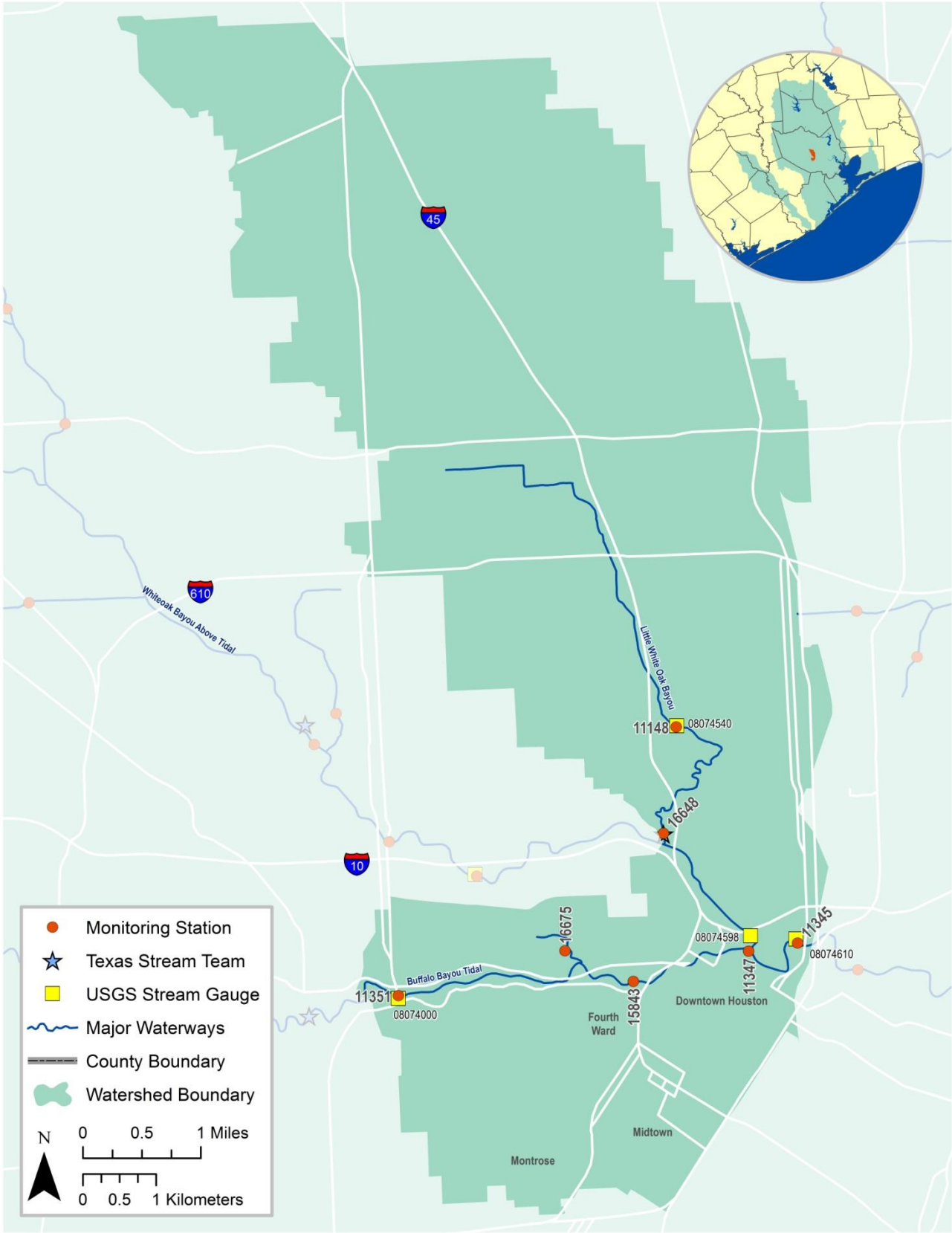
