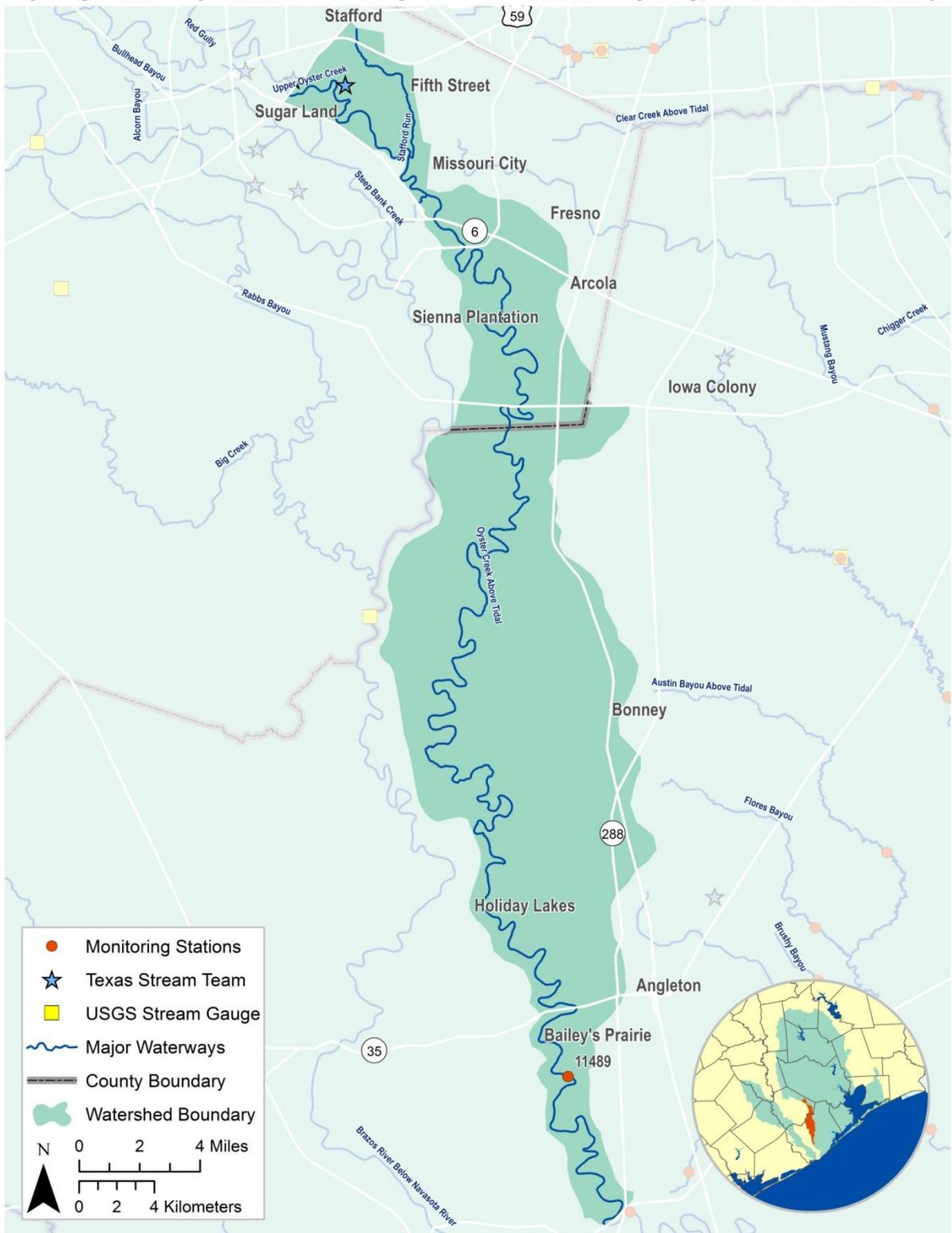
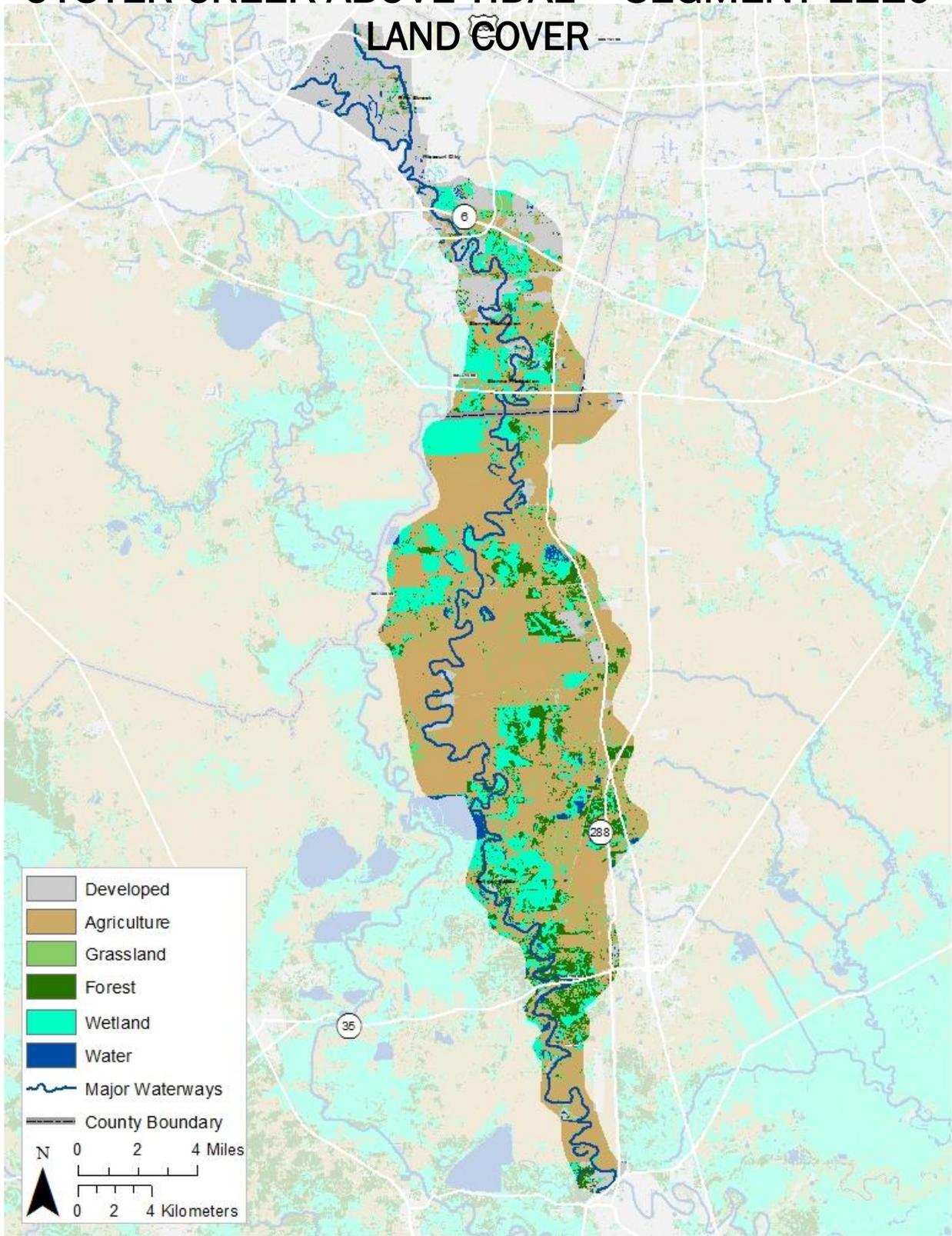
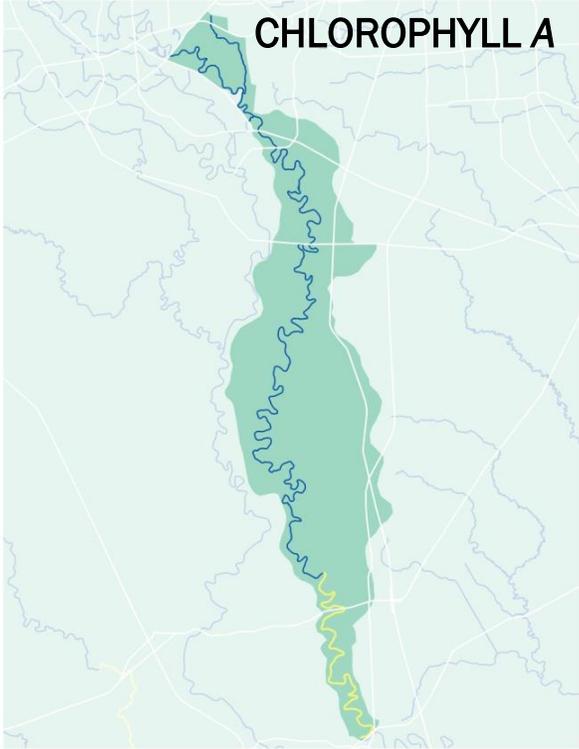
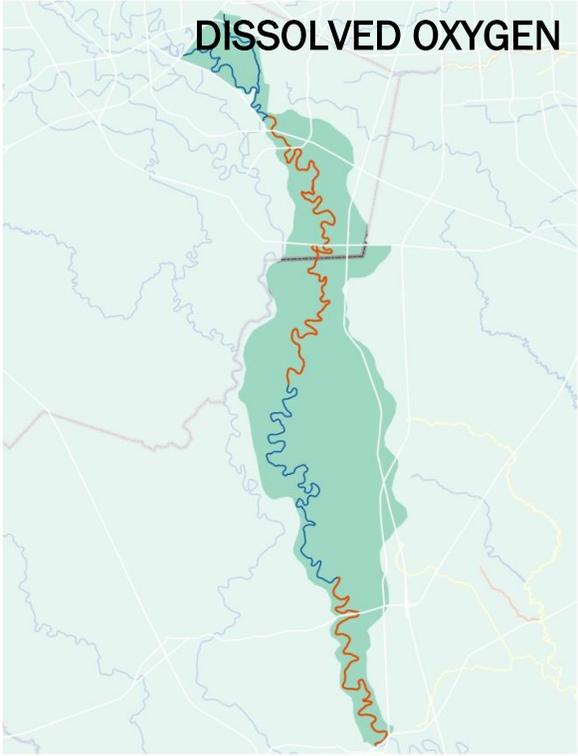
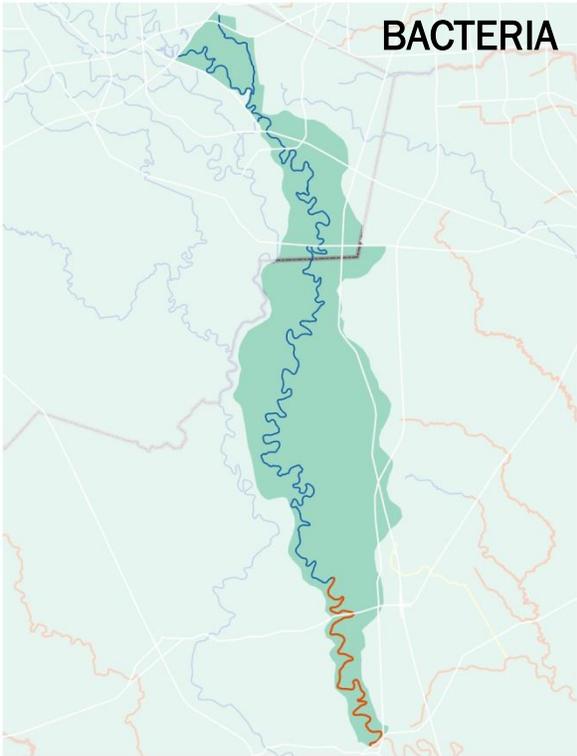


OYSTER CREEK ABOVE TIDAL - SEGMENT 1110



OYSTER CREEK ABOVE TIDAL – SEGMENT 1110 LAND COVER





~~~~~ Impairment    ~~~~~ Concern    ~~~~~ No Impairments or Concerns

|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                              |  |  |  |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|--|--|--|
| <b>Segment Number: 1110</b>                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Name: Oyster Creek Above Tidal</b>                                                        |  |  |  |
| <b>Length:</b> 78 miles                        | <b>Watershed Area:</b> 167 square miles                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Designated Uses:</b> Primary Contact Recreation 1; High Aquatic Life; Public Water Supply |  |  |  |
| <b>Number of Active Monitoring Stations:</b> 1 | <b>Texas Stream Team Monitors:</b> 1                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Permitted Outfalls:</b> 15                                                                |  |  |  |
| <b>Description:</b>                            | <p>From a point 100 meters (110 yards) upstream of FM 2004 in Brazoria County to a point 4.3 km (2.7 mi) upstream of Scanlan Road in Fort Bend County</p> <p>Segment 1110A (Perennial Stream w/ high ALU): Upper Oyster Creek Above Tidal (unclassified water body) – From a point 4.3 km (2.7 mi) upstream of Scanlan Road in Fort Bend County upstream to the confluence with Middle Oyster Creek approximately 325 m south of McKeever Road In Fort Bend County</p> |                                                                                              |  |  |  |

| Percent of Stream Impaired or of Concern |             |          |                  |           |               |       |
|------------------------------------------|-------------|----------|------------------|-----------|---------------|-------|
| Segment ID                               | PCBs/Dioxin | Bacteria | Dissolved Oxygen | Nutrients | Chlorophyll a | Other |
