TEXAS STATE Soil & Water CONSERVATION BOARD

Texas State Soil and Water Conservation Board
Clean Water Act §319(h) Nonpoint Source Grant Program
FY 2023 Workplan 23-06

SUMMARY PAGE	
Title of Project	Statewide Delivery of Lone Star Healthy Streams Feral Swine Component and Providing Technical Assistance on Feral Swine Management in Priority Watersheds
Project Goals	• Facilitate statewide implementation of feral swine damage management education through watershed-based group trainings. • Promote healthy watersheds by increasing citizen awareness, understanding, and knowledge about the biology, impacts and economics, methods of removal, and laws and regulations concerning the management of feral swine. • Enhance watershed education across the state as it relates to the reduction of feral swine damage in Texas. • Empower individuals and communities to find creative solutions to improve watershed health by reducing populations of the non-native invasive feral swine.
Project Tasks	(1) Project Administration; (2) Coordinate and deliver watershed-based feral swine education trainings in selected watersheds throughout Texas; (3) Evaluate the effectiveness of the feral swine education trainings; (4) Distribute and manage computer-based training
Measures of Success	• Deliver a minimum of 36 watershed-based feral swine trainings in selected watersheds • Numbers of citizens participating in watershed-based feral swine trainings • Increased Knowledge and plans for practice adoption of feral swine population education techniques, as measured by retrospective post-tests.
Project Type	Implementation ( ); Education (X); Planning ( ); Assessment ( ); Groundwater ( )

Status of Waterbody on *2022 Texas Integrated Report*	Segment ID	Parameter of Impairment or Concern	Category
	2201 – Arroyo Colorado Tidal	Bacteria, Depressed DO, Mercury in ET, PCBs in ET	5c, 5c, 5c, 5a
	2201B – Unnamed Drainage Ditch Tributary (B)	Bacteria	5b
	2202 – Arroyo Colorado Above Tidal	Bacteria, Mercury in ET, PCBs in ET	5c, 5c, 5a
	1218 – Nolan/ South Nolan Creek	Bacteria	5c
	1218C – Little Nolan Creek	Bacteria	5c
	1218D – Long Branch	Bacteria	5b
	1221 – Leon River Below Proctor Lake	Bacteria	5c
	1221A – Resley Creek	Bacteria, Depressed DO	5b, 5c
	1221C – Pecan Creek	Bacteria	5c
	1221D – Indian Creek	Bacteria	5b
	1221G – Coryell Creek	Bacteria	5c
	1222A – Duncan Creek	Bacteria	5c
	1222B – Rush-Copperas Creek	Bacteria	5c
	1222C – Sabana River	Bacteria	5c
	1222E – Sweetwater Creek	Bacteria	5c
	1223 – Leon River Below Leon Reservoir	Bacteria, Depressed DO	5c, 5c
	1259 Leon River Above Belton Lake	Bacteria	5c
	1804A – Geronimo Creek	Bacteria	5c
	0821A – Pilot Grove Creek	Bacteria	5c
	0821C – Wilson Creek	Bacteria	5c
	0821D – East Fork Trinity River Above Lake Lavon	Bacteria	5c
	1810 – Plum Creek	Bacteria	4b
	1217 – Lampasas River Above Stillhouse Hollow Lake	Bacteria	5c
	2422B – Double Bayou West Fork	Bacteria, Depressed DO, Dioxin in ET, PCBs in ET	5c, 5b, 5a, 5a
	2422D – Double Bayou East Fork Tidal	Bacteria, Dioxin in ET, PCBs in ET	5c, 5a, 5a

	2492A – San Fernando Creek	Bacteria	5b
	2203 – Petronila Creek Tidal	Bacteria	5c
	2204 – Petronila Creek Above Tidal	Bacteria	5b
	1902 – Lower Cibolo Creek	Bacteria	5c
	1902A – Martinez Creek	Bacteria	5c
	1902B – Salitrillo Creek	Bacteria	5c
	1902C – Clifton Branch	Bacteria, Depressed DO	5c, 5b

Project Location (Statewide or Watershed and County)	Arroyo Colorado Watershed in Hidalgo, Willacy, and Cameron Counties; Leon River Watershed in Comanche, Hamilton, Erath, Coryell, Mills, McLennan, and Bell Counties; Geronimo Creek Watershed in Guadalupe and Comal Counties; Lake Lavon Watershed in Collin, Fannin, Grayson, and Hunt Counties; Plum Creek Watershed in Caldwell, Hays, and Travis Counties; Lampasas River Watershed in Mills, Hamiliton, Coryell, Lampasas, Burnet, Bell, and Williamson Counties; Double Bayou Watershed in Liberty and Chambers Counties; San Fernando and Petronila Watershed in Jim Wells, Nueces, Kleberg, and Duval Counties; Mid and Lower Cibolo Watershed in Comal, Guadalupe, Bexar, Wilson, and Karnes Counties.					
Key Project Activities	Hire Staff ( ); Surface Water Quality Monitoring ( ); Technical Assistance (X); Education (X); Implementation ( ); BMP Effectiveness Monitoring ( ); Demonstration (X); Planning ( ); Modeling ( ); Bacterial Source Tracking ( ); Other ( )					
2022 Texas NPS Management Program Reference	• Component One – LTGs 1, 2, 3, 4, 6, 7, 8 • Component One – STGs 3A, 3B, 3G • Component Two & Three					
Project Costs	Federal	$629,159	Non-Federal	$419,440	Total	$1,048,599
Project Management	• Texas A&M Natural Resources Institute					
Project Period	September 26, 2023 – August 31, 2026					

Part I – Applicant Information

Applicant							
Project Lead	James C. Cathey						
Title	Associate Director						
Organization	Texas A&M Natural Resources Institute						
E-mail Address	James.cathey@ag.tamu.edu						
Street Address	1001 Holleman Dr.						
City	College Station	County	Brazos	State	TX	Zip Code	77840
Telephone Number	979-314-3986			Fax Number	n/a		

Project Partners	
Names	Roles & Responsibilities
Texas State Soil and Water Conservation Board (TSSWCB)	Provide state oversight and management of all project activities and ensure coordination of activities with related projects and TCEQ.
Texas A&M AgriLife Extension Service – Texas A&M Natural Resources Institute	Provide overall project management including project coordination, submission of quarterly and final reports, delivery of feral swine management education workshops, distribution and support of computer-based training, and evaluation of program effectiveness.

