

CLEAN RIVERS PROGRAM

BASIN HIGHLIGHTS REPORT

GUADALUPE RIVER AND
LAVACA-GUADALUPE COASTAL BASINS

2024



INTRODUCTION

2024 Report



This report highlights activities of the Clean Rivers Program (CRP) in the Guadalupe River and the Lavaca-Guadalupe Coastal Basins in 2023. CRP is a statewide program managed by Texas Commission on Environmental Quality (TCEQ), established in 1991 to holistically manage water quality issues throughout the state of Texas. The program is funded by fees assessed to water rights and wastewater discharge permit holders. The objectives of the program are to provide quality assured data to TCEQ for use in decision making, identify and evaluate water quality issues, promote cooperative watershed planning, recommend management strategies, inform and engage stakeholders, and maintain efficient use of funds.

The Guadalupe-Blanco River Authority (GBRA), along with the Upper Guadalupe River Authority (UGRA), carry out the water quality management efforts in these basins under contract with TCEQ. The Watershed Association (WA), the Meadows Center for Water and the Environment (MCWE) contribute monitoring data collected under the Guadalupe Basin CRP quality assurance project plan from the Blanco River and Cypress Creek watersheds. The majority of funding allocated to this

program is used by the partners to carry out monitoring efforts and perform quality assurance and data management.

The 2024 Basin Highlights Report consists of maps of water quality sampling sites and major highlights and events from the past year. This report includes a summary of mussel surveys performed by GBRA and consultants over the summer of 2023 to inform the development of the Guadalupe River Habitat Conservation Plan. The impacts on water quality data from the extreme drought were also assessed; its influence on trends that were significant within the upper, middle, and lower sections of the Guadalupe River basin are discussed. In addition, the report includes an update on the completion of Lake Dunlap Dam construction and the refilling of the reservoir as well as updates from our CRP partners that highlight ongoing projects and activities throughout the Blanco and Cypress Creek watersheds and upper basin of the Guadalupe River. An overview of water quality monitoring is provided as well as a summary of water quality concerns and impairments from the 2022 Texas Integrated Report for the Clean Water Act section 305(b) and 303(d).

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Front Cover: San Marcos River upstream of Cheatham Street in San Marcos, Texas.

GBRA Freshwater Mussel Surveys to Inform Guadalupe River Habitat Conservation Plan Development



Biologists recording mussel data during mussel survey.

The Guadalupe-Blanco River Authority (GBRA) is actively developing a multi-species Guadalupe River Habitat Conservation Plan (GRHCP) in coordination with the United States Fish and Wildlife Service (USFWS), which will include three mussel species that have been proposed to receive Federal Endangered status under the U.S. Endangered Species Act (ESA). Freshwater mussels from the family Unionidae have a unique life history that is

entirely aquatic. These organisms have a parasitic larval life stage that requires attachment to a fish host before transformation into a largely immobile juvenile that settles on the substrate and filters food particles from the water column. The limited dispersal opportunities of these organisms along with their distinctive spawning and feeding requirements make them especially vulnerable to changes in the water quality and quantity of the rivers and streams where they reside. Knowledge on distributional occupancy for the Guadalupe Orb (*Cyclonaias necki*), False Spike (*Fusconaia mitchelli*), and Guadalupe Fatmucket (*Lampsilis bergmanni*) was lacking in large portions of the Guadalupe River basin to which they are endemic. While preparing the GRHCP, GBRA determined that in order to adequately assess the potential impacts of covered activities and conservation measures in the basin targeted mussel surveys would be beneficial.

A total of 149 sites were identified and surveyed by aquatic biologists from GBRA and BIO-WEST Inc. during the summers of 2022 and 2023 to document the presence of native mussels, with a focus on the three species proposed for ESA protections. Semi-quantitative 4 person-hour (p-h) time searches were utilized at the majority of study locations, but SCUBA transect surveys and surface-supplied-air Hookah searches were utilized in deeper habitats (>1.5 m). A track hoe was also used to dredge 20 m² of sediment from the bottom of alligator occupied canals near the coast, which was sorted for mussels from the shoreline. These GBRA funded surveys resulted in occupancy documentation for 14,106 mussels from 16 different species throughout the Guadalupe River Basin (Table 1). The Guadalupe Fatmucket was the 4th most abundant (7.9%) mussel surveyed in Kerr County. The Guadalupe Orb was the only mussel found on the Guadalupe River mainstem in Comal County and the 4th most abundant (4.37%) mussel surveyed overall. The False Spike was only found on the mainstem of the Guadalupe River, but this included the river reach between the Comal and San Marcos River confluences where the species had not been previously collected since



A Guadalupe Orb, a proposed endangered species, that was found during a mussel survey.

1993. The occupancy data provided by these surveys will be invaluable for informing the GRHCP and ensuring that focal mussel species are adequately addressed by the plan. The survey results were also provided to the Mussels of Texas project (<https://mussels.nri.tamu.edu/>) to collaboratively inform future research and conservation efforts for these species. Additional information regarding the GRCHP covered mussel species can be found on the GBRA website (<https://www.gbra.org/environmental/habitat-conservation-plan/>).

Scientific Name	Common Name	Totals # Surveyed	% of Total
<i>Amblema plicata</i>	Threeridge	10244	72.62%
<i>Arcidens confragosus</i>	Rock Pocketbook	1	0.01%
<i>Cyloniaias necki</i>	Guadalupe Orb	617	4.37%
<i>Cyloniaias pustulosa</i>	Pimpleback	1387	9.83%
<i>Cyrtoniaias tampicoensis</i>	Tampico Pearlymussel	220	1.56%
<i>Fusconaia mitchelli</i>	False Spike	3	0.02%
<i>Glebula rotundata</i>	Round Pearlyshell	29	0.21%
<i>Lampsilis bergmanni</i>	Guadalupe Fatmucket	26	0.18%
<i>Lampsilis hydiana</i>	Louisiana Fatmucket	19	0.13%
<i>Lampsilis teres</i>	Yellow Sandshell	180	1.28%
<i>Megaloniaias nervosa</i>	Washboard	838	5.94%
<i>Pyganodon grandis</i>	Giant Floater	16	0.11%
<i>Quadrula quadrula</i>	Mapleleaf	13	0.09%
<i>Toxolasma parvum</i>	Lilliput	0	0.00%
<i>Toxolasma texasiense</i>	Texas Lilliput	57	0.40%
<i>Tritogonia verrucosa</i>	Pistolgrip	247	1.75%
<i>Utterbackia imbecilis</i>	Paper Pondshell	210	1.49%
Total Mussels Surveyed		14106	
Total Sites Surveyed		145	
Total Search Time (p-hours)		529.5	
Total Search Area (meters)		35320	

Table 1: Results of 2022 and 2023 GBRA Freshwater Mussel Surveys in the Guadalupe River Basin.

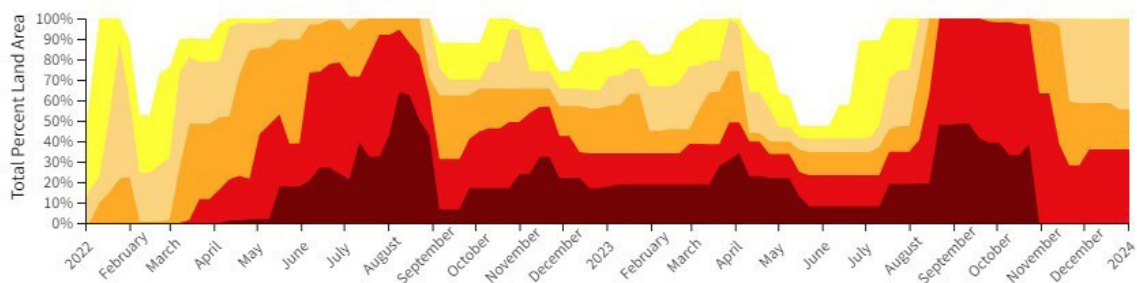
2022–2023 Drought

The Guadalupe River basin experienced extreme drought conditions between 2022 and 2023 (Figure 1). Overly dry conditions have led to lower than normal flow conditions throughout the basin, with sections of the river running completely dry. Drought conditions can cause severe disruption to aquatic communities, including federally proposed threatened and endangered species such as the Guadalupe orb mussel due to habitat loss, desiccation, and alteration of water quality.



