



Sabine River Basin Big Cow Creek Watershed Characterization Report 2020

*Prepared in Cooperation with the Texas Commission on Environmental Quality
The preparation of this report was financed in part through funding from the
Texas Commission on Environmental Quality.*



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Introduction

Through the Texas Clean Rivers Program (TCRP), the Texas Commission on Environmental Quality (TCEQ) forms partnerships with regional water authorities to coordinate and conduct water quality monitoring and to promote stakeholder interest in improving the water quality of Texas surface waters. The Sabine River Authority of Texas (SRA-TX) is the TCRP planning agency within the Sabine River Basin.

The Sabine River Basin Big Cow Creek Watershed Characterization Report describes water quality in the Big Cow Creek (BCC) watershed in the Sabine River Basin. The BCC watershed was selected for its unique characteristics, importance as a major tributary and the segment's inclusion on the 2020 TCEQ Texas Integrated Report (IR) 303(d) list for bacteria impairment. This report encompasses, but is not limited to, the examination of water quality monitoring data, hydrological characteristics, land use, permitted dischargers and major watershed events.

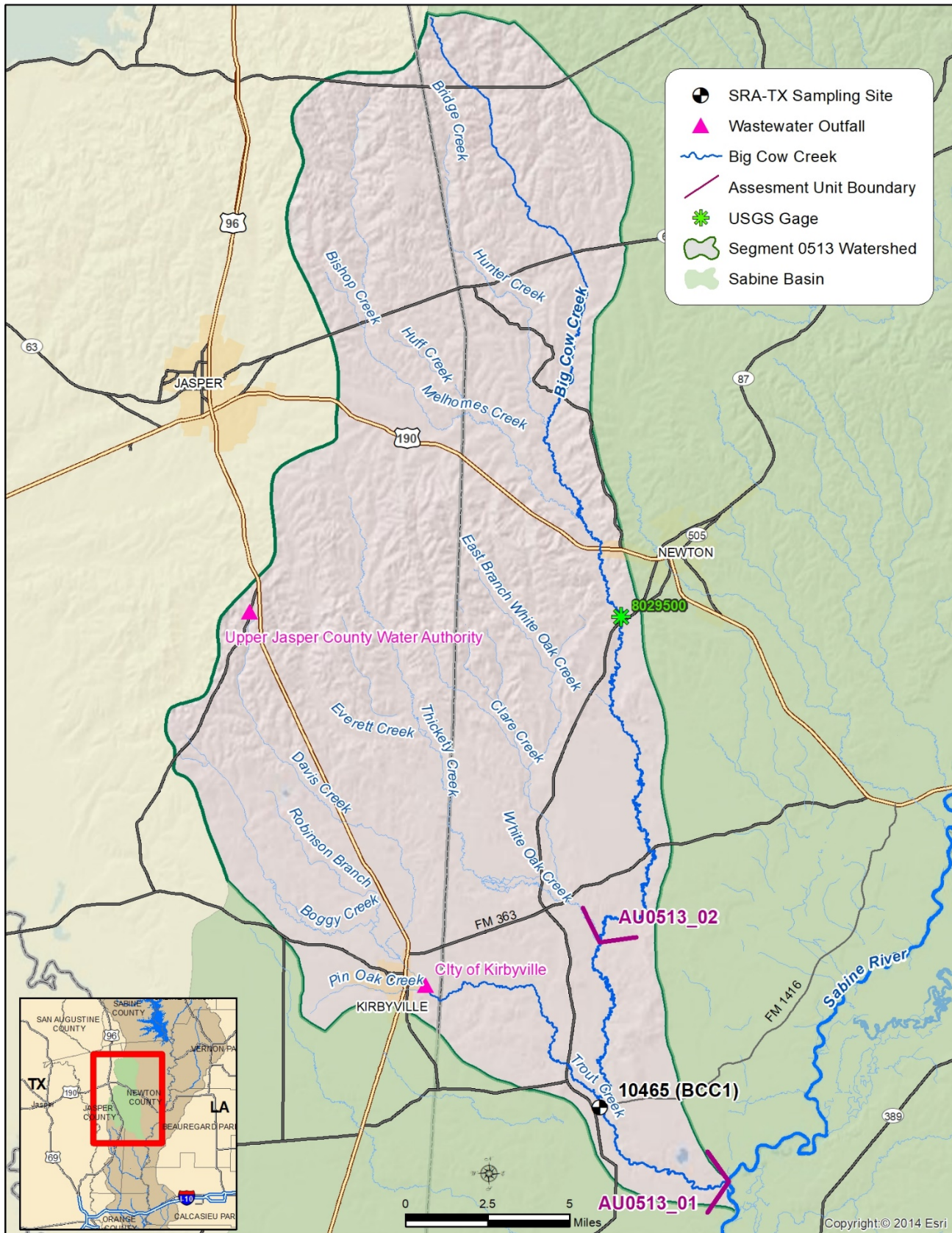
Segment 0513 – Big Cow Creek

Segment 0513 (see Figure 1) begins from the confluence with the Sabine River in Newton County to a point 4.6 kilometers (2.9 miles) upstream of R 255 in Newton County. The BCC watershed is 37 miles long, 15 miles wide, has an approximate drainage area of 349 square miles and is in the Western Gulf Plain Ecoregion. The upper watershed is characterized by rolling sand hills, open mixed forests, and scattered pine groves. The lower section is bottomland composed of mixed hardwood and pine. The watershed covers parts of Jasper and Newton counties and is largely rural with no major industries.



Big Cow Creek Confluence with Sabine River

Figure 1. Big Cow Creek Watershed Segment 0513





Big Cow Creek at FM 1416

