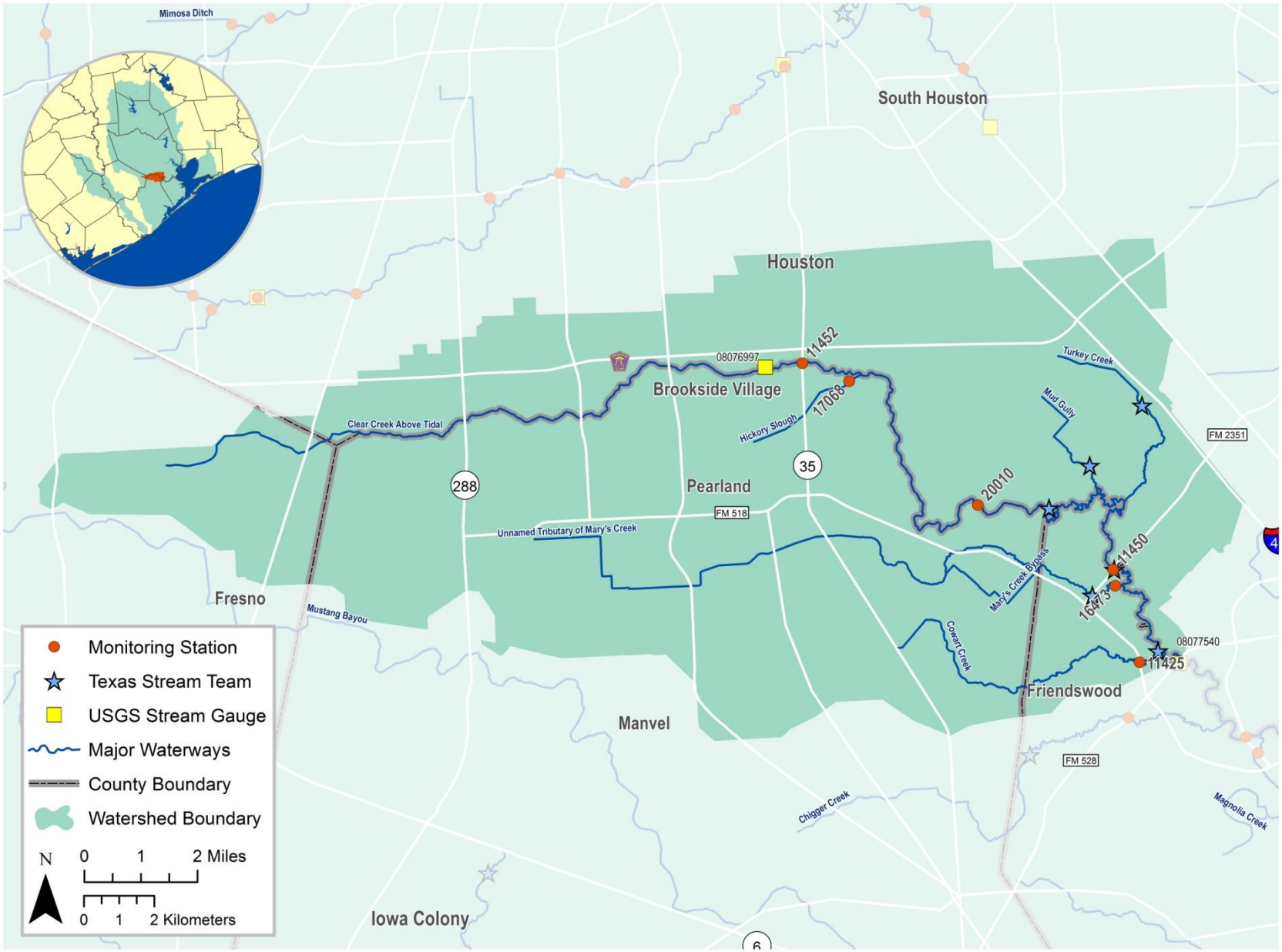
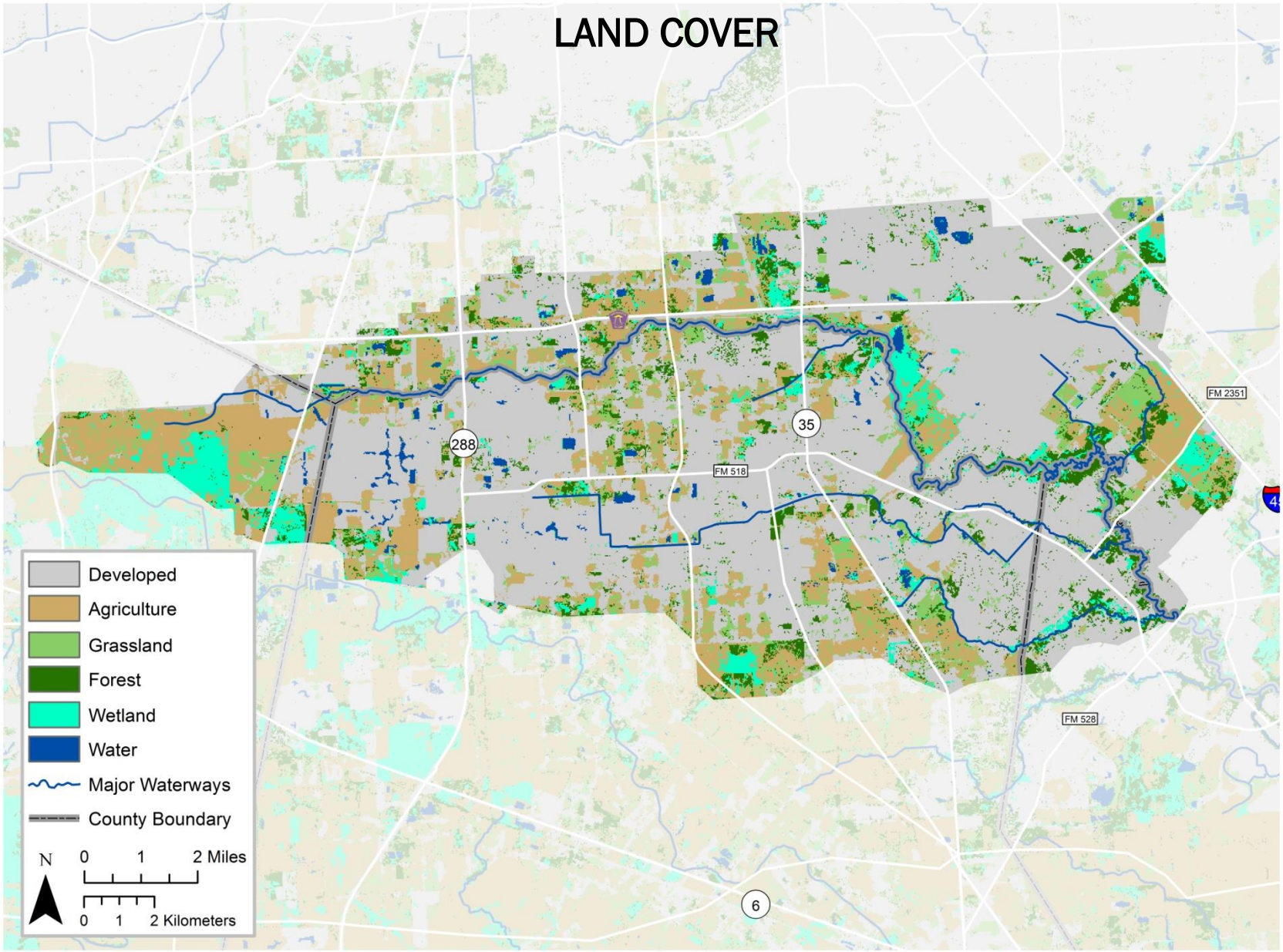
