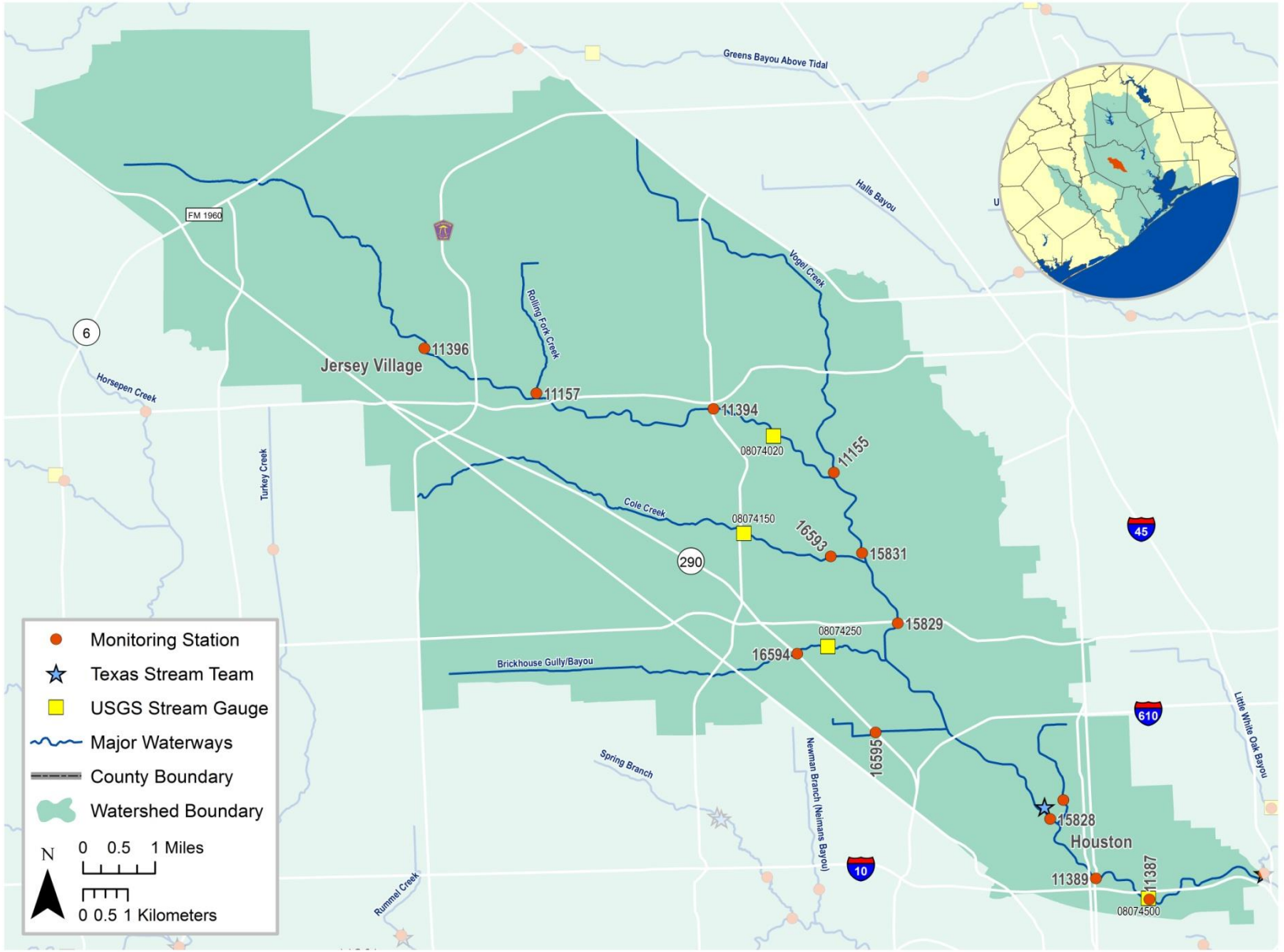
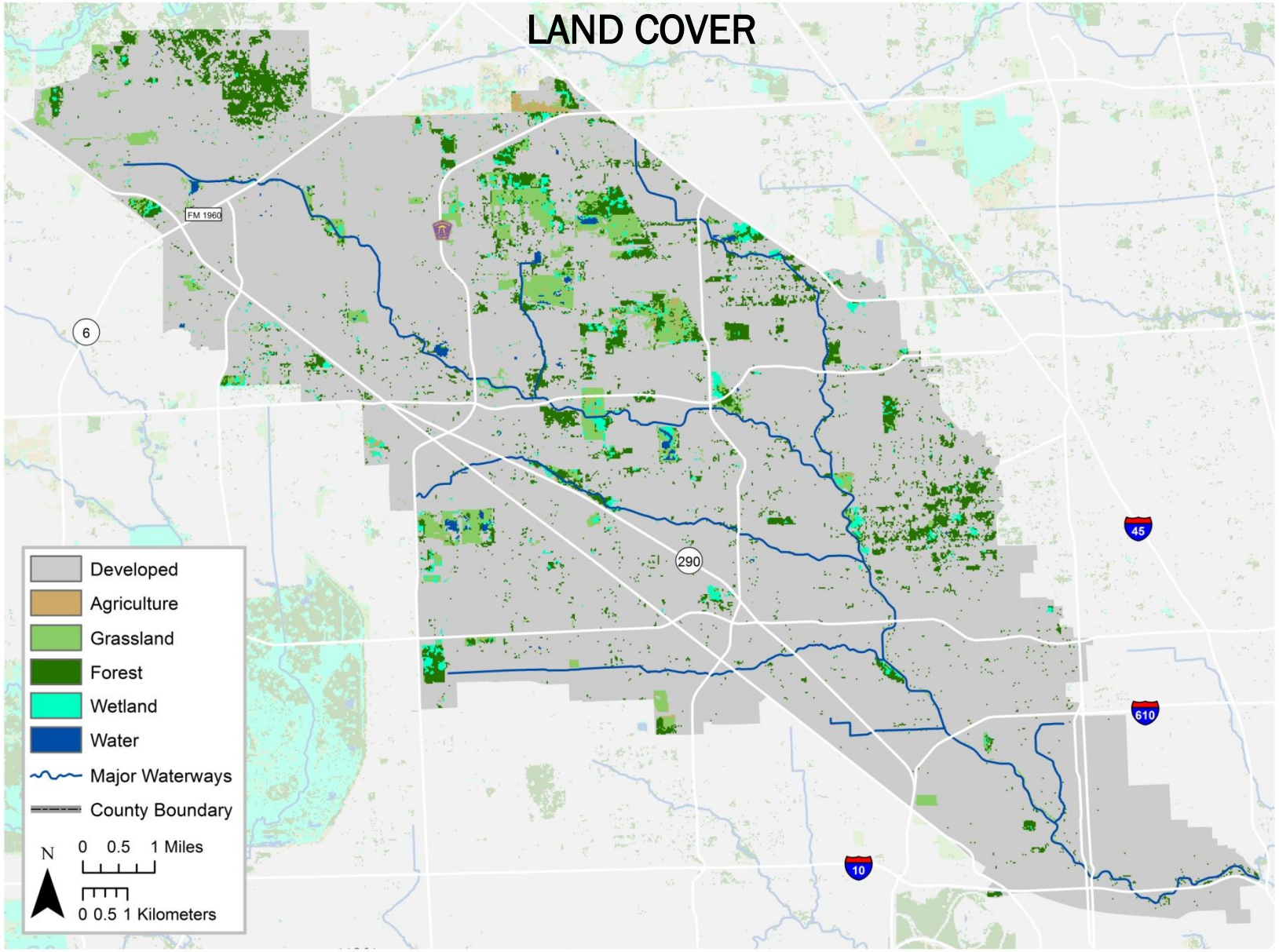
