Texas Riparian & Stream Ecosystem Education Program III

Final Report 2022

Contributors include:
Texas Water Resources Institute, Texas A&M Forest Service, Texas Parks and Wildlife Department, USDA Natural Resources Conservation Service, Texas A&M Natural Resources Institute, Texas Riparian Association, Auburn University

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Texas Water Resources Institute
Texas A&M University System
College Station, Texas 77840-2118
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The Texas Riparian and Stream Ecosystem Education Program is hosted and coordinated by the Texas Water Resources Institute, part of Texas A&M AgriLife Research, the Texas A&M AgriLife Extension Service, and the College of Agriculture and Life Science at Texas A&M University.

CONTENTS

ACRONYMS

BLM	Bureau of Land Management
BMPs	Best Management Practices
CE	Continuing Education
CEA	County Extension Agent
CEU	Continuing Education Unit
DO	Dissolved Oxygen
EPA	U.S. Environmental Protection Agency
ESSM	Department of Ecosystem Science & Management, Texas A&M University
GBRA	Guadalupe-Blanco River Authority
GLCI	Grazing Lands Conservation Initiative
GLO	General Land Office
IRNR	Texas A&M Institute of Renewable Natural Resources
NGO	Non-governmental Organization
NPS	Nonpoint Source
NRA	Nueces River Authority
NRCS	Natural Resources Conservation Service, part of USDA
PFC	Proper Functioning Condition
QPR	Quarterly Progress Report
SCSC	Department of Soil and Crop Sciences, Texas A&M University
SWCD	Soil and Water Conservation District
TCEQ	Texas Commission on Environmental Quality
TFS	Texas A&M Forest Service
TIAER	Texas Institute for Applied Environmental Research
TMDL	Total Maximum Daily Load
TPWD	Texas Parks and Wildlife Department
TRA	Texas Riparian Association
TSSWCB	Texas State Soil and Water Conservation Board
TST	Texas Stream Team, Meadows Center for Water and the Environment
TTU-LRFS	Texas Tech University – Llano River Field Station
TWRI	Texas Water Resources Institute
TXDOT	Texas Department of Transportation
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Services
WCSC	Watershed Coordination Steering Committee
WFSC	Wildlife and Fisheries Sciences unit of Texas A&M AgriLife Extension Service
WPP	Watershed Protection Plan

ACKNOWLEDGEMENTS

- AgriLife Extension—Austin County
- AgriLife Extension—Bandera County
- AgriLife Extension—Bell County
- AgriLife Extension—Bexar County
- AgriLife Extension—Caldwell County
- AgriLife Extension—Chambers County
- AgriLife Extension—Comal County
- AgriLife Extension—Coryell County
- AgriLife Extension—Dallas County
- AgriLife Extension—Galveston County
- AgriLife Extension—Guadalupe County
- AgriLife Extension—Jackson County
- AgriLife Extension—Johnson County
- AgriLife Extension—Kimble County
- AgriLife Extension—Kleberg-Kenedy County
- AgriLife Extension—Lampasas County
- AgriLife Extension—Nacadoches County
- AgriLife Extension—Navarro County
- AgriLife Extension—Smith County

- Angelina-Neches River Authority
- Bandera County River Authority & Groundwater District
- City of Corsicana
- City of New Braunfels
- Harris County Flood Control District
- Houston Advanced Research Center
- Houston-Galveston Area Council
- Lavaca-Navidad River Authority
- Plum Creek Watershed Partnership
- San Antonio River Authority
- South Texas Natives Program
- Tarrant Regional Water District
- Texas A&M Soil & Crop Sciences
- Texas Community Watershed Partnership
- Texas Parks and Wildlife Department
- Texas Riparian Association
- Texas Sea Grant
- Texas Tech University Center at Junction
- Trinity River Authority

EXECUTIVE SUMMARY

The State of Texas has more than 191,000 miles of rivers and streams that comprise corridors of great economic, social, cultural, and environmental value. Riparian degradation is a major threat to water quality, in-stream habitat, terrestrial wildlife, aquatic species, and overall stream health. The Texas Riparian and Stream Ecosystem Education Program is funded by the U.S. Environmental Protection Agency (EPA) through the Texas State Soil and Water Conservation Board (TSSWCB). The Texas Riparian and Stream Ecosystem Education Program originated through the Texas Water Resources Institute (TWRI) through coordination and partnership with the Texas A&M AgriLife Extension Service, Texas A&M AgriLife Research, TSSWCB, EPA, Texas Parks and Wildlife Department, USDA Natural Resource Conservation Service (NRCS), Texas A&M Forest Service (TFS), TTU Llano River Field Station (TTU-LRFS) (now known as the Texas Tech University Center at Junction), the Texas Commission on Environmental Quality (TCEQ), and Texas State University-River Systems Institute (now known as The Meadows Center for Water and the Environment at Texas State University). The project supports the Texas Nonpoint Source Management Program's goal of protecting and restoring water quality. It provides training to landowners, land managers, water and natural resource professionals, and the general public on healthy watershed management through the assistance of local partners. Only a portion of the attendees responded if they owned or managed land for a total of over 122,239 acres impacted by this project, which does not include the improvements made by professional staff, whose work positively impacts even more acreage through successful land stewardship across the Lone Star State.

Results of program goals:

> • Conducted Workshops in 24 Watersheds to approximately 879 participants in prioritized watersheds

> • Coordinated 2 Statewide Riparian Conferences with project partners.