BCC is comprised of two assessment units (AUs): AU0513_01 and AU 0513_02. AU 0513_01 is defined as BCC from the confluence with the Sabine River southeast of Kirbyville upstream to the confluence of White Oak Creek east of Kirbyville (Figure 1). AU 0513_02 is defined as BCC from the confluence of White Oak Creek east of Kirbyville to the headwaters 4.6 kilometers (2.9 miles) upstream of Recreational Road 255 in Newton County (Figure 1). The City of Kirbyville has a population of 2,142 (US Census Bureau, 2010) and is located in the Trout Creek watershed, a tributary to BCC (see Figure 1). The TCEQ station ID used for the 2020 IR assessment along with its description, assigned AU ID and monitoring entity are listed in Table 1.

Table 1. Segment 0513 Monitoring Station

TCEQ Station ID (SRA-TX ID)	Description	AU_ID	Monitoring Entity
10465 (BCC1)	Big Cow Creek at FM 1416 South of Bon Wier	0513_01	SRA-TX

Hydrology Characteristics

BCC is classified as a freshwater stream with perennial flow. TCEQ's designated uses for BCC are primary contact recreation, high aquatic life use and public water supply. The United States Geologic Survey (USGS) maintains one flow gaging station (USGS # 08029500) located on BCC near Newton, TX on SH 87 (see Figure 1). This USGS Gage is one of five prescribed measuring points in the Sabine Basin for the Environmental Flow Standards adopted by TCEQ on April 20, 2011. During the 2020 IR assessment period of 08/17/2010 to 11/30/2018, the mean flow at this site was 121 cubic feet per second (cfs) with a maximum flow of 39,500 cfs on 08/30/2017 and a minimum flow of 1.1 cfs on 08/23/2011. The maximum flow in August was due to rainfall from Hurricane Harvey. Intermittent flows with pools are typical in the upper AU 0513_02 during late summer, early fall, and periods of drought. Water flow is sufficient for recreational use and the primary section utilized for recreational activity is from the SH 87 crossing to the Sabine River (See Figure 1). BCC has numerous spring flows that result in clear, cool water. In FY2020, the creek had an average water temperature of 19.6 °C, average pH of 6.4 SU, average dissolved oxygen of 8.0 mg/L, average specific conductance of 39 µS/cm and average total dissolved solids of 25 mg/L.