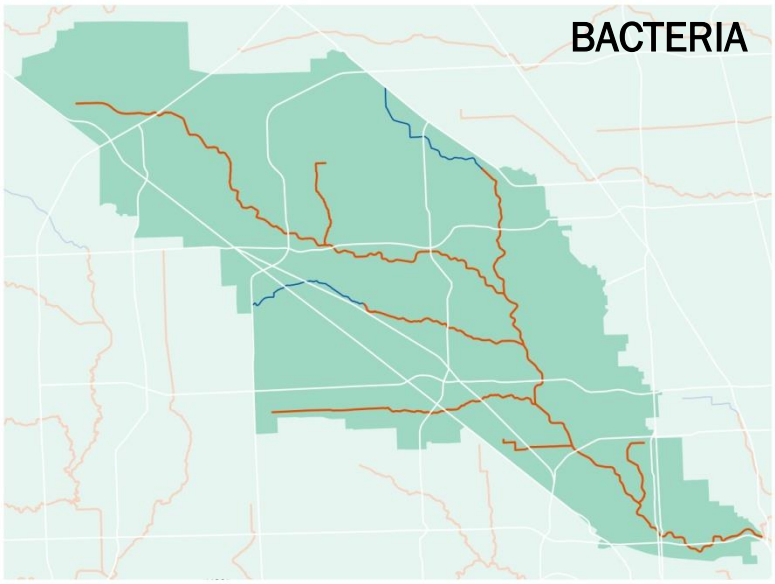
WHITE OAK BAYOU - SEGMENT 1017

