

# East Texas Basic Recreational Use Attainability Analyses Project Report

Sabine River Basin - Nichols Creek (Segment 0502A) and Grace Creek (Segment 0505B)  
Contract No. 582-9-90439-11



Grace Creek at H.G. Moseley Parkway, Longview, TX

*Prepared for:*

**TEXAS COMMISSION ON ENVIRONMENTAL QUALITY**



*Prepared by:*

**Texas AgriLife Research and Parsons**



**July 2011**

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## ACRONYMS AND ABBREVIATIONS

ATV	all-terrain vehicle
cfs	cubic feet per second
FM	farm to market
GIS	geographic information system
GPS	global positioning system
m	meter
NHD	National Hydrography Dataset
QAPP	quality assurance project plan
RUAA	Recreational Use Attainability Analyses
RV	recreational vehicle
SRA	Sabine River Authority
SS-QAP	site specific project quality assurance plan
SWQM	surface water quality monitoring
TCEQ	Texas Commission on Environmental Quality
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department
TSWQS	Texas Surface Water Quality Standards
UAA	Use Attainability Analyses
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey

## SECTION 1 INTRODUCTION

This study was performed in East Texas on portions of the Sabine River basin to quantify characteristics of a select group of water bodies to assist the Texas Commission on Environmental Quality (TCEQ) in the development of appropriate use classifications. Use Attainability Analyses (UAA) are assessments of the physical, chemical, biological, and economic conditions affecting attainment of a water body use. Recreational UAA (RUAA) characterize and assess the level of recreation use on a water body. Several water bodies in Texas are not meeting the water quality criteria for the contact recreation use assigned to them. In addition, concerns have been raised by stakeholders statewide as to the appropriateness of the current recreational uses and criteria, which are based on the U.S. Environmental Protection Agency's (USEPA) *Ambient Water Quality Criteria for Bacteria – 1986*. This RUAA report, which covers two unclassified water bodies of the Sabine River basin, was commissioned by TCEQ to collect data that will assist them in addressing these issues.

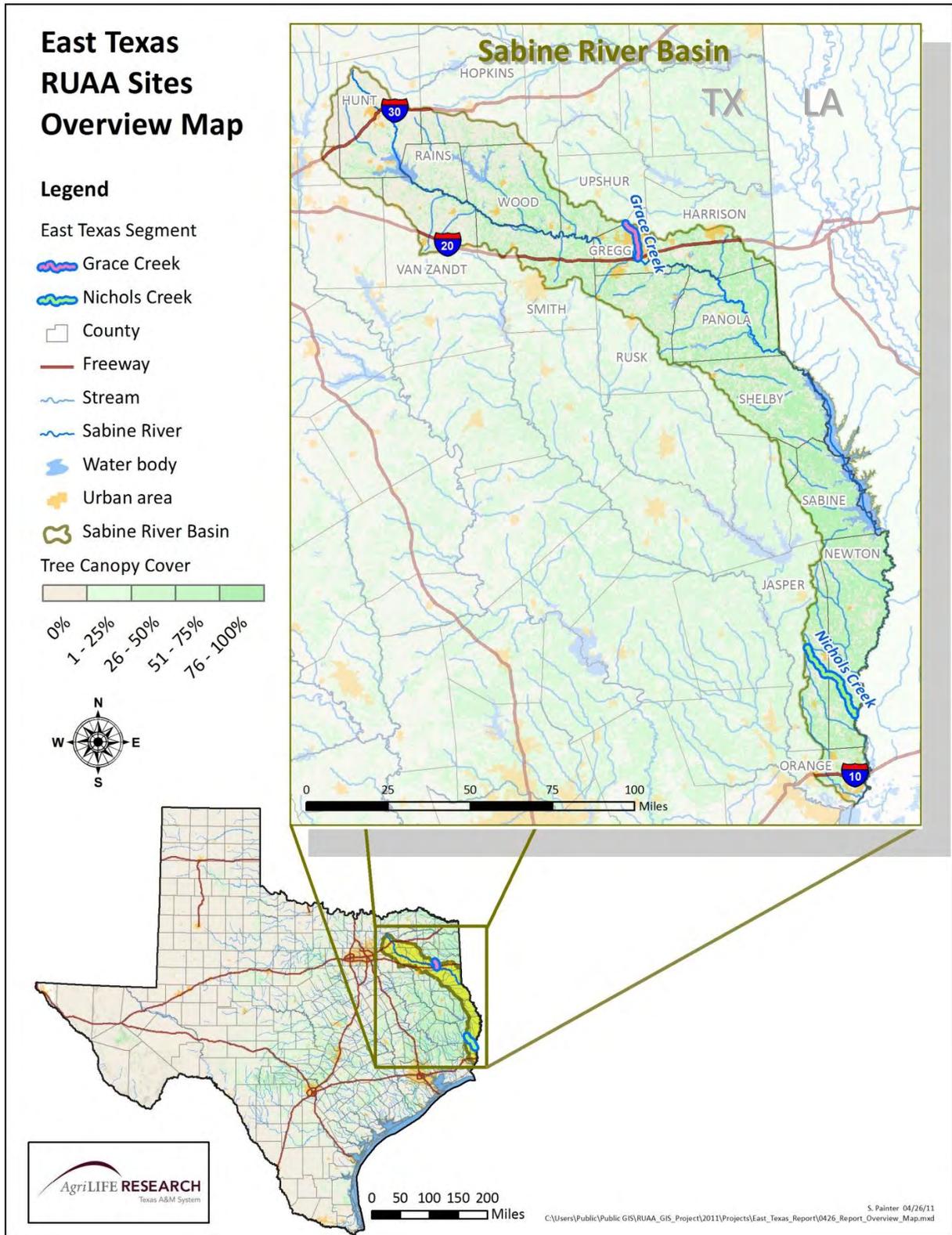
### 1.1 Project Description

The purpose of this project was to conduct Basic RUAA surveys on the water bodies listed in Table 1.1 and illustrated in Figure 1.1, which are on the Texas 2008 303(d) List of Impaired Waters. Table 1.1 identifies both the portion of each tributary considered impaired, as defined in the Texas 2008 303(d) list, and the entire length based on the National Hydrography Dataset (NHD). RUAA surveys were conducted on the length of each water body as defined in the NHD in an effort to characterize the entire stream. This investigation provides information necessary for TCEQ to evaluate, and if appropriate, modify contact recreation use designations.

**Table 1.1 Water Bodies Targeted for Basic RUAA**

Assessment Unit	Water Body Name	TCEQ 303(d) List Description	Stream Type	303(d) Listed Stream Miles	NHD Stream Miles
0502A	Nichols Creek	From the confluence of the Sabine River to the upstream perennial portion of the stream south of Kirbyville in Newton and Jasper Counties.	Intermittent with Perennial Pools	25	39.2
0505B	Grace Creek	Perennial stream from the confluence with the Sabine River up to FM 1844 in Gregg County.	Perennial	12.3	14.8
			<b>Total Miles</b>	<b>43.8</b>	<b>54.0</b>

Figure 1.1 Water Bodies in the Sabine River Basin Targeted for RUAA



## 1.2 TCEQ Guidelines for RUAA

The TCEQ guidance outlined in *Recreational Use-Attainability Analyses (RUAA): Procedures for a Comprehensive RUAA and a Basic RUAA Survey* provided the guidelines for design of this study (TCEQ 2009). The general concept behind RUAA is to evaluate if an alternative recreational use should be assigned to classified or unclassified streams other than the designated or presumed recreational uses identified in the Texas Surface Water Quality Standards (TSWQS) 30 Texas Administrative Code 307.1-307.10. A recreational use that is less stringent than applicable presumed uses can only be assigned to a water body for regulatory purposes after that use is designated for an individual water body in the TSWQS and approved by USEPA (TCEQ 2009).

Designated recreational uses for classified water bodies, as found in Appendix A of the TSWQS document, include:

- Contact recreation: Recreational activities involving a significant risk of ingestion of water, including wading by children, swimming, water skiing, diving, and surfing.
- Noncontact recreation: Aquatic recreational pursuits not involving a significant risk of water ingestion; including fishing, commercial and recreational boating, and limited body contact incidental to shoreline activity.

