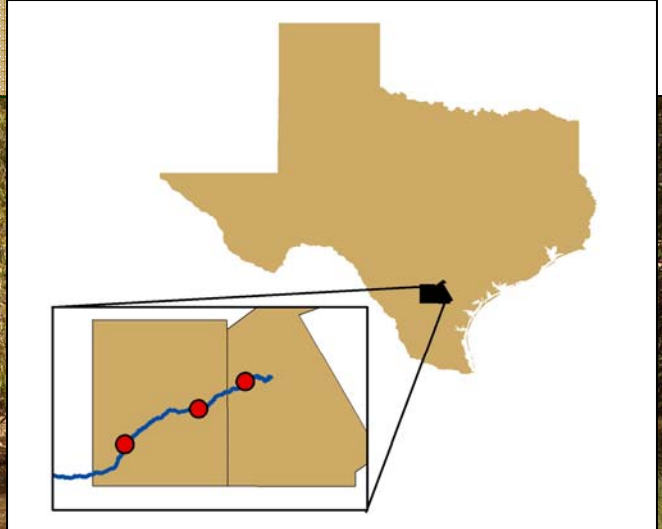


Impairment Verification Monitoring-Volume 2:
Biological and Habitat Components
Segment 2104, Nueces River
February 2005



Ecological Communications Corporation
Austin, TX



**Impairment Verification Monitoring-Volume 2: Biological and
Habitat Components
Segment 2104, Nueces River**

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Under Texas Engineering Experiment Station Project No. 32525-60880 CC
Texas Commission on Environmental Quality Contract No.582-4-58897, Amendment 1

Prepared for
Total Maximum Daily Load Program
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Impairment Verification Monitoring-Volume 2: Biological and Habitat Components
Segment 2104 Nueces River

ABSTRACT

Ecological Communications Corporation (EComm) conducted biological data collection and analysis as part of an impairment verification monitoring project on the Nueces River (Segment 2104). The lower 25 miles of Segment 2104 appear 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 meeting the dissolved oxygen criteria for high aquatic life use, and will be recommended for delisting.

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APPENDICES

Appendix A Complete Raw Data Set Segment 2104 – Nueces River: September 2003, August 2004	
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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



Figure 1. Station 17897

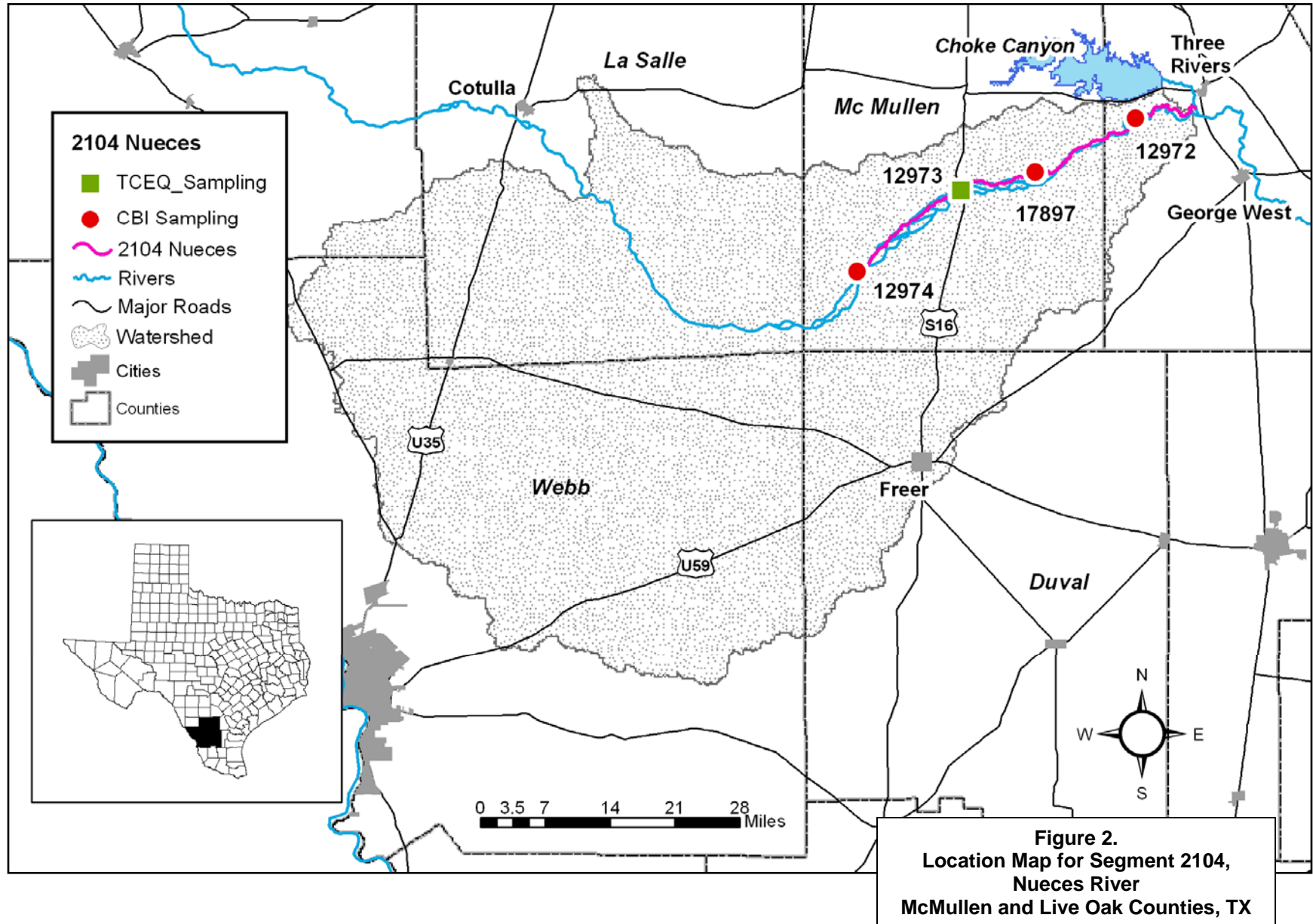
segments are included on the 1999 State of Texas Clean Water Act 303(d) list as impaired due to concentrations of dissolved oxygen or bacteria or both which exceed established criteria. One of these waterbodies was Nueces River (Segment 2104), and is included on the State's 303(d) list as impaired for its high aquatic life use designation. The impairment to this portion of Segment 2104 was caused by an exceedance of the established dissolved oxygen criteria within the lower 25 miles of the segment. As an initial phase for TMDL development, Segment 2104 was assessed to verify the aquatic life impairment using the latest sampling techniques. This initial assessment was performed so that resources within the program can be

efficiently utilized for truly impaired waterbodies, preventing TMDL development for a waterbody that may be delisted or subject to a water quality standards revision at a later date. Chemical, physical, and biological data were collected at three 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) Development of a TMDL, or
- 4) Additional monitoring to better characterize the impairment.

Segment 2104 begins at Holland Dam in central La Salle County and flows for approximately 105 miles through McMullen County into western Live Oak County, to the confluence of the Frio River. The watershed is sparsely populated and, as typical of the South Texas Brush Country, it dominated by grasses, mesquite, prickly pear cacti, and other thorny shrubs. The major land use in this watershed is agriculture. A location map of the segment is provided in Figure 2. Site 12972 is located in Live Oak County below Three Rivers at FM 1042. Site 17897 is on the private Smith lease near the southern end of Ranch Road 99 in McMullen County. Site 12974, also located in McMullen County, is located at SH 624. All three sites fall within Ecoregion 31 – Southern Texas Plains (TPWD 2002).

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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 (IBI). Additionally, EComm generated IBI for all stations using regional criteria developed by the 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 12972

Also, in addition to data collection via RWA guidelines and TCEQ Surface Water Quality Monitoring (SWQM) Procedures Manual (TNRCC 1999a), EComm captured data for 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 2104 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 attempted for this segment to be used if it was determined that a UAA was the correct course of action. 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 2104 was conducted in September 2003 and August 2004. Consistently high flows during the study years prevented additional sampling events.

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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)
<i>800</i>	<i>Channel flow status</i>	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
<i>812</i>	<i>Statewide IBI</i>	98003	Number of fish species
<i>833</i>	<i>Habitat Quality Index</i>	89905	Number of minutes debris was sampled
84161	Stream order	89851	Percent grass
84159	Percent instream cover	89854	Percentage tree canopy
<i>813</i>	<i>Number of cyprinidae species</i>	89859	Drainage area
<i>814</i>	<i>Number of benthic invertebrates</i>	89860	Length of reach
72052	Streambed slope	89861	Average stream width
<i>816</i>	<i>Percent that are tolerant species, excluding G.affinis</i>	89862	Average stream depth
<i>817</i>	<i>Number of individuals per seine haul</i>	89864	Maximum pool width
<i>818</i>	<i>Number of individuals per minute electroshocking</i>	89865	Maximum pool depth
<i>819</i>	<i>Percentage of individuals as non-native</i>	89866	Average width of riparian vegetation
<i>820</i>	<i>Regional IBI</i>	90010	Dominant functional feeding group percentage
<i>832</i>	<i>Total RBP score</i>	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
<i>834</i>	<i>Percentage benthic scrapers</i>	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	<i>835</i>	<i>Benthic invertebrate taxa richness</i>
89850	Percent as shrubs	<i>836</i>	<i>Number instream cover types</i>
98004	Total number of darter species	89904	Minutes spent kicknetting

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

Benthic Macroinvertebrate Collections



Figure 4. Macroinvertebrate Collection

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. Intervals were repeated until the minimum sample size of 100 specimens was approached, met, or exceeded. All individuals collected within the net 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.

