

Recreational Use Attainability Analysis for Big Cypress Creek (0405A) in the Cypress Creek River Basin

By Leah Taylor
Texas Institute for Applied Environmental Research
Submitted to TCEQ February 2022



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Texas Commission on Environmental Quality
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Chapter 1. Introduction

Problem Statement

Big Cypress Creek (0405A) is an unclassified water body identified for assessment purposes by the Texas Commission on Environmental Quality (TCEQ). Big Cypress Creek is approximately 10 river miles long and is comprised of one assessment unit (AU). The 2018 Texas Integrated Report of Surface Water Quality (TCEQ, 2018a) defines Big Cypress Creek (0405A) as being located from the confluence with Lake Cypress Springs in Franklin County, to approximately 5 miles west of State Highway 37 (Figure 1.1). Big Cypress Creek is listed as impaired for bacteria on the 2018 Texas 303(d) list for bacteria. Water body 0405A was first listed in 2016 and has continued to be listed as impaired for bacteria on the 2018 Texas 303(d) list. Big Cypress Creek is also impaired for depressed dissolved oxygen. The Texas Integrated Report of Surface Water Quality (TCEQ, 2018a) includes the Texas 303(d) list of impaired water bodies and is available online dating back to 1992.

Big Cypress Creek (0405A) has a presumed use of primary contact recreation based on the Texas Surface Water Quality Standards (TSWQS) (TCEQ, 2010). Prior to June 2010 only two categories of recreation use, contact and noncontact, existed in Texas. In June 2010, TCEQ adopted revisions to the TSWQS that expanded the designation of contact recreation into three categories (primary contact recreation, secondary contact recreation 1, and secondary contact recreation 2) based on varying degrees of interaction with the water, while maintaining a fourth category of noncontact recreation. On February 12, 2014, TCEQ adopted a fourth designation of contact recreation, primary contact 2. These revisions were codified in the Texas Administrative Code (TAC), Title 30 Chapter 307 and became effective as a state rule on July 22, 2010 (TCEQ, 2010). These revisions were codified in the Texas Administrative Code (TAC), Title 30 Chapter 307 and became effective as a state rule on July 22, 2010 (TCEQ, 2010). As a result of these revisions to the TSWQS, all water bodies listed as impaired based on bacteria for contact recreation are scheduled to undergo a standards review to determine if primary contact recreation is appropriate or if a revision to the use category for recreation should be considered.

Use attainability analyses (UAAs) are studies to evaluate the designated or presumed uses of a water body. In order to identify and assign attainable uses and criteria to individual water bodies, UAAs evaluate physical, chemical, biological, and economic factors affecting use attainment of a water body (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 category of a water body, the findings of which are presented within this report for Big Cypress Creek (0405A).

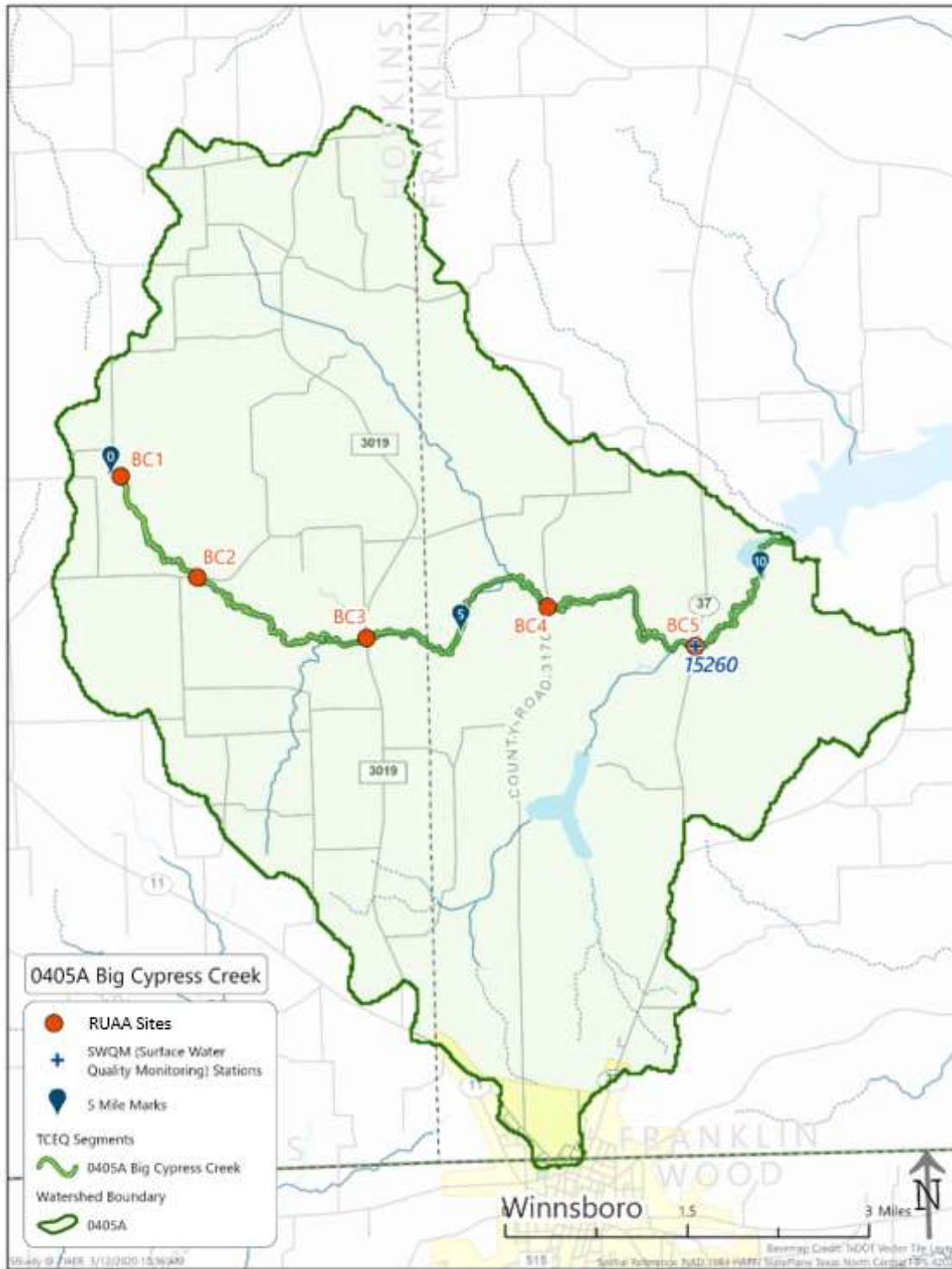


Figure 1.1 Watershed of Big Cypress Creek (0405A)

There are no wastewater discharges, and one concentrated animal feeding operation located in the Big Cypress Creek watershed.

Objectives

The objective of this report is to present the findings of a Comprehensive RUAA for Big Cypress Creek following TCEQ March 2014 Procedures for a Comprehensive RUAA and a Basic RUAA Survey (TCEQ, 2014b). An RUAA consists of three parts: field surveys to document water body characteristics and signs of recreation, interviews with stakeholders regarding past and current use of the water body, and a historical review regarding recreational use of the water body. All components of this RUAA were performed by Texas Institute for Applied Environmental Research (TIAER), which is located on the campus of Tarleton State University in Stephenville, Texas. Field surveys and interviews for the RUAA were conducted under a Texas Commission on Environmental Quality (TCEQ) approved Quality Assurance Plan (QAP; TIAER, 2020).

Stakeholder and Agency Involvement

TCEQ 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. TIAER provided coordination for public participation for this project.

Input from TCEQ regional staff, United States Geological Survey regional staff, Texas Parks and Wildlife Department (TPWD) regional staff, 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).

Meetings with state agencies, river authority representatives, local officials, and stakeholders were held to give an overview of water quality issues within Big Cypress Creek watershed and to obtain comments on proposed survey sites prior to field data collection. Meetings targeted local and state agencies as well as stakeholders in an effort to inform them of the assessment of water quality within Big Cypress Creek and the need for an RUAA.

