

Upstream Actions, Downstream Impacts: Tackling Bacteria and Nutrients in Texas Watersheds

**Texas Association of Watershed Sponsors (TAWWS)
Annual Conference**

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**Texas Water
Resources Institute**
make every drop count



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Texas Surface Water Quality Standards



- Reviewed every 3 years
- Assess water bodies every 2 years
- Use most recent 7 years of data

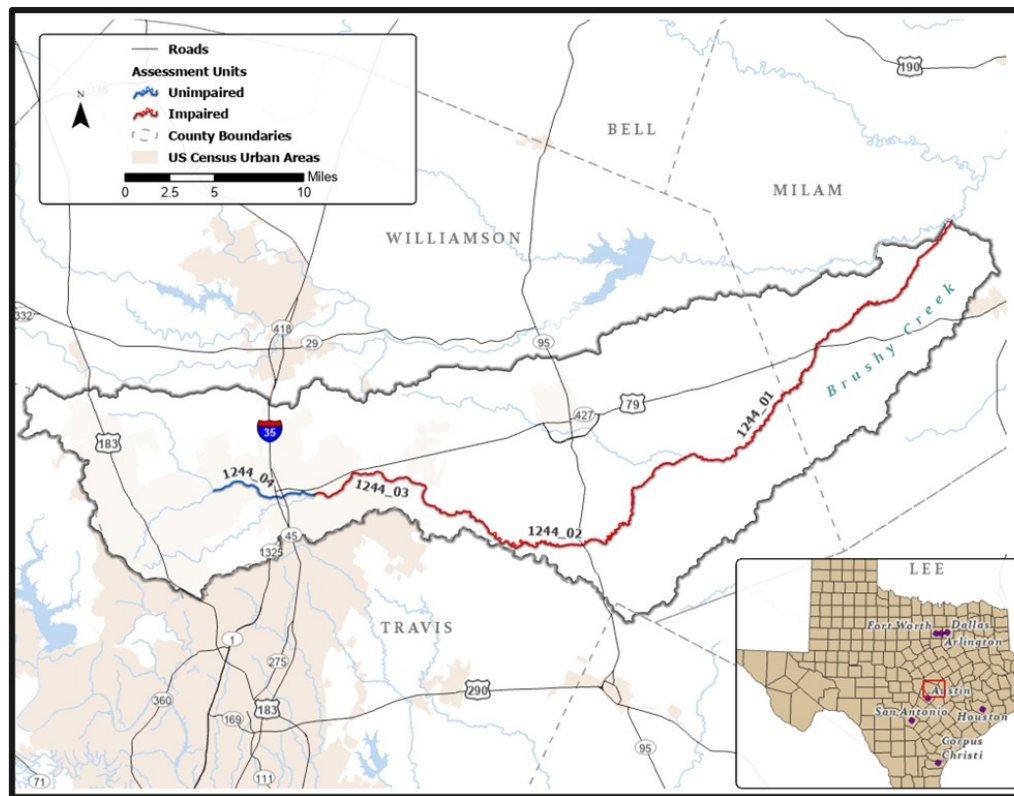
Surface Water Quality

1. Designated Segments and Assessment Units (AU)

2. Designated Usage

- **General Use**
- **Domestic Water Supply**
- **Aquatic Life**
- **Recreation**
 - **primary contact** – swimming, wading, kayaking... activities likely to result in ingestion of, or immersion in, water
 - **secondary contact** – boating, rowing...immersion is unlikely

