

TEXAS STREAM TEAM FINAL REPORT (1B): CONTRACT #18-80175

MARCH 1, 2018 – FEBRUARY 28, 2019 & APRIL 1, 2020 – FEBRUARY 28, 2021

Report: 2020-07
August 2021



© Jana - Guadalupe River New Braunfels, Texas



THE MEADOWS CENTER
FOR WATER AND THE ENVIRONMENT
TEXAS STATE UNIVERSITY

TEXAS STREAM TEAM



TEXAS  STATE
UNIVERSITY
The rising STAR of Texas

This project has been funded wholly or in part by the United States Environmental Protection Agency under assistance agreement (99614622) to Texas Commission on Environmental Quality. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency, nor does the EPA endorse trade names or recommend the use of commercial products mentioned in this document.

Acknowledgments

The Texas Stream Team encourages life-long learning about the environment and people's relationship to the environment through its multidisciplinary citizen science programs. We also provide hands-on opportunities for Texas State University students and inspire future careers and studies in natural resource related fields. Preparation of final reports serve as contract deliverables for granting entities, but they also serve as valuable educational experiences for the students and staff that prepare the reports. Texas Stream Team values the staff contributions and recognizes each individual for their role. The following staff and student workers assisted in the preparation of this report and are acknowledged for their contributions:

Sandra Arismendez, Ph.D. - Water Quality Monitoring Coordinator

Eryl Austin-Bingamon - Student Research Assistant

Claudia Campos - Administrative Coordinator

Anna Huff - Communications Manger

Meagan Lobban - Education Manager

Aspen Navarro, M.S. - Program Coordinator

Alexander Neal - Former Texas Stream Team employee

Laura Parchman - GIS and Data Management Associate

Jenna Walker, M.A.Geo. - Deputy Director

Daniel Vasquez – Student Research Assistant

Texas Stream Team Final Report (1B): Contract #18-80175

MARCH 1, 2018 – FEBRUARY 28, 2019 & APRIL 1, 2020 – FEBRUARY 28, 2021

August 2021

Report: 2020-07



THE MEADOWS CENTER
FOR WATER AND THE ENVIRONMENT

TEXAS STATE UNIVERSITY

TEXAS STREAM TEAM

601 University Drive, San Marcos Texas 78666
512.245.1346 | txstreamteam@txstate.edu | www.JoinStreamTeam.org

MEMBER **THE TEXAS STATE UNIVERSITY SYSTEM**

CONTENTS

I. EXECUTIVE SUMMARY	7
II. MEETING TEXAS STREAM TEAM GOALS	8
Short-term Goals	8
Updated Resources	8
Program Organization	8
Data Use	8
Continuing Through the Coronavirus Pandemic	9
Future and Long-term Goals	9
Quality Assurance Program	9
Participation along the Texas Gulf Coast	9
Teacher Involvement	9
Program Organization	9
III. TEXAS STREAM TEAM TRAININGS	10
Core Water Quality Citizen Scientist Training	10
Advanced Water Quality Citizen Scientist Training	10
<i>E. coli</i> Bacteria Water Quality Citizen Scientist Training	11
Riparian Evaluation Citizen Scientist Training	11
Macroinvertebrate Bioassessment Citizen Scientist Training	11
Texas Stream Team Trainer Training	11
Texas Stream Team Snapshot of Activity	8
IV. TEXAS STREAM TEAM CITIZEN SCIENCE	13
Objectives	13
Support of Existing Monitoring	13
Targeted Watersheds	13
Watershed Protection Plans	13
Total Maximum Daily Load	14
Correspondence to Promote Watershed Services	14
Correspondence with Watershed Coordinators	14
Participants	16
Citizen Science Metrics	
Water Quality Monitoring By the Numbers	
Citizen Scientist Recognition	16
Texas Stream Team Fest	16
Texas Stream Team's Annual Golden Secchi Award	17
Texas Stream Team Citizen Scientist Spotlight	17
V. WATER QUALITY DATA COLLECTION	18
Objective	18
Waterways Dataviewer	18
Datamap	18
Data Submittals	19
TCEQ Data Activity Reports	19
EPA Water Quality Exchange	19

Data Summary Reports	19
VI. TEXAS STREAM TEAM WATERSHED EDUCATION AND OUTREACH	21
Objective	21
Educator Resources and Activities	21
Texas Stream Team Partner Education Programs	21
Spring Lake Education Program	22
Teacher Workshops	22
Citizen Scientist Resources	23
Newsletters	23
Online Community Forum Updates	23
Texas Stream Team Calendar	24
Texas Stream Team Website	24
VII. TEXAS STREAM TEAM PROGRAMS	25
Monofilament Finders Program	25
Anglers	25
Student Organizations	25
Green Living	25
VIII. PARTNERS AND GROUPS	26
Partnership Program	26
Frio Canyon Garden Club of Leakey, TX	26
City of Grapevine	26
City of Arlington	26
City of Carrollton	26
Monitoring Groups	26
Partner Meetings	27
October 6th, 2018 Partner Meeting	27
Regional Meetings	27
July 25th, 2018 – Texas Stream Team Workshop	27
February 22nd, 2019 - Coffee & Conservation	27
US EPA Region 6 Annual Regional Technical Group (RTAG)	27
Conferences	27
The Texas Water Resources Institute (TWRI)'s Texas Watershed Planning Training Program	27
IX. GRANT FUNDING OPPORTUNITIES	27
X. TEXAS STREAM TEAM IN THE NEWS	27
XI. CONCLUSION	27



Texas Stream Team Student Research Assistant, Daniel Vasquez, test water quality at Spring Lake in San Marcos, Texas.

EXECUTIVE SUMMARY

The past three years have been a period of intense organizational growth at Texas Stream Team at The Meadows Center for Water and the Environment (the Meadows Center). Throughout the contract period (March 1st, 2018 – February 28th, 2019; April 1st, 2020 – February 28th, 2021) it has been the goal of Texas Stream Team to increase the accuracy and availability of our program resources to our partners and stakeholders across Texas. Texas Stream Team staff have been working through challenges posed by staff turnover and COVID-19 restrictions to streamline organizational policies and procedures, provide trainings, update monitoring resources, enhance the Texas Stream Team Waterways Dataviewer database, diversify education and outreach efforts, and many other activities that are included in this report.

Texas Stream Team is dedicated to involving Texans in the process of citizen science and environmental stewardship. Throughout this contract reporting period, Texas Stream Team staff and partners led 124 trainings, certifying 583 citizen scientists. Of these citizen scientists, 257 are actively monitoring. Among existing citizen scientists, 195 sites were actively monitored, and 182 new sites were established. In the past year, Texas Stream Team citizen scientists dedicated 19,219 hours to volunteer efforts. To further engage the public in water and environmental stewardship, Texas Stream Team attended 280 Education and Outreach events, one Teacher Workshop event, and established three new partnerships.

Within the contract reporting period, Texas Stream Team has added two new full-time team members to the program, Aspen Navarro and Dr. Sandra Arismendez. Aspen Navarro is the Program Coordinator, acting as the primary liaison for Texas Stream Team inquires, project management, helping with outreach and training materials, scheduling all Texas Stream Team activities, and assisting with statewide trainings. Dr. Sandra Arismendez is the Water Quality Monitoring Coordinator, acting as the primary contact for all monitoring and equipment inquiries, overseeing all Quality Assurance Project Plans (QAPPs), helping with training materials, and assisting with statewide trainings.

This report will elaborate on short-term and long-term goals of the contract period, as well as information on recent and upcoming Texas Stream Team projects. Throughout the period of March 2018 – February 2019 and April 2020 - February 2021, Texas Stream Team has valued the opportunity to grow alongside our partners and citizen scientists and we look forward to ambitiously pursuing water and environmental stewardship in the next upcoming contract period.

II. MEETING TEXAS STREAM TEAM GOALS

SHORT-TERM GOALS

Texas Stream Team will implement the following short-term goals to manage the future of the program, to expand the program, and to help better serve our partners.