Station 17404 (Guadalupe River at FM 474) on August 24, 2023.

U.S. Drought Monitor



U.S. Drought Monitor Category

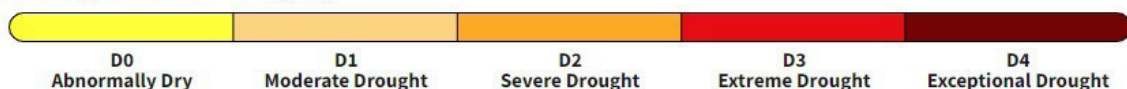


Figure 1: Total Percent Land Area affected by drought within major counties in the Guadalupe River Basin in 2022–2023. Area assessed includes Comal, Guadalupe, Kendall, Hays, Kerr, Gonzales, Dewitt, Caldwell, Victoria, and Calhoun counties. Source: U.S. Drought Monitor. <https://www.drought.gov/historical-information?dataset=0&selectedDateUSDM=20120103>.

The severe drought in 2022-2023 also impacted recreational use within the basin as flows decreased. The Guadalupe River and many of its tributaries contain popular destinations for swimming, canoeing, and tubing, especially in the summer months. Portions of the Guadalupe River experienced greatly reduced

flows during the summers of 2022 and 2023, with some sections of the river going completely dry. The Guadalupe River upstream of Canyon Lake ceased to flow in 2022 and 2023 for 108 and 134 days respectively, resulting in the longest period of no inflows to Canyon lake since its impoundment in 1964.



Upstream (left) and downstream (right) of the Guadalupe River at FM 311 SE of Spring Branch (TCEQ Station 13700) in summer of 2022.

Water Quality Trends: Chlorides and Sulfates

Chloride and sulfate concentrations generally increased over time throughout the basin between 2022 and 2023. Extreme drought coupled with high temperatures increases evaporation, which can cause constituents like sulfates and chlorides to become more concentrated in the water column. Elevated chloride and sulfate levels can affect the water balance in the cells of aquatic organisms, such as freshwater mussels, aquatic insects, and fish. For more information regarding general water quality trends in this basin,

please see the 2023 Basin Summary Report at <https://www.gbra.org/news/publications/basin-summary-reports/>.

Chloride and sulfate trends differ longitudinally in the Guadalupe River Basin. In the Upper Guadalupe Basin, chloride and sulfate concentrations decreased over time at many stations between 2012 and 2022 (GBRA 2023). However, chloride and sulfate concentrations generally increased over time between 2022 and 2023 in this part of the basin.

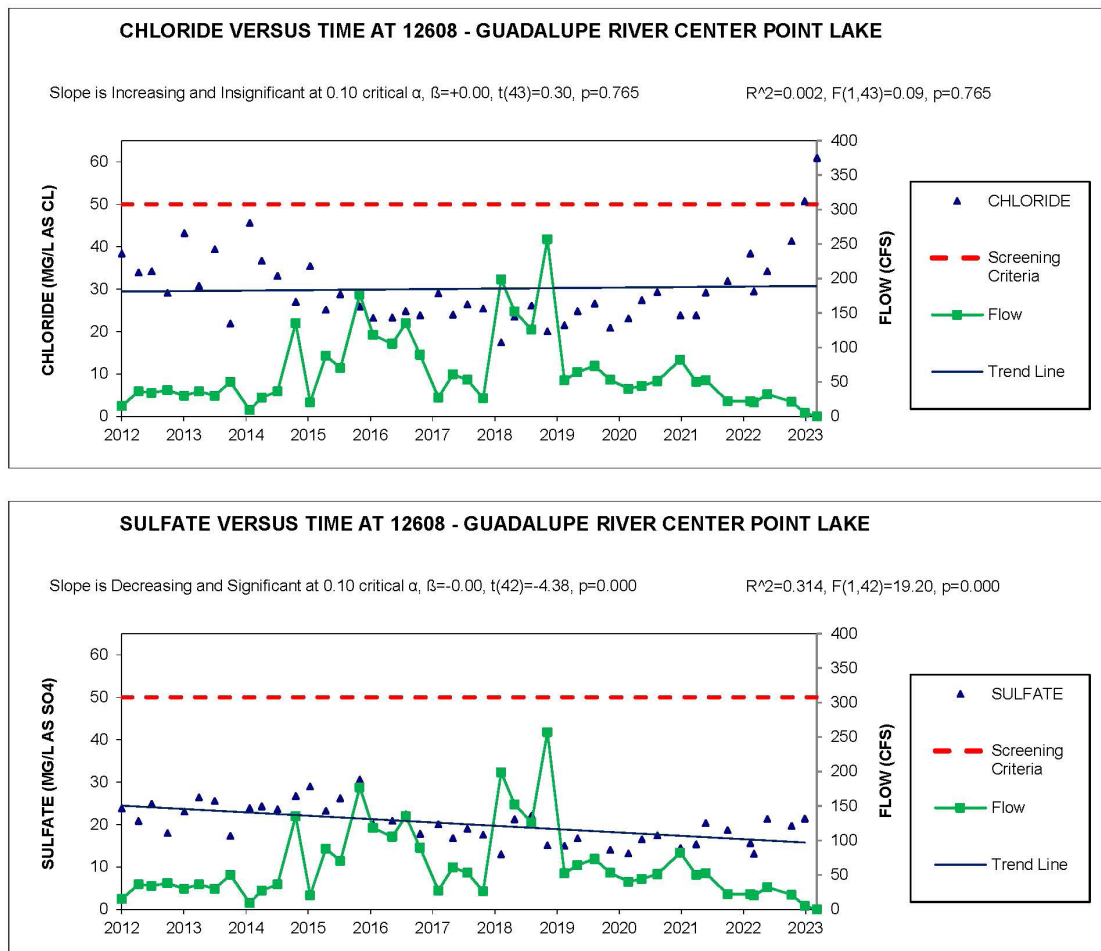


Figure 2: Chloride and sulfate trends over time at station 12608 in the upper portion of the Guadalupe River Basin.

Although chloride and sulfate concentrations were already increasing over time at many stations in the middle portion of the Guadalupe River Basin between 2012-2022 (GBRA 2023), these trends often became stronger with the addition of 2022-2023 data. For example, chloride and sulfate trends over time in the Upper San Marcos river at IH 35 (station 12672) increased over time between 2012 and 2023 (Figure

3). The addition of 2023 data to the previous analyses improved the r^2 values originally found using data only from 2012-2022 (GBRA 2023), indicating a stronger trend when the new data were added. During the recent drought, flows substantially decreased at many stations in this portion of the basin, and this likely caused elevated chloride and sulfate concentrations.

