

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

MARCH 1, 2019 – MARCH 31, 2020

Report: 2020-02
May 2020



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THE MEADOWS CENTER
FOR WATER AND THE ENVIRONMENT

TEXAS STATE UNIVERSITY

TEXAS STREAM TEAM



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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:

Anna Huff, Communications Manger

Alexander Neal, Bachelor of Science in Geography Resource and Environmental Studies

Aspen Navarro, Program Coordinator

Claudia Campos, Administrative Coordinator

Eryl Austin-Bingamon, Student Research Assistant

Jenna Walker, Deputy Director

Dr. Kelly Albus, Meadows Center Fellow

Laura Parchman, GIS and Data Management Associate

Meagan Lobban, Education Manager

Dr. Sandra Arismendez, Water Quality Monitoring Coordinator

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TEXAS STATE UNIVERSITY

TEXAS STREAM TEAM

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

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Texas Stream Team citizen science training on the Arroyo Colorado watershed.

EXECUTIVE SUMMARY

March 2019 to March 2020 has been an ambitious year for Texas Stream Team at The Meadows Center for Water and the Environment (the Meadows Center). Throughout the past year it has been the goal of Texas Stream Team to increase the accessibility, accuracy, and availability of our program resources to all our partners and stakeholders across Texas. Texas Stream Team staff have been working to streamline organizational policies and procedures, provide our partners and citizen scientists with updated training and monitoring resources, update and enhance the Texas Stream Team Waterways Dataviewer database, increase education and outreach efforts, and many other activities included in this report.

Texas Stream Team is dedicated to involving Texans in the process of citizen science and environmental stewardship. In the past year, Texas Stream Team staff and partners have led 101 trainings, certifying 733 citizen scientists. Of these citizen scientists, 51 are actively monitoring. Among existing citizen scientists, 170 sites were actively monitored, and 85 new sites were established. In the past year, Texas Stream Team citizen scientists dedicated 3,672 hours to volunteer efforts. To further engage the public in water and environmental stewardship, Texas Stream Team attended 30 Education and Outreach events, one Teacher Workshop event, and established seven new partnerships.

Within the past year, Texas Stream Team added two new 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 inquiries, helping with outreach and training materials, scheduling all Texas Stream Team activities, and assists with providing 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 assists with providing statewide trainings.

In May 2019 Texas Stream Team was honored with the [Texas Environmental Excellence Award for the Civic/Community](#) category by the Texas Commission on Environmental Quality (TCEQ). The 2019 winners of the Texas Environmental Excellence Awards were celebrated at an award reception and banquet on May 15, 2019, hosted by the commissioners for the TCEQ at the Austin Convention Center. Texas Stream Team was honored to receive this award as a recognition for bringing together numerous partners and thousands of citizen scientist to monitor and protect water quality across Texas.

This report will elaborate on short-term and long-term goals of the past year, as well as information on recent Texas Stream Team projects. During the past year, Texas Stream Team valued the opportunity to grow alongside our partners and citizen scientists and we look forward to another year of ambitious water and environmental stewardship.

The Meadows Center and Texas Stream Team staff present at TCEQ's Texas Environmental Excellence Award Ceremony.



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 past year were directed towards the Texas Stream Team Standard Core Water Quality Citizen Scientist Training (Standard Core) and Probe Core Water Quality Citizen Scientist Training (Probe Core), which include:

- Updated monitoring resources
 - Core Environmental Monitoring Form
 - Texas Stream Team Core Water Quality Citizen Scientist Manual
 - Standard Core and Probe Core Field Guides
- Updated trainer resources
 - Rebranded and updated Training Packets
 - Rebranded and updated Core PowerPoint Training presentation
 - Standard Core and Probe Core Trainer Training Packets and Training Checklists

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 past year included:

- Website organization,
- Monitoring group organization,
- 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,
- Continue data collection and assessment,
- Increase the amount of Texas Stream Team data used for academic research,
- Increase guided resources for Dataviewer users, and
- Increase guided resources for Datamap users.

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 each training,
- Reconstruct field quality control checklists,
- 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 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,
- 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

Texans can become certified citizen scientists with Texas Stream Team by completing Texas Stream Team's Standard Core training. During a three-phase training process, the trainee learns how to measure water quality parameters including temperature, dissolved oxygen, pH, and conductivity using a custom water quality monitoring kit. Trainees also learn why these parameters are important and how nonpoint source (NPS) pollution can impact water quality.

Between March 2019 and March 2020, 82 Standard Core trainings were conducted, 13 of which were held by Texas Stream Team staff. These trainings resulted in 593 certified citizen scientists.

Texas Stream Team citizen scientists can increase their involvement with Texas Stream Team by participating in the Advanced Water Quality Citizen Scientist Training (Advanced). Once certified, an Advanced citizen scientist can begin collecting water quality samples to test for nitrate-nitrogen, orthophosphate, turbidity, E. coli bacteria, and streamflow. These measurements, in addition to Standard Core water quality parameters, provide a more complete profile of the water quality at any given site.

In the past year, four Advanced trainings were conducted by Texas Stream Team staff and partners. These trainings resulted in 14 certified citizen scientists.

