

FY2015 Basin Highlights Report & FY2016 Coordinated Monitoring



CANADIAN AND RED RIVER BASINS ADVISORY COMMITTEE MEETING



MARCH 17, 2015 – AMARILLO, TEXAS

**Jose Martinez
Environmental Technician**

Presentation Overview



- **Water Quality Parameters**
- **Water Quality Monitoring in the Canadian River Basin**
- **Water Quality Monitoring in the Red River Basin**
- **Recreational Use Attainability Analysis**
- **Future Monitoring Goals for FY2016**

Water Quality Parameters



Solids/Dissolved Solids

Parameter	Cause / Source	Impact
TSS (Total Suspended Solids)	Sources may include point and nonpoint sources. The most common source is soil erosion. Land disturbance in riparian areas typically increases TSS levels.	Increased turbidity can reduce the amount of light to plants which decreases the oxygen production.
TDS (Total Dissolved Solids)	Sources of TDS include weathering and dissolution of rocks and soils, agricultural and stormwater runoff and point source discharges	TDS is a quantification of the materials dissolved in water, typically chloride and sulfate anions which form salts.
Chloride	Natural weathering and leaching of sedimentary rocks, soils, and salt. Other sources include oil exploration and storage, sewage and industrial discharges.	Chloride, a salt, is an essential element for maintaining normal physiological functions in all organisms.
Sulfate	Soluble sulfate occurs in almost all natural waters. It is often dissolved into waters from rocks and soils containing gypsum, iron sulfides, and other sulfur compounds.	Sulfate can affect taste and odor of drinking water.

Water Quality Parameters



Nutrients

Parameter	Cause / Source	Impact
Ammonia	Ammonia is excreted by animals and is produced during the decomposition of plants and animals. Produced by the breakdown of compounds containing organic nitrogen.	Elevated ammonia levels are a good indicator of organic pollution and can adversely affect fish and invertebrate reproductive capacity and stunt growth.
Nitrate	Nitrates are used as fertilizers to supply a nitrogen source for plant growth.	Nitrate additions to surface waters can lead to excessive growth of aquatic plants.
Total Phosphorus	An essential nutrient, required for growth of organisms. Sources include wastewater, agricultural drainage, and certain industrial wastes.	Excessive amounts of total phosphorus increase primary productivity and algal growth. It also contributes to the eutrophication of lakes.
Chlorophyll-a	Chlorophyll a is a photosynthetic pigment, found in all green plants and algae. The concentration of chlorophyll-a is used to estimate phytoplankton biomass in surface water.	In the presence of sunlight and abundant food sources, photosynthesis increases. Excessive Chlorophyll-a can cause extreme cyclical swings in DO and pH.

Water Quality Parameters



Bacteria

Parameter	Cause / Source	Impact
E. coli	Bacteria present in warm bodied animals. It may come from poorly maintained or ineffective septic systems, overflow of domestic wastewater plants and/or runoff from feedlots.	The primary indicator bacteria used to determine if a fresh water body is suitable for contact recreation. Typically not harmful, but their presence is an indicator of fecal matter contamination which may contain other pathogens.
Enterococcus	Bacteria present in warm bodied animals.	Typically not harmful, but their presence is an indicator of fecal matter contamination which may contain other pathogens. This bacteria has shown to be more hearty in waterbodies with high conductivity and salinity.

Water Quality Parameters



Aquatic Health

Parameter	Cause / Source	Impact
Dissolved Oxygen	Excessive amounts of organic material and algal blooms may cause DO levels to fluctuate. The resulting low levels of DO can stress or kill aquatic life.	Dissolved oxygen is vital to fish and other aquatic life. It is the most frequently used indicator of a water body's ability to support aquatic life.
pH	Industrial and wastewater discharges, runoff, accidental spills, and non point sources. Human activity that causes increases in organic matter and bacteria, and over abundant algae.	Most aquatic organisms function best in a pH range of 6.0 to 9.0. Higher alkalinity levels in surface waters will buffer acid rain and other acid wastes and prevent pH changes that are harmful to aquatic life.
Temperature	Natural changes in water temperature occur seasonally. Changes can also be caused by alteration of the riparian zone, drought, or as a result of industrial uses such as electrical generation.	Colder water typically contains higher amounts of DO. As temperatures fluctuate, there is a direct effect on dissolved oxygen levels.

Canadian Reach I



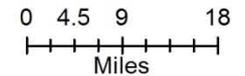
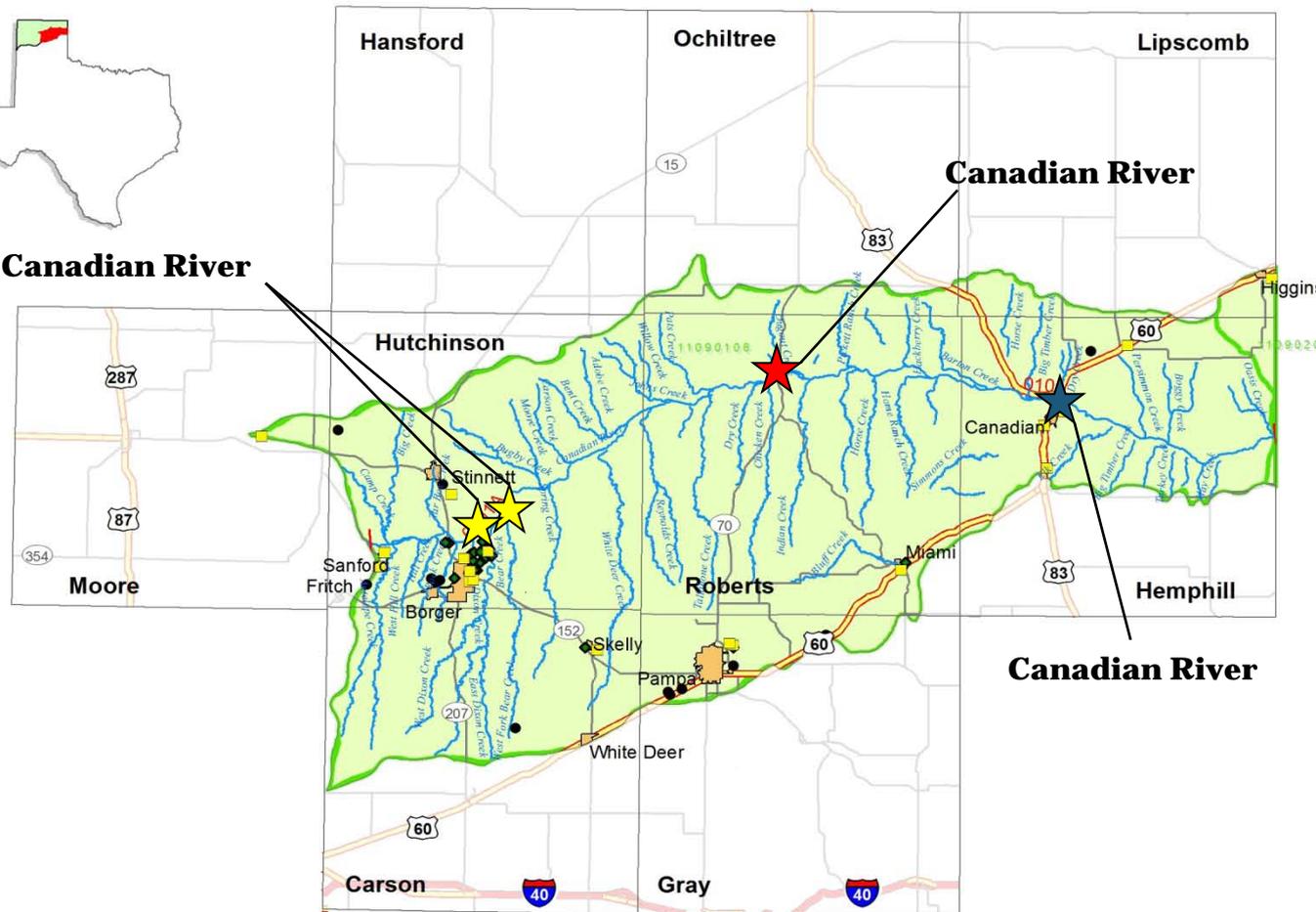
- Canadian River Below Lake Meredith (0101)
 - Bacteria impairment
 - Chlorophyll-*a*, ammonia, and depressed DO concerns
- Dixon Creek (0101A)
- Rock Creek (0101B)
- White Deer Creek (0101C)



Canadian River Basin Reach I



Canadian River



Legend

- MSW / Landfill
- Wastewater Outfall
- CAFO
- Segment Boundary
- 0101 Segment ID
- Hydrology
- Urbanized Area
- County Boundary
- HUA Boundary
- Canadian Reach I

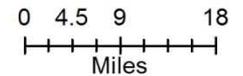
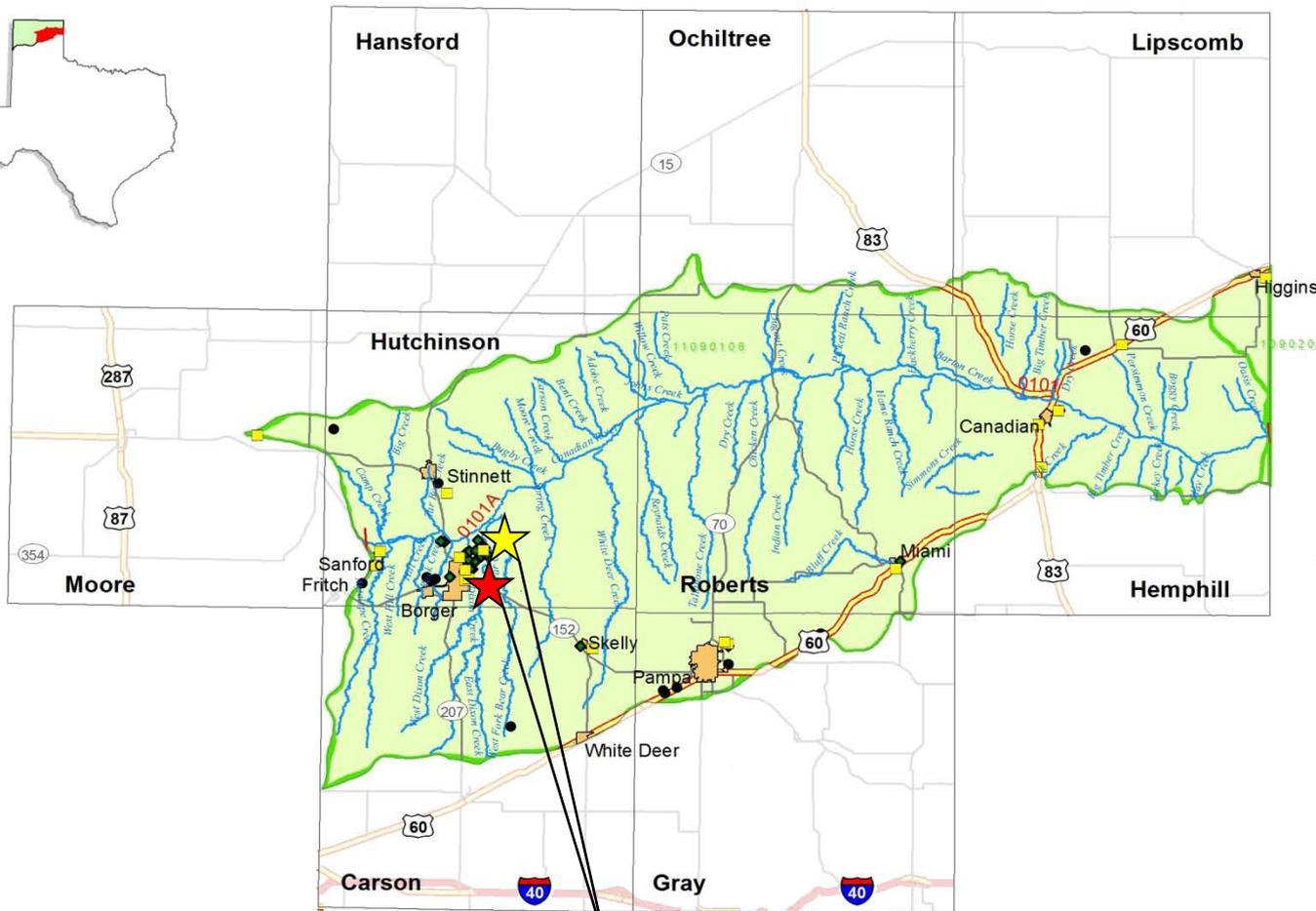
Canadian Reach I



- Canadian River Below Lake Meredith (0101)
- Dixon Creek (0101A)
 - Bacteria, depressed DO, and selenium impairments
 - Chlorophyll-*a* and nitrate concerns
 - RUAA has been completed and submitted to TCEQ
- Rock Creek (0101B)
- White Deer Creek (0101C)



Canadian River Basin Reach I



Legend

- MSW / Landfill
- Wastewater Outfall
- CAFO
- Segment Boundary
- 0101 Segment ID
- Hydrology
- Urbanized Area
- County Boundary
- HUA Boundary
- Canadian Reach I

Dixon Creek

Dixon Creek at SH 152



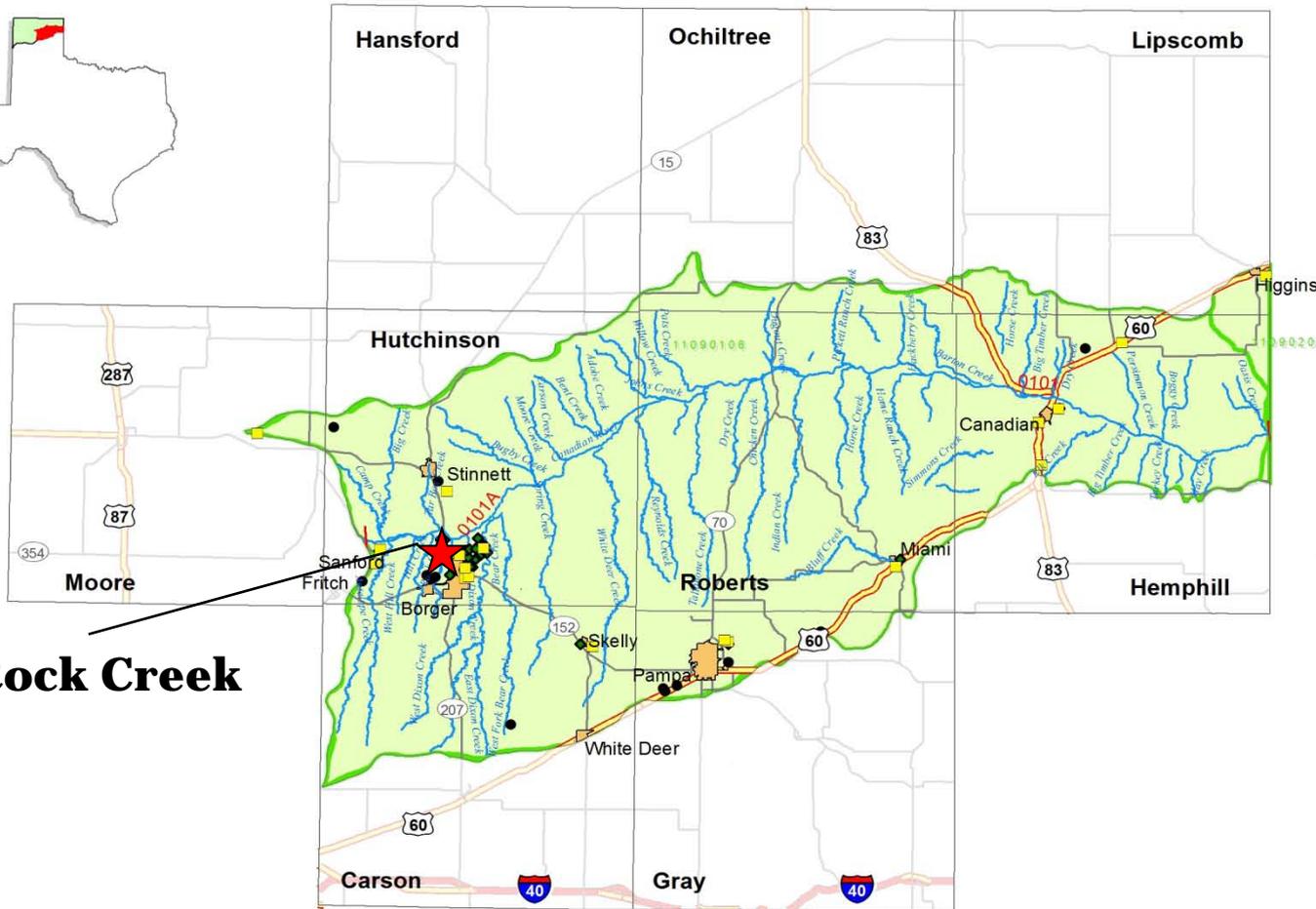
Canadian Reach I



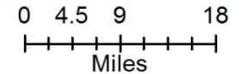
- Canadian River Below Lake Meredith (0101)
- Dixon Creek (0101A)
- Rock Creek (0101B)
 - No impairments
 - Nitrate, **chlorophyll-a**, total phosphorus concerns
- White Deer Creek (0101C)



