

Cedar Bayou Above Tidal @ FM 1942

TCEQ ID – 11118



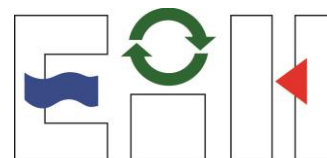
Biological Monitoring Summary Packet

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November 11, 2014

Prepared by the Environmental Institute of Houston University of Houston - Clear Lake in cooperation with the Houston-Galveston Area Council and the Texas Commission on Environmental Quality



Environmental Institute of Houston

NOTE: Fish were collected using SWQM protocols. Fish that were photographically vouchered (i.e. > 30cm) 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.



Prepared by the Environmental Institute of Houston

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Summary of the Biological Assessment

Sample Collection

At the request of the Houston-Galveston Area Council (H-GAC), in conjunction with the second half of Task 8 of the FY 2013/2014 Development of a Watershed Protection Plan for Cedar Bayou (QAPP), the Environmental Institute of Houston (EIH) conducted an aquatic life monitoring (ALM) study at two sample locations within the Cedar Bayou watershed. These sampling events were conducted during index and critical periods (May and July) in 2014 with previous sampling efforts having been conducted in the same time frame of 2013. This packet contains a summary of the biological information collected by EIH in 2014 at Texas Commission on Environmental Quality (TCEQ) site 11118 (Cedar Bayou Above Tidal at FM 1942).

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, and solids), nekton (seining and electrofishing), benthic macroinvertebrates (RBP kicknet), and physical habitat characterization. Photographs were taken at each transect of upstream, left bank, downstream, and right bank views. All measurements were recorded according to protocols outline in the TCEQ's Surface Water Quality Monitoring (SWQM) Procedures Manual Volume 1 (October 2008, plus applicable updates) and Volume 2 (June 2007).

Twenty-four hour (diel) monitoring for D.O. was also conducted in Cedar Bayou concurrently with biological monitoring and in conjunction with Task 9 (24-hr. D.O. sampling). This data has been submitted to H-GAC for entry into the Surface Water Quality Monitoring Information System (SWQMIS).

Results

Index sampling was performed on 2 May 2014 and critical sampling was performed on 28 July 2014. Instantaneous flow was taken during both sampling events and increased from index (3.7528 cfs) to critical (5.6486 cfs) sampling.

During index sampling, instantaneous water temperature was 20.09°C, while diel averaged 21.57°C (range: 19.35-24.59°C, $n = 96$). Instantaneous specific conductance was 1,303 µS/cm while diel averaged 1,341 µS/cm (range: 1,296-1,473 µS/cm, $n = 96$). Instantaneous D.O. was 7.77 mg/L, while diel averaged 7.78 mg/L (range: 6.56-9.99 mg/L, $n = 96$). Instantaneous pH was 7.96, while diel ranged from 8.08-8.30 ($n = 96$).

During critical sampling, instantaneous water temperature was 29.59°C, while diel averaged 30.33°C (range: 29.34-31.11°C, $n = 24$). Instantaneous specific conductance was 930 µS/cm, while diel averaged 813 µS/cm (range: 741-873 µS/cm, $n = 24$). Instantaneous D.O. was 5.12 mg/L, while diel averaged 5.96 mg/L (range: 4.94-7.29 mg/L, $n = 24$). Instantaneous pH was 8.02, while diel ranged from 7.66-7.97 ($n = 24$). Note: due to technical difficulties, diel values are based on 24 total hourly readings (instead of the total 96 typically recorded).

Sulfate (128.6 mg/L; 85.4 mg/L), chloride (180 mg/L; 130 mg/L), *E. coli* (809 MPN/100mL; 63 MPN/100mL), ammonia nitrogen (0.50 mg/L; 0.26 mg/L), and hardness (290 mg/L; 184 mg/L)

levels all decreased from index to critical periods, respectively. Total suspended solid (27.4 mg/L; 57.0 mg/L), chlorophyll-a (12µg/L; 12.3 µg/L), enterococcus¹ (581 MPN/100mL; 670 MPN/100mL), nitrate/nitrite nitrogen (0.21 mg/L; 0.22 mg/L), total Kjeldahl nitrogen (1.7 mg/L; 2.8 mg/L), orthophosphate phosphorus (0.280 mg/L; 0.698 mg/L), turbidity (22.70 NTU, 33.60 NTU), and total phosphorus (0.850 mg/L; 0.870 mg/L) levels all increased from index to critical periods, respectively.

Ecoregion specific coefficient of variance (CV) adjusted mean nekton and benthic IBI scores were 44.5 and 28.4, respectively², while mean physical habitat IBI score was 20. IBI scores for nekton and physical habitat indicate high ALU; benthic IBI score indicates intermediate ALU. Raw benthic IBI score for the index period classifies as high ALU while the critical period classifies as intermediate ALU.

Nekton IBI score for the critical period might be slightly elevated as a result of using alternate sampling equipment to sample nekton. Backpack electrofishing was used during the index period; however, due to equipment malfunction, barge electrofishing was used during the critical period. All settings were adjusted to mimic the use of a backpack electroshocker to account for inherent bias between the two methods. Site was sampled according to protocol using both methods resulting in comparable data between the two events.

Conclusion

Cedar Bayou above tidal (segment 0902) was formerly listed on the 2008 Texas Integrated Report 303(d) list for impaired benthic community. In 2010, it was removed from the Texas Integrated Report 303(d) list due to a change in impairment criteria, but, was included in the 305(b) list of water bodies with concerns for impairment based on depressed D.O. levels and impaired macroinvertebrate communities. Segment 0902 is no longer listed on the 2012 Texas Integrated Report 305(b) or 303(d) lists as impaired or as a water body with concern for impairment.

Based on high ALU designations for nekton and physical habitat and high/intermediate ALU designations for benthic macroinvertebrates with average diel D.O. levels being > 3.00 mg/L, our results suggest that site 11118 is supporting its ALU rating of high with concern for benthic macroinvertebrates.

¹ It is interesting to note that enterococcus levels were > 33 MPN/100mL during both sampling events (value required for listing in 2012 Guidance for Assessing and Reporting Surface Water Quality in Texas).

² Nekton IBI: 41 (index) & 43 (critical); Benthic Macroinvertebrate IBI: 30 (index) & 24 (critical); Physical Habitat IBI: 20 (index) & 20 (critical)

Aquatic Life Monitoring and Habitat Assessment Checklist

Background Information

Name of Water Body: Cedar Bayou Above Tidal @ FM 1942 West of Mont Belvieu, TX
 Segment Number: 0902 Station ID: 11118 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 2012 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 2012 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 – TX05345; TX05346; TX05347; TX05348; TX05349
Critical – TX05350; TX05351; TX05352; TX05353; TX05354

Objective for Aquatic Life Use Assessment

Is this water body supporting its designated uses? Yes No

Reason: Nekton and physical habitat scores were high for both the index and critical period; benthic macroinvertebrate scores were high during the index period and intermediate during the critical period. In index and critical sampling periods, diel D.O. averaged 7.78 mg/L and 5.96 mg/L, respectively, with an absolute minima being 6.56 mg/L and 4.94 mg/L, respectively. In summation, this site is supporting high ALU, with concerns for benthic macroinvertebrates.

Known or potential causes of Aquatic Life Use concern or impairment: Segment 0902 was originally listed on the 2008 Texas Integrated Report 303(d) list for impaired benthic community, but was delisted in 2010 due to a change in impairment criteria. It was listed in the 2010 Texas Integrated Report 305(b) list of water bodies with concerns for depressed D.O. and impaired macroinvertebrate communities, but is not currently listed on the 2012 Texas Integrated Report 305(b) or 303(d) lists.

Identify Sources of Pollution:

Point Source: Yes No Identify: Outfall from nearby plant downstream of FM 1942 bridge (just downstream of upstream most transect)

Nonpoint Source: Yes No Identify: Mowed power corridor between transects 2 and 3. FM 1942 bridge crossing drains runoff from FM 1942.

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: 5/2/2014

Flow Severity: <u>Normal</u>	Pools covering <u>14.9</u> % of the <u>235</u> meters assessed	Flowing at <u>3.7528</u> cfs (measured)
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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, drier conditions persisted regionally leading to lower water levels and flow conditions (than compared to critical sampling).