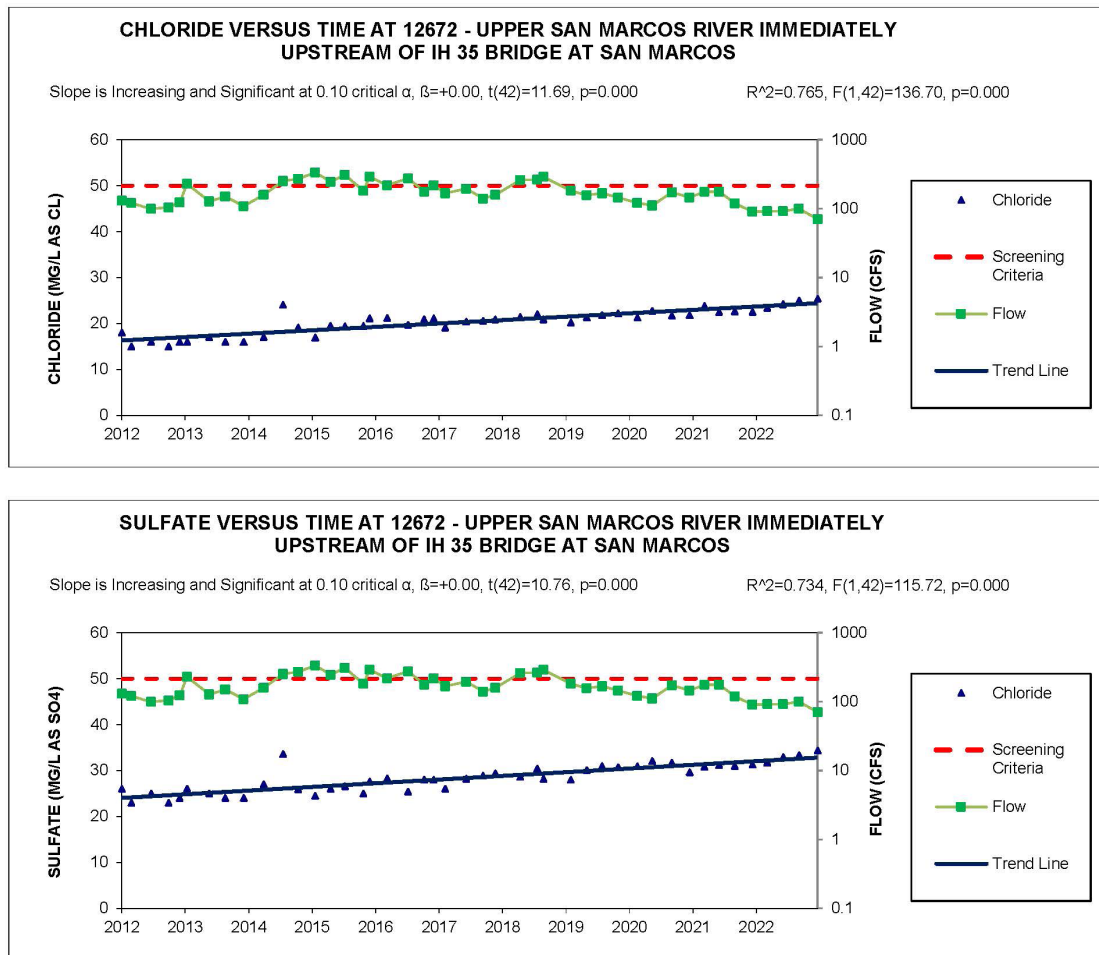


Figure 3: Chloride and sulfate trends over time at station 12672 in the middle portion of the Guadalupe River Basin.

In the lower Guadalupe Basin, chloride and sulfate concentrations in Coletto Creek Reservoir (station 20827) continued to increase with decreasing water level in the past year (Figure 4). Similar to other areas in this basin, chloride and sulfate levels appear to closely correspond with changes in water levels in this reservoir.

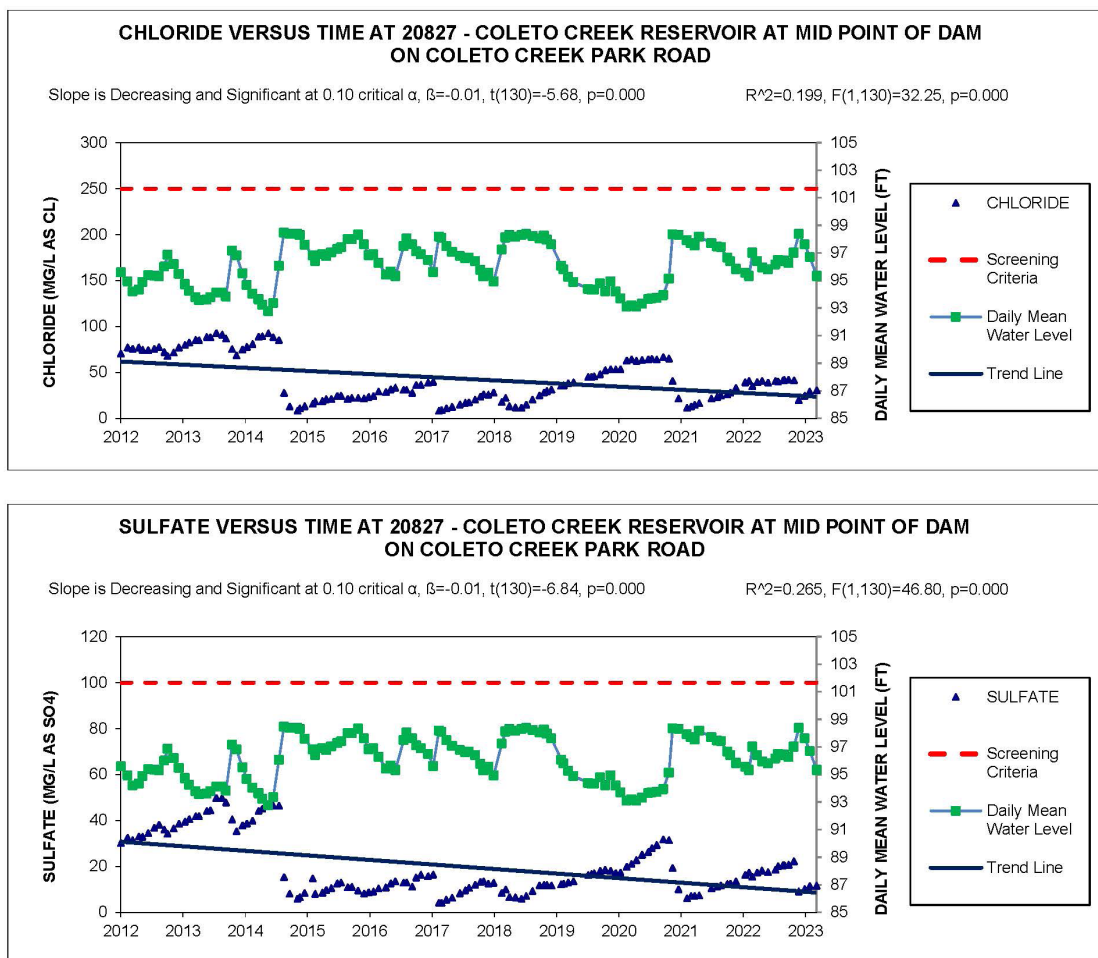


Figure 4: Chloride and sulfate trends over time at station 20827 in the lower portion of the Guadalupe River Basin.

Completion of Lake Dunlap Dam

Following the completion of the redesigned Dunlap Dam, Lake Dunlap began to refill on August 31, 2023 and reached its full capacity by the end of October. Subsequently, GBRA resumed taking monthly secchi depth measurements in September 2023 to measure water clarity at Station 12596, which is located near Lone Star Drive on Lake Dunlap. Flow data is also available as representative flow gages once again became operational.

Lake Dunlap was first impounded in 1928 for the purpose of hydro-electric power generation. Today, Lake Dunlap is still used for power generation and is also an extremely popular location for boating and fishing. Largemouth bass (*Micropterus salmoides*) and Channel catfish (*Ictalurus punctatus*) are some of the most common species caught at Lake Dunlap.