A public meeting focusing specifically on the RUAA was held at the Hansen-Sewell Center located in Pittsburg, Texas on February 24, 2020. At this meeting input was sought on the proposed sampling sites for the Big Cypress Creek RUAA. Attendees provided information regarding activities that typically occur within the watershed and offered assistance in accessing the stream via privately owned property.

A final public meeting occurred on February 24, 2022, virtually, to inform stakeholders of the findings of both field surveys. The next steps of the RUAA were discussed at this meeting and feedback from stakeholders was solicited. At the meeting, stakeholders were informed that the draft RUAA report was open for public review and comment. The draft report is available via the project website at <https://www.tceq.texas.gov/waterquality/standards/ruaas/cypress-creek-basin-ruaa-part3>.

Watershed stakeholders were invited to attend public meetings through mailed invitations, public announcements (TCEQ website), and individual phone calls. Information on past meetings for this RUAA, presentations, and other information, can be found on the project's website:

<https://www.tceq.texas.gov/waterquality/standards/ruaas/cypress-creek-basin-ruaa-part3>.

Chapter 2. Study Methodology

The process of developing a list of sites to be surveyed for the RUAA began with a reconnaissance of potential locations along each water body. A combination of Geographic Information System (GIS) data, review of historical information, and meetings, phone conversations with local entities and stakeholders were used to determine sites included in the RUAA field surveys.

Watershed Reconnaissance and Site Selection Strategy

Reconnaissance of each watershed was conducted to collect background information before selecting appropriate sites for each RUAA. To the degree possible, site reconnaissance was coordinated with watershed stakeholders in an effort to increase local landowner interest in water quality issues. The March 2014 RUAA procedures (TCEQ, 2014) recommends selecting three sites per every five miles of stream. Based on this recommendation, the preferred number of sites for Big Cypress Creek was six.

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

- Location of areas along the water body that were accessible to the public and had the highest potential for recreational use, such as road crossings and parks;
- Location of permitted wastewater outfalls and other potential point sources;
- Hydrologic characteristics, such as stream type, streamflow, and hydrologic alterations; and
- Location of city boundaries or other designated population areas.

The site selection process considered locations that were accessible to the public, had the highest potential for recreational use, and that were established TCEQ monitoring stations where historical data may have been 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.

Survey Methods

Field Survey Data Collection Activities

As specified in the procedures for a Comprehensive RUAA (TCEQ, 2014), two separate field surveys occurred at each selected survey site during the warm season (air temperature greater than or equal to 70 degrees Fahrenheit or 21 degrees Celsius) when human recreational activities were most likely to occur (May - September). Ideally, field surveys were to be conducted when stream flow conditions were normal. Rainfall data 30 days prior to each survey were also documented to provide antecedent conditions.

Data collection activities at each RUAA site for both field surveys included the following:

- Measurement of average depth at thalweg (deepest depth).
- Measurement of depths, lengths, and widths of substantial pools.
- Documentation of observational/anecdotal data required on the RUAA field data sheets.
- Photographs of any signs of recreation.
- Photographs of site conditions including upstream, downstream, left bank, and right bank photos at the 0-m, 150-m, and 300-m transects.

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 (2014). The thalweg is defined as the deepest depth of a transect perpendicular to the stream channel. A substantial pool was defined as a pool greater than 1-m (3.28-ft) deep and 10-m (32.8-ft) long for the purposes of the RUAA survey (TCEQ, 2014).

As instructed in the RUAA procedures manual (TCEQ, 2014), a 300-m reach at each site was evaluated to determine average thalweg depth. Eleven transects at 30-m intervals were established along the reach. Transects were labeled upstream to downstream with the 300-m transect at the most upstream point of the survey and the 0-m transect being the most downstream. Thalweg was measured at each of the eleven transects. Where significant pools were encountered along the 300-m reach, depths, widths and lengths were measured and recorded. Depths, lengths and widths are presented in meters as per the RUAA procedures (TCEQ, 2014).

Observational /Anecdotal Data

Anecdotal information was recorded on field data sheets during all surveys using the field data sheets from the TCEQ-approved QAP (TIAER, 2020).

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

- Channel flow status as indicated by flow severity.
- Stream type (e.g., ephemeral, intermittent, etc.).
- Riparian zone characteristics (forest, pasture, eroded banks, etc.).
- Stream accessibility.
- Substrate type.
- Anecdotal information related to observed human contact activities.

Photographs

TIAER staff created photographic records of each site during the site surveys. Photographs were intended to clearly depict the characteristics of the channel and any

evidence of observed uses or indications of human use, hydrologic modifications, etc. Photographs were taken specifically at the 0-m, 150-m, and 300-m transects (as described in the Field Data Sheets). Any items of interest, e.g., obstructions, 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 taken to indicate potential bacteria sources to the water body. All photographs were labeled in a manner that indicated the date, site location, orientation to the stream, and photo's subject. Selected photos representative of each RUAA field site are included with the survey results for each water body in this report.

Chapter 3. Study Area

Description of Big Cypress Creek

Big Cypress Creek is located in Hopkins County with portions of the stream extending into Franklin and Wood Counties in the northeastern portion of Texas. Water body 0405A is within the Cypress Creek River Basin. The medium sized watershed is approximately 20,014 acres (roughly 31.27 square miles) with a population of 1,200 (USCB, 2010). The watershed does not have any parks within its boundaries and overlaps the City of Winnsboro (population 3,271) (USCB, 2010).

Climatic Conditions

Annual precipitation for the Big Cypress Creek watershed was based on data obtained from the National Oceanic and Atmospheric Administration's website (NOAA, 2015) for Mount Vernon, Texas (Station USC00416119). It is important to note that this station is not within the Big Cypress Creek watershed boundaries. However, it is the nearest station with climate data available for both precipitation and temperature. Normal precipitation (1981-2010) for Station USC00416119 averages 47.42 inches per year with a peak rainfall typically occurring in the months of October and May (Figure 3.1).

Average maximum temperatures for Station USC00416119 rise above 70°F beginning in April and ending in October (Figure 3.1). March through October are the months known as generally suitable for assessing recreational use, but only if temperatures reach above 70°F (TCEQ, 2014b).

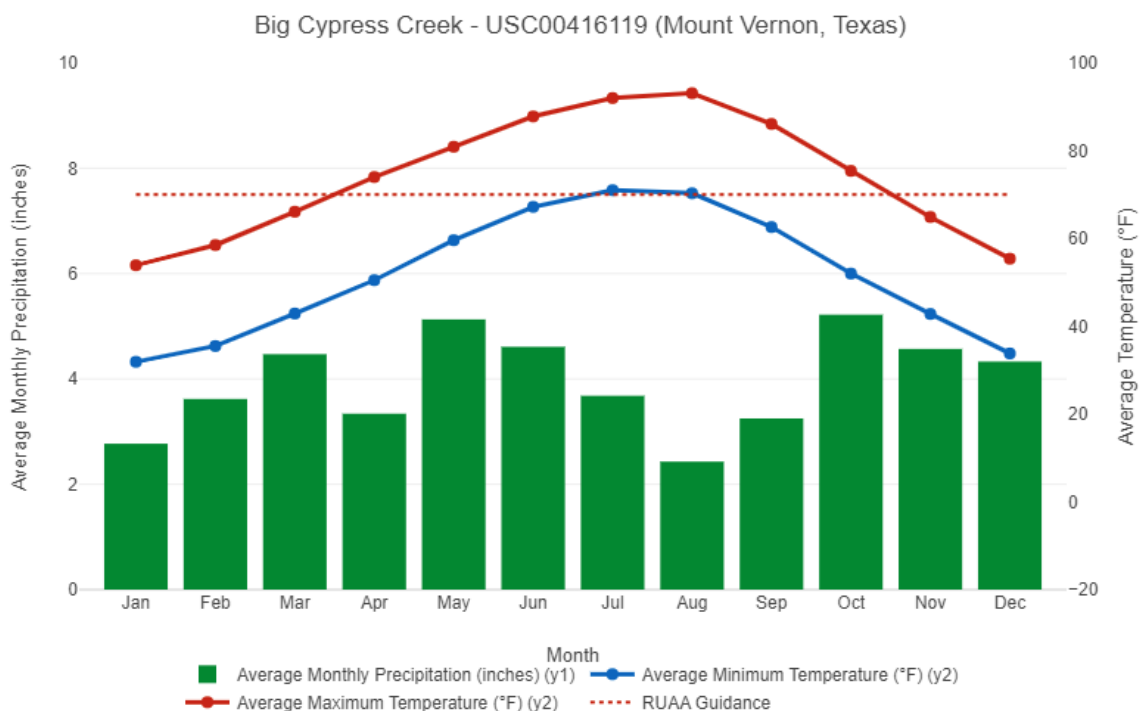


Figure 3.1 Monthly average precipitation for Mount Vernon, Texas

Source: NOAA (2015) based on data for 1974-2015.

