



**Texas State Soil and Water Conservation Board
 Clean Water Act §319(h) Nonpoint Source Grant Program
 FY 2017 Workplan 17-10**

SUMMARY PAGE			
Title of Project	Continued Statewide Delivery of the Texas Well Owner Network & Water Resources Education and Outreach for Students and Teachers		
Project Goals	<ul style="list-style-type: none"> Continued statewide implementation of the Texas Well Owner Network (TWON) program through (1) “Well Educated” programs of 4-6 hours, and (2) “Well Informed” programs of 1-2 hours Improve and protect well water and surface water quality by increasing awareness of water quality issues and knowledge of best management practices (BMPs) through improved private well management Provide and develop content and resources for training and educating Texas students and teachers on water quality and other environmental related topics. 		
Project Tasks	(1) Project Administration; (2) Coordination and delivery of TWON Well Educated and Well Informed events, (3) Evaluate the effectiveness of TWON trainings, (4) Coordinate and develop Youth Water Education content and resources, (5) Conduct Youth Education resource program delivery, and (6) Youth Education programming evaluations		
Measures of Success	<ul style="list-style-type: none"> Increase well owner awareness of water quality issues and knowledge of BMPs through distribution of TWON publications and delivery of 60 TWON Well Educated and Well Informed events Deliver at least 30 TWON Well Educated (4- to 6-hour) events in selected watersheds Deliver at least 30 TWON Well Informed (1- to 2-hour) events in selected watersheds Measure impact of program delivery through participation in TWON events and increased knowledge and understanding of program participants Increase Texas students and teachers understanding of water quality and other environmental topics Delivery of 5 youth education training events for teachers in priority watershed areas. Participation in 6 Texas STEM educator conferences to present and advertise developed program materials and resources. Delivery of 10 community events to educate youth on water quality, nonpoint source pollution, watershed protection, and other environmental topics Delivery of 4 student training programs for service-learning programs on watershed protection and water quality Participation in 5 established youth education events, working with local Texas A&M AgriLife County Extension Agents, in priority watershed areas Measure impact of the 5 training events for teachers to assess participant’s program satisfaction and intentions to incorporate training materials and resources into their coursework, Conduct 1 virtual follow-up training for teachers who participated in teacher training events to gauge experience with workshop materials and successes encountered. 		
Project Type	Implementation (); Education (X); Planning (); Assessment (); Groundwater (X)		
Status of Waterbody on <i>2014 Texas Integrated Report</i>	<u>Segment ID</u>	<u>Parameter of Impairment or Concern</u>	<u>Category</u>
	0207	Bacteria	5b
	0612	Bacteria	5b
	0901	Bacteria, PCBs and Dioxin	5c, 5a, 5a
	1105	Bacteria	5c
1103	Bacteria, Depressed DO	5a	

	1804A	Bacteria	5c
	2311	Depressed DO	5c
	1209	Bacteria	5c
	1217D	Depressed DO	5c
	1221	Bacteria	5c
	1221A	Depressed DO, Bacteria	5b and 5b
	1221D	Bacteria	5b
	1221F	Bacteria	5c
	1901	Bacteria	4a
	1301	Bacteria	5c
	1302	Bacteria	5b
	1302A	Bacteria	5b
	1302B	Bacteria	5b
		Depressed DO	5c
	1202K	Bacteria	5c
	1908	Bacteria	5c
		Chloride	5c
	1245C	Bacteria	5b
	1245D	Bacteria	5b
	1245F	Bacteria	5b
	1245I	Bacteria	5b
	1421	Bacteria and Depressed DO	5c and 5c
	1911	Impaired fish community	5c
	1911B	Bacteria	5a
	1911C	Bacteria	5a
	1911D	Bacteria	5a
	1911E	Bacteria	5c
	1911H	Depressed DO	5c
	1911I	Bacteria	5c
	2102	TDS	5c
	2201 and 2202	Bacteria	5c
	2422B and D	Bacteria, Depressed DO, Dioxin, PCBs	5c, 5b, 5a, 5a
	1815	Depressed DO, Impaired habitat	CS and CS

<p>Project Location (Statewide or Watershed and County)</p>	<p>Statewide with priorities for: Adams and Cows Bayous in Adams, Jasper and Newton Counties; Attoyac Bayou in Rusk, Nacogdoches, San Augustine, and Shelby Counties; Arroyo Colorado in Cameron and Willacy Counties; Bastrop Bayou Watershed in Brazoria County; Buck Creek in Donley, Collingsworth, and Childress Counties; Dickinson Bayou in Brazoria and Galveston Counties; Cedar Bayou in Chambers, Liberty and Harris Counties; Concho River in Irion, Runnels, Sterling, Coke, Reagan, Tom Green, Schleicher, and Concho Counties; Cypress Creek in Hays County; Dickinson Bayou in Brazoria and Galveston Counties; Double Bayou in Chambers County; Geronimo Creek Watershed in Guadalupe and Comal Counties; Pecos River Watershed in Texas in Crane, Crockett, Pecos, Reeves, Terrell, Upton, and Ward Counties; Plum Creek Watershed in Caldwell, Hays, and Travis Counties; Lampasas River Watershed in Bell, Burnet, Coryell, Hamilton, Lampasas, Mills, and Williamson Counties; Leon River Watershed below Proctor Lake in Comanche, Hamilton, Erath, , Mills and Bell Counties; Navasota River in Grimes, Leon, Robertson, Brazos, Madison and Limestone Counties; Nueces River below Lake Corpus Christi in Nueces, Jim Wells and San Patricio Counties; Lower San Antonio River Watershed in DeWitt, Goliad, Guadalupe, Karnes, Refugio, Victoria, and Wilson Counties; Peach Creek in Bastrop, Caldwell, Fayette, Gonzales and Counties; San Bernard River Watershed in Austin, Colorado, Wharton, Fort Bend, and Brazoria Counties; Lake Granbury Watershed in Hood, Parker, Palo Pinto, Ranger, Erath, and Jack Counties; Gilleland Creek in Travis County; Lake Houston Area Watersheds in Grimes, Harris, Liberty, Montgomery, San Jacinto, Walker, and Waller Counties; Mill Creek in Washington and Austin Counties; Upper Cibolo Creek in Kendall County; Upper Llano River watershed in Edwards, Kerr, Kimble, Menard, Real, and Sutton Counties; Upper Oyster Creek in Fort Bend County; Upper San Antonio River in Bexar County; and any new watersheds identified for TMDL or WPP development.</p>					
<p>Key Project Activities</p>	<p>Hire Staff (); Surface Water Quality Monitoring (); Technical Assistance (); Education (X); Implementation (); BMP Effectiveness Monitoring (); Demonstration (); Planning (); Modeling (); Bacterial Source Tracking (); Other ()</p>					
<p>2012 Texas NPS Management Program Reference</p>	<ul style="list-style-type: none"> • Component 1 – LTG Objectives 1, 2, 4, 7 • Component 1 – STGs 2C, 3A, 3B, 3D, 3E, 3G • Components 2, 3 					
<p>Project Costs</p>	<p>Federal</p>	<p>\$757,749</p>	<p>Non-Federal</p>	<p>\$491,766</p>	<p>Total</p>	<p>\$1,249,515</p>
<p>Project Management</p>	<ul style="list-style-type: none"> • Texas Water Resources Institute • Texas A&M AgriLife Extension Service 					
<p>Project Period</p>	<p>October 1, 2017 – August 31, 2023</p>					

Part I – Applicant Information

Applicant							
Project Lead	Dr. Troy Allen Berthold						
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Project Co-Lead	Joel Pigg						
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Project Co-Lead	Dr. Anish Jantrania						
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Project Co-Lead	Shelly Tornquist						
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Project Co-Lead	Dr. Kelly Albus						
Title	Extension Program Specialist III						
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Project Co-Lead	David W. Smith						
Title	Extension Program Specialist						
Organization	Texas A&M AgriLife Extension Service, Dept. of Biological & Agricultural Engineering						
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Telephone Number	979.862.1989			Fax Number			

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, TCEQ and the Texas Groundwater Protection Committee.
Texas Water Resources Institute (TWRI), Texas A&M AgriLife Extension Service	Project coordination and administration. Host and maintain the TWON and youth education website/educational material clearinghouse. Assist in development and distribution of TWON and youth education press releases and publications. Assist with reviewing, modifying, and developing educational resources and tools for youth teachers and students. Assist in the execution of youth education community events, service-learning student training programs, and youth education training for teachers.
Texas A&M AgriLife Extension Service – Department of Soil and Crop Sciences (SCSC)	Project coordination with watershed coordinators, County Extension Agents and groundwater conservation districts; update and tailor educational materials and programs to local conditions; deliver programs; provide content management for TWON website/educational material clearinghouse; and conduct program/educational material evaluations.
Texas A&M AgriLife Extension Service – Department of Biological and Agricultural Engineering (BAEN)	Assist with developing supplemental TWON materials and delivering educational programs. Assist with reviewing, modifying, and developing educational resources and tools for youth teachers and students. Assist in the execution of youth education community events and service-learning student training programs.
Texas Water Development Board (TWDB) and the Texas Alliance of Groundwater Districts	Support coordination with the Texas Alliance of Groundwater Districts as appropriate in order to communicate project goals, activities, training opportunities and accomplishments to affected parties.
Texas A&M AgriLife- The Dallas Center	Assist with reviewing, modifying, and developing educational resources and tools for youth teachers and students. Assist in the execution of youth education community events and youth education trainings for teachers. Oversee the execution of youth education training for teachers’ evaluation and organize the delivery of the virtual youth education follow-up training for teachers’ evaluation.
Texas A&M University, College of Engineering, Spark!	Assist with reviewing, modifying, and developing educational resources and tools for youth teachers and students. Assist in the execution of youth education community events and youth education trainings for teachers.

