Wichita River at FM 810

TCEQ ID – 10145

Biological Monitoring Summary Packet

EIH Final Report #17-003
August 8, 2017

Prepared by the Environmental Institute of Houston University of Houston - Clear Lake in cooperation with the Red River Authority and the Texas Commission on Environmental Quality

Environmental Institute of Houston

Environmental Institute of Houston

Prepared by the Environmental Institute of Houston / University of Houston-Clear Lake

Jenny Oakley, Environmental Scientist
Mandi Gordon, Senior Biologist

Principal Investigator

Dr. George Guillen
Environmental Institute of Houston
University of Houston Clear Lake
2700 Bay Area Blvd
Houston, Texas 77058

Prepared in cooperation with and for the Red River Authority

Jose Martinez, Project Manager
Red River Authority
P.O. Box 240
Wichita Falls, TX 76307

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Summary of the Biological Assessment

Sample Collection

At the request of the Red River Authority (RRA), under Amendment #5 to the Red River Authority of Texas' Clean Rivers Program FY 2016-2017 QAPP, the Environmental Institute of Houston (EIH) conducted an aquatic life monitoring (ALM) study on the Wichita River, Clay County, TX. The sampling events were conducted during index and critical periods (June and July) in 2017. This packet contains a summary of the biological information collected at Texas Commission on Environmental Quality (TCEQ) site 10145 (Wichita River at FM 810).

The monitoring effort for each sample event included collection of instantaneous flow (discharge), field parameters (temperature, specific conductance, dissolved oxygen [D.O.], and pH), water chemistry (bacteria, nutrients, Chlorophyll, and solids), nekton (seining and electrofishing), benthic macroinvertebrates (RBP kicknet), and physical habitat characterization. Twenty-four hour (diel) monitoring for D.O. was also conducted concurrently with biological monitoring.

All measurements were recorded according to protocols outline in the TCEQ's Surface Water Quality Monitoring (SWQM) Procedures Manual Volume 1 (August 2012) and Volume 2 (May 2014). All data represented herein has been submitted to the RRA for entry into the Surface Water Quality Monitoring Information System (SWQMIS).

Results

Index sampling was performed on June 14, 2017 and critical sampling was performed on July 19, 2017. Flow data were obtained from the USGS gage (07312700-Wichita River at Charlie) located at the FM 810 bridge. Instantaneous flow values were higher during the index (248 cfs) compared to the critical (103 cfs) sampling.

During index sampling, instantaneous water temperature was 29.20°C, while diel averaged 28.89°C (range: 27.52-30.06°C, n = 96). Instantaneous specific conductance was 1,998 µS/cm while diel averaged 2,083 µS/cm (range: 1,943-2,174 µS/cm, n = 96). Instantaneous D.O. was 9.48 mg/L, while diel averaged 8.75 mg/L (range: 6.61-11.1 mg/L, n = 96). Instantaneous pH was 8.32, while diel ranged from 7.9-8.39 (n = 96).

During critical sampling, instantaneous water temperature was 30.20°C, while diel averaged 31.06°C (range: 29.29-32.69°C, n = 96). Instantaneous specific conductance was 4630 µS/cm, while diel averaged 2,767 µS/cm (range: 1,590-4,349 µS/cm, n = 96). Instantaneous D.O. was 10.44 mg/L, while diel averaged 8.08 mg/L (range: 4.72-11.51 mg/L, n = 96). Instantaneous pH was 8.49, while diel ranged from 7.53-8.54 (n = 96).

Sulfate (194 mg/L; 424 mg/L), chloride (552 mg/L; 985 mg/L), *E. coli* (76 MPN/100mL; 180 MPN/100mL), Alkalinity (138mg/L; 186mg/L), Dissolved Solids (1140mg/L; 2934mg/L), total phosphorus (0.415mg/L; 0.476mg/L), chlorophyll-a (99.2ug/L; 237ug/L), pheophytin-a (36.4ug/L; 49ug/L) levels all increased from index to critical periods, respectively. Total

suspended solid (162 mg/L; 107 mg/L), total kjeldahl nitrogen (2.52 mg/L; 2.23 mg/L), nitrate/nitrite nitrogen (0.564 mg/L; 0.288 mg/L), and turbidity (130 NTU, 75 NTU) levels all decreased from index to critical periods, respectively. No differences in ammonia nitrogen was observed between index (<0.05mg/L) and critical (<0.05mg/L) periods.

Ecoregion specific coefficient of variance (CV) adjusted mean nekton and benthic macroinvertebrate IBI scores were 39.57 and 21.57, respectively[1], while mean physical habitat IBI score was 21.5. Un-adjusted mean IBI scores for nekton indicate intermediate ALU, un-adjusted mean benthic IBI score indicates limited ALU, and the mean physical habitat IBI score indicates high ALU.

Conclusion

The Wichita River below Diversion Lake Dam (segment 0214) is listed on the 2014 Texas Integrated Report 303(d) list for bacteria and has a high ALU designation. Our results suggest that site 10145 (segment 0214) is not supporting its designated ALU rating of high for benthic macroinvertebrates or nekton. It is supporting its designated ALU rating of high for physical habitat and 24hr dissolved oxygen. Additional sampling is suggested because the Index sampling was conducted following a moderate rain event, and flow was still slightly elevated above base flow during sampling. As a result nekton sampling was difficult due to water depth and velocities. In addition the coefficient of variance of the adjusted means for both the nekton and benthic IBIs are greater than 2x the ALU coefficient of variance indicating additional sampling is needed.

[1] Nekton IBI: 31 (index), 39 (critical) and 35.0 un-adjusted mean; Benthic Macroinvertebrate IBI: 16 (index), 25 (critical), and 20.5 un-adjusted mean; Physical Habitat IBI: 22 (index) & 21 (critical)

Aquatic Life Monitoring and Habitat Assessment Checklist

Background Information

Name of Water Body: Wichita River Below Diversion Lake Dam
Segment Number: 0214 Station ID: 10145 On Segment: Yes ☒ No ☐

Permit number, if applicable: SPR-0504-383 Check monitoring objective: ALM ☒ ALU ☐ UAA ☐ RWA ☐

Historic Stream Characterization (choose one):
Intermittent ☐ Intermittent with perennial pools sufficient to support significant aquatic life use ☐ Perennial ☒ Unknown ☐

Basis for historic stream characterization (describe): Historical classification for stream characterization was based on topographic USGS maps and previously established TCEQ stream classifications (including TSWQS and 2014 Texas Integrated Report).

Current Aquatic Life Use Designation (if classified segment or site specific standard determined):
Exceptional ☐ High ☒ Intermediate ☐ Limited ☐

Current Assessment Status on the 2014 Water Quality Inventory, 305(b) Report:
Supported ☐ Partially Supported ☒ Not Supported ☐ Concern ☐ Not Assessed ☐

Data Entry

Field Data Entry (FDE) Information:
Date Entered Into FDE: _____ RTAG #: _____ (TCEQ Regional Biologists only)
Field Data (CRP Partners only): Tag #'s: Index – RR28509; RR28513; RR28517; RR28521; RR28525
Critical – RR28511; RR28515; RR28519; RR28523; RR28527

Objective for Aquatic Life Use Assessment

Is this water body supporting its designated uses? Yes ☐ No ☒
Reason: Nekton scores were limited and intermediate for the index and critical periods respectively; benthic macroinvertebrate scores were high during the index period and intermediate during the critical period. Physical Habitat scores were high for both the index and critical periods. In index and critical sampling periods, diel D.O. averaged 8.75 mg/L and 8.08 mg/L, respectively, with an absolute minima being 6.61 mg/L and 4.72 mg/L, respectively. In summation, this site is supporting high ALU for physical habitat and 24hr D.O., with concerns for nekton and benthic macroinvertebrates.

Known or potential causes of Aquatic Life Use concern or impairment: Segment 0214 is listed on the 2014 Texas Integrated Report 303(d) list for impaired bacteria.

