Total Maximum Daily Load Grant Program

Recreational Use Attainability Analysis for Mid Pecan Bayou

TSSWCB Project # 10-53
Revision 0

Quality Assurance Project Plan

Texas State Soil and Water Conservation Board

Prepared by
Texas Institute for Applied Environmental Research
Stephenville, Texas

Effective Period: From Final Approval through January 31, 2012 with annual updates required

Questions concerning this quality assurance project plan should be directed to:

Dr. Larry Beran
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Texas AgriLife Research and Extension Center at Stephenville
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A1 Approval Sheet

Quality Assurance Project Plan (QAPP) for TSSWCB Project 10-53, Recreational Use Attainability Analysis for Mid Pecan Bayou.

Texas State Soil and Water Conservation Board (TSSWCB)

Name: Pamela Casebolt
Title: TSSWCB Project Manager (PM)

Signature: _____ Date: _____

Name: Donna Long
Title: TSSWCB Quality Assurance Officer (QAO)

Signature: _____ Date: _____

Texas AgriLife Research and Extension Center at Stephenville (AgriLife-SV)

Name: Dr. Larry Beran
Title: AgriLife-SV PM

Signature: _____ Date: _____

Texas Institute for Applied Environmental Research (TIAER)

Name: Nikki Jackson
Title: TIAER PM

Signature: _____ Date: _____

Name: Timothy L. Jones
Title: TIAER Field Staff Supervisor

Signature: _____ Date: _____

Name: Nancy Easterling
Title: TIAER QAO

Signature: _____ Date: _____

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A2 Table of Contents

List of Acronyms

AgriLife-SV	Texas AgriLife Research and Extension Center in Stephenville
BMP	Best Management Practice
CAFO	Confined Animal Feeding Operation
CAR	Corrective Action Report
COC	Chain of Custody
CRP	Texas Clean Rivers Program
CWA	federal Clean Water Act
DOC	Demonstration of Capability
DMRG	TCEQ Data Management Reference Guide
EPA	United States Environmental Protection Agency
GIS	Geographic Information System
GPS	Global Positioning System
NELAC	National Environmental Laboratory Accreditation Conference
NELAP	National Environmental Laboratory Accreditation Program
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
PM	Project Manager
QA/QC	Quality Assurance/Quality Control
QAM	Quality Assurance Manual
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QMP	Quality Management Plan
QPR	Quarterly Progress Report
RUAA	Recreational Use Attainability Analysis
SOP	Standard Operating Procedure
SWQM	Surface Water Quality Monitoring
TCEQ	Texas Commission on Environmental Quality
TIAER	Texas Institute for Applied Environmental Research
TMDL	Total Maximum Daily Load
TSSWCB	Texas State Soil and Water Conservation Board
TSWQS	Texas Surface Water Quality Standards
WWTF	Wastewater Treatment Facility

A3 Distribution List

Organizations, and individuals within, which will receive copies of the approved QAPP and any subsequent revisions include:

Texas State Soil and Water Conservation Board (TSSWCB)
PO Box 658
Temple, TX 76503

Name: Pamela Casebolt
Title: TSSWCB PM

Name: Donna Long
Title: TSSWCB QAO

Texas AgriLife Research and Extension Center at Stephenville (AgriLife-SV)
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Tarleton State University, Box T-0410
Stephenville, TX 76402

Name: Nikki Jackson
Title: TIAER PM

Name: Timothy L. Jones
Title: TIAER Field Operations Manager

Name: Nancy Easterling
Title: TIAER QAO

A4 Project/Task Organization

The following is a list of individuals and organizations participating in the project with their specific roles and responsibilities:

TSSWCB

Pamela Casebolt
TSSWCB PM
Maintains a thorough knowledge of work activities, commitments, deliverables, and time frames associated with project. Develops lines of communication and working relationships between AgriLife-SV, TIAER and TSSWCB. Tracks deliverables to ensure that tasks are completed as specified in the contract. Responsible for ensuring that the project deliverables are submitted on time and are of acceptable quality and quantity to achieve project objectives. Participates in the development, approval, implementation, and maintenance of the QAPP. Assists the TSSWCB QAO in technical review of the QAPP. Responsible for verifying that the QAPP is followed by project participants. Notifies the TSSWCB QAO of particular circumstances that may adversely affect the quality of data derived from the collection and analysis of samples. Enforces corrective action.

Donna Long
TSSWCB QAO
Reviews and approves QAPP and any amendments or revisions and ensures distribution of approved/revised QAPPs to TSSWCB and project participants. Responsible for verifying that the QAPP is followed by project participants. Determines that the project meets the requirements for planning, quality assurance (QA), quality control (QC), and reporting. Monitors implementation of corrective actions. Coordinates or conducts audits of field and laboratory systems and procedures.

AgriLife-SV

Dr. Larry Beran
AgriLife-SV PM
Responsible for all project activities and tasks. Responsible for project administration. Develops and maintains relationships with landowners and stakeholders. Ensures tasks and other requirements in the contract are executed on time and are of acceptable quality. Monitors and assesses the quality of work. Coordinates attendance at conference calls, training, meetings, and related project activities with the TSSWCB. Responsible for verifying the QAPP is followed and the project is producing data of known and acceptable quality. Complies with corrective action requirements.

TIAER

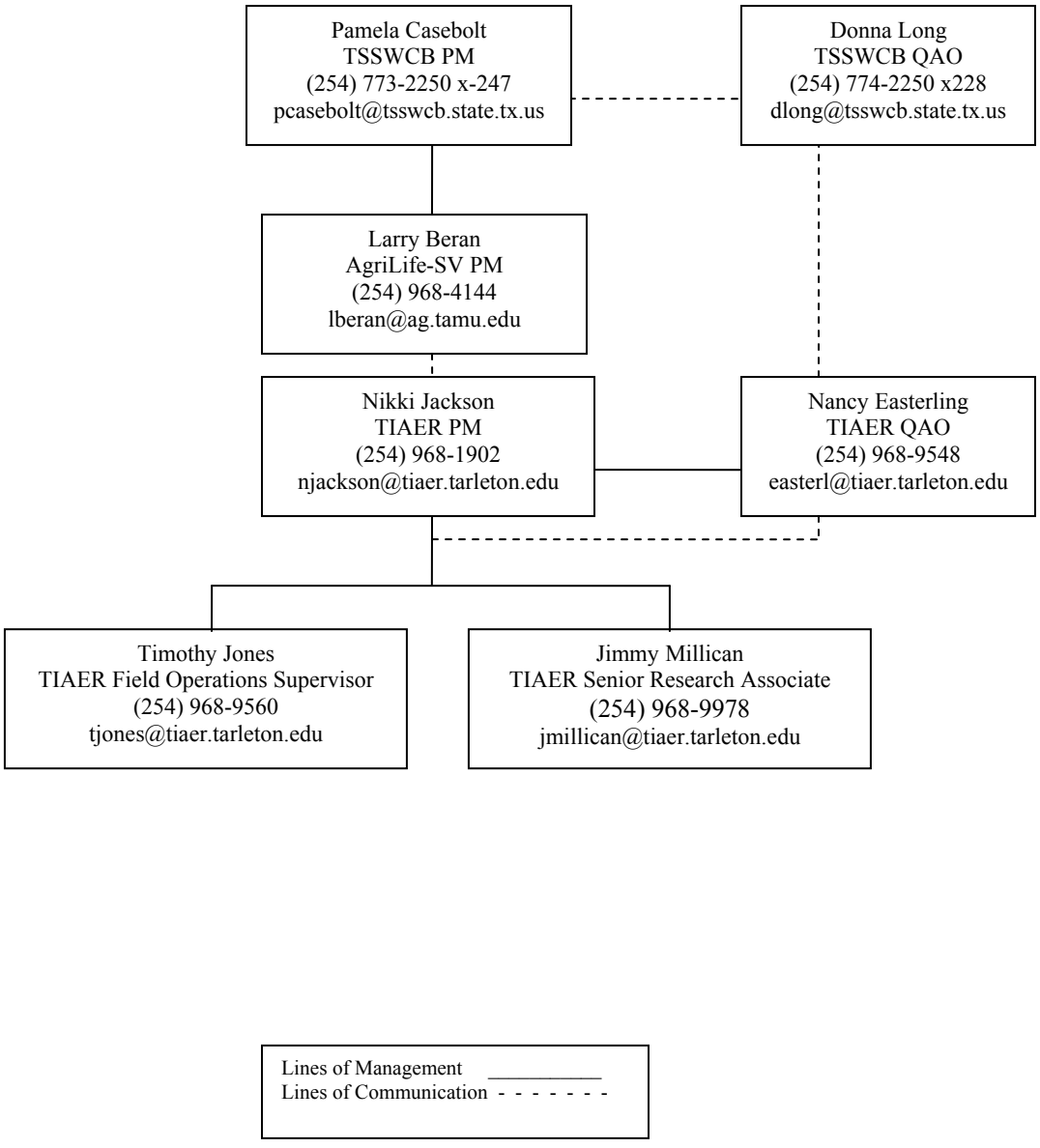
Nikki Jackson
TIAER PM
Responsible for ensuring tasks and other requirements assigned to TIAER in the contract are executed on time and are of acceptable quality. Monitors and assesses the quality of work. Responsible for verifying the QAPP is followed and the project produces data of known and acceptable quality. Complies with corrective action requirements

Nancy Easterling
TIAER QAO
Responsible for coordinating development and implementation of the QA program. Responsible 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 QA records. Responsible for coordinating with the TSSWCB QAO to resolve QA- related issues. Notifies TIAER PM of particular circumstances that may adversely affect the quality of data. 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.

Timothy L. Jones
TIAER Field Operations Manager
Responsible for supervising all aspects of the measurements and data collection for surface water and other RUAA information in the field. Responsible for the acquisition of field data measurements in a timely manner that meet the quality objectives specified in Section A7 (Table A.1), 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 Sections A6 and A8.

Jimmy Millican
TIAER Senior Research Associate
Oversees data management for the study. Responsible for transferring data to the AgriLife-SV PM in an acceptable format and according to workplan specifications. Provides the point of contact for resolving issues related to the data.

Figure A4.1 Organization Chart – Lines of Communication



A5 Problem Definition/Background

The Mid Pecan Bayou watershed is largely rural, though the northwest area of the watershed includes portions of the City of Brownwood. Willis Creek, the most upstream tributary to Mid Pecan Bayou, receives the discharge from the City of Brownwood Wastewater Treatment Facility and also provides drainage for a portion of Brownwood. This segment of Pecan Bayou is located in Brown County basically south of the City of Brownwood. Road crossings are far between on this 13 mile creek segment, and the only two road crossings are FM 2126 and CR 257. The land adjacent to Mid Pecan Bayou reflects the rural nature of the watershed with a wooded riparian zone of variable width existing along almost its entire length and cultivated fields, improved pasture and range/wooded areas predominating outside the riparian zone.