Stream Characterization Event 2 Date: 7/28/2014

Flow Severity: <u>Normal</u>	Pools covering <u>14.6</u> % of the <u>240</u> meters assessed	Flowing at <u>5.6486</u> cfs (measured)
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Describe conditions that may have adversely affected stream during each sampling event (for example, recent rains, drought, and construction): Recent rain may have caused flooding in surrounding area 2 weeks prior to sampling event. All bodies of water in surrounding area were flowing at higher rates when compared to index sampling, but, for the most part, the second half of the summer season was wetter than the first half (i.e. during 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: 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: 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

Maps of Sample Location

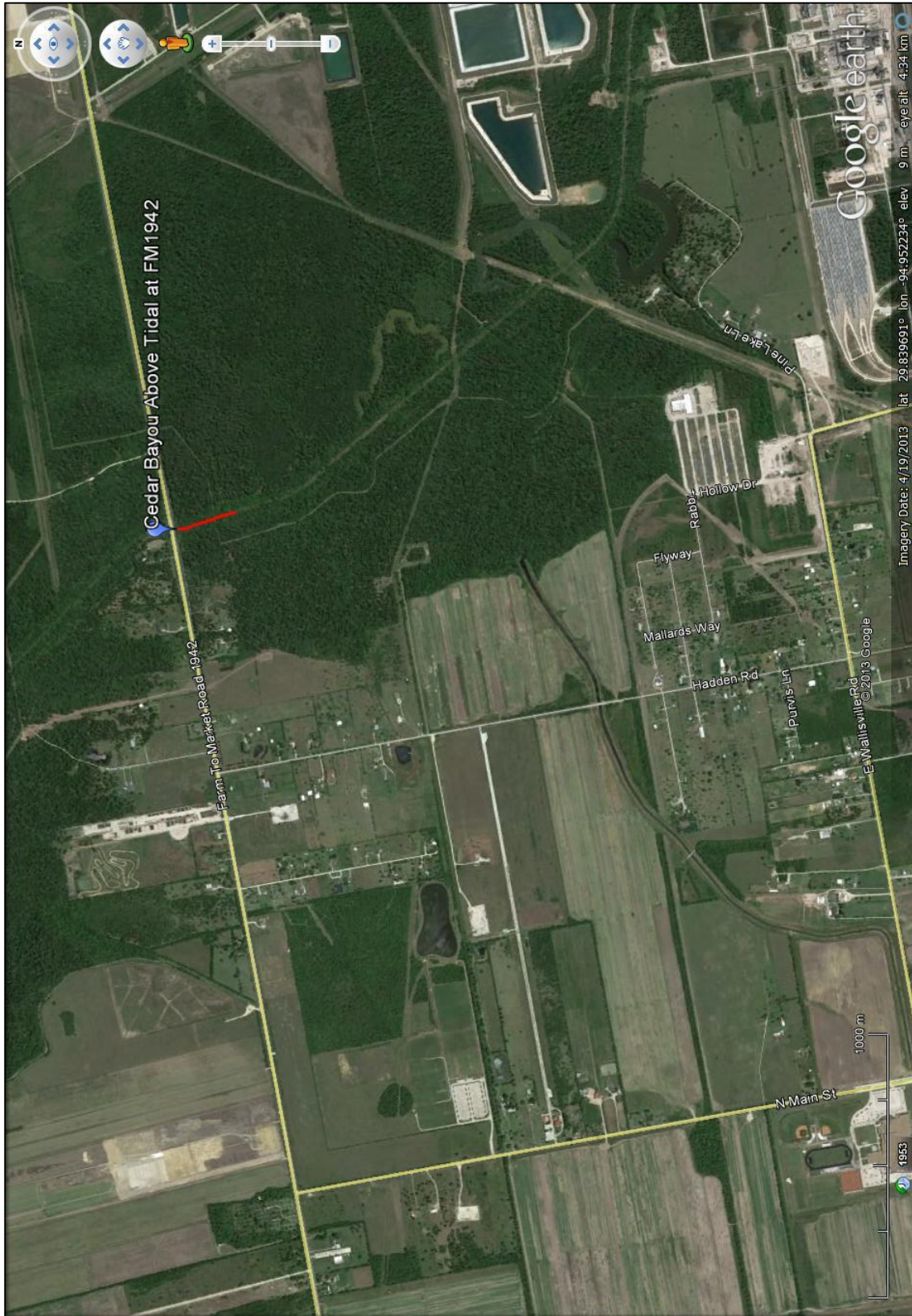


Figure 1 Aerial map of overall sample area (site indicated at top-most transect of reach) including length of evaluated reach (redline 235m and 240m during index and critical periods respectively).

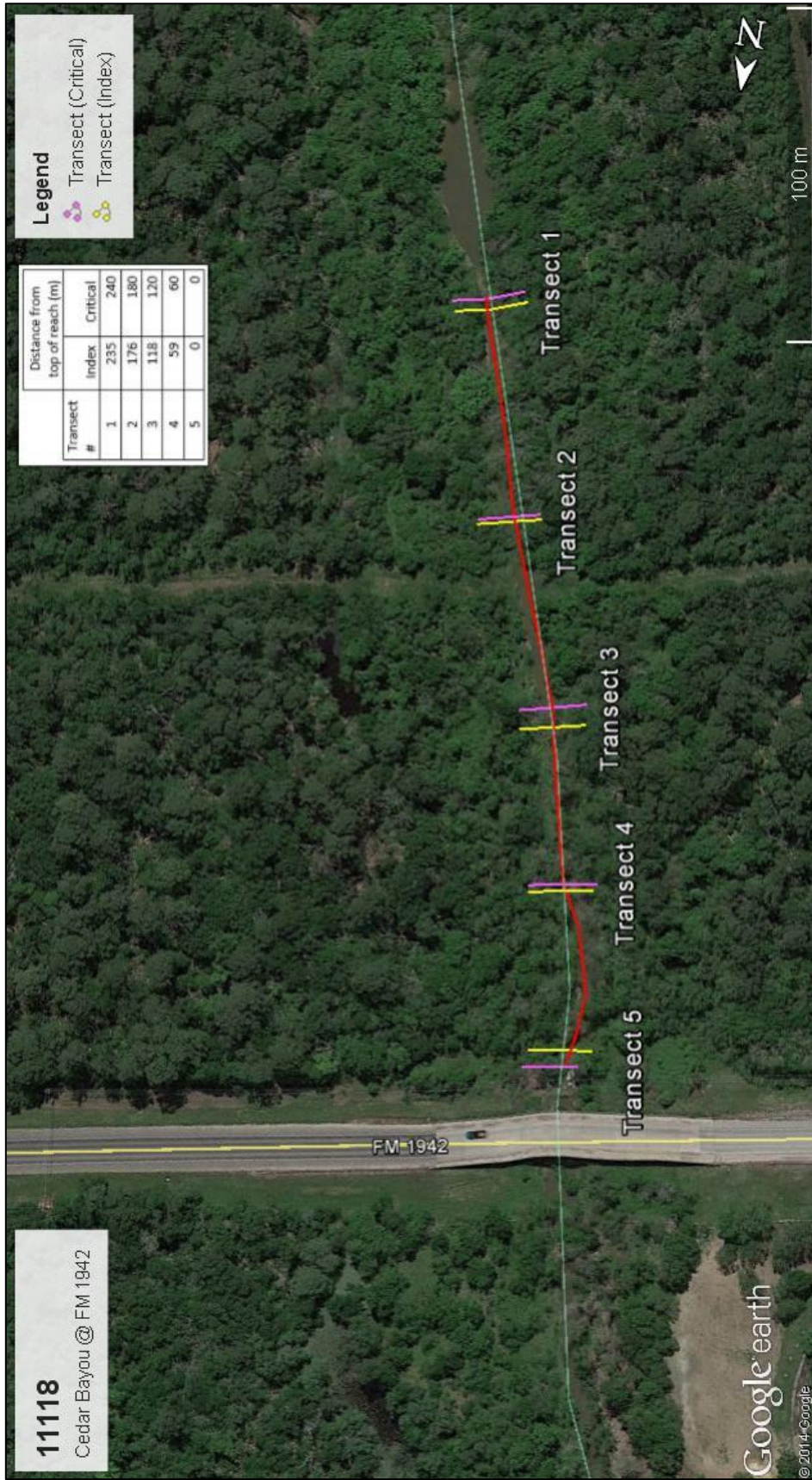


Figure 1 Location of transects for index (yellow lines) and critical (pink lines) sampling periods. Solid red line indicates curvature of Cedar Bayou.

