

**Mid Pecan Bayou  
Recreational Use Attainability Analysis**

*Prepared for:*

**Texas State Soil and Water Conservation Board  
Project 10-53**

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## CHAPTER 1

### INTRODUCTION

#### **Problem Statement**

The TSSWCB is leading an effort to examine water quality impairments (bacteria only) in Mid Pecan Bayou (Segment 1431). The segment is located in the southeast portion of Brown County and contains a portion of the City of Brownwood within its watershed boundaries. Segment 1431 first occurred on the Texas 303(d) List in 2006 due to *Escherichia coli* (*E. coli*) concentrations that exceeded the geometric mean criteria established to protect contact recreation use in the Texas Surface Water Quality Standards. Also beginning in 2006, a concern was noted for elevated nitrate, orthophosphorus, and total phosphorus concentrations that exceeded statewide nutrient screening levels. The bacteria impairment for Segment 1431 also appears on the 2008 Texas 303(d) List and the 2010 Texas 303(d) List. Concerns for nitrate, orthophosphorus, and total phosphorus concentrations have also continued as part of the 2008 and 2010 water quality assessments. This report focuses on the contact recreation use of Mid Pecan Bayou (Segment 1431) and the impairment associated with the elevated bacteria concentrations.

Mid Pecan Bayou is designated for primary contact recreation use in the *Texas Surface Water Quality Standards* (TSWQS; Texas Commission on Environmental Quality, 2010a). Recent revisions to the TSWQS include an expansion of the contact recreation use into three categories: Primary Contact Recreation (PCR), Secondary Contact Recreation 1 (SCR1), and Secondary Contact Recreation 2 (SCR2). There is also a fourth use category of Noncontact Recreation (NCR). The TSWQS also specify a process to evaluate the uses of a waterbody through a use attainability analysis (UAAs). To identify and assign attainable uses and criteria to individual waterbodies, UAAs evaluate the physical, chemical, biological, and economic factors affecting attainment of a waterbody use (40 Code of Federal Regulations §131.10(g)). A recreational use attainability analysis (RUAA) is a specific type of UAA focused on determining the appropriate recreational use of a waterbody, which was implemented in this study.

#### **Objectives**

The objective of this project was to perform and report the findings of a Comprehensive RUAA for Mid Pecan Bayou following the Texas Commission on Environmental Quality (TCEQ) May 2009 *Procedures for a Comprehensive RUAA and a Basic RUAA Survey* (TCEQ, 2009). Mid Pecan Bayou is comprised of one assessment unit (AU) defined by TCEQ (2010b). A total of eight sites were selected for the study. All field surveys were performed by Texas Institute for Applied Environmental Research (TIAER) staff located on the Tarleton State University Stephenville, Texas campus under a TSSWCB-approved Quality Assurance Project Plan (QAPP; TIAER, 2011).

#### **Stakeholder and Agency Involvement**

The TSSWCB and its collaborating entities maintain an inclusive public participation process. From the inception of this project, the project team sought to ensure that stakeholders were informed and involved. Texas AgriLife Research at Stephenville provided coordination for public participation in this project.

Input from the Lower Colorado River Authority (LCRA), Texas Parks and Wildlife Department regional staff, TCEQ regional staff, TSSWCB, Pecan Bayou Soil and Water Conservation District and other local agencies was solicited as well as input from watershed stakeholders on the need for the RUAA (see Contact Information Form available on the project website noted below). The involvement of stakeholders is recognized as the key source of information about the river segment of interest and in conducting an RUAA can lead to improvement in selection of survey sites.

Two meetings with state agencies, river authority representatives, local officials, and stakeholders were held to obtain comments on the proposed survey sites prior to field data collection and solicit input from all interested parties within the study area throughout the project. Given the highly rural nature and the limited number of stream road crossings in the segment, the feedback obtained along with support from local landowners at the meetings proved valuable to the field crews.

The first meeting targeted local and state agencies in an effort to inform them of the goals and objectives associated with conducting RUAA's. At the same time input was sought on the proposed sampling survey sites being recommended for the Mid Pecan Bayou RUAA. This meeting was held at the Adams Street Community Center located in Brownwood, TX on February 22, 2011.

A technical meeting targeting local and state agencies as well as local stakeholders was held on May 4, 2011. The meeting was conducted at the Depot Civic and Cultural Center in Brownwood, TX to discuss possible bacteria sources in the Mid Pecan Bayou watershed. Stakeholders and technical experts were asked to lend their local expertise in the design of the bacteria source survey.

On August 10, 2011, a Progress Update Meeting was held in Brownwood to provide a summary of activities conducted to date on the RUAA on the Mid Pecan Bayou. This meeting was held to discuss findings from the source survey and the initial RUAA survey completed in June 2011. It was noted during the meeting that public activities were reported, through observations and interviews, at sites MP003 (a low water crossing on CR 257 also known as "ten mile crossing") and MP007 (a bridge crossing on FM 2126). The stakeholders, both during and after the meeting, discussed the possibilities of limiting the public activities at MP003.

On November 1, 2011, some of the Mid Pecan Bayou stakeholders attended a meeting with the Brown County Judge and Precinct One Commissioner to discuss various options for addressing the issues associated with Ten Mile Crossing and the public's activities on nearby county and private property. Later the same day, a trip was made to the location for a meeting between the County Commissioner, local stakeholders, and city/county health officials. Subsequent to that visit, and a follow-up visit by the Brownwood-Brown County Health Department officials, a recommendation was made to the Precinct One Commissioner that a sign be posted to state that swimming is prohibited (letter is provided in Appendix A).

On January 9, 2012, the item of Ten Mile Crossing was brought before the Brown County

Commissioners Court for discussion. Following discussion, a recommendation was made to issue a formal resolution to address the concern for the threat posed to the health, safety and welfare of the public at the site known as “Ten Mile Crossing”. Later the same day, the Resolution was presented at the Final Stakeholders Meeting. The Resolution states that the County right-of-way on Brown County Road 257 at the “Ten Mile Crossing” at the Pecan Bayou shall not be used by the public for access to the Pecan Bayou for wading, swimming, boating, fishing, hunting, or camping (Resolution is provided in Appendix B).

A final stakeholder meeting, facilitated by Texas AgriLife Research, was held in Brownwood at the Adams Street Community Center on January 9, 2012. At the meeting local landowners, land managers, community and county officials, along with the general public, heard presentations on the RUAA and inventory of possible bacteria sources in the Mid Pecan Bayou watershed from TIAER and were also provided information on the next steps to be taken by the TSSWCB with the data collected. Stakeholders did pose several questions after the presentation regarding the waters depth, number of landowners along the Mid Pecan Bayou and if there were trails leading to the water. The Brown County Precinct 1 Commissioner, whose precinct Mid Pecan Bayou runs through, presented the Resolution adopted by the Commissioners Court (Appendix B) and the letter from the County Health Department (Appendix A) regarding the unsafe conditions at the County Road 257 crossing.

Watershed stakeholders were invited to attend the public meeting through mailed invitations, public announcements (TCEQ and TSSWCB webpages), and individual phone calls. A list of those invited to attend the meetings is provided in Appendix C.

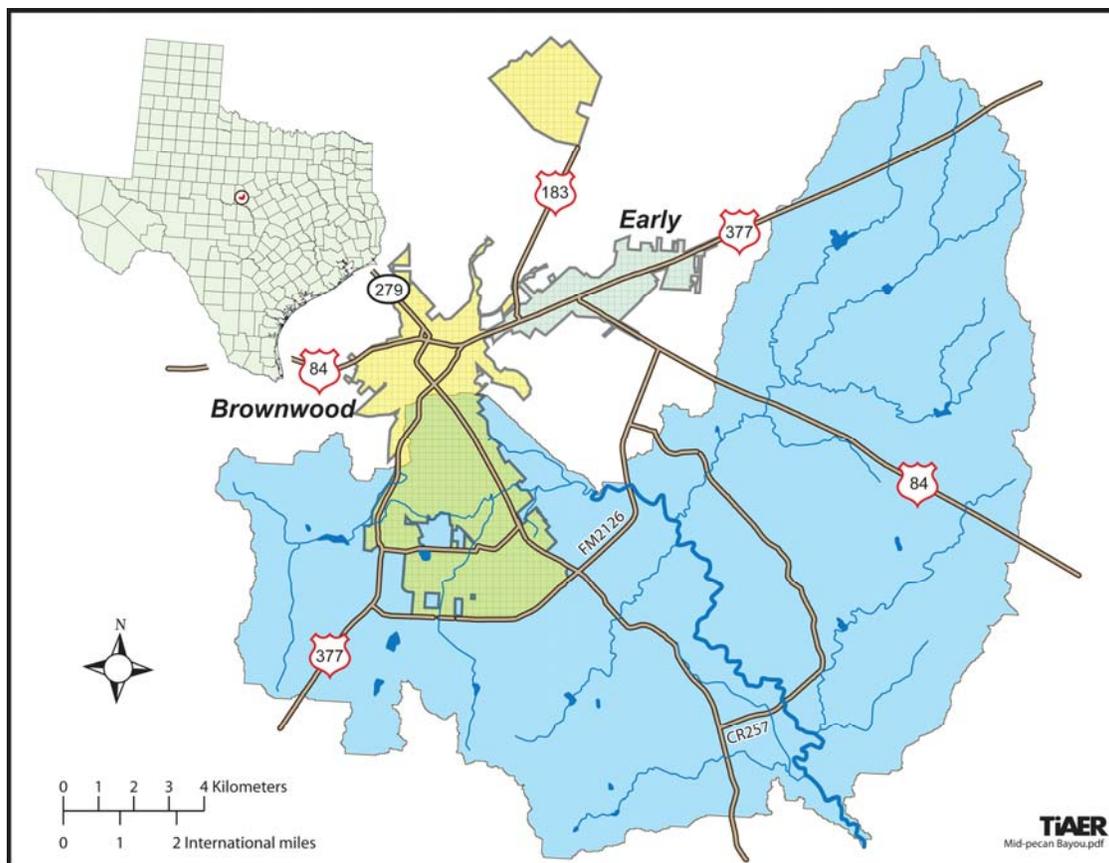
Information on past meetings for this RUAA, including reports and other information, can be found on the project website <http://www.tsswcb.texas.gov/managementprogram/mpbruaa>.

## CHAPTER 2

### STUDY AREA

#### Description of Mid Pecan Bayou

Mid Pecan Bayou (Segment 1431) is defined as Pecan Bayou from a point immediately upstream of the confluence of Mackinally Creek in Brown County to a point immediately upstream of Willis Creek in Brown County (Figure 2-1; TCEQ 2010a). Segment 1431 is located entirely within Brown County southeast of the City of Brownwood and is comprised of a single assessment unit (AU 1431\_01) representing the entire waterbody. Because the impaired segment is comprised of only one AU, the AU descriptor is unnecessarily cumbersome and in this report Mid Pecan Bayou will be referred to synonymously as Segment 1431.



**Figure 2-1** General map of Mid Pecan Bayou watershed for Segment 1431.

Pecan Bayou is reportedly the western most bayou in the United States (LCRA, 2007). The headwaters of Pecan Bayou begin in Callahan County and flow for approximately 100 miles to the confluence with the Colorado River in Mills County. The Bayou is impounded about midway to form Lake Brownwood. The Pecan Bayou watershed contains six classified segments as defined by TCEQ. Segment 1419 is defined as Lake Coleman (an impoundment on Jim Ned Creek, a tributary to Pecan Bayou), Segment 1420 is Pecan Bayou above Lake Brownwood,

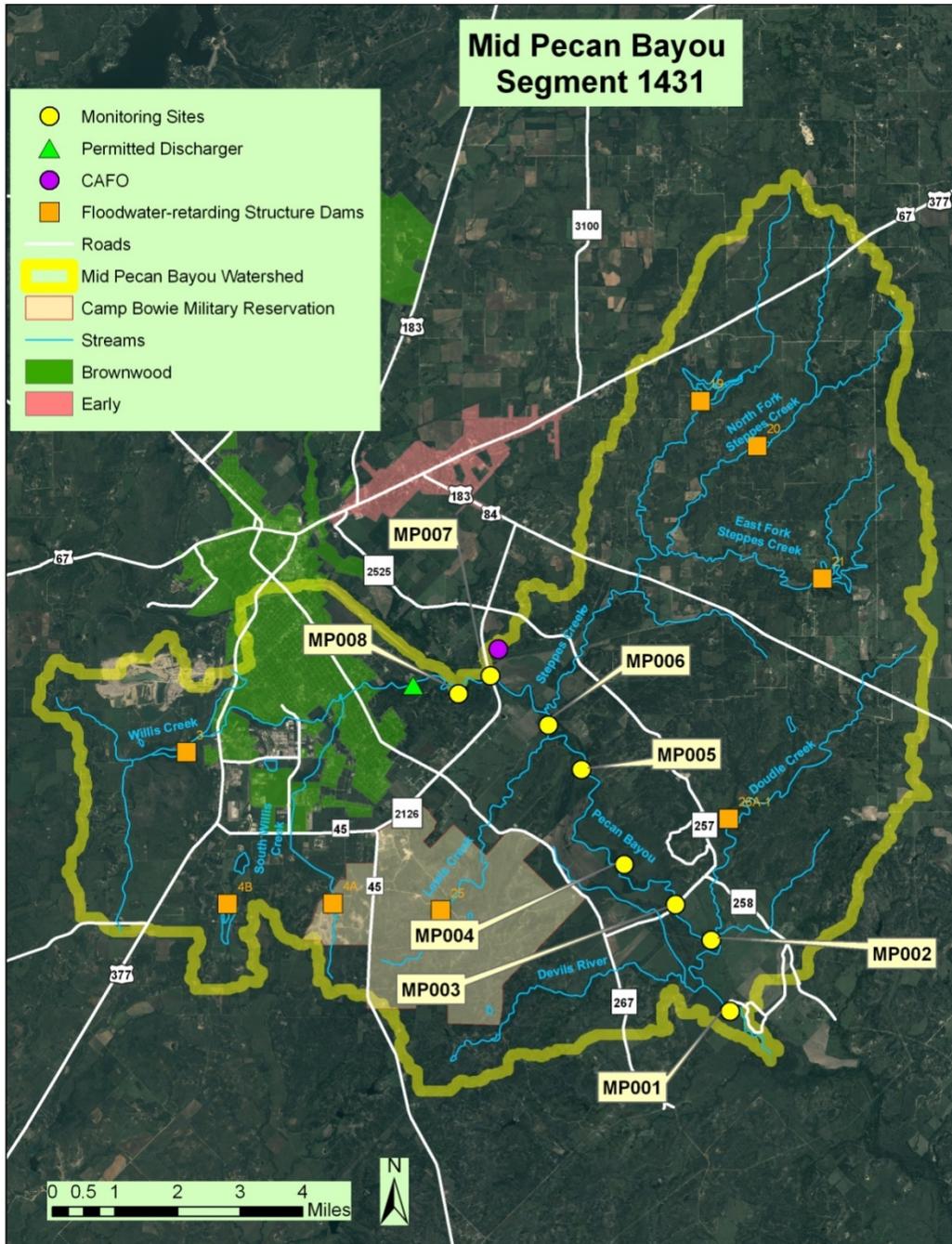
Segment 1418 is Lake Brownwood, 1432 is Upper Pecan Bayou, Segment 1431 is Mid Pecan Bayou, and Segment 1417 is Lower Pecan Bayou. Flows within Segments 1432, 1431 and 1417 are influenced largely by releases from Lake Brownwood (LCRA, 2007). Flows along Segment 1431 and to a lesser degree Segment 1417 are also influenced by discharges from the City of Brownwood wastewater treatment facility (WWTF).

