



*Nueces River Authority*

## **Basin Highlights Report**

### **Nueces River Basin**

### **San Antonio-Nueces Coastal Basin**

### **Nueces-Rio Grande Coastal Basin**

**March 2005**

**Prepared in cooperation with the Texas Commission on Environmental Quality  
Clean Rivers Program**



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## List of Acronyms

CCS	Center for Coastal Studies
CPL	Central Power and Light Company
CRP	Clean Rivers Program
DSHS	Department of State Health Services
DO	Dissolved Oxygen
EDC	Endocrine Disrupting Chemicals
EPA	United States Environmental Protection Agency
FY	Fiscal year
MUD	Municipal Utility District
NRA	Nueces River Authority
PCB	polychlorinated biphenols
SHP	State Historic Park
SNA	State Natural Area
SP	State Park
SWQM	Surface Water Quality Monitoring
TAMUCC	Texas A&M University – Corpus Christi
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TGLO	Texas General Land Office
TMDL	Total Maximum Daily Load
TPWD	Texas Parks and Wildlife Department
TXDOT	Texas Department of Transportation
WCID	Water Control and Improvement District
WSC	Water Supply Corporation
WWTP	Waste Water Treatment Plant



## INTRODUCTION

In 1991, the Texas Legislature passed the Texas Clean Rivers Act which requires basin-wide water quality assessments to be conducted for each river basin in Texas. Under this act, the Clean Rivers Program (CRP) has developed an effective partnership involving the Texas Commission on Environmental Quality (TCEQ), other state agencies, river authorities, local governments, industry, and citizens. Using a watershed management approach, the Nueces River Authority (NRA) and TCEQ work together to identify and evaluate surface water quality issues and to establish priorities for corrective action. Under CRP, NRA is responsible for the San Antonio – Nueces Coastal Basin, the Nueces River Basin, and the Nueces – Rio Grande Coastal Basin; an area roughly 31,500 square miles, ranging from the hill country in Edwards County to San Antonio Bay in Refugio County to the Brownsville Ship Channel in Cameron County.

The San Antonio – Nueces Coastal Basin is approximately 3,100 square miles, covering all or part of 7 counties. The basin is bordered by the San Antonio River Basin to the north, the Lavaca-Guadalupe Coastal Basin to the northeast, bays, estuaries, and the Gulf of Mexico to the east, the Nueces-Rio Grande Coastal Basin to the south, and the Nueces River Basin to the northwest. Being a coastal area, the basin is naturally host to several recreational areas. These include Goose Island State Park (SP) near Rockport, Copano Bay State Fishing Pier along State Highway 35 north of Fulton, Fulton Mansion State Historic Park (SHP) in Fulton, and the Aransas National Wildlife Refuge in Aransas County.

The Nueces River Basin covers approximately 17,000 square miles, encompassing all or part of 23 counties in South-Central Texas. Other rivers within the basin include the Frio, Leona, Sabinal, and Atascosa Rivers. The basin is bordered by the Colorado, Guadalupe, and San Antonio River Basins to the north, the San Antonio – Nueces Coastal Basin to the southeast, the Nueces – Rio Grande Coastal Basin to the south, and the Rio Grande River basin to the south and southwest. Throughout the basin, the rivers are used for water supply and recreational purposes. The basin is home to numerous recreational areas including: Choke Canyon State SP on the south side of Choke Canyon Reservoir near Three Rivers, Lake Corpus Christi SP on the southeast bank of Lake Corpus Christi near Mathis, Garner SP north of Concan, Tips State Recreational Area on the Frio River in Three Rivers, Lipantitlan SHP near Sandia, Lost Maples State Natural Area (SNA) north of Vanderpool, and Hill Country SNA north of Hondo.

The Nueces – Rio Grande Coastal Basin covers approximately 10,400 square miles, encompassing all or part of 12 counties in South Texas. The basin is bordered by the Nueces River Basin and the San Antonio – Nueces Coastal Basin to the north, bays, estuaries, and the Gulf of Mexico to the east, and the Rio Grande River Basin to the south and southwest. The inland area of the basin is dominated by large ranches, including the King Ranch. Recreational areas are primarily along the coast and include Mustang Island SP, Port Isabelle Light House SHP in Port Isabel, and the Padre Island National Seashore.

## BASIN HIGHLIGHTS

### Golden Algae Study

The Texas Parks and Wildlife Department (TPWD), in cooperation with CRP partners, including NRA, conducted a statewide survey for *Prymnesium parvum*. *P. parvum*, also known as golden algae, is a toxin forming haptophytic protist that has been linked to fish kills in the Pecos River dating back to the 1950's. *P. parvum* is thought to be endemic to the Pecos River and upper reaches of the Colorado, Brazos, and Red River basins, however, the range in Texas is unknown. TPWD asked all program partners to submit surface water samples from all Texas reservoirs to determine the range and distribution of *P. parvum* to help determine if it is spreading. NRA submitted samples from both Choke Canyon Reservoir and Lake Corpus Christi and the results have indicated no algae present.

### Endocrine Disrupting Chemicals

In the spring of 2004, NRA assisted in a study to monitor surface waters and sediment samples for the presence of Endocrine Disrupting Chemicals (EDCs) within the Nueces River Basin and the Nueces Coastal Basins by collecting additional water samples during routine monitoring. EDCs are chemical compounds known to affect hormone production and various biological processes in animals. EDCs include: pesticides, polychlorinated biphenols (PCBs), dioxin, phenols, pharmaceutical byproducts, personal care byproducts, hormone steroids and phytoestrogens. The study was a master's thesis conducted by Sridhar Swargam, a graduate student at Texas A&M University – Corpus Christi (TAMUCC) under Dr. E. Billiot. The water samples were analyzed by Sridhar for 597 chemical compounds. Sridhar's finding included a total of 6 pesticides, 13 industrial chemicals and 3 phthalates during the study. Pesticides were distributed at sites including Petronila Creek, San Fernando Creek, and Oso Creek due to high occurrences of agricultural uses. Industrial pesticides used in anti-fouling paint to protect ship hulls were found at Conn Brown Harbor in Aransas County.

### Cannons of Fort Lipantitlán

On October 26, 2004, NRA assisted Steve Hoyt of the Texas Historical Commission in the search for a pair of cannons believed to have been dumped in the Nueces River following the Battle of Lipantitlán on November 4, 1835. The cannons, one believed to be made of bronze and the other made of iron, offer a rare opportunity for NRA to contribute to the finding of artifacts dating back to the time of the Texas Revolution. Fort Lipantitlán was established by the Spanish on the Nueces River in 1734, one hundred years before the Texas Revolution.



A preliminary search using a device called a magnetometer revealed numerous locations in the river where subsurface iron was detected. After areas of interest were identified, a large brass probe was used to search through the river bottom sediment to locate the sources of iron.



The team will continue their search during the spring and early summer of 2005.



## Snow in South Texas

Christmas Eve 2004 in South Texas went down in history as the snowiest on record. Tom Dever, a meteorologist at the weather service, said “the snowfall was the result of a perfect combination of weather conditions: lots of upper-level moisture and below-freezing temperatures at all levels of the atmosphere. That combination is rare for South Texas because cold weather here is typically accompanied by dry air, which does not provide the fuel needed for snow.”

Snowfall amounts ranged from 1.5” in Brownsville to 12” inches in various locations in the Coastal Bend. The Corpus Christi International Airport recorded 4.4”, the most ever recorded in a 24 hour period and the most recorded since 1895 when 4.3” was recorded. The last measurable snowfall amount was recorded in February 1973 when Corpus Christi received

approximately 1 inch; the last trace of snow was recorded December 12<sup>th</sup> 1997.



## OVERVIEW OF WATER QUALITY MONITORING

NRA coordinates with TCEQ’s Total Maximum Daily Load (TMDL) team and Surface Water Quality Monitoring (SWQM) personnel from Regions 13, 14, and 15 every spring to develop the monitoring schedule for the next fiscal year (FY). The Center for Coastal Studies (CCS) at TAMUCC conducts TMDL sampling and also participates in the meeting. Region 16 has recently taken over stations in La Salle and Zavala counties that had been monitored by Region 13. Region 16 will participate in the coordinated monitoring meeting for FY 2006. This coordination allows each entity to maximize their sampling efforts by avoiding duplication of effort, and assures that the parameters needed for assessment are being collected at the required stations.

A detailed list of stations, the type monitoring being performed, the monitoring entity, and the monitoring frequency for FY 2005 are included in the Water Quality Data Review section of this report. Routine monitoring consists of conventional and field parameters, bacteria, and flow. Appendix 1 lists the individual parameters for conventional, bacteria, field, and metals for those stations monitored by NRA. Appendix 2 gives a brief explanation of each parameter.

The data collected are used to assess the water quality with respect to aquatic life use, contact recreation, public water supply, and fish consumption as defined in the Texas Surface Water Quality Standards.

The standards associated with aquatic life use are designed to protect plant and animal species that live in and around the water. They establish optimal conditions for the support of aquatic life and define indicators used to measure whether these conditions are met. Some pollutants or conditions that may

violate this standard include low levels of dissolved oxygen (DO), or toxic substances such as metals or pesticides. The concentration of DO is a single, easy-to-measure characteristic of water that typically correlates with the occurrence and diversity of aquatic life in a water body. A water body that can support diverse, abundant aquatic life is a good indication of high water quality. A related problem is an excess of nutrients in water. Large quantities of nutrients in water can cause excessive growth of vegetation. This excessive vegetation, often called an algal bloom, reduces DO in the water column as dead plant material decomposes. Water with a low concentration of DO is called hypoxic. Changes in dissolved solids concentrations also affect the quality of habitat for aquatic life. Metals also pose a threat to livestock and aquatic life.

The standard associated with contact recreation use measures the level of certain bacteria in water to estimate the relative risk of swimming or other water sports involving direct contact with the water. It is possible to swim in water that does not meet this standard without becoming ill; however, the probability of becoming ill is higher than it would be if bacteria levels were lower. E. coli in fresh waters and Enterococci in marine waters are measured to determine the relative risk of swimming. Bacteria originate from the wastes of warm-blooded animals; their presence indicates that pathogens from these wastes may be reaching a body of water from inadequately treated sewage, improperly managed animal waste from livestock, pets in urban areas, aquatic birds and mammals, or failing septic systems.

Standards associated with public water supply indicate whether water from a lake or river is suitable for use as a source for a public water supply system. Source water is treated before it is delivered to the tap; a

separate set of standards govern treated drinking water. Indicators used to measure the safety or usability of surface water bodies as a source for drinking water include the presence or absence of substances such as metals or pesticides.

Concentrations of salts, such as sulfate or chloride, are also measured, since treatment to remove high levels of salts from drinking water is expensive. High levels of dissolved solids such as chloride and sulfate can cause water to be unusable, or simply too costly to treat, for drinking water uses. High concentrations of metals such as cadmium, mercury, and lead pose a threat to drinking water supplies and human health.

The standards associated with fish consumption are designed to protect the public from consuming fish or shellfish that may be contaminated by pollutants in the water. The standards identify levels at which there is a significant risk that certain toxic substances dissolved in water may accumulate in the tissue of aquatic species. However, because these levels do not always predict when toxic substances will accumulate in fish to unsafe concentrations, the state also conducts tests on fish and shellfish tissue to determine if there is a risk to the public from consuming fish caught in state waters. The standards also specify bacterial levels in marine waters to assure that oysters or other shellfish that may accumulate bacteria from the water are safe for commercial harvest, sale, and consumption by the public. Eating fish contaminated with metals can cause these toxic substances to accumulate in human tissue, posing a significant health threat. Toxic substances from pesticides and industrial chemicals, called organics, pose the same concerns as metals. PCBs, for example, are industrial chemicals that are toxic and probably carcinogenic.

Although banned in the United States in 1977, PCBs remain in the environment, and they accumulate in fish and human tissues when consumed.

The Department of State Health Services (DSHS), formerly the Texas Department of Health, conducts chemical testing of fish tissue to determine whether there is a risk to human health from consuming fish or shellfish caught in Texas streams, lakes, and bays. Fish seldom contain levels of contaminants high enough to cause an imminent threat to human health, even to someone who eats fish regularly. Risk increases for those persons who regularly consume larger fish and predatory fish from the same area of contaminated water over a long period of time. To reduce health risks in areas of contamination, people should eat smaller fish from a variety of water bodies. When a fish consumption advisory is issued, a person may legally take fish or shellfish from the water body under the advisory, but should limit how much fish he or she eats, and how often. When a fish consumption closure is issued, it is illegal to take fish from the water body.

### **Assessments**

The 2002 Assessment was the last assessment to evaluate all uses for all segments. The assessment used data from March 1, 1996 to February 28, 2001. The 2004 Assessment, using data from March 1, 1998 to February 28, 2003, primarily evaluated segments and parameters that were identified as concerns or impairments in the 2002 Assessment. The 2006 Assessment will be a full assessment. It will use data from December 1, 1999 to November 30, 2004.

## **Water Quality Data Review**

This section is divided into four subsections, one for the San Antonio-Nueces Coastal Basin, the Nueces River Basin, the Nueces-Rio Grande Coastal Basin, and the Bays, Estuaries and Gulf of Mexico. The discussion for each section contains:

- A description of the segment
- A map of the segment with active monitoring stations plotted (FY 2005 stations, any additional sites that are not currently being monitored but were used in the most recent assessments, and / or any additional sites used in a TMDL)
- Detailed information about the FY 2005 monitoring stations (parameters sampled, frequency of sampling, and the responsible agency)
- A list of the additional sites
- A list of permitted outfalls
- A discussion of any impairments in the segment
- A discussion of any concerns in the segment

There are two tables at the beginning of each subsection. The first table summarizes the concerns and impairments identified by an assessment. A concern is identified when a parameter exceeds the standard in 10% - 25% of the samples. An impairment is identified when a parameter exceeds the standard in 25% or more of the samples. The second table lists the FY 2005 monitoring stations in each segment.

Appendix 1 lists the individual parameters for conventional, bacteria, field, and metals for those stations monitored by NRA. Appendix 2 gives a brief explanation of each parameter.

# San Antonio – Nueces Coastal Basin

Table 1. Assessment Summary

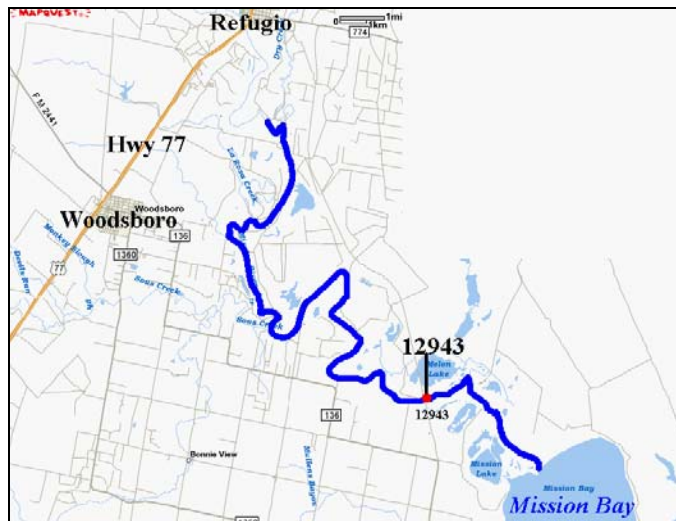
Segment	Description		Concerns	Impairments
2001	Mission River Tidal			Bacteria
2002	Mission River Above Tidal		Depressed DO	
2003	Aransas River Tidal		Orthophosphorus	Bacteria
2004	Aransas River Above Tidal	Upper 25 miles	Depressed DO	

Table 2. FY 2005 Monitoring Stations

Segment	Station ID	Station Description
2001	12943	Mission River Tidal at FM 2678 Bridge between Refugio and Bayside
2002	12944	Mission River Above Tidal at US 77-upstream from bridge at Refugio
2003	12947	Aransas River Tidal at boat ramp on FM 629 south of Bonnie View
2004	12952	Aransas River Above Tidal at County Road East of Skidmore

## 2001 – Mission River Tidal

From the confluence with Mission Bay in Refugio County to a point 7.4 km (4.6 miles) downstream of US 77 in Refugio County



### 2005 Monitoring

12943 – FM 2678 Bridge between Refugio and Bayside

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Field	4	

### Permitted Outfalls

Town of Woodsboro

### Impairments

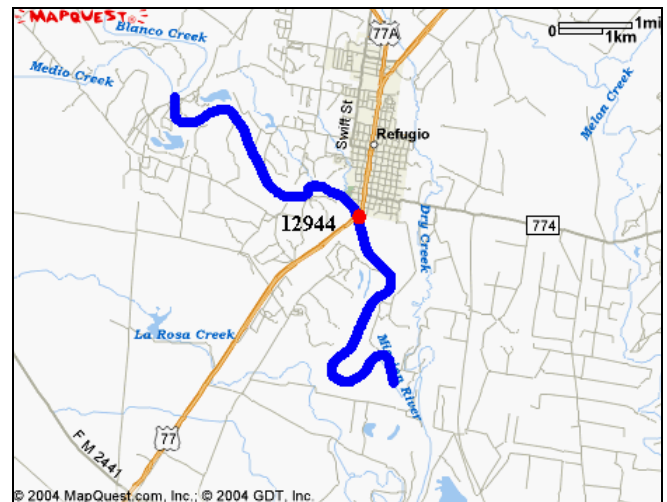
Bacteria is listed as an impairment in this segment. The source of the bacteria is unknown, so additional data and information will be collected before a TMDL is scheduled.

### Concerns

The 2004 Assessment did not identify any concerns in this segment.

## 2002 – Mission River Above Tidal

From a point 7.4 km (4.6 miles) downstream of US 77 in Refugio County to the confluence of Blanco Creek and Medio Creek in Refugio County



### 2005 Monitoring

12944 – US 77-upstream from bridge at Refugio

Parameter	Frequency	Agency
24hr DO	1	NRA
Conventional	4	
Bacteria	4	
Flow	4	
Field	4	

### Permitted Outfalls

Town of Refugio  
Pettus Municipal Utility District (MUD)

### Impairments

The 2004 Assessment did not identify any impairments in this segment.

### Concerns

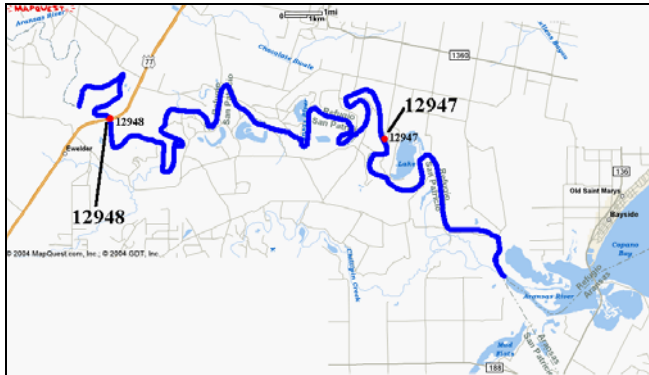
Depressed DO is listed as a concern for this segment. The 24 hour DO monitoring has been completed and the data shows that the segment does not have a depressed DO problem as all ten of

the results meet the standard. Therefore, this segment should be removed from the 303(d) list after the 2006 Assessment.

The 2002 Assessment identified bacteria as a concern based on limited data. Enough samples were available for a full assessment in 2004 and bacteria was removed as a concern.

**2003 – Aransas River Tidal**

From the confluence with Copano Bay in Aransas/Refugio County to a point 1.6 km (1.0 mile) upstream of US 77 in Refugio/San Patricio County



**2005 Monitoring**

12947 – At boat ramp on FM 629 south of Bonnie View

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Field	4	

The sampling location for this segment has been moved from station 12948 near the upper end of the segment to station 12947 a little more than halfway down the segment. Samples at the new site have been taken beginning in October 2004.

**Additional Sites**

12948 – At US 77 Bridge Between Woodsboro and Sinton

**Permitted Outfalls**

- City of Sinton (City and Welder Park)
- City of Odem
- Texas Department of Transportation (TXDOT)
- St. Paul Water Supply Corporation (WSC)

**Impairments**

Bacteria is listed as an impairment in this segment. The source of the bacteria is unknown, so additional data and information will be collected before a TMDL is scheduled.

**Concerns**

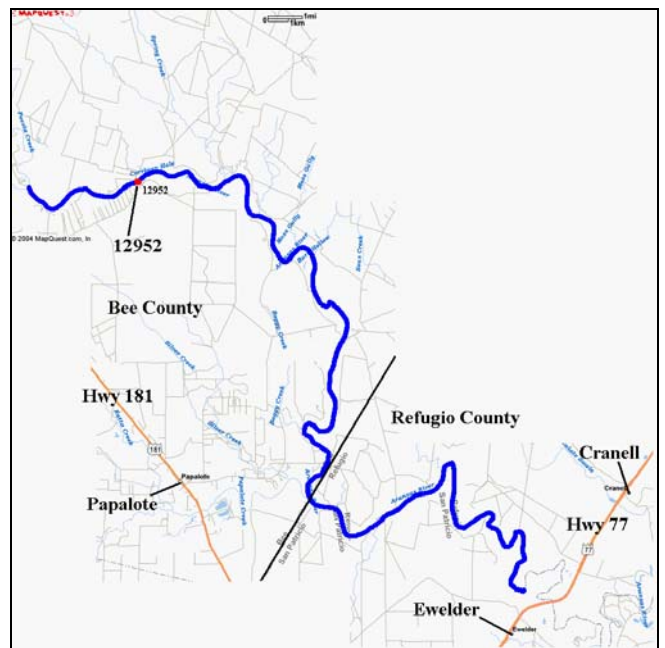
The 2004 assessment lists this segment as having a concern for orthophosphorus. Beginning in FY 2004, orthophosphorus samples were required to be filtered in the field immediately after collection, and this parameter was dropped from the analysis.

Trend analysis for the data from March 1996 (beginning of 2002 Assessment) through August 2003 shows a decreasing trend in the orthophosphorus values.