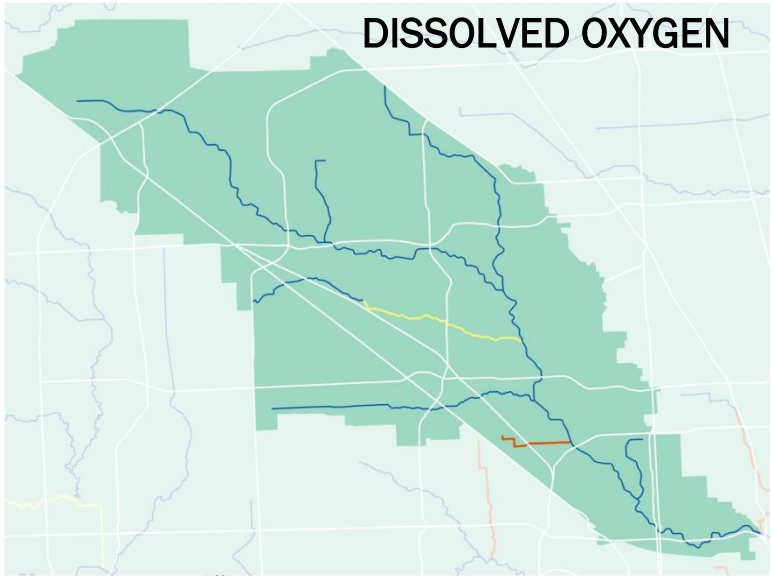


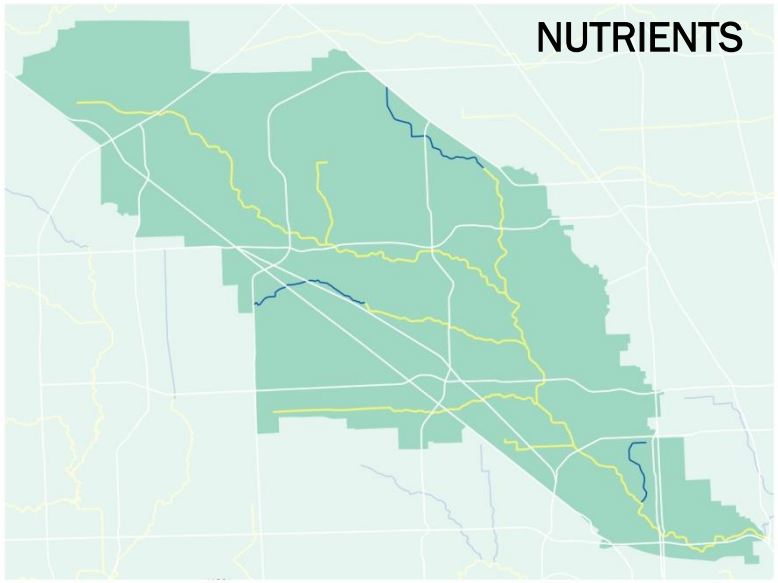
WHITE OAK BAYOU - SEGMENT 1017

LAND COVER









Impairment Concern No Impairments or Concerns

Segment Number:	1017	Name:	White Oak Bayou Above Tidal		
Length:	24 miles	**Watershed Area:**	88 square miles	**Designated Uses:**	Primary Contact Recreation 1; Limited Aquatic Life
Number of Active Monitoring Stations:	13	**Texas Stream Team Monitors:**	1	**Permitted Outfalls:**	48

Description:

Segment 1017 (Perennial Stream w/ limited ALU): From a point immediately upstream of the confluence of Little White Oak Bayou in Harris County to a point 3.0 km (1.9 mi) upstream of FM 1960 in Harris County

Segment 1017A (Perennial Stream w/ limited ALU): Brickhouse Gully (unclassified water body) — Perennial stream from the confluence with White Oak Bayou up to Gessner Road

