

# Beaver Creek at FM 2326

## TCEQ ID – 15120



## Biological Monitoring Summary Packet

EIH Final Report #17-004  
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





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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 Beaver Creek, Wichita 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 15120 (Beaver Creek at FM 2326).

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 outlined 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 13, 2017 and critical sampling was performed on July 18, 2017. Flow data were obtained from the USGS gage (07312200-Beaver Creek near Electra, TX) located at the FM 2326 bridge. Instantaneous flow values were higher during the index (29.1 cfs) compared to the critical (11.4 cfs) sampling.

During index sampling, instantaneous water temperature was 32.00°C, while diel averaged 30.05°C (range: 27.36-33.24°C,  $n = 96$ ). Instantaneous specific conductance was 2,626  $\mu\text{S}/\text{cm}$  while diel averaged 3,112  $\mu\text{S}/\text{cm}$  (range: 2,693-3,819  $\mu\text{S}/\text{cm}$ ,  $n = 96$ ). Instantaneous D.O. was 8.88 mg/L, while diel averaged 8.28 mg/L (range: 7.22-9.98 mg/L,  $n = 96$ ). Instantaneous pH was 8.15, while diel ranged from 7.78-8.14 ( $n = 96$ ).

During critical sampling, instantaneous water temperature was 30.20°C, while diel averaged 31.48°C (range: 27.93-34.62°C,  $n = 96$ ). Instantaneous specific conductance was 4,037  $\mu\text{S}/\text{cm}$  while diel averaged 3,603  $\mu\text{S}/\text{cm}$  (range: 3,133-4,132  $\mu\text{S}/\text{cm}$ ,  $n = 96$ ). Instantaneous D.O. was 7.20 mg/L, while diel averaged 6.93 mg/L (range: 4.72-10.81 mg/L,  $n = 96$ ). Instantaneous pH was 7.77, while diel ranged from 7.42-8.04 ( $n = 96$ ).

Sulfate (72.6 mg/L; 73.5 mg/L), chloride (641 mg/L; 1040 mg/L), *E. coli* (21 MPN/100mL; 190 MPN/100mL), dissolved solids (1640mg/L; 2660mg/L), total suspended solid (115mg/L; 148mg/L), turbidity (100NTU; 150NTU), and chlorophyll-a (22.9ug/L; 69.9ug/L) levels all increased from index to critical periods, respectively. Total alkalinity (170 mg/L; 148 mg/L),

nitrate/nitrite nitrogen (0.0313 mg/L; <0.02 mg/L), total kjeldahl nitrogen (1.4 mg/L; 1.37 mg/L), pheophytin-a (7.62ug/L; <2ug/L), and total phosphorus (0.135 mg/L; 0.122 mg/L) levels all decreased from index to critical periods, respectively.

Ecoregion specific coefficient of variance (CV) adjusted mean nekton and benthic macroinvertebrate IBI scores were 43.85 and 30.51, respectively<sup>1</sup>, while mean physical habitat IBI score was 17. Un-adjusted mean IBI scores for nekton and benthic IBI score indicates high ALU, and the mean physical habitat IBI score indicates intermediate ALU.

## Conclusion

Beaver Creek (segment 0214A) is listed on the 2014 Texas Integrated Report 303(d) list for bacteria and has a high ALU designation. Our results suggest that site 15120 (segment 0214A) is not supporting its designated ALU rating of high for physical habitat. It is supporting its designated ALU rating of high for nekton, benthic macroinvertebrates 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 the nekton IBI is greater than 2x the ALU coefficient of variance indicating additional sampling is needed.

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<sup>1</sup> Nekton IBI: 34 (index) & 41 (critical); Benthic Macroinvertebrate IBI: 27 (index) & 31 (critical); Physical Habitat IBI: 16 (index) & 18 (critical)

# Aquatic Life Monitoring and Habitat Assessment Checklist

## Background Information

Name of Water Body: Beaver Creek

Segment Number: 0214A Station ID: 15120 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 – RR28508; RR28512; RR28516; RR28520; RR28524  
Critical – RR28510; RR28514; RR28518; RR28522; RR28526

## Objective for Aquatic Life Use Assessment

Is this water body supporting its designated uses? Yes  No

Reason: Nekton scores were limited and high for the index and critical periods respectively; benthic macroinvertebrate scores were intermediate during the index period and high during the critical period. Physical Habitat scores were intermediate for both the index and critical periods. In index and critical sampling periods, diel D.O. averaged 8.28 mg/L and 6.93 mg/L, respectively, with an absolute minima being 7.22 mg/L and 4.72 mg/L, respectively. In summation, this site is supporting high ALU for benthic macroinvertebrate and 24hr D.O., with concerns for nekton and benthic macroinvertebrates.

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

Identify Sources of Pollution:

Point Source: Yes  No  Identify: Old culvert observed at transect 2 (during critical event)

Nonpoint Source: Yes  No  Identify: Bridge crossing drains runoff from FM 2326 just upstream 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: 6/13/2017

Flow Severity: <u>Normal</u>	Pools covering <u>0</u> % of the <u>280</u> meters assessed	Flowing at <u>29.10</u> cfs (gage)
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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: <u>Low</u>	Pools covering <u>0</u> % of the <u>200</u> meters assessed	Flowing at <u>11.40</u> cfs (gage)
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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: 07312200 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: 07312200 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