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 electrofishing gear powered by either 7 amp-hour or 12 amp-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 plastic 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 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 specimen.

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Electrofishing collections were 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.



Figure 5. Station 12974

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

Several subjective habitat parameters were evaluated as required by the RWA manual (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 ensure that all crew members 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 2104. The fish component resulted in Statewide and Regional IBI scores, the macroinvertebrate component

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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. 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 31)	RBP	HQI
Limited	<34	<25	<22	<14
Intermediate	40-44	25-36	22-28	14-19
High	48-52	37-41	29-36	20-25
Exceptional	58-60	>41	>36	26-31

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

Table 3. Results of Biological and Habitat Sampling for Segment 2104, Nueces River

Event 1				
Station (region)	Statewide IBI	Regional IBI	RBP	HQI
12972 (31)	38 - Limited-Intermediate	33 – Intermediate	22 – Intermediate	18 - Intermediate
17897 (31)	40 - Intermediate	31 – Intermediate	27 - Intermediate	18 – Intermediate
12974 (31)	30 - Limited	29 - High	23 – Intermediate	17 - Intermediate
Event 2				
Station (region)	Statewide IBI	Regional IBI	RBP	HQI
12972 (31)	40 - Intermediate	37 - High	30 - High	17 – Intermediate
17897 (31)	38 – Limited-Intermediate	33 – Intermediate	31 - High	18 - Intermediate
12974 (31)	32 - Limited	35 - Intermediate	24 - Intermediate	16 - Intermediate

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 2104. Statewide IBI scores averaged approximately 36 (Intermediate-Limited) across all sites over both sampling events. This result was in poor agreement with the designated aquatic life use, which was determined as “High” (0% overall). Regional IBI scores averaged 33 for the three sites and represented a higher agreement with the standard (33%; 67% below standard). RBP scores

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averaged approximately 26 (Intermediate), a 33% agreement (67% below standard), while HQI averaged 17 (Intermediate) in 0% agreement with the aquatic life use (100% below standard).

4.0 DISCUSSION

Average scores of all components generally reflected poor agreement with the high aquatic life use designation for Segment 2104. However, dissolved oxygen concentrations throughout the study were generally above criteria. Stream morphology and hydrology may have played a role in reducing sampling effectiveness, as the river channel is deep and is wadeable only in certain areas. Further, periods of high flow and flooding dominated the segment preceding sampling on both occasions, most likely disrupting the natural vegetative structure of the segment and temporarily dispersing local fish and benthic macroinvertebrate populations.

Segment 2104 did show some spatial and temporal variation in aquatic life use scores among and within sites. EComm is currently investigating the causes for this, but it is hypothesized that several factors may contribute, including flows, time of day, time of year, temperature, and dissolved oxygen levels.

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 below the established standards, despite the acceptable dissolved oxygen levels.

REFERENCES

- CONRAD BLUCHER INSTITUTE FOR SURVEYING AND SCIENCE (CBI) 2004. *Impairment Verification Monitoring –Volume 1: Physical and Chemical Components; Segment 2104, Nueces River.*
- CBI. 2003. *Total Daily Maximum Load Project: Basin Groups D & E Dissolved Oxygen and Bacteria Impairments, Draft Monitoring Plan.* August 2003.
- SULLIVAN, A., M. BEAMAN, F.J. KELLY, V. PALMA AND J. WALTHER. 2004: *Impairment Verification Monitoring in eleven Texas water bodies: Step 1 for the development of successful and cost effective TMDLs.* In: Proceedings of the Water Environment Federation 77th Annual Conference, October 2-6, 2004, New Orleans, LA.
- TEXAS NATURAL RESOURCE CONSERVATION COMMISSION. 1999a. *Surface Water Quality Monitoring Procedures Manual.* Water Quality Division. Surface Water Quality Monitoring Program. GI-252. June 1999.

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

TEXAS PARKS AND WILDLIFE DEPARTMENT. 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
SEGMENT 2140-NUECES RIVER
SEPTEMBER 2003
AUGUST 2004

Ecological Communications Corporation
Austin, TX

BIOTIC ASSESSMENT – BENTHIC MACROINVERTEBRATES

Species Lists and Preliminary Data Manipulation



Benthic Macroinvertebrates - Kick Sample (Qualitative)

Stream: Nueces
Date: 9/30/03
Location: 12974

	Species	N=	Tolerance	FFG	HBI
	<i>Argia</i>	7	6	P	0.736842105
	<i>Enallagma</i>	2	6	P	0.210526316
%	<i>Fallceon</i>	1	4	SCR/CG	0.070175439
P 14.285714	<i>Curicta</i>	1	-	-	-
SCR 27.040816	<i>Belostoma</i>	1	10	P	0.175438596
CG 29.591837	<i>Hydrometrus</i>	1	-	-	-
FC 0	<i>Dineutus</i> (A)	1	5	P	0.087719298
SHR 29.081633	<i>Tropisternus</i> (L)	1	9	P	0.157894737
100	<i>Cyphon</i> (L)	39	-	SCR/CG/SHR	-
	<i>Hydaticus</i> (A)	1	-	P	-
	<i>Coptotomus</i> (A)	1	-	P	-
	<i>Physella</i>	13	9	SCR	2.052631579
	<i>Hyaella</i>	26	8	CG/SHR	3.649122807
	<i>Paleomontes</i>	5	4	CG/SHR	0.350877193
		57	0.14		7.49122807

P-Predator
SCR-Scraper
CG-Collector/Gatherer
FC-Filtering Collector
SHR-Shredder

HBI-Hisenhoff Biotic Index=
sum(nt/N)
n=number of individuals of a
particular taxa
t=tolerance value of that taxa
N=total number of organisms in a
sample

Stream: Nueces
Date: 9/29/03
Location: 17897

	Species	N=	Tolerance	FFG	HBI
	<i>Argia</i>	1	6	P	0.057692308
	<i>Stenonema</i>	4	4	SCR/CG	0.153846154
%	<i>Fallceon</i>	48	4	SCR/CG	1.846153846
P 1.9230769	<i>Farrodes</i>	4	2	SCR/CG	0.076923077
SCR 30.288462	<i>Tricorythodes</i>	19	5	CG	0.913461538
CG 49.519231	<i>Isonychia</i>	3	3	FC	0.086538462
FC 18.269231	<i>Cheumatopsyche</i>	3	6	FC	0.173076923
SHR 0	<i>Smicridea</i>	1	4	FC	0.038461538
100	<i>Berosus</i> (L)	1	9	P	0.086538462
	<i>Stenelmis</i> (A)	6	7	SCR/CG	0.403846154
	<i>Microcyloepus</i> (L)	1	2	SCR/CG	0.019230769
	<i>Simulium</i>	12	4	FC	0.461538462
	<i>Paleomontes</i>	1	4	CG	0.038461538
		104	8.45454545		4.355769231

Stream: Nueces
Date: 9/23/03
Location: 12972

	Species	N=	Tolerance	FFG	HBI
	<i>Enallagma</i>	3	6	P	0.176470588
	<i>Fallceon</i>	31	4	SCR/CG	1.215686275
%	<i>Caenis</i>	32	7	CG/SCR	2.196078431
P 11.746032	<i>Tricorythodes</i>	14	5	CG	0.68627451
SCR 36.666667	<i>Hydrometrus</i>	1	-	-	-
CG 48.412698	<i>Dineutus</i> (L)	1	5	P	0.049019608
FC 2.2222222	<i>Berosus</i> (A)	3	9	P	0.264705882
SHR 0.952381	<i>Coptotomus</i> (A)	3	-	P	-
100	<i>Peltodytes</i> (A)	2	8	SHR/P	0.156862745
	Chironomidae	4	6	P/FC/CG	0.235294118
	<i>Physella</i>	7	9	SCR	0.617647059
	<i>Corbicula</i>	1	6	FC	0.058823529
	Cambaridae	4	5	CG	0.196078431
		102	0.96153846		5.852941176

Benthic Macroinvertebrates - Kick Sample (Qualitative)