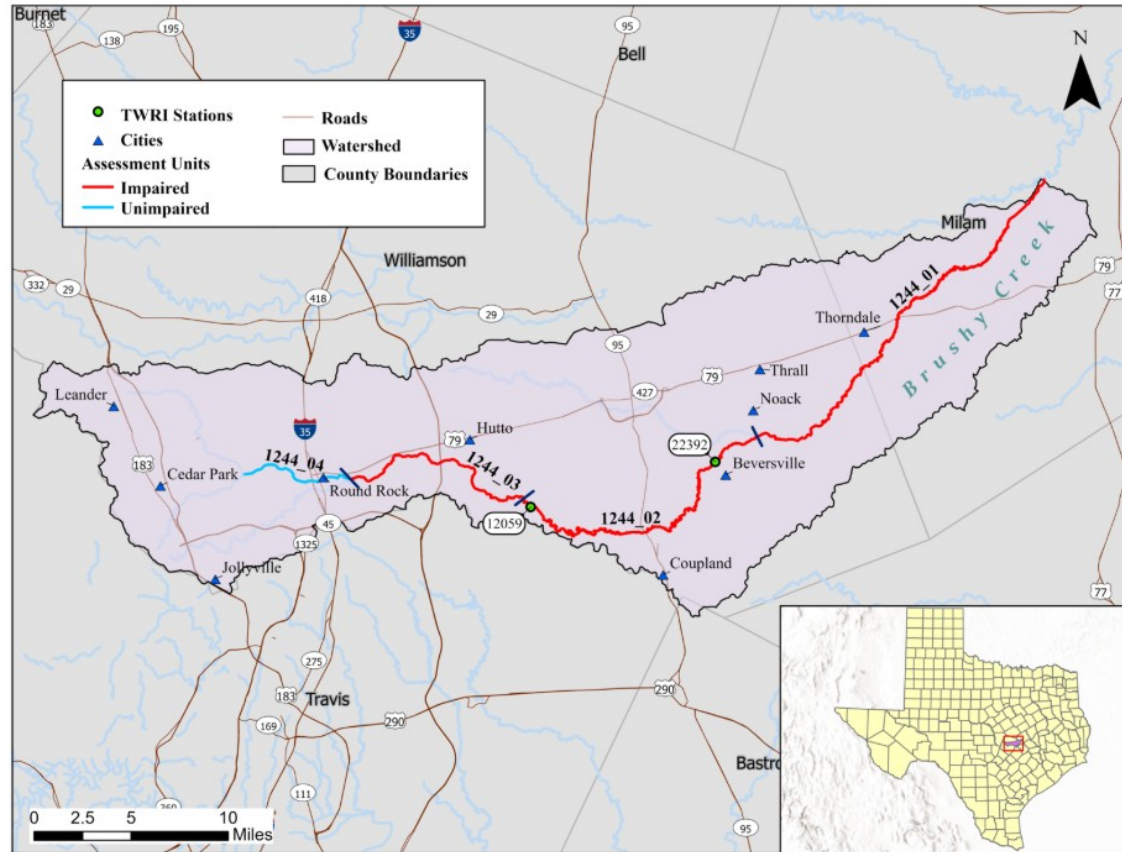
Brushy Creek Watershed



Brushy Creek:

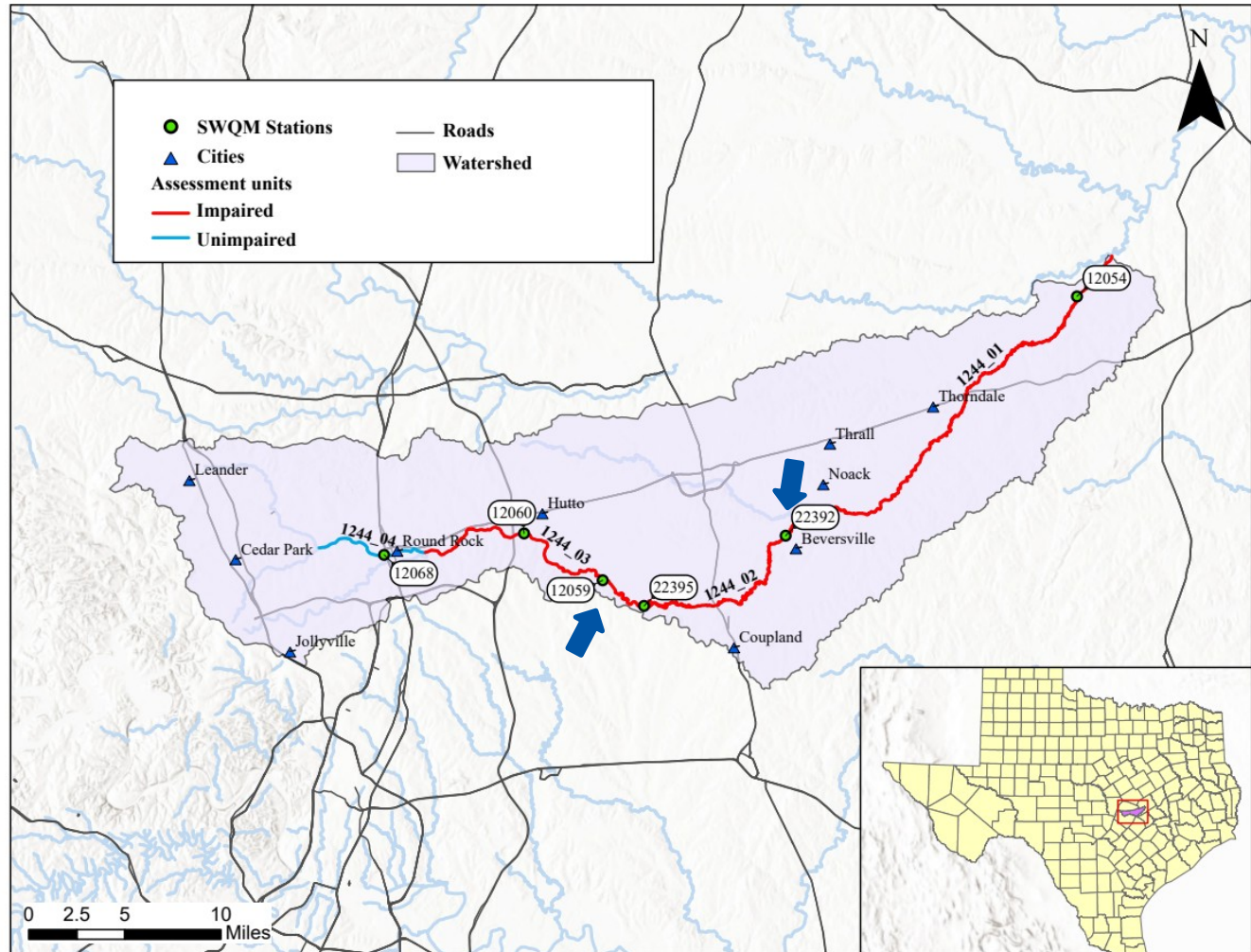
- **Has 4 Assessment Units (AUs)**
- Covers **68.7 miles across Williamson and Milam counties.**
- First referenced by Spanish Explorers as “Arroyo de las Ánimas Benditas” or “Creek of the Blessed Souls” in **1716!**

Brushy Creek Water Quality



- **IMPAIRED** : *E. Coli* >**126 MPN** in the 2024 Texas Integrated Report.
- **Concerns for : Elevated nitrate levels- 2024 IR**
- **Concerns for: Elevated phosphate levels- Draft 2026 IR**