All the data will be reviewed at the FY 2006 Coordinated Monitoring Meeting and a decision will be made on whether or not to resume sampling for orthophosphorus.

**2004 – Aransas River Above Tidal**

From a point 1.6 km (1.0 mile) upstream of US 77 in Refugio/San Patricio County to the confluence of Poesta Creek and Aransas Creek in Bee County



This segment is divided into two sub-segments, the upper 25 miles and the lower 33 miles.

**2005 Monitoring**

**Upper 25 Miles**

12952 – At County Road East of Skidmore

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Flow	4	
Field	4	



**Permitted Outfalls**

City of Beeville (City and Chase Field)  
 Skidmore WSC  
 Tynan WSC

**Impairments**

The 2002 Assessment did not identify any impairments on this segment.

**Concerns**

The 2002 Assessment listed the upper 25 miles as having a concern for depressed DO. After the assessment, it was discovered that beginning in August 1998, samples were being taken on Aransas Creek, an

intermittent stream, not the Aransas River. The incorrect location was assigned a new SWQM number and assigned to those sampling results. The correct location has been sampled since July 2002, but there were only 3 grab samples available for the 2004 Assessment. Two of the ten samples available for the 2006 Assessment do not meet the standard. Ten 24 hour DO measurements will be needed in order to determine if there is an actual depressed DO problem.

The DO data will be reviewed at the Coordinated Monitoring Meeting and a decision will be made on whether or not to perform 24 hour DO monitoring in FY 2006.

**Nueces River Basin**

Table 3. Assessment Summary

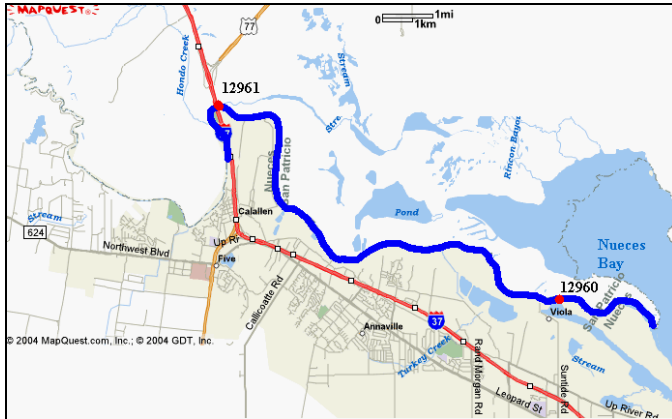
Segment	Description		Concerns	Impairments
2101	Nueces River Tidal		Excessive Algal Growth	
2104	Nueces River Above Frio River	25 miles surrounding SH 16	Chloride TDS	Depressed DO
		Remainder of segment	Chloride TDS	
2107	Atascosa River	Lower 25 miles	TDS	Bacteria
		25 miles surrounding U.S. 281	Ammonia Excessive Algal Growth TDS	Bacteria Depressed DO
		Remainder of segment	TDS	
2109	Leona River		Nitrate+nitrite nitrogen Sulfate	
2110	Lower Sabinal River			Nitrate+nitrite nitrogen
2113	Upper Frio River	25 miles surrounding SH 127		Depressed DO
2115	Seco Creek	Upper 25 miles	Temperature	
2116	Choke Canyon Reservoir	5120 acres near dam		TDS Bacteria
		Small north arm near dam and Willow Hollow Tank		TDS Bacteria
		5120 acres in middle of lake		TDS
		Large north arm near mid-lake and Jacob oil field		TDS Bacteria
		Southern arm near mid-lake and Rec. Road 7 west of Calliham	Depressed DO	TDS Bacteria
		Western end of lake to RR bridge	Depressed DO	TDS Bacteria
		Remainder of lake		TDS Bacteria
2117	Frio River Above Choke Canyon Reservoir	Lower 25 miles		Bacteria Depressed DO
		2 miles downstream of SH 97 to 14 miles upstream of SH 97		Bacteria Depressed DO
		25 miles surrounding La Salle CR crossing north of SH 97		Depressed DO
		25 miles surrounding IH 35		Depressed DO

Table 4. FY 2005 Monitoring Stations

Segment	Station ID	Station Description
2101	12960	Nueces River Tidal North of Viola Turning Basin
	12961	Nueces River Tidal Bridge on US 77 / IH 37 Below Dam and Salt Water Barrier
2102	12964	Nueces River Below Lake Corpus Christi at Bluntzer Bridge on FM 666
	12965	Nueces River Below Lake Corpus Christi At La Fruta Bridge, SH 359
2103	12967	Lake Corpus Christi Mid-lake at the Dam
	17648	Lake Corpus Christi At Live Oak CR 151 near River Creek Acres Upstream of Lake Corpus Christi
	18350	Lake Corpus Christi Mid-lake 1.42 KM East of the Intersection of Canyon Dr and McWhorter Dr in the Lagarto Subdivision
2104	12973	Nueces River Above Frio River At SH 16 South of Tilden
2105	12975	Nueces River Above Holland Dam At IH 35 South of Cotulla
2106	12977	Nueces River / Lower Frio River At US 72 in Three Rivers
	12978	Nueces River / Lower Frio River At US 59 East of George West
	17437	Nueces River / Lower Frio River Approximately 1 mi Downstream of SH 72 in Three Rivers Near Diamond Shamrock Outfall
2107	12980	Atascosa River At FM 99 Bridge West of Whitsett
	12980	Atascosa River At US 281 at Pleasanton
2108	12983	San Miguel Creek At SH 16 North of Tilden
2109	12985	Leona River At FM 1581 Southwest of Pearsall
	12987	Leona River At Hwy 57 Near Batesville
	18418	Leona River 370 M KM Upstream of FM 140
2110	12993	Lower Sabinal River Bridge on US 90 West Of Sabinal
2111	12994	Upper Sabinal River 12.5 Miles North of Sabinal and 2.3 Miles Downstream From the Mouth of Onion Creek
2112	12996	Upper Nueces River US US 57 South of Uvalde
	13005	Upper Nueces River At SR-55, South of Barksdale
	16704	Upper Nueces River At SH 55 Bridge, 2.5km South of Laguna
	17143	Upper Nueces River Lake Averhoff (Upper Nueces Lake) Mid-Lake at Boat Ramp Off Dirt Road 0.5 mi North of FM 1025, 6.5 mi North of Crystal City
2113	13006	Upper Frio River At SH 127 East of Concan
	13007	Upper Frio River At Magers Crossing
2114	13010	Hondo Creek Downstream From Bridge on Ranch Road 462 Near Tarpley
2115	13013	Seco Creek At Miller Ranch Near Utopia
2116	13020	Choke Canyon Reservoir Mid-lake on Live Oak/McMullen County Line (Near Old Hwy 99)
	17389	Choke Canyon Reservoir Approximately 0.5 km Southeast of RR 66 Southern Most Bridge Crossing the Frio River Arm
2117	13023	Frio River Above Choke Canyon Reservoir At SH 16 in Tilden
	13024	Frio River Above Choke Canyon Reservoir At US 35 North of Dilley
	15449	Frio River Above Choke Canyon Reservoir At FM 187 8 Mi. South of Sabinal
	18373	Frio River Above Choke Canyon Reservoir Immediately Upstream of SH 97 North of Fowlerton

## 2101 – Nueces River Tidal

From the confluence with Nueces Bay in Nueces County to Calallen Dam 1.7 km (1.1 miles) upstream of US 77/IH 37 in Nueces/San Patricio County



## 2005 Monitoring

12960 – North of Viola Turning Basin

Parameter	Frequency	Agency
24hr DO	1	TCEQ Region 14
Conventional	4	
Bacteria	4	
Field	4	
Metals in Water	4 (Zinc)	TCEQ TMDL (CCS)
Metals in Sediment	2 (Zinc)	
Field	4	

12961 – Bridge on US 77 / IH 37 Below Dam and Salt Water Barrier

Parameter	Frequency	Agency
Metals in Water	4 (Zinc)	TCEQ TMDL (CCS)
Metals in Sediment	2 (Zinc)	
Field	4	

## Permitted Outfalls

City of Corpus Christi (Allison Plant)  
San Patricio County MUD No. 1  
Central Power and Light Company (CPL) (Lon C. Hill Power Station – No longer in operation)

## Impairments

The 2002 Assessment did not identify any impairments in this segment.

Although zinc in oyster tissues is not an impairment or concern, CCS is collecting metals samples in this segment as part of the Nueces Bay TMDL. More information is available at <http://www.tnrcc.state.tx.us/water/quality/tmdl/NuecesBayZinc.html>.

## Concerns

There is a concern for excessive algal growth, based on chlorophyll a measurements, on this segment. The source of elevated chlorophyll a is unknown.

## 2102 – Nueces River Below Lake Corpus Christi

From Calallen Dam 1.7 km (1.1 miles) upstream of US 77/IH 37 in Nueces/San Patricio County to Wesley E. Seale Dam in Jim Wells/San Patricio County



This segment is divided into two parts, the upper 14 miles and the lower 25 miles.

## 2005 Monitoring

Lower 25 Miles

12964 – At Bluntzer Bridge on FM 666

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Flow	4	
Field	4	

Upper 14 Miles

12965 – At La Fruta Bridge, SH 359

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Flow	4	
Field	4	

## Additional Sites

Lower 25 Miles

12962 – Intake at Corpus Christi Cunningham Water Treatment Plant

## Permitted Outfalls

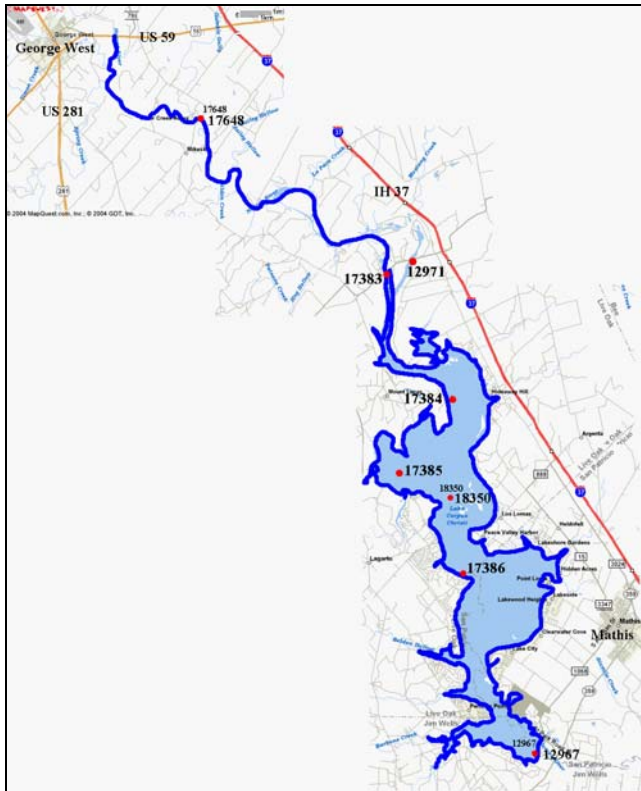
Wright Materials, Inc.  
Knolle Cattle Company

## Impairments and concerns

The 2002 Assessment did not identify any impairments or concerns in this segment.

## 2103 – Lake Corpus Christi

From Wesley E. Seale Dam in Jim Wells/San Patricio County to a point 100 m (110 yards) upstream of US 59 in Live Oak County, up to the normal pool elevation of 94.0 feet (impounds Nueces River)



The lake is divided into six sub-segments, the area approximately 4 miles SE of FM 3162 and FM 534 intersection near western shore, mid-lake near the dam, upper arm of lake at FM 534 crossing, upper portion of lake on opposite shore from Hideaway Hill, western arm of lake near Largarto Creek inlet, and the remainder of the lake.

### 2005 Monitoring

#### Mid-lake Near Dam

12967 – Mid-lake at the Dam

Parameter	Frequency	Agency
Metals in Water	2	NRA
Metals in Sediment	2	
Conventional	4	
Bacteria	4	
Field	4	

#### Above Lake Corpus Christi

17648 – At Live Oak CR 151 near River Creek Acres Upstream of Lake Corpus Christi

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Flow	4	
Field	4	

#### Western Arm of Lake Near Lagarto Creek Inlet

18350 – Mid-lake 1.42 KM East of the Intersection of Canyon Dr. and McWhorter Dr. in the Lagarto Subdivision

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Field	4	

#### Additional Monitoring Sites

##### Area Approximately 4 Miles SE of FM 3162 and FM 534 Intersection Near Western Shore

17386 – Approximately 4.0 Mi. Southeast of Intersection of FM 3162 and FM 534 - Approximately 0.2 Miles Off Western Shore

##### Upper Arm of Lake at FM 534 Crossing

12971 – At Fm 534 East of Dinero  
17383 – At Fm 534 Bridge Near Upper End of Nueces River Arm

##### Upper Portion of Lake on Opposite Shore From Hideaway Hill

17384 – Approximately 0.2 Miles Off Western Shore Directly West of Hideaway Hill

##### Western Arm of Lake Near Largarto Creek Inlet

17385 – 1.0 Miles East of FM 534 Bridge Near Ramireno Creek

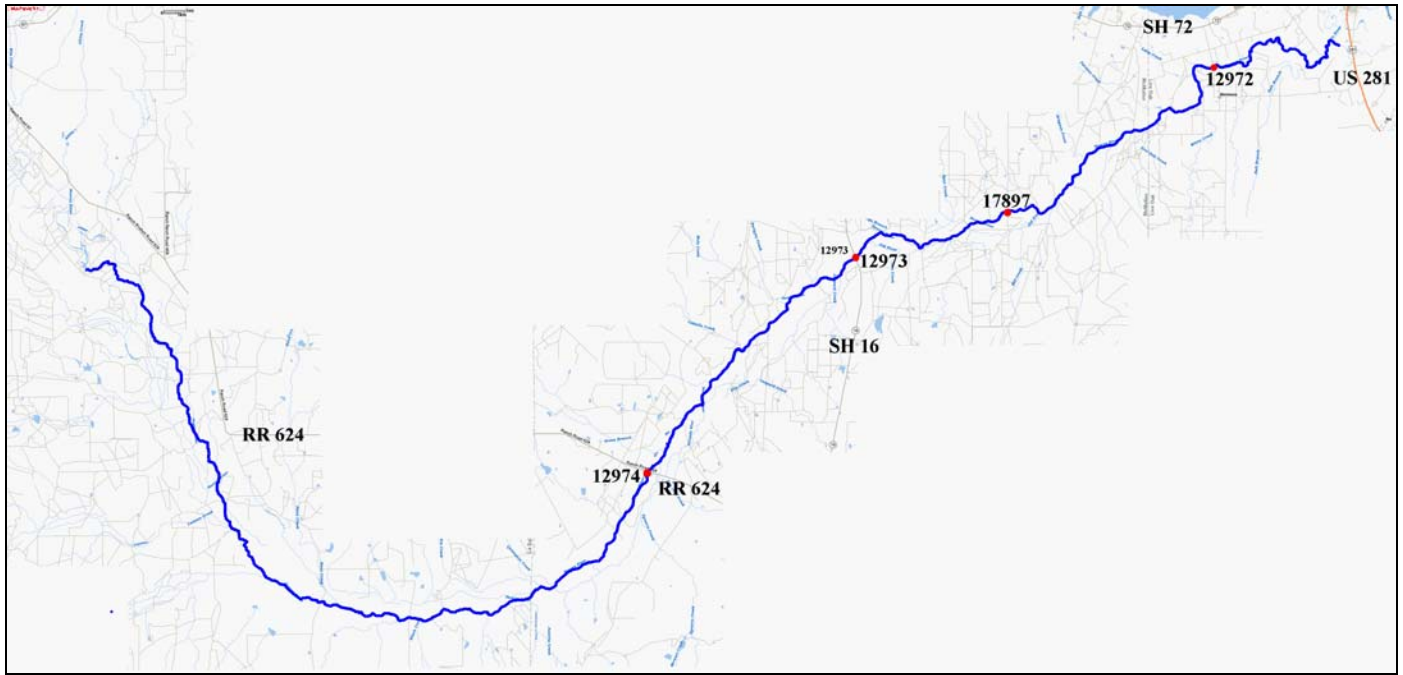
#### Permitted Outfalls

City of Mathis  
City of George West

#### Impairments and concerns

The 2002 Assessment did not identify any impairments or concerns in this segment.





**2104 – Nueces River Above Frio River**

From the confluence of the Frio River in Live Oak County to Holland Dam in LaSalle County

The segment is divided into 2 sub-segments, the 25 miles surrounding SH 16 and the remainder of the segment.

**2005 Monitoring**

**25 Miles Surrounding SH 16**

12973 – At SH 16 South of Tilden

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Flow	4	
Field	4	

**Additional Sites**

12972 – Nueces River Bridge on County Road 1.2 Miles North of Simmons

12974 – At FM 624

17897 – Approximately 13.9KM Downstream of SH 16 on Smith Lease

**Impairments**

The 25 miles surrounding SH 16 portion of the segment was identified in the 2000 Assessment as impaired due to depressed DO. The segment will remain listed as not meeting the standard until sufficient 24-hour DO measurements are available for assessment. Ten 24-hour DO samples are needed to determine if there is a low DO problem.

A TMDL to address the low DO problem has begun. There will be 15 measurements from 4 stations available

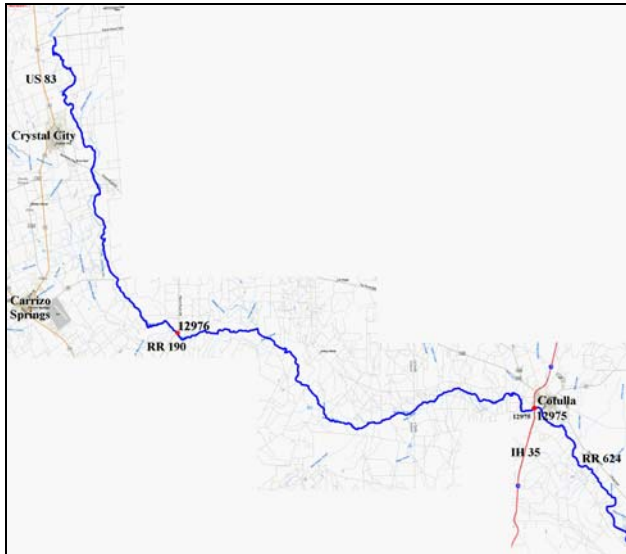
for the 2006 Assessment, all of which meet the standard of 5 MG/L. No single station has 10 measurements. More information is available at [http://www.tnrcc.state.tx.us/water/quality/tmdl/SC\\_bac\\_DOproject.html](http://www.tnrcc.state.tx.us/water/quality/tmdl/SC_bac_DOproject.html).

**Concerns**

Chloride and total dissolved solids (TDS) were identified as concerns for the entire segment in the 2002 Assessment. Both parameters had unusually high readings in June 1998. In each case, the one anomaly caused the mean to exceed the standard. Both parameters will most likely be removed as a concern as a result of the 2006 Assessment.

## 2105 – Nueces River Above Holland Dam

From Holland Dam in LaSalle County to a point 100 m (110 yards) upstream of FM 1025 in Zavala County



The segment is divided into three sub-segments, the lower 25 miles, the 25 miles around FM 190, and the remainder of the segment.

### 2005 Monitoring

#### Lower 25 Miles

12975 – At IH 35 South of Cotulla

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 16
Bacteria	4	
Flow	4	

### Additional Monitoring Sites

#### 25 Miles Around FM 190

12976 – Nueces River Bridge on FM 190 North of Asherton

### Permitted Outfalls

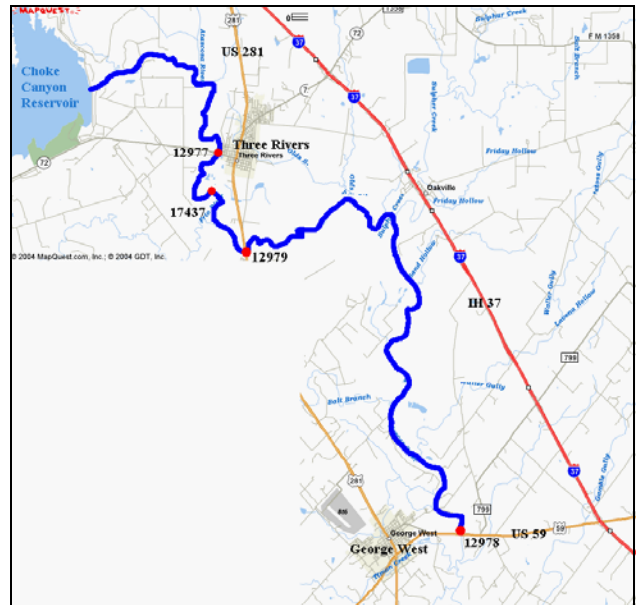
City of Crystal City  
 City of Carrizo Springs  
 City of Cotulla  
 City of Asherton  
 City of Big Wells  
 Zavala County (Crystal City Land Fill)  
 Zavala Feeders, Inc.

### Impairments and Concerns

The 2002 Assessment did not identify any impairments or concerns in this segment.

## 2106 – Nueces River / Lower Frio River

From a point 100 m (110 yards) upstream of US 59 in Live Oak County to Choke Canyon Dam in Live Oak County



The segment is divided into two sub-segments, the lower 17 miles, and the upper 10 miles.

### 2005 Monitoring

#### Upper 10 Miles

12977 – At US 72 in Three Rivers

Parameter	Frequency	Agency
Metals in Water	2	NRA
Metals in Sediment	2	
Conventional	4	
Bacteria	4	
Field	4	

17437 – Approximately 1 mi Downstream of SH 72 in Three Rivers Near Diamond Shamrock Outfall

Parameter	Frequency	Agency
Metals in Water	2	NRA
Organics in Water	2	
Metals in Sediment	2	
Conventional	4	
Bacteria	4	
Field	4	

#### Lower 17 Miles

12978 – At US 59 East of George West

Parameter	Frequency	Agency
Metals in Water	2	NRA
Metals in Sediment	2	
Conventional	4	
Bacteria	4	
Field	4	

**Additional Sites**

**Lower 17 Miles**

12979 – At Nueces River Bridge on US 281 South of Three Rivers

**Permitted Outfalls**

Valero Refining Company  
City of Three Rivers

**Impairments and Concerns**

The 2004 Assessment did not identify any concerns or impairments in this segment.

