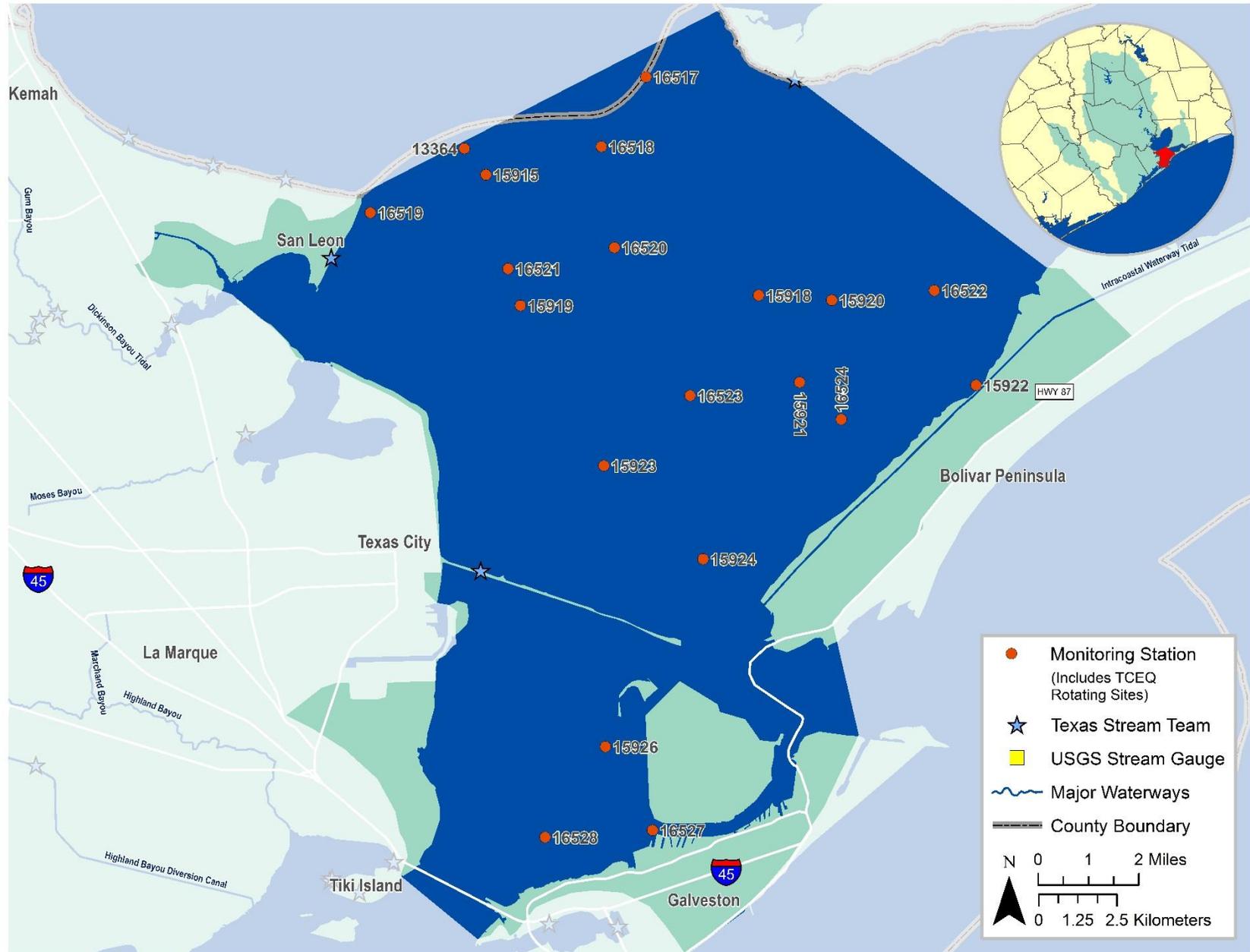