Part II – Project Information

Project Type							
Surface Water	X	Groundwater					
Does the project implement recommendations made in: (a) a completed WPP; (b) an accepted WPP; (c) an adopted TMDL; (d) an approved I-Plan; (e) a Comprehensive Conservation and Management Plan developed under CWA §320; (f) the *Texas Coastal NPS Pollution Control Program*; or (g) the *Texas Groundwater Protection Strategy*?				Yes	X	No	
If yes, identify the document.	Update to the Arroyo Colorado Watershed Protection Plan; Watershed Protection Plan for the Leon River Below Proctor Lake and Above Belton Lake; Watershed Protection Plan for Nolan Creek/South Nolan Creek; Geronimo and Alligator Creeks Watershed Protection Plan; Lavon Lake Watershed Protection Plan; 2022 Update to the Plum Creek Watershed Protection Plan; Lampasas River Watershed Protection Plan; Double Bayou Watershed Protection Plan; San Fernando and Petronila Creek Watershed Protection Plan Final Draft; Mid and Lower Cibolo Creek Watershed Protection Plan						
If yes, identify the agency/group that developed and/or approved the document.	The Arroyo Colorado Watershed Partnership; Parsons Water & Infrastructure Inc. and the Brazos River Authority; Texas Institute for Applied Environmental Research facilitated by TCEQ; The Geronimo and Alligator Creeks Watershed Partnership facilitated by Texas AgriLife Extension Service, GBRA, and TSSWCB; Lavon Lake Watershed Partnership facilitated by North Texas Municipal Water District, Texas A&M AgriLife Research & Extension Service, and TSSWCB; Plum Creek Watershed Partnership facilitated by Texas A&M AgriLife Extension and TSSWCB; Lampasas River Watershed Partnership facilitated by Texas A&M AgriLife Research and TSSWCB; Double Bayou Watershed Partnership facilitated by Houston Advanced Research Center; Texas Water Resources Institute; Stakeholders of the Mid and Lower Cibolo Creek Watershed facilitated by Texas Water Resources Institute	Year Developed	2017; 2015 2019; 2012 2017; 2022 2013; 2016 2022; 2019			

Watershed Information				
Watershed or Aquifer Name(s)	Hydrologic Unit Code (12 Digit)	Segment ID	Category on 2022 IR	Size (Acres)
Arroyo Colorado Watershed	121102080100 121102080600 121102080300 121102080700 121102080800	2201 2201B 2202	5c, 5c, 5c, 5a 5b 5c, 5c, 5a	451,840
Leon River	120702011002 120702010908 120702010906 120702010903 120702010907 120702010905 120702010902 120702010806 120702010802 120702010801 120702010705 120702010704 120702010703 120702010702 120702010701 120702010605 120702010603 120702010602 120702010601 120702010509 120702010503 120702010502 120702010409 120702010407 120702010406 120702010405 120702010403 120702010402 120702010307 120702010306 120702010305 120702010303 120702010301 120702010209 120702010208 120702010204 120702010203 120702010201 120702011104 120702011102 120702011101	1218 1218C 1218D 1221 1221A 1221C 1221D 1221G 1222A 1222B 1222C 1222E 1223 1259	5c 5c 5b 5c 5b, 5c 5c 5b 5c 5c 5c 5c 5c 5c, 5c 5c	938,515
Geronimo Creek Watershed	121002020111 121002020110	1804A	5c	44,800

Lake Lavon Watershed	120301060307 120301060306 120301060305 120301060304 120301060208 120301060207 120301060205 120301060206 120301060203 120301060202 120301060201 120301060105	0821A 0821C 0821D	5c 5c 5c	492,095
Plum Creek Watershed	121002030406 121002030410 121002030408 121002030409 121002030407 121002030404 121002030403 121002030405 121002030402 121002030401	1810	4b	288,240
Lampasas River Watershed	120702030509 120702030507 120702030506 120702030504 120702030309 120702030302 120702030205 120702030106 120702030105 120702030103	1217D	5c	798,375
Double Bayou Watershed	120402020100	2422B 2422D	5c, 5b, 5a, 5a 5c, 5a, 5a	89,380
San Fernando and Petronila Creeks Watershed	121102050803 121102050608 121102050607 121102050606 121102050604 121102050603 121102050601 121102050506 121102040407 121102040406 121102040405 121102040404	2492A 2203 2204	5b 5c 5b	1,247,102

Mid and Lower Cibolo Creek Watershed	121003040201 121003040202 121003040206 121003040205 121003040302 121003040304 121003040401 121003040402 121003040403 121003040405 121003030206	1902 1902A 1902B 1902C	5c 5c 5c, 5b	371,504

Water Quality Impairment

Describe all known causes (i.e., pollutants of concern) and sources (e.g., agricultural, silvicultural) of water quality impairments or concerns from any of the following sources: *2022 Texas Integrated Report,* Clean Rivers Program Basin Summary/Highlights Reports, or other documented sources.

Segment ID	Body Name	Impairment	Code
2201	Arroyo Colorado Tidal	Bacteria	5c
		Depressed DO	5c
		Mercury in ET	5c
		PCBs in ET	5a
2201B	Unnamed Drainage Ditch Tributary (B)	Bacteria	5b
2202	Arroyo Colorado Above Tidal	Bacteria	5c
		Mercury in ET	5c
		PCBs in ET	5a
1218	Nolan/ South Nolan Creek	Bacteria	5c
1218C	Little Nolan Creek	Bacteria	5c
1218D	Long Branch	Bacteria	5b
1221	Leon River Below Proctor Lake	Bacteria	5c
1221A	Resley Creek	Bacteria	5b
		Depressed DO	5c
1221C	Pecan Creek	Bacteria	5c
1221D	Indian Creek	Bacteria	5b
1221G	Coryell Creek	Bacteria	5c
1222A	Duncan Creek	Bacteria	5c
1222B	Rush-Copperas Creek	Bacteria	5c
1222C	Sabana River	Bacteria	5c
1222E	Sweetwater Creek	Bacteria	5c
12223	Leon River Below Leon Reservoir	Bacteria	5c
		Depressed DO	5c
1259	Leon River Above Belton Lake	Bacteria	5c
1804A	Geronimo Creek	Bacteria	5c

0821A	Pilot Grove Creek	Bacteria	5c
0821C 0821D	Wilson Creek East Fork Trinity River Above Lake Lavon	Bacteria Bacteria	5c 5c
1810	Plum Creek	Bacteria	4b
1217	Lampasas River Above Stillhouse Hollow Lake	Bacteria	5c
2422B	Double Bayou West Fork	Bacteria	5c
		Depressed DO	5b
		Dioxin in ET	5a
		PCBs in ET	5a
2422D	Double Bayou East Fork Tidal	Bacteria	5c
		Dioxin in ET	5a
		PCBs in ET	5a
2492A	San Fernando Creek	Bacteria	5b
2203	Petronila Creek Tidal	Bacteria	5c
2204	Petronila Creek Above Tidal	Bacteria	5b
1902	Lower Cibolo Creek	Bacteria	5c
1902A	Martinez Creek	Bacteria	5c
1902B	Salitrillo Creek	Bacteria	5c
1902C	Clifton Branch	Bacteria	5c
		Depressed DO	5b

Project Narrative

Problem/Need Statement

All watersheds in Texas are threatened by nonpoint source (NPS) pollution which is detrimental to the valuable water resources of the state. To help combat this threat, federal and state water resource management agencies have adopted the Watershed Approach for managing water quality. One vital component of this approach involves engaging local stakeholders to become actively involved in planning and implementing water resource management and protection programs in their watershed. Many Watershed Protection Plans (WPP) and Total Maximum Daily Loads (TMDLs) being developed now call for the removal of feral swine to reduce their negative effects on water quality (e.g., Plum Creek, Leon River). Providing education to landowners about effective management strategies is crucial to the success of reducing feral swine populations.