**2107 – Atascosa River**

From the confluence with the Frio River in Live Oak County to the confluence of the West Prong Atascosa River and the North Prong Atascosa River in Atascosa County



The segment is divided into three sub-segments, the lower 25 miles, the 25 miles surrounding US 281, and the remainder of the segment.

**2005 Monitoring**

**Lower 25 Miles**

12980 – At FM 99 Bridge West of Whitsett

Parameter	Frequency	Agency
24hr DO	4	NRA
Conventional	4	
Bacteria	4	
Flow	4	
Field	4	

**25 Miles Surrounding U. S. 281**

12982 – At US 281 at Pleasanton

Parameter	Frequency	Agency
24hr DO	4	TCEQ Region 13
Conventional	4	
Bacteria	4	
Flow	4	
Field	4	

**Additional Sites**

**Lower 25 Miles**

12981 – On Dirt Road Directly East of Pleasanton At Railroad Bridge

**25 Miles Surrounding U. S. 281**

17898 – 150 meters downstream of Hunt Road  
17899 – 500 meters southwest of intersection of Leal Rd and Mopac Railroad  
17900 – At IH 37

**Permitted Outfalls**

San Miguel Electric Coop, Inc.  
City of Lytle  
City of Jourdanton  
City of Pleasanton  
City of Potteet  
Benton City WSC

**Impairments**

Bacteria is listed as an impairment in the lower 25 miles of the segment and in the 25 miles surrounding US 281. A TMDL is underway. Initial results indicate that a full TMDL is warranted. The field crew plans on sampling during and immediately after high flow events to try and pinpoint the source of the bacteria.

The TMDL is a part of the larger TMDL Project for Bacteria and Dissolved Oxygen in South Central Texas Streams. More information on the TMDL is available at [http://www.tnrcc.state.tx.us/water/quality/tmdl/SC\\_bac\\_DOproject.html](http://www.tnrcc.state.tx.us/water/quality/tmdl/SC_bac_DOproject.html). NRA is a member of the steering committee for this TMDL.

Depressed DO is also listed as an impairment in the 25 miles surrounding U.S. 281. The standard will be reviewed and additional data and information will be collected before a TMDL is scheduled.

### Concerns

Ammonia and excessive algal growth are listed as concerns in the 25 miles surrounding U.S. 281 and TDS is listed as a concern for the entire segment. The pollutant source for these concerns is unknown.

### Permitted Outfalls

City of Charlotte  
City of Devine  
City of Natalia  
San Miguel Electric Coop, Inc.

### 2108 – San Miguel Creek

From a point immediately upstream of the confluence of Mustang Branch in McMullen County to the confluence of San Francisco Perez Creek and Chacon Creek in Frio County

### Impairments and Concerns

The 2002 Assessment did not identify any impairments or concerns in this segment.



The segment is divided into two sub-segments, the lower 25 miles and the upper 41 miles.

### 2005 Monitoring

#### Lower 25 Miles

12983 – At SH 16 North of Tilden

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Flow	4	
Field	4	

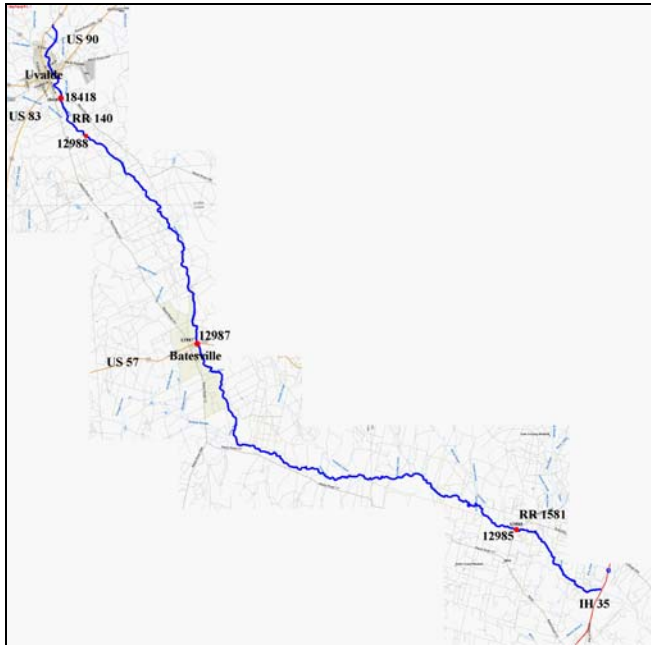
#### Additional Sites

##### Upper 41 Miles

12984 – At SH 97 12 Miles South of Charlotte

## 2109 – Leona River

From the confluence with the Frio River in Frio County to US 83 in Uvalde County



### 2005 Monitoring

12985 – At FM 1581 Southwest of Pearsall

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 13
Bacteria	4	
Flow	4	
Field	4	

12987 – At Hwy 57 Near Batesville

Parameter	Frequency	Agency
Organics in Sediment	2	TCEQ Region 16
Conventional	4	
Bacteria	4	
Flow	4	
Fish Tissue	2	
Field	4	

18414 – 370M Upstream of FM 140

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Flow	4	
Field	4	

Station 18414 was added to this segment beginning in the first quarter of FY 2005.

### Additional Monitoring Sites

12988 – 4.7 Mi. Southeast of Uvalde Downstream From Cooke's Slough

### Permitted Outfalls

City of Uvalde  
Live Oak Feedlot, Inc.

### Impairments

The 2002 Assessment did not identify any impairments in this segment.

### Concerns

Nitrate+nitrite nitrogen was identified as a concern in the 2002 Assessment. Beginning April 2003, the analysis for nitrogen switched from nitrate+nitrite to nitrate and nitrite separately, nitrate being the primary parameter of concern.

Review of the nitrate data that will be available for the 2006 Assessment indicates that the nitrate concentration increases downstream. Nitrite was not detected in any of the samples.

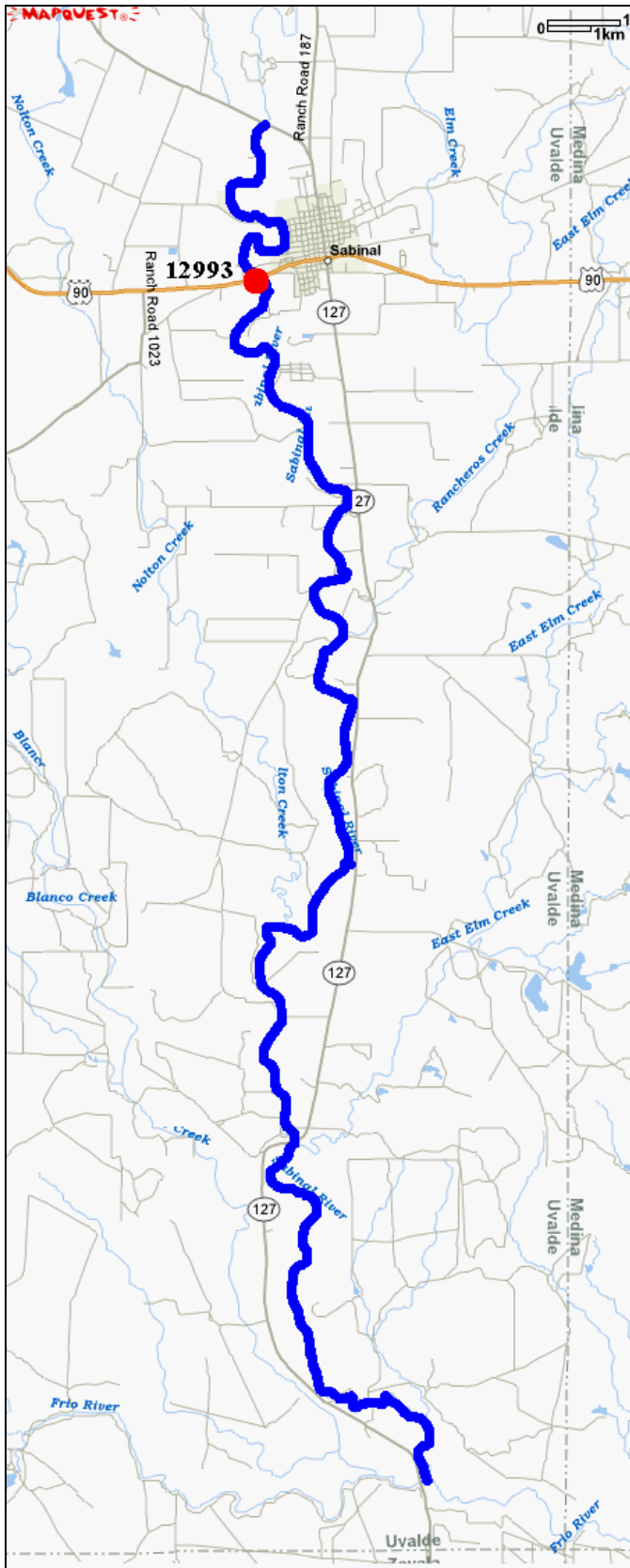
Sulfate was also identified as a concern in the 2002 Assessment. The pollutant source for these concerns is unknown.

Recently, increased bacteria levels have been recorded in this segment. The data will be reviewed at the FY 2006 Coordinated Monitoring Meeting and a decision will be made on whether or not to increase sampling to try and determine the source of the bacteria.



## 2110 – Lower Sabinal River

From the confluence with the Frio River in Uvalde County to a point 100 m (110 yards) upstream of SH 127 in Uvalde County



## 2005 Monitoring

12993 – Bridge on US 90 West Of Sabinal

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 13
Bacteria	4	
Flow	4	
Field	4	

## Permitted Outfalls

City of Sabinal

## Impairments

Nitrate+nitrite nitrogen is listed as an impairment in this segment. The most likely source of the nitrogen is the Sabinal Waste Water Treatment Plant (WWTP). A TMDL is underway, the focus of which is to obtain grants to upgrade the plant. The consensus is that this will correct the problem.

## Concerns

The 2002 Assessment did not identify any concerns in this segment.

**2111 – Upper Sabinal River**

From a point 100 m (110 yards) upstream of SH 127 in Uvalde County to the most upstream crossing of FM 187 in Bandera County



**2005 Monitoring**

12994 – 12.5 Miles North of Sabinal and 2.3 Miles Downstream From the Mouth of Onion Creek

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 13
Bacteria	4	
Flow	4	
Field	4	

**Additional Monitoring Sites**

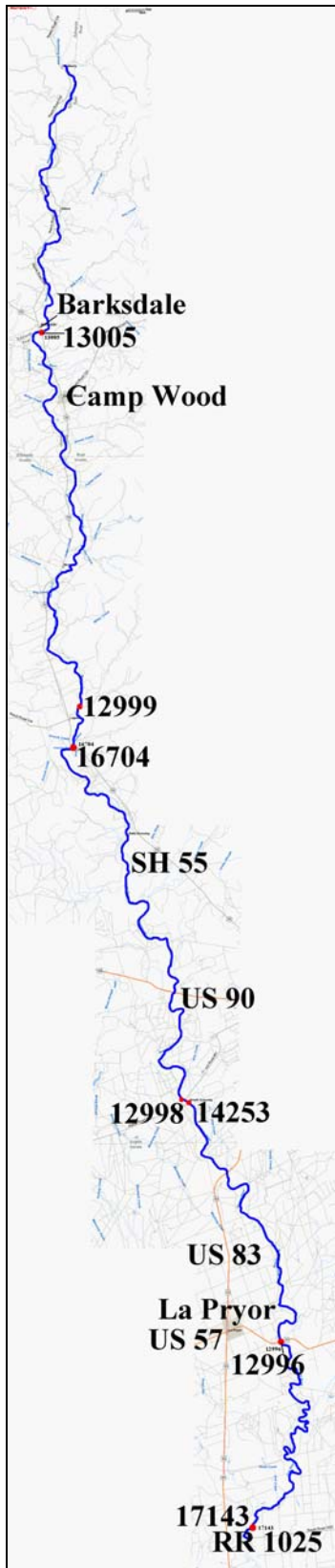
14939 – At FM 187, 5.6 Mi. South Of Vanderpool

**Impairments and Concerns**

The 2002 Assessment did not identify any impairments or concerns in this segment.

## 2112 – Upper Nueces River

From a point 100 m (110 yards) upstream of FM 1025 in Zavala County to the confluence of the East Prong Nueces River and Hackberry Creek in Edwards County



The segment is divided into three sub-segments, the lower 25 miles, the 25 miles surrounding RR 334 and US 55, and the remainder of the segment.

### 2005 Monitoring

#### Lower 25 Miles

12996 – US US 57 South of Uvalde

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 16
Bacteria	4	
Flow	4	
Field	4	

17143 – Lake Averhoff (Upper Nueces Lake) Mid-Lake at Boat Ramp Off Dirt Road 0.5 mi North of FM 1025, 6.5 mi North of Crystal City

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 16
Bacteria	4	
Field	4	

#### 25 Miles Surrounding RR 334 and U.S. 55

16704 – At SH 55 Bridge, 2.5km South of Laguna

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 13
Bacteria	4	
Flow	4	
Field	4	

#### Remainder of the Segment

13005 – At SR-55, South of Barksdale

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Flow	4	
Field	4	

#### Additional Sites

##### Lower 25 Miles

12998 – 8.8 Miles Southwest of Uvalde At McDaniel Ranch

14253 – At Fm 481 Southwest of Uvalde

##### 25 Miles Surrounding RR 334 and U.S. 55

12999 – 1 Mile Northeast of Laguna and 0.5 Miles Downstream From Sycamore Creek

#### Permitted Outfalls

City of Camp Wood

City of La Pryor

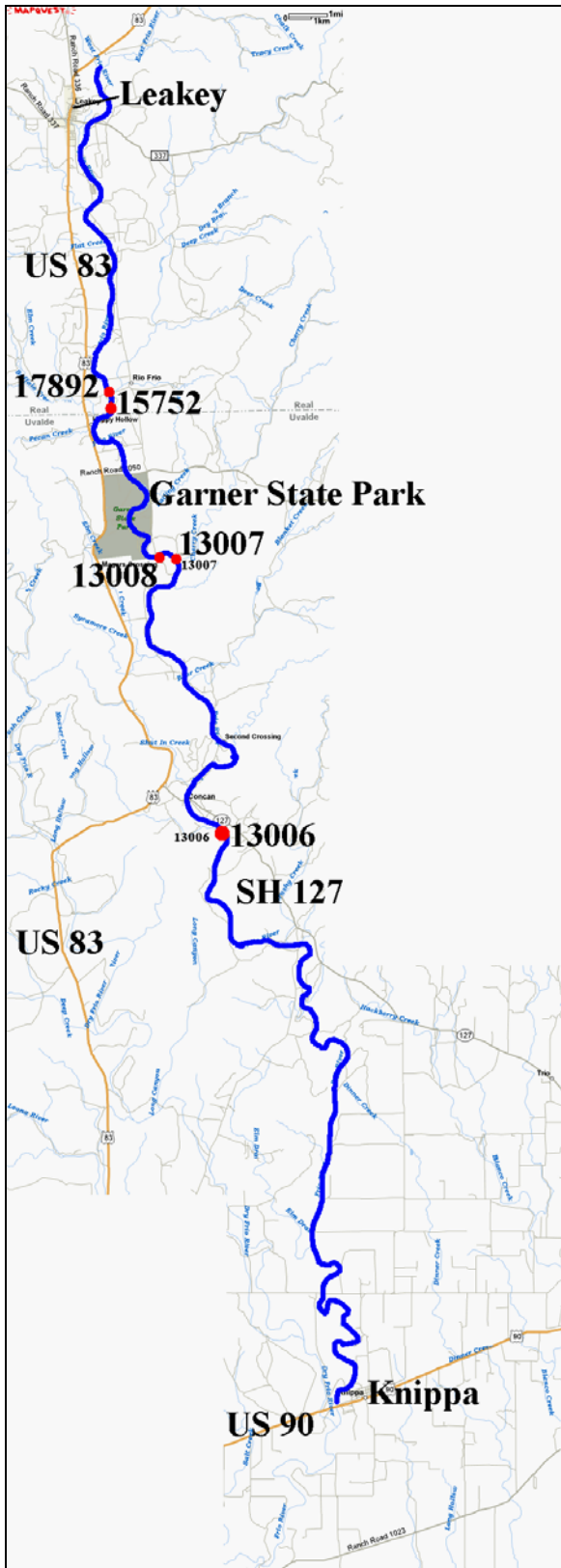
#### Impairments and Concerns

The 2002 Assessment did not identify any impairments or concerns in this segment.



## 2113 – Upper Frio River

From a point 100 m (110 yards) upstream of US 90 in Uvalde County to the confluence of the West Frio River and the East Frio River in Real County



The segment is divided into two sub-segments, the 25 miles surrounding SH 127, and the remainder of the segment.

### 2005 Monitoring

#### 25 Miles Surrounding SH 127

13006 – At SH 127 East of Concan

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 13
Bacteria	4	
Flow	4	
Field	4	

### Additional Sites

#### Remainder of the Segment

13007 – At Magers Crossing

13008 – At Garner State Park Dam

15752 – At Jake’s Hole Approx 1000 Ft Downstream of FM 1120

17982 – At Apache Bluffs 0.5KM Upstream of FM 1120

### Permitted Outfalls

Alto Frio Encampment

Garner State Park

### Impairments

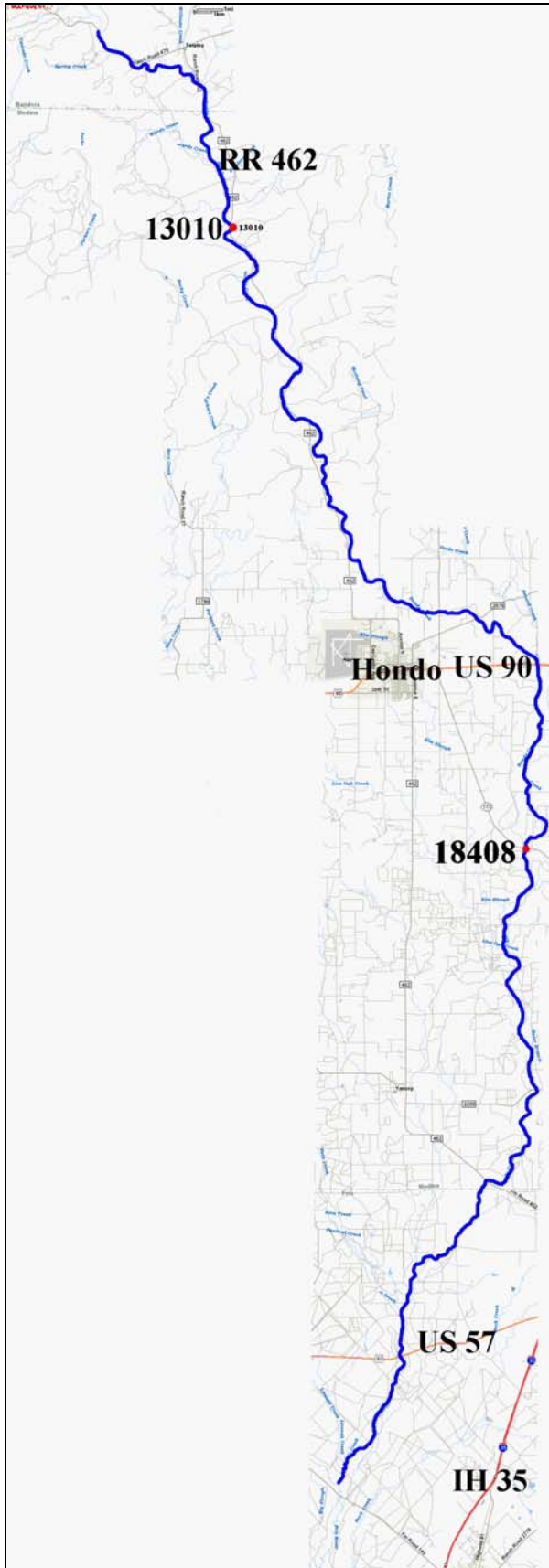
Depressed DO is listed as an impairment in the 25 miles surrounding SH 127. A TMDL has been conducted in this segment, and the final report is available on the TCEQ’s website, <http://www.tnrc.state.tx.us/water/quality/tmdl/2113UpperFrioRiverFinalReport-PCChem.pdf>. The Executive Summary states “Based upon the 24-hour dissolved oxygen data collected for this study, the Upper Frio River appears to be meeting the exceptional aquatic life use and should be removed from the states list of impaired waters.”

### Concerns

The 2002 Assessment did not identify any concerns in this segment.

**2114 – Hondo Creek**

From the confluence with the Frio River in Frio County to FM 470 in Bandera County



The segment is divided into two sub-segments, the upper 25 miles and the lower 53 miles.