Stream: Nueces
Date: 8/10/2004
Location: 12974

	Species	N=	Tolerance	FFG	HBI
	<i>Argia</i>	1	6	P	0.081081081
	<i>Hetaerina</i>	6	6	P	0.486486486
%	<i>Tricorythodes</i>	1	5	CG	0.067567568
P 22.131148	<i>Thraulodes</i>	27	2	CG/SCR	0.72972973
SCR 20.355191	<i>Belostoma</i>	3	10	P	0.405405405
CG 34.289617	<i>Dineutus</i>	3	5	P	0.202702703
FC 4.0983607	<i>Scirtes</i>	26	-	SCR/CG/SHR	-
SHR 19.125683	<i>Cyphon</i>	8	-	SCR/CG/SHR	-
100	<i>Celina (A)</i>	7	-	P	-
	<i>Laccophilus(A)</i>	1	-	P	-
	<i>Laccodytes (A)</i>	6	-	P	-
	<i>Palaemonetes</i>	4	4	CG	0.216216216
	<i>Corbicula</i>	5	6	FC	0.405405405
	<i>Hyalella</i>	24	8	CG/SHR	2.594594595
		74	0.8974359		5.189189189

Stream: Nueces
Date: 8/11/04
Location: 17897

	Species	N=	Tolerance	FFG	HBI
	<i>Argia</i>	4	6	P	0.184615385
	<i>Hetaerina</i>	2	6	P	0.092307692
%	<i>Erpetogomphus</i>	1	1	P	0.007692308
P 5.6410256	<i>Tricorythodes</i>	3	5	CG	0.115384615
SCR 21.153846	<i>Fallceon</i>	43	4	SCR/CG	1.323076923
CG 32.179487	<i>Isonychia</i>	29	3	FC	0.669230769
FC 40.769231	<i>Thraulodes</i>	2	2	CG/SCR	0.030769231
SHR 0.2564103	<i>Cheumatopsyche</i>	3	6	FC	0.138461538
100	<i>Smicridea</i>	15	4	FC	0.461538462
	<i>Nectopsyche</i>	1	3	SHR/CG/P	0.023076923
	<i>Stenelmis (A)</i>	9	7	CG/SCR	0.484615385
	<i>Stenelmis (L)</i>	1	7	CG/SCR	0.053846154
	<i>Simulium</i>	1	4	FC	0.030769231
	<i>Palaemonetes</i>	11	4	CG	0.338461538
	<i>Corbicula</i>	5	6	FC	0.230769231
		130	4.45405983		4.184615385

P-Predator
SCR-Scraper
CG-Collector/Gatherer
FC-Filtering Collector
SHR-Shredder

HBI-Hisenhoff Biotic Index=
sum(nt/N)
n=number of individuals of a
particular taxa
t=tolerance value of that taxa
N=total number of organisms in a
sample

Stream: Nueces
Date: 8/10/04
Location: 12972

	Species	N=	Tolerance	FFG	HBI
	<i>Argia</i>	1	6	P	0.06
	<i>Hetaerina</i>	3	6	P	0.18
%	<i>Brechmorhoga</i>	2	6	P	0.12
P 16.666667	<i>Erpetogomphus</i>	10	1	P	0.1
SCR 28.5	<i>Tricorythodes</i>	4	5	CG	-
CG 33.166667	<i>Fallceon</i>	39	4	SCR/CG	1.56
FC 21.666667	<i>Isonychia</i>	18	3	FC	0.54
SHR 0	<i>Cheumatopsyche</i>	1	6	FC	-
100	<i>Smicridea</i>	2	4	FC	0.08
	<i>Stenelmis (A)</i>	18	7	CG/SCR	1.26
	<i>Chironomidae</i>	2	6	P/CG/FC	0.12
		100	2.7037037		4.02

BIOTIC ASSESSMENT – BENTHIC MACROINVERTEBRATES

Rapid Bioassessment Protocol



Stream: Nueces Date: 9/30/03 Location: 12974 County: Live Oak		
Metric	Value	Score
1. Taxa Richness	14	2
2. EPT Taxa Abundance	1	1
3. Biotic Index (HBI)	7.49	1
4. % Chironomidae	0	1
5. % Dominant Taxon	39	2
6. % Dominant FFG	29.59183673	4
7. % Predators	14.28571429	4
8. Ratio of Intolerant:Tolerant Taxa	0.14	1
9. % of Total Trichoptera as Hydropsychidae	NoTrichoptera	1
10. # of Non-insect Taxa	3	2
11. % Collector-Gatherers	29.59183673	3
12. % of Total Number as Elmidae	0	1
Aquatic Life Use: INTERMEDIATE	Total Score:	23

Stream: Nueces Date: 9/29/03 Location: 17897 County: McMullen		
Metric	Value	Score
1. Taxa Richness	13	2
2. EPT Taxa Abundance	7	3
3. Biotic Index (HBI)	4.36	3
4. % Chironomidae	0	1
5. % Dominant Taxon	30.18867925	3
6. % Dominant FFG	63.61904762	1
7. % Predators	11.74285714	4
8. Ratio of Intolerant:Tolerant Taxa	4.1	3
9. % of Total Trichoptera as Hydropsychidae	100	1
10. # of Non-insect Taxa	1	1
11. % Collector-Gatherers	49.51923077	1
12. % of Total Number as Elmidae	6.603773585	4
Aquatic Life Use: INTERMEDIATE	Total Score:	27

Stream: Nueces Date: 9/23/03 Location: 12972 County: McMullen		
Metric	Value	Score
1. Taxa Richness	13	2
2. EPT Taxa Abundance	3	1
3. Biotic Index (HBI)	5.85	1
4. % Chironomidae	3.773584906	4
5. % Dominant Taxon	30.18867925	3
6. % Dominant FFG	63.61904762	1
7. % Predators	11.74285714	4
8. Ratio of Intolerant:Tolerant Taxa	0.96	1
9. % of Total Trichoptera as Hydropsychidae	NoTrichoptera	1
10. # of Non-insect Taxa	3	2
11. % Collector-Gatherers	48.40952381	1
12. % of Total Number as Elmidae	0	1
Aquatic Life Use: INTERMEDIATE	Total Score:	22

Metrics and Scoring for Kick Samples, Rapid Bioassessment Protocol - Benthic Macroinvertebrates

Stream: Nueces Date: 8/10/04 Location: 12974 County: Live Oak		
Metric	Value	Score
1. Taxa Richness	14	2
2. EPT Taxa Abundance	2	1
3. Biotic Index (HBI)	5.19	2
4. % Chironomidae	0	1
5. % Dominant Taxon	22.13114754	4
6. % Dominant FFG	34.28688525	4
7. % Predators	22.13114754	3
8. Ratio of Intolerant:Tolerant Taxa	0.9	1
9. % of Total Trichoptera as Hydropsychidae	NoTrichoptera	1
10. # of Non-insect Taxa	3	2
11. % Collector-Gatherers	34.28688525	2
12. % of Total Number as Elmidae	0	1
Aquatic Life Use: INTERMEDIATE	Total Score:	24

Stream: Nueces Date: 8/11/04 Location: 17897 County: McMullen		
Metric	Value	Score
1. Taxa Richness	15	3
2. EPT Taxa Abundance	7	3
3. Biotic Index (HBI)	4.18	3
4. % Chironomidae	0	1
5. % Dominant Taxon	33.07692308	2
6. % Dominant FFG	40.76923077	3
7. % Predators	5.615384615	4
8. Ratio of Intolerant:Tolerant Taxa	4.45	3
9. % of Total Trichoptera as Hydropsychidae	94.73684211	1
10. # of Non-insect Taxa	2	2
11. % Collector-Gatherers	32.17692308	2
12. % of Total Number as Elmidae	7.692307692	4
Aquatic Life Use: HIGH	Total Score:	31

Stream: Nueces Date: 8/10/04 Location: 12972 County: McMullen		
Metric	Value	Score
1. Taxa Richness	11	2
2. EPT Taxa Abundance	5	2
3. Biotic Index (HBI)	4.02	3
4. % Chironomidae	2	4
5. % Dominant Taxon	39	2
6. % Dominant FFG	33.16	3
7. % Predators	16.67	3
8. Ratio of Intolerant:Tolerant Taxa	2.7	2
9. % of Total Trichoptera as Hydropsychidae	33.33333333	3
10. # of Non-insect Taxa	0	1
11. % Collector-Gatherers	33.16	2
12. % of Total Number as Elmidae	18	3
Aquatic Life Use: HIGH	Total Score:	30

BIOTIC ASSESSMENT – FISH

Species Lists and Preliminary Data Manipulation



FISH COLLECTED

Stream: Nueces	Species	N=	Type	Method	Tolerance	Trophic Gp.
Date: 9/23/03	Bluegill	3	SF	E	T	IF
Location: 12972	Bullhead Minnow	5	CY	E		IF
	Gizzard Shad	3		E	T	O
	Green Sunfish	11	SF	E	T	P
	Lepomis sp.	5	SF	E		
* 1 RGC with infection	Longear Sunfish	5	SF	E		IF
	Rio Grande Cichlid	2		E		IF
	Sailfin Molly	5		E	T	O
	Texas Shiner	1	CY	E		IF
	Warmouth	5	SF	E	T	P
	Western Mosquitofish	21		E	T	IF
		66			48	37