> • Increased knowledge and understanding of riparian function showed a statistically significant increase of 12.64% based on matching pairs of pre-/post-tests (mean scores of 81.33 and 91.61 respectively; p value=0.000 with alpha 0.05). At the training, 97% of Respondents said they plan to adopt BMPs discussed during the workshop. "Follow-up" workshop evaluations were responded by 224 previously-attended participants, 82% of whom stated that they had adopted or plan adopt the BMPs discussed during their workshop.

TWRI, in partnership with TRA, has maintained a website, http://texasriparian.org, which serves as a public clearinghouse for project-related information. The Texas Riparian website has had 99,376 visitors since its inception in January of 2013 and 40,403 visitors during this project period. The website has 632 subscribed to the website blog posts. The Texas Riparian Listserv, maintained by TWRI and TRA, has 503 subscribers. TWRI and TRA also maintain a Facebook page, which currently has 2,339 followers, at Facebook.com/TexasRiparianAssociation. Texas Riparian and Stream Ecosystem Education Program training events were advertised through the websites, web blog, TWRI training newsletter, the listserv, and Facebook. TWRI, with assistance of the Riparian Team, watershed coordinators, and local partners, delivered daylong Texas Riparian and Stream Ecosystem Education Program training events in 24 prioritized watersheds. Throughout the four-year period, news releases were published for each public event through different media outlets across the state of Texas. Presentations of varying length were developed and delivered to a variety of audiences throughout the state. Overall, 30 presentations were given supporting the Texas Riparian and Stream Ecosystem Education Program. TWRI conducted presentations to a total of at least 964 people and executed a total of 6,802 contact hours to promote riparian education and stream health across the state.

INTRODUCTION

Riparian degradation is a major threat to water quality, in-stream habitat, terrestrial wildlife, aquatic species, and overall stream health. Conversely, proper management, protection, and restoration of riparian areas decrease bacteria, nutrient, and sediment loadings to waterbodies; lower in-stream temperatures; improve dissolved oxygen levels; improve aquatic habitat; and ultimately improves aquatic and fish community integrity. Elevated bacteria,

low dissolved oxygen, and degraded habitat and aquatic communities account for most of the impairments in the *2016 Texas Integrated Report*.

To improve the management of these sensitive and vital ecosystems, riparian education programs are needed regarding the nature and function of riparian zones, their benefits, and BMPs for protecting them. Not only does the program assist with the management of NPS pollution but it also promotes tremendous ecosystem service benefits and economic benefits to communities across Texas.

The State of Texas has more than 191,000 miles of rivers and streams that, along with closely associated floodplain and upland areas, comprise corridors of great economic, social, cultural, and environmental value. These riparian corridors are complex ecosystems that include the land, plants, animals, and network of streams within them. They perform a number of ecological functions such as modulating streamflow, storing water, removing harmful materials from water, and providing habitat for aquatic and terrestrial plants and animals. Simply put, the health of riparian systems is paramount to stream health.

The conditions of streams and riparian zones reflect the sum of impacts of natural and man-induced disturbances within drainage areas, commonly referred to as watersheds. Management of the land, streams, and riparian zones affects not only individual landowners, but also livestock, wildlife, aquatic life and ecosystem services for individuals and ecosystems downstream. By understanding the processes of streams, key indicators and impacts of disturbances to stream health, and activities that hinder recovery of stream ecosystems, landowners and other citizen-stakeholders can evaluate stream systems and improve their management to produce desired conditions.

Changes within a surrounding ecosystem (e.g., watershed) will impact the physical, chemical, and biological processes occurring within a stream corridor. Stream systems normally function within natural ranges of flow, sediment movement, temperature, and other variables, in "dynamic equilibrium." Over the years, human activities have contributed to changes in the dynamic equilibrium of stream systems. These activities have manipulated stream corridor systems for a wide variety of purposes, including domestic and industrial water supplies, irrigation, transportation, hydropower, waste disposal, mining, flood control, timber management, recreation, aesthetics, and fish and wildlife habitat. Increases in human population, along with industrial, commercial, and residential development within watersheds have placed heavy demands on stream corridors. The cumulative effects of these activities result in significant direct and indirect changes, not only to stream corridors, but also to the ecosystems or watersheds they are located in. The direct changes include degradation of water quality, decreased water storage and conveyance capacity, loss of habitat for fish and wildlife, and decreased recreational and aesthetic values. While the indirect changes are harder to quantify such as air quality, decomposition of wastes, and other ecosystem services we all take for granted, there is direct economic benefits that can be calculated. Many cities across Texas have found that improving creek and floodplain protection is needed to prevent unsustainable public expense to maintain drainage infrastructure.

