Impairment Verification Monitoring
Biological and Habitat Components
Segment 1806A, Camp Meeting Creek, Texas
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Ecological Communications Corporation
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Impairment Verification Monitoring-Volume 2: Biological and Habitat Components
Segment 1806A, Camp Meeting Creek, Texas

By:
Jeremy Walther and Victor Palma

Ecological Communications Corporation
3355 Bee Caves Road
Suite 700
Austin, TX 78746
512/329-0031
www.ecommcorporation.com

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P.O. Box 13087, MC - 150
Austin, Texas 78711-3087

ABSTRACT

Ecological Communications Corporation (EComm) conducted biological data collection and analysis as part of an impairment verification monitoring project for Camp Meeting Creek (Segment 1806A). Segment 1806A 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 an Aquatic Life Assessment 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.

This segment is an unclassified water body with a presumed aquatic life use of "Limited" based upon the intermittent with perennial pools flow regime as determined by SWQM staff. However, based on field observations and conversations with local residents, the presumption may need to be changed to an aquatic life use of "High" due to perennial flow conditions for Segment 1806A. Based on data collected by EComm and TEES from 2002 to 2004, this water body appears to be meeting a "High" aquatic life use and exceeding the presumed "Limited" aquatic life use designated in the Texas Water Quality Standards (TCEQ 2000).

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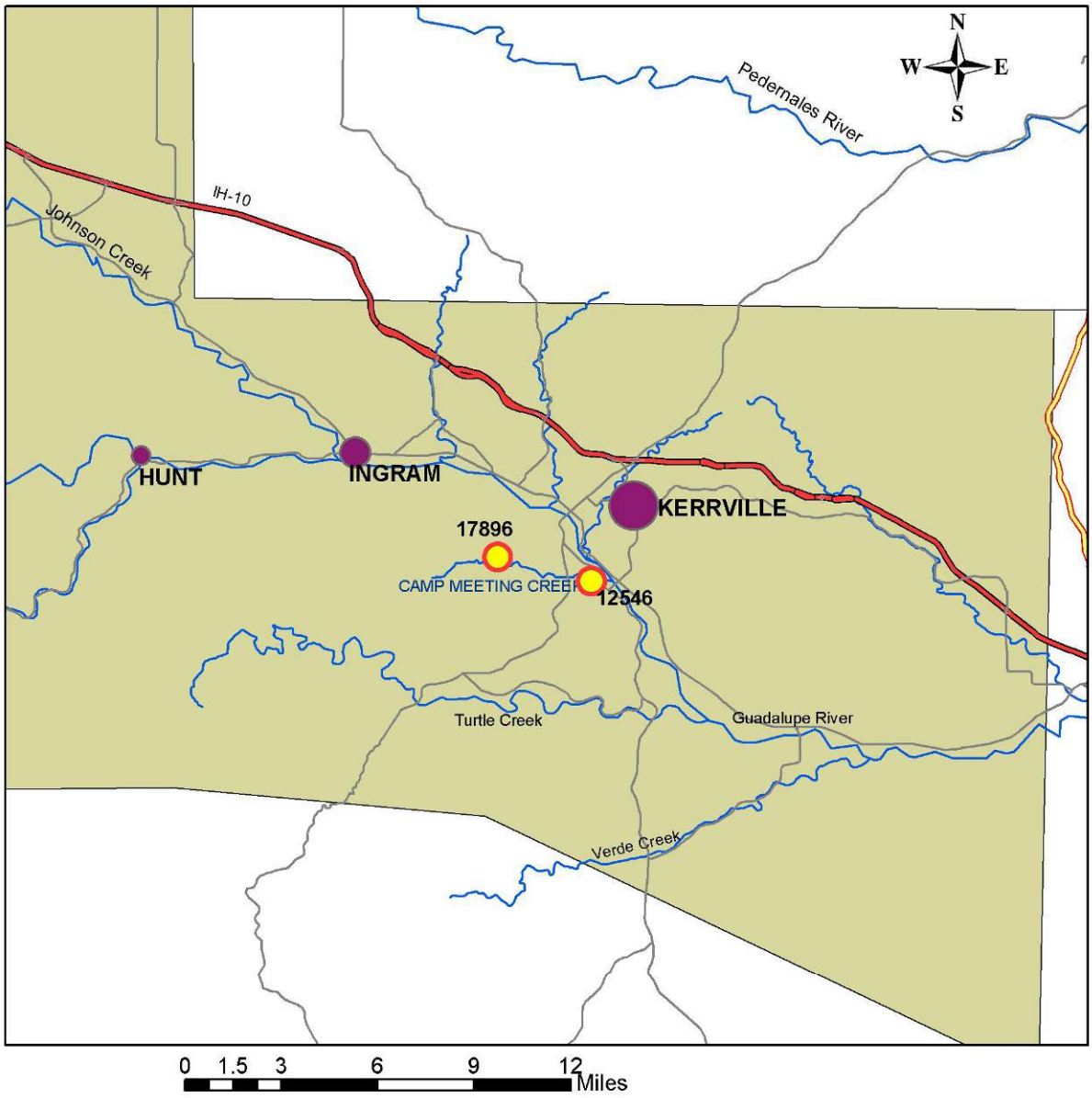
1.0 INTRODUCTION