Contact recreation is presumed as a use for all unclassified waters. Based on the 2010 TSWQS approved by TCEQ in June 2010, recreational uses that can now be considered for classified and unclassified streams include:

- 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 water body, and/or (2) limited public access.
- Noncontact Recreation: Activities such as ship and barge traffic, birding, and using hike and bike trails near a water body, not involving a significant risk of water ingestion, and where Primary and Secondary Contact Recreation should not occur because of unsafe conditions.

A change to a designated use requires a revision in the TSWQS that is adopted by TCEQ and approved by USEPA. RUAA are the documentation required by TCEQ to evaluate and consider a change to a designated or presumed use.

A Basic RUAA Survey is conducted to (1) collect information on a water body, such as the presence or absence of water recreation activities, stream flow type, and stream depth; (2)

establish/verify a presumed use; or (3) provide core information to be included in a Comprehensive RUAA. Basic RUAA surveys can be conducted on a relatively small unclassified water body evaluated during conditions amenable for contact recreation and can often be accomplished on a single sampling date. A Comprehensive RUAA, which includes information from a Basic RUAA Survey, is required for classified water bodies or where presumed uses for unclassified water bodies may be inappropriate. It is an expanded effort requiring two or more field observation trips and historical data review.

## SECTION 2

### SITE RECONNAISSANCE AND SELECTION

The process of developing a survey site list began by using a combination of Geographic Information System (GIS) data, review of historical information, meetings, and phone conversations with local entities, and field reconnaissance. The Site Specific Project Quality Assurance Plan (SS-QAP) and Monitoring Plan for this investigation was used to present detailed information on site selection, maps of the water bodies and proposed survey sites, survey and interview procedures, field survey equipment, and data handling and reporting.

#### 2.1 Site Selection Criteria

The TCEQ guidance outlined in *Recreational Use-Attainability Analyses (RUAA): Procedures for a Comprehensive RUAA and a Basic RUAA Survey* (TCEQ 2009) recommends that surveys be performed on three sites for every 5 stream miles to collect information to support the RUAA. With the 54 stream miles covered by the two water bodies listed in Table 1.1, this equates to approximately 30 recommended survey sites. Using this as a guideline, specific criteria were used to evaluate this recommended population of survey sites and determine which of these could effectively be surveyed. Key criteria used in this investigation to aid survey site selection included:

- Locating areas in which 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, populated areas, federal and state parks, parks operated by the U.S. Army Corps of Engineers, river authorities, counties, cities, and private organizations).
- Utilizing GIS tools to compile supplemental information, including locations of Texas Pollution Discharge Elimination System (TPDES) wastewater treatment plants, other pertinent jurisdictional information, and roads crossing streams.
- Riparian corridor characteristics.
- Hydrologic characteristics, such as stream type, stream flow, hydrologic alterations, etc.
- Landowner or tenant permission to access private lands was acquired before conducting surveys.
- When possible, sites were selected at or near existing stream flow gages and existing surface water quality monitoring stations.

Survey site selection was prioritized using the following scheme: public road crossings, publicly accessible locations, then privately owned access points that might be used by the public, which resulted in a draft list of 32 potential survey sites (17 sites in Nichols Creek watershed, 15 sites in Grace Creek watershed). To the degree possible, the information listed in the criteria above was integrated into GIS maps; proposed survey sites were also displayed. A GIS map and a draft list of survey sites were produced and used by a field crew to conduct site reconnaissance to verify that each proposed site could be surveyed. The site reconnaissance maps are provided in Appendix A and Table 2.1 provides the draft list of survey sites considered.

**Table 2.1 Potentially Accessible Sites Evaluated by Reconnaissance Team Prior to Survey Data Collection**

Count	Stream Name	Road or Property Name	Alternate Road Name	Site ID Number	Assessment Unit	5 mile Subsegment Unit	TCEQ SWQM Location
1	Nichols Creek	FM 253		66	0502A	01	15652
2	Nichols Creek	State Hwy 87		67	0502A	02	
3	Nichols Creek	Driveway		68	0502A	03	
4	Nichols Creek	County Rd	3102	69	0502A	04	
5	Nichols Creek	Holmes Rd		70 <sup>1</sup>	0502A	04	
6	Nichols Creek	Holmes Rd		72 <sup>1</sup>	0502A	04	
7	Nichols Creek	Driveway	PR 7047	73	0502A	04	
8	Nichols Creek	Unnamed Street		74	0502A	05	
9	Nichols Creek	Unnamed Street		75	0502A	06	
10	Nichols Creek	US Hwy 96		76	0502A	06	
11	Nichols Creek	Unnamed	CR 594	77	0502A	07	
12	Nichols Creek	Driveway		78	0502A	07	
13	Nichols Creek	County Rd		79	0502A	07	
14	Nichols Creek	FM 82	Off of CR 413	80	0502A	07	
15	Nichols Creek	FM 1013		81	0502A	08	
16	Nichols Creek	FM 1013		82	0502A	08	
17	Nichols Creek	CR 408		83	0502A	08	
18	Grace Creek	W Cotton St		0	0505B	01	
19	Grace Creek	State Hwy 31	W South St	1	0505B	01	
20	Grace Creek	State Loop 281	FM 1845 S	2	0505B	01	14499
21	Grace Creek	W Sabine St		3	0505B	01	
22	Grace Creek	State Hwy 281	Tomlinson Pkwy	5	0505B	02	16689
23	Grace Creek	E Fairmont St	Fairmont St	6	0505B	02	15789
24	Grace Creek	Hawkins Pkwy	W Hawkins Pkwy	7	0505B	02	

Count	Stream Name	Road or Property Name	Alternate Road Name	Site ID Number	Assessment Unit	5 mile Subsegment Unit	TCEQ SWQM Location
25	Grace Creek	Spring Hill Rd		8	0505B	02	
26	Grace Creek	US Hwy 80	W Marshall Ave	9	0505B	02	16686, 16687
27	Grace Creek	H.G. Moseley Pkwy		10	0505B	02	
28	Grace Creek	Oak Forest CC		10.5	0505B	02	
29	Grace Creek	FM 1844		11	0505B	03	
30	Grace Creek	Graystone Rd		12	0505B	03	
31	Grace Creek	McCann Creek Rd		13	0505B	03	
32	Grace Creek	United RV Park		13.5	0505B	03	

<sup>1</sup> Sites 70 and 72 represent two attempted access points at the same reconnaissance site. Access was not possible at either point. Therefore, through the remainder of this report, Nichols Creek at Holmes Rd. is identified as Site 71 since it represents a single inaccessible location that was not surveyed.

## 2.2 Agency and Landowner Input

Input from the Sabine River Authority (SRA), Texas Parks and Wildlife Department (TPWD) regional staff, TCEQ regional staff, Texas State Soil and Water Conservation Board and other local agencies and stakeholders is recognized as the key source of information that can lead to the improvement of the prioritization of selecting survey sites. Two meetings were held within the target region prior to field data collection.

The first meeting targeted local and state agencies in an effort to inform them of the goals associated with conducting RUAs. At the same time input was sought on the proposed sampling survey sites being recommended for the Sabine River Basin RUAs. Appendix B provides a list of individuals who were invited to, and those who attended, this meeting which was held at the SRA facility located at Lake Fork, near Quitman, TX on August 26, 2009.

A second stakeholder meeting targeted landowners, land managers, community leaders and the general public. This was held on May 20, 2010, also at the SRA facility near Quitman, Texas. Watershed stakeholders were invited to attend the public meeting through public announcements (newspapers and TCEQ webpage), and individual phone calls. Lists of those invited to attend the second meeting and those who attended are provided in Appendix B.

## 2.3 Site Reconnaissance

Using the site reconnaissance maps (Appendix A) and the draft list of survey sites (Table 2.1), a pair of teams consisting of two members each attempted to reach the potential sites. The site reconnaissance effort of the locations listed in Table 2.1 was conducted in mid-August 2009. The teams recorded the accessibility (public, private), descriptions for survey teams of how to access each water body, recreational evidence, stream type (perennial, intermittent, etc.), stream flow, hydrologic modifications, and GPS data. Not all sites were accessible to the public or the team. Attempts to contact property owners through local contacts such as the Hopkins County AgriLife Extension office, TPWD, the Gregg, Jasper, and Newton County Central Appraisal District offices resulted in access to a few additional survey sites. Efforts were made to evaluate the accessibility along 300 meters (m) of the creek bed at each of the sites.

