2024 Basin Highlights Report

San Antonio – Nueces Coastal Basin Nueces River Basin Nueces – Rio Grande Coastal Basin Bays and Estuaries



Written by Nueces River Authority:

Courtney Taylor Jessica Wright Wesley Harris



In preparation for: Texas Commission on Environmental Quality



This document was prepared in cooperation with the Texas Commission on Environmental Quality under authorization of the Clean Rivers Act

Introduction

In 1991, the Texas Legislature passed the Texas Clean Rivers Act (Senate Bill 818) requiring basin-wide water quality assessments to be conducted for each river basin in Texas. The Texas Commission on Environmental Quality (TCEQ) implements the Clean Rivers Program (CRP) by contracting with 15 partner agencies to collect data from over 1,800 water monitoring sites in the 25 river and coastal basins throughout the state. Each river or coastal basin is assigned to one of the partner agencies.

The Program Goal of the CRP is to maintain and improve the quality of water within each river basin in Texas through an ongoing partnership involving the TCEQ, river authorities, other agencies, regional entities, local governments, industry and citizens.

Nueces River Authority (NRA), working closely with TCEQ:

- conducts surface water quality monitoring to identify and
- evaluate surface water quality issues,
- establishes priorities for corrective action,
- works to implement those actions, and
- adapts to changing priorities.

NRA's objectives are to:

- Provide quality assured data to TCEQ for use in water quality decision making,
- identify and evaluate water quality issues,
- > promote cooperative watershed planning,
- inform and engage stakeholders,
- maintain efficient use of public funds, and
- adapt to emerging water quality issues.

Surface water quality data are used in the development of the Texas Surface Water Quality Standards, for modeling water quality trends, providing baseline data for water quality projects, and to help establish wastewater permit limits.

Under CRP, the NRA is responsible for the San Antonio – Nueces Coastal Basin, the Nueces River Basin, the Nueces – Rio Grande Coastal Basin, and the adjacent bays and estuaries - an area roughly 30,500 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.

In 2023, NRA conducted routine quarterly water quality monitoring at 34 river and 9 coastal stations on a quarterly basis for conventional, bacteria, flow (where applicable), and field parameters. NRA also conducted 24-hour dissolved oxygen (DO) monitoring at six sites. NRA is also currently monitoring for metals in water at three locations twice a year. All monitoring procedures and methods followed the guidelines prescribed in the NRA QAPP, the TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods (RG-415) and the TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data (RG-416).

Bandera County River Authority and Groundwater District (BCRAGD) will conduct routine quarterly monitoring, collecting field, conventional, bacteria and, where applicable, flow data at 5 river stations in Basin 21 Water quality data is submitted to the Surface Water Quality Monitoring Information Systems (SWQMIS) database that can be used for water quality assessments.

The Texas Integrated Report of Surface Water Quality is prepared and submitted to the U.S. Environmental Protection Agency (EPA) every two years in even numbered years, as required by law.

Visit Nueces River Authority's Clean Rivers Program website for more information!

https://nracleanriversprogram.org/

Water Quality Monitoring

WHAT IS MONITORED AND WHY

Dissolved oxygen

for aquatic life



Chloride

Sulfate
Total Dissolve

• Solids (TDS)

for public water supply

ŋ

Bacteria

for contact recreation



Water temperature

- pH
- Ammonia
- Nitrogen
- Phosphorus

for general use



Fish tissue

for fish consumption



NRA provides an interactive map with access to quality assured surface water quality data at:

https://nueces-ra.maps.arcgis.com/apps/webappviewer/index.html?id=a983728eb5834fc4a5780745096cedd7

Basin 20 – San Antonio-Nueces Coastal Basin

The San Antonio-Nueces Coastal Basin covers approximately 3,100 square miles, draining to Copano and St. Charles Bays. The basin is largely rural, with the dominant industries being crop farming and cattle production. Monitoring sites in Basin 20 are located on the tidal and above tidal portions of the Mission and Aransas rivers and for Aransas and Poesta creeks.



Basin 20 - Concerns and Impairments

Waterbody	Impairment Description	Concerns/Impairments
Mission River Tidal 2001	Chlorophyll-a Bacteria	Screening Level
		Concern, 4a
Mission River Above Tidel 2002	Low Dissolved Oxygon, Chlorophyllia	Screening Level
	Low Dissolved Oxygen, Chiorophyli-a	Concern
Arapsas Divor Tidal 2002	Chlorophyll a Bactoria	Screening Level
Aransas River Tidai 2003	Chiorophyli-a, Daclena	Concern, 4a
Arapaga Biyer Aboya Tidal 2004	Low Dissolved Oxygen (DO) Nitrate, Total Bheenberge, Besterie	Screening Level
Aransas River Above Tidai 2004	Low Dissolved Oxygen (DO), Nitrate, Total Phosphorus, Bacteria	Concern, 4a
Aransas Creek 2004A	Bacteria	4c
Boosto Crock 2004B	Low Dissolved Oxygon (DO) Nitrate Total Pheenberus Pactoria	Screening Level
POesia Creek 2004B	Low Dissolved Oxygen (DO), Mitale, Total Phosphorus, Bacteria	Concern, 5c, 4a

Station ID	Sampling location	Sampling Schedule
12943	Mission River Tidal at FM 2678	Quarterly
12944	Mission River at US 77	Quarterly
12947	Aransas River Tidal at FM 629	Quarterly
12930	Chiltipin Creek Mid Channel at Plymouth Rd	Quarterly (Metals x2 yearly)
12952	Aransas River East of Skidmore	Quarterly
12941	Aransas Creek at US 181	Quarterly
12937	Poesta Creek at FM 202	Quarterly (Field only)

