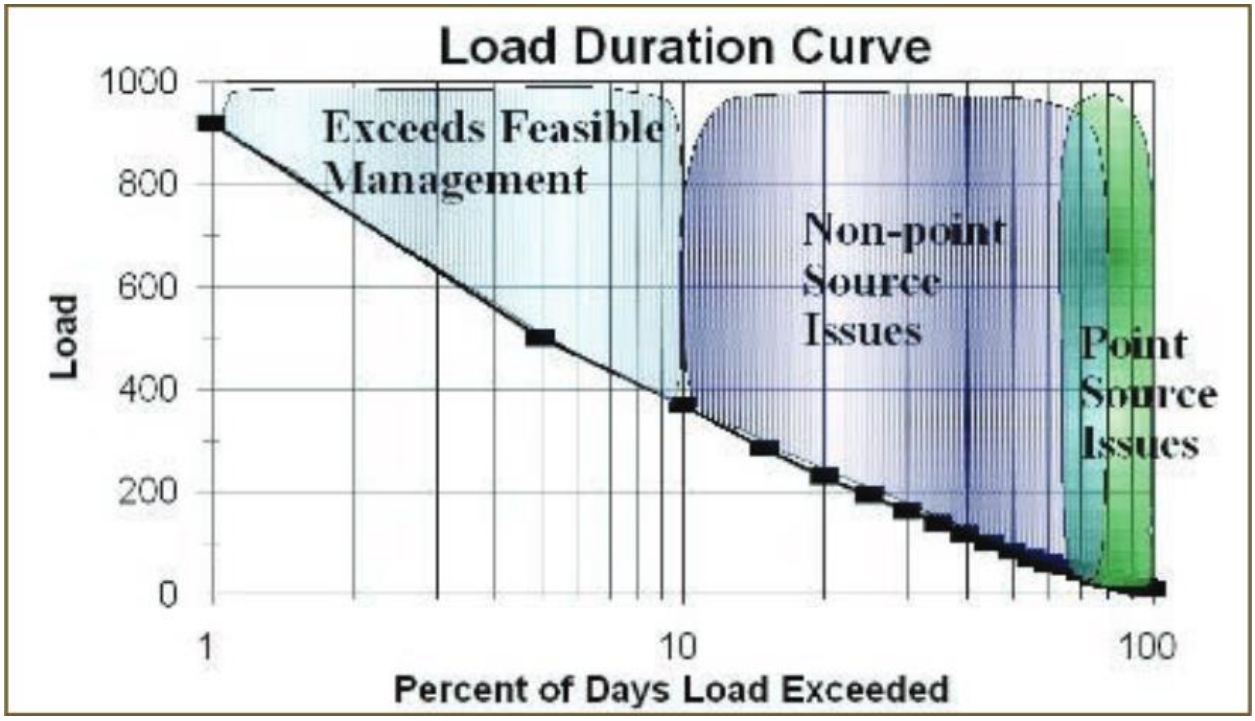


Figure 9. Regions of likely pollutant sources along load duration curve (normal scale Y-axis, log scale X-axis).

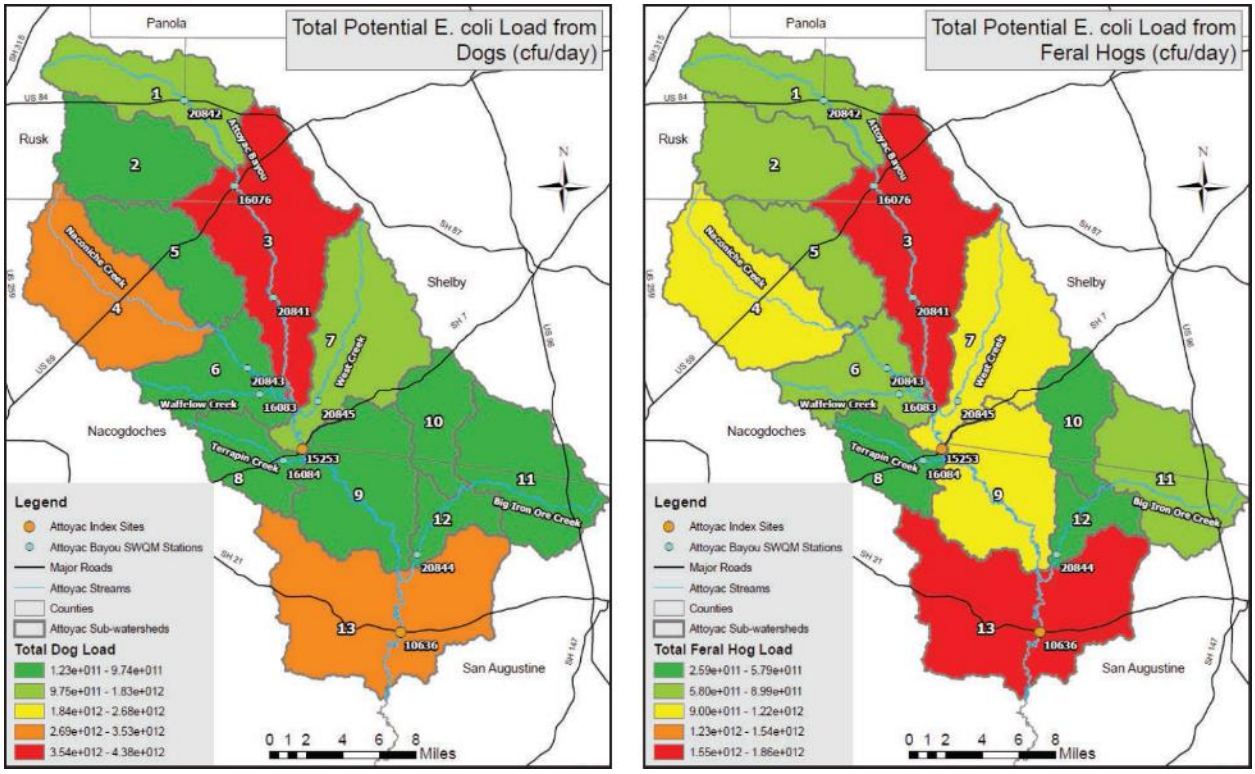
8.3 Load Calculation and Modeling Analyses

8.3.1 SELECT Pollutant Load Calculation Tool

Through baseline monitoring and the associated LDC analysis, it is possible to begin forming an understanding of where areas contributing high pollutant loads may be situated in the watershed, as well as whether those contributions may be from point or nonpoint sources. However, this only provides a basic spatial location of the potential sources and a general understanding of their origin. To further identify the extent of a certain source type's likely contribution to the bacteria load in a specific subwatershed, the Spatially Explicit Load Enrichment Calculation Tool (SELECT) analysis can be conducted for any number of potential bacteria source types, including urban/municipal runoff, agricultural runoff, failing septic systems, wildlife, and even invasive species.

SELECT first uses spatial data for land use and/or land cover data to determine where representatives from a particular contributing source might be located, and then uses watershed boundaries, soils data, topography, and stream network information to further determine suitability and range. In the example provided in Figure 10, it was expected that the majority of dogs would be found in close proximity to human populations, while it was expected that feral hogs would stay within suitable habitat found within riparian bands near rivers, on cropland, or within the vicinity of other water sources, so the spatial analysis incorporated these limitations.

Then, an estimated population density is applied to these suitable areas. Population density data can come in the form of census estimates for humans, literature values from published resource agency materials, or in some cases, anecdotal evidence from watershed stakeholders. In the example provided in Figure 10, statewide estimates for feral hog population were first applied to the watershed, then anecdotal evidence from watershed stakeholders was used to verify and adjust the statewide estimates. For dogs, an average value of dogs per household was applied to local human population estimates, and that estimated population was then concentrated around areas with higher human population densities to simulate the expected loading conditions.



Source: Attoyac Bayou Watershed Protection Plan.

Figure 10. Visual output examples from SELECT analysis for separate estimated populations of dogs (left) and feral hogs (right).

Finally, literature values for *E. coli* production from these sources are applied to the estimated population so that a potential *E. coli* load can be calculated for each subwatershed in the analysis. This yields visual output that can be color-coded to show the severity of the load's potential contribution to the watershed, which can be used to pinpoint areas where management measures would provide the most cost-to-benefit ratio. In the case of the feral hog analysis in Figure 10, funding used for hog control BMPs would be best utilized in subwatersheds 3 and 13, where contributions are expected to be significant. Conversely, potential *E. coli* contributions from feral hogs are low in 8, 10, and 12 so it would be best to focus control efforts elsewhere.

Although SELECT can provide users with valuable information for pollutant source location and quantification, there are some caveats which must be publicized to stakeholders about its use. The load calculations that are output from the model, even if based on the best available science and information, are still predicted *E. coli* loadings that are effectively "worst-case scenarios." This is because SELECT is not currently capable of accounting for the natural processes that occur in the watershed, such as natural bacterial decay, breakdown by sunlight, permeation to groundwater, etc. that influence bacteria die-off as the load makes its way to a water body. As such, the total load predicted from a subwatershed by SELECT is not expected to reach the creek, and thus, represents a potential loading. SELECT is currently incapable of making adjustments needed to provide a real-world, delivered loading to the creek. Despite this shortcoming, both stakeholders and technical advisory staff agree that this analysis method, coupled with the LDC analysis covered in Section 8.2, is the most cost-effective means of source identification and analysis available for the watershed.

8.3.2 SWAT Modeling Exercises

The Soil and Water Assessment Tool (SWAT) watershed modeling program will also be used to quantify pollutant loads in the watershed. While they may both shed some light on the topic of pollutant loading, the SWAT model differs from the SELECT analysis in several important aspects. The primary difference concerns the type of data

used by the two tools, with SELECT principally relying on anecdotal and estimated data based on human/animal populations, whereas SWAT relies on collected data for flow, discrete, field-collected water pollutant concentrations, and many smaller variables that can be adjusted by the user to accurately approximate watershed characteristics, like evapotranspiration rates and antecedent soil moisture conditions. Then, the two tools will then use the water, soil, and topographic characteristics of the watershed to provide the user with two sources of data with which to make decisions about watershed pollutant management. SWAT is currently the preferred model of choice for this project, but may be substituted with a more suitable alternative, should the need arise.

9.0 Conclusions

In addition to the impairments listed for Segment 0838C in the *2016 Texas Integrated Report of Surface Water Quality for the Clean Water Act Sections 305(b) and 303(d)* (TCEQ, 2019b), the 2013-2016 Joe Pool Lake Customer Report (TRA, 2017)provides an overall summary of the potential issues facing the watershed:

When reviewing the 1997-2012 water quality data as a whole:

- Increasing trends of both algal and atrazine concentrations in the reservoir and
- E. coli, total dissolved solids, atrazine and sulfate, in excess of standards in tributaries.

When focusing on the more recent data analyzed annually between 2013 and 2015, the following concerns were noted in respective annual reports:

- TDS concentrations exceed standards on a regular basis at tributary sites;
- E. coli, nitrate/nitrite, and sulfate samples occasionally exceeded standards at tributary sites;
- Chlorophyll-a and TSS demonstrate an increasing trend at site A3 (Mountain Creek arm); and
- One Giardia cyst was detected in the sample collected at intake site I1 (Lakeview Intake) on 9/2/2015.

An attempt to re-evaluate using data from 2013 to 2016 was attempted to focus on more comparable, recent data. However, the extreme weather (both drought and excessive rains) of those years complicates trend analyses over such a short time period.

The WPP effort will also endeavor to address other stakeholder concerns with respect to water quality as identified during public meetings and other outreach campaigns. As these concerns are identified and investigated through continued contact with stakeholders and studied in the watershed, additional historical data analysis may be needed, which will continue past the submission of this report. Application of and adherence to this adaptive approach will result in a more thorough and applicable set of solutions for managing water quality issues and concerns within the Joe Pool Lake watershed.

9.1 Joe Pool Lake (Segment 0838)

While there are no immediate needs for addressing water quality impairments in Joe Pool Lake, concerns for maintaining water quality have been made known by stakeholders who would like to see continued nutrient and sediment management addressed in the WPP. These concerns are related to nitrate inputs and algal growth and decay (as indicated by chlorophyll-a). Overall trends for both parameters are currently decreasing in the lake, and the management measures recommended in the WPP will hopefully continue to add to these decreases, or at the very least, stall any future increases. These management measures may be targeted to areas with direct drainage to the lake, or by extension within larger tributaries such as Mountain, Soap, and Walnut Creeks, which may be contributing a significant portion of the nutrient load itself.

While certainly important, lake protection strategies for the listed water quality concerns are two of many outcomes identified thus far in the stakeholder process. The Lake Arlington Master Plan (Malcolm Pirnie 2011) also identified several aesthetic and community wellness-based outcomes that are expected to be incorporated

into the Joe Pool Lake WPP. These include trash and litter control efforts, lakefront property renovations, and other efforts that are expected to also provide some level of bacteria and/or nutrient load reductions as well. As stakeholder outcomes develop around the lake, further historical data analysis will be conducted to adapt to and address stakeholder needs. Accompanying updates to this report will be made if/when those needs arise.

9.2 Walnut Creek (Segment 0838C)

The primary focus within Walnut Creek is the bacteria impairment. Along with the data collected through this effort, stakeholder input and expert technical advice will be used to provide the base on which management efforts to address the impairment will be built. The end goal will be improving water quality in Walnut Creek, and by extension, protecting the water quality downstream in Joe Pool Lake.

As with the lake, there are several additional stakeholder concerns that are expected to be addressed in the WPP. These include similar concerns for floatable and deposited trash and debris, along with erosion control measures and nutrient controls. The BMPs identified to address these additional concerns are expected to provide some level of bacteria and/or nutrient load reductions in addition to their primary purposes.

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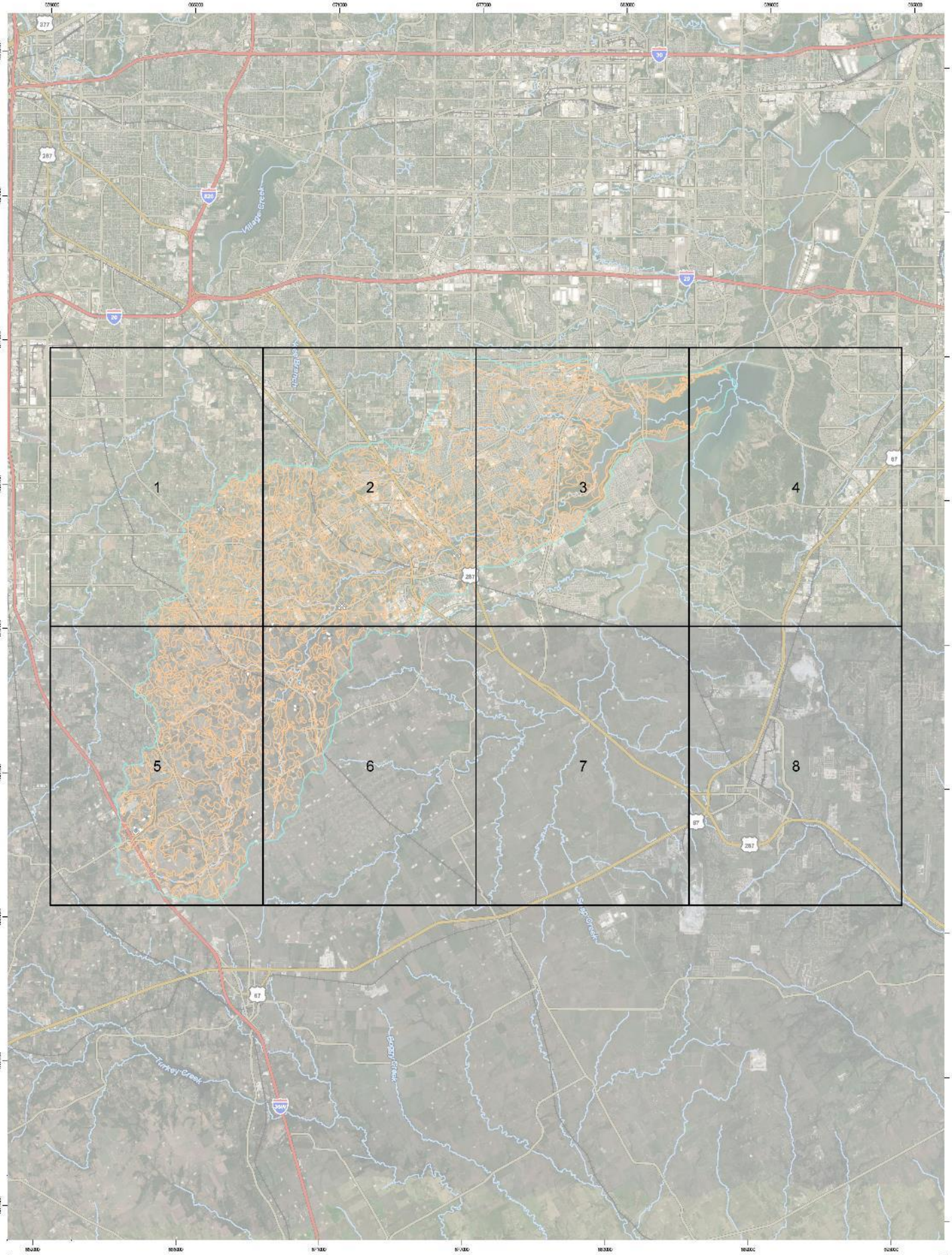
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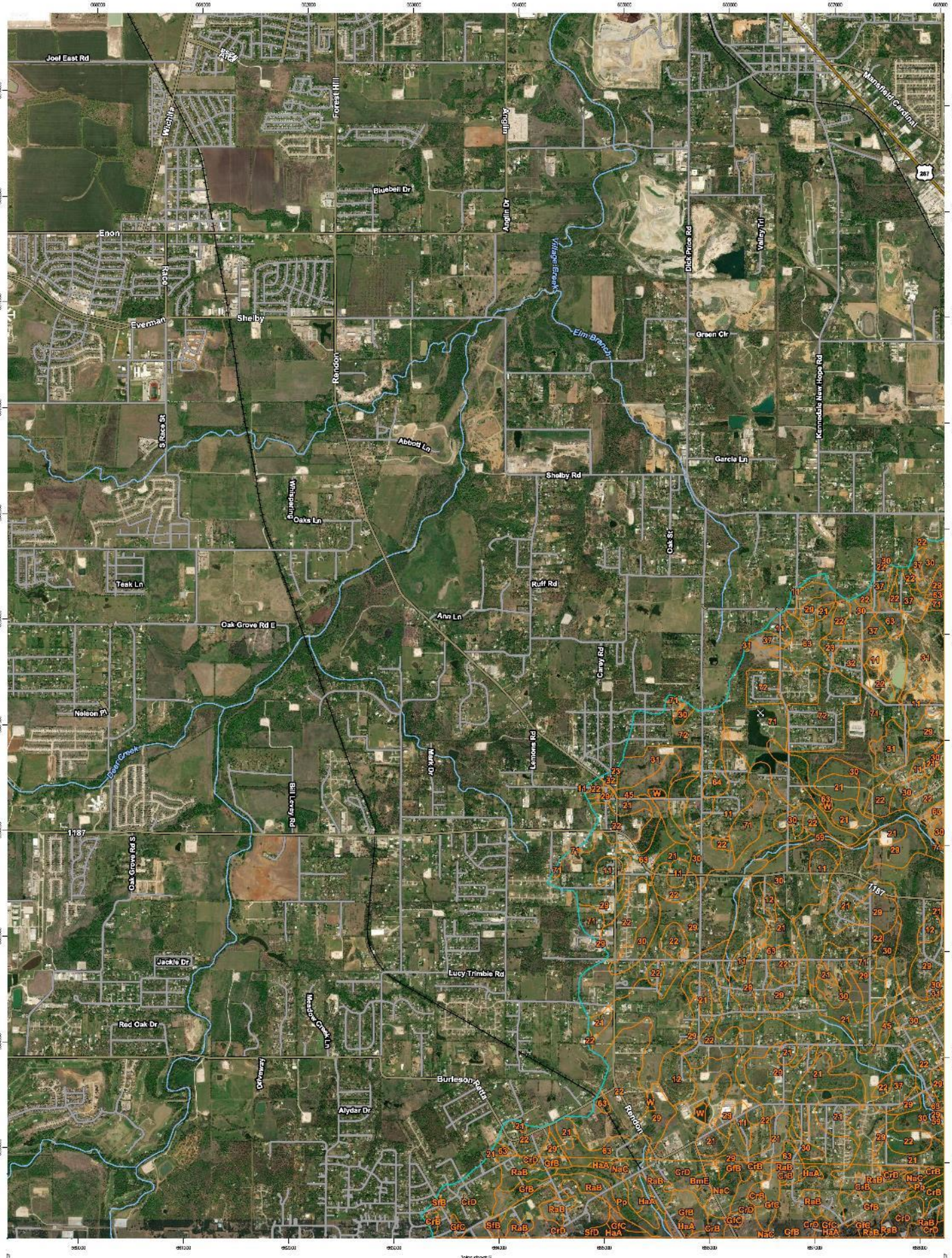
Appendix A

NRCS Soils Surveys for the Joe Pool Lake Watershed

Soil Map—Dallas County, Texas, Johnson County, Texas, and Tarrant County, Texas
(Joe Pool Lake Watershed - Walnut Creek Arm)
Index Sheet



Map Scale: 1:106,000 if printed on C portrait (17" x 22") sheet.
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Feet
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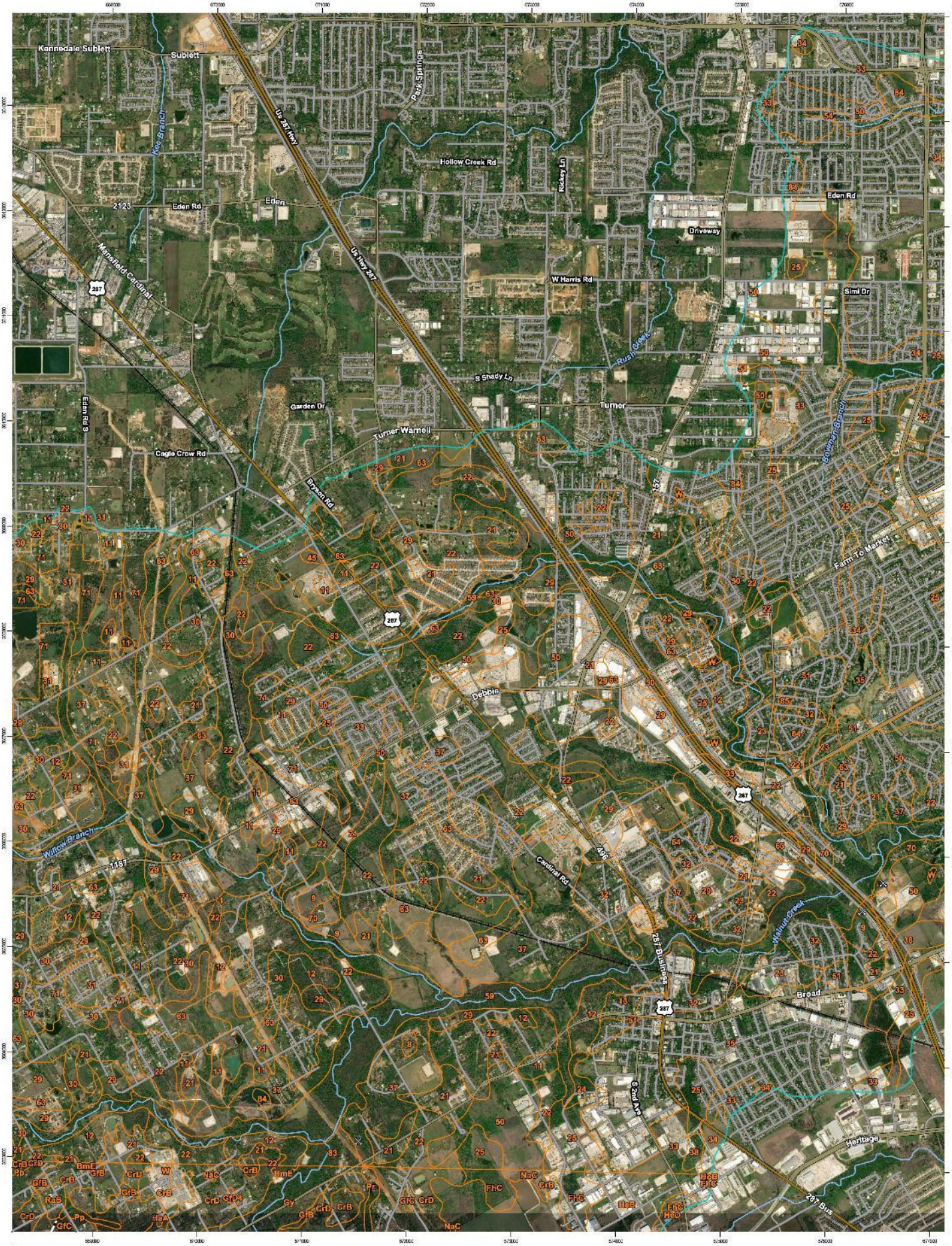
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Meters: 0, 300, 700, 1400, 2100
Feet: 0, 1000, 2000, 4000, 6000
Map projection: Web Mercator. Corner coordinates: WGS84. Edge tics: UTM Zone 14N WGS84

Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

Map Sheet Location

Soil Map—Dallas County, Texas, Johnson County, Texas, and Tarrant County, Texas
(Joe Pool Lake Watershed - Walnut Creek Arm)
Map sheet 2 of 3



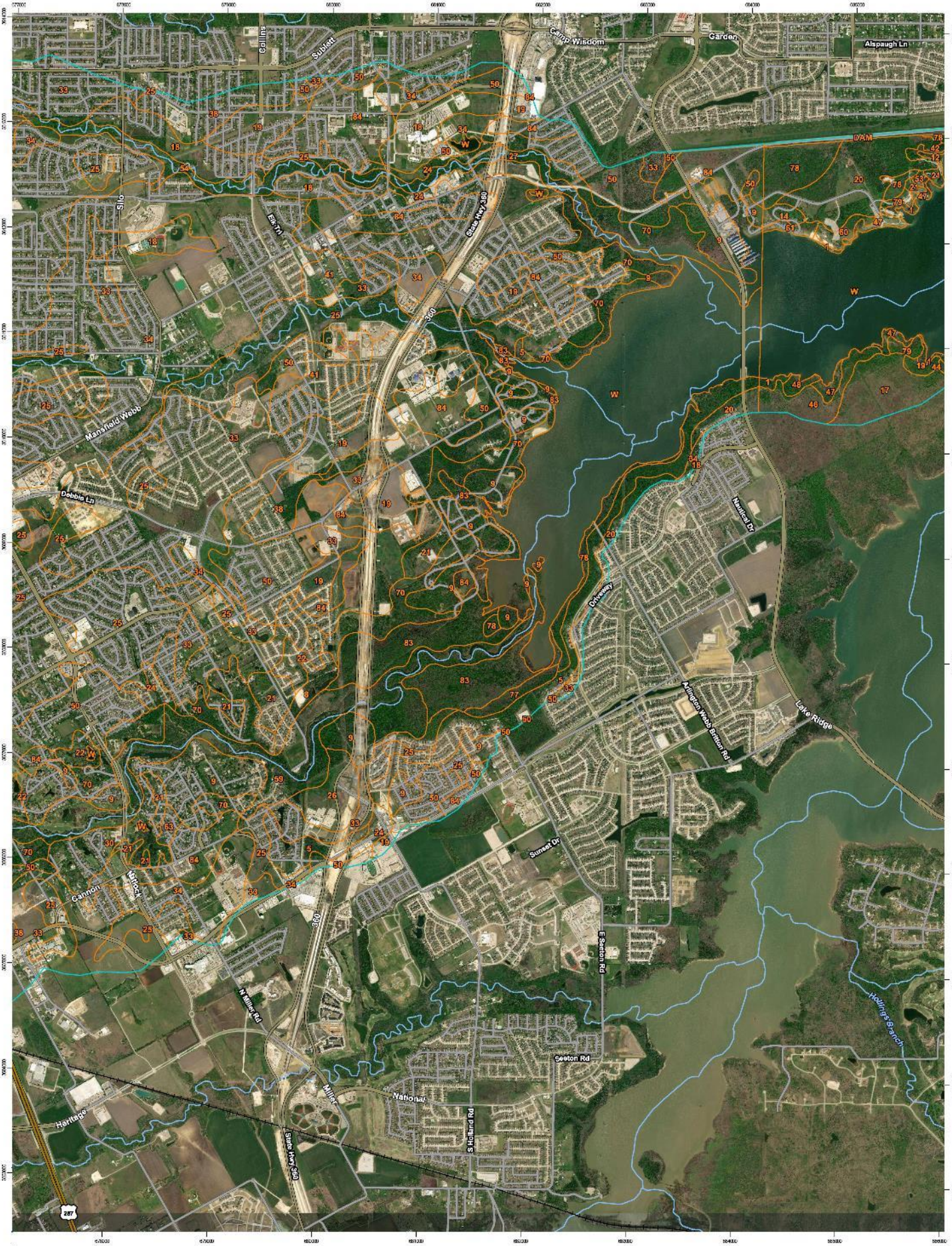
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Meters
Feet
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

Map Sheet Location

9/24/2018
Page 3 of 15



Map Scale: 1:24,000 if printed on C portrait (17" x 22") sheet.
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Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

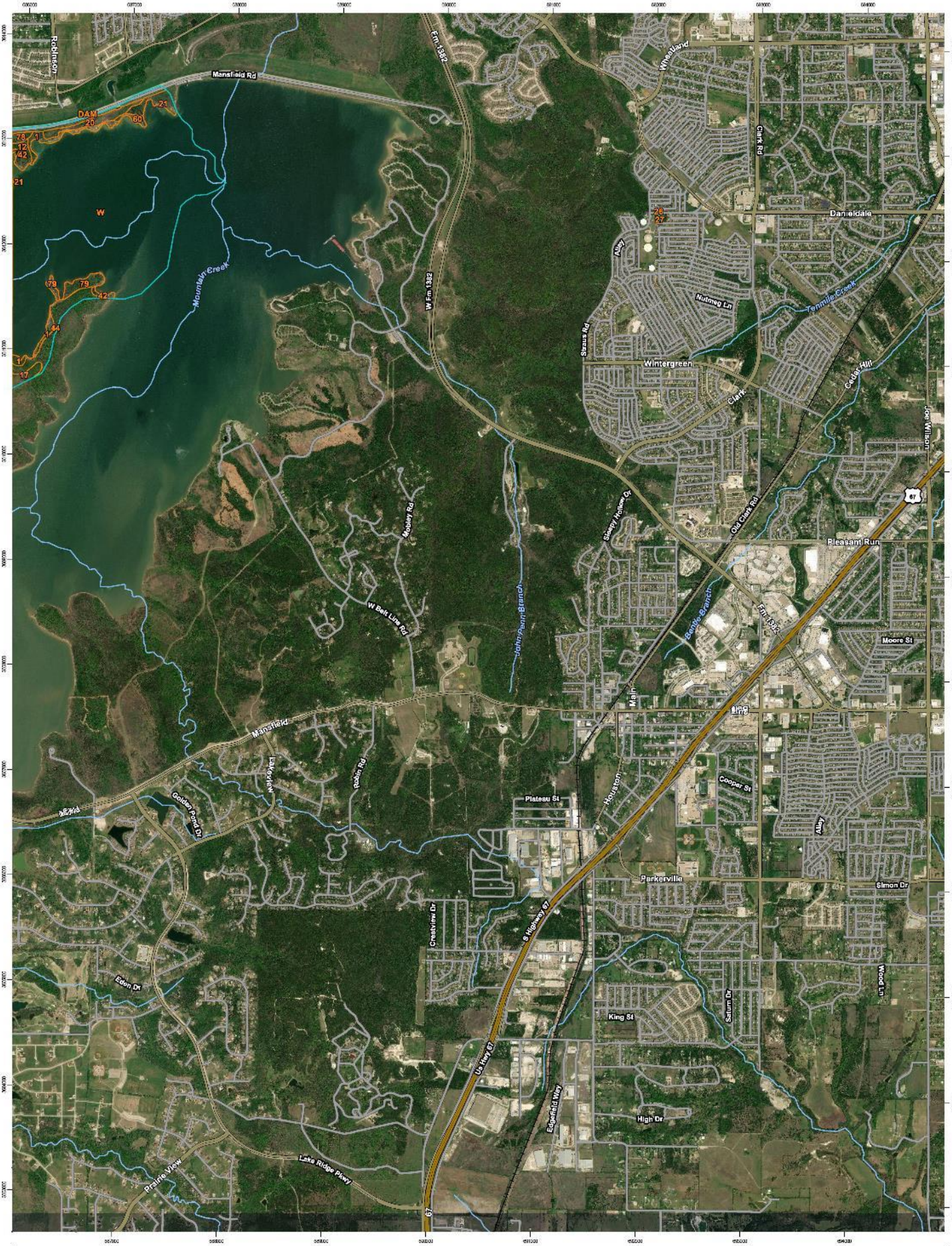
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Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

Map Sheet Location

9/24/2018
Page 4 of 15



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Meters 0 350 700 1400 2100
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Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

Soil Map—Dallas County, Texas, Johnson County, Texas, and Tarrant County, Texas
(Joe Pool Lake Watershed - Walnut Creek Arm)
Map sheet 5 of 8



Map Scale: 1:24,000 if printed on C portrait (17" x 22") sheet.
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Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

Map Sheet Location

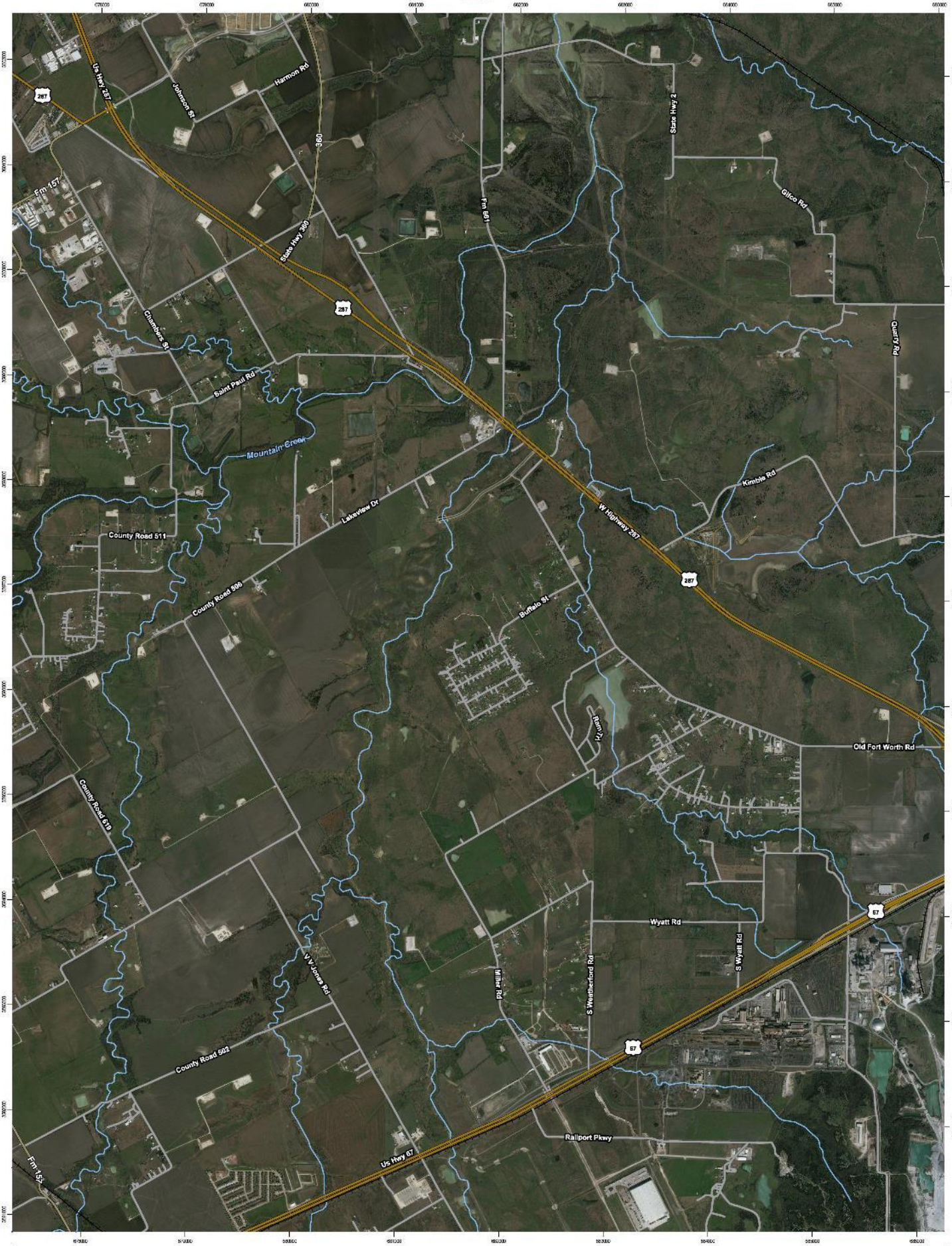
9/24/2018
Page 6 of 15

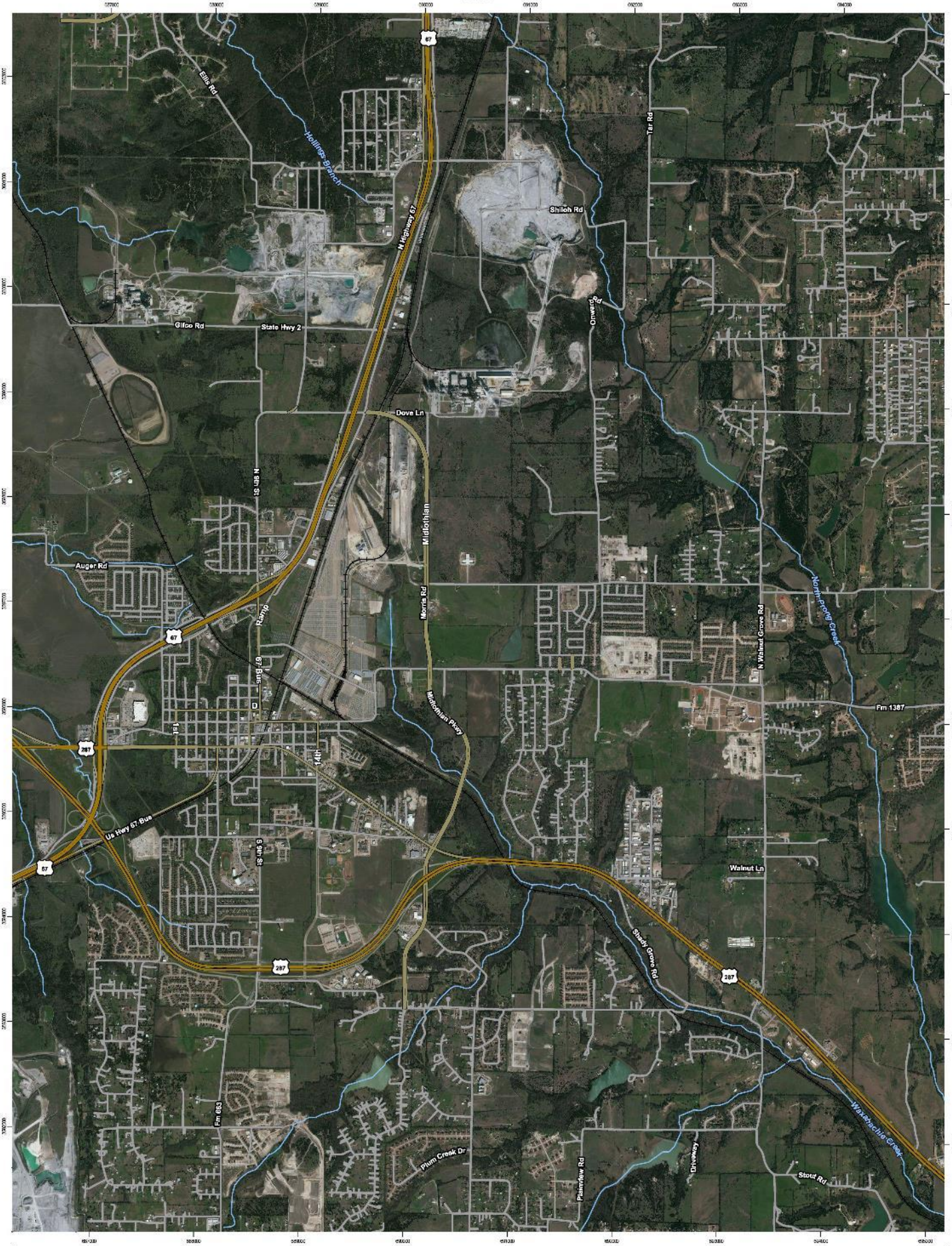
Soil Map—Dallas County, Texas, Johnson County, Texas, and Tarrant County, Texas
(Joe Pool Lake Watershed - Walnut Creek Arm)
Map sheet: 6 of 8
John's sheet 2



John's sheet 5
John's sheet 7

Map Scale: 1:24,000 if printed on C portrait (17" x 22") sheet.
Meters 0 300 700 1400 2100
Feet 0 1000 2000 4000 6000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84


Us Hwy 287
Johnson St
Harmon Rd
287
360
Fm 157
State Hwy 360
Fm 661
State Hwy 2
Gifco Rd
Chambers St
Saint Paul Rd
Mountain Creek
Quarry Rd
Kimble Rd
Lakeview Dr
W Highway 287
County Road 511
County Road 506
Buffalo St
Old Fort Worth Rd
County Road 619
Wyatt Rd
S Wyatt Rd
V V Jones Rd
Miller Rd
S Weatherford Rd
67
County Road 502
Railport Pkwy
Us Hwy 67
Fm 157



Map Scale: 1:24,000 if printed on C portrait (17" x 22") sheet.

Meters: 0 350 700 1400 2100

Feet: 0 1000 2000 4000 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Dallas County, Texas
Survey Area Data: Version 16, Sep 14, 2018

Soil Survey Area: Johnson County, Texas
Survey Area Data: Version 15, Sep 14, 2018

Soil Survey Area: Tarrant County, Texas
Survey Area Data: Version 16, Sep 16, 2018

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 8, 2013—Dec 13, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Altoga silty clay, 5 to 12 percent slopes, eroded	36.7	0.1%
12	Axtell fine sandy loam, 2 to 5 percent slopes, moderately eroded	6.0	0.0%
14	Bastsil fine sandy loam, 0 to 2 percent slopes	15.3	0.0%
17	Branyon clay, 0 to 1 percent slopes	116.3	0.2%
19	Burleson clay, 1 to 3 percent slopes	10.5	0.0%
20	Crockett fine sandy loam, 0 to 1 percent slopes	178.7	0.3%
21	Crockett fine sandy loam, 1 to 3 percent slopes	22.8	0.0%
26	Eddy clay loam, 1 to 3 percent slopes	0.0	0.0%
27	Eddy clay loam, 3 to 8 percent slopes	0.0	0.0%
42	Heiden clay, 2 to 5 percent slopes, eroded	12.2	0.0%
44	Houston Black clay, 1 to 3 percent slopes	29.8	0.1%
46	Lewisville silty clay, 1 to 3 percent slopes	62.1	0.1%
47	Lewisville silty clay, 3 to 5 percent slopes, eroded	35.8	0.1%
48	Lewisville silty clay, 5 to 8 percent slopes	9.7	0.0%
53	Normangee clay loam, 1 to 3 percent slopes	3.0	0.0%
60	Silawa fine sandy loam, 1 to 3 percent slopes	22.6	0.0%
61	Silawa fine sandy loam, 3 to 8 percent slopes	12.5	0.0%
78	Wilson clay loam, 0 to 1 percent slopes	88.6	0.2%
79	Wilson clay loam, 1 to 3 percent slopes	32.2	0.1%
DAM	Dams	32.0	0.1%
W	Water	1,219.5	2.2%
Subtotals for Soil Survey Area		**1,946.3**	**3.5%**
Totals for Area of Interest		**55,260.8**	**100.0%**

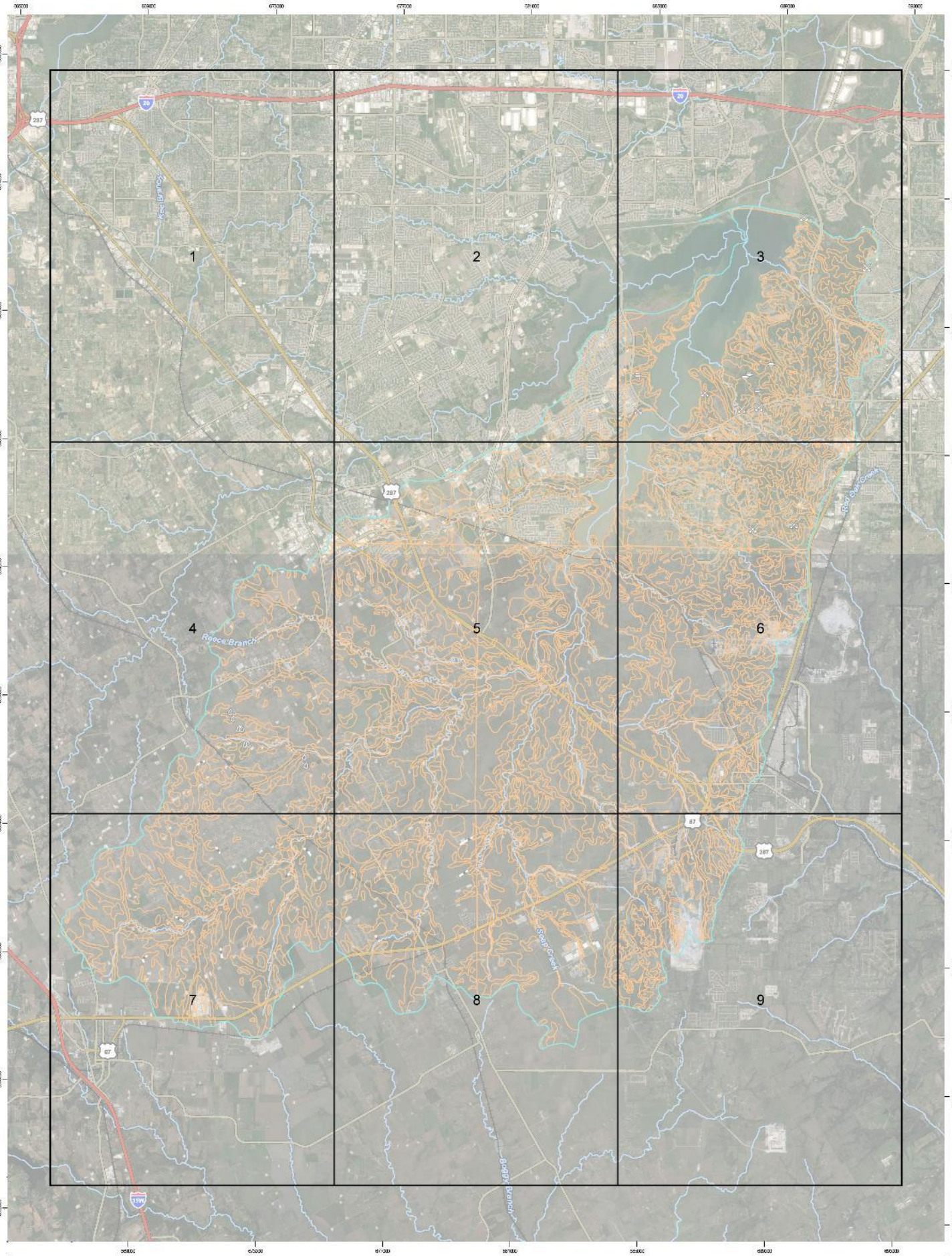
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BmE	Birome-Rayex complex, 5 to 20 percent slopes	273.6	0.5%
BuB	Burleson clay, 1 to 3 percent slopes	16.7	0.0%
CrB	Crosstell fine sandy loam, 1 to 3 percent slopes	2,434.4	4.4%
CrD	Crosstell fine sandy loam, 3 to 8 percent slopes	8,204.6	14.8%
FhC	Ferris-Heiden complex, 2 to 5 percent slopes	715.6	1.3%
GaB	Gasil loamy fine sand, 0 to 5 percent slopes	0.8	0.0%
GfB	Gasil fine sandy loam, 1 to 3 percent slopes	925.7	1.7%
GfC	Gasil fine sandy loam, 3 to 8 percent slopes	943.4	1.7%
GfD4	Gasil fine sandy loam, 1 to 8 percent slopes, severely eroded	69.2	0.1%
Gw	Gowen clay loam, occasionally flooded	407.8	0.7%
Gy	Gowen clay loam, frequently flooded	644.0	1.2%
HaA	Hassee fine sandy loam, 0 to 1 percent slopes	191.4	0.3%
HeB	Heiden clay, 1 to 3 percent slopes	3,108.2	5.6%
HeD	Heiden clay, 3 to 8 percent slopes	616.6	1.1%
HoB	Houston Black clay, 1 to 3 percent slopes	22.5	0.0%
NaC	Navo clay loam, 2 to 5 percent slopes	581.6	1.1%
Pb	Pits, 0 to 45 percent slopes	20.7	0.0%
Pp	Pulexas fine sandy loam, frequently flooded	549.9	1.0%
Pr	Pursley clay loam, frequently flooded	221.7	0.4%
RaB	Rader fine sandy loam, 0 to 3 percent slopes	1,458.4	2.6%
SaB	Sanger clay, 1 to 3 percent slopes	3.4	0.0%
SfB	Silstid loamy fine sand, 1 to 3 percent slopes	152.2	0.3%
SfD	Silstid loamy fine sand, 3 to 8 percent slopes	245.0	0.4%
Tn	Tinn clay, 0 to 1 percent slopes, frequently flooded	47.3	0.1%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
W	Water	61.3	0.1%
WsA	Wilson silty clay loam, 0 to 1 percent slopes	4.1	0.0%
Subtotals for Soil Survey Area		**21,919.8**	**39.7%**
Totals for Area of Interest		**55,260.8**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5	Altoga silty clay loam, 5 to 12 percent slopes	274.4	0.5%
8	Arents, loamy	46.1	0.1%
9	Bastsil fine sandy loam, 0 to 3 percent slopes	548.9	1.0%
11	Birome fine sandy loam, 1 to 5 percent slopes	400.2	0.7%
12	Birome-Aubrey-Rayex complex, 5 to 15 percent slopes	332.7	0.6%
13	Birome-Aubrey-Urban land complex, 5 to 15 percent slopes	28.9	0.1%
18	Branyon clay, 0 to 1 percent slopes	308.0	0.6%
19	Burleson clay, 0 to 1 percent slopes	302.9	0.5%
20	Chatt silty clay, 1 to 3 percent slopes	73.0	0.1%
21	Crosstell fine sandy loam, 1 to 3 percent slopes	3,034.0	5.5%
22	Crosstell fine sandy loam, 3 to 8 percent slopes	3,218.4	5.8%
23	Crosstell-Urban land complex, 1 to 5 percent slopes	121.8	0.2%
24	Ferris clay, 5 to 12 percent slopes, eroded	176.5	0.3%
25	Ferris-Heiden complex, 2 to 5 percent slopes	1,346.2	2.4%
26	Frio silty clay, 0 to 1 percent slopes, occasionally flooded	75.6	0.1%
27	Frio silty clay, frequently flooded	93.3	0.2%
29	Gasil fine sandy loam, 1 to 3 percent slopes	1,323.5	2.4%
30	Gasil fine sandy loam, 3 to 8 percent slopes	1,005.8	1.8%
31	Gasil sandy clay loam, graded, 1 to 5 percent slopes	448.2	0.8%

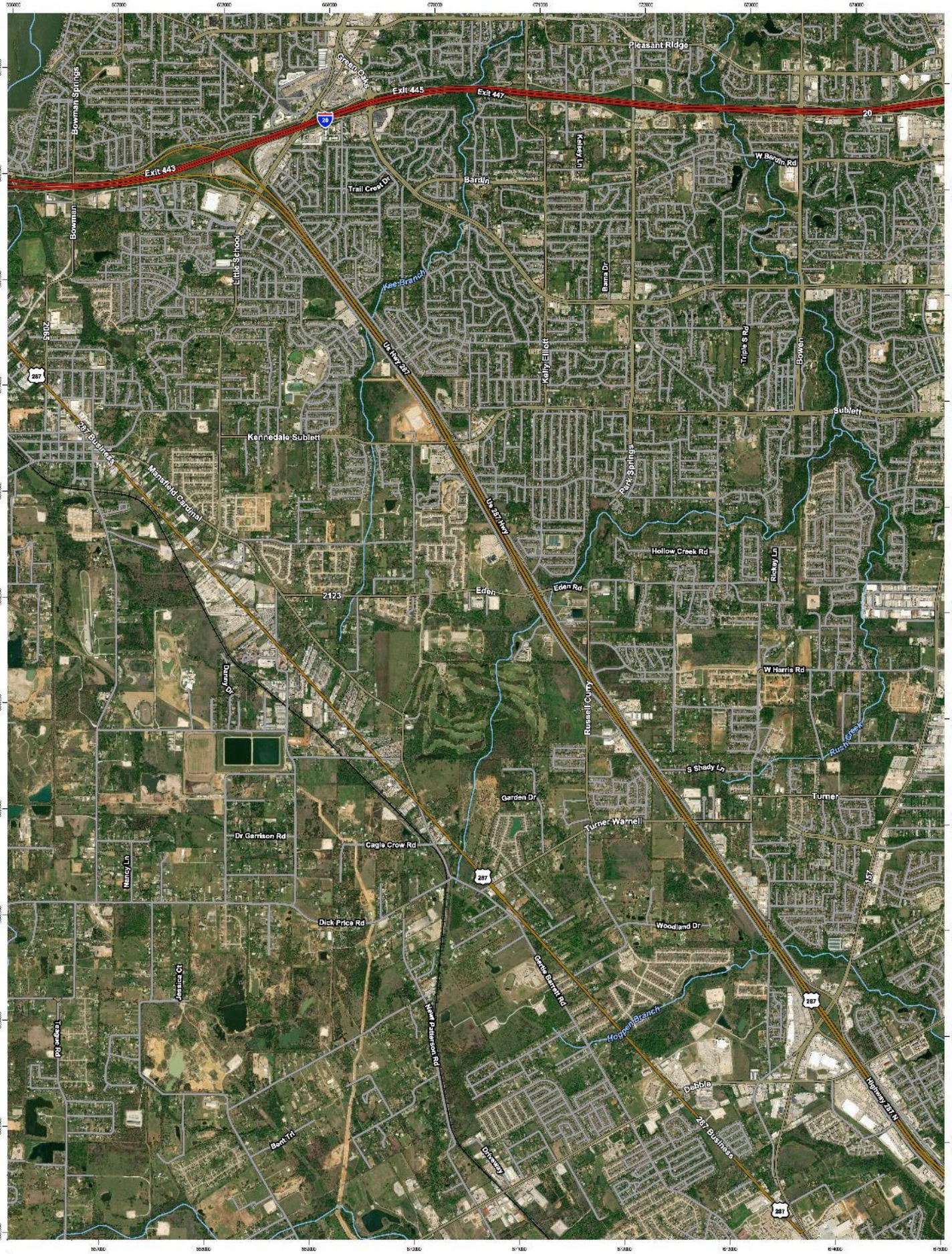
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
32	Gasil-Urban land complex, 1 to 8 percent slopes	284.5	0.5%
33	Heiden clay, 1 to 3 percent slopes	3,857.4	7.0%
34	Houston Black clay, 1 to 3 percent slopes	1,655.1	3.0%
35	Houston Black-Urban land complex, 1 to 4 percent slopes	758.9	1.4%
37	Konsil fine sandy loam, 1 to 5 percent slopes	963.9	1.7%
38	Leson clay, 1 to 3 percent slopes	216.5	0.4%
41	Lott silty clay, 1 to 3 percent slopes	121.3	0.2%
45	Mabank fine sandy loam, 0 to 1 percent slopes	50.3	0.1%
50	Navo clay loam, 1 to 3 percent slopes	2,547.4	4.6%
51	Navo-Urban land complex, 1 to 3 percent slopes	168.2	0.3%
54	Ovan clay, frequently flooded	138.7	0.3%
59	Pulexas fine sandy loam, frequently flooded	1,564.8	2.8%
63	Rader fine sandy loam, 0 to 3 percent slopes	1,771.7	3.2%
64	Rader-Urban land complex, 0 to 3 percent slopes	80.8	0.1%
70	Silawa fine sandy loam, 3 to 8 percent slopes	759.3	1.4%
71	Silstid loamy fine sand, 1 to 5 percent slopes	809.8	1.5%
72	Silstid-Urban land complex, 1 to 5 percent slopes	222.5	0.4%
77	Sunev clay loam, cool, 1 to 3 percent slopes	25.7	0.0%
78	Sunev clay loam, 3 to 8 percent slopes	42.9	0.1%
83	Whitesboro loam, frequently flooded	316.7	0.6%
84	Wilson clay loam, 0 to 2 percent slopes	882.3	1.6%
85	Wilson-Urban land complex, 0 to 2 percent slopes	9.9	0.0%
W	Water	987.6	1.8%
Subtotals for Soil Survey Area		**31,394.6**	**56.8%**
Totals for Area of Interest		**55,260.8**	**100.0%**

Soil Map—Dallas County, Texas, Ellis County, Texas, Johnson County, Texas, and Tarrant County, Texas
(Joe Pool Lake Watershed - Mountain Creek Arm)
Index Sheet



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Soil Map—Dallas County, Texas, Ellis County, Texas, Johnson County, Texas, and Tarrant County, Texas
(Joe Pool Lake Watershed - Mountain Creek Arm)
Map sheet 1 of 9



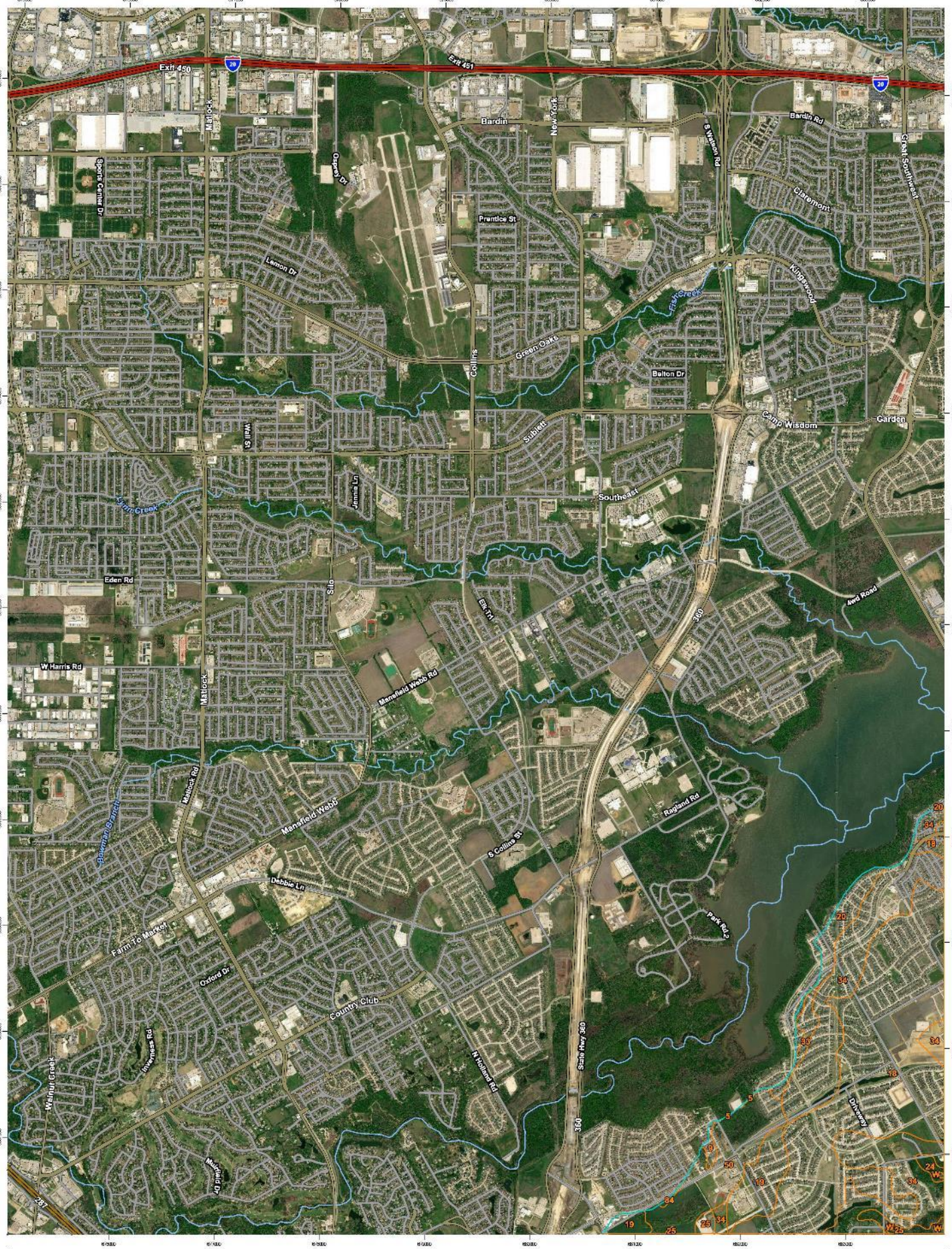
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Natural Resources Conservation Service