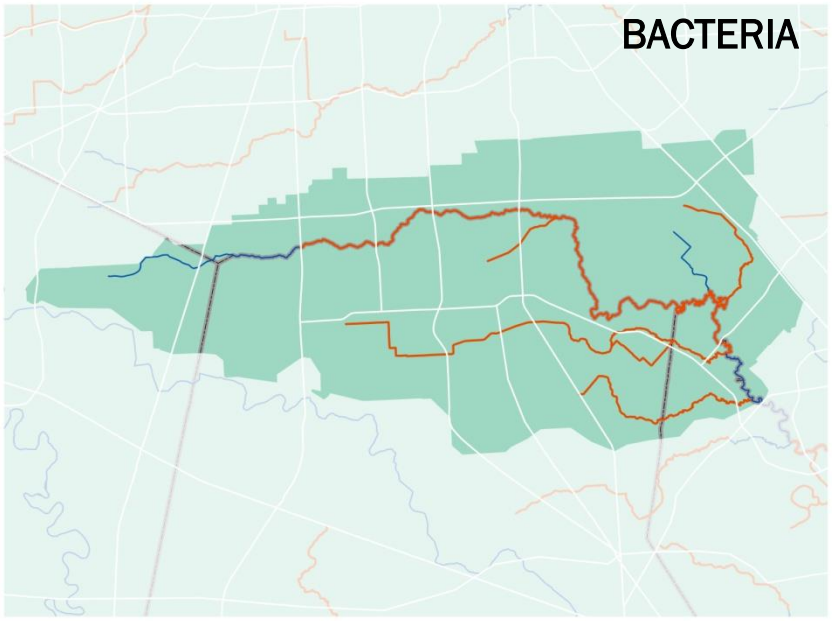
CLEAR CREEK ABOVE TIDAL – SEGMENT 1102