TCEQ and TSSWCB established a joint technical Task Force on Bacteria TMDLs in September 2006 charged with making recommendations on cost-effective and time-efficient bacteria TMDL development methodologies. The Task Force recommended the use of a three-tier approach that is designed to be scientifically credible and accountable to watershed stakeholders. The tiers move through increasingly aggressive levels of data collection and analysis in order to achieve stakeholder consensus on needed load reductions and strategies to achieve those reductions. In June 2007, the TCEQ and TSSWCB adopted the principles and general process recommended by the Task Force. Fundamental in the three-tier approach is ensuring that the appropriate water quality standard (i.e., designated use) is applied to the waterbody before initiating any watershed planning activity (e.g., TMDL or WPP).

Major revisions to the Texas Surface Water Quality Standards were adopted by the TCEQ Commission on June 30, 2010 and became effective as state rule on July 22, 2010. The recently adopted revisions include modifications to contact recreation use and bacteria criteria. As part of this revised process, TCEQ has developed procedures for conducting recreational Use Attainability Analyses (UAAs). In order for a new category of recreational use or a different bacteria water quality standard to be applied to a waterbody, a RUAA will need to be conducted. TCEQ and TSSWCB have collaborated on developing a list of priority waterbodies for collecting information needed for RUAAs; Mid Pecan Bayou is on that list.

Segment 1431 is not supporting the contact recreation use due to excessive bacteria, specifically the geometric mean E. coli concentration of assessment data. Mid Pecan Bayou was assessed in 2008 has having a geometric mean *E. coli* concentration of 282 cfu/100 mL. The geometric mean falls between the criterion for primary contact recreation (126 cfu/100 mL) and secondary contact recreation 1 (630 cfu/100 mL) in the recently adopted revisions to the TSWQS.

In accordance with the *Memorandum of Agreement between the TCEQ and the TSSWCB Regarding TMDLs, Implementation Plans, and Watershed Protection Plans,* the TSSWCB has agreed to take the lead role in conducting an RUAA in the study area. TSSWCB, AgriLife-SV, and TIAER will work with local stakeholders to progress through the data collection and analysis components of a RUAA and at the end of this project have adequate data that either supports the existing designated use (primary contact recreation) or supports a change in designated use (secondary contact recreation).

A6 Project/Task Description

This project consists of performing a Comprehensive RUAA on Mid Pecan Bayou (Segment 1431) for the purpose of ascertaining the level of recreational use occurring in the bayou. This project will adhere to the procedures provided in the *TCEQ Procedures for a Comprehensive RUAA and a Basic RUAA Survey*.

This Comprehensive RUAA of Mid Pecan Bayou consists of 3 main tasks: a) conducting the required two surveys of Mid Pecan Bayou, b) public participation and stakeholder interaction and c) evaluation of historical bacterial water quality data and survey of possible bacteria sources.

Using GIS inventory and current land use classification, TIAER will identify sites, with the help of stakeholders, for RUAA data collection. Sites will be located in areas where the waterbody is accessible to the public and have the highest potential for recreational use (primary contact). The sites will be well-spaced and, where practical, distributed such that there are 3 sites for every 5 miles of stream. Table B1.1 indicates site locations.

TIAER will conduct field surveys at selected sites during the period people would most likely be using the waterbody for contact recreation; surveys shall ascertain the suitability of the streams for contact recreation use and shall document the hydrological characteristics of the stream. Two field surveys will be conducted at each site. Each survey will be performed at a time of year and under weather and hydrologic conditions conducive to observing recreational use on Mid Pecan Bayou, which means when air temperatures are warm to hot (>70^{o} F). The surveys should be performed during the period people would most likely be using the waterbody for contact recreation, typically March to October (e.g., spring break, summer, holidays, and weekends). A historical information review will be conducted on recreation use that occurred on Mid Pecan Bayou on and after November 28, 1975.

Each survey will be conducted per the most recently applicable TCEQ RUAA guidance and will include collection of transect information along a stretch of the bayou at each site, a streamflow measurement at each site, numerous physical observations, bank access, stream substrate, and collection of survey information from individuals either actively recreating at each site or knowledgeable of the site and Mid Pecan Bayou, in general. Information to be collected shall at least satisfy those questions found on the Field Data Sheet in Appendix C.

AgriLife-SV shall document and describe the antecedent rainfall conditions (approximately 30 days prior to fieldwork) at each selected site.

TIAER will collect a digital photographic record of each selected site during the field surveys. Photographs should clearly depict the entire channel. A photograph will be taken at each measured transect. Evidence of observed uses or indications of human use as well as evidence of non-use will be chronicled. Photographs will include upstream, left and right bank, and downstream views at the top (300m), middle (150m), and bottom (0m) transect of each reach.

Obstructions, stream color, water surface characteristics, stream trash and observed evidence of wildlife (tracks or fecal material) will be included in the photographic record of each site.

TIAER will design and conduct a watershed source survey that better characterizes the possible sources of bacteria loadings. Local stakeholders and technical experts will be consulted in the development of the source survey, which will represent warm and cool seasons and low and high flow conditions. Locations of possible bacteria sources identified during the source survey will be incorporated into the GIS inventory.

In the interest of generating complete descriptions of all project waterbodies, it is the intent of TSSWCB to fully complete RUAA surveys on waterbodies where obvious primary contact recreation occurs or that may be at other than baseflow conditions. This protocol deviates from the guidance in the TCEQ *Procedures for a Comprehensive RUAA and a Basic RUAA Survey* (June 2010) which suggests terminating the survey when such conditions are encountered.

AgriLife-SV will facilitate public education and stakeholder interaction. Stakeholder interaction will help in obtaining landowner permission for access to sites along Mid Pecan Bayou and ensuring that decision-making regarding the RUAA is founded on local input. A public meeting will be held where the RUAA process is described and solicitation is made for access to the waterbody. Direct interaction with affected city councils, county commissioners courts, and SWCDs will occur. Any necessary follow-up meetings will be conducted to further communicate the RUAA process and to obtain landowner permission for access to the bayou. A final public meeting will be conducted to present findings of the RUAA surveys.

Pertinent tasks from the project contract are provided below.

Task	Project Milestones	Agency	Start Month	End Month
3.1	Conduct at least one reconnaissance trip to assess potential survey sites. The reconnaissance trip(s) will be a follow-up on the interaction with landowners under Task 4. The goal will be to have approximately 3 sites per 5 miles of river (approximately 8 sites) of which 2 sites will be at the two public access points (road crossings).	TIAER	1	4
3.2	Utilizing information from subtask 5.1 (comprehensive GIS inventory), subtask 3.1 (reconnaissance trip), Task 4 (public input), and other relevant information, identify sites for RUAA data collection. Proposed sites should be located in areas where the waterbody is accessible to the public and has the highest potential for recreational use (primary contact). Because public access is limited along this waterbody, other sites will also be selected for the purpose of characterizing the physical characteristics of the stream to assist in determining the potential level of recreation use that can be supported. The sites should be well-spaced and, in general, distributed such that there are 3 sites for every 5 miles of stream.	TIAER	1	4
3.3	Conduct a thorough historical information review of the recreational uses of the waterbody back to November 28, 1975. Historical resources that should be examined include, but are not limited to, photographic evidence, local newspapers, museum collections, published reports, historical society records, and long-term landowners/residents. Texas Parks and Wildlife Department and commercial providers of outdoor recreation goods and services should be consulted for historical information.	TIAER	1	12
3.4	Conduct 2 field surveys at each site during a normal warm season (air temperature ≥ 70°F) and baseflow conditions (sustained or typical dry, warm-weather flows between rainfall events, excluding unusual antecedent conditions of drought or wet weather), when people would most likely be using the waterbody for contact recreation, typically March to October (e.g., spring break, summer, holidays or weekends). To ascertain the suitability of the streams for contact recreation use, field surveys shall document hydrological characteristics of the stream, such as width and depth of channel and substantial pools, flow/discharge, air/stream temperature, bank access, and stream substrate. Information to be collected shall at least satisfy those questions found on the Field Data Sheet from the latest	TIAER	11	15

	version of the *TCEQ Procedures for a Comprehensive Recreational UAA and a Basic UAA Survey*. Document and describe antecedent (prior to fieldwork) rainfall conditions (approximately the previous 30 days) at each selected site			
3.5	Collect a digital photographic record of each selected site during the field surveys. Photographs shall include upstream, left and right bank, and downstream views. Any evidence of observed uses or indications of human use shall be photographed. Photographs should clearly depict the entire channel and each transect measured	TIAER	11	15
3.6	In order to obtain information on existing and historical uses and stream characteristics, TIAER shall conduct interviews of 1) users present during the field surveys, 2) streamside landowners along the field survey transects, 3) local residents, and 4) commercial providers of outdoor recreation goods and services. Surveys shall include at least those questions found on the Interview Form in the latest version of the *TCEQ Procedures for a Comprehensive Recreational UAA and a Basic UAA Survey*.	TIAER	11	15
3.7	Combine findings from historical information review, field surveys, and user interviews into a Technical Report that shall at least include those contents described for a Comprehensive RUAA in the latest version of the *TCEQ Procedures for a Comprehensive Recreational UAA and a Basic UAA Survey*	TIAER	14	18
4.1	Facilitate public participation activities and coordinate stakeholder involvement in the project. AgriLife-SV will develop (Months 1-2) and maintain (Months 3-18) a list of stakeholders likely to be affected by this project.	AgriLife-SV	1	18
4.2	Provide logistical support for public meetings, including, but not limited to, securing meeting facilities, preparing/disseminating meeting notices and agendas, and preparing meeting summaries. At a minimum, public stakeholder meetings shall consist of an initial public meeting (Month 3), a source survey design meeting (subtask 5.3) (Month 4), a project update meeting (Month 10), and a meeting presenting final Technical Reports (Month 16). A primary objective of the public meetings is to solicit landowner permission for private-land access to Mid Pecan Bayou for survey sites.	AgriLife-SV	1	18
4.2	Participate in all public stakeholder meetings	TIAER	1	18
4.3	Attend and participate in other public meetings, including, but not limited to, city council meetings, county commissioners court meetings, SWCD meetings, and LCRA Clean Rivers Program Steering Committee and Coordinated Monitoring meetings, in order to communicate project goals, activities, and accomplishments to affected parties	AgriLife-SV, (TIAER, as appropriate)	1	18
4.4	Develop and disseminate educational materials to watershed stakeholders, including, but not limited to, flyers, brochures, letters, and news releases. AgriLife-SV will provide information to LCRA for inclusion in the Clean Rivers Program Basin Summary Report and Basin Highlights Report.	AgriLife-SV	1	18
5.1	Develop a comprehensive GIS inventory for the study area. Data should include the most recent information available on land use/land cover classification, elevation, soils, stream networks, reservoirs, roads, public parklands, municipalities and satellite imagery or aerial photography. Locations of SWQM stations, USGS gages, public access points to the waterbodies, floodwater-retarding structures, wetlands, TPDES permittees (including WWTFs, CAFOs and MS4s), and subdivisions should also be included. Sites permitted for land application of sewage sludge and septage should be included. Locations of possible bacteria sources, identified in Subtask 5.4, should be incorporated. The cumulative impact of TSSWCB-certified WQMPs on the management of agricultural and silvicultural lands should be documented	TIAER	1	6
5.2	Conduct a historical data review for the waterbody in order to assess and characterize trends and variability in water quality, specifically bacteria. Historical data collection activities should concentrate on 1) ambient water quality data; 2) streamflow and water level data; 3) precipitation records; and 4) permitted facilities, discharges, and effluent quality. At a minimum, U.S. Geological Survey (USGS), National Weather Service (NWS), Texas Parks and Wildlife Department (TPWD), Texas Water Development Board (TWDB), Lower Colorado River Authority (LCRA), TCEQ, and EPA should be queried for data related to the study area.	TIAER	1	12
5.3	Facilitate a meeting of local stakeholders and technical experts to design a source survey (also known as a sanitary survey) that better characterizes the possible sources of bacteria loadings. The source survey should be developed so that it represents warm and cool seasons and low and high flow conditions. The source survey should evaluate sources like WWTFs, central sewage collection systems, OSSFs, and MS4s. TPDES compliance issues should be examined. Wildlife, livestock and non-domestic animal populations should be examined. Technical experts should include at least one representative, as appropriate to their jurisdiction and interest, from TPWD, Texas Department of Agriculture (TDA), TCEQ, Texas AgriLife Extension Service, Texas Forest Service (TFS), USGS, U.S. Fish and Wildlife Service (USFWS), USDA Natural Resources Conservation Service (USDA-NRCS), USDA Agricultural Research Service (USDA-ARS), LCRA, and affected municipalities, counties and SWCDs.	AgriLife-SV, TIAER	1	4
5.4	Conduct the source survey in the study area designed in Subtask 5.3	TIAER	5	16

