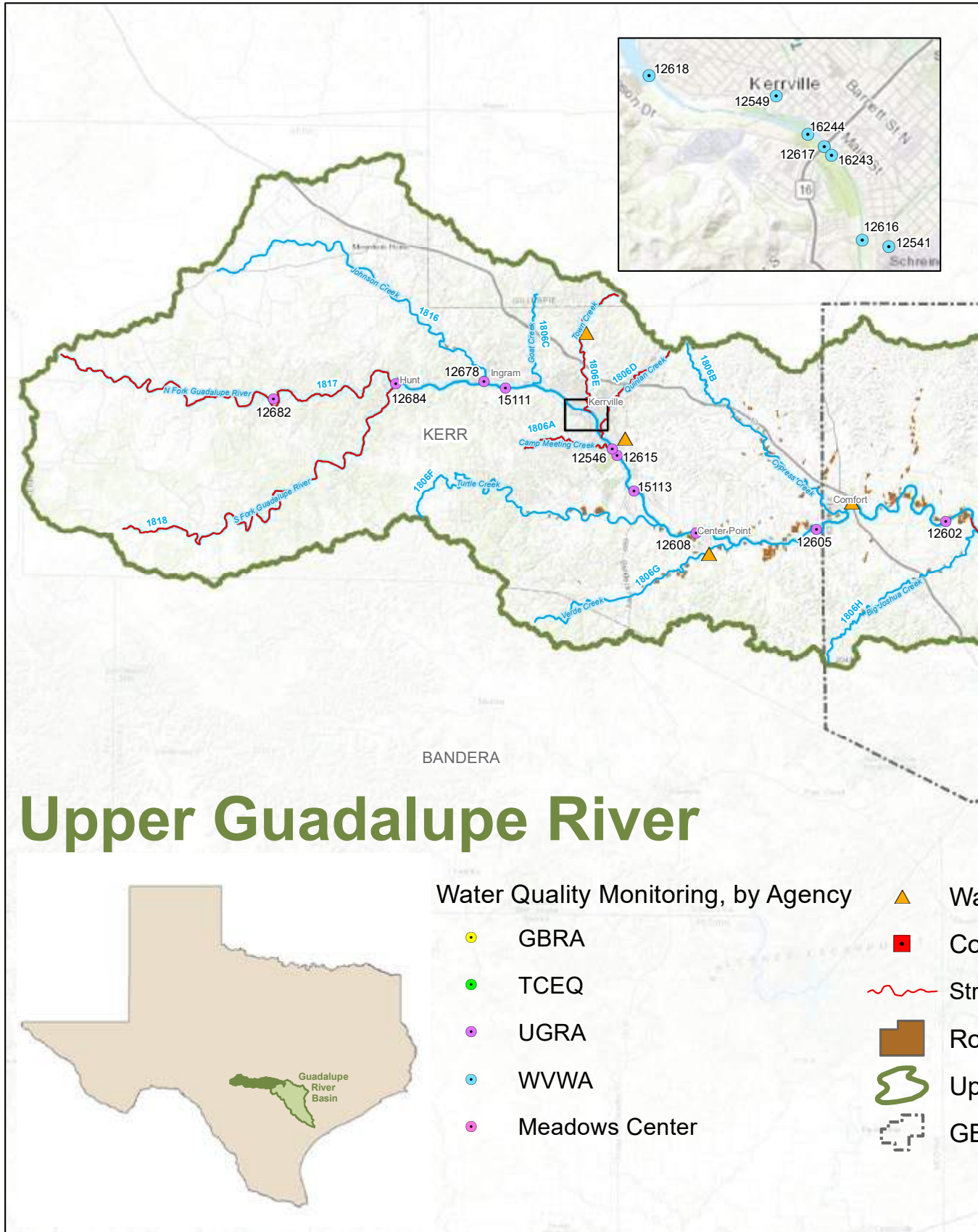


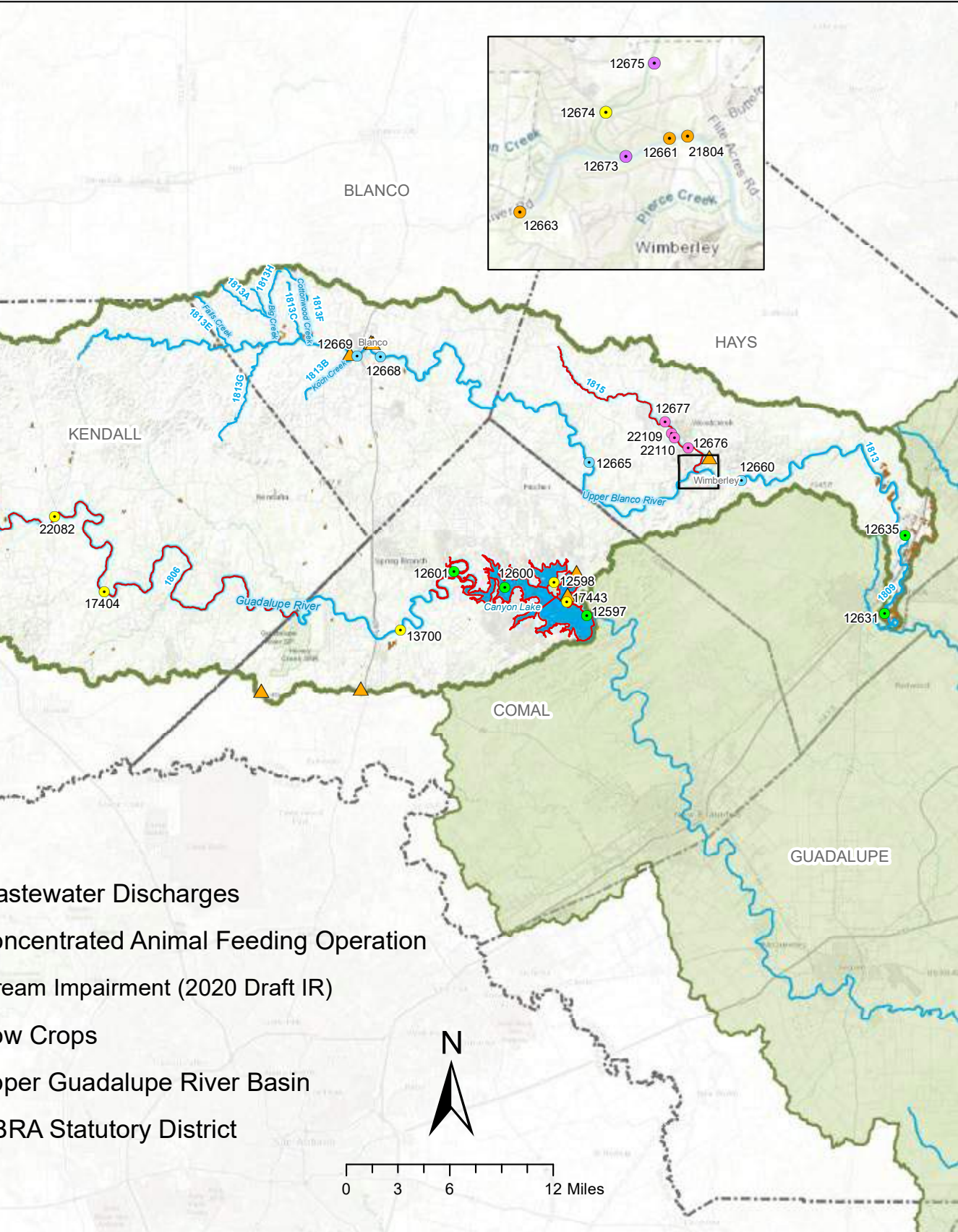
2020 Basin Highlights R E P O R T



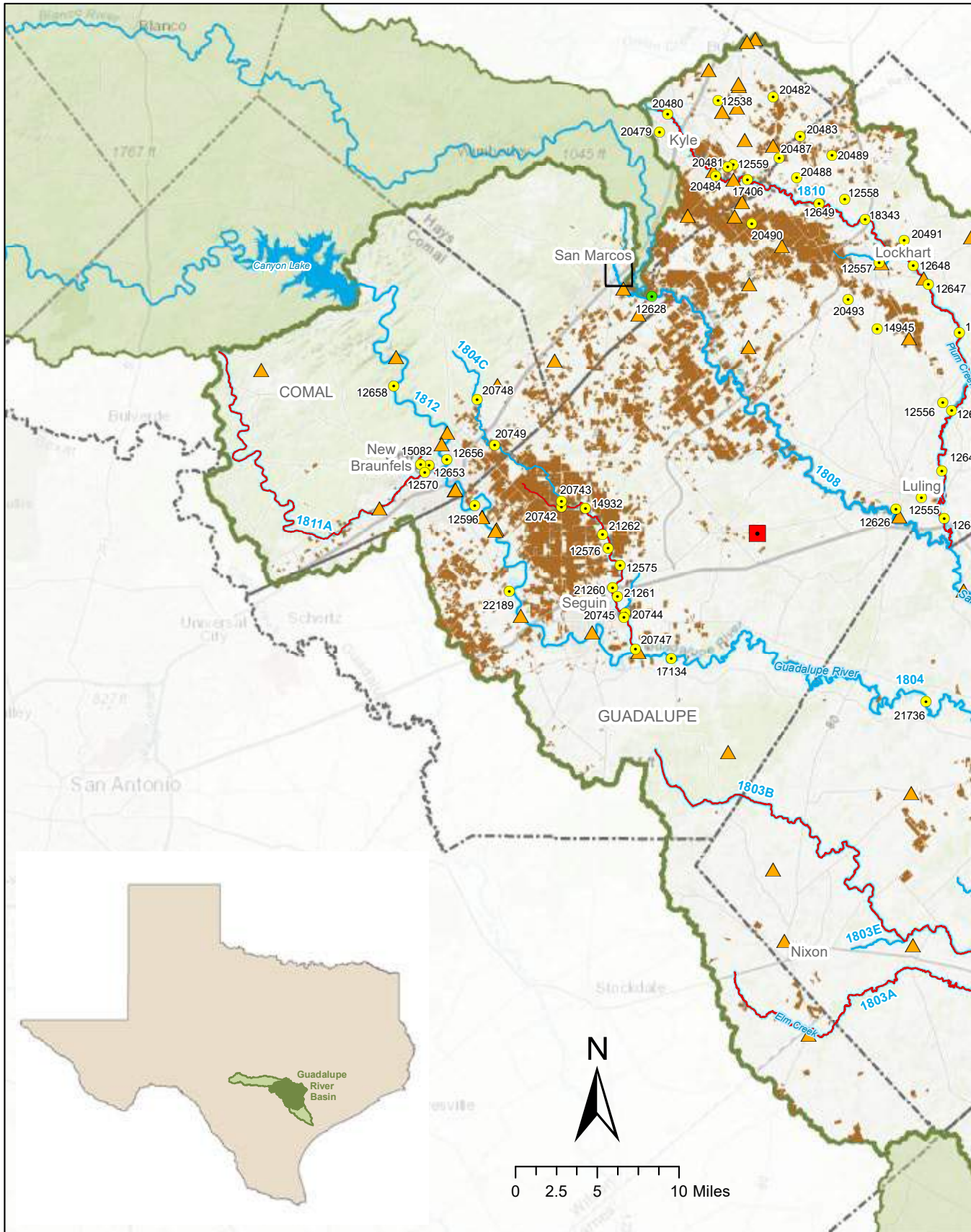
CLEAN RIVERS PROGRAM

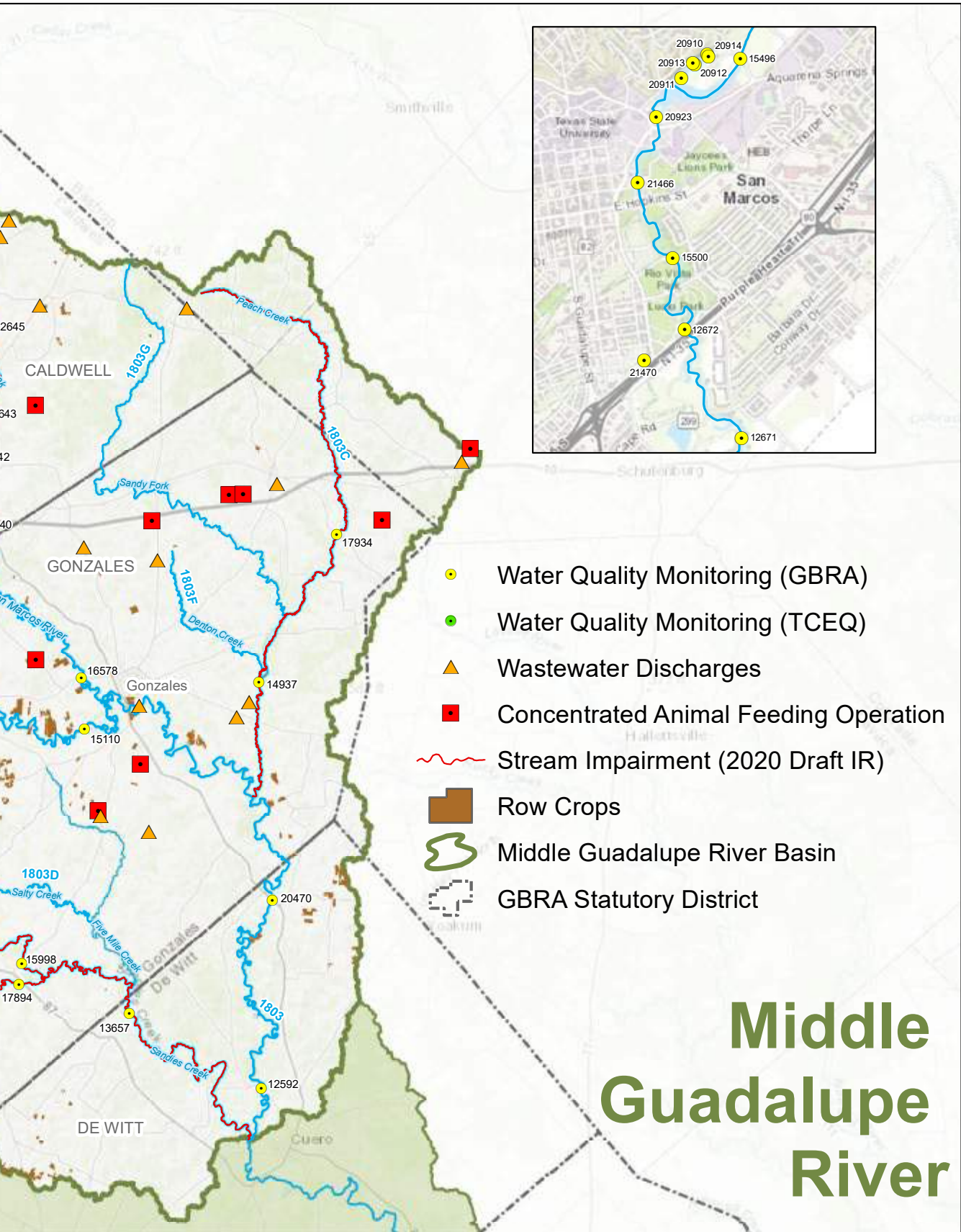
Guadalupe River and Lavaca-Guadalupe Coastal Basins

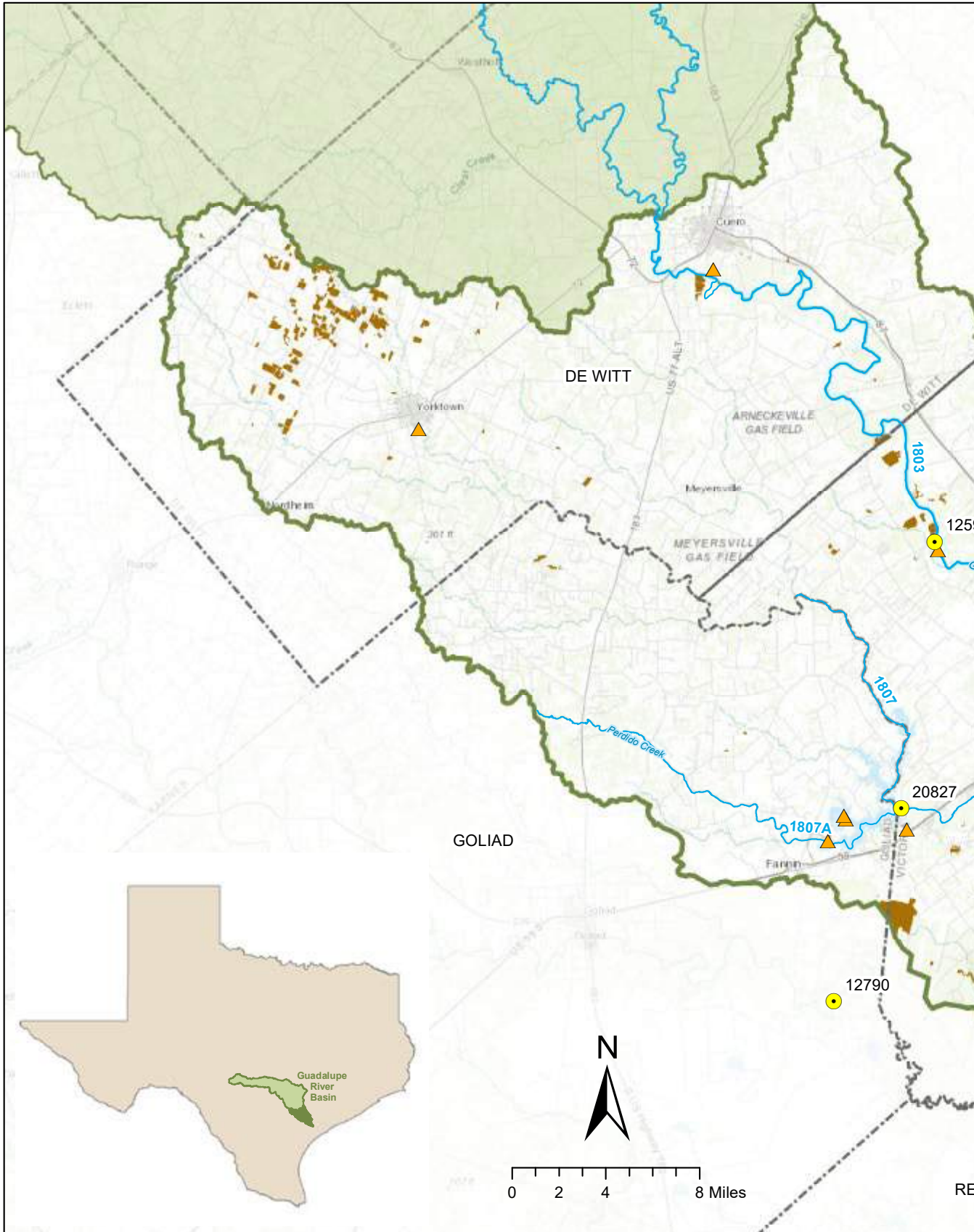




2020 Basin Highlights REPORT







Lower Guadalupe River

- Water Quality Monitoring (GBRA)
- Water Quality Monitoring (TCEQ)
- ▲ Wastewater Discharges
- Concentrated Animal Feeding Operation
- ~ Stream Impairment (2020 Draft IR)
- Lower Guadalupe River Basin
- GBRA Statutory District
- Row Crops