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 Camp Meeting Creek (Segment 1806A). The impairment to Segment 1806A 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 1806A remained on the impaired waters list. As an initial phase in TMDL development, the aquatic life use impairment to Segment 1806A was verified using the latest sampling techniques. The initial assessment was performed so that resources within the program can be efficiently utilized for truly impaired water bodies, preventing TMDL development for a water body that may be delisted or subject to a water quality standards revision at a later date. Chemical, physical, and biological data were collected at two sites within the segment in an effort to determine what course of action, if any, needed to be taken to address impairments. Data collection activities would result in one of four outcomes: 1) Removal of the water body from the 303(d) list, 2) An evaluation of applicable water quality standards (aquatic life use impairments only), 3) TMDL, or 4) Additional monitoring to better characterize the impairment.

Figure 1. Station 17896

Segment 1806A begins at the headwaters of Camp Meeting Creek above Ranchero Road in Kerrville, TX. It flows for approximately 9 miles prior to the confluence with the Guadalupe River in Kerr County, near the State Highway 173 crossing. The creek flows through mostly residential areas and a private golf course. A location map of the segment is provided in Figure 2. Site 17896 is located approximately 0.5 mile upstream from the Ranchero Road crossing. Site 12546 is located at the Hwy 173 crossing, approximately 0.1 mile upstream of the confluence with the Guadalupe in Kerrville.



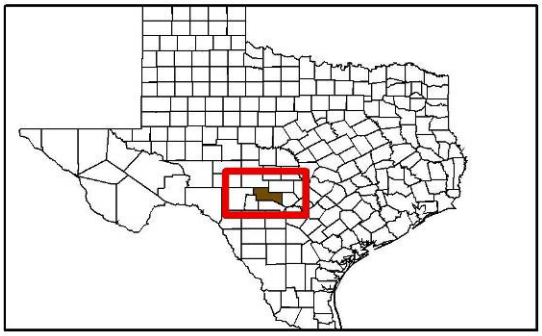


Figure 2.
Location Map for Segment 1806A,
Camp Meeting Creek
Kerr County, TX

2.0 BIOLOGICAL AND HABITAT METHODOLOGY

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

Figure 3. Station 12546

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 1806A, an unclassified water body, had not previously been designated as a segment requiring a standards change to reflect site specific conditions. Studies which examine site specific conditions and recommend changes to established or presumed uses are referred to as Use Attainability Analyses (UAA) and Aquatic Life Assessment (ALA), respectively. 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 ALA data requirements for biological data was conducted. Biological ALA requirements include at least four complete sampling events over two consecutive index periods. Nekton, benthos, and habitat data are collected and analyzed for each sampling event. Two events must be conducted during Year 1 and two events must be conducted during Year 2. Each year, one event must be from the Critical Period (July 1 – September 30), and one from outside the Critical Period, but during the Index Period (March 15 – October 15). Biological sampling for Segment 1806A was conducted in September 2002,

October 2002, June 2003, and August 2003. Therefore, sufficient data exists to make the determination, should an ALA be required.

