

**Central and Southeast Texas Recreational Use-Attainability Analyses Project
Duck Creek (Segment 1209H) Basic RUAA**

Results Report

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Introduction

Problem Statement

Recreational Use-Attainability Analyses (RUAA) are scientific assessments that are used to determine existing and attainable recreational use for a water body and determine if that use might be different than the presumed recreational use, as specified in the Clean Water Act. In September, 2009 a Basic RUAA was initiated on Duck Creek, Segment 1209H. This Basic RUAA Report will provide the Texas Commission on Environmental Quality (TCEQ) Standards Group with relevant information to help determine the appropriate attainable recreation use for Duck Creek. The completion of this Basic RUAA consisted of several important interrelated components including 1) reconnaissance and site selection, 2) Basic RUAA and 3) public outreach. The objectives of each component are listed below.

Objectives

1. Reconnaissance and Site Selection

The primary objective of this phase is to select survey sites that would be accessible to users and most likely characterize recreational uses in the watershed. This was accomplished primarily with the input of local, state and regional agency staff familiar with the watershed, as well as aerial imagery. An initial stakeholder meeting occurred on March 9, 2010 at the Navasota Center, Navasota TX. Reconnaissance surveys were conducted on January 12 and 13, 2010 and provided the basis site selection for discussion in this meeting.

2. Basic Recreational Use Attainability Analysis

The primary objective of the Duck Creek RUAA was to characterize the recreational use and potential impediments to use for this stream. The RUAA field surveys were conducted on the Friday, May 28, 2010, to collect information on the water body and associated uses. These

field surveys were conducted at selected sites with the highest probability of detecting recreation use. The objective was to document and characterize observed use, site conditions (hydrology, physical attributes), and weather during the survey the RUAA field surveys.

3. Public Participation

The objective of the public participation phase of the Basic RUAA was to solicit as much information from various watershed stakeholders including agency staff, citizens, recreational user groups and other interested parties on the historical and current recreational uses in Duck Creek. This included soliciting information on recreational uses by sending out emails to key organizations and staff familiar with the watershed. The stakeholder contact list is provided in Appendix 1. In addition, on March 9, 2010 a stakeholder meeting was held to gather information on the watershed including likely recreational access points.

Study Area

Description of Water Body

Duck Creek is a tributary to the Navasota River Below Lake Limestone, which is located within the Brazos River Basin. Segment 1209H is an unclassified segment by the TCEQ and is approximately 19 miles in length. Segment 1209H begins at the confluence the Navasota River Below Lake Limestone in Robertson County and continues to the headwaters in Limestone County. Duck Creek supports post oaks and grasses in its sandy loams as it travels across very slightly sloped terrain (Handbook of Texas online, 2010). Duck Creek (Segment 1209H) is on the Texas 303(d) list for geometric mean values that exceed the bacteria criteria associated with primary contact recreation uses (TCEQ, 2008).

Environmental Features and Population Characteristics

The climate in the Navasota River Watershed is classified as having hot, humid summers and mild winters. Duck Creek has been disturbed by human activities that have altered both the land use and vegetation cover of the watershed. These activities include the construction of roads and in-stream sewer lines, conversion of land for agriculture, and the building of commercial businesses and residential neighborhoods. The area can be described as rural with a very sparse population density.

Watershed Characterization

The Navasota River watershed traverses flat to rolling terrain with local shallow depressions, surfaced by clay and sandy loams that support water-tolerant hardwoods, conifers, and grasses. The riparian zone is minimally impacted by development. The watershed of Duck Creek is predominantly rural with agriculture being the primary land use.

Permitted Discharges (Municipal, Industrial, Stormwater)

Duck Creek is affected by storm water runoff from agricultural, industrial, and urban areas. Under TPDES, the TCEQ has issued three permits to discharge treated wastewater to the Segment 1209H watershed (Figure 1). These permits are held by: Sanderson Farm Inc (1) and Oak Grove Management Co, LLC (2).