Once citizen scientists become certified to monitor water quality, they can also become certified as a Texas Stream Team Trainer. A Texas Stream Team Trainer completes additional training and instruction necessary to lead Texas Stream Team citizen scientist trainings. Citizen scientists may become certified trainers for the Standard Core, Probe Core, E. coli, Advanced, Macroinvertebrate Bioassessment, and Riparian Evaluation trainings.

Fifteen citizen scientists were trained and certified as trainers by Texas Stream Team staff and partners during the past year.

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 82 Core trainings and certified a total of 593 citizen scientists within the past year.



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 four Advanced trainings and certified a total of 14 Advanced citizen scientists within the past year.

RIPARIAN EVALUATION CITIZEN SCIENTIST TRAINING

The Texas Stream Team Riparian Evaluation Citizen Scientist Training (Riparian Evaluation) teaches participants to assess the health of a waterbody based on the quality of the riparian habitat present. Data is 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, Claudia Campos, participating in the Riparian Evaluation Training on 4/5/2019 in San Marcos, TX. Photo by Valerie Villareal.

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.

Texas Stream Team staff conducted four Macroinvertebrate Bioassessment trainings and certified a total of 44 citizen scientists within the past year.



Citizen Scientists participating in Texas Stream Team's Macroinvertebrate Bioassessment Citizen Scientist Training on 11/04/2019. Photo by Andrew Shirey.

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.

In the past year, Texas Stream Team staff and partners held eleven training events where 15 citizen scientists were certified to lead trainings. The following citizen scientists were certified to lead Texas Stream Team trainings:

1. Nick Ellis, Galveston Bay Foundation – Core Trainer
2. Debra Jones, Northeast Texas – Core Trainer
3. Zach Peterson, City of Denton – Core Trainer
4. Shelby Robertson, City of Denton – Core Trainer
5. Patina Crowder, Iraan Sheffield ISD – Core Trainer
6. Jon Quick, Friends of the Pecos – Core Trainer
7. Ira Yates, Iraan – Core Trainer
8. Aspen Navarro, The Meadows Center - Core Trainer
9. Gary Gill, Boys Ranch ISD – Core Trainer
10. Aleta Meyer, Lindheimer Chapter Texas Master Naturalist – Core Trainer
11. Mitchel Saborine, Bobcat Stream Team at Texas State University – Core Trainer
12. Liomari Diaz, Groundwork Dallas – Core Trainer
13. Art Crowe, The Middle Blanco River Watershed Monitors – Core Trainer
14. Devan Green, The Meadows Center – Macroinvertebrate Bioassessment Trainer
15. Lauren Patterson, Baylor Stream Team at Baylor University – Core Trainer

TEXAS STREAM TEAM SNAPSHOT OF ACTIVITY

- 82 Core (Standard and Probe) Trainings
- 593 New Core Citizen Scientists Certified
- 4 Advanced Trainings
- 14 New Advanced Citizen Scientists Certified
- 2 E. coli Bacteria Trainings
- 12 New E. coli Citizen Scientists Certified
- 2 Riparian Trainings
- 23 New Riparian Evaluation Citizen Scientists Certified
- 4 Macroinvertebrate Bioassessment Trainings
- 44 New Macroinvertebrate Bioassessment Citizen Scientists Certified
- 11 Trainer Training Events
- 15 Citizen Scientists Certified to lead Texas Stream Team Trainings
- 605 Education and Outreach Events (includes Texas Stream Team activities at Spring Lake)
- 238 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.

In December 2019, a comprehensive inventory was conducted of available Texas Stream Team equipment and supplies. Results of the inventory lead to the identification of equipment and supplies necessary to fulfill remaining FY20 contract deliverables. In February 2020, a Texas Stream Team supply order was placed to replenish the inventory. The supply order included core, probe and advanced kits, transparency tubes, reagents/buffers/standards, Coliscan Easygel, petri dishes, and other miscellaneous supplies.

Texas Stream Team partner organizations and citizen scientists are fundamental to the success of our statewide monitoring efforts. As Texas Stream Team continues to grow, our financial support for monitoring groups and individual citizen scientists becomes more limited. As a result, many of our partners, trainers, and citizen scientists raise funds for their monitoring efforts. To help our program participants secure outside funding, Texas Stream Team has constructed a [Funding Guidance document](#) which includes monitoring cost estimates, funding sources, and funding opportunities. Texas Stream Team also encourages partners, monitoring groups, and individuals to reach out to us at any time for additional help when applying for funding opportunities.

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 utilizing equipment and supplies from the Texas Stream Team inventory occurred at locations state-wide, 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. Texas Stream Team has 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.

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. Texas Stream Team provided analyses of Texas Stream Team monitoring data through the form of watershed Data Summary Reports within the past year, specifically for the Medina and Cypress Creek Watersheds. These data summary reports were provided to the City of Wimberley, residents, and other watershed



Texas Stream Team citizen scientists sampling water quality in Oso Bay. Photo by Michelle Villarreal Leschper.

stakeholders to provide an update on monitoring efforts and needs. See the Data Summary Reports section below for more information on these reports and how to access them.

