# Watershed: Coastal Watershed Complex (Columbus to Matagorda)

**Segments:** 1304, 1305, 1401, 1402, 1501, 1502, 2441, 2451

**Major Water Bodies:** Colorado River, Tres Palacios River, Caney Creek, Carancahua Creek, Peyton Creek, Skull Creek, Matagorda Bay, East Matagorda Bay

**Population Centers:** Columbus, Bay City, Eagle Lake, Wharton, El Campo, Van Vleck

**Counties:** Matagorda, Colorado, Wharton, Jackson, Calhoun, Brazoria

**Ecoregion:** Western Gulf Coastal Plains

**Ecoregion Descriptions:** A nearly flat physiographic belt bordering the Gulf of Mexico; The principal distinguishing characteristics are its relatively flat coastal plain topography and mainly grassland potential natural vegetation. Inland from this region the plains are more irregular and have mostly forest or savanna-type vegetation potentials. Largely because of these characteristics, a high percentage of the land is in cropland. Recent urbanization and industrialization have become concerns in this region.

**Climate:** Subtropical humid with annual precipitation averaging 38 inches with September the wettest month; Rainfall is evenly distributed throughout the year, with peaks occurring in spring due to increased thunderstorm activity and in fall due to tropical disturbances.

**Land Use:** Mostly cropland, some cropland with grazing land.

**Soils:** Vertisols; formed under prairie vegetation and predominantly dark, loamy and clayey.

**Permitted Discharges:** 22

**Permitted CAFOs:** 3

Fig. 13 - Coastal Watershed Permit Holders

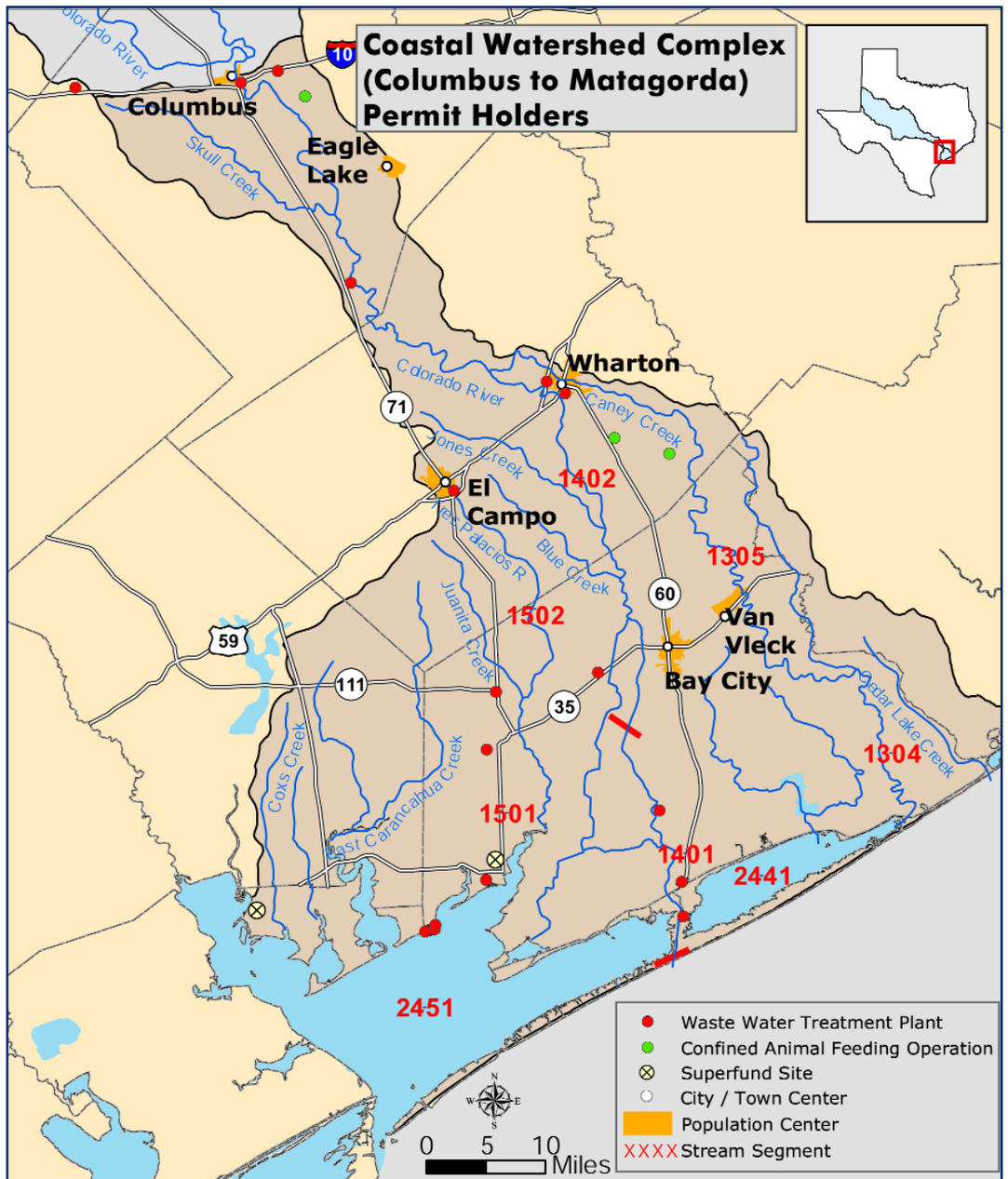

Table 6 - Trends in the Coastal Region of the Colorado River Basin

| | | Time vs. Constituent | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Nutrients | | | | |
| Station | Description | DO | CI | Fecal | TP | $NO_3$-N | Ch a | Secchi | TSS |
| 12290 | C.R. Columbus | | ↓ | | ↓ | | **N/A** | **N/A** | |
| 12287 | C. R. Garwood | ↑ | ↓ | | | | **N/A** | **N/A** | |
| 12286 | C.R. Wharton | ↑ | ↓ | | | | **N/A** | **N/A** | |
| 12284 | C.R. Bay City | | ↓ | | | | **N/A** | **N/A** | |

*See Appendix A: Glossary on page 76 for definition of terms.*

## Trend Analysis in the Coastal Watershed

Four sampling locations were evaluated for trends in water quality in the coastal complex. All sites are located on the main stem of the Colorado River. LCRA also samples two tidally influenced segments, but because of daily fluctuations in physicochemical properties in tidally influenced waters, trends were not analyzed at those sites.

