# Red River Authority of Texas Clean Rivers Program

## AQUATIC LIFE MONITORING

**APRIL 10, 2018**

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RED RIVER AUTHORITY OF TEXAS
CRP PROJECT SUPERVISOR

## SegID: 0214 Wichita River Below Diversion Lake Dam

From the confluence with the Red River in Clay County to Diversion Dam in Archer County

**Segment Type** Freshwater Stream

***AU_ID: 0214_01*** *From the confluence with the Red River upstream to the confluence with an un-named tributary immediately upstream of FM 2393*

| Flow Type | Flow Type Source | ALU Designation | ALU Designation Source |
|---|---|---|---|
| perennial | TSWQS | High | TWQS-Appendix A |

**Station ID(s):** 10145

***AU_ID: 0214_02*** *From an un-named tributary immediately upstream of FM 2393 upstream to the River Road WWTP*

| Flow Type | Flow Type Source | ALU Designation | ALU Designation Source |
|---|---|---|---|
| perennial | TSWQS | High | TWQS-Appendix A |

**Station ID(s):** 10148; 10149

***AU_ID: 0214_03*** *From the River Road WWTP upstream to the confluence with Buffalo Creek*

| Flow Type | Flow Type Source | ALU Designation | ALU Designation Source |
|---|---|---|---|
| perennial | TSWQS | High | TWQS-Appendix A |

**Station ID(s):** 10150; 10151; 10152; 10153; 15999; 16734; 16735; 18832; 20321

***AU_ID: 0214_04*** *From the confluence with Buffalo Creek upstream to the confluence with Beaver Creek*

| Flow Type | Flow Type Source | ALU Designation | ALU Designation Source |
|---|---|---|---|
| perennial | TSWQS | High | TWQS-Appendix A |

**Station ID(s):** 10154

***AU_ID: 0214_05*** *From the confluence with Beaver Creek upstream to the Diversion Lake Dam*

| Flow Type | Flow Type Source | ALU Designation | ALU Designation Source |
|---|---|---|---|
| perennial | TSWQS | High | TWQS-Appendix A |

**Station ID(s):** 10155; 10156

# Biological Monitoring

- Aquatic Life Monitoring on Beaver Creek (15120) and Wichita River (10145)

- 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 Dissolved Oxygen monitoring
  - Conventional water chemistry sample

# Wolf Creek LDS Study

# Wolf Creek LDS Study

# White Deer Creek LDS Study

# White Deer Creek LDS Study

# Wolf Creek LDS Study

# White Deer Creek LDS Study

# Beaver Creek at FM 2326
# TCEQ ID – 15120

- The Authority and the Environmental Institute of Houston-Clear Lake Conducted 2 Biological Events
  - June 2017 (index period)
  - July 2017 (critical period)

# Beaver Creek at FM2326
# TCEQ ID – 15120

| Parameter | Index | Critical |
|---|---|---|
| Instantaneous Flow | 29.1 cfs | 11.4 cfs |
| Water Temperature °C | 32.00 | 30.20 |
| Diel Specific Conductance | 3,112 µs/cm | 3,603 µs/cm |
| Diel DO | 8.28 mg/L | 6.93 mg/L |
| Water pH | 8.15 | 7.77 |
| *E. coli* | 21 MPN/100mL | 190 MPN/100mL |
| Total Dissolved Solids | 1,640 mg/L | 2,660 mg/L |
| Total Phosphorus | 0.135 mg/L | 0.122 mg/L |
| TKN | 1.4 mg/L | 1.37 mg/L |

# Maps of Sample Location

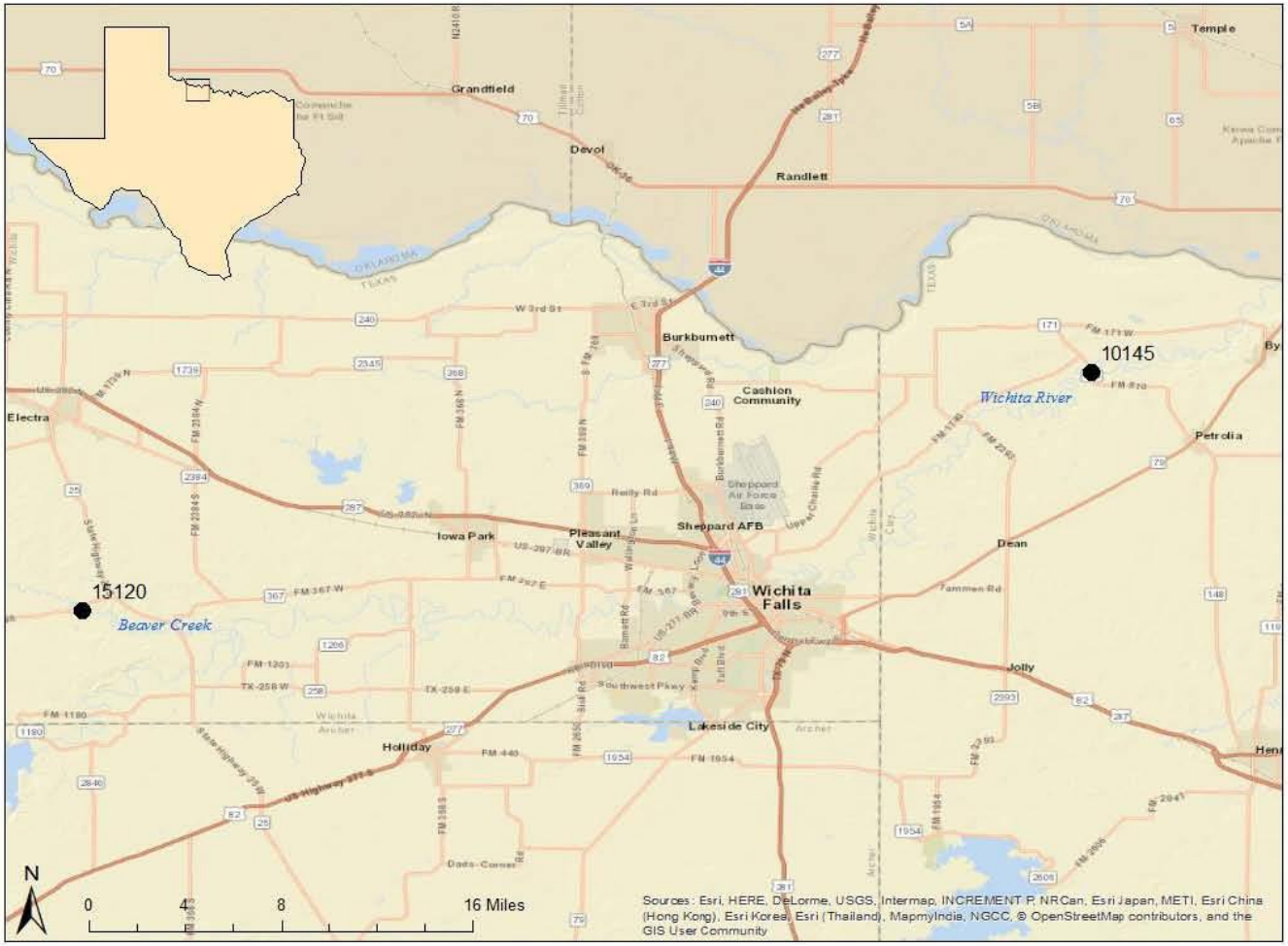


Figure 1 Map of overall sample area.

