Impairment Verification Monitoring
Biological and Habitat Components
Segment 1906, Lower Leon Creek, Texas
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Ecological Communications Corporation
Austin, TX

Impairment Verification Monitoring-Volume 2: Biological and Habitat Components
Segment 1906, Lower Leon Creek

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ABSTRACT

Ecological Communications Corporation (EComm) conducted biological data collection and analysis as part of an impairment verification monitoring project for Lower Leon Creek (Segment 1906). Segment 1906 appears on the State of Texas' 303(d) list as impaired for high aquatic life based on low dissolved oxygen concentrations previously reported by or to the Texas Commission on Environmental Quality (TCEQ) or its predecessor agencies. Due to an insufficient amount of data to support a re-assessment, this water body remained on the draft 2002 303(d) list. The objective of EComm's data assessment was to assemble enough information on the water body to support a use attainability analysis if it was determined that the designated aquatic life use was incorrect.

A separate but related assessment was simultaneously conducted by the Texas Engineering Experiment Station (TEES) and the Conrad Blucher Institute for Surveying and Science (CBI) to facilitate the objective. The TEES/CBI effort included physical and chemical data collection and analysis in an attempt to provide a comprehensive assessment of the water quality within the stream segment. As part of the overriding TMDL project, 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 appears to indicate a lower aquatic life use than the "High" use designated in the Texas Water Quality Standards (TCEQ 2000).

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1.0 INTRODUCTION

In 2000 the Texas Commission on Environmental Quality (TCEQ) initiated a study to investigate water quality impairments in 11 water bodies in Basin Groups D & E identified through the 1999 305(b) Water Quality Inventory as part of a total daily maximum load (TMDL) program. The segments were included on the 1999 State of Texas Clean Water Act 303(d) list as impaired due to concentrations of dissolved oxygen or bacteria or both which exceed established criteria. One of these water bodies was Lower Leon Creek (Segment 1906). The impairment to Segment 1906 was caused by an exceedance of the established dissolved oxygen criteria as indicated by data collected through the statewide monitoring program. Because an insufficient number of 24-hour dissolved oxygen values were available in 2002 to determine if the aquatic life use criterion is supported, Segment 1906 remained on the impaired waters list. As an initial phase in TMDL development, the aquatic life use impairment to Segment 1906 was verified using the latest sampling techniques. The initial assessment was performed so that resources within the program can be efficiently utilized for truly impaired water bodies, preventing TMDL development for a water body that may be delisted or subject to a water quality standards revision at a later date. Chemical, physical, and biological data were collected at 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) TMDL, or 4) Additional monitoring to better characterize the impairment.

Figure 1. Station 12838

Segment 1906 begins approximately 110 yards upstream of State Highway 16 northwest of San Antonio in Bexar County. It flows for approximately 32 miles prior to the confluence with the Medina River in Bexar County. The creek flows through the western portions of San Antonio. Approximately one half of the segment is located inside Interstate 410 Loop. A location map of the segment is provided in Figure 2. Site 12845 is located at U.S. Highway 90 West in San Antonio. Site 12838 is located at Interstate Highway 35 in San Antonio. Site 14198 is located just upstream of Leon Creek Waste Water Treatment Plant.

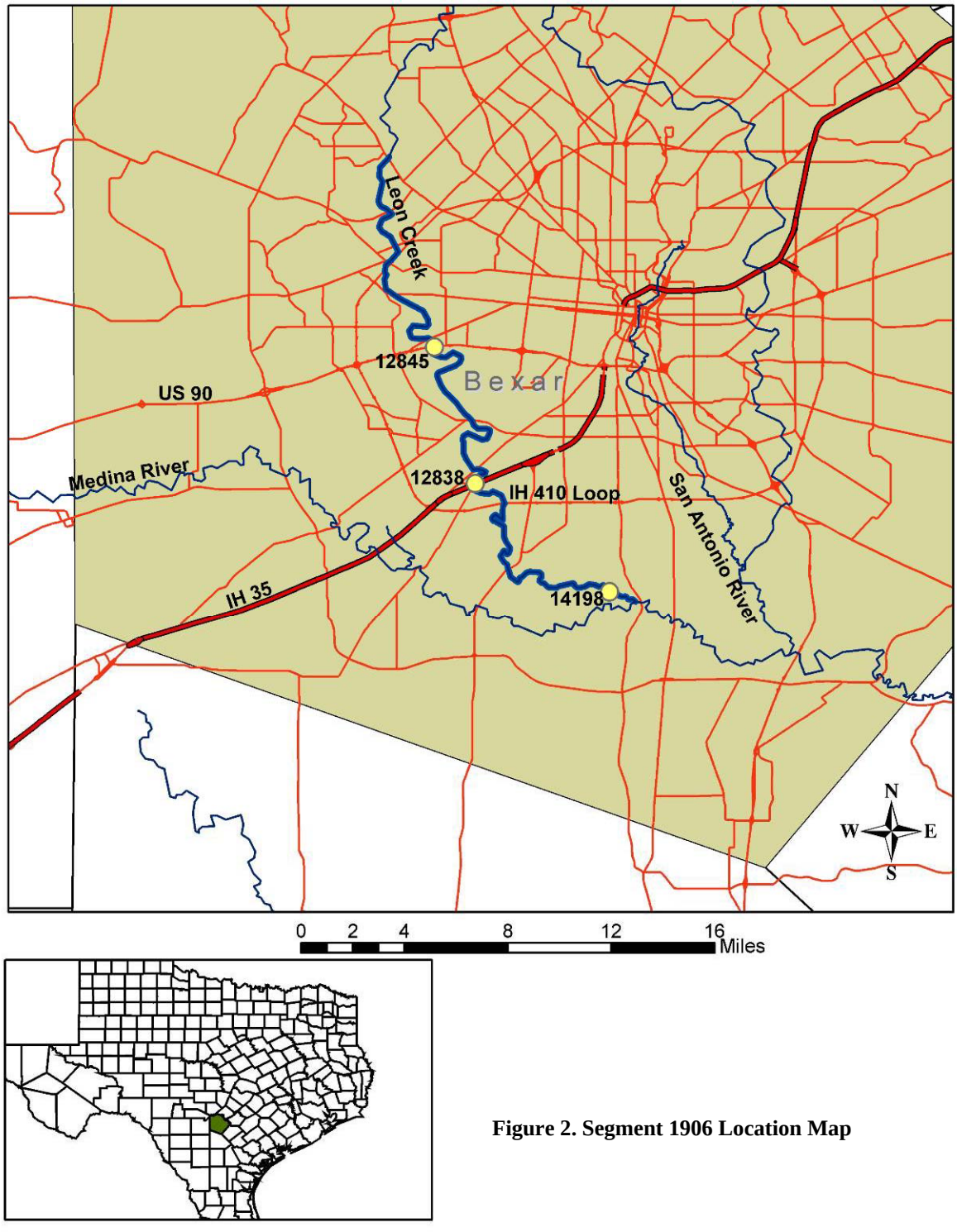

Figure 2. Segment 1906 Location Map

2.0 BIOLOGICAL AND HABITAT METHODOLOGY

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

Figure 3. Station 12845

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

Segment 1906 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 aquatic life impairment based upon exceedences of the dissolved oxygen criteria, a biological sampling regime satisfying the minimum UAA data requirements for biological data was conducted. Biological UAA requirements include at least three complete sampling events over two consecutive index periods. Nekton, benthos, and habitat data are collected and analyzed for each sampling event. 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 1906 was conducted in September 2002, March 2003, and September 2003. Therefore, if it is determined that the aquatic life uses and criteria should be evaluated within a UAA, sufficient data exists to make the determination.

Table 1. STORET Codes

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

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

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

Benthic Macroinvertebrate Collections

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

Figure 4. Station 14198

Nekton Collections

Collection of fish in the field was conducted using both electrofishing and seine methods to ensure a representative sample was collected at each site. Electrofishing was conducted using Smith-Root LR-24 backpack electrofishers powered by either 7 amp-hour or 12 am-hour 24 volt deep-cycle batteries. Each sampling team consisted of three field personnel, including a field director and two technicians. One team member served as the backpack operator while the other two flanked the operator with dip nets. Collected fish were temporarily placed in a five-gallon bucket partially filled with water for later identification. Sampling teams moved in an upstream direction, focusing pulses on snags, along vegetated banks, within large boulders or gravel-based riffles, and any other location most likely to contain fish. Active sampling (instances when current was applied to the water) was conducted for a minimum of 900 seconds. Field teams used best judgment to gauge if enough active sampling had been conducted to collect an accurate representation of present species; therefore, the minimum sampling time was exceeded at some sites. Maximum active sampling time for any site was approximately 1,000 seconds. Upon completion of electrofishing, fish were immediately identified, recorded, and returned to the water in order to minimize mortality. Any fish that could not be identified in the field was preserved in either formalin solution or ethanol. If more than one fish exhibiting the same characteristics could not be field identified, then only one representative specimen was preserved

for later lab identification. Additionally, one individual from each field-identified species was retained as a voucher.

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

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

Habitat Assessment

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

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

Several other subjective habitat parameters were used as required by RWA Procedures 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 assure that all crewmembers were given identical background and similar interpretation of the subjective measurements.

3.0 RESULTS

Aquatic life use determinations were based upon scores for each of the three ecosystem components (fish, benthic macroinvertebrates, and habitat) analyzed for Segment 1906. The fish component resulted in Statewide and Regional IBI scores, the macroinvertebrate component resulted in a RBP score, and the habitat resulted in a HQI score. The scores from each of these calculations in turn relates to a specific Aquatic Life Use designation: limited, intermediate, high, or exceptional (Table 2). The Aquatic Life Use designation is used to assess existing uses according to the health of the sampled biological communities as compared to established water

quality standards. It should be noted that the calculated scores of the Statewide IBI may fall in between two range subcategories (see ranges in Table 2). In these cases, subcategories were assigned as an intermediary between the two subcategories. For example, if a site received a Statewide IBI score of 38, it would fall between the "Limited" and "Intermediate" subcategories, and would be considered to have a "Limited-Intermediate" Aquatic Life Use subcategory.

Table 2. Ranges and Subcategories for each component

Subcategory	Statewide IBI	Regional IBI (Region 32)	RBP	HQI
Limited	<34	<35	<22	<14
Intermediate	40-44	35-40	22-28	14-19
High	48-52	41-48	29-36	20-25
Exceptional	58-60	>48	>36	26-31

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

Table 3. Results of Biological and Habitat Sampling for Segment 1906-Lower Leon Creek

FY02	Statewide IBI	Regional IBI	RBP	HQI
12845	40 – Intermediate	41-High	22 – Intermediate	21 – Intermediate
12838	44 – Intermediate	33 – Limited	21 – Limited	15 – Intermediate
14198	40 - Intermediate	37 - Intermediate	28 - Intermediate	19 – Intermediate
FY03				
12845	42 – Intermediate	46 – High	28 – Intermediate	19 – Intermediate
12838	44 – Intermediate	38 – Intermediate	28 – Intermediate	15 – Intermediate
14198	44 - Intermediate	45 - High	28 - Intermediate	21 – High
FY04				
12845	40 – Intermediate	38 – Intermediate	28 – Intermediate	18 – Intermediate
12838	44 – Intermediate	40 – Intermediate	25 – Intermediate	17 – Intermediate
14198	46 – Intermediate-High	43 - High	33 - High	20 - High

For each component, an average score was calculated using scores from every sampling event. Scores for sampling events for each component that scored within the subcategory "High" agreed with the designated aquatic life use value for the segment. A subcategory of "Limited", "Limited-Intermediate", "Intermediate", or "Intermediate-High" was considered substandard, as it reflects a poorer level of water quality than that for which the segment is designated. A subcategory of "Exceptional" would be considered exceeding standards for Segment 1906. Statewide IBI scores averaged approximately 42.7 (Intermediate) across all sites over all sampling events, and indicated a poor agreement with the designated aquatic life use (0%), which was determined as "high" according the Texas Surface Water Quality Standards (TCEQ 2000). Regional IBI scores averaged 40.1 (Intermediate), and represented a higher agreement (44.4%; 0% above standard). RBP scores averaged 26.8 (Intermediate), an 11.1% agreement

(88.9% below standard), while HQI averaged approximately 18.3 (Intermediate) in 22.2% agreement with the aquatic life use (77.8% below standard).

4.0 DISCUSSION

Average scores of all biological components generally reflected lower values than the high aquatic life use designation for Segment 1906. The general trend in Statewide IBI scores is to underestimate the aquatic life use when compared to other assessment methods (TPWD 2002). Therefore, the lower Statewide IBI scores generated from data collected for this study are most likely not indicative of the true aquatic life use of this segment. Low Regional IBI scores may be attributed to various biological parameters analyzed for each particular sampling event, including low species diversity, low abundance, unbalanced trophic structure, and limited presence of certain indicative species. Dissolved oxygen concentrations throughout the study were consistently above standards.

5.0 CONCLUSION

Based on the Regional IBI, RBP, and HQI scores, the biological and habitat data appear to indicate a lower aquatic life use than the "High" use designated in the Texas Water Quality Standards.