Canadian River Basin Reach I



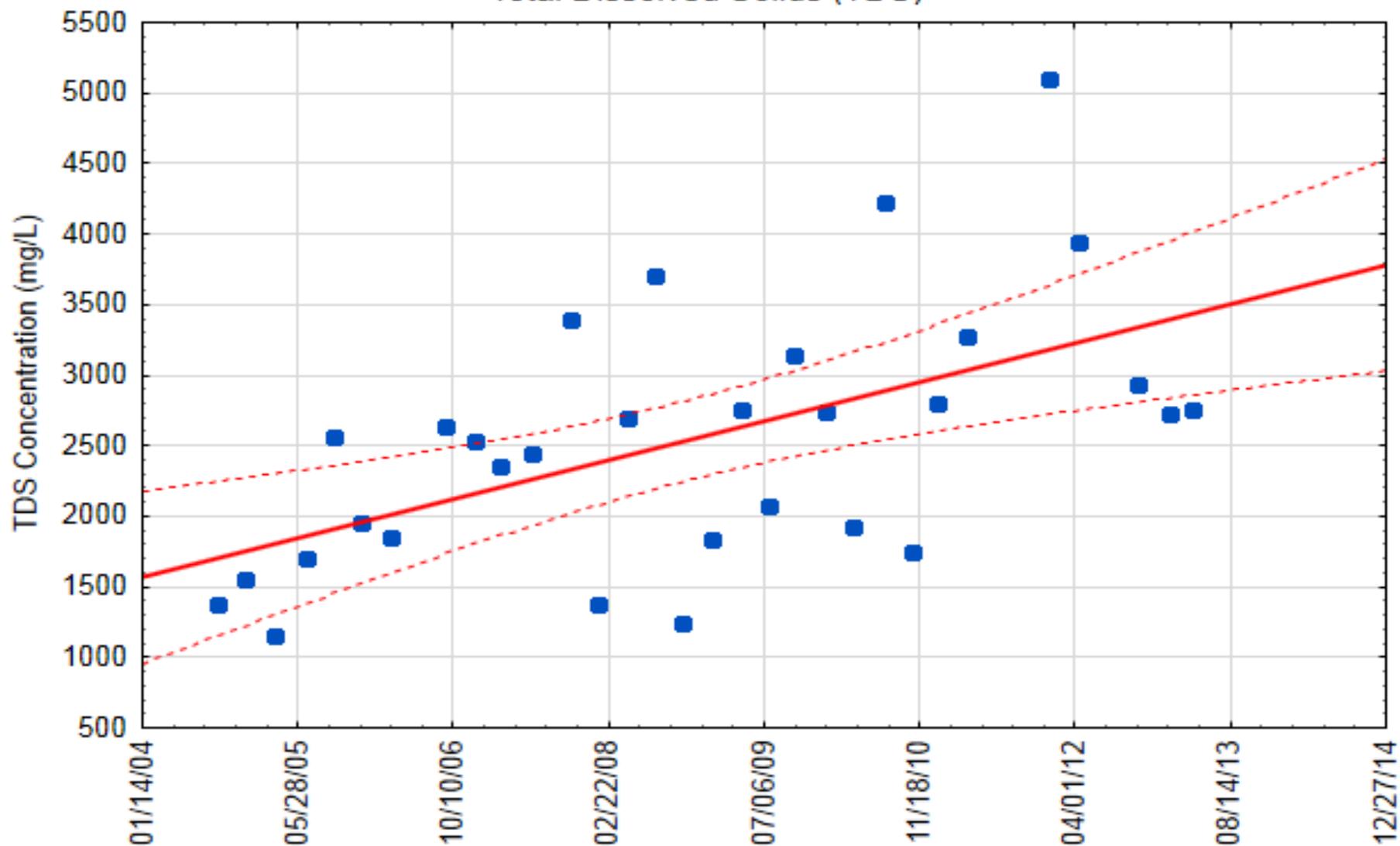
Rock Creek



Legend

- MSW / Landfill
- Wastewater Outfall
- CAFO
- Segment Boundary
- 0101 Segment ID
- Hydrology
- Urbanized Area
- County Boundary
- HUA Boundary
- Canadian Reach I

Rock Creek
Segment 0101B_01
Total Dissolved Solids (TDS)



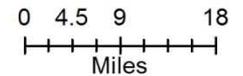
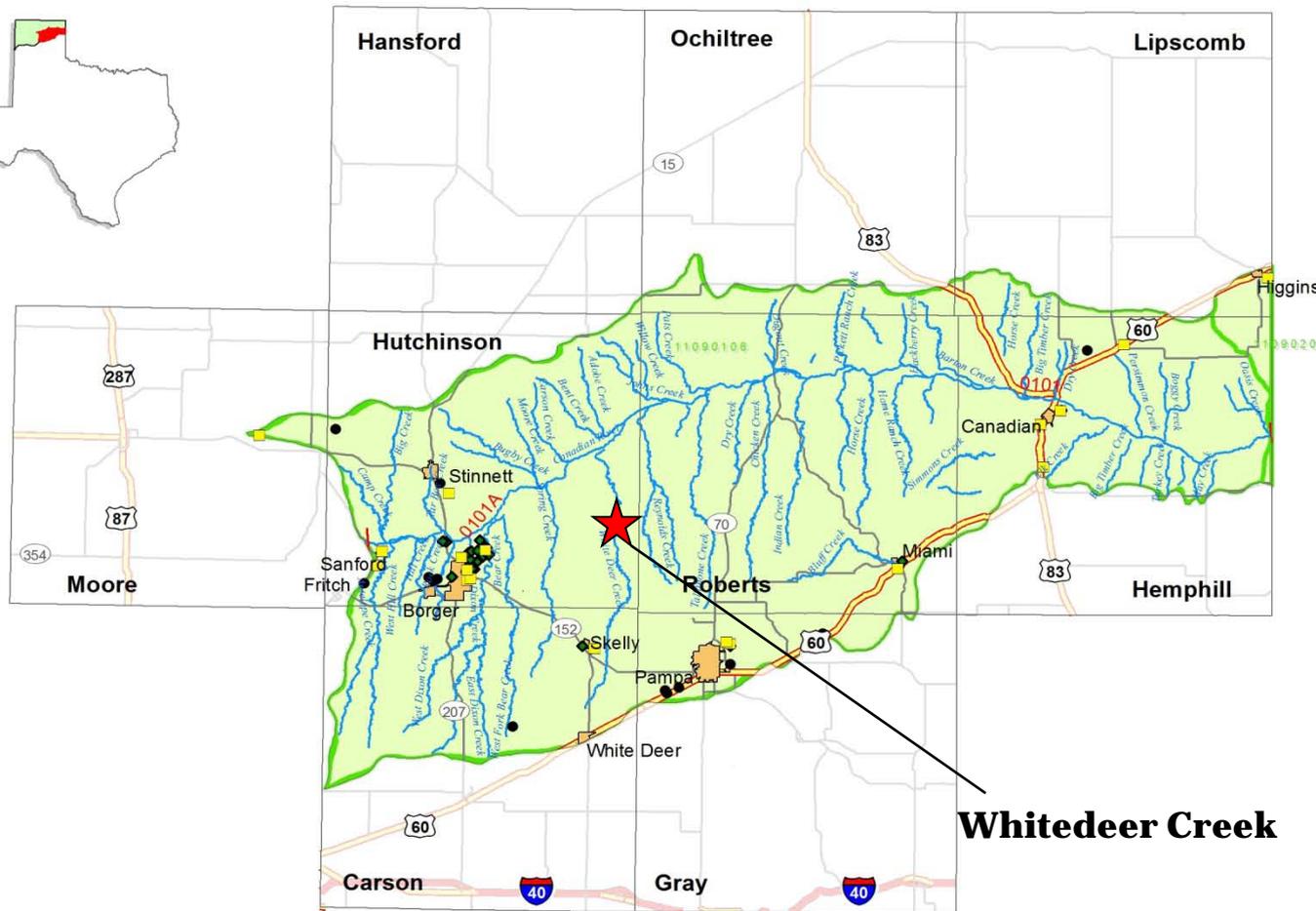
Canadian Reach I



- Canadian River Below Lake Meredith (0101)
- Dixon Creek (0101A)
- Rock Creek (0101B)
- White Deer Creek (0101C)
 - **No impairments or concerns**



Canadian River Basin Reach I



Legend

- MSW / Landfill
- Wastewater Outfall
- CAFO
- Segment Boundary
- 0101 Segment ID
- Hydrology
- Urbanized Area
- County Boundary
- HUA Boundary
- Canadian Reach I

Whitedeer Creek

White Deer Creek at Jeep Crossing



Canadian Reach II



- Lake Meredith (0102)
 - Mercury in edible fish tissue, chloride, sulfate, TDS impairment
 - No concerns
- Canadian River Above Lake Meredith (0103)
- Big Blue Creek (0102A)
- East Amarillo Creek (0103A)
- Unnamed Tributary to West Amarillo Creek (0103C)

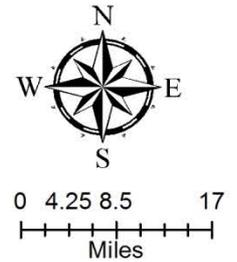
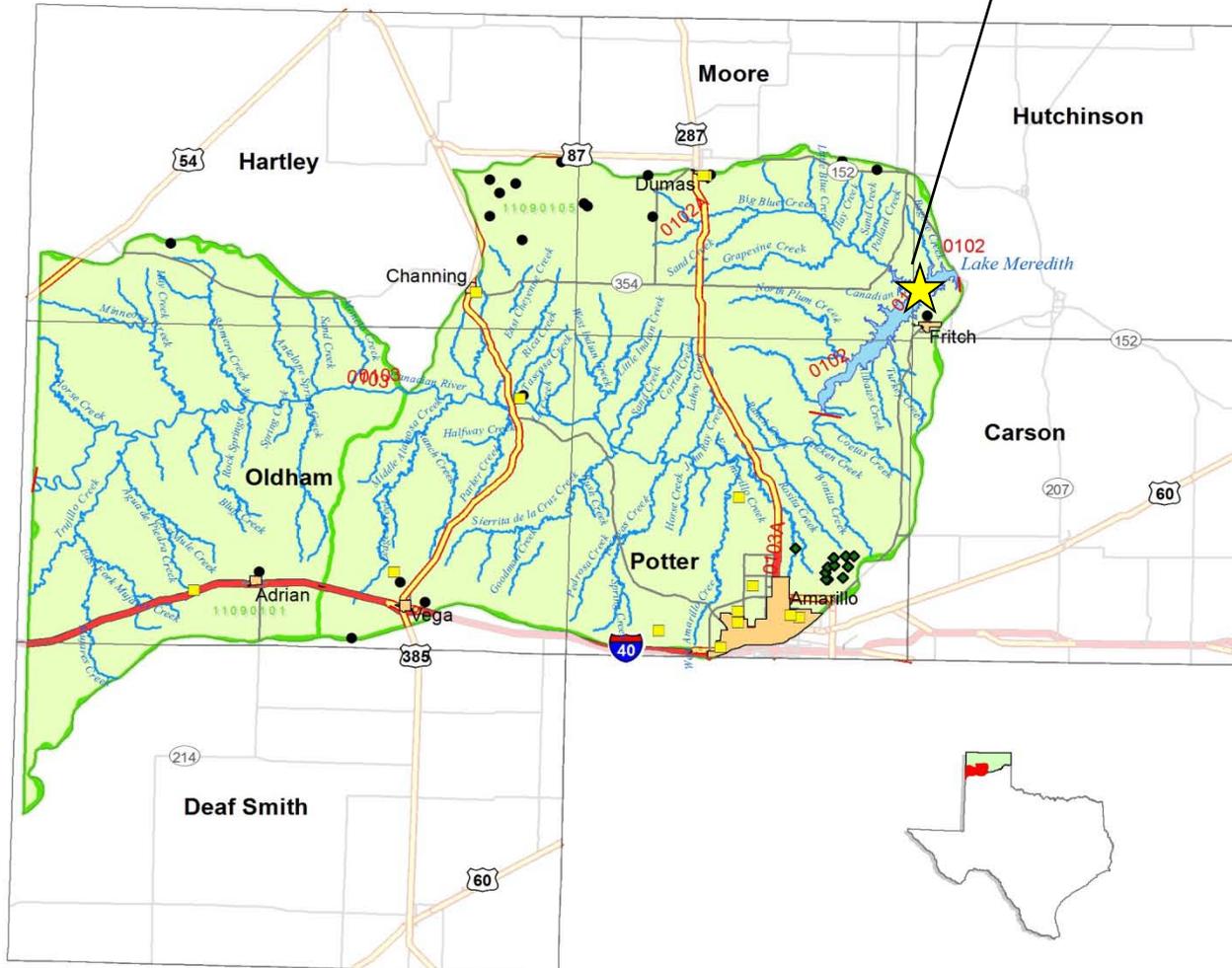


Canadian River Basin

Reach II



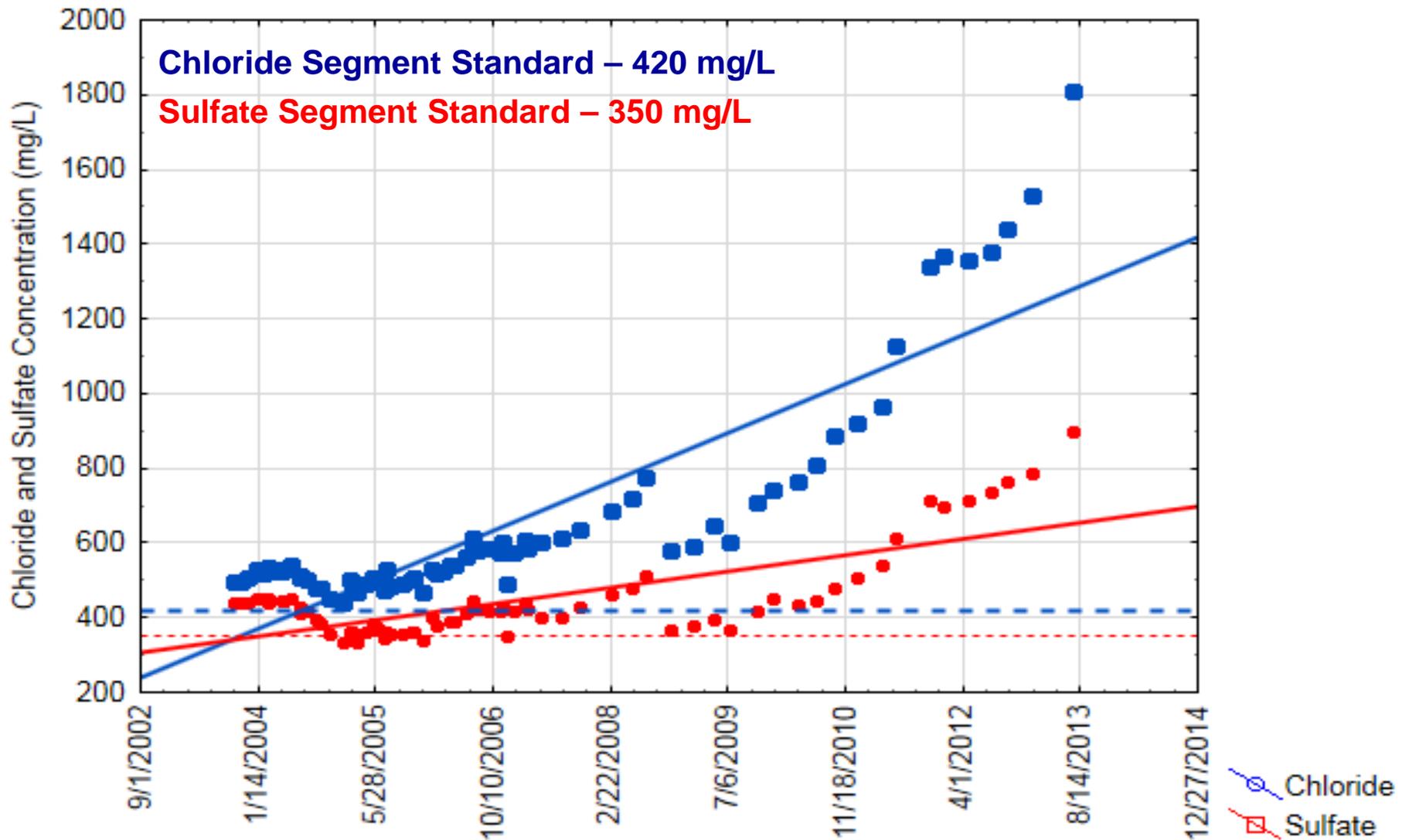
Lake Meredith



Legend

- MSW / Landfill
- Wastewater Outfall
- CAFO
- Segment Boundary
- 0101 Segment ID
- Hydrology
- Urbanized Area
- County Boundary
- HUA Boundary
- Canadian Reach II

