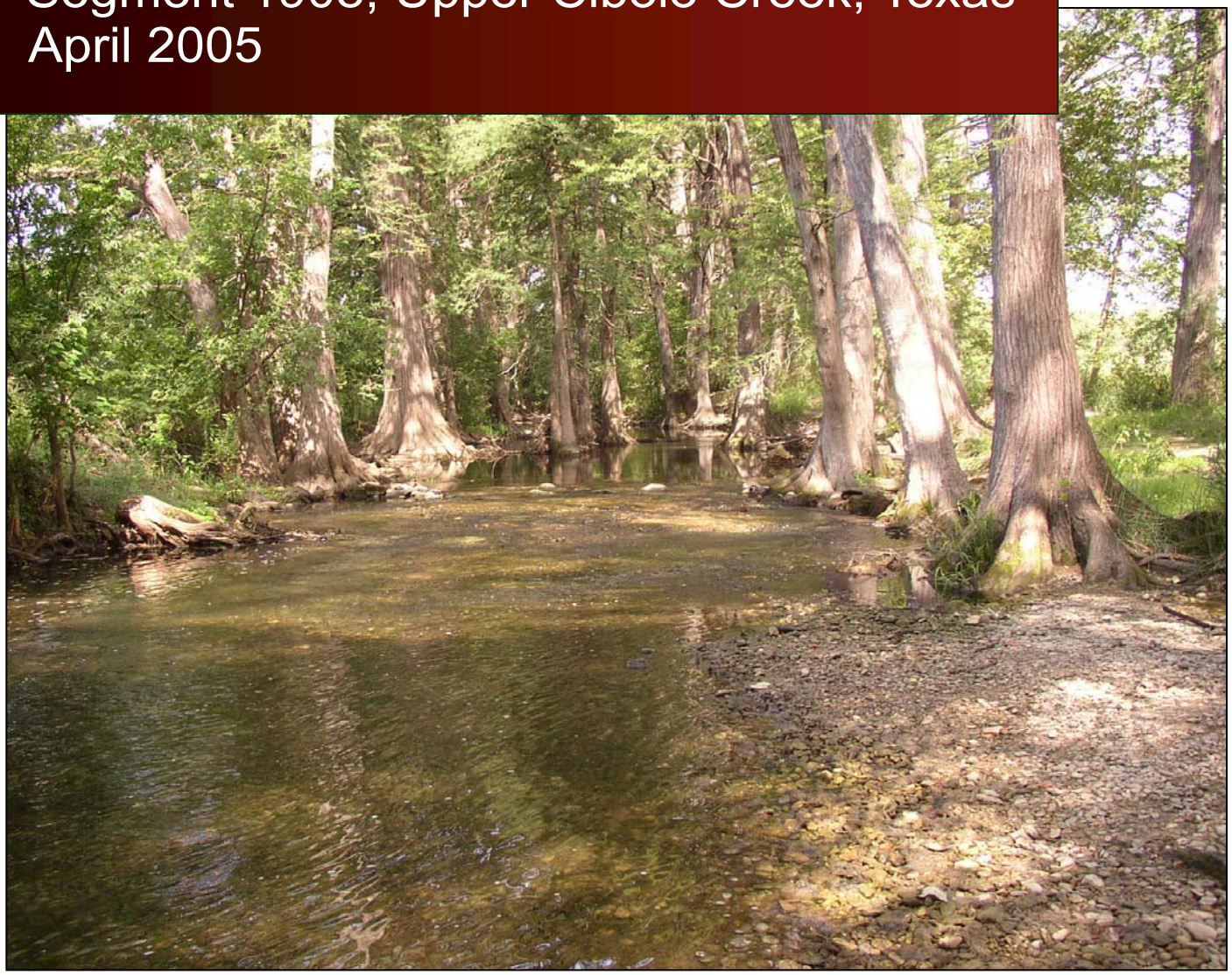
Impairment Verification Monitoring Biological and Habitat Components Segment 1908, Upper Cibolo Creek, Texas April 2005



Ecological Communications Corporation
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Impairment Verification Monitoring-Volume 2: Biological and Habitat Components
Segment 1908, Upper Cibolo Creek

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ABSTRACT

Ecological Communications Corporation (EComm) conducted biological data collection and analysis as part of an impairment verification monitoring project for Upper Cibolo Creek (Segment 1908). Segment 1908 appears on the State of Texas' 303(d) list as impaired for high aquatic life based on low dissolved oxygen concentrations previously reported by or to the Texas Commission on Environmental Quality (TCEQ) or its predecessor agencies. Due to an insufficient amount of data to support a re-assessment, this water body remained on the draft 2002 303(d) list. The objective of EComm's data assessment was to assemble enough information on the water body to support a use attainability analysis if it was determined that the designated aquatic life use was incorrect.

A separate but related assessment was simultaneously conducted by the Texas Engineering Experiment Station (TEES) and the Conrad Blucher Institute for Surveying and Science (CBI) to facilitate the objective. The TEES/CBI effort included physical and chemical data collection and analysis in an attempt to provide a comprehensive assessment of the water quality within the stream segment. As part of the overriding TMDL project (TCEQ Contract 582-4-58897), the combined biological, physical, and chemical data collection and analytical activities will result in one of four outcomes:

1. Removal of the water body from the 303(d) list,
2. An evaluation of applicable water quality standards (aquatic life use impairments only),
3. Development of a TMDL, or
4. Additional monitoring to better characterize the impairment.

Based on data collected by EComm and TEES from 2002 to 2004, this water body was found to be attaining its designated aquatic life use, and will be recommended for delisting.

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1.0 INTRODUCTION

In 2000 the Texas Commission on Environmental Quality (TCEQ) initiated a study to investigate water quality impairments in 11 water bodies in Basin Groups D & E identified through the 1999 305(b) Water Quality Inventory as part of a total daily maximum load (TMDL) program. The segments were included on the 1999 State of Texas Clean Water Act 303(d) list as impaired due to concentration levels of dissolved oxygen or bacteria or both which exceed established criteria. One of these water bodies was Upper Cibolo Creek (Segment 1908). The impairment to Segment 1908 was caused by an exceedance of the established dissolved oxygen criteria based upon comparisons to the instantaneous grab samples. Because an insufficient number of 24-dissolved oxygen values were available in 2002 to determine if the aquatic life use criterion was supported, Segment 1908 remained on the impaired waters list. As an initial phase in TMDL development, the aqautic life use impairment to Segment 1908 was verified using the latest sampling techniques. The initial assessment was performed so that resources within the program can be efficiently utilized for truly impaired water bodies, preventing TMDL development for a water body that may be delisted or subject to a water quality standards revision at a later date. Chemical, physical, and biological data were collected at two sites within the segment in an effort to determine what course of action, if any, needed to be taken to address impairments. Data collection activities would result in one of four outcomes: 1) Removal of the water body from the 303(d) list, 2) An evaluation of applicable water quality standards (aquatic life use impairments only), 3) TMDL, or 4) Additional monitoring to better characterize the impairment.

Figure 1. Station 12857

Segment 1908 originates in extreme southwestern Kendall County, Texas. It flows 66 miles to Comal County and forms the boundary for Bexar and Comal Counties. The creek traverses the Edwards Aquifer Recharge zone, and is known to disappear in some areas as it enters the underground water table through cracks and other openings in exposed Edwards formation outcrop. A location map of the segment is provided in Figure 2. Site 12857 (also internally referred to as 10007 during the initial portion of data collection and analysis) is located in Kendall County just above Boerne at IH 10 and Ranger Creek Road. Site 16702 is located below Boerne, at the Cibolo Nature Center off Texas State Highway 46.

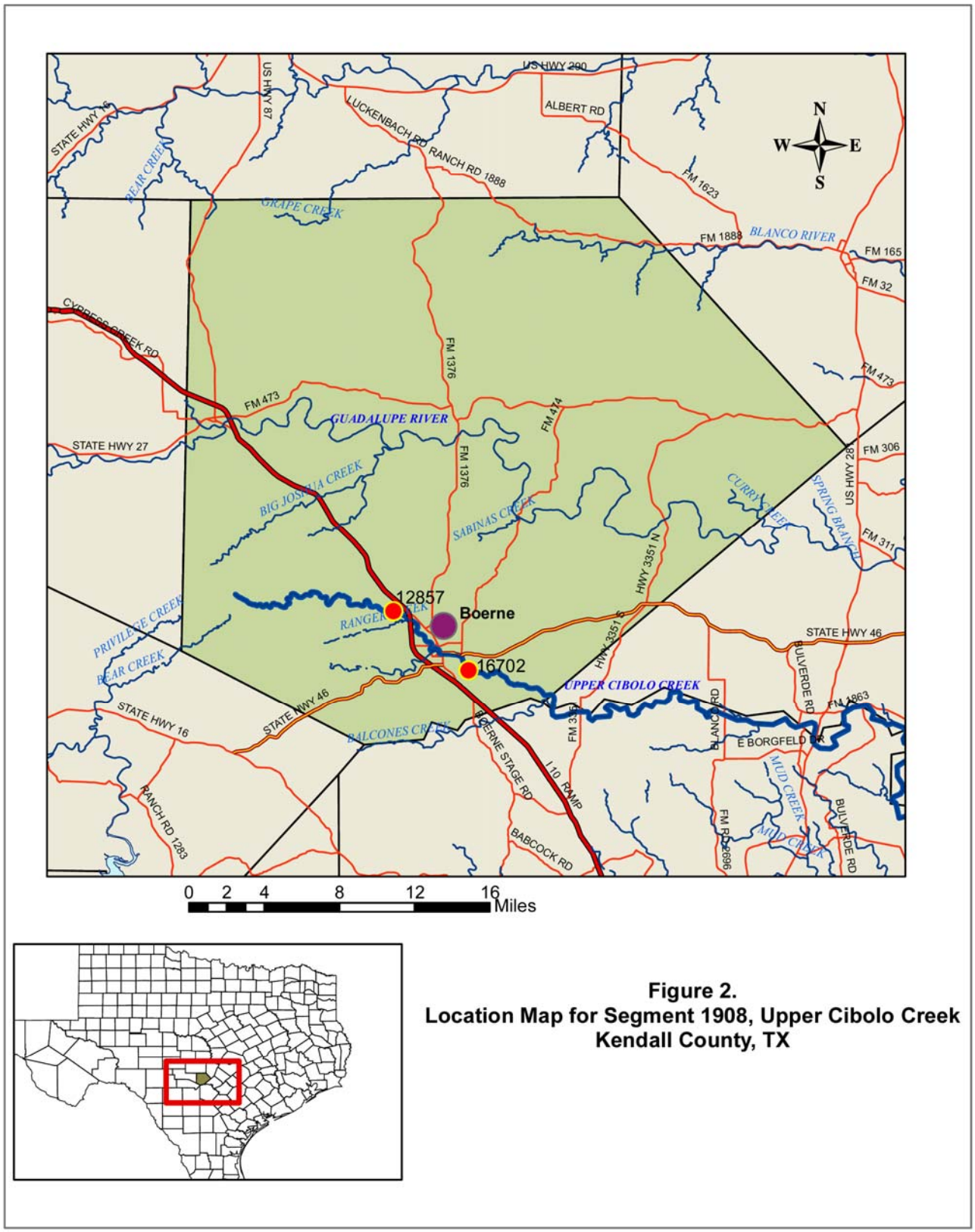


Figure 2.
Location Map for Segment 1908, Upper Cibolo Creek
Kendall County, TX

2.0 BIOLOGICAL AND HABITAT METHODOLOGY

Biological data (including fish, benthic macroinvertebrates, and habitat) were collected under strict interpretation of the Biological Component and Stream Physical Habitat Component sections of the Receiving Water Assessment (RWA) Procedures Manual (Texas Natural Resource Conservation Commission [TNRCC] 1999b). As specified in the RWA manual, EComm evaluated fish sampled in accordance with statewide criteria of Indices of Biotic Integrity (IBIs). Additionally, EComm generated IBIs for all stations using regional criteria developed by Texas Parks and Wildlife Department (2002). The regional criteria consider differences in landforms, soil types, vegetation, climatic conditions, and zoogeographic factors among the ecoregions and thus "provide a better representation of the integrity of fish assemblage" as compared to statewide criteria.

