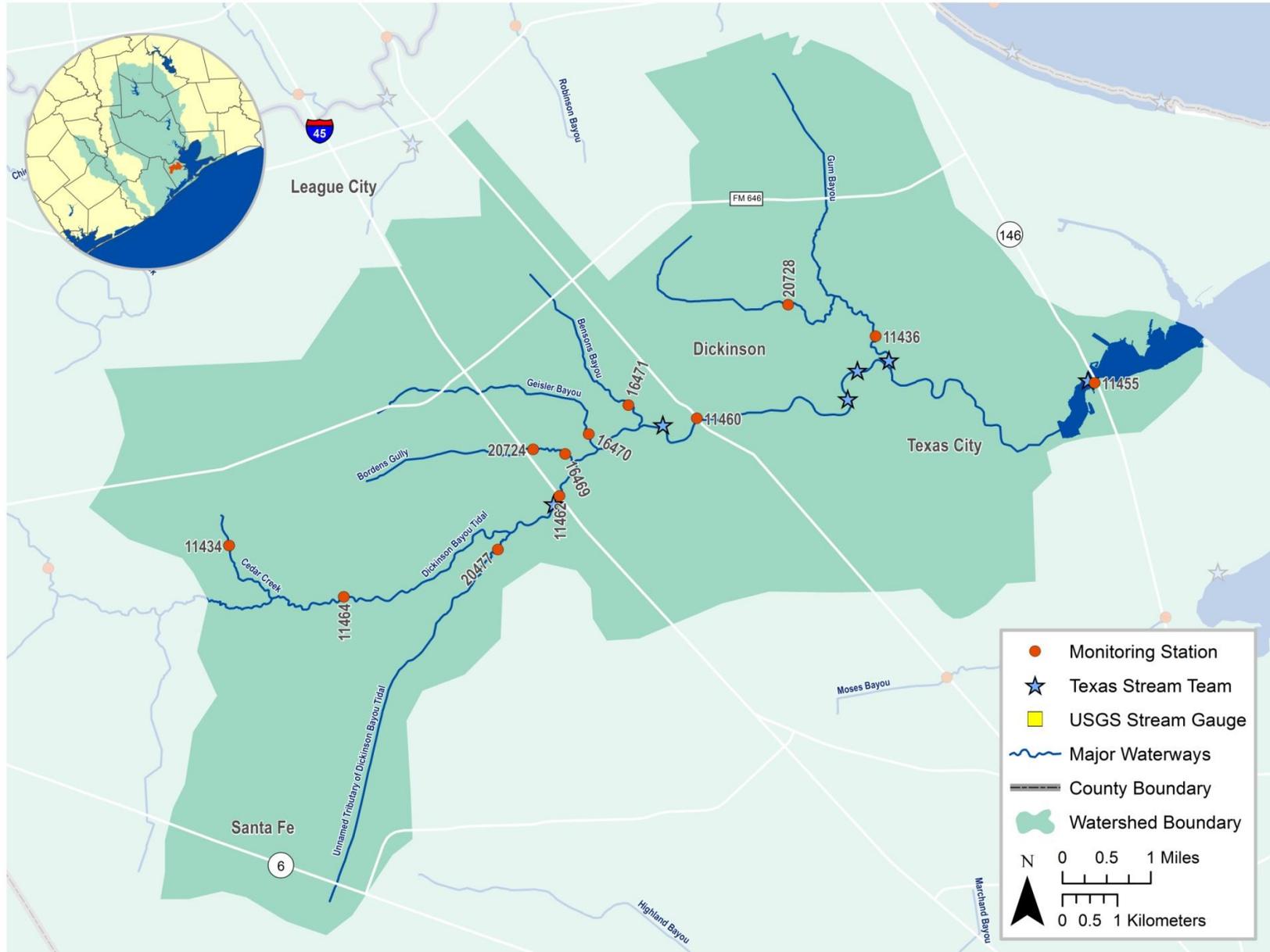