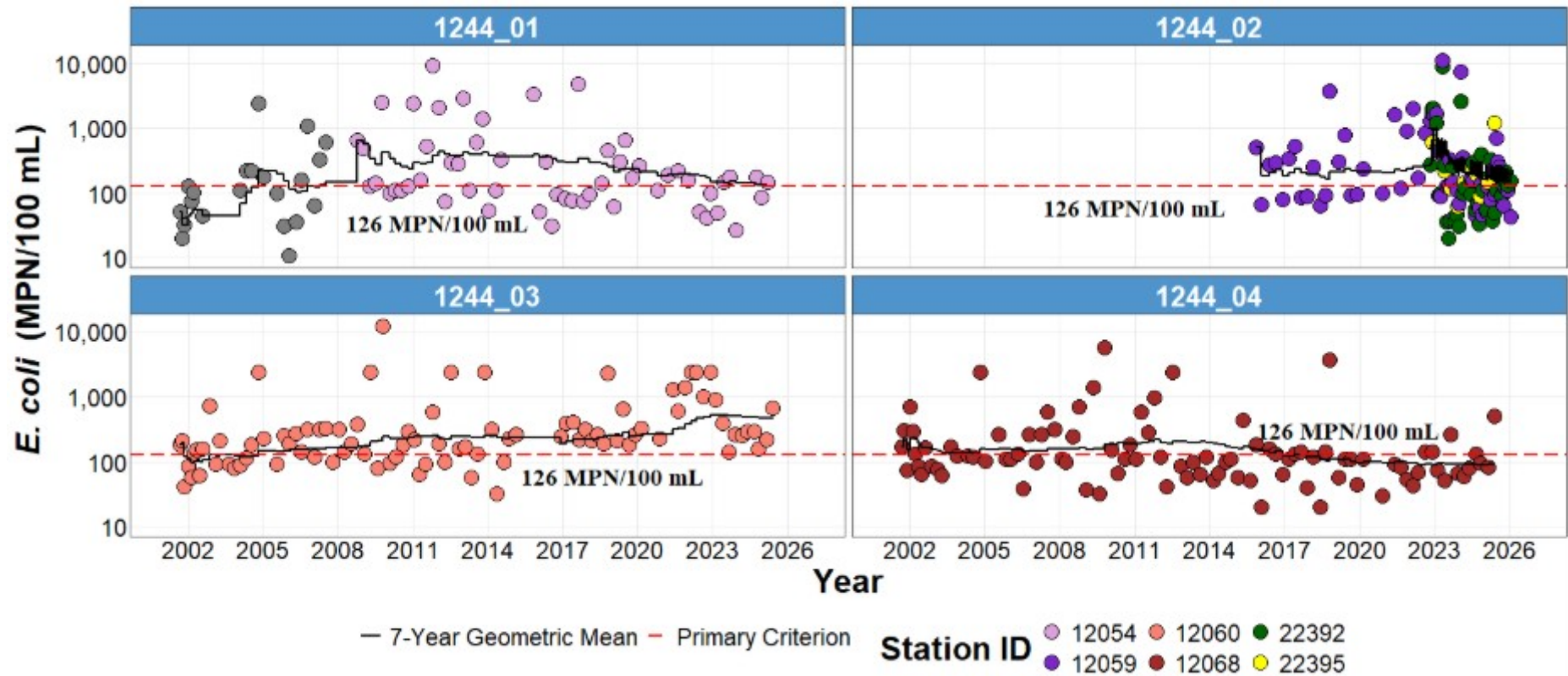
SWQM STATIONS & TWRI MONITORING



TWRI Monitored Parameters include:

pH, temperature, DO, turbidity, conductivity, flow, *E. Coli*

Brushy Creek E. Coli Concentrations by AU from 2002 to 2025



Where Does Fecal Bacteria Come From?

Direct Deposition:

- Birds and mammals
 - Livestock
 - Wildlife
 - Dogs



Non-Point Sources:

- Stormwater runoff transports bacteria from surface fecal matter
- Failing septic systems



Point Sources:

- Improperly treated wastewater
- Illegal dumping
- Municipal stormwater



What is a Watershed Protection Plan?



Brushy Creek
Photo by Cameron Castilaw

Watershed protection plans (WPPs):

- Voluntary
- Holistic
- Establish management measures, reduction goals, and goal schedule.
- Prioritize management measures based on technical merit and benefits to the community
- Potentially qualify a watershed for 319 grant funding

What are WPPs Designed to Do?