Updated Resources

Texas Stream Team has been working to update the resources available to our partners and citizen scientists. Updates to monitoring and training documents will increase the accuracy and accessibility of the resources made available to our network of citizen scientists, trainers, and partners. Our goals for the contract period were directed towards the Texas Stream Team Standard Core Water Quality Citizen Scientist (Standard Core) Training and Probe Core Water Quality Citizen Scientist (Probe Core) Training, and Riparian Evaluation Citizen Scientist (Riparian Evaluation) Training which include:

- Updated monitoring resources
 - Core Environmental Monitoring Form
 - Riparian Evaluation Environmental Monitoring Form
 - Texas Stream Team Core Water Quality Citizen Scientist Manual
 - Standard Core Field Guide
- Updated trainer resources
 - Rebranded and updated Training Packets
 - Rebranded and updated Core PowerPoint Training presentation
 - Rebranded and updated Riparian Evaluation Training presentation
 - Converted the Riparian Evaluation Training into an online module
 - Converted Phase I of Riparian Evaluation Training into an online module
 - Trainer Training Packets and Training Checklists
 - COVID-19 suggestions for holding in-person trainings
 - Moved training packets to electronic forms - Training Enrollment Form

Program Organization

As Texas Stream Team continues to grow, staff have focused on organizing and maximizing standard operating procedures and administrative tools for the program. Increasing the organization of the program will allow Texas Stream Team staff to operate with more efficiency and enhance partner engagement across the state. Our goals for the contract period included:

- Partner organization,
- Trainer organization, and
- Online forms and resources.

Data Use

When citizen scientists submit monitoring data, the data are processed and stored in the Texas Stream Team Waterways Dataviewer (Dataviewer). These data are published online for public access through our online Datamap. These data platforms can be used to view historical and current water quality data associated with each monitoring site. Texas Stream Team has worked to diversify and increase the use of citizen scientist data. Our specific goals for the past year were to:

- Enhance the Datamap to be more user-friendly,
- Increase the amount of Texas Stream Team data used for academic research,
- Research alternatives for the Dataviewer for individual citizen scientists without Data Coordinators to be able to enter their data electronically, and

- Update the Dataviewer based on updated Monitoring Forms, including quality control checklist sections for guidance and to improve data.

Continuing Through the Coronavirus Pandemic

During the contract period, Texas Stream Team staff were faced with the challenge of adapting to COVID-19 restrictions in a way which maximizes public health and safety while still promoting and growing Texas Stream Team's citizen scientist network. To accomplish this, Texas Stream Team has placed a significant priority on adapting and converting current training protocols to an online format. Since March of 2020, Texas Stream Team has been working to create module-based trainings that can be completed online and asynchronously. To appropriately adapt to COVID-19 restrictions, goals include:

- Creating an online version of all current training materials,
- Transitioning trainings to an online learning platform which allows citizen scientists to complete modules asynchronously,
- Creating online Environmental Monitoring form for all trainings, and
- Improving online engagement and promoting learning objectives during synchronous trainings.

FUTURE AND LONG-TERM GOALS

Quality Assurance Program

In accordance with the Texas Stream Team Quality Assurance Project Plan (QAPP), we strive to refine, document, and implement data quality objectives and quality assurance activities. These activities ensure the data submitted and published through the Texas Stream Team program continue to be of a known and documented quality acceptable for their intended uses including for scientific research. Our goals are to:

- Review and refine the QAPP,
- Update and relay monitoring criteria,
- Create instructional manuals for all trainings,
- Create field quality control checklists for all trainings,
- Reconstruct data entry quality control checklists, and
- Reconstruct and implement routine quality control review sessions for citizen scientists.

Participation along the Texas Gulf Coast

The Gulf of Mexico is a unique and valuable marine resource that receives freshwater runoff from Texas watersheds. Texas Stream Team recognizes the importance of this resource and has been working to expand citizen science along the Texas Gulf Coast. Our goals are to increase:

- Partnerships,
- Monitoring groups and trainers,
- Monitoring activities,
- Accessibility to kits and supplies, and
- Monofilament Finders stations.

Teacher Involvement

Engaging classrooms has always been a priority for Texas Stream Team. By providing curricula to Texas teachers, we strive to involve students of all ages in citizen science and water quality monitoring. Texas Stream Team continually works to increase resources available to teachers and students. Our goals include:

- Expanding website resources,
- Developing a high school internship,
- Increase teacher trainers,
- Assisting with kits and supplies, and
- Attending education and outreach events.

Program Organization

As Texas Stream Team continues to expand, streamlining and program organization will continue to be a priority for staff. Our long-term organization goals are to:

- Develop and implement improved protocols for trainers, and
- Strengthen existing water quality monitoring protocols.

III. TEXAS STREAM TEAM TRAININGS

CORE WATER QUALITY CITIZEN SCIENTIST TRAINING

Texas Stream Team Core citizen scientists are certified by completing a three-phase training that instructs participants on how to measure various physical and chemical parameters using custom water quality monitoring kits. These parameters include conductivity, dissolved oxygen, pH, total depth, water and air temperature, and water transparency. Core trained citizen scientists are also taught how to conduct various field observations.

Core trainings are either conducted using a digital Probe kit or a custom chemical kit. These trainings are referred to as Probe Core and Standard Core and are the most common trainings. Participants that complete this initial level of instruction become certified Core citizen scientists and are encouraged to conduct monthly monitoring.

Texas Stream Team staff and partners conducted 117 Core trainings and certified a total of 639 citizen scientists within the contract period.

In addition to the Core trainings that were held, Texas Stream Team developed three Standard Core instructional videos for citizen scientists to reference if they need a refresher or clarification on the monitoring protocols. These videos are endorsed at Texas Stream Team trainings, on the Texas Stream Team website, and sent to citizen scientists directly, if needed. In the future, these videos will be used for Standard Core virtual trainings and quality control sessions. The three instructional videos include:

1. [Standard Core Water Quality pH Monitoring](#)
2. [Standard Core Water Quality Dissolved Oxygen Monitoring](#)
3. [Standard Core Water Quality Conductivity Monitoring](#)



Citizen scientist in training participating in Phase III of Texas Stream Team's Standard Core Training on 1/27/19. Photo by Andrew Shirey.

ADVANCED WATER QUALITY CITIZEN SCIENTIST TRAINING

Once citizen scientists have actively monitored Core parameters for six months, Texas Stream Team encourages them to gain further monitoring experience by becoming certified to test Advanced water quality parameters. The Advanced training is a three-phase training that certifies Core citizen scientists to test parameters such as Nitrate-Nitrogen, Orthophosphates, Turbidity, and Streamflow.

An Advanced certification encourages citizen scientists to become more engaged as water quality stewards. It also provides Texas Stream Team with more comprehensive stream data that can be used to draw informed conclusions about the health of Texas waterways.

Texas Stream Team staff and partners conducted six Advanced trainings and certified a total of 35 Advanced citizen scientists within the contract period.

In addition to the Advanced trainings that were held, Texas Stream Team developed three Advanced instructional videos for citizen scientists. The Advanced videos will be used in the same manner and endorsement as the Standard Core videos. The three instructional videos include:

1. [Advanced Water Quality Turbidity Monitoring](#)
2. [Advanced Water Quality Nitrate-Nitrogen Monitoring](#)
3. [Advanced Water Quality Orthophosphate Monitoring](#)

E. COLI BACTERIA WATER QUALITY CITIZEN SCIENTIST TRAINING

Citizen scientists who have completed their Core certification can obtain additional certification in *E. coli* bacteria water quality monitoring. *E. coli* bacteria monitoring involves performing tests for *E. coli* bacteria, which is measured to determine the relative risk of contact recreation in a water body. *E. coli* is a bacterium that originates from the wastes of warm-blooded animals, and the presence of this bacteria indicates that associated pathogens from waste may be reaching a body of water. Sources of *E. coli* bacteria include inadequately treated sewage, improperly managed animal waste from livestock, pets, aquatic birds and mammals, or failing septic systems.

It is important to routinely collect *E. coli* bacteria water quality data because this information helps establish baseline waterbody conditions, as well as identify abnormal environmental events when they occur. This information provides essential data in assessing and managing nonpoint source pollution and protecting the health of Texas citizens.

Texas Stream Team staff and partners conducted four *E. coli* Bacteria trainings and certified a total of 30 new *E. coli* Bacteria citizen scientists within the contract period.