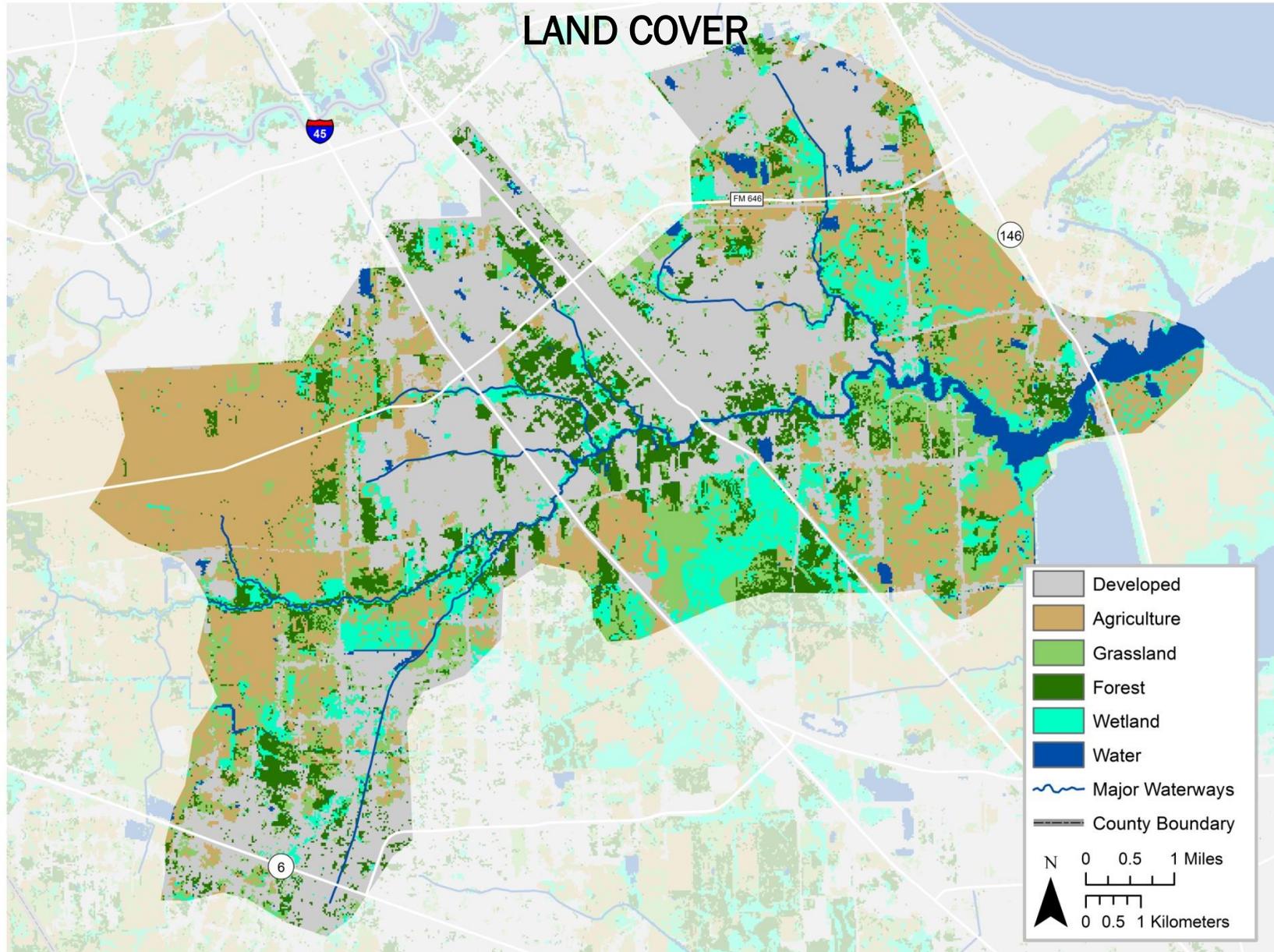


