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Mid Pecan Bayou

Historical Water Quality, Bacteria Source Survey, and Geographic Information System Inventory

Study Team:
Texas AgriLife Research
&
Texas Institute for Applied Environmental Research
Stephenville, Texas

January 9, 2012



Bacteria Source Survey

Assessment:

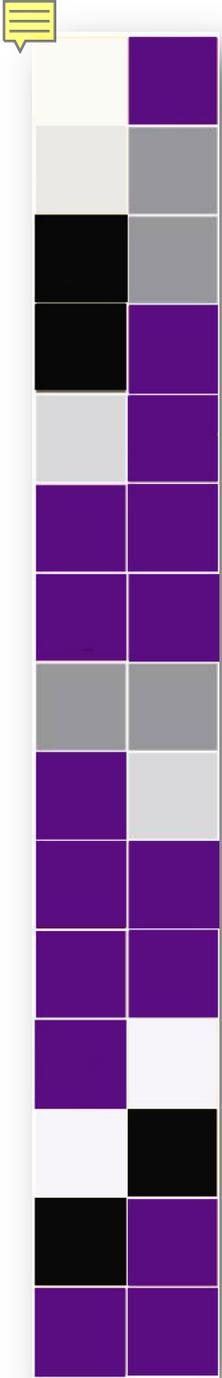
1. GIS inventory of the study area
2. Historical water quality data review
3. Evaluation of permitted & non-permitted sources
4. Evaluation of observed sources through boating or walking portions of the impaired segment



GIS Inventory

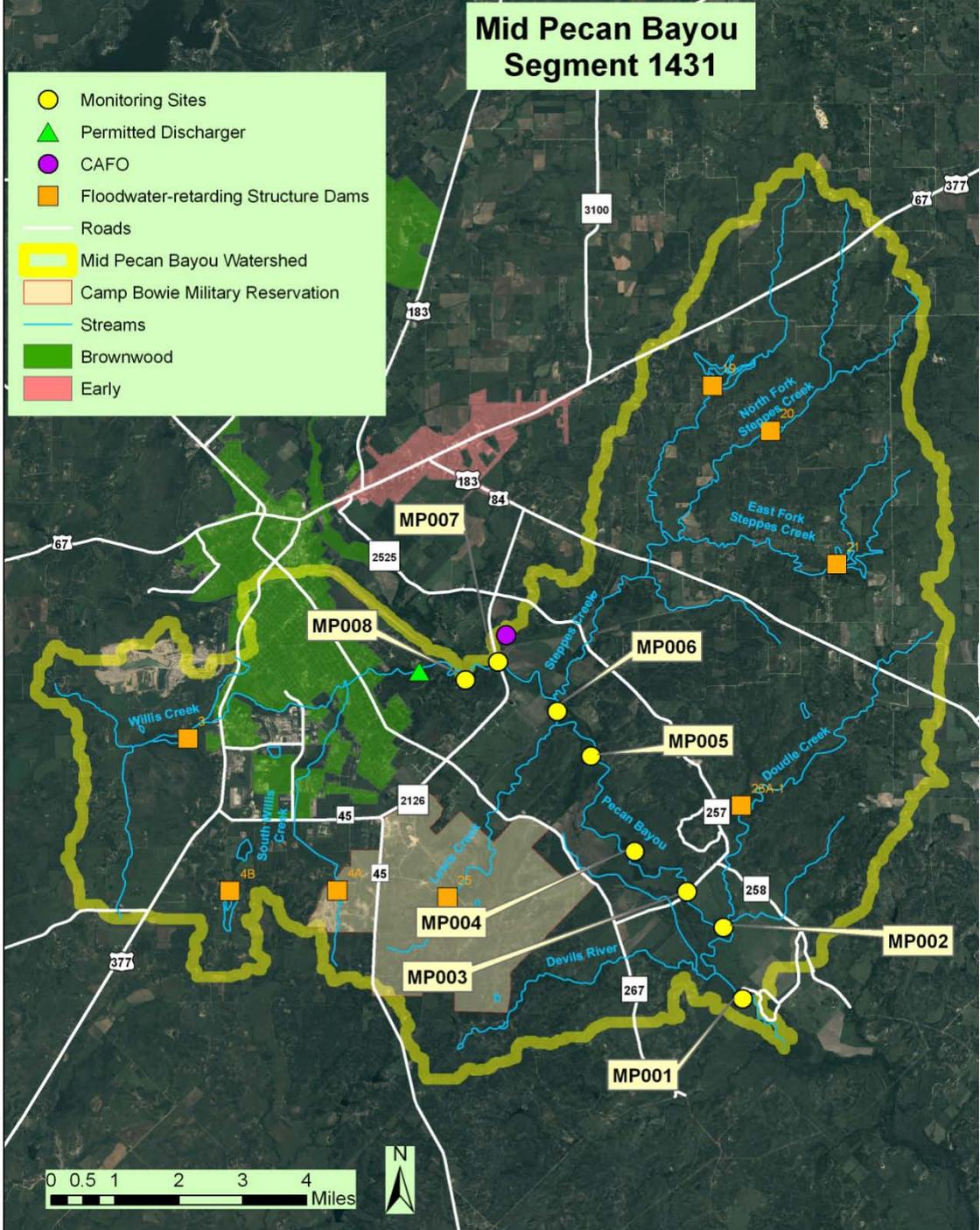
- Comprehensive GIS inventory developed using information from existing sources
- Included
 - Land use
 - Stream network
 - Roads
 - Public access points
 - Other layers, as appropriate





Mid Pecan Bayou Segment 1431

- Monitoring Sites
- Permitted Discharger
- CAFO
- Floodwater-retarding Structure Dams
- Roads
- Mid Pecan Bayou Watershed
- Camp Bowie Military Reservation
- Streams
- Brownwood
- Early