Land Use and Land Cover

The Big Cypress Creek watershed lies within the Post Oak Savannah ecoregion as defined in the publication Ecoregions of Texas (Griffith et al., 2007). The dominant land cover within the Big Cypress Creek watershed is Pasture/Hay at 55.59% and is present throughout the watershed (Table 3.1 and Figure 3.2). Mixed Forest is the secondary land cover encompassing 16.28% of the Big Cypress Creek watershed.

Table 3.1 Land use/land cover classes within the Big Cypress Creek watershed

Source: 2011 National Land Cover Database (USGS, 2016).

Class	Area (acres)	Percent (%)
Pasture/Hay	11,128	55.59%
Mixed Forest	3,258	16.28%
Woody Wetlands	1,814	9.06%
Deciduous Forest	1,485	7.41%
Developed, Low Intensity	705	3.52%
Grassland/Herbaceous	552	2.76%
Developed, Open Space	369	1.84%

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Class	Area (acres)	Percent (%)
Open Water	179	0.89%
Evergreen Forest	178	0.89%
Emergent Herbaceous Wetlands	151	0.76%
Shrub/Scrub	113	0.57%
Developed, Medium Intensity	65	0.32%
Developed, High Intensity	9	0.05%
Barren Land (Rock/Sand/Clay)	7	0.04%
Cultivated Crops	6	0.03%
TOTAL	32,225	100%

The land use/land cover for the watershed area was obtained from the National Land Cover Database (NLCD) maintained by the U.S. Geological Survey (USGS, 2016). The land use/land cover categories within the watershed are described as follows from the NLCD legend:

- 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.
- Mixed Forest - areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover.
- Woody Wetlands - areas of forest of shrubland vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
- Deciduous Forest - Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.
- Developed, Low Intensity - Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover. These areas most commonly include single-family housing units.
- 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.
- Developed, Open Space - Areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot, single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.

- Evergreen Forest - areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.
- Open Water - Areas of open water, generally with less than 25% cover of vegetation or soil.
- Emergent Herbaceous Wetlands - Areas where perennial herbaceous vegetation accounts for greater than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
- 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.
- Developed, Medium Intensity - Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.
- Developed High Intensity - Highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses, and commercial/industrial. Impervious surfaces account for 80% to 100% of the total cover.
- Barren Land (Rock/Sand/Clay) - areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
- 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.

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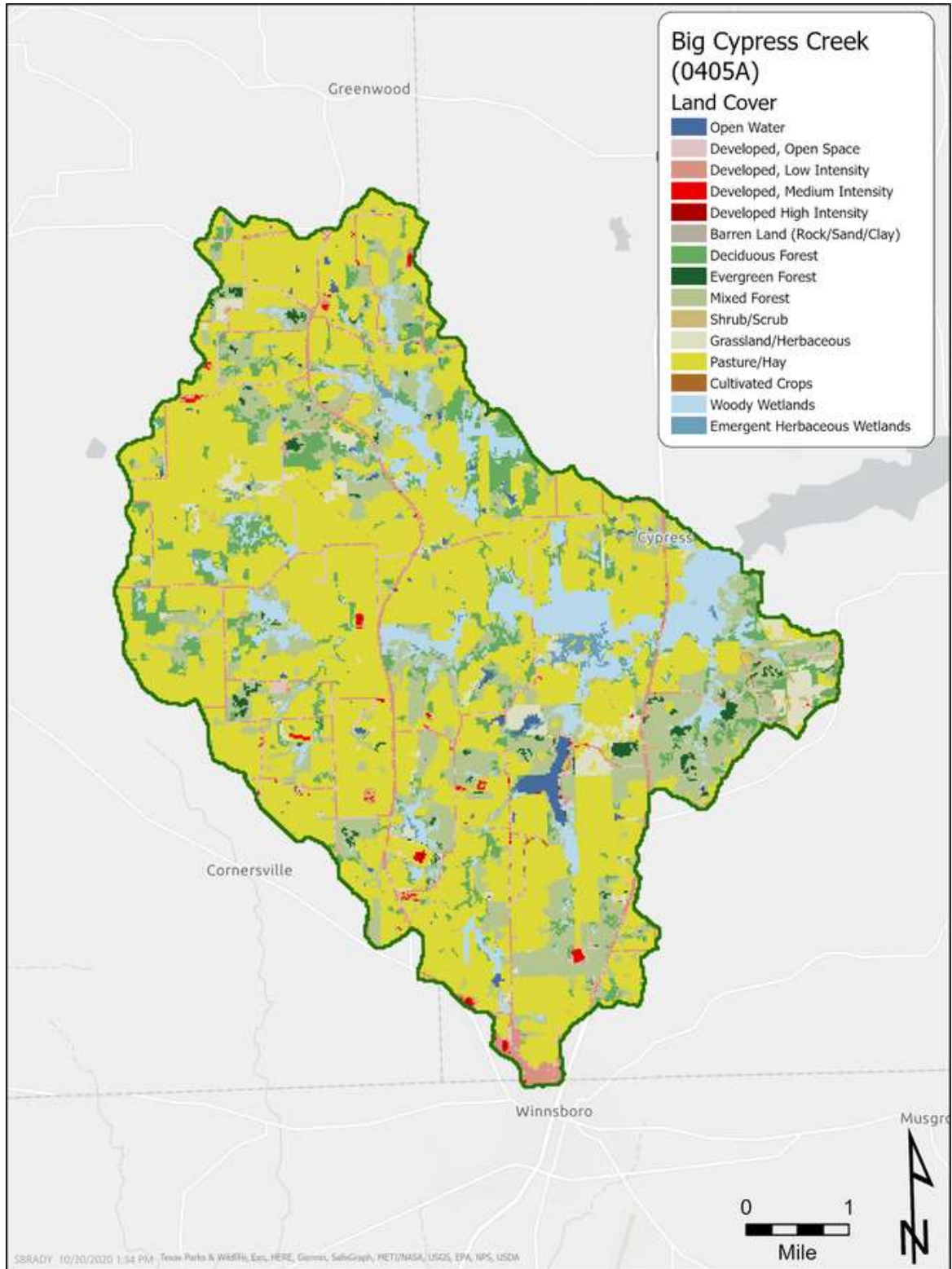


Figure 3.2 Land use and land cover of the Big Cypress Creek watershed

Source: 2016 National Land Cover Database (USGS, 2016).

Regulated Sources

Potential sources of fecal pollution, as measured by indicator bacteria *Escherichia coli* (*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 include domestic and industrial wastewater treatment facilities (WWTFs); stormwater 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 each facility or a general permit for operation.

Wastewater Discharge Facilities

There are no municipal wastewater treatment facilities (WWTF) within the Big Cypress Creek watershed.

Regulated Stormwater

The TPDES and the NPDES Municipal Separate Storm Sewer (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. Because there are no cities within the watershed boundary, there are no stormwater permits within the watershed.