Field team members did not enter into fenced or designated private properties without landowner/tenant permission for the safety of team members. Sites that the field teams could access from public points of interest and/or through landowner/tenant approved locations were the only ones surveyed. Verification of limited access decreased the total number of sites that could be surveyed; however, site reconnaissance did prove to be a valuable and necessary step to prepare the field teams for conducting the actual surveys to support the RUAs. The site reconnaissance resulted in the determination that of the original 32 potential sites listed in Table 2.1 for Nichols and Grace Creek, only 20 of these sites were considered as candidates for conducting site surveys. These sites would serve as the basis for the RUAs for the two streams addressed in this report. The 20 survey sites are listed in Table 2.2. Sites for each stream are arranged in Table 2.2 from upstream to downstream.

**Table 2.2 List of Survey Sites for Nichols Creek and Grace Creek**

Count	Stream Name	Road or Property Name	Site ID	Assessment Unit	5 Mile Subsegment Unit	Scheduled Monitoring Frequency FY 2010/11	TCEQ SWQM Location	X Coordinate	Y Coordinate
1	Nichols Creek	FM 1013	82	0502A	08	Once		93° 59' 14.00"	30° 41' 26.87"
2	Nichols Creek	FM 1013	81	0502A	08	Once		93° 57' 54.90"	30° 38' 33.46"
3	Nichols Creek	FM 82	80	0502A	07	Once		93° 54' 57.28"	30° 35' 38.76"
4	Nichols Creek	FM 82	79	0502A	07	Once		93° 57' 53.40"	30° 38' 33.00"
5	Nichols Creek	US Hwy 96	76	0502A	06	Once		93° 48' 19.29"	30° 28' 23.68"
6	Nichols Creek	State Hwy 87	67	0502A	02	Once		93° 48' 19.35"	30° 28' 33.48"
7	Nichols Creek	FM 253	66	0502A	01	Once	15652	93° 47' 01.96"	30° 25' 23.27"
8	Grace Creek	FM 1844	11	0505B	03	Once		94° 48' 48.55"	32° 35' 28.48"
9	Grace Creek	McCann Creek Rd	13	0505B	03	Once		94° 47' 54.47"	32° 34' 31.76"
10	Grace Creek	Graystone Rd	12	0505B	03	Once		94° 47' 41.37"	32° 34' 21.16"
11	Grace Creek	Spring Hill Rd	8	0505B	02	Once		94° 45' 59.70"	32° 33' 13.81"
12	Grace Creek	Hawkins Pkwy	7	0505B	02	Once		94° 45' 56.20"	32° 32' 53.36"
13	Grace Creek	State Hwy 281	5	0505B	02	Once	16689	94° 45' 37.45"	32° 31' 30.36"
14	Grace Creek	H.G. Moseley Pkwy	10	0505B	02	Once		94° 45' 37.44"	32° 31' 30.39"
15	Grace Creek	E. Fairmont St	6	0505B	02	Once	15789	94° 45' 37.38"	32° 30' 52.89"
16	Grace Creek	US Hwy 80	9	0505B	02	Once	16686, 16687	94° 45' 13.60"	32° 30' 01.58"
17	Grace Creek	W Cotton St	0	0505B	01	Once		94° 45' 15.16"	32° 29' 14.17"
18	Grace Creek	State Hwy 31	1	0505B	01	Once		94° 45' 16.12"	32° 29' 33.13"
19	Grace Creek	W Sabine St	3	0505B	01	Once		94° 45' 18.47"	32° 28' 54.88"
20	Grace Creek	State Loop 281	2	0505B	01	Once	14499	94° 44' 59.95"	32° 27' 44.00"

## **SECTION 3**

### **RUAA TECHNICAL APPROACH**

#### **3.1 Experimental Design**

Basic RUAA Surveys were conducted to collect information on each water body. Field collection activities focused on documenting the presence and/or absence of water recreation activities, stream flow type, and stream depth (TCEQ 2009). Basic RUAA surveys were performed during the summer of 2010. Basic and Comprehensive RUAA surveys are performed using the TCEQ *Recreational Use-Attainability Analyses (RUAA) Procedures for a Comprehensive RUAA and a Basic RUAA Survey* (May 2009 version) and according to the following requirements described in the most current TCEQ TMDL RUAA Quality Assurance Project Plan (QAPP) (TCEQ 2009a):

- Data Representativeness - TCEQ TMDL RUAA QAPP Section A7
- Field measurement techniques found in the Surface Water Quality Monitoring (SWQM) Procedures Manual – TCEQ TMDL RUAA QAPP Section B2
- Data Management - TCEQ TMDL RUAA QAPP Section B10

Field measurements and data collection were performed according to TCEQ SWQM Procedures Manual (TCEQ RG-415) (TCEQ 2008).

#### **3.2 Sampling Conditions**

The RUAA surveys were conducted during normal warm season conditions (air temperature greater than or equal to 70 degrees Fahrenheit) under baseflow conditions when people are most likely to use the water bodies for recreation. Baseflow conditions are defined as sustained or typical warm-weather flows between rainfall events, excluding unusual antecedent conditions of drought or wet weather. When discussions with local entities or users indicated that recreational use timing differs from the normal conditions, attempts were made to conduct RUAA surveys at those times of use. Site surveys were conducted during the weekends (Friday through Sunday) of June 25, 2010 on Grace Creek and July 16, 2010 on Nichols Creek.

#### **3.3 Field Tasks**

Field Survey Forms were obtained from *Recreational Use-Attainability Analyses (RUAA): Procedures for a Comprehensive RUAA and a Basic RUAA Survey* (TCEQ 2009). These forms were used to document, define, and organize the data collected and observations made at each survey site. The Field Survey Forms for each survey site are provided in Appendix C. For reconnaissance sites that were not surveyed, photographs were taken from the roadside where possible to demonstrate the inaccessible conditions. The focus of the data collection effort was on the stream corridor and to observe recreational uses or to document evidence showing possible uses.

Field collection of data was performed using a combination of the following:

- Hardcopy of TCEQ RUAA Procedures (May 2009 version) Data Collection Sheets;
- Field Logbook;

- Global Positioning System (GPS) unit meeting TCEQ GPS Requirements. This Trimble GeoXT GPS unit was also utilized to input field data for the RUAA survey forms directly into digital format for electronic download to a computer database format;
- Digital camera for all photographs taken; and
- Measurement equipment (measuring tapes, measuring survey rods, water velocity meter, compass, water thermometer, air thermometer).

The field surveys began as the field team approached the survey area, looking for signs of recreational use and ways of access to the streambed. Initial observations were made to find a 300m section of the stream that had the most potential for recreational use, which was wadeable, and which had public or permitted access.

The tasks performed at each survey site consisted of collecting measurements (stream or pool dimensions, water flow, air and water temperature), documenting streambed and adjacent area conditions, completing the survey forms, documenting uses or possible uses of the water body, talking with local people on known uses of the water body, and collecting GPS coordinates and a standard set of photographs. For most sites, photographs were taken facing upstream, downstream, left bank, and right bank at the 30m, 150m, and 300m transect. Photographs of RUAA sites are provided in Appendix D. If for some reason safe access was not possible at any one of the three transects, no data or images were collected and the reason(s) was documented.

## SECTION 4 PROJECT RESULTS

Section 4 summarizes the site survey data collected and observations made for each water body.

### 4.1 Nichols Creek (Segment 0502A)

From its intermittent headwaters west of Kirbyville in Jasper County, to its confluence with the Sabine River on the southeastern edge of Newton County, Nichols Creek runs for 39.2 miles (NHD) (See Figure 4.2, p. 4-2). Of those 39.2 miles, the southern 25 miles are referenced on the Texas 2008 303(d) List of impaired water bodies. Nichols Creek was further subdivided into 8 subsegments - 0502A\_08 through 0502A\_01 - for assessment purposes. During the weekend of July 16, 2010, AgriLife team members conducted a Basic RUAA survey for Nichols Creek. When conducting the field work, as shown in Table 2.2, only 5 of these 8 subsegments were investigated by the field crew. The data collected at each survey site is summarized below from upstream to downstream.

The most upstream survey site accessible on Nichols Creeks was Site 82. Nichols Creek was little more than a dry bed dominated by mud/clay soil with forested banks, easily accessible from Farm to Market (FM) 1013 by climbing down the culvert. With lack of water presence, there were no signs of recreational activities to suggest historical events during periods of heavy precipitation.