Benefits of healthy riparian/stream systems:
- High quality habitat for both aquatic and riparian species
- Dissipation of flood energy and reduced downstream flood intensity and frequency
- Higher, longer-lasting and less variable baseflow between storm events
- Deposition of sediment in the floodplain, stabilizing it and maintaining downstream reservoir capacity longer
- Debris and nutrient use and filtering in the floodplain to improve water quality and dissolved oxygen levels in the aquatic system
- Riparian vegetation canopies to shade streams and reduce their temperatures, providing a food base for aquatic and riparian fauna

- Fewer invasions of exotic undesirable riparian species
- Higher biodiversity than terrestrial uplands
- "Stabilized" banks, which reduce erosion and protect property including ownership boundaries
- Increased economic value through wildlife, livestock, timber, and recreational enterprises
- Improved rural land aesthetics and real estate values

This program has coordinated closely with TPWD, NRCS, and TFS on both delivery and content to ensure landowners throughout the state are provided a consistent message of riparian enhancement and protection. This project has created a synergy and an important network with other individuals and organizations conducting stream and riparian education and has cooperate with other relevant and successful local programs to establish the State's mechanism to deliver quality riparian education in high priority watersheds. This project has implemented a riparian education program to support and enhance riparian management and water quality protection efforts by all agencies and organizations actively engaged in watershed planning across Texas. This program is and will benefit watershed efforts regardless of constituent targeted or whether the watershed is urban, suburban, or rural. Further, by protecting these ecologically sensitive riparian areas, communities will be able to improve water quality while maintaining healthy ecosystems, providing wildlife habitat and opportunities for outdoor recreation, and allowing the enhancement of ecosystem services.

PROJECT DESCRIPTION

The main goal of the Texas Riparian and Stream Ecosystem Education Program is to deliver riparian education programs to targeted watersheds to promote healthy riparian areas, thus healthy watersheds, by increasing citizen awareness, understanding, and knowledge about the nature and function of riparian zones, their benefits, and BMPs for protecting them and minimizing NPS pollution.

Clare Entwistle and Alexander Neal have served as the Riparian Education Program Coordinators for coordination of all project activities and for the promotion and delivery of Texas Riparian and Stream Ecosystem Education programming and web-based tools. TWRI has assembled and coordinated closely with the Riparian Team to assist with the development of the Texas Riparian and Stream Ecosystem Program, marketing, and delivery (Table 1). TWRI has partnered with TRA to host all of the information on the TRA website found at TexasRiparian.org. TWRI has set up a new registration system on the Texas A&M University eStore where RSVP and registrations can occur on a secure site. TWRI has coordinated with the AgriLife Extension County Agent for each event as well as a local watershed coordinator for most of the workshops. Partners of the program have been instructors at these workshops. TWRI developed a flier and registration form for each workshop to advertise the workshop on various online platforms and in physical locations.

TWRI has coordinated the delivery of daylong riparian education programs by conducting riparian trainings in targeted watersheds and providing access to the program through web-based tools delivered via web, conferences, websites, the Texas Riparian listserv, and Facebook. TWRI organized instructor teams for each event, composed of members of the Riparian Team, contractors, and others as needed to deliver the riparian education programs. TWRI has hosted coordination meetings or conference calls, at least quarterly, with project partners to discuss project activities, project schedule, communication needs, deliverables, and other requirements. TWRI kept in close contact with instructors and planning members throughout the project.

Table 1. Riparian Team List of Members and Organizations

Riparian Team		
First	Last	Organization
Blake	Alldredge	Upper Trinity Regional Water District
Nikki	Dictson	Independent contractor
Jacquelyn	Duke	Baylor University
Fouad	Jaber	Texas A&M AgriLife Extension Service
Ingrid	Karklins	Environmental Survey Consulting
Julie	Lewey	Nueces River Authority
Melissa	Parker	Texas Parks & Wildlife Department
Anne	Rogers-Harrison	Texas Riparian Association
Gretchen	Riley	Texas A&M Forest Service
Staryn	Wagner	Austin Watershed Protection
Kyle	Wright	USDA- Natural Resource Conservation Service
James	Long	Texas Natural Resources Institute

TWRI in partnership with TRA has continued to maintain the Texas Riparian website that serves as a public clearinghouse for project-related information. This website serves as a means to disseminate information to stakeholders and the general public. The training registration site continually has newly scheduled dates available for attendees to RSVP to the workshops and it is linked to the TRA website. These websites are also linked to the RemarkableRiparian.org website that is being managed by the Nueces River Authority and both have the online educational materials made available through this project.

The Texas Riparian website had 99,376 visitors since January 2013 and over 40,403 during this project period. The website has 632 subscribed to the website blog posts. The Texas Riparian Listserv has 503 subscribers. TWRI set maintains a Facebook for the Texas Riparian Association and currently has 2,339 followers at Facebook.com/TexasRiparianAssociation. Workshops were advertised through the websites, web blog, training newsletter, the listserv and Facebook. TWRI, with assistance of the Riparian Team, with the watershed coordinators and local partners delivered daylong riparian education training events in 24 prioritized watersheds. Materials were developed and added to the websites on a weekly to monthly basis. Information continually shared on these platforms includes upcoming conferences, voice over PowerPoint videos, online tools and resources, and upcoming workshops.

The original program goals included:
- Deliver 24 riparian education programs to participants in prioritized watersheds, typically watersheds with watershed planning or watershed-based implementation efforts due to impaired water quality.
- Coordinate 2 statewide riparian conferences with partnering organizations.
- Increased knowledge and understanding of riparian function and implementation of BMPs by individuals participating in the program, as measured by pre-/post-tests and post follow up evaluation.

Results of program goals:
- Conducted workshops in 24 prioritized watersheds to approximately 879 participants.

- Coordinated 2 statewide riparian conferences with partnering organizations.

• Increased knowledge and understanding of riparian function showed a statistically significant increase of 10% based on matching pairs of pre-/post-tests (mean scores of 81 and 92 respectively; p value=0.000 with alpha 0.05). At the training, 97% of Respondents said they plan to adopt BMPs discussed during the workshop. For the "follow-up" workshop evaluations, we had 224 respondents and nearly 82% of respondents stated that they had adopted or plan adopt the BMPs discussed during the workshop.