**Figure 2** Sample reach map for index event showing location of physical habitat transects, benthic macroinvertebrate sampling, 24hr Dissolved oxygen, and conventional water sampling locations.

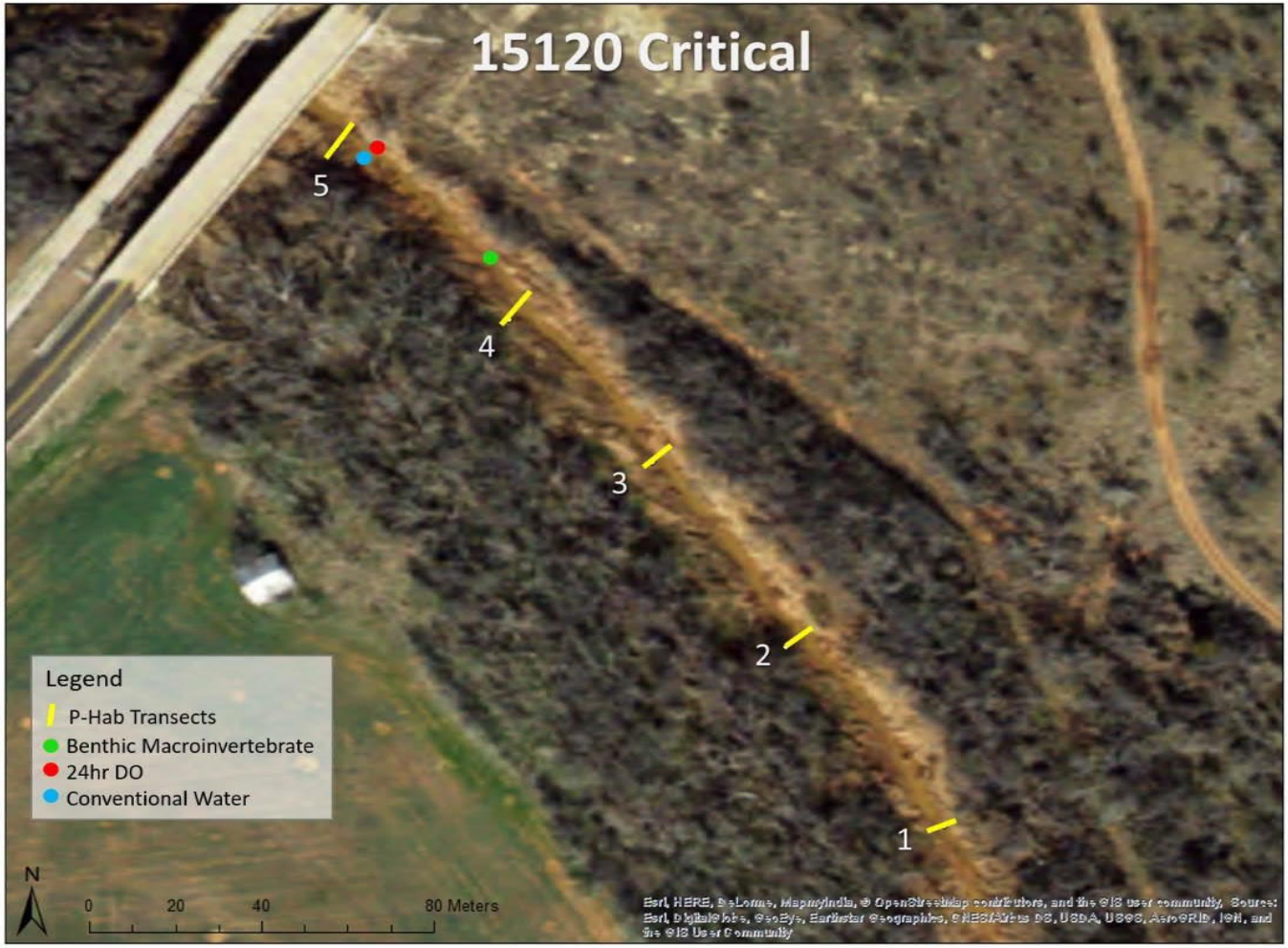


**Figure 3** Sample reach map for critical event showing location of physical habitat transects, benthic macroinvertebrate sampling, 24hr Dissolved oxygen, and conventional water sampling locations.

## Nekton Community IBI Data, Summary Data, and Species Lists

### Ecoregion 27 Nekton IBI

**Date** 06/13/2017 **TCEQ ID** 15120
**Site** Beaver Creek at FM 2326

| Metric | Value | Score |
|---|---|---|
| Total Number of Fish Species | 11 | 3 |
| Number of Native Cyprinid Species | 5 | 5 |
| Number of Benthic Invertivore Species | 0 | 1 |
| Number of Sunfish Species | 2 | 3 |
| % of Individuals as Tolerant Species[a] | 64.1 | 1 |
| % of Individuals as Omnivores | 20.4 | 1 |
| % of Individuals as Invertivores | 66.7 | 5 |
| % of Individuals as Piscivores | 12.9 | 5 |
| Number of Individuals in Sample | 309 | 2 |
| Number of Individuals/seine haul | 33.8 | 1 |
| Number of Individuals/min electrofishing | 7.0 | 3 |
| % of Individuals as Non-native Species | 0.0 | 5 |
| % of Individuals With Disease/Anomaly | 0.6 | 3 |
| **Regional Score and Aquatic Life Use** | **36** | **Intermediate** |

[a] not including *G. affinis*

| Scoring Criteria | |
|---|---|
| Exceptional | > 49 |
| High | 39 – 48 |
| Intermediate | 31 – 38 |
| Limited | < 31 |

### Nekton Summary Data

**Date** 06/13/2017 **TCEQ ID** 15120
**Site** Beaver Creek at FM 2326

| Description | STORET | Value |
|---|---|---|
| Stream order | 84161 | 4 |
| Minimum seine mesh diagonal (cm) | 89930 | 0.125 |
| Maximum seine mesh diagonal (cm) | 89931 | 0.125 |
| Seine length (m) | 89941 | 4.572 |
| Electrofishing method (1=boat, 2=backpack) | 89943 | 3 |
| Electrofishing effort (sec) | 89944 | 906 |
| Seining effort (number of hauls) | 89947 | 6 |
| Combined length of seine hauls (m) | 89948 | 60 |
| Seining effort (duration, minutes) | 89949 | 3.42 |
| Ecoregion | 89961 | 27 |
| Area seined ($m^2$) | 89976 | 274.32 |
| Total fish species (n) | 98003 | 11 |
| Number of sunfish species (n) | 98008 | 2 |
| Total intolerant species (n) | 98010 | 0 |
| Omnivore individuals (%) | 98017 | 20.4 |
| Invertivore individuals (%) | 98021 | 66.7 |
| Piscivore individuals (%) | 98022 | 12.9 |
| Individuals with disease or anomaly (%) | 98030 | 0.6 |
| Number of native cyprinid species (n) | 98032 | 5 |
| Individuals as non-native species (%) | 98033 | 0 |
| Total individuals seining (n) | 98039 | 203 |
| Total individuals electroshocking (n) | 98040 | 106 |
| Number of benthic invertivores (n) | 98052 | NA |
| Individuals per seine haul (n) | 98062 | 33.8 |
| Individuals per minute electroshocking (n) | 98069 | 7 |
| Tolerant individuals (except *G. affinis*) (%) | 98070 | 64.1 |

