

MID AND LOWER CIBOLO CREEK WATERSHED CHARACTERISTICS AND WATER QUALITY

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Watershed Waterbodies

- Mid-Lower Cibolo Creek (~92 miles)
- Martinez Creek (~26 miles)
- Salatrillo Creek (~11 miles)
- Clifton Branch (~8 miles)

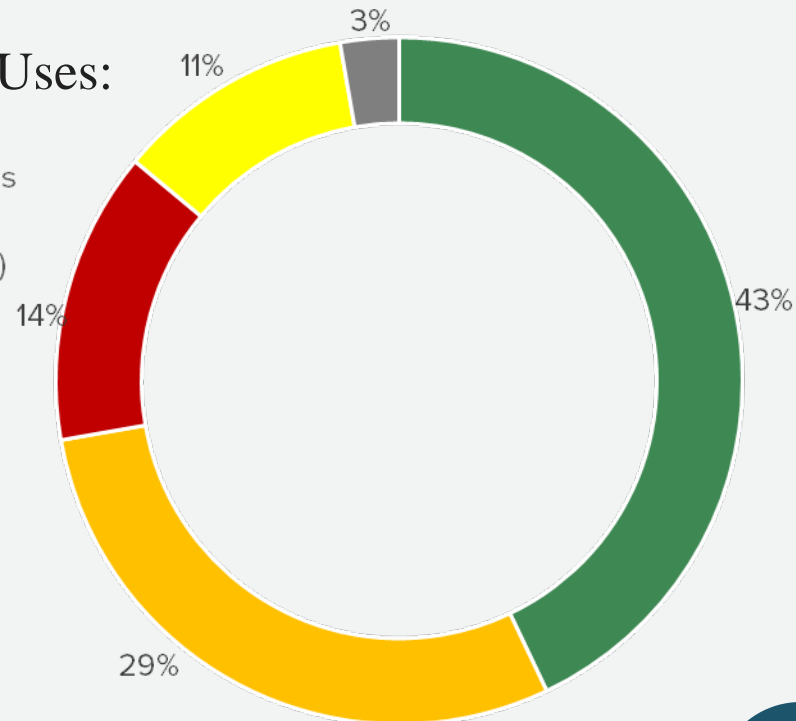


Key Watershed Characteristics

- Area: 580 sq miles (371,200 ac)
- Estimated Population: 186,154

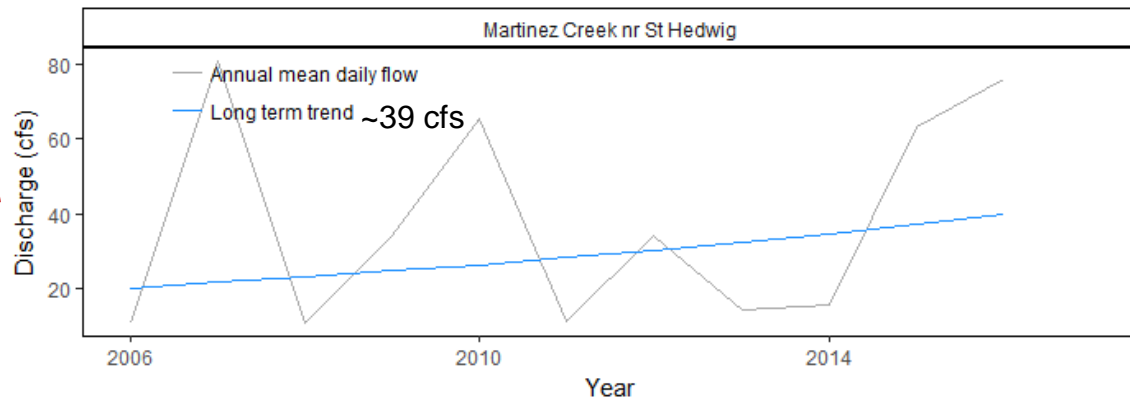
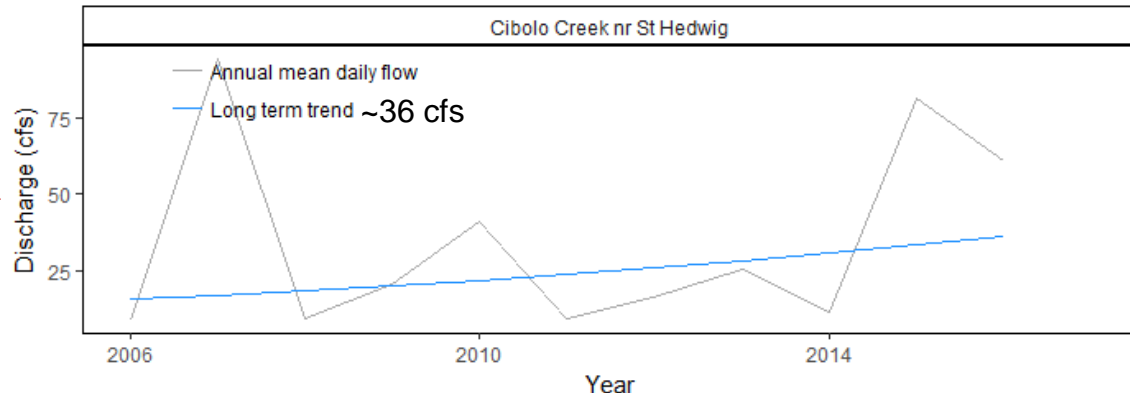
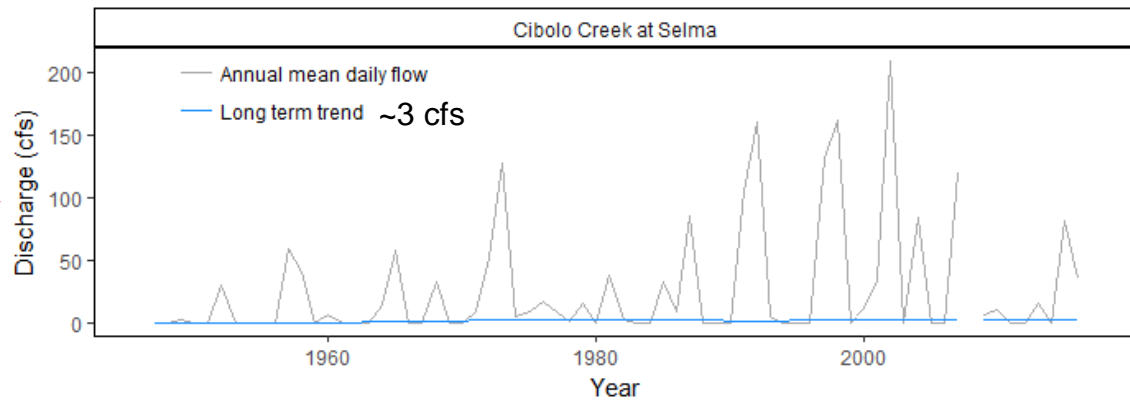
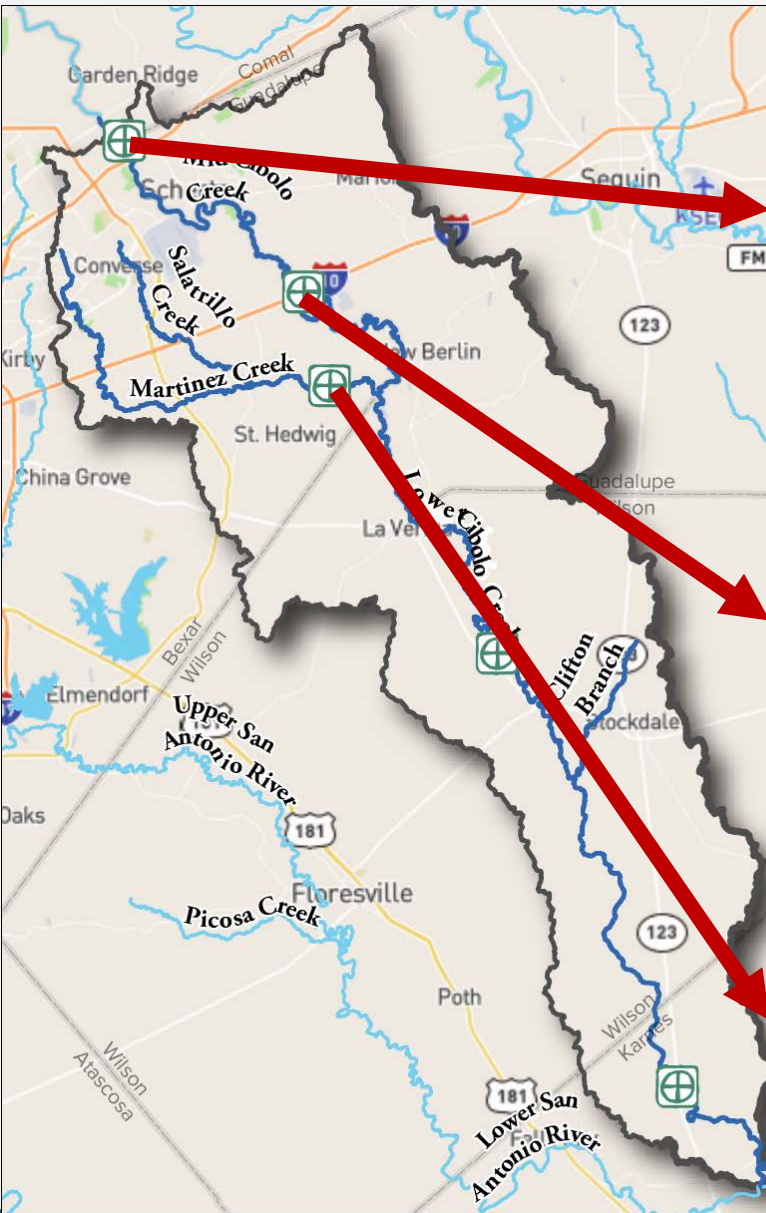
- Major Land Uses:

- Forest/Scrub/Herbaceous (159,360 ac)
- Pasture/Hay (108,800 ac)
- Developed (51,200 ac)
- Row Crop (41,600 ac)
- Other (10,240 ac)

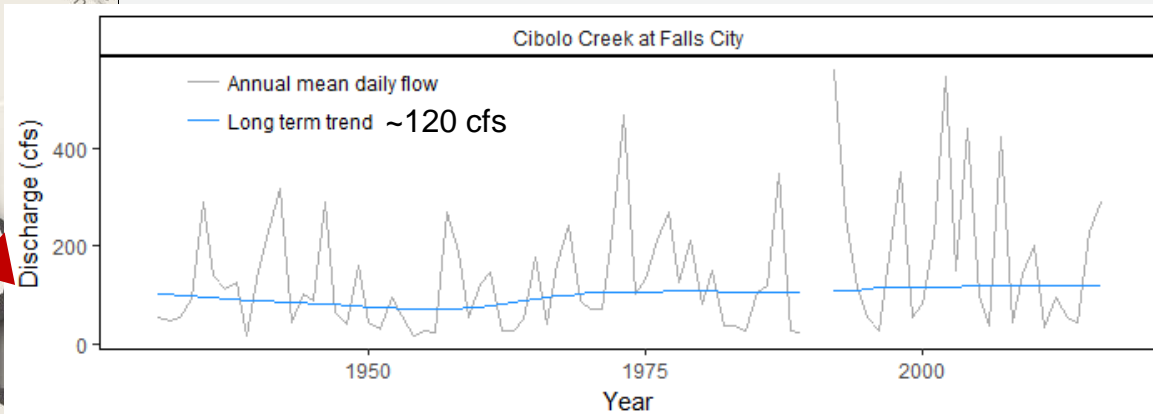
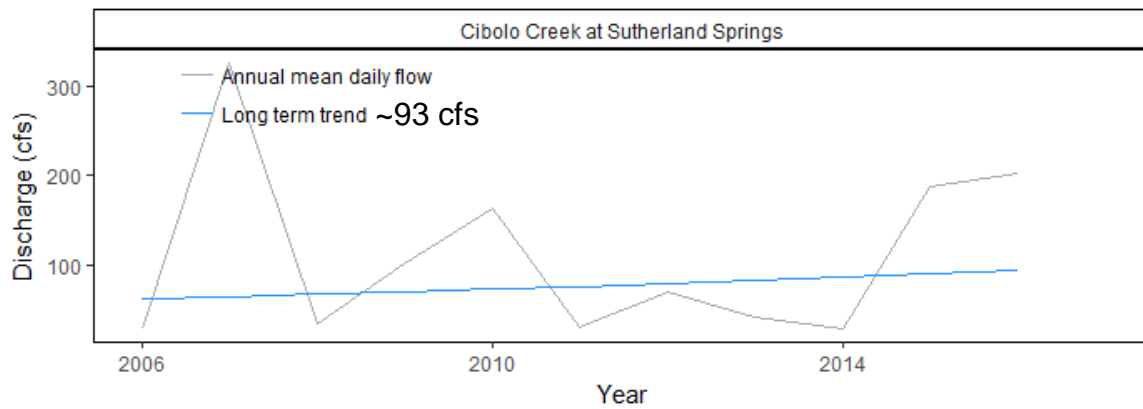
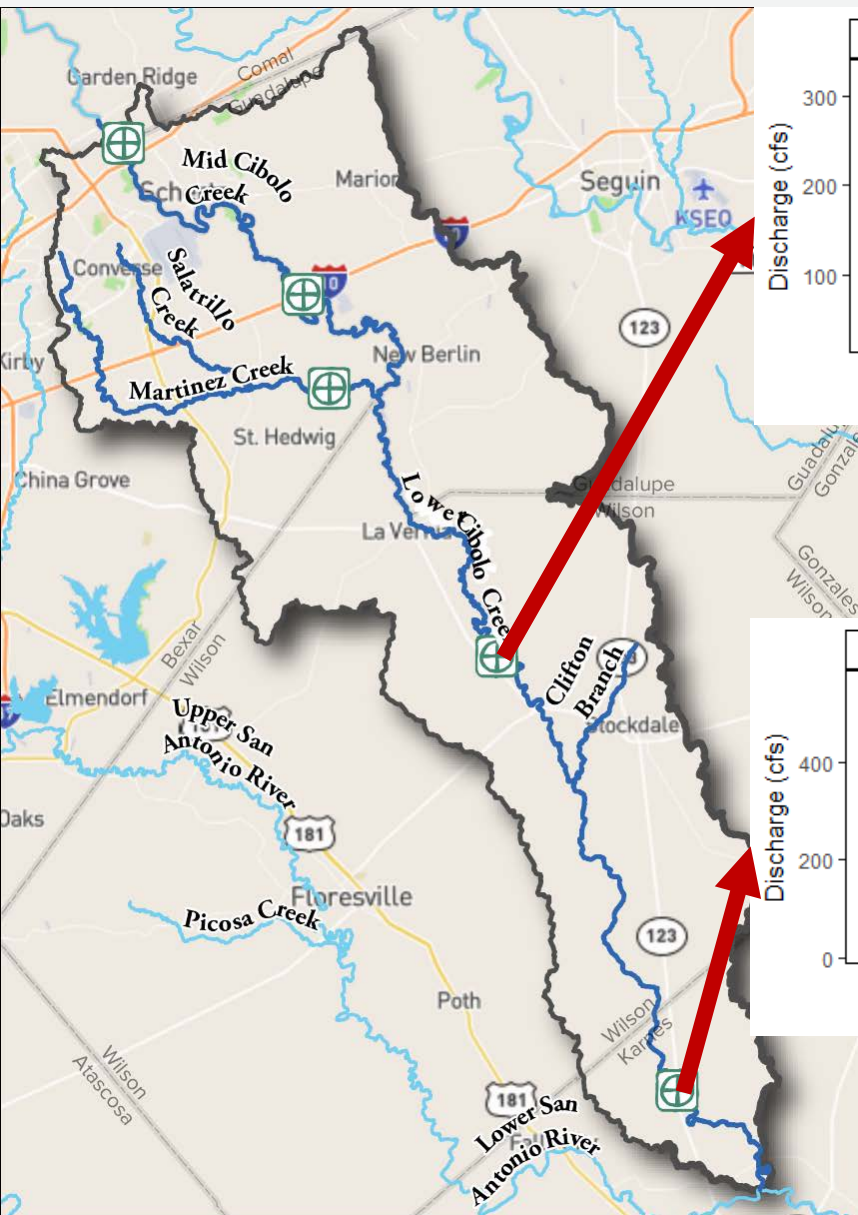


- Permitted Dischargers: 9 permitted active WWTPs, 18.715 MGD

Streamflow



Streamflow



WATER QUALITY

Water Quality Background

- Clean Water Act – The primary federal law governing water pollution
- US EPA administers the Clean Water Act
- Individual states set water quality standards and monitor water bodies to ensure standards are met
- Waterbodies that do not meet standards are listed in the 303(d) list

Types of Pollutant Sources

- Point sources – “end of pipe” discharge
 - Examples: Wastewater plant, industrial discharge
 - Regulated! Discharge permit required
- Non-point sources – comes from many diffuse sources
 - Regulated: municipal separate storm sewer systems, certain industrial sites
 - Non-regulated: All other runoff sources