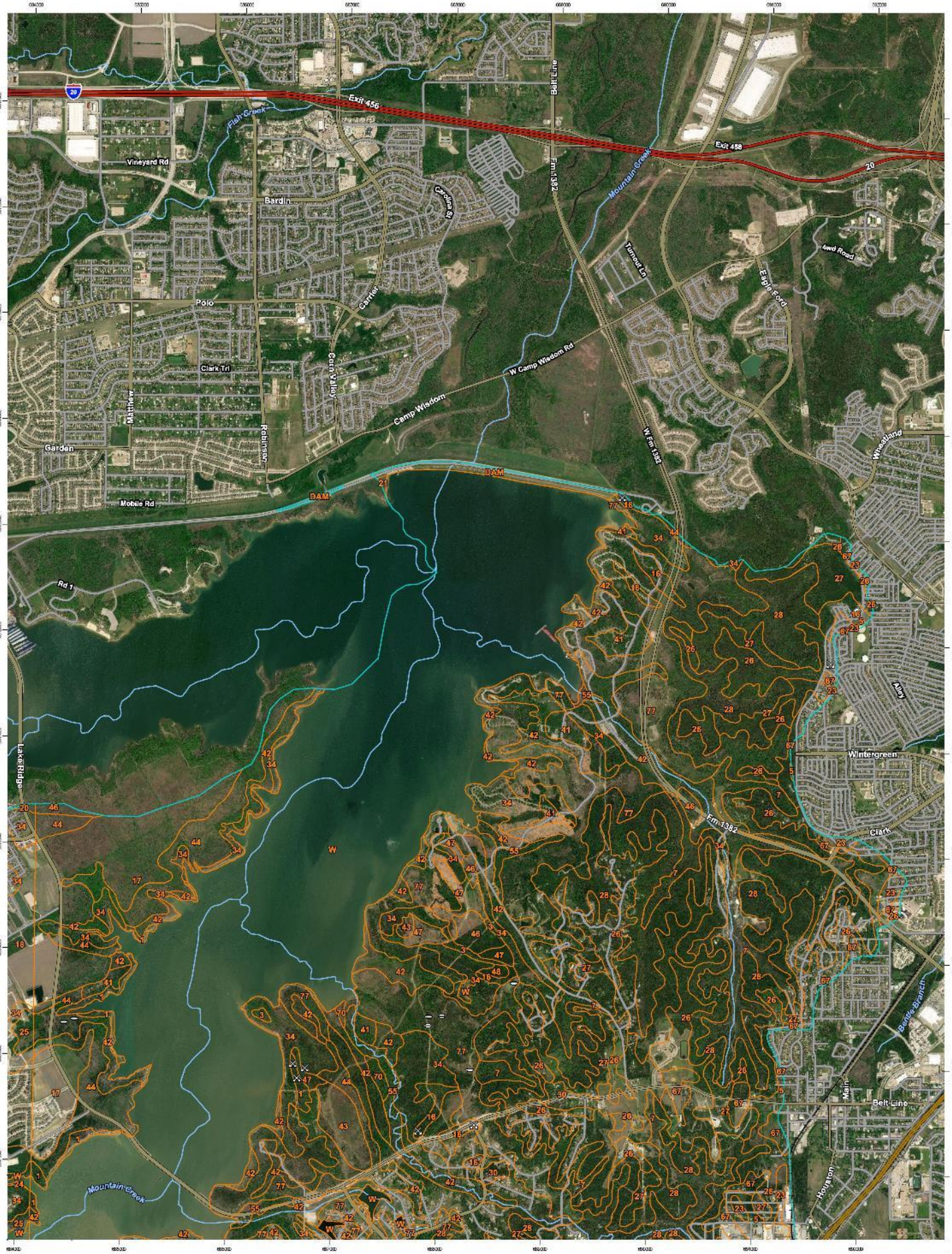
Web Soil Survey
National Cooperative Soil Survey

Map Sheet Location

9/24/2019
Page 2 of 16



Map Scale: 1:24,000 if printed on C portrait (17" x 22") sheet.
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Map Scale: 1:24,000 if printed on C portrait (17" x 22") sheet.
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Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

Map Sheet Location

Soil Map—Dallas County, Texas, Ellis County, Texas, Johnson County, Texas, and Tarrant County, Texas
(Joe Pool Lake Watershed - Mountain Creek Arm)
Map sheet: 5 of 9
John's sheet 2



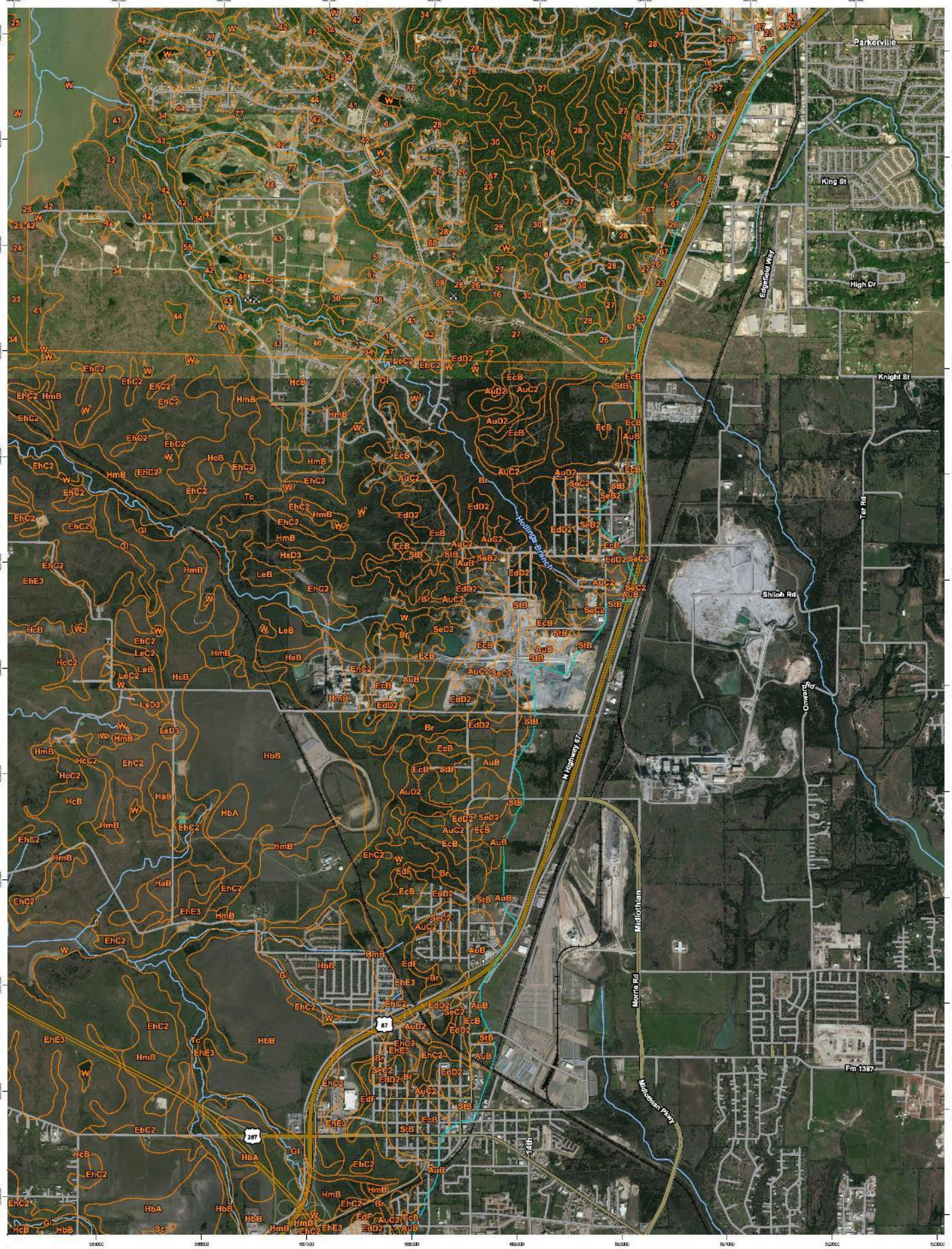
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Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

Map Sheet Location

Soil Map—Dallas County, Texas, Ellis County, Texas, Johnson County, Texas, and Tarrant County, Texas
(Joe Pool Lake Watershed - Mountain Creek Arm)
Map sheet 6 of 9

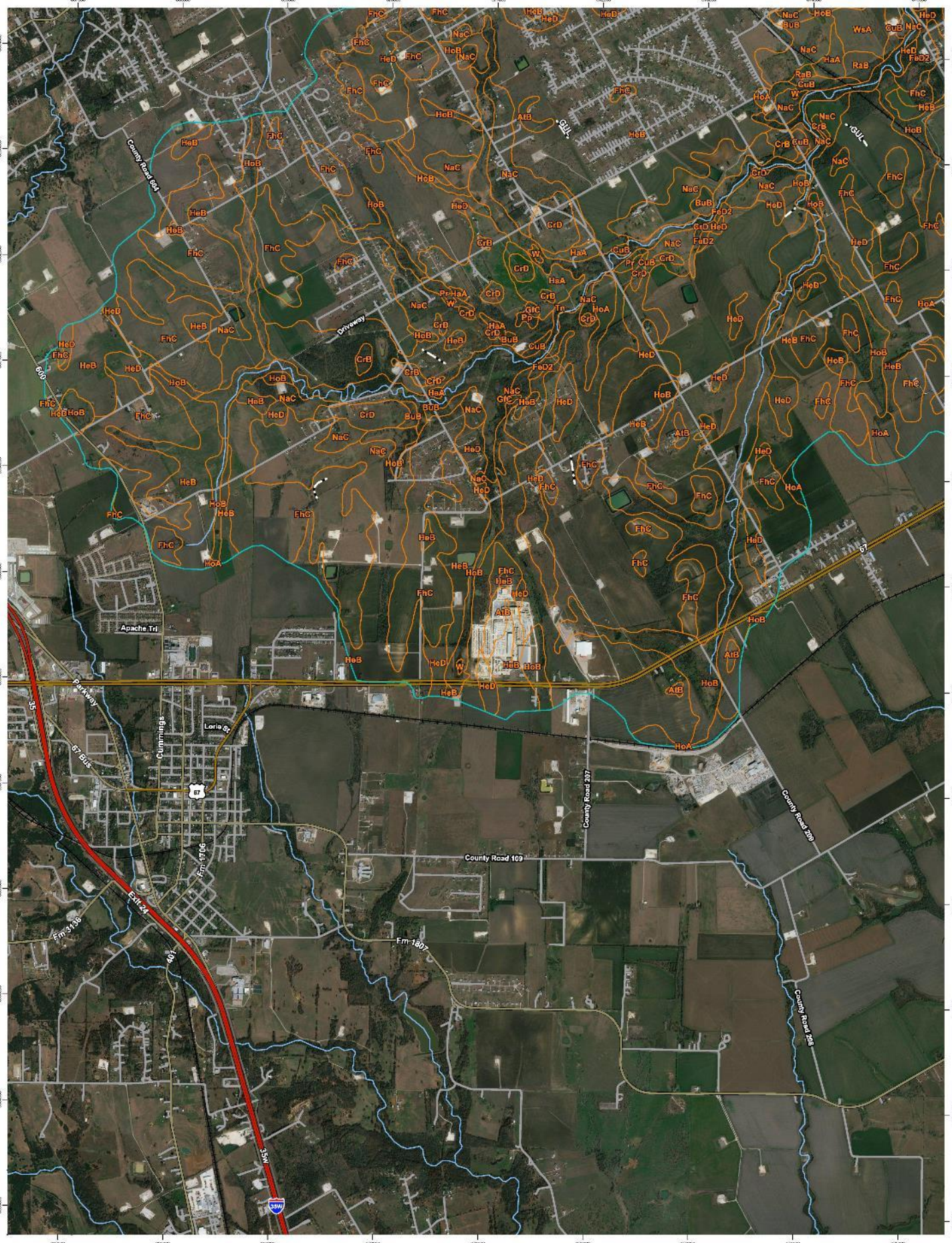


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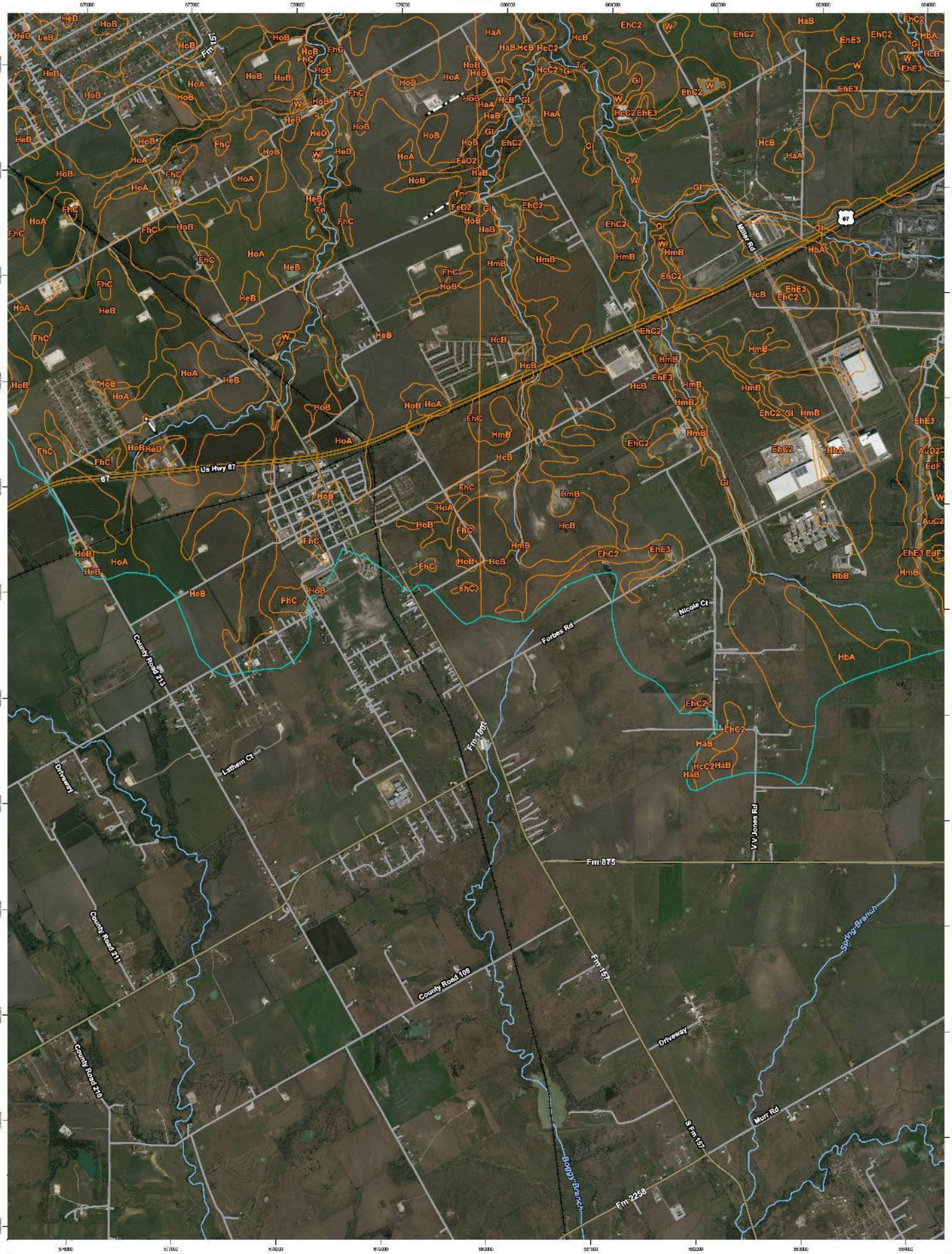
Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

Map Sheet Location

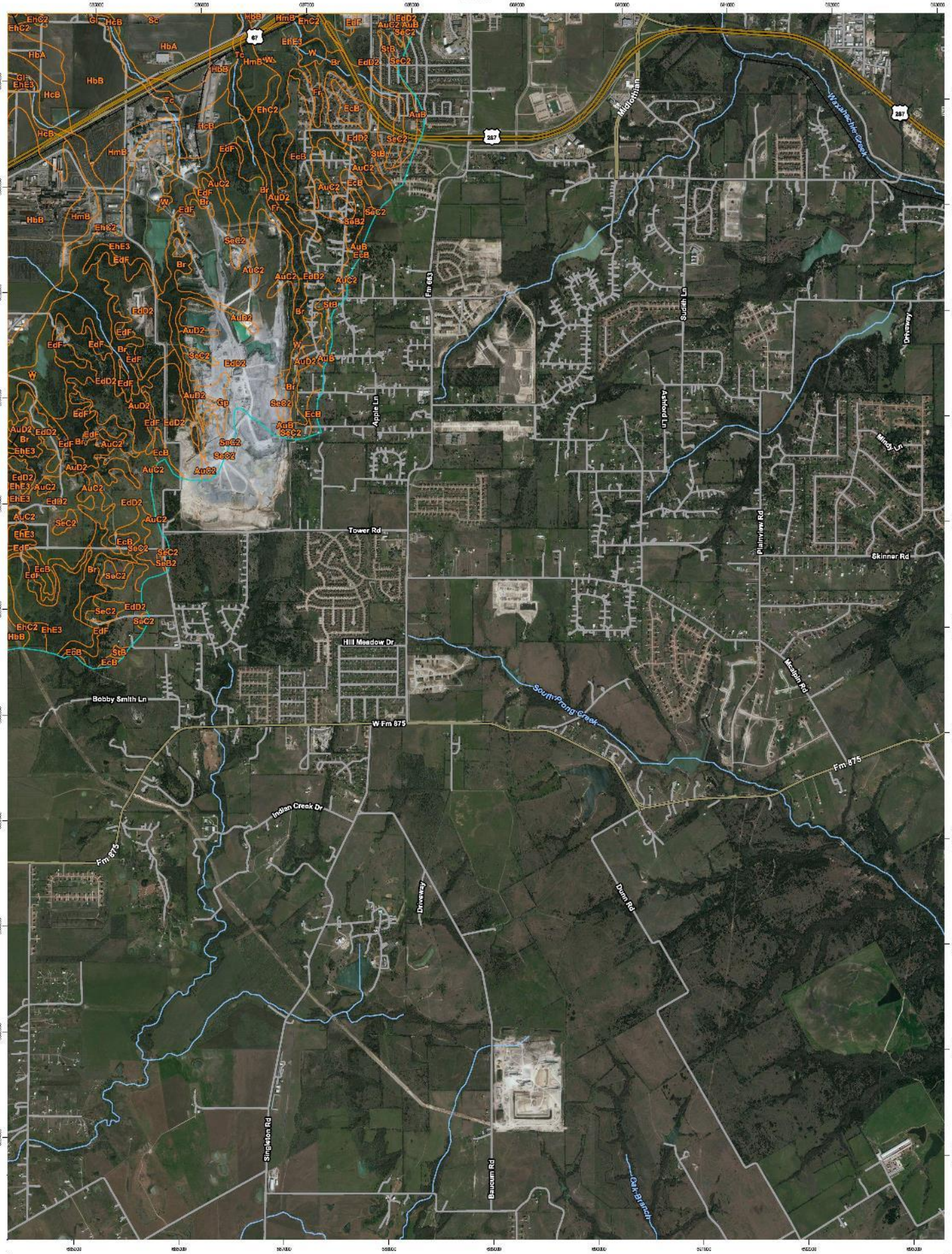

County Road 604
Driveway
600
Apache Trl
Parkway
35
67 Bus
Cummings
Loria St
67
Exit 24
Frm 1706
Frm 3136
401
35W
Frm 1807
County Road 109
County Road 207
County Road 209
County Road 208
61
GULL

Soil Map—Dallas County, Texas, Ellis County, Texas, Johnson County, Texas, and Tarrant County, Texas
(Joe Pool Lake Watershed - Mountain Creek Arm)
Map sheet 8 of 9
John's sheet 5



Map Scale: 1:24,000 if printed on C portrait (17" x 22") sheet.
Meters 0 300 700 1400 2100
Feet 0 1000 2000 4000 6000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

Soil Map—Dallas County, Texas, Ellis County, Texas, Johnson County, Texas, and Tarrant County, Texas
(Joe Pool Lake Watershed - Mountain Creek Arm)
Map sheet 9 of 9
Tabs sheet 6



Map Scale: 1:24,000 if printed on C portrait (17" x 22") sheet.
Meters 0 300 700 1400 2100
Feet 0 1000 2000 4000 6000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

Map Sheet Location

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Dallas County, Texas
Survey Area Data: Version 16, Sep 14, 2018

Soil Survey Area: Ellis County, Texas
Survey Area Data: Version 14, Sep 14, 2018

Soil Survey Area: Johnson County, Texas
Survey Area Data: Version 15, Sep 14, 2018

Soil Survey Area: Tarrant County, Texas
Survey Area Data: Version 16, Sep 16, 2018

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 8, 2013—Dec 13, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Altoga silty clay, 5 to 12 percent slopes, eroded	73.4	0.1%
3	Arents, loamy, hilly, rarely flooded	14.6	0.0%
5	Austin silty clay, 1 to 3 percent slopes	198.3	0.2%
6	Austin silty clay, 2 to 5 percent slopes, eroded	74.8	0.1%
7	Austin-Lewisville complex, 5 to 8 percent slopes, erode d	751.2	0.9%
16	Whitewright loam, 3 to 5 percent slopes	147.9	0.2%
17	Branyon clay, 0 to 1 percent slopes	447.3	0.5%
21	Crockett fine sandy loam, 1 to 3 percent slopes	1.9	0.0%
23	Dalco clay, 1 to 3 percent slopes	48.5	0.1%
26	Eddy clay loam, 1 to 3 percent slopes	1,012.5	1.2%
27	Eddy clay loam, 3 to 8 percent slopes	1,168.3	1.3%
28	Eddy-Whitewright complex, 8 to 20 percent slopes	1,899.0	2.2%
30	Eddy-Stephen complex, 1 to 5 percent slopes	216.3	0.2%
34	Ferris-Heiden complex, 5 to 12 percent slopes	1,810.1	2.1%
41	Heiden clay, 1 to 3 percent slopes	296.6	0.3%
42	Heiden clay, 2 to 5 percent slopes, eroded	1,038.6	1.2%
43	Houston Black clay, 0 to 1 percent slopes	230.3	0.3%
44	Houston Black clay, 1 to 3 percent slopes	654.6	0.7%
46	Lewisville silty clay, 1 to 3 percent slopes	160.6	0.2%
47	Lewisville silty clay, 3 to 5 percent slopes, eroded	116.3	0.1%
48	Lewisville silty clay, 5 to 8 percent slopes	5.8	0.0%
55	Ovan clay, frequently flooded	183.6	0.2%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
67	Stephen silty clay, 1 to 4 percent slopes	272.4	0.3%
68	Stephen silty clay, 3 to 5 percent slopes	46.2	0.1%
70	Sunev clay loam, 1 to 3 percent slopes	14.0	0.0%
77	Vertel clay, 5 to 12 percent slopes	1,669.7	1.9%
DAM	Dams	44.8	0.1%
W	Water	3,544.4	4.0%
Subtotals for Soil Survey Area		**16,142.0**	**18.4%**
Totals for Area of Interest		**87,842.5**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AuB	Austin silty clay, 1 to 3 percent slopes	242.5	0.3%
AuC2	Austin silty clay, 2 to 5 percent slopes, eroded	333.0	0.4%
AuD2	Austin silty clay, 5 to 8 percent slopes, moderately eroded	232.6	0.3%
Br	Broken alluvial land, rarely flooded	538.3	0.6%
DAM	Dams	9.4	0.0%
EcB	Eddy gravelly clay loam, 1 to 3 percent slopes	525.8	0.6%
EdD2	Eddy soils, 3 to 8 percent slopes, eroded	2,405.0	2.7%
EdF	Eddy soils, 8 to 20 percent slopes	246.7	0.3%
EhC2	Ellis and Heiden clay, 3 to 5 percent slopes, eroded	2,687.4	3.1%
EhE3	Ellis and Heiden clays, 5 to 12 percent slopes, severe ly eroded	4,950.7	5.6%
Fl	Bosque loam, rarely flooded	82.9	0.1%
Fr	Frio silty clay, 0 to 1 percent slopes,frequently flooded	47.0	0.1%
Fs	Frio silty clay, 0 to 1 percent slopes, occasionally flooded	27.5	0.0%
Gl	Gullied land	457.4	0.5%
Gp	Gravel pits	25.2	0.0%
HaA	Houston Black clay, 0 to 1 percent slopes	262.8	0.3%
HaB	Houston Black clay, 1 to 3 percent slopes	2,294.7	2.6%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
HbA	Branyon clay, 0 to 1 percent slopes	947.9	1.1%
HbB	Branyon clay, 1 to 3 percent slopes	3,449.4	3.9%
HcB	Heiden clay, 1 to 3 percent slopes	5,054.9	5.8%
HcC2	Heiden clay, 3 to 5 percent slopes, eroded	502.8	0.6%
HcD2	Heiden clay, 5 to 8 percent slopes, eroded	62.5	0.1%
HmB	Heiden and Ellis clays, 1 to 3 percent slopes	1,308.6	1.5%
HsD3	Heiden-Ferris complex, 5 to 8 percent slopes, severely eroded	235.6	0.3%
LeB	Lewisville silty clay, 1 to 3 percent slopes	92.0	0.1%
LeC2	Lewisville silty clay, 3 to 5 percent slopes, eroded	92.7	0.1%
LeD2	Lewisville silty clay, 5 to 8 percent slopes, eroded	42.3	0.0%
LsD3	Altoga soils, 5 to 8 percent slopes, severely eroded	57.9	0.1%
Sc	Slickspots	4.2	0.0%
SeB2	Stephen-Eddy complex, 1 to 3 percent slopes, eroded	47.9	0.1%
SeC2	Stephen-Eddy complex, 2 to 5 percent slopes	289.6	0.3%
StB	Stephen silty clay, 1 to 4 percent slopes	299.0	0.3%
SuE3	Ferris clay, 5 to 12 percent slopes, eroded	27.6	0.0%
Tc	Trinity clay, 0 to 1 percent slopes, frequently flooded	1,699.3	1.9%
To	Trinity clay, 0 to 1 percent slopes, occasionally flooded	375.6	0.4%
W	Water	435.4	0.5%
WsB	Wilson clay loam, 1 to 3 percent slopes	60.8	0.1%
WsB2	Wilson clay loam, 1 to 3 percent slopes, eroded	82.1	0.1%
Subtotals for Soil Survey Area		**30,536.8**	**34.8%**
Totals for Area of Interest		**87,842.5**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AtB	Altoga silty clay, 2 to 5 percent slopes	78.1	0.1%
BuA	Burleson clay, 0 to 1 percent slopes	77.0	0.1%
BuB	Burleson clay, 1 to 3 percent slopes	216.3	0.2%
CrB	Crosstell fine sandy loam, 1 to 3 percent slopes	83.9	0.1%
CrD	Crosstell fine sandy loam, 3 to 8 percent slopes	168.8	0.2%
CuB	Culp clay loam, 0 to 3 percent slopes	203.6	0.2%
FeD2	Ferris clay, 5 to 12 percent slopes, eroded	96.4	0.1%
FhC	Ferris-Heiden complex, 2 to 5 percent slopes	2,911.6	3.3%
Fr	Frio silty clay, 0 to 1 percent slopes, occasionally flooded	22.1	0.0%
GfC	Gasil fine sandy loam, 3 to 8 percent slopes	5.1	0.0%
Gw	Gowen clay loam, occasionally flooded	55.9	0.1%
HaA	Hassee fine sandy loam, 0 to 1 percent slopes	99.1	0.1%
HeB	Heiden clay, 1 to 3 percent slopes	18,847.5	21.5%
HeD	Heiden clay, 3 to 8 percent slopes	1,648.9	1.9%
HoA	Houston Black clay, 0 to 1 percent slopes	1,847.4	2.1%
HoB	Houston Black clay, 1 to 3 percent slopes	3,789.1	4.3%
LeB	Lewisville silty clay, 1 to 3 percent slopes	9.9	0.0%
NaC	Navo clay loam, 2 to 5 percent slopes	1,567.1	1.8%
NwB	Navo-Wilson complex, 0 to 3 percent slopes	299.2	0.3%
Pp	Pulexas fine sandy loam, frequently flooded	5.4	0.0%
Pr	Pursley clay loam, frequently flooded	17.0	0.0%
RaB	Rader fine sandy loam, 0 to 3 percent slopes	25.7	0.0%
Tn	Tinn clay, 0 to 1 percent slopes, frequently flooded	1,793.2	2.0%
W	Water	35.6	0.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
WsA	Wilson silty clay loam, 0 to 1 percent slopes	105.6	0.1%
WsB	Wilson silty clay loam, 1 to 3 percent slopes	28.3	0.0%
Subtotals for Soil Survey Area		**34,038.1**	**38.7%**
Totals for Area of Interest		**87,842.5**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5	Altoga silty clay loam, 5 to 12 percent slopes	0.5	0.0%
9	Bastsil fine sandy loam, 0 to 3 percent slopes	7.4	0.0%
18	Branyon clay, 0 to 1 percent slopes	1,996.3	2.3%
19	Burleson clay, 0 to 1 percent slopes	137.6	0.2%
20	Chatt silty clay, 1 to 3 percent slopes	71.1	0.1%
24	Ferris clay, 5 to 12 percent slopes, eroded	173.6	0.2%
25	Ferris-Heiden complex, 2 to 5 percent slopes	554.3	0.6%
33	Heiden clay, 1 to 3 percent slopes	760.8	0.9%
34	Houston Black clay, 1 to 3 percent slopes	2,370.9	2.7%
35	Houston Black-Urban land complex, 1 to 4 percent slopes	17.0	0.0%
41	Lott silty clay, 1 to 3 percent slopes	8.1	0.0%
50	Navo clay loam, 1 to 3 percent slopes	185.7	0.2%
54	Ovan clay, frequently flooded	219.6	0.3%
78	Sunev clay loam, 3 to 8 percent slopes	17.1	0.0%
84	Wilson clay loam, 0 to 2 percent slopes	1.6	0.0%
W	Water	604.2	0.7%
Subtotals for Soil Survey Area		**7,125.8**	**8.1%**
Totals for Area of Interest		**87,842.5**	**100.0%**

Appendix B

USFWS IPaC Report for the Joe Pool Lake Watershed

IPaC Information for Planning and Consultation **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Texas



Local office

Arlington Ecological Services Field Office

(817) 277-1100
(817) 277-1129

2005 Ne Green Oaks Blvd
Suite 140
Arlington, TX 76006-6247

http://www.fws.gov/southwest/es/arlingtontexas/
http://www.fws.gov/southwest/es/EndangeredSpecies/lists/

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
Golden-cheeked Warbler (=wood) Dendroica chrysoparia No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/33	Endangered
Least Tern Sterna antillarum No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8505	Endangered
Piping Plover Charadrius melodus This species only needs to be considered if the following condition applies: • Wind Energy Projects There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot Calidris canutus rufa This species only needs to be considered if the following condition applies: • Wind Energy Projects No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1864	Threatened

NOT FOR CONSULTATION

Clams

NAME	STATUS
Texas Fawnsfoot Truncilla macrodon No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8965	Candidate

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

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Bald Eagle Haliaeetus leucocephalus	**Breeds Sep 1 to Jul 31**
Buff-breasted Sandpiper Calidris subruficollis **This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.** https://ecos.fws.gov/ecp/species/9488	**Breeds elsewhere**
Harris's Sparrow Zonotrichia querula **This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.**	**Breeds elsewhere**
Lesser Yellowlegs Tringa flavipes **This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.** https://ecos.fws.gov/ecp/species/9679	**Breeds elsewhere**
Red-headed Woodpecker Melanerpes erythrocephalus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Semipalmated Sandpiper Calidris pusilla This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere

NOT FOR CONSULTATION

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



NOT FOR CONSULTATION

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

NOT FOR CONSULTATION

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

The area of this project is too large for IPaC to load all NWI wetlands in the area. The list below may be incomplete. Please contact the local U.S. Fish and Wildlife Service office or visit the NWI map for a full list.

FRESHWATER EMERGENT WETLAND

- PEM1A
- PEM1Ch
- PEM1Ah
- PEM1Fh
- PEM1C
- PEM1Cx
- PEM1Ax

FRESHWATER FORESTED/SHRUB WETLAND

- PFO1A
- PFO1Ch
- PSS1A
- PFO1C
- PSS1/EM1A
- PFO1Ah
- PSS1C
- PSS1Ch
- PSS1Ax

FRESHWATER POND

- PUBFh
- PUBHh
- PUBHx
- PAB4Hh
- PUSCh
- PUBFx
- PUSAh
- PUSCx
- PUBF
- PAB3Hh
- PUSAx
- PAB4Hx
- PUBH
- PAB4Fh

LAKE

NOT FOR CONSULTATION

L1UBHh
L1UBHx

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

Appendix C

TPWD Threatened & Endangered Resources Reports for Dallas, Ellis, Tarrant, and Johnson Counties

Table C-1. State and federal listing status acronyms and their descriptions.

Listing Status	Description
LE or LT	Federally Listed Endangered or Threatened
PE or PT	Federally Proposed Endangered or Threatened
SAE or SAT	Federally Listed Endangered or Threatened by Similarity of Appearance
C	Federal Candidate for Listing
DL or PDL	Federally Delisted or Proposed for Delisting
E or T	State Listed Endangered or Threatened
NT	Not tracked or no longer tracked by the State
“blank”	No regulatory listing status, but considered a "species of greatest conservation need" as defined in the 2012 Texas Conservation Action Plan

Table C-2. Federal and state status of threatened and endangered species potentially within the Joe Pool Lake watershed.

Scientific Name	Common Name	Federal Status	State Status	Description
Amphibians				
Desmognathus conanti	southern dusky salamander			Details unknown.
Anaxyrus woodhousii	Woodhouse's toad			Extremely catholic up to 5000 feet, does very well (except for traffic) in association with man.
Pseudacris streckeri	Strecker's chorus frog			Wooded floodplains and flats, prairies, cultivated fields and marshes. Likes sandy substrates.
Pseudacris fouquettei	cajun chorus frog			Habitat description is not available at this time.
Lithobates areolatus areolatus	southern crawfish frog			The Southern Crawfish Frog can be found in abandoned crawfish holes and small mammal burrows. This species inhabits moist meadows, pasturelands, pine scrub, and river flood plains. This species spends nearly all of its time in burrows and only leaves the burrow area to breed. Although this species can be difficult to detect due to its reclusive nature, the call of breeding males can be heard over great distances. Eggs are laid and larvae develop in temporary water such as flooded fields, ditches, farm ponds and small lakes. Habitat: Shallow water, Herbaceous Wetland, Riparian, Temporary Pool, Cropland/hedgerow, Grassland/herbaceous, Suburban/orchard, Woodland â€“ Conifer.

Scientific Name	Common Name	Federal Status	State Status	Description
			Birds	
Plegadis chihi	white-faced ibis		T	Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.
Mycteria americana	wood stork		T	Prefers to nest in large tracts of baldcypress (Taxodium distichum) or red mangrove (Rhizophora mangle); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960
Haliaeetus leucocephalus	bald eagle		T	Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds
Laterallus jamaicensis	black rail	PT		Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of Salicornia
Grus americana	whooping crane	LE	E	Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties.
Charadrius melodus	piping plover	LT	T	Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.

Scientific Name	Common Name	Federal Status	State Status	Description
Birds (continued)				
Charadrius montanus	mountain plover			Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous
Calidris canutus rufa	red knot	LT		Red knots migrate long distances in flocks northward through the contiguous United States mainly April-June, southward July-October. A small plump-bodied, short-necked shorebird that in breeding plumage, typically held from May through August, is a distinctive and unique pottery orange color. Its bill is dark, straight and, relative to other shorebirds, short-to-medium in length. After molting in late summer, this species is in a drab gray-and-white non-breeding plumage, typically held from September through April. In the non-breeding plumage, the knot might be confused with the omnipresent Sanderling. During this plumage, look for the knotâ€™s prominent pale eyebrow and whitish flanks with dark barring. The Red Knot prefers the shoreline of coast and bays and also uses mudflats during rare inland encounters. Primary prey items include coquina clam (Donax spp.) on beaches and dwarf surf clam (Mulinia lateralis) in bays, at least in the Laguna Madre. Wintering Range includes- Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston, Jefferson, Kennedy, Kleberg, Matagorda, Nueces, San Patricio, and Willacy. Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore.
Leucophaeus pipixcan	Franklin's gull			Habitat description is not available at this time.
Sternula antillarum athalassos	interior least tern	LE	E	Sand beaches, flats, bays, inlets, lagoons, islands. Subspecies is listed only when inland (more than 50 mi from a coastline); nests along sand/gravel bars within braided streams, rivers; also on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony
Athene cunicularia hypugaea	western burrowing owl			Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows
Vireo atricapilla	black-capped vireo		E	Oak-juniper woodlands with distinctive patchy, two-layered aspect; shrub and tree layer with open, grassy spaces; requires foliage reaching to ground level for nesting cover; return to same territory, or one nearby, year after year; deciduous and broad-leaved shrubs and trees provide insects for feeding; species composition less important than presence of adequate broad-leaved shrubs, foliage to ground level, and required structure; nesting season March-late summer
Setophaga chrysoparia	golden-cheeked warbler	LE	E	Ashe juniper in mixed stands with various oaks (Quercus spp.). Edges of cedar brakes. Dependent on Ashe juniper (also known as cedar) for long fine bark strips, only available from mature trees, used in nest construction; nests are placed in various trees other than Ashe juniper; only a few mature junipers or nearby cedar brakes can provide the necessary nest material; forage for insects in broad-leaved trees and shrubs; nesting late March-early summer.

Scientific Name	Common Name	Federal Status	State Status	Description
				Fishes
Anguilla rostrata	american eel			Originally found in all river systems from the Red River to the Rio Grande. Aquatic habtiats include large rivers, streams, tributaries, coastal watersheds, estuaries, bays, and oceans. Spawns in Sargasso Sea, larva move to coastal waters, metamorphose, and begin upstream movements. Females tend to move further upstream than males (who are often found in brackish estuaries). American Eel are habitat generalists and may be found in a broad range of habitat conditions including slow- and fast-flowing waters over many substrate types. Extirpation in upstream drainages attributed to reservoirs that impede upstream migration.
				Mammals
Blarina carolinensis	southern short-tailed shrew			Habitat description is not available at this time.
Myotis austroriparius	southeastern myotis bat			Caves are rare in Texas portion of range; buildings, hollow trees are probably important. Historically, lowland pine and hardwood forests with large hollow trees; associated with ecological communities near water. Roosts in cavity trees of bottomland hardwoods, concrete culverts, and abandoned man-made structures.
Myotis velifer	cave myotis bat			Colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore.
Perimyotis subflavus	tricolored bat			Forest, woodland and riparian areas are important. Caves are very important to this species.
Eptesicus fuscus	big brown bat			Any wooded areas or woodlands except south Texas. Riparian areas in west Texas.
Lasiurus borealis	eastern red bat			Found in a variety of habitats in Texas. Usually associated with wooded areas. Found in towns especially during migration.
Lasiurus cinereus	hoary bat			Known from montane and riparian woodland in Trans-Pecos, forests and woods in east and central Texas.
Tadarida brasiliensis	Mexican free-tailed bat			Roosts in buildings in east Texas. Largest maternity roosts are in limestone caves on the Edwards Plateau. Found in all habitats, forest to desert.
Nyctinomops macrotis	big free-tailed bat			Habitat data sparse but records indicate that species prefers to roost in crevices and cracks in high canyon walls, but will use buildings, as well; reproduction data sparse, gives birth to single offspring late June-early July; females gather in nursery colonies; winter habits undetermined, but may hibernate in the Trans-Pecos; opportunistic insectivore
Sylvilagus aquaticus	swamp rabbit			Habitat description is not available at this time.

Scientific Name	Common Name	Federal Status	State Status	Description
Mammals (continued)				
Ictidomys tridecemlineatus	thirteen-lined ground squirrel			Habitat description is not available at this time.
Cynomys ludovicianus	black-tailed prairie dog			Dry, flat, short grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle; live in large family groups
Microtus pinetorum	woodland vole			Include grassy marshes, swamp edges, old-field/pine woodland ecotones, tallgrass fields; generally sandy soils.
Ursus americanus	black bear		T	In Chisos, prefers higher elevations where pinyon-oaks predominate; also occasionally sighted in desert scrub of Trans-Pecos (Black Gap Wildlife Management Area) and Edwards Plateau in juniper-oak habitat. For ssp. luteolus, bottomland hardwoods, floodplain forests, upland hardwoods with mixed pine; marsh. Bottomland hardwoods and large tracts of inaccessible forested areas.
Mustela frenata	long-tailed weasel			Includes brushlands, fence rows, upland woods and bottomland hardwoods, forest edges & rocky desert scrub. Usually live close to water.
Neovison vison	mink			Intimately associated with water; coastal swamps & marshes, wooded riparian zones, edges of lakes. Prefer floodplains.
Taxidea taxus	American badger			Habitat description is not available at this time.
Spilogale putorius	eastern spotted skunk			Catholic; open fields prairies, croplands, fence rows, farmyards, forest edges & woodlands. Prefer wooded, brushy areas & tallgrass prairies. S.p. ssp. interrupta found in wooded areas and tallgrass prairies, preferring rocky canyons and outcrops when such sites are available.
Spilogale putorius interrupta	plains spotted skunk			Catholic; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie
Conepatus leuconotus	western hog-nosed skunk			Habitats include woodlands, grasslands & deserts, to 7200 feet, most common in rugged, rocky canyon country; little is known about the habitat of the ssp. telmalestes
Puma concolor	mountain lion			Rugged mountains & riparian zones.

Scientific Name	Common Name	Federal Status	State Status	Description
				Reptiles
Macrochelys temminckii	alligator snapping turtle		T	Perennial water bodies; deep water of rivers, canals, lakes, and oxbows; also swamps, bayous, and ponds near deep running water; sometimes enters brackish coastal waters; usually in water with mud bottom and abundant aquatic vegetation; may migrate several miles along rivers; active March-October; breeds April-October
Terrapene carolina	eastern box turtle			Eastern box turtles inhabit forests, fields, forest-brush, and forest-field ecotones. In some areas they move seasonally from fields in spring to forest in summer. They commonly enters pools of shallow water in summer. For shelter, they burrow into loose soil, debris, mud, old stump holes, or under leaf litter. They can successfully hibernate in sites that may experience subfreezing temperatures. In Maryland bottomland forest, some hibernated in pits or depressions in forest floor (usually about 30 cm deep) usually within summer range; individuals tended to hibernate in same area in different years (Stickel 1989). Also attracted to farms, old fields and cut-over woodlands, as well as creek bottoms and dense woodlands. Egg laying sites often are sandy or loamy soils in open areas; females may move from bottomlands to warmer and drier sites to nest. In Maryland, females used the same nesting area in different years (Stickel 1989).
Terrapene ornata	western box turtle			Ornate or western box trutles inhabit prairie grassland, pasture, fields, sandhills, and open woodland. They are essentially terrestrial but sometimes enter slow, shallow streams and creek pools. For shelter, they burrow into soil (e.g., under plants such as yucca) (Converse et al. 2002) or enter burrows made by other species; winter burrow depth was 0.5-1.8 meters in Wisconsin (Doroff and Keith 1990), 7-120 cm (average depth 54 cm) in Nebraska (Converse et al. 2002). Eggs are laid in nests dug in soft well-drained soil in open area (Legler 1960, Converse et al. 2002). Very partial to sandy soil.
Apalone mutica	smooth softshell			Any permanent body of water.Large rivers and streams; in some areas also found in lakes, impoundments, and shallow bogs (Ernst and Barbour 1972). Usually in water with sandy or mud bottom and few aquatic plants. Often basks on sand bars and mudflats at edge of water. Eggs are laid in nests dug in high open sandbars and banks close to water, usually within 90 m of water (Fitch and Plummer 1975).
Alligator mississippiensis	American alligator			Coastal marshes; inland natural rivers, swamps and marshes; manmade impoundments.

Scientific Name	Common Name	Federal Status	State Status	Description
Reptiles (continued)				
Ophisaurus attenuatus	slender glass lizard			Prefers relatively dry microhabitats, usually associated with grassy areas. Habitats include open grassland, prairie, woodland edge, open woodland, oak savannas, longleaf pine flatwoods, scrubby areas, fallow fields, and areas near streams and ponds, often in habitats with sandy soil. This species often appears on roads in spring. During inactivity, it occurs in underground burrows. In Kansas, slender glass lizards were scarce in heavily grazed pastures, increased as grass increased with removal of grazing, and declined as brush and trees replaced grass (Fitch 1989). Eggs are laid underground, under cover, or under grass clumps (Ashton and Ashton 1985); in cavities beneath flat rocks or in abandoned tunnels of small mammals (Scalopus, Microtus) (Fitch 1989).
Phrynosoma cornutum	Texas horned lizard		T	Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area. Open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September.
Nerodia harteri	Brazos water snake		T	Shallow, fast-flowing water with a rocky or gravelly substrate preferred. Adults can be found in deep water with mud bottoms. Upper Brazos River drainage; riffle specialist, in shallow water with rocky bottom and on rocky portions of banks.
Thamnophis sirtalis	common garter snake			Irrigation canals and riparian-corridor farmlands in west; marshy, flooded pastureland, grassy or brushy borders of permanent bodies of water; coastal salt marshes.
Thamnophis sirtalis annectens	Texas garter snake			Irrigation canals and riparian-corridor farmlands in west; marshy, flooded pastureland, grassy or brushy borders of permanent bodies of water; coastal salt marshes. Wet or moist microhabitats are conducive to the species occurrence, but is not necessarily restricted to them; hibernates underground or in or under surface cover; breeds March-August.
Crotalus horridus	timber (canebrake) rattlesnake		T	Swamps, floodplains, upland pine and deciduous woodland, riparian zones, abandoned farmland. Limestone bluffs, sandy soil or black clay. Prefers dense ground cover, i.e. grapevines, palmetto.
Sistrurus tergeminus	massasauga			Quite common in gently rolling prairie occasionally broken by creek valley or rocky hillside.
Crustaceans				
Caecidotea bilineata	a cave obligate isopod			Habitat description is not available at this time.
Insects				
Bombus pensylvanicus	American bumblebee			Habitat description is not available at this time.
Pogonomyrmex comanche	Comanche harvester ant			Habitat description is not available at this time.
Amblycorypha uhleri	a katydid			Habitat description is not available at this time.

Scientific Name	Common Name	Federal Status	State Status	Description
Insects (continued)				
Arethaea ambulator	No accepted common name			Habitat description is not available at this time.
Neotrichia juani	No accepted common name			Habitat description is not available at this time.
Mollusks				
Lampsilis satura	sandbank pocketbook		T	Small to large rivers with moderate flows and swift current on gravel, gravel-sand, and sand bottoms; east Texas, Sulfur south through San Jacinto River basins; Neches River
Pleurobema riddellii	Louisiana pigtoe		T	Streams and moderate-size rivers, usually flowing water on substrates of mud, sand, and gravel; not generally known from impoundments; Sabine, Neches, and Trinity (historic) River basins
Potamilus amphichaenus	Texas heelsplitter		T	Quiet waters in mud or sand and also in reservoirs. Sabine, Neches, and Trinity River basins
Fusconaia chunii	No accepted common name			Habitat description is not available at this time.
Truncilla macrodon	Texas fawnsfoot	C	T	Little known; possibly rivers and larger streams, and intolerant of impoundment; flowing rice irrigation canals, possibly sand, gravel, and perhaps sandy-mud bottoms in moderate flows; Brazos and Colorado River basins
Plants				
Matelea edwardsensis	plateau milkvine			Occurs in various types of juniper-oak and oak-juniper woodlands; Perennial; Flowering March-Oct; Fruiting May-June
Echinacea atrorubens	Topeka purple-coneflower			Occurring mostly in tallgrass prairie of the southern Great Plains, in blackland prairies but also in a variety of other sites like limestone hillsides; Perennial; Flowering Jan-June; Fruiting Jan-May
Liatris glandulosa	glandular gay-feather			Occurs in herbaceous vegetation on limestone outcrops (Carr 2015)
Physaria engelmannii	Engelmann's bladderpod			Grasslands and calcareous rock outcrops in a band along the eastern edge of the Edwards Plateau, ranging as far north as the Red River (Carr 2015).
Cuscuta exaltata	tree dodder			Parasitic on various Quercus, Juglans, Rhus, Vitis, Ulmus, and Diospyros species as well as Acacia berlandieri and other woody plants; Annual; Flowering May-Oct; Fruiting July-Oct
Astragalus reflexus	Texas milk vetch			Grasslands, prairies, and roadsides on calcareous and clay substrates; Annual; Flowering Feb-June; Fruiting April-June
Dalea hallii	Hall's prairie clover			In grasslands on eroded limestone or chalk and in oak scrub on rocky hillsides; Perennial; Flowering May-Sept; Fruiting June-Sept
Pediomelum reverchonii	Reverchon's scurfpea			Mostly in prairies on shallow rocky calcareous substrates and limestone outcrops; Perennial; Flowering Jun-Sept; Fruiting June-July

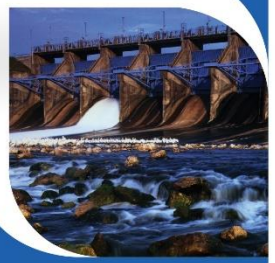
Scientific Name	Common Name	Federal Status	State Status	Description
Plants (continued)				
Phlox oklahomensis	Oklahoma phlox			Known from a 1958 collection from an oak woodland four miles east of Garland, Texas (Carr 2015).
Agalinis auriculata	earleaf false foxglove			Known in Texas from one late nineteenth century specimen record labeled -Benbrook-; in Oklahoma, degraded prairies, floodplains, fallow fields, and borders of upland sterile woods; in Arkansas, blackland prairie; Annual; Flowering August - October
Agalinis densiflora	Osage Plains false foxglove			Most records are from grasslands on shallow, gravelly, well drained, calcareous soils; Prairies, dry limestone soils; Annual; Flowering Aug-Oct
Yucca necopina	Glen Rose yucca			Grasslands on sandy soils and limestone outcrops; flowering April-June
Carex shinnersii	Shinner's sedge			Occurs in ditches and swales in prairie landscapes (Carr 2015).
Hexalectris nitida	Glass Mountains coral-root			Apparently rare in mixed woodlands in canyons in the mountains of the Brewster County, but encountered with regularity, albeit in small numbers, under Juniperus ashei in woodlands over limestone on the Edwards Plateau, Callahan Divide and Lampasas Cutplain; Perennial; Flowering June-Sept; Fruiting July-Sept
Hexalectris warnockii	Warnock's coral-root			In leaf litter and humus in oak-juniper woodlands on shaded slopes and intermittent, rocky creekbeds in canyons; in the Trans Pecos in oak-pinyon-juniper woodlands in higher mesic canyons (to 2000 m [6550 ft]), primarily on igneous substrates; in Terrell County under Quercus fusiformis mottes on terrraces of spring-fed perennial streams, draining an otherwise rather xeric limestone landscape; on the Callahan Divide (Taylor County), the White Rock Escarpment (Dallas County), and the Edwards Plateau in oak-juniper woodlands on limestone slopes; in Gillespie County on igneous substrates of the Llano Uplift; flowering June-September; individual plants do not usually bloom in successive years

Source: Texas Parks and Wildlife Department.

Appendix G: Pollutant Source Survey PowerPoint

JPLWPP Preliminary Pollutant Source Survey - Draft

Heather Firn
Trinity River Authority
October 22, 2020





JOE POOL LAKE WATERSHED PROTECTION

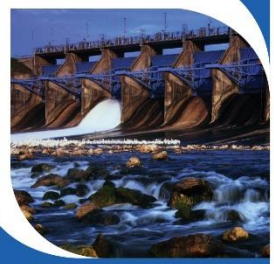
Trinity River Authority of Texas
Enriching the Trinity basin as a resource for Texans



Outline

- Overview of JPL Watershed
- Analysis of Historical Data Report Overview and Results
- 2020 Basin Summary Report Trends
- Combined trends from current project and JPL Customer Summary Reports
- Kick-off Stakeholder meeting
- Next steps

Joe Pool Lake Watershed

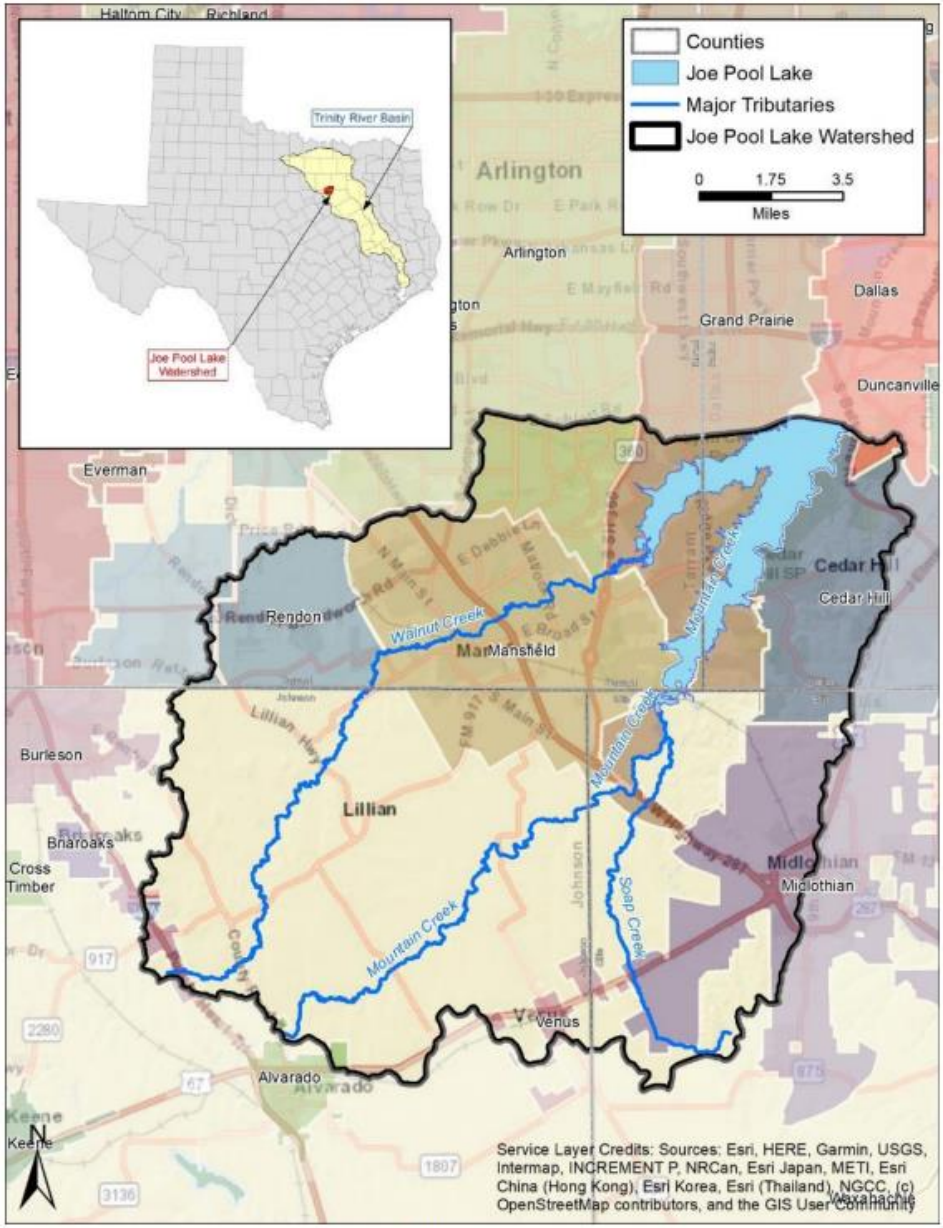




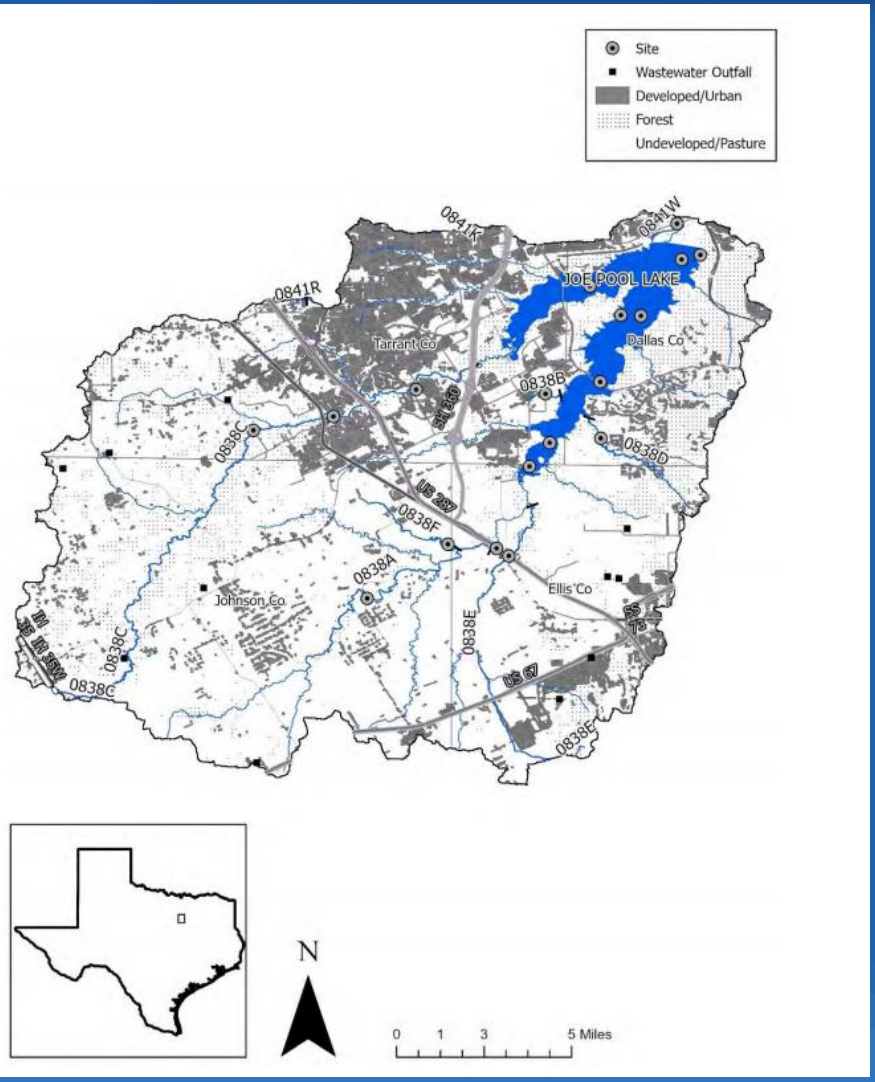


Review of Watershed

- Joe Pool Lake Watershed
  - Located in Dallas, Ellis, Johnson, and Tarrant Counties
  - Walnut Creek sub-watershed to the west
  - Mountain Creek sub-watershed to the east
  - Land use includes urban, suburban, industrial, municipal, agricultural, and several parks
  - JPL designated uses: public water supply, aquatic life, contact recreation, fish consumption, general use
- Project Goals
  - Protect water quality
    - Joe Pool Lake
    - Tributaries
  - Improve water quality
    - Address nitrate concern (lake)
    - Bacteria (Walnut Cr)



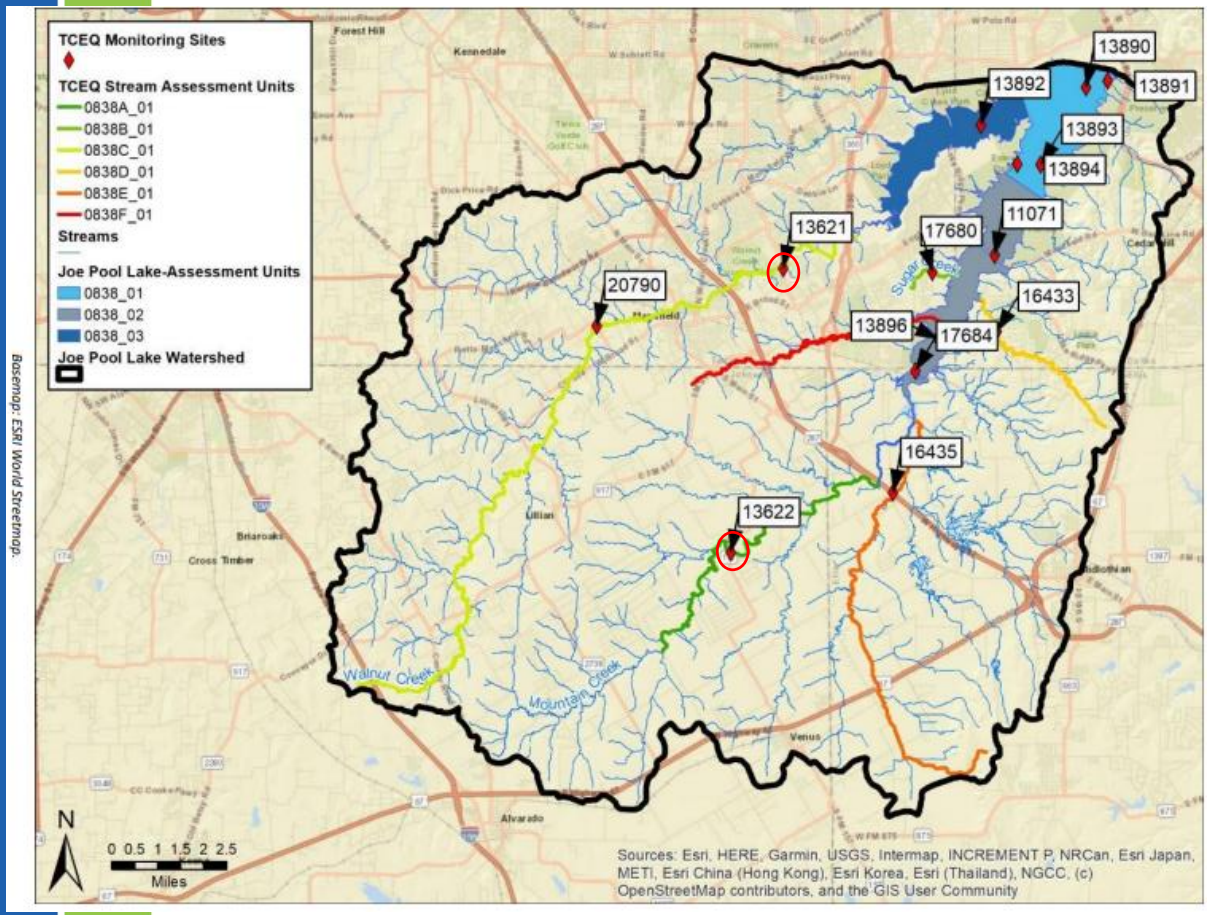
Watershed Segments



- TCEQ-monitored segments, including Joe Pool Lake (0838), a classified segment, and six unclassified segments:
  - Mountain Creek (0838A),
  - Sugar Creek (0838B),
  - Walnut Creek (0838C),
  - Hollings Branch (0838D),
  - Soap Creek (0838E),
  - Unnamed tributary (0838F), known locally as Low Branch

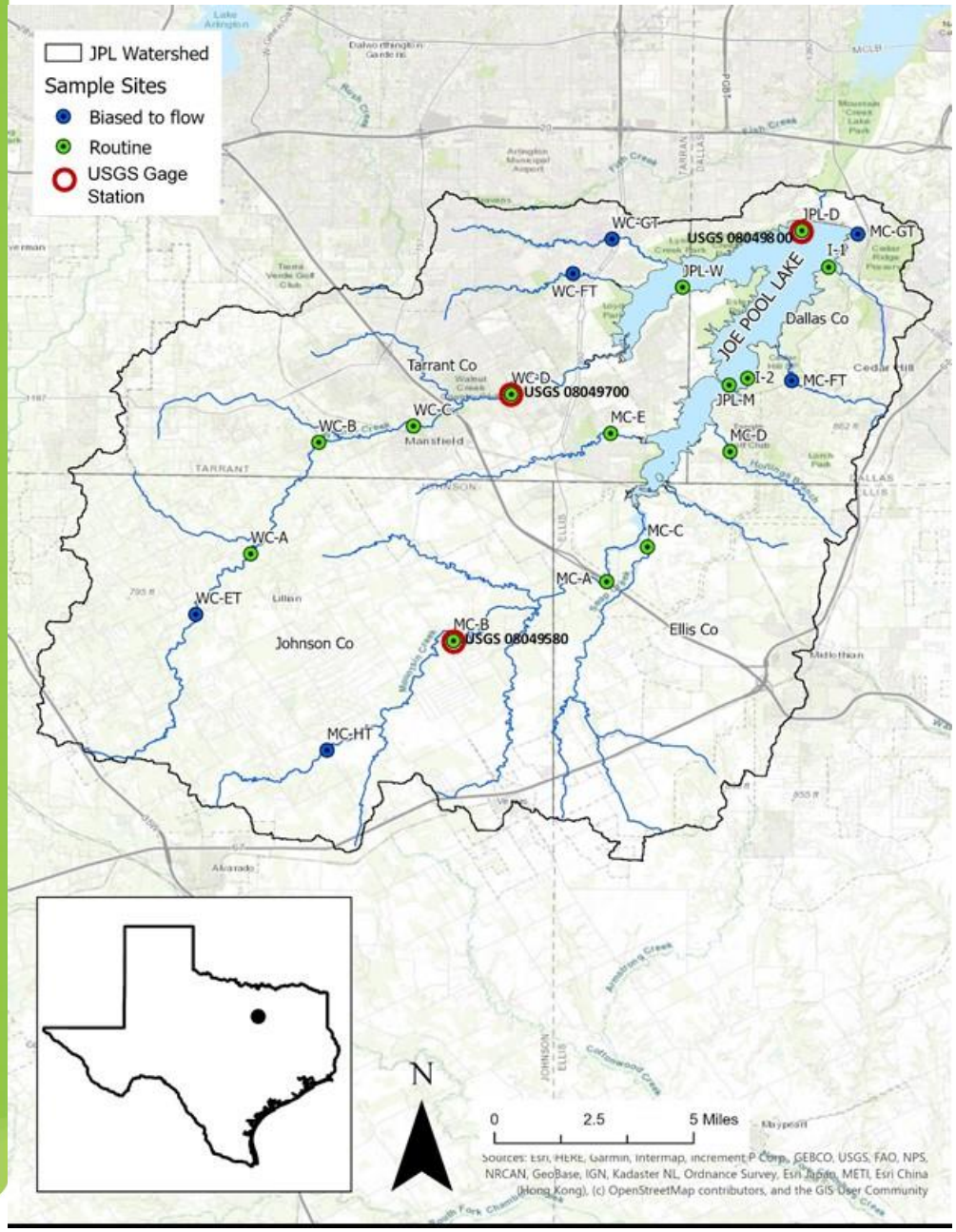


Assessment Units



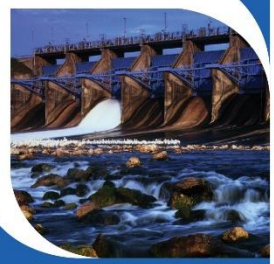
- The lake is composed of 3 assessment units (AUs) that are analyzed for water quality, as part of TCEQ's SWQMIS.
- Each assessment unit contains one or more SWQMIS monitoring station, from which data is analyzed to evaluate the unit's use assessment.
- Each unit's station is listed separately in the reporting database, the lake is evaluated as a whole segment, compounding data from all 3 assessment units for analysis.
- Stream segments are evaluated separate from one another but may be composed of data from several monitoring stations.
- All stream segments composed of a single AU.

