Amendment # 1
Update to Appendix B Sampling Process Design and Monitoring Schedule to the Upper Neches River Basin Clean Rivers Program FY 2018-2019 QAPP

Prepared by the Angelina and Neches River Authority (ANRA) in Cooperation with the Texas Commission on Environmental Quality (TCEQ)

Effective: Immediately upon approval by all parties

Questions concerning this QAPP should be directed to:

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or

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Justification

This document details the changes made to the basin-wide Quality Assurance Project Plan to update Appendix B and Table A7 for FY 2018 Q4 and 2019. This document also updates required field parameters, updates personnel changes, and adds language about laboratory subcontracting and QA responsibilities.

Summary of Changes

Section A1: The Approval Page was changed to reflect personnel changes at ANRA, TCEQ, and LCRA, adding Ana-Lab.

Section A3: The Distribution List was changed to reflect personnel changes at ANRA, TCEQ, and LCRA, adding Ana-Lab.

Section A4: The Project/Task Organization was changed to reflect personnel changes at ANRA, TCEQ, and LCRA, adding Ana-Lab.

Figure A4.1: Organization Chart was changed to reflect personnel changes at ANRA, TCEQ, and LCRA, adding Ana-Lab.

Section A6: Project/Task Description was modified to include Ana-Lab as a subcontract lab for chlorophyll-a/pheophytin-a analysis.

Section A9: Documents and Records (Table A9.1) Project Documents and Records was modified to add Ana-Lab; Laboratory Test Reports section was modified to add Ana-Lab.

Section B2: Sampling Methods, Sample Container section was modified to add Ana-Lab.

Section B3: Sampling Handling and Custody, Sample Handling section was modified to add Ana-Lab.

Section B4: Analytical Methods, Analytical Method Deficiencies and Corrective Actions section was modified to add Ana-Lab.

Section B5: TNI language was added referencing the subcontracting of laboratory tests.

The following information in Appendix B was amended to reflect changes to:

- Sample design rationale FY 2018 Q4 and FY 2019
- Monitoring Sites table
- Maps of sampling sites with updated legends

Section B10: Data Management, Data Management Process section was modified to add Ana-Lab.

Section C2: Reports to Management (Table C2.1) was modified to add Ana-Lab Laboratory Manager.

Section D2: Verification and Validation Methods (Table D2.1) was modified to add Ana-Lab Laboratory Manager and QAO.

Appendix A: Measurement Performance Specifications (Tables A7.1 – A7.4) was modified to add Ana-Lab as a subcontract lab for chlorophyll-a/pheophytin-a analysis. Parameter codes 89978 and 89979 removed from Table A7.4

Appendix D: Field Data Sheets was modified, parameter codes 89978 and 89979 removed.

Appendix E: Chain of Custody forms were updated to include Ana-Lab.

Detail of Changes

A1 Approval Page

Section A1: The Approval Page was changed to reflect personnel changes. ANRA: "Brian Sims" was changed to "Dylan Coleman" as the ANRA CRP Project Manager, "Hannah Lucia" was changed to "Jeremiah Poling" as the ANRA CRP Quality Assurance Officer, and "Hannah Lucia" was changed to "Trey Reeves" as the ANRA Laboratory Interim Quality Assurance Officer. The Approval Page was changed to reflect personnel changes. TCEQ: "Kelly Rodibaugh" was changed to "Rebecca DuPont" as the TCEQ CRP Project Manager. The Approval Page was changed to reflect personnel changes. LCRA: "Roland Garcia" was changed to "Dale Jurecka" as the LCRA Lab Manager, and "Jennifer Blossom" was changed to "Angel Mata" as the LCRA Quality Assurance Officer. Ana-Lab was added to Approval Page.

A3 Distribution List

Section A3: The Distribution List was changed to reflect personnel changes at TCEQ: "Kelly Rodibaugh" was changed to "Rebecca DuPont" as the TCEQ CRP PM and the phone number was changed from "512-239-1739" to "512-239-6697". The Distribution List was changed to reflect personnel changes at ANRA: "Brian Sims" was changed to "Dylan Coleman" as the ANRA CRP PM and the phone number was changed from "936-633-7527" to "936-632-7795." The Distribution List was changed to reflect personnel changes at LCRA: "Jennifer Blossom" was changed to "Angel Mata" as the LCRA ELS Quality Assurance Officer and the phone number was changed from "512-730-5144" to "512-730-6018" and "Dale Jurecka" was changed to the LCRA ELS Laboratory Manager and "Jason Woods" was added as the LCRA ELS Project Manager with the phone number "512- 730-5339." Ana-Lab was added to Distribution Page.

A4 Project/Task Organization

Section A4: The Project/Task Organization section was changed to reflect personnel changes at TCEQ: "Kelly Rodibaugh" was changed to "Rebecca DuPont" as the TCEQ CRP PM. The Project/Task Organization section was changed to reflect personnel changes at ANRA: "Brian Sims" was changed to "Dylan Coleman" as the ANRA CRP PM, "Hannah Lucia" was changed to "Jeremiah Poling" as the ANRA CRP QAO, "Hannah Lucia" was changed to "Trey Reeves" as the ANRA Laboratory Interim Quality Assurance Officer, and "Chuck Whitehead" was changed to "Jay Eagle" as the ANRA Field Technician. The Project/Task Organization section was changed to reflect personnel changes at LCRA: "Roland Garcia" was changed was changed to "Dale Jurecka" as the LCRA ELS Laboratory Manager, and "Jennifer Blossom" was changed to "Angel Mata" as the LCRA ELS Quality Assurance Officer and

"Dale Jurecka" was changed to "Jason Woods" as the LCRA ELS Project Manager. Ana-Lab was added to Project Task Organization Page.

Figure A4.1. Organization Chart - Lines of Communication

Figure A4.1: Organization Chart was changed to reflect personnel changes at TCEQ: "Kelly Rodibaugh" was changed to "Rebecca DuPont" as the TCEQ CRP PM. The Organization Chart was changed to reflect personnel changes at ANRA: "Brian Sims" was changed to "Dylan Coleman" as the ANRA CRP PM. The Organization Chart was changed to reflect personnel changes at ANRA: "Chuck Whitehead" was changed to "Jay Eagle" as the ANRA Field Technician. The Organization Chart was changed to reflect personnel changes at LCRA: "Roland Garcia" was changed was changed to "Dale Jurecka" as the LCRA ELS Laboratory Manager, and "Jennifer Blossom" was changed to "Angel Mata" as the LCRA ELS Quality Assurance Office, and "Dale Jurecka" was changed to "Jason Woods" as the LCRA ELS Project Manager. Ana-Lab was added to Organization Chart-Lines of Communication page.

A6 Project/Task Description

Section A6: Project/Task Description paragraph was modified to include Ana-Lab

A9 Documents and Records

Table A9.1: Project Documents and Records Table was modified to include Ana-Lab.

Section A9: Documents and Records, Laboratory Test Reports paragraph was modified to include Ana-Lab.

B2 Sampling Methods

Section B2: Sample Containers paragraph was modified to include Ana-Lab.

B3 Sampling Handling and Custody

Section B3: Sampling Handling and Custody, Sample Handling section was modified to include Ana-Lab.

B4 Analytical Methods

Section B4: Analytical Methods, Analytical Method Deficiencies and Corrective Actions section was modified to add Ana-Lab.

B5 Quality Control

Section B5: Added language to the "Quality Control or Acceptability Requirements Deficiencies and Corrective Actions" section to clarify the QA/QC responsibilities of labs included as signatories to this QAPP who subcontract lab work for this project.

B10 Data Management

Section B10: Data Management, Data Management Process section was modified to add Ana-Lab.

C2 Reports to Management

Section C2: Reports to Management (Table C2.1) was modified to add Ana-Lab Laboratory Manager.

D2 Verification and Validation Methods

Section D2: Verification and Validation Methods (Table D2.1) was modified to add Ana-Lab Laboratory Manager and QAO.

Appendix A: Measurement Performance Specifications (Table A7.1)

Appendix A: Measurement Performance Specifications paragraph was modified to add Ana-Lab.

Appendix A: Measurement Performance Specifications (A7 Tables) was modified to add Ana-Lab. Parameter codes 89978 and 89979 were removed from Table A7.4.

Appendix B: Sample Design Rationale for FY 2018 Q4 and FY 2019

Appendix B: Sample Design Rationale for FY 2018 Q4 and FY 2019 was modified to include changes made to the monitoring schedule for FY 2019.

Monitoring Sites Table

Appendix B: Table B1.1 was modified to reflect monitoring schedule for FY 2019.

Maps

Appendix C: Maps were modified to reflect monitoring schedule for FY 2019.

Appendix D: Field Data Sheets

Appendix D: Field Data Sheets appendix was modified; parameter codes 89978 and 89979 were removed.

Appendix E: Chain of Custody Forms

Appendix E: Chain of Custody forms were updated to include Ana-Lab.
These changes will be incorporated into this QAPP document and TCEQ and the ANRA will acknowledge and accept these changes by signing this document.

A1 Approval Page

Texas Commission on Environmental Quality

Water Quality Planning Division

Electronically Approved 6/21/2018

Sarah Eagle, Work Leader Date
Clean Rivers Program

Electronically Approved 6/21/2018

Kelly Rodibaugh Date
Project Quality Assurance Specialist
Clean Rivers Program

Electronically Approved 6/21/2018

Rebecca DuPont Date
Project Manager
Clean Rivers Program

Electronically Approved 6/21/2018

Cathy Anderson, Team Leader Date
Data Management and Analysis

Monitoring Division

Electronically Approved 6/25/2018

Sharon Coleman Date
TCEQ QA Manager and Acting Lead CRP QA Specialist

Angelina & Neches River Authority (ANRA)

Environmental Division – Clean Rivers Program

Electronically Approved 6/21/2018

Dylan Coleman Date
ANRA CRP Project Manager

Electronically Approved 6/21/2018

Jeremiah Poling Date
ANRA CRP Quality Assurance Officer

Electronically Approved 6/21/2018

Jeremiah Poling Date
ANRA CRP Data Manager

Environmental Division – ANRA Environmental Laboratory

Electronically Approved 6/21/2018

Trey Reeves Date
ANRA Laboratory Manager

Electronically Approved 6/21/2018

Trey Reeves Date
ANRA Laboratory Interim Quality Assurance Officer

Lower Colorado River Authority (LCRA)

Environmental Laboratory Services (ELS)

Electronically Approved 6/25/2018

_____

Dale Jurecka Date
LCRA ELS Manager

Electronically Approved 6/25/2018

_____

Angel Mata Date
LCRA ELS Quality Assurance Officer

Ana-Lab Corporation (Kilgore)

Electronically Approved 6/21/2018

Will Boyd Date
Ana-Lab Manager

Electronically Approved 6/21/2018

Tracey Varvel Date
Ana-Lab Quality Assurance Officer

Sub-tier participants (e.g., subcontractors, subparticipants, or other units of government) will sign this 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.