Water Quality Standards

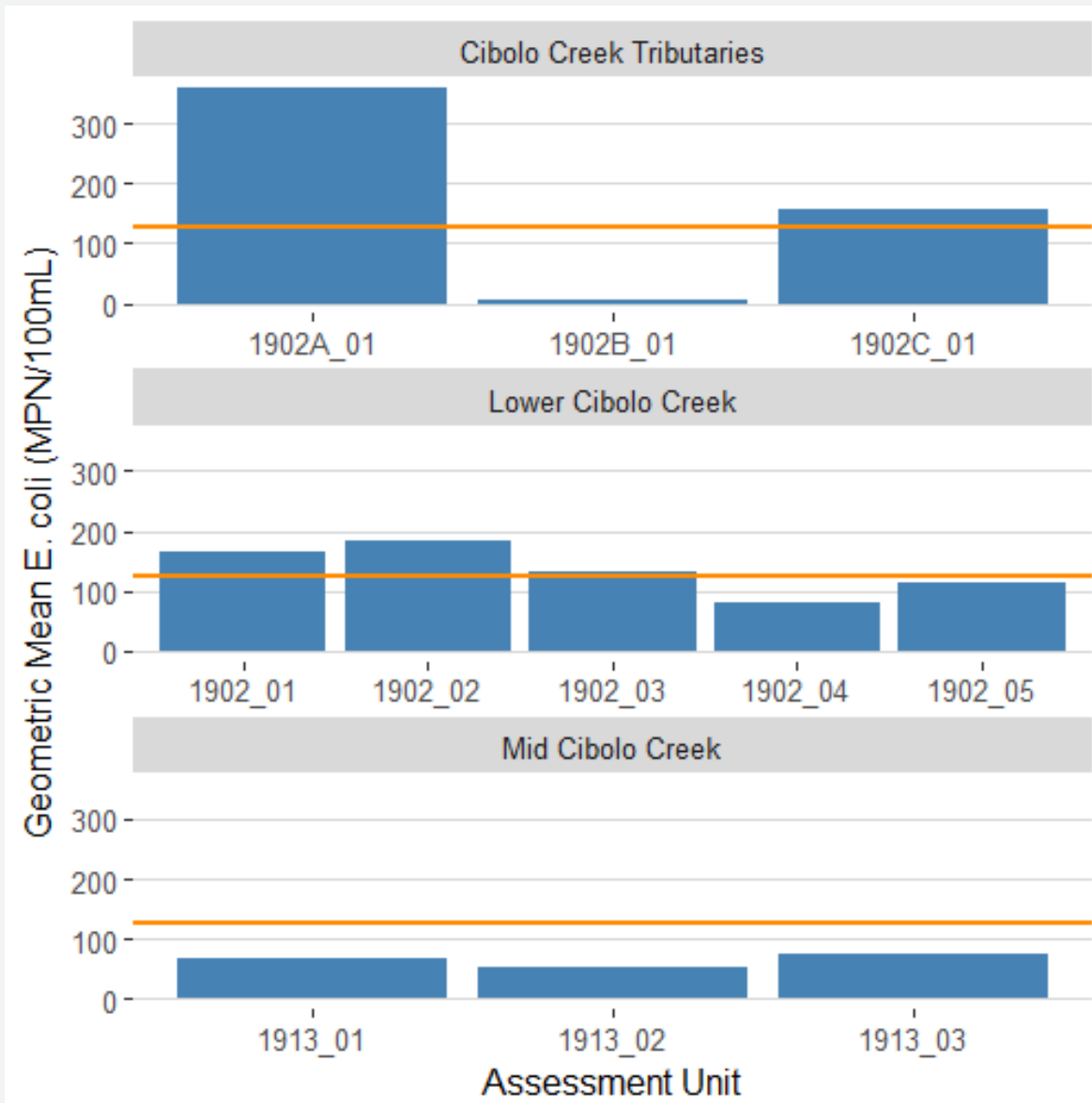
- State establishes water quality standards based on designated uses:
 - *E. coli* standards relate to Contact Recreation Use

Use Level	<i>E. coli</i> concentration
Primary Contact Recreation	126 cfu/100mL
Secondary Contact 1	630 cfu/100mL
Secondary Contact 2	1030 cfu/100mL
Noncontact	2060 cfu/100mL

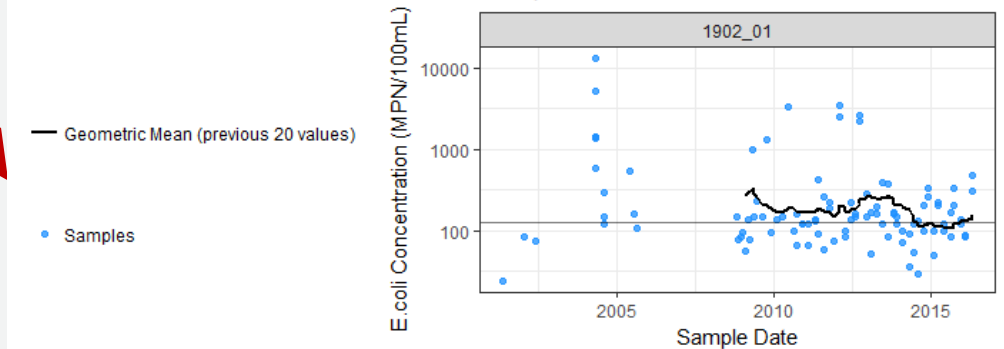
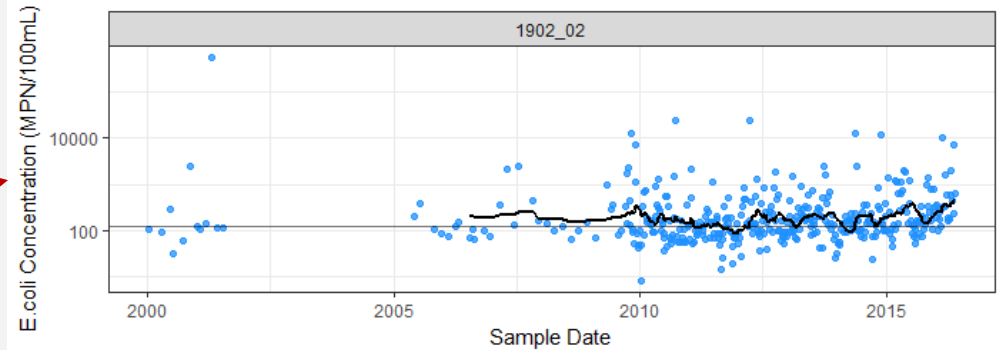
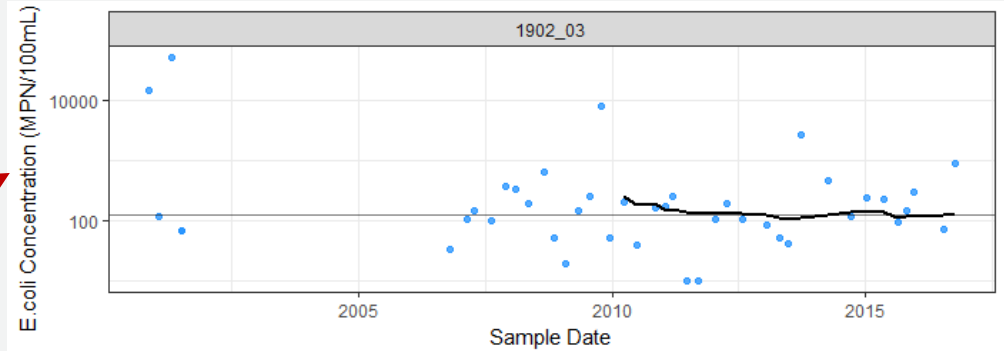
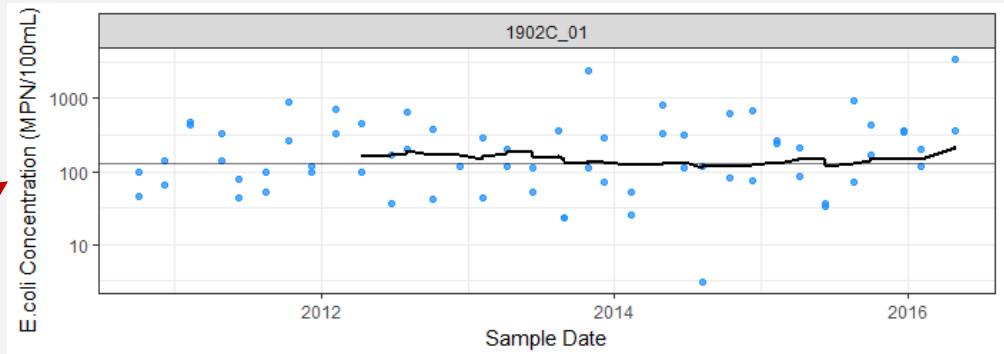
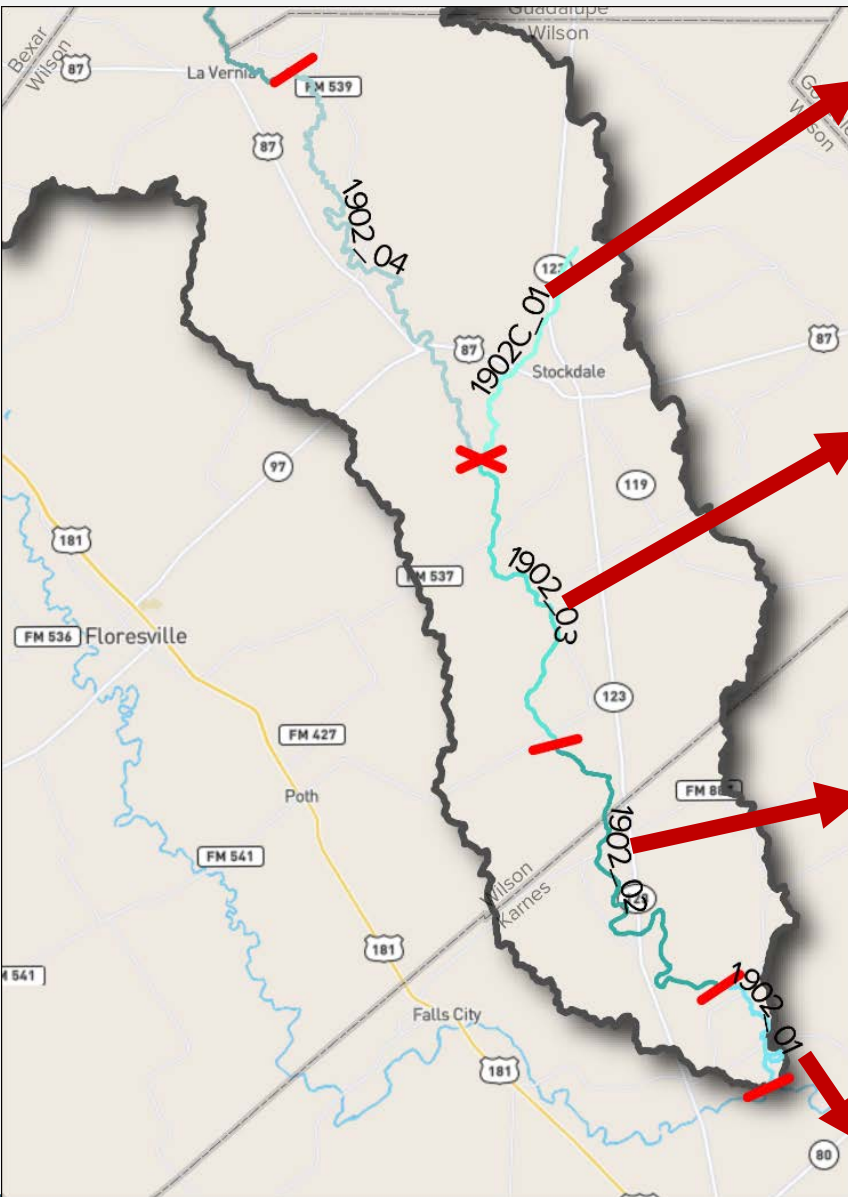
Bacteria