Lake Meredith
Segment 0102_01
Chloride and Sulfate



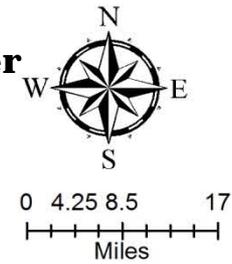
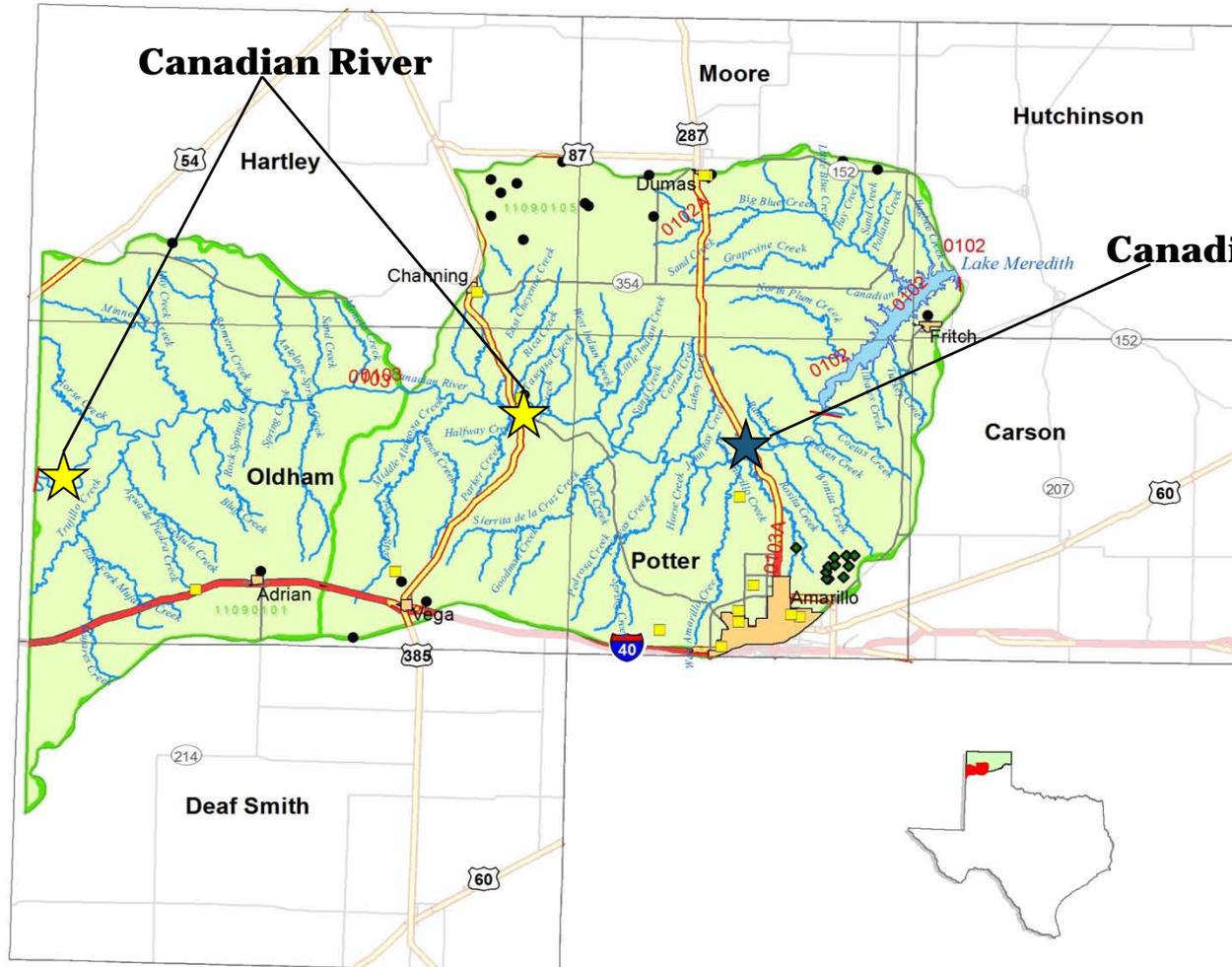
Canadian Reach II



- Lake Meredith (0102)
- Canadian River Above Lake Meredith (0103)
 - **Chloride impairment**
 - **Bacteria concern**
- Big Blue Creek (0102A)
- East Amarillo Creek (0103A)
- Unnamed Tributary to West Amarillo Creek (0103C)



Canadian River Basin Reach II



Legend

- MSW / Landfill
- Wastewater Outfall
- CAFO
- Segment Boundary
- 0101 Segment ID
- Hydrology
- Urbanized Area
- County Boundary
- HUA Boundary
- Canadian Reach II

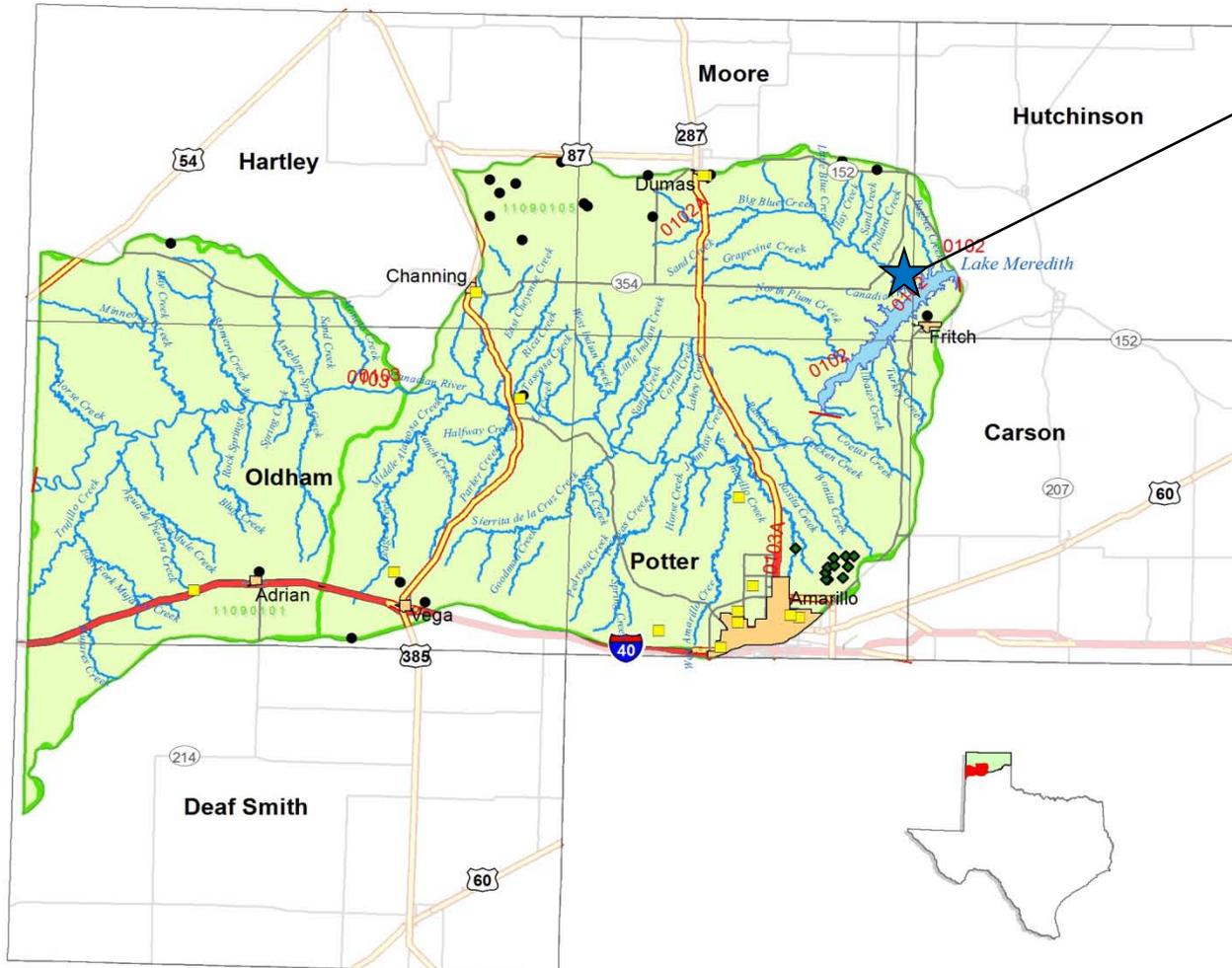
Canadian Reach II



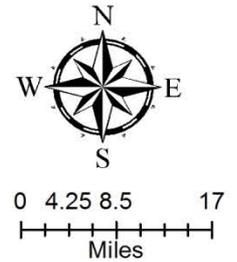
- Lake Meredith (0102)
- Big Blue Creek (0102A)
- Canadian River Above Lake Meredith (0103)
- Big Blue Creek (0102A)
 - **No impairments or concerns**
- East Amarillo Creek (0103A)
- Unnamed Tributary to West Amarillo Creek (0103C)



Canadian River Basin Reach II



Big Blue Creek



Legend

- MSW / Landfill
- Wastewater Outfall
- CAFO
- Segment Boundary
- 0101 Segment ID
- Hydrology
- Urbanized Area
- County Boundary
- HUA Boundary
- Canadian Reach II

Big Blue Creek at FM 1913



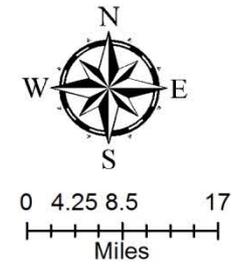
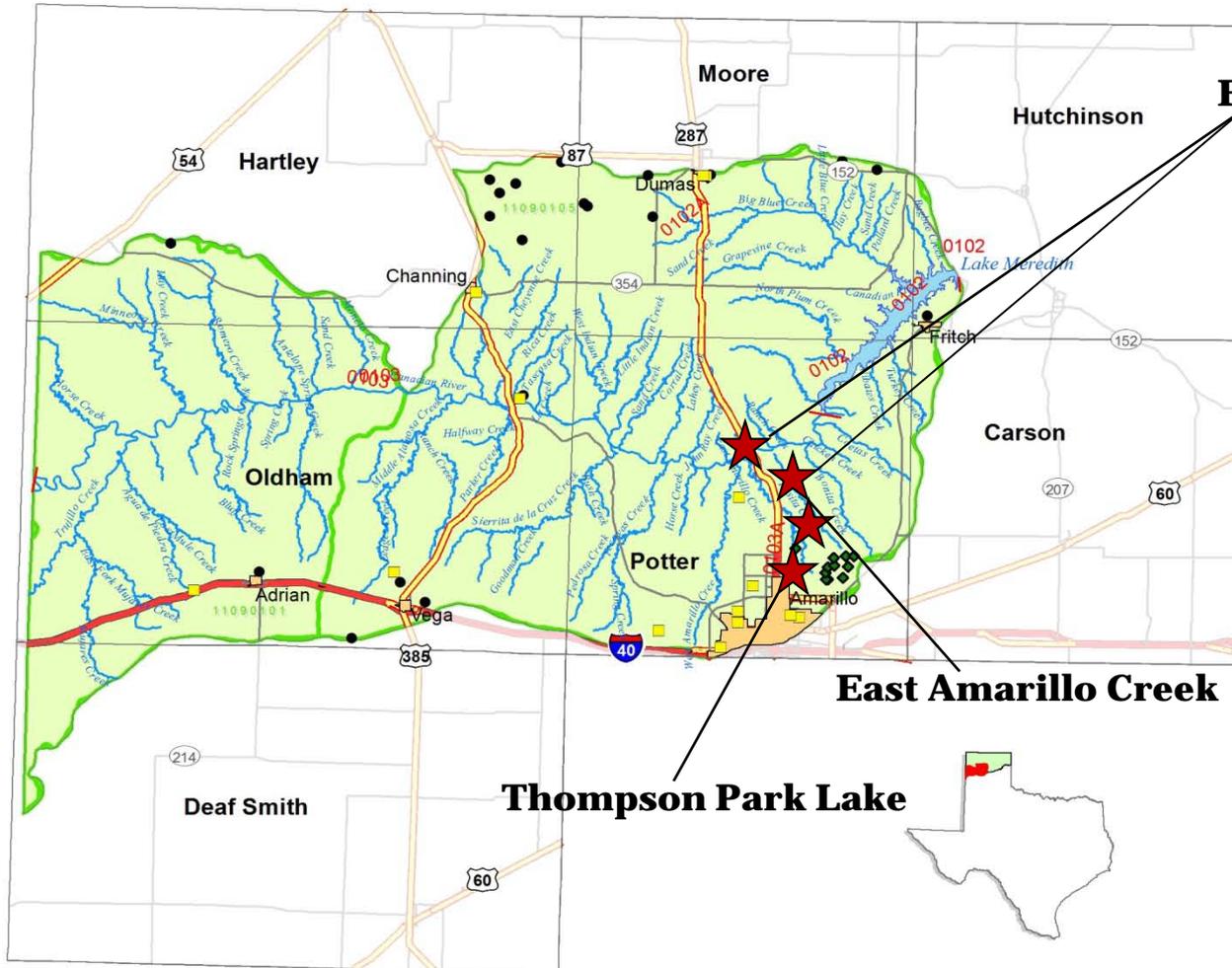
Canadian Reach II



- Lake Meredith (0102)
- Big Blue Creek (0102A)
- Canadian River Above Lake Meredith (0103)
- Big Blue Creek (0102A)
- East Amarillo Creek (0103A)
 - **No impairments**
 - **Chlorophyll-*a* and nitrate concerns**
- Unnamed Tributary to West Amarillo Creek (0103C)