A7 Quality Objectives and Criteria

The project objective is to collect data that may be used to support decisions related to recreational use designation. Data to be collected in the RUAA surveys at each site are listed in *Procedures for a Comprehensive Recreational UAA and a Basic UAA Survey*. The types of measurement data to be collected for this project are listed in Table A7.1.

Table A7.1 Measurement Performance Specifications

Parameter	Units	Matrix	Method [1]	Parameter Code	AWRL	(LOQ)	Rec. at LOQ (%)	Precision LCS/LCSD (%RPD) [2]	Rec. of LCS	Respon-sible Entity
Temperature, Water	ºC	Water	EPA 170.1 & TCEQ SOP	00010	NA	NA	NA	NA	NA	TIAER Field
Temperature, Air	ºC	Air	EPA 170.1 & TCEQ SOP	00020	NA	NA	NA	NA	NA	TIAER Field
Flow	cfs	Water	TCEQ SOP	00061	NA	NA	NA	NA	NA	TIAER Field
Flow Measurement Method	1-gage 2-electric 3-mechnical 4-weir/flume 5doppler	Water	TCEQ SOP	89835	NA	NA	NA	NA	NA	TIAER Field

1. *Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods*, most current version.

Precision

Precision is the degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves. It is a measure of agreement among replicate measurements of the same property, under prescribed similar conditions, and is an indication of random error. Instrument precision will be assured by proper use, maintenance, and calibration of flow meters and thermometers in accordance with manufacturer specifications.

Bias

Bias is a statistical measurement of correctness and includes components of systemic error. A measurement is considered unbiased when the value reported does not differ from the true value. Bias in instrument measurements will be addressed through training in instrument use to assure consistency within and between field teams.

Representativeness

Representativeness is a measure of how accurately a monitoring program reflects actual water quality conditions and recreational uses. The representativeness of the data is dependent on the sampling locations, the conditions under which surveys are performed, and the survey procedures.

The RUAA surveys will ideally be performed at a frequency of three sites per five stream miles to assure maximum capture of stream recreational uses. Additionally, sites will be surveyed preferentially during high recreational use potential, both temporally and hydrologically.

Representativeness will be measured with the completion of data collected in accordance with the approved QAPP.

Comparability

Confidence in the comparability of data sets from this project and those for similar uses is based on the commitment of TIAER to use only the methods and QA/QC protocols prescribed in the *Procedures for a Comprehensive Recreational UAA and a Basic UAA Survey* in accordance with quality system requirements and as described in this QAPP.

Completeness

The completeness of the data is basically a function of weather, site access, and the availability and willingness of individual responders. Ideally, 100% of the data should be available. Unavailable data due to weather and the inability to access the sites and interview individuals are to be expected. Therefore, it will be a general goal of the project that 90% data completion is achieved. Interviewing the required contacts, completing the field data sheets and interview forms for each site, and providing the required photographic evidence, maps, and final report will guarantee the completeness of the each data set.

A8 SPECIAL TRAINING/CERTIFICATION

Field personnel will receive training in proper field analysis. Before actual field measurements occur, field personnel will demonstrate to the TIAER QAO or designee their ability to properly calibrate field equipment and perform field analysis procedures. Training will be documented and retained in the TIAER Monitoring Staff Training file and be available during a monitoring systems audit.

Personnel collecting Global Positioning System (GPS) data have training and certification obtained by 1) completing an agency training class, 2) completing a suitable training class offered by an outside vendor, or 3) by providing documentation of sufficient GPS expertise and experience.

A9 Documents and Records

Quarterly progress reports (QPRs) will note activities conducted in connection with the RUAA, items or areas identified as potential problems, and any variations or supplements to the QAPP. Corrective Action Reports (CARs) will be utilized when necessary. CARs that result in any changes or variations from the QAPP will be made known to pertinent project personnel and documented in an update or amendment to the QAPP. All QPR and QAPP revisions will be distributed to personnel listed in Section A3.

The TSSWCB may elect to take possession of records at the conclusion of the specified retention period.

RUAA Reports and Forms

- Information to be collected shall at least satisfy those questions found on Contact Information Form (Appendix C)
- Field Data Sheets, Interview Forms, and RUAA Summary in electronic format
- Digital photographic record, cataloged in an appropriate manner

Records and Documents Retention Requirements

Document/Record	Location at TIAER	Retention	Form
QAPP, amendments, and appendices	Central Files	5 years	Paper
QAPP distribution documentation	Central Files	5 years	Paper/Electronic
Training records	Central Files	5 years	Paper
Field notebooks or field data sheets	Central Files	5 years	Paper/Electronic
Field equipment calibration/maintenance l	Central Files	5 years	Paper
RUAA Contact Information, Field Data, And Interview Forms	Central Files	5 years	Paper/Electronic
Field SOPs	Central Files	5 years	Paper/Electronic
Corrective action documentation	Central Files	5 years	Paper/Electronic

QAPP Revision and Amendments

Until the work described is completed, this QAPP shall be revised as necessary and reissued annually on the anniversary date, or revised and reissued within 120 days of significant changes, whichever is sooner. The last approved versions of QAPPs shall remain in effect until revised versions have been fully approved; the revision must be submitted to the TSSWCB for approval before the last approved version has expired. If the entire QAPP is current, valid, and accurately reflects the project goals and the organization's policy, the annual re-issuance may be done by a certification that the plan is current. This can be accomplished by submitting a cover letter stating the status of the QAPP and a copy of new, signed approval pages for the QAPP.

Amendments to the QAPP may be necessary to reflect changes in project organization, tasks, schedules, objectives and methods; address deficiencies and non-conformances; improve operational efficiency; and/or accommodate unique or unanticipated circumstances. Requests or amendments are directed from the AgriLife-SV PM to the TSSWCB PM in writing. The changes are effective immediately upon approval by the TSSWCB PM and QAO, or their designees.

Amendments to the QAPP and the reasons for the changes will be documented, and copies of the approved QAPP Expedited Amendment form will be distributed to all individuals on the QAPP distribution list by the AgriLife-SV PM. Amendments shall be reviewed, approved, and incorporated into a revised QAPP during the annual revision process.

B1 Sampling Process Design (Experimental Design)

TIAER will collect information that can be used to evaluate recreational uses in the study area. Methods used and sampling process design shall be consistent with the TCEQ *Procedures for a Comprehensive RUAA and a Basic RUAA Survey* (June 2010). TIAER will conduct field surveys at selected sites during periods people would most likely use the waterbody for contact recreation; surveys shall ascertain the suitability of the streams for contact recreation use and shall document the hydrological characteristics of the stream.

Field data will be collected following procedures detailed in *TCEQ SWQM Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2008* (RG-415).

Mid Pecan Bayou (Segment 1431) has on average one station for every 2.76 km (1.72 miles) of stream. There are two public access stations located at FM 2126 and CR 257. The other six stations are located on private properties; landowner permission has been granted to access these stations. Other than two road crossings there are no other publicly accessible areas (parklands operated by public or private entities) with potential for recreational use directly along the segment; however, there may be public property in the watershed in the City of Brownwood. This has been confirmed through interviews with local entities during completion of the Contact Information Form. There is 1 WWTF outfall located on Willis Creek and 1 CAFO within the watershed. This has been confirmed by contacting the TCEQ Regional office.

Table B1.1 provides the sites selected for use in the project. Sites are identified according to map legend and, where applicable, TCEQ Station ID.

Table B1.1 Mid Pecan Bayou Watershed Segment 1431 Sites
Sites are listed in upstream to downstream order

TCEQ ID	Map Legend	Site Description	Latitude	Longitude	Distance to Previous Station (km)	Distance from Upper Segment Boundary (km)	Distance from Lower Segment Boundary (km)	Private or Public Access	Private Access Landowner Approved
12502	MP008	Mid Pecan Bayou downstream of Willis Creek confluence	31.691389	-98.935555	0.00	0.45	21.74	Private	Yes
12504	MP007	Mid Pecan Bayou at FM 2126 southeast of Brownwood, TX	31.69546	-98.92710	1.14	1.59	20.60	Public	Not Applicable
-	MP006	Mid Pecan Bayou 0.39 km downstream of confluence with Steppes Creek south of Brownwood, TX	31.684065	-98.911486	2.80	4.39	17.80	Private	Yes
12505	MP005	Mid Pecan Bayou 4.88 km downstream of FM 2126	31.673889	-98.902809	2.20	6.59	15.60	Private	Yes
	MP004	Mid Pecan Bayou 3.1 km upstream of Brown CR 257	31.652208	-98.891161	4.67	11.26	10.93	Private	Yes

TCEQ ID	Map Legend	Site Description	Latitude	Longitude	Distance to Previous Station (km)	Distance from Upper Segment Boundary (km)	Distance from Lower Segment Boundary (km)	Private or Public Access	Private Access Landowner Approved
12507	MP003	Mid Pecan Bayou at Brown CR 257 (Ten Mile Crossing) 12.19 km downstream of FM 2126	31.64232	-98.877251	3.08	14.34	7.85	Public	Not Applicable
20800	MP002	Mid Pecan Bayou 1.6 km downstream of Brown CR 257	31.634271	-98.866911	1.55	15.89	6.30	Private	Yes
-	MP001	Mid Pecan Bayou 1.0 km downstream of the confluence with Devils River, south of Brownwood, TX	31.617719	-98.862308	3.90	19.79	2.40	Private	Yes

B2 Sampling Methods

Field Sampling Procedures

The sampling process design will be based on the *Procedures for a Comprehensive Recreational UAA and a Basic UAA Survey*. Field measurements will be made according to procedures documented in the *TCEQ SWQM Procedures Volume 1: Physical and Chemical Monitoring Methods, 2008 (RG-415).* Water temperature will be measured using calibrated YSI 600 XLM multiprobes. Air temperature will be measured using hand-held field thermometers. Instantaneous water velocity measurements (flow) will be measured using SonTek Flow Tracker™ Acoustic Doppler Velocimeter. TIAER personnel will use the streamflow measurement form developed by TIAER.