Identify Sources of Pollution:
Point Source: Yes ☐ No ☒ Identify: _____
Nonpoint Source: Yes ☒ No ☐ Identify: Bridge crossing drains runoff from FM 810 just downstream of the sample reach.

Ambient Toxicity Tests in Water body? Yes ☐ No ☒
Results:

	Sediment Chronic	Sediment Acute	Water Chronic	Water Acute
Significant effect				
No significant effect				

Monitoring Information

Biological monitoring conducted during index period (03/15 to 06/30 and 10/01 to 10/15) and critical period (07/01 to 09/30):

Stream Characterization Event 1 Date: 6/14/2017

Flow Severity: Normal	Pools covering __0__% of the __500__ meters assessed	Flowing at __248.0__ cfs (gage)

Describe conditions that may have adversely affected stream during each sampling event (for example, recent rains, drought, and construction): Prior to index sampling, the area experience a rain event that resulted in high flow severity. Both sites were in "normal" conditions when sampled, but the water depth and velocity made some sampling protocols more difficult (than compared to critical sampling).

Stream Characterization Event 2 Date: 7/19/2017

Flow Severity: Normal	Pools covering __0__% of the __500__ meters assessed	Flowing at __103.0__ cfs (gage)

Describe conditions that may have adversely affected stream during each sampling event (for example, recent rains, drought, and construction): More representative sample for nekton due to sampling conditions (water depth and velocity) as compared to the index sampling.

Nekton Sampling Event 1

Minimum 15-minute (900 seconds) electrofishing: Yes ☒ No ☐
Minimum 6 seine hauls (or equivalent effort to sample 60 meters): Yes ☒ No ☐
Fish sampling conducted in all available habitat types: Yes ☒ No ☐
If no, please describe why:

Benthic Macroinvertebrate Sampling Event 1

Indicate method(s) used:

Rapid Bioassessment: 5-minute kicknet ☒ Snags ☐
Quantitative: Surber ☐ Snags ☐ Dredge ☐

Habitat Assessment Event 1

TCEQ Habitat Protocols: Yes ☒ No ☐

Stream Flow Measurement Event 1

Instantaneous measurement: Yes ☐ No ☒
USGS Gage Reading: USGS Gage: 07312700 Yes ☒ No ☐

Nekton Sampling Event 2

Minimum 15-minute (900 seconds) electrofishing: Yes ☒ No ☐
Minimum 6 seine hauls (or equivalent effort to sample 60 meters): Yes ☒ No ☐
Fish sampling conducted in all available habitat types: Yes ☒ No ☐
If no, please describe why:

Benthic Macroinvertebrate Sampling Event 2

Indicate method(s) used:

Rapid Bioassessment: 5-minute kicknet ☒ Snags ☐
Quantitative: Surber ☐ Snags ☐ Dredge ☐

Habitat Assessment Event 2

TCEQ Habitat Protocols: Yes ☒ No ☐

Stream Flow Measurement Event 2

Instantaneous measurement: Yes ☐ No ☒
USGS Gage Reading: USGS Gage: 07312700 Yes ☒ No ☐

Assessment Results (Optional)

Fish community index Event 1

Exceptional ☐ High ☐ Intermediate ☐ Limited ☒

Fish community index Event 2

Exceptional ☐ High ☒ Intermediate ☐ Limited ☐

Benthic macroinvertebrate community index Event 1

Exceptional ☐ High ☐ Intermediate ☐ Limited ☒

Benthic macroinvertebrate community index Event 2

Exceptional ☐ High ☐ Intermediate ☒ Limited ☐

Habitat index Event 1

Exceptional ☐ High ☒ Intermediate ☐ Limited ☐

Habitat index Event 2

Exceptional ☐ High ☒ Intermediate ☐ Limited ☐

NOTE: Due to post-rain event conditions at the site during the Index sample event, it is likely that the Nekton and Benthic community was underrepresented and the observed IBI score is lower than the actual conditions at the site.

Maps of Sample Location

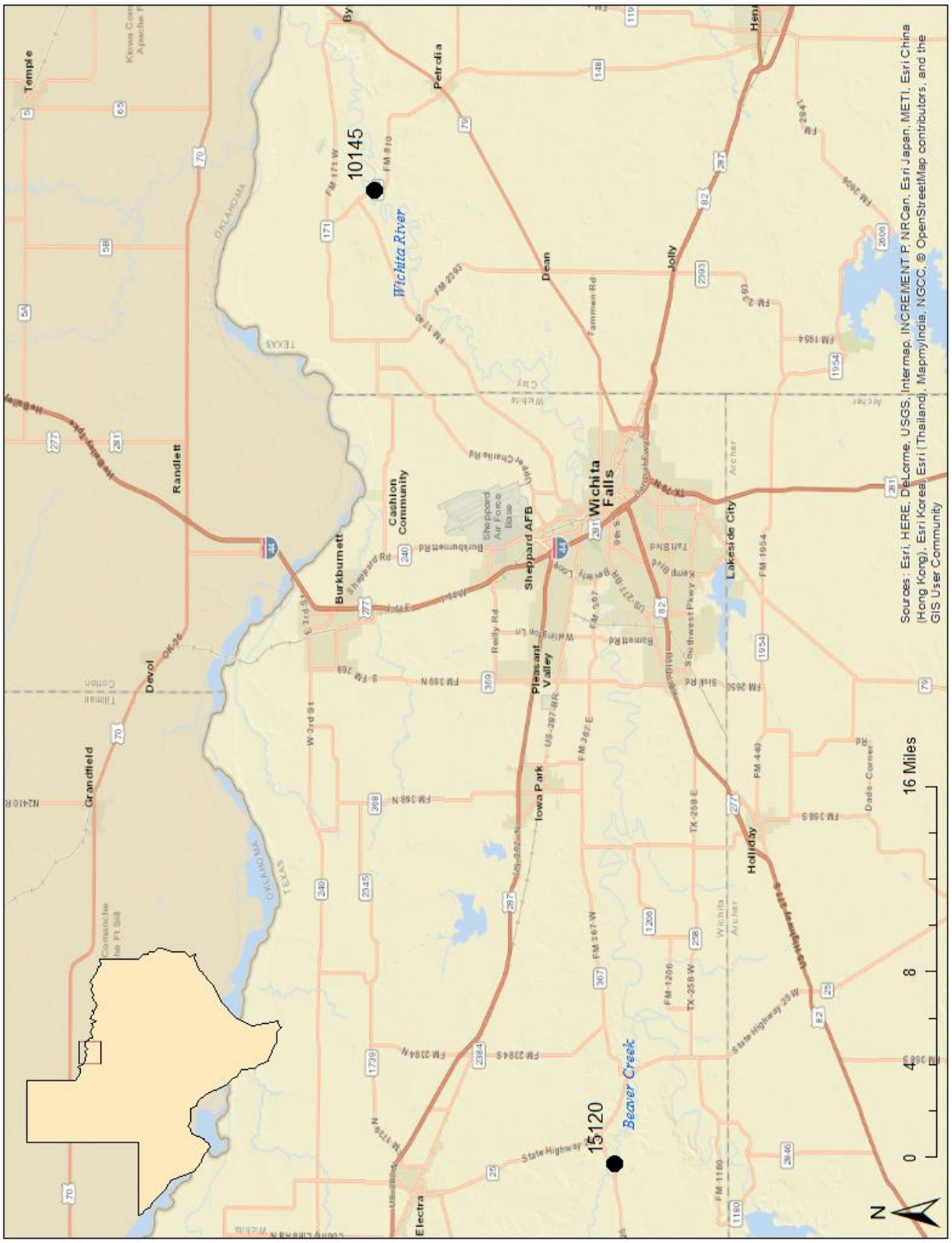


Figure 1 Map of overall sample area.