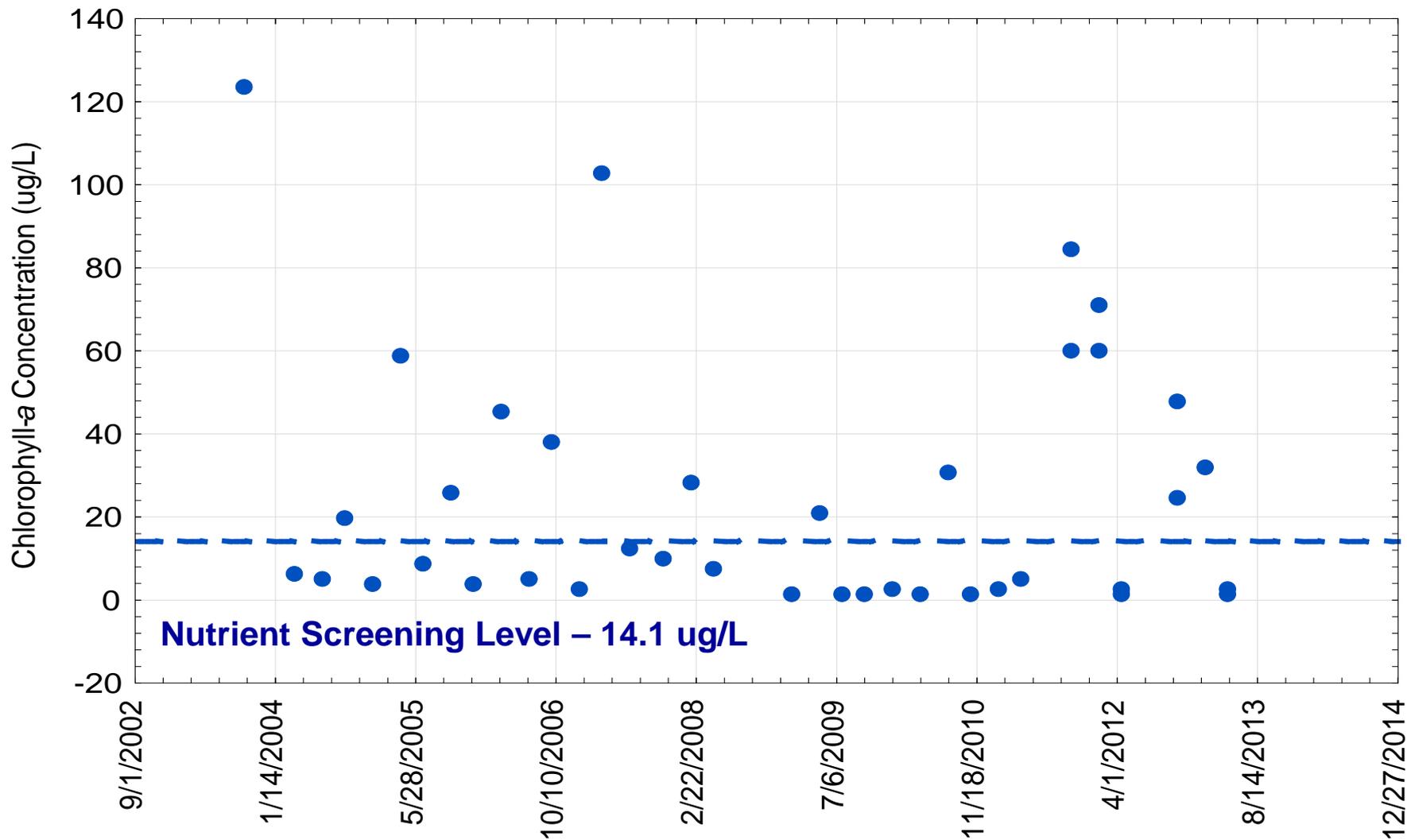
Canadian River Basin Reach II



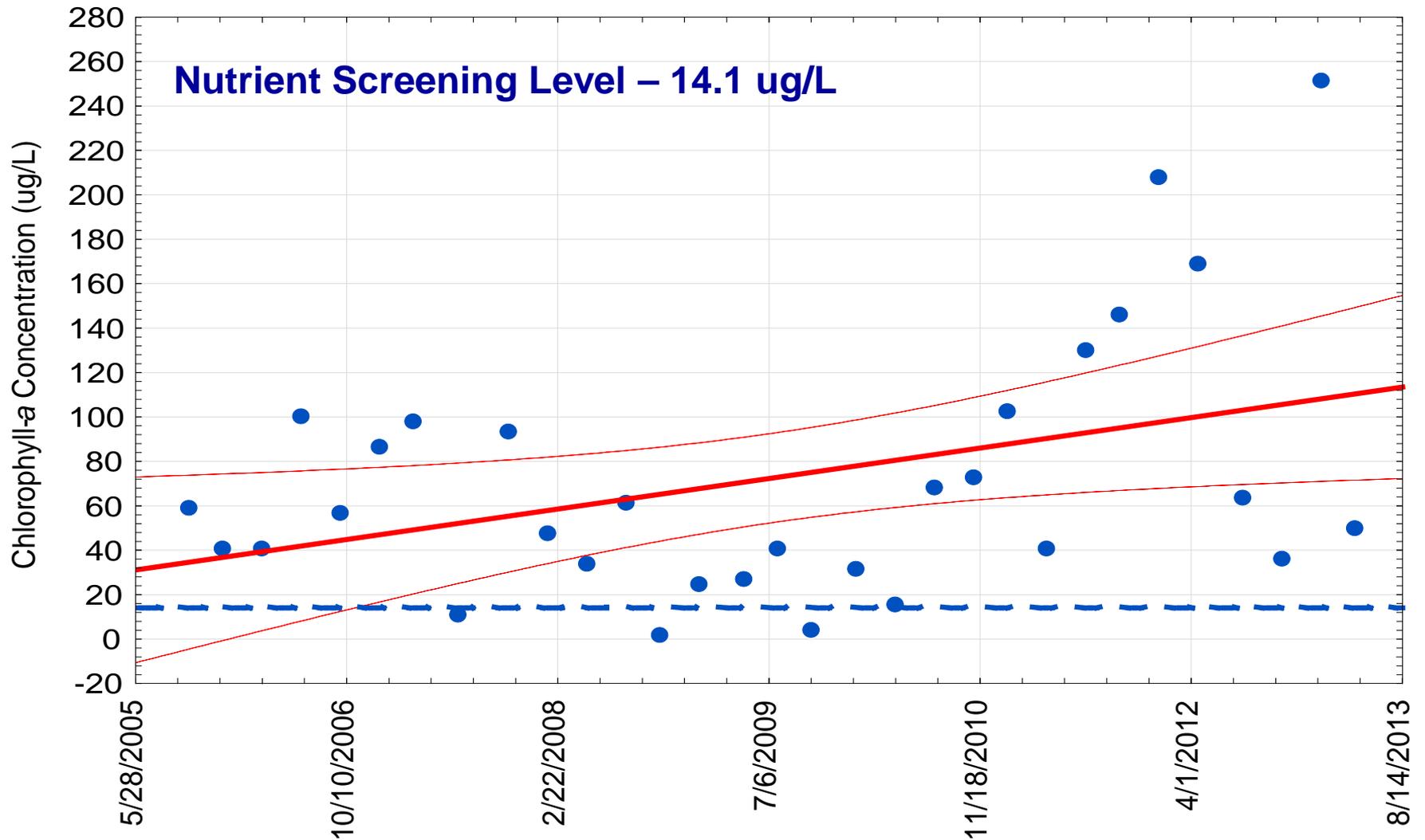
Legend

- MSW / Landfill
- Wastewater Outfall
- CAFO
- Segment Boundary
- 0101 Segment ID
- Hydrology
- Urbanized Area
- County Boundary
- HUA Boundary
- Canadian Reach II

East Amarillo Creek
Segment 0103A_01
Chlorophylla



East Amarillo Creek
Segment 0103A_02
Chlorophylla



Canadian Reach II

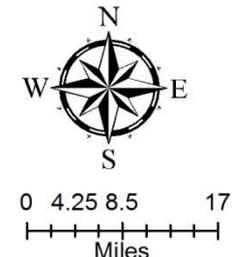
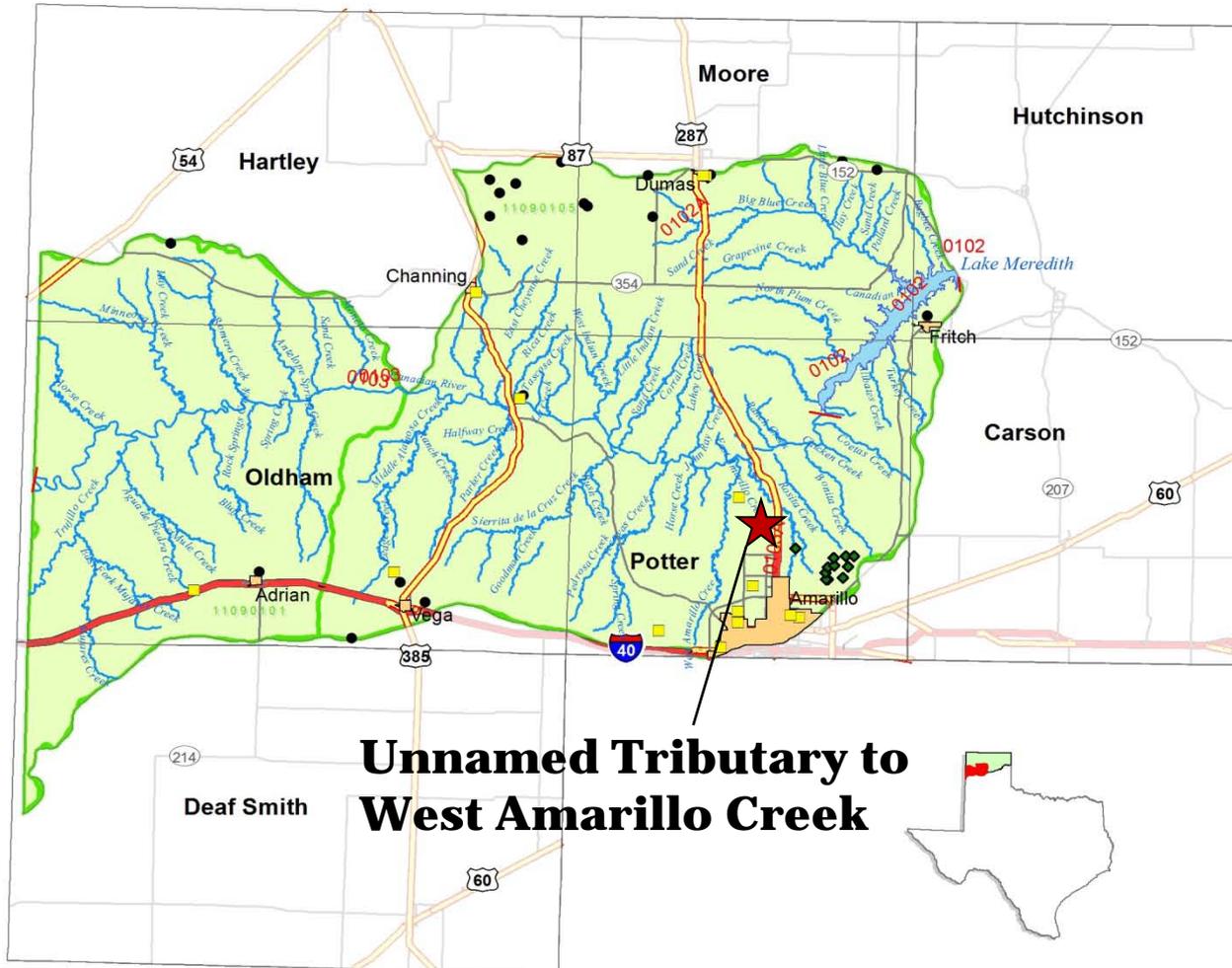


- Lake Meredith (0102)
- Big Blue Creek (0102A)
- Canadian River Above Lake Meredith (0103)
- East Amarillo Creek (0103A)
- Unnamed Tributary to West Amarillo Creek (0103C)
 - **No impairments**
 - **Chlorophyll-*a* concern**



Canadian River Basin

Reach II



Unnamed Tributary to West Amarillo Creek

Legend

- MSW / Landfill
- Wastewater Outfall
- CAFO
- Segment Boundary
- 0101 Segment ID
- Hydrology
- Urbanized Area
- County Boundary
- HUA Boundary
- Canadian Reach II

Unnamed Tributary of West Amarillo Creek



Canadian Reach III



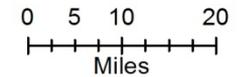
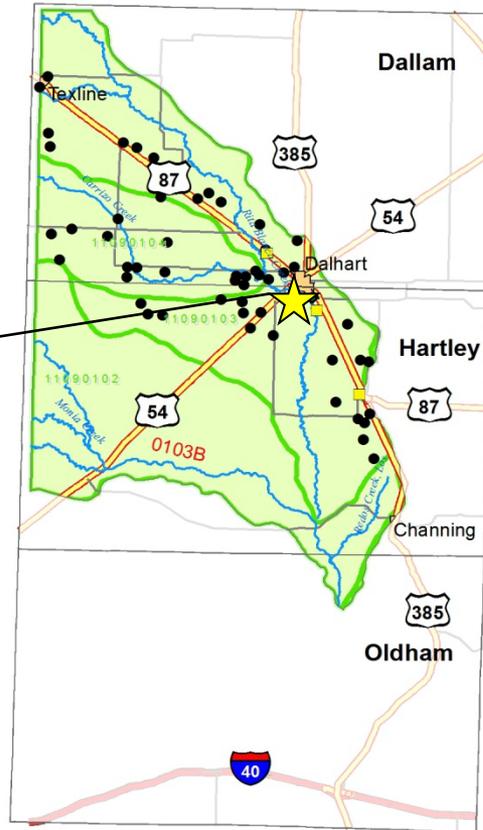
- Rita Blanca Lake (0105)
 - pH and **chloride** impairment
 - Ammonia, chlorophyll-*a*, nitrate, total phosphorus concerns



Canadian River Basin Reach III



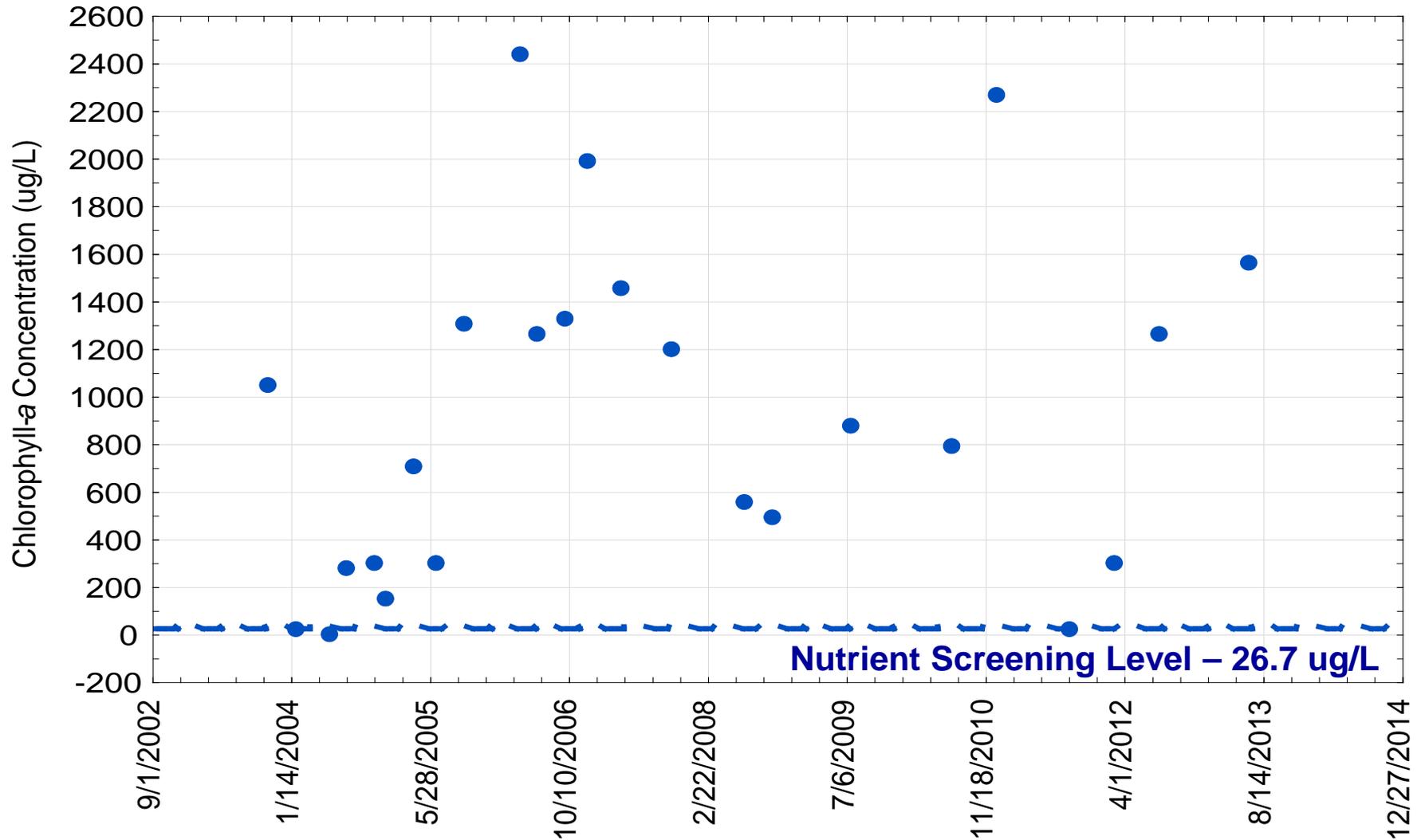
Rita Blanca Lake



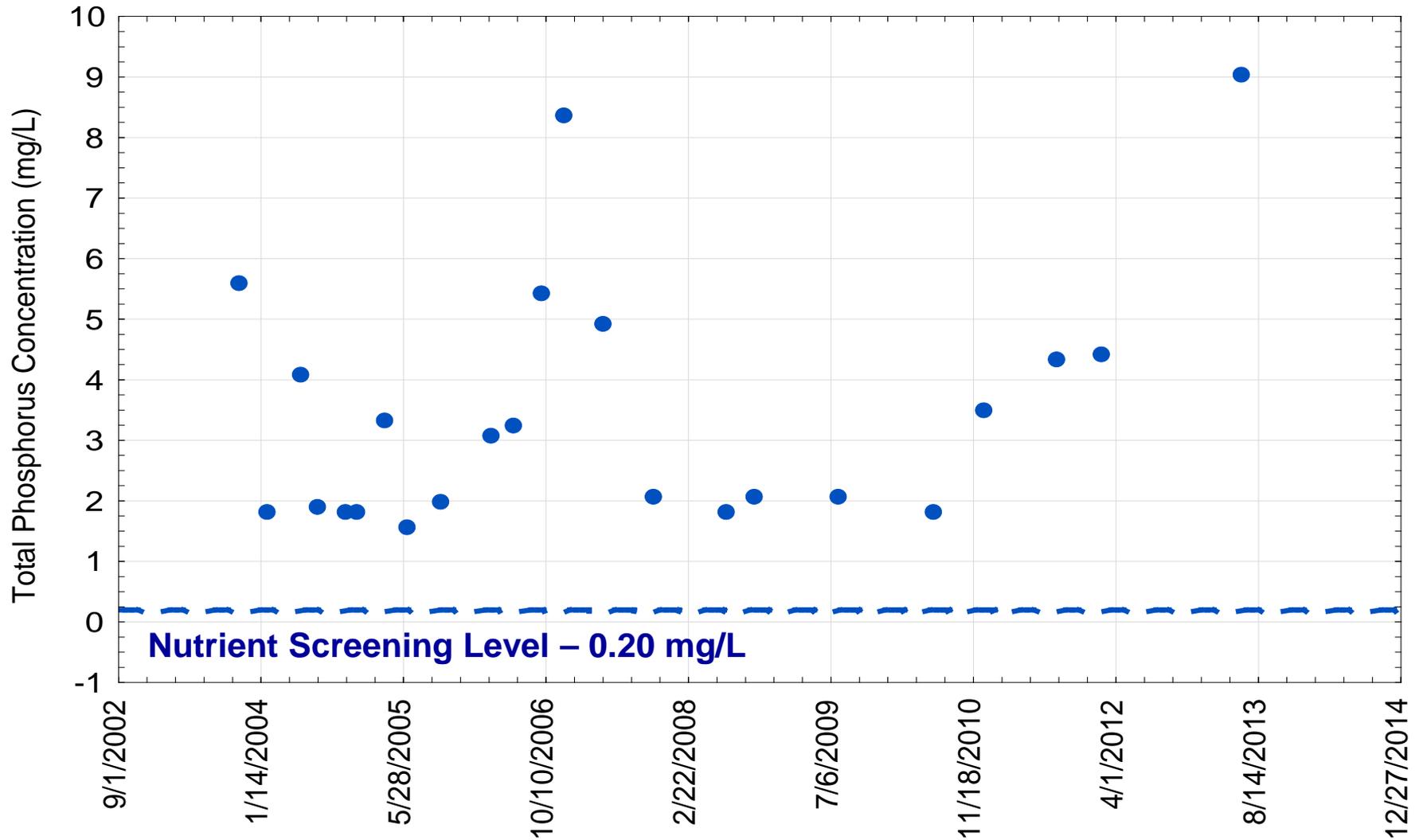
Legend

- MSW / Landfill
- ◆ Wastewater Outfall
- CAFO
- 0101 Segment ID
- ~ Hydrology
- County Boundary
- ⊕ Urbanized Area
- ⬡ HUA Boundary
- ⬢ Canadian Reach III