Duck Creek (Segment 1209H) Basic RUAA

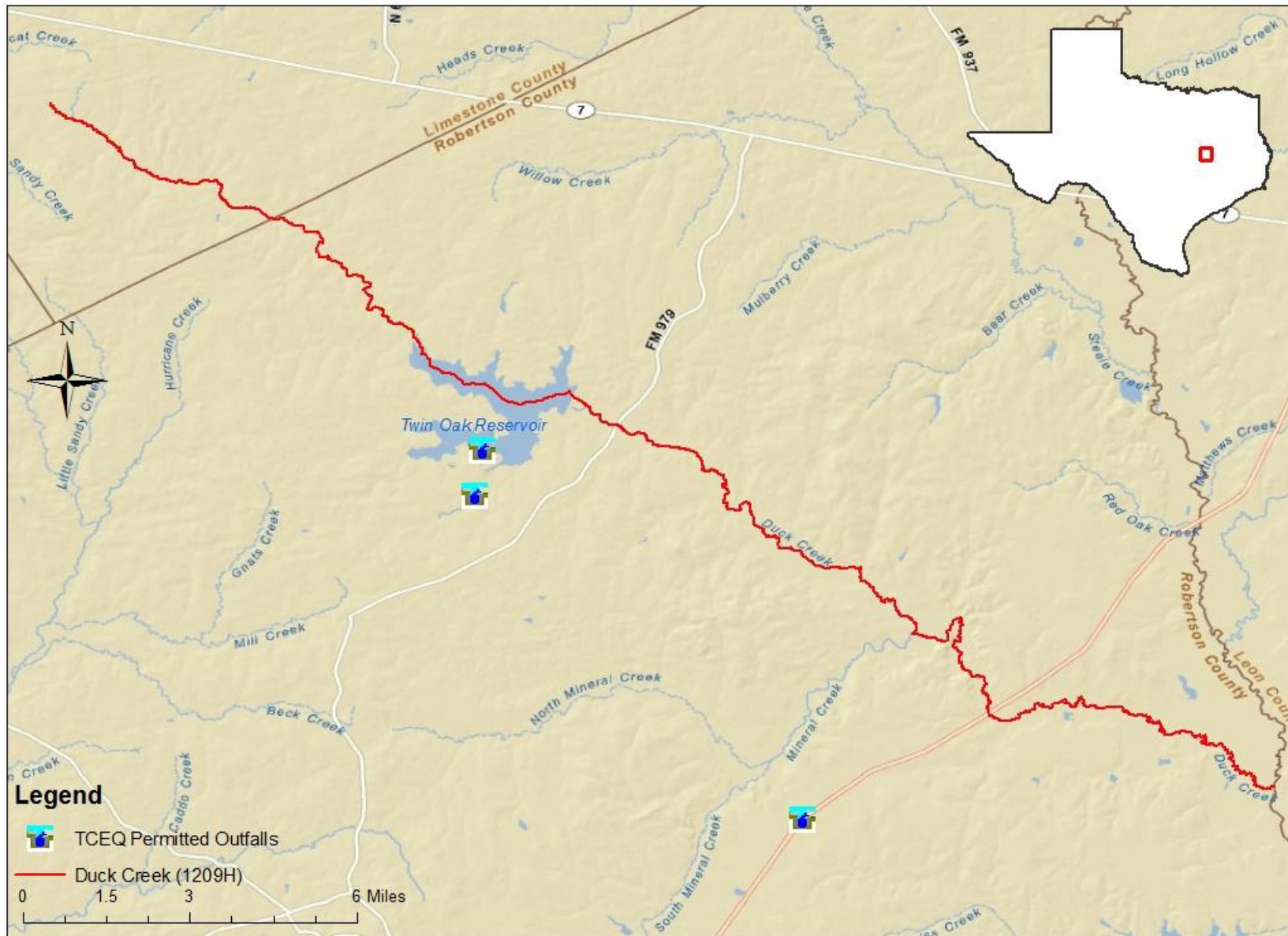


Figure 1. TCEQ permitted outfalls, adjacent to Duck Creek, Segment 1209H. There are no public parks located directly adjacent to the segment.

Potential Nonpoint Sources

Potential sources of nonpoint source pollution in the watershed include municipal point source discharges, on-site sewage facilities (OSSFs or septic systems), and runoff from agricultural lands (particularly chicken farms located within the Duck Creek watershed). For any urban collection and treatment system, sanitary sewer overflows and waste water treatment facilities (WWTF) bypasses are possible sources of bacteria loadings to receiving waters. Duck Creek (Segment 1209H) watershed can be described as relatively rural. There are potentially a number of OSSFs in use in the watershed. OSSFs require routine repairs and maintenance to avoid failures causing potential leaks or overflows. Poorly maintained OSSFs are a potential source of bacteria loadings into Duck Creek.

