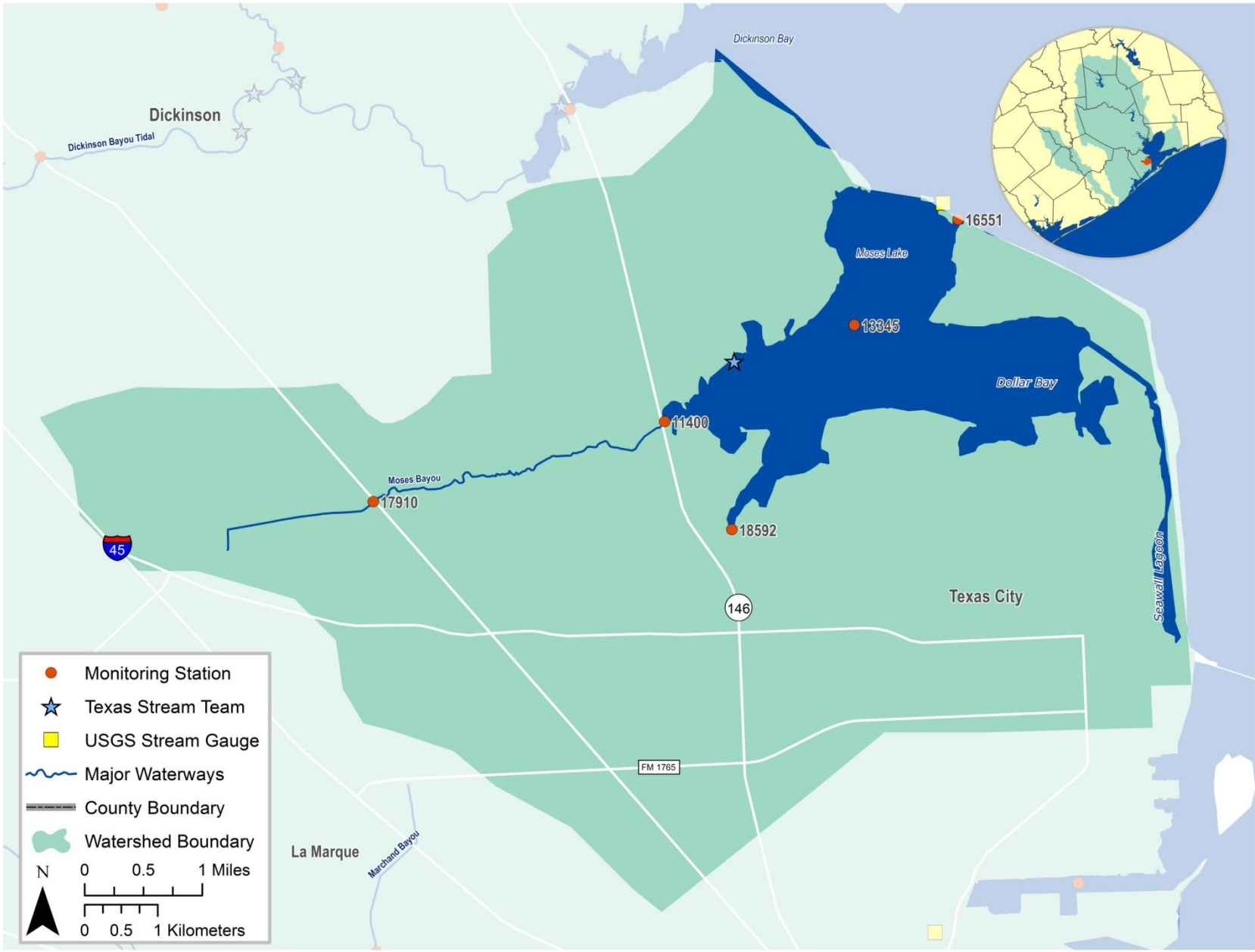
# MOSES LAKE - SEGMENT 2431



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