Feral swine remain as one of the greatest damage management challenges in the United States to wildlife, agriculture, and watershed health. These animals have established themselves across Texas and pose a variety of challenges including riparian and sedimentation damage, agricultural loss, predation, transmittal of disease and parasites, and environmental damage to both urban and rural environments. Recent studies estimate that the population of feral swine has increased in the United States from 2.4 million to 6.9 million with 2.6 million wild pigs in Texas alone (Lewis, J.S. et al., 2019). These numbers make feral swine one of the most abundant large invasive animal species found in the United States at present. The updated distribution maps provided by the USDA show feral swine spread across 31 states, and in every county in Texas except one.

New research suggests that the once accepted value of >$1.5 billion of yearly crop damages and control costs across the United States may be much higher (McKee, S., 2020). In 2020, the Texas A&M Department of Agricultural Economics found that the total agricultural damage in Texas exceeds $100 million each year with studies pointing towards as high as $230 million. These costs do not take into consideration the natural resource damages done by feral swine. As population numbers grow so does a significant level of economic, biologic, and natural resource damage. This non-native invasive species continues to be a threat to Texas waterways and ecosystems. Feral swine activities have a detrimental effect on watersheds and the water quality by causing increased sediments loads, algae blooms, oxygen depletion, bank erosion, and contamination by parasites and bacteria. Along with the water quality issues, destruction of habitat for native wildlife and the predation of wildlife is a concern for the overall health of watersheds and the ecosystems that exist within.

Landowners and watershed managers observe evidence of feral swine activity and damage frequently in many watersheds. Their local population and range are expanding, and analyses demonstrate these animals are likely a source of NPS pollution to streams. Further, financial losses to the agricultural community in Texas are estimated at $230 million on an annual basis. Landowners spend an estimated $7 million annually on their control and/or correction of damage, based on a study from 2008 and reported by a 2020 Economic Impact Assessment done by Texas A&M AgriLife Extension Department of Agricultural Economics this figure remains unchanged (Higginbotham et al. 2008; McCorkle 2020). However, these values are far underestimated, as damage to suburban areas was not part of the assessment. Likewise, monetary effects of problems associated with erosion, nutrient cycling, and water quality are just now being assessed by researchers. Additionally, feral swine have the potential to contribute *E. coli*, some of which could pathogenic, that further degrade water quality but more importantly contribute to current bacteria impairments in Texas streams. Bacterial source tracking (BST) studies are now providing insight as to the extent of feral swine bacterial contributions within watersheds statewide.

Through TSSWCB project 08-07*, Implementing Agriculture Nonpoint Source Components of the Plum Creek Watershed Protection Plan*, feral swine gained considerable attention in the planning phase, resulting in an education campaign to describe techniques used by the public for feral swine removal. A full time Extension Assistant was hired to spearhead educational efforts in Travis, Hays, and Caldwell counties. Education outlets took several forms including: 56 one-on-one technical guidance site visits; 25 face-to-face community presentations with 3,301 attendees; development of web-based reporting tools to gather information on number of feral swine sightings, animals removed, and methods of capture; a project description tri-fold pamphlet; 10 news releases with an audience considered to be

several hundred thousand people; 12 hardcopy peer-edited articles, 7 of which were translated to Spanish; over 11,115 combined internet downloads/reads of 12 peer-edited articles; 13 internet web-videos viewed over 83,000 times; 2 voice-over presentations; 2 radio interviews having a 98 county-area broadcast with the potential to be heard by 6.5 million people.

Through TSSWCB project 12-06*, Statewide Delivery of Lone Star Healthy Streams Feral Hog Component and Providing Technical Assistance on Feral Hog Management in Priority Watersheds*, feral swine outreach efforts addressed the needs of Texas landowners and the public on a large scale. This project resulted in a widespread and modernized educational campaign that incorporated outlets including social media, videos, publications, newsletters, articles, distance-based/online education, media interviews, technical site visits and others in addition to conventional face-to-face programing. One full time Extension Associate and 2 Extension Assistants were employed during the campaign. Resulting efforts included: 41 one-on-one technical guidance site visits; 170 face-to-face presentations (15 four-hour and 155 one-hour) with 10,787 attendees; 97% of surveyed participants reported knowledge gained concerning feral swine biology, legal control options, efficient trap/bait techniques and types/extent of damage; a statewide online feral swine reporting tool with a total of 2,785 swine sighted and 1,333 swine removed based on 861 total reports; 25 web videos viewed 114,603 times; a feral swine Facebook page with 3,466 "Likes" reaching 7,781 unique users monthly; a feral swine Twitter page that has 206 followers reaching 1,983 individuals monthly; 37 blog articles with 66,490 views; 94 online articles about project activities composed by outside media; 25 newspaper interviews; 21 AgriLife Communications news releases; 9 magazine articles; 1 television interview and 1 radio interview.

Through TSSWCB project 09-06, *Development of a Synergistic, Comprehensive Statewide Lone Star Healthy Streams Program*, many of the feral swine educational resources developed for the Plum Creek Watershed have been incorporated into the Lone Star Healthy Streams (LSHS) Program. The goal of the LSHS Program is the protection of Texas waterways from bacterial contamination originating from livestock operations and feral swine. To achieve this goal, LSHS's objective is the education of Texas farmers, ranchers, and landowners about proper grazing, feral swine management, and riparian area protection to reduce the levels of bacterial contamination in streams, rivers, and other waterbodies. The program's major goal is the protection of Texas waterways from bacterial contamination originating from beef cattle, dairy cattle, horses, poultry, and feral swine. The framework for LSHS is five resource manuals that focus on bacterial runoff management for beef cattle, dairy cattle, horses, poultry, and feral swine.

Through enhanced education regarding riparian protection and vegetation management on grazing lands, LSHS will further protect Texas waterways from sediment, nutrient, and pesticide runoff with the concomitant loss of water and topsoil. LSHS is the state's primary coordinated and comprehensive educational program to address NPS pollution and water quality impacts from livestock operations and feral swine. This project will deliver the feral swine component of the LSHS Program in priority watersheds.