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Appendix A
Complete Raw Data Set
Biological and Habitat Components
Segment 1906-Lower Leon Creek, Texas
September 2002
March 2003
September 2003

Ecological Communications Corporation
Austin, TX

BIOTIC ASSESSMENT – BENTHIC MACROINVERTEBRATES

Species Lists and Preliminary Data Manipulation

Stream	Date	ID
Leon	9/24/02	12845

Func.Gp	%
P	24.359
SCR	0
CG	3.20513
FC	72.4359
SHR	0
	100

Taxa	N=	Func.Gp.	Tolerance	HBI
Odonata-Coenagrionidae-*Argia*	4	P	6	0.4615385
Ephemeroptera-Tricorythidae-*Tricorythodes*	1	CG	5	0.0961538
Trichoptera-Hydropsychidae-*Cheumatopsyche*	4	FC	6	0.4615385
Diptera-Chironomidae	2	P/CG/FC	6	0.2307692
Diptera-Tabanidae-*Tabanus*	3	P	7	0.4038462
Diptera-Simulidae-*Simulium*	32	FC	4	2.4615385
Hirudinea	4	P	8	0.6153846
Tricladia (Dugesia)	1	P	7.5	0.1442308
Gastropoda (Limnophila)- Lymnaeidae-*Fossaria*	6	-	-	-
Bivalvia (Heterodonta)- Corbiculidae-*Corbicula*	1	FC	6	0.1153846
Total	52			4.9903846
Intolerant/Tolerant	1.74			

Stream	Date	ID
Leon	9/24/02	12838

Func.Gp	%
P	25
SCR	4.16667
CG	20.8333
FC	50
SHR	0
	100

Taxa	N=	Func.Gp.	Tolerance	HBI
Odonata-Coenagrionidae-*Argia*	1	P	6	0.5
Odonata-Libellidae-*Perithemis*	1	P	4	0.3333333
Ephemeroptera-Tricorythidae-*Tricorythodes*	2	CG	5	0.8333333
Trichoptera-Hydropsychidae-*Cheumatopsyche*	1	FC	6	0.5
Coleoptera-Elmidae-*Microcylloepus* (L)	1	CG/SCR	2	0.1666667
Hirudinea	1	P	8	0.6666667
Bivalvia (Heterodonta)-Corbiculidae-*Corbicula*	5	FC	6	2.5
Total	12			5.5
Intolerant/Tolerant	0.5			

Stream	Date	ID
Leon	9/23/02	14198

Func.Gp	%
P	4.32692
SCR	9.61538
CG	12.9808
FC	73.0769
SHR	0
	100

Taxa	N=	Func.Gp.	Tolerance	HBI
Odonata-Coenagrionidae-*Argia*	1	P	6	0.0576923
Ephemeroptera-Leptophlebiidae-*Thraulodes*	6	CG/SCR	2	0.1153846
Ephemeroptera-Leptophlebiidae-*Travarella*	1	FC	2	0.0192308
Ephemeroptera-Isonychidae (Oligoneuriidae)-*Isonychia*	10	FC	3	0.2884615
Ephemeroptera-Baetidae-*Baetis*	9	SCR/CG	4	0.3461538
Ephemeroptera-Baetidae-*Camelobaetidius (Dactylabaetis)*	1	SCR/CG	4	0.0384615
Trichoptera-Hydropsychidae-*Cheumatopsyche*	6	FC	6	0.3461538
Trichoptera-Hydropsychidae-*Smicridea*	2	FC	4	0.0769231
Trichoptera-Philopotamidae-*Chimarra*	3	FC	3	0.0865385
Coleoptera-Elmidae-*Hexacylloepus* (A)	1	CG/SCR	2	0.0192308
Coleoptera-Elmidae-*Stenelmis* (A)	1	CG/SCR	7	0.0673077
Coleoptera-Elmidae-*Stenelmis* (L)	2	CG/SCR	7	0.1346154
Diptera-Chironomidae	9	P/CG/FC	6	0.5192308
Diptera-Simulidae-*Simulium*	51	FC	4	1.9615385
Diptera-Empididae-*Hemerodromia*	1	P/CG	6	0.0576923
Total	104			4.1346154
Intolerant/Tolerant	4.2			

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

HBI-Hilsenhoff Biotic Index: =sum(nt/N) where n=number of ind. of a particular taxa, t=tolerance value of that taxon, N=number organisms in sample.

Stream: Leon
Date: 3/31/03
Location: 12845

	%
P	4.89296636
SCR	39.9082569
CG	46.17737
FC	8.56269113
SHR	0.4587156
	100

Species	N=	Tolerance	FFG	HBI
Argia sp.	1	6	P	0.055045872
Erpetogomphus	1	1	P	0.009174312
Brechmorhoga	2	6	P	0.110091743
Tricorythodes	4	5	CG	0.183486239
Leptohypes	12	2	CG/SCR	0.220183486
Caenis	1	7	SCR/CG	0.064220183
Fallceon	70	4	SCR/CG	2.568807339
Cheumatopsyche	2	6	FC	0.110091743
Psephenus	1	4	SCR	0.036697248
Chironomidae	4	6	P/CG/FC	0.220183486
Oligochaeta	2	8	CG	0.146788991
Physella	1	9	SCR	0.082568807
Corbicula	6	6	FC	0.330275229
Hyalella	1	8	CG/SHR	0.073394495
Cambaridae	1	5	CG	0.04587156
	109	4.45		4.256880734

Stream: Leon
Date: 3/31/03
Location: 12838

	%
P	6.81818182
SCR	13.0681818
CG	14.7727273
FC	64.7727273
SHR	0.56818182
	100

Species	N=	Tolerance	FFG	HBI
Argia sp.	2	6	P	0.136363636
Leptohypes	1	2	CG/SCR	0.022727273
Caenis	1	7	SCR/CG	0.079545455
Fallceon	16	4	SCR/CG	0.727272727
Cheumatopsyche	21	6	FC	1.431818182
Leucotrichia	1	3	CG/SCR	
Psephenus	1	4	SCR	0.045454545
Stenus	1	-	P	
Chironomidae	6	6	P/CG/FC	0.409090909
Simulium	34	4	FC	
Tricladida	1	7.5	P	0.085227273
Physella	1	9	SCR	0.102272727
Hyalella	1	8	CG/SHR	0.090909091
Cambaridae	1	5	CG	0.056818182
	88	1.63636364		3.1875

Stream: Leon
Date: 4/1/03
Location: 14198

	%
P	14.8717949
SCR	15.3846154
CG	21.7948718
FC	47.9487179
SHR	0
	100

Species	N=	Tolerance	FFG	HBI
Argia sp.	9	6	P	0.415384615
Brechmorhoga	3	6	P	0.138461538
Tricorythodes	1	5	CG	0.038461538
Leptohypes	9	2	CG/SCR	0.138461538
Fallceon	16	4	SCR/CG	0.492307692
Thraulodes	1	2	CG/SCR	0.015384615
Isonychia	33	3	FC	0.761538462
Camelobaetidius	1	4	SCR/CG	0.030769231
Fallceon	9	4	SCR/CG	0.276923077
Cheumatopsyche	21	6	FC	0.969230769
Stenelmis (L)	3	7	CG/SCR	0.161538462
Macrelmis (L)	1	2	CG/SCR	0.015384615
Chironomidae	22	6	P/CG/FC	1.015384615
Simulium	1	4	FC	0.030769231
	130	1.24137931		4.5

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

HBI=Hilsenhoff Biotic Index= sum(nt/N) where n=number of ind. of a particular taxa, t= tolerance value of that taxon, and N=total number of organisms in a sample.

Stream: Leon
Date: 9/21/03
Location: 12845

	%
P	35.5769231
SCR	16.8269231
CG	27.4038462
FC	15.3846154
SHR	4.80769231
	100

Species	N=	Tolerance	FFG	HBI
Argia	8	6	P	0.461538462
Tricorythodes	4	5	CG	0.192307692
Leptohypes	2	2	CG	0.038461538
Caenis	2	7	CG/SCR	0.134615385
Fallceon	16	4	SCR/CG	0.615384615
Cheumatopsyche	8	6	FC	0.461538462
Chimarra	1	3	FC	0.028846154
Stenelmis	8	7	SCR/CG	0.538461538
Helichus (A)	7	4	SCR/CG	0.269230769
Berosus (L)	1	9	P	0.086538462
Petrophila	1	5	SCR	0.048076923
Hirudinea	2	8	P	0.153846154
Tricladida	26	7.5	P	1.875
Corbicula	7	6	FC	0.403846154
Hyalella	10	8	CG/SHR	0.769230769
Cambaridae	1	5	CG	0.048076923
	104	0.44444444		6.125

Stream: Leon
Date: 9/21/03
Location: 12838

	%
P	28.2051282
SCR	9.61538462
CG	18.5897436
FC	43.5897436
SHR	0
	100

Species	N=	Tolerance	FFG	HBI
Erpetogomphus	1	1	P	0.038461538
Leptohypes	3	2	CG	0.230769231
Stenelmis	3	7	CG/SCR	0.807692308
Psephenus	1	4	SCR	0.153846154
Chironomidae	1	6	P/CG/FC	0.230769231
Hirudinea	6	8	P	1.846153846
Corbicula	11	6	FC	2.538461538
	26	0.23809524		5.846153846

Stream: Leon
Date: 9/20/03
Location: 14198

	%
P	2.75229358
SCR	36.2385321
CG	38.0733945
FC	22.9357798
SHR	0
	100

Species	N=	Tolerance	FFG	HBI
Tricorythodes	1	5	CG	0.04587156
Leptohypes	13	2	CG/SCR	0.23853211
Thraulodes	19	2	CG/SCR	0.348623853
Travarella	1	2	FC	0.018348624
Isonychia	12	3	FC	0.330275229
Baetis	30	4	CG/SCR	1.100917431
Camelobaetidius	13	4	SCR/CG	0.47706422
Cheumatopsyche	2	6	FC	0.110091743
Smicridea	3	4	FC	0.110091743
Chimarra	3	3	FC	0.082568807
Microcylloepus (A)	1	2	CG/SCR	0.018348624
Stenelmis (A)	1	7	CG/SCR	0.064220183
Helichus (A)	2	4	CG/SCR	0.073394495
Corydalus	3	6	P	0.165137615
Oligochaeta	1	8	CG	0.073394495
Corbicula	4	6	FC	0.220183486
	109	8.90909091		3.47706422

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

BIOTIC ASSESSMENT – BENTHIC MACROINVERTEBRATES

Rapid Bioassessment Protocol

Stream: Leon	**Date: 9/24/02**	**Location: 12845**	**County: Bexar**
Metric		**Value**	**Score**
1. Taxa Richness		9	2
2. EPT Taxa Abundance		2	1
3. Biotic Index (HBI)		4.99	2
4. % Chironomidae		3.84615385	4
5. % Dominant Taxon		61.5384615	1
6. % Dominant FFG		72.4359038	1
7. % Predators		24.3589808	3
8. Ratio of Intolerant:Tolerant Taxa		1.74	2
9. % of Total Trichoptera as Hydropsychidae		100	1
10. # of Non-insect Taxa		4	3
11. % Collector-Gatherers		3.20512885	1
12. % of Total Number as Elmidae		0	1
Aqautic Life Use: INTERMEDIATE	***(Total Sample Size = 58)***	Total Score:	22

Stream: Leon	**Date: 9/24/02**	**Location: 12838**	**County: Bexar**
Metric		**Value**	**Score**
1. Taxa Richness		7	1
2. EPT Taxa Abundance		2	1
3. Biotic Index (HBI)		5.5	1
4. % Chironomidae		0	1
5. % Dominant Taxon		41.6666667	1
6. % Dominant FFG		50	2
7. % Predators		25	3
8. Ratio of Intolerant:Tolerant Taxa		0.5	1
9. % of Total Trichoptera as Hydropsychidae		100	1
10. # of Non-insect Taxa		2	2
11. % Collector-Gatherers		20.8333333	3
12. % of Total Number as Elmidae		8.33333333	4
Aqautic Life Use: LIMITED ***(Total Sample Size= 12)****		Total Score:	21

Stream: Leon	**Date: 9/23/02**	**Location: 14198**	**County: Bexar**
Metric		**Value**	**Score**
1. Taxa Richness		14	2
2. EPT Taxa Abundance		8	3
3. Biotic Index (HBI)		4.13	3
4. % Chironomidae		8.65384615	3
5. % Dominant Taxon		49.0384615	1
6. % Dominant FFG		73.0769231	1
7. % Predators		4.32692308	1
8. Ratio of Intolerant:Tolerant Taxa		4.2	3
9. % of Total Trichoptera as Hydropsychidae		72.7272727	2
10. # of Non-insect Taxa		0	1
11. % Collector-Gatherers		12.9807692	4
12. % of Total Number as Elmidae		3.84615385	4
Aqautic Life Use: INTERMEDIATE		Total Score:	28

Stream: Leon	**Date: 3/31/03**	**Location: 12845**	**County: Bexar**
Metric		**Value**	**Score**
1. Taxa Richness		15	3
2. EPT Taxa Abundance		5	2
3. Biotic Index (HBI)		4.26	3
4. % Chironomidae		3.66972477	4
5. % Dominant Taxon		64.2201835	1
6. % Dominant FFG		46.1743119	2
7. % Predators		4.88990826	4
8. Ratio of Intolerant:Tolerant Taxa		4.45	3
9. % of Total Trichoptera as Hydropsychidae		100	1
10. # of Non-insect Taxa		5	3
11. % Collector-Gatherers		46.1743119	1
12. % of Total Number as Elmidae		0	1
Aqautic Life Use: INTERMEDIATE		Total Score:	28