The following are watershed coordinators or project leads Texas Stream Team staff have corresponded with throughout the past year to provide partnership support or to help kickstart Texas Stream Team monitoring efforts:

- Lauren Strack, Headwaters at the Comal – Dry Comal/Comal Watershed,
- Rachel Sanborn, San Marcos River Rangers – Upper San Marcos River Watershed,
- David Baker, Wimberley Valley Watershed Association – Cypress Creek Watershed,
- Meredith Miller, William R. Sinkin Eco Centro – Upper San Antonio River Watershed,
- Sarah Cunningham, Mission-Aransas National Estuarine Research Reserve – Mission Aransas Watershed,
- Jace Tunnell – Nurdle Patrol, Mission Aransas Watershed,
- Kendall Guidroz, Houston-Galveston Area Council – San Bernard Watershed,
- Stephen Risinger - Plum Creek Watershed, and
- Jaime Flores, Texas A&M AgriLife Extension – Arroyo Colorado Watershed Coordinator.

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 252 people participated in Texas Stream Team monitoring each month between March 2019 and March 2020. These citizen scientists dedicated 3,672 volunteer hours to monitoring and traveled a total of 47,198 miles.

CITIZEN SCIENTIST METRICS

Water Quality Monitoring by the Numbers

- 2,214 Monitoring Events
- 3,672 Hours Spent Sampling
- 47,198 Miles Traveled
- 170 Sites Monitored on Average



Alexander Neal and Aquatic Alliance members present citizen scientist, Ben Sandifer, with the Texas Stream Team 2019 Golden Secchi Award. Photo by Alexander Neal.

CITIZEN SCIENTIST RECOGNITION

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. Between March 2019 and March 2020, the following citizen scientists, partners, and monitoring groups were featured:

- Islander Stream Team (June 2019): [Access Here](#)
- Ben Sandifer (September 2019): [Access Here](#)
- Debra Jones (October 2019): [Access Here](#)
- Jim Jones (December 2019): [Access Here](#)
- Tyson Broad (February 2020): [Access Here](#)

Texas Stream Team's Annual Golden Secchi Award

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. During this event, Texas Stream Team staff decided to create a yearly award to commemorate our most dedicated citizen scientists called the Golden Secchi Award, also known as the Citizen Scientist of the Year Award. This award remains at Texas Stream Team Headquarters so that it may be etched each year with the recipient's name.

In September of 2019, Texas Stream Team announced citizen scientist [Ben Sandifer](#) as the recipient of the Golden Secchi Award. Mr. Sandifer monitors one of the last free flowing springs in Dallas County, Big Spring, and has never missed a month of monitoring since joining Texas Stream Team in June 2013. A Texas Stream Team staff member presented Mr. Sandifer with the Golden Secchi Award along with his own Golden Secchi lapel pin. Nine affiliated persons with Texas Stream Team were present, including Aquatic Alliance Group Coordinator, Richard Grayson.

This announcement, along with other citizen scientist spotlights, are published on the Texas Stream Team Waterways Newsletter and Community Forum.

V. WATER QUALITY DATA COLLECTION

OBJECTIVE

To improve the functionality and capability of the Texas Stream Team Dataviewer for data entry, access, and to generate reports more easily. All submitted data collected under the QAPP is uploaded to the Dataviewer. Texas Stream Team staff will produce and distribute data summary reports that inform partners and the public regarding the current status of water quality at selected monitoring sites.

WATERWAYS DATAVIEWER

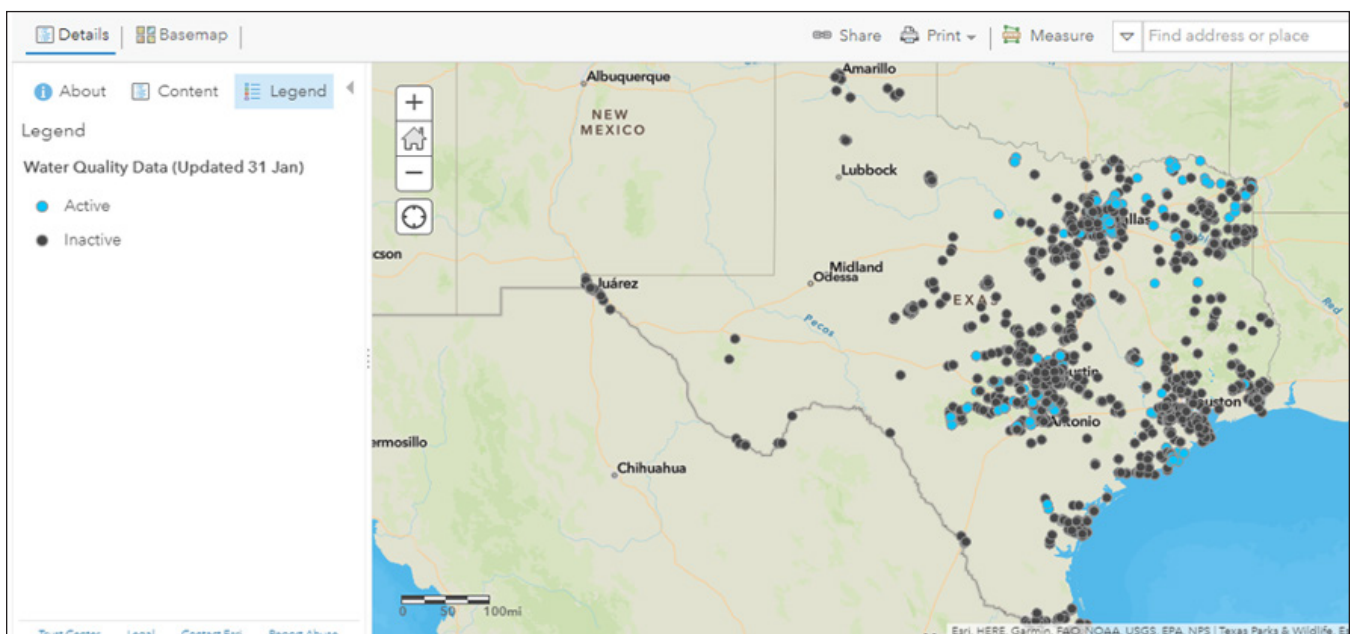
Texas Stream Team is the receptacle for all the data collected by Texas Stream Team citizen scientists. The data undergo review for quality assurance by Group Data Coordinators and Texas Stream Team staff and are then displayed on the Dataviewer. All submitted data collected under the Texas Stream Team Program Citizen Science Water Quality Monitoring QAPP are uploaded to the Texas Stream Team Dataviewer.