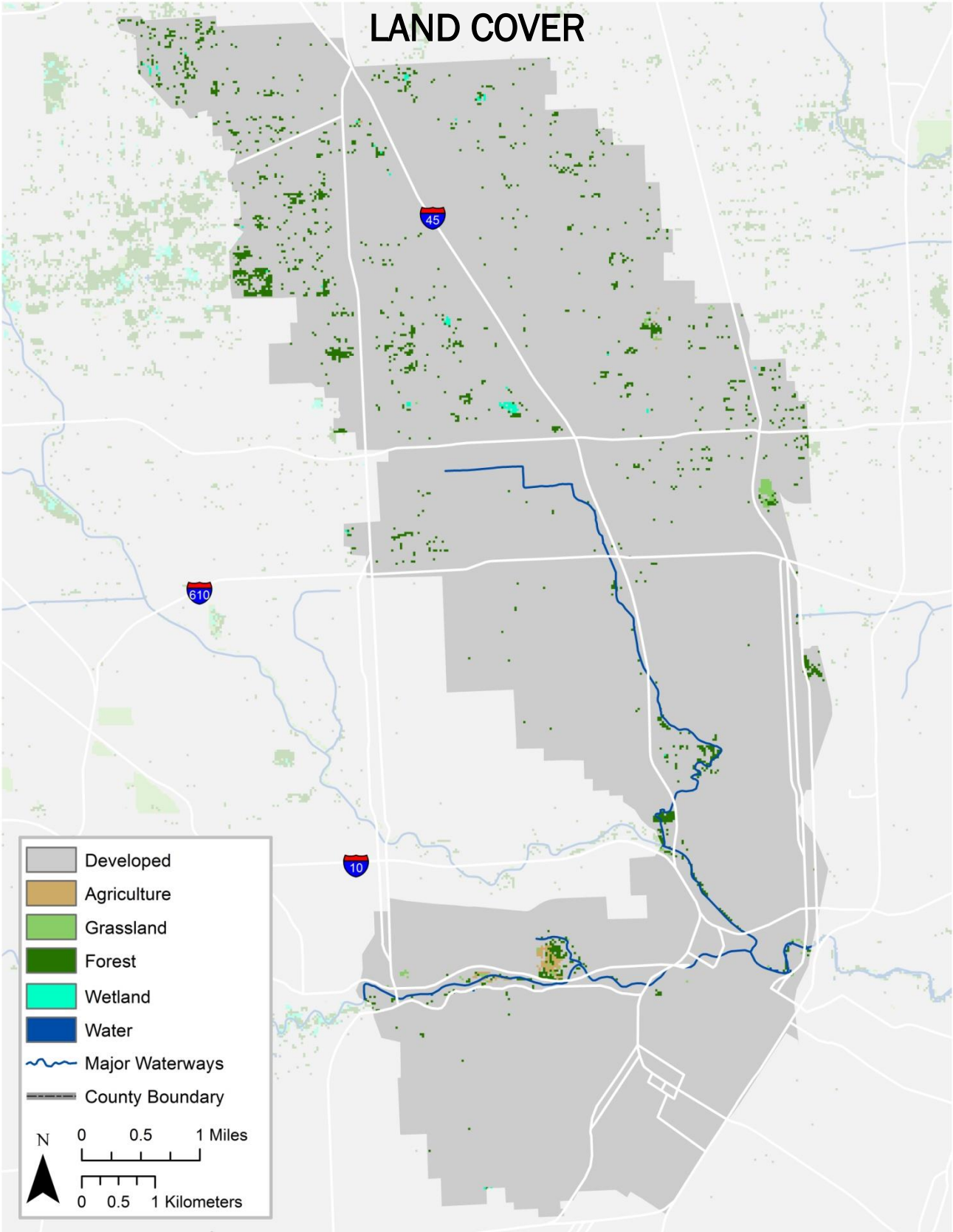