Site 81 sits just downstream of Site 82, on FM 1013. The stream characteristics of this site also provided no indications of recreational evidence. This site is in a rural area, surrounded by low sloped, fenced, forested banks with no public access. The creek bed at this site, shown by photographs in Figure 4.1 taken from FM 1013, had no flow when this site was visited. The water present was a shallow pool with no flow.

**Figure 4.1 Nichols Creek, Survey Site 81**



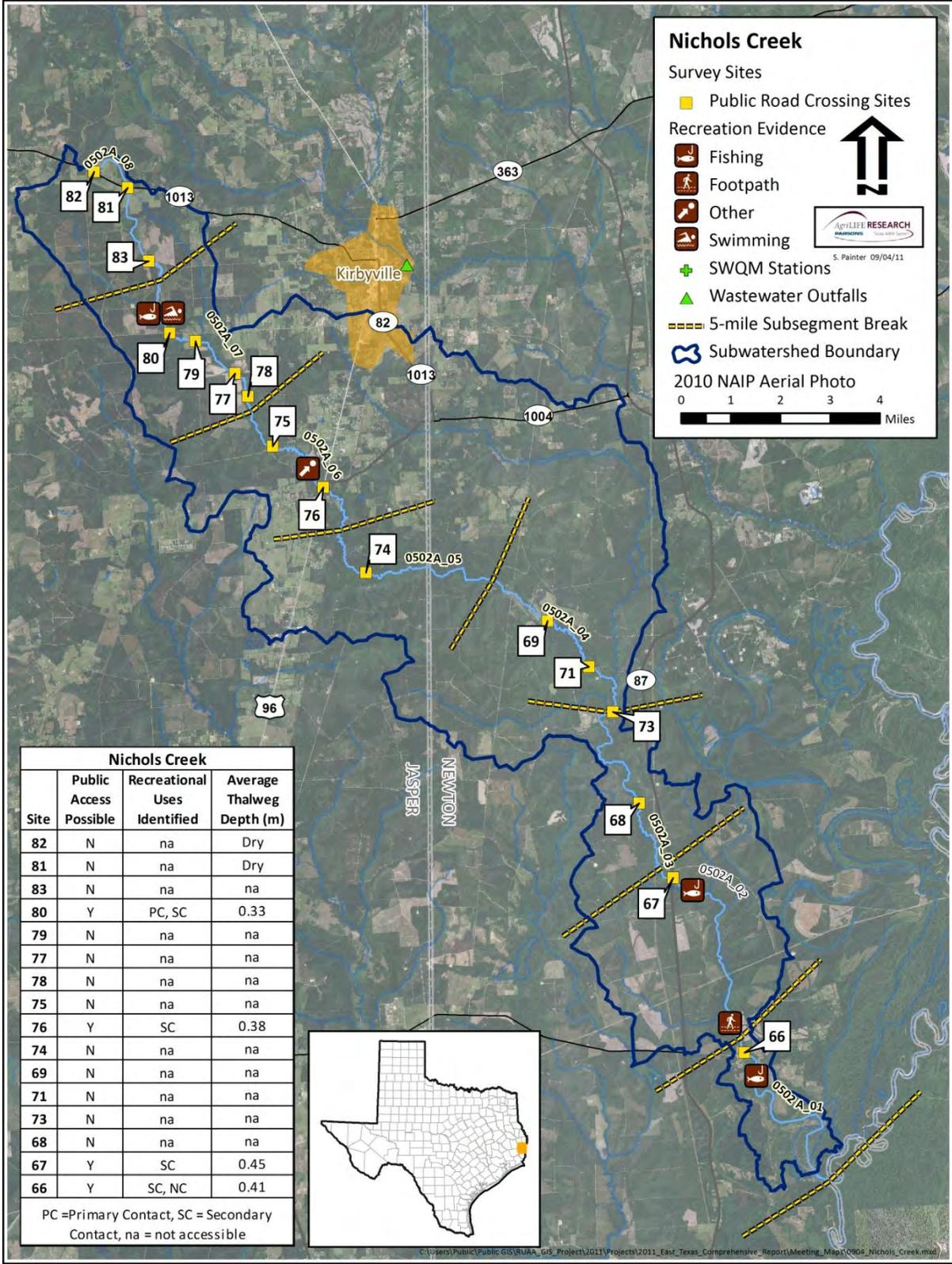
**Site 81 at FM 1013 Upstream View**



**Site 81 at FM 1013 Downstream View**

Access by the field crew to Site 83, the most downstream site in subsegment 0502A\_08, was prohibited by a locked gate, so this site was not surveyed.

Figure 4.2 Map of Nichols Creek



Site 80, located on FM 82 in the 0502A\_07 subsegment, had an average stream width of 4.10m, and banks that were moderately easy to navigate to water's edge. The average thalweg measured at this site was 0.33m. Public access is possible at this site. Evidence of recreational activities found in the stream included a bait box, beer cans, and a child's floatable toy. This site is at a remote, rural location surrounded by a forested corridor. Other survey site characteristics recorded included black water color, surface scum with algae mats, presence of water moccasins, and household garbage littering the banks.

Site 79 sits immediately downstream on County Road 413 and is characterized by steep banks and a thick, forested riparian zone. No flowing water was observed upstream or downstream at this site. Small, shallow isolated pools were observed upstream and downstream at this site; however, since access was prohibited by posted no trespassing signs, it was not possible to record the data required on the Field Survey Form. No additional evidence of recreational activity within the riparian corridor was visible from the roadside vantage point.

The two remaining sites in subsegment 0502A\_07, Sites 77 and 78, were both located on private property, and were not accessible to the field crew. Therefore, no survey was conducted at either location.

Site 75 is located at the upstream end of subsegment 0502A\_06. Access was prohibited by a locked gate, so no survey was conducted.

Site 76, located on Texas Highway 96 in a rural area approximately 4.75 miles south of Kirbyville, was the only site surveyed along subsegment 0502A\_06. Dominated by a forested riparian corridor, this stream was easily accessible from below the Highway 96 bridge. No flow was observed. The average thalweg measured was 0.38m. Within the 300m reach surveyed, the Field Data Sheet for the site indicates an absence of water at 120, 180, and 240 through 300m. In the presence of water, the typical average stream width was 2.50m, as shown in Figure 4.3 below. Evidence of human presence included garbage (cans, cups, and candy wrappers) and all-terrain vehicle (ATV) tracks.

**Figure 4.3 Nichols Creek Survey Site 76**



**Site 76 at Highway 96 Upstream View**



**Site 76 at Highway 96 Downstream View**

Subsegments 0502A\_05, 04, and 03 had no publicly accessible survey sites. The inaccessible survey sites along these three subsegments (74, 69, 71, 73, and 68) were held within private property, behind locked gates. In the absence of surveys for these subsegments, the field team traveled farther downstream to conduct surveys on a single site in each of the following subsegments: 0502A\_02 and 01.

The only site accessible to characterize subsegment 0502A\_02 was Site 67 located on Highway 87. Access to the stream bed is along a steep ditch adjacent to the bridge. No flow was observed at this site. In the 300m reach surveyed, the average thalweg of the isolated pools measured in the mud/clay channel was 0.45m. The typical average width was 4.00m. Running through forest land, the water was red and portrayed a scum-like surface texture prior to becoming a dry bed at 300m downstream of the Highway 87 bridge crossing, as seen in the photographs provided in Appendix D. Trekking through thick vegetation and around log jams throughout the reach of the site, team members observed fishing tackle in the form of a bobber.

The most downstream site surveyed by the field team was Site 66, located at FM 253. Figure 4.4 provides photographs taken from the 30m transect depicting the forest-like riparian corridor and a substantial isolated pool. Access to the site was easily attainable as field team was able to drive down to river's edge. Typical average width where water was present was 4.00m. During the survey, no flowing water was observed between the 150m and 300m transect. The average thalweg measured for that stretch was 0.41m. Channel obstructions observed were log jams, rip rap, and old house appliances. Indicators of human use were footpaths/prints and a fish net.