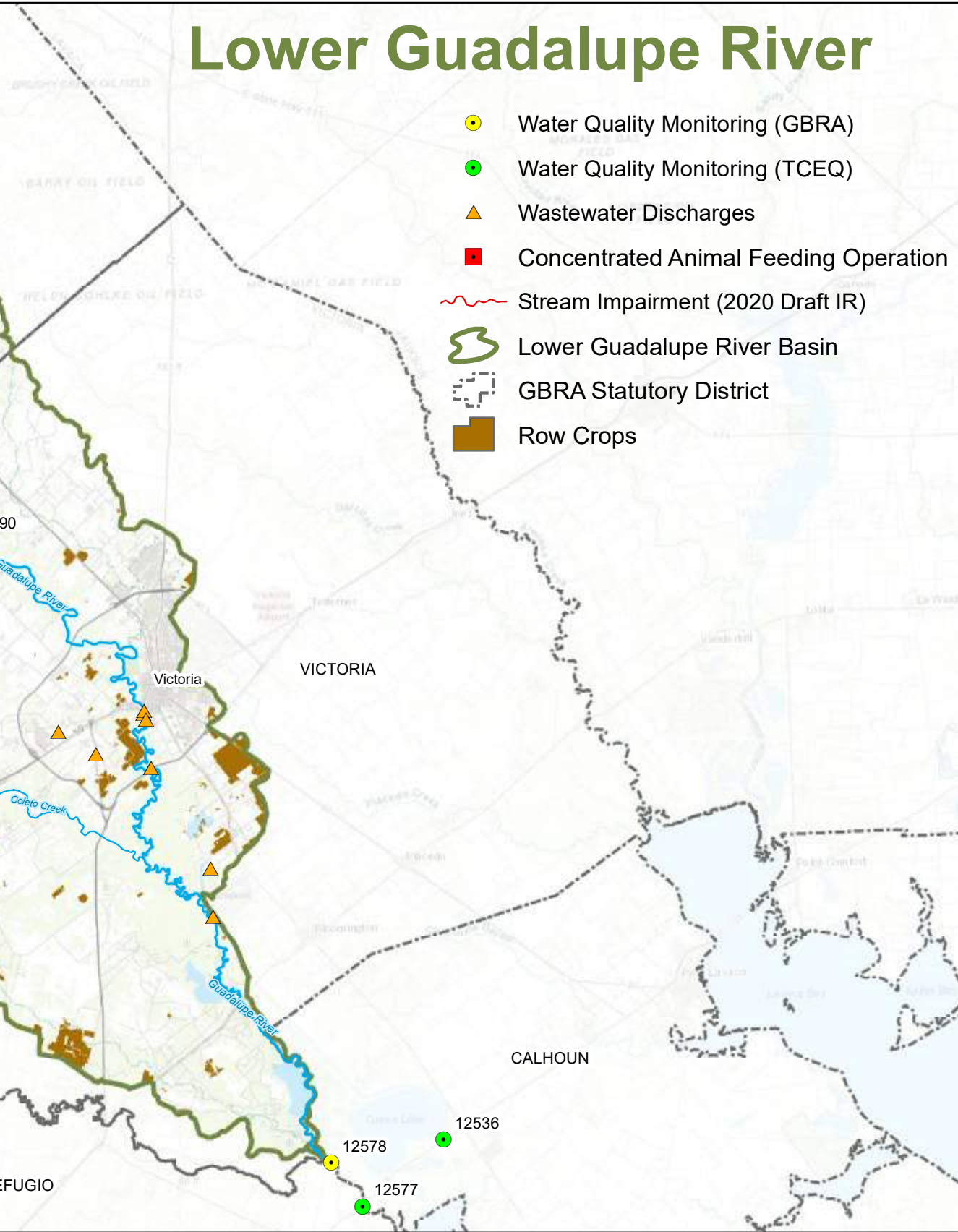


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**Cover photo: A Great Blue Heron flies over the Guadalupe River in Kerrville.
Photo by: Steve Peters**



Guadalupe River
in Kendall County

2019 BASIN HIGHLIGHTS REPORT

This report highlights the activities of the Guadalupe River Basin and the Lavaca-Guadalupe Coastal Basin under the Clean Rivers Program (CRP) in 2019. CRP is a statewide program established by the Texas legislature in 1991 to holistically manage water quality issues throughout the state. CRP program objectives are to provide quality assured data for regulatory decisions, identify and evaluate water quality issues, promote cooperative watershed planning, recommend management strategies, inform and engage stakeholders and maintain efficient use of public funds. The Texas Commission on Environmental Quality (TCEQ) manages the program. TCEQ contracts the Guadalupe-Blanco River Authority (GBRA), and Upper Guadalupe River Authority (UGRA), to conduct water quality monitoring, assessment and stakeholder outreach

activities in the Guadalupe-Blanco River Basin. Partners use the majority of the funding allocated for the CRP program to conduct monitoring, perform quality assurance and data management functions for the program. This report includes a description of the major basin events (Table 1), water quality monitoring (Table 2), public outreach and education, watershed planning, and stewardship activities in the River Basin. The 2020 Basin Highlights Report also includes maps of water quality sampling sites and a review of the water quality impairments and concerns in the Draft 2020 Texas Integrated Report for the Clean Water Act section 305(b) and 303(d) (Table 3). Additional information on the Guadalupe River Basin and the Lavaca-Guadalupe Coastal Basin Clean Rivers Program can be found at www.gbra.org/crp.

TABLE 1**Clean Rivers Program Guadalupe River and Lavaca-Guadalupe Coastal Basins Inventory of Events for 2019**

Event	Segment/ Sub-watershed	Comments
Water Hyacinth treatments in tidally influenced portions of the Guadalupe River	1701, 1801	Texas Parks and Wildlife Department (TPWD) and GBRA collaborated in the treatment of invasive water hyacinth that blocked public access and created poor water quality conditions in the tidally influenced portions of the Guadalupe River in 2019. A total of 62 acres of hyacinth were sprayed with glyphosate on Hog Bayou, Goff Bayou and the South Fork of the Guadalupe River in May of 2019. This chemical treatment occurred prior to the annual Texas Water Safari canoe race in June. A follow-up treatment of 24 acres occurred in July. In November of 2019, the treatment area expanded to include Schwings Bayou and Mission Lake, as contractors applied diquat dibromide to 119 acres of water hyacinth.
Zebra Mussels in GBRA Hydro Lakes	1804, 1805, 1812	Zebra mussels are of particular concern to the Guadalupe River Basin because of their potential to damage infrastructure such as pipes and boats below the waterline, inhibit recreation, or out-compete native freshwater mussel species. Texas Parks and Wildlife Department (TPWD) declared zebra mussels had “infested” Canyon Reservoir with a reproducing population in 2018. TPWD discovered live mussels in the Guadalupe River downstream of Canyon Dam soon after. GBRA and TPWD proactively performed intensive monitoring of the three closest hydroelectric impoundments downstream of Canyon Dam. In November of 2018, GBRA collected zebra mussel larvae and positive DNA from Lakes Dunlap and McQueeney. The following month, TPWD reclassified these water bodies as “suspect” for zebra mussels. In May of 2019, GBRA discovered adult zebra mussels in Lakes Dunlap, McQueeney, and Placid and TPWD reclassified all three impoundments as “positive” for zebra mussels. To date, there is no evidence of a reproducing population in these waterbodies. The species has continued to spread despite an intensive educational outreach effort by GBRA and TPWD encouraging the public to decontaminate boats through the statewide Clean, Drain & Dry campaign.



**Guadalupe Orb found in
the Guadalupe River in
Kendall County**

TABLE 1 - continued

<p>Lake Dunlap Spillgate Failure</p>	<p>1804</p>	<p>A spillgate on the GBRA TP-1 Dam that impounded the waters of Lake Dunlap failed on May 14, 2019. Professional engineers determined the failure was due to deterioration of original structural steel components and the 92-year-old dam had exceeded its useful lifespan. The water level of Lake Dunlap subsequently dropped by 12 feet as water evacuated the reservoir. GBRA has actively documented changes to the riparian communities in this section of the Guadalupe as native plants and animals recolonize previously submerged habitat.</p>
<p>Watershed Protection Plan Implementation Begins for Comal River and Dry Comal Creek</p>	<p>1811, 1811A</p>	<p>The Dry Comal Creek and Comal River Watershed Partnership developed a Watershed Protection Plan (WPP) to address E. coli bacteria loading in these watersheds in August 2018. Watershed stakeholders identified urban wildlife as one of the primary sources of nonpoint source pollution in the watershed and the City of New Braunfels implemented several Best Management Practices (BMPs) in 2019 to reduce bacteria from these sources. In January 2019, the city installed educational signage to discourage the feeding of wildlife in the watershed. The City passed an ordinance prohibiting wildlife feeding in September 2018. In March 2019, the city hosted an Urban Wildlife Workshop to educate citizens about the detrimental effects of wildlife feeding. In April 2019, biologists oiled 30+ invasive waterfowl eggs to reduce populations of these species.</p>
<p>TPWD Public Fishing Access on the Guadalupe River Below Canyon</p>	<p>1812</p>	<p>Texas Parks and Wildlife Department (TPWD) received grant funding from the U.S. Department of Agriculture's Voluntary Public Access and Habitat Incentive Program to provide free public access to the Guadalupe River downstream of the 1st crossing on River Road. The lease of Camp Huaco Springs will allow recreational trout fishing anglers free access a ½-mile riverbank of the Guadalupe from December 7, 2019, through March 21, 2020. This lease will supplement the previous free access point at Guadalupe Park near Canyon Reservoir Tailrace and the timing will coincide with the stocking of 20,498 rainbow trout by TPWD in December of 2019, through January of 2020.</p>

TABLE 1 - continued

Construction of Historic “One Water Campus” Begins in Cypress Creek Watershed	1815	The Wimberley Independent School District began construction of a new “One Water Campus” in July of 2019. Upon projected completion of the campus in 2020, this 90,600 square foot facility will utilize innovative green infrastructure tools such as rainwater harvesting, HVAC condensate collection, and wastewater reuse to conserve the water resources of the Cypress Creek Watershed. This initiative will assist with meeting the water quality and quantity improvement goals laid out in the Cypress Creek Watershed Protection Plan.
Giant Reed Controls Continue in Kerr County	1806, 1816, 1817, & 1818	TPWD began implementing the Healthy Creeks Initiative in 2015 to control the spread of Giant Reed (Arundo Donax) in the Texas Hill Country. TPWD collaborated with the Nature Conservancy, Hill Country Alliance and local landowners to identify and spray the plants with approved aquatic herbicides. In 2018, TPWD partnered with the Upper Guadalupe River Authority (UGRA) to expand this effort into the headwaters of the Guadalupe River Basin. This partnership continued throughout 2019, with the goal of eradicating Giant Reed from the headwaters of the Guadalupe River and preventing further downstream expansion.