In the last grant cycle, the Wildlife and Fisheries Extension Unit's and now Texas A&M Natural Resources Institute's outreach and educational efforts relative to feral swine damage abatement were delivered to the public by County Extension Agents at the county, multi-county, regional and state levels with the support of Extension Wildlife Specialists and Associates via direct contact (i.e., phone, e-mail, publications, one-on-one), mass media, group meetings as applied research/result demonstrations. Based on evaluations conducted statewide, program participants reported damage in the following categories: pastures-83%; fences, water troughs or other improvements-48%; owner/employee time-35%; commodity crops-39%; loss of hunting lease value, wildlife food plots/feeders-22%; wetlands-23%; loss of land value-28%; equipment/vehicles-14%; specialty crops-22%; livestock-17%; stored commodities-8%; and personal injuries-2%.

Increases in knowledge among program participants revealed the following on specific subjects (before vs. after a program) included: feral swine biology-88%; legal control options-85%; efficient trap/bait techniques-87%; types/extent of swine damage-57%. Ninety-nine percent of respondents increased their general knowledge of feral swine and their control.

Program evaluations revealed the following practice adoptions by percentage: use larger traps-64%; pre-bait traps to encourage consistent feral swine visits-36%; scout for feral swine-48%; use baits with scent appeal-15%; market trapped feral swine to offset economic impacts-43%; set traps whenever fresh sign appears-35%; vary/change baits used in traps at different locations-20%; and use protective eyewear/gloves during field dressing as a disease precaution-12%.

Through TSSWCB project 14-12, *Statewide Delivery of Lone Star Healthy Streams Feral Hog Component and Providing Technical Assistance on Feral Hog Management in Priority Watersheds,* feral hog outreach efforts continued to provide resources and education to Texas landowners and the public. Momentum gained through TSSWCB project 12-06 resulted in an expanded campaign that extended into schools, urban/suburban areas, homeowners associations, various conservation groups, and other entities statewide in addition to conventional programming. Social media, videos, publications, newsletters, articles, distance-based/online education, media interviews, technical site visits and other outlets remained integral supplementation to face-to-face program delivery. Resulting efforts included: 180 face-to-face presentations (159 one-hour and 17 four-hour workshops), 19 technical site visits and 4 educational booths which amassed 12,071 direct contact hours. Post program evaluations showed that 98.7% of surveyed participants reported knowledge gained concerning feral swine biology, legal control options, efficient trap/bait techniques and types/extent of feral swine damage. A 6 video "Wild Pig Management Video Series" was created that has gained 62,979 views and counting. An additional 17 educational feral swine web videos were created which have gained 25,832 views. Other resources include a statewide online feral swine reporting tool with 115 total reports of feral swine sighted or removed; a feral swine Facebook page with a reach of 356,600 people; a feral swine Twitter page that has 680 followers; a "Coping with Feral Swine" website that received 212,597 page views (192,655 unique page views); 21 blog articles with 48,019 views; 5 editions of the "Wild Pig Newsletter" publications which have 343 subscribers and an online reach of 6,514 readers via Facebook (also distributed by CEA's statewide); 2 feal swine distance education courses; 2 narrated wild pig education programs; 3 extension publications; 5 newspaper interviews; 19 AgriLife Communications news releases; 2 magazine articles and 4 television interviews. TSSWCB project 14-12 is ongoing, and metrics associated with outreach and educational efforts continue to grow.

Public education and outreach regarding feral swine management measures has been successfully implemented in the Plum Creek WPP and through additional programming of the Texas A&M AgriLife Extension Service. This agency and specifically the Texas A&M Natural Resources Institute provides quality, relevant outreach and continuing education programs and services to the people of Texas and the demand for information related to the management of feral swine is high among many clientele groups in Texas.

Feral swine abatement remains an important educational process in Texas and our past efforts show a track record of productivity and high return on the dollar invested. This project will continue statewide implementation, in targeted watersheds with bacteria impairments and WPPs/TMDLs, of the feral swine educational program to support and enhance current and future watershed management and protection efforts by watershed partnerships, agencies and natural resource organizations in Texas.

Through TSSWCB project 19-04, *Statewide Delivery of Lone Star Healthy Streams Feral Hog Component and Providing Technical Assistance on Feral Hog Management in Priority Watersheds*, innovative outreach efforts adapted to new educational challenges to continue to meet public need for watershed based wild pig programming statewide and beyond. Due to the Covid-19 pandemic, conventional face-to-face program delivery was unavailable or experienced diminished attendance for a significant portion of the ongoing project period. However, an adapted campaign of direct and remote programming efforts, including interactive distance-based private lands stewardship learning academies, were supplemented by additional resource production including social media promotions, videos, publications, blog articles, magazine articles, media interviews, webinars and others to further extend the core conservation message of the project initiative. As of August 2022, data reported below were preliminary at the time this report was prepared pending the completion of project activities for Q4 of 2022 as well as extension year 2023. Available data for the project were 64 wild pig educational events (8 wild pig workshops, including 50 one-hour programs, 9 one-and-a-half hour programs, 4 online webinars, 2 educational booths and 3 technical site visits) which amassed 3,847 contact hours from 3,336 attendees. At the height of Covid-19, project initiatives shifted to the creation of interactive web-based

educational resources, and during this time 8 wild pig private lands stewardship learning academies were produced to meet programming and publication goals for the project. As of August 2022, the Texas A&M Natural Resources Institute private land stewardship academies were taken 1,610 times. Video also proved highly popular as a platform to deliver wild pig educational content to the public. In the last grant cycle, the Texas A&M Natural Resources Institute's wild pig YouTube content garnered 7,439 indirect contact hours (310 twenty-four-hour days) of watch time. As of August 2022, the total direct and indirect educational contact hours through face-to-face, remote, webinar and video educational delivery was 11,286 hours and counting.

Additional resource production and promotions included 17 blog articles, 2 extension publications, 1 magazine article, 7 videos, 11 AgriLife Today press releases, 5 media interviews and widespread social media, website and wild pig reporting system promotions. The Texas A&M Natural Resources Institute's wild pigs Facebook website averaged 33,827 impressions, 1,925 clicks, 1,048 engagements and 8,340 views per quarter with an average reach of 42,218 users throughout each quarter of the project. Additionally, the wild pigs Twitter account had an average reach of 63,712 users throughout each quarter of the project. Our wild pig website received 14,031 views over 9,716 sessions and attained 8,296 new users over the course of the project and the wild pig reporting system received 236 reports documenting 2,989 (1,730 juvenile and 1,259 adult) wild pigs sighted or removed by reporting system participants. The eXtension "Coping with Feral Swine" website received 310,516 total page views over 497,864 total sessions with an average reach of 17,956 users throughout each quarter of the project. Although content can still be found on-line, the platform is no longer supported by eXtension. Project personnel attended a total of 21 prioritized meetings and conferences.