PROGRAM

The program is adapted to each location and a local presentation was often coordinated to meet local needs. For example, the program was adapted in coordination with the Riparian Team and others for urban areas and coastal areas. TFS was integral for both adapting the program and delivering it in East Texas and urban areas. Due to logging activities in this region and specific requirements placed on such operations, the program was adapted in coordination with the TFS to meet the needs of landowners and land managers to ensure consistency with existing training programs. Further, TFS is the recognized expert in Texas with regards to bottomland hardwood forests and their vegetation and management. As these bottomland forests are vital to riparian protection and improvements, TFS expertise was needed to appropriately manage these critical systems.

Feral hogs remain an important issue in managing and protecting riparian and stream ecosystems, so we have continued to partner with other entities, including the Texas A&M Natural Resources Institute, to present and share the latest information, technology, and management strategies on feral hog management.

A 5-6 person instructor team was used at each training program along with local presentations. The basic existing framework, established by TRA and other original project partners, was utilized and expanded upon to incorporate water quality improvement and watershed management. The morning session includes indoor, classroom-style presentations. During lunch, additional presentations were provided that relate to the issues and resources of the watershed within the training location. The afternoon session were conducted outside at one or more stream locations. Participants can see in the field firsthand the vegetation and functions they learned about in the classroom setting. Depending on the number of attendees the group was broken into two or more smaller groups and then rotated through the presentations and "stream walk".

Coordinate and Advertise Riparian Education Programs

The Riparian Team has assisted with program development, marketing, and delivery of this project's workshops and statewide riparian conferences. This Riparian Team has served as the primary pool of instructors to deliver the Texas Riparian and Stream Ecosystem Education Program. Multiple calls and emails occurred with planning team members to discuss availability to instruct at upcoming workshops.

TWRI worked in concert with TSSWCB, TCEQ, TPWD, NRCS, TFS, and other state and local organizations to select locations for the riparian education training events. This project delivered riparian education programs to targeted watersheds across the state. Priority watersheds were selected in collaboration with TSSWCB, and with input from TCEQ and others, and primarily represent watersheds with ongoing or developing WPP, TMDL or other watershed-based implementation activities.

TWRI, with assistance of the Riparian Team, watershed coordinators, and local partners, delivered daylong riparian education training events in 24 prioritized watersheds. Certificates of completion were provided to all participants of the training events.

Training events were conducted at the following locations and dates:
  a. Richland-Chambers Watershed on September 19, 2018
  b. Lampasas River Watershed on October 23, 2018

c. Lower Medina River Watershed on November 6, 2018
d. Upper Medina River Watershed on March 6, 2019
e. Baffin Bay Watershed on April 15, 2019
f. Double and Cedar Bayou Watersheds on May 1, 2019
g. Plum Creek Watershed on October 15, 2019
h. Llano River Watershed on October 23, 2019
i. Baffin Bay Watershed on November 6, 2019
j. Big Elm Creek Watershed on November 13, 2019
k. Lavaca River Watershed on February 27, 2020
l. Attoyac Bayou Watershed on October 19, 2020
m. San Antonio River, Cibolo Creek Watersheds on December 2020
n. Joe Pool Lake Watershed on April 20, 2021
o. Leon River Watershed on September 7, 2021
p. Angelina River Watershed on September 22, 2021
q. Mill Creek Watershed on October 1, 2021
r. Lampasas River Watershed on October 13, 2021
s. Comal River Watershed on November 2, 2021
t. Dickinson Bayou & Galveston County Watersheds on February 22, 2022
u. Geronimo & Alligator Creek Watersheds on March 8, 2022
v. San Antonio River, Lower Medina River Watersheds on May 5, 2022
w. Plum Creek Watershed on May 12, 2022
x. Village Creek-Lake Arlington Watershed on October 19, 2022

TWRI, with assistance of the Riparian Team, has actively marketed riparian education trainings through news releases (AgriLife News and local media outlets), internet postings, newsletter announcements, public/conference presentations, flyers, etc., to enhance awareness and attendance. TWRI advertised the workshops and conferences on the Texas Riparian listserv, through notifications to TRA and TWRI website subscribers, the Texas Watershed Coordinators listserv, and Facebook. TWRI worked with the Marketing and Communications unit of Texas A&M AgriLife, County Extension Agents, and watershed coordinators to develop press releases.

TWRI developed a workshop flyer and registration form for each of the workshops. TWRI provided County Extension Agents and watershed coordinators the flyer, registration form, and materials to advertise to their local stakeholders. TWRI and the Riparian Team developed a program fact sheet and fliers for each workshop which can be found at the Texas Riparian website. TWRI developed a program banner to advertise the program and use to direct interested persons at each workshop.

To help market the program and further expand the reach of the program, presentations of varying length (15/30/45/60 min.) were developed and delivered to audiences throughout the state through AgriLife Extension programs, watershed stakeholder meetings, Clean Rivers Program Basin Steering committees, Texas Riparian Association meetings and other venues. These presentations are available for delivery by anyone on the Riparian Team. Overall, 30 presentations were given about and supporting the Riparian Education Project, including project workshops. TWRI conducted presentations to a total of at least 964 people and a total of 6,802 contact hours to promote riparian education and stream health statewide. Additionally, key elements and messages were incorporated into presentations delivered by the TWRI Program Specialist, TFS, and others on the Riparian Team throughout the state to generate greater interest in riparian protection efforts and increasingly expand requests for

the program and its resources. This has greatly increased momentum for the riparian education field in Texas, attendance to this project's workshops, and implementation of riparian protection concepts by landowners, setting the stage for greater improvements in riparian habitat, stream stability, and water quality state-wide.