A3 Distribution List

Texas Commission on Environmental Quality

Rebecca DuPont, Project Manager
Clean Rivers Program
MC-234
(512) 239-6697

Angelina & Neches River Authority

Dylan Coleman, CRP Project Manager
(936) 632-7795

Lower Colorado River Authority Environmental Laboratory Services

Dale Jurecka, LCRA ELS Laboratory Manager
(512) 730-6337

Jason Woods, LCRA Project Manager
(512) 730-5339

Angel Mata, LCRA ELS Quality Assurance Officer
(512)730-6018

Ana-Lab
2600 Dudley Road
Kilgore, TX 75662

Will Boyd, Ana-Lab Laboratory Manager
(903) 984-0551

Tracey Varvel, Ana-Lab Laboratory QAO
(903) 984-0551

A4 PROJECT/TASK ORGANIZATION

Rebecca DuPont
CRP Project Manager
Responsible for the development, implementation, and maintenance of CRP contracts. Tracks, reviews, and approves deliverables. Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Assists CRP Lead QA Specialist in conducting Basin Planning Agency audits. Verifies QAPPs are being followed by Basin Planning Agency and that projects are producing data of known quality. Coordinates project planning with the Basin Planning Agency Project Manager. Reviews and approves data and reports produced by the Basin Planning Agency. Notifies QA Specialists of circumstances which may adversely affect the quality of data derived from the collection and analysis of samples. Develops, enforces, and monitors corrective action measures to ensure the Basin Planning Agency meets deadlines and scheduled commitments.

Dylan Coleman
ANRA CRP Project Manager
Responsible for implementing and monitoring CRP requirements in contracts, QAPPs, and QAPP amendments and appendices. Coordinates basin planning activities and work of basin partners. Ensures monitoring systems audits are conducted to ensure QAPPs are followed by basin planning agency participants and that projects are producing data of known quality. Ensures that subparticipants are qualified to perform contracted work. Ensures CRP project managers and/or QA Specialists are notified of deficiencies and corrective actions, and that issues are resolved. Responsible for validating that data collected are acceptable for reporting to the TCEQ.

Jeremiah Poling
ANRA CRP Quality Assurance Officer
Responsible for coordinating the implementation of the QA program. Responsible for writing and maintaining the QAPP and monitoring its implementation. 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 QA records. Responsible for coordinating with the TCEQ QAS to resolve QA-related issues. Notifies the ANRA CRP Project Manager of particular circumstances which may adversely affect the quality of data. Coordinates and monitors deficiencies and corrective action. Coordinates and maintains records of data verification and validation. Coordinates the research and review of technical QA material and data related to water quality monitoring system design and analytical techniques. Conducts monitoring systems audits on project participants to determine compliance with project and program specifications, issues written reports, and follows through on findings. Ensures that field staff is properly trained and that training records are maintained.

Trey Reeves
ANRA Laboratory Interim Quality Assurance Officer
Responsible for the overall quality control and quality assurance of analyses performed by ANRA Lab. Monitors the implementation of the QM/QAPP within the laboratory to ensure complete compliance with QA data quality objectives, as defined by the contract and in this QAPP. Conducts in-house audits to ensure compliance with written SOPs and to identify potential problems. Responsible for supervising and verifying all aspects of the QA/QC in the QA the laboratory.

Jay Eagle
ANRA Field Technician
Coordinate and conduct field data collection activities in accordance with the basin coordinated monitoring schedule and this QAPP.

Dale Jurecka
LCRA ELS Laboratory Manager
Responsible for overall performance, administration, and reporting of analyses performed by LCRA's Environmental Laboratory Services. Responsible for supervision of laboratory personnel involved in generating analytical data for the project. Ensures that laboratory personnel have adequate training and a thorough knowledge of this QAPP and related SOPs. Responsible for oversight of all laboratory operations ensuring that all QA/QC requirements are met, documentation is complete and adequately maintained, and results are reported accurately.

Angel Mata
LCRA ELS Quality Assurance Officer
Responsible for the overall quality control and quality assurance of analyses performed by LCRA's ELS. Monitors the implementation of the QM/QAPP within the laboratory to ensure complete compliance with QA data quality objectives, as defined by the contract and in this QAPP. Conducts in-house audits to ensure compliance with written SOPs and to identify potential problems. Responsible for supervising and verifying all aspects of the QA/QC in the laboratory

Jason Woods
LCRA ELS Project Manager
Responsible for analyses performed by LCRA ELS for ANRA. Responsible for project set up in LIMS. Responsible for corrective action and all communication with COA. Makes ELS data available to the ANRA PM. Notifies ANRA of laboratory analysis issues that may invalidate data. Reviews and verifies all laboratory data for integrity and continuity, reasonableness and conformance to project requirements, and then validates the data against the measurement performance specifications listed in Table A7.1 of the QAPP.

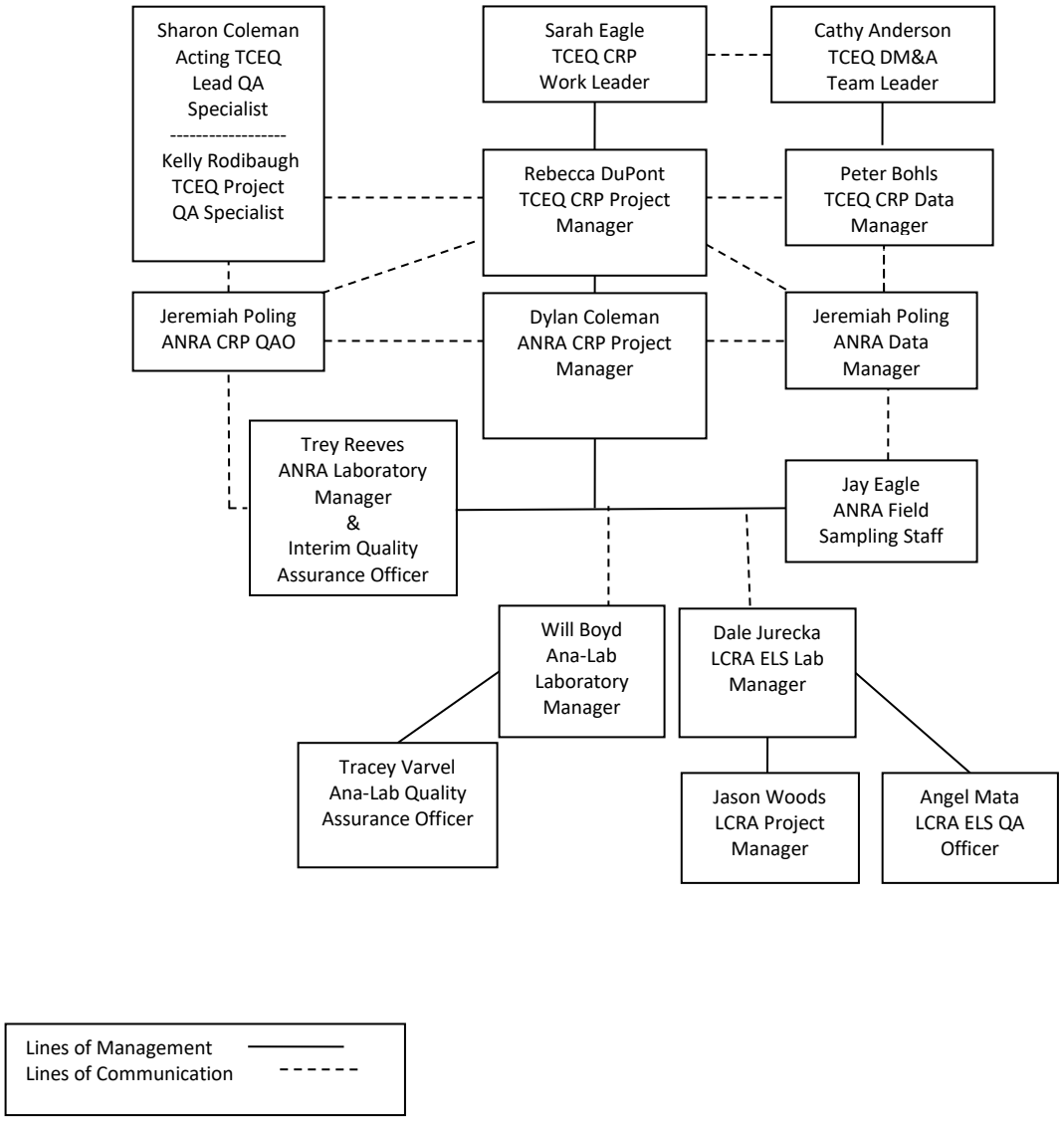
Will Boyd
Ana-Lab Laboratory Manager
Responsible for overall performance, administration, and reporting of analyses performed by Ana-Lab. Responsible for supervision of laboratory personnel involved in generating analytical data for the project. Ensures that laboratory personnel have adequate training and a thorough knowledge of this QAPP and related SOPs. Responsible for oversight of all laboratory operations ensuring that all QA/QC requirements are met, documentation is complete and adequately maintained, and results are

reported accurately.

Tracey Varvel
Ana-Lab Quality Assurance Officer
Responsible for the overall quality control and quality assurance of analyses performed by Ana-Lab. Monitors the implementation of the QM/QAPP within the laboratory to ensure complete compliance with QA data quality objectives, as defined by the contract and in this QAPP. Conducts in-house audits to ensure compliance with written SOPs and to identify potential problems. Responsible for supervising and verifying all aspects of the QA/QC in the QA the laboratory.