Water Quality Monitoring Sites



- Our current monitoring sites for this project

Analysis of Historical Data
October 2019







Analysis of Historical Data Report – Oct ’19
Summary

- This analysis assessed existing water quality data in the watershed and analyzed it within the context of various watershed characteristics (e.g., climate, land use, land cover, geology, ecology) to ascertain current and historical conditions, as well as any trends in the data.
- Since the onset of the JPLWPP project
  - The concern for nitrate in the Mountain Creek arm has been removed and the Walnut Creek *E.coli* impairment has been delisted.
  - The TCEQ 2020 Integrated Report has been adopted



Analysis of Historical Data

for the

Joe Pool Lake Watershed Characterization Project

October 2019

tra

Trinity River Authority of Texas

Analysis of Historical Data Report – Oct '19
Description of Assessments

- TCEQ 2016 Integrated Report
  - TCEQ 2016 Texas Integrated Report covers a seven-year assessment period from December 1, 2007 to November 30, 2014
  - Methods used for this assessment are described in the TCEQ's 2014 *Guidance for Assessing and Reporting Surface Water Quality in Texas*
- TRA In-house Assessment
  - TRA prepares a comprehensive Trinity River Basin Summary Report every 5 years
  - It encompasses a detailed analysis of water quality data and potential sources, as well as recommendations for future basin activities
  - The 2015 Basin Summary Report used data collected from December 1, 2008 to November 30, 2013
- TRA Joe Pool Lake Customer Water Quality Reports
  - 2013-2016 was the primary focus within the Analysis of Historical Data Report

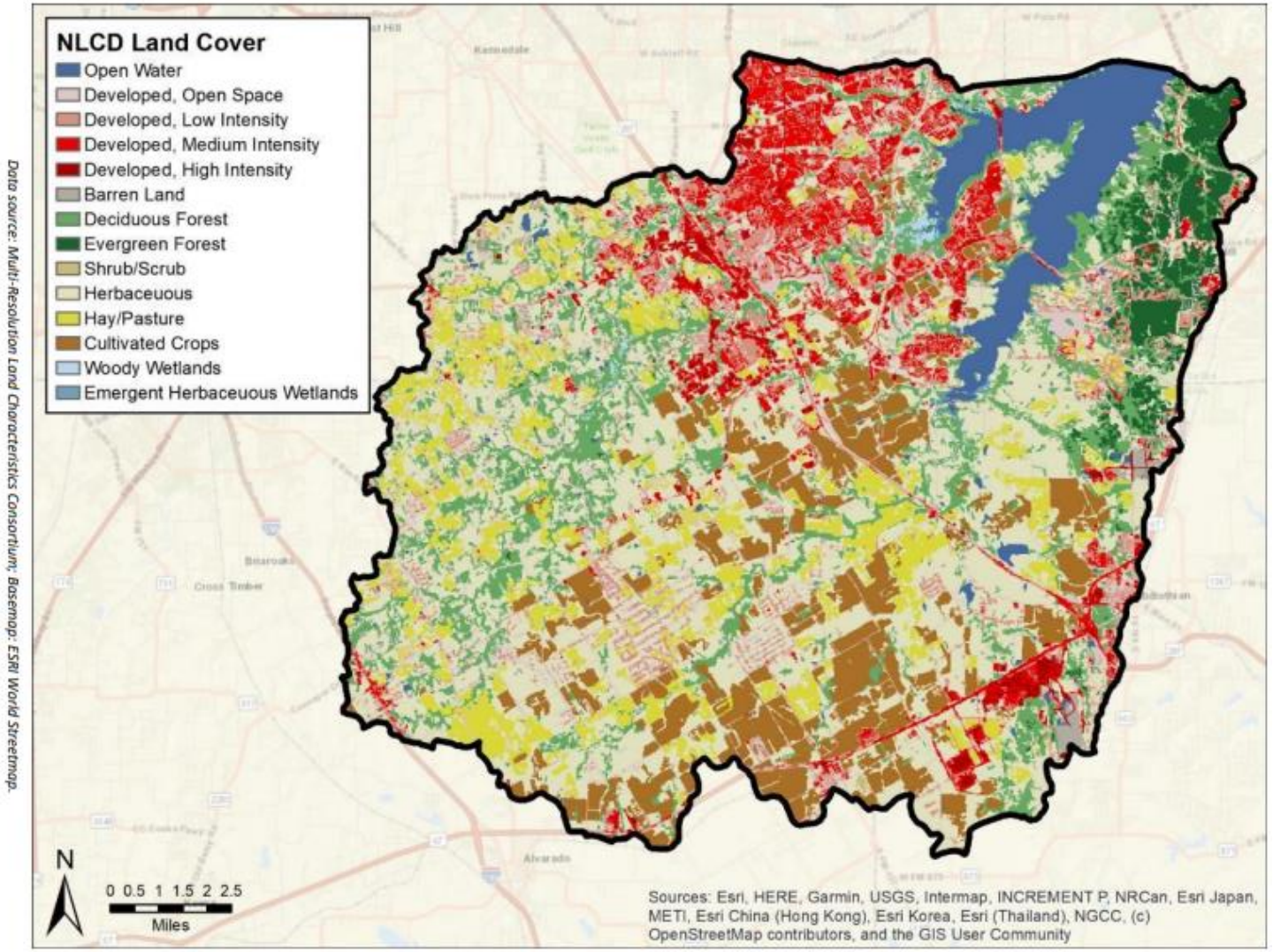
Analysis of Historical Data Report – Oct ‘19
Description of Assessments

- Data Collection
  - Data in SWQMIS used for the Analysis of Historical Data Report was available from 1997 to 2012.
  - Data collected after 2012 was still collected under the sampling protocols dictated in SWQM Procedures Manual, but was not submitted to TCEQ for inclusion in the SWQMIS database.

- Water Quality Trends
  - Trend analyses were conducted as part of the TRA BSR In-house Assessment and the Joe Pool Lake Customer Reports.
  - Trend analyses were conducted on all datasets determined to be adequately normal.
  - Datasets that passed significance testing were determined to have trends that warranted further discussion and investigation.

Analysis of Historical Data Report – Oct ‘19
Watershed Characteristics

- Land Cover



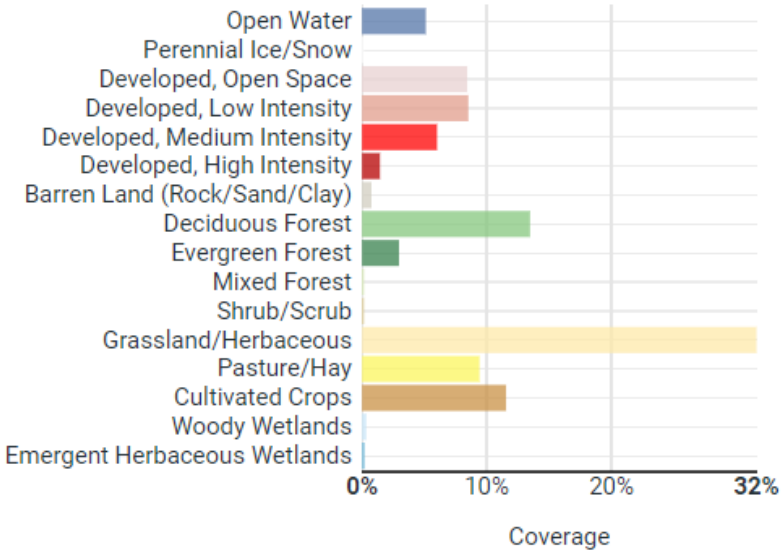
Land Cover

Land Cover	Acres	% of Watershed Total
Open Water	7415.492	5.2%
Developed, Open Space	10784.51	7.5%
Developed, Low Intensity	12488.02	8.7%
Developed, Medium Intensity	8946.74	6.3%
Developed, High Intensity	1880.34	1.3%
Barren Land	1078.957	0.8%
Deciduous Forest	19254.84	13.5%
Evergreen Forest	4233.348	3.0%
Shrub/Scrub	168.6263	0.1%
Herbaceous	45717.33	32.0%
Hay/Pasture	13630.5	9.5%
Cultivated Crops	16709.2	11.7%
Woody Wetlands	478.2166	0.3%
Emergent Herbaceous Wetlands	291.659	0.2%

Land cover distribution

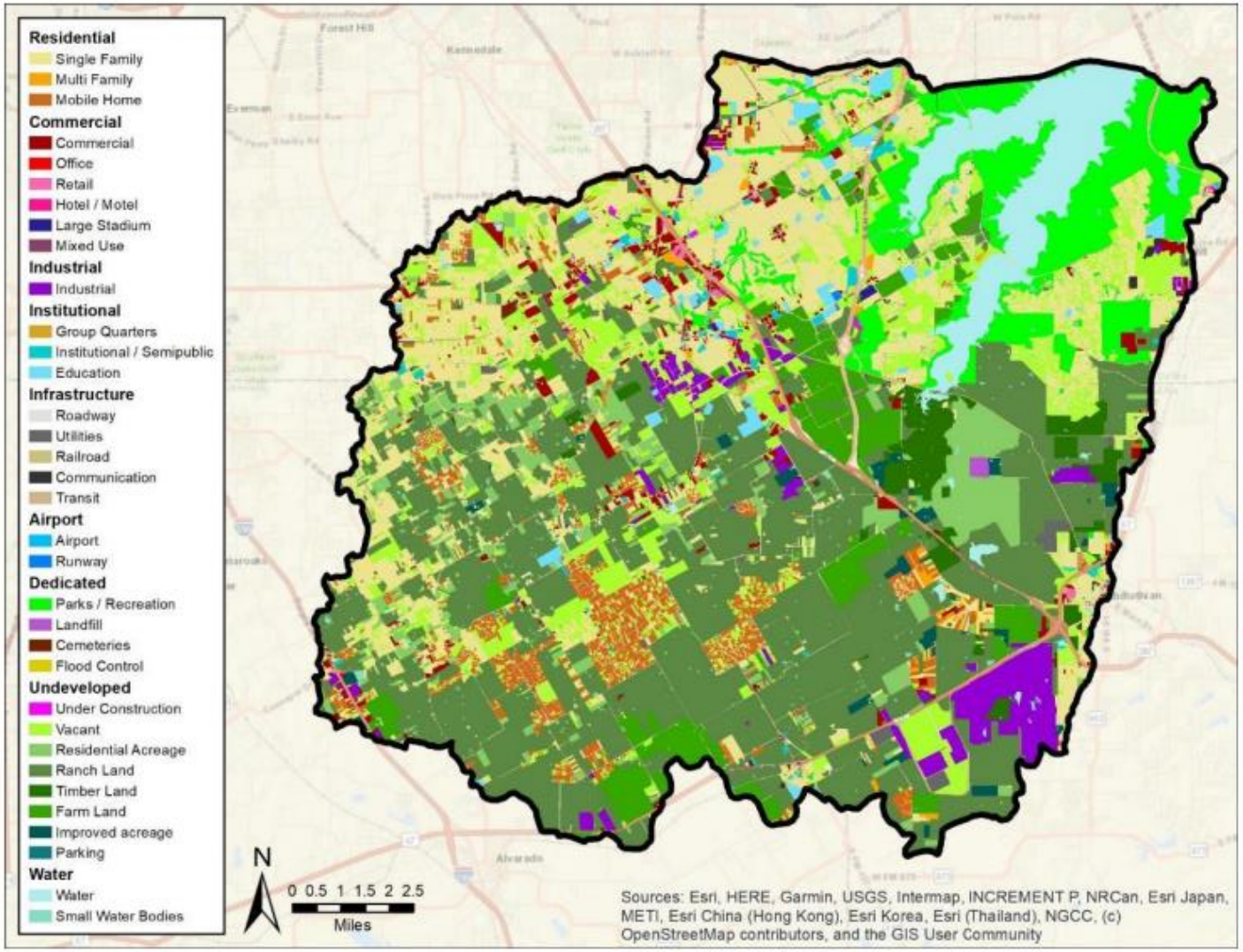
Related Layer: National Land Cover Database ✔ Turn on

Source: National Land Cover Database (NLCD 2011)

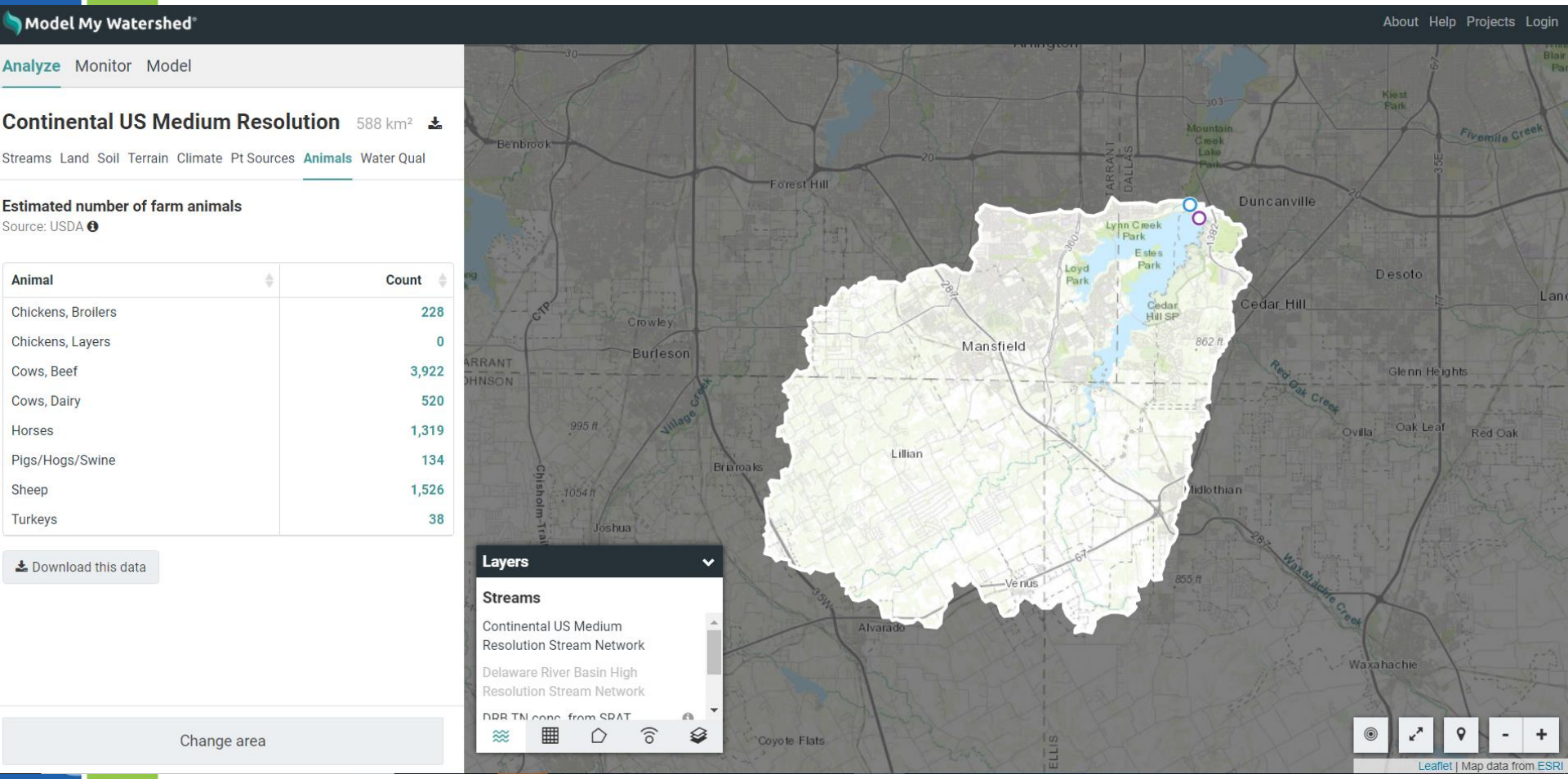


Analysis of Historical Data Report – Oct ‘19
Watershed Characteristics

- Land Use Cover



Estimated # of farm animals



Analysis of Historical Data Report – Oct '19
Reservoir Characteristics

- Hydraulics
  - Joe Pool Lake receives 100% of its yield from natural tributaries, draining an area of approximately 232 square miles.
  - Incoming flows are comprised of stormwater runoff, as well as treated wastewater effluent from two WWTFs and several smaller domestic sewage discharges within the watershed.
  - Databases maintained by USEPA did not identify any discharges of cooling water, mining effluent, or concentrated animal feeding operation effluent in the watershed.
  - Discharges in the Joe Pool Lake watershed, by type and count

County	Domestic Sewage <1 MGD	Wastewater Dischargers >1 MGD	Total
Ellis	2	2	4
Johnson	5		5
Tarrant	1		1
Total	**8**	**2**	**10**

No discharge permits for cooling water, concentrated animal feeding operations, or mining exist in the watershed.

Analysis of Historical Data Report – Oct ‘19
Trend Analysis

- 32 significant trends were identified (2003-2013)
- 4 sites were analyzed for responses for trends
  - 0838_2 for the lake
  - 0838B, C, and E for tributaries



Analysis of Historical Data Report – Oct '19
Trend Analysis

Trend analysis results summary for Joe Pool Lake (0838) and its tributaries (0838A-0838E). (2003-2013)

Assessment Unit		Flow			Secchi Depth			Water Temp			pH			Sp Cond			*E. coli*			TDS			Chloride		
Seg_AU	Site	A	S	W	A	S	W	A	S	W	A	S	W	A	S	W	A	S	W	A	S	W	A	S	W
0838_02	17684						UP						DN												
0838B_01	17680					UP	UP							DN		DN	DN	DN		DN		DN			
0838C_01	13621		DN				DN																DN	DN	DN
0838E_01	16435									UP															

Assessment Unit		SO4			BOD5			NH3			NO3			TKN			TP			Hardness		
Seg_AU	Site	A	S	W	A	S	W	A	S	W	A	S	W	A	S	W	A	S	W	A	S	W
0838_02	17684																					
0838B_01	17680	DN		DN					UP			DN		DN	DN	DN				DN	DN	
0838C_01	13621					UP											UP	UP	UP	DN	DN	DN
0838E_01	16435																					

Trends Key

A-All Months

S-Summer/Growing Season (May-October)

W-Winter/Dormant Season (November-April)

UP Increasing Trends

DN Decreasing Trends



Analysis of Historical Data Report – Oct '19
Trend Analysis

Long-term trends (1997-2016) in the main body of Joe Pool Lake and in its tributaries.

Site	Parameter	MEAN	MAXIMUM	MINIMUM	DATA #	Trend of Test (p=0.05)
Main Body	TEMPERATURE, WATER DEG C	20.19	33.59	6.08	618	No Trend
	OXYGEN, DISSOLVED mg/L	8.33	16.49	ND	598	Increasing
	PH s.u.	8.16	10.53	5.16	615	Decreasing
	TSS mg/L	7.84	42.00	ND	239	Increasing
	NO2 + NO3 mg/l	0.16	0.98	ND	270	Decreasing
	NH3 mg/L	0.03	0.19	ND	266	Decreasing
	TKN mg/L	0.48	1.40	ND	266	No Trend
	TP mg/L	0.03	0.94	ND	265	No Trend
	HARDNESS mg/L	159.28	316.00	ND	540	Decreasing
	E. COLI MPN/100 mL	18.48	649.00	ND	102	No Trend
	CHLOROPHYLL-A ug/L	6.82	27.00	ND	222	Increasing
	OP mg/L	ND	0.10	ND	269	Decreasing
Tributary	HARDNESS mg/L	339.85	777.00	66.00	392	No Trend
	E. COLI MPN/100 mL	964.91	41100.00	2.00	98	Decreasing
	TDS mg/L	670.36	2260.00	169.00	391	No Trend



Detailed Analysis of Signif Trend in JPL

Segment	Station	Parameter	Season	R^2	Slope	P	Std Dev	T	Skewness /SES	Kurtosis/ SEK	N	Mean	Max	Q75	Median	Q25	Min	IQR	Min Date	Max Date
0838_02	17684	Secchi	Winter	0.2	0.2	0.04	0.09	2.23	0.94	0.3	22	0.13	0.34	0.15	0.1	0.08	0.04	0.07	11/15/2004	4/22/2008
0838_02	17684	pH	Winter	0.16	-0.09	0.04	0.04	-2.17	0.36	-0.47	27	8.03	8.6	8.2	8	7.9	7.5	0.3	12/15/2003	4/22/2008

- Secchi depth appears to be the lone constituent of interest with respect to increasing trends, while pH is slowly decreasing.



Detailed Analysis of Signif Trend in 3 JPL Tribs

Segment	Station	Parameter	Season	R^2	Slope	P	Std Dev	T	Skewness /SES	Kurtosis/ SEK	N	Mean	Max	Q75	Median	Q25	Min	IQR	Min Date	Max Date
0838B_01	17680	Secchi Depth	Summer	0.31	0.04	0	0.01	5.02	-1.25	-2.32	58	0.41	0.6	0.6	0.46	0.21	0.02	0.39	5/24/2004	10/30/2013
0838B_01	17680	Secchi Depth	Winter	0.22	0.03	0	0.01	3.71	1.28	-1.33	51	0.34	0.76	0.52	0.34	0.19	0.08	0.33	11/15/2004	11/19/2013
0838B_01	17680	Sp Cond	POR	0.15	-0.05	0	0.01	-4.51	0.06	1.01	##	717.85	1590	790	659	536	214	254	12/15/2003	11/19/2013
0838B_01	17680	Sp Cond	Winter	0.22	-0.07	0	0.02	-4.06	-0.13	0.26	59	761.98	1590	990	678	537	214	453	12/15/2003	11/19/2013
0838B_01	17680	NH3	Summer	0.33	0.01	0.01	0	3	0.88	-0.45	20	0.08	0.17	0.11	0.07	0.04	0	0.07	5/24/2004	8/20/2013
0838B_01	17680	NO3	Summer	0.43	-0.26	0	0.07	-3.49	0.73	-0.28	18	0.22	1.45	0.23	0.1	0.03	0.03	0.21	5/24/2004	8/20/2013
0838B_01	17680	TKN	POR	0.2	-0.08	0.01	0.03	-2.93	1.1	0.77	36	0.73	2.3	0.9	0.6	0.49	0.22	0.41	2/23/2004	11/19/2013
0838B_01	17680	TKN	Summer	0.26	-0.08	0.03	0.03	-2.43	1.27	0.64	19	0.85	2.3	0.95	0.69	0.6	0.3	0.35	5/24/2004	8/20/2013
0838B_01	17680	TKN	Winter	0.19	-0.04	0.08	0.02	-1.88	1.87	0.88	17	0.6	1.3	0.6	0.6	0.4	0.22	0.2	2/23/2004	11/19/2013
0838B_01	17680	Hardness	POR	0.13	-0.03	0.03	0.01	-2.29	0.14	1.03	37	133.78	272	148	132	120	74	28	2/23/2004	11/19/2013
0838B_01	17680	Hardness	Summer	0.28	-5.29	0.03	2.18	-2.42	0.17	-1.15	17	116.76	164	140	120	88	74	52	5/24/2004	8/20/2013
0838B_01	17680	SO4	POR	0.14	-0.05	0.03	0.02	-2.34	0.31	1.38	37	166.68	420	191	146.1	124	54	67	2/23/2004	11/19/2013
0838B_01	17680	SO4	Winter	0.19	-8.48	0.07	4.32	-1.96	1.74	0.88	18	165.29	306	195	153	128	77.3	67	2/23/2004	11/19/2013
0838B_01	17680	E. coli	POR	0.12	-0.22	0	0.05	-3.99	0.88	-0.83	##	264.68	2800	160	52	17	0.5	143	12/15/2003	11/19/2013
0838B_01	17680	E. coli	Summer	0.27	-0.33	0	0.07	-4.58	1.3	-0.87	59	303.97	2600	160	46	17	2	143	5/24/2004	10/30/2013
0838B_01	17680	TDS	POR	0.15	-0.05	0	0.01	-4.58	-0.33	1.28	##	468.5	1034	514	422.58	355.6	139	158.5	12/15/2003	11/19/2013
0838B_01	17680	TDS	Winter	0.24	-0.07	0	0.02	-4.22	-0.3	0.78	59	502.42	1034	643.5	444.41	358.2	139	285.4	12/15/2003	11/19/2013
0838C_01	13621	Air Temp	Summer	0.11	-1.51	0.05	0.75	-2	-0.36	0.08	33	25.44	38	28.5	25	23	11	5.5	5/24/2004	10/21/2008
0838C_01	13621	Flow	Summer	0.26	-0.47	0.09	0.25	-1.87	-0.53	-0.67	16	7.15	73	6.6	0.45	0.01	0	6.6	6/15/2004	9/18/2012
0838C_01	13621	Secchi Depth	Winter	0.13	-0.06	0.08	0.03	-1.82	-0.93	-1.17	24	0.4	0.6	0.6	0.45	0.25	0.08	0.35	11/15/2004	11/18/2008
0838C_01	13621	BOD5	Summer	0.21	0.23	0.06	0.11	2.03	1.81	-0.22	17	2.02	7	3	1	1	1	2	5/24/2004	8/19/2008
0838C_01	13621	TKN	Summer	0.27	0.2	0.07	0.1	2.01	1.2	1.57	13	0.73	1.9	0.7	0.6	0.6	0.3	0.1	5/24/2004	5/20/2008
0838C_01	13621	TP	POR	0.45	0.8	0	0.19	4.31	-0.41	-1.4	25	0.1	0.62	0.13	0.06	0.01	0.01	0.13	2/23/2004	11/18/2008
0838C_01	13621	TP	Summer	0.42	0.78	0.02	0.29	2.67	-0.33	-0.7	12	0.13	0.62	0.17	0.06	0.02	0.01	0.15	5/24/2004	8/19/2008
0838C_01	13621	TP	Winter	0.52	0.04	0.01	0.01	3.48	1.12	-0.55	13	0.08	0.23	0.11	0.04	0.01	0.01	0.11	2/23/2004	11/18/2008
0838C_01	13621	Hardness	POR	0.3	-69.4	0	18.5	-3.76	-0.68	-0.95	35	432.46	730	564	458	290	112	274	1/22/2004	11/18/2008
0838C_01	13621	Hardness	Summer	0.34	-82.7	0.01	29.7	-2.78	-0.87	-0.79	17	440.94	700	576	470	308	120	268	5/24/2004	8/19/2008
0838C_01	13621	Hardness	Winter	0.27	-58.9	0.03	24.1	-2.44	-0.04	-0.27	18	424.44	730	516	449	290	112	226	1/22/2004	11/18/2008
0838C_01	13621	Chloride	POR	0.22	-8.53	0	2.81	-3.03	-0.94	-0.95	35	65.89	104	86	67	44.9	14.7	41.1	1/22/2004	11/18/2008
0838C_01	13621	Chloride	Summer	0.22	-9.05	0.06	4.45	-2.03	-1.36	-0.18	17	66.04	100	83	72.6	47	14.7	36	5/24/2004	8/19/2008
0838C_01	13621	Chloride	Winter	0.22	-8.12	0.05	3.8	-2.13	0.03	-1.08	18	65.74	104	86	63	43	23	43	1/22/2004	11/18/2008
0838E_01	16435	Water Temp	Winter	0.12	1.15	0.09	0.65	1.78	0.2	-0.93	25	13.41	21.1	16.6	12.8	11	6	5.6	1/13/2009	4/23/2013

Trends in JPL Tributaries

- Most trends are decreasing and do not present a concern
- Increasing trends for both Secchi depth and ammonia (NH3) in Sugar Creek - 0838B, while Biochemical Oxygen Demand (BOD5) and total phosphorus (TP) are on the increase in Walnut Creek - 0838C.
  - The correlation coefficient for TP and stream flow is 0.88, indicating that TP is being washed into the stream during rain events.
- TDS Levels were very close to the 300 mg/L – continued monitoring of TDS should conducted to determine if it is natural or anthropogenic
- Of the remaining trends with R2 values greater than 0.4, three are decreasing trends for nutrients including ammonia and total Kjeldahl nitrogen (TKN) and one is a decreasing trend for pH.
- Decreases in nutrient trends are of no concern, given that the watershed is expected to continue urbanizing.

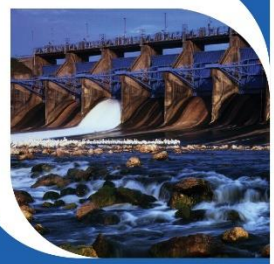
Analysis of Historical Data Report – Oct ‘19
Walnut Creek Conclusions

- Walnut Creek (0838C) was listed as impaired in the 2016 Integrated Report with a value of 126.62 MPN/100 mL (since been delisted).
- Elevated E. coli and stream flow values typically occur in tandem due to nonpoint source inputs of incoming stormwater runoff from the surrounding watershed.
- A residential subdivision with a golf course is located immediately upstream of the sampling station but is wooded along the channel.
- Further upstream, this wooded riparian zone continues through rural areas.
- The E. coli impairment is therefore assumed to be caused either by wildlife or pet waste.
- Failing septic systems from further upstream are also suspect.

Analysis of Historical Data Report – Oct '19
Conclusions

- When reviewing the 1997-2012 water quality data as a whole:
  - Increasing trends of both algal and atrazine concentrations in the reservoir
  - E. coli, total dissolved solids, atrazine and sulfate, in excess of standards in tributaries.
- When focusing on the more recent data analyzed annually between 2013 and 2015, the following concerns were noted in respective annual reports:
  - TDS concentrations exceed standards on a regular basis at tributary sites;
  - E. coli, nitrate/nitrite, and sulfate samples occasionally exceeded standards at tributary sites;
  - Chlorophyll-a and TSS demonstrate an increasing trend in the Mountain Creek arm; and
  - One Giardia cyst was detected in the sample collected at intake site I1 (Lakeview Intake) on 9/2/2015.

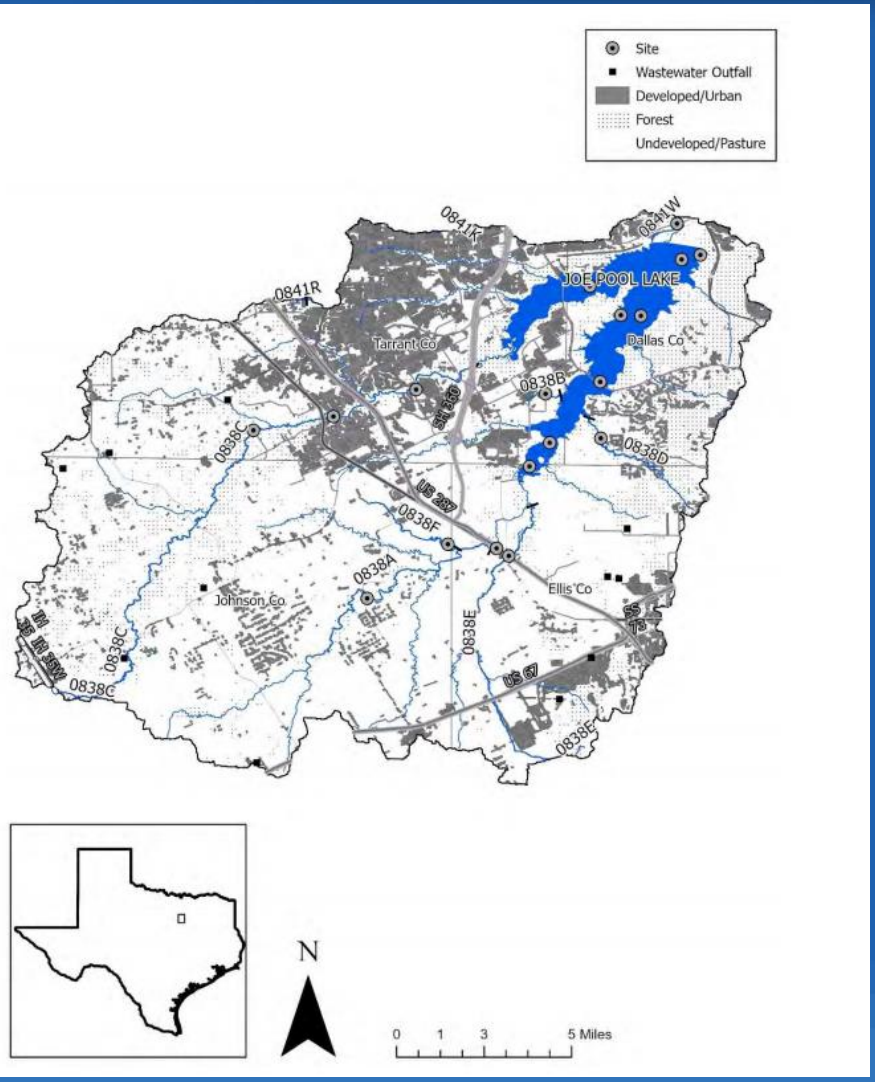
2020 TRA Basin Summary Report







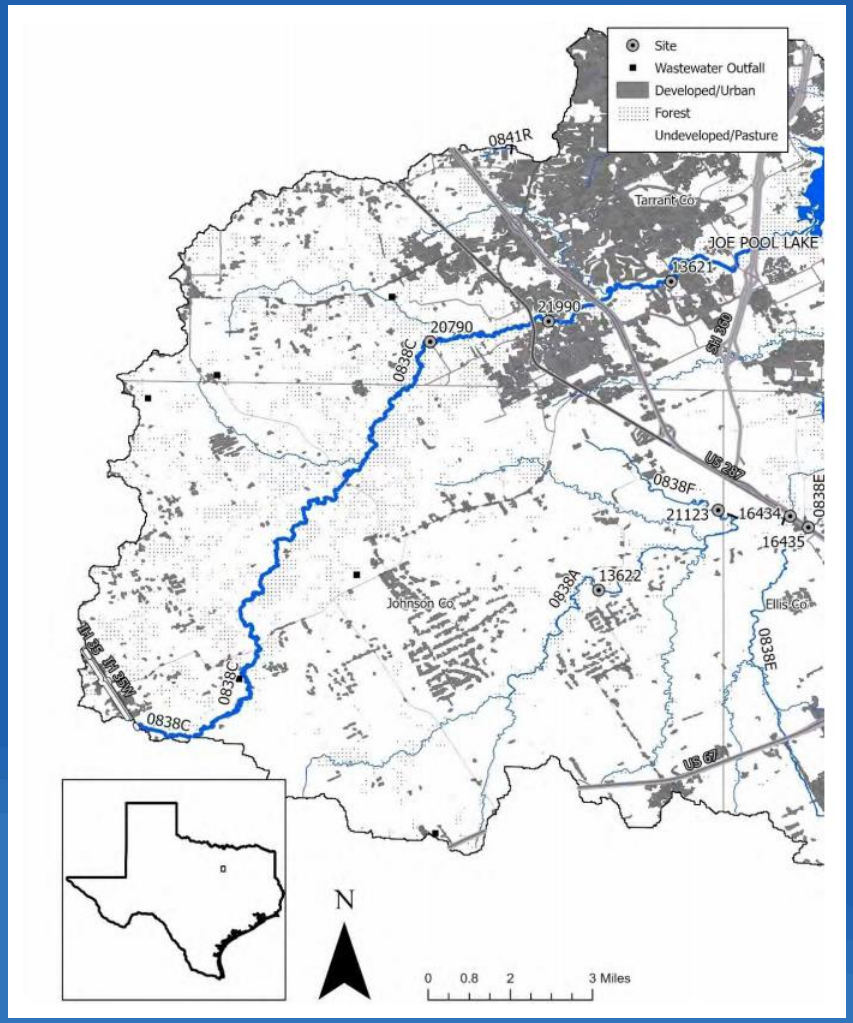
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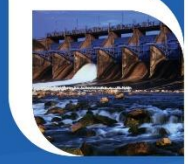


0838C Walnut Creek



Segment & Assessment Unit		0838C_01
Site		13621
Specific Conductance	All	Not Significant
	Summer	↓
	Winter	Not Significant
Total Dissolved Solids	All	Not Significant
	Summer	↓
	Winter	Not Significant
Days Since Precipitation	All	Not Significant
	Summer	Not Significant
	Winter	↑

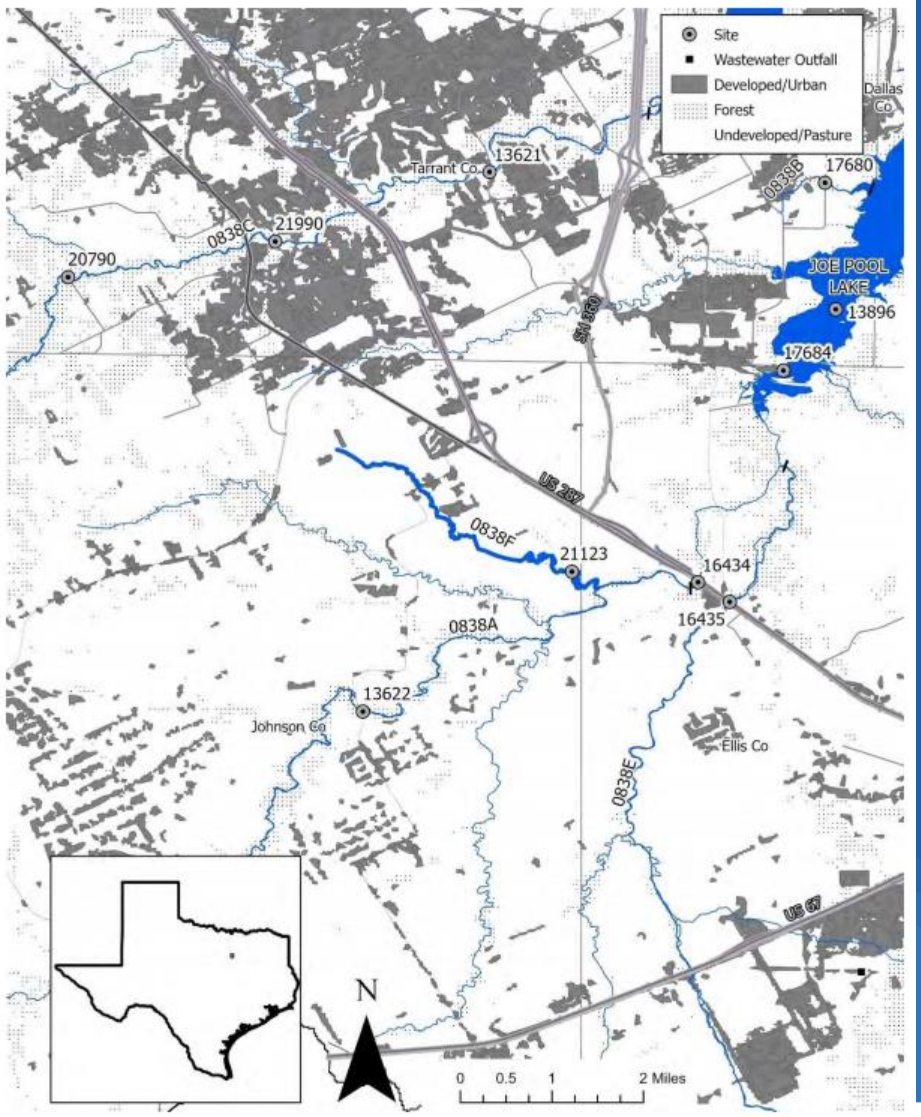
↓ = Decreasing Trend, ↑ = Increasing Trend





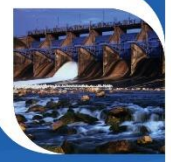


0838F Unnamed tributary of Mountain Creek



Segment & Assessment Unit		0838F_01
Site		21123
Days Since Precipitation	All	Not Significant
	Summer	↓*
	Winter	Not Significant

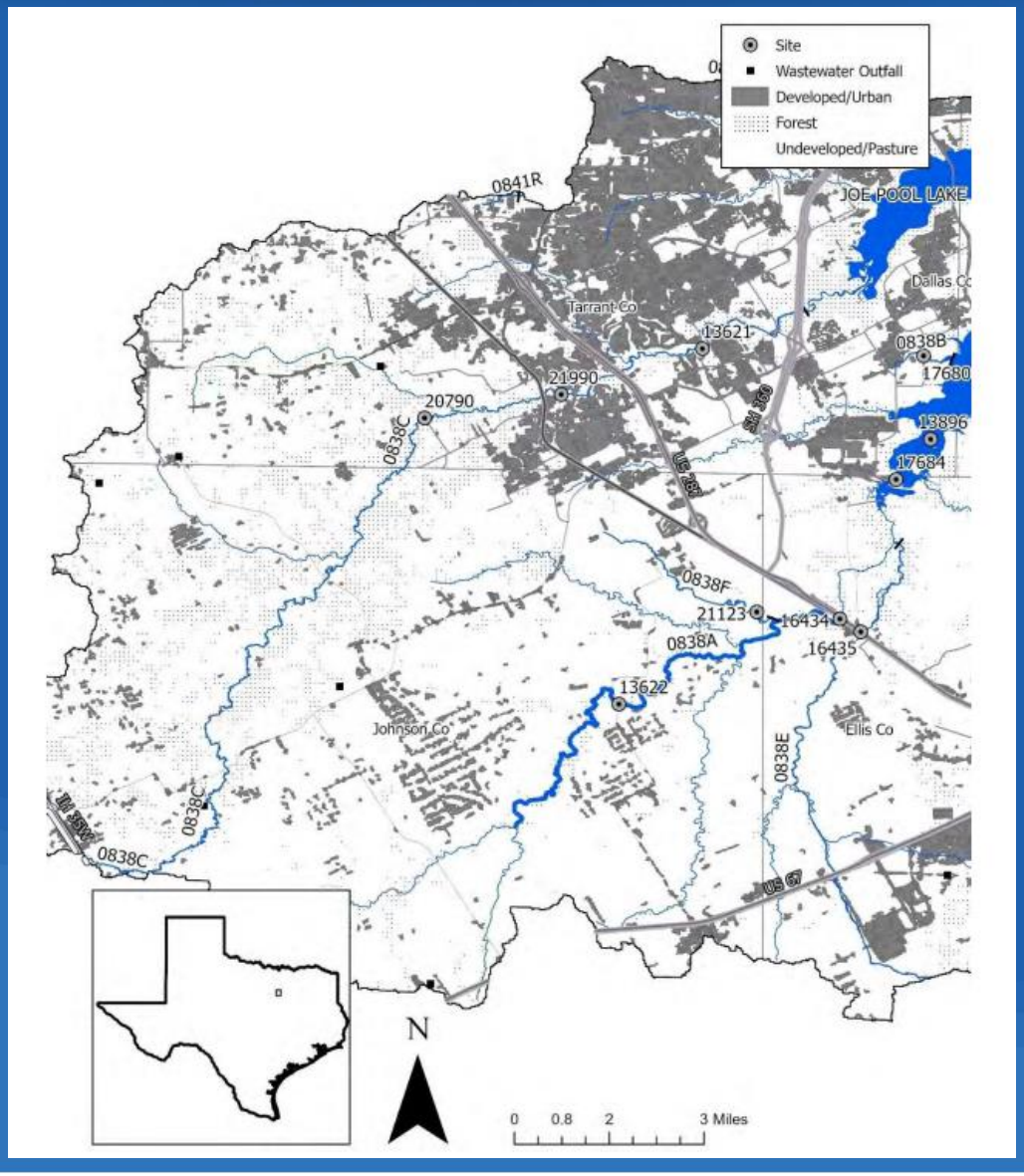
↓ = Decreasing Trend, ↑ = Increasing Trend, * - trend based on less than 9 years of data

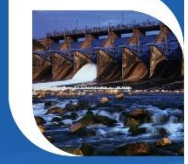






0838A Mountain Creek

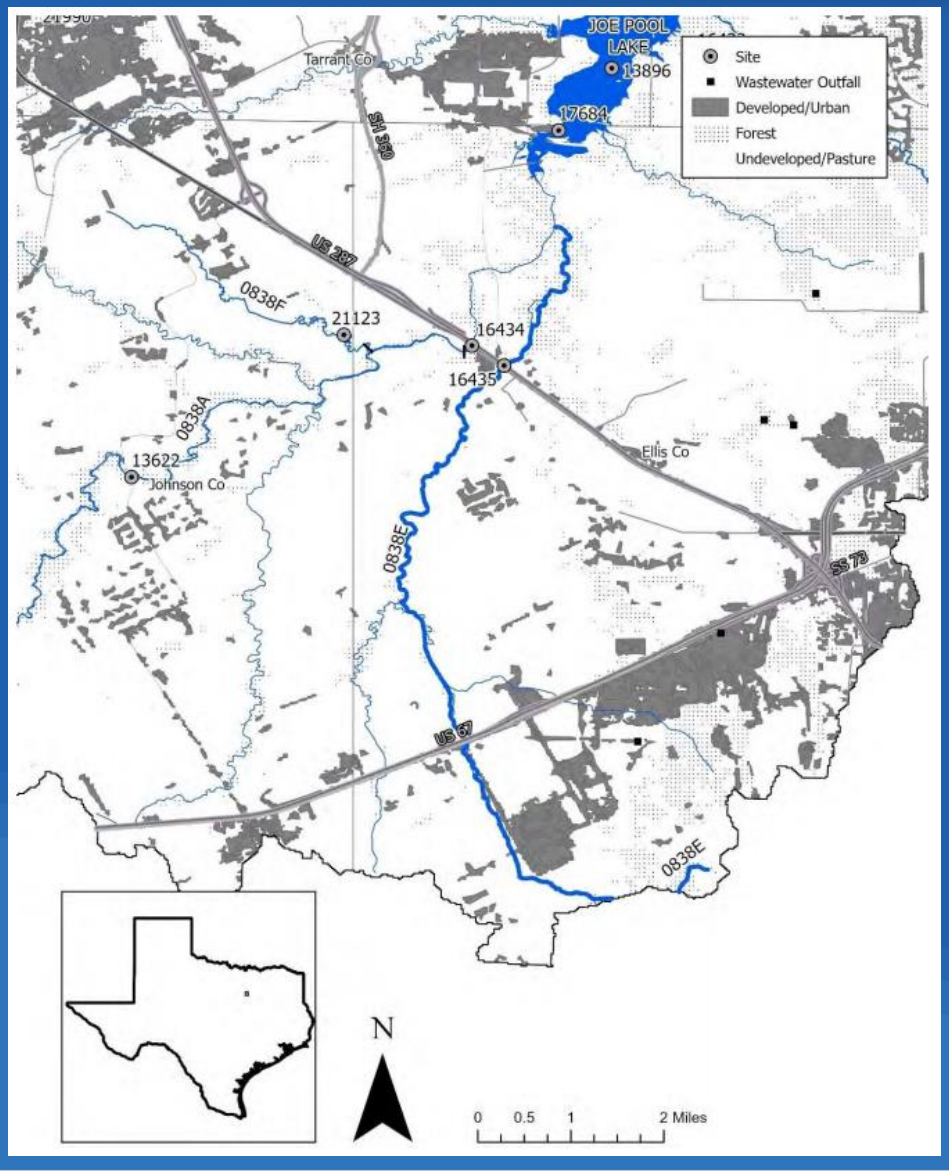






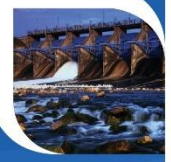


0838E Soap Creek



Segment & Assessment Unit		0838E_01
Site		16435
pH	All	No Trend
	Summer	↑*
	Winter	No Trend
Flow Severity	All	↓*
	Summer	↓*
	Winter	↓*
Days Since Precipitation	All	Not Significant
	Summer	Not Significant
	Winter	↑*

↓ = Decreasing Trend, ↑ = Increasing Trend, * - trend based on less than 9 years of data







0838 Joe Pool Lake

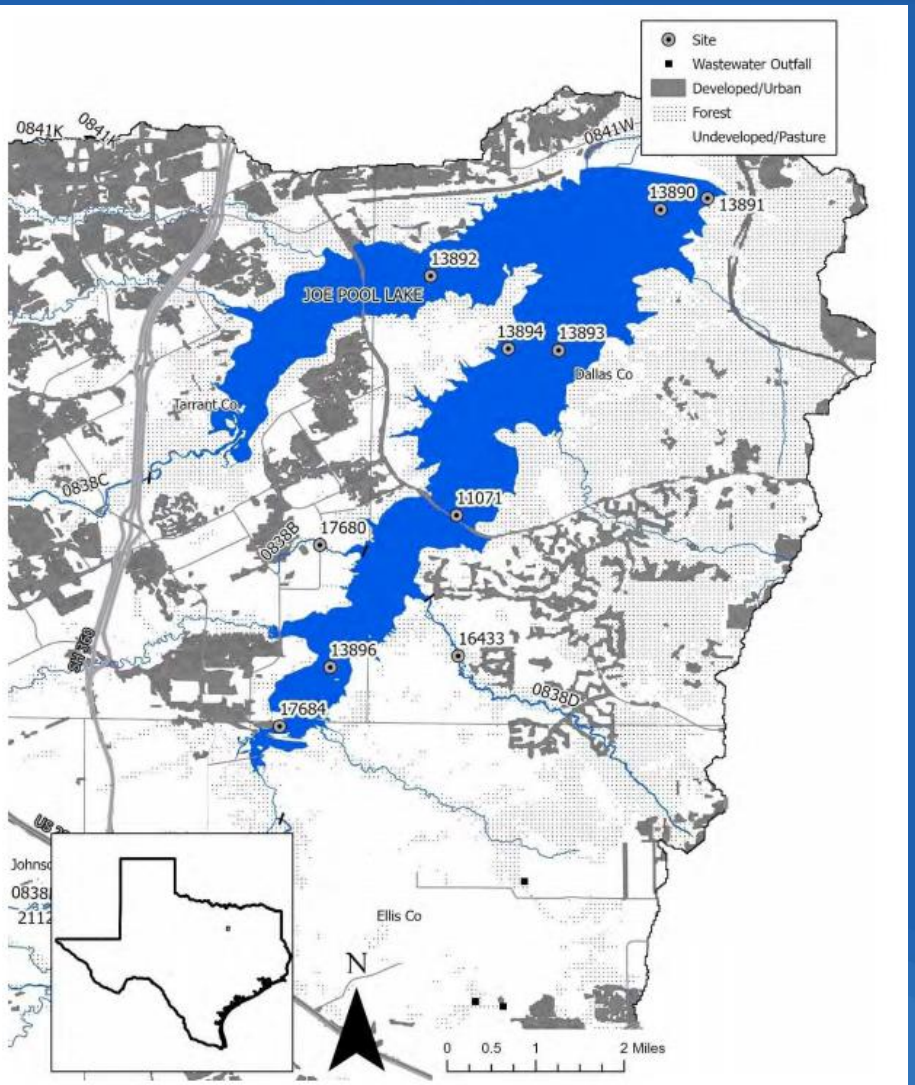
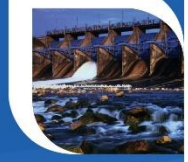


Figure 307: Segment 0838 Map

Segment & Assessment Unit		0838_02
Site		17684
Secchi Depth	All	No Trend
	Summer	No Trend
	Winter	↑*
Field Ammonia	All	No Trend
	Summer	No Trend
	Winter	↑*

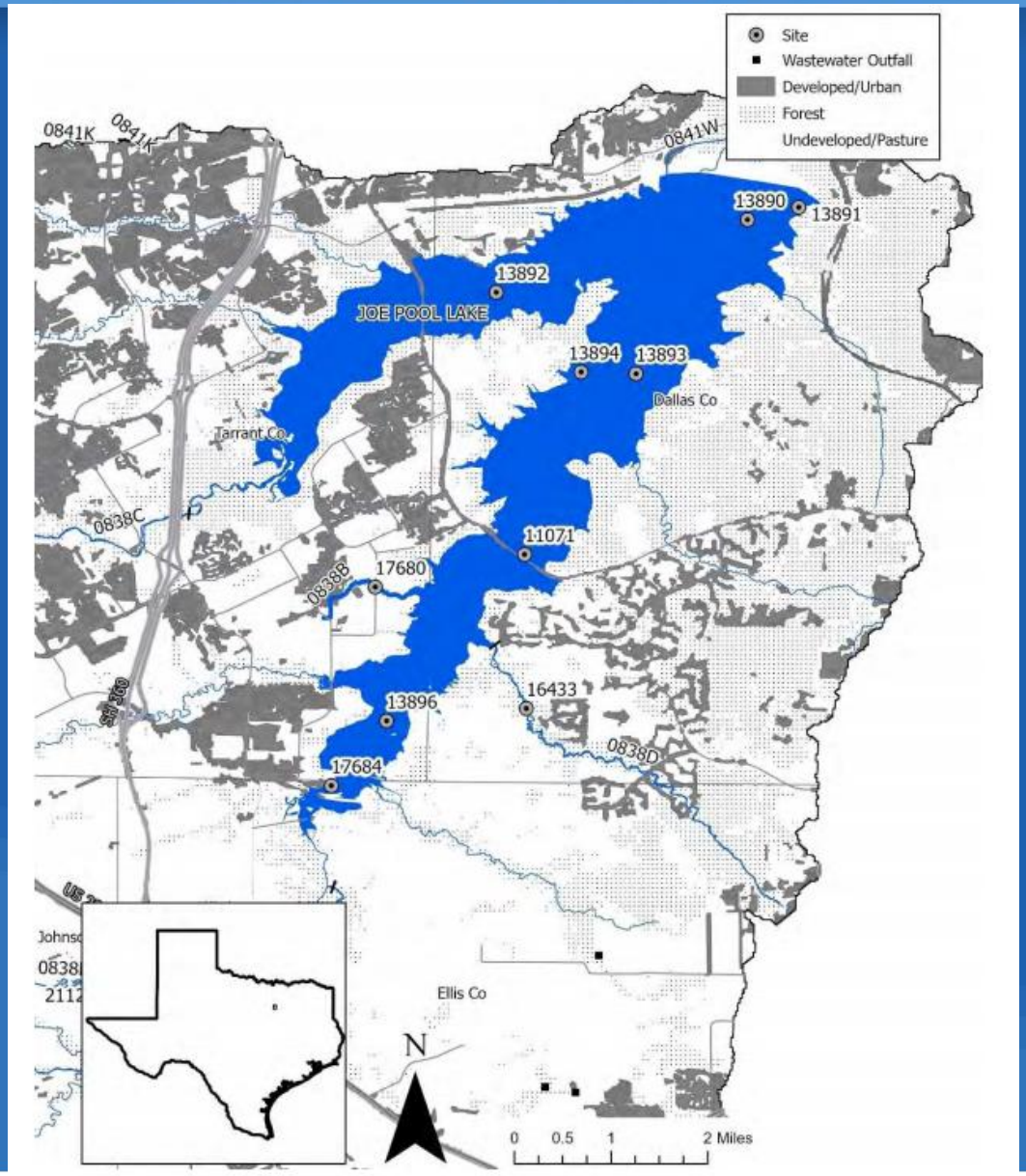
↓ = Decreasing Trend, ↑ = Increasing Trend, * - trend based on less than 9 years of data







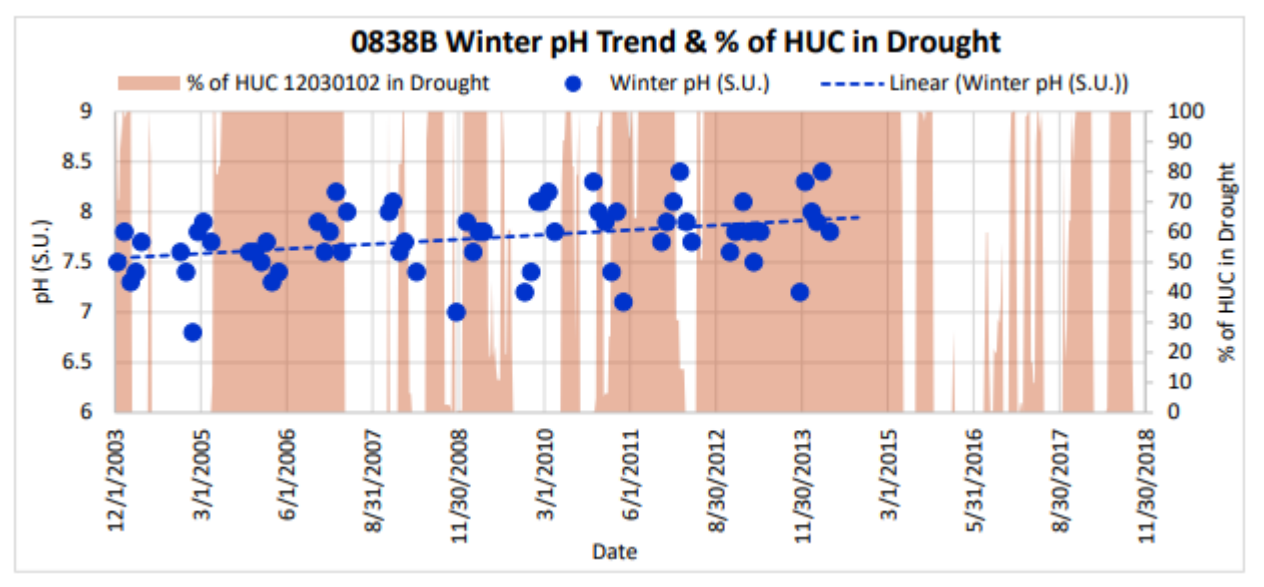
0838B Sugar Creek

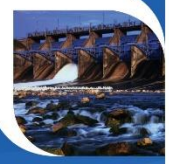




0838B Sugar Creek

Segment & Assessment Unit		0838B_01
Site		17680
Secchi Depth	All	No Trend
	Summer	↑
	Winter	↑
Specific Conductance	All	↓
	Summer	Not Significant
	Winter	↓
pH	All	No Trend
	Summer	No Trend
	Winter	↑





