

# Recreational Use Attainability Analysis for The Unnamed Tributary of Buffalo Creek (0214F) in the Red River Basin

Prepared for:  
Texas Commission on Environmental Quality  
P.O. Box 13087  
Austin, Texas 78711-3087

Prepared by:  
Texas Institute for Applied Environmental Research  
Tarleton State University  
Stephenville, Texas

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For more information about this document or any other document TIAER produces, send email to [tiaer@tarleton.edu](mailto:tiaer@tarleton.edu)

## Author

Leah Taylor, senior project director, TIAER, [ltaylor@tarleton.edu](mailto:ltaylor@tarleton.edu)

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## Chapter 1

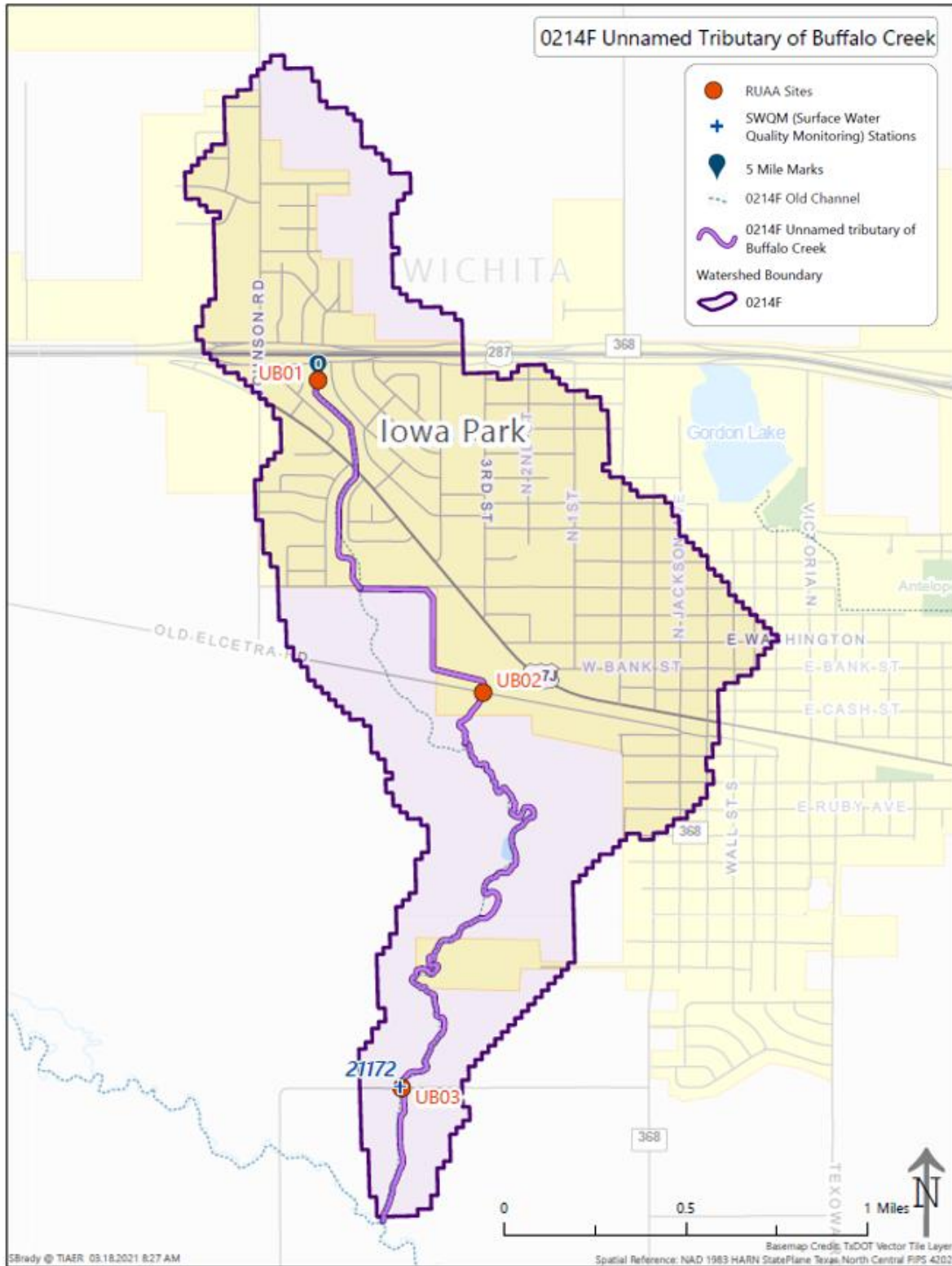
### Introduction

#### Problem Statement

The Unnamed Tributary of Buffalo Creek (0214F) is an unclassified water body identified for assessment purposes by the Texas Commission on Environmental Quality (TCEQ). The Unnamed Tributary of Buffalo Creek is approximately three river miles long and is comprised of only one assessment unit (AU). The 2018 Texas Integrated Report of Surface Water Quality (TCEQ, 2018a) defines The Unnamed Tributary of Buffalo Creek (0214F) as being located from the confluence of Buffalo Creek upstream to the headwater at eastbound frontage road of US 287 in Iowa Park (Figure 1.1). The Unnamed Tributary of Buffalo Creek (0214F) was first listed on the Texas 303(d) list as impaired for bacteria in 2016 and has continued to be listed as impaired for bacteria on the 2018 Texas 303(d) lists. There are no additional impairments for The Unnamed Tributary of Buffalo Creek. 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.

The Unnamed Tributary of Buffalo Creek (0214F) 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, the 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. 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 The Unnamed Tributary of Buffalo Creek (0214F).



**Figure 1.1** Watershed of Unnamed Tributary of Buffalo Creek (0214F). No permitted wastewater discharges or concentrated animal feeding operations are located in the Unnamed Tributary of Buffalo Creek watershed.

## Objectives

The objective of this report is to present the findings of a Comprehensive RUAA for the Unnamed Tributary of Buffalo Creek following the 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

The 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 the 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 the Unnamed Tributary of Buffalo 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 the Unnamed Tributary of Buffalo Creek and the need for an RUAA.

A public meeting focusing specifically on the RUAA was held at the Tom Burnett Memorial Library located in Iowa Park, Texas on February 19, 2020. At this meeting input was sought on the proposed sampling sites for the Unnamed Tributary of Buffalo 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 September 15, 2021 virtually through a webinar platform 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. No comments were received during the meeting nor during the 30 day review period.

