



**BIOLOGICAL & AGRICULTURAL  
ENGINEERING**  
TEXAS A & M UNIVERSITY

# Rowlett Creek Watershed Protection Plan Stakeholder Meeting #5

Wednesday, May 15th , 2024





# Agenda

- 10:00 Welcome/Introductions
- 10:10 WPP Progress Update
- 10:15 Discussion and Next Steps
- 10:20 Presentation: “WPP Dos and Don’ts” by Aaron Hoff and Heather Firn
- 11:00 Adjourn

## Project Summary

- Writing of Watershed Protection Plan continues
- Chapter 1 approved by TCEQ and Steering Committee
- Chapter 1 now available for Stakeholder review
- QAPP has been approved!
- Chapters 2, 3, 4, and 5 will be released now that QAPP has been approved. TCEQ and Stakeholders must approve before public release.



## Project Website

- <https://agrilife.org/lid/rowlett-creek-watershed-characterization/>
- Chapters available for download as Steering Committee approves them for release





## Upcoming Tasks

- Final determination of potential *E. coli* sources Finalization of source determination methodology
- Determine load reduction necessary to meet water quality standards (will start once new QAPP is approved)



## Upcoming Meeting Goals

- Next meeting- August TBD
- More draft chapters of WPP will be completed and ready for stakeholder review

# Questions, Discussion





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# WATERSHED PROTECTION PLANNING DO'S AND DON'TS

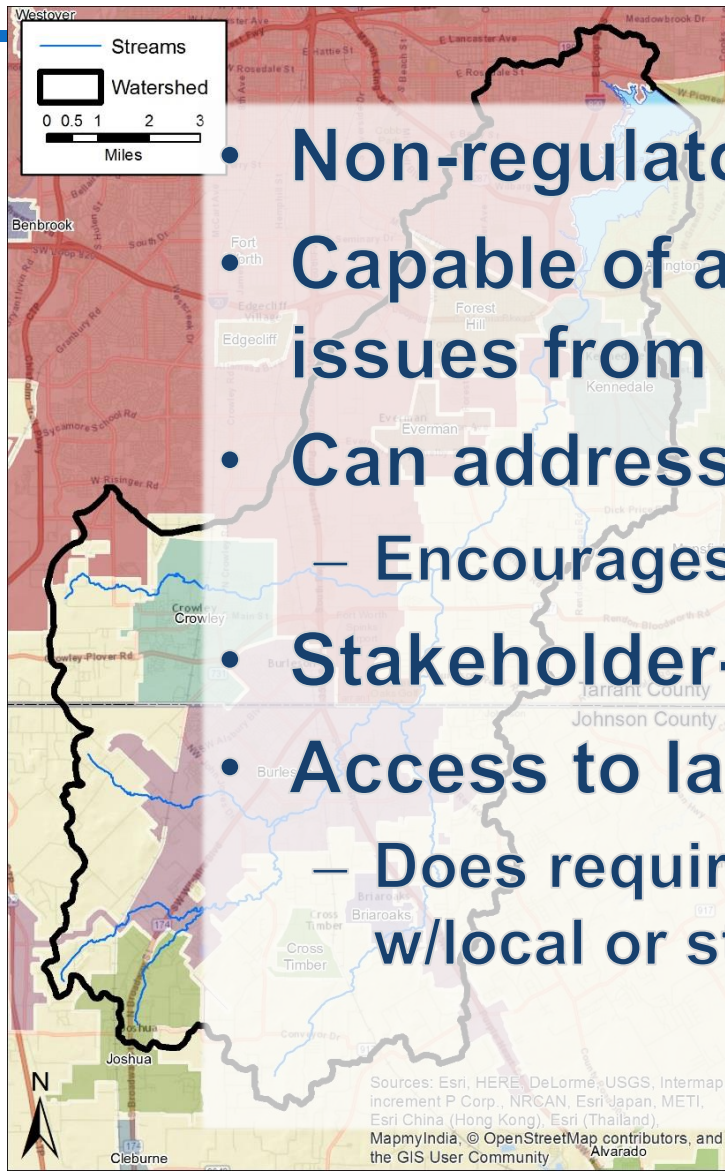
MAY 2024: HEATHER FIRN, WATERSHED SCIENTIST III &  
AARON HOFF, WATERSHED MANAGER, TRWD



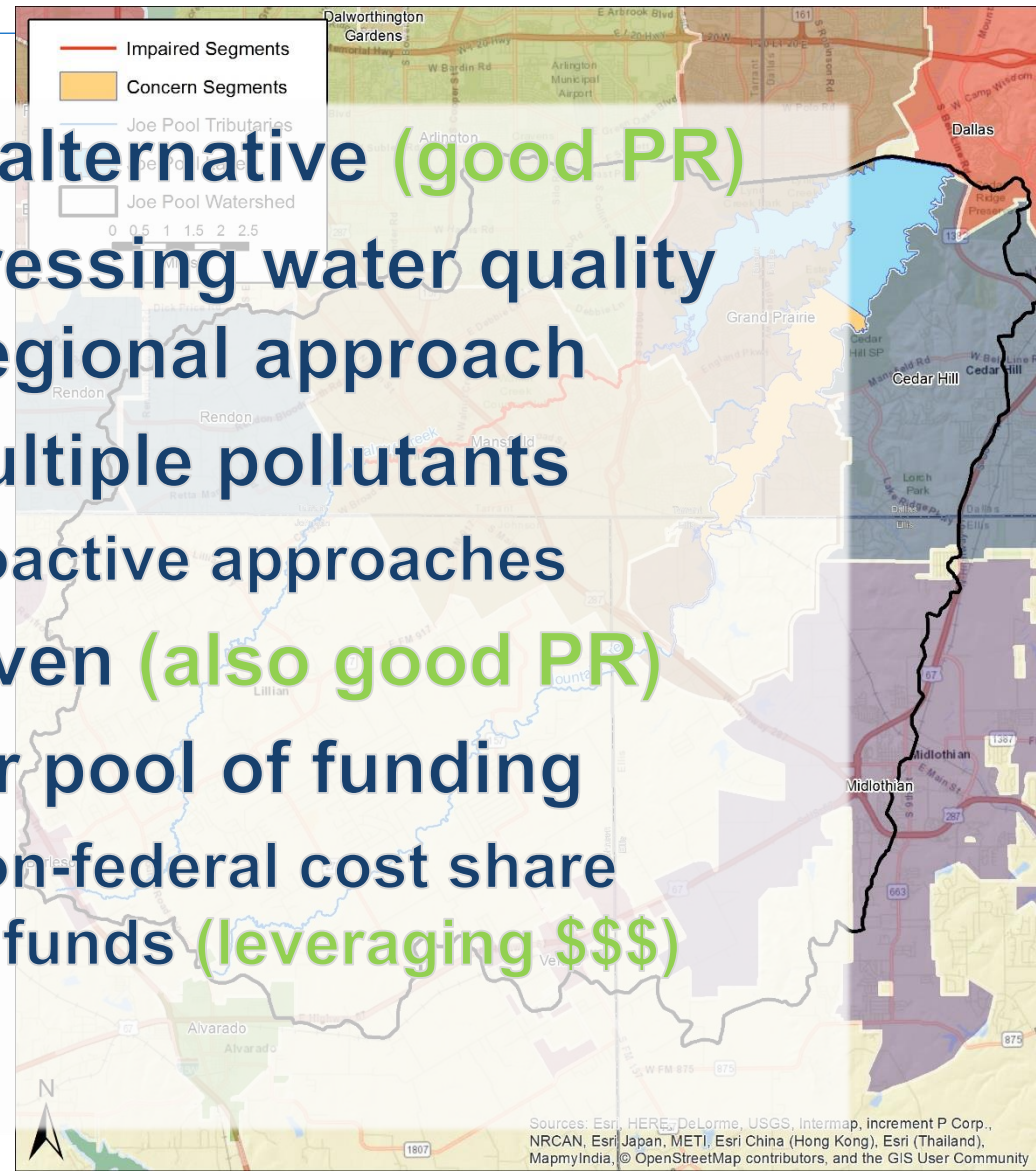
**Trinity River Authority of Texas**  
*Enriching the Trinity basin as a resource for Texans*