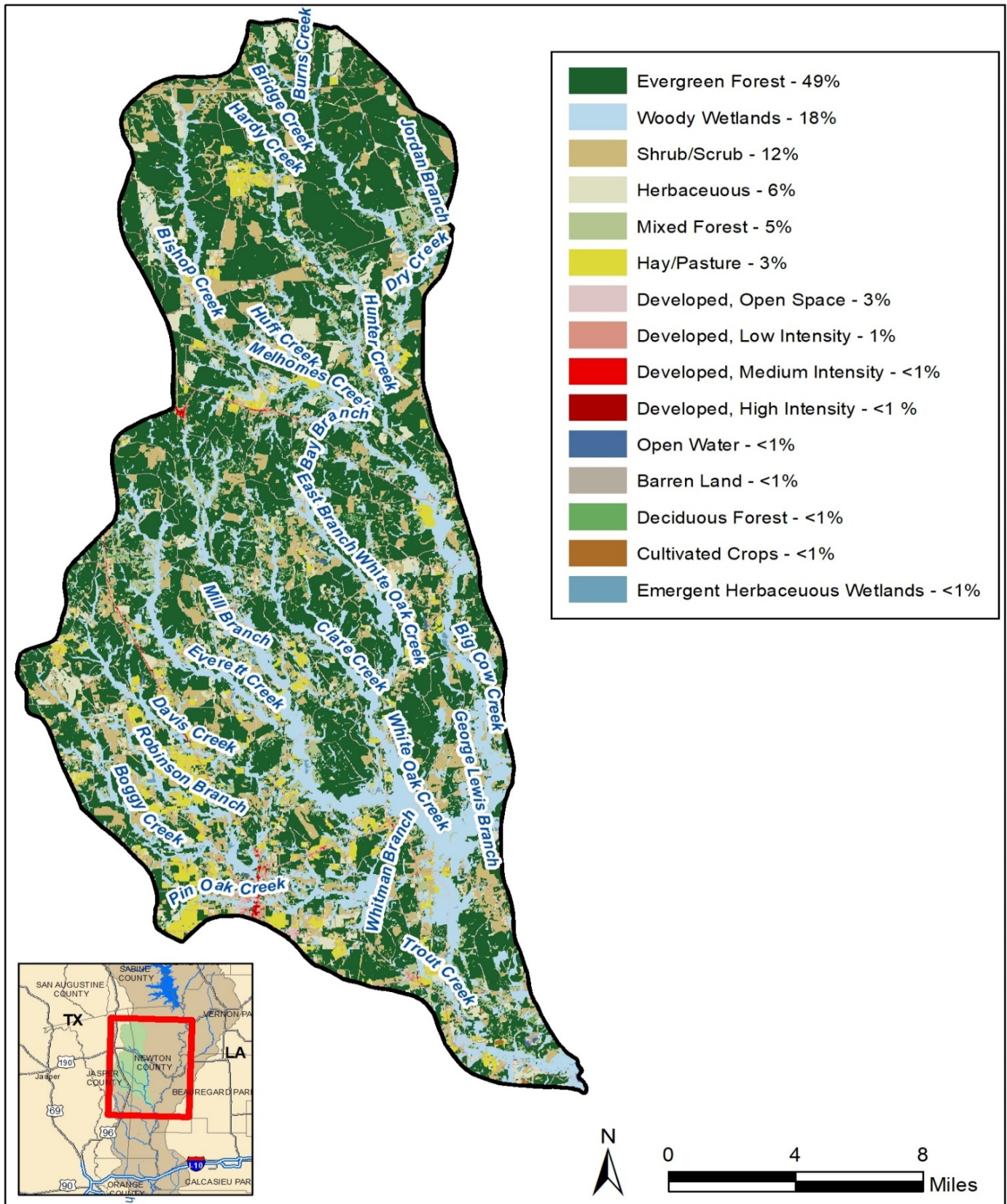
Land Use

Spatial analysis of this segment indicates that evergreen forests, woody wetlands, and shrub/scrub accounts for 79 percent of land use (see Figure 2). Herbaceous, mixed forest, hay/pasture and developed open space account for an additional 14 percent of land use. Low intensity development is 1 percent, with medium and high development less than 1 percent each. Small family livestock farming and silviculture activities occur within this rural watershed. The watershed population is approximately 8,400, which correlates to a density of 24 people per square mile (US Census Bureau, 2010).