For the RUAA field surveys, information to be collected shall at least satisfy those questions found on the Field Data Sheet from the TCEQ *Procedures for a Comprehensive RUAA and a Basic RUAA Survey*.

Documentation of Field Sampling Activities

Field sampling activities are documented on the Field Data Sheet – Basic RUAA Survey (Appendix C). For all visits, station ID, location, time, date, and sample collector's name/signature are recorded. Values for all measured field parameters are recorded. Detailed observational data are recorded including water appearance, weather, biological activity, stream uses, unusual odors, specific sample information, missing parameters.

The following will be recorded for all visits:

1. Station ID
2. Date and time
3. Location
6. Data collector's name/signature
7. Values for measured field parameters
8. Detailed observational data, including:
    a. water appearance
    b. unusual weather conditions
    c. apparent biological activity
    d. unusual odors, if applicable
    e. 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.)
    f. watershed or instream activities (events impacting water quality, e.g., bridge construction, livestock watering upstream, etc.)
    g. missing data (when scheduled data are not collected)

Field activities for recreational use attainability tasks shall at least satisfy those questions found on the Field Data Sheets, Interview Forms, and RUAA Summary Sheet as specified in Appendix C.

Recording Data

For the purposes of this section and subsequent sections, all personnel follow the basic rules for recording information as documented below:

1. Legible writing in indelible, waterproof ink with no modifications, write-over's or cross-outs;
2. Changes should be made by crossing out original entries with a single line, entering the changes, and initialing and dating the corrections.
3. Close-outs on incomplete pages with an initialed and dated diagonal line.

Deficiencies, Nonconformances and Corrective Action Related to Sampling Requirements

Deficiencies are defined as unauthorized deviation from procedures documented in the QAPP. Nonconformances are deficiencies which affect quality and render the data unacceptable or indeterminate. Deficiencies related to sampling method requirements include, but are not limited to, such things as sonde calibration and sample site adjustments.

Deficiencies are documented in logbooks, field data sheets, etc. by field staff and reported to the TIAER Field Operations Manager who will notify the TIAER QAO. The TIAER QAO will notify the TIAER PM of the potential nonconformance within 24 hours. The TIAER staff member identifying the deficiency will initiate a record on the Deficiency Worksheet to document the deficiency.

The TIAER QAO, in consultation with TIAER PM (and other affected individuals/organizations), will determine if the deficiency constitutes a nonconformance. If it is determined the activity or item in question does not affect data quality and therefore is not a valid nonconformance, the deficiency worksheet will be completed accordingly. If it is determined a nonconformance does exist, the TIAER QAO in consultation with TIAER PM will determine the disposition of the nonconforming activity or item and necessary corrective action(s); results will be documented by the TIAER QAO by completion of a CAR.

CARs document: root cause(s); programmatic impact(s); specific corrective action(s) to address the deficiency; action(s) to prevent recurrence; individual(s) responsible for each action; the timetable for completion of each action; and, the means by which completion of each corrective action will be documented. CARs will be included with quarterly progress reports. In addition, significant conditions (i.e., situations which, if uncorrected, could have a serious effect on safety or on the validity or integrity of data) will be reported to the TSSWCB immediately both verbally and in writing.

B3 SAMPLE HANDLING AND CUSTODY

Sample Handling

Sample parameters for this project are recorded *in situ*. No physical samples are collected, so this section is not applicable.

B4 ANALYTICAL METHODS

Failures in Measurement Systems and Corrective Actions

Failures in field measurement systems involve, but are not limited to, such things as instrument malfunctions, failures in calibration, etc. In many cases, the field technician will be able to correct the problem. If the problem is resolvable by the field technician, then they will document the problem on the field data sheet and complete the measurement. If the problem is not resolvable, then it is conveyed to the TIAER QAO through initiation of a CAR. The nature and disposition of the problem is reported to the TIAER PM, who will include this information in the CAR and submit with the QPR which is sent to the AgriLife-SV PM, who will send the QPR to the TSSWCB PM.

B5 QUALITY CONTROL

Sample parameters for this project are recorded *in situ*. No physical samples are collected, so this section is not applicable.

B6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION AND MAINTENANCE

All sampling equipment testing and maintenance requirements are detailed in the TCEQ *Surface Water Quality Monitoring Procedures, Volume 1*. Field equipment is inspected and tested upon receipt and is assured appropriate for use. Acceptance criteria are detailed in the TIAER's quality assurance manual. Equipment records are kept on all field equipment and are available for inspection by the TSSWCB. A supply of critical spare parts is maintained by the TIAER Field Supervisor, or designee.

B7 INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

Field equipment calibration requirements are contained in the TCEQ *Surface Water Quality Monitoring Procedures, Volume 1*.

B8 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

All new batches of field supplies are inspected before use to ensure that they are adequate. Acceptance criteria are detailed in TIAER's SOP-Q-102, Laboratory Material Acceptance Criteria.

B9 Non-direct Measurements

Information generated from the following tasks, which are included in the overall project contract, may be used to identify sites for RUAA data collection:

- A comprehensive GIS inventory of the study area.
- Reconnaissance trip(s) to assess potential survey sites.
- Public meetings for solicitation of landowner permission for access to survey sites.
- Historical information review of recreational uses of the waterbody since November 1975.

B10 Data Management

TIAER will collect, store electronically, and make all collected project data available to the AgriLife-SV PM. TIAER will also be responsible for maintaining backup files to protect the data. Data will be stored, managed and submitted to TSSWCB through the AgriLife-SV PM. RUAA data will not go into TCEQ's Surface Water Quality Monitoring Information System (SWQMIS) database. The data will be accompanied by other deliverables, such as a final RUAA report. Deliverables will be submitted to the TSSWCB as described in the contract.

TIAER recordkeeping and document control procedures are contained in the TIAER QAM. Original field data sheets are stored in the main office of the TIAER Field Staff.

TIAER will complete Field Data Sheets for the Basic RUAA, Contact Information Forms, and Comprehensive RUAA Interview Forms by hand on hard copies. Information on the forms will be entered into electronic versions at the TIAER office in a directory specifically designated for the project that is backed up incrementally every evening and completely once a week. A TIAER staff member other than the person who electronically entered the data will review at least 10 percent of the survey information in the database against the original hard copies. TIAER staff members will enter data electronically onto the RUAA Summary Sheet into the project directory. Photographs will be taken according to guidelines in the Procedures for a Comprehensive RUAA and a Basic RUAA Survey. The photographs will be taken by an electronic camera and stored in a jpg format in the project directory.

Hardware and Software Requirements

Hardware configurations are sufficient to run Microsoft Access 2003 under the Windows Server 2003 operating system in a networked environment. Information resources staff is responsible for assuring hardware configurations meet the requirements for running current and future data management/database software as well as providing technical support. Software development and database administration are also the responsibility of the information resources department. Information resources develop applications based on user requests and assure full system compatibility prior to implementation.

References:
TIAER's Standard Operating Procedure SOP-Q-102, Laboratory Material Acceptance Criteria, Rev. 6. Available upon request from TIAER.

C1 Assessments and Response Actions

Table C1.1 Assessments and Response Actions

Assessment Activity	Approximate Schedule	Responsible Party	Scope	Response Requirements
Status Monitoring Oversight, etc.	Continuous	AgriLife-SV Project Manager	Monitoring of the project status and records to ensure requirements are being fulfilled.	Report to TSSWCB in Quarterly Progress Reports
Monitoring Systems Audit	At least once per life of the project; dates to be determined by TSSWCB	TSSWCB QAO	The assessment will be tailored in accordance with objectives needed to assure compliance with the QAPP. Field measurement; facility review; and data management as they relate to the project	30 days to respond in writing to the TSSWCB to address corrective actions
Monitoring Systems Audit	Based on work plan and/or discretion of TIAER	TIAER QAO	The assessment will be tailored in accordance with objectives needed to assure compliance with the QAPP. Field measurement; facility review; and data management as they relate to the project	30 days to respond in writing to the TIAER QAO to address corrective actions
Site Visit	At least once per fiscal year; dates to be determined by TSSWCB	TSSWCB PM	Status of activities. Overall compliance with work plan and QAPP	As needed

Corrective Action

The TIAER QAO is responsible for implementing and tracking corrective action procedures as a result of audit findings. Records of audit findings and corrective actions are maintained by both the TSSWCB PM and the TIAER QAO.

If audit findings and corrective actions cannot be resolved, then the authority and responsibility for terminating work is specified in the TSSWCB QMP and in agreements or contracts between participating organizations.

C2 Reports to Management

Reports to TSSWCB Project Management

All reports detailed in this section are contract deliverables that will be transferred from AgriLife-SV and to TSSWCB in accordance with contract requirements. The project team of AgriLife-SV and TIAER will collaborate on the development of each deliverable with the AgriLife-SV PM having final responsibility for all reports and any draft reports.

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

Final Project Report – Summarizes AgriLife-SV and TIAER activities for the entire project period including a description and documentation of major project activities; evaluation of the project results and environmental benefits:

- Electronic copies of completed interview forms, field data sheets, flow sheets, and RUAA summary sheet;
- Digital photographic record, cataloged for appropriate identification
- Technical Report summarizing historical information review, field surveys, and user interviews; Technical Report shall at least include those contents described for a Comprehensive RUAA in the TCEQ *Procedures for a Comprehensive RUAA and a Basic RUAA Survey* (June 2010)

Reports to TIAER Project Management

The TIAER PM submits internal monthly progress reports to TIAER management. Progress on project deliverables and any problems or issues concerning project activities are noted in the progress reports.

D1 Data Review, Verification, and Validation

The TIAER PM will review the data collected during each RUAA survey for completeness and accuracy as described in Section D2. All measurement data will be verified and validated at the Project level.