Nekton Community IBI Data, Summary Data, and Species Lists

Ecoregion 34 Nekton IBI			
Date	05/02/2014	TCEQ ID	11118
Site	Cedar Bayou Above Tidal @ FM 1942		
Metric	Value	Score	
Total number fish species	19	5	
Number native cyprinid species	3	5	
Number benthic invertivore species	0	1	
Number sunfish species	5	5	
Number intolerant species	1	5	
Percent individuals as tolerant ^a	0.4	5	
Percent individuals as omnivores	89.7	1	
Percent individuals as invertivores	9.9	1	
Number individuals in sample	1978	3	
Individuals per seine haul	323.8	5	
Individuals per min electrofishing	1.39	1	
Percent individuals as non-natives	0.0	5	
Percent individuals with disease or anomalies	0.0	5	
Regional Score and Aquatic Life Use	41	High	
^a not including <i>G. affinis</i>			
Scoring Criteria			
Exceptional		> 49	
High		39 – 48	
Intermediate		31 – 38	
Limited		< 31	

Nekton Summary Data			
Date	05/02/2014	TCEQ ID	11118
Site	Cedar Bayou Above Tidal @ FM 1942		
Description	STORET	Value	
Stream order	84161	2	
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	2	
Electrofishing effort (sec)	89944	1510	
Seining effort (number of hauls)	89947	6	
Combined length of seine hauls (m)	89948	62	
Seining effort (duration, minutes)	89949	3.25	
Ecoregion	89961	34	
Area seined (m ²)	89976	267.7	
Total fish species (n)	98003	19	
Number of sunfish species (n)	98008	5	
Total intolerant species (n)	98010	1	
Omnivore individuals (%)	98017	89.7	
Insectivore individuals (%)	98021	9.9	
Piscivore individuals (%)	98022	N/A	
Individuals with disease or anomaly (%)	98030	0	
Number of native cyprinid species (n)	98032	3	
Individuals as non-native species (%)	98033	0	
Total individuals seining (n)	98039	1943	
Total individuals electroshocking (n)	98040	35	
Number of benthic invertivores (n)	98052	0	
Individuals per seine haul (n)	98062	323.8	
Individuals per minute electroshocking (n)	98069	1.39	
Tolerant individuals (except <i>G. affinis</i>) (%)	98070	0.4	

SPECIES LIST - NEKTON

Date 05/02/2014
Site Cedar Bayou Above Tidal @ FM 1942
TCEQ ID 11118

		Collection Method (E = electro, S = seine)												
		Collection Effort (for E: sec; for S: meters)			ES	S1	S2	S3	S4	S5	S6	Seine	Overall	
STORET	Scientific Name	Common Name	#	#	#	Total #	#	#	#	#	#	Total #	Total #	
98412	<i>Anchoa mitchilli</i>	Bay anchovy	1			1	20	39		18	30	2	109	110
98427	<i>Brevoortia patronus</i>	Gulf Menhaden	5			5	957	147	9	238	278	128	1757	1762
98487	<i>Cyprinella venusta</i>	Blacktail shiner	1			1	1		4	3	3		11	12
98430	<i>Dorosoma cepedianum</i>	Gizzard shad			1	1							0	1
98429	<i>Dorosoma petenense</i>	Threadfin shad				0	2						2	2
98713	<i>Gambusia affinis</i>	Western mosquitofish	2		1	3	4			1	1		6	9
99094	<i>Lepomis cyanellus</i>	Green sunfish	2	1	1	4							0	4
99095	<i>Lepomis gulosus</i>	Warmouth			2	2							0	2
99099	<i>Lepomis megalotis</i>	Longear sunfish	2	4	4	10		2					2	12
99101	<i>Lepomis miniatus</i>	Redspotted sunfish			3	3							0	3
99102	<i>Lepomis symmetricus</i>	Bantam sunfish	1			1							0	1
98728	<i>Menidia beryllina</i>	Inland silverside				0	1	3	7	3	4		18	18
98968	<i>Micropogonias undulatus</i>	Atlantic croaker	1			1	8	1		2			11	12
99090	<i>Micropterus salmoides</i>	Largemouth bass			1	1							0	1
98793	<i>Mugil cephalus</i>	Striped mullet	1			1	1	1				6	8	9
98452	<i>Opsopoeodus emiliae</i>	Pugnose minnow				0		1					1	1
98498	<i>Pimephales vigilax</i>	Bullhead minnow	1			1	3	5	3			4	15	16
98663	<i>Strongylura marina</i>	Atlantic needlefish				0			1		1		2	2
99218	<i>Trinectes maculatus</i>	Hogchoker				0		1					1	1
Total Collected						35							1943	1978
Total Taxa						14							13	19

Ecoregion 34 Nekton IBI			
Date	07/28/2014	TCEQ ID	11118
Site	Cedar Bayou Above Tidal @ FM 1942		
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	164	1	
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	43	High	
^a not including <i>G. affinis</i>			
Scoring Criteria			
Exceptional		> 49	
High		39 – 48	
Intermediate		31 – 38	
Limited		< 31	

Nekton Summary Data		
Description	STORET	Value
Stream order	84161	2
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	2
Electrofishing effort (sec)	89944	994
Seining effort (number of hauls)	89947	6
Combined length of seine hauls (m)	89948	71
Seining effort (duration, minutes)	89949	3.00
Ecoregion	89961	34
Area seined (m ²)	89976	324.6
Total fish species (n)	98003	18
Number of sunfish species (n)	98008	4
Total intolerant species (n)	98010	0
Omnivore individuals (%)	98017	3.7
Insectivore individuals (%)	98021	93.3
Piscivore individuals (%)	98022	N/A
Individuals with disease or anomaly (%)	98030	0
Number of native cyprinid species (n)	98032	3
Individuals as non-native species (%)	98033	0
Total individuals seining (n)	98039	136
Total individuals electroshocking (n)	98040	28
Number of benthic invertivores (n)	98052	0
Individuals per seine haul (n)	98062	22.7
Individuals per minute electroshocking (n)	98069	1.69
Tolerant individuals (except <i>G. affinis</i>) (%)	98070	4.3

SPECIES LIST - NEKTON

Date 07/28/2014
Site Cedar Bayou Above Tidal @ FM 1942
TCEQ ID 11118

Collection Method		(E = electro, S = seine)												
Collection Effort		(for E: sec; for S: meters)												
STORET	Scientific Name	Common Name	E1	E2	E3	ES	S1	S2	S3	S4	S5	S6	Seine	Overall
			#	#	#	Total #	#	#	#	#	#	#	Total #	Total #
98564	<i>Ameiurus natalis</i>	Yellow bullhead			1	1							0	1
98412	<i>Anchoa mitchilli</i>	Bay anchovy			1	1	28			8	10	29	75	76
98427	<i>Brevoortia patronus</i>	Gulf Menhaden				0				1			1	1
98487	<i>Cyprinella venusta</i>	Blacktail shiner			1	1		6	2				5	13
98430	<i>Dorosoma cepedianum</i>	Gizzard shad				0						1	1	1
98677	<i>Fundulus notatus</i>	Blackstripe topminnow				0	1	1		1			3	3
98713	<i>Gambusia affinis</i>	Western mosquitofish		1		1	2			1	5		8	9
98561	<i>Ictalurus punctatus</i>	Channel catfish			1	1					1		1	2
99094	<i>Lepomis cyanellus</i>	Green sunfish			1	1							0	1
99097	<i>Lepomis macrochirus</i>	Bluegill			1	1						2	2	3
99099	<i>Lepomis megalotis</i>	Longear sunfish	3		13	16	1						1	17
99101	<i>Lepomis miniatus</i>	Redspotted sunfish			2	2							0	2
98728	<i>Menidia beryllina</i>	Inland silverside				0			1	1		8	10	10
99089	<i>Micropterus punctulatus</i>	Spotted bass	1		1	2							0	2
99090	<i>Micropterus salmoides</i>	Largemouth bass			1	1					1		1	2
98793	<i>Mugil cephalus</i>	Striped mullet				0		1					1	1
98452	<i>Opsopoeodus emiliae</i>	Pugnose minnow				0		2		10	2	2	16	16
98498	<i>Pimephales vigilax</i>	Bullhead minnow				0				1	2		3	3
Total Collected						28							136	164
Total Taxa						11							14	18

Benthic Community IBI Data, Summary Data, and Species Lists

Qualitative Benthos IBI			
Date	05/02/2014	TCEQ ID	11118
Site	Cedar Bayou Above Tidal @ FM 1942		
Metric	Value	Score	
Taxa Richness	22	4	
EPT Taxa Abundance	4	2	
Biotic Index (HBI)	5.85	1	
% Chironomidae	8.41	3	
% Dominant Taxon	25.23	3	
% Dominant FFG	42.76	3	
% Predators	9.81	4	
Intolerant : Tolerant	0.50	1	
% Total Trichoptera as Hydropsychidae	50.00	3	
# of Non-Insect Taxa	10	4	
% Collector-Gatherers	42.76	1	
% of Total Number as Elmidae	32.24	1	
AQUATIC LIFE USE SCORE		30	
AQUATIC LIFE USE RATING		High	
Scoring Criteria			
Exceptional	>36		
High	29 - 36		
Intermediate	22 - 28		
Limited	<22		