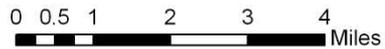
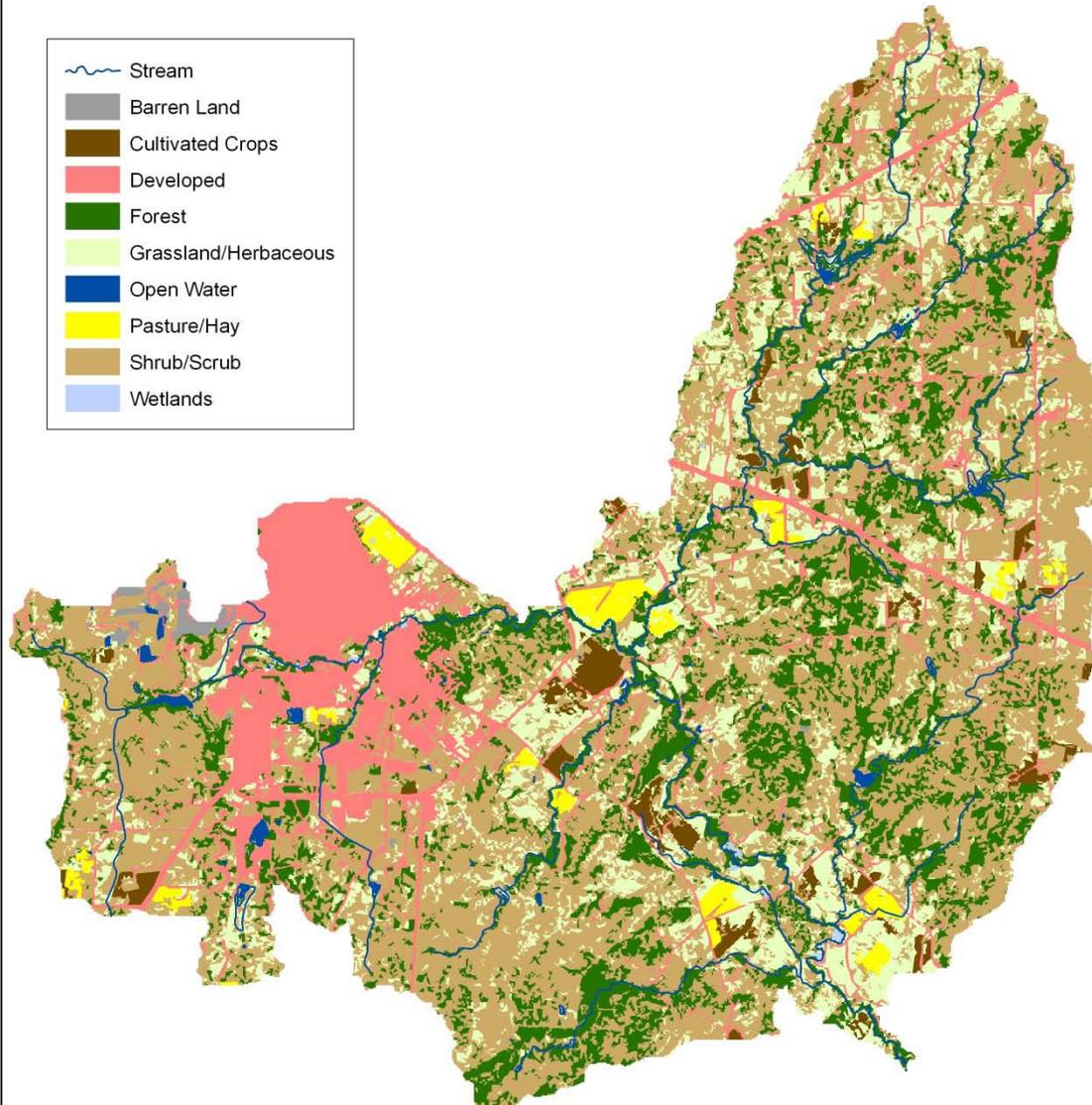


Land Use Classification

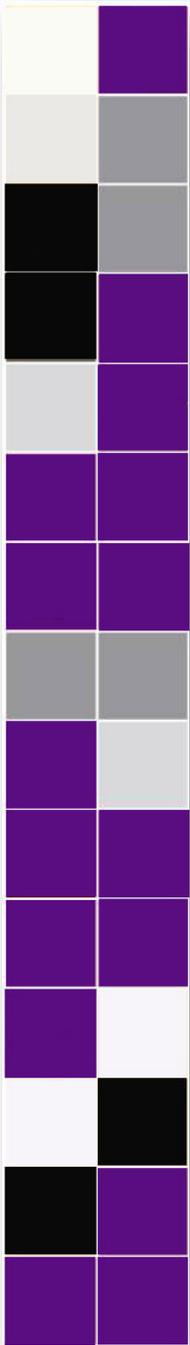
Land Use Classification	Area (Hectares)	Percent of Total
Shrub/Scrub	12,957	47
Forest	5,010	18
Grassland/Herbaceous	4,313	16
Developed	3,690	13
Cultivated Crops	591	2
Pasture/Hay	498	2
Open Water	148	0.5
Barren Land	113	0.4
Wetlands	43	0.2
Total	27,362	



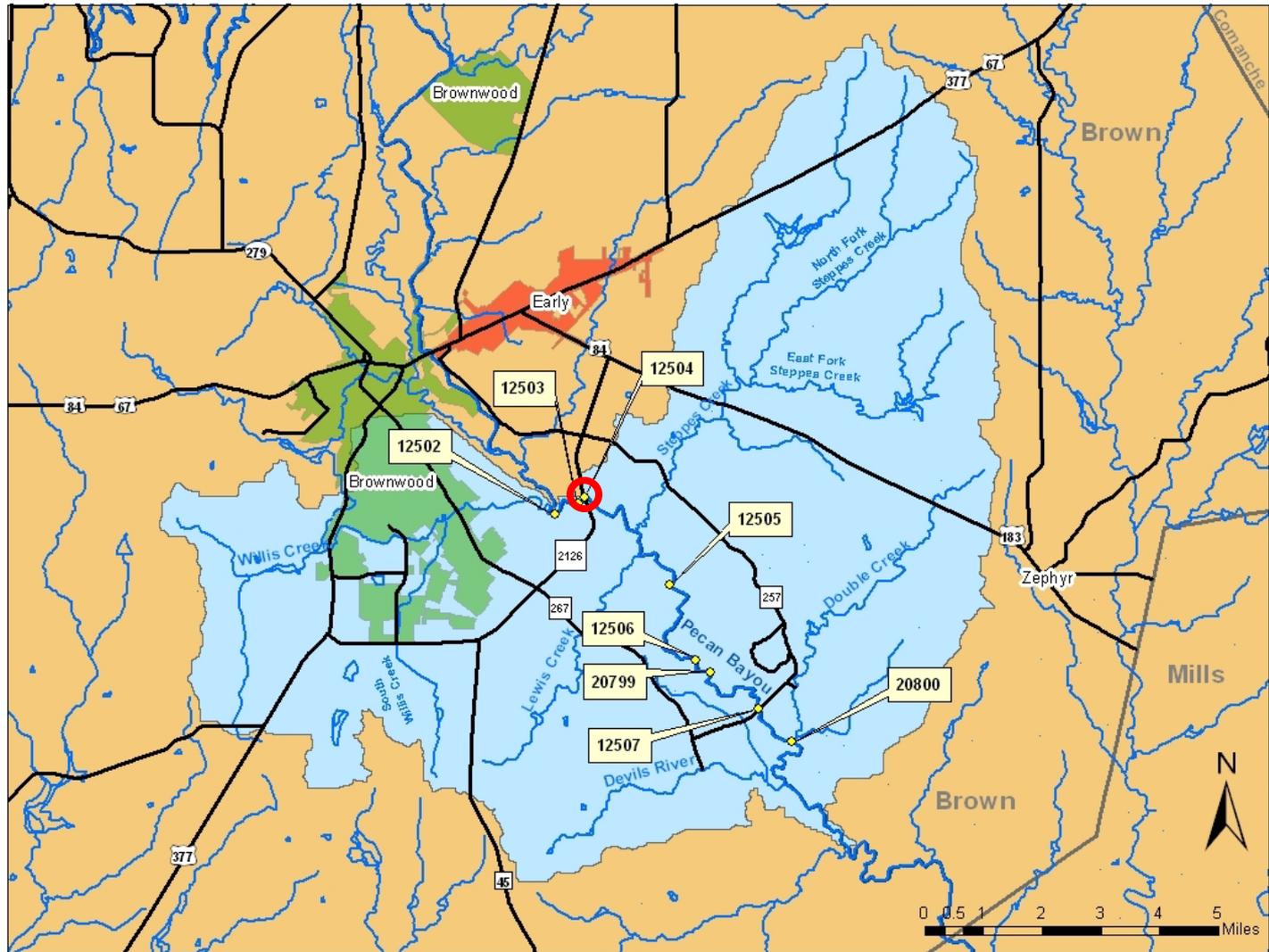
Mid Pecan Bayou Land Use/Land Cover (Source: 2006 NLCD)