Watershed stakeholders were invited to attend public meetings through mailed invitations, public announcements (TCEQ website), and/or individual phone calls. Information on upcoming meetings for this RUAA, presentations, the draft report, and other information, were made available on the project's website:

<https://www.tceq.texas.gov/waterquality/standards/ruaas/red-river-basin-ruaa-part4>



## 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 and 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 recommended number of sites for the Unnamed Tributary of Buffalo Creek was three.

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 took into account 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 and
- 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

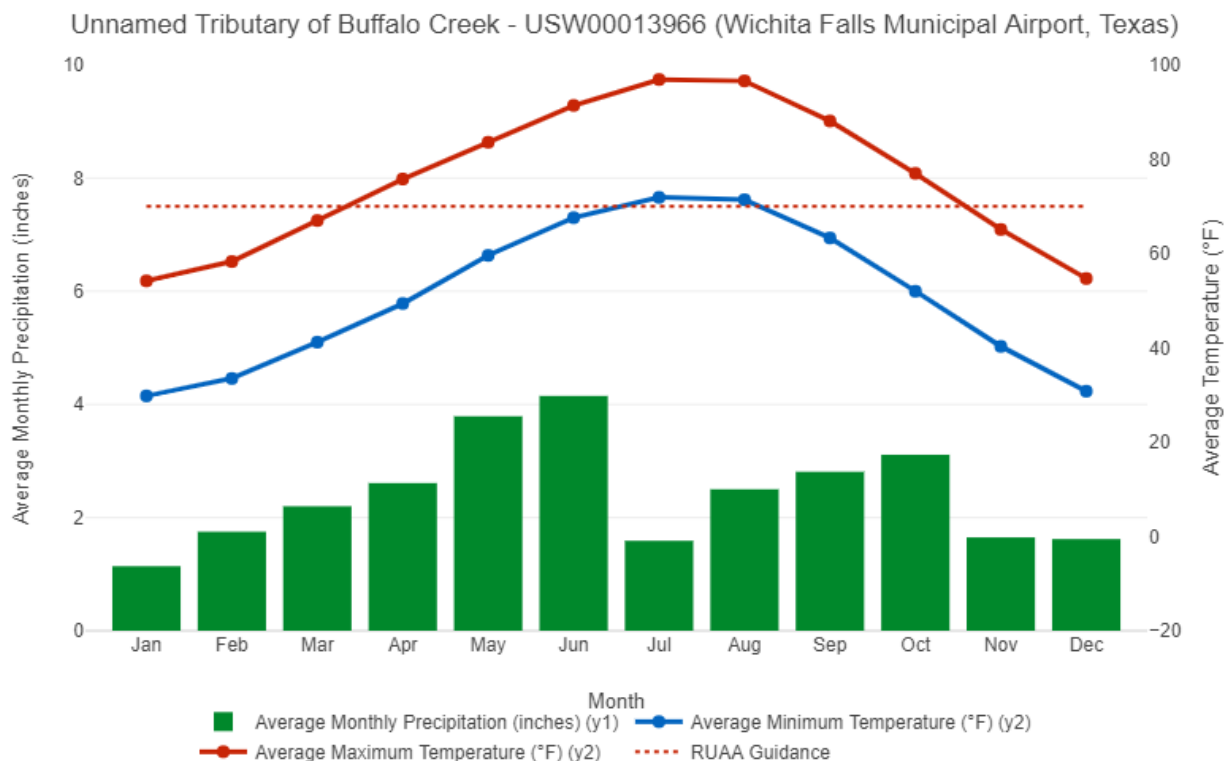
#### Description of the Unnamed Tributary of Buffalo Creek

The Unnamed Tributary of Buffalo Creek is located in Wichita County in the northwestern portion of Texas. Water body 0214F is within the Red River Basin. The tiny watershed is approximately 1,365 acres (roughly 2.13 square miles) with a population of 3,634 (USCB, 2010). The watershed encompasses the City of Iowa Park (population 6,383) (USCB, 2010). Iowa Park is approximately 10 miles north west of Wichita Falls, Texas.

#### Climatic Conditions

Annual precipitation for the Unnamed Tributary of Buffalo Creek watershed was based on data obtained from the National Oceanic and Atmospheric Administration's website (NOAA, 2015) for Wichita Falls, Texas (Station USW00013966). It is important to note that this station is not within the Unnamed Tributary of Buffalo Creek watershed boundaries. However, it is the nearest station with climate normal available for both precipitation and temperature. Normal precipitation (1981-2010) for Station USW00013966 averages 28.92 inches per year with a peak rainfall typically occurring in the months of May and June (Figure 3.1).

Average maximum temperatures for Station USW00013966 rise above 70°F beginning in month April and ending in October (Figure 3.1). March through October are the months notes as generally suitable for assessing recreational use, but only if temperatures reach above 70°F (TCEQ, 2014b).



**Figure 3.1 Monthly average precipitation for Pittsburg, Texas.**

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

**Land Use and Land Cover**

The Unnamed Tributary of Buffalo Creek watershed lies within the Rolling Plains ecoregion as defined in the publication Ecoregions of Texas (Griffith et al., 2007). The dominant land cover within the Unnamed Tributary for Buffalo Creek is Developed Low Intensity at 29.26% and is present throughout the watershed (Table 3.1 and Figure 3.2). Grassland/Herbaceous is the secondary land cover encompassing 28.90% of the Unnamed Tributary of Buffalo Creek watershed. As previously stated, the Unnamed Tributary of Buffalo Creek largely flows through residential neighborhoods. The Unnamed Tributary of Buffalo Creek has no parks located along its mainstem.