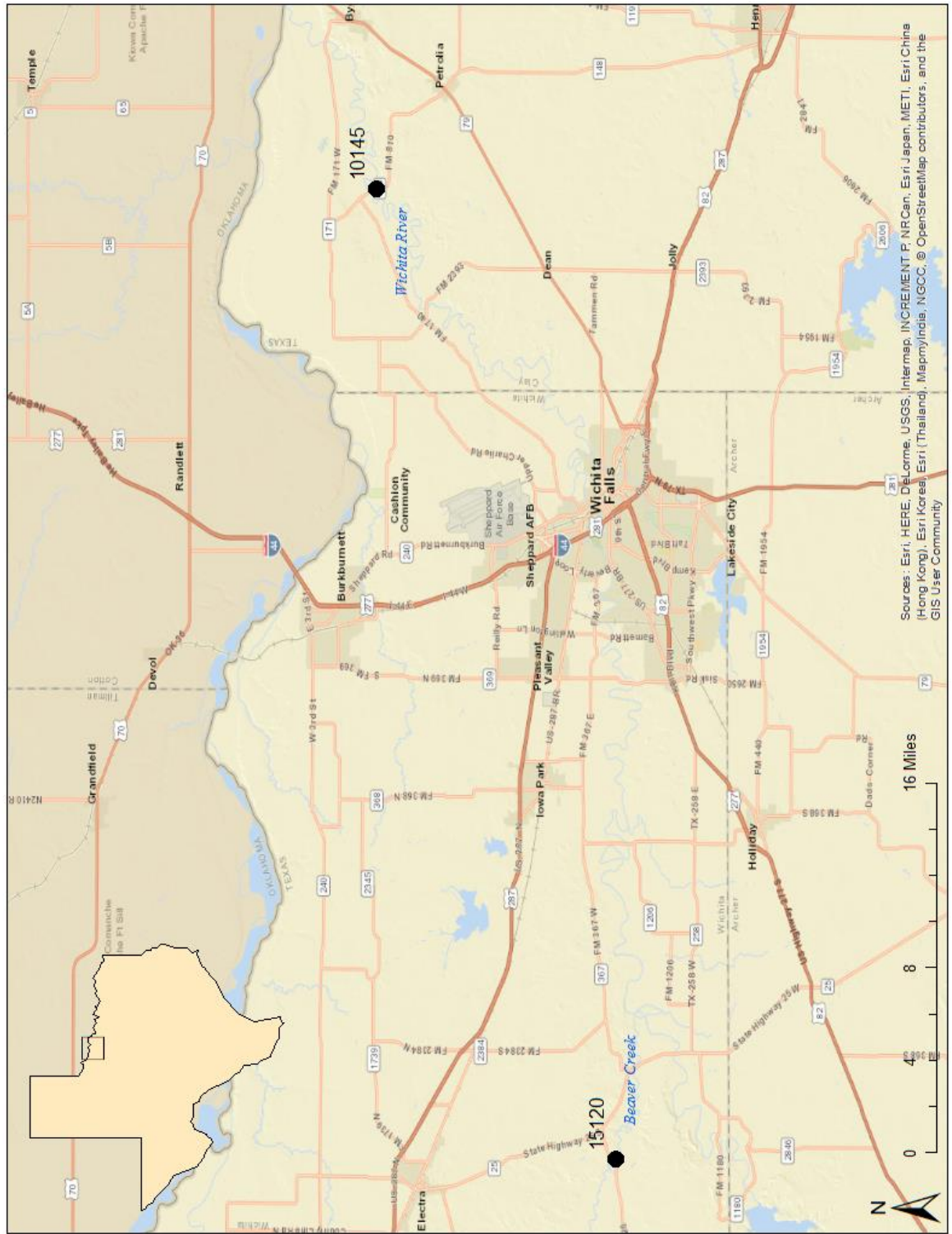


Figure 1 Map of overall sample area.



**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		
<b>Date</b>	06/13/2017	<b>TCEQ ID</b> 15120
<b>Site</b>	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 <sup>a</sup>	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
<b>Regional Score and Aquatic Life Use</b>	<b>36</b>	<b>Intermediate</b>
<sup>a</sup> not including <i>G. affinis</i>		
Scoring Criteria		
Exceptional		> 49
High		39 – 48
Intermediate		31 – 38
Limited		< 31

Nekton Summary Data		
<b>Date</b>	06/13/2017	<b>TCEQ ID</b> 15120
<b>Site</b>	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 <sup>2</sup> )	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 <i>G. affinis</i> ) (%)	98070	64.1

**SPECIES LIST AND ABUNDANCE- NEKTON**

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

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

<b>Ecoregion 27 Nekton IBI</b>			
<b>Date</b>	07/18/2017	<b>TCEQ ID</b>	15120
<b>Site</b>	Beaver Creek at FM 2326		
<b>Metric</b>	<b>Value</b>	<b>Score</b>	
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 <sup>a</sup>	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	
<b>Regional Score and Aquatic Life Use</b>	<b>46</b>	<b>High</b>	
<sup>a</sup> not including <i>G. affinis</i>			
<b>Scoring Criteria</b>			
Exceptional		> 49	
High		39 – 48	
Intermediate		31 – 38	
Limited		< 31	

<b>Nekton Summary Data</b>			
<b>Description</b>	<b>STORET</b>	<b>Value</b>	
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 <sup>2</sup> )	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 <i>G. affinis</i> ) (%)	98070	52.6	

### SPECIES LIST AND ABUNDANCE - NEKTON

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

STORET	Collection Method	(E = electro, S = seine)	E1	E2	E3	E4	ES	S1	S2	S3	S4	S5	S6	Seine	Overall Total
	Collection Effort	(for E: sec; for S: meters)	300	307	303	303	1213	10	10	10	10	10	10	60	
	Scientific Name	Common Name					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
<b>Total Collected</b>							<b>188</b>							<b>551</b>	<b>739</b>
<b>Total Taxa</b>							<b>15</b>							<b>9</b>	<b>15</b>

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

<b>Qualitative Benthos IBI</b>			
<b>Date</b>	6/13/2017	<b>TCEQ ID</b>	15120
<b>Site</b>	Beaver Creek at FM 2326		
<b>Metric</b>	<b>Value</b>	<b>Score</b>	
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	
<b>AQUATIC LIFE USE SCORE</b>	<b>27</b>		
<b>AQUATIC LIFE USE RATING</b>	<b>Intermediate</b>		
<b>Scoring Criteria</b>			
Exceptional	>36		
High	29 - 36		
Intermediate	22 - 28		
Limited	<22		

<b>Benthos Summary Data</b>			
<b>Date</b>	6/13/2017	<b>TCEQ ID</b>	15120
<b>Site</b>	Beaver Creek at FM 2326		
<b>Description</b>	<b>STORET</b>	<b>Value</b>	
Stream order	84161	4	
Data reporting units	89899	1	
Kicknet effort (m <sup>2</sup> )	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	