Over the last grant cycle, the Texas A&M Natural Resources Institute's outreach and educational efforts were delivered to the public through face-to-face, web-based, webinar, video and interactive private lands stewardship academy delivery at the county, multi-county, regional and state levels with the support of NRI staff and County Extension Agents via direct contact (i.e., phone, e-mail, publications, one-on-one), mass media, group meetings, remote access and others. Based on evaluations conducted statewide, program participants reported damage in the following categories: pastures-54%; fences, water troughs or other improvements-37%; owner/employee time-35%; commodity crops-18%; loss of hunting lease value, wildlife food plots/feeders-21%; wetlands-17%; loss of land value-15%; equipment/vehicles-37%; specialty crops-15%; livestock-11%; stored commodities-7%; and personal injuries-4%.

Program participants reported increased knowledge (before vs. after a program) on the following specific subjects which included: feral swine biology-81%; legal control options-80%; efficient trap/bait techniques-79%; types/extent of swine damage-74%. Over ninety-five percent of respondents reported increased general knowledge of feral swine and their control following our feral swine event.

Program evaluations documented the following planned practice adoption by program participants: use larger traps-46%; pre-bait traps to encourage consistent feral swine visits-36%; scout for feral swine-40%; use baits with scent appeal-16%; market trapped feral swine to offset economic impacts-37%; set traps whenever fresh sign appears-33%; vary/change baits used in traps at different locations-16%; and use protective eyewear/gloves during field dressing as a disease precaution-11%.

Project Narrative

General Project Description (Include Project Location Map)

This project will continue the statewide implementation of the feral swine management education program by conducting watershed-based trainings in selected watersheds. Priority watersheds will be selected in collaboration with TSSWCB and primarily represent those developing or in implementation phases of WPPs or TMDLs. Other watersheds may be selected based on need and in response to collaborations with other groups and organizations, including river authorities, SWCDs, local citizen groups/watershed associations, etc. Watersheds will be selected consistent with the State's implementation of the Texas NPS Management Program and specific CWA §319(h)-funded projects.

Priority watersheds selected for feral swine education trainings will be identified for water quality impairments resulting from high swine activity. Watershed-based education trainings will be tailored as much as possible to the watershed to convey biology, best management practices, removal techniques and laws and regulations associated with managing populations of this invasive species. Priority watersheds will include, but are not limited to, Arroyo Colorado Watershed in Hidalgo, Willacy, and Cameron Counties; Leon River Watershed in Comanche, Hamilton, Erath, Coryell, Mills, McLennan, and Bell Counties; Geronimo Creek Watershed in Guadalupe and Comal Counties; Lake Lavon Watershed in Collin, Fannin, Grayson, and Hunt Counties; Plum Creek Watershed in Caldwell, Hays, and Travis Counties; Lampasas River Watershed in Mills, Hamiliton, Coryell, Lampasas, Burnet, Bell, and Williamson Counties; Double Bayou Watershed in Liberty and Chambers Counties; San Fernando and Petronila Watershed in Jim Wells, Nueces, Kleberg, and Duval Counties; Mid and Lower Cibolo Watershed in Comal, Guadalupe, Bexar, Wilson, and Karnes Counties.

Watershed-Based Feral Hog Educational Training. The watershed-based training will be delivered as 4-hour training events or a 1-hour presentation depending on cooperation at county Extension programs; focusing on biology, removal techniques, and laws and regulations associated with feral swine management that will help improve watershed impairments. Extension will work in concert with state organizations and Count Extension Agents to select and schedule locations for the watershed-based feral swine education training events. Priority will be given to locations currently involved in WPP or TMDL processes and those planning future watershed efforts. Our focus areas are shown by the map below (Figure 1).

A minimum of 12 events will be conducted annually in selected watersheds and will include a mix of 4-hour workshops and 1-hour county programs. Continuing Education Unit Credits, as approved by the Texas Department of Agriculture, will be made available to participants, who hold the Pesticide Applicators Licenses.

