

# **FY2016 Basin Highlights Report & FY2017 Coordinated Monitoring**



**CANADIAN AND RED RIVER  
BASINS ADVISORY COMMITTEE MEETING**



**APRIL 19, 2016 – 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
- Biological Monitoring in the Canadian River Basin
- Future Monitoring Goals for FY2017

# Water Quality Parameters



## Solids/Dissolved Solids

Parameter	Cause / Source	Impact
<b>TSS</b> <b>(Total Suspended Solids)</b>	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.
<b>TDS</b> <b>(Total Dissolved Solids )</b>	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.
<b>Chloride</b>	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.
<b>Sulfate</b>	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
<b>Ammonia</b>	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.
<b>Nitrate</b>	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.
<b>Total Phosphorus</b>	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.
<b>Chlorophyll-a</b>	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
<b><i>E. coli</i></b>	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.
<b>Enterococcus</b>	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
<b>Dissolved Oxygen</b>	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.
<b>pH</b>	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.
<b>Temperature</b>	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



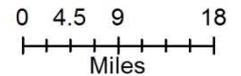
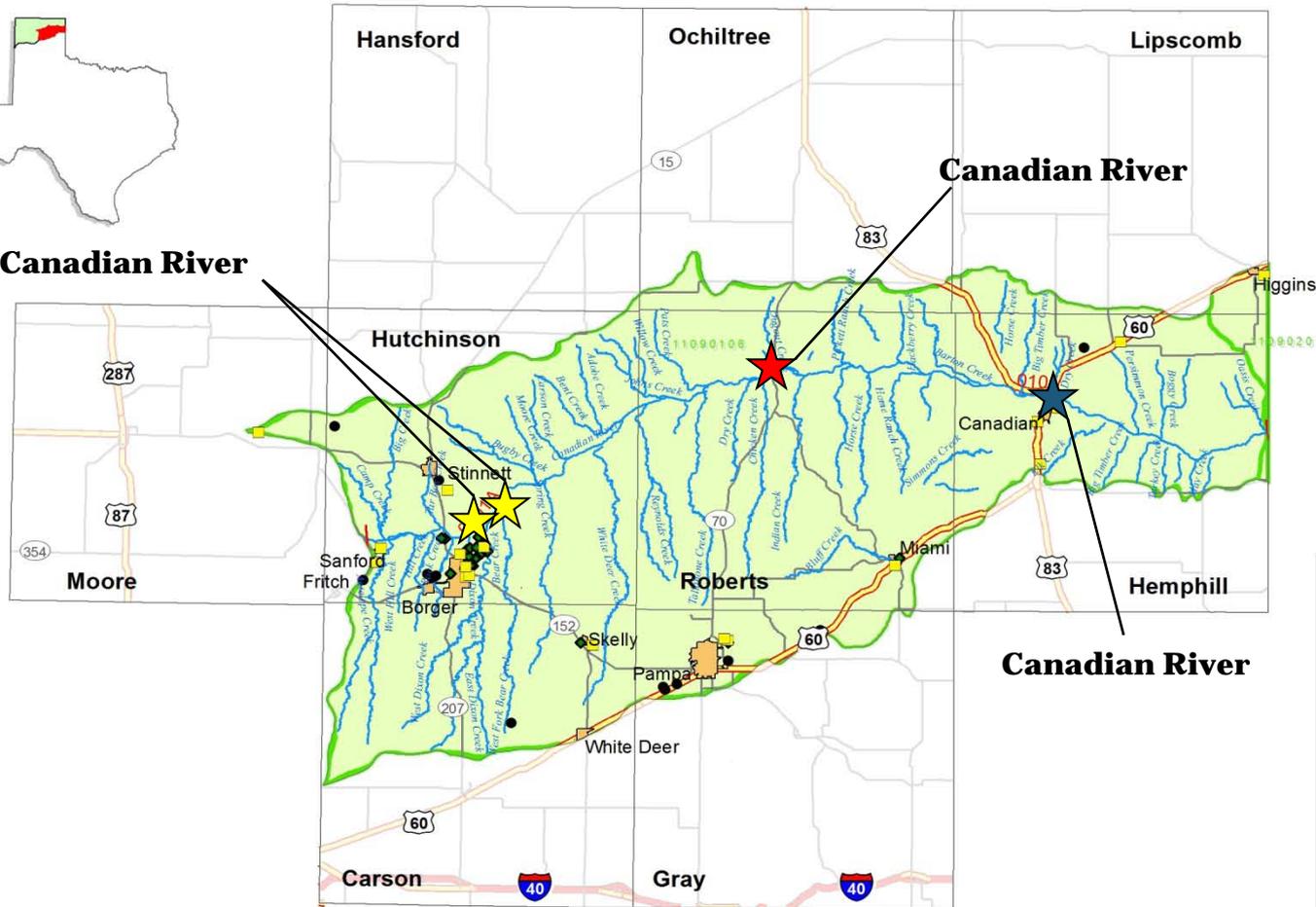
- Canadian River Below Lake Meredith (0101)
  - **Bacteria impairment**
  - **Chlorophyll-*a*, ammonia, and depressed DO concerns**
- Dixon Creek (0101A)
- Rock Creek (0101B)
- White Deer Creek (0101C)



# Canadian River Basin Reach I



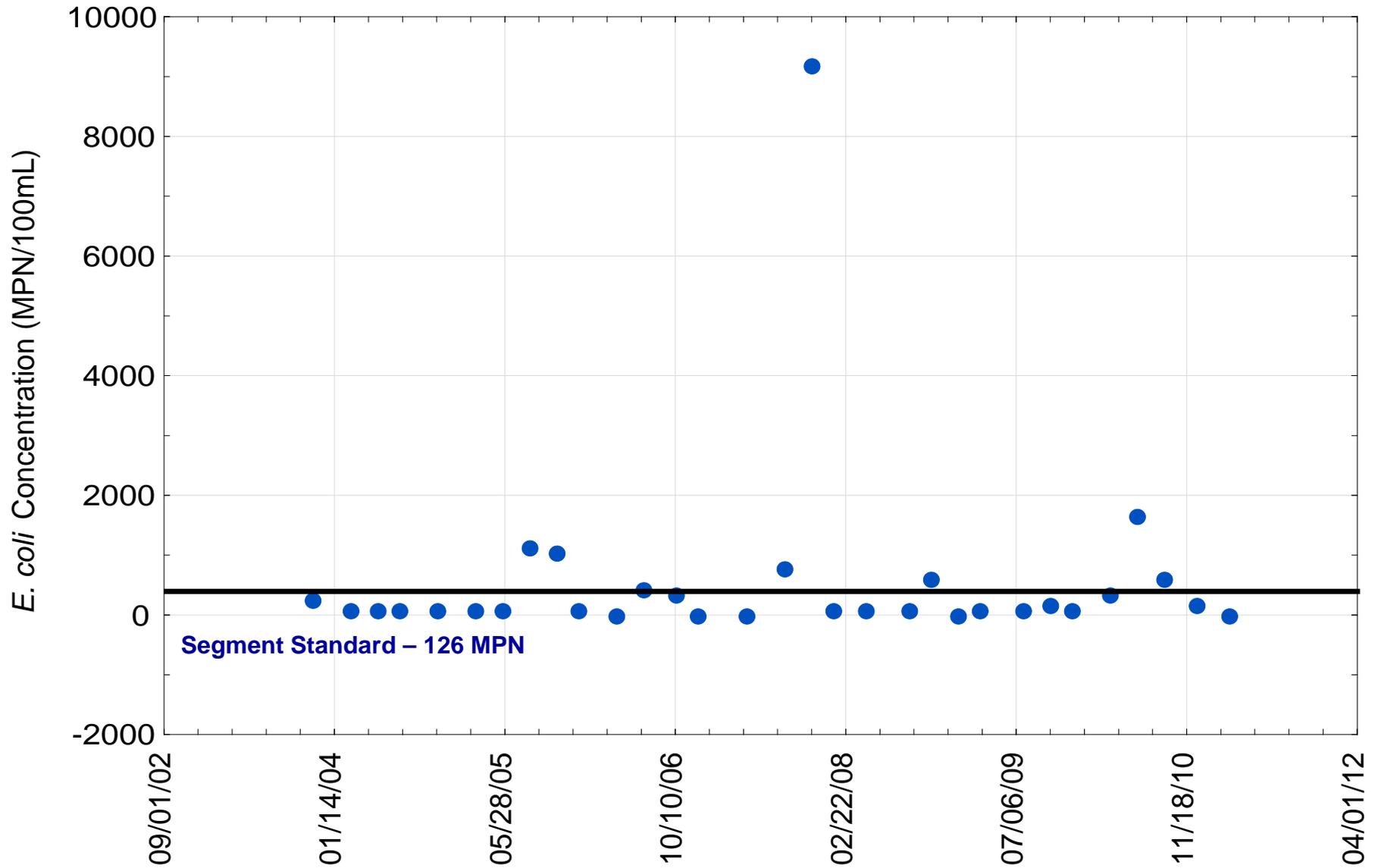
Canadian River



### Legend

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

Canadian River Below Lake Meredith  
Segment 0101\_03  
*E. coli*



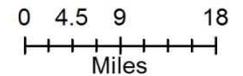
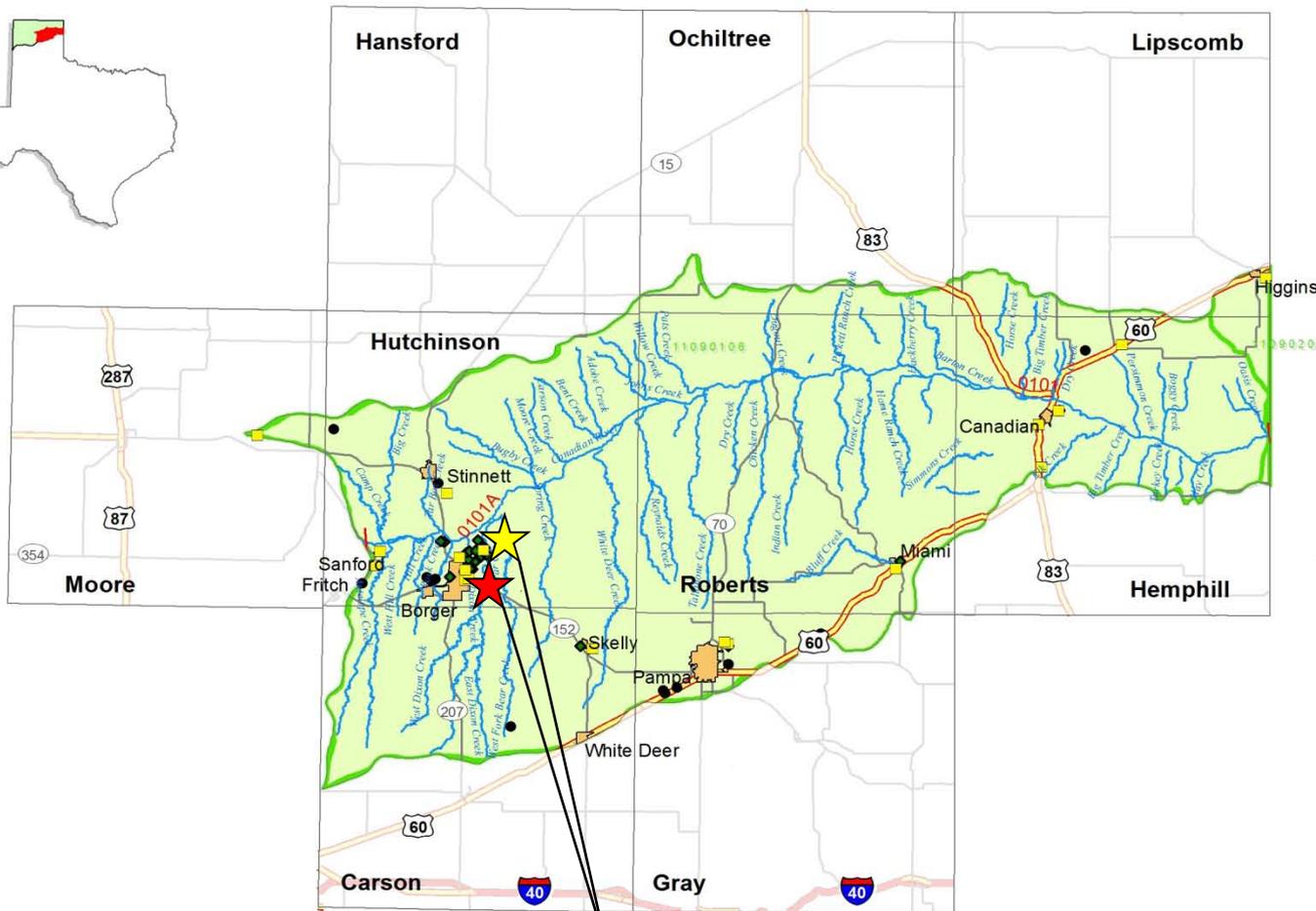
# Canadian Reach I



- 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 – 4/14/2015



# Dixon Creek at SH 152 – 1/12/2016



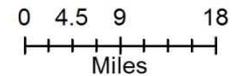
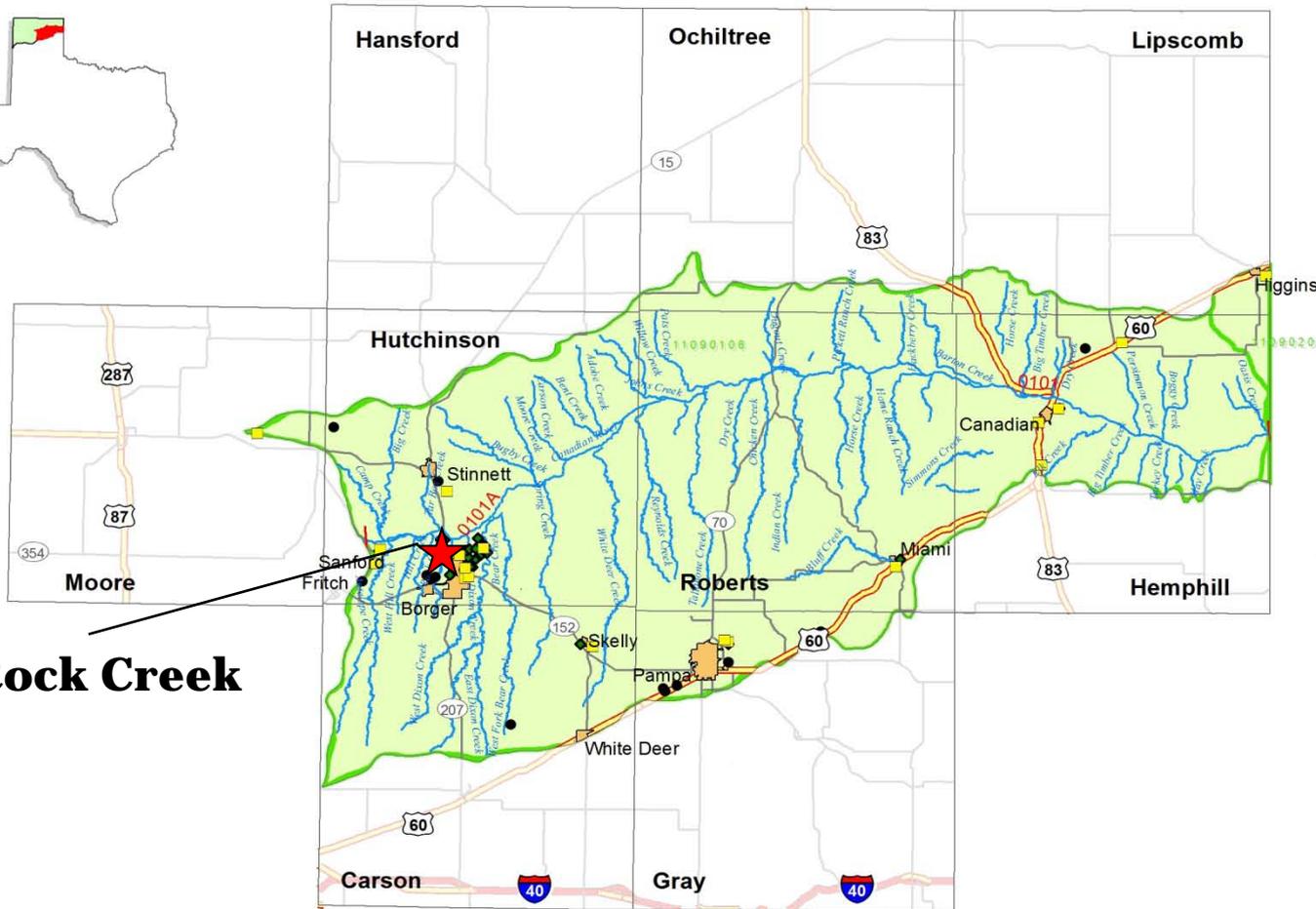
# Canadian Reach I