| 1110                                     | -           | 42       | 66               | -         | 42            | 100   |

| Segment 1110                                  |                  |                                   |                  |
|-----------------------------------------------|------------------|-----------------------------------|------------------|
| Standards                                     | Perennial Stream | Screening Levels                  | Perennial Stream |
| Temperature (°C/°F):                          | 32 / 90          | Ammonia (mg/L):                   | 0.33             |
| Dissolved Oxygen (24-Hr Average) (mg/L):      | 5.0              | Nitrate-N (mg/L):                 | 1.95             |
| Dissolved Oxygen (Absolute Minima) (mg/L):    | 3.0              | Orthophosphate Phosphorus (mg/L): | 0.37             |
| pH (standard units):                          | 6.5-9.0          | Total Phosphorus (mg/L):          | 0.69             |
| <i>E. coli</i> (MPN/100 mL) (grab):           | 399              | Chlorophyll a (µg/L):             | 14.1             |
| <i>E. coli</i> (MPN/100 mL) (geometric mean): | 126              |                                   |                  |
| Chloride (mg/L as Cl):                        | 300              |                                   |                  |
| Sulfate (mg/L as SO <sub>4</sub> ):           | 150              |                                   |                  |
| Total Dissolved Solids (mg/L):                | 750              |                                   |                  |

## FY 2016 Active Monitoring Stations

| Site ID | Site Description                      | Frequency | Monitoring Entity | Parameter Groups                             |
|---------|---------------------------------------|-----------|-------------------|----------------------------------------------|
| 11489   | Oyster Creek downstream of Walker St. | Quarterly | TCEQ              | Field, Conventional, Bacteria, Chlorophyll a |