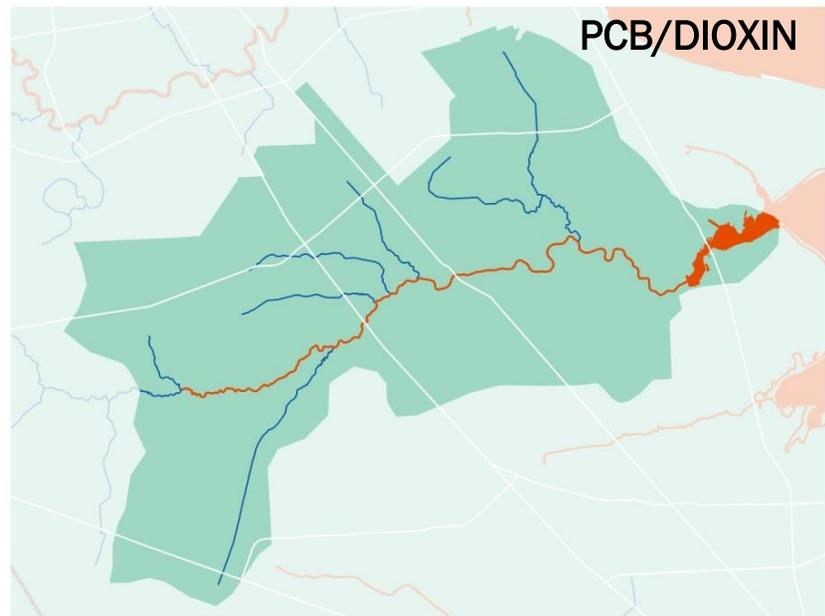
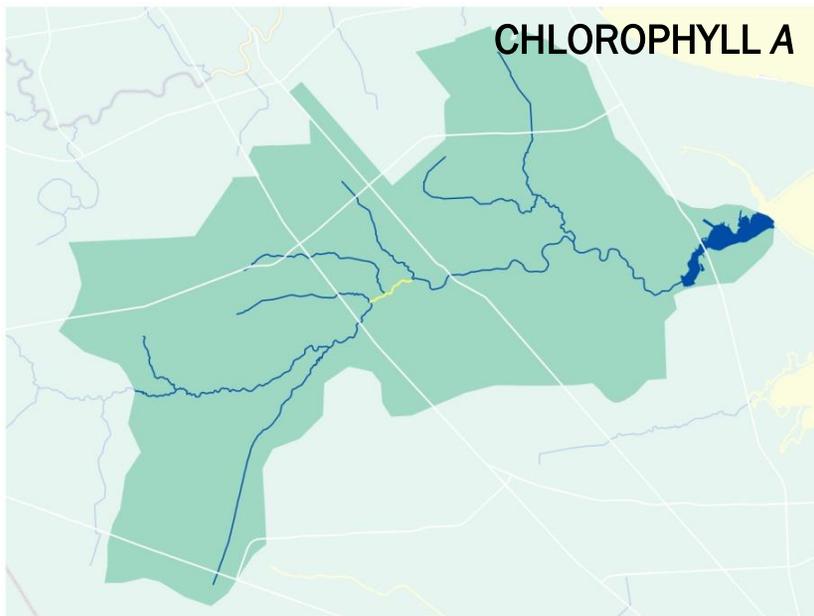