- **What is it?**
 - *Escherichia coli* are bacteria commonly found in the environment, foods, and intestines of people and animals
- **Why do we measure it?**
 - *E. coli* is used as an indicator of the presence of fecal matter from warm blooded critters and the potential for pathogen presence
- **How does it get in streams?**
 - Natural factors
 - Direct deposition from wildlife, runoff transporting wildlife manure to streams, bacteria re-suspended during high flows
 - Human factors
 - Runoff transporting bacteria from pet waste, livestock manure, failing OSSF/septic systems, sanitary sewer overflows
 - Direct loading from permitted dischargers

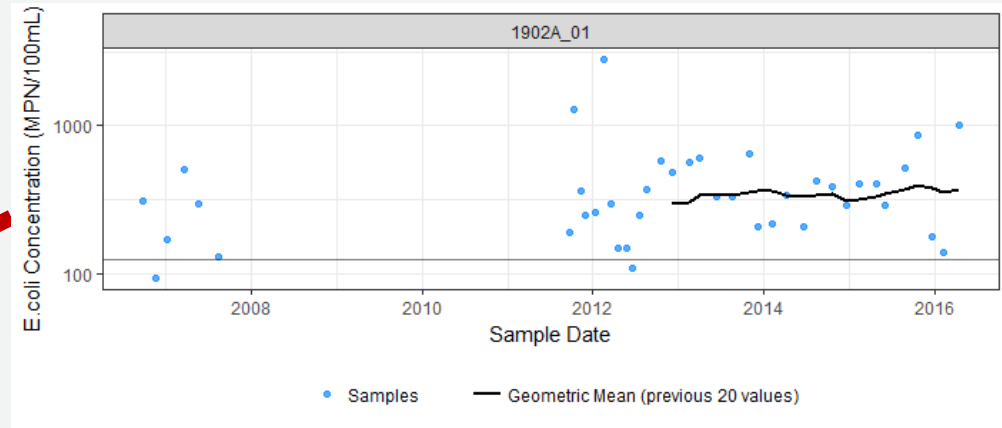
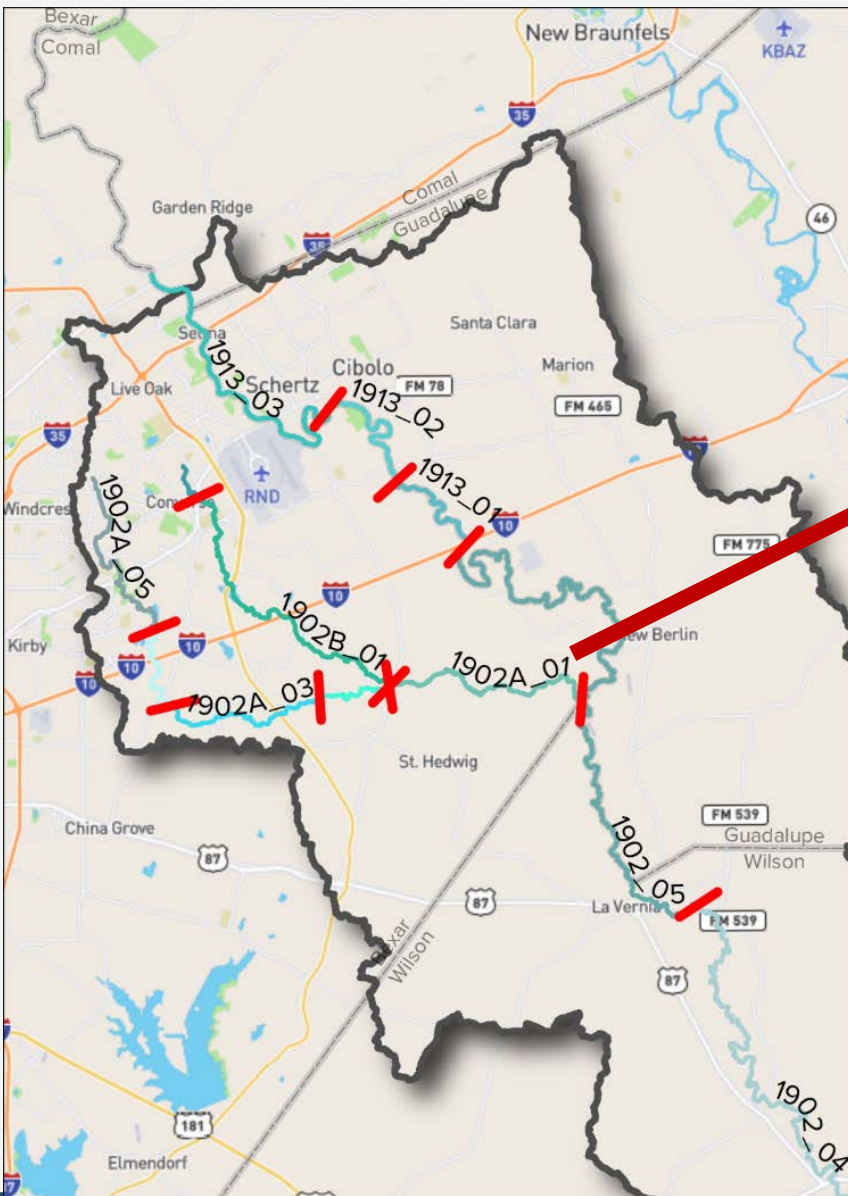
Bacteria