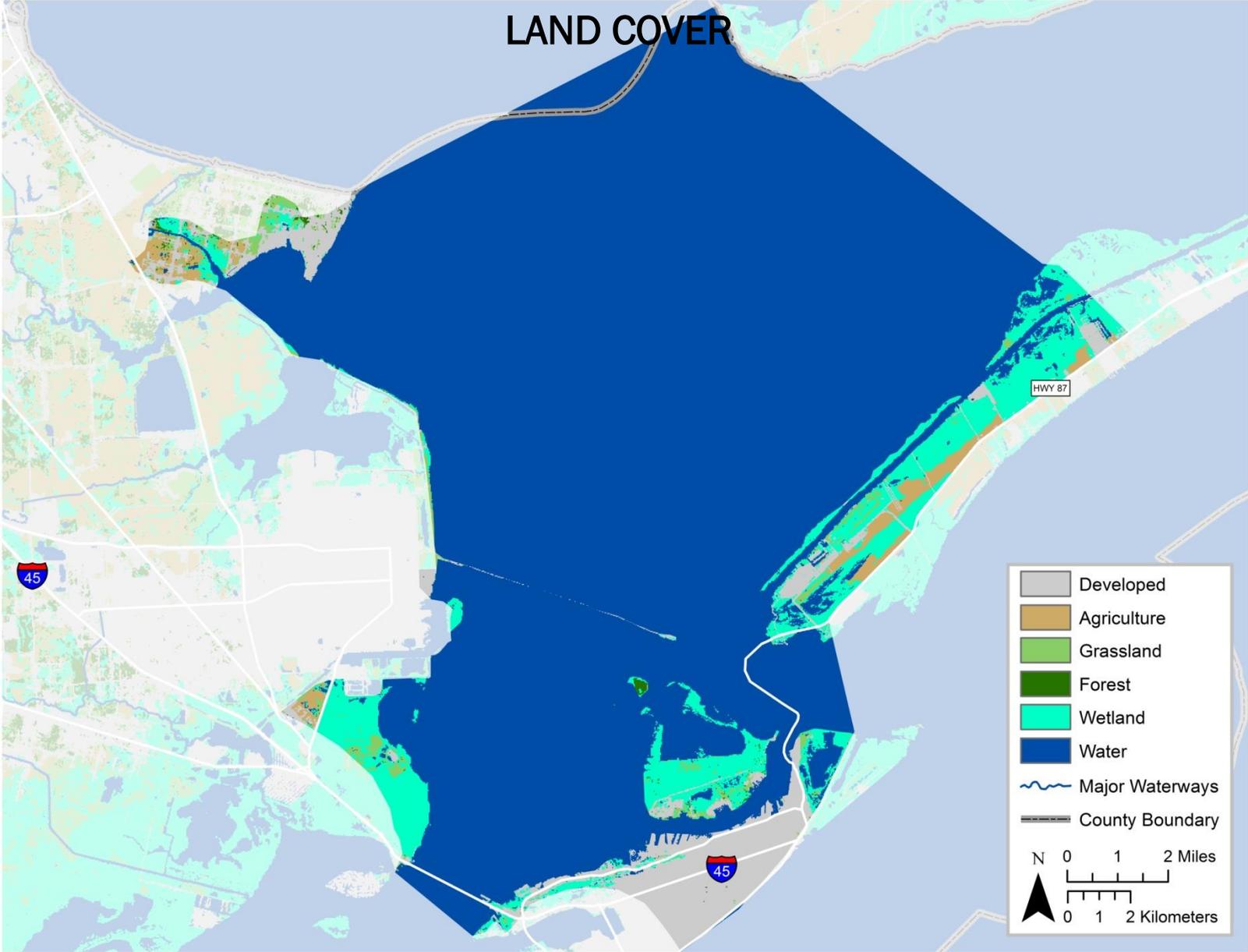