**2005 Monitoring**

**Upper 25 miles**

13010 – Downstream From Bridge on Ranch Road 462 Near Tarpley

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 13
Bacteria	4	
Flow	4	
Field	4	

**Lower 53 miles**

18408 – Mid Channel Immediately Downstream of SH 173 SE of Hondo

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 13
Bacteria	4	
Flow	4	
Field	4	

**Permitted Outfalls**

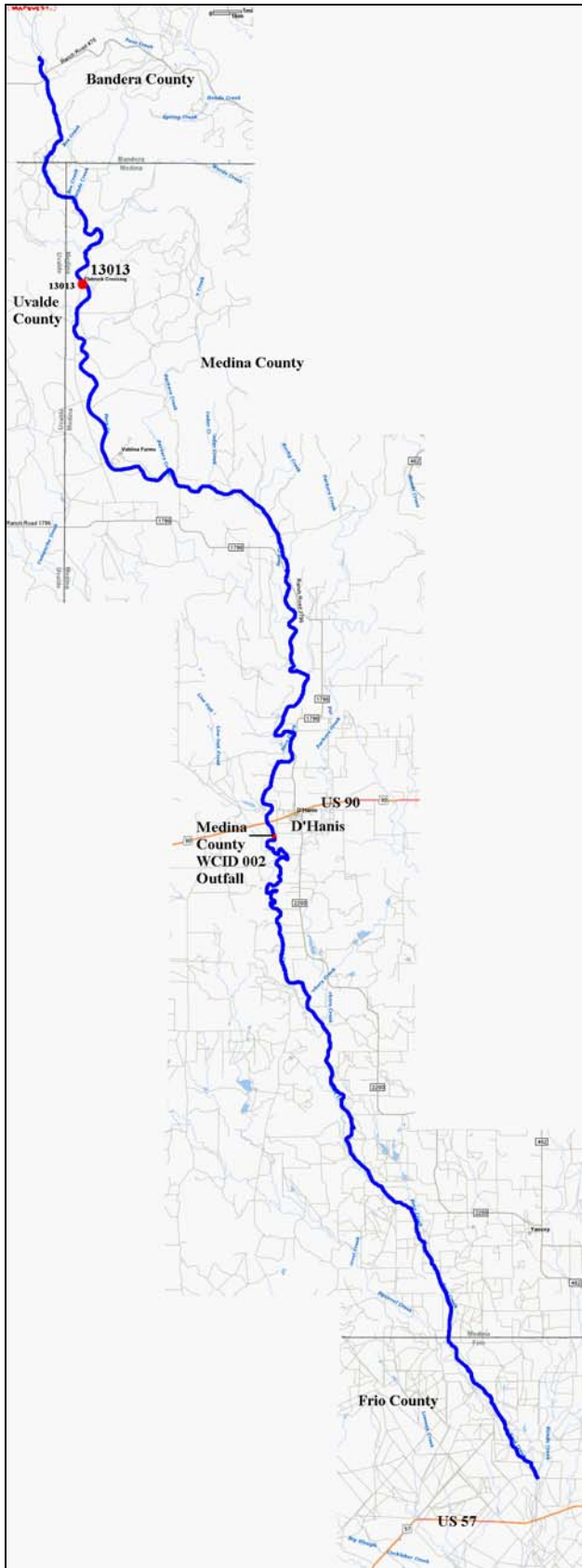
City of Hondo

**Impairments and Concerns**

The 2002 Assessment did not identify any impairments or concerns in this segment.

## 2115 - Seco Creek

From the confluence with Hondo Creek in Frio County to the confluence of West Seco Creek in Bandera County



The segment is divided into two sub-segments; the upper 25 miles and the lower 45 miles.

## 2005 Monitoring

### Upper 25 Miles

13013 – At Miller Ranch Near Utopia

Parameter	Frequency	Agency
24hr DO	2	TCEQ Region 13
Conventional	4	
Bacteria	4	
Flow	4	
Field	4	

### Permitted Outfalls

Medina County Water Control and Improvement District (WCID) 002.

### Impairments

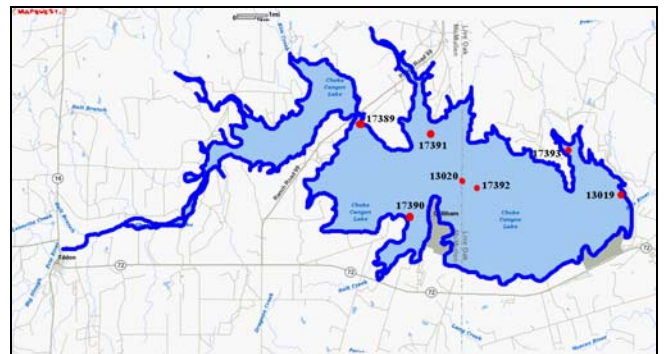
The 2002 Assessment did not identify any impairments in this segment.

### Concerns

Temperature is listed as a concern in the upper 25 miles of the segment. However, the elevated temperatures are most likely the result of natural causes.

## 2116 – Choke Canyon Reservoir

From Choke Canyon Dam in Live Oak County to a point 4.2 km (2.6 miles) downstream of SH 16 on the Frio River Arm in McMullen County and to a point 100 m (110 yards) upstream of the confluence of Mustang Branch on the San Miguel Creek Arm in McMullen County, up to the normal pool elevation of 220.5 feet (impounds Frio River)



The segment is divided into 7 sub-segments; 5120 acres near dam, small north arm of lake near dam and Willow Hollow Tank, 5120 acres in middle of lake, large north arm near mid lake and Jacob Oil Field, southern arm near mid lake and Rec. Road 7 west of Calliham, western end of lake to RR bridge, and remainder of lake.

## 2005 Monitoring

### 5120 Acres in Middle of Lake

13020 – Mid-lake on Live Oak/McMullen County Line  
(Near Old Hwy 99).

Parameter	Frequency	Agency
Metals in Water	2	NRA
Metals in Sediment	2	
Conventional	4	
Bacteria	4	
Field	4	

### Western End of Lake up to RR Bridge

17389 – Approximately 0.5 km Southeast of RR 66  
Southern Most Bridge Crossing the Frio River Arm.

Parameter	Frequency	Agency
24hr DO	1	NRA
Metals in Water	2	
Metals in Sediment	2	
Conventional	4	
Bacteria	4	
Field	4	

### Additional Sites

#### 5120 Acres in Middle of Lake

17392 – Mid-Lake Approx. 1 Mi East of the Point at  
Choke Canyon State Park

#### 5120 Acres in Near Dam

13019 – Mid-Lake, 1/4 Mile Upstream From the Dam

#### Large North Arm Near Mid Lake and Jacob Oil Field

17391 – Approx. 2.0 Km SW of SR Road 8 Termination  
At Shore, Mouth of Opossum Creek Arm

#### Small North Arm of Lake Near Dam and Willow Hollow Tank

17393 – Mid-Arm in the NE Arm West of the Intersection  
of US 281 and IH 37

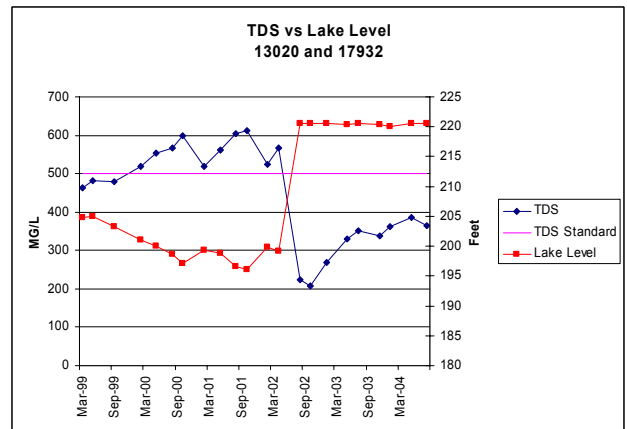
#### Southern Arm Near Mid Lake and Rec. Road 7 West of Calliham

17390 – Approx. 0.5 KM West of Choke Canyon State  
Park and 4 KM North of SH 72 Crossing the Salt  
Creek Arm

### Impairments

The entire reservoir is listed as having an impairment for TDS. The majority of the data were collected during the drought of record for the area.

A direct relationship exists between TDS readings and the lake level. The following graph uses data from stations 17392 from March 1999 – August 2000 and from 13020 from October 2000 to August 2004.



As the reservoir level falls, the TDS levels rise. TDS values have been below the standard since the reservoir filled during the flood of July 2002. Subsequently, a standards review for TDS will be conducted before a TMDL is scheduled.

Bacteria is also listed as being an impairment throughout the reservoir, except for the 5120 acres near the middle of the lake. The source of the bacteria is unknown, so additional data and information will be collected before a TMDL is scheduled.

### Concerns

Depressed DO is listed as being a concern in the southern arm near mid lake and Rec. Road 7 west of Calliham and in the western end of the lake to RR bridge. Ten measurements were taken at station 17389 between August 2002 and October 2004. Four of the measurements did not meet the standard, so it is likely that the western end of the lake to RR bridge will remain listed after the 2006 Assessment. The pollutant source for this concern is unknown.



## 2117 – Frio River Above Choke Canyon Reservoir

From a point 4.2 km (2.6 miles) downstream of SH 16 in McMullen County to a point 100 m (110 yards) upstream of US 90 in Uvalde County



The segment is divided into six sub-segments, the lower 25 miles, from 2 miles downstream of SH 97 to 14 miles upstream of SH 97 crossing, 25 miles surrounding La Salle CR crossing north of SH 97, the 25 miles surrounding IH 35, the 25 miles surrounding FM 187, and the remainder of the segment.

### 2005 Monitoring

#### Lower 25 Miles

13023 – At SH 16 in Tilden

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Flow	4	
Field	4	

#### From 2 Miles Downstream Of SH 97 to 14 Miles Upstream of SH 97 Crossing

18373 – Immediately Upstream of SH 97 North of Fowlerton

Parameter	Frequency	Agency
24hr DO	2	NRA
Conventional	4	
Bacteria	4	
Flow	4	
Field	4	

### 25 Miles Surrounding IH 35

13024 – At US 35 North of Dilley

Parameter	Frequency	Agency
24hr DO	4	TCEQ Region 13
Conventional	4	
Bacteria	4	
Flow	4	
Field	4	

### 25 miles surrounding FM 187

15449 – At FM 187 8 Mi. South of Sabinal

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 13
Bacteria	4	
Flow	4	
Field	4	

### Additional Monitoring Sites

#### 25 Miles Surrounding La Salle CR Crossing North of SH 97

15448 – At La Salle CR, 5 Miles North of SH 97 and 5 Miles East of FM 469, 6 Miles NE of Los Angeles

#### From 2 Miles Downstream Of SH 97 to 14 Miles Upstream of SH 97 Crossing

15637 – At end of Private Road 0.6 KM NW of Fowlerton and 1.1 KM Upstream of SH 97

### Permitted Outfalls

City of Pearsall  
City of Dilley  
McMullen County WCID No. 1

### Impairments

Bacteria is listed as an impairment in the lower 25 miles of the segment. It is also listed for bacteria in the section from 2 miles downstream of SH 97 to 14 miles upstream of SH 97 crossing based on limited data. The source of the bacteria is unknown, so additional data and information will be collected before a TMDL is scheduled.

Depressed DO is listed as an impairment in the 25 miles surrounding La Salle CR crossing north of SH 97, in the 25 miles surrounding IH 35, from 2 miles downstream of SH 97 to 14 miles upstream of SH 97, and in the lower 25 miles of the segment. The pollutant source is unknown, so additional data and information will be collected before a TMDL is scheduled.

### Concerns

Chloride and TDS are listed as concerns in the entire segment.

Depressed DO and bacteria are listed as concerns in the 25 miles surrounding IH 35.

Nitrate+nitrite nitrogen is listed as a concern in the 25 miles surrounding IH 35 and in the lower 25 miles of the segment.

Excessive algal growth is listed as a concern in the lower 25 miles of the segment.

The pollutant source for these concerns is unknown.

## Nueces – Rio Grande Coastal Basin

Table 5. Assessment Summary

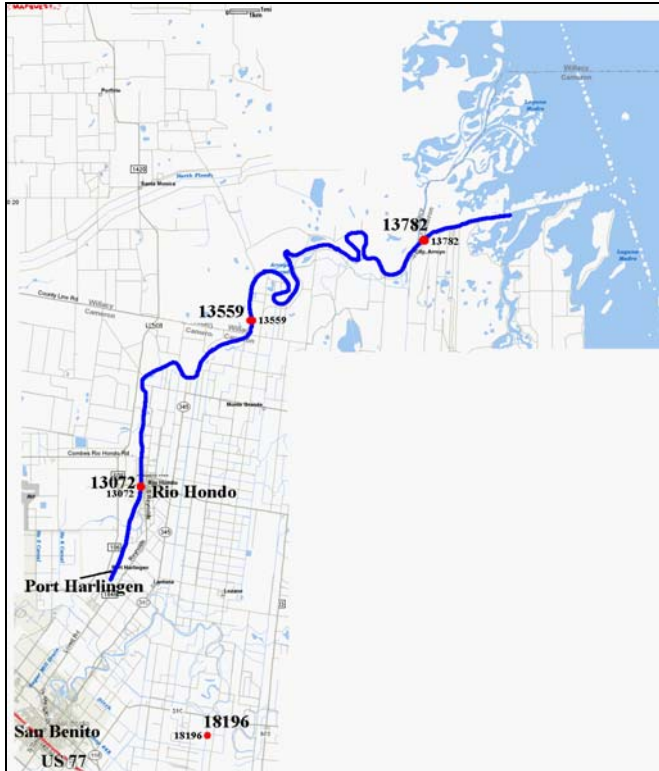
Segment	Description	Concerns	Impairments	
2201	Arroyo Colorado Tidal	3 miles upstream to 2 miles downstream of Marker 27	Nitrate+nitrite nitrogen	
		1 mile upstream to 3 miles downstream of Camp Perry	Nitrate+nitrite nitrogen	Depressed DO
		Upper 4 miles	Nitrate+nitrite nitrogen Ammonia	Depressed DO
2202	Arroyo Colorado Above Tidal	Lower 4 miles	Ammonia Orthophosphorus Total phosphorus Excessive algal growth	Bacteria Chlordane, DDE, and toxaphene in small mouth buffalo
		11 miles upstream to 4 miles downstream of US 77		Bacteria Chlordane, DDE, and toxaphene in small mouth buffalo
		14 miles upstream to 11 miles downstream of FM 1015	Ammonia Orthophosphorus Total phosphorus Excessive algal growth	Bacteria Chlordane, DDE, and toxaphene in small mouth buffalo
		Upper 19 miles	Ammonia Orthophosphorus Total phosphorus Excessive algal growth	Bacteria Chlordane, DDE, and toxaphene in small mouth buffalo
2202A	Donna Reservoir		PCBs in fish tissue	
2203	Petronila Creek Tidal		Temperature	
2204	Petronila Creek Above Tidal	Excessive algal growth		

Table 6. FY 2005 Monitoring Stations

Segment	Station ID	Station Description
2201	13072	Arroyo Colorado Tidal FM 106 Bridge at Rio Hondo
	13073	Arroyo Colorado Tidal At Camp Perry North of Rio Hondo
	13559	Arroyo Colorado Tidal At Marker 27 (Mile 15) 0.5 Mile North of the Point Where Channel Becomes Boundary Between Willacy And Cameron Counties
	13782	Arroyo Colorado Tidal Near CM 16 at Arroyo City, KM 10.9
	18196	Arroyo Colorado Tidal Unnamed Drainage Ditch Approximately 842 m South of FM 510 and 403 m West of Adams Rd, East of San Benito, Just Downstream of Proposed Wetland Facility
2202	13074	Arroyo Colorado Above Tidal At Low Water Bridge at Port Harlingen
	13081	Arroyo Colorado Above Tidal Main Floodway In Llano Grande At Fm 1015 South Of Weslaco
	13084	Arroyo Colorado Above Tidal At US 281 South Of Pharr
2203	13090	Petronila Creek Tidal 1.2 2 Km Upstream of the Confluence With Tunas Creek
2204	13094	Petronila Creek Above Tidal At FM 892 Southeast of Driscoll

## 2201 – Arroyo Colorado Tidal

From the confluence with Laguna Madre in Cameron/Willacy County to a point 100 m (110 yards) downstream of Cemetery Road south of Port Harlingen in Cameron County



The segment is divided into five sub-segments, the lower 9 miles, approximately 2 miles upstream to approximately 2 miles downstream of Marker 22, approximately 3 miles upstream to 2 miles downstream of Marker 27, approximately 1 mile upstream to 3 miles downstream of Camp Perry, and the upper 4 miles of the segment.

### 2005 Monitoring Upper 4 Miles

13072 – FM 106 Bridge at Rio Hondo

Parameter	Frequency	Agency
24hr DO	2	NRA
Conventional	4	TCEQ Region 15
Bacteria	4	
Field	4	

18196 – Unnamed Drainage Ditch Approximately 842 m South of FM 510 and 403 m West of Adams Rd, East of San Benito, Just Downstream of Proposed Wetland Facility

Parameter	Frequency	Agency
Conventional	12	NRA
Bacteria	12	
Flow	12	
Field	12	

### Approximately 1 Mile Upstream to 3 Miles Downstream of Camp Perry

13073 – At Camp Perry North of Rio Hondo

Parameter	Frequency	Agency
24hr DO	2	NRA
Conventional	4	TCEQ Region 15
Bacteria	4	
Field	4	

### Approximately 3 Miles Upstream to 2 Miles Downstream of Marker 27

13559 – At Marker 27 (Mile 15) 0.5 Mile North of the Point Where Channel Becomes Boundary Between Willacy And Cameron Counties

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 15
Bacteria	4	
Field	4	

### Lower 9 Miles

13782 – Near CM 16 at Arroyo City, KM 10.9

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 15
Bacteria	4	
Field	4	

### Additional Sites

13071 – At Mile 10 (Marker 22)

### Permitted Outfalls

Taiwan Shrimp Village Association  
Southern Star Inc.  
City of Rio Hondo  
City of Pharr  
Arroyo Aquaculture Association

### Impairments

Ambient toxicity in sediment was identified as an impairment in the entire segment in the 2000 Assessment. The entire segment now meets the applicable water quality criterion for ambient toxicity in sediment.

Depressed DO is listed as an impairment in the 1 mile upstream to 3 miles downstream of Camp Perry and in the upper 4 miles of the segment. The source of the impairment has been identified as crop-related.

Initial studies indicate that a 90% load reduction would be required for the segment to meet the standard – a goal that is feasibly unrealistic. Therefore, the Arroyo Colorado Watershed Protection Plan (WPP) is being developed to improve the overall water quality for the entire Arroyo Colorado watershed, including Segment 2202. The plan has five major components, wastewater infrastructure, agricultural uses, habitat restoration, refinement of the TMDL analysis, and public education and outreach. Additional information is available at

[http://www.tnrcc.state.tx.us/water/quality/tmdl/arroyoWP\\_P.pdf](http://www.tnrcc.state.tx.us/water/quality/tmdl/arroyoWP_P.pdf). NRA is a member of the steering committee for the WPP and participates on the public education and outreach subcommittee.

**Concerns**

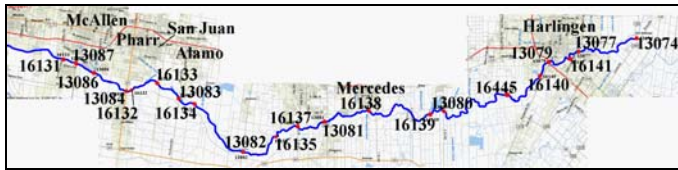
Nitrate+nitrite nitrogen is listed as a concern in the approximately 1 mile upstream to 3 miles downstream of Camp Perry, approximately 3 miles upstream to 2 miles downstream of Marker 27, and in the upper 4 miles of the segment.

Ammonia is listed as a concern in the upper 4 miles of the segment.

The source of the nitrogen and ammonia has been identified as crop-related.

**2202 – Arroyo Colorado Above Tidal**

From a point 100 m (110 yards) downstream of Cemetery Road south of Port Harlingen in Cameron County to FM 2062 in Hidalgo County



The segment is divided into four sub-segments, the lower 4 miles, approximately 11 miles upstream to approximately 4 miles downstream of US 77, approximately 14 miles upstream to approximately 11 miles downstream of FM 1015, and the upper 19 miles of the segment.

**2005 Monitoring**

**14 Miles Upstream to 11 Miles Downstream of FM 1015**

13074 – At Low Water Bridge at Port Harlingen

Parameter	Frequency	Agency
24hr DO	2	NRA
Metals in Sediment	2	TCEQ Region 15
Organics in Sediment	2	
Conventional	4	
Bacteria	4	
Field	4	

**Lower 4 Miles**

13081 – Main Floodway In Llano Grande At Fm 1015 South Of Weslaco

Parameter	Frequency	Agency
24hr DO	2	NRA
Conventional	4	TCEQ Region 15
Bacteria	4	
Field	4	

**Upper 19 Miles**

13084 – At US 281 South Of Pharr

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 15
Bacteria	4	
Flow	4	
Field	4	

**Additional Monitoring Sites**

**14 Miles Upstream to 11 Miles Downstream of FM 1015**

- 13080 – At FM 506 South of La Feria
- 13082 – At FM 493 South of Donna
- 16135 – 3.5 KM Upstream from FM 88 SE of Donna
- 16137 – At FM 88 South of Weslaco
- 16138 – 1.2 KM Upstream form FM 491, South of Mercedes
- 16139 – 1.3 KM Upstream from FM 506, SW of La Feria

**11 Miles Upstream to 4 Miles Downstream of US 77**

- 13077 – At Loop 499 Bridge in Harlingen
- 13079 – At US 77 in SW Harlingen
- 16140 – At Southernmost corner of Botts Park in Harlingen, 1.8 KM Upstream from US 77/US 83
- 16141 – 75M Downstream from Commerce Street in Harlingen
- 16445 – At Low Water Crossing at Dilworth Road, East of La Feria

**Upper 19 Miles**

- 13083 – At FM 907 South of Alamo
- 13086 – At FM 336 South of McAllen
- 13087 – At FM 115 South of McAllen
- 16131 – 1.5 KM Upstream from FM 1926, SW of McAllen
- 16132 – 0.5 KM Downstream from US 281, South of Pharr
- 16133 – 0.5 KM Upstream from FM 1426, South of San Juan
- 16134 – 2.3 KM Downstream from FM 907, South of Alamo



## Permitted Outfalls

CPL (La Palma Power Station)  
City of San Benito  
City of Harlingen  
City of McAllen  
City of La Feria  
City of Hidalgo  
City of San Juan  
Winter Garden Park Corporation  
City of Mission  
Fruit of the Loom  
J. L. Bates LP  
La Palma WLE LP  
City of Mercedes  
City of Donna  
City of Alamo  
City of Pharr  
Military Highway WSC  
City of Weslaco  
Frontera Generation LP & AEP  
Donna ISD  
US Department of Agriculture

## Impairments

Bacteria has been identified as an impairment in the entire segment. Although flagged as requiring more data and information before a TMDL is scheduled, this parameter will be included in the Arroyo Colorado WPP discussed in the write up for Segment 2201.