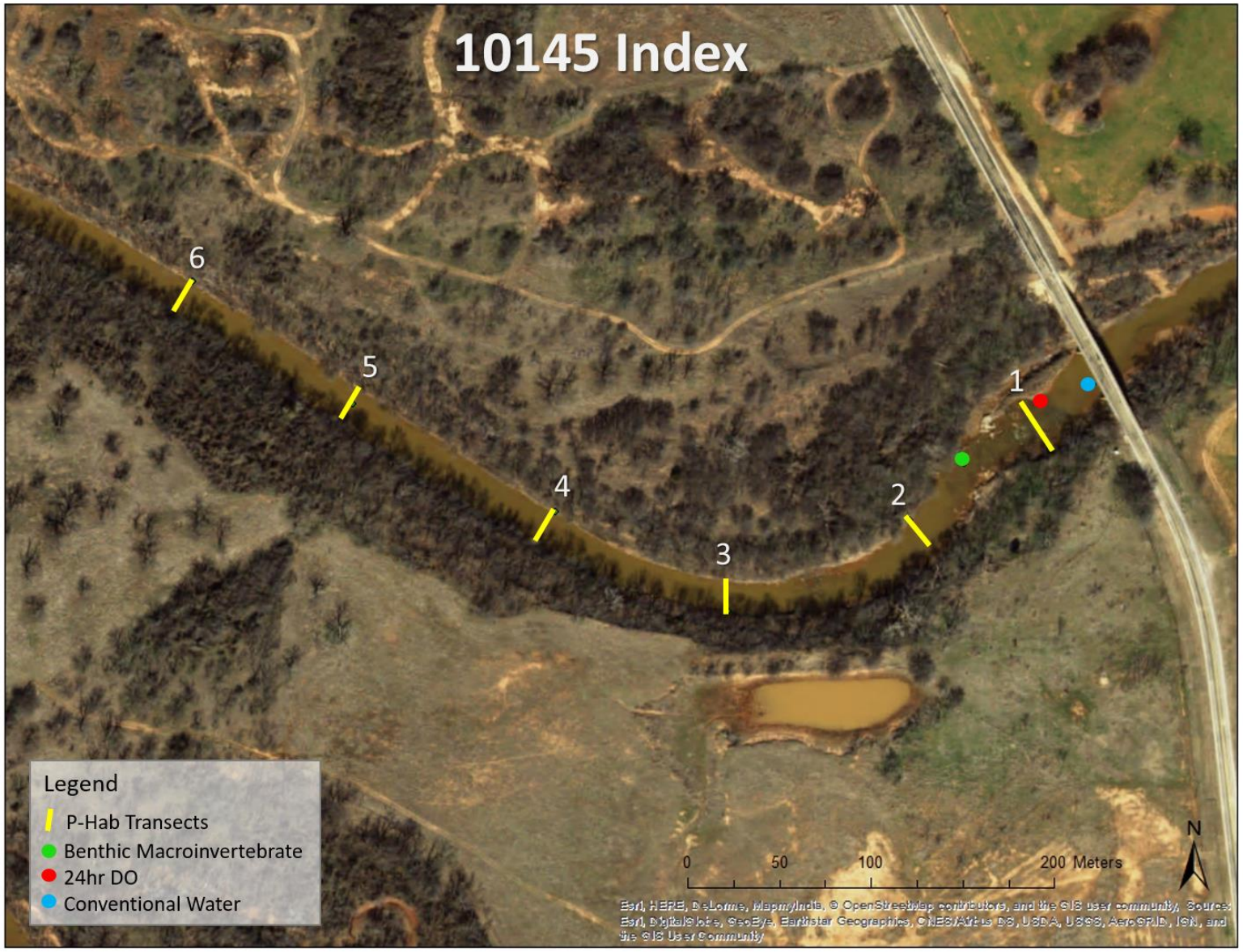


Figure 2 Sample reach map for index event showing location of physical habitat transects, benthic macroinvertebrate sampling, 24hr dissolved oxygen, and conventional water sampling locations.

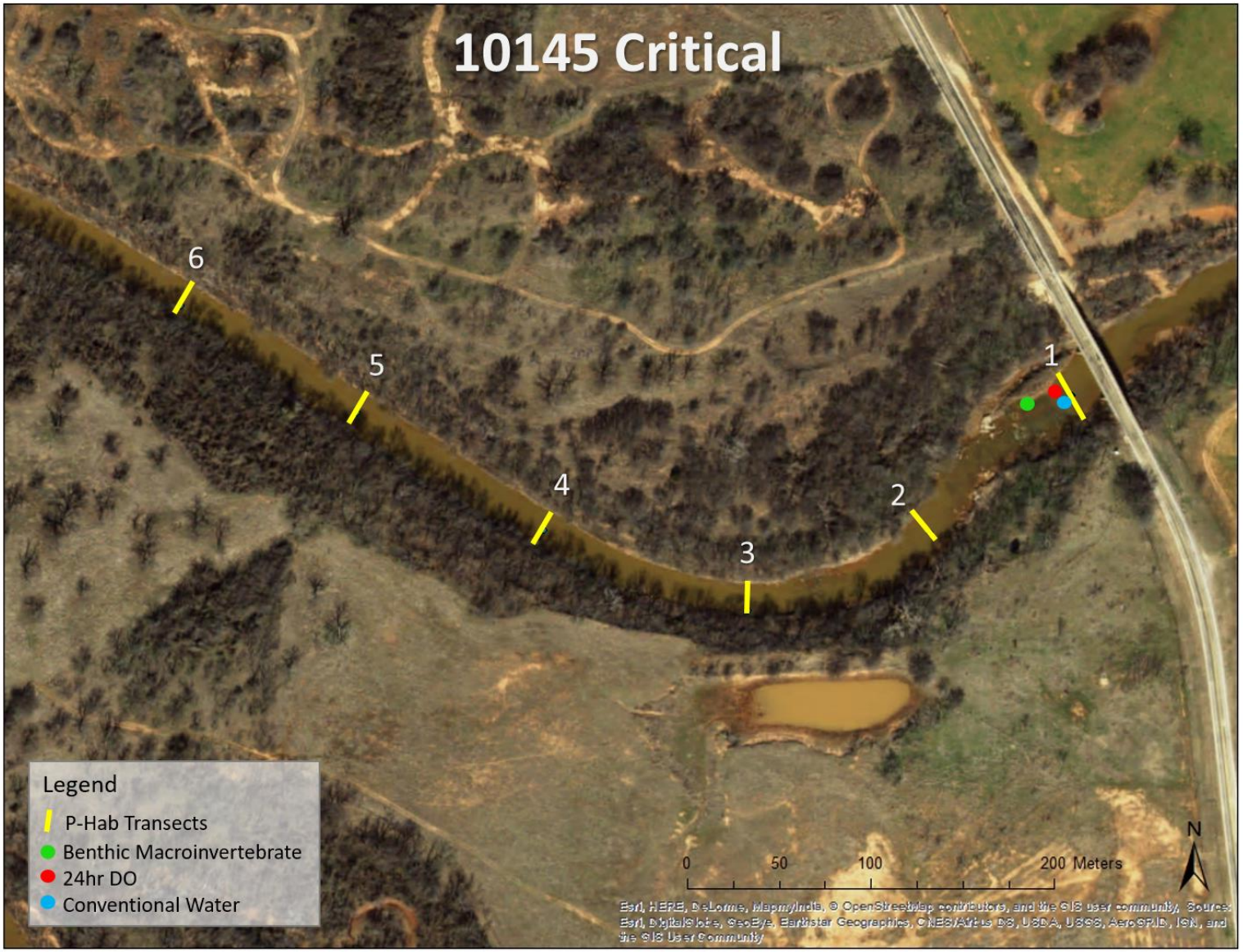


Figure 3 Sample reach map for critical event showing location of physical habitat transects, benthic macroinvertebrate sampling, 24hr dissolved oxygen, and conventional water sampling locations.