Regression analysis with flow was not carried out on this watershed because the main stem of the Colorado River is manipulated into a seasonal irrigation vs. nonirrigation pattern. Therefore, only constituent vs. time was analyzed. More detailed results of the trend analysis are located in Table 6.

## Projects in the Coastal Watershed:

### Matagorda County Constructed Wetland Project

A survey conducted by LCRA in 1990 revealed that 15 percent of onsite wastewater systems in Wharton and Matagorda counties discharged raw or improperly treated sewage into water courses. Small drain field sizes, soils with low permeability, and high groundwater tables all contribute to ineffective waste treatment and created a public health concern.

In 1994, LCRA received a Clean Water Act Section 319(h) grant through TCEQ (formerly TNRCC) to construct and study the effectiveness of manmade wetlands as an alternative to conventional treatment. Wetland treatment systems were built for two single-family residences in Blessing, Texas.

The constructed wetlands produced an effluent quality exceeding that produced by a conventional septic tank with 99 percent removal of fecal coliform. The project was established as a wetland demonstration. In November 1996, a field day was held at the study sites to showcase the project.

While the wetland demonstration was deemed a success, the technology has not yet received widespread acceptance as a mainstream treatment option for onsite treatment for many reasons; maintenance is more rigorous, wetland systems can be more expensive than standard systems, they typically require more land area.

### Tres Palacios River Bacteria Study

In 1996 and 1999, the Texas Natural Resource Conservation Commission listed the Tres Palacios River on Texas' Clean Water Act 303(d) List as an impaired water body due to elevated bacteria and total dissolved solids. The lower basin CRP Steering Committee recommended that a special study of the Tres Palacios River be performed to investigate the sources of bacteria. The study, which began in 1999, enlisted professional and volunteer monitors, educational institutions, public agencies and businesses in the area.

Drainage ditch in the Tres Palacios watershed is used as a sewer.

Two conclusions drawn from the study were:

- Bacteria levels were elevated throughout the river during and approximately one week after rain events strong enough to produce runoff into the river.
- Nutrient content during dry weather monitoring conditions appeared to be tied to populated areas. Higher levels of nutrients were reported in the upper and lower ends of the watershed.

