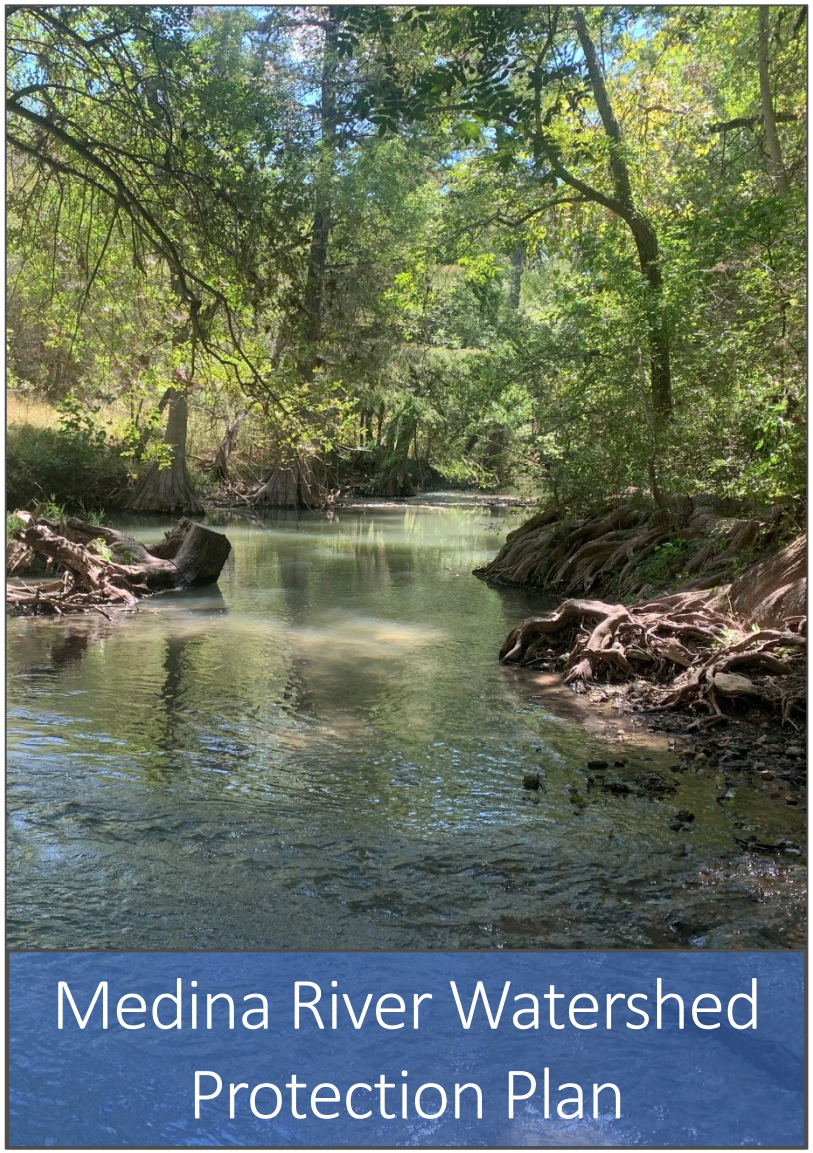

Medina River
Below Diversion Dam

Watershed Protection Plan
Stakeholder Meeting

St. Louis Braden Keller Community Center, Castroville
September 9, 2024

Tina Hendon, Program Specialist
Lucas Gregory, Associate Director
Texas A&M AgriLife, Texas Water Resources Institute

Texas Water Resources Institute
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Texas A&M AgriLife Research | Extension

Welcome!
Willkumme!

Overview of Project

Where we are

Work Group activities

Result of analyses

Where we go from here

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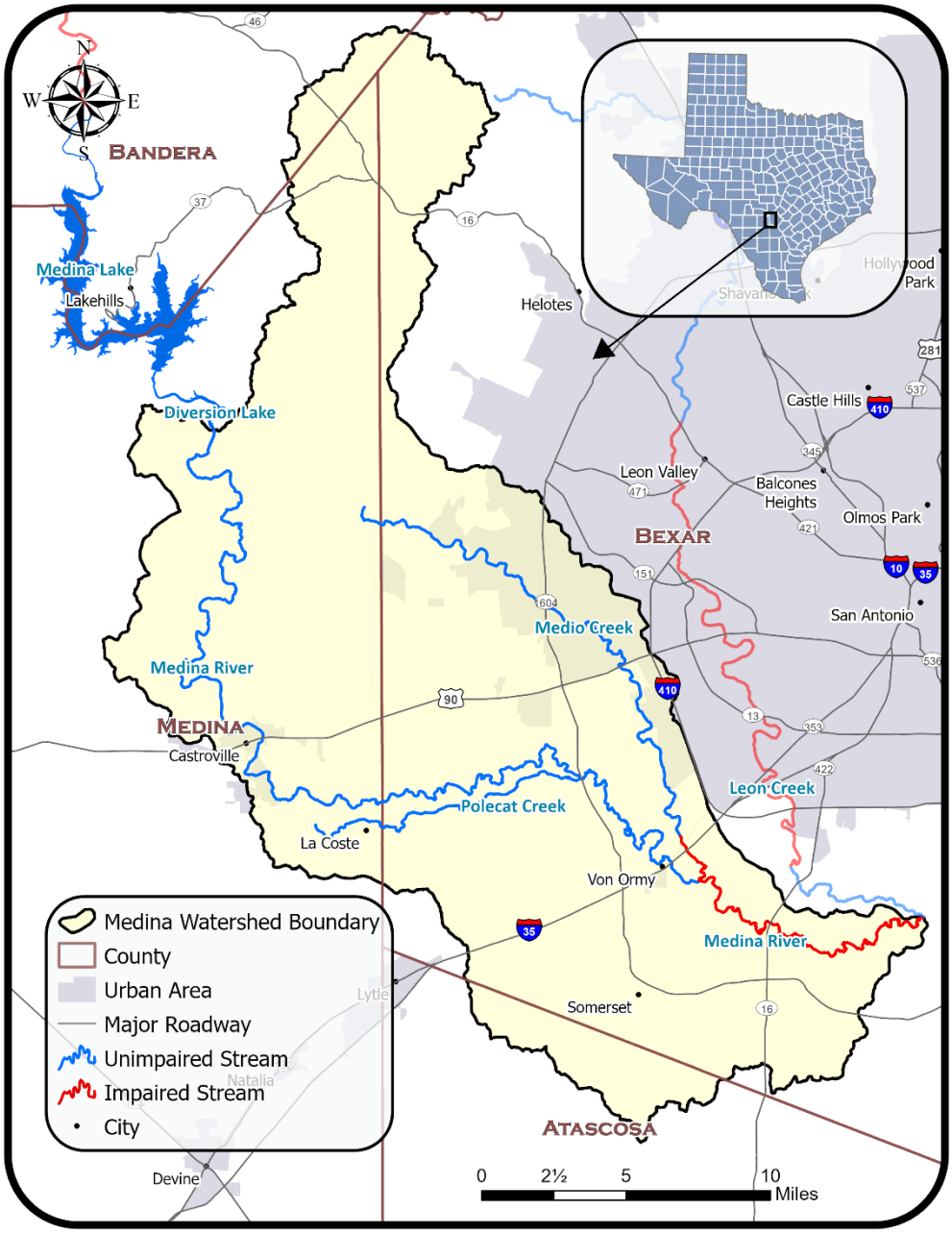
Overview of Project

Medina River below Diversion Lake

Medina River
- ✓ impaired for bacteria
- ✓ concern for nitrate

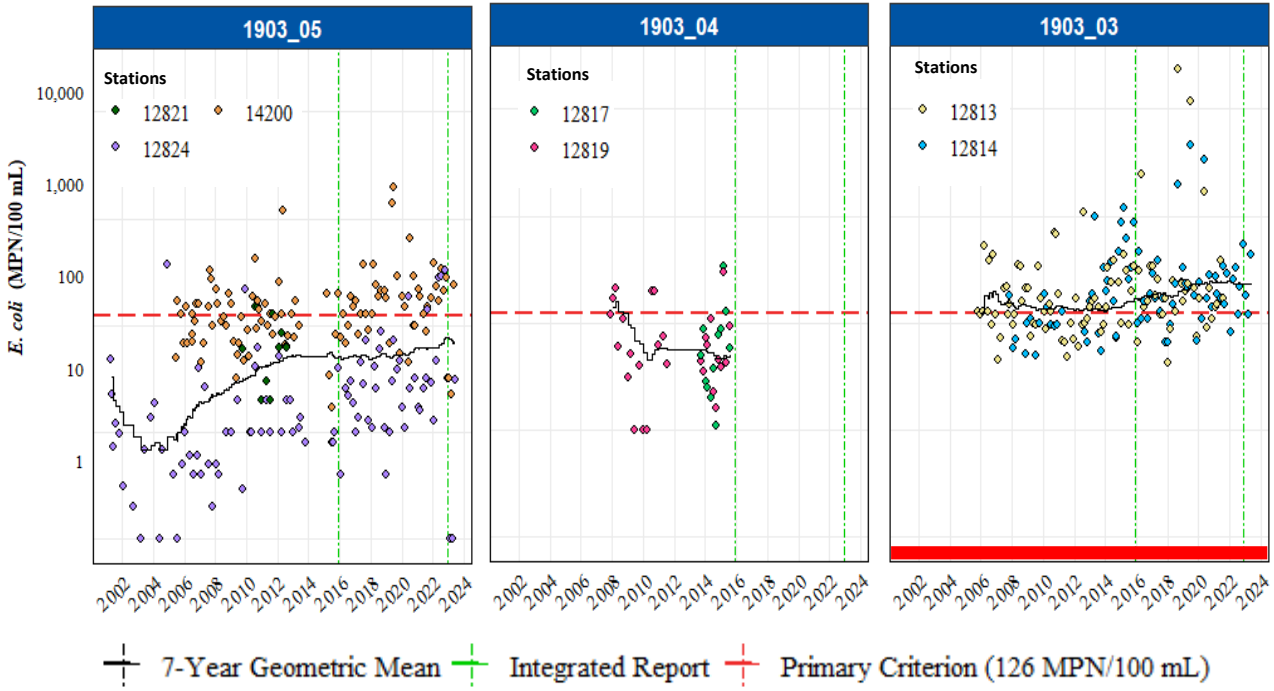
Medio Creek
- ✓ impaired for bacteria

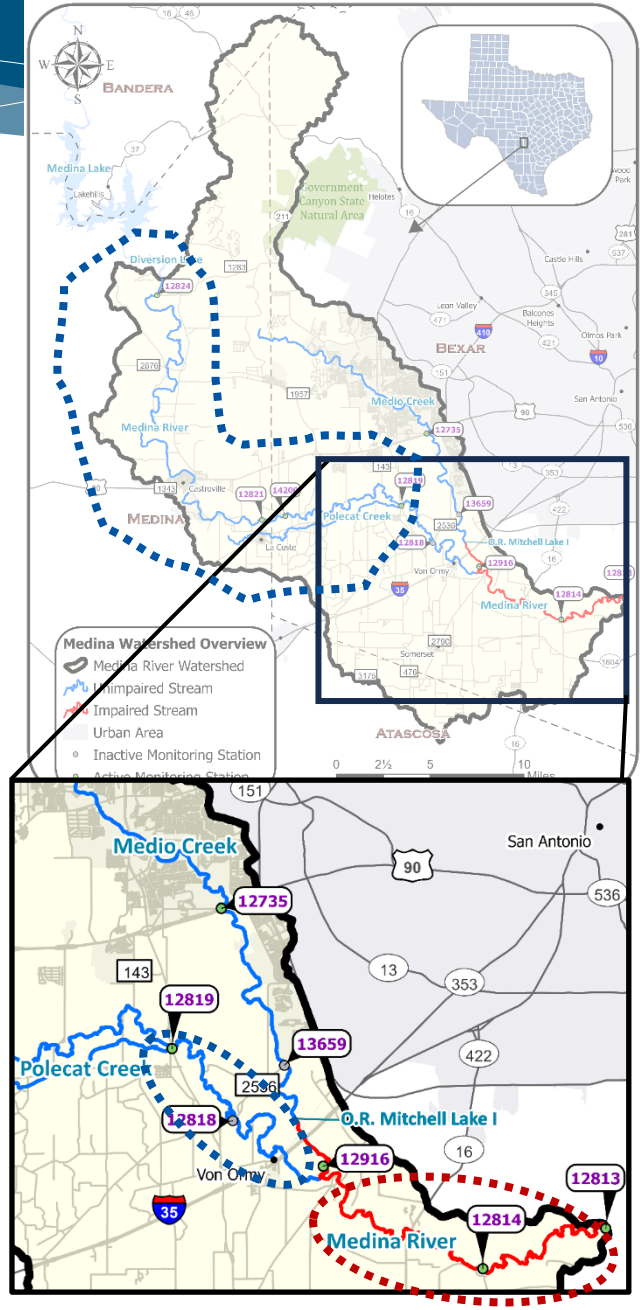
Polecat Creek
- ✓ not impaired
- ✓ no concerns



Water Quality Data

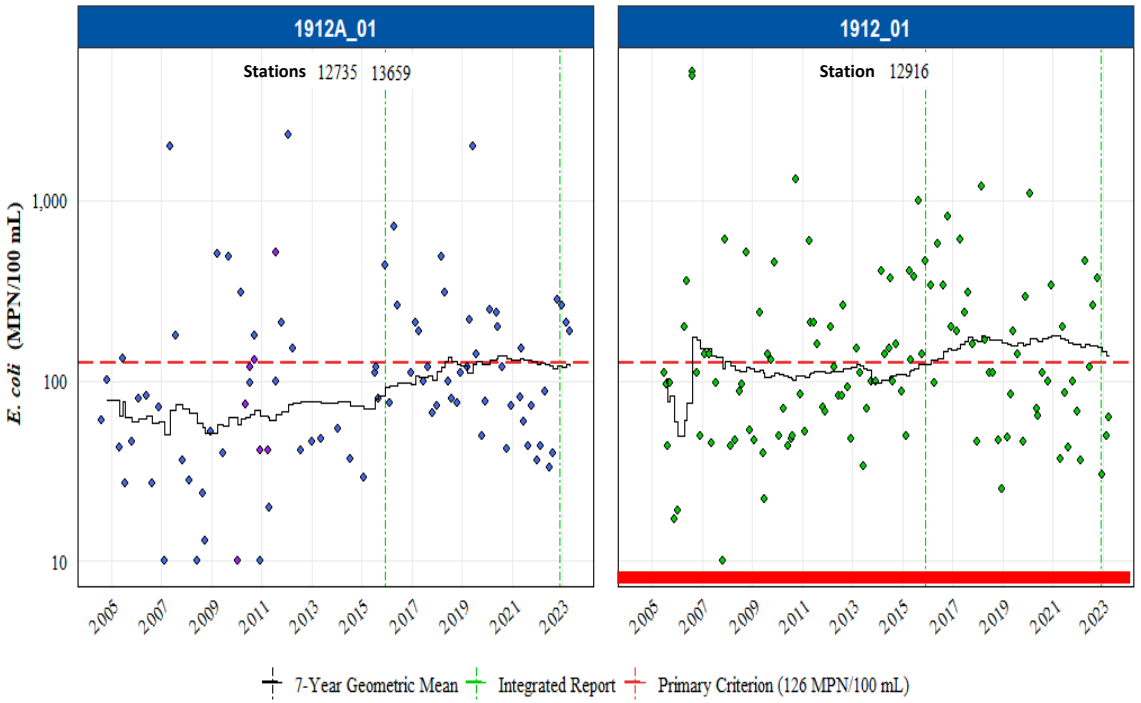
Medina River Below Diversion Lake

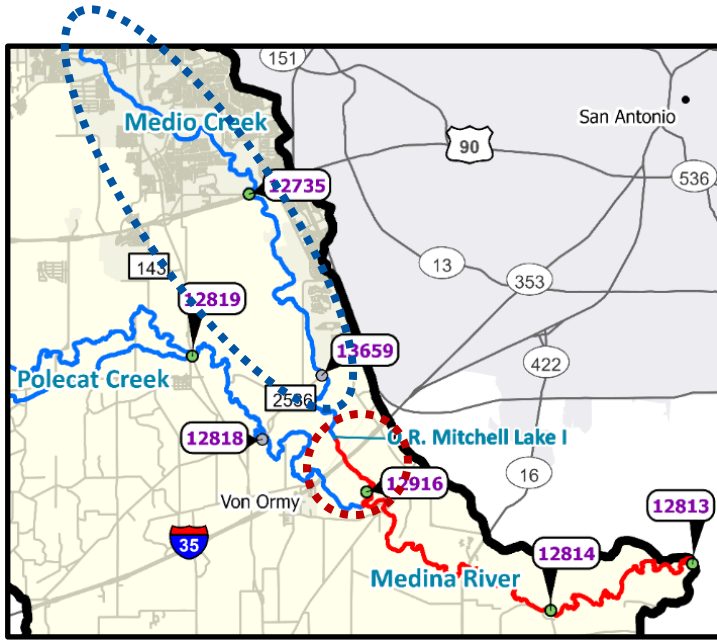




Water Quality Data

Medio Creek





TCEQ 2024
Assessment Period

Watershed Planning
to improve water quality

- ✓ Build Partnerships
- ✓ Characterize your watershed
- ✓ Identify goals and solutions
- ✓ Design an implementation program
- ✓ Implement the watershed plan
- ✓ Measure progress and make adjustments

TEXAS A&M AGRILIFE

A Watershed Protection Plan is…

A comprehensive plan that addresses sources and causes of pollutants in a watershed

- ✓Creating a WPP is a voluntary and locally-driven approach to address existing or potential water quality impairments
- ✓Recommendations contained in a WPP are developed through a partnership with stakeholders who live and work in the watershed

TEXAS A&M AGRILIFE

Composing the Watershed Protection Plan

- ✓ Gather lots of local stakeholder input
- ✓ TWRI is assisting in the process

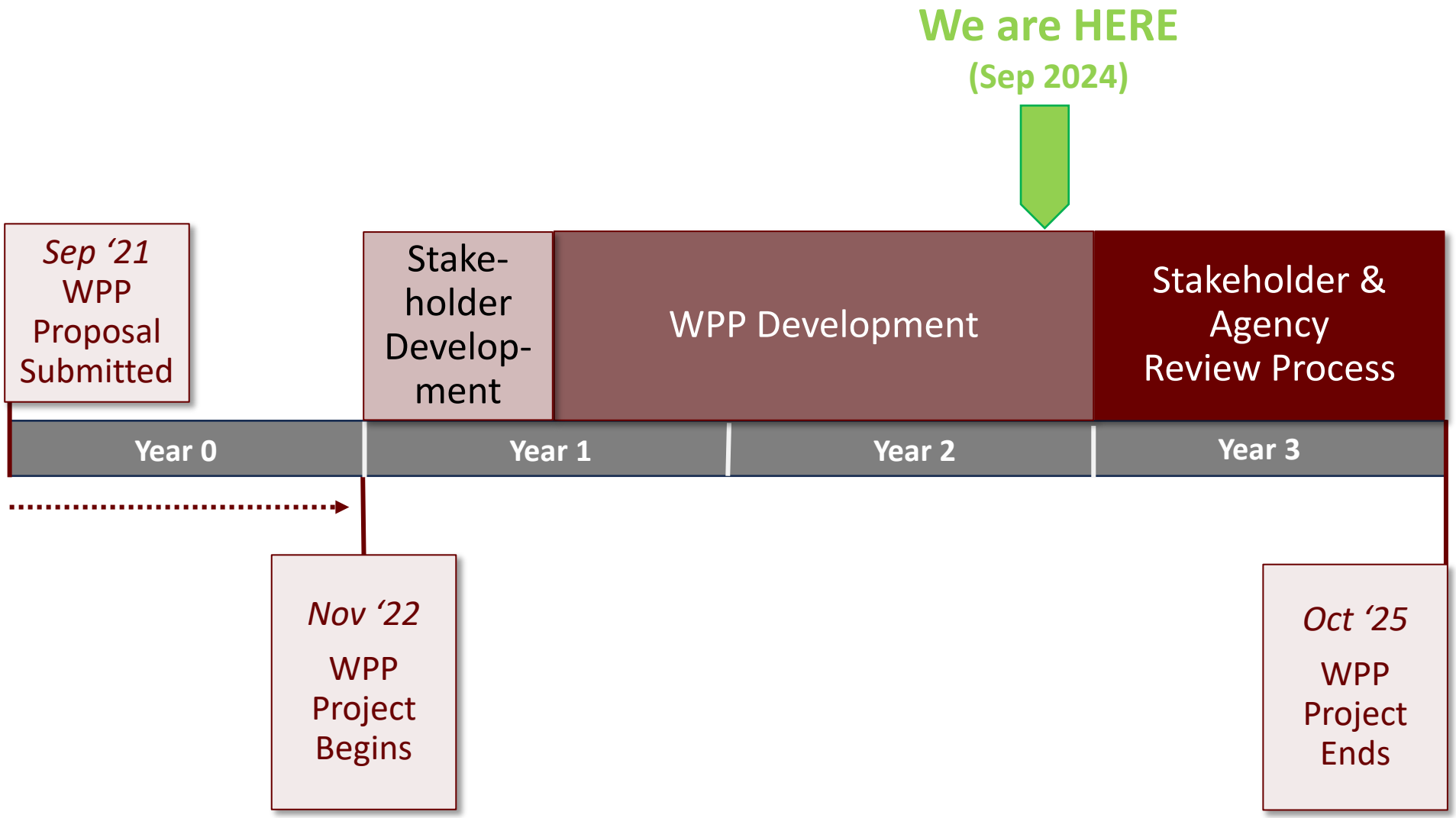
TEXAS A&M AGRILIFE

WPP Outline

- ✓ Chapter 1 – Intro to Watershed Management
- ✓ Chapter 2 – Description of Watershed Characteristics
- ✓ Chapter 3 – Existing Water Quality Conditions
- ✓ Chapter 4 – Identified Sources of Pollutants
- ✓ Chapter 5 – Pollutant Source Assessment (reductions needed)
- ✓ Chapter 6 – Strategies (How we can improve water quality)
- ✓ Chapter 7 – Education and Outreach Plan
- ✓ Chapter 8 – Implementation Plan
- ✓ Chapter 9 – Available Resources
- ✓ Chapter 10 – Measures of Success

TEXAS A&M AGRILIFE

WPP Project Timeline



“Approval” of the WPP

- ✓ Stakeholder Approval
- ✓ State Approval
- ✓ EPA Acceptance

Do we need EPA to accept our plan?