# What's a Watershed Protection Plan?



- Non-regulatory alternative (good PR)
- Capable of addressing water quality issues from a regional approach
- Can address multiple pollutants
  - Encourages proactive approaches
- Stakeholder-driven (also good PR)
- Access to larger pool of funding
  - Does require non-federal cost share w/local or state funds (leveraging \$\$\$)





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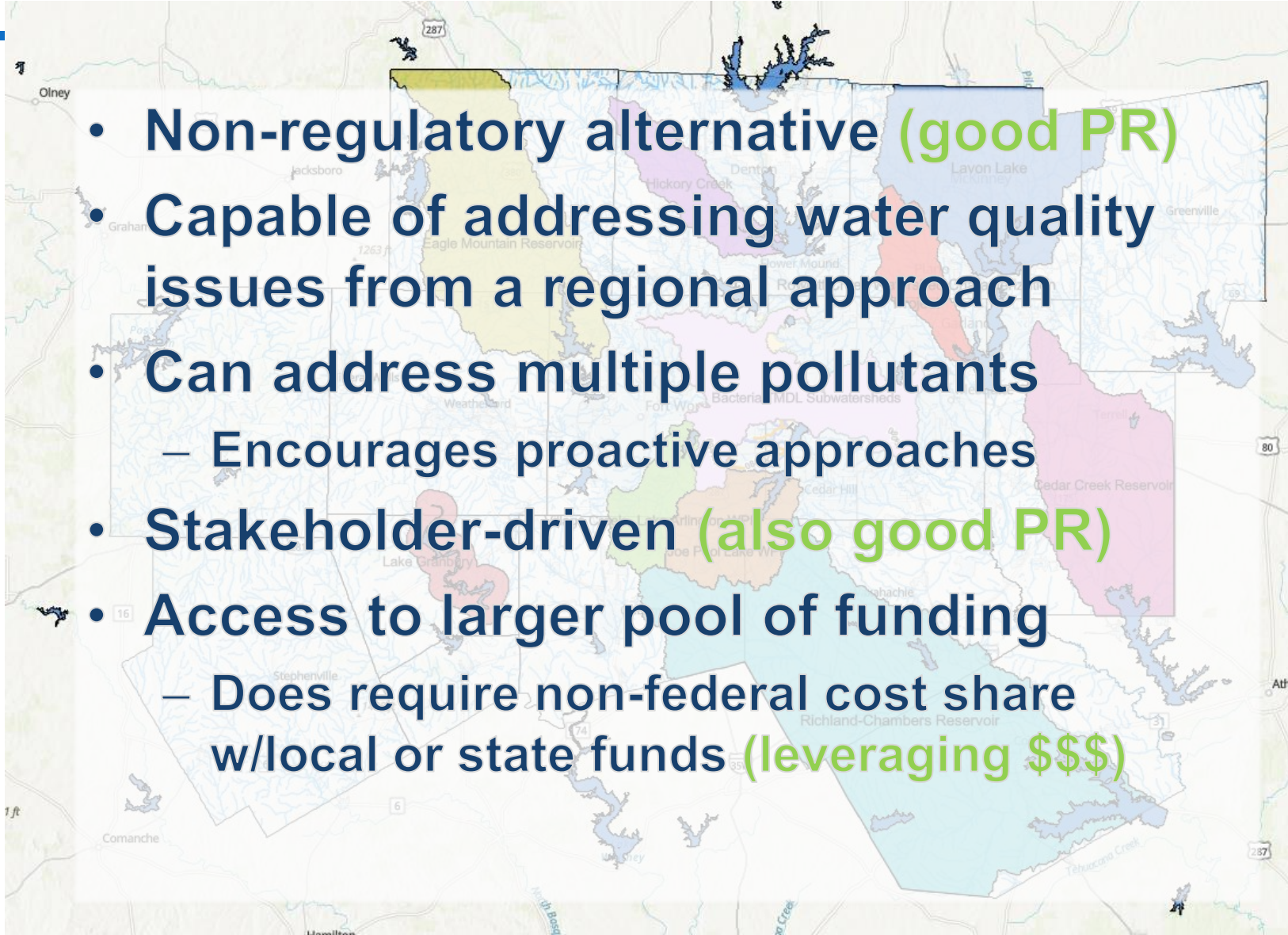
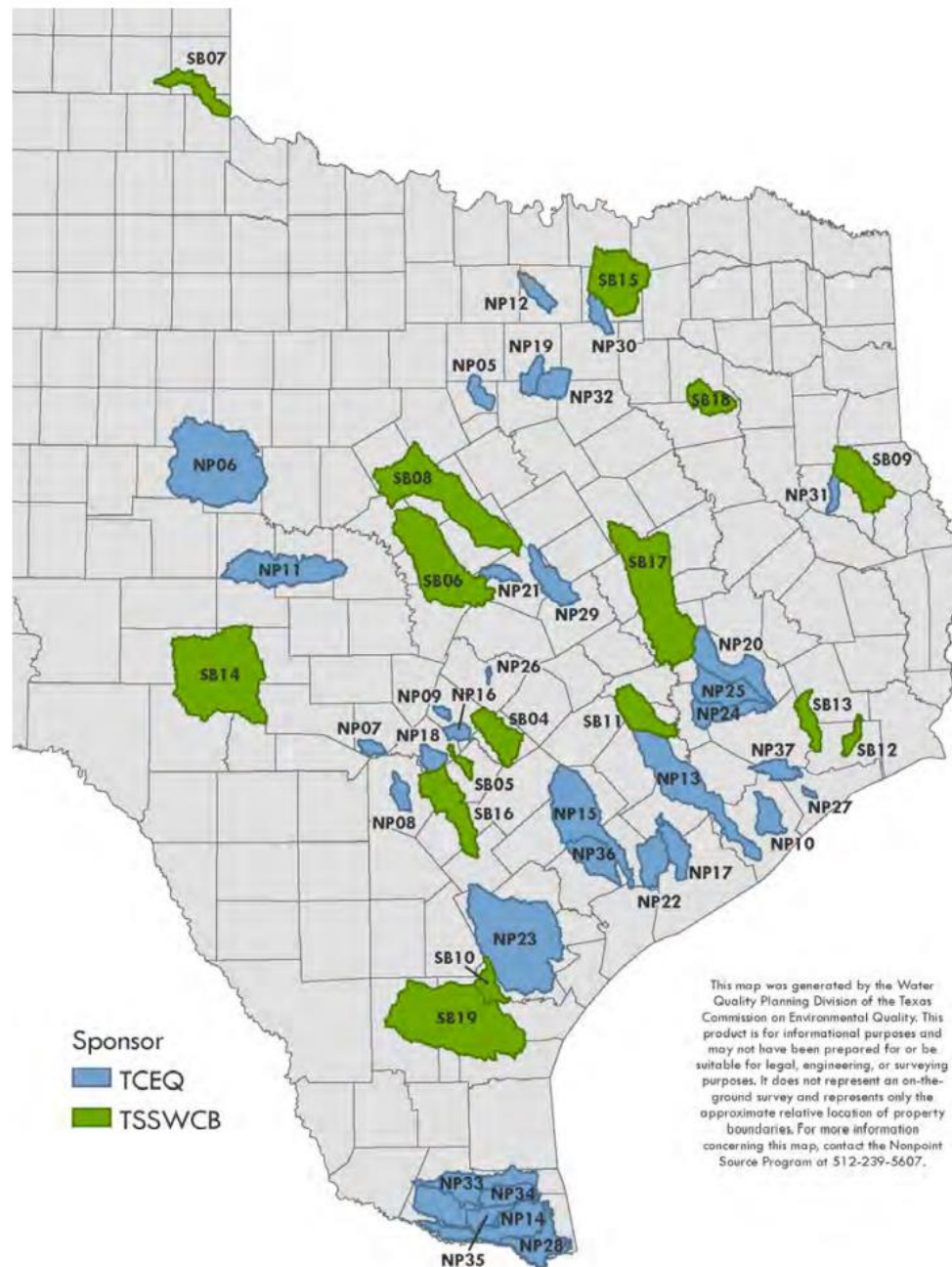