Total Maximum Daily Loads (TMDLs) for Indicator Bacteria in Aransas River Above Tidal (Segment 2004) and Poesta Creek (Segment 2004B)

High concentrations of bacteria are often found in the tidal portions of the Mission and Aransas rivers and Poesta Creek. Elevated concentrations of bacteria may indicate a health risk to people who swim or wade in the rivers - activities called "contact recreation". A TMDL titled *Two Total Maximum Daily Loads for Indicator Bacteria in the Tidal Segments of the Mission and Aransas Rivers: Segments 2001 and 2003* and the associated Implementation Plan (IP) was approved by the EPA in 2017. An addendum to the study was conducted on the Aransas River Above Tidal and Poesta Creek (Segments 2004 and 2004B). The Technical Report, which was completed by Texas Water Resources Institute (TWRI), is available online at:

https://www.tceq.texas.gov/downloads/water-quality/tmdl/mission-aransas-rivers-recreational-76/76-aransas-poesta-tsd.pdf

Basin 21 - Nueces River Basin

The Nueces River winds 315 miles from its source in the Edwards Plateau near Rocksprings (elevation 2,402) through the thorny brush country of the South Texas Plains to the river's end in Nueces Bay, located near Corpus Christi. The total drainage area 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.



Station 21815 – Nueces River above Calallen "saltwater barrier

Station ID	Sampling location
21815	Nueces River at Saltwater Barrier
20936	Nueces River at Hazel Bazemore Park
12964	Nueces River at FM 666
12965	Nueces River at FM 359
12967	Lake Corpus Christi near Dam
17384	Lake Corpus Christi near Hideaway Hill
17648	Lake Corpus Christi at CR 151
12972	Nueces River at FM 1042
12973	Nueces River at SH 16
12974	Nueces River at FM 624
12976	Nueces River at FM 190 in Asherton
12977	Frio River at SH 72 in Three Rivers
12979	Nueces River at US 281
12980	Atascosa River at FM 99
20764	Atascosa River at FM 541 in McCoy
12983	San Miguel Creek at SH 16
18418	Leona River at FM 140
12985	Leona River at FM 1581
12993	Sabinal River at US 90
14939	Sabinal River at FM 187
21948	Sabinal River at RR 187
22306	Upper Sabinal at FM 187
13005	Nueces River at SH 55
16704	Nueces River at SH 55
22330	Nueces River near Chalk Bluff
22331	Nueces River Near Cr 414
18408	Hondo Creek at SH 173
22 227	Commissioners Creek
13017	Seco Creek at SH 470
13019	Choke Canyon Reservoir near Dam
13020	Choke Canyon Reservoir Mid-Lake

Sampling Schedule

Quarterly (Total Dissolved Solids, Chlorophyll-a/Pheophytin only) Quarterly Quarterly Quarterly (Total Dissolved Solids, Chlorophyll-a/Pheophytin only) Quarterly Quarterly Quarterly Quarterly (metals x2 yearly) Quarterly 24-hour DO (Flow & Field only) 24-hour DO Quarterly Quarterly Quarterly (metals x2 yearly) Quarterly (24hr DO x4 yearly) Quarterly (metals x2 yearly) Quarterly (24hr DO x4 yearly) Quarterly Quarterly

17389	Choke Canyon Reservoir at FM 99
22328	Choke Canyon Reservoir
13023	Frio River at SH 16 in Tilden
13024	Frio River at IH 35
18373	Frio River at SH 97 near Fowlerton

Quarterly (metals x2 yearly) Quarterly Quarterly (metals x2 yearly) Quarterly Quarterly



Basin 21 - Concerns and Impairments

Waterbody	Impairment Description	Concern/Impairments
Nueses River Tidel 2101	Chlorophyll a fich kille	Use concern, Screening Level
	Chiorophyli-a, lish kilis	Concern
Nueces River Below Lake Corpus Christi 2102	Chlorophyll-a	Screening Level Concern
Lake Corpus Christi 2103	Low DO	Screening Level Concern
Nueces River Above Frio River 2104	Low DO, Chlorophyll- <i>a,</i> Nitrate,	Screening Level Concern
Nueces River Above Holland Dam 2105	Low DO, Chlorophyll- <i>a</i>	Screening Level Concern, 5c
Nueces River / Lower Frio River 2106	Chlorophyll- <i>a, TDS, Bacteria</i>	Screening Level Concern, 5b,5c
Lower Atascosa River 2107	Chlorophyll-a, TDS, Bacteria	Screening Level Concern, 5b,5c
San Miguel Creek 2108	Low DO, Bacteria	Screening Level Concern, 5b
Leona River 2109	Nitrate, low DO, Bacteria	Screening Level Concern, 5c
Lower Sabinal River 2110	Nitrate, Chlorophyll-a, bacteria, low DO	Screening Level Concern
Upper Nueces River 2112	Low OO	Screening Level Concern
Upper Frio River 2113	Impaired Fish Community	5c, Use Concern
Hondo Creek 2114	Nitrate	Screening Level Concern
Choke Canyon Reservoir 2116	Low DO, Excessive algal growth	Screening Level Concern, 5n, Use
Frie River Above Cheke Capyon Reconveir 2117	Low DO, Chlorophyll o Nitrato, Bostoria	Sereening Lovel Concern, 50
FILO RIVELADOVE CHOKE CATIYOFT RESERVOIL 2117	Low DO, Childrophyll-a, Nilfale, Baclena	
Lippor Atagagaa Divor 2119	DO Impaired microbonthic fich	Screening Lovel Concern
Opper Alascosa River 2116	DO, Impaired microbentric, fish	
Contraction of the local division of the loc	Impoired fish community Impoired hebitet	
Lipper Atascosa Piver 2118C	Impaired hish community, impaired habitat,	Screening Level Concern 5h
	Chlorophyll-a	
Leona River 2109 Lower Sabinal River 2110 Upper Nueces River 2112 Upper Frio River 2113 Hondo Creek 2114 Choke Canyon Reservoir 2116 Frio River Above Choke Canyon Reservoir 2117 Upper Atascosa River 2118 Upper Atascosa River 2118C	Nitrate, low DO, Bacteria Nitrate, Chlorophyll-a, bacteria, low DO Low OO Impaired Fish Community Nitrate Low DO, Excessive algal growth Low DO, Chlorophyll-a, Nitrate, Bacteria Impaired habitat, Total Phosphorus, Low DO, Impaired microbenthic, fish community, Bacteria Impaired fish community, Impaired habitat, Impaired microbenthic, Total Phosphorus, Chlorophyll-a	Screening Level Concern, 5cScreening Level ConcernScreening Level Concern5c, Use ConcernScreening Level ConcernScreening Level Concern, 5n, Use concernScreening Level Concern, 5cScreening Level Concern, 5c