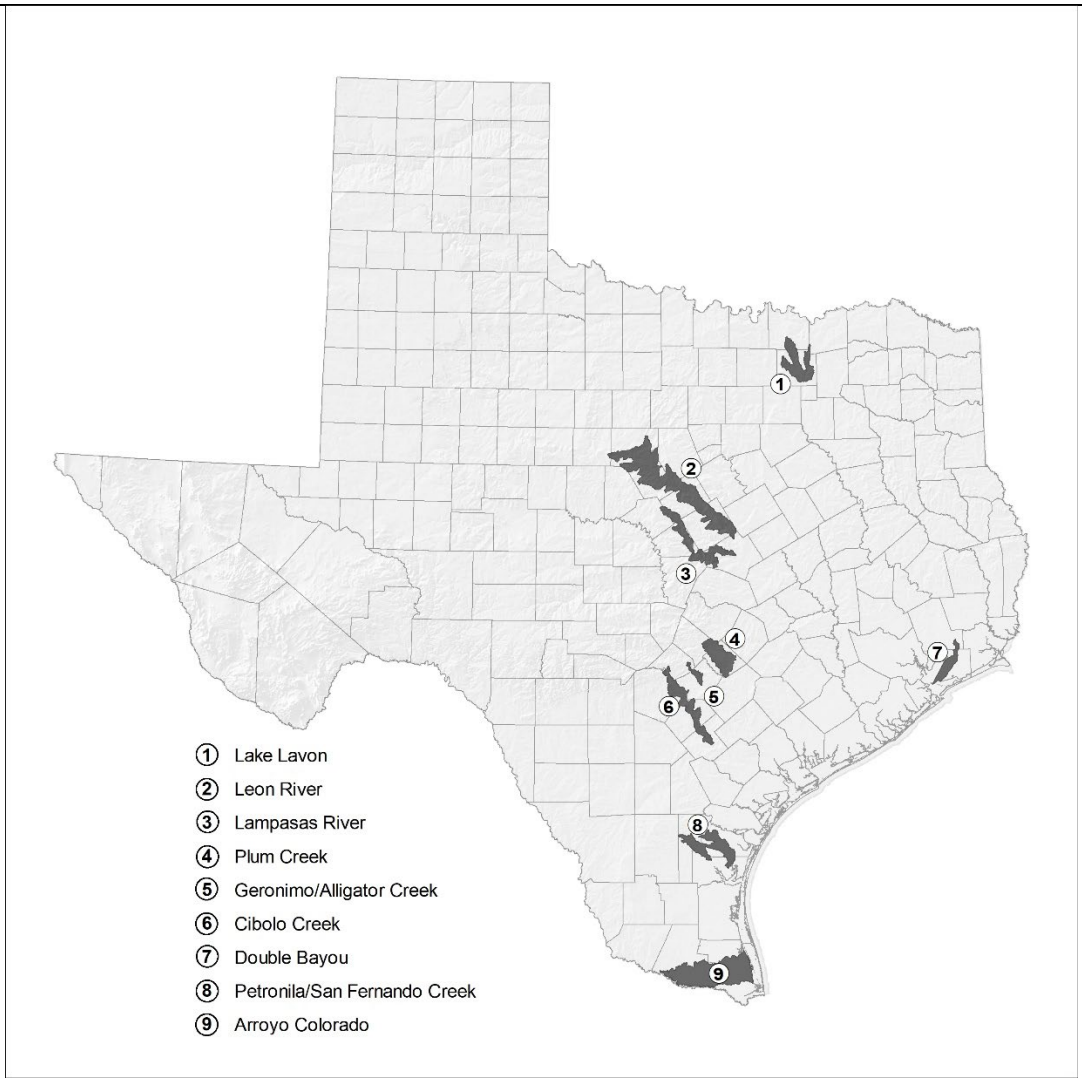

Figure 1

Evaluation and Assessment. Both 4-hour and 1-hour educational programs will include an evaluation component to assess program effectiveness by assessing knowledge gained, projected cost reduction, and plans to adopt damage abatement practices. A new evaluation instrument is being developed by NRI. This instrument will more accurately represent the data that can be gained from these educational programs and will be used to maintain a long-term data set. Descriptive, correlative, and analysis of variance statistical procedures will be utilized in this evaluation. Results will be summarized in a project final report and shared at the local level with the County Extension Agent.

Development of AgriLife Communication News Releases. News releases will be developed with assistance from AgriLife/NRI Communications to announce educational events and schedules, new extension articles and other pertinent information.

Development of Extension Educational Publications. At least three new extension articles regarding feral swine management will be produced (1/yr). Production of 25+ feral swine management articles created early on for the Plum Creek Watershed Partnership demonstrates the ability to identify needs of landowners and deliver educational materials to reduce feral swine numbers. Appeal of the articles continues to be demonstrated by the thousands of read/downloads by internet users and popularity of hardcopies at public meetings.

Development of Extension Educational Videos. At least three new extension web-videos will be produced and posted on the Texas A&M Natural Resources Institute's YouTube channel annually. Appeal of this site and videos was demonstrated by feral swine videos created throughout the project being viewed nearly 750,000 times. These views led to 7,439 hours of watch time which is roughly equivalent to 310 days of viewing. One video in the "Wild Pig Management Video Series" gained over 220,000 views since it was created.

Connection with Extension Social Media. Educational materials will be linked via internet resources taking advantage of outlets such as Facebook, Twitter, and others. Connectivity among websites for Extension, TSSWCB, natural resource NGOs and other state agencies is a must to gain greater impact of educational resources. Social media has proven to be a productive way of pushing out information to the public with the NRI's Wild Pig pages averaged over 100,00 users throughout each quarter during our last project. The Feral Swine Community of Practice hosted by eXtension.org represents a group of experts from 17 states involved in feral swine research and education outreach. The website was accessed 310,516 times in the previous grant cycle. The site now contains numerous feral swine resources including at least 100 Frequently Asked Questions, 50 Educational Articles, Webinars and set of Ask the Expert questions.

This project will support two full time and one part time Program Coordinators, who will collaborate with existing Extension-NRI members to educate landowners on strategies to reduce and manage feral swine populations. Program Coordinators will be under the direction of the PI in the Texas A&M Natural Resources Institute. Landowners will be encouraged to remove and report the number of feral swine in their watershed to abate the potential for environmental damage and degradation of water quality. We will work closely with AgriLife County Extension Agents to foster programing.

In addition to tracking feral swine damage management activities, this team will be a vital contact point with the community by disseminating educational materials, promoting feral swine management strategies, and fostering communication and partnership between landowners and stakeholders in general.

Tasks, Objectives and Schedules						
Task 1	Project Administration					
Costs	Federal	$52,430	Non-Federal	$34,954	Total	$87,384
Objective	To effectively administer, coordinate and monitor all work performed under this project including technical and financial supervision and preparation of status reports.					
Subtask 1.1	Texas A&M Natural Resources Institute will prepare electronic quarterly progress reports (QPRs) for submission to the TSSWCB. QPRs shall document all activities performed within a quarter and shall be submitted by the 1st of January, April, July and October. QPRs shall be distributed to all Project Partners.					
	Start Date	Month 1		Completion Date	Month 36	
Subtask 1.2	Texas A&M Natural Resources Institute will perform accounting functions for project funds and will submit appropriate Reimbursement Forms to TSSWCB at least quarterly.					
	Start Date	Month 1		Completion Date	Month 36	
Subtask 1.3	Texas A&M Natural Resources Institute will host coordination meetings or conference calls, at least quarterly, with Project Partners to discuss project activities, project schedule, communication needs, deliverables, and other requirements. Texas A&M Natural Resources Institute will develop lists of action items needed following each project coordination meeting and distribute to project personnel.					
	Start Date	Month 1		Completion Date	Month 36	
Subtask 1.4	Texas A&M Natural Resources Institute will develop a Final Report that summarizes activities completed and conclusions reached during the project and discusses the extent to which project goals and measures of success have been achieved.					
	Start Date	Month 1		Completion Date	Month 36	
Deliverables	• QPRs in electronic format • Reimbursement Forms and necessary documentation in hard copy format • Final Report in electronic and hard copy formats					

Tasks, Objectives and Schedules						
Task 2	Coordinate and deliver watershed-based feral swine educational trainings in selected watersheds throughout Texas					
Costs	Federal	$314,584	Non-Federal	$209,723	Total	$524,307
Objective	Facilitate statewide delivery of feral swine education programs to increase understanding of the adverse impact feral swine can have on habitats and water resources, and to provide understanding of biology, best management practices, reduction techniques, laws, and regulations in abatement processes.					
Subtask 2.1	Extension will employ 2 Program Coordinators to serve as the field contact and be responsible for the general oversight and coordination of project activities, as well as servicing watersheds statewide. An additional 1 Program Coordinator will coordinate the activities of the student intern, work on publications, and assist with assessment of attendee evaluations. A NRI communication specialist will assist in developing new materials for social media websites on feral swine management, editing videos on feral swine management for websites, managing data, and developing infographics for the public and watershed coordinators.					
	Start Date	Month 1		Completion Date	Month 36	