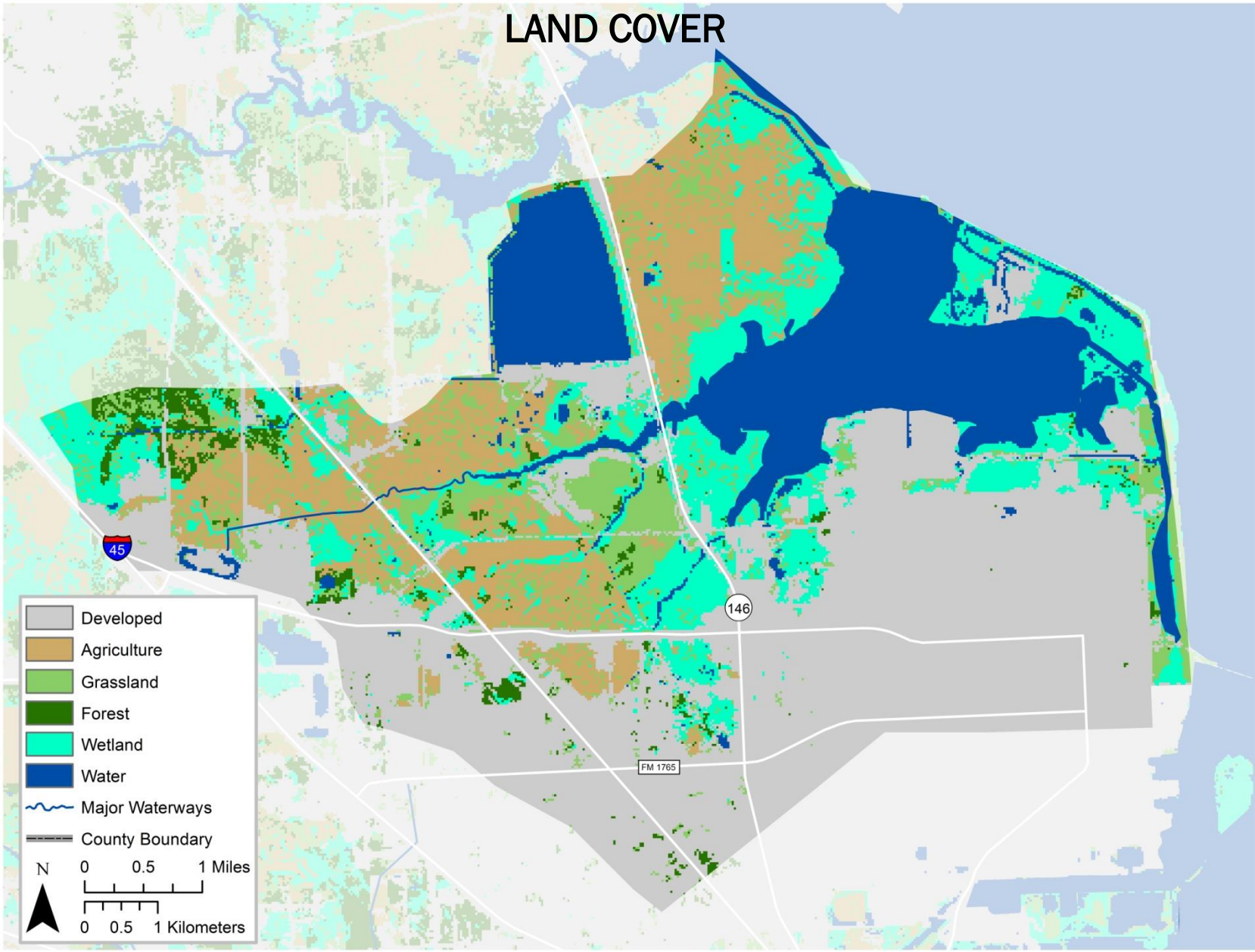
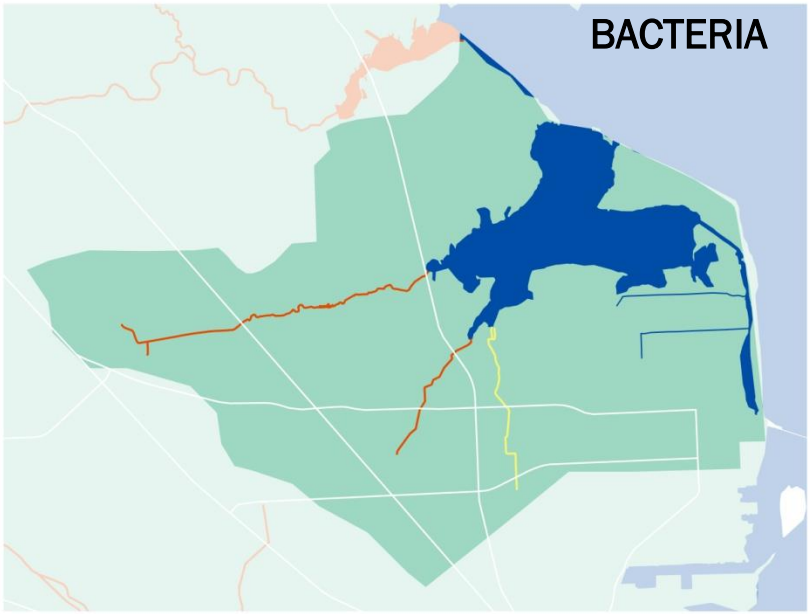