### SPECIES LIST - BENTHIC MACROINVERTEBRATES

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

STORET	Phylum	Class	Order	Family	Genus	Count
90382	Annelida	Oligochaeta				3
91004	Arthropoda	Crustacea	Arguloida	Argulidae	<i>Argulus</i>	1
93036	Mollusca	Bivalvia	Veneroida	Corbiculidae	<i>Corbicula</i>	18
92253	Arthropoda	Insecta	Coleoptera	Elmidae	<i>Stenelmis</i>	7
92491	Arthropoda	Insecta	Diptera	Chironomidae		89
92596	Arthropoda	Insecta	Diptera	Simuliidae	<i>Simulium</i>	5
92619	Arthropoda	Insecta	Diptera	Tabanidae	<i>Chrysops</i>	1
91651	Arthropoda	Insecta	Ephemeroptera	Baetidae	<i>Fallceon</i>	12
91579	Arthropoda	Insecta	Ephemeroptera	Baetidae	<i>Labiobaetis</i>	19
91641	Arthropoda	Insecta	Ephemeroptera	Baetidae	<i>Proclouon</i>	1
91510	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	<i>Maccaffertium</i>	2
91549	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae		1
92292	Arthropoda	Insecta	Trichoptera	Hydropsychidae	<i>Cheumatopsyche</i>	6
92296	Arthropoda	Insecta	Trichoptera	Hydropsychidae	<i>Hydropsyche</i>	65
92305	Arthropoda	Insecta	Trichoptera	Hydropsychidae	<i>Potamyia</i>	1
<b>Total</b>						<b>231</b>

<b>Qualitative Benthos IBI</b>			
<b>Date</b>	7/18/2017	<b>TCEQ ID</b>	15120
<b>Site</b>	Beaver Creek at FM 2326		
<b>Metric</b>	<b>Value</b>	<b>Score</b>	
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	
<b>AQUATIC LIFE USE SCORE</b>		<b>31</b>	
<b>AQUATIC LIFE USE RATING</b>		<b>High</b>	
<b>Scoring Criteria</b>			
Exceptional	>36		
High	29 - 36		
Intermediate	22 - 28		
Limited	<22		

<b>Benthos Summary Data</b>			
<b>Date</b>	07/18/2017	<b>TCEQ ID</b>	15120
<b>Site</b>	Beaver Creek at FM 2326		
<b>Description</b>	<b>STORET</b>	<b>Value</b>	
Stream order	84161	4	
Data reporting units	89899	1	
Kicknet effort (m <sup>2</sup> )	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	

**SPECIES LIST - BENTHIC MACROINVERTEBRATES**

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

<b>STORET</b>	<b>Phylum</b>	<b>Class</b>	<b>Order</b>	<b>Family</b>	<b>Genus</b>	<b>Count</b>
90382	Annelida	Oligochaeta				5
91241	Arthropoda	Crustacea	Amphipoda	Taltridae	<i>Hyaella</i>	1
91397	Arthropoda	Crustacea	Decapoda	Palaemonidae	<i>Palaemonetes</i>	2
93036	Mollusca	Bivalvia	Veneroida	Corbiculidae	<i>Corbicula</i>	4
92217	Arthropoda	Insecta	Coleoptera	Dryopidae	<i>Helichus</i>	3
92253	Arthropoda	Insecta	Coleoptera	Elmidae	<i>Stenelmis</i>	29
92092	Arthropoda	Insecta	Coleoptera	Gyrinidae	<i>Gyretes</i>	3
92491	Arthropoda	Insecta	Diptera	Chironomidae		19
92611	Arthropoda	Insecta	Diptera	Stratiomyidae	<i>Nemotelus</i>	1
91651	Arthropoda	Insecta	Ephemeroptera	Baetidae	<i>Fallceon</i>	29
91579	Arthropoda	Insecta	Ephemeroptera	Baetidae	<i>Labiobaetis</i>	25
91600	Arthropoda	Insecta	Ephemeroptera	Caenidae	<i>Caenis</i>	2
91607	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		1
91594	Arthropoda	Insecta	Ephemeroptera	Tricorythidae	<i>Tricorythodes</i>	7
91919	Arthropoda	Insecta	Hemiptera	Veliidae	<i>Microvelia</i>	2
91683	Arthropoda	Insecta	Odonata	Coenagrionidae	<i>Argia</i>	3
92292	Arthropoda	Insecta	Trichoptera	Hydropsychidae	<i>Cheumatopsyche</i>	11
92296	Arthropoda	Insecta	Trichoptera	Hydropsychidae	<i>Hydropsyche</i>	58
<b>Total</b>						<b>205</b>

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

<b>Habitat Quality Index</b>		
<b>Date</b>	06/13/2017	
<b>Site</b>	Beaver Creek at FM 2326	
<b>TCEQ ID</b>	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
<b>AQUATIC LIFE USE SCORE</b>	<b>16</b>	
<b>AQUATIC LIFE USE RATING</b>	<b>Intermediate</b>	
Scoring Criteria		
Exceptional	26 - 31	
High	20 - 25	
Intermediate	14 - 19	
Limited	< 14	

### Habitat Summary Data

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

Description	STORET	Value
Instantaneous flow measurement (cfs)	00061	29.1
Mean stream slope over evaluated reach (m/km)	72051	0.464
Mean instream cover (%)	84159	6
Stream order	84161	4
Number of transects	89832	5
Flow measurement method (1=gage, 2=electric, 3=mechanical, 4=weir, 5=doppler)	89835	1
Total number of stream bends	89839	6
Well defined stream bends	89840	0
Moderately defined stream bends	89841	1
Poorly defined stream bends	89842	5
Number of riffles	89843	0
Dominant substrate (1=clay, 2=silt, 3=sand, 4=gravel, 5=cobble, 6=boulder, 7=bedrock)	89844	1
Mean substrate gravel or larger (%)	89845	1.20
Mean bank erosion (%)	89846	54.20
Mean bank slope (°)	89847	30.80
Channel flow status (4=high, 3=moderate, 2=low, 1=no flow)	89848	3
Riparian vegetation	—	—
Trees (%)	89849	12.80
Shrubs (%)	89850	0.00
Grasses/forbes (%)	89851	47.20
Cultivated fields (%)	89852	0
Other (%)	89853	40.00
Mean tree canopy (%)	89854	36.47
Drainage area above location (km <sup>2</sup> )	89859	1687.50
Length of segment evaluated (km)	89860	0.28
Mean stream width (m)	89861	6.20
Mean stream depth (m)	89862	1.14
Maximum pool width (m)	89864	1.04
Maximum pool depth (m)	89865	4.50
Mean width natural buffer vegetation (m)	89866	>18.5
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** 6/13/2017  
**Site** Beaver Creek at FM 2326  
**TCEQ ID** 15120