Segment 1017B (Perennial Stream w/ ALU): Cole Creek (unclassified water body) — Perennial stream from the confluence of White Oak Bayou up to south of Beltway 8

Segment 1017C (Perennial Stream w/ limited ALU): Vogel Creek (unclassified water body) — From the White Oak Bayou confluence to a point 3.2 km (2.0 mi) upstream of the White Oak Bayou confluence to just south of State Hwy 249 in Harris County

Segment 1017D (Perennial Stream w/ limited ALU): Unnamed Tributary of White Oak Bayou (unclassified water body) — From the confluence with White Oak Bayou Above Tidal confluence downstream of TC Jester, to Hempstead Hwy, north of US Hwy 290 in Harris County

Segment 1017E (Perennial Stream w/ limited ALU): Unnamed Tributary of White Oak Bayou (unclassified water body) — From the confluence with White Oak Bayou Above Tidal, near W 11th Street, to just upstream of W 26th Street, south of Loop 610 W in Harris County

Segment 1017F (Perennial Stream w/ high ALU): Rolling Fork Creek (unnamed tributary) — From the White Oak Bayou Above Tidal confluence to a point 3.9 km (2.4 mi) upstream

Percent of Stream Impaired or of Concern						
Segment ID	PCBs/Dioxin	Bacteria	Dissolved Oxygen	Nutrients	Chlorophyll *a*	Other
1017	-	100	-	100	-	-
1017A	-	100	-	100	-	-
1017B	-	55	55	55	-	-
1017C	-	32	-	32	-	-
1017D	-	100	100	100	-	-
1017E	-	100	-	-	-	-
1017F	-	100	-	100	-	-

Segment 1017			
Standards	Perennial Stream	Screening Levels	Perennial Stream
Temperature (°C/°F):	33 / 92	Ammonia (mg/L):	0.33
Dissolved Oxygen *(24-Hr Average)* (mg/L):	5.0 / 3.0	Nitrate-N (mg/L):	1.95
Dissolved Oxygen *(Absolute Minima)* (mg/L):	3.0 / 2.0	Orthophosphate Phosphorus (mg/L):	0.37
pH (standard units):	6.5-9.0	Total Phosphorus (mg/L):	0.69
E. coli (MPN/100 mL) (grab):	399	Chlorophyll *a* (µg/L):	14.1
E. coli (MPN/100 mL) (geometric mean):	126		
Chloride (mg/L as Cl):	110		
Sulfate (mg/L as SO_4):	65		
Total Dissolved Solids (mg/L):	600		

FY 2016 Active Monitoring Stations				
Site ID	Site Description	Frequency	Monitoring Entity	Parameter Groups
11155	Vogel Creek at Little York Rd	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria
11157	Rolling Fork Creek at Lake Lane	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria
11387	Whiteoak Bayou at Heights Blvd	Quarterly	TCEQ	Field, Conventional, Bacteria, Chlorophyll *a*
11389	Whiteoak Bayou at N Shepherd	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria

11394	Whiteoak Bayou at N Houston Rd	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria
11396	Whiteoak Bayou at Tahoe Drive	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria
15828	Whiteoak Bayou at West TC Jester Blvd	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria
15829	Whiteoak Bayou at W 43rd St	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria
15831	Whiteoak Bayou at W Tidwell Rd	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria
16593	Cole Creek at Bolivia Blvd	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria
16594	Brickhouse Gully at US 290	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria
16595	Unnamed Trib of Whiteoak Bayou at Mangum Rd	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria
16596	Unnamed Trib of Whiteoak Bayou at West 14th	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria

Water Quality Issues Summary

Issue	2014 Assessment *I – Impaired* *C – Of Concern*	Possible Causes / Influences / Concerns Voiced by Stakeholders	Possible Solutions / Actions To Be Taken
Elevated Levels of Indicator Bacteria	1017 I 1017A I 1017B I 1017C I 1017D I 1017E I 1017F I	▪ Rapid urbanization and increased impervious cover ▪ Constructed stormwater controls failing ▪ Direct and dry weather discharges ▪ Poorly operated or undersized WWTFs ▪ WWTF non-compliance, overflows, and collection system by-passes ▪ Waste haulers illegal discharges/improper disposal ▪ Improper or no pet waste disposal ▪ Developments with malfunctioning OSSFs	▪ Add water quality features to stormwater systems ▪ Improve compliance and enforcement of existing storm water quality permits to minimize contamination in runoff ▪ Improve construction oversight to minimize TSS discharges to waterways. ▪ Impose new or stricter bacteria limits than currently designated by TCEQ ▪ Regionalize chronically non-compliant WWTFs ▪ Increase monitoring requirements for self-reporting ▪ Require all systems to develop and implement a utility asset management program and protect against power outages at lift stations ▪ More public education regarding pet waste disposal ▪ Ensure proper citing of new or replacement OSSFs ▪ More public education regarding OSSF operation and maintenance