Historical Water Quality Data



TCEQ Sampling Stations



Texas Commission on Environmental Quality for Primary Contact Recreation

Constituent	Geometric Mean (colonies/100mL)
<i>E. coli</i>	126
Fecal coliform	200



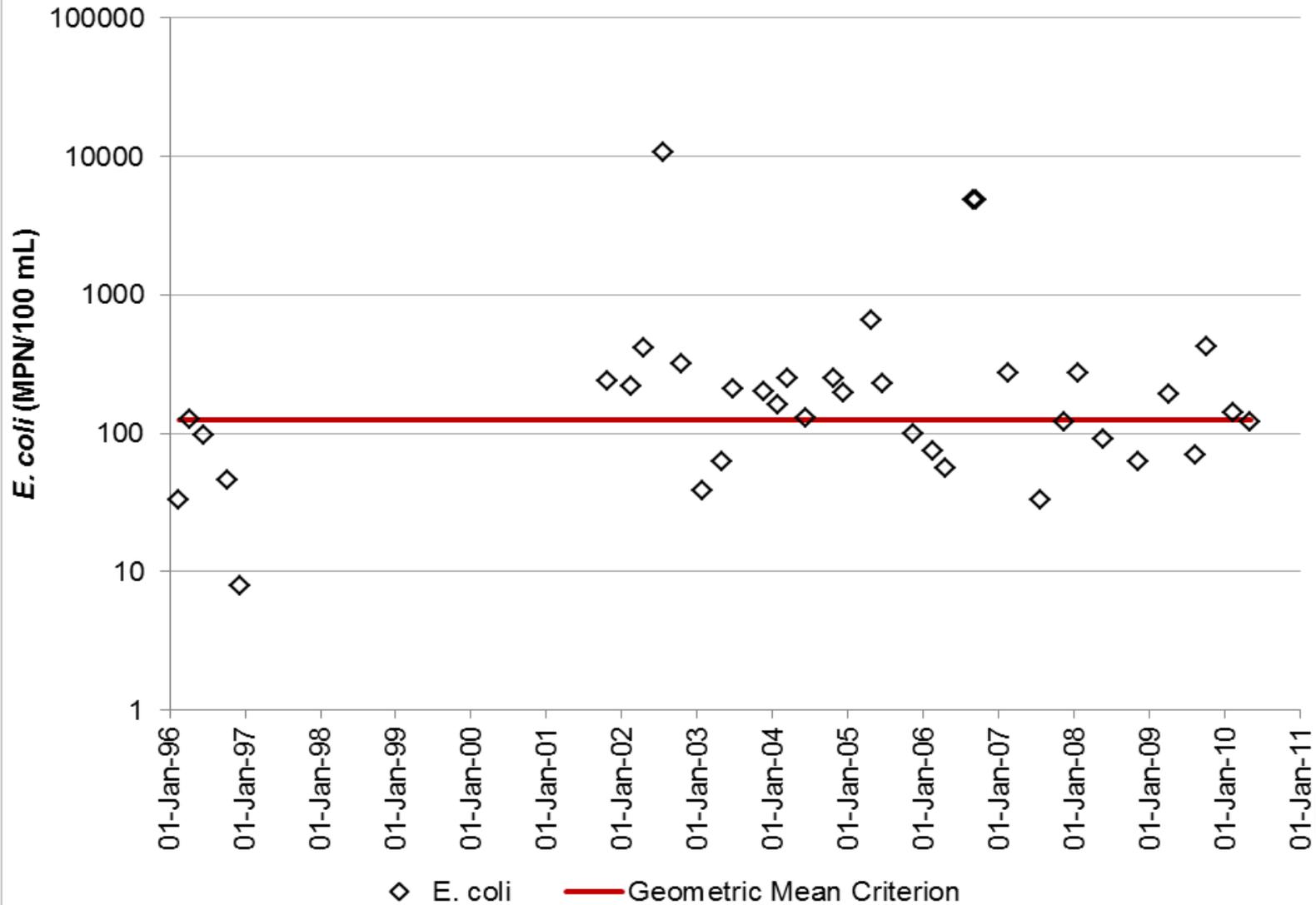
Bacteria values reported by TCEQ in determining impairment status:

Constituent	Assessment Year	Period of Record	Sample Numbers	Geometric Mean
<i>E. coli</i>	2006	1999–2004	13	242
Fecal coliform	2006	1999–2004	15	104
<i>E. coli</i>	2008	1999–2006	21	282
Fecal coliform	2008	1999–2006	15	104
<i>E. coli</i>	2010	2001–2008	26	228
Fecal coliform	2010	2001–2008	7	258