Sandies Creek
in DeWitt County

Overview of Water Quality Monitoring

One of the key roles of CRP is fostering coordination and cooperation in monitoring efforts. GBRA holds coordinated monitoring meetings annually with entities collecting water quality data on the Guadalupe River and its tributaries. By coordinating these efforts and discussing the areas in need of additional monitoring, partners collect data more efficiently, maximizing the limited resources available to these entities. Table 2 outlines the types and amounts of water quality monitoring that will be conducted in the Guadalupe River Basin and the Lavaca-Guadalupe Coastal Basin under a TCEQ-approved Quality Assurance Project Plan (QAPP) from September 2019 through August 2020. The data collected under this QAPP includes a mixture of conventional, bacteriological, and biological parameters. Partners submit the data collected from the CRP program to TCEQ. This quality assured data assists with assessments of water bodies, development of Total Maximum Daily Load (TMDL) studies, Watershed Protection Plans (WPPs), and water quality permits. GBRA posts all monitoring data collected under the CRP program to the GBRA website at <https://www.gbra.org/crp/default.aspx>. Program data for all CRP partners is also available on the TCEQ CRP public viewer at <https://www80.tceq.texas.gov/SwqmisWeb/public/crpweb.faces>.

The GBRA CRP partners include the UGRA and the Wimberley Valley Watershed Association (WVWA). These entities have served as longtime partners under the GBRA QAPP. UGRA is responsible for CRP monitoring in and around Kerr County, while the WVWA conducts water quality monitoring in the Upper Blanco watershed. CRP partners use monitoring data to establish a baseline of water quality, identify potential pollution problems, document spatial and temporal changes, determine impacts of point and nonpoint source pollution and assess compliance with water quality standards. In addition to the monitoring conducted by CRP, TCEQ and the Texas Soil and Water Conservation Board (TSSWCB) fund nonpoint source monitoring in the watershed. TCEQ funds monitoring in support of the Cypress Creek WPP by the Meadows Center for Water and the Environment. TSSWCB funds monitoring to support the Plum Creek WPP and Geronimo Creek WPP by GBRA. The goals of these monitoring programs is to assess changes in water quality through implementation activities associated with the WPP. These programs will also provide recommendations for local planning efforts to protect water quality. GBRA provides laboratory analysis, technical assistance and oversight of the quality assurance aspects of these programs. The complete monitoring schedule for the Guadalupe River Basin is available at <http://www.cms.lcra.org>.





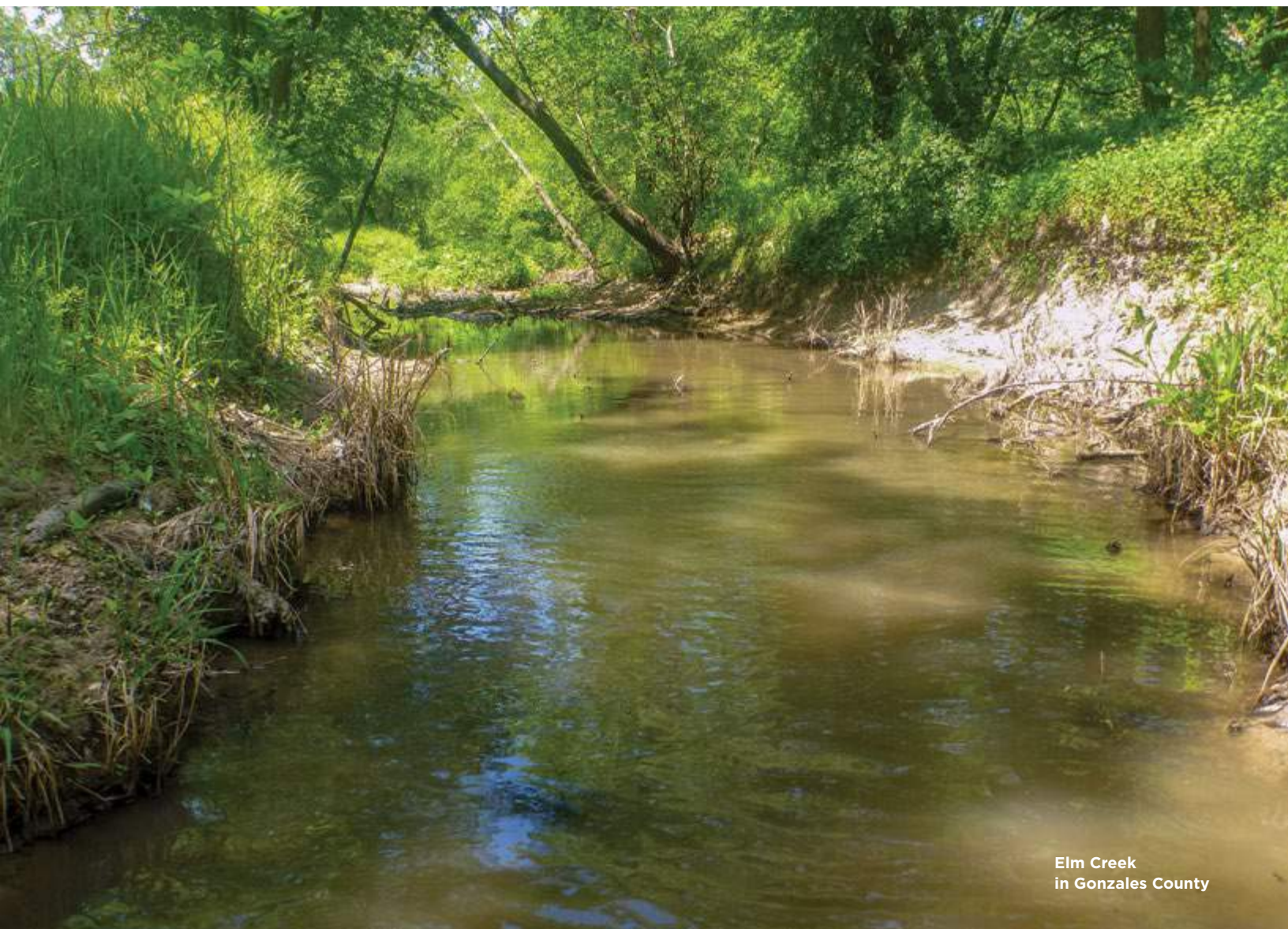
Guadalupe River
in Kendall County

TABLE 2**Monitoring parameters and frequencies conducted by monitoring partners in the Guadalupe River Basin in FY2020.**

Sampling Entity	Field Parameters	Conventional Parameters	Bacteria	Biological and Habitat	24 Hr. Dissolved Oxygen
GBRA	21 sites monthly; 13 sites quarterly	19 sites monthly; 13 sites quarterly	21 sites monthly; 13 sites quarterly	3 sites 2x/year	5 sites 5x/year
UGRA	6 sites monthly; 11 sites quarterly	12 sites quarterly	6 sites monthly; 11 sites quarterly		1 site 2x/year
TCEQ	8 sites quarterly	8 sites quarterly	8 sites quarterly		
WVWA (Blanco River)	2 sites monthly; 5 sites quarterly	2 sites monthly; 5 sites quarterly	2 sites monthly; 5 sites quarterly		
Meadows Center (Cypress Creek)	6 sites quarterly	6 sites quarterly	6 sites quarterly		2 sites 2x/year
TSSWCB-Funded GBRA (Plum Creek & Geronimo Creek)	11 sites-monthly; 46 sites 6x/year; 4 sites 4x/year	11 sites-monthly; 46 sites 6x/year; 4 sites 4x/year	11 sites-monthly; 46 sites 6x/year; 4 sites 4x/year	2 sites 2x/year	7 sites 5x/year

2020 Draft Texas Water Quality Inventory

TCEQ performs ongoing assessments of the water quality in all of the classified and many of the unclassified water bodies in the state of Texas that have sufficient monitoring data. Every two years, TCEQ completes a report detailing the results of these assessments that describe the designated uses and level of support for every water body assessed. The results of these assessments are used by TCEQ to determine if a water body will be listed on the 303(d) list of impaired water bodies. Table 3 identifies all of the water quality impairments and concerns TCEQ identified for the Guadalupe River Basin in the most recent draft 2020 Texas Integrated Report.