Segment 1431 representing Mid Pecan Bayou is approximately 13 miles long (LCRA, 2007). The watershed of Segment 1431 includes the Camp Bowie Military Reservation, and the southern portion of the City of Brownwood with the remainder of the watershed lying largely within rural areas dominated by agricultural production (Figure 2-2).

The flow type for Mid Pecan Bayou is described as perennial, which means it flows throughout the year (TCEQ 2010c). Designated uses for Segment 1431 are primary contact recreation, general use, and fish consumption with an assumed high aquatic life use. This classified segment was first listed on the 2006 Texas 303(d) List and every subsequent 303(d) List due to excessive bacteria, specifically the geometric mean *E. coli* concentration of assessment data. There are also concerns due to exceedances of nutrient screening levels; specifically nitrate, orthophosphorus, and total phosphorus. A review of historical water quality data and a more detailed presentation of watershed characteristics for Mid Pecan Bayou is presented in the companion report, *Mid Pecan Bayou: Historical Water Quality, Source Survey and Geographic Information System Inventory* (Millican et al., 2011).

In reviewing historical water quality data, fecal coliform and *E. coli* concentrations did not appear to increase or decrease over time. As part of the site reconnaissance for the RUAA and during the RUAA surveys conducted for this project, TIAER field staff noted any observations of potential bacteria sources to Mid Pecan Bayou. The most common potential sources observed were birds, wildlife, feral hogs, and livestock. Some unidentified pipes were noted leading directly into the stream, but these were most likely related to uptake of irrigation water from the stream rather than discharge. Permitted sources within the Mid Pecan Bayou watershed include a CAFO (Brown-Tex Feedlot) and the City of Brownwood WWTF. A compliance history review indicated that a formal enforcement action had been taken against the CAFO; however a recent comprehensive compliance inspection revealed that the CAFO has resolved the issue and is currently in compliance. A compliance history review conducted on the Brownwood WWTF indicated that the facility was in compliance.

Also of note in the historical water quality data review was that almost all of the water quality data used in assessing and defining the bacteria impairment of Segment 1431 came from one station (12504), which is located in the upper portion of the watershed. Water quality at station 12504 is largely impacted by upstream water quality associated with Segment 1432 (Upper Pecan Bayou) and contributions from Willis Creek, a tributary that flows through the City of Brownwood and into which Brownwood's wastewater treatment facility (WWTF) discharges. It is recommended to better assess water quality and define pollutant sources along Mid Pecan Bayou (Segment 1431) that an additional monitoring station at the lower end of the AU be added, particularly if some remedial action, such as a Total Maximum Daily Load or Watershed Protection Plan, is taken to resolve the bacteria impairment.



**Figure 2-2** Map of Mid Pecan Bayou watershed for Segment 1431 showing dominate features including monitoring sites used for the RUAA.

### **Climatic Conditions**

The Mid Pecan Bayou watershed is in a subtropical-subhumid region of Texas characterized by hot and humid summers and mild and dry winters (Office of Texas State Climatologist, 1983), and lies within the Cross Timbers and Central Great Plains Ecoregions (Griffith et al., 2004).

The National Weather Service (NWS) currently maintains a weather station within the City of Brownwood (station 411138). Daily precipitation data obtained from the NWS station in Brownwood indicates a 30-year average rainfall (1981-2010) for the Brownwood area of 776 mm or 30.6 inches (NCDC, 2011). It should be noted that the 30-year average excludes data from the years 1984, 1985, 1987, 1994, 1998, and 2004 as significant amounts of missing precipitation data occurred during these six years. The wettest months are generally May, June, and September, while the driest months are generally January, November and December.

### **Land Use and Land Cover**

The land use/land cover data for Segment 1431 was obtained from the 2006 National Land Cover Database of the U.S. Geological Survey. The land use/land cover categories for NLCD are described in Homer et al., (2004) as follows:

- Shrub/Scrub – areas dominated by shrubs less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
- Forest – areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Forest includes deciduous forest, evergreen forest, and mixed forest.
- Grassland/Herbaceous – areas dominated by graminoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing and are also commonly referred to as rangeland.
- Developed – areas characterized by a high percentage (30% or greater) of constructed materials (e.g., asphalt, concrete, buildings, etc.). Developed land includes open space and low, medium and high intensity developed areas.
- Cultivated Crops – areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20% of total vegetation. This class also includes all land being actively tilled.
- Pasture/Hay – areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.
- Open Water – areas of open water, generally with less than 25% cover of vegetation or soil.
- Barren Land – areas characterized by bare rock, gravel, sand, silt, clay, or other earthen material, with little or no "green" vegetation present regardless of its inherent ability to

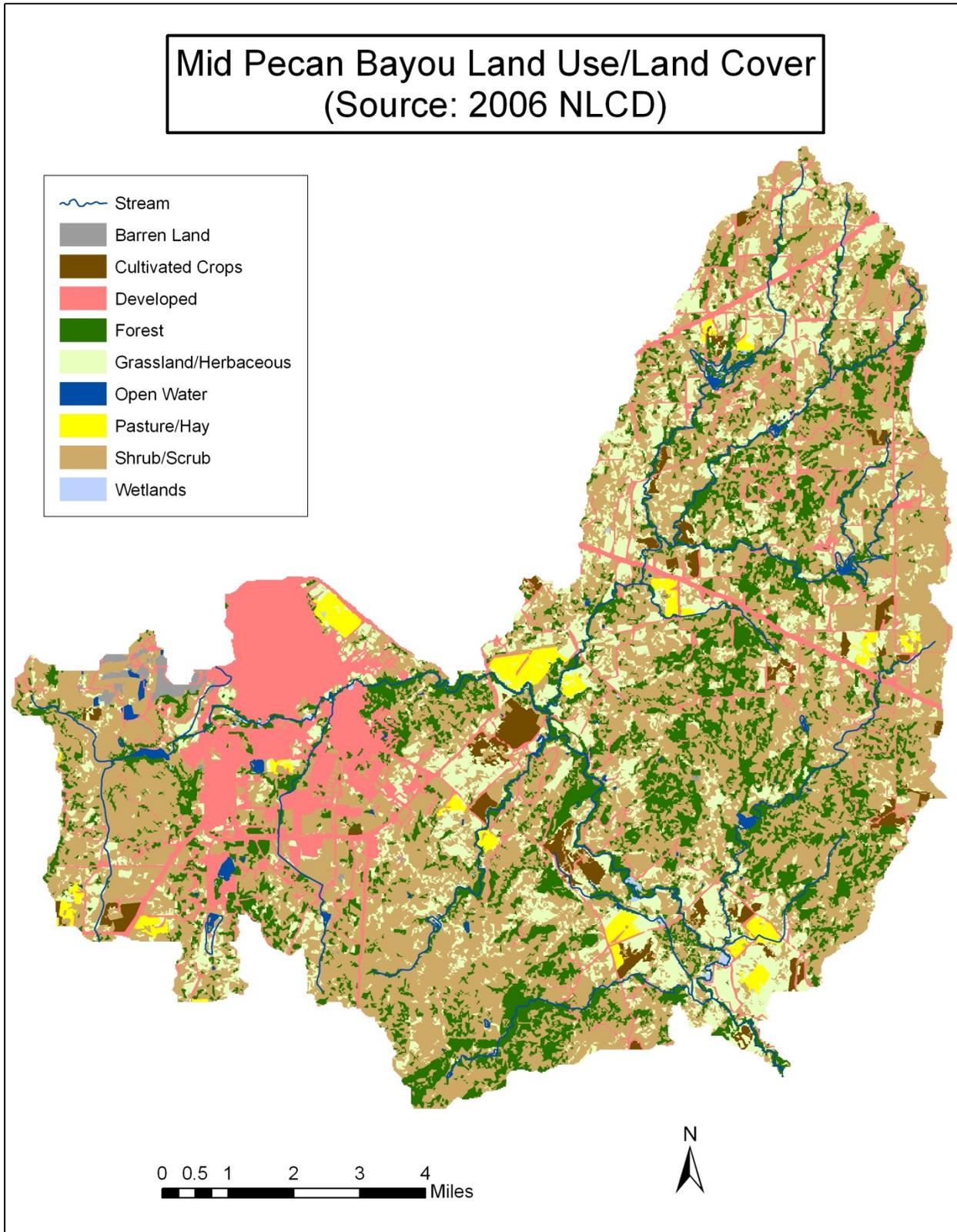
support life. Vegetation, if present, is more widely spaced and scrubby than that in the green vegetated categories; lichen cover may be extensive. Generally, vegetation accounts for less than 15% of total cover.

- Wetlands – areas where the soil or substrate is periodically saturated with or covered with water.

While the City of Brownwood is prominent in the watershed, developed land comprises only 13 percent of the watershed area (Table 2-1), primarily in the Willis Creek tributary. The major land use categories are shrub/scrub covering 47 percent of the area followed by forest comprising 18 percent and grassland/herbaceous comprising 16 percent (Table 2-1, Figure 2-3).

**Table 2-1** Land use/land cover classes within the Mid Pecan Bayou watershed (Source: 2006 National Land Cover Database).

<b>Classification</b>	<b>Area (ha)</b>	<b>Percent (%)</b>
Shrub/Scrub	12,957	47.4
Forest	5,010	18.3
Grassland/Herbaceous	4,313	15.8
Developed	3,690	13.5
Cultivated Crops	591	2.2
Pasture/Hay	498	1.8
Open Water	148	0.5
Barren Land	113	0.4
Wetlands	43	0.2
<b>Total</b>	<b>27,363</b>	



**Figure 2-3** Land use/land cover within the Mid Pecan Bayou watershed (Source: 2006 National Land Cover Database).

## Regulated Sources

Potential sources of fecal pollution, as measured by indicator bacteria *E. coli*, can be divided into two primary categories: *regulated* and *unregulated*. Pollution sources that are regulated have permits issued by TCEQ under the Texas Pollutant Discharge Elimination System (TPDES) and/or by the USEPA under the National Pollutant Discharge Elimination System (NPDES) and are generally point sources. Examples of regulated sources are domestic wastewater treatment facility (WWTF) discharges; stormwater discharges from industries, construction, and municipal separate storm sewer systems (MS4s) of cities; and concentrated animal feeding operations (CAFOs). These various regulated sources are required to have either an individual permit that is specific for their facility or operate under a general permit.

### Wastewater Treatment Facilities

There is one permitted WWTF located within Segment 1431 that is operated by the City of Brownwood (permit WQ0010565-001). The WWTF is located at the southeast end of Hoover Avenue within the City of Brownwood (see Figure 2-2). Treated domestic wastewater effluent is discharged into Willis Creek, a tributary to Mid Pecan Bayou. The WWTF is authorized to discharge domestic wastewater at an annual average flow not to exceed 4.54 million gallons per day. Monthly average discharge data from February 2005 through March 2009 for Brownwood's WWTF was obtained from the United States Environmental Protection Agency (USEPA) permit compliance system (PCS) database (USEPA, 2010). Based on the data obtained from the USEPA website the actual annual average flow for the City of Brownwood WWTF was 2.57 million gallons per day. Brownwood's WWTF is an activated sludge process plant operating in the extended aeration mode. The Brownwood WWTF utilizes a chlorine contact chamber for disinfection of wastewater. As of January 1, 2010, a new TCEQ rule requiring bacteria effluent limits and monitoring requirements was established for new and amended WWTF permits statewide. The TCEQ has not yet applied these rules to the Brownwood WWTF permit. As such, there is no *E. coli* effluent limit in Brownwood's permit and there are no *E. coli* effluent monitoring requirements in their permit. There was no bacteria monitoring data available for the WWTF effluent discharge either through the USEPA compliance database or from the Brownwood WWTF. A compliance history review conducted utilizing the PCS database and personal communications with the TCEQ Region 3 office did not reveal any significant compliance issues with the Brownwood WWTF.

### Regulated Stormwater

The TPDES and the NPDES MS4 Phase I and II rules require municipalities and certain other entities in urban areas to obtain permits for their stormwater systems. Phase I permits are individual permits for large and medium sized communities with populations exceeding 100,000, whereas Phase II permits are for smaller communities that are located within an "Urbanized Area". An "Urbanized Area" is defined by the U.S. Census Bureau as an area with populations greater than 50,000 and with an overall population density of at least 1,000 people per square mile. Further, TCEQ is also authorized to "designate" MS4 Phase II applicable coverage outside of UAs if the area's population is greater than 10,000 with a density of at least 1,000 people per square mile. The City of Brownwood has a total population of 19,288 based on 2010 population estimates (Texas State Data Center, 2011) and is not considered to be located in an Urbanized Area based on population density, thus, the City of Brownwood does not meet the designated MS4 thresholds and is not required to obtain a permit for their MS4.

### Concentrated Animal Feeding Operations

There is currently one permitted CAFO located within Segment 1431. The Brown-Tex Feedlot is located at 1900 FM 2126 along the northern boundary of the Mid Pecan Bayou watershed (see Figure 2-2). The Brown-Tex Feedlot is currently permitted by TCEQ to hold 2,500 head of beef cattle under permit number TXG921184. A compliance history review revealed a formal TCEQ enforcement action against the feedlot in response to a complaint investigation performed in March 2010. The investigation of the complaint resulted in a finding of an unauthorized discharge of agricultural waste. A review of the agreed order (docket number 2010-0865-AGR-E) indicates that corrective action had been implemented. Subsequently, a comprehensive compliance investigation conducted by TCEQ on the Brown-Tex Feedlot in April 2011 found the facility to be in compliance.

### Permitted Land Application of Sewage and Septage Sludge

A query performed on September 12, 2011 of the TCEQ database for registered land application sites by a member of the TCEQ Municipal Permits Team indicated that there are currently no registered land application sites in Brown County that receive Class B sewage sludge or septage sludge.

### **Potential Unregulated Sources**

Unregulated sources are typically nonpoint source in nature, meaning the pollution originates from multiple diffuse locations and is usually carried to surface waters by rainfall runoff, and the sources generally are not regulated by permit under the TPDES and NPDES. The specifics of unregulated sources will only be summarized within this report, including a variety of sources such as wildlife (mammals and birds), unmanaged feral animals (e.g., feral hogs), on-site sewage facilities (OSSFs), pets, and livestock. Sources observed during the RUAA surveys are specifically noted in a companion report, *Mid Pecan Bayou: Historical Water Quality, Source Survey and Geographic Information System Inventory* (Millican et al., 2011).