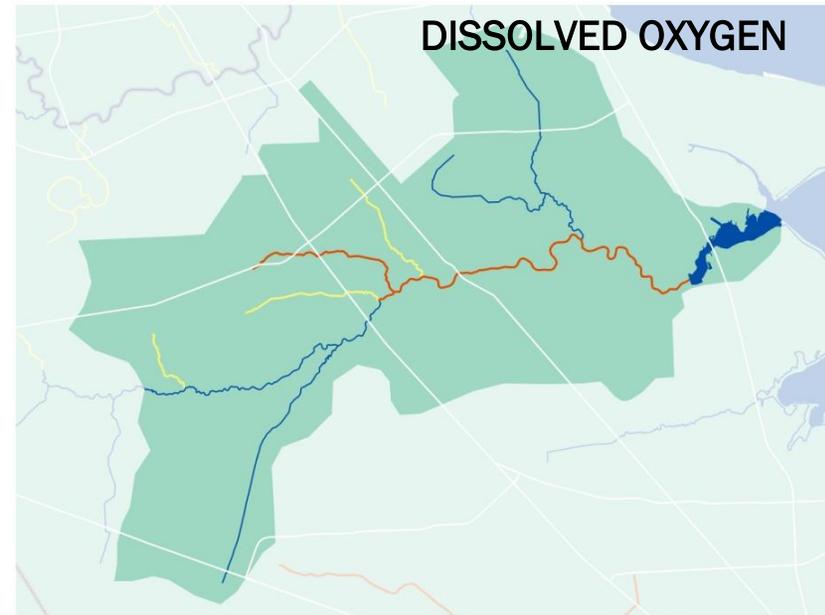
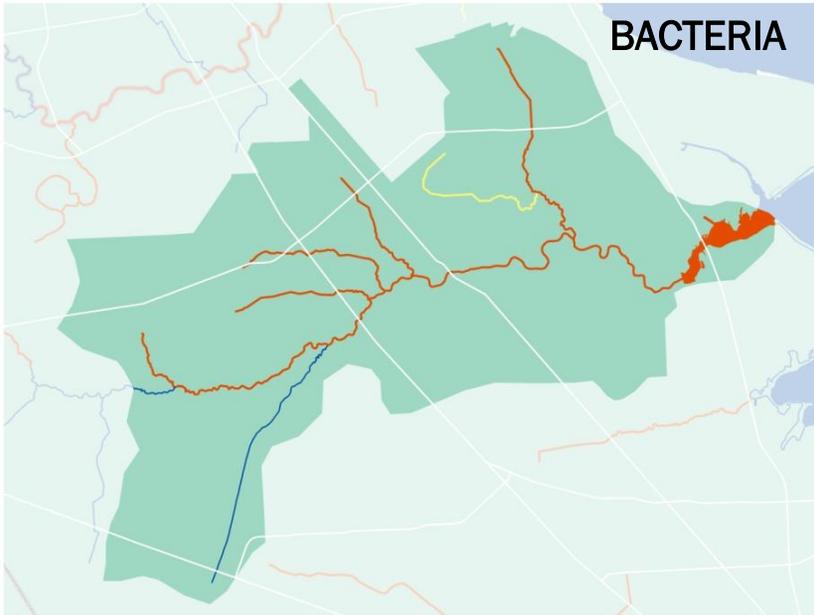
DICKINSON BAYOU TIDAL - SEGMENT 1103