Nekton Community IBI Data, Summary Data, and Species Lists

Ecoregion 27 Nekton IBI

Date 06/14/2017 **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**

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

SPECIES LIST - BENTHIC MACROINVERTEBRATES

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

STORET	Phylum	Class	Order	Family	Genus	Count
90382	Annelida	Oligochaeta				147
91056	Arthropoda	Crustacea	Ostracoda			9
90196	Nematoda					2
92253	Arthropoda	Insecta	Coleoptera	Elmidae	*Stenelmis*	2
92491	Arthropoda	Insecta	Diptera	Chironomidae		12
92596	Arthropoda	Insecta	Diptera	Simuliidae	*Simulium*	5
91579	Arthropoda	Insecta	Ephemeroptera	Baetidae	*Labiobaetis*	75
91594	Arthropoda	Insecta	Ephemeroptera	Tricorythidae	*Tricorythodes*	11
92305	Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Potamyia*	2
					Total	**265**

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 (m^2)	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

SPECIES LIST - BENTHIC MACROINVERTEBRATES

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

STORET	Phylum	Class	Order	Family	Genus	Count
90382	Annelida	Oligochaeta				50
92874	Mollusca	Gastropoda	Limnophila	Physidae	*Physella*	2
92217	Arthropoda	Insecta	Coleoptera	Dryopidae	*Helichus*	1
92253	Arthropoda	Insecta	Coleoptera	Elmidae	*Stenelmis*	17
92491	Arthropoda	Insecta	Diptera	Chironomidae		76
92428	Arthropoda	Insecta	Diptera	Tipulidae	*Limnophila*	1
91579	Arthropoda	Insecta	Ephemeroptera	Baetidae	*Labiobaetis*	9
91600	Arthropoda	Insecta	Ephemeroptera	Caenidae	*Caenis*	66
91557	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	*Neochoroterpes*	5
91594	Arthropoda	Insecta	Ephemeroptera	Tricorythidae	*Tricorythodes*	33
91713	Arthropoda	Insecta	Odonata	Gomphidae	*Erpetogomphus*	4
91718	Arthropoda	Insecta	Odonata	Gomphidae	*Gomphus*	2
92292	Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Cheumatopsyche*	4
92296	Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Hydropsyche*	1
92305	Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Potamyia*	13
					Total	**284**

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 Summary Data

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

Description	STORET	Value
Instantaneous flow measurement (cfs)	00061	248.0
Mean stream slope over evaluated reach (m/km)	72051	0.490
Mean instream cover (%)	84159	16.17
Stream order	84161	2
Number of transects	89832	6
Flow measurement method (1=gage, 2=electric, 3=mechanical, 4=weir, 5=doppler)	89835	1
Total number of stream bends	89839	2
Well defined stream bends	89840	1
Moderately defined stream bends	89841	0
Poorly defined stream bends	89842	1
Number of riffles	89843	2
Dominant substrate (1=clay, 2=silt, 3=sand, 4=gravel, 5=cobble, 6=boulder, 7=bedrock)	89844	3
Mean substrate gravel or larger (%)	89845	25.83
Mean bank erosion (%)	89846	40.42
Mean bank slope (°)	89847	48.60
Channel flow status (4=high, 3=moderate, 2=low, 1=no flow)	89848	3
Riparian vegetation	—	—
Trees (%)	89849	47.50
Shrubs (%)	89850	5.83
Grasses/forbes (%)	89851	28.75
Cultivated fields (%)	89852	0
Other (%)	89853	18.75
Mean tree canopy (%)	89854	67.65
Drainage area above location (km^2)	89859	8858.7
Length of segment evaluated (km)	89860	0.5
Mean stream width (m)	89861	22.35
Mean stream depth (m)	89862	1.50
Maximum pool width (m)	89864	NA
Maximum pool depth (m)	89865	NA
Mean width natural buffer vegetation (m)	89866	>20
Aesthetics (1=wilderness, 2=natural, 3=common, 4=offensive)	89867	2
Number of instream cover types	89929	6
Ecoregion	89961	27
Land development (1=unimpacted, 2=low, 3=moderate, 4=high)	89962	2

Habitat Transect Data

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

Description	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5	Transect 6
Stream type (RI=riffle, RU=run, G=glide, P=pool)	RU	RU	RU	RU	RU	RU
Stream width (m)	28	24.3	20	20	21	20.8
Left bank slope (°)	12	43.75	90	67.5	57.5	45
Left bank erosion potential (%)	85	55	40	20	30	25
Left bank width of natural buffer vegetation (m)	20	20	20	20	20	20
Right bank slope (°)	15	50	40	42.5	60	60
Right bank erosion potential (%)	70	15	20	25	70	30
Right bank width of natural buffer vegetation (m)	20	20	20	20	20	20
Tree canopy (%)	23.53	50	86.76	79.41	97.06	69.12
Dominant substrate type (1=clay, 2=silt, 3=sand, 4=gravel, 5=cobble, 6=boulder, 7=bedrock, 8=other)	4	6	3	3	1	3
Stream depth at point 1 (m)	0	0.05	0.305	0.45	0.15	0.26
Stream depth at point 2 (m)	1.05	0.5	1.51	1.35	1.55	1.115
Stream depth at point 3 (m)	1.1	0.55	2.01	1.62	1.58	1.345
Stream depth at point 4 (m)	0.97	0.65	1.98	1.64	1.55	1.34
Stream depth at point 5 (m)	0.57	0.93	1.87	1.62	1.59	1.29
Stream depth at point 6 (m)	0.92	0.95	1.69	1.64	1.6	1.28
Stream depth at point 7 (m)	0.885	0.91	1.59	1.62	1.54	1.315
Stream depth at point 8 (m)	0.93	0.73	1.45	1.58	1.48	1.385
Stream depth at point 9 (m)	0.9	0.66	1.35	1.16	1.49	1.5
Stream depth at point 10 (m)	0.8	0.61	0.59	1.105	0.76	0.99
Stream depth at point 11 (m)	0	0	0.38	0.24	0.38	0.26
Substrate gravel or larger (%)	80	75	0	0	0	0
Instream cover (%)	10	60	13	5	3	6
Left bank trees (%)	0	25	50	90	95	25
Left bank shrubs (%)	5	0	5	0	0	10
Left bank grasses/forbes (%)	65	50	43	10	5	60
Left bank cultivated fields (%)	0	0	0	0	0	0
Left bank other (%)	30	25	2	0	0	5
Right bank trees (%)	25	90	80	25	40	25
Right bank shrubs (%)	35	0	15	0	0	0
Right bank grasses/forbes (%)	2	5	0	40	20	45
Right bank cultivated fields (%)	0	0	0	0	0	0
Right bank other (%)	48	5	5	35	40	30
Transect Latitude (decimal degrees)	34.05600	34.05565	34.05520	34.05569	34.05622	34.05682
Transect Longitude (decimal degrees)	-98.29529	-98.29598	-98.29687	-98.29772	-98.29871	-98.29950
Total length of reach (m)			500			

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

Habitat Summary Data

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

Description	STORET	Value
Instantaneous flow measurement (cfs)	00061	103.0
Mean stream slope over evaluated reach (m/km)	72051	0.490
Mean instream cover (%)	84159	17.17
Stream order	84161	4
Number of transects	89832	6
Flow measurement method (1=gage, 2=electric, 3=mechanical, 4=weir, 5=doppler)	89835	1
Total number of stream bends	89839	2
Well defined stream bends	89840	1
Moderately defined stream bends	89841	0
Poorly defined stream bends	89842	1
Number of riffles	89843	2
Dominant substrate (1=clay, 2=silt, 3=sand, 4=gravel, 5=cobble, 6=boulder, 7=bedrock)	89844	1
Mean substrate gravel or larger (%)	89845	14.17
Mean bank erosion (%)	89846	37.92
Mean bank slope (°)	89847	60.63
Channel flow status (4=high, 3=moderate, 2=low, 1=no flow)	89848	3
Riparian vegetation	—	—
Trees (%)	89849	58.75
Shrubs (%)	89850	3.75
Grasses/forbes (%)	89851	30.83
Cultivated fields (%)	89852	0
Other (%)	89853	6.67
Mean tree canopy (%)	89854	53.9216
Drainage area above location (km^2)	89859	8858.7
Length of segment evaluated (km)	89860	0.50
Mean stream width (m)	89861	20.70
Mean stream depth (m)	89862	1.23
Maximum pool width (m)	89864	NA
Maximum pool depth (m)	89865	NA
Mean width natural buffer vegetation (m)	89866	19.58
Aesthetics (1=wilderness, 2=natural, 3=common, 4=offensive)	89867	2
Number of instream cover types	89929	4
Ecoregion	89961	27
Land development (1=unimpacted, 2=low, 3=moderate, 4=high)	89962	2