RIPARIAN EVALUATION CITIZEN SCIENTIST TRAINING

Texas Stream Team's Riparian Evaluation training teaches participants to assess the health of a waterbody based on the quality of the riparian habitat present. Riparian evaluation data are coupled with water quality data and used to track ecosystem and habitat health over time in the rivers and streams that flow to the Texas Gulf Coast.

The Riparian Evaluation training focuses on the nature and function of stream and riparian zones, and the benefits and direct impacts of a healthy riparian habitat. The riparian education program includes an introduction to riparian principles, watershed processes, basic hydrology, erosion/deposition principles, riparian vegetation, potential causes of degradation and impairment(s), and available local resources including technical assistance and tools that can be employed to prevent and/or resolve degradation.

Texas Stream Team staff conducted four Riparian Evaluation trainings and certified a total of 81 citizen scientists within the contract period.

MACROINVERTEBRATE BIOASSESSMENT CITIZEN SCIENTIST TRAINING

The Texas Stream Team Macroinvertebrate Bioassessment Citizen Scientist Training (Macroinvertebrate Bioassessment) teaches participants to monitor the health of a lake, river, stream, or estuary by using benthic macroinvertebrates to determine habitat quality of a waterbody. Macroinvertebrate data are coupled with water quality data and used to track ecosystem and habitat health over time in the rivers and streams that flow to the Texas Gulf Coast.

Texas Stream Team developed this program to educate citizen scientists about the importance of using benthic macroinvertebrates as indicators of the biological condition of waterbodies. Benthic macroinvertebrates are used to assess the long-term water quality of a stream because many species are sensitive to pollution and sudden changes in the environment.

Due to COVID-19 restrictions, Macroinvertebrate trainings were unable to be held during the contract period. An increased focus in developing and implementing Riparian trainings was emphasized due to the format of the training, which is compatible with socially-distanced learning. During this period, the Macroinvertebrate training has been updated and training materials are continuing to be developed.

TEXAS STREAM TEAM TRAINER TRAINING

Citizen scientists who seek to become more involved with Texas Stream Team can become certified as a Texas Stream Team Trainer. Trainers lead Texas Stream Team citizen scientist trainings and act as an essential link between Texas Stream Team and local communities.

Citizen scientists can become certified as a trainer for any Texas Stream Team training. The citizen scientist is instructed on

the methods and procedures of Texas Stream Team trainings through a four-part process. After becoming a certified trainer, Texas Stream Team Trainers can lead training events in their own communities. Trainers help Texas Stream Team increase the number of citizen science activities across the state of Texas.

During the contract period, Texas Stream Team staff and partners held six training events where the following seven citizen scientists were certified to lead Texas Stream Team trainings:

1. Elena Middleton, Bobcat Stream Team – Standard Core Trainer
2. Kendall Guidroz, Houston-Galveston Area Council – Standard Core Trainer
3. Jason Biemer, Lost Pines Master Naturalists – Standard Core Trainer
4. Christopher Alexis, Midwestern State University Texas Stream Team – Standard Core Trainer
5. Brianna Nisi, Texas Stream Team Grand Prairie – Standard Core Trainer
6. Chandani Rana, Texas Stream Team Grand Prairie – Standard Core Trainer
7. Scott Rippeth, San Marcos River Rangers – Standard Core Trainer

TEXAS STREAM TEAM SNAPSHOT OF ACTIVITY

- **117** Core (Standard and Probe) Trainings
- **639** New Core Citizen Scientists Certified
- **6** Advanced Trainings
- **35** New Advanced Citizen Scientists Certified
- **4** *E. coli* Bacteria Trainings
- **30** New *E. coli* Citizen Scientists Certified
- **4** Riparian Trainings
- **81** New Riparian Evaluation Citizen Scientists Certified
- **6** Trainer Training Events
- **7** Citizen Scientists Certified to lead Texas Stream Team Trainings
- **38** Education and Outreach Events (includes Texas Stream Team activities at Spring Lake)
- **370** Individuals Engaged in Water Quality Presentations

IV. TEXAS STREAM TEAM CITIZEN SCIENCE

Once participants have been certified by completing all phases of the Standard Core training, Texas Stream Team citizen scientists can begin to collect and submit water quality data. These data are then processed and published by Texas Stream Team. By increasing the number of certified citizen scientists, more data are available to Texas Stream Team and local resource managers who can utilize this information to help manage water resources and water quality in Texas.

OBJECTIVES

- To engage a minimum of 400 citizen scientists annually in activities related to water quality.
- Citizen scientists will monitor at least 425 sites across Texas, with some sites in communities with an interest in developing or currently developing Watershed Protection Plans (WPPs).
- To manage, expand, and strengthen statewide water quality citizen scientists and partner networks in areas implementing WPPs.
- To promote general services in watersheds across Texas that contribute to the development of nine-element WPPs.
- To offer and provide services that contribute to the successful implementation of accepted WPPs across Texas.

SUPPORT OF EXISTING MONITORING

Texas Stream Team supports water quality and environmental monitoring efforts state-wide as needed. In doing so, Texas Stream Team maintains an inventory of water quality monitoring kits and supplies for use by Texas Stream Team staff to fulfill contract deliverables such as monitoring events, trainings, and quality control sessions. Texas Stream Team also maintains a limited inventory of kits and supplies to equip citizen scientists who do not currently have partner support or where partner funding is not available. The monitoring events, trainings, and quality control sessions conducted by Texas Stream Team staff are described in section III. Texas Stream Team Trainings of this report. Equipment and supplies from the Texas Stream Team inventory were used to support those staff-lead events. These activities lead to a draw-down of inventory.

Throughout the contract period, Texas Stream Team staff fulfilled equipment and supply requests received from citizen scientists without partner support and/or funding resources and will continue to fulfill requests throughout the contract period. Both staff-led events and citizen scientist monitoring state-wide utilized equipment and supplies from the Texas Stream Team inventory, in watersheds with interests in developing or currently developing WPPs and in watersheds implementing WPPs.

TARGETED WATERSHEDS

Watershed Protection Plans

A WPP is a coordinated framework for implementing prioritized and integrated water quality protection and restoration strategies driven by environmental objectives. Through the WPP process, stakeholders holistically address the sources and causes of impairments and threats to both surface and ground water resources within a watershed. Texas Stream Team citizen scientists are currently monitoring in the following watersheds that are developing or implementing WPPs:

- Arroyo Colorado,
- Clear Creek,
- Cypress Creek,
- Dry Comal/Comal,
- Lower Nueces River,
- Lavon Lake,
- Middle and Lower Cibolo Creek,
- Mission and Aransas Rivers,
- Navasota River,
- Upper Cibolo Creek,
- San Bernard,
- Shoal Creek,
- Upper San Antonio River, and
- Upper San Marcos River.

For more information about Texas Stream Team's involvement with WPPs, please visit the Texas Stream Team [WPP webpage](#).

Total Maximum Daily Load

A Total Maximum Daily Load (TMDL) is a water resource management plan that targets pollutants in a stream or body of water that are causing an impairment. The TMDL program works to improve water quality in impaired or threatened water bodies in Texas. The program is authorized by and created to fulfill the requirements of Section 303(d) of the federal Clean Water Act.

Texas Stream Team Citizen Scientists are currently monitoring in the following watersheds that are developing or implementing TMDL plans:

- Gilleland Creek,
- Guadalupe River,
- Orange County, and
- Oso Bay/Oso Creek.

For more information about Texas Stream Team's involvement with TMDL plans, please visit the [Texas Stream Team TMDL webpage](#).

Correspondence to Promote Watershed Services

Texas Stream Team promotes services to organizations and partners identified as interested in developing a WPP. Texas Stream Team also provides services for communities developing a watershed protection plan, such as correspondence with watershed managers, trainings and citizen scientist certifications, and assistance with the creation and management of regional water quality monitoring groups.

In July 2020, Texas Stream Team collaborated with the development of the Dry Comal/Comal WPP, specifically with the Headwaters of the Comal organization. Texas Stream Team conducted a Standard Core water quality monitoring training in the fall to certify local volunteers to test for water quality. Since then, the Headwaters group have become new partners of Texas Stream Team and has developed a group monitoring plan to begin monitoring twice a month at two sites on a consistent schedule moving forward.