DDD, DDT, chlordane, dieldrin, endrin, heptachlor epoxide, heptachlor, hexachlorobenzene, lindane, and toxaphene in smallmouth buffalo and DDE in fish tissue were also listed as impairments in the 2002 Assessment. The United States Environmental Protection Agency (EPA) has approved a TMDL for chlordane, DDE, and toxaphene in fish tissue. All the other organic compounds in the fish tissue have been removed from the list. More information can be found at [http://www.tnrcc.state.tx.us/water/quality/tmdl/arroyo\\_leg\\_tmdl.pdf](http://www.tnrcc.state.tx.us/water/quality/tmdl/arroyo_leg_tmdl.pdf) and [http://www.tnrcc.state.tx.us/water/quality/tmdl/arroyo\\_leg\\_acy\\_tmdl.pdf](http://www.tnrcc.state.tx.us/water/quality/tmdl/arroyo_leg_acy_tmdl.pdf).

## Concerns

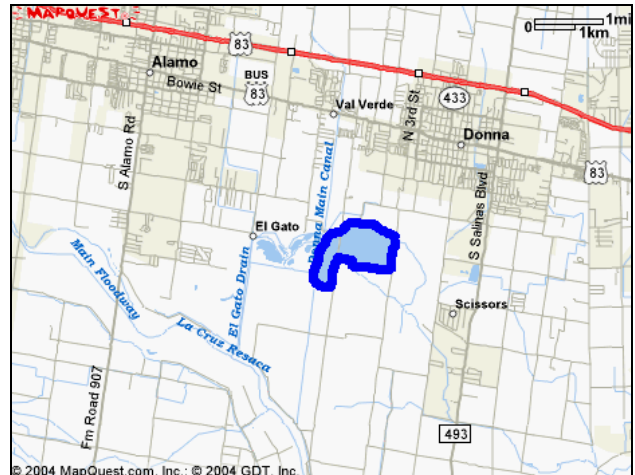
Ammonia, orthophosphorus, total phosphorus, and excessive algal growth are concerns in all but the 11 miles upstream to 4 miles downstream of US 77 sub-segment.

Nitrate+nitrite nitrogen is listed as a concern for the entire segment.

The source of all of the concerns is suspected to be from stormwater runoff.

## 2202A – Donna Reservoir

Off-channel irrigation reservoir pumped from Rio Grande near the City of Donna in Hidalgo County



## Impairments

The segment has an impairment for PCBs in fish tissue. This segment / parameter is included in the TMDL approved by EPA for segment 2201.

## Concerns

The 2002 Assessment did not identify any concerns in this segment.

## 2203 – Petronila Creek Tidal

From the confluence of Chiltipin Creek in Kleberg County to a point 1 km (0.6 miles) upstream of private road crossing near Laureles Ranch in Kleberg County



### 2005 Monitoring

13090 – 1.2 2 Km Upstream of the Confluence With Tunas Creek

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

### Impairments

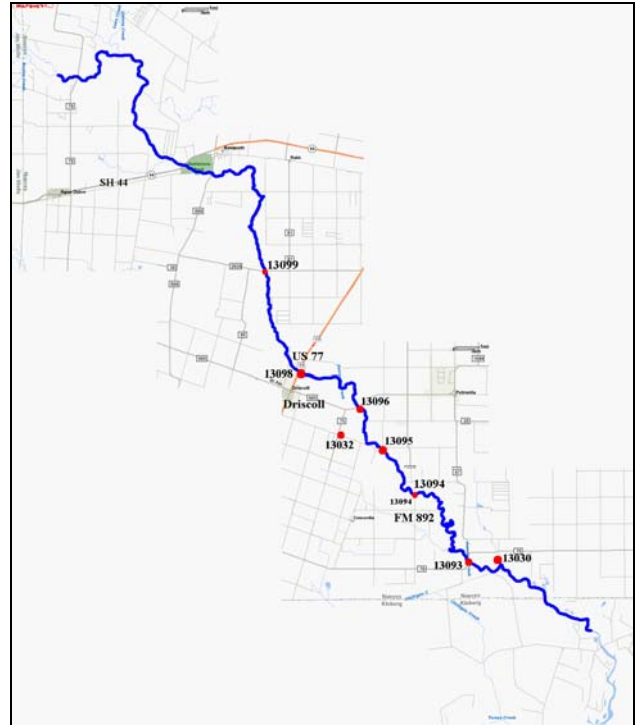
Temperature was identified as an impairment in the 2002 Assessment. However, it has been determined that the elevated temperatures are due to natural causes.

### Concerns

Excessive algal growth was identified as a concern in the 2002 Assessment. Station 13090 was not monitored from November 2001 through August 2004 due to inaccessibility onto the King Ranch. The station was added back to the monitoring schedule for FY 2005 in order to properly evaluate the chlorophyll a.

## 2204 – Petronila Creek Above Tidal

From a point 1 km (0.6 miles) upstream of private road crossing near Laureles Ranch in Kleberg County to the confluence of Agua Dulce and Banquete Creeks in Nueces County



The segment is divided into two sub-segments, the lower 25 miles and the upper 19 miles of the segment.

### 2005 Monitoring

#### Lower 25 Miles

13094 – At FM 892 Southeast of Driscoll

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Flow	4	
Field	4	

### Additional Sites

#### Lower 25 Miles

- 13030 – Unnamed Tributary to Petronila Creek at FM 70 Near Stanolind-Luby Camp Refinery
- 13032 – Unnamed Drainage Ditch Tributary to Petronila Creek at Beatty Rd, Enters Petronilla Cr 2 Miles Downstream of FM 665
- 13093 – At FM 70 East of Bishop
- 13095 – At Beatty Rd, 2.5 Miles Downstream of FM 665
- 13096 – At FM -665 East of Driscoll
- 13098 – At US 77 Bridge

#### Upper 19 Miles

- 13099 – At FM 2826 North of Driscoll

### Permitted Outfalls

City of Agua Dulce  
City of Orange Grove  
City of Driscoll  
Nueces Co. WCID No. 5  
Coastal Bend Youth City  
Bishop Consolidated Independent School District  
(Petronila Elementary)  
US Ecology Texas LP

### Impairments

This segment has impairments for chloride, sulfate, and TDS. A TMDL is underway. The data collection phase of the project is complete. The data results collected under baseline, runoff, and storm event flows are being studied to qualify the suspected sources: groundwater migration/geology; non-compliant saltwater injection, oil, and gas wells; and agriculture.

An airborne geophysical survey has also been completed. The data are being analyzed to try and pinpoint the source or sources of the high concentrations of chloride, sulfate, and TDS.

More information can be found at [http://www.tnrcc.state.tx.us/water/quality/tmdl/colorado\\_sangabriel\\_project.html](http://www.tnrcc.state.tx.us/water/quality/tmdl/colorado_sangabriel_project.html). NRA is a member of the steering committee for this TMDL.

### Concerns

Chlorophyll a has been identified as a concern in the lower 25 miles of the segment. The pollutant source for this concerns is unknown.



Photo courtesy of Dr. Jeff Paine, Bureau of Economic Geology, University of Texas at Austin

## Bays, Estuaries, and Gulf of Mexico

Table 7. Assessment Summary

Segment	Description		Concerns	Impairments
2462	San Antonio Bay / Hynes Bay / Guadalupe Bay	San Antonio Bay near Austwell	Nitrate+nitrite nitrogen Orthophosphorus Total phosphorus	
		Guadalupe Bay		Bacteria in oyster waters
		San Antonio Bay near Seadrift		Bacteria in oyster waters
		ICWW		Bacteria in oyster waters
		18.0 square miles in Hynes Bay and upper San Antonio Bay	Bacteria in oyster waters	
2471	Aransas Bay	6.8 square miles along the northern edge of the bay near Rockport	Bacteria in oyster waters	
2472	Copano Bay / Port Bay / Mission Bay	Near FM 188, west of Rockport	Depressed DO	
		Near FM 136, south of Bayside	Total phosphorus	
		Area along southern shore including Port Bay		Bacteria in oyster waters
2473	St. Charles Bay	Northeast of Goose Island State Park		Bacteria
2481	Corpus Christi Bay	16.0 square miles along shoreline near Corpus Christi and Portland		Bacteria in oyster waters
2482	Nueces Bay			Zinc in oyster tissue
2483	Redfish Bay	Area near SH 361	Depressed DO	
2483A	Conn Brown Harbor		Depressed DO	
2484	Corpus Christi Inner Harbor	Area near Avery Turning Basin	Ammonia	
		Area near Navigation Blvd.	Ammonia Nitrate+nitrite nitrogen	
		Area near Viola Turning Basin	Ammonia Nitrate+nitrite nitrogen	
2485	Oso Bay	Lower portion of bay		Depressed DO Bacteria
		Middle portion of bay near SH 358		Depressed DO Bacteria
		Middle portion of bay near railroad bridge		Depressed DO
		Upper portion of bay		Depressed DO
		Lower portion of bay, western side	Depressed DO Elevated nutrients Excessive algal growth	Bacteria
2485A	Oso Creek	Lower 25 miles	Nitrate+nitrite nitrogen Orthophosphorus Total phosphorus	Bacteria

Table 7 (cont.)

2491	Laguna Madre	Upper Laguna Madre near Packery Channel		Depressed DO
		Area near upper end of Padre Island National Seashore		Depressed DO
		Area around mouth of Baffin Bay	Excessive algal growth	Depressed DO
		Area around mouth of Arroyo Colorado	Ammonia Nitrate+nitrite nitrogen Orthophosphorus Total phosphorus	Depressed DO
		18.1 square miles near the Arroyo Colorado and along ICWW		Bacteria in oyster waters
2492	Baffin Bay	Upper Baffin Bay near Los Olmos and Fernando Creek arms	Excessive algal growth	
2494	Brownsville Ship Channel	Turning Basin	Depressed DO	
2501	Gulf of Mexico			Mercury in king mackerel > 43 inches

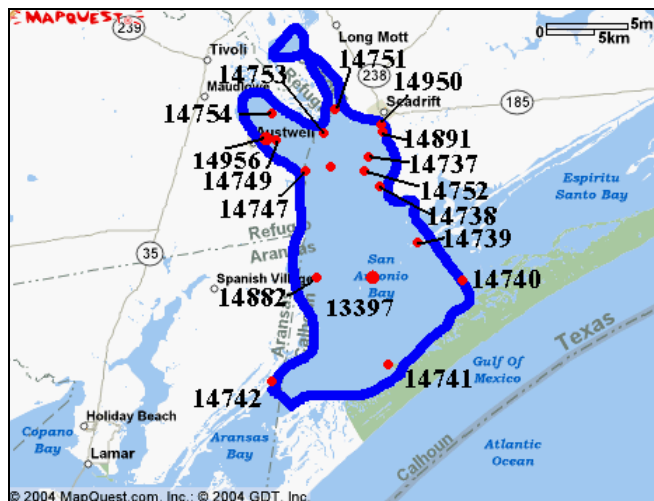
Table 8. FY 2005 Monitoring Stations

Segment	Station ID	Station Description
2462	13397	San Antonio Bay Intracoastal Canal at Buoy C-17
	14956	Hynes Bay At Austwell at Texas Parks And Wildlife Public Boat Ramp
2463	13400	Mesquite Bay South of Intracoastal Waterway Marker 13
2471	13402	Aransas Bay Intersection of Intracoastal Canal and Lydia Ann Channel South of Rockport
	16232	Aransas Bay At Broadway and the Inlet Canal to Canoe Lake in Rockport
	16492	Aransas Bay In Lydia Ann Channel Directly West of Aransas Light House
2472	12945	Copano Bay At FM 136 Bridge South of Bayside
	13404	Copano Bay West Side of Fishing Pier, Alongside SH 35
	13405	Copano Bay At FM 881 West of Rockport
	14783	Copano Bay 1 Mile East of Bayside
	17724	Copano Bay Approx. 3.5 Miles West of Copano Bay Fishing Pier Boat Ramp at South End of Copano Bay Causeway (Sh 35)
2473	13406	St. Charles Bay Northeast of Goose Island State Park
2481	13407	Corpus Christi Bay At Corpus Christi Channel Marker #62
	13409	Corpus Christi Bay Near Corpus Christi Ship Channel Marker 86
	13410	Corpus Christi Bay Near Corpus Christi Ship Channel Marker 86
	13411	Corpus Christi Bay ½ Mile off Doddridge Road
	14355	Corpus Christi Bay Near Shamrock Point
	17791	Corpus Christi Bay Approx. 3.1 Miles Southwest of Shamrock Point on Shamrock Island
2482	13420	Nueces Bay US 181 Bridge at Causeway (North Side)
	13421	Nueces Bay US 181 Bridge At Causeway (South Side)
	13422	Nueces Bay ½ Mile From South Shore at East Overhead Power Line
	13423	Nueces Bay 1 Mile From North Shore at East Overhead Power Line
	13424	Nueces Bay ½ Mile From North Shore at West Overhead Powerline at the 11th Pair Of Pylons From the North Shore
	13425	Nueces Bay Near Whites Point
2483	13426	Redfish Bay SH 361 at 3rd Bridge Between Aransas Pass and Port Aransas
	14801	Redfish Bay At the ICWW at Aransas Pass
2483A	13287	Conn Brown Harbor
2484	13430	Corpus Christi Inner Harbor US 181 Bridge At Causeway (South Side)
	13432	Corpus Christi Inner Harbor Near Navigation Blvd. Draw Bridge
	13436	Corpus Christi Inner Harbor Mid- Channel, Adjacent to the Saber Refining Co Barge Dock
	13439	Corpus Christi Inner Harbor In Viola Turning Basin

Table 8 (cont.)

2485	13440	Oso Bay At Padre Island Drive (SH 358)
	13442	Oso Bay 13442 - Ocean Drive
	17118	Oso Bay Northeast of Padre Island Drive (SH 358) 100m From Northeast Corner Of Bridge in Corpus Christi
	17119	Oso Bay 100m Northeast of Holly Road at RR Bridge in Corpus Christi
	17120	Oso Bay 50m Northeast of Yorktown Bridge (CR 24) in Corpus Christi
2485A	13028	Oso Creek At SH 286 South of Corpus Christi
	13029r	Oso Creek At FM 763 Southwest of Corpus Christi
2491	13443	Laguna Madre South of the Intersection of GIWW and Padre Island Causeway
	13444	Laguna Madre At Intersection of GIWW at Baffin Bay Marker
	13445	Laguna Madre At GIWW Near Bird Island
	13446	Laguna Madre GIWW at Marker 129 East of Port Isabel
	13447	13447 – Intersection of GIWW and Arroyo Colorado
	13448	Laguna Madre Intersection of GIWW and Port Mansfield Channel
	13449	Laguna Madre Channel Marker C-225A North of Port Mansfield
	14870	Laguna Madre 200 yds. Off Laguna Vista Shoreline
	17121	Laguna Madre 0.7km Southeast of End of Yorktown Road Approximately 1.3km Northwest of Pita Island in Corpus Christi
2492	18188	Laguna Madre East of ICWW Marker 221 at South End of Dredge Material Placement Island
	13450	Baffin Bay At Channel Marker 14
2492A	13452	Baffin Bay At Channel Marker 36
	13033	San Fernando Creek At US 77 Bypass Bridge at Kingsville
2493	13459	South Bay Near Near Ship Channel Marker 1
	14865	South Bay Middle of Bay
2494	13460	Brownsville Ship Channel Near Ship Channel Marker 35 (Black Buoy)
	14871	Brownsville Ship Channel At East End of Turning Basin
	14875	Brownsville Ship Channel At Entrance to San Martin Lake
2494A	13285	Port Isabel Fishing Harbor At Hwy 100 Bridge
2501	13468	Gulf of Mexico At Port Aransas Near End of South Jetty Near Marker R-7
	13470	Gulf of Mexico At Port Isabel, Just Beyond Jetties at Bell Buoy

**2462 – San Antonio Bay / Hynes Bay / Guadalupe Bay**



The segment is divided into three sub-segments for standard assessment, 8.0 square miles of San Antonio Bay near Seadrift, Hynes Bay near Austwell, and the remainder of the bay.

The segment is divided into five sub-segments for oyster waters assessment, Guadalupe Bay, San Antonio Bay near Seadrift, Intracoastal Water Way (ICWW), 18.0 square miles in Hynes Bay and upper San Antonio Bay, and the remainder of San Antonio Bay.

**2005 Monitoring  
Remainder of the Bay**

13397 – Intracoastal Canal at Buoy C-17

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

**Hynes Bay Near Austwell**

14956 – At Austwell at Texas Parks And Wildlife Public Boat Ramp

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Field	4	

**Additional Sites**

**8.0 square miles of San Antonio Bay near Seadrift**

14950 – At Public Seawall in Seadrift Business District at Third Street

**Remainder of the Bay**

- 14737 – At Intersection of the Seadrift Channel and Victoria Barge Canal
- 14738 – At Mosquito Point
- 14739 – Between ICWW Markers 4 and 5
- 14740 – 600 Yards West of South Pass Island Channel
- 14741 – 800 Yards North of Panther Point
- 14742 – Near Rattlesnake Island
- 14747 – 100 Yards East of Mcdowell Point
- 14749 – 400 Yards East of Austwell
- 14751 – 800 Yards SE of Marsh Point
- 14752 – 100 Yards SW of Victoria Barge CM 23
- 14753 – 200 Yards South of Grassy Point
- 14754 – 1 1/4 Miles North of Austwell
- 14755 – Miles East of Mcdowell Point
- 14882 – 1/2 Miles East of Webb Point
- 14891 – In Seadrift Harbor

**Permitted Outfalls**

Refugio WCID No. 1  
City of Austwell

**Impairments**

There is an impairment for bacteria for oyster waters for Guadalupe Bay, San Antonio Bay near Seadrift, and ICWW. The assessment is based on shellfish classification maps produced by DSHS.

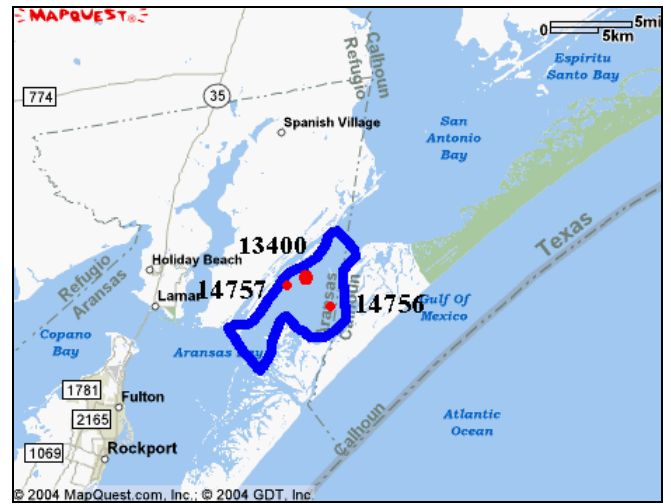
A TMDL is underway for all affected bays along the Texas Coast to try and identify the source of the bacteria. Participants in the TMDL, led by DSHS, are the Texas General Land Office (TGLO), TPWD, the Galveston Bay Estuary Program, EPA, and the Coastal Bend Bays Estuary Program. More information can be found at <http://www.tnrcc.state.tx.us/water/quality/tmdl/gulfcoast/yster.pdf>.

**Concerns**

Bacteria for oyster waters is listed as a concern for the 18.0 square miles in Hynes Bay and upper San Antonio Bay.

Nitrate+nitrite nitrogen, orthophosphorus, and total phosphorus have been identified as concerns in San Antonio Bay near Austwell. The source of these contaminants has been identified as dry and/or wet weather municipal point source discharges.

**2463 – Mesquite Bay**



The segment is divided into two sub-segments for standard assessment, the northern portion and the remainder of the bay.

The segment is divided into two sub-segments for oyster waters assessment, 12.0 square miles in the main portion of the three bays, and 0.6 square miles near ICWW.

**2005 Monitoring**

**Northern Portion**

13400 – South of Intracoastal Waterway Marker 13

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

**Additional Sites**

**Remainder of Bay**

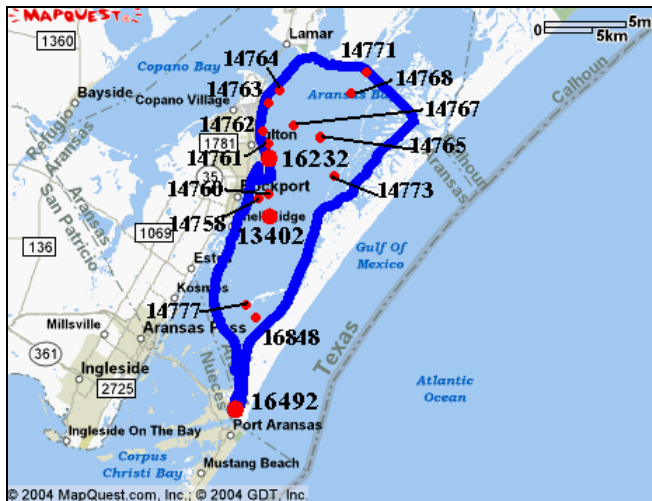
- 14756 – At the Intersection of Mesquite Bay and Cedar Bayou Channels
- 14757 – 1 Mile West of Third Chain Islands in Mesquite Bay Channel

**Impairments and Concerns**

The 2002 Assessment did not identify any impairments or concerns if this segment.



## 2471 – Aransas Bay



The segment is divided into three sub-segments for standard assessment, middle of bay near Shell Ridge, lower portion of bay in Lydia Ann Channel, and remainder of the bay.

The segment is divided into two sub-segments for oyster water assessment, 81.0 square miles in the main portion of the bay, and 6.8 square miles along the northern edge of the bay and near Rockport.