**Table 3.1 Land use/land cover classes within the Unnamed Tributary of Buffalo Creek watershed.**

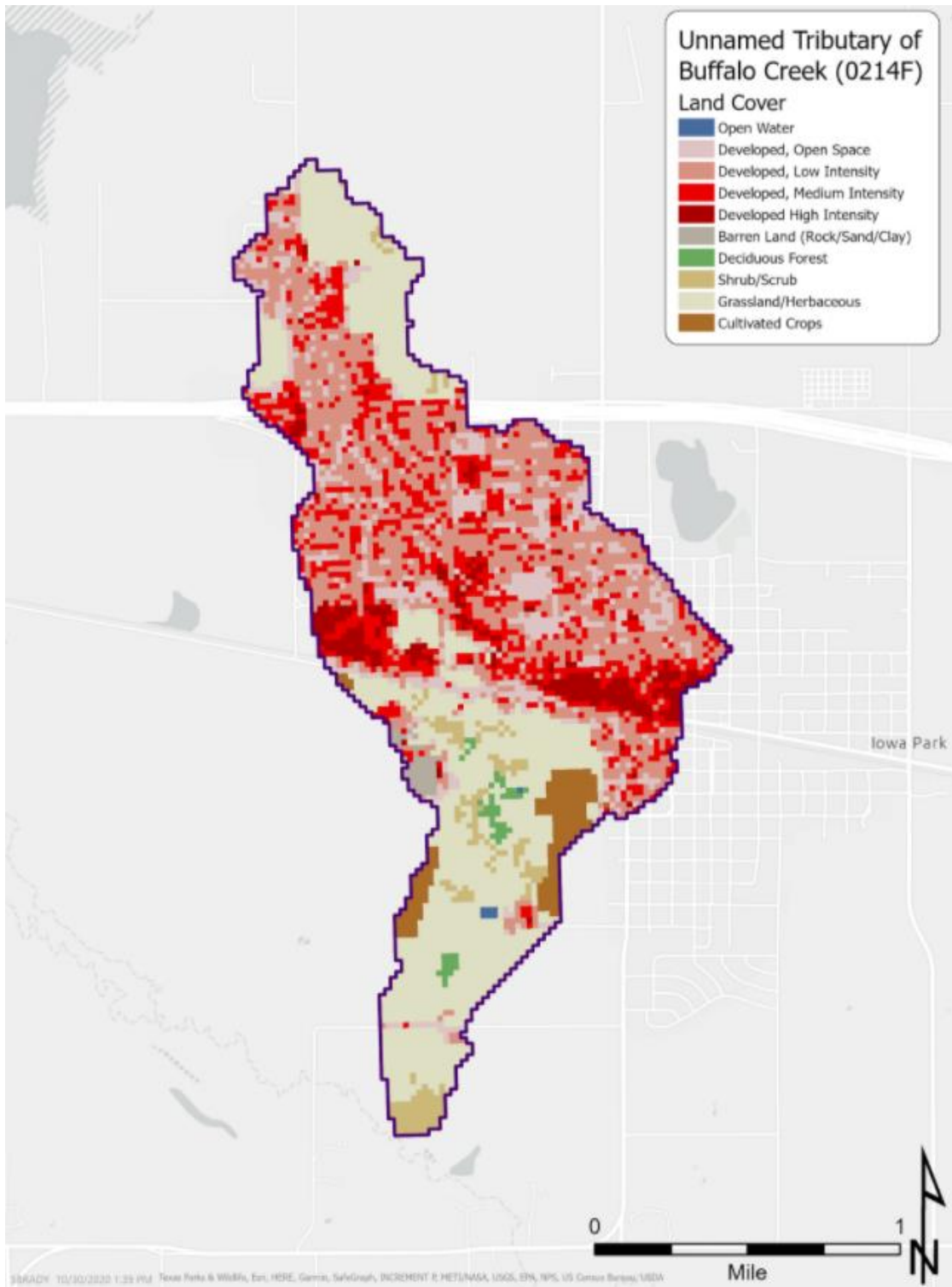
Source: 2011 National Land Cover Database (USGS, 2016).

Class	Area (acres)	Percent (%)
Developed, Low Intensity	400	29.26%
Grassland/Herbaceous	395	28.90%
Developed, Medium Intensity	220	16.12%
Developed, Open Space	169	12.38%
Developed, High Intensity	69	5.05%
Cultivated Crops	45	3.29%
Shrub/Scrub	44	3.26%
Deciduous Forest	12	0.85%
Barren Land (Rock/Sand/Clay)	11	0.78%
Open Water	2	0.11%
Emergent Herbaceous Wetlands	0	0%
TOTAL	1,367	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:

- **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, 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, 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.

- **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.
- **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.
- **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.
- **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.
- **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.
- **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.



**Figure 3.3** Land use and land cover of the Unnamed Tributary of Buffalo 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 is one municipal wastewater treatment facility (WWTF) within the Unnamed Tributary of Buffalo Creek watershed. The Iowa Park WWTF (WQ0010691002) has a permitted daily averages daily flow of 1 MGD. The WWTF does not discharge directly into the Unnamed Tributary of Buffalo Creek, but into an unnamed drainage ditch then into the Unnamed Tributary of Buffalo Creek.

## 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 the population of Iowa Park does not meet this criteria, there are no entities required to obtain a stormwater permit in the Unnamed Tributary of Buffalo Creek watershed.

## Concentrated Animal Feeding Operations

There are currently no permitted CAFOs located within the watershed of the Unnamed Tributary of Buffalo Creek (0214F).

## 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 cattle and calves, chicken, and sheep are the most common livestock found within the watershed.

**Table 3.2** Estimated livestock numbers within the Unnamed Tributary of Buffalo Creek watershed based on statistics for Wichita Counties and adjusted for the percent of the county represented by the watershed. (Source: USDA, 2012).

100% of the Unnamed Tributary of Buffalo Creek watershed resides in Wichita County.

County	Cattle & Calves (all beef)	All Goats	All Sheep	Horses & ponies	Hogs & Pigs	Chickens
Wichita	79,622	622	3,594	1,553	956	5,220
Proportional Average for the Unnamed Tributary of Buffalo Creek Watershed	275	2	12	5	3	18

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 1,550 households within the Unnamed Tributary of Buffalo Creek watershed which indicates that there are potentially 952 dogs and 708 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, population data from the U.S. Census Bureau were used. The 2010 U.S. Census Bureau (USCB) data indicated that 28 households in the Unnamed Tributary of Buffalo Creek 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 Unnamed Tributary of Buffalo 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 Iowa Park

[City of Iowa Park Homepage<sup>1</sup>](#)

Search retrieved no results.

Wichita County

[Wichita County Homepage<sup>2</sup>](#)

Search retrieved no results.

### Library Sources:

Tom Burnett Memorial Library

[Tom Burnett Memorial Library Homepage<sup>3</sup>](#)

Phone: (940) 592-4981

Searched online catalog. Search retrieved no results.