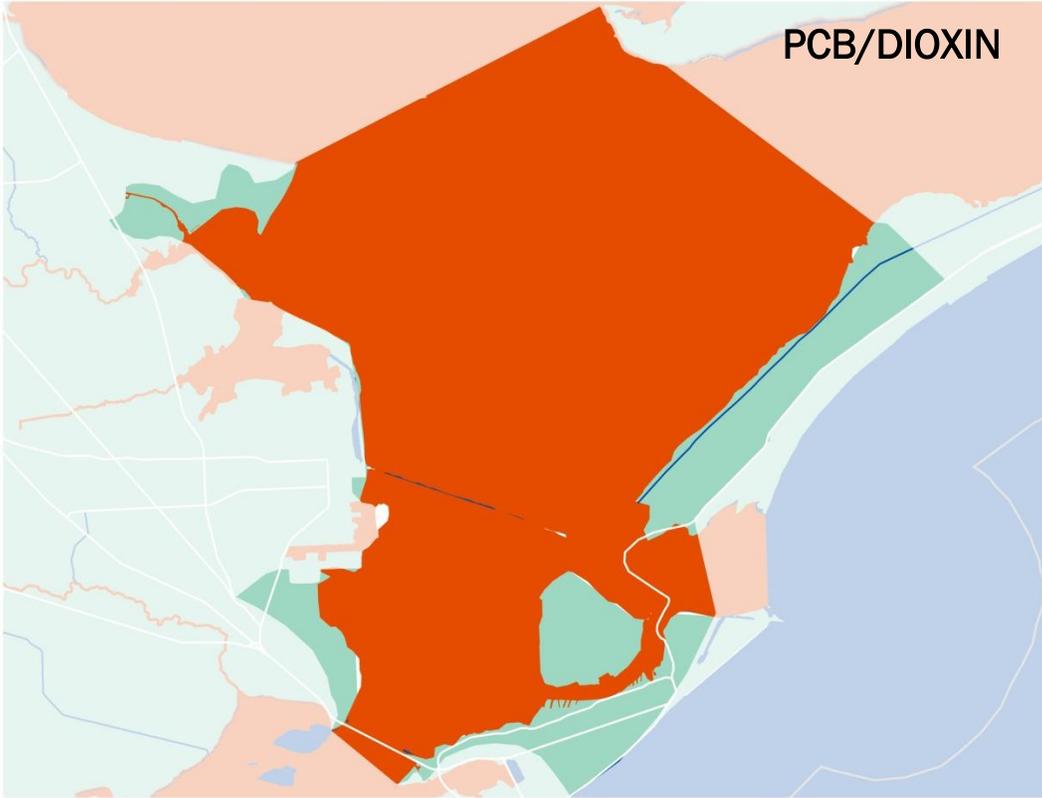
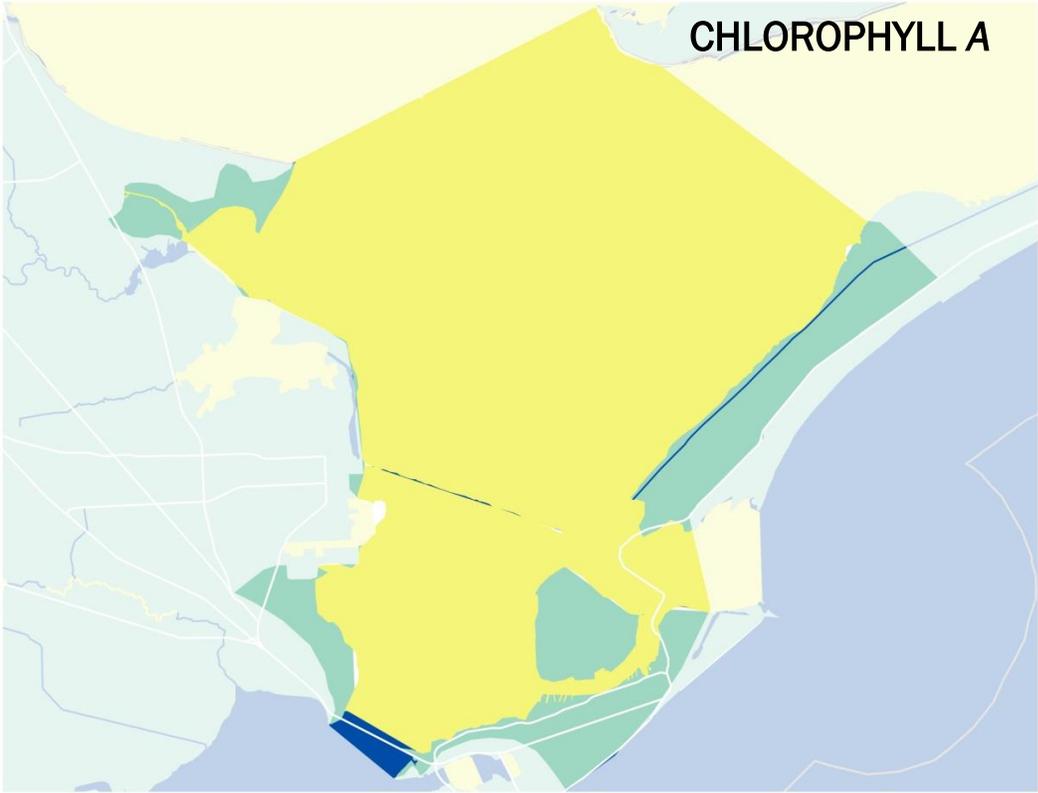
LOWER GALVESTON BAY - SEGMENT 2439