## Water Quality Issues Summary

| Issue                                        | 2014<br>Assessment<br><i>I – Impaired</i><br><i>C – Of Concern</i> | Possible Causes / Influences / Concerns Voiced by Stakeholders                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Possible Solutions / Actions To Be Taken                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Elevated Levels of Indicator Bacteria</b> | 1110 I                                                             | <ul style="list-style-type: none"> <li>▪ Animal waste from agricultural production and domestic animal facilities</li> <li>▪ Rapid urbanization and increased impervious cover</li> <li>▪ Constructed stormwater controls failing</li> <li>▪ Developments with malfunctioning OSSFs</li> <li>▪ Improper or no pet waste disposal</li> <li>▪ Poorly operated or undersized WWTFs</li> <li>▪ WWTF non-compliance, overflows, and collection system by-passes</li> <li>▪ Direct and dry weather discharges</li> <li>▪ Waste haulers illegal discharges/improper disposal</li> </ul> | <ul style="list-style-type: none"> <li>▪ Create and implement Water Quality Management Plans for individual agricultural properties</li> <li>▪ Implement stream fencing or alternative water supplies to keep livestock out of or away from waterways</li> <li>▪ Improve compliance and enforcement of existing stormwater quality permits</li> <li>▪ Improve construction oversight to minimize TSS discharges to waterways</li> <li>▪ Add water quality features to stormwater systems</li> <li>▪ More public education regarding OSSF operations and maintenance</li> <li>▪ Ensure proper citing of new or replacement OSSFs</li> <li>▪ More public education on pet waste disposal</li> <li>▪ Regionalize chronically non-compliant WWTFs</li> <li>▪ Increase monitoring requirements for self-reporting</li> <li>▪ Require all systems to develop and implement a utility asset management program and protect against power outages at lift stations</li> <li>▪ Impose new or stricter bacteria limits than currently designated by TCEQ</li> </ul> |
| <b>Dissolved Oxygen Concentrations</b>       | 1110 I                                                             | <ul style="list-style-type: none"> <li>▪ Excessive nutrients and organic matter from agricultural production and related activities</li> <li>▪ Excessive nutrients and organic matter