Part II – Project Information

Project Type							
Surface Water	X	Groundwater	X				
Does the project implement recommendations made in (a) a completed WPP, (b) an adopted TMDL, (c) an approved I-Plan, (d) a Comprehensive Conservation and Management Plan developed under CWA §320, (e) the <i>Texas Coastal NPS Pollution Control Program</i> , or (f) the <i>Texas Groundwater Protection Strategy</i> ?				Yes	X	No	
If yes, identify the document.		Attoyac Bayou Watershed Protection Plan; Buck Creek Watershed Protection Plan; A Watershed Protection Plan for the Arroyo Colorado Phase I; Buck Creek Watershed Protection Plan; Cedar Bayou Watershed Protection Plan; Concho River Watershed Protection Plan; Cypress Creek Watershed Protection Plan; Eight Total Maximum Daily Loads for Indicator Bacteria in Dickinson Bayou and Three Tidal Tributaries; Double Bayou Watershed Protection Plan; Geronimo Creek and Alligator Creeks Watershed Protection Plan; Fifteen TMDLs for Indicator Bacteria in Watersheds of the Lake Houston Area; Lake Granbury Watershed Protection Plan Implementation; Lampasas River Watershed Protection Plan; Implementation Plan for One Total Maximum Daily Load for Bacteria in Gilleland Creek; Leon River Watershed Protection Plan; Lower Nueces River Watershed Protection Plan; One Total Maximum Daily Load for Bacteria in the Lower San Antonio River; One Total Maximum Daily Load for Bacteria in Peach Creek; Mill Creek Watershed Protection Plan; Plum Creek Watershed Protection Plan; Upper Cibolo Creek Watershed Protection Plan; Upper San Antonio River Watershed Protection Plan; San Bernard River Watershed Protection Plan; One TMDL for Bacteria in Upper Oyster Creek					
If yes, identify the agency/group that developed and/or approved the document.		Attoyac Bayou Watershed Partnership facilitated by TWRI and TSSWCB;	Year Developed	2014			
		Arroyo Colorado Watershed Partnership facilitated by Texas Sea Grant, TCEQ and the U.S. EPA		2007			
		Bastrop Bayou Stakeholder Group facilitated by Houston-Galveston Area Council, Galveston Bay Estuary Program and TCEQ; University of Houston, and CDM;		2011			
		Buck Creek Watershed Protection Plan facilitated by TWRI and TSSWCB;		2014			
		Cedar Bayou Watershed Partnership facilitated by the H-GAC, Galveston Bay Estuary Program, TSSWCB, and U.S. EPA		2016			
		Concho River Watershed Advisory Committee facilitated by the Upper Colorado River Authority, TSSWCB, U.S. EPA, and Texas Institute for Applied Environmental Research;		2011			

	<p>Cypress Creek WPP facilitated by The Meadows Center, TCEQ, Texas A&M AgriLife Extension, City of Wimberley, Blue Hole, Hays Trinity Groundwater Conservation District, U.S. EPA, Hays County, Texas Clean Rivers Program, City of Woodcreek, Texas Water Development Board, TSSWCB, Guadalupe-Blanco River Authority (GBRA), and the Wimberley Valley Watershed Association;</p>		2015
	<p>Eight Total Maximum Daily Loads for Indicator Bacteria in Dickinson Bayou and Three Tidal Tributaries; facilitated by TCEQ</p>		2012
	<p>Double Bayou Watershed Partnership facilitated by Galveston Bay Estuary Program, TCEQ, TSSWCB, Houston Advanced Research Center, U.S. Geologic Survey, and Shead Conservation Solutions</p>		2016
	<p>Geronimo Creek Watershed Partnership facilitated by Texas A&M AgriLife Extension Service and TSSWCB;</p>		2012
	<p>One Total Maximum Daily Load for Bacteria in the Lower San Antonio River; facilitated by TCEQ</p>		2008
	<p>One Total Maximum Daily Load for Bacteria in Peach Creek; facilitated by TCEQ</p>		2008
	<p>Landowners and entities in the Pecos River watershed, facilitated by AgriLife Extension, TWRI and TSSWCB;</p>		2008
	<p>Plum Creek Watershed Partnership and facilitated by Texas AgriLife Extension Service and TSSWCB;</p>		2008; 2014
	<p>Lampasas River Watershed Partnership facilitated by Texas A&M AgriLife Research and TSSWCB;</p>		2012
	<p>Landowners and entities in the Leon River watershed, facilitated by Brazos River Authority and TSSWCB;</p>		2012

	Nueces River Watershed Partnership facilitated by the Nueces River Authority and TSSWCB		2016
	Landowners and entities in the San Bernard River watershed, facilitated by the Houston-Galveston Area Council and TCEQ;		2013
	The Lake Granbury Watershed Protection Plan Stakeholders Committee facilitated by the Brazos River Authority and TCEQ;		2011
	Mill Creek Watershed Partnership facilitated by Texas A&M AgriLife Extension Service and the TSSWCB;		2015
	Upper Cibolo Creek Watershed Partnership facilitated by the City of Boerne, Texas landowners and entities in the Upper Cibolo Creek watershed and the TCEQ;		2013
	One TMDL for Bacteria in Upper Oyster Creek prepared by the TCEQ;		2007
	Upper San Antonio River Watershed Partnership facilitated by Texas A&M AgriLife Research, San Antonio River Authority, and the TCEQ		2007; ongoing

Watershed Information				
Watershed or Aquifer Name(s)	Hydrologic Unit Code (12 Digit)	Segment ID	Category on 2014 IR	Size (Acres)
Adams and Cow Bayous	120100051100, 120100051001, 120100051002, 120100051003, 120100051004, 120100051005	0508, 0508A, 0508B, 0508C, 0511, 0511A, 0511B, 0511C, 0511E	4a	160,000
Arroyo Colorado (Lower, Middle and Upper)	121102080700, 121102080600, 121102080100	2201 and 2202	5c	1,169,920
Attoyac Bayou	120200050301 – 120200050307, 120200050401 – 120200050406,	0612	5b	354,629
Bastrop Bayou Tidal	120402050400	1105	5c	138,880
Buck Creek	111201050204, 111201050208, 111201050303,	0207	5b	184,960

	111201050305 – 111201050307, 111201050401 – 111201050407, 111201050501 – 111201050502			
Cedar Bayou Tidal	120402030101, 120402030102, 120402030103, 120402030104, 120402030105, 120402030106	0901	5c	92,800
Concho River	120800041104 120800070204 120901010206 120901020101 120901020103 120901020201- 120901020205 120901020306 120901020501 120901020505- 120901020509 120901030402- 120901030404 120901030504 120901030601- 120901030602 120901030701- 120901030706 120901030801- 120901030804 120901030901- 120901030909 120901031001- 120901031006 120901031101- 120901031105 120901040101 120901040102 120901040104 120901040106 120901040107 120901040203 120901040204 120901040301- 120901040303 120901040305 120901040401 120901040403 120901040404 120901040406-	1421	5c	4,200,000

	120901040408 120901040502- 120901040505 120901040508- 120901040510 120901050101- 120901050107 120901050201- 120901050207 120901050301 120901050302 120901050304- 120901050308 120901050401- 120901050407 120901040103 120901040105 120901040108 120901040205- 120901040207 120901040304 120901040306 120901040402 120901040405 120901040501 120901040506 120901040507 120901020102 120901020302- 120901020305 120901020401- 120901020408 120901020502- 120901020504 120901090102 120901090103 120901090104			
Cypress Creek	121002030202	1815	SI	24,328
Dickinson Bayou	120402040200	1103	5a	63,287
Double Bayou	120402020100	2422B 2422D	5c 5c	89,325
Geronimo Creek (including its tributary, Alligator Creek)	121002020110, 121002020111	1804A	5c	44,152
Gilleland Creek	120903010106	1428C	4a	52,866
Lake O' The Pines	111403050401, 111403050402, 111403050403, 111403050404, 111403050405, 111403050406, 111403050407, 111403060101	0403		

Spring Creek	120401020201, 120401020205, 120401020209, 120401020212, 120401020213	1008	5c, 5c	100,148
Spring Branch	120401030101, 120401030102, 120401030104, 120401030105, 120401030110	1010C	5c	114,773
Mill Creek	1207010402	1202K	5c	256,000
North and South Llano River	12090202, 12090203	1415_05, 1415_06	1	605,622 604,228
Navasota River	120701030201- 204; 0307, 0309; 0401-0407; 0501- 0510; 0601-0604; 0701-0707; 0801- 0804	1209	5b	1,002,056
Plum Creek	110901050702, 110901050703, 111002030102, 111301050208, 111302090204, 120100040204, 120301010104, 120500030306, 120601020401, 120702010804, 120702010805, 120800020403, 121002030401 – 121002030403	1810	4b	288,240
Lampasas River (Lampasas River above Stillhouse Hollow Lake, Rocky Creek, Sulphur Creek, Simms Creek)	120702030101 – 120702030509	1217 1217A 1217B 1217C 1217D	5c 5b 2 2 5c	839,800
Leon River below Proctor Lake	120702010501 – 120702010509, 120702010601 – 120702010605, 120702010701 – 120702010705, 120702010801 – 120702010806, 120702010901 – 120702010908, 120702011002	1221	5c	871,488
Lower Nueces River	121101110701, 121101110705	2102	5c	116,862
Lower San Antonio River	121003030202,	1901	4a	776,863