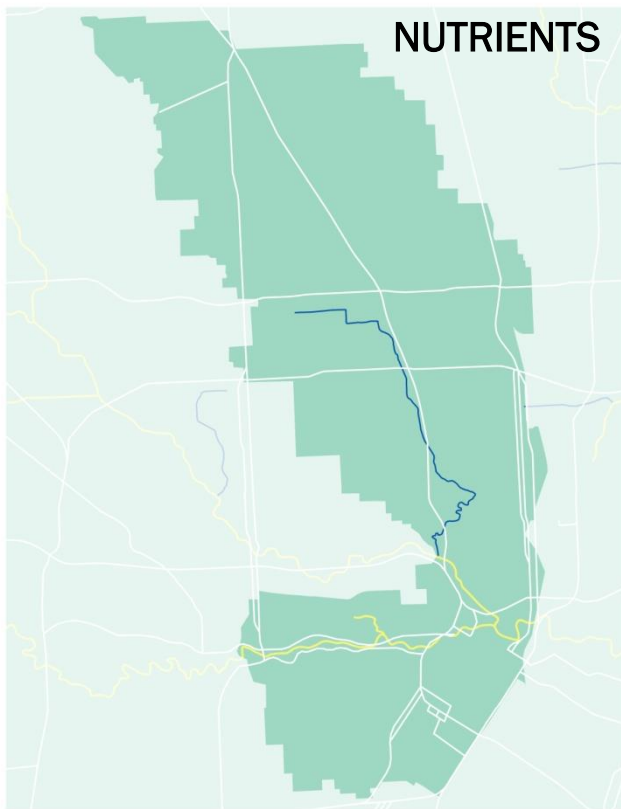
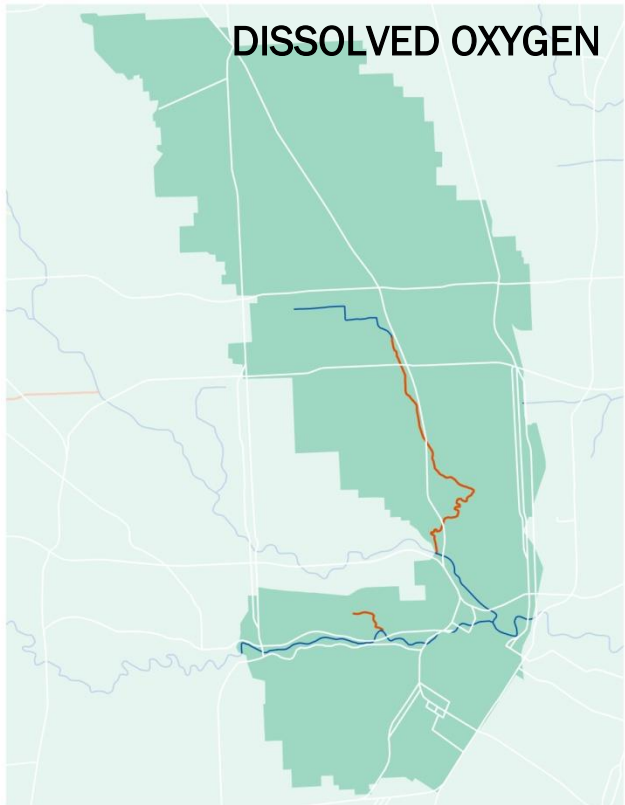
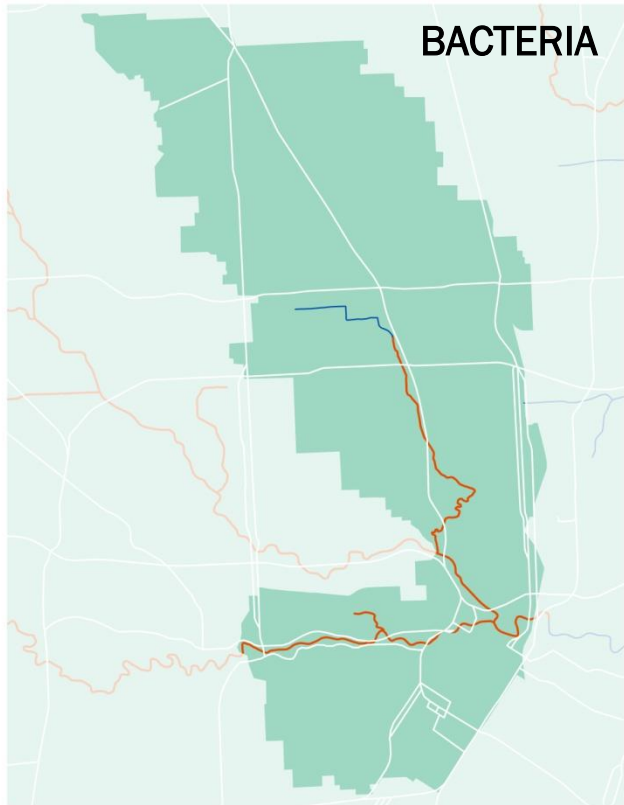
BUFFALO BAYOU TIDAL - SEGMENT 1013