### 2005 Monitoring

#### Middle of Bay near Shell Ridge

13402 – Intersection of Intracoastal Canal and Lydia Ann Channel South of Rockport

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

#### Remainder of Bay

16232 – At Broadway and the Inlet Canal to Canoe Lake in Rockport

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

#### Lower Portion of Bay in Lydia Ann Channel

16492 – In Lydia Ann Channel Directly West of Aransas Light House

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

## Additional Monitoring Sites

### Remainder of Bay

- 14758 – 3/4 Mile East of Rockport
- 14760 – At Shellfish Marker 2
- 14761 – 1 Mile Southeast of Fulton
- 14762 – 3/4 Mile Northeast of Fulton
- 14763 – 1-2 Miles Northeast of Aransas County Airport
- 14764 – Mile Southeast of SH 35 Bridge
- 14765 – At Dead Man Island
- 14767 – At Half Moon Reef
- 14768 – 1 Mile North Jay Bird Point
- 14771 – 1/2 Mile South of Dunham Point
- 14773 – 1 Mile South of Long Reef
- 14777 – 1/4 Mile NE of Mud Island
- 16848 – 0.25 Mile SE of Mud Island, 1.5 Mi West of Southern End of San Joseph Island

### Permitted Outfalls

City of Rockport

### Impairments

No impairments have been identified in this segment.

### Concerns

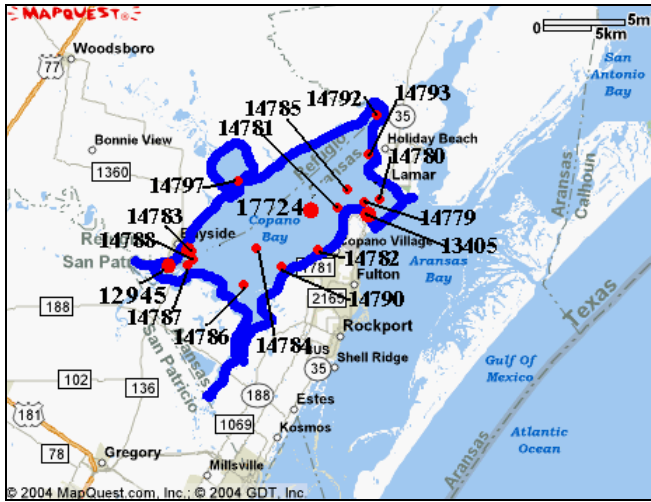
Bacteria for oyster waters is listed as a concern for the 6.8 square miles along the northern edge of the bay and near Rockport.

### Little Bay

See the Texas Watch Volunteer Monitoring discussion on Page 51 of this report for information on their monitoring activities in Little Bay.



## 2472 – Copano Bay / Port Bay / Mission Bay



The bay is divided into five sub-segments for standard assessment: the area near SH 35; the area near FM 188, west of Rockport; the area near FM 136, south of Bayside; the area east of Bayside; and the remainder of the bay.

The bay is divided into three sub-segments for oyster waters assessment; the area along southern shore including Port Bay; area near Bayside; and the main portion of Copano Bay.

### 2005 Monitoring

#### Area Near FM 136, South of Bayside

12945 – At FM 136 Bridge South of Bayside

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Field	4	

#### Area Near SH 35

13404 – West Side of Fishing Pier, Alongside SH 35

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Field	4	

#### Area Near FM 188, west of Rockport

13405 – At FM 881 West of Rockport

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Field	4	

#### Area East of Bayside

14783 – 1 Mile East of Bayside

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

17724 – Approx. 3.5 Miles West of Copano Bay  
Fishing Pier Boat Ramp at South End of Copano Bay Causeway (SH 35)

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

### Additional Monitoring Sites

#### Remainder of Bay

- 14779 – At South End of Causeway
- 14780 – Off North End of Pier Reef
- 14781 – At Redfish Point
- 14782 – 800 Yards Northeast of Salt Lake
- 14784 – At End of Shell Bank Reef
- 14785 – 1 1/2 Miles Northwest of the Causeway
- 14786 – 1 Mile West of Rattlesnake Point
- 14787 – 1 1/4 Miles SE Bayside
- 14788 – 1/2 Mile South of Bayside
- 14790 – 400 Yards North of Lane Tree Point
- 14792 – 800 Yards Southwest of Turtle Point
- 14793 – 300 Yards West of Palmeto Point
- 14797 – Mission Bay South Side of Bay

### Permitted Outfalls

- Town of Bayside
- City of Taft

### Impairments

There is an impairment for bacteria for oyster waters in the area along the southern shore including Port Bay and the area near Bayside. The assessment is based on shellfish classification maps produced by DSHS.

This bay is included in the TMDL discussed in the write up for Segment 2462. More information can be found at

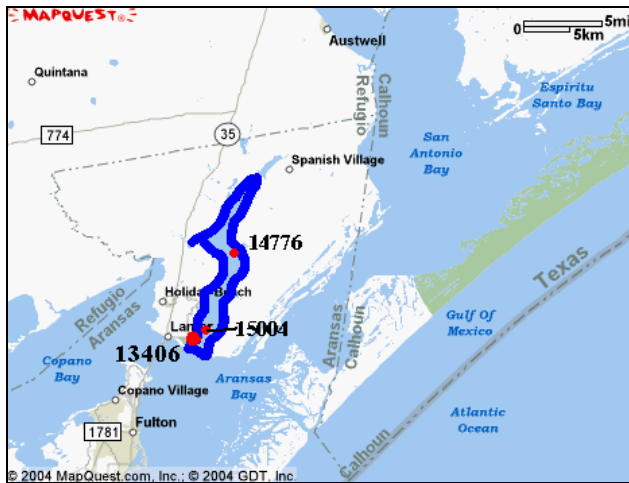
<http://www.tnrcc.state.tx.us/water/quality/tmdl/gulfcostaoyster.pdf>.

### Concerns

Total phosphorus has been identified as a concern in the area near FM 136, south of Bayside.

Depressed DO has been identified as a concern in the area near FM 188, west of Rockport. Ten 24-hour DO measurements were collected between July 2002 and August 2004 and all were above the standard of 5 MG/L. The 2006 Assessment should remove this concern.

## 2473 – St. Charles Bay



The bay is divided into two sub-segments, northeast of Goose Island State Park and the remainder of the bay.

### 2005 Monitoring

#### Northeast of Goose Island State Park

13406 – Northeast of Goose Island State Park

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Field	4	

### Additional Sites

#### Remainder of Bay

14776 – 1/2 Mile East of Big Sharp Point

15004 – Approximately 0.6 Mi. NE of Hail Point

### Permitted Outfalls

Aransas County MUD No. 1

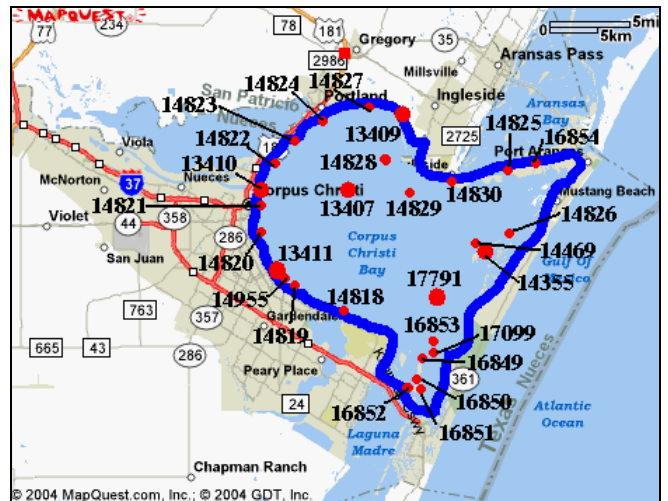
### Impairments

Bacteria has been identified as an impairment in the area northeast of Goose Island State Park. The source of the bacteria is unknown, so additional data and information will be collected before a TMDL is scheduled.

### Concerns

The 2004 Assessment did not identify any concerns in this segment.

## 2481 – Corpus Christi Bay



The bay is divided into six sub-segments for standard assessment: mid-bay, north near channel marker 62; near Shamrock Cove; La Quinta Channel, near channel marker 16; Corpus Christi Channel, near channel marker 86; off Doddridge Rd.; and the remainder of the bay.

The bay is divided into two sub-segments for oyster waters assessment, 16.0 square miles along shoreline near Corpus Christi and Portland and 107.1 square miles in the main portion of the bay.

### 2005 Monitoring

#### Mid-Bay, North Near Channel Marker 62

13407 – At Corpus Christi Channel Marker #62

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

#### La Quinta Channel, Near Channel Marker 16

13409 – La Quinta Channel Marker 16

Parameter	Frequency	Agency
Metals in Water	2	TCEQ Region 14
Metals in Sediment	2	
Organics in Sediment	2	
Conventional	4	
Bacteria	4	
Field	4	

#### Corpus Christi Channel, Near Channel Marker 86

13410 – Near Corpus Christi Ship Channel Marker 86

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

**Off Doddridge Rd.**

13411 – ½ Mile off Doddridge Road

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

14355 – Near Shamrock Point

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

17791 – Approx. 3.1 Miles Southwest of Shamrock Point on Shamrock Island

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

**Additional Sites****Near Shamrock Cove**

14469 – At Southeast End of Shamrock Island In Shamrock Cove

**Remainder of Bay**

14818 – 500 Yards From the Mouth of Oso Bay

14819 – 300 Yards Offshore From Storm Sewer Outfall

14820 – 200 Yards Off Cole Park Fishing Pier

14821 – At Mouth of the Corpus Christi Boat Basin

14822 – East of Rincon Point

14823 – At Indian Reef

14824 – West End of Portland

14825 – 100 Yards. West of Point Mustang

14826 – 400 Yards From Mouth of Sinclair Cut

14827 – 600 Yards West of La Quinta Channel Turning Basin

14828 – At Middle of Long Reef

14829 – At the Intersection of Corpus And Ingleside Channels

14830 – At Port Ingleside

14955 – At Seawall at Doddridge Road

16849 – 1 Mile NE Of ICWW CM 14, 3 Mile North of PR 22 In Corpus Christi

16850 – At ICWW CM 15, Approximately 2 Miles North of PR 22 at Corpus Christi

16851 – 700 Yards East Of ICWW CM 27, 1.75 Miles North Of PR 22 in Corpus Christi

16852 – At ICWW CM 27, Approximately 1.5 Miles North of PR 22 in Corpus Christi

16853 – 100M North Of Mustang Island, Spoil Bank Peninsula

16854 – In Corpus Christi Ship Channel at Mustang Island Mooring Channel, 3.25 KM West Of SH 361

17099 – Near the Mouth of the Laguna Madre, 4.3 Miles NE of SH 22 - JFK Causeway

**Permitted Outfalls**

Koch Pipeline Company, L. P.

E. I. Du Pont De Nemours &amp; Co.

US Department of the Navy (Corpus Christi Naval Air Station)

Occidental Chemical Corporation

City of Gregory

City of Ingleside

Nueces Co. WCID No. 4

Texas A&amp;M University System

**Impairments**

There is an impairment for bacteria for oyster waters in the area along the southern shore including Port Bay and the area near Bayside. The assessment is based on shellfish classification maps produced by DSHS.

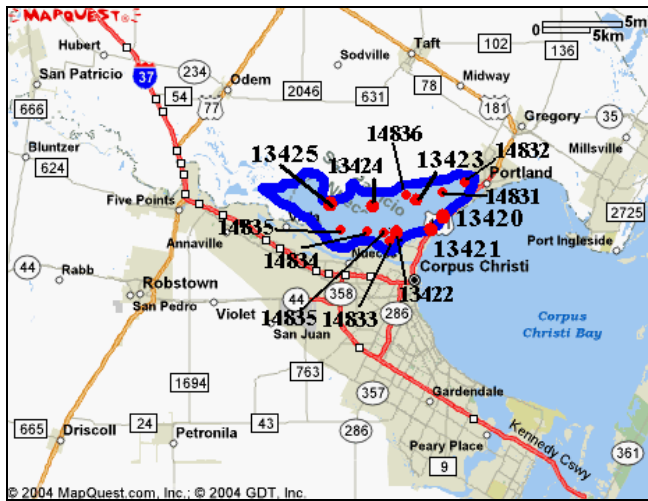
This bay is included in the TMDL discussed in the write up for Segment 2462. More information can be found at

<http://www.tnrc.state.tx.us/water/quality/tmdl/gulfcostaoyster.pdf>.

**Concerns**

The 2002 Assessment did not identify any concerns in this segment.

## 2482 – Nueces Bay



The bay is divided into four sub-segments, US 181 Causeway, south shore power line, near Whites Point, and the remainder of the bay.

### 2005 Monitoring

#### Remainder of Bay

13420 – US 181 Bridge at Causeway (North Side)

Parameter	Frequency	Agency
Metals in Water	4 (Zinc)	TCEQ TMDL (CCS)
Metals in Sediment	2(Zinc)	
Field	4	

13423 – 1 Mile From North Shore at East Overhead Power Line

Parameter	Frequency	Agency
Metals in Water	4 (Zinc)	TCEQ TMDL (CCS)
Metals in Sediment	2(Zinc)	
Field	4	

13424 – ½ Mile From North Shore at West Overhead Powerline at the 11th Pair Of Pylons From the North Shore

Parameter	Frequency	Agency
Metals in Water	4 (Zinc)	TCEQ TMDL (CCS)
Metals in Sediment	2(Zinc)	
Field	4	

14833 – South Side of Bay at Central Power and Light's Discharge

Parameter	Frequency	Agency
Metals in Water	4 (Zinc)	TCEQ TMDL (CCS)
Metals in Sediment	2(Zinc)	
Field	4	

18365 – Nueces Bay Near S Shore Just S Of E-W Powerlines Between Pylons 10-11 1.08 KM W and 362 M N Of Northernmost Point Of Burleson Rd

Parameter	Frequency	Agency
Metals in Water	4 (Zinc)	TCEQ TMDL (CCS)
Metals in Sediment	2(Zinc)	
Field	4	

### US 181 Causeway

13421 – US 181 Bridge At Causeway (South Side)

Parameter	Frequency	Agency
Metals in Water	4 (Zinc)	TCEQ TMDL (CCS)
Metals in Sediment	2(Zinc)	
Field	4	
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

### South Shore Power Line

13422 – ½ Mile From South Shore at East Overhead Power Line

Parameter	Frequency	Agency
Metals in Water	4 (Zinc)	TCEQ TMDL (CCS)
Metals in Sediment	2(Zinc)	
Field	4	
Metals in Water	2	TCEQ Region 14
Conventional	4	
Bacteria	4	
Field	4	

Near Whites Point

13425 – Near Whites Point

Parameter	Frequency	Agency
Metals in Water	4 (Zinc)	TCEQ TMDL (CCS)
Metals in Sediment	2(Zinc)	
Field	4	
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

### Additional Sites

#### Remainder of Bay

14831 – North of Indian Point

14832 – 1 Mile West of Portland

14834 – South Side of Bay Off Avery Point

14835 – North of Grain Silos

14836 – 500 Yards Offshore From Eastern Most Overhead Power Cable

### Permitted Outfalls

CPL (Nueces Bay Plant – intermittent during peak periods)

City of Portland WWTP

Sublight Enterprises, Inc. (Portland Inn)

Nueces Bay WLE LP

## Impairments

The entire bay has an impairment for zinc in oyster tissue. A TMDL is underway. The majority of zinc loadings (66%) were attributed to once-through cooling water that originates in the Corpus Christi Harbor from discharges by the Central Power and Light's Nueces Bay Plant. Approximately 23% of the loadings were attributed to atmospheric deposition, 5% to Lake Corpus Christi, 5% to land surface runoff, and 1% to the remaining permitted dischargers.

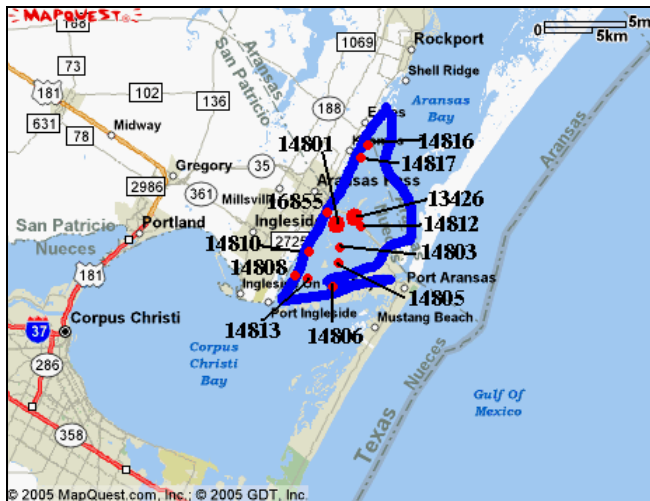
Metals sampling is also being conducted in Segment 2101, Nueces River Tidal, and Segment 2484, Corpus Christi Ship Channel in conjunction with this TMDL.

More information on the TMDL, which is funded through FY 2006, is available at <http://www.tnrcc.state.tx.us/water/quality/tmdl/nuecesbay.pdf>.

## Concerns

The 2002 Assessment did not identify any concerns in this segment.

## 2483 – Redfish Bay



The bay is divided into four sub-segments, the area near SH 361, the area near Ransom Island, ICWW near Ingleside, and the rest of the bay.

## 2005 Monitoring

### Area near SH 361

13426 – SH 361 at 3rd Bridge Between Aransas Pass and Port Aransas

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Field	4	

## ICWW near Ingleside

14801 – At the ICWW at Aransas Pass

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

## Additional Sites

### Area near Ransom Island

14803 – 1 Mile Northeast of Ransom Island

### Rest of the Bay

14805 – 1 1/2 Mile East of Ransom Island

14806 – 1 1/4 Mile South of Ransom Island

14808 – In the ICWW 1/4 Mile Northeast of Port Ingleside

14810 – In the ICWW 2.5 Miles Northeast of Port Ingleside

14812 – In the Aransas Channel at Hog Island

14813 – At the Intersection of Corpus Christi and Aransas Channels

14816 – In the ICWW 3.5 Miles Southwest of Rockport

14817 – 3 Miles Northeast of Aransas Pass

16855 – At ICWW At SH361 In Aransas Pass

## Permitted Outfalls

Degussa Engineered Carbons

Aker Gulf Marine

City of Aransas Pass

Tesoro Marine Servicet

Gulf Marine Fabricators

Martin Operating Partnership

## Impairments

The 2002 Assessment did not identify any impairments in this segment.

## Concerns

There is a concern for depressed DO in the area near SH 361. Ten 24-hour DO measurements were collected between July 2002 and September 2004 and all were above the standard of 5 MG/L. The 2006 Assessment should remove this concern.



## 2483A – Conn Brown Harbor

From the confluence with the Aransas Channel southeast of Aransas Pass in San Patricio County to a point 1 mile northeast in Aransas County



### 2005 Monitoring

13287 – Conn Brown Harbor

Parameter	Frequency	Agency
24hr DO	7	TCEQ TMDL (UTMSI)
Field	7	

### Permitted Outfalls

Liberty Seafood Inc.

### Impairments

The harbor has an impairment for depressed DO. The University of Texas Marine Science Institute at Port Aransas (UTMSI) is collecting more data and information before a TMDL is scheduled.

### Concerns

The 2002 Assessment did not identify any concerns in this segment.

## 2484 – Corpus Christi Inner Harbor



The harbor is divided into three sub-segments, the area near Avery Turning Basin, the area near Navigation Blvd., and the area near Viola Turning Basin.

## 2005 Monitoring

### Area near Avery Turning Basin

13430 – US 181 Bridge At Causeway (South Side)

Parameter	Frequency	Agency
Metals in Water	4	TCEQ
Metals in Sediment	2	TMDL
Field	4	(CCS)
Metals in Water	2	TCEQ Region 14
Metals in Sediment	2	
Organics in Sediment	2	
Conventional	4	
Bacteria	4	
Field	4	

### Area near Navigation Blvd.

13432 – Near Navigation Blvd. Draw Bridge

Parameter	Frequency	Agency
Metals in Water	4	TCEQ
Metals in Sediment	2	TMDL
Field	4	(CCS)
Organics in Sediment	2	TCEQ Region 14
Conventional	4	
Bacteria	4	
Field	4	

### Area between Navigation Blvd. And Viola Turning Basin

13436 –Mid- Channel, Adjacent to the Saber Refining Co. Barge Dock

Parameter	Frequency	Agency
Metals in Water	4 (Zinc)	TCEQ TMDL (CCS)
Metals in Sed.	2 (Zinc)	
Field	4	

### Area near Viola Turning Basin

13439 – In Viola Turning Basin

Parameter	Frequency	Agency
Metals in Water	4	TCEQ
Metals in Sediment	2	TMDL
Field	4	(CCS)
Metals in Water	2	TCEQ Region 14
Organics in Water	2	
Conventional	4	
Bacteria	4	
Field	4	



**Permitted Outfalls**

Encycle / Texas, Inc.  
 Elementis Chromium L.P.  
 Flint Hills Resources LP  
 Coastal Refining and Marketing  
 Citgo Refining and Chemicals  
 Valero Refining Company-Texas  
 Williams Terminals Holdings  
 Equistar Chemicals LP  
 Applied Industrial Materials  
 Koch Pipeline Company LP  
 Trifinery Petroleum Services  
 Shamrock Logistics Operations (Diamond Shamrock Refining)  
 Javelina Company  
 Corpus Christi Cogeneration  
 City of Corpus Christi (Broadway Plant)  
 Valero Logistics Operations  
 Magellan Terminals Holdings  
 Trigeant Limited

**Impairments**

The 2002 Assessment did not identify any impairments in this segment.