Table 1. STORET Codes
(New STORET codes captured are temporarily assigned to the "00800" series (*in italics*)

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

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

Benthic Macroinvertebrate Collections

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

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 and each site. 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 1806A. 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 30)	RBP	HQI
Limited	<34	<30	<22	<14
Intermediate	40-44	30-41	22-28	14-19
High	48-52	42-51	29-36	20-25
Exceptional	58-60	>51	>36	26-31

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

Table 3. Results of Biological and Habitat Sampling for Segment 1806A-Camp Meeting Creek

FY02	Statewide IBI	Regional IBI	RBP	HQI
17896	38-Limited/Intermediate	37-Intermediate	30-High	22-High
12546	40-Intermediate	41-Intermediate	24-Intermediate	19-Intermediate
17896	44-Intermediate	47-High	31-High	20-High
12546	44-Intermediate	46-High	28-Intermediate	18-Intermediate
FY03				
17896	42-Intermediate	47-High	28-Intermediate	21-High
12546	42-Intermediate	48-High	26-Intermediate	18-Intermediate
17896	42-Intermediate	45-High	30-High	21-High
12546	46-Intermediate/High	48-High	21-Limited	21-High

For each component, an average score was calculated using scores from every sampling event. Scores for sampling events for each component that scored within the subcategory "Limited" agreed with the designated aquatic life use value for the segment. A subcategory of "Limited-Intermediate", "Intermediate", or "Intermediate-High", "High", "High-Exceptional", or "Exceptional" was considered above standard, as it reflects a improved level of water quality than that for which the segment is designated. All scores for each component were well above the standard. Statewide IBI scores averaged approximately 42.3 (Intermediate) across all sites over all sampling events, and indicated a poor agreement with the presumed high aquatic life use of "Limited" (0%, 100% above standard). Regional IBI scores averaged 44.9 (High), and represented a similar agreement (0%; 1000% above standard). RBP scores averaged 27.3 (Intermediate), a 0% agreement (100% above standard), while HQI averaged approximately 20 (High) in 0% agreement with the aquatic life use (100% above standard).

4.0 DISCUSSION

Average scores of all biological components reflected the high aquatic life use designation for Segment 1806A. However, based on field observations of discussions with local residents familiar with the water body, perennial flow, as opposed to the current assumption of intermittent flow with perennial pools, may be a more appropriate flow regime designation for Segment 1806A. A change to perennial flow regime would raise the aquatic life use standard to "High." Based on biological data collected for this project from 2002 to 2004, Segment 1806a appears to

be meeting the "High" standard. Dissolved oxygen concentrations throughout the study generally exceeded standards, indicating poor water quality.

5.0 CONCLUSION

Based on the Regional IBI, RBP, and HQI scores, the biological and habitat data appear to indicate that the designated aquatic life use of "High" in the Texas Water Quality Standards is being met for Segment 1806A; thus, aquatic life use appears to be above the current assumed standard of "Limited." A change to the assumed flow regime designation may be appropriate for this segment.

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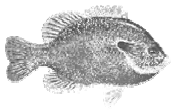
Appendix A
Complete Raw Data Set
Biological and Habitat Components
Segment 1806A-Camp Meeting Creek, Texas
September 2002
October 2002
June 2003
August 2003

Ecological Communications Corporation
Austin, TX

BIOTIC ASSESSMENT – FISH

Species Lists and Preliminary Data Manipulation



Stream	Date	ID
Camp Meeting	9/3/02	17896

Func.Gp	%
P	41.6667
SCR	4.32692
CG	10.4167
FC	42.6282
SHR	1
	100.038

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.

Taxa	N=	Func.Gp.	Tolerance	HBI
Odonata-Coenagrionidae-*Argia*	10	P	6	0.6122449
Odonata-Calopterygidae-*Hetaerina*	16	P	6	0.9795918
Odonata-Libellulidae-*Brechmorhoga*	4	P	6	0.244898
Odonata-Libellulidae-*Erythemis*	1	P	5	0.0510204
Ephemeroptera-Tricorythidae-Tricorythodes	4	CG	5	0.2040816
Ephemeroptera-Tricorythidae-*Leptohypes*	2	CG/SCR	2	0.0408163
Ephemeroptera-Heptageniidae-*Stenonema*	1	SCR/CG	4	0.0408163
Ephemeroptera-Baetidae-*Baetis*	2	SCR/CG	4	0.0816327
Hemiptera-Veliidae-*Rhagovelia*	3	P	-	-
Hemiptera-Gerridae-*Limnoporus*	2	-	-	-
Hemiptera-Gerridae-*Neogerris*	1	-	-	-
Megaloptera-Corydalidae-Corydalus	2	P	6	0.122449
Megaloptera-Sialidae-*Sialis*	1	P	4	0.0408163
Trichoptera-Hydropsychidae-*Cheumatopsyche*	18	FC	6	1.1020408
Trichoptera-Philopotamidae-*Chimarra*	19	FC	3	0.5816327
Trichoptera-Hydrophilidae (Hydropsychidae)-*Hydropsyche*	2	FC	5	0.1020408
Coleoptera-Hydrophilidae-*Tropisternus* (A) *(Berosus)*	1	P	9	0.0918367
Coleoptera-Hydrophilidae-*Helobata* (A)	1	-	-	-
Coleoptera-Scirtidae-*Cyphon* (L)	3	CR/CG/SH	-	-
Diptera-Chironomidae	4	P/CG/FC	6	0.244898
Diptera-Tabanidae-*Tabanus*	4	P	7	0.2857143
Diptera-Simulidae-*Simulium*	4	FC	4	0.1632653
Gastropoda (Limnophila)-Physidae-*Physella*	1	SCR	9	0.0918367
Amphipoda-Hyallelidae-*Hyallela (CG-8)*	2	CG	8	0.1632653
Total	104	98		5.244898
Intolerant/Tolerant	0.58			