Stream: Leon	**Date: 3/31/03**	**Location: 12838**	**County: Bexar**
Metric		**Value**	**Score**
1. Taxa Richness		14	2
2. EPT Taxa Abundance		5	2
3. Biotic Index (HBI)		3.19	4
4. % Chironomidae		6.81818182	3
5. % Dominant Taxon		38.6363636	2
6. % Dominant FFG		64.7727273	1
7. % Predators		6.81818182	4
8. Ratio of Intolerant:Tolerant Taxa		1.64	2
9. % of Total Trichoptera as Hydropsychidae		95.4545455	1
10. # of Non-insect Taxa		3	2
11. % Collector-Gatherers		14.7727273	4
12. % of Total Number as Elmidae		0	1
Aqautic Life Use: INTERMEDIATE		Total Score:	28

Stream: Leon	**Date: 4/1/03**	**Location: 14198**	**County: Bexar**
Metric		**Value**	**Score**
1. Taxa Richness		14	2
2. EPT Taxa Abundance		7	3
3. Biotic Index (HBI)		4.5	3
4. % Chironomidae		16.9230769	1
5. % Dominant Taxon		25.3846154	3
6. % Dominant FFG		47.9461538	2
7. % Predators		14.8692308	4
8. Ratio of Intolerant:Tolerant Taxa		1.24	1
9. % of Total Trichoptera as Hydropsychidae		100	1
10. # of Non-insect Taxa		0	1
11. % Collector-Gatherers		21.7923077	3
12. % of Total Number as Elmidae		3.07692308	4
Aqautic Life Use: INTERMEDIATE		Total Score:	28

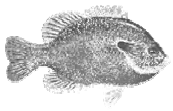
Stream: Leon	**Date: 9/21/03**	**Location: 12845**	**County: Bexar**
Metric		**Value**	**Score**
1. Taxa Richness		16	3
2. EPT Taxa Abundance		5	2
3. Biotic Index (HBI)		6.125	1
4. % Chironomidae		0	1
5. % Dominant Taxon		25	3
6. % Dominant FFG		35.5769231	4
7. % Predators		35.5769231	2
8. Ratio of Intolerant:Tolerant Taxa		0.44	1
9. % of Total Trichoptera as Hydropsychidae		88.8888889	1
10. # of Non-insect Taxa		5	3
11. % Collector-Gatherers		27.4038462	3
12. % of Total Number as Elmidae		7.69230769	4
Aqautic Life Use: INTERMEDIATE		Total Score:	28

Stream: Leon	**Date: 9/21/03**	**Location: 12838**	**County: Bexar**
Metric		**Value**	**Score**
1. Taxa Richness		7	1
2. EPT Taxa Abundance		6	2
3. Biotic Index (HBI)		5.85	1
4. % Chironomidae		3.84615385	4
5. % Dominant Taxon		42.3076923	1
6. % Dominant FFG		43.5769231	3
7. % Predators		28.1923077	2
8. Ratio of Intolerant:Tolerant Taxa		0.24	1
9. % of Total Trichoptera as Hydropsychidae		NoTrichoptera	1
10. # of Non-insect Taxa		2	2
11. % Collector-Gatherers		18.5769231	4
12. % of Total Number as Elmidae		11.5384615	3
Aqautic Life Use: INTERMEDIATE ***(Total Sample Size= 26)****		Total Score:	25

Stream: Leon	**Date: 9/20/03**	**Location: 14198**	**County: Bexar**
Metric		**Value**	**Score**
1. Taxa Richness		16	3
2. EPT Taxa Abundance		10	4
3. Biotic Index (HBI)		3.48	4
4. % Chironomidae		0	1
5. % Dominant Taxon		27.5229358	3
6. % Dominant FFG		38.0733945	3
7. % Predators		2.75229358	1
8. Ratio of Intolerant:Tolerant Taxa		8.9	4
9. % of Total Trichoptera as Hydropsychidae		62.5	2
10. # of Non-insect Taxa		2	2
11. % Collector-Gatherers		38.0733945	2
12. % of Total Number as Elmidae		1.83486239	4
Aqautic Life Use: HIGH		Total Score:	33

BIOTIC ASSESSMENT – FISH

Species Lists and Preliminary Data Manipulation



FISH COLLECTED

Stream	Date	ID	Species	N=	Type	Method	Tolerance	Trophic Gp
Leon	9/24/02	12845	Black Bullhead	1		E	T	O
			Blacktail Shiner	1		E	-	IF
			Bluegill	13	SF	E	T	IF
			Bluegill	1	SF	S	T	IF
			Bullhead Minnow	14		E	-	IF
			Channel Catfish	3		E	T	O
			Gambusia affinis	13		E	T	IF
			Gambusia affinis	46		S	T	IF
			Gizzard Shad	2		E	T	O
			Green Sunfish	56	SF	E	T	P
			Green Sunfish	1	SF	S	T	P
			Longear Sunfish	1	SF	E	-	IF
			Mexican Tetra	3		S	-	IF
			Redbreast Sunfish	5	SF	E	-	IF
			Red Shiner	1		E	T	IF
			Rio Grande Cichlid	10		E	-	IF
			Sailfin Molly	5		E	T	O
			Spotted/Orange Spotted Sunfish	5	SF	S	-	IF
			Spotted/Orange Spotted Sunfish	9	SF	E	-	IF
			Warmouth	7	SF	E	T	P
			Total	197				

Stream	Date	ID	Species	N=	Type	Method	Tolerance	Trophic Gp
Leon	9/24/02	12838	Bluegill	1	SF	S	T	IF
			Gambusia affinis	31		S	T	IF
			Green Sunfish	13	SF	E	T	P
			Longear Sunfish	7	SF	E	-	IF
			Redbreast Sunfish	6	SF	E	-	IF
			Rio Grande Cichlid	2		S	-	IF
			Rio Grande Cichlid	1		E	-	IF
			Sailfin Molly	3		S	T	O
			Sailfin Molly	1		E	T	O
			Guadalupe Bass	4		S	I	P
			Spotted/Orange Spotted Sunfish	4	SF	S	-	IF
			Spotted/Orange Spotted Sunfish	5	SF	E	-	IF
			Warmouth	1	SF	E	T	P
			Total	79				

**Abnormalities:
1 Gambusia with black splotches

KEY:

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

FISH COLLECTED

Stream	Date	ID
Leon	9/25/02	14198

**Abnormalities:
1 Sailfin Molly with black splotches

Species	N=	Type	Method	Tolerance	Trophic Gp
Bluegill	3	SF	E	T	IF
Bluegill	4	SF	S	T	IF
Bullhead Minnow	14		S	-	IF
Channel Catfish	1		E	T	O
Gambusia affinis	15		S	T	IF
Gizzard Shad	2		E	T	O
Green Sunfish	1	SF	S	T	P
Largemouth Bass	1		E	-	P
Longear Sunfish	2	SF	E	-	IF
Mexican Tetra	3		E	-	IF
Rio Grande Cichlid	1		E	-	IF
Sailfin Molly	11		S	T	O
Spotted Bass	1		E	-	P
Spotted Bass	1		S	-	P
Spotted Gar	1		E	T	P
Spotted/Orange Spotted Sunfish	3	SF	E	-	IF
Spotted/Orange Spotted Sunfish	7	SF	S	-	IF
Suckermouth catfish	1		E	-	H
Texas Shiner	62		S	-	IF
Warmouth	1	SF	E	T	P
Total	135				

KEY:

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

Stream: Leon
Date: 3/31/03
Location: 12845

Species	N=	Type	Method	Tolerance	Trophic Gp.
Amazon molly	1		E	~	O
Amazon molly	5		S	~	O
Bluegill	5	SF	E	T	IF
Bluegill	1	SF	S	T	IF
Bullhead minnow	13	CY	E	~	IF
Bullhead minnow	18	CY	S	~	IF
Channel catfish	5		E	T	O
Channel catfish	1		S	T	O
Gambusia affinis	2		E	T	IF
Gambusia affinis	10		S	T	IF
Green sunfish	2	SF	E	T	P
Green sunfish	1	SF	S	T	P
Longear sunfish	14	SF	E	~	IF
Longear sunfish	5	SF	S	~	IF
Mexican tetra	35		E	~	IF
Mexican tetra	2		S	~	IF
Shiner	11	CY	E	~	IF
Shiner	12	CY	S	~	IF
Red shiner	43	CY	E	T	IF
Red shiner	118	CY	S	T	IF
Redbreast sunfish	1	SF	E	~	IF
Rio Grande cichlid	4		E	~	IF
Rio Grande cichlid	2		S	~	IF
Sailfin molly	7		E	T	O
Sailfin molly	5		S	T	O
Spottail shiner	2	CY	E	~	IF
Spottail shiner	1	CY	S	~	IF
Spotted bass	1		E	~	P
Spotted sunfish	6	SF	E	~	IF
Texas shiner	164	CY	E	~	IF
Texas shiner	337	CY	S	~	IF
Warmouth	4	SF	E	T	P
Yellow bullhead	1		E	~	O
	839				

**juvy longear sunfish with abnormal growth on tail

KEY:
SF - Sunfish
CY - Cyprinidae
D - Darter
SU - Sucker
E - Electroshock
S - Seine
V - Visually Observed
T - Tolerant
I - Intolerant
~ - Intermediate
O - Omnivore
IF - Invertiivore
P - Piscivore
H - Herbivore

Stream: Leon
Date: 4/1/03
Location: 12838

Species	N=	Type	Method	Tolerance	Trophic Gp.
Amazon molly	2		E	~	O
Amazon molly	3		S	~	O
Bluegill	7	SF	E	T	IF
Gambusia affinis	3		E	T	IF
Gambusia affinis	15		S	T	IF
Green sunfish	1	SF	E	T	P
Guadalupe bass	1		E	I	P
Longear sunfish	25	SF	E	~	IF
Longear sunfish	23	SF	S	~	IF
Longear/Redbreast hybrid	4	SF	E	~	IF
Redbreast sunfish	6	SF	E	~	IF
Redbreast sunfish	5	SF	S	~	IF
Rio Grande cichlid	1		E	~	IF
Sailfin molly	3		S	T	O
Spotted gar	1		E	T	P
Spotted sunfish	4	SF	E	~	IF
Spotted sunfish	5	SF	S	~	IF
Texas shiner	33	CY	S	~	IF
Warmouth	6	SF	E	T	P
	148				

**2 sunfish with parasitic worms on fins

Stream: Leon
Date: 4/1/03
Location: 14198

Species	N=	Type	Method	Tolerance	Trophic Gp.
Amazon molly	1		E	T	O
Amazon molly	2		S	T	O
Bluegill	1	SF	S	T	IF
Bullhead minnow	1	CY	E	~	IF
Channel catfish	1		E	T	O
Gambusia affinis	4		S	T	IF
Green sunfish	3	SF	E	T	P
Longear sunfish	7	SF	E	~	IF
Longear sunfish	4	SF	S	~	IF
Mexican tetra	1		E	~	IF
Mexican tetra	3		S	~	IF
Shiner	13	CY	E	~	IF
Shiner	58	CY	S	~	IF
Red shiner	1	CY	S	T	IF
Redbreast sunfish	2	SF	E	~	IF
Rio Grande cichlid	1		E	~	IF
Spottail shiner	2	CY	S	~	IF
Spotted sunfish	7	SF	E	~	IF
Spotted sunfish	1	SF	S	~	IF
Texas shiner	14	CY	E	~	IF
Texas shiner	374	CY	S	~	IF
	501				

Stream: Leon
Date: 9/21/03
Location: 12845

Species	N=	Type	Method	Tolerance	Trophic Gp.
Bluegill	17	SF	E	T	IF
Bluegill	2	SF	S	T	IF
Common Carp	2	CY	E	T	O
Green Sunfish	9	SF	E	T	P
Guadalupe Bass	5		E	I	P
Guadalupe Bass	1		S	I	P
Largemouth Bass	2		E		P
Lepomis sp.	4	SF	E		-
Lepomis sp.	1	SF	S		-
Longear Sunfish	11	SF	E		IF
Longear Sunfish	2	SF	S		IF
Red Shiner	5	CY	S	T	IF
Rio Grande Cichlid	26		E		IF
Rio Grande Cichlid	2		S		IF
Sailfin Molly	21		E	T	O
Sailfin Molly	10		S	T	O
Threadfin Shad	2		E		O
Threadfin Shad	4		S		O
Warmouth	4	SF	E	T	P
Western Mosquitofish	3		E	T	IF
Western Mosquitofish	22		S	T	IF
	155		49	70	90
			106		