### Non-Permitted Agricultural Activities and Domesticated Animals

Statistics of livestock in Brown County based on 2010 estimates obtained from United States Department of Agriculture (USDA) National Agricultural Statistics Service website (USDA, 2011) indicate that a variety of livestock reside within the watershed (Table 2-2). It should be noted that the livestock numbers obtained by the USDA represent the number of livestock present in Brown County at the time the survey was conducted, and those numbers likely change throughout the year due to economic factors and environmental conditions (e.g., market values, drought, etc.) These livestock numbers represent the entirety of Brown County and do not reflect actual numbers in the Mid Pecan Bayou watershed; however, the livestock numbers should reflect anticipated relative livestock populations, e.g., more cattle present than goats. The Mid Pecan Bayou watershed is entirely within Brown County, but comprises only about 11 percent of the county. Activities such as livestock grazing close to waterbodies and agricultural use of manure as fertilizer, can contribute *E. coli* to nearby waterbodies. Furthermore, pets can also be sources of *E. coli* bacteria, because storm runoff carries the animal wastes into streams (USEPA, 2009).

**Table 2-2** Livestock statistics for Brown County. (Source USDA, 2011).

Livestock	Number within Brown County	Estimated Number within the Mid Pecan Bayou Watershed <sup>a</sup>
All Cattle and Calves	59,000	6,490
All Goats (meat and other)	14,000	1,540
All Sheep and Lambs	6,000	660
Hens and Pullets of Laying Age	2,000	220
Equine	2,300	250

a. Estimated livestock numbers for Mid Pecan Bayou derived as a direct proportion of the watershed area within Brown County.

### Wildlife and Unmanaged Nondomestic Animals

*E. coli* bacteria are common inhabitants of the intestines of all warm blooded animals, including wildlife, such as deer, raccoons, and birds. With access to the stream channel, direct deposition of animal waste can be a concentrated source of bacteria loading to a waterbody. Fecal bacteria from wildlife are also deposited onto land surfaces, where it may be washed into nearby streams by rainfall runoff. Specifically documented in Mid Pecan Bayou were avian rookeries in or near the Bayou and avian nests under the FM 2126 bridge directly over the Bayou. The Texas Parks and Wildlife Department (TPWD), including the local game warden, were contacted, but information was unavailable regarding estimates of wildlife populations for the watershed of Segment 1431.

While feral hogs are not natural wildlife, they are an invasive species and as unmanaged or feral animals, they also contribute bacteria to streams in a manner similar to wildlife. Feral hogs are noted for moving in groups along waterways, and particularly in times of drought will congregate near perennial water sources to drink and wallow. TPWD classifies feral hogs as unprotected, exotic, non-game animals (Taylor, 2003). Although found throughout much of Texas, there is a scarcity of data on feral hog densities in Texas. Studies in comparable bottomland habitats indicate typical densities of nearly 30 hogs per square mile (Tate, 1984 and Hone, 1988).

### Failing On-Site Sewage Facilities

OSSFs also known as septic systems are often used in rural areas that do not have the ability to connect to a central wastewater collection system. The following information was obtained through personal communications with the Brown County OSSF program Designated Representative. Currently there are 2,912 permitted OSSFs located in Brown County, most of which are anaerobic systems. It should be noted that the total OSSF count is for the entirety of Brown County and does not include “grandfathered” OSSFs that are exempt from permitting requirements. The representative indicated that most of the OSSF complaints received were regarding OSSFs located near Lake Brownwood north of the Mid Pecan Bayou watershed. The representative added that the rural areas of Brown County rarely submitted complaints regarding

OSSFs and was likely due to the low population density in those areas.

### Upstream Sources

Mid Pecan Bayou is not an isolated waterbody in that it receives flow from immediately upstream from Upper Pecan Bayou (Segment 1432). From TCEQ, bacteria data were only available for station 12508 (Pecan Bayou at US 377) along Upper Pecan Bayou through May 5, 2010 (TCEQ, 2010c). Station 12508 is located about four miles upstream of where Segment 1431 for Mid Pecan Bayou begins. The 2010 water quality assessment indicates for data collected between 2001 and 2008 that the Upper Pecan Bayou is fully supporting of the criterion for primary contact recreation use (TCEQ, 2010b). The 2010 water quality assessment indicates a geometric mean for Segment 1432 of 101 most probable number per 100 milliliters (MPN/100 mL) for *E. coli* based on 25 samples. For comparison, a geometric mean for Segment 1431 was indicated of 228 MPN/100 mL based on 26 samples.

### **Historical Information on Recreational Use**

A review of historical information was performed regarding recreational water uses for Mid Pecan Bayou. The review considered the time period of November 28, 1975 to the present in accordance with 40 CFR Part 131 (EPA regulations related to UAAs). Government offices, libraries, historical societies, and newspapers were searched and contacted in addition to generic Internet searches. The following is a summary of the review and searches.

### The Handbook of Texas Online

<http://www.tshaonline.org>

Searched the handbook by bayou name and by community. Nothing significant was found on recreation use of Mid Pecan Bayou.

### Government Sources

City of Brownwood

<http://ci.brownwood.tx.us>

Nothing significant was found.

Texas Parks and Wildlife Department

(Contact: Lt. Tracy Davis, Phone: 325-646-0440)

Lieutenant Tracy Davis stated in a phone interview on February 22, 2011 that since his tenure in Brown County began in 1994 he had only infrequently witnessed recreation occurring on or in Mid Pecan Bayou. According to Lt. Davis the most common recreation is fishing from the banks or sometimes out of boats, but he had seen people swimming in the water on very rare occasions. He identified 10-mile Crossing (at CR 257) as the most popular site for boat entry along Mid Pecan Bayou (see Figure 2-1).

Brown County Water Improvement District No.1

This District owns and operates Lake Brownwood. Nothing significant was found.

Brownwood Library

<http://www.brownwoodpubliclibrary.com>

Explored various links and online texts. Nothing significant was found.

Phone: (325) 646-0155

Spoke with librarian about records of recreational use on Mid Pecan Bayou. Librarian recommended TIAER consult the Brownwood Genealogy and Local History Branch and Pecan Valley Genealogical Society.

### Historical Society Sources

#### Brown County Historical Society

<http://www.browncountyhistory.org/bchs.html>

Explored various links and online texts. Nothing significant was found.

Phone: (325) 643-3322

Called Donnie Lappe, President of the Brown County Historical Society. He was unavailable but spoke with a volunteer about records of recreational use of the Mid Pecan Bayou. The volunteer did not know of any such records.

#### Brownwood Genealogy and Local History Branch and Pecan Valley Genealogical Society

<http://www.browncountytexasgenealogy.com>

Phone: (325) 646-6006

Spoke with a volunteer about records of recreational use of the Mid Pecan Bayou. Volunteer did not know of any such records.

### Newspaper

#### Brownwood Bulletin

(Gene Deason)

<http://www.brownwoodbulletin.com>

Phone: (325) 641-3119

Spoke with Mr. Gene Deason, Editor of the Brownwood Bulletin. Mr. Deason stated that he thought canoeing was quite limited along Mid Pecan Bayou due to dams and other structures. Deason also stated that he knows that people fish in Mid Pecan Bayou, but he did not know of any published writings on recreational use of Mid Pecan Bayou.

### Internet Searches

#### Family Old Photos

<http://www.familyoldphotos.com/tx/coll/brownwood>

Nothing significant was found.

#### TxGenWeb

<http://www.rootsweb.ancestry.com/~txbrown/>

Nothing significant was found.

#### Geocaching.com

[http://www.geocaching.com/seek/cache\\_details.asp](http://www.geocaching.com/seek/cache_details.asp)

A search of the site turned up a single entry describing some natural features of Mid Pecan Bayou but did not indicate whether the authors had approached the Bayou.

Academia

## Howard Payne University

(Wade Kinnin)

Phone: (325) 649-8602

Spoke with Wade Kinnin, librarian at Howard Payne University. Based on his search of library records he concluded that no faculty have published research on the Mid Pecan Bayou area.

(Dr. Lynn Little)

Phone: (325) 646-2502

Spoke with the Secretary for Dr. Lynn Little, the Dean of Science and Math at Howard Payne University. Dr. Lynn Little stated that no one at the University is conducting research on Mid Pecan Bayou and that there is no data to his knowledge from research in the past.

## CHAPTER 3

### STUDY METHODOLOGY

#### Survey Methodology

The following text provides details of the data collection activities designed to obtain the necessary field-related information for a RUAA. A Comprehensive RUAA was conducted for the Mid Pecan Bayou classified Segment 1431. The major field components of a Comprehensive RUAA are summarized as the following:

- Site reconnaissance (completed April 2011)
- Site selection (completed April 2011)
- Field surveys (Survey 1: June 10 – 11, 2011; Survey 2: September 2 – 4, 2011)

The first two components, site reconnaissance and site selection, did not constitute formal data collection activities requiring an approved QAPP. These two components, however, were critical to the success of data collection activities under the last bullet; the field surveys, which included various field activities (e.g., streamflow measurement) covered by a TSSWCB approved QAPP (TIAER, 2011).

#### Site Reconnaissance and Site Selection Strategy

The site reconnaissance was conducted prior to performing field survey activities. The reconnaissance had the purpose of collecting background information and selecting appropriate sites for the field survey. To the degree possible, the site reconnaissance was coordinated with the process to involve the watershed stakeholders and increase local landowner interest in water quality issues in the Mid Pecan Bayou.

The site selection process took into account locations along Mid Pecan Bayou that were accessible to the public, had the highest potential for recreational use, and had TCEQ monitoring stations where historical data may have been previously collected. The site selection process also considered parks and bridge crossings along the river, as well as, access through private lands adjacent to the river.

In order for the number of sites selected to adhere to the guidelines in the May 2009 procedures for performing a RUAA (TCEQ, 2009), wherein it states “In general, choose three (3) sites per every five (5) miles of stream,” it was determined that eight (8) sites would be sufficient. Map reconnaissance and a ground survey of the study area yielded only two locations that could provide public access, which were at road crossings. The rural nature of much of the watershed and the limited number of road crossings made accessibility of the stream challenging, landowner cooperation was essential in gaining access to an appropriate number of sites.

The strategy used in station selection for the RUAA surveys incorporated the following: Existing TCEQ monitoring stations were used, when appropriate, although four of the five TCEQ sites identified in the 13 mile reach as potential RUAA sites were located within private property, three additional sites were selected using aerial photographs and spaced appropriately to achieve

some degree of spatial symmetry. Landowner permission was obtained that allowed access to the 300-m reach required for a site.

The following information was compiled using Geographic Information System (GIS) based tools prior to, during, and immediately following the site reconnaissance:

- The location of areas along the segment that were accessible to the public and had the highest potential for recreational use (see Figure 2-2);
- The location of wastewater treatment facility outfalls and other potential point sources (see Figure 2-2);
- The land cover and land use characteristics of the watershed (see Figure 2-3);
- The hydrologic characteristics, such as stream type, streamflow, hydrologic alterations, etc. (see Millican et al., 2011); and
- The location of proposed sites for data collection following TCEQ guidance (TCEQ, 2009).

On February 22, 2011, TIAER presented a list of proposed RUAA sites to an aggregate of state and local agencies; TCEQ, TSSWCB, Lower Colorado River Authority, Texas Parks and Wildlife Department, City of Brownwood, and Brown County. The final RUAA sites noted in Figure 2-2 and Table 3-1 reflect the results of input received following the meeting. Site selection was also greatly aided by efforts of the Pecan Bayou Soil and Water Conservation District #553 and the solicitation for cooperating landowners at the public meeting held on February 22, 2011 in the City of Brownwood.

On May 27, 2011, TSSWCB received confirmation that TCEQ staff concur that an adequate number and spatial density of sites was selected to adhere to the RUAA guidelines.

### **Survey Site Descriptions**

Eight sites were selected for the RUAA survey in Mid Pecan Bayou. These sites were selected as a result of public accessibility and landowner cooperation. As only two publically accessible points were located, six sites were accessible only through private lands. Entrances to these privately controlled sites were limited by fences and locked gates and were often several kilometers from public roads through less than inviting terrain. Without the voluntary cooperation of landowners, TIAER staff would not have been able to access many of the sites. Moving from the most downstream site, up the Bayou, the selected sites were:

**Site MP001** is located in Mid Pecan Bayou 1.0 km downstream of the confluence with Devils River, south of Brownwood. Site MP001 was only accessible through fenced private property via a locked gate. Distance from the gate to the stream is 3.7 km. This site was selected because of landowner cooperation and the site provided opportunity for characterization of Segment 1431.

**Table 3-1** Location and description of RUAA monitoring sites.

<b>Mid Pecan Bayou Watershed Segment 1431</b>									
Sites 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	31.695460	-98.92710	1.14	1.59	20.60	Public	Not Applicable*
---	MP006	Mid Pecan Bayou 0.39 km downstream of the 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
12507	MP003	Mid Pecan Bayou at Brown CR 257 (Ten Mile Crossing) 12.19 km downstream of FM 2126	31.642320	-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

\* access to site N/A but access to full 300m reach "around" site was approved by landowner

**Site MP002** (TCEQ Station 20800) is located in Mid Pecan Bayou 1.6 km downstream of Brown CR 257, south of Brownwood. Site MP002 was only accessible through fenced private property via a locked gate. Distance from the gate to the stream is 2.1 km. This site was selected because of landowner cooperation and the site provided opportunity for characterization of Segment 1431.

**Site MP003** (TCEQ Station 12507) is located in Mid Pecan Bayou at Brown CR 257 (also known as Ten-mile Crossing) 12.19 km downstream of FM 2126, south of Brownwood. Site MP003 was selected because it was publically accessible, thus, increasing the potential for recreational activities at this location. The site provided opportunity for characterization of Segment 1431.

**Site MP004** is located in Mid Pecan Bayou 3.1 km upstream of Brown CR 257, south of Brownwood. Site MP004 was only accessible through fenced private property via a locked gate. Distance from the gate to the stream is 2.9 km. This site was selected because of landowner cooperation and the site provided opportunity for characterization of Segment 1431.

**Site MP005** (TCEQ Station 12506) is located in Mid Pecan Bayou 4.88 km downstream of FM 2126, south of Brownwood. Site MP005 was only accessible through fenced private property via a locked gate. Distance from the gate to the stream is 1.9 km. This site was selected because of landowner cooperation and the site provided opportunity for characterization of Segment 1431.

**Site MP006** is located in Mid Pecan Bayou 0.39 km downstream of the confluence with Steppes Creek, south of Brownwood. Site MP006 was only accessible through fenced private property via a locked gate. Distance from the gate to the stream is 1.9 km. This site was selected because of landowner cooperation and the site provided opportunity for characterization of Segment 1431. For the RUAA surveys, sites MP005 and MP006 were accessed from the property of a single landowner. TIAER staff launched two 2-man boats and travelled upstream (about 850 m) and downstream (about 750 m) from this central location between the two sites.