## SPECIES LIST AND ABUNDANCE- NEKTON

**Date** 6/13/2017
**Site** Beaver Creek at FM 2326
**TCEQ ID** 15120

| STORET | Scientific Name | Common Name | E1 | E2 | E3 | ES | S1 | S2 | S3 | S4 | S5 | S6 | Seine | Overall Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Collection Method** | (E = electro, S = seine) | E1 | E2 | E3 | ES | S1 | S2 | S3 | S4 | S5 | S6 | Seine | |
| | **Collection Effort** | (for E: sec; for S: meters) | 302 | 303 | 301 | 906 | 10 | 10 | 10 | 10 | 10 | 10 | 60 | |
| 98474 | *Cyprinella lutrensis* | Red shiner | 5 | 26 | 2 | 33 | 3 | 15 | 18 | 9 | 13 | 6 | 64 | 97 |
| 98430 | *Dorosoma cepedianum* | Gizzard shad | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 3 | 3 |
| 98713 | *Gambusia affinis* | Western mosquitofish | 6 | 43 | 18 | 67 | 0 | 1 | 17 | 0 | 2 | 1 | 21 | 88 |
| 98562 | *Ictalurus furcatus* | Blue catfish | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 2 |
| 98561 | *Ictalurus punctatus* | Channel catfish | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 3 | 3 |
| 99094 | *Lepomis cyanellus* | Green sunfish | 9 | 10 | 16 | 35 | 0 | 0 | 1 | 0 | 2 | 0 | 3 | 38 |
| 99101 | *Lepomis miniatus* | Redspotted sunfish | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 99092 | *Lepomis sp.(unknown)* | Sunfish species | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 98467 | *Notropis buchanani* | Ghost shiner | 0 | 1 | 0 | 1 | 1 | 0 | 5 | 0 | 0 | 0 | 6 | 7 |
| 98457 | *Phenacobius mirabilis* | Suckermouth minnow | 3 | 1 | 1 | 5 | 0 | 0 | 0 | 2 | 0 | 1 | 3 | 8 |
| 98497 | *Pimephales promelas* | Fathead minnow | 7 | 18 | 32 | 57 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 57 |
| 98498 | *Pimephales vigilax* | Bullhead minnow | 2 | 0 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| | | **Total Collected** | | | | 203 | | | | | | | 106 | 309 |
| | | **Total Taxa** | | | | 8 | | | | | | | **9** | 12 |

## Ecoregion 27 Nekton IBI

**Date** 07/18/2017 **TCEQ ID** 15120

**Site** Beaver Creek at FM 2326

| Metric | Value | Score |
|---|---|---|
| Total number fish species | 14 | 5 |
| Number native cyprinid species | 6 | 5 |
| Number benthic invertivore species | 0 | 1 |
| Number sunfish species | 3 | 3 |
| Number intolerant species | 0 | 1 |
| Percent individuals as tolerant[a] | 52.6 | 1 |
| Percent individuals as omnivores | 7.2 | 5 |
| Percent individuals as invertivores | 89.2 | 5 |
| Number individuals in sample | 739 | 1 |
| Individuals per seine haul | 91.8 | 1 |
| Individuals per min electrofishing | 9.3 | 1 |
| Percent individuals as non-natives | 0.1 | 5 |
| Percent individuals with disease or anomalies | 0.4 | 5 |
| **Regional Score and Aquatic Life Use** | **46** | **High** |

[a] not including G. affinis

| Scoring Criteria | |
|---|---|
| Exceptional | > 49 |
| High | 39 – 48 |
| Intermediate | 31 – 38 |
| Limited | < 31 |

## Nekton Summary Data

| Description | STORET | Value |
|---|---|---|
| Stream order | 84161 | 4 |
| Minimum seine mesh diagonal (cm) | 89930 | 0.125 |
| Maximum seine mesh diagonal (cm) | 89931 | 0.125 |
| Seine length (m) | 89941 | 4.572 |
| Electrofishing method (1=boat, 2=backpack) | 89943 | 3 |
| Electrofishing effort (sec) | 89944 | 1213 |
| Seining effort (number of hauls) | 89947 | 6 |
| Combined length of seine hauls (m) | 89948 | 60 |
| Seining effort (duration, minutes) | 89949 | 2.05 |
| Ecoregion | 89961 | 27 |
| Area seined ($m^2$) | 89976 | 230 |
| Total fish species (n) | 98003 | 14 |
| Number of sunfish species (n) | 98008 | 3 |
| Total intolerant species (n) | 98010 | 0 |
| Omnivore individuals (%) | 98017 | 7.2 |
| Insectivore individuals (%) | 98021 | 89.2 |
| Piscivore individuals (%) | 98022 | 3.7 |
| Individuals with disease or anomaly (%) | 98030 | 0.4 |
| Number of native cyprinid species (n) | 98032 | 6 |
| Individuals as non-native species (%) | 98033 | 0.1 |
| Total individuals seining (n) | 98039 | 551 |
| Total individuals electroshocking (n) | 98040 | 188 |
| Number of benthic invertivores (n) | 98052 | NA |
| Individuals per seine haul (n) | 98062 | 91.8 |
| Individuals per minute electroshocking (n) | 98069 | 9.3 |
| Tolerant individuals (except *G. affinis*) (%) | 98070 | 52.6 |

## SPECIES LIST AND ABUNDANCE - NEKTON

**Date** 7/18/2017
**Site** Beaver Creek at FM 2326
**TCEQ ID** 15120

| | **Collection Method** | (E = electro, S = seine) | E1 | E2 | E3 | E4 | ES | S1 | S2 | S3 | S4 | S5 | S6 | Seine | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Collection Effort** | (for E: sec; for S: meters) | 300 | 307 | 303 | 303 | 1213 | 10 | 10 | 10 | 10 | 10 | 10 | 60 | **Overall** |
| **STORET** | **Scientific Name** | **Common Name** | | | | | Total | | | | | | | Total | **Total** |
| 98474 | Cyprinella lutrensis | Red shiner | 9 | 8 | 16 | 33 | 66 | 16 | 150 | 16 | 14 | 30 | 11 | 237 | 303 |
| 98437 | Cyprinus carpio | Common carp | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 98713 | Gambusia affinis | Western mosquitofish | 5 | 5 | 8 | 11 | 29 | 17 | 50 | 27 | 17 | 24 | 22 | 157 | 186 |
| 98562 | Ictalurus furcatus | Blue catfish | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 98561 | Ictalurus punctatus | Channel catfish | 0 | 0 | 4 | 1 | 5 | 5 | 3 | 3 | 14 | 9 | 1 | 35 | 40 |
| 98340 | Lepisosteus oculatus | Spotted gar | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 99094 | Lepomis cyanellus | Green sunfish | 0 | 6 | 5 | 5 | 16 | 2 | 2 | 1 | 3 | 0 | 0 | 8 | 24 |
| 99097 | Lepomis macrochirus | Bluegill | 8 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 99099 | Lepomis megalotis | Longear sunfish | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2 |
| 99092 | Lepomis sp. (unknown) | Sunfish species | 0 | 0 | 0 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 3 |
| 98463 | Notropis bairdi | Red River shiner | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 98467 | Notropis buchanani | Ghost shiner | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 98457 | Phenacobius mirabilis | Suckermouth minnow | 0 | 0 | 3 | 13 | 16 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 18 |
| 98497 | Pimephales promelas | Fathead minnow | 1 | 0 | 0 | 6 | 7 | 2 | 1 | 0 | 2 | 0 | 0 | 5 | 12 |
| 98498 | Pimephales vigilax | Bullhead minnow | 9 | 6 | 5 | 12 | 32 | 4 | 10 | 29 | 43 | 11 | 8 | 105 | 137 |
| | | **Total Collected** | | | | | **188** | | | | | | | **551** | **739** |
| | | **Total Taxa** | | | | | **15** | | | | | | | **9** | **15** |

## Critical Period

*Ictalurus furcatus* (Blue Catfish) captured with totebarge electroshocker.