Characterize the watershed

Set goals

Identifying sources of pollution

Estimate pollutant loads

Set load reductions

Identify management strategies

Implement management strategies

Monitor and evaluate

Maintain public participation

Distributed Sources of Bacteria in Watersheds

Watershed Drivers



Observed Reservoir & Infrastructure Challenges

- Nutrient runoff (agricultural, urban, wildlife)
- Failing or unsewered septic systems
- Stormwater loading in developed areas
- Wastewater contributions
- Land use and growth pressures

- Algal blooms (nutrient enrichment)
- Water quality concerns (including taste & odor)
- Increased system management demands
- Bacteria impairments
- Sediment and inflow quality issues

Why Watershed Planning Matters for Infrastructure and Systems

Watershed Management Actions



Infrastructure & System Benefits

- Nutrient management (ag & urban BMPs)
- Septic repair / sewer connections
- Stormwater controls & retrofits
- Riparian restoration
- Targeted load reduction in critical areas

- Reduced algal bloom frequency/severity
- Lower treatment costs & complexity
- Improved inflow water quality
- Better regulatory compliance
- Improved sediment management / reduced infilling
- Supports long-term storage capacity and system performance

What are the Major Tasks for Stakeholders?



- **Identify needed education** and outreach.
- **Oversee implementation plan** development & scheduling
- **Provide input** on potential sources of bacteria
- **Set goals** and objectives
- **Identify reasonable implementation** measures

HOW CAN TAWS FIT IN THIS PROCESS?

- **Help identify** priority problem areas
- **Align infrastructure planning** with watershed priorities
- **Support or leverage funding** for targeted projects
- **Share data** to improve decision-making
- **Partner on implementation** opportunities

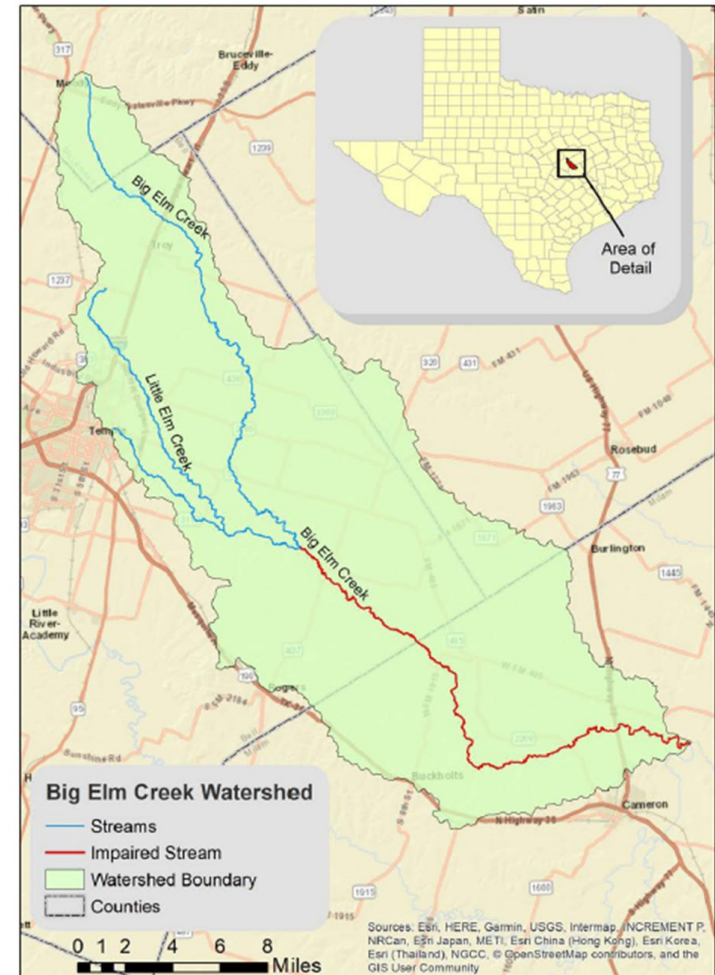
Big Elm Creek WPP Implementation

Watershed Description

- **Located in the Lower Brazos Basin**
- **Approximately 324 mi²**
- **Includes portions of McLennan, Bell, Falls and, Milam counties**

Watershed Water Quality

- **Elevated Levels of *E. coli* Bacteria**



What was the response?