Bacteria



Bacteria



* Currently not on the 303(d) list, limited data through 2012

Water Quality Standards

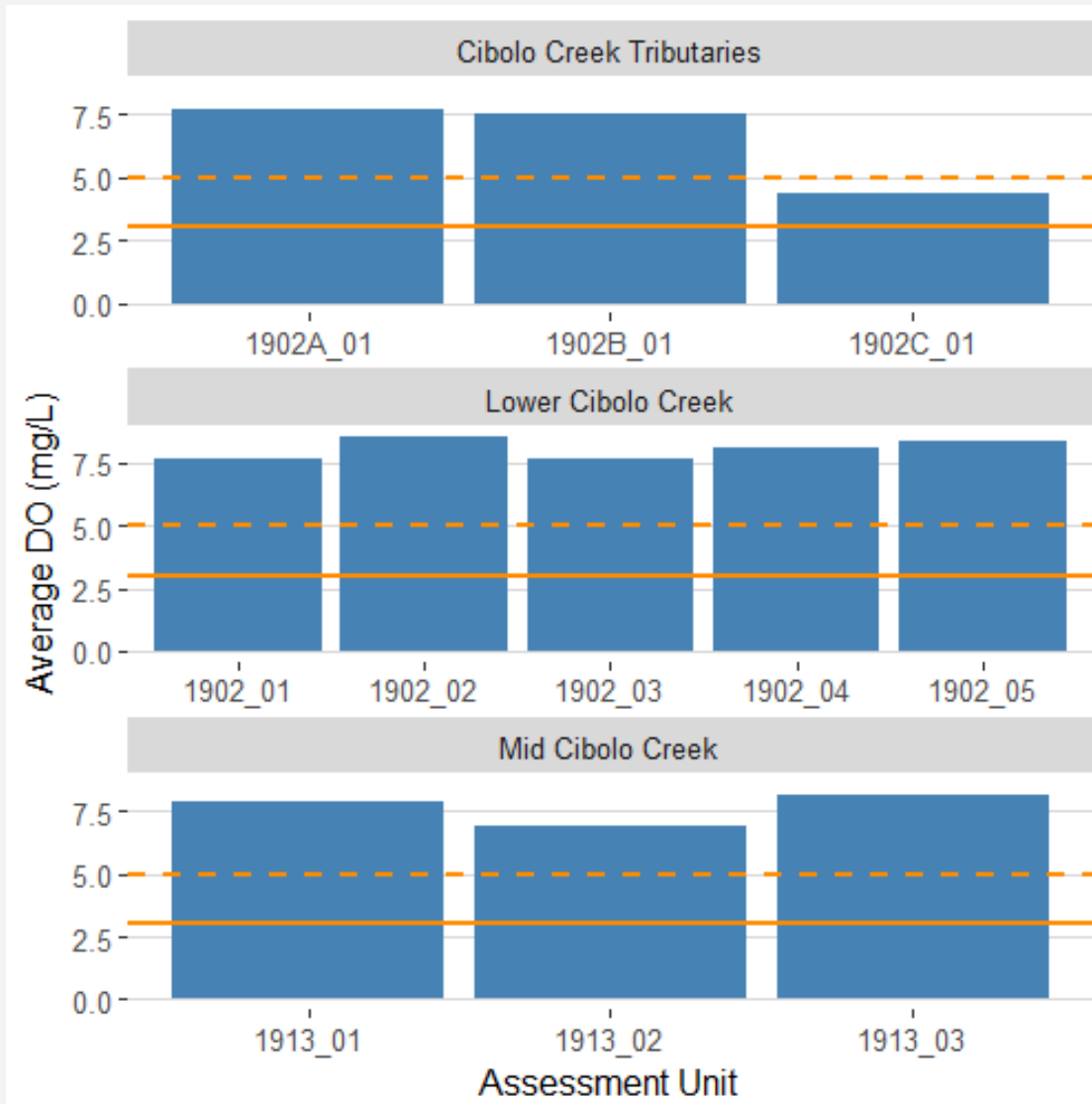
- State establishes water quality standards based on designated uses:
 - Dissolved oxygen standards relate to Aquatic Life Use

Aquatic Life Use Level	Dissolved Oxygen (Mean/Minimum)
Exceptional	6.0/4.0 mg/L
High	5.0/4.0 mg/L
Intermediate	4.0/3.0 mg/L
Limited	3.0/2.0 mg/L

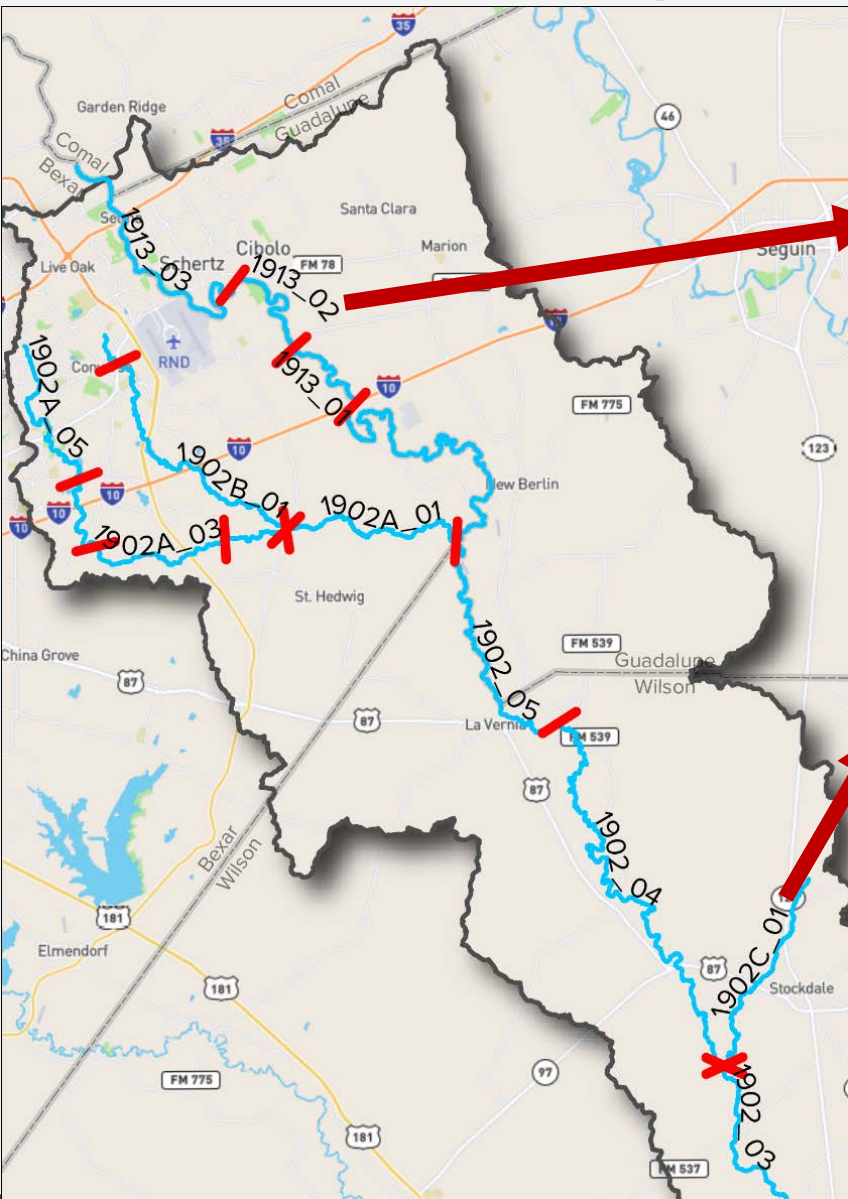
Dissolved Oxygen

- **What is it?**
 - A measure of how much oxygen is dissolved in the water.
- **Why do we measure it?**
 - Organisms living in the stream depend on normal dissolved oxygen levels to survive
- **How do Dissolved Oxygen concentrations degrade?**
 - Daily and seasonal changes due to temperature, sunlight, and vegetation
 - Decreased turbulence and shallower water depth due to low flow
 - Increased organic matter reaching waterbodies
 - Removal of riparian habitat, increased stream temps

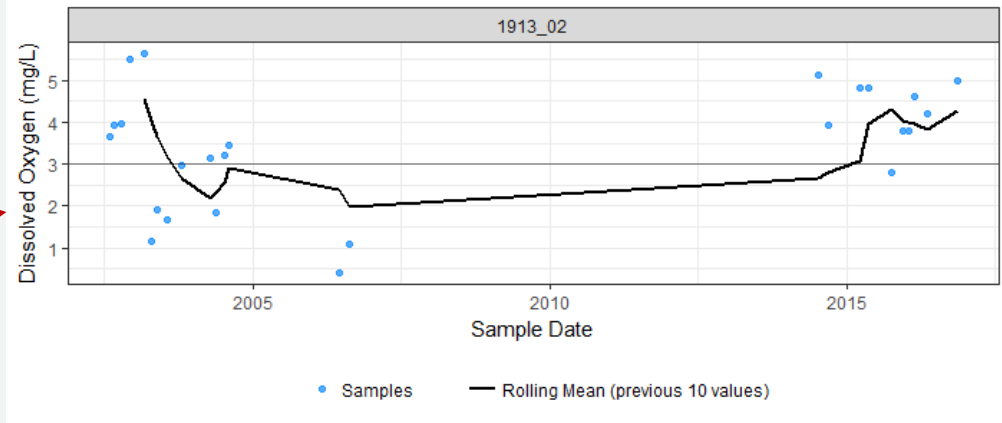
Dissolved Oxygen



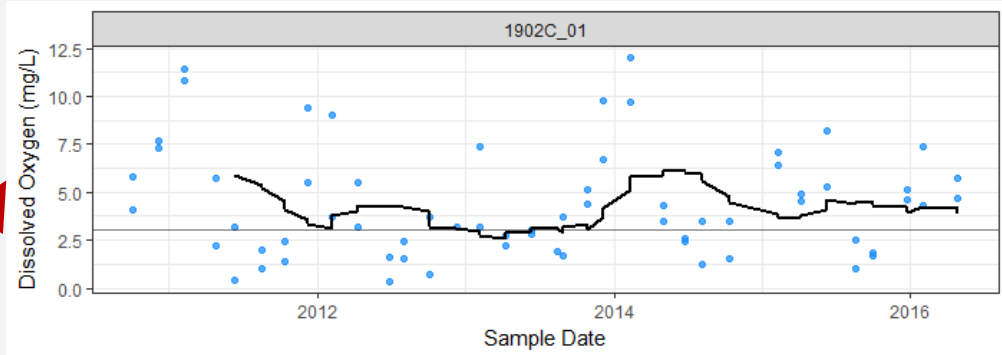
Dissolved Oxygen



24-hour minimum dissolved oxygen



Dissolved oxygen (grab sample)