## Benthic Community IBI Data, Summary Data, and Species Lists

### Qualitative Benthos IBI

**Date** 6/13/2017 **TCEQ ID** 15120
**Site** Beaver Creek at FM 2326

| Metric | Value | Score |
|---|---|---|
| Taxa Richness | 15 | 3 |
| EPT Taxa Abundance | 8 | 3 |
| Biotic Index (HBI) | 5.42 | 1 |
| % Chironomidae | 38.53 | 1 |
| % Dominant Taxon | 53.97 | 2 |
| % Dominant FFG | 53.97 | 2 |
| % Predators | 13.28 | 4 |
| Intolerant : Tolerant | 0.85 | 1 |
| % Total Trichoptera as Hydropsychidae | 100 | 1 |
| # of Non-Insect Taxa | 3 | 2 |
| % Collector-Gatherers | 23.67 | 3 |
| % of Total Number as Elmidae | 3.03 | 4 |
| **AQUATIC LIFE USE SCORE** | **27** | |
| **AQUATIC LIFE USE RATING** | **Intermediate** | |

| Scoring Criteria | |
|---|---|
| Exceptional | >36 |
| High | 29 - 36 |
| Intermediate | 22 - 28 |
| Limited | <22 |

### Benthos Summary Data

**Date** 6/13/2017 **TCEQ ID** 15120
**Site** Beaver Creek at FM 2326

| Description | STORET | Value |
|---|---|---|
| Stream order | 84161 | 4 |
| Data reporting units | 89899 | 1 |
| Kicknet effort ($m^2$) | 89903 | 5.5 |
| Kicknet effort (min) | 89904 | 5.7 |
| Debris/shoreline effort, min picked (min) | 89905 | 0 |
| Total n for sample (n) | 89906 | 231 |
| Gravel substrate (%) | 89923 | 10 |
| Macrophyte bed (%) | 89926 | 0 |
| Snags and brush (%) | 89927 | 10 |
| Bedrock (%) | 89928 | 0 |
| Net mesh size (cm) | 89946 | 0.05 |
| Benthic sampler | 89950 | 3 |
| Ecoregion | 89961 | 27 |
| HBI | 90007 | 5.42 |
| EPT index (n) | 90008 | 8 |
| Dominant FFG (%) | 90010 | 53.97 |
| Collector-gatherers (%) | 90025 | 23.67 |
| Predators (%) | 90036 | 13.28 |
| Dominant taxon (%) | 90042 | 38.53 |
| Intolerant : Tolerant taxa | 90050 | 0.85 |
| Non-insect taxa (n) | 90052 | 3 |
| n as Elmidae (%) | 90054 | 3.03 |
| Taxa richness (n) | 90055 | 15 |
| Chironomidae (%) | 90062 | 0 |
| Trichoptera as Hydropsychidae (%) | 90069 | 100 |

## Qualitative Benthos IBI

**Date** 7/18/2017 **TCEQ ID** 15120
**Site** Beaver Creek at FM 2326

| Metric | Value | Score |
|---|---|---|
| Taxa Richness | 18 | 3 |
| EPT Taxa Abundance | 7 | 3 |
| Biotic Index (HBI) | 5.30 | 1 |
| % Chironomidae | 9.27 | 3 |
| % Dominant Taxon | 28.29 | 3 |
| % Dominant FFG | 38.70 | 3 |
| % Predators | 6.99 | 4 |
| Intolerant : Tolerant | 1.62 | 2 |
| % Total Trichoptera as Hydropsychidae | 100.00 | 1 |
| # of Non-Insect Taxa | 4 | 3 |
| % Collector-Gatherers | 32.36 | 2 |
| % of Total Number as Elmidae | 14.15 | 3 |

**AQUATIC LIFE USE SCORE** **31**
**AQUATIC LIFE USE RATING** **High**

| Scoring Criteria | |
|---|---|
| Exceptional | >36 |
| High | 29 - 36 |
| Intermediate | 22 - 28 |
| Limited | <22 |

## Benthos Summary Data

**Date** 07/18/2017 **TCEQ ID** 15120
**Site** Beaver Creek at FM 2326

| Description | STORET | Value |
|---|---|---|
| Stream order | 84161 | 4 |
| Data reporting units | 89899 | 1 |
| Kicknet effort (m²) | 89903 | 4.5 |
| Kicknet effort (min) | 89904 | 5.67 |
| Debris/shoreline effort, min picked (min) | 89905 | 0 |
| Total n for sample (n) | 89906 | 205 |
| Gravel substrate (%) | 89923 | 10 |
| Macrophyte bed (%) | 89926 | 0 |
| Snags and brush (%) | 89927 | 7 |
| Bedrock (%) | 89928 | 0 |
| Net mesh size (cm) | 89946 | 0.05 |
| Benthic sampler | 89950 | 3 |
| Ecoregion | 89961 | 27 |
| HBI | 90007 | 5.30 |
| EPT index (n) | 90008 | 7 |
| Dominant FFG (%) | 90010 | 38.70 |
| Collector-gatherers (%) | 90025 | 32.36 |
| Predators (%) | 90036 | 6.99 |
| Dominant taxon (%) | 90042 | 28.29 |
| Intolerant : Tolerant taxa | 90050 | 1.62 |
| Non-insect taxa (n) | 90052 | 4 |
| n as Elmidae (%) | 90054 | 14.15 |
| Taxa richness (n) | 90055 | 18 |
| Chironomidae (%) | 90062 | 9.27 |
| Trichoptera as Hydropsychidae (%) | 90069 | 100 |

## Physical Habitat IBI Data, Summary Data, and Transect Data

### Habitat Quality Index

| | |
|---|---|
| **Date** | 06/13/2017 |
| **Site** | Beaver Creek at FM 2326 |
| **TCEQ ID** | 15120 |

| Metric | Value | Score |
|---|---|---|
| **Instream Cover, mean (%)** | 6 | 1 |
| **Riffles, number of** | 0 | 1 |
| **Pools, maximum depth (m)** | 4.50 | 4 |
| **Bank Stability** | — | 1 |
| **Slope component, mean angle (°)** | 30.80 | — |
| **Erosion component, mean (%)** | 54.20 | — |
| **Riparian Buffer Vegetation, mean width (m)** | >18.5 | 2 |
| **Channel Flow Status** (4=High, 3=Moderate, 2=Low, 1=No flow) | 3 | 3 |
| **Channel Sinuosity** | 1 | 1 |
| **Bottom Substrate, mean gravel or larger (%)** | 1.2 | 1 |
| **Aesthetics** (1=Wilderness, 2=Natural, 3=Common, 4=Offensive) | 2 | 2 |
| **AQUATIC LIFE USE SCORE** | **16** | |
| **AQUATIC LIFE USE RATING** | **Intermediate** | |

| Scoring Criteria | |
|---|---|
| Exceptional | 26 - 31 |
| High | 20 - 25 |
| Intermediate | 14 - 19 |
| Limited | < 14 |