Stream: Leon
Date: 9/21/03
Location: 12838

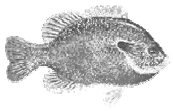
Species	N=	Type	Method	Tolerance	Trophic Gp.
Amazon Molly	1		S		O
Bluegill	4	SF	E	T	IF
Gizzard Shad	2		S	T	O
Guadalupe Bass	2		E	I	P
Guadalupe Bass	1		S	I	P
Largemouth Bass	1		E		P
Lepomis sp.	5	SF	E		-
Longear Sunfish	8	SF	E		IF
Mexican Tetra	1		E		IF
Red Shiner	1	CY	E	T	IF
Red Shiner	5	CY	S	T	IF
Redbreast Sunfish	2	SF	E		IF
Rio Grande Cichlid	21		E		IF
Sailfin Molly	7		E	T	O
Sailfin Molly	3		S	T	O
Warmouth	4	SF	E	T	P
Western Mosquitofish	6		E	T	IF
Western Mosquitofish	128		S	T	IF
	202		140	25	176
			62		

Stream: Leon
Date: 9/20/03
Location: 14198

Species	N=	Type	Method	Tolerance	Trophic Gp.
Central Stoneroller	20	CY	E		H
Green Sunfish	2	SF	E	T	P
Grey Redhorse	1	S	E		IF
Guadalupe Bass	6		E	I	P
Lepomis sp.	1	SF	E		-
Lepomis sp.	1	SF	S		-
Red Shiner	2	CY	S	T	IF
Rio Grande Cichlid	73		E		IF
Rio Grande Cichlid	1		S		IF
Sailfin Molly	6		E	T	O
Sailfin Molly	1		S	T	O
Suckermouth Catfish	1		E		H
Texas Logperch	3	D	E	I	IF
Texas Shiner	2	CY	E	T	IF
Threadfin Shad	2		E		O
Western Mosquitofish	1		E	T	IF
Western Mosquitofish	15		S	T	IF
	138		20	29	98
			118		

BIOTIC ASSESSMENT – FISH

Indices of Biotic Integrity – Statewide Criteria



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

Stream: Leon	Date: 09/24/02 Location: 12845	County: Bexar	
Category	**Metric**	**Value**	**Score**
Species Richness and Composition	1. Total number of fish species	16	5
	2. Number of darter species	0	1
	3. Number of sunfish species (exc. bass)	6	5
	4. Number of sucker speices	0	1
	5. Number of intolerant species	0	1
	6. Percentage of individuals as tolerants	76	1
Trophic Composition	7. Percentage of individuals as omnivores	6	5
	8. Percentage of individuals as insectivores	62	3
	9. Percentage of individuals as piscivores	32	5
Fish Abundance and Condition	10. Number of individuals in sample	197	3
	11. Percentage of individuals as hybrids	0	5
	12. Percentage of individuals with disease/anomalies	0	5
	Aquatic Life Use: INTERMEDIATE	Total Points:	**40**

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

Stream: Leon	Date: 09/24/02	Location: 12838	County: Bexar	
Category	**Metric**		**Value**	**Score**
Species Richness and Composition	1. Total number of fish species		10	5
	2. Number of darter species		0	1
	3. Number of sunfish species (exc. bass)		6	5
	4. Number of sucker speices		0	1
	5. Number of intolerant species		1	3
	6. Percentage of individuals as tolerants		63	1
Trophic Composition	7. Percentage of individuals as omnivores		5	5
	8. Percentage of individuals as insectivores		72	3
	9. Percentage of individuals as piscivores		23	5
Fish Abundance and Condition	10. Number of individuals in sample		79	3
	11. Percentage of individuals as hybrids		0	5
	12. Percentage of individuals with disease/anomalies		1	5
	Aquatic Life Use: INTERMEDIATE		Total Points:	**44**

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

Stream: Leon	Date: 09/25/02 Location: 14198	County: Bexar	
Category	**Metric**	**Value**	**Score**
Species Richness and Composition	1. Total number of fish species	17	5
	2. Number of darter species	0	1
	3. Number of sunfish species (exc. bass)	5	5
	4. Number of sucker speices	0	1
	5. Number of intolerant species	0	1
	6. Percentage of individuals as tolerants	29	1
Trophic Composition	7. Percentage of individuals as omnivores	10	5
	8. Percentage of individuals as insectivores	85	5
	9. Percentage of individuals as piscivores	4	3
Fish Abundance and Condition	10. Number of individuals in sample	135	3
	11. Percentage of individuals as hybrids	0	5
	12. Percentage of individuals with disease/anomalies	1.3	5
	Aquatic Life Use: INTERMEDIATE	Total Points:	**40**

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

Stream: Leon	Date: 3/31/03	Location: 12845	County: Bexar	
Category	**Metric**		**Value**	**Score**
Species Richness and Composition	1. Total # of fish species		19	5
	2. Number of darter species		0	1
	3. Number of sunfish species (exc. bass)		6	5
	4. Number of sucker species		0	1
	5. Number of intolerant species		0	1
	6. Percentage of individuals as tolerants		24	1
Trophic Composition	7. Percentage of individuals as omnivores		3	5
	8. Percentage of individuals as insectivores		96	5
	9. Percentage of individuals as piscivores		1	3
Fish Abundance and Condition	10. Number of individuals in sample		839	5
	11. Percentage of individuals as hybrids		0	5
	12. Percentage of individuals with disease/anomolies		0	5
	Aquatic Life Use: INTERMEDIATE		Total Points:	42

Stream: Leon	Date: 4/1/03	Location: 12838	County: Bexar	
Category	**Metric**		**Value**	**Score**
Species Richness and Composition	1. Total # of fish species		13	5
	2. Number of darter species		0	1
	3. Number of sunfish species (exc. bass)		6	5
	4. Number of sucker species		0	1
	5. Number of intolerant species		1	3
	6. Percentage of individuals as tolerants		24	1
Trophic Composition	7. Percentage of individuals as omnivores		5	5
	8. Percentage of individuals as insectivores		89	5
	9. Percentage of individuals as piscivores		6	5
Fish Abundance and Condition	10. Number of individuals in sample		148	3
	11. Percentage of individuals as hybrids		0	5
	12. Percentage of individuals with disease/anomolies		0	5
	Aquatic Life Use: INTERMEDIATE		Total Points:	44

Stream: Leon	Date: 4/1/03	Location: 14198	County: Bexar	
Category	**Metric**		**Value**	**Score**
Species Richness and Composition	1. Total # of fish species		15	5
	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		3	5
Trophic Composition	7. Percentage of individuals as omnivores		0.7	5
	8. Percentage of individuals as insectivores		98	5
	9. Percentage of individuals as piscivores		0.5	1
Fish Abundance and Condition	10. Number of individuals in sample		501	5
	11. Percentage of individuals as hybrids		0	5
	12. Percentage of individuals with disease/anomolies		0	5
	Aquatic Life Use: INTERMEDIATE		Total Points:	44

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

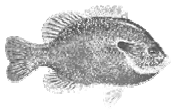
Stream: Leon	Date: 9/21/03	Location: 12845	County: Bexar	
Category	**Metric**		**Value**	**Score**
Species Richness and Composition	1. Total # of fish species		13	5
	2. Number of darter species		0	1
	3. Number of sunfish species (exc. bass)		5	5
	4. Number of sucker species		0	1
	5. Number of intolerant species		1	3
	6. Percentage of individuals as tolerants		63.33333333	1
Trophic Composition	7. Percentage of individuals as omnivores		26	3
	8. Percentage of individuals as insectivores		60	3
	9. Percentage of individuals as piscivores		14	5
Fish Abundance and Condition	10. Number of individuals in sample		155	3
	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: Leon	Date: 9/21/03	Location: 12838	County: Bexar	
Category	**Metric**		**Value**	**Score**
Species Richness and Composition	1. Total # of fish species		14	5
	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		1	3
	6. Percentage of individuals as tolerants		80.7106599	1
Trophic Composition	7. Percentage of individuals as omnivores		6.598984772	5
	8. Percentage of individuals as insectivores		89.34010152	5
	9. Percentage of individuals as piscivores		4.060913706	3
Fish Abundance and Condition	10. Number of individuals in sample		202	5
	11. Percentage of individuals as hybrids		0	5
	12. Percentage of individuals with disease/anomolies		0	5
	Aquatic Life Use: INTERMEDIATE		Total Points:	44

Stream: Leon	Date: 9/20/03	Location: 14198	County: Bexar	
Category	**Metric**		**Value**	**Score**
Species Richness and Composition	1. Total # of fish species		13	5
	2. Number of darter species		1	3
	3. Number of sunfish species (exc. bass)		2	5
	4. Number of sucker species		1	3
	5. Number of intolerant species		2	3
	6. Percentage of individuals as tolerants		21.32352941	1
Trophic Composition	7. Percentage of individuals as omnivores		6.617647059	5
	8. Percentage of individuals as insectivores		72.05882353	3
	9. Percentage of individuals as piscivores		5.882352941	5
Fish Abundance and Condition	10. Number of individuals in sample		138	3
	11. Percentage of individuals as hybrids		0	5
	12. Percentage of individuals with disease/anomolies		0	5
	Aquatic Life Use: INTERMEDIATE-HIGH		Total Points:	46

BIOTIC ASSESSMENT – FISH

Indices of Biotic Integrity – Regional Criteria



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

Stream: Leon	Date: 09/24/02	Location: 12845	County: Bexar	
Metric			**Value**	**Score**
1. Total number of fish species			16	5
2. Number of native cyprinid species			3	3
3. Number of benthic invertivore species			0	1
4. Number of sunfish species			6	5
5. Percentage of individuals as tolerants (exc. G. affinis)			46	3
6. Percentage of individuals as omnivores			6	5
7. Percentage of individuals as insectivores			62	3
8. Percentage of individuals as piscivores			32	5
9. Number of individuals in sample			197	-
a. number of ind/seine haul			9	1
b. number of ind/min electrofishing			9.4	5
10. Percentage of ind. as non-native species			2.5	3
11. Percentage of individuals with disease/anomalies			0	5
Aquatic Life Use:	HIGH		Total Points:	**41**

3*

*Average of 9a and 9b

Drainage area upstream of 12845 ~ 492.0 sq. km.

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

Stream: Leon	Date: 09/24/02	Location: 12838	County: Bexar	
Metric			**Value**	**Score**
1. Total number of fish species			10	3
2. Number of native cyprinid species			0	1
3. Number of benthic invertivore species			0	1
4. Number of sunfish species			6	5
5. Percentage of individuals as tolerants (exc. G. affinis)			24	5
6. Percentage of individuals as omnivores			5	5
7. Percentage of individuals as insectivores			72	5
8. Percentage of individuals as piscivores			23	5
9. Number of individuals in sample			79	-
a. number of ind/seine haul			7.5	1
b. number of ind/min electrofishing			2.3	1
10. Percentage of ind. as non-native species			7.6	1
11. Percentage of individuals with disease/anomalies			1.3	1
Aquatic Life Use:	LIMITED		Total Points:	**33**

1*

*Average of 9a and 9b

Drainage area upstream of 12838 ~ 535.9 sq. km.

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

Stream: Leon	Date: 09/25/02	Location: 14198	County: Bexar	
Metric			**Value**	**Score**
1. Total number of fish species			17	5
2. Number of native cyprinid species			2	3
3. Number of benthic invertivore species			0	1
4. Number of sunfish species			5	5
5. Percentage of individuals as tolerants (exc. G. affinis)			18	5
6. Percentage of individuals as omnivores			10	3
7. Percentage of individuals as insectivores			85	5
8. Percentage of individuals as piscivores			4	1
9. Number of individuals in sample			135	-
a. number of ind/seine haul			19	1
b. number of ind/min electrofishing			1.3	1
10. Percentage of ind. as non-native species			0.7	5
11. Percentage of individuals with disease/anomalies			0.7	3
Aquatic Life Use:	INTERMEDIATE		Total Points:	**37**

1*

*Average of 9a and 9b

Drainage area upstream of 14198 ~ 611.0 sq. km.

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

Stream: Leon (32)	Date: 3/31/03	Location: 12845	County: Bexar	
Metric		**Value**	**Score**	
1. Total # of fish species		19	5	
2.Total Number of cyprinid species		5	5	
3. Number of benthic invertivore species		0	1	
4. Number of sunfish species (exc. bass)		6	5	
5. Percentage of individuals as tolerants (exc. *G.affinis*)		22.9	5	
6. Percentage of individuals as omnivores		3	5	
7. Percentage of individuals as insectivores		96	5	
8. Percentage of individuals as piscivores		1	1	
9. Number of individuals in sample		~	~	
a. Number of individuals/seine hual		86.3	3	
b. Number of individuals/min. electroshocking		21.4	5	4*
10. Percentage of individuals as non-native species		0.1	5	
11. Percentage of individuals with disease/anomolies		0.1	5	
Aquatic Life Use: High		Total Points:	46	

*Average of 9a and 9b

Drainage area upstream of 12845 ~ 492 sq. km.

Stream: Leon (32)	Date: 4/1/03	Location: 12838	County: Bexar	
Metric		**Value**	**Score**	
1. Total # of fish species		13	5	
2.Total Number of cyprinid species		1	1	
3. Number of benthic invertivore species		0	1	
4. Number of sunfish species (exc. bass)		6	5	
5. Percentage of individuals as tolerants (exc. *G.affinis*)		14.2	5	
6. Percentage of individuals as omnivores		5.4	5	
7. Percentage of individuals as insectivores		88.5	5	
8. Percentage of individuals as piscivores		6.1	3	
9. Number of individuals in sample		~	~	
a. Number of individuals/seine hual		14.5	1	
b. Number of individuals/min. electroshocking		4.2	3	2*
10. Percentage of individuals as non-native species		7.4	1	
11. Percentage of individuals with disease/anomolies		0	5	
Aquatic Life Use: INTERMEDIATE		Total Points:	38	

*Average of 9a and 9b

Drainage area upstream of 12838 ~ 536 sq. km.