Site Reconnaissance Summary

Perspective sites were chosen based on public access and documented uses from the stakeholder response to the request for information e-mail which is included in Appendix 1. Initial reconnaissance surveys were conducted on January 12 and 13, 2010. A total of twelve perspective sites were visited. Of these, only four were publicly accessible and chosen for field survey sites (Tables 1 & 2). Site suggestions were submitted to the TCEQ as part of the Quality Assurance Project Plan's (QAPP) Monitoring Plan, which was approved by TCEQ on May 27, 2010.

Methodologies

RUAA Survey Site Selection and Descriptions

Duck Creek flows through mostly rural areas held by largely private property owners. The target density of survey sites should be approximately three (3) sites per every five (5) miles of stream (TCEQ, 2009). During our study, survey sites were established in areas where the

water body is accessible to the public and has the highest potential for recreational use (road crossings, public lands/parks located near the water body, and populated areas). A total of four (4) survey sites were established (Table 2 & Figure 2). These sites were chosen based on public access potential and also providing sufficient spatial coverage throughout the segment. In portions where the recommended three (3) sites per every five (5) miles of stream was not possible, supplementary information was gathered through coordination with local authorities, using topographic maps and aerial photos.

Every effort was made to obtain supplementary recreational use information about the entire length of the segment, including areas other than the selected sites in this Basic RUAA. Topographic maps and aerial imagery were used to provide the needed geographic information about potential recreational opportunities, potential access points, and potential access obstacles along the Duck Creek. Review of these resources resulted in reconnaissance site selection. The subsequent reconnaissance site visits confirmed the limited public access along the Duck Creek. Fences, gates, and no trespassing signage are common public access limitations on the segment and resulted in less than three (3) sites for every five (5) miles of stream. Figure 3 is a photograph taken at field survey site 4 and is a good representation of the general site conditions found along Duck Creek.