Figure 3. Station 16702

Also, in addition to data collection via RWA guidelines and TCEQ Surface Water Quality Monitoring (SWQM) Procedures Manual (TNRCC 1999a), EComm captured data for approximately 14 previously uncoded biological and habitat parameters. These parameters include: the various metrics used in determining regional IBI scores; the final scores for aquatic life use values for both statewide and regional IBI criteria; the final scores for Rapid Bioassessment Protocol (RBP) for benthic macroinvertebrates; and the final scores for Habitat Quality Indices (HQIs). All 14 parameters were assigned unique STORET codes in an effort to create maximum efficiency for data management. The new STORET codes and descriptions, along with other STORET codes captured for this segment, are provided in Table 1.

Segment 1908 had not previously been designated as a segment requiring either a Use Attainability Analysis (UAA) or an Aquatic Life Assessment (ALA). Although the main purpose of the physical/chemical component of the study was to verify the impairment, a biological sampling regime satisfying the minimum UAA data requirements was conducted. UAA requirements include at least three complete sampling events over two consecutive index periods. One event is required in the early portion (before April 30) of the Index Period (March 15 – October 15) in either Year 1 or Year 2, and the other two efforts must be conducted during the Critical Period (July 1 – September 30), including one sampling event during Year 1 and the other during Year 2. Biological sampling for Segment 1908 was conducted in September 2002, July 2003, and October 2003. Since this assessment failed to acquire a sample from the early portion of the index period, more data would be required for this segment of Cibolo Creek if it is determined that the aquatic life uses and criteria should be evaluated within a UAA.

Table 1. STORET Codes

(New STORET codes captured are temporarily assigned to the "00800" series (*in italics*)

STORET Code	Description	STORET Code	Description
89832	Number of lateral transects	90008	EPT index
89847	Average bank slope	98009	Total number of sucker species
89846	Average bank erosion potential	98010	Total number of intolerant species
89845	Percent of substrate that is gravel or larger	98016	Percent individuals as tolerants (fish)
800	*Channel flow status*	98017	Percent individuals as omnivores
89844	Dominant substrate	98021	Percent individuals as insectivores
89843	Total number of riffles	98022	Percent individuals as piscivores
89842	Number of poorly defined stream bends	98023	Total number of individuals in fish sample
89841	Number of moderately defined stream bends	98024	Percent individuals as hybrid
89840	Number of well defined stream bends	98030	Percent with disease
812	*Statewide IBI*	98003	Number of fish species
833	*Habitat Quality Index*	89905	Number of minutes debris was sampled
84161	Stream order	89851	Percent grass
84159	Percent instream cover	89854	Percentage tree canopy
813	*Number of cyprinidae species*	89859	Drainage area
814	*Number of benthic invertebrates*	89860	Length of reach
72052	Streambed slope	89861	Average stream width
816	*Percent that are tolerant species, excluding G.affinis*	89862	Average stream depth
817	*Number of individuals per seine haul*	89864	Maximum pool width
818	*Number of individuals per minute electroshocking*	89865	Maximum pool depth
819	*Percentage of individuals as non-native*	89866	Average width of riparian vegetation
820	*Regional IBI*	90010	Dominant functional feeding group percentage
832	*Total RBP score*	89899	Biological rpt unit
89853	Percent other as riparian vegetation	90009	Number of functional feeding groups
89839	Total number of stream bends	89906	Number of individuals in RBA sample
98008	Total number of sunfish species	89941	Seine length
90025	Percentage benthic gatherers	89943	Electrofishing method
90030	Percentage benthic filterers	89944	Electrofishing duration
90035	Percentage benthic shredders	89946	Average mesh size
90036	Percentage benthic predators	89948	Number of seine hauls
834	*Percentage benthic scrapers*	89950	Benthic sampling code
90042	Percentage benthic inverts individuals in dominant taxon	89961	Texas ecoregion
90050	Ratio of intolerant to tolerant taxa	89976	Area seined
90052	Number of non-insects	90007	Hilsenhoff biotic index
90054	Percentage of Elmidae	89849	Percent trees
92266	Percentage of Trichoptera that are Hydropsychidae	89867	Aesthetics
92491	Percent Chironomidae	*835*	*Benthic invertebrate taxa richness*
89850	Percent as shrubs	*836*	*Number instream cover types*
98004	Total number of darter species	89904	Minutes spent kicknetting

* STORET Codes beginning with 8 have yet to be formally established

Benthic Macroinvertebrate Collections

Biological sampling included fish and benthic macroinvertebrate data collection at each site within the segment. A location map of the segment, as well as the two site locations within the segment, is provided in Figure 2. Collection of benthic macroinvertebrates in the field was conducted using a 12-inch D-frame kicknet in riffle areas traveling a zigzag pattern across the bed in five-minute intervals. In the event that no riffles were present, snags, leaf packs, and other debris were picked for macroinvertebrates. Intervals were repeated until the minimum sample size of 100 specimens was approached, met, or exceeded. All individuals collected within the net or through picking were transferred and stored in 70% ethanol for lab analysis and identification. The collection of all individuals within a sample assured that no biases were present for larger, more active, or otherwise more obvious species captured in the net. Most individuals were identified to genus, or as otherwise suggested by the RWA manual. Collections from sites were analyzed using the 12 metrics defined in the Rapid Bioassessment Protocol in Appendix B of the RWA manual. These metrics include parameters such as species diversity and composition, trophic structure, and species tolerance to adverse environmental conditions.

Figure 4. Macroinvertebrate Collection

Nekton Collections

Collection of fish in the field was conducted using both electrofishing and seine methods to ensure a representative sample was collected at each site. Electrofishing was conducted using Smith-Root LR-24 backpack electrofishers powered by either 7 amp-hour or 12 am-hour 24 volt deep-cycle batteries. Each sampling team consisted of three field personnel, including a field director and two technicians. One team member served as the backpack operator while the other two flanked the operator with dip nets. Collected fish were temporarily placed in a five-gallon bucket partially filled with water for later identification. Sampling teams moved in an upstream direction, focusing pulses on snags, along vegetated banks, within large boulders or gravel-based riffles, and any other location most likely to contain fish. Active sampling (instances when current was applied to the water) was conducted for a minimum of 900 seconds. Field teams used best judgment to gauge if enough active sampling had been conducted to collect an accurate representation of present species; therefore, the minimum sampling time was exceeded at some sites. Maximum active sampling time for any site was approximately 1,000 seconds. Upon completion of electrofishing, fish were immediately identified, recorded, and returned

Figure 5. Sampling at Site 16702

to the water in order to minimize mortality. Any fish that could not be identified in the field was preserved in either formalin solution or ethanol. If more than one fish exhibiting the same characteristics could not be field identified, then only one representative specimen was preserved for later lab identification. Additionally, one individual from each field-identified species was retained as a voucher.

Electrofishing was complemented by seining at all sites where seining was possible. A straight seine measuring 30' x 4' with 1/8" mesh was used. Six seine hauls, each approximately 10 meters long, were taken during each sampling event. Only successful seine hauls were counted. Those that encountered obstacles that could have resulted in the escape of fish (heavy snags or rocks that prevented or otherwise significantly impaired the lead line from traveling across the bottom substrate) were not included. After each successful haul, collected specimens were identified, recorded, and immediately returned to the stream in an effort to minimize mortality. Species which could not be field-identified were handled in the manner described in the electrofishing section.

Collections were analyzed using metrics defined by TNRCC 1999 to generate Statewide IBI. Regional IBI were also calculated using the TPWD 2002 criteria. Both calculations use metrics that capture parameters such as species diversity and composition, community trophic structure, and fish abundance and condition.

Habitat Assessment

Various habitat data were collected at each site, including primary attributes (instream channel measurements), secondary attributes (stream morphology), and tertiary attributes (riparian environment) of each site. Data were used to generate a Habitat Quality Index (HQI), which serves the same function as the RBP for macroinvertebrates and IBIs for fish.

Descriptions of the various data collected are provided in Table 1.

Several other subjective habitat parameters were used as required by TNRCC 1999. These include bank erosion potential, aesthetics, dominant types of riparian vegetation, and to a lesser degree, percent instream cover and percent gravel or larger. For the purpose of this project, EComm attempted to standardize such measurements by using the same crews for each segment during as many sampling events as possible. Because this was not always possible, and because individuals within a crew may have different duties for any given sampling event, a training session was conducted prior to fieldwork to help assure that all crewmembers were given identical background and similar interpretation of the subjective measurements.

3.0 RESULTS

Aquatic life use determinations were based upon scores for each of the three ecosystem components (fish, benthic macroinvertebrates, and habitat) analyzed for Segment 1908. The fish component resulted in Statewide and Regional IBI scores, the macroinvertebrate component resulted in a RBP score, and the habitat resulted in a HQI score. The scores from each of these calculations in turn relates to a given Aquatic Life Use designation: limited, intermediate, high,

or exceptional (Table 2). The Aquatic Life Use designation is used to assess existing uses according to the health of the sampled biological communities as compared to established water quality standards. It should be noted that the calculated scores of the Statewide IBI may fall in between two range subcategories (see ranges in Table 2). In these cases, subcategories were assigned as an intermediary between the two subcategories. For example, if a site received a Statewide IBI score of 38, it would fall between the "Limited" and "Intermediate" subcategories, and would be considered to have a "Limited-Intermediate" Aquatic Life Use subcategory.

Table 2. Ranges and Subcategories for each component

Subcategory	Statewide IBI	Regional IBI (Region 30)	RBP	HQI
Limited	<34	<30	<22	<14
Intermediate	40-44	30-41	22-28	14-19
High	48-52	42-51	29-36	20-25
Exceptional	58-60	>51	>36	26-31

Results of the biological and habitat analyses for the two sites over three sampling events are provided in Table 3. Raw data are provided in Appendix A.

Table 3. Results of Biological and Habitat Sampling for Segment 1908-Upper Cibolo Creek

FY02	Statewide IBI	Regional IBI	RBP	HQI
12857	42 - Intermediate	46 - High	28 - Intermediate	16 - Intermediate
16702	42 - Intermediate	51 - High	34 - High	23 - High
FY03				
12857	44 - Intermediate	53 - Exceptional	35 - High	16 - Intermediate
16702	46 - Intermediate-High	57 - Exceptional	34 - High	23 - High
FY04				
12857	44 - Intermediate	46 - High	28 - Intermediate	17 - Intermediate
16702	44 - Intermediate	42 - High	33 - High	21 - High

For each component, an average score was calculated using scores from every sampling event. Scores for sampling events for each component that scored within the subcategory "High" agreed with the designated aquatic life use value for the segment. A subcategory of "Limited", "Limited-Intermediate", "Intermediate", or "Intermediate-High" was considered substandard, as it reflects a poorer level of water quality than that for which the segment is designated. A subcategory of "Exceptional" would be considered exceeding standards for Segment 1908. Statewide IBI scores averaged approximately 43.5 (Intermediate) across all sites over all sampling events, and indicated a poor agreement with the designated aquatic life use (0%), which was determined as "high" according the Water Quality Inventory. Regional IBI scores averaged 49 (High), and represented a higher agreement (67%; 33% above standard). RBP scores averaged 32 (High), a 66.7% agreement (33.3% below standard), while HQI averaged

approximately 19 (Intermediate) in 50% agreement with the aquatic life use (50% below standard).

4.0 DISCUSSION

Other than Statewide IBI and to a lesser extent, Habitat Quality Indices, average scores of all components generally reflected agreement with the high aquatic life use designation for Segment 1908. The general trend in Statewide IBI scores is to underestimate the aquatic life use when compared to other assessment methods (TPWD 2002). Therefore, the lower Statewide IBI scores generated from data collected for this study are most likely not indicative of lower aquatic life use. Lower than standard HQI scores most likely were found as a result of the urban character of site 12857. This site was located directly under IH 10, had an extremely limited vegetative structure and buffer zone, and was relatively shallow and straight. Of the 24 aquatic life use calculations generated for Segment 1908, two (8.3%) scored "Exceptional", a subcategory generally reserved for relatively pristine streams. All four component scores were fairly consistent across sites and across time, which was unusual due to the dynamic climatic conditions within this segment over the two-year sampling period. Dissolved oxygen concentrations throughout the study were consistently above standards.

It should be noted that because this segment traverse the Edwards Aquifer recharge zone, some portions of the creek are intermittent as water enters openings in the surface into underground waterways. Neither site reflected this phenomenon, as waters at both appeared to be perennial. Based on research conducted on other stream segments, portions of Segment 1908 that exhibit this intermittent behavior most likely would score lower than the sampled sites.