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

Stream: Leon (32)	**Date: 4/1/03**	**Location: 14198**	**County: Bexar**	
Metric			**Value**	**Score**
1. Total # of fish species			15	5
2.Total Number of cyprinid species			5	5
3. Number of benthic invertivore species			0	1
4. Number of sunfish species (exc. bass)			5	5
5. Percentage of individuals as tolerants (exc. *G.affinis*)			1.6	5
6. Percentage of individuals as omnivores			0.8	5
7. Percentage of individuals as insectivores			98.6	5
8. Percentage of individuals as piscivores			0.6	1
9. Number of individuals in sample			~	~
a. Number of individuals/seine hual			75	3
b. Number of individuals/min. electroshocking			3.4	3
10. Percentage of individuals as non-native species			0.4	5
11. Percentage of individuals with disease/anomolies			0	5
Aquatic Life Use: HIGH			Total Points:	45

3*

*Average of 9a and 9b

Drainage area upstream of 14198 ~ 611 sq. km.

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

Stream: Leon (32)	Date: 9/21/03	Location: 12845	County: Bexar	
Metric		**Value**	**Score**	
1. Total # of fish species		13	5	
2.Total Number of cyprinid species		2	3	
3. Number of benthic invertivore species		0	1	
4. Number of sunfish species (exc. bass)		5	5	
5. Percentage of individuals as tolerants (exc. *G.affinis*)		46.66666667	3	
6. Percentage of individuals as omnivores		26	1	
7. Percentage of individuals as insectivores		60	3	
8. Percentage of individuals as piscivores		14	5	
9.. Number of individuals in sample			~	
a. Number of individuals/seine hual		8.166666667	1	2*
b. Number of individuals/min. electroshocking		7.066666667	3	
10. Percentage of individuals as non-native species		1.290322581	5	
11. Percentage of individuals with disease/anomolies		0	5	
Aquatic Life Use: INTERMEDIATE		Total Points:	38	

*Average of 9a and 9b

Drainage area upstream of 12845 ~ 492 sq. km.

Stream: Leon (32)	Date: 9/21/03	Location: 12838	County: Bexar	
Metric		**Value**	**Score**	
1. Total # of fish species		14	5	
2.Total Number of cyprinid species		1	1	
3. Number of benthic invertivore species		0	1	
4. Number of sunfish species (exc. bass)		5	5	
5. Percentage of individuals as tolerants (exc. *G.affinis*)		12.69035533	5	
6. Percentage of individuals as omnivores		6.598984772	5	
7. Percentage of individuals as insectivores		89.34010152	5	
8. Percentage of individuals as piscivores		4.060913706	1	
9.. Number of individuals in sample			~	
a. Number of individuals/seine hual		23.33333333	1	2*
b. Number of individuals/min. electroshocking		4.133333333	3	
10. Percentage of individuals as non-native species		0.99009901	5	
11. Percentage of individuals with disease/anomolies		0	5	
Aquatic Life Use: HIGH		Total Points:	40	

*Average of 9a and 9b

Drainage area upstream of 12838 ~ 535.9 sq. km.

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

Stream: Leon (32)	Date:9/20/03	Location: 14198	County: Bexar	
Metric		**Value**	**Score**	
1. Total # of fish species		13	3	
2.Total Number of cyprinid species		3	3	
3. Number of benthic invertivore species		1	3	
4. Number of sunfish species (exc. bass)		2	3	
5. Percentage of individuals as tolerants (exc. *G.affinis*)		9.558823529	5	
6. Percentage of individuals as omnivores		6.617647059	5	
7. Percentage of individuals as insectivores		72.05882353	5	
8. Percentage of individuals as piscivores		5.882352941	3	
9.. Number of individuals in sample			~	
a. Number of individuals/seine hual		3.333333333	1	3*
b. Number of individuals/min. electroshocking		7.866666667	5	
10. Percentage of individuals as non-native species		0.724637681	5	
11. Percentage of individuals with disease/anomolies		0	5	
Aquatic Life Use: HIGH		Total Points:	43	

*Average of 9a and 9b

Drainage area upstream of 14198 ~ 611 sq. km.

HABITAT ASSESSMENT

Part I – Stream Physical Characteristics Worksheet

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

Part I - Stream Physical Characteristics Worksheet

Observers: Jw, BH,MB Date: 9/24 Time: noon Weather conditions: Sunny

Stream: Leon Location of site: 12845 Length of stream reach: 220m

Stream Segment No.: 1906 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 0; No. Moderately Defined 0; No. Poorly Defined 1

Channel Obstructions/Modifications: lo water cross No. of Riffles: 2 Channel Flow Status (circle one): **high moderate low no flow**

Riparian Vegetation (%):
Left Bank: Trees 15 Shrubs 7 Grasses, Forbs 30 Cult. Fields _ Other 48
Right Bank: Trees 16 Shrubs 4 Grasses, Forbs 42 Cult. Fields _ Other 38

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth:)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	19m	50	70%	2.28	2.44	2.44	2.44	2.44	2.44	2.39	2.28	1.98	1.08	0.25	25	70%	29%
U1 66m upstream from northern low water crossing	Habitat Type (Circle One) **Riffle Run Glide Pool**		Dominant Substrate Type Bedrock				Dominant Types Riparian Vegetation: Left Bank: 50% Other; 15% Tree; 30% Forb; 5% Shrub (Oak) Right Bank: 30% Tree; 40% Other; 20% Forb; 10% Shrub								% Gravel or Larger 80%		
	Algae or Macrophytes (Circle One) **Abundant Common Rare Absent**		Width of Natural Buffer Vegetation (m) LB: >20 RB: >20				Instream Cover Types: Macrophytes, Logs, Overhanging vegetation								% Instream Cover 5%		

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth:)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	12.34m	28	5%	0.05	0.66	1.13	1.19	1.31	1.16	1.12	1.06	0.78	0.50	0.02	15	5%	0%
U2 just downstream of northern low water crossing	Habitat Type (Circle One) **Riffle Run Glide Pool**		Dominant Substrate Type Gravel				Dominant Types Riparian Vegetation: Left Bank: 60% Other; 40% Forb (Bermuda Grass) Right Bank: 60^ Other; 40% Forb (Bermuda Grass)								% Gravel or Larger 100%		
	Algae or Macrophytes (Circle One) **Abundant Common Rare Absent**		Width of Natural Buffer Vegetation (m) LB: 0m RB: 0m				Instream Cover Types: Boulder, Gravel, Cobble, Macrophytes								% Instream Cover 55%		

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth:											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U3 Downstream side of west bound 90 bridge	6.15m	25	25%	0.21	0.43	0.45	0.40	0.37	0.34	0.32	0.28	0.21	0.16	0.01	18	50%	0%
Habitat Type (Circle One) **Riffle** Run Glide Pool	Dominant Substrate Type: Gravel	Dominant Types Riparian Vegetation: Left Bank: 50% Other; 50% Forb (Bermuda Grass) Right Bank: 80% Forb; 20% Other (Bermuda Grass)														% Gravel or Larger: 100%	
Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 0 RB: 0	Instream Cover Types: Macrophytes, Gravel, Cobble, Artificial														% Instream Cover: 60%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth:											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U4 37m downstream of southern low water crossing	13.31m	115	80%	0.19	0.35	0.45	0.46	0.43	0.60	0.77	0.84	0.76	0.69	0.48	78	75%	0%
Habitat Type (Circle One) **Riffle** Run Glide Pool	Dominant Substrate Type: Cobble	Dominant Types Riparian Vegetation: Left Bank: 30% Tree; 30% Shrub; 20% Other; 20% Forb Right Bank: 20% Tree; 60% Forb; 20% Other														% Gravel or Larger: 80%	
Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: >20 RB: >20	Instream Cover Types: Cobble, Boulder, Overhanging vegetation, Macrophytes														% Instream Cover: 58%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth:											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U5 55m downstream from U4	21m	150	60%	0.80	1.00	1.30	1.98	2.21	1.98	2.44	2.59	2.51	2.44	1.50	70	80%	29%
Habitat Type (Circle One) **Riffle** Run Glide Pool	Dominant Substrate Type: Bedrock	Dominant Types Riparian Vegetation: Left Bank: 30% Tree; 60% Other; 10% Forb Right Bank: 30% Tree; 50% Other; 10% Forb; 10% Shrub														% Gravel or Larger: 80%	
Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: >20 RB: >20	Instream Cover Types: Bedrock, Macrophytes, Overhanging vegetation														% Instream Cover: 75%	

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

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

Part I - Stream Physical Characteristics Worksheet

Observers: Jw, BH,MB Date: 9/24 Time: noon Weather conditions: Sunny

Stream: Leon Location of site: 12845 Length of stream reach: 220m

Stream Segment No.: 190 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 0; No. Moderately Defined 0; No. Poorly Defined 1

Channel Obstructions/Modifications: lo water cross No. of Riffles: 2 Channel Flow Status (circle one): **high moderate low no flow**

Riparian Vegetation (%):
Left Bank: Trees 15 Shrubs 7 Grasses, Forbs 30 Cult. Fields _ Other 48
Right Bank: Trees 16 Shrubs 4 Grasses, Forbs 42 Cult. Fields _ Other 38

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth:)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	19m	50	70%	2.28	2.44	2.44	2.44	2.44	2.44	2.39	2.28	1.98	1.08	0.25	25	70%	29%
U1 66m upstream from northern low water crossing	Habitat Type (Circle One) **Riffle Run Glide Pool**	Dominant Substrate Type: Bedrock		Dominant Types Riparian Vegetation: Left Bank: 50% Other; 15% Tree; 30% Forb; 5% Shrub (Oak) Right Bank: 30% Tree; 40% Other; 20% Forb; 10% Shrub											% Gravel or Larger: 80%		
	Algae or Macrophytes (Circle One) **Abundant Common Rare Absent**	Width of Natural Buffer Vegetation (m) LB: >20 RB: >20		Instream Cover Types: Macrophytes, Logs, Overhanging vegetation											% Instream Cover: 5%		

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth:)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	12.34m	28	5%	0.05	0.66	1.13	1.19	1.31	1.16	1.12	1.06	0.78	0.50	0.02	15	5%	0%
U2 just downstream of northern low water crossing	Habitat Type (Circle One) **Riffle Run Glide Pool**	Dominant Substrate Type: Gravel		Dominant Types Riparian Vegetation: Left Bank: 60% Other; 40% Forb (Bermuda Grass) Right Bank: 60^ Other; 40% Forb (Bermuda Grass)											% Gravel or Larger: 100%		
	Algae or Macrophytes (Circle One) **Abundant Common Rare Absent**	Width of Natural Buffer Vegetation (m) LB: 0m RB: 0m		Instream Cover Types: Boulder, Gravel, Cobble, Macrophytes											% Instream Cover: 55%		

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:													
U3 Downstream side of west bound 90 bridge	6.15m	25	25%	0.21	0.43	0.45	0.40	0.37	0.34	0.32	0.28	0.21	0.16	0.01	18	50%	0%
	Habitat Type (Circle One) **Riffle** Run Glide Pool		Dominant Substrate Type Gravel												Dominant Types Riparian Vegetation: Left Bank: 50% Other; 50% Forb (Bermuda Grass) Right Bank: 80% Forb; 20% Other (Bermuda Grass)		% Gravel or Larger 100%	
	Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: 0 RB: 0												Instream Cover Types: Macrophytes, Gravel, Cobble, Artificial		% Instream Cover 60%	

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:													
U4 37m downstream of southern low water crossing	13.31m	115	80%	0.19	0.35	0.45	0.46	0.43	0.60	0.77	0.84	0.76	0.69	0.48	78	75%	0%
	Habitat Type (Circle One) **Riffle** Run Glide Pool		Dominant Substrate Type Cobble												Dominant Types Riparian Vegetation: Left Bank: 30% Tree; 30% Shrub; 20% Other; 20% Forb Right Bank: 20% Tree; 60% Forb; 20% Other		% Gravel or Larger 80%	
	Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: >20												Instream Cover Types: Cobble, Boulder, Overhanging vegetation, Macrophytes		% Instream Cover 58%	

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:													
U5 55m downstream from U4	21m	150	60%	0.80	1.00	1.30	1.98	2.21	1.98	2.44	2.59	2.51	2.44	1.50	70	80%	29%
	Habitat Type (Circle One) **Riffle** Run Glide Pool		Dominant Substrate Type Bedrock												Dominant Types Riparian Vegetation: Left Bank: 30% Tree; 60% Other; 10% Forb Right Bank: 30% Tree; 50% Other; 10% Forb; 10% Shrub		% Gravel or Larger 80%	
	Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: >20												Instream Cover Types: Bedrock, Macrophytes, Overhanging vegetation		% Instream Cover 75%	

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:													
	Habitat Type (Circle One) **Riffle** Run Glide Pool		Dominant Substrate Type												Dominant Types Riparian Vegetation: Left Bank: Right Bank:		% Gravel or Larger	
	Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: RB:												Instream Cover Types:		% Instream Cover	