Duck Creek (Segment 1209H) Basic RUAA

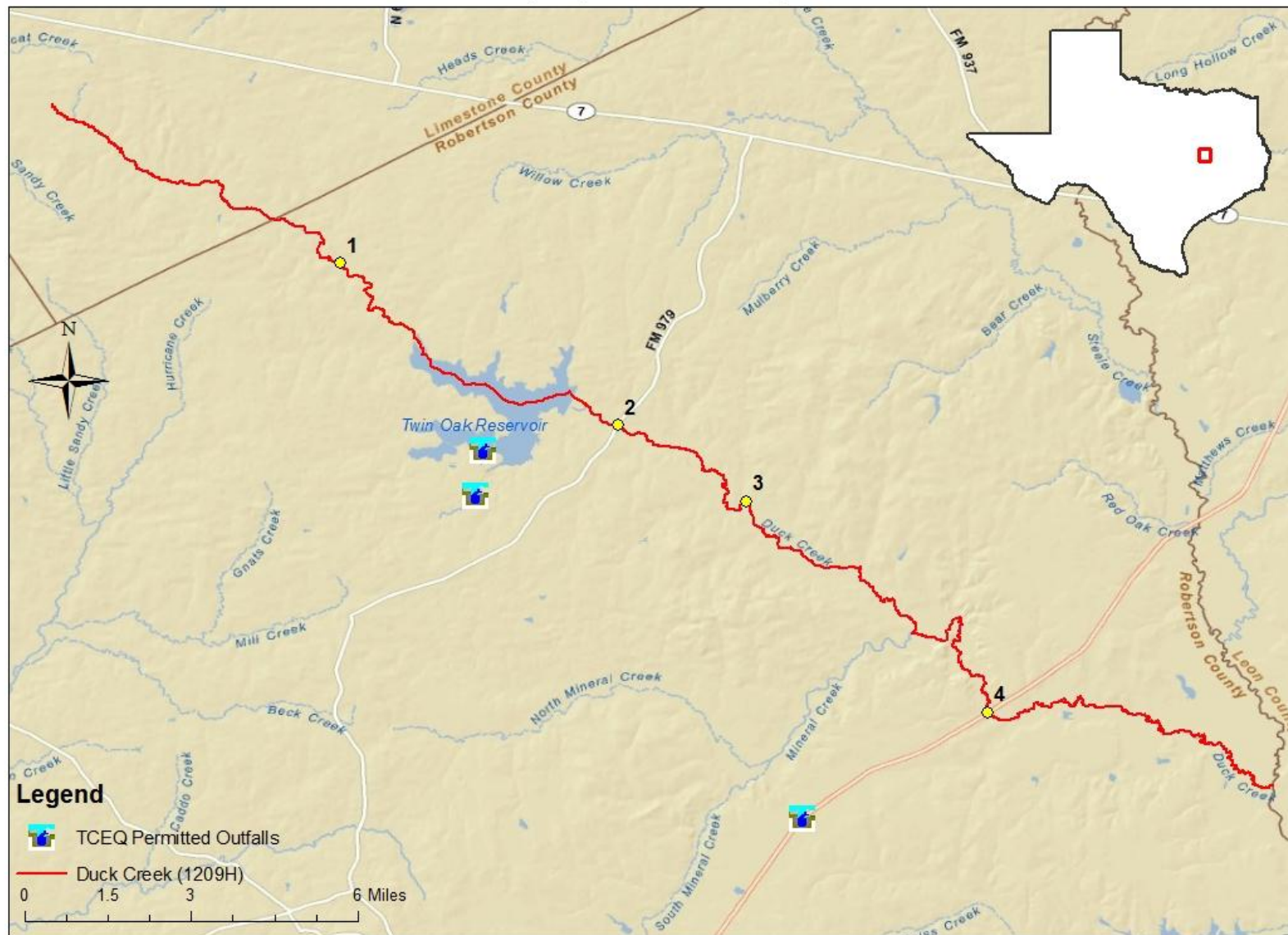


Figure 2. Basic RUAA survey sites on Duck Creek, Segment 1209H, selections based on river mile/assessment units, accessibility, and recreational features.

Table 1. Site reconnaissance for Basic RUAA on Duck Creek, Segment 1209H.

Recon Site #	Description	Latitude	Longitude	Public Access	Water Access	Recommended site?
1	LCR704 A @ Duck Creek	N/A	N/A	Private	N/A	No
2	LCR704 B @ Duck Creek	N/A	N/A	Private	N/A	No
3	LCR704 C @ Duck Creek	N/A	N/A	Private	N/A	No
4	White Rock Rd @ Duck Creek	31.23651	-96.52273	Can pull off on right bank	Barbed wire fence along right and left bank; heavy vegetation on the left bank	Yes
5	CR477 @ Duck Creek	N/A	N/A	Private	N/A	No
6	FM979 @ Duck Creek	31.19422	-96.45055	Can park on upstream left bank	Gentle slope on upper left bank	Yes
7	FM2096 @ Duck Creek	31.17435	-96.41702	Can park along road on any side	Can get to water from under the bridge	Yes
8	CR372 upstream @ Duck Creek	N/A	N/A	Private	N/A	No
9	CR372 downstream @ Duck Creek	N/A	N/A	Private	N/A	No
10	US79 @ Duck Creek	31.11936	-96.35408	Can pull off upstream left bank	Easy slope under bridge on left and right bank	Yes
11	Hoxie Chapel Rd 1 @ Duck Creek	31.09084	96.31195	Private	N/A	No
12	Hoxie Chapel Rd 2 @ Duck Creek	N/A	N/A	Private	N/A	No

Table 2. Survey sites for the Basic RUAA Survey on Duck Creek, Segment 1209H (corresponding to Figure 2 and Table 1)

Recon Site #	Field Survey Site #	Description	Latitude	Longitude	Approx. river mile
4	1	White Rock Rd @ Duck Creek	31.23651	-96.52273	22.3
6	2	FM979 @ Duck Creek (TCEQ site: 16390)	31.19422	-96.45055	16.0
7	3	FM2096 @ Duck Creek	31.17435	-96.41702	12.9
10	4	US79 @ Duck Creek (TCEQ site: 11389)	31.11936	-96.35408	5.7