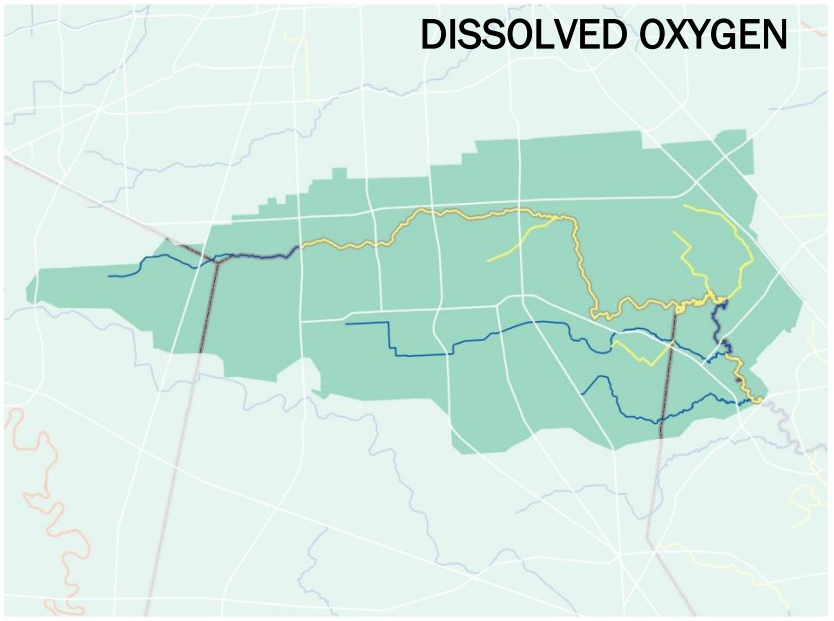


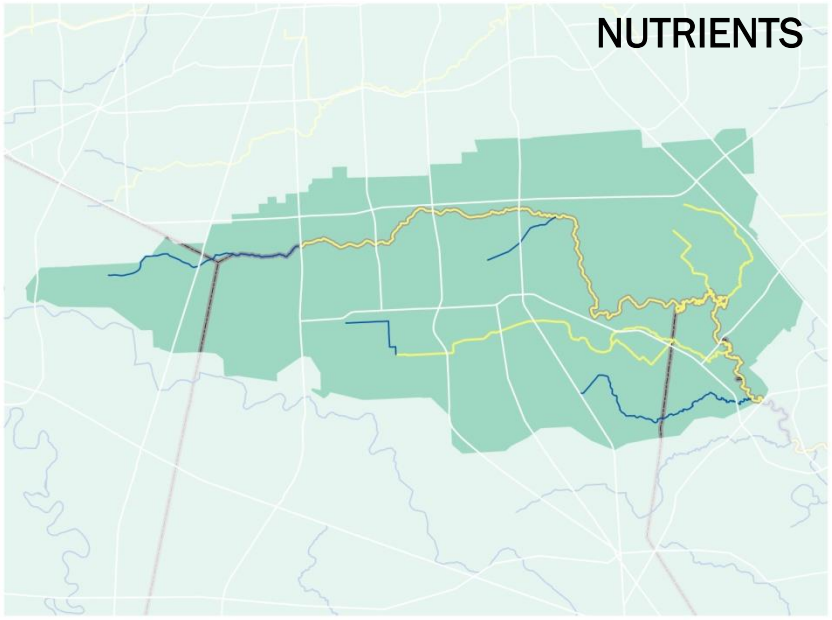
CLEAR CREEK ABOVE TIDAL - SEGMENT 1102

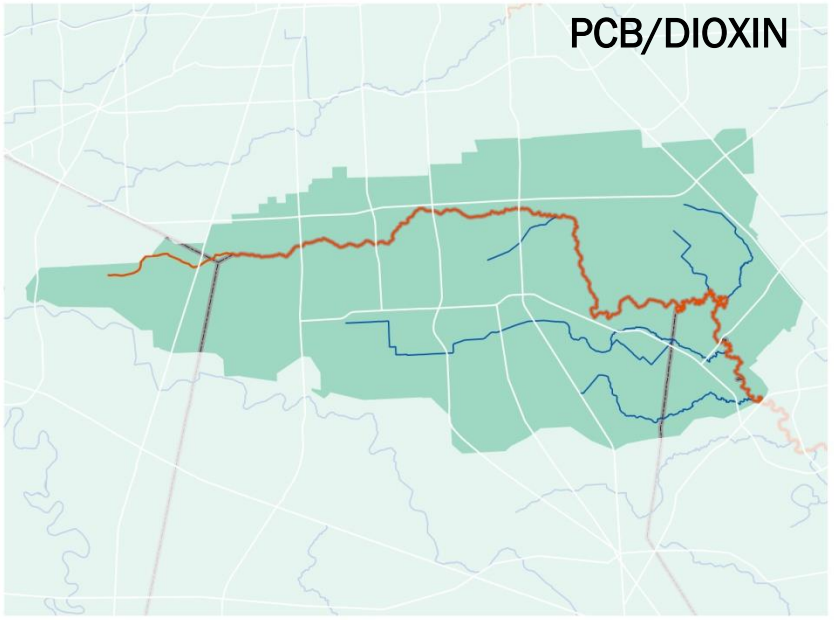
LAND COVER





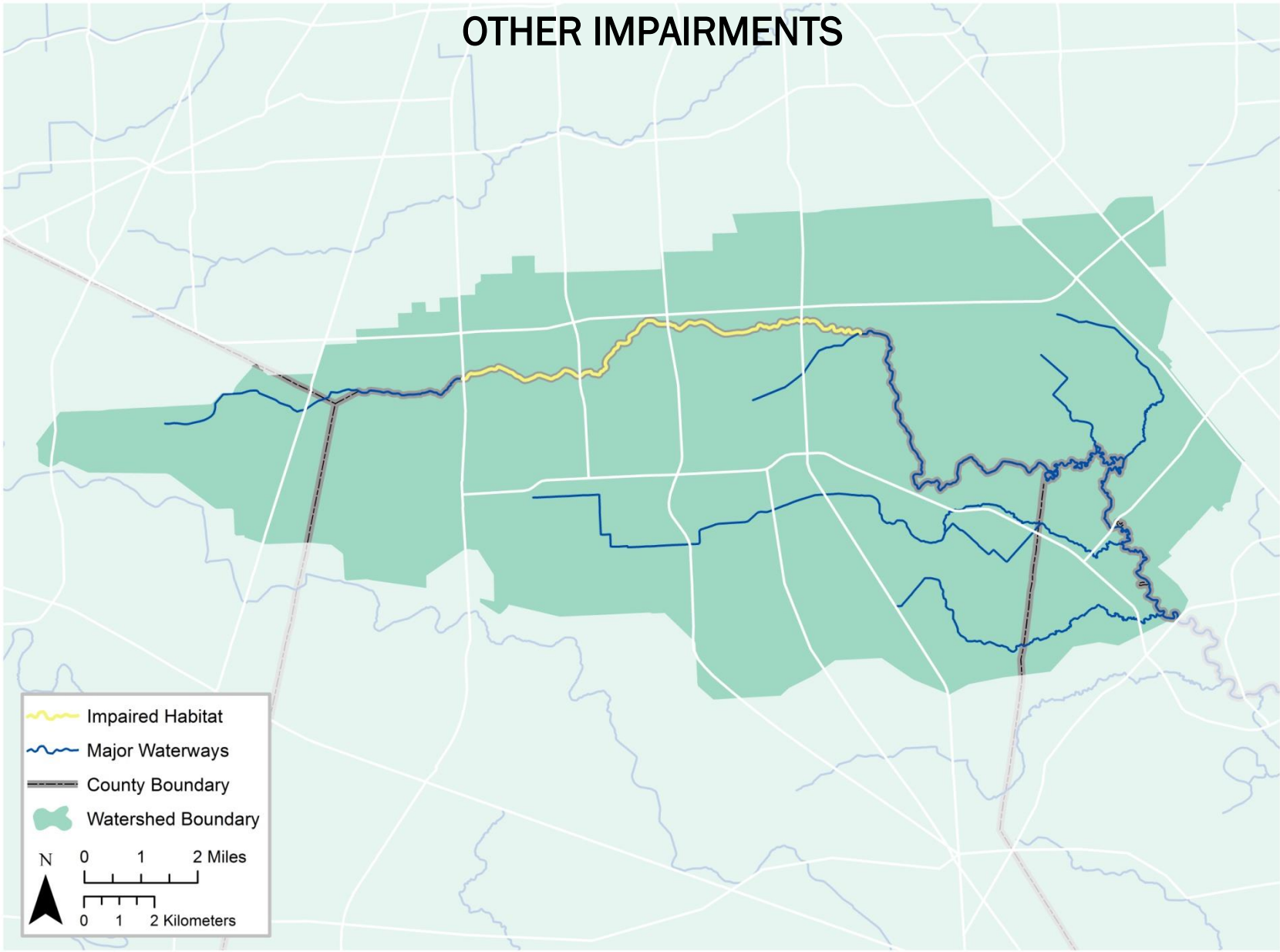






Impairment Concern No Impairments or Concerns

CLEAR CREEK ABOVE TIDAL - SEGMENT 1102
OTHER IMPAIRMENTS



Segment Number: 1102	Name:	Clear Creek Above Tidal			
Length:	31 miles	**Watershed Area:**	115 square miles	**Designated Uses:**	Primary Contact Recreation 1; High Aquatic Life
Number of Active Monitoring Stations:	6	**Texas Stream Team Monitors:**	6	**Permitted Outfalls:**	13

Description:	Segment 1102 (Perennial Stream w/ high ALU): From a point 100 meters (110 yards) upstream of FM 528 in Galveston/Harris County to Rouen Road in Fort Bend County Segment 1102A (Intermittent Stream with Pools w/ limited ALU): Cowart Creek (unclassified water body) – From the Clear Creek Above Tidal confluence in Galveston County to SH 35 in Brazoria County Segment 1102B (Perennial Stream w/ intermediate ALU): Mary's Creek/North Fork Mary's Creek (unclassified water body) – Perennial stream from the confluence with Clear Creek to confluence with North and South Fork Mary's Creek near FM 1128, approximately 5 km (3.1 mi) SW of Pearland. Includes perennial portion of North Fork Mary's Creek to confluence with unnamed tributary Segment 1102C (Perennial Stream w/ high ALU): Hickory Slough (unclassified water body) – From the Clear Creek Above Tidal confluence to a point 0.69 km (0.43 mi) upstream of Mykawa Road Segment 1102D (Perennial Stream w/ high ALU): Turkey Creek (unclassified water body) – From the Clear Creek Above Tidal confluence to a point 0.98 km (0.61 mi) upstream of Scarsdale Blvd Segment 1102E (Perennial Stream w/ high ALU): Mud Gully (unclassified water body) – From the Clear creek Above Tidal confluence to a point 0.80 km (0.49 mi) downstream of Hughes Road Segment 1102F (Perennial Stream w/ high ALU): Mary's Creek Bypass (unclassified water body) – From the Mary's Creek confluence NE of FM 518 to a point 0.96 km (0.60 mi) upstream to the Mary's Creek confluence (NW of County Road 126) Sub-Segment 1102G (Perennial Stream w/ high ALU): Unnamed Tributary of Mary's Creek (unclassified water body)—From the Mary's Creek confluence 1.3 km (0.84 mi) west of FM 1128 to a point 1.2 km (0.75 mi) upstream to the confluence of an unnamed tributary