Rita Blanca Lake
Segment 0105_01
Chlorophylla



Rita Blanca Lake
Segment 0105_01
Total Phosphorus



Canadian Reach IV



- Palo Duro Reservoir (0199A)
 - No impairments
 - Total phosphorus concern

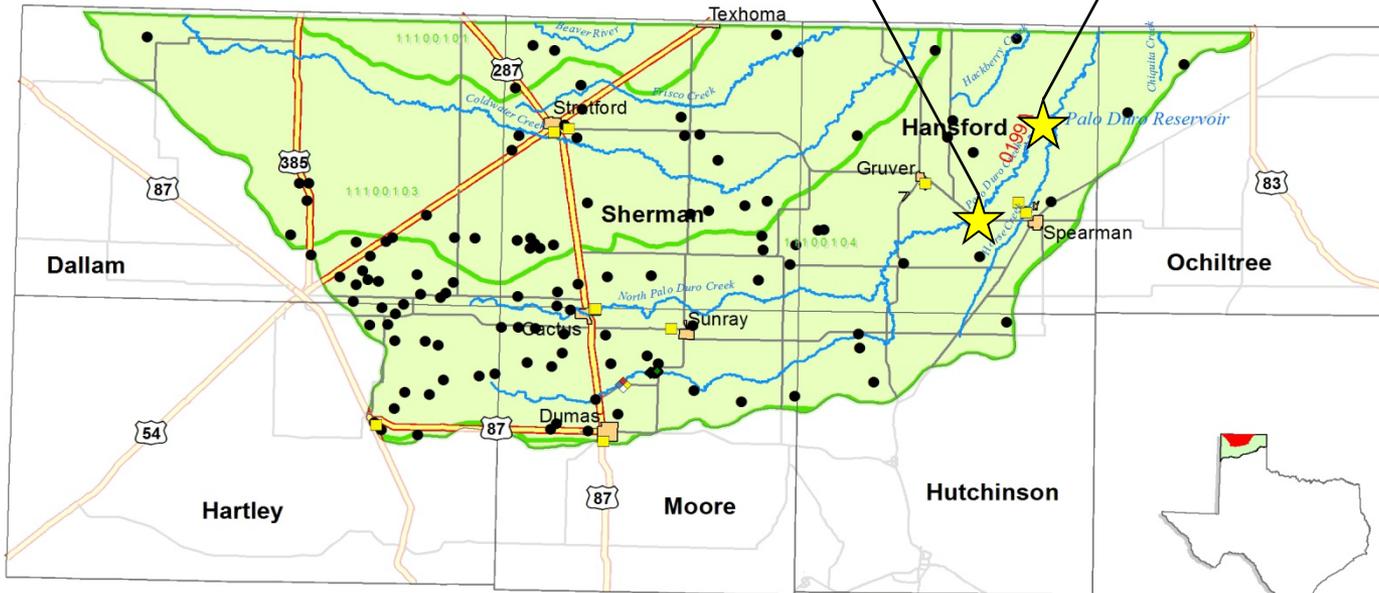


Canadian River Basin Reach IV



Palo Duro Reservoir

Palo Duro Creek



Legend

- Impaired 303(d) MS
- Non-Impaired MS
- MSW / Landfill
- Wastewater Outfall
- CAFO
- Superfund Site
- Segment Boundary
- Segment ID
- Hydrology
- County Boundary
- Urbanized Area
- HUA Boundary
- Canadian Reach IV



Canadian Reach V

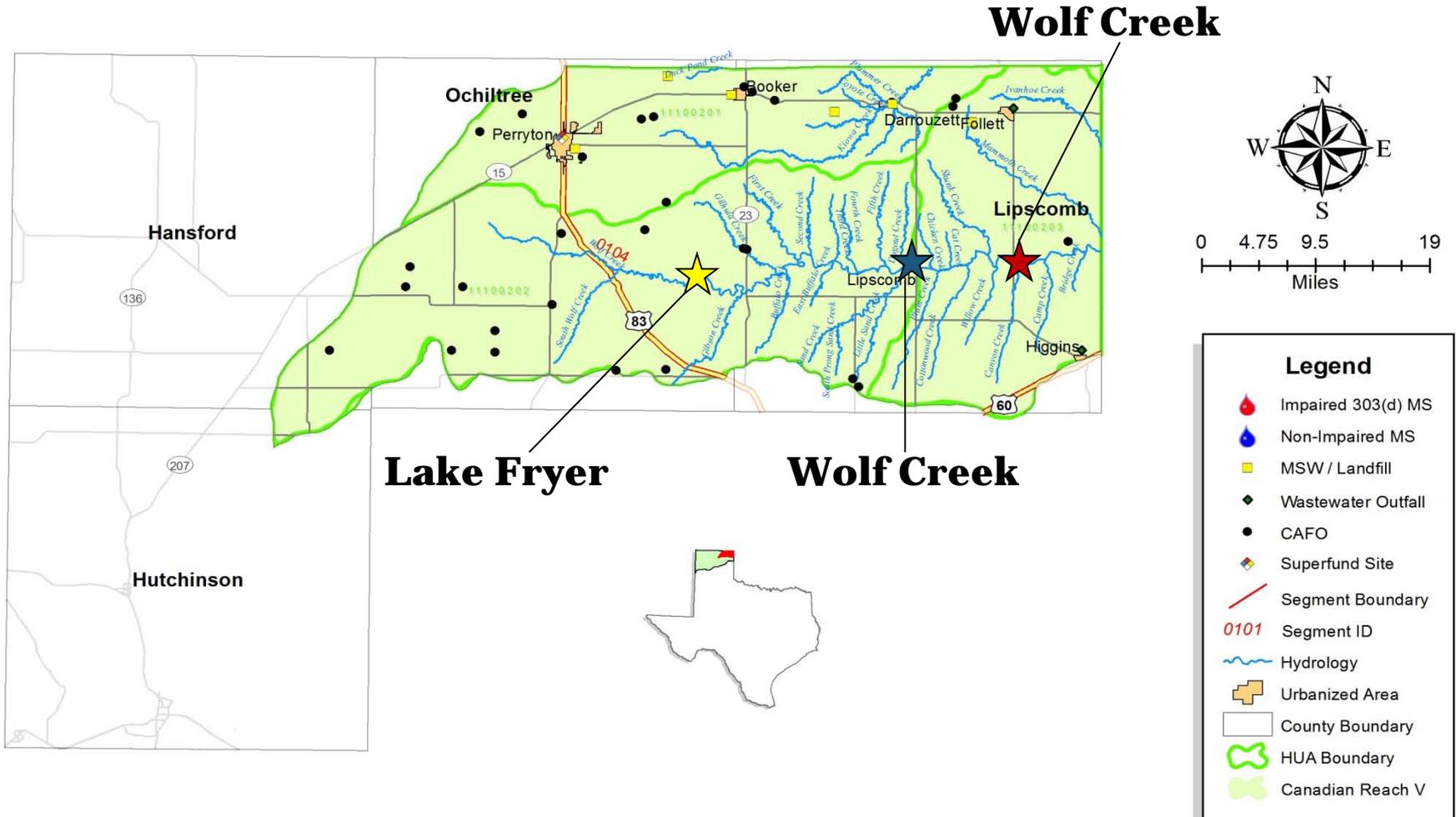


- **Wolf Creek (0104)**
 - **No impairments**
 - **Chlorophyll-a concern**
- **Kiowa Creek (0199B)**

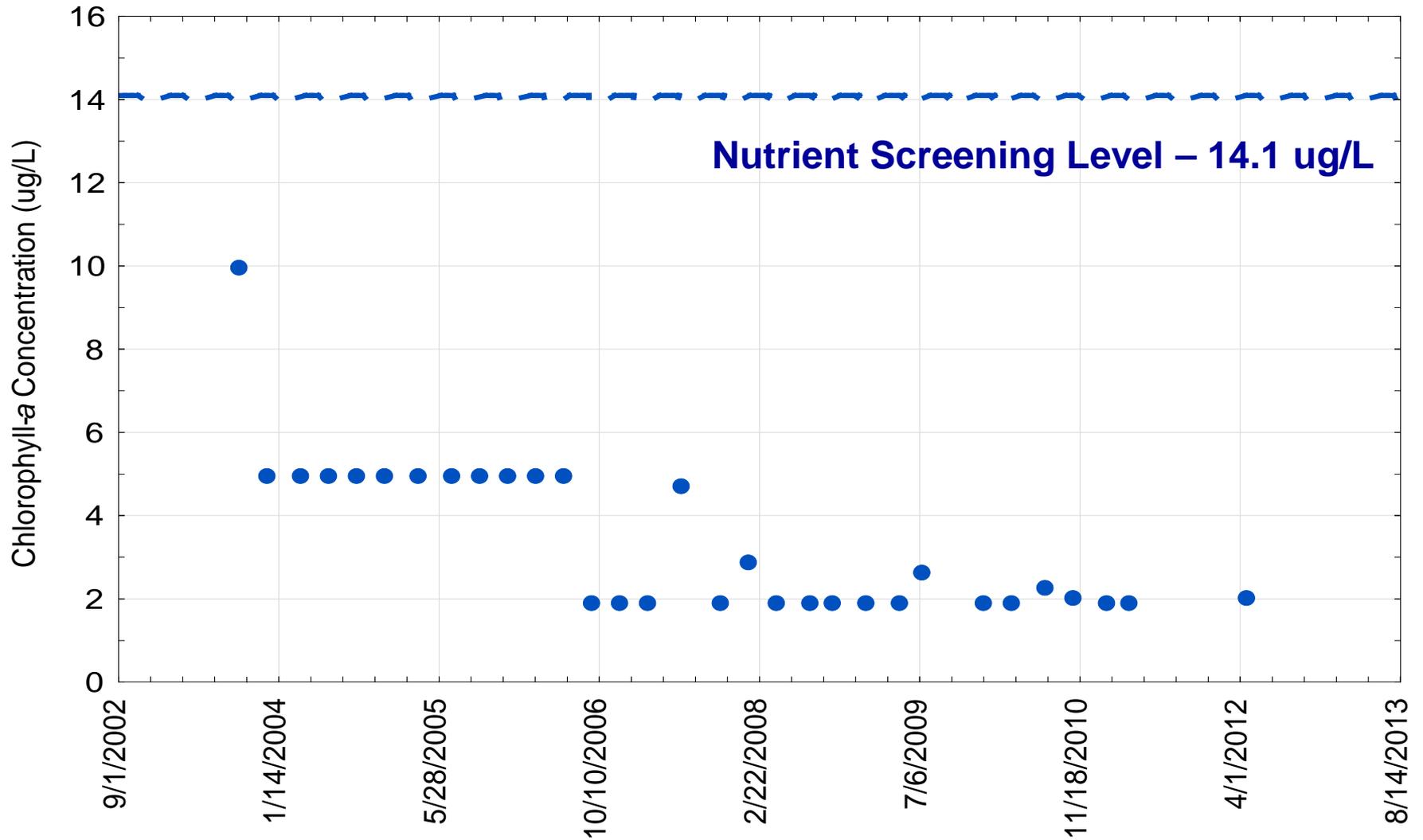


Canadian River Basin

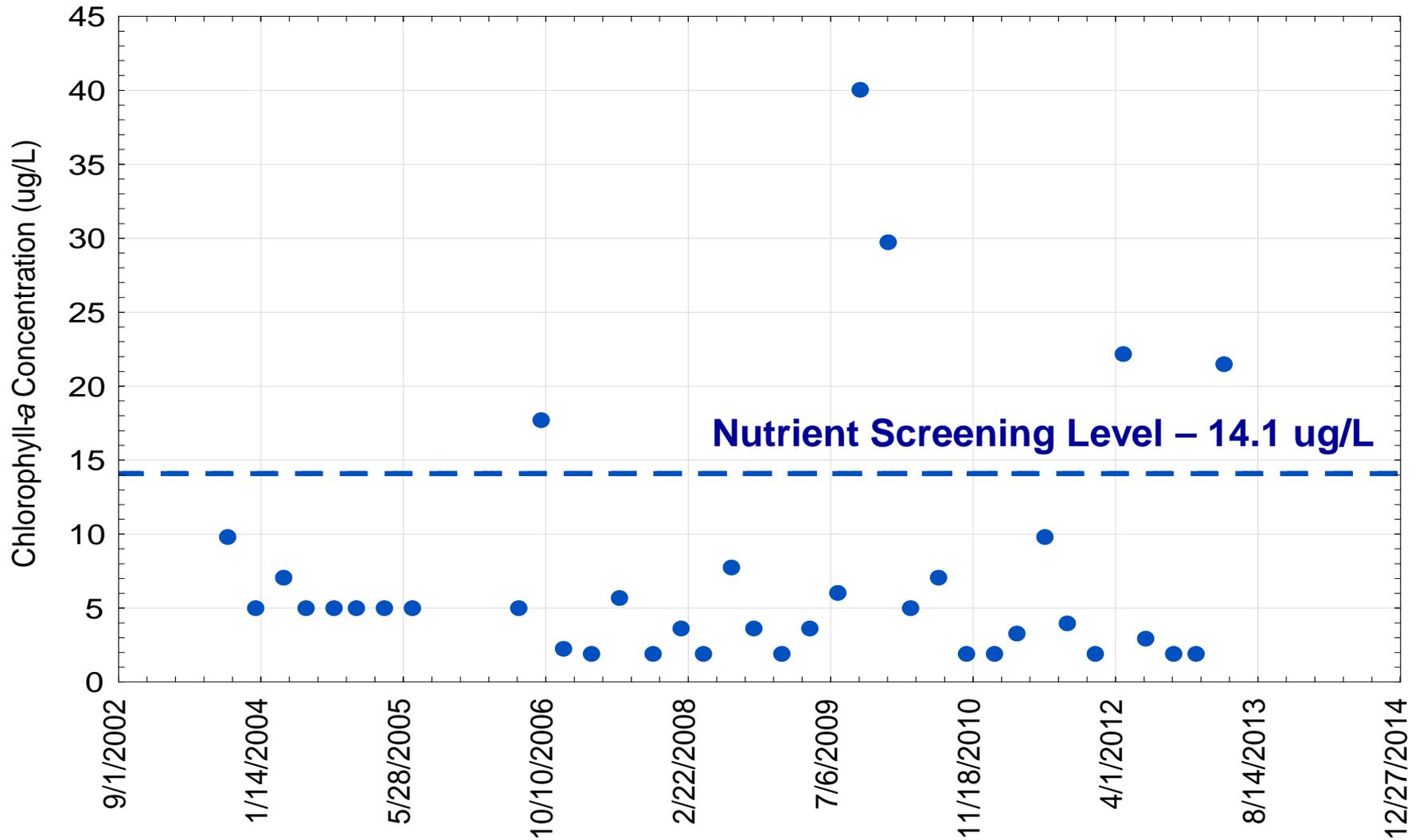
Reach V



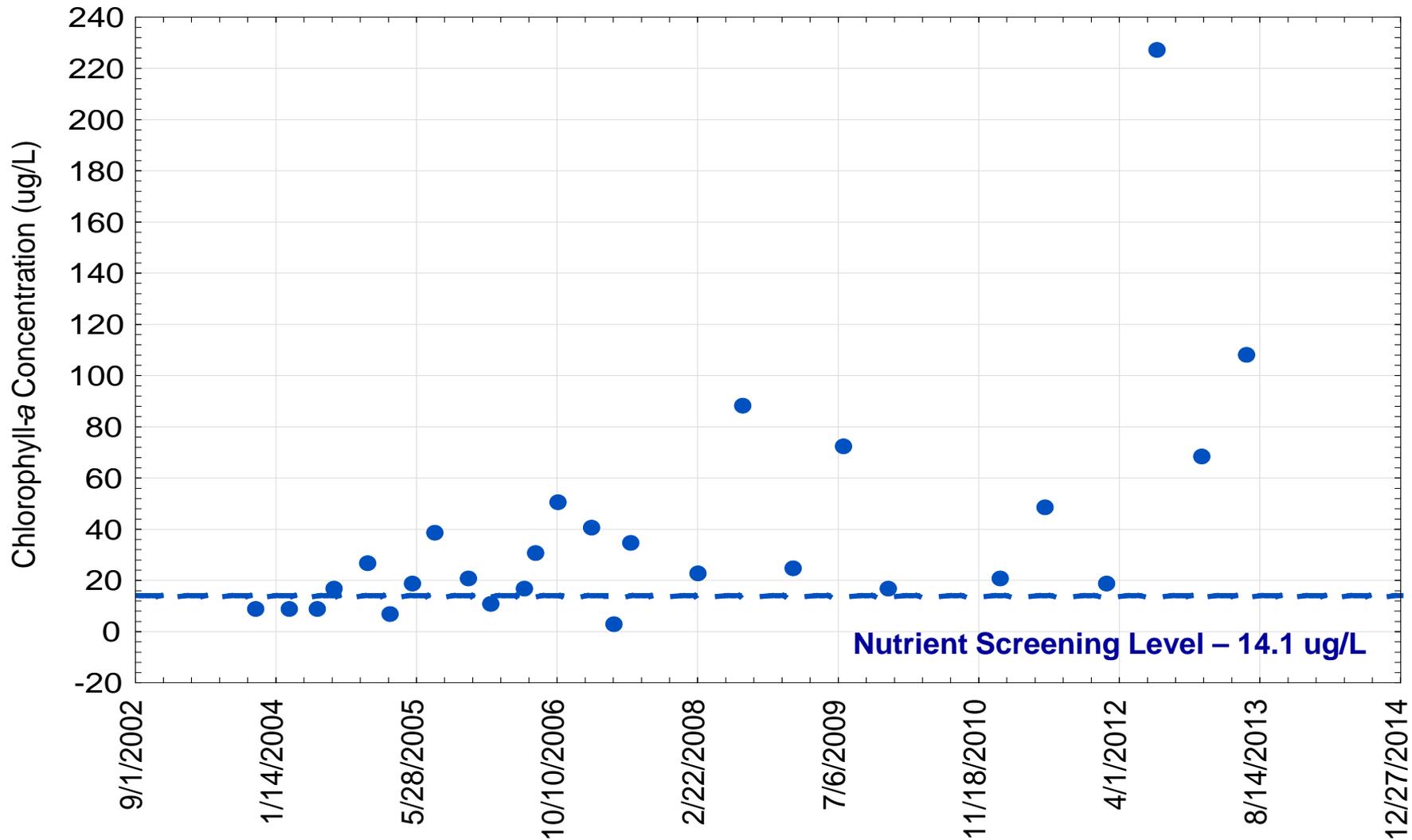
Wolf Creek at FM 1454
Segment 0104_01
Chlorophylla