FIGURE 4.1  
Watersheds with WPPs Being Developed or Implemented

# WPPs in Texas







# WATERSHED PROTECTION PLANNING DO'S AND DON'TS





...

# DÖ – prior to grant application

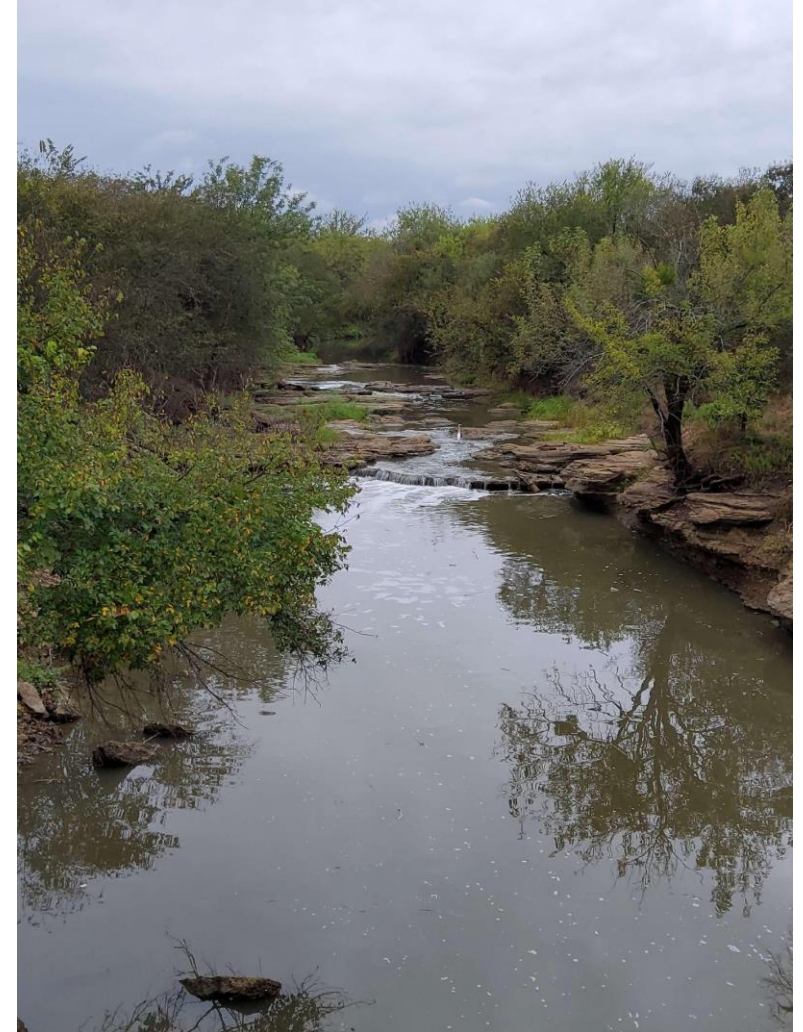
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- Build partnerships (stakeholder buy-in; involvement)
- Determine match and it's source





- Research your watershed and current available data, needs, concerns, ordinances, MS4 permit language, etc
- Develop a fact sheet





# ... DON'T

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- Assume everyone knows what a watershed is
- Speak in acronyms
- Use technical jargon





- Know your audience
- Diversify communication methods





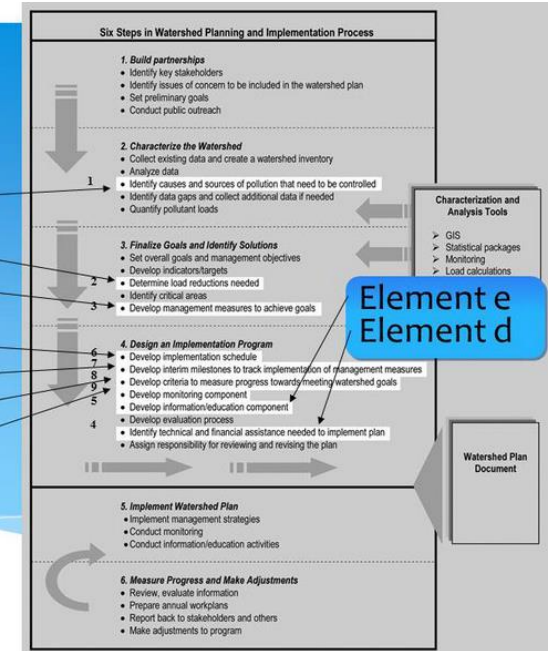
# ... DON'T

- Write more than you have to
- Scare your agency reviewers



## The 9 Elements of Watershed Planning

- Element a
- Element b
- Element c
- Element f
- Element g
- Element h
- Element i