Description	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5
Stream type (RI=riffle, RU=run, G=glide, P=pool)	RU	RU	RU	RU	P
Stream width (m)	6.4	6.6	5.6	4.4	8.0
Left bank slope (°)	23	40	42.5	25	60
Left bank erosion potential (%)	80	12	20	50	45
Left bank width of natural buffer vegetation (m)	20	20	20	20	15
Right bank slope (°)	18	15	35	25	25
Right bank erosion potential (%)	70	85	45	60	75
Right bank width of natural buffer vegetation (m)	20	20	20	20	10
Tree canopy (%)	25.00	44.12	26.47	33.82	52.94
Dominant substrate type (1=clay, 2=silt, 3=sand, 4=gravel, 5=cobble, 6=boulder, 7=bedrock, 8=other)	1	1	1	1	1
Stream depth at point 1 (m)	0	0	0	0	0
Stream depth at point 2 (m)	0.21	0.31	0.52	0.40	0.435
Stream depth at point 3 (m)	0.27	0.565	1.00	0.93	0.75
Stream depth at point 4 (m)	0.355	0.725	1.15	1.30	0.89
Stream depth at point 5 (m)	0.705	0.705	1.065	1.35	0.945
Stream depth at point 6 (m)	0.895	0.93	1.02	1.325	0.96
Stream depth at point 7 (m)	0.975	0.70	0.975	1.065	0.95
Stream depth at point 8 (m)	0.91	0.64	0.675	1.00	0.855
Stream depth at point 9 (m)	0.99	0.285	0.49	0.805	0.60
Stream depth at point 10 (m)	0.175	0.10	0.405	0.41	0.55
Stream depth at point 11 (m)	0	0	0	0	0.25
Substrate gravel or larger (%)	0	1	3	0	2
Instream cover (%)	4	5	10	2	9
Left bank trees (%)	20	1	1	5	55
Left bank shrubs (%)	0	0	0	0	0
Left bank grasses/forbes (%)	31	94	92	60	40
Left bank cultivated fields (%)	0	0	0	0	0
Left bank other (%)	67	5	7	35	5
Right bank trees (%)	20	5	1	15	5
Right bank shrubs (%)	0	0	0	0	0
Right bank grasses/forbes (%)	40	20	55	30	10
Right bank cultivated fields (%)	0	0	0	0	0
Right bank other (%)	40	75	44	55	85
Transect Latitude (decimal degrees)	33.90360	33.90421	33.90479	33.90529	33.90575
Transect Longitude (decimal degrees)	-98.90354	-98.90372	-98.90407	-98.90445	-98.90499
Total length of reach (m)	280				

### 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
<b>AQUATIC LIFE USE SCORE</b>	<b>18</b>	
<b>AQUATIC LIFE USE RATING</b>	<b>Intermediate</b>	
<b>Scoring Criteria</b>		
Exceptional	26 - 31	
High	20 - 25	
Intermediate	14 - 19	
Limited	< 14	

### Habitat Summary Data

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

Description	STORET	Value
Instantaneous flow measurement (cfs)	00061	11.4
Mean stream slope over evaluated reach (m/km)	72051	0.464
Mean instream cover (%)	84159	5.60
Stream order	84161	4
Number of transects	89832	5
Flow measurement method (1=gage, 2=electric, 3=mechanical, 4=weir, 5=doppler)	89835	1
Total number of stream bends	89839	3
Well defined stream bends	89840	0
Moderately defined stream bends	89841	1
Poorly defined stream bends	89842	2
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	2.60
Mean bank erosion (%)	89846	59.00
Mean bank slope (°)	89847	26.75
Channel flow status (4=high, 3=moderate, 2=low, 1=no flow)	89848	2
Riparian vegetation	—	—
Trees (%)	89849	11.00
Shrubs (%)	89850	2.50
Grasses/forbes (%)	89851	49.00
Cultivated fields (%)	89852	0
Other (%)	89853	37.50
Mean tree canopy (%)	89854	27.9412
Drainage area above location (km <sup>2</sup> )	89859	1687.50
Length of segment evaluated (km)	89860	0.464
Mean stream width (m)	89861	4.06
Mean stream depth (m)	89862	0.70
Maximum pool width (m)	89864	3.50
Maximum pool depth (m)	89865	1.01
Mean width natural buffer vegetation (m)	89866	18.50
Aesthetics (1=wilderness, 2=natural, 3=common, 4=offensive)	89867	2
Number of instream cover types	89929	2
Ecoregion	89961	27
Land development (1=unimpacted, 2=low, 3=moderate, 4=high)	89962	2