Project Organization Chart

Figure A4.1. Organization Chart - Lines of Communication



A6 Project/Task Description

All chlorophyll-a and pheophytin samples are analyzed by Ana-Lab or LCRA laboratory. LCRA ELS will serve as alternate for the sample analyses of conventional parameters: ammonia-N, nitrate-N, nitrite-N, combined nitrate+nitrite-N, total phosphorus, total suspended solids, chloride, and sulfate, in the event that analysis cannot be conducted at the ANRA Environmental Laboratory (ex: instrument failure, service or maintenance required).

A9 Documents and Records

Table A9.1 Project Documents and Records

Document/Record	Location	Retention (yrs.)	Format
QAPPs, amendments and appendices	ANRA	5	Electronic or Paper
Field SOPs	ANRA	5	Electronic or Paper
Laboratory Quality Manuals	ANRA/LCRA/Ana-Lab	5	Electronic or Paper
Laboratory SOPs	ANRA/LCRA/Ana-Lab	5	Electronic or Paper
QAPP distribution documentation	ANRA	5	Electronic or Paper
Field staff training records	ANRA	5	Electronic or Paper
Field equipment calibration/maintenance logs	ANRA	5	Electronic or Paper
Field notebooks or data sheets	ANRA	5	Electronic or Paper
Chain of custody records	ANRA/LCRA/Ana-Lab	5	Electronic or Paper
Laboratory calibration records	ANRA/LCRA/Ana-Lab	5	Electronic or Paper
Laboratory instrument printouts	ANRA/LCRA/Ana-Lab	5	Electronic or Paper
Laboratory data reports/results	ANRA/LCRA/Ana-Lab	5	Electronic or Paper
Laboratory equipment maintenance logs	ANRA/LCRA/Ana-Lab	5	Electronic or Paper
Corrective Action Documentation	ANRA/LCRA/Ana-Lab	5	Electronic or Paper

Laboratory Test Reports

Upon completion of all analyses, the ANRA Environmental Laboratory generates a Report Cover Page, a Laboratory Analysis Report, and a Quality Control Data Report. The chain of custody documentation, field data sheets, Ana-Lab and/or LCRA laboratory reports (if applicable) are attached to form the final report. The ANRA Laboratory Manager reviews the report and submits it to the ANRA CRP QAO for additional review. Upon final review by the ANRA CRP QAO, the report is submitted to the ANRA Data Manager for electronic submittal.

B2 Sampling Methods

- Amber containers are required for chlorophyll-a sampling. Amber polyethylene bottles are provided by the ANRA for samples that will be analyzed by Ana-Lab, or LCRA ELS laboratory for samples that will be analyzed at the LCRA ELS laboratory.

B3 Sampling Handling and Custody

Chlorophyll-a/Pheophytin-a samples to be sent to Ana-Lab are relinquished by the sample custodian when they are deemed acceptable after a thorough inspection of the sample documentation, preservation, hold times, and containers. The samples are then filtered by ANRA and stored in ANRA lab freezer, to maintain a temperature below freezing. Frozen sample filters are to be picked up by Ana-Lab courier services, samples are then packed on ice in a cooler to maintain a temperature between freezing and 6 ° C. The sealed cooler, containing filtered sample containers and COC forms, is then received by the Ana-Lab sample courier and transported to Ana-Lab, where it is relinquished. Ana-Lab inspects the custody seal and filtered sample containers to be sure that the samples have not been tampered with. After examination and temperature verification, the samples are received by Ana-Lab.

5. Samples requiring subcontractor lab analysis are delivered to the Ana-Lab for analysis via courier service. These samples are accompanied by the Ana-Lab COC form. The COC is relinquished by the ANRA Laboratory and is given to the Ana-Lab courier (personnel authorized to receive samples). The date and time the sample was received by the ANRA Laboratory must be filled out, along with the ANRA Sample Custodian relinquishment signature before Ana-Lab courier accepts the sample(s). Copies of complete COC forms are returned along with Ana-Lab analysis report.

6. A copy of the COC forms is retained for ANRA records. Copies of COC forms are kept along with the laboratory analysis reports and associated field sheet(s).

B4 Analytical Methods

Deficiencies in field and laboratory measurement systems involve, but are not limited to such things as instrument malfunctions, failures in calibration, blank contamination, quality control samples outside QAPP defined limits, etc. In many cases, the field technician or lab analyst will be able to correct the problem. If the problem is resolvable by the field technician or lab analyst, then they will document the problem on the field data sheet or laboratory record and complete the analysis. If the problem is not resolvable, then it is conveyed to the ANRA, Ana-Lab or LCRA ELS Laboratory Manager, who will make the determination and notify the ANRA, Ana-Lab or LCRA ELS QAO. If the analytical system failure may compromise the sample results, the resulting data will not be reported to the TCEQ. The nature and disposition of the problem is reported on the data report which is sent to the ANRA CRP Project Manager. ANRA CRP Project Manager will include this information in the CAP and submit with the Progress Report which is sent to the TCEQ CRP Project Manager.

B5 Quality Control

Quality Control or Acceptability Requirements Deficiencies and Corrective Actions

Sampling QC excursions are evaluated by the ANRA Project Manager, in consultation with the ANRA QAO. In that differences in sample results are used to assess the entire sampling process, including environmental variability, the arbitrary rejection of results based on pre-determined limits is not practical. Therefore, the professional judgment of the ANRA Project Manager and QAO will be relied upon in evaluating results.

Laboratory measurement quality control failures are evaluated by the laboratory staff. The disposition of such failures and the nature and disposition of the problem is reported to the ANRA Laboratory QAO. The Laboratory QAO will discuss with the ANRA Project Manager. If applicable, the ANRA Project Manager will include this information in the CAP and submit with the Progress Report which is sent to the TCEQ CRP Project Manager.

Additionally, in accordance with CRP requirements and the TNI Standard (Volume 1, Module 2, Section 4.5, Subcontracting of Environmental Tests) when a laboratory that is a signatory of this QAPP finds it necessary and/or advantageous to subcontract analyses, the laboratory that is the signatory on this QAPP must ensure that the subcontracting laboratory is NELAP-accredited (when required) and understands and follows the QA/QC requirements included in this QAPP, including methodology. The signatory laboratory is also responsible for quality assurance of the data prior to delivering it to the ANRA CRP Project Manager, including review of all applicable QC samples related to CRP data. As stated in section 4.5.5 of the TNI Standard, the laboratory performing the subcontracted work shall be indicated in the final report and the signatory laboratory shall make a copy of the subcontractor's report available to the client (ANRA CRP Project Manager) when requested.

The definition of and process for handling deficiencies and corrective action are defined in Section C1.

B10 Data Management

It is imperative that Clean Rivers Program data be maintained and managed in a manner consistent with the development and use of the data. To ensure scientifically valid results, ANRA CRP data, will be subjected to a rigorous data management process. Documented quality assurance and quality control checks/procedures will be applied to all data collected by ANRA and analyzed by the ANRA laboratory, Ana-Lab and/or LCRA ELS.

Data to be incorporated into the ANRA CRP Database is subject to varying levels of review. The QA/QC checks evaluate each data set as a whole, and the validity of individual data points. An initial review is performed by the ANRA Laboratory Manager, who is responsible for entering all laboratory data into the lab's LIMS. The ANRA Laboratory Manager also reviews laboratory analysis reports before they are submitted to the ANRA CRP/Lab Quality Assurance Officer.

Before CRP data is entered into the ANRA CRP database, it is evaluated by the ANRA Lab/CRP QAO for any problems that might impose a limitation on the use of the data; this includes all data analysis performed by Ana-Lab and LCRA ELS. The following information is considered:

C2 Reports to Management

Table C2.1 QA Management Reports

Type of Report	Frequency (daily, weekly, monthly, quarterly, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation	Report Recipients
Lab Analysis, Lab QA/QC Reports	Monthly	Monthly	ANRA Laboratory Manager, LCRA Laboratory Manager, Ana-Lab Laboratory Manager	ANRA QAO, ANRA CRP Project Manager, ANRA Data Manager
Corrective Action Reports	As needed	With Progress Reports	ANRA Quality Assurance Officer	ANRA CRP Project Manager, TCEQ Project Manager
Progress Reports	Quarterly	Per contract deliverables	ANRA CRP Project Manager	TCEQ Project Manager
Monitoring Systems Audit Report and Response	Once per contract period	With Progress Report	ANRA CRP Project Manager and ANRA Quality Assurance Officer	TCEQ Project Manager
Data Review Checklist and Summary	Quarterly	Per contract deliverables	ANRA Data Manager/ Project Manager	TCEQ Project Manager
Contractor Evaluation	Once per contract period	Per contract deliverables	TCEQ Project Manager	ANRA CRP Project Manager

D2 Verification and Validation Methods

Table D2.1: Data Review Tasks

Data to be Verified	Field Task	Laboratory Task	QA Task	Data Manager Task
Sample documentation complete; samples labeled, sites identified	Field Collector	ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	ANRA Data Manager
Field QC samples collected for all analytes as prescribed in the TCEQ SWQM Procedures Manual	Field Collector		ANRA QAO	ANRA Data Manager
Standards and reagents traceable		ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	
Chain of custody complete/acceptable	Field Collector	ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	
NELAP Accreditation is current		ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	
Sample preservation and handling acceptable	Field Collector	ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	
Holding times not exceeded	Field Collector	ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	

Collection, preparation, and analysis consistent with SOPs and QAPP	Field Collector	ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	
Field documentation (e.g., biological, stream habitat) complete	Field Collector		ANRA QAO	ANRA Data Manager
Instrument calibration data complete	Field Collector	ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	ANRA Data Manager
QC samples analyzed at required frequency		ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	ANRA Data Manager
QC results meet performance and program specifications		ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	ANRA Data Manager
Analytical sensitivity (LOQ/AWRL) consistent with QAPP		ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	ANRA Data Manager
Results, calculations, transcriptions checked		ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	ANRA Data Manager
Laboratory bench-level review performed		ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	
All laboratory samples analyzed for all scheduled parameters		ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	ANRA Data Manager
Corollary data agree		ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	ANRA Data Manager
Nonconforming activities documented	ANRA CRP Project Manager	ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	ANRA Data Manager
Outliers confirmed and documented; reasonableness check performed	ANRA CRP Project Manager	ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	ANRA Data Manager
Dates formatted correctly			ANRA/LCRA/Ana-Lab QAO	ANRA Data Manager
Depth reported correctly and in correct units	Field Collector		ANRA QAO	ANRA Data Manager
TAG IDs correct				ANRA Data Manager
TCEQ Station ID number assigned				ANRA Data Manager
Valid parameter codes				ANRA Data Manager
Codes for submitting entity(ies), collecting entity(ies), and monitoring type(s) used correctly				ANRA Data Manager
Time based on 24-hour clock				ANRA Data Manager
Check for transcription errors		ANRA/LCRA /Ana-Lab Laboratory Manager	ANRA/LCRA/Ana-Lab QAO	ANRA Data Manager
Sampling and analytical data gaps checked (e.g., all sites for which data are reported are on the coordinated monitoring schedule)	ANRA CRP Project Manager		ANRA QAO	ANRA Data Manager
Field instrument pre- and post-calibration results within limits	Field Collector		ANRA QAO	ANRA Data Manager
10% of data manually reviewed			ANRA/LCRA/Ana-Lab QAO	ANRA Data Manager

Appendix A: Measurement Performance Specifications (A7 Tables)

Appendix A reflects actual parameters, methods, etc. employed by ANRA, Ana-Lab and LCRA ELS. Procedures for laboratory analysis are in accordance with the most recently published edition of Standard Methods for the Examination of Water and Wastewater, 40 CFR 136, or otherwise approved independently. Only data collected that have a valid TCEQ parameter code assigned in Appendix A are stored in SWQMIS. Any parameters listed in Appendix A that do not have a valid TCEQ parameter code assigned will not be stored in SWQMIS.