Percent of Stream Impaired or of Concern						
Segment ID	PCBs/Dioxin	Bacteria	Dissolved Oxygen	Nutrients	Chlorophyll *a*	Other
1102	100	72	65	92	-	-
1102A	-	100	-	--	-	-
1102B	-	100	-	100	-	-
1102C	-	100	100	-	-	-
1102D	-	100	100	100	-	-
1102E			100	100		
1102F		100	100	100		
1102G		100				

Segment 1102			
Standards	Perennial Stream	Screening Levels	Perennial Stream
Temperature (°C/°F):	35 / 95	Ammonia (mg/L):	0.33
Dissolved Oxygen *(24-Hr Average)* (mg/L):	5.0 / 4.0	Nitrate-N (mg/L):	1.95
Dissolved Oxygen *(Absolute Minima)* (mg/L):	3.0 / 3.0	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):	200		
Sulfate (mg/L as SO_4):	100		
Total Dissolved Solids (mg/L):	600		

FY 2016 Active Monitoring Stations				
Site ID	**Site Description**	**Frequency**	**Monitoring Entity**	**Parameter Groups**
11425	Cowart Creek at FM 518	Quarterly	EIH	Field, Conventional, Bacteria
11450	Clear Creek at FM 2351	Quarterly	TCEQ	Field, Conventional, Bacteria, Chlorophyll *a*
11452	Clear Creek at Telephone Rd	Quarterly	TCEQ	Field, Conventional, Bacteria, Chlorophyll *a*, Flow
16473	Mary's Creek at Mary's Crossing	Quarterly	EIH	Field, Conventional, Bacteria
17068	Hickory Slough at Robinson Drive	Quarterly	EIH	Field, Conventional, Bacteria
20010	Clear Creek at end of Yost Rd in Pearland	Quarterly	EIH	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	1102 I 1102A I 1102B I 1102C I 1102D I 1102F I 1102G I	▪ Rapid urbanization and increased impervious cover ▪ Animal waste from agricultural production and domestic animal facilities ▪ Constructed stormwater controls failing ▪ Poorly operated or undersized WWTFs ▪ WWTF non-compliance, overflows, and collection system by-passes ▪ Direct and dry weather discharges ▪ Waste haulers illegal discharges/improper disposal ▪ Improper or no pet waste disposal ▪ Developments with malfunctioning OSSFs	▪ Improve compliance and enforcement of existing stormwater quality permits ▪ Improve construction oversight to minimize TSS discharges to waterways ▪ Add water quality features to stormwater systems ▪ Implement stream fencing or alternative water supplies to keep livestock out of or away from waterways ▪ Create and implement Water Quality Management Plans for individual agricultural properties ▪ Install and/or conserve vegetative buffer areas along all waterways ▪ Impose new or stricter bacteria limits than currently designated by TCEQ ▪ Regionalize chronically non-compliant WWTFs ▪ 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 ▪ Ensure proper citing of new or replacement OSSFs ▪ More public education regarding OSSF operation and maintenance