Stream	Date	ID
Camp Meeting	9/4/02	12546

Func.Gp	%
P	50.1475
SCR	14.4543
CG	21.2389
FC	13.8643
SHR	0.29499
	100

Taxa	N=	Func.Gp.	Tolerance	HBI
Odonata-Coenagrionidae-*Argia*	13	P	6	0.8478261
Odonata-Calopterygidae-*Hetaerina*	1	P	6	0.0652174
Odonata-Libellulidae-*Perithemis*	1	P	4	0.0434783
Odonata-Libellulidae-*Brechmorhoga*	2	P	6	0.1304348
Odonata-Aeschnidae-*Boyeria*	1	P	3	0.0326087
Ephemeroptera-Tricorythidae-Tricorythodes	1	CG	5	0.0543478
Ephemeroptera-Heptageniidae-*Stenonema*	2	SCR/CG	4	0.0869565
Ephemeroptera-Baetidae-*Baetis*	28	SCR/CG	4	1.2173913
Hemiptera-Naucoridae-*Ambrysus*	1	P	-	-
Hemiptera-Naucoridae-Cryphocricos	5	P	-	-
Hemiptera-Veliidae-*Rhagovelia*	14	P	-	-
Megaloptera-Corydalidae-*Corydalus*	5	P	6	0.326087
Trichoptera-Hydropsychidae-*Cheumatopsyche*	4	FC	6	0.2608696
Coleoptera-Elmidae-*Hexacylloepus* (A)	1	CG/SCR	2	0.0217391
Coleoptera-Elmidae*Microcylloepus* (A)	1	CG/SCR	2	0.0217391
Coleoptera-Scirtidae-*Cyphon* (L)	1	CR/CG/SH	-	-
Diptera-Chironomidae	20	P/CG/FC	6	1.3043478
Diptera-Tabanidae-*Tabanus*	6	P	7	0.4565217
Diptera-Simulidae-*Simulium*	5	FC	4	0.2173913
Tricladida (Dugesia)	1	P	7.5	0.0815217
Total	113	92		5.1684783
Intolerant/Tolerant	0.77			

Stream	Date	ID
Camp Meeting 2	10/3/02	17896

Func.Gp	%
P	28.1746
SCR	9.52381
CG	31.74603
FC	30.55556
SHR	0
	100

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.

Taxa	N=	Func.Gp.	Tolerance	HBI
Odonata-Coenagrionidae-*Argia*	13	P	6	0.9512
Odonata-Calopterygidae-*Hetaerina*	1	P	6	0.0732
Odonata-Libellulidae-*Brechmorhoga*	2	P	6	0.1463
Ephemeroptera-Tricorythidae-Tricorythodes	15	CG	5	0.9146
Ephemeroptera-Tricorythidae-*Leptohypes*	1	CG	2	0.0244
Ephemeroptera-Leptophlebiidae-*Thraulodes*	1	CG/SCR	2	0.0244
Ephemeroptera-Heptageniidae-*Stenonema*	2	SCR/CG	4	0.0976
Ephemeroptera-Baetidae-*Baetis*	5	SCR/CG	4	0.2439
Ephemeroptera-Baetidae-*Camelobaetidius (Dactylobaetis)*	2	SCR/CG	4	0.0976
Hemiptera-Veliidae-*Rhagovelia*	1	P	-	-
Trichoptera-Hydropsychidae-*Cheumatopsyche*	3	FC	6	0.2195
Trichoptera-Hydropsychidae-*Hydropsyche*	3	FC	5	0.1829
Trichoptera-Philopotamidae-*Chimarra*	10	FC	3	0.3659
Trichoptera-Polycentropidae-*Polyplectropus*	2	FC/P	6	0.1463
Trichoptera-Hydroptilidae-*Leucotrichia*	2	CG/SCR	3	0.0732
Coleoptera-Lutrochidae (Limnichidae)-*Lutrochus*	1	CG	-	-
Diptera-Chironomidae	11	P/CG/FC	6	0.8049
Diptera-Simulidae-*Simulium*	5	FC	4	0.2439
Diptera-Stratiomyidae-*Caloparyphus*	1	-	-	-
Hirudinea	1	P	8	0.0976
Tricladida (Degusia)	1	P	7.5	0.0915
Gastropoda (Limnophila)-Physidae-*Physella*	2	SCR	9	0.2195
Total	84	82		5.0183
Intolerant/Tolerant	1.278			