BUFFALO BAYOU TIDAL - SEGMENT 1013

LAND COVER

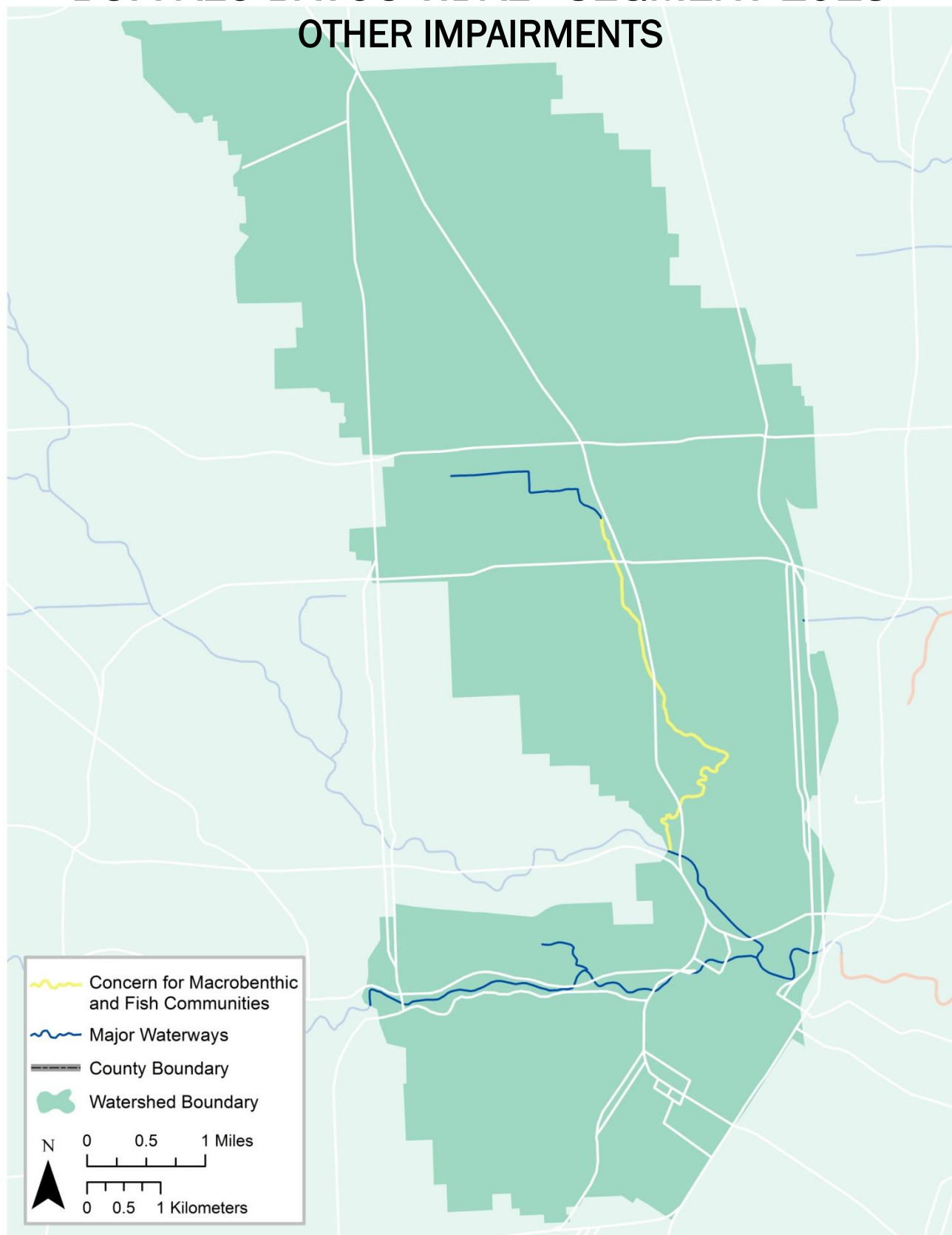




 Impairment  Concern  No Impairments or Concerns

BUFFALO BAYOU TIDAL - SEGMENT 1013

OTHER IMPAIRMENTS



Segment Number:	1013	Name:	Buffalo Bayou Tidal			
Length:	5 miles	Watershed Area:	9 square miles	Designated Uses:	Primary Contact Recreation 1; Intermediate Aquatic Life	
Number of Active Monitoring Stations:	7	Texas Stream Team Monitors:	1	Permitted Outfalls:	0	
Description:	<p>Segment 1013 (Tidal Stream w/ intermediate ALU): From a 100 meters (110yards) upstream of US 59 in Harris County to a point 400 meters (440 yards) upstream of Shepherd Drive in Harris County</p> <p>Segment 1013A Perennial Stream w/ intermediate ALU): Little White Oak Bayou (unclassified water body)—From the confluence of White Oak Bayou to Yale Street in Harris County</p> <p>Segment 1013B: Retired segment description</p> <p>Segment 1013C (Perennial Stream w/ high ALU): Unnamed Non-Tidal Tributary of Buffalo Bayou Tidal (unclassified water body)—From the Buffalo Bayou confluence upstream to a point 0.34 km (0.21 mi) east of Studemont Street</p>					