### Newspaper Sources:

Iowa Park Leader

[Iowa Park Leader<sup>4</sup>](#)

Phone: (940) 592-4431

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

### Internet Searches:

The Handbook of Texas Online

[The Handbook of Texas Online - Search for the Unnamed Tributary of Buffalo Creek<sup>5</sup>](#)

Searched the handbook by creek name. Search retrieved no results.

Texas Escapes Online Magazine

[Texas Escapes Online Magazine - Search for the Unnamed Tributary of Buffalo Creek<sup>6</sup>](#)

Nothing significant was found.

- 
- <sup>1</sup> <http://www.iowapark.com/>
  - <sup>2</sup> <https://wichitacountytx.com/>
  - <sup>3</sup> <https://tomburnettlibrary.booksys.net/opac/tbl/index.html#menuHome>
  - <sup>4</sup> <https://www.iowaparkleader.com/>
  - <sup>5</sup> <https://www.tshaonline.org/handbook>
  - <sup>6</sup> <http://www.texasescapes.com/>

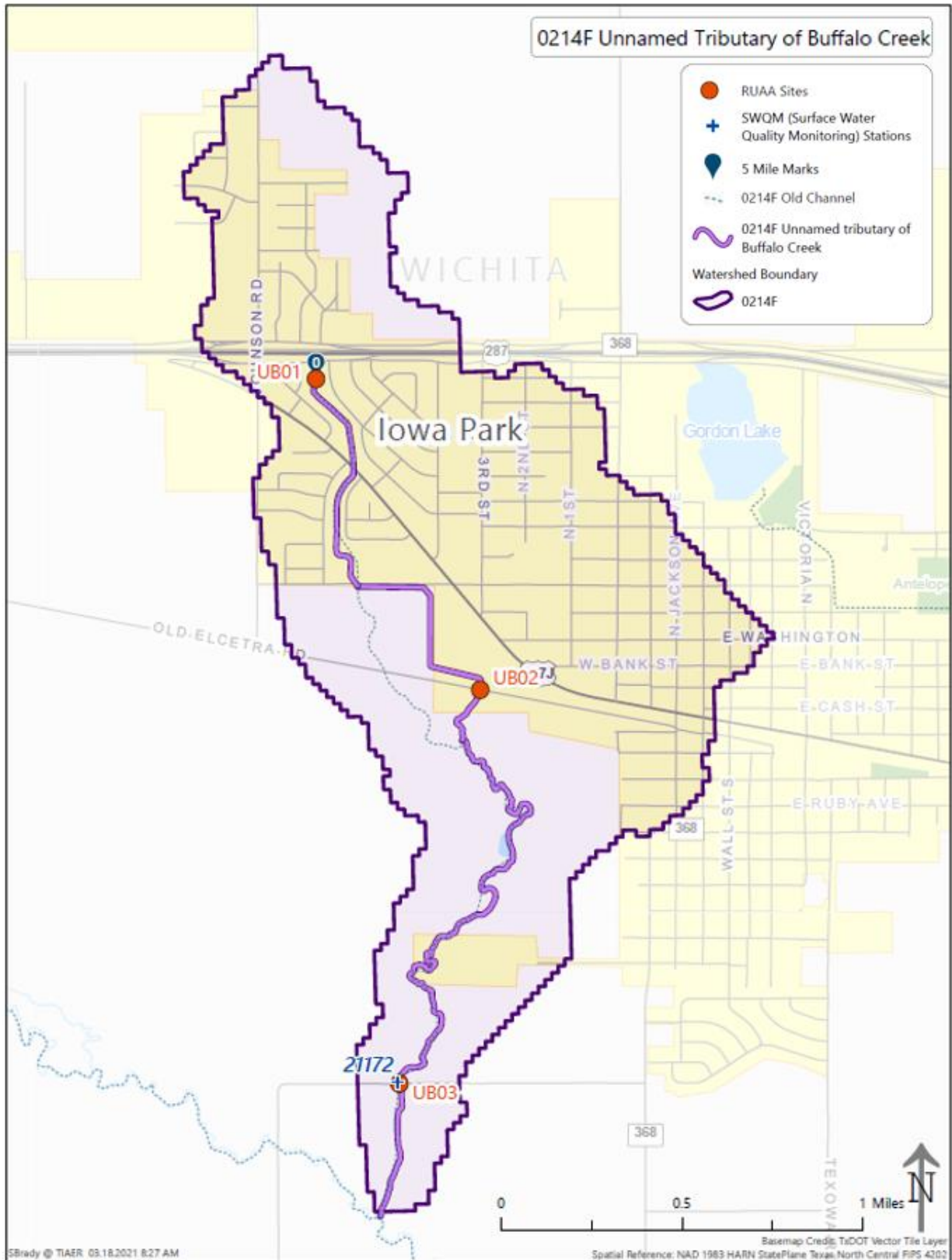
## **Chapter 4**

### **The Unnamed Tributary of Buffalo Creek (0214F)**

#### **Survey Site Descriptions**

The Unnamed Tributary of Buffalo Creek (02214F) is 3.2 river miles long indicating a goal of 3 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 3 survey sites along the Unnamed Tributary of Buffalo Creek (Figure 4.1 and Table 4.1). All 3 sites were located at public road crossings.

All 3 sites allowed for public access. There was no fencing upstream or downstream of the crossings. Access to the stream between road crossings between sites 2 and 3 was moderately difficult due to steep banks and dense vegetation. Site UB03 was co-located with a TCEQ sampling station. RUAA surveys were performed April 27, 2020 and June 17, 2020 at all locations. A brief description of each site follows.