Station 12596 on Dunlap Reservoir taken on November 28, 2023.

GBRA Coordinated Monitoring Meeting

GBRA held its 2023 meeting on March 15, 2023. The Basin Steering Committee remains a major communication vehicle for the CRP. This group is composed of community leaders and interested citizens from throughout the basin and meets annually to review activities and advise the program on priorities for monitoring and special studies. The Steering Committee membership includes: representation from municipalities, counties, industries, homeowner organizations, Texas State Soil and Water Conservation Board (TSSWCB), Texas Parks and

Wildlife Department (TPWD), chambers of commerce, and local regional environmental organizations. These meetings are open to the public with the primary purpose of reviewing and approving achievable basin water quality objectives and priorities, considering available technology and economic impacts, and guiding work plans and the allocation of available resources. Notice of upcoming Steering Committee meetings is made available by emailed notices, social media, and on the meeting page of the GBRA website (www.gbra.org).

Upper Guadalupe River Authority

Part of UGRA's mission is to actively facilitate the understanding of water issues and engage the community in maintaining and promoting the health and enjoyment of the Upper Guadalupe River Basin. UGRA has an active education program designed to give Kerr County residents a better understanding of the Upper Guadalupe River and its watershed. UGRA staff prepare presentations for area schools, clubs, organizations, and summer camps to teach about water quality, pollution threats, conservation, the water cycle, and the importance of the Guadalupe River to the community. This year, staff

conducted 40 programs educating over 2,400 members of the public about local water resources. UGRA's public awareness campaign keeps the community informed of water issues through newspaper features, radio announcements, and social media.

The UGRA EduScape is an educational demonstration landscape surrounding the UGRA headquarters building. Virtual and in person tours of the EduScape are conducted year-round and many visitors also stop by for a self-guided tour. The landscape presents 15 water-saving features in addition to 30 interpretive

and water conservation tip signs. A quarter mile walking trail leisurely meanders through several different plant zones and demonstrates techniques like rainwater harvesting, rain gardens, pervious walkways, and the use of native plants. The features highlight practical ways to improve water conservation and stormwater detention in your home or business landscape.

UGRA further encouraged homeowners and professionals to adopt landscaping best practices by hosting a Waterwise Landscaping Seminar during fall 2023. Speakers at the event covered a wide range of topics including rainwater harvesting, native plants, and irrigation methods. Over 80 attendees learned of new ways to conserve water from local experts and professionals in their fields.

UGRA provides opportunities for citizen stewardship and community involvement in protecting the water resources of Kerr County. A popular activity is the UGRA Volunteer Summer Study. This program is supported by interested members of the community who collect surface water samples for *E. coli* bacteria analysis each summer. This year's program was supported by 27 volunteers who collected 330 samples at 40 locations throughout



The UGRA Eduscape.

Kerr County. The information collected by the volunteers provides important data and helps identify areas in need of further investigation while including the community in water quality monitoring.

Above all, UGRA is a resource and advocate for the community on water quality, surface water, and the Guadalupe River. Please contact UGRA with comments, questions or concerns at (830) 896-5445 or visit www.ugra.org.

UGRA Program Highlight

In 2022, UGRA launched the Rainwater System Grant Program to promote the construction of higher capacity rainwater catchment systems by nonprofit organizations, schools, and public entities. The 2023 recipient of the grant was the Hunt Volunteer Fire Department who were awarded \$15,000 to expand the capacity of their system. They can now collect up to 50,000 gallons of rainwater that will be used to fill their tanker trucks for firefighting throughout Kerr County.



UGRA Board Members present the UGRA Rainwater System Grant Program Award to Hunt Volunteer Fire Department.



20th annual UGRA River Clean Up participants.

This July marked the 20th anniversary of UGRA's Annual River Clean Up, where volunteers pick up trash throughout the watershed in Kerr County. In 2023, approximately 549 volunteers came together to pick up 8,110 pounds of trash in just one morning. Afterwards, the individuals, families, and civic groups gathered in Flat Rock Park to celebrate the beautiful Guadalupe River and their hard work.

Meadows Center for Water and the Environment Texas Stream Team

The Texas Stream Team program, a surface water quality community science initiative at The Meadows Center for Water and the Environment, demonstrated significant success in outreach activities within the Guadalupe River Basin in 2023. Over the year, the program conducted 683 monitoring events with 1,119 participants, involving community scientists who contributed 1,126 hours to water quality monitoring. Community scientists traveled a combined distance of 15,741 miles to and from their monitoring sites this year. The program's impact is further highlighted by the 18 training sessions held in the Guadalupe Basin, attracting 278 participants. These sessions, covering topics

such as riparian evaluation and *E. coli* bacteria training, contribute to building local expertise and fostering a sense of environmental responsibility. Noteworthy outreach events within the basin include the Guadalupe Blanco River Authority's Clean Rivers Program FY24 Coordinated Monitoring Meeting and FY23 Basin Steering Committee Meeting, attended by 30 individuals, and the Urban Riparian Symposium, drawing 60 attendees. These outreach efforts underscore the program's commitment to community engagement and environmental stewardship, specifically within the Guadalupe River Basin, which is arguably the most active basin for the program in the state.



*Texas Stream Team training event at The Headwaters of the Comal.
Photo credit Madison Mitchell.*

The Watershed Association

Cypress Creek Watershed Protection Plan

Federal funding for the Cypress Creek Watershed Protection Plan (CCWPP) concluded in August 2023. Going forward, Cypress Creek stakeholders seek the continuation of coordination efforts to ensure a clean, clear, and flowing future for Cypress Creek. Local stakeholders can build on the existing multifaceted watershed protection plan to accomplish these goals. For this effort to be successful, the following key components were identified as part of a sustainability plan:

Sustainability Plan Highlights:

- Continuation of watershed coordination and communication
- Meadows Center to maintain Clean Rivers Program (CRP) monitoring
- Funding through Interlocal Agreement of local partners and key stakeholders

Collective Goals of Current Stakeholders

Despite significant accomplishments since the project's inception, many challenges remain ahead. Development pressures and persistent drought conditions warrant continued collaborative

effort toward safeguarding water quality and water availability.

Regarding impacts to flow and groundwater availability, stakeholders identified drought and population increases, education of new residents, management of groundwater pumping, and unmanaged growth in sensitive areas as near-term challenges. Regarding impacts to managing water quality, stakeholders identified maintaining flow, managing growth and development while minimizing impervious cover and maximizing water reuse, managing and treating stormwater, and proper maintenance or upgrades to old septic systems as near-term challenges. Furthermore, stakeholders identified flow and groundwater availability as the highest priority parameter to address for future CCWPP projects.

Participating stakeholders identified future project needs and ranked them by priority for the next phase of the Watershed Protection Plan are:

- Source switch or alternate water supply feasibility for growing groundwater demand
- Stormwater study, analysis, and/or

- engineering audit
- Community-scale Type 1 reuse feasibility study
- Demonstration project or mitigation BMP for untreated downstream stormwater flows
- Impact analysis of water quality ordinance changes
- Web-based water quality data accessibility enhancements

Partners identified three key priorities for the next phase of the CCWPP:

- 1) Continued coordination and communication
- 2) Continued water quality monitoring and data analysis
- 3) Special projects

Water quality monitoring through the Clean Rivers Program of the six sites along Cypress Creek, seven sites along the Blanco River, and two groundwater

monitoring sites within the Wimberley Valley document conditions and serve as a first alert to water quality problems.