	121003030205, 121003030206, 121003030403, 121003030404, 121003030501, 121003030503, 121003030505, 121003030604 – 121003030608, 121003040405			
San Bernard River	120904010101, 120904010102, 120904010104, 120904010109, 120904010205, 120904010207, 120904010302, 120904010304 – 120904010306, 120904010308	1301 1302 1302A 1302B	5c 5a 5c 5c	672,000
Lake Granbury	120602010601 – 0608, 120602010701 – 0706, 120602010801 – 120602010809, 120602010901 – 120602010907, 120602011001 – 120602011004, 120602011101 – 120602011110, 120602011201 – 120602011208	1205	2	1,335,138
Upper Cibolo Creek	1210030402	1908	5c	49,210
Upper Oyster Creek	120402050100, 120402050200, 120701040403	1245C 1245D 1245F 1245I	5b	65,649
Upper San Antonio River (and Apache Creek, Alazan Creek, San Pedro Creek, Sixmile Creek, Picoso Creek, Martinez Creek)	1210030306	1911 1911B 1911C 1911D 1911E 1911H 1911I	5c 5a 5a 5a 5c 5c 5c	80,000

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: *2014 Texas Integrated Report*, Clean Rivers Program Basin Summary/Highlights Reports, or other documented sources.

This project will continue statewide implementation of the TWON program. Watersheds and aquifers will be selected in collaboration with the TSSWCB and with input from other interested groups including groundwater conservation districts (GCDs), County Extension Agents (CEAs), river authorities and Soil and Water Conservation Districts (SWCDs). Many of the watersheds and aquifers selected are described in the *Texas NPS Management Program* or identified as impaired in the *2014 Texas Integrated Report*.

The U.S. Geological Survey (USGS, DeSimone et al. 2009) reported that nitrate was the most commonly detected contaminant in private wells derived from man-made sources at concentrations greater than the EPA Maximum Contaminant Level (MCL). A second finding was that total coliform bacteria were detected in 34% of sampled wells. The MCL goal for fecal coliform bacteria, including *Escherichia coli*, in drinking water is zero.

For 2003-2008, the TWDB reported that for the 3,861 private water wells sampled, the percentage of wells exceeding the nitrate MCL varied from 2% to 50% each year, depending on the region. Additionally, results of well screenings conducted by the Texas A&M AgriLife Extension Service from 2003-2009 indicated that about 33% of private wells in Texas contain coliform bacteria.

Segment ID	Body Name	Impairment	Code
0207	Buck Creek (Lower Prairie Dog Town Fork)	Bacteria	5b
0508 and 0511	Adams and Cow Bayou	Bacteria, Depressed DO, pH	4a
0612	Attoyac Bayou	Bacteria	5b
0901	Cedar Bayou Tidal	Bacteria, PCBs, Dioxin	5c, 5a, 5a
1105	Bastrop Bayou Tidal	Bacteria	5c
1103	Dickinson Bayou	Bacteria, Depressed DO Dioxin, PCBs	5a and 5b 5a and 5a
1202K	Mill Creek	Bacteria	5c
1804A	Geronimo Creek	Bacteria	5c
2311	Upper Pecos River	Depressed DO	5c
1810	Plum Creek	Bacteria	4b
1209	Navasota River	Bacteria	5c
1217B	Sulphur Creek	Depressed DO	5c
1217D	North Fork Rocky Creek	Depressed DO	5b
1221	Leon River below Proctor Lake	Bacteria	5c
1221A	Resley Creek	Bacteria and Depressed DO	5b and 5b
1221D	Indian Creek	Bacteria	5b
1221F	Walnut Creek	Bacteria	5c
1901	Lower San Antonio River	Bacteria	4a
1301	San Bernard River Tidal	Bacteria	5c
1302	San Bernard River Above Tidal	Bacteria	5b
1302A	Gum Tree Branch	Bacteria	5b
1302B	West Bernard Creek	Bacteria and Depressed DO	5b and 5c
1421	Concho River	Bacteria and Depressed DO	5c and 5c
2102	Lower Nueces	TDS	5c
2201 and 2202	Arroyo Colorado	Bacteria	5c
2422B	Double Bayou West Fork	Bacteria, Depressed DO Dioxin, PCBs	5c and 5b 5a and 5a
2422D	Double Bayou East Fork	Bacteria, Dioxin, PCBs	5c, 5a, 5a

Water Quality Concerns			
0612	Attoyac Bayou	Bacteria	CN
0207	Buck Creek	Chlorophyll-a	CS
0207A	Buck Creek from OK state line to S of Hedley	Nitrate	CS
1804A	Geronimo Creek	Nitrate	CS
1217B	Sulphur Creek	Depressed DO	CS
1221	Leon River Below Proctor lake	Chlorophyll-a	CS
		Depressed DO	CS
1221A	Resley Creek	Chlorophyll-a	CS
		Nitrate	CS
		Bacteria	CN
		Orthophosphorus	CS
1221B	South Leon River	Depressed DO	CS
1221D	Indian Creek	Depressed DO	CN
		Nitrate	CS
		Orthophosphorus	CS
1205	Lake Granbury	Chlorophyll-a	CS
1901	Lower San Antonio River	Bacteria	CN
		Chlorophyll-a	CS
		Nitrate	CS
		Orthophosphorus	CS
		Total phosphorus	CS
2311	Upper Pecos River	Bacteria	CN
		Chlorophyll-a	CS
		Depressed DO	CS
		Golden alga	CN
1810	Plum Creek	Depressed DO	CS
		Nitrate	CS
		Orthophosphorus	CS
		Total phosphorus	CS
1301	San Bernard River Tidal	Chlorophyll-a	CS
1302	San Bernard River Above Tidal	Depressed DO	CS
1302A	Gum Tree Branch	Bacteria	CN
		Depressed DO	CS
1302B	West Bernard Creek	Depressed DO	CS
Special Interest			
0207A	Buck Creek	Bacteria	WAP
1205	Lake Granbury	Bacteria	WAP
1217	Lampasas River Above Stillhouse Hollow Lake	Bacteria	WAP
1415	Upper Llano	-	WAP
1815	Cypress Creek	Depressed DO, Impaired fish community, Impaired habitat, Impaired macrobenthic community	WAP

Project Narrative

Problem/Need Statement

Over 1,000,000 private water wells in Texas provide water to citizens in rural areas and increasingly to those living on small acreages in the rural-urban interface. Public drinking water supplies are generally of good quality and are monitored through requirements of the federal Safe Drinking Water Act; however, private well owners are independently responsible for monitoring the quality of their wells and frequently at greater risk for exposure to compromised water quality.

Management and protection of private water wells are under the control of the landowner, and therefore, depend primarily on education rather than regulation. To address the issues described above, which affect both surface water and groundwater, SCSC, BAEN and TWRI have developed TWON to deliver a science-based, community-responsive education curriculum. TWON focuses on protecting groundwater quality and aquifer integrity, and also complements the successful Texas Watershed Steward program by emphasizing the importance of implementing BMPs. The two most common private well pollutants, fecal coliform bacteria and nutrients, also are the most frequent cause of waterbody impairment or concern in Texas. It is likely that in many cases, local release of fecal coliform bacteria and nutrients is not limited to contamination of the property owner's private well and that these contaminants are transported off-site and contribute to pollutant loadings in surface waterbodies.

TWON provides training to Texans regarding water quality and BMPs for protecting their wells and surface waters, which averts off-site transport of contaminants (bacteria and nutrients) to surface waters, prevents contamination of underlying aquifers, and safeguards the health of landowners and their families. As a result, this program supports ongoing watershed protection planning efforts being conducted by TSSWCB and others by expanding the reach of these programs to additional audiences and resulting in greater BMP implementation for water quality improvement and protection. This project builds upon and continues the impact of TSSWCB projects #10-04 and 13-08, "Preventing Water Quality Contamination Through the Texas Well Owner Network" and "Statewide Delivery of the Texas Well Owner Network." Project information is at twon.tamu.edu, and a final report for the initial TWON project (10-04) is available at <http://twri.tamu.edu/media/545634/tr-463.pdf>.

Youth Education Component:

Across Texas' waterbodies, the management and protection of water quality continues to be a key issue of influencing the development of watershed protections plans (WPPs). The development of WPPs helps Texas water professionals bring funding, resources, and strategies to affected watershed areas that, when implemented effectively, can help lead to significant improvements in water quality across the state. An essential strategy in the WPP process is an effective education and outreach campaign. Education and outreach efforts towards the Texas community on water quality and nonpoint source pollution brings needed awareness to a community's current water quality situation and influences long-term behavioral changes. A typical education and outreach campaign targets Texas adults, but a key demographic that needs to be targeted is Texas youth. According to the United States Census Bureau, population estimates for the state of Texas in 2019 estimated that 25.5% of the total Texas population, close to 29 million, was comprised of individuals who were under the age of 18 (*United States Census Bureau, Jul. 2019*)¹. Today, there is no state programming standard to educate our future leaders on the importance of watershed protection planning and protecting Texas' water quality. Water professionals today must investigate ways to incorporate Texas youth in their water education campaigns if they are wanting their efforts to have long-term success.