Continuing Education Units

The TWRI Program Specialist established CEU credits for the Texas Riparian and Stream Ecosystem Education Program to encourage participation by landowners and water resource professionals. TWRI provided program materials to potential CEU providers who reviewed the agenda and evaluated the program and established the following:

- o Texas Water Resources Institute – 1 hour
- o Texas Department of Agriculture Pesticide Applicators License – Approved for 3 CEUs
- o Texas Nutrient Management Planning Specialists – 6 hrs
- o Texas Floodplain Management Association – 7 CECs
- o Texas Forestry Association – approved for up to 6 hrs approved
- o Society of American Foresters – approved for up to 6 hrs
- o International Society of Arboriculture – approved for up to 8.25 hrs
- o Texas Master Naturalists – approval required at the chapter level each time
- o Texas Waters Specialist Certification training hours - approval required
- o Texas Master Gardeners – approval required at the chapter level each time
- o Texas Board of Architectural Examiners does not approve courses but said we should advertise as "Acceptable for HSW" – or good for State CE hours
- o The program may also be used for CEUs for Professional Engineers.

Riparian Landowner Trainings

Riparian landowner trainings focus on the nature and function of riparian zones (fluvial geomorphology, hydrology, and vegetation), the benefits and economic impacts from ecological services of healthy riparian zones, BMPs for enhancing and protecting riparian zones, and technical and financial resources and incentives available for implementing riparian BMPs and riparian protection measures. Riparian education programs cover an introduction to riparian principles, watershed processes, basic hydrology, erosion/deposition principles, riparian vegetation, potential causes of degradation and possible resulting impairment, and available local resources including technical assistance and tools that can be employed to prevent and/or resolve degradation. At the conclusion of each training, participants received a certificate of completion.

The goal was for participants to better understand and relate to riparian and watershed processes, the benefits that healthy riparian areas provide, and the tools that can be employed to prevent and/or resolve degradation and improve water quality. As a part of the training, participants were educated on the importance of riparian protection activities. A major goal of the program was to foster implementation of riparian BMPs. Training events also emphasized the need for watershed planning which supports the maintenance of a natural hydrograph for streams within the given watershed planning area. Restoration of riparian areas degraded by changes to the natural hydrologic regime must be conducted in concert with efforts to remedy the identified upstream disturbances.

TWRI and the Riparian Team worked in concert with state and local organizations to select and schedule locations for the riparian education programs. TWRI conducted workshops for over 24 watersheds with 879 in attendance. Priority was given to agencies and organizations currently involved in WPP or TMDL processes and those planning future watershed efforts. Additionally, other watersheds were selected based on impairment status, environmental sensitivity, and/or other priority issues. Due to the size of many watersheds in the state and in an effort to enhance outreach, riparian education programs, in both urban and rural settings, may be offered multiple times and at different locations within prioritized watersheds. In some instances, it made sense to combine close watersheds for one workshop and advertise to both watershed groups.

Conferences

The workshops and conferences were coordinated with the TPWD, TFS, NRCS, TRA, River Authorities, local Soil and Water Conservation Districts (SWCDs), County Extension Agents (CEAs), on its riparian programs. Two Statewide Riparian Conferences were held to provide additional riparian information to interested attendees. TWRI and TRA were on the planning committees, coordination committees, coordinated and conducted pre-conference workshops, assisted with moderating, and presented at these conferences. More information about these conferences can be found at TexasRiparian.org.

2019 Urban Riparian Symposium in Grapevine

TWRI chaired the planning committee and coordinated the 2019 Urban Riparian Symposium, "Building Community Connections for Healthy Urban Streams," which was held from February 27th to March 1st in Grapevine. The conference included two workshops with a field trip to a creek, three opening and closing plenary speakers, a reception and over 48 presentations during concurrent sessions on a variety of topics dealing with stream and riparian issues. 131 professionals attended.

2021 Urban Riparian Symposium (Online)

TWRI chaired the planning committee and coordinated the 2021 Urban Riparian Symposium, "Down by the Riverside: Creating Connections in a Distanced World," which was held from February 10th to February 12th as a virtual conference.

MAINTAINED WEB-BASED RIPARIAN EDUCATION AND RESOURCES

Goal: To expand the reach and participation in the Texas Riparian and Stream Ecosystem Education Program via web-based resources.

In cooperation with this project, web-based resources were maintained by the Nueces River Authority (NRA) with non-federal funding from several private foundations. These web-based resources have been delivering comprehensive riparian information. These include voice-over PowerPoint presentations from past riparian landowner trainings, videos, and other resources designed to help K-12 education, nature groups, and landowners to better understand the many functional benefits of our riparian areas in Texas. Citizens unable to attend face-to-face events are encouraged to utilize the web-based voice over PowerPoint presentation versions of the training. The NRA "Remarkable Riparian" website was linked to the Texas Riparian Association website to increase program availability and accessibility.