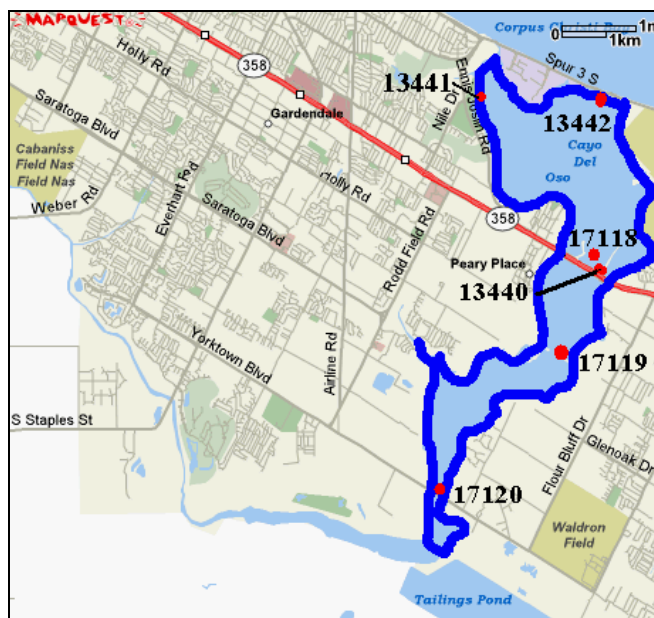
**Concerns**

Ammonia has been identified as a concern in the entire harbor.

Nitrate+nitrite nitrogen has been identified as a concern in the area near Navigation Blvd. and in the area near the Viola Turning Basin.

The source of these concerns is unknown.

**2485 – Oso Bay**



The bay is divided into five sub-segments for assessment: lower portion of bay; middle portion of bay near SH 358; middle portion of bay near railroad bridge;

upper portion of bay; and lower portion of bay, western side.

**2005 Monitoring**

**Middle Portion of Bay Near SH 358**

13440 – At Padre Island Drive (SH 358)

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Field	4	

**Lower Portion of Bay**

13442 - Ocean Drive

Parameter	Frequency	Agency
24hr DO	12	TCEQ TMDL (CCS)
Conventional	8	
Field	12	

**Middle Portion of Bay Near SH 358**

17118 – Northeast of Padre Island Drive (SH 358)  
 100m From Northeast Corner Of Bridge in Corpus Christi

Parameter	Frequency	Agency
24hr DO	12	TCEQ TMDL (CCS)
Conventional	8	
Field	12	

**Middle Portion of Bay Near Railroad Bridge**

17119 – 100m Northeast of Holly Road at RR Bridge in Corpus Christi

Parameter	Frequency	Agency
24hr DO	12	TCEQ TMDL (CCS)
Conventional	8	
Field	12	

**Upper Portion of Bay**

17120 – 50m Northeast of Yorktown Bridge (CR 24) in Corpus Christi

Parameter	Frequency	Agency
24hr DO	12	TCEQ TMDL (CCS)
Conventional	8	
Field	12	

**Additional Monitoring Sites**

**Lower Portion of Bay, Western Side**

13441 – Opposite Oso Sewage Treatment Plant Discharge, 500 Feet East of Ennis Joslin Road

**Permitted Outfalls**

Central Power and Light Company (Barney M. Davis Plant)  
 Texas A&M University System (La Coss Facility Corpus Christi)  
 City of Corpus Christi (Oso Facility)

**Impairments**

The entire bay, except for the lower portion, western side, has an impairment for depressed DO. The Center of Coastal Studies is conducting 24-hour DO monitoring in order to collect more data and information before a TMDL is schedule. The

depressed DO is suspected to be caused by municipal discharges.

The lower portion of the bay, the lower portion of the bay – western side, and the middle portion of the bay near SH 358 have an impairment for bacteria. A TMDL is underway. A hydrologic model is being developed to try and identify the source of the bacteria. The bacteria is generally believed to be from municipal discharges and non-point source runoff. More information on the TMDL is available at

<http://www.tnrcc.state.tx.us/water/quality/tmdl/osobaybacteria.html>. This TMDL also includes Oso Creek, Segment 2485A. NRA is a member of the steering committee for this TMDL.

**Concerns**

The lower portion of the bay – western side has concerns for depressed DO, elevated nutrients, and excessive algal growth. The source has been identified as municipal discharges.

**2485A – Oso Creek (unclassified water body)**

From the confluence with Oso Bay in southern Corpus Christi to a point 3 miles upstream of SH 44, west of Corpus Christi in Nueces County



The segment is divided into two sub-segments for assessments, the lower 25 miles and the upper 4.5 miles.

**2005 Monitoring**

**Lower 25 Miles**

13028 – At SH 286 South of Corpus Christi

Parameter	Frequency	Agency
Conventional	4	NRA
Bacteria	4	
Field	4	

13029 – At FM 763 Southwest of Corpus Christi

Parameter	Frequency	Agency
Bacteria	4	NRA
Flow	4	
Field	4	

**Permitted Outfalls**

City of Corpus Christi (Greenwood)  
 City of Robstown  
 Corpus Christi Peoples Baptist Church  
 Tennessee Pipeline Construction (Cudahy Field)  
 Celanese Ltd

**Impairments**

The lower 25 miles has an impairment for bacteria. This segment is included in the TMDL discussed in the write up for Segment 2485.

**Concerns**

The lower 25 miles has concerns for nitrate+nitrite nitrogen, orthophosphorus, and total phosphorus. The source of these pollutants has been identified as municipal discharges.

## 2491 – Laguna Madre

The Laguna is divided into eleven sub-segments for standard assessment, upper Laguna Madre near Packery Channel Park, the area near the upper end of Padre Island National Seashore, the area around the mouth of Baffin Bay, the area around Rincon de San Jose, the area around Port Mansfield, the area around the mouth of the Arroyo Colorado, the area adjacent to the Laguna Atascosa National Wildlife Refuge, the area around Morano Blanco, the Lower Laguna Madre near Laguna Heights and Laguna Vista, the lower Laguna Madre from Andie Bowie Park to Isla Blanca Park to Port Isabel, and the remainder of the segment.

The Laguna is divided into three sub-segments for oyster waters assessment, 18.1 square miles near the Arroyo Colorado and along the ICWW, the main portion of the Laguna Madre south of Ports Mansfield, and the remainder of the Laguna Madre north of Port Mansfield.

### 2005 Monitoring

#### Upper Laguna Madre Near Packery Channel Park

13443 – South of the Intersection of GIWW and Padre Island Causeway

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

17121 – 0.7km Southeast of End of Yorktown Road  
Approximately 1.3km Northwest of Pita Island in Corpus Christi

Parameter	Frequency	Agency
24hr DO	12	TCEQ TMDL (CCS)
Benthics	5	
Conventional	8	
Field	12	

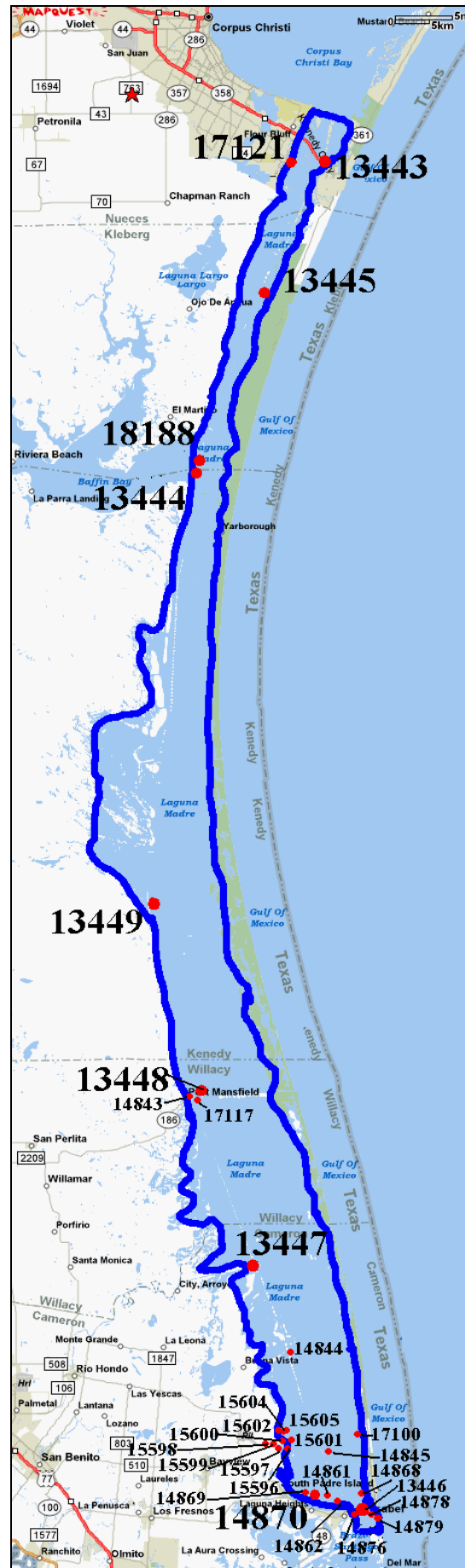
#### Area Around Mouth of Baffin Bay

13444 – At Intersection of GIWW at Baffin Bay Marker

Parameter	Frequency	Agency
Field	12	TCEQ TMDL (CCS)
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

18188 – East of ICWW Marker 221 at South End of Dredge Material Placement Island

Parameter	Frequency	Agency
24hr DO	12	TCEQ TMDL (CCS)
Conventional	8	
Benthics	5	
Field	12	



**Area Near Upper End of Padre Island National Seashore**

13445 – At GIWW Near Bird Island

Parameter	Frequency	Agency
24hr DO	12	TCEQ TMDL (CCS)
Benthics	5	
Conventional	8	
Field	12	
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

**Lower Laguna Madre From Andie Bowie Park to Isla Blanca Park to Port Isabel**

13446 – GIWW at Marker 129 East of Port Isabel

Parameter	Frequency	Agency
24hr DO	12	TCEQ TMDL (CCS)
Benthics	5	
Conventional	8	
Field	12	
Conventional	4	TCEQ Region 15
Bacteria	4	
Field	4	

**Area Around Mouth of the Arroyo Colorado**

13447 – Intersection of GIWW and Arroyo Colorado

Parameter	Frequency	Agency
24hr DO	12	TCEQ TMDL (CCS)
Benthics	5	
Conventional	8	
Field	12	
Conventional	4	TCEQ Region 15
Bacteria	4	
Field	4	

**Area Around Port Mansfield**

13448 – Intersection of GIWW and Port Mansfield Channel

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 15
Bacteria	4	
Field	4	

**Area Around Rincon de San Jose**

13449 – Channel Marker C-225A North of Port Mansfield

Parameter	Frequency	Agency
24hr DO	12	TCEQ TMDL (CCS)
Benthics	5	
Conventional	8	
Field	12	
Conventional	4	TCEQ Region 15
Bacteria	4	
Field	4	

**Lower Laguna Madre near Laguna Heights and Laguna Vista**

14870 – 200 yds. Off Laguna Vista Shoreline

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 15
Bacteria	4	
Field	4	

**Additional Monitoring Sites**

**Area Adjacent of the Laguna Atascosa National Wildlife Refuge**

14844 – At ICWW Marker 49

**Area around Morano Blanco**

14845 – At ICWW Marker 109

15596 – Cove Immediately South of Morano Blanco

Near SW Shoreline, 0.6 KM Upstream of Mouth

15597 – Cove Immediately South Of Morano Blanco

Near Southern Shoreline, 0.8 KM Upstream of Mouth

15598 – Cove Immediately South of Morano Blanco

Near Southern Shoreline, 0.5 KM Upstream of Mouth

15599 – Cove Immediately South of Morano Blanco

Near Southern Shoreline, 0.55 KM Upstream of Mouth

15600 – Cove Immediately South of Morano Blanco,

Mid-Cove, 0.5 KM Upstream of Mouth

15601 – Cove Immediately South of Morano Blanco,

Mid-Cove, 0.3 KM Upstream of Mouth

15602 – Near West Shoreline, Bordering Laguna Atascosa National Wildlife Refuge, 1.9 Km North Of Morano Blanco Point

15604 – Near West Shoreline, Bordering Laguna

Atascosa National Wildlife Refuge, 0.75 KM North of Morano Blanco Point

15605 – Near West Shore Bordering Laguna

Atascosa National Wildlife Refuge, 0.7 KM North Of Morano Blanco Point

**Area around Port Mansfield**

14843 – At Port Mansfield CM 40

17117 – 1/4 Mi NW of ICWW CM 284 in the Turning

Channel Between the ICWW and the Port Mansfield Channel

**Lower Laguna Madre From Andie Bowie Park to Isla Blanca Park to Port Isabel**

14862 – 300 Yards NE of Entrance to Yacht Club Turning Basin

14868 – 100 Yards Off South Padre Island 2 Miles North of the Causeway

14876 – At the Middle of the South Padre Island Causeway

14878 – At Entrance to Sea Ranch Marina Channel

14879 – 1/4 Mile South of Coast Guard Boat Docks

17100 – 400M West of Andy Bowie Park

**Lower Laguna Madre near Laguna Heights and Laguna Vista**

14861 – 300 Yards NW of the Yacht Club Turning Basin Entrance

14869 – 200 Yards Off Laguna Heights Shoreline

**Permitted Outfalls**

- Harlingen Shrimp Farms, LTD
- City of Santa Rosa
- Loma Alta Trust (Loma Alta Aquaculture)
- City of Raymondville
- City of Edinburg
- City of Weslaco
- Port Mansfield Public Utility District (PUD)
- City of McAllen
- Jim Hogg County WCID No. 2 (Hebbronville Plant)
- City of Lyford
- US Dept. of Justice (Port Isabel Detention Center)
- Fig Tree R.V. Resort, L.C.
- US Department of the Interior
- Sebastian MUD
- North Alamo WSC (La Sara)
- City of Corpus Christi (Laguna Madre and Whitecap Plants)
- Laguna Madre Water District (Isla Blanca Plant, Andy Bowie Park Plant and Laguna WWTP)
- Rio Grande Valley Sugar Growers
- City of Edcouch
- County of Hidalgo
- City of La Villa
- City of Elsa
- Calpine Construction Finance
- Calpine Hidalgo Energy Center

**Impairments**

The area around the mouth of Baffin Bay, the area around the mouth of the Arroyo Colorado, the area near the upper end of Padre Island National Seashore, and the Upper Laguna Madra near Packery Channel have an impairment for depressed DO. CCS is conducting 24-hour DO monitoring in order to collect more data and information before a TMDL is schedule.

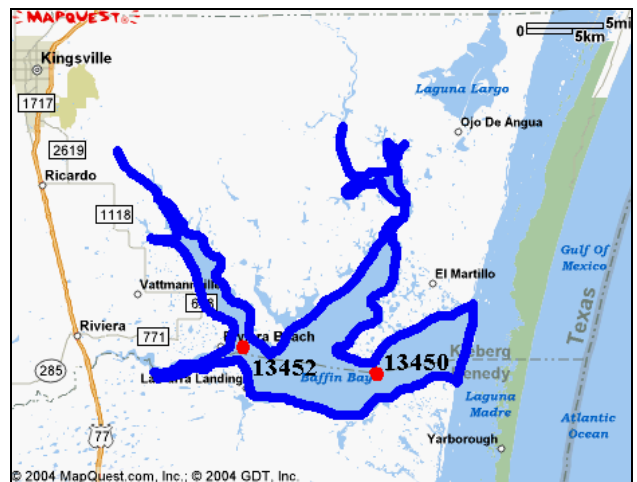
**Concerns**

There is a concern for bacteria in oyster waters in the 18.1 square miles near the Arroyo Colorado and along the ICWW.

The area around the mouth of Baffin Bay has a concern for excessive algal growth.

The area around the mouth of the Arroyo Colorado has concerns for ammonia, nitrate+nitrate nitrogen, orthophosphorus and total phosphorus. The source is believed to be from municipal discharges and urban runoff.

**2492 – Baffin Bay**



The bay is divided into three sub-segments for assessment, Upper Baffin Bay near Los Olmos and Fernando Creek arms, Lower Baffin Bay near Salvation Point and Black Bluff, and the remainder of the segment.

**2005 Monitoring**

**Lower Baffin Bay near Salvation Point and Black Bluff**

13450 – At Channel Marker 14

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

**Upper Baffin Bay near Los Olmos and Fernando Creek Arms**

13452 – At Channel Marker 36

Parameter	Frequency	Agency
Metals in Water	2	TCEQ Region 14
Conventional	4	
Bacteria	4	
Field	4	

**Permitted Outfalls**

- Texas Ecologist, Inc. (US Ecology)
- Kleberg County (Kaufer Hubert Memorial Park)
- Riviera WCID
- County of Kleberg (Ricardo WWTP)

**Impairments**

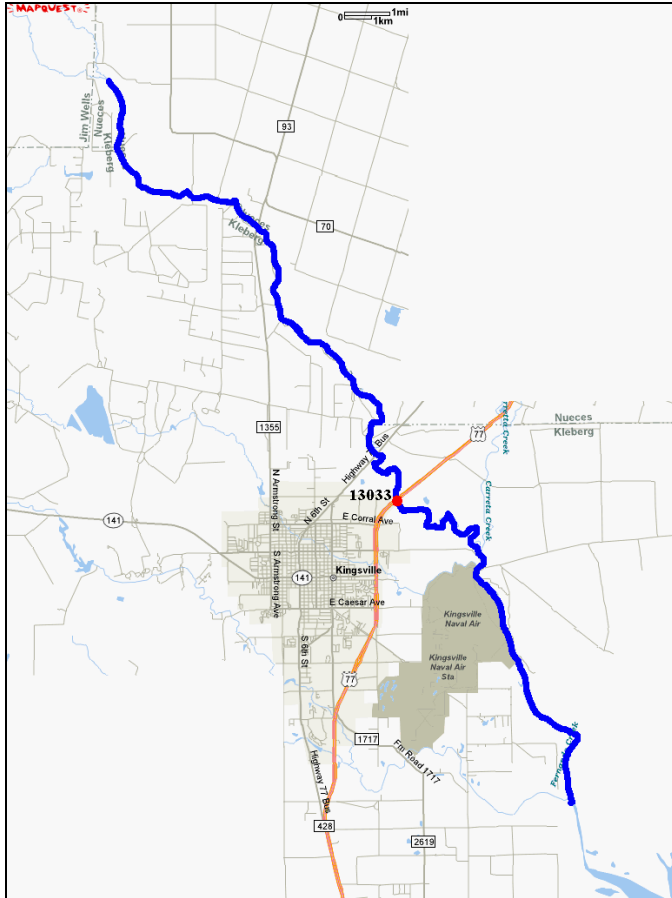
The 2002 Assessment did not identify any impairments in this segment.

**Concerns**

There is a concern for excessive algal growth in Upper Baffin Bay near Los Olmos and Fernando Creek arms. The source of the pollutant for this concern is unknown.



**2492A – San Fernando Creek (unclassified water body)**



The segment is divided into two sub-segments for assessments, 25 miles upstream of the confluence with Cayo del Grullo and the remainder of the creek.

**2005 Monitoring  
Remainder of Creek**

13033 – At US 77 Bypass Bridge at Kingsville

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Flow	4	
Field	4	

**Permitted Outfalls**

- City of Alice
- San Diego MUD
- Ticona Polymers, Inc.
- City of Bishop
- City of Kingsville
- US Department of the Navy (Kingsville Naval Air Station)

**Impairments and Concerns**

The 2004 Assessment did not identify any impairments or concerns on this segment.

**2493 – South Bay**



**2005 Monitoring**

13459 – Near Ship Channel Marker 17

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 15
Bacteria	4	
Field	4	

14865 – Middle of Bay

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 15
Bacteria	4	
Field	4	

**Additional Monitoring Sites**

- 14855 – 100 Yards NW of Brazos Island
- 14856 – South Bay
- 14858 – South Bay
- 14880 – South Bay
- 17101 – 1.9 Miles East of Del Mar Beach

**Impairments and Concerns**

The 2002 Assessment did not identify any impairments or concerns on this segment.



## 2494 – Brownsville Ship Channel



The segment is divided into three sub-segments for assessment, near the mouth, in the turning basin, and the mid-portion of the ship channel.

### 2005 Monitoring Near the Mouth

13460 – Near Ship Channel Marker 35 (Black Buoy)

Parameter	Frequency	Agency
Metals in Water	2	TCEQ Region 15
Metals in Sediment	2	
Conventional	4	
Bacteria	4	
Field	4	

### Turning Basin

14871 – At East End of Turning Basin

Parameter	Frequency	Agency
24hr DO	2	TCEQ Region 15
Conventional	4	
Bacteria	4	
Field	4	

### Mid-portion of the Ship Channel

14875 – At Entrance to San Martin

Parameter	Frequency	Agency
Metals in Water	2	TCEQ Region 15
Metals in Sediment	2	
Conventional	4	
Bacteria	4	
Field	4	

### Additional Sites

17102 – 4.2 Miles West of the Mouth at CM 38

## Permitted Outfalls

Brownsville Navigation District (Fishing Harbor Plant and Northside Plant)  
 Valley MUD No. 2  
 Laguna Madre Water District (Port Isabel Plant)  
 Brownsville Public Utilities (N. Robindale Plant)  
 City of Los Fresnos  
 John Frias (St. Francis of Assisi)  
 Olmito WSC (Olmito Plant)  
 Lone Star Hatchery, Inc.

## Impairments

The 2002 Assessment did not identify any impairments on this segment.

## Concerns

There is a concern for depressed DO in the turning basin. 24-hour DO measurements are being collected at two stations in order to help determine the pollutant source for this concern.

## 2494A – Port Isabel Fishing Harbor (unclassified water body)



### 2005 Monitoring

13285 – At Hwy 100 Bridge

Parameter	Frequency	Agency
Metals in Water	2	TCEQ Region 15
Metals in Sediment	2	
Conventional	4	
Bacteria	4	
Field	4	

### Impairments and Concerns

The 2004 Assessment did not identify any impairments or concerns on this segment.

## 2501 – Gulf of Mexico

The lower gulf is divided into three sub-segments for assessment, the Port Aransas area, the Port Isabel area, and the Port Mansfield area.