There are many avenues Texas water professionals can explore to reach Texas youth. One essential avenue is Texas' classrooms and utilizing Texas teachers who are tasked with educating our younger generation. A report by the Texas Education Agency (TEA) reported that total enrollment in Texas public schools had increased by 13.3% in just a 10-year period; the 2019-2020 total enrollment indicated a total enrollment of 5,493,940 students (*Enrollment in Texas Public School 2019-2020, Aug. 2020*)². Our Texas teachers interact with numerous students on a daily basis and have the capability to make worthwhile impacts and provide opportunities for Texas youth to understand how they can better their local environments. Efforts must be made now by today's water professionals to equip Texas youth and Texas

teachers with the necessary tools and resources to bring needed knowledge and understanding towards the importance of protecting and preserving water quality in Texas' waterbodies.

1- United States Census Bureau. (2019). Quick Facts: Texas. <https://www.census.gov/quickfacts/TX>.

2- Texas Education Agency. (2020). (rep.). Enrollment in Texas Public Schools 2019-20. Retrieved from https://tea.texas.gov/sites/default/files/enroll_2019-20.pdf

Project Narrative

General Project Description (Include Project Location Map)

This project will continue statewide implementation of the TWON program, which builds institutional and local capacity to improve and protect both well water and surface water quality by improving awareness of water quality issues and increasing knowledge of BMPs. The training includes methods for safeguarding well water quality for landowners and their families and others relying on the availability of high quality groundwater stored by aquifers. Because improved understanding of water quality, human impacts and management practices to improve well and surface water quality will help to forestall off-site transport of coliform bacteria and nutrients to surface waters, TWON is an effective tool to bring to bear in WPP and TMDL implementation where investigations indicate bacterial and nutrient contributions. The program is delivered through (1) "Well Educated" programs of 4-6 hours, (2) "Well Informed" programs of 1-2 hours, and (3) evaluation of the program so that needed modifications and improvements can be made. Both versions of the program include opportunities for participants to have a water well sample screened for bacteria, nitrate and total dissolved solids (TDS). Program activities, deliverables, accounting and reporting will be managed by TWRI in cooperation with SCSC and BAEN.

TWON Water Well Events. A total of 60 Well Informed and Well Educated programs will be delivered; a minimum of 30 TWON Well Informed (approximately 10 each year) and 30 TWON Well Educated (approximately 10 each year) programs will be delivered throughout the project to provide wellhead protection information and recommendations for remediating well contamination, if appropriate. Educational materials such as the TWON Handbook, factsheets and PowerPoint modules developed through TSSWCB projects #10-04 and 13-08, "Preventing Water Quality Contamination Through the Texas Well Owner Network" and "Statewide Delivery of the Texas Well Owner Network," will be used. Trainings will be delivered by the TWON Coordinator, BAEN and/or SCSC Program Specialists and/or the SCSC Associate Professor and Extension Specialist, as appropriate. TWON educational programs are delivered in two forms: 1) Well Informed events will be scheduled for areas where the watershed coordinator or CEA recommends short and extremely focused events not lasting more than 2 hours, and 2) Well Educated programs will usually be delivered in other areas for more comprehensive, specific topics through a 4- to 6-hour event.

TWON Educational Program Topics. The TWON education curriculum emphasizes BMPs for safeguarding private well water quality and aquifer integrity. The TWON curriculum and publications include the following topics:

- Interpretation of well water screening results
- Watershed and groundwater hydrology and the importance to neighbors and the public of safeguarding aquifer integrity and groundwater quality
- Proper siting of drinking water wells and avoiding improper well construction techniques
- Proper maintenance and protection of the wellhead
- Proper household waste management
- Improperly sited and functioning on-site wastewater treatment systems
- Maintenance, aging and failure of on-site wastewater treatment systems
- Effects of land use changes on well water quality
- Locating and properly plugging abandoned wells

Selection of Screening/Training Locations. SCSC will collaborate with the TSSWCB and other state and local organizations to select locations for TWON events. SCSC 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.

Well Water Analyses. For both TWON Well Educated and Well Informed events, participants will be encouraged to arrive with private well water samples, collected using the Soil, Water and Forage Testing Laboratory water collection procedures (<http://soiltesting.tamu.edu/files/waterweb1.pdf>). Samples will be screened for nitrate, salinity concentrations and arsenic for areas where these contaminants are of concern according to the *Texas NPS Management Program* Appendix D Groundwater Constituents of Concern Report. For participants with positive results, remediation instructions and/or a recommendation and instructions will be given for sending follow-up samples to an accredited NELAC laboratory to perform drinking water analyses.

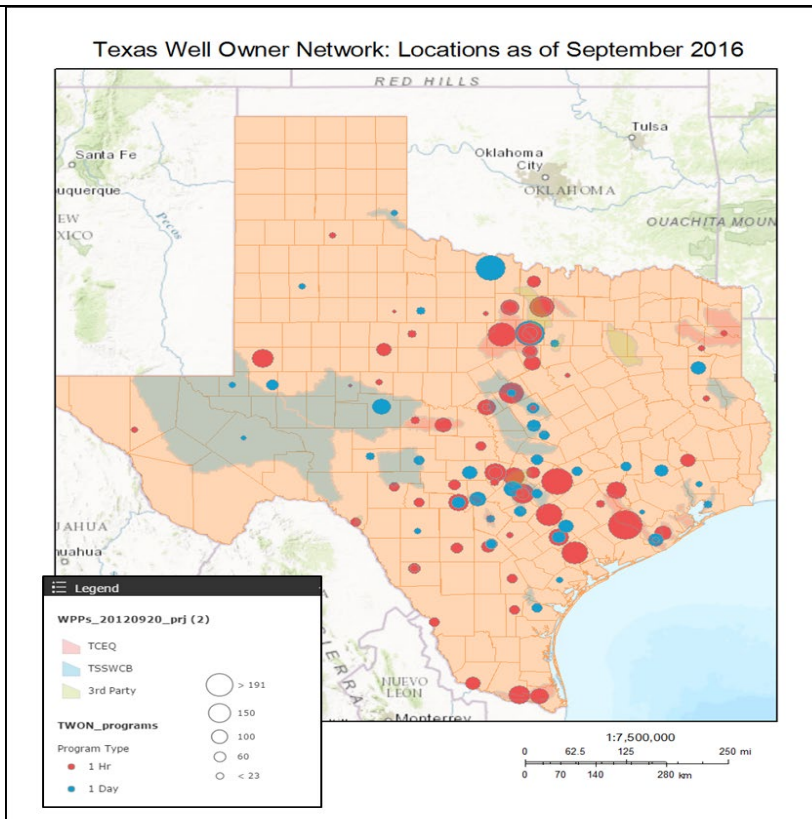
Screening for *E. coli* bacteria will either be conducted on-site or at Texas A&M University by the SCSC Program Specialist or nearby NELAC-certified laboratory representatives will be available at the beginning of the program to accept samples for analyses at their laboratories or participants will be issued a discounted voucher to be taken to the nearest cooperating NELAC-certified lab. During most of the screenings, results of bacterial analyses will not be available before the training is completed. Bacterial screening results and remediation instructions or recommendations for additional testing will be emailed or mailed to the participants, which allows them to receive bacterial screening results privately. Participants who use the voucher provided during the longer 4- to 6-hour trainings to submit a sample for bacterial analyses to a NELAC-certified lab will have begun the recommended practice of testing their water annually for fecal-indicator bacteria. TWON will request participants' permission to receive copies of bacterial lab results so that appropriate remediation recommendations and materials may be forwarded to those with positive analyses.

Most participants will be responsible for the cost of their water sample screening analysis (approximately \$10-\$20/sample depending on the laboratory or supplies used). Previous experience with private well water screenings has indicated that requiring a nominal fee improves attendance because the community perceives the program as being developed for all rather than targeting those with financial need. However, for underserved and student audiences, and by individual request through the CEA or watershed coordinator, costs of analyses will be underwritten by the project through the purchase of necessary supplies.

As a result of the training, participants will more clearly understand the relationships between practices in or near their well and the quality of water available for their families and other families pumping from the same formation. To increase delivery of the educational materials to a greater audience, any new or updated TWON educational materials will continue to be posted online (<http://twon.tamu.edu/fact-sheets/>) as they are developed to make them readily available to the public.

Assessment. An evaluation approach that was developed through TSSWCB projects #10-04 and #13-08 will be used to measure both knowledge and behavior changes of program participants. A pre-test/post-test evaluation strategy will be implemented at the beginning and end of each training event. The pre-test will ask knowledge-based questions and the post-test will measure knowledge change of participants. In addition, the post-test will include 'intentions to change' questions that will focus on behaviors that participants should adopt based on what they have learned.

A one year follow-up evaluation instrument will also be administered to participants via online technology. Emails will be sent to program participants to determine which practices were adopted one year after the program.