One possible source of elevated nutrients and bacteria in the upper portion of the Tres Palalcios River includes the city of El Campo. In the lower watershed, housing subdivisions using onsite sewage facilities could be attributed to elevated nutrient levels.

In 2000, the study findings were presented to area residents at a public meeting. LCRA produced and distributed a brochure explaining the results of the study and actions residents can take to better ensure safe contact recreation.

Tres Palacios River is site of sampling/training event.

Table 7 - Coastal Basin Data Summary

| Segment | Year | Temperature (°C) | Dissolved Oxygen (mg/L) | pH (S.U.) | Ammonia (mg/L) | Nitrate + Nitrite (mg/L) | Total Phosphorus (mg/L) | Ortho Phosphorus (mg/L) | Chloride (mg/L) | Sulfate (mg/L) | E. coli (cfu/dL) | Chlorophyll (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Colorado River (above tidal)** | 1996 | 22.98 | 7.80 | 8.03 | 0.080 | 1.222 | 0.354 | 0.234 | 55.1 | 38.9 | 127 | 4.0 |
| | 1997 | 21.81 | 8.10 | 7.87 | 0.050 | 0.673 | 0.275 | 0.083 | 40.7 | 31.7 | 141 | 20.1 |
| Segment 1402 | 1998 | 24.13 | 7.98 | 7.41 | 0.150 | 0.825 | 0.227 | 0.100 | 49.7 | 40.4 | 168 | 19.0 |
| 3 sites | 1999 | 23.43 | 8.63 | 8.01 | 0.030 | 1.945 | 0.311 | 0.204 | 59.9 | 45.2 | 197 | 7.2 |
| | 2000 | 25.42 | 7.94 | 8.11 | 0.032 | 1.241 | 0.450 | 0.272 | 50.3 | 40.5 | 160 | 7.4 |
| | **Mean** | **23.38** | **8.11** | **7.82** | **0.069** | **1.171** | **0.341** | **0.182** | **51.0** | **39.2** | **124** | **10.7** |
| | **Benchmark** | **35.00** | **5.00** | **6.5 - 9.0** | **0.170** | **2.760** | **0.800** | **0.500** | **100.0** | **100.0** | **126** | **11.6** |
| | **Violation Rate %** | **0.00** | **1.40** | **0.00** | **8.500** | **10.300** | **3.600** | **1.500** | **0.0** | **0.0** | **14** | **29.7** |
| **Colorado River (tidal)** | 1996 | 22.16 | 7.14 | 7.75 | 0.081 | 1.033 | 0.230 | 0.187 | 735.6 | 124.7 | 28 | 4.7 |
| | 1997 | 20.11 | 8.76 | 7.90 | 0.050 | 0.600 | - | 0.072 | 156.8 | 48.1 | 28 | 5.4 |
| Segment 1401 | 1998 | 26.88 | 6.62 | 7.34 | 0.175 | 0.600 | 0.207 | 0.077 | 388.8 | 190.3 | 29 | 14.3 |
| 1 site | 1999 | 24.09 | 9.26 | 8.11 | 0.087 | 1.605 | 0.517 | 0.198 | 1217.0 | 200.6 | 25 | 13.9 |
| | 2000 | 21.62 | 7.90 | 7.98 | 0.117 | 0.755 | 0.277 | 0.073 | 4463.1 | 607.8 | 43 | 7.8 |
| | **Mean** | **22.95** | **8.01** | **7.78** | **0.113** | **0.909** | **0.298** | **0.122** | **1316.8** | **222.9** | **45** | **9.4** |
| | **Benchmark** | **35.00** | **4.00** | **6.5 - 9.0** | **0.580** | **1.830** | **0.710** | **0.550** | **-** | **-** | **126** | **19.2** |
| | **Violation Rate** | **0.00** | **4.50** | **0.00** | **0.000** | **4.500** | **5.600** | **0.000** | **0.0** | **0.0** | **13** | **36.0** |
| **Tres Palacios River (tidal)** | 1996 | 21.45 | 6.73 | 7.58 | 0.135 | 0.626 | 0.291 | 0.132 | 1524.0 | 207.7 | 78 | 3.4 |
| | 1997 | 20.82 | 6.74 | 7.48 | 0.125 | 1.539 | 0.400 | 0.091 | 255.8 | 34.0 | 101 | 9.0 |
| Segment 1501 | 1998 | 23.82 | 5.63 | 7.14 | 0.204 | 1.475 | 0.238 | 0.075 | 1057.0 | 407.7 | 67 | 5.1 |
| 1 site | 1999 | 23.16 | 6.78 | 7.58 | 0.063 | 1.158 | 0.220 | 0.128 | 4090.1 | 561.5 | 48 | 10.0 |
| | 2000 | 20.33 | 6.66 | 7.80 | 0.205 | 0.688 | 0.450 | 0.173 | 2368.0 | 337.9 | 48 | 5.1 |
| | **Mean** | **22.01** | **6.52** | **7.46** | **0.148** | **1.096** | **0.305** | **0.119** | **1770.9** | **292.6** | **38** | **6.6** |
| | **Benchmark** | **35.00** | **5.00** | **6.5 - 9.0** | **0.580** | **1.830** | **0.710** | **0.550** | **-** | **-** | **126** | **19.2** |
| | **Violation Rate %** | **0.00** | **23.10** | **0.00** | **0.000** | **9.100** | **5.600** | **0.000** | **0.0** | **0.0** | **22** | **25.0** |
| **Caney Creek (tidal)** | 1996 | - | - | - | - | - | - | - | - | - | - | - |
| | 1997 | - | - | - | - | - | - | - | - | - | - | - |
| Segment 1304 | 1998 | - | - | - | - | - | - | - | - | - | - | - |
| 1 site | 1999 | - | - | - | - | - | - | - | - | - | - | - |
| | 2000 | 22.49 | 6.56 | 7.98 | 0.040 | 0.301 | 0.313 | 0.177 | 5214.6 | 767.5 | 114 | 20.6 |
| | **Mean** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| | **Benchmark** | **35.00** | **4.00** | **6.5 - 9.0** | **0.580** | **1.830** | **0.710** | **0.550** | **-** | **-** | **126** | **19.2** |
| | **Violation Rate** | **0.00** | **42.90** | **0.00** | **0.000** | **0.000** | **0.000** | **0.000** | **0.0** | **0.0** | **43** | **57.0** |