### Habitat Transect Data

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

Description	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5
Stream type (RI=riffle, RU=run, G=glide, P=pool)	G	P	G	G	G
Stream width (m)	4.0	4.6	2.8	3.1	5.8
Left bank slope (°)	10	45	18	40	40
Left bank erosion potential (%)	70	40	60	40	30
Left bank width of natural buffer vegetation (m)	20	20	20	20	15
Right bank slope (°)	20	20	25	30	20
Right bank erosion potential (%)	80	60	70	70	70
Right bank width of natural buffer vegetation (m)	20	20	20	20	10
Tree canopy (%)	38.24	29.41	26.47	19.12	26.47
Dominant substrate type (1=clay, 2=silt, 3=sand, 4=gravel, 5=cobble, 6=boulder, 7=bedrock, 8=other)	1	1	1	1	1
Stream depth at point 1 (m)	0	0	0	0	0
Stream depth at point 2 (m)	0.36	0.165	0.30	0.135	0.22
Stream depth at point 3 (m)	0.45	0.30	0.305	0.17	0.325
Stream depth at point 4 (m)	0.495	0.51	0.35	0.21	0.37
Stream depth at point 5 (m)	0.70	0.565	0.44	0.225	0.455
Stream depth at point 6 (m)	0.61	0.85	0.49	0.39	0.59
Stream depth at point 7 (m)	0.49	0.965	0.50	0.31	0.70
Stream depth at point 8 (m)	0.365	0.95	0.41	0.40	0.70
Stream depth at point 9 (m)	0.25	0.65	0.37	0.37	0.655
Stream depth at point 10 (m)	0.21	0.30	0.235	0.36	0.43
Stream depth at point 11 (m)	0	0	0	0.24	0
Substrate gravel or larger (%)	0	0	10	0	3
Instream cover (%)	5	1	2	10	10
Left bank trees (%)	0	0	5	0	60
Left bank shrubs (%)	0	0	0	0	5
Left bank grasses/forbes (%)	80	95	60	65	35
Left bank cultivated fields (%)	0	0	0	0	0
Left bank other (%)	20	5	35	35	0
Right bank trees (%)	30	5	5	5	0
Right bank shrubs (%)	10	0	0	10	0
Right bank grasses/forbes (%)	10	40	40	25	40
Right bank cultivated fields (%)	0	0	0	0	0
Right bank other (%)	50	55	55	60	60
Transect Latitude (decimal degrees)	33.90434	33.90473	33.90513	33.90544	33.90582
Transect Longitude (decimal degrees)	-98.90374	-98.90407	-98.90435	-98.90465	-98.90501
Total length of reach (m)	200				

## Diel Summary Data and Measurements

<b>Diel Measurement Summary</b>			
<b>Start Date</b>	06/14/2017	<b>Start Time</b>	08:00
<b>End Date</b>	06/15/2017	<b>End Time</b>	07:45
<b>Site</b>	Beaver Creek at FM 2326		
<b>TCEQ ID</b>	15120		
<b>Parameter</b>	<b>STORET</b>	<b>Value</b>	
Temp Mean	00209	30.05	
Temp Maximum	00210	33.24	
Temp Minimum	00211	27.36	
Spec Cond Mean	00212	3112	
Spec Cond Maximum	00213	3819	
Spec Cond Minimum	00214	2693	
pH Maximum	00215	8.14	
pH Minimum	00216	7.78	
# Temp Measurements	00221	96	
# Spec Cond Measurements	00222	96	
# pH Measurements	00223	96	
DO Minimum	89855	7.22	
DO Maximum	89856	9.98	
DO Mean	89857	8.28	
# DO Measurements	89858	96	

Diel Data						
Date	6/14/2017	TCEQ ID	15120			
Site Name	Beaver Creek at FM 2326					
Date	Time	Temp	pH	Dissolved Oxygen	Dissolved Oxygen	Specific Conductance
(mm/dd/yyyy)	(hh:mm)	(°C)	Std. Units	(mg/L)	(%)	(µS/cm)
06/14/2017	08:00	27.38	7.80	7.25	92.5	3366
06/14/2017	08:15	27.36	7.79	7.25	92.5	3444
06/14/2017	08:30	27.36	7.79	7.22	92.2	3508
06/14/2017	08:45	27.37	7.79	7.23	92.3	3562
06/14/2017	09:00	27.38	7.78	7.24	92.4	3608
06/14/2017	09:15	27.39	7.79	7.24	92.5	3643
06/14/2017	09:30	27.40	7.78	7.29	93.1	3672
06/14/2017	09:45	27.42	7.78	7.31	93.4	3695
06/14/2017	10:00	27.51	7.79	7.34	94.0	3714
06/14/2017	10:15	27.55	7.79	7.39	94.7	3731
06/14/2017	10:30	27.61	7.79	7.43	95.3	3746
06/14/2017	10:45	27.70	7.80	7.46	95.9	3760
06/14/2017	11:00	27.80	7.80	7.49	96.4	3772
06/14/2017	11:15	27.94	7.81	7.60	98.0	3783
06/14/2017	11:30	28.13	7.81	7.71	99.8	3791
06/14/2017	11:45	28.33	7.82	7.76	100.9	3800
06/14/2017	12:00	28.48	7.83	7.85	102.3	3807
06/14/2017	12:15	28.68	7.83	7.95	104.0	3812
06/14/2017	12:30	28.87	7.85	8.05	105.6	3816
06/14/2017	12:45	29.07	7.86	8.18	107.7	3818
06/14/2017	13:00	29.30	7.87	8.34	110.2	3819
06/14/2017	13:15	29.60	7.89	8.41	111.7	3817
06/14/2017	13:30	29.80	7.90	8.61	114.7	3812
06/14/2017	13:45	30.08	7.92	8.72	116.8	3805
06/14/2017	14:00	30.36	7.93	8.87	119.3	3795
06/14/2017	14:15	30.58	7.94	9.00	121.5	3783
06/14/2017	14:30	30.83	7.96	9.11	123.6	3768
06/14/2017	14:45	31.11	7.98	9.21	125.5	3750
06/14/2017	15:00	31.32	7.99	9.37	128.1	3729
06/14/2017	15:15	31.58	8.01	9.50	130.5	3707
06/14/2017	15:30	31.88	8.03	9.60	132.5	3682
06/14/2017	15:45	32.09	8.04	9.70	134.3	3653
06/14/2017	16:00	32.28	8.06	9.78	135.9	3613
06/14/2017	16:15	32.48	8.07	9.92	138.2	3566
06/14/2017	16:30	32.64	8.08	9.92	138.5	3508
06/14/2017	16:45	32.81	8.09	9.96	139.6	3435
06/14/2017	17:00	32.97	8.11	9.98	140.1	3354
06/14/2017	17:15	33.08	8.12	9.97	140.2	3265
06/14/2017	17:30	33.15	8.13	9.92	139.7	3175
06/14/2017	17:45	33.21	8.13	9.89	139.3	3088
06/14/2017	18:00	33.24	8.14	9.83	138.6	3009
06/14/2017	18:15	33.23	8.14	9.78	137.7	2940
06/14/2017	18:30	33.20	8.14	9.74	137.1	2884
06/14/2017	18:45	33.14	8.14	9.64	135.5	2838
06/14/2017	19:00	33.05	8.13	9.51	133.5	2801
06/14/2017	19:15	32.97	8.13	9.41	131.9	2775