(Map of Texas Well Owner Network Training Locations)

Youth Education Component:

TWRI will coordinate closely with project partners made up of Texas A&M AgriLife-The Dallas Center, Texas A&M University- College of Engineering-Spark!, and Texas A&M AgriLife Extension Service – Department of Biological and Agricultural Engineering (BAEN)-Texas 4-H Water Ambassadors. Together, this team will conduct education and outreach to increase knowledge and understanding of water quality, nonpoint source pollution, and other environmental related topics for Texas students and teachers.

Coordinate and Develop Youth Water Education Resources: TWRI will work with project partners to conduct a review of existing education materials to get a better understanding of what is currently available for teacher and students. Materials reviewed not only will be utilized for student and teacher project engagement but also align with Texas Essential Knowledge and Skills (TEKS) requirements. Existing materials to be reviewed include, but not limited to: Texas 4-H Development youth materials, Texas A&M AgriLife Dallas Center youth materials, and Spark! PK-12 Engineering Education Outreach materials. Once review has been concluded, TWRI and project partners will work with teachers and youth educational coordinators to identify gaps in existing content as it relates to water quality and environmental sciences.

After reviewing of materials and needs assessment is finalized, TWRI and project partners will modify existing, or develop new educational resources that will be used at youth education for teachers' workshops. Workshops will focus on providing details of Texas water quality standards, water quality monitoring, and include interactive activities for teachers to conduct water quality classroom exercises. A classroom toolkit will also be developed and provided for teachers who attended a youth education for teachers' workshop event. Teachers will be able to use this toolkit in their classrooms to educate their students on watershed protection, pollution sources, control measures, and other relevant environmental topics as well as include interactive activities to advance student education.

The review of materials and needs assessment will also spur the development of service-learning kits for students that engage with service-learning opportunities and events. For this project, TWRI and project partners will be working with the Texas 4-H Water Ambassador group as the targeted students for the service-learning kits and student training events. Texas 4-H Water Ambassadors, formed in 2017, are a group of Texas high-schoolers who have taken the initiative to educate themselves about Texas water resources. The mission of the group is to “provide high school youth an opportunity to gain advanced knowledge and develop leadership skills related to the science, technology, engineering and management of water in Texas.” Texas 4-H Water Ambassadors are given numerous opportunities to gain knowledge and better understanding of Texas water issues and are tasked to pass along all information learned from these events to their local Texas communities. To date, 74 youth from across Texas have served as Texas 4-H Water Ambassadors and have made great impacts in their local communities. The development of the service-learning kits will aid these ambassadors in their mission as these kits will contain water quality interactive exercises, fact sheets, water education posters, speaker materials and, how-to guides for presenting resources and conducting exercises for their local education and outreach events.

Lastly, TWRI and project partners will host and maintain a project website to house project-related information and developed content. The project website will serve as a platform for teachers and students to access water quality and environmental science information to teachers and students.

Conduct Youth Education Resource Programming: With the developed youth education content and resources, TWRI and project partners will provide training and community outreach for teachers and students throughout Texas to raise awareness of water quality through education and outreach; prioritizing event and training locations based on priority watershed areas and Texas STEM educator events. Event delivery can be broken down as followed:

1. Youth Education Training for Teachers: Working with project partners, TWRI will organize and deliver five, day-long trainings for teachers using workshop materials and resources developed. Training will address topics such as Texas water quality standards, water quality monitoring, and provide interactive activities for teachers to conduct water quality classroom exercises. To check-in with attendees with these training events, TWRI and project partners will organize and conduct at least one follow-up training for teachers that have attended each of the five day-long trainings. Follow-up trainings further train teachers with the curriculum and resources developed from this project in and assess the use of workshop materials in the classroom. These will be delivered virtually and occur between one to three months after the initial training. Additionally, the project team will attend three conferences/trade shows annually such as STEM 4 innovation, the Texas STEM Conference, and the Conference for the Advancement of Science Teaching (CAST) to present and advertise training materials to Texas STEM educators.
2. Youth Education Training for Students: Utilizing content and resources developed, TWRI and project partners will deliver at least four trainings to students for service-learning programs on watershed protection, water quality, and other relevant topics. During these trainings, students will learn on how to effectively use service-learning resources kits in their own watersheds.
3. Youth Education Community Events: TWRI and project partners will coordinate and participate in ten community events to educate youth in targeted communities on water quality, nonpoint source pollution, watershed protection, and other relevant topics. Five of these events will occur in conjunction with youth education trainings for teachers, while the other five events will occur as stand-alone events or with established community events. Community events will be occurring in priority watershed areas. TWRI and project partners will deliver materials identified and developed for this project for these community events.
4. TWRI Youth Programming Events: Working with local Texas A&M AgriLife County Extension Agents, TWRI will present at already established youth events in the priority watershed areas. Events can include, but not limited to, youth agricultural days, county earth day events, 4-H meetings, or other

relevant educational opportunities. TWRI will utilize resources developed from project and participate in five events.

Youth Education Programming Evaluation: Focusing on the youth education events for teachers, in-person and virtual, TWRI and project partners will conduct post-training evaluations to assess overall effectiveness of training content, resources, and training events. For the five, in-person youth education training for teachers' workshops, evaluations will assess participant's program satisfaction, participant's intentions to incorporate training materials and resources into their coursework, and additional training feedback. For the virtual youth education for teachers' follow-up event(s), evaluations will gauge their experience with workshop materials, understand how they incorporated the training into their classroom, challenges and successes encountered, and request any additional feedback.

Tasks, Objectives and Schedules						
Task 1	Project Administration					
Costs	Federal	\$10,847	Non-Federal	\$6,066	Total	\$16,913
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	TWRI 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 1 st of January, April, July and October. QPRs shall be distributed to all Project Partners.					
	Start Date	Month 3	Completion Date	Month 60		
Subtask 1.2	TWRI will perform accounting functions for project funds and will submit appropriate Reimbursement Forms through sponsored research services (SRS) to TSSWCB at least quarterly.					
	Start Date	Month 1	Completion Date	Month 60		
Subtask 1.3	TWRI 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. TWRI will develop lists of action items needed following each project coordination meeting and distribute to project personnel.					
	Start Date	Month 1	Completion Date	Month 60		
Subtask 1.4	TWRI and SCSC will attend and participate in the Texas Groundwater Protection Committee and subcommittee meetings, Texas Alliance of Groundwater Districts conferences, and other meetings as appropriate to communicate project goals, activities and achievements accomplished to affected parties.					
	Start Date	Month 1	Completion Date	Month 42		
Subtask 1.5	TWRI, in collaboration with SCSC, will maintain the TWON website (twon.tamu.edu) to serve as a clearinghouse for TWON information and resources. Unique visitors will be tracked through the website and reported in QPRs.					
	Start Date	Month 1	Completion Date	Month 42		
Subtask 1.6	TWRI, in collaboration with SCSC, will develop a Final TWON Report that summarizes the TWON project activities completed and conclusions reached during the project and discuss the extent to which project goals and measures of success have been achieved.					
	Start Date	Month 3	Completion Date	Month 42		
Subtask 1.7	TWRI, in collaboration with youth education project partners, will develop Final Youth Education Report that summarizes the youth education project activities completed and conclusions reached during the project and discuss the extent to which project goals and measures of success have been achieved.					
	Start Date	Month 66	Completion Date	Month 72		
Deliverables	<ul style="list-style-type: none"> • 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	Coordination and delivery of TWON screenings and trainings					
Costs	Federal	\$404,917	Non-Federal	\$269,944	Total	\$674,861
Objective	Deliver a total of 60 TWON Well Informed 1- to 2-hour screenings and TWON Well Educated 4- to 6-hour trainings in priority watersheds and aquifers.					
Subtask 2.1	SCSC will continue to employ an Extension Program Specialist who will serve as the full-time TWON Program Coordinator and will be responsible for the general oversight and coordination of all project activities and for promoting, coordinating and/or delivering the TWON training events. SCSC will coordinate with the TSSWCB and other state and local organizations already involved in WPP/TMDL processes or who are planning future WPP/TMDL processes in specific watersheds to select locations for the TWON Well Educated and Well Informed events. SCSC and TSSWCB will periodically make collaborative decisions to re-prioritize and add/remove locations from the list.					
	Start Date	Month 1		Completion Date	Month 42	
Subtask 2.2	SCSC with assistance from TWRI will develop and disseminate informational materials to actively market TWON events including news releases, internet and social media postings, newsletter announcements, public/conference presentations, flyers, etc. As appropriate, TWRI will include information on the project in the <i>txH2O</i> , <i>Conservation Matters</i> e-letter and <i>AgriLife Today</i> . All announcements, letters and publications will be provided to the TSSWCB for review and comment prior to dissemination.					
	Start Date	Month 1		Completion Date	Month 42	
Subtask 2.3	Deliver 1- to 2-hour Well Informed events to provide well-head protection information and recommendations for remediating well contamination, if appropriate. Well Informed educational events will be delivered by the SCSC Associate Professor and Extension Specialist, TWON Coordinator and/or the SCSC Program Specialist as appropriate. A minimum of 30 Well Informed events (approximately 10 each year) will be delivered throughout the project. Events will include an opportunity for participant water samples to be screened for fecal indicator bacteria, nitrate and TDS and an overview of the well management topics discussed in more detail during comprehensive TWON Well Educated Events.					
	Start Date	Month 1		Completion Date	Month 42	
Subtask 2.4	Deliver 4- to 6-hour TWON Well Educated events in selected watersheds, with the minimum goal being 30 events delivered throughout the course of the project (approximately 10 each year) to increase local understanding of the factors that can adversely impact well water quality, and provide information and tools to prevent and/or resolve them. Well Educated events will include a well water quality screening opportunity for participants. Well Educated events will be delivered by the TWON Coordinator and a combination of the BAEN and SCSC Program Specialists and the SCSC Associate Professor and Extension Specialist.					
	Start Date	Month 1		Completion Date	Month 42	
Deliverables	<ul style="list-style-type: none"> List of program delivery watersheds selected in cooperation with TSSWCB, updated as needed Delivery of at least 30 (10 each year) 4- to 6-hour TWON Well Educated events Delivery of at least 30 (10 each year) 1- to 2-hour TWON Well Informed events Meeting notices, materials, agendas and attendance lists for TWON events Press releases, newspaper articles, newsletters and other public information, as developed and disseminated 					