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

Part I - Stream Physical Characteristics Worksheet

Observers: Jw, BH,MB Date: 9/24 Time: noon Weather conditions: Sunny

Stream: Leon Location of site: 12845 Length of stream reach: 220m

Stream Segment No.: 1906 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 0; No. Moderately Defined 0; No. Poorly Defined 1

Channel Obstructions/Modifications: lo water cross No. of Riffles: 2 Channel Flow Status (circle one): **high moderate low no flow**

Riparian Vegetation (%):
Left Bank: Trees 15 Shrubs 7 Grasses, Forbs 30 Cult. Fields _ Other 48
Right Bank: Trees 16 Shrubs 4 Grasses, Forbs 42 Cult. Fields _ Other 38

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth:)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	19m	50	70%	2.28	2.44	2.44	2.44	2.44	2.44	2.39	2.28	1.98	1.08	0.25	25	70%	29%
U1 66m upstream from northern low water crossing	Habitat Type (Circle One) **Riffle Run Glide Pool**		Dominant Substrate Type Bedrock				Dominant Types Riparian Vegetation: Left Bank: 50% Other; 15% Tree; 30% Forb; 5% Shrub (Oak) Right Bank: 30% Tree; 40% Other; 20% Forb; 10% Shrub								% Gravel or Larger 80%		
	Algae or Macrophytes (Circle One) **Abundant Common Rare Absent**		Width of Natural Buffer Vegetation (m) LB: >20 RB: >20				Instream Cover Types: Macrophytes, Logs, Overhanging vegetation								% Instream Cover 5%		

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth:)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	12.34m	28	5%	0.05	0.66	1.13	1.19	1.31	1.16	1.12	1.06	0.78	0.50	0.02	15	5%	0%
U2 just downstream of northern low water crossing	Habitat Type (Circle One) **Riffle Run Glide Pool**		Dominant Substrate Type Gravel				Dominant Types Riparian Vegetation: Left Bank: 60% Other; 40% Forb (Bermuda Grass) Right Bank: 60^ Other; 40% Forb (Bermuda Grass)								% Gravel or Larger 100%		
	Algae or Macrophytes (Circle One) **Abundant Common Rare Absent**		Width of Natural Buffer Vegetation (m) LB: 0m RB: 0m				Instream Cover Types: Boulder, Gravel, Cobble, Macrophytes								% Instream Cover 55%		

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:													
U3 Downstream side of west bound 90 bridge	6.15m	25	25%	0.21	0.43	0.45	0.40	0.37	0.34	0.32	0.28	0.21	0.16	0.01	18	50%	0%
	Habitat Type (Circle One) **Riffle** Run Glide Pool		Dominant Substrate Type Gravel												Dominant Types Riparian Vegetation: Left Bank: 50% Other; 50% Forb (Bermuda Grass) Right Bank: 80% Forb; 20% Other (Bermuda Grass)		% Gravel or Larger 100%	
	Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: 0 RB: 0												Instream Cover Types: Macrophytes, Gravel, Cobble, Artificial		% Instream Cover 60%	

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:													
U4 37m downstream of southern low water crossing	13.31m	115	80%	0.19	0.35	0.45	0.46	0.43	0.60	0.77	0.84	0.76	0.69	0.48	78	75%	0%
	Habitat Type (Circle One) **Riffle** Run Glide Pool		Dominant Substrate Type Cobble												Dominant Types Riparian Vegetation: Left Bank: 30% Tree; 30% Shrub; 20% Other; 20% Forb Right Bank: 20% Tree; 60% Forb; 20% Other		% Gravel or Larger 80%	
	Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: >20												Instream Cover Types: Cobble, Boulder, Overhanging vegetation, Macrophytes		% Instream Cover 58%	

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:													
U5 55m downstream from U4	21m	150	60%	0.80	1.00	1.30	1.98	2.21	1.98	2.44	2.59	2.51	2.44	1.50	70	80%	29%
	Habitat Type (Circle One) **Riffle** Run Glide Pool		Dominant Substrate Type Bedrock												Dominant Types Riparian Vegetation: Left Bank: 30% Tree; 60% Other; 10% Forb Right Bank: 30% Tree; 50% Other; 10% Forb; 10% Shrub		% Gravel or Larger 80%	
	Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: >20												Instream Cover Types: Bedrock, Macrophytes, Overhanging vegetation		% Instream Cover 75%	

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:													
	Habitat Type (Circle One) **Riffle** Run Glide Pool		Dominant Substrate Type												Dominant Types Riparian Vegetation: Left Bank: Right Bank:		% Gravel or Larger	
	Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: RB:												Instream Cover Types:		% Instream Cover	

Pool - 111
R.Ct - 11
Run -
Glide - 1
Band - ?

U-D-L-R

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

Part I - Stream Physical Characteristics Worksheet

Observers: JW' BH Date: 5/11/03 Time: M Weather conditions: S

Stream: Lee Location of site: 17845 Length of stream reach: 260m

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 6 No. Moderately Defined 6 No. Poorly Defined 6

Channel Obstructions/Modifications: Lyc(s) Debris No. of Riffles: 2 Channel Flow Status (circle one): high moderate low no flow

Riparian Vegetation (%):
Left Bank: Trees 10 Shrubs 2 Grasses, Forbs 20 Cult. Fields _ Other 60%
Right Bank: Trees 2 Shrubs 1 Grasses, Forbs 70 Cult. Fields _ Other 60%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 1.91										Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U1	19m	58°	70%	1.95	2.41	2.93	2.46	2.41	2.25	2.31	2.18	1.21	.70	0.13	33	70%	2.5
60m from road crossing	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type: Bedrock		Dominant Types Riparian Vegetation: Left Bank: Forbs - Other Right Bank: Trees Shrubs -											% Gravel or Larger: 15%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 40m RB: >20m		Instream Cover Types: Good Macrophytes / Overhang											% Instream Cover: 5%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: .75										Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U2 downstream side of road crossing	18m	23°	40	0.02	0.36	0.49	0.54	0.62	0.41	0.25	0.20	0.08	0.04	0.02	15°	40%	0
	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type: Cobble		Dominant Types Riparian Vegetation: Left Bank: Forbs - 99% Right Bank: 1% Trees - 99% Forb											% Gravel or Larger: 95%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 40m RB: 20m		Instream Cover Types: Overhangs, Cobble, Good Algae, Snag											% Instream Cover: 40%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: .21)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U3 Card of riffle @ edge of downst. [illegible]	10m	15°	15%	0.01	0.18	0.26	0.30	0.30	1.27	0.22	0.23	0.15	0.26	0.01	16°	30%	8%

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

Dominant Substrate Type: Cobble

Dominant Types Riparian Vegetation: Left Bank: [illegible] Right Bank: Forbs

% Gravel or Larger: 90%

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

Width of Natural Buffer Vegetation (m) LB: 0 RB: 0

Instream Cover Types: Algae; Moss; Gravel; Cobble; Boulder, Snag,

% Instream Cover: 50%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: .34)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U4 35m down from 2nd Lwe	16m	41°	60%	0.05	0.32	0.40	0.32	0.32	0.32	0.55	0.52	0.60	0.60	0.02	25°	55%	0

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

Dominant Substrate Type: Cobble

Dominant Types Riparian Vegetation: Left Bank: 20% Trees; 50% other, 40 Forbs Right Bank:

% Gravel or Larger: 95%

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

Width of Natural Buffer Vegetation (m) LB: >20m RB: 10m

Instream Cover Types: Cobble, Gravel, Boulder; Macro, Algae

% Instream Cover: 30%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: 193)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U5 55m down from U4	16	27°	50%	0.15	0.68	1.41	1.40	2.03	2.45	2.44	2.45	2.30	2.40	1.20	80°	50%	2/17

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

Dominant Substrate Type: Gravel

Dominant Types Riparian Vegetation: Left Bank: 40% T, 20% F; 20% O; 20% Sh Right Bank: 79% F; 10% T; 10% F 90

% Gravel or Larger: 90%

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

Width of Natural Buffer Vegetation (m) LB: >20 RB: 10m

Instream Cover Types: Overhang Vegetation, Snags; Cobble, Gravel

% Instream Cover: 10%

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

Habitat Type (Circle One) Riffle Run Glide Pool

Dominant Substrate Type

Dominant Types Riparian Vegetation: Left Bank: Right Bank:

% Gravel or Larger

Algae or Macrophytes (Circle One) Abundant Common Rare Absent

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

Instream Cover Types:

% Instream Cover

Herons, Snake, Turtle, Swallows

Pool - 11
Run
Glide
Riffle 1
Bend

Semi - rich
Omin - sing

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

Part I - Stream Physical Characteristics Worksheet

Observers: JW BH Date: 5/10/07 Time: 18 Weather conditions: 5

Stream: Lean Location of site: 19555 Length of stream reach: 250m

Stream Segment No.: Observed Stream Uses: Ecc 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 8, No. Moderately Defined 2, No. Poorly Defined 0

Channel Obstructions/Modifications: LWC (2) No. of Riffles: 1 Channel Flow Status (circle one): high moderate low no flow

Riparian Vegetation (%):
Left Bank: Trees 1 Shrubs 2 Grasses, Forbs 70 Cult. Fields Other 10
Right Bank: Trees 3 Shrubs 0 Grasses, Forbs 80 Cult. Fields 0 Other 17

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: 1.41)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
V1	8m	9°	85%	0.09	1.17	1.37	1.65	1.69	1.25	1.34	1.30	1.27	1.32	0.28	65°	85%	6/7
62m Upstream from LWC	Habitat Type (Circle One) Riffle Run Glide Pool		Dominant Substrate Type: Silt					Dominant Types Riparian Vegetation: Left Bank: 80% Forb 2% T 2% S 16% O Right Bank: 60% maintained field							% Gravel or Larger: 5%		
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >50m RB: 0					Instream Cover Types: Gravel, Macrophytes							% Instream Cover: 1%		

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: .38)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
V2 3m down from LWC	6.5m	10°	70%	0.02	0.30	0.49	0.58	0.57	0.40	0.55	0.49	0.34	0.30	0.01	18°	70%	1/17
	Habitat Type (Circle One) Riffle Run Glide Pool		Dominant Substrate Type: Gravel					Dominant Types Riparian Vegetation: Left Bank: Forbs - 80% 6% T, 15% O Right Bank: 90% 10% O							% Gravel or Larger: 90%		
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: 6 RB: >20					Instream Cover Types: Gravel, Cobble, Snag, Algae							% Instream Cover: 15%		

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: .34											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	8.1m	29°	65%	0.32	0.40	0.30	0.41	0.49	0.46	0.42	0.33	0.43	0.36	0.03	54°	65%	15/17
UB - 50m downstream from LOC	Habitat Type (Circle One) Riffle Run Glide Pool		Dominant Substrate Type: Gravel				Dominant Types Riparian Vegetation: Left Bank: [illegible] Right Bank: [illegible]									% Gravel or Larger: 85%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: 0 RB: 0				Instream Cover Types: Algae, Snag, Gravel									% Instream Cover: 10%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: .53											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	7.1m	48°	45%	0.03	0.53	1.93	0.24	0.23	0.24	0.21	0.56	0.45	0.03		64°	65%	15/17
U4 65m downstream of U3 other side of LOC	Habitat Type (Circle One) Riffle Run Glide Pool		Dominant Substrate Type: Gravel				Dominant Types Riparian Vegetation: Left Bank: [illegible] 15% 5% Right Bank: 60% 15% 15%									% Gravel or Larger: 70%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: >20				Instream Cover Types: Cobble Gravel, Snag, Algae, Gravel, Overhang Veg									% Instream Cover: 2%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 1.93											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	10m	46°	79%	0.52	1.41	1.93	1.55	1.37	1.02	1.06	0.93	0.42	0.29	0.06	52°	80%	14/17
U5 30m downstream from U4	Habitat Type (Circle One) Riffle Run Glide Pool		Dominant Substrate Type: Silt				Dominant Types Riparian Vegetation: Left Bank: 80% F 5% D 2% T 3% S Right Bank: 70% F 20% T 5% T 5% O									% Gravel or Larger: 0%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: >20				Instream Cover Types: Snag, Overhang Veg									% Instream Cover: 1%	

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

Pool – 11
Rif – 11
Run
Glide
Bend – M, P

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

Part I - Stream Physical Characteristics Worksheet

Observers: Barlow Date: 4/1/03 Time: 12 Weather conditions: S

Stream: Leon Location of site: [illegible] Length of stream reach: 495m

Stream Segment No.: __ Observed Stream Uses: Swim 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 2; No. Moderately Defined 1; No. Poorly Defined 1

Channel Obstructions/Modifications: ______ No. of Riffles: 2 Channel Flow Status (circle one): high moderate low no flow

Riparian Vegetation (%):
Left Bank: Trees 11 Shrubs 2 Grasses, Forbs 20 Cult. Fields __ Other 14
Right Bank: Trees 5 Shrubs 1 Grasses, Forbs 94 Cult. Fields __ Other 17

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth:)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
P1 just above Effluent	15	45°	70%	0.41	0.51	0.25	0.59	0.82	1.10	1.14	0.85	0.72	0.60	0.19	75°	80%	0/17