5.0 CONCLUSION

Based on the Regional IBI, RBP, and HQI scores, the biological and habitat data appear to support the conclusion that existing aquatic life uses are meeting the established standards.

REFERENCES

CONRAD BLUCHER INSTITUTE FOR SURVEYING AND SCIENCE (CBI) 2005. *Impairment Verification Monitoring –Volume 1: Physical and Chemical Components; Segment 1908, Upper Cibolo Creek.*

CBI 2003. *Total Daily Maximum Load Project: Basin Groups D & E Dissolved Oxygen and Bacteria Impairments, Draft Monitoring Plan*. August 2003.

SULLIVAN, ANDREW, Mark Beaman, Frank Kelly, Victor Palma, and Jeremy Walther. *Impairment Verification Monitoring in Eleven Texas Waterbodies: Step 1 for the Development of Successful and Cost Effective TMDLs*. September 2004.

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION. 1999a. *Surface Water Quality Monitoring Procedures Manual*. Water Quality Division. Surface Water Quality Monitoring Program. GI-252. June 1999.

_____. 1999b. *Receiving Water Assessment Procedures Manual*. Water Quality Division, Surface Water Quality Monitoring Program. GI-253. June 1999.

TPWD 2002. *Regionalization of the Index of Biotic Integrity for Texas Streams*. Gordon W. Linam, Leroy J. Kleinsasser, and Kevin B. Mayes, Resource Protection Division. River Studies Report No. 17. June 2002.

Appendix A
Complete Raw Data Set
Biological and Habitat Components
Segment 1908-Upper Cibolo Creek, Texas
September 2002
July 2003
October 2003

Ecological Communications Corporation
Austin, TX

BIOTIC ASSESSMENT – BENTHIC MACROINVERTEBRATES

Species Lists and Preliminary Data Manipulation

Stream	Date	ID
U.Cibolo	9/4/02	12857

Func.Gp	N=
P	36.6337
SCR	7.42574
CG	10.396
FC	45.5446
SHR	0
	100

Taxa	N=	Func.Gp.	Tolerance	HBI
Odonata-Coenagrionidae-*Argia*	13	P	6	0.8297872
Odonata-Calopterygidae-*Hetaerina*	5	P	6	0.3191489
Odonata-Libellulidae-*Brechmorhoga*	4	P	6	0.2553191
Ephemeroptera-Leptophlebiidae-*Thraulodes*	7	CG/SCR	2	0.1489362
Ephemeroptera-Leptophlebiidae-*Farrodes*	2	CG/SCR	2	0.0425532
Ephemeroptera-Heptageniidae-*Stenonema*	1	SCR/CG	4	0.0425532
Ephemeroptera-Baetidae-*Baetis*	2	SCR/CG	4	0.0851064
Hemiptera-Veliidae-*Rhagovelia*	4	P	-	-
Megaloptera-Corydalidae-Corydalus	2	P	6	0.1276596
Trichoptera-Polycentropidae-*Cernotina*	1	P	6	0.0638298
Trichoptera-Hydropsychidae-*Cheumatopsyche*	23	FC	6	1.4680851
Trichoptera-Philopotamidae-*Chimarra*	23	FC	3	0.7340426
Coleoptera-Elmidae-*Microcylloepus* (A)	3	CG/SCR	2	0.0638298
Coleoptera-Lutrochidae-*Lutrochus*	3	CG	-	-
Diptera-Tabanidae-*Tabanus*	8	P	7	0.5957447
Total	101	94		4.7765957
Intolerant/Tolerant	0.68			

Stream	Date	ID
U.Cibolo	9/5/02	16702

Func.Gp	N=
P	37.5
SCR	22.1154
CG	19.2308
FC	21.1538
SHR	0
	100

Taxa	N=	Func.Gp.	Tolerance	HBI
Odonata-Coenagrionidae-*Argia*	5	P	6	0.3846154
Odonata-Calopterygidae-*Hetaerina*	2	P	6	0.1538462
Odonata-Libellulidae-*Brechmorhoga*	6	P	6	0.4615385
Ephemeroptera-Tricorythidae-*Tricorythodes*	1	CG	5	0.0641026
Ephemeroptera-Leptophlebiidae-*Thraulodes*	26	CG/SCR	2	0.6666667
Ephemeroptera-Leptophlebiidae-*Farrodes*	2	CG/SCR	2	0.0512821
Ephemeroptera-Baetidae-*Baetis*	6	SCR/CG	4	0.3076923
Hemiptera-Naucoridae-*Ambrysus*	14	P	-	-
Hemiptera-Naucoridae-*Cryphocricos*	10	P	-	-
Hemiptera-Veliidae-*Rhagovelia*	2	P	-	-
Trichoptera-Hydropsychidae-*Cheumatopsyche*	7	FC	6	0.5384615
Trichoptera-Philopotamidae-*Chimarra*	13	FC	3	0.5
Coleoptera-Psephenidae-*Psephenus*	4	SCR	4	0.2051282
Coleoptera-Elmidae-*Macrelmis* (A)	1	CG/SCR	2	0.025641
Coleoptera-Elmidae-*Hexacylloepus* (A)	2	CG/SCR	2	0.0512821
Diptera-Chironomidae	1	SCR/CG	4	0.0512821
Bivalvia (Heterodonta)-Corbiculidae-*Corbicula*	2	FC	6	0.1538462
Total	104	78		3.6153846
Intolerant/Tolerant	2.55			

Benthic Macroinverebrates - (Qualitative) Kick Sample

Stream: U.Cibolo
Date: 7/31/03
Location: 12857

FFG	
P	31.667
SCR	9.5455
CG	21.667
FC	37.121
SHR	0
	100

Species	N=	Tolerance	FFG	HBI
Argia	5	6	P	0.352941176
Hetaerina	2	6	P	0.141176471
Brechmorhoga	3	6	P	0.211764706
Tricorythodes	6	5	CG	0.352941176
Leptohypes	4	2	CG	0.094117647
Camelobaetidius	2	4	SCR/CG	0.094117647
Isonychia	8	3	FC	0.282352941
Thraulodes	4	2	CG/SCR	0.094117647
Ambrysus	5	-	P	-
Cryphocricos	5	-	P	-
Rhagovelia	8	-	P	-
Corydalus	2	6	P	0.141176471
Cheumatopsyche	13	6	FC	0.917647059
Smicridea	1	4	FC	0.047058824
Chimarra	9	3	FC	0.317647059
Helicopsyche	1	2	SCR	0.023529412
Polycentropus	1	3	FC/P	0.035294118
Stenelmis (A)	1	7	CG/SCR	0.082352941
Microcylloepus (A)	4	2	CG/SCR	0.094117647
Hexacylloepus (A)	1	2	CG/SCR	0.023529412
Macrelmis (L)	3	2	CG/SCR	0.070588235
Macrelmis (A)	2	2	CG/SCR	0.047058824
Celina (L)	1	-	P	-
Lutrochus (A)	3	-	CG	-
Lutrochus (L)	1	-	CG	-
Chironomidae	4	6	P/CG/FC	0.282352941
Tabanus	2	7	P	0.164705882
Simulium	3	4	FC	0.141176471
Physella	1	9	SCR	0.105882353
Corbicula	5	6	FC	0.352941176
	110	1.28947368		4.470588235

Stream: U.Cibolo
Date: 7/31/03
Location: 16702

		Species	N=	Tolerance	FFG	HBI
		Argia	3	6	P	0.155172414
		Hetaerina	1	6	P	0.051724138
		Brechmorhoga	1	6	P	0.051724138
		Erpetogomphus	1	1	P	0.00862069
P	21.264	*Tricorythodes*	1	5	CG	0.043103448
SCR	34.052	*Leptohypes*	10	2	CG	0.172413793
CG	36.351	*Camelobaetidius*	2	4	SCR/CG	0.068965517
FC	8.3333	*Baetis*	12	4	SCR/CG	0.413793103
SHR	0	*Baetodes*	1	4	SCR	0.034482759
	100	*Thraulodes*	1	2	CG/SCR	0.017241379
		Ambrysus	3	-	P	-
		Cryphocricos	4	-	P	-
		Corydalus	1	6	P	0.051724138
		Cheumatopsyche	2	6	FC	0.103448276
		Smicridea	6	4	FC	0.206896552
		Stenelmis (A)	1	7	CG/SCR	0.060344828
		Stenelmis (L)	1	7	CG/SCR	0.060344828
		Microcylloepus (A)	27	2	CG/SCR	0.465517241
		Hexacylloepus (A)	5	2	CG/SCR	0.086206897
		Macrelmis (L)	2	2	CG/SCR	0.034482759
		Macrelmis (A)	7	2	CG/SCR	0.120689655
		Neoelmis (A)	2	2	CG/SCR	0.034482759
		Dubiraphia (L)	1	5	CG/SCR	0.043103448
		Psephenus	8	4	SCR	0.275862069
		Chironomidae	2	6	P/CG/FC	0.103448276
		Tricladida	10	7.5	P	0.646551724
		Corbicula	1	6	FC	0.051724138
			116	3.73913043		3.362068966

Stream: U.Cibolo
Date: 10/8/03
Location: 12857

		Species	N=	Tolerance	FFG	HBI
		Argia	9	6	P	0.586956522
		Tricorythodes	31	5	CG	1.684782609
		Leptohypes	11	2	CG	0.239130435
P	27.102804	*Camelobaetidius*	2	4	SCR/CG	0.086956522
SCR	7.9439252	*Fallceon*	1	4	SCR/CG	0.043478261
CG	47.663551	*Isonychia*	3	3	FC	0.097826087
FC	16.82243	*Ambrysus*	4	-	P	-
SHR	0.4672897	*Rhagovelia*	11	-	P	-
	100	*Corydalus*	2	6	P	0.130434783
		Cheumatopsyche	7	6	FC	0.456521739
		Chimarra	2	3	FC	0.065217391
		Microcylloepus (A)	4	2	SCR/CG	0.086956522
		Hexacylloepus (A)	1	2	SCR/CG	0.02173913
		Macrelmis (L)	4	2	SCR/CG	0.086956522
		Helichus (A)	1	4	SCR/CG	0.043478261
		Chironomidae	6	6	P/FC/CG	0.391304348
		Tabanus	1	7	P	0.076086957
		Simulium	4	4	FC	0.173913043
		Physella	2	9	SCR	0.195652174
		Hyalella	1	8	CG/SHR	0.086956522
			92	2.28571429		4.554347826

Stream: U.Cibolo
Date: 10/8/03
Location: 16702

		Species	N=	Tolerance	FFG	HBI
		Argia	4	6	P	0.244897959
		Brechmorhoga	7	6	P	0.428571429
		Erpetogomphus	3	1	P	0.030612245
P	33.928571	*Tricorythodes*	1	5	CG	0.051020408
SCR	29.910714	*Leptohypes*	10	2	CG	0.204081633
CG	27.232143	*Fallceon*	5	4	SCR/CG	0.204081633
FC	8.9285714	*Ambrysus*	7	-	P	-
SHR	0	*Cryphocricos*	7	-	P	-
	100	*Cheumatopsyche*	5	6	FC	0.306122449
		Smicridea	1	4	FC	0.040816327
		Chimarra	3	3	FC	0.091836735
		Microcylloepus	15	2	SCR/CG	0.306122449
		Hexacylloepus (A)	4	2	SCR/CG	0.081632653
		Macrelmis	10	2	SCR/CG	0.204081633
		Neoelmis (A)	1	2	SCR/CG	0.020408163
		Psephenus (L)	16	4	SCR	0.653061224
		Chironomidae	3	6	P/CG/FC	0.183673469
		Tabanus	1	7	P	0.071428571
		Oligochaeta	1	8	CG	0.081632653
		Tricladida	8	7.5	P	0.612244898
			98	2.37931034		3.816326531