Tasks, Objectives and Schedules						
Task 3	Evaluate TWON effectiveness					
Costs	Federal	\$40,947	Non-Federal	\$27,298	Total	\$68,245
Objective	To measure both knowledge and behavior changes of individuals participating in the program					
Subtask 3.1	SCSC will administer pre-test and post-test evaluations to evaluate knowledge increases by individuals participating in TWON regarding program principles, appropriate BMPs addressing proper private well management, participant satisfaction with the program and attendees' intentions to change their behavior as a result of their participation.					
	Start Date	Month 1	Completion Date	Month 42		
Subtask 3.2	SCSC will administer one-year follow-up evaluations via online techniques to assess behavior changes adopted and other activities by TWON Well Educated participants.					
	Start Date	Month 1	Completion Date	Month 42		
Subtask 3.3	SCSC will analyze results obtained from the pre-test/post-test and one-year follow-up evaluations using descriptive summary statistics. SCSC will modify the educational program and materials as appropriate.					
	Start Date	Month 3	Completion Date	Month 42		
Deliverables	<ul style="list-style-type: none"> Pre-test/post-test evaluation results for TWON training Follow-up evaluations for TWON training 					

Tasks, Objectives and Schedules						
Task 4	Coordinate and Develop Youth Water Education Content and Resources					
Costs	Federal	\$ 90,311	Non-Federal	\$57,076	Total	\$147,387
Objective	To develop content and resources for training and educating Texas students and teachers on water quality and other environmental related topics.					
Subtask 4.1	<p>TWRI will work with Texas A&M Engineering-SPARK!, Texas A&M AgriLife-Dallas, and Texas 4-H Water Ambassadors Program coordinators to review existing water quality educational resources that can be utilized for student and teacher project engagement and aligns with Texas Essential Knowledge and Skills (TEKS) . Existing materials will include, but not be limited to:</p> <ul style="list-style-type: none"> Texas 4-H Youth Development Texas A&M AgriLife Dallas Center Spark! PK-12 Engineering Education Outreach 					
	Start Date	Month 48	Completion Date	Month 54		
Subtask 4.2	TWRI and project partners will work with teachers and educational coordinators to identify gaps in existing content as it relates to water quality and environmental sciences. Results from this task will serve as the basis for what is developed in subtask 4.3 and 4.4.					
	Start Date	Month 48	Completion Date	Month 54		
Subtask 4.3	After the completion of subtasks 4.1 and 4.2, TWRI and project partners will modify existing, or develop new educational resources for teachers. Workshops will focus on providing details of Texas water quality standards, water quality monitoring, and include interactive activities for teachers to conduct water quality classroom exercises.					
	Start Date	Month 48	Completion Date	Month 54		
Subtask 4.4	After the completion of subtasks 4.1 and 4.2, TWRI and project partners will modify existing, or develop new educational resources for students. Classroom toolkits will focus on watershed protection, pollution sources and control measures, and other relevant environmental topics as well as include interactive activities to advance student education.					
	Start Date	Month 48	Completion Date	Month 54		
Subtask 4.5	TWRI and project partners will create educational kits for students that engage in service-learning projects, such as the Texas 4-H Water Ambassadors. Service-learning kits may contain water quality interactive exercises, fact sheets, water education posters, speaker materials and, how-to guides for presenting resources and conducting exercises.					

	Start Date	Month 48	Completion Date	Month 54
Subtask 4.6	TWRI and project partners will host and maintain a project website to house project-related information and developed content. The project website will serve as a platform for teachers and students to access water quality and environmental science information to teachers and students.			
	Start Date	Month 48	Completion Date	Month 72
Deliverables	<ul style="list-style-type: none"> • Summary of existing educational materials • Summary of needs assessment for content development • Workshop content for teachers. • Classroom toolkits for students. • Service-Learning resource kits for students • Project website and website updates (when needed) 			

Tasks, Objectives and Schedules						
Task 5	Conduct Youth Education Resource Program Delivery					
Costs	Federal	\$ 150,519	Non-Federal	\$93,844	Total	\$244,363
Objective	Provide training and community outreach for teachers and students throughout Texas to raise awareness of water quality through education and outreach; prioritizing event and training locations based on priority watershed areas and Texas STEM educator events.					
Subtask 5.1	<p>TWRI and project partners will organize and deliver five, day-long trainings for teachers using workshop materials developed in Task 4. Training will address topics such as Texas water quality standards, water quality monitoring, and provide interactive activities for teachers to conduct water quality classroom exercises.</p> <p>TWRI and project partners will organize and conduct at least one follow-up training for teachers that have attended each of the five day-long trainings. Follow-up trainings further train teachers with the curriculum developed in Task 4 and assess the use of workshop materials in the classroom. These trainings will be delivered virtually and occur between one to three months after the initial training.</p> <p>Additionally, the project team will attend three conferences/trade shows annually such as STEM 4 innovation, the Texas STEM Conference, and the Conference for the Advancement of Science Teaching (CAST) to present and advertise training event materials to Texas STEM educators.</p>					
	Start Date	Month 54	Completion Date	Month 70		
Subtask 5.2	TWRI and project partners will coordinate and participate in ten community events (five events per year) to educate youth in targeted communities on water quality, nonpoint source pollution, watershed protection, and other relevant topics. These events will occur in conjunction with youth education trainings for teachers (Subtask 5.1). TWRI and project partners deliver materials identified and developed in Task 4 for these community events.					
	Start Date	Month 54	Completion Date	Month 70		
Subtask 5.3	Utilizing content and resources developed form Task 4, TWRI and project partners will deliver at least four trainings (two trainings per year) to students for service-learning programs on watershed protection, water quality, and other relevant topics. During these trainings, students will learn on how to effectively use service-learning resources kits (Subtask 4.5) in their own watersheds. .					
	Start Date	Month 54	Completion Date	Month 70		
Subtask 5.4	Working with local Texas A&M AgriLife County Extension Agents, TWRI will present at already established youth events in the priority watershed areas. Events can include, but not limited to, youth agricultural days, county earth day events, 4-H meetings, or other relevant educational opportunities. TWRI will utilize resources developed from Task 4 and participate in five events.					
	Start Date	Month 54	Completion Date	Month 72		

Deliverables	<ul style="list-style-type: none"> Schedules, agendas, and attendance lists (when appropriate) for education trainings, conference participation, and community events Marketing materials for educational trainings and community events as developed and disseminated. Periodically updated list of specific areas where education trainings and community events have been and will be implemented.
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Tasks, Objectives and Schedules

Task 6	Youth Education Programming Evaluation					
Costs	Federal	\$60,208	Non-Federal	\$37,538	Total	\$97,746
Objective	To evaluate overall effectiveness of training content, resources, and training events.					
Subtask 6.1	TWRI and project partners will conduct a post-training evaluation at each of the five teacher training workshops in Subtask 3.1 to assess participant’s program satisfaction, participant’s intentions to incorporate training materials and resources into their coursework, and additional training feedback.					
	Start Date	Month 54	Completion Date	Month 70		
Subtask 6.2	TWRI and project partners will conduct a post-training evaluation for teachers who participate in virtual follow-up training events held one to three months after the initial workshops. Evaluations will gauge their experience with workshop materials, understand how they incorporated the training into their classroom, challenges and successes encountered, and request any additional feedback.					
	Start Date	Month 54	Completion Date	Month 70		
Deliverables	<ul style="list-style-type: none"> Workshop evaluations for teacher training events Workshop evaluations for virtual follow up event(s) Results from evaluations 					

Project Goals (Expand from Summary Page)

This project will continue statewide implementation of the TWON through (1) Well Educated programs of 4 to 6 hours, and (2) Well Informed programs of 1 to 2 hours. The goals of the project are to improve and protect both groundwater and surface water quality by increasing awareness of water quality issues and knowledge of BMPs through improved private well management. Project goals will be achieved through (1) 30 (approximately 10 per year) Well Educated programs, (2) 30 (approximately 10 per year) Well Informed programs, and (3) evaluation of the program to measure knowledge gained, BMPs adopted and to determine if modifications and improvements need to be made to the programs. Both versions of the program include opportunities for participants to have a water well sample screened for fecal indicator bacteria, nitrate and TDS. If water quality standards are exceeded, recommendations for determining contamination sources and resolving issues are provided.