Habitat Type (Circle One): Riffle Run Glide Pool

Dominant Substrate Type: Silt

Dominant Types Riparian Vegetation: Left Bank: 5% F 15% O 5% T; Right Bank: 90% F 5% S 5% O

% Gravel or Larger: 15%

Algae or Macrophytes (Circle One): Abundant Common Rare Absent

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

Instream Cover Types: Gravel, overhanging Veg

% Instream Cover: 1%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: .4)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D2 15 m up from effluent @ top of riffle	9 m	36°	95%	0.08	0.15	0.30	0.35	0.30	0.28	0.22	0.20	0.11	0.04	0.03	9°	50%	0.5/17

Habitat Type (Circle One): Riffle Run Glide Pool

Dominant Substrate Type: Cobble

Dominant Types Riparian Vegetation: Left Bank: 85% F 5% T 10% O; Right Bank: 90% F 1% T 9% O

% Gravel or Larger: 95%

Algae or Macrophytes (Circle One): Abundant Common Rare Absent

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

Instream Cover Types: Gravel, Cobble

% Instream Cover: 40%

1 Mod Usual- Carp
S. Cover

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: .89											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D3 150m up from Effluent	.9m	43°	85%	0.34	0.53	0.49	0.68	0.89	1.11	1.88	1.95	1.27	1.14	0.65	112	80%	3/17
	Habitat Type (Circle One) Riffle Run Glide Pool		Dominant Substrate Type: Gravel					Dominant Types Riparian Vegetation: Left Bank: 70% T 10% T 10% S 10% O; Right Bank: 80% T 15% O 5% T								% Gravel or Larger: 85%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: >20					Instream Cover Types: Overhang Veg;								% Instream Cover: 5%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: .89											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D4 75m up from D3	10m	26°	95%	0.01	0.49	0.63	0.34	80	0.89	0.98	1.08	1.07	1.06	0.93	33°	95%	3/17
	Habitat Type (Circle One) Riffle Run Glide Pool		Dominant Substrate Type: Silt					Dominant Types Riparian Vegetation: Left Bank: 15% T 40% O 45% F; Right Bank: 10% T 30% F 10% O								% Gravel or Larger: 0%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: >20					Instream Cover Types: None								% Instream Cover: 0%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: .99											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D5 75m up from D4	15m	35°	75%	0.07	0.39	0.21	0.20	0.22	0.26	0.11	0.34	0.39	0.40	0.03	9°	95%	4/17
	Habitat Type (Circle One) Riffle Run Glide Pool		Dominant Substrate Type: Silt					Dominant Types Riparian Vegetation: Left Bank: 5% T 80% F 5% O; Right Bank: 80% F 15% O 5% T								% Gravel or Larger: 10%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: >20					Instream Cover Types: Gravel Cobble; Snag								% Instream Cover: 1%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: .14											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D6 75m up from D5	15m	26°	95%	0.05	0.12	0.23	0.07	0.09	0.13	0.09	0.11	0.14	0.00	0.07	35°	90%	5/17
	Habitat Type (Circle One) Riffle Run Glide Pool		Dominant Substrate Type: Cobble					Dominant Types Riparian Vegetation: Left Bank: 60% F; 15% T 15% O; Right Bank: 60% O; 40% F 10% T								% Gravel or Larger: 75%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: >20					Instream Cover Types: Cobble Gravel								% Instream Cover: 60%	

12/26/03

Pool
Riffle
Bend P
Glide
Run

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

Part I - Stream Physical Characteristics Worksheet

Observers: JW, NB Date: 9/21/03 Time: 11 Weather conditions: Rain

Stream: Leon Location of site: 12845 Length of stream reach: 260m

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: 1 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_

stream is out of bank

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Thalweg Depth: / Stream Depths (m) at Points Across Transect	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	21	25	90%	2.0	20	90%	4/17

not typical bank (Left Bank Slope / Left Bank Erosion Potential); not typical bank (Right Bank Slope / Right Bank Erosion Potential)

Location of Transect			
U1 40 m upstream from road crossing	Habitat Type (Circle One) Riffle Run Glide Pool (circled: Pool)	Dominant Substrate Type: bedrock	Dominant Types Riparian Vegetation: Left Bank: 20 tree 15 shrub 55 forbes 10 other; Right Bank: 25 tree 10 shrub 50 forbes 15 other
	% Gravel or Larger: 50%		
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: >20 RB: >20	Instream Cover Types: overhanging veg, macro, snags, artificial
	% Instream Cover: 5		

stream is out of bank

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Thalweg Depth: 6.19 / Stream Depths (m) at Points Across Transect	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U2	11	2	80%	.01, 0, .03, .15, .09, .23, .21, .13, .80, .35, .08	10	90%	0

Location of Transect			
downstream side of road crossing	Habitat Type (Circle One) Riffle Run Glide Pool (circled: Pool)	Dominant Substrate Type: cobble	Dominant Types Riparian Vegetation: Left Bank: 95 forbes 5 other; Right Bank: 95 forbes 5 other
	% Gravel or Larger: 80%		
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent (circled: Common)	Width of Natural Buffer Vegetation (m) LB: 0 RB: 0	Instream Cover Types: cobble, gravel, macro, snags, artificial
	% Instream Cover: 50%		

32/85

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: 0.43)	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U3 end of riffle @ edge of downstream highway cross	9.5	18	90	.10 .26 .85 .80 .75 .68 .45 .33 .30 .21 .04	15	90	0

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation: Left Bank: 95 forbes 5 other Right Bank:	% Gravel or Larger
Glide Pool	gravel	" "	60%

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

stream is out of bank

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth:)	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U4 35 m from low water crossin	16	45	95		45	85	14/17

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation: Left Bank: 20 tree 15 shrub 55 grass 10 forbes Right Bank:	% Gravel or Larger
Glide Pool	gravel	" "	95

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 320 RB: 320	Instream Cover Types: overhang veg gravel, cobble, macro, artificia	% Instream Cover
Rare Absent			20%

stream out of bank

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth:)	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U5 50 m from U4 same as last	16.5	45	88		45	95	14/17

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation: Left Bank: 20 tree 15 shrub 55 grass 10 forbes Right Bank:	% Gravel or Larger
Glide Pool	gravel	" "	95

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 320 RB: 320	Instream Cover Types: overhang veg. gravel, cobble, macro, artificia	% Instream Cover
Rare Absent			20%

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

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

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

12/26/03

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

Part I - Stream Physical Characteristics Worksheet

Observers: JW MB Date: 9/21/03 Time: 3pm Weather conditions: rainy

Stream: Leon Location of site: 12838 Length of stream reach: 250m

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 0; No. Moderately Defined 0; No. Poorly Defined 0

Channel Obstructions/Modifications: Livestock No. of Riffles: 1 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_

* slopes not at normal level

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth:	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	11	*30	90	.80	*70	90	4/17

9/85

U1 60 m upstream from low water crossing	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type: silt	Dominant Types Riparian Vegetation: Left Bank: 10 tree 5 shrub 50 forbes 35 other; Right Bank: 90 grass 10 other	% Gravel or Larger: 5%
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: >20 RB: >20	Instream Cover Types: artificial, macro, overhang, ves, gravel	% Instream Cover: 20%

stream out of bank

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 0.70	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	13	*10	90	.01 .49 .90 .90 .90 .95 .95 .95 .85 .70 .09	*36	90	0

U2 5m down from LWC	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type: gravel	Dominant Types Riparian Vegetation: Left Bank: 75 other 25 forbes; Right Bank: 85 other 15 forbes	% Gravel or Larger: 65%
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 0 RB: 0	Instream Cover Types: gravel, cobble	% Instream Cover: 20

stream out of bank

stream out of bank ← stream out of bank ← stream out of bank

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: 0.69)	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U3 50m down From LWC	12	*35	90	.10 .86 .98 .97 1.00 .96 1.01 .94 .61 .16 .02	*8	90	3/17

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation	% Gravel or Larger
Glide Pool	cobble	Left Bank: 90 grass 10 other Right Bank: 80 grass 20 other	75%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m)	Instream Cover Types	% Instream Cover
Rare	LB: 0 RB: 0	artificial, gravel, snags	15%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: 0.81)	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U4 65m down From U3 other side of LWC	16	*40	80	.38 .77 .92 .97 1.24 1.18 1.16 1.11 .93 .27 .02	*40	0	1/17

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation	% Gravel or Larger
Glide Pool	silt	Left Bank: 95 grass 2 tree 3 other Right Bank: 95 grass 5 other	35%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m)	Instream Cover Types	% Instream Cover
Rare	LB: 0 RB: 0	cobble, overhang veg. gravel, macro, artificial, snags	5%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth: 1.35 1.31 1.15 .87 .12)	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U5 70m down From U4	11	30	90		30	90	1/17

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation	% Gravel or Larger
Glide Pool	silt	Left Bank: 5 shrub 5 tree 60 grass 30 other Right Bank: 80 grass 20 other	30%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m)	Instream Cover Types	% Instream Cover
Rare	LB: >20 RB: >20	macro, overhang veg. artificial, cobble, boulder, snags,	20%

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

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

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

12/26/03

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

* Very heavy rain could not complete transects

Part I - Stream Physical Characteristics Worksheet

Observers: SW, BAB Date: 12/26/03 Time: 1600 Weather conditions: Rain

Stream: Lean Location of site: 14128 Length of stream reach: ___

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

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

Channel Obstructions/Modifications: _____ No. of Riffles: 1 Channel Flow Status (circle one): high moderate low no flow

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

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth:											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	14	75	95	.19	.40	.52	.89	1.15	1.10	.50	.89	.78	.71	.27	65	90	0
D1	Habitat Type (Circle One) Riffle Run Glide Pool		Dominant Substrate Type: silt												Dominant Types Riparian Vegetation: Left Bank: 10 tree 15 shrub 60 grass 15 other Right Bank: 5 tree 30 shrub 50 grass 15 other		% Gravel or Larger: 5%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: >20												Instream Cover Types: macro. overhang veg. gravel		% Instream Cover: 10%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth:											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D2	9.5	80	25	.32	.40	.46	.35	.25	.20	.17	.15	.14	.17	.01	50	90	1/17
	Habitat Type (Circle One) Riffle Run Glide Pool		Dominant Substrate Type: cobble												Dominant Types Riparian Vegetation: Left Bank: 15 tree 15 shrub 55 forbes 20 other Right Bank: 15 tree 15 shrub 60 grass 10 other		% Gravel or Larger: 90%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: >20												Instream Cover Types: macro, artificial, gravel, cobble		% Instream Cover: 30%	

1/51

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth:											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D3	10.5	45	70.							1.25	1.00	.95	.67	.45	80	90	5/12

Habitat Type (Circle One) Riffle Run Glide Pool

Dominant Substrate Type: cobble

Dominant Types Riparian Vegetation:
Left Bank: 25 tree 20 shrub 25 forbs 30 other
Right Bank: 10 tree 15 shrub 65 forbs 15 other

% Gravel or Larger: 50%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent

Width of Natural Buffer Vegetation (m) LB: RB: >30 30

Instream Cover Types:

% Instream Cover

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

Habitat Type (Circle One) Riffle Run Glide Pool

Dominant Substrate Type

Dominant Types Riparian Vegetation:
Left Bank:
Right Bank:

% Gravel or Larger

Algae or Macrophytes (Circle One) Abundant Common Rare Absent

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

Instream Cover Types:

% Instream Cover

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

Habitat Type (Circle One) Riffle Run Glide Pool

Dominant Substrate Type

Dominant Types Riparian Vegetation:
Left Bank:
Right Bank:

% Gravel or Larger

Algae or Macrophytes (Circle One) Abundant Common Rare Absent

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

Instream Cover Types:

% Instream Cover

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

Habitat Type (Circle One) Riffle Run Glide Pool

Dominant Substrate Type

Dominant Types Riparian Vegetation:
Left Bank:
Right Bank:

% Gravel or Larger

Algae or Macrophytes (Circle One) Abundant Common Rare Absent

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

Instream Cover Types:

% Instream Cover

HABITAT ASSESSMENT

Part II – Summary of Physical Characteristics of Water Body

Part II - Summary of Physical Characteristics of Water Body

Stream name	Leon 12845
Date of assessment	9/24/2002
Stream bed slope over evaluated reach	0.0035
Approximate drainage area above transect furthest downstream	492km²
Stream order	3
Length of stream evaluated	260m
Number of lateral transects made	5
Average stream width	8.80m
Average stream depth	1.23m
Instantaneous flow	5.94 ft^3/sec
Indicate flow measurement method	Current Meter
Channel flow status	High
Maximum pool width	5m
Maximum pool depth	>1m
Total number of stream bends	1
Number of well defined bends	0
Number of moderately defined bends	0
Number of poorly defined bends	1
Total number of riffles	2
Dominant substrate type	Gravel
Average percent of substrate gravel sized or larger	88%
Average percent instream cover	51%
Number of stream cover types	7
Average percent stream bank erosion potential	52%
Average stream bank slope	57°
Average width of vegetative buffer	12m
Average riparian vegetation percent composition by:	
Trees	15.50%
Shrubs	5.50%
Grasses/Forbes	36%
Cultivated Fields	
Other	43%
Average percent tree canopy coverage	12%
Overall aesthetic appraisal of stream	Common