Concentrated Animal Feeding Operations

There is currently one permitted CAFO located within the watershed of the Big Cypress Creek watershed.

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 are not regulated by permit under the TPDES and NPDES. Potential unregulated sources include wildlife (mammals and birds), large exotics, unmanaged feral animals (e.g., feral hogs), on-site sewage facilities (OSSFs), pets, and livestock.

Non-Permitted Agricultural Activities and Domesticated Animals

Activities such as livestock grazing close to water bodies and agricultural use of manure as fertilizer can contribute *E. coli* to nearby water bodies. Livestock statistics were obtained from United States Department of Agriculture (USDA) National Agricultural Statistics Service website (USDA, 2017). While these are county level

statistics and thus only a very rough estimate of livestock in the watershed (Table 3.2), these statistics indicate that chickens, cattle and calves, and horses and donkeys are the most common livestock found within the watershed.

Table 3.2 Estimated livestock numbers within the Big Cypress Creek watershed based on statistics for Upshur, Camp, and Wood Counties and adjusted for the percent of the county represented by the watershed

Source: USDA, 2012

The Big Cypress Creek watershed comprises of about 50.6% of Hopkins County, 49.3% of Franklin County, and 0.1% of Wood County.

County	Chickens	Cattle & Calves (all beef)	All Goats	All Sheep	Horses & Donkeys	Hogs & Pigs
Hopkins	378,822	13,242	100	143	209	36
Franklin	307,663	3,687	11	4	26	15
Wood	251,233	4,657	82	97	147	29
Proportional Average for the Big Cypress Creek Watershed	937,717	21,585	192	244	382	80

Domestic pets are another unregulated source of *E. coli* bacteria, particularly dogs, because storm runoff often carries these wastes into streams (USEPA, 2009). A rough estimate of the dog and cat population can be computed assuming there are 0.614 dogs and 0.457 cats per household (AVMA, 2018). According to the 2010 census there are 566 households within the Big Cypress Creek watershed which indicates that there are potentially 348 dogs and 259 cats residing within the watershed.

Wildlife

E. coli bacteria are common inhabitants of the intestines of all warm-blooded animals, including wildlife such as mammals and birds. Wildlife are naturally attracted to riparian corridors of streams and rivers. With direct access to the stream channel, the deposition of wildlife waste can be a concentrated source of bacteria loading to a water body. Fecal bacteria from wildlife are also deposited onto land surfaces, where it may be washed into nearby streams by rainfall runoff.

Failing On-Site Sewage Facilities

Septic systems or on-site sewage facilities (OSSFs) are often used in rural areas that do not have the ability to connect to a central wastewater collection system. To estimate the number of potential OSSFs in the watershed, 911 address points outside of city boundaries and outside of any area municipal utility districts were used. Results indicate that 544 households in the watershed are outside municipal areas and likely on septic systems.

Historical Information on Recreational Use

A review of historical information was performed regarding recreational water uses for the Big Cypress Creek. The review considered the time period of November 28, 1975 to the present in accordance with 40 CFR Part 131 (EPA standards regulation). Government offices, libraries, and newspapers were searched and contacted in addition to generic internet searches. The following is a summary of the review and searches.

Government Sources

City of Winnsboro

[City of Winnsboro Homepage¹](#)

Search retrieved no results.

Upshur County

[Upshur County Homepage²](#)

Search retrieved no results.

Franklin County

[Franklin County Homepage³](#)

Search retrieved no results.

Wood County

[Wood County Homepage⁴](#)

Search retrieved no results.

Library Sources

Gilbreath Memorial Library

[Gilbreath Memorial Library Homepage⁵](#)

Phone: (903) 342-6866

Library is currently closed with no scheduled reopen date. Webpage was taken down; thus, search retrieved no results.

Newspaper Sources

News Around Winnsboro Texas Facebook Page

[News Around Winnsboro Texas⁶](#)

Explored various links and online texts. Search retrieved no results.

¹ www.Cityofwinnsboro.org/index.html

² www.coutyofupshur.com

³ www.co.franklin.tx.us/

⁴ www.mywoodcounty.com/

⁵ www.cityoftyler.org/government/departments/library

⁶ www.facebook.com/groups/NewsWinnsboro

Internet Searches

Google

[Google.com – Search for Big Cypress Creek⁷](#)

Searched Google by creek name. Search retrieved two results:

1. [Wikipedia⁸](#)
 - Wikipedia shared no recreational information.
2. [Good Places Great Things Blog⁹](#)
 - Blog reports that the “bayou” is “not for swimming”

The Handbook of Texas Online

[The Handbook of Texas Online - Search for Big Cypress Creek \(Franklin County\)¹⁰](#)

Searched the handbook by creek name. Search retrieved no results of recreational contact.

⁷www.google.com/search?q=big+cypress+creek+texas&sxsrf=AOaemvLjTrsTqgfPh28nqBGFOjnSNrf_KA%3A1638820734641&source=hp&ei=fmuuYZKoi7SxqtsPi5-u6Ac&iflsg=ALs-wAMAAAAAYa55jp4JWmVka2tmE1Yvpz29iRmhCOX&ved=0ahUKEwiS3_D9-s_0AhW0mGoFHYuPC30Q4dUDCAo&uact=5&oq=big+cypress+creek+texas&gs_lcp=Cgdnd3Mtd2l6EAMyBggAEBYOHjIGCAAQFhAeMgYIABAWEB4yBggAEBYOHjoECCMQJzoECAAOQzoOCC4OgAQOsQMOxwEQowI6BOgAEIAEOggILhCxAXCDAToRCC4OgAQOsQMOgweQxwEQowI6BOguEIAEOgQILhBDOgoILhDHARCvARBDOgsIABCABBCCxAXCDAToKCAAQsQMOgweEQzoKCC4OxwEQOQMOOzoICC4OgAQOsOM6CwguELEDEMcbEKMCOgsILhCABBDHARCvAToICAAOgAQOsOM6BwguELEDEEM6CggAEIAEEIcCEBO6EwguEIAEEIcCELEDEMcbEK8BEBO6EAgueIAEEIcCEMcbEK8BEBO6CwguEIAEEMcbENEDogOILhCABBDHARCvARAKOgcIABCABBKogOILhDHARCvARAKOgOILhAKOgoILhDHARDRAxAKOg4ILhCABBCCxAXDHARCvAVAAWNEjYLokaAJwAHgBgAGYAogBjBeSAQY5LjEILjGYAOCgAOE&scient=gws-wiz

⁸ www.en.wikipedia.org/wiki/Big_Cypress_Creek

⁹ www.goodplacesgreatthings.com/2017/05/23/mystery-big-cypress-creek/

¹⁰ www.tshaonline.org/handbook/entries/big-cypress-creek-franklin-county

Chapter 4. Big Cypress Creek (0405A)

Survey Site Descriptions

Big Cypress Creek is 10 river miles long indicating a goal of 6 sites (3 sites per 5 miles of river) for the RUAA survey. With the help of cooperating stakeholders, TIAER was able to establish a total of 5 survey sites along Big Cypress Creek (Figure 4.1 and Table 4.1). All 5 sites were located at public road crossings.

All 5 sites initially allowed for public access. There was no fencing upstream or downstream of the crossings. Access to the stream between road crossings was moderately difficult due to steep banks and dense vegetation. The average distance between survey sites was 1.75 river miles with the largest gap being 2.71 river miles between Site BC02 and BC03. Site BC05 is co-located with TCEQ sampling station 15260. RUAA surveys were performed June 22, 2021 and August 24, 2021 at four of the five locations. Landowner permission was not initially required to access sites at any location. However, between scouting the sites and the first survey, a gate had been installed at the road leading to site BC01. Attempts were made to gain access but were unsuccessful. A brief description of each site follows.