Photos taken of Lake Corpus Christi.

Dissolved Oxygen (DO) Monitoring

NRA routinely collects DO data on waterbodies during routine monitoring events. Waterbodies such as Choke Canyon Reservoir are found to have low DO concentrations due to reasons including nutrient enrichment, insufficient circulation, and seasonal influences (warm water holds less oxygen). In segments where there are impairments for DO, NRA conducts diel monitoring where DO is measured every 30 minutes in a 24-hour period. NRA conducts 24-hour DO monitoring in Choke Canyon and at 4 sites in Basin 21. Two sites are located on the Atascosa River (In Pleasanton and FM-541 in McCoy) and the other two sites are located on the Nueces River at FM-624 and FM-190 in Asherton.

Choke Canyon Reservoir is approximately 24% full as of December 2023. Release of water depends on how full Corpus Christi Lake is. Choke Canyon is currently releasing 58 acre feet of water. Water input and flow are needed to help correct impairments in Choke Canyon and Lake Corpus Christi.

American Alligator found in Choke Canyon Reservoir

Nueces River Watershed Partnership – Lower Nueces River: Watershed Protection Plan Implementation

The Lower Nueces River (Segment 2102) below Lake Corpus Christi flows 39 miles from Wesley Seale Dam at Lake Corpus Christi to the saltwater barrier dam in Calallen. The segment was the focus of a WPP due to an impairment for TDS. The segment also has a water quality concern for chlorophyll-*a*. The WPP was approved in 2016 and is now in the implementation phase. One of the implementation plan strategies identified is the On-site Sewage Facility (OSSF) Repair and Replacement Assistance Program.

February 2017 - February 2020

NRA developed and promoted a voluntary septic inspection program that offered technical and financial assistance to qualifying homeowners for repairs and replacement. The program offered the repair of 12 septic systems and fully replaced 19 septic tanks. NRA

then evaluated the possibility of connecting 30 homes with septic systems to existing wastewater collection pipes or finding alternate solutions. The study found that the repairs to the septic tanks and connecting homes to the collection pipe would improve water quality.

October 2018 - August 2022

In March 2019, 47 pump outs and inspections were completed. Fourteen were found to be in good working order; 12 repairs have been made; and 19 systems have been replaced. A workshop for homeowners on the importance of septic system maintenance was also held to improve awareness.

September 2023 - August 2026

NRA held a meeting on November 1st 2023, to answer public questions and to raise awareness about the program. NRA also made an application for homeowners to fill out to assist their septic tank and see if they qualify.



This map was generated by the Nonpoint Source Program of the Texas Commission on Environmental Quality. This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information concerning this map, contact the Nonpoint Source Program at 512-239-6682. Map created November 2023.

https://www.tceq.texas.gov/waterguality/nonpoint-source/projects/lower-nueces-wpp-septic

Segment 2101 – Nueces River Tidal Segment

The Nueces Tidal Segment is starting to get some attention it desperately needs. With representatives from the Coastal Bend Industry Association, City of Corpus Christi, Texas Commission on Environmental Quality, Nueces County, Port of Corpus Christi, Texas Parks and Wildlife Department, Nueces River Authority, Harte Research Institute, Coastal Bend Bays and Estuaries Program and the local community came together to discuss experienced issues and scientific studies on the Nueces River downstream of the saltwater barrier dam in Calallen. The dam has been in place since 1921 as the sole provider of domestic water for the Robstown area. The main issues include a lack of flow due to small tidal flux and drought along with nutrient rich wastewater effluent which is not able to flush out well. Meetings will be held later in the summer to delineate a path forward. Alternative methods to add freshwater to the Nueces Delta will also be discussed. Though studies by TAMUCC & CBBEP have proven that wastewater effluent dumped into the bays and estuaries significantly impacts water quality. Effluent is still being dumped into the Nueces River due to higher permitting requirements into the bay. The Allison plant has implemented numerous upgrades according to the City of Corpus Christi to improve its effluent.



Segment 2103 – Lake Corpus Christi

The 1981 re-constructed Mikeska Bridge has been removed and construction is underway for an entirely new bridge. Remnants of the original 1936 bridge appear removed. The new bridge is expected to be accessible to the public starting May 2024.