Figure 3. Picture of field survey site 4, showing the general representation of the physical conditions seen on Duck Creek, Segment 1209H

Sampling Methods

RUAAAs are used to identify and assign attainable uses and criteria to individual water bodies. Applicable uses and associated criteria are defined in the Texas Surface Water Quality Standards (TSWQS). Until recently, Texas had two recreation use categories in the 2000 TSWQS: contact and noncontact recreation. These recreation use categories were expanded to include more categories: primary contact, and secondary contact recreation (1 & 2). Primary contact recreation consists of recreational activities involving a significant risk of ingestion of water including: wading by children, swimming, water skiing, diving, and surfing. Secondary

contact recreation 1 is considered water recreation activities not involving a significant risk of water ingestion: including fishing, commercial and recreational boating, and limited body contact incidental to shoreline activity. Secondary contact recreation 2 follows the same definition as secondary contact recreation 1 except that it occurs less frequently due to (1) physical characteristics of the water body and/or (2) limited public access.

According to TCEQ agency guidance, a Basic RUAA must be conducted on Duck Creek since it is an unclassified water body (Segment 1209H). RUAA Surveys were conducted during the normal warm season and periods when people would be most likely use the water body for contact recreational purposes. RUAA surveys were also conducted during optimal sampling conditions that are representative of the normal flow conditions of the stream and are not storm-influenced. RUAA field surveys for Duck Creek (Segment 1209H) were conducted Friday, May 28, 2010. Weather conditions for this day and the prior 30 days can be found in Appendix 4. More specific procedures can be found in *TCEQ's RUAA Procedures Document, May 2009*.

Field Survey Descriptions

A Basic RUAA field survey begins with marking off a 300 meter (m) reach of the waterway, flagging every 30m. Sites with public accessibility limitations may not be fully assessed in this way. In instances such as these, a laser range finder was used to document the length of the stream reach that could be observed. A flow measurement (where possible) was then taken within the 300m stream reach. If the waterbody is wadeable, a depth measurement was taken every 30m and width measurements are taken at the widest, narrowest, and average width points within the 300m reach. Pictures are taken to document the survey at 30, 150, and 300m facing upstream, right bank, downstream, and left bank (Appendix 3). Air temperature and water temperature were also recorded at an easily accessible location. Finally, the Basic

RUAA datasheets were completed to document any recreational uses, signs of recreational use, impeding conditions, or other field notes taken during the field survey. The depth measurements for the sites that were considered non-wadeable were taken from the bridge at the deepest point accessible.

Due to impediments affecting stream access, complete field survey methods were not possible at some locations on Duck Creek. Impediments to stream access, such as steep banks, fences, log jams, and overgrown banks, at times limited the field survey team's ability to survey the complete 300m stretch of stream. In each case where this was a factor, the impediments were documented on the field data sheet and documenting pictures of these conditions were taken (Appendix 3). Specific impediments causing access constraints for each site can be found in Appendices 2 and 5.

Results

The field survey site visit was completed on each of the four sample sites on Friday, May 28, 2010. All field data sheets are attached (Appendix 2).

Physical Evaluation and Flow

During the field surveys the air and water temperatures fell within the range of acceptable temperatures for sampling described in the TCEQ procedures manual (Table 3). The average depth of Duck Creek was 0.5m and the average width is 5.7m. The average secchi tube reading taken at the field survey sites was 0.6m (Table 3). The flow Duck Creek based on measurements taken site number 4 was 4.4 cubic feet per second (cfs).

Duck Creek riparian zone can be generalized as forest (Table 4). The dominant substrate along the creek was generally composed of sand and mud/clay.

Recreational Uses

Based on our field surveys we did not personally observe recreation on Duck Creek (Segment 1209H). We observed evidence of recreational use (foot paths/prints, animal trap, graffiti, and riffle shell) at field survey sites 1 and 2 (Table 5, Figure 4, & Appendix 5). There were noted impediments at each site along Duck Creek that could limit the recreation, including channel obstructions: steep slopes, fences, log jams, other fallen trees and debris, thick bank vegetation, and rip rap (Table 5, Figure 4, & Appendix 5).