LOWER GALVESTON BAY - SEGMENT 2439

LAND COVER





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

Segment Number: **2439** Name:

## Lower Galveston Bay

**Area:** 361.6 square miles **Miles of Shoreline:** 70.1 miles **Designated Uses:** Primary Contact Recreation; High Aquatic Life Use; Oyster Waters

**Number of Active Monitoring Stations:** 13 **Texas Stream Team Monitors:** 3 **Permitted Outfalls:** 14

**Description:**

Segment 2439: A 361.6 square kilometer (139.2 square mile) portion of Galveston Bay located entirely within Galveston County extending eastward from the Galveston Causeway (IH-45) past Bolivar Roads (the pass between Galveston Island and Bolivar Peninsula) to an imaginary north-south line from Smith Point to approximately ½ mile east of Pepper Grove Cove on Elm Grove Point and east of Bluewater Subdivision on Bolivar Peninsula. And south of the imaginary line between Eagle Pt and Redfish Reef near the community of San Leon in Galveston County and Smith Point in Chambers County.

Segment 24390W (Oyster Waters)

### Percent of Stream Impaired or of Concern

| Segment ID | PCBs/Dioxin | Bacteria | Dissolved Oxygen | Nutrients | Chlorophyll a | Other |
|------------|-------------|----------|------------------|-----------|---------------|-------|
| 2439       | 100         | -        | -                | -         | 100           | -     |
| 24390W     | -           | 100      | -                | -         | -             | -     |

### Segment 2439

| Standards                                                  | Bays & Estuaries | Screening Levels                  | Bays & Estuaries |
|------------------------------------------------------------|------------------|-----------------------------------|------------------|
| Temperature (°C/°F):                                       | 35 / 95          | Ammonia-N (mg/L):                 | 0.10             |
| Dissolved Oxygen (24-Hr Average) (mg/L):                   | 4.0              | Nitrate-N (mg/L):                 | 0.17             |
| Dissolved Oxygen (Absolute Minima) (mg/L):                 | 3.0              | Orthophosphate Phosphorus (mg/L): | 0.19             |
| pH (standard units):                                       | 6.5-9.0          | Total Phosphorus-P (mg/L):        | 0.21             |
| Enterococci (MPN/100mL) (grab):                            | 104              | Chlorophyll a (µg/L):             | 11.6             |
| Enterococci (MPN/100mL) (geometric mean):                  | 35               |                                   |                  |
| Fecal Coliform in Oyster Waters (CFU/100mL) (median/grab): | 14/43            |                                   |                  |