- ✓ *No. But it allows for funding to support local efforts & recommendations*
- ✓ *Indicates that a local effort is underway to improve/protect water quality*

Does EPA acceptance bind or require participation?

- ✓ *No. The plan is voluntary.*

TEXAS A&M AGRILIFE

Outcomes

- ✓ Potential funding for implementation projects
- ✓ Restoration and protection of local water resources
- ✓ Benefits to:
  - Recreation
  - Local economy
  - Human well-being
  - Wildlife
  - Other natural resources
  - …

TEXAS A&M AGRILIFE

Work Groups

Work Group Overview

- ✓ **Agriculture and Rural Concerns**
- ✓ **Urban Development, Ordinances, Planning**
- ✓ **Wastewater** (incl WWTF, OSSF)
- ✓ **Stormwater and Flooding**
- ✓ **Education and Outreach** (incl Parks & Rec)

Work Group Overview

✓Meeting 1

- Potential sources of bacteria & nutrients
- Data & methods
- Data gaps, concerns, considerations
- Education & Outreach goals

✓Meeting 2+

- Loading analysis
- Management measures
- Resources needed
- Challenges or obstacles to implementing
- Education & Outreach opportunities

Bacteria Load Assessment

Reductions Needed
to meet
Water Quality Target

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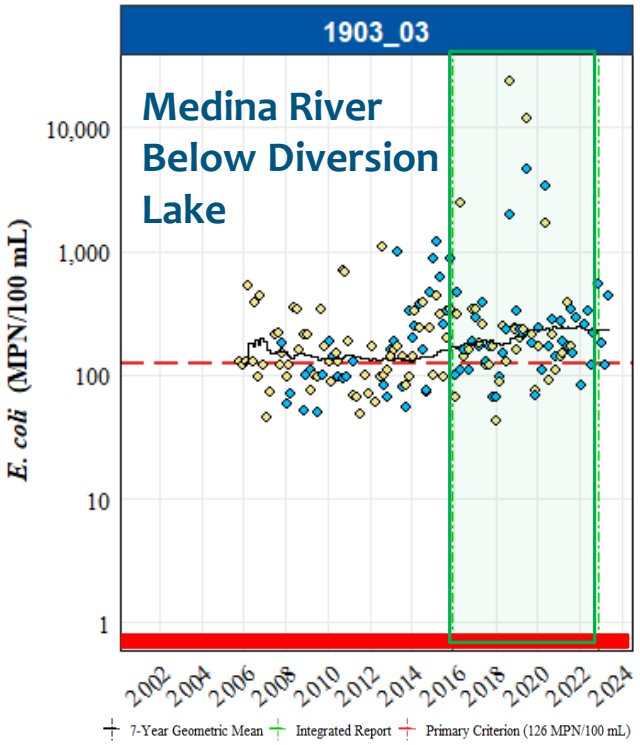
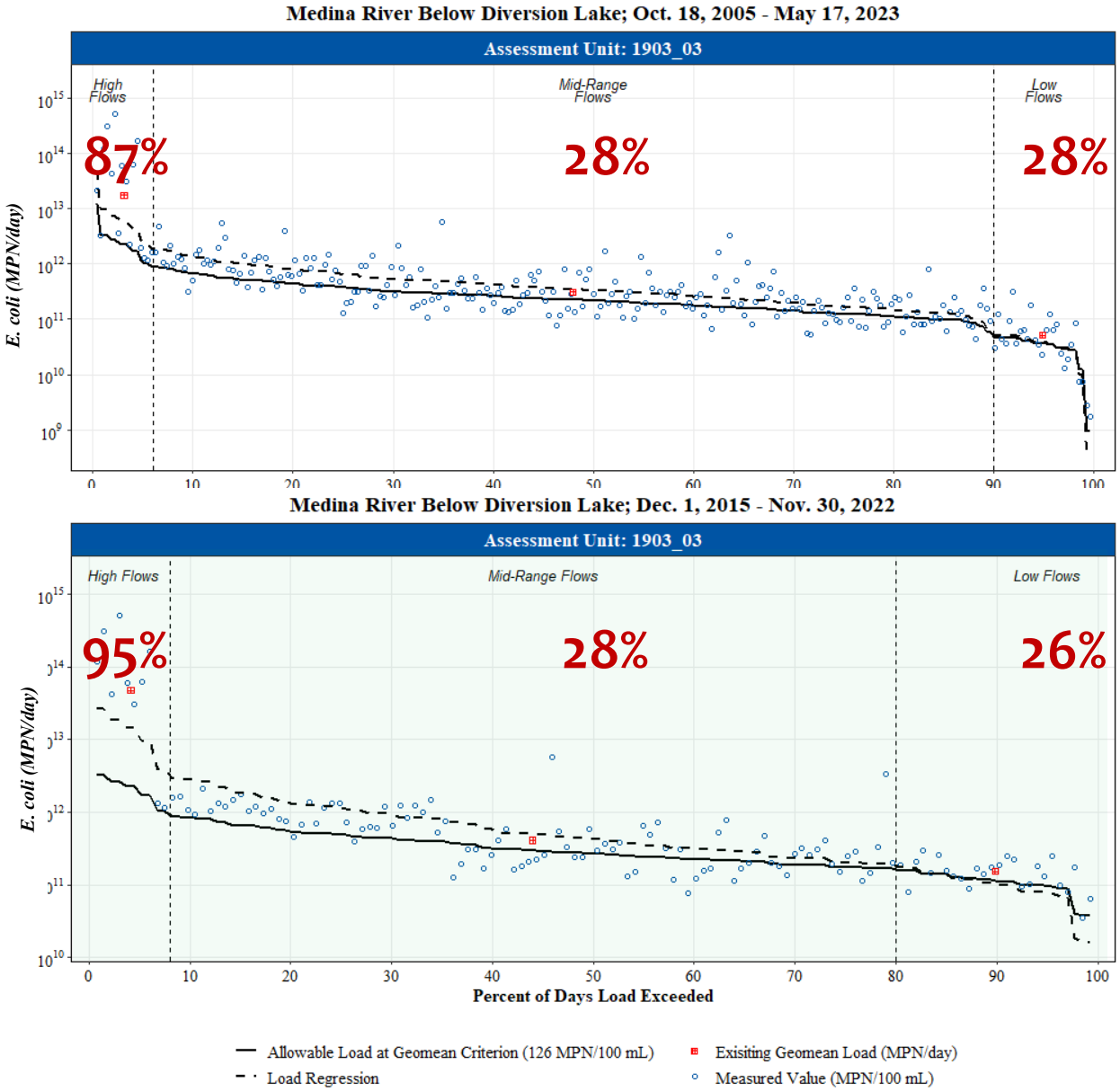
RESEARCH | EXTENSION

Load Reductions



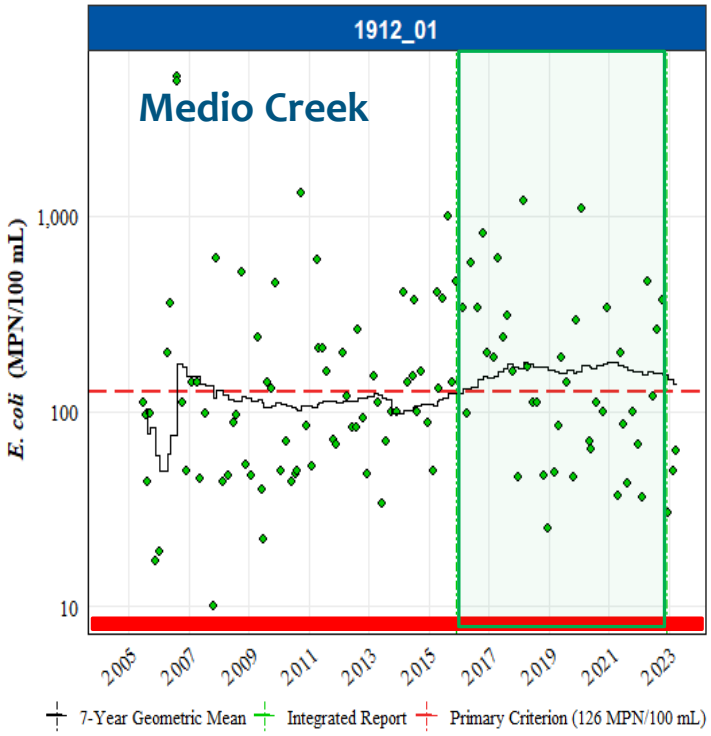


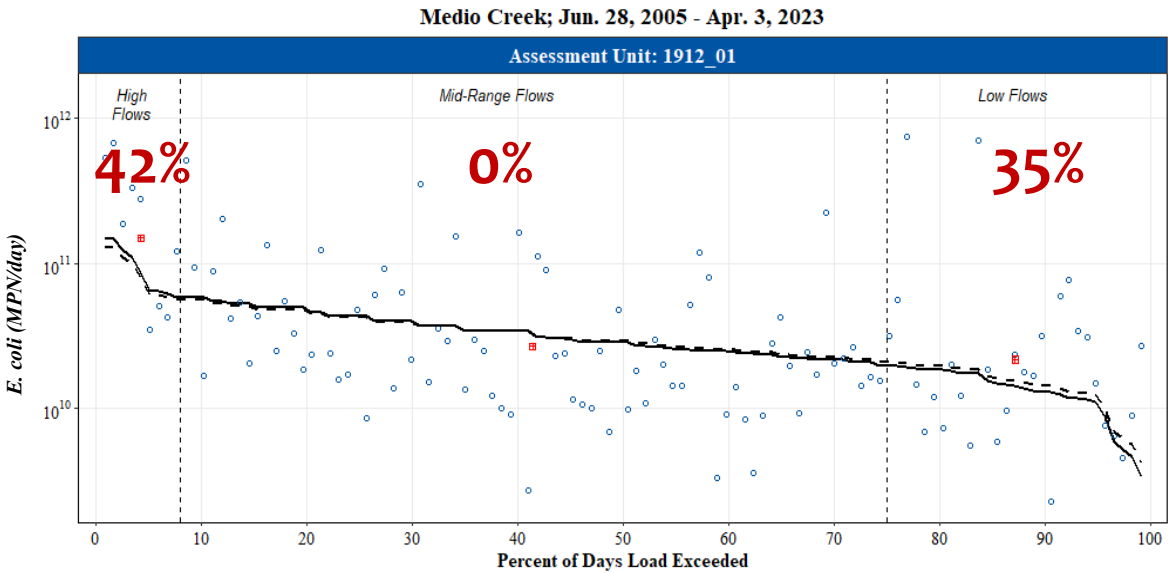
Preferred Method

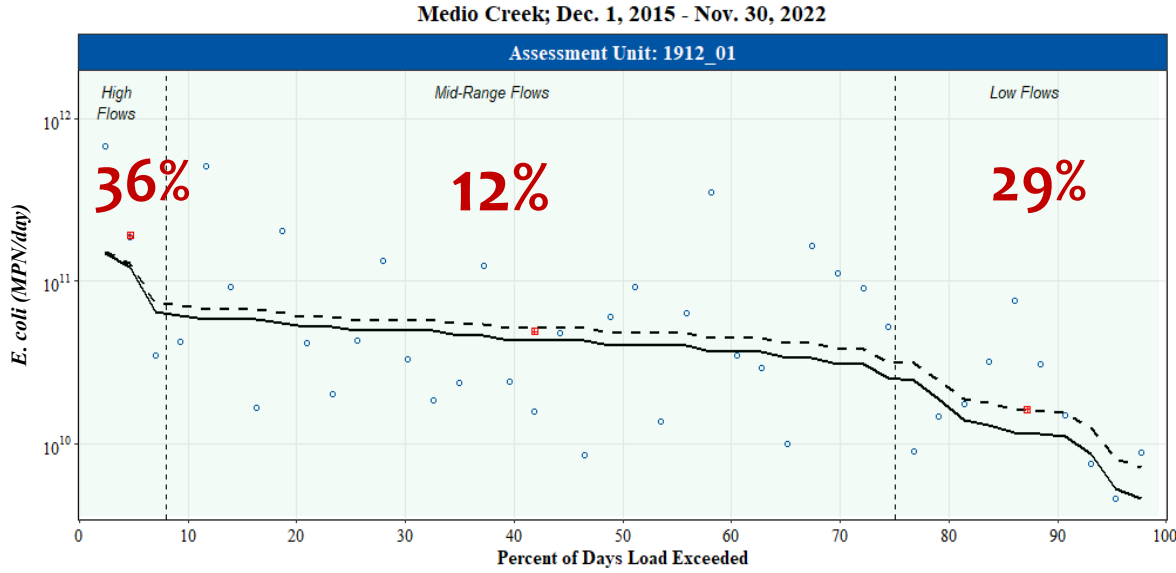
✓Integrated Report period

Texas Water Resources Institute
make every drop count

Load Reductions







Preferred Method

✓Integrated Report period

Texas Water Resources Institute
make every drop count

Sources of Pollutants

- Where is it coming from?
- How much is there?

Land-based Sources

- Livestock
- Wildlife (deer)
- Feral hogs

People-based Sources

- Wastewater treatment plants
- Domestic dogs
- On-site sewage facilities

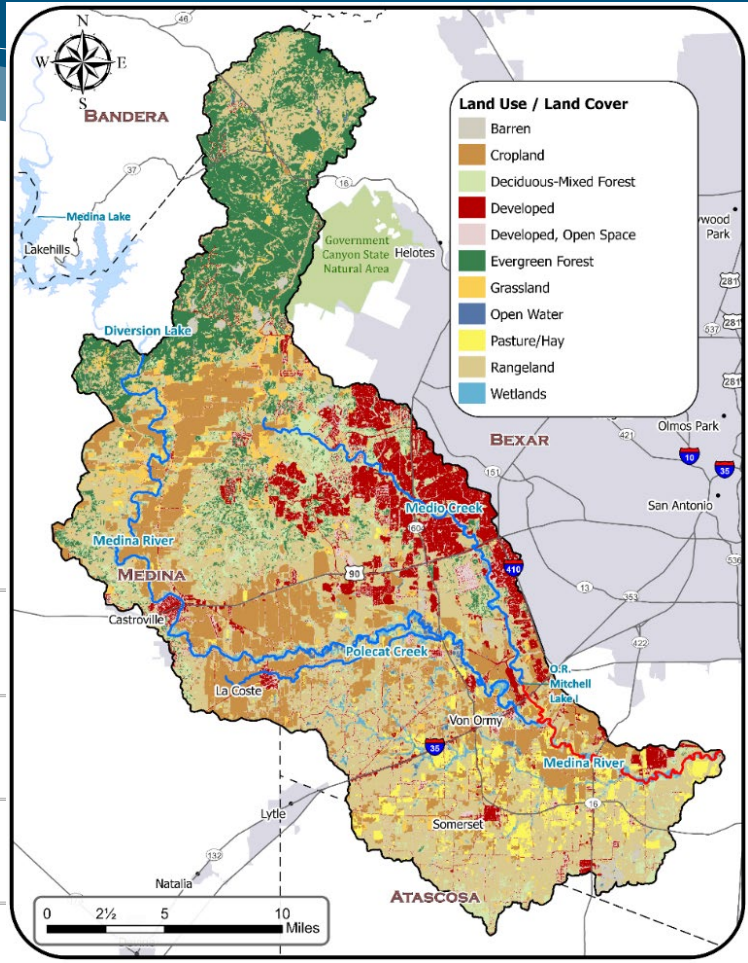
Land-Based Sources

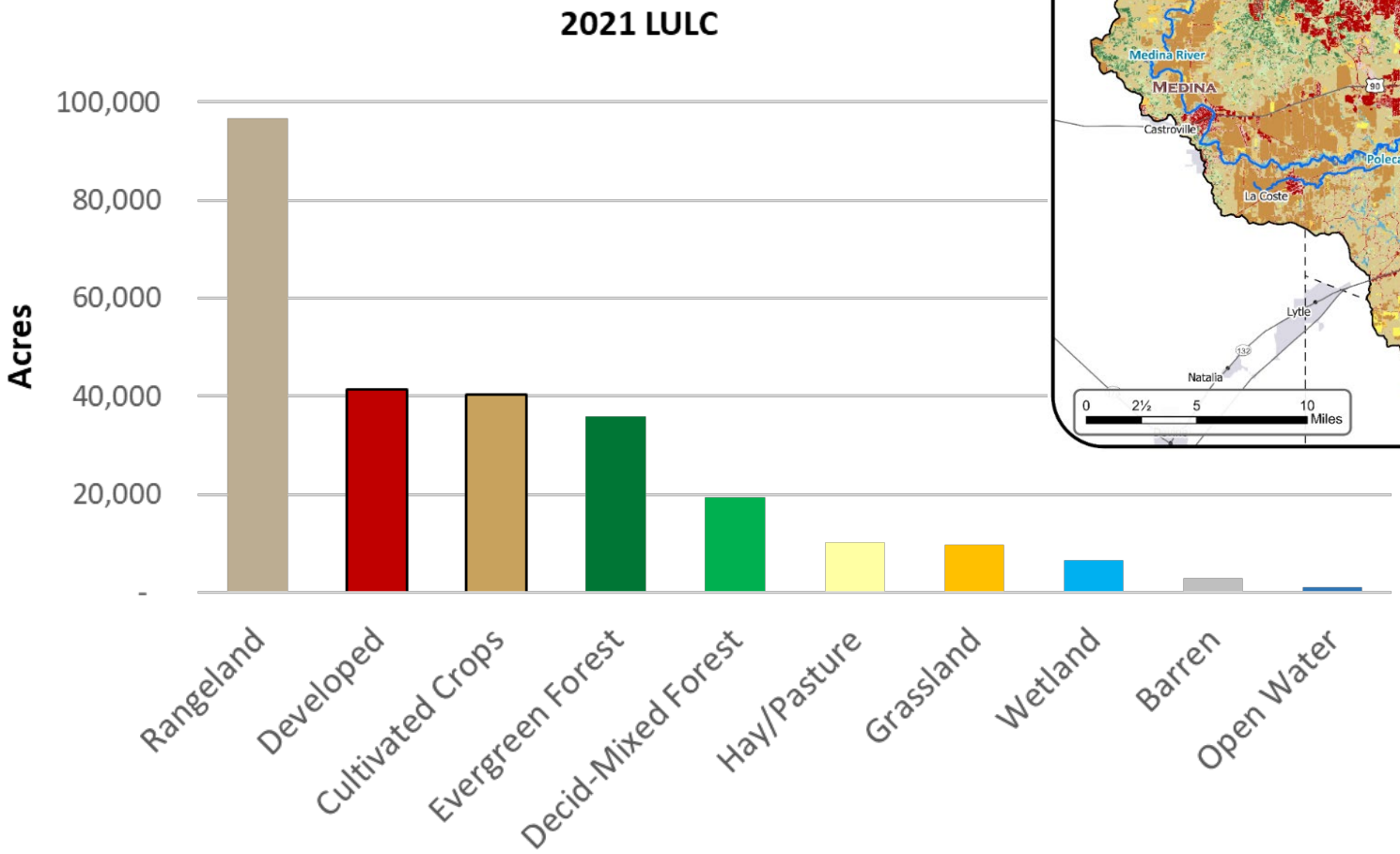
Land Use & Land Cover
Land Development Trends
Habitat Changes
Pollutant Loads
Priority Areas
Management Measures