Next Steps

The sustainability plan offers a foundation for discussions moving forward. The plan and supporting Interlocal Agreement were a topic of discussion at the final Cypress Creek watershed speaker series that took place in mid-July 2023. Stakeholders and fiscal contributors are working to determine a budget mechanism to ensure equitable funding for continued sampling and coordination of watershed protection plan efforts. The Meadows Center and Watershed Association are engaged in discussions with key partners to confirm support and financial contributions to the Interlocal Agreement.



Cypress Creek in Wimberley, Texas. Photo credit: Allyson Schlandt.

Overview of Water Quality Monitoring

The Guadalupe River Basin contains over 6,000 miles of rivers, creeks, and streams and flows through several ecoregions as it makes its way to San Antonio Bay and finally, the Gulf of Mexico. Extensive water quality monitoring occurs in this basin under the Clean Rivers Program to monitor current conditions and identify long-term water quality trends. GBRA, UGRA, the Meadows Center, and the Watershed Association all perform monitoring under this

program (Table 2). In addition to Clean Rivers Program data, GBRA collects additional data in connection with Watershed Protection Plans in the Plum Creek and Geronimo & Alligator Creeks watersheds. Figures 5-7 indicate the full set of sampling locations. A full description of the current sampling schedule can be found on the online Coordinated Monitoring Schedule at <https://cms.lcra.org>.

Sampling Entity	Monthly	Quarterly	Total
GBRA	19	13	32
UGRA	7	10	17
WWWA	3	4	7
MCME	0	6	6

Table 2: Number of stations monitored by sampling entity under Clean Rivers Program.

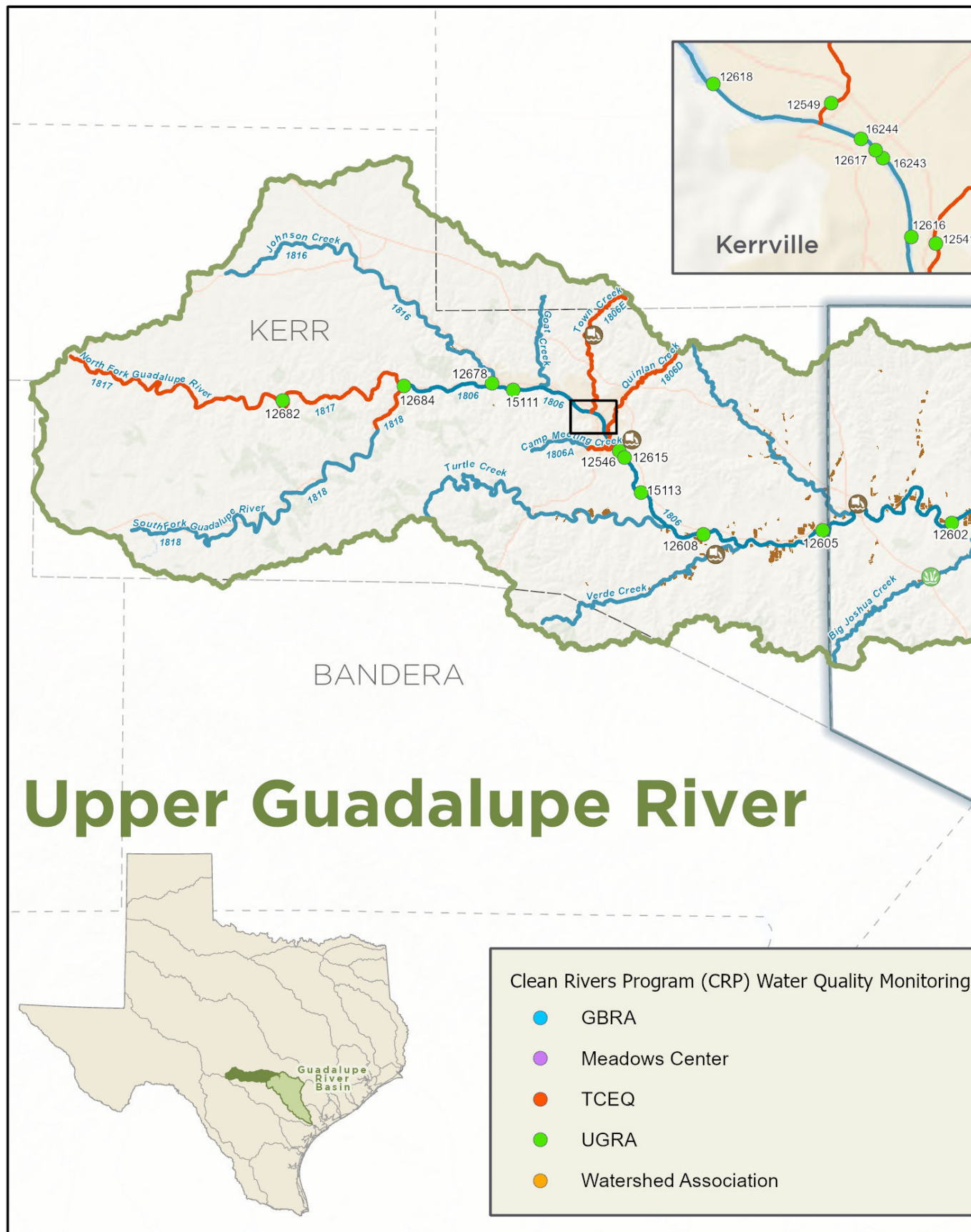
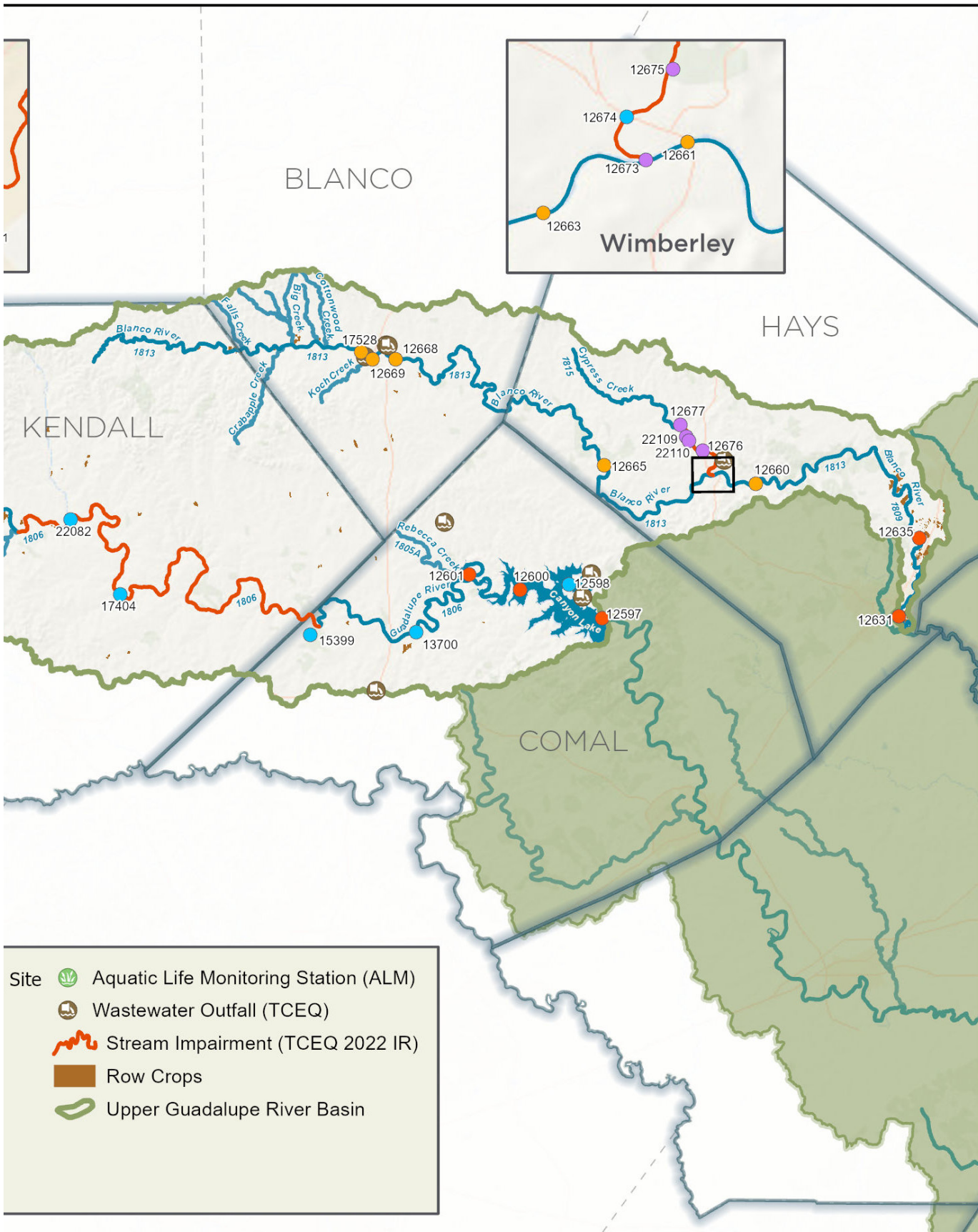