Stream: Nueces	Species	N=	Type	Method	Tolerance	Trophic Gp.
Date: 9/30/03	Bluegill	2	SF	E	T	IF
Location: 12974	Western Mosquitofish	4		E	T	IF
		6				

Stream: Nueces	Species	N=	Type	Method	Tolerance	Trophic Gp.
Date: 9/30/03	Bluegill	6	SF	E	T	IF
Location: 17897	Bullhead Minnow	4	CY	E		IF
	Channel Catfish	1		E	T	O
	Green Sunfish	5	SF	E	T	P
	Lepomis sp.	1	SF	S		-
	Longear Sunfish	17	SF	E		IF
	Longear Sunfish	1	SF	S		IF
	Mexican Tetra	1		S		IF
	Red Shiner	69	CY	E	T	IF
	Red Shiner	47	CY	S	T	IF
	Rio Grande Cichlid	4		E		IF
	Sailfin Molly	7		E	T	O
	Sailfin Molly	17		S	T	O
	Western Mosquitofish	7		E	T	IF
	Western Mosquitofish	79		S	T	IF
		266		146	152	235

FISH COLLECTED

Stream: Nueces
Date: 8/10/04
Location: 12972

Species	N=	Type	Method	Tolerance	Trophic Gp.
Amazon Molly	2		S		O
Bullhead Minnow	15	CY	E		IF
Bullhead Minnow	37	CY	S		IF
Channel Cat	3		E	T	O
Channel Cat	1		S	T	O
Gizzard Shad	1		S	T	O
Green Sunfish	3	SF	E	T	P
Longear Sunfish	4	SF	E		IF
Longear Sunfish	1	SF	S		IF
Red Shiner	4	CY	E	T	IF
Red Shiner	71	CY	S	T	IF
Sailfin Molly	4		E	T	O
Sailfin Molly	2		S	T	O
Texas Shiner	5	CY	S		IF
Warmouth	2	SF	E	T	P
Western Mosquitofish	53		S	T	IF
Western Mosquitofish	34		E	T	IF
<hr/>					
242					

Stream: Nueces
Date: 8/10/04
Location: 12974

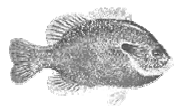
Species	N=	Type	Method	Tolerance	Trophic Gp.
Bluegill	2	SF	E	T	IF
Western Mosquitofish	5		E	T	IF
Green Sunfish	2	SF	E	T	P
Green SF x Warmouth	1	SF	E	T	P
Warmouth	5	SF	E	T	P
Bullhead Catfish	1		V		O
Gar	1		V	T	P
Cyprinid 1	2	CY	E		IF
Cyprinid 2	2	CY	E		IF
<hr/>					
21					

Stream: Nueces
Date: 8/11/04
Location: 17897

Species	N=	Type	Method	Tolerance	Trophic Gp.
Bullhead Minnow	1	CY	S		IF
Bullhead Minnow	16	CY	E		IF
Channel Catfish	4		E	T	O
Green Sunfish	3	SF	E	T	P
Green SF x Bluegill	1	SF	E	T	-
Longear Sunfish	1	SF	E		IF
Flathead Catfish	1		E		P
Mexican Tetra	4		E		IF
Red Shiner	8	CY	E	T	IF
Red Shiner	1	CY	S	T	IF
Texas Shiner	6	CY	S		IF
Sailfin Molly	2		E	T	O
Sailfin Molly	39		S	T	O
Darter	1	D	E		IF
Sucker	1	S	E	-	-
Longnose Gar	1		S	T	O
Western Mosquitofish	32		S	T	IF
<hr/>					
122		80		59	

BIOTIC ASSESSMENT – FISH

Indices of Biotic Integrity – Statewide Criteria



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

Stream: Nueces Date: 9/23/03 Location: 12972 County: Live Oak			
Category	Metric	Value	Score
Species Richness and Composition	1. Total # of fish species	11	3
	2. Number of darter species	0	1
	3. Number of sunfish species (exc. bass)	5	5
	4. Number of sucker species	0	1
	5. Number of intolerant species	0	1
	6. Percentage of individuals as tolerants	78.68852459	1
Trophic Composition	7. Percentage of individuals as omnivores	13.1147541	5
	8. Percentage of individuals as insectivores	60.6557377	3
	9. Percentage of individuals as piscivores	26.2295082	5
Fish Abundance and Condition	10. Number of individuals in sample	66	3
	11. Percentage of individuals as hybrids	0	5
	12. Percentage of individuals with disease/anomolies	0	5
Aquatic Life Use: LIMITED-INTERMEDIATE		Total Points:	38

Stream: Nueces Date: 9/30/03 Location: 12974 County: McMullen			
Category	Metric	Value	Score
Species Richness and Composition	1. Total # of fish species	2	1
	2. Number of darter species	0	1
	3. Number of sunfish species (exc. bass)	1	3
	4. Number of sucker species	0	1
	5. Number of intolerant species	0	1
	6. Percentage of individuals as tolerants	100	1
Trophic Composition	7. Percentage of individuals as omnivores	0	5
	8. Percentage of individuals as insectivores	100	5
	9. Percentage of individuals as piscivores	0	1
Fish Abundance and Condition	10. Number of individuals in sample	6	1
	11. Percentage of individuals as hybrids	0	5
	12. Percentage of individuals with disease/anomolies	0	5
Aquatic Life Use: LIMITED		Total Points:	30

Stream: Nueces Date: 9/30/03 Location: 17897 County: McMullen			
Category	Metric	Value	Score
Species Richness and Composition	1. Total # of fish species	11	3
	2. Number of darter species	0	1
	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	89.81132075	1
Trophic Composition	7. Percentage of individuals as omnivores	9.433962264	5
	8. Percentage of individuals as insectivores	88.67924528	5
	9. Percentage of individuals as piscivores	1.886792453	3
Fish Abundance and Condition	10. Number of individuals in sample	266	5
	11. Percentage of individuals as hybrids	0	5
	12. Percentage of individuals with disease/anomolies	0	5
Aquatic Life Use: INTERMEDIATE		Total Points:	40

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

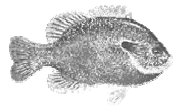
Stream: Nueces		Date: 8/10/04	Location: 12972	County: Live Oak	
Category	Metric	Value	Score		
Species Richness and Composition	1. Total # of fish species	11	3		
	2. Number of darter species	0	1		
	3. Number of sunfish species (exc. bass)	3	5		
	4. Number of sucker species	0	1		
	5. Number of intolerant species	0	1		
	6. Percentage of individuals as tolerants	73.55371901	1		
Trophic Composition	7. Percentage of individuals as omnivores	5.371900826	5		
	8. Percentage of individuals as insectivores	92.56198347	5		
	9. Percentage of individuals as piscivores	2.066115702	3		
Fish Abundance and Condition	10. Number of individuals in sample	242	5		
	11. Percentage of individuals as hybrids	0	5		
	12. Percentage of individuals with disease/anomolies	0	5		
Aquatic Life Use: INTERMEDIATE			Total Points:	40	

Stream: Nueces		Date: 8/10/04	Location: 12974	County: McMullen	
Category	Metric	Value	Score		
Species Richness and Composition	1. Total # of fish species	9	3		
	2. Number of darter species	0	1		
	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	76.19047619	1		
Trophic Composition	7. Percentage of individuals as omnivores	4.761904762	5		
	8. Percentage of individuals as insectivores	52.38095238	3		
	9. Percentage of individuals as piscivores	42.85714286	5		
Fish Abundance and Condition	10. Number of individuals in sample	21	1		
	11. Percentage of individuals as hybrids	4.761904762	1		
	12. Percentage of individuals with disease/anomolies	0	5		
Aquatic Life Use: LIMITED			Total Points:	32	

Stream: Nueces		Date: 8/11/04	Location: 17897	County: McMullen	
Category	Metric	Value	Score		
Species Richness and Composition	1. Total # of fish species	14	3		
	2. Number of darter species	1	3		
	3. Number of sunfish species (exc. bass)	3	5		
	4. Number of sucker species	1	3		
	5. Number of intolerant species	0	1		
	6. Percentage of individuals as tolerants	73.7704918	1		
Trophic Composition	7. Percentage of individuals as omnivores	38.33333333	3		
	8. Percentage of individuals as insectivores	58.33333333	3		
	9. Percentage of individuals as piscivores	3.33333333	3		
Fish Abundance and Condition	10. Number of individuals in sample	120	3		
	11. Percentage of individuals as hybrids	0.819672131	3		
	12. Percentage of individuals with disease/anomolies	0	5		
Aquatic Life Use: LIMITED-INTERMEDIATE			Total Points:	38	

BIOTIC ASSESSMENT – FISH

Indices of Biotic Integrity – Regional Criteria



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

Stream: Nueces (31) Date: 9/23/03 Location: 12972 County: Live Oak		
Metric	Value	Score
1. Total # of fish species	11	3
2. Total Number of cyprinid species	2	1
3. Number of benthic species	0	1
4. Number of sunfish species (exc. bass)	5	5
5. Percentage of individuals as tolerants (exc. <i>G.affinis</i>)	36.06557377	3
6. Percentage of individuals as omnivores	13.1147541	3
7. Percentage of individuals as insectivores	60.6557377	3
8. Percentage of individuals as piscivores	26.2295082	5
9. Number of individuals in sample		~
a. Number of individuals/seine haul	0	1
b. Number of individuals/min. electroshocking	4.4	3
10. Percentage of individuals as non-native species	0	5
11. Percentage of individuals with disease/anomalies	1.515151515	1
Aquatic Life Use: INTERMEDIATE	Total Points:	33

3*

*Based solely on electroshocking score

Drainage area upstream of Station 12972 = 22,463 sq. km.