- **Develop a watershed protection plan**
- **Developed from input from area residents**
- **Received EPA acceptance in 2021**
- **Implementation has begun**



Potential Bacteria Sources



Feral Hogs



Failing septic systems



Agricultural



Dogs



Urban stormwater runoff



Wastewater treatment plants

Feral Hogs



- **Voluntarily construct fencing around deer feeders to prevent feral hog use**
- **Voluntarily identify travel corridors and employ trapping and hunting in these areas to reduce hog numbers**
- **Voluntarily shoot hogs on sight; ensure that lessees shoot hogs on sight**
- **Feral Hog Workshops**

Failing Septic Systems



- **Administer an OSSF repair/replacement program to address deficient systems identified during inspections**
- **Identify and inspect failing OSSFs within priority areas**
- **Repair/replace OSSFs as funding allows**
- **Septic System Maintenance Classes for Homeowners**

Agricultural Conservation Planning



- **Develop, implement, and provide financial assistance for livestock Conservation Plans (CPs) and Water Quality Management Plans (WQMPs).**
- **Deliver programming designed for watershed landowners**

Agricultural BMPs



- **Achieve the goals of improving forage quality and distribution**
- **Diversify water resource locations**
- **Better distribute livestock across a property**
- **Have positive effects on forage health and utilization**
- **This can all result in improved water quality**

Post Cards for Ranchers

AM I PROPERLY STOCKED?

OVERSTOCKING INDICATORS:

- Bare patches
- Visible hooves from a distance
- Noticeable manure from a distance
- Weed encroachment

Overgrazed: hooves and manure visible.



Appropriate stocking rates:
adequate forage & root growth.

ADVANTAGES TO APPROPRIATELY STOCKING:

- Protection of soil & water resources
- Drought resilience
- Decrease in feeding costs
- Increase forage production
- Higher body scores

OVERSTOCKING CAN LEAD TO:

- Susceptibility to drought
- Increased feeding costs
- Increased soil erosion & rainfall runoff
- Decreased forage production
- Increased external parasites



Overgrazed vs. Not Overgrazed

ACHIEVE APPROPRIATE STOCKING RATES THROUGH:

- Developing a grazing plan
- Resting your pasture & allowing for recovery
- Cross fencing
- Adding shade structures & fresh water sources
- Stocking according to YOUR grazable acres

WHO CAN HELP?

Post Cards for Farmers

Don't Guess
DO A SOIL TEST

If you...

- Grow crops or forage
- Apply fertilizer
- Want to maximize yield

Do a Soil Test First!

Find out your:

- Current nutrient levels
- Crop-specific nutrient needs
- Soil pH & recommended adjustments
- Customized fertilizer rates (lb/acre)
- Fertilizer N-P-K ratios

Use Soil Testing to:

- Improve crop yield and quality
- Find the right fertilizer for your crop
- Reduce fertilizer costs and waste

See back for instructions

Dog Waste



- **Install and maintain pet waste stations in parks and other public areas**
- **Educational campaigns to the public about the importance of properly managing and disposing of dog waste on public and private property**

Stormwater Runoff



- **Work with local municipalities to identify and install demonstration BMPs**
- **Deliver stormwater management education programs about stormwater BMPs**
 - **Riparian and Stream Ecosystem Education Workshops**
- **Monitor the effectiveness of BMPs**

Questions?



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