## Habitat Quality Index

**Date** 7/18/2017
**Site** Beaver Creek at FM 2326
**TCEQ ID** 15120

| Metric | Value | Score |
|---|---|---|
| **Instream Cover, mean (%)** | 5.6 | 1 |
| **Riffles, number of** | 2 | 3 |
| **Pools, maximum depth (m)** | 1.01 | 3 |
| **Bank Stability** | — | 2 |
| **Slope component, mean angle (°)** | 26.75 | — |
| **Erosion component, mean (%)** | 59.00 | — |
| **Riparian Buffer Vegetation, mean width (m)** | >18.5 | 3 |
| **Channel Flow Status** (4=High, 3=Moderate, 2=Low, 1=No flow) | 2 | 2 |
| **Channel Sinuosity** | 1 | 1 |
| **Bottom Substrate, mean gravel or larger (%)** | 2.6 | 1 |
| **Aesthetics** (1=Wilderness, 2=Natural, 3=Common, 4=Offensive) | 2 | 2 |
| **AQUATIC LIFE USE SCORE** | **18** | |
| **AQUATIC LIFE USE RATING** | **Intermediate** | |

| Scoring Criteria | |
|---|---|
| Exceptional | 26 - 31 |
| High | 20 - 25 |
| Intermediate | 14 - 19 |
| Limited | < 14 |

## Site Photographs

### Index – Transect 1

(Bottom of reach)

Upstream taken from transect 1 during index period.

Right bank taken from transect 1 during index period.

Left bank taken from transect 1 during index period.

Downstream taken from transect 1 during index period.

# Wichita River at FM 810
# TCEQ ID - 10145

- The Authority and the Environmental Institute of Houston – Clear Lake conducted 2 Biological events
  - June 2017 (index period)
  - July 2017 (critical period)

# Wichita River at FM 810
# TCEQ ID - 10145

| Parameter | Index | Critical |
|---|---|---|
| Instantaneous Flow | 248 cfs | 103 cfs |
| Water Temperature °C | 29.20 | 30.20 |
| Diel Specific Conductance | 2,083 µs/cm | 2,767 µs/cm |
| Diel DO | 8.75 mg/L | 8.08 mg/L |
| Water pH | 8.32 | 8.49 |
| *E. coli* | 76 MPN/100mL | 180 MPN/100mL |
| Total Dissolved Solids | 1,140 mg/L | 2,934 mg/L |
| Total Phosphorus | 0.415 mg/L | 0.476 mg/L |
| TKN | 2.52 mg/L | 2.23 mg/L |

# Maps of Sample Location

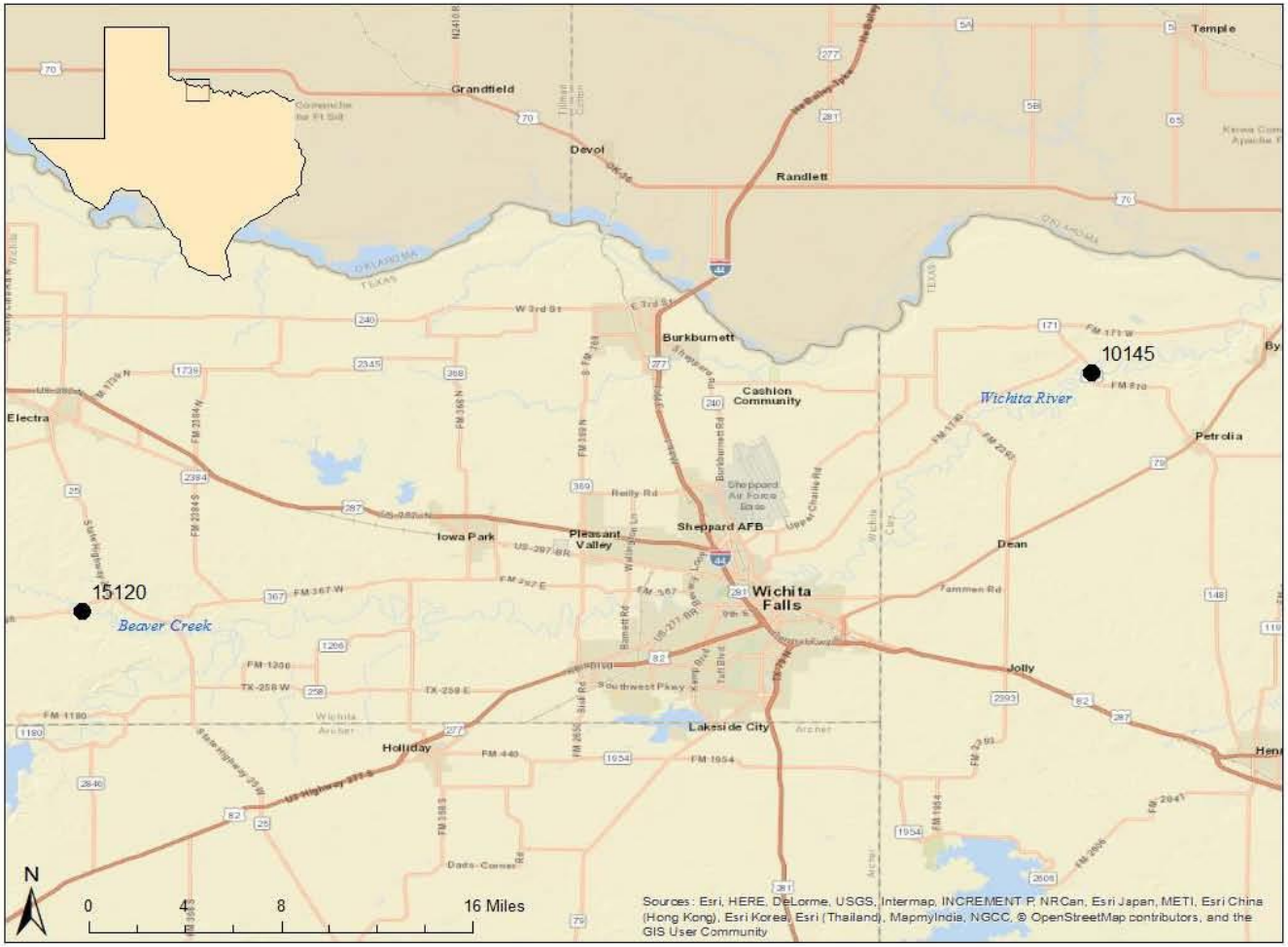


Figure 1 Map of overall sample area.