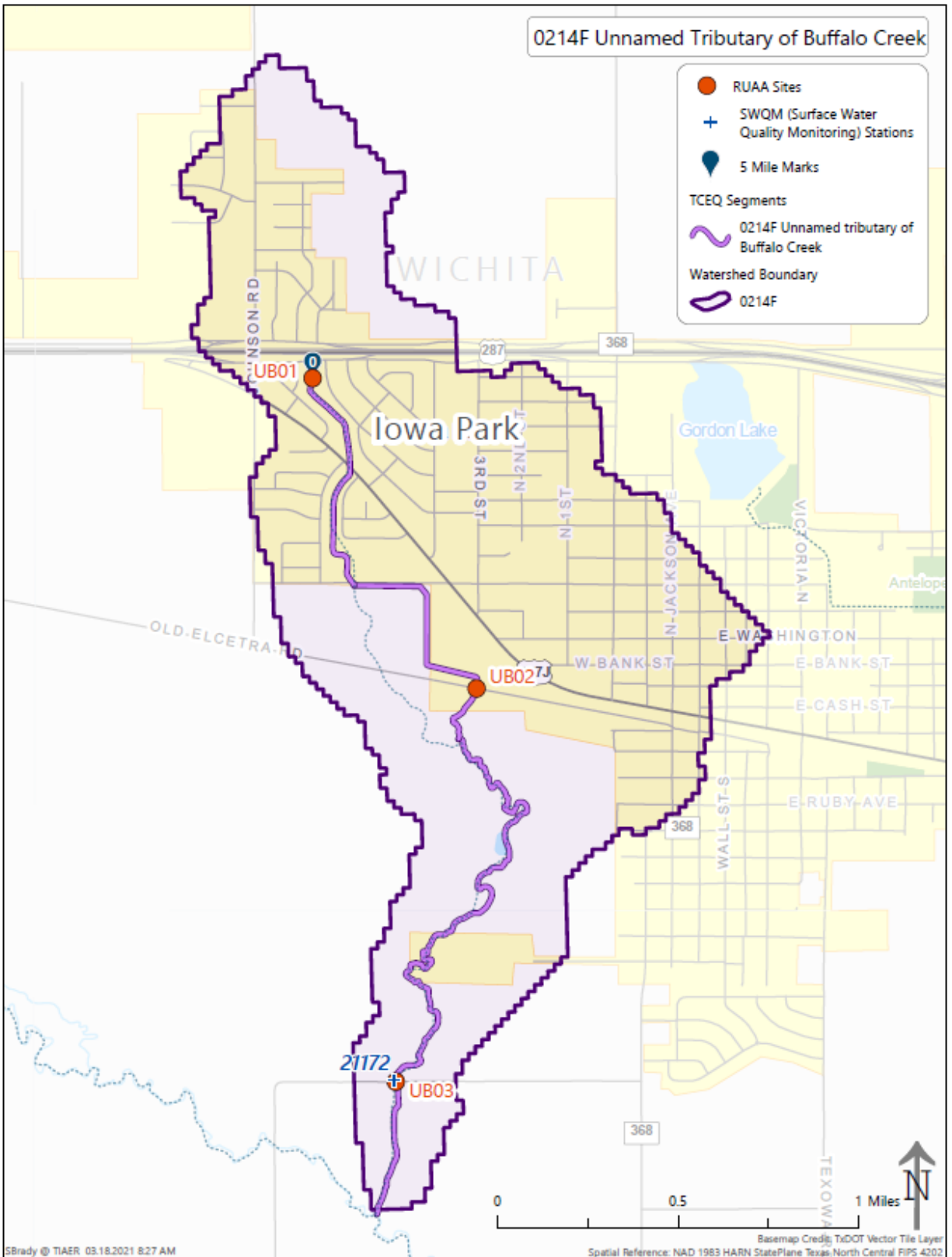


Figure 4.1 Watershed of the Unnamed Tributary of Buffalo Creek (0214F).

**Table 4.1 Description and location of RUAA field survey sites for the Unnamed Tributary of Buffalo Creek, Water Body 0214F.**

<b>Site ID</b>	<b>TCEQ ID</b>	<b>Site Description</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Access</b>
UB01		Unnamed Tributary of Buffalo Creek at SW Access Road in Iowa Park	33.96473	-98.68781	Public
UB02		Unnamed Tributary of Buffalo Creek at W Smith Ave in Iowa Park	33.95228	-98.67988	Public
UB03	21172	Unnamed Tributary of Buffalo Creek at Coleman Park Rd in Iowa Park	33.93649	-98.68374	Public

<sup>1</sup>Distances were digitally estimated using the measuring tool in ArcGIS 10.1 with the 2010 National Agriculture Imagery Program (NAIP) 1-m digital orthophoto quarter quads (DOQQs) and the National Hydrography Dataset (NHD) stream layer as reference guides.



Site UB01 is the most upstream site located on the Unnamed Tributary of Buffalo Creek. This site is publicly accessible from the bridge throughout the entire 300 m reach. Access to complete the surveys did not require land owner permission to enter the stream.

Site UB02 is located on the Unnamed Tributary of Buffalo Creek about 1.82 miles from site UB01. This site is publicly accessible via the road crossing on W Smith Avenue in Iowa Park. Due to very dense vegetation, access into the stream was moderately difficult. Landowner permission to access the stream from the road crossing was not required to complete the surveys.

Site UB03 is located on the Unnamed Tributary of Buffalo Creek about 0.39 miles from site UB02. This site was publicly accessible via the road crossing on Coleman Park Road in Iowa Park. While access to the stream via the road crossing was public, private property was on both the left and right banks of the stream.

## **Field Survey Results and Discussions**

### **General Description of RUAA Survey Sites and Conditions for the Unnamed Tributary of Buffalo Creek 0214F**

The Unnamed Tributary of Buffalo Creek RUAA surveys were conducted on April 27 and June 17, 2020 at all three 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, 2.50 inches of precipitation fell, while 1.75 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 (index value: +2.00 - +2.99) conditions for North Texas during March and April 2020 and mid range to moderately moist (index value: -1.99 + 2.99) conditions during May and June 2020 (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 were at public road crossings. Overall thalweg depth averaged 0.17 m for the first survey and 0.11 m for the second survey. Access to the stream was difficult or moderately difficult at two of the three sites due to steep, densely vegetated banks. The dominant substrate was mud and clay. The majority of the stream corridor was mowed and maintained with several areas lined with shrubs and pasture. The maximum stream width

encountered was 4 m at Site UB03. Typical stream widths were wider at Site UB03 (1.2 m), and gradually narrowed to 0.5 and 0.3 m while traveling upstream. Flow conditions appeared low during both the first and second surveys with no flow or dry at Site UB01 during both surveys. The water was clear in color at all sites during both surveys except Site UB01 during the second survey where there was no water. The water surface at most sites was clear during the first survey with foam or scum only apparent at Site UB03 during the second survey. Evidence of wildlife was observed at all sites, most commonly in the form of canine and raccoon 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 the other eight survey sites.