In early 2021, Texas Stream Team was awarded additional funds from TCEQ which allowed us to work closely with the Shoal Creek Watershed Action Plan (SCWAP) staff to support the development of the plan. Texas Stream Team contracted Tom Hegemier of Doucet and Associates, to develop a model for the SCWAP. The SELECT model was refined to assess surface runoff pollutant loads, focused on bacteria, to address input from TCEQ. The water quality modeling was used to develop the best management practices plan to manage bacteria to meet the state contact recreation criteria. The modeling identified individual BMPs, the pollutant load managed by each, and the number of sizes of the BMPs to meet the WPP project goals. The watershed management plan will be used in the implementation phase of the project that will begin later in 2021.

Correspondence with Watershed Coordinators

Texas Stream Team corresponds with a minimum of eight Watershed Coordinators or project leads and offers services to support implementation of WPPs. The following are watershed coordinators or project leads Texas Stream Team staff have corresponded with throughout the contract period to provide partnership support or to help kickstart Texas Stream Team monitoring efforts:

- Blake Alldredge, Upper Trinity Regional Water District - Upper Trinity River,
- Dani Apodaca, LCRA Monitoring Coordinator - Colorado River Basin,
- Eryl Austin-Bingamon, Bobcat Stream Team - Upper San Marcos River, Guadalupe River,
- David Baker, Wimberley Valley Watershed Association - Cypress Creek, Guadalupe River,
- Bill Balboa, Matagorda Bay Foundation - Matagorda Bay,
- Ryan Bass, Upper Cibolo Creek Watershed Coordinator - Upper Cibolo Creek,
- Tyson Broad, Upper Llano River Watershed Protection Plan - Upper Llano River,
- Cassidy Campbell, North Central Texas Council of Governments - Upper Trinity River,

- Sarah Cunningham, Mission Aransas National Estuarine Research Reserve - Mission and Aransas Watershed,
- Nick Dornak, The Meadows Center for Water and the Environment - Upper San Marcos River Watershed,
- Elizabeth Edgerton, Guadalupe-Blanco River Authority - Guadalupe River Basin,
- Mark Enders, Dry Comal Creek and Comal River Watersheds Program Manager - Dry Comal Creek and Comal River Watersheds,
- Clare Entwistle, Mid and Lower Cibolo Creek Watershed Protection Plan Development Project Manager - Mid and Lower Cibolo Creek Watershed,
- Carla Ethridge, Clean Rivers Program Manager – Angelina and Neches River,
- Robin Gary, Wimberley Valley Watershed Association - Cypress Creek, Guadalupe River,
- Israel Garza, City of Killeen - Nolan Creek/Lampasas River,
- Ginger Geist, Lone Man Creek Wimberley Monitors - Cypress Creek,
- Matthew Green, Town of Flower Mound - Elm Fork Trinity River,
- Lucas Gregory, Attoyac Bayou/Navasota River Project Manager and Quality Assurance Officer - Attoyac Bayou/Navasota River,
- Lee Gudgell, Guadalupe-Blanco River Authority - Guadalupe River Basin,
- Kendall Guidroz, Houston-Galveston Area Council – San Jacinto River,
- Jaime Flores, Texas A&M AgriLife Extension – Arroyo Colorado Watershed,
- Rocky Freund, Lower Nueces River Watershed Protection Plan - Lower Nueces River Watershed,
- Tricia Haas, Lake Lavon Watershed Protection Plan - Lake Lavon Watershed,
- Erin Hill, Center for Coastal Studies Texas A&M University Corpus Christi Coast Bend Watershed - Oso Creek, Nueces River,
- Aaron Huff, Village-Creek-Lake Arlington Watershed Protection Plan and Joe Pool Lake Watershed Protection Plan - Village-Creek-Lake Arlington Watershed,
- Desiree Jackson, Bobcat Stream Team - Upper San Marcos River, Guadalupe River,
- Marty Kelly, Texas Parks and Wildlife Department,
- Sky Lewey, Nueces River Authority - Nueces River,
- Ward Ling, Miller Creek/Alligator and Geronimo Watershed Coordinator - Miller Creek/Alligator and Geronimo Watershed,
- Hannah Lucia, Lower Neches Valley Authority - Lower Neches River,
- Jim Miller, Middle Blanco River Watershed Monitors - Cypress Creek,
- Meredith Miller, William R. Sinkin Eco Centro – Upper San Antonio River Watershed,
- Justin Bower, The Cypress Creek Watershed Partnership - San Jacinto River Basin,
- Christopher Morris, City of Dallas - Trinity River,
- Jake Mowrer, Mill Creek Watershed Coordinator - Mill Creek Watershed,
- Annalisa Peace, Greater Edwards Aquifer Alliance - Honey Creek,
- Jeremiah Poling – Angelina and Neches River Authority - Angelina-Neches River,
- Chandani Rana, City of Grapevine - Trinity River,
- Judy Reeves, Texarkana College - Red River, Sabine River, Sulphur River, and Big Cypress Bayou,
- Galen Roberts, Lake Lavon Watershed Protection Plan - Lake Lavon Watershed,
- Rachel Sanborn, San Marcos River Rangers - Upper San Marcos River, Guadalupe River,
- Luke Sanders, Sabine River Authority - Upper Sabine River Basin,
- Nora Schell, City of Waco - Waco Wetlands,
- Michael Sherman, Tres Palacios Watershed Protection Plan - Lavaca River Watershed Protection Plan,

- Shane Simpson, Lake Conroe Watershed Protection Plan - Lake Conroe Watershed,
- Brian Sims, Attoyac Bayou Watershed Coordinator - Attoyac Bayou,
- Laurie Strack, New Braunfels - Dry Comal/Comal Watershed, and
- Amy Truong, Attoyac Bayou Extension Assistant - Attoyac Bayou.

PARTICIPANTS

Anyone with an interest in becoming a citizen scientist or learning more about the natural resources in Texas can get involved in Texas Stream Team’s citizen scientist trainings and programs. Citizen scientists monitor a wide variety of habitats from rivers, creeks, ponds, and lakes to bays, bayous, and estuaries. Participants range from school age to senior citizens, from individuals, to organized groups.

An average of 466 citizen scientists were engaged annually. An average of 426 sites were monitored by people participating in Texas Stream Team citizen scientist within the contract period. These citizen scientists dedicated 4,278 volunteer hours to monitoring and traveled a total of 50,041 miles.

CITIZEN SCIENTIST METRICS: WATER QUALITY MONITORING BY THE NUMBERS

- **466** Citizen Scientists Engaged Annually
- **2,729** Monitoring Events
- **4,278** Hours Spent Sampling
- **50,041** Miles Traveled
- **426** Sites Monitored on Average