Figure 5: Map of upper portion of the Guadalupe River Basin with monitoring stations.



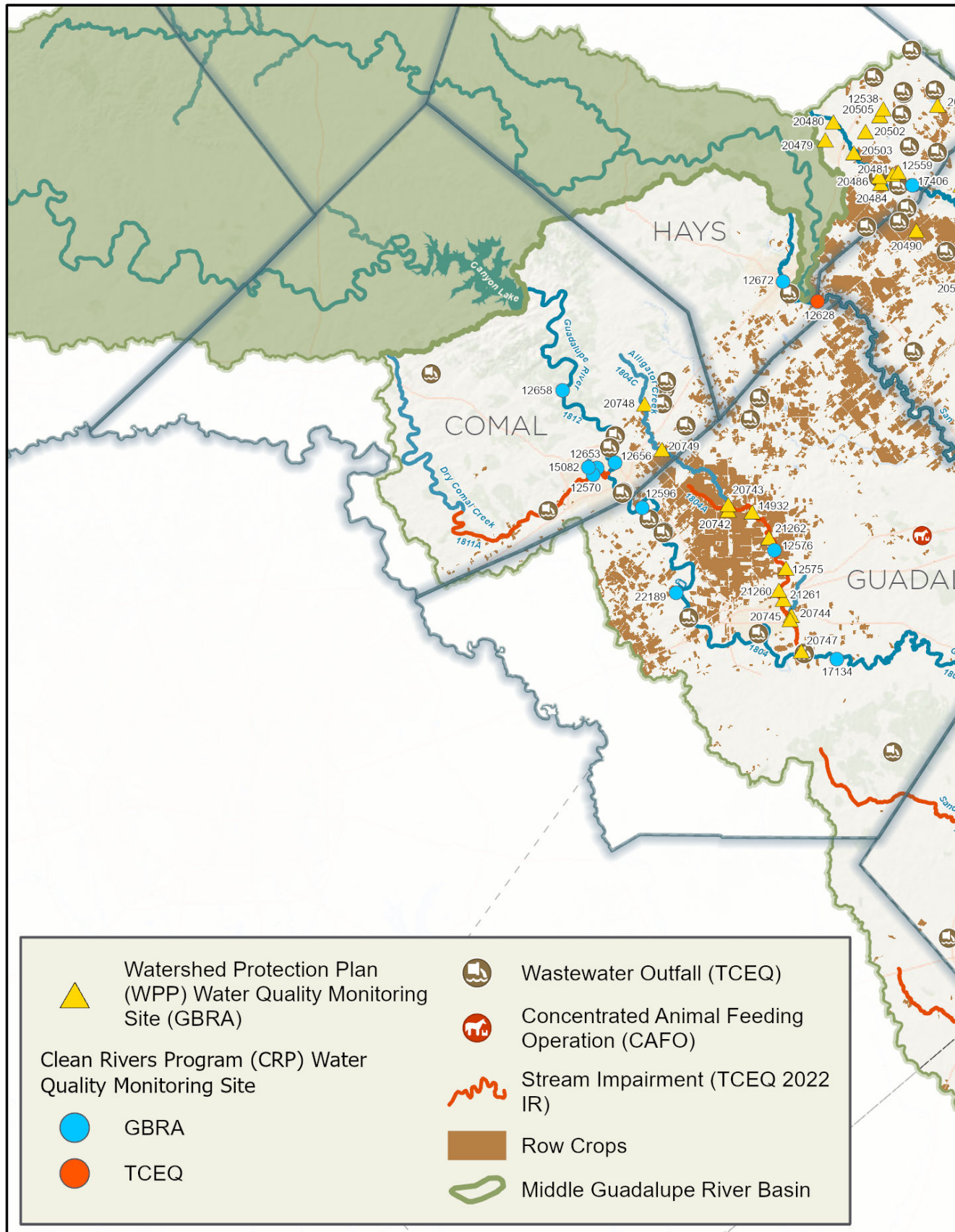
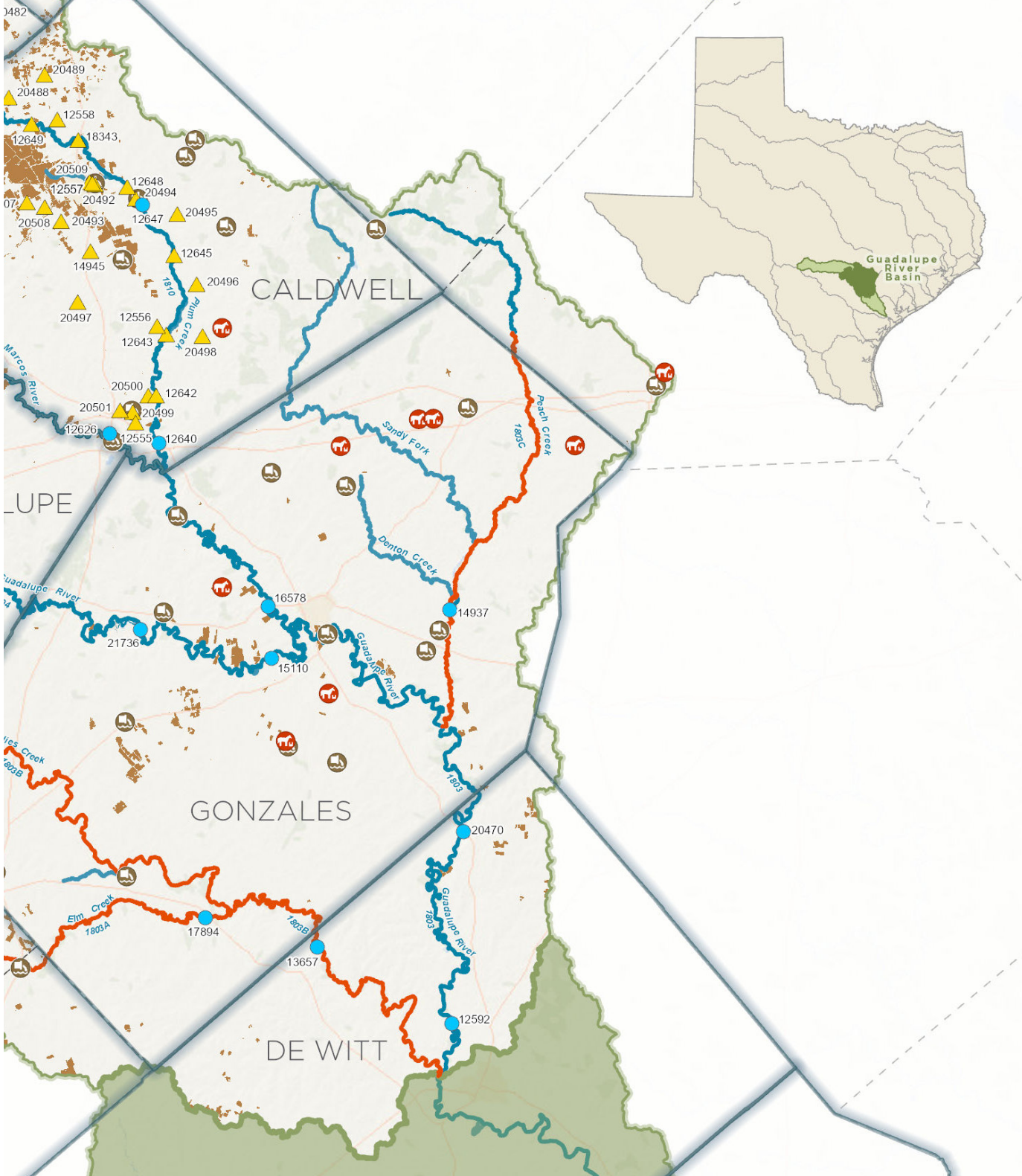