Wolf Creek at SH 305
Segment 0104_02
Chlorophylla



Lake Fryer Mid-Lake
Segment 0104_03
Chlorophylla



Canadian Reach V



- Wolf Creek (0104)
- Kiowa Creek (0199B)
 - No impairments or concerns

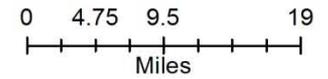
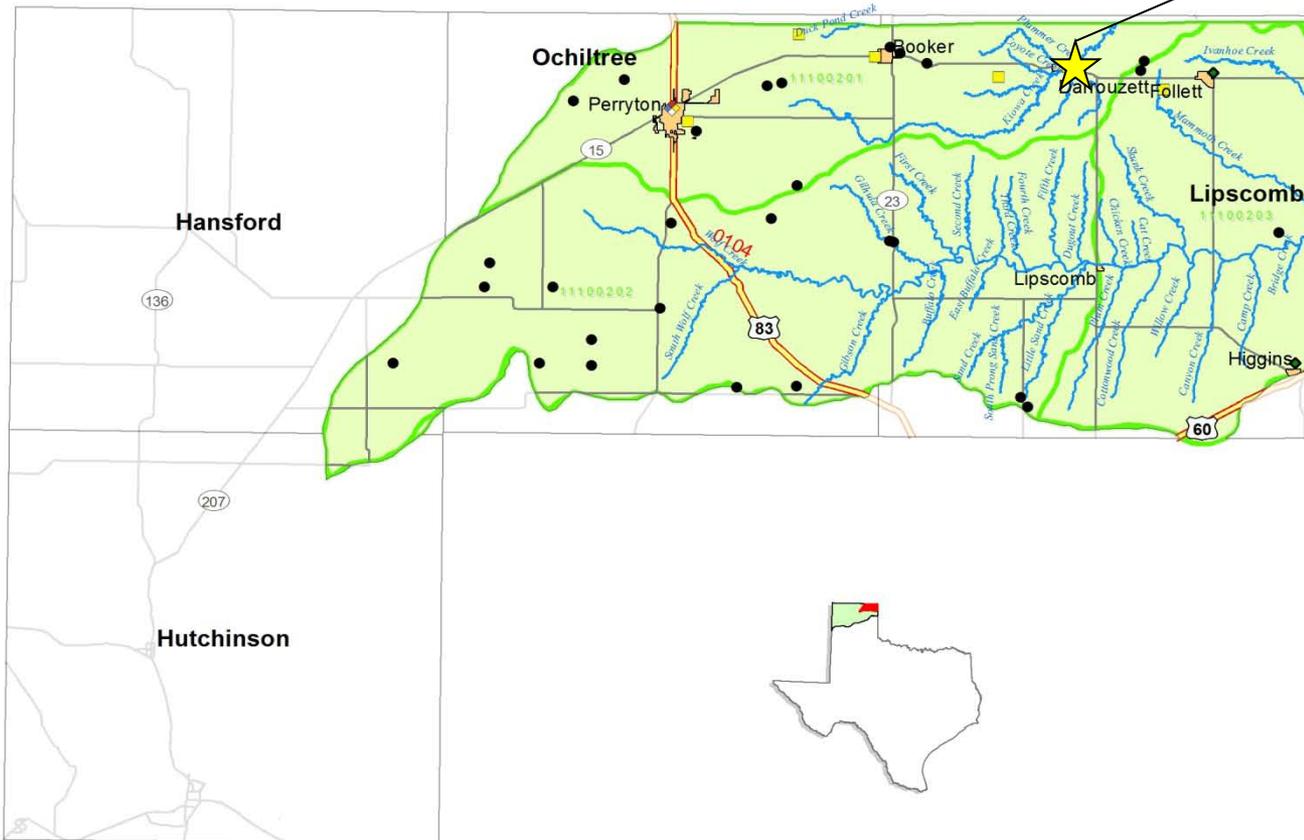


Canadian River Basin

Reach V



Kiowa Creek



Legend

- Impaired 303(d) MS
- Non-Impaired MS
- MSW / Landfill
- Wastewater Outfall
- CAFO
- Superfund Site
- Segment Boundary
- Segment ID
- Hydrology
- Urbanized Area
- County Boundary
- HUA Boundary
- Canadian Reach V

Red Reach IV



- Lower PDTF Red River (0207)
 - Bacteria impairment
 - Chlorophyll-*a* concern
- Buck Creek (0207A)
- Mackenzie Reservoir (0228)
- Upper PDTF Red River (0229)
- Lake Tanglewood (0229A)

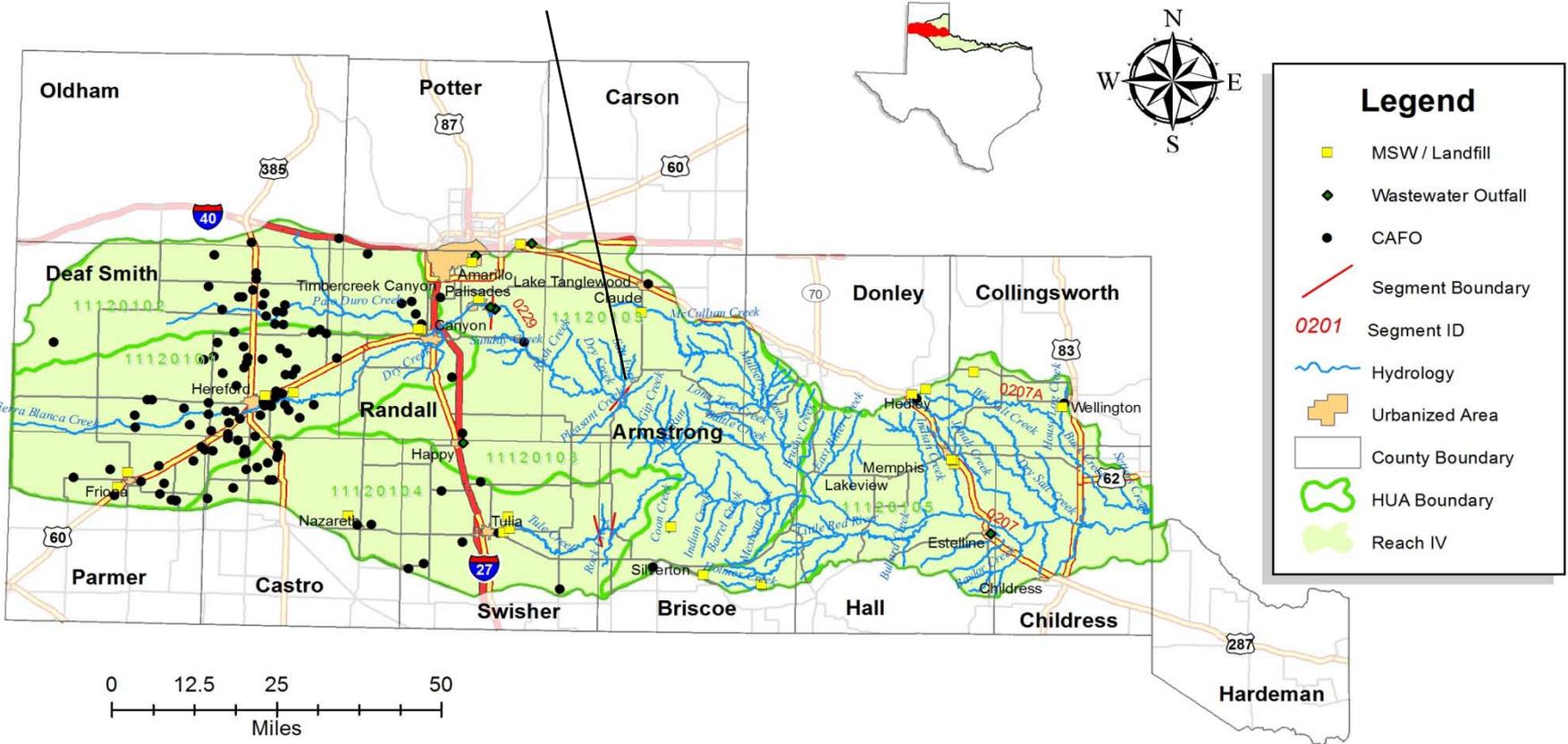


Red River Basin

Reach IV



Lower PDTF Red River



Legend

- MSW / Landfill
- Wastewater Outfall
- CAFO
- Segment Boundary
- 0201 Segment ID
- Hydrology
- Urbanized Area
- County Boundary
- HUA Boundary
- Reach IV

LPDTF Red River at SH 207



Red Reach IV

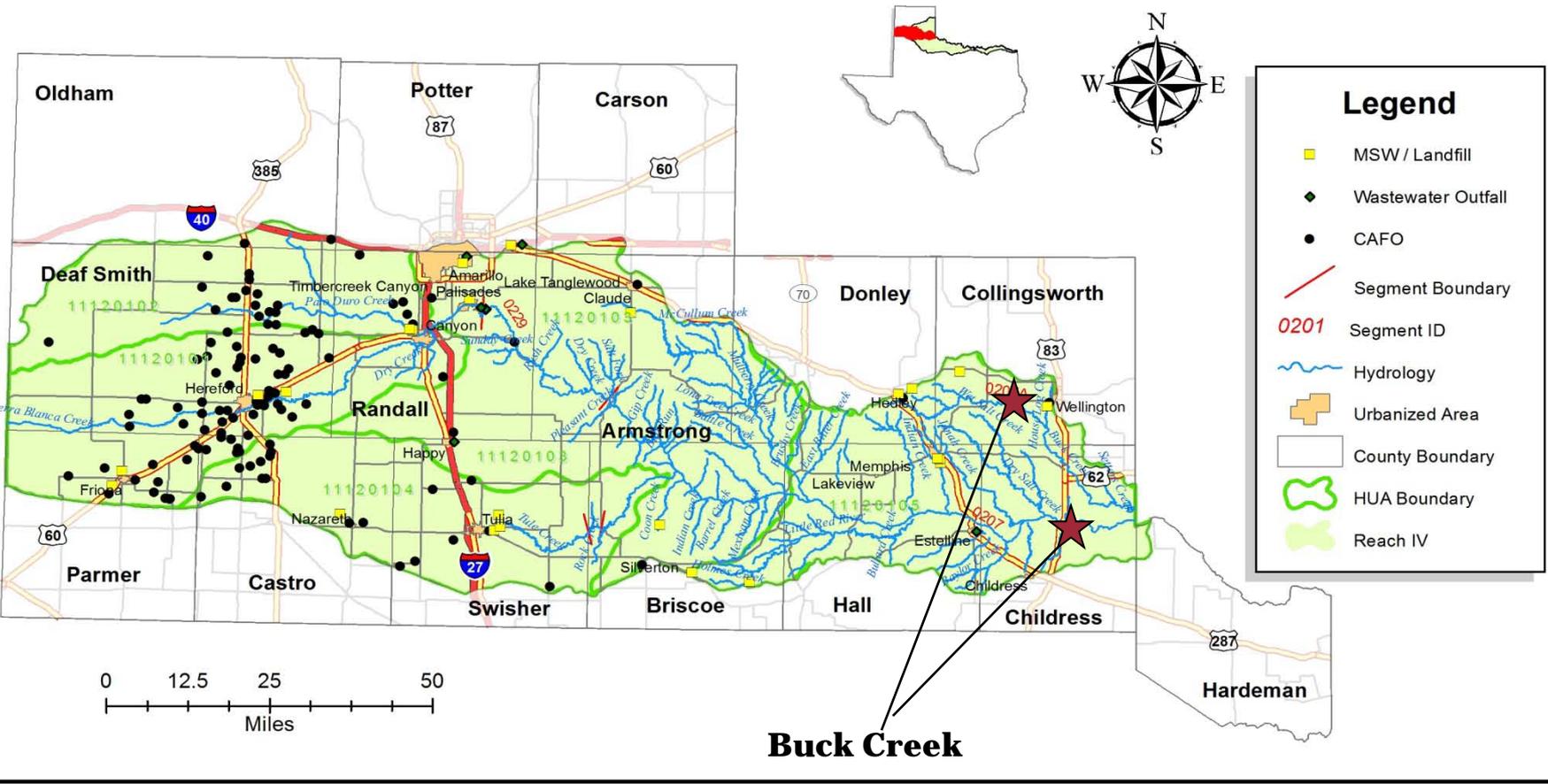


- Lower PDTF Red River (0207)
- Buck Creek (0207A)
 - No impairments
 - Nitrate concern
- Mackenzie Reservoir (0228)
- Upper PDTF Red River (0229)
- Lake Tanglewood (0229A)



Red River Basin

Reach IV



Buck Creek

Buck Creek at RR 1547



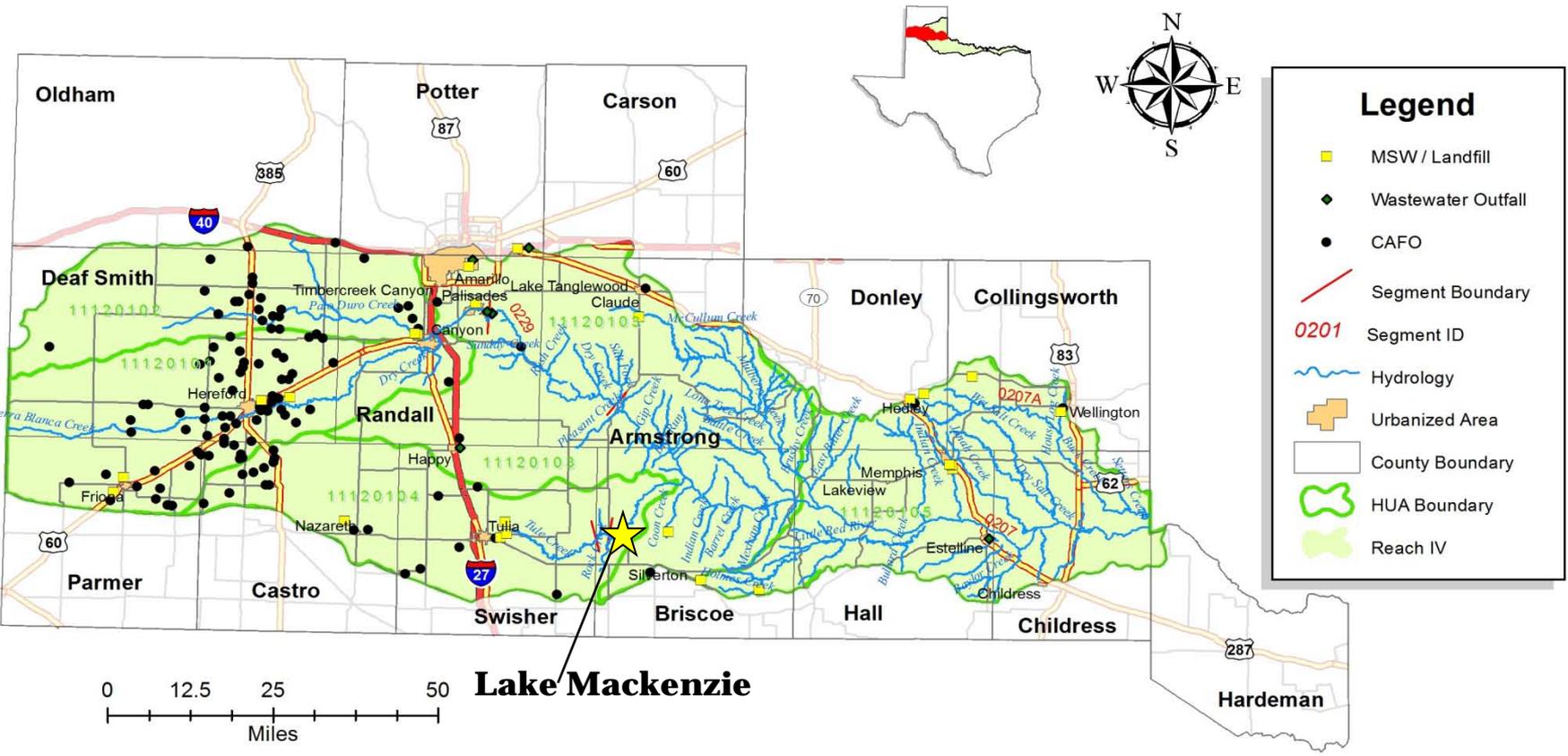
Red Reach IV



- Lower PDTF Red River (0207)
- Buck Creek (0207A)
- Mackenzie Reservoir (0228)
 - **TDS impairment**
 - **No concerns**
- Upper PDTF Red River (0229)
- Lake Tanglewood (0229A)



Red River Basin Reach IV



Legend

- MSW / Landfill
- ◆ Wastewater Outfall
- CAFO
- Segment Boundary
- 0201 Segment ID
- ~ Hydrology
- Urbanized Area
- County Boundary
- HUA Boundary
- Reach IV