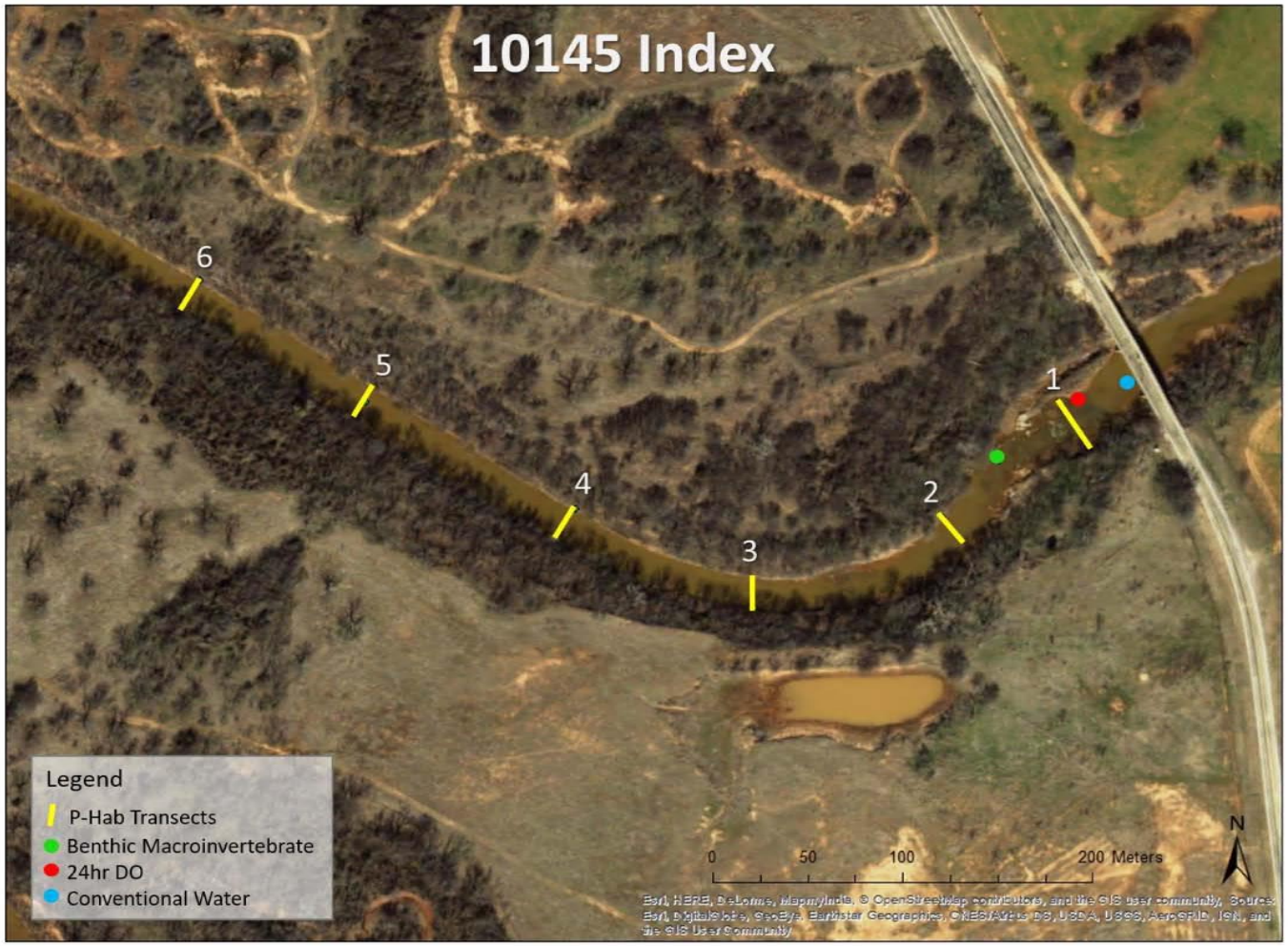


**Figure 2** Sample reach map for index event showing location of physical habitat transects, benthic macroinvertebrate sampling, 24hr dissolved oxygen, and conventional water sampling locations.

## Nekton Community IBI Data, Summary Data, and Species Lists

**Ecoregion 27 Nekton IBI**

**Date** 06/14/2017 **TCEQ ID** 10145
**Site** Wichita River at FM 810

| Metric | Value | Score |
|---|---|---|
| Total Number of Fish Species | 9 | 3 |
| Number of Native Cyprinid Species | 3 | 3 |
| Number of Benthic Invertivore Species | 0 | 1 |
| Number of Sunfish Species | 2 | 3 |
| % of Individuals as Tolerant Species[a] | 77.4 | 1 |
| % of Individuals as Omnivores | 14.5 | 3 |
| % of Individuals as Invertivores | 69.4 | 5 |
| % of Individuals as Piscivores | 16.1 | 5 |
| Number of Individuals in Sample | -- | -- |
| Number of Individuals/seine haul | 1.3 | 1 |
| Number of Individuals/min electrofishing | 2.7 | 1 |
| % of Individuals as Non-native Species | 3.2 | 1 |
| % of Individuals With Disease/Anomaly | 0.0 | 5 |
| **Regional Score and Aquatic Life Use** | **32** | **Limited** |

[a] not including *G. affinis*

| Scoring Criteria | |
|---|---|
| Exceptional | > 49 |
| High | 41 – 48 |
| Intermediate | 35 – 40 |
| Limited | < 35 |

**Nekton Summary Data**

**Date** 06/14/2017 **TCEQ ID** 10145
**Site** Wichita River at FM 810

| Description | STORET | Value |
|---|---|---|
| Stream order | 84161 | 4 |
| Minimum seine mesh diagonal (cm) | 89930 | 0.125 |
| Maximum seine mesh diagonal (cm) | 89931 | 0.125 |
| Seine length (m) | 89941 | 4.572 |
| Electrofishing method (1=boat, 2=backpack) | 89943 | 3 |
| Electrofishing effort (sec) | 89944 | 1200 |
| Seining effort (number of hauls) | 89947 | 7 |
| Combined length of seine hauls (m) | 89948 | 66 |
| Seining effort (duration, minutes) | 89949 | 2.12 |
| Ecoregion | 89961 | 27 |
| Area seined ($m^2$) | 89976 | 301.8 |
| Total fish species (n) | 98003 | 9 |
| Number of sunfish species (n) | 98008 | 2 |
| Total intolerant species (n) | 98010 | 0 |
| Omnivore individuals (%) | 98017 | 14.5 |
| Invertivore individuals (%) | 98021 | 69.4 |
| Piscivore individuals (%) | 98022 | 16.1 |
| Individuals with disease or anomaly (%) | 98030 | 0 |
| Number of native cyprinid species (n) | 98032 | 3 |
| Individuals as non-native species (%) | 98033 | 3.2 |
| Total individuals seining (n) | 98039 | 9 |
| Total individuals electroshocking (n) | 98040 | 53 |
| Number of benthic invertivores (n) | 98052 | NA |
| Individuals per seine haul (n) | 98062 | 1.3 |
| Individuals per minute electroshocking (n) | 98069 | 2.7 |
| Tolerant individuals (except *G. affinis*) (%) | 98070 | 77.4 |

## SPECIES LIST AND ABUNDANCE- NEKTON

**Date** 6/14/2017
**Site** Wichita River at FM 810
**TCEQ ID** 10145

| | **Collection Method** | (E = electro, S = seine) | E1 | E2 | E3 | E4 | ES | S1 | S2&3 | S4 | S5 | S6 | S7 | S8 | Seine | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Collection Effort** | (for E: sec; for S: meters) | 300 | 300 | 300 | 300 | 1200 | 8 | 8 | 10 | 10 | 10 | 10 | 10 | 66 | **Overall** |
| **STORET** | **Scientific Name** | **Common Name** | | | | | Total | | | | | | | | Total | **Total** |
| 98474 | *Cyprinella lutrensis* | Red shiner | 11 | 5 | 16 | 2 | 34 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 35 |
| 98437 | *Cyprinus carpio* | Common carp | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 98429 | *Dorosoma petenense* | Threadfin shad | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 1 | 6 | 6 |
| 98713 | *Gambusia affinis* | Western mosquitofish | 0 | 0 | 3 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 98562 | *Ictalurus furcatus* | Blue catfish | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 99094 | *Lepomis cyanellus* | Green sunfish | 1 | 4 | 2 | 2 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 99097 | *Lepomis macrochirus* | Bluegill | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 98467 | *Notropis buchanani* | Ghost shiner | 1 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 |
| 98497 | *Pimephales promelas* | Fathead minnow | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | **Total Collected** | | | | | 53 | | | | | | | | 9 | 62 |
| | | **Total Taxa** | | | | | **7** | | | | | | | | **4** | 9 |