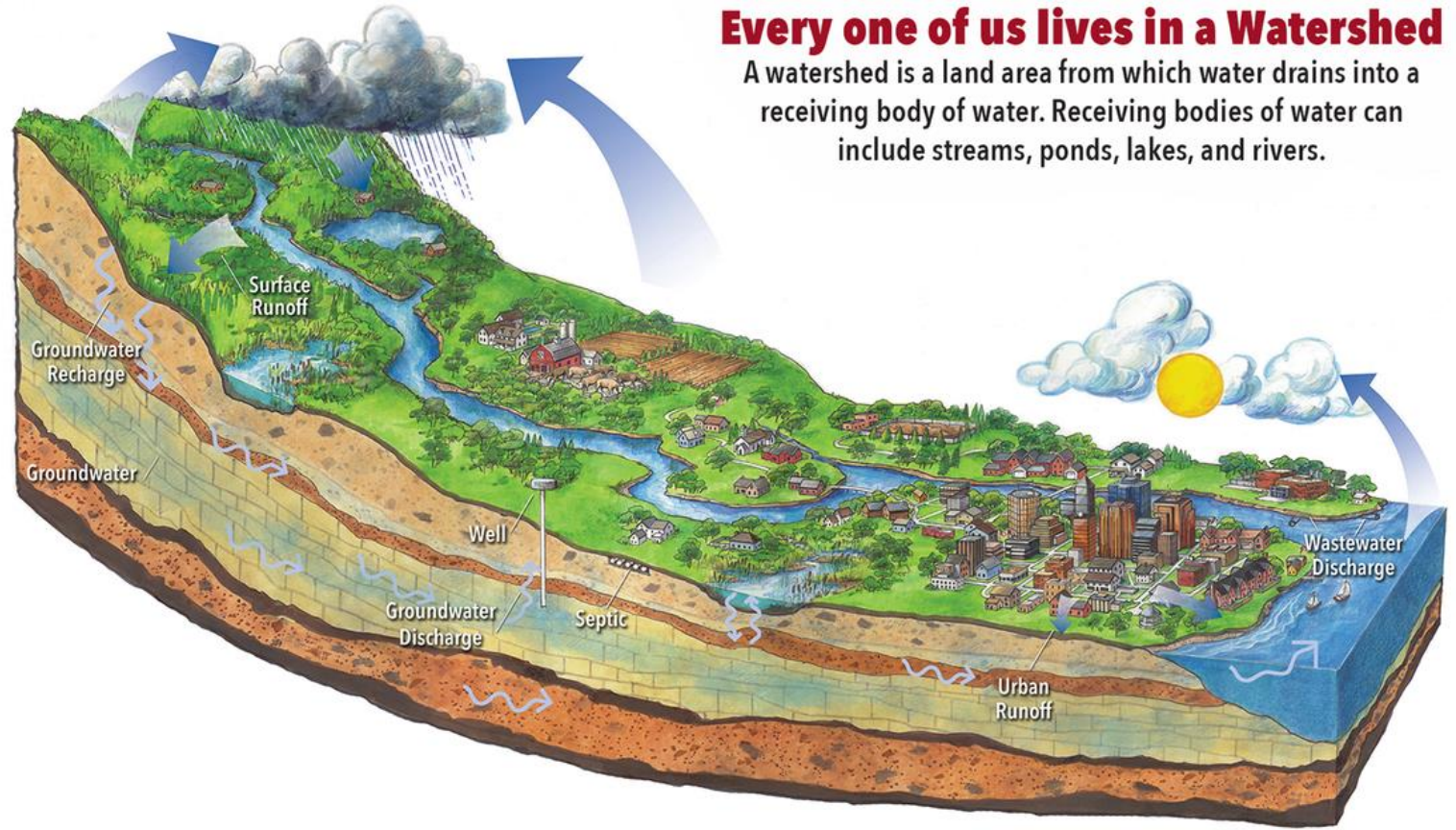


- Give reviewers a clear roadmap

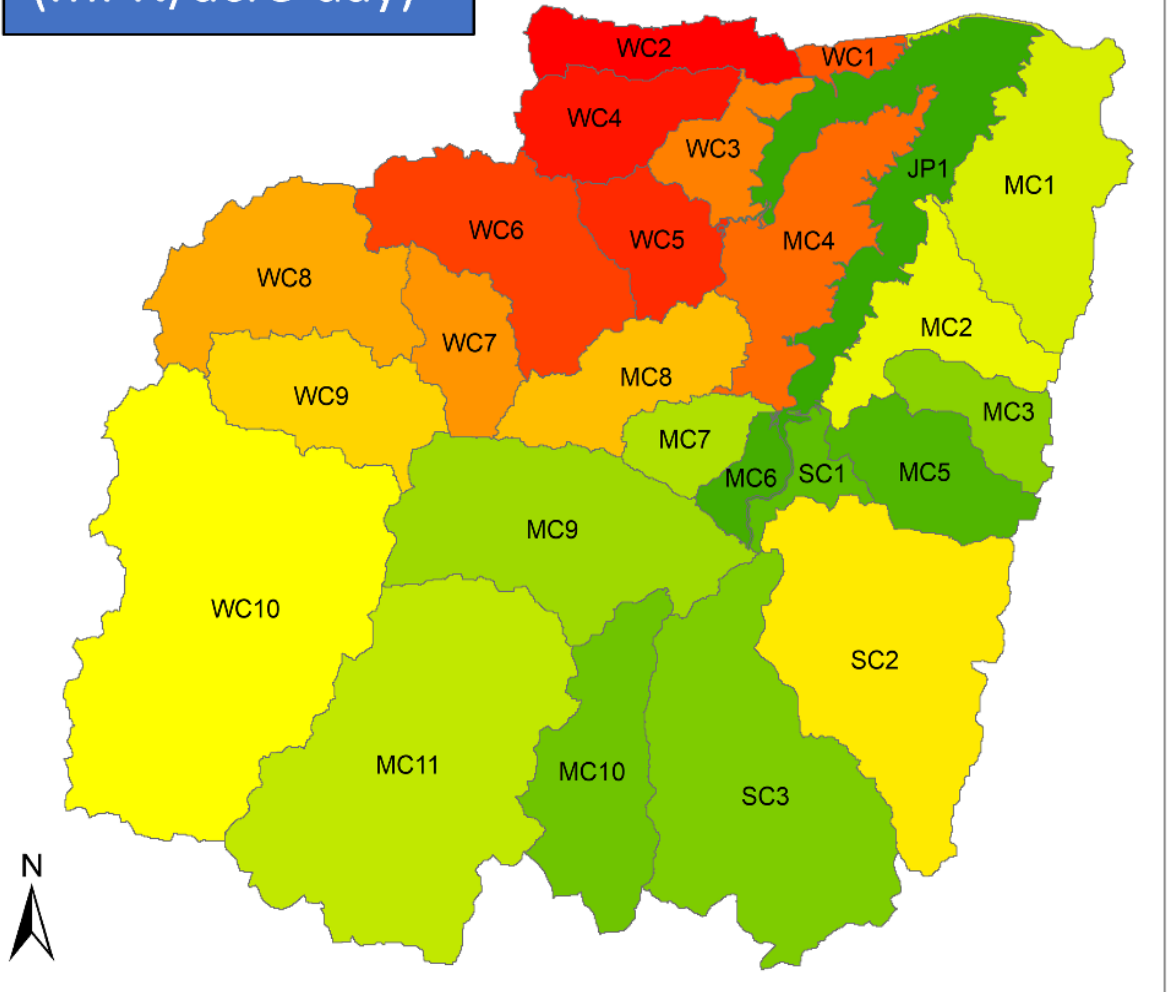
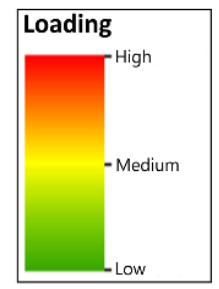




- Use figures/tables/infographics whenever possible



Total Potential  
*E.coli* Load:  
All Sources  
(MPN/acre-day)



# ... DON'T

- Overthink your watershed analysis
- Lean on complicated models

**SWAT** Soil & Water  
Assessment Tool

**HAWQS** Hydrologic and Water Quality System (Version 2.0 BETA)  
A National Watershed and Water Quality Assessment Tool

**TX.SELECT** Spatially Explicit Load Enrichment Calculation Tool  
For the State of Texas

## Model My Watershed ×

Version 1.35.0 ([Release Notes](#))

Model My Watershed is part of [Stroud Water Research Center's WikiWatershed](#) initiative. WikiWatershed is a web toolkit designed to support citizens, conservation practitioners, municipal decision-makers, researchers, educators, and students to collaboratively advance knowledge and stewardship of fresh water.