Benthos Summary Data			
Date	05/02/2014	TCEQ ID	11118
Site	Cedar Bayou Above Tidal @ FM 1942		
Description	STORET	Value	
Stream order	84161	2	
Data reporting units	89899	1	
Kicknet effort (m ²)	89903	5	
Kicknet effort (min)	89904	06:52.0	
Debris/shoreline effort, min picked (min)	89905	0:00:00	
Total n for sample (n)	89906	214	
Gravel substrate (%)	89923	30	
Macrophyte bed (%)	89926	5	
Snags and brush (%)	89927	20	
Bedrock (%)	89928	0	
Net mesh size (cm)	89946	0.05	
Benthic sampler	89950	3	
Ecoregion	89961	34	
HBI	90007	5.85	
EPT index (n)	90008	4	
Dominant FFG (%)	90010	42.76	
Collector-gatherers (%)	90025	42.76	
Predators (%)	90036	9.81	
Dominant taxon (%)	90042	25.23	
Intolerant : Tolerant taxa	90050	0.50	
Non-insect taxa (n)	90052	10	
n as Elmidae (%)	90054	32.24	
Taxa richness (n)	90055	22	
Chironomidae (%)	90062	8.41	
Trichoptera as Hydropsychidae (%)	90069	50.00	

SPECIES LIST - BENTHIC MACROINVERTEBRATES

Date 05/02/2014
Site Cedar Bayou Above Tidal @ FM 1942
TCEQ ID 11118

STORET	Phylum	Class	Order	Family	Genus	Count
90913	Annelida	Hirudinea				5
90382	Annelida	Oligochaeta				11
91265	Arthropoda	Crustacea	Amphipoda	Gammaridae	<i>Gammarus</i>	35
91241	Arthropoda	Crustacea	Amphipoda	Taltridae	<i>Hyalella</i>	4
91397	Arthropoda	Crustacea	Decapoda	Palaemonidae	<i>Palaemonetes</i>	5
91370	Arthropoda	Crustacea	Mysidacea	Mysidae	<i>Taphromysis</i>	9
91056	Arthropoda	Crustacea	Ostracoda			1
	Mollusca	Gastropoda	Mesogastropoda	Hydrobiidae		6
93032	Mollusca	Bivalvia	Veneroida	Sphaeriidae	<i>Sphaerium</i>	1
93036	Mollusca	Bivalvia	Veneroida	Corbiculidae	<i>Corbicula</i>	7
92230	Arthropoda	Insecta	Coleoptera	Elmidae	<i>Dubiraphia</i>	15
92253	Arthropoda	Insecta	Coleoptera	Elmidae	<i>Stenelmis</i>	54
92090	Arthropoda	Insecta	Coleoptera	Gyrinidae	<i>Dineutus</i>	3
92478	Arthropoda	Insecta	Diptera	Ceratopogonidae	<i>Bezzia</i>	2
92491	Arthropoda	Insecta	Diptera	Chironomidae		18
	Arthropoda	Insecta	Diptera	Ephydriidae	<i>Hydrellia</i>	3
91600	Arthropoda	Insecta	Ephemeroptera	Caenidae	<i>Caenis</i>	23
91619	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	<i>Stenacron</i>	3
91944	Arthropoda	Insecta	Hemiptera	Gerridae	<i>Rheumatobates</i>	3
91687	Arthropoda	Insecta	Odonata	Coenagrionidae	<i>Enallagma</i>	2
92292	Arthropoda	Insecta	Trichoptera	Hydropsychidae	<i>Cheumatopsyche</i>	2
92324	Arthropoda	Insecta	Trichoptera	Hydroptilidae	<i>Hydroptila</i>	2
Total						214

Qualitative Benthos IBI			
Date	07/28/2014	TCEQ ID	11118
Site	Cedar Bayou Above Tidal @ FM 1942		
Metric	Value	Score	
Taxa Richness	15	3	
EPT Taxa Abundance	6	2	
Biotic Index (HBI)	5.53	1	
% Chironomidae	23.69	1	
% Dominant Taxon	34.94	2	
% Dominant FFG	40.43	3	
% Predators	10.71	4	
Intolerant : Tolerant	0.62	1	
% Total Trichoptera as Hydropsychidae	82.61	1	
# of Non-Insect Taxa	3	2	
% Collector-Gatherers	40.43	2	
% of Total Number as Elmidae	26.10	2	
AQUATIC LIFE USE SCORE	24		
AQUATIC LIFE USE RATING	Intermediate		
Scoring Criteria			
Exceptional	>36		
High	29 - 36		
Intermediate	22 - 28		
Limited	<22		

Benthos Summary Data			
Date	07/28/2014	TCEQ ID	11118
Site	Cedar Bayou Above Tidal @ FM 1942		
Description	STORET	Value	
Stream order	84161	2	
Data reporting units	89899	1	
Kicknet effort (m ²)	89903	6	
Kicknet effort (min)	89904	05:00.0	
Debris/shoreline effort, min picked (min)	89905	0:02:00	
Total n for sample (n)	89906	249	
Gravel substrate (%)	89923	0	
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	34	
HBI	90007	5.53	
EPT index (n)	90008	6	
Dominant FFG (%)	90010	40.43	
Collector-gatherers (%)	90025	40.43	
Predators (%)	90036	10.71	
Dominant taxon (%)	90042	34.94	
Intolerant : Tolerant taxa	90050	0.62	
Non-insect taxa (n)	90052	3	
n as Elmidae (%)	90054	26.1	
Taxa richness (n)	90055	15	
Chironomidae (%)	90062	23.69	
Trichoptera as Hydropsychidae (%)	90069	82.61	

SPECIES LIST - BENTHIC MACROINVERTEBRATES

Date 07/28/2014
Site Cedar Bayou Above Tidal @ FM 1942
TCEQ ID 11118

STORET	Phylum	Class	Order	Family	Genus	Count
90913	Annelida	Hirudinea				1
90382	Annelida	Oligochaeta				2
91241	Arthropoda	Crustacea	Amphipoda	Taltridae	<i>Hyaella</i>	3
92230	Arthropoda	Insecta	Coleoptera	Elmidae	<i>Dubiraphia</i>	2
92253	Arthropoda	Insecta	Coleoptera	Elmidae	<i>Stenelmis</i>	63
92092	Arthropoda	Insecta	Coleoptera	Gyrinidae	<i>Gyretes</i>	3
92491	Arthropoda	Insecta	Diptera	Chironomidae		59
91646	Arthropoda	Insecta	Ephemeroptera	Baetidae	<i>Baetis</i>	1
91651	Arthropoda	Insecta	Ephemeroptera	Baetidae	<i>Fallceon</i>	87
91600	Arthropoda	Insecta	Ephemeroptera	Caenidae	<i>Caenis</i>	2
92074	Arthropoda	Insecta	Megaloptera	Corydalidae	<i>Corydalis</i>	1
91669	Arthropoda	Insecta	Odonata	Calopterygidae	<i>Hetaerina</i>	2
92292	Arthropoda	Insecta	Trichoptera	Hydropsychidae	<i>Cheumatopsyche</i>	18
92296	Arthropoda	Insecta	Trichoptera	Hydropsychidae	<i>Hydropsyche</i>	1
92324	Arthropoda	Insecta	Trichoptera	Hydroptilidae	<i>Hydroptila</i>	4
Total						249

Physical Habitat IBI Data, Summary Data, and Transect Data

Habitat Quality Index		
Date	05/02/2014	
Site	Cedar Bayou Above Tidal @ FM 1942	
TCEQ ID	11118	
Metric	Value	Score
Instream Cover, mean (%)	29.0	2
Riffles, number of	1	2
Pools, maximum depth (m)	1.3	4
Bank Stability	—	2
Slope component, mean angle (°)	43.0	—
Erosion component, mean (%)	14.5	—
Riparian Buffer Vegetation, mean width (m)	16	2
Channel Flow Status (4=High, 3=Moderate, 2=Low, 1=No flow)	3	2
Channel Sinuosity	2	1
Bottom Substrate, mean gravel or larger (%)	32.0	3
Aesthetics (1=Wilderness, 2=Natural, 3=Common, 4=Offensive)	2	2
AQUATIC LIFE USE SCORE	20	
AQUATIC LIFE USE RATING	High	
Scoring Criteria		
Exceptional	26 - 31	
High	20 - 25	
Intermediate	14 - 19	
Limited	< 14	