- 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

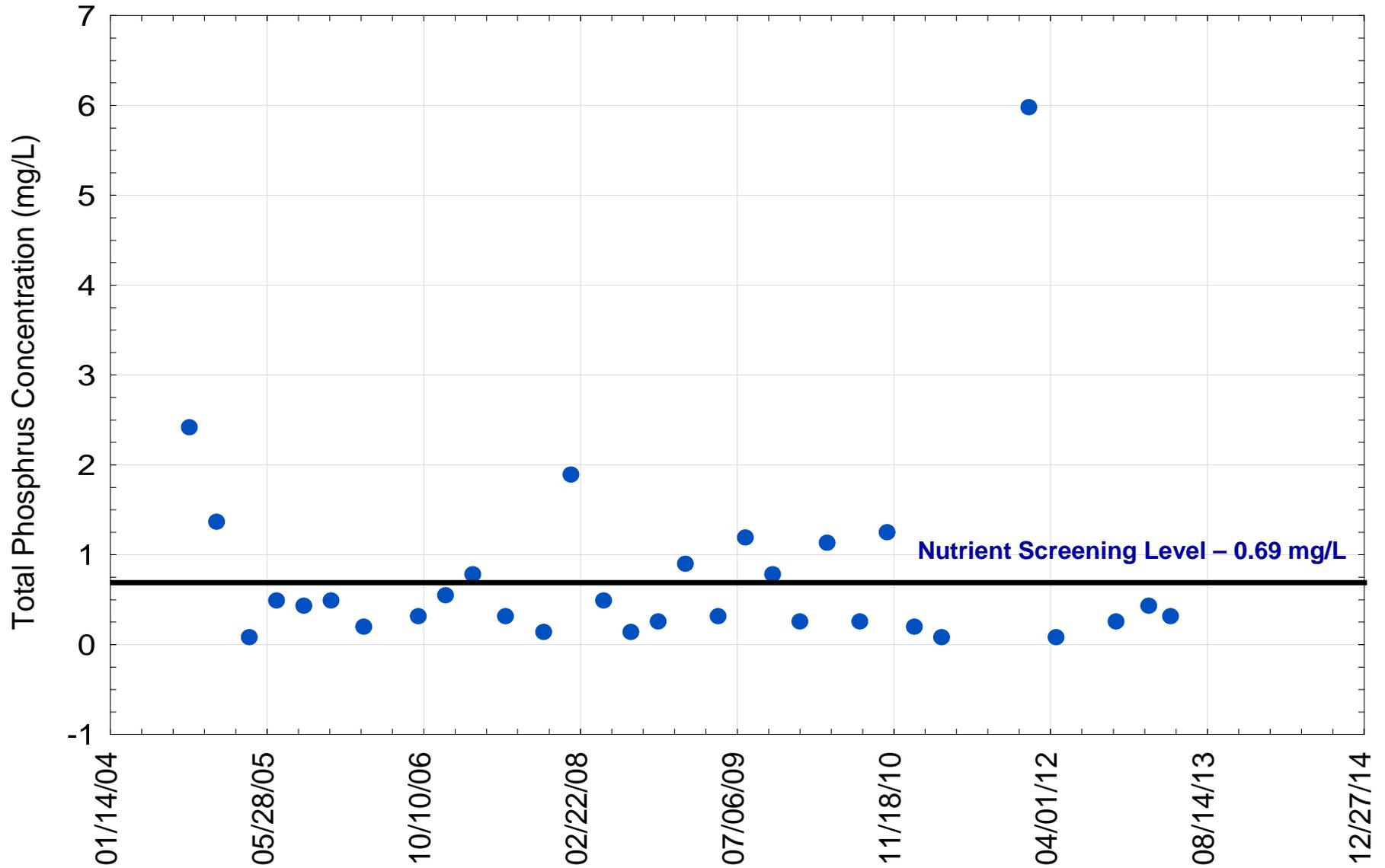


**Rock Creek**

### 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 Phosphorus



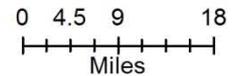
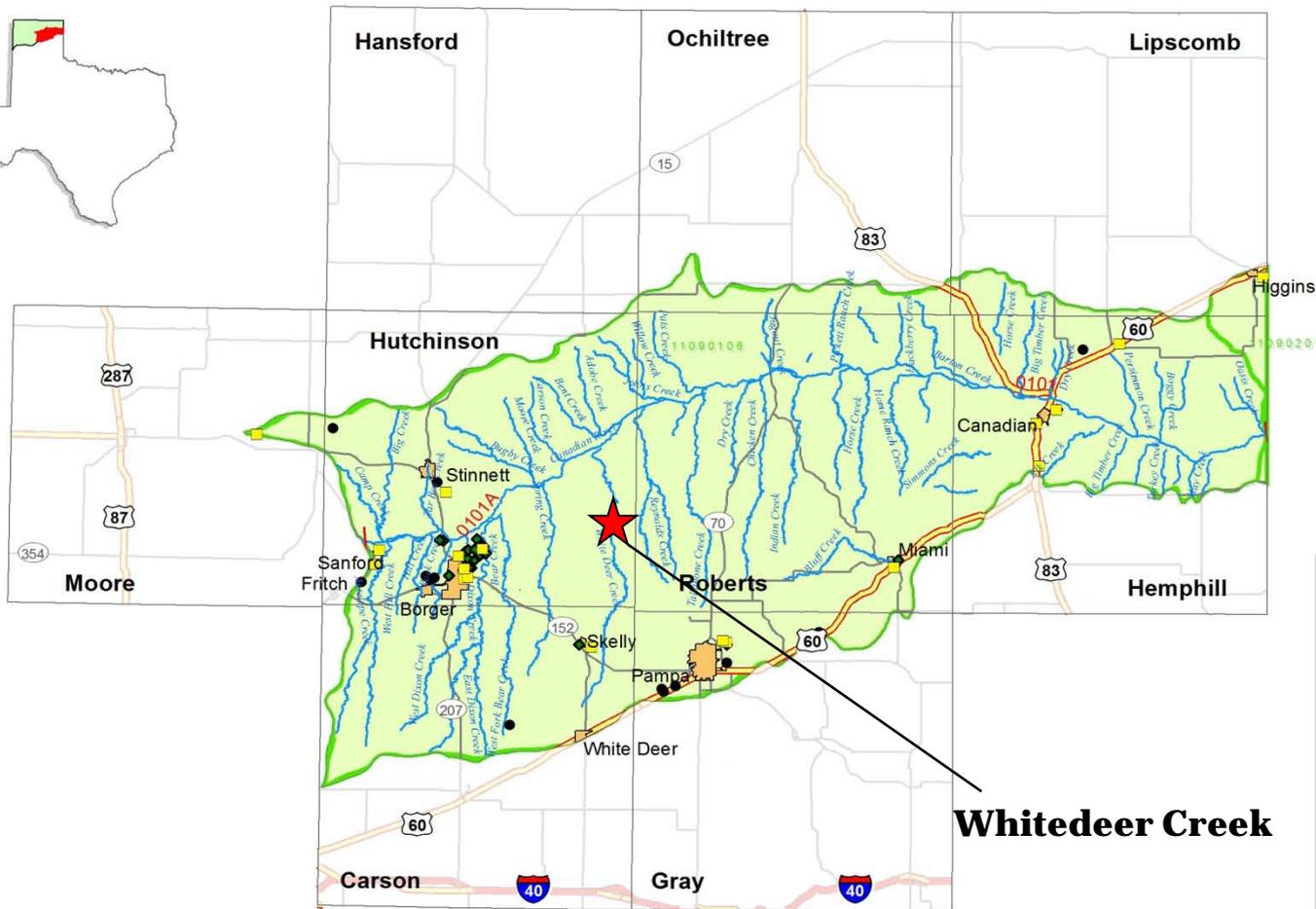
# Canadian Reach I



- Canadian River Below Lake Meredith (0101)
- Dixon Creek (0101A)
- Rock Creek (0101B)
- White Deer Creek (0101C)
  - No impairments or concerns
  - Aquatic Life Monitoring – May 2016



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

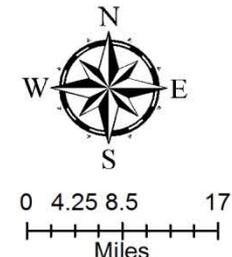
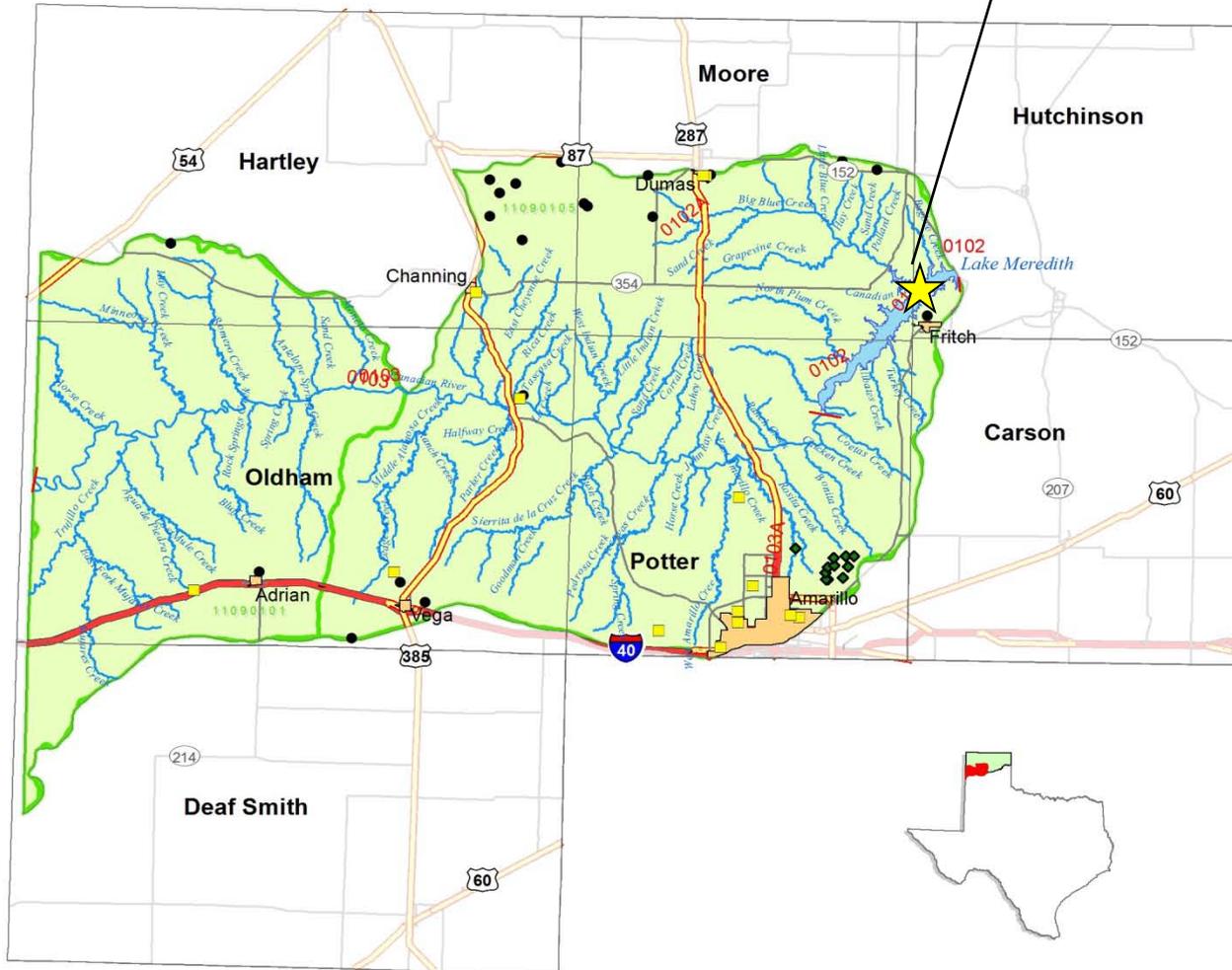