Figure 6: Map of middle portion of the Guadalupe River Basin with monitoring stations.

Middle Guadalupe River



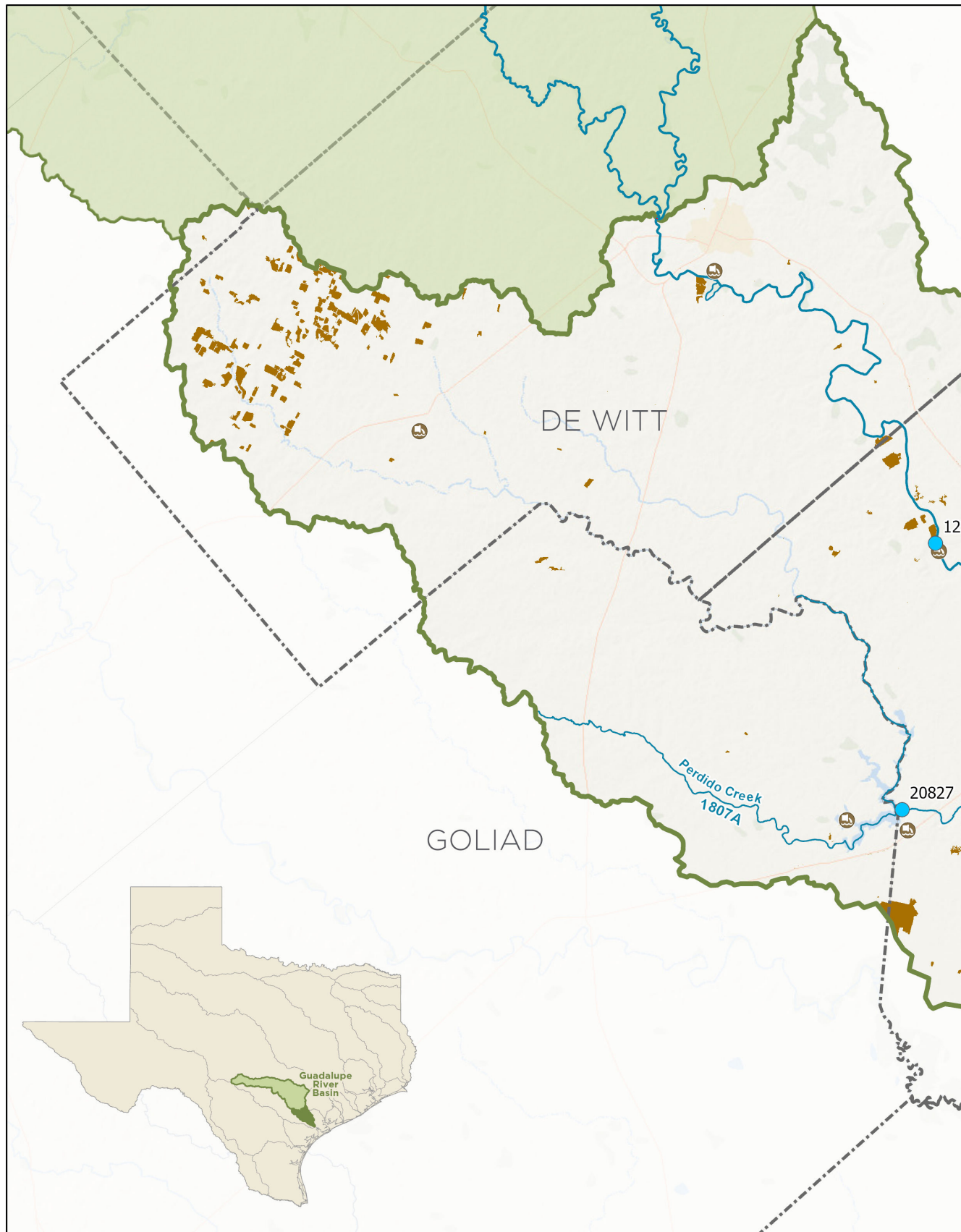
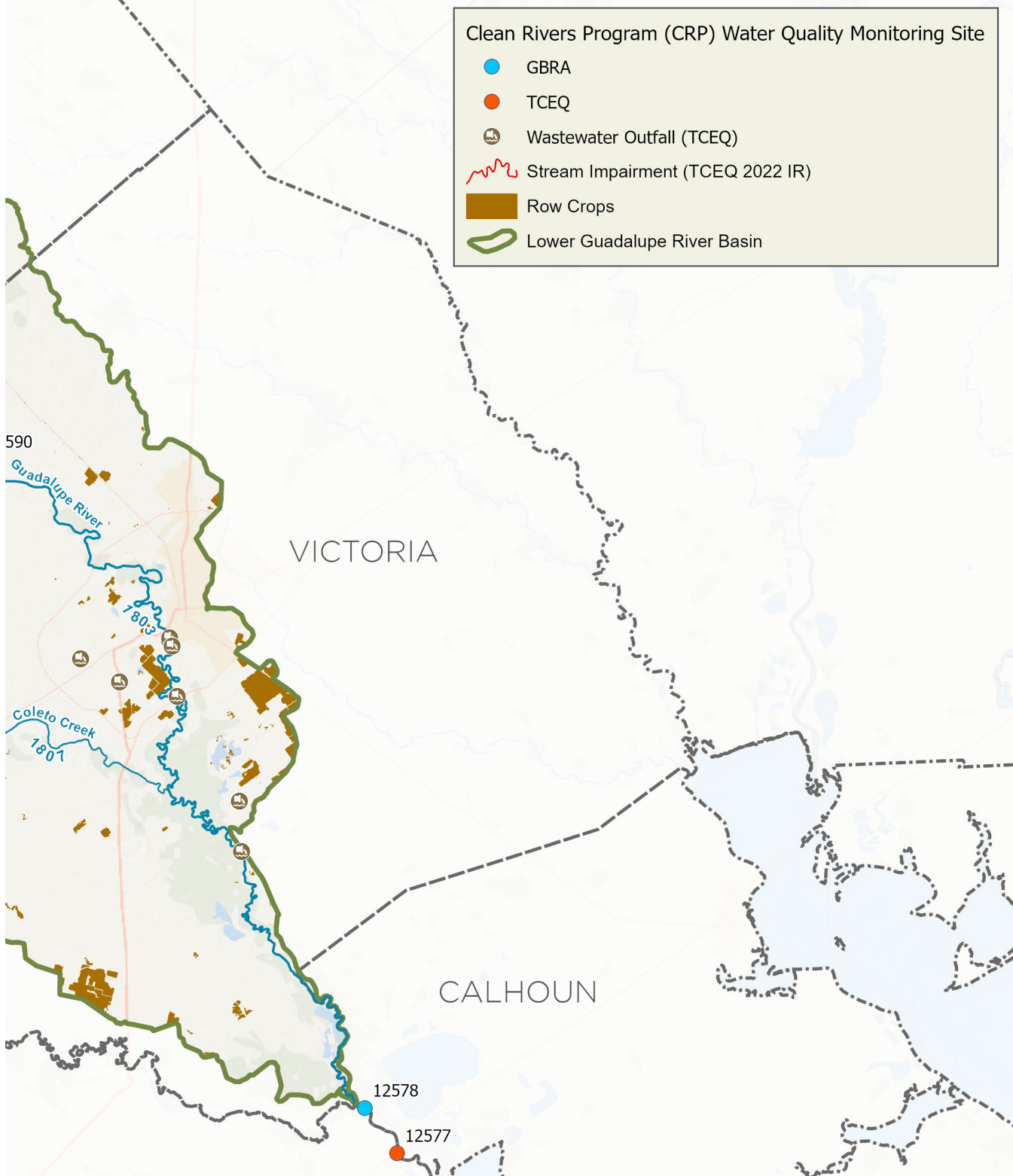