**Site MP007** (TCEQ Station 12504) is located in Mid Pecan Bayou at FM 2126, southeast of Brownwood. Site MP007 was selected because it was publically accessible and the potential for recreational activities at the site. The site provided opportunity for characterization of Segment 1431.

**Site MP008** (TCEQ Station 12502) is located in Mid Pecan Bayou downstream of the confluence with Willis Creek above FM 2126, southeast of Brownwood. Site MP008 was only accessible through fenced private property via a locked gate. This site was selected because of landowner cooperation and the site provided opportunity for characterization of Segment 1431.

### **Field Survey Data Collection Activities**

As specified in the procedures for a Comprehensive RUAA (TCEQ, 2009), two different field surveys at the eight sites occurred on different weekends during the warm season (air temperature greater than or equal to 70°F) when human recreational activities were most likely to occur (March - October). Further, field surveys were conducted when stream flow conditions were normal (in June 2011). However, in September 2011, it was not possible to avoid the

extreme drought conditions that persisted throughout the summer of 2011.

Data collection activities for each of the two field surveys included the following activities at each site:

- instantaneous streamflow,
- average depth at thalweg and substantial pool depths, lengths, and widths,
- observational/anecdotal data required by the RUAA,
- air and water temperature measurements, and
- photographic record.

#### Instantaneous Streamflow Measurements

An instantaneous water velocity measurement was made at each station using the most applicable current meter. The collection of velocity measurements under wadeable stream conditions was performed using either a SonTek Flow Tracker™ Acoustic Doppler Velocimeter or a Teledyne RDI StreamPro™ Acoustic Doppler Current Profiler (ADCP). Velocity measurements followed protocols outlined in the *TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment and Tissue* (2008). TIAER personnel used the stream flow measurement form developed by TIAER, which follows guidance and contains the information in TCEQ manuals (TCEQ, 2008 and 2009).

#### Average Depth at Thalweg and Substantial Pool Depths

Determination of thalweg and substantial pool depths is applicable to contact recreation use determination for intermittent and perennial freshwaters according to TCEQ (2008). The thalweg is defined as the deepest depth of a transect perpendicular to the stream channel.

As instructed in the RUAA procedures manual (TCEQ, 2009), a 300-m reach at each station was evaluated to determine average depth at the thalweg. Eleven transects at 30-m intervals were established in the 300-m stream reach bracketing each station. Each reach surveyed was oriented downstream to up, the 0-m transect was always set as the most downstream and the 300-m transect as the most upstream.

Determination of the thalweg in both wadeable and non-wadeable streams was determined as described in the RUAA Procedures (TCEQ, 2009), Section E – Item 1 Wadeable Streams and Item 2 Non-wadeable Streams.

Measuring each transect was accomplished, where wadeable, using a surveyor's rod to measure depth. At some locations, where water depth did not allow wading, or submerged obstructions created unsafe situations, a depth of greater than (>) the deepest measurable depth was reported.

#### Observational /Anecdotal Data

Anecdotal information was recorded on field data sheets during all surveys and studies using the field data sheets from the TSSWCB-approved QAPP.

Types of observational and anecdotal records included, but were not limited to, the following:

- channel flow status,
- stream type (e.g., ephemeral, intermittent, etc.),
- streamflow,
- general weather conditions (cloud cover/rain), including 30-day conditions and antecedent rainfall record,
- substrate type,
- accessibility, and
- anecdotal information related to observed human contact activities.

#### Air and Water Temperature Measurements

Water temperature, in degrees C, was measured using a 600 XLM YSI multiprobe and a 650 MDS data logger. Air temperature was measured by a handheld thermometer in degrees C. Both instruments were checked against a NTIS certified thermometer on a routine basis.

#### Photographs

TIAER staff created photographic records of each site during the site surveys. Photographs included an upstream view, left and right bank views, downstream view (as described in the Field Data Sheets), any evidence of observed uses or indications of human use, hydrologic modifications, etc. Photographs were intended to clearly depict the entire channel and were taken at all eleven transects at each site. Any items of interest, e.g., obstructions, observed were also photographed. Photographs were used to document evidence of recreational use (e.g., fishing tackle) and actual recreation. Photographs were also used to document a lack of use (e.g., dry creek beds) or impediments to recreational use. In addition as part of the overall project, photographs were also taken to indicate potential bacteria sources to the waterbody; this is discussed in *Mid Pecan Bayou: Historical Water Quality, Source Survey and Geographic Information System Inventory* (Millican et al., 2011) with the findings summarized in Chapter 2. All photographs were cataloged in a manner that indicates the site location, date, view orientation and what is being shown and are provided electronically on the project website <http://www.tsswcb.texas.gov/managementprogram/mpbruaa>. Selected photos representative of each site are included in chapters 4 and 5. In chapters 6 it is discussed where all of the photos can be found.

## CHAPTER 4

### PHYSICAL SURVEY RESULTS

#### General Description of Stream and Survey Sites

The RUAA surveys were conducted in Segment 1431 on June 10-11, 2011 and September 2-4, 2011. Surveys and associated interviews were performed on weekdays, weekends, and holidays (Labor Day weekend) at opportune times to observe recreational activities in and around Mid Pecan Bayou. At each site, eleven transects (cross sections) were measured along a 300-m reach at 30-m increments. All measurements are reported from downstream (0 m) to upstream (300 m) on field data sheets provided electronically as an appendix to this report (See Chapter 6). Though some cross sections were non-wadeable (generally > 1.0 m in depth), the use of 2-person boats allowed thalweg depth measurements to be collected at most transects. Where it was not feasible to launch a boat, the non-wadeable transects were reported as greater than the deepest value collected.

Table 4-1 shows the rainfall data for 30-days antecedent to the RUAA surveys, which were performed June 10-11 and September 2-4, 2011. Surveys were conducted during varying air and water temperatures as shown in Table 4-2. Air temperatures were above 70° F and water temperatures were sufficiently warm enough for recreational activities to occur.

Table 4-3 describes the appearance of the stream channel and riparian corridor at each site.

Table 4-4 shows the average thalweg depth for each reach and site during each of the RUAA surveys. At some locations where a boat was not available, the thalweg depth was recorded as greater than (>) the deepest measured value. If the actual thalweg was not found due to excessive depth, the deepest measurement recorded was used to calculate the average thalweg depth for the site. Access (public or private) to each site and level of effort to access the stream from the bank at each site is also provided in Table 4-4.

Table 4-5 shows the maximum, minimum and average widths of the stream at each site for each survey. The observed flow and total discharge is also listed in this table for each site per survey.

Stream aesthetics and wildlife observations are reported in Table 4-6 for each site and survey. In general, the majority of observed tracks and fecal droppings reported in Table 4-6 were wildlife in origin. Avian feces were the dominant dropping observed at all sites. Tracks included birds, raccoon, deer, bovine and feral hogs. Observed trash was predominantly plastics and was most common at bridge crossings. No evidence of major dumping was observed. Trash on private lands, which was rarely observed, appeared to have washed in during high flow periods.

A description of each site is presented along with selected photos taken during the surveys. All photos are provided electronically as an appendix to this report (See Chapter 6).

**Table 4-1** Rainfall records for the National Weather Service station in Brownwood for month prior to RUAA surveys . (RUAA surveys were conducted June 10 – 11, 2011 and September 2 – 4, 2011. Dates of surveys are highlighted in gray shades)

RUAA Trip 1 June 10 - 11, 2011		RUAA Trip 2 September 2 - 4 , 2011	
Date	Rainfall (in)	Date	Rainfall (in)
<b>May 2011</b>		<b>August 2011</b>	
11	4.06	4	0.22
12	0	5	0.3
13	0	6	0.1
14	0	7	0.07
15	0	8	0.09
16	0	9	0.09
17	0	10	0.11
18	0	11	0
19	0	12	0
20	0	13	2.25
21	0	14	0
22	0	15	0
23	0	16	0
24	0	17	0.02
25	0	18	0
26	0	19	0
27	0	20	0
28	0	21	0
29	0	22	0
30	0	23	0.07
31	0	24	0.11
<b>June 2011</b>		25	0.07
1	0	26	0.08
2	0	27	0.26
3	0	28	0.25
4	0	29	0.04
5	0	30	0
6	0	31	0
7	0	<b>September 2011</b>	
8	0	1	0
9	0	2	0.01
10	0	3	0
11	0	4	0

**Table 4-2** Field Parameters measured at each station for the Mid Pecan Bayou RUAA.

Assessment Unit	Station Number	June 10-11, 2011		September 2-4, 2011	
		Air Temp (°C)	Water Temp (°C)	Air Temp (°C)	Water Temp (°C)
1431	MP001	24.0	23.8	35.0	30.0
	MP002	28.0	26.8	32.0	29.1
	MP003	33.0	26.4	35.0	29.6
	MP004	36.0	31.2	36.0	31.7
	MP005	34.0	27.4	26.0	27.6
	MP006	28.0	26.4	24.0	27.2
	MP007	34.0	28.9	30.0	26.4
	MP008	36.0	30.0	28.0	25.1

**Table 4-3** Stream Channel and corridor assessment per site sampled in the Mid Pecan Bayou.

Assessment Unit	Site Number	Stream bank	Stream Channel Appearance	Dominant Substrate	Corridor Appearance	Riparian Size	Park	Landscape Surroundings
1431	MP001	Right	Natural	Mud/Clay over Gravel	Denuded/Eroded	Large	No	Native
		Left			Pasture	Large		Native
	MP002	Right	Natural	Gravel	Forest	Large	No	Pasture
		Left			Forest/Pasture	Large		Pasture
	MP003	Right	Natural	Mud/Clay	Forest with shrubs	Large	No	Native
		Left			Forest with shrubs	Large		Native
	MP004	Right	Natural	Mud/Clay	Forest with shrubs	Large	No	Pasture
		Left			Forest with shrubs	Large		Pasture
	MP005	Right	Natural	Gravel	Forest	Large	No	Native
		Left			Forest	Large		Native
	MP006	Right	Natural	Mud/Clay	Forest with shrubs	Large	No	Native
		Left			Forest with shrubs	Large		Native
	MP007	Right	Natural	Gravel/Sand	Forest with shrubs	Large	No	Pasture
		Left			Forest with shrubs	Large		Native
	MP008	Right	Natural	Gravel	Forest with shrubs	Large	No	Native
		Left			Forest with shrubs	Large		Native

**Table 4-4** Thalweg depth, stream flow type, and site accessibility for the assessment unit and each site for the surveys conducted.

Assessment Unit (AU)	Segment Length (miles)	# of Sites	# of Recreational Areas in AU	Avg. Thalweg Depth (m) for Assessment Unit		Stream Flow Type	General Access	Bank Access
				June 10-11, 2011	September 2-4, 2011			
1431	13	8	0	0.85	0.85	Perennial	Private	MD
Site	Reach length (meters)	# of Transects	# of Recreational Areas at Site	Avg. Thalweg Depth (m) by Site		Stream Flow Type	General Access	Bank Access
				June 10-11, 2011	September 2-4, 2011			
MP001	300	11	0	0.41	0.23	Intermittant w/ perennial pools	Private	MD
MP002	300	11	0	0.33	0.33	Intermittant w/ perennial pools	Private	ME
MP003	300	11	0	0.95	0.99	Intermittant w/ perennial pools	Public	ME
MP004	300	11	0	0.57	0.65	Perennial	Private	MD
MP005	300	11	0	1.63	1.80	Perennial	Private	MD
MP006	300	11	0	0.77	0.80	Perennial	Private	MD
MP007	300	11	0	1.47	1.37	Perennial	Public	MD
MP008	300	11	0	0.64	0.65	Perennial	Private	ME

E = Easy, ME = Moderately Easy, MD = Moderately Difficult, D = Difficult

**Table 4-5** Description of surveyed streams in the Mid Pecan Bayou watershed

Assessment Unit	Date	Site Number	Maximum width (m)	Minimum width (m)	Average width (m)	Total Discharge (cfs)	Observed Flow
1431	June 10-11, 2011	MP001	14.5	0.5	5.10	0.1	Low
		MP002	17.5	0.0	10.8	0.0	No Flow*
		MP003	29.0	0.0	19.0	0.0	No Flow*
		MP004	25.0	0.4	9.0	<0.1	Low
		MP005	31.0	15.5	18.5	0.3	Low
		MP006	26.0	2.8	14.8	0.4	Low
		MP007	22.0	7.2	12.5	3.1	Low
		MP008	15.5	3.5	6.5	3.8	Low
	September 2-4, 2011	MP001	13.5	0.0	6.5	0.0	No Flow*
		MP002	18.5	0.0	8.0	0.0	No Flow*
		MP003	25.0	0.4	18.5	<0.1	Low
		MP004	27.5	1.2	12.0	<0.1	Low
		MP005	27.6	15.5	19.7	0.2	Low
		MP006	24.6	1.7	12.7	0.1	Low
		MP007	21.0	4.1	17.5	2.9	Low
		MP008	16.0	3.5	16.0	2.0	Low

\* No flow indicates that there was no flowing water. Perennial pools were observed at the site with dry streambed between pools.

**Table 4-6** Stream aesthetics and wildlife observations in the Mid Pecan Bayou watershed. (From Field Data Sheet – Sect. F).

Station	Survey Date	Water Aesthetics						Wildlife Observations				Stream Garbage		
		Aquatic Vegetation	Algae Cover	Odor	Color	Bottom Deposit	Water Surface	Reptiles	Water Dependant Birds	Mammals	Evidence	Large in Channel	Small in Channel	Bank
MP001	June 10, 2011	A	A	N	brown	fine seds.	clear	MP snakes	N	N	tracks/fecal	N	N	A
	September 2, 2011	A	C	N	green	fine seds.	clear	N	SP	N	tracks/fecal	R	N	SP
MP002	June 10, 2011	A	Ab	N	green/brown	fine seds.	clear	MP snakes	N	N	tracks/fecal	R	R	R
	September 2, 2011	A	C	R	green	fine seds	clear	N	N	SP livestock	tracks/fecal	A	R	A
MP003	June 10, 2011	A	Ab	C	green	fine seds.	scum	N	N	N	tracks	R	R	R
	September 3, 2011	R	C	N	green/brown	fine seds.	scum	N	N	SP raccoon	tracks/fecal	R	R	C
MP004	June 10, 2011	A	C	C	green/brown	fine seds.	scum	N	MP	N	tracks/fecal/nests	R	R	A
	September 3, 2011	R	C	N	green/brown	fine seds.	clear	N	SP	MP livestock	tracks/fecal/nests	R	R	A
MP005	June 11, 2011	R	R	N	green/brown	fine seds.	clear	N	MP	N	tracks/nests	R	R	R
	September 3, 2011	R	Ab	N	green	fine seds.	scum	N	SP	N	fecal	R	A	R
MP006	June 11, 2011	C	C	R	green/brown	fine seds.	clear	SP snakes	MP	N	tracks/fecal	R	R	R
	September 3, 2011	R	R	N	green/brown	fine seds.	scum	N	SP	SP livestock	tracks/fecal	R	R	R
MP007	June 10, 2011	A	R	N	green/brown	fine seds.	clear/scum	N	MP	N	tracks/nests	R	R	R
	September 4, 2011	R	R	N	green	fine seds.	scum	N	SP	N	tracks/fecal	R	R	A
MP008	June 10, 2011	R	C	R	green/brown	fine seds.	clear	N	SP	N	tracks/fecal	R	R	R
	September 4, 2011	C	R	R	green	fine seds.	scum/foam	N	SP	SP squirrel livestock	tracks/fecal	R	A	R

A = absent, R = rare, C = common, Ab = abundant, N = none, SP = slight presence, MP = moderate presence, LP = large presence

### Physical Description of Site MP001

Mid Pecan Bayou at site MP001 was visited on June 10 and September 2, 2011. This site was accessible only through private lands that were fenced and locked at County Road (CR) 258 south of Brownwood, Texas in Brown County. Distance from the gate to the property boundary along the bayou is 3.7 km. From the property, the site can only be accessed by crossing a barbed wire fence that runs several hundred meters along the boundary of the property. Once on the river bank, access was achieved from a steep, high bank. At the river, the left bank (facing downstream) is relatively low and level. The right bank was generally vertical and denuded by erosion along most of the 300-m reach. In June, a flow of 0.06 cubic feet per second (cfs) was measured at the narrowest portion of the stream (0.45 m). In September, there was no flow and several meters of dry stream bed were observed. Although the access point for the field crew was down a steep bank, along the 300-m reach at several locations the left bank was gently sloping and would allow easier access. Table 4-3 describes the stream channel and riparian zone appearance of this site. [Photogroup 4-1](#) depicts the general appearance of the stream at site MP001.