Land Use & Land Cover
Land Development Trends
Habitat Changes

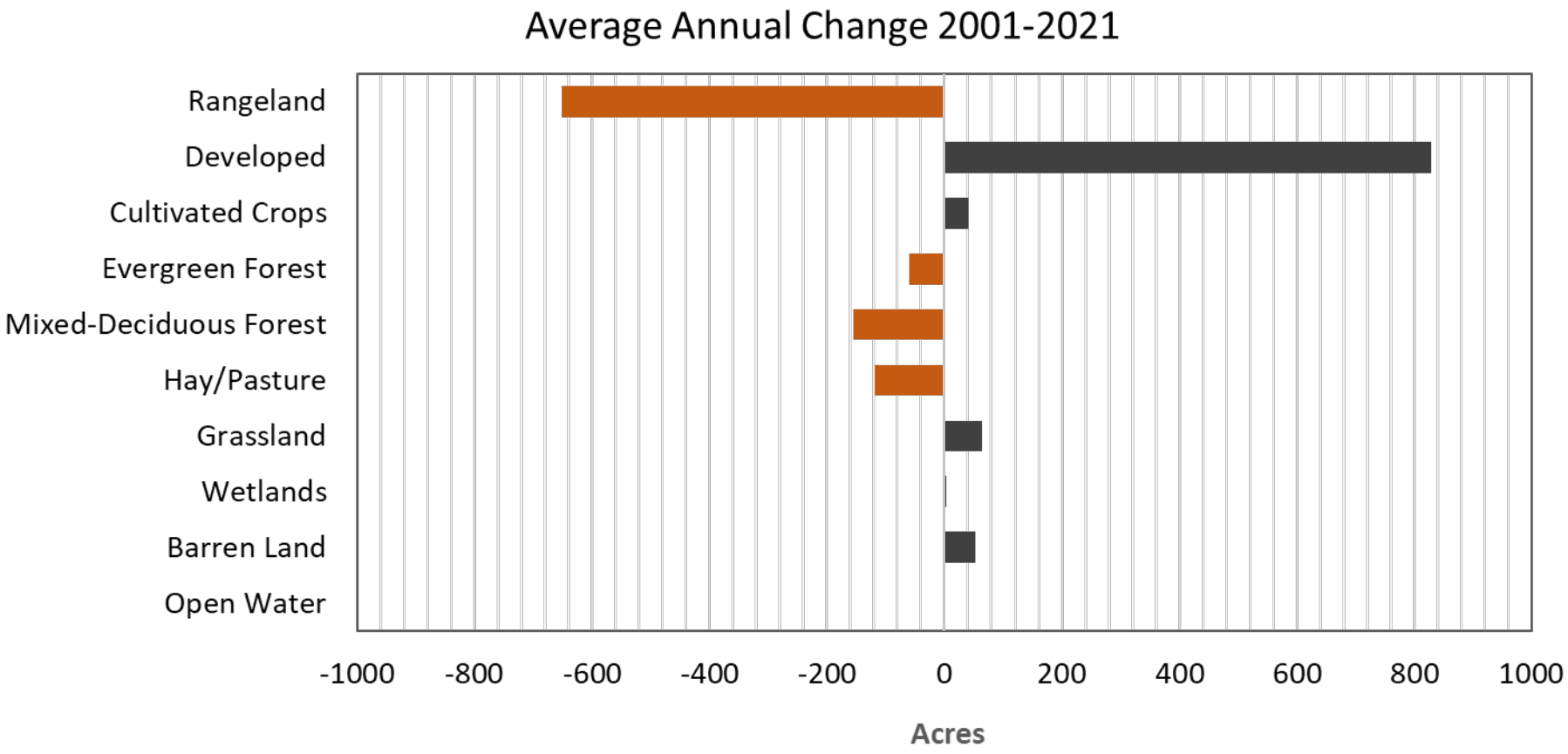
Land Use and Land Cover

2021 National Land Cover Database (NLCD)



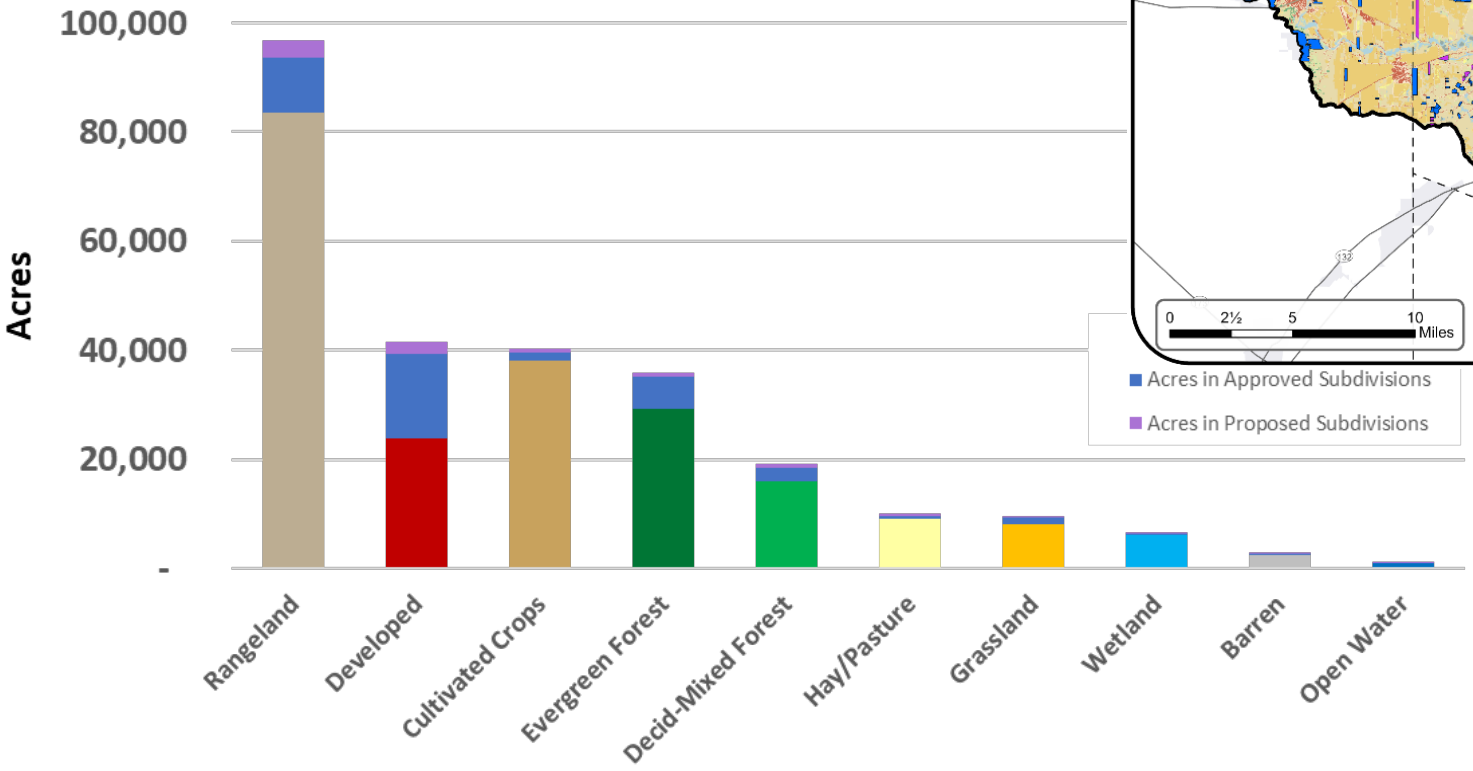


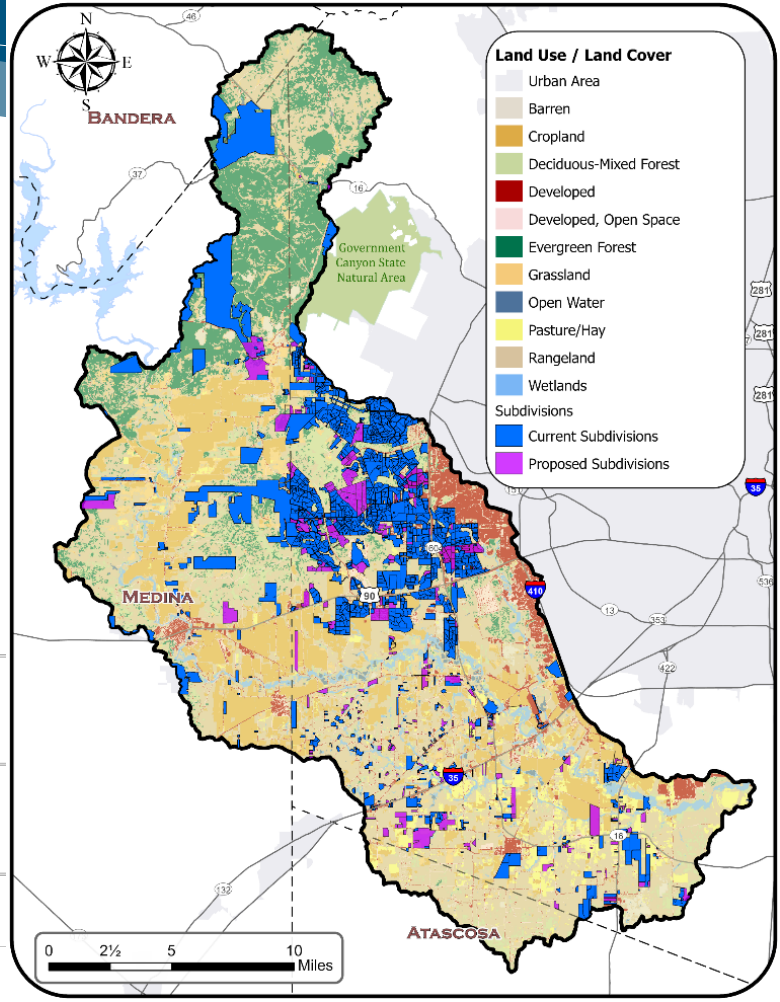
Average Annual Change in NLCD LULC



Land Use and Land Cover

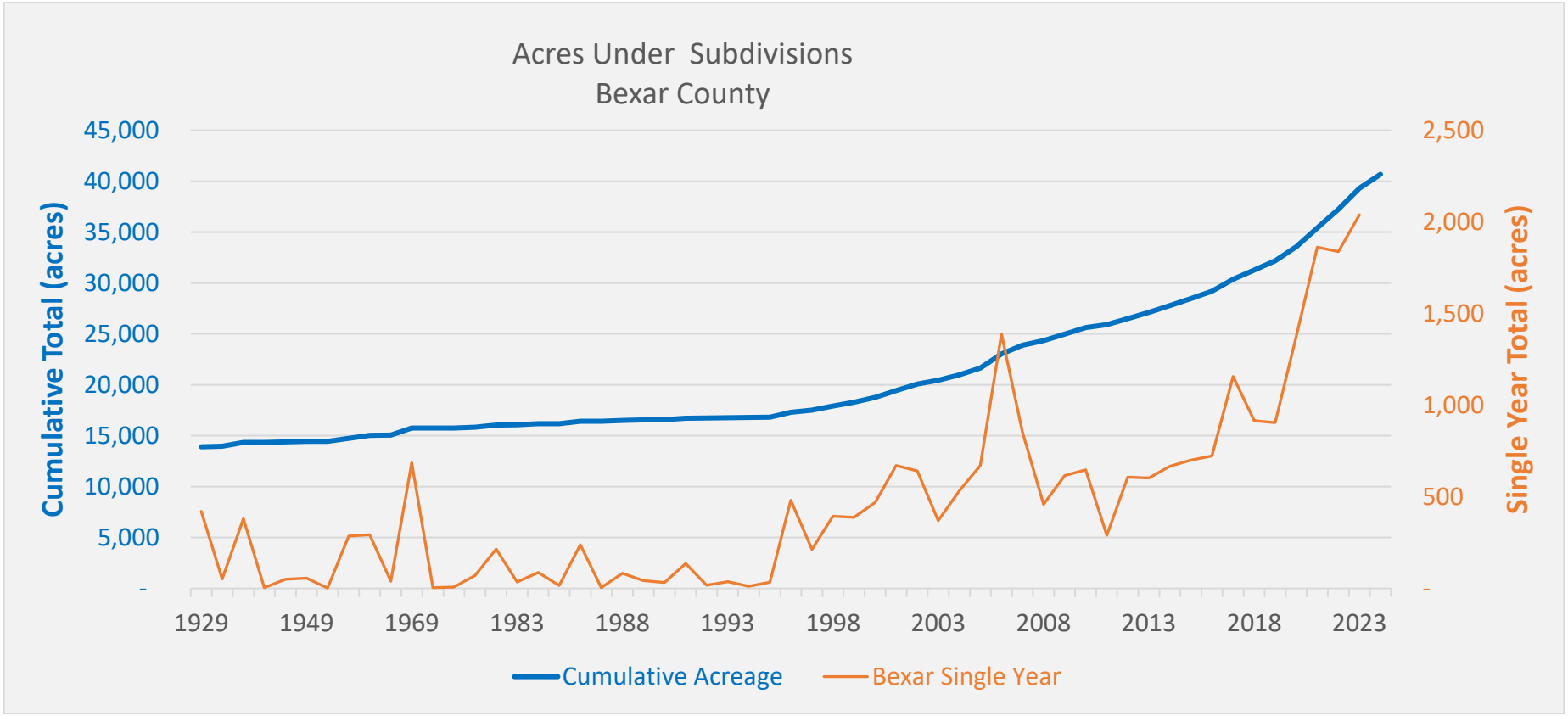
2021 NLCD + Subdivisions





Development Trends - Subdivisions

Bexar County in Medina WPP Watershed(<1929-2023)

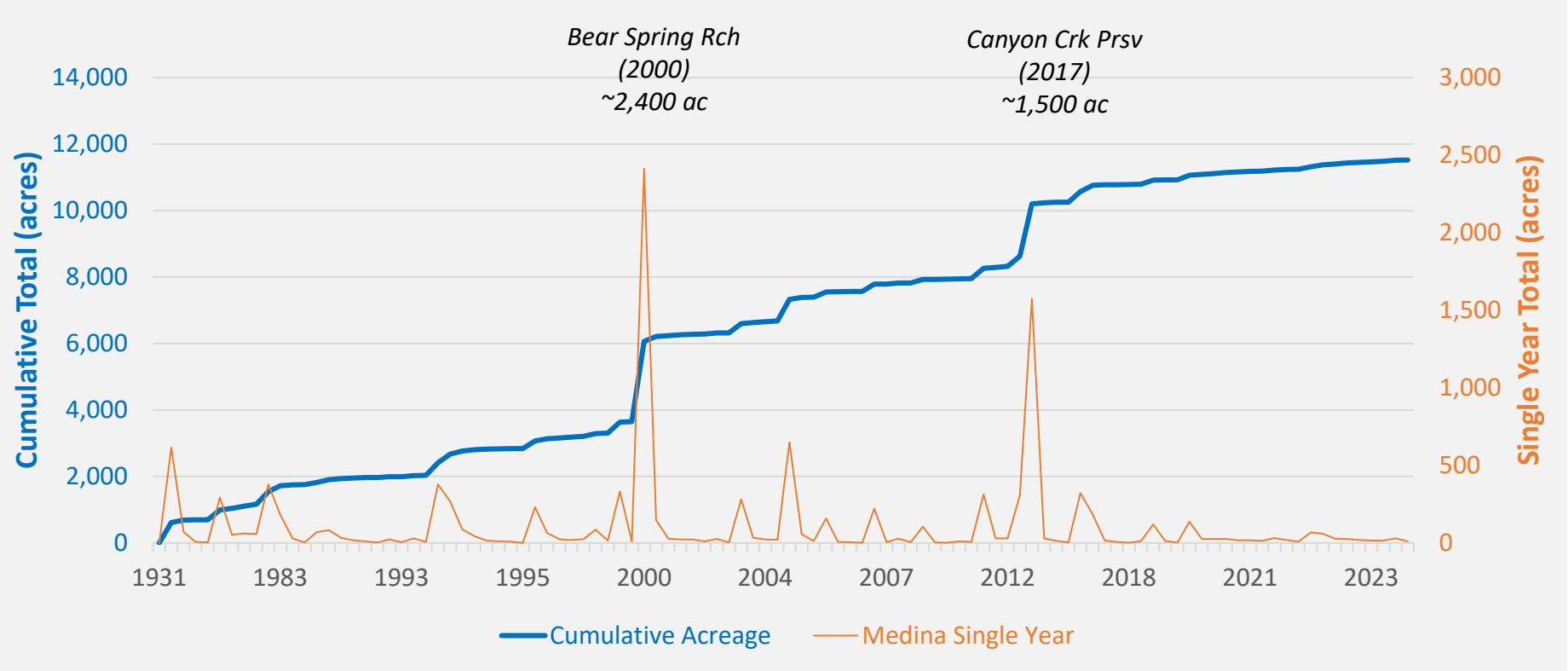


Bexar County provided

- ✓ *GIS file w/names (on most), date*

Development Trends - Subdivisions

Medina County in Medina WPP Watershed (1931-2023)