Youth Education Component:
 This project will strive to provide and develop content and resources for training and educating Texas students and teachers on water quality and other environmental related topics. This overall goal will be achieved through (1) coordination and development of youth water education content and resources for Texas students and teachers, (2) delivery of youth education resource programming, and (3) youth education programming evaluation to evaluate overall effectiveness of training content, resources, and training events (teacher events only).

Measures of Success (Expand from Summary Page)

Increase well owner awareness of water quality issues and knowledge of BMPs through:

- Distribution of TWON publications and delivery of TWON well screenings and trainings
- Delivery of 60 TWON Well Educated and Well Informed events.
- Delivery of at least 30 (approximately 10 each year) 4 to 6-hour TWON Well Educated programs in selected watersheds
- Delivery of at least 30 (approximately 10 each year) 1- to 2-hour TWON Well Informed programs.

Measure impact of program delivery through:

- Numbers of citizens participating in TWON programs and unique visitors to website
- Increased knowledge and understanding of individuals participating in the program, as measured by pre-/post-tests and one-year follow-up evaluations
- Intention to adopt or adoption of recommended BMPs as indicated by pre-/post-tests and one-year follow-up evaluations.

Youth Education Component:

Increase understanding of water quality issues and knowledge of strategies for Texas students and teachers through:

- Delivery of 5 youth education training events for teachers in priority watershed areas.
- Participation in 6 Texas STEM educator conferences to present and advertise developed program materials and resources.
- Delivery of 10 community events to educate youth in targeted communities on water quality, nonpoint source pollution, watershed protection, and other environmental topics
- Delivery of 4 student training programs for service-learning programs (Texas 4-H Water Ambassadors) on watershed protection and water quality
- Participation in 5 established youth education events, working with local Texas A&M AgriLife County Extension Agents, in priority watershed areas
- Conduct 1 virtual follow-up training for teachers who participated in one of the five teacher training events to gauge experience with workshop materials and successes encountered

Measure impact of youth education training events for teachers through:

- Measure impact of 5 youth education training events for teachers to assess participant's program satisfaction and intentions to incorporate training materials and resources into their coursework,
- Conduct 1 virtual follow-up training for teachers who participated in one of the five teacher training events to gauge experience with workshop materials and successes encountered

2012 Texas NPS Management Program Reference (Expand from Summary Page)

Components, Goals, and Objectives

Component 1 – Explicit short- and long-term goals, objectives and strategies that protect surface and ground water.

LTG: Protect and restore water quality affected by NPS pollution through assessment, implementation and education

1. Focus NPS abatement efforts ...and available resources in watersheds and aquifers as identified as impacted by NPS pollution.
2. Support the implementation of state, regional, and local programs to prevent NPS pollution through assessment ...and education.
4. Support the implementation of state, regional, and local programs to reduce NPS pollution to groundwater through the *Texas Groundwater Protection Strategy*, based on the potential for degradation with respect to use.
7. Increase overall public awareness of NPS issues and prevention activities.

STG Two – Implementation: Implement TMDL I-Plans and/or WPPs and other state, regional and local plans/programs to reduce NPS pollution...potentially degraded with respect to use criteria by NPS pollution.

- Objective C – Develop and implement BMPs to address NPS constituents of concern in aquifers identified as impacted by or vulnerable to NPS pollution.

STG Three – Education: Conduct education and technology transfer activities to help increase awareness of NPS pollution and activities which contribute to the degradation of waterbodies, including aquifers, by NPS.

- Objective A – Enhance existing outreach programs at the state, regional, and local levels to maximize the effectiveness of NPS education.
- Objective B – Administer programs to educate citizens about water quality and their potential role in causing NPS pollution.
- Objective D – Conduct outreach through the CRP, AgriLife Extension, SWCDs, and others to enable stakeholders and the public to participate in decision-making and provide a more complete understanding of water quality issues and how they relate to each citizen.
- Objective G- Implement public outreach and education to maintain and restore water quality in water bodies impacted by NPS pollution.

Objective E – Implement outreach and education activities identified in the *Texas Groundwater Protection Strategy* to prevent NPS impacts to groundwater.

Component 2 - Working partnerships and linkages to appropriate State, interstate, Tribal, regional, and local entities, private sector groups, and Federal agencies.

Component 3 - Balanced approach that emphasizes both statewide NPS programs and on-the-ground management of individual watersheds.

EPA State Categorical Program Grants – Workplan Essential Elements

FY 2014-2018 EPA Strategic Plan Reference

Strategic Plan Goal – Goal 2 Protecting America’s Waters

Strategic Plan Objective – Objective 2.2 Protect and Restore Watersheds and Aquatic Ecosystems

Part III – Financial Information

Budget Summary			
Federal	\$757,749	% of total project	61%
Non-Federal	\$491,766	% of total project	39%
Total	\$1,249,515	Total	100%
Category	Federal	Non-Federal	Total
Personnel	\$ 443,544	\$ 213,171	\$ 656,715
Fringe Benefits	\$ 142,077	\$ 62,136	\$ 204,213
Travel	\$ 18,781	\$ 0	\$ 18,781
Equipment	\$ 0	\$ 0	\$ 0
Supplies	\$ 24,791	\$ 0	\$ 24,791
Contractual	\$ 0	\$ 0	\$ 0
Construction	\$ 0	\$ 0	\$ 0
Other	\$ 29,719	\$ 10,200	\$ 39,919
Total Direct Costs	\$ 658,912	\$ 285,507	\$ 944,419
Indirect Costs (≤ 15%)	\$ 98,837	\$ 100,792	\$ 199,629
Unrecovered IDC		\$ 105,467	\$ 105,467
Total Project Costs	\$ 757,749	\$ 491,766	\$ 1,249,515

Budget Justification (Federal)		
Category	Total Amount	Justification
Personnel	\$ 443,544	<ul style="list-style-type: none"> • TWRI Program Manager: \$55,366 @ 0.917 months (\$4,232) • TWRI Program Specialist: \$43,500 @ 2.689 months (\$9,749) • TWRI Associate Director: \$103,721 @ 0.08 months (\$728) • SCSC TWON Coordinator, Drew Gholson (October 2017 – February 2019): \$68,322 @ 9.84 months (\$56,035) • SCSC TWON Coordinator, Joel Pigg (April 2019 – Current): \$75,000 @ 23.626 months (\$147,663) • SCSC Extension Program Specialist: \$56,051 @ 8.947 months (\$41,792) • BAEN Extension Program Specialist: \$59,624 @ 5.966 months (\$29,645) • Texas A&M AgriLife: The Dallas Center Extension Program Specialist: \$76,400 @ 9.79 months (\$62,333) • BAEN Extension Program Specialist: \$75,271 @ 5.985 months (\$37,544) • TWRI Extension Program Specialist, Nathan Glavy: \$41,820 @ 0.94 months (\$3,285) • TWRI Extension Program Specialist, Alexander Neal: 48,000 @ 3.58 months (\$14,343) • Department of Engineering, Spark! Program Staff Member: \$75,735 @ 5.73 months (\$36,195) <p>*named positions are budgeted with a 3% annual pay increase in all years; TBD positions and graduate students are budgeted with a 3% pay increase in years after year 1 *(Salary estimates are based on average monthly percent effort for the entire contract. Actual percent effort may vary more or less than estimated between months; but in the aggregate, will not exceed total effort estimates for the entire project.) *cell phone allowances for project calls/emails during & after business hours & travel are occasionally factored into salaries & fringe, but again, will not exceed overall dollar amount</p>
Fringe Benefits	\$ 142,077	<ul style="list-style-type: none"> • Fringe benefits for full-time faculty/staff are calculated at 17.5% of salaries and \$745/month • Fringe benefits for full-time faculty/staff are calculated at 18.5% of salaries and \$771/month <p>*(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.) *cell phone allowances for project calls/emails during & after business hours & travel are occasionally factored into salaries & fringe, but again, will not exceed overall dollar amount</p>
Travel	\$ 18,781	<ul style="list-style-type: none"> • SCSC Extension Water Resource Specialist, Extension Program Specialist and TWON Coordinator travel for TWON Well Educated trainings, TWON Well Informed screenings and related meetings statewide includes mileage at the state rate. Lodging and per diem are also included at the state rate for the locations when an overnight stay is necessary due to distance and associated Concur travel system usage fees. Funds may also be for specialist and program specialists to disseminate information regarding the successful delivery of the TWON program at national, international and state conferences such as the SWCD Directors annual conference. Due to COVID-19 travel restrictions, there may be a reduction in lodging and per diem expenses. (\$682): • Up to 10 TWON Well Educated locations/year x 1 night x 3 individuals (program specialists and other Extension personnel necessary for support of training events) x lodging at state rate per