Recreational Use Attainability Analysis for Big Cypress Creek (0405A) in the Cypress Creek River Basin

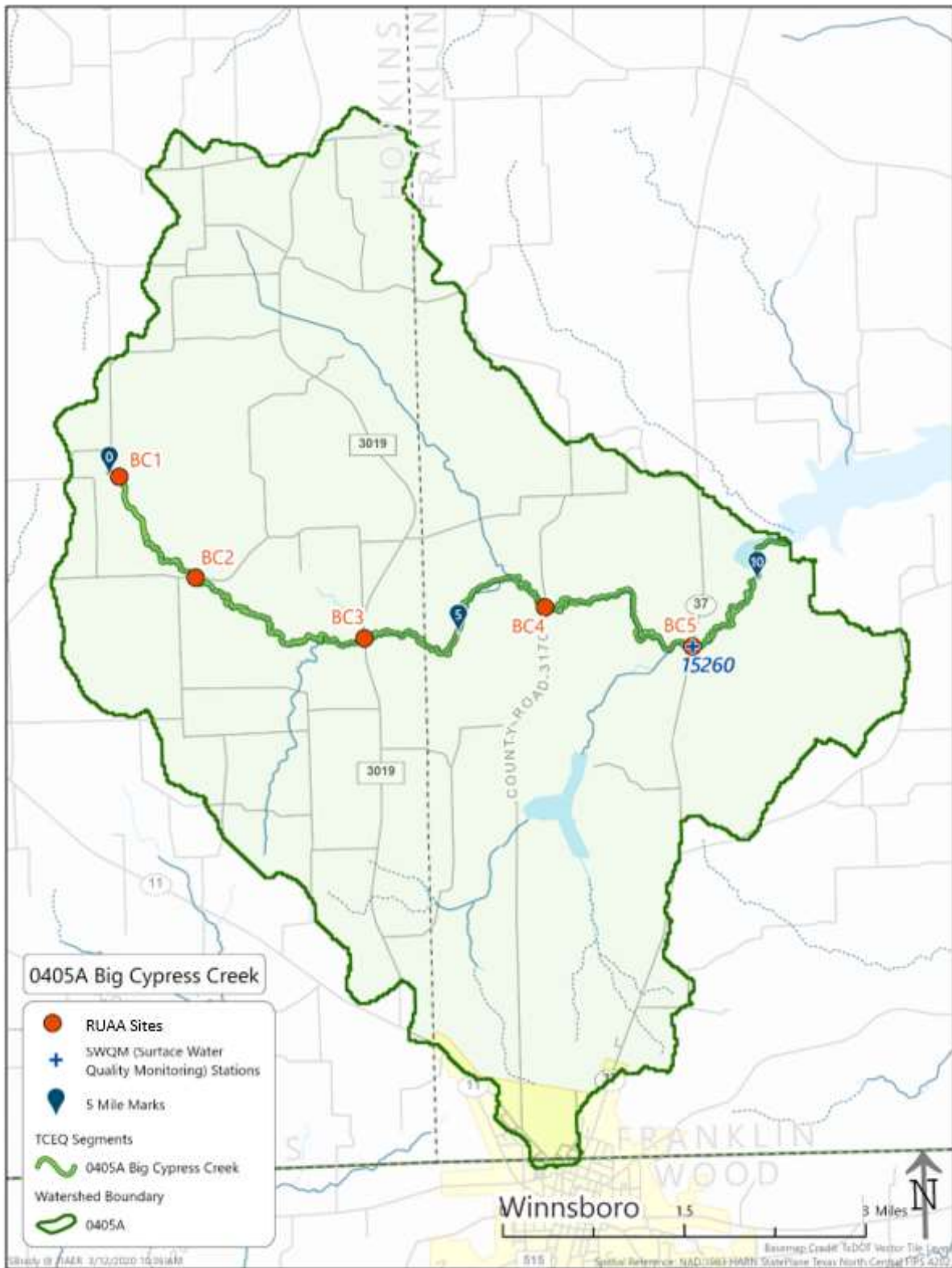


Figure 4.1 Watershed of Big Cypress Creek (0405A)

Table 4.1 Description and location of RUAA field survey sites for Big Cypress Creek, Water Body 0405A

Site ID	TCEQ ID	Site Description	Latitude	Longitude	Access
BC01		Big Cypress Creek at CR 2386	33.04578	-95.35114	Private
BC02		Big Cypress Creek at CR 2392	33.03344	-95.3407	Public
BC03		Big Cypress Creek at FM 3019	33.02555	-95.31692	Public
BC04		Big Cypress Creek at CR 3170	33.02859	-95.29108	Public
BC05	15260	Big Cypress Creek at HWY 37	33.02337	-95.27027	Public

Site BC01 is the most upstream site located on Big Cypress Creek. This site was initially publicly accessible on County Road 2386; however, a gate was installed prior to the first survey. Attempts to identify a landowner for access was unsuccessful and therefore, this site was not surveyed.

Site BC02 is located on Big Cypress Creek about 2.68 miles from site BC01. This site is publicly accessible via the road crossing on FM 2392 in Hopkins County. Due to a barbed wire fence and steep banks, access into the stream was difficult. Landowner permission to access the stream from the road crossing was not required to complete the surveys.

Site BC03 is located on Big Cypress Creek about 2.26 miles from site BC02. This site was publicly accessible via the road crossing on FM 3019 in Hopkins County. Access to the stream was difficult due to steep banks and rip rap on both sides of the stream.

Site BC04 is located on Big Cypress Creek about 2.21 miles from site BC03. This site was publicly accessible via the road crossing on FM 3170 in Franklin County. Access to the stream was difficult due to steep banks and bank garbage.

Site BC05 is located on Big Cypress Creek about 1.92 miles from site BC04. This site was publicly accessible via the road crossing on Hwy 37 in Franklin County. Access to the stream was difficult due to steep banks and thick vegetation.

Field Survey Results and Discussions

General Description of RUAA Survey Sites and Conditions for Big Cypress Creek (0405A)

The RUAA surveys on Big Cypress Creek were conducted on June 22 and August 24, 2021 at all four of the five sites. The surveys were performed on weekdays, weekends, or holidays at opportune times to observe recreational activities. Air temperatures

prior to and during both the first and second surveys were above 21°C (70°F), indicated by the RUAA guidelines as warm enough to promote recreational activities (Tables 4.2 and 4.3). In the 30 days prior to the first survey, 2.09 inches of precipitation fell, while 7.70 inches fell 30 days prior to the second survey. These rainfall events did not cause a hindrance to accessing the stream. The Palmer Drought Severity Index (PDSI) indicated moderately moist conditions (index value: +2.00 to +2.99) conditions for East Texas during June and extremely moist conditions (+2.00 to +2.99) for October (TWDB, 2020).

A summary of the RUAA field survey results is presented in the following tables:

- Table 4.4 describes the stream channel and corridor characteristics at each site.
- Table 4.5 notes the average thalweg depth by site during each survey and the access to the stream, whether public or private, and the ease of bank access.
- Tables 4.6 and 4.7 document the maximum, minimum, and average stream widths at each site for each survey and observed flow conditions.
- Tables 4.8 and 4.9 note stream aesthetics, wildlife observations and tracks, and the presence of garbage by site observed during each survey.

Physical descriptions of each site follow these tables along with selected photos showing notable characteristics of each site. All sites surveyed were at public road crossings. Overall thalweg depth averaged 0.33 m for the first survey and 0.26 m for the second survey. Access to the stream was difficult or moderately difficult at all four sites visited due to steep, densely vegetated banks. The dominant substrate was mud and clay. The majority of the stream corridor was forest with several areas lined with shrubs and pasture. The maximum stream width encountered was 9.4 m at Site BC04 during the first survey. Typical stream widths were widest at Site BC05 (5 m) with typical narrow width of 0.8 m at BC02. Flow conditions appeared normal during the first survey and low during the second. The water was clear in color at sites BC02 and BC03 and brown at sites BC04 and BC05 during both surveys. The water surface at most sites was clear during the first survey, but had foam or scum apparent at Sites BC03, BC04, and BC05 during the second survey. Evidence of wildlife was rarely observed at sites, most commonly in the form of raccoon and hog tracks. Trash was rarely observed at most survey sites and when observed was typically plastics, aluminum cans, and bottles. No evidence of recreation was observed at any of the four survey sites.