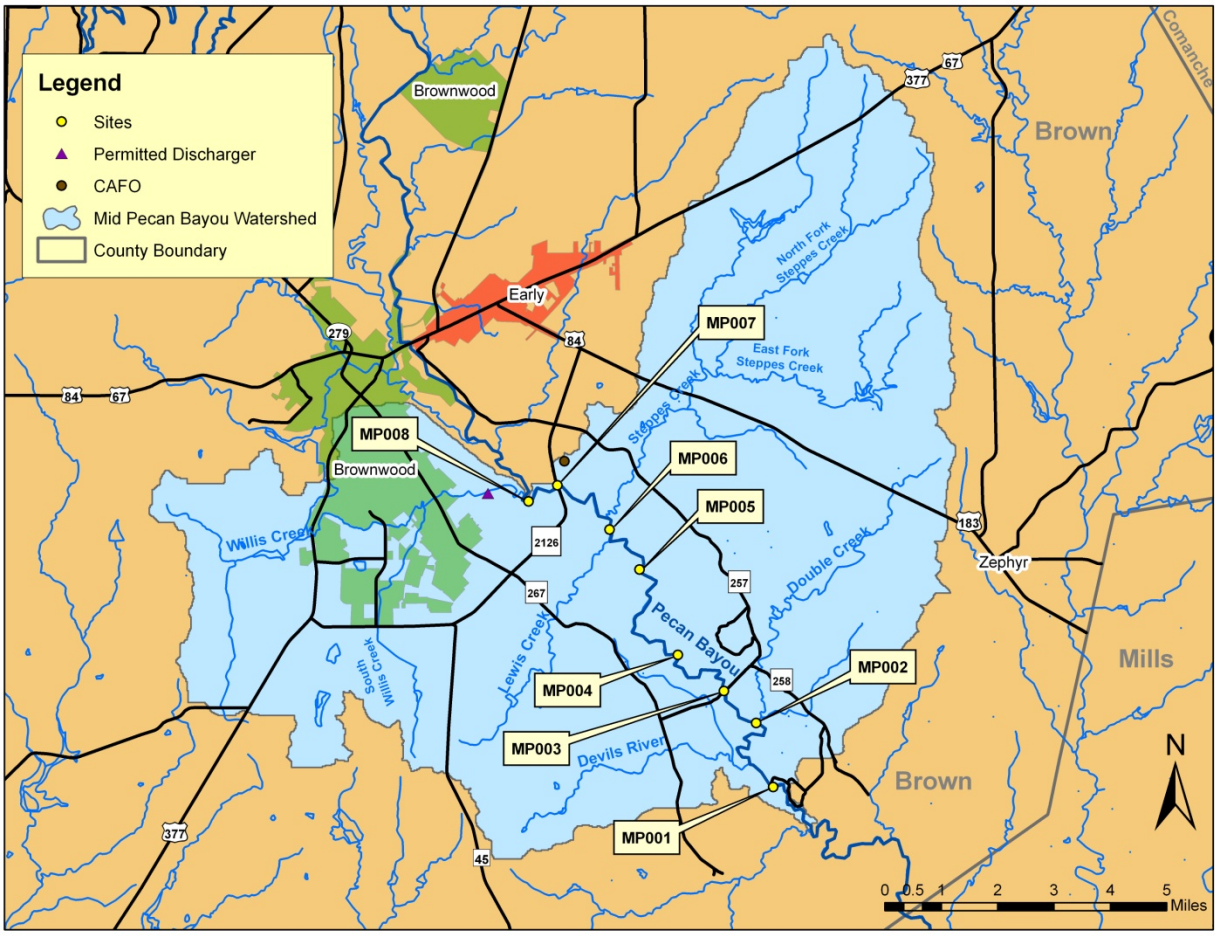
D2 Verification and Validation Methods

The TIAER PM is responsible for reviewing surveys for completeness and accuracy. At least 10% of measurement data in the final, electronic RUAA field data sheets and interview forms should be verified for accuracy against the original handwritten values in field notebooks, field data sheets and interview forms.

D3 Reconciliation with User Requirements

The overall goal of the project is to collect data that provide stakeholders and agencies with sufficient information to determine recreational use status throughout the Mid Pecan Bayou.

Appendix A: Maps of Area Location and RUAA Stations


Legend
Sites
Permitted Discharger
CAFO
Mid Pecan Bayou Watershed
County Boundary
Brownwood
Early
Brown
Comanche
Mills
Zephyr
MP001
MP002
MP003
MP004
MP005
MP006
MP007
MP008
North Fork Steppes Creek
East Fork Steppes Creek
Steppes Creek
Double Creek
Pecan Bayou
Lewis Creek
Devils River
Willis Creek
South Willis Creek
67
377
279
84
183
2126
267
257
258
45
N
0 0.5 1 2 3 4 5
Miles

Appendix B: Flow Measurement Standard Operating Procedure

SOP-F-103

Flow Measurements and Estimates

Revision 4

_____ _____

Automated Sampling Supervisor Date

_____ _____

Quality Assurance Officer Date

Texas Institute for Applied Environmental Research

Effective Period: _15-Apr-2011_____ to __14-Apr-2012_____

1.0 Applicability

This procedure applies to stream flow measurements taken at all sampling sites under study by the Texas Institute for Applied Environmental Research (TIAER), Tarleton State University, Stephenville, Texas.

2.0 Purpose

The purpose of this procedure is to establish guidelines for the uniform collection of streamflow data using the YSI Sontec FlowTracker Velocimeter, RDI ADCP Doppler boat, Global Water digital flow probe, and the Price type AA and pygmy current meters.

3.0 Definitions

3.1 Global Water digital flow probe - a propeller type current meter employing a propeller spinning about a horizontal axis and an electronic counter and digital algorithms for current measurement conversions.

3.2 Price Type AA and pygmy current meter - consists of six conical cups rotating about a vertical axis. Electric contacts driven by the cups close a circuit through a battery and the wire of the supporting cable to cause a click for each revolution (or each fifth revolution) in headphones worn by the operator. Larger versions are connected to a sounding weight. The number of click counts per unit time is then converted to flow measurements through tables provided with the instrument.

3.3 Sontek Flowtracker handheld ADV unit – an acoustic Doppler Velocimeter that attaches to a rod to measure depth and velocity while wading across a water body

3.3 Teledyne RD Instrument ADCP Doppler boat – a battery-operated acoustic Doppler current profiler unit on a floating platform that measures depth and velocity across a stream transect

4.0 Equipment, Calibration & Maintenance – all maintenance and calibrations are performed according to manufacturer's specifications

4.1 Global Water digital flow probe

4.2 Price Type AA and Pygmy current meters

4.3 Sontek Flowtracker handheld ADV unit

4.4 RD Instruments ADCP Doppler boat

4.5 Tag line - a chord or wire marked in specific length increments, e.g. feet or tenths of feet, for use in cross section delineation

5.0 Procedure

5.1 Verify that the flow probe is set to English units and the calibration is set to 33.31 or 33.34. This is accomplished by holding both control buttons down for approximately 30 seconds and toggling through the options.

5.2 Write down the current flowmeter level reading and the current time before collecting the flow measurement. In addition, write down if the flowmeter is a SPA or not a SPA.

5.3 Stretch a tag line across the stream cross section in a manner perpendicular to the stream flow direction.

5.4 Flow measurements are to be taken in increments not exceeding 10% of the total stream width across the entire cross section, starting as close to the waters edge as is possible. A minimum of 10 measurement must be collected. The ideal measurement is one in which no increment contains more that 5% of the total discharge. Equal section widths are not recommended unless the discharge is evenly spread across the entire stream width.

5.5 When using the Global Water flow probe, the operator shall first inspect the digital readings for the average (avg) velocity. It should read 0.0 prior to emersion of the probe into the stream. Resetting the velocity to 0.0 can be accomplished by depressing the two control buttons simultaneously at the avg. position. Refer to Appendix 1, the manufacturer operator's manual for further detail. This reading must be reset to 0.0 prior to each measurement.

5.5.1 To begin the measurement the propeller shroud is inserted vertically into the water column. A series of at least five slow vertical movements of the probe from the surface of the water to the stream bottom is required for an accurate measurement. The time elapsed during the measurement should be 30 to 40 seconds. The propeller shroud should never leave the water during this procedure. Care should taken not to move the probe into or away from the stream flow direction, as this will alternately increase or decrease propeller speed and affect measurement accuracy.

5.5.2 Remove the probe vertically from the water following the final downward movement. The instrument will have recorded the average and maximum velocities for that water column in feet per second (fps). These measurements can be obtained by depressing the left control button on the instrument head. The measurements should then be recorded on the stream flow sheet. After recording the average and maximum velocities, lower the probe in the water to obtain the depth at that particular section. The depth can also be obtained while raising and lowering the probe during the actual velocity measurement.

5.5.3 This procedure shall then be repeated at every increment across the stream cross section with the velocities and depths being recorded on the stream flow sheet.

5.6 When using a Price current meter, measurements are still taken in varying or one foot increments across the stream cross section. Velocities are measured at two-tenths and eight-tenths of the stream depth as the average of these equals the mean velocity in the vertical. In shallow water near the shore a single velocity at six-tenths depth can be used to approximate the mean in the vertical section. If water

depths are greater than or equal to 2.5 feet, the two-point method should be used. For water levels less than 2.5 feet, the one-point method should be used.

5.6.1 The Price current meter is lowered to the stream bottom with the crane from a bridge over the stream. Depth is determined lowering the weighted current meter to the surface of the water. The depth counter is set to zero and the current meter is then lowered to the bottom of the stream. Once at the bottom, the counter is read to obtain the depth of the stream at a particular point. Calculations of two-tenths and eight-tenths depth or the six-tenths depth can then be made.

5.6.2 The meter is raised to the appropriate depth. Starting the digital Aquacount that is connected to the sounding reel begins velocity measurements. The Aquacount will count the number of pulses sent by the current meter for a predetermined length of time. Velocity at this depth is determined by comparing the number of impulses per unit time to the provided tables. These tables are based on the relation between revolutions per second N of the meter cups and the velocity v in an equation of the form $v = a + bN$, where b is the constant of proportionality and a is the starting velocity or the velocity required to overcome mechanical friction.

5.6.3 When using the two-point method, the meter is then raised to the appropriate depth and procedure is repeated. The two-tenths and eight-tenths velocities are averaged and recorded as stream velocity at that point.

5.6.4 Repeat at each increment across the stream.

5.7 When using the FlowTracker Handheld ADV unit with USGS wading rod, measurements are still taken in varying or one foot increments across the stream cross section.

5.7.1 The wading rod is placed on the stream bottom and the total stream depth is measured using the staff gage on the rod. Where water depths are greater than 2.5 feet, velocities are measured at two-tenths and eight-tenths of the stream depth as the average of these equals the mean velocity in the vertical. Where water depths are less than 2.5 feet, a single velocity at six-tenths depth can be used to approximate the mean in the vertical section.