Photos courtesy of Shellie McCumber



Choke Canyon Reservoir



In the first image, a graph depicting the fluctuating lake levels of Corpus Christi Lake spanning from 2011 to 2024 starkly illustrates the impact of Texas's ongoing drought. Similarly, the second image showcases a graph illustrating the reservoir levels of Choke Canyon Reservoir from 2011 to 2024. As the reservoir levels mirror the downward trend seen in Corpus Christi Lake, it highlights the widespread impact of the drought on vital water sources. Moreover, the third image, a heat map of Texas for the year 2023, provides a striking visual representation of the intense heat and aridity experienced across the state, exacerbating the challenges posed by the persistent drought conditions. Together, these images serve as poignant reminders of the urgent need for sustainable water management strategies to mitigate the effects of the drought and ensure the resilience of Texas's water supply in the face of future climate uncertainties.

Texas Lignite Expansion

On August 23rd 2023 Texas regulators approved a 12,000-acre coal mine expansion for San Miguel Mine despite objections from local governments and the Nueces River Authority concerned about their water supplies. This is the second coal mining permit issued by Texas in the last 10 years. The other permit went to the same coal mine to expand back in 2018. The expansion empowers the San Miguel power plant to extract lignite, a low-grade coal utilized in smaller power plants. The aftermath of lignite combustion leaves behind toxic ash, which is then repurposed to backfill mining pits. San Miguel's ash pile contains beryllium at 127 times the concentration established in the EPA's groundwater standards; plus cobalt at 488 times and lithium at 90 times the standard limit, boron at 35 times and radium at six times the standard limit. along with other contaminants.

Around San Miguel's two ash ponds, which collectively cover 30 acres, the study found this practice raises significant environmental and health concerns, particularly in the context of San Miguel's proximity to vital water sources like Choke Canyon Reservoir, upon which communities such as Three Rivers heavily depend for their drinking water. The community's greatest fear is that coal ash migrates into its water supply, polluting drinking water. The coal ash could eventually seep into the local tributaries that feed into the reservoir.

The local region relies extensively on lakes and rivers for drinking water due to the contamination of groundwater. The existing pollution renders well usage impractical due to the dump sites, further emphasizing the importance of safeguarding surface water quality. Additionally, the water beneath San Miguel's ash dumps is recognized as some of the most toxic in the nation, raising serious concerns about the long-term ecological impacts and potential health hazards for the surrounding communities. San Miguel cited that the permit application for groundwater did not provide adequate protection planning to reduce human and environmental risk.



John Byrum, executive director of the Nueces River Authority, filed an official challenge to the August 2023 permit "Our concern dealt with the protection of the water quality of the tributaries leading into Choke Canyon reservoir, we take our job very seriously."

Aquatic Life Monitoring

Aquatic Life Monitoring (ALM) is an interagency bioassessment study between TCEQ and Texas Parks and Wildlife Department (TPWD) used to determine if aquatic assemblages (fish and benthic macroinvertebrates) and physical habitat in wadeable freshwater streams in Texas meets the aquatic life use criteria as established in the Texas Surface Water Quality Standards. ALM monitoring occurred in the Nueces River Basin in the Atascosa River (Segment 2107) Data from the bioassessment indicated that aquatic assemblages reflect as non-supporting due to low concentration of dissolved oxygen that were below the criteria associated with a high aquatic life use, as well as being listed as non-supporting for contact recreation due to elevated levels of bacteria in the stream.



Basin 22 – Nueces-Rio Grande Coastal Basin

The Nueces-Rio Grande Coastal Basin covers approximately 10,400 square miles in South Texas and includes streams such as the Arroyo Colorado Tidal (Segment 2201) and above tidal (Segment 2202) in the Rio Grande Valley, and Petronila Creek Tidal (Segment 2203) and above tidal (Segment 2204), which is a tributary to Alazan Bay located on the northern arm of Baffin Bay.



Station ID	Sampling location	Sampling Schedul
13079	Arroyo Colorado at US 77	Quarterly
13094	Petronila Creek at FM 892	Quarterly
13096	Petronila Creek at FM 665	Quarterly
20806	Petronila Creek at Alice Road	Quarterly



Basin 22 - Concerns and Impairments

Waterbody	Concern/Impairments	Description
Arroyo Colorado Tidal 2201	Screening Level Concern, 5c	Low DO, Chlorophyll- <i>a</i> , Nitrate, Total Phosphorus, Bacteria, Mercury in edible tissue, Polychlorinated Biphenyl (PCBs) in edible tissue
Unnamed Drainage Ditch Tributary (B) in Cameron County Drainage District #3 2201B	Screening Level Concern, 5b	Chlorophyll-a, Bacteria
Arroyo Colorado Above Tidal 2202	Screening Level Concern, 5c, 5a	Chlorophyll- <i>a</i> , Nitrate, Total Phosphorus, Bacteria, Mercury in edible tissue, PCBs in edible tissue
Donna Reservoir 2202A	4a	PCBs in edible tissue
Unnamed Drainage Ditch Tributary (B) to S. Arroyo Colorado 2202B	Screening Level Concern	Chlorophyll-a, Ammonia
Petronila Creek Tidal 2203	Screening Level Concern, 5c	Chlorophyll- <i>a</i> , Bacteria
Petronila Creek Above Tidal 2204	Screening Level Concern, 4a, 5b	Chlorophyll- <i>a, DO, Phosphorus,</i> Bacteria, Chloride, Sulfate, TDS

Segment 21931 – Animal tracks at Petronila Creek at FM 335

Petronila Creek Tributary Study Salts

Petronila Creek, located in Kleberg and Nueces counties, flows forty-four miles to its confluence in Alazan Bay. In 2000, water quality testing found that elevated levels of chloride, sulfate, and TDS in the creek exist downstream of US Hwy 77 in an area where manmade nonpoint sources such as produced water, brine pits, and brine injection wells are known to exist. Research is currently being conducted on previous oil and gas operations adding to the impairments of Petronila creek. To address the impairments TCEQ adopted three TMDLs for the creek in 2007. Since FY 2013-2014, the TCEQ has contracted with NRA to conduct monthly water quality monitoring to identify chloride, sulfate, and TDS contributions from tributaries of Petronila Creek, including drainage ditches. For FY 2018, NRA conducted monthly monitoring at 13 sites. Four sites are located on the main stem of Petronila Creek (13093, 13094, 13095, and 13096).