Stream: Nueces (31) Date: 9/30/03 Location: 12974 County: McMullen		
Metric	Value	Score
1. Total # of fish species	2	1
2. Total Number of cyprinid species	0	1
3. Number of benthic species	0	1
4. Number of sunfish species (exc. bass)	1	1
5. Percentage of individuals as tolerants (exc. <i>G.affinis</i>)	33.33333333	3
6. Percentage of individuals as omnivores	0	5
7. Percentage of individuals as insectivores	100	5
8. Percentage of individuals as piscivores	0	1
9. Number of individuals in sample		~
a. Number of individuals/seine haul	0	1
b. Number of individuals/min. electroshocking	0.4	1
10. Percentage of individuals as non-native species	0	5
11. Percentage of individuals with disease/anomalies	0	5
Aquatic Life Use: INTERMEDIATE	Total Points:	29

1*

*Based solely on electroshocking score

Drainage area upstream of Station 12974 = 20,555 sq. km.

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

Stream: Nueces (31) Date: 9/30/03 Location: 17897 County: McMullen		
Metric	Value	Score
1. Total # of fish species	11	3
2. Total Number of cyprinid species	2	1
3. Number of benthic species	1	1
4. Number of sunfish species (exc. bass)	4	3
5. Percentage of individuals as tolerants (exc. <i>G.affinis</i>)	57.35849057	1
6. Percentage of individuals as omnivores	9.433962264	3
7. Percentage of individuals as insectivores	88.67924528	5
8. Percentage of individuals as piscivores	1.886792453	1
9. Number of individuals in sample		~
a. Number of individuals/seine hual	24.33333333	3
b. Number of individuals/min. electroshocking	8	3
10. Percentage of individuals as non-native species	0	5
11. Percentage of individuals with disease/anomolies	0	5
Aquatic Life Use: INTERMEDIATE	Total Points:	31

3*

*Average of 9a and 9b

Drainage area upstream of Station 17897 = 21,886 sq. km.

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

Stream: Nueces (31) Date: 8/10/04 Location: 12972 County: Live Oak		
Metric	Value	Score
1. Total # of fish species	11	3
2. Total Number of cyprinid species	3	3
3. Number of benthic species	1	1
4. Number of sunfish species (exc. bass)	3	3
5. Percentage of individuals as tolerants (exc. <i>G.affinis</i>)	37.60330579	3
6. Percentage of individuals as omnivores	5.371900826	5
7. Percentage of individuals as insectivores	92.56198347	5
8. Percentage of individuals as piscivores	2.066115702	1
9. Number of individuals in sample		~
a. Number of individuals/seine haul	28.83333333	3
b. Number of individuals/min. electroshocking	4.6	3
10. Percentage of individuals as non-native species	0	5
11. Percentage of individuals with disease/anomolies	0	5
Aquatic Life Use: HIGH		Total Points: 37

3*

*Average of 9a and 9b

Drainage area upstream of Station 12972 = 22,463 sq. km.

Stream: Nueces (31) Date: 8/10/04 Location: 12974 County: McMullen		
Metric	Value	Score
1. Total # of fish species	9	3
2. Total Number of cyprinid species	2	1
3. Number of benthic species	1	1
4. Number of sunfish species (exc. bass)	4	3
5. Percentage of individuals as tolerants (exc. <i>G.affinis</i>)	52.38095238	1
6. Percentage of individuals as omnivores	4.761904762	5
7. Percentage of individuals as insectivores	52.38095238	3
8. Percentage of individuals as piscivores	42.85714286	5
9. Number of individuals in sample		~
a. Number of individuals/seine haul	0	1
b. Number of individuals/min. electroshocking	1.4	1
10. Percentage of individuals as non-native species	0	5
11. Percentage of individuals with disease/anomolies	0	5
Aquatic Life Use: INTERMEDIATE		Total Points: 33

1*

*Based solely on electroshocking score

Drainage area upstream of Station 12974 = 20,555 sq. km.

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

Stream: Nueces (31) Date: 8/11/04 Location: 17897 County: McMullen		
Metric	Value	Score
1. Total # of fish species	14	5
2. Total Number of cyprinid species	3	3
3. Number of benthic species	3	5
4. Number of sunfish species (exc. bass)	3	3
5. Percentage of individuals as tolerants (exc. <i>G.affinis</i>)	48.76033058	3
6. Percentage of individuals as omnivores	38.33333333	1
7. Percentage of individuals as insectivores	58.33333333	3
8. Percentage of individuals as piscivores	3.33333333	1
9. Number of individuals in sample		~
a. Number of individuals/seine hual	13.33333333	1
b. Number of individuals/min. electroshocking	2.8	1
10. Percentage of individuals as non-native species	0	5
11. Percentage of individuals with disease/anomolies	0	5
Aquatic Life Use: INTERMEDIATE	Total Points:	35

1*

*Average of 9a and 9b

Drainage area upstream of Station 17897 = 21,886 sq. km.

HABITAT ASSESSMENT

Part I – Stream Physical Characteristics Worksheet



12/20/07

Run - 1
Glide -
bend - 11 (well defined)

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

Part I - Stream Physical Characteristics Worksheet

Observers: DN WB Date: 9/23/07 Time: 12:30 Weather conditions: S

Stream: Naces Location of site: 12972 Length of stream reach: 250

Stream Segment No.: Observed Stream Uses: Rel 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										Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
				Thalweg Depth:												
U1 255 upstream crom bridge above bend in river	11.9	70°	90	0.40										60°	95	105/17
				Habitat Type (Circle One) Riffle Run												
Algae or Macrophytes (Circle One) Abundant/ Common Rate Absent	Width of Natural Buffer (m)	Left Bank Erosion Potential (%)	Dominant Substrate Type	Stream Cover Types:										% Instream Cover	% Gravel or Larger	
				Gravel												
U2 50m down from U1	11	100°	90	0.23										45	90	105/17
				Habitat Type (Circle One) Riffle Run												
Algae or Macrophytes (Circle One) Abundant/ Common Rare/Absent	Width of Natural Buffer (m)	Left Bank Erosion Potential (%)	Dominant Substrate Type	Stream Cover Types:										% Instream Cover	% Gravel or Larger	
				Gravel												

Stream Depths (m) at Points Across Transect

Dominant Types Riparian Vegetation:
Left Bank: 20 tree 20 shrub 50 grass 10 other
Right Bank: 20 tree 30 shrub 40 grass 10 other

Instream Cover Types:
overhangs, veg, roots, snags, gravel, cobble

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	0.65 Thalweg Depth:	Stream Depth (m) at Points Across Transect										Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)		
U3 50m down from U2 at pipeline row	14.7	50°	90	11.84	90	95	96	98	90	58	54	31	04	33	90	0			
Habitat Type (Circle One) Riparian Run Gilled Pool	Dominant Substrate Type: Gravel			Dominant Types Riparian Vegetation: Left Bank: 15 grass 25 other Right Bank: 75 grass 25 other										% Gravel or Larger: 40%					
Algae or Macrophytes (Circle One) Absent Common Rare Absent	Width of Natural Buffer: LB: 0 RB: 0			Instream Cover Types: Snags, Macro, Gravel													% Instream Cover: 10%		

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	0.70 Thalweg Depth:	Stream Depth (m) at Points Across Transect										Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)		
U4 50m down from U3	11.9	110°	90	1.44	76	70	74	90	87	90	86	84	108	104	70	85	817		
Habitat Type (Circle One) Riparian Run Gilled Pool	Dominant Substrate Type: bedrock			Dominant Types Riparian Vegetation: Left Bank: 20 tree 5 shrub 55 grasses 20 other Right Bank: 20 tree 10 shrub 30 Rubus 40 other 50%										% Gravel or Larger: 50%					
Algae or Macrophytes (Circle One) Absent Common Rare Absent	Width of Natural Buffer: LB: 20 RB: 20			Instream Cover Types: Gravel, cobble, macro			overhangs, veg, snags										% Instream Cover: 10%		