Water Quality Standards

- Currently, no numeric criteria for nutrients in streams
- Screening level for total phosphorus, orthophosphorus, ammonia, nitrate nitrogen, and chlorophyll-a as preliminary indication of possible concerns
- Concern identified when level exceed >20% of time

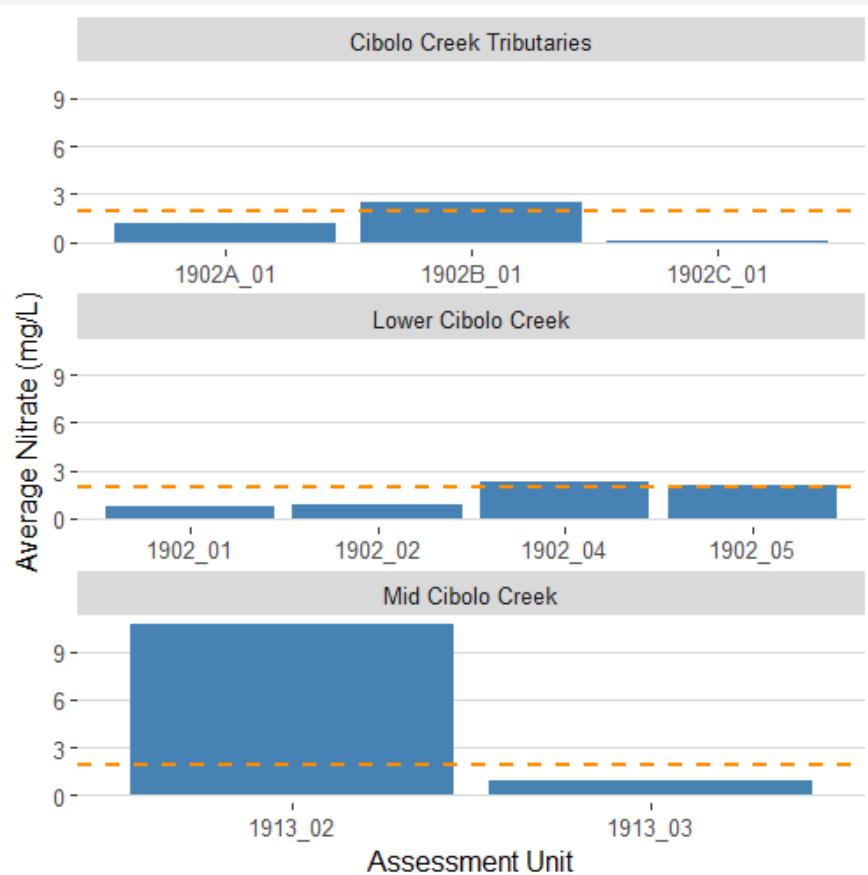
Parameter	Screening Level
Total Phosphorus	0.69 mg/L
Orthophosphorus	0.37 mg/L
Ammonia	0.33 mg/L
Nitrate	1.95 mg/L
Chlorophyll-a	14.10 µg/L

- https://www.tceq.texas.gov/assets/public/waterquality/swqm/assess/14txir/2014_guidance.pdf

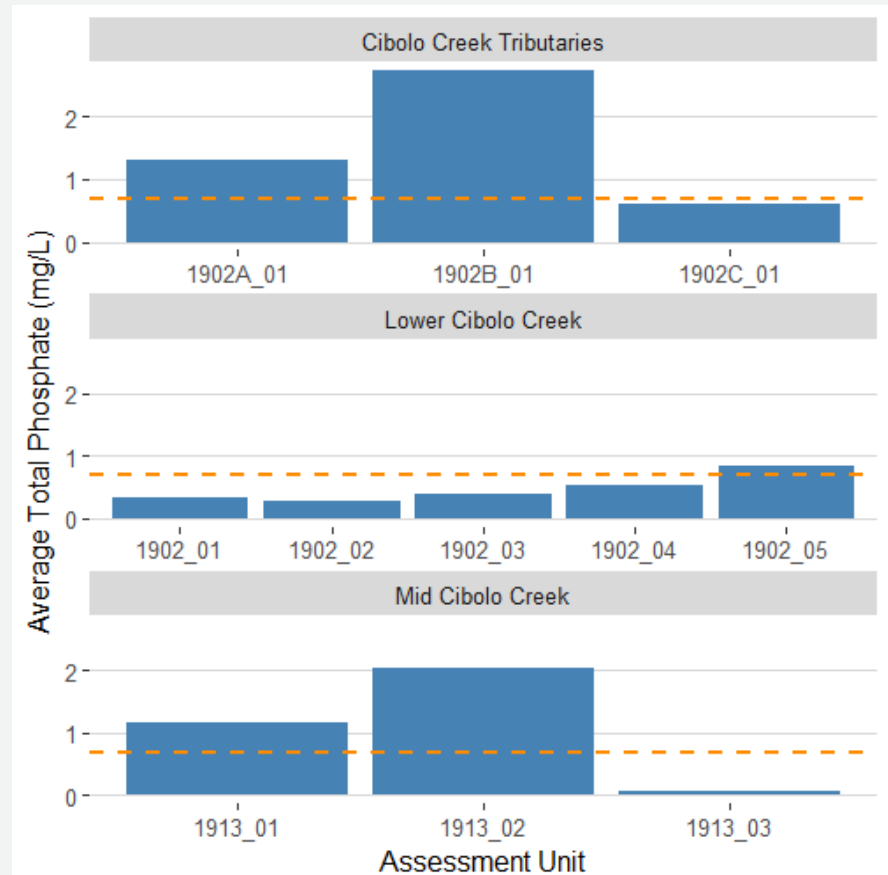
Nutrients

- **What is it?**
 - Plant food (Total Phosphorous and Nitrate)
- **Why do we measure it?**
 - Excessive nutrients can lead to plant/algae blooms
 - Decomposition of built up plant/algae matter can lead to decreased DO
- **How does it get there?**
 - Natural factors
 - Surface runoff, erosion, and springflows
 - Seasonal aquatic plant growth and die off
 - Human factors
 - Runoff carrying nutrients associated with fertilizers, manure, faulty OSSFs
 - Direct loadings from permitted dischargers