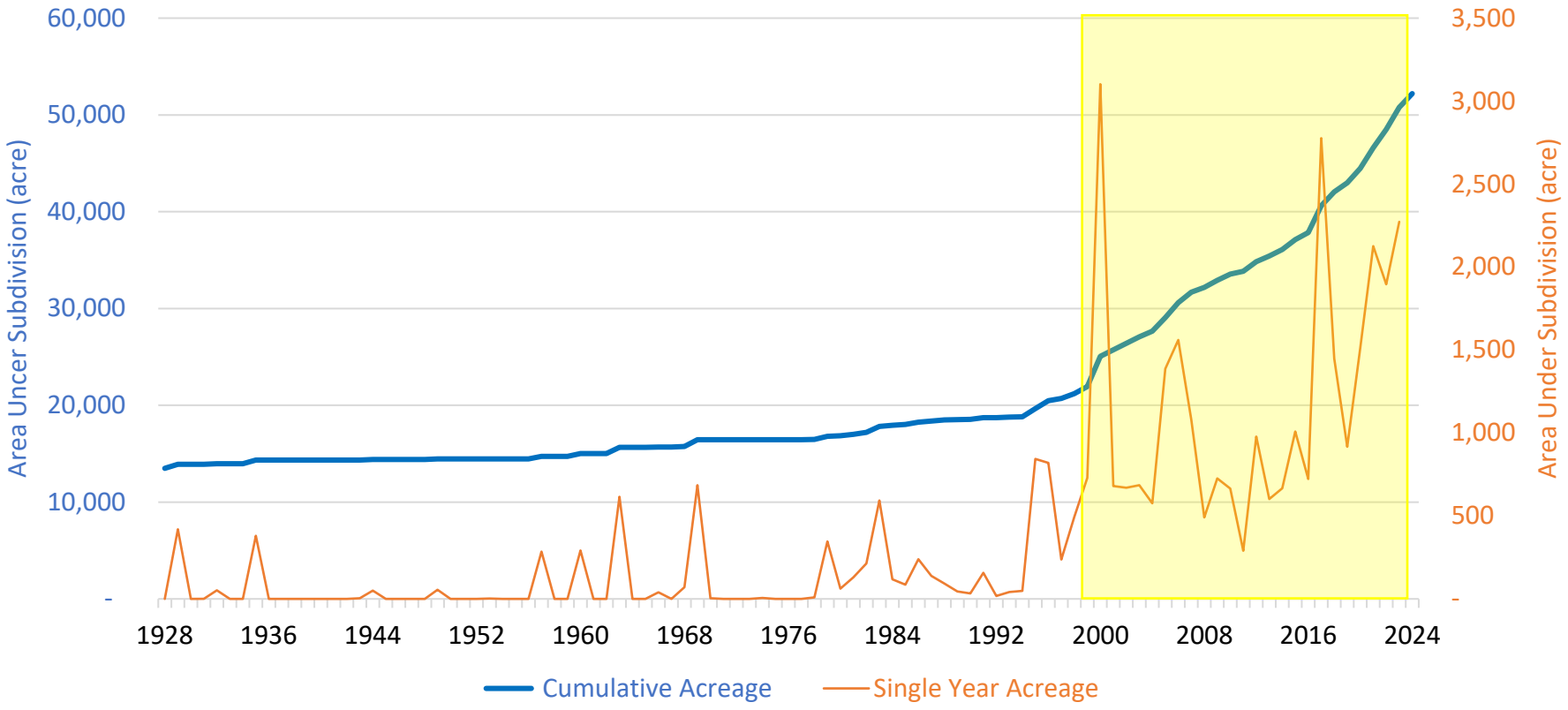
Medina County provided

- ✓ *GIS file w/name*
- ✓ *County Clerk public search for dates*

Development Trends - Subdivisions

Estimated 52k Acres Under Subdivision in Medina WPP Watershed

Bexar & Medina Counties, <1929-2023



Development Trends and Land Use

Grazeable Land

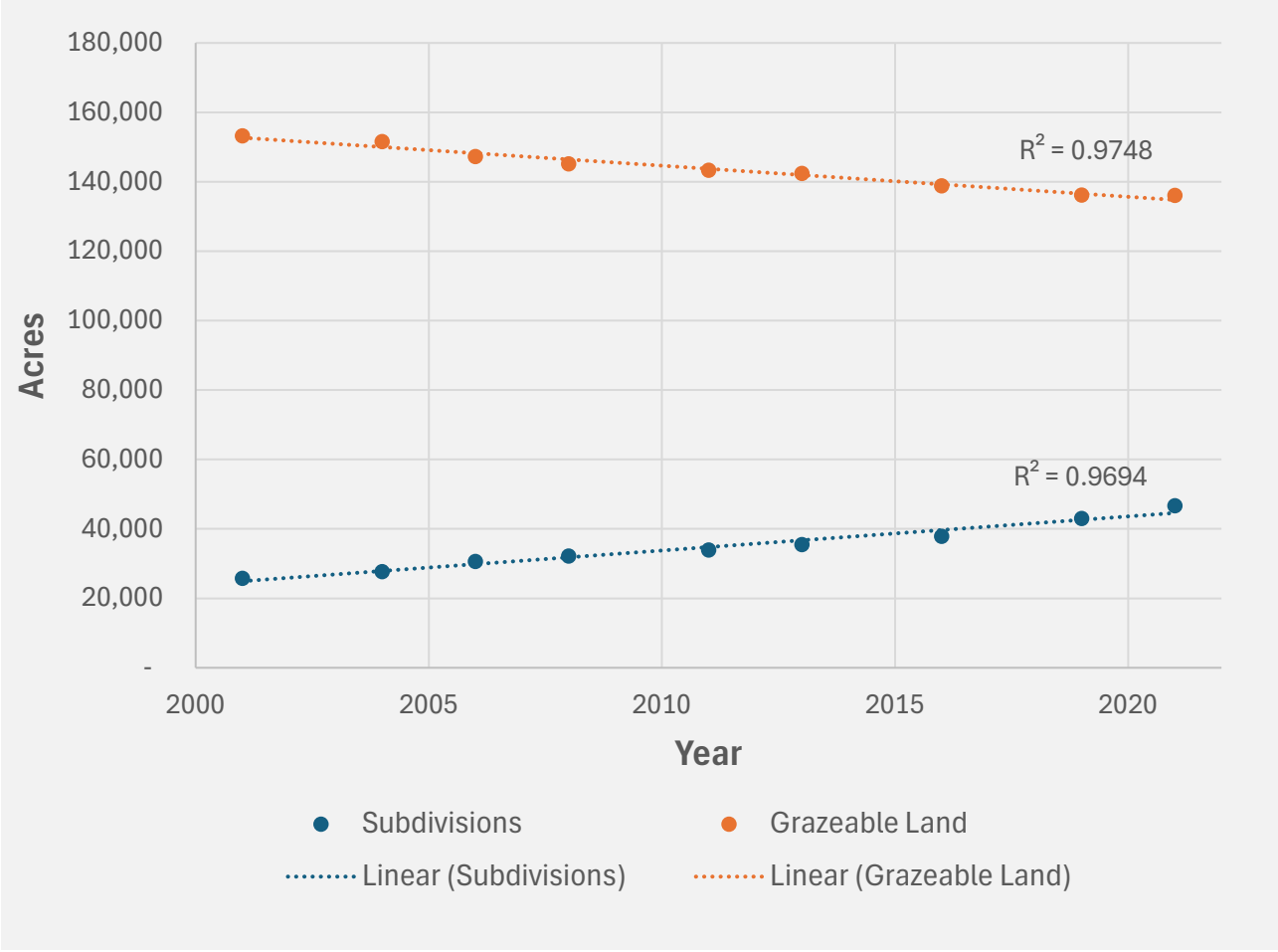
Deciduous Forest

Mixed Forest

Pasture/Hay

Grassland

Rangeland



Development Trends and Land Use

Habitat – Deer and Feral Hogs

Deciduous Forest

Evergreen Forest

Mixed Forest

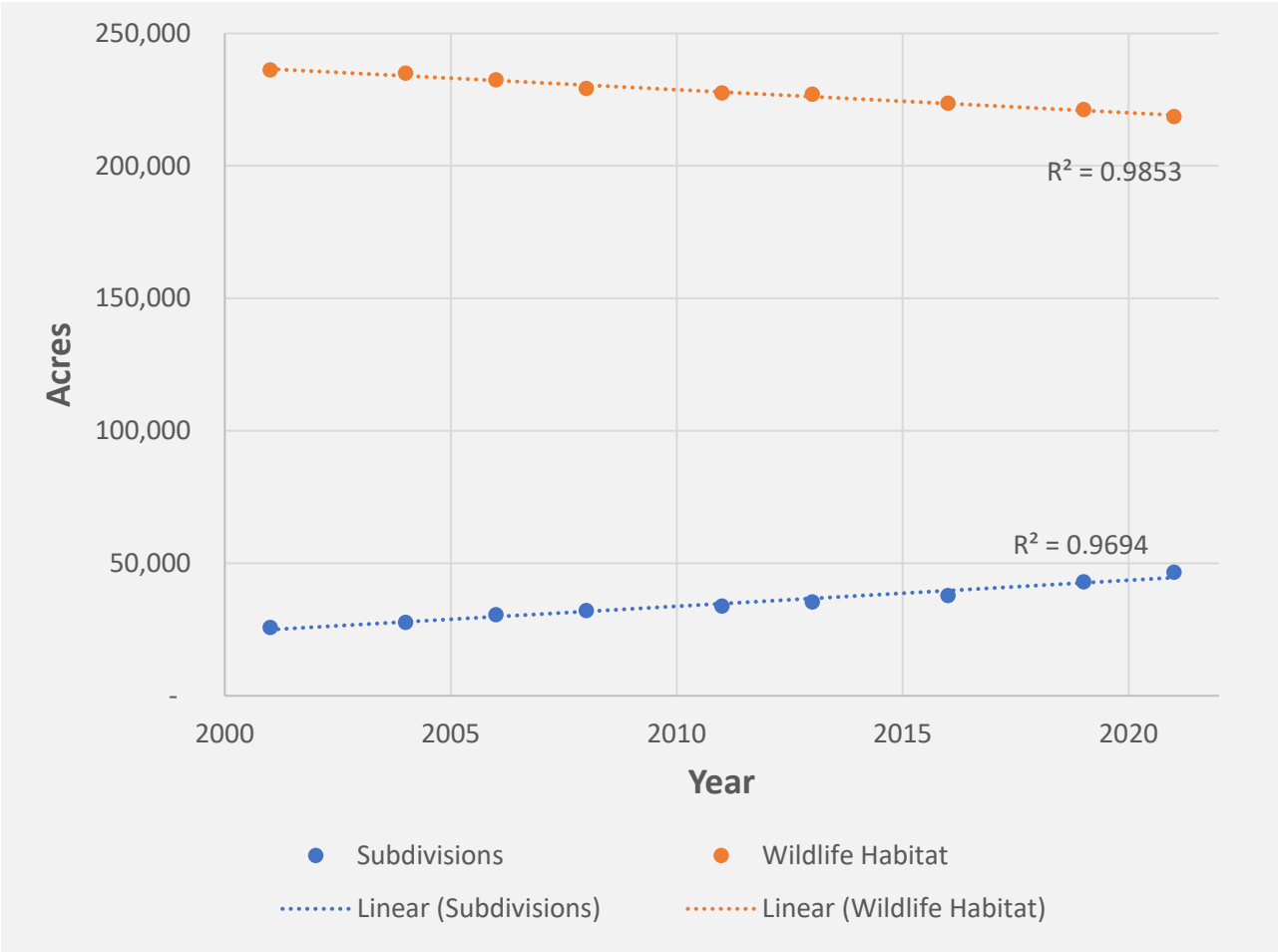
Pasture/Hay

Grassland

Rangeland

Wetland

Cropland



Pollutant Loads
Priority Areas
Management Measures

E. coli Loads From Animals
- Approach

Map current critical source areas and *E. coli* load by subbasin

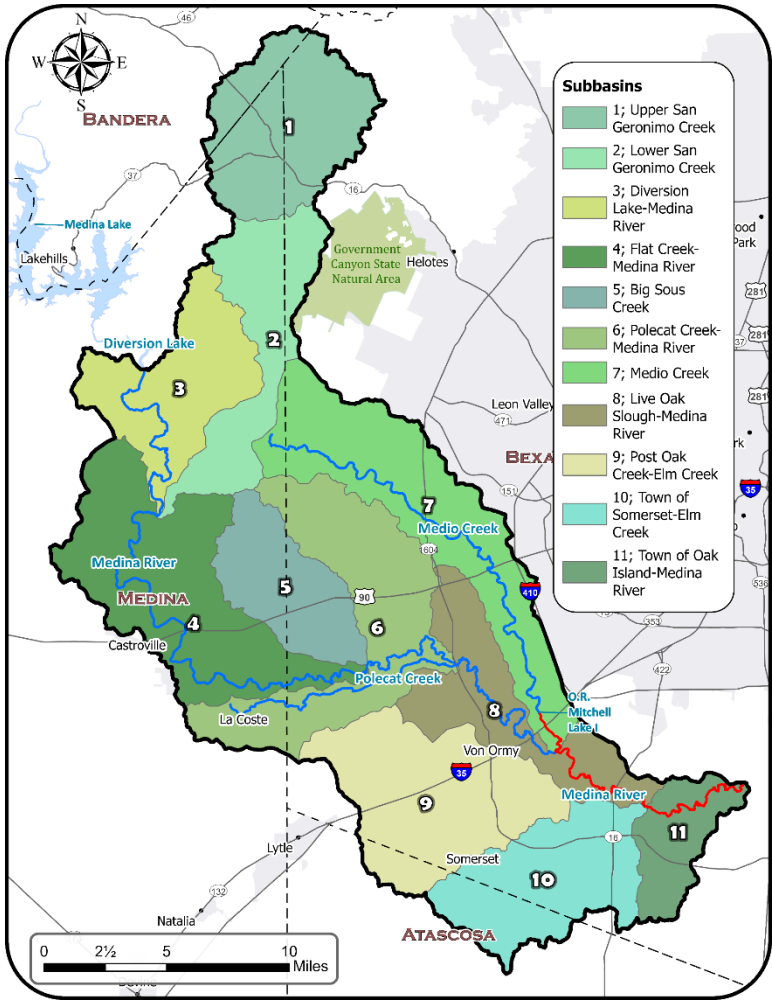
- *2021 LULC not in subdivision*
- *current population estimates*
- *Maps standardized by subbasin size*

Project future LULC estimates

- *historic rate of change*

Project future *E. coli* load

- *projected LULC*
- *proportionately reduced population estimates*



Management Measures

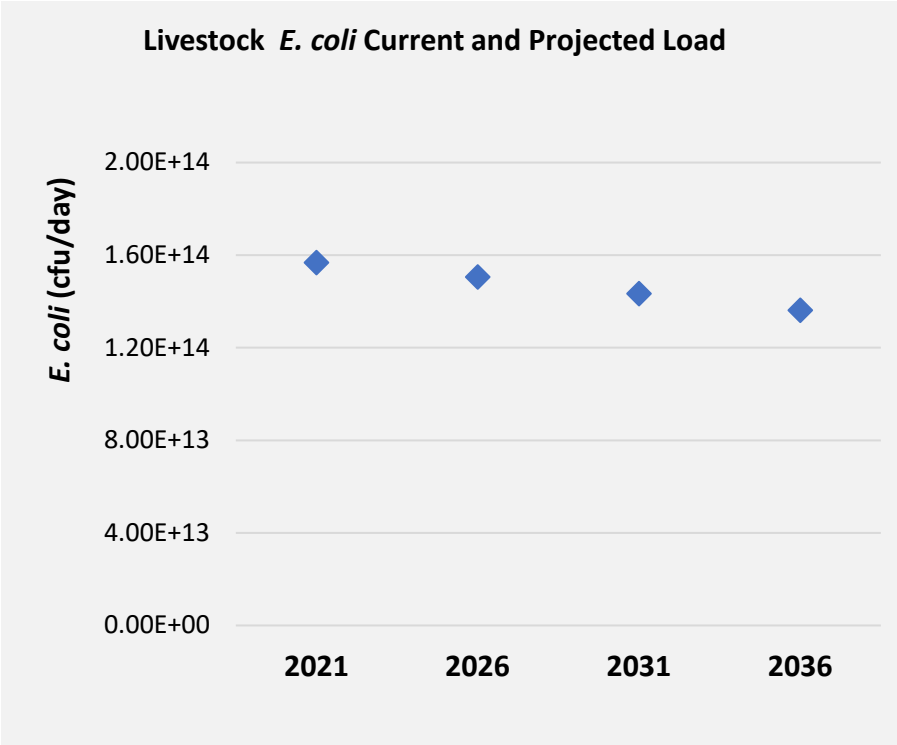
- ✓ Actions that directly or indirectly reduce pollutant loads potentially reaching waterbodies.
- ✓ Effective management measures are both feasible and locally acceptable.

Considerations

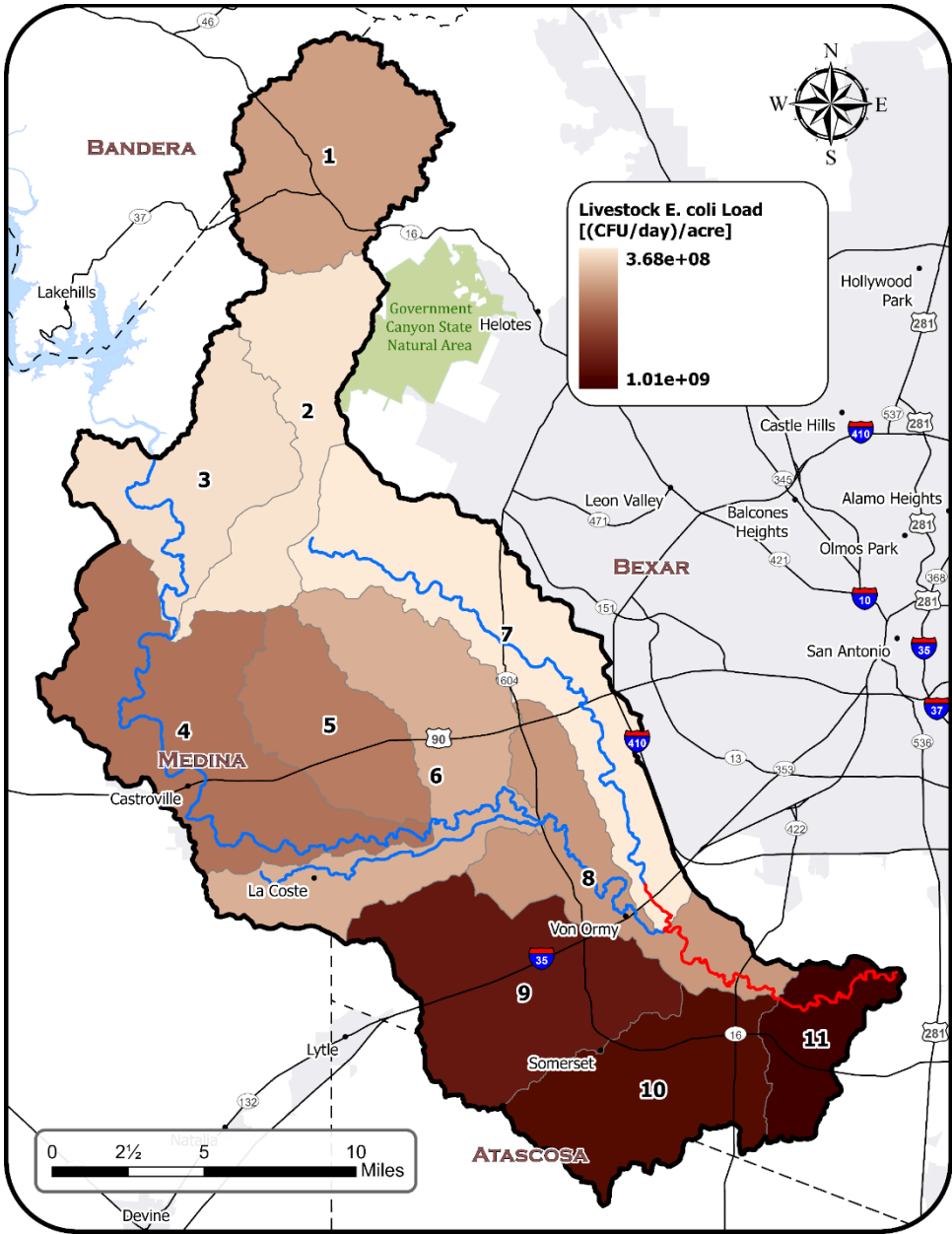
- ❑ *What measures have worked in the past?*
- ❑ *What has not worked?*
- ❑ *Are there programs available but not yet tried?*
- ❑ *What are the challenges to adoption?*
- ❑ *Are there knowledge gaps or specific education needs?*
- ❑ *Are existing education programs available and helpful?*
- ❑ *Are new education programs needed?*

Livestock

Estimated Populations =	
Cattle	9,505
Horses	591
Sheep	2,357
Goats	2,358



Pasture/Hay, Rangeland/Grassland, Deciduous & Mixed Forest



Livestock

Conservation Plans

Water Quality Management Plans

Stocking Rates for Ag Valuation

Full Implementation		
Total # Livestock	14,811	
Total Livestock Load *(cfu/year)*		5.27 +E16
# of Livestock Farms	662	
CP or WQMPs per year	12	
CP/WQMP Efficiency	75%	
Livestock Load Reduction *(cfu/year)*		7.16 +E14

Potential Partners

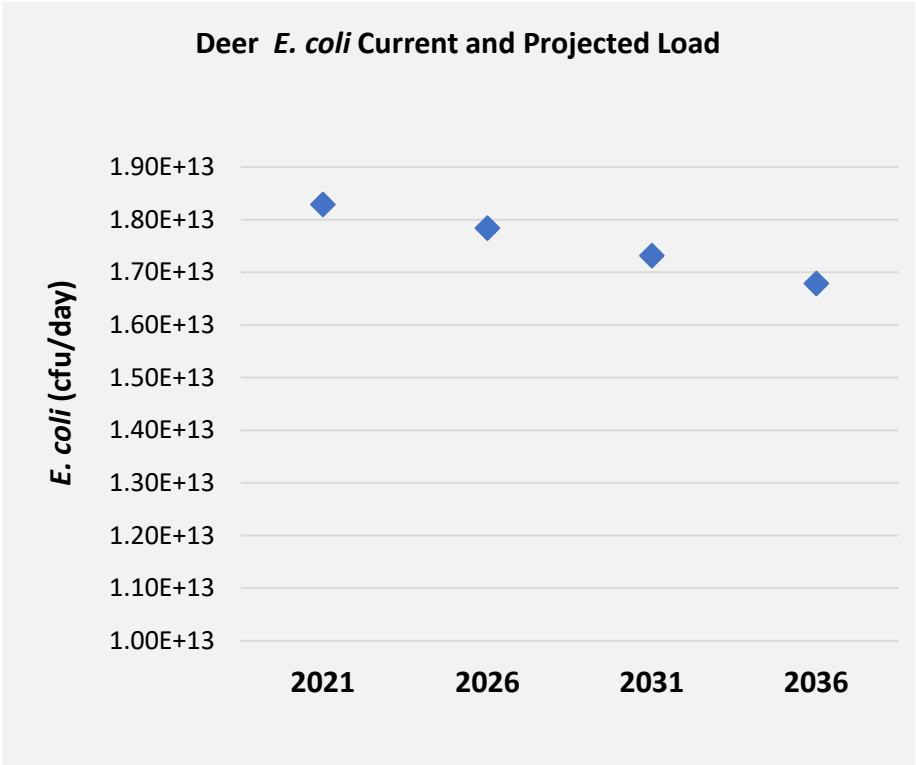
- ✓NRCS
- ✓TSSWCB / SWCDs
- ✓Edwards Aquifer Authority
- ✓Counties
- ✓Others?

Example Practices

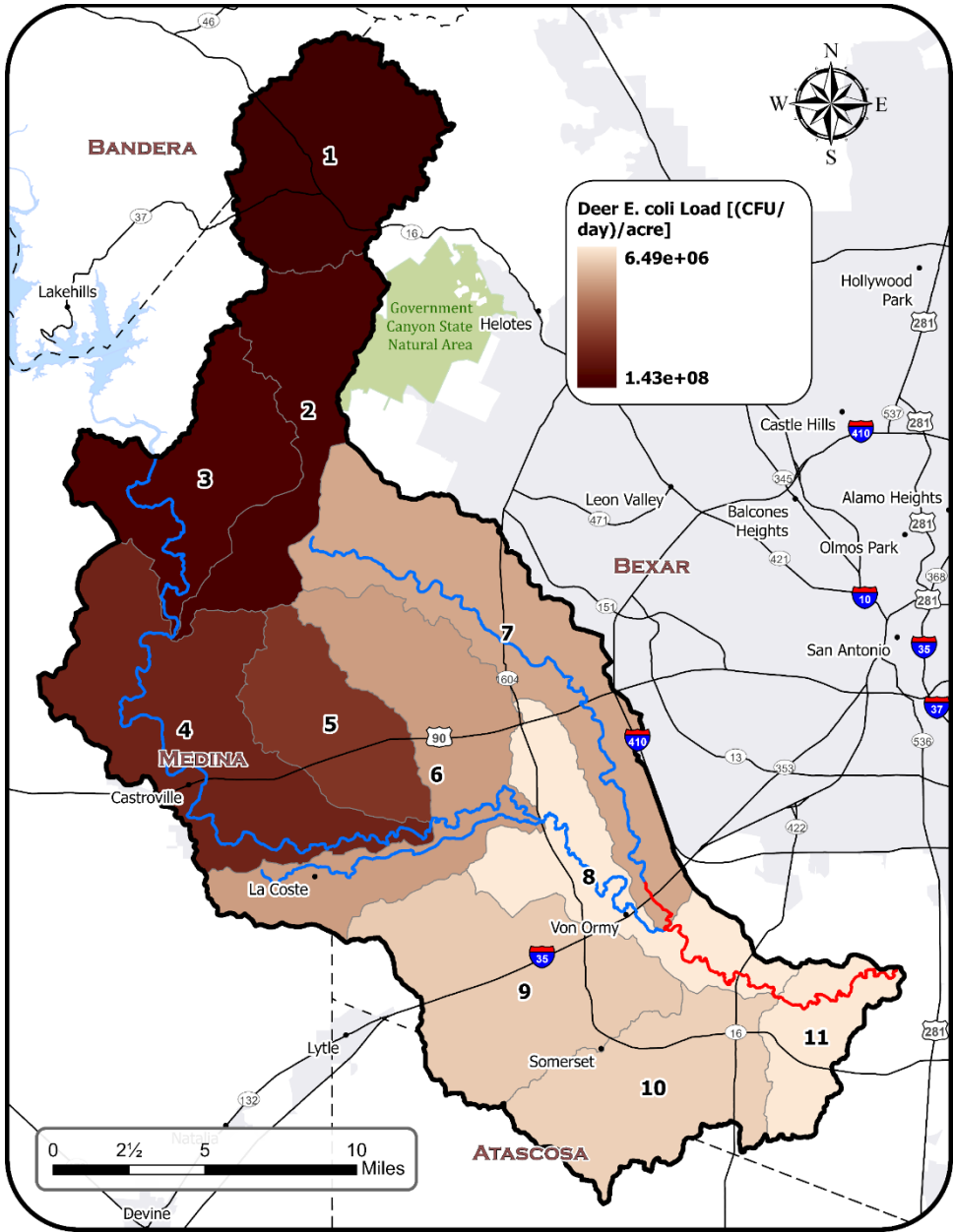
- ✓*Prescribed grazing*
- ✓*Pasture and hay planting*
- ✓*Alternative water sources*
- ✓*Herbaceous weed treatment*
- ✓*Riparian buffers, etc.*

White-tailed Deer

Estimated Population = 17,280



All Forest *Pasture/Hay* *Grassland*
Rangeland *Wetland* *Cropland*



White-tailed Deer

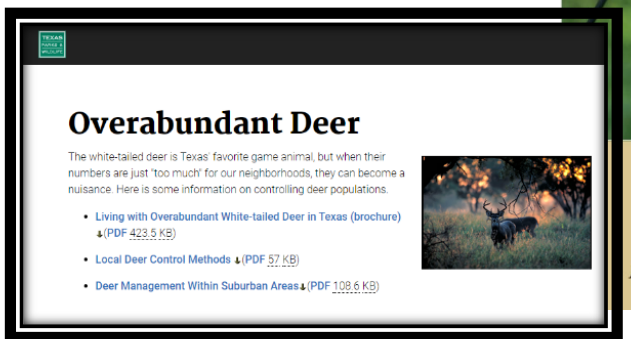
Targeted education, local ordances

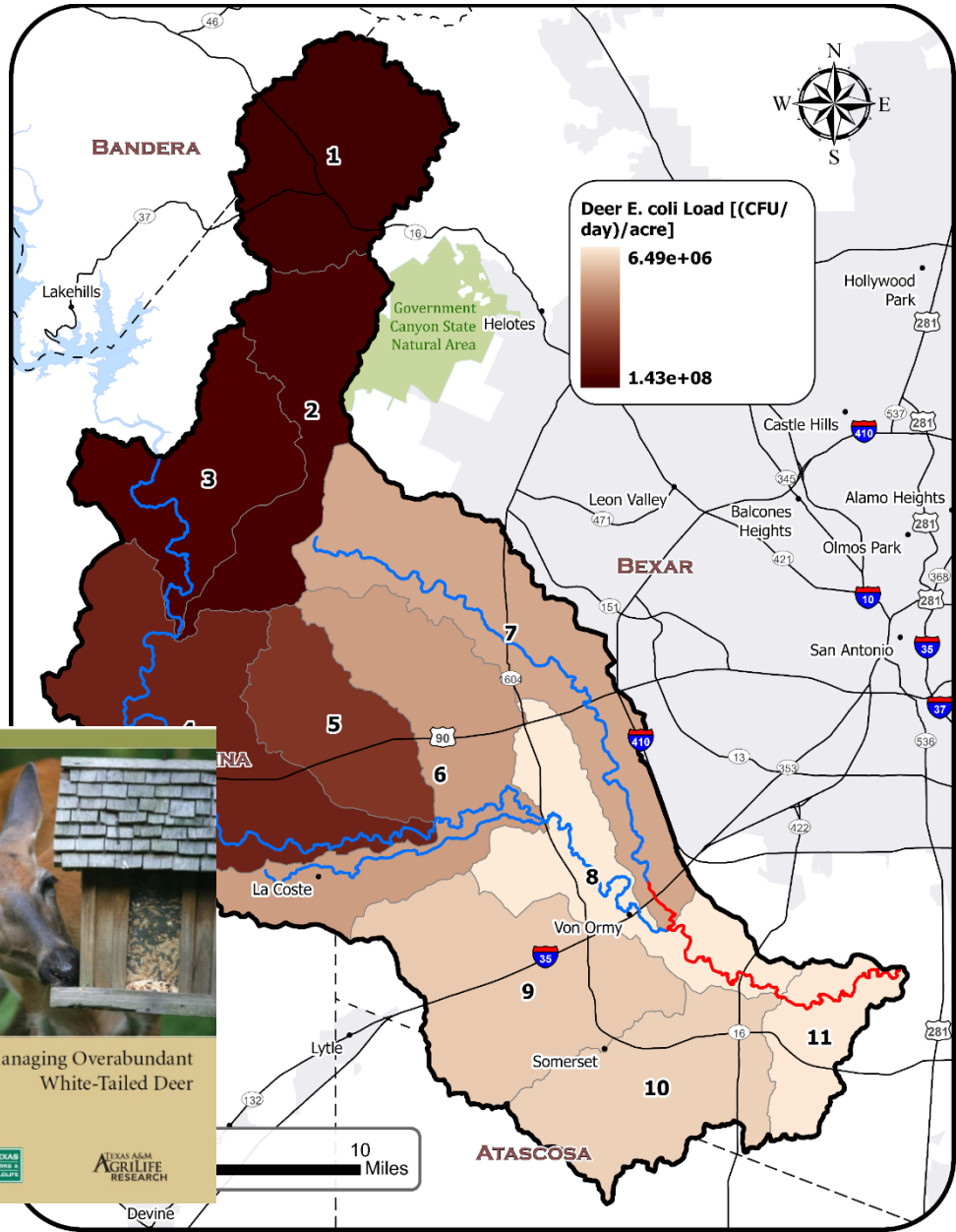
Potential Partners

- ✓TPWD
- ✓Counties, Cities, HOAs
- ✓TAMU AgriLife
- ✓Others?