The Dataviewer is a Salesforce-based database platform that allows account holders to enter and view their water quality data. This data is used to update the Esri ArcOnline map, which is available for anyone to view. Citizen scientists with a Dataviewer account may utilize this platform to submit water quality data to Texas Stream Team, making the process from data collection to public dissemination quicker and more efficient. Alternatively, citizen scientists that have not requested Dataviewer accounts can submit scanned copies of environmental monitoring forms to the Texas Stream Team program email, or hard copies through mail. Texas Stream Team staff regularly enter data from these forms to the Dataviewer so that data is maintained for public access.

Texas Stream Team citizen scientists monitored 170 sites on average and submitted a total of 2,730 monitoring events in the state between March 2019 and March 2020.

DATAMAP

All the data entered to the Dataviewer by citizen scientists can be viewed by non-account holders on the Texas Stream Team Datamap. The Datamap allows members of the public to view active and inactive Texas Stream Team sites and download water quality data. The Datamap can be accessed through the Texas Stream Team [Dataviewer and Datamap webpage](#).



Texas Stream Team's Datamap

DATA SUBMITTALS

TCEQ Data Activity Reports

Texas Stream Team submit Data Activity Reports (DARs) to TCEQ that provide a quarterly snapshot of Texas Stream Team activity. The monitoring section contains the number of active sites, active monitoring participants, as well as the distance and time spent monitoring. The training section lists trainings held by Texas Stream Team as well as our partners. The type of training, the location, the trainer, and the number of participants is included. Finally, the Education and Outreach section lists the events that Texas Stream Team has participated in, at Spring Lake and across the state.

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.

Between March 2019 and March 2020, three 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 in order 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 between March 2019 and March 2020 include:

- Lake Travis Watershed Data Report (March 2019): [Access Here](#)
- Barton Creek Watershed Data Report (June 2019): [Access Here](#)

- Lady Bird Lake Watershed Data Report (September 2019): [Access Here](#)
- Medina River Watershed Data Report (October 2019): [Access Here](#)
- Cypress Creek Watershed Data Report (March 2020): [Access Here](#)

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

WATER QUALITY MONITORING TECHNIQUE STUDY

In February 2019, Texas Stream Team completed a study to evaluate Texas Stream Team water quality monitoring techniques for efficiency and cost effectiveness in comparison to other water quality testing tools currently on the market. Newer water quality monitoring technologies have increased the options for citizen science: continually shaping the way we collect data in the field, providing citizen scientist water quality monitors with new capabilities, and increasing the amount, variety, and quality of data being collected. This study did not entail environmental data operations to compare techniques but was a cost analysis of citizen science water quality monitoring equipment. The following low-tech data collection technique recommendations resulted from this work:

- Monitor surface water quality using social media.
 - The global popularity of social media and intelligent mobile devices with GPS and photography functions allows citizens to monitor surface water quality.
- Use core test kit for dissolved oxygen.
- Conductivity and pH have many options, but the customized LaMotte Core Kit follows our QAPP and is a more logical option to continue using.
- Most kits are expensive; it is highly recommended that groups with ample funding should purchase and use these kits. Groups using these kits should be testing multiple sites and parameters.
- Kits such as the tampon test or the test strips are good for groups looking for qualitative presence of pollutants.

Although this study was not a technical study to evaluate the efficiencies of different monitoring techniques, this report included initial thoughts about the demo models in action. Before incorporating any technique into the Texas Stream Team program, the method will need to be approved by TCEQ and added to the existing Texas Stream Team QAPP.

San Marcos River Rangers participating in Standard Core Training in San Marcos. Photo by Andrew Shirey.





Texas Stream Team student worker, Ola Nzeogu (right), and Spring Lake Education Program student worker, Kimberly Yax (left), attended the Exploring Science Day Austin Energy Regional Science Festival on 02/22/2020. Photo by Meagan Lobban.

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. Between March 2019 and March 2020, Texas Stream Team incorporated the Macroinvertebrate “Bug Picking” Activity into one partner education program in a watershed implementing a WPP.