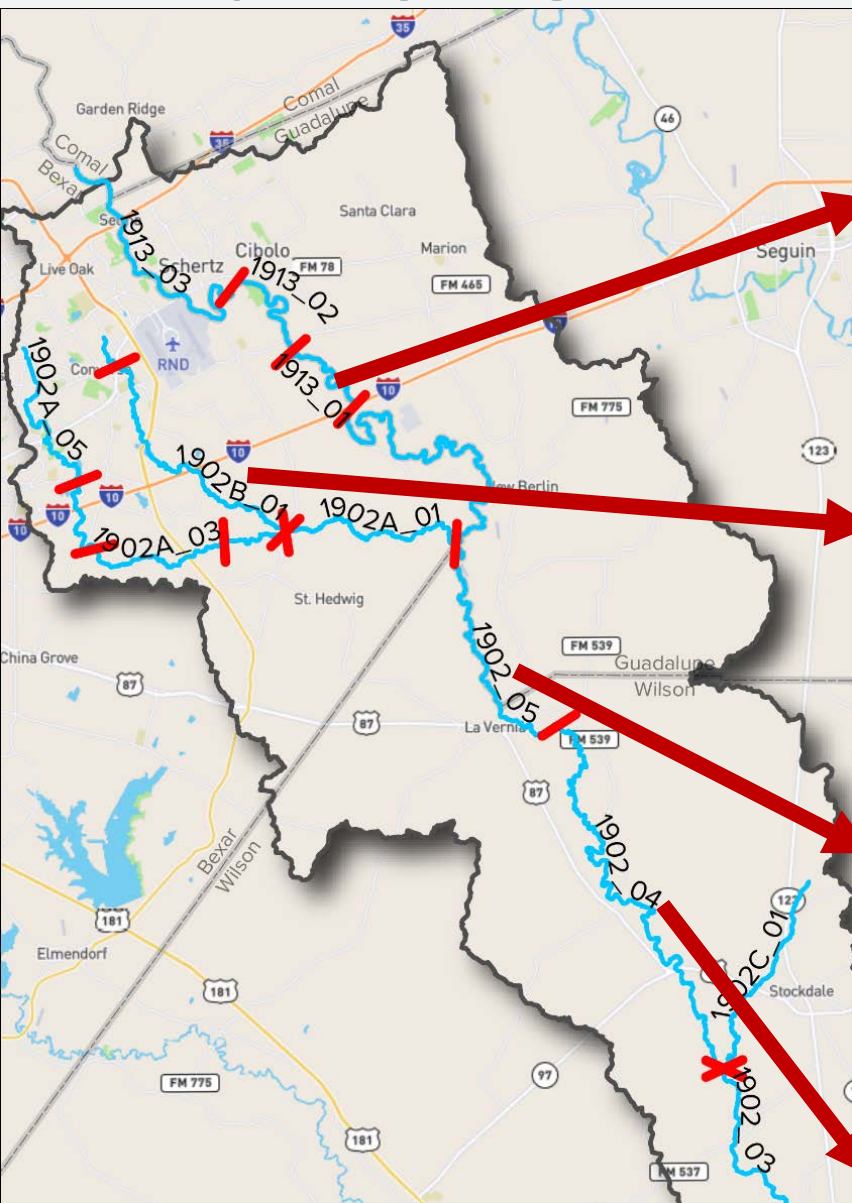
Nitrate



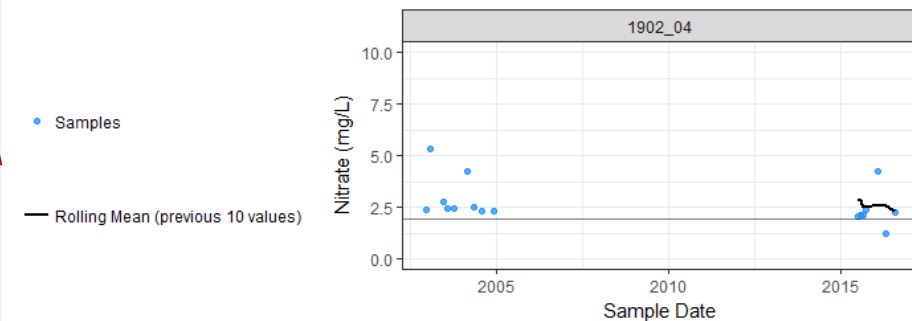
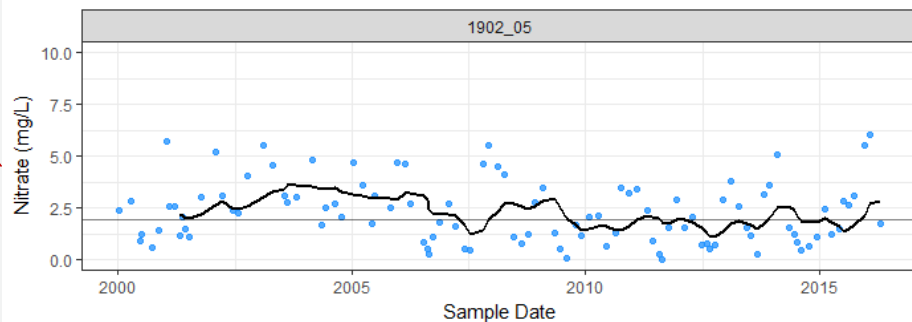
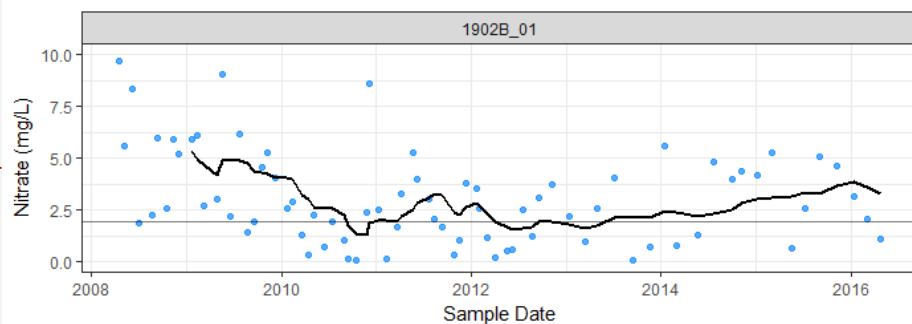
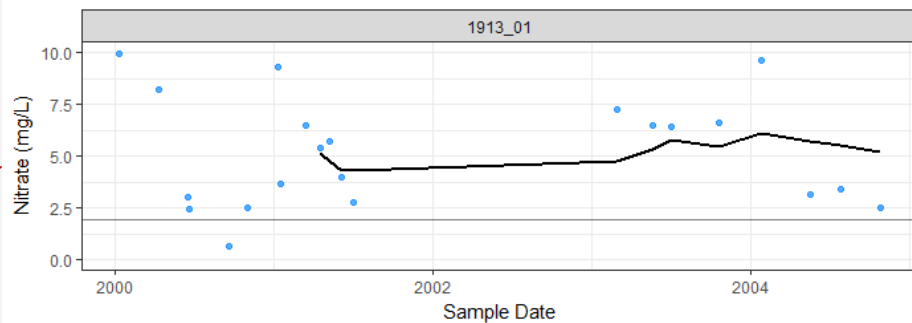
Total Phosphorous