## Ecoregion 27 Nekton IBI

**Date** 07/19/2017 **TCEQ ID** 10145

**Site** Witchita River at FM 810

| Metric | Value | Score |
|---|---|---|
| Total number fish species | 18 | 5 |
| Number native cyprinid species | 3 | 5 |
| Number benthic invertivore species | 0 | 1 |
| Number sunfish species | 4 | 5 |
| Number intolerant species | 0 | 1 |
| Percent individuals as tolerant[a] | 4.3 | 5 |
| Percent individuals as omnivores | 3.7 | 5 |
| Percent individuals as invertivores | 93.3 | 5 |
| Number individuals in sample | -- | -- |
| Individuals per seine haul | 22.7 | 1 |
| Individuals per min electrofishing | 1.69 | 1 |
| Percent individuals as non-natives | 0.0 | 5 |
| Percent individuals with disease or anomalies | 0.0 | 5 |
| **Regional Score and Aquatic Life Use** | **42** | **High** |

[a] not including G. affinis

| Scoring Criteria | |
|---|---|
| Exceptional | > 49 |
| High | 41 – 48 |
| Intermediate | 35 – 40 |
| Limited | < 35 |

## Nekton Summary Data

| Description | STORET | Value |
|---|---|---|
| Stream order | 84161 | 4 |
| Minimum seine mesh diagonal (cm) | 89930 | 0.125 |
| Maximum seine mesh diagonal (cm) | 89931 | 0.125 |
| Seine length (m) | 89941 | 4.572 |
| Electrofishing method (1=boat, 2=backpack) | 89943 | 3 |
| Electrofishing effort (sec) | 89944 | 1200 |
| Seining effort (number of hauls) | 89947 | 6 |
| Combined length of seine hauls (m) | 89948 | 60 |
| Seining effort (duration, minutes) | 89949 | 1.82 |
| Ecoregion | 89961 | 27 |
| Area seined ($m^2$) | 89976 | 274.3 |
| Total fish species (n) | 98003 | 15 |
| Number of sunfish species (n) | 98008 | 2 |
| Total intolerant species (n) | 98010 | 0 |
| Omnivore individuals (%) | 98017 | 7.9 |
| Insectivore individuals (%) | 98021 | 82.1 |
| Piscivore individuals (%) | 98022 | 9.7 |
| Individuals with disease or anomaly (%) | 98030 | 0.3 |
| Number of native cyprinid species (n) | 98032 | 4 |
| Individuals as non-native species (%) | 98033 | 1.6 |
| Total individuals seining (n) | 98039 | 48 |
| Total individuals electroshocking (n) | 98040 | 332 |
| Number of benthic invertivores (n) | 98052 | 0 |
| Individuals per seine haul (n) | 98062 | 8 |
| Individuals per minute electroshocking (n) | 98069 | 16 |
| Tolerant individuals (except *G. affinis*) (%) | 98070 | 85 |

## SPECIES LIST AND ABUNDANCE - NEKTON

**Date** 7/19/2017
**Site** Witchita River at FM 810
**TCEQ ID** 10145

| | **Collection Method** | (E = electro, S = seine) | E1 | E2 | E3 | E4 | ES | S1 | S2 | S3 | S4 | S5 | S6 | Seine | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Collection Effort** | (for E: sec; for S: meters) | 300 | 300 | 300 | 300 | 1200 | 10 | 10 | 10 | 10 | 10 | 10 | 60 | **Overall** |
| **STORET** | **Scientific Name** | **Common Name** | | | | | Total | | | | | | | Total | **Total** |
| 98528 | *Ctenopharyngodon idella* | Grass carp | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 98474 | *Cyprinella lutrensis* | Red shiner | 6 | 45 | 132 | 56 | 239 | 22 | 0 | 1 | 0 | 1 | 2 | 26 | 265 |
| 98437 | *Cyprinus carpio* | Common carp | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 98713 | *Gambusia affinis* | Western mosquitofish | 0 | 0 | 7 | 0 | 7 | 16 | 0 | 0 | 0 | 0 | 0 | 16 | 23 |
| 98562 | *Ictalurus furcatus* | Blue catfish | 1 | 4 | 0 | 0 | 5 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 6 |
| 98561 | *Ictalurus punctatus* | Channel catfish | 3 | 21 | 0 | 1 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 |
| 98341 | *Lepisosteus osseus* | Longnose gar | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 99094 | *Lepomis cyanellus* | Green sunfish | 1 | 4 | 11 | 8 | 24 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 26 |
| 99099 | *Lepomis megalotis* | Longear sunfish | 0 | 0 | 2 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 98450 | *Macrhybopsis hyostoma* | Shoal chub | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 |
| 98728 | *Menidia beryllina* | Inland silverside | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 99090 | *Micropterus salmoides* | Largemouth bass | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 98457 | *Phenacobius mirabilis* | Suckermouth minnow | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 98498 | *Pimephales vigilax* | Bullhead minnow | 0 | 2 | 11 | 2 | 15 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 16 |
| 98570 | *Pylodictis olivaris* | Flathead catfish | 1 | 2 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| | | **Total Collected** | | | | | **332** | | | | | | | **48** | **380** |
| | | **Total Taxa** | | | | | **14** | | | | | | | **7** | **15** |

# Wichita River at FM 810
# TCEQ ID - 10145

## Benthic Community IBI Data, Summary Data, and Species Lists

### Qualitative Benthos IBI

**Date** 6/14/2017 **TCEQ ID** 10145
**Site** Wichita River at FM 810

| Metric | Value | Score |
|---|---|---|
| Taxa Richness | 9 | 2 |
| EPT Taxa Abundance | 3 | 1 |
| Biotic Index (HBI) | 6.46 | 1 |
| % Chironomidae | 4.53 | 3 |
| % Dominant Taxon | 55.47 | 1 |
| % Dominant FFG | 79.31 | 1 |
| % Predators | 1.76 | 1 |
| Intolerant : Tolerant | 0.59 | 1 |
| % Total Trichoptera as Hydropsychidae | 100 | 1 |
| # of Non-Insect Taxa | 3 | 2 |
| % Collector-Gatherers | 79.31 | 1 |
| % of Total Number as Elmidae | 0.75 | 1 |
| **AQUATIC LIFE USE SCORE** | **16** | |
| **AQUATIC LIFE USE RATING** | **Limited** | |

| Scoring Criteria | |
|---|---|
| Exceptional | >36 |
| High | 29 - 36 |
| Intermediate | 22 - 28 |
| Limited | <22 |