<b>Date</b>	<b>Time</b>	<b>Temp</b>	<b>pH</b>	<b>Dissolved Oxygen</b>	<b>Dissolved Oxygen</b>	<b>Specific Conductance</b>
06/14/2017	19:30	32.85	8.12	9.34	130.6	2757
06/14/2017	19:45	32.72	8.12	9.23	128.8	2742
06/14/2017	20:00	32.61	8.11	9.13	127.2	2730
06/14/2017	20:15	32.47	8.10	9.05	125.8	2721
06/14/2017	20:30	32.33	8.10	8.93	123.9	2714
06/14/2017	20:45	32.21	8.09	8.83	122.2	2708
06/14/2017	21:00	32.09	8.08	8.81	121.6	2704
06/14/2017	21:15	31.98	8.08	8.73	120.3	2702
06/14/2017	21:30	31.86	8.08	8.69	119.5	2700
06/14/2017	21:45	31.76	8.07	8.61	118.3	2697
06/14/2017	22:00	31.63	8.06	8.52	116.8	2697
06/14/2017	22:15	31.49	8.06	8.45	115.6	2697
06/14/2017	22:30	31.36	8.05	8.43	115.0	2695
06/14/2017	22:45	31.20	8.04	8.36	113.8	2693
06/14/2017	23:00	31.02	8.03	8.27	112.2	2696
06/14/2017	23:15	30.84	8.02	8.21	111.0	2696
06/14/2017	23:30	30.67	8.00	8.12	109.5	2696
06/14/2017	23:45	30.50	7.99	8.06	108.3	2697
06/15/2017	00:00	30.36	7.98	8.02	107.6	2697
06/15/2017	00:15	30.22	7.98	7.99	106.8	2698
06/15/2017	00:30	30.10	7.97	7.95	106.1	2697
06/15/2017	00:45	29.97	7.96	7.91	105.4	2696
06/15/2017	01:00	29.86	7.96	7.89	105.0	2698
06/15/2017	01:15	29.74	7.95	7.86	104.4	2700
06/15/2017	01:30	29.64	7.94	7.83	103.8	2701
06/15/2017	01:45	29.54	7.94	7.80	103.2	2701
06/15/2017	02:00	29.45	7.94	7.81	103.1	2701
06/15/2017	02:15	29.35	7.93	7.77	102.4	2704
06/15/2017	02:30	29.25	7.92	7.71	101.4	2704
06/15/2017	02:45	29.16	7.92	7.69	101.0	2704
06/15/2017	03:00	29.07	7.91	7.68	100.7	2705
06/15/2017	03:15	28.99	7.91	7.63	100.0	2707
06/15/2017	03:30	28.90	7.90	7.66	100.1	2708
06/15/2017	03:45	28.82	7.89	7.62	99.5	2709
06/15/2017	04:00	28.75	7.88	7.56	98.6	2710
06/15/2017	04:15	28.69	7.88	7.54	98.3	2711
06/15/2017	04:30	28.64	7.87	7.51	97.7	2714
06/15/2017	04:45	28.58	7.86	7.47	97.1	2716
06/15/2017	05:00	28.52	7.86	7.45	96.8	2718
06/15/2017	05:15	28.47	7.85	7.43	96.5	2720
06/15/2017	05:30	28.43	7.85	7.39	95.9	2722
06/15/2017	05:45	28.38	7.84	7.38	95.6	2724
06/15/2017	06:00	28.34	7.84	7.38	95.6	2726
06/15/2017	06:15	28.30	7.84	7.35	95.1	2728
06/15/2017	06:30	28.26	7.83	7.34	95.0	2730
06/15/2017	06:45	28.21	7.83	7.33	94.7	2733
06/15/2017	07:00	28.18	7.82	7.31	94.4	2735
06/15/2017	07:15	28.15	7.82	7.32	94.4	2737
06/15/2017	07:30	28.11	7.82	7.28	94.0	2739
06/15/2017	07:45	28.07	7.82	7.28	93.8	2742

### Diel Measurement Summary

**Start Date**      07/17/2017    **Start Time**      17:30  
**End Date**        07/18/2017    **End Time**        17:15

**Site**                Beaver Creek at FM 2326  
**TCEQ ID**          15120

Parameter	STORET	Value
Temp Mean	00209	31.48
Temp Maximum	00210	34.62
Temp Minimum	00211	27.93
Spec Cond Mean	00212	3603
Spec Cond Maximum	00213	4132
Spec Cond Minimum	00214	3133
pH Maximum	00215	8.04
pH Minimum	00216	7.42
# Temp Measurements	00221	96
# Spec Cond Measurements	00222	96
# pH Measurements	00223	96
DO Minimum	89855	4.72
DO Maximum	89856	10.81
DO Mean	89857	6.93
# DO Measurements	89858	96