Table A7.4: The parameter codes 89978 PRIMARY CONTACT, OBSERVED ACTIVITY (# OF PEOPLE OBSERVED) and 89979 EVIDENCE OF PRIMARY CONTACT RECREATION (1=OBSERVED, 0=NOT OBSERVED) are no longer requested for the CRP program. Parameter codes 89978 and 89979 removed from Table A7.4.

TABLE A7.1 Measurement Performance Specifications for the Angelina & Neches River Authority

Conventional Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	TCEQ AWRL	LOQ	LOQ Check Sample %Rec	Precision (RPD of LCS/LCSD)	Bias %Rec. of LCS	Lab
RESIDUE, TOTAL NONFILTRABLE (MG/L)	mg/L	water	SM 2540D	00530	5	2.5	NA	NA	80-120	ANRA
						1				LCRA ELS*
NITROGEN, AMMONIA, TOTAL (MG/L AS N)	mg/L	water	SM 4500-NH_3-D	00610	0.1	0.1	70-130	20	80-120	ANRA
			EPA 350.1			0.02				LCRA ELS*
NITRITE PLUS NITRATE, TOTAL ONE LAB DETERMINED VALUE (MG/L AS N)	mg/L	water	EPA 353.2	00630	0.05	0.04	70-130	20	80-120	ANRA
			SM 4500 - NO_3 H			0.02				LCRA ELS*
NITRITE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0	00615	0.05	0.05	70-130	20	80-120	ANRA
NITRATE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0	00620	0.05	0.05	70-130	20	80-120	ANRA
PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	mg/L	water	EPA 365.1	00665	0.06	0.02	70-130	20	80-120	ANRA
			SM 4500-P E			0.06				ANRA
			EPA 365.4			0.02				LCRA ELS*
CHLORIDE (MG/L AS CL)	mg/L	water	EPA 300.0	00940	5	5	70-130	20	80-120	ANRA
			EPA 300.0							LCRA ELS*
SULFATE (MG/L AS SO4)	mg/L	water	EPA 300.0	00945	5	5	70-130	20	80-120	ANRA
			EPA 300.0							LCRA ELS*
CHLOROPHYLL-A, FLUOROMETRIC METHOD, UG/L	µg/L	water	EPA 445.0	70953	3	2	NA	20	80-120	Ana-Lab
										LCRA ELS**
PHEOPHYTIN-A UG/L FLUOROMETRIC METHOD	µg/L	Water	EPA 445.0	32213	3	2	NA	NA	NA	Ana-Lab
										LCRA ELS**

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 Methods for the Examination of Water and Wastewater. Reference laboratory Standard Operating Procedures for method revision and approval year.
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)
*LCRA ELS will serve as alternate for the sample analyses of conventional parameters: ammonia-N, combined nitrate+nitrite-N, total phosphorus, total suspended solids, chloride and sulfate, in the event that analysis cannot be conducted at the ANRA Environmental Laboratory (ex: instrument failure, service or maintenance required).
**LCRA ELS will serve as alternate for the sample analyses of conventional parameters: Chlorophyll-a/Pheophytin-a, in the event that analysis cannot be conducted at the Ana-Lab Laboratory (ex: instrument failure, service or maintenance required).

TABLE A7.2 Measurement Performance Specifications for the Angelina & Neches River Authority

Bacteriological Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	TCEQ AWRL	LOQ	LOQ Check Sample %Rec	Log Difference of Duplicates	Bias %Rec. of LCS	Lab
E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	MPN/100 mL	water	IDEXX Laboratories Colilert/ IDEXX Laboratories Colilert-18/SM 9223-B**	31699	1	1	NA	0.50*	NA	ANRA
E. COLI, COLILERT, IDEXX, HOLDING TIME	hours	water	NA	31704	NA	NA	NA	NA	NA	ANRA

* 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.
** E.coli samples analyzed by these methods should always be processed as soon as possible and within 8 hours. When transport conditions necessitate delays in delivery longer than 8 hours, the holding time may be extended and samples must be processed as soon as possible and within 30 hours

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 Methods for the Examination of Water and Wastewater. Reference laboratory Standard Operating Procedures for method revision and approval year.
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)

TABLE A7.3 Measurement Performance Specifications for the Angelina & Neches River Authority

Flow Parameters

Parameter	Units	Matrix	Method	Parameter Code	Lab
FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)	cfs	water	TCEQ SOP V1	00061	Field
FLOW SEVERITY:1=No Flow,2=Low,3=Normal,4=Flood,5=High,6=Dry	NU	water	TCEQ SOP V1	01351	Field
STREAM FLOW ESTIMATE (CFS)	cfs	water	TCEQ SOP V1	74069	Field
FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER	NU	other	TCEQ SOP V1	89835	Field

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 Methods for the Examination of Water and Wastewater. Reference laboratory Standard Operating Procedures for method revision and approval year.
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)

TABLE A7.4 Measurement Performance Specifications for the Angelina & Neches River Authority

Field Parameters

Parameter	Units	Matrix	Method	Parameter Code	TCEQ AWRL	LOQ	LOQ Check Sample %Rec	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*	NA	NA	NA	NA	Field
TRANSPARENCY, SECCHI DISC** (METERS)	meters	water	TCEQ SOP V1	00078	NA*	NA	NA	NA	NA	Field
SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25°C)	us/cm	water	EPA 120.1 and TCEQ SOP, V1	00094	NA*	NA	NA	NA	NA	Field
OXYGEN, DISSOLVED (MG/L)	mg/L	water	SM 4500-O G and TCEQ SOP V1	00300	NA*	NA	NA	NA	NA	Field
PH (STANDARD UNITS)	s.u	water	EPA 150.1 and TCEQ SOP V1	00400	NA*	NA	NA	NA	NA	Field
DAYS SINCE PRECIPITATION EVENT (DAYS)	days	other	TCEQ SOP V1	72053	NA*	NA	NA	NA	NA	Field
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	meters	water	TCEQ SOP V2	82903	NA*	NA	NA	NA	NA	Field
RESERVOIR STAGE (FEET ABOVE MEAN SEA LEVEL)†	FT ABOVE MSL	water	TWDB	00052	NA*	NA	NA	NA	NA	Field
RESERVOIR PERCENT FULL†	% RESERVOIR CAPACITY	water	TWDB	00053	NA*	NA	NA	NA	NA	Field
RESERVOIR ACCESS NOT POSSIBLE LEVEL TOO LOW ENTER 1 IF REPORTING	NS	other	TCEQ Drought Guidance	00051	NA*	NA	NA	NA	NA	Field
MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS)*	meters	other	TCEQ SOP V2	89864	NA*	NA	NA	NA	NA	Field
MAXIMUM POOL DEPTH AT TIME OF STUDY(METERS)*	meters	other	TCEQ SOP V2	89865	NA*	NA	NA	NA	NA	Field
POOL LENGTH, METERS*	meters	other	TCEQ SOP V2	89869	NA*	NA	NA	NA	NA	Field
% POOL COVERAGE IN 500 METER REACH*	%	other	TCEQ SOP V2	89870	NA*	NA	NA	NA	NA	Field
WIND INTENSITY (1=CALM,2=SLIGHT,3=MOD.,4=STRONG)	NU	other	NA	89965	NA	NA	NA	NA	NA	Field
PRESENT WEATHER (1=CLEAR,2=PTCLDY,3=CLDY,4=RAIN,5=OTHER)	NU	other	NA	89966	NA	NA	NA	NA	NA	Field
WATER SURFACE (1=CALM,2=RIPPLE,3=WAVE,4=WHITECAP)	NU	water	NA	89968	NA	NA	NA	NA	NA	Field

*To be routinely reported when collecting data from perennial pools.
**or Secchi tube
† As published by the Texas Water Development Board on their website https://waterdatafortexas.org/reservoirs/statewide

References:
United States Environmental Protection Age+A23ncy (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 Methods for the Examination of Water and Wastewater Reference laboratory Standard Operating Procedures for method revision and approval year.
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)

Appendix B: Sample Design Rationale for the remainder of FY 2018 and FY 2019

The sample design is based on the legislative intent of CRP. Under the legislation, the Basin Planning Agencies have been tasked with providing data to characterize water quality conditions in support of the Texas Water Quality Integrated Report, and to identify significant long-term water quality trends. Based on Steering Committee input, achievable water quality objectives and priorities and the identification of water quality issues are used to develop work plans which are in accord with available resources. As part of the Steering Committee process, the ANRA coordinates closely with the TCEQ and other participants to ensure a comprehensive water monitoring strategy within the watershed.

Changes were made to the monitoring schedule for the remainder of FY 2018 and FY 2019:

Chlorophyll-a /pheophytin monitoring changes:

Due to cost issues, ANRA will scale back chlorophyll-a /pheophytin monitoring to only 22 of the sites that we monitor. For the sites at which we continue to collect samples for chlorophyll-a / pheophytin, the chlorophyll-a / pheophytin filtration will be performed by ANRA, and the samples will be analyzed by Ana-Lab (retaining LCRA ELS for back up analysis).