**Table 4.2 Rainfall records with maximum and minimum temperature for Iowa Park, Texas 30 days prior to the first RUAA survey initiated on April 27, 2020.**

Survey dates are highlighted in gray. Weather Data from Weather Underground; station Lawton – Fort Still Regional Airport Station. (Weather Underground, 2020)

<b>Date</b>	<b>Daily Precipitation (in)</b>	<b>High Temperature (°F)</b>	<b>Low Temperature (°F)</b>
26-March-20	0	92	72
27-March-20	0	81	70
28-March-20	0	81	71
29-March-20	0	71	39
30-March-20	0	61	55
31-March-20	0.75	66	56
1-April-20	0	71	47
2-April-20	0	73	56
3-April-20	0.11	64	34
4-April-20	0	51	38
5-April-20	0	66	42
6-April-20	0	71	59
7-April-20	0	86	59
8-April-20	0	89	54
9-April-20	0	73	56
10-April-20	0	70	46
11-April-20	0	71	51
12-April-20	1.53	70	40
13-April-20	0.04	49	36
14-April-20	0	46	32
15-April-20	0.01	62	29
16-April-20	0.01	75	44
17-April-20	0	58	41
18-April-20	0	67	34
19-April-20	0	73	53
20-April-20	0	75	48
21-April-20	0	82	49
22-April-20	0	82	56
23-April-20	0.05	85	49
24-April-20	0	79	58
25-April-20	0	76	53
26-April-20	0	83	47
27-April-20	0	83	62

**Table 4.3 Rainfall records with maximum and minimum temperature for Iowa Park, Texas 30 days prior to the second RUAA survey initiated on June 17, 2020.**

Survey dates are highlighted in gray. Weather Data from Weather Underground; station Lawton – Fort Still Regional Airport Station. (Weather Underground, 2020)

<b>Date</b>	<b>Daily Precipitation (in)</b>	<b>High Temperature (°F)</b>	<b>Low Temperature (°F)</b>
16-May-20	1.10	70	62
17-May-20	0.24	84	60
18-May-20	0	86	58
19-May-20	0	84	64
20-May-20	0	75	62
21-May-20	0	85	67
22-May-20	0	88	63
23-May-20	0	88	65
24-May-20	0.31	87	65
25-May-20	0	71	62
26-May-20	0.01	79	60
27-May-20	0	85	55
28-May-20	0	83	65
29-May-20	0	88	58
30-May-20	0	86	62
31-May-20	0	85	58
1-June-20	0	86	62
2-June-20	0	91	67
3-June-20	0	94	67
4-June-20	0	100	69
5-June-20	0.09	96	70
6-June-20	0	96	72
7-June-20	0	92	73
8-June-20	0	96	68
9-June-20	0	87	65
10-June-20	0	88	53
11-June-20	0	93	53
12-June-20	0	93	59
13-June-20	0	95	59
14-June-20	0	93	63
15-June-20	0	95	61
16-June-20	0	94	69

**Table 4.4 Stream channel and corridor appearance for each site sampled along the Unnamed Tributary of Buffalo Creek (0214F).**

<b>Site Number</b>	<b>Stream Channel Appearance</b>	<b>Dominant Substrate</b>	<b>Corridor Appearance</b>	<b>Riparian Size</b>	<b>Park</b>	<b>Landscape Surroundings</b>
UB01	Natural	Mud/Clay	Mowed/Maintained Corridor	Small	No	Native/Improved Pasture
UB02	Natural	Mud/Clay	Shrub/Mowed/Maintained Corridor	Small	No	Native/Improved Pasture
UB03	Natural	Mud/Clay	Shrub/Pasture	Small	No	Native/Improved Pasture

**Table 4.5 Thalweg depth, stream flow type, and site accessibility during the two surveys of the Unnamed Tributary of Buffalo Creek (0214F).**

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
UB01	300	11	0	0.04	0	Intermittent	Intermittent	Public	E
UB02	300	11	0	0.19	0.08	Intermittent with Pools	Intermittent	Public*	MD
UB03	300	11	0	0.28	0.24	Perennial	Perennial	Private	MD

<sup>a</sup> During the second survey, only 180 m of reach length and 7 transects were surveyed. The average thalweg depth is, thus, based on 7 rather than 11 transects for Trip 2. A more detailed explanation is provided below in site description.

**Table 4.6** Description of surveyed stream sites along the Unnamed Tributary of Buffalo Creek during the first survey performed on April 27, 2020.

Site Number	Maximum Width (m)	Minimum Width (m)	Typical Average Width (m)	Observed Flow
UB01	2.3	0	0	No Flow
UB02	5	0	1	Low
UB03	4	0.5	1.2	Low

**Table 4.7** Description of surveyed stream sites along the Unnamed Tributary of Buffalo Creek during the second survey performed on June 17, 2020.

Site Number	Maximum Width (m)	Minimum Width (m)	Typical Average Width (m)	Observed Flow
UB01	0	0	0	Dry
UB02	1.0	0	0.4	No Flow
UB03	1.0	0.3	1.2	Normal

**Table 4.8 Stream aesthetics along the Unnamed Tributary of Buffalo Creek during the first survey performed April 27, 2020.**

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.

<b>Site</b>	<b>Aquatic Vegetation</b>	<b>Algae Cover</b>	<b>Odor</b>	<b>Color</b>	<b>Bottom Deposit</b>	<b>Water Surface</b>	<b>Reptiles</b>	<b>Water Dependent Birds</b>	<b>Mammals</b>	<b>Evidence of wildlife</b>	<b>Large garbage in Channel</b>	<b>Small garbage in Channel</b>	<b>Bank garbage</b>
UB01	A	R	N	Clear	Fine Sediments	Clear	N	N	MP	Tracks/Fecal Droppings	N	R	R
UB02	C	R	N	Clear	Fine Sediments	Clear	N	N	N	Tracks/Fecal Droppings	N	R	R
UB03	C	R	C	Clear	Fine Sediments	Clear	N	N	SP	Tracks/Fecal Droppings	N	R	R



**Table 4.9 Stream aesthetics along the Unnamed Tributary of Buffalo Creek during the second survey performed June 17, 2020.**

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
UB01	A	A	N	None	None	None	N	N	SP	Tracks	N	R	R
UB02	C	A	N	Clear	Fine Sediment	Clear	N	N	N	Tracks/Fecal Droppings	N	R	R
UB03	R	C	R	Clear	Solids	Scum/Clear	SP	N	N	Tracks/Fecal Droppings	N	R	N

### Physical Description of UB01

The Unnamed Tributary of Buffalo Creek site UB01 was visited on April 27 and June 17, 2020. This site was located at the SW Access Road of HWY 287 in Iowa Park, Texas. The site was publicly accessible at an alleyway that ran between a residential neighborhood making access to the stream easy. TIAER personnel accessed the stream by way of the access road off of Hwy 287 and drove into the public alley.