**Figure 4.4 Nichols Creek, Survey Site #66**



Site 66 at FM 253 Upstream View



Site 66 at FM 253 Downstream View

#### **4.2 Summary of Characteristics Observed along Nichols Creek (Segment 0502A)**

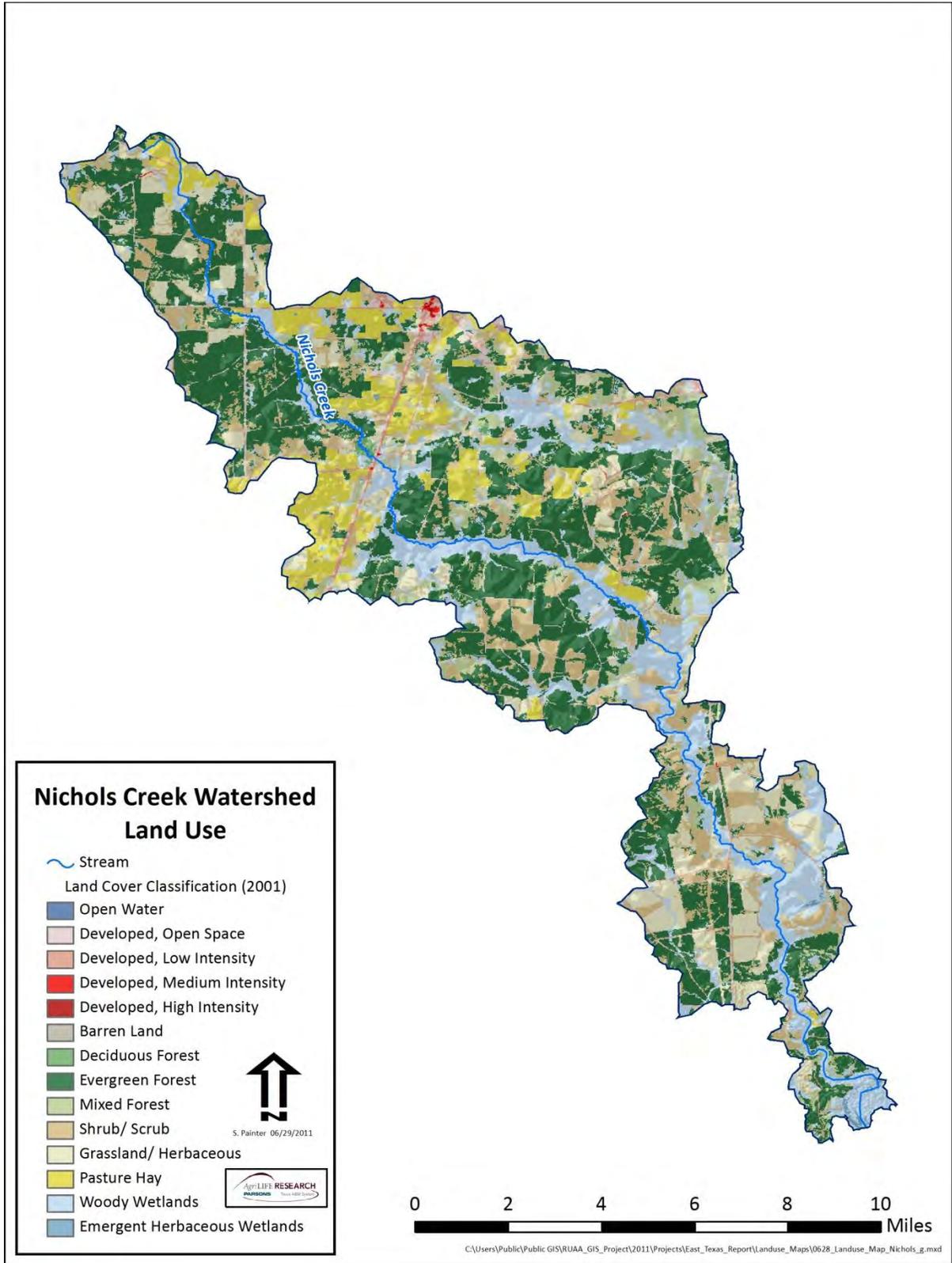
At its headwaters, Nichols Creek is little more than a shallow ditch draining a residential area on the periphery of Kirbyville. Soon after leaving the headwaters area, Nichols Creek runs almost exclusively through mature wetlands dominated by deciduous trees. Figure 4.5 and Table 4.2 display and summarize the land use/land cover of the Nichols Creek watershed (U.S. Geological Survey [USGS] 2007). Surrounding land is owned by large timber companies and investment firms, and public access to the majority of the riparian corridor is limited. At the available road crossings, access to the stream is further restricted by gated entry ways to private

property. Stream flow was not observed at any of the six sites surveyed, and depths were very shallow; the average thalweg was 0.39m for the entire reach of the tributary. Individual site thalwegs for all sites surveyed can be viewed in Table 4.1. There was some evidence of secondary contact recreation activities such as fishing at Site 66, located on FM 253. Footpaths to the creek were found at Sites 67 and 80, located at Highway 87 and FM 82, respectively. There were children's toys left at Site 80. See Table 4.6 for a summary of the evidence of recreation activity recorded. Interviews indicate that fishing occurs more during the cooler winter months than during the warmer months that coincided with the survey. Evidence of recreational activities observed at points along the creek includes fishing tackle, foot paths and prints, garbage (cups and candy wrappers), as well as a child's flotation device. At the time of surveys there was evidence of wildlife such as alligators or small game trails.

**Table 4.1 Nichols Creek: Average Thalwegs**

Date	Site	PCR	Pools > 1.00m	Avg. Thalweg (m)
7/16/2010	82	None	None	Dry
7/16/2010	81	None	None	Dry
7/16/2010	83	None	None	Not Accessible
7/16/2010	80	Evidence	None	0.33
7/16/2010	79	None	None	Not Accessible
7/16/2010	77	None	None	Not Accessible
7/16/2010	78	None	None	Not Accessible
7/16/2010	75	None	None	Not Accessible
7/16/2010	76	None	None	0.38
7/16/2010	74	None	None	Not Accessible
7/16/2010	69	None	None	Not Accessible
7/16/2010	71	None	None	Not Accessible
7/16/2010	73	None	None	Not Accessible
7/16/2010	68	None	None	Not Accessible
7/16/2010	67	None	None	0.45
7/16/2010	66	None	None	0.41
Overall Thalweg Average				<b>0.39</b>

Figure 4.5 Nichols Creek Watershed Land Use Map



**Table 4.2 Nichols Creek Watershed: Land Use Summary by Category**

Land Use Category	Acres	Percent
Open Water	11	0.0%
Developed, Open Space	2,435	4.0%
Developed, Low Intensity	1,015	1.7%
Developed, Medium Intensity	49	0.1%
Developed, High Intensity	14	0.0%
Barren Land (Rock/Sand/Clay)	26	0.0%
Deciduous Forest	110	0.2%
Evergreen Forest	20,855	34.0%
Mixed Forest	4,573	7.5%
Shrub/Scrub	8,922	14.6%
Grassland/Herbaceous	6,897	11.3%
Pasture/Hay	5,107	8.3%
Cultivated Crops	0	-
Woody Wetlands	11,080	18.1%
Emergent Herbaceous Wetlands	204	0.3%
<b>Total</b>	<b>61,298</b>	<b>100.0%</b>

### 4.3 Grace Creek (Segment 0505B)

Grace Creek runs from FM 1844 for 14.8 miles through Gregg County to its confluence with the Sabine River (See Figure 4.7, p. 4-9). The 2008 §303(d) List identifies 12.3 miles as impaired for elevated bacteria levels. In this report, Grace Creek was further subdivided into three subsegments for assessment purposes: 0505B\_03, 0505B\_02, and 0505B\_01. At its headwaters, in the 0505B\_03 subsegment, the creek was very shallow and was lined with thick vegetation. As Grace Creek nears Longview, it runs through more open areas consisting of pasture and grassland. Subsegment 0505B\_02 runs through the City of Longview. In the northern portion of this urban area, public access was common, with heavy wooded vegetation up to the stream edge. Toward the center of Longview, the creek bank was more managed, with parks and lawns facilitating recreational activity. Homeless encampments were evident with attendant human use of the creek. The Longview wastewater treatment plant (TPDES Permit #10589-002) outfall is located downstream of the city, discharging to a small tributary of Grace Creek. AgriLife team members conducted a Basic RUAA survey on Grace Creek during the weekend of June 26, 2010. The data collected at each survey site is summarized below from upstream to downstream.

The most upstream site on Grace Creek is Site 11, located at the crossing of FM 1844. Due to steep, vegetated banks and private property concerns, the reach was inaccessible to the field team and, therefore, no survey was conducted.