# Canadian River Basin

## Reach II



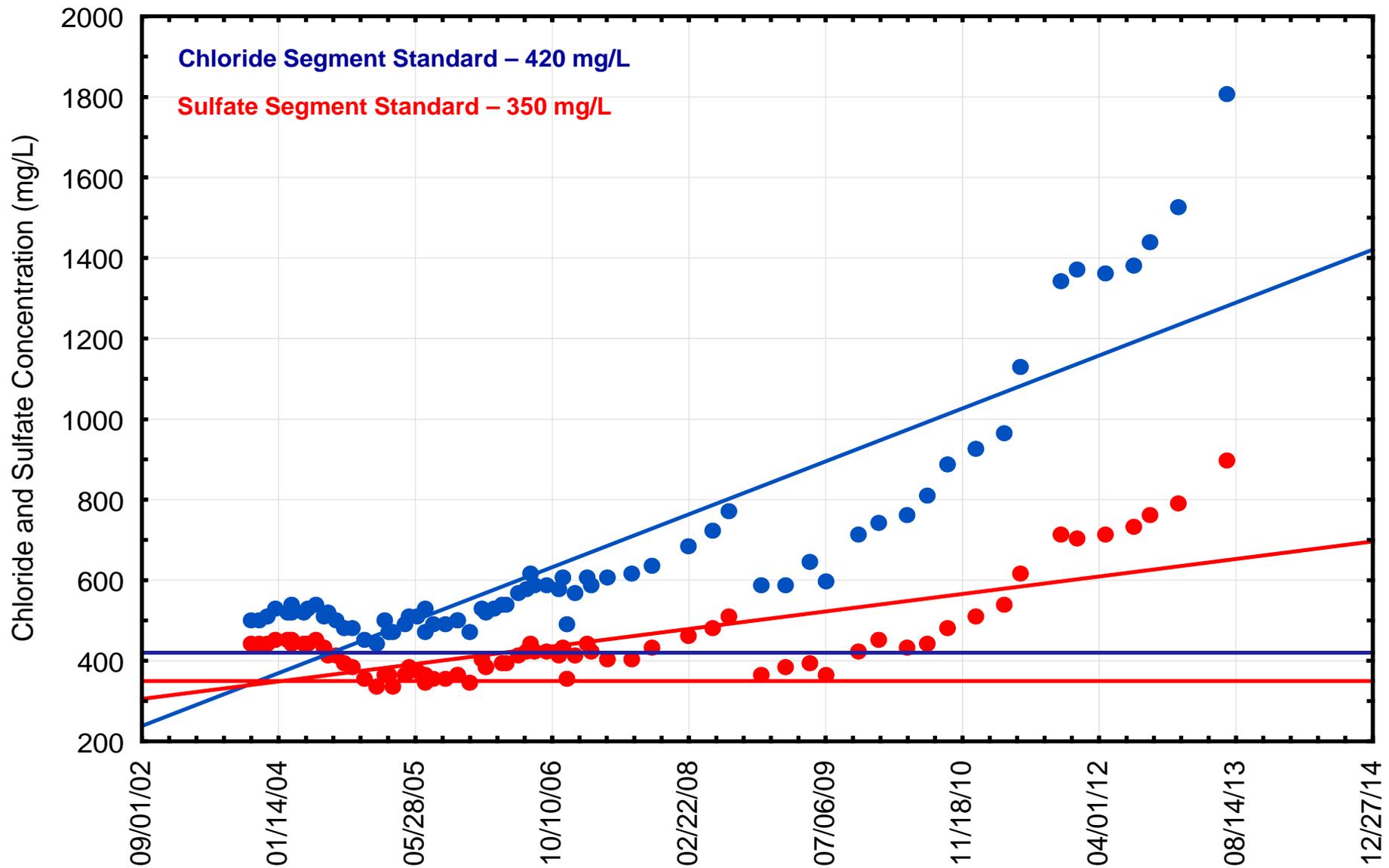
### Lake Meredith



### 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

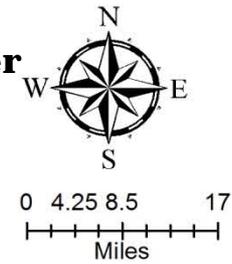
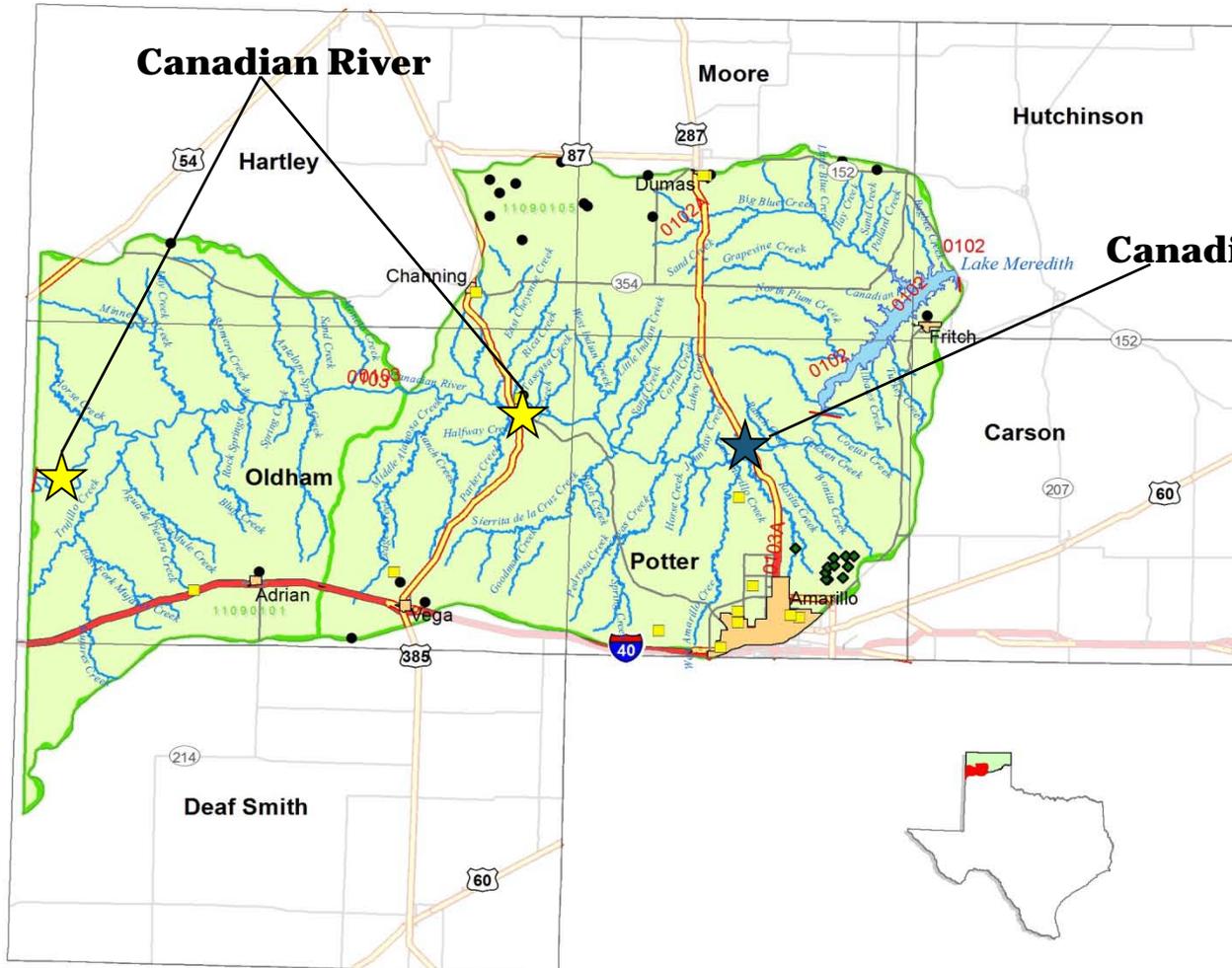


- Lake Meredith (0102)
- Canadian River Above Lake Meredith (0103)
  - **Chloride impairment**
  - **Bacteria concern**
- Big Blue Creek (0102A)
- East Amarillo Creek (0103A)
- Unnamed Tributary to West Amarillo Creek (0103C)



# 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

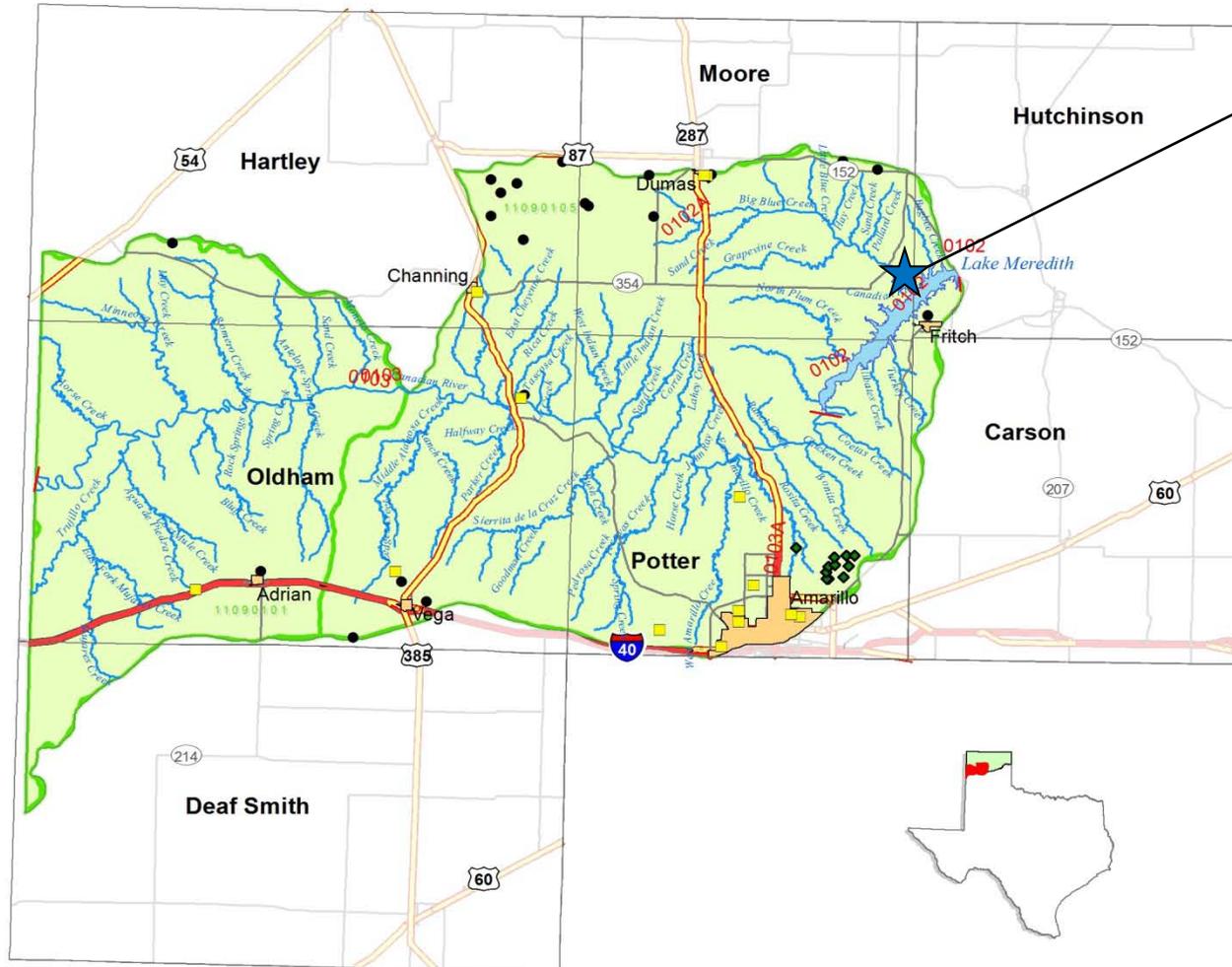
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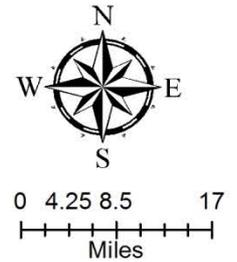
- Lake Meredith (0102)
- Big Blue Creek (0102A)
- Canadian River Above Lake Meredith (0103)
- Big Blue Creek (0102A)
  - **No impairments or concerns**
- East Amarillo Creek (0103A)
- Unnamed Tributary to West Amarillo Creek (0103C)



# 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- 4/12/2016



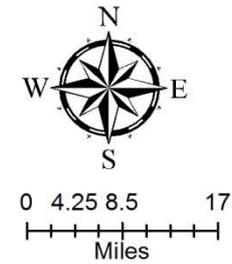
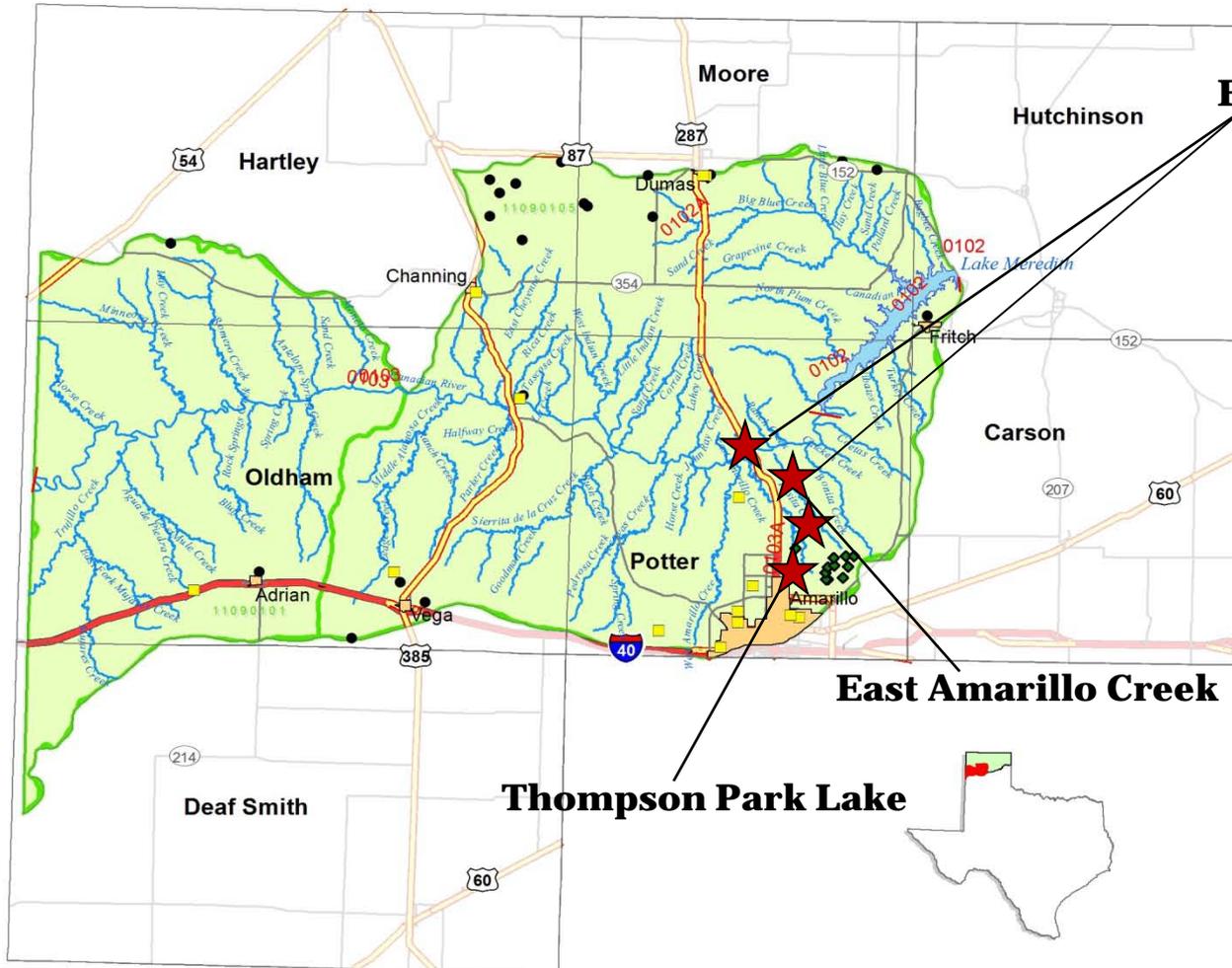
# Canadian Reach II



- 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)