Habitat Transect Data

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

Description	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5	Transect 6
Stream type (RI=riffle, RU=run, G=glide, P=pool)	RU	G	G	G	G	G
Stream width (m)	25	22.7	18.2	19.9	21.2	17.2
Left bank slope (°)	10	97.5	40	72.5	95	92.5
Left bank erosion potential (%)	70	40	30	15	20	20
Left bank width of natural buffer vegetation (m)	20	20	20	20	20	20
Right bank slope (°)	30	60	70	85	40	35
Right bank erosion potential (%)	60	40	60	30	40	35
Right bank width of natural buffer vegetation (m)	15	20	20	20	20	20
Tree canopy (%)	22.06	52.94	66.18	60.29	57.35	64.71
Dominant substrate type (1=clay, 2=silt, 3=sand, 4=gravel, 5=cobble, 6=boulder, 7=bedrock, 8=other)	3	5	1	1	1	1
Stream depth at point 1 (m)	0	0.19	0.575	0.31	0	0
Stream depth at point 2 (m)	0.64	0.43	1.17	0.855	0.65	0.695
Stream depth at point 3 (m)	0.45	0.45	1.395	0.97	1.03	0.93
Stream depth at point 4 (m)	0.4	0.565	1.71	1.25	1.31	0.95
Stream depth at point 5 (m)	0.62	0.715	1.78	1.39	1.33	0.93
Stream depth at point 6 (m)	0.6	0.78	1.51	1.39	1.31	0.95
Stream depth at point 7 (m)	0.56	0.74	1.45	1.34	1.24	0.965
Stream depth at point 8 (m)	0.625	0.65	1.28	1.35	1.23	1.2
Stream depth at point 9 (m)	0.65	0.4	1.1	1.36	1.25	1.195
Stream depth at point 10 (m)	0.56	0.285	0.6	1.365	1.07	1.32
Stream depth at point 11 (m)	0	0	0	0	0.235	0.145
Substrate gravel or larger (%)	25	60	0	0	0	0
Instream cover (%)	15	35	15	25	5	8
Left bank trees (%)	0	20	80	100	95	60
Left bank shrubs (%)	0	0	0	0	0	0
Left bank grasses/forbes (%)	85	70	20	0	5	35
Left bank cultivated fields (%)	0	0	0	0	0	0
Left bank other (%)	15	10	0	0	0	5
Right bank trees (%)	10	60	70	70	60	80
Right bank shrubs (%)	30	0	0	0	5	10
Right bank grasses/forbes (%)	55	30	15	25	25	5
Right bank cultivated fields (%)	0	0	0	0	0	0
Right bank other (%)	5	10	15	5	10	5
Transect Latitude (decimal degrees)	34.05626	34.05559	34.05521	34.05560	34.05618	34.05670
Transect Longitude (decimal degrees)	-98.29519	-98.29588	-98.29677	-98.29777	-98.29869	-98.29955
Total length of reach (m)			500			

Diel Summary Data and Measurements

Diel Measurement Summary

Start Date	06/13/2017	**Start Time**	18:46
End Date	06/15/2017	**End Time**	9:20
Site	Witchita River at FM 810		
TCEQ ID	10145		

Parameter	STORET	Value
Temp Mean	00209	28.89
Temp Maximum	00210	30.06
Temp Minimum	00211	27.52
Spec Cond Mean	00212	2083
Spec Cond Maximum	00213	2174
Spec Cond Minimum	00214	1943
pH Maximum	00215	8.39
pH Minimum	00216	7.9
# Temp Measurements	00221	96
# Spec Cond Measurements	00222	96
# pH Measurements	00223	96
DO Minimum	89855	6.61
DO Maximum	89856	8.75
DO Mean	89857	8.75
# DO Measurements	89858	96

Diel Data

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

Date (mm/dd/yyyy)	Time (hh:mm)	Temp (°C)	pH Std. Units	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Specific Conductance (µS/cm)
06/14/2017	08:00	30.05	7.90	6.61	84.30	1943
06/14/2017	08:15	30.01	7.90	6.61	84.20	1945
06/14/2017	08:30	30.00	7.91	6.67	84.90	1947
06/14/2017	08:45	29.95	7.91	6.75	86.00	1949
06/14/2017	09:00	29.92	7.93	6.85	87.30	1953
06/14/2017	09:15	29.86	7.93	6.86	87.50	1956
06/14/2017	09:30	29.83	7.94	6.97	88.90	1959
06/14/2017	09:45	29.80	7.94	6.98	89.20	1965
06/14/2017	10:00	29.76	7.95	7.05	90.00	1967
06/14/2017	10:15	29.74	7.97	7.16	91.60	1972
06/14/2017	10:30	29.68	7.98	7.24	92.70	1973
06/14/2017	10:45	29.60	8.00	7.41	94.90	1976
06/14/2017	11:00	29.54	8.01	7.50	96.20	1980
06/14/2017	11:15	29.48	8.03	7.61	97.70	1981
06/14/2017	11:30	29.43	8.03	7.66	98.40	1981
06/14/2017	11:45	29.37	8.05	7.79	100.30	1986
06/14/2017	12:00	29.30	8.06	7.92	102.00	1987
06/14/2017	12:15	29.26	8.07	8.01	103.40	1990
06/14/2017	12:30	29.20	8.08	8.08	104.30	1991
06/14/2017	12:45	29.16	8.11	8.32	107.60	1995
06/14/2017	13:00	29.11	8.11	8.45	109.60	1997
06/14/2017	13:15	29.05	8.13	8.55	111.10	2002
06/14/2017	13:30	29.01	8.15	8.76	114.10	2009
06/14/2017	13:45	28.95	8.16	8.88	115.80	2012
06/14/2017	14:00	28.91	8.19	9.11	119.10	2018
06/14/2017	14:15	28.85	8.21	9.27	121.40	2023
06/14/2017	14:30	28.78	8.22	9.38	123.10	2026
06/14/2017	14:45	28.73	8.23	9.50	124.80	2031
06/14/2017	15:00	28.69	8.26	9.73	128.20	2035
06/14/2017	15:15	28.64	8.26	9.78	128.90	2037
06/14/2017	15:30	28.60	8.29	10.03	132.40	2041
06/14/2017	15:45	28.55	8.30	10.19	134.90	2043
06/14/2017	16:00	28.54	8.32	10.38	137.30	2046
06/14/2017	16:15	28.52	8.33	10.47	138.90	2046
06/14/2017	16:30	28.47	8.35	10.54	140.10	2050
06/14/2017	16:45	28.45	8.36	10.83	144.00	2055
06/14/2017	17:00	28.40	8.36	10.91	145.00	2056
06/14/2017	17:15	28.38	8.37	11.00	146.30	2060
06/14/2017	17:30	28.33	8.38	11.05	147.10	2063
06/14/2017	17:45	28.30	8.38	11.02	146.70	2068
06/14/2017	18:00	28.26	8.39	11.07	147.30	2071
06/14/2017	18:15	28.23	8.39	11.10	147.80	2077
06/14/2017	18:30	28.20	8.39	11.05	147.10	2083
06/14/2017	18:45	28.16	8.39	11.03	146.80	2088
06/14/2017	19:00	28.14	8.39	10.99	146.40	2090
06/14/2017	19:15	28.09	8.39	10.97	146.10	2095