Habitat Summary Data

Date 05/02/2014
Site Cedar Bayou Above Tidal @ FM 1942
TCEQ ID 11118

Description	STORET	Value
Instantaneous flow measurement (cfs)	00061	3.7528
Mean stream slope over evaluated reach (m/km)	72051	0.000
Mean instream cover (%)	84159	29.0
Stream order	84161	2
Number of transects	89832	5
Flow measurement method (1=gage, 2=electric, 3=mechanical, 4=weir, 5=doppler)	89835	5
Total number of stream bends	89839	2
Well defined stream bends	89840	0
Moderately defined stream bends	89841	0
Poorly defined stream bends	89842	2
Number of riffles	89843	1
Dominant substrate (1=clay, 2=silt, 3=sand, 4=gravel, 5=cobble, 6=boulder, 7=bedrock)	89844	1
Mean substrate gravel or larger (%)	89845	32.0
Mean bank erosion (%)	89846	14.5
Mean bank slope (°)	89847	43.0
Channel flow status (4=high, 3=moderate, 2=low, 1=no flow)	89848	3
Riparian vegetation	—	—
Trees (%)	89849	58.0
Shrubs (%)	89850	6.5
Grasses/forbes (%)	89851	82
Cultivated fields (%)	89852	0
Other (%)	89853	12.5
Mean tree canopy (%)	89854	82.65
Drainage area above location (km ²)	89859	356.90
Length of segment evaluated (km)	89860	0.235
Mean stream width (m)	89861	5.6
Mean stream depth (m)	89862	0.414
Maximum pool width (m)	89864	6.3
Maximum pool depth (m)	89865	1.3
Mean width natural buffer vegetation (m)	89866	16
Aesthetics (1=wilderness, 2=natural, 3=common, 4=offensive)	89867	2
Number of instream cover types	89929	3
Ecoregion	89961	34
Land development (1=unimpacted, 2=low, 3=moderate, 4=high)	89962	2

Habitat Transect Data

Date 05/02/2014
Site Cedar Bayou Above Tidal @ FM 1942
TCEQ ID 11118

Description	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5
Stream type (RI=riffle, RU=run, G=glide, P=pool)	G	G	G	G	RI
Stream width (m)	6.8	4.6	5.1	5.9	5.4
Left bank slope (°)	20	20	35	65	20
Left bank erosion potential (%)	20	15	10	10	40
Left bank width of natural buffer vegetation (m)	>20	>20	>20	>20	0
Right bank slope (°)	70	55	40	50	55
Right bank erosion potential (%)	10	10	10	10	10
Right bank width of natural buffer vegetation (m)	>20	>20	>20	>20	0
Tree canopy (%)	95.59	91.18	97.06	95.59	33.82
Dominant substrate type (1=clay, 2=silt, 3=sand, 4=gravel, 5=cobble, 6=boulder, 7=bedrock, 8=other)	1	1	1	4	4
Stream depth at point 1 (m)	0.34	0.49	0.46	0.52	0.02
Stream depth at point 2 (m)	0.40	0.50	0.58	0.53	0.03
Stream depth at point 3 (m)	0.44	0.57	0.70	0.57	0.06
Stream depth at point 4 (m)	0.39	0.56	0.71	0.57	0.14
Stream depth at point 5 (m)	0.35	0.57	0.86	0.53	0.17
Stream depth at point 6 (m)	0.31	0.59	0.86	0.46	0.24
Stream depth at point 7 (m)	0.32	0.60	0.88	0.38	0.28
Stream depth at point 8 (m)	0.28	0.56	0.87	0.34	0.18
Stream depth at point 9 (m)	0.28	0.53	0.68	0.32	0.14
Stream depth at point 10 (m)	0.23	0.55	0.59	0.31	0.04
Stream depth at point 11 (m)	0.00	0.37	0.51	0.00	0.00
Substrate gravel or larger (%)	5	5	5	60	85
Instream cover (%)	5	15	20	25	80
Left bank trees (%)	80	50	95	40	0
Left bank shrubs (%)	0	20	5	20	0
Left bank grasses/forbes (%)	70	75	90	70	70
Left bank cultivated fields (%)	0	0	0	0	0
Left bank other (%)	30	5	10	10	30
Right bank trees (%)	80	50	60	85	40
Right bank shrubs (%)	5	5	0	5	5
Right bank grasses/forbes (%)	90	90	95	80	90
Right bank cultivated fields (%)	0	0	0	0	0
Right bank other (%)	5	5	5	20	5
Transect Latitude (decimal degrees)	29.84730	29.84788	29.84842	29.84884	29.84927
Transect Longitude (decimal degrees)	-94.94652	-94.94663	-94.94701	-94.94708	-94.94712
Total length of reach (m)	235				

Habitat Quality Index

Date 07/28/2014
Site Cedar Bayou Above Tidal @ FM 1942
TCEQ ID 11118

Metric	Value	Score
Instream Cover, mean (%)	18.0	2
Riffles, number of	1	2
Pools, maximum depth (m)	1.4	4
Bank Stability	—	2
Slope component, mean angle (°)	39.3	—
Erosion component, mean (%)	24.0	—
Riparian Buffer Vegetation, mean width (m)	19	2
Channel Flow Status (4=High, 3=Moderate, 2=Low, 1=No flow)	3	2
Channel Sinuosity	2	1
Bottom Substrate, mean gravel or larger (%)	34.0	3
Aesthetics (1=Wilderness, 2=Natural, 3=Common, 4=Offensive)	2	2
AQUATIC LIFE USE SCORE		20
AQUATIC LIFE USE RATING		High
Scoring Criteria		
Exceptional	26 - 31	
High	20 - 25	
Intermediate	14 - 19	
Limited	< 14	

Habitat Summary Data

Date 07/28/2014
Site Cedar Bayou Above Tidal @ FM 1942
TCEQ ID 11118

Description	STORET	Value
Instantaneous flow measurement (cfs)	00061	5.6486
Mean stream slope over evaluated reach (m/km)	72051	0.010
Mean instream cover (%)	84159	18.0
Stream order	84161	2
Number of transects	89832	5
Flow measurement method (1=gage, 2=electric, 3=mechanical, 4=weir, 5=doppler)	89835	5
Total number of stream bends	89839	2
Well defined stream bends	89840	0
Moderately defined stream bends	89841	1
Poorly defined stream bends	89842	1
Number of riffles	89843	1
Dominant substrate (1=clay, 2=silt, 3=sand, 4=gravel, 5=cobble, 6=boulder, 7=bedrock)	89844	1
Mean substrate gravel or larger (%)	89845	34.0
Mean bank erosion (%)	89846	24.0
Mean bank slope (°)	89847	39.3
Channel flow status (4=high, 3=moderate, 2=low, 1=no flow)	89848	3
Riparian vegetation	—	—
Trees (%)	89849	56.0
Shrubs (%)	89850	11.0
Grasses/forbes (%)	89851	73.5
Cultivated fields (%)	89852	0
Other (%)	89853	24
Mean tree canopy (%)	89854	89.71
Drainage area above location (km ²)	89859	356.90
Length of segment evaluated (km)	89860	0.240
Mean stream width (m)	89861	5.70
Mean stream depth (m)	89862	0.494
Maximum pool width (m)	89864	7.1
Maximum pool depth (m)	89865	1.4
Mean width natural buffer vegetation (m)	89866	19
Aesthetics (1=wilderness, 2=natural, 3=common, 4=offensive)	89867	2
Number of instream cover types	89929	3
Ecoregion	89961	34
Land development (1=unimpacted, 2=low, 3=moderate, 4=high)	89962	2

Habitat Transect Data

Date 07/28/2014
Site Cedar Bayou Above Tidal @ FM 1942
TCEQ ID 11118

Description	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5
Stream type (RI=riffle, RU=run, G=glide, P=pool)	G	G	G	G	RI
Stream width (m)	6.4	4.8	5.8	6.2	5.3
Left bank slope (°)	28	37	65	65	15
Left bank erosion potential (%)	30	20	30	30	40
Left bank width of natural buffer vegetation (m)	>20	>20	>20	>20	15
Right bank slope (°)	45	43	20	45	30
Right bank erosion potential (%)	10	5	20	35	20
Right bank width of natural buffer vegetation (m)	>20	>20	>20	>20	15
Tree canopy (%)	100.00	92.65	92.65	100.00	63.24
Dominant substrate type (1=clay, 2=silt, 3=sand, 4=gravel, 5=cobble, 6=boulder, 7=bedrock, 8=other)	1	1	1	1	3
Stream depth at point 1 (m)	0.00	0.00	0.65	0.00	0.00
Stream depth at point 2 (m)	0.60	0.74	0.75	0.45	0.19
Stream depth at point 3 (m)	0.57	0.76	0.79	0.47	0.24
Stream depth at point 4 (m)	0.58	0.70	0.82	0.47	0.18
Stream depth at point 5 (m)	0.55	0.75	0.84	0.51	0.23
Stream depth at point 6 (m)	0.54	0.72	0.80	0.53	0.20
Stream depth at point 7 (m)	0.49	0.75	0.81	0.54	0.20
Stream depth at point 8 (m)	0.35	0.81	0.88	0.60	0.21
Stream depth at point 9 (m)	0.30	0.84	0.90	0.65	0.14
Stream depth at point 10 (m)	0.22	0.90	0.76	0.71	0.13
Stream depth at point 11 (m)	0.00	0.00	0.68	0.66	0.00
Substrate gravel or larger (%)	25	25	35	40	45
Instream cover (%)	5	10	15	15	45
Left bank trees (%)	65	60	60	70	0
Left bank shrubs (%)	5	10	5	20	30
Left bank grasses/forbes (%)	80	75	75	60	80
Left bank cultivated fields (%)	0	0	0	0	0
Left bank other (%)	15	15	25	40	20
Right bank trees (%)	70	70	50	65	50
Right bank shrubs (%)	5	5	0	10	20
Right bank grasses/forbes (%)	80	85	90	70	40
Right bank cultivated fields (%)	0	0	0	0	0
Right bank other (%)	10	15	10	30	60
Transect Latitude (decimal degrees)	29.84735	29.84789	29.84838	29.84885	29.84933
Transect Longitude (decimal degrees)	-94.94653	-94.94663	-94.94684	-94.94693	-94.94709
Total length of reach (m)	240				