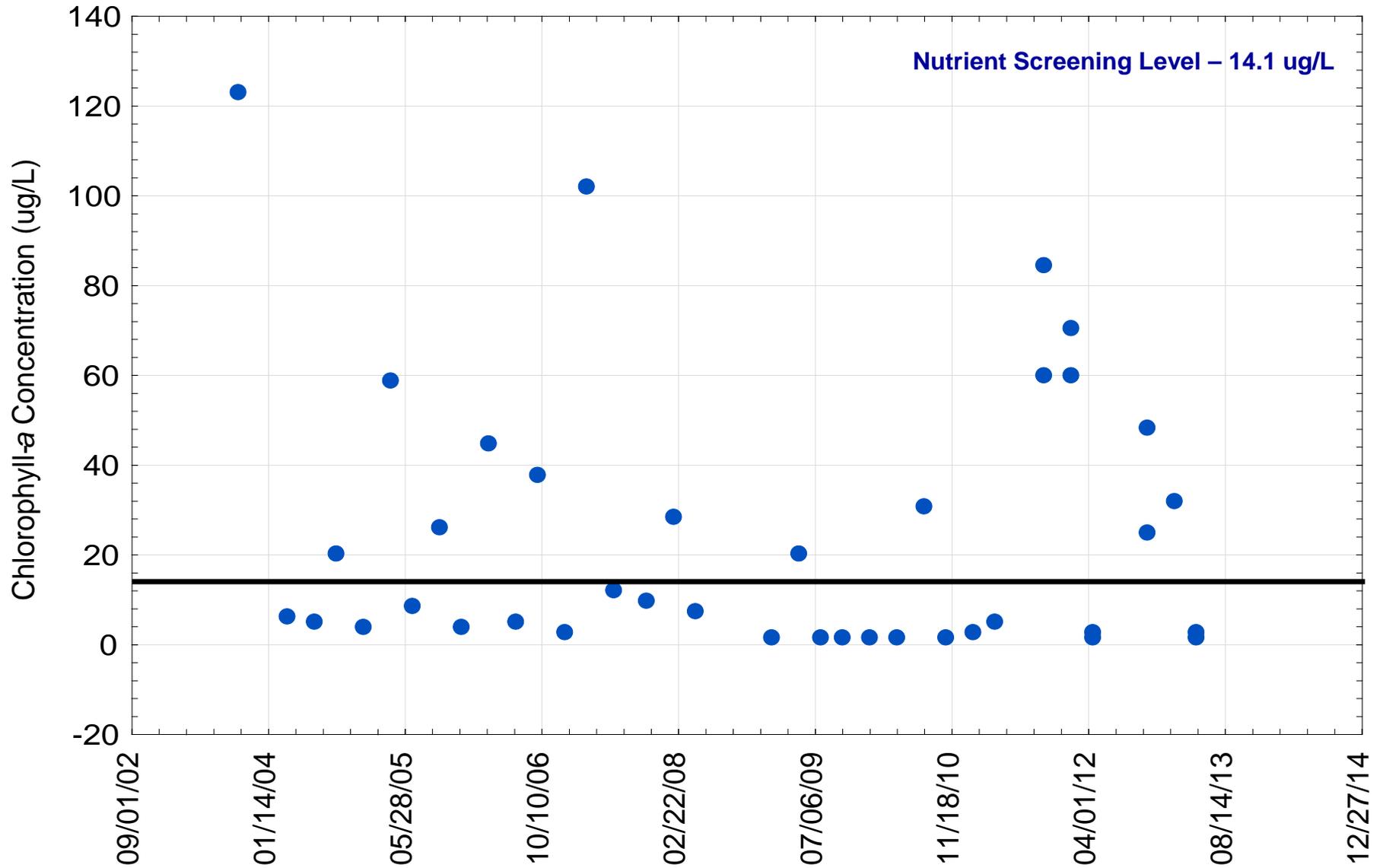
# Canadian River Basin Reach II



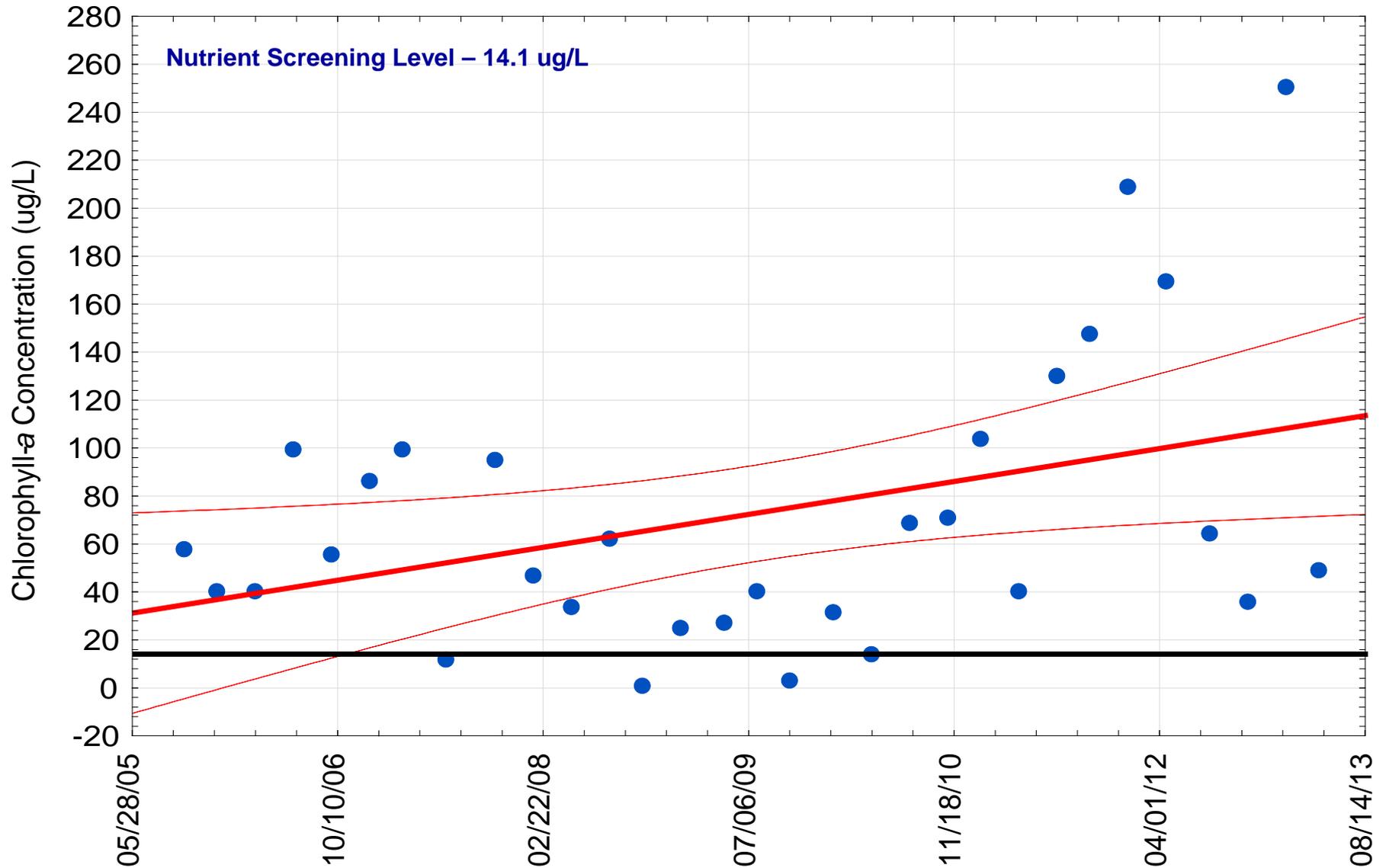
**Legend**

- 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  
Chlorophyll -a



East Amarillo Creek  
Segment 0103A\_02  
Chlorophyll -a



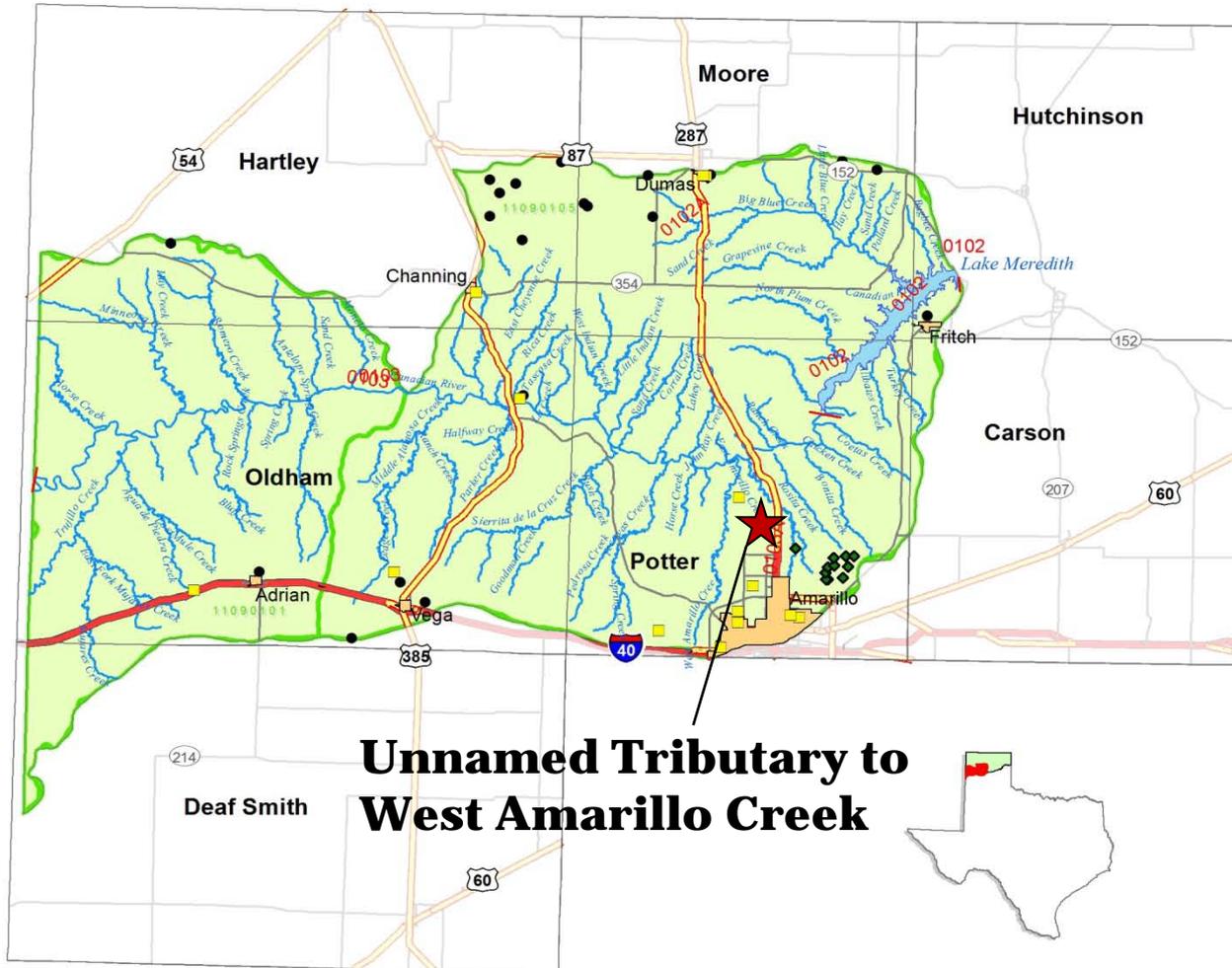
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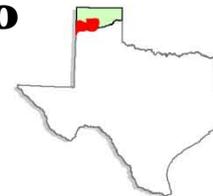
- Lake Meredith (0102)
- Big Blue Creek (0102A)
- Canadian River Above Lake Meredith (0103)
- East Amarillo Creek (0103A)
- Unnamed Tributary to West Amarillo Creek (0103C)
  - **No impairments**
  - **Chlorophyll-*a* concern**



# Canadian River Basin Reach II



**Unnamed Tributary to  
West Amarillo Creek**



# Unnamed Tributary of West Amarillo Creek



# Canadian Reach III



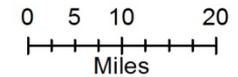
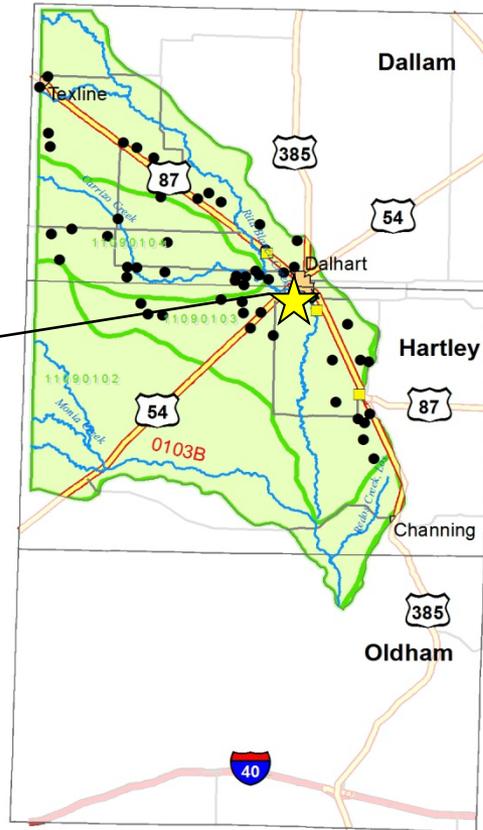
- Rita Blanca Lake (0105)
  - pH and **chloride** impairment
  - Ammonia, chlorophyll-*a*, nitrate, total phosphorus concerns