CITIZEN SCIENTIST RECOGNITION

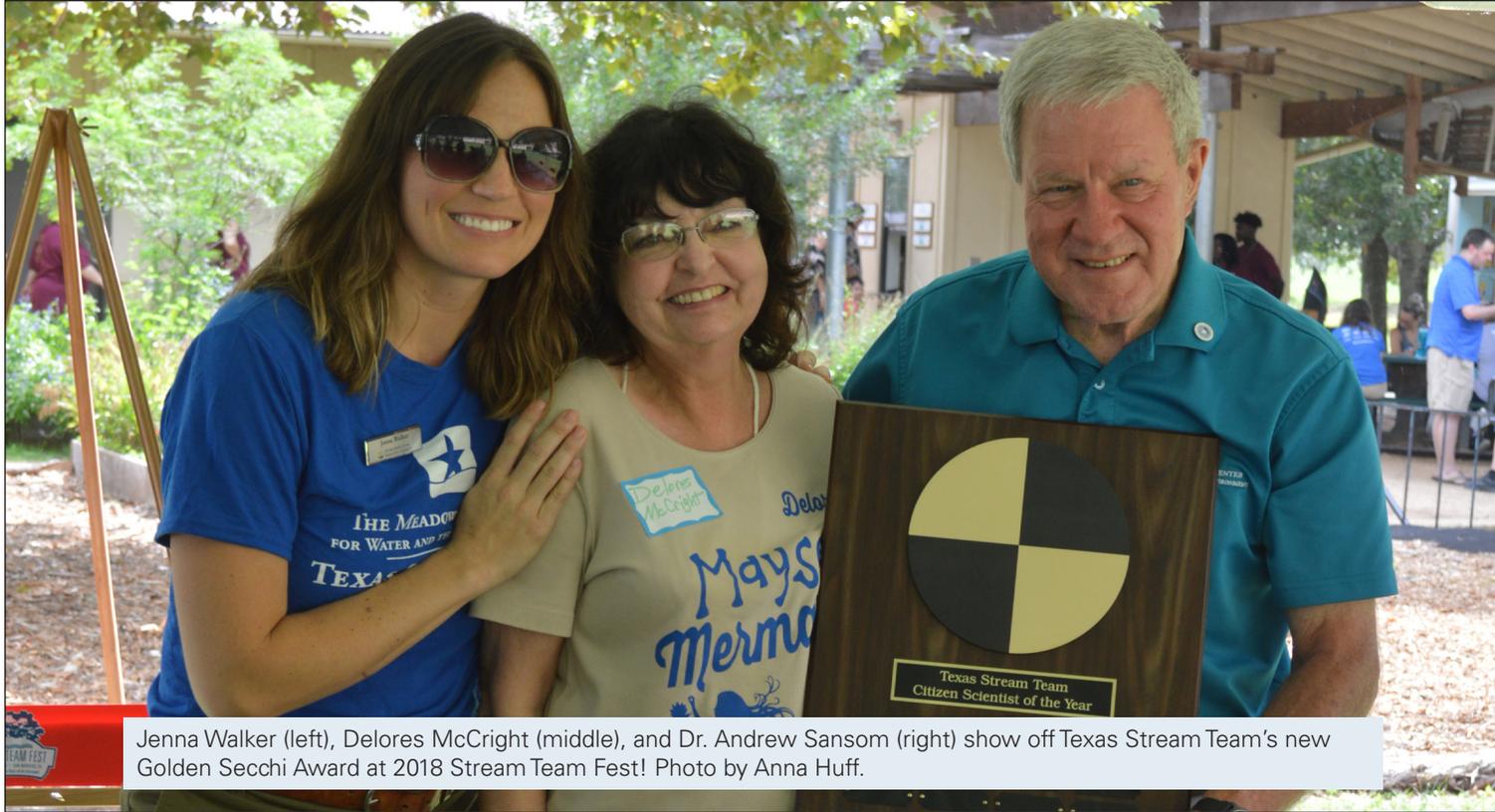
Texas Stream Team Fest

In October of 2018, Texas Stream Team celebrated training its 10,000th citizen scientist through a Texas Stream Team festival with partners, citizen scientists, and friends. Stream Team Fest, which was held on October 6th at the Meadows Center, was attended by nearly 100 citizen scientists, partner organizations, and volunteers. The event included talks from guest speakers and an award ceremony to honor members, groups, and partners in the Texas Stream Team community. Stream Team Fest honored:

- Friend of Texas Stream Team - Mike Bira
- Friend of Texas Stream Team - Nicole Hall
- Student Chapter - Bobcat Stream Team
- Most Participant in a Watershed - San Marcos River Rangers
- Most Active Group - Aquatic Alliance
- Most Active Municipality - City of Dallas
- Most Supportive Partner - Houston-Galveston Area Council
- Texas Stream Team 21 Years of Service - Rachel Sanborn
- Texas Stream Team 18 Years of Service - Pat Stroka

Event activities included glass-bottom boat rides, discovery hall tours, hiking, kayaking, and wetland walks. In addition, Michael Jones, former Texas Stream Team Water Resource Specialist, held a water quality monitoring demonstration at the Headwaters of Spring Lake. Music was provided by Dr. Robert Mace, Deputy Executive Director of The Meadows Center for Water and the Environment.

Event sponsors included Whole Earth Provision Co., Recreational Equipment, Inc. (REI), Buzz Mill, American Party Rental, and Marvelous Munchies. This event was also supported in part by the EPA through TCEQ.



Jenna Walker (left), Delores McCright (middle), and Dr. Andrew Sansom (right) show off Texas Stream Team's new Golden Secchi Award at 2018 Stream Team Fest! Photo by Anna Huff.

Texas Stream Team's Annual Golden Secchi Award

During Stream Team Fest, Texas Stream Team staff presented the first annual Golden Secchi Award, also known as the Citizen Scientist of the Year Award. This yearly award commemorates our most dedicated citizen scientists, who have consistently contributed to the growth of water quality citizen science and environmental stewardship.

In October of 2018, Texas Stream Team announced citizen scientist Delores McCright as the first recipient of the Golden Secchi Award. Delores is an experienced citizen scientist who has dedicated 25 years of experience to Texas Stream Team. Delores got her start with Texas Stream Team while looking for a project for the Texarkana College Earth Club, a club which she sponsored. According to Delores, she “fell in love with water quality monitoring”. Over two decades later, Delores is an active citizen scientist who monitors several sites within the Northeastern Texas area. Delores is also a Texas Stream Team trainer, training new citizen scientists in and around Texarkana.

Texas Stream Team Citizen Scientist Spotlight

Since the early 2000's, Texas Stream Team staff have continuously worked to highlight active citizen scientists in newsletters and monthly news blasts to showcase the amazing people that contribute hard work and dedication to the Texas Stream Team program. Within the contract period, the following citizen scientists, partners, and monitoring groups were featured:

- Lissa Martinez (Spring 2018) [Access Here](#)
- Pat Stroka (Fall 2018) [Access Here](#)
- Sirena Gatica (Spring 2019) [Access Here](#)

EPA Water Quality Exchange

Under the Clean Water Act, state, tribal and federal agencies monitor lakes, streams, rivers, and other types of water bodies to determine water quality condition. The data generated from these monitoring activities help water resource managers know where pollution problems exist, where to focus pollution control energies and where progress has been made. TCEQ requires Texas Stream Team submit water quality data to the Water Quality Exchange (WQX), the mechanism for data partners to submit water monitoring data to the United States Environmental Protection Agency (EPA).

Texas Stream Team staff review, verify, and validate water quality monitoring data before it is submitted to EPA. Texas Stream Team data manager, Laura Parchman, formats and submits data for semi-annual submittals to the WQX database (formerly known as STORET Data Warehouse). After each submittal is completed, Texas Stream Team provides the TCEQ Project Manager with a copy/confirmation of each submittal.

Within the contract reporting period, two data submittals to WQX database were submitted, and can be accessed through the [Water Quality Portal](#) (WQP), a platform available to the public to retrieve water monitoring data from EPA.

DATA SUMMARY REPORTS

Texas Stream Team staff generate Watershed Data Summary Reports every quarter to assess the data collected and to show the status of water quality at reported monitoring sites in watersheds throughout the entire state. Data summary reports are watershed-wide analyses of selected Texas Stream Team citizen scientist water quality data. These reports look at the average values of the parameters collected for a watershed, as well as provide an analysis of each site monitored. The reports cite the Texas Surface Water Quality Standards to give the reader a reference to the quality of the water in the watershed, however, these reports are not used as an assessment of water quality by the state. Instead, these reports are used to notify the public about the quality of water in Texas, provide long-term baseline data, and to provide resource managers with supplemental data that can help with the decision-making process.

The data presented in data summary reports should be considered in conjunction with other relevant water quality reports to provide a holistic view of water quality in the watershed. Such sources include, but are not limited to:

- Texas Surface Water Quality Standards.
- Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d).
- Texas Clean Rivers Program partner reports, such as Basin Summary Reports and Basin Highlight Reports.
- Total maximum daily load reports.
- Texas Commission of Environmental Quality and Texas State Soil and Water Conservation Board Nonpoint Source Programs' funded reports, including watershed protection plans.

Data summary reports completed by Texas Stream Team within the contract period include:

- San Bernard Watershed Data Report (June 2018): [Access Here](#)
- Upper Cibolo Creek Watershed Data Report (September 2018): [Access Here](#)
- Upper Highland Lakes Watershed Data Report (December 2018): [Access Here](#)
- San Bernard River Data Report (June 2020): [Access Here](#)
- Lower Nueces River Watershed Data Report (August 2020): [Access Here](#)

All Texas Stream Team data summary reports are available online on the Texas Stream Team [Data and Research webpage](#).

VI. TEXAS STREAM TEAM WATERSHED EDUCATION AND OUTREACH

OBJECTIVE

To provide watershed education to 4,000 to 5,000 people annually on NPS pollution and activities that support water conservation and management.