≊USGS

USGS 08212820 Petronila Ck at FM 665 nr Driscoll, TX



Conductivity versus Rainfall Trend Analysis

Station (# of Samples)	Rainfall Correlation	Chloride Trend	Sulfate Trend	TDS Trend
13030 (n = 97)	-0.3651	R ² = 0.1205 ↑	R ² = 0.1167↓	R ² = 0.0534↔
13032 (n = 42)	-0.4392	R ² = 0.007 ↔	R ² = 0.0067↔	R ² = 0.0013↔
13095 (n = 99)	-0.6084	R ² = 0.0951 ↑	R ² = 0.0926 ↓	R ² = 0.1203 ↑
18484 (n = 94)	-0.4408	R ² = 0.1376 ↑	R ² = 0.0715 ↑	R ² = 0.0005 ↔
18642 (n = 91)	-0.4081	R² = 0.0882 ↓	R² = 0.0852↓	R ² = 0.0372↔
21594 (n = 84)	-0.3026	R ² = 0.1514↑	$R^2 = 0.0009 \leftrightarrow$	R² = 0.1255↓
21596 (n = 77)	-0.5407	R² = 0. 133 ↑	R² = 0.00785↔	R ² = 0.0149↔
21598 (n = 94)	-0.3453	R ² = 0.0838 ↑	R ² = 0.0705↓	R ² = 0.0856 ↑
21929 (n = 58)	-0.4705	R ² = 0.1012↑	R ² = 0.1283↑	R ² = 0.034↔
21931 (n = 37)	-0.3659	R ² = 0.0093↔	R ² = 0.0226↔	R ² = 0.0037↔

* TDS = Total Dissolved Solids

The observed inverse correlation between rainfall and the concentrations of chloride, sulfate, and Total Dissolved Solids (TDS) can be seen across various monitoring stations. This is due to the dilution effect done by rainfall. The dilution arises from the increased volume in the water bodies resulting from the addition of rainwater. The addition of rainwater effectively dilutes the pre-existing concentrations of chloride, sulfate, and TDS, leading to lower overall levels in the water samples. This temporary dilution can lead to improved water quality by bringing elevated levels within acceptable and safe limits. The temporary nature of the improvement doesn't diminish its environmental significance as it provides a reprieve, allowing ecosystems and water resources to adapt and recover. An increase in water input, can have positive implications for the system and has the potential to dilute substances such as chloride, sulfate, and Total Dissolved Solids (TDS).

Station ID	Sampling location	Sampling S	Schedu
21598	Tributary to Petronila Creek near	FM 70	Montl
21929	Tributary to Petronila Creek at FM	л 70	Mont
13030	Tributary to Petronila Creek at FM	Л 70	Mont
21596	Tributary to Petronila Creek at FM	И 89	Montl
18642	Tributary to Petronila Creek at FM	N 892	Montl
21931	Tributary to Petronila Creek at FM	И 3354	Mont
13093	Petronila Creek at FM 70		Mont
13094	Petronila Creek at FM 892		Mont
13095	Petronila Creek at County Road	18	Mont
13096	Petronila Creek at FM 665		Mont
13032	Tributary to Petronila Creek at Cl	R 18/75	Mont
18484	Tributary to Petronila Creek at Cl	R 24	Mont
21594	Tributary to Petronila Creek at Cl	R 233	Mont



Nutrient Sampling in Petronila Creek (Segment 2204)

The health of Baffin Bay has been of great concern to scientists and concerned citizens due to fish kills, water quality problems, and food web changes in the bay. The Baffin Bay Stakeholder Group, formed in 2012, is composed of scientists from Harte Research Institute (HRI) at Texas A&M University-Corpus Christi, Coastal Bend Bays & Estuaries Program (CBBEP), United States Department of Agriculture – Natural Resource Conservation Service, Texas State Soil & Water Conservation Board, Texas Water Resources Institute, Texas Commission on Environmental Quality (TCEQ), Texas Sea Grant, Texas General Land Office, NRA, and a host of concerned citizens, including commercial and recreational fishermen, ranchers, and business owners. The scientists at HRI have determined that the primary causes of the water quality concerns are due to excessive nutrients in the bay. The Petronila and San Fernando Creeks Watershed Protection Plan (WPP) was approved by EPA in December 2022, providing voluntary management measures to address bacteria impairments on both creeks. Many management measures identified in the WPP will also help reduce nutrient loading to the system.

To provide further clarity regarding nutrient inputs into the Baffin Bay system, this study presents twelve months of water quality data from thirteen stations. Four stations are located on the main stem and nine are located on the tributaries of the creek. Nutrients analyzed include ammonia, total kjeldahl nitrogen (TKN), dissolved total kjeldahl nitrogen (DTKN), total phosphate (TP), nitratenitrogen, nitrite-nitrogen, chlorophyll-a, and pheophytin. Monitoring data for Project #2333 occurred from September 2022 and ended on August 1, 2023.

Nutrient inputs to Petronila Creek Above Tidal (TCEQ Segment 2204) come from a variety of permitted and non-permitted sources including wastewater treatment plants (WWTPs), non-point source (NPS) runoff from cropland, groundwater interactions, wildlife, and other natural sources. Permitted sources include eight WWTPs that contribute treated domestic wastewater to Petronila Creek Above Tidal or its tributaries, one of which contributes measurable flow to the study area.