NRA has maintained and updated materials and links on the website: RemarkableRiparian.org, some of which are described and linked below. NRA has recorded voice-over PowerPoint videos of the workshop presentations and mini module videos. They are on both the TexasRiparian.org and RemarkableRiparian.org.

Voice over PowerPoint of Workshop Presentations
1. Riparian and Watershed Management: Steve Nelle, Retired USDA Natural Resources Conservation Service
2. Stream Processes and Hydrology: Ryan McGillicuddy, Texas Parks and Wildlife Department
3. Riparian Vegetation and hindrances to Healthy Riparian Areas: Steve Nelle, USDA NRCS
4. Management Practices and Local Resources: Nikki Dictson, Texas Water Resources Institute
5. Riparian Considerations for Land Operators: Lori Hazel, Texas A&M Forest Service

Riparian Mini-Modules

Lesson 1: Debunking the Myths Nueces River Authority
Commonly held beliefs about riparian areas that are only partially true.

Lesson 2: Defining Riparian Nueces River Authority
Riparian Area Defined, Where is it? What does it do?

Lesson 3: Function Produces Values Nueces River Authority

What area some of the values people expect from Riparian areas and what are the components of function that produce them.

[Lesson 4: How A River Works](#) Nueces River Authority
Concepts and Definitions; Base Flow/Bank Full, Flood Flow, Floodplain. How water moves in a channel and erosion and deposition processes.

[Lesson 5: The Impacts of Channel Degradation](#) Nueces River Authority
Too Much Energy and Not enough energy dissipation can cause degradation and it can be predicted or interpreted using Lane's Balance.

[Lesson 6: The Importance of Riparian Vegetation](#) Nueces River Authority
Role of vegetation in riparian function and photographic evidence of recovery.

[Lesson 7: What Hinders Function and Recovery](#) Nueces River Authority
Photographic evidence of recovery and hindrances to recovery.

[Lesson 8: Riparian Degradation and Recovery](#) Nueces River Authority
Visual examples of how rivers degrade and recover.

[Understanding Lane's Balance for streams](#) – A YouTube video with Steve Nelle explaining Lane's Balance.

[Understanding Your Remarkable Riparian Area](#) – A webinar on YouTube featuring the late Sky Jones-Lewey of the Nueces River Authority that was sponsored by Texas Wildlife Association and AgriLife Extension Service in 2012.

## AgriLife Learn – Free Online Riparian Landowner Training

In the summer of 2020, TWRI launched a free, online version of the Texas Riparian and Stream Ecosystem Education program for landowners. The online training is housed on AgriLife Learn, which is the home for online educational resources for the Texas A&M AgriLife Extension. Since the inception of the online training, the training has been utilized by several hundred AgriLife Learn users each year. Enrollment in the training requires an AgriLife Learn account which are free for any persons to create. The same CEUs available for the in-person riparian education program are available for the online version.

EVALUATE THE EFFECTIVENESS OF THE RIPARIAN EDUCATION PROGRAM

The in-person training and presentations included an evaluation component to assess program effectiveness and to modify and enhance curriculum content to achieve project goals. A two-stage evaluation approach was used to measure both knowledge and behavior changes of individuals participating in the program.

Stage 1. A pre-/post-test evaluation strategy was implemented at the beginning and end of the face-to-face educational program. The pre-test asked knowledge-based questions and the post-test measured the same knowledge-based questions to determine the knowledge increase of participants as well as questions regarding 'satisfaction' and 'intentions to change or adopt' riparian management strategies.

Stage 2. A post six-month follow-up assessment was also sent to participants via email to what practices were adopted six months after participating in the program and what economic benefits participants are expecting to receive.

Male v. Female

40% 60%
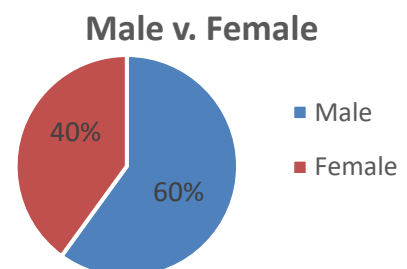
■ Male
■ Female

The Stage 1 evaluations asked demographic data, program satisfaction, and willingness to adopt conservation practices. Of the participants who participated in the workshops and both pre- and post-test evaluations, 40% were female and 60% were male (n=334).

The largest age group represented was 31-55 years old with 39%. The second largest age group represented was 56-70 years old with 31%. Participants ages 18-30 made up 18% of the participants present. Participants with the age of 71+ were the least represented age group at the workshops making up 12% of all the participants who participated in both evaluations (n=334).