Elm Creek
in Gonzales County

TABLE 3***Table 3. Water Quality Impairments and Concerns described in the Draft 2020 Texas Integrated Report for the Clean Water Act Section 303(d) and 305(b) using data from 12/01/11 to 11/30/18.**

Segment Number	Water Body	Impairment [303(d)] List	Concern
1701	Victoria Barge Canal		Chlorophyll-a; (Removed Nitrate)
1801	Guadalupe River Tidal		Bacteria; Nitrate
1802	Guadalupe River below San Antonio River		Nitrate
1803	Guadalupe River below San Marcos River		Bacteria; Nitrate
1803A	Elm Creek	Depressed Dissolved Oxygen 24 Hour Average & Minimum; Depressed Dissolved Oxygen Grab Minimum	Depressed Dissolved Oxygen Grab Screening Level; Chlorophyll-a
1803B	Sandies Creek	Depressed Dissolved Oxygen 24 Hour Average & Minimum; Depressed Dissolved Oxygen Grab Minimum; Impaired Fish Community; Impaired Macrobenthic Community; Bacteria	Impaired Habitat; Depressed Dissolved Oxygen Grab Screening Level (Removed DO Grab Minimum)
1803C	Peach Creek	Depressed Dissolved Oxygen Grab Minimum & Screening Level; Bacteria	Impaired Fish Community; Total Phosphorus; Chlorophyll-a
1804A	Geronimo Creek	Bacteria	Nitrate
1804D	Baer Creek		Bacteria
1805	Canyon Lake	Mercury in Edible Fish Tissue	
1806	Guadalupe above Canyon Reservoir	Bacteria	Impaired Fish Community; Impaired Habitat (Removed Concern for Bacteria and Depressed DO Grab Screening Level)

TABLE 3 - continued

1806A	Camp Meeting Creek	Bacteria	Depressed Dissolved Oxygen Grab Screening Level
1806D	Quinlan Creek	Bacteria	
1806E	Town Creek	Bacteria	Depressed Dissolved Oxygen Grab Screening Level (Removed Depressed DO Grab Minimum)
1807	Coletto Creek		Chlorophyll-a
1810	Plum Creek	Bacteria	Impaired Fish Community; Impaired Macrobenthic Community; Impaired Habitat; Ammonia; Nitrate; Total Phosphorus (Removed Depressed Dissolved Oxygen 24 Hour Average)
1810A	Town Branch	Bacteria	Bacteria; Nitrate (Removed Depressed DO Grab Screening Level)
1811	Comal River	Bacteria	
1811A	Dry Comal Creek	Bacteria	
1815	Cypress Creek	Depressed Dissolved Oxygen 24 Hour Average; Impaired Fish Community; Impaired Macrobenthic Community	Impaired Habitat; (Removed Depressed DO Grab Screening Level)
1816	Johnson Creek		Impaired Habitat
1817	North Fork Guadalupe River	Impaired Fish Community; Impaired Macrobenthic Community	Impaired Habitat
1818	South Fork Guadalupe River	Impaired Fish Community; Impaired Macrobenthic Community	Impaired Habitat; (Removed Depressed DO Grab Screening Level)

* Blue highlighted text indicates a change from the previous 2018 Texas Integrated Report.

Changes Assessed in the Draft 2020 Integrated Report

The Draft 2020 Integrated Report increased the number of impaired segments in the Guadalupe River basin from 11 to 15. A 36 percent increase in impaired water bodies in the basin was primarily due to aquatic life use impairments for three spring fed tributaries on the Edwards plateau. TCEQ assessors discovered impairments of segment 1815 (Cypress Creek), 1817 (North Fork), and 1818 (South Fork) following implementation of ecoregion specific updates to aquatic life assessment standards. Despite the new impairments, many portion of the Guadalupe River have excellent water quality. Segments 1804 (Guadalupe Below Comal), 1808 (Lower San Marcos), 1809 (Lower Blanco), 1812 (Guadalupe Below Canyon), 1813 (Upper Blanco), and 1814 (Upper San Marcos) are fully supporting of all designated uses. Additionally, TCEQ also removed one nutrient concern and five dissolved oxygen concerns from segments on the Draft 2020 Integrated Report.

The Draft 2020 Integrated Report (IR) on Water Quality identified assessment status changes in multiple stream segments. The following is a descriptive list of all of the changes noted in the Draft 2020 IR:

Segment 1701 - Victoria Barge Canal

The Victoria Barge Canal is a tidally influenced 34.9-mile-long man-made channel that connects the Port of Victoria to the Gulf Intracoastal Waterway in Calhoun County. The Draft 2020 IR removed a concern for **nitrate nitrogen** from this segment of the Lavaca-Guadalupe Coastal Basin. This change occurred due to an increase in the nitrate nitrogen standard assessment screening criteria for this segment from 0.17 mg/L to 1.10 mg/L.

Segment 1803B - Sandies Creek

Sandies Creek is a 30.8-mile rural tributary of the Guadalupe River that flows from Guadalupe County to Dewitt County. In the Draft 2020 IR, TCEQ changed a previously identified **dissolved oxygen grab minimum** concern on Sandies Creek to a 303(d) list impairment. This change was due to additional routine dissolved oxygen data collected below the impairment threshold. Sandies Creek was already listed for impairments to 24-hour dissolved oxygen average, fish community and microbenthic community.

Segment 1806 - Guadalupe River above Canyon Reservoir

The 105-mile-long upper segment of the Guadalupe River flows over the limestone substrates of the Edwards Plateau from the confluence with North and South Forks of the Guadalupe River in Kerr County to Canyon Reservoir in Comal County. This segment was added to the 303(d) list as a result of geometric mean of **bacteria** concentrations exceeding the contact recreation standard. This assessment unit (AU) had previously identified concerns for bacteria and dissolved oxygen grab minimum in the 2018 IR. This segment was also previously impaired for bacteria, but removed from the 303(d) list in 2016, when average concentrations fell below the contact recreation standard of 126 MPN/100 mL of *E. coli*. GBRA collected the bacteria for the impaired AU at station 17404 upstream of the FM 474 Bridge in Kendall County.



**Guadalupe Bass found
in the Guadalupe River
in Kendall County**

The assessed 177 MPN/100 mL geometric mean at this station is significantly higher than the values assessed at the closest upstream (55 MPN/100 mL at 12602) and downstream (68 MPN/100 ML at 13700) stations. In order to better characterize this AU, GBRA added a new upstream monitoring station 22082 above the FM 1376 bridge. Station 22082 has shown significantly lower bacteria concentrations than station 17404 downstream, with only one documented exceedance of the stream standard during a high flow event. The addition of this new data will most likely not be enough to remove the impairment for this segment in the Draft 2020 IR, but as more data accumulates, the long-term geometric mean at this AU should reduce. The source of the bacteria at station 17404 remains unclear, but the consistently high values may be associated with failing onsite sewage facilities (OSSFs) upstream of the sample station.

Segment 1807 - Coletto Creek

The Coletto Creek tributary of the Guadalupe River travels 27 miles from Dewitt County to Victoria County and includes the 3,100-acre Coletto Creek Reservoir. Coletto Creek was included in the Texas Integrated Report due to concerns for **chlorophyll-a** concentrations greater than the nutrient screening criteria. This green pigment from the cells of algae and plants allows them to absorb energy from sunlight and is a key indicator of nutrient availability. Data collected from monitoring station 12790 in the center of the Coletto Reservoir Dam exceeded the 14.10 mg/L nutrient screening level 23 times during the assessment period. Coletto Reservoir has experienced a noticeable decline in submerged aquatic vegetation following scouring floods in 2015. The increase in green pigment is most likely due to opportunistic algae making use of the excess nutrients in the absence of aquatic macrophytes. GBRA and TPWD are collaborating to find solutions for revitalization of the aquatic vegetation in Coletto Reservoir.

Segment 1810 - Plum Creek

The 58-mile-long Plum Creek tributary of the San Marcos River has a new concern for **ammonia nitrogen** in the AU upstream of State Highway 21. The upper most AU of Plum Creek has exceeded the nutrient screening criteria of 0.33 mg/L 16 times during the assessment period. The exceedances of the standard occur during all flow conditions and may be associated with a point source discharge. Monthly Plum Creek WPP Implementation monitoring ammonia grabs averaged 2.82 mg/L from the City of Kyle WWTF and 0.29 mg/L from the City of Buda WWTF in 2019. The two downstream AUs recorded multiple exceedances of the screening criteria, but do not currently meet the frequency requirement to justify a concern. The Draft 2020 IR also removed a previously identified concern for depressed dissolved oxygen below the grab screening level.

Segment 1810A - Town Branch

The Draft 2020 IR removed a **depressed dissolved oxygen grab screening** level concern for this tributary to the middle AU of Plum Creek. Concerns for **bacteria** and **nitrate nitrogen** continue to persist at this location. This spring fed stream is located inside of an urban park in the City of Lockhart and receives nonpoint source runoff from the surrounding impervious cover.

Segment 1806E - Town Creek

The Town Creek tributary of the Guadalupe River in Kerr County no longer has an identified concern for **dissolved oxygen grab minimum (<3.0 mg/L)**, but the concern for **dissolved oxygen grab screening level (<5.0 mg/L)** remains. This segment remains impaired for bacteria concentrations over the contact recreation standard of 126 MPN/100 mL.



Spotted Gar found in Sandies Creek in DeWitt County



Orangethroat Darter found in the Guadalupe River in Kendall County



White Crappie found
in Sandies Creek in
DeWitt County

Segment 1815 - Cypress Creek

The 15.7-mile-long Cypress Creek tributary of the Blanco River has been placed on the 303(d) list of impaired water bodies due to **depressed dissolved oxygen 24-hour, impaired fish community**, and impaired microbenthic community, with additional concerns for **impaired habitat**. TCEQ also removed a prior concern for **depressed dissolved oxygen** below the grab screening level from the integrated report. The documented flow of the spring fed Cypress Creek has ceased on several occasions and the Cypress Creek Watershed Protection Plan has identified water quantity as a primary concern for this watershed. A use attainability analysis (UAA) may be required to determine if the current “exceptional” aquatic life use standard is appropriate for this stream.