## FY 2016 Active Monitoring Stations

| Site ID | Site Description               | Frequency   | Monitoring Entity | Parameter Groups                             |
|---------|--------------------------------|-------------|-------------------|----------------------------------------------|
| 13364   | Lower Galveston Bay at CM 2    | Quarterly   | TCEQ              | Field, Conventional, Bacteria, Chlorophyll a |
| 13364   | Lower Galveston Bay at CM 2    | Once / Year | TCEQ              | Benthics, Metals in Sediment                 |
| 16517   | Lower Galveston Bay at 98GB023 | Quarterly   | TCEQ              | Field, Conventional, Bacteria, Chlorophyll a |
| 16517   | Lower Galveston Bay at 98GB023 | Once / Year | TCEQ              | Benthics, Metals in Sediment                 |
| 16518   | Lower Galveston Bay at 98GB025 | Quarterly   | TCEQ              | Field, Conventional, Bacteria, Chlorophyll a |
| 16519   | Lower Galveston Bay at 98GB026 | Quarterly   | TCEQ              | Field, Conventional, Bacteria, Chlorophyll a |
| 16520   | Lower Galveston Bay at 98GB027 | Quarterly   | TCEQ              | Field, Conventional, Bacteria, Chlorophyll a |
| 16521   | Lower Galveston Bay at 98GB028 | Quarterly   | TCEQ              | Field, Conventional, Bacteria, Chlorophyll a |
| 16521   | Lower Galveston Bay at 98GB028 | Once / Year | TCEQ              | Benthics, Metals in Sediment                 |
| 16522   | Lower Galveston Bay at 98GB029 | Quarterly   | TCEQ              | Field, Conventional, Bacteria, Chlorophyll a |
| 16523   | Lower Galveston Bay at 98GB030 | Quarterly   | TCEQ              | Field, Conventional, Bacteria, Chlorophyll a |
| 16524   | Lower Galveston Bay at 98GB031 | Quarterly   | TCEQ              | Field, Conventional, Bacteria, Chlorophyll a |
| 16524   | Lower Galveston Bay at 98GB031 | Once / Year | TCEQ              | Benthics, Metals in Sediment                 |
| 16525   | Lower Galveston Bay at 98GB032 | Quarterly   | TCEQ              | Field, Conventional, Bacteria, Chlorophyll a |
| 16526   | Lower Galveston Bay at 98GB033 | Quarterly   | TCEQ              | Field, Conventional, Bacteria, Chlorophyll a |
| 16527   | Lower Galveston Bay at 98GB034 | Quarterly   | TCEQ              | Field, Conventional, Bacteria, Chlorophyll a |
| 16528   | Lower Galveston Bay at 98GB035 | Quarterly   | TCEQ              | Field, Conventional, Bacteria, Chlorophyll a |
| 16528   | Lower Galveston Bay at 98GB035 | Once / Year | TCEQ              | Benthics, Metals in Sediment                 |

## Water Quality Issues Summary

| Issue                               | 2014 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</b> | 24390W I                                                        | <ul style="list-style-type: none"> <li>▪ Rapid urbanization and increased impervious cover</li> <li>▪ Animal waste from agricultural production</li> </ul> | <ul style="list-style-type: none"> <li>▪ Improve compliance and enforcement of existing stormwater quality permits</li> <li>▪ Improve construction oversight to minimize TSS</li> </ul> |

|                                                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Bacteria in Oyster Waters</b></p>             |               | <p>and hobby farms</p> <ul style="list-style-type: none"> <li>▪ Constructed stormwater controls failing</li> <li>▪ Improper disposal of waste from boats</li> <li>▪ Developments with malfunctioning OSSFs</li> <li>▪ Improper or no pet waste disposal</li> <li>▪ Waste haulers illegal discharges/improper disposal</li> <li>▪ Direct and dry weather discharges</li> <li>▪ Poorly operated or undersized WWTFs</li> <li>▪ WWTF non-compliance, overflows, and collection system by-passes</li> </ul> | <p>discharges to waterways</p> <ul style="list-style-type: none"> <li>▪ Add water quality features to stormwater systems</li> <li>▪ Implement stream fencing or alternative water supplies to keep livestock out of or away from waterways</li> <li>▪ Encourage Water Quality Management Plans or similar projects for agricultural properties</li> <li>▪ Install and/or conserve vegetative buffer areas along all waterways</li> <li>▪ More public education on proper boat waste disposal</li> <li>▪ More public education regarding OSSF operation 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>▪ 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> <li>▪ Increase monitoring requirements for self-reporting</li> </ul> |
| <p><b>Elevated Chlorophyll a Concentrations</b></p> | <p>2439 C</p> | <ul style="list-style-type: none"> <li>▪ Fertilizer runoff from surrounding watershed promotes 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>▪ Add water quality features to stormwater systems</li> <li>▪ More public education regarding nutrients</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <p><b>PCBs/Dioxin in Edible Fish Tissue</b></p>     | <p>2439 I</p> | <ul style="list-style-type: none"> <li>▪ Concentrated deposits outside boundaries of the waste pits located adjacent to San Jacinto River and I-10 bridge</li> </ul>                                                                                                                                                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>▪ Remove or contain contamination from locations already identified</li> <li>▪ Encourage additional testing to locate all unknown sources/deposits</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## Segment Discussion:

**Watershed Characteristics:** This segment primarily receives flow from other bodies of water such as Upper Galveston Bay, East Bay, West Bay and the Gulf of Mexico. The land portion of the watershed includes parts of the Cities of Galveston and Texas City, and the unincorporated communities of San Leon and Port Bolivar. The eastern end of Galveston Island is heavily urbanized with commercial shipping operations located along both the north and south shores of the Galveston Ship Channel. A large portion of Pelican Island, located to the north of the channel, is used for dredge disposal and contains a great deal of wetland habitat. Likewise, the east end of the Galveston Island on the bay side of the seawall is a dredge disposal area.