# Canadian River Basin Reach III



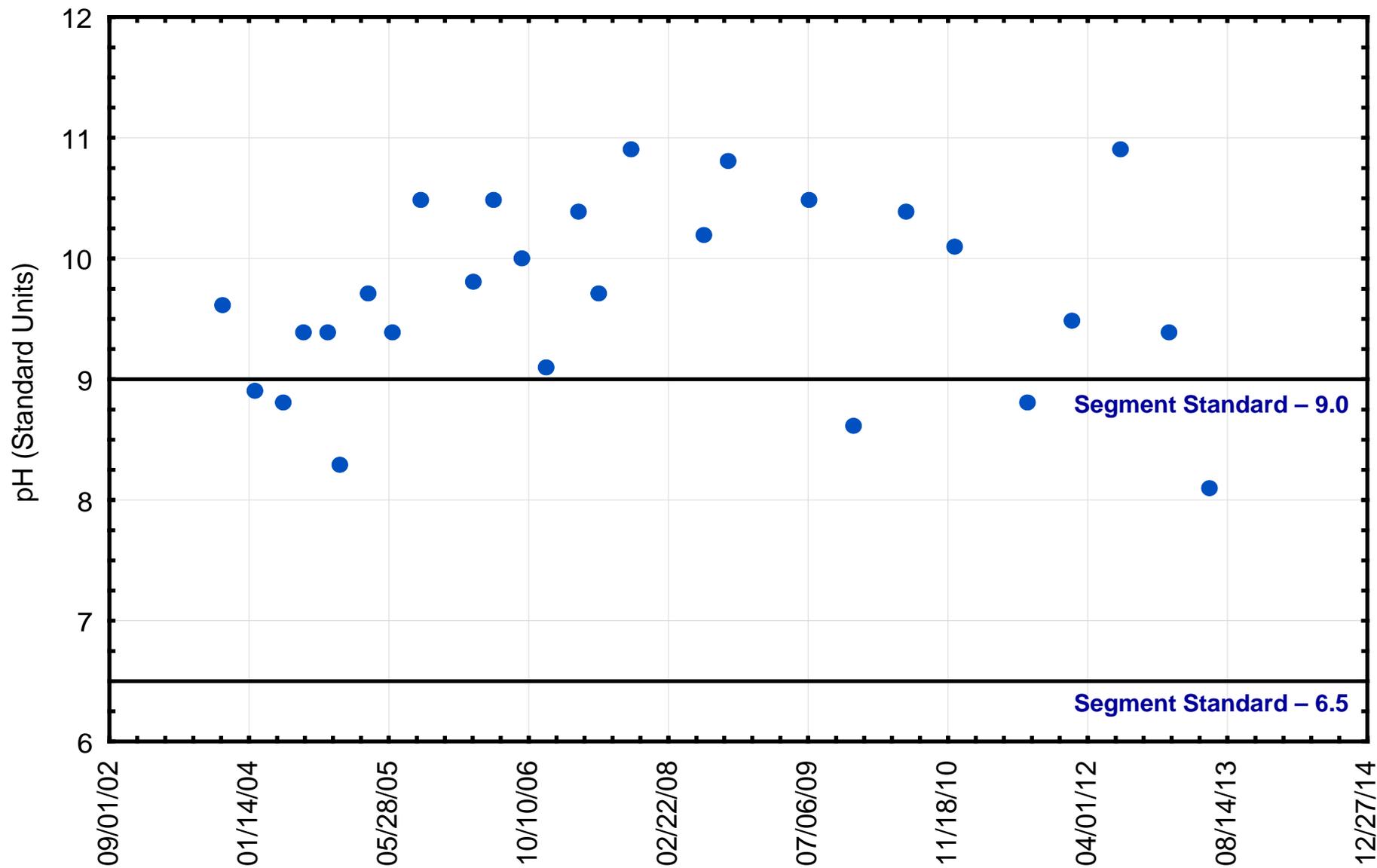
**Rita Blanca Lake**



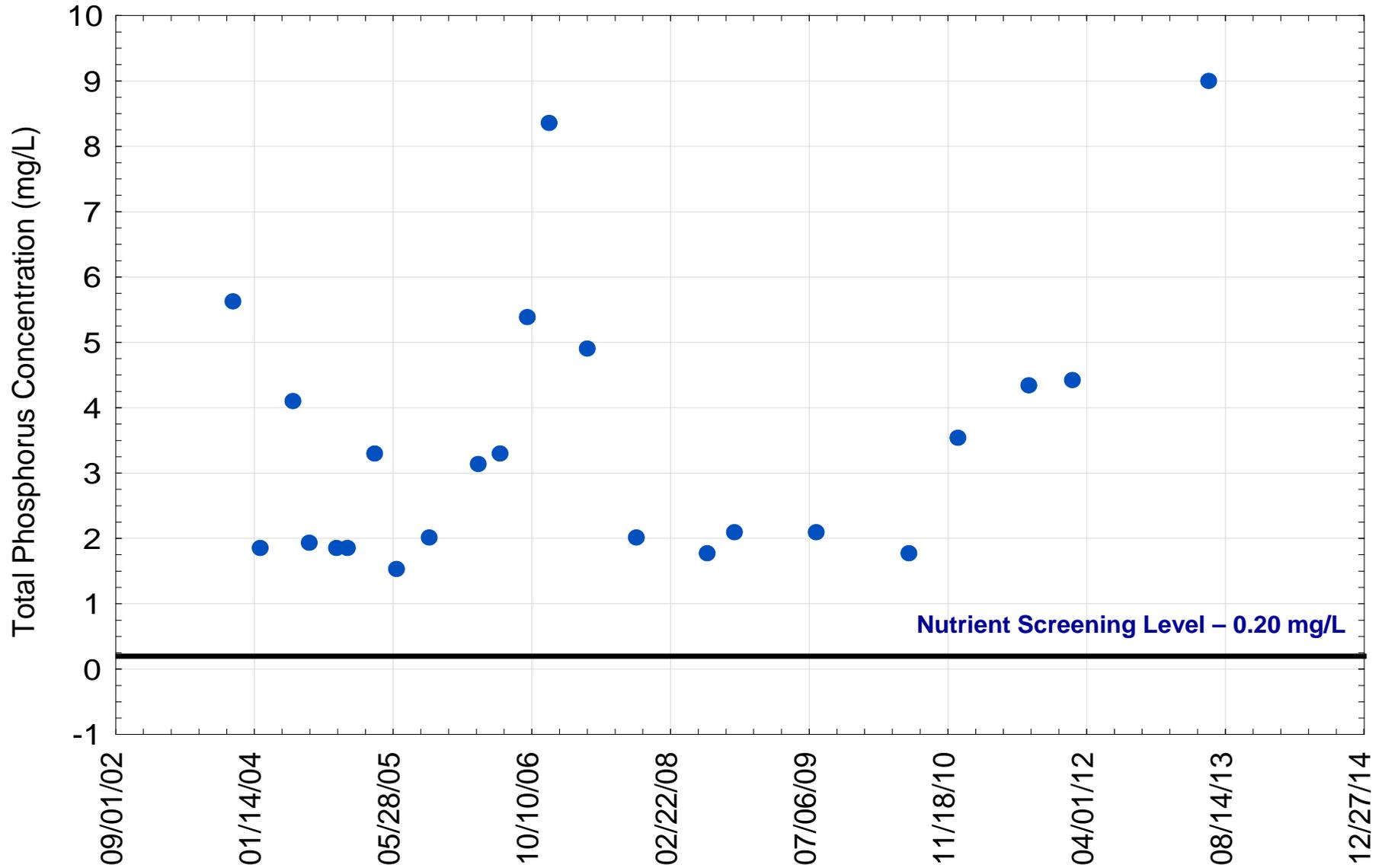
## Legend

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

Rita Blanca Lake  
Segment 0105\_01  
pH



Rita Blanca Lake  
Segment 0105\_01  
Total Phosphorus



# Canadian Reach IV



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

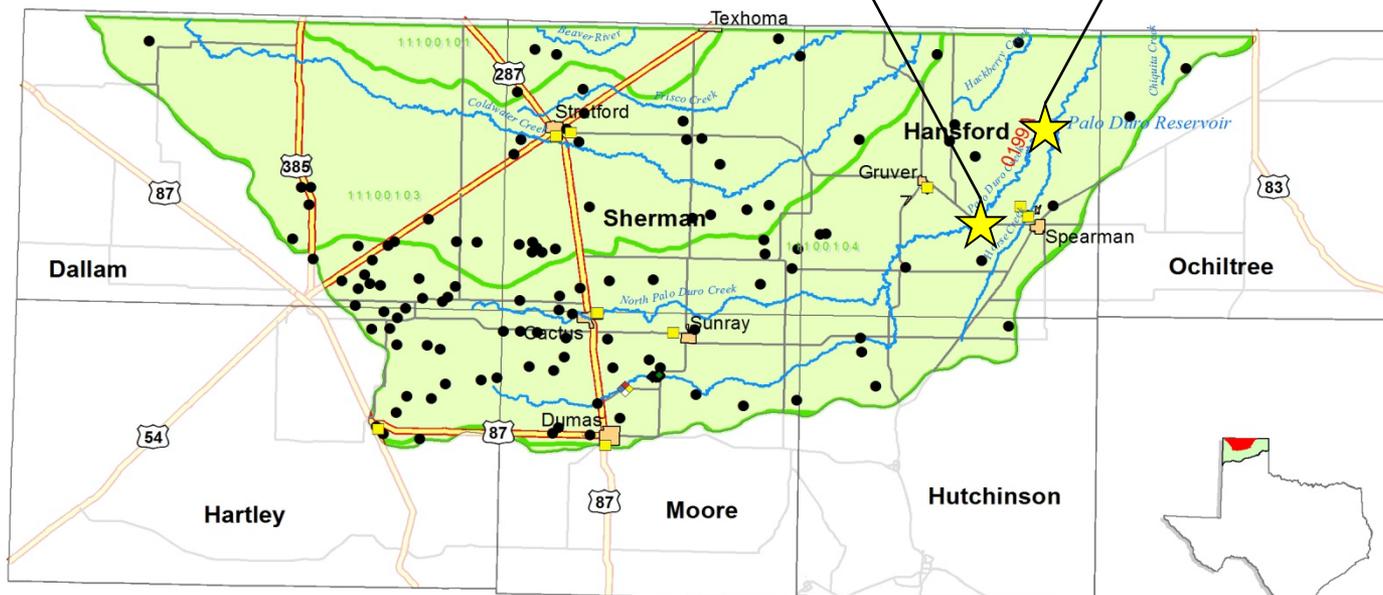


# Canadian River Basin Reach IV



**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

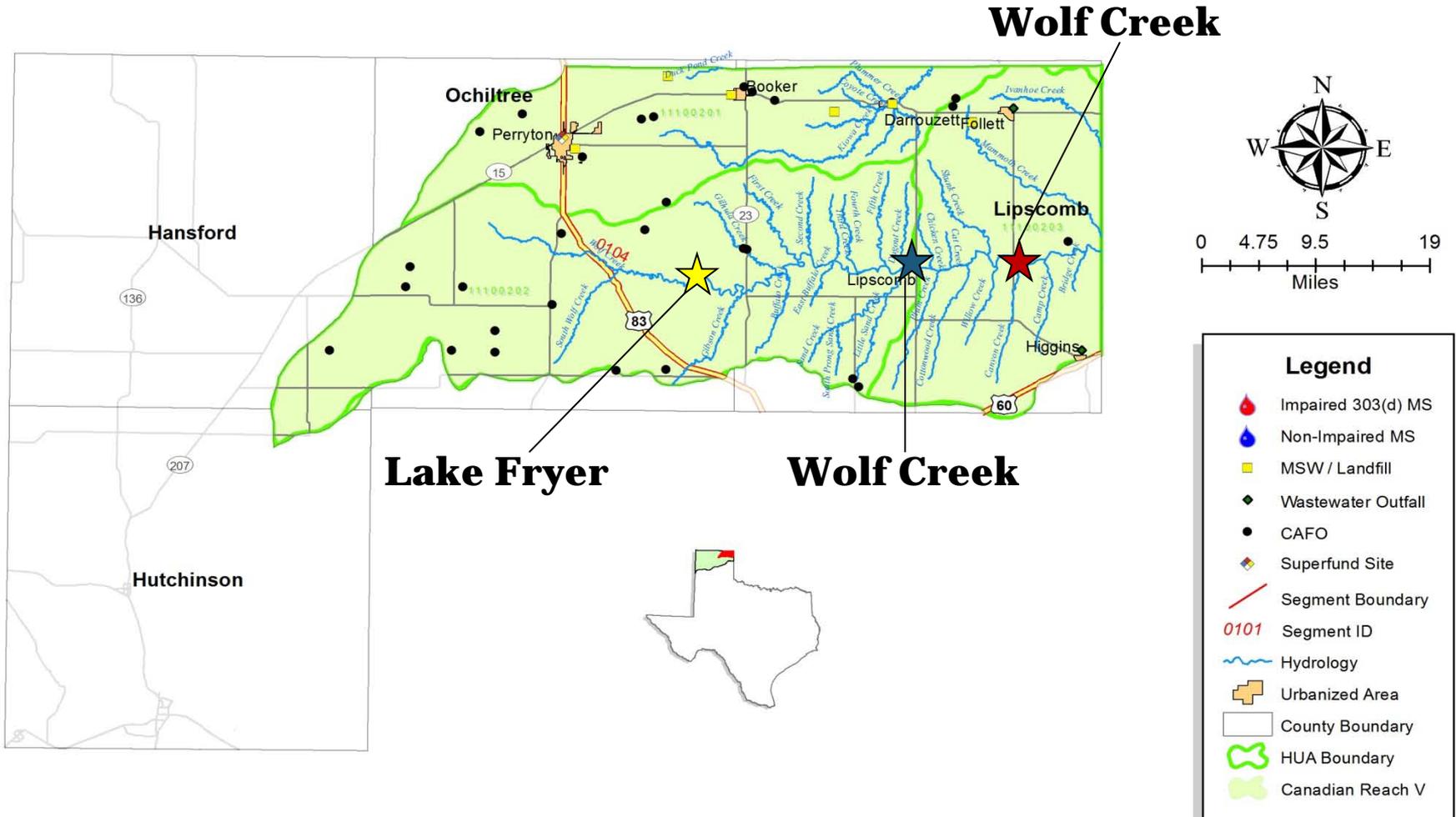


- **Wolf Creek (0104)**
  - **No impairments**
  - **Chlorophyll-a concern**
  - **Aquatic Life Monitoring – May 2016**
- **Kiowa Creek (0199B)**