DICKINSON BAYOU TIDAL - SEGMENT 1103

LAND COVER





 Impairment  Concern  No Impairments or Concerns

Segment Number: 1103	Name: Dickinson Bayou Tidal
-----------------------------	------------------------------------

Length: 15 miles	Watershed Area: 60 square miles	Designated Uses: Primary Contact Recreation 1; High Aquatic Life
-------------------------	--	---

Number of Active Monitoring Stations: 12	Texas Stream Team Monitors: 6	Permitted Outfalls: 14
---	--------------------------------------	-------------------------------

Description:	<p>Segment 1103 (Tidal Stream w/ high ALU): From the Dickinson Bay confluence 2.1 km (1.3 mi) downstream of SH 146 in Galveston County to a point 4.0 km (2.5 mi) downstream of FM 517 in Galveston County</p> <p>Segment 1103A (Tidal Stream w/ high ALU): Bensons Bayou (unclassified water body) – From the Dickinson Bayou confluence to point 0.6 km (0.37 mi) upstream of FM 646 in Galveston County</p> <p>Segment 1103B (Tidal Stream w/ high ALU): Bordens Gully (unclassified water body) – From the Dickinson Bayou Tidal confluence to a point 1.4 km (0.87 mi) upstream of FM 646 in Galveston County</p> <p>Segment 1103C (Tidal Stream w/ high ALU): Geisler Bayou (unclassified water body) – From the Dickinson Bayou Tidal confluence to a point 1.37 km (0.85 mi) upstream of FM 646 in Galveston County</p> <p>Segment 1003D (Tidal Stream w/ high ALU): Gum Bayou (unclassified water body) – From the Dickinson Bayou Tidal confluence to State Hwy 96 in Galveston County</p> <p>Segment 1003E (Perennial Stream w/ high ALU): Cedar Creek (unclassified water body) – From the Dickinson Bayou Tidal confluence to a point 0.63 km (0.39 mi) upstream FM 517 in Galveston County</p> <p>Segment 1003F (Tidal Stream w/ high ALU): Unnamed tributary of Dickinson Bayou Tidal (unclassified water body) – From the Dickinson Bayou Tidal confluence to a point 0.36 km (0.22 mi) upstream of State Hwy 6</p> <p>Segment 1103G (Tidal Stream w/ high ALU): Unnamed Tributary of Gum Bayou (unclassified water body) – From the confluence with Gum Bayou to a point 0.39 miles south of the FM646/FM1266 intersection between League City and Dickinson</p>
---------------------	---

Percent of Stream Impaired or of Concern						
--	--	--	--	--	--	--

Segment ID	PCBs/Dioxin	Bacteria	Dissolved Oxygen	Nutrients	Chlorophyll a	Other
1103	100	100	78	-	29	-
1103A	-	100	100	-	-	-
1103B	-	100	100	-	-	-
1103C	-	100	100	-	-	-
1103D	-	100	-	-	-	-
1103E	-	100	100	-	-	-

Segment 1103

Standards	Tidal Stream	Perennial Stream	Screening Levels	Tidal Stream	Perennial Stream
Temperature (°C/°F):	35 / 95	35 / 95	Ammonia-N (mg/L):	0.46	0.33
Dissolved Oxygen (24-Hr Average) (mg/L):	4.0	5.0	Nitrate-N (mg/L):	1.10	1.95
Dissolved Oxygen (Absolute Minima) (mg/L):	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-P (mg/L):	0.66	0.69
Enterococci (MPN/100mL) (grab):	104		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
11434	Cedar Creek at FM 517	Quarterly	EIH	Field, Conventional, Bacteria
11436	Gum Bayou at FM 517	Quarterly	EIH	Field, Conventional, Bacteria
11455	Dickinson Bayou Tidal at SH 146	Quarterly	EIH	Field, Conventional, Bacteria
11460	Dickinson Bayou at SH 3	Quarterly	TCEQ	Field, Conventional, Bacteria, Chlorophyll a
11462	Dickinson Bayou Tidal At IH-45	Quarterly	EIH	Field, Conventional, Bacteria
11464	Dickinson Bayou Tidal N of Arcadia	Quarterly	TCEQ	Field, Conventional, Bacteria, Chlorophyll a
16469	Borden's Gully at FM 517	Quarterly	EIH	Field, Conventional, Bacteria
16470	Geisler Bayou at FM 517 Bridge	Quarterly	EIH	Field, Conventional, Bacteria
16471	Benson's Bayou on Wagon Rd	Quarterly	EIH	Field, Conventional, Bacteria
20477	Unnamed Trib of Dickinson Bayou at Ave L SW of Dickinson	Quarterly	TCEQ	Field, Conventional, Bacteria, Chlorophyll a
20724	Borden's Gully at Spruce Drive	Quarterly	EIH	Field, Conventional, Bacteria, Flow
20728	Trib of Gum Bayou at Owens Drive	Quarterly	EIH	Field, Conventional, Bacteria, Flow