Example Measures

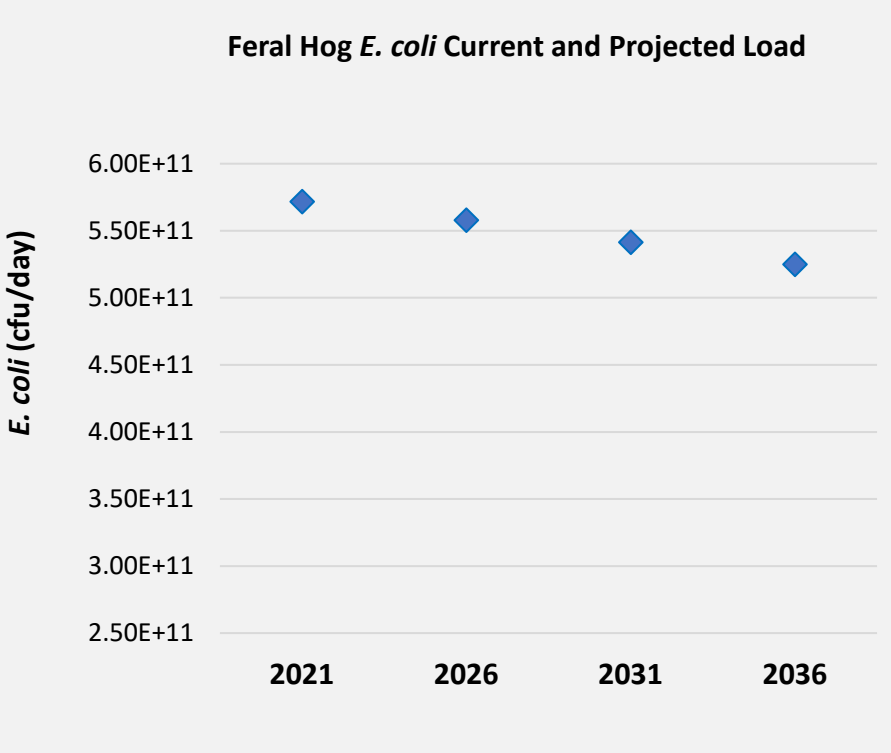
- ✓*Presentations, workshops*
- ✓*Printed materials, website*
- ✓*Feeding ordinances?*





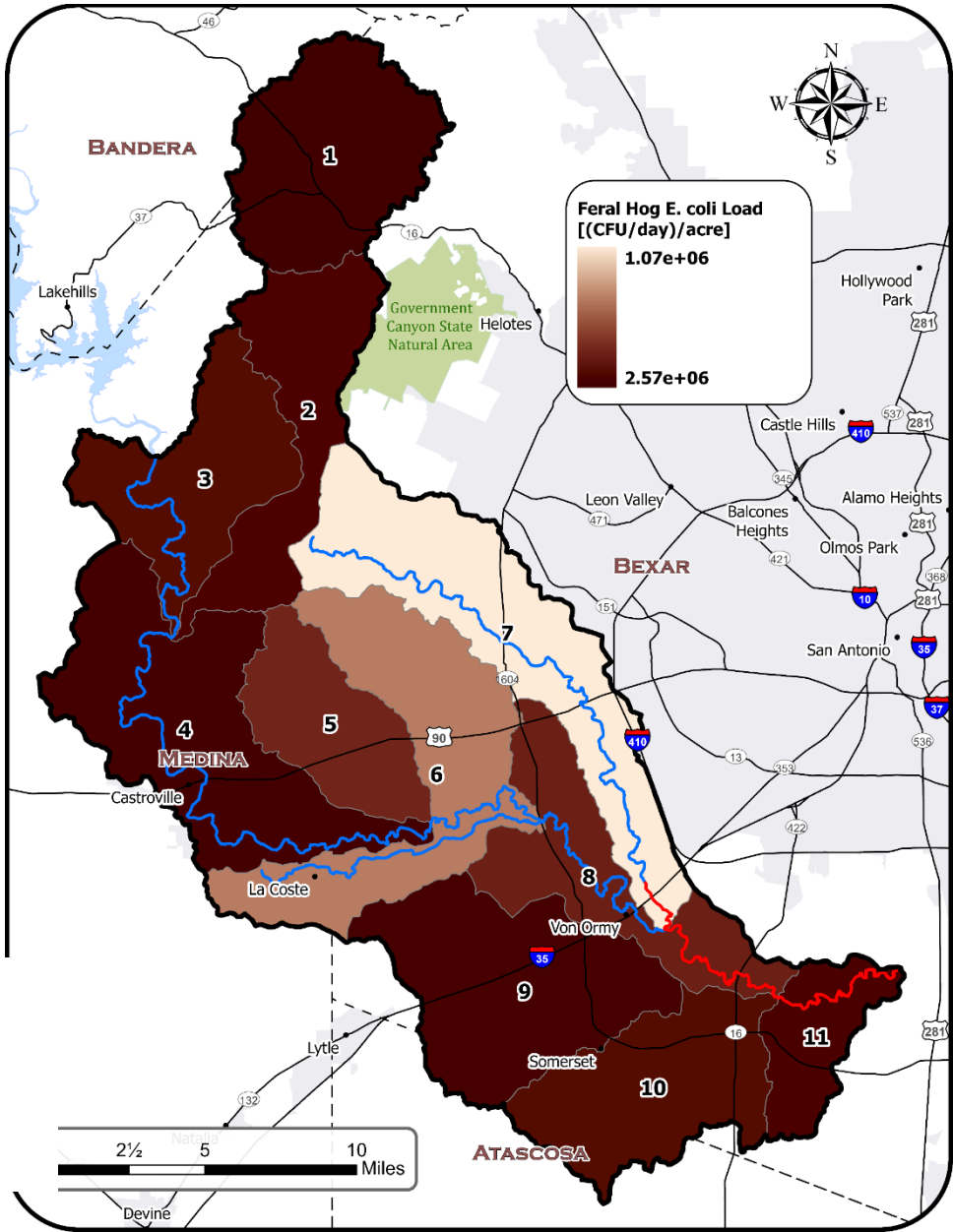
Feral Hogs

Estimated Population = 6,146



Projections based on density of 32 ac/hog

All Forest *Pasture/Hay* *Grassland*
Rangeland *Wetland* *Cropland*



Feral Hogs

Targeted education and removal

Full Implementation		
Total # Feral Hogs	6,146	
Total Feral Hog Load *(cfu/year)*		2.09 +E14
# of Hogs Removed/yr	500	
Feral Hog Load Reduction *(cfu/year)*		1.74 +E13

Potential Partners

- ✓Tx Wildlife Damages Services
- ✓NRCS / TSSWCB / SWCDs
- ✓Counties, Cities, HOAs
- ✓TAMU AgriLife
- ✓Others?

Example Measures

- ✓*Targeted workshops*
- ✓*Prevention strategies*
- ✓*Trapping and removal*
- ✓*Bounty programs*
- ✓…

People-Based Sources

Population Trends
Pollutant Loads
Priority Areas
Management Measures

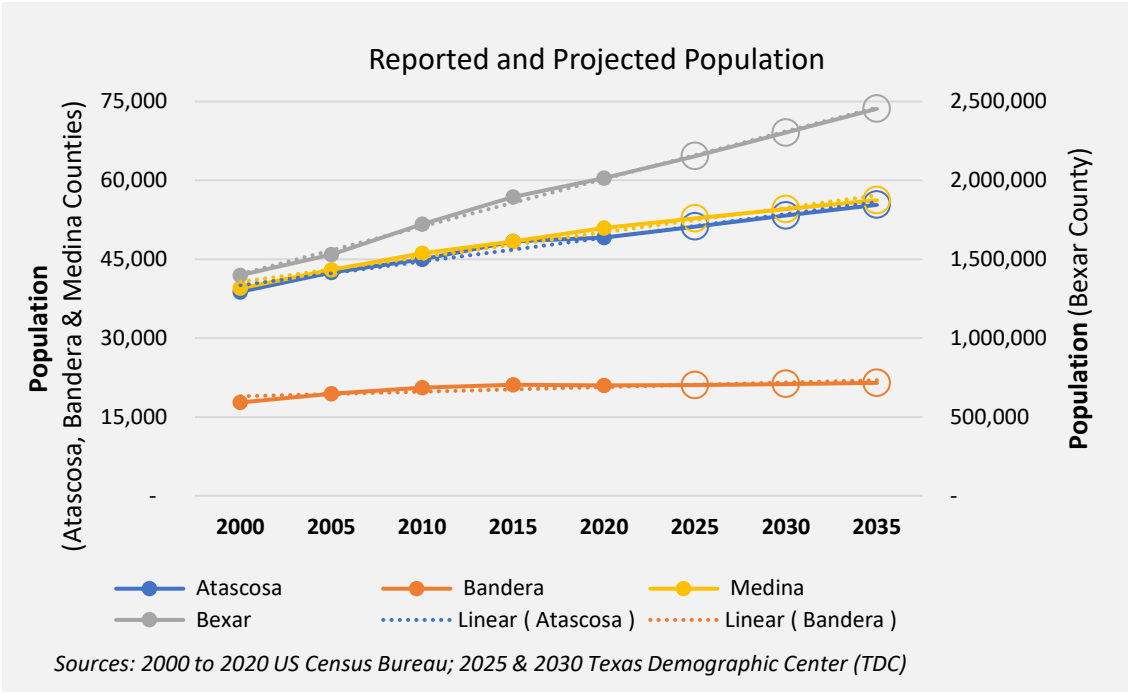
Reported and Projected Population

Population Trends

Reported and Projected Population for Counties in Watershed

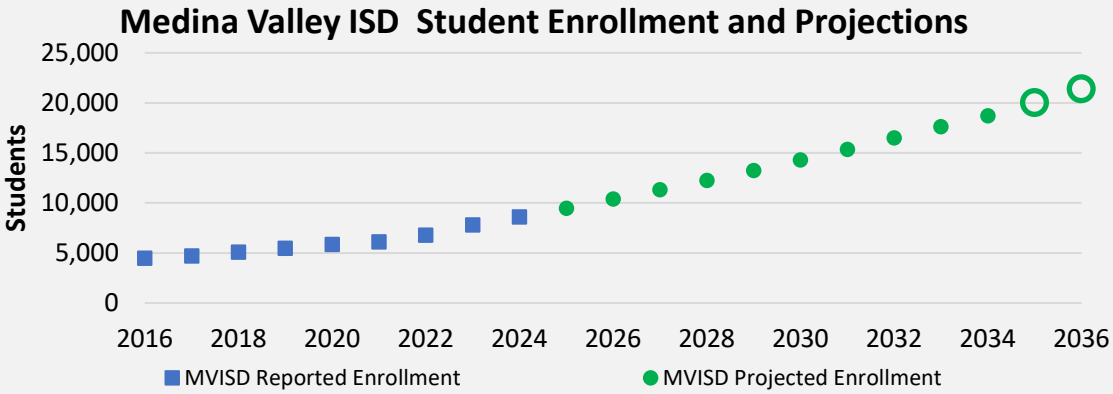
Tx Demographic Center & 2020 US Census Bureau

County	2000	2005	2010	2015	2020	2025	2030	2035
Atascosa	38,805	42,495	44,964	48,382	49,134	51,198	53,324	55,353
Bandera	17,755	19,428	20,546	21,127	20,992	21,060	21,272	21,485
Bexar	1,398,834	1,529,270	1,722,841	1,894,811	2,015,369	2,153,582	2,302,829	2,454,094
Medina	39,484	42,977	46,130	48,419	50,939	52,752	54,536	56,230

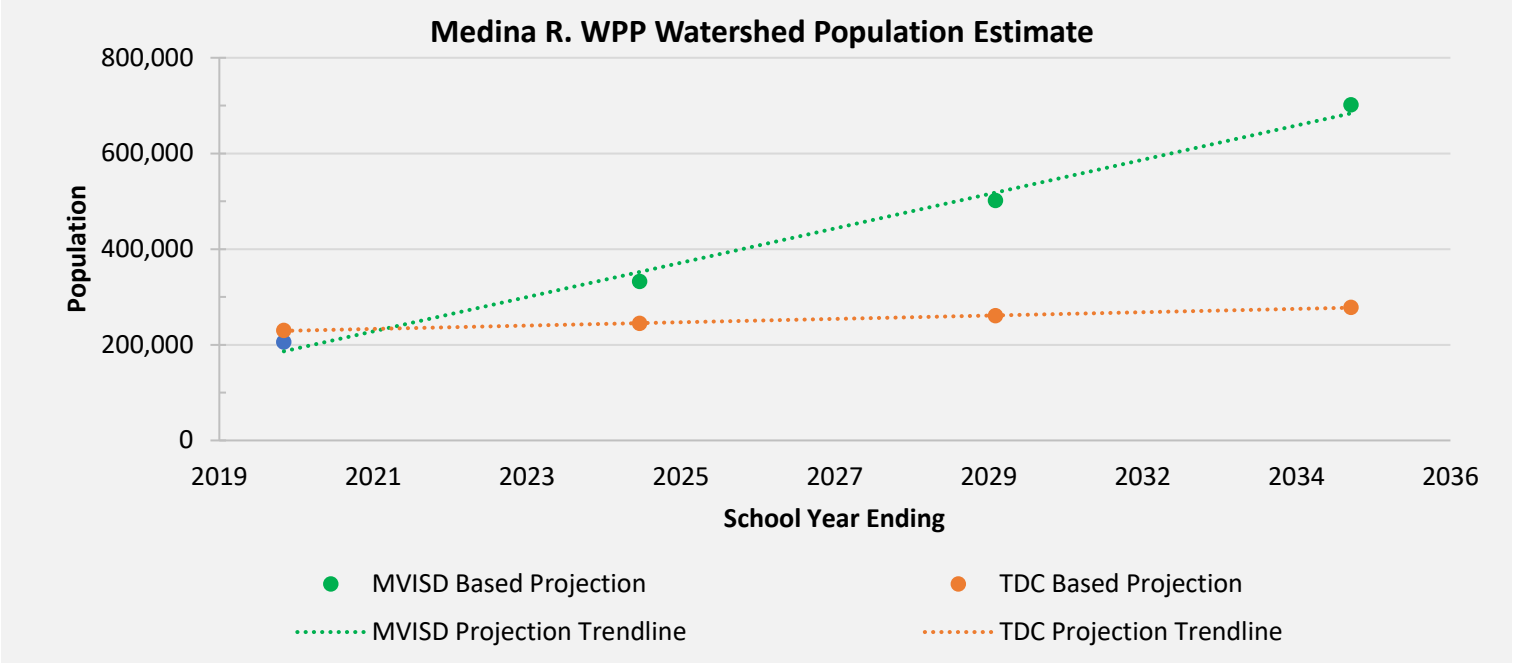


Sources: 2000 to 2020 US Census Bureau; 2025 & 2030 Texas Demographic Center (TDC)

Population Trends

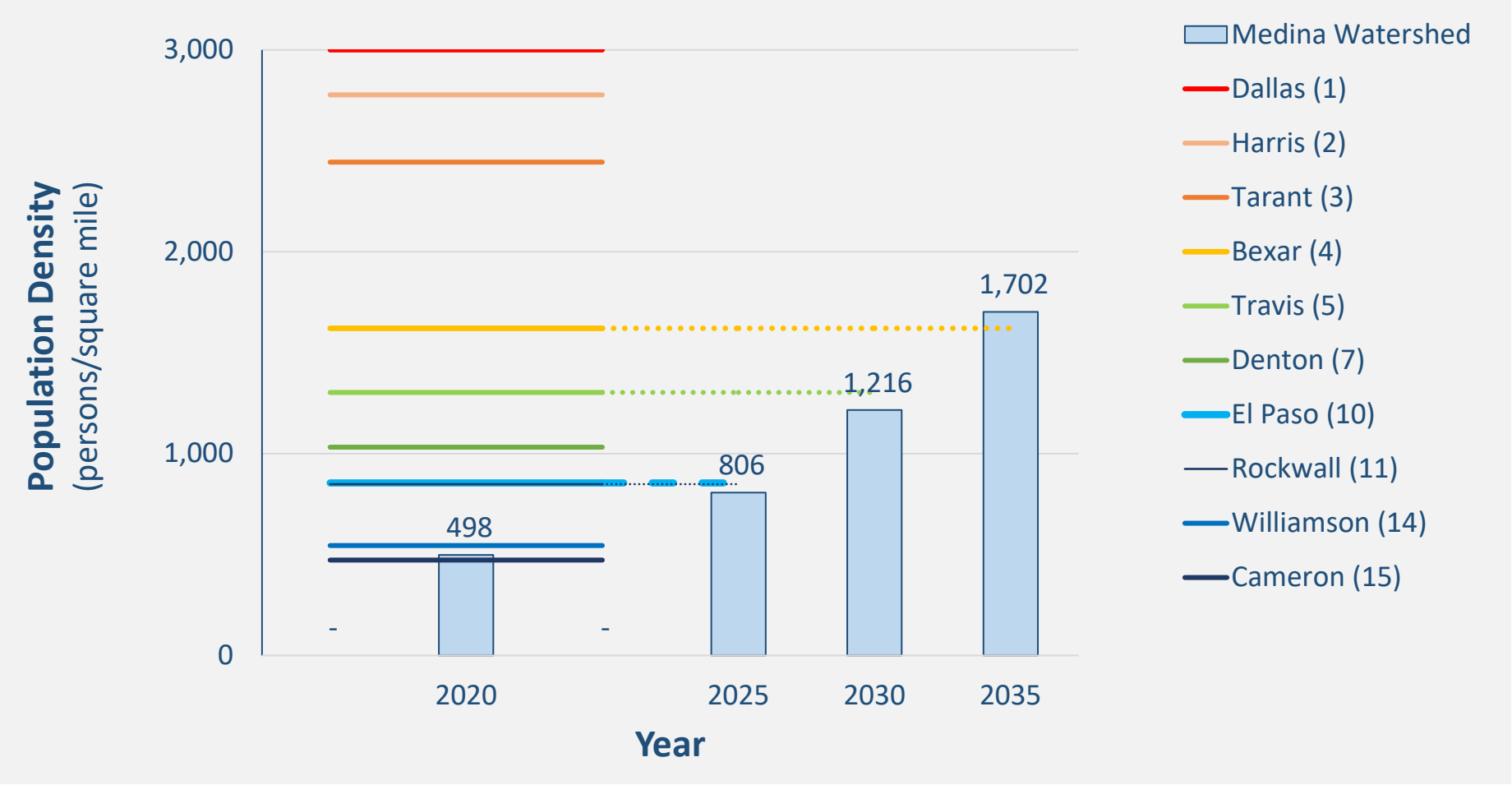


Estimated population increase of 242% 2020 - 2035



Population Trends

Medina Watershed Density Compared to Various Texas Counties



Pollutant Loads
Priority Areas
Management Measures

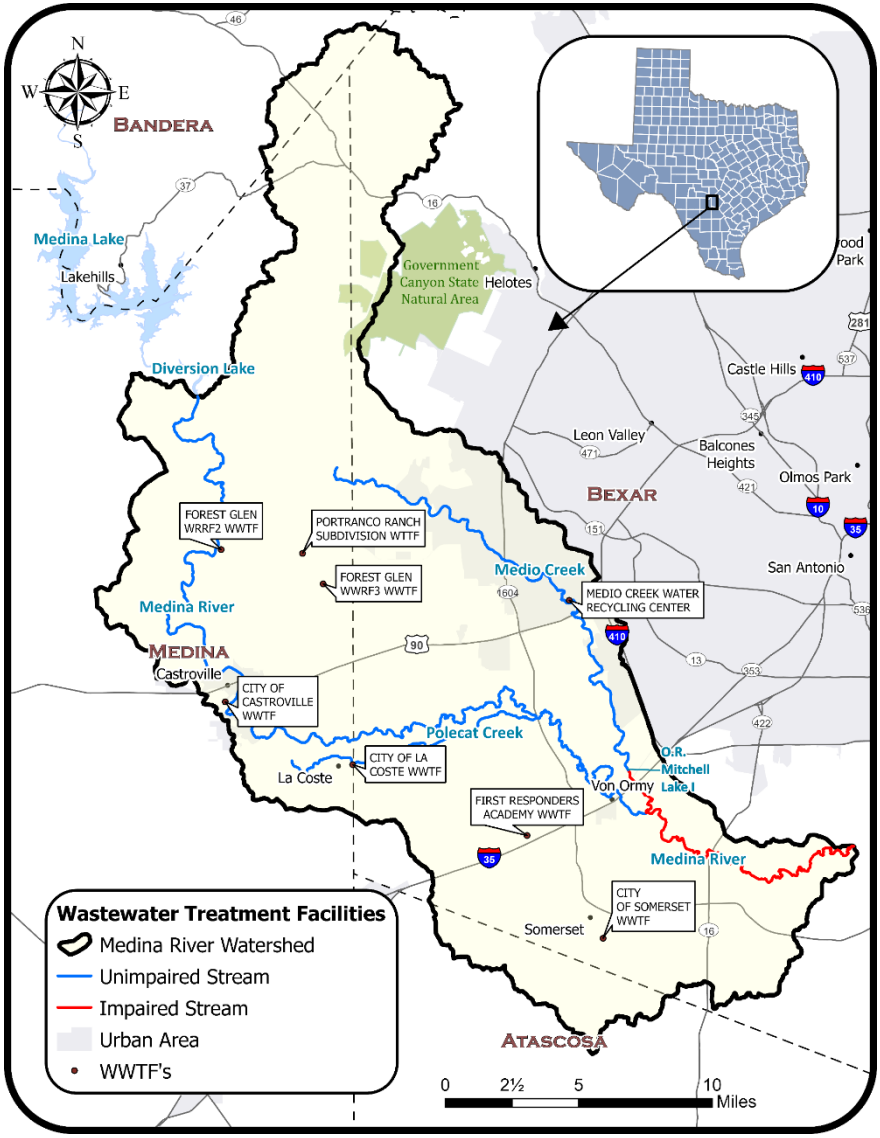
Wastewater Treatment Facilities

Facility	Flow (30-day average MGD/day) Permit Limit (current/ultimate)	Reported Daily Avg
Medio Creek WRC	16.0	**9.0**
City of Castroville	**0.7**	*
City of Somerset	**0.32**	0.094
City of La Coste	**0.2**	0.15
Portranco Ranch[1]	0.108 / **0.24**	0.079
Forest Glen WRRF2[1]	**0.06** / .023	*
SARA 1st Responders Academy	**0.025**	0.003
Forest Glen WRRF3	**0.06/0.150**	**