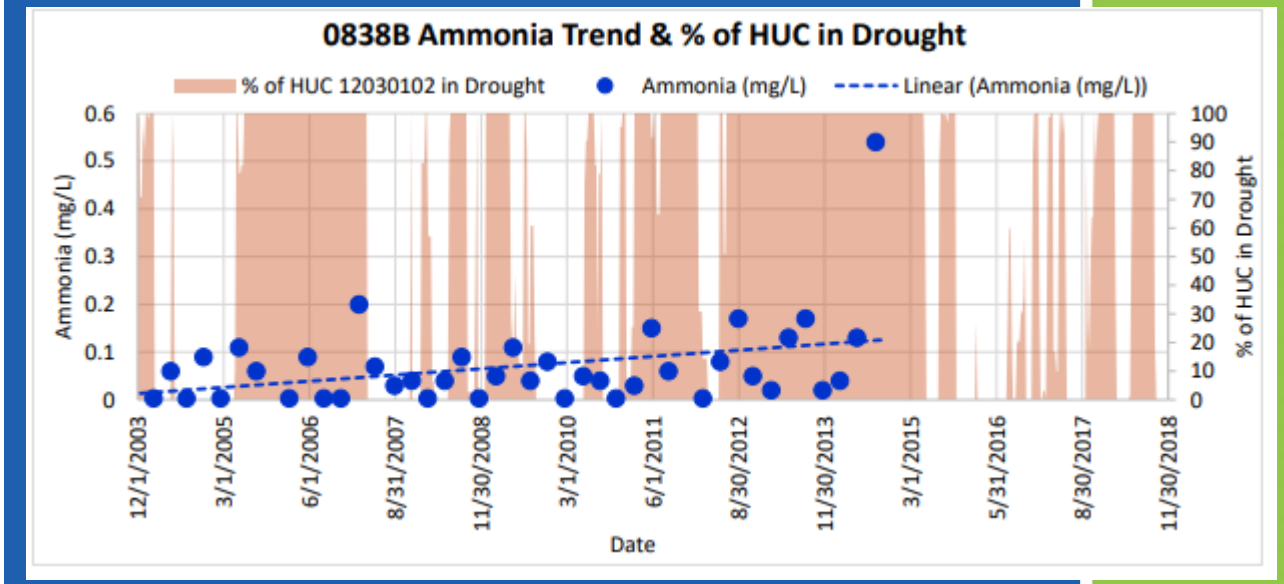




0838B Sugar Creek

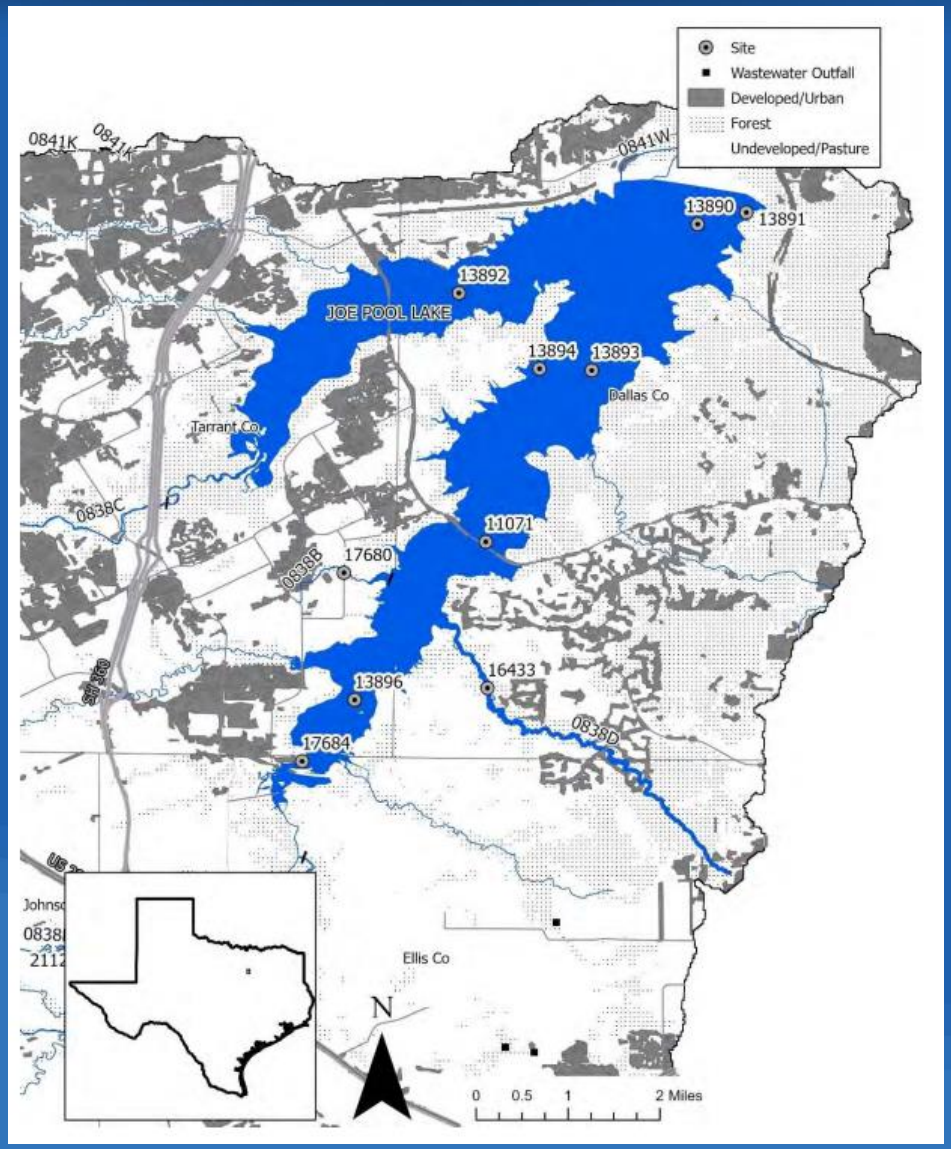
Segment & Assessment Unit		0838B_01
Site		17680
Ammonia	All	↑
	Summer	No Trend
	Winter	Not Significant
Nitrate	All	↓
	Summer	↓
	Winter	Not Significant
Hardness	All	↓
	Summer	↓
	Winter	No Trend
Sulfate	All	↓
	Summer	↓
	Winter	Not Significant
Fecal Streptococcus	All	Not Significant
	Summer	↓
	Winter	No Trend
E. coli	All	↓
	Summer	↓
	Winter	Not Significant
Total Dissolved Solids	All	↓
	Summer	Not Significant
	Winter	↓

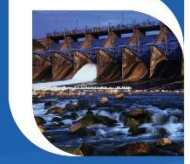
↓ = Decreasing Trend, ↑ = Increasing Trend





0838D Hollings Branch







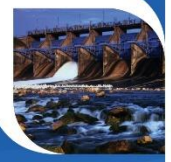


0838D Hollings Branch

Segment & Assessment Unit		0838D_01
Site		16433
Water Temperature	All	Not Significant
	Summer	↑*
	Winter	Not Significant
Specific Conductance	All	Not Significant
	Summer	↓*
	Winter	↑*
pH	All	No Trend
	Summer	↑*
	Winter	No Trend

Segment & Assessment Unit		0838D_01
Site		16433
Total Dissolved Solids	All	Not Significant
	Summer	↓*
	Winter	↑*
Field Turbidity	All	Not Significant
	Summer	↓*
	Winter	Not Significant

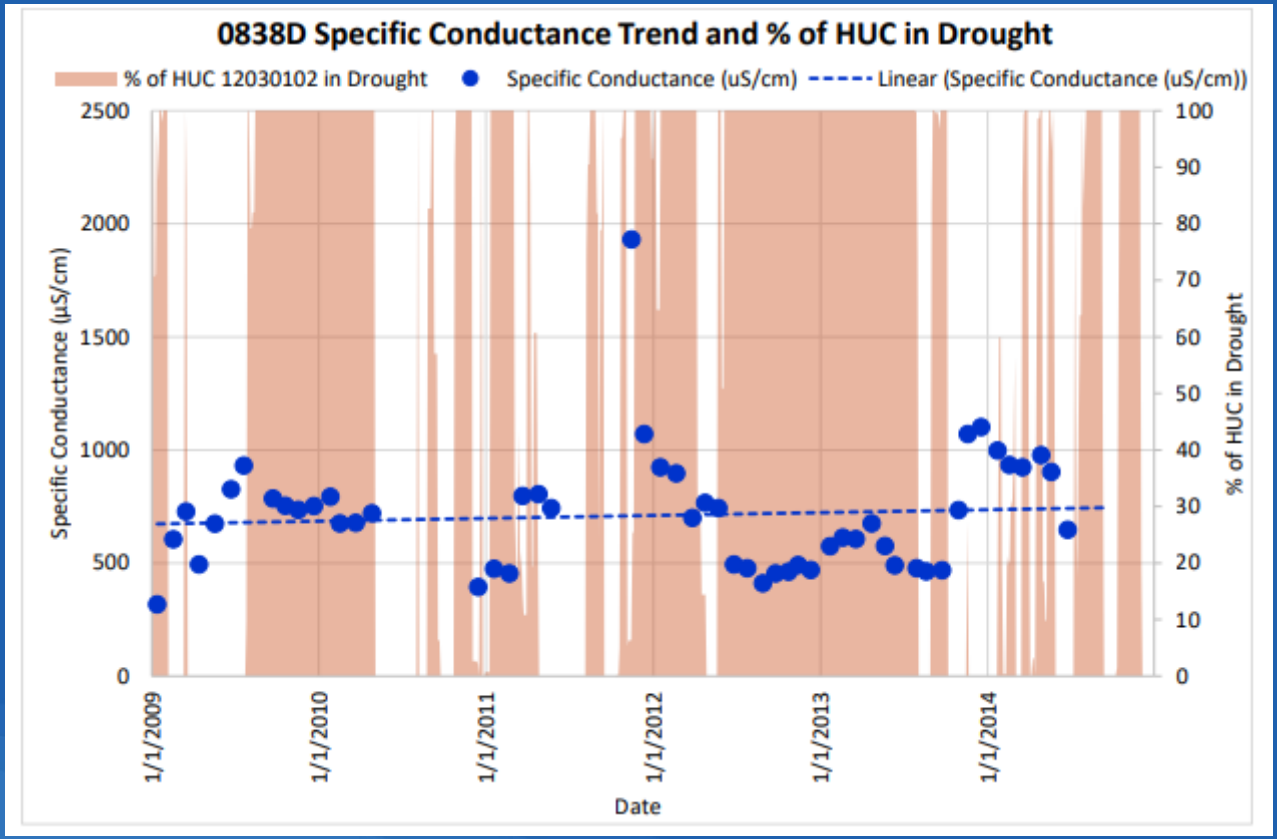
↓ = Decreasing Trend, ↑ = Increasing Trend, * - trend based on less than 9 years of data





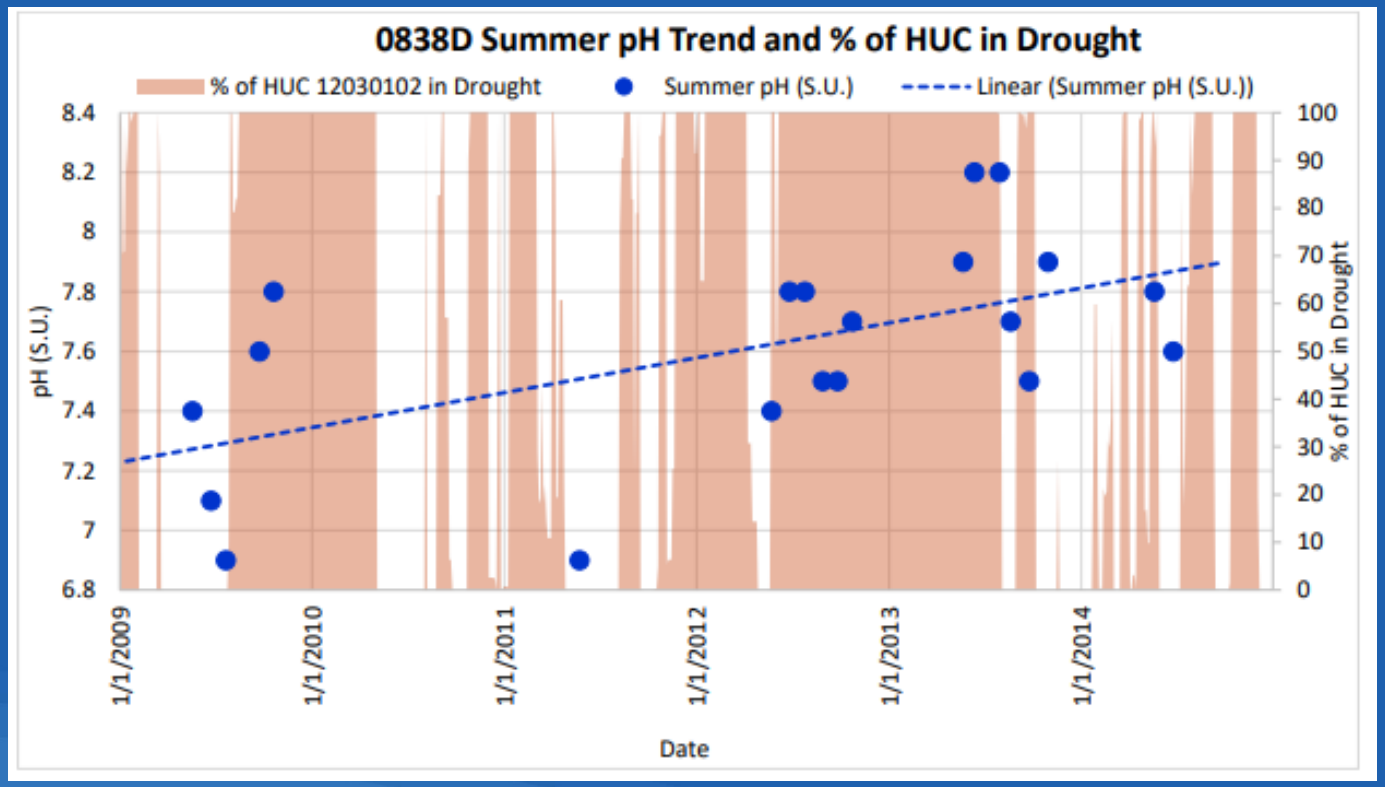


0838D Hollings Branch



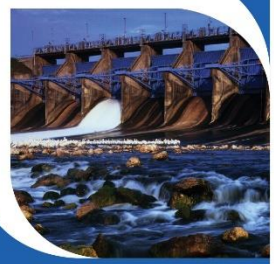


0838D Hollings Branch





Trends from JPL Customer Reports and Current Project Monitoring







E.coli in Joe Pool Lake



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
I-1	31699-E. coli M	POR	11.34286	4	125	0	22.6688992	0	13	35	11-Nov-13	30-Apr-20	-0.00599	0.2410002	Decreasing	
I-1	31699-E. coli M	Summer	4.235294	2	43	0	10.2196466	0	3	17	15-Jul-14	14-Oct-19	-0.00364	0.3512993	Decreasing	
I-1	31699-E. coli M	Winter	18.05556	10	125	0	28.83109478	4	21	18	11/11/2013	4/30/2020	-0.00796	0.33779222	Decreasing	
I-2	31699-E. coli M	POR	6.583333	4	29	1	8.0392032	2	7	12	25-Jun-19	30-Apr-20	0.029181	0.2201282	Increasing	
I-2	31699-E. coli M	Summer	3	2	8	1	2.8284271	2	2	5	25-Jun-19	14-Oct-19	-0.05132	0.1183596	Decreasing	
I-2	31699-E. coli M	Winter	9.142857	4	29	2	9.73701822	4	15	7	11/14/2019	4/30/2020	0.033709	0.64860883	Increasing	
JPL-D	31699-E. coli M	POR	8.509434	3	79	0	15.0379298	0	8	53	28-Sep-07	30-Apr-20	0.002451	0.084815	Increasing	
JPL-D	31699-E. coli M	Summer	2.241379	1	12	0	2.8240697	0	4	29	28-Sep-07	14-Oct-19	4.15E-05	0.9094707	Increasing	
JPL-D	31699-E. coli M	Winter	16.08333	9	79	0	19.80319839	2	19	24	4/28/2008	4/30/2020	0.003865	0.19784425	Increasing	
JPL-M	31699-E. coli M	POR	9.711539	3	119	0	19.5832427	2	8	52	28-Sep-07	30-Apr-20	0.000407	0.832954	Increasing	
JPL-M	31699-E. coli M	Summer	7.607143	2	55	0	13.516353	2	4	28	28-Sep-07	14-Oct-19	-0.00014	0.9393814	Decreasing	
JPL-M	31699-E. coli M	Winter	12.16667	4	119	0	24.98463296	2	10	24	4/28/2008	4/30/2020	0.000533	0.89008798	Increasing	
JPL-W	31699-E. coli M	POR	25.48077	4	649	0	92.3200933	1.5	8	52	28-Sep-07	30-Apr-20	-0.00205	0.8219874	Decreasing	
JPL-W	31699-E. coli M	Summer	34.89286	2.5	649	0	123.5359715	1.5	7.5	28	28-Sep-07	14-Oct-19	0.002016	0.9035346	Increasing	
JPL-W	31699-E. coli M	Winter	14.5	4	118	0	27.38454023	1	12	24	4/28/2008	4/30/2020	-0.00474	0.25532541	Decreasing	

E.Coli & Flow in Mountain Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
MC-A	00061-FLOW	STPOR	3.66272	0.61	32	0	7.1919653	0.03	2.16	25	12-Nov-13	28-Apr-20	0.001901	0.3114473	Increasing	
MC-A	31699-E. coli	MPOR	930.4167	159.5	12000	1	2552.334446	24	530	24	12-Nov-13	28-Apr-20	0.074706	0.9230831	Increasing	
MC-A	00061-FLOW	STSummer	2.144222	0.03	11.448	0	4.1496476	0	0.61	9	15-Jul-14	11-Sep-19	-0.00048	0.8179681	Decreasin	
MC-A	31699-E. coli	MSummer	686.6667	104	4839	1	1568.466209	2	362	9	11-May-15	11-Sep-19	-2.189	0.0082457	Decreasin	sig
MC-A	00061-FLOW	STWinter	4.516875	1.12	32	0	8.450650246	0.15	3.73	16	11/12/2013	4/28/2020	0.002872	0.28680794	Increasing	
MC-A	31699-E. coli	MWinter	1076.667	172	12000	8	3038.97543	29	620	15	11/12/2013	4/28/2020	0.776832	0.46593219	Increasing	
MC-B	00061-FLOW	STPOR	1.651667	0.045	15	0	4.2707692	0.015	1.3	12	26-Jun-19	28-Apr-20	0.01389	0.2794026	Increasing	
MC-B	31699-E. coli	MPOR	1139.5	145	12000	4	3423.344232	15	310	12	26-Jun-19	28-Apr-20	11.39233	0.2676637	Increasing	
MC-B	00061-FLOW	STSummer	0.408	0	2	0	0.8901236	0	0.04	5	26-Jun-19	16-Oct-19	-0.01468	0.1761835	Decreasin	
MC-B	31699-E. coli	MSummer	76.8	15	210	4	93.1058537	15	140	5	26-Jun-19	16-Oct-19	-0.48851	0.7135134	Decreasin	
MC-B	00061-FLOW	STWinter	2.54	0.06	15	0.03	5.540869366	0.04	2	7	11/12/2019	4/28/2020	0.030121	0.46183934	Increasing	
MC-B	31699-E. coli	MWinter	1898.571	220	12000	10	4457.156899	70	440	7	11/12/2019	4/28/2020	19.28534	0.562561	Increasing	
MC-C	00061-FLOW	STPOR	9.693448	3.68	80	0.3	16.5911207	1.79	8.8	29	12-Nov-13	28-Apr-20	0.006244	0.124091	Increasing	
MC-C	31699-E. coli	MPOR	605.383	138	4839	4	1128.881546	43	473	47	8-Jun-00	28-Apr-20	-0.1745	0.1003201	Decreasin	
MC-C	00061-FLOW	STSummer	5.996923	1.41	45	0.3	12.1645971	0.97	4.3	13	15-Jul-14	16-Oct-19	0.005362	0.3306677	Increasing	
MC-C	31699-E. coli	MSummer	753.6667	208.5	4839	4	1347.292153	65.5	755.5	24	8-Jun-00	16-Oct-19	-0.27492	0.0787437	Decreasin	
MC-C	00061-FLOW	STWinter	12.69688	4.935	80	2.08	19.33862102	2.905	17	16	11/12/2013	4/28/2020	0.006899	0.23804756	Increasing	
MC-C	31699-E. coli	MWinter	450.6522	119	3300	16	847.2764177	40	409	23	4/29/2009	4/28/2020	0.064673	0.65587529	Increasing	
MC-D	00061-FLOW	STPOR	2.243571	0.29	18.89	-0.03	4.2961345	0.065	1.985	28	12-Nov-13	28-Apr-20	-0.00031	0.7730924	Decreasin	
MC-D	31699-E. coli	MPOR	218.2821	57	2599	0	502.3476962	27	152	39	8-Jun-00	28-Apr-20	0.029477	0.5633562	Increasing	
MC-D	00061-FLOW	STSummer	3.671	0.14	18.89	0	6.362144	0.05	5.22	10	15-Jul-14	20-Aug-19	-0.00114	0.7302421	Decreasin	
MC-D	31699-E. coli	MSummer	222.5294	49	2599	0	617.1410007	15	152	17	8-Jun-00	20-Aug-19	0.016832	0.8436376	Increasing	
MC-D	00061-FLOW	STWinter	1.450556	0.36	9.98	-0.03	2.45363709	0.16	1.9	18	11/12/2013	4/28/2020	6.93E-05	0.92310461	Increasing	
MC-D	31699-E. coli	MWinter	215	57.5	1454	4	407.9606657	30	130	22	4/29/2009	4/28/2020	0.057468	0.41284103	Increasing	
MC-E	00061-FLOW	STPOR	5.035	0.4	44	0.05	12.4620249	0.15	3.3	12	26-Jun-19	28-Apr-20	0.06359	0.0732418	Increasing	
MC-E	31699-E. coli	MPOR	556	35	5200	2	1545.473908	16	270	11	26-Jun-19	28-Apr-20	8.284529	0.0750877	Increasing	
MC-E	00061-FLOW	STSummer	0.364	0.1	1.4	0.05	0.5820052	0.07	0.2	5	26-Jun-19	16-Oct-19	-0.00851	0.2538858	Decreasin	
MC-E	31699-E. coli	MSummer	32.4	30	87	2	33.5901771	8	35	5	26-Jun-19	16-Oct-19	-0.49667	0.2466082	Decreasin	
MC-E	00061-FLOW	STWinter	8.371429	2	44	0.2	15.91620917	0.4	7	7	11/12/2019	4/28/2020	0.158315	0.14143985	Increasing	
MC-E	31699-E. coli	MWinter	992.3333	156.5	5200	16	2067.233772	25	400	6	11/12/2019	4/28/2020	21.03798	0.14743069	Increasing	

E.coli & Flow in Walnut Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
WC-A	00061-FLOW	S1POR	7.25125	0.505	45	0	15.6266946	0	6	8	24-Jun-19	28-Apr-20	-0.05903	0.2348678	Decreasin	
WC-A	31699-E. coli	MPOR	1806.875	260	6500	30	2770.511734	102.5	3600	8	24-Jun-19	28-Apr-20	-3.84781	0.6794802	Decreasin	
WC-A	00061-FLOW	S1Summer	15.00333	0.01	45	0	25.9778758	0	45	3	24-Jun-19	19-Aug-19	-0.81279	0.3200858	Decreasin	
WC-A	31699-E. coli	MSummer	2288.333	280	6500	85	3648.713244	85	6500	3	24-Jun-19	19-Aug-19	-115.785	0.3031947	Decreasin	
WC-A	00061-FLOW	S1Winter	2.6	1	10	0	4.219004622	0	2	5	1/22/2020	4/28/2020	0.02381	0.69811228	Increasing	
WC-A	31699-E. coli	MWinter	1518	240	6000	30	2549.082188	120	1200	5	1/22/2020	4/28/2020	12.92049	0.72834249	Increasing	
WC-B	00061-FLOW	S1POR	11.12727	0	90	0	27.1854406	0	3.9	11	24-Jun-19	28-Apr-20	-0.09248	0.2608271	Decreasin	
WC-B	31699-E. coli	MPOR	2855	130	12000	8	4847.570876	63	6000	11	24-Jun-19	28-Apr-20	3.991083	0.7927209	Increasing	
WC-B	00061-FLOW	S1Summer	22.5	0	90	0	45	0	45	4	24-Jun-19	9-Sep-19	-1.08969	0.1914138	Decreasin	
WC-B	31699-E. coli	MSummer	3120.75	210	12000	63	5920.26595	96.5	6145	4	24-Jun-19	9-Sep-19	-143.707	0.1894596	Decreasin	
WC-B	00061-FLOW	S1Winter	4.628571	0	25	0	9.151450575	0	3.9	7	11/19/2019	4/28/2020	0.062911	0.35579197	Increasing	
WC-B	31699-E. coli	MWinter	2703.143	80	12000	8	4643.936384	30	6000	7	11/19/2019	4/28/2020	53.3269	0.08520724	Increasing	
WC-C	00061-FLOW	S1POR	12.085	0.7	85	0.04	25.3426541	0.2	8	12	24-Jun-19	28-Apr-20	-0.05691	0.4601825	Decreasin	
WC-C	31699-E. coli	MPOR	2695.75	615	13000	34	4292.100188	120	3600	12	24-Jun-19	28-Apr-20	-0.35847	0.9783981	Decreasin	
WC-C	00061-FLOW	S1Summer	17.268	0.2	85	0.04	37.8648005	0.2	0.9	5	24-Jun-19	15-Oct-19	-0.61239	0.1857177	Decreasin	
WC-C	31699-E. coli	MSummer	3055	500	13000	75	5593.757682	100	1600	5	24-Jun-19	15-Oct-19	-82.4702	0.24429	Decreasin	
WC-C	00061-FLOW	S1Winter	8.382857	3.9	38	0.08	13.5371116	0.2	9.4	7	11/19/2019	4/28/2020	0.106638	0.28258754	Increasing	
WC-C	31699-E. coli	MWinter	2439.143	730	9200	34	3567.833863	140	5600	7	11/19/2019	4/28/2020	41.36468	0.08140648	Increasing	
WC-D	00061-FLOW	S1POR	16.872	5.3	170	0.01	34.6571642	0.5	11.3	35	12-Nov-13	28-Apr-20	-0.00069	0.9299439	Decreasin	
WC-D	31699-E. coli	MPOR	1773.714	158	24000	8	4650.864427	42	840	35	12-Nov-13	28-Apr-20	1.601481	0.1235706	Increasing	
WC-D	00061-FLOW	S1Summer	23.95882	5.3	170	0.01	47.1059154	0.34	11.3	17	15-Jul-14	15-Oct-19	-0.00682	0.7085845	Decreasin	
WC-D	31699-E. coli	MSummer	1606.353	279	14000	16	3462.08983	77	1095	17	15-Jul-14	15-Oct-19	0.613391	0.6469316	Increasing	
WC-D	00061-FLOW	S1Winter	10.17889	3.35	48	0.11	14.70177936	0.7	9.61	18	11/12/2013	4/28/2020	0.003408	0.42305814	Increasing	
WC-D	31699-E. coli	MWinter	1931.778	103	24000	8	5650.275481	42	770	18	11/12/2013	4/28/2020	2.1556	0.17926923	Increasing	

Nitrate & Nitrite in Joe Pool Lake



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
I-1	00615-Nitrite n	POR	0.025	0.025	0.025	0.025	0	0.025	0.025	12	25-Jun-19	30-Apr-20	0		Decreasin	sig
I-1	00615-Nitrite n	Summer	0.025	0.025	0.025	0.025	0	0.025	0.025	5	25-Jun-19	14-Oct-19	0		Decreasin	sig
I-1	00615-Nitrite n	Winter	0.025	0.025	0.025	0.025	0	0.025	0.025	7	11/14/2019	4/30/2020	0		Decreasin	sig
I-2	00615-Nitrite n	POR	0.025	0.025	0.025	0.025	0	0.025	0.025	12	25-Jun-19	30-Apr-20	0		Decreasin	sig
I-2	00615-Nitrite n	Summer	0.025	0.025	0.025	0.025	0	0.025	0.025	5	25-Jun-19	14-Oct-19	0		Decreasin	sig
I-2	00615-Nitrite n	Winter	0.025	0.025	0.025	0.025	0	0.025	0.025	7	11/14/2019	4/30/2020	0		Decreasin	sig
JPL-D	00615-Nitrite n	POR	0.009598	0.008	0.031	0	0.0095021	0	0.014	87	29-Jan-97	30-Apr-20	1.2E-06	0.0007892	Increasing	sig
JPL-D	00615-Nitrite n	Summer	0.008535	0.004	0.031	0	0.009595	0	0.014	43	22-May-97	14-Oct-19	1.3E-06	0.0237826	Increasing	sig
JPL-D	00615-Nitrite n	Winter	0.010636	0.008	0.031	0	0.009403342	0.0035	0.017	44	1/29/1997	4/30/2020	1.2E-06	0.01596873	Increasing	sig
JPL-M	00615-Nitrite n	POR	0.012462	0.009	0.078	0	0.0145606	0	0.024	93	30-Jan-97	30-Apr-20	6E-07	0.2786486	Increasing	
JPL-M	00615-Nitrite n	Summer	0.008702	0.005	0.038	0	0.0098332	0	0.014	47	21-May-97	14-Oct-19	9E-07	0.1033277	Increasing	
JPL-M	00615-Nitrite n	Winter	0.016304	0.0115	0.078	0	0.017457083	0.002	0.025	46	1/30/1997	4/30/2020	2.89E-07	0.75644157	Increasing	
JPL-W	00615-Nitrite n	POR	0.010924	0.0065	0.12	0	0.0153216	0	0.0165	92	31-Jan-97	30-Apr-20	6E-07	0.3110721	Increasing	
JPL-W	00615-Nitrite n	Summer	0.0104	0.004	0.12	0	0.0193442	0	0.013	45	21-May-97	14-Oct-19	1E-07	0.9329413	Increasing	
JPL-W	00615-Nitrite n	Winter	0.011426	0.009	0.03	0	0.010292979	0.002	0.025	47	1/31/1997	4/30/2020	1.01E-06	0.05884425	Increasing	
I-1	00620-Nitrate n	POR	0.124583	0.1	0.31	0.025	0.1107712	0.025	0.205	12	25-Jun-19	30-Apr-20	0.000787	0.0051814	Increasing	sig
I-1	00620-Nitrate n	Summer	0.05	0.025	0.15	0.025	0.0559017	0.025	0.025	5	25-Jun-19	14-Oct-19	-0.00091	0.1874876	Decreasin	
I-1	00620-Nitrate n	Winter	0.177857	0.19	0.31	0.025	0.111648897	0.05	0.3	7	11/14/2019	4/30/2020	0.001623	0.00746379	Increasing	sig
I-2	00620-Nitrate n	POR	0.149583	0.11	0.45	0.025	0.1408167	0.025	0.245	12	25-Jun-19	30-Apr-20	0.000855	0.025219	Increasing	sig
I-2	00620-Nitrate n	Summer	0.066	0.025	0.23	0.025	0.0916788	0.025	0.025	5	25-Jun-19	14-Oct-19	-0.00149	0.1874876	Decreasin	
I-2	00620-Nitrate n	Winter	0.209286	0.23	0.45	0.025	0.144118833	0.06	0.28	7	11/14/2019	4/30/2020	0.001831	0.0399671	Increasing	sig
JPL-D	00620-Nitrate n	POR	0.146839	0.12	0.98	0	0.1496879	0.025	0.24	87	29-Jan-97	30-Apr-20	-7.1E-06	0.2387709	Decreasin	
JPL-D	00620-Nitrate n	Summer	0.105814	0.05	0.44	0	0.1336615	0	0.24	43	22-May-97	14-Oct-19	-1.2E-05	0.1446885	Decreasin	
JPL-D	00620-Nitrate n	Winter	0.186932	0.185	0.98	0	0.155032689	0.095	0.24	44	1/29/1997	4/30/2020	-4E-06	0.63439898	Decreasin	
JPL-M	00620-Nitrate n	POR	0.182	0.12	0.77	0	0.180115	0.025	0.27	91	30-Jan-97	30-Apr-20	-1.1E-05	0.1247933	Decreasin	
JPL-M	00620-Nitrate n	Summer	0.116283	0.055	0.57	0	0.1451103	0	0.22	46	21-May-97	14-Oct-19	-9.4E-06	0.2723355	Decreasin	
JPL-M	00620-Nitrate n	Winter	0.249178	0.22	0.77	0	0.188921495	0.1	0.3	45	1/30/1997	4/30/2020	-1.3E-05	0.18402974	Decreasin	
JPL-W	00620-Nitrate n	POR	0.123178	0.11	0.46	0	0.1135638	0.025	0.2	90	31-Jan-97	30-Apr-20	-7.6E-06	0.0880393	Decreasin	
JPL-W	00620-Nitrate n	Summer	0.088733	0.05	0.46	0	0.1169496	0	0.12	45	21-May-97	14-Oct-19	-8.4E-06	0.2284431	Decreasin	
JPL-W	00620-Nitrate n	Winter	0.157622	0.16	0.42	0	0.099912982	0.08	0.22	45	1/31/1997	4/30/2020	-7.5E-06	0.16187333	Decreasin	

Nitrate & Nitrite in Mountain Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
MC-A	00615-Nitrite n	POR	0.043522	0.025	0.61	0	0.0747463	0.005	0.046	115	22-Jan-97	28-Apr-20	-2.2E-06	0.496084	Decreasin	
MC-A	00615-Nitrite n	Summer	0.031429	0.013	0.3	0	0.0600462	0.005	0.026	35	25-Jun-97	20-Aug-19	-4.5E-06	0.3558526	Decreasin	
MC-A	00615-Nitrite n	Winter	0.048813	0.025	0.61	0	0.080108486	0.006	0.0655	80	1/22/1997	4/28/2020	-1.7E-06	0.69031888	Decreasin	
MC-B	00615-Nitrite n	POR	0.035833	0.025	0.1	0.025	0.025658	0.025	0.025	12	26-Jun-19	28-Apr-20	5.93E-05	0.4492736	Increasing	
MC-B	00615-Nitrite n	Summer	0.025	0.025	0.025	0.025	0	0.025	0.025	5	26-Jun-19	16-Oct-19	0		Decreasin	sig
MC-B	00615-Nitrite n	Winter	0.043571	0.025	0.1	0.025	0.032237955	0.025	0.08	7	11/12/2019	4/28/2020	-0.0001	0.66830016	Decreasin	
MC-C	00615-Nitrite n	POR	0.0562	0.0265	0.241	0	0.0638456	0.013	0.08	40	22-Jan-97	28-Apr-20	-6E-07	0.8557642	Decreasin	
MC-C	00615-Nitrite n	Summer	0.045667	0.022	0.232	0	0.0639918	0.004	0.07	15	25-Jun-97	16-Oct-19	1.7E-06	0.7656882	Increasing	
MC-C	00615-Nitrite n	Winter	0.06252	0.041	0.241	0	0.064220402	0.02	0.08	25	1/22/1997	4/28/2020	-2E-06	0.645364	Decreasin	
MC-D	00615-Nitrite n	POR	0.014462	0.008	0.07	0	0.0188482	0	0.025	39	28-Jan-97	28-Apr-20	3.6E-06	0.0002217	Increasing	sig
MC-D	00615-Nitrite n	Summer	0.018	0.0045	0.07	0	0.0243684	0	0.025	12	24-Jun-97	20-Aug-19	5.1E-06	0.0758403	Increasing	
MC-D	00615-Nitrite n	Winter	0.012889	0.009	0.07	0	0.01611338	0	0.025	27	1/28/1997	4/28/2020	3.12E-06	0.00099742	Increasing	sig
MC-E	00615-Nitrite n	POR	0.025	0.025	0.025	0.025	0	0.025	0.025	12	26-Jun-19	28-Apr-20	0		Decreasin	sig
MC-E	00615-Nitrite n	Summer	0.025	0.025	0.025	0.025	0	0.025	0.025	5	26-Jun-19	16-Oct-19	0		Decreasin	sig
MC-E	00615-Nitrite n	Winter	0.025	0.025	0.025	0.025	0	0.025	0.025	7	11/12/2019	4/28/2020	0		Decreasin	sig
MC-A	00620-Nitrate n	POR	0.744739	0.28	5.98	0	1.1695986	0.08	0.95	115	22-Jan-97	28-Apr-20	-6.9E-05	0.1716573	Decreasin	
MC-A	00620-Nitrate n	Summer	0.499571	0.1	5.72	0	1.1308738	0.05	0.34	35	25-Jun-97	11-Sep-19	-9.1E-05	0.2937808	Decreasin	
MC-A	00620-Nitrate n	Winter	0.852	0.385	5.98	0	1.177003436	0.11	1.305	80	1/22/1997	4/28/2020	-6.2E-05	0.31849373	Decreasin	
MC-B	00620-Nitrate n	POR	0.40125	0.025	1.55	0.025	0.5489789	0.025	0.695	12	26-Jun-19	28-Apr-20	0.000457	0.78803	Increasing	
MC-B	00620-Nitrate n	Summer	0.17	0.025	0.75	0.025	0.3242299	0.025	0.025	5	26-Jun-19	16-Oct-19	-0.00527	0.1854028	Decreasin	
MC-B	00620-Nitrate n	Winter	0.566429	0.39	1.55	0.025	0.637218659	0.025	1.31	7	11/12/2019	4/28/2020	-0.00475	0.29856547	Decreasin	
MC-C	00620-Nitrate n	POR	0.900125	0.375	4.8	0	1.2355983	0.055	1.32	40	22-Jan-97	28-Apr-20	0.000206	0.000702	Increasing	sig
MC-C	00620-Nitrate n	Summer	0.458	0.29	2.14	0	0.5895543	0.05	0.67	15	25-Jun-97	16-Oct-19	0.000119	0.0094585	Increasing	sig
MC-C	00620-Nitrate n	Winter	1.1654	0.52	4.8	0	1.443144657	0.07	1.68	25	1/22/1997	4/28/2020	0.000263	0.00358752	Increasing	sig
MC-D	00620-Nitrate n	POR	0.214795	0.16	1.32	0	0.2537478	0.025	0.32	39	28-Jan-97	28-Apr-20	9.1E-06	0.5259194	Increasing	
MC-D	00620-Nitrate n	Summer	0.19125	0.075	0.7	0	0.2206615	0.06	0.275	12	24-Jun-97	20-Aug-19	3.19E-05	0.2422808	Increasing	
MC-D	00620-Nitrate n	Winter	0.225259	0.18	1.32	0	0.270436057	0.025	0.32	27	1/28/1997	4/28/2020	3.76E-06	0.83163854	Increasing	
MC-E	00620-Nitrate n	POR	0.624167	0.535	1.29	0.36	0.2978242	0.43	0.65	12	26-Jun-19	28-Apr-20	-0.00156	0.0653519	Decreasin	
MC-E	00620-Nitrate n	Summer	0.802	0.69	1.29	0.36	0.4060419	0.51	1.16	5	26-Jun-19	16-Oct-19	-0.00287	0.6174536	Decreasin	
MC-E	00620-Nitrate n	Winter	0.497143	0.48	0.61	0.39	0.086739896	0.41	0.58	7	11/12/2019	4/28/2020	-0.00044	0.49528987	Decreasin	
JPL-W	00620-Nitrate n	Winter	0.157622	0.16	0.42	0	0.099912982	0.08	0.22	45	1/31/1997	4/30/2020	-7.5E-06	0.16187333	Decreasin	

Nitrate & Nitrite in Walnut Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
WC-A	00615-Nitrite m	POR	0.025	0.025	0.025	0.025	0	0.025	0.025	8	24-Jun-19	28-Apr-20	0		Decreasin	sig
WC-A	00615-Nitrite m	Summer	0.025	0.025	0.025	0.025	0	0.025	0.025	3	24-Jun-19	19-Aug-19	0		Decreasin	sig
WC-A	00615-Nitrite m	Winter	0.025	0.025	0.025	0.025	0	0.025	0.025	5	1/22/2020	4/28/2020	0		Decreasin	sig
WC-B	00615-Nitrite m	POR	0.025	0.025	0.025	0.025	0	0.025	0.025	11	24-Jun-19	28-Apr-20	0		Decreasin	sig
WC-B	00615-Nitrite m	Summer	0.025	0.025	0.025	0.025	0	0.025	0.025	4	24-Jun-19	9-Sep-19	0		Decreasin	sig
WC-B	00615-Nitrite m	Winter	0.025	0.025	0.025	0.025	0	0.025	0.025	7	11/19/2019	4/28/2020	0		Decreasin	sig
WC-C	00615-Nitrite m	POR	0.025	0.025	0.025	0.025	0	0.025	0.025	12	24-Jun-19	28-Apr-20	0		Decreasin	sig
WC-C	00615-Nitrite m	Summer	0.025	0.025	0.025	0.025	0	0.025	0.025	5	24-Jun-19	15-Oct-19	0		Decreasin	sig
WC-C	00615-Nitrite m	Winter	0.025	0.025	0.025	0.025	0	0.025	0.025	7	11/19/2019	4/28/2020	0		Decreasin	sig
WC-D	00615-Nitrite m	POR	0.013896	0.0095	0.086	0	0.0159052	0	0.024	164	22-Jan-97	28-Apr-20	-1.6E-06	0.0068829	Decreasin	sig
WC-D	00615-Nitrite m	Summer	0.013846	0.009	0.086	0	0.0171805	0	0.019	78	26-Jun-97	15-Oct-19	-2.2E-06	0.0221438	Decreasin	sig
WC-D	00615-Nitrite m	Winter	0.013942	0.01	0.071	0	0.014755541	0	0.025	86	1/22/1997	4/28/2020	-1.2E-06	0.13162206	Decreasin	
WC-A	00620-Nitrate n	POR	0.14125	0.0475	0.45	0.025	0.1831422	0.025	0.255	8	24-Jun-19	28-Apr-20	-0.00042	0.4859173	Decreasin	
WC-A	00620-Nitrate n	Summer	0.166667	0.025	0.45	0.025	0.2453739	0.025	0.45	3	24-Jun-19	19-Aug-19	-0.00768	0.3202083	Decreasin	
WC-A	00620-Nitrate n	Winter	0.126	0.07	0.42	0.025	0.166785791	0.025	0.09	5	1/22/2020	4/28/2020	-0.00235	0.28746957	Decreasin	
WC-B	00620-Nitrate n	POR	0.152273	0.11	0.62	0.025	0.1799912	0.025	0.23	11	24-Jun-19	28-Apr-20	-0.00014	0.8072846	Decreasin	
WC-B	00620-Nitrate n	Summer	0.17375	0.025	0.62	0.025	0.2975	0.025	0.3225	4	24-Jun-19	9-Sep-19	-0.0072	0.1914138	Decreasin	
WC-B	00620-Nitrate n	Winter	0.14	0.15	0.28	0.025	0.096220233	0.025	0.23	7	11/19/2019	4/28/2020	0.001113	0.08213895	Increasing	
WC-C	00620-Nitrate n	POR	0.165417	0.15	0.67	0.025	0.1784843	0.0375	0.205	12	24-Jun-19	28-Apr-20	-0.00041	0.4444893	Decreasin	
WC-C	00620-Nitrate n	Summer	0.211	0.14	0.67	0.025	0.2625452	0.06	0.16	5	24-Jun-19	15-Oct-19	-0.00488	0.0984492	Decreasin	
WC-C	00620-Nitrate n	Winter	0.132857	0.17	0.25	0.025	0.097376295	0.025	0.23	7	11/19/2019	4/28/2020	0.001243	0.04376207	Increasing	sig
WC-D	00620-Nitrate n	POR	0.245581	0.225	1.24	0	0.2162972	0.07	0.35	160	22-Jan-97	28-Apr-20	-2.2E-05	0.0091616	Decreasin	sig
WC-D	00620-Nitrate n	Summer	0.210573	0.19	0.72	0	0.1948892	0.025	0.32	75	26-Jun-97	15-Oct-19	-2.1E-05	0.0749591	Decreasin	
WC-D	00620-Nitrate n	Winter	0.276471	0.24	1.24	0	0.230296268	0.1	0.37	85	1/22/1997	4/28/2020	-2.3E-05	0.06012682	Decreasin	

TKN in Joe Pool Lake



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
I-1	00625-TKN mg/ POR		0.3425	0.34	0.49	0.1	0.1128253	0.28	0.44	12	25-Jun-19	30-Apr-20	-0.00027	0.4224243	Decreasin	
I-1	00625-TKN mg/ Summer		0.354	0.4	0.45	0.21	0.1040673	0.28	0.43	5	25-Jun-19	14-Oct-19	-0.00012	0.9354194	Decreasin	
I-1	00625-TKN mg/ Winter		0.334286	0.34	0.49	0.1	0.126208444	0.28	0.45	7	11/14/2019	4/30/2020	-0.00099	0.27405695	Decreasin	
I-2	00625-TKN mg/ POR		0.345833	0.335	0.52	0.1	0.117354	0.28	0.43	12	25-Jun-19	30-Apr-20	-0.00019	0.6039978	Decreasin	
I-2	00625-TKN mg/ Summer		0.368	0.35	0.51	0.26	0.1143241	0.26	0.46	5	25-Jun-19	14-Oct-19	0.001204	0.4427143	Increasing	
I-2	00625-TKN mg/ Winter		0.33	0.33	0.52	0.1	0.125830574	0.3	0.4	7	11/14/2019	4/30/2020	-0.00053	0.57547517	Decreasin	
JPL-D	00625-TKN mg/ POR		0.492789	0.404	5.71	0	0.5352003	0.4	0.51	109	29-Jan-97	30-Apr-20	7.7E-06	0.6737622	Increasing	
JPL-D	00625-TKN mg/ Summer		0.441709	0.4	0.8	0	0.1409909	0.4	0.5	55	22-May-97	14-Oct-19	-1.9E-06	0.7811929	Decreasin	
JPL-D	00625-TKN mg/ Winter		0.544815	0.44	5.71	0	0.746973114	0.3	0.6	54	1/29/1997	4/30/2020	1.72E-05	0.63021959	Increasing	
JPL-M	00625-TKN mg/ POR		0.462086	0.485	1.4	0	0.1982984	0.4	0.55	116	30-Jan-97	30-Apr-20	-1.4E-05	0.0247219	Decreasin	sig
JPL-M	00625-TKN mg/ Summer		0.450203	0.42	1.4	0	0.1826577	0.4	0.52	59	21-May-97	14-Oct-19	-1E-06	0.9076866	Decreasin	
JPL-M	00625-TKN mg/ Winter		0.474386	0.5	1.2	0	0.214226328	0.4	0.6	57	1/30/1997	4/30/2020	-2.7E-05	0.00431762	Decreasin	sig
JPL-W	00625-TKN mg/ POR		0.47973	0.5	0.95	0	0.194879	0.39	0.6	115	31-Jan-97	30-Apr-20	-1.5E-05	0.0174501	Decreasin	sig
JPL-W	00625-TKN mg/ Summer		0.481535	0.5	0.9	0	0.1470854	0.4	0.6	58	21-May-97	14-Oct-19	-5.4E-06	0.4414388	Decreasin	
JPL-W	00625-TKN mg/ Winter		0.477895	0.5	0.95	0	0.235127145	0.33	0.6	57	1/31/1997	4/30/2020	-2.4E-05	0.02348752	Decreasin	sig

TKN in Mountain Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
MC-A	00625-TKN mg/	POR	0.898682	0.8	2.8	0	0.4650838	0.6	1.1	129	22-Jan-97	28-Apr-20	-7E-05	0.0000329	Decreasin	sig
MC-A	00625-TKN mg/	Summer	0.961925	0.855	2.6	0.2	0.4823282	0.7	1.1	40	25-Jun-97	11-Sep-19	-8.7E-05	0.0025827	Decreasin	sig
MC-A	00625-TKN mg/	Winter	0.870258	0.8	2.8	0	0.457039672	0.6	1.04	89	1/22/1997	4/28/2020	-6E-05	0.00381353	Decreasin	sig
MC-B	00625-TKN mg/	POR	0.525	0.45	1.35	0.1	0.3274558	0.3	0.675	12	26-Jun-19	28-Apr-20	0.000903	0.3634525	Increasing	
MC-B	00625-TKN mg/	Summer	0.412	0.43	0.8	0.1	0.2568463	0.29	0.44	5	26-Jun-19	16-Oct-19	-0.00317	0.3534327	Decreasin	
MC-B	00625-TKN mg/	Winter	0.605714	0.49	1.35	0.28	0.366554095	0.31	0.76	7	11/12/2019	4/28/2020	0.001449	0.59784214	Increasing	
MC-C	00625-TKN mg/	POR	1.145714	1	3.04	0	0.6306492	0.7	1.49	63	22-Jan-97	28-Apr-20	2.87E-05	0.3087458	Increasing	
MC-C	00625-TKN mg/	Summer	1.18	1.1	2.4	0.6	0.4695615	0.85	1.52	26	25-Jun-97	16-Oct-19	2.09E-05	0.5452817	Increasing	
MC-C	00625-TKN mg/	Winter	1.121622	0.87	3.04	0	0.728283803	0.6	1.3	37	1/22/1997	4/28/2020	3.24E-05	0.44436181	Increasing	
MC-D	00625-TKN mg/	POR	0.345818	0.3	1.7	0	0.349347	0.1	0.43	55	28-Jan-97	28-Apr-20	-2.5E-05	0.1507661	Decreasin	
MC-D	00625-TKN mg/	Summer	0.451667	0.4	1.42	0.1	0.317328	0.28	0.6	18	24-Jun-97	20-Aug-19	-2E-05	0.5465239	Decreasin	
MC-D	00625-TKN mg/	Winter	0.294324	0.2	1.7	0	0.356631934	0	0.4	37	1/28/1997	4/28/2020	-3.1E-05	0.12041714	Decreasin	
MC-E	00625-TKN mg/	POR	0.388333	0.325	0.98	0.1	0.2484436	0.23	0.495	12	26-Jun-19	28-Apr-20	0.001171	0.1028034	Increasing	
MC-E	00625-TKN mg/	Summer	0.302	0.33	0.52	0.1	0.196774	0.1	0.46	5	26-Jun-19	16-Oct-19	0.000434	0.8790445	Increasing	
MC-E	00625-TKN mg/	Winter	0.45	0.32	0.98	0.22	0.276947648	0.24	0.64	7	11/12/2019	4/28/2020	0.002709	0.15005749	Increasing	

TKN in Walnut Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
WC-A	00625-TKN mg/	POR	0.4375	0.275	1.24	0.1	0.3940903	0.23	0.575	8	24-Jun-19	28-Apr-20	-0.00074	0.5736242	Decreasin	
WC-A	00625-TKN mg/	Summer	0.516667	0.21	1.24	0.1	0.6288349	0.1	1.24	3	24-Jun-19	19-Aug-19	-0.01865	0.3759604	Decreasin	
WC-A	00625-TKN mg/	Winter	0.39	0.29	0.85	0.25	0.257972867	0.26	0.3	5	1/22/2020	4/28/2020	0.000386	0.91919678	Increasing	
WC-B	00625-TKN mg/	POR	0.693636	0.63	1.54	0.22	0.4088343	0.33	0.95	11	24-Jun-19	28-Apr-20	2.02E-05	0.9874417	Increasing	
WC-B	00625-TKN mg/	Summer	0.6175	0.355	1.54	0.22	0.618944	0.27	0.965	4	24-Jun-19	9-Sep-19	-0.01548	0.1651159	Decreasin	
WC-B	00625-TKN mg/	Winter	0.737143	0.71	1.2	0.33	0.284529687	0.53	0.95	7	11/19/2019	4/28/2020	-0.0002	0.92798123	Decreasin	
WC-C	00625-TKN mg/	POR	0.649167	0.495	1.77	0.27	0.4464294	0.345	0.81	12	24-Jun-19	28-Apr-20	-0.00069	0.612635	Decreasin	
WC-C	00625-TKN mg/	Summer	0.782	0.56	1.77	0.32	0.5841832	0.43	0.83	5	24-Jun-19	15-Oct-19	-0.00593	0.4571653	Decreasin	
WC-C	00625-TKN mg/	Winter	0.554286	0.38	1.19	0.27	0.335651463	0.29	0.79	7	11/19/2019	4/28/2020	0.003625	0.11413701	Increasing	
WC-D	00625-TKN mg/	POR	0.722	0.6	6.2	0	0.62999	0.46	0.8	182	22-Jan-97	28-Apr-20	-4.9E-05	0.0189575	Decreasin	sig
WC-D	00625-TKN mg/	Summer	0.741412	0.6	5	0	0.5859773	0.48	0.8	85	26-Jun-97	15-Oct-19	-4.5E-05	0.1174705	Decreasin	
WC-D	00625-TKN mg/	Winter	0.70499	0.6	6.2	0	0.668747983	0.41	0.8	97	1/22/1997	4/28/2020	-5.3E-05	0.08265269	Decreasin	

Total & Ortho Phosphorus in Joe Pool Lake



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
I-1	00665-Total Phosphorus	Winter	0.0237	0.0259	0.03	0.01	0.007516426	0.02	0.03	7	11/14/2019	4/30/2020	-3.2E-05	0.57904642	Decreasin	
I-1	00665-Total Phosphorus	Summer	0.016	0.02	0.02	0.01	0.0054772	0.01	0.02	5	25-Jun-19	14-Oct-19	5.4E-06	0.9460576	Increasing	
I-1	00665-Total Phosphorus	POR	0.020492	0.02	0.03	0.01	0.0075793	0.015	0.02795	12	25-Jun-19	30-Apr-20	2.73E-05	0.2248316	Increasing	
I-2	00665-Total Phosphorus	Winter	0.033529	0.03	0.05	0.0212	0.009151815	0.03	0.04	7	11/14/2019	4/30/2020	-3.6E-05	0.60582435	Decreasin	
I-2	00665-Total Phosphorus	Summer	0.032	0.03	0.04	0.03	0.0044721	0.03	0.03	5	25-Jun-19	14-Oct-19	0.000031	0.6257272	Increasing	
I-2	00665-Total Phosphorus	POR	0.032892	0.03	0.05	0.0212	0.0073196	0.03	0.03675	12	25-Jun-19	30-Apr-20	1.8E-06	0.9362109	Increasing	
JPL-D	00665-Total Phosphorus	Winter	0.026929	0.0211	0.11	0	0.020166223	0.02	0.03	55	1/29/1997	4/30/2020	-1.1E-07	0.90508136	Decreasin	
JPL-D	00665-Total Phosphorus	Summer	0.013273	0.02	0.04	0	0.0130603	0	0.02	55	22-May-97	14-Oct-19	1.2E-06	0.0511186	Increasing	
JPL-D	00665-Total Phosphorus	POR	0.020101	0.02	0.11	0	0.0182491	0	0.03	110	29-Jan-97	30-Apr-20	5E-07	0.3839438	Increasing	
JPL-M	00665-Total Phosphorus	Winter	0.041807	0.04	0.27	0	0.03788103	0.02	0.05	57	1/30/1997	4/30/2020	-2.1E-06	0.22970279	Decreasin	
JPL-M	00665-Total Phosphorus	Summer	0.02678	0.03	0.08	0	0.0160216	0.02	0.04	59	21-May-97	14-Oct-19	3E-07	0.6566081	Increasing	
JPL-M	00665-Total Phosphorus	POR	0.034164	0.03	0.27	0	0.0297516	0.02	0.04	116	30-Jan-97	30-Apr-20	-9E-07	0.3604495	Decreasin	
JPL-W	00665-Total Phosphorus	Winter	0.035246	0.03	0.11	0	0.019867662	0.02645	0.045	56	1/31/1997	4/30/2020	-4.1E-07	0.64918617	Decreasin	
JPL-W	00665-Total Phosphorus	Summer	0.042017	0.03	0.94	0	0.1214423	0.02	0.04	58	21-May-97	14-Oct-19	-4.3E-06	0.4568838	Decreasin	
JPL-W	00665-Total Phosphorus	POR	0.038691	0.03	0.94	0	0.0874246	0.02	0.04	114	31-Jan-97	30-Apr-20	-2.3E-06	0.427101	Decreasin	
JPL-D	70507-Ortho Phosphorus	Winter	0.008545	0	0.08	0	0.016933222	0	0.01	55	29-Jan-97	30-Apr-20	-1.5E-06	0.04820244	Decreasin	sig
JPL-D	70507-Ortho Phosphorus	Summer	0.000893	0	0.01	0	0.0028774	0	0	56	22-May-97	14-Oct-19	5E-07	0.0003567	Increasing	sig
JPL-D	70507-Ortho Phosphorus	POR	0.004685	0	0.08	0	0.0126362	0	0	111	29-Jan-97	30-Apr-20	-6E-07	0.1797549	Decreasin	
JPL-M	70507-Ortho Phosphorus	Winter	0.007895	0	0.05	0	0.01435977	0	0.01	57	30-Jan-97	30-Apr-20	-1.7E-06	0.00798555	Decreasin	sig
JPL-M	70507-Ortho Phosphorus	Summer	0.0015	0	0.02	0	0.0044436	0	0	60	21-May-97	14-Oct-19	1E-07	0.4953994	Increasing	
JPL-M	70507-Ortho Phosphorus	POR	0.004615	0	0.05	0	0.0109496	0	0	117	30-Jan-97	30-Apr-20	-8E-07	0.025025	Decreasin	sig
JPL-W	70507-Ortho Phosphorus	Winter	0.008947	0	0.1	0	0.017996449	0	0.01	57	31-Jan-97	30-Apr-20	-2.1E-06	0.00921481	Decreasin	sig
JPL-W	70507-Ortho Phosphorus	Summer	0.001552	0	0.02	0	0.0045119	0	0	58	21-May-97	14-Oct-19	3E-07	0.2108433	Increasing	
JPL-W	70507-Ortho Phosphorus	POR	0.005217	0	0.1	0	0.0135302	0	0	115	31-Jan-97	30-Apr-20	-1E-06	0.02496	Decreasin	sig

Total & Ortho Phosphorus in Mountain Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
MC-A	00665-Total Phosphorus	Winter	0.121841	0.08	0.73	0	0.111158568	0.05	0.15	88	1/22/1997	4/28/2020	-1.8E-05	0.00032681	Decreasin	sig
MC-A	00665-Total Phosphorus	Summer	0.125122	0.1	0.43	0.02	0.0885754	0.06	0.15	41	25-Jun-97	11-Sep-19	-5.7E-06	0.3134203	Decreasin	
MC-A	00665-Total Phosphorus	POR	0.122884	0.099	0.73	0	0.1041752	0.05	0.15	129	22-Jan-97	28-Apr-20	-1.4E-05	0.0003483	Decreasin	sig
MC-B	00665-Total Phosphorus	Winter	0.121029	0.11	0.2	0.0434	0.066416105	0.0438	0.19	7	11/12/2019	4/28/2020	-0.00063	0.16673589	Decreasin	
MC-B	00665-Total Phosphorus	Summer	0.058	0.04	0.15	0.03	0.051672	0.03	0.04	5	26-Jun-19	16-Oct-19	-0.00091	0.1367952	Decreasin	
MC-B	00665-Total Phosphorus	POR	0.094767	0.0669	0.2	0.03	0.0665605	0.04	0.16	12	26-Jun-19	28-Apr-20	9.21E-05	0.653663	Increasing	
MC-C	00665-Total Phosphorus	Winter	0.3164	0.265	0.858	0	0.25248634	0.1	0.5	30	1/22/1997	4/28/2020	2.62E-05	0.10946481	Increasing	
MC-C	00665-Total Phosphorus	Summer	0.323333	0.22	1.74	0	0.3519943	0.1	0.45	27	25-Jun-97	16-Oct-19	5.43E-05	0.0261217	Increasing	sig
MC-C	00665-Total Phosphorus	POR	0.319684	0.24	1.74	0	0.3009157	0.1	0.47	57	22-Jan-97	28-Apr-20	0.000039	0.00557	Increasing	sig
MC-D	00665-Total Phosphorus	Winter	0.026355	0.02	0.12	0	0.03038399	0	0.04	29	1/28/1997	4/28/2020	-3.2E-06	0.10711517	Decreasin	
MC-D	00665-Total Phosphorus	Summer	0.068333	0.03	0.32	0	0.1000735	0.01	0.06	18	24-Jun-97	20-Aug-19	4.4E-06	0.6804938	Increasing	
MC-D	00665-Total Phosphorus	POR	0.042432	0.03	0.32	0	0.0684725	0	0.04	47	28-Jan-97	28-Apr-20	-9E-07	0.8097032	Decreasin	
MC-E	00665-Total Phosphorus	Winter	0.070014	0.033	0.271	0.01	0.091202347	0.02	0.0761	7	11/12/2019	4/28/2020	0.000925	0.13143985	Increasing	
MC-E	00665-Total Phosphorus	Summer	0.018	0.01	0.04	0.01	0.0130384	0.01	0.02	5	26-Jun-19	16-Oct-19	-0.00014	0.4373912	Decreasin	
MC-E	00665-Total Phosphorus	POR	0.048342	0.025	0.271	0.01	0.0729123	0.01	0.045	12	26-Jun-19	28-Apr-20	0.000388	0.0592976	Increasing	
MC-A	70507-Ortho Phosphorus	Winter	0.04625	0.03	0.32	0	0.062013562	0	0.06	56	22-Jan-97	28-Apr-20	-9.3E-06	0.00281552	Decreasin	sig
MC-A	70507-Ortho Phosphorus	Summer	0.026667	0.02	0.1	0	0.0303795	0	0.04	33	25-Jun-97	11-Sep-19	2E-07	0.9205445	Increasing	
MC-A	70507-Ortho Phosphorus	POR	0.038989	0.03	0.32	0	0.0531944	0	0.06	89	22-Jan-97	28-Apr-20	-5.6E-06	0.0081262	Decreasin	sig
MC-B	70507-Ortho Phosphorus	Winter	0.048571	0.03	0.13	0.01	0.046342411	0.01	0.08	7	12-Nov-19	28-Apr-20	-0.00043	0.1801073	Decreasin	
MC-B	70507-Ortho Phosphorus	Summer	0.026	0.01	0.09	0.01	0.0357771	0.01	0.01	5	26-Jun-19	16-Oct-19	-0.00058	0.1854028	Decreasin	
MC-B	70507-Ortho Phosphorus	POR	0.039167	0.01	0.13	0.01	0.0420948	0.01	0.075	12	26-Jun-19	28-Apr-20	-2.2E-05	0.8682805	Decreasin	
MC-C	70507-Ortho Phosphorus	Winter	0.124722	0.06	0.61	0	0.165503321	0	0.17	36	22-Jan-97	28-Apr-20	7.87E-06	0.41989563	Increasing	
MC-C	70507-Ortho Phosphorus	Summer	0.172593	0.05	1.77	0	0.3501603	0.02	0.23	27	25-Jun-97	16-Oct-19	0.00003	0.2337252	Increasing	
MC-C	70507-Ortho Phosphorus	POR	0.145238	0.05	1.77	0	0.2597136	0	0.18	63	22-Jan-97	28-Apr-20	1.74E-05	0.1355437	Increasing	
MC-D	70507-Ortho Phosphorus	Winter	0.005556	0	0.09	0	0.016291004	0	0.005	36	28-Jan-97	28-Apr-20	4.8E-07	0.61163882	Increasing	
MC-D	70507-Ortho Phosphorus	Summer	0.033889	0	0.34	0	0.0920447	0	0.01	18	24-Jun-97	20-Aug-19	0	0.9972697	Decreasin	
MC-D	70507-Ortho Phosphorus	POR	0.015	0	0.34	0	0.0554484	0	0.01	54	28-Jan-97	28-Apr-20	9E-07	0.7334397	Increasing	