Site MP001 was wadeable for the entire 300-m reach length. During neither survey did depths exceed one meter at any of the eleven transects. Wading was relatively easy, although the presence of fine sediments in some locations caused some difficulties. [Photogroup 4-2](#) depicts surveying the stream and stream bank access.

Average thalweg depth, hydrographic parameters, and aesthetic appearance of the water and wildlife observations for the site during each survey have been previously provided in Tables 4-4, 4-5, and 4-6, respectively. [Photogroup 4-3](#) illustrates the water color, general appearance and clarity of the water surface at Site MP001.

### Physical Description of Site MP002

Mid Pecan Bayou at site MP002 was visited on June 10 and September 2, 2011. This site was accessible only through private lands that were fenced and locked at CR 258 south of Brownwood, Texas in Brown County. Distance from the gate to the bayou access point is 2.1 km. From the property, the site was moderately easy to access at a power line right-of-way. The bank at this location was not as high as the remainder of the reach. At the bayou, there were several meters of gravel bar at stream level that allowed easy access along the 300-m study area. Flow was not measured on either visit as dry river bed with perennial pools was encountered on each trip: one dry transect in June and four in September. Gently sloping stream banks were observed at several locations along the 300-m reach once TIAER staff entered the stream. Table 4-3 describes the stream channel and riparian zone appearance of this site. [Photogroup 4-4](#) depicts the general appearance of the stream at this site.

Site MP002 was wadeable for the entire 300-m reach length. Depths greater than one meter were only measured at the 300-transect in both June and September. Wading was relatively easy along the entire reach. [Photogroup 4-5](#) depicts surveying the stream and stream bank access.

Average thalweg depth, hydrographic parameters, and aesthetic appearance of the water and wildlife observations for the site during each survey have been previously provided in Tables 4-

4, 4-5, and 4-6, respectively. [Photogroup 4-6](#) illustrates the water color, general appearance and clarity of the water surface at site MP002.

#### Physical Description of Site MP003

Mid Pecan Bayou at site MP003 was visited on June 10 and September 3, 2011. This site was accessible from a low water crossing at CR 257 south of Brownwood, Texas in Brown County. Away from the crossing, the bayou is bordered by private property both upstream and downstream and access is limited by high, steep banks and fences along the top of the banks. No flow was measured in either June or September, although a flow estimate of <0.01 cfs was recorded in September as water was observed moving across the apron of the crossing but was too shallow (0.01 m) and below the threshold of the flow monitoring equipment. Other than the concrete apron of the bridge crossing in June, no dry bed was observed. No other access points were observed along the 300-m reach. Table 4-3 describes the stream channel and riparian zone appearance of this site. [Photogroup 4-7](#) depicts the general appearance of the stream at this site.

Site MP003 was wadeable for the most of the lower 150-m reach, the exception was a pool between 150 and 120 meters that exceeded 1.5 m in depth. In addition to the pool mentioned above, the remaining upper 150 meters were non-wadeable and were surveyed by staff using a 10-ft two-person boat. During both surveys, depths upstream of CR 257 exceeded 1.2 m at three transects in June and four in September. [Photogroup 4-8](#) depicts surveying the stream and stream bank access.

Average thalweg depth, hydrographic parameters, and aesthetic appearance of the water and wildlife observations for the site during each survey have been previously provided in Tables 4-4, 4-5, and 4-6, respectively. [Photogroup 4-9](#) illustrates the water color, general appearance and clarity of the water surface at site MP003.

#### Physical Description of Site MP004

Mid Pecan Bayou at site MP004 was visited on June 10 and September 3, 2011. This site was accessible only through private lands that were fenced and locked at CR 257 south of Brownwood, Texas in Brown County. Once on the property, one must drive approximately 2.9 km through very harsh terrain dominated by mesquite, cactus, and a variety of other thorn-bearing vegetation. The bank of the bayou was not accessible by vehicle, thus it was necessary to walk some distance through mesquite and other vegetation to reach the bayou. The bank was high and relatively steep along the majority of the reach. Staff had to pick their way down to the water's edge using wildlife or cattle paths. During both the June and September surveys, flow, though observed, was not measurable and was recorded at <0.01 cfs. Although the majority of the bank was steep and high, there were some areas along the reach that afforded access via more gentle slopes. Table 4-3 describes the stream channel and riparian zone appearance of this site. [Photogroup 4-10](#) depicts the general appearance of the stream at this site.

Site MP004 was easily wadeable for the most of the 300-m reach, except at the 270-m transect where depths exceeded 1.5 m. [Photogroup 4-11](#) depicts surveying the stream and stream bank access.

Average thalweg depth, hydrographic parameters, and aesthetic appearance of the water and wildlife observations for the site during each survey have been previously provided in Tables 4-4, 4-5, and 4-6, respectively. [Photogroup 4-12](#) illustrates the water color, general appearance and clarity of the water surface at site MP004.

### Physical Description of Site MP005

Mid Pecan Bayou at site MP005 was visited on June 11 and September 3, 2011. This site was accessible only through private lands that were fenced and locked; however, TIAER staff was unable to make contact with a landowner for direct access. Because of this, it was necessary for TIAER staff to access MP005 (and MP006 - see next site description) through a centrally located private property off FM 2525 south of Brownwood, Texas in Brown County. Distance through this property from FM 2525 to the bank access point was approximately 2.4 km. At the bayou, the launch point was located approximately 500 m upstream of site MP005. During the June survey, flow was recorded at 0.26 cfs, while by the September survey it had decreased to 0.15 cfs. The majority of the bank was steep and high which limited access, though some areas along the reach afforded access via more gentle slopes, particularly at the 210-m transect where there appeared to be a path wide enough for a wheeled vehicle, e.g., ATV, that led to the water's edge (Figure 4-1). Also at this location an aluminum boat was observed embedded on its side in the bank. Table 4-3 describes the stream channel and riparian zone appearance of this site. [Photogroup 4-13](#) depicts the general appearance of the stream at this site.



**Figure 4-1** Picture of path to water's edge and boat embedded into the bank at MP005. Photo taken September 3, 2011 at the 210-m transect.

Site MP005 was surveyed entirely from boats. The depth at most transects made wading infeasible. Following RUAA procedure, stream widths were measured at each transect during the September 3, 2011 survey when the water was too deep to wade (Table 4-7). [Photogroup 4-14](#) depicts surveying the stream and stream bank access.

Average thalweg depth, hydrographic parameters, and aesthetic appearance of the water and wildlife observations for the site during each survey have been previously provided in Tables 4-

4, 4-5, and 4-6, respectively. [Photogroup 4-15](#) illustrates the water color, general appearance and clarity of the water surface at site MP005.

**Table 4-7** Transect width measurements at Site MP005

Date	Site	Transect Location (m)	Width (m)
September 3, 2011	MP005	0	17.0
		30	17.0
		60	16.0
		90	19.0
		120	23.0
		150	25.5
		180	23.5
		210	15.5
		240	18.0
		270	19.0
		300	23.5

#### Physical Description of Site MP006

Mid Pecan Bayou at site MP006 was visited on June 11 and September 3, 2011. As with MP005, this site was accessible only through private lands that were fenced and locked. TIAER staff accessed MP006 through the property described above (See MP005). The launch point was located approximately 600 m downstream of site MP006. During the June survey, flow was recorded at 0.38 cfs, while by the September survey it had decreased to 0.14 cfs. As observed downstream, the majority of the bank was steep and high which limited access, though, as observed at MP005, some areas exhibited gentler slopes and animal trails that afforded only moderately difficult access. Table 4-3 describes the stream channel and riparian zone appearance of this site. [Photogroup 4-16](#) depicts the general appearance of the stream at this site.

TIAER staff used boats to access site MP006 from the launch area downstream but the survey was performed on foot. While the average depth was less than 1.0 m (Table 4-4), depths in excess of 1.0 m were encountered at a few cross sections and depths greater than 1.5 m were only recorded at the 60-m transect (11 June) and 240-m transect (11 June and 3 September). [Photogroup 4-17](#) depicts surveying the stream and stream bank access.

Average thalweg depth, hydrographic parameters, and aesthetic appearance of the water and wildlife observations for the site during each survey have been previously provided in Tables 4-4, 4-5, and 4-6, respectively. [Photogroup 4-18](#) illustrates the water color, general appearance and clarity of the water surface at site MP006.

#### Physical Description of Site MP007

Mid Pecan Bayou at site MP007 was visited on June 10 and September 4, 2011. Although this site could have been accessed beneath the FM 2126 bridge crossing, the adjacent landowner requested that TIAER use his property to get to the stream in order to secure vehicles and equipment from passers-by. The property from which TIAER launched the boats was fenced and locked. TIAER staff accessed MP007 from a launch location approximately 200 m upstream of FM 2126. The bayou bank was high and steep along the majority of the reach. Channel access

could be attained under the FM 2126 bridge, although some effort would be required. Toward the bottom of the reach (30 to 0-m transects), the right bank (facing downstream) appeared lower, thus allowing easier access, although it was located within private property. During the June survey, flow was recorded at 3.1 cfs, while by the September survey it had decreased to 2.9 cfs. Table 4-3 describes the stream channel and riparian zone appearance of this site. [Photogroup 4-19](#) depicts the general appearance of the stream at this site.

Site MP007 was surveyed by boat from the 300-m to the 60-m transects. The 0-m and 30-m transects were wadeable. The depth at most transects made wading infeasible. Following RUAA procedure, stream widths were measured during the September 4, 2011 survey when the water was too deep to wade (Table 4-8). [Photogroup 4-20](#) depicts surveying the stream and stream bank access.

Average thalweg depth, hydrographic parameters, and aesthetic appearance of the water and wildlife observations for the site during each survey have been previously provided in Tables 4-4, 4-5, and 4-6, respectively. [Photogroup 4-21](#) illustrates the water color, general appearance and clarity of the water surface at Site MP005.

**Table 4-8** Transect width measurements at Site MP007

Date	Site	Transect Location (m)	Width (m)
September 4, 2011	MP007	0	n/a
		30	n/a
		60	14.0
		90	18.0
		120	17.5
		150	18.5
		180	21.0
		210	18.0
		240	19.0
		270	16.5
		300	18.0

#### Physical Description of Site MP008

Mid Pecan Bayou at site MP008 was visited on June 10 and September 4, 2011. This site was only accessible through private property that was fenced and locked and boats were required to travel approximately 600 m upstream from the launch area to the survey site. The bayou banks at this site did not appear as high or steep as most of the sites encountered lower in the segment. Though some areas of the reach did exhibit high steep banks, there were numerous locations at which the bayou could be accessed with moderate ease. There were also areas along each bank that were low, broad, and long. During the June survey, flow was recorded at 3.8 cfs, while by the September survey it had decreased to 2.0 cfs. Table 4-3 describes the stream channel and riparian zone appearance of this site. [Photogroup 4-22](#) depicts the general appearance of the stream at this site.

Site MP008 was wadeable for the entire 300-m reach. Depth exceeded a meter at only one transect (210 m) on each visit, and wading was relatively easy on the gravel bottom. Very little

deep sediment was encountered that inhibited walking. [Photogroup 4-23](#) depicts surveying the stream and stream bank access.

Average thalweg depth, hydrographic parameters, and aesthetic appearance of the water and wildlife observations for the site during each survey have been previously provided in Tables 4-4, 4-5, and 4-6, respectively. [Photogroup 4-24](#) illustrates the water color, general appearance and clarity of the water surface at site MP008.