Diel Summary Data and Measurements

Diel Measurement Summary			
Start Date	05/03/2014	Start Time	0:00:32
End Date	05/03/2014	End Time	23:45:32
Site	Cedar Bayou Above Tidal @ FM 1942		
TCEQ ID	11118		
Parameter	STORET	Value	
Temp Mean	00209	21.57	
Temp Maximum	00210	24.59	
Temp Minimum	00211	19.35	
Spec Cond Mean	00212	1341	
Spec Cond Maximum	00213	1473	
Spec Cond Minimum	00214	1296	
pH Maximum	00215	8.30	
pH Minimum	00216	8.08	
pH Average	—	8.21	
# Temp Measurements	00221	96	
# Spec Cond Measurements	00222	96	
# pH Measurements	00223	96	
DO Minimum	89855	6.56	
DO Maximum	89856	9.99	
DO Mean	89857	7.78	
# DO Measurements	89858	96	

Diel Data

Date 05/03/2014 **TCEQ ID** 11118
Site Name Cedar Bayou Above Tidal @ FM 1942

Date (mm/dd/yyyy)	Time (hh:mm:ss)	Temp (°C)	pH Std. Units	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Specific Conductance (µS/cm)
5/3/2014	0:00:32	21.18	8.15	7.09	80.2	1367
5/3/2014	0:15:32	21.07	8.12	7.06	79.7	1402
5/3/2014	0:30:32	21.01	8.12	6.96	78.4	1371
5/3/2014	0:45:32	20.92	8.11	6.89	77.5	1372
5/3/2014	1:00:32	20.82	8.10	6.85	76.9	1367
5/3/2014	1:15:32	20.72	8.08	6.81	76.3	1383
5/3/2014	1:30:32	20.62	8.08	6.81	76.1	1380
5/3/2014	1:45:32	20.54	8.09	6.71	74.9	1354
5/3/2014	2:00:32	20.45	8.10	6.67	74.3	1338
5/3/2014	2:15:32	20.36	8.10	6.65	74.0	1337
5/3/2014	2:30:32	20.28	8.11	6.64	73.7	1340
5/3/2014	2:45:32	20.21	8.12	6.62	73.4	1340
5/3/2014	3:00:32	20.14	8.13	6.61	73.2	1345
5/3/2014	3:15:32	20.08	8.15	6.60	73.0	1345
5/3/2014	3:30:32	20.02	8.16	6.59	72.8	1344
5/3/2014	3:45:32	19.96	8.18	6.60	72.8	1345
5/3/2014	4:00:32	19.91	8.19	6.60	72.7	1346
5/3/2014	4:15:32	19.86	8.20	6.59	72.5	1346
5/3/2014	4:30:32	19.81	8.21	6.58	72.4	1348
5/3/2014	4:45:32	19.77	8.22	6.58	72.3	1348
5/3/2014	5:00:32	19.72	8.23	6.58	72.3	1349
5/3/2014	5:15:32	19.68	8.24	6.58	72.2	1349
5/3/2014	5:30:32	19.64	8.24	6.58	72.1	1349
5/3/2014	5:45:32	19.60	8.24	6.58	72.1	1341
5/3/2014	6:00:32	19.57	8.24	6.58	72.0	1340
5/3/2014	6:15:32	19.53	8.24	6.57	71.9	1344
5/3/2014	6:30:32	19.49	8.24	6.57	71.8	1339
5/3/2014	6:45:32	19.46	8.23	6.56	71.7	1339
5/3/2014	7:00:32	19.43	8.23	6.57	71.7	1341
5/3/2014	7:15:32	19.40	8.23	6.57	71.7	1342
5/3/2014	7:30:32	19.37	8.23	6.58	71.7	1342
5/3/2014	7:45:32	19.36	8.23	6.59	71.9	1344
5/3/2014	8:00:32	19.35	8.23	6.60	72.0	1344
5/3/2014	8:15:32	19.35	8.23	6.64	72.4	1345
5/3/2014	8:30:32	19.36	8.24	6.67	72.7	1346
5/3/2014	8:45:32	19.38	8.23	6.70	73.1	1348
5/3/2014	9:00:32	19.41	8.23	6.75	73.7	1343
5/3/2014	9:15:32	19.44	8.23	6.81	74.3	1343
5/3/2014	9:30:32	19.49	8.23	6.86	75.0	1341
5/3/2014	9:45:32	19.54	8.23	6.91	75.5	1341
5/3/2014	10:00:32	19.59	8.22	6.97	76.3	1341
5/3/2014	10:15:32	19.67	8.22	7.05	77.3	1340
5/3/2014	10:30:32	19.75	8.21	7.15	78.6	1339
5/3/2014	10:45:32	19.85	8.21	7.24	79.7	1337
5/3/2014	11:00:32	19.98	8.21	7.35	81.1	1338
5/3/2014	11:15:32	20.11	8.19	7.48	82.8	1364

Date (mm/dd/yyyy)	Time (hh:mm:ss)	Temp (°C)	pH Std. Units	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Specific Conductance (µS/cm)
5/3/2014	11:30:32	20.30	8.18	7.64	84.9	1370
5/3/2014	11:45:32	20.47	8.17	7.77	86.6	1371
5/3/2014	12:00:32	20.63	8.17	7.92	88.6	1379
5/3/2014	12:15:32	20.83	8.18	8.11	91.1	1361
5/3/2014	12:30:32	21.06	8.19	8.33	93.9	1351
5/3/2014	12:45:32	21.29	8.19	8.54	96.7	1361
5/3/2014	13:00:32	21.52	8.19	8.78	99.9	1364
5/3/2014	13:15:32	21.78	8.19	8.96	102.4	1355
5/3/2014	13:30:32	21.99	8.18	9.13	104.8	1362
5/3/2014	13:45:32	22.19	8.19	9.30	107.2	1341
5/3/2014	14:00:32	22.37	8.19	9.40	108.7	1349
5/3/2014	14:15:32	22.37	8.14	9.34	108.0	1396
5/3/2014	14:30:32	22.39	8.10	9.36	108.3	1473
5/3/2014	14:45:32	22.64	8.13	9.57	111.2	1431
5/3/2014	15:00:32	22.80	8.16	9.68	112.9	1379
5/3/2014	15:15:32	22.94	8.19	9.75	113.9	1346
5/3/2014	15:30:32	23.07	8.17	9.73	114.0	1365
5/3/2014	15:45:32	23.10	8.17	9.76	114.4	1376
5/3/2014	16:00:32	23.23	8.18	9.93	116.7	1366
5/3/2014	16:15:32	23.46	8.20	9.94	117.3	1362
5/3/2014	16:30:32	23.61	8.22	9.91	117.3	1326
5/3/2014	16:45:32	23.86	8.25	9.99	118.8	1309
5/3/2014	17:00:32	23.96	8.25	9.95	118.6	1315
5/3/2014	17:15:32	24.14	8.27	9.95	118.9	1304
5/3/2014	17:30:32	24.27	8.28	9.90	118.7	1306
5/3/2014	17:45:32	24.32	8.29	9.80	117.5	1300
5/3/2014	18:00:32	24.44	8.29	9.74	117.1	1298
5/3/2014	18:15:32	24.43	8.28	9.59	115.2	1303
5/3/2014	18:30:32	24.56	8.30	9.55	115.0	1301
5/3/2014	18:45:32	24.59	8.30	9.43	113.6	1307
5/3/2014	19:00:32	24.58	8.30	9.31	112.2	1305
5/3/2014	19:15:32	24.55	8.29	9.18	110.6	1308
5/3/2014	19:30:32	24.48	8.30	9.04	108.7	1306
5/3/2014	19:45:32	24.47	8.29	8.91	107.2	1303
5/3/2014	20:00:32	24.33	8.29	8.73	104.7	1305
5/3/2014	20:15:32	24.24	8.29	8.57	102.6	1304
5/3/2014	20:30:32	24.15	8.28	8.41	100.5	1299
5/3/2014	20:45:32	24.02	8.29	8.22	98.0	1296
5/3/2014	21:00:32	23.86	8.28	8.02	95.4	1298
5/3/2014	21:15:32	23.70	8.27	7.86	93.2	1298
5/3/2014	21:30:32	23.55	8.26	7.72	91.2	1300
5/3/2014	21:45:32	23.42	8.26	7.55	89.1	1305
5/3/2014	22:00:32	23.26	8.25	7.42	87.2	1310
5/3/2014	22:15:32	23.13	8.24	7.30	85.6	1327
5/3/2014	22:30:32	23.01	8.23	7.17	84.0	1308
5/3/2014	22:45:32	22.89	8.22	7.04	82.3	1306
5/3/2014	23:00:32	22.78	8.22	6.94	80.9	1307
5/3/2014	23:15:32	22.67	8.21	6.85	79.7	1311
5/3/2014	23:30:32	22.55	8.19	6.77	78.5	1315
5/3/2014	23:45:32	22.45	8.18	6.70	77.6	1317