Date	Time	Temp	pH	Dissolved Oxygen	Dissolved Oxygen	Specific Conductance
06/14/2017	19:30	28.07	8.39	10.90	145.20	2099
06/14/2017	19:45	28.04	8.39	10.81	143.90	2103
06/14/2017	20:00	28.03	8.39	10.75	143.10	2107
06/14/2017	20:15	28.01	8.38	10.67	141.80	2108
06/14/2017	20:30	30.05	8.38	10.53	139.90	2114
06/14/2017	20:45	30.01	8.37	10.40	138.10	2116
06/14/2017	21:00	30.00	8.36	10.31	136.80	2118
06/14/2017	21:15	29.95	8.36	10.17	134.90	2123
06/14/2017	21:30	29.92	8.36	10.07	133.50	2126
06/14/2017	21:45	29.86	8.35	9.93	131.50	2128
06/14/2017	22:00	29.83	8.34	9.82	129.90	2131
06/14/2017	22:15	29.80	8.34	9.68	127.90	2133
06/14/2017	22:30	29.76	8.33	9.57	126.30	2136
06/14/2017	22:45	29.74	8.33	9.43	124.40	2138
06/14/2017	23:00	29.68	8.32	9.36	123.30	2141
06/14/2017	23:15	29.60	8.32	9.26	121.80	2143
06/14/2017	23:30	29.54	8.31	9.14	120.10	2144
06/14/2017	23:45	29.48	8.31	9.04	118.80	2148
06/15/2017	00:00	29.43	8.31	8.96	117.60	2149
06/15/2017	00:15	29.37	8.30	8.87	116.30	2150
06/15/2017	00:30	29.30	8.30	8.77	115.00	2152
06/15/2017	00:45	29.26	8.29	8.68	113.60	2153
06/15/2017	01:00	29.20	8.29	8.58	112.20	2154
06/15/2017	01:15	29.16	8.28	8.52	111.40	2155
06/15/2017	01:30	29.11	8.27	8.48	110.80	2156
06/15/2017	01:45	29.05	8.26	8.41	109.70	2158
06/15/2017	02:00	29.01	8.25	8.32	108.40	2159
06/15/2017	02:15	28.95	8.24	8.23	107.20	2160
06/15/2017	02:30	28.91	8.24	8.14	105.90	2162
06/15/2017	02:45	28.85	8.23	8.03	104.40	2163
06/15/2017	03:00	28.78	8.23	7.96	103.30	2165
06/15/2017	03:15	28.73	8.22	7.87	102.20	2165
06/15/2017	03:30	28.69	8.22	7.80	101.30	2165
06/15/2017	03:45	28.64	8.21	7.72	100.20	2166
06/15/2017	04:00	28.60	8.20	7.65	99.10	2166
06/15/2017	04:15	28.55	8.20	7.59	98.40	2165
06/15/2017	04:30	28.54	8.19	7.51	97.20	2163
06/15/2017	04:45	28.52	8.19	7.46	96.50	2161
06/15/2017	05:00	28.47	8.19	7.38	95.40	2159
06/15/2017	05:15	28.45	8.18	7.33	94.70	2157
06/15/2017	05:30	28.40	8.18	7.28	94.00	2155
06/15/2017	05:45	28.38	8.18	7.23	93.20	2154
06/15/2017	06:00	28.33	8.18	7.21	93.00	2153
06/15/2017	06:15	28.30	8.17	7.16	92.20	2154
06/15/2017	06:30	28.26	8.17	7.14	91.90	2156
06/15/2017	06:45	28.23	8.17	7.08	91.20	2159
06/15/2017	07:00	28.20	8.17	7.07	91.00	2162
06/15/2017	07:15	28.16	8.17	7.07	90.90	2166
06/15/2017	07:30	28.14	8.17	7.08	91.00	2171
06/15/2017	07:45	28.09	8.18	7.14	91.80	2174

Diel Measurement Summary

Start Date	07/17/2017	**Start Time**	17:00
End Date	07/19/2017	**End Time**	8:40
Site	Witchita River at FM 810		
TCEQ ID	10145		

Parameter	STORET	Value
Temp Mean	00209	31.06
Temp Maximum	00210	32.69
Temp Minimum	00211	29.29
Spec Cond Mean	00212	2767
Spec Cond Maximum	00213	4349
Spec Cond Minimum	00214	1590
pH Maximum	00215	8.54
pH Minimum	00216	7.53
# Temp Measurements	00221	96
# Spec Cond Measurements	00222	96
# pH Measurements	00223	96
DO Minimum	89855	4.72
DO Maximum	89856	11.51
DO Mean	89857	8.08
# DO Measurements	89858	96

Diel Data

Date 7/19/2017 **TCEQ ID** 10145

Site Name Witchita River at FM 810

Date (mm/dd/yyyy)	Time (hh:mm)	Temp (°C)	pH Std. Units	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Specific Conductance (µS/cm)
07/18/2017	08:30	29.30	7.53	4.72	61.9	1590
07/18/2017	08:45	29.29	7.53	4.76	62.4	1612
07/18/2017	09:00	29.30	7.54	4.79	62.8	1636
07/18/2017	09:15	29.32	7.54	4.76	62.5	1652
07/18/2017	09:30	29.33	7.55	4.85	63.8	1671
07/18/2017	09:45	29.37	7.55	4.83	63.5	1684
07/18/2017	10:00	29.40	7.56	4.97	65.4	1702
07/18/2017	10:15	29.43	7.57	5.00	65.9	1717
07/18/2017	10:30	29.47	7.58	5.03	66.3	1731
07/18/2017	10:45	29.55	7.60	5.19	68.4	1745
07/18/2017	11:00	29.63	7.61	5.25	69.3	1759
07/18/2017	11:15	29.72	7.63	5.33	70.6	1772
07/18/2017	11:30	29.83	7.64	5.43	72.0	1783
07/18/2017	11:45	29.94	7.66	5.61	74.5	1798
07/18/2017	12:00	30.06	7.68	5.68	75.6	1816
07/18/2017	12:15	30.24	7.72	5.91	78.9	1831
07/18/2017	12:30	30.32	7.73	6.03	80.6	1850
07/18/2017	12:45	30.46	7.76	6.22	83.4	1869
07/18/2017	13:00	30.62	7.80	6.43	86.5	1890
07/18/2017	13:15	30.72	7.83	6.60	88.9	1917
07/18/2017	13:30	30.81	7.86	6.74	90.9	1937
07/18/2017	13:45	30.90	7.90	6.93	93.6	1963
07/18/2017	14:00	30.96	7.93	7.14	96.6	1989
07/18/2017	14:15	31.16	7.99	7.50	101.8	2016
07/18/2017	14:30	31.27	8.02	7.60	103.3	2038
07/18/2017	14:45	31.37	8.07	7.98	108.6	2062
07/18/2017	15:00	31.51	8.11	8.19	111.8	2084
07/18/2017	15:15	31.68	8.16	8.49	116.3	2104
07/18/2017	15:30	31.81	8.21	8.89	122.0	2126
07/18/2017	15:45	31.91	8.25	9.17	126.0	2146
07/18/2017	16:00	32.05	8.29	9.41	129.7	2162
07/18/2017	16:15	32.15	8.33	9.75	134.5	2183
07/18/2017	16:30	32.21	8.35	9.89	136.6	2198
07/18/2017	16:45	32.29	8.37	10.09	139.7	2214
07/18/2017	17:00	32.42	8.40	10.33	143.3	2232
07/18/2017	17:15	32.56	8.43	10.53	146.4	2251
07/18/2017	17:30	32.64	8.46	10.81	150.5	2276
07/18/2017	17:45	32.67	8.48	10.91	152.0	2300
07/18/2017	18:00	32.67	8.49	11.10	154.6	2330
07/18/2017	18:15	32.68	8.51	11.20	156.1	2362
07/18/2017	18:30	32.69	8.52	11.25	156.8	2390
07/18/2017	18:45	32.69	8.52	11.42	159.3	2425
07/18/2017	19:00	32.67	8.52	11.29	157.4	2460
07/18/2017	19:15	32.69	8.54	11.51	160.6	2512
07/18/2017	19:30	32.68	8.54	11.46	159.8	2543