# Canadian River Basin

## Reach V



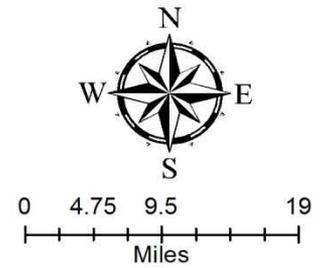
**Wolf Creek**

**Lake Fryer**

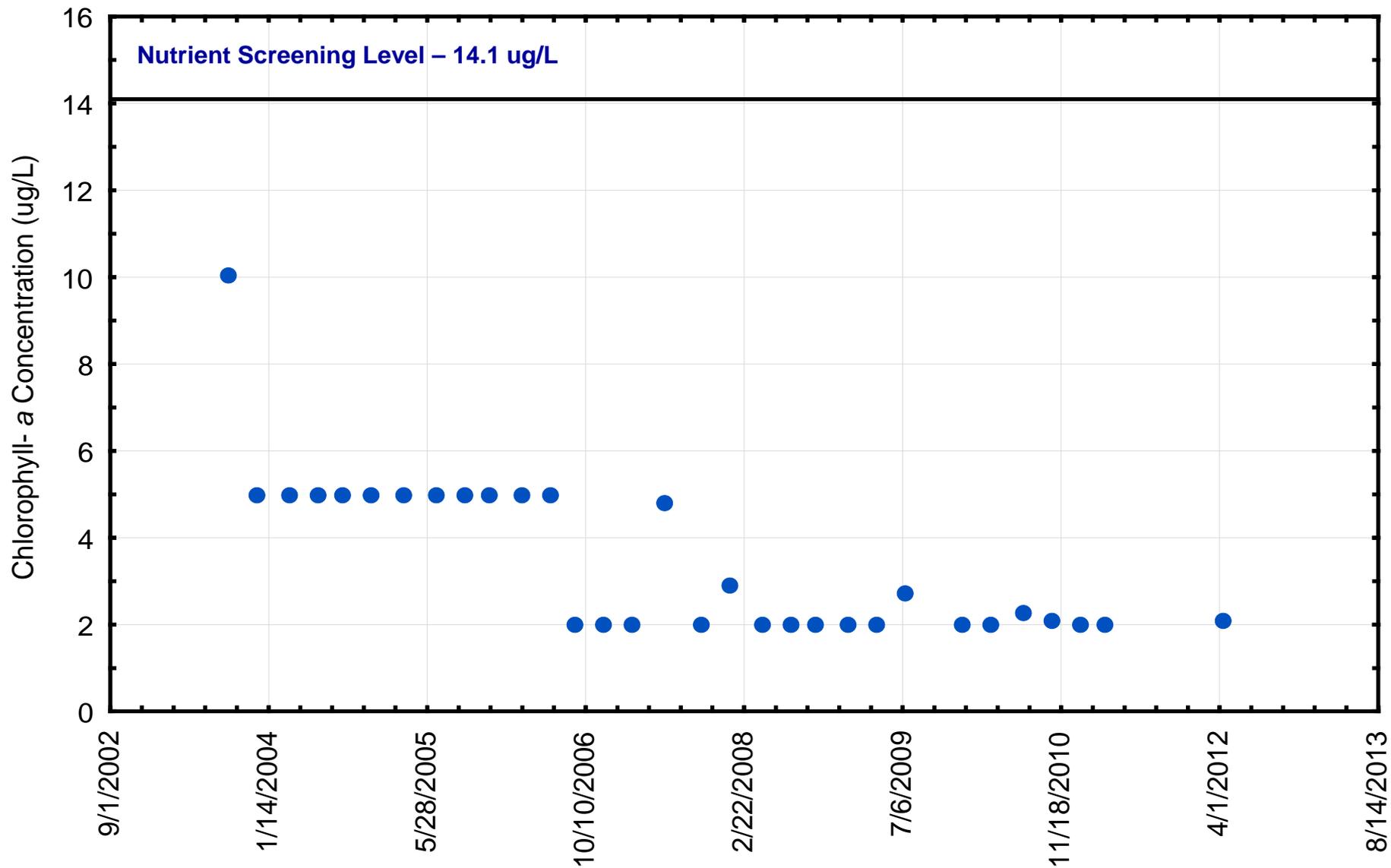
**Wolf Creek**

Hansford

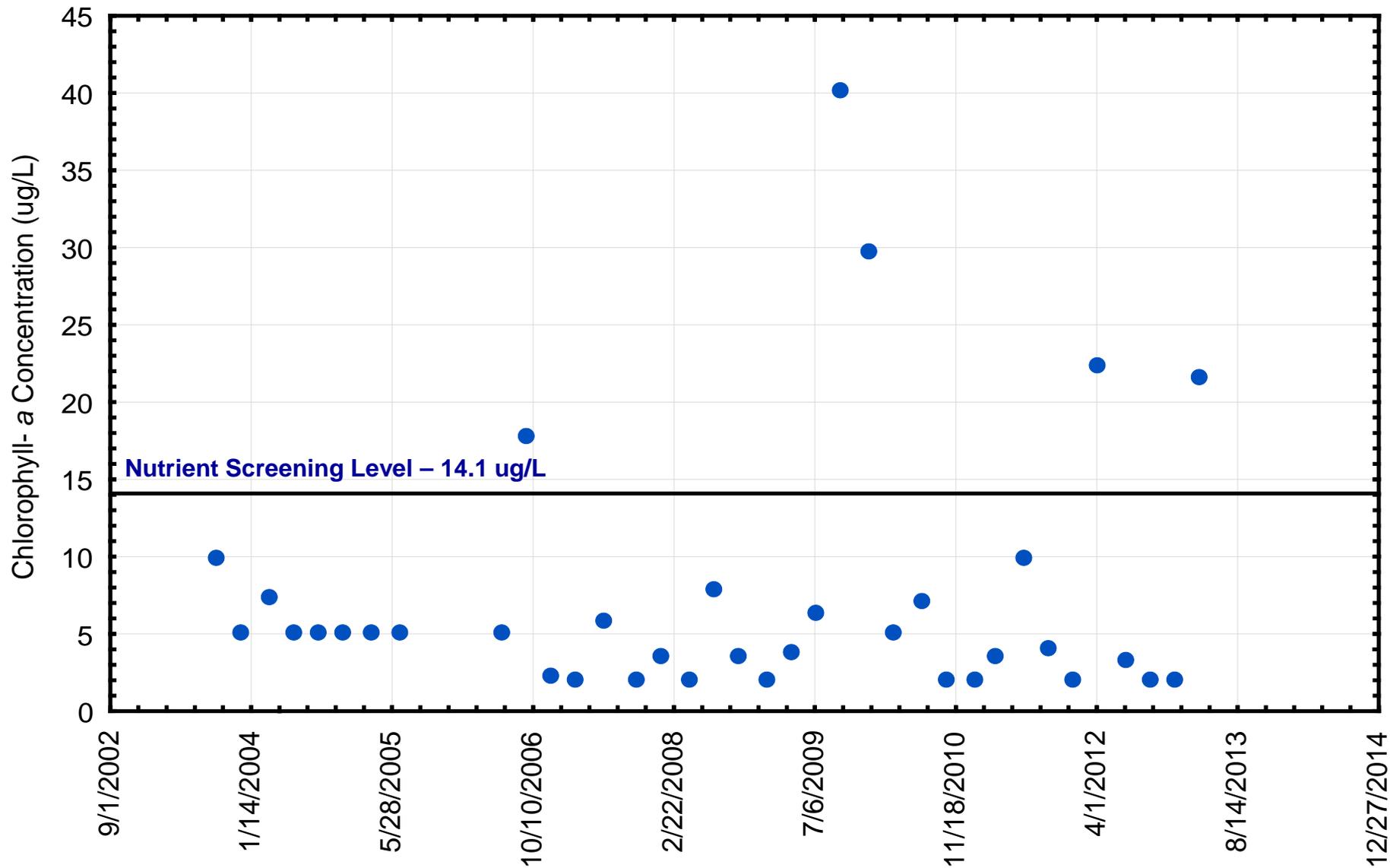
Hutchinson



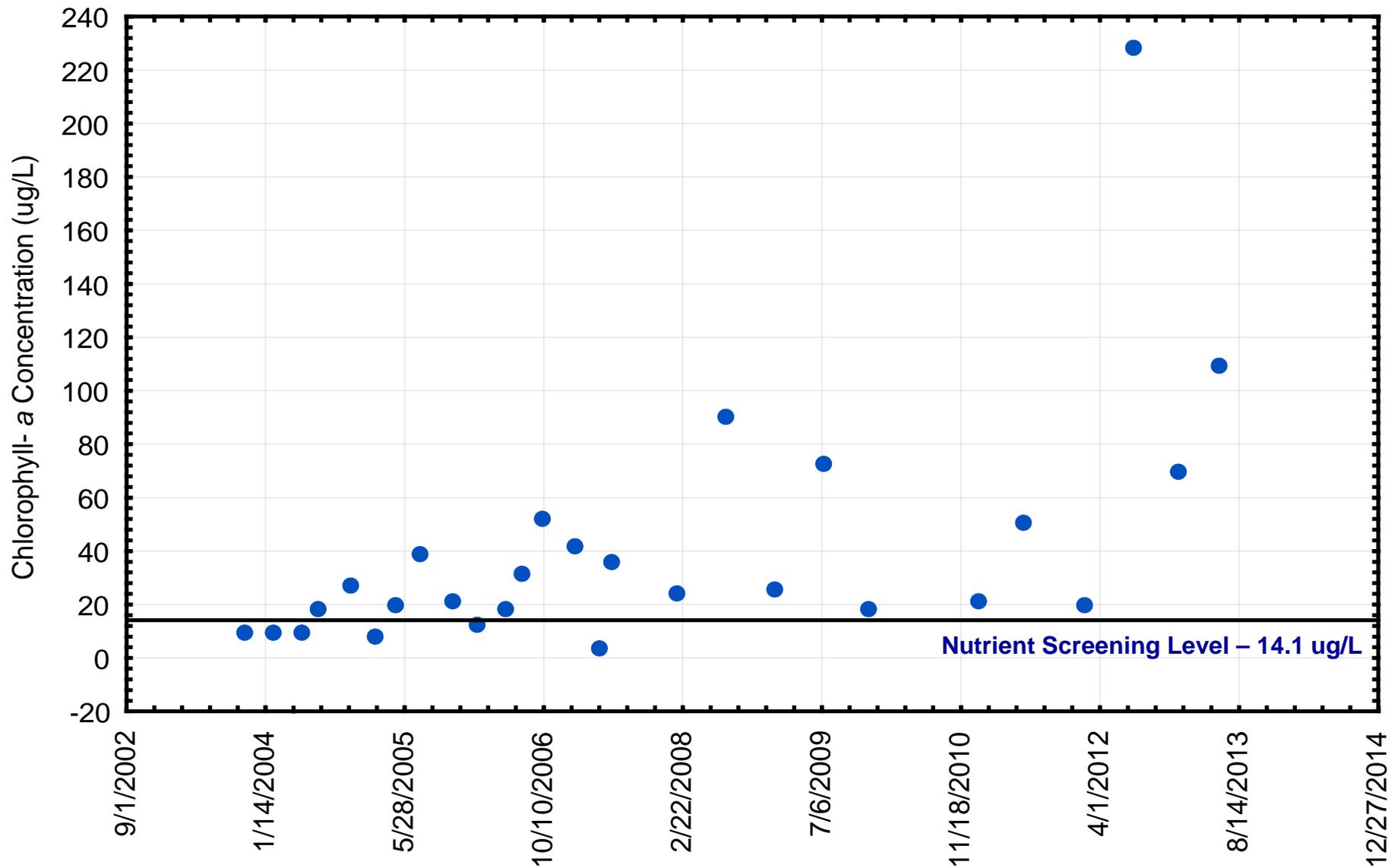
Wolf Creek at FM 1454  
Segment 0104\_01  
Chlorophyll-*a*



Wolf Creek at SH 305  
Segment 0104\_02  
Chlorophyll-a



Lake Fryer Mid-Lake  
Segment 0104\_03  
Chlorophyll-a



# Canadian Reach V



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

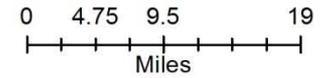
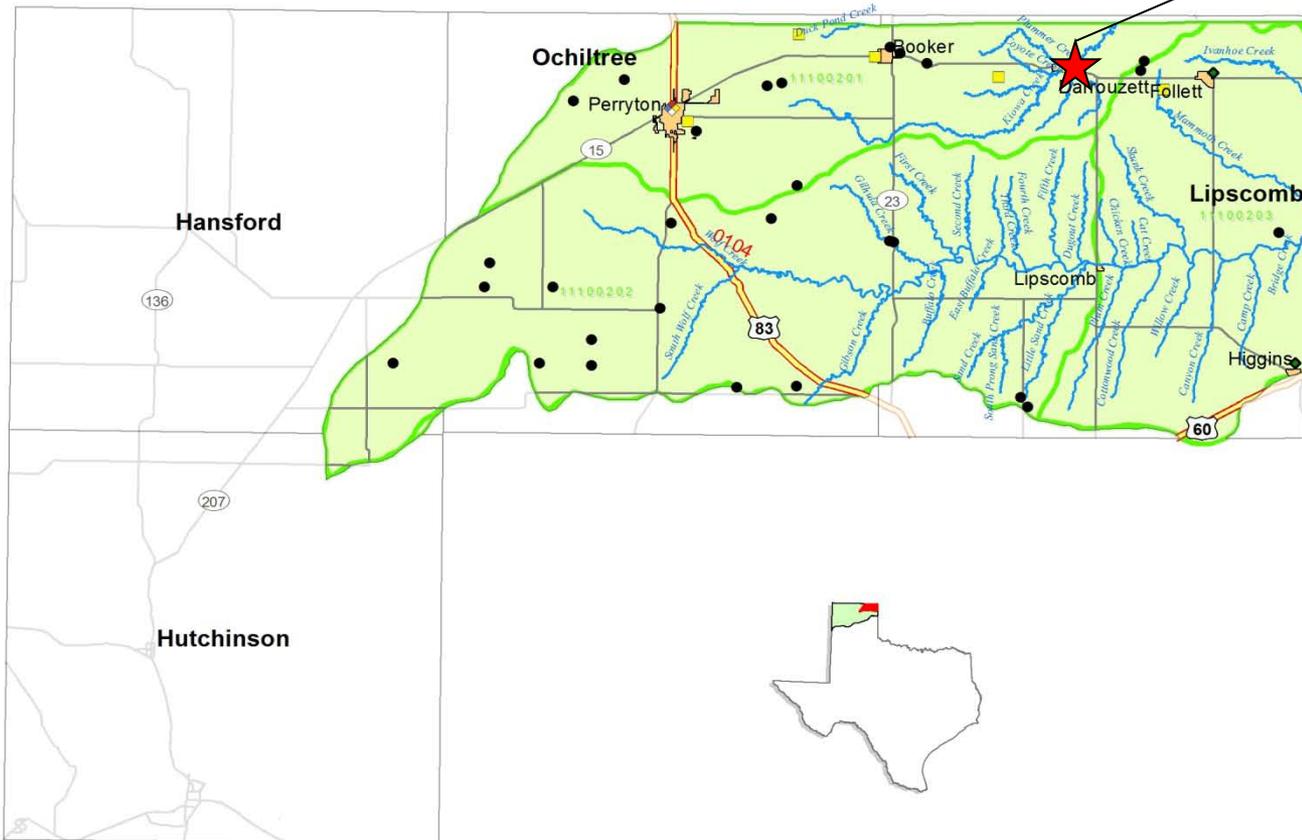