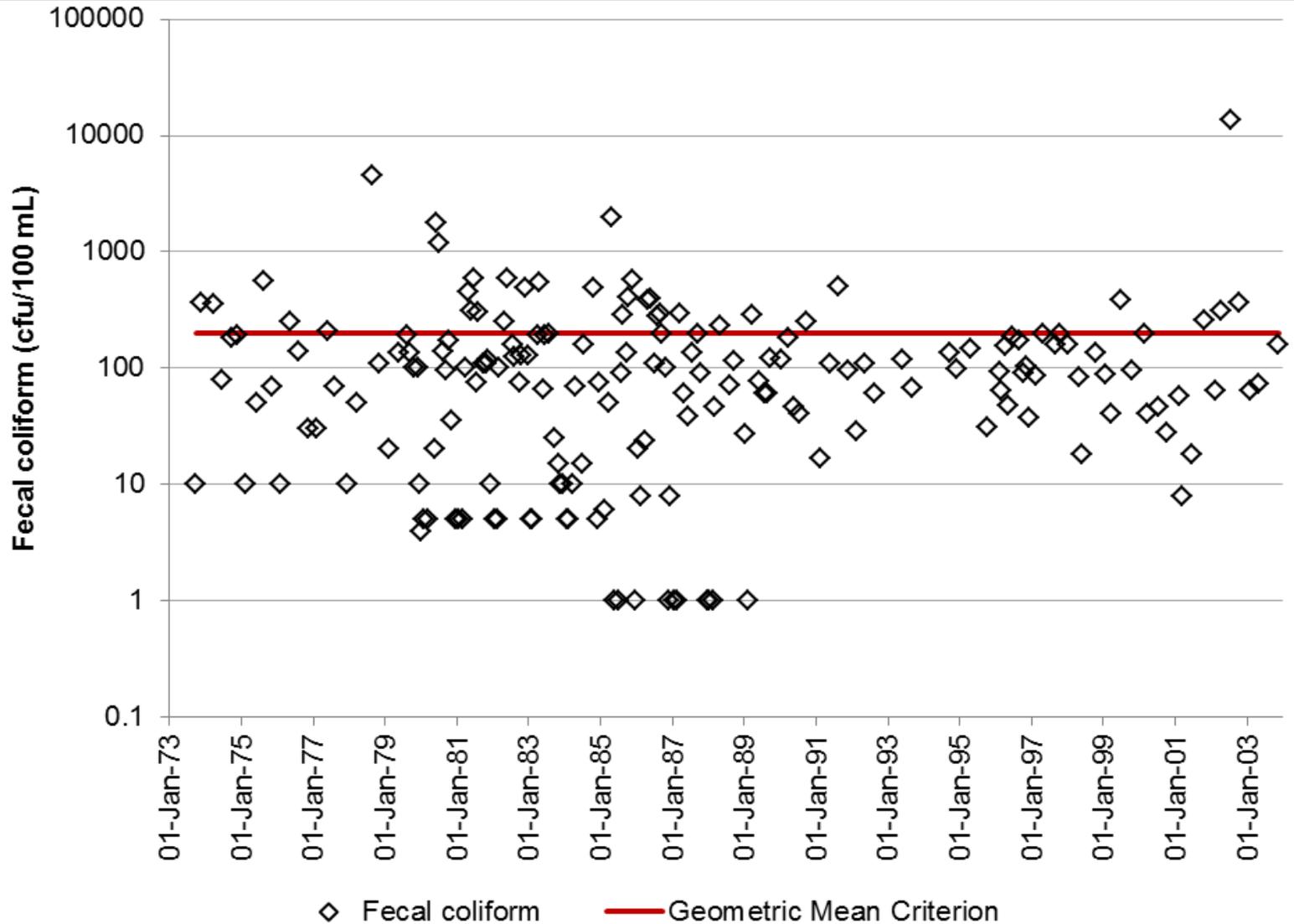
Data are from station 12504 – Pecan Bayou at FM 2126 (MP007)



Segment 1431 - All data from Station 12504



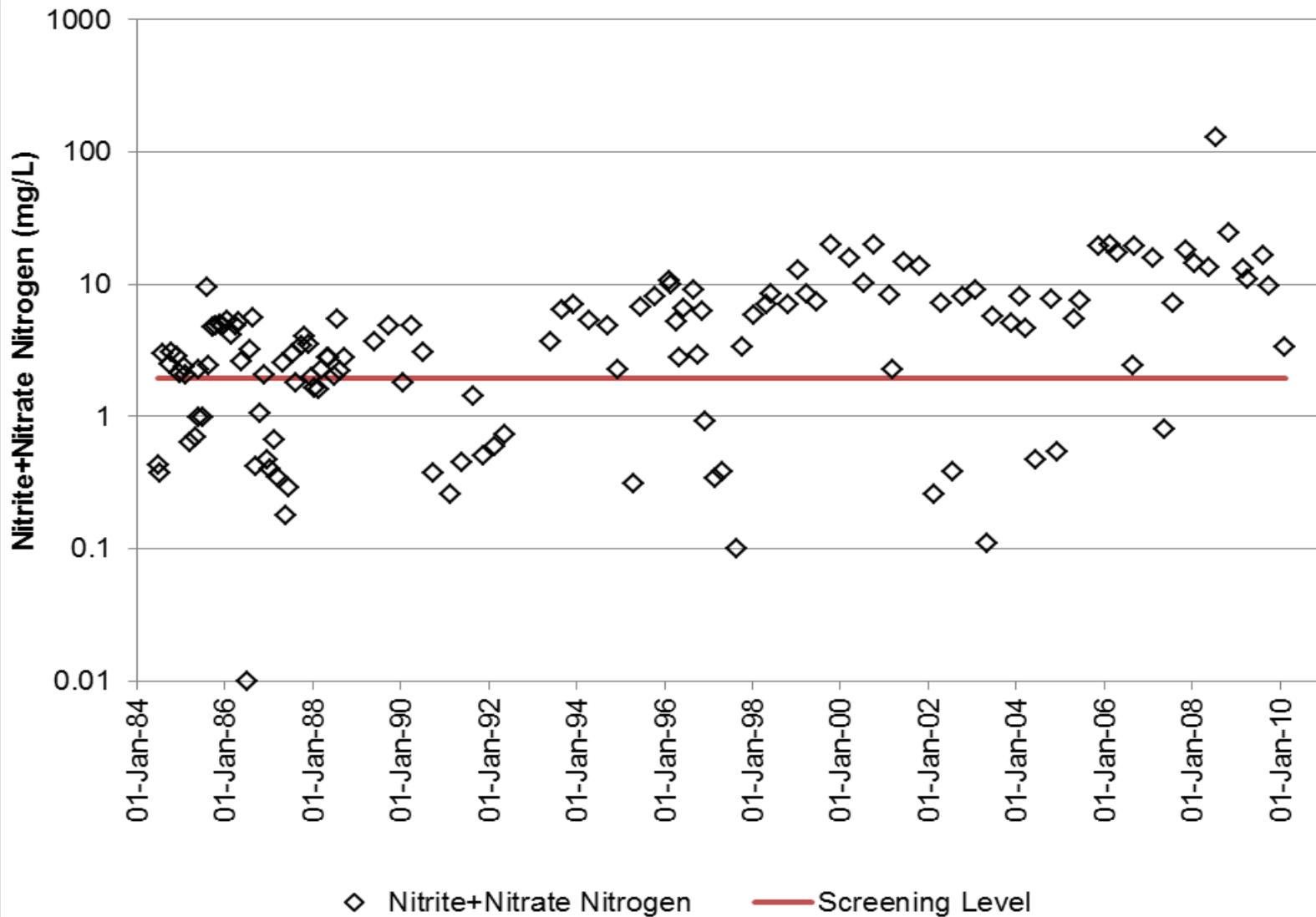
Segment 1431 - All data from Station 12504