Date	Time	Temp	pH	Dissolved Oxygen	Dissolved Oxygen	Specific Conductance
07/18/2017	19:45	32.69	8.54	11.39	158.9	2588
07/18/2017	20:00	32.68	8.54	11.37	158.6	2635
07/18/2017	20:15	32.66	8.53	11.46	159.7	2679
07/18/2017	20:30	32.65	8.53	11.35	158.2	2727
07/18/2017	20:45	32.60	8.52	11.20	156.0	2766
07/18/2017	21:00	32.56	8.51	11.09	154.4	2805
07/18/2017	21:15	32.51	8.51	10.97	152.7	2842
07/18/2017	21:30	32.43	8.50	10.87	151.0	2877
07/18/2017	21:45	32.39	8.50	10.74	149.2	2908
07/18/2017	22:00	32.32	8.50	10.59	146.9	2931
07/18/2017	22:15	32.27	8.49	10.46	145.0	2953
07/18/2017	22:30	32.20	8.49	10.30	142.6	2972
07/18/2017	22:45	32.14	8.49	10.16	140.5	2992
07/18/2017	23:00	32.07	8.48	9.98	138.0	3007
07/18/2017	23:15	31.99	8.48	9.79	135.1	3024
07/18/2017	23:30	31.91	8.48	9.66	133.1	3039
07/18/2017	23:45	31.81	8.48	9.51	130.9	3055
07/19/2017	00:00	31.71	8.48	9.42	129.4	3073
07/19/2017	00:15	31.63	8.47	9.24	126.7	3092
07/19/2017	00:30	31.55	8.47	9.09	124.6	3115
07/19/2017	00:45	31.48	8.47	9.03	123.6	3145
07/19/2017	01:00	31.40	8.46	8.83	120.7	3175
07/19/2017	01:15	31.32	8.47	8.65	118.0	3210
07/19/2017	01:30	31.26	8.46	8.67	118.3	3245
07/19/2017	01:45	31.17	8.45	8.49	115.6	3282
07/19/2017	02:00	31.10	8.44	8.31	113.1	3322
07/19/2017	02:15	31.02	8.43	8.21	111.6	3365
07/19/2017	02:30	30.93	8.42	8.02	108.9	3419
07/19/2017	02:45	30.84	8.41	7.92	107.3	3462
07/19/2017	03:00	30.77	8.40	7.75	105.0	3507
07/19/2017	03:15	30.68	8.39	7.58	102.5	3564
07/19/2017	03:30	30.59	8.38	7.42	100.1	3614
07/19/2017	03:45	30.52	8.36	7.27	98.1	3658
07/19/2017	04:00	30.45	8.35	7.19	96.9	3714
07/19/2017	04:15	30.38	8.35	7.10	95.6	3763
07/19/2017	04:30	30.30	8.34	6.95	93.5	3810
07/19/2017	04:45	30.24	8.33	6.85	91.9	3862
07/19/2017	05:00	30.18	8.32	6.66	89.3	3901
07/19/2017	05:15	30.10	8.31	6.64	88.9	3942
07/19/2017	05:30	30.03	8.30	6.50	87.1	3986
07/19/2017	05:45	29.95	8.29	6.38	85.4	4028
07/19/2017	06:00	29.90	8.28	6.34	84.7	4066
07/19/2017	06:15	29.82	8.27	6.25	83.4	4106
07/19/2017	06:30	29.75	8.27	6.10	81.3	4148
07/19/2017	06:45	29.70	8.25	6.06	80.8	4179
07/19/2017	07:00	29.63	8.25	6.00	79.8	4217
07/19/2017	07:15	29.57	8.24	5.93	78.8	4246
07/19/2017	07:30	29.52	8.23	5.85	77.7	4275
07/19/2017	07:45	29.47	8.23	5.79	76.8	4302
07/19/2017	08:00	29.44	8.22	5.74	76.2	4326
07/19/2017	08:15	29.42	8.22	5.85	77.6	4349

Additional Field Data Measurements

Additional Parameter Data

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

Description	STORET	Value
***E. coli* IDEXX Colilert (MPN/100 ml)**	31699	76
Holding Time, *E. coli* IDEXX Colilert (hh:mm)	31704	2.00
TSS (mg/l)	00530	162
Total Alkalinity (mg/l)	00140	138
Ammonia-N, Total (mg/l)	00610	<0.5
Nitrate/Nitrite-N, Total (mg/l)	00630	0.564
Total Phosphorus-P (mg/l)	00665	0.415
Total Kjeldahl Nitrogen (mg/l)	00625	2.52
Turbidity (NTU)	82079	130
Chloride (mg/l)	00940	552
Sulfate (mg/l)	00945	194
TDS, dried @ 180°C (mg/l)	70300	1140
Chlorophyll-a (ug/l)	70953	99.2
Pheophytin-a (ug/l)	32213	36.4
Temperature (°C)	00010	29.20
Secchi Depth (m)	00078	0.110
Specific Conductance (µS/cm)	00094	1998
DO (mg/L)	00300	9.48
pH (standard units)	00400	8.32
Salinity (ppt)	00480	1.01
Flow Severity (1=No Flow, 2=Low, 3=Normal, 4=Flood, 5=High, 6=Dry)	01351	3
Water Clarity (1=Excellent, 2=Good, 3=Fair, 4=Poor)	20424	4
Days Since Last Significant Rainfall (days)	72053	5
Total Water Depth (m)	82903	1.342
Wind Intensity (1=Calm, 2=Slight, 3=Moderate, 4=Strong)	89965	3
Present Weather (1=Clear, 2=Partly Cloudy, 3=Cloudy, 4=Rain, 5=Other)	89966	2
Water Surface (1=Calm, 2=Ripples, 3=Waves, 4=Whitecap)	89968	2
Water Color (1=Brownish, 2=Reddish, 3=Greenish, 4=Blackish, 5=Clear, 6=Other)	89969	1
Water Odor (1=sewage, 2=Chemical, 3=Rotten Egg, 4=Musky, 5=Fishy, 6=None, 7=Other)	89971	6

Additional Parameter Data

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

Description	STORET	Value
E. coli **IDEXX Colilert (MPN/100 ml)**	31699	180
Holding Time, *E. coli* IDEXX Colilert (hh:mm)	31704	2.83
TSS (mg/l)	00530	107
Total Alkalinity (mg/l)	00140	186
Ammonia-N, Total (mg/l)	00610	<0.05
Nitrate/Nitrite-N, Total (mg/l)	00630	0.288
Total Phosphorus-P (mg/l)	00665	0.476
Total Kjeldahl Nitrogen (mg/l)	00625	2.23
Turbidity (NTU)	82079	75
Chloride (mg/l)	00940	985
Sulfate (mg/l)	00945	424
TDS, dried @ 180°C (mg/l)	70300	2934
Chlorophyll-a (ug/l)	70953	237
Pheophytin-a (ug/l)	32213	49
Temperature (°C)	00010	30.20
Secchi Depth (m)	00078	0.077
Specific Conductance (µS/cm)	00094	4630
DO (mg/L)	00300	10.44
pH (standard units)	00400	8.49
Salinity (ppt)	00480	2.45
Flow Severity (1=No Flow, 2=Low, 3=Normal, 4=Flood, 5=High, 6=Dry)	01351	3
Water Clarity (1=Excellent, 2=Good, 3=Fair, 4=Poor)	20424	4
Days Since Last Significant Rainfall (days)	72053	10
Total Water Depth (m)	82903	0.570
Wind Intensity (1=Calm, 2=Slight, 3=Moderate, 4=Strong)	89965	2
Present Weather (1=Clear, 2=Partly Cloudy, 3=Cloudy, 4=Rain, 5=Other)	89966	2
Water Surface (1=Calm, 2=Ripples, 3=Waves, 4=Whitecap)	89968	2
Water Color (1=Brownish, 2=Reddish, 3=Greenish, 4=Blackish, 5=Clear, 6=Other)	89969	1
Water Odor (1=sewage, 2=Chemical, 3=Rotten Egg, 4=Musky, 5=Fishy, 6=None, 7=Other)	89971	6

Site Photographs

Index – Transect 1

(Bottom of reach)

Upstream taken from transect 1 during index period.