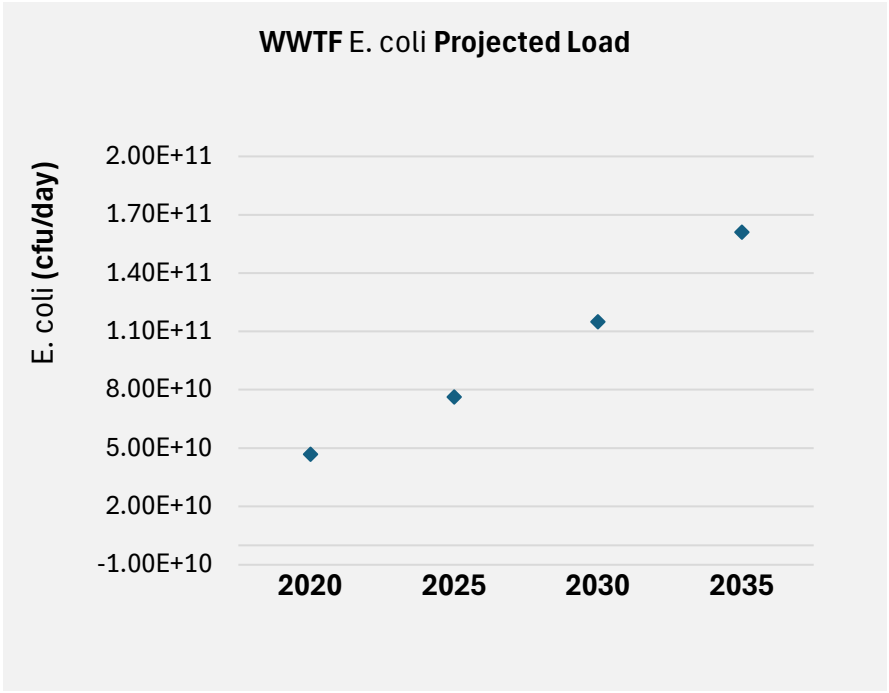
[1]*phased permit for facility expansion*

* = *not reported;* ** = *under construction*

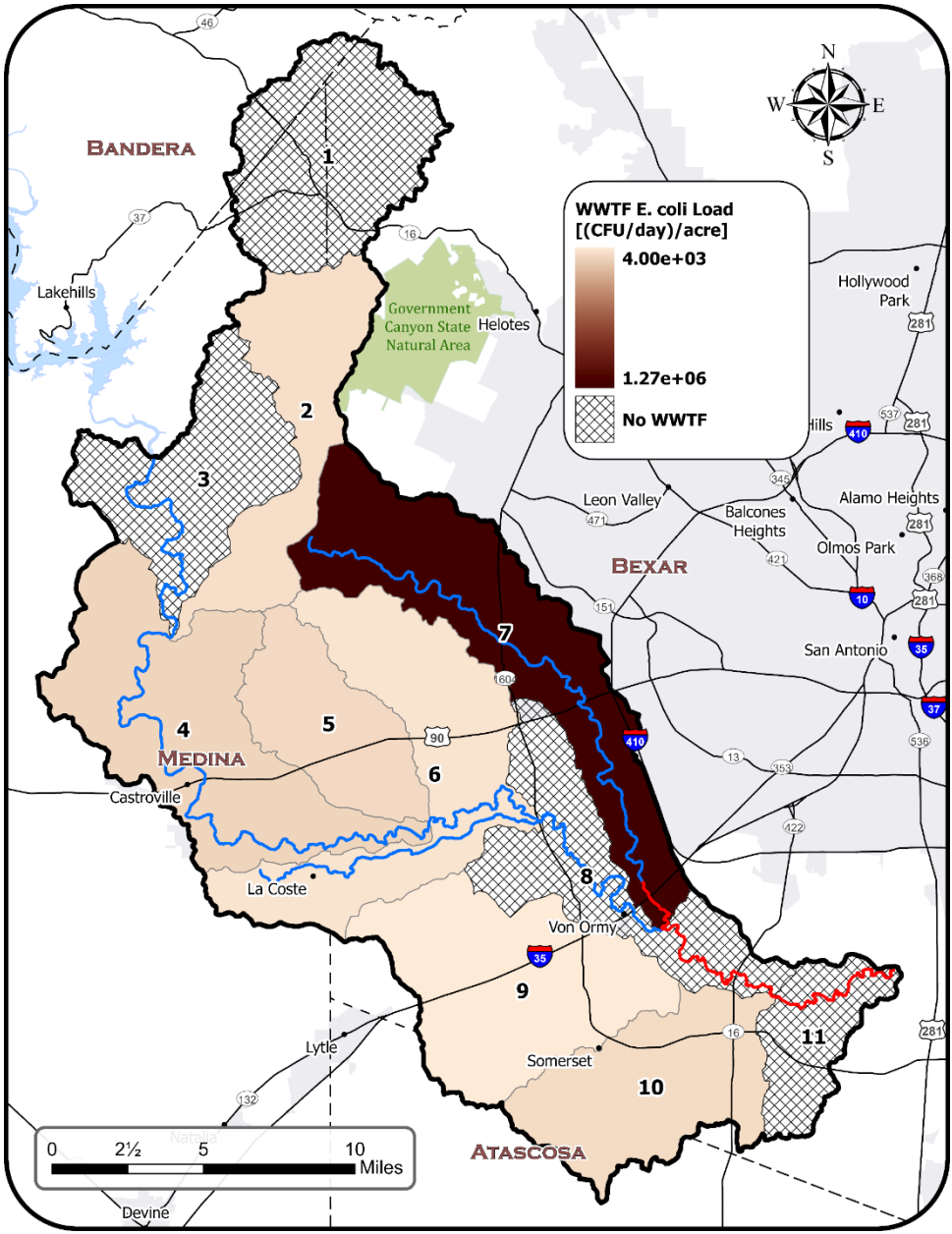
Bold = *used in analysis*



Wastewater Treatment Facilities



Load based on reported flow for Medio Creek WRC;
Predicted for Forest Glen WRRF3;
Permitted flow for all others.



Wastewater Treatment Facilities

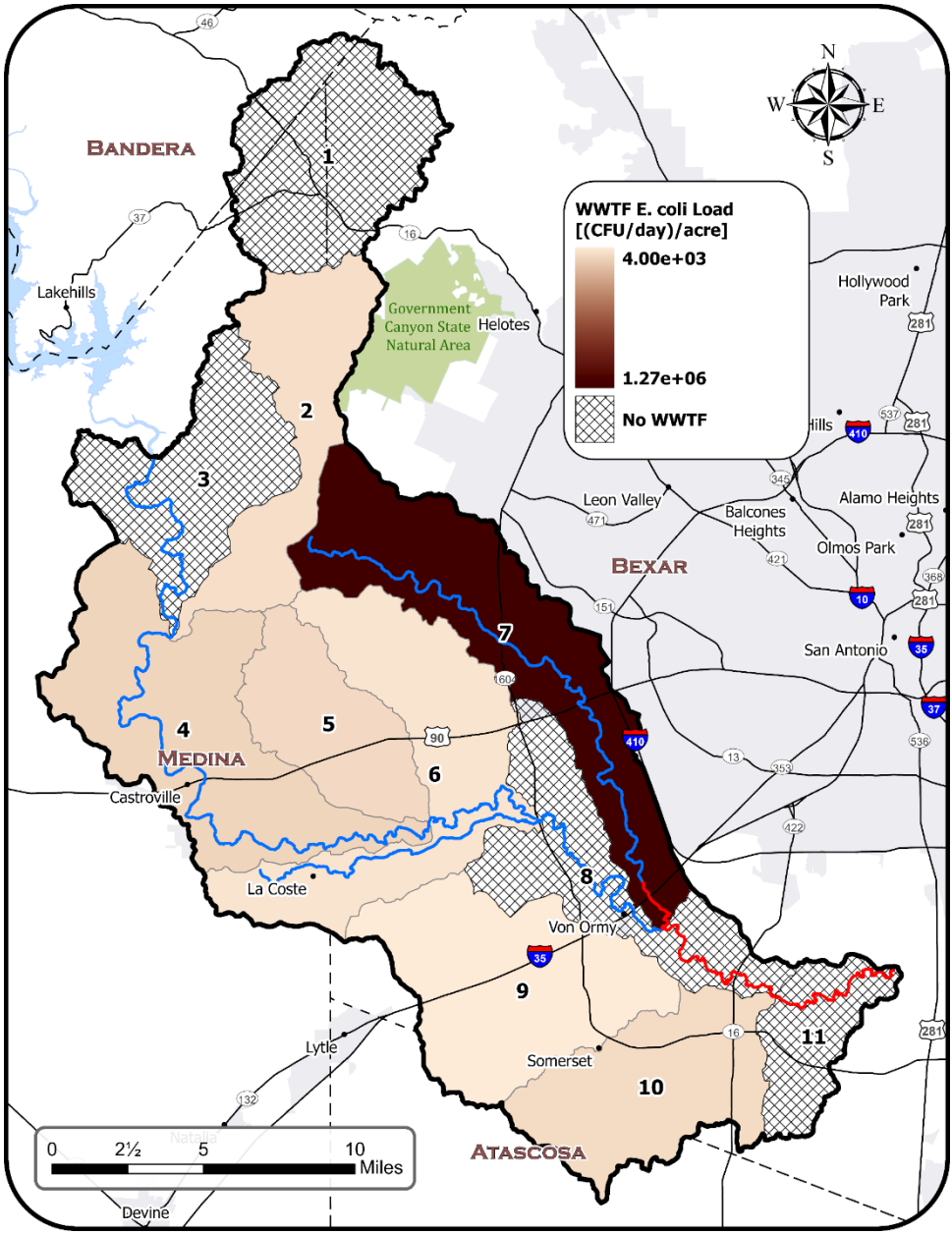
Good Housekeeping and planning for growth

Potential Partners

- ✓Permittees
- ✓Operators

Example Measures

- ✓*Operator training*
- ✓*Identifying SSO causes*
- ✓*Collection system repairs or replacement*
- ✓*Nutrient removal*
- ✓*Others?*



On-Site Sewage Facilities

Estimated 13,733 OSSFs

Medina County

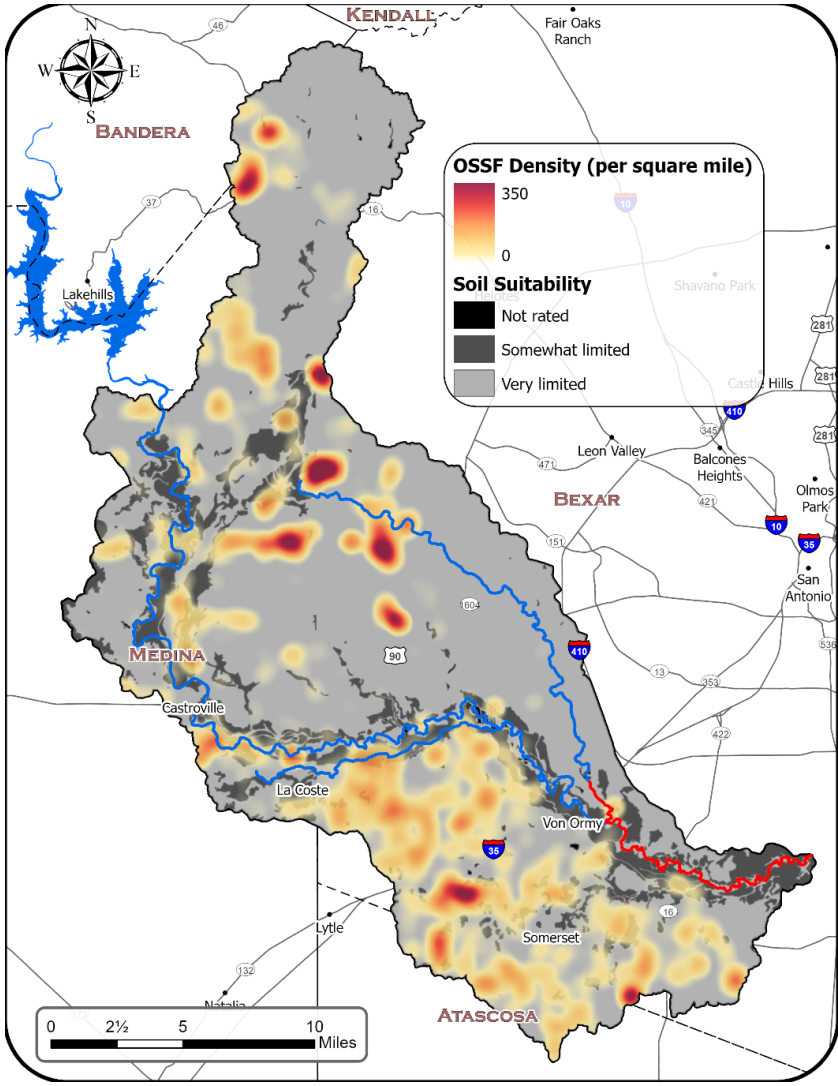
- ✓ Number of permits issued
- ✓ 911 addresses, 2020 Census households
- ✓ 2022 satellite imagery
- ✓ Municipal jurisdictions
- ✓ Failure rate 10% conventional, 65% aerobic

Bandera, Atascosa Counties

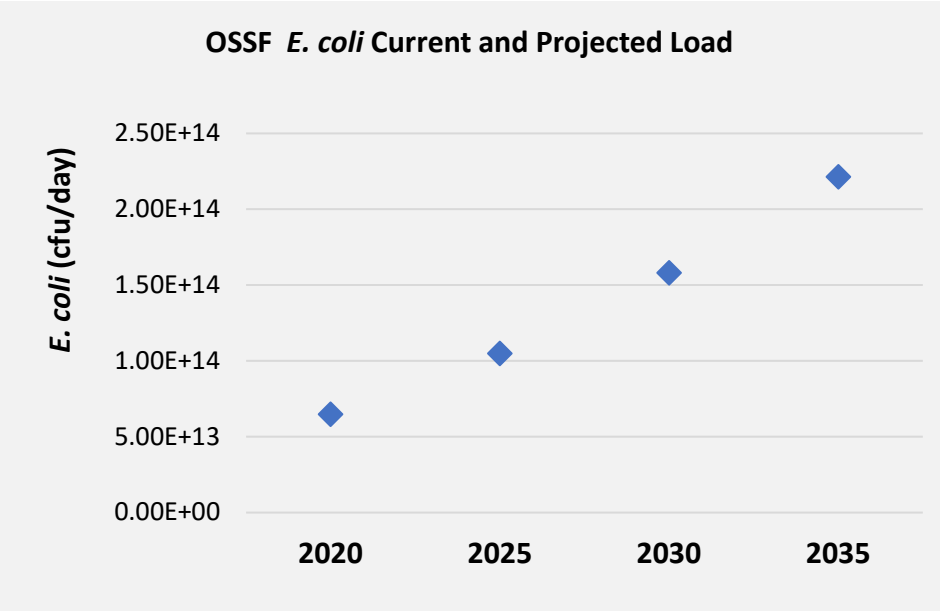
- ✓ 911 method above
- ✓ Failure rate 12% across all system types

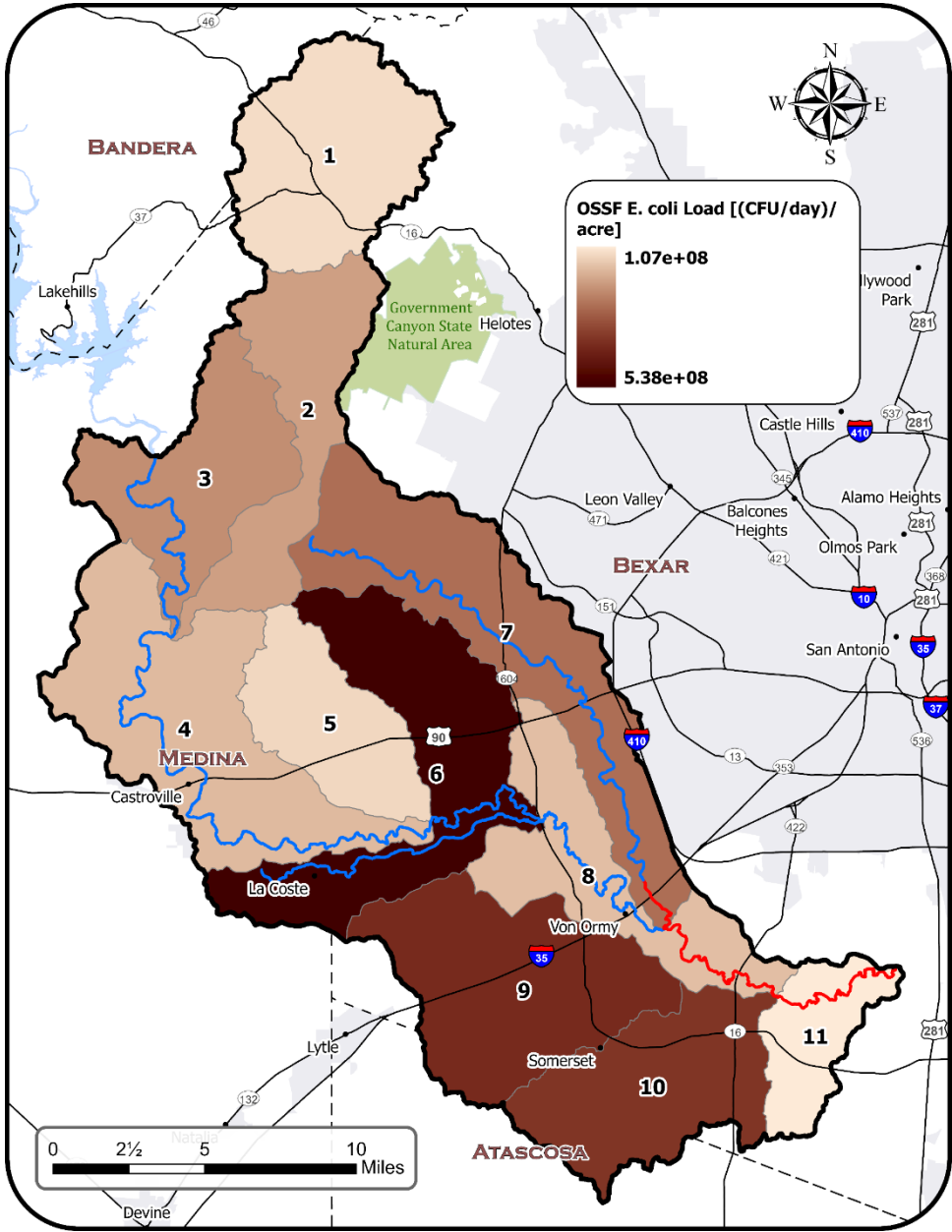
Bexar County

- ✓ Location of permits issued
- ✓ Failure rate 7.5% across all types



On-Site Sewage Facilities





On-Site Sewage Facilities

Education and repair or replacement

Potential Partners

- ✓Counties
- ✓Homeowners
- ✓TAMU AgriLife

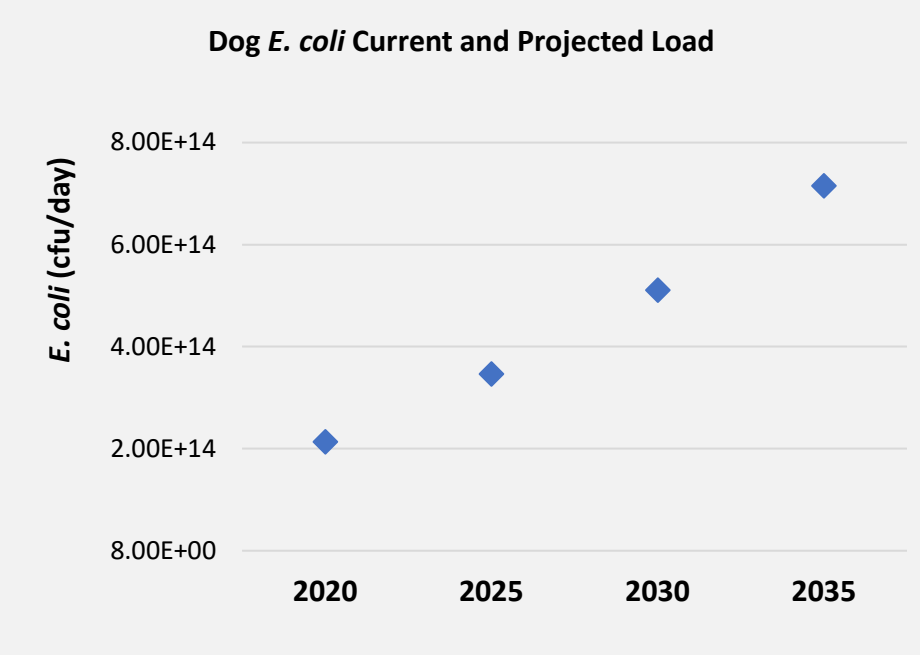
Example Measures

- ✓*Workshops, brochures & online training*
  - *Operation & maintenance*
  - *Installer and maintenance provider*
  - *Maintenance of aerobic systems*
- ✓*Repair & replacement programs*