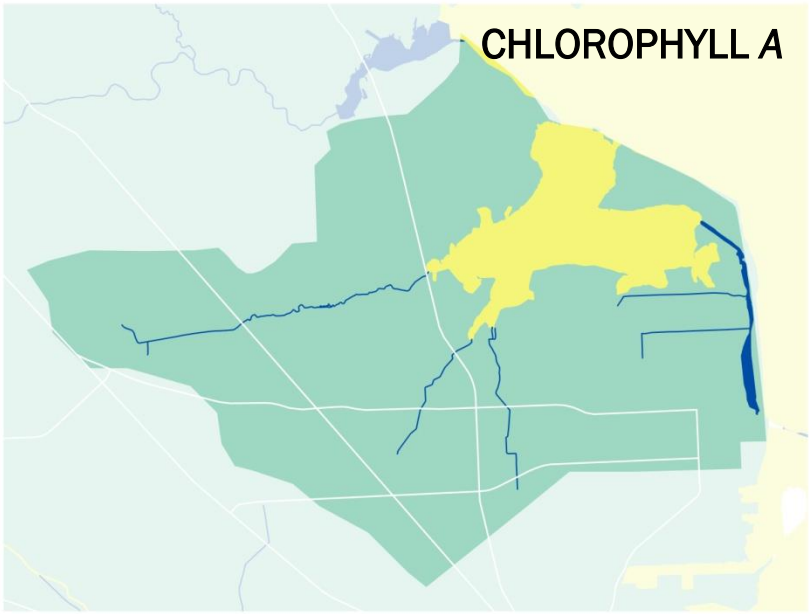
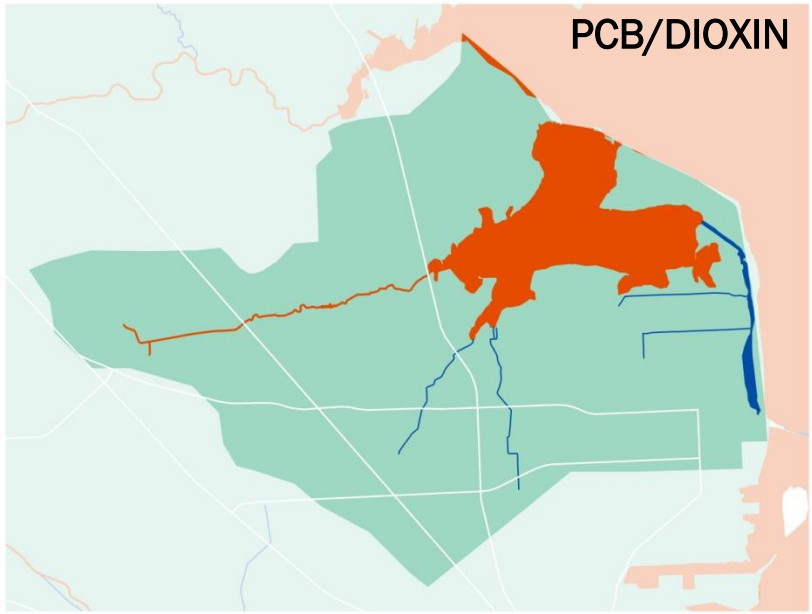
## LAND COVER