- [Read more about Model My Watershed](#)
- [Meet the development team](#)

With major funding from:

WILLIAM PENN  
FOUNDATION





- Keep it simple
- Favor tools with more opportunities for stakeholder input

- Manage expectations
  - Water quality improvement goals – mid-range flows





# LDC for *E. coli* at Site 13621 (Walnut Creek at Matlock Rd)

LDC for *E. coli* at 13621

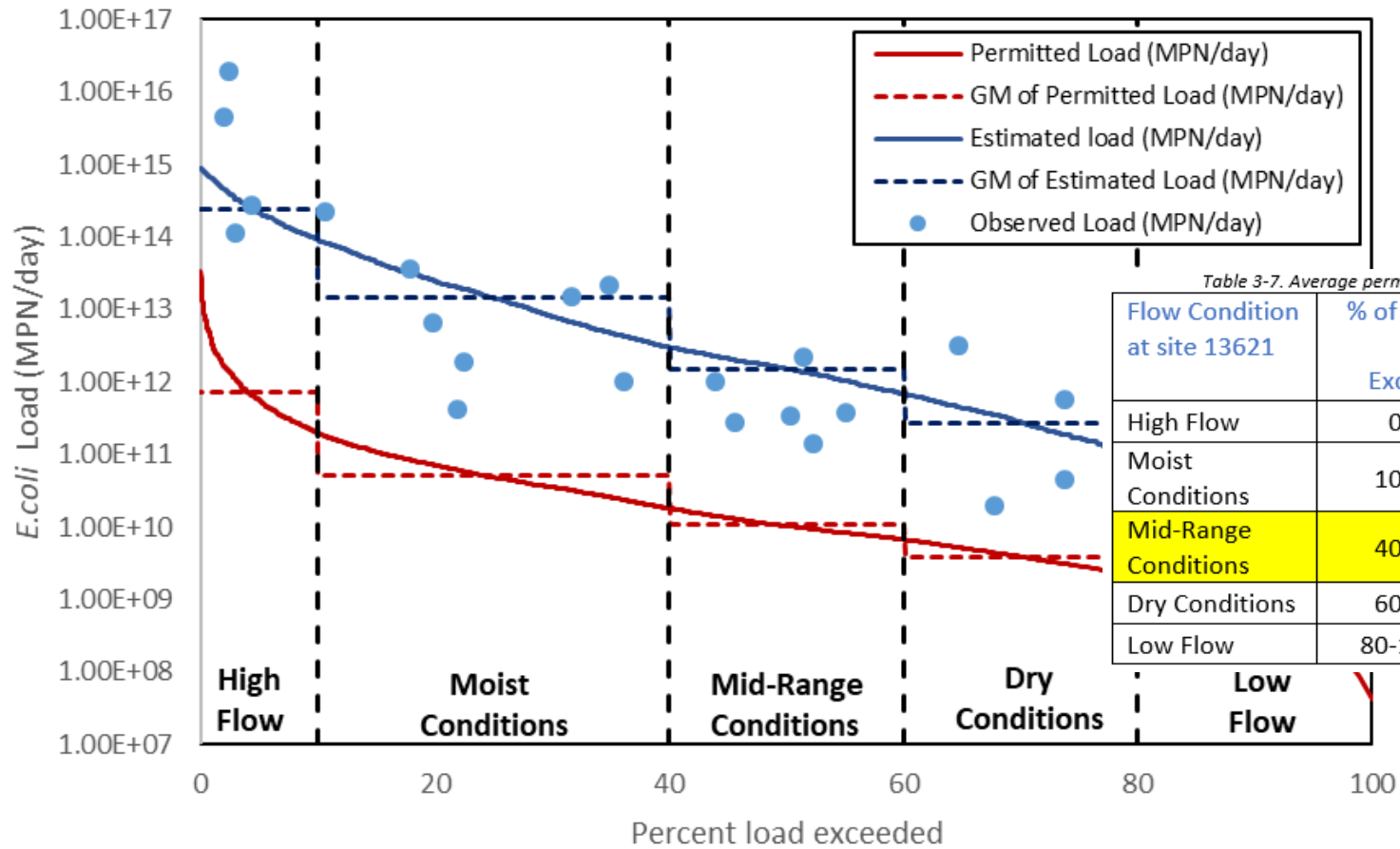


Table 3-7. Average permitted loading, estimated loading, and load reduction of *E. coli* loading for monitoring station 13621.

Flow Condition at site 13621	% of Time Flow Exceeds	Permitted Loading (MPN/day)	Daily Loading (MPN/day)	% Daily Load Reduction Needed	Annual Loading (MPN/yr)	Annual Reduction Needed (MPN/yr)
High Flow	0-10%	7.11E+11	2.37E+14	100%	8.64E+16	8.62E+16
Moist Conditions	10-40%	5.19E+10	1.48E+13	100%	5.40E+15	5.38E+15
Mid-Range Conditions	40-60%	1.05E+10	1.48E+12	99%	5.41E+14	5.37E+14
Dry Conditions	60-80%	3.80E+09	2.69E+11	99%	9.83E+13	9.69E+13
Low Flow	80-100%	5.25E+08	3.33E+09	84%	1.21E+12	1.02E+12



# Water Quality Improvement Goals

## JPL Map

Table 5-2 *E. coli*, TKN, and NO<sub>x</sub> load reduction goals

Parameter		Soap Creek (22134)	Walnut Creek (13621)	Mountain Creek (16434)	Hollings Branch (16433)	Low Branch (22135)	Bowman Branch (22133)	Total Load Reduction Goal
<i>E. coli</i>	Mid-Range Flow Conditions	91%	99%	93%	87%	96%	99%	
	MPN/yr	7.70E+14	5.37E+14	9.88E+14	5.72E+13	4.80E+13	1.60E+13	<b>2.42E+15</b>
TKN	Mid-Range Flow Conditions	74%	42%	31%	35%	16%	4%	
	Ton/yr	*	6.16E-01	1.2634	1.63E-01	1.39E-02	1.56E-03	<b>2.1</b>
NO <sub>x</sub>	Mid-Range Flow Conditions	53%	—	—	—	—	—	
	Ton/yr	1.54E+01	—	—	—	—	—	<b>15.4</b>
Nutrients (TKN+NO <sub>x</sub> )*	Ton/yr							<b>17.5</b>

\* Soap Creek TKN loading of 7.82E+00 ton/yr is not included in the reduction calculation. Stakeholders agreed that since NO<sub>x</sub> (NO<sub>2</sub>+NO<sub>3</sub>) loading is greater than TKN loading in Soap Creek, BMPs implemented targeted for NO<sub>x</sub> loading would also mitigate TKN loading specifically in Soap Creek.

# Water Quality Improvement Strategies

Management Measures <sup>(1)</sup>	Anticipated <i>E. coli</i> Load Reduction	Other Management Goals
<b>Pet Waste</b>		
Pet waste disposal ordinances	2.30E+15 MPN/yr	-
Supplemental pet waste stations		
Bioswale/raingarden projects		
Backyard pet waste digesters		
<b>Lawn Residue and Waste</b>		
Illicit discharge surveys	1.86E+01 Ton/yr (Nutrients)	Nutrient reduction to remove existing concerns
Lawn waste management ordinances		
Permeable paver sidewalks/driveways, rain barrels, low-water plantings, bioswale/rain garden projects, bio retention ponds		
<b>Livestock</b>		
WQMPs and CPs	1.08E+15 MPN/yr	-
<b>OSSFs</b>		
Incentivized OSSF inspections/pumpouts	4.71E+12 MPN/yr	-
HOA/NA coordinated OSSF cleanout events		
Practice-focused OSSF training		
Septic-to-sewer initiatives		
OSSF inspection ordinances for property transfers		
<b>Illegal Dumping and Litter Accumulation</b>		
Illegal dumping surveys	-	15% of sites shift to lower impact category
Rural home hazardous waste pickup/dropoff days		
JPL cleanup events		
<b>SSOs</b>		
Support for interdepartmental reporting network for SSO locations	-	Reduce instance of SSOs in watershed by 10%
Stormwater infrastructure assessments		
Permeable paver parking lots		
<b>Sediment and Flooding</b>		
Riparian, wetland and/or stream restoration projects	-	-
Stormwater infrastructure assessments		
Identify and install green infrastructure		
<b>Feral Hogs</b>		
Trap share program	1.20E+13 MPN/yr	-
Establish regional feral hog resource and support network		
Feral hog removal and/or exclusion from attractive nuisances		
Riparian buffer restoration/extension		
<b>Total Anticipated <i>E. coli</i> Load Reductions</b>	<b>3.40E+15 MPN/yr</b>	
<b>Anticipated Nutrient Load Reductions</b>	<b>1.86E+01 Ton/yr</b>	

(1) Note that all management measures categories include education and outreach components.