Diel Measurement Summary

Start Date 07/25/2014 **Start Time** 12:15:32
End Date 07/26/2014 **End Time** 11:15:32

Site Cedar Bayou Above Tidal @ FM 1942
TCEQ ID 11118

Parameter	STORET	Value
Temp Mean	00209	30.33
Temp Maximum	00210	31.11
Temp Minimum	00211	29.34
Spec Cond Mean	00212	813
Spec Cond Maximum	00213	873
Spec Cond Minimum	00214	741
pH Maximum	00215	7.97
pH Minimum	00216	7.66
pH Average	—	7.84
# Temp Measurements	00221	24*
# Spec Cond Measurements	00222	24*
# pH Measurements	00223	24*
DO Minimum	89855	4.94
DO Maximum	89856	7.29
DO Mean	89857	5.96
# DO Measurements	89858	24*

* Note: due to technical difficulties, diel values are based on 24 total hourly readings.

Diel Data

Date 07/25/2014 **TCEQ ID** 11118
Site Name Cedar Bayou Above Tidal @ FM 1942

Date (mm/dd/yyyy)	Time (hh:mm:ss)	Temp (°C)	pH Std. Units	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Specific Conductance (µS/cm)
7/25/2014	12:15:32	29.70	7.70	6.29	83.00	820
7/25/2014	13:15:32	30.17	7.84	6.51	86.60	818
7/25/2014	14:15:32	30.70	7.93	7.09	95.10	818
7/25/2014	15:15:32	31.01	7.97	7.29	98.30	819
7/25/2014	16:15:32	31.11	7.96	7.13	96.30	822
7/25/2014	17:15:32	30.99	7.95	7.02	94.70	831
7/25/2014	18:15:32	30.86	7.95	6.79	91.30	836
7/25/2014	19:15:32	30.87	7.95	6.52	87.70	846
7/25/2014	20:15:32	30.98	7.95	6.36	85.80	851
7/25/2014	21:15:32	30.99	7.94	6.12	82.60	860
7/25/2014	22:15:32	30.93	7.93	5.89	79.40	866
7/25/2014	23:15:32	30.81	7.91	5.74	77.20	873
7/26/2014	0:15:32	30.67	7.90	5.67	76.10	865
7/26/2014	1:15:32	30.53	7.89	5.65	75.60	854
7/26/2014	2:15:32	30.39	7.88	5.65	75.40	838
7/26/2014	3:15:32	30.23	7.85	5.59	74.40	819
7/26/2014	4:15:32	30.05	7.80	5.51	73.20	793
7/26/2014	5:15:32	29.88	7.77	5.42	71.60	780
7/26/2014	6:15:32	29.72	7.73	5.27	69.60	765
7/26/2014	7:15:32	29.55	7.68	5.08	66.80	748
7/26/2014	8:15:32	29.39	7.66	4.94	64.80	749
7/26/2014	9:15:32	29.34	7.67	4.95	64.90	749
7/26/2014	10:15:32	29.40	7.69	5.08	66.70	746
7/26/2014	11:15:32	29.64	7.73	5.41	71.30	741

Additional Field Data Measurements

Additional Parameter Data		
Date	05/02/2014	
Site	Cedar Bayou Above Tidal @ FM 1942	
TCEQ ID	11118	
Description	STORET	Value
<i>E. coli</i> IDEXX Colilert (MPN/100 ml)	31699	809
Holding Time, <i>E. coli</i> IDEXX Colilert (hh:mm)	31704	581
TSS (mg/l)	00530	27.4
VSS (mg/l)	00535	N/A
Ammonia-N, Total (mg/l)	00610	0.5
Nitrate/Nitrite-N, Total (mg/l)	00630	0.21
Total Phosphorus-P (mg/l)	00665	0.850
Orthophosphate-P, field filtered (mg/l)	00671	0.280
TOC (mg/l)	00680	N/A
Chloride (mg/l)	00940	180
Sulfate (mg/l)	00945	128.6
TDS, dried @ 180°C (mg/l)	70300	N/A
Temperature (°C)	00010	20.09
Secchi Depth (m)	00078	0.298
Specific Conductance (µS/cm)	00094	1303
DO (mg/L)	00300	7.77
pH (standard units)	00400	7.96
Salinity (ppt)	00480	0.65
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	N/A
Days Since Last Significant Rainfall (days)	72053	18
Total Water Depth (m)	82903	0.358
Turbidity, Observed (1=Low, 2=Medium, 3=High)	88842	N/A
Wind Intensity (1=Calm, 2=Slight, 3=Moderate, 4=Strong)	89965	1
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	3
Water Odor (1=sewage, 2=Chemical, 3=Rotten Egg, 4=Musky, 5=Fishy, 6=None, 7=Other)	89971	6

Additional Parameter Data

Date 07/28/2014
Site Cedar Bayou Above Tidal @ FM 1942
TCEQ ID 11118

Description	STORET	Value
<i>E. coli</i> IDEXX Colilert (MPN/100 ml)	31699	63
Holding Time, <i>E. coli</i> IDEXX Colilert (hh:mm)	31704	670
TSS (mg/l)	00530	57.0
VSS (mg/l)	00535	N/A
Ammonia-N, Total (mg/l)	00610	0.26
Nitrate/Nitrite-N, Total (mg/l)	00630	0.22
Total Phosphorus-P (mg/l)	00665	0.870
Orthophosphate-P, field filtered (mg/l)	00671	0.698
TOC (mg/l)	00680	N/A
Chloride (mg/l)	00940	130
Sulfate (mg/l)	00945	85.4
TDS, dried @ 180°C (mg/l)	70300	N/A
Temperature (°C)	00010	29.59
Secchi Depth (m)	00078	0.274
Specific Conductance (µS/cm)	00094	930
DO (mg/L)	00300	5.12
pH (standard units)	00400	8.02
Salinity (ppt)	00480	0.45
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	N/A
Days Since Last Significant Rainfall (days)	72053	9
Total Water Depth (m)	82903	0.502
Turbidity, Observed (1=Low, 2=Medium, 3=High)	88842	N/A
Wind Intensity (1=Calm, 2=Slight, 3=Moderate, 4=Strong)	89965	1
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	4

Site Photographs

Index – Transect 1

(Bottom of reach)



Figure 2 View upstream taken from transect 1 during index period.



Figure 3 View of right bank taken from transect 1 during index period.



Figure 4 View of left bank taken from transect 1 during index period.



Figure 5 View downstream taken from transect 1 during index period.

Index – Transect 2



Figure 6 View upstream taken from transect 2 during index period.



Figure 7 View of right bank taken from transect 2 during index period.



Figure 8 View of left bank taken from transect 2 during index period.



Figure 9 View downstream taken from transect 2 during index period.

Index – Transect 3



Figure 10 View upstream taken from transect 3 during index period.



Figure 11 View of right bank taken from transect 3 during index period.



Figure 12 View of left bank taken from transect 3 during index period.



Figure 13 View downstream taken from transect 3 during index period.

Index – Transect 4



Figure 14 View upstream taken from transect 4 during index period.



Figure 15 View of right bank taken from transect 4 during index period.



Figure 16 View of left bank taken from transect 4 during index period.



Figure 17 View downstream taken from transect 4 during index period.

Index – Transect 5

(Top of reach)



Figure 18 View upstream taken from transect 5 during index period.



Figure 19 View of right bank taken from transect 5 during index period.