			▪ Increase monitoring and enforcement efforts to identify and repair failing OSSFs.
Dissolved Oxygen Concentrations	1017B C 1017D I	▪ Fertilizer runoff from urbanized properties, such as landscaped areas, residential lawns, and sport fields ▪ Excessive nutrients and organic matter from WWTF effluent, SSOs, malfunctioning OSSFs, illegal disposal of grease trap waste, and biodegradable solid waste (e.g., grass clippings and pet waste) ▪ Vegetative canopy removed	▪ Improve compliance and enforcement of existing storm water quality permits ▪ Improve operation and maintenance of existing WWTP and collection systems ▪ Regionalize chronically non-compliant WWTFs ▪ More public education regarding disposal of household fats, oils, and grease ▪ More public education regarding OSSF operation and maintenance ▪ More public education regarding pet waste disposal ▪ Work with drainage districts and agencies to change practices of clear cutting waterways ▪ Conserve or plant canopy trees and habitat along waterways
Elevated Nutrients	1017 C 1017A C 1017B C 1017C C 1017D C 1017F C	▪ Fertilizer runoff from urbanized properties, such as landscaped areas, residential lawns, and sport fields ▪ WWTF effluent, SSOs, and malfunctioning OSSFs	▪ Implement *YardWise* and *Watersmart* landscape practices ▪ Encourage implementation of LID practices in new developments ▪ Maintain riparian buffer areas along waterways ▪ Monitor phosphorus levels at WWTFs to determine if controls are needed.

Segment Discussion:

Watershed Characteristics: The watershed contains widespread residential development with the densest urban population located within the I-610 Loop. High-density commercial development is concentrated along the U.S. Highway 290 corridor but is also scattered throughout the watershed. Subdivisions and commercial development have also rapidly expanded to the northwest of Jersey Village. All segments throughout the entire watershed have been channelized leaving grassy banks and little, if any, vegetative canopy. The main channel in the lower 9.1 miles of the segment has both a concrete bottom and concrete sides half way up the banks. All grass banks throughout the entire watershed are mowed on a regular basis.

Water Quality Issues: This segment is not supporting its contact recreation use designation. The entire segment and all tributaries to Whiteoak Bayou Above Tidal are listed as impaired for bacteria in the 2014 Texas Integrated Report. Overall, bacteria levels have fallen since 2008 but remain significantly above the current state water quality standard. Refer to the table below for more information about the geometric means and percent grab exceedances for each AU in the White Oak Bayou Above Tidal segment.

Assessment Unit	TCEQ Assessment (2005-2012) Geomean (MPN/100 mL)	HGAC Analysis 2001-2008 Geomean (MPN/100 mL) / % Grab Exceedance	HGAC Analysis 2008-2015 Geomean (MPN/100 mL) / % Grab Exceedance
1017_01	375	578 / 53.4	258 / 32.5
1017_02	643	1195 / 78.4	480 / 48.4
1017_03	638	1230 / 79.5	569 / 55.0
1017_04	2794	3708 / 96.5	2796 / 93.5
1017A_01	1446	2685 / 91.9	799 / 57.4
1017B_02	1539	2829 / 93.2	797 / 69.4
1017C_01	368	419 / 44.2	251 / 28.8
1017D_01	1158	4178 / 82.4	1111 / 60.3
1017E_01	962	1844 / 90.5	1498 / 87.1
1017F_01	711	1062 / 83.3	552 / 62.9

Nutrient levels are also a significant concern for the entire watershed except for in segment 1017E. Ammonia levels have shown the lowest number of exceedances since 2001 with about 32% and 34% of grab samples exceeding the 0.33 mg/L screening criteria for segments 1017C and 1017D, respectively. Nitrate-nitrogen (nitrate) and total phosphorus (TP) levels, however, are elevated in this segment, with the percent exceedances for all segments listed as having a concern being no less than 68%. Conditions have also been deteriorating in the majority of segments since 2008. See the table below for a breakdown of percent exceedances for nitrate and TP for the main segment.