Dissolved Oxygen Concentrations	1102 C 1102C C 1102D C 1102E C 1102F C	▪ Excessive nutrients and organic matter from agricultural production, and related activities ▪ 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 ▪ High temperature discharges from industrial WWTFs	▪ Create and implement Water Quality Management Plans for individual agricultural properties ▪ Improve compliance and enforcement of existing stormwater quality permits ▪ Install and/or conserve riparian buffer areas along all waterways ▪ Regionalize chronically non-compliant WWTFs ▪ Improve operation and maintenance of existing WWTF and collection systems ▪ More public education regarding disposal of household fats, oils, and grease ▪ Improved OSSF maintenance and education ▪ More public education on pet waste disposal ▪ Work with drainage districts and agencies to change practices of clear cutting and channelizing waterways to protect from solar heating
Elevated Nutrients	1102 C 1102B C 1102D C 1102E C 1102F C	▪ Agricultural runoff from row crops, fallow fields, and animal operations ▪ Fertilizer runoff from urbanized properties, such as landscaped areas, residential lawns, and sport fields ▪ WWTF effluent, sanitary sewer overflows, and malfunctioning OSSFs	▪ Create and implement Water Quality Management Plans for individual agricultural properties ▪ Implement YardWise and Watersmart landscape practices ▪ Install and/or maintain riparian buffer areas between agricultural fields and waterways ▪ Monitor phosphorus levels at WWTFs to determine if controls are needed
PCBs/Dioxin in Edible Fish Tissue	1102 I	▪ Concentrated deposits outside boundaries of the waste pits located adjacent to San Jacinto River and I-10 bridge ▪ Waste pit located along the San Jacinto River immediately upstream of I-10 ▪ Unknown industrial or urban sources	▪ Encourage regulators and responsible parties to work together to remediate Superfund site ▪ Remove or contain contamination from locations already identified ▪ Encourage additional testing to locate all unknown sources/deposits
Fish Community/ Habitat	1102 C	▪ Loss of habitat due to channelization of waterway ▪ Ongoing maintenance of modified channel ▪ Bank and streambed erosion or erosion of farm fields and construction sites	▪ Re-connect oxbows and lost channels to augment water storage and retention ▪ Work with drainage districts to install/construct habitat that doesn't interfere with water movement ▪ Strategically plant vegetation to enhance tree canopy and slow bank erosion to create more habitat

Segment Discussion:

Watershed Characteristics: Rapid population growth in the Clear Creek Above Tidal watershed has sparked the expansion of residential and commercial development primarily along FM518 though Friendswood and Pearland. Scattered areas of open space are still present throughout the watershed that will likely be developed as growth continues in the area. There are also some agricultural land uses in the southern and western portions of the watershed. The majority of development is served by waste water treatment facilities (WWTF), but there are still several areas that use on-site sewage facilities (OSSF) as their primary means of wastewater treatment.

Water Quality Issues: There are 13 assessment units (AUs) in this watershed. The 2014 Texas Integrated Report lists the AU 1102_02, 1102_03, and 1102_04 of the main channel of Clear Creek Above Tidal and 6 unclassified segments as impaired for recreational use due to elevated levels of indicator bacteria.

Assessment Unit	TCEQ Assessment (2005-2012) Geomean (MPN/100 mL) / % Grab Exceedance	HGAC Analysis 2001-2008 Geomean (MPN/100 mL) / % Grab Exceedance	HGAC Analysis 2008-2015 Geomean (MPN/100 mL) / % Grab Exceedance
1102_02	182 / NA	248 / 38.8	124 / 20.8
1102_03	173 / NA	68 / 0.0	181 / 21.4
1102_04	348 / NA	260 / 31.8	171 / 12.5
1102A_02	360 / NA	504 / 52.6	157 / 25.9
1102B_01	206 / NA	231 / 25.0	328 / 33.3
1102C_01	392 / NA	93 / 18.9	120 / 28.6

Although a TMDL has been completed for this segment, most of the assessment units remain impaired for contact recreation. Three AUs (1102_02, 1102_03, and 1102_05) within the classified segment as well as four AUs (1102C_01, 1102D_01, 1102E_01, and 1102F_01) within the unclassified tributaries are listed as having concerns for depressed dissolved oxygen (DO). There is a concern for habitat in 1102_02.