BIOTIC ASSESSMENT – BENTHIC MACROINVERTEBRATES

Rapid Bioassessment Protocol

Stream: U.Cibolo	**Date: 9/04/02**	**Location: 12857**	**County: Kendall**
Metric		**Value**	**Score**
1. Taxa Richness		15	3
2. EPT Taxa Abundance		7	3
3. Biotic Index (HBI)		4.78	2
4. % Chironomidae		0	1
5. % Dominant Taxon		22.7722772	3
6. % Dominant FFG		45.5445545	2
7. % Predators		36.6336634	1
8. Ratio of Intolerant:Tolerant Taxa		0.68	1
9. % of Total Trichoptera as Hydropsychidae		48.9361702	3
10. # of Non-insect Taxa		0	1
11. % Collector-Gatherers		10.3960396	4
12. % of Total Number as Elmidae		2.97029703	4
Aqautic Life Use: INTERMEDIATE		Total Score:	28

Stream: U.Cibolo	**Date: 9/05/02**	**Location: 16702**	**County: Kendall**
Metric		**Value**	**Score**
1. Taxa Richness		17	3
2. EPT Taxa Abundance		6	2
3. Biotic Index (HBI)		3.62	4
4. % Chironomidae		0.96153846	4
5. % Dominant Taxon		25	3
6. % Dominant FFG		37.5	3
7. % Predators		37.5	1
8. Ratio of Intolerant:Tolerant Taxa		2.55	2
9. % of Total Trichoptera as Hydropsychidae		35	3
10. # of Non-insect Taxa		1	1
11. % Collector-Gatherers		19.2307692	4
12. % of Total Number as Elmidae		2.88461538	4
Aqautic Life Use: HIGH		Total Score:	34

Stream: U.Cibolo	**Date: 7/31/03**	**Location: 12857**	**County: Kendall**
Metric		**Value**	**Score**
1. Taxa Richness		30	4
2. EPT Taxa Abundance		8	3
3. Biotic Index (HBI)		4.47	3
4. % Chironomidae		3.63636364	4
5. % Dominant Taxon		11.8181818	4
6. % Dominant FFG		37.1181818	3
7. % Predators		31.6636364	2
8. Ratio of Intolerant:Tolerant Taxa		1.29	1
9. % of Total Trichoptera as Hydropsychidae		56	2
10. # of Non-insect Taxa		2	2
11. % Collector-Gatherers		21.6636364	3
12. % of Total Number as Elmidae		10	4
Aqautic Life Use: HIGH		Total Score:	35

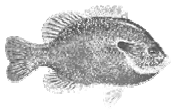
Stream: U.Cibolo	**Date: 7/31/03**	**Location: 16702**	**County: Kendall**
Metric		**Value**	**Score**
1. Taxa Richness		25	4
2. EPT Taxa Abundance		8	3
3. Biotic Index (HBI)		3.36	4
4. % Chironomidae		1.72413793	4
5. % Dominant Taxon		23.2758621	3
6. % Dominant FFG		36.3534483	4
7. % Predators		21.2672414	3
8. Ratio of Intolerant:Tolerant Taxa		3.74	3
9. % of Total Trichoptera as Hydropsychidae		100	1
10. # of Non-insect Taxa		2	2
11. % Collector-Gatherers		36.3534483	2
12. % of Total Number as Elmidae		39.6551724	1
Aqautic Life Use: HIGH		Total Score:	34

Stream: U.Cibolo	**Date: 10/8/03**	**Location: 12857**	**County: Kendall**
Metric		**Value**	**Score**
1. Taxa Richness		20	3
2. EPT Taxa Abundance		7	3
3. Biotic Index (HBI)		4.55	2
4. % Chironomidae		5.60747664	3
5. % Dominant Taxon		28.9719626	3
6. % Dominant FFG		47.6635514	2
7. % Predators		27.1028037	2
8. Ratio of Intolerant:Tolerant Taxa		2.29	2
9. % of Total Trichoptera as Hydropsychidae		77.7777778	1
10. # of Non-insect Taxa		2	2
11. % Collector-Gatherers		47.6635514	1
12. % of Total Number as Elmidae		8.41121495	4
Aqautic Life Use: INTERMEDIATE		Total Score:	28

Stream: U.Cibolo	**Date: 10/8/03**	**Location: 16702**	**County: Kendall**
Metric		**Value**	**Score**
1. Taxa Richness		20	3
2. EPT Taxa Abundance		6	2
3. Biotic Index (HBI)		3.81	3
4. % Chironomidae		2.67857143	4
5. % Dominant Taxon		14.2857143	4
6. % Dominant FFG		33.9285714	4
7. % Predators		33.9285714	2
8. Ratio of Intolerant:Tolerant Taxa		2.38	2
9. % of Total Trichoptera as Hydropsychidae		66.6666667	2
10. # of Non-insect Taxa		2	2
11. % Collector-Gatherers		27.2321429	3
12. % of Total Number as Elmidae		26.7857143	2
Aqautic Life Use: HIGH		Total Score:	33

BIOTIC ASSESSMENT – FISH

Species Lists and Preliminary Data Manipulation



Stream	Date	ID	Species	N=	Type	Method	Tolerance	Trophic Gp
U.Cibolo	9/4/02	10007	Blacktail shiner	61		S	-	IF
			Blacktail shiner	19		E	-	IF
			Bluegill	4	SF	E	T	IF
			Bluegill	1	SF	S	T	IF
			Bullhead Minnow	19		E	-	IF
			Channel Catfish	4		E	T	O
			Green Sunfish	16	SF	E	T	P
			Longear Sunfish	22	SF	E	-	IF
			Longear/Spotted hybrid	1	SF	E	-	IF
			Orangethroat Darter	3	D	E	-	IF
			Red Shiner	9		E	T	IF
			Red Shiner	24		S	T	IF
			Redbreast Sunfish	14	SF	E	-	IF
			Spotted Bass	5		E	-	P
			Spotted Bass	1		S	-	P
			Stoneroller	24		E	-	H
			Stoneroller	10		S	-	H
			Warmouth	1	SF	E	T	P
			Total	238				

KEY:

SF	Sunfish
D	Darter
SU	Sucker
E	Electroshock
S	Seine
V	Visually Observed
I	Intolerant
T	Tolerant
-	Intermediate
O	Omnivore
IF	Invertivore
P	Piscivore
H	Herbivore

Stream	Date	ID	Species	N=	Type	Method	Tolerance	Trophic Gp
U.Cibolo	9/5/02	16702	Blacktail shiner	37		S	-	IF
			Bluegill	4	SF	S	-	IF
			Bluegill	15	SF	E	-	IF
			Channel Catfish	4		E	T	O
			Green Sunfish	5	SF	E	T	P
			Green Sunfish	1	SF	S	T	P
			Greenthroat darter	4	D	E	I	IF
			Guadalupe Bass	1		E	I	P
			Guadalupe Bass	4		S	I	P
			Longear Sunfish	5	SF	E	-	IF
			Longear/Spotted hybrid	1	SF	S	-	IF
			Longear/Spotted hybrid	2	SF	E	-	IF
			Orangethroat Darter	4	D	E	-	IF
			Pallid shiner	1		S	-	IF
			Redbreast Sunfish	4	SF	E	-	IF
			Redbreast Sunfish	1	SF	S	-	IF
			Redbreast/Spotted Sunfish	1	SF	E	-	IF
			Redear/Bluegill hybrid	1	SF	S	-	IF
			Rio Grande Cichlid	8		E	-	IF
			Spotted/Orange Spotted Sunfish	4	SF	E	-	IF
			Spotted/Orange Spotted Sunfish	1	SF	S	-	IF
			Stoneroller	6		E	-	H
			Stoneroller	4		S	-	H
			Warmouth	1	SF	S	T	P
			Warmouth	1	SF	E	T	P
			Yellow Bullhead	2		E	-	O
			Total	122				

Stream: U.Cibolo
Date: 7/31/03
Location: 16702

1 RGC with growth on body

Species	N=	Type	Method	Tolerance	Trophic Gp.
Blacktail shiner	2	CY	E	~	IF
Blacktail shiner	31	CY	S	~	IF
Bluegill	7	SF	E	~	IF
Bluegill	1	SF	S	~	IF
Central stoneroller	34	CY	E	~	H
Central stoneroller	5	CY	S	~	H
Gambusia	1		E	T	IF
Gambusia	11		S	T	IF
Green sunfish	5	SF	E	T	P
Green sunfish	2	SF	S	T	P
Greenthroat darter	9	D	E	I	IF
Greenthroat darter	1	D	S	I	IF
Guadalupe bass	2		E	I	P
Lepomis sp.	2	SF	E	~	IF
Lepomis sp.	10	SF	S	~	IF
Longear sunfish	17	SF	E	~	IF
Longear sunfish	6	SF	S	~	IF
Orangethroated darter	1	D	E	~	IF
Redbreast sunfish	2	SF	E	~	IF
Rio Grande cichlid	4		E	~	IF
Rio Grande cichlid	29		S	~	IF
Spotted bass	2		E	~	P
Texas shiner	8	CY	E	~	IF
Texas shiner	28	CY	S	~	IF
Unknown minnow	29	CY	S	~	IF
Yellow bullhead	4		E	~	O
	253				

Stream: U. Cibolo
Date: 7/31/03
Location: 12857

Species	N=	Type	Method	Tolerance	Trophic Gp.
Blacktail shiner	2	CY	E	~	IF
Blacktail shiner	29	CY	S	~	IF
Bluegill	9	SF	E	~	IF
Central stoneroller	44	CY	E	~	H
Central stoneroller	150	CY	S	~	H
Channel catfish	3		E	T	O
Gambusia	8		S	T	IF
Green sunfish	5	SF	E	T	P
Greenthroated darter	4	D	E	I	IF
Guadalupe bass	2		S	I	P
Lepomis sp.	1	SF	S	~	IF
Longear sunfish	16	SF	E	~	IF
Longear sunfish	2	SF	S	~	IF
Orangethroated darter	11	D	E	~	IF
Orangethroated darter	10	D	S	~	IF
Red shiner	5	CY	E	T	IF
Red shiner	9	CY	S	T	IF
Redbreast sunfish	2	SF	E	~	IF
Rio Grande cichlid	1		S	~	IF
Spotted bass	1		E	~	P
Texas shiner	1	CY	E	~	IF
Texas shiner	3	CY	S	~	IF
Unknown minnow	3	CY	E	~	IF
Unknown minnow	9	CY	S	~	IF
Warmouth	1	SF	E	T	P
	331				

Stream: U.Cibolo
Date: 10/8/03
Location: 16702

* 3 greenthroats w/ spots
* 8 blacktails w/ spots

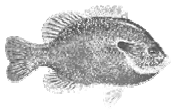
Species	N=	Type	Method	Tolerance	Trophic Gp.
Blacktail Shiner	1	CY	E		IF
Blacktail Shiner	90	CY	S		IF
Bluegill	2	SF	E	T	IF
Central Stoneroller	68	CY	E		H
Central Stoneroller	40	CY	S		H
Channel Catfish	2		E	T	O
Green Sunfish	3	SF	E	T	P
Greenthroat Darter	7	D	E	I	IF
Greenthroat Darter	2	D	S	I	IF
Guadalupe Bass	3		E	I	P
Guadalupe Bass	3		S	I	P
Lepomis sp.	1	SF	E		-
Lepomis sp. Hybrid	4	SF	E		-
Longear Sunfish	10	SF	E		IF
Orangethroat Darter	9	D	E		IF
Red Shiner	1	CY	E	T	IF
Red Shiner	2	CY	S	T	IF
Redbreast Sunfish	1	SF	E		IF
Redbreast Sunfish	17	SF	S		IF
Rio Grande Cichlid	6		E		IF
Rio Grande Cichlid	4		S		IF
Roundnose Minnow	80	CY	E	I	O
Roundnose Minnow	51	CY	S	I	O
Texas Shiner	54	CY	S		IF
Warmouth	1	SF	E	T	P
Western Mosquitofish	3		E	T	IF
Western Mosquitofish	34		S	T	IF
Yellow Bullhead	12		E		O
	511		297	11	145
			214		243
					10

Stream: U. Cibolo
Date: 10/8/03
Location: 10007

Species	N=	Type	Method	Tolerance	Trophic Gp.
Blacktail Shiner	9	CY	E		IF
Blacktail Shiner	146	CY	S		IF
Bluegill	6	SF	E	T	IF
Central Stoneroller	2	CY	E		H
Central Stoneroller	76	CY	S		H
Green Sunfish	9	SF	E	T	P
Green Sunfish	1	SF	S	T	P
Longear Sunfish	16	SF	E		IF
Longear Sunfish	1	SF	S		IF
Orangethroat Darter	6	D	E		IF
Orangethroat Darter	1	D	S		IF
Red Shiner	2	CY	E	T	IF
Red Shiner	10	CY	S	T	IF
Redbreast Sunfish	21	SF	E		IF
Rio Grande Cichlid	8		E		IF
Rio Grande Cichlid	11		S		IF
Texas Shiner	58	CY	S		IF
Western Mosquitofish	5		E	T	IF
Western Mosquitofish	25		S	T	IF
	413		329	28	309
			84		