Many of the nutrient parameters analyzed in this report show an extremely wide range of concentrations with results spanning from the limits of quantification to values significantly above their respective screening levels. Episodes of highly elevated nutrient concentrations as well as periods of very low concentrations show varying degrees of seasonality and are summarized below:

Ammonia

The Limit of Quantitation (LOQ) for ammonia is 0.1 mg/L. The TCEQ screening level is 0.33 mg/L.

Petronila Station Locations	<u>Minimum</u>	<u>Maximum</u>	<u>Mean</u>
Both	0.01 mg/L	0.8 mg/L	0.14 mg/L
Petronila Creek	0.01 mg/L	0.5 mg/L	0.11 mg/L
Petronila Tributaries	0.10 mg/L	0.8 mg/L	0.14 mg/L

Nitrate

LOQ for nitrate is 0.025 mg/L. The TCEQ screening level is 1.95 mg/L.

<u>Nitrate</u>	<u>Minimum</u>	Maximum	<u>Mean</u>
Main stem and Tributary Stations	0.02 mg/L	57 mg/L	3.15 mg/L
Main Steam Stations	0.02 mg/L	37.5 mg/L	2.9 mg/L
Tributary Stations	0.02 mg/L	57 mg/L	3.27 mg/L

Nitrite

The LOQ for Nitrite is 0.02 mg/L, however no TCEQ screening level exists for this parameter.

Nitrite	<u>Minimum</u>	<u>Maximum</u>	<u>Mean</u>
Main steam and Tributary Stations	0.02 mg/L	5.3 mg/L	0.06 mg/L
Main Steam Stations	0.02 mg/L	0.15 mg/L	0.02 mg/L
Tributary Stations	0.02 mg/L	5.3 mg/L	0.08 mg/L

Dissolved Total Kjeldahl Nitrogen (DTKN)

The LOQ for dissolved TKN is 0.2 mg/L, however no TCEQ screening levels exist for this nutrient parameter.

DTKN	<u>Minimum</u>	<u>Maximum</u>	<u>Mean</u>
Main steam and Tributary Stations	0.20 mg/L	5.2 mg/L	1.03 mg/L
Main Steam Stations	0.20 mg/L	2.7 mg/L	0.87 mg/L
Tributary Stations	0.20 mg/L	5.2 mg/L	1.11 mg/L

Total Kjeldahl Nitrogen (TKN)

The LOQ for TKN is 0.2 mg/L, however no TCEQ screening levels exist for this nutrient parameter.

TKN	<u>Minimum</u>	<u>Maximum</u>	<u>Mean</u>
Main steam and Tributary Stations	0.20 mg/L	12.2 mg/L	1.29 mg/L
Main Steam Stations	0.20 mg/L	4.2 mg/L	1.07 mg/L
Tributary Stations	0.20 mg/L	12.2 mg/L	1.39 mg/L

Pheophytin

The LOQ for Pheophytin is 2.0 µg/L, however no TCEQ screening levels exist for this nutrient parameter.

Pheophytin	<u>Minimum</u>	<u>Maximum</u>	<u>Mean</u>
Main steam and Tributary Stations	2 ug/L	2415 ug/L	15.92 ug/L
Main Steam Stations	2 ug/L	127.7 ug/L	27.23 ug/L
Tributary Stations	2 ug/L	2415 ug/L	19.98 ug/L

Chlorophyll-a

The LOQ for Chlorophyll-*a* is 2.0 μ g/L. The TCEQ screening level is 14.1 μ g/L.

Chlorophyll-a	<u>Minimum</u>	<u>Maximum</u>	Mean
Main steam and Tributary Stations	2 ug/L	1321.9 ug/L	49.1 ug/L
Main Steam Stations	2 ug/L	390.4 ug/L	29.1 ug/L
Tributary Stations	2 ug/L	1321.9 ug/L	58 ug/L



San Fernando and Petronila Creeks Watershed Protection Plan (WPP)

Accepted by the EPA, a major accomplishment for the coalition of local stakeholders and state officials who collaboratively created the science-based plan. The WPP outlines a strategy to implement management measures that will reduce nonpoint source pollution into the creeks and ultimately Baffin Bay. The plan is available for download at https://baffin.twri.tamu.edu/ or https://baffin.twri.tamu.edu/wp-content/uploads/sites/11/2023/09/San-Fernando-and-Petronila-Creeks-WPP.2023-update_opt.pdf

Better Farming to Reduce Non-Point Pollution

A great opportunity to reduce nutrients into Baffin Bay is by implementing different farming techniques. The USDA Natural Resources Conservation Service (NRCS) in Texas announced grant opportunities for partners to receive funding through its Texas Partners for Conservation Program. This grant will help fund programs to utilize natural soil chemistry to grow crops rather than adding nutrients. Applications must be submitted through <u>grants.gov</u>. For assistance with the registration process, contact grants.gov applicant support at **1-800-518-4726** or via email at <u>support@grants.gov</u>.

Wastewater Treatment

According to the Lower Nueces River Watershed Protection Plan, 58% of the nitrogen contribution is due to wastewater from septic tanks and wastewater treatment plants that are unable to meet permit requirements. The remaining 42% is contributed to agricultural runoff and wildlife sources along the tributary streams of Baffin Bay. It was also found that Petronila creek was the poorest water quality of any along the gulf coast. There are 13 wastewater treatment plants and OSSF from 4 colonias that discharge sewage into water that enters Baffin Bay. For more information please visit <u>Microsoft Word - LNRWPP</u> Final Draft <u>Dec2015</u> clean (texas.gov)

Basin 24 – Bays and Estuaries

The Bays and Estuaries region of Texas covers approximately 2,002 square miles along the entire Texas Coast. There are 48 classified estuarine segments that are monitored by several Clean Rivers Program partner river authorities and TCEQ regional offices. NRA monitors water quality in the following 5 coastal segments: Copano/Port/Mission Bay (Segment 2472), Redfish Bay (Segment 2483), Oso Bay (Segment 2485), Laguna Madre (Segment 2491), and Baffin Bay/Alazan Bay/Cayo del Grullo/Laguna Salada (Segment 2492).