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	1.10 Thalweg Depth:	Stream Depth (m) at Points Across Transect										Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)		
U5 50m down from U4	8.5	55	90	1.12	1.11	1.15	1.23	1.29	1.45	1.50	1.49	1.07	1.00	1.22	50	90	817		
Habitat Type (Circle One) Riparian Run Gilled Pool	Dominant Substrate Type: Gravel			Dominant Types Riparian Vegetation: Left Bank: 20 tree 25 shrub 55 grasses 10 other Right Bank: 15 tree 5 shrub 40 Rubus 40 other 50%										% Gravel or Larger: 50%					
Algae or Macrophytes (Circle One) Absent Common Rare Absent	Width of Natural Buffer: LB: 20 RB: 20			Instream Cover Types: Overhang, veg, roots			Gravel, cobble, macro, snags										% Instream Cover: 10		

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

12/26/03

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

Part I - Stream Physical Characteristics Worksheet

Observers: SWMS Date: 9/30/03 9:30 am

Stream: Nilees Location of site: 12974 Length of stream reach: 450

Stream Segment No.: ___ Observed Stream User: ___ 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 Observations/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 (%)	Thalweg Depth:										Right Bank Slope (%)	Right Bank Erosion Potential (%)	Tree Canopy (%)																			
				Stream Depths (m) at Points Across Transect																															
U1 at snags ~50m up from bridge	9.65	22	95	1.0	1.04	1.38	1.04	1.20	1.50	1.55	1.40	1.34	1.30	1.04	1.12	50	95	17/17																	
Habitat Type (Circle One): Kettle Run Glide Pool		Dominant Substrate Type		Width of Natural Buffer LB: ___ RB: ___		Instream Cover Types:		Dominant Types Riparian Vegetation: Left Bank: 20 tree 30 shrub 30 grass 20 other Right Bank: 5 tree 80 grass 15 other								% Gravel or Larger		% Instream Cover																	
Algae or Macrophytes (Circle One): Abundant Common Rare Absent		Left Bank Erosion Potential (%)		Thalweg Depth:		Stream Cover Types:		Stream Depths (m) at Points Across Transect								Right Bank Erosion Potential (%)		Tree Canopy (%)																	
U2 90 m down from U1		12.25		80		95		1.13		1.06		1.60		1.40		2.0		2.15		2.14		1.24		.90		.54		.06		45		95		11/17	
Habitat Type (Circle One): Kettle Run Glide Pool		Dominant Substrate Type		Width of Natural Buffer LB: ___ RB: ___		Instream Cover Types:		Dominant Types Riparian Vegetation: Left Bank: 5 tree 15 shrub 40 grass 5 other Right Bank: 10 tree 10 shrub 40 grass 20 other								% Gravel or Larger		% Instream Cover																	
Algae or Macrophytes (Circle One): Abundant Common Rare Absent		Left Bank Erosion Potential (%)		Thalweg Depth:		Stream Cover Types:		Stream Depths (m) at Points Across Transect								Right Bank Erosion Potential (%)		Tree Canopy (%)																	
U2 90 m down from U1		12.25		80		95		1.13		1.06		1.60		1.40		2.0		2.15		2.14		1.24		.90		.54		.06		45		95		11/17	
Habitat Type (Circle One): Kettle Run Glide Pool		Dominant Substrate Type		Width of Natural Buffer LB: ___ RB: ___		Instream Cover Types:		Dominant Types Riparian Vegetation: Left Bank: 5 tree 15 shrub 40 grass 5 other Right Bank: 10 tree 10 shrub 40 grass 20 other								% Gravel or Larger		% Instream Cover																	
Algae or Macrophytes (Circle One): Abundant Common Rare Absent		Left Bank Erosion Potential (%)		Thalweg Depth:		Stream Cover Types:		Stream Depths (m) at Points Across Transect								Right Bank Erosion Potential (%)		Tree Canopy (%)																	

Location of Transect	Stream Width (m)	Left Bank Slope (%)	Left Bank Erosion Potential (%)	Thalweg Depth:										Right Bank Slope (%)	Right Bank Erosion Potential (%)	Tree Canopy (%)																			
				Stream Depths (m) at Points Across Transect																															
U1 at snags ~50m up from bridge	9.65	22	95	1.0	1.04	1.38	1.04	1.20	1.50	1.55	1.40	1.34	1.30	1.04	1.12	50	95	17/17																	
Habitat Type (Circle One): Kettle Run Glide Pool		Dominant Substrate Type		Width of Natural Buffer LB: ___ RB: ___		Instream Cover Types:		Dominant Types Riparian Vegetation: Left Bank: 20 tree 30 shrub 30 grass 20 other Right Bank: 5 tree 80 grass 15 other								% Gravel or Larger		% Instream Cover																	
Algae or Macrophytes (Circle One): Abundant Common Rare Absent		Left Bank Erosion Potential (%)		Thalweg Depth:		Stream Cover Types:		Stream Depths (m) at Points Across Transect								Right Bank Erosion Potential (%)		Tree Canopy (%)																	
U2 90 m down from U1		12.25		80		95		1.13		1.06		1.60		1.40		2.0		2.15		2.14		1.24		.90		.54		.06		45		95		11/17	
Habitat Type (Circle One): Kettle Run Glide Pool		Dominant Substrate Type		Width of Natural Buffer LB: ___ RB: ___		Instream Cover Types:		Dominant Types Riparian Vegetation: Left Bank: 5 tree 15 shrub 40 grass 5 other Right Bank: 10 tree 10 shrub 40 grass 20 other								% Gravel or Larger		% Instream Cover																	
Algae or Macrophytes (Circle One): Abundant Common Rare Absent		Left Bank Erosion Potential (%)		Thalweg Depth:		Stream Cover Types:		Stream Depths (m) at Points Across Transect								Right Bank Erosion Potential (%)		Tree Canopy (%)																	

bend - 11 well defined
1 moderate

7/2/02

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	1.21 Transect Depth:	Stream Depth (m) at Points Across Transect										Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
					U3	12.3	75	95	1.70	1.03	1.35	1.55	2.10	2.10			
90 m down from U2	Habitat Type (Circle One) Riparian Grass Glide Pool	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer (m) L.R. R.B. >>> 200	Dominant Substrate Type 6:1T	Dominant Types Riparian Vegetation: Left Bank: 10 tree 5 shrub 70 grass 15 other Right Bank: 15 tree 10 shrub 45 grass 10 other										% Instream Cover 10	% Gravel or Larger 0	
Stream Cover Types: snags, roots, overhanging veg.																	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	1.4 Transect Depth:	Stream Depth (m) at Points Across Transect										Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
					U4	11.2	75	95	1.49	1.21	1.51	2.20	2.25	2.25			
90 m down from U3	Habitat Type (Circle One) Riparian Grass Glide Pool	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer (m) L.R. R.B. >>> 200	Dominant Substrate Type 6:1T	Dominant Types Riparian Vegetation: Left Bank: 15 tree 15 shrub 40 grass 30 other Right Bank: 5 tree 15 shrub 40 grass 20 other										% Instream Cover 5	% Gravel or Larger 0	
Stream Cover Types: snags, roots, overhanging veg.																	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	0.99 Transect Depth:	Stream Depth (m) at Points Across Transect										Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
					U5	10.95	50	95	1.03	1.45	1.89	1.00	1.10	1.34			
90 m down from U4	Habitat Type (Circle One) Riparian Grass Glide Pool	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer (m) L.R. R.B. >>> 200	Dominant Substrate Type 6:1T	Dominant Types Riparian Vegetation: Left Bank: 25 tree 35 grass 40 other Right Bank: 20 tree 50 grass 30 other										% Instream Cover 10	% Gravel or Larger 0	
Stream Cover Types: snags, roots, snags																	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	1.1 Transect Depth:	Stream Depth (m) at Points Across Transect										Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
					U6	15.0	60	95	1.10	1.05	1.44	1.70	2.25	1.65			
90 m down from U5	Habitat Type (Circle One) Riparian Grass Glide Pool	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer (m) L.R. R.B. >>> 200	Dominant Substrate Type silt	Dominant Types Riparian Vegetation: Left Bank: 5 tree 80 grass 15 other Right Bank: 30 tree 20 grass 50 other										% Instream Cover 10	% Gravel or Larger 0	
Stream Cover Types: snags, artificial roots, overhanging veg.																	