Downstream, Site 13 is located at McCann Creek Road. Signs were posted stating private property and also prohibiting fishing and any other recreational activity. Photographs near the road crossing displaying utility pipes that cross the creek are shown in Figure 4.6. Through the first 30 m reach, the depth of the water was very shallow with a low flow of 0.025 cubic feet per second (cfs). No photographs could be taken beyond the 150m transect as there was thick vegetation restricting access. With access restricted, only a single depth measurement of 0.25m

just below the culvert road crossing was taken and photographs were only taken up to the 150m transect to detail stream characteristics. No specific evidence of recreational activity was recorded at this site. Evidence of livestock feces and the pasture-dominated corridor was photographed and is documented in Appendix D.

**Figure 4.6 Grace Creek, Survey Site 13**

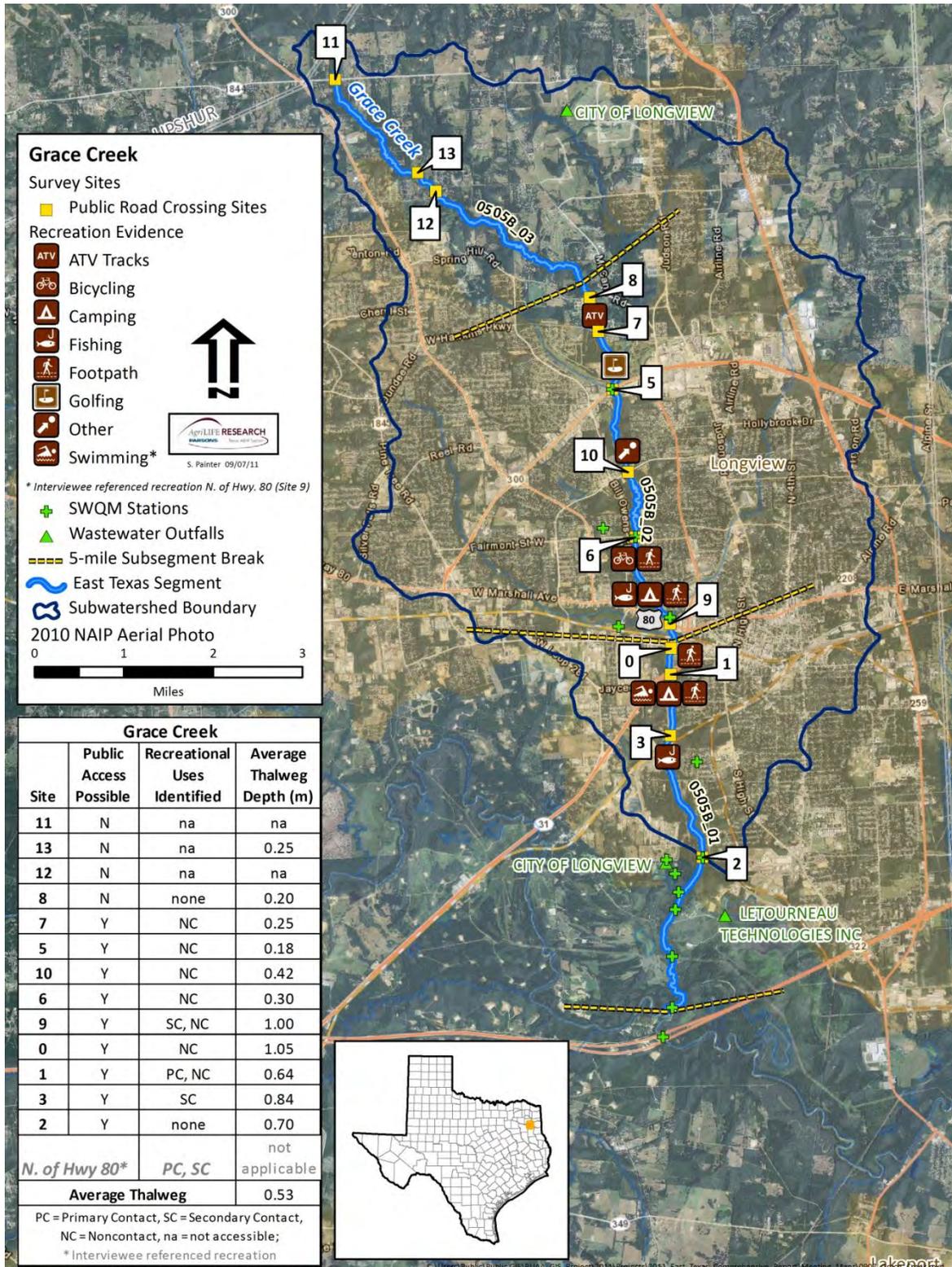


**Site 13 at McCann Creek Rd. Upstream View**



**Site 13 McCann Creek Rd. Downstream View**

Figure 4.7 Map of Grace Creek



Note: The single foot path symbol on Figure 4.7 above between Sites 6 and 9 represents foot paths observed at both sites (See Table 4.8).

The most downstream site in subsegment 0505B\_03, Site 12, and the uppermost site of subsegment 0505B\_02, Site 8, were inaccessible to the field team as a result of fenced off banks and steep, unsafe banks. Therefore no survey was conducted at these sites.

Site 7, on Hawkins Parkway, was the uppermost site that could be fully assessed by the field team. Located in subsegment 0505B\_02, this site weaved through a narrow forested corridor averaging 3.00m wide with a water flow of 0.058 cfs. The average thalweg measured at this location was 0.23m. Motorcycle tracks observed below the bridge crossing suggest this is the only form of recreation occurring near the site. Oak Forest Country Club sits approximately 630m downstream of Hawkins Parkway.

Site 5, located on Highway 281, meanders through the Oak Forest Country Club as it opens up to a more urbanized riparian corridor. Overgrown vegetation along the creek banks impeded access to the site. Characteristics of the stream showed a sandy substrate averaging 4.00m in width and measuring 0.18m deep. The water surface at this site was a combination of scum and foam with a significant amount of oil. There were no observations of golfer's fetching stray balls from within the creek, but many stray balls were observed in the channel itself. Due to the confluence of two tributaries on the upstream side of the bridge, flow measurements were recorded at 50m downstream of the road crossing.

Site 10 is located farther downstream on H.G. Mosley Parkway between two residential areas of Longview. This site is situated at the approximate mid-point of both Grace Creek and subsegment 0505B\_02. Evidence of noncontact recreation included graffiti on the bridge trusses, bicycle tracks, and city employees working in the riparian corridor. Channel obstructions included a large utility pipeline that crosses the creek immediately downstream of the bridge and large cobble stone, which can be seen in Figure 4.8. The large cobble meandered into the creek bed creating a riffle/pool condition. At the 60m transect, the channel transitioned from cobble to a mud/clay bottom, providing for smoother wading. Characteristics of the water at this site indicated an average depth measuring 0.42m, a channel width of 6.50m, and a flow of 0.78 cfs. Other characteristics of the clear, brown water include occasional algae cover and odor.

**Figure 4.8 Grace Creek, Survey Site #10**



**Site 10 at H.G. Mosley Pkwy Upstream View**



**Site 10 at H.G. Mosley Pkwy Downstream View**

At East Fairmont Street, Site 6 was accessed below the bridge and down a moderately steep bank. This perennial stream had a dominate substrate of silt and an average width of 6.50m. The average thalweg measured over the 300m reach was 0.30m. Due to overgrown banks, low depths, metal and old concrete culverts within the channel, recreational activities would be hindered. Other characteristics observed were the brown, scummy, odorous water. Water flow was measured at 2.13 cfs. The field team did note a footpath but did not observe any evidence of contact recreation. Noncontact recreation in the form of bicycling was observed.

Site 9, located at Highway 80, is the most downstream survey site in subsegment 0505B\_02. The creek bed at this site was mud/clay, dominated by a forested corridor. At this site the perennial stream had a measured flow of 3.98 cfs. The average thalweg measured was 1.00m and this pool measured 2.00m deep immediately off the bank. These physical characteristics suggest that this location could support contact recreation in the pool located below the bridge. This site was fairly easy to access, as the team was able to park close to the stream and descend down a semi steep vegetated bank. However, unsafe conditions at the confluence of two streams located 150m upstream prevented the field team from accessing the remaining transects. Photographs for this site in Appendix D display small irregular isolated pools connected by narrow mud/clay channels. The field team found several homeless encampments below the bridge and up around the trusses as well as fishing tackle near water's edge.