Total & Ortho Phosphorus in Walnut Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
WC-A	00665-Total Phosphorus	Winter	0.07584	0.06	0.16	0.0425	0.047949484	0.05	0.0667	5	1/22/2020	4/28/2020	9.7E-05	0.8908687	Increasing	
WC-A	00665-Total Phosphorus	Summer	0.156667	0.06	0.38	0.03	0.1939931	0.03	0.38	3	24-Jun-19	19-Aug-19	-0.00579	0.3694824	Decreasin	
WC-A	00665-Total Phosphorus	POR	0.10615	0.06	0.38	0.03	0.1175418	0.04625	0.11335	8	24-Jun-19	28-Apr-20	-0.0004	0.2968663	Decreasin	
WC-B	00665-Total Phosphorus	Winter	0.215814	0.23	0.34	0.0767	0.096823076	0.1	0.29	7	11/19/2019	4/28/2020	-0.00077	0.2792259	Decreasin	
WC-B	00665-Total Phosphorus	Summer	0.225	0.14	0.57	0.05	0.2407627	0.06	0.39	4	24-Jun-19	9-Sep-19	-0.00446	0.3817989	Decreasin	
WC-B	00665-Total Phosphorus	POR	0.219155	0.21	0.57	0.05	0.1517771	0.0767	0.29	11	24-Jun-19	28-Apr-20	-0.0003	0.5199301	Decreasin	
WC-C	00665-Total Phosphorus	Winter	0.117514	0.11	0.18	0.06	0.048389235	0.07	0.167	7	11/19/2019	4/28/2020	0.000212	0.56822033	Increasing	
WC-C	00665-Total Phosphorus	Summer	0.24	0.19	0.65	0.04	0.2414539	0.09	0.23	5	24-Jun-19	15-Oct-19	-0.00273	0.4004923	Decreasin	
WC-C	00665-Total Phosphorus	POR	0.16855	0.13	0.65	0.04	0.1626505	0.0778	0.185	12	24-Jun-19	28-Apr-20	-0.00065	0.170623	Decreasin	
WC-D	00665-Total Phosphorus	Winter	0.117225	0.09	0.74	0	0.112185056	0.06	0.13	97	1/22/1997	4/28/2020	-1.2E-05	0.01431711	Decreasin	sig
WC-D	00665-Total Phosphorus	Summer	0.155385	0.09	2.07	0.03	0.2616202	0.05	0.15	91	26-Jun-97	15-Oct-19	-9.9E-06	0.4353417	Decreasin	
WC-D	00665-Total Phosphorus	POR	0.135696	0.09	2.07	0	0.1994195	0.05	0.14	188	22-Jan-97	28-Apr-20	-1.1E-05	0.0946956	Decreasin	
WC-A	70507-Ortho Phosphorus	Winter	0.04	0.03	0.07	0.03	0.017320508	0.03	0.04	5	22-Jan-20	28-Apr-20	-1.9E-05	0.9393748	Decreasin	
WC-A	70507-Ortho Phosphorus	Summer	0.043333	0.01	0.11	0.01	0.057735	0.01	0.11	3	24-Jun-19	19-Aug-19	-0.00181	0.3202083	Decreasin	
WC-A	70507-Ortho Phosphorus	POR	0.04125	0.03	0.11	0.01	0.0335676	0.02	0.055	8	24-Jun-19	28-Apr-20	-4E-05	0.7228466	Decreasin	
WC-B	70507-Ortho Phosphorus	Winter	0.07	0.09	0.12	0.01	0.045092498	0.03	0.11	7	19-Nov-19	28-Apr-20	-0.00055	0.06334944	Decreasin	
WC-B	70507-Ortho Phosphorus	Summer	0.0325	0.01	0.1	0.01	0.045	0.01	0.055	4	24-Jun-19	9-Sep-19	-0.00109	0.1914138	Decreasin	
WC-B	70507-Ortho Phosphorus	POR	0.056364	0.03	0.12	0.01	0.0467488	0.01	0.1	11	24-Jun-19	28-Apr-20	2.38E-05	0.871222	Increasing	
WC-C	70507-Ortho Phosphorus	Winter	0.034286	0.01	0.09	0.01	0.035523299	0.01	0.08	7	19-Nov-19	28-Apr-20	-0.00017	0.54133742	Decreasin	
WC-C	70507-Ortho Phosphorus	Summer	0.06	0.06	0.09	0.02	0.0308221	0.04	0.09	5	24-Jun-19	15-Oct-19	0.000004	0.9928688	Increasing	
WC-C	70507-Ortho Phosphorus	POR	0.045	0.035	0.09	0.01	0.034772	0.01	0.085	12	24-Jun-19	28-Apr-20	-0.00014	0.1732293	Decreasin	
WC-D	70507-Ortho Phosphorus	Winter	0.042833	0.03	0.43	0	0.06605318	0	0.06	60	22-Jan-97	28-Apr-20	-6.9E-06	0.04772949	Decreasin	sig
WC-D	70507-Ortho Phosphorus	Summer	0.054857	0.03	0.65	0	0.1011491	0	0.06	70	26-Jun-97	15-Oct-19	-9.3E-06	0.0857466	Decreasin	
WC-D	70507-Ortho Phosphorus	POR	0.049308	0.03	0.65	0	0.0866266	0	0.06	130	22-Jan-97	28-Apr-20	-8.1E-06	0.011943	Decreasin	sig

Chlorophyll-a in Joe Pool Lake



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
I-1	32211-Chlorophl	Winter	5.357143	5	15	1.5	4.913538149	1.5	8	7	11/14/2019	4/30/2020	-0.02399	0.5153886	Decreasin	
I-1	32211-Chlorophl	Summer	14.2	14	22	10	4.7116876	11	14	5	25-Jun-19	14-Oct-19	0.090113	0.0862928	Increasing	
I-1	32211-Chlorophl	POR	9.041667	9	22	1.5	6.4788409	3.25	14	12	25-Jun-19	30-Apr-20	-0.03651	0.0419793	Decreasin	sig
I-2	32211-Chlorophl	Winter	6.928571	7	14	1.5	4.107194617	4	10	7	11/14/2019	4/30/2020	-0.01463	0.63902403	Decreasin	
I-2	32211-Chlorophl	Summer	15.2	14	19	11	3.2710854	14	18	5	25-Jun-19	14-Oct-19	0.003233	0.9458062	Increasing	
I-2	32211-Chlorophl	POR	10.375	10.5	19	1.5	5.5886451	6	14	12	25-Jun-19	30-Apr-20	-0.03764	0.0097896	Decreasin	sig
JPL-D	32211-Chlorophl	Winter	4.186842	4	15	0	3.359630856	1.8	6	38	2/27/1997	4/30/2020	2.88E-05	0.87500873	Increasing	
JPL-D	32211-Chlorophl	Summer	7.419643	6.95	19	0	3.8410425	4.85	9.1	56	22-May-97	14-Oct-19	0.001012	0	Increasing	
JPL-D	32211-Chlorophl	POR	6.112766	5.75	19	0	3.9698659	4	8	94	27-Feb-97	30-Apr-20	0.000497	0.0005367	Increasing	sig
JPL-M	32211-Chlorophl	Winter	5.3975	5	17	0	3.611341643	2.95	7	40	1/30/1997	4/30/2020	0.00014	0.4598104	Increasing	
JPL-M	32211-Chlorophl	Summer	9.429091	8	24	0	4.9909426	6.2	11.5	55	21-May-97	14-Oct-19	0.001361	0	Increasing	
JPL-M	32211-Chlorophl	POR	7.731579	7	24	0	4.8708264	4.4	10	95	30-Jan-97	30-Apr-20	0.000706	0.0000407	Increasing	sig
JPL-W	32211-Chlorophl	Winter	8.12	7	27	0	5.823172102	4	10.95	40	1/31/1997	4/30/2020	6.53E-05	0.83165412	Increasing	
JPL-W	32211-Chlorophl	Summer	10.22593	9.65	24	3	4.6388102	6.5	13	54	21-May-97	14-Oct-19	0.001139	0.0000002	Increasing	sig
JPL-W	32211-Chlorophl	POR	9.329787	8	27	0	5.251581	5.2	12	94	31-Jan-97	30-Apr-20	0.000571	0.0028126	Increasing	sig

Chlorophyll-a in Mountain Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
MC-A	32211-Chlorophl	Winter	11.5	9	31	1.5	9.569918147	5	15	7	11/12/2019	4/28/2020	0.006014	0.93419411	Increasing	
MC-A	32211-Chlorophl	Summer	3	2.75	5	1.5	1.779513	1.5	4.5	4	26-Jun-19	11-Sep-19	0.006741	0.8736493	Increasing	
MC-A	32211-Chlorophl	POR	8.409091	5	31	1.5	8.6192174	1.5	10	11	26-Jun-19	28-Apr-20	0.036166	0.1586696	Increasing	
MC-B	32211-Chlorophl	Winter	9.285714	9	18	5	4.231401884	6	10	7	11/12/2019	4/28/2020	0.00433	0.89297599	Increasing	
MC-B	32211-Chlorophl	Summer	5.5	5	9	1.5	3.0413813	4	8	5	26-Jun-19	16-Oct-19	-0.03921	0.3286606	Decreasin	
MC-B	32211-Chlorophl	POR	7.708333	8	18	1.5	4.1145989	5	9	12	26-Jun-19	28-Apr-20	0.014502	0.2384379	Increasing	
MC-C	32211-Chlorophl	Winter	36.71429	26	77	13	22.25394561	20	48	7	11/12/2019	4/28/2020	-0.13743	0.39926003	Decreasin	
MC-C	32211-Chlorophl	Summer	46.6	38	113	14	40.1285435	17	51	5	25-Jun-19	16-Oct-19	0.677883	0.1516719	Increasing	
MC-C	32211-Chlorophl	POR	40.83333	32	113	13	29.6918518	18.5	49.5	12	25-Jun-19	28-Apr-20	-0.02474	0.7868836	Decreasin	
MC-D	32211-Chlorophl	Winter	1.857143	1.5	4	1.5	0.944911183	1.5	1.5	7	11/11/2019	4/28/2020	0.008367	0.20252886	Increasing	
MC-D	32211-Chlorophl	Summer	2.333333	1.5	4	1.5	1.4433757	1.5	4	3	26-Jun-19	20-Aug-19	0.000551	0.9933175	Increasing	
MC-D	32211-Chlorophl	POR	2	1.5	4	1.5	1.0540926	1.5	1.5	10	26-Jun-19	28-Apr-20	-8.2E-05	0.9812719	Decreasin	
MC-E	32211-Chlorophl	Winter	4.571429	1.5	23	1.5	8.12623617	1.5	1.5	7	11/12/2019	4/28/2020	0.07226	0.20086734	Increasing	
MC-E	32211-Chlorophl	Summer	2.2	1.5	5	1.5	1.5652476	1.5	1.5	5	26-Jun-19	16-Oct-19	0.027339	0.1410742	Increasing	
MC-E	32211-Chlorophl	POR	3.583333	1.5	23	1.5	6.1968956	1.5	1.5	12	26-Jun-19	28-Apr-20	0.025495	0.1617023	Increasing	

Chlorophyll-a in Walnut Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
WC-A	32211-Chlorophl	Winter	3.5	1.5	7	1.5	2.761340254	1.5	6	5	1/22/2020	4/28/2020	-0.02632	0.49948281	Decreasin	
WC-A	32211-Chlorophl	Summer	6.666667	5	12	3	4.7258156	3	12	3	24-Jun-19	19-Aug-19	-0.16171	0.1844711	Decreasin	
WC-A	32211-Chlorophl	POR	4.6875	4	12	1.5	3.6638923	1.5	6.5	8	24-Jun-19	28-Apr-20	-0.01653	0.1429657	Decreasin	
WC-B	32211-Chlorophl	Winter	12.57143	15	22	4	6.267831705	6	16	7	11/19/2019	4/28/2020	0.018064	0.70974446	Increasing	
WC-B	32211-Chlorophl	Summer	13.5	12	26	4	9.4692485	6.5	20.5	4	24-Jun-19	9-Sep-19	-0.15426	0.4560293	Decreasin	
WC-B	32211-Chlorophl	POR	12.90909	15	26	4	7.1197548	6	16	11	24-Jun-19	28-Apr-20	-0.00484	0.8281997	Decreasin	
WC-C	32211-Chlorophl	Winter	6.071429	7	9	1.5	3.194116615	3	9	7	11/19/2019	4/28/2020	0.026036	0.26379054	Increasing	
WC-C	32211-Chlorophl	Summer	13.6	11	24	9	6.1073726	10	14	5	24-Jun-19	15-Oct-19	0.075629	0.3496556	Increasing	
WC-C	32211-Chlorophl	POR	9.208333	9	24	1.5	5.8444159	5.5	10.5	12	24-Jun-19	28-Apr-20	-0.02278	0.1858996	Decreasin	
WC-D	32211-Chlorophl	Winter	4.3375	4.85	7	1.5	2.107088377	2.25	6	8	4/26/2000	4/28/2020	-4.1E-05	0.90659632	Decreasin	
WC-D	32211-Chlorophl	Summer	11.6	9	19	5	6.0663004	8	17	5	24-Jun-19	15-Oct-19	-0.13404	0.0095598	Decreasin	sig
WC-D	32211-Chlorophl	POR	7.130769	6	19	1.5	5.3273484	4.7	8	13	26-Apr-00	28-Apr-20	0.000282	0.7325773	Increasing	

TSS in Joe Pool Lake



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
I-1	00530-TSS mg/l	Winter	8.857143	7	16	5	4.01781746	6	12	7	11/14/2019	4/30/2020	0.021739	0.46855921	Increasing	
I-1	00530-TSS mg/l	Summer	8.2	8	10	7	1.0954451	8	8	5	25-Jun-19	14-Oct-19	-0.01091	0.4709306	Decreasin	
I-1	00530-TSS mg/l	POR	8.583333	8	16	5	3.0587678	6.5	10	12	25-Jun-19	30-Apr-20	0.006127	0.5105022	Increasing	
I-2	00530-TSS mg/l	Winter	14.42857	13	30	5	8.162049229	8	19	7	11/14/2019	4/30/2020	0.041134	0.50131637	Increasing	
I-2	00530-TSS mg/l	Summer	13.2	13	17	10	2.5884358	12	14	5	25-Jun-19	14-Oct-19	0.000674	0.985728	Increasing	
I-2	00530-TSS mg/l	POR	13.91667	13	30	5	6.258933	11	15.5	12	25-Jun-19	30-Apr-20	0.012828	0.5005143	Increasing	
JPL-D	00530-TSS mg/l	Winter	6.666667	6	16	2	3.350712272	4	9	45	1/29/1997	4/30/2020	0.000187	0.24616531	Increasing	
JPL-D	00530-TSS mg/l	Summer	4.320755	4	23	0	3.2330837	3	5	53	22-May-97	14-Oct-19	0.000231	0.1482186	Increasing	
JPL-D	00530-TSS mg/l	POR	5.397959	4.5	23	0	3.4752135	3	7	98	29-Jan-97	30-Apr-20	0.000218	0.0660848	Increasing	
JPL-M	00530-TSS mg/l	Winter	12.91111	12	27	2	5.987950864	9	17	45	1/30/1997	4/30/2020	0.0006	0.03135869	Increasing	sig
JPL-M	00530-TSS mg/l	Summer	9.189655	8	26	2	5.4142661	5	13	58	21-May-97	14-Oct-19	0.000631	0.0129528	Increasing	sig
JPL-M	00530-TSS mg/l	POR	10.81553	10	27	2	5.9404687	6	14	103	30-Jan-97	30-Apr-20	0.000644	0.0009284	Increasing	sig
JPL-W	00530-TSS mg/l	Winter	9.2	8	31	0	5.742979904	6	10	45	1/31/1997	4/30/2020	0.000117	0.67058128	Increasing	
JPL-W	00530-TSS mg/l	Summer	7.357143	6	42	3	5.897391	4	8	56	21-May-97	14-Oct-19	0.000181	0.5311504	Increasing	
JPL-W	00530-TSS mg/l	POR	8.178218	7	42	0	5.8726417	5	10	101	31-Jan-97	30-Apr-20	0.000158	0.4260171	Increasing	

TSS in Mountain Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
MC-A	00530-TSS mg/l	Winter	67.77273	19.5	996	3	208.2077561	8	38	22	1/22/1997	4/28/2020	-0.02179	0.09896018	Decreasin	
MC-A	00530-TSS mg/l	Summer	54.16667	23	353	6	96.4608572	13.5	43	12	25-Jun-97	11-Sep-19	-0.00026	0.9755601	Decreasin	
MC-A	00530-TSS mg/l	POR	62.97059	22	996	3	175.3048402	9	38	34	22-Jan-97	28-Apr-20	-0.01368	0.1206051	Decreasin	
MC-B	00530-TSS mg/l	Winter	21.57143	23	39	9	10.39001352	10	28	7	11/12/2019	4/28/2020	0.01522	0.84710859	Increasing	
MC-B	00530-TSS mg/l	Summer	11	12	14	8	2.4494897	9	12	5	26-Jun-19	16-Oct-19	0.006012	0.8650735	Increasing	
MC-B	00530-TSS mg/l	POR	17.16667	13	39	8	9.5234957	9.5	23	12	26-Jun-19	28-Apr-20	0.04828	0.0762433	Increasing	
MC-C	00530-TSS mg/l	Winter	106.2162	56	936	0	168.9155172	32	89	37	1/22/1997	4/28/2020	0.00648	0.50983083	Increasing	
MC-C	00530-TSS mg/l	Summer	95.28	77	361	7	82.5345988	47	124	25	25-Jun-97	16-Oct-19	0.013178	0.0243589	Increasing	sig
MC-C	00530-TSS mg/l	POR	101.8065	64.5	936	0	139.814847	33	112	62	22-Jan-97	28-Apr-20	0.008765	0.1623877	Increasing	
MC-D	00530-TSS mg/l	Winter	47.44444	8	1230	0	203.4108361	3.5	17.5	36	1/28/1997	4/28/2020	-0.00502	0.67047957	Decreasin	
MC-D	00530-TSS mg/l	Summer	26.82353	14	177	2	41.8885952	8	15	17	24-Jun-97	20-Aug-19	0.002486	0.5927082	Increasing	
MC-D	00530-TSS mg/l	POR	40.83019	9	1230	0	168.7706382	6	17	53	28-Jan-97	28-Apr-20	-0.00366	0.6683098	Decreasin	
MC-E	00530-TSS mg/l	Winter	54.28571	18	299	3	108.4661457	3	33	7	11/12/2019	4/28/2020	1.063845	0.14866461	Increasing	
MC-E	00530-TSS mg/l	Summer	8.2	11	12	3	4.3243497	4	11	5	26-Jun-19	16-Oct-19	-0.05312	0.3580676	Decreasin	
MC-E	00530-TSS mg/l	POR	35.08333	11	299	3	83.5893189	3.5	18.5	12	26-Jun-19	28-Apr-20	0.394735	0.1018888	Increasing	

TSS in Walnut Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
WC-A	00530-TSS mg/l	Winter	6.4	5	11	3	3.847076812	3	10	5	1/22/2020	4/28/2020	0.039257	0.46655706	Increasing	
WC-A	00530-TSS mg/l	Summer	46.66667	20	115	5	59.6517672	5	115	3	24-Jun-19	19-Aug-19	-1.72227	0.4004627	Decreasin	
WC-A	00530-TSS mg/l	POR	21.5	7.5	115	3	38.2024681	4	15.5	8	24-Jun-19	28-Apr-20	-0.18109	0.1193789	Decreasin	
WC-B	00530-TSS mg/l	Winter	38.85714	18	166	10	56.38093227	13	28	7	11/19/2019	4/28/2020	0.520126	0.19534901	Increasing	
WC-B	00530-TSS mg/l	Summer	94.75	55	253	16	109.676418	21	168.5	4	24-Jun-19	9-Sep-19	-2.08117	0.3663771	Decreasin	
WC-B	00530-TSS mg/l	POR	59.18182	22	253	10	79.4428325	15	84	11	24-Jun-19	28-Apr-20	-0.19293	0.4308017	Decreasin	
WC-C	00530-TSS mg/l	Winter	31	22	97	5	32.16623488	6	41	7	11/19/2019	4/28/2020	0.438386	0.02388573	Increasing	sig
WC-C	00530-TSS mg/l	Summer	85.2	18	372	6	160.4655726	8	22	5	24-Jun-19	15-Oct-19	-2.50808	0.2074367	Decreasin	
WC-C	00530-TSS mg/l	POR	53.58333	20	372	5	103.4728408	7	37.5	12	24-Jun-19	28-Apr-20	-0.30879	0.3207626	Decreasin	
WC-D	00530-TSS mg/l	Winter	22.66667	12.5	110	6	28.98375357	7	16.5	24	1/22/1997	4/28/2020	-0.00012	0.95005363	Decreasin	
WC-D	00530-TSS mg/l	Summer	55.77273	35.5	438	6	94.758305	12	48	22	26-Jun-97	15-Oct-19	0.002669	0.712267	Increasing	
WC-D	00530-TSS mg/l	POR	38.5	16	438	6	69.9942061	10	41	46	22-Jan-97	28-Apr-20	0.001125	0.7454946	Increasing	

TDS in Joe Pool Lake



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
I-1	70300-TDS mg/l	POR	265.0909	267	283	249	12.119856	253	278	11	25-Jun-19	30-Apr-20	0.057897	0.107379	Increasing	
I-1	70300-TDS mg/l	Summer	258.75	258	270	249	9.215024	251.5	266	4	25-Jun-19	14-Oct-19	0.107094	0.4482152	Increasing	
I-1	70300-TDS mg/l	Winter	268.7143	270	283	251	12.65851868	253	279	7	11/14/2019	4/30/2020	0.05676	0.55182147	Increasing	
I-2	70300-TDS mg/l	POR	269.2727	272	304	235	20.6886003	255	280	11	25-Jun-19	30-Apr-20	0.052631	0.4172599	Increasing	
I-2	70300-TDS mg/l	Summer	269.5	271.5	280	255	10.4721854	263	276	4	25-Jun-19	14-Oct-19	-0.01294	0.9413391	Decreasin	
I-2	70300-TDS mg/l	Winter	269.1429	275	304	235	25.66079092	235	285	7	11/14/2019	4/30/2020	0.280819	0.10017589	Increasing	
JPL-D	70300-TDS mg/l	POR	302.023	303	692	148	44.610396	282	323	217	29-Jan-97	30-Apr-20	-0.00121	0.3677954	Decreasin	
JPL-D	70300-TDS mg/l	Summer	297.213	301	471	148	40.4250896	278	316	108	22-May-97	14-Oct-19	0.000375	0.8319076	Increasing	
JPL-D	70300-TDS mg/l	Winter	306.789	303	692	210	48.11503834	286	324	109	1/29/1997	4/30/2020	-0.00272	0.17479048	Decreasin	
JPL-M	70300-TDS mg/l	POR	304.4242	306	427	107	35.7950947	287	328	231	30-Jan-97	30-Apr-20	-0.00108	0.2981008	Decreasin	
JPL-M	70300-TDS mg/l	Summer	304.4261	306	427	242	32.3671538	281	327	115	21-May-97	14-Oct-19	-0.00072	0.5971287	Decreasin	
JPL-M	70300-TDS mg/l	Winter	304.4224	307	388	107	39.03914443	291.5	331	116	1/30/1997	4/30/2020	-0.00139	0.37091873	Decreasin	
JPL-W	70300-TDS mg/l	POR	300.6943	301	426	222	31.31564	278	323	229	31-Jan-97	30-Apr-20	-0.00199	0.02748	Decreasin	sig
JPL-W	70300-TDS mg/l	Summer	302.708	304	394	240	30.9483098	278	324	113	21-May-97	14-Oct-19	-0.00269	0.0378338	Decreasin	sig
JPL-W	70300-TDS mg/l	Winter	298.7328	299	426	222	31.67974466	278.5	321	116	1/31/1997	4/30/2020	-0.00136	0.28156028	Decreasin	

TDS in Mountain Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
MC-A	70300-TDS mg/l	POR	657.1032	614.5	2260	254	283.7865629	452	816	126	22-Jan-97	28-Apr-20	-0.01116	0.2988087	Decreasin	
MC-A	70300-TDS mg/l	Summer	610.7838	593	1331	296	206.2819181	445	720	37	25-Jun-97	20-Aug-19	-0.01192	0.3840698	Decreasin	
MC-A	70300-TDS mg/l	Winter	676.3596	628	2260	254	309.3722841	452	868	89	1/22/1997	4/28/2020	-0.01149	0.42456143	Decreasin	
MC-B	70300-TDS mg/l	POR	596.7273	617	1112	269	279.688073	349	729	11	26-Jun-19	28-Apr-20	0.912985	0.2950299	Increasing	
MC-B	70300-TDS mg/l	Summer	608.25	717.5	729	269	226.2408378	492	724.5	4	26-Jun-19	16-Oct-19	3.289773	0.3053333	Increasing	
MC-B	70300-TDS mg/l	Winter	590.1429	431	1112	295	323.4874694	349	958	7	11/12/2019	4/28/2020	3.905747	0.05450445	Increasing	
MC-C	70300-TDS mg/l	POR	666.7049	642	1221	300	190.0136262	559	748	61	22-Jan-97	28-Apr-20	-0.00456	0.5991888	Decreasin	
MC-C	70300-TDS mg/l	Summer	652.8	631	1136	348	174.0509983	538	721	25	25-Jun-97	16-Oct-19	-0.02161	0.0877717	Decreasin	
MC-C	70300-TDS mg/l	Winter	676.3611	663	1221	300	202.207129	567.5	753	36	1/22/1997	4/28/2020	0.007063	0.55641362	Increasing	
MC-D	70300-TDS mg/l	POR	487.0182	468	694	285	90.6641117	435	536	55	28-Jan-97	28-Apr-20	0.009581	0.0286407	Increasing	sig
MC-D	70300-TDS mg/l	Summer	455.1667	452	632	285	78.8656714	434	494	18	24-Jun-97	20-Aug-19	-0.00141	0.8680271	Decreasin	
MC-D	70300-TDS mg/l	Winter	502.5135	492	694	352	92.94521135	442	548	37	1/28/1997	4/28/2020	0.014517	0.00374358	Increasing	sig
MC-E	70300-TDS mg/l	POR	648.0909	645	1095	366	238.8231373	430	751	11	26-Jun-19	28-Apr-20	-1.21568	0.0846995	Decreasin	
MC-E	70300-TDS mg/l	Summer	802.75	843	1095	430	308.8013115	551	1054.5	4	26-Jun-19	16-Oct-19	1.035491	0.8393115	Increasing	
MC-E	70300-TDS mg/l	Winter	559.7143	602	751	366	149.4096319	423	692	7	11/12/2019	4/28/2020	-1.43752	0.1586785	Decreasin	

TDS in Walnut Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
WC-A	70300-TDS mg/l	POR	582.75	564.5	1044	258	285.9249402	335	780.5	8	24-Jun-19	28-Apr-20	-0.38238	0.6909079	Decreasin	
WC-A	70300-TDS mg/l	Summer	712	834	1044	258	406.9545429	258	1044	3	24-Jun-19	19-Aug-19	14.10752	0.1540721	Increasing	
WC-A	70300-TDS mg/l	Winter	505.2	416	727	299	200.5372783	371	713	5	1/22/2020	4/28/2020	3.602378	0.13423601	Increasing	
WC-B	70300-TDS mg/l	POR	460.7	429	713	268	175.08985	305	626	10	24-Jun-19	28-Apr-20	0.196234	0.7318472	Increasing	
WC-B	70300-TDS mg/l	Summer	519.6667	626	654	279	208.8931146	279	654	3	24-Jun-19	19-Aug-19	6.761369	0.2775101	Increasing	
WC-B	70300-TDS mg/l	Winter	435.4286	354	713	268	170.1635068	305	593	7	11/19/2019	4/28/2020	2.175248	0.04290712	Increasing	sig
WC-C	70300-TDS mg/l	POR	509.4545	493	729	267	125.05228	452	564	11	24-Jun-19	28-Apr-20	0.064283	0.8725265	Increasing	
WC-C	70300-TDS mg/l	Summer	507	516	729	267	191.1700813	373.5	640.5	4	24-Jun-19	15-Oct-19	0.85054	0.7859327	Increasing	
WC-C	70300-TDS mg/l	Winter	510.8571	493	652	380	88.2277896	452	564	7	11/19/2019	4/28/2020	-0.01672	0.98064654	Decreasin	
WC-D	70300-TDS mg/l	POR	691.0726	691	1878	180	284.6820823	464	870	179	22-Jan-97	28-Apr-20	-0.02852	0.0024037	Decreasin	sig
WC-D	70300-TDS mg/l	Summer	733.5823	715	1878	237	331.7210601	492	962	79	26-Jun-97	15-Oct-19	-0.05057	0.001755	Decreasin	sig
WC-D	70300-TDS mg/l	Winter	657.49	680.5	1124	180	237.5643026	457	818.5	100	1/22/1997	4/28/2020	-0.0108	0.31240865	Decreasin	

Conductivity in Joe Pool Lake



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
I-1	00094-Conducti	Winter	446.4333	446	557	373.1	50.95125698	421	458	18	11/11/2013	4/30/2020	-0.01678	0.24988215	Decreasin	
I-1	00094-Conducti	Summer	463.58	479	567.7	389	42.4975245	429	479	30	18-Sep-12	14-Oct-19	-0.02596	0.0002764	Decreasin	sig
I-1	00094-Conducti	POR	457.15	453.5	567.7	373.1	46.0839336	425.5	479	48	18-Sep-12	30-Apr-20	-0.02236	0.0002114	Decreasin	sig
I-2	00094-Conducti	Winter	464.3889	457	554	423	36.36600213	450	467	9	4/29/2014	4/30/2020	-0.03723	0.01667233	Decreasin	sig
I-2	00094-Conducti	Summer	461.9857	477	566	403	37.510589	434	478	21	18-Sep-12	14-Oct-19	-0.02019	0.0049833	Decreasin	sig
I-2	00094-Conducti	POR	462.7067	462.35	566	403	36.5575402	437	478	30	18-Sep-12	30-Apr-20	-0.01606	0.0039469	Decreasin	sig
JPL-D	00094-Conducti	Winter	462.2964	474	805	96	122.9291045	439	509	1039	1/29/1997	4/30/2020	0.020785	2.2406E-24	Increasing	sig
JPL-D	00094-Conducti	Summer	500.7345	489	6700	40	218.9223299	442	540	1107	22-May-97	14-Oct-19	0.012644	0.0007754	Increasing	sig
JPL-D	00094-Conducti	POR	482.1245	485	6700	40	179.9830686	440	529	2146	29-Jan-97	30-Apr-20	0.017217	0	Increasing	sig
JPL-M	00094-Conducti	Winter	466.346	472	1116	46.4	143.5435451	398.5	517	552	1/30/1997	4/30/2020	0.025241	1.0583E-16	Increasing	sig
JPL-M	00094-Conducti	Summer	493.314	489	870	40	124.8017188	442	537	579	21-May-97	14-Oct-19	0.01222	0.0000071	Increasing	sig
JPL-M	00094-Conducti	POR	480.1519	482	1116	40	134.8921459	432	527	1131	30-Jan-97	30-Apr-20	0.018727	0	Increasing	sig
JPL-W	00094-Conducti	Winter	465.507	468	1176	101	135.3753986	408	512	543	1/31/1997	4/30/2020	0.0225	1.3414E-14	Increasing	sig
JPL-W	00094-Conducti	Summer	491.7266	486	867	40	114.0439573	440.5	530	572	21-May-97	14-Oct-19	0.009313	0.0001903	Increasing	sig
JPL-W	00094-Conducti	POR	478.9578	479	1176	40	125.5183278	429	520	1115	31-Jan-97	30-Apr-20	0.015976	0	Increasing	sig

Conductivity in Mountain Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
MC-A	00094-Conducti	Winter	753.6891	729.5	1721	55	365.2337663	508	994	92	1/22/1997	4/28/2020	0.038744	0.01168903	Increasing	sig
MC-A	00094-Conducti	Summer	726.6735	767	1707	105	379.7658482	428	1032	49	22-May-97	11-Sep-19	-0.01147	0.5987511	Decreasin	
MC-A	00094-Conducti	POR	744.3007	736	1721	55	369.2173596	504	1022	141	22-Jan-97	28-Apr-20	0.020905	0.0948458	Increasing	
MC-B	00094-Conducti	Winter	862.2857	670	1500	528	393.7701166	533	1290	7	11/12/2019	4/28/2020	4.648662	0.06318606	Increasing	
MC-B	00094-Conducti	Summer	922.8	1030	1050	464	256.6109896	1030	1040	5	26-Jun-19	16-Oct-19	4.268209	0.1706146	Increasing	
MC-B	00094-Conducti	POR	887.5	981.5	1500	464	330.8950671	557.5	1045	12	26-Jun-19	28-Apr-20	0.891561	0.3749633	Increasing	
MC-C	00094-Conducti	Winter	906.3833	951	2338	84	402.8656526	674.5	1144	72	1/22/1997	4/28/2020	0.032296	0.0666594	Increasing	
MC-C	00094-Conducti	Summer	955.6854	991.5	1859	112	378.1657539	779.5	1138.5	48	22-May-97	16-Oct-19	-0.00188	0.9235607	Decreasin	
MC-C	00094-Conducti	POR	926.1042	969.5	2338	84	392.3083486	725.5	1144	120	22-Jan-97	28-Apr-20	0.017981	0.1688394	Increasing	
MC-D	00094-Conducti	Winter	797.8543	720.5	6160	60.9	674.1310316	630	841	70	1/28/1997	4/28/2020	0.081263	0.00609079	Increasing	sig
MC-D	00094-Conducti	Summer	641.4205	690	877	119	152.7831886	538	739	39	23-May-97	20-Aug-19	0.014072	0.1633836	Increasing	
MC-D	00094-Conducti	POR	741.8826	709	6160	60.9	551.573222	608	777	109	28-Jan-97	28-Apr-20	0.057817	0.0039849	Increasing	sig
MC-E	00094-Conducti	Winter	831.2857	918	1070	557	200.9143385	617	1020	7	11/12/2019	4/28/2020	-2.1402	0.10751197	Decreasin	
MC-E	00094-Conducti	Summer	1172.2	1300	1540	649	353.9070499	992	1380	5	26-Jun-19	16-Oct-19	2.045713	0.6856849	Increasing	
MC-E	00094-Conducti	POR	973.3333	956	1540	557	313.6562488	683	1185	12	26-Jun-19	28-Apr-20	-1.72952	0.0490841	Decreasin	sig

Conductivity in Walnut Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
WC-A	00094-Conducti	Winter	817.4	698	1100	579	257.0171201	620	1090	5	1/22/2020	4/28/2020	4.892565	0.09836178	Increasing	
WC-A	00094-Conducti	Summer	1029	1240	1500	347	604.7668972	347	1500	3	24-Jun-19	19-Aug-19	20.71504	0.1822848	Increasing	
WC-A	00094-Conducti	POR	896.75	894	1500	347	392.732097	599.5	1170	8	24-Jun-19	28-Apr-20	-0.22341	0.8664781	Decreasin	
WC-B	00094-Conducti	Winter	688.1429	576	1050	478	232.8729472	483	912	7	11/19/2019	4/28/2020	2.716864	0.07828918	Increasing	
WC-B	00094-Conducti	Summer	817.5	969	991	341	318.1388586	646.5	988.5	4	24-Jun-19	9-Sep-19	7.421226	0.2210737	Increasing	
WC-B	00094-Conducti	POR	735.1818	807	1050	341	259.154324	483	986	11	24-Jun-19	28-Apr-20	0.173401	0.8310071	Increasing	
WC-C	00094-Conducti	Winter	787.8571	785	968	533	146.9846121	690	916	7	11/19/2019	4/28/2020	-0.08443	0.94135694	Decreasin	
WC-C	00094-Conducti	Summer	751.4	700	1140	338	296.2259273	681	898	5	24-Jun-19	15-Oct-19	1.092715	0.7968264	Increasing	
WC-C	00094-Conducti	POR	772.6667	773	1140	338	209.8706672	685.5	907	12	24-Jun-19	28-Apr-20	0.208399	0.7468324	Increasing	
WC-D	00094-Conducti	Winter	813.3232	809	1693	105.1	358.5655076	532	1121	99	1/22/1997	4/28/2020	0.037932	0.01006548	Increasing	sig
WC-D	00094-Conducti	Summer	792.8093	755	1742	100	391.7618782	500	1025	97	21-May-97	15-Oct-19	0.013846	0.4310345	Increasing	
WC-D	00094-Conducti	POR	803.1709	774.5	1742	100	374.5371808	527	1071	196	22-Jan-97	28-Apr-20	0.026653	0.0187467	Increasing	sig

DO in Joe Pool Lake



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
I-1	00300-DO mg/l	POR	8.243958	8.4	11.73	5.62	1.6742744	6.39	9.2	48	18-Sep-12	30-Apr-20	0.000954	0.0000068	Increasing	sig
I-1	00300-DO mg/l	Summer	7.23	6.84	8.95	5.62	1.050504	6.3	8.35	30	18-Sep-12	14-Oct-19	0.000729	0.0000153	Increasing	sig
I-1	00300-DO mg/l	Winter	9.933889	10.015	11.73	8.49	1.014542139	8.88	10.82	18	11/11/2013	4/30/2020	6.79E-07	0.9981738	Increasing	
I-2	00300-DO mg/l	POR	8.604333	8.285	10.9	6.38	1.1754902	8.1	9.2	30	18-Sep-12	30-Apr-20	0.000449	0.0140163	Increasing	sig
I-2	00300-DO mg/l	Summer	8.054286	8.18	9.8	6.38	0.7865785	7.67	8.29	21	18-Sep-12	14-Oct-19	-3.9E-05	0.8140096	Decreasin	
I-2	00300-DO mg/l	Winter	9.887778	10.3	10.9	8.55	0.902687346	9.14	10.6	9	4/29/2014	4/30/2020	0.000766	0.06753259	Increasing	
JPL-D	00300-DO mg/l	POR	7.183618	7.65	16.49	-0.07	3.0734375	5.47	9.19	2082	29-Jan-97	30-Apr-20	0.000182	0.0000012	Increasing	sig
JPL-D	00300-DO mg/l	Summer	5.731002	6.44	14.77	-0.07	2.7580698	3.77	7.75	1068	22-May-97	14-Oct-19	0.000262	0.0000001	Increasing	sig
JPL-D	00300-DO mg/l	Winter	8.713592	9.07	16.49	1.28	2.612404535	7.33	10.26	1014	1/29/1997	4/30/2020	0.000223	5.1647E-07	Increasing	sig
JPL-M	00300-DO mg/l	POR	7.514519	7.74	16.3	0	3.0625956	5.77	9.6	1091	30-Jan-97	30-Apr-20	0.000197	0.0000425	Increasing	sig
JPL-M	00300-DO mg/l	Summer	6.488543	6.785	16.3	0.33	2.7723503	5	8.1	556	21-May-97	14-Oct-19	0.000121	0.0532334	Increasing	
JPL-M	00300-DO mg/l	Winter	8.580766	9.15	15.32	0	2.987008194	6.56	10.44	535	1/30/1997	4/30/2020	0.000286	1.1659E-05	Increasing	sig
JPL-W	00300-DO mg/l	POR	7.986321	8.04	15.46	0.14	2.6354521	6.54	9.75	1090	31-Jan-97	30-Apr-20	0.000143	0.0005192	Increasing	sig
JPL-W	00300-DO mg/l	Summer	7.018112	7.34	14.98	0.14	2.1649199	6.01	8.2	556	21-May-97	14-Oct-19	3.05E-05	0.5282356	Increasing	
JPL-W	00300-DO mg/l	Winter	8.994419	9.525	15.46	1.26	2.704542205	7.89	10.56	534	1/31/1997	4/30/2020	0.000276	3.1304E-06	Increasing	sig

DO in Mountain Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
MC-A	00300-DO mg/l	POR	8.369143	7.57	105.3	0.73	8.8740235	5.55	9.64	140	22-Jan-97	28-Apr-20	0.00023	0.446711	Increasing	
MC-A	00300-DO mg/l	Summer	6.173674	6.15	16.2	2.3	2.2199284	5.23	6.98	49	22-May-97	11-Sep-19	-1.2E-05	0.9279015	Decreasin	
MC-A	00300-DO mg/l	Winter	9.551319	8.62	105.3	0.73	10.72178698	6.64	10.64	91	1/22/1997	4/28/2020	0.000297	0.51762625	Increasing	
MC-B	00300-DO mg/l	POR	6.125	5.55	8.4	4.5	1.4802488	4.85	7.55	12	26-Jun-19	28-Apr-20	0.011545	0.0012222	Increasing	sig
MC-B	00300-DO mg/l	Summer	5.06	5.1	5.7	4.5	0.5128353	4.6	5.4	5	26-Jun-19	16-Oct-19	0.007586	0.2449403	Increasing	
MC-B	00300-DO mg/l	Winter	6.885714	6.9	8.4	4.6	1.490445763	5.4	8.2	7	11/12/2019	4/28/2020	0.017355	0.06874657	Increasing	
MC-C	00300-DO mg/l	POR	9.283613	8.09	103.3	0.85	9.3584481	6.5	10.49	119	22-Jan-97	28-Apr-20	0.000139	0.6553095	Increasing	
MC-C	00300-DO mg/l	Summer	6.902449	7.04	16.59	2.63	2.2660902	5.76	7.72	49	22-May-97	16-Oct-19	-4.8E-05	0.6742025	Decreasin	
MC-C	00300-DO mg/l	Winter	10.95043	9.8	103.3	0.85	11.80500427	7.93	11.5	70	1/22/1997	4/28/2020	0.000322	0.54082881	Increasing	
MC-D	00300-DO mg/l	POR	9.584537	8.97	90.6	0.82	8.5278468	7.025	10.725	108	28-Jan-97	28-Apr-20	0.000315	0.3223049	Increasing	
MC-D	00300-DO mg/l	Summer	9.529231	7.65	90.6	2.5	13.4962108	6.15	8.88	39	23-May-97	20-Aug-19	0.000595	0.5092998	Increasing	
MC-D	00300-DO mg/l	Winter	9.615797	9.69	20.63	0.82	3.555622476	8.4	11.4	69	1/28/1997	4/28/2020	0.000185	0.25004296	Increasing	
MC-E	00300-DO mg/l	POR	8.35	8.35	10.9	4.6	1.8564384	7.1	10.1	12	26-Jun-19	28-Apr-20	0.009814	0.0616242	Increasing	
MC-E	00300-DO mg/l	Summer	7.18	7.2	8.7	4.6	1.6192591	7	8.4	5	26-Jun-19	16-Oct-19	0.022706	0.27947	Increasing	
MC-E	00300-DO mg/l	Winter	9.185714	9.8	10.9	6.7	1.617022543	7.7	10.5	7	11/12/2019	4/28/2020	-0.00059	0.96177727	Decreasin	

DO in Walnut Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
WC-A	00300-DO mg/l	POR	7.6625	8.1	10.7	4.6	2.1125053	5.8	9.1	8	24-Jun-19	28-Apr-20	0.008514	0.2005327	Increasing	
WC-A	00300-DO mg/l	Summer	5.9	5.7	7.4	4.6	1.4106736	4.6	7.4	3	24-Jun-19	19-Aug-19	-0.05011	0.0652381	Decreasin	
WC-A	00300-DO mg/l	Winter	8.72	8.8	10.7	5.9	1.756986056	8.8	9.4	5	1/22/2020	4/28/2020	-0.02951	0.17687925	Decreasin	
WC-B	00300-DO mg/l	POR	6.381818	6.4	9.4	2.7	2.3323028	4.3	8.6	11	24-Jun-19	28-Apr-20	0.011224	0.0970381	Increasing	
WC-B	00300-DO mg/l	Summer	5.05	4.35	7.3	4.2	1.5022206	4.25	5.85	4	24-Jun-19	9-Sep-19	-0.03695	0.1786541	Decreasin	
WC-B	00300-DO mg/l	Winter	7.142857	8.6	9.4	2.7	2.465669039	5.3	9	7	11/19/2019	4/28/2020	0.020079	0.2638025	Increasing	
WC-C	00300-DO mg/l	POR	6.854546	7	12.8	0.5	3.4955296	5	9.6	11	24-Jun-19	28-Apr-20	0.009414	0.3906924	Increasing	
WC-C	00300-DO mg/l	Summer	6.8	6	12.8	2.4	4.4211612	3.7	9.9	4	24-Jun-19	15-Oct-19	0.054629	0.4054831	Increasing	
WC-C	00300-DO mg/l	Winter	6.885714	7.5	9.8	0.5	3.253935346	5.2	9.6	7	11/19/2019	4/28/2020	0.030203	0.19253822	Increasing	
WC-D	00300-DO mg/l	POR	7.768573	6.88	94.8	0	6.9671901	5.665	9.095	192	22-Jan-97	28-Apr-20	0.000298	0.1644127	Increasing	
WC-D	00300-DO mg/l	Summer	6.172146	5.95	13.33	1.356	1.836665	5.34	6.88	96	21-May-97	15-Oct-19	2.42E-05	0.7702166	Increasing	
WC-D	00300-DO mg/l	Winter	9.365	8.875	94.8	0	9.437705676	6.88	10.705	96	1/22/1997	4/28/2020	0.000546	0.17345315	Increasing	

pH in Joe Pool Lake



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
I-1	00400-PH	POR	8.010208	8.205	8.6	6.07	0.4686808	7.865	8.265	48	18-Sep-12	30-Apr-20	-0.00012	0.059896	Decreasin	
I-1	00400-PH	Summer	8.173667	8.24	8.6	7.57	0.2266622	8.11	8.29	30	18-Sep-12	14-Oct-19	-4.9E-05	0.2456892	Decreasin	
I-1	00400-PH	Winter	7.737778	7.915	8.4	6.07	0.627633797	7.54	8.2	18	11/11/2013	4/30/2020	-3E-05	0.87116579	Decreasin	
I-2	00400-PH	POR	8.250667	8.235	8.7	7.6	0.3530159	7.9	8.67	30	18-Sep-12	30-Apr-20	-0.0002	0.0000533	Decreasin	sig
I-2	00400-PH	Summer	8.329524	8.4	8.7	7.8	0.3646022	7.9	8.68	21	18-Sep-12	14-Oct-19	-0.00023	0.000708	Decreasin	sig
I-2	00400-PH	Winter	8.066667	8.2	8.3	7.6	0.254950976	8	8.2	9	4/29/2014	4/30/2020	-8.4E-05	0.52496553	Decreasin	
JPL-D	00400-PH	POR	7.968751	8.06	9.8	5.94	0.4036855	7.78	8.21	2154	29-Jan-97	30-Apr-20	7.5E-06	0.120674	Increasing	
JPL-D	00400-PH	Summer	7.909828	8	9.8	6.03	0.4406379	7.61	8.22	1107	22-May-97	14-Oct-19	3.79E-05	0.0000005	Increasing	sig
JPL-D	00400-PH	Winter	8.031051	8.09	9.43	5.94	0.350098654	7.92	8.2	1047	1/29/1997	4/30/2020	-1.8E-05	0.00273762	Decreasin	sig
JPL-M	00400-PH	POR	8.035613	8.08	10.01	5.16	0.4116565	7.83	8.26	1126	30-Jan-97	30-Apr-20	-9.8E-06	0.1239728	Decreasin	
JPL-M	00400-PH	Summer	8.002418	8.03	9.96	6.62	0.4003481	7.77	8.27	579	21-May-97	14-Oct-19	1.46E-05	0.0973494	Increasing	
JPL-M	00400-PH	Winter	8.07075	8.11	10.01	5.16	0.420816825	7.89	8.26	547	1/30/1997	4/30/2020	-3.4E-05	0.00019415	Decreasin	sig
JPL-W	00400-PH	POR	8.114924	8.14	10.54	5.96	0.3738336	7.93	8.3	1117	31-Jan-97	30-Apr-20	-9.6E-06	0.0996331	Decreasin	
JPL-W	00400-PH	Summer	8.101084	8.11	10.54	6.01	0.3929299	7.89	8.305	572	21-May-97	14-Oct-19	-6.5E-06	0.4557081	Decreasin	
JPL-W	00400-PH	Winter	8.12945	8.18	9.97	5.96	0.352457848	7.97	8.3	545	1/31/1997	4/30/2020	-1.3E-05	0.10632872	Decreasin	

pH in Mountain Creek



Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
MC-A	00400-PH	POR	7.69078	7.68	8.8	6.97	0.3174926	7.5	7.9	141	22-Jan-97	28-Apr-20	-3.8E-05	0.0002781	Decreasin	sig
MC-A	00400-PH	Summer	7.686735	7.6	8.8	7	0.3198788	7.49	7.84	49	22-May-97	11-Sep-19	-4.7E-05	0.0078717	Decreasin	sig
MC-A	00400-PH	Winter	7.692935	7.68	8.61	6.97	0.317952025	7.5	7.9	92	1/22/1997	4/28/2020	-3.4E-05	0.01120076	Decreasin	sig
MC-B	00400-PH	POR	7.225	7.25	7.8	6.6	0.3768892	6.95	7.55	12	26-Jun-19	28-Apr-20	0.00122	0.2818125	Increasing	
MC-B	00400-PH	Summer	7.24	7.4	7.6	6.6	0.4037326	7.1	7.5	5	26-Jun-19	16-Oct-19	0.004118	0.4570776	Increasing	
MC-B	00400-PH	Winter	7.214286	7.2	7.8	6.7	0.389138242	6.9	7.6	7	11/12/2019	4/28/2020	0.005646	0.00637218	Increasing	sig
MC-C	00400-PH	POR	7.909174	7.89	9.2	5.78	0.4240059	7.72	8.1	121	22-Jan-97	28-Apr-20	2.7E-06	0.848148	Increasing	
MC-C	00400-PH	Summer	7.875306	7.86	8.87	6.49	0.4048102	7.66	8.1	49	22-May-97	16-Oct-19	1.8E-06	0.9304505	Increasing	
MC-C	00400-PH	Winter	7.932222	7.9	9.2	5.78	0.437879726	7.735	8.155	72	1/22/1997	4/28/2020	3.98E-06	0.83726958	Increasing	
MC-D	00400-PH	POR	7.860056	7.84	9.69	6.9	0.408312	7.67	8.045	108	28-Jan-97	28-Apr-20	-2.4E-05	0.1111177	Decreasin	
MC-D	00400-PH	Summer	7.857447	7.825	9.69	6.9	0.4765717	7.6	8.02	38	23-May-97	20-Aug-19	2.32E-05	0.4677064	Increasing	
MC-D	00400-PH	Winter	7.861471	7.86	9.66	6.91	0.369783279	7.67	8.05	70	1/28/1997	4/28/2020	-4.6E-05	0.00473934	Decreasin	sig
MC-E	00400-PH	POR	7.3	7.2	7.8	6.9	0.3104249	7.05	7.6	12	26-Jun-19	28-Apr-20	0.001507	0.0913174	Increasing	
MC-E	00400-PH	Summer	7.14	7.1	7.6	6.9	0.2701851	7	7.1	5	26-Jun-19	16-Oct-19	-0.00291	0.4307403	Decreasin	
MC-E	00400-PH	Winter	7.414286	7.4	7.8	7	0.302371578	7.1	7.7	7	11/12/2019	4/28/2020	0.002737	0.19128533	Increasing	

pH in Walnut Creek



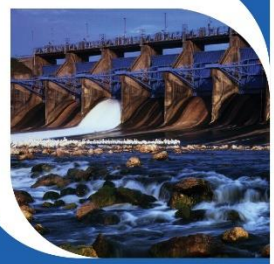
Site ID	Storet_Desc	Season	MEAN	MEDIAN	MAXIMUM	MINIMUM	STANDARD_DEVIATION	PERCENTILE_25TH	PERCENTILE_75TH	NUMBER_OF_DATA	START_DATE	END_DATE	SLOPE	P_VALUE	Trend	Test
WC-A	00400-PH	POR	7.4375	7.45	8	6.8	0.410357	7.15	7.75	8	24-Jun-19	28-Apr-20	0.001752	0.1707849	Increasing	
WC-A	00400-PH	Summer	7.2	7.3	7.5	6.8	0.3605551	6.8	7.5	3	24-Jun-19	19-Aug-19	-0.01243	0.167546	Decreasin	
WC-A	00400-PH	Winter	7.58	7.6	8	7	0.402492236	7.4	7.9	5	1/22/2020	4/28/2020	0.006532	0.19871563	Increasing	
WC-B	00400-PH	POR	7.181818	7.4	7.8	6.1	0.6013621	6.5	7.7	11	24-Jun-19	28-Apr-20	0.002442	0.1721091	Increasing	
WC-B	00400-PH	Summer	7.125	7.4	7.6	6.1	0.6946222	6.7	7.55	4	24-Jun-19	9-Sep-19	0.018102	0.1298246	Increasing	
WC-B	00400-PH	Winter	7.214286	7.4	7.8	6.5	0.598410593	6.5	7.8	7	11/19/2019	4/28/2020	0.00858	0.01226349	Increasing	sig
WC-C	00400-PH	POR	7.358333	7.35	7.7	6.9	0.2574643	7.2	7.55	12	24-Jun-19	28-Apr-20	0.000796	0.3025205	Increasing	
WC-C	00400-PH	Summer	7.34	7.3	7.5	7.2	0.1140175	7.3	7.4	5	24-Jun-19	15-Oct-19	-0.00257	0.0036159	Decreasin	sig
WC-C	00400-PH	Winter	7.371429	7.5	7.7	6.9	0.335232684	7	7.7	7	11/19/2019	4/28/2020	0.004598	0.02227717	Increasing	sig
WC-D	00400-PH	POR	7.540615	7.52	10.15	6.25	0.4868367	7.3	7.72	195	22-Jan-97	28-Apr-20	-4.6E-05	0.001858	Decreasin	sig
WC-D	00400-PH	Summer	7.547708	7.49	10.15	6.47	0.5148111	7.295	7.73	96	21-May-97	15-Oct-19	-4.8E-05	0.0353518	Decreasin	sig
WC-D	00400-PH	Winter	7.533737	7.55	9.46	6.25	0.460617567	7.34	7.72	99	1/22/1997	4/28/2020	-4.4E-05	0.02180189	Decreasin	sig

Summary

- Stakeholders will help to prioritize the pollutant sources based on the results of the modeling of the subwatersheds
- Pet waste, SSO's, Livestock, OSSF's, Feral Hogs, WWTFs and Wildlife sources of pollutants will be identified through the modeling efforts and stakeholder input
- Illegal dumping/refuse accumulation and yard waste concerns will be identified via stakeholder input



Kick-off Stakeholder Meeting





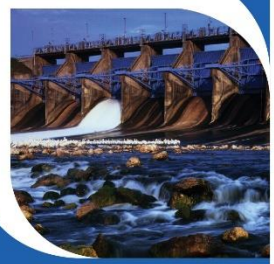


Kick-off Stakeholder Meeting

- Were you able to send out stakeholder meeting announcement?
  - Any suggestions on other outlets to publish?
- So far – 10 in-person registrants
  - Google-sheet will be sent out day of meeting for all virtual attendees to sign-in
- Kick-off Meeting will be composed of:
  - Water Quality in Joe Pool Lake
  - Watershed Protection Planning
  - Joe Pool Lake Watershed Partnership
  - Next Steps



Next Steps







Update

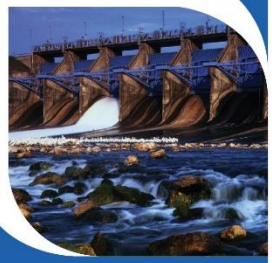
- Phase I will be completed once Final Report and Final Data Collection Report have been submitted ~ Dec 20/Jan 21
- Phase II – Modeling, Stakeholder meetings, WPP development
  - submitted 1st round of updates for Modeling QAPP back to state in Sep
  - TWS workshop had 34 attendees



Questions?

http://www.trinityra.org/joepoollakewpp

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Trinity River Authority
firnha@trinityra.org
817-467-4343







EPA United States Environmental Protection Agency

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

JOE POOL LAKE WATERSHED PROTECTION

Appendix H: Water Quality Monitoring Assessment Requirements

Trinity River Authority of Texas
Desktop Readiness Review

Title of Project:

Joe Pool Lake Watershed Protection Plan (WPP) Phase I – Watershed Characterization and Stakeholder Coordination

Funding Agency and Contract Number:

TCEQ Project No. 582-19-90205

Date of Review:

5/17/19

Participants:

Angela Kilpatrick (Data Manager, QAO), Aaron Hoff (Project Manager, Field Supervisor), Kelly McKnight (Field Operations), Addison Stucky (Field Operations)

1.0 Scope and Purpose

The scope of this desktop readiness review will serve to ensure that all field staff are familiar with the quality documentation related to this project, specifically sections related to field sampling procedures.

This document will ensure that field staff:

- Are aware of and understand the procedures outlined in the project's quality assurance project plan (QAPP);
- Understand that many of the requirements in the QAPP are based on those outlined in TCEQ's Surface Water Quality Monitoring (SWQM) Procedures Manual ;
- Acknowledge that internally-developed SOPs are to be followed when no procedures for a specific parameter are outlined in the SWQM Procedures Manual; and
- Are able to recall and locate specific sections of these documents if they have questions about collection/preservation procedures for a specific parameter.

2.0 Document Review

2.1 Overview

The TRA Quality Assurance Officer (QAO), in cooperation with the TRA Project Manager (PM), discussed the project's QAPP with field staff, highlighting the list of collected parameters, as well as the locations of procedures related to the collection (and preservation, where applicable) for each parameter.

2.2 Field Parameters

Topics covered:

- Reviewed procedure for recording Secchi disc transparency and procedure modifications when using a Secchi tube.
- Discussed difference between parameters taken at disconnected pools during dry conditions vs. 'backwater' pools at stations near lake that may occur during high-flow conditions, and the value of recording lake gage

height to track when/how often 'backwater' conditions occur. This information will help inform procedures for future sampling done under the "high flow," flow-biased regime.

2.3 Flow Parameters

Topics covered:

- 'Backwater' conditions discussion from previous section was also discussed for flow measurement. Important in the context of staff safety, and whether or not flow can be measured with a wading rod, or will have to be measured via the Riversurveyor acoustic Doppler setup.

2.4 Bacteriological Parameters

Topics covered:

- Reviewed collection location, holding time, and preservation procedures.

2.5 Conventional Parameters

- Reviewed list of collected parameters.
  - TSS, VSS, TDS
  - Nitrate, Nitrite, TKN
  - Total phosphorus, Orthophosphate-phosphorus
  - Chlorophyll-a
- Discussed collection location, holding time, and preservation procedures.

3.0 Summary and Approval

The TRA QAO and PM agree that the field staff demonstrated sufficient familiarity with the quality documentation. The QAO and PM also agree that field staff have performed the above sampling procedures with enough regularity and diligence to understand the importance of following these procedures properly.

3.1 Trinity River Authority

5/17/19

Angela Kilpatrick — Date
Data Manager & QA Officer

5/17/19

Aaron Hoff — Date
Project Manager & Field Supervisor

5/17/19

Kelly McKnight — Date
Environmental Scientist

5/17/19

Addison Stucky — Date
Environmental Scientist

3.2 Texas Commission on Environmental Quality

_____

Jessica Johnstone — Date
NPS Project Manager

Trinity River Authority of Texas
Internal Monitoring Systems Audit

Title of Project:

Joe Pool Lake Watershed Protection Plan (WPP) Phase I – Watershed Characterization and Stakeholder Coordination

Funding Agency and Contract Number:

TCEQ Project No. 582-19-90205

Audit Date:

6/24/19 – 6/26/19

Participants:

Angela Kilpatrick (Data Manager, QAO), Aaron Hoff (Project Manager, Field Supervisor), Kelly McKnight (Field Operations), Addison Stucky (Field Operations)

Definitions:

Quality Audit - Systematic and independent examination to determine whether quality activities and related results comply with planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve objectives.