For FY 2019 ANRA will cease monitoring at 4 sites, and will add parameters to 1 site:

Dropped Sites:

ANRA will drop two sites that have proved redundant, and two that have achieved their monitoring goals.

1. Jack Creek at SH 94 (10493) is being dropped because it's in the same AU with Jack at FM 3150 (10494), and the data collected thus far doesn't indicate any significant differences in the water quality at the two sites. Access is more difficult at SH 94, so of the two, it was chosen to be discontinued.
2. Sam Rayburn downstream of Marion's Ferry (21100) is being discontinued after a comparison of the data from Sam Rayburn Angelina Arm at Hwy 103 Crossing (10613) which is in the same AU didn't expose enough significant differences in water quality to justify having two sites in the AU.
3. Two sites on tributaries of Lake Striker, Johnson (21430) and Bowles (21429) creeks are being discontinued because their monitoring objectives have been achieved. They were put in place to study ambient pH levels to determine if they were naturally low, or if there was some point source possibly contributing. The levels have been consistently low during monitoring, and we have not seen any evidence of related pollution so it appears it's naturally occurring.

Modified Sites:

ANRA will be changing one site (10499 - Biloxi at CR 216) from E. coli and field parameters only, to the full suite of parameters (including conventionals) that we collect at our other sites. This is primarily for consistency with the other sites that we monitor.

Monitoring Sites for 2019

Table B1.1 Sample Design and Schedule, FY 2019 - Angelina & Neches River Authority

Site Description	Station ID	Waterbody ID	Region	SE	CE	MT	24 hr DO	AqHab	Benthics	Nekton	Metal Water	Organic Water	Metal Sed	Organic Sed	Conv	Amb Tox Water	Amb Tox Sed	Bacteria	Flow	Fish Tissue	Field	Comments
NECHES RIVER AT US 69 1.01 KM NORTH OF FM 1014/US 69 INTERSECTION 1.8 KM NORTHWEST OF ROCKLAND IN TYLER COUNTY	10585	0604	10	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site
CEDAR CREEK AT ELLIS AVE IN LUFKIN	21434	0604A	10	AN	AN	RT									4			4	4		4	
CEDAR CREEK AT FM 1336 1.29 KM WEST-SOUTHWEST OF FM 324/FM 1336 INTERSECTION IN SOUTHWEST LUFKIN	13528	0604A	10	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site
CEDAR CREEK AT FM 2497 5.55 KM NORTHWEST OF FM 2497/US 59 INTERSECTION 7.45 KM NORTH NORTHWEST OF CITY OF DIBOLL	10478	0604A	10	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site
CEDAR CREEK AT ST LOOP 287 IN LUFKIN	10479	0604A	10	AN	AN	RT									4			4	4		4	
HURRICANE CREEK 38 METERS DOWNSTREAM OF KIWANIS PARK DRIVE AND DIRECTLY DOWNSTREAM OF CONFLUENCE WITH UNNAMED TRIBUTARY IN LUFKIN	21433	0604B	10	AN	AN	RT									4			4	4		4	
HURRICANE CREEK AT FM 324 6.74 KM SOUTH SOUTHWEST OF LUFKIN	13529	0604B	10	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site
HURRICANE CREEK AT ST LOOP 287 IN SOUTH LUFKIN	10487	0604B	10	AN	AN	RT									4			4	4		4	
JACK CREEK AT FM 2497 5 KM SOUTHEAST OF SH 94/FM 2497 INTERSECTION 13.3 KM SOUTHWEST OF LUFKIN	10492	0604C	10	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site
JACK CREEK AT FM 3150 7 KM WEST OF LUFKIN	10494	0604C	10	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site
PINEY CREEK AT FM 358 2.4 KM EAST OF FM 3154/FM 358 INTERSECTION 10 KM EAST OF CITY OF PENNINGTON	16096	0604D	10	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site

Site Description	Station ID	Waterbody ID	Region	SE	CE	MT	24 hr DO	AqHab	Benthics	Nekton	Metal Water	Organic Water	Metal Sed	Organic Sed	Conv	Amb Tox Water	Amb Tox Sed	Bacteria	Flow	Fish Tissue	Field	Comments
BILOXI CREEK AT ANGELINA CR216 8 KM SOUTHEAST OF LUFKIN 2.4 KM DOWNSTREAM OF US69	10499	0604M	10	AN	AN	RT									4			4	4		4	
BILOXI CREEK AT FM 1818 2.5 KM EAST OF FM 1818/ FM 58 INTERSECTION 13.8 KM EAST OF DIBOLL	16097	0604M	10	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site
BUCK CREEK AT FM 1818 4.72 KM WEST OF FM 844/ FM 1818 17.94 KM EAST OF DIBOLL	16098	0604N	10	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site
LAKE RATCLIFF WHERE NORTHWEST ARM OF LAKE JOINS MAIN BODY 350 M NORTHWEST OF THE SOUTHWEST CORNER OF DAM1.48 KM WEST OF RATCLIFF	17339	0604T	10	AN	AN	RT									4			4			4	Chlorophyll-a/Pheophytin monitoring will continue for this site
BAYOU CARRIZO AT SH 21 NEAR NACOGDOCHES	21432	0610P	10	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site
SAM RAYBURM RESERVOIR NEAR SHIRLEY CREEK IN THE ANGELINA RIVER CHANNEL 5.13 KM NE OF FM 2109/ FM 2801 INTERSECTION	15524	0610	10	AN	AN	RT									4			4			4	
SAM RAYBURN RESERVOIR ADJACENT TO ALLIGATOR COVE IN THE ATTOYAC RIVER CHANNEL 3.94 KM NORTHWEST OF FM 3185/ SH 147 INTERSECTION	15523	0610	10	AN	AN	RT									4			4			4	
AYISH BAYOU AT SH 103 0.8 KM EAST OF FM 705	15361	0610A	10	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site
AYISH BAYOU AT WEST COLUMBIA STREET IN CITY OF SAN AUGUSTINE	21431	0610A	10	AN	AN	RT									4			4	4		4	
ANGELINA RIVER 340 METERS UPSTREAM OF SH 204 9.93 KM WEST OF CUSHING	10633	0611	5	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site

Site Description	Station ID	Waterbody ID	Region	SE	CE	MT	24 hr DO	AqHab	Benthics	Nekton	Metal Water	Organic Water	Metal Sed	Organic Sed	Conv	Amb Tox Water	Amb Tox Sed	Bacteria	Flow	Fish Tissue	Field	Comments
ANGELINA RIVER AT SH 21 11.17 KM EAST NORTHEAST OF ALTO	10630	0611	10	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site
ANGELINA RIVER UPSTREAM SAM RAYBURN RESERVOIR AT FM 1798 5.5 KM WEST OF LANEVILLE	10635	0611	5	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site
LA NANA BAYOU AT LOOP 224 NORTH IN THE CITY OF NACOGDOCHES 1.2 KM EAST OF THE INTERSECTION OF US BUS 59F/ST LOOP 224 NORTH	16301	0611B	10	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site
LA NANA BAYOU AT NACOGDOCHES CR 526 6.9 MI SOUTH OF NACOGDOCHES BETWEEN FM 2863 AND FM 3228	10474	0611B	10	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site
LA NANA BAYOU IMMEDIATELY UPSTREAM OF EAST MAIN STREET/STATE HIGHWAY 7/ STATE HIGHWAY 21 IN NACOGDOCHES	20792	0611B	10	AN	AN	RT									4			4	4		4	
MUD CREEK AT US 79 9.8 KM EAST OF JACKSONVILLE AND 5.9 KM WEST OF NEW SUMMERFIELD	14477	0611C	5	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site
MUD CREEK AT US 84 0.87 KM SOUTHWEST OF REKLAW	10532	0611C	5	AN	AN	RT									4			4	4		4	
LAKE NACOGDOCHES IN MAIN POOL NEAR DAM 375 M EAST OF WESTERN EDGE OF DAM 126 M NORTH OF DAM 10 MI WEST OF NACOGDOCHES	15801	0611Q	10	AN	AN	RT									4			4			4	Chlorophyll-a/Pheophytin monitoring will continue for this site
LAKE NACOGDOCHES NEAR ISLAND IN UPPER LAKE EQUIDISTANT BETWEEN ISLAND AND BOAT RAMP AT THE END OF HARBOR DRIVE AND 3.37 KM SOUTH OF SH 21	21021	0611Q	10	AN	AN	RT									4			4			4	
LAKE STRIKER NEAR DAM APPROX 0.8 MILES SOUTHEAST OF POWERPLANT 138 M NORTHWEST OF SPILLWAY AND 7.5 MILES SOUTHEAST OF NEW SUMMERFIELD	17824	0611R	5	AN	AN	RT									4			4			4	Chlorophyll-a/Pheophytin monitoring will continue for this site

Site Description	Station ID	Waterbody ID	Region	SE	CE	MT	24 hr DO	AqHab	Benthics	Nekton	Metal Water	Organic Water	Metal Sed	Organic Sed	Conv	Amb Tox Water	Amb Tox Sed	Bacteria	Flow	Fish Tissue	Field	Comments
LAKE STRIKER UPPER LAKE EQUIDISTANT BETWEEN SHORELINES 2.28KM SOUTHEAST OF INTERSECTION OF FM2274/FM32889.4 KM E. OF NEW SUMMERFIELD	17822	0611R	5	AN	AN	RT									4			4			4	
ATTOYAC BAYOU AT SH 21 0.71 KM WEST OF INTERSECTION OF SH 21/ FM 1196 4.77 KM EAST OF CHIRENO	10636	0612	10	AN	AN	RT									4			4	4		4	Chlorophyll-a/Pheophytin monitoring will continue for this site
ATTOYAC BAYOU AT SH 7 1.75 KM NORTHEAST OF MARTINSVILLE	15253	0612	10	AN	AN	RT									4			4	4		4	
ATTOYAC BAYOU AT US 59 4.12 KM NORTHEAST OF GARRISON	16076	0612	10	AN	AN	RT									4			4	4		4	
NACONICHE LAKE NEAR THE DAM 226 METERS NORTH AND 715 METERS WEST OF INTERSECTION OF FM 2435 AND US 59 NORTHEAST OF CITY OF NACOGDOCHES	21435	0612G	6	10	AN	AN	RT								4			4			4	Chlorophyll-a/Pheophytin monitoring will continue for this site
WEST CREEK AT FM 2913 2.57 KM N OF INTERSECTION WITH SH 7	20845	0612F	6	10	AN	AN	RT								4			4	4		4	