On March 11, 2019, Texas Stream Team participated at the 2019 Blue Hole Spring Break Nature Camp in Wimberley to provide the Macroinvertebrate ‘Bug-picking’ exercise to teach campers about pollution (point and nonpoint) and the process of measuring water quality by assessing the presence of macroinvertebrates. A total of 17 youth between six to twelve sampled Cypress Creek with nets for macroinvertebrates and identified the common species found in the creek.

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. Between March 2019 and March 2020, Spring Lake staff held 19 EnviroScape model demonstrations.

This past fall, the Spring Lake Education Program began introducing the Texas Stream Team program to Texas State University freshman during University Seminar classes. Texas Stream Team began gathering this data in August 2019 as most University Seminar professors schedule a glass-bottom boat tour for their students.

Additionally, through the outdoor learning program, Texas Stream Team is able to foster partnerships to engage and provide water quality monitoring certifications to students of all grade levels. Between March 2019 and March 2020, Texas Stream Team staff and partners certified more than 300 students as citizen scientists.

	Number of Events	Total Participants
All Events	325	24,569
Events at Spring Lake	295	22,882
Events Statewide	30	1,687

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 12, 2019, 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. Last year, 32 teachers participated in the event. 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 Meadow Center. Additionally, teachers were given lesson plans for all activities and information about the Meadows Center and Texas Stream Team.

Between March of 2019 and March of 2020, Texas Stream Team and the Meadows Center staff attended one Teacher Workshop and reached a total of 32 participants.

Waterways



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

Texas Stream Team's Waterways Newsletter (2019)

CITIZEN SCIENTIST RESOURCES

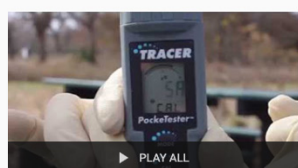
Newsletters

Between March 2019 and March 2020, the name of the Texas Stream Team newsletter was changed from “Headwaters Newsletter” to “Waterways Newsletter” to be more all-encompassing of all waterbodies in Texas. Between March 2019 and March 2020, Texas Stream Team published three newsletters, which can be accessed on the Texas Stream Team [Waterways Newsletter Archive webpage](#).

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.

Online Community Forum

The Texas Stream Team [Community Forum](#) provides 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. This past year, Texas Stream Team continued to upload resources and promote the forum.



Water Quality Parameters

6 videos • 75 views • Updated today

≡ ✂ ⋮



Texas Stream Team

SUBSCRIBE

- 1 Texas Stream Team Conductivity Water Testing
Texas Stream Team 3:27
- 2 Texas Stream Team Dissolved Oxygen Water Testing
Texas Stream Team 5:04
- 3 Texas Stream Team pH Water Testing
Texas Stream Team 0:59
- 4 Texas Stream Team Turbidity Water Testing
Texas Stream Team 2:41
- 5 Texas Stream Team Orthophosphate Water Testing
Texas Stream Team 5:46
- 6 Texas Stream Team Nitrate Nitrogen Water Testing
Texas Stream Team 2:53

YouTube Instructional Videos

In June of 2019, Texas Stream Team published water quality testing videos for many Core and Advanced parameters to provide citizen scientists with resources to guide them with water quality sampling events. These videos also provide citizen scientists with refreshers on the proper procedures for collecting water quality data. These videos are available to the public on the [Texas Stream Team YouTube channel](#).

More recently (2/27/2020), a training video for [Texas Stream Team *E. coli* monitoring](#) was completed. The video has been submitted to TCEQ and will be posted on the Texas Stream Team YouTube channel soon for public viewing.

New Texas Stream Team Water Quality Parameter Videos Available on YouTube

Revised Training Manuals

A revised Texas Stream Team Program Volunteer Surface Water Quality Monitoring Project QAPP was submitted to TCEQ for review and was approved on December 17, 2019. The QAPP revision necessitated an update of the Texas Stream Team Core Citizen Scientist Water Quality Monitoring Manual (Core Manual) due to approved changes and the addition of monitoring procedures.