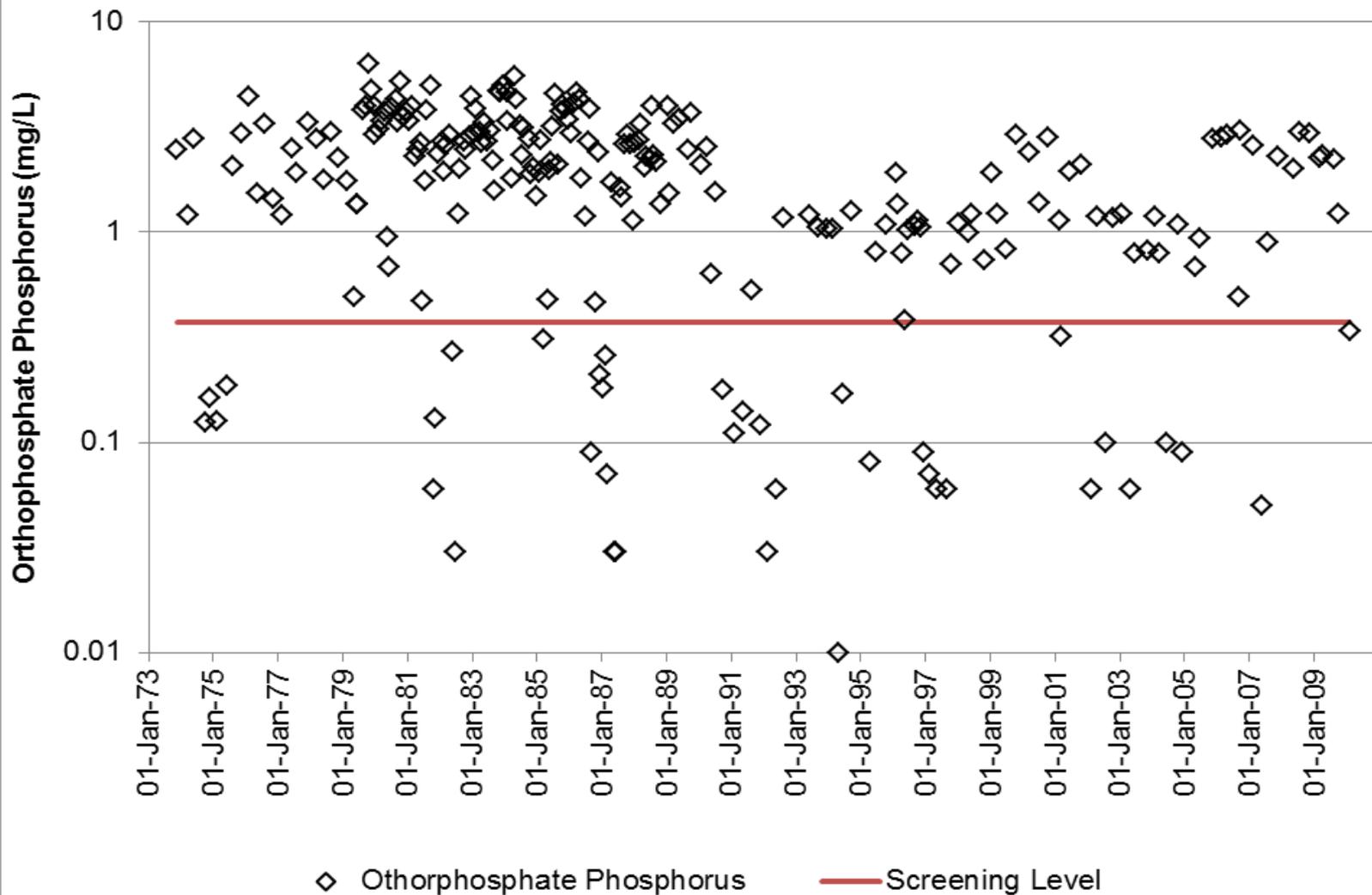
Nutrient values reported by TCEQ in determining 2010 concerns

Constituent	Number of Samples	Screening Level (mg/L)	Number of Samples That Exceed Screening Level	Mean of Samples That Exceed Screening Level (mg/L)
Nitrate	29	1.95	22	16.8
Orthophosphorus	28	0.37	21	1.70
Total Phosphorus	29	0.69	21	1.87