Assessment Unit	Parameter	HGAC Analysis 2001-2008 % Grab Exceedance	HGAC Analysis 2008-2015 % Grab Exceedance
1017_01	Nitrate	93.1	98.4
1017_01	TP	93.1	98.4
1017_02	Nitrate	88.5	96.8
1017_02	TP	88.5	96.8
1017_03	Nitrate	82.4	95.0
1017_03	TP	82.4	95.0
1017_04	Nitrate	84.3	84.4
1017_04	TP	84.3	84.4

Special Studies/Projects: This segment is part of a larger geographic area covered under several TMDLs, collectively known as the Bacteria Implementation Group (BIG) I-Plan. Implementation efforts in this watershed in particular have been very successful in reducing bacteria levels in White Oak Bayou. For example, the City of Houston and Harris County worked together in reducing sanitary sewer system leaks and overflows and eliminating illegal sewer connections in the watershed. Additionally, the Harris County Flood Control District (HCFCD) now includes water quality features, such as wetlands, in the stormwater detention basins they develop along the bayou. Refer to the Public Involvement and Outreach section of the 2016 Basin Summary Report for more information about the BIG.

Trends: Regression analysis of water quality data revealed 34 significant parameter trends for the seven AUs located within the White Oak Bayou Above Tidal watershed. Two parameter trends were detected for the main segment including decreasing alkalinity and chloride levels. Segment 1017A, Brickhouse Gully, has six significant trends – increasing DO, pH, sulfate, and TP and decreasing *E. coli* and total suspended solids (TSS). Five trends were detected for segment 1017B, Cole Creek, including increasing nitrate, sulfate, and TP while *E. coli* and Secchi transparency are decreasing over time. Dissolved oxygen (DO) and *E. coli* are decreasing in segment 1017C, Vogel Creek, but a significant increasing trend in TP is also present. Segment 1017D, which is an unnamed tributary of White Oak Bayou, revealed the most statistically significant trends with a total of nine parameters showing change over time – increasing DO, pH, and TSS and decreasing chloride, *E. coli*, nitrate, Secchi transparency, specific conductivity (SPCond), and TP. Seven parameter trends were detected on 1017E including increasing sulfate and decreasing ammonia, chloride, nitrate, Secchi transparency, SPCond, and TP. Finally, only two decreasing trends were detected on segment 1017F - ammonia and pH.

Trends of note include the increasing nutrient levels detected on Brickhouse Gully, Cole Creek (nitrate, TP), and Vogel Creek. All three assessment units are currently listed as having a concern for nutrients in the 2014 Integrated Report. Segment 1017D is also listed as having a nutrient concern, but regression analysis of nutrient data for this segment reveal a gradual improvement in nitrate and TP. However, average nitrate and TP levels at segment 1017D have primarily been in compliance with state screening criteria during the period of record with the majority of nutrient samples collected falling below the screening level. Increasing TP and nitrate values are likely related to increased surface runoff and wastewater effluent from existing and newer developments.

A bacteria impairment exists for all seven segments located within the White Oak Bayou Above Tidal watershed. Regression analysis detected an improvement in *E. coli* levels in four out of the seven segments including 1017A, 1017B, 1017C, and 1017D. These improvements are likely related to the various implementation efforts carried out throughout the watershed in recent years (e.x., BIG I-Plan). Although regression analysis did not find a significant change in bacteria levels over time for the remaining segments in the watershed, moving seven-year bacteria geometric mean plots reveal a gradual decrease in *E. coli* concentrations for all segments except 1017E, unnamed tributary of White Oak Bayou, located inside the I-610 Loop. Runoff from the highly urbanized area inside the 610 Loop is likely the primary contributor of bacteria for segment 1017E. This segment is still greatly impaired by bacteria with the majority of samples collected during the period of record measuring significantly higher than the 126 MPN/100 mL standard.

The 2014 Integrated Report also lists segments 1017B and 1017D as having a concern and impairment for DO, respectively. Regression analysis of DO data for segment 1017D shows a gradual improvement over time; however, no change in DO was detected for segment 1017B during the period of record. Additionally, pH levels seem to be on the rise. Dense algal blooms and wastewater discharge containing detergents and soap-based products may be potential causes for the increasingly basic pH levels.

Recommendations
Continue collecting water quality data to support actions associated with any future watershed protection plan development and possible modeling.
Work with the Bacteria Implementation Group (BIG) stakeholders to complete and implement the I-Plan recommendations for bacteria reduction.