Big Cow Creek Bridge at FM 1416

Figure 2. Big Cow Creek Watershed Land Cover Classification Segment 0513





Big Cow Creek Downstream of SH 87

There are four closed and one inactive landfill and one superfund site with a deleted status within this watershed.

The City of Kirbyville has a permit to discharge 0.93 million gallons per day (MGD) of treated wastewater to Trout Creek and then to BCC, located approximately 17.5 kilometers (10.9 miles) upstream of TCEQ station 10465. The Upper Jasper County Water Authority has a permit to discharge 0.04 MGD of treated wastewater. The discharge flows to a roadside ditch, into Horn Branch, then to Davis Creek, then to Trout Creek and then into BCC, located approximately 45.5 kilometers (28.3 miles) from TCEQ station 10465.

Potential Stakeholders

Potential stakeholders and entities with possible interest in this watershed are as follows:

- AgriLife Extension
- City of Kirbyville
- Landowners / Citizens
- Environmental Protection Agency
- Jasper-Newton Soil and Water Conservation District
- Permitted Dischargers
- Railroad Commission of Texas
- Sabine River Authority of Texas
- Texas Commission on Environmental Quality
- Texas Forest Service
- Texas Parks and Wildlife Department
- Texas State Soil and Water Conservation Board

Impairment / Area of Interest

The 2020 TCEQ IR indicates non-support for *E. coli* in AU 0513_01 and an Aquatic Life Use concern for dissolved lead in water. This segment was first listed for *E. coli* in 2018 and remains on the 303(d) list. The 2020 IR assessment results for AU0513_01 indicate a geometric mean of 184.64 MPN for the 81 samples collected for *E. coli* analysis, which exceeds the Texas Surface Water Quality Standard (TSWQS) of 126 MPN for primary contact recreation. This impairment is currently classified as Category 5c, which specifies that additional data or information must be collected or evaluated before a management strategy is scheduled.

For AU 0513_01 the Aquatic Life Use concern for dissolved lead in water was first listed in the 2010 IR. The 2020 IR assessment results indicate one exceedance of lead in water of 0.40 µg/L for the 8 samples collected, which exceeds the TSWQS Aquatic Life Use criteria of 0.24 µg/L. All remaining water quality parameters in this segment meet the TSWQS and support their designated uses.



Big Cow Creek Upstream FM 1416

Possible Causes of Impairment

Due to the small number of permitted dischargers in this rural watershed, non-point source pollution is a probable source of bacteria impairment. Elevated bacteria levels are consistently observed during periods of increased flows from rainfall and are correlated with increased turbidity and reduced Secchi transparencies. Potential non-point sources of bacteria include runoff from natural areas, private septic systems, livestock, and wildlife ¹. This rural watershed has large populations of wildlife including feral hogs, beaver, otter, raccoons, and deer.

Potential sources for dissolved lead in water are attributed to non-point upstream sources².

Recommendations

The SRA-TX will continue to monitor TCEQ station 10465 (BCC1) monthly, which is the most representative downstream station. Monthly monitoring will include routine field, conventional parameters, and bacteria. Metals in water will be sampled once annually. Future monitoring needs, priorities and purposes will be planned with qualified monitoring organizations and stakeholders during the 2021 Coordinated Monitoring Meetings.



Lower Sabine River

¹ [TCEQ Potential Sources of Impairments and Concerns](https://www.tceq.texas.gov/assets/public/waterquality/swqm/assess/20txir/2020_sources.pdf) , https://wayback.archive-it.org/414/20200910072252/https://www.tceq.texas.gov/assets/public/waterquality/swqm/assess/20txir/2020_sources.pdf, accessed 03/08/2020

² Ibid