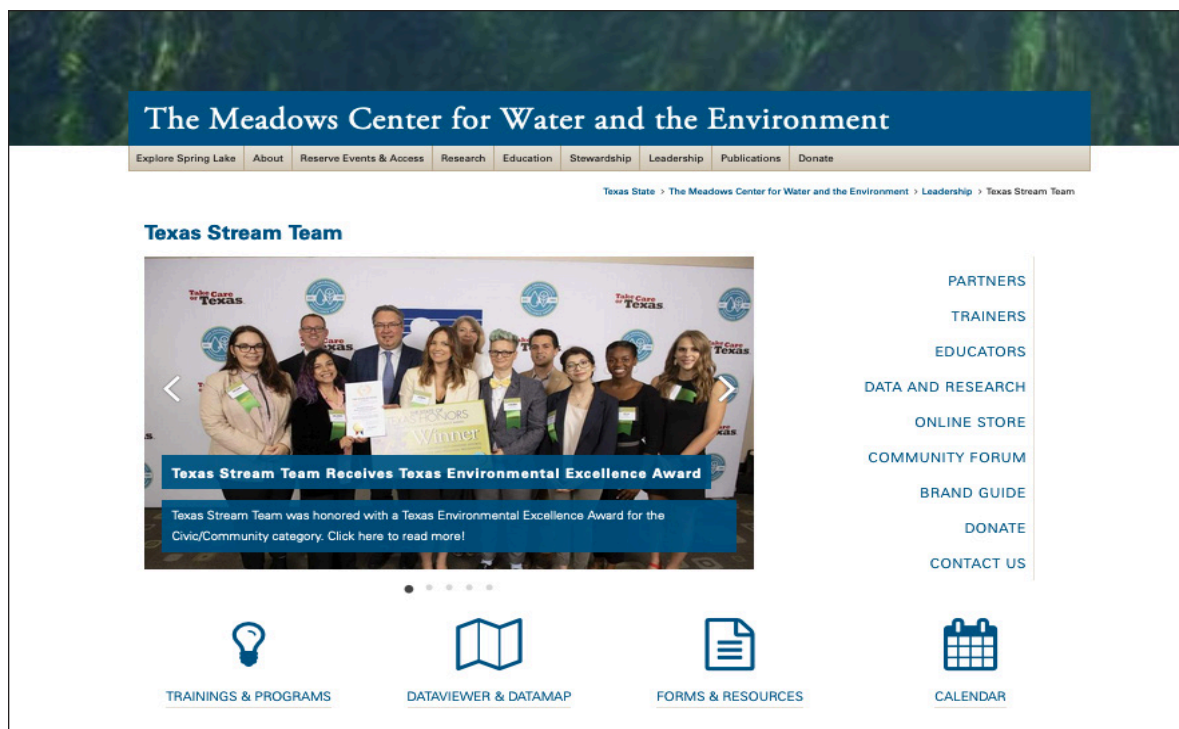
The Core Manual revisions began in January 2020 and continue as of the date of this report. One of the major changes to the QAPP and Core Manual resulted from the addition of salinity measurements using a refractometer. Citizen scientists monitoring along the Texas Gulf Coast requested use of a refractometer to measure salinity in tidally influenced streams, bays, estuaries, and the Gulf of Mexico. Citizen scientists in west Texas, along the Pecos River where conductivity measurements exceed the range of the conductivity meter, also requested an alternative means to measure conductivity and the use of a refractometer was Texas Stream Team's recommendation. Therefore, we have created protocol for use of the refractometer and will begin incorporating its use into the Texas Stream Team training materials. The Advanced Citizen Scientist Water Quality Monitoring Manual (Advanced Manual) revisions will commence in the next quarter.

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](#). 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

Between March 2019 and March 2020, 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.

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.

Between the period of March 2019 and March 2020, 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
- [A Guide to Creating a Texas Stream Team Student Chapter](#)

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



Texas Stream Team's Monofilament Finders Logo

GREEN LIVING

Texas Stream Team tackles a green stormwater infrastructure (GSI) project with each TCEQ contract 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. For this current contract, Texas Stream Team chose to restore a failing riparian area located at Spring Lake in April 2019. In addition to this hands-on restoration, Texas Stream Team also developed a Riparian Restoration Guide which will soon be incorporated on the Texas Stream Team [Green Living webpage](#) to provide the public with knowledge on riparian zones, why they are important, and step-by-step instructions on repairing a degraded riparian zone.

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 seven new partnerships were initiated between March 2019 and March 2020.

Cleanup the Colorado (Austin)

Cleanup the Colorado is a volunteer organization that focuses on hosting cleanup efforts throughout the Colorado River basin. Cleanup events are primarily organized within the Highland Lake areas, as well as on Lady Bird Lake in Austin, TX. Past cleanups, such as the 2019 LoCo Trash Bash, organized citizens of central Texas in trash-removal efforts that improved the health of the Colorado River and its tributaries. In the future, Texas Stream Team hopes to continue working with Cleanup the Colorado to increase stewardship in the Colorado River basin.

Headwaters at the Comal Partnership (New Braunfels)

The Headwaters at the Comal is a nonprofit organization that focuses on restoring, protecting, and promoting public awareness on the significance of the Comal Springs in New Braunfels, TX. Situated on the headwaters of the Comal River, this organization is currently working to restore the riparian habitat surrounding Comal Springs, as well as provide a dedicated educational facility where visitors of all ages can engage directly with environmental stewardship and water resources. Throughout the past year Texas Stream Team has been working alongside Headwaters at the Comal to establish and support a regular monitoring group on the Comal River.

Mission-Aransas National Estuarine Research Reserve (Port Aransas)

The Mission-Aransas National Estuarine Research Reserve is a federal and state partnership that conducts coastal research and hosts education and stewardship programs. Managed by the University of Texas Marine Science Institute, the Reserve works in partnership with organizations across Texas and strives to improve and promote our understanding of coastal ecosystems. Throughout the past year Texas Stream Team has been working with the Reserve to increase monitoring initiatives in the Gulf of Mexico and expand citizen science into the Texas coastal region.

In addition to this, Texas Stream Team has partnered with Mission-Aransas to develop and implement environmental stewardship initiatives, including the recently developed Nurdle Patrol program. The Nurdle Patrol program focuses on bringing the coastal community together to tackle plastic pollution, specifically focusing on nurdle awareness and removal efforts. In the future Texas Stream Team plans to incorporate the Nurdle Patrol program into Core monitoring efforts by including a dedicated section for nurdle observations on the updated Texas Stream Team monitoring forms. More information about the Nurdle Patrol can be found on the Texas Stream Team website.