Audit Finding - A conclusion of importance based on observation(s). An undesirable deviation or nonconformity.

Corrective Action - Action taken to eliminate the root cause(s) and the symptom(s) of an existing undesirable deviation or nonconformity to prevent recurrence.

Objective Evidence - Verifiable qualitative or quantitative observations, information, records, or statements of fact pertaining to the quality of a product or service or to the existence and implementation of quality system element.

1.0 Scope and Purpose

The scope of his quality audit will cover components of TRA's monitoring systems and data management activities. This includes checklist items for quality control procedures, the work environment, analytical activities, and reporting requirements.

This document will:

- Ensure that procedures outlined in the project's quality assurance project plan (QAPP) are followed by all staff;
- Determine proper data quality control procedures and observe their effectiveness;
- Identify deficiencies with current procedures and implement changes required for correction; and
- Document all deficiencies for disclosure in the project's corrective action process.

2.0 Standard Operating Procedures

2.1 Overview

The TRA Quality Assurance Officer (QAO), in cooperation with the TRA Project Manager (PM), will act as the auditor. The auditor will be responsible for monitoring activities related to:

Field Operations

- Sample collection/storage/shipment
- Testing procedures
- Instrument calibration/usage

Data Management

- Field measurement recording procedures
- Records storage
- Contractor communication

The auditor will perform these functions as required per the agreements outlined in the scope of work for this project.

2.2 Schedule and Agenda

The auditor will coordinate with the PM and Field Operations staff to schedule the date, scope, and content of the audit.

Checklists are used by the auditor to record their findings. Any noted deficiencies are discussed with the staff responsible for that particular task.

2.3 Deficiencies

The auditor will consult with audited staff to determine whether a finding is legitimate. If no resolution is reached, the auditor will generate deficiency reports for legitimate findings.

The auditor will develop a final report including all of the legitimate findings and present it to audited staff. Staff will respond to deficiency reports per the requirements outlined in TRA's corrective action procedures within 30 days of the published date of the finding.

If deficiencies are believed to affect the validity of instrument calibrations or testing methods used for submitted data, the funding agency will be notified.

2.4 Closure

Closure of audit findings occurs once corrective actions have been documented for all findings. Closure must be agreed upon by both the TRA auditor and the funding agency's QAO, as appropriate. Documentation related to the audit is maintained by the TRA auditor.

2.5 Verification

Objective evidence provided by the audited staff will be submitted by the auditor as part of the next scheduled audit. To support this need, the auditor will continue to observe audited staff in the interim to ensure that corrective actions are properly implemented and exhibit long-term effectiveness.

3.0 Audit Form

Operation	Y	N	NA	Comments
Quality System				
1) Quality documentation made available to, understood by, and implemented by all personnel.	X			
2) Quality documentation references calibration and/or verification test procedures used.	X			
3) Quality documentation describes sample-handling procedures.	X			
4) Quality documentation references major equipment and reference measurement standards used as well as the facilities and services conducting tests at TRA's request.	X			
5) Quality documentation references procedures for equipment calibration, verification, and maintenance.	X			
6) Quality documentation kept current by the QAO.	X			
7) QAO conducts annual internal audits of all technical operations.	X			
8) QAO notifies management when nonconformances are identified, and recommends corrective actions.	X			
9) Annual internal audit results are reviewed by management to ensure that necessary steps are taken to ensure the integrity and effectiveness of technical operations.	X			
10) All audits, review findings, and related corrective actions are documented.	X			Reported in QPRs.
11) QAO ensures that notification of, and compliance with, corrective actions occur within the timeframe designated by relevant contractual agreements.	X			
12) TRA maintains general procedures for addressing nonconformances, which:				These items are defined in TRA's Corrective Action Plan.
a) Identify individuals responsible for each QC data category.	X			
b) Identify individuals responsible for recommending and/or initiating corrective actions.	X			
c) Define actions that analysts should take if the associated QC results are unacceptable.	X			
d) Define protocols for handling/documenting out-of-control situations and subsequent corrective actions?	X			
e) Specify how/which data qualifiers to use if out-of-control data is to be reported despite failed QC measures?	X			
f) Define corrective action report review procedures for QAO and management?	X			
13) Corrective action reports log is up-to-date.			X	No corrective actions to date for project.
Training				
1) Training records are available for all technical staff to review, including:				
a) Verification that employee has read, understands, and is implementing the latest versions of quality documentation.			X	All sampling staff well-versed in CRP sampling protocols.
b) Evidence of training or workshops attended by the employee for specific equipment, techniques, and procedures.			X	All sampling staff have attended CRP/SWQM training workshops.
2) Training records for technical staff include documentation of continuing proficiency with instruments/test methods used.	X			TRA utilizes an ongoing training program for sampling staff

Operation	Y	N	NA	Comments
3) New evaluations of proficiency conducted if significant changes in instrumentation, personnel, or test methods occur.			X	No changes to date for project.
Equipment				
1) Calibration/maintenance procedures are documented and available for all technical staff to review.	X			
2) TRA maintains records of certificates indicating traceability to national standards of measurements.	X			
3) Calibrations conducted for relevant scientific equipment, considering:				
a) Calibration intervals recommended by the manufacturer, TCEQ requirements, or TRA SOP, as relevant.	X			
b) NIST traceable references used, where applicable.	X			Thermometer for sonde temperature checks
c) The entire operative range in which the equipment is used.	X			
4) Established correction factors used for instrument measurements are documented and available for all technical staff to use.	X			
5) Raw data records for instrument performance are retained for all technical staff to review.	X			
Data Collection/Sample Handling				
1) Label/identification system for sampling containers used to limit confusion regarding the identity of the analyte at all times	X			
2) Sample collection techniques follow those referenced in the quality documentation, specifically:				
a) Proper sampling containers used.	X			
b) Proper sampling depths observed.	X			
c) Samples are collected from the proper location.	X			
3) Tests for preservative usage are performed, or appropriate preservative doses are measured out and pre-packaged beforehand.			X	All preservatives used in-field are purchased pre-packaged. All acid-preserved samples are tested for adequate preservation at the lab upon receipt.
4) Preservative is used with appropriate samples.	X			
5) Samples are sealed, stored, and transported properly.	X			
6) Field data sheets are legible and filled out completely.	X			Days since last rain/flow/lake level fields completed upon return to office.
7) Errors on field data sheets are corrected in accordance with both contract laboratory protocols and those in the quality documentation.	X			
8) Deviations from typical sampling/handling protocols are noted on field data sheets.			X	No deviations observed.
9) Chain of custody forms are filled out properly with all logged samples and other pertinent information.	X			
10) QAO confirms that laboratory reporting limits are within requirements outlined in quality documentation.	X			
Data Records/Storage				
1) Original field data sheets are maintained, in either hard copy or digital format, depending on recording medium used.	X			

Operation	Y	N	NA	Comments
2) Write-protected backup versions of field data sheets, chain of custody records, and instrument output logs (when appropriate) are maintained in a location separate from original copies.	X			Hard copies kept by project manager, backup versions kept on TRA servers.
3) Equipment calibration logbooks are maintained and filled out properly.	X			
4) Quality documentation, amendments, and related field SOPs are maintained and available for field staff to review.	X			
5) Quality document adherence documentation for all sub-tier participants is maintained.			X	No sub-tier participants for this project.
6) Documentation of distribution for all quality documents (including QAPPs, appendices, and amendments) is maintained.			X	No sub-tier participants for this project.
7) Laboratory reports are reviewed to ensure that:				
a) All samples were analyzed for required parameters.	X			
b) Datasets (field and laboratory) are reasonable and in agreement with existing datasets (if applicable).	X			
c) Outliers and suspect data are identified.			X	Insufficient data is available for analysis of suspected outliers at this time.
d) QC sample results are analyzed for acceptability.	X			
8) Corrective action report records are maintained.	X			No CAPs to date for this project, but record book for maintaining CAPs is available.
9) Digital copies of related project reports (task-related reports, progress reports, final reports) are maintained.			X	No related project reports exist to date.
10) Backup and archived records are protected against hazards (fire, theft, loss, deterioration, vermin, electronic/magnetic degradation).	X			

Auditor's Notes:

This audit covers the first sampling event for the Joe Pool Lake Watershed Protection Plan (WPP) Phase I project. As such, the dataset is not robust enough to conduct several of the QC operations described above, particularly those related to statistics. Similarly, no interim reports have been produced at this time for the project.

Required Corrective Actions:

None recommended.

Audit Closure Date:

8/1/19

8/1/19

Angela Kilpatrick — Date

Data Manager, QAO

8/1/19

Aaron Hoff — Date

Project Manager & Field Supervisor

Appendix I: Data Collection Report



Data Collection Report

for the

Joe Pool Lake Watershed Characterization Project

December 2020

JOE POOL LAKE
WATERSHED PROTECTION

Trinity River Authority of Texas

On the cover:

Preparing for flow data collection on the west bank of Hollings Branch near Marker Lane in Cedar Hill, Texas.

Data Collection Report

for

The Joe Pool Lake Watershed Characterization Project

Funded by

The Texas Commission on Environmental Quality
(Contract No. 582-19-90205)

Investigating Entities



The Trinity River Authority of Texas

Prepared by

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List of Acronyms

BMP	best management practice
Chl-a	chlorophyll-a
CRP	Clean Rivers Program
DO	dissolved oxygen
E. coli	*Escherichia coli*
EPA	Environmental Protection Agency
JPL	Joe Pool Lake Watershed
LDC	load duration curve
MPN	most probable number
NO_2	nitrite
NO_3	nitrate
OB	Optical brightener
OP	orthophosphate
OSSF	on-site sewage facility
QAPP	Quality Assurance Project Plan
SELECT	Spatially Explicit Load Enrichment Calculation Tool
Sp. Cond	specific conductance
St. Dev	standard deviation
SWAT	Soil and Water Assessment Tool
SWQM	Surface Water Quality Monitoring
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TKN	total Kjeldahl nitrogen
TP	total phosphorous
TRA	Trinity River Authority of Texas
TSS	total suspended solids
TSWQS	Texas Surface Water Quality Standards
USGS	United States Geological Survey
VSS	Volatile Suspended Solids
WPP	watershed protection plan

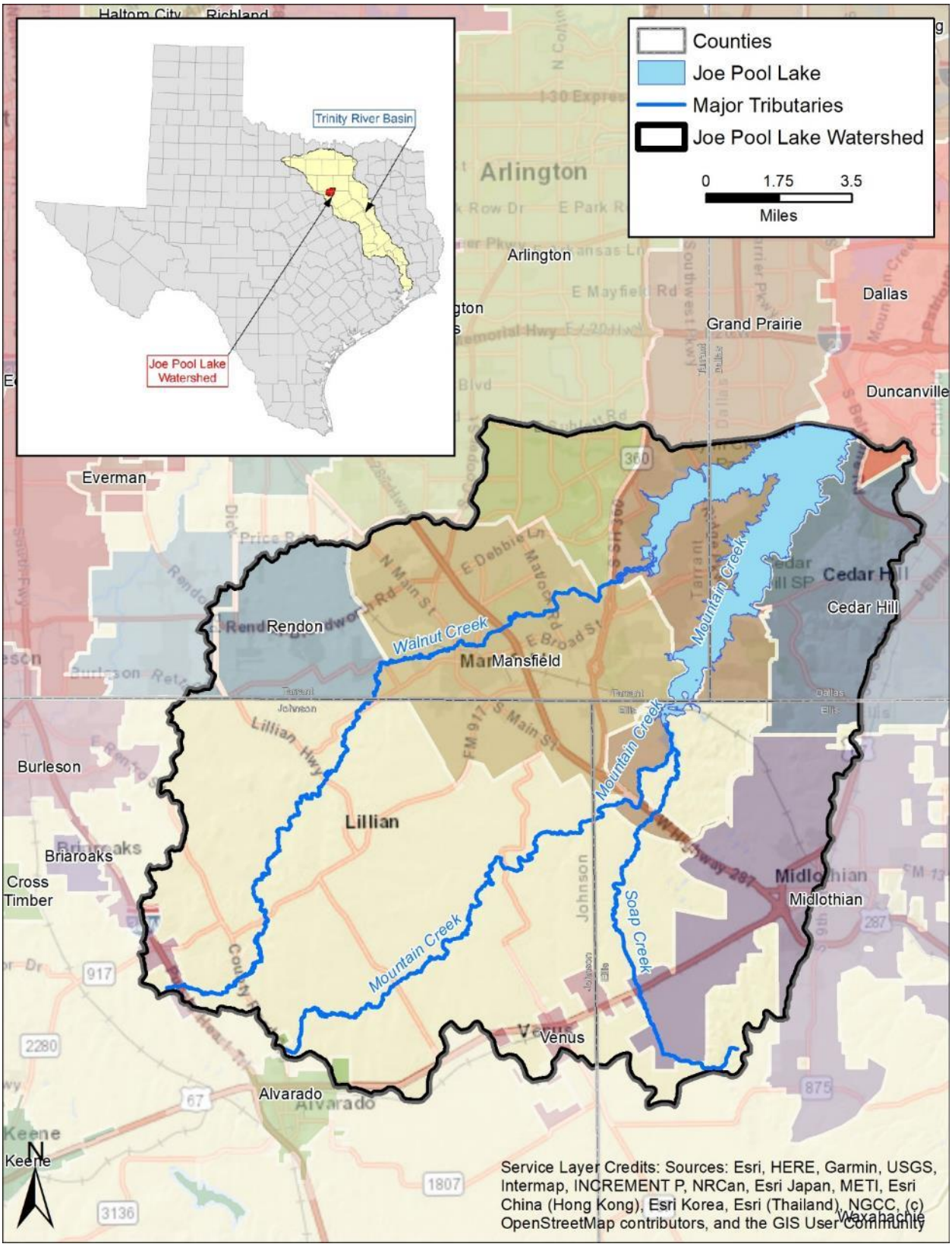
1.0 Introduction

This data collection report was prepared as part of an effort to improve water quality within Walnut Creek, which is a tributary of Joe Pool Lake (JPL). The effort has further goals of protecting water quality in JPL, along with its other tributaries, Soap Creek and Mountain Creek. These waterbodies and their shared watershed are located in Dallas, Ellis, Johnson, and Tarrant counties, in the southern extent of the Dallas/Fort Worth Metroplex in North-central Texas (Figure 1-1). Walnut Creek, one of Joe Pool's two main tributaries, was listed on the 2014 TCEQ Texas Water Quality Inventory and 303(d) List due to elevated levels of *E. coli*, with its first listing occurring in 2006. The majority of the impaired segment flows through the city limits of Mansfield, who approached TRA in late 2015 as they were considering restoration options available for Walnut Creek. Additionally, the Mountain Creek arm of Joe Pool Lake was listed on the 2014 Water Quality Inventory—Water Bodies with Concerns for Use Attainment and Screening Levels for general use concerns due to elevated levels of nitrate. The Cities of Cedar Hill, Grand Prairie, and Mansfield all border this segment of concern. As of the 2018 TCEQ Texas Integrated Report, the Walnut Creek segment has been delisted and the Mountain Creek concern has been removed (TCEQ 2019a).

The data collected as part of this project and the ensuing analysis thereof will serve to expand and enhance the knowledge of the stakeholder group as they make important management decisions to improve and protect water quality in the Joe Pool Lake watershed. This project will result in the development of a watershed protection plan (WPP) that integrates the results of these water quality data, Spatially Explicit Load Enrichment Calculation Tool (SELECT) calculations, Soil and Water Assessment Tool (SWAT) watershed modeling program, and load duration curve (LDC) results with goals and strategies for water quality improvements. Aspects of the SELECT, SWAT, and LDC analyses will be covered in detail later in a technical report on source identification and load reduction evaluation as part of this project.

The goal of this project was to conduct both routine and targeted water quality sampling and analysis for several parameters, including *Escherichia coli* (*E. coli*), nitrites (NO_2), nitrates (NO_3), total Kjehdahl nitrogen (TKN), total phosphorus (TP), and orthophosphate (OP), in order to obtain the technical information necessary to build the WPP. The data collected will be used to inform other reports developed as part of this project, which will evaluate annual and seasonal trends, spatial patterns, hydrologic characteristics (*i.e.,* flow characterization), and other relational patterns that will help identify how and when *E. coli* and other pollutants are entering the system. Five distinct sampling regimes were conducted as part of this project:

- Regime #1 - routine sampling at 9 stream sites (herein after called routine monitoring). The routine monitoring consisted of bi-monthly *E. coli*, NO_2, NO_3, TKN, TP, and OP samples, as well as field and flow parameters. These routine samples were consistently taken near the beginning of the two-month cycle, regardless of flow conditions.
- Regime #2 - bi-monthly flow-biased monitoring at the same 9 stream sites (herein after called flow-targeted monitoring) and for the same parameters described for the routine monitoring. The flows represented by these sample events were selected to capture a wide range of flows needed for building functional LDCs. The goal of the flow-targeted monitoring was to ensure that, to the furthest extent possible, the full range of flows were represented in the resultant data set. Therefore, sampling for targeted flows was based on data gaps that developed in the routine monitoring. For example, if routine monitoring did not include high flow events, then higher flows were targeted for monitoring. Conversely, if routine monitoring tended to occur during normal and higher flow events, then low flow events were targeted. The needed flows and timing of flow-targeted monitoring were evaluated on a continuous basis during the course of sampling to ensure that any flow-targeted samples were spread out as evenly as possible.



Basemap: ESRI World Streetmap.

Figure 1-1. Location of the Joe Pool Lake Watershed.

- Regime #3 - a supplement of the first and second regime, focused on the high-flow events that may have occurred during routine sampling or among those events selected for the flow-targeted monitoring. Three sampling events were completed with an additional six sites sampled. These sites are located within ephemeral portions of main tributaries near their headwaters, or within smaller, typically ephemeral tributaries surrounding the lake. The intent of using this regime was to characterize the periodic loading to the lake from channels or portions of channels that are typically dry, but where accumulated pollutants may contribute significantly to pollutant loads during periods of significant overland runoff. As there were only three samples per site collected in this regime, they will not be directly used to calculate load or flow duration curves. Rather, they will act to inform downstream measurements, providing additional information about potential pollutant sources and periodic contribution to the overall load delivered to the lake.
- Regime #4 - monitoring at five lake sites in Joe Pool Lake, with samples collected during both the routine and flow-targeted regimes described above. All parameters described in those regimes were collected at lake sites, except for flow parameters. Despite this lack of flow data, the flow-targeted samples will still provide important information about any changes in the condition of the lake during flow-targeted events, specifically during low-flow or drought periods, as well as high-flow or flood conditions. Given the pooled conditions at these sites, assessment of conditions will not be based on the calculation of flow/load duration curves, but rather on the pollutant concentrations at each site. Profile samples were collected for relevant field parameters (water temperature, pH, dissolved oxygen, specific conductance) at lake sites following the SWQM Procedures manual (Chapter 3, pg. 4):
    - ***Reservoirs, inland streams, bays, and barge channels with depths 1.5 to < 3.0 meters.*** *In reservoirs, inland streams, bays, and barge channels (for example, the Intracoastal Waterway) which are 1.5 to < 3.0 m deep, record measurements at 0.30 m below the surface, at mid-depth, and at 0.3 m above the bottom.*
    - ***Reservoirs, inland streams, and bays with depths ≥ 3.0 meters.*** *In reservoirs, inland streams, and bays which are 3.0 meters or greater in depth, record measurements at 0.30 m below the surface and then at 1.0 m and each subsequent 1.0 m interval. For the final measurement, take a reading 0.30 m above the bottom, if possible. If the remaining distance is less than 0.3 m, a final measurement is not required. The intervals may be extended to 3.0 m in reservoirs, if the total depth exceeds 18 m. All of the intervals, however, must be equal—1, 2, or 3 meters—and consistent with intervals used in earlier and subsequent field events. This helps determine compliance with water quality standards.*
- Regime #5 - optical brightener (OB) testing at various sites in the watershed including, but not necessarily limited to, the 9 sites at which routine and flow-targeted monitoring were conducted. This testing consisted of deployment of natural untreated cotton sampling medium for a short period of time while field staff were on site collecting samples. The sampling medium was placed in a rigid flow through sample container and fixed in the stream. After deployment, the sample medium was collected and checked for fluorescence due to the detectable presence of OBs. These compounds are found in many laundry detergents and can indicate the presence of sewage leaks or failing septic systems in the upstream watershed. This testing did not generate numeric data but may help identify the potential sources of E. coli in the watersheds and provide information for the development of the WPP. In addition, this testing may help in the selection of best management practices (BMPs) for some areas of the Joe Pool Lake watershed. The OB testing was completed, but the results were largely inconclusive.

Additional information such as land use, soil types, locations of septic systems (also known as on-site sewage facilities or OSSFs), etc. were obtained and published in the Analysis of Historical Data for the Joe Pool Lake Watershed Characterization document (TRA, 2019). This information will be supplemented from other sources (e.g. stakeholders) as needed to fill data gaps for SELECT, SWAT and LDC calculations.

The purpose of this report is to summarize the data collected during the watershed characterization phase and provide a basic statistical review of the results. A more rigorous analysis of the data will be provided in the forthcoming Technical Report.

2.0 Overview of Sample Collection Efforts

Sampling conducted as part of this project began on 6/24/2019 and concluded on 4/30/2020. A list of all analytical parameters collected in the field are provided in Table 2-1. Please refer to Section A7, Quality Objectives and Criteria of the Quality Assurance Project Plan (QAPP) for Monitoring and Data Acquisition requirements for more information about sample collection, processing, and representativeness. For additional information about the collection, preservation, and laboratory analysis of samples collected for these parameters, please consult the Texas Commission on Environmental Quality (TCEQ) *SWQM Procedures Manual, Volume 1: Physical and Chemical Monitoring Methods* (TCEQ 2012). A brief description of selected parameters is provided in Section 2.1 through 2.4 below.

Table 2-1. List of collected parameters for water quality monitoring.

Field Parameters										
Parameter	**Units**	**Matrix**	**Method**	**Parameter Code**	**AWRL**	**Limit of Quantitation (LOQ)**	**Recovery at LOQ (%)**	**Precision (RPD of LCS/LCSD)**	**Bias %Rec. of LCS**	**Lab**
TEMPERATURE, WATER (DEGREES CENTIGRADE)	DEG C	water	SM 2550 B and TCEQ SOP V1	00010	NA[1]	NA	NA	NA	NA	Field
TEMPERATURE, AIR (DEGREES CENTIGRADE)	DEG C	air	SM 2550 B and TCEQ SOP V1	00020	NA[1]	NA	NA	NA	NA	Field
TRANSPARENCY, SECCHI DISC (METERS)	meters	water	TCEQ SOP V1	00078	NA[1]	NA	NA	NA	NA	Field
SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C)	uS/cm	water	EPA 120.1 and TCEQ SOP, V1	00094	NA[1]	NA	NA	NA	NA	Field
OXYGEN, DISSOLVED (MG/L)	mg/L	water	SM 4500-O G & TCEQ SOP V1	00300	NA[1]	NA	NA	NA	NA	Field
PH (STANDARD UNITS)	s.u	water	EPA 150.1 and TCEQ SOP V1	00400	NA[1]	NA	NA	NA	NA	Field
DAYS SINCE PRECIPITATION EVENT (DAYS)	days	other	TCEQ SOP V1	72053	NA[1]	NA	NA	NA	NA	Field
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	meters	water	TCEQ SOP V2	82903	NA[1]	NA	NA	NA	NA	Field
MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS)[2]	meters	other	TCEQ SOP V2	89864	NA[1]	NA	NA	NA	NA	Field
MAXIMUM POOL DEPTH AT TIME OF STUDY(METERS)[2]	meters	other	TCEQ SOP V2	89865	NA[1]	NA	NA	NA	NA	Field
POOL LENGTH, METERS[2]	meters	other	TCEQ SOP V2	89869	NA[1]	NA	NA	NA	NA	Field
% POOL COVERAGE IN 500 METER REACH[2]	%	other	TCEQ SOP V2	89870	NA[1]	NA	NA	NA	NA	Field
Flow Parameters										
Parameter	**Units**	**Matrix**	**Method**	**Parameter Code**	**AWRL**	**Limit of Quantitation (LOQ)**	**Recovery at LOQ (%)**	**Precision (RPD of LCS/LCSD)**	**Bias %Rec. of LCS**	**Lab**
FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)	cfs	water	TCEQ SOP V1	00061	NA[1]	NA	NA	NA	NA	Field

FLOW SEVERITY:1=No Flow,2=Low,3=Normal,4=Flood,5=High,6=Dry	NU	water	TCEQ SOP V1	01351	NA[1]	NA	NA	NA	NA	Field
FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER	NU	other	TCEQ SOP V1	89835	NA[1]	NA	NA	NA	NA	Field

Bacteriological Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Recovery at LOQ (%)	Precision (RPD of LCS/LCSD)	Bias %Rec. of LCS	Lab
E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	MPN/ 100 mL	water	Colilert/ Colilert-18	31699	1	1	NA	0.50[3]	NA	TRA
E. COLI, COLILERT, IDEXX, HOLDING TIME	hours	water	NA	31704	NA	NA	NA	NA	NA	TRA

Conventional Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Recovery at LOQ (%)	Precision (RPD of LCS/LCSD)	Bias %Rec. of LCS	Lab
RESIDUE, TOTAL NONFILTRABLE (MG/L)	mg/L	water	SM 2540 D	00530	5	2	NA	NA	NA	TRA
RESIDUE, VOLATILE NONFILTRABLE (MG/L)	mg/L	water	EPA 160.4	00535	5	2	NA	NA	NA	TRA
NITRITE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00615	0.05	0.05	70-130	20	80-120	TRA
NITRATE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00620	0.05	0.05	70-130	20	80-120	TRA
NITROGEN, KJELDAHL, TOTAL (MG/L AS N)	mg/L	water	EPA 351.2	00625	0.2	0.2	70-130	20	80-120	TRA
PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	mg/L	water	SM 4500 P E	00665	0.06	0.02	70-130	20	80-120	TRA
CHLOROPHYLL-A UG/L SPECTROPHOTOMETRIC ACID. METH	µg/L	water	SM 10200 H No field of accreditation (FOA) offered	32211	3	3	NA	20	80-120	TRA
RESIDUE, TOTAL FILTRABLE (DRIED AT 180C) (MG/L)	mg/L	water	SM 2540 C	70300	10	10	NA	20	80-120	TRA
ORTHOPHOSPHATE PHOSPHORUS, DISS, MG/L, FILTER >15MIN	mg/L	water	SM 4500 P F	70507	0.04	0.02	70-130	20	80-120	TRA

1 - Reporting to be consistent with SWQM guidance and based on measurement capability.
2 - To be routinely reported when collecting data from perennial pools.
3 -This value is not expressed as a relative percent difference. It represents the maximum allowable difference between the logarithm of the result of a sample and the logarithm of the duplicate result. See Section B5.

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416)

2.1 Field Parameters

Water Temperature

This basic water quality parameter is perhaps one of the most important indicators of health in an aquatic ecosystem, as it is directly linked to many of the physiological processes carried out by aquatic organisms. As temperature increases, dissolved oxygen (DO) in the water decreases. This results in increased oxygen demand across the whole community, which can be stressful for higher-level, cold-blooded organisms like fish and aquatic insects, who depend on species-specific temperatures to survive. Variations in water temperature become more detrimental to aquatic species when they occur rapidly, especially for organisms that may lack the biological advantages to adapt quickly to the change.

Water Transparency

Two methods were used to measure water transparency for this project, secchi depth and nephalometric turbidity. High turbidity can limit the amount of available light in the water column by inhibiting photosynthetic growth in autotrophic organisms like phytoplankton, algae, and aquatic plants. This growth limitation may be either helpful or detrimental to the overall aquatic community, depending on several other biological factors, including the trophic state of the waterbody, and whether or not algal communities are also limited by nutrients. The reduced visibility from high turbidity may also be detrimental to predatory species of fish and birds that depend on visibility to locate their prey.

Dissolved Oxygen

Although the specific needs will vary based on the community assemblage and species adaptations, DO is vital to the survival of fish and aquatic insects. DO is affected by both temperature and nutrient concentrations, albeit indirectly. Primary productivity and decomposition processes also affect the amount of DO in the water column. Minimum DO concentrations may vary based on the type of water body (lentic or lotic systems), flow status of lotic systems (perennial, intermittent, with or without pools), species assemblage, and in-stream habitat. The Texas Commission on Environmental Quality (TCEQ) accounts for these differences by applying waterbody-specific DO criteria. Some waterbodies have had full-scale biological surveys undertaken to set the criteria. For those waterbodies which have not had biological surveys performed, criteria are based on known or presumed flow status until these surveys can be undertaken.

Specific Conductance (@ 25°C)

The efficiency with which a liquid can conduct electricity at a certain temperature is known as specific conductance. In most water quality studies, a standard temperature of 25°C is used for sonde-based deployments. A waterbody will become more conductive with increased levels of ionic dissolved solids, which include both nutrients and salts. As levels of these solids increase, particularly nutrients, DO decreases, which typically results in reduced water quality and overall aquatic health.

Potential Hydrogen (pH)

A waterbody is considered ‘neutral’ if it has a pH of 7.0, with values less than 7.0 being acidic and values greater than 7.0 considered alkaline. Healthy aquatic habitats typically fall within a pH range of 6.5-9.0, which is reflected within the TCEQ water quality standard for the parameter. However, TCEQ does have the ability to adjust the pH range where appropriate using local monitoring data for specific sites.

Days Since Last Precipitation Event

It is important for both field staff and data analysts to be mindful of recent precipitation events that coincide with monitoring events. Rainfall that produces runoff can carry nonpoint source pollutants (*E. coli*, nutrients, and other solids) into a waterbody. The volume of these pollutant loads typically increase with the duration and severity of the runoff event. Monitoring precipitation events is important for data analysts to determine if high pollutant loads are the result of inputs from a recent rainfall/runoff event, or perhaps from other factors.

2.2 Flow Parameters

Instantaneous Stream Flow

Flow measurement is an integral part of this project, as it is one of the two components required to compute the bacterial and nutrient loads. Flooding, stream geomorphology, and aquatic life support are all directly influenced by streamflow, and runoff and streamflow drive the generation, transport, and delivery of many nonpoint source pollutants. Calculation of pollutant loads requires knowledge of water flow (Meals and Dressing 2008). These results will indicate areas of interest in the watershed with respect to making informed water quality management recommendations.

Flow Severity

A qualitative observation of flow is sometimes useful, in addition to measured flow, to categorize the flow regime at the time of sample collection within the greater context of the watershed. Though two tributaries may have the exact same measured flow during a given event, that flow rate may be normal in one tributary, but uncharacteristically high in the other. This difference may indicate the effects of localized rainfall, external water inputs, or other natural or anthropogenic factors.

Flow Method

In addition to the use of existing U.S. Geological Survey (USGS) gage station data, TRA uses instruments to directly measure flow. It is important for data analysts to be mindful of the flow measurement method used to collect the data, as it may explain and eventually correct any errors that may arise in flow data. See the QAPP for Monitoring and Data Acquisition for this project for more information on the approved methods used during this project.

2.3 Bacteria Parameters

E. coli

E. coli is a bacterium commonly found in the intestines of warm-blooded animals and humans. These bacteria live in the waste products and can be washed into surface and ground water during rain events, or directly deposited in surface waters. High measurements of these bacteria can indicate improperly treated wastewater, illicit discharges, livestock and wildlife presence, and a host of other sources. Some strains of this bacteria produce powerful toxins and can cause severe illness if ingested. To protect public safety, Clean Rivers Program (CRP) partners sample for bacteria throughout the basin. These samples are compared to a surface water quality standard determined by the TCEQ and approved by the U.S. Environmental Protection Agency. *E. coli* is used in assessing water bodies against the Contact Recreation use standard. Because *E. coli* results can vary by orders of magnitude, the standard is based on the geometric mean (geomean) of the sample set. It is important to note that analysis of *E. coli* as an "indicator bacteria" is based on current knowledge and technology and has its limitations – primarily that it is shed by all warm-blooded animals. This test is intended as a surrogate for the

potential for human illness – higher levels of *E. coli* indicate that there is higher potential for illness causing strains of *E. coli*, other bacteria, or viruses to be found in the water which may be ingested during recreational activities such as swimming, wading, and boating.

Optical Brighteners

Optical brighteners are dye compounds that are added to laundry detergent to make clothing seem whiter or brighter in color after washing. Although not a direct measurement of bacterial contamination, the presence or absence of OBs in the water found at the monitoring site may be an indicator of human sewage contamination, which is a potential source of *E. coli* in the watershed. However, other household, personal care, and industrial products can contain similar dyes, which can present 'false positives' in the test. These include, but are not limited to, antifreeze, car wash detergents, lawn grass dyes, and some viral-vector pesticides. The OB testing was completed, but the results were largely inconclusive.

2.4 Conventional Parameters

Solids

Total dissolved solids (TDS) is a rudimentary measurement of all the dissolved ions within a waterbody. While it does provide a very rough indicator of general water quality, it cannot reveal the specific source or composition of the ions in the sample.

The suspended or colloidal particles, commonly referred to as total suspended solids (TSS), are the particles that are suspended in the water column that are not passed through a filter of a specific pore size. This can include organic matter such as algal and bacterial cells and planktonic organisms as well as inorganic matter such as erodible soil material.

Volatile suspended solids (VSS) is the portion of the suspended solids that are lost on the ignition of the dried solids. Along with TSS, it can also provide further indication of microbial, algal, and planktonic growth within a water quality sample.

Turbidity is closely related to TSS, but is technically an optical feature of the water. It is a measurement of the light scattered by a water sample rather than the mass of the material suspended in the water. The measurement can also include response to dyes in the water such as tannin staining from decaying leaves.

Nutrients

Nutrients are essential for the productivity of aquatic ecosystems. Without the building blocks, or "food", that drives the system, there will be no plant and animal life. Conversely, an overabundance of nutrients within riverine and reservoir ecosystems can have detrimental effects. Clear reservoirs are more susceptible to algal blooms due to nutrient enrichment than sediment-laden rivers and lakes. Algae require nutrients and light to grow, but waterbodies in this watershed are generally turbid. As a result, light can be more of a limiting factor than nutrients.

The most common limiting nutrients in aquatic environments are phosphorus and nitrogen. Nutrients can enter waterbodies via runoff containing residential and agricultural fertilizers, as well as animal waste, atmospheric deposition, effluent from wastewater treatment plants, and sanitary sewer overflows.

NO_3 is one of the components of total nitrogen, along with NO_2 and TKN. NO_3 and NO_2 are inorganic, oxidized forms of nitrogen, with nitrate being the most abundant and nitrite often occurring at such low levels that for the majority of the samples, the limit of quantitation was not met over the course of this monitoring effort. TKN is the final component of total nitrogen, which contains ammonia (another inorganic form of nitrogen) and organic nitrogen.

TP is a measure of all the forms of phosphorus that are present in a water sample. This includes both dissolved and particulate forms, as well as both organic and inorganic forms. Of the inorganic forms, OP (sometimes referred to as "reactive phosphorus") is important because it is the form used most readily by plants. A prominent by-product of natural processes, OP is also found in sewage.

Chlorophyll-a

Chlorophyll-a (chl-a) is commonly used throughout the state as a surrogate for algal biomass. It is the pigment responsible for the green color of many algal species and is vital for photosynthesis. High levels of chl-a may indicate algal blooms have occurred or are occurring in a waterbody. Typically nutrients, such as nitrogen and phosphorous, are the limiting factors for algal growth. However, in some systems, trace metals may also be limiting.

In more turbid waterbodies, nutrients are not always the limiting factor for algal growth. In the naturally turbid waters of the river, light availability is commonly the limiting factor. High suspended sediment loads decrease light penetration into the water column. Therefore, algal productivity is limited to a narrow band at the surface of the water which can range from just a few inches to several feet depending on the turbidity of the water. In reservoirs, light can be the limiting factor in the turbid upper reaches and coves where sediments are still in suspension. As sediments settle out nearer to the main body of the reservoirs, nutrients can become the limiting factors.

Algal growth can affect levels of DO and pH. As algae cycle through photosynthesis and respiration during a 24-hour period, DO and pH levels rise and fall in response. Because chl-a is used as a surrogate for algal biomass, data analysis can show a strong correlation between chl-a, DO, and pH. The strength and direction of the correlation depends on the extent of the algal bloom and the time of day, as well as the time required for DO and pH levels to recover.

At night or during cloudy weather, algal respiration is the dominant process. Cellular respiration uses carbohydrates and oxygen to produce carbon dioxide and water. Carbon dioxide in the presence of water forms carbonic acid which reduces the pH of the water. Therefore, oxygen and pH levels can decrease.

During sunny daylight hours, algal photosynthesis becomes dominant. The process of photosynthesis uses light, carbon dioxide, and water to produce carbohydrates and oxygen. Therefore, oxygen and pH levels can increase.

During an algal bloom, it is not uncommon for the water to become supersaturated with DO during the day. At night or during cloudy weather, DO and pH can drop to very low levels. This rise and fall in DO and pH during a 24-hour period is called a diurnal swing. The severity of the diurnal swing and the resultant minimum and maximum DO and pH levels are dependent of the extent of the algal bloom. While uncommon in areas like the Trinity River where mineral inputs from calcareous soils provide a strong buffering capacity, water bodies with weaker buffering capacity may be more sensitive to intense DO and pH declines, occasionally causing fish kills.

3.0 Data Review and Assessment Methods

3.1 TCEQ Water Quality Standards

TCEQ is responsible for establishing numeric and narrative criteria for water quality in the state of Texas. These criteria are described in TCEQ's Texas Surface Water Quality Standards (TSWQS) and are approved by the U.S. Environmental Protection Agency (EPA). These standards are codified in the Texas Administrative Code (TAC), Title 30, Chapter 307, hereto referred to as TAC 307 (TCEQ 2014) and are used by TCEQ regulatory programs to establish reasonable methods of assessing water bodies of the state with the intent of implementing targeted strategies aimed at specific water quality uses. Site-specific water quality criteria for Joe Pool Lake (Segment 0838) and Hollings Branch Creek, Mountain Creek, Soap Creek, Sugar Creek, Walnut Creek (Segment 0838A-F), as defined in TAC 307, are presented in Table 3-1.

Table 3-1. Site-specific water quality criteria for the Joe Pool Lake watershed.

Parameter	Segment ID	
	0838	0838A-F
Cl^- (mg/L)	100	100
SO_4^{2-} (mg/L)	250	-
TDS (mg/L)	500	300
DO (mg/L) 24-hr minimum	3.0	1.5[a]
DO (mg/L) 24-hr average	5.0	2.0[a]
pH range	6.5-9.0	6.5-9.0
E. coli (#/100ml) geomean	126	126
Temperature (°F; °C)	95; 35	95; 35

(a) Tributaries 0838B and 0838C use a DO 24-hr minimum and average of 2.0 mg/L and 3.0 mg/L, respectively.

3.2 Nutrient Screening Levels and Reference Criteria

Currently, no numeric standards exist for nutrients in streams in the state of Texas. Numeric standards for chl-a have been approved by EPA for 75 reservoirs in the state; however, Joe Pool Lake is not one of these reservoirs. In such situations where no water quality standards exist, or are in the process of being developed, controls such as narrative criteria and antidegradation considerations are often used. Despite this lack of numeric criteria, TCEQ continues to screen for parameters such as nitrogen, phosphorus, and chl-a as preliminary indicators for concern. To support this effort, nutrient screening levels and reference conditions are often used to compare a waterbody to reference values at a local, regional, or national level. Table provides screening level values from various sources. The Texas Nutrient Screening Levels are based on statistical analyses of Surface Water Quality Monitoring (SWQM) data (TCEQ 2015) and the EPA Reference Criteria are regional values based on data from reservoirs and streams within specific ecoregion units and subunits (USEPA 2000a, USEPA 2000b). It is worth noting that these Reference Criteria differ from the Texas Nutrient Screening Levels in that EPA developed the Reference Criteria using conditions that are indicative of minimally impacted (or in some cases, pristine) waterbodies, attainment of which would result in protection of all designated uses within those specific units and subunits. As such, Reference Criteria thresholds are much lower than those for state screening levels, and surpassing them may not necessarily indicate a concern, as is the case with the state thresholds. Where state screening levels or national reference criteria were non-existent, other sources were used, for nitrite (NO_2) in particular (Mesner and Geiger 2010).

Table 3-2. Texas Nutrient Screening Levels and EPA Nutrient Reference Criteria.

Parameter		TCEQ Screening Levels		EPA Reference Criteria				Other Sources
		Lake/Reservoir	Stream	Lake/Reservoir		Stream		
TKN	(mg/L)	-	-	0.38[a]	0.41[b]	0.3[a]	0.4[b]	
NO_2^-	(mg/L)	-	-	-	-	-	-	0.02[c]
NO_3^-	(mg/L)	0.37	1.95	-	-	-	-	
NO_2^-+NO_3^-	(mg/L)	-	-	0.017[a]	0.01[b]	0.125[a]	0.078[b]	
TP	(mg/L)	0.20	0.69	0.02[a]	0.019[b]	0.037[a]	0.038[b]	
OP[d]	(mg/L)	0.05	0.37	-	-	-	-	
Chlorophyll a[e]	(µg/L)	26.7	14.1	5.18[a]	2.875[b]	0.93[a]	1.238[b]	

(a) Reference conditions for aggregate Ecoregion IX waterbodies, upper 25th percentile of data from all seasons, 1990-1999.

(b) Reference conditions for level III Ecoregion 29 waterbodies, upper 25th percentile of data from all seasons.

(c) For nitrite, concentrations above 0.02 mg/L (ppm) usually indicate polluted waters (Mesner, N., J. Geiger. 2010. Understanding Your Watershed: Nitrogen. Utah State University, Water Quality Extension.

(d) OP is no longer used for TCEQ screening purposes, as of the 2014 Texas Integrated Report.

(e) Chlorophyll a, as measured by Spectrophotometric method with acid correction.

3.3 303(d) Water Quality Inventory Table

The TCEQ 2020 Texas Integrated Report for the Trinity River covers a seven-year assessment period from December 1, 2011 to November 30, 2018 (TCEQ 2020). In cases where additional data was needed to meet minimum data requirements and make an informed assessment, data from an additional three-year period beginning December 1, 2008 were used. The methods used for this assessment are described in the 2020 Guidance for Assessing and Reporting Surface Water Quality in Texas (TCEQ 2019c).

Findings of the Integrated Report assessments are classified as Fully Supporting, No Concern, Use Concern, Screening Level Concern, and Not Supporting. To simplify data presentation in this report, the Use Concern and Screening Level Concern classifications were combined into a single "Concern" category. Use Concern findings are given for assessments against designated use standards for water quality parameters such as DO and *E. coli*. Use Concerns can apply to datasets with limited data where the threshold number of exceedances are met or to datasets with adequate data where there are less than the threshold number of exceedances required for a Not Supporting finding. Screening Level Concerns apply to General Use parameters, such as nutrients and chl-a, as well as a few other parameters for other designated uses. These parameters have screening levels rather than standards.

The TCEQ 2020 Texas Integrated Report did not identify any concerns or impairments. However, the impetus to conduct water quality monitoring in Joe Pool Lake watershed was based on the TCEQ 2014 Texas Integrated Report that did identify concerns and impairments (TCEQ 2015). The results of the 2014, 2016, 2018 and 2020 assessments are shown in Table , Table , Table , Table , which call out any impairments or concerns identified in each segment (TCEQ 2015, 2019a, 2019b, 2020). The results are accompanied by an evaluation of which designated uses have data that was available for a use assessment.

Table 3-3. 2020 Texas Integrated Report & 2020 TRA In-house Assessment information for Joe Pool Lake Watershed.

Waterbody	Segment ID	Designated Uses*					2020 TCEQ Report	
		Aquatic Life	Contact Recreation	General Use	Fish Consumption	Public Water Supply	Impairments	Concerns
Joe Pool Lake: Lowermost portion of reservoir adjacent to the dam	0838_01							
Joe Pool Lake: Mountain Creek arm	0838_02							
Joe Pool Lake: Walnut Creek arm	0838_03							
Mountain Creek: Entire segment	0838A_01							
Sugar Creek: Entire segment	0838B_01	•	•	•	•			
Walnut Creek: From the confluence with Joe Pool Lake up to the headwaters at Spring Street in	0838C_01	•	•					
Hollings Branch from the confluence of Mountain Creek arm of Joe Pool Lake upstream to the headwater 500 m downstream of US 67 in Midlothian	0838D_01	•	•	•	•			
Soap Creek from the confluence of the Maountain Creek arm of Joe Pool Lake upstream to the headwater 6.6 km (3.98 miles) upstream of US 67 in Midlothian	0838E_01	•	•	•	•			
Unnamed tributary of Mountain Creek: Intermittent stream from the confluence with Mountain Creek south of Mansfield upstream to the headwaters approximately 2.0 k, upstream of FM 157 in Mansfield	0838F_01	•	•	•				

**note: blanks in the "Designated Uses" column indicate that no data was available for a specific designated use in the corresponding segment, or that a specific designated use does not apply for that segment.*

Table 3-4. 2018 Texas Integrated Report information for Joe Pool Lake Watershed.

Waterbody	Segment ID	Designated Uses*					2018 TCEQ Report	
		Aquatic Life	Contact Recreation	General Use	Fish Consumption	Public Water Supply	Impairments	Concerns
Joe Pool Lake: Lowermost portion of reservoir adjacent to the dam	0838_01							
Joe Pool Lake: Mountain Creek arm	0838_02							
Joe Pool Lake: Walnut Creek arm	0838_03							
Mountain Creek: Entire segment	0838A_01							
Sugar Creek: Entire segment	0838B_01	•	•	•	•			
Walnut Creek: From the confluence with Joe Pool Lake up to the headwaters at Spring Street in Burleson	0838C_01	•	•					
Hollings Branch from the confluence of Mountain Creek arm of Joe Pool Lake upstream to the headwater 500 m downstream of US 67 in Midlothian	0838D_01	•	•	•	•			
Soap Creek from the confluence of the Maountain Creek arm of Joe Pool Lake upstream to the headwater 6.6 km (3.98 miles) upstream of US 67 in Midlothian	0838E_01	•	•	•	•			
Unnamed tributary of Mountain Creek: Intermittent stream from the confluence with Mountain Creek south of Mansfield upstream to the headwaters approximately 2.0 k, upstream of FM 157 in Mansfield	0838F_01	•	•					

**note: blanks in the "Designated Uses" column indicate that no data was available for a specific designated use in the corresponding segment, or that a specific designated use does not apply for that segment.*

Table 3-5. 2016 Texas Integrated Report information for Joe Pool Lake Watershed.

Waterbody	Segment ID	Designated Uses*					2016 TCEQ Report	
		Aquatic Life	Contact Recreation	General Use	Fish Consumption	Public Water Supply	Impairments	Concerns
Joe Pool Lake: Lowermost portion of reservoir adjacent to the dam	0838_01			•	•			
Joe Pool Lake: Mountain Creek arm	0838_02	•	•	•	•			
Joe Pool Lake: Walnut Creek arm	0838_03			•	•			
Mountain Creek: Entire segment	0838A_01							
Sugar Creek: Entire segment	0838B_01	•	•	•	•			
Walnut Creek: From the confluence with Joe Pool Lake up to the headwaters at Spring Street in Burleson	0838C_01	•	•	•			bacteria	
Hollings Branch from the confluence of Mountain Creek arm of Joe Pool Lake upstream to the headwater 500 m downstream of US 67 in Midlothian	0838D_01	•	•	•	•			
Soap Creek from the confluence of the Maountain Creek arm of Joe Pool Lake upstream to the headwater 6.6 km (3.98 miles) upstream of US 67 in Midlothian	0838E_01	•	•	•				
Unnamed tributary of Mountain Creek: Intermittent stream from the confluence with Mountain Creek south of Mansfield upstream to the headwaters approximately 2.0 k, upstream of FM 157 in Mansfield	0838F_01	•	•	•				

**note: blanks in the "Designated Uses" column indicate that no data was available for a specific designated use in the corresponding segment, or that a specific designated use does not apply for that segment.*

Table 3-6. 2014 Texas Integrated Report & 2015 TRA In-house Assessment information for Joe Pool Lake Watershed.

Waterbody	Segment ID	Designated Uses*					2014 TCEQ Report	
		Aquatic Life	Contact Recreation	General Use	Fish Consumption	Public Water Supply	Impairments	Concerns
Joe Pool Lake: Lowermost portion of reservoir adjacent to the dam	0838_01	•		•	•	•		
Joe Pool Lake: Mountain Creek arm	0838_02	•	•	•	•	•		nitrate
Joe Pool Lake: Walnut Creek arm	0838_03	•		•	•	•		
Mountain Creek: Entire segment	0838A_01	•		•	•			
Sugar Creek: Entire segment	0838B_01	•	•	•	•			
Walnut Creek: From the confluence with Joe Pool Lake up to the headwaters at Spring Street in Burleson	0838C_01	•	•	•	•		bacteria	
Hollings Branch from the confluence of Mountain Creek arm of Joe Pool Lake upstream to the headwater 500 m downstream of US 67 in Midlothian	0838D_01	•	•	•				
Soap Creek from the confluence of the Maountain Creek arm of Joe Pool Lake upstream to the headwater 6.6 km (3.98 miles) upstream of US 67 in Midlothian	0838E_01	•	•	•				
Unnamed tributary of Mountain Creek: Intermittent stream from the confluence with Mountain Creek south of Mansfield upstream to the headwaters approximately 2.0 k, upstream of FM 157 in Mansfield	0838F_01							

**note: blanks in the "Designated Uses" column indicate that no data was available for a specific designated use in the corresponding segment, or that a specific designated use does not apply for that segment.*

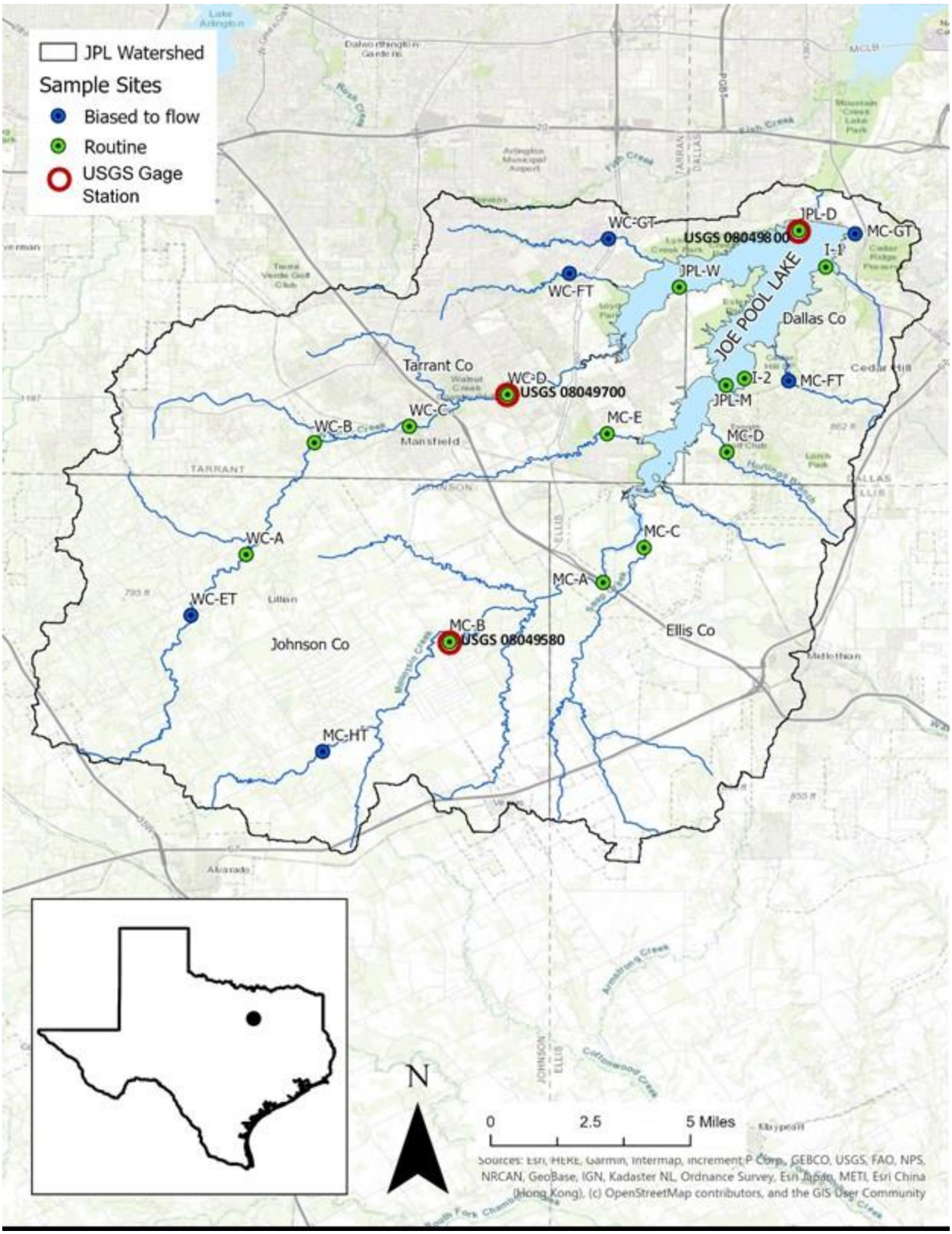
4.0 Summary of Sample Collection Efforts

The data in this report summarizes a 11-month collection effort from June 2019 to April 2020. A collection of all the data sampled as part of this project is provided in Appendix A and Appendix B. Data was collected at 14 sites across the watershed with an additional six sites during high flow conditions (Figure 4-1).

Specific site selection criteria for each site are detailed below.

- 22131(WC-A) – WALNUT CREEK AT FM 2738/LILLIAN HIGHWAY IN JOHNSON COUNTY
  - Site is upstream of the Valley Branch confluence, allowing for differentiation between it and King Branch as pollutant load sources.
- 20790 (WC-B) – WALNUT CREEK AT RETTA ROAD IN SOUTHEAST TARRANT COUNTY
  - Site is upstream of the Willow Branch confluence, just outside of the city limits of Mansfield. This will allow for differentiation between the more rural land uses upstream and downstream urban land uses as pollutant load sources.
- 21990 (WC-C) – WALNUT CREEK AT KATHERINE ROSE MEMORIAL PARK FOOT BRIDGE 400 METERS UPSTREAM OF N WALNUT CREEK DRIVE IN MANSFIELD
  - Site is located within a municipal park near the center of Mansfield, characterizing urban land uses.
- 13621 (WC-D) – WALNUT CREEK AT MATLOCK ROAD 2.6 MI NORTHEAST OF MANSFIELD
  - Most downstream site on Walnut Creek, also the site of a USGS flow gage. Will likely be used for calculating pollutant load contributions to Joe Pool Lake from Walnut Creek.
- 22132 (WC-ET) – WALNUT CREEK AT JOHNSON COUNTY ROAD 519 WEST OF LILLIAN IN JOHNSON COUNTY
  - Site is upstream of the King Branch confluence, allowing for differentiation between it and the Walnut Creek headwaters as pollutant load sources (high-flow events only).
- 22133 (WC-FT) – BOWMAN BRANCH AT SOUTH SH 360 IN THE CITY OF GRANDE PRAIRE IN TARRANT COUNTY
  - Site will characterize pollutant load contributions from Bowman Branch (high-flow events only).
- 17198 (WC-GT) – LYNN CREEK 136 METERS DOWNSTREAM OF WEBB LYNN ROAD 2.6 KM UPSTREAM OF JOE POOL LAKE IN GRAND PRAIRIE
  - Site will characterize pollutant load contributions from Lynn Creek (high-flow events only).
- 16434 (MC-A) – MOUNTAIN CREEK AT US287 1.6KM NORTHWEST OF INTERSECTION OF US 287 AND FM 661
  - Most downstream point on Mountain Creek accessible to vehicle traffic, although it is assumed to be under influence of the lake for some periods of time throughout the year. May or may not be acceptable as point of load calculation for Mountain Creek, depending on results of the characterization study.
- 13622 (MC-B) – MOUNTAIN CREEK AT FM 157 3.9 MI NORTH OF VENUS 3.0 MI UPSTREAM FROM GRASSY CREEK
  - Site of a USGS flow gage. Will likely be used for calculating pollutant load contributions to Joe Pool Lake from Mountain Creek, should 16434 prove not to be ideal for load calculation.
- 22134 (MC-C) – SOAP CREEK 1.1 KILOMETERS UPSTREAM OF THE CONFLUENCE WITH MOUNTAIN CREEK IN ELLIS COUNTY
  - Site is downstream of several smaller Soap Branch tributaries, one of which carries treated wastewater effluent.
- 16433 (MC-D) – HOLLINGS BRANCH AT TANGLE RIDGE ROAD 1KM UPSTREAM OF CONFLUENCE OF HOLLINGS BRANCH WITH JOE POOL LAKE
  - Characterizes loads originating from the east side of the lake.

- 22135 (MC-E) – LOW BRANCH AT SOUTH HOLLAND ROAD EAST OF THE CITY OF MANSFIELD IN TARRANT COUNTY
    - Characterizes contributions to Mountain Creek from urban sources.
- 22136 (MC-FT) – BAGGETT BRANCH AT MANSFIELD ROAD IN THE CITY OF CEDAR HILL IN DALLAS COUNTY
    - Characterizes contributions to Joe Pool Lake from heavily wooded areas (high-flow events only).
- 22137 (MC-GT) – MOUNTAIN CREEK TRIBUTARY 2 AT FM 1382/BELT LINE ROAD ALONG THE NORTHERN BOUNDARY OF CEDAR HILL STATE PARK IN DALLAS COUNTY
    - Characterizes loads originating from heavily wooded areas on the east side of the lake (high flow events only).
- 22138 (MC-HT) – MOUNTAIN CREEK AT FM 2738 IN JOHNSON COUNTY
    - Site is upstream of the Fish Spring Branch confluence, allowing for differentiation between it and the Mountain Creek headwaters as pollutant load sources (high-flow events only).
- 11073 (JPL-D) – JOE POOL LAKE MID LAKE AT DAM 48 METERS SOUTH AND 2.24 KM WEST OF INTERSECTION OF MANSFIELD ROAD AND FM 1382
    - Characterizes pollutant concentrations in the main body of the reservoir
- 11072 (JPL-W) – JOE POOL LAKE WALNUT CREEK ARM AT LAKE RIDGE PARKWAY 1.43 KM NORTH AND 503 M WEST OF INTERSECTION OF LAKE RIDGE PKWY AND HANGER LOWE RD
    - Characterizes pollutant concentrations in the western arm of the reservoir
- 11071 (JPL-M) – JOE POOL LAKE MOUNTAIN CREEK ARM AT LAKE RIDGE PKWY/MANSFIELD ROAD 251 M N AND 1.19 KM W OF INTERSECTION OF ANDERSON RD AND LK RIDGE USGS SITE DC 323503097012201
    - Characterizes pollutant concentrations in the eastern arm of the reservoir
- 22139 (I-1) – JOE POOL LAKE AT INTAKE STRUCTURE 423 METERS WEST OF THE BOAT RAMP AT JOE POOL MARINA IN CEDAR HILL STATE PARK
    - Park Characterizes pollutant concentrations near the northern water treatment intake.
- 22140 (I-2) – JOE POOL LAKE AT INTAKE STRUCTURE 785 METERS NORTHWEST FROM THE INTERSECTION OF ANDERSON ROAD AND MANSFIELD ROAD IN DALLAS COUNTY
    - Characterizes pollutant concentrations near the northern water treatment intake.



Basemap: ESRI World Streetmap.

Figure 4-1. Sampling sites and USGS gage sites in the Joe Pool Lake Watershed.

4.1 Statistics Summary Tables

Table 4-1 through Table 4-3 contain the summary statistics for Joe Pool Lake watershed for data collected June 2019 to April 2020. This includes basic statistical parameters, such as the data range, mean, standard deviation (st. dev), as well as measures of dataset completeness (count and percent completeness). Mountain Creek watershed summary includes routine stations 13622, 16434, 22134, 16433, and 22135 as well as flow-targeted stations 22138, 22136, and 22137. Walnut Creek watershed summary includes routine stations 22131, 20790, 21990, and 13621 as well as flow-targeted stations 22132, 22133, and 17198. Joe Pool Lake summary includes routine stations 11071, 11072, 11073, 22139, and 22140.

Table 4-1. Statistics summary table for Mountain Creek watershed.

Mountain Creek watershed					
Parameter	Data Points	Range	Mean	St. Dev	% Complete
E. coli (MPN/100 mL)	65	2 - 12000	945	2627	94%
DO	66	2.5 - 11.8	8.00	2.12	96%
TDS (mg/L)	66	269 - 1112	607	192	96%
Nitrate (mg/L)	66	0.08 - 4.8	0.94	1.08	96%
Nitrite (mg/L)	67	n/a - n/a	n/a	n/a	96%
TKN (mg/L)	66	0.22 - 2.35	0.67	0.45	96%
TP (mg/L)	66	0.02 - 0.858	0.15	0.17	96%
OP (mg/L)	66	0.02 - 0.38	0.10	0.08	96%
Chlorophyll a (µg/L)	66	4.0 - 113.0	19.0	23.0	96%

Table 4-2. Statistics summary table for Walnut Creek watershed.

Walnut Creek watershed					
Parameter	Data Points	Range	Mean	St. Dev	% Complete
E. coli (MPN/100 mL)	52	8 - 37000	3895	6925	90%
DO (mg/L)	52	0.5 - 12.8	7	3	90%
TDS (mg/L)	52	217 - 1044	504	204	90%
Nitrate (mg/L)	52	0.05 - 1.18	0.33	0.28	90%
Nitrite (mg/L)	52	n/a - n/a	n/a	n/a	90%
TKN (mg/L)	52	0.21 - 2.19	0.68	0.49	90%
TP (mg/L)	52	0.03 - 0.98	0.17	0.18	90%
OP (mg/L)	52	0.02 - 0.17	0.07	0.04	90%
Chlorophyll a (µg/L)	52	3.0 - 45.0	11.0	8.0	90%

Table 4-3. Statistics summary table for Joe Pool Lake.