BIOTIC ASSESSMENT – FISH

Indices of Biotic Integrity – Statewide Criteria



Quantitative Biological Scoring for Evaluating Aquatic Life Use Subcategories Based on Fish Statewide Criteria

Stream: U. Cibolo	Date: 9/4/02 Location: 12857	County: Kendall	
Category	**Metric**	**Value**	**Score**
Species Richness and Composition	1. Total number of fish species	13	5
	2. Number of darter species	1	3
	3. Number of sunfish species (exc. bass)	6	5
	4. Number of sucker speices	0	1
	5. Number of intolerant species	0	1
	6. Percentage of individuals as tolerants	24	1
Trophic Composition	7. Percentage of individuals as omnivores	2	5
	8. Percentage of individuals as insectivores	74	3
	9. Percentage of individuals as piscivores	10	5
Fish Abundance and Condition	10. Number of individuals in sample	238	5
	11. Percentage of individuals as hybrids	0.5	3
	12. Percentage of individuals with disease/anomalies	0	5
	Aquatic Life Use: INTERMEDIATE	Total Points:	**42**

Quantitative Biological Scoring for Evaluating Aquatic Life Use Subcategories Based on Fish Statewide Criteria

Stream: U. Cibolo	Date: 9/5/02 Location: 16702	County: Kendall	
Category	**Metric**	**Value**	**Score**
Species Richness and Composition	1. Total number of fish species	17	5
	2. Number of darter species	2	3
	3. Number of sunfish species (exc. bass)	8	5
	4. Number of sucker speices	0	1
	5. Number of intolerant species	2	3
	6. Percentage of individuals as tolerants	10	3
Trophic Composition	7. Percentage of individuals as omnivores	5	5
	8. Percentage of individuals as insectivores	76	3
	9. Percentage of individuals as piscivores	10	5
Fish Abundance and Condition	10. Number of individuals in sample	122	3
	11. Percentage of individuals as hybrids	3	1
	12. Percentage of individuals with disease/anomalies	0	5
	Aquatic Life Use: INTERMEDIATE	Total Points:	**42**

Quantitative Biological Scoring for Evaluating Aquatic Life Use Subcategories Based on Fish Statewide Criteria

Stream: U.Cibolo	Date: 7/31/03	Location: 12857	County: Kendall
Category	**Metric**	**Value**	**Score**
Species Richness and Composition	1. Total # of fish species	18	5
	2. Number of darter species	2	3
	3. Number of sunfish species (exc. bass)	6	5
	4. Number of sucker species	0	1
	5. Number of intolerant species	2	3
	6. Percentage of individuals as tolerants	9.37	3
Trophic Composition	7. Percentage of individuals as omnivores	0.91	5
	8. Percentage of individuals as insectivores	37.8	1
	9. Percentage of individuals as piscivores	2.11	3
Fish Abundance and Condition	10. Number of individuals in sample	331	5
	11. Percentage of individuals as hybrids	0	5
	12. Percentage of individuals with disease/anomolies	0	5
	Aquatic Life Use: INTERMEDIATE	Total Points:	44

Stream: U.Cibolo	Date: 7/31/03	Location: 16702	County: Kendall
Category	**Metric**	**Value**	**Score**
Species Richness and Composition	1. Total # of fish species	16	5
	2. Number of darter species	2	3
	3. Number of sunfish species (exc. bass)	5	5
	4. Number of sucker species	0	1
	5. Number of intolerant species	2	3
	6. Percentage of individuals as tolerants	10.3	3
Trophic Composition	7. Percentage of individuals as omnivores	1.58	5
	8. Percentage of individuals as insectivores	78.7	3
	9. Percentage of individuals as piscivores	4.35	3
Fish Abundance and Condition	10. Number of individuals in sample	253	5
	11. Percentage of individuals as hybrids	0	5
	12. Percentage of individuals with disease/anomolies	0.4	5
	Aquatic Life Use: INTERMEDIATE-HIGH	Total Points:	46

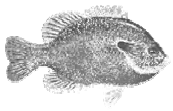
Quantitative Biological Scoring for Evaluating Aquatic Life Use Subcategories Based on Fish Statewide Criteria

Stream: U.Cibolo	Date: 10/8/03	Location: 12857	County: Kendall
Category	**Metric**	**Value**	**Score**
Species Richness and Composition	1. Total # of fish species	11	5
	2. Number of darter species	1	3
	3. Number of sunfish species (exc. bass)	4	5
	4. Number of sucker species	0	1
	5. Number of intolerant species	0	1
	6. Percentage of individuals as tolerants	14.04358354	3
Trophic Composition	7. Percentage of individuals as omnivores	0	5
	8. Percentage of individuals as insectivores	74.81840194	3
	9. Percentage of individuals as piscivores	2.421307506	3
Fish Abundance and Condition	10. Number of individuals in sample	413	5
	11. Percentage of individuals as hybrids	0	5
	12. Percentage of individuals with disease/anomolies	0	5
	Aquatic Life Use: INTERMEDIATE	Total Points:	44

Stream: U.Cibolo	Date: 10/8/03	Location: 16702	County: Kendall
Category	**Metric**	**Value**	**Score**
Species Richness and Composition	1. Total # of fish species	19	5
	2. Number of darter species	2	3
	3. Number of sunfish species (exc. bass)	7	5
	4. Number of sucker species	0	1
	5. Number of intolerant species	3	5
	6. Percentage of individuals as tolerants	9.486166008	3
Trophic Composition	7. Percentage of individuals as omnivores	28.65612648	3
	8. Percentage of individuals as insectivores	48.02371542	3
	9. Percentage of individuals as piscivores	1.976284585	3
Fish Abundance and Condition	10. Number of individuals in sample	511	5
	11. Percentage of individuals as hybrids	0.782778865	3
	12. Percentage of individuals with disease/anomolies	0	5
	Aquatic Life Use: INTERMEDIATE	Total Points:	44

BIOTIC ASSESSMENT – FISH

Indices of Biotic Integrity – Regional Criteria



Quantitative Biological Scoring for Evaluating Aquatic Life Use Subcategories Based on Fish Regional Criteria

Stream:Upper Cibolo	Date: 09/04/02	Location: 12857	County: Kendall	
Metric			**Value**	**Score**
1. Total number of fish species			13	5
2. Number of native cyprinid species			4	3
3. Number of benthic invertivore species			1	3
4. Number of sunfish species			6	5
5. Number of intolerant species			0	1
6. Percentage of individuals as tolerants (exc. G. affinis)			24.8	5
7. Percentage of individuals as omnivores			2	5
8. Percentage of individuals as insectivores			74	5
9. Percentage of individuals as piscivores			10	5
10. Number of individuals in sample			238	-
a. number of ind/seine haul			16	1
b. number of ind/min electrofishing			9.4	5
11. Percentage of ind. as non-native species			5.9	1
12. Percentage of individuals with disease/anomalies			0	5
Aquatic Life Use: HIGH			Total Points:	**46**

3*

*Average of 10a and 10b

Drainage area upstream of Site 12857 = 72.1 sq. km.

Quantitative Biological Scoring for Evaluating Aquatic Life Use Subcategories Based on Fish Regional Criteria

Stream:Upper Cibolo	Date: 09/05/02	Location: 16702	County: Kendall	
Metric			**Value**	**Score**
1. Total number of fish species			17	5
2. Number of native cyprinid species			3	3
3. Number of benthic invertivore species			2	5
4. Number of sunfish species			8	5
5. Number of intolerant species			2	5
6. Percentage of individuals as tolerants (exc. G. affinis)			9.8	5
7. Percentage of individuals as omnivores			5	5
8. Percentage of individuals as insectivores			76	5
9. Percentage of individuals as piscivores			10	5
10. Number of individuals in sample			122	-
a. number of ind/seine haul			9.3	1
b. number of ind/min electrofishing			4.4	3
11. Percentage of ind. as non-native species			4.1	1
12. Percentage of individuals with disease/anomalies			0	5
Aquatic Life Use: HIGH			Total Points:	**51**

2*

*Average of 10a and 10b

Drainage area upstream of Site 16702 = 163.3 sq. km.

Quantitative Biological Scoring for Evaluating Aquatic Life Use Subcategories Based on Fish Regional Criteria
(Region 30)

Stream: U.Cibolo (30)	Date:7/31/03	Location:12857	County: Kendall	
Metric		**Value**	**Score**	
1. Total # of fish species		18	5	
2.Total Number of cyprinid species		5	5	
3. Number of benthic invertivore species		2	5	
4. Number of sunfish species (exc. bass)		6	5	
5. Number of intolerant species		2	5	
6. Percentage of individuals as tolerants (exc. *G.affinis*)		6.95	5	
7. Percentage of individuals as omnivores		0.91	5	
8. Percentage of individuals as insectivores		37.8	3	
9. Percentage of individuals as piscivores		2.7	1	
10. Number of individuals in sample		~	~	
a. Number of individuals/seine hual		37.3	3	4*
b. Number of individuals/min. electroshocking		7.1	5	
11. Percentage of individuals as non-native species		0.6	5	
12. Percentage of individuals with disease/anomolies		0	5	
Aquatic Life Use: EXCEPTIONAL		Total Points:	53	

*Average of 10a and 10b

Drainage area upstream of Site 12857 = 72.1 sq. km.

Stream: U.Cibolo (30)	Date: 7/31/03	Location: 16702	County: Kendall	
Metric		**Value**	**Score**	
1. Total # of fish species		16	5	
2.Total Number of cyprinid species		4	3	
3. Number of benthic invertivore species		2	5	
4. Number of sunfish species (exc. bass)		5	5	
5. Number of intolerant species		2	5	
6. Percentage of individuals as tolerants (exc. *G.affinis*)		2.77	5	
7. Percentage of individuals as omnivores		1.58	5	
8. Percentage of individuals as insectivores		78.7	5	
9. Percentage of individuals as piscivores		4.35	3	
10. Number of individuals in sample		~	~	
a. Number of individuals/seine hual		25.5	1	3*
b. Number of individuals/min. electroshocking		6.67	5	
11. Percentage of individuals as non-native species		0.79	5	
12. Percentage of individuals with disease/anomolies		0	5	
Aquatic Life Use: EXCEPTIONAL		Total Points:	54	

*Average of 10a and 10b

Drainage area upstream of Site 16702 = 163.3 sq. km.

Quantitative Biological Scoring for Evaluating Aquatic Life Use Subcategories Based on Fish Regional Criteria
(Region 30)

Stream: U.Cibolo (30)	Date: 10/8/03	Location:12857	County: Kendall	
Metric		**Value**	**Score**	
1. Total # of fish species		19	5	
2.Total Number of cyprinid species		5	5	
3. Number of benthic invertivore species		2	5	
4. Number of sunfish species (exc. bass)		7	5	
5. Number of intolerant species		3	5	
6. Percentage of individuals as tolerants (exc. *G.affinis*)		2.173913043	5	
7. Percentage of individuals as omnivores		28.65612648	1	
8. Percentage of individuals as insectivores		48.02371542	3	
9. Percentage of individuals as piscivores		1.976284585	1	
10. Number of individuals in sample			~	
a. Number of individuals/seine hual		49.5	5	
b. Number of individuals/min. electroshocking		14.26666667	5	5*
11. Percentage of individuals as non-native species		3.522504892	1	
12. Percentage of individuals with disease/anomolies		0	5	
Aquatic Life Use: HIGH		Total Points:	46	

*Average of 10a and 10b

Drainage area upstream of Site 12857 = 72.1 sq. km.