22003 H	Hidalgo Main Floodwater Channel at FM 1420
22004 F	Raymondville Drain at CR 445
13033 5	San Fernando Creek at US 77
13034 L	Los Olmos Creek at US 77
22170 \$	San Martin Lake

Basin 24 - Concerns and Impairments

Waterbody	Concerns/Impairments	Description
Conn Brown Harbor 2483A	Use Concern, 5c	Copper in water, Bacteria
Oso Bay 2485	Screening Level Concern, 5c	Chlorophyll-a, Total Phosphorus, Low DO, Bacteria,
Oso Creek 2485A	Screening Level Concern, 5c, 4a	Chlorophyll-a, Nitrate, Total Phosphorus, Bacteria
Unnamed trib of Oso Creek 2485B	Screening Level Concern	Total Phosphorus
West Oso Creek 2485D	Screening Level Concern	Total Phosphorus
Drainage Ditches flowing into Lower Laguna Madre 2491C	Screening Level Concern	Chlorophyll-a, Bacteria, Total Phosphorus, Nitrate
San Fernando Creek 2492A	Screening Level Concern	Chlorophyll-a, Nitrate, Total Phosphorus
Los Olmos Creek Tidal 2492B	Screening Level Concern	Low DO, Chlorophyll-a, Bacteria

Quarterly Quarterly Quarterly Quarterly Quarterly

Oso Bay & Oso Creek Total Maximum Daily Load and Integrated Plan

Since 2002, Oso Creek (Segment 2485A), which flows 28 miles to the confluence of Oso Bay in Nueces County has been identified as being impaired for having bacteria concentrations that exceed state water quality standards. Since 2003, the TCEQ and the Texas State Soil and Water Conservation Board (TSSWCB) have conducted numerous studies of bacteria sources and quantities in the Oso Creek watershed. Based on the results of those studies, a TMDL and an Implementation Plan (IP) for Oso Creek is being developed to address the contact recreation impairment. Staff from the Center for Coastal Studies at Texas A&M University – Corpus Christi and the Coastal Bend Bays Foundation (CBBF) is disseminating information to the public at http://www.tceq.texas.gov/waterquality/tmdl/67-osobaybacteria.html



Baffin Bay/Alazan Bay/Cayo del Grullo/Laguna Salada (Segment 2492)

For more than 10 years Baffin Bay has been on the TCEQ 303(d) list for a water quality concern for chlorophyll-*a*. Major tributaries to the bay, including Petronila and San Fernando creeks, have water quality concerns and/or impairments listed on the TCEQ 303(d) list. Although the bay is not officially impaired for any parameter, widespread brown tide events, episodic low dissolved oxygen related fish kills, a dwarf clam mortality event, and an emaciated black drum (*Mulinia lateralis*) event in 2010 prompted researchers from Texas A&M University-CC Harte Research Ititute (HRI) to form the Baffin Bay Stakeholder Group to address water quality concerns. The group is composed of stakeholders from USDA-NRCS, TSSWCB, TWRI, TCEQ, Texas Sea Grant, Texas General Land Office (TxGLO), TPWD, Coastal Bend Bays and Estuaries Program (CBBEP) and private landowners.

Bringing Back the Bivalve

Oyster Farming in Copano Bay is proving to be beneficial in 2023. Oyster reef and habitat has grown tremendously in the past few years as a result of the Sink Your Shucks program that started in 2009. The program was the first in Texas that reclaims oyster shells from local restaurants and returns them to our local waters providing both substrates to form new reefs and habitat for fish, crabs and other organisms This program has led to over three million pounds of shell to be recycled and 25 acres of reef habitat have been restored in Copano Bay, Aransas Bay, and St. Charles Bay. Another first in Texas was the first Cultivated Oyster Mariculture Permit given in 2021 to Brad Lomax. Despite a few setbacks, Mr. Lomax's Texas Oyster Company has produced a great number of Oysters grown from Copano Bay and sold to local restaurants in the Corpus Christi area. Oyster reefs that have been lost can be replenished and regrown thanks to oyster farming. Oyster production in Copano Bay will also help to keep the water cleaner due to the natural filtration of oysters. More information at: https://www.harteresearch.org/oysterrecycling



Building a Sustainable Wastewater Treatment Plant (WWTP)

Working with the *Bringing Baffin Back* campaign, the NRA has developed a solution to improve water quality in the bay. The solution is to construct treatment facilities that would improve water quality in Petronila Creek and surrounding areas. A state of the art regional wastewater treatment plant is a cost efficient investment in the environmental and economic prosperity of the region. The NRA is currently working on repairs to Bishop and Driscoll WWTPs to improve effluent into Petronila Creek. The regional plant will use plans from local WWTP plants and the Leakey WWTP which has been very successful.



The Leakey WWTP consists of approximately 12.4 miles of wastewater collection system pipe, 7 lift stations, one sequencing batch reactor type wastewater treatment plant with the current capacity to treat 250,000 gallons per day expandable up to 400,000 gallons per day, 2 effluent holding ponds, and 193 acres of treated effluent spray fields. Travis Pruski, NRA's Director of Planning, explains 'What [is] great about this system is that there is no runoff into the Frio River - it is reused for irrigation'.