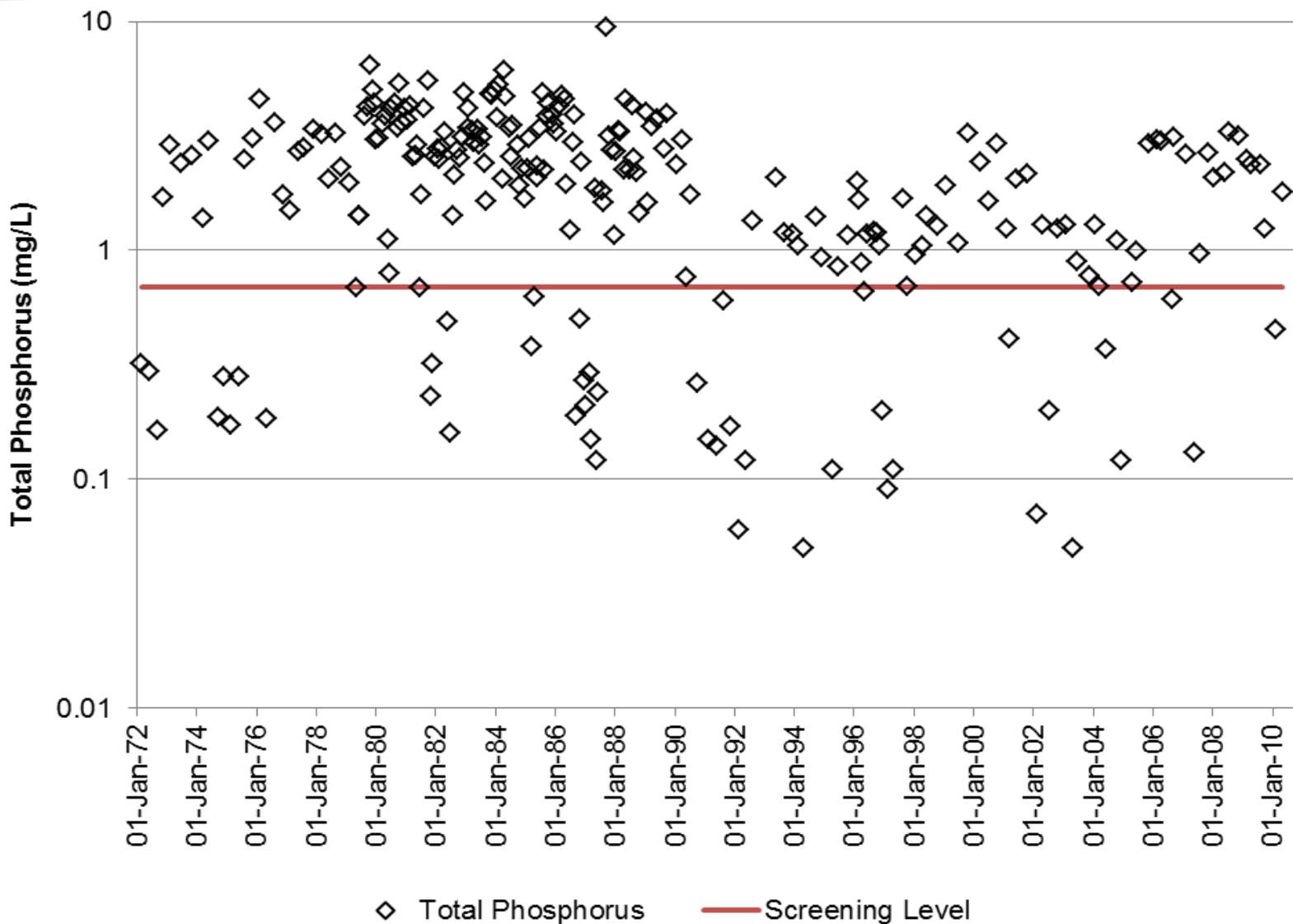
Segment 1431 - All data from Station 12504



Segment 1431 - All data from Station 12504



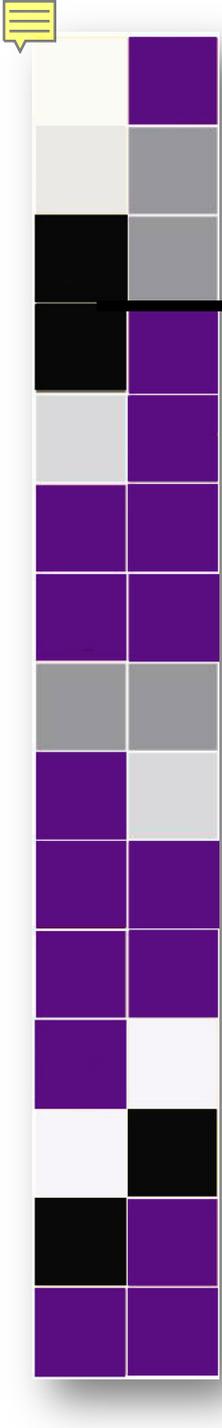
Segment 1431 - All data from Station 12504



Bacteria Source Survey

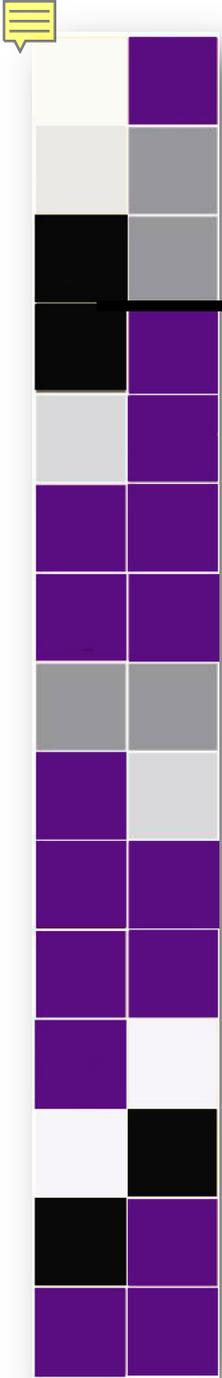
- Permitted Sources
 - Brownwood Wastewater Treatment Facility
 - Concentrated Animal Feeding Operation (Brown– Tex Feedlot)





Wastewater Treatment Facility

- City of Brownwood WWTF
 - AU 1431_01
 - Treated domestic wastewater effluent
 - Discharge into Willis Creek
 - Permit – Not to exceed 4.54 million gallons/day
 - Monthly average (Feb. '05 – March '09) – 2.57 million gallons/day



Permitted Dischargers

- Concentrated Animal Feeding Operation (Brown-Tex Feedlot)
 - 1 permitted Large CAFO within AU 1431_01
 - Head Count - 2,500
 - April 2011 Comprehensive Compliance Investigation indicates that CAFO is in compliance

Bacteria Source Survey

- Non-Permitted Sources
 - Livestock
 - Wildlife
 - On-Site Sewage Facilities (septic systems)
 - Observed Sources
 - Upstream Sources