EDUCATOR RESOURCES AND ACTIVITIES

In addition to offering Teacher Workshops, Texas Stream Team staff have been working to increase the total number of resources available to teachers. Updated teacher resources can be found on the Texas Stream Team [Educators webpage](#), including updated curricula and lesson plans.

Texas Stream Team Partner Education Programs

Under this contract, Texas Stream Team is required to incorporate educational activities into one existing partner program in a watershed developing a WPP, and two in areas implementing a WPP. In December of 2018, Texas Stream Team incorporated the Macroinvertebrate “Bug Picking” Activity into one partner education program in a watershed implementing a WPP.

Throughout the month of December, Texas Stream Team hosted the Macroinvertebrate “Bug Picking” activity for four schools totaling 788 engaged students. Schools included the Goodnight Middle School and Miller Middle School of San Marcos, TX, the Johnson High School Environmental Science Club of Buda, TX, and the Nature Schooling Group of New Braunfels, TX.

In June of 2018, Texas Stream Team held a Macroinvertebrate “Bug Picking” demonstration in a watershed developing a WPP. The “Bug Picking” demonstration was held at the El Ranchito Nature Discovery Camp, in Bee Cave, TX for a total of 24 participants.



The Meadows Center's booth at the Austin Energy Regional Science Fair on 2/23/2019. Photo by Alexander Neal.



SPRING LAKE EDUCATION PROGRAM

The Meadows Center uses its location at Spring Lake – the headwaters of the San Marcos River – to offer watershed education through educational activities to visiting students from schools across the state. It is estimated that roughly 30,000 students visit Spring Lake annually. The Meadows Center's Spring Lake Education outdoor learning programs engage people of all ages, teaching them about Spring Lake and the importance of water to all living things. Activities include Glass-Bottom Boat Tours, the “Splash into Science Snorkel Program”, Paddling Tours, the Outdoor Academy, and more.

The Spring Lake Education Program and other partner programs utilize Texas Stream Team’s suite of activities targeted from elementary to high school grade levels to educate students of all ages on watershed processes. These activities include using the 3D EnviroScape(R) Watershed/Nonpoint Source (NPS) Model, the Macroinvertebrate “Bug Picking” activity, and the Texas Stream Team water quality monitoring kit to demonstrate water quality sampling.

Texas Stream Team utilizes the 3D EnviroScape Watershed/NPS education model to provide a hands-on, interactive demonstration of pollutant sources and their impacts on water quality. EnviroScape model demonstrations teach youth how stormwater runoff carries pollutants through the watershed to a pond, lake, river, bay, or ocean – and the best management practices to prevent this type of pollution from occurring. Within the contract period, Spring Lake staff held 34 EnviroScape model demonstrations for a total engagement with 1,384 students. These numbers were highly affected by the COVID-19 closures, which took place from March 2020 to September 2020.

Through the outdoor learning program, Texas Stream Team can foster partnerships to engage and provide water quality monitoring certifications to students of all grade levels. Within the contract period, Texas Stream Team staff and partners certified more than 33 students as citizen scientists. These metrics were also highly influenced by COVID-19 closures.

	NUMBER OF EVENTS	TOTAL PARTICIPANTS
All Events	38	21,162
Events at Spring Lake	12	17,352
Events Statewide	26	3,810

Teacher Workshops

Texas Stream Team and the Meadows Center staff organize, attend, and/or lead frequent teacher workshops that engage teachers and students in hands-on lessons about citizen science, water quality, and environmental stewardship.

On June 13, 2018, Texas Stream Team attended and helped plan the Groundwater to the Gulf (G2G) workshop for Central Texas teachers. G2G is a free, 3-day, fieldtrip-based workshop for up to 50 teachers. During the 2018 workshop, 27 teachers participated. G2G emphasizes classroom techniques and provides resources for teaching water science. Participants follow

the path of water bodies in Central Texas from their origins to their destination in the Gulf of Mexico. Topics include hydrology, groundwater, urban watersheds, water quality, river stewardship, water protection, and water conservation. Participants experience:

- Hands-on field trips with local water experts,
- Receive free curricula, TEKS-aligned activities, and resources,
- Learn about field-trip opportunities for the school year; and receive 22 continuing education credits.

During the first day, Texas Stream Team staff member, Meagan Lobban, participated in the Hydro Models session and presented the 3D EnviroScape Watershed/NPS pollution education model for teachers. During the second day, Ms. Lobban along with the Austin Youth River Watch (AYRW) introduced Texas Stream Team and demonstrated the Probe Core and Standard Core kits. Teachers were provided a copy of Texas Stream Team’s environmental monitoring form to fill out during the water quality testing demonstration to show what can be done in the classroom or on a field trip with their students at the Meadows Center. Additionally, teachers were given lesson plans for all activities and information about the Meadows Center and Texas Stream Team.

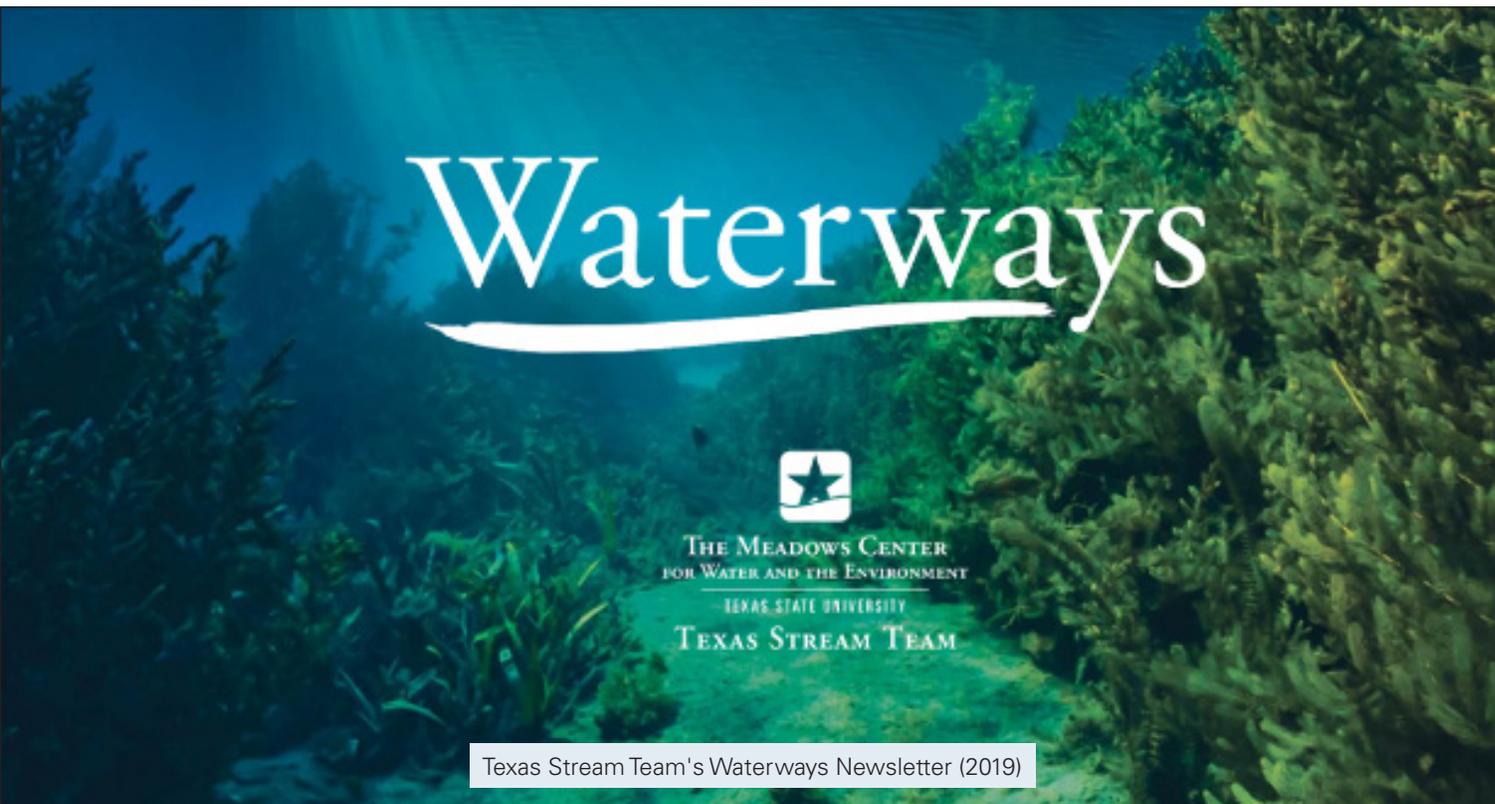
Within the contract period, Texas Stream Team and the Meadows Center staff attended one Teacher Workshop and reached a total of 27 participants.