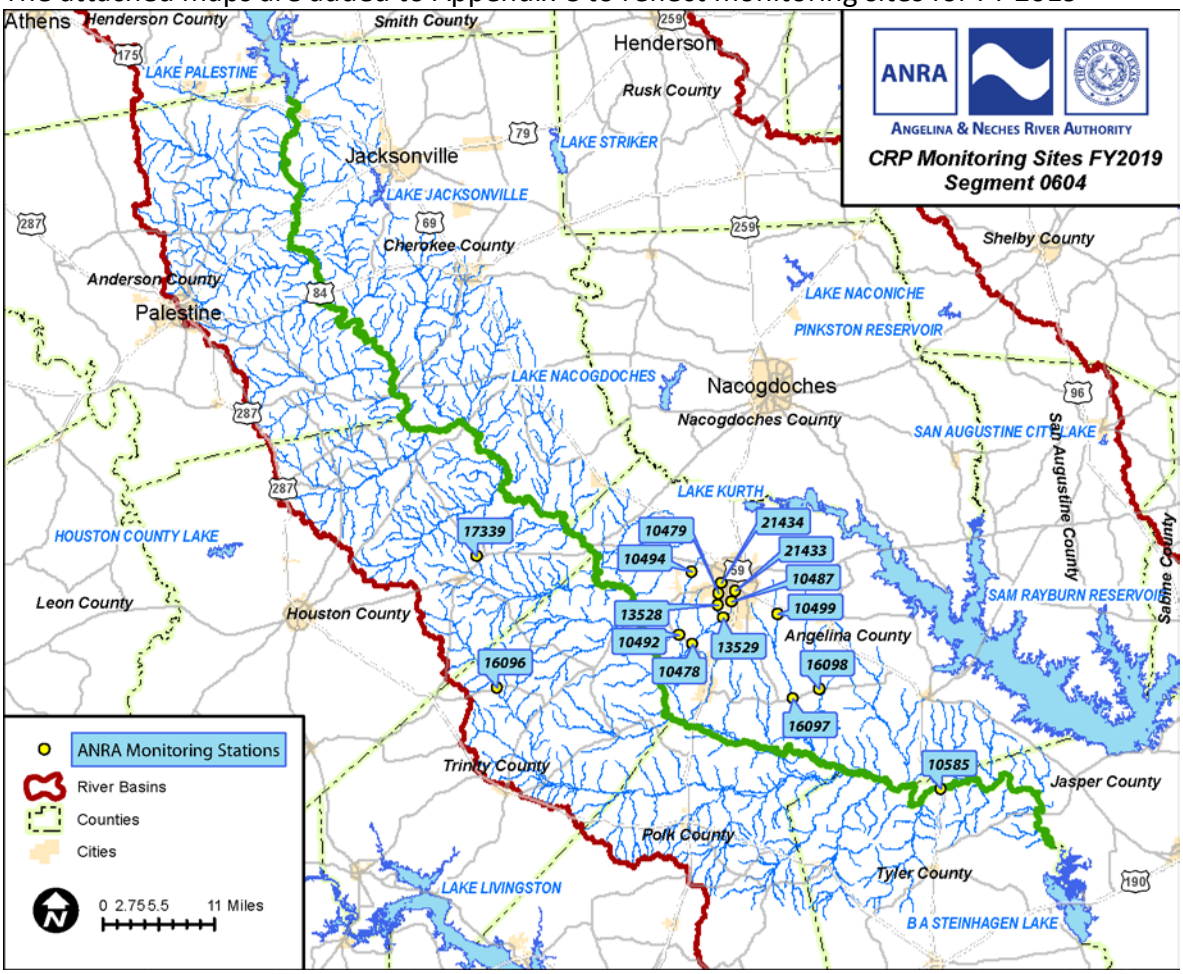
Appendix C: Station Location Maps

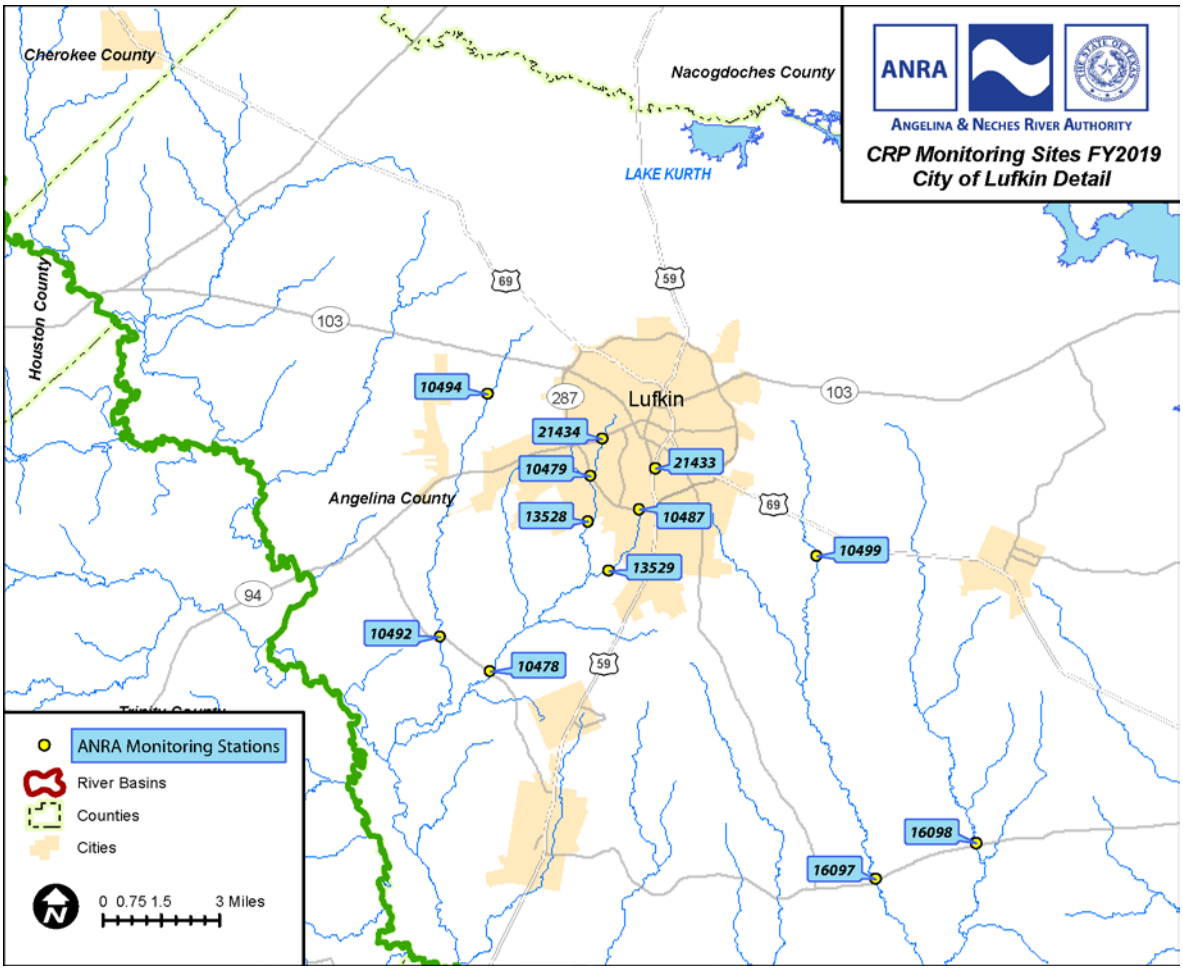
Station Location Maps

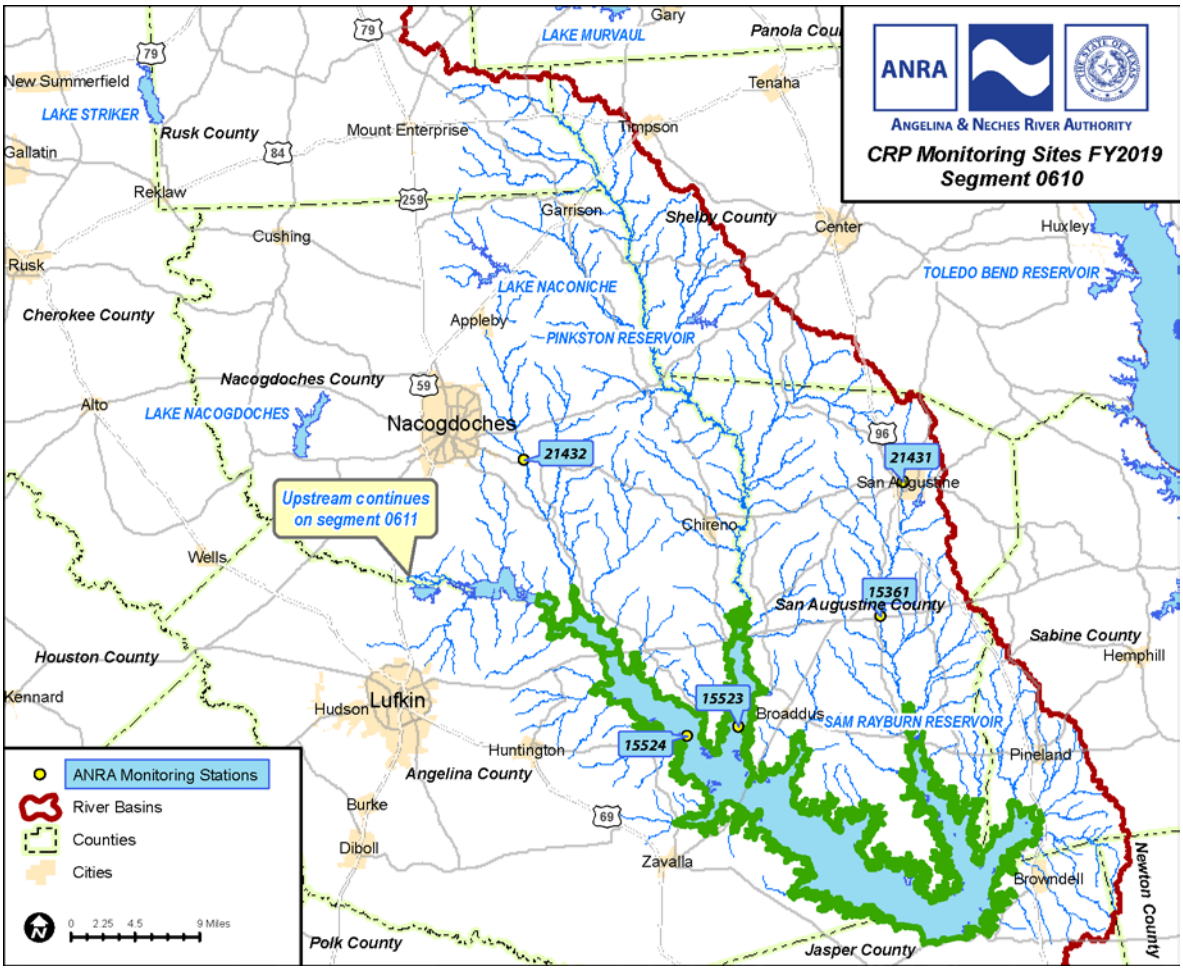
Maps of stations monitored by the ANRA are provided below. The maps were generated by the ANRA. This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information concerning this map, Jeremiah Polling, ANRA Information Systems Coordinator, at 936-633-7551, or via email at jpoling@anra.org.