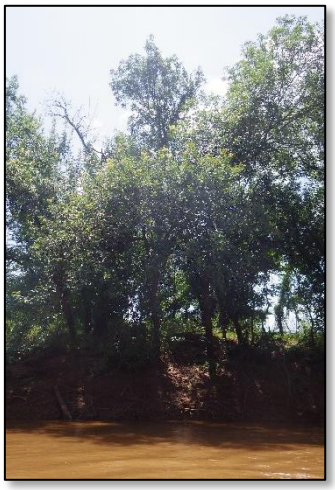
Right bank taken from transect 1 during index period.

Left bank taken from transect 1 during index period.

Downstream taken from transect 1 during index period.

Index – Transect 2

Upstream taken from transect 2 during index period.



Right bank taken from transect 2 during index period.

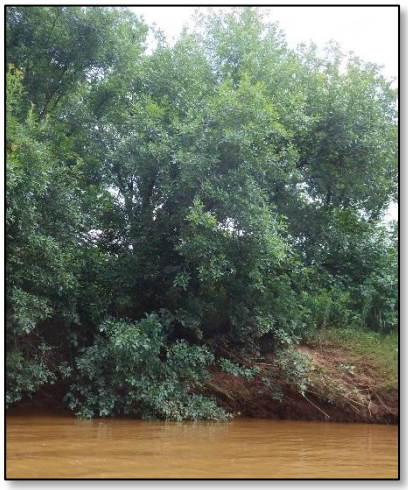
Left bank taken from transect 2 during index period.

Downstream taken from transect 2 during index period.

Index – Transect 3

Upstream taken from transect 3 during index period.

Right bank taken from transect 3 during index period.



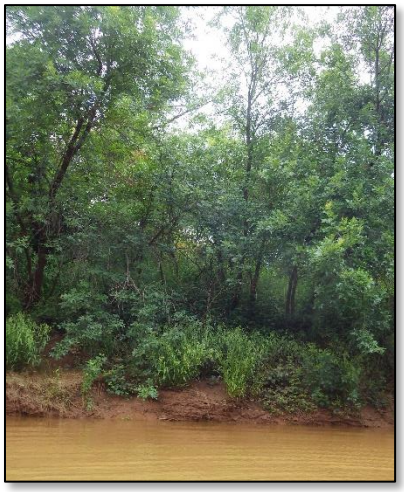
Left bank taken from transect 3 during index period.

Downstream taken from transect 3 during index period.

Index – Transect 4

Upstream taken from transect 4 during index period.

Right bank taken from transect 4 during index period.

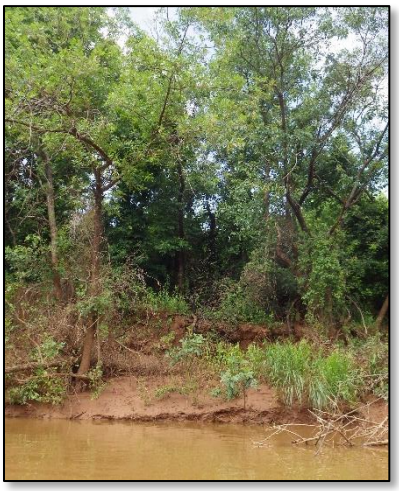


Left bank taken from transect 4 during index period.

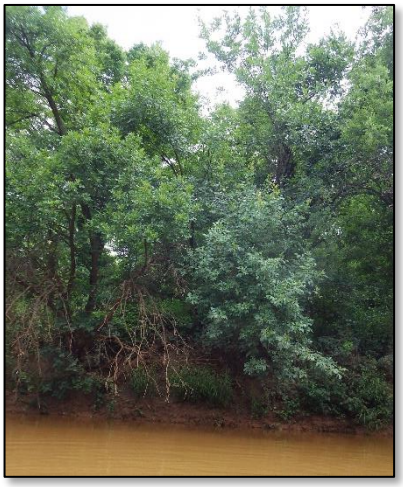
Downstream taken from transect 4 during index period.

Index – Transect 5

Upstream taken from transect 5 during index period.



Right bank taken from transect 5 during index period.



Left bank taken from transect 5 during index period.

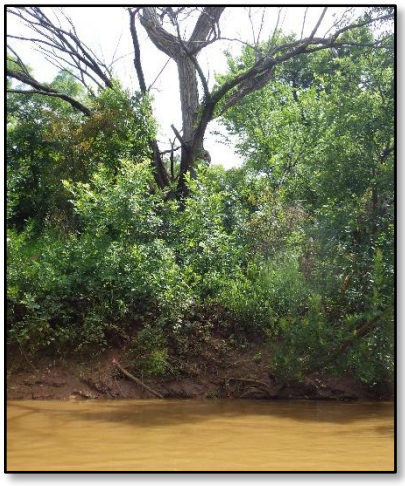
Downstream taken from transect 5 during index period.

Index – Transect 6

(Top of reach)

Upstream taken from transect 6 during index period.

Right bank taken from transect 6 during index period.



Left bank taken from transect 6 during index period.

Downstream taken from transect 6 during index period.

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.

Critical – Transect 2

Upstream taken from transect 2 during critical period.

Right bank taken from transect 2 during critical period.

Left bank taken from transect 2 during critical period.

Downstream taken from transect 2 during critical period.

Critical – Transect 3

Upstream taken from transect 3 during critical period.

Right bank taken from transect 3 during critical period.

Left bank taken from transect 3 during critical period.

Downstream taken from transect 3 during critical period.

Critical – Transect 4

Upstream taken from transect 4 during critical period.

Right bank taken from transect 4 during critical period.

Left bank taken from transect 4 during critical period.

Downstream taken from transect 4 during critical period.

Critical – Transect 5

Upstream taken from transect 5 during critical period.

Right bank taken from transect 5 during critical period.

Left bank taken from transect 5 during critical period.

Downstream taken from transect 5 during critical period.

Critical – Transect 6

(Top of reach)

Upstream taken from transect 6 during critical period.

Right bank taken from transect 6 during critical period.

Left bank taken from transect 6 during critical period.

Downstream taken from transect 6 during critical period.

Nekton Photographic Vouchers

Index Period

NOTE: Fish were collected using SWQM protocols. Fish that were photographically vouchered (i.e. > 10cm) were not preserved and released at the site before departure. All other vouchered specimens were preserved, and will be stored at EIH laboratory facilities for 5 years.

Cyprinus carpio (Common carp) captured with totebarge electroshocker.

Critical Period

Ictalurus furcatus (Blue Catfish) captured with totebarge electroshocker.

Ictalurus punctatus (Channel Catfish) captured with totebarge electroshocker.

Cyprinus carpio (Common carp) captured with totebarge electroshocker.

Pylodictis olivaris (Flathead catfish) captured with totebarge electroshocker.

Ctenopharyngodon idella (Grass carp) captured with totebarge electroshocker.

Lepisosteus osseus (Longnose gar) captured with totebarge electroshocker.