Segment 1817 - North Fork of the Guadalupe River

The Draft 2020 IR listed the North Fork of the Guadalupe River in Kerr County on the 303(d) list due to **impaired fish community** and **impaired macro-benthic community** with concerns for **impaired habitat**. Previous IRs have assessed concerns for **depressed dissolved oxygen** below the grab screening level. This 29-mile-long spring-fed headwater stream may require a use attainability analysis (UAA) to determine if the current “exceptional” aquatic life use standard is appropriate.

Segment 1818 - South Fork of the Guadalupe River

The South Fork of the Guadalupe River (Segment 1818) in Kerr County is listed on the 303(d) list of impaired water bodies due to **impaired fish community** and impaired macro-benthic community, with concerns for **impaired habitat**. TCEQ removed a previous concern for **depressed dissolved oxygen** below the grab screening level in the Draft 2020 Integrated Report. This 27-mile-long spring-fed headwater stream may require a use attainability analysis (UAA) to determine if the current “exceptional” aquatic life use standard is appropriate.

UPPER GUADALUPE RIVER AUTHORITY PROGRAMS AND SERVICES

Water Quality Monitoring

As the lead water resource planning agency for the Upper Guadalupe River Basin, UGRA partners with municipal and county governments, communities, civic groups, and citizens to preserve and protect the water quality in all Kerr County surface waterbodies.

As an active partner in the Texas Clean Rivers Program, UGRA performs routine sampling at 12 sites quarterly and six sites monthly. In addition, UGRA continues the County Wide Goal Based Monitoring Program that concentrates on the main tributaries to the Guadalupe River and monitors the same parameters as the Clean Rivers Program. Routine monitoring provides consistent tracking so water quality concerns can be identified and addressed quickly.

UGRA's Summer Swimability Program provides information on current water quality conditions for local citizens. Samples for *E. coli* bacteria analysis are taken at 21 sites on a weekly basis from Memorial Day to Labor Day. The results are compared to state standards for contact recreation and are posted on the UGRA website.

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 samples for *E. coli* bacteria analysis each summer. 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.

**Monitoring water
quality in the
Guadalupe River
in Waring**



Central to these varied water monitoring programs is the nationally accredited UGRA Environmental Laboratory, a full-service laboratory serving the entire Hill Country. The laboratory's analytical services include bacteriological, chemical, and biological testing of drinking water, wastewater, and surface water. The laboratory is accredited according to the National Environmental Laboratory Accreditation Program and is one of the largest microbiological laboratories in the region.

Watershed Stewardship

UGRA is committed to the elimination of trash from the river and actively solicits and promotes community involvement in the multipart Trash-Free Initiative. UGRA coordinates and funds routine cleanups at 15 low water crossings across the county. Over 27,000 pounds of trash was removed from these low water crossings in 2019. The Annual River Clean Up is a county-wide event to promote proper stewardship and awareness of the importance of the Guadalupe River to the community and its proper stewardship. In 2019, more than 10,000 pounds of garbage was collected by 526 participants, working along the river from above Hunt, all the way to Center Point. As a proactive measure to reduce littering, UGRA continues to fund summertime litter patrols with licensed peace officers at the most popular river crossings to promote the message, "Pack it in, Pack it out."

UGRA promotes landowner practices that have the potential to enhance groundwater and surface water resources. Numerous studies have indicated brush control, primarily Ashe Juniper removal, can help increase Edwards Plateau Aquifer recharge, enhance spring flow, and improve range and pastureland productivity. UGRA offers financial assistance to eligible landowners to aid their brush management efforts. Additionally, UGRA has worked with landowners to construct eight water and sediment control basins in western Kerr County. The structures temporarily retain high flows and sediment associated with heavy rainfall while providing erosion control, water quality protection, and bolstering spring flow.

To promote water conservation and reduce stormwater runoff, UGRA encourages the practice of rainwater harvesting by offering a rebate up to \$200 on the purchase of rainwater harvesting equipment and by annually selecting one project for a \$2,500 cost assistance payment toward the construction of a large rainwater catchment system.





Trash collected at the 16th Annual UGRA River Cleanup

Riparian areas are the dense band of native vegetation along a body of water. When full of native trees, grasses, and forbs, they improve water quality and quantity by intercepting runoff from upland areas and stabilizing the bank. UGRA joined Texas Parks and Wildlife Department in the Healthy Creeks Initiative to assist landowners with the treatment of invasive giant cane (*Arundo donax*) on their properties. The cane invades riparian areas and displaces native riparian vegetation which reduces the health of streamside areas and their ability to improve water quality and quantity. Additionally, UGRA has partnered with Kerr County to offer a bounty payment on feral hogs. The hogs seek out areas along waterways and cause damage to streamside vegetation that increases erosion and bacteria pollution from runoff.

Streamside Landowner Workshop



Public Education

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 prepares 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. UGRA's public awareness campaign keeps the community informed of water issues through newspaper features and radio announcements.

UGRA's educational landscape called the UGRA EduScape has been the focus of recent education programs through tours and the workshop "Landscaping to Keep Our River Healthy." 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 demonstrating 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. In 2019, the Texas Water Development Board awarded UGRA the Texas Rain Catcher Award for the UGRA EduScape in recognition of exemplary efforts to promote rainwater harvesting and water conservation through educational and outreach activities.

Programs focusing on riparian areas have been another priority in UGRA's education program. UGRA sponsors workshops for streamside landowners to share techniques and information to increase stewardship of these vital streamside habitats. Streamside landowners in Kerr County can contact UGRA for a free copy of "The Remarkable Riparian Field Guide" to help inform management of these crucial habitats.

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 <http://www.ugra.org>.



**Example of
UGRA EduScape**

JACOB'S WELL GROUNDWATER MANAGEMENT ZONE

A new Groundwater Management Zone has been proposed to protect sustainable spring flow from Jacob's Well into Cypress Creek, often called the lifeblood of Wimberley, Texas. Jacob's Well Groundwater Management Zone (JWGMZ) is located in the upper Cypress Creek Watershed and would cover approximately 32 square miles located around and north of Jacob's Well.

The Meadows Center for Water and the Environment at Texas State University recently published a report titled, "Evaluation for the Development of a Jacob's Well Groundwater Management Zone in Hays County, Texas." Marcus Gary, EAA Field Operations Manager and Hydrogeologist, chaired the report's technical team, which was comprised of representatives from the Barton Springs Edwards Aquifer Conservation District, Hays Trinity Groundwater Conservation District, and the Meadows Center for Water and the Environment.

The Guadalupe-Blanco River Authority, along with the Wimberley Valley Watershed Association, the Texas Land Trust Council, the Friends of Blue Hole, and 26 other community members, landowners, and water supply companies served on the stakeholder committee that was tasked with reviewing the technical report and offered recommendations to the Hays Trinity Groundwater Conservation District for adoption into the JWGMZ.

Jacob's Well is a karst spring, which originates from the Middle Trinity Aquifer. It is located in the Cypress Creek watershed in Wimberley. In the past, the spring has stopped flowing due to pumping influences in the areas that

surround it. The published report provides a scientific framework to potentially aid the Hays Trinity Groundwater Conservation District in developing policy changes to maintain the spring flow at Jacob's Well by recommending the establishment of groundwater management zones.

One of these areas has been defined as the Jacob's Well Groundwater Management Zone (see Figure 1), in which a reduction of pumping in this zone during periods of drought could help maintain the spring flow. The second defined area, Regional Recharge Area Groundwater Management Zone, contains the largest documented spring in the Hill Country Trinity Aquifer, known as the Pleasant Valley Spring (PVS). The spring has a measured range from 12 to 60 cubic feet per second. At its highest, that amounts to about 27,000 gallons per minute! The spring flow supplies water to the Blanco River, which directly feeds into the Edwards Aquifer.

"Maintaining spring flow into Cypress Creek and the Blanco River is essential for our local economy and for the health of our regional ecosystems," said Wimberley Valley Watershed Association (WVWA) Executive Director David Baker, a member of the stakeholder committee for the Jacob's Well GMZ. "Establishing management zones is something the WVWA has been advocating for since 2010. We were already over-pumping the aquifer in 2000 when Jacob's Well stopped for the first time in recorded history. Even developers and water utilities represented on the task force recognized that keeping the springs flowing at Jacob's Well and Pleasant Valley - and keeping the water clean and healthy - is a benefit to everyone."

Through collaboration, efforts such as these affect policy changes that can be instituted to maintain the integrity of naturally occurring springs and aquifers. The scientific technical committee of this report has provided science based research to be considered, and continued research will be conducted to further develop an understanding of the Regional Recharge Area Groundwater Management Zone.

Original story published in the EAA News Drop, a quarterly magazine published by the Edwards Aquifer Authority.