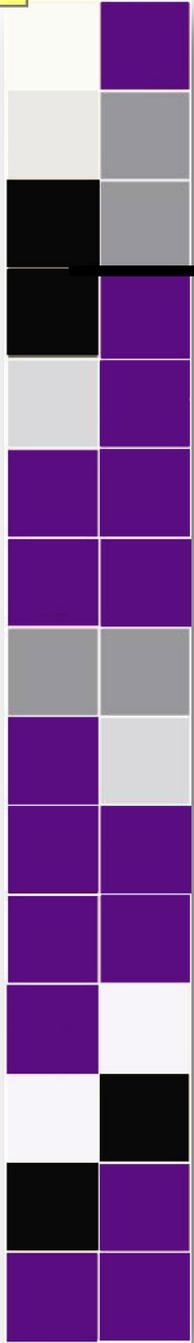


Livestock

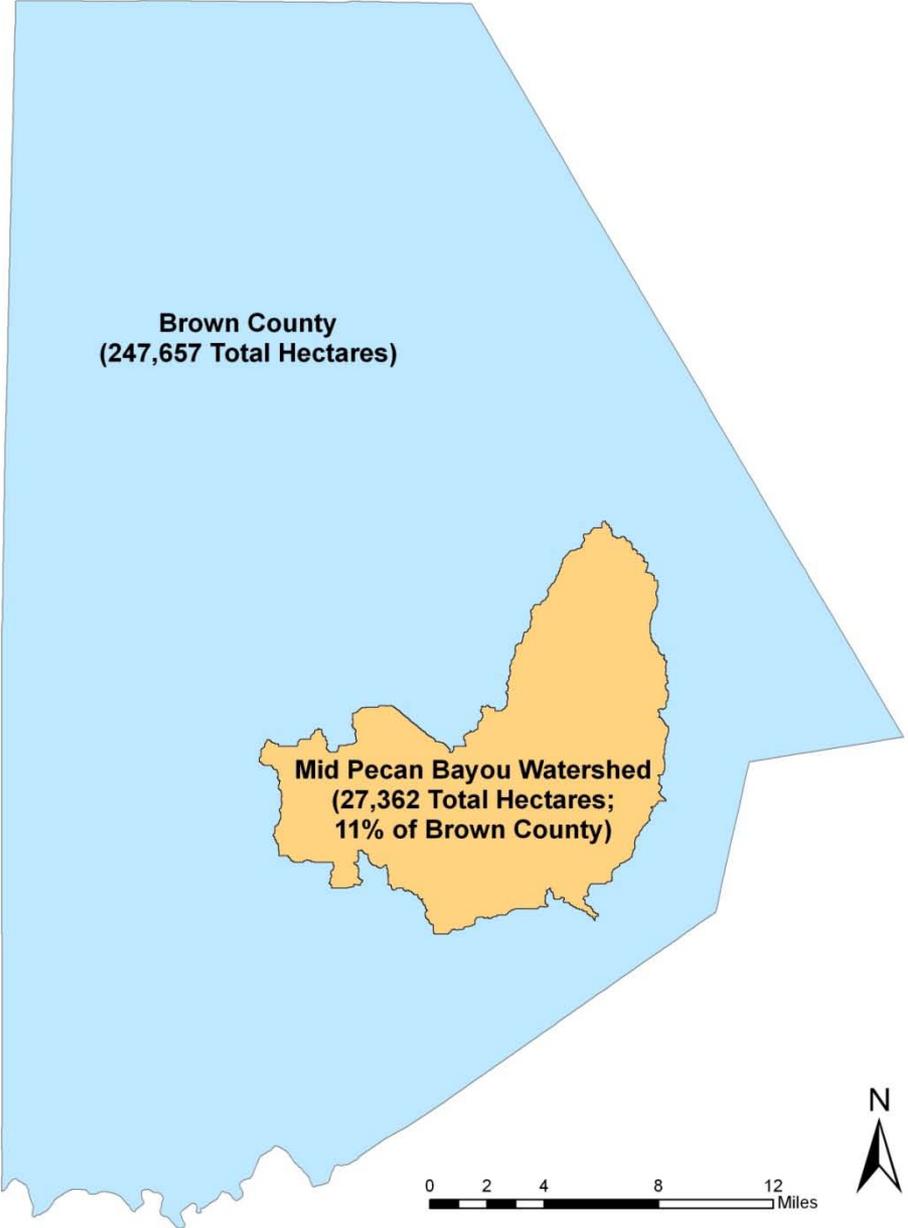
Livestock Statistics for Brown County (Source USDA, 2011)

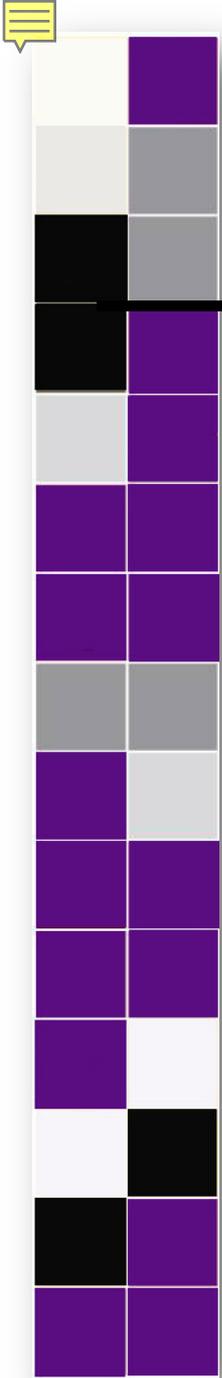
Livestock	Number within Brown County	Estimated Number within the Mid Pecan Bayou Watershed
All Cattle and Calves	59,000	6,490
All Goats (meat and other)	14,000	1,540
All Sheep and Lambs	6,000	660
Hens and Pullets of Laying age	2,000	220
Equine	2,300	250

Estimated livestock numbers for Mid Pecan Bayou derived as a direct proportion of the watershed area within Brown County



Mid Pecan Bayou Watershed





Septic System Densities

- Currently 2,912 permitted On-Site Sewage Facilities (OSSFs) located in Brown County.
- Most complaints located near Lake Brownwood north of the Mid Pecan Bayou watershed.

Bacteria Source Survey

- Non-Permitted Sources Observed
 - Avian Nests
 - Wildlife
 - Feral Hogs
 - Livestock

Non Point Sources Observed

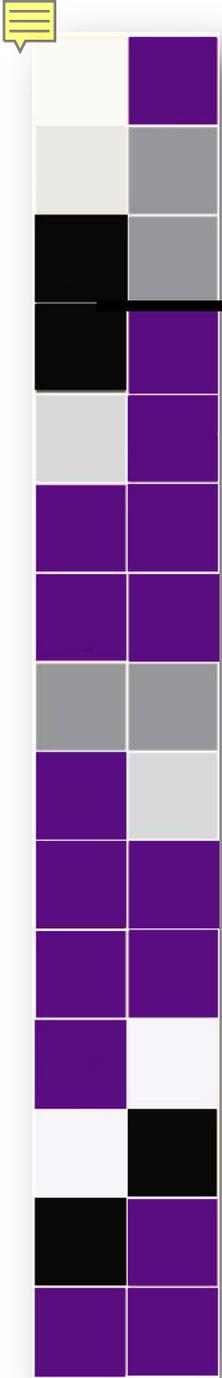


- Avian rookeries along the creek
- Swallow nests below bridge



Livestock Tracks





Wildlife and Other Contributors

- Numerous tracks were found during the RUAA surveys
- Raccoon, Deer
- Feral Hog (invasive species)
- Turkey

Feral Hog “Wallow” Along Bayou



- “Wallow” Along Bayou
- Hog Feces
- Hog Run



Unidentified Pipes...