- Actively involve stakeholders
  - Example: identification of priority areas – pet waste vs wildlife
- Tangible results





# Priority Continuum

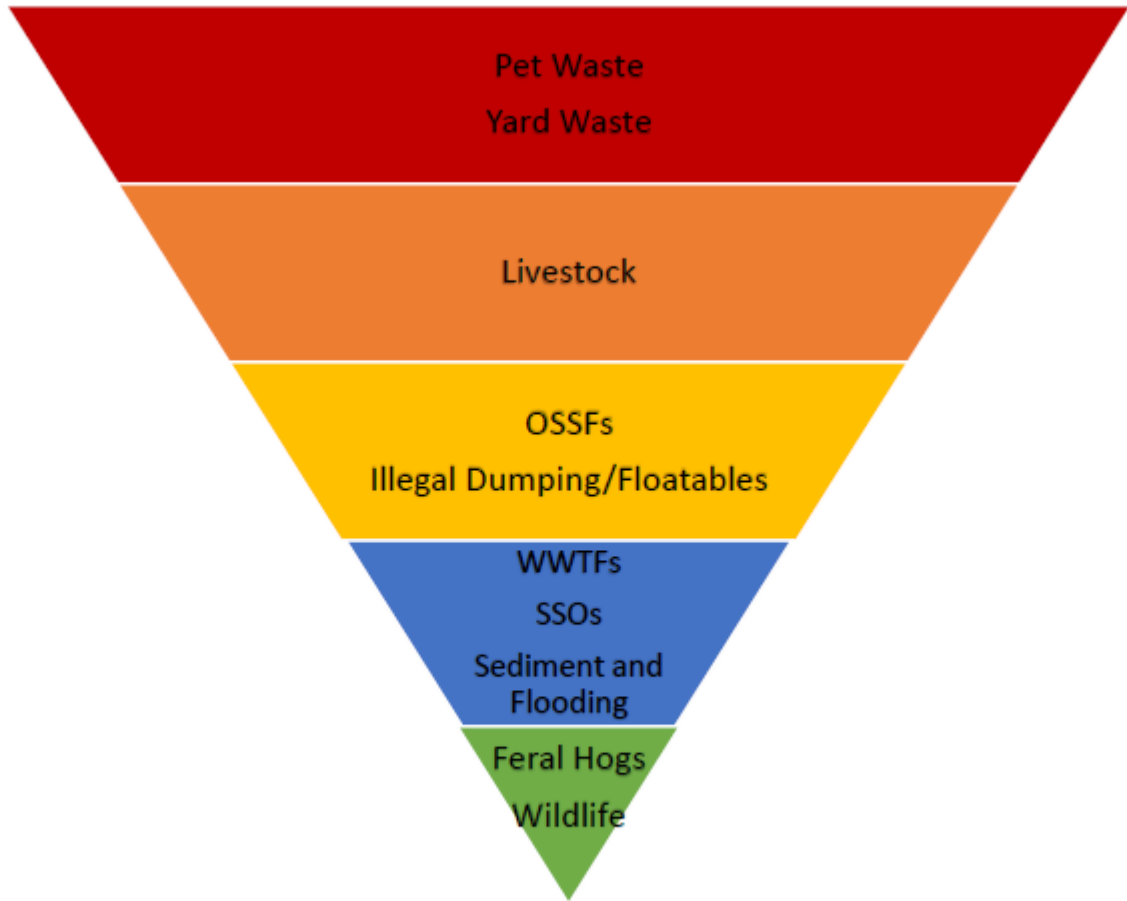


Figure 4-1 Continuum for prioritizing pollutant sources in the JPL watershed, from highest priority (red) to lowest (green)

Table 4-1 Summary of potential pollutant sources in the watershed and associated management priority

Source	Concerns	Potential Impacts	Rank <sup>1</sup>	Priority <sup>2</sup>
Pets	Improper disposal of pet waste	(1) Indirect <i>E. coli</i> loading to water body from yards, public greenspaces, kennels, and shelters; (2) spread of disease amongst/between species	1	1
	Disease transmission and public safety			
	Lack of education on impacts and proper disposal			
Livestock	Increased runoff from overgrazing of upland areas	(1) Direct/indirect <i>E. coli</i> loading to water body; (2) loss of natural pollutant mitigation capabilities	2	2
	Manure transported to water body by runoff			
	Direct manure deposition in water body			
	Riparian buffer zone degradation			
OSSFs	"Straight pipes" and other illegal wastewater discharges	(1) Direct/indirect loading of untreated wastewater to water body; (2) local groundwater resource degradation	3	3
	Improperly treated aerobic effluent applied to land			
	Failure due to age, improper design, or lack of maintenance			
Feral Hogs	Manure transported to water body by runoff	(1) Direct/indirect <i>E. coli</i> loading to water body; (2) loss of natural pollutant mitigation capabilities; (3) loss of natural species diversity	4	5
	Displacement/predation of native species			
	Direct manure deposition in water body			
	Riparian buffer zone degradation			
Wildlife	Manure transported to water body by runoff	(1) Direct/indirect <i>E. coli</i> loading to water body; (2) loss of natural pollutant mitigation capabilities	5	5
	Riparian buffer zone degradation			
	Direct manure deposition in water body			
WWTF	Failure due to age, stormwater I&I, or lack of maintenance	(1) Direct loading of untreated wastewater to water body	6	4
	Overloads from population growth or illicit connections			
Yard Waste and Residue	Improper disposal of yard clippings	(1) Direct/indirect contamination of water body from <i>E. coli</i> , nutrients, and hazardous materials; (2) impacts to aquatic wildlife	-	1
	Excessive fertilizer, herbicide, or pesticide application			
SSOs	Failure due to age, land erosion, or construction damage	(1) Direct/indirect <i>E. coli</i> loading to water body; (2) human health hazards	-	4
	Failure due to stormwater I&I issues			
Illegal Dumping	Household/construction waste disposal in/near waterbody	(1) Direct/indirect contamination of water body from <i>E. coli</i> , nutrients, and hazardous materials; (2) localized human health hazards; (3) Flow obstruction/alteration	-	3
	Animal carcass/hunting remains disposal in/near water body			
	Disposal of large items (furniture, appliances, vehicles)			
Sediment and Flooding	Sediment loading and increased risk in flooding in developing areas	(1) Impact to aquatic life (2) impact to water supply and flood supply capacity in JPL, (3) Direct/indirect nutrient and bacteria loading to waterbodies from runoff and erosion events, (4) public health and safety (5) erosion, (6) infrastructure damage	-	4
	Loss of natural areas/green spaces			

(1) Relative impact of *E. coli* load on the watershed, as ranked by the SELECT analysis. Sources noted by '-' could not be included in the SELECT analysis.

(2) Water quality restoration priorities, as identified by watershed stakeholders.