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	1103 I 1103A I 1103B I 1103C I 1103D I 1103E I	<ul style="list-style-type: none"> ▪ Rapid urbanization and increased impervious cover ▪ Constructed stormwater controls failing ▪ Animal waste from agricultural production and domestic animal facilities ▪ WWTF non-compliance, overflows, and collection system by-passes ▪ Poorly operated or undersized WWTFs ▪ Direct and dry weather discharges ▪ Waste haulers illegal discharges/improper disposal ▪ Improper or no pet waste disposal ▪ Developments with malfunctioning OSSFs 	<ul style="list-style-type: none"> ▪ 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 ▪ Increase monitoring requirements for self-reporting ▪ 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 ▪ More public education regarding OSSF operation and maintenance ▪ Ensure proper citing of new or replacement OSSFs
Dissolved Oxygen Concentrations	1103 I 1103A C 1103B C 1103C I 1103E C	<ul style="list-style-type: none"> ▪ Excessive nutrients and organic matter from agricultural production, and related activities ▪ Excessive nutrients and organic matter from WWTF effluent, sanitary sewer overflows, malfunctioning OSSFs, illegal disposal of grease trap waste, and biodegradable solid waste, such as grass clippings and pet waste ▪ High temperature discharges from industrial WWTFs 	<ul style="list-style-type: none"> ▪ Install and/or maintain riparian buffer areas between agricultural fields and waterways ▪ Create and implement Water Quality Management Plans for individual agricultural properties ▪ Improve compliance and enforcement of existing stormwater quality permits ▪ Improve operation and maintenance of existing WWTF and collection systems ▪ Regionalize chronically non-compliant WWTFs ▪ More public education regarding disposal of household fats, oils, and grease

			<ul style="list-style-type: none"> More public education on pet waste disposal More stringent OSSF maintenance and education
PCBs/Dioxin in Edible Fish Tissue	1103 I	<ul style="list-style-type: none"> Waste pit located along the San Jacinto River immediately upstream of I-10 bridge Concentrated deposits outside boundaries of the waste pits located adjacent to San Jacinto River and I-10 bridge 	<ul style="list-style-type: none"> 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
Elevated Chlorophyll a Concentrations	1103 C	<ul style="list-style-type: none"> Fertilizer runoff from surrounding watershed promote algal growth in waterways Nutrient loading from WWTF effluent, sanitary sewer overflows, and malfunctioning OSSFs promotes algal growth 	<ul style="list-style-type: none"> Improve compliance and enforcement of existing stormwater quality permits Improve stormwater controls in new developments Reduce or manage fertilizer runoff from agricultural areas More public education regarding nutrients and consequences

Segment Discussion:

Watershed Characteristics: The Dickinson Bayou Tidal Watershed is heavily developed in the areas surrounding I-45 and FM517 around the City of Dickinson. This watershed also includes parts of Santa Fe and Texas City. Large tracts of the watershed are still undeveloped or are used for agriculture particularly at the west end of FM517 and south of the City of Dickinson. There are a number of small acreage farms in these areas that are used for cattle and horse grazing. Most of the developed areas within the City of Dickinson are served by wastewater treatment facilities (WWTF) but the rest of the rural area uses on-site sewage facilities (OSSF).