Stream: U.Cibolo (30)	Date: 10/8/03	Location: 16702	County: Kendall	
Metric		**Value**	**Score**	
1. Total # of fish species		11	3	
2.Total Number of cyprinid species		4	3	
3. Number of benthic invertivore species		1	3	
4. Number of sunfish species (exc. bass)		4	5	
5. Number of intolerant species		0	1	
6. Percentage of individuals as tolerants (exc. *G.affinis*)		6.779661017	5	
7. Percentage of individuals as omnivores		0	5	
8. Percentage of individuals as insectivores		74.81840194	5	
9. Percentage of individuals as piscivores		2.421307506	1	
10. Number of individuals in sample			~	
a. Number of individuals/seine hual		54.83333333	5	
b. Number of individuals/min. electroshocking		5.6	5	5*
11. Percentage of individuals as non-native species		5.084745763	1	
12. Percentage of individuals with disease/anomolies		0	5	
Aquatic Life Use: HIGH		Total Points:	42	

*Average of 10a and 10b

Drainage area upstream of site 16702 = 163.3 sq. km.

HABITAT ASSESSMENT

Part I – Stream Physical Characteristics Worksheet

Insert Part II 11/15/02

Table B-12. Part I. Stream Physical Characteristics Worksheet

Part I - Stream Physical Characteristics Worksheet

Observers:_____ Date: 9/4/02 Time: 1:40PM Weather conditions: P cloudy

Stream: upper Cibolo creek Location of site: 10007 Length of stream reach:___

Stream Segment No.:_ Observed Stream Uses:_____ Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive

Stream Type (Circle One): perennial or intermittent w/ perennial pools Stream Bends: No. Well Defined_; No. Moderately Defined_; No. Poorly Defined 1

Channel Obstructions/Modifications:_____ No. of Riffles: 3 Channel Flow Status (circle one): high moderate low no flow

Riparian Vegetation (%):
Left Bank: ~~Trees 2~~ Shrubs 10 ~~Grasses, Forbs 50~~ ~~Cult. Fields 0~~ Other 58
Right Bank: ~~Trees 10~~ Shrubs 15 ~~Grasses, Forbs~~ ~~Cult. Fields 0~~ Other ~~90~~

11/05

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: inches)	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	704"	150	40	1¼ 1 0 ¼ 1¼ 1¼ 1 1½ 1½ 0 0	5°	10	0

barbed wire fence downstream of northmost bridge	Habitat Type (Circle One): ~~Riffle~~ Run Glide Pool	Dominant Substrate Type: limestone bedrock	Dominant Types Riparian Vegetation: Left Bank: grasses 70% other 30% F; Right Bank: grasses 40 other 10% F	% Gravel or Larger: 0
	Algae or Macrophytes (Circle One): ~~Abundant~~ Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 15 RB: 2	Instream Cover Types: algae, concrete boulders	% Instream Cover: 35

0T 0S 20F 80 0

2

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: inches)	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
between north and 2nd bridges	318"	90	40	6½ 10 9½ 10 11 10½ 11 15 9½ 9 8	90	60	0

	Habitat Type (Circle One): Riffle ~~Run~~ Glide Pool	Dominant Substrate Type: limestone bedrock	Dominant Types Riparian Vegetation: Left Bank: sumac, grasses 5%T, 65%F 30%O; Right Bank: grasses 2%S 3%F 95%O	% Gravel or Larger: 5%
	Algae or Macrophytes (Circle One): Abundant Common Rare ~~Absent~~	Width of Natural Buffer Vegetation (m) LB: 2 RB: 1	Instream Cover Types: gravel, cut bank	% Instream Cover: 5

2.5T 1S 34F 62.50

1

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth:	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
between 2nd and 3rd bridges	281"	12	10	.03 .13 .12 .10 .06 .08 .13 .11 .09 .05 .99 .01 — 1 5 6½ 4 2 3 5 4½ 3½ 3 ½	45	10	20%/17

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation	% Gravel or Larger
	cobble	Left Bank: sumac, grasses 50% O 45% F 5% S Right Bank: sumac, grasses 98% O 1% S 1% F	90

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m)	Instream Cover Types	% Instream Cover
	LB: 2 RB: 1	gravel, cobble, overhanging veg	80

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth:	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
between 3rd and south bridge	433"	18	10	.05 .01 .05 .00 .01 .05 .13 .20 .15 .03 — 2 ½ 2 0 0 ½ 2 5 8 6 1	16	5	0

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation	% Gravel or Larger
	cobble	Left Bank: grasses (bermuda) 70% O 30% F Right Bank: none 100% O	60

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m)	Instream Cover Types	% Instream Cover
	LB: 0 RB: 0	gravel, cobble, boulder, macrophytes, cut bank	50

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth:	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
@30m upstream of southmost bride	334"	53	40	.10 .11 .18 .15 .17 .08 .09 .11 .09 .09 .08 .125 — 4 4½ 7 6 6½ 3 3½ 4½ 3½ 3½ 3	53	50	50%

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation	% Gravel or Larger
	limestone bedrock	Left Bank: bermuda grass 70% O 30% F Right Bank: elm, chinaberry, pecan 30% O 40% F 30% T/S	2%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m)	Instream Cover Types	% Instream Cover
	LB: 1 RB: 10	overhanging veg, gravel	2%

Part II 11/13/02

1 Poorly Defined

Pool - 11
Run - 1
Glide - 11
Riffle - 711
Bend + Pier

Table B-12. Part 1. Stream Physical Characteristics Worksheet

Part I - Stream Physical Characteristics Worksheet

Observers: JW, SF Date: 9/15/02 Time: Noon Weather conditions: PC

Stream: U. Cibola Location of site: 16702 Length of stream reach: 225m

Stream Segment No.:_ Observed Stream Uses:______ Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive

Stream Type (Circle One): perennial or intermittent w/ perennial pools Stream Bends: No. Well Defined_; No. Moderately Defined_; No. Poorly Defined 1

Channel Obstructions/Modifications:_______ No. of Riffles:__ Channel Flow Status (circle one): high moderate low no flow

Riparian Vegetation (%):
Left Bank: Trees_ Shrubs_ Grasses, Forbs_ Cult. Fields_ Other_
Right Bank: Trees_ Shrubs_ Grasses, Forbs_ Cult. Fields_ Other_

2/4/05

Location of Transect	Stream Width (m) 4.0?	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — L, Thalweg Depth: 21", 3.17m, R											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	318"	12°	30%	0.5"	4"	9"	20"	20.5"	21"	21"	16"	8"	35"	1.6"	4°	5%	15.5/17

D1 — Location of Transect: 10yds down from concrete stepping stones / down most picnic tables

Habitat Type (Circle One) Riffle Run Glide Pool — Glide circled

Dominant Substrate Type: Cobble

Dominant Types Riparian Vegetation: Cypress / Cottonwood / Grape vine
Left Bank: 70% tree - 20% shrub 5% forb 5% other
Right Bank: 90%? forb; 5% tree; 15% other Chinaberry Cottonwood

% Gravel or Larger: 90%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent — Absent circled

Width of Natural Buffer Vegetation (m) LB: >20 RB: >20

Instream Cover Types: Cobble, Gravel, Boulder, Roots,

% Instream Cover: 55%

37.5 T
10 S
47.5 F
10 0
100

Location of Transect	Stream Width (m) 1.34?	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — L, Thalweg Depth:, 5.48m, R											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
65y up - 40y up from stepping stones	364"	20°	40%	1"	15"	29"	27"	23.5"	21"	21"	23.5"	24"	24"	3"	22°	33%	3.1/17

D2

Habitat Type (Circle One) Riffle Run Glide Pool — Pool circled

Dominant Substrate Type: Cobble

Dominant Types Riparian Vegetation:
Left Bank: Cypress/Willow - 60% other 35% forb; 10% tree
Right Bank: Cypress - 50% forb 30% other 20% tree;

% Gravel or Larger: 90%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent — Absent circled

Width of Natural Buffer Vegetation (m) LB: >10 RB: >10

Instream Cover Types: Roots, Cobble, Gravel, Boulder, Fallen Log

% Instream Cover: 50%

15 T
0 S
40 F
45 0
100

Location of Transect	Stream Width (m) 6.63m	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect 1.97m (L … Thalweg Depth)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
60y up	261"	50	35%	1.5"	3"	5.5"	8.5"	10"	11"	10"	10"	9"	4"	1"	20°	50%	9/17

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation	% Gravel or Larger
Glide (circled)	Cobble	Left Bank: Cypress - 40% other, 10% tree, 50% forb Right Bank: 90% forb; 10% tree - Johnson Grass	100%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m)	Instream Cover Types	% Instream Cover
Rare (circled)	LB: 720 RB: 720	Cobble, Gravel, Macrophytes, Roots	50%

Location of Transect	Stream Width (m) 8.56m	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect 6.69m (L … Thalweg Depth … R)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
60y up	337"	30°	60%	12.5"	30"	49.5"	45"	49.5"	43"	20"	17"	3"	4"	1"	16°	75%	16/17

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation	% Gravel or Larger
Pool (circled)	Bedrock	Left Bank: Cypress - 10% tree 90% forb Right Bank: Hackberry - 20% tree; 60% forb; 20% other	20%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m)	Instream Cover Types	% Instream Cover
Abundant (marked)	LB: 720 RB: 720	Gravel, Cobble, Boulder, Roots, Macrophytes	40%

Location of Transect	Stream Width (m) 8.15	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect .92m (L … Thalweg Depth … R)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
65y up	321"	18°	30%	1/2"	4"	1.5"	3.5"	1"	5.5"	5"	4.5"	5"	4.5"	1"	14°	40%	16/17

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation	% Gravel or Larger
Riffle (circled)	Cobble	Left Bank: 90% forb · 5% tree 5% other - Johnson Right Bank: 80% forb · 10% tree 10% other - Johnson	90%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m)	Instream Cover Types	% Instream Cover
Absent (circled)	LB: 720 RB: 720	Cobble, Boulder, Roots, Leaf Packs	60%

Margin notes: 10T 05 70F 200 / 100; 15T .5 75F 100 / 100; 7.5T 05 85F 7.50 / 100

Dytiscid – Part II 8/26/03

Pool ||
Glide |
Run |
Riffle ||

Table B-12. Part 1. Stream Physical Characteristics Worksheet

Part I - Stream Physical Characteristics Worksheet

Observers: Jamie Date: 1/12/03 Time: 5 Weather conditions: ___

Stream: U Clyde Location of site: [illegible] Length of stream reach: ___

Stream Segment No.: ___ Observed Stream Uses: ___ Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive

Stream Type (Circle One): perennial or intermittent w/ perennial pools Stream Bends: No. Well Defined_; No. Moderately Defined_; No. Poorly Defined_

Channel Obstructions/Modifications: ___ No. of Riffles: ___ Channel Flow Status (circle one): high moderate low no flow

Riparian Vegetation (%):
Left Bank: Trees_ Shrubs_ Grasses, Forbs_ Cult. Fields_ Other_
Right Bank: Trees_ Shrubs_ Grasses, Forbs_ Cult. Fields_ Other_

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 0.02											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
Barbed wire fence D1	18.7	22°	60%	.04	0	.02	.03	.03	.02	.03	0	0	.02	.01	90	60%	0
	Habitat Type (Circle One) Riffle Run Glide Pool: Run	Dominant Substrate Type: bedrock		Dominant Types Riparian Vegetation: Left Bank: 80 grass 20 other; Right Bank: 50 other 50 grass												% Gravel or Larger: 100%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent: Common	Width of Natural Buffer Vegetation (m) LB: >20 RB: 0		Instream Cover Types: algae, boulder												% Instream Cover: 2%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 0.23											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D2 between northern [illegible] and bridge	8.5	12°	75%	.01	.23	.26	.31	.40	.30	.31	.24	.25	.20	.02	135°	50%	0
	Habitat Type (Circle One) Riffle Run Glide Pool: Pool	Dominant Substrate Type: bedrock		Dominant Types Riparian Vegetation: Left Bank: 50 other 50 grass; Right Bank: 2 tree 2 grass 96 other												% Gravel or Larger: 100%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent: Common	Width of Natural Buffer Vegetation (m) LB: 10 RB: 0		Instream Cover Types: undercut bank, algae, macrophytes, overhang veg.												% Instream Cover: 25%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 0.44	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D3 between 2nd + 3rd bridges	7.2	90°	80%	.38 .39 .40 .43 .46 .51 .53 .54 .49 .48 .21	35°	0%	0

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation: Left Bank: 50 grass 50 other; Right Bank: 100 other	% Gravel or Larger
	bedrock		80%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 10 RB: 0	Instream Cover Types: boulder, undercut snags, algae, macrophytes, bank	% Instream Cover
			20%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 0.09	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D4 between 3rd + 4th bridges	2.9	90	10%	.06 .10 .10 .16 .14 .11 .15 .06 .04 .03 .01	5°	0%	0