Age

■ 18-30	
■ 31-55	
■ 56-70	
■ 71+	

18% / 39% / 31% / 12%
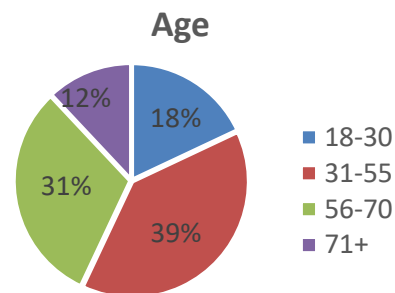
Most participants (21%) stated that they resided in a city with a population greater than 250,000. Second with 16%, were participants who live on a farm or ranch consisting of less than 100 acres. A close third with 13%, were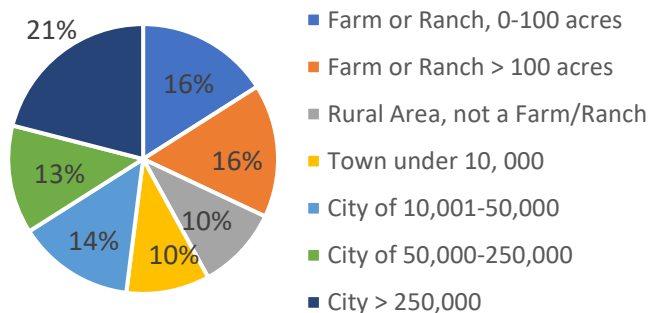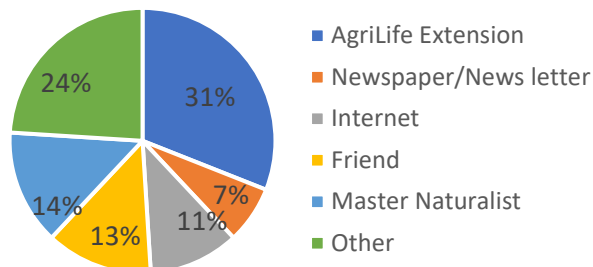 participants who resided in a city with population 50,000-250,000. Participants residing in a rural area represented 10%. Participants from cities with populations between 10,001 and 50,000 represented 14% of respondents. Farm or ranch residences with greater than 100 acres represented 16% of respondents. Lastly, participants in towns under 10,000 residents were represented by 10% of those in attendance (n=333).

When asked how they heard of the program, the majority of respondents 31%, stated that they heard about it through the Texas A&M AgriLife Extension Service. 14% of respondents heard about the program through the Texas Master Naturalist, 11% heard through the internet, and 24% other. Respondents also stated that they heard from friends (13%) or newspapers/newsletters (7%) (n=329).

Place of Residence

21% / 16% / 16% / 10% / 10% / 14% / 13%

■ Farm or Ranch, 0-100 acres	
■ Farm or Ranch > 100 acres	
■ Rural Area, not a Farm/Ranch	
■ Town under 10, 000	
■ City of 10,001-50,000	
■ City of 50,000-250,000	
■ City > 250,000	

Hear of Program

24% / 31% / 7% / 11% / 13% / 14%

■ AgriLife Extension	
■ Newspaper/News letter	
■ Internet	
■ Friend	
■ Master Naturalist	
■ Other	

On all evaluations TWRI asked how much land, in acres, the participant owns or manages. Of the responses, 44% of participants stated that they did not own or manage any land and around 7% stated that they worked with less than one acre of land. Around 16% of participants stated that the owned or managed between 1 – 10 acres of land, while 5% stated that they managed between 11 and 49 acres. There were over 5% of participants who stated that they owned or managed 50-99 acres of land. Over 16% of participants owned 100 – 499 acres and almost 7% of workshop attendees stated that they owned 500-999 acres of land, another 4% of participants own or manage 1,000 -9,999 acres, and nearly 1% own or manage 10,000 acres of land or more (maximum acreage = 30,000) (n=334). The total combined acreage for all workshop participants is more than 122,239 acres.

Evaluations also asked for each attendee's demographic information. Most participants identified as being an agency professional, but there was a fairly even showing of all affiliations overall besides retirees who came to a close second with agency professionals. The evaluations also show that an overwhelming majority of participants, 78%, had a bachelor's degree or higher (n=336).

Affiliation

- 24% Agency Professional
- 17% City/County Official/Employee
- 9% Non-governmental Organization
- 13% Private Business Owner/Employee
- 7% Agricultural/Forestry/Producer
- 8% Education/University/Student
- 22% Retired

Education

- 1% Some High School
- 5% High School Graduate/GED
- 3% Vocational or Technical Degree
- 15% Some College
- 42% Bachelor Degree
- 34% Post Graduate Degree

The score of each participant's pre- and post-test were statistically analyzed and show that we have a statistically significant difference within the 304 pairs. The mean score of the pre-tests was 81.33 with a standard deviation of 14.75. The post tests had a mean score of 91.61 with a standard deviation of 9.81. This showed a 12.64% increase between pre and post- test scores and knowledge gained overall. Our p-value was 0.000 with alpha at 0.05, which lets us know that there was a statistically significant change from the pre- and post-tests and that post-tests typically resulted in higher scores than pre-tests.

Overall we had 99.2% of respondents mostly or completely satisfied with the program (80.1% completely satisfied) (n=367). 97.8% of respondents were mostly or completely satisfied with the course materials (80.8% completely satisfied) (n=360). The vast majority of respondents, 99.2%, stated that they were mostly or completely satisfied with the ease of understanding the course (84.7% completely satisfied) (n=360). Virtually all respondents (99.7%) would recommend this course to others (n=362). Over half of all respondents, 59.6%, believed that they would benefit economically from this course in the future (n=359).

The last section of the evaluation went through the conservation practices covered during the workshop. All participants were asked to respond whether they were or were not planning to adopt the practices discussed at the workshop. Most respondents, 97%, said they would adopt at least some of the BMPs discussed at the workshop (n=369). Most participants stated that they were planning to adopt each of these conservation practices (range of 38% – 79% adoption rates; Table 2; n=347).