from</li> </ul>                                                                                                                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>▪ Create and implement Water Quality Management Plans for individual agricultural properties</li> <li>▪ Install and/or maintain riparian buffer areas</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

|                                                    |        |                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                    |        | <p>WWTF effluent, SSOs, malfunctioning OSSFs, illegal disposal of grease trap waste, and biodegradable solid waste (e.g., grass clippings and pet waste)</p> <ul style="list-style-type: none"> <li>▪ Vegetative canopy removed</li> </ul>                  | <p>between agricultural fields and waterways</p> <ul style="list-style-type: none"> <li>▪ Improve compliance and enforcement of existing stormwater quality permits</li> <li>▪ More public education regarding OSSF operation and maintenance</li> <li>▪ More public education regarding disposal of household fats, oils, and grease</li> <li>▪ Improve operation and maintenance of existing WWTF and collection systems</li> <li>▪ Regionalize chronically non-compliant WWTFs</li> <li>▪ More public education on pet waste disposal</li> <li>▪ Work with drainage districts and agencies to change practices of clear cutting and channelizing waterways to protect from solar heating</li> <li>▪ Conserve or restore trees and habitat along waterways to maintain/create shade to cool water</li> </ul> |
| <b>Elevated Chlorophyll a Concentrations</b>       | 1110 C | <ul style="list-style-type: none"> <li>▪ Fertilizer runoff from surrounding watershed promote algal growth in waterways</li> <li>▪ Nutrient loading from WWTF effluent, sanitary sewer overflows, and malfunctioning OSSFs promotes algal growth</li> </ul> | <ul style="list-style-type: none"> <li>▪ Improve compliance and enforcement of existing stormwater quality permits</li> <li>▪ Improve stormwater controls in new developments</li> <li>▪ Reduce or manage fertilizer runoff from agricultural areas</li> <li>▪ More public education regarding nutrients and consequences</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Impaired Habitat