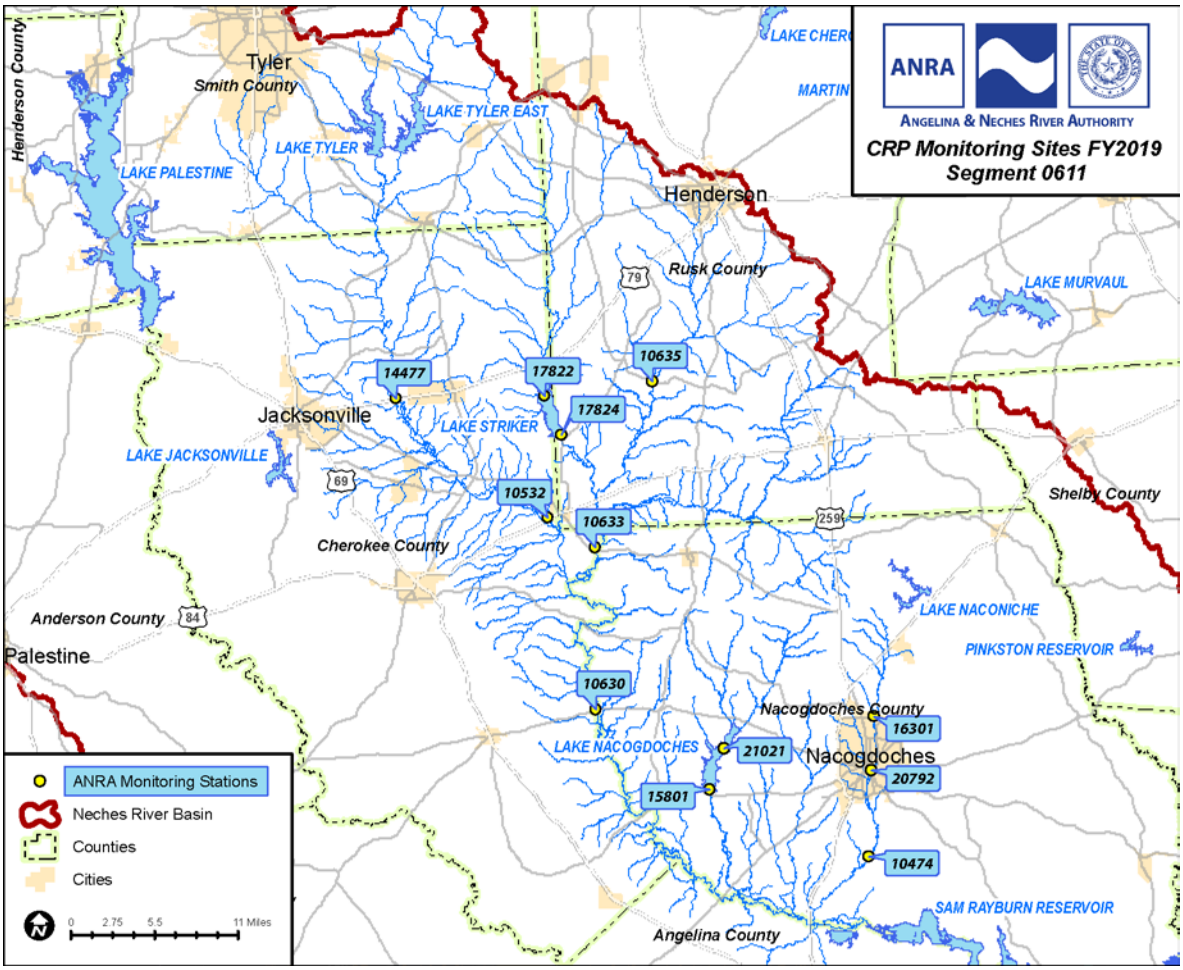
Maps

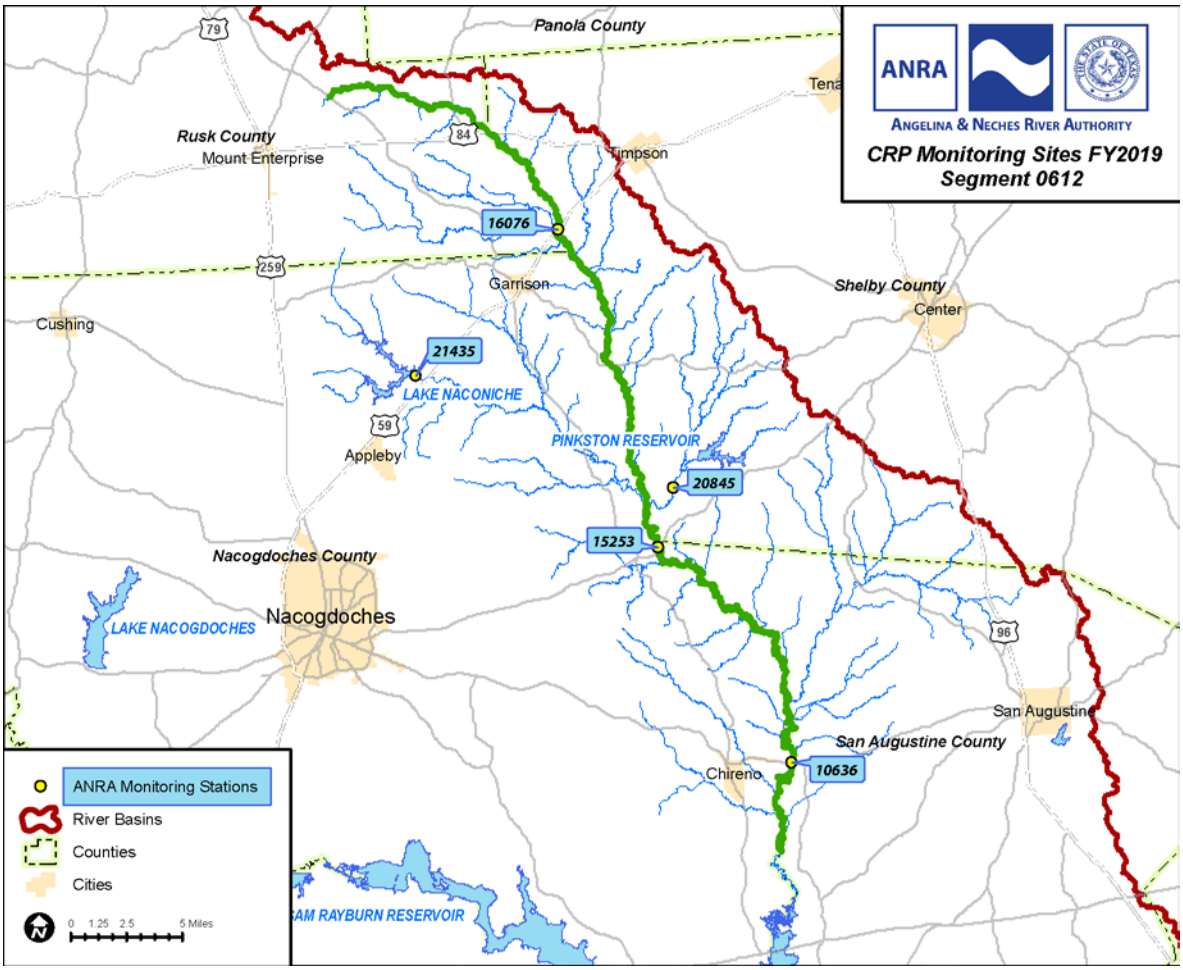
The attached maps are added to Appendix C to reflect monitoring sites for FY 2019




ANRA
Angelina & Neches River Authority
CRP Monitoring Sites FY2019
City of Lufkin Detail
Cherokee County
Nacogdoches County
LAKE KURTH
Houston County
Angelina County
Lufkin
10494
21434
10479
13528
21433
10487
13529
10499
10492
10478
16098
16097
ANRA Monitoring Stations
River Basins
Counties
Cities
0 0.75 1.5 3 Miles


ANRA
Angelina & Neches River Authority
CRP Monitoring Sites FY2019
Segment 0610
Gary
Panola Cou
LAKE MURVAUL
Tenaha
New Summerfield
LAKE STRIKER
Rusk County
Mount Enterprise
Timpson
Gallatin
Reklaw
Garrison
Shelby County
Center
Huxley
Cushing
Rusk
LAKE NACONICHE
TOLEDO BEND RESERVOIR
Cherokee County
Appleby
PINKSTON RESERVOIR
Nacogdoches County
Alto
LAKE NACOGDOCHES
Nacogdoches
21432
21431
San Augustine
Upstream continues on segment 0611
Chireno
Wells
15361
San Augustine County
Sabine County
Hemphill
Houston County
Kennard
Hudson
Lufkin
15523
Broaddus
SAM RAYBURN RESERVOIR
15524
Huntington
Pineland
Angelina County
Burke
Diboll
Zavalla
Browndell
Newton County
Polk County
Jasper County
ANRA Monitoring Stations
River Basins
Counties
Cities
0 2.25 4.5 9 Miles