We evaluated the land area managed by participants and whether or not the respondents believed they would benefit economically due to this course. Cross-tabulations showed landowners with 50 acres or more were likely to respond that they would benefit economically with ranges of 44% - 94% corresponding to answering yes to this question (Table 3). Respondents were also asked if they had participated in conservation programs prior to taking the training. Cross-tabulations showed landowners with 50 acres or more were more likely to respond that they had participated in conservation programs before with ranges of 56% - 83% corresponding to answering yes to this question (Table 4).

Table 2. Percent of Participants that Plan to Adopt Each of the Conservation Practices

	% Plan to Adopt	% Undecided	% Will not Adopt
Riparian Herbaceous Buffers	68.7%	8.8%	22.5%
Riparian Forest Buffers	59.0%	11.0%	30.0%
Prescribed Grazing	38.3%	10.6%	51.1%
Rotational Grazing	43.1%	7.6%	49.3%
Manage Feral Hogs	44.2%	7.8%	36.4%
Rangeland Planting of Vegetative Cover	58.8%	11.0%	30.2%
Manage to Reduce Bare Ground	79.0%	4.0%	17.0%
Monitor Stream Sites through Photos	61.9%	15.5%	22.6%

Table 3. Land Owned or Managed by Acre Range vs. Benefit Economically Cross-tabulation

		Benefit Economically			
		Yes	%	No	%
Acre Range	**0**	63	54	54	46
	less than 1 acre	8	42	11	58
	1 - 10 acres	18	38	29	62
	11 - 49 acres	7	44	9	56
	50 - 99 acres	13	72	5	28
	100 - 499 acres	34	79	9	21
	500 - 999 acres	16	94	1	6
	1,000 – 9,999 acres	10	83	2	17
	10,000 + acres	2	66	1	33
Total		171		121	

Table 4. Acre Range vs. Participated in Conservation Programs Prior Cross-tabulation

		Participated in Conservation Prior			
		Yes	%	No	%
Acre Range	0	49	41	70	59
	less than 1 acre	8	42	11	58
	1 - 10 acres	26	54	22	46
	11 - 49 acres	7	41	10	59
	50 - 99 acres	12	66	6	33
	100 - 499 acres	25	56	20	44
	500 - 999 acres	15	83	3	17
	1,000 - 9,999 acres	10	83	2	17
	10,000 + acres	2	66	1	33
Total		154		145	

Post Workshop Follow-up Evaluations

Six months following each workshop, TWRI sent "follow-up" evaluations via email to each participant to again determine adoption and willingness to adopt BMPs discussed at the training. The following dataset includes information from 224 completed "follow-up" evaluations.

We reminded participants that at the riparian training that was held about 6 months ago, they shared some opinions about adopting management practices and asked them to share some additional information regarding the same practices and their plans to adopt them. Six months after the workshop an average of 82% of respondents stated that they had adopted some of the BMPs discussed at the workshop or plan to adopt some of these practices in the future (responses ranged 72-93% depending on the practice, Table 5). A total of 45 respondents believed they would economically benefit as a result of content learned and utilized. From the respondents, about 10% estimated they have benefited between $100 and $999, 13% estimated they benefited between $1,000 and $4,999, 5% estimated they benefited between $5,000 and $9,999, and 2% estimated they have benefited over $10,000 because of the information they learned at the training (Table 6). About 21% of respondents believed that they had benefited economically, but it was difficult to quantify exactly how much. The remaining 2% of respondents stated that they have received other benefits from attending the trainings that were perhaps not quantifiable in dollar amounts (Table 6). Other benefits include knowledge gained and improvements to parklands. An additional 32% of responding attendees, or 60 individuals, have participated in a conservation program since attending the riparian training (Table 7). Specific relevant conservation programs, apart from the BMPs described within the trainings, include NRCS and/or TPWD programs for producers or landowners, or tax valuation for wildlife management.

Table 5. Participants' Willingness to Adopt Practices Six Months Following the Training.

Question	I have adopted in the last 6 months		I plan on adopting in the future		I will not adopt the practice		I am undecided	
	Response	Percent	Response	Percent	Response	Percent	Response	Percent
Riparian Herbaceous Buffers	29	53.70%	15	27.78%	3	5.56%	7	12.96%
Riparian Forest Buffers	32	58.18%	12	21.82%	2	3.64%	9	16.36%
Prescribed Grazing	34	47.89%	26	36.62%	6	8.45%	5	7.04%
Rotational Grazing	25	32.05%	37	47.44%	12	15.38%	4	5.13%
Manage Feral Hogs	58	55.24%	40	38.10%	0	0%	7	6.67%
Rangeland Planting of vegetative cover	33	27.27%	59	48.76%	14	11.57%	15	12.40%
Manage to reduce bare ground	30	33.33%	52	57.78%	6	6.67%	2	2.22%
Monitor stream sites through photos	31	32.98%	37	39.36%	8	8.51%	18	19.15%
Total	272		278		51		67	

Table 6. Participants' Estimated Economic Benefit in Terms of Dollars.

Economic Benefit	Response	Percentage
$100-999	8	9.52%
$1,000-4,999	11	13.10%
$5,000-9,999	4	4.76%
$10,000+	2	2.38%
Difficult to Quantify	18	21.43%
Other Benefits*	2	2.38%
Total	45	

*other benefits included knowledge gained and undetermined parkland improvements.

Table 7. Participants' Participation in a Conservation Program Since Attending the Training

Answer	Response	Percentage
Yes	67	30.73%
No	78	35.78%
I had already participated in a program prior to attending the training	64	29.36%
I do not plan to participate in a program at all	9	4.13%
Total	218	%