Water Quality Issues: The 2014 Texas Integrated Report lists all four assessment units of segment 1103 as well as five tributaries (1103A, 1103B, 1103C, 1103D, and 1103E) as impaired for contact recreation due to high levels of indicator bacteria. Unclassified segment 1103G is listed as a concern for near nonattainment. Unclassified segment 1103F was not assessed for the 2014 IR; however, data suggests that this segment is impaired for contact recreation. A table of the TCEQ assessment as well as H-GAC 7 year analyses is located below:

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
1103_01	73 / NA	31 / 25.0	91 / 32.1
1103_02	52 / NA	22 / 19.5	55 / 34.4
1103_04	137 / NA	65 / 39.6	155 / 59.3
1103A_01	271 / NA	91 / 43.5	271 / 67.9
1103B_01	400 / NA	213 / 81.0	489 / 82.6

1103C_01	388 / NA	143 / 61.9	310 / 82.1
1103D_01	112 / NA	41 / 17.4	141 / 44.4
1103E_01	127 / NA	131 / 18.2	114 / 3.8
1103F_01	1454 / NA	NA / NA	598 / 78.6
1103G_01	694 / NA	NA / NA	669 / 76.5

The assessment units 1103_02, 1103_03, 1103_04, and 1103C_01 are listed as impaired for depressed dissolved oxygen (DO). Also the assessment units 1103A_01, 1103B_01, 1103C_01, 1103E_01 are listed as a concern for water quality screening levels for depressed dissolved oxygen.

Assessment unit 1103_02 is also list for a chlorophyll a concern for water quality screening levels. Approximately 50 percent of samples exceeded the 21 micrograms per liter screening criteria level.

All four assessment units of 1103 are under a fish consumption advisory due to potentially hazardous levels of PCBs and Dioxin found in edible fish tissue.

Due to the bacteria impairments as well as the dissolved oxygen impairments and concerns, this segment does not meet the primary contact recreation or high aquatic life use designations.

Special Studies/Projects: This segment has been included in two TMDL projects and a watershed protection plan (WPP). A bacteria TMDL is currently underway for this segment and the above tidal segment. Dickinson Bayou Tidal is also part of the Galveston Bay System Survey for Dioxin and PCBs. Texas A&M Agrilife facilitated both the TMDL and the WPP projects. Additionally, H-GAC has been tasked by the TCEQ to implement a basin-wide plan for addressing bacterial impairments for the San Jacinto-Brazos Coastal Basin which includes this segment of Oyster 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. Refer to the Public Involvement and Outreach section of the 2016 Basin Summary Report for more information.

Trends: Regression analysis of water quality data revealed 16 statistically significant parameter trends for all AUs in the Dickinson Bayou Tidal watershed. Six significant trends were detected for the main segment including increasing chloride, enterococci, nitrate, and salinity while DO and total suspended solids (TSS) are decreasing over time. Benson Bayou, AU 1103A, had only one increasing trend for salinity while AUs 1103B, Bordens Gully, and 1103C, Geisler Bayou, had an increasing trend in salinity and Secchi transparency. An increase in enterococci and nitrate was detected for 1103D, Gum Bayou, while 1103E, Cedar Creek, revealed an increase in ammonia and salinity and decrease in DO over time.

The entire Dickinson Bayou Tidal watershed is designated as impaired for bacteria. Current trends and moving geometric means for enterococci show that bacteria levels are still a major concern in this watershed. Regression analysis of bacteria data for the main segment revealed a gradual increase in [enterococci](#) over time with concentrations reaching levels greater than 10,000 MPN/100 mL during the period of record. Moving seven-year bacteria geometric means for segments [1103](#), [1103A](#), [1103B](#), [1103C](#), and [1103D](#) show enterococci geomeans gradually increasing at levels significantly higher than the 35 MPN/100 mL water quality standard.

Regression analysis of DO data revealed statistically significant decreasing trends for the [main segment of Dickinson Bayou Tidal](#) as well as for [Cedar Creek, AU 1103E](#). A small portion of the main segment is currently listed as having a chlorophyll a concern as well. Regression analysis of [chlorophyll a](#) data revealed a relatively stable trend during the period of record for the main segment; however, exceedances greater than the 21 µg/L standard are still frequent.

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 working with Texas Agrilife to help complete the bacteria TMDL and the WPP.