Site 0, the most upstream site on subsegment 0505B\_01, is located on West Cotton Street. Forested on both sides of the stream, this location was moderately difficult to access because of a 1m drop from the bank. There was an abundance of large and small debris in the channel, such as pipes, tires, chairs, gas cans, and a presence of snakes. Normal flow conditions were observed at this site, and flow of 7.30 cfs was recorded. As the team made its way downstream, one of the members who was observing depths and tracking distances, stepped into a very deep pool at 120m, which had a depth of at least 1.90m. Because of this non-wadeable circumstance, the field team could only obtain the thalweg to that point. The average thalweg measured for the portion of the streambed that was waded was 1.05m and had an average stream width of 8.00m. There was also an outlet pipe protruding the bank at 30m on the right bank, but the team could not verify its point of origin.

Site 1 sits downstream, on Highway 31, and is a normal perennial type stream, with a flow of 5.59 cfs, flanked by a forested riparian zone. This site portrayed a much different bottom deposit of gravel rather than silt or mud/clay than the sites surveyed upstream. The typical average width of this stream site was 11.00m and average depth was 0.64m. There were points along the 300m reach that were over 1.00m deep. Evidence of recreational activities observed at this location included a footpath and an inner tube. On the concrete below the bridge were cardboard boxes used as a sleeping pad for homeless.

Farther downstream, located on Sabine Creek Road, was Site 3. Access from the road to the creek bed is characterized by steep, vegetated, littered banks. At this site the creek is perennial and a flow of 7.70 cfs was recorded. The typical average width for the 150 meter transect surveyed was 5.00m and 0.84m deep. On the top of the bridge were a number of catfish carcasses suggesting that fishing occurs at this location and snakes in the creek were

observed. There were significant amounts of debris and garbage dumped in and around this stream site, indicative of its remote location.

The most downstream site that was surveyed on subsegment 0505B\_01 of Grace Creek was Site 02, located on State Loop 281. Figure 4.9 provides photographs taken from the 150m transect depicting a wide channel flanked by forest riparian zones and normal flowing water. The average thalweg measured was 0.70m. Water flow at the location was calculated at 8.78 cfs. There is public access at Site 02 from a steep vegetated bank below the bridge. There was no evidence of primary, secondary, or noncontact recreation at this site. The streambed of the channel was sediment-rich, making the stream very difficult to wade. There were no access points to Grace Creek downstream of this site.

**Figure 4.9 Grace Creek, Survey Site 02**



**Site 02 at State Loop 281 Upstream View**



**Site 02 at State Loop 281 Downstream View**

#### **4.4 Summary of Characteristics Observed along Grace Creek (Segment 0505B)**

At its headwaters, Grace Creek is very shallow with thick vegetation restricting access. As the creek nears the City of Longview, it runs through more open areas consisting of pasture and grassland. In the northern portion of this urban area, public access was common, with heavy wooded vegetation up to the stream edge. Toward the center of Longview, the creek bank was more managed, with parks and lawns facilitating potential recreational activity. The Grace Creek watershed is heavily developed: 66 percent of the total surface area had some form of development with 22 percent at a medium or high intensity. Although 26 percent of the land area is forested, only a small fraction is evergreen pine plantations. Approximately 9 percent of the land area is pasture or grassland and essentially no land is cultivated (Figure 4.10 and Table 4.4).

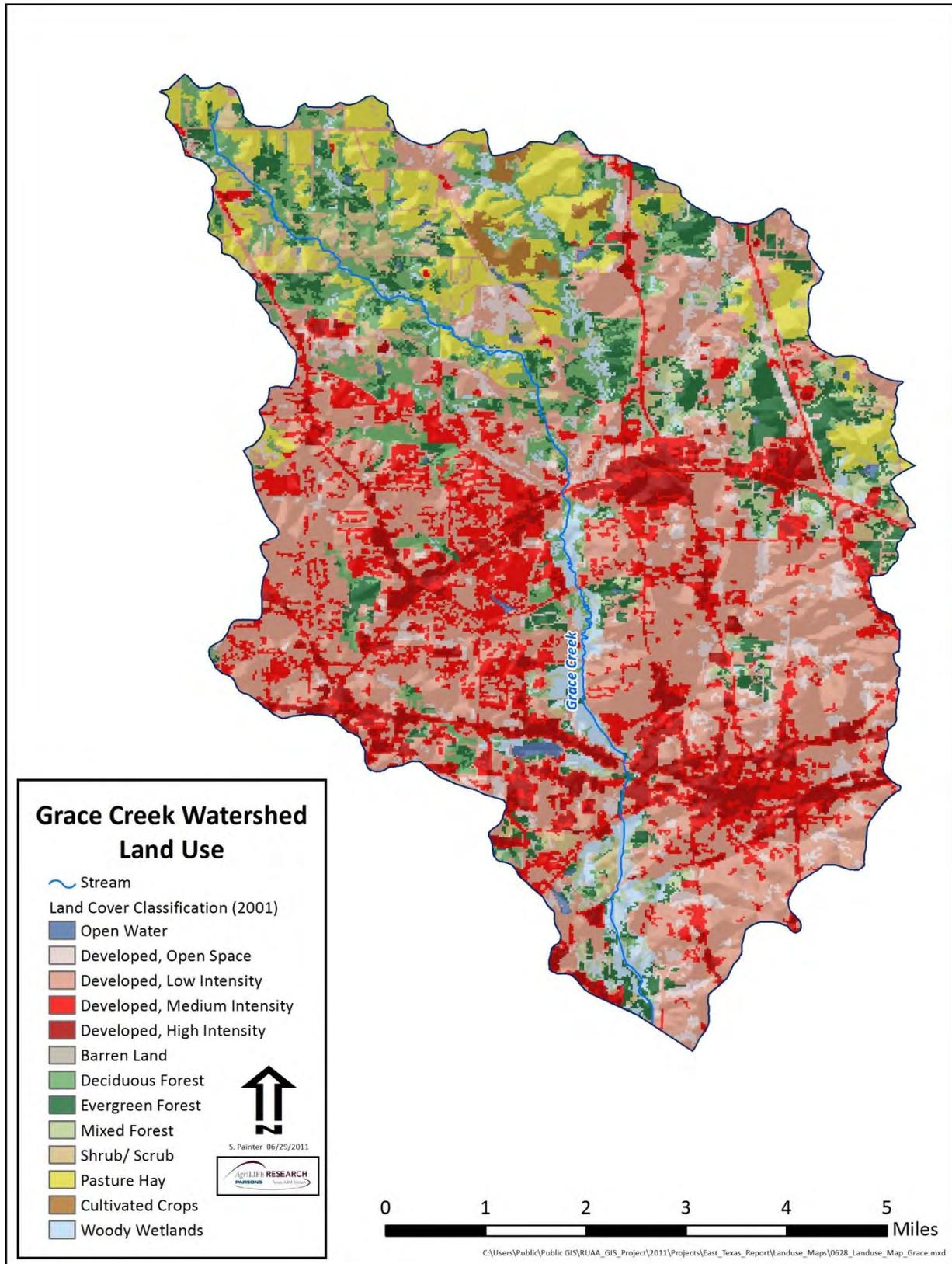
In summary, for individual sites that were not accessible to field crews, a zero was used as a place marker for the calculation of average thalweg. It was determined at the time of report preparation that the zero, when figured into the calculation, skewed the actual average thalweg. Therefore, the correct average thalweg of Grace Creek is 0.53m. Individual site thalwegs for all sites surveyed can be viewed in Table 4.3. Evidence of recreational activities throughout

this creek include fishing tackle, fish carcasses, the Paul G. Boorman Hike and Bike Trail located at H.G. Moseley Parkway, ATV tracks, Oak Forest County Club, and homeless encampments under bridges.