CITIZEN SCIENTIST RESOURCES

Newsletters

The Waterways newsletter connects citizen scientists, partners, and other interested parties across the state with the latest updates from Texas Stream Team. The newsletter includes information about upcoming trainings, Texas Stream Team events, partner trainings and events, a citizen scientist spotlight, and more. The Waterways newsletter allows Texas Stream Team to promote partner activities and show appreciation for the great work of our statewide citizen scientists.

Within the contract period, Texas Stream Team published four newsletters, which can be accessed on the Texas Stream Team [Waterways Newsletter Archive webpage](#).



Texas Stream Team's Waterways Newsletter (2019)

Online Community Forum Updates

The Texas Stream Team Community Forum provided a place for citizen scientists to share valuable knowledge and experiences with each other online by posting questions, sharing stories, photos, best practices, submitting wish lists, publicizing events, providing feedback, and brainstorming with others.

Within the contract period, Texas Stream Team continued to upload resources and promote the forum. The Texas Stream Team Community Forum underwent a rebrand and update for the year 2019 from January 25th - February 4th, 2020, with the rollout scheduled for February 4. The new websites and features included:

- A new, rebranded layout.
- Making it possible to post and comment using existing social media platforms (Facebook, Twitter, Google).
- New photos and galleries featuring Citizen Scientists and their monitoring sites.
- Combining Forums and removing Profiles for a more user-friendly experience, and so that we achieve the purpose of the Texas Stream Team Community Forum more effectively.
- A new Texas Stream Team Blog where Community Forum members can get additional news, guides, instructions, stories, and resources from Texas Stream Team and Texas Stream Team newsletters.
- The Blog on the Community Forum website can help organize information better and help keep Forums from getting cluttered. Blog Posts can be referenced in Forums to help Community Forum members communicate more easily and more effectively.
- Improved search engine optimization (SEO).
- Improved accessibility for the visually impaired.

Throughout the contract period, Texas Stream Team staff have worked to update and improve the Texas Stream Team website to provide easier access to training information, calendar events, and more. With feedback from the Texas Stream Team community and recent website improvements, the need for the online Community Forum began to diminish significantly. Because of this, Texas Stream Team discontinued the Forum on September 1, 2020. Texas Stream Team continues to brainstorm methods to engage with citizen scientists and plans to integrate and introduce alternative platforms for communication in the future.

Texas Stream Team Calendar

The Texas Stream Team [Calendar](#) provides a place for participants to view all upcoming trainings offered by Texas Stream Team staff and partners, as well as upcoming events. The Texas Stream Team Calendar can be accessed on through the Texas Stream Team website and Community Forum.

Texas Stream Team Website

Since December of 2019, Texas Stream Team staff have been working to update the layout and expand the content of the [Texas Stream Team website](#), and updates continue as of the date of this report. These updates will make it easier for partners and citizen scientists to access online forms, databases, reports, resources, and to learn more about the Texas Stream Team program. Texas Stream Team staff is also currently working on creating, proofreading, and publishing new resource material for our partner organizations. The goal of the Texas Stream Team website overhaul is to expand on the amount and quality of the resources available to partners, as well as improve the layout and accessibility of the website. By working to increase and improve partner resources, Texas Stream Team hopes to further engage and involve partners across the state of Texas in the process of citizen science.

VII. TEXAS STREAM TEAM PROGRAMS

Within the contract period, Texas Stream Team expanded and promoted many different programs with the goal of further engaging our partners and citizen scientists in the process of water quality monitoring and environmental stewardship.

MONOFILAMENT FINDERS PROGRAM

Texas Stream Team is working to restore habitat and protect wildlife across our state by mobilizing a network of environmental stewards to educate the public, remove fishing line from the environment, and encourage anglers to recycle monofilament line. Texas Stream Team collects the data reported by citizen scientists and is currently working to increase the number of recycling stations in Central Texas and along the Texas Coast.



THE MEADOWS CENTER
FOR WATER AND THE ENVIRONMENT
TEXAS STATE UNIVERSITY
TEXAS STREAM TEAM

Texas Stream Team's
Monofilament Finders Logo

ANGLERS

The Texas Stream Team Anglers program is currently being developed by Texas Stream Team staff with the hopes of engaging fishing and outdoor enthusiasts in the act of environmental stewardship. The aims of the Angler pilot program are to:

- Reach out to fishing organizations and outdoor enthusiasts who wish to become citizen scientists.
- Provide anglers across Texas with resources to assess the health of aquatic ecosystems in remote locations that land-based monitors may not be able to access.
- To protect and conserve fishing sites and waterways for anglers across Texas.

While this program is still in development, a page on the Texas Stream Team website has been reserved for future updates.

STUDENT ORGANIZATIONS

Student organizations can partner with Texas Stream Team to provide their local institution and community with Texas Stream Team trainings, opportunities for water quality stewardship, and meaningful hands-on experience in the field of water resources and environmental management. Texas Stream Team encourage and collaborate with student organizations, such as Bobcat Stream Team (BST) at Texas State University.

Within the contract period, Texas Stream Team has continued to support the establishment and growth of Texas Stream Team student chapters across the state of Texas. This includes, but is not limited to:

- Expansion of online resources available to students
- Assistance with funding opportunities
- Guest speaking events

Additional resources are available through the Texas Stream Team [Student Organizations webpage](#).

GREEN LIVING

Texas Stream Team occasionally tackles a green stormwater infrastructure (GSI) project with TCEQ contracts to help put water quality improvements into action. GSI sets infrastructure in place to help direct the flow of stormwater away from built environments in a controlled manor to increase infiltration.

Texas Stream Team appreciates the opportunity to foster public awareness on this issue affecting water quality and has been inspired to create a Green Living section on the [Texas Stream Team website](#) to showcase the various green infrastructure projects that Texas Stream Team has completed in the past, accompanied by materials that can help communities and individuals replicate these projects.

VIII. PARTNERS AND GROUPS

Texas Stream Team partners work with Texas Stream Team to grow citizen science activities in their communities, and solicit public and private entities to help train, equip, manage, and offer general support to the growing number of citizen scientists across the state. Additionally, partners identify areas of concern, reduce pollution, and provide citizens, industry, and public agencies with information needed to improve and conserve Texas' natural resources. Partners include citizens, industries, river authorities, councils of government, water districts, cities, state and federal agencies, students, teachers, private groups, foundations, and more.

PARTNERSHIP PROGRAM

Texas Stream Team continues to develop new partnerships with organizations across the state. The partnerships are focused on collaborations wherein Texas Stream Team water quality monitoring activities and Texas Stream Team educational materials are in line with the partner's goals. A total of four partnerships were initiated within the contract period.

Frio Canyon Garden Club of Leakey, TX

The Frio Canyon Garden Club, also known as the Leakey Garden Club, is a non-profit organization founded in 1994 to encourage a love of the natural beauty of the Texas Hill Country and the Frio Canyon. Through the Frio Canyon Garden Club, members and the public can learn more about native plants and best growing practices in the area. The Frio Canyon Garden Club welcomes individuals who are interested in learning and sharing information on gardening and water conservation.

In June 2018, Texas Stream Team partnered with the Frio Canyon Garden Club to host a Riparian Evaluation training for the Leakey Springs Restoration Project. This event certified 13 total Leakey residents as Riparian citizen scientists.

City of Grapevine

The City of Grapevine is a local government located in the Dallas-Fort Worth Metroplex. The City of Grapevine partnered with Texas Stream Team on July 10th, 2018. Under the Leadership partner level, the City of Grapevine has held Texas Stream Team trainings and recruited citizen scientists for volunteer monitoring, with an initial goal of 5 trainings held annually. In addition to this, the City of Grapevine participates in outreach and education, advertising Texas Stream Team trainings and programs through the Parks and Recreation Department, the Grapevine Library, and at a variety of "Keep Grapevine Beautiful" events.