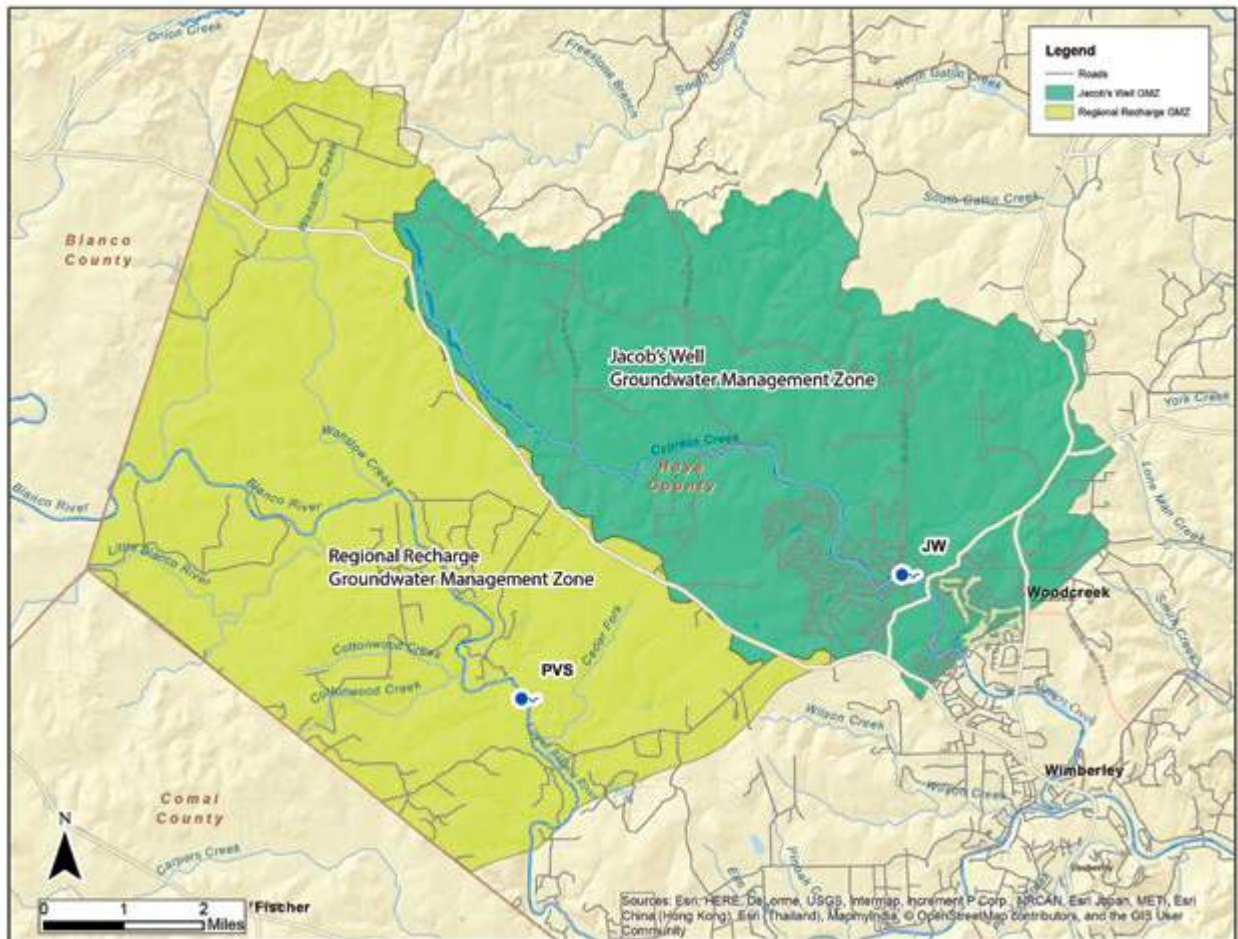


Figure 1: Areas of hydrologic influence to Jacob’s Well shown in hatched areas. Potential groundwater management zones are shaded green and yellow. The area of the Jacob’s Well Groundwater Management Zone is 34 square miles and the area of the Regional Recharge Groundwater Management Zone is 56 square miles.

BUILDING THE FIRST ONE WATER SCHOOL IN TEXAS

The Cypress Creek Watershed Protection Plan (CCWPP) saw many projects through in 2019, including the first One Water school in Texas! The new school, which was officially named Blue Hole Primary School, will open its doors for classes this fall to serve the growing Hill Country communities of Wimberley and Woodcreek.

One Water is a water planning and management approach that rethinks how water moves through and is used in a community; it brings stakeholders like developers, community leaders, urban planners, water managers and engineers together with the goal of utilizing water as thoughtfully and efficiently as possible. The One Water concept for the school, spearheaded by Nick Dornak, Director of Watershed Services for The Meadows Center for Water and the Environment at Texas State University, and David Baker, Director of the Wimberley Valley Water Association (WVWA), was ratified by the Wimberley Independent School District (WISD) Board of Trustees in June 2019 with construction beginning shortly after in July. The school's One Water design acknowledges the importance of protecting Wimberley's sensitive water resources by managing all the water as a single resource that is sustainable and reusable.

Blue Hole Primary School, will utilize a variety of One Water strategies to reduce groundwater usage from the Trinity Aquifer by 90 percent when compared to traditional construction standards, thereby protecting groundwater that supplies crystal clear spring flows to Jacob's Well, Blue Hole and Cypress Creek. It will incorporate best practices such as collecting rainwater and AC condensate to flush toilets and irrigate landscaping and an onsite treatment and reuse system to beneficially reuse gray/black water produced by the school. Additional green stormwater infrastructure will comprise of permeable pavers, vegetated swales and rain gardens to highlight a 21st century approach to managing nonpoint source pollution from new developments. To complete the One Water immersive, educational experience for students, staff and visitors, features such as clear pipes and signage are built into the very architecture of Blue Hole Primary.

The new school will not only benefit the environment but will also save money for WISD in the long-term. The district projects it will save nearly \$800,000 over the next 30 years in utilities as less water is used to operate the school. The money saved can help the district employ additional staff and teachers, while keeping the district less dependent from outside water and energy resources.



**Groundbreaking for
Texas' first One Water
School in Wimberley**

Texas' first One Water school will serve as a model for communities throughout the Texas Hill Country as well as a teaching tool to WISD students about the value of water conservation. The region will face enormous water challenges over the next 100 years and beyond, however Blue Hole Primary School will provide an important reminder that it is possible to balance the challenges of growth with the continued stewardship of our precious water resources.

WVWA funded the engineering and design of the One Water infrastructure through a generous grant from the Harry L. Willett Foundation. Thanks also to the WISD Board of Trustees and Superintendent, Dwain York for their vision, as well as Joe Day, David Venhuizen, PE, O'Connell Robertson & Associates Inc., Doucet & Associates Inc., AGCM Inc., WISD, WVWA, and Meadows Center staff for their expertise and valuable contributions to this project.

THE UPPER SAN MARCOS RIVER WATERSHED PROTECTION PLAN

The Upper San Marcos River watershed spans 94.6 square miles and contains 4.5 miles of the Upper San Marcos River. A majority of the flow in the Upper San Marcos River is comprised of groundwater from the Edwards Aquifer. While the watershed is predominantly rural, rapid urbanization and development near the main stem of the Upper San Marcos River have led to water quality concerns. The Upper San Marcos River Watershed Protection Plan (WPP) is designed to ensure the future health of the Upper San Marcos River watershed by addressing biodiversity, population growth, and changing water quality and quantity.



In 2019, the WPP, formerly known as the San Marcos Watershed Initiative, underwent a major rebranding to commemorate recent EPA approval of the watershed. Rebranding initiatives consisted of a new name, logo, newsletter, and website. Along with the rebranding, we added two additional full-time staff members to the watershed team to support and fulfill the mission of the WPP. Aspen Navarro was hired as the Program Coordinator in June, and Sandra Arismendez joined as the Monitoring Coordinator in early November. We are grateful to have Aspen and Sandra on the team and are very excited to see the new ideas and innovations that will come from their combined knowledge and expertise!

In efforts to combat potential contaminants and other nonpoint source pollutants from reaching the river, the WPP team along with staff from the City of San Marcos and Texas State University collaborated to implement two best management practices (BMPs) in the watershed. The first BMP is a biofiltration pond that will capture and treat stormwater runoff onsite before making its way into the San Marcos River. The second BMP, known as the “Hogtrap”, is designed to divert stormwater from an area of campus known for receiving an excess amount of runoff while reducing hillside erosion. The two locations are extremely important due to their proximity to the river’s mainstem and tributaries. The two BMPs are projected to be complete in early 2020, and educational signage will be installed concurrently along with a self-guided tour that will educate viewers on the BMPs and their importance.

A bird's-eye view of wild rice growing in the upper San Marcos River
Photo by: Andrew Shirey





The TCEQ recently awarded a Clean Water Act 319 grant to the WPP in conjunction with the San Marcos Greenbelt Alliance and the SMTX Mermaid Society to fund restoration and preventative projects at the Sessom Creek Natural Area (a tributary of the San Marcos River), and education and outreach programs that will teach citizens about watershed protection and nonpoint source pollution. Execution of this contract will begin in early 2020. This contract will strengthen community involvement and knowledge of the WPP by collaborating with several local organizations and non-profits.

The WPP team is excited to continue protecting this invaluable gem of the hill country in 2020 and is turning its focus to working with community members, education and outreach events, and to construct more BMPs throughout the watershed. For more information about the Upper San Marcos River Watershed Protection Plan and to read the official WPP, please visit: <http://www.UpperSanMarcosRiver.org>.

**A view of flowing wild rice from a dock near Sewel Park
Photo by Andrew Shirey**





**The fall colors
of Spring Lake
Photo by Andrew Shirey**

**Wildlife seen at the
San Marcos River
Photo by Andrew Shirey**



CITY OF NEW BRAUNFELS UPDATE

Significant efforts were made in 2019 to protect and preserve the water quality of rivers and creeks within the Guadalupe River watershed in the New Braunfels area. As part of the Dry Comal Creek and Comal River Watershed Protection Plan (WPP) initiative, the City of New Braunfels and local partners implemented various watershed management measures to minimize bacteria loading to both the Dry Comal Creek and Comal River. WPP implementation efforts in 2019 included the management of overabundant wildlife within New Braunfels that involved enforcement of a wildlife feeding ordinance, installation of more than 200 “No-Feed” signage in local parks, oil-coating of non-native waterfowl eggs and trapping of non-native waterfowl. WPP implementation efforts also included the installation of pet waste disposal stations to supplement existing stations in the Dry Comal Creek and Comal River watersheds to help reduce bacteria loading associated with pet waste. The City also made significant efforts to educate the public of the WPP initiative and efforts to reduce bacteria loading. The City coordinated with New Braunfels ISD, Comal ISD and GBRA to develop educational materials and hold presentations at local schools to inform students on watershed management and bacteria pollution prevention. Approximately 950 school children were reached as part of the classroom presentations. WPP implementation efforts were funded in part by a grant from the Texas Commission on Environmental Quality and the Environmental Protection Agency.