Leakey Regional Wastewater System Leakey, Texas

On-Site Septic Facility (OSSF) Assistance Program

The NRA has received grant funding through the Coastal Bend Bays & Estuaries Program to implement a bacteria reduction program in targeted watersheds by providing financial assistance to eligible property owners to repair or replace existing septic systems which are not functioning properly. An improperly functioning septic system releases bacteria into the water causing contamination and possible illness to both humans and animals. This program offers <u>free of charge</u> to the property owner, on a first- come first-serve basis, septic system pump outs, inspections, and repairs and/or replacements if recommended by the septic inspectors. <u>The program is open to homeowners living in colonia communities located in Nueces, Jim Wells and San Patricio Counties</u>. With permission, a certified OSSF inspector will evaluate septic systems. Where inspections find septic system malfunctions, the information will be used only within the assistance program and is not referred to enforcement agencies.

The first OSSF Assistance Program Outreach meeting was held on November 1, 2023 for Jim Wells and Nueces Counties. Around 30 participants attended the outreach, including Jim Wells County Precinct 1 Commissioner, Margie Gongalez, and the Safety & Inspection Department head Emede Gonzalez. During this meeting Javier Ramirez gave a presentation about what a septic system is and how to identify signs of malfunction. Mr. Ramirez also educated the public about the basics of OSSF Maintenance & Inspection by showing them power point slides with information regarding the house items that damage septic systems. Information was also given on things that can help prolong the life of the OSSF.

Inspections of the septic systems will take place soon. For any questions please contact Javier Ramirez at: ramirez@nueces.ra.org 361-653-2110

Green Lake Dam

Successful flood planning from the NRA has made it possible for the completion of Green Lake Dam. The dam which is located behind the North Shore Country Club golf course in Portland failed in 2021. The dam is responsible for the primary water source for the North Shore Country Club. It is also the main drainage outfall for the city of Gregory. The project consisted of widening and deepening the channel upstream from the dam and rebuilding the dam itself. The water flow into the bay will be quicker and will eliminate flooding issues in the area. Gregory has flooded for decades because the dam was at a higher elevation than the city itself. The original dam was 20 ½ feet high and now it is 15 ½ high. Now that the dam is lowered Gregory will be completely out of the flood plain.



Lower Laguna Madre/Brownsville Ship Channel WPP

The Lower Laguna Madre/Brownsville Ship Channel (LLM/BSC) Watershed, located between the Arroyo Colorado and the Rio Grande Rivers' watersheds, drains much of the Lower Rio Grande Valley through the Brownsville Ship Channel. This segment was the focus of a WPP due to an impairment for bacteria and a water quality concern for dissolved oxygen. Details of the WPP, which is ongoing, can be found at: https://www.tceq.texas.gov/waterquality/nonpoint-source/projects/lower-laguna-madre-watershed-protection-plan

Steering Committee Membership

Steering Committees are made up of representatives from the public, government, industry, business, agriculture, and environmental groups. They are created to help guide Clean Rivers Program efforts by providing input on local water quality concerns and setting priorities within its basins. NRA provides a quarterly update to stakeholders that summarizes CRP funded activities including water quality monitoring, updates on various water quality studies, and education/outreach. Steering Committee Meetings are held every year. To receive an update in your e-mail inbox, please contact Jessica Wright at: jwright@nueces-ra.org. or visit the Clean Rivers Program section of our website at: https://www.nueces-ra.org/CP/CRP/

Public Outreach and Educational Activities

In late 2023, NRA launched a new Facebook Page titled *Nueces River Authority* that will post content related to CRP funded Surface Water Quality Monitoring. The page also promotes stewardship activities such as litter clean up events and educational activities that include the use of the custom-made watershed model of the Nueces River Basin, a groundwater model, an Aquifer model and various rainfall runoff models that are used in classrooms, County Agriculture Fairs, and community events such as Earth-Day Bay-Day and Kid Fish in Corpus Christi. The NRA's public outreach program also includes the UP2U litter prevention campaign which promotes personal responsibility for clean rivers and beaches.

Up2U and Litter Bag

The Up2U campaign for personal responsibility and litter prevention speaks to students, as well as adults, by empowering them to make better choices about water and its protection. Litter bags are distributed from the headwaters to the beaches by volunteer advocates and recreation service organizations. The bags are also given to students as a follow-up and personal challenge following each lesson.

Clean Rivers & Beaches Ríos y Playas Limpias





Nueces Basin Summit

The first-ever Nueces Basin Summit took place between <u>June 21-23, 2023</u> in Portland, TX. This summit brought together County, City & State Representatives from all 26 counties and 65 cities through the Nueces River Basin. The water conference held a collaborative discussion to find challenges to protect, manage and enhance water resources. The Summit also included discussions about water supply, water quality, flood planning, funding options and wastewater management.

The next Basin Summit will be held June 19th-June 21st 2024.

2024 SUMMIT TOPICS

WATER SUPPLY FLOOD PLANNING WATER QUALITY WASTEWATER LEGISLATIVE UPDATES FUNDING OPTIONS

WORKING TOGETHER WE CAN BRING Big Change TO THE NUECES BASIN

24,048 Square Miles - bigger than 10 states including West Virginia 800,000 Population - would be 6th lagest city in Texas 26 Counties 63 Cities 6 - US Representatives

4 - State Senators 10 - State Representatives



Admission is FREE for City and County Officials. Register Online at: NuecesBasinSummit.org



JOIN US! JUNE 19-21, 2024

Portland Community Center 2000 Bill G. Webb Drive, Portland, TX 78374

WORKING TOGETHER WE CAN BRING Big Change TO THE NUECES BASIN

This document was prepared in cooperation with the Texas Commission on Environmental Quality under authorization of the Clean Rivers Act.