### Benthos Summary Data

**Date** 6/14/2017 **TCEQ ID** 10145
**Site** Wichita River at FM 810

| Description | STORET | Value |
|---|---|---|
| Stream order | 84161 | 4 |
| Data reporting units | 89899 | 1 |
| Kicknet effort ($m^2$) | 89903 | 5 |
| Kicknet effort (min) | 89904 | 5.03 |
| Debris/shoreline effort, min picked (min) | 89905 | 0 |
| Total n for sample (n) | 89906 | 265 |
| Gravel substrate (%) | 89923 | 80 |
| Macrophyte bed (%) | 89926 | 0 |
| Snags and brush (%) | 89927 | 0 |
| Bedrock (%) | 89928 | 0 |
| Net mesh size (cm) | 89946 | 0.05 |
| Benthic sampler | 89950 | 3 |
| Ecoregion | 89961 | 27 |
| HBI | 90007 | 6.46 |
| EPT index (n) | 90008 | 3 |
| Dominant FFG (%) | 90010 | 79.31 |
| Collector-gatherers (%) | 90025 | 79.31 |
| Predators (%) | 90036 | 1.76 |
| Dominant taxon (%) | 90042 | 55.47 |
| Intolerant : Tolerant taxa | 90050 | 0.59 |
| Non-insect taxa (n) | 90052 | 3 |
| n as Elmidae (%) | 90054 | 0.75 |
| Taxa richness (n) | 90055 | 9 |
| Chironomidae (%) | 90062 | 4.53 |
| Trichoptera as Hydropsychidae (%) | 90069 | 100 |

## Qualitative Benthos IBI

**Date** 7/19/2017 **TCEQ ID** 10145
**Site** Wichita River at FM 810

| Metric | Value | Score |
|---|---|---|
| Taxa Richness | 15 | 3 |
| EPT Taxa Abundance | 7 | 3 |
| Biotic Index (HBI) | 6.24 | 1 |
| % Chironomidae | 26.76 | 1 |
| % Dominant Taxon | 26.76 | 3 |
| % Dominant FFG | 55.40 | 1 |
| % Predators | 11.38 | 4 |
| Intolerant : Tolerant | 0.31 | 1 |
| % Total Trichoptera as Hydropsychidae | 100.00 | 1 |
| # of Non-Insect Taxa | 2 | 2 |
| % Collector-Gatherers | 55.40 | 1 |
| % of Total Number as Elmidae | 5.99 | 4 |
| **AQUATIC LIFE USE SCORE** | **25** | |
| **AQUATIC LIFE USE RATING** | **Intermediate** | |

| Scoring Criteria | |
|---|---|
| Exceptional | >36 |
| High | 29 - 36 |
| Intermediate | 22 - 28 |
| Limited | <22 |

## Benthos Summary Data

**Date** 07/19/2017 **TCEQ ID** 10145
**Site** Wichita River at FM 810

| Description | STORET | Value |
|---|---|---|
| Stream order | 84161 | 4 |
| Data reporting units | 89899 | 1 |
| Kicknet effort (m²) | 89903 | 8 |
| Kicknet effort (min) | 89904 | 5.48 |
| Debris/shoreline effort, min picked (min) | 89905 | 0 |
| Total n for sample (n) | 89906 | 284 |
| Gravel substrate (%) | 89923 | 70 |
| Macrophyte bed (%) | 89926 | 0 |
| Snags and brush (%) | 89927 | 0 |
| Bedrock (%) | 89928 | 0 |
| Net mesh size (cm) | 89946 | 0.05 |
| Benthic sampler | 89950 | 3 |
| Ecoregion | 89961 | 27 |
| HBI | 90007 | 6.24 |
| EPT index (n) | 90008 | 7 |
| Dominant FFG (%) | 90010 | 55.4 |
| Collector-gatherers (%) | 90025 | 55.4 |
| Predators (%) | 90036 | 11.38 |
| Dominant taxon (%) | 90042 | 26.76 |
| Intolerant : Tolerant taxa | 90050 | 0.31 |
| Non-insect taxa (n) | 90052 | 2 |
| n as Elmidae (%) | 90054 | 5.99 |
| Taxa richness (n) | 90055 | 15 |
| Chironomidae (%) | 90062 | 26.76 |
| Trichoptera as Hydropsychidae (%) | 90069 | 100 |

## Physical Habitat IBI Data, Summary Data, and Transect Data

### Habitat Quality Index

| | |
|---|---|
| **Date** | 06/14/2017 |
| **Site** | Wichita River at FM 810 |
| **TCEQ ID** | 10145 |

| Metric | Value | Score |
|---|---|---|
| **Instream Cover, mean (%)** | 16.17 | 2 |
| **Riffles, number of** | 2 | 3 |
| **Pools, maximum depth (m)** | NA | 4 |
| **Bank Stability** | — | 1 |
| **Slope component, mean angle (°)** | 48.60 | — |
| **Erosion component, mean (%)** | 40.42 | — |
| **Riparian Buffer Vegetation, mean width (m)** | >20 | 2 |
| **Channel Flow Status** (4=High, 3=Moderate, 2=Low, 1=No flow) | 3 | 3 |
| **Channel Sinuosity** | 3 | 3 |
| **Bottom Substrate, mean gravel or larger (%)** | 25.83 | 2 |
| **Aesthetics** (1=Wilderness, 2=Natural, 3=Common, 4=Offensive) | 2 | 2 |
| **AQUATIC LIFE USE SCORE** | **22** | |
| **AQUATIC LIFE USE RATING** | **High** | |

| Scoring Criteria | |
|---|---|
| Exceptional | 26 - 31 |
| High | 20 - 25 |
| Intermediate | 14 - 19 |
| Limited | < 14 |

## Habitat Quality Index

**Date** 7/19/2017
**Site** Witchita River at FM 810
**TCEQ ID** 10145

| Metric | Value | Score |
|---|---|---|
| **Instream Cover, mean (%)** | 17.17 | 2 |
| **Riffles, number of** | 2 | 3 |
| **Pools, maximum depth (m)** | NA | 4 |
| **Bank Stability** | — | 0 |
| **Slope component, mean angle (°)** | 60.63 | — |
| **Erosion component, mean (%)** | 37.92 | — |
| **Riparian Buffer Vegetation, mean width (m)** | 19.58 | 3 |
| **Channel Flow Status** (4=High, 3=Moderate, 2=Low, 1=No flow) | 3 | 3 |
| **Channel Sinuosity** | 2 | 2 |
| **Bottom Substrate, mean gravel or larger (%)** | 14.17 | 2 |
| **Aesthetics** (1=Wilderness, 2=Natural, 3=Common, 4=Offensive) | 2 | 2 |
| **AQUATIC LIFE USE SCORE** | **21** | |
| **AQUATIC LIFE USE RATING** | **High** | |

| Scoring Criteria | |
|---|---|
| Exceptional | 26 - 31 |
| High | 20 - 25 |
| Intermediate | 14 - 19 |
| Limited | < 14 |

## Critical – Transect 1

(Bottom of reach)

Upstream taken from transect 1 during critical period.

Right bank taken from transect 1 during critical period.

Left bank taken from transect 1 during critical period.

Downstream taken from transect 1 during critical period.

# Conclusions

- Beaver Creek at FM 2326 (15120)
  - Listed on 303(d) List for Bacteria and has a high ALU designation
  - Results indicate that 15120 is not supporting high ALU rating for habitat
  - Results indicate that 15120 is supporting high ALU rating for benthos, nekton and Diel DO
- Wichita River at FM 810 (10145)
  - Listed on 303(d) List for Bacteria and has a high ALU designation
  - Results indicate that 10145 is not supporting high ALU rating for benthos or nekton
  - Results indicate that 10145 is supporting high ALU rating for Diel DO and physical habitat

**ADDITIONAL MONITORING IS SUGGESTED**

# Questions

# RED RIVER AUTHORITY OF TEXAS

Clean Rivers Program Partner since 1991

NELAP accredited laboratory since 2006


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