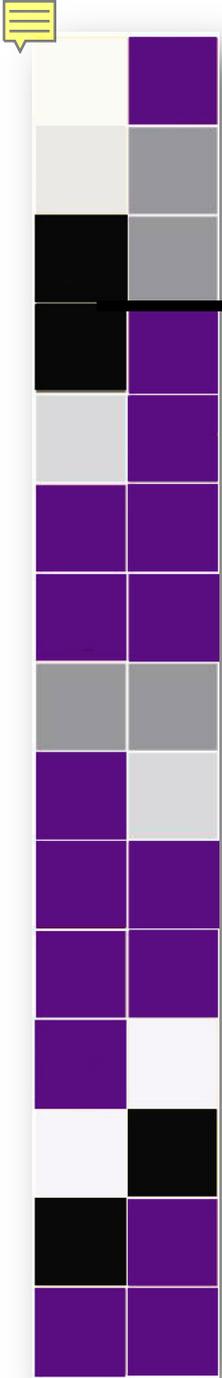


Swallows & Bird Droppings



Swallows

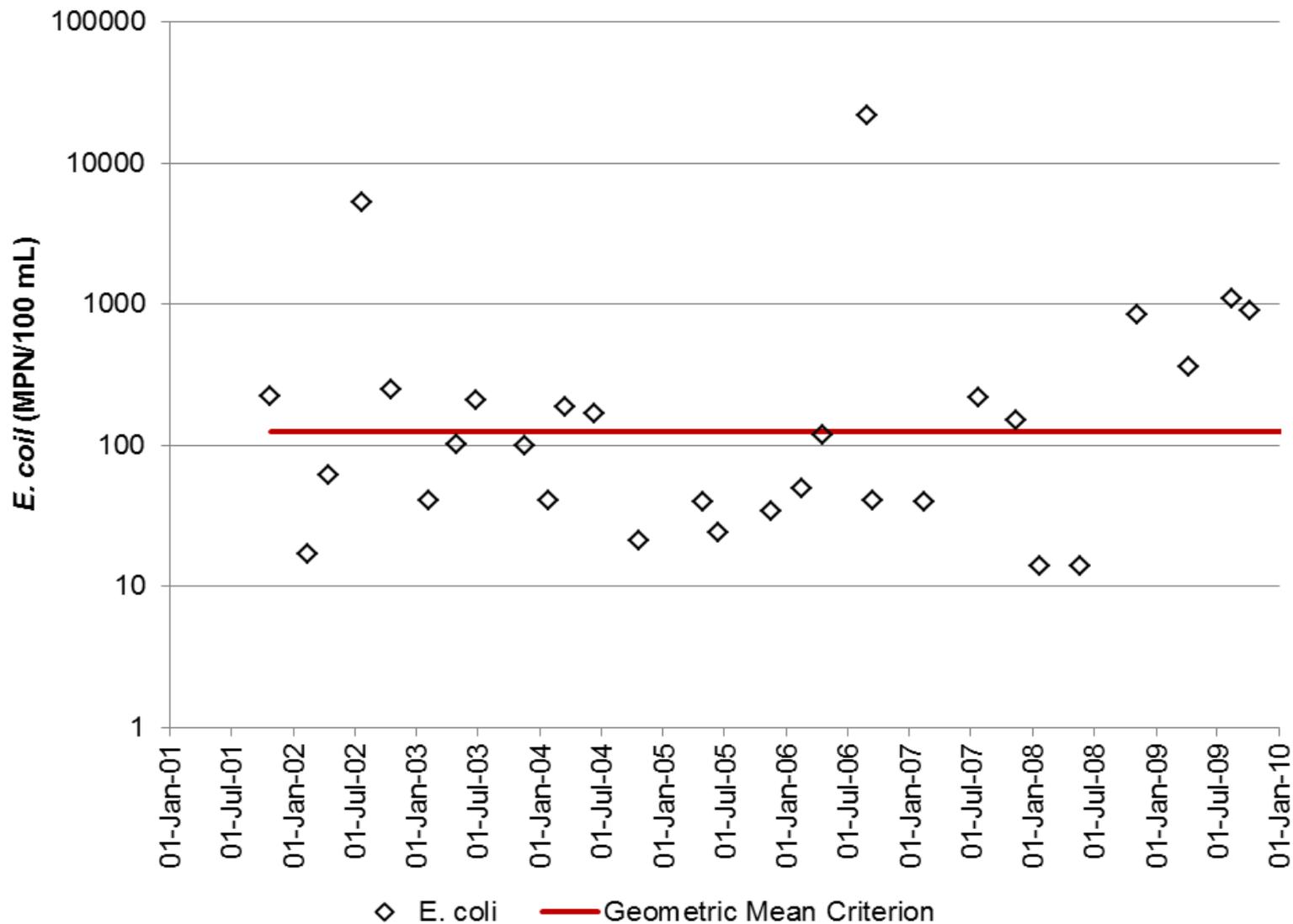




Upstream Contributions

- Mid Pecan Bayou not an isolated waterbody.
- Receives flow from Upper Pecan Bayou (Segment 1432).

Upper Pecan Bayou (Segment 1432) – Station 12508



Summary

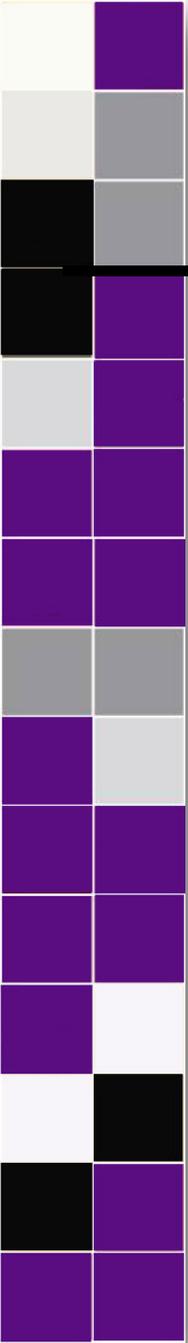
- Permitted sources appear to be in compliance (WWTF & CAFO)
 - Non-permitted sources include:
 - Livestock
 - Wildlife
 - Feral Hogs
 - Birds
 - Domestic animals
- For non-permitted sources, difficult to assess magnitude of contribution

Summary

- Historical Water Quality Data
 - Bacteria concentrations do not appear to be increasing or decreasing over time, so likely no large change has occurred in sources since early 1970's
 - For assessment purposes, all bacteria data are only from one station (12504) located in the upper portion of the watershed

Public Comment Period

- The Public Comment Period ends on January 13, 2012 for both draft Technical Reports.



Questions?

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