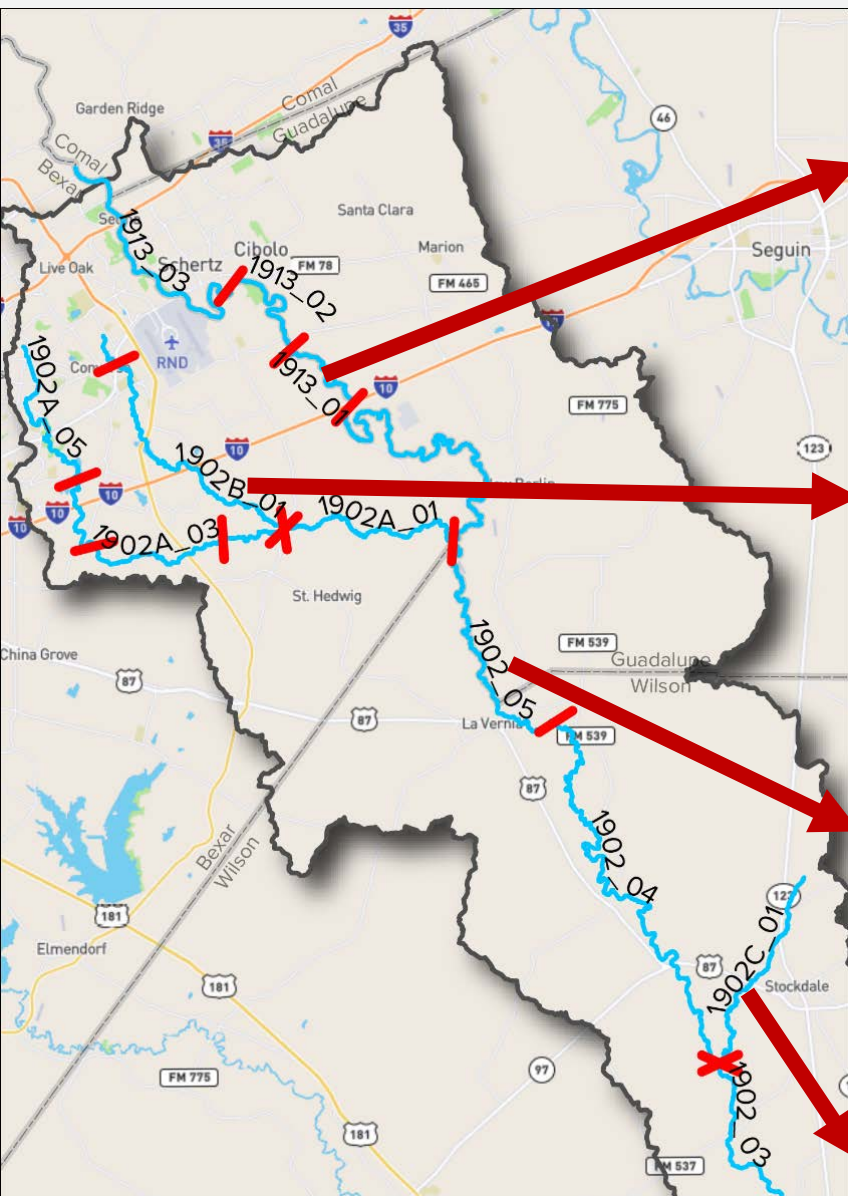
Nutrients



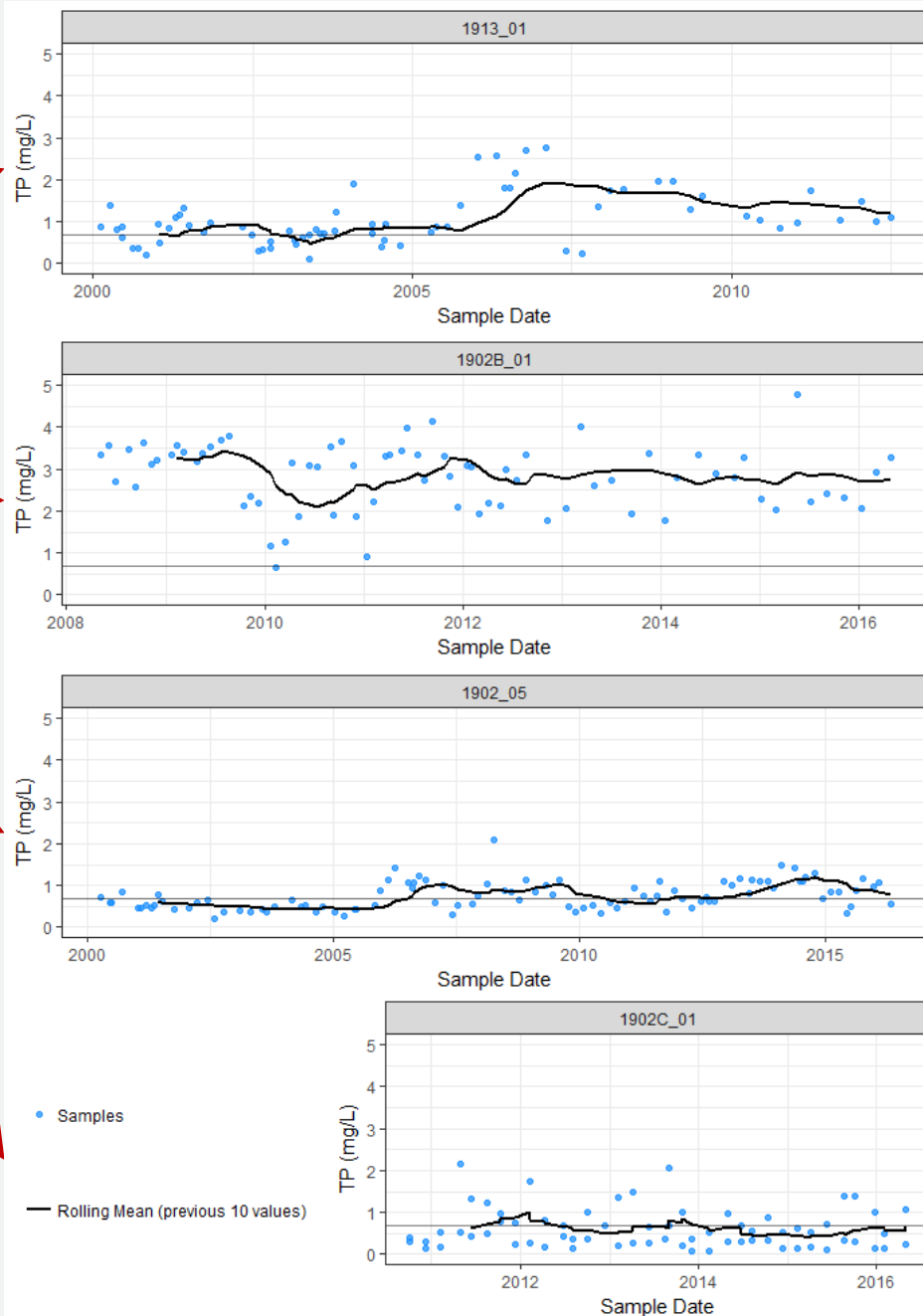
Nitrate



Nutrients



Total Phosphorous



Summary of Water Quality Conditions

- Ongoing primary contact recreation impairment in Lower Cibolo & Clifton Branch due to *E. coli* bacteria
- Concern in Martinez Creek due to *E. coli* bacteria
- Dissolved Oxygen impairment in Clifton Branch, improving DO in Mid Cibolo Creek
- Nutrient concerns based on TCEQ screening levels in the Mid Cibolo, portion of Lower Cibolo, Martinez Creek, and Salatrillo Creek

EXTRA SLIDES

***from 2014 Texas Integrated Report on Surface Water Quality
based on data from 2005-2012**

Impairments

Concerns	
Parameter	Assessment Unit
Dissolved Oxygen (Grab)	1902C_01
Nitrate	1902_04; 1902_05
Total Phosphorous	1902_05; 1902C_01

Current Impairments and Concerns

**from 2014 Texas Integrated Report of Surface Water Quality*
based on data from 2005-2012

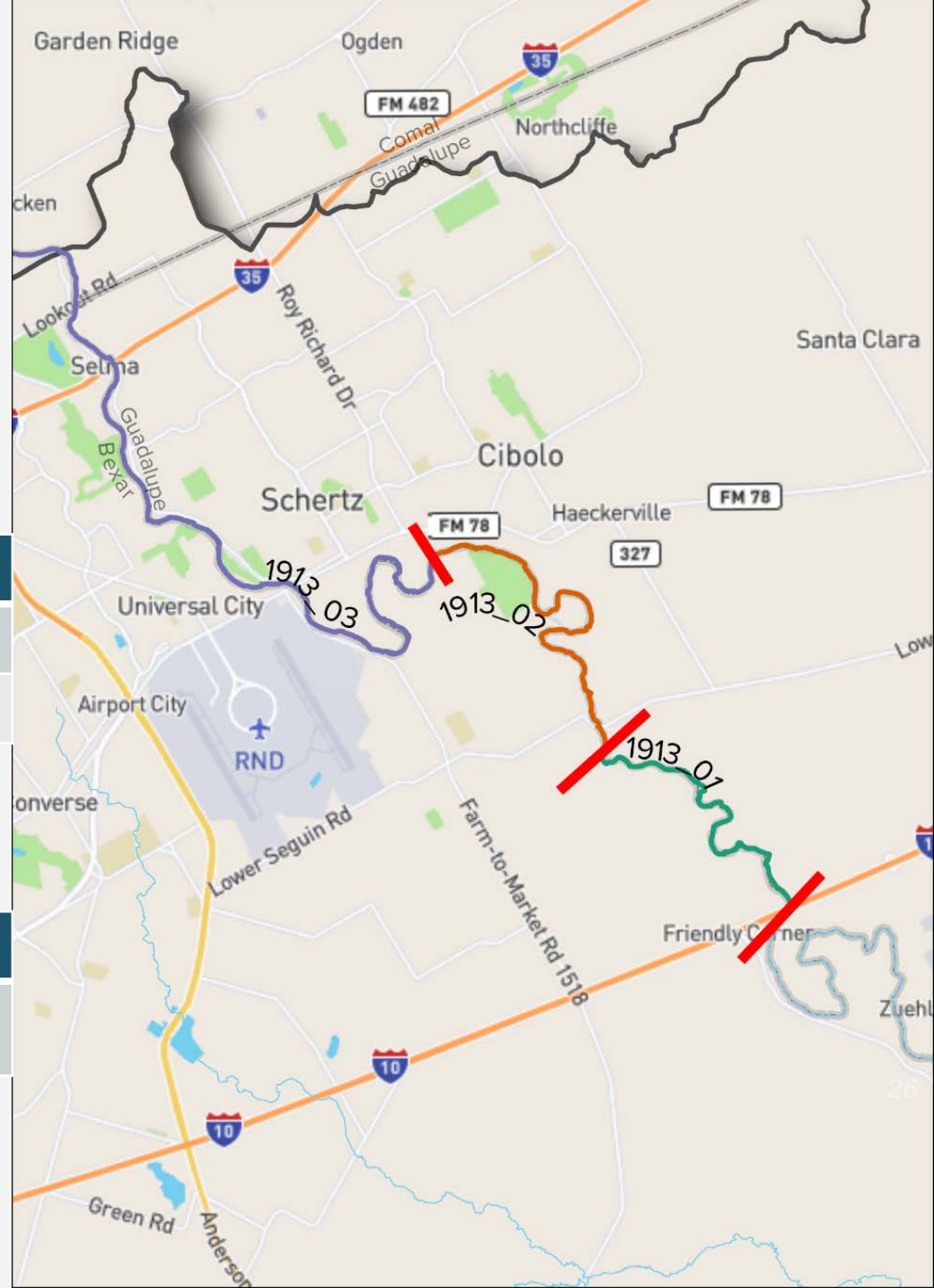
Mid Cibolo Creek

Concerns

Parameter	Assessment Unit
Nitrate	1913_01; 1913_02
Total Phosphorous	1913_01; 1913_02

Category 4b

Parameter	Assessment Unit
DO (24-hr Minimum)	1913_02



Current Impairments and Concerns

**from 2014 Texas Integrated Report of Surface Water Quality based on data from 2005-2012*

Martinez and Salatrillo Creeks

Concerns

Parameter	Assessment Unit
Bacteria	1902A_01*; 1902A_03*; 1902A_04*
Nitrate	1902A_03*; 1902A_04*; 1902B_01
Total Phosphorus	1902A_01; 1902A_03*; 1902A_04*; 1902B_01