5.7.2 After determining the depth and the appropriate method, use the depth chart to determine where to place the flowtracker probe.

5.7.2.1 Turn on the Flowtracker handheld and press the Enter key.

5.7.2.2 Press 3: Start Data Run.

5.7.2.3 Press 1 and input the appropriate site name. If the site file already exists, you will also need to input an extension name.

5.7.2.4 Press 9 to accept the name.

5.7.2.5 Press 1 and input the beginning flowmeter depth as the staff ht..

5.7.2.6 Press next station

5.7.2.7 Press the set location key and input the edge of the water tagline reading.

5.7.2.8 Press the set depth key and input a depth of 0.

5.7.2.9 Press the next station key.

5.7.2.10 Input the appropriate location tagline reading.

5.7.2.11 Input the appropriate depth and press enter.

5.7.2.12 Press the measure key and wait.

5.7.2.13 Press enter.

5.7.2.14 Press 1 and accept the reading.

5.7.2.15 Repeat steps 5.7.2.10 through 5.7.2.13 until you get to the opposite edge of the stream. When reaching the opposite edge, press the end section key.

5.7.2.16 Input the appropriate location and depth.

5.7.2.17 Using the previous station key, toggle back to the beginning until you see the gauge ht screen. Input the ending flowmeter depth as the gauge ht.

5.7.2.18 Use the next station key until you get to the ending edge screen.

5.7.2.19 Press the calculate Discharge key to calculate the flow.

5.7.2.20 Press the 9 key to exit.

5.7.2.21 Turn the Flowtracker handheld unit off and place it back in the carrying case.

5.7.2.22 Fill out all the appropriate information on the Flowtracker flow measurement sheet.

5.8 The Doppler boat is used to determine flow when the stream is not wadeable. Instructions are included in Attachment 2, Instructions for Use of the Doppler Boat.

5.9 When stream levels are too high or too swift to safely wade with the Global Water flow probe and no bridges are available to operate the weighted current meter or Doppler boat, flow measurements can be obtained using the float method. This is done by timing an object over a known distance and calculating the velocity. Several float tests should be done at different locations along the width of the stream. Objects of choice are floating debris, horse apples, oranges or even cactus.

5.10 Write down the current flowmeter level reading and the current time before collecting the flow measurement and again after collecting the flow measurement.

6.0 Quality Control & Safety Aspects

6.1 All aspects of this procedure shall conform to the criteria established in OPM-Q-100 “Field Quality Control” and OPM-S-101 “Field Safety”.

6.2 No unauthorized repair or maintenance shall be performed on any instrument. Permission of the field manager(s) shall be obtained prior to performing any equipment maintenance.

7.0 References

7.1 Linsey, R.K. 1982. *Hydrology for Engineers.* McGraw-Hill Book Company, New York.

7.2 U.S. Geological Survey, 1969. *Discharge Measurements at Gaging Stations, Book 3 Chapter A8,* United States Government printing office, Washington.

7.3 Instruction Manual, FlowTracker Handheld ADV, 2001

7.4 Aquacount Operator’s Manual

8.0 Attachments

8.1 Example of TIAER Flow Measurement Sheet

8.2 Instructions for Use of the Doppler Boat

Attachment 1: Example of TIAER STREAM FLOW (DISCHARGE) MEASUREMENT FORM

Stream:____Date:____________Station: __________________
Description: ____
Time Begin: ____________ Time End: _____________ Meter Type: ___________________________
Observers: ______________________ Stream Width:_______________ Section Width: ____________________
Flow severity estimate 1. No flow 2. Low 3. Normal 4. Flood 5. High (circle one)
Days since last significant precipitation <1 1 2 3 4 5 6 7 >7 (circle one)
Current weather: ____
Flowmeter depth at Start ________ at ___:___ __________ at ___:___ _________ at End
Staff Gage depth at Start ________ at ___:___ __________ at ___:___ _________ at End
Total # measurements ________ Water's edge _____ ft and ______ ft.
Substrate type: silt/sand gravel cobble bedrock
Describe flow: ____
Vegetation/debris in stream? Describe ____
Observations:____

Section Midpoint (ft) (m)	**Section Depth (ft) (m) (cm)**	**Observational Depth** ft-m-cm**	**Velocity**		**Area W x D (ft^2) (m^2)**	**Flow (Q) V x A (m^3/sec) (cfs)**
			At Point (ft/sec) (m/sec)	**Average (ft/sec)(m/sec)**		

Average Velocity	Total Area (∑A) (ft2)	
m^3/s x 35.3 =ft^3/s	**Total Flow (Discharge) (ΣQ) (ft^3/s)**	

Attachment 2: INSTRUCTIONS FOR USE OF THE RDI DOPPLER BOAT

BOAT Place transducer so 1 and 3 are forward
White button is power, orange light comes on when powered

PDA Turn on PDA, tap iPAQ Wireless icon (bottom right corner of PDA); then tap middle Blue Tooth icon. Select "OK" button at top right.
Press Start, select StreamPro, then StreamPro again (blue light on boat turns on)
Select Configuration File\ Load Factory Default. Select Units and change to English.
Select Test\ Instrument\ Start Pinging

BOAT Walk across bridge, dragging the boat across stream from edge to edge. Observe depth readings on PDA to determine the deepest portion.

PDA Select Instrument \ Stop Pinging
Set Max depth to about half a foot more than the maximum observed depth. To change depth, select Setup \ Configuration File \ Change Settings.
Select (drag over) value; use keyboard icon in bottom right to make changes. Select Accept.
Select Configuration File \ Save As\ SD card
Select Directory of the waterbody/project
Name file (naming convention is yymmdd_5 digit site ID). Select "OK".
Select Data Collection; tap Transect Start
Input distance from location of boat to water's edge. Select "OK" and allow instrument to collect edge data and program the boat. Wait for message "Proceed across stream."

COLLECT MEASUREMENTS:

- Walk across bridge, dragging boat to collect one set of measurements.
- At the far side, select "Transect Stop". Estimate how close to the water's edge the boat gets. Input that value for the other side. Or allow instrument to collect edge data and program the boat. Wait for message "Proceed across stream."
- Boat will automatically calculate discharge for the transect.
- Walk back across bridge, collecting the next set of measurements and discharge calculation.
- Collect at least 4 sets of measurements. Calculate what 5% of the average would be. If the range of discharge measurements exceeds 5%, take additional measurements.
- Select History to display all measurements. The average of the measurements will be shown.
- Review discharge calculations on PDA. Uncheck those not within 5% of the average. If there are fewer than four measurements within 5% of the average, take additional measurements until you obtain 4 within 5%. If, after 8 tries, there are not 4 measurements within 5% of the average, note it on the field data sheet with any pertinent comments about conditions at the site.

EXIT File\Exit StreamPro
Turn off blue tooth, PDA, and boat.

Appendix C: RUAA Contact Information, Field Data, Interview and Summary Forms

Draft Definitions (2010 TSWQS Revision)

- Primary contact recreation: Water recreation activities, such as wading by children, swimming, water skiing, diving, tubing, surfing, and whitewater kayaking, canoeing, and rafting, involving a significant risk of ingestion of water.
- Secondary contact recreation 1: Water recreation activities, such as fishing, commercial and recreational boating, and limited body contact incidental to shoreline activity, not involving a significant risk of water ingestion and that commonly occur.
- Secondary contact recreation 2: Water recreation activities, such as fishing, commercial and recreational boating, and limited body contact incidental to shoreline activity, not involving a significant risk of water ingestion but that occur less frequently than for secondary contact recreation 1 due to (1) physical characteristics of the waterbody and/or (2) limited public access.
- Noncontact recreation: Activities, such as ship and barge traffic, birding, and using hike and bike trails near a waterbody, not involving a significant risk of water ingestion, and where primary and secondary contact recreation should not occur because of unsafe conditions.

Information from Local Contacts:

1. If any entity answered no, please list the reason(s) why:

   _____
   _____
   _____

2. Did the local entities confirm that primary contact recreation activities frequently occur? ☐ Yes ☐ No
   Please describe how often the activities occur? ☐ Unknown ☐ Never ☐ Daily ☐ Monthly ☐ Yearly
   If no, explain: _____
   _____

3. Did the local entities confirm that secondary contact recreation 1 activities frequently occur? ☐ Yes ☐ No
   Please describe how often the activities occur? ☐ Unknown ☐ Never ☐ Daily ☐ Monthly ☐ Yearly
   If no, explain: _____
   _____

4. Did the local entities confirm that secondary contact recreation 2 activities frequently occur? ☐ Yes ☐ No
   Please describe how often the activities occur? ☐ Unknown ☐ Never ☐ Daily ☐ Monthly ☐ Yearly
   If no, explain: _____
   _____

5. Did the local entities confirm that noncontact recreation activities frequently occur? ☐ Yes ☐ No
   Please describe how often the activities occur? ☐ Unknown ☐ Never ☐ Daily ☐ Monthly ☐ Yearly
   If no, explain: _____
   _____

6. Do the local entities know if this waterbody provides substantial flow to a waterbody with primary contact recreation activities (e.g., swimming in a state/local park) or a bathing beach that is located immediately downstream? ☐ Yes ☐ No ☐ Unknown

   If yes, have the local entities provide the name of the waterbody and a description of the location of the primary contact recreation uses or bathing beach.

   _____
   _____

Notify TCEQ Water Quality Standards Group (required):

Send an e-mail notification to the TCEQ Water Quality Standards Group at standards@tceq.state.tx.us.
Notified: ☐ Yes ☐ No
Date Notified by e-mail: _____
Date TCEQ WQS e-mail Response Received: _____
WQS Group Contact Person Providing Response: _____
Did the WQS Group provide a Notice to Proceed with the RUAA? ☐ Yes ☐ No

Additional Local Contacts Made:

Name: _____
Entity: _____
Date Notified: _____

Name: _____
Entity: _____
Date Notified: _____

Name: _____
Entity: _____
Date Notified: _____

Name: _____
Entity: _____
Date Notified: _____

Name: _____
Entity: _____
Date Notified: _____

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Date Notified: _____

Name: _____
Entity: _____
Date Notified: _____

Name: _____
Entity: _____
Date Notified: _____

Field Data Sheets – Basic RUAA Survey

(to be completed for each site)

Data Collectors & Contact Information:	
Date & Time:	County Name:
Stream Name:	
Segment No. or nearest downstream Segment No.:	
Description of Site:	

A. Stream Characteristics:

1. Check the following channel flow status that applies.
   ☐ dry ☐ no flow ☐ low ☐ normal ☐ high ☐ flooded

2. Check the following stream type that applies on the day of the survey:
   ☐ Ephemeral: A stream which flows only during or immediately after a rainfall event, and contains no refuge pools capable of sustaining a viable community of aquatic organisms.
   ☐ Intermittent: A stream which has a period of zero flow for at least one week during most years. Where flow records are available, a stream with a 7Q2 flow of less than 0.1 cubic feet per second is considered intermittent.
   ☐ Intermittent w/ perennial pools: An intermittent stream which maintains persistent pools even when flow in the stream is less than 0.1 cubic feet per second.
   ☐ Perennial: A stream which flows continuously throughout the year. Perennial streams have a 7Q2 equal to or greater than 0.1 cubic feet per second.
   ☐ Designated or unclassified tidal stream: A stream that is tidally influenced. If you checked this box, you will need to contact the Water Quality Standards Group and evaluate whether or not a bathing beach is located along the tidal stream and whether or not a bathing beach is located along the estuary, bay or Gulf water that the tidal stream flows into.