*Mean - annual average value* *Benchmark - state standard or threshold* *Violation Rate - percent of sample exceeded benchmark*

Fig. 14 - Coastal Watershed Monitoring Locations

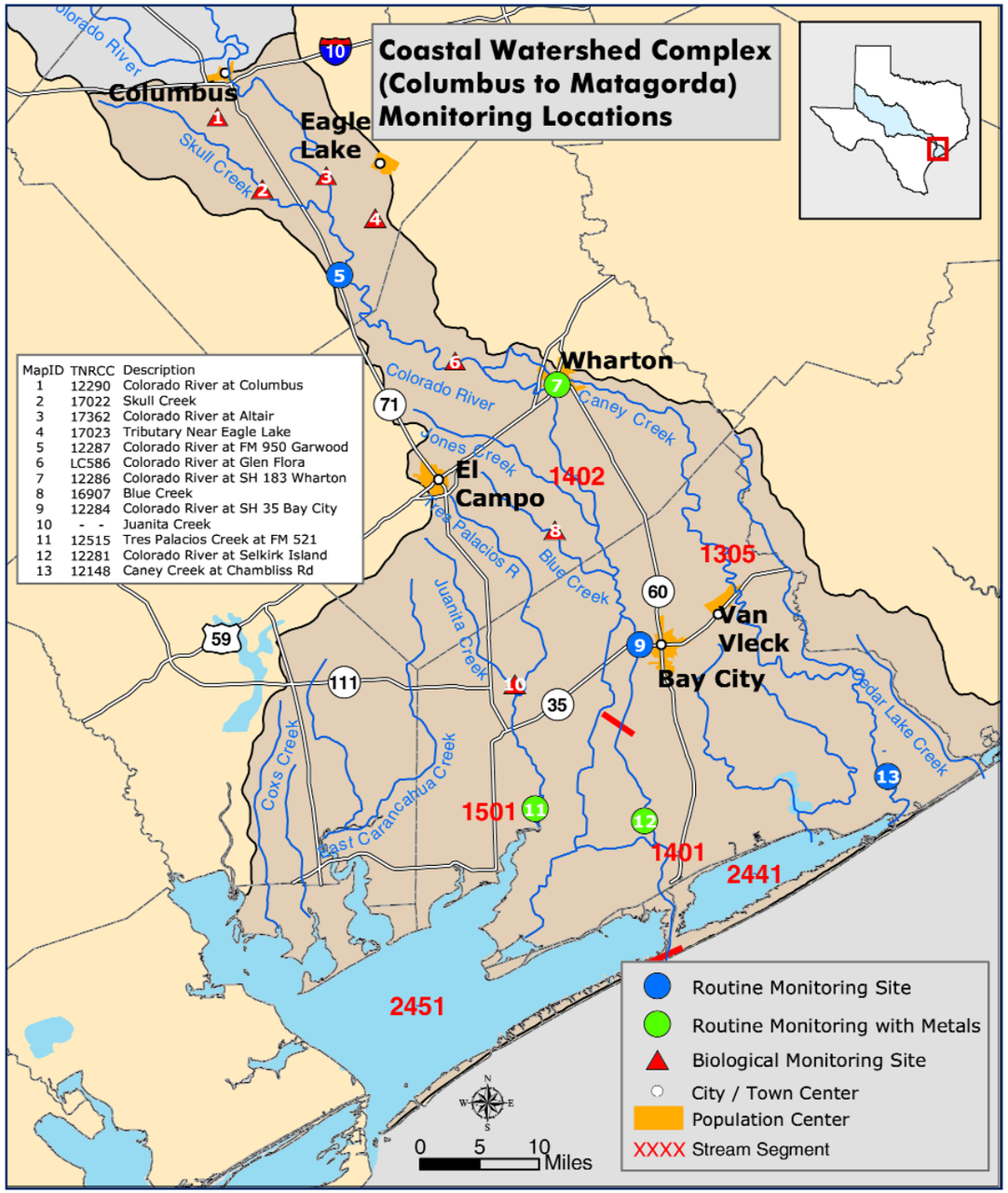

Table 8 - Results of Biological Surveys in the Coastal Basin

| Site | Date | Aquatic Life Use Fish | Aquatic Life Use Macroinvertebrates | Aquatic Life Use Dissolved Oxygen |
|---|---|---|---|---|
| Unnamed Creek South of Eagle Lake | Jun-98 | Intermediate | - | Limited |
| Unnamed Creek South of Eagle Lake | Sep-98 | Limited | - | Limited |
| Unnamed Creek South of Eagle Lake | Dec-98 | Intermediate | - | High |
| Unnamed Creek South of Eagle Lake | Apr-99 | Intermediate | - | Intermediate |
| Blue Creek | Jun-98 | Intermediate | Limited | High |
| Blue Creek | Sep-98 | Limited | - | Intermediate |
| Blue Creek | Dec-98 | Limited | - | Exceptional |
| Blue Creek | Apr-99 | Intermediate | - | Exceptional |
| Skull Creek (90 a) | Jun-98 | Intermediate | High | Intermediate |
| Skull Creek (90 a) | Sep-98 | Intermediate | - | Limited |
| Skull Creek (90 a) | Dec-98 | Intermediate | Intermediate | Exceptional |
| Skull Creek (90 a) | Apr-99 | Intermediate | Limited | Limited |
| Juanita Creek | Jun-98 | Intermediate | High | High |
| Juanita Creek | Sep-98 | Intermediate | Intermediate | Exceptional |
| Juanita Creek | Dec-98 | Intermediate | Intermediate | Exceptional |
| Juanita Creek | Apr-99 | - | - | - |
| Colorado River at Glen Flora | Mar-01 | High | - | Exceptional |
| Colorado River at Altair | Nov-01 | High | - | - |

## Biological Monitoring in the Coastal Region

Six sites were sampled in the Colorado River basin coastal complex. Four were located on tributaries and two sites were on the main stem of the river.

There is little topographical relief in this region. Consequently, streams have slow flow and few riffle habitats. The streams typically have a heavy organic load and deep sediments, which consume a vast amount of dissolved oxygen. As a result, the biological communities must be tolerant to stressful conditions. The lack of rocky substrate does not support benthic communities in most small streams in the area. Fish, benthic macroinvertebrates, and dissolved oxygen generally score limited to intermediate in the tributaries.

The main stem of the Colorado River in this basin supports a healthy, diverse population of fish. The volume of flows in the river and lack of rocky riffle habitats precludes monitoring benthic macroinvertebrates communities. Table 8 describes the aquatic life uses for the coastal streams sampled during the reporting period.

## Metals

Results for the Coastal Basin Watershed dissolved metals in water sampling in August of 1998 is located in Appendix E on page 84.

LCRA biologists perform fishing survey.