Impairment Concern No Impairments or Concerns

| Segment Number: | 2431 | Name: | Moses Lake |
|---|---|---|---|
| **Area:** | 4 square miles | **Miles of Shoreline:** | 10.7 miles |
| **Designated Uses:** | Primary Contact Recreation 1; High Aquatic Life Use | | |
| **Number of Active Monitoring Stations:** | 5 | **Texas Stream Team Monitors:** | 1 |
| **Permitted Outfalls:** | 5 | | |

**Description:**

An 8.5 square kilometer (3.3 square mile) water body on the western shore of Lower Galveston Bay entirely enclosed by the Texas City levee system immediately north of the urbanized portion of the City of Texas City, south of and adjacent to Dickinson Bay in Galveston County

Segment 2431A (Tidal Stream w/ high ALU): Moses Bayou (unclassified water body) — From Moses Lake confluence to 2.2 km (1.4 mi) upstream of SH 3 in Galveston County

Segment 2431B (Estuary w/ high ALU): Seawall Lagoon (unclassified water body) – Located approximately 1.9 km (1.2 mi) south of Dollar Point adjacent to Bay Street N in Galveston County

Segment 2431C (Tidal Stream w/ high ALU): Unnamed Tributary to the Southern Arm (west) of Moses Lake (unclassified water body) – From the confluence with the southern arm (west) of Moses Lake to a point 0.45 mi upstream of State Highway 3 near La Marque

Segment 2431D (Tidal Stream w/ high ALU): Unnamed Tributary to the Southern Arm (east) of Moses Lake (unclassified water body) – From the confluence with the southern arm (east) of Moses Lake to a point 0.6 mi upstream of State Highway 146 in Texas City

**Percent of Stream Impaired or of Concern**

| Segment ID | PCBs/Dioxin | Bacteria | Dissolved Oxygen | Nutrients | Chlorophyll *a* | Other |
|---|---|---|---|---|---|---|
| 2431 | 100 | - | - | - | 45 | - |
| 2431A | 100 | 100 | - | - | - | - |
| 2431C | - | 100 | - | - | - | - |
| 2431D | - | 100 | - | - | - | - |

## Segment 2431

| Standards | Bays & Estuaries | Tidal Streams | Screening Levels | Bays & Estuaries | Tidal Streams |
|---|---|---|---|---|---|
| Temperature (°C/°F): | 35 / 95 | 35 / 95 | Ammonia-N (mg/L): | 0.10 | 0.46 |
| Dissolved Oxygen *(24-Hr Average)* (mg/L): | 4.0 | 4.0 | Nitrate-N (mg/L): | 0.17 | 1.10 |
| Dissolved Oxygen *(Absolute Minima)* (mg/L): | 3.0 | 3.0 | Orthophosphate Phosphorus (mg/L): | 0.19 | 0.46 |
| pH (standard units): | 6.5-9.0 | 6.5-9.0 | Total Phosphorus-P (mg/L): | 0.21 | 0.66 |
| Enterococci (MPN/100mL) (grab): | 104 | 104 | Chlorophyll *a* (µg/L): | 11.6 | 21 |
| Enterococci (MPN/100mL) (geometric mean): | 35 | 35 | | | |

## FY 2016 Active Monitoring Stations

| Site ID | Site Description | Frequency | Monitoring Entity | Parameter Groups |
|---|---|---|---|---|
| 11400 | Moses Bayou at SH 146 Bridge | Quarterly | EIH | Field, Conventional, Bacteria |
| 13345 | Moses Lake at CM 9 | Quarterly | TCEQ | Field, Conventional, Bacteria, Chlorophyll *a* |
| 16551 | Moses Lake at Galveston Bay | Quarterly | EIH | Field, Conventional, Bacteria, Chlorophyll *a* |
| 17910 | Moses Bayou at SH 3 | Quarterly | EIH | Field, Conventional, Bacteria |
| 18592 | Trib of Moses Lake at Loop 197 North | Quarterly | EIH | Field, Conventional, Bacteria |

## Water Quality Issues Summary

| Issue | 2014 Assessment<br>*I – Impaired*<br>*C – Of Concern* | Possible Causes / Influences / Concerns Voiced by Stakeholders | Possible Solutions / Actions To Be Taken |
|---|---|---|---|
| **Elevated Levels of Indicator Bacteria** | 2431A I<br>2431C I<br>2431D C | ▪ Rapid urbanization and increased impervious cover<br>▪ Constructed stormwater controls failing<br>▪ Animal waste from agricultural production, hobby farms, and riding stables<br>▪ Improper or no pet waste disposal | ▪ Improve compliance and enforcement of existing stormwater quality permits<br>▪ Improve construction oversight to minimize TSS discharges to waterways<br>▪ Add water quality features to stormwater systems<br>▪ Implement stream fencing or alternative water |