Percent of Stream Impaired or of Concern						
Segment ID	PCBs/Dioxin	Bacteria	Dissolved Oxygen	Nutrients	Chlorophyll a	Other
1013	-	100	-	100	-	-
1013A	-	42.4	42.4	-	-	42.4
1013C	-	100	100	100	-	-

Segment 1013						
Standards	Screening Levels		Screening Levels	Screening Levels		
	Tidal Stream	Perennial Stream		Tidal Stream	Perennial Stream	
Temperature (°C/°F):	33 / 92	33 / 92	Ammonia (mg/L):	0.46	0.33	
Dissolved Oxygen (24-Hr Average) (mg/L):	3.0	5.0 / 4.0	Nitrate-N (mg/L):	1.10	1.95	
Dissolved Oxygen (Absolute Minima) (mg/L):	2.0	3.0 / 3.0	Orthophosphate Phosphorus (mg/L):	0.46	0.37	
pH (standard units):	6.5-9.0	6.5-9.0	Total Phosphorus (mg/L):	0.66	0.69	
Enterococci (MPN/100mL) (grab):	89		Chlorophyll-a (µg/L):	21	14.1	
Enterococci (MPN/100mL) (geometric mean):	35					
<i>E. coli</i> (MPN/100 mL) (grab):		399				
<i>E. coli</i> (MPN/100 mL) (geometric mean):		126				

FY 2016 Active Monitoring Stations

Site ID	Site Description	Frequency	Monitoring Entity	Parameter Groups
11148	Little White Oak Bayou at Trimble	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria
11345	Buffalo Bayou Tidal at Mckee Street	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria, Chlorophyll a (Qrtrly)
11347	Buffalo Bayou Tidal at Main Street	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria
11351	Buffalo Bayou Tidal at Shepherd Drive	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria
15843	Buffalo Bayou Tidal at Sabine Street	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria
16648	Little White Oak Bayou at White Oak Drive	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria
16675	Unnamed Trib of Buffalo Bayou Tidal	Nine Times / Year	COH / HHS	Field, Conventional, Bacteria

Water Quality Issues Summary

Issue	2014 Assessment <i>I - Impaired</i> <i>C - Of Concern</i>	Possible Causes / Influences / Concerns Voiced by Stakeholders	Possible Solutions / Actions To Be Taken
Elevated Levels of Indicator Bacteria	1013 I 1013A I 1013C I	<ul style="list-style-type: none"> ▪ Constructed stormwater controls failing ▪ Collection system overflows and by-passes ▪ Direct and dry weather discharges ▪ Waste haulers illegal discharges/improper disposal ▪ Improper or no pet waste disposal 	<ul style="list-style-type: none"> ▪ Improve compliance and enforcement of existing stormwater quality permits ▪ Improve construction oversight to minimize TSS discharges to waterways ▪ Require all systems to develop and implement a utility asset management program and protect against power outages at lift stations ▪ More public education on pet waste disposal
Dissolved Oxygen Concentrations	1013A I 1013C I	<ul style="list-style-type: none"> ▪ Excessive nutrients and organic matter from SSOs, illegal disposal of grease trap waste, and biodegradable solid waste (e.g., grass clippings and pet waste) ▪ Vegetative canopy removed 	<ul style="list-style-type: none"> ▪ Improve compliance and enforcement of existing stormwater quality permits ▪ Improve operation and maintenance of existing WWTF and collection systems ▪ More public education regarding pet waste and household fats, oils, and grease disposal ▪ Work with drainage districts and agencies to change practices of clear cutting and channelizing waterways to protect from solar heating ▪ Conserve or restore trees and habitat along waterways to maintain/create shade to cool water
Elevated Nutrients	1013 C 1013C C	<ul style="list-style-type: none"> ▪ Fertilizer runoff from urbanized properties, such as landscaped areas, residential lawns, and sport fields ▪ Sanitary sewer overflows 	<ul style="list-style-type: none"> ▪ Implement YardWise and Watersmart landscape practices ▪ Require all systems to develop and implement a utility asset management program and protect

			against power outages at lift stations
Macrobenthic Community	1013A I	<ul style="list-style-type: none"> ▪ Bank erosion and erosion at construction sites ▪ Loss of habitat due to channelization of waterway ▪ Ongoing maintenance of modified channel 	<ul style="list-style-type: none"> ▪ Re-connect oxbows and lost channels to augment water storage and retention ▪ Strategically plant vegetation to enhance tree canopy and slow bank erosion to create more habitat ▪ Work with drainage districts to install/construct habitat that doesn't interfere with water movement