**Photogroup 4-1** Mid Pecan Bayou site MP001 depicting general appearance of the site (All individuals pictured are TIAER staff). Top Left - 0-m transect, upstream view, June 2011; Top Right - 0-m transect, upstream view, September 2011; Middle Left – 150-m transect upstream view, June 2011; Middle Right – 150-m transect upstream view, September 2011; Bottom Left – 270-m transect, upstream view, September 2011; Bottom Right – 300-m transect downstream view, June 2011. [Return to Text](#)



**Photogroup 4-2** Mid Pecan Bayou site MP001 depicting field staff in the stream and stream bank access (All individuals pictured are TIAER Staff). Top Left – 90-m transect, June 2011; Top Right – 120-m transect, June 2011; Middle Left – 300-m transect, June 2011; Middle Right – 120-m transect, September 2011; Bottom Left – 30-m transect, June 2011; Bottom Right – bank access 120-m transect, September 2011. [Return to Text](#)



**Photogroup 4-3** Mid Pecan Bayou site MP001 illustrating the water color, general appearance and clarity of the water surface. Top Left – 30-m transect, June 2011; Top Right – 90-m transect, June 2011; Middle Left – 210-m transect, June 2011; Middle Right – 0-m transect, September 2011; Bottom Left – 240-m transect, June 2011; Bottom Right – 300-m transect, September 2011. [Return to Text](#)



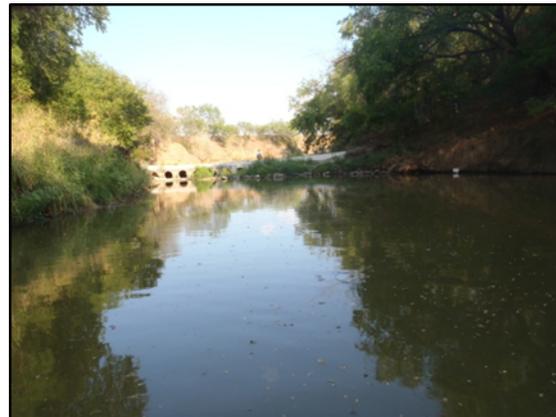
**Photogroup 4-4** Mid Pecan Bayou site MP002 depicting general appearance of the site (All individuals pictured are TIAER staff). Top Left – 0-m transect, downstream view, June 2011; Top Right – 0-m transect, upstream view, September 2011; Middle Left – 150-m transect downstream view, June 2011; Middle Right – 150-m transect downstream view, September 2011; Bottom Left – 300-m transect, downstream view, June 2011; Bottom Right – 300-m transect upstream view, September 2011. [Return to Text](#)



**Photogroup 4-5** Mid Pecan Bayou site MP002 depicting field staff in the stream and stream bank access (All individuals pictured are TIAER Staff). Top Left – 0-m transect, June 2011; Top Right – 270-m transect, June 2011; Middle Left – 300-m transect, June 2011; Middle Right – 240-m transect, September 2011; Bottom Left – 240-m transect, June 2011; Bottom Right – bank access 120-m transect, September 2011. [Return to Text](#)



**Photogroup 4-6** Mid Pecan Bayou site MP002 illustrating the water color, general appearance and clarity of the water surface. Top Left – 270-m transect downstream, June 2011; Top Right – 120-m transect downstream, June 2011; Middle Left – 0-m transect upstream, June 2011; Middle Right – 300-m transect downstream, September 2011; Bottom Left – 210-m transect, September 2011; Bottom Right – 150-m transect, September 2011. [Return to Text](#)



**Photogroup 4-7** Mid Pecan Bayou site MP003 depicting general appearance of the site (All individuals pictured are TIAER staff). Top Left – 0-m transect upstream, June 2011; Top Right – 0-m transect upstream, September 2011; Middle Left – 150-m transect downstream, June 2011; Middle Right – 150-m transect downstream, September 2011; Bottom Left – 300-m transect downstream, June 2011; Bottom Right – 210-m transect downstream, June 2011.

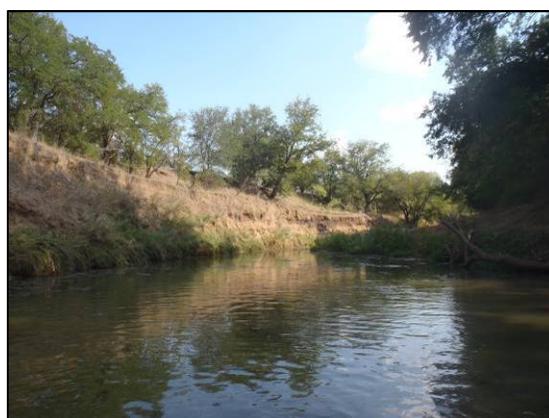
[Return to Text](#)



**Photogroup 4-8** Mid Pecan Bayou site MP003 depicting field staff in the stream and stream bank access (All individuals pictured are TIAER Staff). Top Left – 30-m transect, June 2011; Top Right – 90-m transect, June 2011; Middle Left – 120-m transect, June 2011; Middle Right – 90-m transect, September 2011; Bottom Left – 150-m bank access left, April 2011; Bottom Right – 150-m bank access right, April 2011. [Return to Text](#)



**Photogroup 4-9** Mid Pecan Bayou site MP003 illustrating the water color, general appearance and clarity of the water surface. Top Left – 60-m transect, June 2011; Top Right – 210-m transect, June 2011; Middle Left – 270-m transect, June 2011; Middle Right – 90-m transect, September 2011; Bottom Left – 120-m transect, June 2011; Bottom Right – 300-m transect, September 2011. [Return to Text](#)



**Photogroup 4-10** Mid Pecan Bayou site MP004 depicting general appearance of the site (All individuals pictured are TIAER staff). Top Left – 0-m transect upstream, June 2011; Top Right – 0-m transect upstream, September 2011; Middle Left – 150-m transect upstream, June 2011; Middle Right – 150-m transect upstream, September 2011; Bottom Left – 270-m transect upstream, June 2011; Bottom Right – 300-m transect downstream, September 2011. [Return to Text](#)



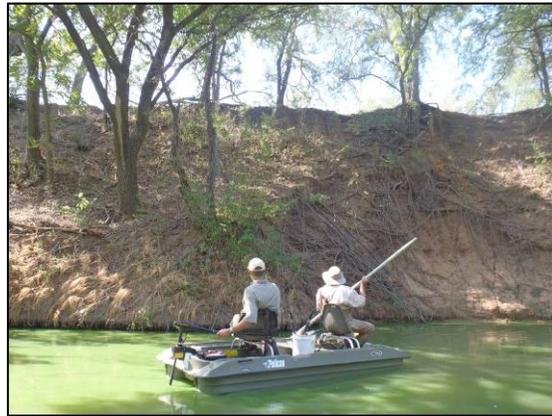
**Photogroup 4-11** Mid Pecan Bayou site MP004 depicting field staff in the stream and stream bank access (All individuals pictured are TIAER Staff). Top Left – 270-m transect, June 2011; Top Right – 60-m transect, June 2011; Middle Left – 30-m transect, June 2011; Middle Right – 210-m transect, September 2011; Bottom Left – 300-m bank access left, June 2011; Bottom Right – 210-m bank access right, September 2011. [Return to Text](#)



**Photogroup 4-12** Mid Pecan Bayou site MP004 illustrating the water color, general appearance and clarity of the water surface. Top Left – 240-m transect, June 2011; Top Right – 180-m transect, June 2011; Middle Left – 30-m transect, June 2011; Middle Right – 0-m transect, September 2011; Bottom Left – 150-m transect, September 2011; Bottom Right – 90-m transect, September 2011. [Return to Text](#)



**Photogroup 4-13** Mid Pecan Bayou site MP005 depicting general appearance of the site (All individuals pictured are TIAER staff). Top Left – 0-m transect upstream, June 2011; Top Right – 0-m transect upstream, September 2011; Middle Left – 150-m transect downstream, June 2011; Middle Right – 150-m transect upstream, September 2011; Bottom Left – 240-m transect downstream, June 2011; Bottom Right – 300-m transect downstream, September 2011. [Return to Text](#)



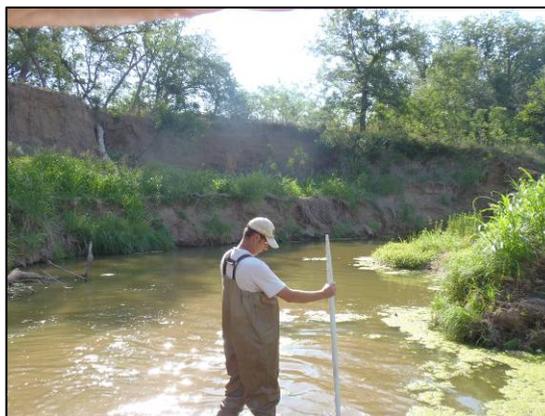
**Photogroup 4-14** Mid Pecan Bayou site MP005 depicting field staff in the stream and stream bank access (All individuals pictured are TIAER Staff). Top Left – 0-m transect, June 2011; Top Right – 0-m transect, September 2011; Middle Left – 30-m transect, June 2011; Middle Right – 240-m transect, September 2011; Bottom Left – 240-m bank access left, June 2011; Bottom Right – 90-m bank access left, September 2011. [Return to Text](#)



**Photogroup 4-15** Mid Pecan Bayou site MP005 illustrating the water color, general appearance and clarity of the water surface. Top Left – 0-m transect, June 2011; Top Right – 150-m transect, June 2011; Middle Left – 30-m transect, June 2011; Middle Right – 0-m transect, September 2011; Bottom Left – 210-m transect, September 2011; Bottom Right – 270-m transect, September 2011. [Return to Text](#)



**Photogroup 4-16** Mid Pecan Bayou site MP006 depicting general appearance of the site (All individuals pictured are TIAER staff). Top Left – 0-m transect upstream, June 2011; Top Right – 0-m transect upstream, September 2011; Middle Left – 150-m transect upstream, June 2011; Middle Right – 150-m transect upstream, September 2011; Bottom Left – 210-m transect upstream, June 2011; Bottom Right – 300-m transect downstream, September 2011. [Return to Text](#)



**Photogroup 4-17** Mid Pecan Bayou site MP006 depicting field staff in the stream and stream bank access (All individuals pictured are TIAER Staff). Top Left – 120-m transect, June 2011; Top Right – 0-m transect, September 2011; Middle Left – 30-m transect, June 2011; Middle Right – 60-m transect, September 2011; Bottom Left – 60-m bank access right, June 2011; Bottom Right – 270-m bank access, September 2011. [Return to Text](#)



**Photogroup 4-18** Mid Pecan Bayou site MP006 illustrating the water color, general appearance and clarity of the water surface. Top Left – 30-m transect, June 2011; Top Right – 60-m transect, June 2011; Middle Left – 270-m transect, June 2011; Middle Right – 120-m transect, September 2011; Bottom Left – 240-m transect, September 2011; Bottom Right – 300-m transect, September 2011. [Return to Text](#)



**Photogroup 4-19** Mid Pecan Bayou site MP007 depicting general appearance of the site (All individuals pictured are TIAER staff). Top Left – 0-m transect downstream, June 2011; Top Right – 0-m transect upstream, September 2011; Middle Left – 150-m transect upstream, June 2011; Middle Right – 150-m transect upstream, September 2011; Bottom Left – 210-m transect upstream, June 2011; Bottom Right – 300-m transect downstream, September 2011. [Return to Text](#)



**Photogroup 4-20** Mid Pecan Bayou site MP007 depicting field staff in the stream and stream bank access (All individuals pictured are TIAER Staff). Top Left – 0-m transect, June 2011; Top Right – 180-m transect, September 2011; Middle Left – 30-m transect, June 2011; Middle Right – 150-m transect, September 2011; Bottom Left – 150-m bank access right, June 2011; Bottom Right – 0-m bank access right, September 2011. [Return to Text](#)



**Photogroup 4-21** Mid Pecan Bayou site MP007 illustrating the water color, general appearance and clarity of the water surface. Top Left – 150-m transect, June 2011; Top Right – 180-m transect, June 2011; Middle Left – 300-m transect, June 2011; Middle Right – 60-m transect, September 2011; Bottom Left – 180-m transect, September 2011; Bottom Right – 270-m transect, September 2011. [Return to Text](#)



**Photogroup 4-22** Mid Pecan Bayou site MP008 depicting general appearance of the site (All individuals pictured are TIAER staff). Top Left – 0-m transect upstream, June 2011; Top Right – 0-m transect downstream, September 2011; Middle Left – 150-m transect downstream, June 2011; Middle Right – 150-m transect upstream, September 2011; Bottom Left – 300-m transect downstream, June 2011; Bottom Right – 240-m transect upstream, September 2011. [Return to Text](#)



**Photogroup 4-23** Mid Pecan Bayou site MP008 depicting field staff in the stream and stream bank access (All individuals pictured are TIAER Staff). Top Left – 210-m transect, June 2011; Top Right – 300-m transect, September 2011; Middle Left – 180-m transect, June 2011; Middle Right – 210-m transect, September 2011; Bottom Left – 30-m bank access right, June 2011; Bottom Right – 270-m bank access right, September 2011. [Return to Text](#)



**Photogroup 4-24** Mid Pecan Bayou site MP008 illustrating the water color, general appearance and clarity of the water surface. Top Left – 60-m transect, June 2011; Top Right – 180-m transect, June 2011; Middle Left – 240-m transect, June 2011; Middle Right – 120-m transect, September 2011; Bottom Left – 270-m transect, September 2011; Bottom Right – 300-m transect, September 2011. [Return to Text](#)

## CHAPTER 5

### OBSERVATIONS AND INTERVIEWS

#### Activities Observed

During each RUAA survey, field personnel visited the sites during times of days and on days when recreational activities were apt to be observed. Two of the eight selected sites were at locations that provided public access. The remaining six sites were located on private property and TIAER personnel were granted permission from the landowners to conduct the RUAA at these locations.

No contact (primary or secondary) or noncontact recreational activities were observed by TIAER employees at any of the sites during the field surveys. At site MP002, a shoe print was observed in the stream bed near an inverted 5-gallon bucket during the June 2011 field survey. It is not known if the bucket had been used as a seat or not. Only one shoe print was observed in the area of the bucket at the site. In addition, during the September 2011 field survey, remnants of a campfire were found just below the bottom transect of the reach. [Photogroup 5-1](#) illustrates the aforementioned items.

Possible evidence of fishing was observed at site MP007 in the form of a fishing bobber found downstream of the bridge crossing. It is not known if it washed in from upstream or was lost at the site. During the second visit, a fishing lure was observed on a rock at the 150-m transect, directly underneath the bridge at site MP007. Field personnel who observed the lure did not have a camera; therefore, a picture was not collected. [Photogroup 5-2](#) shows the fishing bobber.

At site MP003, evidence of use was observed by TIAER personnel during both of the field surveys. Although there is a no parking sign along Brown CR 257 prohibiting parking on the low water crossing over Mid Pecan Bayou, a small, graveled parking area is located at the top of the hill west of the Bayou. Downstream from the low water crossing, a well-used path leads to a gravel bar suitable for access to the Bayou. It was in this area that human tracks and trash were observed during both surveys [Photogroup 5-3](#). While these observations indicate the site appears to be used and has public access, the gravel bar, path, and trash are all on private property downstream of the public road crossing. The trash included beverage cups and bottles, cigarette butts and a pair of socks. The only evidence of fishing was a bobber that was found during the second trip. [Photogroup 5-4](#) illustrates the aforementioned observations.

#### Activities Interviewed

Interviews were conducted of several landowners along Mid Pecan Bayou as well as other persons of interest. At the two sites which afforded for public access (MP003 and MP007), visits were conducted at times other than the physical surveys in an effort to determine if human recreation occurred at the sites. Only one of these visits yielded any human presence. At MP003, two individuals were found, and interviewed by TIAER personnel. In addition to landowner and other personal interviews, TIAER staff contacted Howard Payne University faculty and librarians for information on any research pertaining to Segment 1431. One TIAER employee also conducted interviews during a high school junior varsity football game in Brownwood in an attempt to find persons who had knowledge of recreation occurring within Segment 1431.

A total of 24 interviews were collected from landowners along Mid Pecan Bayou and other people with knowledge of the Mid Pecan Bayou watershed. The lack of persons observed recreating during the field surveys made collecting additional interviews difficult. Of the 24 interviews conducted in Segment 1431, the most common recreational use was identified as fishing. It was commonly related that the reason for not swimming in the stream was that the water appears dirty and unclean and comes from the WWTF. In years past, the stream had a reputation of being “nasty” and most people apparently still believe that to be the case.

The landowner at site MP001 stated that his main reason for not recreating in the stream is that he typically is busy working on the ranch and he is not an avid fisherman. He claimed that he and his son have hunted ducks at certain locations of the stream on his property with some success. His son has put on a pair of waders and waded in the stream to retrieve the ducks, but does not recreate in the stream. The landowner also relayed that back in the 1950’s and 1960’s when the stream was always flowing he drank some of the stream water on a hot summer afternoon while working on the ranch. He would not recommend drinking from the stream at the present time though. As he stated “the stream was a lot cleaner back then than it is now”.