Subtask 2.2	Texas A&M Natural Resources Institute will work in concert with state agencies, local organizations, and County Extension Agents to select locations for the watershed-based feral swine education training events. Texas A&M Natural Resources Institute will coordinate efforts with state agencies and organizations already involved in WPP/TMDL processes or who are planning future WPP/TMDL processes in specific watersheds. Programming will focus on, but not be limited to, watershed areas such as Arroyo Colorado Watershed in Hidalgo, Willacy, and Cameron Counties; Leon River Watershed in Comanche, Hamilton, Erath, Coryell, Mills, McLennan, and Bell Counties; Geronimo Creek Watershed in Guadalupe and Comal Counties; Lake Lavon Watershed in Collin, Fannin, Grayson, and Hunt Counties; Plum Creek Watershed in Caldwell, Hays, and Travis Counties; Lampasas River Watershed in Mills, Hamiliton, Coryell, Lampasas, Burnet, Bell, and Williamson Counties; Double Bayou Watershed in Liberty and Chambers Counties; San Fernando and Petronila Watershed in Jim Wells, Nueces, Kleberg, and Duval Counties; Mid and Lower Cibolo Watershed in Comal, Guadalupe, Bexar, Wilson, and Karnes Counties.			
	Start Date	Month 1	Completion Date	Month 36
Subtask 2.3	Texas A&M Natural Resources Institute will actively market watershed-based feral swine education trainings through news releases (AgriLife Communications), internet postings, newsletter announcements, public/conference presentations, flyers, etc. TSSWCB must review and approve all project-related content in any materials prior to distribution.			
	Start Date	Month 1	Completion Date	Month 36
Subtask 2.4	Texas A&M Natural Resources Institute will deliver at least 12 feral swine education training events in selected watersheds, annually. Texas A&M Natural Resources Institute will be working closely with our colleagues conducting Lone Star Healthy Streams (LSHS) and Texas Water Resources Institute (TWRI) to share educational resources for delivery to constituents. Resources will be incorporated into overarching LSHS programming.			
	Start Date	Month 1	Completion Date	Month 36
Subtask 2.5	Texas A&M Natural Resources Institute will produce at least 1 new publication (hardcopy or electronic), annually. Publications will be produced and made available to the public through social media outlets commonly used in extension programming.			
	Start Date	Month 1	Completion Date	Month 36
Subtask 2.6	Project personnel will attend and participate in prioritized meetings, as appropriate, to communicate project goals, activities, and accomplishments to affected parties. Such meetings may include, but are not limited to, Clean Rivers Program Basin Steering Committees, the Texas Watershed Planning Short Course, Texas Watershed Coordinator Roundtables, the TSSWCB Regional Watershed Coordination Steering Committee, and the annual meeting of Texas Soil and Water Conservation District Directors.			
	Start Date	Month 1	Completion Date	Month 36
Deliverables	• List of specific watersheds where feral swine trainings have been implemented. • Schedules, agendas, meeting materials, and attendance numbers for education trainings. • Press releases, newspaper articles, newsletters, public information statements, etc., as developed and disseminated.			

Tasks, Objectives and Schedules						
Task 3	Evaluate the effectiveness of the watershed-based feral swine education trainings.					
Costs	Federal	$69,903	Non-Federal	$46,602	Total	$116,505
Objective	To measure both knowledge gained and plans for practice adoption of individuals participating in the program.					
Subtask 3.1	Texas A&M Natural Resources Institute will administer a post-test retrospective evaluation instrument to evaluate increased knowledge gained, dollars saved, and plans for practice adoption by individuals within the selected watersheds to evaluate participant satisfaction with the program, and to evaluate participant's intentions to adopt abatement practices.					
	Start Date	Month 1	Completion Date	Month 36		

Subtask 3.2	Texas A&M Natural Resources Institute will analyze results obtained from evaluations using standard statistical procedures. Results will be incorporated into the final report and shared with County Extension Agents.			
	Start Date	Month 1	Completion Date	Month 36
Deliverables	• Post-test retrospective evaluations for feral swine educational trainings. • Results from evaluations included in the final report.			

Tasks, Objectives and Schedules						
Task 4	Produce, distribute, and manage computer-based information and trainings.					
Costs	Federal	$192,242	Non-Federal	$128,161	Total	$320,403
Objective	To use social media and web-based outlets to convey feral swine management information to clientele					
Subtask 4.1	Texas A&M Natural Resources Institute will use websites such as NRI's YouTube, NRI's blog, NRI's wild pig website, and others to distribute promotional material, news releases, videos, and extension articles.					
	Start Date	Month 1	Completion Date	Month 36		
Subtask 4.2	Texas A&M Natural Resources Institute will produce at least 3 videos annually. These videos will be published and made available to the public through our social media outlets.					
	Start Date	Month 1	Completion Date	Month 36		
Subtask 4.3	Texas A&M Natural Resources Institute will assess our social media outlets with Google Analytics or similar features and report these metrics. These metrics will include reports such as the number of visitors, unique visitors, page views, video views, and reads that indicate use by clientele.					
	Start Date	Month 1	Completion Date	Month 36		
Subtask 4.4	Texas A&M Natural Resources Institute will develop at least 1 Private Land Stewardship Short Course used to teach landowners and the public about feral swine annually. These short courses will be available online through Texas A&M Natural Resources Institute.					
	Start Date	Month 1	Completion Date	Month 36		
Deliverables	• Results of information delivered through social media outlets. • Videos as produced and disseminated. • Private Land Stewardship short courses as produced and disseminated.					

Project Goals (Expand from Summary Page)

• Facilitate statewide implementation of the feral swine damage management education program through watershed-based group trainings. Increase stakeholder involvement in abatement of feral swine and their damage to aid WPP and/or TMDL implementation or development processes by educating local citizens.
• Promote healthy watersheds by increasing citizen awareness, understanding, and knowledge about the potential impairments caused by feral swine and the abatement practices to reduce their numbers that should minimize NPS pollution.
• Enhance watershed education across the state as it relates to the reduction of feral swine damage in Texas. Enhance learning opportunities for watershed education across the state and establish a larger, more well-informed citizen base.
• Empower individuals and communities to find creative solutions to improve watershed health by properly managing populations of the feral swine.