12/26/07

17697

bend - 1 pool
pool - 11
riffle - 1
run - 1

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

Part I - Stream Physical Characteristics Worksheet

Observers: Low MB Date: 9/30/03 Time: 12 Weather conditions: S
 Stream: Nucleus Location of site: 10008 Length of stream reach: 300m
 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 (%)	Thalweg Depth:										Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)	
				Stream Depths (m) at Points Across Transect													
D1 135m wide at U-shaped bend in river	8.1	30	90	0.04	0.49	0.58	0.64	0.65	0.68	0.70	0.78	0.84	0.75	0.04	45	90	517
Habitat Type (Circle One) Riffle Run Glide Pool		Dominant Substrate Type Gravel		Instream Cover Types: Gravel/macro snags										% Instream Cover 55		% Gravel or Larger 55	
Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer (m) LB: <u>220</u> RB: <u>220</u>		Instream Cover Types: Gravel/macro snags										% Instream Cover 5			

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Thalweg Depth:										Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)	
				Stream Depths (m) at Points Across Transect													
D2 75m up from D1	9.0	45	90	0.05	0.05	0.59	0.54	0.50	0.46	0.45	0.42	0.35	0.28	0.02	11	90	917
Habitat Type (Circle One) Riffle Run Glide Pool		Dominant Substrate Type Gravel		Instream Cover Types: Gravel, snags, roots, macro										% Instream Cover 60		% Gravel or Larger 60	
Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer (m) LB: <u>220</u> RB: <u>220</u>		Instream Cover Types: Gravel, snags, roots, macro										% Instream Cover 6			

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

Part I - Stream Physical Characteristics Worksheet

Observers: JBW Date: 4/14/01 Weather conditions: RC

Stream: Nice Location of site: 1272 Length of stream reach: 250m

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

Well - 1
Mod - 1
Poor
G/LR - 1
R/LR
Rn - 1

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Thalweg Depth:										Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
				Dominant Substrate Type	0.03	0.35	0.40	0.53	0.55	0.58	0.60	0.50	0.38			
U1 255 UP Narrow width	12.5	40°	75%	Gravel											90%	75/14
Habitat Type (Circle One) Riffle Run Gravel Pool		Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: 728 RB: 770		Instream Cover Types: Swampy Pool, Gravel		Dominant Types Riparian Vegetation: Left Bank: 10T, 5S, 5H, 80% D Right Bank: 15T, 5H, 80% D		% Instream Cover: 8%						

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Thalweg Depth:										Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
				Dominant Substrate Type	0.11	1.32	1.22	1.15	1.16	1.23	1.30	1.10	0.50			
U2 - 500m Down U1	9.5m	28°	46%	Clay											100%	105/14
Habitat Type (Circle One) Riffle Run Gravel Pool		Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: 728 RB: 770		Instream Cover Types: Gravel, Swag, Lead Rock, Pool		Dominant Types Riparian Vegetation: Left Bank: 15T, 10T, 10T, 10% A 65% D Right Bank: 5%		% Instream Cover: 5%						

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

Part I - Stream Physical Characteristics Worksheet

Observers: JW, BT Date: 3/10/14 Time: 11⁰⁰ Weather conditions: ☀

Stream: Nucers Location of site: 12974 Length of stream reach: 450m

Stream Segment No.: Observed Stream Uses: Rec 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: None No. of Riffles: None Channel Flow Status (circle one): high/moderate/low no flow

Riparian Vegetation (%):
 Left Bank: Trees None Shrubs None Grasses None Forbs None Cult. Fields None Other None
 Right Bank: Trees None Shrubs None Grasses None Forbs None Cult. Fields None Other None

W-1
M-11
P-1
P-1
P-1
P-1

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Thalweg Depth:						Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)	
<u>V1 @ turn in 50m up from bridge</u>	<u>11.5m</u>	<u>25°</u>	<u>95%</u>	<u>0.06</u>	<u>0.58</u>	<u>0.15</u>	<u>1.4</u>	<u>1.5+</u>	<u>0.61</u>	<u>0.01</u>	<u>42°</u>	<u>95%</u>	<u>11.5/12</u>
Habitat Type (Circle One) <u>Riffle Run Glide Pool</u>	Dominant Substrate Type <u>Silt</u>		Width of Natural Buffer (m) LB: <u>70m</u> RB: <u>70m</u>	Instream Cover Types: <u>Sony, Duckweed, Artificial</u>						% Instream Cover <u>10%</u>			
Algae or Macrophytes (Circle One) <u>Absent</u>	Dominant Substrate Type <u>Silt</u>		Stream Depth (m) at Points Across Transect		Dominant Types Riparian Vegetation: <u>None</u>						% Gravel or Larger <u>0%</u>		

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Thalweg Depth:						Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)	
<u>V1 - Down from stream V1 ~ 40m down from bridge</u>	<u>9m</u>	<u>92°</u>	<u>90%</u>	<u>6.35</u>	<u>←</u>	<u>←</u>	<u>←</u>	<u>←</u>	<u>←</u>	<u>←</u>	<u>21°</u>	<u>95%</u>	<u>16/17</u>
Habitat Type (Circle One) <u>Killie Run Glide Pool</u>	Dominant Substrate Type <u>Silt</u>		Width of Natural Buffer (m) LB: <u>70m</u> RB: <u>70m</u>	Instream Cover Types: <u>Sony, Artificial, Leaf Pack, Undercut</u>						% Instream Cover <u>25%</u>			
Algae or Macrophytes (Circle One) <u>Abundant/ Common</u>	Dominant Substrate Type <u>Silt</u>		Stream Depth (m) at Points Across Transect		Dominant Types Riparian Vegetation: <u>None</u>						% Gravel or Larger <u>0%</u>		

Location of Transect		Stream Width (m)		Left Bank Slope (°)	Left Bank Erosion Potential (%)	Thalweg Depth:						Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)			
U3 90m down Cm U2		10.5		43°	85%	0.04	0.25	1.5*				→	0.85	0.14	39°	95%	16/14
Habitat Type: Circle One) Riparian Run Gully Pool		Algae or Macrophytes (Circle One) Abundant Common Rare/Absent		Width of Natural Buffer LB: 20 RB: 20		Dominant Types Riparian Vegetation: Left Bank: 15%T, 20%S, 15%H, 50%O Right Bank: 25%T, 10%O, 10%S, 60%O						Stream Cover Types: Snyg, Art. Fossil, Durban		% Instream Cover		10%	
Left Bank Slope (°)		Right Bank Slope (°)		Right Bank Erosion Potential (%)		Tree Canopy (%)											

Location of Transect		Stream Width (m)		Left Bank Slope (°)	Left Bank Erosion Potential (%)	Thalweg Depth:						Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)				
U4 90m down Cm U3		9.3m		30°	95%	0.05	0.64	0.95				←	1.5*	0.97	0.38	47°	75%	11/14
Habitat Type: Circle One) Riparian Run Gully Pool		Algae or Macrophytes (Circle One) Abundant Common Rare/Absent		Width of Natural Buffer LB: 20 RB: 20		Dominant Types Riparian Vegetation: Left Bank: 10%T, 45%S, 10%H, 70%O Right Bank: 90%O, 10%T						Stream Cover Types: Root, Snyg, Artificial Fossil, Undercut		% Instream Cover		5%		
Left Bank Slope (°)		Right Bank Slope (°)		Right Bank Erosion Potential (%)		Tree Canopy (%)												

Location of Transect		Stream Width (m)		Left Bank Slope (°)	Left Bank Erosion Potential (%)	Thalweg Depth:						Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)			
U5 10m down		9.5m				0.01	0.41	0.81				←	1.5*	0.03	29°	25%	14/14
Habitat Type: Circle One) Riparian Run Gully Pool		Algae or Macrophytes (Circle One) Abundant Common Rare/Absent		Width of Natural Buffer LB: 20 RB: 20		Dominant Types Riparian Vegetation: Left Bank: 15%T, 10%S, 10%H, 15%S, 60%O Right Bank:						Stream Cover Types: Art. Fossil, Root, Snyg		% Instream Cover		10%	
Left Bank Slope (°)		Right Bank Slope (°)		Right Bank Erosion Potential (%)		Tree Canopy (%)											

Location of Transect		Stream Width (m)		Left Bank Slope (°)	Left Bank Erosion Potential (%)	Thalweg Depth:						Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)					
U6 90m down		10.3m		38°	95%	0.07	0.70					←	1.2*	0.95	0.03	0.02	78°	95%	6/14
Habitat Type: Circle One) Riparian Run Gully Pool		Algae or Macrophytes (Circle One) Abundant Common Rare/Absent		Width of Natural Buffer LB: 20 RB: 20		Dominant Types Riparian Vegetation: Left Bank: 25%T, 10%S, 40%O Right Bank: 10%T, 10%S, 80%O						Stream Cover Types: Algae, Snyg		% Instream Cover		5%			
Left Bank Slope (°)		Right Bank Slope (°)		Right Bank Erosion Potential (%)		Tree Canopy (%)													