Segment Discussion

Watershed Characteristics: The Buffalo Bayou Tidal watershed is completely urbanized and encompasses downtown Houston, the theater and entertainment districts, residential developments, high volume mixed-commercial developments, and light industry. Several parks and natural areas are located along the banks of Buffalo and Whiteoak Bayous. Programs like the Houston Downtown Living Initiative have rapidly increased residential development and redevelopment throughout central Houston resulting in an increased population density within the Buffalo Bayou watersheds. A major portion of the Houston metropolitan area is drained by Buffalo Bayou. In addition to a large number of municipal and industrial wastewater discharges, Buffalo Bayou Tidal receives significant amounts of urban storm water runoff. Interstate-45, Interstate-10, and US Highway 59 are major thoroughfares that converge around downtown Houston.

Water Quality Issues: Contact recreation uses are not currently supported in this watershed. Each of the three assessment units (AUs) are listed in the 2014 IR as impaired for bacteria. H-GAC analyses show little change in seven-year geometric means since the TCEQ assessment, although the rolling seven-year geometric mean plots show some reduction in bacteria density over time in [1013](#) and [1013A](#).

Assessment Unit	TCEQ Assessment (2005-2012)	HGAC Analysis 2001-2008	HGAC Analysis 2008-2015
	Geomean (MPN/100 mL) / % Grab Exceedance	Geomean (MPN/100 mL) / % Grab Exceedance	Geomean (MPN/100 mL) / % Grab Exceedance
1013_01	238	285 / 68.4	207 / 64.6
1013A_01	1828	5586 / 94.6	1863 / 72.6
1013C_01	5087	4483 / 90.5	4862 / 95.0

TCEQ identified concerns for general use due to elevated concentrations of ammonia, nitrate-nitrogen(nitrate), and total phosphorus (TP) in the main channel (1013_01). There is a possibility that ammonia will be removed as a concern in the 2016 assessment, but exceedance rates for TP and nitrate have increased. Detailed exceedance statistics are found in the table below.

Assessment Unit	Parameter	TCEQ Assessment (2005-2012)	HGAC Analysis 2001-2008	HGAC Analysis 2008-2015
		% Grab Exceedance	% Exceedance	% Exceedance
1013_01	Nitrate	75.2	72.0	80.9
1013_01	Total Phosphorus	62.1	52.6	68.0
1013C_01	Ammonia	27.9	61.2	18.0

Aquatic life uses are not supported in the unclassified tributaries. 1013A_01 (Little White Oak Bayou) and 1013C_01 are impaired due to depressed dissolved oxygen (DO). In addition, a concern for impaired macrobenthic community was identified in Little White Oak Bayou.

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. Refer to the Public Involvement and Outreach section of the 2016 Basin Summary Report for more information about the BIG.

Trends: Regression analysis of watershed data revealed two statistically significant trends for the main Buffalo Bayou Tidal segment – increasing salinity and decreasing Secchi transparency. Little White Oak Bayou (segment 1013A) has a total of seven statistically significant parameter trends including decreasing ammonia, chloride, *E. coli*, specific conductance (SPCond), and TP while instantaneous flow and pH are increasing over time. A decreasing ammonia and Secchi transparency trend as well as increasing trends for [nitrate](#) and total suspended solids (TSS) were detected for segment 1013C, an unnamed tributary of Buffalo Bayou Tidal.

Trends of note for monitoring stations located on Little White Oak Bayou include the [slight improvement in dissolved oxygen \(DO\)](#) while [bacteria](#) and [TP](#) levels decrease over time. However, nutrient trends in the Buffalo Bayou Tidal watershed vary depending on location. Overall, bacteria levels in the Buffalo Bayou Tidal watershed have [remained stable](#) during the period of record with the majority of samples still measuring well above the set water quality standard.

Recommendations

Address concerns found in this segment summary through stakeholder participation. Stakeholders have expressed an interest in developing a watershed protection plan for this watershed.

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.