City of Arlington

The City of Arlington is a local government located in the Dallas-Fort Worth Metroplex. The City of Arlington partnered with Texas Stream Team on January 16th, 2019. As a Leadership partner, The City of Arlington provides materials, support, and training for volunteer monitors, coordinating one volunteer recognition event annually, in addition to attending the annual meeting of Texas Stream Team monitors.

City of Carrollton

The City of Carrollton is a local government located in the Dallas-Fort Worth Metroplex. The City of Carrollton partnered with Texas Stream Team on June 22nd, 2020 as an Educational Partner. The City of Carrollton plans to utilize Texas Stream Team water quality monitoring for educational activities, as well as integrate educational materials and Texas Stream Team curriculum into current environmental education programs.

MONITORING GROUPS

Texas Stream Team encourages its citizen scientists to seek involvement with other interested people to form monitoring groups. Monitoring groups range from a handful of interested citizens organizing on a grass-roots level, to existing groups of volunteers, such as Texas Master Naturalists, that may want to integrate water quality monitoring into their chapter

program. Texas Stream Team seeks to work with and recruit existing groups whenever possible. The following groups initiated or revised monitoring plans within the contract period:

- Grapevine High School Stream Team
- City of Arlington (University of Texas students)

PARTNER MEETINGS

October 6th, 2018 Partner Meeting

On October 6th, 2018, Texas Stream Team hosted a partner meeting at Spring Lake Hall in San Marcos, TX. Information was provided to partners about citizen scientist resources such as the Waterways Dataviewer, Community Forum, and calendar. Partners that attended included:

- Delores McCright, The Texarkana College Earth Club
- Rachel Sanborn, The San Marcos River Rangers
- Nicole Hall, TCEQ
- Andreina Alexatos, TreeFolks
- Mike Bira, EPA
- Tyson Broad, Texas Tech University

REGIONAL MEETINGS

July 25th, 2018 – Texas Stream Team Workshop

On July 25th, 2018, Texas Stream Team along with the City of Dallas held a training and workshop for Upper Trinity River partners at the North Central Texas Council of Governments (NCTCOG) offices located in Arlington, TX.

A total of 12 Upper Trinity River partners completed Texas Stream Team’s Standard Core training. In addition to the training, participants were provided with a survey to gather feedback on the watershed services and citizen science needs these partners required for watershed planning activities.

This event featured representatives from:

- City of Arlington,
- City of Fort Worth,
- City of Grand Prairie,
- City of Irving,
- City of McKinney,
- Houston-Galveston Area Council,
- Lower Brazos Riverwatch,
- Nueces River Authority,
- Texas A&M Natural Resource Institute,
- Texas A&M University,
- Town of Flower Found,
- Trinity River Authority,
- University of Texas – Arlington,
- University of Texas Rio Grande Valley,
- Texas Forest Service,
- Texas Roots,
- Texas Water Resources Institute,
- North Texas Municipal Water District,
- San Jacinto River Authority,
- City of Frisco.

February 22nd, 2019 - Coffee & Conservation

On February 22nd, 2019, Texas Stream Team participated in Coffee & Conservation, a two-and-a-half-hour event hosted by the Texas A&M University Forest Service. This event featured representatives from:

- Texas Stream Team at The Meadows Center for Water and the Environment,
- The Hays County Soil & Water Conservation District,
- The United States Department of Agriculture’s Natural Resources Conservation Service,



The representatives of Coffee & Conservation. Photo courtesy of Brad Hamel, Central Texas Regional Urban Forester at TAMU Forest Service.

- The Texas Parks & Wildlife Department, and
- The City of Austin's Wildland Conservation Division.

Texas Stream Team showcased the latest efforts in Watershed Protection Planning, Riparian Evaluation and Surface Water Quality Monitoring using a certified Texas Stream Team trainer, Alexander Neal, to demonstrate the usage of probe monitoring kits, as well as the Your Remarkable Riparian Field Guide in its 3rd edition. Participants asked questions pertaining to water quality monitoring, the San Marcos River, and possibilities for combining Texas Stream Team with projects for graduate students. A total of 10 members of the general public interacted with Texas Stream Team during the event.

US EPA Region 6 Annual Regional Technical Group (RTAG)

On June 7, 2018, Jenna Walker presented to a group of 60 individuals at the annual RTAG meeting in Dallas, TX on the following topic: Texas Stream Team Citizen Science: Nutrient and Baseline Water Quality Monitoring.

CONFERENCES

The Texas Water Resources Institute (TWRI)'s Texas Watershed Planning Training Program

In Spring of 2018, the Texas Water Resources Institute (TWRI)'s Texas Watershed Planning Training Program held its 9th short course at the Camp Allen Conference and Retreat Center near Navasota to train 30 watershed coordinators and other water resource professionals in watershed planning. Since it was first established in 2008, the four-day course has educated around 300 water professionals on issues related to watershed planning and water resources.

The course is one of the few in the country that builds upon the nine elements for watershed planning, as identified by the U.S. Environmental Protection Agency (EPA). It provides guidance on stakeholder coordination, education and outreach; data collection and analysis; and tools available for planning and development. Watershed professionals use these tools to work alongside stakeholders in pursuit of successful watershed planning efforts.

Michael Jones from Texas Stream Team attended the course and led a presentation on Texas Stream Team water quality monitoring techniques, including information about citizen science, and how watershed education can fit into watershed protection activities.

The Texas Watershed Planning Program is currently funded by EPA through the Texas State Soil and Water Conservation Board with funding from the Texas Commission on Environmental Quality in previous years.

Jenna Walker led a similar presentation for 20 coordinators at the 2019 Texas Watershed Planning Short Course held in Bandera on February 20th, 2019.

IX. GRANT FUNDING OPPORTUNITIES

Texas Stream Team is continuing to grow and expand and is always looking for opportunities to fund such demand to continue our programs and services. The more Texas Stream Team grows, the more demand there is for statewide access to Texas Stream Team trainings, monitoring kits, and supplies. Throughout the contract period, Texas Stream Team staff set forth efforts to secure additional funding to implement our ambitious goals for the Texas Stream Team program.

Within the contract period, Texas Stream Team submitted grants from the following institutions/organizations:

- Nestle Waters North America
- EPA Gulf of Mexico Program Cooperative Agreement
- Texas Sea Grant

Within the contract period, Texas Stream Team applied for future funding from the following organizations:

- San Marcos Lions Club

X. TEXAS STREAM TEAM IN THE NEWS

DATE	TITLE	FEATURED IN
July 8, 2018	'Citizen scientists' tracking water quality across Northeast Texas, more sought to help monitor local streams	Longview News-Journal
July 12, 2018	Texas Stream Team shows worth of citizen involvement	Longview News-Journal
November 26, 2018	Making the connection: Watersheds and our water supplies	TribTalk
December 2, 2018	Stream Team Expanding Its Efforts	The San Marcos Daily Record
January 8, 2019	Become a citizen scientist in your garden and beyond	Austin 360
August 30, 2020	In Otter News...Otters Make A Splash In San Marcos River	The San Marcos Daily Record

XI. CONCLUSION

March 2018 to February 2021 has been a period of ambitious growth and organizational restructuring for the Texas Stream Team program. Despite the challenges presented by COVID-19 restrictions and closures, staff and partners have continued working to engage citizen scientists across Texas by adapting Texas Stream Team protocols and programming to a distance format and continuing to offer frequent training opportunities. Our staff looks forward to continued expansion and growth of the program, strengthening partnerships, adding additional monitoring and trainings, and increasing our education and outreach events to continue our mission of improving watershed stewardship through citizen science and environmental education throughout the great state of Texas.



Michael Jones of the Texas Stream Team shows a specific conductivity meter and demonstrates its use to watershed coordinators.



© Jana - Guadalupe River New Braunfels, Texas



THE MEADOWS CENTER
FOR WATER AND THE ENVIRONMENT
TEXAS STATE UNIVERSITY

601 University Drive, San Marcos Texas 78666
512.245.1346 | txstreamteam@txstate.edu | www.JoinStreamTeam.org