At site MP002, the landowner revealed that the only type of recreation he and his family do along the bayou is fishing. Reasons for not swimming were difficulty in accessing the stream and if you made it to the stream, the water was generally not deep enough for swimming. The areas he knows of that are deep enough for swimming are not on his property and he will “not allow his children to swim these locations due to the types of people that frequent these locations”.

One landowner stated that based on the past reputation of the stream being “nasty”, he will not swim in the bayou on his property (site MP003). It was further stated that due to what he has observed on the bottom of the stream during times of drought, he would not want to risk injury swimming in the stream. He and his family have utilized the stream for fishing, but not very frequently.

The landowner at site MP004 stated that he and his family do not utilize the stream for any form of recreation, fishing or swimming. He stated that based on the impurities he believes are in the water, he would not get into the stream or want to eat any fish caught out of the stream. He did concede that the stream is beginning to appear cleaner than it has in the past and is beginning to look more inviting for both swimming and fishing.

Attempts to contact landowners for sites MP005 and MP006 were unsuccessful. However, the landowner who gave TIAER employees access to the stream between the two locations agreed to participate in an interview. This landowner claimed to have knowledge of the project and did not want the classification of the stream changed. He stated that he, his family and friends do utilize the stream for fishing, swimming and wading, both adults and children. During the summer, the stream is utilized recreationally approximately six to eight times a year. He and his family enjoy the stream and want the current classification standard upheld.

At site MP007, the landowner shared that he and his family do not recreate in the stream. He

stated that the water is coming out of the “sewer plant” and he is not going to stick his head under that water nor will he let other family members. He has gotten into the stream to repair an irrigation pump, but he does not consider that recreation. The landowner did admit that he and other friends and family members hunt ducks. To his knowledge, no swimming or wading has occurred in the stream on his property. The landowner indicated he has seen people fishing underneath the bridge, but their vehicles are parked in the FM 2126 right-of-way at the bridge crossing and not on his property. He stated that this occurs on a weekly basis.

In addition to the information about the recreational uses on their property, the landowners also had information about the road crossing at site MP003, which is publicly accessible. All of the landowners claimed to have observed people fishing at this location. A few of the landowners have observed some people swimming and wading. The wading was typically small children playing while adults (presumably parents) were fishing but this was only observed occasionally.

Additional interviews were collected from persons familiar with Pecan Bayou. Some were familiar with Mid Pecan Bayou, while others were only familiar with the Upper Pecan Bayou area within in the City of Brownwood above Segment 1431.

An individual actually found at site MP003 stated that the site is a very popular fishing location. He stated “that millions of fishermen come to that location to fish”, but he has never observed anyone swimming at the location due to the numerous hooks and snags in the stream. He added, “the under currents in the stream would make swimming very difficult”. A female, who was at the site with this interviewee, added that she was usually the only one fishing at the site. These persons were sitting in their car at the graveled parking area described previously.

A researcher with knowledge of the area stated that while performing an aquatic life UAA at site MP003, she had encountered people swimming and wading at the location on two different occasions. On one occasion in 2010, she found two people swimming in the upstream pool at the road crossing. They informed her that they frequently came to the site to clean up the area and would swim in the pool when they finished. On another occasion in 2011, she encountered a man with two children. She stated that they were carrying floats and proceeded to the downstream gravel “beach” area. One of the children began to swim in the stream downstream of the road crossing.

Other interviews revealed that swimming, wading and fishing routinely occur in the city park, above Segment 1431, near the highway 377 dam. It was stated that children routinely swim, wade and fish during the summers in the deeper water above the dam in the park. One person indicated that he observed others recreating in the stream, but the interviewee’s parent would not allow him to swim because the water was unclean. One person shared that the only time she would wade in the water was to get from one side of the stream to the other; out of necessity, but not for recreation. Another person confirmed that he had observed people fishing in the stream at site MP003.

Table 5-1 shows the types of activities identified during the interviews of individuals with information pertinent to recreational activities in Mid Pecan Bayou.

**Table 5-1** Activities reported in interviews at sites along Mid Pecan Bayou. Activities include personal use, observed use, and heard about use each counted separately.

Watershed	Site Name	Swimming	Wading		Standing Sitting Sleeping	Hunting	Fishing
			Adults	Children			
Mid Pecan Bayou	MP001		1			1	1
	MP002						1
	MP003	4	4	7	2		28
	MP004						
	MP005						
	MP006						
	MP007			1		1	5
	MP008						
	Other locations	3	2	2		2	3
	SUM	7	7	10	2	4	38

Copies of all of interviews conducted along Mid Pecan Bayou are provided electronically on the project website <http://www.tsswcb.texas.gov/managementprogram/mpbruaa> as an appendix to this report.



**Photogroup 5-1** Mid Pecan Bayou site MP002 illustrating the inverted 5-gallon bucket, the single shoe print located near the bucket, and the remnants of a campfire. [Return to Text](#)



**Photogroup 5-2** Mid Pecan Bayou site MP007 illustrating the fishing bobber located on the piece of concrete. [Return to Text](#)



**Photogroup 5-3** Mid Pecan Bayou site MP003 showing the no parking sign, parking area, walking path, and beverage containers. [Return to Text](#)



**Photogroup 5-4** Mid Pecan Bayou site M003 showing cigarette butts, a pair of socks and a fishing bobber. (TIAER field personnel in upper left photograph). [Return to Text](#)

## CHAPTER 6

### ORGANIZATION OF ELECTRONIC FILES AND RUAA SUMMARY

#### Organization of Electronic Files

Copies of all interviews from each survey, field data sheets with flow measurements, the contact information form, the RUAA summary form, and transect and other pictures are provided electronically as an appendix to this report on the project website <http://www.tsswcb.texas.gov/managementprogram/mpbruaa>.

Electronic files are organized by survey and provided with the following file structure:

```
RUAA-2011_Mid_Pecan_Bayou(1431)
  Other_RUAA_Information
    General Interviews
  RUAA_Survey1_10_11Jun2011
    Field_Data_Sheets
    Interviews
    MP001_photos
    MP002_photos
    MP003_photos
    MP004_photos
    MP005_photos
    MP006_photos
    MP007_photos
    MP008_photos
  RUAA_Survey2_02_05Sep2011
    Field_Data_Sheets
    Interviews
    MP001_photos
    MP002_photos
    MP003_photos
    MP004_photos
    MP005_photos
    MP006_photos
    MP007_photos
    MP008_photos
```

Under each site folder for photos, as appropriate, are subfolders labeled other, rec\_signs, source\_signs, and transect\_photos. All photos are labeled with date (yyyymmdd), location (site) and with other descriptive information. For example under the transect folder, the photo name 20110610\_mp001\_0m\_DS.jpg indicates that the picture was taken on June 10, 2011 at site MP001 at the 0-m transect and represents the downstream orientation of the picture. In a similar manner, the notation LB indicates left bank, RB indicates right bank, and US indicates upstream for orientation of the transect photos.

## Summary

RUAA surveys were conducted at eight sites along Mid Pecan Bayou (classified Segment 1431) on June 10-11, 2011 and September 2-4, 2011. Although the stream contains sufficient water and significant pools, there were no recreational activities observed by TIAER field staff during the two surveys. Recreational activities reported by interviewees are summarized in Figure 6-1 and the overall RUAA findings are summarized below. Interviewees reported that Mid Pecan Bayou was seldom used for primary contact recreation but was frequently used for secondary contact recreation, primarily fishing. Noncontact recreation was not observed reported. The average thalweg depth was 0.85 m, and there were substantial pools (> 1 m deep) throughout the segment, but public access to the stream was very limited, except at two road crossings. The Palmer Drought Severity Index (PDSI) represented severe drought conditions during the first survey in June 2011 and extreme drought conditions during the second survey in September 2011.

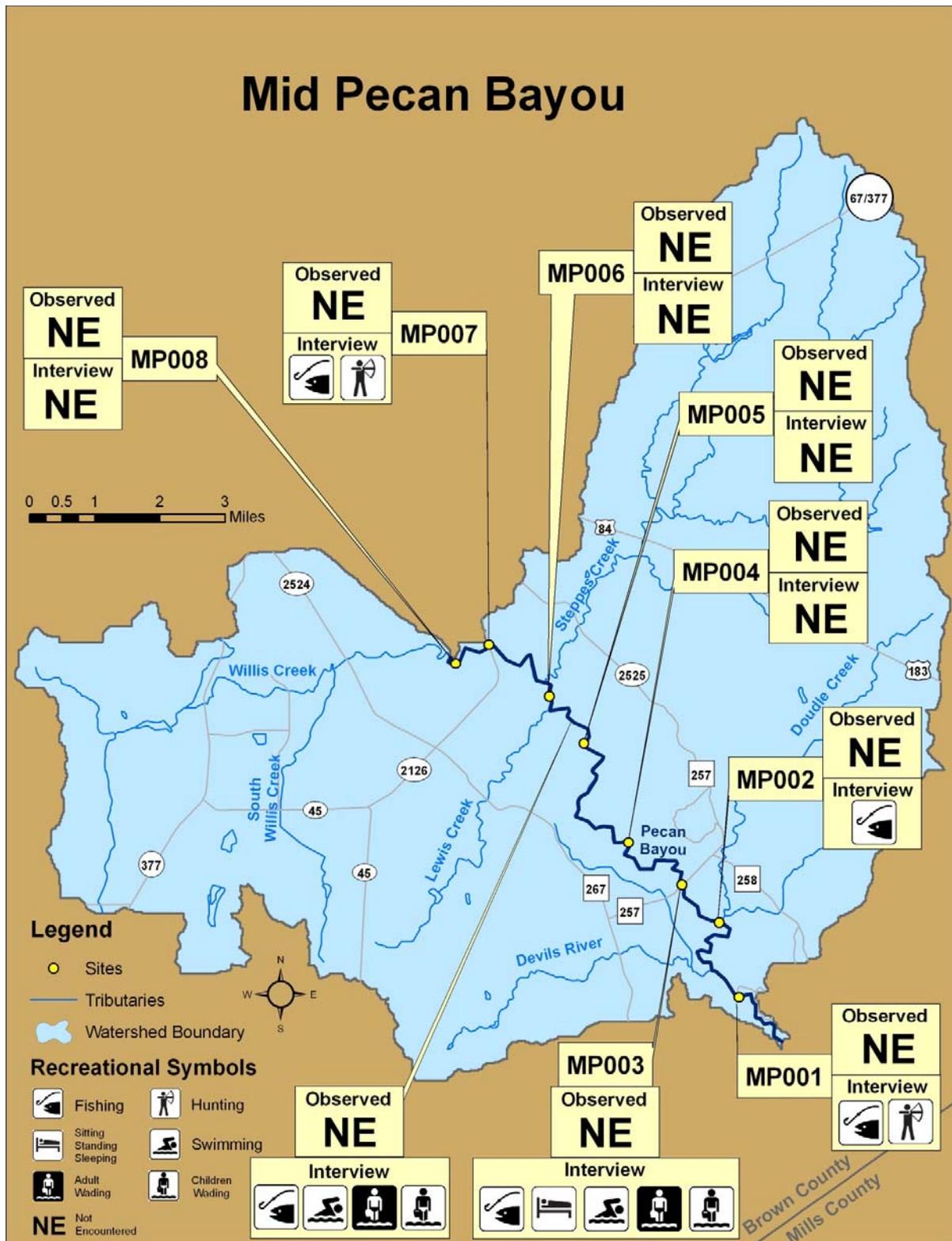
During both field surveys, TIAER personnel never observed anyone recreating in the stream at any of the eight selected sites. Evidence of some form of recreation was observed at site MP003. Drink containers, cigarette butts and a pair of socks indicate that people utilize the location for some form of recreation, but it is unknown if contact recreation occurs. Additionally, evidence of fishing tackle was observed at sites MP003 and MP007, the two sites that are publicly accessible. From the interviews, frequent fishing appears to be the main form of stream recreation, predominantly at site MP003. Some persons stated that swimming, boating and wading were also observed at site MP003, while others claimed to have never observed such activities. Only one of the interviewed landowners, located between Stations MP005 and MP006, claimed to personally swim and wade in the stream.

During the two surveys, very few indications of human use were observed. Some fishing tackle was observed at Sites MP003 and MP007. A shoe print and remnants of a campfire were documented at Site MP002. A canoe was observed on the high bank of a pecan orchard that bordered the stream where TIAER personnel launched boats to survey site MP005 and MP006. In addition, various bottles, cups and assorted trash were observed at Site MP003. No additional signs of human use were observed during the surveys of the stream.

While conducting the stream surveys, no characteristics, such as boat docks, parks, playgrounds, biking trails, campgrounds or sports fields, were encountered that would promote recreation.

The rural nature of the area surrounding Mid Pecan Bayou is an impediment to recreation. Except for sites MP007 and MP003, which are located at road crossings, all other access to Mid Pecan Bayou, except for from within the stream channel, is through private property that is fenced, gated and locked. Access to most of the stream can only be gained through these properties by permission of the landowner. Even then, the distances from gates to the river across private land would also act as a deterrent to persons seeking to reach the river, because there are no private roads to the river and cacti, mesquite and other thorny trees make the journey hazardous for walking.

Within the stream channel, no obstructions were encountered that would impede movement upstream or downstream for the portions of the stream that TIAER traversed.



**Figure 6-1** Summary of observed and interviewed human activities along Segment 1431. Of note, two interviewees indicated fishing, boating, swimming and/or wading by both children and adults, but the locations of these activities were not specified except as along Mid Pecan Bayou.

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**Appendix A**  
**Brownwood-Brown County Health Department Letter**

*Brownwood-Brown Co. Health Dept.*

*P.O. Box 1389 • 510 E. Lee  
Brownwood, Texas 76804  
Phone 325-646-0554*

December 16<sup>th</sup> 2011

Steve Adams  
1050 West Commerce  
Brownwood Texas 76801  
325-6465518

Re: 10 Mile Crossing Brown County Texas

On September 11<sup>th</sup> 2011 an Inspection was conducted by James B Hayes M.D. and myself Paul Coghlan Sanitation Inspector Brownwood Brown County Health Department, The following items were noted:

- Broken Glass around the entire area
- Lumber and construction material was located in and out of the water
- Rebar sticking out of concrete and metal with sharp ends exposed in the water
- Trash such as old tires, medical waste was located in the area
- Human feces were located in the area along with used female products.
- Discarded Animal Carcasses

The area that was covered by water was full of brush and debris that covered the sharp rebar and broken bottles, there are several sharp metal edges sticking out where the old pilings to an old bridge used to be located.

The area is unsafe for swimming due to the large amount of hazards in the area and in the water along with the dangers of someone drowning due to not knowing how deep the stream is and the experience of the swimmer.