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation: Left Bank: 50 grass 50 other; Right Bank: 100 other	% Gravel or Larger
	boulder		100%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 10 RB: 0	Instream Cover Types: cobble, boulder, algae, gravel	% Instream Cover
			45%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 0.10	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D5 20m south of 4th bridge	9.5	31°	75%	.06 .17 .19 .14 .08 .09 .10 .07 .06 .07 .07	15°	75%	1/17

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation: Left Bank: 75 other 25 forbes; Right Bank: 25 tree 55 other 20 forbes	% Gravel or Larger
	bedrock		100%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 10 RB: >20	Instream Cover Types: algae, cobble, macrophytes	% Instream Cover
			5%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth:	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation: Left Bank: Right Bank:	% Gravel or Larger

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: RB:	Instream Cover Types:	% Instream Cover

Mission pharmaceuticals

Dighead Part II - 8/26/03

Riffle III
Pool III
Bend 1 (poor)
Glide 1

Table B-12. Part 1. Stream Physical Characteristics Worksheet

Part I - Stream Physical Characteristics Worksheet

Observers: AW, AM Date: 9/3/03 Time: 10 Weather conditions: S

Stream: U.C. Lake Location of site: 16202 Length of stream reach: 186m

Stream Segment No.: Observed Stream Uses: Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive

Stream Type (Circle One): perennial or intermittent w/ perennial pools Stream Bends: No. Well Defined ; No. Moderately Defined ; No. Poorly Defined

Channel Obstructions/Modifications: No. of Riffles: Channel Flow Status (circle one): high moderate low no flow

Riparian Vegetation (%):
Left Bank: Trees Shrubs Grasses, Forbs Cult. Fields Other
Right Bank: Trees Shrubs Grasses, Forbs Cult. Fields Other

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 0.20											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	5.2	12°	50%	.02	.18	.42	.42	.41	.27	.24	.11	.07	.06	.01	10°	5%	17/17
D1 70 m D from cattle drop	Habitat Type (Circle One) Riffle Run Glide Pool		Dominant Substrate Type: gravel				Dominant Types Riparian Vegetation: Left Bank: 55 tree 10 shrub 25 forbs 10 other Right Bank: 2 tree 90 grass 8 other									% Gravel or Larger: 95%		
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: >20				Instream Cover Types: root wads, gravel, cobble, macrophytes,									% Instream Cover: 35%		

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 0.42											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D2 50m upstream from D1	11.9	26°	50%	.02	.32	.71	.78	.82	.81	.77	.75	.71	.50	.03	24°	50%	12/17
	Habitat Type (Circle One) Riffle Run Glide Pool		Dominant Substrate Type: cobble				Dominant Types Riparian Vegetation: Left Bank: 50 grass 50 other Right Bank: 10 tree 5 shrub 65 grass 20 other									% Gravel or Larger: 85%		
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: 0 RB: >20				Instream Cover Types: gravel, cobble, root wads, algae, overhang veg.									% Instream Cover: 30%		

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 0.26											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D3	6.4	8°	55%	.01	.03	.14	.15	.26	.39	.49	.63	.44	.20	.02	20°	65%	15.5/17

50m upstream from D2

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation:	% Gravel or Larger
	cobble	Left Bank: 5 tree 70 grass 25 other Right Bank: 2 tree 90 grass 8 other	95%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: >20 RB: >20	Instream Cover Types: algae, rootwad, gravel, cobble,	% Instream Cover
			45%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 0.34											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D4	9.2	8°	50%	.01	.10	.23	.32	.49	.55	.50	.50	.53	.50	.03	21°	50%	17/17

50m upstream from D3

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation:	% Gravel or Larger
	boulder	Left Bank: 5 tree 85 grass, 10 other Right Bank: 2 tree 88 grass 10 other	95%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: >20 RB: >20	Instream Cover Types: Animal, snags, algae, gravel, cobble, boulder, rootwad	% Instream Cover
			35%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 0.39											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D5	6.9	10°	35%	.03	.16	.45	.60	.65	.61	.60	.57	.39	.17	.02	15°	45%	17/17

50m upstream from D4

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation:	% Gravel or Larger
	cobble	Left Bank: 5 tree 85 grass 10 other Right Bank: 10 tree 70 grass 20 other	95%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: >20 RB: >20	Instream Cover Types: gravel, cobble, algae, rootwad	% Instream Cover
			30%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth:											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation:	% Gravel or Larger
		Left Bank: Right Bank:	

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: RB:	Instream Cover Types:	% Instream Cover

12/30/03

Glide - 1
Run - 1
Riffle - 1

Table B-12. Part 1. Stream Physical Characteristics Worksheet

Part I - Stream Physical Characteristics Worksheet

Observers: JW MD Date: 10/8/03 Time: 2pm Weather conditions: Rainy

Stream: Cibolo Location of site: 10007 Length of stream reach: 200 m

Stream Segment No.:__ Observed Stream Uses:_____ Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive

Stream Type (Circle One): perennial or intermittent w/ perennial pools Stream Bends: No. Well Defined_; No. Moderately Defined_; No. Poorly Defined_

Channel Obstructions/Modifications:_____ No. of Riffles:__ Channel Flow Status (circle one): high moderate low no flow

Riparian Vegetation (%):
Left Bank: Trees_ Shrubs_ Grasses, Forbs_ Cult. Fields_ Other_
Right Bank: Trees_ Shrubs_ Grasses, Forbs_ Cult. Fields_ Other_

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: 0.03)										Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	11.14	5	75	.01	.02	0	.03	.02	.02	.04	.04	.04	.03	.01	35	0	0

6/5/03

wire fence D1	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type: bedrock	Dominant Types Riparian Vegetation: Left Bank: 5 tree 75 grass 20 other; Right Bank: 10 grass 90 other
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: ~~20~~ RB: 0	Instream Cover Types: overhangveg, algae, boulder, artificial

			% Gravel or Larger: 100%
			% Instream Cover: 60

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: 0.22)										Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D2 between northernmost & 2nd bridge 40m from D1	8.86	40	80	.18	.19	.20	.20	.24	.27	.25	.39	.23	.22	.08	45	0	0

	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type: bedrock	Dominant Types Riparian Vegetation: Left Bank: 5 shrub 60 grass 35 other; Right Bank: 100 other
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 15 RB: 0	Instream Cover Types: macro, algae, overhangveg, undercut bank

		% Gravel or Larger: 100
		% Instream Cover: 30

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: 0.26)	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D3 35m from D2 between 2nd & 3rd bridges	8.78	35	65	.03 .23 .25 .33 .35 .34 .35 .32 .35 .30 .04	35	0	0

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation	% Gravel or Larger
	cobble	Left Bank: 60 grass 40 other Right Bank: 5 grass 95 other	80

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 15 RB: 0	Instream Cover Types: gravel, cobble, boulder, artificial, algae, macro, overhang veg.	% Instream Cover
			40

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: 0.12)	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D4 35m from D3 between 3rd & 4th bridges	3.66	8	30	.01 .05 .10 .14 .16 .19 .17 .18 .14 .10 .03	20	50	0

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation	% Gravel or Larger
	cobble	Left Bank: 40 grass 60 other. Right Bank: 5 grass 95 other	90

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 15 RB: 2	Instream Cover Types: algae, macro, gravel, cobble, leaf pak, boulder	% Instream Cover
			25

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: 0.09)	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D5 40m from D4 20m south of southern most bridge	8.23	25	80	.08 .12 .17 .08 .06 .08 .06 .08 .11 .05 .05	30	80	6.5/17

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation	% Gravel or Larger
	bedrock	Left Bank: 30 grass 70 other Right Bank: 5 tree, 80 grass 10 shrub 5 other	100%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 5 RB: 15	Instream Cover Types: algae, overhang veg, macro, boulder, snags, leaf pak	% Instream Cover
			10%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth:)	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation	% Gravel or Larger
		Left Bank: Right Bank:	

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: RB:	Instream Cover Types:	% Instream Cover

12/30/03

Run
Riffle - 11
Glide - 1
Pool - 11
Bend

Table B-12. Part 1. Stream Physical Characteristics Worksheet

Part I - Stream Physical Characteristics Worksheet

Observers: MB, JW Date: 10/8/03 Time: 11 Weather conditions: C

Stream: U. Cibolo Location of site: 16702 Length of stream reach: 200m

Stream Segment No.: Observed Stream Uses: Pasture Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive

Stream Type (Circle One): perennial or intermittent w/ perennial pools Stream Bends: No. Well Defined ; No. Moderately Defined : No. Poorly Defined 1

Channel Obstructions/Modifications: No. of Riffles: Channel Flow Status (circle one): high moderate low no flow

Riparian Vegetation (%):
Left Bank: Trees Shrubs Grasses, Forbs Cult. Fields Other
Right Bank: Trees Shrubs Grasses, Forbs Cult. Fields Other

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: 0.05)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	16.55m	40°	20%	0.08	0.12	0.04	0.04	0	0	0.12	0.08	0.09	0	0.03	15°	50%	100%

20m downstream concrete steps D1	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type: Cobble	Dominant Types Riparian Vegetation: Left Bank: 20T, 5S, 60F, 15 other; Right Bank: 5T, 85F, 10% other
	% Gravel or Larger: 100%		
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: >20 RB: >20	Instream Cover Types: Gravel, Cobble, Leaf Pack, Snag, Root, Algae
	% Instream Cover: 40%		

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: 0.52)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D2	11.93m	19°	40%	0.05	0.45	0.63	0.72	0.82	0.82	0.85	0.77	0.72	0.58	0.06	34°	50%	14/17

50m upstream from D1	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type: Gravel	Dominant Types Riparian Vegetation: Left Bank: 80F; 15 other; 5T; Right Bank: 10T; 70F; 20 other
	% Gravel or Larger: 70%		
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 5m RB: >20m	Instream Cover Types: Algae, Gravel, Cobble, Overhang Veg, Roots
	% Instream Cover: 20%		

80/85

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: 0.32)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D3 50m up from D2	8.95m	18°	35%	0.06	0.08	0.19	0.3	0.4	0.5	0.55	0.61	0.58	0.18	0.07	45°	50%	15.5/17
	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type: Gravel	Dominant Types Riparian Vegetation: Left Bank: 5T 80F 15 other; Right Bank: 5T 85F 10 other													% Gravel or Larger: 80%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 720 RB: 720	Instream Cover Types: Algae, Leafpack, Root, Gravel, Overhang Macroph													% Instream Cover: 40%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: 0.24)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D4 50m up from D3	9.2m	36°	40%	0.02	0.11	0.29	0.30	0.29	0.31	0.36	0.38	0.36	0.19	0.04	41°	40%	100%
	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type: Gravel	Dominant Types Riparian Vegetation: Left Bank: 5T 80F 15 other; Right Bank: 10T 85F 5 other													% Gravel or Larger: 80%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: >20m RB: >20m	Instream Cover Types: Algae, Cobble, Gravel, Root, Leaf;													% Instream Cover: 30%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: 0.11)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D5 50m up from D4	4.55m	9°	25%	0.11	0.11	0.14	0.15	0.12	0.08	0.10	0.11	0.11	0.14	0.09	21°	10%	16.5/17
	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type: Cobble	Dominant Types Riparian Vegetation: Left Bank: 5T 90F 5 other; Right Bank: 5T 80F 15 other													% Gravel or Larger: 100%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 720 RB: 720	Instream Cover Types: Algae, Gravel, Cobble, Root, Leaf, Macrophyte													% Instream Cover: 35%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth:)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation: Left Bank: Right Bank:													% Gravel or Larger	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: RB:	Instream Cover Types:													% Instream Cover	