Diel Data						
Date	7/17/2017	TCEQ ID	15120			
Site Name	Beaver Creek at FM 2326					
Date (mm/dd/yyyy)	Time (hh:mm)	Temp (°C)	pH Std. Units	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Specific Conductance (µS/cm)
07/17/2017	17:30	34.33	7.96	8.99	129.0	3253
07/17/2017	17:45	34.44	7.96	8.99	129.3	3226
07/17/2017	18:00	34.51	7.98	9.07	130.7	3219
07/17/2017	18:15	34.59	7.99	9.12	131.5	3215
07/17/2017	18:30	34.62	8.01	9.18	132.5	3209
07/17/2017	18:45	34.61	8.02	9.17	132.2	3198
07/17/2017	19:00	34.58	8.03	9.14	131.7	3182
07/17/2017	19:15	34.51	8.04	9.16	131.9	3186
07/17/2017	19:30	34.43	8.04	9.11	131.1	3195
07/17/2017	19:45	34.35	8.04	8.96	128.7	3163
07/17/2017	20:00	34.20	8.04	8.70	124.6	3133
07/17/2017	20:15	34.09	8.02	8.55	122.2	3151
07/17/2017	20:30	33.97	8.02	8.41	120.1	3149
07/17/2017	20:45	33.87	8.02	8.26	117.7	3147
07/17/2017	21:00	33.77	8.02	8.17	116.2	3150
07/17/2017	21:15	33.68	8.01	8.00	113.6	3152
07/17/2017	21:30	33.57	8.00	7.83	111.0	3158
07/17/2017	21:45	33.44	7.99	7.62	107.8	3145
07/17/2017	22:00	33.36	7.99	7.50	105.9	3150
07/17/2017	22:15	33.26	7.98	7.37	104.0	3165
07/17/2017	22:30	33.19	7.98	7.26	102.3	3179
07/17/2017	22:45	33.11	7.97	7.12	100.1	3181
07/17/2017	23:00	33.02	7.95	6.96	97.8	3187
07/17/2017	23:15	32.91	7.94	6.82	95.7	3200
07/17/2017	23:30	32.79	7.92	6.67	93.4	3213
07/17/2017	23:45	32.68	7.90	6.51	91.0	3220
07/18/2017	00:00	32.58	7.89	6.35	88.6	3233
07/18/2017	00:15	32.44	7.86	6.20	86.3	3249
07/18/2017	00:30	32.31	7.85	6.07	84.2	3259
07/18/2017	00:45	32.17	7.83	5.90	81.8	3264
07/18/2017	01:00	32.04	7.81	5.78	79.9	3273
07/18/2017	01:15	31.90	7.79	5.68	78.3	3288
07/18/2017	01:30	31.75	7.76	5.55	76.3	3298
07/18/2017	01:45	31.60	7.74	5.47	75.0	3319
07/18/2017	02:00	31.46	7.72	5.36	73.3	3338
07/18/2017	02:15	31.32	7.70	5.26	71.9	3347
07/18/2017	02:30	31.16	7.69	5.18	70.5	3358
07/18/2017	02:45	31.01	7.67	5.11	69.4	3372
07/18/2017	03:00	30.85	7.65	5.05	68.4	3387
07/18/2017	03:15	30.70	7.64	4.97	67.2	3404
07/18/2017	03:30	30.54	7.62	4.91	66.3	3419
07/18/2017	03:45	30.39	7.61	4.88	65.6	3436
07/18/2017	04:00	30.23	7.60	4.86	65.2	3447
07/18/2017	04:15	30.07	7.58	4.84	64.8	3460
07/18/2017	04:30	29.91	7.57	4.85	64.6	3478
07/18/2017	04:45	29.74	7.56	4.82	64.1	3496

<b>Date</b>	<b>Time</b>	<b>Temp</b>	<b>pH</b>	<b>Dissolved Oxygen</b>	<b>Dissolved Oxygen</b>	<b>Specific Conductance</b>
07/18/2017	05:00	29.58	7.54	4.78	63.4	3513
07/18/2017	05:15	29.42	7.52	4.75	62.9	3527
07/18/2017	05:30	29.27	7.51	4.74	62.5	3553
07/18/2017	05:45	29.14	7.50	4.73	62.3	3572
07/18/2017	06:00	28.97	7.50	4.74	62.2	3594
07/18/2017	06:15	28.83	7.49	4.75	62.2	3612
07/18/2017	06:30	28.69	7.48	4.72	61.7	3623
07/18/2017	06:45	28.59	7.47	4.72	61.6	3639
07/18/2017	07:00	28.47	7.46	4.73	61.5	3664
07/18/2017	07:15	28.37	7.45	4.72	61.4	3685
07/18/2017	07:30	28.26	7.45	4.74	61.5	3701
07/18/2017	07:45	28.17	7.44	4.76	61.6	3721
07/18/2017	08:00	28.09	7.44	4.76	61.6	3741
07/18/2017	08:15	28.01	7.44	4.82	62.3	3765
07/18/2017	08:30	27.94	7.44	4.87	62.8	3786
07/18/2017	08:45	27.93	7.42	4.92	63.5	3809
07/18/2017	09:00	27.94	7.42	4.99	64.4	3828
07/18/2017	09:15	28.00	7.43	5.10	65.8	3853
07/18/2017	09:30	28.06	7.44	5.20	67.2	3872
07/18/2017	09:45	28.15	7.45	5.34	69.1	3885
07/18/2017	10:00	28.26	7.46	5.46	70.8	3902
07/18/2017	10:15	28.43	7.48	5.70	74.2	3921
07/18/2017	10:30	28.62	7.49	5.82	76.1	3938
07/18/2017	10:45	28.73	7.50	5.93	77.7	3952
07/18/2017	11:00	29.02	7.52	6.13	80.7	3968
07/18/2017	11:15	29.24	7.53	6.36	84.0	3990
07/18/2017	11:30	29.61	7.57	6.66	88.5	4016
07/18/2017	11:45	29.75	7.59	6.85	91.2	4033
07/18/2017	12:00	30.19	7.62	7.17	96.3	4042
07/18/2017	12:15	30.55	7.66	7.47	100.9	4058
07/18/2017	12:30	30.78	7.68	7.71	104.6	4065
07/18/2017	12:45	30.99	7.70	7.88	107.3	4082
07/18/2017	13:00	31.39	7.73	8.10	111.0	4095
07/18/2017	13:15	31.56	7.75	8.39	115.3	4108
07/18/2017	13:30	31.83	7.78	8.57	118.3	4123
07/18/2017	13:45	32.25	7.81	8.77	121.9	4126
07/18/2017	14:00	32.44	7.83	9.02	125.8	4128
07/18/2017	14:15	32.67	7.84	9.00	126.1	4132
07/18/2017	14:30	32.69	7.83	9.05	126.8	4125
07/18/2017	14:45	32.82	7.83	9.04	126.9	4121
07/18/2017	15:00	32.98	7.85	9.19	129.4	4122
07/18/2017	15:15	33.13	7.87	9.38	132.4	4121
07/18/2017	15:30	33.33	7.89	9.57	135.5	4122
07/18/2017	15:45	33.45	7.91	9.67	137.2	4126
07/18/2017	16:00	33.58	7.94	9.93	141.2	4127
07/18/2017	16:15	33.61	7.95	9.98	142.0	4122
07/18/2017	16:30	33.72	7.95	10.17	144.9	4116
07/18/2017	16:45	33.88	7.99	10.39	148.4	4116
07/18/2017	17:00	34.03	8.01	10.65	152.5	4116
07/18/2017	17:15	34.15	8.03	10.81	155.1	4118