Part II - Summary of Physical Characteristics of Water Body

Stream name	Leon 12838
Date of assessment	9/24/2002
Stream bed slope over evaluated reach	0.0012
Approximate drainage area above transect furthest downstream	536km²
Stream order	3
Length of stream evaluated	250m
Number of lateral transects made	5
Average stream width	9.22m
Average stream depth	0.91m
Instantaneous flow	19.2 ft^3/sec
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	10m
Maximum pool depth	>1m
Total number of stream bends	1
Number of well defined bends	0
Number of moderately defined bends	0
Number of poorly defined bends	1
Total number of riffles	0
Dominant substrate type	Sand
Average percent of substrate gravel sized or larger	42%
Average percent instream cover	18%
Number of stream cover types	6
Average percent stream bank erosion potential	83%
Average stream bank slope	50°
Average width of vegetative buffer	15m
Average riparian vegetation percent composition by:	
Trees	6%
Shrubs	1%
Grasses/Forbes	36%
Cultivated Fields	
Other	57%
Average percent tree canopy coverage	35%
Overall aesthetic appraisal of stream	Common

Part II - Summary of Physical Characteristics of Water Body

Stream name	Leon 14198
Date of assessment	9/25/2002
Stream bed slope over evaluated reach	0.0024
Approximate drainage area above transect furthest downstream	611km²
Stream order	3
Length of stream evaluated	375m
Number of lateral transects made	6
Average stream width	10.39m
Average stream depth	0.78m
Instantaneous flow	26.78 ft^3/sec
Indicate flow measurement method	Current Meter
Channel flow status	High
Maximum pool width	8m
Maximum pool depth	>1m
Total number of stream bends	2
Number of well defined bends	0
Number of moderately defined bends	2
Number of poorly defined bends	0
Total number of riffles	1
Dominant substrate type	Silt
Average percent of substrate gravel sized or larger	32%
Average percent instream cover	16%
Number of stream cover types	5
Average percent stream bank erosion potential	83%
Average stream bank slope	54°
Average width of vegetative buffer	>20m
Average riparian vegetation percent composition by:	
Trees	17%
Shrubs	3%
Grasses/Forbes	42%
Cultivated Fields	
Other	38%
Average percent tree canopy coverage	16%
Overall aesthetic appraisal of stream	Natural

Part II - Summary of Physical Characteristics of Water Body

Stream name	Leon 12845
Date of assessment	3/31/2003
Stream bed slope over evaluated reach	0.0035
Approximate drainage area above transect furthest downstream	492km²
Stream order	3
Length of stream evaluated	260m
Number of lateral transects made	5
Average stream width	15.8m
Average stream depth	.090m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	19m
Maximum pool depth	>1m
Total number of stream bends	1
Number of well defined bends	0
Number of moderately defined bends	0
Number of poorly defined bends	1
Total number of riffles	2
Dominant substrate type	Cobble
Average percent of substrate gravel sized or larger	77%
Average percent instream cover	27%
Number of stream cover types	7
Average percent stream bank erosion potential	48%
Average stream bank slope	34°
Average width of vegetative buffer	12m
Average riparian vegetation percent composition by:	
Trees	9.00%
Shrubs	2.00%
Grasses/Forbes	29%
Cultivated Fields	
Other	60%
Average percent tree canopy coverage	1%
Overall aesthetic appraisal of stream	Common

Part II - Summary of Physical Characteristics of Water Body

Stream name	Leon 12838
Date of assessment	3/31/2003
Stream bed slope over evaluated reach	0.0012
Approximate drainage area above transect furthest downstream	536km²
Stream order	3
Length of stream evaluated	250m
Number of lateral transects made	5
Average stream width	9.16m
Average stream depth	0.72m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	16m
Maximum pool depth	>1m
Total number of stream bends	1
Number of well defined bends	0
Number of moderately defined bends	0
Number of poorly defined bends	1
Total number of riffles	0
Dominant substrate type	Gravel
Average percent of substrate gravel sized or larger	50%
Average percent instream cover	6%
Number of stream cover types	6
Average percent stream bank erosion potential	71%
Average stream bank slope	45°
Average width of vegetative buffer	15m
Average riparian vegetation percent composition by:	
Trees	5%
Shrubs	1%
Grasses/Forbes	66%
Cultivated Fields	
Other	18%
Average percent tree canopy coverage	29%
Overall aesthetic appraisal of stream	Common

Part II - Summary of Physical Characteristics of Water Body

Stream name	Leon 14198
Date of assessment	4/1/2003
Stream bed slope over evaluated reach	0.0024
Approximate drainage area above transect furthest downstream	611km²
Stream order	3
Length of stream evaluated	375m
Number of lateral transects made	6
Average stream width	12.2m
Average stream depth	0.49m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	High
Maximum pool width	15m
Maximum pool depth	>1m
Total number of stream bends	2
Number of well defined bends	0
Number of moderately defined bends	1
Number of poorly defined bends	1
Total number of riffles	2
Dominant substrate type	Silt
Average percent of substrate gravel sized or larger	50%
Average percent instream cover	18%
Number of stream cover types	4
Average percent stream bank erosion potential	88%
Average stream bank slope	41°
Average width of vegetative buffer	>20m
Average riparian vegetation percent composition by:	
Trees	8%
Shrubs	2%
Grasses/Forbes	73%
Cultivated Fields	
Other	17%
Average percent tree canopy coverage	16%
Overall aesthetic appraisal of stream	Natural

Part II - Summary of Physical Characteristics of Water Body

Stream name	Leon 12845
Date of assessment	9/21/2003
Stream bed slope over evaluated reach	0.0035
Approximate drainage area above transect furthest downstream	492km²
Stream order	3
Length of stream evaluated	260m
Number of lateral transects made	5
Average stream width	14.8m
Average stream depth	0.31
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	High
Maximum pool width	20m
Maximum pool depth	>2m
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	76%
Average percent instream cover	29%
Number of stream cover types	7
Average percent stream bank erosion potential	87%
Average stream bank slope	27
Average width of vegetative buffer	15m
Average riparian vegetation percent composition by:	
Trees	13.00%
Shrubs	8.00%
Grasses/Forbes	70%
Cultivated Fields	
Other	9%
Average percent tree canopy coverage	38%
Overall aesthetic appraisal of stream	Common

**Stream out of banks

Part II - Summary of Physical Characteristics of Water Body

Stream name	Leon 12838
Date of assessment	9/21/2003
Stream bed slope over evaluated reach	0.0012
Approximate drainage area above transect furthest downstream	536km²
Stream order	3
Length of stream evaluated	250m
Number of lateral transects made	5
Average stream width	12.6m
Average stream depth	0.73m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	High
Maximum pool width	16m
Maximum pool depth	>1m
Total number of stream bends	1
Number of well defined bends	0
Number of moderately defined bends	0
Number of poorly defined bends	1
Total number of riffles	1
Dominant substrate type	Silt
Average percent of substrate gravel sized or larger	42%
Average percent instream cover	16%
Number of stream cover types	8
Average percent stream bank erosion potential	80%
Average stream bank slope	33
Average width of vegetative buffer	10m
Average riparian vegetation percent composition by:	
Trees	2%
Shrubs	1%
Grasses/Forbes	65%
Cultivated Fields	
Other	31%
Average percent tree canopy coverage	11%
Overall aesthetic appraisal of stream	Common

**Stream out of banks

Part II - Summary of Physical Characteristics of Water Body

Stream name	Leon 14198
Date of assessment	9/20/2003
Stream bed slope over evaluated reach	0.0024
Approximate drainage area above transect furthest downstream	611km²
Stream order	3
Length of stream evaluated	150m (heavy rain, rising water)
Number of lateral transects made	3 (heavy rain, rising water)
Average stream width	11.3m
Average stream depth	0.54m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	High
Maximum pool width	14m
Maximum pool depth	>1m
Total number of stream bends	2
Number of well defined bends	0
Number of moderately defined bends	1
Number of poorly defined bends	1
Total number of riffles	1
Dominant substrate type	Cobble
Average percent of substrate gravel sized or larger	48%
Average percent instream cover	30%
Number of stream cover types	6
Average percent stream bank erosion potential	80%
Average stream bank slope	53
Average width of vegetative buffer	>20m
Average riparian vegetation percent composition by:	
Trees	13%
Shrubs	17%
Grasses/Forbes	52%
Cultivated Fields	
Other	18%
Average percent tree canopy coverage	2%
Overall aesthetic appraisal of stream	Natural

**Stream out of banks (3 transects completed due to safety concerns of rising water)

HABITAT ASSESSMENT

Part III – Habitat Quality Indices

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 12845	Date: 9/24/02
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports a stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score: 4	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate, i.e., gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be in mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score: 4	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score: 3	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is > 1m	**Moderate** Pool covers approximately 50% or slightly less than the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxillary pockets
Score: 3	3	2	1	0
Channel Flow Status	**High** Water reaches the base of both the lower banks; <5% of channel substrate is exposed	**Moderate** Water fills <75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score: 3	3	2	1	0
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 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: 2	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Tree and/or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score: 1	3	2	1	0
Total Score: 21	HIGH			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 12838	Date: 9/24/02
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports a stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score: 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: 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 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: 2	**3**	**2**	**1**	**0**
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Tree and/or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score: 1	**3**	**2**	**1**	**0**
Total Score: 15	INTERMEDIATE			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 14198	Date: 9/25/02
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports a stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score: 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: 3	**3**	**2**	**1**	**0**
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 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: 19	INTERMEDIATE			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 12845	Date: 3/31/03
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports a stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score: 2	**4**	**3**	**2**	**1**
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate, i.e., gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be in mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score: 4	**4**	**3**	**2**	**1**
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score: 3	**4**	**3**	**2**	**1**
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is > 1m	**Moderate** Pool covers approximately 50% or slightly less than the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxillary pockets
Score: 3	**3**	**2**	**1**	**0**
Channel Flow Status	**High** Water reaches the base of both the lower banks; <5% of channel substrate is exposed	**Moderate** Water fills <75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score: 2	**3**	**2**	**1**	**0**
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 1	**3**	**2**	**1**	**0**
Channel Sinuosity	**High** ≥2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) are present	**Moderate** 1 well-defined bend OR ≥3 moderately-defined bends present	**Low** <3 moderately-defined bends OR only poorly-defined bends present	**None** Straight channel; may be channelized
Score: 1	**3**	**2**	**1**	**0**
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score: 2	**3**	**2**	**1**	**0**
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Tree and/or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score: 1	**3**	**2**	**1**	**0**
Total Score: 19	INTERMEDIATE			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 12838	Date: 3/31/03
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports a stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score: 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	**4**	**3**	**2**	**1**
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is > 1m	**Moderate** Pool covers approximately 50% or slightly less than the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxillary pockets
Score: 3	**3**	**2**	**1**	**0**
Channel Flow Status	**High** Water reaches the base of both the lower banks; <5% of channel substrate is exposed	**Moderate** Water fills <75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score: 2	**3**	**2**	**1**	**0**
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 1	**3**	**2**	**1**	**0**
Channel Sinuosity	**High** ≥2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) are present	**Moderate** 1 well-defined bend OR ≥3 moderately-defined bends present	**Low** <3 moderately-defined bends OR only poorly-defined bends present	**None** Straight channel; may be channelized
Score: 1	**3**	**2**	**1**	**0**
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score: 2	**3**	**2**	**1**	**0**
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Tree and/or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score: 1	**3**	**2**	**1**	**0**
Total Score: 15	INTERMEDIATE			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 14198	Date: 4/1/03
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: 3	**4**	**3**	**2**	**1**
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is > 1m	**Moderate** Pool covers approximately 50% or slightly less than the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxillary pockets
Score: 3	**3**	**2**	**1**	**0**
Channel Flow Status	**High** Water reaches the base of both the lower banks; <5% of channel substrate is exposed	**Moderate** Water fills <75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score: 3	**3**	**2**	**1**	**0**
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 1	**3**	**2**	**1**	**0**
Channel Sinuosity	**High** ≥2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) are present	**Moderate** 1 well-defined bend OR ≥3 moderately-defined bends present	**Low** <3 moderately-defined bends OR only poorly-defined bends present	**None** Straight channel; may be channelized
Score: 1	**3**	**2**	**1**	**0**
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score: 3	**3**	**2**	**1**	**0**
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Tree and/or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score: 2	**3**	**2**	**1**	**0**
Total Score: 21	HIGH			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 12845	Date: 9/21/03
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports a stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score: 2	**4**	**3**	**2**	**1**
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate, i.e., gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be in mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score: 4	**4**	**3**	**2**	**1**
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score: 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: 3	**3**	**2**	**1**	**0**
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 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: 2	**3**	**2**	**1**	**0**
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Tree and/or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score: 1	**3**	**2**	**1**	**0**
Total Score: 18	INTERMEDIATE			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 12838	Date: 9/21/03
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: 3	**3**	**2**	**1**	**0**
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 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: 2	**3**	**2**	**1**	**0**
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Tree and/or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score: 1	**3**	**2**	**1**	**0**
Total Score: 17	INTERMEDIATE			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 14198	Date: 9/20/03
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports a stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score: 3	**4**	**3**	**2**	**1**
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate, i.e., gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be in mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score: 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: 3	**3**	**2**	**1**	**0**
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 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: 20	HIGH			