and Microbenthic Community</b> | 1110 C | <ul style="list-style-type: none"> <li>▪ Ongoing maintenance of modified channel</li> <li>▪ Bank and streambed erosion or erosion of farm fields and construction sites</li> <li>▪ Loss of habitat due to channelization of waterway</li> </ul>             | <ul style="list-style-type: none"> <li>▪ Re-connect oxbows and lost channels to augment water storage and retention</li> <li>▪ Strategically plant vegetation to enhance tree canopy and slow bank erosion to create more habitat</li> <li>▪ Work with drainage districts to install/construct habitat that doesn't interfere with water movement</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

**Segment Discussion:**

**Watershed Characteristics:** The majority of the watershed is not developed and is used for agricultural purposes. Much of the area is bottomland forest, grassland, and wetland habitat with numerous oxbow lakes. There are a few pockets of development associated with Arcola, Sienna Plantation, Fresno, Bailey’s Prairie, Bonney Village, Angleton, Holiday Lakes, and Lake Jackson. The very top of the watershed is highly developed and is part of Sugar Land and Missouri City.

**Water Quality Issues:** The Texas Integrated Report lists the assessment unit 1110\_01 as impaired for contact recreational use due to elevated levels of E. coli bacteria. The TCEQ assessment data and H-GAC analyses are summarized 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 |
| 1110_01         | 201 / NA                                 | 209 / 12.0                               | 200 / 18.5                               |

Assessment Units 1110\_01 as well as 1110\_03 are also impaired for dissolved oxygen 24 hour average and dissolved oxygen 24 hour minimum. These assessments units also have a dissolved oxygen grab concern for water quality screening criteria. Based upon the dissolved oxygen impairments and concerns, all three assessment units within this classified segment have a concern for habitat. There is a chlorophyll a concern in 1110\_01. The TCEQ assessment found that 51 percent of the chlorophyll a samples exceeded the screening level of 14.1 micrograms per liter.