HABITAT ASSESSMENT

Part II – Summary of Physical Characteristics of Water Body

Part II - Summary of Physical Characteristics of Water Body

Stream name	U.Cibolo 12857
Date of assessment	9/4/2002
Stream bed slope over evaluated reach	0.0076
Approximate drainage area above transect furthest downstream	72km²
Stream order	4
Length of stream evaluated	200m
Number of lateral transects made	5
Average stream width	10.52m
Average stream depth	0.11m
Instantaneous flow	8.61 ft^3/sec
Indicate flow measurement method	Current Meter
Channel flow status	High
Maximum pool width	8m
Maximum pool depth	<0.5m
Total number of stream bends	1
Number of well defined bends	0
Number of moderately defined bends	0
Number of poorly defined bends	1
Total number of riffles	3
Dominant substrate type	Bedrock
Average percent of substrate gravel sized or larger	31%
Average percent instream cover	34%
Number of stream cover types	7
Average percent stream bank erosion potential	28%
Average stream bank slope	40°
Average width of vegetative buffer	1m
Average riparian vegetation percent composition by:	
Trees	2%
Shrubs	2.30%
Grasses/Forbes	25.40%
Cultivated Fields	
Other	70.30%
Average percent tree canopy coverage	13%
Overall aesthetic appraisal of stream	Common

Part II - Summary of Physical Characteristics of Water Body

Stream name	U.Cibolo 16702
Date of assessment	9/5/2002
Stream bed slope over evaluated reach	0.0013
Approximate drainage area above transect furthest downstream	163km²
Stream order	4
Length of stream evaluated	225m
Number of lateral transects made	5
Average stream width	8.16m
Average stream depth	0.36m
Instantaneous flow	1.91 ft^3/sec
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	6m
Maximum pool depth	>1m
Total number of stream bends	1
Number of well defined bends	0
Number of moderately defined bends	0
Number of poorly defined bends	1
Total number of riffles	3
Dominant substrate type	Cobble
Average percent of substrate gravel sized or larger	78%
Average percent instream cover	51%
Number of stream cover types	7
Average percent stream bank erosion potential	40%
Average stream bank slope	17°
Average width of vegetative buffer	>20m
Average riparian vegetation percent composition by:	
Trees	17%
Shrubs	2%
Grasses/Forbes	62.50%
Cultivated Fields	
Other	18.50%
Average percent tree canopy coverage	87%
Overall aesthetic appraisal of stream	Natural

Part II - Summary of Physical Characteristics of Water Body

Stream name	U.Cibolo 12857
Date of assessment	7/31/2003
Stream bed slope over evaluated reach	0.0076
Approximate drainage area above transect furthest downstream	72km²
Stream order	4
Length of stream evaluated	200m
Number of lateral transects made	5
Average stream width	9.16m
Average stream depth	0.18m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	9m
Maximum pool depth	<0.5m
Total number of stream bends	1
Number of well defined bends	0
Number of moderately defined bends	0
Number of poorly defined bends	1
Total number of riffles	2
Dominant substrate type	Bedrock
Average percent of substrate gravel sized or larger	96%
Average percent instream cover	19%
Number of stream cover types	5
Average percent stream bank erosion potential	49%
Average stream bank slope	36°
Average width of vegetative buffer	10m
Average riparian vegetation percent composition by:	
Trees	2%
Shrubs	0.00%
Grasses/Forbes	33.00%
Cultivated Fields	
Other	65.00%
Average percent tree canopy coverage	4%
Overall aesthetic appraisal of stream	Common

Part II - Summary of Physical Characteristics of Water Body

Stream name	U.Cibolo 16702
Date of assessment	7/31/2003
Stream bed slope over evaluated reach	0.0013
Approximate drainage area above transect furthest downstream	163km²
Stream order	4
Length of stream evaluated	225m
Number of lateral transects made	5
Average stream width	7.92m
Average stream depth	0.32m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	12m
Maximum pool depth	>1m
Total number of stream bends	1
Number of well defined bends	0
Number of moderately defined bends	0
Number of poorly defined bends	1
Total number of riffles	3
Dominant substrate type	Cobble
Average percent of substrate gravel sized or larger	93%
Average percent instream cover	35%
Number of stream cover types	7
Average percent stream bank erosion potential	46%
Average stream bank slope	16°
Average width of vegetative buffer	>20m
Average riparian vegetation percent composition by:	
Trees	8%
Shrubs	2%
Grasses/Forbes	72.00%
Cultivated Fields	
Other	18.00%
Average percent tree canopy coverage	92%
Overall aesthetic appraisal of stream	Natural

Part II - Summary of Physical Characteristics of Water Body

Stream name	U.Cibolo 12857
Date of assessment	10/8/2003
Stream bed slope over evaluated reach	0.0076
Approximate drainage area above transect furthest downstream	72km²
Stream order	4
Length of stream evaluated	200m
Number of lateral transects made	5
Average stream width	8.1m
Average stream depth	0.14
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	11m
Maximum pool depth	0.4m
Total number of stream bends	1
Number of well defined bends	0
Number of moderately defined bends	0
Number of poorly defined bends	1
Total number of riffles	1
Dominant substrate type	Bedrock
Average percent of substrate gravel sized or larger	94%
Average percent instream cover	33%
Number of stream cover types	10
Average percent stream bank erosion potential	46%
Average stream bank slope	28
Average width of vegetative buffer	10m
Average riparian vegetation percent composition by:	
Trees	1%
Shrubs	2%
Grasses/Forbes	30%
Cultivated Fields	
Other	67%
Average percent tree canopy coverage	8%
Overall aesthetic appraisal of stream	Common

Part II - Summary of Physical Characteristics of Water Body

Stream name	U.Cibolo 16702
Date of assessment	10/8/2003
Stream bed slope over evaluated reach	0.0013
Approximate drainage area above transect furthest downstream	163km²
Stream order	4
Length of stream evaluated	225m
Number of lateral transects made	5
Average stream width	9.0m
Average stream depth	0.25m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	12m
Maximum pool depth	0.82m
Total number of stream bends	1
Number of well defined bends	0
Number of moderately defined bends	0
Number of poorly defined bends	1
Total number of riffles	2
Dominant substrate type	Gravel
Average percent of substrate gravel sized or larger	86%
Average percent instream cover	33%
Number of stream cover types	8
Average percent stream bank erosion potential	36%
Average stream bank slope	28
Average width of vegetative buffer	>20m
Average riparian vegetation percent composition by:	
Trees	7%
Shrubs	1%
Grasses/Forbes	80.00%
Cultivated Fields	
Other	12.00%
Average percent tree canopy coverage	94%
Overall aesthetic appraisal of stream	Natural

HABITAT ASSESSMENT

Part III – Habitat Quality Indices

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 12857	Date: 9/4/02
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports a stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score: 3	**4**	**3**	**2**	**1**
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate, i.e., gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be in mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score: 3	**4**	**3**	**2**	**1**
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score: 3	**4**	**3**	**2**	**1**
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is > 1m	**Moderate** Pool covers approximately 50% or slightly less than the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxillary pockets
Score: 1	**3**	**2**	**1**	**0**
Channel Flow Status	**High** Water reaches the base of both the lower banks; <5% of channel substrate is exposed	**Moderate** Water fills <75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score: 3	**3**	**2**	**1**	**0**
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 1	**3**	**2**	**1**	**0**
Channel Sinuosity	**High** ≥2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) are present	**Moderate** 1 well-defined bend OR ≥3 moderately-defined bends present	**Low** <3 moderately-defined bends OR only poorly-defined bends present	**None** Straight channel; may be channelized
Score: 1	**3**	**2**	**1**	**0**
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score: 0	**3**	**2**	**1**	**0**
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Tree and/or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score: 1	**3**	**2**	**1**	**0**
Total Score: 16	INTERMEDIATE			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 16702	Date: 9/5/02
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports a stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score: 4	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate, i.e., gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be in mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score: 4	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score: 3	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is > 1m	**Moderate** Pool covers approximately 50% or slightly less than the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxillary pockets
Score: 3	3	2	1	0
Channel Flow Status	**High** Water reaches the base of both the lower banks; <5% of channel substrate is exposed	**Moderate** Water fills <75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score: 2	3	2	1	0
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 1	3	2	1	0
Channel Sinuosity	**High** ≥2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) are present	**Moderate** 1 well-defined bend OR ≥3 moderately-defined bends present	**Low** <3 moderately-defined bends OR only poorly-defined bends present	**None** Straight channel; may be channelized
Score: 1	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score: 3	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Tree and/or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score: 2	3	2	1	0
Total Score: 23	HIGH			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 12857	Date: 7/31/03
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports a stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score: 2	**4**	**3**	**2**	**1**
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate, i.e., gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be in mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score: 4	**4**	**3**	**2**	**1**
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score: 3	**4**	**3**	**2**	**1**
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is > 1m	**Moderate** Pool covers approximately 50% or slightly less than the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxillary pockets
Score: 1	**3**	**2**	**1**	**0**
Channel Flow Status	**High** Water reaches the base of both the lower banks; <5% of channel substrate is exposed	**Moderate** Water fills <75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score: 2	**3**	**2**	**1**	**0**
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 1	**3**	**2**	**1**	**0**
Channel Sinuosity	**High** ≥2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) are present	**Moderate** 1 well-defined bend OR ≥3 moderately-defined bends present	**Low** <3 moderately-defined bends OR only poorly-defined bends present	**None** Straight channel; may be channelized
Score: 1	**3**	**2**	**1**	**0**
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score: 1	**3**	**2**	**1**	**0**
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Tree and/or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score: 1	**3**	**2**	**1**	**0**
Total Score: 16	INTERMEDIATE			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 16702	Date: 7/31/03
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports a stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score: 3	**4**	**3**	**2**	**1**
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate, i.e., gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be in mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score: 4	**4**	**3**	**2**	**1**
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score: 3	**4**	**3**	**2**	**1**
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is > 1m	**Moderate** Pool covers approximately 50% or slightly less than the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxillary pockets
Score: 3	**3**	**2**	**1**	**0**
Channel Flow Status	**High** Water reaches the base of both the lower banks; <5% of channel substrate is exposed	**Moderate** Water fills <75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score: 2	**3**	**2**	**1**	**0**
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 2	**3**	**2**	**1**	**0**
Channel Sinuosity	**High** ≥2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) are present	**Moderate** 1 well-defined bend OR ≥3 moderately-defined bends present	**Low** <3 moderately-defined bends OR only poorly-defined bends present	**None** Straight channel; may be channelized
Score: 1	**3**	**2**	**1**	**0**
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score: 3	**3**	**2**	**1**	**0**
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Tree and/or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score: 2	**3**	**2**	**1**	**0**
Total Score: 23	HIGH			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 12857	Date: 10/08/03
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports a stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score: 3	**4**	**3**	**2**	**1**
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate, i.e., gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be in mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score: 4	**4**	**3**	**2**	**1**
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score: 2	**4**	**3**	**2**	**1**
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is > 1m	**Moderate** Pool covers approximately 50% or slightly less than the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxillary pockets
Score: 1	**3**	**2**	**1**	**0**
Channel Flow Status	**High** Water reaches the base of both the lower banks; <5% of channel substrate is exposed	**Moderate** Water fills <75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score: 2	**3**	**2**	**1**	**0**
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 1	**3**	**2**	**1**	**0**
Channel Sinuosity	**High** ≥2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) are present	**Moderate** 1 well-defined bend OR ≥3 moderately-defined bends present	**Low** <3 moderately-defined bends OR only poorly-defined bends present	**None** Straight channel; may be channelized
Score: 1	**3**	**2**	**1**	**0**
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score: 2	**3**	**2**	**1**	**0**
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Tree and/or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score: 1	**3**	**2**	**1**	**0**
Total Score: 17	INTERMEDIATE			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 16702	Date: 10/8/03
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports a stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score: 3	**4**	**3**	**2**	**1**
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate, i.e., gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be in mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score: 4	**4**	**3**	**2**	**1**
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score: 3	**4**	**3**	**2**	**1**
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is > 1m	**Moderate** Pool covers approximately 50% or slightly less than the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxillary pockets
Score: 2	**3**	**2**	**1**	**0**
Channel Flow Status	**High** Water reaches the base of both the lower banks; <5% of channel substrate is exposed	**Moderate** Water fills <75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score: 2	**3**	**2**	**1**	**0**
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 1	**3**	**2**	**1**	**0**
Channel Sinuosity	**High** ≥2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) are present	**Moderate** 1 well-defined bend OR ≥3 moderately-defined bends present	**Low** <3 moderately-defined bends OR only poorly-defined bends present	**None** Straight channel; may be channelized
Score: 1	**3**	**2**	**1**	**0**
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score: 3	**3**	**2**	**1**	**0**
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Tree and/or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score: 2	**3**	**2**	**1**	**0**
Total Score: 21	HIGH			