General use is not supported throughout the watershed. Many assessment units are listed as having a concern for water quality screening criteria levels for nutrients. Several AU listed as concerns have no recent data available, so the concern is based on old data. Of the 13 assessment units in the watershed, six are listed total phosphorus (TP), five for nitrate nitrogen, and one for ammonia. Exceedance statistics for existing data are summarized below.

Assessment Unit	Parameter	TCEQ Assessment (2005-2012) % Grab Exceedance	HGAC Analysis 2001-2008 % Exceedance	HGAC Analysis 2008-2015 % Exceedance
1102_02	Total Phosphorus	25.7	18.0	55.0
1102_03	Total Phosphorus	45.8	66.7	73.3
1102_04	Nitrate	56.7	48.1	88.5
1102_04	Total Phosphorus	59.3	38.6	68.2
1102B_01	Nitrate	31.3	25.0	46.4
1102B_01	Total Phosphorus	54.5	37.0	89.3
1102F_01	Total Phosphorus	60.0	Insufficient Data	No Data

The fish consumption use is not supported in the main channel of Clear Creek Above Tidal (1102). The Texas Department of State Health Services issued a restricted and no-consumption advisory due to unsafe levels of PCBs in edible fish tissue.

Special Studies/Projects: H-GAC has been tasked by the TCEQ to implement a basin-wide approach for addressing bacterial impairments for the San Jacinto-Brazos Coastal Basin which includes Clear Creek. Development for the basin-wide TMDL began in September of 2015 and will result in a final Basin 11 Summary Report in September of 2016 that will summarize basin characteristics, water quality impairments, potential bacteria sources, and recommendations for bacterial reduction. This segment is also part of the geographic area for the Bacteria Implementation Group (BIG) TMDL. For more information, please refer to the detailed discussions of the BIG located in section two of the 2016 Basin Summary Report.

Trends: Regression analysis of water quality data revealed statistically significant trends for 21 parameters at four of the eight segments located in the Clear Creek Above Tidal watershed. The main segment of Clear Creek Above Tidal had a total of eight significant trends including increasing ammonia, instantaneous flow, nitrate, salinity, total Kjeldahl nitrogen (TKN), and TP while alkalinity and chloride are decreasing over time. Segment 1102A, Cowart Creek, had five significant trends – increasing ammonia and decreasing *E. coli*, Secchi transparency, TP, and total suspended solids (TSS). Significant trends detected on segment 1102B, Mary's Creek, include increasing instantaneous flow, nitrate, TP, and TSS while sulfate levels are decreasing. Segment 1102C, Hickory Slough, had three significant trends detected including increasing TP and decreasing specific conductance and sulfate. Regression analysis did not detect any significant water quality trends for the remaining segments.

The majority of the Clear Creek Above Tidal watershed is impaired for bacteria. Regression analysis detected a slight decrease in *E. coli* concentrations over time at Cowart Creek; however, bacteria exceedances are still common. Moving seven-year bacteria geometric mean plots for the main segment show several fluctuations in bacteria levels during the period of record with *E. coli* geomeans consistently higher than the 126 MPN/100 mL standard since 2005.Geometric means for bacteria at Mary's Creek reveal a significant increase in bacteria since around 2012. Reasons for fluctuations in geomean bacteria levels during the period of record are likely related to rain events when collection systems overflow, WWTFs and OSSFs malfunction, and pet waste, livestock fields, and enclosures lead to higher bacteria levels in stormwater.

The 2014 Texas Integrated Report has this segment listed as having a concern for nutrients. Increasing nutrient trends were detected in segments 1102, 1102B, and 1102C. Nitrate and TP levels in the main segment of Clear Creek Above Tidal are frequently exceeding the 1.95 mg/L and 0.69 mg/L screening criteria, respectively. Likely causes for nutrient increases in this watershed include runoff from urban and agricultural areas as well as from WWTF discharges. A DO concern is also present for the majority of segments located in this watershed. Regression analysis for segment 1102C found no significant trends in DO and concentrations remain in compliance for the majority of samples collected during the period of record.

Recommendations
Address concerns found in this segment summary through stakeholder participation.
Continue collecting water quality data to support actions associated with any future watershed protection plan development and possible modeling.
Continue to work with the BIG to implement the I-Plan recommendations for bacteria reduction.