Figure 7: Map of lower portion of the Guadalupe River Basin with monitoring stations.

Lower Guadalupe River



Impairments in the Guadalupe River Basin

The 2022 Texas Integrated Report is a statewide assessment on waters within the state. This report compares water quality data collected across the state and is compared to approved water quality standards every two years. These results are published in the Texas Integrated Report of Surface Water Quality for the Clean Water Act Sections 305(b) and 303(d). When monitoring data indicates that water quality meets the minimum state standards, then that water body is classified with no impairments or

concerns. If there is not enough data for an accurate analysis and it does not meet the minimum requirements, it is listed as a concern. If there is enough data for analysis and it does not meet the criteria, that body of water is listed for an impairment on the 303(d) list. Waterbodies in the Guadalupe River Basin with impairments and or concerns are listed in Table 3. Waterbodies that were recently delisted in the 2022 Texas Integrated Report are listed in Table 4.

Table 3: Impaired waterbodies in the Guadalupe River Basin according to the 2022 Texas Integrated Report.

Segment	Water Body	Impairment	Concern	Impairment Year
1801	Guadalupe River Tidal	Bacteria	Nitrate	2022
1802	Guadalupe River Below San Antonio River	NA	Nitrate	NA
1803	Guadalupe River Below San Marcos River	NA	Nitrate	NA
1803A	Elm Creek	Dissolved oxygen	Chlorophyll-a, dissolved oxygen	2004
1803B	Sandies Creek	Bacteria, dissolved oxygen	Dissolved oxygen	2004, 1999
1803C	Peach Creek	Bacteria, dissolved oxygen	Chlorophyll-a, impaired macrobenthic community, total phosphorus	2002, 2006
1804A	Geronimo Creek	Bacteria	Nitrate	2006
1805	Canyon Lake	Mercury in fish	NA	2006
1806	Guadalupe River Above Canyon Lake	Bacteria	Impaired fish community, impaired habitat in water	2002
1806A	Camp Meeting Creek	Bacteria	Dissolved oxygen	2018
1807	Coletto Creek	NA	Chlorophyll-a	NA
1808	Lower San Marcos River	NA	Bacteria	NA

1810	Plum Creek	Bacteria	Ammonia, fish kill, impaired fish community, impaired habitat, impaired macrobenthic, nitrate, total phosphorus	NA
1810A	Town Branch	NA	Bacteria, dissolved oxygen, nitrate	NA
1811	Comal River	Bacteria	NA	2016
1811A	Dry Comal Creek	Bacteria	NA	2010
1815	Cypress Creek	Impaired fish community, impaired macrobenthic community	Dissolved oxygen, impaired habitat	2020
1816	Johnson Creek	NA	Impaired habitat	NA
1817	North Fork Guadalupe River	Impaired fish community, impaired macrobenthic community	Impaired habitat	2020
1818	South Fork Guadalupe River	Impaired fish community, impaired macrobenthic community	Impaired habitat	2020

Table 4: Delisted waterbodies in the Guadalupe River according to the 2022 Texas Integrated Report.

Segment	Water Body	Impairment
1803B	Sandies Creek	Impaired fish community, impaired macrobenthic community
1815	Cypress Creek	Dissolved oxygen

Segment 1801 (Guadalupe River Tidal) was newly listed as impaired for bacteria in the 2022 Integrated Report. This segment is the portion of the Guadalupe River that flows just downstream of the salt water barrier until it reaches the confluence with the Guadalupe Bay in Calhoun/Refugio county. Although reasons for this impairment are unclear, nonpoint source runoff is a likely cause of the bacteria impairment. This portion of the watershed is largely rural. Runoff in this area may contain nutrients and bacteria from farmed fields, livestock pastures, and failing septic systems. Inflow from Victoria Barge

Canal is also possible, which could impact water quality. Additionally, this area contains many marshes and backwaters. Wildlife such as migratory birds are common and may also contribute to bacteria in this segment, and tides may bring in bacteria inputs from nearby bays and backwaters. If elevated bacteria levels persist, further management steps could be considered such as a bacterial source tracking study to determine sources of the impairment or development and implementation of best management practices to minimize nonpoint sources of bacteria.

Management Efforts for Impaired Waterbodies

Multiple TCEQ and TSSWCB projects exist to address existing impairments in the Guadalupe River Basin. TCEQ has developed total maximum daily loads (TMDLs) for bacteria in the Guadalupe River Above Canyon Lake (segment 1806), Camp Meeting Creek (1806A), Quinlan Creek (1806D), and Town Creek (1806E). TMDLs are commonly used for waterbodies that have water quality issues due to excessive quantities of one or more pollutants. A TMDL acts like a budget for a waterbody, determining how much of a pollutant the waterbody can handle while still supporting its water quality standards. For more information regarding TMDLs and specific TMDL projects, please visit TCEQ's TMDL program website at <https://www.tceq.texas.gov/waterquality/tmdl>.

Watershed protection plans (WPPs) may also be used to address impairments in waterbodies. WPPs describe the sources of pollution affecting a waterbody and define voluntary actions that will be taken to improve water quality and reduce pollution. These projects are developed in coordination with regional and local stakeholders.

TCEQ has developed a WPP for the Cypress Creek (1815) watershed, the Comal (1811) and Dry Comal (1811A) watershed, and the Upper San Marcos River watershed (1814). TSSWCB has developed WPPs for the Plum Creek watershed (1810) and for the Geronimo and Alligator Creeks watershed (1804A, 1804C). For more information on WPPs, please see the TCEQ WPP program webpage at <https://www.tceq.texas.gov/waterquality/nonpoint-source/mgmt-plan/watershed-pp.html> or the TSSWCB WPP webpage at <https://www.tsswcb.texas.gov/programs/texas-nonpoint-source-management-program/watershed-protection-plan-program>.

Literature Cited:

Guadalupe-Blanco River Authority (GBRA). 2023. 2023 Basin Summary Report, Clean Rivers Program, Guadalupe River and Lavaca-Guadalupe Coastal Basins. <https://www.gbra.org/news/publications/basin-summary-reports/>. Accessed 1/12/2024.

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