Joe Pool Lake					
Parameter	Data Points	Range	Mean	St. Dev	% Complete
E. coli (MPN/100 mL)	60	2 - 51	8.0	10	100%
DO (mg/L)	60	6.4 - 11.2	9.3	1.18	100%
TDS (mg/L)	60	154 - 317	267	25	100%
Nitrate (mg/L)	60	0.05 - 0.49	0.20	0.10	100%
Nitrite (mg/L)	60	n/a - n/a	n/a	n/a	100%
TKN (mg/L)	60	0.2 - 0.52	0.38	0.09	100%
TP (mg/L)	60	0.02 - 0.05	0.03	0.01	100%
OP (mg/L)	60	n/a - n/a	n/a	n/a	100%
Chlorophyll a (µg/L)	60	4.0 - 24.0	12.0	6.0	100%

4.2 Parameter Summaries

Table 4-4. Summary of E. coli measurements in the Joe Pool Lake Watershed June 2019 – April 2020. contain the geomean statistics for *E.coli* and averages for each parameter of interest in the Joe Pool Lake watershed, for data collected June 2019 to April 2020. Geomeans for *E.coli* and averages for the parameter at each monitoring station are presented, except when sufficient data were unavailable for the purposes of the calculation. Each table includes routine and flow-targeted data. Six columns representing the results of three flow-targeted samples have cells blacked out indicating that sampling was not scheduled. Of the fourteen routine data columns, five columns have grayed out cells indicating that a sampling event was scheduled, but a sample was either unable to be taken because the site was dry, samples were lost or the quality control measurements did not pass the requirements specified in the QAPP for Monitoring and Data Acquisition for this project. Due to the 2014 Texas Integrated Report listing and subsequent 2018 TCEQ Texas Integrated Report delisting of Walnut Creek Assessment Unit (0838C_01) bacteria impairment, a geomean or average calculation is provided based on information from all sites within the Walnut Creek Assessment Unit (0838C_01), which excludes Site WC-ET (22132), Site WC-FT (22133) and Site WC-GT (17198). In addition, due to the 2014 Texas Integrated Report listing and subsequent 2018 Texas Integrated Report removal of Mountain Creek Assessment Unit (0838_02) for nitrate concern, an average calculation was provided based on information from site JPL-M (11071) within the Mountain Creek Assessment Unit (0838_02). Where relevant data were available, this was compared to the geomean or average presented in the 2014, 2016, 2018 and 2020 Texas Integrated Report assessment results for the Trinity River (TCEQ 2015, 2019a, 2019b, 2020).

4.2.1 E. coli

Table 4-4. Summary of E. coli measurements in the Joe Pool Lake Watershed June 2019 – April 2020. contains all the *E. coli* measurements collected as part of this project. The TCEQ Standard for *E.coli* is equivalent in both streams and lakes. Geomeans in red signify that the water quality criterion (126 MPN/100 mL) has been exceeded at that site for data taken over the duration of the project. The overall Mountain Creek watershed geomean is 100.25 MPN/100 mL. The overall Walnut Creek geomean is 537.74 MPN/100 mL. The overall Joe Pool Lake geomean is 4.94 MPN/100 mL. The geomean for the entire Joe Pool Lake watershed is 59.17 mpn/100mL.

The Walnut Creek Assessment Unit (0838C_01) geomean for data at all Walnut Creek main stem sites was then calculated for comparison to the geomean calculated for the 2014, 2016, 2018 and 2020 Texas Integrated Report assessment results for the Trinity River (TCEQ 2015, 2019a, 2019b, 2020). The results are in Table 4-4. Summary of E. coli measurements in the Joe Pool Lake Watershed June 2019 – April 2020. .

Table 4-4. Summary of E. coli measurements in the Joe Pool Lake Watershed June 2019 – April 2020.

Site	MC-HT	MC-B	MC-A	MC-C	MC-D	MC-E	MC-FT	MC-GT	WC-ET	WC-A	WC-B	WC-C	WC-D	WC-FT	WC-GT	JPL-W	JPL-D	I-1	I-2	JPL-M
TCEQ #	22138	13622	16434	22134	16433	22135	22136	22137	22132	22131	20790	21990	13621	22133	17198	11072	11073	22139	22140	11071
E. coli (MPN/ 100 mL)	150	210	240	410	180	87	100	4		6500	12000	13000	14000	430	1500	4	4	4	8	4
	12000	15	2	24	84	35	290	270	63	280	130	100	26	7900	9700	2	2	2	2	2
	1100	15	2	37	4	2	480	4400	7900	85	290	500	20	12000	37000	4	2	2	2	2
		4	2	56		8			1100		63	75	16			2	4	2	2	2
		140		110		30						1600	320			2	2	8	2	2
		150	8	34	30	16					30	34	81			4	21	4	4	4
		10	13	40	57	25					8	170	8			8	29	12	6	15
		440	80	270	130	270				120	80	1200	840			4	16	4	4	12
		70	48	39	21	43				30	74	140	25			2	51	24	15	2
		12000	12000	2200	430					6000	6000	5600	5200			6	6	13	29	42
		220	620	440	110	400				240	730	730	2200			8	4	4	4	8
		400	450	3300	1400	5200				1200	12000	9200	24000			4	4	8	4	8
	Site Geomeans																			
	1256	*102*	*47*	*147*	*85*	*55*	*241*	*168*	*818*	*420*	*305*	*614*	*268*	*3442*	*8135*	*4*	*7*	*5*	*5*	*5*
	MC Geomean							100.25	WC Geomean						537.74	JPL Geomean				4.94

**note: TCEQ Standard for E. coli is 126 MPN/100 mL. Values in red exceed the standard.*

Table 4-5. Walnut Creek Assessment Unit E.coli geomean compared to 2014, 2016, 2018 and 2020 Texas Integrated Report.

WC-A	WC-B	WC-C	WC-D	Site
22131	20790	21990	13621	TCEQ #
6500	12000	13000	14000	*E. coli* (MPN/ 100 mL)
280	130	100	26	
85	290	500	20	
	63	75	16	
		1600	320	
	30	34	81	
	8	170	8	
120	80	1200	840	
30	74	140	25	
6000	6000	5600	5200	
240	730	730	2200	
1200	12000	9200	24000	
Walnut Creek AU geomean			379.58	
2014 Texas Integrated Report			195.6	
2016 Texas Integrated Report			126.62	
2018 Texas Integrated Report			94.75	
2020 Texas Integrated Report			96.6	

4.2.2 Total Dissolved Solids

Table 4-6 contains all the Total Dissolved Solids (TDS) measurements collected as part of this project. Averages in red signify that the water quality criterion for streams (300 mg/L) has been exceeded at that site for data taken over the duration of the project. The average for Mountain Creek watershed was 606.91 mg/L. The average for Walnut Creek watershed was 503.96 mg/L. The averages for data taken over the duration of the project within Joe Pool Lake due not exceed the water quality criterion for lakes (500 mg/L).

Table 4-6. Summary of TDS measurements in the Joe Pool Lake Watershed June 2019 – April 2020.

Site	MC-HT	MC-B	MC-A	MC-C	MC-D	MC-E	MC-FT	MC-GT	WC-ET	WC-A	WC-B	WC-C	WC-D	WC-FT	WC-GT	JPL-W	JPL-D	I-1	I-2	JPL-M
TCEQ #	22138	13622	16434	22134	16433	22135	22136	22137	22132	22131	20790	21990	13621	22133	17198	11072	11073	22139	22140	11071
TDS (mg/L)	352	269	358	567	444	430	660	577	359	258	279	267	252	731	562	249	260	262	280	259
	333	720	720	563	519	1014	567	388		834	626	729	870	309	217	242	229	249	255	248
	1001	715	643	605	481	1095	354	388	344	1044	654	552	979	544	285	278	241	254	272	251
		729	796	652		914			768		673	447	738			297	317	317	303	283
		729		666		672						480	286			269	258	270	271	271
		369	638	666	694	751					305	556	316			252	262	251	235	237
		431	594	748	677	602					311	493	436			268	279	278	275	263
		295	442	755	548	439				371	268	452	316			259	255	279	235	154
		617	619	767	589	692				416	504	564	512			240	278	253	270	266
		349	426	599	526	423				299	354	380	310			291	263	283	304	305
		958	684	743	512	645				727	713	652	653			279	282	267	285	303
		1112	743	758	358	366				713	593	479	426			275	274	270	280	287
	Site Average																			
	562	*608*	*606*	*674*	*535*	*670*	*527*	*451*	*490*	*583*	*480*	*504*	*508*	*528*	*355*	*267*	*267*	*269*	*272*	*261*
	MC Average							606.91	WC Average						503.96	JPL Average				267.03

**note: TCEQ Standard for TDS is 300 mg/L for streams and 500 mg/L for lakes. Values in red exceed the standard.*

4.2.3 Nitrogen

Table 4-7 contains all the Nitrate (NO_3) measurements collected as part of this project. Averages in yellow signify that the TCEQ screening level for streams (1.95 mg/L) and for lakes (0.37 mg/L) has been exceeded at that site for data taken over the duration of the project. The average for Mountain Creek watershed is 0.94 mg/L. The average for Walnut Creek watershed is 0.33 mg/L. The average for Joe Pool Lake is 0.20 mg/L. The overall average for data at all Joe Pool Lake watershed sites was calculated to be 0.53 mg/L.

The Mountain Creek Assessment Unit (0838_02) overall average for data at site JPL-M (11071) was then calculated for comparison to the average calculated for the 2014, 2016, 2018, and 2020 Texas Integrated Report assessment results for the Trinity River (TCEQ 2015, 2019a, 2019b, 2020). The results are in Table 4-4. Summary of E. coli measurements in the Joe Pool Lake Watershed June 2019 – April 2020. .

Table 4-7. Summary of NO3 measurements in the Joe Pool Lake Watershed June 2019 – April 2020.

Site	MC-HT	MC-B	MC-A	MC-C	MC-D	MC-E	MC-FT	MC-GT	WC-ET	WC-A	WC-B	WC-C	WC-D	WC-FT	WC-GT	JPL-W	JPL-D	I-1	I-2	JPL-M
TCEQ #	22138	13622	16434	22134	16433	22135	22136	22137	22132	22131	20790	21990	13621	22133	17198	11072	11073	22139	22140	11071
Nitrate (mg/L)	0.3	0.75	0.75	1.29	0.53	0.51	0.1	0.41	<0.05	0.45	0.62	0.67	0.71	0.84	1.18	0.09	0.12	0.15	0.23	0.22
	0.14	<0.05	<0.05	0.29	0.16	1.16	0.6	<0.05		<0.05	<0.05	0.16	<0.05	0.92	0.33	<0.05	<0.05	<0.05	<0.05	<0.05
	<0.05	<0.05	<0.05	0.55	<0.05	1.29	0.54	0.19	0.15	<0.05	<0.05	0.14	<0.05	0.66	0.53	<0.05	<0.05	<0.05	<0.05	<0.05
		<0.05	<0.05	0.67		0.69			<0.05		<0.05	<0.05	<0.05			<0.05	<0.05	<0.05	<0.05	<0.05
		<0.05		2.14		0.36						0.06	0.32			<0.05	<0.05	<0.05	<0.05	<0.05
		1.55	<0.05	4.8	<0.05	0.61					<0.05	<0.05	0.11			<0.05	<0.05	<0.05	<0.05	<0.05
		<0.05	<0.05	<0.05	<0.05	0.48					<0.05	<0.05	0.07			0.05	0.05	0.05	0.06	0.06
		0.64	<0.05	3.35	0.2	0.41				0.42	0.11	0.23	0.36			0.15	0.15	0.15	0.16	0.22
		0.39	<0.05	4.71	0.08	0.56				<0.05	0.28	0.05	<0.05			0.19	0.17	0.19	0.23	0.22
		1.31	0.77	2.57	0.23	0.45				0.09	0.15	0.18	0.2			0.19	0.26	0.3	0.45	0.49
		<0.05	<0.05	2.23	0.41	0.39				<0.05	0.16	0.17	0.17			0.22	0.3	0.31	0.28	0.29
		<0.05	0.08	1.32	0.58	0.58				0.07	0.23	0.25	0.34			0.16	0.22	0.22	0.26	0.24
	Site Average																			
	0.22	*0.93*	*0.53*	*2.17*	*0.31*	*0.62*	*0.41*	*0.30*	*0.15*	*0.26*	*0.26*	*0.21*	*0.29*	*0.81*	*0.68*	*0.15*	*0.18*	*0.20*	*0.24*	*0.25*
	MC Average							0.94	WC Average						0.33	JPL Average				0.20

**note: TCEQ Screening level for nitrate in streams is 1.95 mg/L and 0.37 mg/L in lakes. Values in yellow exceed the screening level.*

Table 4-8. Mountain Creek Assessment Unit (0838_02) NO3 average compared to 2014, 2016, 2018 and 2020 Texas Integrated Report.

	JPL-M	Site
	11071	TCEQ #
	0.22	Nitrate (mg/L)
	<0.05	
	<0.05	
	<0.05	
	<0.05	
	<0.05	
	0.06	
	0.22	
	0.22	
	0.49	
	0.29	
	0.24	
Mountain Creek AU average	0.25	
2014 Texas Integrated Report	0.74	
2016 Texas Integrated Report	1.52	
2018 Texas Integrated Report	n/a	
2020 Texas Integrated Report	n/a	

Table 4-9 contains all the Nitrite (NO_2) measurements collected as part of this project. Literature values from Utah State Water Quality Extension for NO_2 in polluted waters is 0.02 mg/L. However, the limit of quantitation for NO_2 is 0.05 mg/L. Values in yellow exceed the limit of quantitation and thus the screening level. For the purposes of this analysis, none of the measurements that fell below the limit of quantitation were considered to be exceedances of the screening level. Due to the amount of non-detects, no averages for the Joe Pool Lake Watershed overall could be generated.

Table 4-9. Summary of nitrite measurements in the Joe Pool Lake Watershed June 2019 – April 2020.

Site	MC-HT	MC-B	MC-A	MC-C	MC-D	MC-E	MC-FT	MC-GT	WC-ET	WC-A	WC-B	WC-C	WC-D	WC-FT	WC-GT	JPL-W	JPL-D	I-1	I-2	JPL-M
TCEQ #	22138	13622	16434	22134	16433	22135	22136	22137	22132	22131	20790	21990	13621	22133	17198	11072	11073	22139	22140	11071
Nitrite (mg/L)	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.05	< 0.05	< 0.05	< 0.05	<0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.05	< 0.05	< 0.05		<0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	<0.05	<0.05	<0.05	0.07	<0.05	< 0.05	< 0.05	< 0.05	< 0.05	<0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	< 0.05	<0.05	<0.1	0.07		< 0.05			< 0.05		< 0.05	< 0.05	< 0.05			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
		<0.05		0.14		< 0.05						< 0.05	< 0.05			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
		0.08	<0.05	0.2	<0.05	< 0.05					< 0.05	< 0.05	< 0.05			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
		<0.05	<0.05	0.08	<0.05	< 0.05					< 0.05	< 0.05	< 0.05			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
		<0.05	<0.05	0.08	<0.05	< 0.05				<0.05	< 0.05	< 0.05	< 0.05			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
		<0.05	<0.05	0.08	<0.05	< 0.05				<0.05	< 0.05	< 0.05	< 0.05			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
		0.1	0.07	0.07	<0.05	< 0.05				<0.05	< 0.05	< 0.05	< 0.05			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
		<0.05	<0.05	<0.05	<0.05	< 0.05				<0.05	< 0.05	< 0.05	< 0.05			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
		<0.05	<0.05	<0.05	<0.05	< 0.05				<0.05	< 0.05	< 0.05	< 0.05			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

**note: Literature values from Utah State Water Quality Extension for nitrite in polluted waters is 0.02 mg/L. However, the limit of quantitation for nitrite is 0.05 mg/L. Values in yellow exceed the limit of quantitation and thus the screening level. Due to the limited dataset, no averages could be generated.*

Table 4-10 contains all the total Kjehdahl nitrogen (TKN) measurements collected as part of this project. Averages in yellow signify that the EPA Reference Criteria (0.4 mg/L) for streams and (0.41 mg/L) for lakes in this ecoregion (Ecoregion 29) has been exceeded at that site for data taken over the duration of the project. This point of reference differs significantly from both a water quality criteria (as is used with *E. coli* and TDS) and from TCEQ screening levels (NO_3, TP, OP) in that it does not indicate a cause for concern, but rather is a reference to TKN levels found in healthy, functioning streams in the region (USEPA 2000b). For that reason, several more yellow averages for each site appear in the dataset.

The average for Mountain Creek watershed is 0.67 mg/L. The average for Walnut Creek watershed is 0.68 mg/L. The average for Joe Pool Lake is 0.38 mg/L. The overall average for data at all Joe Pool Lake watershed sites was calculated to be 0.57 mg/L.

Table 4-10. Summary of TKN measurements in the Joe Pool Lake Watershed June 2019 – April 2020.

Site	MC-HT	MC-B	MC-A	MC-C	MC-D	MC-E	MC-FT	MC-GT	WC-ET	WC-A	WC-B	WC-C	WC-D	WC-FT	WC-GT	JPL-W	JPL-D	I-1	I-2	JPL-M
TCEQ #	22138	13622	16434	22134	16433	22135	22136	22137	22132	22131	20790	21990	13621	22133	17198	11072	11073	22139	22140	11071
Total Kjeldahl Nitrogen (mg/L)	0.55	0.8	0.64	1.1	<0.2	0.52	<0.2	0.22	0.24	1.24	1.54	1.77	2.19	<0.2	0.35	0.5	0.49	0.4	0.26	0.48
	1.01	0.44	0.44	1.29	<0.2	<0.2	0.23	0.38		<0.2	0.39	0.32	0.37	1.1	0.64	0.47	0.41	0.43	0.46	0.52
	0.38	<0.2	0.4	0.85	<0.2	<0.2	0.4	0.34	1	0.21	0.22	0.43	0.34	1.29	2.16	0.34	0.34	0.21	0.35	0.29
		0.29	0.42	1.74		0.33			0.29		0.32	0.56	0.24			0.4	<0.2	0.28	0.26	0.2
		0.43		1.52		0.46						0.83	0.57			0.48	0.52	0.45	0.51	0.52
		0.28	0.54	1.17	<0.2	0.32					0.63	0.37	0.75			0.23	0.32	0.34	0.32	0.39
		0.46	0.39	1.24	<0.2	0.24					0.95	0.29	0.27			0.41	0.42	0.34	0.33	0.37
		0.59	0.34	0.77	<0.2	0.47				0.29	0.71	0.38	0.34			0.38	0.33	0.45	0.4	0.42
		0.76	0.49	1.58	<0.2	0.22				0.26	0.53	0.27	0.37			0.27	0.29	0.49	0.34	0.42
		1.35	1.04	1.12	0.27	0.64				0.85	1.2	1.19	1.22			0.44	0.34	0.34	0.52	<0.2
		0.49	0.62	0.81	<0.2	0.28				0.3	0.33	0.59	0.34			<0.2	<0.2	<0.2	<0.2	<0.2
		0.31	0.57	2.35	0.4	0.98				0.25	0.81	0.79	0.94			0.42	0.33	0.28	0.3	0.32
	Site Average																			
	0.65	*0.56*	*0.54*	*1.30*	*0.34*	*0.45*	*0.32*	*0.31*	*0.51*	*0.49*	*0.69*	*0.65*	*0.66*	*1.20*	*1.05*	*0.39*	*0.38*	*0.36*	*0.37*	*0.39*
	MC Average							0.67	WC Average						0.68	JPL Average				0.38

**note: EPA reference criteria for TKN in pristine streams is 0.4 mg/L and pristine Lake/Reservoirs is 0.41 mg/L. Values in yellow indicate that this condition is not being met.*

4.2.4 Phosphorus

Table 4-11 contains all the Total Phosphorus (TP) measurements collected as part of this project. None of the site averages exceeded the TCEQ screening level (0.69 mg/L) for streams nor the (0.20 mg/L) for lakes over the duration of the project. The average for Mountain Creek watershed is 0.15 mg/L. The average for Walnut Creek watershed is 0.17 mg/L. The average for Joe Pool Lake is 0.03 mg/L. The overall average for data at all Joe Pool Lake watershed sites was calculated to be 0.12 mg/L.

Table 4-11. Summary of total phosphorus measurements in the Joe Pool Lake Watershed June 2019 – April 2020.

Site	MC-HT	MC-B	MC-A	MC-C	MC-D	MC-E	MC-FT	MC-GT	WC-ET	WC-A	WC-B	WC-C	WC-D	WC-FT	WC-GT	JPL-W	JPL-D	I-1	I-2	JPL-M
TCEQ #	22138	13622	16434	22134	16433	22135	22136	22137	22132	22131	20790	21990	13621	22133	17198	11072	11073	22139	22140	11071
Total Phosphorus (mg/L)	0.07	0.15	0.14	0.23	<0.02	0.04	<0.02	0.18	0.09	0.38	0.57	0.65	0.98	0.04	0.08	0.02	<0.02	0.02	0.03	0.03
	0.179	0.04	0.03	0.18	<0.02	<0.02	<0.02	0.0321		0.03	0.05	0.04	0.06	0.18	0.13	0.03	<0.02	<0.02	0.03	0.03
	0.0331	0.04	0.05	0.3	0.02	<0.02	0.0764	0.129	0.39	0.06	0.07	0.09	0.05	0.16	0.43	0.03	0.02	0.02	0.03	0.04
		0.03	0.03	0.36		<0.02			0.0601		0.21	0.23	0.04			0.03	<0.02	<0.02	0.04	0.04
		0.03		0.61		0.02						0.19	0.08			0.03	0.03	0.02	0.03	0.02
		0.19	0.12	0.58	0.03	0.03					0.29	0.15	0.08			0.03	0.03	0.02	0.04	0.03
		0.11	0.04	0.36	<0.02	<0.02					0.34	0.07	0.06			0.03	0.03	0.03	0.03	0.03
		0.17	0.07	0.3	<0.02	0.05				0.06	0.21	0.11	0.07			0.03	0.02	0.02	0.03	0.03
		0.09	0.06	0.41	<0.02	0.02				0.05	0.1	0.06	0.04			0.03	0.02	0.03	0.03	0.04
		0.2	0.19	0.25	<0.02	0.0761				0.16	0.23	0.18	0.23			0.03	0.02	0.03	0.05	0.05
		0.0434	0.063	0.244	<0.02	0.033				0.0425	0.0767	0.0856	0.0678			0.0309	0.0211	0.0259	0.0335	0.0317
		0.0438	0.099	0.858	0.0943	0.271				0.0667	0.264	0.167	0.193			0.0229	<0.02	<0.02	0.0212	0.0313
	Site Average																			
	0.09	*0.09*	*0.08*	*0.39*	*0.05*	*0.07*	*0.08*	*0.11*	*0.18*	*0.11*	*0.22*	*0.17*	*0.16*	*0.13*	*0.21*	*0.03*	*0.02*	*0.02*	*0.03*	*0.03*
	MC Average							0.15	WC Average						0.17	JPL Average				0.03

**note: TCEQ screening level for TP in streams is 0.69 mg/L and in lakes is 0.20 mg/L. Values in yellow exceed the screening level.*

Table 4-12 contains all the orthophosphate (OP) measurements collected as part of this project. OP is no longer used for TCEQ screening purposes, as of the 2014 Texas Integrated Report (TCEQ 2015). Averages in yellow signify that the previously-used TCEQ screening level for streams (0.37 mg/L) and (0.05 mg/L) for lakes has been exceeded at that site for data taken over the duration of the project. The average for Mountain Creek watershed is 0.10 mg/L. The average for Walnut Creek watershed is 0.07 mg/L. The average for Joe Pool Lake is <0.02 mg/L. The overall average for data at all Joe Pool Lake watershed sites was calculated to be 0.08 mg/L.

Table 4-12. Summary of orthophosphate measurements in the Joe Pool Lake Watershed June 2019 – April 2020.

Site	MC-HT	MC-B	MC-A	MC-C	MC-D	MC-E	MC-FT	MC-GT	WC-ET	WC-A	WC-B	WC-C	WC-D	WC-FT	WC-GT	JPL-W	JPL-D	I-1	I-2	JPL-M
TCEQ #	22138	13622	16434	22134	16433	22135	22136	22137	22132	22131	20790	21990	13621	22133	17198	11072	11073	22139	22140	11071
Orthophosphate (mg/L)	0.04	0.09	0.06	0.03	<0.02	<0.02	<0.02	0.02	0.04	0.11	0.1	0.09	0.09	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02
	0.07	<0.02	<0.02	0.05	<0.02	<0.02	<0.02	<0.02		<0.02	<0.02	0.02	<0.02	0.07	0.05	<0.02	<0.02	<0.02	<0.02	<0.02
	<0.02	<0.02	<0.02	0.09	<0.02	<0.02	<0.02	0.03	0.17	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
		<0.02	<0.02	0.1		<0.02			<0.02		<0.02	0.09	<0.02			<0.02	<0.02	<0.02	<0.02	<0.02
		<0.02		0.23		<0.02						0.06	0.04			<0.02	<0.02	<0.02	<0.02	<0.02
		0.13	0.06	0.38	<0.02	<0.02					0.12	0.08	<0.02			<0.02	<0.02	<0.02	<0.02	<0.02
		<0.02	<0.02	0.25	<0.02	<0.02					0.09	<0.02	<0.02			<0.02	<0.02	<0.02	<0.02	<0.02
		0.07	<0.02	0.1	<0.02	<0.02				0.03	0.11	0.03	0.02			<0.02	<0.02	<0.02	<0.02	<0.02
		0.03	0.02	0.14	<0.02	<0.02				0.04	0.03	<0.02	<0.02			<0.02	<0.02	<0.02	<0.02	<0.02
		0.08	0.07	0.1	<0.02	<0.02				0.07	0.1	0.09	0.09			<0.02	<0.02	<0.02	<0.02	<0.02
		<0.02	<0.02	0.1	<0.02	<0.02				0.03	0.03	<0.02	<0.02			<0.02	<0.02	<0.02	<0.02	<0.02
		<0.02	<0.02	<0.02	<0.02	<0.02				0.03	<0.02	<0.02	<0.02			<0.02	<0.02	<0.02	<0.02	<0.02
	Site Average																			
	0.06	*0.08*	*0.05*	*0.14*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	*0.03*	*0.11*	*0.05*	*0.08*	*0.06*	*0.06*	*0.07*	*0.04*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*
	MC Average							0.10	WC Average						0.07	JPL Average				#DIV/0!

**note: TCEQ screening level previously used for orthophosphate is 0.37 mg/L for streams and 0.05 mg/L for lakes. Values in yellow exceed the screening level.*

4.2.5 Chlorophyll-a

Table 4-13 contains all the chl-a measurements collected as part of this project. Averages in yellow signify that the TCEQ screening level (14.1 µg/L) for streams and (26.7 µg/L) for lakes has been exceeded at that site for data taken over the duration of the project. The average for Mountain Creek watershed is 18.97 µg/L. The average for Walnut Creek watershed is 10.85 µg/L. The average for Joe Pool Lake is 11.67 mg/L. The overall average for data at all Joe Pool Lake watershed sites is 13.51 µg/L.

Table 4-13. Summary of chlorophyll a measurements in Joe Pool Lake Watershed June 2019 – April 2020.

Site	MC-HT	MC-B	MC-A	MC-C	MC-D	MC-E	MC-FT	MC-GT	WC-ET	WC-A	WC-B	WC-C	WC-D	WC-FT	WC-GT	JPL-W	JPL-D	I-1	I-2	JPL-M
TCEQ #	22138	13622	16434	22134	16433	22135	22136	22137	22132	22131	20790	21990	13621	22133	17198	11072	11073	22139	22140	11071
Chlorophyll a (µg/L	<3	8	<3	38	<3	<3	<3	5	<3	12	15	14	19	<3	<3	17	14	10	14	15
	7	9	4	17	4	<3	<3	<3		5	26	10	17	<3	<3	22	15	14	19	24
	<3	<3	5	14	<3	<3	4	<3	14	3	4	11	9	6	45	14	13	11	14	18
		4	<3	51		<3			<3		9	9	8			18	16	14	11	18
		5		113		5						24	5			21	19	22	18	20
		5	<3	77	<3	<3					6	<3	<3			14	15	15	14	17
		9	9	26	<3	<3					16	7	<3			4	4	<3	<3	<3
		10	31	13	<3	<3				6	15	3	3			7	4	<3	4	4
		18	15	48	<3	<3				<3	15	9	6			7	5	5	7	5
		6	5	20	<3	<3				7	10	9	6			12	5	<3	10	10
		9	9	25	<3	<3				<3	4	4	5			7	6	8	7	7
		8	10	48	4	23				<3	22	9	7			8	4	5	5	6
	Site Average																			
	7.00	*8.27*	*11.00*	*40.83*	*4.00*	*14.00*	*4.00*	*5.00*	*14.00*	*6.60*	*12.91*	*9.91*	*8.50*	*6.00*	*45.00*	*12.58*	*10.00*	*11.56*	*11.18*	*13.09*
	MC Average							18.97	WC Average						10.85	JPL Average				11.67

**note: TCEQ screening level for chlorophyll a in streams is 14.1 µg/L and 26.7 µg/L in lakes. Values in yellow exceed the screening level.*

4.2.6 Dissolved Oxygen

Table 4-14 contains all the dissolved oxygen measurements collected as part of this project. Yellow signifies that the water quality criterion for minimum DO (3 mg/L) has not been met at that site. The Mountain Creek watershed average is 8.03 mg/L. The Walnut Creek watershed average is 7.34 mg/L. The Joe Pool Lake average is 9.27 mg/L. The overall average for dissolved oxygen data at all Joe Pool Lake watershed sites is 8.25 mg/L.

Table 4-14. Summary of dissolved oxygen measurements in Joe Pool Lake Watershed June 2019 – April 2020.

Site	MC-HT	MC-B	MC-A	MC-C	MC-D	MC-E	MC-FT	MC-GT	WC-ET	WC-A	WC-B	WC-C	WC-D	WC-FT	WC-GT	JPL-W	JPL-D	I-1	I-2	JPL-M
TCEQ #	22138	13622	16434	22134	16433	22135	22136	22137	22132	22131	20790	21990	13621	22133	17198	11072	11073	22139	22140	11071
DO (mg/L)	9.6	4.6	6.3	7.8	8.0	7.0	10.6	8.4	6.3	7.4	7.3	7.0	7.4	10.9	10.7	9.2	9.0	8.4	8.1	8.9
	8.5	4.5	6.3	4.9	8.2	4.6	9.3	8.6	5.3	5.7	4.3	5.0	6.0	10.1	9.7	8.7	8.4	8.8	8.6	8.9
	8.2	5.4	6.2	5.0	2.5	8.4	8.5	7.2	9.6	4.6	4.4	2.4	6.0	7.9	7.5	7.7	8.1	8.6	7.2	6.7
		5.7	6.8	6.5		7.2			4.8		4.2		5.7			6.6	8.0	8.4	7.1	6.4
		5.1		8.4		8.7						12.8	4.2			9.0	7.9	8.4	9.8	9.7
		4.6	4.2	11.5	8.4	6.7					5.3	0.5	6.5			10.0	9.8	9.4	10.6	10.5
		6.5	9.0	11.5	11.1	10.9					2.7	5.2	8.9			9.8	9.5	9.8	10.3	10.4
		5.4	10.5	11.1	11.8	10.5				10.7	9.0	9.6	10.4			10.4	10.3	10.0	10.5	10.0
		8.4	8.8	9.6	11.3	10.4				8.8	9.4	9.8	11.2			10.6	10.5	10.6	10.9	10.8
		8.2	9.0	9.0	10.0	8.3				8.8	8.6	8.8	9.1			11.2	11.0	10.9	10.8	10.8
		6.9	9.0	9.2	11.2	9.8				9.4	8.6	7.5	9.3			9.0	9.0	8.8	9.2	9.1
		8.2	8.0	7.7	8.6	7.7				5.9	6.4	6.8	7.1			9.8	9.1	9.0	9.0	8.6
	Site Average																			
	9	*6*	*8*	*9*	*9*	*8*	*9*	*8*	*7*	*8*	*6*	*7*	*8*	*10*	*9*	*9*	*9*	*9*	*9*	*9*
	MC Average							8.03	WC Average						7.34	JPL Average				9.28

**note: TCEQ Standard for DO 24 hr min is 3 mg/L for streams. Values in yellow are below the standard.*

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Appendix A

Analytical and Field Data for Stations in
AUs 0838 and 0838A-F

Appendix A: Raw Data for Stations in AUs 0838 and 0838A-F

Table A. Color Codes for Appendix A

Verified Outlier
Parameter not in QAPP
Error - Out of hold time
Error - Failed LCS Recovery
Error - Failed LOQ

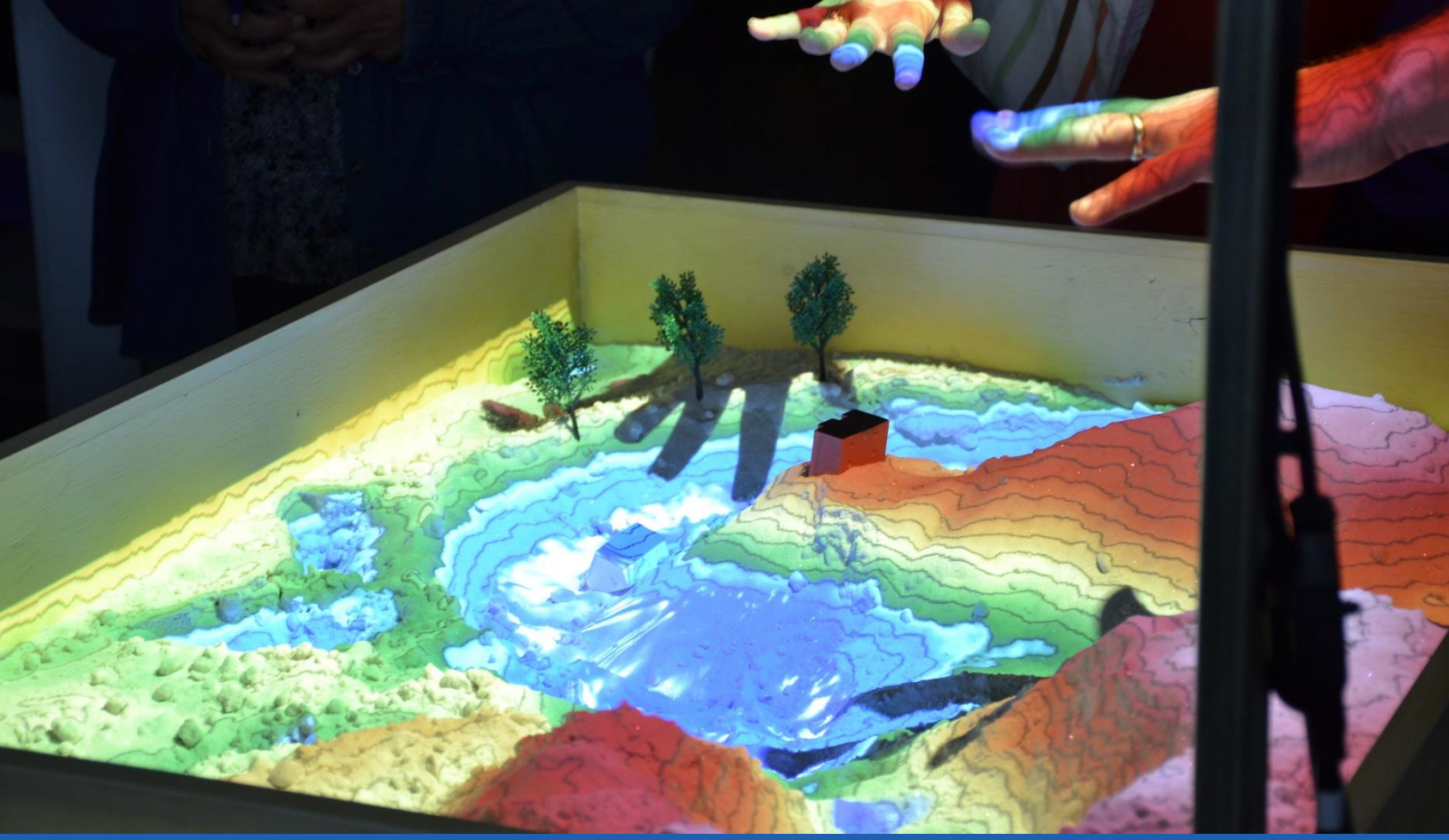
Station	Date	Time	Depth	TEMPERATURE, WATER (DEGREES CENTIGRADE)	TEMPERATURE, AIR (DEGREES CENTIGRADE)	FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)	TRANSPARENCY, SECCHI DISC (METERS)	SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C)	OXYGEN, DISSOLVED (MG/L)	PH (STANDARD UNITS)	RESIDUE, TOTAL NONFILTRABLE (MG/L)	RESIDUE, VOLATILE NONFILTRABLE (MG/L)	NITRITE NITROGEN, TOTAL (MG/L AS N)	NITRATE NITROGEN, TOTAL (MG/L AS N)	NITROGEN, KJELDAHL, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	FLOW SEVERITY:1=No Flow,2=Low,3=Normal,4=Flood,5=High,6=Dry	E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	CHLOROPHYLL-A UG/L SPECTROPHOTOMETRIC ACID. METH	RESIDUE,TOTAL FILTRABLE (DRIED AT 180C) (MG/L)	ORTHOPHOSPHATE PHOSPHORUS,DISS,MG/L,FILTER >15MIN	DAYS SINCE PRECIPITATION EVENT (DAYS)	Field Turbidity NTU	DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER	Blue Green Algae RFU	Total Chlorophyll RFU	RESERVOIR STAGE (FEET ABOVE MEAN SEA LEVEL)	RESERVOIR PERCENT FULL
22131	06/24/2019	10:55	0.1	24.1	25.0	45	0.06	347	7.4	7.5	115	16	<0.05	0.45	1.24	0.38	3	6500	12	258	0.11	3	58.4	0.3	2	0.36	1.025		
20790	06/24/2019	12:45	0.3	24.2	27.0	90	0.55	341	7.3	6.1	253	29	<0.05	0.62	1.54	0.57	5	12000	15	279	0.1	3	50		5	0.47	1		
21990	06/24/2019	13:59	0.3	24.2	27.0	85	0.04	338	7.0	7.5	372	47	<0.05	0.67	1.77	0.65	5	13000	14	267	0.09	3	92		5	0.5	0.93		
13621	06/24/2019	14:34	0.3	25.1	29.0	115	0.04	354	7.4	6.7	438	54	<0.05	0.71	2.19	0.98	5	14000	19	252	0.09	3			1	0.57	0.95		
16434	06/26/2019	12:00	0.08	25.6	29.0	6.9	0.16	549	6.3	7.4	31	<5	<0.05	0.75	0.64	0.14	3	240	<3	358	0.06	5	18.4		2	0.12	0.74		
13622	06/26/2019	11:20	0.3	25.4	29.0	2	0.28	464	4.6	6.6	12	3	<0.05	0.75	0.8	0.15	3	210	8	269	0.09	5	11.2		1	0.15	0.75		
22134	06/25/2019	12:11	0.3	27.3	29.0	45	0.07	796	7.8	8.2	112	14	<0.05	1.29	1.1	0.23	3	410	38	567	0.03	5	50.2		5	0.68	1.53		
16433	06/26/2019	10:30	0.05	23.7	29.0	1.6	>0.6	690	8.0	8.0	8	<2	<0.05	0.53	<0.2	<0.02	3	180	<3	444	<0.02	5	4.1		2	0	0.11		
22135	06/26/2019	13:52	0.04	26.9	31.0	1.4	0.42	649	7.0	7.6	11	<2	<0.05	0.51	0.52	0.04	3	87	<3	430	<0.02	5	6.4		2	0.07	0.32		
11073	06/25/2019	09:34	0.3	27.9	25.0		0.62	423	9.0	8.1	6	2	<0.05	0.12	0.49	<0.02		4	14	260	<0.02	4	2.75			0.38	0.73	522.63	100.12
11072	06/25/2019	10:02	0.3	27.9	27.0		0.67	425	9.2	8.2	5	2	<0.05	0.09	0.5	0.02		<4	17	249	<0.02	4	2.75			0.46	0.82	522.63	100.12
11071	06/25/2019	11:00	0.3	27.5	29.0		0.34	435	8.9	8.2	10	3	<0.05	0.22	0.48	0.03		<4	15	259	<0.02	4	5.7			0.45	0.85	522.63	100.12
22139	06/25/2019	12:59	0.3	28.8	31.0		0.46	427	8.4	8.2	10	2	<0.05	0.15	0.4	0.02		4	10	262	<0.02	4	4.83			0.25	0.36	522.63	100.12
22140	06/25/2019	10:38	0.3	27.1	28.0		0.33	437	8.1	7.9	13	<3	<0.05	0.23	0.26	0.03		8	14	280	<0.02	4	6.84			0.36	0.75	522.63	100.12
22131	07/23/2019	10:22	0.03	25.2	28.0	0.01	>0.6	1240	5.7	7.3	5	<2	<0.05	<0.05	<0.2	0.03	3	280	5	834	<0.02	12	2.35		2	0.06	0.55		
20790	07/23/2019	11:02	0.3	28.0	29.0	0	0.42	991	4.3	7.3	16	<5	<0.05	<0.05	0.39	0.05	1	130	26	626	<0.02	12	5.92			0.5	3.17		
21990	07/23/2019	11:43	0.1	26.0	29.0	0.2	0.59	1140	5.0	7.4	6	<2	<0.05	0.16	0.32	0.04	2	100	10	729	0.02	12	3.58	0.3	2	0.23	1.37		
13621	07/23/2019	13:29	0.3	28.2	31.0	9.6	0.28	1300	6.0	7.5	23	<7	<0.05	<0.05	0.37	0.06	3	26	17	870	<0.02	12	11.4		1	0.75	5.08		
16434	07/24/2019	10:05	0.04	24.9	25.0	0.03	0.51	1050	6.3	7.6	8	<2	<0.05	<0.05	0.44	0.03	2	2	4	720	<0.02	13	4.6	0.12	2	0.021	0.408		
13622	07/24/2019	09:26	0.3	26.7	22.0	0.04	0.47	1030	4.5	7.4	12	<3	<0.05	<0.05	0.44	0.04	3	15	9	720	<0.02	13	5.24		1	0.283	0.982		
22134	07/22/2019	12:51	0.1	30.7	34.0	0.4	0.11	907	4.9	8.1	65	<7	<0.05	0.29	1.29	0.18	3	24	17	563	0.05	11	35.3	0.3	2	0.46	0.57		
16433	07/24/2019	11:05	0.1	24.2	25.0	0.2	>0.6	772	8.2	7.7	2	<2	<0.05	0.16	<0.2	<0.02	3	84	4	519	<0.02	13	6.32	0.3	2	0.104	0.958		
22135	07/23/2019	14:09	0.02	25.8	32.0	0.07	>0.6	1380	4.6	6.9	11	2	<0.05	1.16	<0.2	<0.02	3	35	<3	1014	<0.02	12	1.61	0.06	2	0	0.1		
11073	07/22/2019	10:28	0.3	30.1	31.0		0.75	422	8.4	8.4	6	3	<0.05	<0.05	0.41	<0.02		2	15	229	<0.02	11	3.38			0.58	0.9	521.57	99.91
11072	07/22/2019	11:01	0.3	29.8	32.0		0.51	427	8.7	8.5	11	4	<0.05	<0.05	0.47	0.03		<2	22	242	<0.02	11	5.4			0.89	1.33	521.57	99.91
11071	07/22/2019	11:52	0.3	29.9	33.0		0.34	435	8.9	8.5	16	5	<0.05	<0.05	0.52	0.03		2	24	248	<0.02	11	8.94			0.93	1.36	521.57	99.91
22139	07/22/2019	13:40	0.3	31.0	32.0		0.59	421	8.8	8.6	7	3	<0.05	<0.05	0.43	<0.02		2	14	249	<0.02	11	3.47			0.54	0.91	521.57	99.91
22140	07/22/2019	11:38	0.3	30.1	33.0		0.36	434	8.6	8.5	14	4	<0.05	<0.05	0.46	0.03		2	19	255	<0.02	11	8.6			0.76	0.89	521.57	99.91

Station	Date	Time	Depth	TEMPERATURE, WATER (DEGREES CENTIGRADE) 00010	TEMPERATURE, AIR (DEGREES CENTIGRADE) 00020	FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC) 00061	TRANSPARENCY, SECCHI DISC (METERS) 00078	SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C) 00094	OXYGEN, DISSOLVED (MG/L) 00300	PH (STANDARD UNITS) 00400	RESIDUE, TOTAL NONFILTRABLE (MG/L) 00530	RESIDUE, VOLATILE NONFILTRABLE (MG/L) 00535	NITRITE NITROGEN, TOTAL (MG/L AS N) 00615	NITRATE NITROGEN, TOTAL (MG/L AS N) 00620	NITROGEN, KJELDAHL, TOTAL (MG/L AS N) 00625	PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P) 00665	FLOW SEVERITY:1=No Flow,2=Low,3=Normal,4=Flood,5=High,6=Dry 01351	E. COLI, COLILERT, IDEXX METHOD, MPN/100ML 31699	CHLOROPHYLL-A UG/L SPECTROPHOTOMETRIC ACID. METH 32211	RESIDUE,TOTAL FILTRABLE (DRIED AT 180C) (MG/L) 70300	ORTHOPHOSPHATE PHOSPHORUS,DISS,MG/L,FILTER >15MIN 70507	DAYS SINCE PRECIPITATION EVENT (DAYS) 72053	Field Turbidity NTU 82078	DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE 82903	FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER 89835	Blue Green Algae RFU	Total Chlorophyll RFU	MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS) 89864	MAXIMUM POOL DEPTH AT TIME OF STUDY(METERS) 89865	POOL LENGTH, METERS 89869	% POOL COVERAGE IN 500 METER REACH 89870	RESERVOIR STAGE (FEET ABOVE MEAN SEA LEVEL) 00052	RESERVOIR PERCENT FULL 00053
22131	08/19/2019	09:54	0.3	26.5	28.0	0	0.4	1500	4.6	6.8	20	<3	<0.05	<0.05	0.21	0.06	1	85	3	1044	<0.02	4	6.33			0.12	0.748	12	0.4	45	9		
20790	08/19/2019	11:05	0.3	28.5	32.0	0	0.2	986	4.4	7.6	26	<5	<0.05	<0.05	0.22	0.07	1	290	4	654	<0.02	4	14.9			0.221	0.732	10	1.5	140	28		
21990	08/19/2019	12:05	0.3	28.0	32.0	0.04	>0.6	898	2.4	7.3	8	<2	<0.05	0.14	0.43	0.09	2	500	11	552	0.04	4	6.03	0.9	2	0.362	1.139						
13621	08/19/2019	13:00	0.13	30.2	32.0	0.3	>0.6	1430	6.0	7.5	12	<2	<0.05	<0.05	0.34	0.05	2	20	9	979	<0.02	4	2.78	0.2	1	0.921	0.714						
16434	08/20/2019	10:50	0.05	28.1	32.0	0	0.55	1060	6.2	7.6	24	<2	<0.05	<0.05	0.4	0.05	1	<2	5	643	<0.02	5	5.02	0.53		0	0.306	2.8	0.53	90	80		
13622	08/20/2019	13:10	0.3	29.1	41.0	0	0.53	1040	5.4	7.5	8	<2	<0.05	<0.05	<0.2	0.04	1	15	<3	715	<0.02	5	3.44		1	0.105	0.435	16	1.5	500	100		
22134	08/20/2019	11:47	0.25	30.4	38.0	1.1	0.09		5.0	7.8	112	<20	0.07	0.55	0.85	0.3	3	37	14	605	0.09	5	48.5	0.85	2	0.618	0.584						
16433	08/20/2019	09:50	0.15	26.1	32.0	0	0.55	721	2.5	7.1	9	<2	<0.05	<0.05	<0.2	0.02	1	4	<3	481	<0.02	5	3.31	0.24		0.005	0.192	4.9	0.46	12			
22135	08/20/2019	14:02	0.05	29.0	38.0	0.05	>0.6	1540	8.4	7.0	3	<2	<0.05	1.29	<0.2	<0.02	2	2	<3	1095	<0.02	5	1.23	0.25	2	0	0.284						
11073	08/19/2019	10:44	0.3	30.8	32.0		0.66	412	8.1	8.4	5	<2	<0.05	<0.05	0.34	0.02		<2	13	241	<0.02	4	2.65			0.3	0.62					520.79	99.76
11072	08/19/2019	11:41	0.3	30.6	34.0		0.56	414	7.7	8.2	6	3	<0.05	<0.05	0.34	0.03		4	14	278	<0.02	4	2.65			0.48	0.87					520.79	99.76
11071	08/19/2019	13:09	0.3	30.2	36.0		0.42	433	6.7	8.0	10	<3	<0.05	<0.05	0.29	0.04		2	18	251	<0.02	4	5.94			0.47	0.88					520.79	99.76
22139	08/19/2019	14:00	0.3	31.7	37.0		0.52	414	8.6	8.4	8	<2	<0.05	<0.05	0.21	0.02		<2	11	254	<0.02	4	3.51			0.17	0.35					520.79	99.76
22140	08/19/2019	12:49	0.3	30.4	36.0		0.37	433	7.2	8.1	10	<4	<0.05	<0.05	0.35	0.03		2	14	272	<0.02	4	5.83			0.4	0.72					520.79	99.76
22131	09/09/2019	10:00	0		28.0												6					9										
20790	09/09/2019	10:33	0.1	24.6	28.0	0	0.14	952	4.2	7.5	84	<14	<0.05	<0.05	0.32	0.21	1	63	9	673	<0.02	9	19.6	0.3		0.542	2.26	12	0.55	56	25		
21990	09/09/2019	11:05	0.1	25.4	29.0	0.2	0.22	681		7.3	18	<4	<0.05	<0.05	0.56	0.23	2	75	9	447	0.09	9	14.9	0.3	2	0.242	0.73						
13621	09/09/2019	11:42	0.3	27.1	29.0	5.9	0.38	1050	5.7	7.4	11	<4	<0.05	<0.05	0.24	0.04	2	16	8	738	<0.02	9	6.25		1	0.249	1.177						
16434	09/11/2019	11:20	0.1	25.3	28.0	0	>0.6	1070	6.8	7.7	6	<2	<0.1	<0.05	0.42	0.03	1	2	<3	796	<0.02	11	3.69	0.3		0.167	0.78	10	0.3	84	70		
13622	09/11/2019	10:10	0.3	27.5	27.0	0	0.48	1030	5.7	7.6	9	<2	<0.05	<0.05	0.29	0.03	1	4	4	729	<0.02	11	7.19		1	0.134	0.501			500	100		
22134	09/11/2019	11:59	0.1	27.4	29.0	1.4	0.05	932	6.5	8.1	124	<20	0.07	0.67	1.74	0.36	2	56	51	652	0.1	11	67.4	0.3	2	2.735	0.759						
16433	09/11/2019	13:51	0		33.0												6					11										
22135	09/09/2019	12:07	0.066	27.6	31.0	0.1	>0.6	1300	7.2	7.1	12	2	<0.05	0.69	0.33	<0.02	2	8	<3	914	<0.02	9	0.56	0.2	2	0.206	0.328						
11073	09/10/2019	11:15	0.3	29.3	32.0		0.75	414	8.0	8.3	4	2	<0.05	<0.05	<0.2	<0.02		4	16	317	<0.02	10	3.92			0.63	0.82					520.13	99.64
11072	09/10/2019	11:43	0.3	28.8	32.0		0.42	422	6.6	7.9	9	<4	<0.05	<0.05	0.4	0.03		<2	18	297	<0.02	10	6.05			1.11	1.02					520.13	99.64
11071	09/10/2019	12:38	0.3	28.3	33.0		0.28	429	6.4	7.8	15	<3	<0.05	<0.05	0.2	0.04		<2	18	283	<0.02	10	8.65			1.13	1.26					520.13	99.64
22139	09/10/2019	13:05	0.3	29.8	38.0		0.76	414	8.4	8.3	8	<3	<0.05	<0.05	0.28	<0.02		2	14	317	<0.02	10	3.6			0.8	1					520.13	99.64
22140	09/10/2019	12:18	0.3	28.7	33.0		0.32	427	7.1	7.8	17	<5	<0.05	<0.05	0.26	0.04		2	11	303	<0.02	10	8.68			1.06	1.24					520.13	99.64
22131	10/15/2019	10:47	0		26.0												6					3										
20790	10/15/2019	11:00	0		24.0												6					3										
21990	10/15/2019	11:26	0.03	19.0	24.0	0.9	0.31	700	12.8	7.2	22	6	<0.05	0.06	0.83	0.19	2	1600	24	480	0.06	3	17.6	0.1	2	0.46	2						
13621	10/15/2019	11:59	0.3	19.2	24.0	0.5	>0.6	487	4.2	7.0	6	<2	<0.05	0.32	0.57	0.08	2	320	5	286	0.04	3	7.34		1	0.13	0.75						
16434	10/16/2019	11:01	0		16.0												6					4										
13622	10/16/2019	10:25	0.3	19.0	15.0	0	0.36	1050	5.1	7.1	14	<3	<0.05	<0.05	0.43	0.03	1	140	5	729	<0.02	4	8.26		1	0.17	0.78	20	1	500	100		
22134	10/16/2019	11:39	0.05	18.4	16.0	2.2	0.07	1000	8.4	8.3	132	<22	0.14	2.14	1.52	0.61	2	110	113	666	0.23	4	66	0.15	2	4.49	0.9						
16433	10/16/2019	13:25	0		18.0												6					4										
22135	10/16/2019	14:15	0.05	20.8	21.0	0.2	>0.6	992	8.7	7.1	4	<2	<0.05	0.36	0.46	0.02	2	30	5	672	<0.02	4	2.16	0.15	2	0.05	0.36						
11073	10/14/2019	11:49	0.3	23.1	22.0		0.39	423	7.9	7.9	8	<3	<0.05	<0.05	0.52	0.03		<2	19	258	<0.02	2				1.26	1.32					519.13	99.45
11072	10/14/2019	12:28	0.3	22.9	23.0		0.46	421	9.0	8.3	8	<3	<0.05	<0.05	0.48	0.03		2	21	269	<0.02	3				1.31	1.58					519.13	99.45
11071	10/14/2019	13:23	0.3	22.0	24.0		0.43	419	9.7	8.4	8	<3	<0.05	<0.05	0.52	0.02		2	20	271	<0.02	2				1.11	1.35					519.13	99.45
22139	10/14/2019	13:50	0.3	25.0	25.0		0.48	429	8.4	8.0	8	<3	<0.05	<0.05	0.45	0.02		8	22	270	<0.02	2				1.25	1.45					519.13	99.45
22140	10/14/2019	13:02	0.3	22.1	24.0		0.43	424	9.8	8.4	12	4	<0.05	<0.05	0.51	0.03		<2	18	271	<0.02	2				1.03	1.27					519.13	99.45
22131	11/19/2019	09:25	0		13.0												6					11										
20790	11/19/2019	09:48	0.3	6.2	18.0	0	0.3	478	5.3	6.8	22	<10	<0.05	<0.05	0.63	0.29	1	30	6	305	0.12	11	12.7	0.3		0.22	1.04	10	1.2	130	80		
21990	11/19/2019	10:31	0.1	8.9	18.0	0.08	>0.6	862	0.5	7.0	6	<2	<0.05	<0.05	0.37	0.15	2	34	<3	556	0.08	11	3.51	0.3	2	0.35	0.256						
13621	11/11/2019	12:14	0.3	13.4	7.0	1.7	0.59	515	6.5	6.7	12	<3	<0.05	0.11	0.75	0.08	3	81	<3	316	<0.02	3	6.22		1	0.27	1.12						
16434	11/12/2019	11:05	0.1	6.0	1.0	0.1	0.59	937	4.2	7.3	11	<3	<0.05	<0.05	0.54	0.12	3	8	<3	638	0.06	4	7.29	0.3	2	0.2	0.67						
13622	11/12/2019	10:12	0.3	10.2	-1.0	0.03	0.35	582	4.6	6.7	23	<5	0.08	1.55	0.28	0.19	3	150	5	369	0.13	4	11.25		1	0.35	1.24						
22134	11/12/2019	12:12	0.1	6.8	2.0	2.6	0.1	1020	11.5	8.1	60	18	0.2	4.8	1.17	0.58	3	34	77	666	0.38	4	35.9	0.3	2	2.15	0.72						
16433	11/11/2019	14:50	0.02	13.3	3.0	0.2	>0.6	1000	8.4	7.7	8	<2	<0.05	<0.05	<0.2	0.03	3	30	<3	694	<0.02	3	4.05	0.06	2	0.06	0.14						
22135	11/12/2019	13:54	0.03	14.6	4.0	0.2	>0.6	1070	6.7	7.0	5	<2	<0.05	0.61	0.32	0.03	3	16	<3	751	<0.02	4	3.29	0.1	2	0.06	0.16						
11073	11/11/2019	10:14	0.3	16.0	18.0		0.44	418	9.8	7.9	9	<3	<0.05	<0.05	0.32	0.03		21	15	262	<0.02	3	5.61			1	1.35					519.25	99.47
11072	11/14/2019	10:39	0.3	12.7	10.0		0.49	416	10.0	8.0	8	<2	<0.05	<0.05	0.23	0.03		4	14	252	<0.02	6	3.76			8	1.29					519.25	99.47
11071	11/14/2019	11:32	0.3	11.5	12.0		0.43	422	10.5	8.1	11	<3	<0.05	<0.05	0.39	0.03		4	17	237	<0.02	6	6.57			0.81	0.75					519.25	99.47
22139	11/14/2019	09:59	0.3	13.5	9.0		>0.6	424	9.4	7.7	6	<2	<0.05	<0.05	0.34	0.02		4	15	251	<0.02	6	2.39			0.79	1.03					519.25	99.47
22140	11/14/2019	11:58	0.3	11.8	12.0		0.42	423	10.6	8.2	13	<3	<0.05	<0.05	0.32	0.04		<4	14	235	<0.02	6	6.52			0.68	0.6					519.25	99.47