Table 4.2 Rainfall records with maximum and minimum temperature for Tyler, Texas 30 days prior to the first RUAA survey initiated on June 22, 2021

Survey dates are highlighted in gray and bolded. Weather Data from Weather Underground; station KTXTYLER Station. (Weather Underground, 2020)

Date	Daily Precipitation (in)	High Temperature (°F)	Low Temperature (°F)
May 21	0.12	79	70
May 22	0.45	76	70
May 23	0.02	83	69
May 24	0	81	71
May 25	0.05	82	68
May 26	0.29	86	69
May 27	0	87	73
May 28	0.60	79	65
May 29	0	84	69
May 30	0	76	60
May 31	0	83	64
June 1	0.18	79	66
June 2	0.01	81	62
June 3	0	81	65
June 4	0	80	68
June 5	0.14	85	70
June 6	0.23	87	70
June 7	0	82	70
June 8	0	82	-
June 9	0	91	79
June 10	0	91	75
June 11	0	90	75
June 12	0	88	74
June 13	0	96	74
June 14	0	96	77
June 15	0	95	75
June 16	0	97	72
June 17	0	94	74
June 18	0	92	73
June 19	0	93	70
June 20	0	93	75
June 21	0	93	75
June 22	0	86	71

Table 4.3 Rainfall records with maximum and minimum temperature for Tyler, Texas 30 days prior to the second RUAA survey initiated on August 24, 2021

Survey dates are highlighted in gray and bolded. Weather Data from Weather Underground; station KTXTYLER Station. (Weather Underground, 2020)

Date	Daily Precipitation (in)	High Temperature (F)	Low Temperature (F)
July 24	0	93	77
July 25	0	93	78
July 26	0	95	75
July 27	0	95	78
July 28	0	92	79
July 29	0.52	96	76
July 30	0	96	77
July 31	0	95	78
August 1	0	96	78
August 2	0	85	-
August 3	0	88	73
August 4	0	89	73
August 5	0	87	71
August 6	0	90	73
August 7	0	92	74
August 8	0	94	78
August 9	0	94	79
August 10	0	94	78
August 11	0	94	78
August 12	0	94	78
August 13	0	94	75
August 14	0	92	72
August 15	1.25	88	73
August 16	0	91	74
August 17	0.06	91	72
August 18	5.44	88	70
August 19	0.42	92	77
August 20	0.01	93	78
August 21	0	94	75
August 22	0	94	78
August 23	0	94	75
August 24	0	94	74

Table 4.4 Stream channel and corridor appearance for each site sampled along Big Cypress Creek (0405A)

Site Number	Stream Channel Appearance	Dominant Substrate	Corridor Appearance	Riparian Size	Park
BC01					
BC02	Natural	Gravel/Rip Rap	Forest/Pasture	Small	No
BC03	Natural	Gravel/Sand	Forest/Shrub	Small	No
BC04	Natural	Sand	Forest/Shrub	Small	No
BC05	Natural	Mud/Clay/Sand	Forest/Shrub	Small	No

Table 4.5 Thalweg depth, stream flow type, and site accessibility during the two surveys of Big Cypress Creek (0405A)

Stream flow type represents observed stream characteristics on the date of the survey. Under general access, * indicates that the site was publicly accessible at a road crossing but that further access was limited by fencing of private property. For Bank Access, E = Easy, ME = Moderately Easy, MD = Moderately Difficult, D = Difficult.

Site	Reach length (m)	# of Transects	# of Recreational Areas at Site	Avg. Site Thalweg Depth (m) for Trip 1	Avg. Site Thalweg Depth (m) for Trip 2	Stream Flow Type Survey 1	Stream Flow Type Survey 2	General Access	Bank Access
BC01								Public/Private	
BC02	300	11	0	0.21	0.12	Intermittent with Pools	Intermittent with Pools	Public	D
BC03	300	11	0	0.45	0.39	Intermittent with Pools	Intermittent with Pools	Public	D
BC04	300	11	0	0.33	0.32	Intermittent with Pools	Intermittent with Pools	Public	D
BC05	300	11	0	0.65	0.47	Intermittent with Pools	Intermittent with Pools	Public	MD

Table 4.6 Description of surveyed stream sites along Big Cypress Creek during the first survey performed on June 22, 2021

Site Number	Maximum Width (m)	Minimum Width (m)	Typical Average Width (m)	Observed Flow
BC01				
BC02	2.3	0.80	1.5	Low
BC03	7.6	0.85	4	Normal
BC04	9.4	2.3	4	Normal
BC05	8.4	2.3	6	Normal

Table 4.7 Description of surveyed stream sites along Big Cypress Creek during the second survey performed on August 24, 2021

Site Number	Maximum Width (m)	Minimum Width (m)	Typical Average Width (m)	Observed Flow
BC01				
BC02	1.4	0	0.8	No flow
BC03	4.6	0.3	3	Low
BC04	8.1	0.9	3.5	Low
BC05	8.5	1.8	5	Low

Table 4.8 Stream aesthetics along Big Cypress Creek during the first survey performed June 22, 2021

From Field Data Sheet - Section F: A = absent, R = rare, C = common, Ab = abundant, N = none, NW = no water, SP = slight presence, MP = moderate presence, LP = large presence.

Site	Aquatic Vegetation	Algae Cover	Odor	Color	Bottom Deposit	Water Surface	Reptiles	Water Dependent Birds	Mammals	Evidence of wildlife	Large garbage in Channel	Small garbage in Channel	Bank garbage
BC01													
BC02	A	A	N	Clear	Fine Sediment	Clear	N	N	SP	Tracks/Fecal Droppings	N	R	N
BC03	A	A	N	Clear	Fine Sediment	Clear	SP	N	N	Tracks/Fecal Droppings	N	R	R
BC04	A	A	N	Brown	Fine Sediment	Clear/Oil/Flock	N	N	N	Tracks/Fecal Droppings	R	N	R
BC05	A	A	N	Brown	Fine Sediment	Clear	N	N	N	Tracks/Fecal Droppings	N	R	R

Table 4.9 Stream aesthetics along Big Cypress Creek during the second survey performed August 24, 2021

From Field Data Sheet - Section F: A = absent, R = rare, C = common, Ab = abundant, N = none, NW = no water, SP = slight presence, MP = moderate presence, LP = large presence. NA indicates not applicable because conditions were dry.

Site	Aquatic Vegetation	Algae Cover	Odor	Color	Bottom Deposit	Water Surface	Reptiles	Water Dependent Birds	Mammals	Evidence of wildlife	Large garbage in Channel	Small garbage in Channel	Bank garbage
BC01													
BC02	A	A	N	Clear	Fine Sediments	Clear	N	N	N	Tracks/Fecal Droppings	N	N	N
BC03	A	A	N	Clear	Fine Sediments	Clear/Scum	N	N	N	Tracks/Fecal Droppings	N	R	R
BC04	A	A	N	Brown	Fine Sediments	Clear/Scum	N	N	N	Tracks/Fecal Droppings	R	R	R
BC05	A	A	N	Brown	Fine Sediments	Clear/Scum	N	N	N	Tracks/Fecal Droppings	R	R	R

Physical Description of BC01

Big Cypress Creek site BC01 was visited on June 22 and August 24, 2021. This site was located at the crossing on CR 2386 in Franklin County. The site was initially thought to be publicly accessible via the crossing. Upon arrival during the first survey, a gate had been installed at the assumed county road entry and attempts to contact a landowner were unsuccessful. Figure 4.2 shows the gate installed across the road. Figure 4.3 shows the solar panel to power the gate.