Table 3. Physical parameters from the basic recreational use attainability analysis field surveys conducted on Duck Creek, Segment 1209H. * = no water access, ** = Flow too low to register, *** = Stream not deep enough to take flow, one velocity measurement was taken at thalweg: 0.68 ft/s

Site #	Site Description	Air	Water	Average Depth (m)	Average Width (m)	Stream Flow (cfs)	Secchi (m)
		Temperature (°C)	Temperature (°C)				
1	White Rock Rd @ Duck Creek	32.0	24.0	0.61	8.53	*	*
2	FM 979 @ Duck Creek	30.0	24.5	0.43	5.79	**	0.77
3	FM 2096 @ Duck Creek	31.5	24.5	0.40	3.20	***	0.59
4	US 79 @ Duck Creek	30.0	24.5	0.47	5.18	4.36	0.52
Total Average		30.9	24.4	0.5	5.7	4.4	0.6

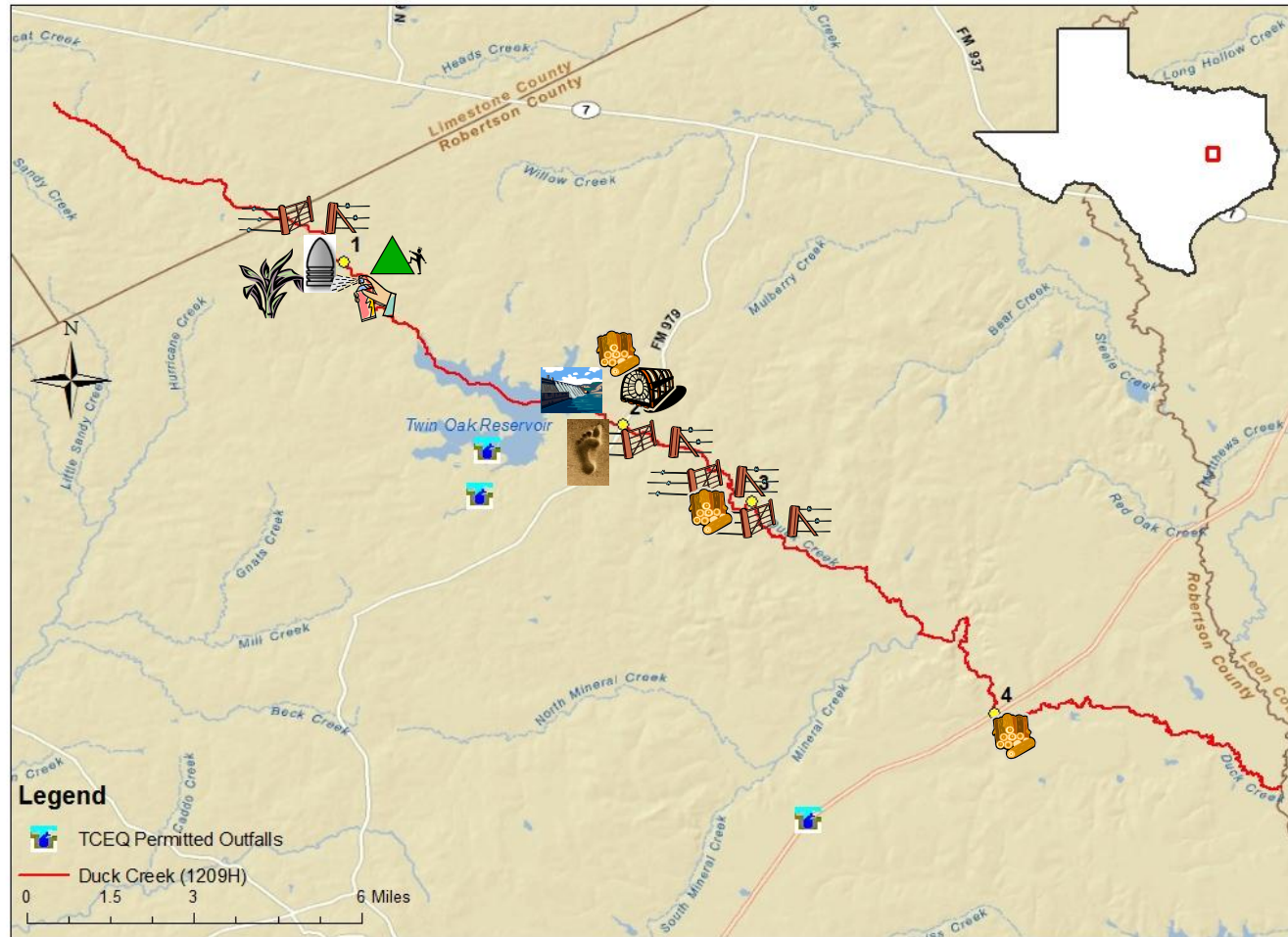
Table 4. Physical characteristics of Riparian Zone and Dominant Substrate of the field survey sites sampled during the Basic Recreational Use Attainability Analysis on Duck Creek, Segment 1209H. Site 1 dominant primary substrate is unknown because there was no water access.