# Canadian River Basin

## 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)

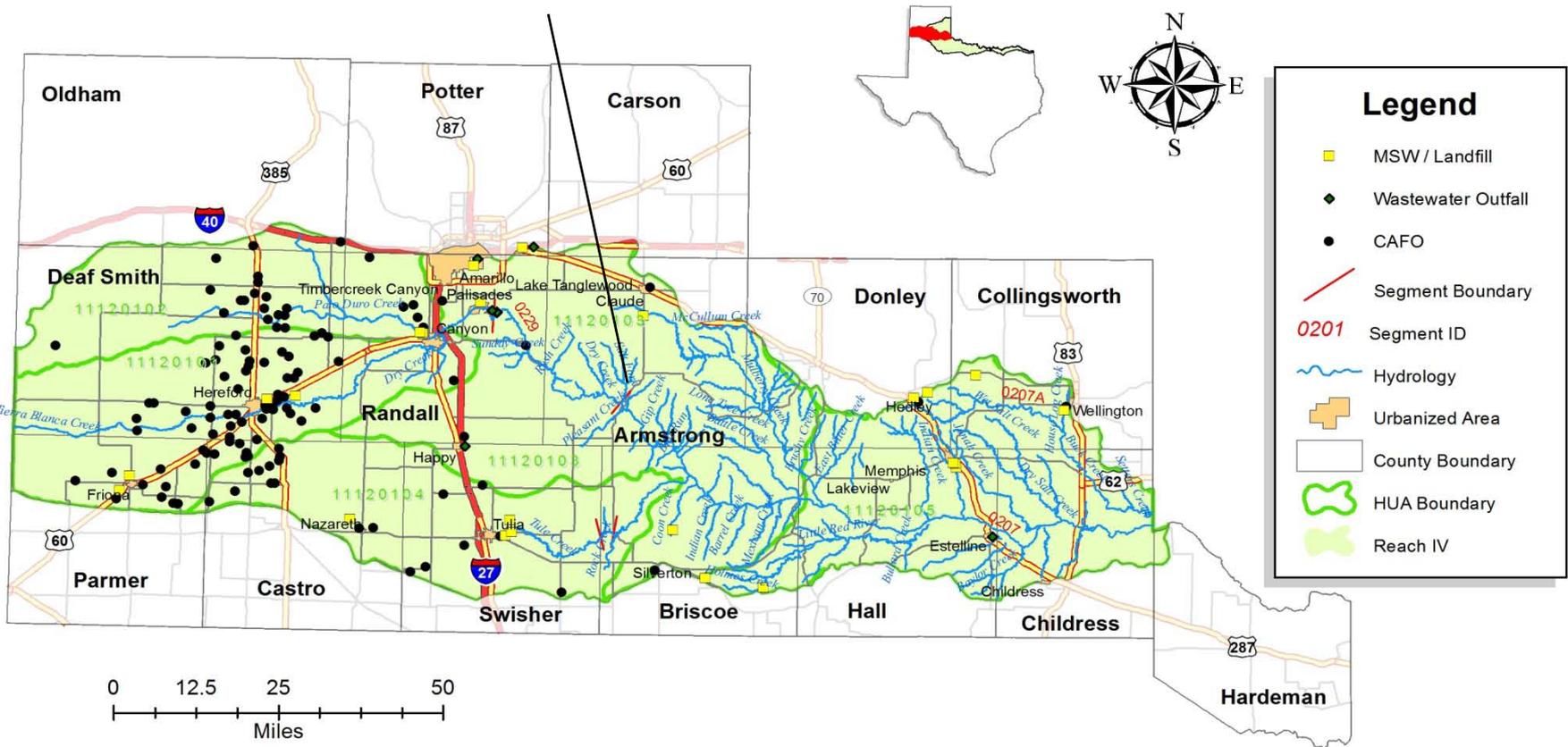


# Red River Basin

## Reach IV



### Lower PDTF Red River



# LPDTF Red River at US 70 – 4/13/2016



# Red Reach IV

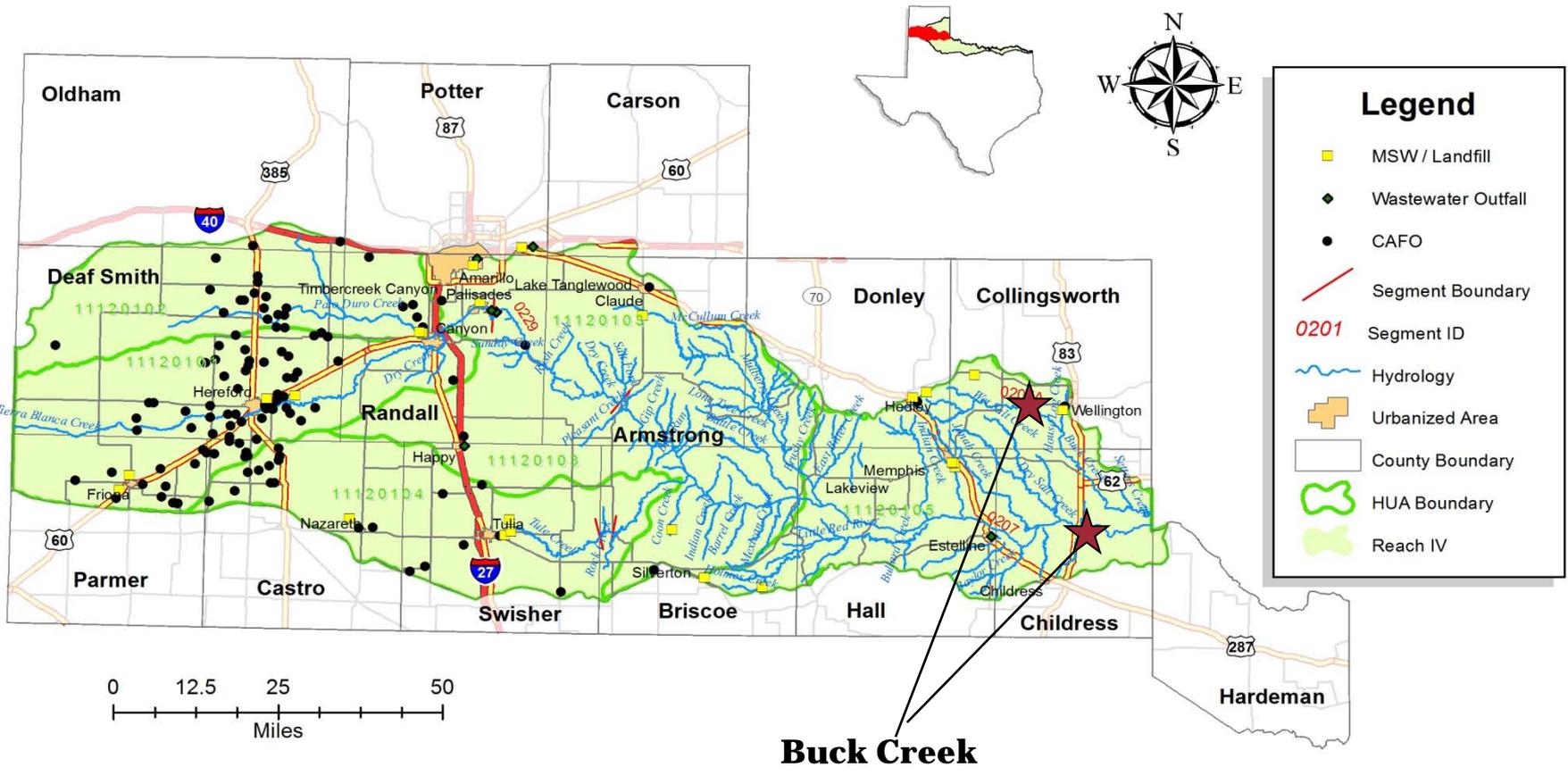


- Lower PDTF Red River (0207)
- Buck Creek (0207A)
  - No impairments
  - Nitrate concern
- Mackenzie Reservoir (0228)
- Upper PDTF Red River (0229)
- Lake Tanglewood (0229A)



# Red River Basin

## Reach IV



# **Buck Creek at RR 1547 – 4/12/2016**



# **Buck Creek at US 83 – 10/5/2015**



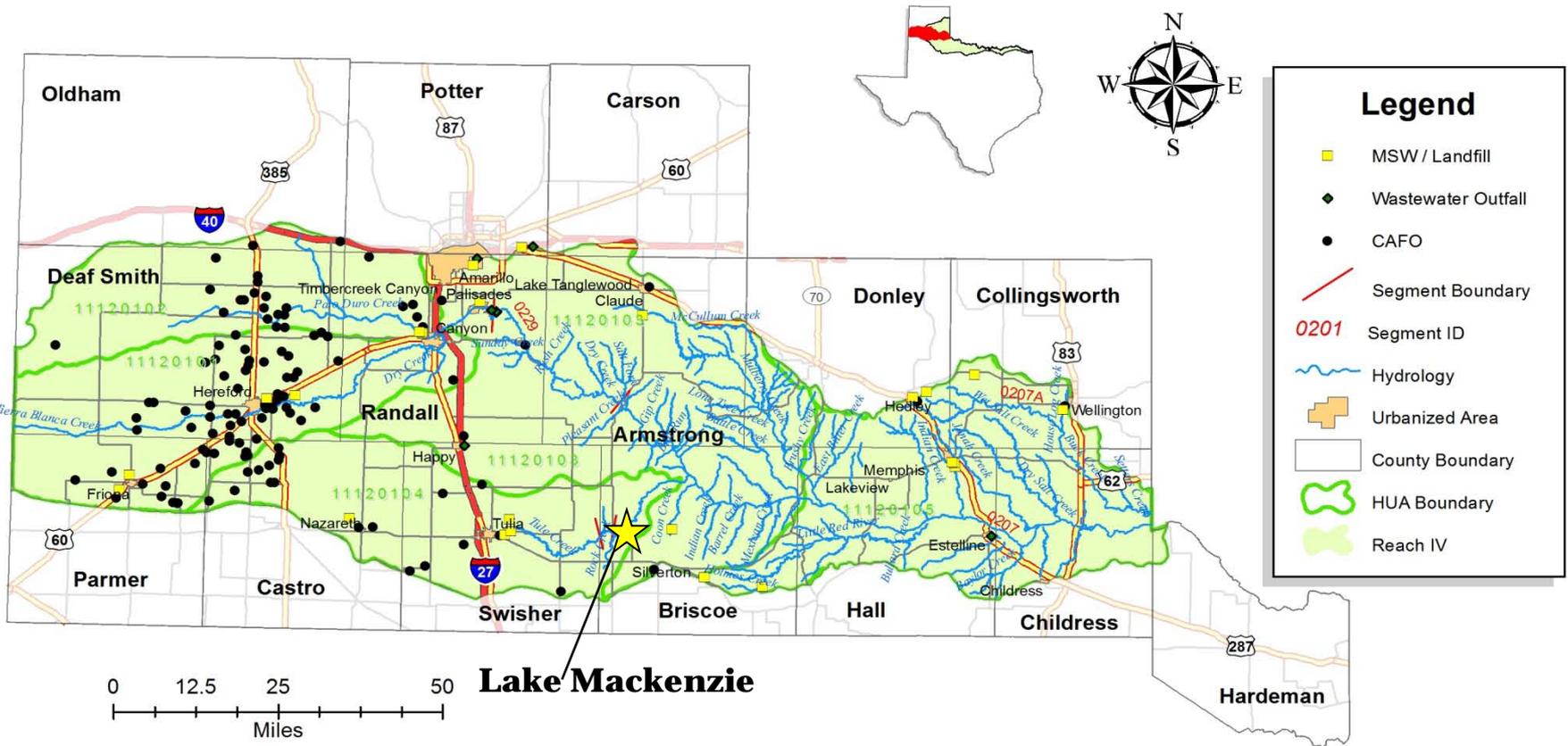
# Red Reach IV



- 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



# 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)

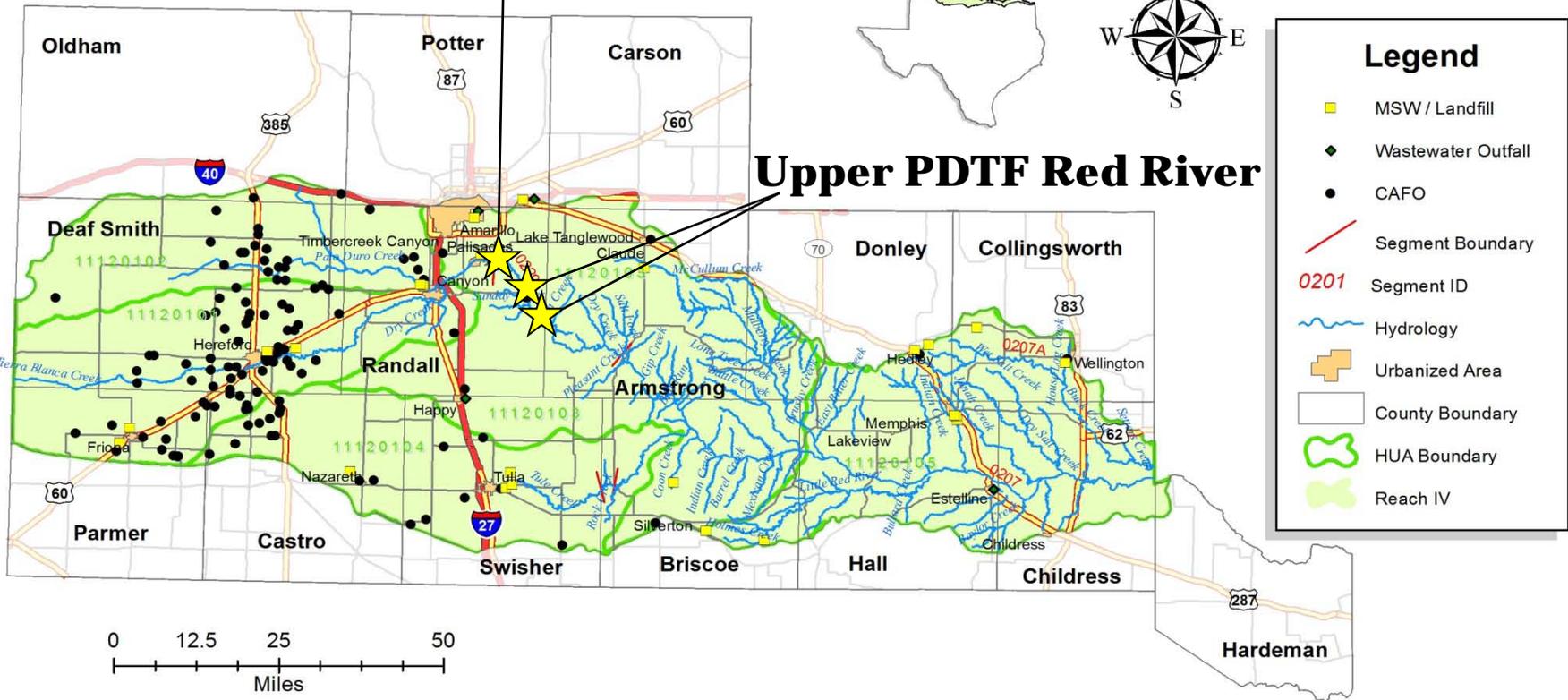


# Red River Basin Reach IV

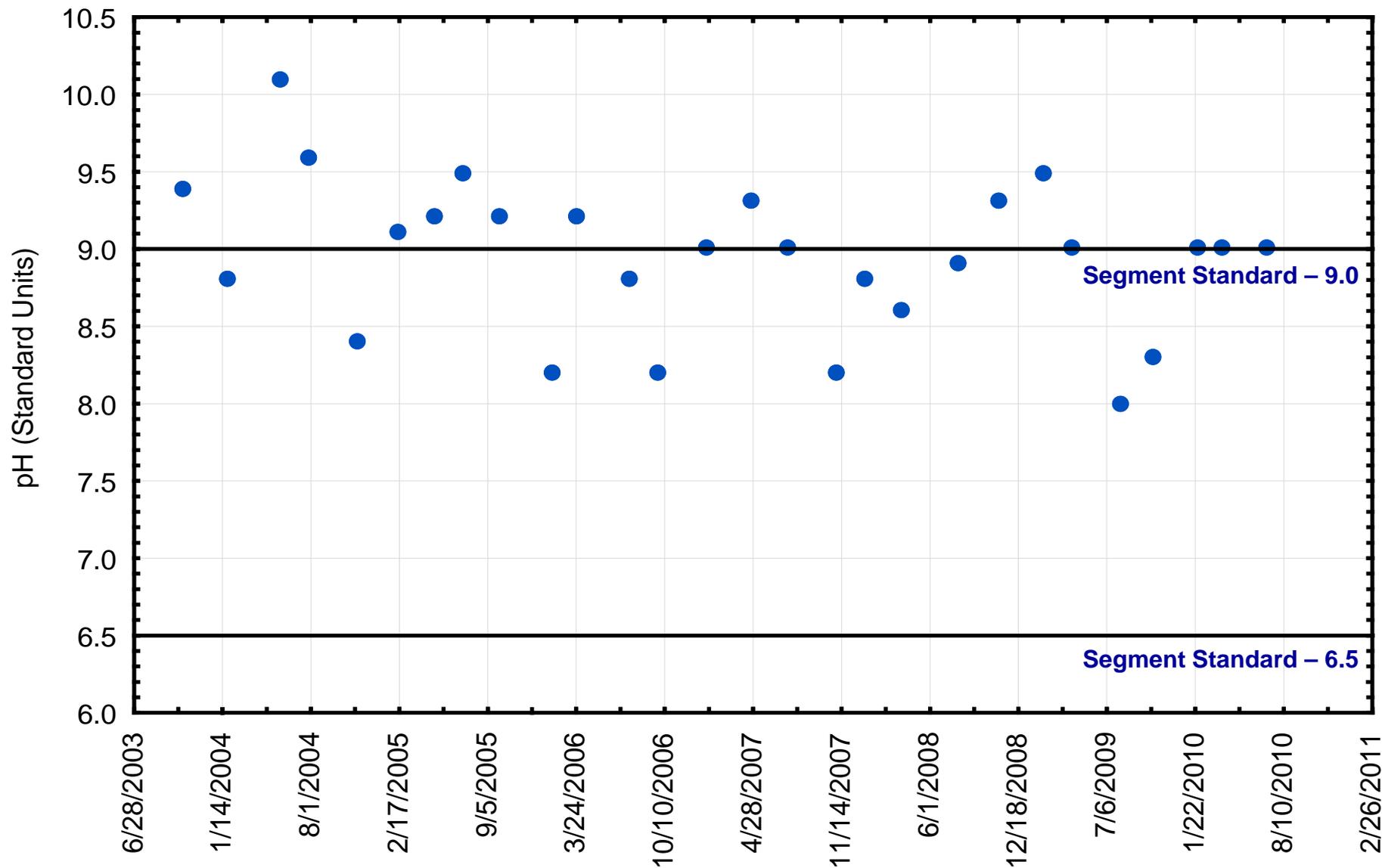


## Lake Tanglewood

## Upper PDTF 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**

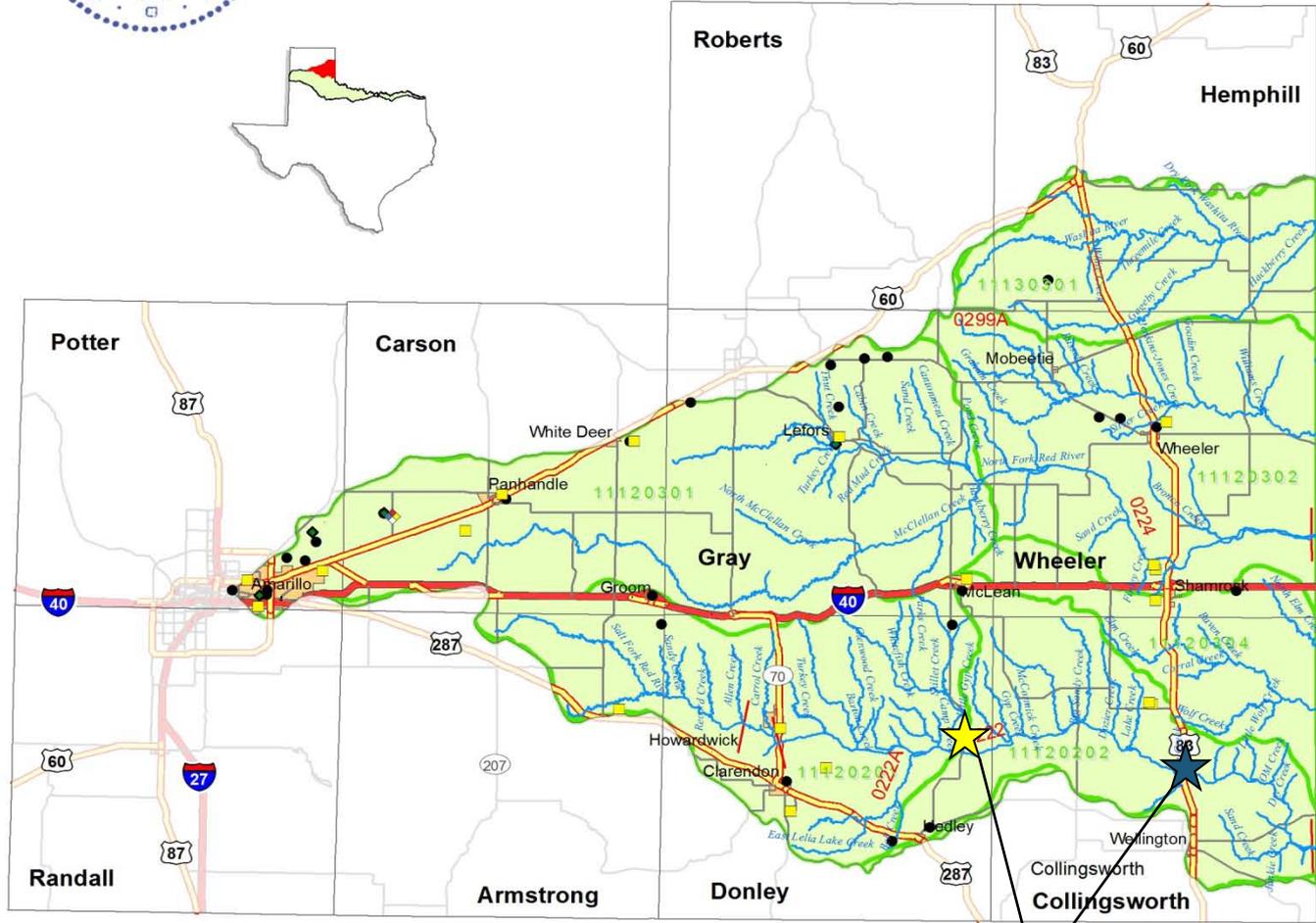
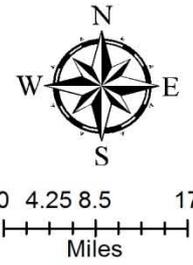
# Red Reach V