Plum Creek Watershed Partnership (east Central Texas)

For over 10 years the Plum Creek Watershed Partnership has worked to increase awareness of water resource issues within the Plum Creek Watershed. The Partnership is facilitated by a local watershed coordinator, as well as the cooperation of stakeholders across the state of Texas. Through the efforts of its dedicated stakeholders this partnership remains at

the forefront of water resource management and continues to strive to ensure a safe, clean and healthy stream for all to enjoy. Throughout the period of March 2019 to March 2020 Texas Stream Team staff have been working to expand monitoring efforts throughout the Plum Creek Watershed. In order to ensure the restoration and protection of Plum Creek, Texas Stream Team has also continued to contribute to the collection and management of water quality data in accordance with the Plum Creek Watershed Protection Plan. More information about this plan can be found on the Texas Stream Team website.

Texas A&M –Texas 4-H2O Leadership Academy Water Ambassadors Program (Texas)

The Texas 4-H Water Ambassadors Program provides high school youth an opportunity to gain advanced knowledge and develop leadership skills related to the science, technology, engineering, and management of water in Texas. Through an application process, each spring up to 30 high school youth are selected to participate in a summer 4-H2O Leadership Academy and commit service hours annually in a variety of ways. The Leadership Academy is a multi-day tour of Texas exposing youth to a wider diversity of water resources, water uses, sensitive ecosystems, water quality concerns, as well as the applies research and technologies employed to conserve this valued resource. Spring Lake is one of the destinations of this multi-day tour, which enables Texas Stream Team staff the opportunity to provide water quality certification to participants every summer.

The Expedition School (Austin)

The Expedition School in Austin, TX provides accessible outdoor programming to students of all ages in the form of outdoor expeditions, first-aid and safety courses, and classes such as kayaking and canoeing. Students who participate in the Expedition School's outdoor education programs come away with strengthened leadership skills, practical knowledge, and memorable experiences that prepare them to be life-long environmental stewards. Throughout the past year Texas Stream Team staff have been working to incorporate citizen science and water quality monitoring curriculum into the Expedition School program, with the hope of establishing a long-term Texas Stream Team Trainer who can continuously engage the students of the Expedition School in Texas Stream Team citizen science activities.

The Advanced Environmental Research Institute (AERI) at the University of North Texas (Denton)

The Advanced Environmental Research Institute (AERI) at the University of North Texas is home to a multidisciplinary team of researchers committed to investigating the natural world. For nearly 80 years, AERI researchers have worked to foster, facilitate and conduct science-based interdisciplinary environmental research that provides an understanding of how human actions impact the environment, and then use that knowledge to suggest scientific, engineering, policy and/or educational solutions to actual environmental problems. Throughout the past year Texas Stream Team has worked to support AERI research initiatives in water quality and watershed stewardship.

For a complete list of Texas Stream Team partners, please visit the Texas Stream Team [Partners webpage](#). To locate Texas Stream Team partners, please visit Texas Stream Team's [Partner Map](#).

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 between March 2019 and March 2020:

- Airbus Helicopters, Inc,
- Baylor University,
- City of Denton,
- The Middle Blanco River Monitors,
- Friends of the Pecos,

- Headwaters at the Comal,
- Highland Lakes Chapter Master Naturalists,
- Hill Country Master Naturalists, and
- Three affiliated and one unaffiliated individual citizen scientists.

Between March 2019 and March 2020, eight Texas Stream Team citizen scientist monitoring groups submitted monitoring plans and four Texas Stream Team citizen scientists submitted individual monitoring plans.

PARTNER MEETINGS

April 3rd, 2019 Partner Webinar

In April of 2019, Texas Stream Team hosted a two-hour partner webinar. Topics covered included staff changes, updated trainer presentations, instructor protocols, monitoring forms, and Core and Advanced manuals. Information about citizen scientist resources such as the Waterways Dataviewer, Community Forum, and calendar were also provided. A total of 18 participants attended this webinar. Partners that attended included:

- Advanced Environmental Research Institute (AERI) at the University of North Texas
- City of Denton,
- City of Grapevine,
- City of Killeen,
- EPA - Region 6,
- Houston-Galveston Area Council (H-GAC),
- San Marcos River Foundation (SMRF), and
- Texas Parks and Wildlife (TPWD).

July 16th, 2019 Trainer Webinar

In July of 2019, Texas Stream Team held a one-and-a-half-hour trainer webinar. The webinar was mandatory for trainers to attend and covered topics such as: standard operating procedures, Texas Stream Team trainer resources, the Texas Stream Team Community Forum, the Waterways Dataviewer, and other Texas Stream Team and partner updates.

August 7th, 2019 Partner Meeting

In August of 2019, Texas Stream Team held a three-hour partner meeting. This meeting covered topics such as: updated Texas Stream Team resources, teacher resources and support, and general guidelines. This meeting also provided a recap on topics covered in the April 3rd webinar, such as the Texas Stream Team Community Forum, updates to the Waterways Dataviewer, and provided the opportunity for other Texas Stream Team and partner updates.