•••

# Joe Pool Lake Watershed Protection Plan

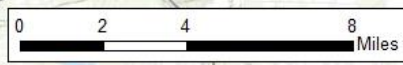
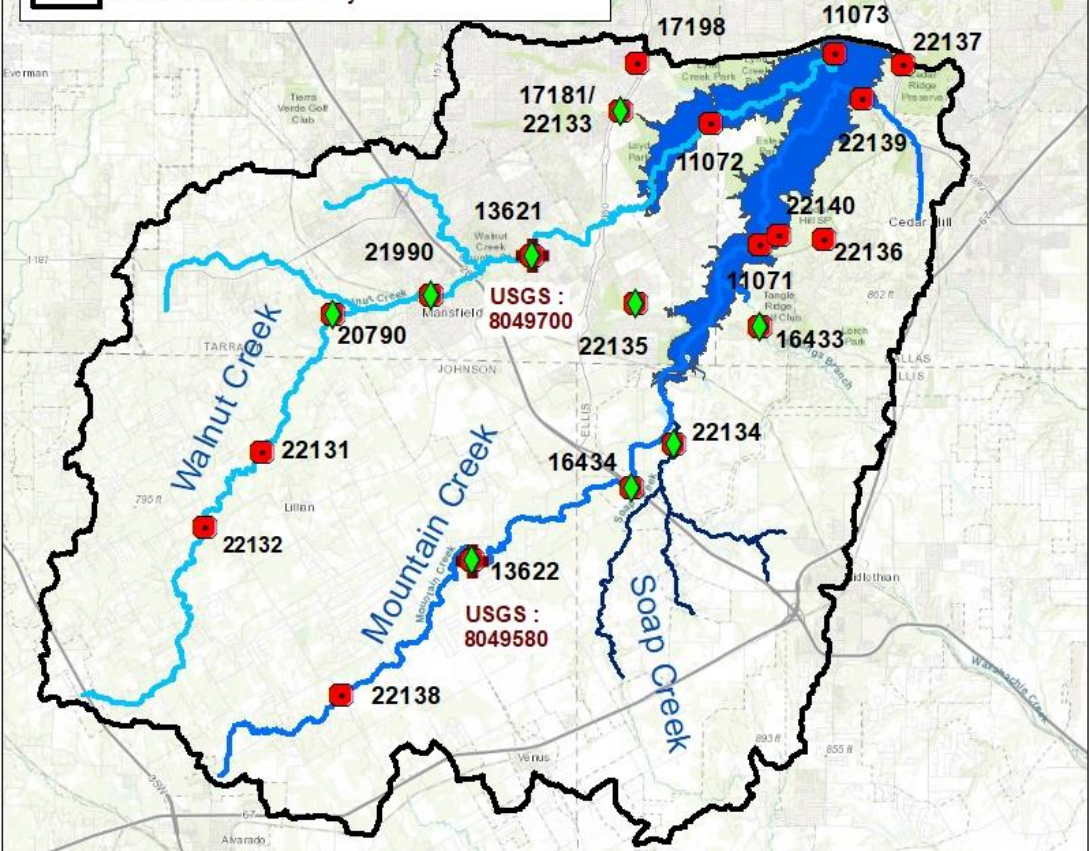
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# USGS Gages, Monitoring Stations and Stream Network

- ◆ Monitoring Stations for LDC Assessment
- Project Water Quality Monitoring Stations
- + USGS gauges
- Mountain Creek
- Soap Creek
- Walnut Creek
- Joe Pool Lake
- Watershed Boundary



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, INRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community



# Examples of Common BMPs



# •••• Pet waste





# •• LID-Rainwater Harvesting





# *LID-Pervious Pavers*





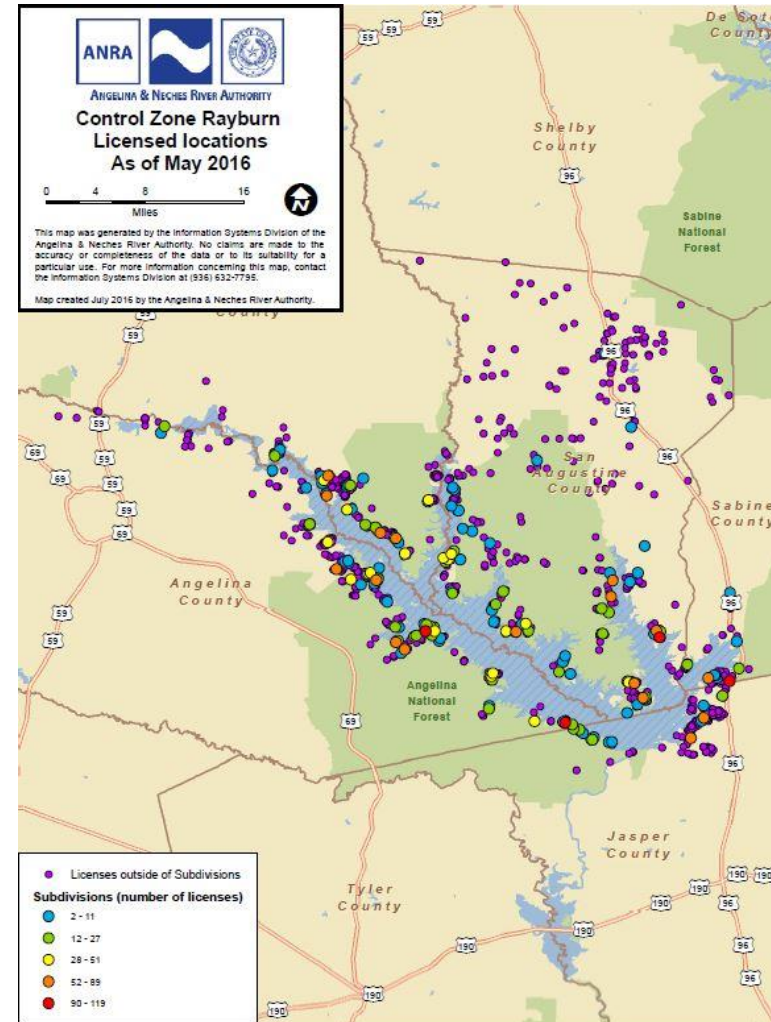
# ••• Riparian Restoration and Education

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# Septic system repair/replacement and database creation





# Education and Outreach

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Stakeholder involvement through:

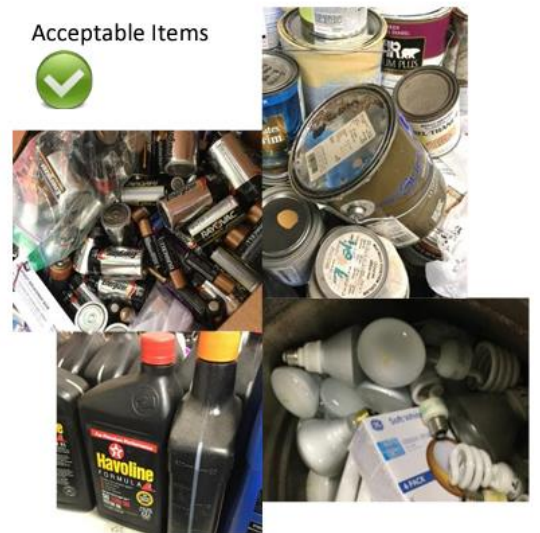
- Trainings and workshops
- Publications
- Public Service Announcements
- Events