### 2005 Monitoring

#### Port Aransas Area

13468 – At Port Aransas Near End of South Jetty Near Marker R-7

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 14
Bacteria	4	
Field	4	

#### Port Isabel Area

13470 – At Port Isabel, Just Beyond Jetties at Bell Buoy

Parameter	Frequency	Agency
Conventional	4	TCEQ Region 15
Bacteria	4	
Field	4	

#### Additional Sites

13469 – At Port Mansfield, Just Beyond Jetties at Bell Buoy

#### Impairments

Based on data from DSHS, all areas are listed as having an impairment for mercury in King Mackerel > 43 inches long. The source of the mercury is attributed to atmospheric deposition. Additional data and information will be collected before a TMDL is scheduled.

#### Concerns

The 2002 Assessment did not identify any concerns on this segment.



## Special Studies

### Cameron County NPS Monitoring Project

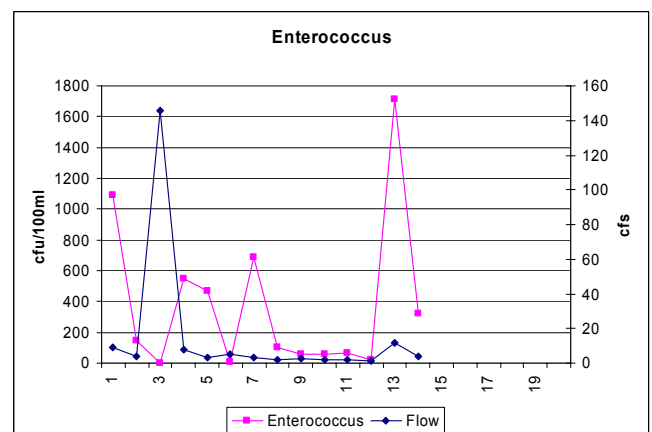
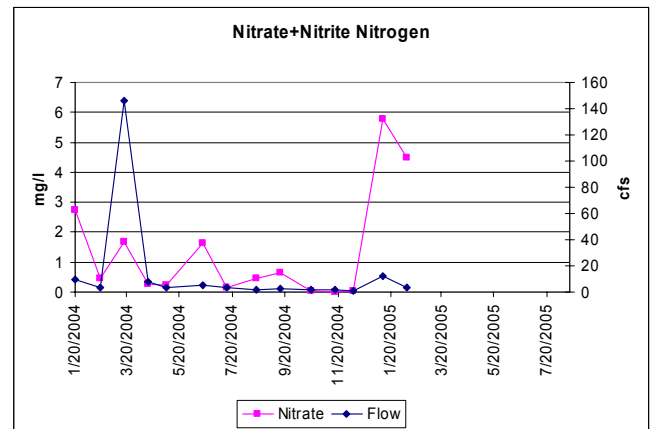
Non-point source (NPS) water pollution is the leading cause of water pollution in the United States (EPA). NPS water pollution is derived from discrete sources in the environment and most often occurs as storm water moves over land picking up and transporting pollutants from multiple sources to receiving waters. Man-made pollutants such as fertilizers, herbicides, pesticides, toxic chemicals from urban runoff, bacteria from faulty septic systems, and animal wastes account for much of the pollution entering receiving waters.

Best Management Practices to minimize NPS pollution include the use of constructed storm-water wetlands where applicable. Wetlands, defined in accordance with the Clean Water Act, are areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. When properly managed, wetlands can reduce NPS pollution downstream by controlling runoff volume, reducing erosion rates and providing partial removal of suspended solids, metals, nutrients, and organics from storm-water runoff. The use of constructed wetlands to treat storm water has increased in recent years. Studies have focused on improving the performance, sustainability, and design of created wetlands.

In Cameron County, a significant water pollution problem caused by NPS pollution has been attributed to runoff from the Green Valley Farms colonia, a largely undeveloped 2,000 acre colonia served by septic tank/soil absorption systems, and surrounding agricultural areas. During periods of wet weather, when soils become saturated, septic systems fail to function properly. Storm waters, in the form of sheet flow, pick up contamination from the colonia and surrounding agricultural areas and transport it downstream. During moderate flooding events, contaminated waters flow into a man-made ditch that flows into the upper portion of the Arroyo Colorado Tidal Segment, which then flows into the Laguna Madre. During large flooding events, a portion of the water diverts to the Resaca De Los Fresnos which flows into the Laguna Atascosa in the Laguna Atascosa National Wildlife Refuge.

Beginning in January 2004, NRA has been collecting field and laboratory data on a monthly basis that will be used to characterize the quality of runoff from the Green Valley Farm colonia prior to the construction of a proposed retention facility and wetland treatment system. In addition to conventional laboratory tests, biological oxygen demand, total Kjeldahl nitrogen, and orthophosphorus have been added to aid in characterizing water quality. NRA will attempt to collect field and conventional parameters on a monthly basis and during four high flow events during the study period; one high flow event has already been captured. However, the retention facility and wetland treatment system project has not yet been funded. Monitoring will continue through August 2005 and data will be retained for future studies.

The following graphs show the recorded values for flow, Nitrate+Nitrite Nitrogen, and Enterococcus from January 2004 through February 2005.



## Stakeholder Participation

CRP depends on public involvement and input from stakeholders to assist in understanding the needs of the basins and the areas of concern. The NRA steering committee serves as the focus for public input and assists with:

- Creation of specific achievable water quality objectives and basin priorities
- Review and development of work plans and allocation of resources
- Development, review and approval of major reports
- Establishing monitoring priorities and developing monitoring plans
- Improving awareness of water quality, water resource, and pollutant source issues
- Increasing opportunities for citizens to identify pressing issues, concerns, and contributing ideas to the CRP process
- Expanding the public's role in water quality management issues

The steering committee includes stakeholder volunteers from across NRA's area of responsibility, representing:

- Private citizens
- Fee-payers (identified in Texas Water Code TWC 26.0135(h))
- Political subdivisions (including local, regional, and state officials)
- State Soil and Water Conservation Board
- Other appropriate state agencies including: TPWD, Texas Water Development Board, TGLO, TDH, Texas Department of Agriculture, Texas Railroad Commission, and TXDOT.
- Other entities interested in water quality matters including: TCEQ regional staff, business and industry, agriculture, environmental and other public interest groups.

NRA encourages stakeholder participation to provide suggestions for additional monitoring, special studies, outreach opportunities, and to be a voice for local concerns. For more information about stakeholder participation, the steering committee process, or how to become a steering committee member, visit our Public Involvement web page at [http://www.nueces-ra.org/CP/CRP/public\\_inv.html](http://www.nueces-ra.org/CP/CRP/public_inv.html), or contact NRA using the contact information at the end of this report.

## Public Outreach

### NRA Activities

In 2004, NRA participated in numerous activities to help educate students on pollution sources, the importance of keeping our waters clean, and what they can do help protect our rivers, lakes, and bays.

#### Nueces County Cooperative Extension

For the past two years NRA outreach staff have participated in the Nueces County Ag Fair, an education event sponsored by the local Texas Cooperative Extension office. The 2004 event drew 779 3<sup>rd</sup> and 4<sup>th</sup> graders from Nueces County elementary schools. Students participated in an NPS demonstration using the Texas Watch watershed model. Following the 2004 Ag Fair, Cooperative Extension staff members were trained in the presentation and have borrowed the model for demonstration to volunteers who will carry the watershed protection message to others in Nueces County. This kind of partnering will help meet the watershed education needs in rural underserved areas of NRA's area of responsibility.

#### Gulf of Mexico Foundation

The Gulf of Mexico Foundation continued its multicultural approach to environmental education sponsoring field trips and cleanups for students in Science and Spanish clubs from coastal middle schools. In fall of 2003, NRA and the City of Corpus Christi outreach staff provided leadership, guidance, and support for a Foundation sponsored field trip to Choke Canyon Reservoir and the lower Nueces River. NRA staff demonstrated NPS pollution threats from human activity using the Texas Watch watershed model. NRA outreach staff continues communication with the Foundation personnel to identify potential education and outreach opportunities within the CRP area of responsibility.

#### Earth Day Bay Day

NRA participates at the Earth Day Bay Day Celebration held each year in April. In past years, NRA has demonstrated the use of monitoring equipment to educate the public about environmental operations at NRA. Posters have been created to show where sampling stations are and what parameters are analyzed. This year NRA will demonstrate how to check on water quality in the basin using the tools found on our website.



## Texas Watch Volunteer Monitoring and Environmental Education Program

Texas Watch volunteers and partners continue to facilitate environmental stewardship by empowering local networks to promote a healthy and safe environment through environmental education and data collection. The Texas Watch Program is supported through grants from the EPA through the TCEQ and administered by Texas State University. Texas Watch activities in the Nueces River basin focus on watershed education and volunteer monitoring. Watershed education activities are centered on an NPS pollution theme that ties land use activities with water quality and natural resources. Texas Watch's certified citizen monitors take part in a three phase training regime that allows participants to collect quality assured data that can be used for local decisions, baseline data, research and education, and problem identification.



*Texas Watch staff (left) discusses NPS pollution during an annual Earth Day outreach event in Port Aransas.*

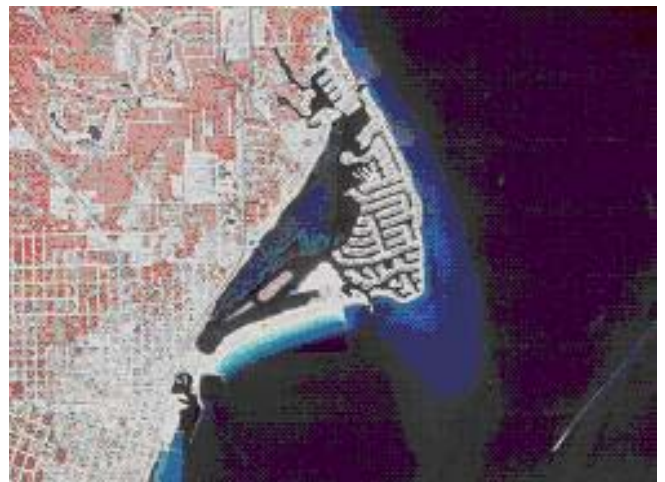
Citizen monitors collect DO, pH, conductivity, salinity, temperature, Secchi depth, flow severity, and record land use activities and various field observations. Through its participation in CRP, Texas Watch monitors continue to assist with comprehensive and cooperative watershed planning, enhance public participation and outreach, provide a scientific response to water quality problems when appropriate, and identify, analyze, and report on water quality issues and potential causes of pollution.

*A satellite view of Rockport, Texas and Little Bay*



*A Texas Watch Trainer (right) demonstrates the proper procedure for measuring specific conductance during a phase I training.*

Active Texas Watch partners operating in the Nueces River basin in 2004 and 2005 include NRA, the Texas State Aquarium Sea Center, the City of Rockport, and the TCEQ Corpus Christi regional office. Since 2000, Texas Watch monitors have documented more than 275 monitoring events from nine sampling sites in this basin. In 2004, twenty-six samples were collected from three sites. The majority of these samples were collected in and around Rockport, Texas. The Little Bay Sentinels Texas Watch monitoring group, which was established in 2000, continues to operate within the City of Rockport's Water Quality Committee. Their main purpose is to test and document the water quality of Little Bay. A veteran Texas Watch monitor, Michael Proctor, continues to lead the monitoring efforts and serve as the chair of the committee. Rockport's beaches continue to meet all requirements for the Blue Watch designation as certified by the Clean Beaches Council. A Blue Wave designation indicates a clean and safe destination that is managed with consideration for its users and the environment.



Aside from the Little Bay monitoring activities, Texas Watch and its partners focus on watershed education

by working with teachers, interest groups, and the general public. The Sea Center continues to serve as a regional hub where monitoring kits are available to area teachers for classroom and field monitoring exercises. Texas Watch provides several types of teaching materials to interested educators. The *Water Quality Monitoring* curriculum is designed for high school and middle school science teachers. For use as a companion to the Texas Watch Water Quality Monitoring Manual, this curriculum covers the key environmental and scientific concepts associated with Texas Watch's core water quality variables. In addition to presenting the procedures for performing the water quality tests, this curriculum provides

lessons, exercises, evaluation materials and TEKS correlations. Texas Watch hopes this curriculum will facilitate the presentation of Texas Watch concepts in the classroom and field. The following curricula are also available: *Intermediate Student Guide to Water Quality Monitoring*, *Understanding Nonpoint Source Pollution*, *Texas Watch Conducting a Watershed Survey Curriculum*.

For more information on Texas Watch, visit their website at <http://www.texaswatch.geo.swt.edu/>.



## Website

The NRA CRP main web page is located at <http://www.nueces-ra.org/CP/CRP>. This page contains links to information about CRP in general, and to specific information with respect to NRA's role in CRP including:

### 303(d) List – <http://www.nueces-ra.org/CP/CRP/303d00.html>

**Summary:** This lists the 2004 Final 303(d) List of Impaired Water Bodies for the Nueces - Rio Grande Coastal Basin, Nueces River Basin, and the San Antonio - Nueces Coastal Basin

### Water Quality Database -- <http://www.nueces-ra.org/cgi-bin/SW/access.cgi>

**Summary:** Sampling data may be retrieved on this page by: Station ID, date range, county, basin or segment.

### Meeting Notices -- <http://www.nueces-ra.org/CP/CRP/crpnotices.html>

**Summary:** Shows upcoming events/meetings and their details for CRP and other environmental related activities.

### Monitoring Schedules -- <http://www.nueces-ra.org/cgi-bin/SW/access.cgi>

**Summary:** Coordinated Monitoring Schedule for FY 2004 and 2005 are posted for easy access to the Texas CRP and SWQM monitoring schedules (<http://cms.lcra.org/>).

### Interactive Clickable Maps of Monitoring Sites -- <http://www.nueces-ra.org/CP/CRP/maps/>

**Summary:** Information may be obtained by clicking on the interactive maps listed below:

1. <http://www.nueces-ra.org/CP/CRP/middle.html> -- Lower Nueces Basin and Coastal Basins
2. <http://www.nueces-ra.org/CP/CRP/upper.html> -- Upper Nueces Basin
3. <http://www.nueces-ra.org/CP/CRP/lower.html> -- Lower Nueces - Rio Grande Coastal Basin
4. <http://www.nueces-ra.org/CP/CRP/maps/fy2005ms/default.htm> -- FY 2005 Monitoring Sites
5. <http://www.nueces-ra.org/CP/CRP/segments.html> -- CRP Segments

### Quality Assurance Project Plans -- <http://www.nueces-ra.org/CP/CRP/>

**Summary:** The Quality Assurance Project is used to delineate organization policy, structure and procedures which will be used to verify and validate the water quality data collected under the Texas Clean River Act (Senate Bill 818). This will ensure proper practices and collections to maintain quality assured data.

### Steering Committee Information -- [http://www.nueces-ra.org/CP/CRP/steering\\_committee/](http://www.nueces-ra.org/CP/CRP/steering_committee/)

**Summary:** This page hosts links to the Summary of Annual Meetings for 2004, a list of the members, and a Steering Committee Input web form.

### Public Outreach -- <http://www.nueces-ra.org/CP/CRP/outreach/>

**Summary:** Shows many important resource links to internal and external sites that help aid in resource protection, and public education.

### Reports -- <http://www.nueces-ra.org/CP/CRP/reports/>

**Summary:** Includes current and historical reports such as the Basin Highlights Reports and Basin Summary report.

The CRP water quality database maintained by NRA contains water quality information about all the SWQM stations with the basins and any available sampling data. The database is updated monthly with any new data in the TCEQ database. The user is able to request information for any SWQM station based on

the SWQM number directly or from a list of stations based on those sampled (1) within a given date range, (2) within a specific county, (3) within a specific basin, or (4) on a specific segment. The station page contains location information and options for sampling data, either by sampling date or by storet code.

## CONTACT INFORMATION

Please contact us for more information on CRP, other activities of NRA, or to obtain additional copies of this report.

### General Office

*First State Bank Bldg, Suite 206  
200 E. Nopal - P.O. Box 349  
Uvalde, Texas 78802-0349  
Tel:830-278-6810 - Fax:830-278-2025*

### Coastal Bend Division

*Natural Resources Center  
6300 Ocean Drive Unit 5865  
Corpus Christi, Texas 78412 - 5865  
Tel:361-825-3193 - Fax:361-825-3195*

### EMAIL

Sky Lewey, Public Outreach Associate  
[slewey@nueces-ra.org](mailto:slewey@nueces-ra.org)

Rocky Freund, Director, Coastal Bend Division  
[rfreund@nueces-ra.org](mailto:rfreund@nueces-ra.org)

Jew-Lee Lann, Information Systems Coordinator  
[jlann@nueces-ra.org](mailto:jlann@nueces-ra.org)

Sam Sugarek, Aquatic Resource Specialist  
[ssugarek@nueces-ra.org](mailto:ssugarek@nueces-ra.org)

## **Appendices**



**Appendix 1. Sampling Parameters**

<b>Monitoring Type</b>	<b>Parameters</b>	
Conventional	Total Suspended Solids Volatile Suspended Solids Total Dissolved Solids Alkalinity Sulfate Chloride Chlorophyll-a Biologic Oxygen Demand <sup>1</sup> Total Kjeldahl Nitrogen <sup>1</sup>	Pheophytin Ammonia Hardness <sup>2</sup> Nitrate+Nitrite Total Organic Carbon Total Phosphorus Turbidity Orthophosphate <sup>1</sup>
Bacteria	E. coli <sup>2</sup>	Enterococcus <sup>3</sup>
Field	pH Dissolved Oxygen Conductivity Salinity <sup>3</sup> Temperature Secchi Depth Days since last rainfall Flow <sup>4</sup> Flow measurement method <sup>4</sup> Flow severity <sup>4</sup> Air temperature	Wind direction Wind intensity Present Weather Water Color Water Odor Water Surface Turbidity Tide Stage <sup>3</sup> Rainfall 1 day prior Rainfall 7 days prior
Organics in Water	1,1,1-Trichloroethane 1,1,2,2-Tetrachloroethane 1,1,2-Trichloroethane 1,1-Dichloroethane 1,1-Dichloroethylene 1,2- Dichloroethane 1,2-Dichloropropane Benzene Bromodichloromethane Bromoform Bromomethane Carbon Tetrachloride Chlorobenzene Chloroethane	Chloroform Chloromethane cis-1,3-Dichloropropene Dibromochloromethane Ethylbenzene Methyl tert-butyl ether Methylene chloride Tetrachloroethylene Toluene trans-1,2-Dichloroethene trans-1,3-Dichloropropene Trichloroethene Vinyl chloride
Metals in Water (All Dissolved)	Aluminum Arsenic Chromium Copper Lead	Manganese Nickel Selenium Silver Zinc
Metals in Sediment	Aluminum Arsenic Cadmium Chromium Copper Lead	Manganese Mercury Nickel Selenium Silver Zinc
<sup>1</sup> Measured only at station 18196 for Special Study <sup>2</sup> Measured only at fresh water stations <sup>3</sup> Measured only at marine and tidal stations <sup>4</sup> Measured only at non-tidal stream stations		

## **Appendix 2. Sampling Parameter Descriptions**

(Please refer to <http://www.nueces-ra.org/CP/CRP/sparameters.doc> for more information about these parameters.)

Alkalinity – measures the buffering capacity of water which helps a solution resist changes in pH caused by the addition of an acid or base thereby maintaining an appropriate pH range for aquatic habitat

Bacteria – measures the amount of pathogens (E. coli in fresh water, Enterococci in marine water) present in the water

Biochemical Oxygen Demand – the measure of the amount of oxygen that is consumed in the biological processes that break down organic matter in water and is used to determine the relative oxygen requirements of wastewaters, effluents, and polluted waters

Chlorides – measures the ionize, water soluble form of chlorine present in the water

Chlorophyll-a – the photosynthetic pigment found in all green plants, algae, and cyanobacteria, the concentration is used to estimate phytoplankton biomass in surface water

Conductivity - is the measure of electrical current carrying capacity of water and is used to measure the amount of dissolved solids and salts in the water

Dissolved Oxygen - the amount of oxygen available to aquatic organisms and is the single most important indicator of a water body's ability to support desirable aquatic life

Hardness - measures divalent ions, salts such as calcium and magnesium, in association with carbonates

Metals – (Aluminum, Arsenic, Cadmium, Chromium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver and Zinc) - certain metals, like Mercury, have been found to bioaccumulate in the tissues of fish making them unsafe to eat - metals may be found in water and sediment

Nitrogen (Ammonia, Nitrate, Nitrite) – measures the nutrient levels in the water related to the decomposition of organic material

Orthophosphate - measures the amount of dissolved phosphorus which is immediately available to plants or algae

pH – measures the acidity of the water which affects the solubility, and therefore the toxicity, of chemicals and metals

Pheophytin – a degradation product of chlorophyll-a that is used to determine a more accurate measure of chlorophyll-a

Salinity - monitored at tidal streams, bays and estuaries only, and derived from conductivity and water temperature

Secchi Depth - measures the clarity or transparency of water

Turbidity - measures the clarity or cloudiness of water

Sulfate – measures the amount of water soluble sulfur present in the water

Total Dissolved Solids – measures the amount of minerals, salts, metals, cations or anions dissolved in the water

Total Kjeldahl Nitrogen – measures the organically bound nitrogen and free ammonia in the water

Total Organic Carbon – measures the amount of carbon covalently bound in organic compounds in a water sample which affects biogeochemical processes, nutrient cycling, biological availability, chemical transport and interactions

Total Phosphorus – measures all chemical forms of phosphorus

Total Suspended Solids – measures the amount of all particles suspended in water which will not pass through a filter



Volatile Organic Compounds - the collective name for a multitude of carbon-based compounds that evaporate readily into the atmosphere which can be health hazard if inhaled: examples include benzene, methyl tert butyl ether (MTBE), vinyl chloride, chloroform, formaldehyde, and toluene

Volatile Suspended Solids – measures the amount of solids lost on ignition (heating to 500° C) which gives an approximation of the amount of organic matter present in the solid fraction of wastewater, activated sludge and industrial wastes

Water temperature – affects the metabolic rates of aquatic organisms and plants