Station	Date	Time	Depth	00010 TEMPERATURE, WATER (DEGREES CENTIGRADE)	00020 TEMPERATURE, AIR (DEGREES CENTIGRADE)	00061 FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)	00078 TRANSPARENCY, SECCHI DISC (METERS)	00094 SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C)	00300 OXYGEN, DISSOLVED (MG/L)	00400 PH (STANDARD UNITS)	00530 RESIDUE, TOTAL NONFILTRABLE (MG/L)	00535 RESIDUE, VOLATILE NONFILTRABLE (MG/L)	00615 NITRITE NITROGEN, TOTAL (MG/L AS N)	00620 NITRATE NITROGEN, TOTAL (MG/L AS N)	00625 NITROGEN, KJELDAHL, TOTAL (MG/L AS N)	00665 PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	01351 FLOW SEVERITY:1=No Flow,2=Low,3=Normal,4=Flood,5=High,6=Dry	31699 E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	32211 CHLOROPHYLL-A UG/L SPECTROPHOTOMETRIC ACID. METH	70300 RESIDUE,TOTAL FILTRABLE (DRIED AT 180C) (MG/L)	70507 ORTHOPHOSPHATE PHOSPHORUS,DISS,MG/L,FILTER >15MIN	72053 DAYS SINCE PRECIPITATION EVENT (DAYS)	82078 Field Turbidity NTU	82903 DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	89835 FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER	BGA RFU Blue Green Algae RFU	Chlor RFU Total Chlorophyll RFU	89864 MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS)	89865 MAXIMUM POOL DEPTH AT TIME OF STUDY(METERS)	89869 POOL LENGTH, METERS	89870 % POOL COVERAGE IN 500 METER REACH	00052 RESERVOIR STAGE (FEET ABOVE MEAN SEA LEVEL)	00053 RESERVOIR PERCENT FULL
22131	12/16/2019	08:55	0		3.0												6						6										
20790	12/16/2019	09:22	0.1	7.2	3.0	0.0	0.52	576	2.7	6.5	18	14	<0.05	<0.05	0.95	0.34	1	8	16	311	0.09	6	5.28	1		1.552	3.786						
21990	12/16/2019	09:56	0.1	9.7	5.0	0.2	>0.6	761	5.2	6.9	5	2	<0.05	<0.05	0.29	0.07	3	170	7	493	<0.02	6	4.48	0.3	2	0.578	2.05						
13621	12/16/2019	10:47	0.3	9.5	5.0	1	>0.6	704	8.9	6.6	7	<2	<0.05	0.07	0.27	0.06	3	8	<3	436	<0.02	6	3.48		1	0.36	0.566						
16434	12/17/2019	09:55	0.05	5.6	1.0	0.2	>0.6	650	9.0	7.5	5	<2	<0.05	<0.05	0.39	0.04	3	13	9	594	<0.02	7	7.13	0.15	2	0.83	2.58						
13622	12/17/2019	09:04	0.3	9.1	0.0	0.04	0.55	670	6.5	7.0	10	<3	<0.05	<0.05	0.46	0.11	3	10	9	431	<0.02	7	8.84		1	0.42	1						
22134	12/17/2019	10:42	0.1	6.6	5.0	4.2	0.22	1160	11.5	8.5	26	<5	0.08	<0.05	1.24	0.36	3	40	26	748	0.25	7	14.7	0.3	2	0.55	1.02						
16433	12/17/2019	11:50	0.05	7.2	5.0	0.06	>0.6	985	11.1	7.8	6	<2	<0.05	<0.05	<0.2	<0.02	3	57	<3	677	<0.02	7	5.61	0.15	2	0.33	0.24						
22135	12/16/2019	12:10	0.1	12.3	5.0	0.4	>0.6	918	10.9	7.3	3	<2	<0.05	0.48	0.24	<0.02	3	25	<3	602	<0.02	6	0.63	0.2	2	0.224	0.277						
11073	12/18/2019	10:45	0.3	11.5	9.0		0.42	451	9.5	7.7	8	<2	<0.05	0.05	0.42	0.03		29	4	279	<0.02	8	3.5			0.26	0.32					519.1	99.4
11072	12/18/2019	10:12	0.3	11.0	6.0		0.46	453	9.8	7.8	7	<2	<0.05	0.05	0.41	0.03		8	4	268	<0.02	8	2.68			0.35	0.56					519.1	99.4
11071	12/18/2019	12:20	0.3	10.7	14.0		0.5	458	10.4	7.8	7	<2	<0.05	0.06	0.37	0.03		15	<3	263	<0.02	8	4.66			0.32	0.56					519.1	99.4
22140	12/18/2019	11:55	0.3	11.2	12.0		0.32	457	10.3	7.7	8	<2	<0.05	0.06	0.33	0.03		6	<3	275	<0.02	8	4.11			0.3	0.36					519.1	99.4
22139	12/18/2019	11:20	0.3	11.6	12.0		0.43	452	9.8	7.6	7	<2	<0.05	0.05	0.34	0.03		12	<3	278	<0.02	8	4.11			0.23	0.19					519.1	99.4
22131	01/22/2020	12:15	0.1	7.4	5.6	0.0	>0.6	620	10.7	7.4	5	<2	<0.05	0.42	0.29	0.06	1	120	6	371	0.03	<1	4.61	0.3		0.427	1.206	5.8	0.6	38	70		
20790	01/22/2020	12:55	0.3	7.2	6.1	0.0	0.38	511	9.0	6.5	10	<3	<0.05	0.11	0.71	0.21	1	80	15	268	0.11	<1	16.8			0.668	2.449	15	1	200	90		
21990	01/23/2020	10:18	0.1	8.6	8.0	3.9	0.33	690	9.6	7.6	22	<4	<0.05	0.23	0.38	0.11	3	1200	3	452	0.03	1	14	0.3	2	0.04	0.57						
13621	01/23/2020	11:06	0.3	9.0	8.0	5	0.37	526	10.4	7.3	17	<3	<0.05	0.36	0.34	0.07	3	840	3	316	0.02	1	12.1		1	0.04	0.28						
16434	01/22/2020	13:05	0.1	8.1	5.0	1.6	0.5	762	10.5	7.8	12	4	<0.05	<0.05	0.34	0.07	5	80	31	442	<0.02	<1	9.63	0.3	2	0.248	3.038						
13622	01/22/2020	12:25	0.3	9.0	4.0	0.06	0.17	533	5.4	6.9	28	<7	<0.05	0.64	0.59	0.17	3	440	10	295	0.07	<1	21.4		1	0.121	0.964						
22134	01/23/2020	13:05	0.1	9.8	12.0	13	0.08	1120	11.1	8.2	89	<14	0.08	3.35	0.77	0.3	3	270	13	755	0.1	1	40.1	0.3	2	0.18	0.63						
16433	01/23/2020	14:22	0.03	11.8	14.0	0.4	>0.6	935	11.8	8.1	7	<2	<0.05	0.2	<0.2	<0.02	3	130	<3	548	<0.02	1	1.13	0.1	2	0.01	0						
22135	01/23/2020	11:38	0.1	9.5	9.0	4.6	0.39	717	10.5	7.8	18	<3	<0.05	0.41	0.47	0.05	3	270	<3	439	<0.02	1	9	0.3	2	0.04	0.26						
11073	01/21/2020	10:55	0.3	11.7	12.0		0.92	443	10.3	7.5	4	<2	<0.05	0.15	0.33	0.02		16	4	255	<0.02	4	2.71			0.032	0.27					519.45	99.5
11072	01/21/2020	11:20	0.3	11.8	12.0		0.65	443	10.4	7.4	8	2	<0.05	0.15	0.38	0.03		<4	7	259	<0.02	4	4.53			0.073	0.555					519.45	99.5
11071	01/21/2020	09:48	0.3	11.7	11.0		0.38	471	10.0	7.5	13	<3	<0.05	0.22	0.42	0.03		12	4	154	<0.02	4	6.84			0.052	0.421					519.45	99.5
22139	01/21/2020	10:37	0.3	11.5	10.0		0.84	445	10.0	7.1	5	<2	<0.05	0.15	0.45	0.02		<4	<3	279	<0.02	4	2.3			0.034	0.201					519.45	99.5
22140	01/21/2020	10:12	0.3	11.6	10.0		0.78	450	10.5	7.6	5	<2	<0.05	0.16	0.4	0.03		4	4	235	<0.02	4	3.45			0.049	0.315					519.45	99.5
22132	01/22/2020	11:25	0.03	7.7	5.0	0.03	>0.6	604	6.3	6.6	4	<3	<0.05	<0.05	0.24	0.09	3		<3	359	0.04	<1	2.45	0.1	2	0.294	0.467						
22133	01/22/2020	10:15	0.22	9.4	4.4	11	0.39	1000	10.9	7.7	13	2	<0.05	0.84	<0.2	0.04	3	430	<3	731	<0.02	<1	6.8	0.66	2	0.332	0.449						
17198	01/22/2020	09:05	0.22	9.0	4.4	6.1	0.2	965	10.7	7.3	33	5	<0.05	1.18	0.35	0.08	3	1500	<3	562	0.03	<1	14	0.66	2	0.238	0.255						
22136	01/22/2020	10:30	0.06	8.6	4.0	0.9	>0.6	967	10.6	7.7	<2	<2	<0.05	0.1	<0.2	<0.02	3	100	<3	660	<0.02	<1	1.28	0.2	2	0.011	0.118						
22137	01/22/2020	09:16	0.1	9.2	4.0	0.03	0.14	791	8.4	7.3	231	<20	<0.05	0.41	0.22	0.18	5	4	5	577	0.02	<1	16.5	0.2	2	0.76	0.28						
22138	01/22/2020	11:33	0.33	7.6	4.0	0.08	>0.6	568	9.6	7.5	5	<2	<0.05	0.3	0.55	0.07	5	150	<3	352	0.04	<1	7.6	0.1	2	0.071	0.667						
22132	01/23/2020	09:34	0.03	8.8	8.0	0.05	>0.6	610	5.3	7.0							3	63				1	1.93	0.1	2	0.02	0.26						
22131	02/03/2020	10:18	0.1	11.8	17.0	0.0	>0.6	698	8.8	7.0	3	<2	<0.05	<0.05	0.26	0.05	1	30	<3	416	0.04	6	0.26	0.3		0.426	1.995	9	0.6	61	70		
20790	02/03/2020	10:55	0.3	9.2	17.0	0.0	0.3	807	9.4	7.4	13	3	<0.05	0.28	0.53	0.1	1	74	15	504	0.03	6	12			1.304	0.41	35	2	70	85		
21990	02/03/2020	11:35	0.1	11.1	18.0	0.5	0.46	916	9.8	7.2	12	<3	<0.05	0.05	0.27	0.06	3	140	9	564	<0.02	6	7.18	0.3	2	0.249	0.923						
13621	02/03/2020	12:25	0.3	11.6	16.0	0.7	0.6	830	11.2	7.0	12	3	<0.05	<0.05	0.37	0.04	3	25	6	512	<0.02	6	3.43		5	0.246	0.889						
16434	02/04/2020	10:40	0.06	13.1	9.0	0.7	0.53	965	8.8	7.8	9	2	<0.05	<0.05	0.49	0.06	3	48	15	619	0.02	7	5.24	0.2	2	0.4	1.39						
13622	02/04/2020	09:59	0.3	11.8	11.0	0.05	0.34	933	8.4	7.2	19	5	<0.05	0.39	0.76	0.09	3	70	18	617	0.03	7	5.49		1	0.47	1.91						
22134	02/04/2020	11:35	0.1	14.0	7.0	5.5	0.08	1100	9.6	8.3	107	<20	0.08	4.71	1.58	0.41	3	39	48	767	0.14	7	34	0.3	2	1.25	5.46						
16433	02/04/2020	13:44	0.1	13.5	8.0	0.2	>0.6	913	11.3	8.2	16	<2	<0.05	0.08	<0.2	<0.02	3	21	<3	589	<0.02	7	1.63	0.3	2	0.22	0.21						
22135	02/03/2020	13:05	0.06	14.1	17.0	0.4	>0.6	1020	10.4	7.1	3	<2	<0.05	0.56	0.22	0.02	3	43	<3	692	<0.02	6	7.73	0.2	2	0.141	0.338						
11073	02/10/2020	09:45	0.3	11.0	8.0		0.58	458	10.5	7.6	8	<2	<0.05	0.17	0.29	0.02		51	5	278	<0.02	13	3.95			0.408	0.62					519.48	99.52
11072	02/10/2020	10:35	0.3	11.1	7.0		0.49	463	10.6	7.8	10	2	<0.05	0.19	0.27	0.03		2	7	240	<0.02	13	4.56			0.371	0.978					519.48	99.52
11071	02/10/2020	11:45	0.3	10.7	8.0		0.35	472	10.8	7.9	17	<3	<0.05	0.22	0.42	0.04		2	5	266	<0.02	13	7.88			0.352	0.898					519.48	99.52
22139	02/10/2020	11:15	0.3	11.2	8.0		0.46	458	10.6	7.8	12	<2	<0.05	0.19	0.49	0.03		24	5	253	<0.02	13	5.68			0.303	0.532					519.48	99.52
22140	02/10/2020	12:35	0.3	10.7	7.0		0.27	470	10.9	8.0	19	<4	<0.05	0.23	0.34	0.03		15	7	270	<0.02	13	7.85			0.368	0.898					519.48	99.52

Station	Date	Time	Depth	TEMPERATURE, WATER (DEGREES CENTIGRADE) 00010	TEMPERATURE, AIR (DEGREES CENTIGRADE) 00020	FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC) 00061	TRANSPARENCY, SECCHI DISC (METERS) 00078	SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C) 00094	OXYGEN, DISSOLVED (MG/L) 00300	PH (STANDARD UNITS) 00400	RESIDUE, TOTAL NONFILTRABLE (MG/L) 00530	RESIDUE, VOLATILE NONFILTRABLE (MG/L) 00535	NITRITE NITROGEN, TOTAL (MG/L AS N) 00615	NITRATE NITROGEN, TOTAL (MG/L AS N) 00620	NITROGEN, KJELDAHL, TOTAL (MG/L AS N) 00625	PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P) 00665	FLOW SEVERITY:1=No Flow,2=Low,3=Normal,4=Flood,5=High,6=Dry 01351	E. COLI, COLILERT, IDEXX METHOD, MPN/100ML 31699	CHLOROPHYLL-A UG/L SPECTROPHOTOMETRIC ACID. METH 32211	RESIDUE,TOTAL FILTRABLE (DRIED AT 180C) (MG/L) 70300	ORTHOPHOSPHATE PHOSPHORUS,DISS,MG/L,FILTER >15MIN 70507	DAYS SINCE PRECIPITATION EVENT (DAYS) 72053	Field Turbidity NTU 82078	DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE 82903	FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER 89835	Blue Green Algae RFU BGA RFU	Total Chlorophyll RFU Chlor RFU	MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS) 89864	MAXIMUM POOL DEPTH AT TIME OF STUDY(METERS) 89865	POOL LENGTH, METERS 89869	% POOL COVERAGE IN 500 METER REACH 89870	RESERVOIR STAGE (FEET ABOVE MEAN SEA LEVEL) 00052	RESERVOIR PERCENT FULL 00053
22131	03/17/2020	10:30	0.1	16.7	17.0	10	0.42	579	8.8	7.9	11	2	<0.05	0.09	0.85	0.16	3	6000	7	299	0.07	1	8.54	0.3	2	0.27	1.12							
20790	03/17/2020	11:00	0.3	16.7	18.0	25	0.17	483	8.6	7.7	28	<4	<0.05	0.15	1.2	0.23	5	6000	10	354	0.1	1	8.9		5	0.36	1.7							
21990	03/17/2020	12:15	0.3	16.7	19.0	38	0.27	533	8.8	7.7	41	<5	<0.05	0.18	1.19	0.18	5	5600	9	380	0.09	1	22		2	0.29	1.3							
13621	03/17/2020	13:14	0.3	18.9	20.0	22	0.2	516	9.1	7.7	38	<5	<0.05	0.2	1.22	0.23	3	5200	6	310	0.09	1	24.6		1	0.31	1.24							
16434	03/17/2020	10:40	0.3	16.3	17.0	32	0.12	571	9.0	7.9	55	9	0.07	0.77	1.04	0.19	5	>12000	5	426	0.07	1	21.5		2	0.368	1.132							
13622	03/17/2020	09:13	0.3	16.6	17.0	15	0.12	528	8.2	7.6	39	8	0.1	1.31	1.35	0.2	3	12000	6	349	0.08	1	24.9		1	0.33	1.49							
22134	03/17/2020	15:00	0.3	18.6	19.0	21	0.12	911	9.0	8.1	167	8	0.07	2.57	1.12	0.25	5	2200	20	599	0.1	1	28.4		2	0.57	1.734							
16433	03/17/2020	11:55	0.025	17.0	18.0	1.9	>0.6	818	10.0	7.9	5	<2	<0.05	0.23	0.27	<0.02	5	430	<3	526	<0.02	1	2.79	0.1	2	0.209	0.29							
22135	03/17/2020	14:03	0.3	17.1	20.0	7	0.21	617	8.3	7.7	33	<5	<0.05	0.45	0.64	0.0761	5		<3	423	<0.02	1	17.9		2	0.14	0.62							
11073	03/11/2020	11:02	0.3	15.4	24.0		0.56	448	11.0	8.2	8	<2	<0.05	0.26	0.34	0.02		6	5	263	<0.02	6	4.14			0.23	0.49						522.26	100
11072	03/11/2020	11:34	0.3	14.5	24.0		0.4	451	11.2	8.6	11	<2	<0.05	0.19	0.44	0.03		6	12	291	<0.02	6	2.78			0.43	1.5						522.25	100
11071	03/11/2020	13:04	0.3	15.4	27.0		0.2	472	10.8	8.5	25	<4	<0.05	0.49	<0.2	0.05		42	10	305	<0.02	6	11.45			0.46	1.92						522.24	100
22139	03/11/2020	12:06	0.3	14.9	26.0		0.35	455	10.9	8.4	16	<3	<0.05	0.3	0.34	0.03		13	<3	283	<0.02	6	17.8			0.34	0.7						522.25	100
22140	03/11/2020	12:42	0.3	15.6	26.0		0.21	467	10.8	8.3	30	<4	<0.05	0.45	0.52	0.05		29	10	304	<0.02	6	11.56			0.42	1.75						522.25	100
22132	03/16/2020	11:03	0.3	14.4	13.0	38	0.11	503	9.6	7.7	73	<10	<0.05	0.15	1	0.39	5	7900	14	344	0.17	<1	34		5	0.41	1.38							
22133	03/16/2020	13:20	0.3	15.1	18.0	23	0.17	476	10.1	7.2	38	<5	<0.05	0.92	1.1	0.18	5	7900	<3	309	0.07	<1	34.04		5	0.26	0.68							
17198	03/16/2020	14:40	0.3	16.0	19.0	12	0.1	423	9.7	7.8	40	<4	<0.05	0.33	0.64	0.13	5	>9700	<3	217	0.05	<1	27.5		2	0.23	0.6							
22136	03/17/2020	12:40	0.3	16.8	19.0	1.9	>0.6	844	9.3	7.9	<2	<2	<0.05	0.6	0.23	<0.02	5	290	<3	567	<0.02	1	1.27		2	0.145	0.211							
22137	03/17/2020	13:15	0.1	16.3	19.0	0.3	>0.6	590	8.6	7.5	14	<2	<0.05	<0.05	0.38	0.0321	5	270	<3	388	<0.02	1	4.6		2	0.225	0.48							
22138	03/17/2020	09:33	0.1	16.8	17.0	5.9	0.18	4620	8.5	7.8	34	<5	<0.05	0.14	1.01	0.179	5	12000	7	333	0.07	1	25.7	0.2	2	0.317	1.2							
22131	04/13/2020	10:35	0.03	13.8	8.0	2	>0.6	1090	9.4	8.0	3	<2	<0.05	<0.05	0.3	0.0425	3	240	<3	727	0.03	2	0.06	0.091	2	0.095	0.208							
20790	04/13/2020	11:20	0.1	15.1	8.0	3.5	0.43	1050	8.6	7.8	15	3	<0.05	0.16	0.33	0.0767	3	730	4	713	0.03	2	5.25	0.3	2	0.202	0.525							
21990	04/13/2020	13:00	0.1	16.2	8.0	6.6	0.19	968	7.5	7.5	34	<4	<0.05	0.17	0.59	0.0856	3	730	4	652	<0.02	2	15.8	0.3	2	0.119	0.395							
13621	04/13/2020	14:15	0.3	16.9	12.0	22	0.34	963	9.3	7.7	13	2	<0.05	0.17	0.34	0.0678	3	2200	5	653	<0.02	2	6.8		1	0.161	0.449							
16434	04/13/2020	13:10	0.3	16.3	12.0	5.3	0.26	966	9.0	7.9	22	4	<0.05	<0.05	0.62	0.063	3	620	9	684	<0.02	1	8.17	1	2	0.3	1.36							
13622	04/13/2020	10:32	0.3	16.2	8.0	2	0.53	1290	6.9	7.3	9	2	<0.05	<0.05	0.49	0.0434	3	220	9	958	<0.02	1	3.11		1	0.34	1.59							
22134	04/13/2020	13:53	0.3	17.0	12.0		0.85	1090	9.2	8.2	86	13	<0.05	2.23	0.81	0.244	3	440	25	743	0.1	1	27.8			0.47	2.2							
16433	04/13/2020	11:58	0.3	14.6	10.0	1.1	>0.6	765	11.2	7.6	3	<2	<0.05	0.41	<0.2	<0.02	3	110	<3	512	<0.02	1	0.11		2	0.02	0.07							
22135	04/13/2020	15:00	0.05	17.3	14.0	2	0.4	920	9.8	7.4	19	<3	<0.05	0.39	0.28	0.033	3	400	<3	645	<0.02	2	5.67	0.15	2	0.205	0.303							
11073	04/14/2020	11:48	0.3	17.6	13.0		0.73	446	9.0	8.0	5	<2	<0.05	0.3	<0.2	0.0211		<4	6	282	<0.02	2	5.3			0.16	0.5						525.22	100
11072	04/14/2020	12:23	0.3	17.8	13.0		0.41	450	9.0	8.1	10	<3	<0.05	0.22	<0.2	0.0309		8	7	279	<0.02	2	3.82			0.27	0.95						525.21	100
11071	04/14/2020	10:28	0.3	17.3	10.0		0.28	458	9.1	7.9	18	4	<0.05	0.29	<0.2	0.0317		8	7	303	<0.02	2	17.52			0.39	0.64						525.25	100
22139	04/14/2020	11:28	0.3	17.4	11.0		0.42	447	8.8	8.1	10	<2	<0.05	0.31	<0.2	0.0259		<4	8	267	<0.02	2	4.32			0.22	0.64						525.22	100
22140	04/14/2020	10:53	0.3	17.1	11.0		0.35	453	9.2	8.1	13	3	<0.05	0.28	<0.2	0.0335		4	7	285	<0.02	2	5.9			0.39	0.64						525.24	100
22132	04/28/2020	10:00	0.1	20.4	27.0	0.4	0.49	1200	4.8	7.5	8	<2	<0.05	<0.05	0.29	0.0601	3	1100	<3	768	<0.02	<1	5.88	0.3	2	0.077	0.064							
22133	04/28/2020	10:45	0.3	21.2	25.0	18	0.12	839	7.9	7.5	94	12	<0.05	0.66	1.29	0.16	3	12000	6	544	<0.02	<1	30.9	0.57	2	0.254	0.848							
17198	04/28/2020	09:48	0.3	20.6	23.9	17	0.055	517	7.5	7.7	448	70	<0.05	0.53	2.16	0.43	5	37000	45	285	<0.02	<1	58	0.73	2	0.839	2.481							
22136	04/28/2020	12:45	0.3	18.4	25.0	3.4	0.14	565	8.5	7.6	52	9	<0.05	0.54	0.4	0.0764	5	480	4	354	<0.02	<1	24.4	0.61	2	0.204	0.753							
22137	04/28/2020	13:30	0.1	20.4	30.0	0.2	0.12	552	7.2	7.2	60	9	<0.05	0.19	0.34	0.129	3	4400	<3	388	0.03	<1	30.5	0.3	2	0.09	0.282							
22138	04/28/2020	09:45	0.03	21.8	23.0	0.2	>0.6	1390	8.2	7.6	17	3	<0.05	<0.05	0.38	0.0331	3	1100	<3	1001	<0.02	<1	2.83	0.1	2	0.14	0.61							
22131	04/28/2020	11:05	0.1	20.5	24.0	1	0.35	1100	5.9	7.6	10	<2	<0.05	0.07	0.25	0.0667	3	1200	<3	713	0.03	<1	8	0.3	2	0.129	0.142							
20790	04/28/2020	12:30	0.1	20.4	30.0	3.9	0.06	912	6.4	7.8	166	<20	<0.05	0.23	0.81	0.264	5	12000	22	593	<0.02	<1		0.3	2	0.256	0.855							
21990	04/28/2020	13:59	0.1	21.3	31.0	9.4	0.08	785	6.8	7.7	97	<13	<0.05	0.25	0.79	0.167	5	9200	9	479	<0.02	<1	41.1	0.3	2	0.263	0.783							
13621	04/28/2020	14:30	0.1	22.3	30.0	44	0.06	668	7.1	7.5	110	<20	<0.05	0.34	0.94	0.193	5	>24000	7	426	<0.02	<1	66.1	0.3	1	0.659	0.137							
16434	04/28/2020	12:35	0.3	21.8	29.0	15	0.2	1090	8.0	7.9	55	<7	<0.05	0.08	0.57	0.099	5	450	10	743	<0.02	<1	20.1	0.6	2	0.35	1.39							
13622	04/28/2020	10:28	0.3	20.7	24.0	0.6	0.37	1500	8.2	7.8	23	<4	<0.05	<0.05	0.31	0.0438	3	400	8	1112	<0.02	<1	6.85		1	0.36	0.99							
22134	04/28/2020	13:31	0.3	22.5	29.0	80	0.01	1140	7.7	7.9	936	<80	<0.05	1.32	2.35	0.858	5	3300	48	758	<0.02	<1	1292		2	1.73	2.57							
16433	04/28/2020	11:30	0.07	20.1	27.0	4.3	0.21	6160	8.6	7.9	88	<10	<0.05	0.58	0.4	0.0943	5	1400	4	358	<0.02	<1	25.3	0.23	2	0.18	0.44							
22135	04/28/2020	11:30	0.3	20.7	25.0	44	0.045	557	7.7	7.6	299	35	<0.05	0.58	0.98	0.271	5	5200	23	366	<0.02	<1	51	0.74	2	0.431	0.869							
11073	04/30/2020	11:51	0.3	22.8	25.0		>0.6	458	9.1	8.4	4	<2	<0.05	0.22	0.33	<0.02		4	4	274	<0.02	2	0.02			0.13	0.34						522.3	100
11072	04/30/2020	13:02	0.3	22.7	26.0		0.39	460	9.8	8.6	6	<2	<0.05	0.16	0.42	0.0229		4	8	275	<0.02	2	1.26			0.33	0.87						522.31	100
11071	04/30/2020	09:58	0.3	20.7	22.0		0.3	471	8.6	7.9	17	<4	<0.05	0.24	0.32	0.0313		8	6	287	<0.02	2	7.16			0.32	0.67						522.31	100
22139	04/30/2020	11:22	0.3	21.5	24.0		0.49	458	9.0	8.3	6	2	<0.05	0.22	0.28	<0.02		8	5	270	<0.02	2	2.89			0.25	0.33						522.3	100
22140	04/30/2020	10:55	0.3	20.9	23.0		0.38	461	9.0	8.3	13	<3	<0.05	0.26	0.3	0.0212		4	5	280	<0.02	2	3.66			0.29	0.63						522.31	100

Appendix J: Public Participation Plan



Public Participation Plan

for the

Joe Pool Lake Watershed Protection Plan

July 2020

JOE POOL LAKE
WATERSHED PROTECTION

tra
Trinity River Authority of Texas

On the cover:
Stakeholders 'make it rain' and learn about watershed functions with Trinity River Authority's interactive AR Sand Box.

Public Participation Plan

for

The Joe Pool Lake Watershed Protection Plan

Funded by

The Texas Commission on Environmental Quality
(Contract No. 582-19-90205)

Investigating Entities

The Trinity River Authority of Texas
Texas A&M AgriLife Research

Prepared by

Heather Firn, Trinity River Authority

June 2020

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List of Acronyms

BMP	best management practice
COG	Council of Governments
DFW	Dallas-Fort Worth
EPA	Environmental Protection Agency
FWS	U.S. Fish & Wildlife Service
JPL	Joe Pool Lake
NCTCOG	North Central Texas Council of Governments
NRCS	U.S. Department of Agriculture - Natural Resource Conservation Service
SWCD	Soil & Water Conservation District
TAG	Technical Advisory Group
TCEQ	Texas Commission on Environmental Quality
TPL	Trust for Public Land
TRA	Trinity River Authority of Texas
TRWD	Tarrant Regional Water District
USGS	U.S. Geological Survey
WPP	watershed protection plan

1.0 Introduction

1.1 Project Overview

The Joe Pool Lake (JPL) Watershed Protection effort was initiated to address water quality concerns in both Joe Pool Lake and its tributaries. Drinking water from Joe Pool Lake is utilized by over forty thousand people in the City of Midlothian and the communities of Venus, Rockett, Mountain Peak, Sardis, and parts of southern Grand Prairie. In addition to this existing use by the City of Midlothian, Joe Pool Lake is expected to be further developed by the Cities of Cedar Hill, Duncanville, and Grand Prairie for their own municipal use. Joe Pool Lake has also been designated as a potential terminal storage reservoir for the Tarrant Regional Water District (TRWD) and Dallas Water Utilities (DWS) Integrated Pipeline Project (IPL), which seeks to connect three reservoirs in east Texas (Richland Chambers, Cedar Creek, and Lake Palestine) to other reservoirs in the Dallas-Fort Worth (DFW) metroplex to enhance the future water supply of the region and to provide for redundancy in the water supply system.

Walnut Creek, one of Joe Pool's two main tributaries, is listed on the 2014 TCEQ Texas Water Quality Inventory and 303(d) List due to elevated levels of E. coli, with its first listing occurring in 2006. The majority of the impaired segment flows through the city limits of Mansfield, who approached TRA in late 2015 as they were considering restoration options available for Walnut Creek. Additionally, the Mountain Creek arm of Joe Pool Lake is currently listed on the 2014 Water Quality Inventory—Water Bodies with Concerns for Use Attainment and Screening Levels for general use concerns due to elevated levels of nitrate. The Cities of Cedar Hill, Grand Prairie, and Mansfield all border this segment of concern.

According to the Texas Water Development Board Population Projections identified during the 2016 Regional Water Planning process, the population of the four counties encompassed in this project are expected to increase a combined 60% from 4.9 million to 7.9 million people over the next 50-year water planning horizon. Conversion of farm land and rapid development in the watershed indicate that water quality has and will continue to be negatively affected unless more vigorous management measures are put in place. To combat this degradation, local stakeholders have elected to take a proactive approach to ensure that appropriate management measures are in place to ensure that the water quality in the lake is protected.

1.2 The Importance of Public Participation

The goal of this project is to develop a watershed protection plan (WPP) for the Joe Pool Lake watershed which 1) establishes an analytical framework for managing water quality, 2) produces a plan of action to address water quality issues, and 3) satisfies the Environmental Protection Agency (EPA) nine-element criteria for WPPs. To achieve this goal, robust public participation and outreach components are vital. Effective WPPs utilize local knowledge and expertise to guide the planning process, ensuring that the best management practices (BMPs) selected for implementation are relevant to the watershed's issues, applicable to the environmental setting of the watershed, and feasible for the watershed residents, given the resources they have available. If this process is followed, local stakeholders are more likely to modify their behaviors and adopt the BMPs identified in the WPP.

2.0 Stakeholder Groups

2.1 General Group Structure

The public effort for the Joe Pool Lake Watershed Protection effort will consist of three stakeholder groups, each with its own set of responsibilities and focus areas (Figure 1). Membership will be dependent on these elements, as will meeting content, group size, and meeting frequency. To ensure that watershed interests are well-represented, efforts will be made by the project team to ensure that stakeholder representation is well-distributed, both spatially throughout the watershed, and topically amongst multiple users with varying needs.

2.2 Watershed Protection Partnership (Partnership)

The JPL Watershed Protection Partnership (Partnership) will function as the overall stakeholder group, consisting of all stakeholders, including subgroup members and general members. As such, there are no formal membership requirements, and members may come and go as they please, attending meetings at their leisure. Partnership meetings will serve as a public forum for stakeholder concerns and updates on project progress.

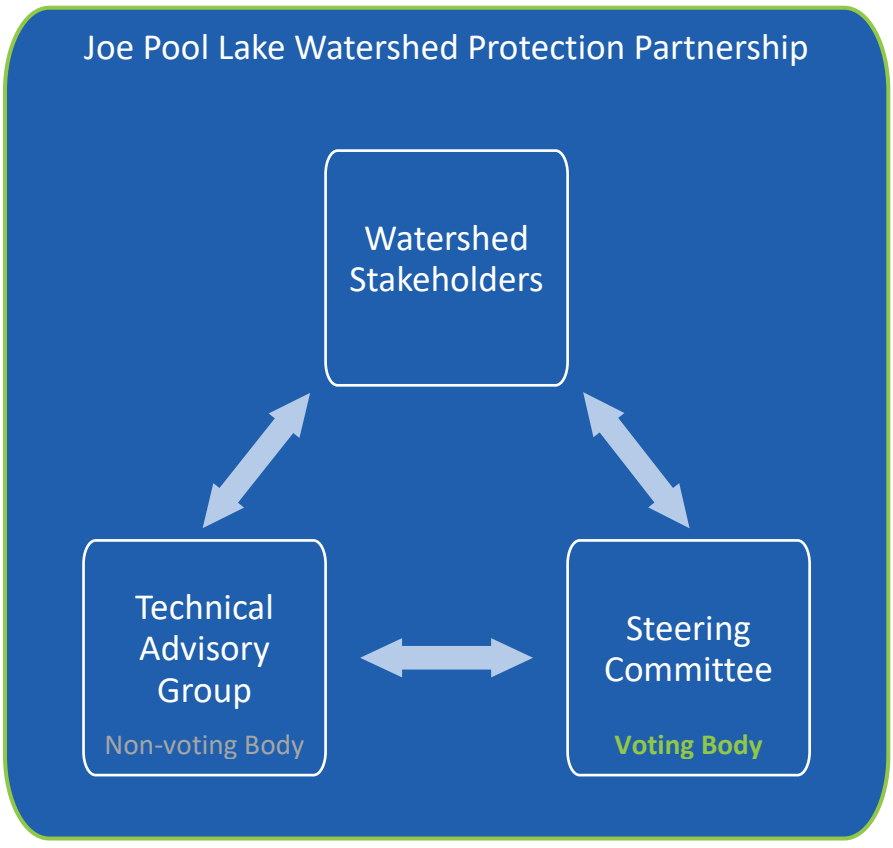


Figure 1. Joe Pool Lake Watershed Protection Partnership group structure.

No formal meeting ground rules will be adopted for the Partnership meetings, but attendees are asked to abide by a few simple rules of etiquette during meetings:

- Save questions until after each presentation has been given (unless otherwise instructed by the presenter);

- Limit discussion to 5 minutes per person;
- Any additional questions may be answered during the open discussion period before the meeting's end; and
- To be respectful of others' time and points of view.

At a minimum, Partnership meetings will be held semi-annually, with content generally focusing on high-level overviews of project components, data collection/pollutant source identification analysis updates, and general project progress updates. Additional information on meeting content is provided in Section 4.0.

The Partnership will be responsible for many of the decisions towards the beginning of the project's lifespan, and will act as the initial coordinating body responsible for electing the initial Steering Committee members. Once formed, the Steering Committee (Committee) will be the main decision-making body of the Partnership, although some minor decisions may be left to the Partnership to decide as a whole during public meetings. If any decision topic becomes contentious, either the meeting facilitator or the Partnership may motion to have the topic deferred to the Committee for a decision.

2.3 Steering Committee

To facilitate the decision-making process, a core group of stakeholders will act as the voting body of the Partnership, which will be known as the Steering Committee (Committee). The Committee will vote on key watershed decisions and review potential water quality improvement BMPs for applicability in the watershed. These recommendations may eventually become part of the WPP, which the Committee will review on a chapter-by-chapter basis.

The intent of the Committee is to provide a wide representation of varied focus groups, including local landowners, businesses, and government officials. The initial group composition will be selected from and approved by an initial coordinating body (the Partnership) by a panel vote. Once approved, the initial Committee group will assess its membership, adding, removing, or replacing members internally by a group vote. The initial panel of members and focus groups is provided in Figure 2.



Figure 2. Initial Steering Committee membership and focus groups.

At any point during the lifetime of the project, the Committee may see a need to create a special subcommittee to address a specific resource or contaminant source concern. Creation/dissolution of these subcommittees and approval of members for any such subcommittees will be left to the discretion of the Committee. If such action is proposed by the Committee, consultation of the watershed coordinator, the TAG, and TCEQ is recommended to ensure that all available resources are identified to assist the proposed subcommittee in their mission.

The Committee will also be required to abide by a set of ground rules, which have been written into a separate document which will be presented for approval at the first Committee meeting. An overview of these ground rules was presented to the Partnership prior to approval of the initial Committee group, and a full copy was provided to potential Committee members. Additional details concerning the formation, procedures, responsibilities, and limitations of the Committee are described in the document, which is provided as Appendix A.

2.4 Technical Advisory Group (TAG)

During initial Partnership meetings, TRA recommended the creation of a second stakeholder subgroup that would provide technical guidance, resource information, and funding opportunity information to both the Committee and the Partnership. Partnership members were presented with candidate agencies to be considered for this Technical Advisory Group (TAG), and asked to recommend any additional agencies/organizations which may benefit the WPP process. The TAG will serve strictly in an advisory capacity and have no formal voting power, making recommendations to the Partnership and Committee as needed. The initial list of recommended entities is provided in Figure 3.

Technical Advisory Group (12 members)

- North Central Texas Council of Governments (NCTCOG)
- Natural Resource Conservation Service (NRCS)
- Railroad Commission of Texas (RRC)
- Texas AgriLife Extension & Research (AgriLife)
- Texas Commission on Environmental Quality (TCEQ)
- Texas Institute for Applied Environmental Research (TIAER)
- Texas Parks & Wildlife Department (TPWD)
- Trinity River Authority of Texas (TRA)
- Tarrant Regional Water District (TRWD)
- U.S. Environmental Protection Agency (EPA)
- U.S. Fish & Wildlife Service (FWS)
- U.S. Geological Survey (USGS)

Figure 3. Technical Advisory Group membership.

A formal meeting schedule for the TAG is not anticipated, but the group may elect to adopt such a schedule if deemed necessary. Presently, it is expected that the majority of TAG business will be conducted via phone/email coordination, with the occasional formal group meeting when the group deems necessary, or at the direction of the Partnership or Committee.

2.5 TRA Roles

TRA will act as the project facilitator for the Joe Pool Lake WPP, with the TRA watershed coordinator acting as the principal point of contact for project and administrative-related matters. The watershed coordinator is responsible for:

- Scheduling and facilitating project meetings;
- Incorporating stakeholder decisions and comments into the WPP;
- Coordinating with the TAG to provide technical guidance to stakeholders during WPP development;
- Coordinating with funding agencies to ensure that deliverable and budget targets are achieved; and
- Ensuring the success of the WPP by verifying compatibility with EPA's nine elements for successful WPPs.

2.6 Funding Agency Roles

Funding for this project is provided by TCEQ through a Clean Water Act Section 319(h) grant from EPA, with match funding from TRA and the Cities of Cedar Hill, Grand Prairie, Mansfield, and Midlothian.

TCEQ and EPA will:

- Provide technical assistance with WPP development;
- Provide federal funding; and
- Review WPP for compatibility with nine key elements for successful WPPs.

The TRA and Cities of Cedar Hill, Grand Prairie, Mansfield, and Midlothian will:

- Provide non-federal match funds and
- Provide insight to ensure the WPP fulfills the needs of local stakeholders.

3.0 Outreach Campaign

3.1 Overall Strategy

This project will employ the use of several public, print, and online interactive approaches to increase awareness about the watershed, its ecological issues, and the planning process aimed at remedying those issues. The intent of the campaign is to begin with broad topics, then to bring in the focus and differentiate amongst more specific topics as project partners learn more about the stakeholders, their interests, and the needs of the watershed. To support this approach, the outreach campaign will begin with public meetings to introduce the watershed-based planning approach to stakeholders, providing them with informative outreach materials in the process. As exposure and education progress, participation will be encouraged for special planning committees, as well as for public feedback periods that will be inherent to some of the project documents. Throughout the life of the project, TRA will also host several educational workshops focused on certain elements of watershed health and water quality to address specific concerns identified in the watershed.

3.2 Fact Sheet

In May 2020, a project fact sheet was developed for distribution at events and meetings related to the project, or for community meetings where project interest may exist. The fact sheet was designed to fit vital project information on a single front-and-back page, including the setting, problem statement, proposed solution, map, and contact information for those that may be interested in becoming involved. As the project proceeds and grows, the content of the fact sheet will change to meet the needs of the project. An example of this fact sheet is provided in Appendix B.

3.3 Website

A project website was launched in May 2019. The site consists of:

- A home page with current events,
- An “About” page with project background information,
- A “Meetings” page with logistics for upcoming meetings and information from past events, and
- A “Maps & Data” page which contains themed maps and GIS files for the watershed.

As with the project fact sheet, the website is intended to grow with the project, and in time will include additional pages to support project results at they become available. The website’s address is: http://www.trinityra.org/joepoollakewpp.

3.4 Project Meetings

At the beginning of the project, TRA engaged several stakeholder groups separately to ascertain interest in the project. This included:

- Municipalities;
- Federal/state/local resource agencies,
- Regional Water Authorities;
- Non-governmental organizations;
- Environmental/conservation groups;
- Local businesses/industries;
- Citizen/community/religious organizations;
- Landowners; and
- Academia.

TRA endeavored to ascertain each group's knowledge of the watershed, the project, and its water quality issues before the meeting, catering the content to each group's interest. If additional stakeholder groups are identified during the planning process, TRA will set up additional meetings with those groups to ensure an appropriate representation of interests is achieved.

After initial stakeholder engagement meetings were conducted, TRA began hosting open public (Partnership) and subgroup (Committee and TAG) meetings to disseminate project information, coordinate efforts, and share the results of project investigations. Please refer to Section 2.0 for more information on Partnership and subgroup meetings.

3.5 Community Meetings & Events

Another method of increasing awareness of the project involves participation in community events and open meetings. This includes participation in meetings hosted by other organizations that have a direct or indirect connection to the project, such as regional and local watershed initiative and planning meetings hosted by resource agencies or regional councils of governments (COGs). This may also include, but is not limited to, participation at community events, such as lake/river cleanups, informational community events like Earth Day, or participation in high school/college career fair events. TRA expects to participate in as many of these events as possible. Since TRA does not plan or schedule many of these events, they will not be a part of any formal meeting schedule.

3.6 Educational Workshops

In addition to regular project meetings for the Partnership and subgroups, TRA will also coordinate with other entities to provide educational opportunities to stakeholders via workshops focused on specific elements tied to watershed health and management. These are intended to broaden stakeholder knowledge on a variety of subjects that cannot be covered in-depth during normal project meetings and are open to the public. Early workshops will focus on broader watershed-related topics (general stewardship, riparian zones), with later workshops targeting more specific audiences (water well owners, pond management, lawn care). A tentative list of proposed workshop topics is provided in Section 4.0.

4.0 Tentative Meeting Schedule and Content

Table 1 lists the tentative schedule for group meetings and workshops. Tentative dates are accompanied by an objective which describes the meeting content.

Table 1. Tentative watershed planning meeting schedule for the Joe Pool Lake WPP.

Title	Meeting Type	Project Quarter	Tentative Date(s)	Objective
Project informational meetings	Project		as needed	Meet with stakeholder groups to inform them of project details and goals. Scheduled as needed, when requested by a specific group or if new stakeholder groups are identified
Community meetings/events	Community		as needed	Attend community events and meetings to promote project awareness and inform public about project details, goals, and ways for them to get involved
Texas Watershed Stewards Workshop	Educational	FY21Q1	9/2020	Provide stakeholders with overview of watershed science and stewardship, including watershed characterization, contaminant identification, and implementing solutions
Partnership Meeting #1	Project	FY21Q1	11/2020	Public kickoff meeting, introduce project components and timeline, review existing data, solicit interest in TAG and Steering Committee
Partnership Meeting #2	Project	FY21Q2	1/2021	Provide in-depth look at stakeholder involvement, including interconnectivity of Partnership, Committee and TAG; review final monitoring plan
Riparian & Stream Ecosystems Workshop	Educational	FY21Q2	1/2021	Provide stakeholders with educational content focused on riparian ecosystems and factors influencing their physical, chemical, and biological health
Partnership Meeting #3	Project	FY21Q2	2/2021	Approve initial Committee members, provide an overview of load duration curves/SELECT analysis
Steering Committee Meeting #1	Project	FY21Q3	2/2021	Assess membership, approve ground rules, discuss future meeting schedule & content, begin review of nutrient screening values
Texas Well Owner Network Workshop	Educational	FY21Q3	3/2021	Provide stakeholders with educational content focused on water well function, testing, and maintenance
Partnership Meeting #4	Project	FY21Q3	03/2021	Provide overview of urban/residential BMPs, present example WPP document, monitoring update.
Steering Committee Meeting #2	Project	FY21Q3	04/2021	Review and make recommendations for chapters: 1) Watershed Management, Watershed Characterization, Watershed Conditions (Final WPP to stakeholders and state is June 2021)
Pond Management Workshop	Educational	FY21Q3	04/2021	Educate stakeholders about inputs to, function of, & management of different ponds, including: ag, detention, retention, & decorative
Partnership Meeting #5	Project	FY21Q3	05/2021	Provide overview of agricultural BMPs; Present and discuss content for chapters: 1) Watershed Management, Watershed Characterization, Watershed Conditions
Septic System Maintenance Workshop	Educational	FY21Q3	5/2021	Educate stakeholders about function & maintenance of onsite wastewater treatment systems (septics)
Steering Committee Meeting #3	Project	FY21Q3	5/2021	Approve previous chapters, review and make recommendations for chapters: 1) Estimates of Pollutant Source Loads/Needed reductions, 2) Management Measures, 3) Technical/Financial Assistance Needs, 4) Educational/outreach needs **(Draft of WPP to Stakeholders and TCEQ is May 2021)**
Lone Star Healthy Streams Workshop	Educational	FY21Q4	06/2021	Provide stakeholders with overview of available water quality BMPs for livestock & ag production
Partnership Meeting #6	Project	FY21Q4	06/2021	Present and discuss content for chapters: 1) Estimates of Pollutant Source Loads/Needed reductions, 2) Management Measures, 3) Technical/Financial Assistance Needs, 4) Educational/outreach needs
Steering Committee Meeting #4	Project	FY21Q4	06/2021	Approve previous chapters, review and make recommendations for any remaining discussion points, review & approve Draft WPP for public comment **(Final WPP to stakeholders and state is June 2021)**
Partnership Meeting #7	Project	FY22Q1	09/2021	Review of Draft WPP before releasing for public comment, outline WPP review process & next steps after EPA acceptance of WPP
Steering Committee Meeting #5	Project	FY22Q1	10/2021	Discuss public comments on WPP before **11/2021** submittal, continue building strategy for implementation

Appendix K: Public Outreach

About Us

About

Joe Pool Lake and its associated park facilities are a popular recreational destination for many Dallas-Fort Worth residents. Water from Joe Pool Lake is currently withdrawn by the City of Midlothian as part of its municipal water supply. This water withdrawal is occasionally used to supply the communities of Venus, Rockett, Mountain Peak, Sardis, and parts of southern Grand Prairie during times of peak demand. In addition to this existing use, Joe Pool Lake is expected to be further developed by the cities of Cedar Hill, Duncanville, and Grand Prairie for their own municipal use.

This project will perform the watershed characterization and stakeholder group development components required to develop a WPP which will meet EPA's nine key elements for watershed-based plans as provided in the EPA's 2014 guidelines. The data collected in this phase of the project will ensure that the WPP provides quantified objectives for water quality improvement through identified and prioritized watershed management strategies.

To prepare for the watershed planning process, expansion and enhancement of the existing stakeholder group will be necessary. The Performing Party will coordinate with the stakeholder group to identify roles for various levels of involvement, define an organizational structure, and outline a plan for how and when the various stakeholder subgroups will be deployed or engaged.

Routine bi-monthly monitoring and flow-weighted monitoring will be conducted at 14 sites to provide spatial coverage of the watershed under ambient conditions. Additional sites will be sampled to include ephemeral contributions during high flow conditions.

The Performing Party will aggregate the information obtained through past projects within the watershed with new data to support the creation of a holistic management plan for the Joe Pool Lake watershed.

Download the project fact sheet for more information.

About Us
- History of Water Quality
- Clean Rivers Program
- Reports
- Village Creek-Lake Arlington WPP
- Region C Water Planning
- Joe Pool Lake WPP
  - About
  - Resources
  - Meetings
  - Reports & Documents
  - Maps & Data
- TRA Courtyard Demonstration Garden

Point of Interest



The Trinity River Authority serves as local sponsor for the following federal projects: Bardwell, Navarro Mills and Joe Pool lakes, and the Wallisville Saltwater Barrier.

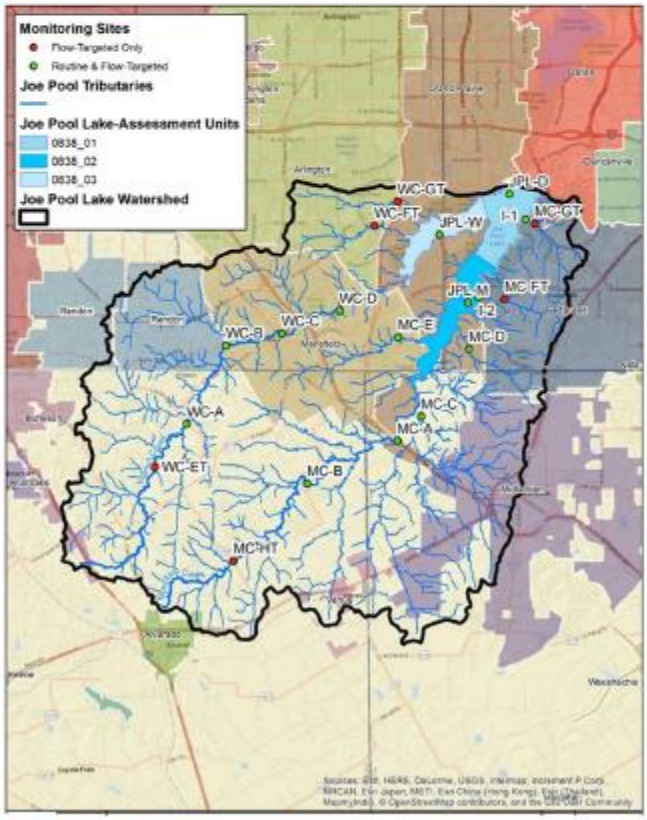
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Joe Pool Lake
Watershed Protection Plan

Background

Joe Pool Lake (JPL) has a total drainage area of 304 sq. miles and is fed by the waters of Walnut Creek and Mountain Creek. Walnut Creek's headwaters are in the City of Burleson and flow approximately 24 miles northeast, emptying into JPL in southeastern Tarrant County. Mountain Creek's headwaters are in the City of Alvarado and flow approximately 19 miles northeast, emptying into JPL in northwestern Ellis County. The JPL watershed is comprised of urban areas in the northern end of the watershed, with industrial, municipal complexes and agricultural use throughout the center and southern extent. In 2014, segments of Mountain Creek had concerns for nitrate and Walnut Creek did not meet state water quality standards for bacteria. Both waterbodies have since been delisted. Currently, water from Joe Pool Lake is being withdrawn by the City of Midlothian as part of its municipal water supply. This water withdrawal is used to supply the communities of Venus, Rockett, Mountain Peak, Sardis, and parts of southern Grand Prairie. JPL is expected to be used as a future water source for many Dallas-Fort Worth cities. Two projects are occurring to develop a watershed protection plan (WPP) for JPL watershed to improve water quality and to mitigate future impacts of rapid urbanization.

River Basin: Trinity River
Water Body: Joe Pool Lake (Segment 0838)
Location: Dallas, Ellis, Johnson, and Tarrant Counties



For More Information

TCEQ NPS Program nps@tceq.texas.gov
www.trinityra.org/joepoollakewpp

Project Descriptions

Sept. 2018 – Feb. 2022

- Complete a characterization of the watershed
- Routinely conduct bi-monthly water quality monitoring and stormwater monitoring at 14 sites within JPL
- Develop a stakeholder group

Nov. 2019 – Feb. 2022

- Identify pollutant contributions
- Expand and define involvement of stakeholder groups
- Develop effective WPP that will provide implementation guidance for restoring water quality in the JPL watershed

Funding Agencies

- Texas Commission on Environmental Quality
- U.S. Environmental Protection Agency
- Local Partnership Group consisting of the Cities of Cedar Hill, Grand Prairie, Mansfield, and Midlothian and the TRA

EPA United States Environmental Protection Agency

TRA Project Manager: Heather Firn · 817.467.4343 · firnha@trinityra.org


tra



Appendix L: Technical Advisory Group Meeting Notes

Joe Pool Lake Watershed Protection Plan

Monitoring Plan Discussion
Trinity River Authority General Office
November 6, 2018

2:00 Welcome/Introductions

2:10 Review of Tentative Monitoring Plan
Aaron Hoff, Watershed Coordinator
Trinity River Authority

2:30 Discussion and Recommended Changes to Monitoring Plan
Open discussion about changes needed to ensure monitoring plan accurately characterizes both the environmental and societal needs of the waterhsed

3:00 Partner Billing Preferences
Aaron Hoff, Watershed Coordinator
Web Mangham, Manager of Environmental Services
Trinity River Authority

3:15 Next Steps
Discussion of project timeline and other general topics

GP - Annual - Dec 1
Mid ✓
Mons ✓

Cost-only, refund

Xturbidity

Nov 26.

Joe Pool Lake WPP Monitoring Discussion – 11/6/2018

Name	Affiliation	E-mail	Phone
Howard Relfsnyder	City of Mansfield	howard.relfsnyder@mansfieldtexas.gov	817-276-9240
Sarah Grella	TRWD	Sarah.grella@trwd.com	(940)765 3267
Tina Hendon	TRWD	tina.hendon@trwd.com	
Rachel Richter	~~TxDOT~~ TPWD	rachel.richter@tpwd.texas.gov	972-293-3841
Tamara Cook	NCTCOG	tcook@nctcog.org	817-608-2395
Cassidy Campbell	NCTCOG	ccampbell@nctcog.org	817-608-2368

Joe Pool Lake WPP Monitoring Discussion – 11/6/2018

Name	Affiliation	E-mail	Phone
CMendez@gptx.org	C of GP	Cindy Mendez	972-237-8225
CRana@gptx.org	C of GP	Chandani Rana	972-237-8082
MIKE ADAMS	MIDLOTHIAN	mike.adams@midlothian.tx.us	972-775-7105

Joe Pool Lake WPP Update

Meeting Notes
Mansfield City Hall
12/11/2019

Phase I: Watershed Characterization Update

Project Website

- TRA's website currently being migrated to a new content management software
- JPLWPP is live, but several recent edits keep disappearing
- Will continue to check with IT/Communications at TRA on status of migration

Historical Data Report

- Final draft approved by TCEQ on 12/3
- Will be posted to website once the migration has stabilized

Preliminary Monitoring Data

- Nitrogen values in Low Branch
  - Continue to monitor trend
  - Aerial imagery review and "Creek Stomp" to locate potential sources
- *E. coli* in lower Walnut Creek
  - Elevated values at Katherine Rose and Matlock
  - Occurred with dry/pooled sites upstream
  - Aerial imagery review and "Creek Stomp" to locate potential sources

Phase II: Watershed Planning Update

Modeling Strategy

- University will receive subcontract for modeling work
- Probably TAMU, perhaps UNT/TCU/UTA

Public Outreach Strategy

- Structure
  - Public meetings, open invitation (Partnership Meetings)
  - Internal voting body, members recommended by Partnership (Steering Committee)
  - Allow for Partnership/Steering Committee to form subcommittees if needed in future
- Branding
  - Theme
    - What's important to watershed stakeholders? (fishing, drinking water source)
    - Identity – specific plant, animal, landmark?
  - Design
    - Provide group w/ examples of logos from other WPPs
    - Send out survey to gather everyone's opinions
    - Grand Prairie has offered to handle logo design based on everyone's feedback
    - Email correspondence on selection

Other Business

Grants

- Trash Free Waters Grant Application – expect good/bad news in February
- NCTCOG Solid Waste Implementation Grant – Due January 6
    - Cedar Hill and Mansfield submitted applications
    - Started gathering ideas for regional projects for FY 21
        - Cameras for illegal dumping reduction
        - Signage for Bowman Branch – issues w/ fisherman littering
        - Old lawnmower exchange program – get voucher for new mulching mower
        - Compost bin program (food diversion + lawn waste as solid waste)
        - Fish cleaning at Cedar Hill State Park – food waste diversion project
        - Schools – food waste diversion project
        - Purchase of tire grinder for one or more locations

Brainstorming – Implementation projects

- Any/all of the programs mentioned above
- SEP funds for OSSFs – lots of existing programs to model from/tap into
- Water line flushing at Cedar Hill State Park – re-visit current strategy

Deliverables

- Powerpoint and online map
- Example WPP logos
- Develop and send out survey

Next Meeting – February/March 2020

Joe Pool Lake WPP Update

Meeting Notes
Lake Parks Facilities – Grand Prairie
2/27/2020

Phase I: Watershed Characterization Update

Project Website

- Will continue to check with IT/Communications at TRA on status of migration

Preliminary Monitoring Data

- *E. coli* in lower Walnut Creek
  - Elevated values continueat Katherine Rose and Matlock
  - Occurred with dry/pooled sites upstream
  - Aerial imagery review and "Creek Stomp" to locate potential sources
- Soap Creek nutrients
  - With the expansion at MCRWS - will advanced nutrient removal be added?
  - Most WWTFs don't currently utilize nutrient removal technology
  - Currently, no environmental standards for N or P, only screening levels
  - Technology is costly, no plans to implement yet

Phase II: Watershed Planning Update

Modeling Strategy

- Texas A&M AgriLife Extension chosen as modeler
- Draft ready for AgriLife & TRA BoD to sign
- Scheduled to begin end of April 2020

Modeling Quality Assurance Project Plan (QAPP)

- Covers data analysis and modeling tasks
- Load duration curves (LDCs)
- HAWQS (combines SWAT & SELECT)
- Linkage to existing CE-QUAL-W2 model for JPL

SWAT vs. SELECT – Why 2 methods?

- SWAT
  - Shows *actual* pollutant load
  - Based on monitoring data
  - Does not identify specific pollutant sources
  - BMP recommendations more refined, but based solely on load and land use/land cover
- SELECT
  - Shows *potential* pollutant load
  - Based on population estimates (animals, humans, specific pollution events)
  - BMP recommendations based on source type or species, but not tied to a geographic location

Public Outreach Strategy

- Public Participation Plan will use this structure:
  - Public meetings, open invitation (Partnership Meetings)
  - Internal voting body, members recommended by Partnership (Steering Committee)
  - Allow for Partnership/Steering Committee to form subcommittees if needed in future

Shared summary of SurveyMonkey results

- Drinking water source protection – most votes for #1
- Recreational Opportunities – most overall Top 3 votes

Logos

- Versions: 7, 8, 9
  - Clean, social media friendly
  - Still distinguishable if it is shrunk down to fit as a logo on a report
  - Gradient actually translates well to a greyscale for sky, not so much for water
  - Maybe try lighter blue as a solid color for water? Also darker blue for comparison?
  - Add 2 or 3 silhouette birds in flight to reflect wildlife?
- Heron & Boat
  - Show both the wildlife & recreation components of the lake's identity
  - Perhaps too detailed for small logo
  - Suggestion to keep heron as mascot but not in the logo
  - Use in other public outreach items
- Versions 18/19/20
- Like with the sun, but without the boat
  - Remove some of the "pills" to declutter and make room for boat?
    - No, don't remove – gives the water its "ripple" effect

Other Business

First Public Meeting

- Kicks off full-fledged stakeholder effort
- Try to shoot for November 2020
- 8-ish monthly meetings after that

Deliverables

- Powerpoint w/logo examples
- Meeting notes

Next Meeting – May 28, 2020 at Dogwood Canyon Audubon Center

Joe Pool Lake WPP Update

Meeting Notes
WebEx
05/28/2020

Introduction

- Public Participation and Fact Sheet comments needed by June 1st

Phase I: Watershed Characterization Update

Preliminary Monitoring Data

- LDC's and more data analysis will be presented to group in future meetings after data is finalized and modeling activities begin
- Data averages/geomeans only represent data collected under WPP QAPP. It does not include any other historical data.
- Routine and Flow biased sampling has been completed
- *E. coli* in lower Walnut Creek
  - Elevated values continue at Katherine Rose and Matlock
- Soap Creek nutrients
  - With the expansion at MCRWS - will advanced nutrient removal be added?
  - Most WWTFs don't currently utilize nutrient removal technology
  - Currently, no environmental standards for N or P, only screening levels
  - Technology is costly, no plans to implement yet

Phase II: Public Outreach/Watershed Planning Update

Public Participation Plan

- Public Participation Plan will use this structure:
  - Public meetings, open invitation (Partnership Meetings)
  - Internal voting body, members recommended by Partnership (Steering Committee)
  - Allow for Partnership/Steering Committee to form subcommittees if needed in future
- Should TPWD be on Steering Committee?
  - Derek Dye will pass information up the line and get back with an answer
  - Aaron Hoff suggest that TRWD be moved to Technical Advisory Group and allow TPWD to be a voting member as they have more stake in Joe Pool Lake
- Technical Advisory Group
  - Howard Redfearn suggested USACE be involved
  - TRA will reach out to USACE
- Watershed Planning Meeting Schedule
  - TWS scheduled for September 15th
  - Kickoff meeting scheduled for November 2020

Fact Sheet

- Should have more bullet points
- Too much text
- No TCEQ requirements for fact sheet; Jessica Johnstone will send an example of fact sheet

Logos

- Versions: 7, 8, 9
  - Clean, social media friendly
  - Still distinguishable if it is shrunk down to fit as a logo on a report
  - Gradient actually translates well to a greyscale for sky, not so much for water
  - Maybe try lighter blue as a solid color for water? Also, darker blue for comparison?
  - Add 2 or 3 silhouette birds in flight to reflect wildlife?
- Heron & Boat
  - Show both the wildlife & recreation components of the lake's identity
  - Perhaps too detailed for small logo
  - Suggestion to keep heron as mascot but not in the logo
  - Use in other public outreach items
- Versions 18/19/20
- Like with the sun, but without the boat
  - Remove some of the "pills" to declutter and make room for boat?
    - No, don't remove – gives the water its "ripple" effect
- Howard Redfearn suggested a jumping fish instead of a boat – a bass + a splash
- A voting request will be sent out via email once graphic is received from Grand Prairie

Other Business

Action Items

- Public Participation Plan and Fact Sheet comments needed by June 1st
- Logo will be put to vote via email by June 1st

Deliverables

- Meeting notes
- Public Participation Plan Draft

Next Meeting – August 27, 2020 at Dogwood Canyon Audubon Center

Joe Pool Lake Watershed Protection Plan

Meeting Notes
WebEx
August 27, 2020

Phase I: Watershed Characterization

- Water Quality Monitoring completed
    - Data Collection Draft Report in progress
    - Preliminary Pollutant Source Survey PPT in progress

Phase II: Public Outreach

- Modeling QAPP in progress
- Texas Watershed Steward Workshop on 09/15/2020
    - TCEQ contacted NCTCOG (Elena Berg) to publish meeting notice
    - Grand Prairie published meeting notice on City calendar and Pipeline Direct City Newsletter
- Kick-off Stakeholder Meeting
    - Plan to schedule second week of November
    - TCEQ and Cedar Hill would like to have a virtual option
    - In-person option could be held in Grand Prairie
    - Cedar Hill will need at least 1.5 month notice to publish meeting notice in water bill
    - NCTCOG will be included in PII mailing list

Other Business

Action Items

- Please review Data Collection Report and Pollutant Source Survey once received

Deliverables

- Meeting notes

Next Meeting – October 22nd, 2020 via virtual platform

Joe Pool Lake Watershed Protection Plan

Project Update Meeting
Microsoft Teams
October 22nd, 2020

9:30 Welcome/Introductions

9:35 Phase I: Watershed Characterization

Preliminary Pollutant Source Survey PPT-Draft

- Analysis of Historical Data Report
- TRA Basin Summary Report Trends
- Combined trends from current project and JPL Customer Water Quality Summary Reports

10:35 Phase II: Public Outreach

Kick-off Stakeholder Meeting

10:50 Next Steps

11:00 Adjourn

JPL Advisory Meeting FY21 Q1 10/22/2020

Howard says that what we called Low Branch may actually Reece Branch
↳ he says that Low Branch runs under 360

Howard – they have repaired some sewer like breaks over the past couple of years on streams that would have eventually flowed in to Walnut Creek – but nothing near the sample location

Mike Adams
Julian Holmes
Julie Collins
Jessica Johnstone
Bart VanAmburgh
Kathleen Myers
Howard
Jason
Duy Vu
Web

Bart says Low Branch may be called wrong & Sugar Creek may be Taaff
↳ Need to confirm against the FEMA FIRM maps