ANRA
Angelina & Neches River Authority
CRP Monitoring Sites FY2019
Segment 0611
Henderson County
Tyler
Smith County
LAKE TYLER EAST
LAKE TYLER
LAKE PALESTINE
LAKE CHER
MARTIN
Henderson
Rusk County
79
LAKE MURVAUL
14477
17822
10635
17824
Jacksonville
LAKE STRIKER
LAKE JACKSONVILLE
69
10532
10633
Cherokee County
Shelby County
259
Anderson County
84
Palestine
LAKE NACONICHE
PINKSTON RESERVOIR
10630
Nacogdoches County
16301
LAKE NACOGDOCHES
21021
Nacogdoches
20792
15801
10474
SAM RAYBURN RESERVOIR
Angelina County
ANRA Monitoring Stations
Neches River Basin
Counties
Cities
0 2.75 5.5 11 Miles


ANRA
Angelina & Neches River Authority
CRP Monitoring Sites FY2019
Segment 0612
Panola County
Rusk County
Mount Enterprise
Timpson
16076
Garrison
Shelby County
Center
Cushing
21435
LAKE NACONICHE
PINKSTON RESERVOIR
Appleby
20845
15253
Nacogdoches County
Nacogdoches
LAKE NACOGDOCHES
San Augustine
San Augustine County
Chireno
10636
ANRA Monitoring Stations
River Basins
Counties
Cities
0 1.25 2.5 5 Miles

Appendix D: Field Data Sheets

SURFACE WATER QUALITY MONITORING PROGRAM FIELD DATA SHEET

ANGELINA & NECHES RIVER AUTHORITY • P.O. BOX 387 / 210 LUFKIN AVE. • LUFKIN, TEXAS 75902-0387 • (936) 632-7795

Station ID:_____ Station Description:_____

Collector(s) Name/Signature:_____

Date Collected: _____ Time Collected: _____ Sample Depth (meters):_____

Field Tests and Measurements:			Sample Identification:				
	Water Temperature °C	00010	TAG ID		Sample ID		
	Specific Conductance (µS/cm)	00094	Parameters Collected:				
	pH (standard units)	00400	X	E. Coli	X	T. Phosphorus	
	Dissolved Oxygen (mg/L)	00300	X	TSS	X	Chlorophyll-a	
	Secchi Depth (meters)	00078	X	Ammonia-N	X	Pheophytin-a	
	Total Water Depth (meters)	82903	X	Nitrate-N	X	Chloride	
	Instantaneous Stream Flow (cfs)	00061	X	Nitrite-N	X	Sulfate	

Field Observations:			
	01351 - Flow Severity (1-no flow, 2- low, 3-normal, 4-flood, 5-high, 6-dry)		
	89835 - Flow measurement method (1-gage, 2-electric, 3-mechanical, 4-weir/flume, 5-doppler)		
	72053 - Days since last significant rainfall		
	89966 - Present Weather (1-clear, 2-partly cloudy, 3-cloudy, 4-rain, 5-other)		
	If sampling from a Reservoir		
		00052 - Reservoir Stage (Feet Above Mean Sea Level) (collected from TWDB website)	
		00053 - Reservoir Percent Full (collected from TWDB website)	
		00051 - Reservoir Access Not Possible, Level Too Low (Enter "1" if true)	
	If sampling from an perennial pool (isolated pool)		
		89864 - Maximum pool width in meters	
		89865 - Maximum pool depth in meters	
		89869 - Pool length in meters	
		89870 - Percentage the pool covers within a 500 meter reach	
	74069 - Stream Flow Estimate (cfs)		(W × D × L × C ÷ T = Flow Estimate)
		Stream Width (W)	(feet)
		Average Depth of Stream (D)	(feet)
		Distance Object Travels (L)	(feet)
		Correction Factor (C)	(0.9 for smooth or muddy bottom) (0.8 for rough or rocky bottom)
		Time for Object to Travel Distance (T)	(seconds)
	Comments/Observations:		

ANRA
ANGELINA & NECHES RIVER AUTHORITY

210 Lufkin Ave
Lufkin, TX 75901
Phone: 936-632-7795
Fax: 936-632-2564
Web: www.anra.org

CHAIN OF CUSTODY RECORD

PAGE 1 of 1

NELAP ACCREDITED TNI LABORATORY

SECTION A - CLIENT INFORMATION (required)		SECTION B – PROJECT INFORMATION		SECTION C – REPORTING REQUIREMENTS			SECTION D – SAMPLER INFORMATION
Company:	TCEQ - Clean Rivers Program	PO #:		Report To:	Hannah Lucia		Sampler Name (Printed)
Address:	210 E Lufkin Ave	Manifest #:		Copy To:			Jeremiah Poling/Hannah Lucia
City, State, ZIP:	Lufkin, TX 75901			Format:	X	Hardcopy (mailed)	
Phone:	936-633-6435			*(Select all that apply)*		Hardcopy (Pick-Up)	Sampler Signature
Fax:	936-632-2564				X	Electronic (PDF)	
Email:	hlucia@anra.org					FAX	

SECTION E – SAMPLE CONTAINERS AND PRESERVATION

Matrix Codes	Container Type Codes	Preservative Codes
DW = Drinking Water NP = Non-Potable S = Soil SL = Sludge	P = Plastic, AG = Amber Glass G = Glass, A = Amber S = Sterile, V = Vial	0 = None, 4 = NaOH 1 = HNO_3, 5 = HCl 2 = H_2SO_4, 6 = Na Thio. 3 = Ice, 7 = Other

Bottle Letter	A	B	C	D	E			
Container Type	S	P	P	P	P			
Preservative	3,6	3	2,3	3	3			

SECTION F - COMMENTS

SECTION F – SAMPLING INFORMATION				SECTION G – ANALYSIS REQUESTED									SECTION H - FIELD ANALYSIS					SECTION I – SAMPLE ID	
Item #	DATE	TIME	SAMPLE DESCRIPTION	Matrix	Composite	Grab	E.coli	TSS	Ammonia-N T. Phosphorus	N03-N, NO2-N, Cl, SO4	Chlorophyll Pheophytin			Flow (MGD) ○ Total ○ Instantaneous	pH (SU)	DO (mg/L)	Temp (°C)	Total Cl_2 (mg/L)	LAB USE ONLY # Cont.	LAB USE ONLY SAMPLE ID #
1				NP		X	X	X	X	X	X								5	
2																				
3																				
4																				
5																				
6																				

SECTION J – COMPOSITE SAMPLE DATA (if applicable)			
	DATE	TIME	TOTALIZER
START			
END			
TOTAL FLOW (MGD)			

SECTION K – TRANSFER OF SAMPLE CUSTODY						
RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	ON ICE?
						Y N
						Y N
						Y N
						Y N
						Y N

Form ID: COC-ANRA
Rev #:0
Effective: 5/17/2017
Approval: HL

Environmental Laboratory Services
The Solution Lab

LCRA Environmental Laboratory Services
Request for Analysis Chain-of-Custody Record

LCRA - Environmental Lab
3505 Montopolis Dr.
Austin, TX 78744

Phone: (512) 356-6022 or 1-800-776-5272
Fax: (512) 356-6021
https://els.lcra.org

Lab ID#:
Client PO:

Project:	CRP - Chorophyll/Pheophytin	**Client:**	ANGELINA NECHES RIVER AUTH.	**Report To:** TReeves@anra.org & LPrado@anra.org ANRA 210 E Lufkin Ave Lufkin, TX 75901	**Invoice To:** DSandford@anra.org ANRA 210 E. Lufkin Ave. Lufkin, TX 75901
Collector:	Hannah Lucia	**Contact:**	Trey Reeves		
Event#:	Profile:84036	**Phone:**	936-632-7795		

LAB USE ONLY	Sample ID *	Collected *		Matrix*	Container(s) Type/Preservative/Number *										Requested Analysis *											
		Date*	Time * HH:MM	AQ = Aqueous S = Solid T = Tissue DW = Drinking Water	COMPOSITE Y/N	FILTERED Y/N	250APU								445.0AM											
1				AQ																						
2																										
3																										
4																										
5																										
6																										
7																										

Transfers	Relinquished By	Date/Time	Received By	Date/Time	Cooler Temp:				Client Special Instructions:
					#	T#	Obs.	Corr.	
1									
2					1				
3					2				Lab Use Only:

Note: Relinquishing sample(s) and signing the COC, client agrees to accept and is bound by the ELS Standard Terms and Conditions. All fields with an asterisk (*) are required to be completed.

ANA-LAB CORP.
THE COMPLETE SERVICE LAB

Shipping:
2600 Dudley Rd
Kilgore, TX 75662

903.984.0551
www.ana-lab.com

Mailing:
P O Box 9000
Kilgore, TX 75663

Fax: 903.984.5914
e-mail: corp@ana-lab.com

Chain of Custody

Panhandle 806.355.3556 | Oklahoma 405.590.2533 | North Texas 972.837.9412 | Central Texas 512.821.0045
Rio Grand Valley 956.831.6437 | Louisiana 318.219.9300 | Gulf Coast 281.333.9414

Report To			Project Name/Location			Analysis Requested
Company Name			Billing Address (if different)			
Address						
City	State	Zip	City	State	Zip	
Phone	Fax		Phone	Fax		
Sampler Signature	Printed Name		Affiliation		PO Number	

Lab Number Do Not Use	Field Identification	Date	Time	Matrix	# of Containers	Notes

Date	Time	Relinquished by:			Received by:			
		Printed Name	Signature	Affiliation	Printed Name	Signature	Affiliation	

☐Wastewater ☐Drinking Water ☐SW846
Samples Contain? ☐HF ☐CN ☐S= ☐other##

##comments

Samples Received on Ice? ☐ Yes ☐ No
Cooler/Sample Secure? ☐ Yes ☐ No
Method of Shipment ☐ Bus ☐ FedEx ☐ Lone Star ☐ UPS ☐ Hand Delivered ☐ Airborne ☐ Other
Tracking or Shipping Number _____
Requested TAT ☐ Routine ☐ 3 day ☐ 2 Day ☐ Next Day

Ana-Lab personnel collect samples as specified by Ana-Lab SOP #000323.

Sample analysis will be provided according to Ana-Lab's Standard Terms and Conditions of Agreement, available upon request and at www.ana-lab.com.
Any other terms proposed by Client are deemed material alterations and are rejected unless expressly agreed to in writing by Ana-Lab.