The City of New Braunfels also continued to implement aquatic habitat protection measures and riparian zone improvements within the Comal River watershed as part of the Edwards Aquifer Habitat Conservation Plan (EAHCP). These efforts included the routine removal of non-native aquatic species such as tilapia, vermiculated sailfin catfish and nutria. In 2019, 1,477 tilapia, 72 vermiculated sailfin catfish and 33 nutria were removed from Landa Lake and the Comal River system. EAHCP riparian zone improvements included the removal of non-native riparian vegetation such as elephant ears, Ligustrum, Chinese tallow and Arundo cane and planting of native vegetation. A total of 1,386 native plants were planted in 2019 primarily along the banks of Landa Lake and the Old Channel of the Comal River. These efforts are intended to protect habitat for endangered species that live in the Comal River and spring systems.



**Dos Rios Cleanup
in New Braunfels**





**Riparian buffer
area along SR #3**



**Dos Rios Cleanup
volunteers**

The City of New Braunfels also completed two green infrastructure/ low-impact development (LID) projects within the Comal River watershed in 2019. These included the construction of a bioretention basin at the end of North Houston Avenue adjacent to the Upper Spring Run portion of Landa Lake and a series of bioretention beds along Ohio Avenue adjacent to the parking area of New Braunfels High School. Both green infrastructure/ LID retrofit project will aid in capturing, infiltrating and treating stormwater runoff from contributing areas. The projects also serve as pilot projects that the City and developers can use as example projects to be considered for design of future developments.

The City also continued to make strides towards managing litter in and around local waterways in New Braunfels. These efforts included the 3rd Annual Dos Rios Watershed Clean-Up event that was held in September 2019. As part of the event, 244 volunteers collected 2,320 pounds of litter from 10 locations along local waterways and within drainages within New Braunfels. Local businesses and civic groups also participated in the City's Adopt-A-Spot program where volunteers collected 753 pounds of litter from "adopted" locations along local waterways in 2019. The City continued to uphold the disposable container ordinance and utilize a litter-collection contractor to minimize recreation-related litter in the Comal and Guadalupe Rivers.



PLUM CREEK BASIN HIGHLIGHTS

After Plum Creek was placed on the 2004 303(d) list of Impaired Waters for contact recreation and nutrient enrichment concerns, the Plum Creek Watershed Partnership (The Partnership) was formed in 2006 and development of the Watershed Protection Plan (WPP) was initiated. The plan was accepted by the EPA in 2008 and implementation began immediately afterwards. After 10 years of implementing The Plum Creek Watershed Protection Plan, The Partnership is very proud of all that has been accomplished since the Plan was created.



The Plum Creek Watershed Partnership has worked tirelessly to produce the fourth update to The Plum Creek WPP in 2019. The Plum Creek WPP is updated biennially in order to keep stakeholders informed and engaged during the implementation phase of the Plan. The 2020 Plum Creek WPP Update details watershed trends, and the accomplishments of The Plum Creek Watershed Partnership and its members that have occurred since the previous update.

The 2020 Update to the WPP contains a variety of programs to address the bacteria impairment and nutrient concerns in the watershed. Programs included a Texas Riparian and Stream Ecosystem Education workshop for over 40 landowners, two Healthy Lawns Healthy Waters Programs, a soil health workshop, watershed trash cleanups, and a wildlife management workshop.

12th Annual Keep Lockhart Beautiful Town Branch Cleanup

The 12th Annual Keep Lockhart Beautiful Watershed Cleanup Event took place on a chilly Saturday in November 2019. One hundred twenty volunteers braved the cold and removed over 300 pounds of trash and debris from the watershed. The network of sponsors and volunteers within the community are what makes the event a success every year. Since its inception of the annual event, over 2,100 volunteers have removed 15,000 pounds of trash and debris from the watershed.



2019 Keep Lockhart Beautiful Cleanup volunteers

Town Branch Urban Trail Riparian Restoration

The Partnership took part in an Urban Riparian and Stream Restoration grant administered through the Texas Commission on Environmental Quality which provided revegetation with native species in a section of Town Branch at Lockhart City Park. This project will increase riparian buffer area no-mow zones, establish a schedule for mowing temporary public viewing areas along the creek on a rotating basis, and will install a rain garden at a city park entrance. As part of the grant, educational signage regarding restoration efforts will be installed along the banks of Town Branch at Lockhart City Park to bring awareness, education and the value of stream restoration to the watershed. Town Branch’s proximity to Lockhart’s urban sprawl make it an ideal location for BMPs that are focused on reducing runoff from stormwater.



Feral Hogs in the Plum Creek Watershed

The Partnership coordinated with Caldwell County and the Meadows Center for Water and the Environment, and made an application to Texas A&M AgriLife Extension Service Wildlife Services. This financial assistance helped fund the feral hog bounty program and with the purchase of trapping supplies for area landowners. Over a seven-month period from March 2019 through September 2019, over 2,600 feral hogs were removed from the Plum Creek watershed through hunting/trapping methods by individual landowners. This represents approximately 25,000 pounds of wild pig excrement that will not make it to Plum Creek or its tributaries. Due to the resounding success and high participation rates of the Caldwell County Bounty Program, additional funding was needed to extend the program until its official close in August of 2019. In response, the Caldwell County Commissioners Court convened on March 8, 2019, and approved an additional \$3,000 to ensure funding lasted until the official close of the program.



Feral hog trap

GERONIMO CREEK WATERSHED

Geronimo Creek, impaired for *E. coli* bacteria, flows through the Irma Lewis Seguin Outdoor Learning Center (ISOLC). For the next two years, the center will be the home of a new Stream Trailer to be used for water quality education activities. The trailer is a mobile fluvial geomorphology teaching aid and demonstration model. An entire class of students can group around the model. Recycling water circulates across a bed of plastic grit, which can be molded by students to create a river system by building landforms, mountains, rivers and deltas. Students can add toy-like objects to model different land uses, such as cities, ranches, farms, etc. Unlike stream trailers using sand or dirt, this one can be used multiple times throughout the day. Water drains very quickly, and set-up and cleanup takes minimal time.

At the ILSOLC, the model is used to teach about nonpoint source pollutants (NPS). In addition to the toy models, different color beads are used to represent NPS. The focus on *E. coli* is portrayed by placement of brown beads for ranch, wildlife and pet waste or yellow for leaking septic tanks. In addition, red is used for toxins from cityscapes, and green for nutrient runoff from both urban and rural land uses. Beads are placed alongside the toy models, close to the stream. When the water is turned on, beads are carried into the stream by runoff and erosion.

The rain garden at the ILSOLC has flourished under the care provided by the Guadalupe County Master Gardeners





The trailer can also be used to illustrate the importance of riparian zones – placement of trees and bushes show the importance of vegetation in filtering out pollutants.

The TCEQ grant for the ILSOLC has funded an on-site educator to work with the two school districts in the watershed – Navarro ISD and Seguin ISD. The educator has informed schools of the availability of the trailer, and many have chosen it as one of their rotation activities when attending the center for Outdoor Classrooms. Other districts that visit are also welcome to choose the trailer as one of their rotations.

2019 Highlights

The Geronimo and Alligator Creeks Watershed was bustling with implementation activities in 2019. Two Homeowner Maintenance of Septic System Workshops, Texas Watershed Stewards Program, Healthy Lawns Healthy Waters Program, and not just one—but two Creek Cleanup Events were just part of what occurred.

Septic system maintenance is a large priority in the watershed, and workshops have been conducted since 2013. The Guadalupe County Environmental Health Department requires homeowner certification or a maintenance provider contract be in place for all aerobic treatment systems in the county. Texas A&M AgriLife Extension started offering classes to certify homeowners in the fall of 2014, and conducts them twice a year to packed rooms. Two workshops were held this year, and 108 homeowners were certified to maintain their aerobic treatment systems.

The Texas Watershed Steward (TWS) Program returned to the watershed in 2019. Fifty-two attendees received information on water quality and its protection, conservation measures, and laws and regulations related to water in Texas and the United States. The TWS Program offers over 13 types of CEUs, and attendees represent a wide variety of interests.

The Healthy Lawns Healthy Waters Program did an excellent job of training homeowners in the area of lawn maintenance by providing free soil test analysis and educational information on lawn irrigation, landscaping practices, and rainwater harvesting. In addition to the free program, door prizes were given away that included rain gages and a 50-gallon rain barrel.



Volunteers take part in the Fall Geronimo and Alligator Creeks Cleanup event



Happy volunteers with some of the trash collected during the Spring Geronimo and Alligator Creeks Cleanup event

The annual Geronimo and Alligator Creeks Cleanup Event held in April, was successful in cleaning up 14 locations for a total of 11 miles of roadway and creek banks. Ninety-nine volunteers worked to remove 3,640 pounds of trash, tires, pallets, and debris from the watershed. The community support for the event was evident through the various church, civic, school, and citizen groups represented in the volunteers and 15 sponsors.

For the first time ever, the Partnership conducted a fall creek cleanup event in October. For this event, 76 volunteers worked to remove 800 pounds of trash and debris from seven miles of roadway and creek banks. Groups from Niagara Bottling LLC, Alamo Group, Spirit of

Joy Lutheran Church, the Boy Scouts of America, students, and homeowners did a great job of cleaning up their community.

At the ILSOLC, maintenance of the rain garden was graciously taken over by the Guadalupe County Master Gardeners. This allowed ILSOLC staff to focus on other duties at the Center, and serves as an example of sustainability for this structure. This type of “ownership” is exactly what it will take to get the community involved for the long-term.



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