Full Implementation		
Total # OSSFs	13,733	
# Failing Systems	1,352	
Total Failing System Load *(cfu/year)*		2.36 E+16
# of Failing Systems Repaired or Replaced per year	25	
Medina Aerobic	*10*	
Medina Conventional	*5*	
Bexar – all	*5*	
Atascosa Bandera – all	*5*	
OSSF Load Reduction *(cfu/year)*		4.34 E+14

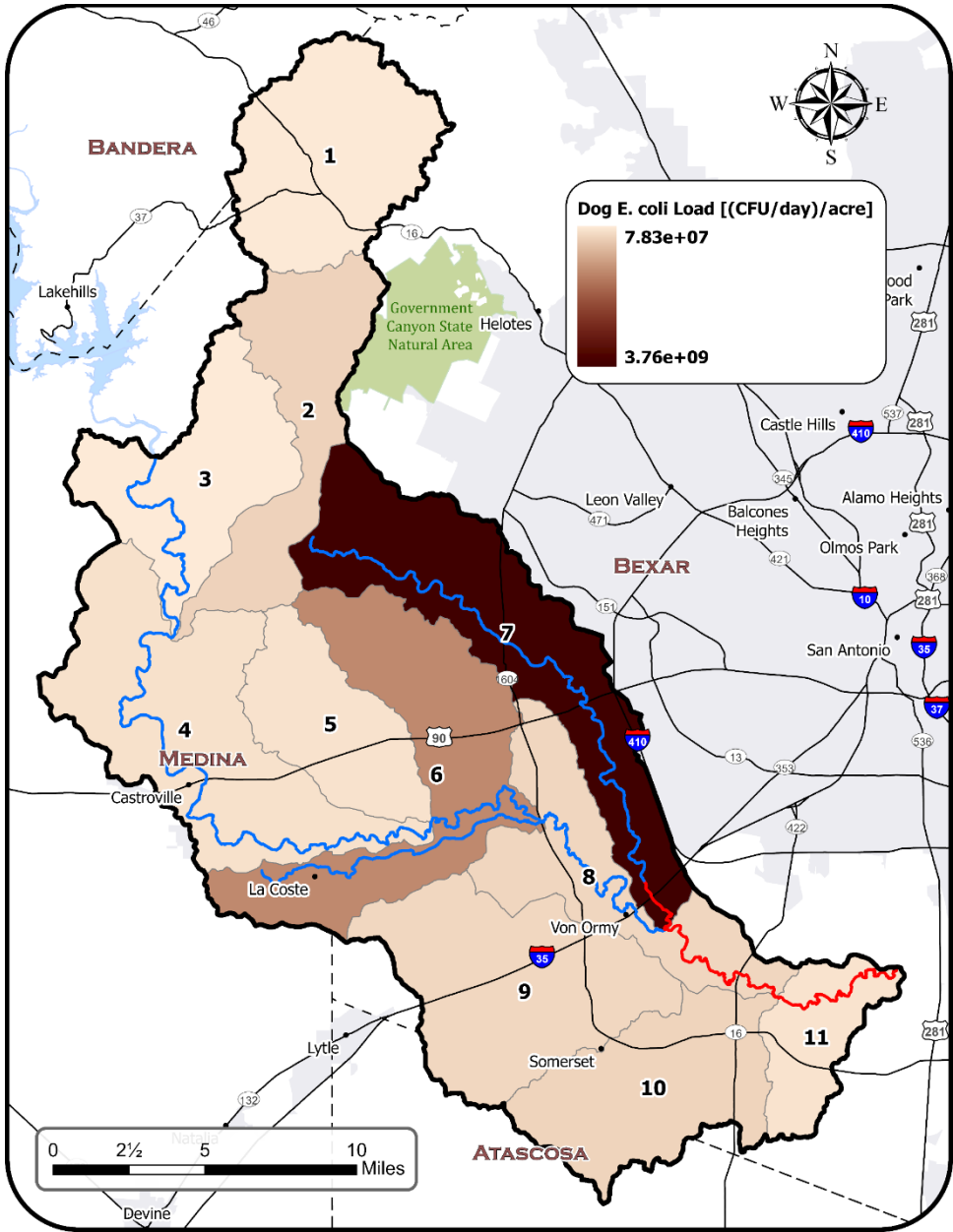
Domestic Dogs

Estimated Population = 67,781



Ownership rate = 60%

Average 1.5 dog/household



Domestic Dogs

Targeted Education & Ordinances

Potential Partners

- ✓Counties
- ✓Cities, HOAs
- ✓Others?

Example Measures

- ✓*Public education*
- ✓*Pet waste stations*
- ✓*Signage*
- ✓*Ordinances*
- ✓*Others?*

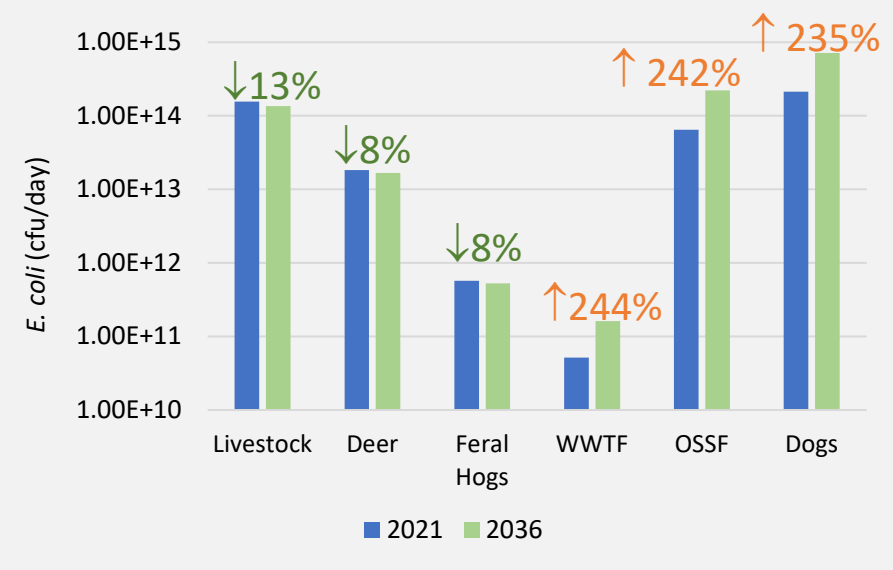
Full Implementation		
Total # Dogs	67,781	
Total Dog Load *(cfu/year)*		7.79 E+16
% Owners picking up	25%	
% Time owners pick up	75%	
Dog Load Reduction *(cfu/year)*		1.46 E+16

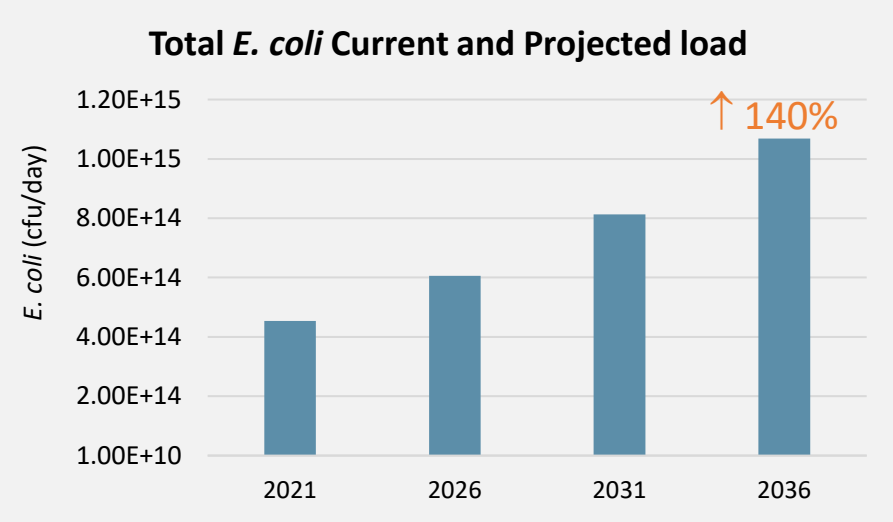
DOO THE RIGHT THING

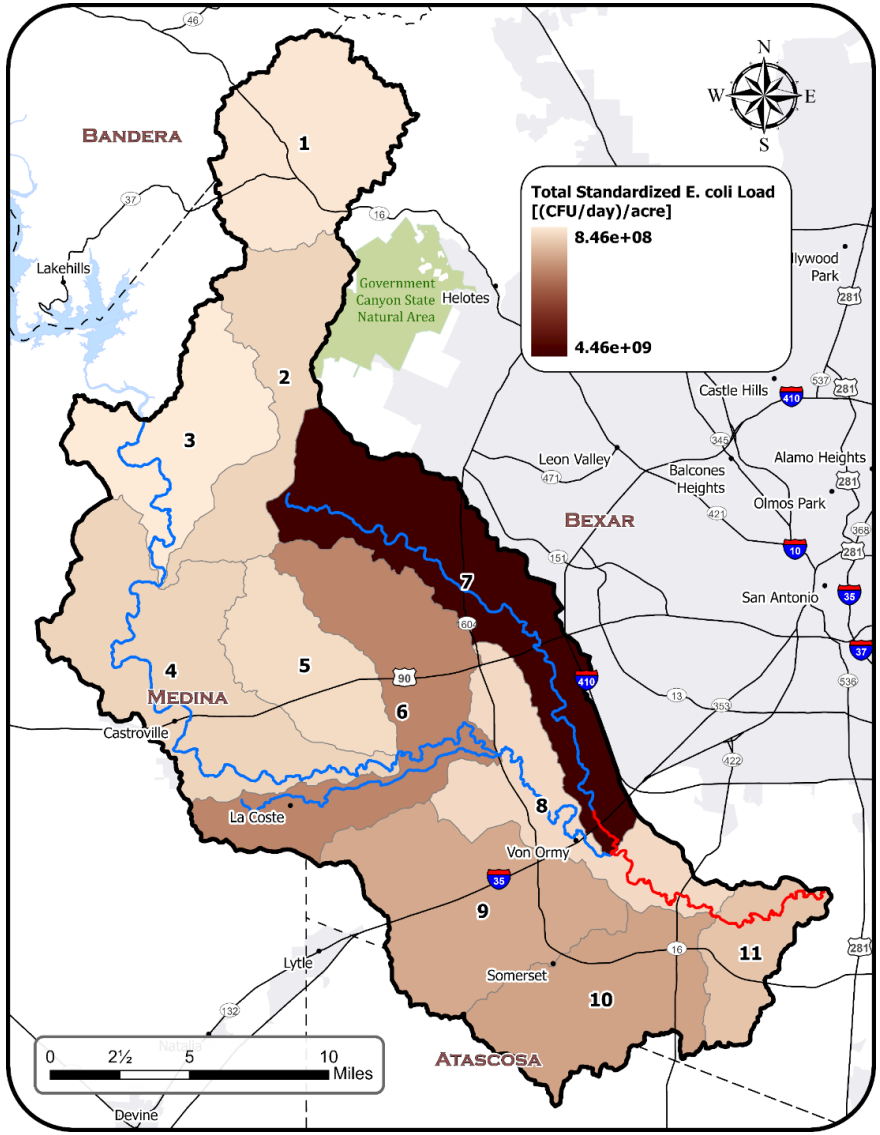
www.dfwstormwater.com/petwaste

Total Load from identified sources

Estimated change w/o management measures







Load Reductions

Needed vs. Planned

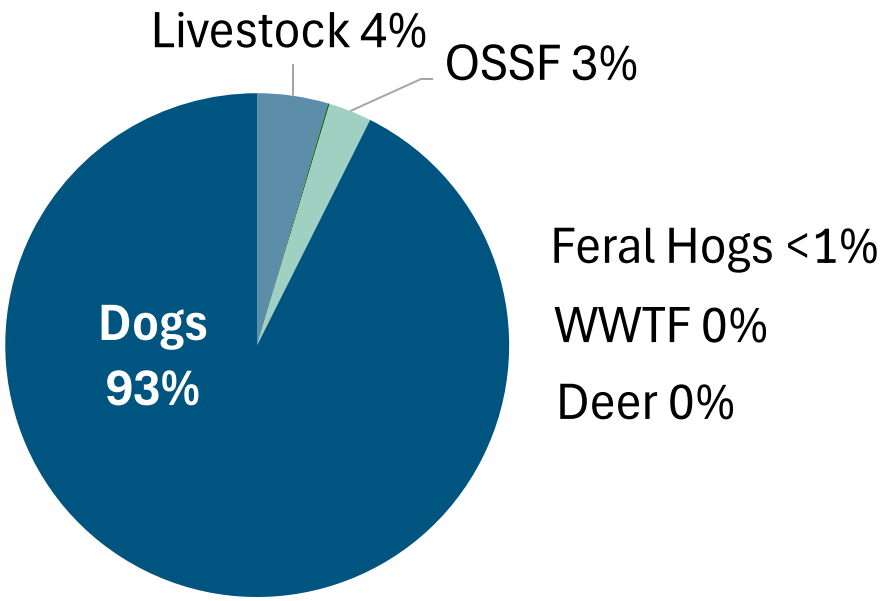
(cfu/year)

Needed 5.94×10^{13}

Planned 1.58×10^{16}

Medium & Low Flow categories
All subbasins

Portion of Reductions by Source



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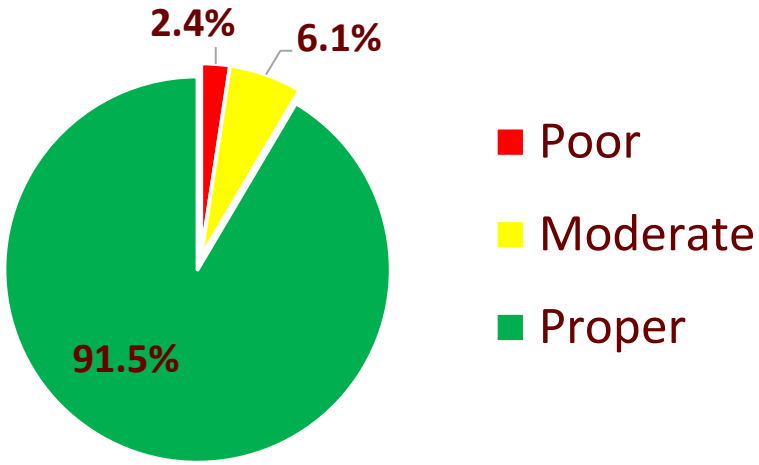
Additional Management Measures

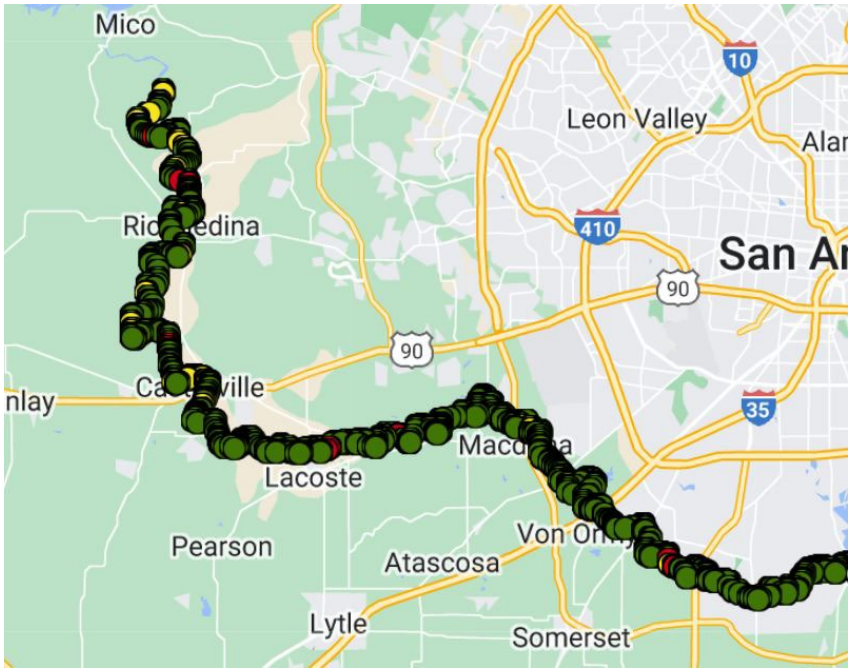
Riparian Restoration

Texas A&M Forest Service study

% Riparian Functioning

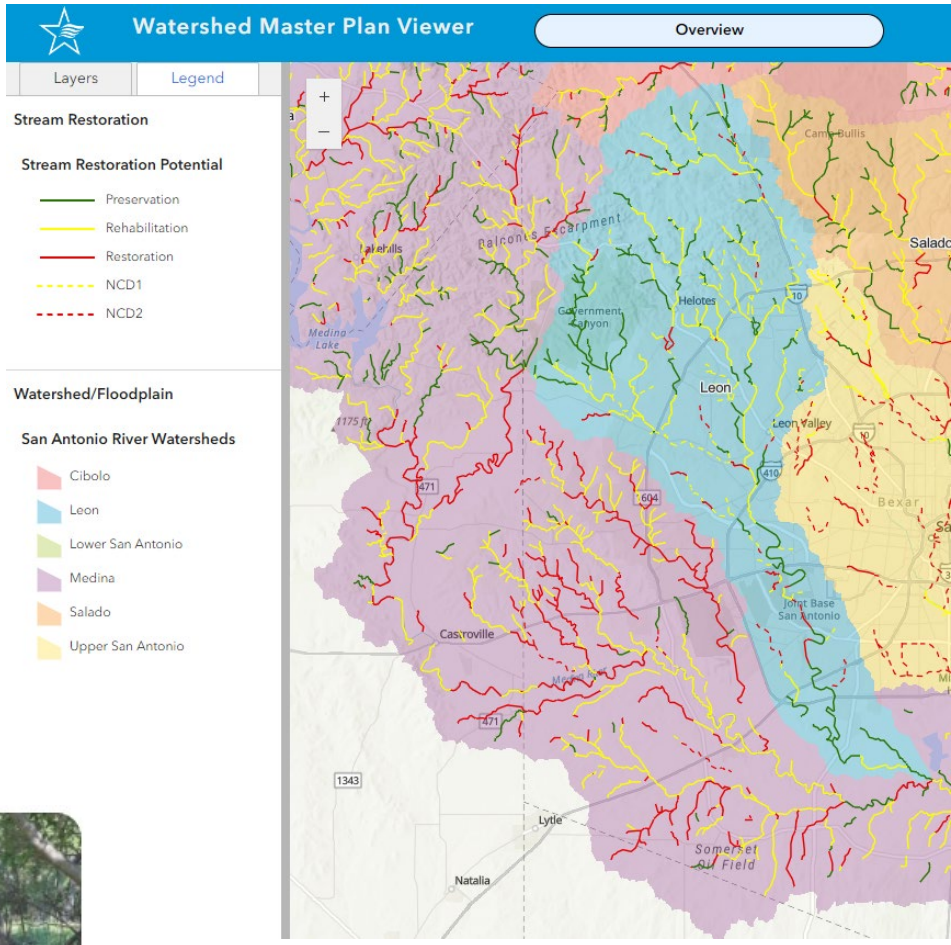


Analyzed 1,000 points on Medina R.



Stream Restoration

- ✓SARA Stream Restoration Program
  - ✓Demonstration projects
  - ✓Technical and design resources
  - ✓Allows for inclusion of Green Infrastructure features.
  - ✓Restoration potential screening has been conducted for the watershed



East Salitrillo Creek before and after stream restoration construction.