Measures of Success (Expand from Summary Page)

• Deliver a minimum of 12 watershed-based feral swine education trainings annually in selected watersheds (mix of 4-hour and 1-hour programs)
• Numbers of citizens (represented by contact hours) participating in watershed-based feral swine education trainings
• Increased knowledge gained and plans to adopt abatement practices by individuals participating in the program, as measured by post-test retrospective evaluations

2022 Texas NPS Management Program **Reference (Expand from Summary Page)**
Components, Goals, and Objectives
Component 1 – Explicit short- and long-term goal, objectives and strategies that protect surface water and groundwater, as appropriate LTG: Protect and restore water quality affected by nonpoint source pollution through assessment, implementation, and education. 1. Focus nonpoint source abatement efforts, implementation strategies, and available resources in watersheds and aquifers identified as impacted by nonpoint source pollution. 2. Support the implementation of state, regional, and local programs to prevent nonpoint source pollution through assessment, implementation, and education. 3. Support the implementation of state, regional, and local programs to reduce nonpoint source pollution, such as the implementation of strategies defined in TMDL I-Plans, WPPs, and other water quality planning efforts in the state. 4. Support the implementation of state, regional, and local programs to reduce nonpoint source pollution to groundwater through the Texas Groundwater Protection Strategy, based on the potential for degradation with respect to use. 6. Develop partnerships, relationships, memoranda of agreement, and other instruments to facilitate collective, cooperative approaches to manage nonpoint source pollution. 7. Increase overall public awareness of nonpoint source issues and prevention activities. 8. Enhance public participation and outreach by providing forums for citizens and industry to contribute their ideas and concerns about the water quality management process. STG 3: Conduct education and technology transfer activities to increase awareness of nonpoint source pollution and activities which contribute to the degradation of water bodies, including aquifers, by nonpoint source pollution. • Objectives A: Enhance existing outreach programs at the state, regional, and local levels to maximize the effectiveness of nonpoint source education. • Objective B: Administer programs to educate citizens about water quality and their potential role in causing nonpoint source pollution. • Objective G: Implement public outreach and education activities to maintain and restore water quality in water bodies impacted by nonpoint source pollution.
Component 2: Working partnerships and linkages to appropriate state, interstate, tribal, regional, and local entities, private sector groups, and federal agencies.
Component 3: Combination of statewide nonpoint source programs and on-the-ground projects achieve water quality benefits; efforts are well-integrated with other relevant state and federal programs.

EPA State Categorical Program Grants – Workplan Essential Elements FY 2022-2026 EPA Strategic Plan Reference
Strategic Plan Goal – 5.0 Ensure Clean and Safe Water for All Communities
Strategic Plan Objective – 5.2 - Protect and Restore Waterbodies and Watersheds
This workplan supports Goal 5 (Ensure Clean and Safe Water for All Communities) and Objective 5.2 (Protect and Restore Waterbodies and Watersheds) by fulfilling the Texas State and Soil Water Conservation Board's NPS Program for education, assessments, best management practices, and related water quality activities.

Part III – Financial Information

Budget Summary				
Federal	$	629,159	% of total project	60%
Non-Federal	$	419,440	% of total project	40%
Total	$	1,048,599	Total	100%

Category	Federal	Non-Federal	Total
Personnel	$ 357,015	$ 200,303	$ 557,318
Fringe Benefits	$ 142,939	$ 46,995	$ 189,934
Travel	$ 9,720	$ 0	$ 9,720
Equipment	$ 0	$ 0	$ 0
Supplies	$ 19,290	$ 0	$ 19,290
Contractual	$ 0	$ 0	$ 0
Construction	$ 0	$ 0	$ 0
Other	$ 18,131	$ 0	$ 18,131
Total Direct Costs	$ 547,095	$ 247,298	$ 794,393
Indirect Costs (≤ 15%)	$ 82,064	$ 79,135	$ 161,199
Unrecovered Indirect Costs	$ 0	$ 93,007	$ 93,007
Total Project Costs	$ 629,159	$ 419,440	$ 1,048,599

Budget Justification (Federal)		
Category	Total Amount	Justification
Personnel	$ 357,015	Principal Investigator: No salary or benefits requested; Co-PI: No salary or benefits requested; Program Manager: $9,897 ($76,776 at 4.17% effort/year); No change Project Coordinator, II: $163,493 ($55,985 at 94.63% effort/year); $9,273 to be covered by Extension. Project Coordinator, I: $139,303 ($48,069 at 93.76% effort/year); $9,273 to be covered by Extension. Project Coordinator: $17,813($48,511 at 11.88% effort/year); $930 to be covered by Extension. Communications Manager: $26,509 (64,850at 13.23% effort per year). $6,904 will be covered by Extension. The adjusted salaries above are current and reflect the state mandated pay increase and merit increases. The increases will be covered by Texas A&M AgriLife Extension.
Fringe Benefits	$ 142,939	Benefits for full time employees are calculated at 18.9% of salaries plus $963/month insurance. Fringe benefits cover FICA, UCI, WCI, and retirement **(**Fringe benefits estimates are based on salary estimates listed. Actual fringe benefits will vary between months coinciding with percent effort variations; but in the aggregate, will not exceed the overall estimated total.)
Travel	$ 9,720	Per Diem - $5,310 (15 trips/year x 3 years x 2 days/trip @ state rate). Hotel - $4,410 (15 trips per year x 3 years x 1 night /trip x @ state rate).
Equipment	$ 0	N/A
Supplies	$ 19,290	Laptop Computers (2) - $5,000 Required computer accessories - $1,000 Batteries - $200 Tech upgrades for presentation hardware - $1,000 Media for publications, social media videos and presentations - $2,250 Projector - $2,500 Vehicle accessories (hitches, toolboxes, etc.) - $2,000 Programmatic and field supplies - $1,500 Game cameras and associated costs - $2,100 Printer ink and paper - $500 Other misc. office supplies - $640 Flash drives for extension publications 150 x $4 ea. - $600
Contractual*	$ 0	N/A
Construction	$ 0	N/A
Other	$ 18,131	Website maintenance $61.83 per month @ 36 months ($2,226) NRI fleet vehicle mileage at state rate ($12,905) Conference Fees $1,000/year ($3,000)
Indirect	$ 82,064	15% of MTDC $547,095 = $82,064.

Budget Justification (Non-Federal)		
Category	Total Amount	Justification
Personnel	$ 200,303	Principal Investigator: $63,259($156,250 at 12.72% effort/year); Co-PI: $137,044($315,593 at 13.64% effort/year).). The adjusted salaries above are current and reflect the state mandated pay increase. The increase will be covered by Texas A&M AgriLife Extension.
Fringe Benefits	$ 46,995	Benefits for full time employees are calculated at 18.9% of salaries plus $963/month insurance. Fringe benefits cover FICA, UCI, WCI, and retirement. (Fringe benefits estimates are based on salary estimates listed. Actual fringe benefits will vary between months coinciding with percent effort variations; but in the aggregate, will not exceed the overall estimated total.)
Travel	$ 0	N/A
Equipment	$ 0	N/A
Supplies	$ 0	N/A
Contractual*	$ 0	N/A
Construction	$ 0	N/A
Other	$ 0	N/A
Indirect	$ 79,135	32% of MTDC $247,298 = $79,135
Indirect Unrecovered	$ 93,007	17% of MTDC $547,095 = $93,007.