3. Streamflow
   Use USGS gage data (if a gage is located at a site or within a quarter mile of a site) or use the Stream Flow (Discharge) Measurement Form and follow the procedures outlined in the most recent TCEQ Surface Water Quality Monitoring Procedures, Volume 1, RG-415. If USGS gage data is used for a site, include that information as an attachment and list the streamflow on the sampling date below. If the stream flow taken at one site is representative of the flow at another site(s), then that flow can be used as the observed flow and should be documented below. If the stream flow measured at one site is different from another site, then stream flow should be taken at both sites.
   _____ cfs

4. Water Quality Data (Field Parameters)
   Field parameters should be collected in accordance with the procedures outlined in the most recent TCEQ Surface Water Quality Monitoring Procedures, Volume 1.
   Air Temp: _____° C Water Temp: _____° C

5. Riparian Zone (Mark dominant categories with L (Left Bank) and R (Right Bank). Bank orientation is determined by the investigator facing downstream.)

_____ Forest	_____ Urban	_____ Rip rap
_____ Shrub dominated corridor	_____ Pasture	_____ Concrete
_____ Herbaceous marsh	_____ Row crops	Other (specify): _____
_____ Mowed/maintained corridor	_____ Denuded/Eroded bank	

6. Ease of bank access to the water body: ☐ Easy ☐ Moderately easy ☐ Moderately difficult ☐ Difficult

7. Please describe access opportunities or explain why the site is not easily accessible (Attach photos for documentation):
   _____
   _____

8. Dominant Primary Substrate
   ☐Cobble ☐Sand ☐Silt ☐Mud/Clay ☐Gravel ☐Bedrock ☐Rip rap ☐ Concrete

Stream Name: _____ Site: _____
Date: _____ Time: _____

B. Primary Contact Water Recreation Evaluation:

- Primary contact recreation draft definition: Water recreation activities, such as wading by children, swimming, water skiing, diving, tubing, surfing, and whitewater kayaking, canoeing, and rafting, involving a significant risk of ingestion of water.

1. Were water recreation activities that involve a significant risk of ingestion (full body immersion) observed at this site? ☐ Yes ☐ No primary contact recreation activities were observed

   a. Check the following boxes of primary contact recreation activities observed at the time of the sampling event at the site (Attach photos of the activities or lack of activities).
   ☐ Wading-Children ☐ Tubing ☐ No primary contact activities that commonly occur were observed
   ☐ Wading-Adults ☐ Surfing ☐ Swimming ☐ Whitewater-kayaking, canoeing, rafting
   ☐ Water skiing ☐ Diving ☐ Other: _____
   ☐ frequent public swimming-created by publicly owned land or commercial operations

   b. Check the number of individuals observed at the site: ☐ None ☐ 1-10 ☐ 11-20 ☐ 20-50 ☐ >50

   c. Check the following that apply regarding the individuals proximity to the water body.
   ☐ Water in mouth or nose of the individual
   ☐ Primary touch: Individual's body (or portion) immersed in water
   ☐ Secondary touch: fishing, pets and related contact with water
   ☐ Individual is in a boat touching water
   ☐ Individual is on shore near water within 8 meters (25ft) of water
   ☐ Individual is well away from water between 8 and 30 meters (100 ft) ☐ Not applicable

2. If primary contact recreation activities are not observed, describe the physical characteristics of the water body that may hinder the frequency of primary contact (depth, etc.) (Attach photos, etc. for documentation).
   _____
   _____

3. Describe if there is public access (e.g., parks, roads, etc.) (Attach photos, maps, etc. for documentation).
   _____
   _____

4. Is an area with primary contact recreation activities or a bathing beach (e.g., state/local parks with swimming, etc.) located near (e.g., within 5 miles upstream and downstream) this site?

C. Secondary Contact Water Recreation Evaluation:

- Secondary contact recreation 1: Water recreation activities, such as fishing, commercial and recreational boating, and limited body contact incidental to shoreline activity, not involving a significant risk of water ingestion and that commonly occur.
- Secondary contact recreation 2: Water recreation activities, such as fishing, commercial and recreational boating, and limited body contact incidental to shoreline activity, not involving a significant risk of water ingestion but that occur less frequently than for secondary contact recreation 1 due to (1) physical characteristics of the water body and/or (2) limited public access.

1. Were water recreation activities observed at the site, but the nature of the recreation does not involve a significant risk of ingestion (e.g., secondary contact recreation activities)? ☐ Yes ☐ No secondary contact recreation activities were observed.

   a. Check the following boxes of secondary contact recreation activities that were observed at the time of the sampling event at the site (Attach photos of activities or lack of activities).
   ☐ Fishing
   ☐ Boating-commercial, recreational
   ☐ Non-whitewater-kayaking, rafting, canoeing
   ☐ No secondary contact recreation activities were observed
   ☐ Other secondary contact activities: _____

Stream Name: _____ Site: _____
Date: _____ Time: _____

b. Check the number of individuals observed at the site.
☐ None ☐ 1-10 ☐ 11-20 ☐ 20-50 ☐ greater than 50

c. Check the following that apply regarding the individuals proximity to the water body.
☐ Secondary touch: fishing, pets and related contact with water
☐ In a boat touching water
☐ Body on shore near water within 8 meters (25ft) of water
☐ Body well away from water between 8 and 30 meters (100 ft)

2. If secondary contact recreation activities are not observed, describe the physical characteristics of the water body that may hinder the frequency of secondary contact (Attach photos, etc. for documentation).

_____
_____

3. If secondary contact recreation activities are observed, how often do water recreational activities occur that do not involve a significant risk of water ingestion? ☐ frequently ☐ infrequently
Please describe how often the activities occur? ☐ Unknown ☐ Never ☐ Daily ☐ Monthly ☐ Yearly

4. If infrequently, what is the reason?
☐ physical characteristics of the water body ☐ limited public access ☐ other
If other, list reasons: _____

5. Describe the physical characteristics of the water body that hinders the frequency of secondary contact recreation (depth, etc.) (Attach photos or depth measurements, etc. for documentation).

_____
_____
_____

6. Describe why there is limited public access (e.g., lack of roads, river or stream banks overgrown, etc.) (Attach photos, maps, etc. for documentation).

_____
_____
_____

D. Noncontact Recreation Evaluation

Noncontact recreation applies to water bodies where recreation activities do not involve a significant risk of water ingestion, and where primary and secondary contact recreation uses do not occur because of unsafe conditions, such as barge traffic.

1. Provide site-specific information and documentation (including photographs) regarding unsafe conditions, recreation activities, and presence or absence of water recreation activities.

_____
_____
_____
_____
_____
_____

Field Data Sheets – Basic RUAA Survey

Stream Name: _____ Site: _____
Date: _____ Time: _____

E. Stream Channel and Substantial Pools Measurements

Please check the following which best describes the river or stream: ☐ Wadeable ☐ Non-wadeable

1. Wadeable Streams

Determine whether or not the average depth at the thalweg is greater than 0.5 meters and if there are substantial pools with a depth of 1 meter or greater. Walk an approximately 300 meter reach (total) at the site and take the following measurements within the 300 meter reach. Measurements should be taken during base flow conditions (sustained or typical dry, warm-weather flows between rainfall events, excluding unusual antecedent conditions of drought or wet weather

Also, take photos facing upstream, downstream, left bank, and right bank at the 30 meters, 150 meters, and 300 meters.

Photos #s (30 meters) Upstream____ Downstream____ Left Bank____ Right Bank____
Photos #s (150 meters) Upstream____ Downstream____ Left Bank____ Right Bank____
Photos #s (300 meters) Upstream____ Downstream____ Left Bank____ Right Bank____

a) Substantial pools - Measure the length of each pool (if > 10 pools only measure 10 pools), the width (at the widest point), and the deepest depth. A substantial pool is considered a pool greater than 10 meters in length for the purposes of a Basic RUAA Survey. If depth and/or width measurements were not attainable, explain why.

	Length (meters)	**Width (meters)**	**Depth (meters)**
Pool 1			
Pool 2			
Pool 3			
Pool 4			
Pool 5			
Pool 6			
Pool 7			
Pool 8			
Pool 9			
Pool 10			

b) Average depth at the thalweg –Take depth measurements approximately every 30 meters to calculate an average depth at the thalweg (at least 10 measurements needed). If depth and/or width measurements were not attainable, explain why.

Distance	**Depth (meters)**
30 meters	
60 meters	
90 meters	
120 meters	
150 meters	
180 meters	
210 meters	
240 meters	
270 meters	
300 meters	
Average	

Stream Name: _____ Site: _____
Date: _____ Time: _____

c) Stream width – Measure (1) the width at one point which represents the typical average width of the 300 meter reach; (2) the width at the narrowest point of the stream within the 300 meter reach; and (3) the width at the widest point of the stream within the 300 meter reach.

Measurement Type	Width (meters)
Typical Average Width of 300 meter reach	
Width at narrowest point of the stream within 300 meter reach	
Width at the widest point of the stream within 300 meter reach	

d) Is there sufficient water within a 300 meter stream reach during base flow conditions to support primary contact recreation? ☐ Yes ☐ No
Comments:_____
_____

2. Non-wadeable Streams
If accessible, take 10 width measurements which represent typical widths of the 300 meter reach. If the water is too deep and not accessible record the estimated average width of the water body.

Also, take photos facing upstream, downstream, left bank, and right bank at .
Photos #s (30 meters) Upstream____ Downstream____ Left Bank____ Right Bank____
Photos #s (150 meters) Upstream____ Downstream____ Left Bank____ Right Bank____
Photos #s (300 meters) Upstream____ Downstream____ Left Bank____ Right Bank____

# Measurements	Width (meters)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Field Data Sheets – Basic RUAA Survey

Stream Name: _____ Site: _____
Date: _____ Time: _____

F. Additional RUAA Information

1. Check the following activities observed over the site reach.

☐ Drinking or water in mouth	☐ Playing on shoreline
☐ Bathing	☐ Picnicking
☐ Walking	☐ Motorcycle/ATV
☐ Jogging/running	☐ Hunting/Trapping
☐ Bicycling	☐ Wildlife watching
☐ Standing	☐ None
☐ Sitting	☐ Other: _____
☐ Lying down/sleeping	

2. Are there permanent or long-term hydrologic modifications that are constructed and operated in a way that affects the recreational uses? ☐ Yes ☐ No (If yes, please provide supporting documentation and photos.)
Comments:_____
_____

3. Check any channel obstructions that apply (Attach photos).

☐ Culverts	☐ Fences	☐ Log jams	☐ Rip rap	☐ Water control structure
☐ Barbed wire	☐ Dams	☐ Thick vegetation	☐ Low bridges	☐ None
☐ Utility pipe	☐ Other (specify):_____			

4. Check all surrounding conditions that promote recreational activities (Attach photos of evidence or unusual items of interest).