# BMP EXAMPLES

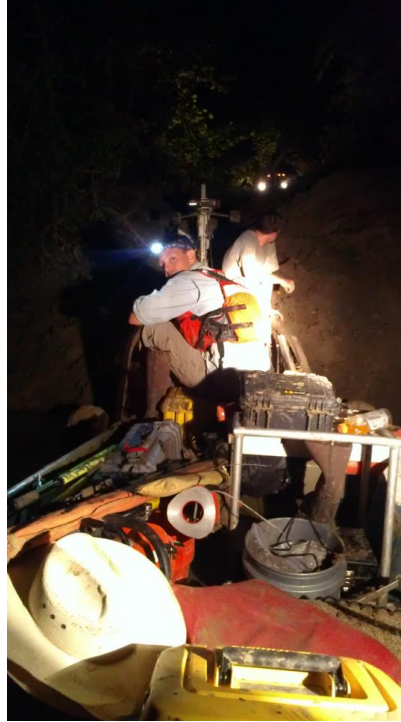
- Installation and maintenance of pet waste stations to combat bacteria in the watershed
- Identification and installation of nature based solutions/green infrastructure to combat nutrient concerns and sediment.
- Expanding household hazardous waste programs to rural/unincorporated areas





Management Measure	Responsible Party	Unit Cost	Units Implemented (by year)										Total Cost	Funding Source
			2024	2025	2026	2027	2028	2029	2030	2031	2032			
<b>Pet Waste</b>														
Pet waste disposal ordinances/bylaws	Cities, counties, HOAs, NAs	N/A	As early as feasible										N/A	L, F3
Supplemental pet waste station recon		\$3,000	1										\$3,000	F6,S5,S7,N1,N3
Supplemental pet waste station install		\$300	34										\$10,200	
Pet waste station maintenance/supplies		\$85	34	34	34	34	34	34	34	34	34	34	\$26,010	
Bioswales and rain gardens	\$12,500	1	1	1	1	1	1	1	1	1	1	\$50,000		
Backyard pet waste digesters	Residents	\$1,000	5	5	5	5	5	5	5	5	5	\$50,000	F6,S7,N1,N3	
Education & outreach - direct marketing	Cities, counties, regional entities	\$17,000	1	1	1	1	1	1	1	1	1	\$153,000	F8,N1,N3	
Education & outreach - general		\$17,000	Assistance/input as needed											\$17,000
<b>Livestock</b>														
WQMPs and CPs	Production agriculture	\$15,000	3	3	3	3	3	3	4	4	4	\$450,000	F1,F4,F5,F7,S1,	
WQMP Technician (1/2 time)		\$40,000	1	1	1	1	1	1	1	1	1	\$360,000	S4,S10,S11,N2,N4	
Education & outreach	Hobby farmers	\$1,000	1	1	1	1	1	1	1	1	1	\$10,000	F8,N1,N2,N3	
<b>Feral Hogs</b>														
Trap share program - trap purchase	Cities, counties, regional entities	\$15,000	3									\$45,000	F6,S7	
Trap share program - maintenance		\$500	1	1	1	1	1	1	1	1	1	\$5,000		
Establish regional feral hog resource and support network	Any public/private landowners, land managers	\$500	1	1	1	1	1	1	1	1	1	\$5,000	F6,F8	
Feral hog removal		N/A	As many as possible										N/A	Unknown
Hog exclusion from attractive nuisances		N/A	As many as possible										N/A	Unknown
Riparian buffer restoration/extension		N/A	Assistance/input as needed										N/A	F6,S5,S7,N1,N2,N3
Education & outreach	All stakeholders	\$7,500	1	1	1	1	1	1	1	1	1	\$75,000	F8	
<b>Illegal Dumping and Litter Accumulation</b>														
Illegal dumping surveys	Cities, counties, HOAs, NAs	\$5,800	1	1	1	1	1	1	1	1	1	\$58,000	F6,S7,S8,N1,N3	
Rural home hazardous waste pickup/dropoff days	Counties, CDPs	\$5,000	2	2	2	2	2	2	2	2	2	\$100,000	F6,S7,N1,N3	
JPL cleanup events	All stakeholders	\$3,500	1	1	1	1	1	1	1	1	1	\$35,000	F6,S7,N1,N3	
Education & outreach		N/A	Assistance/input as needed										N/A	Unknown
<b>Lawn Residue and Waste</b>														
Illicit discharge surveys	Cities, counties	N/A	As needed										N/A	F6,S2,S7,S8,N1,N3
Permeable paver driveways, rain barrels	Residents, businesses, cities, counties	\$5,500	1	1	1	1	1	1	1	1	1	\$55,000	F6,S5,S7,N1,N2,N3	
Low-water use plantings in greenspaces		N/A	Assistance/input as needed										N/A	F6,S5,S7,N1,N2,N3
Lawn waste management ordinances/bylaws	Cities, counties, HOAs, NAs	N/A	As early as feasible										N/A	L, F3
"Water Wise" lawn care training	Residents, landscapers	\$3,500	1		1			1				\$10,500	F8,N1,N3	
Education & outreach - direct marketing	Cities, counties, regional entities	\$17,000	1	1	1	1	1	1	1	1	1	\$153,000	F8,N1,N3	
Education & outreach - general		\$17,000	Assistance/input as needed										\$17,000	F8,N1,N3
<b>SSOs</b>														
Support for interdepartmental reporting network for SSO locations	Wastewater infrastructure operators	N/A	As needed										N/A	L, F3, S12
Stormwater infrastructure assessments	Cities	\$800	1	1	2	2	2	2	1	1	1	\$12,000	F6,S2,S7,S8,N1,N3	
Permeable pavers for parking lots	Lot owners/operators	\$37,500	1		1			1				\$150,000	F6,S5,S7,S12, N1,N2,N3	
Education & outreach	Residents	N/A	Assistance/input as needed										N/A	N/A
<b>OSSFs</b>														
Incentivized OSSF inspections/pumpouts	Residents, HOAs, NAs	\$325	50	50	50	50	50	50	50	50	50	\$162,500	F9,S2,S7	
Replace failing systems		\$10,000	1	1	1	2	2	2	1				\$100,000	F6,S5,S7,N1,N2,N3
HOA/NA coordinated OSSF cleanout events		N/A	Assistance/input as needed										N/A	S7
Homeowner OSSF training		\$7,500	1	1	1	1	1	1	1	1	1	\$75,000	F8	
Practice-focused OSSF training	Real estate agents, OSSF professionals	\$7,500	1	1	1	1	1	1	1	1	1	\$75,000	F8	
OSSF inventory, septic-to-sewer initiatives		N/A	Assistance/input as needed										N/A	F9,S2,S6,S8
OSSF inspection ordinances for property transfers	Cities, counties	N/A	As early as feasible										N/A	L
<b>Sediment and Flooding</b>														
Education & outreach - direct marketing	Cities, counties, regional entities	\$17,000	1	1	1	1	1	1	1	1	1	\$153,000	F8,N1,N3	
Education & outreach - general		\$17,000	Assistance/input as needed										\$17,000	F8,N1,N3
Identify and install GI BMP projects	Cities, contractors, property owners, Counties	\$6 - \$45/per sq. ft	As many as possible										Varies	F3, F6,F10, F11, S5,S7,N1,N2,N3
Riparian, wetland and/or stream restoration	Cities, Counties, USACE, Local and State partners	\$500,000 per project	As needed										Varies	F3, F10, F11
Stormwater infrastructure assessments	Cities, Counties	\$800	7	7	7	7	7	7	7	7	7	\$56,000	F6,S2,S7,S8,N1,N3	
<b>Monitoring Projects</b>														
JPL Long-term Monitoring (bi-monthly)	TRA	\$72,000	1						1			\$288,000	F3,S9	
<b>Key - Grant Blocks</b>														
1st Strike - Outreach/Assessment	Landscape Design BMPs		Rural/OSSFs					Pet Waste						

# Environmental Studies





# Access





# Longitudinal Studies

435 Miles



# Fish Sampling





# 080295 – Overbanking Work



~7,000 cfs



~60,000 cfs



# QUESTIONS?



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