While Texas City is heavily industrialized with a high concentration of refineries and related petrochemical installations, only a relatively small area drains directly to Lower Galveston Bay. Most of the City of Texas City drains through Moses Lake via pumping stations located on the city lagoons. In addition to the wetlands and grasslands, this area also includes several other industrial operations such as landfills, offsite disposal areas, and a superfund site. The other Texas City land area draining to the Bay is the Texas City Dike and all the bay shoreline along the seawall levee north of the dike. A few shrimp boats dock along the Dike but there are no permanently located businesses on the dike. This area supports public recreation such as swimming, wade fishing and wind surfing.

North of Texas City is the unincorporated community of San Leon. It is moderately developed with a mix of residential and commercial land uses. Though smaller in size, the community of Pt. Bolivar on Bolivar Peninsula is also a year round community of mixed residential and commercial uses. Farther east along the peninsula are large tracts of undeveloped land supporting wetland, marsh and grassland habitats intersected with small residential developments and a few canal communities. Many of these houses are vacation homes without year round occupants.

Lower Galveston Bay is a crossroads of many waterways. It supports high volumes of ocean-going ships and barge traffic, particularly along the ship channels and the Intracoastal Waterway. Extensive commercial oyster beds are located across the upper portion of Lower Galveston Bay while the entire bay is used extensively for recreational activities such as boating, fishing and birding.

**Water Quality Issues:** Assessment unit 24390W\_01, which is the area of Lower Galveston Bay located near the Texas City Ship Channel and Moses Lake, is listed in the 2014 IR as impaired for oyster waters due to elevated levels of fecal coliform bacteria. This assessment unit is closed by the Seafood Safety Division of the Texas Department of State Health Services for the harvesting of oysters and other shellfish for direct marketing.

The entire bay segment is also under a fish consumption advisory due to high levels of dioxin and PCBs found in edible fish tissue. Assessment units 2439\_01 and 2439\_02 have also been listed as having a concern for chlorophyll *a*. Approximately 40% of samples exceeded the screening criteria level of 11.6 micrograms per liter.

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**Special Studies/Projects:** This segment is included in the TMDL for the Galveston Bay System Survey on Dioxin and PCBs, which is currently under way. Lower Galveston Bay is also included in the Oyster Waters I-Plan for bacteria which began in 2010 after the TMDL was approved by the EPA. The final draft I-Plan was submitted to the TCEQ in August of 2014 and final approval of the draft was given in August of 2015. For more information about these projects, please refer to the detailed discussions located in the Public Involvement and Outreach section of the 2016 Basin Summary Report.

**Trends:** Regression analysis of water quality data revealed 10 statistically significant parameter trends for the Lower Galveston Bay watershed including increasing sulfate, specific conductance (SPCond), salinity, pH, enterococci, chloride, and alkalinity while total Kjeldahl nitrogen (TKN), nitrate, and ammonia are decreasing over time. This segment is currently listed as impaired for indicator bacteria in oyster waters and for PCBs and dioxin in edible fish tissue. Refer to the water quality issues discussion above for more information about these impairments. The 2014 Texas Integrated Report also lists this segment as having a concern for [chlorophyll a](#). Regression analysis for this segment detected no statistically significant change in chlorophyll a concentrations over time; however, the majority of segments still exceed the 11.6 µg/L screening criteria.

### Recommendations

Continue collecting water quality data to support actions associated with any future watershed protection plan development and possible modeling.

Coordinate education efforts with other local TMDL and watershed protection plan efforts.

Increase the frequency of sampling at representative stations in the watershed to decrease data gaps.

Pursue a new local partner to Clean Rivers Program to collect additional data that would help better isolate problem areas.

Support additional sampling to investigate sources of elevated dioxin and PCB levels.