		<p>night + mileage at the state rate for trips ranging from 100-500 miles roundtrip</p> <ul style="list-style-type: none"> • Up to 10 TWON Well Informed locations/year x 2 nights x 1 individual (program specialist) x lodging at state rate per night + mileage at the state rate for trips ranging from 100-500 miles roundtrip. • BAEN Extension Program Specialist travel to TWON Well Educated trainings and meetings statewide. Travel includes mileage at the state rate; lodging and per diem are also included at the state rate for the locations when an overnight stay is necessary due to distance; and associated Concur travel system usage fees. (\$257): • a minimum of 10 TWON Well Educated locations/year x 1 night x 1 individual (BAEN program specialist or Extension specialist) x lodging at state rate per night + mileage at the state rate for trips ranging from 100-500 miles roundtrip <p>Youth Education Training for Teacher Events (5 events):</p> <ul style="list-style-type: none"> • Travel for two project personnel (The Dallas Center Extension Program Specialist, and two Dept. of Engineering, Spark! Program staff members) Lodging and per diem are also included at the state rate for the locations when an overnight stay is necessary due to distance. Locations for these events will be focused in Austin/San Antonio areas, Houston area, Dallas/Fort Worth area, Rio Grande Valley area and East Texas. (\$2,682): • Five total teacher training events x 2 night x 5 project individuals x lodging at state rate per night (average per diem lodging for locations above) + per diem averaged at \$60/day for 2.5 days + mileage at state rate for trips (average 450 miles roundtrip) • Two nights of lodging and 3 days per diem for 5 community events happening in conjunction with these five teacher training events. <p>Youth Education Community Events (5 additional events/10 total)</p> <ul style="list-style-type: none"> • Travel for two project personnel (The Dallas Center Extension Program Specialist, and two Dept. of Engineering, Spark! Program staff members) Lodging and per diem are also included at the state rate for the locations when an overnight stay is necessary due to distance (\$4,243) • Five total teacher training events x 1 night x 5 project individuals x lodging at state rate per night (average per diem lodging for locations above) + per diem averaged at \$60/day for 2.5 days + mileage at the state rate for trips (average 400 miles roundtrip) <p>Youth Education Service-Learning Kit Trainings (4 events)</p> <ul style="list-style-type: none"> • Travel for one project personnel (one BAEN Extension Program) Lodging and per diem are also included at the state rate for the locations when an overnight stay is necessary due to distance; average 400 roundtrip mileage (\$1,760) <p>Youth Education Community Events for County Extension Agents (5 events)</p> <ul style="list-style-type: none"> • Travel for one project personnel (TWRI Extension Program Specialist) Lodging and per diem are also included at the state rate for the locations when an overnight stay is necessary due to distance; average 200 roundtrip mileage; average 400 roundtrip mileage (\$2,825) <p>Youth Education/STEM Conference Travel (6 events)</p>
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		<ul style="list-style-type: none"> Travel for two project personnel (The Dallas Center Extension Program Specialist, and two Dept. of Engineering, Spark! Program staff members) Lodging and per diem are also included at the state rate for the locations when an overnight stay is necessary due to distance; average 400 roundtrip mileage (\$6,332) Six total conference events x 2 night x 3 project individuals x lodging at state rate per night (average per diem lodging for locations above) + per diem averaged at \$60/day for 2.5 days + mileage at the state rate for trips (average 400 miles roundtrip) 																																				
Equipment	\$ 0	<ul style="list-style-type: none"> N/A 																																				
Supplies	\$ 24,791	<ul style="list-style-type: none"> Booth Supplies for Conferences & events to educate about project efforts- \$500 Service-Learning Kit Materials (100 units @ \$43/unit) – \$4,300 total Youth Education for Teachers workshop supplies (training supplies, education materials, analysis during trainings) @ \$200 each for 6 events- \$1,200 Community Event Supplies (, educational handouts for attendees, supplies needed for table/booth for community events) 10 events @ \$ 421.10/per event – \$ 4,211 total Tamplng kit supplies (tampons, black lights, foil, gloves, toolbox, rope and caribiner) (125 kits @ \$32/kit) – \$4,000 Additional July Community Event supplies: \$10,580 <table border="1"> <tr> <td>Go Direct Temperature Probe</td> <td>\$78.00</td> <td>8</td> <td>\$624.00</td> </tr> <tr> <td>Go Direct pH Sensor</td> <td>\$109.00</td> <td>8</td> <td>\$872.00</td> </tr> <tr> <td>Go Direct Conductivity Probe</td> <td>\$119.00</td> <td>8</td> <td>\$952.00</td> </tr> <tr> <td>Go Direct Optical Dissolved Oxygen Probe</td> <td>\$359.00</td> <td>4</td> <td>\$1,436.00</td> </tr> <tr> <td>Turbidity Sensor</td> <td>\$124.00</td> <td>8</td> <td>\$992.00</td> </tr> <tr> <td>Salinity Sensor</td> <td>\$139.00</td> <td>8</td> <td>\$1,112.00</td> </tr> <tr> <td>Go! Link</td> <td>\$75.00</td> <td>8</td> <td>\$600.00</td> </tr> <tr> <td>LabQuest 3 Interface</td> <td>\$399.00</td> <td>8</td> <td>\$3,192.00</td> </tr> <tr> <td>Engineering Design Kits (PVC pipes, rubber tubing, container, plastic containers for water, wood sticks, wood, carbon, filters, cotton, etc.)</td> <td>\$100.00</td> <td>8</td> <td>\$800.00</td> </tr> </table>	Go Direct Temperature Probe	\$78.00	8	\$624.00	Go Direct pH Sensor	\$109.00	8	\$872.00	Go Direct Conductivity Probe	\$119.00	8	\$952.00	Go Direct Optical Dissolved Oxygen Probe	\$359.00	4	\$1,436.00	Turbidity Sensor	\$124.00	8	\$992.00	Salinity Sensor	\$139.00	8	\$1,112.00	Go! Link	\$75.00	8	\$600.00	LabQuest 3 Interface	\$399.00	8	\$3,192.00	Engineering Design Kits (PVC pipes, rubber tubing, container, plastic containers for water, wood sticks, wood, carbon, filters, cotton, etc.)	\$100.00	8	\$800.00
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Contractual*	\$ 0	<ul style="list-style-type: none"> N/A 																																				
Construction	\$ 0	<ul style="list-style-type: none"> N/A 																																				
Other	\$ 29,719	<ul style="list-style-type: none"> Data Analysis Team services – website maintenance (\$500) TWON Communications Services – press releases, flyers, content, editing, website (\$10,349) SCSC costs for printing training and screening materials (\$150) Postage (\$45) Conference Registration (6 total events @ \$425/event; 3 people/conference) – \$ 7,650 Core water quality sampling kits (5 kits @ \$610/kit) – \$3,050 Youth Edu Communications Services – press releases, flyers, content, editing – \$ 4,815 																																				

		<ul style="list-style-type: none">• Website development and maintenance – \$1,360• Computer/laptop – \$1,800
Indirect	\$ 98,837	<ul style="list-style-type: none">• 15% of modified total direct costs.

Budget Justification (Non-Federal)		
Category	Total Amount	Justification
Personnel	\$ 213,171	<ul style="list-style-type: none"> • TWRI Director, \$205,400 @ 1.59 months (\$28,866) • SCSC Extension Water Resource Specialist, \$96,714 @ 10.62 months (\$90,876) • BAEN Extension Specialist & Associate Professor, \$115,767 annually @ 2.88 months (\$29,484) • Dept of Eng., Spark! Project Team Member, \$45,000 @ 8.4 months (\$63,945) <p>*named positions are budgeted with a 3% annual pay increase in all years; TBD positions and graduate students are budgeted with a 3% pay increase in years after year 1 *(Salary estimates are based on average monthly percent effort for the entire contract. Actual percent effort may vary more or less than estimated between months; but in the aggregate, will not exceed total effort estimates for the entire project.)</p>
Fringe Benefits	\$ 62,136	<ul style="list-style-type: none"> • Fringe benefits for full-time faculty/staff are calculated at 17.5% of salaries and \$745/month • Fringe benefits for full-time faculty/staff are calculated at 18.5% of salaries and \$771/month <p>*(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.)</p>
Travel	\$ 0	• N/A
Equipment	\$ 0	• N/A
Supplies	\$ 0	• N/A
Contractual*	\$ 0	• N/A
Construction	\$ 0	• N/A
Other	\$ 10,200	• Water Well Screening @ \$10,200 (~\$10/sample * 34 samples/screening * 30 screenings)
Indirect	\$ 100,792	Indirect costs on the non-federal portion is calculated at: <ul style="list-style-type: none"> • Texas A&M AgriLife Extension Service's negotiated IDC rate: 28% $\\$196,780 * 0.28 = \\$55,098$ • Indirect costs on the non-federal portion (\$88,727) is calculated at 51.5% negotiated IDC rate
Unrecovered indirect cost	\$ 105,467	Unrecovered indirect costs from the federal portion are calculated at: AgriLife Extension negotiated rate: 28% - 15% = 13% $\$395,620 * 0.13 = \mathbf{\$51,430}$ Unrecovered IDC (Texas A&M AgriLife Extension): 30% MTDC-15%TDC -IDC on MTDC: $\$196,652 * .30 = \$58,696$ -IDC on TDC: $\$196,652 * .15 = \$29,348$ Total Unrecovered IDC (Texas A&M Extension): $\$58,696 - \$29,348 = \$29,348$ Unrecovered IDC (TEES): 51.5% MTDC - 15%TDC -IDC on MTDC: $\$67,640 * .515 = \$34,835$ -IDC on TDC: $\$67,640 * .15 = \$10,146$ Total Unrecovered IDC (TEES) = $\$34,835 - \$10,146 = \$24,689$ Total Unrecovered IDC (Texas A&M AgriLife Extension & TEES): $\$29,348 + \$24,689 = \mathbf{\$54,037}$