Urban Stormwater

Low Impact Development
Green Infrastructure

- ✓Regional detention facilities
- ✓Stormwater cisterns
- ✓Bioretention features
- ✓Permeable parking stalls
- ✓Native landscaping
- ✓Effective pollutant reduction tools

SARA Green Infrastructure Master Plan

- *Demonstration projects*
- *Technical resources for*
  - *Public & homeowners*
  - *Commercial site developers*
  - *Construction professionals*
  - *Construction Inspectors*
  - *Maintenance providers*

Urban Stormwater
Existing Programs

- ✓Bexar County MS4 Program
- ✓CoSA/SAWS MS4 Program
- ✓JBSA-Lackland MS4 Program
- ✓TxDOT MS4 Program
- ✓County Subdivision Rules

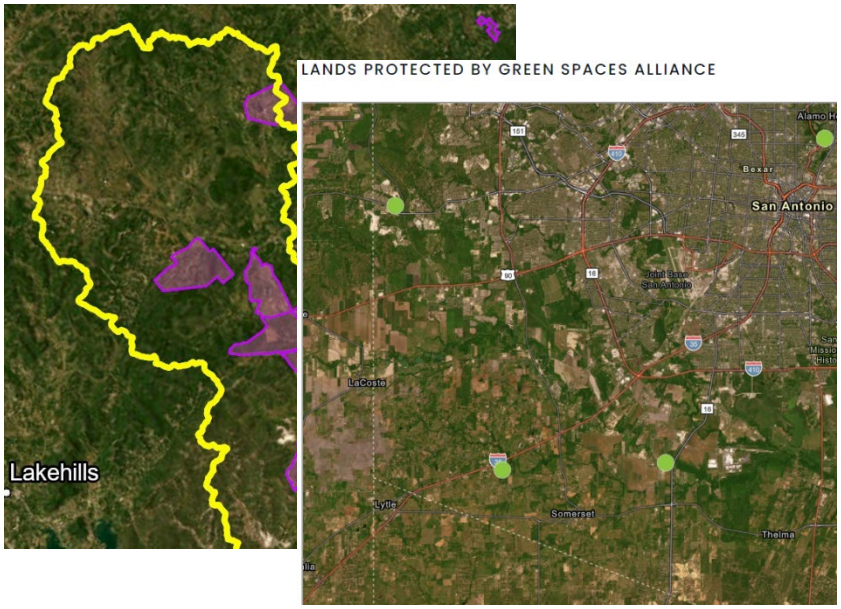
Phase II MS4 Requirements

- ❖*Public Education and Outreach*
- ❖*Public Participation/Involvement*
- ❖*Illicit Discharge Detection & Elimination*
- ❖*Construction Site Runoff Control*
- ❖*Post-Construction Runoff Control*
- ❖*Public Prevention/Good Housekeeping*

Other Existing Programs

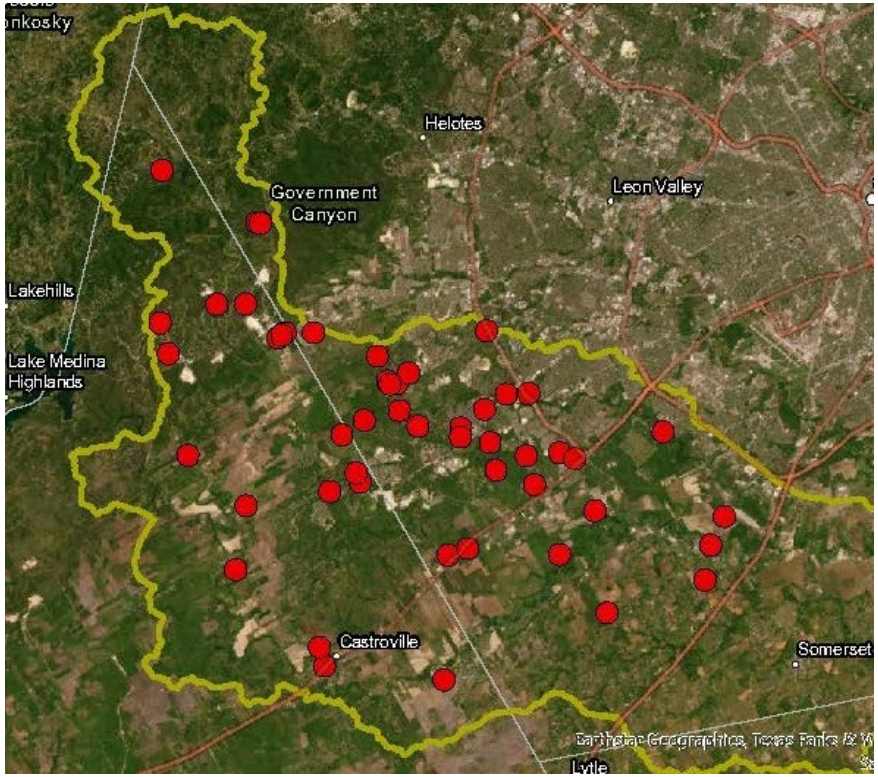
Land Conservation

- ✓CoSA and EAA Conservation Easements
  - ✓5,565 acres in the watershed
- ✓Green Spaces Alliance
  - ✓405 acres in the watershed
- ✓JBSA-LAK REPI Program
  - ✓Readiness & Environmental Protection Integration Program (REPI)

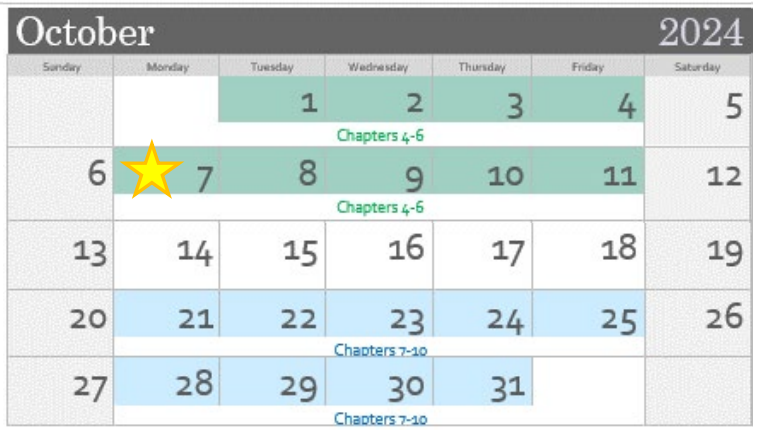


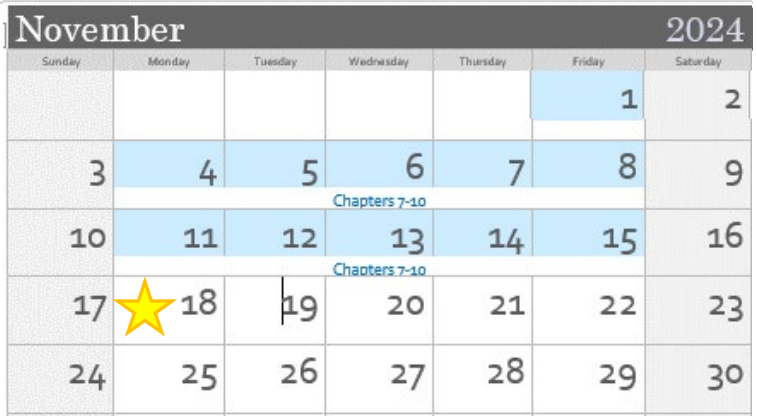
EAA Abandoned Well Program

- ✓50 identified abandoned wells in the watershed



What’s Next?





Next Steps

Stakeholder review (9/16 – 10/11)

- Ch 4 – Source Identification
- Ch 5 – Source Assessment
- Ch 6 – Management Measures

Meet (wk of 10/7) –Discuss comments and:

- Ch 7 – Education & Outreach Plan
- Ch 8 – Implementation Plan
- Ch 9 – Resources
- Ch 10 – Measures of Success

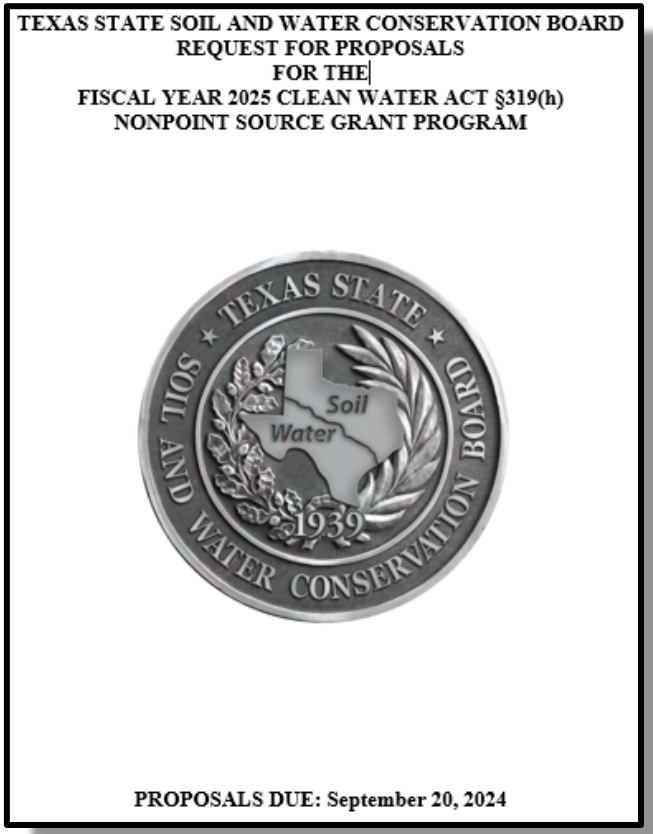
Stakeholder review (wks of 10/21 – 11/18)

Meet (wk of 11/18) –Discuss comments and implementation.

Compiled WPP ready for review process in January.

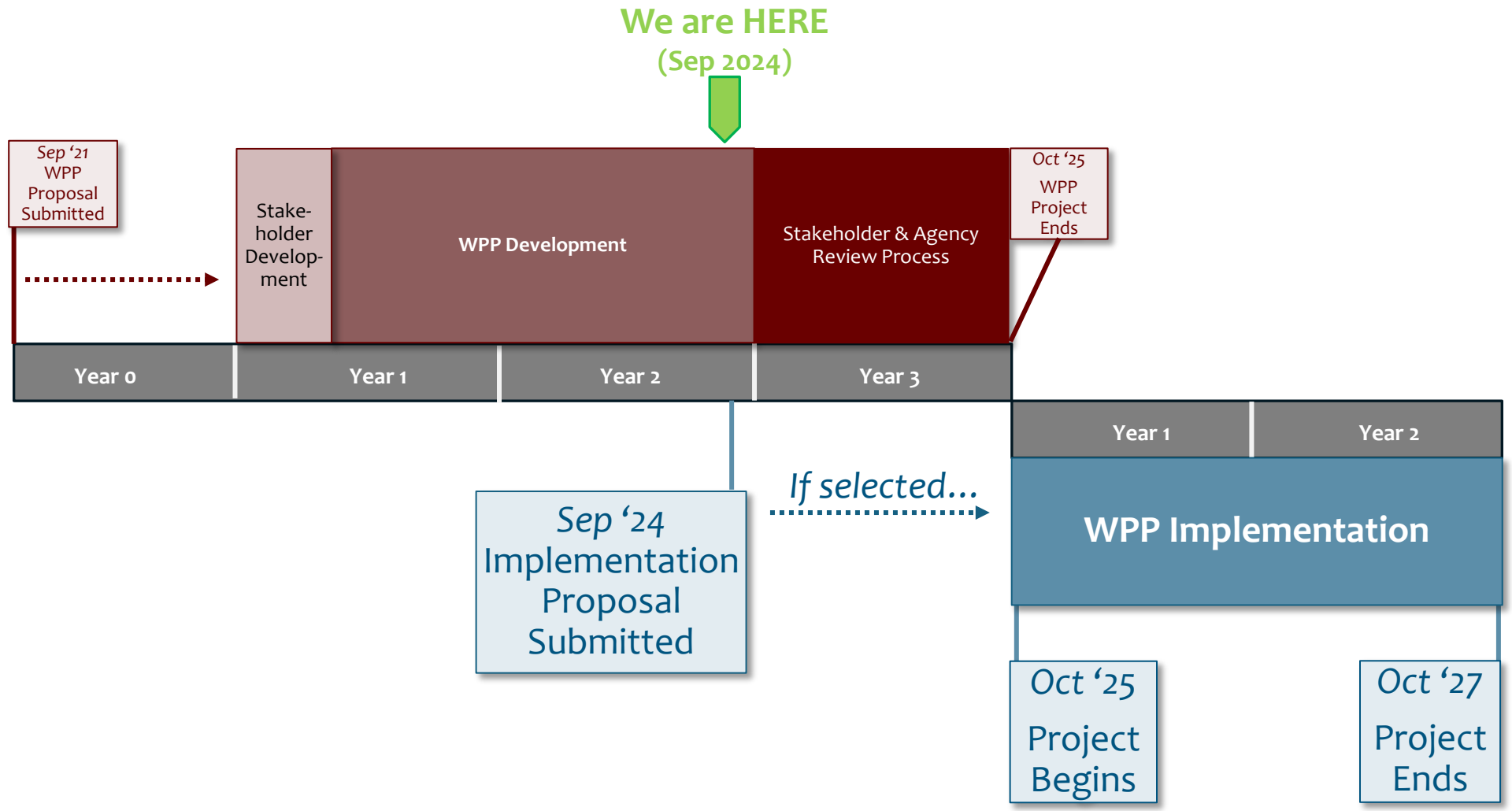
Implementation Proposal

- ✓ Assist w/ funding opportunities.
- ✓ Facilitate communication with stakeholders to engage public in implementation.
- ✓ Participate in public meetings to communicate about the project.
- ✓ Continue stakeholder meetings (qtly) & work group meetings as needed.
- ✓ Coordinate Education & Outreach activities, including
  - Riparian workshops
  - Feral hog management
  - Lone Star Healthy Streams (livestock)
  - Conventional & aerobic septic system workshops (owners & service providers
  - Texas Well Owner Network training
  - …


TEXAS STATE SOIL AND WATER CONSERVATION BOARD
REQUEST FOR PROPOSALS
FOR THE
FISCAL YEAR 2025 CLEAN WATER ACT §319(h)
NONPOINT SOURCE GRANT PROGRAM

PROPOSALS DUE: September 20, 2024

WPP Project Timeline



Thank You!
Merci!

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https://medina.twri.tamu.edu/

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Funding provided by the Texas State Soil and Water Conservation Board through a Clean Water Act Section 319(h) Grant from the U.S. Environmental Protection Agency.

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Medina River below Medina Diversion Lake WPP
Stakeholder Meeting, Castroville, Tx
September 9, 2024
Meeting Notes

AGENDA:
- Overview of Project
- Where we are
- Overview of Work Group activities
- Result of water quality and E. coli loads
- Where we go from here.

Overview of Project
There are a few WPPs out there that have not been "accepted" by EPA but are still being implemented.
- Limited number and self-funded by - TRWD primarily
- Most die on vine if not EPA-accepted, or if external funding is not available
- Agency acceptance opens door to potential funding sources

LDC Results
- Work groups suggest using most recent 7 yrs of data for defining needed Load Reductions, rather than all historic data
- Stakeholder group in agreement.

Land-Based Pollutant Loads, Priority Areas, Management Measures
- Livestock populations, projected load, SELECT analysis
    - Stakeholder group in agreement with the analysis
    - 12 WQMPs/year by MVSWCD is reasonable and feasible. Could do more with additional funds. May be opportunity for using Regional funds that aren't used elsewhere in the region.
    - Reach out to NRCS (not present at meeting) to determine how many CPs would be feasible.
- White-tailed deer populations projected load, SELECT analysis
    - Stakeholder group in agreement with the analysis
- Feral hogs populations projected load, SELECT analysis
    - Stakeholder group in agreement with the analysis
    - Correct agency name on slide: "Tx Wildlife Damages Services"
    - Removing 500 feral hogs/year may be attainable, but little interest from landowners in previous programs offered.
    - Bounty program used in Junction area brought in about 4,000 hog/year.
    - Biggest challenge is the manpower required to deal with traps, hogs after trapped.
    - Helicopters would be desirable, but human population is growing quickly and it may not be feasible.
    - Bringing a LSHS workshop into the watershed to educate on poisons as well as trapping & other programs, including cost information.
    - Should employ all tools and options for reducing the population.
    - Taryn Titsworth, TAMU AgriLife Extension, already has a Feral Hog program on the books for the winter

People-based Pollutant Loads, Priority Areas, Management Measures

- Population estimates and projections
    - Stakeholder group in agreement with the analysis
    - It may be another few years before MVISD enrollment trend starts to flatten
- Wastewater Treatment Facilities estimated load, SELECT analysis, management measures
    - Stakeholder group in agreement with the analysis
- On-Site Sewage Facilities estimated load, SELECT analysis, management measures
    - Stakeholder group in agreement with the analysis
    - Management Measures: Increase 25 to 50
    - Reach out to Bexar County (not present at meeting) to see if input on # of systems that are feasible to be addressed.
    - Update language to "Failing systems repaired, replaced, or maintained correctly"
- Dogs estimated load, SELECT analysis, management measures
    - Stakeholder group in agreement with the analysis

Load Reductions - Needed vs Planned

- Proportion of total load reduction by dogs seems too high.
- Re-analyze dogs using 10% changed behavior at 50% pickup rate, perhaps additional scenarios
- revisit/revise for livestock and septic system measures after speaking w/NRCS and Bexar County.

Other Management Measures

- Riparian Restoration, TFS study
- Stream Restoration, SARA Program
- LID/GI, SARA Green Infrastructure Master Plan
- Land Conservation
- EAA Abandoned Well Program
- Stakeholder group was satisfied with the programs listed and had no other recommendations

Next Meetings

- Meeting the Week of Oct. 7th - ok with stakeholders for next meeting
- No comments on Week of Nov 18th for subsequent meeting
- No comments on roll out of full draft plan in January

TSSWCB FY25 Implementation Proposal

- No objections to planned approach.

Management Measure Scenarios

- The following slides present various scenarios of management measure implementation for Livestock, Feral Hogs, OSSFs, and Domestic Dogs.
- In each case, “Scenario 1” is what was presented during the September 9th stakeholder meeting. The resulting proportion of these “Planned” load reductions by source was not acceptable to stakeholders, so additional scenarios were developed.
- These additional scenarios are presented below and were used to calculate potential load reductions, based on feedback and direction discussed at the meeting.
- In the slides below, the gold star ★ marks the scenario used to develop the total Planned Reductions shown in the last 2 slides.

Livestock

Conservation Plans

Water Quality Management Plans

		Load Reduction Scenarios		
	Load	**Scenario 1**	**Scenario 2**	**Scenario 3**
Total # Livestock	14,811			
Total Livestock Load *(cfu/year)*	5.27 x10^{16}			
# of Livestock Farms	662			
WQMPs per year		**12**	12	12
Conservation Plans per year		-	6	12
CP/WQMP Efficiency		**75%**	75%	75%
Livestock Load Reduction *(cfu/year)*		**7.16 x10^{14}**	1.07 x10^{15}	1.43 x10^{15}

Scenario 1 = Scenario presented at 9/9/24 stakeholder meeting.

Scenario 2 = Add 12 NRCS Conservation Plans per year

Feral Hogs

Targeted education and removal

No additional scenarios

Load Reduction Scenarios	
	Scenario 1
Total # Feral Hogs	**6,146**
Total Feral Hog Load *(cfu/year)*	**2.09** x10^{14}
# of Hogs Removed/yr	**500**
Feral Hog Load Reduction *(cfu/year)*	1.74 x10^{13}

On-Site Sewage Facilities

Education, proper maintenance, repair or replacement

		Load Reduction Scenarios	
	Load	**Scenario 1**	**Scenario 2**
Total # OSSFs	13,733		
# Failing Systems	1,352		
Total Failing System Load *(cfu/year)*	2.36 x10^{16}		
# of Failing Systems Addressed Through Education, Proper Maintenance, Repair or Replacement per year		**25**	60
Medina Aerobic		***10***	20
Medina Conventional		***5***	10
Bexar – all		***5***	20
Atascosa Bandera – all		***5***	10
OSSF Load Reduction *(cfu/year)*		**4.34 x10^{14}**	1.04 x10^{15}

Scenario 1 = Scenario presented at 9/9/24 stakeholder meeting.

Scenario 2 = Increasing total systems addressed to 50 (per stakeholder group), plus an additional 10 in Bexar County (per Bexar County)

Domestic Dogs

Targeted Education & Ordinances

		Load Reduction Scenarios			
	Load	**Scenario 1**	**Scenario 2**	**Scenario 3**	**Scenario 4**
Total # Dogs	67,781	**50,384**	50,384	50,384	50,384
Total Dog Load *(cfu/year)*	7.79 x10^{16}	**5.79E+16**	5.79E+16	5.79E+16	5.79E+16
Ownership Rate		**60%**	44.6%	44.6%	44.6%
Dogs/Household		**1.46**	1.46	1.46	1.46
% Owners picking up		**25%**	25%	15%	15%
% Time owners pick up		**75%**	75%	50%	25%
Dog Load Reduction *(cfu/year)*		**1.46 x10^{16}**	1.09 x10^{16}	4.34 x10^{15}	2.17 x10^{15}

Scenario 1 = Scenario presented at 9/9/24 stakeholder meeting.

Scenario 2 = Reduce Ownership to AVMA 2022 rate of 44.6%

Scenario 3 = Scenario 2 plus reduce % Owners picking up to 15% and % Time to 50%

Scenario 4 = Scenario 3 plus reduce % Time to 25%

Load Reductions

Scenario 1

Needed* vs. Planned
(cfu/year)

Needed 3.84×10^{13}

Planned 1.58×10^{16}

Medium & Low Flow categories
All subbasins

Combined Scenarios

Needed* vs. Planned
(cfu/year)

Needed 3.84×10^{13}

★Planned 4.66×10^{15}

Medium & Low Flow categories
All subbasins

Due to a previously unknown error in TCEQ information, data from monitoring site 12813 has been removed from analysis and "Needed" reductions have been recalculated.

Previously, the "Needed" load reduction was 5.94×10^{13}. This change also reduces the overall target Load Reduction slightly, from 28% to 26%.

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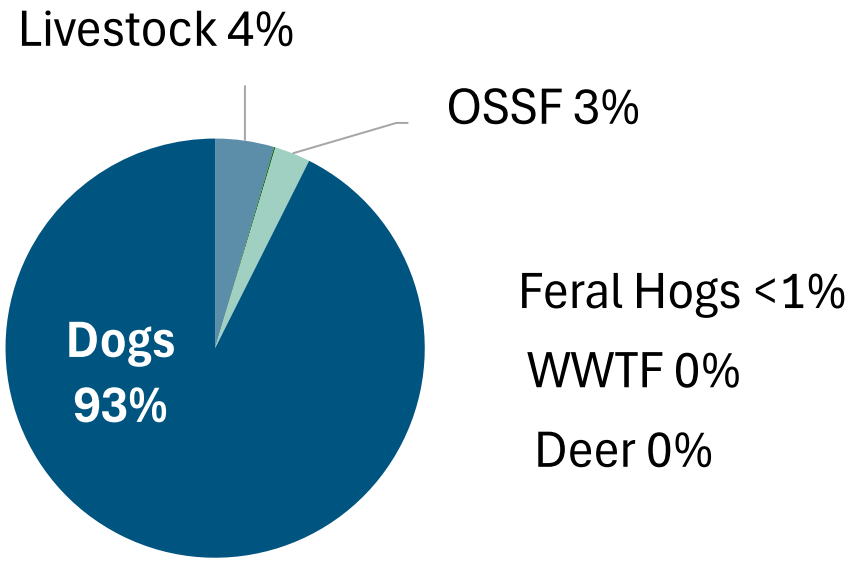
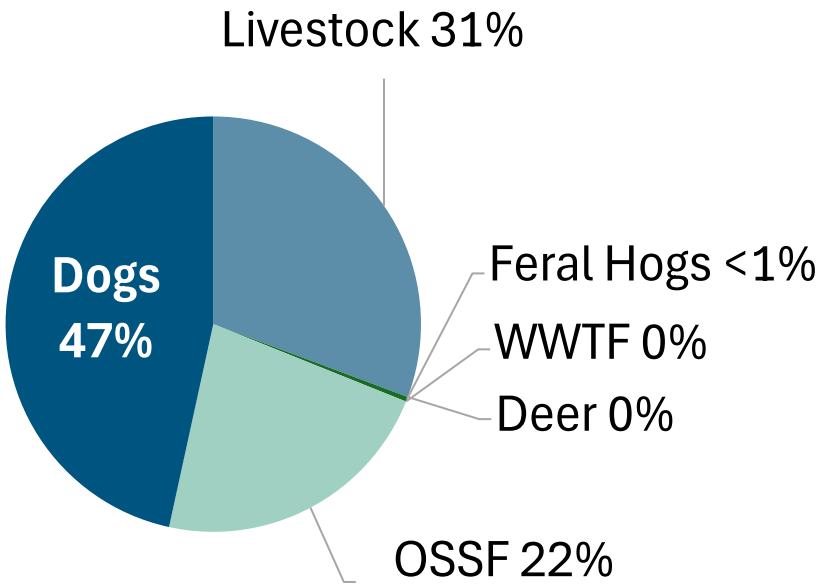
Portion of Load Reductions by Source

Scenario 1



★Combined Scenarios



Scenario 1 = Scenario presented at 9/9/24 stakeholder meeting.

Combined Scenarios = Dogs Scenario 4; Livestock Scenario 3; OSSF Scenario 2

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