Figure 4.2 Photograph of Big Cypress Creek near Site BC01 taken on June 22, 2021



Figure 4.3 Photograph of Big Cypress Creek near Site BC01 taken on June 22, 2021

Physical Description of BC02

Big Cypress Creek at Site BC02 was visited on June 22 and August 24, 2021. This site was located at the County Road 2392 culvert crossing. Access to this site was difficult due to steep banks, dense vegetation and a barbed wire fence. The stream was only publicly accessible at the culvert crossing.

The riparian zone at Site BC02 was forest dominated upstream of the road crossing and pasture dominated downstream of the crossing along both the right and left banks (Table 4.4). The stream was wadeable during each survey with average thalweg depths ranging from 0.21 m to 0.12 m. The stream, designated as intermittent with perennial pools during each survey, was only flowing during the first survey (Table 4.5). Channel widths ranged from a maximum of 2.3 m during the first survey to 0.75 m during the second survey, when the stream was not flowing. Typical observed widths were 1.5 and 0.8 m during each survey (Tables 4.6 and 4.7).



Figure 4.4 Photograph of Big Cypress Creek Site BC02 taken on June 22, 2021

Photograph shows the upstream view of the 150-m transect.

No water dependent birds were observed at this site during either survey (Tables 4.8 and 4.9). Bird and canine droppings were observed in addition to raccoon, bovine and canine tracks. No evidence of wildlife was observed in either survey, but two dogs and a few cows were encountered during the first survey. Aquatic vegetation and algae were absent during both surveys. No odor was detected, water color and surface were both clear during each survey. A bucket and some tires were rarely observed during the first survey with no evidence of human recreation observed during either survey.



Figure 4.5 Photograph of Big Cypress Creek at Site BC02 taken on August 24, 2021
Photograph at the 300-m transect facing downstream.

Physical Description of BC03

Big Cypress Creek at Site BC03 was visited on June 22 and August 24, 2021. This site was accessed via a bridge crossing at FM 3019. Access to the stream Beyond the road crossing was by private property only. The riparian area was forest and shrub dominated with steep slopes on both the right and left banks (Table 4.4). Access to the stream was difficult due to the steep banks, rip rap at the bridge crossing and private property up and downstream of the crossing.

Site BC03 was wadeable during both surveys thalweg depths of 0.45 m during the first survey and 0.39 m during the second survey (Table 4.5). The stream flow type was characterized as intermittent with perennial pools for this reach. Average stream width during both surveys was 3.5 m with maximum and minimum stream widths of 7.6 m and 0.3 m, respectively by survey (Tables 4.6 and 4.7).

The stream banks were steep and densely vegetated (as seen in Figure 4.6) at BC03. Channel obstructions at this site included log jams and overhanging tree branches. Aquatic vegetation and algae cover were absent during each survey. The water was clear with a bottom deposit of fine sediments and an occasional observance of surface scum.

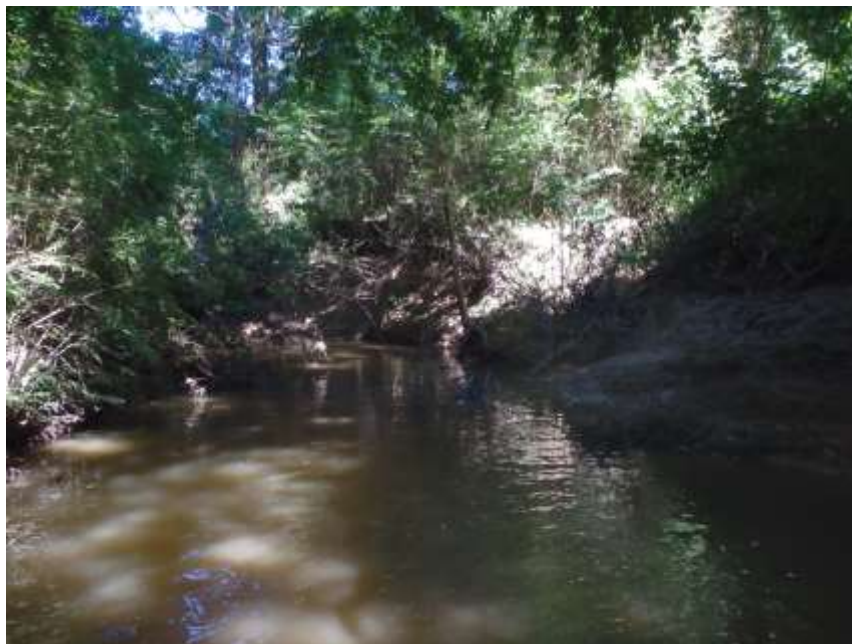


Figure 4.6 Photograph of Big Cypress Creek Site BC03 taken on June 22, 2021

The downstream view of the 150-m transect.

Evidence of wildlife observed were deer and raccoon tracks during each survey. Tires and lumber were observed within the channel during both surveys. Small garbage, in the channel and along the banks, was observed in the form of typical plastic bottles, sacks and cups observed during both surveys (Tables 4.8 and 4.9). No evidence of human recreation was observed at this site.

Physical Description of BC04

Big Cypress Creek site BC04 was visited on June 22 and August 24, 2021. This site was located at the County Road 3170 stream crossing in Franklin County. The site was publicly accessible via the bridge crossing only.

The riparian area was forest and shrub dominated with steep banks and dense vegetation on both banks (Table 4.4 and Figure 4.7). The dominant substrate was a combination of sand, mud and clay depending on the location within the survey reach.



Figure 4.7 Photograph of Big Cypress Creek Site BC04 taken on June 22, 2021

The downstream view of the 150-m transect.

Site BC04 was wadeable with average thalweg ranging from 0.33 m to 0.32 m between surveys. Maximum and minimum widths encountered ranged from 9.4 m to 0.9 m during both surveys (Tables 4.6 and 4.7) with a typical average of approximately 4.0 m.

The stream flow type was observed as intermittent with perennial pools at the time of both surveys (Table 4.5). Aquatic vegetation and algae was absent while the color was brown during both surveys. Only one pool was encountered during both surveys with a maximum depth of 0.9 m.

No water dependent birds, mammals or reptiles were observed during either survey (Tables 4.8 and 4.9). Tracks and fecal droppings from birds and raccoons were noted throughout the survey reach. A small pipeline ran underneath the bridge across the stream at the road crossing as depicted in Figure 4.8. Human footprints were also observed during the first survey, but only underneath the bridge. No other evidence of recreation was encountered. Typical household garbage (plastics, glass, cans) was rarely observed in the stream and on the bank during each survey. A television and a few tires were also observed in the stream just downstream of the bridge crossing.



Figure 4.8 Photograph of Big Cypress Creek Site BC04 taken on August 24, 2021

The downstream view of the 150-m transect.

Physical Description of BC05

Big Cypress Creek at Site BC05 was visited on June 22 and August 24, 2021. This site was located at the bridge crossing on State Highway 37 in Franklin County and is co-located with TCEQ sampling station 15260. Access to this site was moderately difficult due to steep banks with thick vegetation leading to the stream. The stream was only publicly accessible at the bridge crossing.

The riparian zone at Site BC05 was forest and shrub dominated with thick vegetation along both banks (Table 4.4). The stream was wadeable during both surveys and observed to be intermittent with perennial pools (Table 4.5). One pool was encountered during each survey with dimensions of approximately 18.0 m long, 8.0 m wide and a maximum depth of 0.90 m. Average thalweg depths were 0.65 m to 0.47 m between the first and second surveys respectively. Channel widths ranged from 1.8 m to 8.5 m throughout the reach during both surveys with a typical observed width of 5.5 m (Tables 4.6 and 4.7). Figure 4.9 depicts the typical channel width during each survey.



Figure 4.9 Photograph of Big Cypress Creek Site BC05 taken on June 22, 2021

Photograph shows the upstream view of the 150-m transect.

No water dependent birds, mammals or reptiles were observed at this site during either survey (Tables 4.8 and 4.9). Bird droppings were observed in addition to heron, raccoon and deer tracks. Aquatic vegetation and algae cover was absent during both surveys. No odor was detected, water color was brown, and the surface was primarily with some occasional scum observed near debris piles or log jams. Trash was rarely observed throughout the survey reach and consisted of a motorized toy car and typical plastic cups, bags and bottles, primarily near the road crossing.