The creek at this site passes through a mowed and maintained corridor. The riparian area was mowed and open leading directly up to the edge of the stream bank. Banks were gentle and approximately 6 inches high in places. The general appearance of the creek at this location is shown in Figures 4.2 and 4.3.



**Figure 4.2** Photograph of the Unnamed Tributary of Buffalo Creek Site UB01 taken on April 27, 2020. The upstream view of the 300-m transect.

Site UB01 was wadeable with average thalweg ranging from 0.04 m to 0 m between surveys. Figure 4.2 illustrates the typical observed width of the creek at this site, approximately 0 m. Widths ranged from 2.3 m to 0 m during the two surveys (Tables 4.6 and 4.7).

The stream flow type was observed as intermittent at the time of both surveys (Table 4.5). Fish and aquatic vegetation were not observed at this site, and algae cover was rarely observed during the first survey only. The deepest thalweg depth measured during the first survey at the 180-m transect was 0.20 m and the shallowest was 0 m at multiple transects. The stream was completely dry through the whole 300 m reach during the second survey. These factors combined indicate the strong probability that the Unnamed Tributary of Buffalo Creek at this site likely experiences large

periods of time with zero flow. No pools were observed during either survey at this site. The Palmer Drought Index indicated moderately wet for this region of Texas for the first and second surveys respectively. These factors and measured conditions suggest the stream type most appropriate for this site is intermittent.



**Figure 4.3** Photograph of the Unnamed Tributary of Buffalo Creek Site UB01 taken on June 17, 2020. The upstream view of the 150-m transect.

No water dependent birds or reptiles were observed during either surveys (Tables 4.8 and 4.9). Tracks and fecal droppings from domestic pets (canine) were noted throughout the survey reach. This was likely due to the stream running in an alleyway between a residential neighborhood. Aquatic vegetation was absent during both surveys, and algae cover was rarely detected during only the first survey. No large garbage was seen during either survey while small, typical household garbage (plastics, glass, cans) was observed in the stream and on the bank during both surveys.

### **Physical Description of UB02**

The Unnamed Tributary of Buffalo Creek at Site UB02 was visited on April 27 and June 17, 2020. This site was located at the W Smith Avenue bridge crossing. Access to this site was moderately difficult because the banks were steep with thick vegetation leading down to the water. However, the stream was publicly accessible from 0 – 270 m.

Portions of the stream at UB02 passed through open pasture land with a small riparian area (Table 4.4). However, the banks were vegetated with larger trees and a larger shaded understory (Figure 4.4). The stream was wadeable during both surveys. Average thalweg depths ranged from 0.08 m

to 0.19 m between surveys. While the stream was intermittent with perennial pools during the first survey, it was observed as intermittent during the second survey (Table 4.5). Channel widths ranged from 5 m to 0 m throughout the reach during both surveys with a typical observed width of ranging from 1 m to 0.4 m during both surveys respectively (Tables 4.6 and 4.7).



**Figure 4.4** Photograph of Unnamed Tributary of Buffalo Creek Site UB02 taken on April 27, 2020. Photograph shows the upstream view of the 150-m transect. TIAER personnel in photo.



**Figure 4.5** Photograph of the Unnamed Tributary of Buffalo Creek at Site UB02 taken on June 17, 2020. Photograph at the 300-m transect facing upstream.

No water dependent birds were observed at this site during both surveys (Tables 4.8 and 4.9). Bird droppings were also observed in addition to dog and raccoon tracks. No evidence of wildlife was observed in either survey. Aquatic vegetation was common while algae was rare during the first survey. During the second survey, aquatic vegetation was still common, but algae cover was absent. No odor was detected, water color was clear, and the surface clear during each survey. Neither evidence of human recreation nor large garbage was present, however, typical garbage such as plastics, cans, and bottles were present during both surveys. Aquatic vegetation was common during both surveys and some algae cover was observed at this site during the second survey. The water color was clear during both surveys while some scum observed throughout parts of the stream during the second survey.

### **Physical Description of UB03**

The Unnamed Tributary of Buffalo Creek at Site UB03 was visited on April 27 and June 17, 2020. This site was accessed via a bridge crossing at Coleman Road. Access to the stream passed the road crossing was by private property only. The riparian area was both shrub dominated and mowed and maintained on the left and right banks (Table 4.4). Access to the stream was moderately difficult due to private property and a very slick/slippery mud/clay substrate.

Site UB03 was wadeable during both surveys with average thalwegs of 0.24 m and 0.28 m respectively (Table 4.5). The stream flow type was characterized as perennial during both surveys for this reach. The average stream width during the first survey was 1 m while it fell to 0.4 m during the second survey. The maximum stream width was 5 m during the first survey and 1 m

during the second. Minimum widths were constant at 0 m during both surveys (Tables 4.6 and 4.7).

The stream banks were densely vegetated (as seen in Figure 4.6) at UB03. The stream channel was relatively clear of downed logs and twig debris; however, the substrate was slick and slippery to walk. Aquatic vegetation and algae cover was observed during both the first and second surveys. Because this site is downstream of the City of Iowa Park WWTF, a chlorine odor was present during both surveys. The water was clear in color and surface during both surveys with the exception of some scum encounters on the surface during some locations along the 300 m reach during the second survey.



**Figure 4.6** Photograph of The Unnamed Tributary of Buffalo Creek Site UB03 taken on June 17, 2020, the upstream view of the 150-m transect.

A water snake was encountered during the second survey. Other evidence of wildlife observed were crawfish burrows, canine tracks, raccoon tracks, and a cat was seen during the first survey only. No large garbage was encountered during either survey, but some small in channel and bank garbage in the form of plastic bottles was observed during the second survey (Tables 4.8 and 4.9). No evidence of human recreation was observed at this site.