Red Reach IV



- Lower PDTF Red River (0207)
- Buck Creek (0207A)
- Mackenzie Reservoir (0228)
- Upper PDTF Red River (0229)
 - pH impairment
 - Chlorophyll-*a*, nitrate, **bacteria**, **depressed DO**, and total phosphorus concerns
- Lake Tanglewood (0229A)

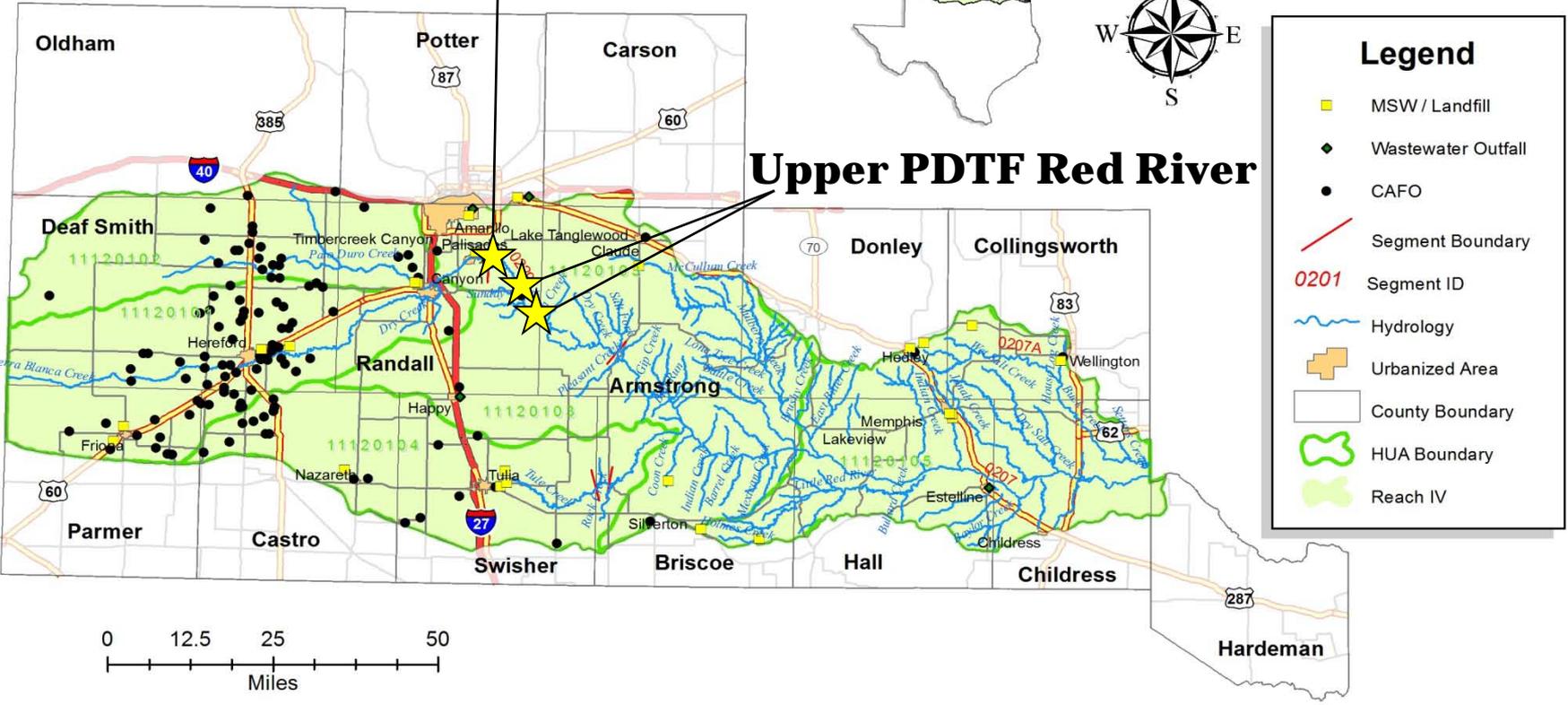


Red River Basin Reach IV

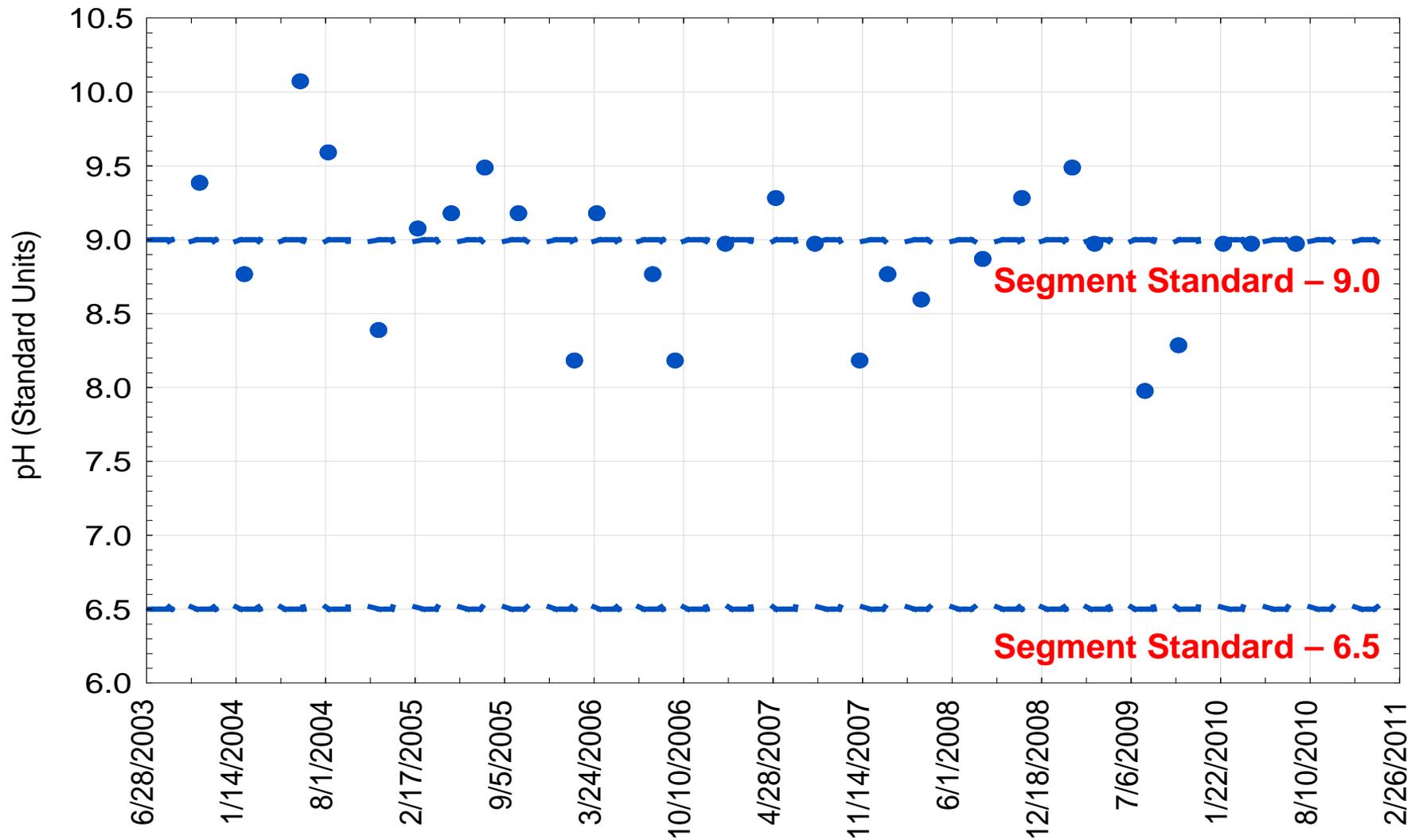


Lake Tanglewood

Upper PDTO Red River



Upper Prairie Dog Town Fork of the Red River
Segment 0229_02
pH



Red Reach IV



- Lower PDTF Red River (0207)
- Buck Creek (0207A)
- Mackenzie Reservoir (0228)
- Upper PDTF Red River (0229)
- Lake Tanglewood (0229A)
 - **No impairments**
 - **Ammonia, chlorophyll-*a*, depressed DO, nitrate, total phosphorus concerns**

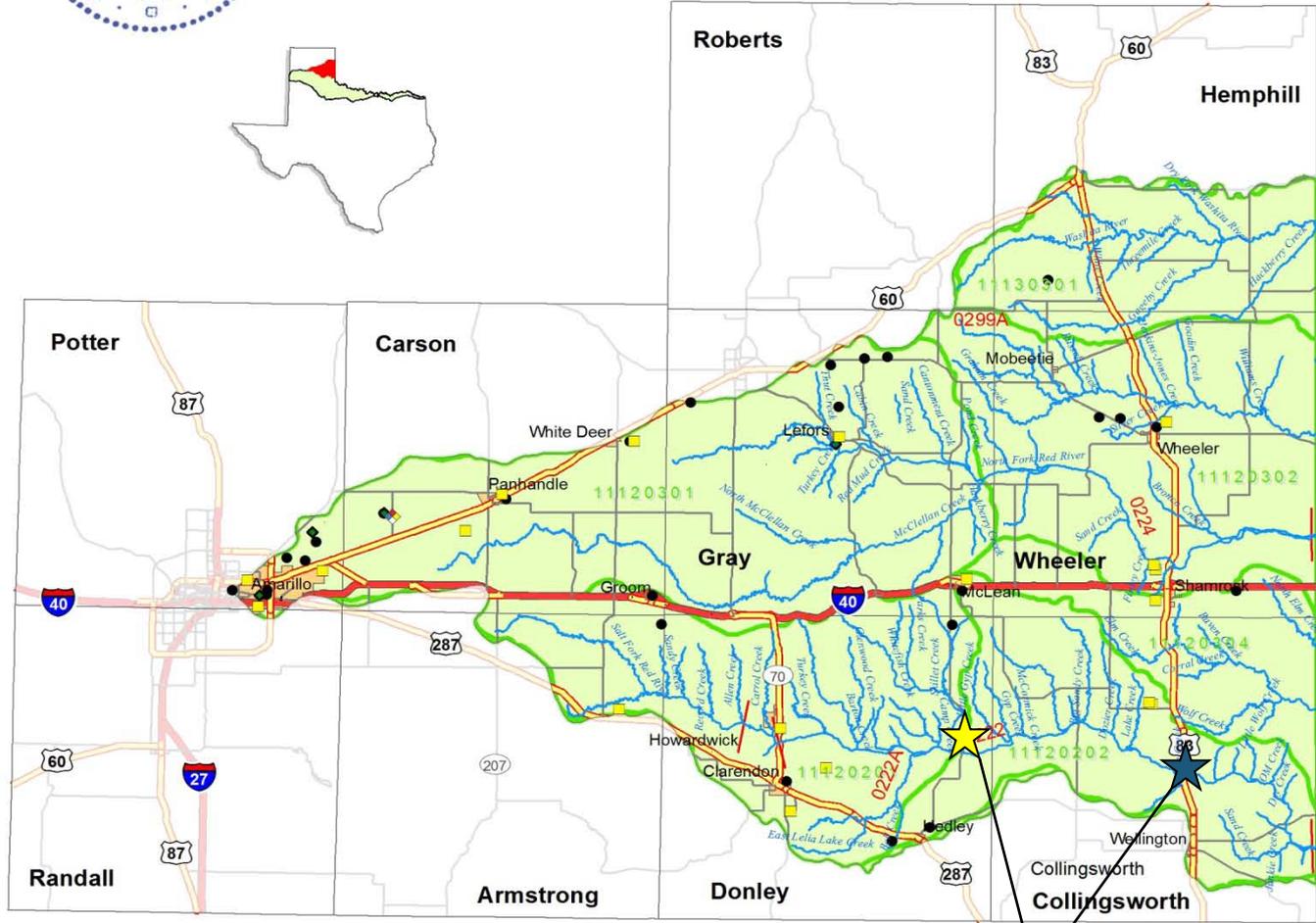
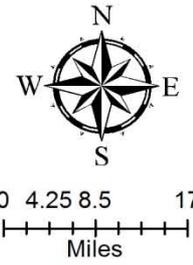
Red Reach V



- Salt Fork of the Red River (0222)
 - **Bacteria impairment**
 - **Nitrate concern**
- McClellan Creek (0224A)
- Sweetwater Creek (0299A)



Red River Basin Reach V



Legend

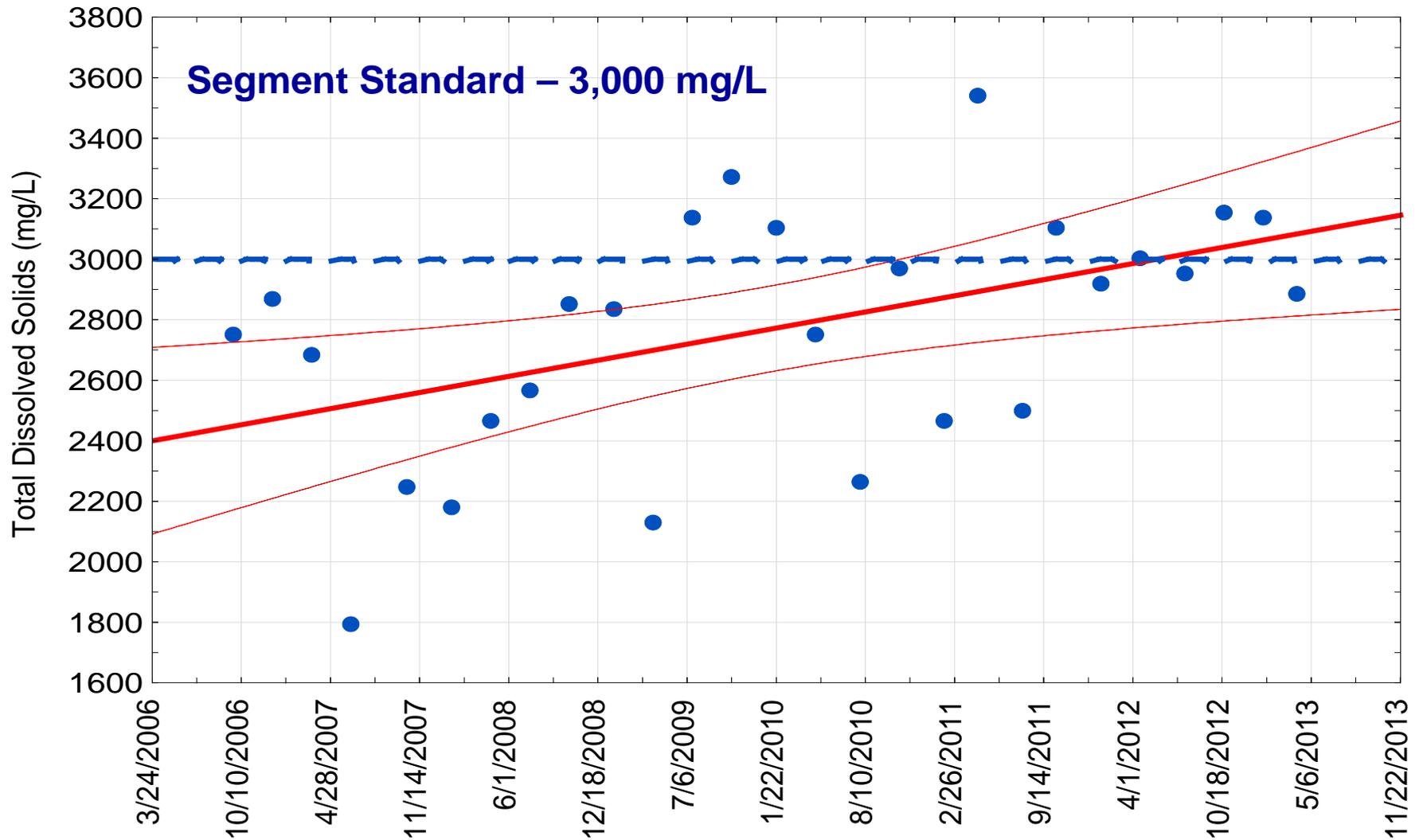
- MSW / Landfill
- Wastewater Outfall
- CAFO
- Superfund Site
- Segment Boundary
- 0201 Segment ID
- Hydrology
- Urbanized Area
- County Boundary
- HUA Boundary
- Red Reach V

Salt Fork Red River

Salt Fork Red River at US 83



Salt Fork of the Red River
Segment 0222_01
Total Dissolved Solids (TDS)



Red Reach V

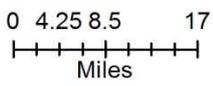


- Salt Fork of the Red River (0222)
- McClellan Creek (0224A)
 - Bacteria impairment
 - No concerns
- Sweetwater Creek (0299A)