Figure 4.10 Photograph of Big Cypress Creek at Site BC05 taken on August 24, 2021

Photograph at the 300-m transect facing upstream.

Observations and Interviews

Activities Observed

During each RUAA survey, field personnel visited sites during times of day and on days when recreational activities were most likely to be observed. All six sites were at public road crossings; however, private property boundaries limited public access to a small area around and underneath all bridge crossings. No form of recreation was directly observed by TIAER staff during either of the two surveys.

Activities Interviewed

A total of three interviews were collected from landowners along Big Cypress Creek.

None of the interviewees stated they had not personally used, seen others use, or heard of others using the stream for any form of recreation. One interview indicated that they know of people who have fishing holes on their property. Reasons as not recreating in the stream primarily being that the stream is not inviting as a recreational stream (Table 4.10).

Activities listed in Table 4.10 indicate the number of times personal use, observed use, and/or heard of use was documented from interviews for a given location or in general along the assessment unit. Blank cells in Table 4.10 indicate no interviewed feedback for that location.

Table 4.10 Summary of recreational activities noted in interviews for Big Cypress Creek

Site Name	Number of Interviews	Swimming	Adult Wading	Children Wading	Hunt	Fish	Boat, Canoe, Kayak
BC01							
BC02	1	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0
BC03							
BC04							
BC05							
General AU	2	0,0,0	0,0,0	0,0,0	0,0,0	1,0,0	0,0,0
Totals	3	0,0,0	0,0,0	0,0,0	0,0,0	1,0,0	0,0,0

Summary

RUAA surveys were conducted at four sites along Big Cypress Creek on June 22 and August 24, 2021. Temperatures were above 21°C (70°F) during the 30 days prior to each survey (Tables 4.2 and 4.3). Water existed and flowed in Big Cypress Creek during both surveys. Stream flow was considered normal during both surveys based on information provided by local residents. The Palmer Drought Severity Index (PDSI) indicated mid-range conditions in June 2020 and moist conditions in August 2020 (TWDB, 2020).

No recreational activities were observed by TIAER field staff during either survey. Roughly 70% of the watershed through which Big Cypress Creek falls into two types of land use. Pasture/hay land accounts for the majority at roughly 55%, while mixed forest lands represent 16% of the watershed. Steep and slippery banks and overgrown banks with thick vegetation were present at all six sites indicating hazardous locations for recreation.

Interviews indicated only no occurrences of recreational activity within the stream. Public access to the stream is limited at all five sites primarily to the right-of-ways immediately surrounding bridge crossings or areas immediately up and down stream of culvert crossings.

Recreational activities observed and reported in interviews are summarized in Figure 4.11. Overall RUAA findings are summarized in the form below.

Recreational Use Attainability Analysis for Big Cypress Creek (0405A) in the Cypress Creek River Basin

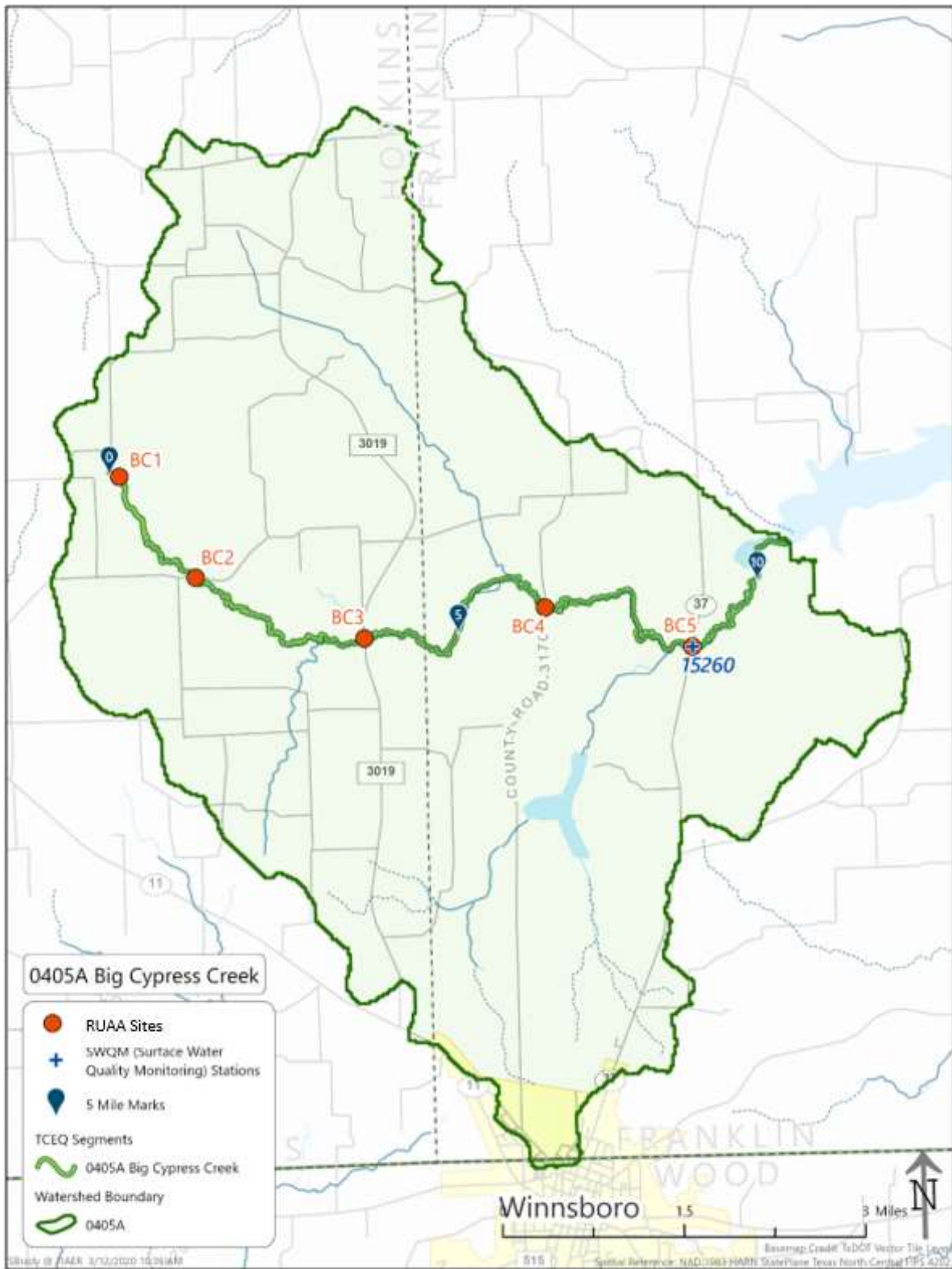


Figure 4.11 Summary of observed and interviewed human activities on Big Cypress Creek.

RUAA Summary

(Not part of the Field Data Sheet)

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

Name of water body: Big Cypress Creek

Segment No. of Nearest Downstream Segment No.: 0405A

Classified?: No

County: Hopkins and Franklin Counties

1. Observations on Use

- a. Do primary contact recreation activities occur on the water body?
frequently seldom not observed or reported unknown
- b. Do secondary contact recreation 1 activities occur on the water body?
frequently seldom not observed or reported unknown
- c. Do secondary contact recreation 2 activities occur on the water body?
frequently seldom not observed or reported unknown
- d. Do noncontact recreation activities occur on the water body?
frequently seldom not observed or reported unknown

2. Physical Characteristics of Water Body

- a. What is the average thalweg depth? 0.37 meters
- b. Are there substantial pools deeper than 1 meter? Yes No
- c. What is the general level of public access?
easy moderate very limited

3. Hydrological Conditions of site visits (Based on Palmer Drought Severity Index)

- Mild-Extreme Drought
- Incipient dry spell
- Near Normal
- Incipient wet spell
- Mild-Extreme Wet

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