☐ Campgrounds	☐ Stairs/walkway	☐ Roads (paved/unpaved)	☐ Other:_____
☐ Playgrounds	☐ Boating access (ramps)	☐ Populated area	☐ None of the Above
☐ Rural area	☐ Beach	☐ Docks or rafts	
☐ Residential	☐ Bridge crossing	☐ Commercial outfitter	
☐ National forests	☐ Commercial boating	☐ Nearby school	
☐ Urban/suburban location	☐ Trails/paths (hiking/biking)	☐ Power Line Corridor	
☐ Golf Course	☐ Paved parking lot	☐ Parks (national/city/county/state)	
☐ Sports Field	☐ Unimproved parking lot	☐ Public Property	

Comments:_____
_____

5. Check all surrounding conditions that impede recreational activities (Attach photos of evidence or unusual items of interest).

☐ Private Property	☐ Fence	☐ No trespass sign
☐ Barge/ship traffic	☐ Wildlife	☐ Industrial
☐ Steep slopes	☐ None of the Above	☐ No public access
☐ Other:_____	☐ No roads	

Comments:_____
_____

6. Check any indications of human use (Attach photos).

☐ Roads	☐ RV/ATV Tracks	☐ NPDES Discharge	☐ Organized event
☐ Rope swings	☐ Camping Sites	☐ Gates on corridor	☐ No Human Presence
☐ Dock/platform	☐ Fire pit/ring	☐ Children's toys	
☐ Foot paths/prints	☐ Fishing Tackle	☐ Remnant's of Kid's play	
☐ Other: _____			

Comments:_____
_____

Field Data Sheets – Basic RUAA Survey

Stream Name: _____ Site: _____
Date: _____ Time: _____

7. Check all water characteristics that apply (Attach photos).
   Aquatic Vegetation: ☐ absent ☐ rare ☐common ☐abundant
   Algae Cover: ☐ absent ☐ rare ☐common ☐abundant
   Odor: ☐ none ☐ rare ☐common ☐abundant
   Color: ☐ clear ☐ green ☐red ☐ brown ☐ black
   Bottom Deposit: ☐ sludge ☐ solids ☐ fine sediments ☐none ☐other
   Water Surface: ☐ clear ☐ scum ☐ foam ☐ debris ☐ oil
   Other: _____
   _____

8. Vertebrates Observed within 300 meter reach
   Snakes ☐ None ☐ slight presence ☐ moderate presence ☐ large presence
   Water Dependent Birds ☐ None ☐ slight presence ☐ moderate presence ☐ large presence
   Alligators ☐ None ☐ slight presence ☐ moderate presence ☐ large presence
   Comments: _____

9. Mammals Observed within 300 meter reach
   Wild ☐ None ☐ slight presence ☐ moderate presence ☐ large presence
   Domesticated Pets ☐ None ☐ slight presence ☐ moderate presence ☐ large presence
   Livestock ☐ None ☐ slight presence ☐ moderate presence ☐ large presence
   Feral Hogs ☐ None ☐ slight presence ☐ moderate presence ☐ large presence
   Comments: _____

10. Evidence of wild animals or evidence of birds, cattle, hogs, etc.
    ☐ Tracks ☐ Fecal droppings ☐ Bird nests

11. Garbage Observed
    Large garbage in the channel ☐ None ☐ Rare ☐ Common ☐ Abundant
    Small garbage in the channel ☐ None ☐ Rare ☐ Common ☐ Abundant
    Bank Garbage ☐ None ☐ Rare ☐ Common ☐ Abundant
    Briefly describe the kinds of garbage observed:
    _____
    _____

12. Is the site located in a wildlife preserve with large wildlife (i.e., waterfowl) population? ☐ Yes ☐ No

13. Please document any other relevant information regarding recreational activities and the water body in general (for example, area outside of the stream reach evaluated).
    _____
    _____
    _____
    _____
    _____

Field Data Sheet - Basic RUAA Survey

Stream Flow (Discharge) Measurement

Stream:_____ Date:_____

Site:_____ Site Description:_____

Time Begin:_____ Time End:_____ Meter Type:_____

Observers:_____ Stream Width*:_____ Section Width (W):_____

Observations:_____

Section Midpoint (ft) (m)	Section Depth (ft) (m) (cm) (D)	Observational Depth** (ft) (m)	Velocity (V)		Flow (Q) (m^3/s) (ft^3/s) Q = (W)(D)(V)
			At Point (ft/s)(m/s)	Average (ft/s)(m/s)	

Comprehensive RUAA Interview Form

Stream Name: _____ Segment #: _____ Site: _____

Interviewer's Name: _____
Date & Time (include AM or PM): _____
Interviewed: ☐ In person ☐ By phone ☐ By mail

☐ No interviews were conducted
If no interviews were conducted, please provide an explanation:

_____
_____

*Are you willing to respond to a short survey about this stream? ☐ Yes ☐ No
If yes, complete contact information for the interviewee below. Do not collect name or contact information if interviewee is a minor. The contact information portion is not required if the interviewee does not want to provide this information.

Legal name: _____ Daytime phone number: _____
Mailing address: _____
Interviewee selected because (e.g., house adjacent to stream; standing by stream, etc.)

_____
_____

Questions:

1. Are you familiar with this stream? ☐ Yes ☐ No If yes, how many years? _____
   If yes, proceed to #2. If no, stop here and do not conduct an interview.

2. Describe the location(s) of the stream reach the interviewee is familiar with:

   _____
   _____

3. Have the interviewer characterize the stream flow. Since the interviewer may not be familiar with TCEQ's definitions or distinction between the different water bodies, please refer to the definitions listed below when asking this question.

   - ☐ Ephemeral: A stream which flows only during or immediately after a rainfall event, and contains no refuge pools capable of sustaining a viable community of aquatic organisms.
   - ☐ Intermittent: A stream which has a period of zero flow for at least one week during most years. Where flow records are available, a stream with a 7Q2 flow of less than 0.1 cubic feet per second is considered intermittent. (Channel contains flowing water for only a portion of the year and surface water may be absent at times.)
   - ☐ Intermittent w/ perennial pools: An intermittent stream which maintains persistent pools even when flow in the stream is less than 0.1 cubic feet per second. (When not flowing, the water may remain in isolated pools.)
   - ☐ Perennial: A stream which flows continuously throughout the year. Perennial streams have 7Q2equal to or greater than 0.1 cubic feet per second.

4. Have you or your family personally used the stream for recreation? ☐ Yes ☐ No
   If yes, proceed to #6. If no, proceed to #5.

5. a. List reasons stream not used.

      _____
      _____

   b. Proceed to #7.

Comprehensive RUAA Interview Form

Stream Name: _____ Segment #: _____ Site: _____

6. How do you use the stream? When did these uses occur (e.g., year(s); season) and how often (times/year)? What location did these uses occur (get specific location and mark on a map)?
   ☐ Swimming ☐ Skin Diving ☐ Water Skiing ☐ Wind surfing ☐ Hunting ☐ Wading-Adults
   ☐ Tubing ☐ Kayaking ☐ Rafting ☐ Trapping ☐ SCUBA diving
   ☐ Snorkeling ☐ Fishing ☐ Boating ☐ Canoeing ☐ Wading-Children

   _____
   _____

7. Have you observed others using this stream for recreation? ☐ Yes ☐ No
   If yes, proceed to #8. If no, proceed to #9.

8. What kinds of uses have you witnessed? When did you witness these uses occurring (e.g., year(s); season) and how often (times/year)? What location did these uses occur (get specific location and mark on a map)?
   ☐ Swimming ☐ Skin Diving ☐ Water Skiing ☐ Wind surfing ☐ Hunting ☐ Wading-Adults
   ☐ Tubing ☐ Kayaking ☐ Rafting ☐ Trapping ☐ SCUBA diving
   ☐ Snorkeling ☐ Fishing ☐ Boating ☐ Canoeing ☐ Wading-Children

   _____
   _____

9. Have you heard about anyone using this stream for recreation? ☐ Yes ☐ No
   If yes, proceed to #10. If no, conclude the interview.

10. What kind of uses have you heard about? When did you hear that these uses occur (e.g., year(s); season) and how often (times/year)? What location did these uses occur (get specific location and mark on a map)?
    ☐ Swimming ☐ Skin Diving ☐ Water Skiing ☐ Wind surfing ☐ Hunting ☐ Wading-Adults
    ☐ Tubing ☐ Kayaking ☐ Rafting ☐ Trapping ☐ SCUBA diving
    ☐ Snorkeling ☐ Fishing ☐ Boating ☐ Canoeing ☐ Wading-Children

    _____
    _____

11. Can you recommend someone else we could contact that knows the stream? ☐ Yes ☐ No
    If yes, list person's contact information:

    _____
    _____

12. Additional comments (from the interviewee or interviewer):

    _____
    _____
    _____

RUAA Summary
(Not part of the Field Data Sheet)

This form should be filled out after RUAA data collection is completed. Use the Contact Information Form, Field Data Sheets from all sites, Interview Forms from all interviews conducted, Historical Information Review, and other relevant information to answer the following questions on the water body.

Name of waterbody: _____
Segment # or Nearest Downstream Segment #: _____
Classified Segment?: _____
County: _____

1. Observations on Use
   a. Do primary contact recreation activities occur on the water body?
      □ frequently □ seldom □ not observed or reported □ unknown

   b. Do secondary contact recreation 1 activities occur on the water body?
      □ frequently □ seldom □ not observed or reported □ unknown

   c. Do secondary contact recreation 2 activities occur on the water body?
      □ frequently □ seldom □ not observed or reported □ unknown

   d. Do noncontact recreation activities occur on the water body?
      □ frequently □ seldom □ not observed or reported □ unknown

2. Physical Characteristics of waterbody
   a. What is the average thalweg depth? _____ meters

   b. Are there substantial pools deeper than 1 meter? □ yes □ no

   c. What is the general level of public access?
      □ easy □ moderate □ very limited

3. Hydrological Conditions (Based on Palmer Drought Severity Index)
   □ Mild-Extreme Drought □ Incipient dry spell □ Near Normal
   □ Incipient wet spell □ Mild-Extreme Wet