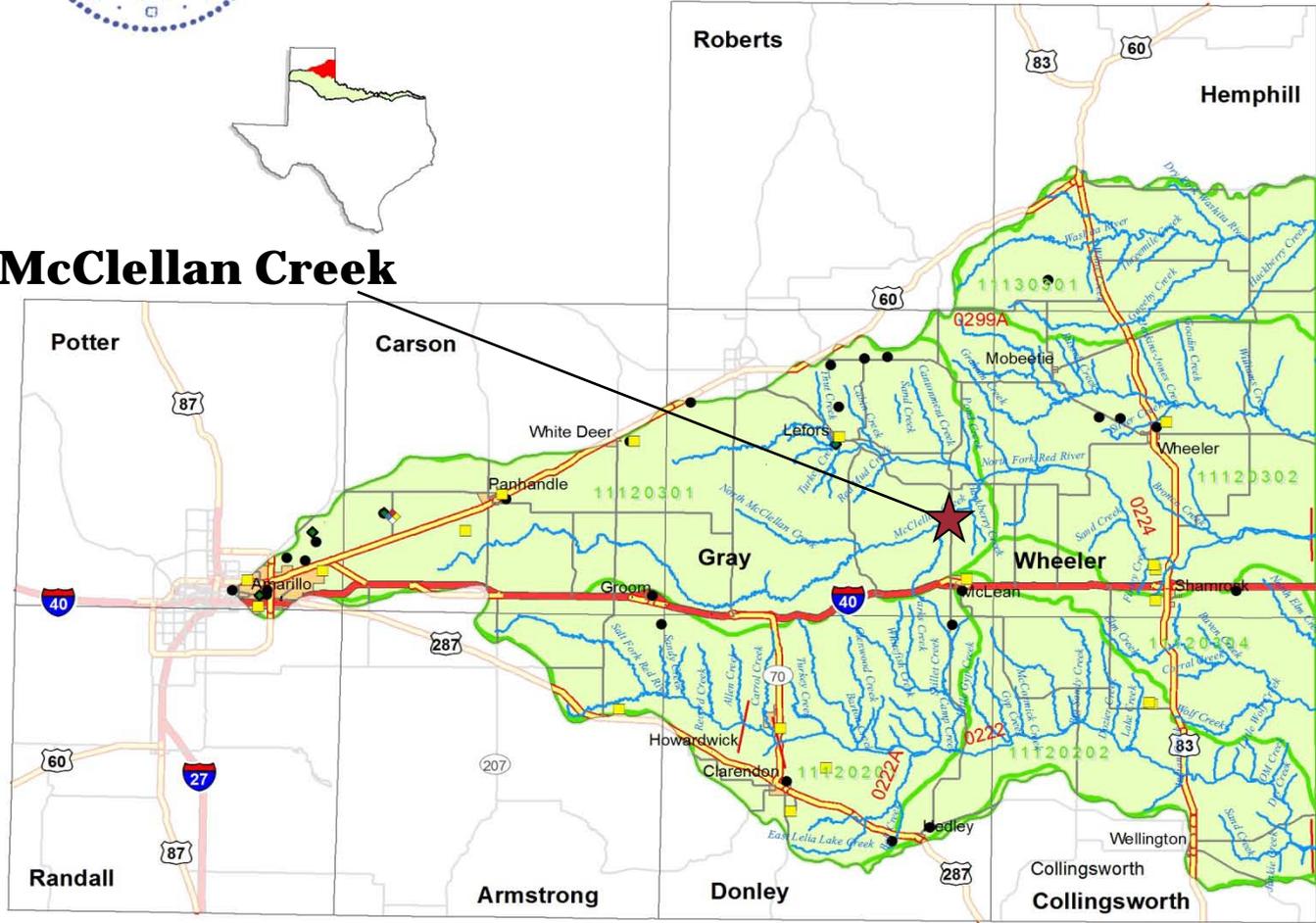


Red River Basin

Reach V



McClellan Creek



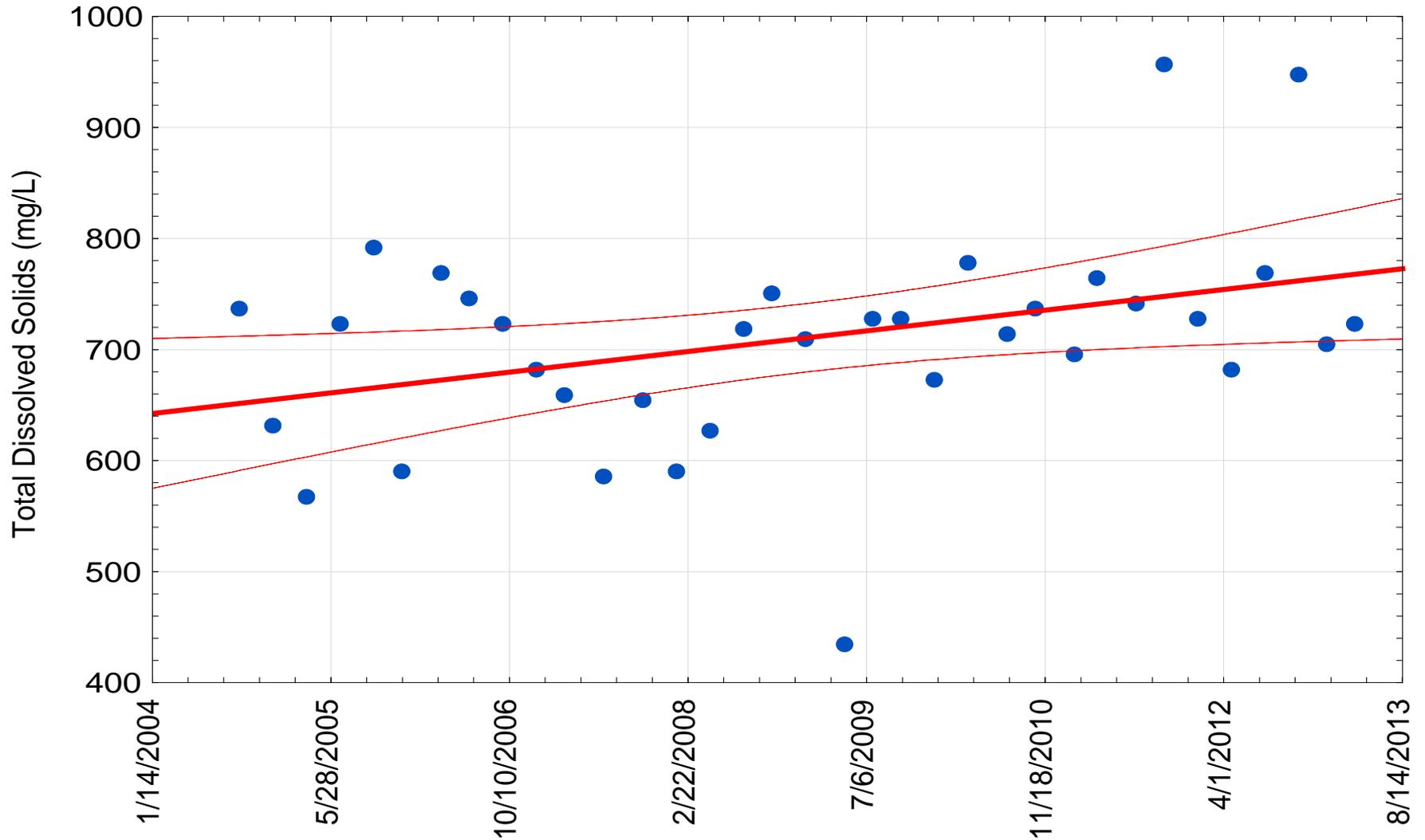
Legend

- MSW / Landfill
- Wastewater Outfall
- CAFO
- Superfund Site
- Segment Boundary
- 0201 Segment ID
- Hydrology
- Urbanized Area
- County Boundary
- HUA Boundary
- Red Reach V

McClellan Creek at SH 273



McClellan Creek
Segment 0224A_01
Total Dissolved Solids (TDS)



Red Reach V



- Salt Fork of the Red River (0222)
- McClellan Creek (0224A)
- Sweetwater Creek (0299A)
 - No impairments
 - Depressed DO concern
 - RUAA has been completed and submitted to TCEQ

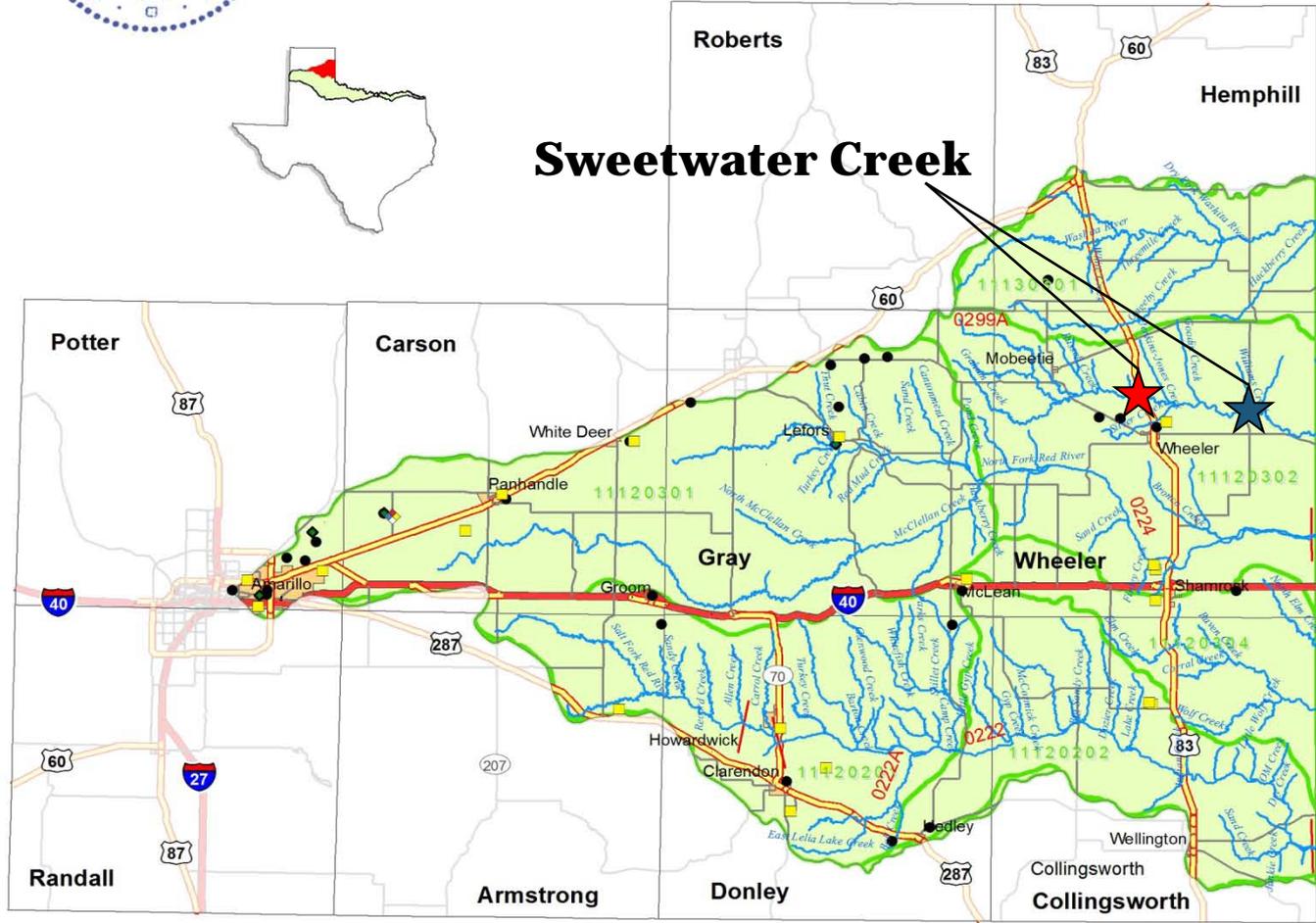
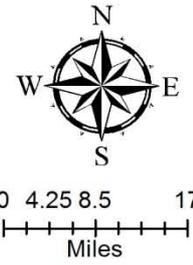


Red River Basin

Reach V



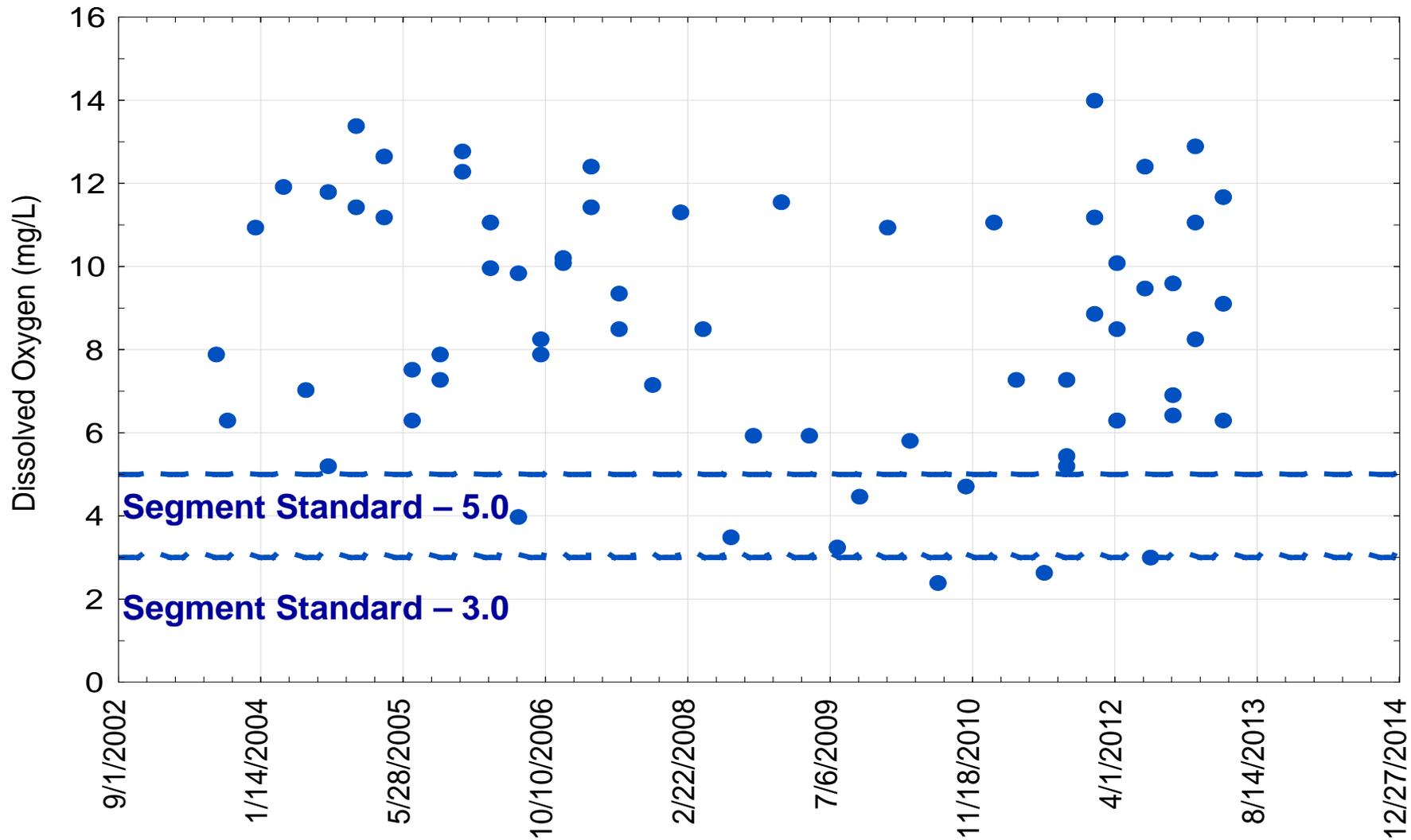
Sweetwater Creek



Legend

- MSW / Landfill
- Wastewater Outfall
- CAFO
- Superfund Site
- Segment Boundary
- 0201 Segment ID
- Hydrology
- Urbanized Area
- County Boundary
- HUA Boundary
- Red Reach V

Sweetwater Creek
Segment 0299A_01
Dissolved Oxygen



What is an RUAA



- A Recreational Use Attainability Analysis (RUAA) is a specific type of Use Attainability Analysis (UAA) focused on determining whether or not the presumed/assigned use of a particular water body is actually appropriate for the said water body.
- The *2010 Texas Surface Water Quality Standards* define four (4) recreational use designations.

RUAA Designations



- **Primary Contact Recreation 1 – 126 MPN Geomean**
- **Secondary Contact Recreation 1 – 630 MPN Geomean**
- **Secondary Contact Recreation 2 – 1,030 MPN Geomean**
- **Noncontact Recreation – 2,060 MPN Geomean**

RUAAs Affect Water Quality Standards



- In Texas, bacteriological water quality standards are applied to a water body based on the assigned recreational use.
- Virtually, all water bodies were assumed to be Primary Contact Recreation 1.
- In order to change a water body's assigned recreational use, a RUAA must be conducted.

Process of a RUAA



- Public meeting is held
- Field studies are then conducted
- 2nd public meeting is held to present data and findings before publishing
- After the public comment period is closed, the final report is sent to TCEQ

Canadian and Red River Basins RUAAAs



- 2008, TCEQ began utilizing RUAAAs in Texas
- TIAER has conducted and completed RUAAAs on 4 segments in the Canadian and Red River Basins
 - 0101A – Dixon Creek
 - 0214B – Buffalo Creek
 - 0230A – Paradise Creek
 - 0299A – Sweetwater Creek
- ***<http://tiaer.tarleton.edu/ruaa/index.html>***

Canadian River Basin Overview



- Due to the enduring drought, the Authority has had minimal success to expand monitoring within the Canadian River Basin.
- A subtle decline in dissolved solids concentrations over the past twelve months .
- Until regular rainfall returns, it will be a challenge to remove any impairments or concerns with future monitoring events.

FY2016 Goals



- Continue to educate the general public on the conservation and protection of this precious natural resource.
- Continue to increase the number of Clean Rivers Program monitoring partners, increasing the amount of water quality data, thus aiding future assessments.
- Pursue additional monitoring locations to aid in identifying impaired water bodies.
- Continue to collect *Enterococcus* data on streams with elevated conductivity to better assess the presence of bacteria.

Questions?