It is the Recommendation of the Brownwood-Brown County Health Department that a sign be posted to state that swimming is prohibited.



Paul Coghlan  
Brownwood – Brown County Health Department  
510 East Lee Street  
Brownwood Texas 76801

**Appendix B**  
**Brown County Resolution**

# RESOLUTION

State of Texas  
County of Brown

**WHEREAS**, certain areas of the Pecan Bayou in the vicinity of the intersection of Brown County Road 257 and the said Pecan Bayou, and the waters of the said Pecan Bayou in that vicinity pose threats to the health, safety and welfare of the public; and

**WHEREAS**, the purpose of the crossing of the Pecan Bayou on Brown County Road 257 is for vehicular traffic, and Brown County as the owner of Brown County Road 257 and the road right-of-way of the said Brown County Road 257 is responsible for the use of said crossing;

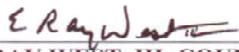
**NOW, THEREFORE**, we, The Brown County Commissioners Court, do hereby resolve that within the boundaries of the County right-of-way for Brown County Road 257 where the same crosses the Pecan Bayou, there shall be no WADING, SWIMMING, BOATING, FISHING, HUNTING, NOR CAMPING.

**IT IS FURTHER RESOLVED** that the County right-of-way on Brown County Road 257 at the "Ten Mile Crossing" at the Pecan Bayou shall not be used by the public for access to the Pecan Bayou for WADING, SWIMMING, BOATING, FISHING, HUNTING, NOR CAMPING.

**IT IS FURTHER RESOLVED** that Brown County Commissioners Court hereby requests and supports action by the Texas Commission on Environmental Quality, or any other State water regulatory agency to prohibit the above stated activities in the following areas of the Pecan Bayou;

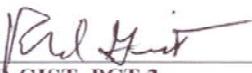
Within the immediate area adjoining the County Road 257 crossing at Pecan Bayou.

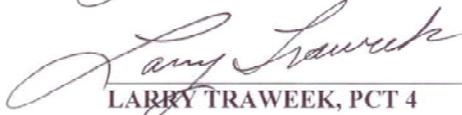
**WITNESS MY HAND AND SEAL OF BROWN COUNTY**, this the 9<sup>th</sup> day of January, 2012.

  
E. RAY WEST, III, COUNTY JUDGE

  
STEVE ADAMS, PCT 1

  
JOEL KELTON, PCT 2

  
RICHARD GIST, PCT 3

  
LARRY TRAWEEK, PCT 4

**Appendix C**  
**List of People Notified for Public Meetings**

FIRST NAME	LAST NAME	CITY	AFFILIATION
Steve	Beal	Early	
Clyde	Gottschalk	Temple	
Melvin	Hale	Brownwood	
Brad	Locker	Brownwood	
Chad	Locker	Brownwood	
Allen	Nelson	Brownwood	
Jo Burk	Poer	Levelland	
Royce and Barbara	Rogers	Blanket	
Carrie	Singleton	Brownwood	
Aaron	Speck	Brownwood	
Edward	Yantis	Brownwood	
Jennifer	Zipp	Midlothian	
Pamela	Casebolt	Temple	Texas State Soil and Water Conservation Board
Jule W.	Richmond	Blanket	Pecan Bayou Soil and Water Conservation District #553
Bobby J.	Clark	Brownwood	Pecan Bayou Soil and Water Conservation District #553
Delbert	Connaway	Brookesmith	Pecan Bayou Soil and Water Conservation District #553
Carlton	Hampton	Early	Pecan Bayou Soil and Water Conservation District #553
Joe	McFarland	Stephenville	Leon Bosque Resource Conservation and Development Council
Leonard T.	Wood	Rising Star	Pecan Bayou Soil and Water Conservation District #553
Jerry	DeHay	Brownwood	City of Brownwood
Steven	Haynes	Brownwood	City of Brownwood
H.D.	Jones	Brownwood	City of Brownwood
Bob	Mangrum	Early	City of Early
Carlton	McMillan	Brownwood	City of Brownwood
Draco	Miller	Brownwood	City of Brownwood
Eddie	Watson	Brownwood	City of Brownwood
Ray	West III	Brownwood	Brown County
David	Withers	Brownwood	City of Brownwood
Steve	Adams	Brownwood	Brown County
Joel	Kelton	Brownwood	Brown County
Richard	Gist	Brownwood	Brown County
Larry	Traweek	Brownwood	Brown County
Don	Hatcher	Brownwood	City of Brownwood
David	Harris	Brownwood	City of Brownwood
Dennis	Winfrey	Brownwood	City of Brownwood
Doran	Lemke	Brownwood	Brown County Appraisal District
Pat	Mooney	Brownwood	Brown County Appraisal District
Bobby	Rountree	Brownwood	City of Brownwood
Dennis	Spinks	Brownwood	Brown County Water Improvement District
Ken	Thomas	Early	City of Early
Dwayne	Grooms	Brownwood	Brown County Farm Bureau
Gregg	Rice	Brownwood	Brownwood Area Chamber of Commerce
James	Campbell	Brownwood	Brownwood Economic Development Corporation
Mark	Campbell	Brownwood	Coldwell Banker Mark Campbell & Assoc.
Tootie	Kelly	Brownwood	Tootie Kelly Real Estate
Brent	Mosely	Early	Ross Real Estate
Eric	Neese	Brownwood	Brown County Abstract Company, Inc.
Jesse	Richmon	Brownwood	Richmon Farm Supply, Inc.
Laura	Terhune	Brownwood	Brownwood Area Chamber of Commerce
Jeff	Whitt	Brownwood	Brown County Farm Bureau Agency
John	Harkey	Brownwood	Ag-Mart/Nelson Wholesale
Clint	Patrick	Brownwood	Mills County State Bank
Patricia	Wise	Austin	Texas Commission on Environmental Quality

FIRST NAME	LAST NAME	CITY	AFFILIATION
Allison	Woodall	Austin	Texas Commission on Environmental Quality
Comer	Tuck	Austin	Texas Water Development Board
Cameron	Turner	Austin	Texas Water Development Board
Charlie	Upchurch	Carlton	Texas State Soil and Water Conservation Board
Jared	Bowen	Temple	Texas State Soil and Water Conservation Board
Ben	Bowers	Temple	Texas State Soil and Water Conservation Board
Lee	Munz	Temple	Texas State Soil and Water Conservation Board
Bill	Hutchison	Austin	Texas Water Development Board
Scott	Campbell	Austin	Texas General Land Office
Laurie	Curra	Austin	Texas Commission on Environmental Quality
Kerry	Niemann	Austin	Texas Commission on Environmental Quality
Monica	Harris	Austin	Texas Commission on Environmental Quality
Winona	Henry	Abilene	Texas Commission on Environmental Quality
Cliff	Moore	Abilene	Texas Commission on Environmental Quality
Steve	Jones	Dublin	Texas State Soil and Water Conservation Board
John	Foster	Temple	Texas State Soil and Water Conservation Board
Aaron	Wendt	Temple	Texas State Soil and Water Conservation Board
Ruben	Solis	Austin	Texas Water Development Board
Robin	Cypher	Austin	Texas Commission on Environmental Quality
Andrew	Sullivan	Austin	Texas Commission on Environmental Quality
Holly	Vierk	Austin	Texas Water Development Board
Pat	Radloff	Austin	Texas Parks and Wildlife Department
Jennifer	Bronson	Waco	Texas Parks and Wildlife Department
Melissa	Dudley	Waco	Texas Parks and Wildlife Department
Lt. Tracy	Davis	Brownwood	Texas Parks and Wildlife Department
Major James	Gutherie	Brownwood	Texas Parks and Wildlife Department
Travis	Allen	Brownwood	Texas Parks and Wildlife Department
Matthew	Marek	Brownwood	Texas Parks and Wildlife Department
Timothy	Birdsong	Austin	Texas Parks and Wildlife Department
Gary	Garrett	Austin	Texas Parks and Wildlife Department
Sonny	Arnold	College Station	Texas Parks and Wildlife Department
John	Davis	Austin	Texas Parks and Wildlife Department
Michelle	Haggerty	Kerrville	Texas Parks and Wildlife Department
Arlene	Kalmbach	Bastrop	Texas Parks and Wildlife Department
Mitch	Lockwood	Kerrville	Texas Parks and Wildlife Department
Danny	Davis	Ranger	Texas Parks and Wildlife Department
Mike	Miller	Stephenville	Texas Parks and Wildlife Department
Kevin	Mote	Brownwood	Texas Parks and Wildlife Department
Nathan	Rains	Cleburne	Texas Parks and Wildlife Department
Clay	Brewer	Brownwood	Texas Parks and Wildlife Department
Jill	Csekitz	Austin	Texas Commission on Environmental Quality
Joe	Martin	Austin	Texas Commission on Environmental Quality
Jim	Davenport	Austin	Texas Commission on Environmental Quality
Richard	Eyster	Austin	Texas Department of Agriculture
David	Villareal	Austin	Texas Department of Agriculture
Cody	Norris	Brownwood	USDA Farm Service Agency
Terry	Been	Brownwood	USDA Natural Resources Conservation Service
Jessica	Benavides	Brownwood	USDA Natural Resources Conservation Service
Kyle	Ellis	Brownwood	USDA Natural Resources Conservation Service
Ricky	Marks	Brownwood	USDA Natural Resources Conservation Service
Joy	Nicholopoulos	Albuquerque	US Fish & Wildlife Service
Daren	Harmel	Temple	USDA Agricultural Research Service
Jim	Herrington	Temple	US Environmental Protection Agency

FIRST NAME	LAST NAME	CITY	AFFILIATION
Henry	Brewer	Dallas	US Environmental Protection Agency
Brian	Mueller	Dallas	US Environmental Protection Agency
Tina	Hendon	Dallas	US Environmental Protection Agency
Susan	Baggett	Temple	USDA Natural Resources Conservation Service
Steve	Bednarz	Temple	USDA Natural Resources Conservation Service
Bob	Stobaugh	Temple	USDA Natural Resources Conservation Service
Bob	Joseph	Austin	US Geological Survey
George	Ozuna	Austin	US Geological Survey
Jeff	Heath	Weatherford	USDA Natural Resources Conservation Service
Randall	Henry	Weatherford	USDA Natural Resources Conservation Service
Alfonso	Leal	Weatherford	USDA Natural Resources Conservation Service
Ed	Reed	Weatherford	USDA Natural Resources Conservation Service
John	Walker	San Angelo	Texas AgriLife Research
Don	Cawthon	Stephenville	Texas AgriLife Research
Jim	Rooni	Austin	Texas Forest Service
Scott	Anderson	Brownwood	Texas AgriLife Extension Service
R	Karthikeyan	College Station	Texas AgriLife Research
Justin	Mechell	College Station	Texas AgriLife Extension Service
Terry	Gentry	College Station	Texas AgriLife Research
Mark	McFarland	College Station	Texas AgriLife Extension Service
Larry	Redmon	College Station	Texas AgriLife Extension Service
James	Cathey	College Station	Texas AgriLife Extension Service
Steve	Byrns	San Angelo	Texas AgriLife Extension Service
M. Scott	Durham	San Angelo	Texas AgriLife Extension Service
Dale	Rollins	San Angelo	Texas AgriLife Extension Service
George	DiGiovanni	El Paso	Texas AgriLife Research
Neal	Wilkins	College Station	Texas AgriLife Research
Marvin	Ensor	San Angelo	Texas AgriLife Extension Service
Raghavan	Srinivasan	College Station	Texas A&M University
Shane	Harrington	Temple	Texas Forest Service
Bill	Harris	College Station	Texas AgriLife Research
Kevin	Wagner	College Station	Texas AgriLife Research
Hughes	Simpson	Lufkin	Texas Forest Service
Mike	Bodenchuk	San Antonio	Texas AgriLife Extension Service
Bruce	Leland	San Antonio	Texas AgriLife Extension Service
Glynn	Riley	Brownwood	Texas AgriLife Extension Service
Bryan	Cook	Austin	Lower Colorado River Authority
David	Cowan	Austin	Lower Colorado River Authority
Tom	Smith	Abilene	West Central Texas Council of Governments
Lee	Standley	Granbury	Leon Bosque Resource Conservation and Development Council
Ned	Meister	Waco	Texas Farm Bureau
Helen	Holdsworth	San Antonio	Texas Wildlife Association
Justin	Dreibelbis		Texas Wildlife Association
Dustin	Kinker	Eastland	Texas Farm Bureau
Kirby	Brown	San Antonio	Texas Wildlife Association
Jack	Andrews	Brady	Texas and Southwestern Cattle Raisers Association
Ellen	Brisendine	Fort Worth	Texas and Southwestern Cattle Raisers Association
Kristin	Hawkins	Fort Worth	Texas and Southwestern Cattle Raisers Association
Bill	Hyman	Lockhart	Independent Cattlemen's Association of Texas
Tim	Niedecken	Fort Worth	Texas and Southwestern Cattle Raisers Association
Jason	Skaggs	Austin	Texas and Southwestern Cattle Raisers Association
Sandy	Whittley	San Angelo	Texas Sheep and Goat Raisers' Association
Clay	Coppedge	Hewitt	Country World News

FIRST NAME	LAST NAME	CITY	AFFILIATION
Gene	Deason	Brownwood	Brownwood Bulletin
Steve	Kelton	San Angelo	Livestock Weekly
Kari	Kramer	Sulphur Springs	Country World News
George	Levesque	Abilene	KTXS-TV ABC
Kim	Nussbaum	Abilene	Abilene Reporter-News
Barry	Rose	Brownwood	KOXE 101.3 FM
Rex	Tackett	Brownwood	KXYL 102.3 FM
Lisa	Tipton	Brownwood	Brownwood News
		Abilene	KRBC-TV NBC
		Abilene	KTAB-TV CBS
		Fort Worth	Weekly Livestock Reporter
Andy	Sansom	San Marcos	Texas State University-San Marcos
Emily	Warren	San Marcos	Texas State University-San Marcos
Jason	Pinchback	San Marcos	Texas State University-San Marcos
Ken	Kramer	Austin	Sierra Club
Cynthia	Whiteford	Austin	Trust for Public Land
Bob	Benson	Austin	Audubon Texas
Myron	Hess	Austin	National Wildlife Federation
Laura	Huffman	Austin	The Nature Conservancy of Texas
Kari	Means	Austin	TRC Solutions, Inc.
Larry	Millar	Abilene	Big Country Audubon Society
Dusty	Jones	Comanche	
Chinling	Chen	Brownwood	USDA Natural Resources Conservation Service
Casey	Spinks	Coleman	USDA Natural Resources Conservation Service
Deana	Moore	Abilene	Texas Commission on Environmental Quality
Jay	Bragg	Waco	Texas Farm Bureau
Alex	Verrillo	Comanche	USDA Natural Resources Conservation Service
Arlene	Salazar	Brownwood	USDA Natural Resources Conservation Service
Walter	Croft	Brownwood	
Janice	Garrett	Brownwood	Sorrel Canyon Ranch
Kyle	Ellis	Brownwood	USDA Natural Resources Conservation Service