- 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 – 10/5/2015**



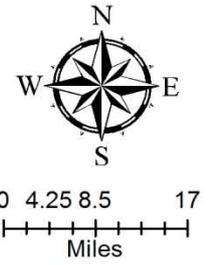
# Red Reach V



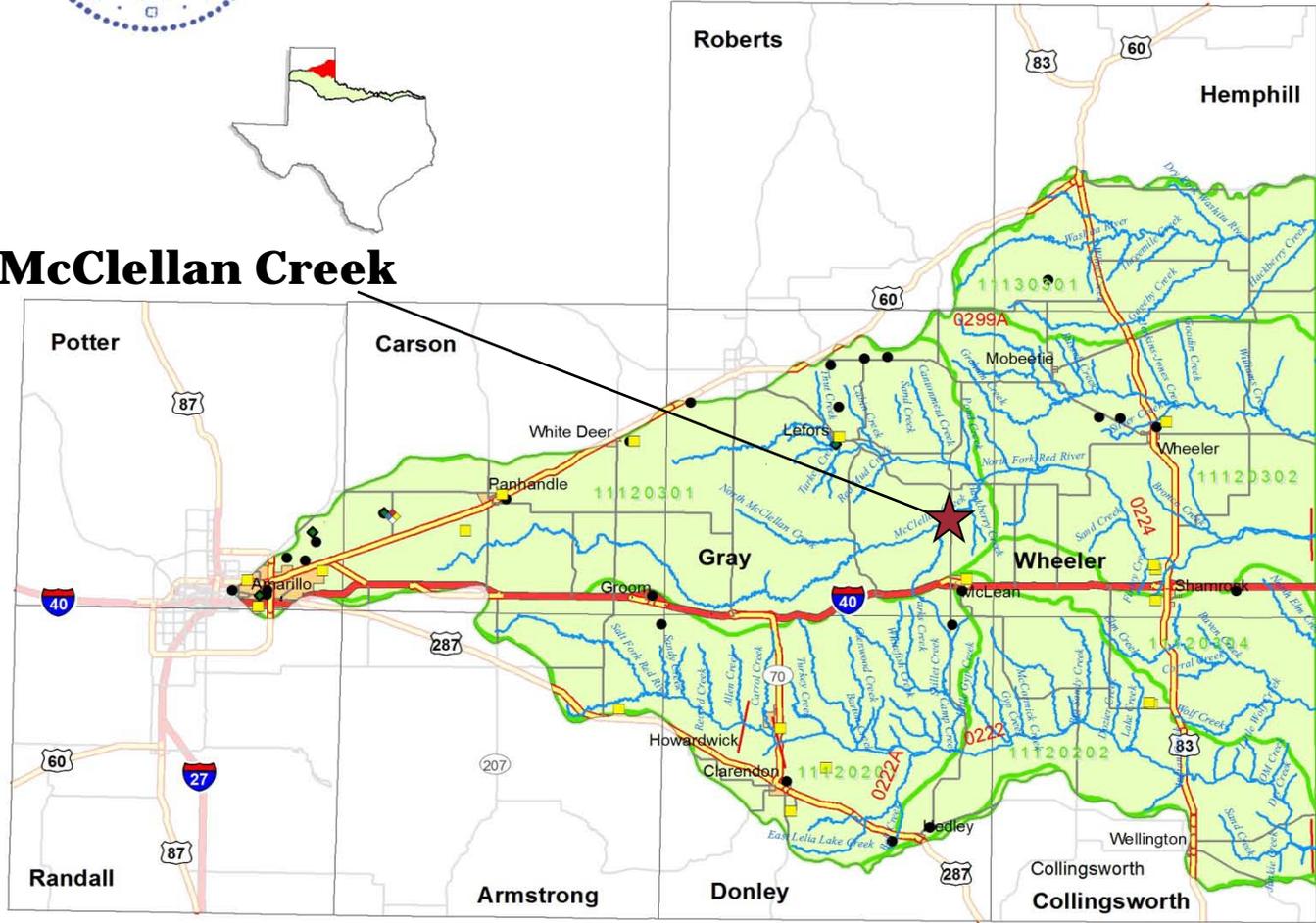
- Salt Fork of the Red River (0222)
- McClellan Creek (0224A)
  - **Bacteria impairment**
  - **No concerns**
- Sweetwater Creek (0299A)



# 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

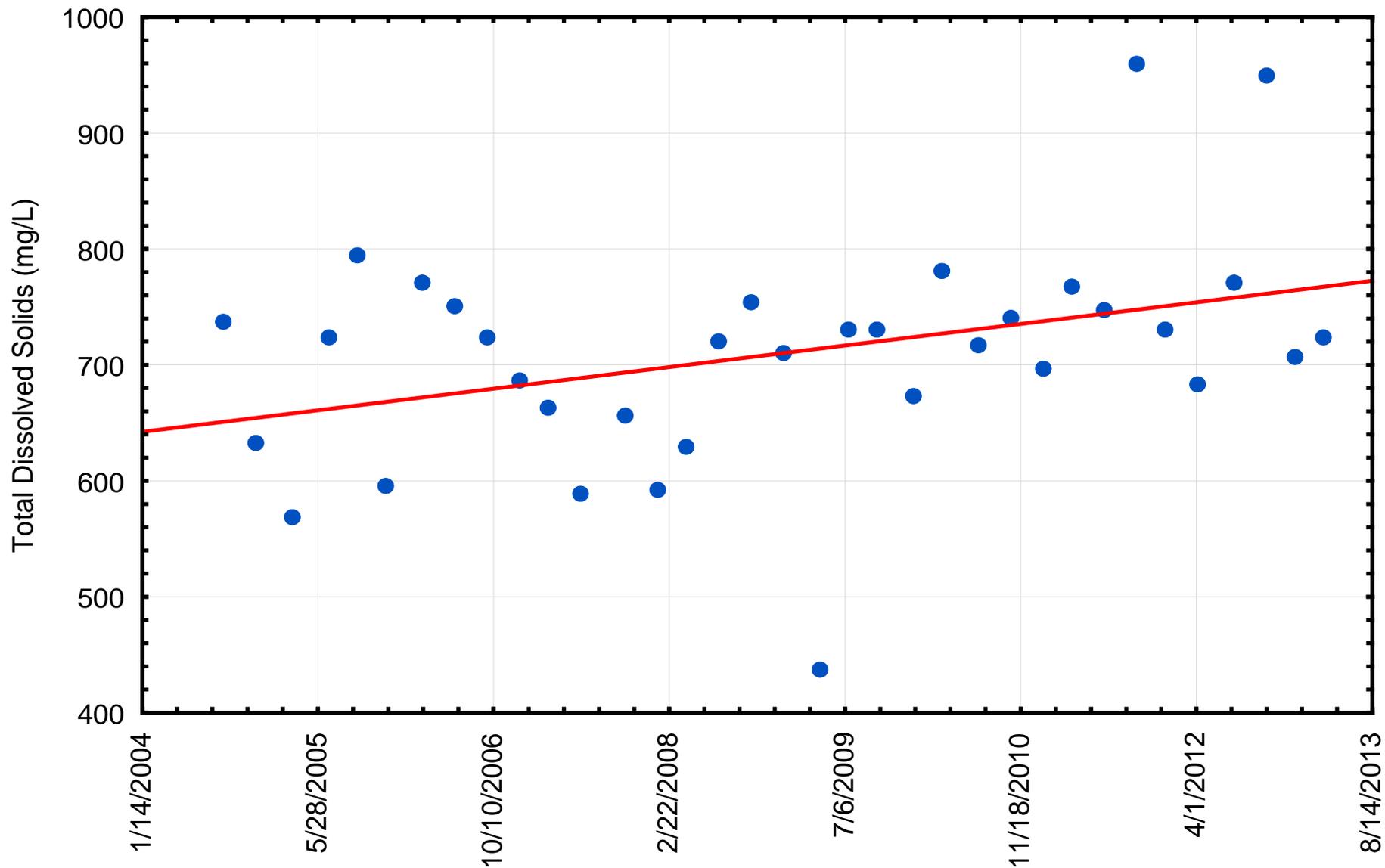
# **McClellan Creek at SH 273 – 4/6/2016**



# McClellan Creek at SH 273 – 7/14/2015



McClellan Creek  
Segment 0224A\_01  
Total Dissolved Solids (TDS)



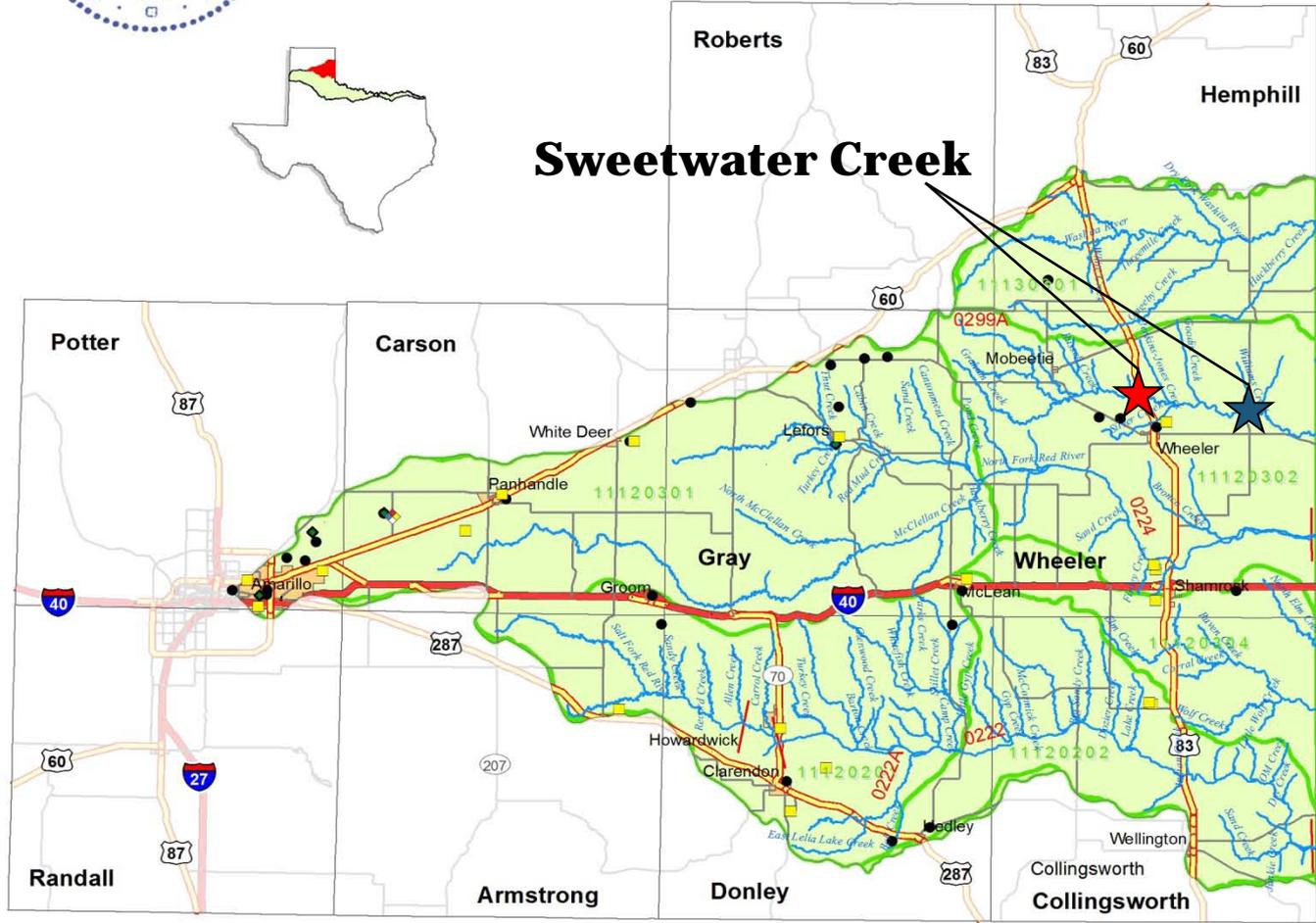
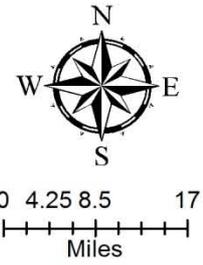
# Red Reach V



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



# 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

# Biological Monitoring



- **Aquatic Life Monitoring on White Deer Creek and Wolf Creek**
- **Biological Assessments**
  - Aquatic Life Use – Attainability Analyses
  - Receiving – Water Assessments
  - Aquatic Life Monitoring
  - Aquatic Life Assessments

# Biological Monitoring



- **Index Period**
  - Help determine ALUs or to evaluate support of existing ALUs
  - Includes Critical Period and Non-critical Period
  - March 15 – October 15
  
- **Critical Period**
  - July 1- Sept 30
  
- **Non-Critical Period**
  - March 15 – June 30, and Oct 1 – Oct 15

# Biological Monitoring



- **Aquatic – Life Monitoring**
  - Characterization of the fish assemblage
  - Characterization of the benthic macroinvertebrate community
  - Assessment of the stream's physical habitat
  - Instantaneous field measurements
  - Measurement of flow discharge
  - 24 – hour DO monitoring
  - Conventional water chemistry sample

# FY2017 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?



# RED RIVER AUTHORITY OF TEXAS



Clean Rivers  
Program  
Partner Since  
1991



NELAP  
Accredited  
Laboratory  
Since 2006

## Contact Information

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Hours of Operation: Monday –Friday 8:00 –5:00 • Emergency Laboratory Services: (940) 636-8024

Website - <http://rra.texas.gov/>