## 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 three sites were at public road crossings; however, private property boundaries limited public access to a small area around and underneath bridge crossing at UB03. 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 the Unnamed Tributary of Buffalo Creek.

All of the three 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 snakes were a reason they did not use the creek for recreation. Lack of flow, shallow waters, and over grown banks were other reasons noted for not using the Unnamed Tributary of Buffalo Creek for recreation. Personal use of the tributary that runs into the Unnamed Tributary of Buffalo Creek was indicated only by one interviewee who swam and waded as an adult. However, this activity did not occur in the stream of study. All interviewees were familiar with the Unnamed Tributary of Buffalo Creek and voluntarily completed an interview to provide their knowledge of the stream. All interviews completed were based on interviewees knowledge of the stream on or near site UB03 (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 the Unnamed Tributary of Buffalo Creek.**

Site Name	Number of Interviews	Swimming	Adult Wading	Children Wading	Hunt	Fish	Boat, Canoe, Kayak
UB01							
UB02							
UB03	3	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0
General AU							
Totals	3	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0	0,0,0

## Summary

RUAA surveys were conducted at three sites along the Unnamed Tributary of Buffalo Creek (0214F) on April 27, 2020 and June 17, 2020. 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 the Unnamed Tributary during both surveys except during the second survey at site UB01 where there was no flow. Stream flow was considered normal during both surveys based on information provided by local residents. The Palmer Drought Severity Index (PDSI) indicated moderately wet conditions in April and June 2020 (TWDB, 2020).

No recreational activities were observed by TIAER field staff during either survey. Almost 80% of the watershed through which the Unnamed Tributary of Buffalo Creek falls into three types of land use. Low Intensity Developed land accounts for the majority at roughly 30%, while grassland/herbaceous and medium intensity developed lands represent 29% and 16% of the

watershed, respectively. Steep and slippery banks and overgrown banks with thick vegetation were present at Sites UB02 and UB03 indicating hazardous locations for recreation.

Interviews indicated no occurrences of recreational activity within the stream. Public access to the stream is limited at two of the three 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 4.7. Overall RUAA findings are summarized in the form below.



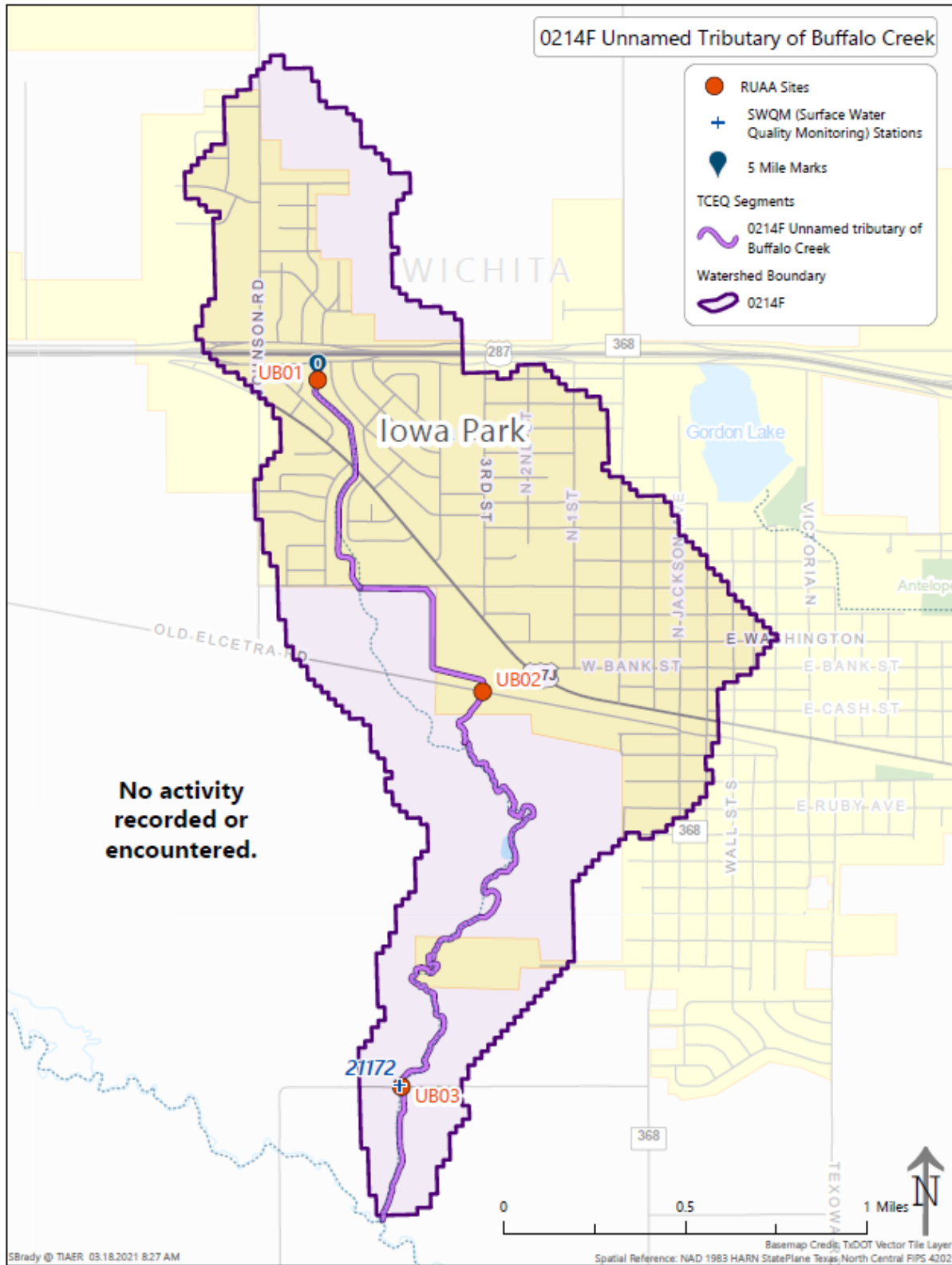


Figure 4.7 Summary of observed and interviewed human activities on the Unnamed Tributary of Buffalo Creek.

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: Unnamed Tributary of Buffalo Creek  
Segment No. of Nearest Downstream Segment No.: 0214F  
Classified?: No  
County: Wichita County

1. Observations on Use

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

2. Physical Characteristics of Water Body

- a. What is the average thalweg depth? 0.14 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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