## Additional Field Data Measurements

Additional Parameter Data		
<b>Date</b>	06/13/2017	
<b>Site</b>	Beaver Creek at FM 2326	
<b>TCEQ ID</b>	15120	
Description	STORET	Value
<i>E. coli</i> IDEXX Colilert (MPN/100 ml)	31699	21
Holding Time, <i>E. coli</i> IDEXX Colilert (hh:mm)	31704	2.05
TSS (mg/l)	00530	115
Total Alkalinity (mg/l)	00140	170
Ammonia-N, Total (mg/l)	00610	<0.05
Nitrate/Nitrite-N, Total (mg/l)	00630	0.0313
Total Phosphorus-P (mg/l)	00665	0.135
Total Kjeldahl Nitrogen (mg/l)	00625	1.4
Turbidity (NTU)	82079	100
Chloride (mg/l)	00940	641
Sulfate (mg/l)	00945	72.6
TDS, dried @ 180°C (mg/l)	70300	1640
Chlorophyll-a (ug/l)	70953	22.9
Pheophytin-a (ug/l)	32213	7.62
Temperature (°C)	00010	32.00
Secchi Depth (m)	00078	0.100
Specific Conductance (µS/cm)	00094	2626
DO (mg/L)	00300	8.88
pH (standard units)	00400	8.15
Salinity (ppt)	00480	1.34
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	11
Total Water Depth (m)	82903	0.813
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	1
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** 07/18/2017  
**Site** Beaver Creek at FM 2326  
**TCEQ ID** 15120

Description	STORET	Value
<i>E. coli</i> IDEXX Colilert (MPN/100 ml)	31699	190
Holding Time, <i>E. coli</i> IDEXX Colilert (hh:mm)	31704	3.50
TSS (mg/l)	00530	148
Total Alkalinity (mg/l)	00140	148
Ammonia-N, Total (mg/l)	00610	<0.05
Nitrate/Nitrite-N, Total (mg/l)	00630	<0.02
Total Phosphorus-P (mg/l)	00665	0.122
Total Kjeldahl Nitrogen (mg/l)	00625	1.37
Turbidity (NTU)	82079	150
Chloride (mg/l)	00940	1040
Sulfate (mg/l)	00945	73.5
TDS, dried @ 180°C (mg/l)	70300	2660
Chlorophyll-a (ug/l)	70953	69.9
Pheophytin-a (ug/l)	32213	<2
Temperature (°C)	00010	30.20
Secchi Depth (m)	00078	0.042
Specific Conductance (µS/cm)	00094	4037
DO (mg/L)	00300	96.70
pH (standard units)	00400	7.77
Salinity (ppt)	00480	2.12
Flow Severity (1=No Flow, 2=Low, 3=Normal, 4=Flood, 5=High, 6=Dry)	01351	2
Water Clarity (1=Excellent, 2=Good, 3=Fair, 4=Poor)	20424	4
Days Since Last Significant Rainfall (days)	72053	2
Total Water Depth (m)	82903	0.480
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	1
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

(Top of reach)



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.

## 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

(Top of reach)



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.

## 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.

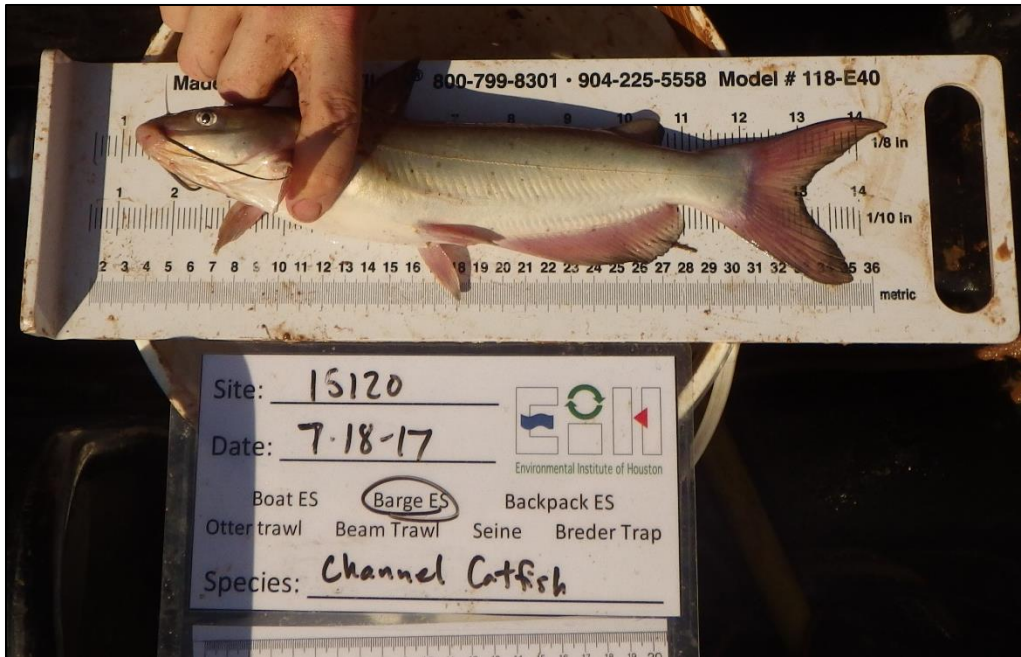


*Ictalurus punctatus* (Channel catfish) captured with seine.

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.