Site #	Site Description	Left Bank	Right Bank	Dominant Primary
		Riparian Zone	Riparian Zone	Substrate
1	White Rock Rd @ Duck Creek	Forest	Forest	Unknown
2	FM 979 @ Duck Creek	Forest	Forest	Sand
3	FM 2096 @ Duck Creek	Forest	Forest	Mud/Clay
4	US 79 @ Duck Creek	Forest	Forest	Mud/Clay

Table 5. Recreational uses observed and documented on Duck Creek, Segment 1209H, for the Basic Recreational Use Attainability Analysis.

Field Survey			
Site	Site Description	Impediments	Evidence
1	White Rock Rd @ Duck Creek	Steep slopes, Fences, Overgrown banks	Riffle shell, Graffiti
2	FM 979 @ Duck Creek	Fence, Fallen trees	Foot paths/prints, Animal trap
3	FM 2096 @ Duck Creek	Fence, Log jam	
4	US 79 @ Duck Creek	Fallen trees, Rip rap	

Duck Creek (Segment 1209H) Basic RUAA



-  Fence
-  Dam/Spillway
-  Riffle shell
-  Animal trap
-  Foot prints
-  Steep slopes
-  Overgrown banks
-  Graffiti
-  Log jam/Fallen tree

Figure 4. Basic RUAA survey sites on Duck Creek, Segment 1209H, with depictions of observed recreational uses, evidence of recreational uses, and impediments. Locations are approximate. See Appendix 5: Google Earth Interactive Map for exact locations of uses, evidence, and impediments.

Summary

Four (4) field surveys were completed on Duck Creek (Segment 1209H) during this basic RUAA to evaluate whether the existing and/or attainable recreational uses of the creek might be different than the current presumed recreational use designation. Important data collected in this RUAA included general stream characteristics, observations and evidence of recreational use, surrounding conditions that promote recreation, and surrounding conditions that impede recreation, including channel obstructions. There is also photographic documentation supplementing and supporting all collected data.

While Duck Creek had numerous impediments to recreational use, such as fences and log jams, the RUAA documented evidence of recreation activities at two field survey sites. Staff did not observe any recreational use on Duck Creek (Segment 1209H) during the field surveys. No primary contact recreation was documented during this basic RUAA. The average thalweg depth was 0.5m, and the average width was 5.7m. The average flow of Duck Creek during the field survey was 4.4cfs. There is a reservoir midway through the segment, however, it is surrounded by private property, and there is no public access. No public recreation areas in the form of maintained parks were found as part of this RUAA. Basic RUAA summary analysis indicates that non-contact recreation activities occur on Duck Creek (Segment 1209H).

Literature Cited

Handbook of Texas Online. 2010. Texas State Historical Association (TSHA) web resource:
<http://www.tshaonline.org>.

Texas Commission on Environmental Quality (TCEQ). 2008. Texas 303(d) list (March 19, 2008). TCEQ, Austin, Texas.

Texas Commission on Environmental Quality (TCEQ). 2009. Recreational Use-Attainability Analyses (RUAAs) Procedures for a Comprehensive RUAA and a Basic RUAA Survey. TCEQ, Austin, Texas.

RUAA Summary Form

RUAA Summary

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

Name of water body: Duck Creek
 Segment No. or Nearest Downstream Segment No.: 1209H
 Classified?: No
 County: Limestone and Robertson

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 Water Body

- a. What is the average thalweg depth? 0.5 meters
- b. Are there substantial pools deeper than 1 meter? yes no N/A
- 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