A total of 22 participants attended this partner meeting. Partners that attended included:

- AERI at the University of North Texas,
- Center for Reservoir and Aquatic Systems Research (CRASR) at Baylor University,
- Cibolo Nature Center and Farm,
- City of Dallas,
- City of Fort Worth,
- City of Waco,



Texas Stream Team staff and partners gathered for Happy Hour at Ivar's Pub on 08/07/2019. Photo by Jenna Walker.

- EPA - Region 6,
- SMRF,
- Spanish and Science Club Network,
- TCEQ, and
- University of Texas at Austin.

REGIONAL MEETINGS

September 23rd, 2019 Upper Trinity River Basin Coordinating Committee

In September of 2019, the Meadows Center Fellow and partner through AERI at the University of North Texas, Dr. Kelly Albus, attended the Upper Trinity River Basin Coordinating Committee (UTRBCC) meeting held at the North Central Texas Council of Governments (NCTCOG) in Arlington, TX. Dr. Albus represented Texas Stream Team in the North Texas area and shared program information and updates, such as background information for any new members, information on the new online Dataviewer, site information about North Texas specifically, what partners can do in the region to promote Texas Stream Team, including Trainer trainings and community resources offered through Texas Stream Team, and introduced Dr. Albus and her new role as the Texas Stream Team contact for the North Texas area.

Additionally, these meetings include updates from all partners in the region regarding water quality management activities, especially relating to WPPs and TMDL plans, and associated restoration efforts and community outreach. The main speaker for this meeting was Aaron Hoff from the Trinity River Authority (TRA) who demonstrated TRA's augmented reality sandbox for watershed education.

About 40 UTRBCC members were engaged at this event. Further, by attending this regional meeting, Texas Stream Team verified that our presence at all possible UTRBCC meetings would be beneficial in the future and would help expand Texas Stream Team efforts in the region through personal networking and maintaining a presence with key players in the area. The members in this committee represent most major authorities in water management in the area, and a majority of current and previous Texas Stream Team partners. For future meetings, Texas Stream Team could be the event speaker to introduce new ideas, trainings, updates, or funding mechanisms, as well as showcase success stories and volunteer highlights.

Details of all UTRBCC meetings are accessible on the NCTCOG website: (<https://www.nctcog.org/envir/committees/upper-trinity-river-basin-coordinating-committee>).

CONFERENCES

11th National Water Monitoring Conference

In March of 2019, two Texas Stream Team staff members attended the National Water Quality Monitoring Council's 11th National Water Monitoring Conference hosted in Denver, Colorado. Texas Stream Team staff enjoyed a week drawing inspiration from leading water resource managers doing amazing work across the country, learning more about new and existing water quality monitoring activities and data management practices, and networking with like-minded folks from different corners of the country. Jenna Walker presented on the power of partnerships with Dani Apodaca of the Colorado River Watch Network which prompted a lot of great discussion about how impactful teaming up with others can be.

Oral, poster, and extended sessions were provided at the conference on topics such as:

- Water Quality Prediction: State of the Art and Future Directions,
- Emerging Risks in Water Quality,
- Tools to Mine, Share, and Visualize Water Quality Data,

- Monitoring Water Across a Changing Hydrologic Cycle,
- Innovative Designs and Technology for Water Quality Monitoring and Assessment,
- Holistic Water Quality Monitoring: Exploring Chemical, Physical and Biological Integrity,
- Effective Monitoring Collaborations and Partnerships,
- Measuring Effectiveness of Management Actions, Improvement, and Restoration Activities, and
- Monitoring and Assessment to Protect Human and Ecosystem Health.

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 period of March 2019 and March 2020, Texas Stream Team staff set forth efforts to secure additional funding to implement our ambitious goals for the Texas Stream Team program.

Between March 2019 and March 2020, Texas Stream Team submitted and received grants from the following institutions/organizations:

- The San Marcos Lions Club
- Texas State University - Environmental Service Committee
- Texas State University - Office of Equity and Inclusion
- The Trull Foundation



Texas Stream Team staff, Claudia Campos and Aspen Navarro, receiving grant award from the San Marcos Lion's Club. Photo by Ryan Spencer.



Texas Stream Team and Meadows Center staff sampling water quality along the San Marcos River.

X. TEXAS STREAM TEAM IN THE NEWS

Date	Title	Featured in
May 22, 2019	Texas State's 'Stream Team' Wins Texas Environmental Excellence Award	San Marcos Corridor News
May 28, 2019	Arroyo Colorado Partnership, TWRI helps school district implement stormwater BMPs	Texas Water Resources Institute
August 30, 2019	Experts Say Little Concern For Blue-Green Algae In San Marcos River	San Marcos Daily Record
October 24, 2019	How much E. coli is in White Rock Lake? This teen wants to find out	The Advocate Lakewood/ East Dallas
November 3, 2019	Texas Master Naturalists act as nature's helpers by filling gaps in state's parks system	Dallas Morning News
March 5, 2020	Team finds citizen scientists make excellent resources	Science X Daily

XI. CONCLUSION

March 2019 to March 2020 has been a period of ambitious growth and organizational restructuring for the Texas Stream Team program. Our staff looks forward to continued expansion 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.



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FOR WATER AND THE ENVIRONMENT
TEXAS STATE UNIVERSITY

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