**Table 4.3 Grace Creek: Average Thalwegs**

Date	Site	PCR	Pools > 1.00 meter	Avg. Thalweg Depth (m)
6/25/2010	11	None	None	Not Accessible
6/25/2010	13	None	None	0.25
6/25/2010	12	None	None	Not Accessible
6/25/2010	8	None	None	0.20
6/25/2010	7	None	None	0.25
6/25/2010	5	None	None	0.18
6/25/2010	10	None	None	0.42
6/25/2010	6	None	None	0.30
6/25/2010	9	None	Yes	1.00
6/25/2010	0	None	Yes	1.05
6/25/2011	1	Evidence	None	0.64
6/25/2010	3	None	None	0.84
6/25/2010	2	None	None	0.70
Overall Thalweg Average				<b>0.53</b>

Figure 4.10 Grace Creek Watershed Land Use Map



**Table 4.4 Grace Creek Watershed: Land Use Summary by Category**

Land Use Category	Acres	Percent
Open Water	111	0.5%
Developed, Open Space	1,502	6.2%
Developed, Low Intensity	8,955	37.2%
Developed, Medium Intensity	3,771	15.7%
Developed, High Intensity	1,538	6.4%
Barren Land (Rock/Sand/Clay)	3	0.0%
Deciduous Forest	2,137	8.9%
Evergreen Forest	1,810	7.5%
Mixed Forest	550	2.3%
Shrub/Scrub	793	3.3%
Grassland/Herbaceous	1,861	7.7%
Pasture/Hay	194	0.8%
Cultivated Crops	0	-
Woody Wetlands	841	3.5%
Emergent Herbaceous Wetlands	0	0.0%
<b>Total</b>	<b>24,065</b>	<b>100.0%</b>

#### 4.5 Summary of Recreation Evidence

Basic RUAA surveys were attempted at 20 sites (Nichols Creek – 7, Grace Creek - 13) in 2010. However, because of restricted access basic RUAA surveys were only documented at 17 of these sites (Nichols Creek – 6, Grace Creek - 11). Table 4.5 provides a summary of the observations documented from the 17 sites. These surveys were completed to establish and verify whether the existing contact recreation uses were different from the designated and presumed recreational uses. Data collected at the sites included general stream characteristics, observations, evidence of recreational uses, and surrounding conditions that promoted and/or impeded recreation in the riparian corridor, such as channel obstructions. The field surveys summarized in this report do not include specific occurrences of primary contact recreation activities as none were observed by the field team. Observations of secondary and noncontact recreation were recorded. The field surveys summarized in this report include observations of primary, secondary and noncontact recreation. At the Summary of Findings meeting, on August 23, 2011 in Sulphur Springs, TX, a stakeholder familiar with Grace Creek noted that it was intermittent with perennial pools and had witnessed some seasonal fishing near bridges and children wading near the Town Lake area North of Highway 80.

**Table 4.5 Summary of Observations by Water Body Name**

Segment Name / #	Count of Sites Accessed (Full stream was surveyed)	Average Thalweg Depth >0.5 m	Pool Depths >1.0 m	Public Access	Observation Type	Observed Use (Yes/No)			
						PCR	SC1	SC2	NCR
Nichols Creek 0502A	6	N	N	6 of 16	Interviews	N	Y	N	N
					Evidence	Y	Y	N	Y
Grace Creek 0505B	11	Y	Y	11 of 13	Interviews	Y	Y	N	Y
					Evidence	Y	Y	Y	Y

Tables 4.6 and 4.7 provide detailed information on the individual sites surveyed and interviews completed. Table 4.8 summarizes additional evidence of recreational activities collected from the surveys and interviews on Nichols and Grace Creeks.

**Table 4.6 RUAA Summary by Site of Information Collected by Field Teams**

Count (U/S to D/S)	Stream Name	Road or Property Name	Site ID	# of People Observed	Ease of Access	Observed Primary	Observed Secondary	Frequency (Based on interviews and evidence)	Evidence of Recreational Use Yes/No	Evidence
1	Nichols Creek	FM 1013	82	0	E	No	No	U	No	-
2	Nichols Creek	FM 1013	81	0	E	No	No	U	No	-
3	Nichols Creek	FM 82	80	0	ME	No	No	I <sup>1</sup>	Yes	Fishing tackle; Child's floatation device
4	Nichols Creek	US Hwy 96	76	0	E	No	No	U/ I	Yes	Trash (cans, cups, candy wrappers)
5	Nichols Creek	State Hwy 87	67	0	ME	No	No	U/ I	Yes	Fishing tackle
6	Nichols Creek	F-M 253	66	0	E	No	No	F <sup>1</sup>	Yes	Foot paths/ prints; Fishing tackle
1	Grace Creek	McCann Creek Rd	13	0	E	No	No	U/ I	Yes	Foot paths/ prints; Sign prohibiting recreational activities
2	Grace Creek	Spring Hill Rd	8	0	D	No	No	U	No	-
3	Grace Creek	Hawkins Pkwy	7	0	ME	No	No	U/ I	Yes	RV/ ATV tracks
4	Grace Creek	State Hwy 281	5	0	MD	No	No	U/I	Yes	Golf course adjacent to stream
5	Grace Creek	H G Moseley Pkwy	10	0	ME	No	No	U/ I	No	Graffiti
6	Grace Creek	E Fairmont St	6	2	ME	No	No	U/ I	Yes	Observed bicycling
7	Grace Creek	US Hwy 80	9	0	ME	No	No	U/ I	Yes	Foot paths/ prints; Camping sites (multiple homeless); Fishing tackle
8	Grace Creek	W Cotton St	0	0	MD	No	No	U	No	-

Count (U/S to D/S)	Stream Name	Road or Property Name	Site ID	# of People Observed	Ease of Access	Observed Primary	Observed Secondary	Frequency (Based on interviews and evidence)	Evidence of Recreational Use Yes/No	Evidence
9	Grace Creek	State Hwy 31	1	0	MD	No	No	U/ I	Yes	Foot paths/ prints; Camping sites (homeless); Inner tube
10	Grace Creek	W Sabine St	3	0	MD	No	No	U/ I	Yes	Fishing tackle (fishing line, fish heads on bridge)
11	Grace Creek	State Loop 281	2	0	ME	No	No	U	No	-

DA = Daily, D = Difficult, E = Easy, F = Frequent, I = Infrequent, MD = Moderately Difficult, ME = Moderately Easy, U = Unknown, U/ I = Unknown/ Infrequent, W = Weekly, 1 = Information gathered in interview near site.

**Table 4.7 Number of Recreational Activities Documented along Nichols and Grace Creek**

Activity	Observed by Surveyors		Reported (by Interviews)					
	Nichols	Grace	Personal		Observed		Secondhand Knowledge	
			Nichols	Grace	Nichols	Grace	Nichols	Grace
# Surveys and Interviews	6	12						
Bicycling	-	1	-	-	-	2	-	2
Campsites	-	2	-	-	-	-	-	-
Child's floatation device	1	-	-	-	-	-	-	-
Fishing	-	-	3	-	2	2	2	-
Fishing tackle	3	2	-	-	-	-	-	-
Foot paths	1	3	-	-	-	-	-	-
Golfing	1	1	-	-	-	-	-	-
Graffiti	-	1	-	-	-	-	-	-
Inner tube	-	1	-	-	-	-	-	-
Wading by Children	-	-	-	-	-	1	-	-

**Table 4.8 Summary of Contact Recreation Reported by Field Teams and Interviews**

Stream	Site #	# of People observed	Field Team			Interviews	
			PCR	SC	Other	PCR	SC
Nichols Creek	80	0	Child's floatation device	Fishing tackle	-	-	-
Nichols Creek	76	0	-	-	Trash (cans, cups, candy wrappers)	-	-
Nichols Creek	67	0	-	Fishing tackle	-	-	-
Nichols Creek	66	0	-	Fishing tackle	Foot paths/ prints;	-	Fishing
Grace Creek	13	0	-	-	Sign prohibiting recreational activities	-	-
Grace Creek	7	0	-	-	RV/ ATV tracks	-	-
Grace Creek	5	0	-	-	Golf course adjacent to stream	-	-
Grace Creek	10	0	-	-	Graffiti	-	-
Grace Creek	6	2	-	-	Observed bicycling; Foot paths/ prints	-	-
Grace Creek	9	0	-	Fishing tackle	Foot paths/ prints; Camping sites (multiple homeless)	-	-
Grace Creek	1	0	Inner tube	-	Foot paths/ prints; Camping sites (homeless)	-	-
Grace Creek	3	0	-	Fishing tackle (fishing line, fish heads on bridge)	-	-	-
Grace Creek	North of Highway 80 <sup>1</sup>		<i>Not applicable</i>			Wading - Children	Fishing

<sup>1</sup> Interviewee made reference to recreation

## **SECTION 5 REFERENCES**

TCEQ 2008. TCEQ SWQM Procedures Manual (TCEQ RG-415, October 2008).

TCEQ 2009. Recreational Use-Attainability Analyses (RUAA): Procedures for a Comprehensive Recreational UAA and a Basic UAA Survey, May 2009.

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