This segment does not fully support its contact recreation and high aquatic life designations. It does fully support public water supply.

**Special Studies/Projects:** One TMDL for bacteria and two TMDLs for dissolved oxygen (DO) were conducted for a small portion of this segment in 2011. H-GAC and TCEQ partnered with local stakeholders to develop an Implementation Plan to address these issues, which was approved in early 2014. The resulting implementation elements have taken on a phased approach since then and H-GAC has now 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.

**Trends:** Regression analysis of water quality data included five significant parameter trends for the Oyster Creek Above Tidal watershed. Increasing trends in nitrate, pH, and total dissolved solids (TDS) were detected while chlorophyll a and Secchi transparency are decreasing over time. The 2014 Texas Integrated Report designates this segment as impaired for bacteria and DO while a concern exists for chlorophyll a and habitat/macroinvertebrate community. [Moving seven-year geometric means for E. coli](#) show fluctuations over time with mean bacteria levels hovering around twice the state limit of 126 MPN/100 mL. Regression analysis of [DO](#) data during the period of record identified no significant changes over time, however, low DO concentrations occur frequently with the majority of samples measuring between 3.0 to 6.0 mg/L. [Chlorophyll a](#) concentrations have shown a gradual improvement over time with exceedances becoming much less frequent after 2010.

## Recommendations

Address concerns found in this segment summary through facilitating stakeholder participation in the Implementation Plan and related efforts.

Continue collecting water quality data to support actions associated with any future Implementation Plan development and future modeling.

Evaluate the impact of increasing flows as a result of increased pumping of Brazos River Water into the Upper Oyster Creek System by the Gulf Coast Water Authority to serve surface water conversion efforts in Fort Bend and other counties.

Pursue new local partners, including the Brazos River Authority, to assist Clean Rivers Program in collecting additional data that would help better isolate problem areas.

---