| | | | |
|---|---|---|---|
| | | ▪ Developments with malfunctioning OSSFs<br>▪ Waste haulers illegal discharges/improper disposal<br>▪ Direct and dry weather discharges<br>▪ Poorly operated or undersized WWTFs<br>▪ WWTF non-compliance, overflows, and collection system by-passes | supplies to keep livestock out of or away from waterways<br>▪ Encourage Water Quality Management Plans or similar projects for agricultural properties<br>▪ Install and/or conserve vegetative buffer areas along all waterways<br>▪ More public education on pet waste disposal<br>▪ More public education regarding OSSF operations and maintenance<br>▪ Ensure proper citing of new or replacement OSSFs<br>▪ Regionalize chronically non-compliant WWTFs<br>▪ Require all systems to develop and implement a utility asset management program and protect against power outages at lift stations<br>▪ Impose new or stricter bacteria limits than currently designated by TCEQ<br>▪ Increase monitoring requirements for self-reporting |
| PCBs/Dioxin in Edible Fish Tissue | 2431 I<br>2431A I | ▪ Concentrated deposits outside boundaries of the waste pits located adjacent to San Jacinto River and I-10 bridge<br>▪ Unknown industrial or urban sources | ▪ Remove or contain contamination from locations already identified<br>▪ Encourage additional testing to locate all unknown sources/deposits |
| Elevated Chlorophyll *a* Concentrations | 2431 C | ▪ Fertilizer runoff from surrounding watershed promotes algal growth in waterways<br>▪ Nutrient loading from WWTF effluent, sanitary sewer overflows, and malfunctioning OSSFs promotes algal growth | ▪ Improve compliance and enforcement of existing stormwater quality permits<br>▪ Improve stormwater controls in new developments<br>▪ More public education regarding nutrients and consequences |

## Segment Discussion:

**Watershed Characteristics:** The northeastern and northwestern portions of the watershed consist mostly of grasslands and forested lands. Ranchettes are the common semi-rural development in this area. Large tracts of undisturbed wetlands and marsh habitats surround Moses Lake and Dollar Bay, an adjacent lagoon. In contrast, the southern section of the watershed is highly urbanized and includes a part of the Texas City petrochemical complex. Development is also concentrated along the major thoroughfares that run through the watershed. Only the urbanized areas of Texas City and La Marque are serviced by municipal wastewater collection and treatment systems. The remaining developments rely on on-site wastewater treatment systems (OSSFs).

**Water Quality Issues:** The 2014 Texas IR lists unclassified segments 2431A and 2431C as impaired for contact recreation due to high levels of enterococci bacteria. The 2014 IR also lists 2431D as having a concern for near non attainment for contact recreation due to high levels of enterococci. 2431A is a new addition to the 303(d) list for bacteria. Refer to the moving seven year bacteria geometric mean plot for segment 2431A for more information about enterococci geometric means over time.

Moses Lake (2431) and Moses Bayou (2431A) are also listed as impaired for fish consumption due to high levels of the dioxin and PCBs found in edible fish tissue. The Texas Department of State Health Services as also issued a Limited Consumption Fish Advisory for this area.

Moses Lake has a concern for chlorophyll *a* with 31 percent of samples over the screening criteria level of 11.6 micrograms per liter. Segments 2431B and 2431C are also listed on the IR for screening criteria concerns for dissolved oxygen grab measurements.

**Special Studies/Projects:** This segment is included in one TMDL project, the Galveston Bay System Survey for Dioxin and PCBs, which is currently under way. For more information, please refer to the detailed discussions located in the Public Involvement and Outreach section of the 2016 Basin Summary Report regarding dioxin and PCB TMDLs.

**Trends:** Regression analysis of water quality data revealed 14 statistically significant trends for two out of the five segments located in the Moses Lake watershed. The main Moses Lake segment revealed ten significant trends including increasing alkalinity, chloride, pH, salinity, specific conductance (SPCond), sulfate, and total dissolved solids (TDS) and decreasing ammonia, nitrate, and total Kjeldahl nitrogen (TKN). Moses Bayou, segment 2431A, had four statistically significant parameter trends including increasing ammonia and total phosphorous (TP) while pH and sulfate are decreasing over time.

The 2014 Texas Integrated report list Moses Lake and Moses Bayou as impaired for PCBs and dioxin in edible fish tissue. Refer to the water quality discussion above for more information about these impairments. A bacteria impairment is also listed for segments 2431A, 2431C. Regression analysis of enterococci data revealed relatively stable bacteria trends over time for these segments with nearly half of all samples collected during the period of record exceeding the 35 MPN/100 mL geometric mean standard for enterococci. A concern for chlorophyll *a* concentrations also exists for the main Moses Lake segment. Analysis of chlorophyll *a* data revealed no statistically significant trend over time, but concentrations greater than the 11.6 µg/L screening criteria are still common.

| 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. |
| 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. |