Figure 20 View of left bank taken from transect 5 during index period.

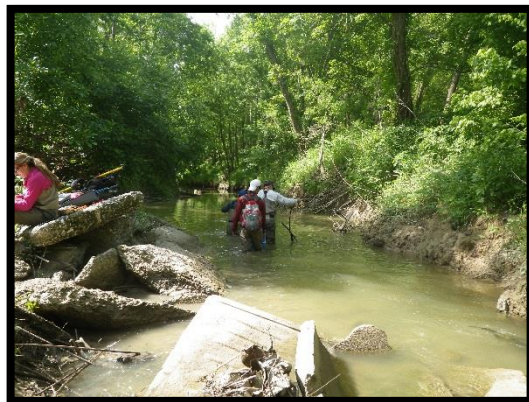


Figure 21 View downstream taken from transect 5 during index period.

Critical – Transect 1

(Bottom of reach)



Figure 22 View upstream taken from transect 1 during critical period.



Figure 23 View of right bank taken from transect 1 during critical period.



Figure 24 View of left bank taken from transect 1 during critical period.

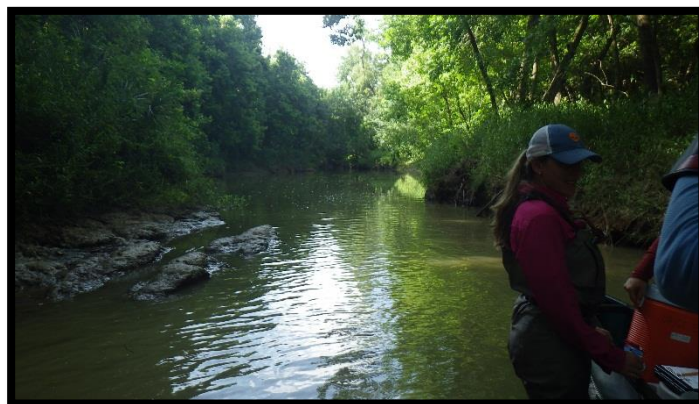


Figure 25 View downstream taken from transect 1 during critical period.

Critical – Transect 2



Figure 26 View upstream taken from transect 2 during critical period.



Figure 27 View of right bank taken from transect 2 during critical period.



Figure 28 View of left bank taken from transect 2 during critical period.



Figure 29 View downstream taken from transect 2 during critical period.

Critical – Transect 3



Figure 30 View upstream taken from transect 3 during critical period.



Figure 31 View of right bank taken from transect 3 during critical period.



Figure 32 View of left bank taken from transect 3 during critical period.



Figure 33 View downstream taken from transect 3 during critical period.

Critical – Transect 4



Figure 34 View upstream taken from transect 4 during critical period.



Figure 35 View of right bank taken from transect 4 during critical period.



Figure 36 View of left bank taken from transect 4 during critical period.



Figure 37 View downstream taken from transect 4 during critical period.

Critical – Transect 5

(Top of reach)



Figure 38 View upstream taken from transect 5 during critical period.



Figure 39 View of right bank taken from transect 5 during critical period.



Figure 40 View of left bank taken from transect 5 during critical period.



Figure 41 View downstream taken from transect 5 during critical period.

Nekton Photographic Vouchers

Index Period



Figure 42 *Lepomis megalotis* (longear sunfish) captured with backpack electroshocker.



Figure 43 *Dorosoma cepedianum* (gizzard shad) captured with backpack electroshocker.



Figure 44 *Micropterus salmoides* (largemouth bass) captured with backpack electroshocker.



Figure 45 *Lepomis miniatus* (redspotted sunfish) captured with backpack electroshocker.



Figure 46 *Lepomis gulosus* (warmouth) captured with backpack electroshocker.



Figure 47 *Mugil cephalus* (striped mullet) captured with backpack electroshocker.



Figure 48 *Cyprinella venusta* (blacktail shiner) captured with backpack electroshocker.



Figure 49 *Strongylura marina* (Atlantic needlefish) captured with backpack electroshocker.

Critical Period



Figure 50 *Lepomis megalotis* (longear sunfish) captured with barge electroshocker.



Figure 51 *Ictalurus punctatus* (channel catfish) captured with barge electroshocker.



Figure 52 *Micropterus salmoides* (largemouth bass) captured with barge electroshocker.



Figure 53 *Cyprinella venusta* (blacktail shiner) captured with barge electroshocker.



Figure 54 *Micropterus punctulatus* (spotted bass) captured with barge electroshocker.



Figure 55 *Lepomis miniatus* (redspotted sunfish) captured with barge electroshocker.



Figure 56 *Lepomis cyanellus* (green sunfish) captured with barge electroshocker.

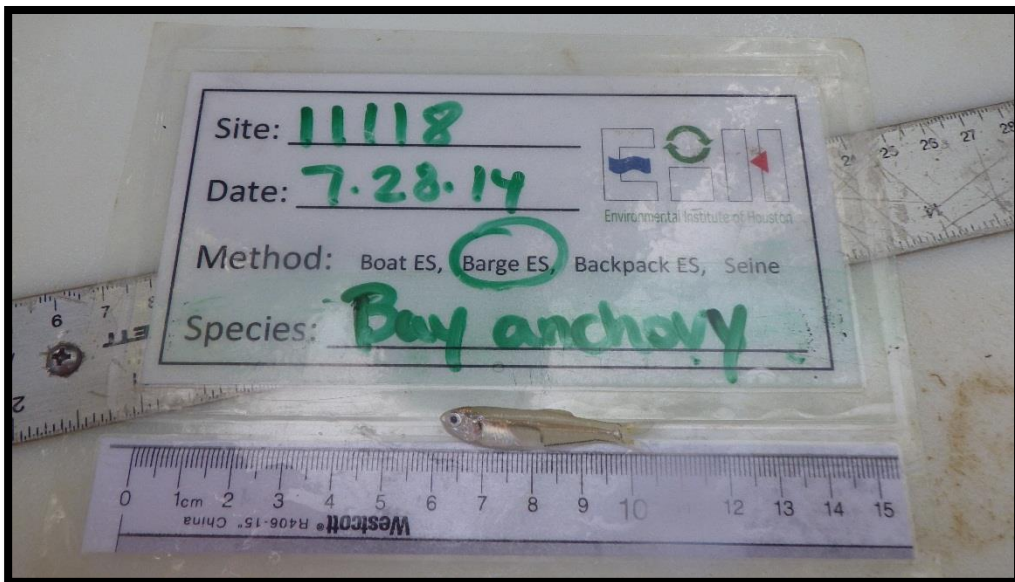


Figure 57 *Anchoa mitchilli* (bay anchovy) captured with barge electroshocker.



Figure 58 *Lepomis macrochirus* (bluegill) captured with barge electroshocker.

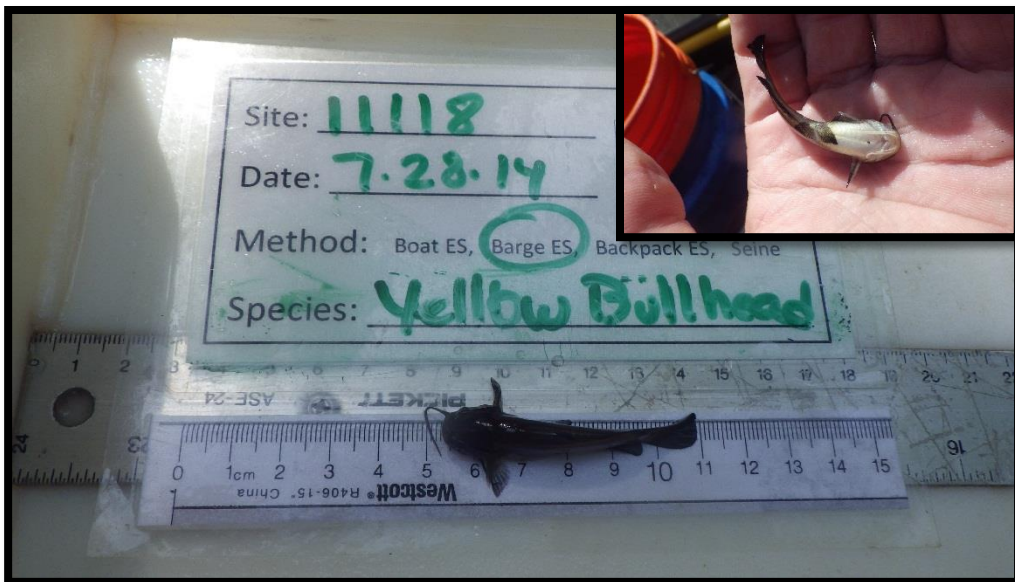


Figure 59 *Ameiurus natalis* (yellow bullhead) captured with barge electroshocker.