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

Part I - Stream Physical Characteristics Worksheet

Observers: JW, BH Date: 8/14/10 Time: 1000 Weather conditions: PC
 Stream: Nees Location of site: 1897 Length of stream reach: 300m

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							Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)	
				Thalweg Depth:	0.15	0.46	1.00	1.15	1.15	1.10				1.06
D1 - 15m downstream Drilyp	8m	56°	99%	Stream Depths (m) at Points Across Transect							33°	100%	15/17	
	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type S, L											Dominant Types Riparian Vegetation: Left Bank: <u>20% T, 5% G, 45% O</u> Right Bank: <u>10% T, 5% G, 80% O</u>	
Algae or Macrophytes (Circle One) Abundant-Common Rare/Absent				Width of Natural Buffer Vegetation (m) LB: <u>70</u> RB: <u>70</u>				Instream Cover Types: <u>Overhanging Sun</u>				% Instream Cover 5%		

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect							Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)	
				Thalweg Depth:	0.11	1.03	1.25	1.22	1.08	1.03				0.73
D2 - 160m downstream Drilyp	9m	66°	90%	Stream Depths (m) at Points Across Transect							20°	75%	4.5/17	
	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type Gravel											Dominant Types Riparian Vegetation: Left Bank: <u>10% T, 20% G, 30% O</u> Right Bank: <u>15% T, 15%</u>	
Algae or Macrophytes (Circle One) Abundant-Common Rare/Absent				Width of Natural Buffer Vegetation (m) LB: <u>70</u> RB: <u>70</u>				Instream Cover Types: <u>Gravel, Sun, Roots</u>				% Instream Cover 5%		

Handwritten notes in the top left corner:
 7.0% - 1
 100% - 1
 100% - 1
 100%

HABITAT ASSESSMENT

Part II – Summary of Physical Characteristics of Water Body



Part II - Summary of Physical Characteristics of Water Body

Stream name	Nueces 12974
Date of assessment	9/30/2003
Stream bed slope over evaluated reach	0.002
Approximate drainage area above transect furthest downstream	20,555
Stream order	5
Length of stream evaluated	0.45km
Number of lateral transects made	6
Average stream width	11.9m
Average stream depth	1.19m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	15m
Maximum pool depth	>2.5m
Total number of stream bends	3
Number of well defined bends	2
Number of moderately defined bends	1
Number of poorly defined bends	0
Total number of riffles	0
Dominant substrate type	Silt
Average percent of substrate gravel sized or larger	0%
Average percent instream cover	13%
Number of stream cover types	6
Average percent stream bank erosion potential	95%
Average stream bank slope	54
Average width of vegetative buffer	>20m
Average riparian vegetation percent composition by:	
Trees	14.00%
Shrubs	8%
Grasses/Forbes	54.0%
Cultivated Fields	
Other	24%
Average percent tree canopy coverage	71%
Overall aesthetic appraisal of stream	Natural

Part II - Summary of Physical Characteristics of Water Body

Stream name	Nueces 17897
Date of assessment	9/30/2003
Stream bed slope over evaluated reach	0.003
Approximate drainage area above transect furthest downstream	21,886
Stream order	5
Length of stream evaluated	0.3km
Number of lateral transects made	5
Average stream width	12.7m
Average stream depth	1m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	19m
Maximum pool depth	>2.5m
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	1
Dominant substrate type	Gravel
Average percent of substrate gravel sized or larger	39%
Average percent instream cover	11%
Number of stream cover types	8
Average percent stream bank erosion potential	93%
Average stream bank slope	46
Average width of vegetative buffer	>20m
Average riparian vegetation percent composition by:	
Trees	7%
Shrubs	0%
Grasses/Forbes	76%
Cultivated Fields	
Other	17%
Average percent tree canopy coverage	28%
Overall aesthetic appraisal of stream	Natural

Part II - Summary of Physical Characteristics of Water Body

Stream name	Nueces 12972
Date of assessment	9/23/2003
Stream bed slope over evaluated reach	0.004
Approximate drainage area above transect furthest downstream	22,463
Stream order	5
Length of stream evaluated	0.25km
Number of lateral transects made	5
Average stream width	11.6m
Average stream depth	0.88m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	15m
Maximum pool depth	1.5m
Total number of stream bends	2
Number of well defined bends	2
Number of moderately defined bends	0
Number of poorly defined bends	0
Total number of riffles	0
Dominant substrate type	Gravel
Average percent of substrate gravel sized or larger	62%
Average percent instream cover	8%
Number of stream cover types	6
Average percent stream bank erosion potential	90%
Average stream bank slope	58
Average width of vegetative buffer	>20m
Average riparian vegetation percent composition by:	
Trees	15%
Shrubs	11%
Grasses/Forbes	52%
Cultivated Fields	
Other	22%
Average percent tree canopy coverage	44%
Overall aesthetic appraisal of stream	Natural

Stream name	Nueces 12974
Date of assessment	8/10/2004
Stream bed slope over evaluated reach	0.002222222
Approximate drainage area above transect furthest downstream	20,555
Stream order	5
Length of stream evaluated	0.45km
Number of lateral transects made	6
Average stream width	10.0m
Average stream depth	>1m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	15m
Maximum pool depth	>2.5m
Total number of stream bends	4
Number of well defined bends	1
Number of moderately defined bends	2
Number of poorly defined bends	1
Total number of riffles	0
Dominant substrate type	Silt
Average percent of substrate gravel sized or larger	0%
Average percent instream cover	11%
Number of stream cover types	6
Average percent stream bank erosion potential	90%
Average stream bank slope	37
Average width of vegetative buffer	>20m
Average riparian vegetation percent composition by:	
Trees	21.00%
Shrubs	10%
Grasses/Forbes	5.0%
Cultivated Fields	
Other	64%
Average percent tree canopy coverage	70%
Overall aesthetic appraisal of stream	Common

Stream name	Nueces 17897
Date of assessment	8/11/2004
Stream bed slope over evaluated reach	0.003333333
Approximate drainage area above transect furthest downstream	21,886
Stream order	5
Length of stream evaluated	0.3km
Number of lateral transects made	5
Average stream width	12m
Average stream depth	1m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	17m
Maximum pool depth	>2.5m
Total number of stream bends	1
Number of well defined bends	0
Number of moderately defined bends	1
Number of poorly defined bends	0
Total number of riffles	1
Dominant substrate type	Silt
Average percent of substrate gravel sized or larger	35%
Average percent instream cover	8%
Number of stream cover types	5
Average percent stream bank erosion potential	94%
Average stream bank slope	47
Average width of vegetative buffer	>20m
Average riparian vegetation percent composition by:	
Trees	10%
Shrubs	0%
Grasses/Forbes	15%
Cultivated Fields	
Other	75%
Average percent tree canopy coverage	39%
Overall aesthetic appraisal of stream	Natural

Stream name	Nueces 12972
Date of assessment	8/10/2004
Stream bed slope over evaluated reach	0.004
Approximate drainage area above transect furthest downstream	22,463
Stream order	5
Length of stream evaluated	0.25km
Number of lateral transects made	5
Average stream width	10.4m
Average stream depth	0.84m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	12.5m
Maximum pool depth	>1.5m
Total number of stream bends	2
Number of well defined bends	1
Number of moderately defined bends	1
Number of poorly defined bends	0
Total number of riffles	0
Dominant substrate type	Gravel
Average percent of substrate gravel sized or larger	40%
Average percent instream cover	6%
Number of stream cover types	6
Average percent stream bank erosion potential	93%
Average stream bank slope	39
Average width of vegetative buffer	>20m
Average riparian vegetation percent composition by:	
Trees	9%
Shrubs	7%
Grasses/Forbes	16%
Cultivated Fields	
Other	68%
Average percent tree canopy coverage	46%
Overall aesthetic appraisal of stream	Natural

HABITAT ASSESSMENT

Part III – Habitat Quality Indices



Habitat Parameter	Scoring Category			Location: 12974	Date: 9/30/03
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: 1	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: 1	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	Small Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	Absent No existing pools; only shallow auxiliary 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: 0	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: 3	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 ungrazed 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: 17	INTERMEDIATE				

Habitat Parameter	Scoring Category		Location: 17897	Date: 9/30/03
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: 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: 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: 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: 0	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: 18	INTERMEDIATE			

Habitat Parameter	Scoring Category			Location: 12972	Date: 9/23/03
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: 1	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: 1	1	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 auxiliary 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: 0	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: 3	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: 18	INTERMEDIATE				

Habitat Parameter	Scoring Category			Location: 12974	Date: 8/10/2004
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: 1	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: 1	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 auxiliary 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: 2	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 ungrazed 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				

Habitat Parameter	Scoring Category			Location: 17897	Date: 8/11/2004
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: 1	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: 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: 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 or 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: 18	INTERMEDIATE				

Habitat Parameter	Scoring Category			Location: 12972	Date: 8/10/04
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: 1	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: 1	1	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: 0	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: 2	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: 17	INTERMEDIATE				