Stream	Date	ID
Camp Meeting 2	10/3/02	12546

Func.Gp	%
P	37.3913
SCR	6.956522
CG	11.30435
FC	44.34783
SHR	0
	100

Taxa	N=	Func.Gp.	Tolerance	HBI
Odonata-Coenagrionidae-*Argia*	5	P	6	0.3333
Odonata-Calopterygidae-*Hetaerina*	3	P	6	0.2
Odonata-Libellulidae-*Brechmorhoga*	5	P	6	0.3333
Odontata-Gomphidae-*Erpetogomphus*	1	P	1	0.0111
Ephemeroptera-Baetidae-*Baetis*	11	SCR/CG	4	0.4889
Hemiptera-Naucoridae-*Ambrysus*	1	P	-	-
Hemiptera-Naucoridae-*Cryphocricos*	1	P	-	-
Hemiptera-Veliidae-*Rhagovelia*	9	P	-	-
Megaloptera-Corydalidae-Corydalus	6	P	6	0.4
Trichoptera-Hydropsychidae-*Cheumatopsyche*	25	FC	6	1.6667
Trichoptera-Hydrophilidae (Hydropsychidae)-*Hydropsyche*	1	FC	5	0.0556
Trichoptera-Hydropsychidae-*Smicridea*	3	FC	4	0.1333
Coleoptera-Elmidae-*Hexacylloepus*	3	CG/SCR	2	0.0667
Coleoptera-Staphylinidae-*Stenus*	4	P	-	-
Diptera-Chironomidae	15	P/CG/FC	6	1
Diptera-Tabanidae-*Tabanus*	1	P	7	0.0778
Diptera-Tabanidae-*Hypomitra*	1	-	-	-
Diptera-Simulidae-*Simulium*	17	FC	4	0.7556
Oligochaeta	1	CG	8	0.0889
Tricladida (Dugesia)	2	P	7.5	0.1667
Gastropoda (Limnophila)-Physidae-*Physella*	1	SCR	9	0.1
Total	115	90		5.8778
Intolerant/Tolerant	0.563			

FISH COLLECTED

Stream: Camp Meeting
Date: 6/11/03
Location: 12546

Stream Order:

**Bluegill hybrid with parasites

Species	N=	Type	Method	Tolerance	Trophic Gp.
Bluegill	11	SF	E	T	IF
Bluegill	15	SF	S	T	IF
Bluegill/longear hybrid	1	SF	S	~	IF
Central stoneroller	75	CY	E	~	H
Central stoneroller	5	CY	S	~	H
Etheostoma sp.	5	D	E		IF
Etheostoma sp.	3	D	S		IF
Gambusia affinis	1		E	T	IF
Gambusia affinis	33		S	T	IF
Green sunfish	2	SF	E	T	P
Green sunfish hybrid	4	SF	E	T	P
Guadalupe bass	1		E	I	P
Guadalupe bass	19		S	I	P
Longear sunfish	12	SF	E	~	IF
Longear sunfish	13	SF	S	~	IF
Mexican tetra	1		E	~	IF
Mexican tetra	1		S	~	IF
Redbreast	5	SF	E	~	IF
Redbreast	1	SF	S	~	IF
Spottail	18	CY	E	~	IF
Spottail	50	CY	S	~	IF
Texas shiner	1	CY	S	~	IF
Warmouth	7	SF	E	T	P
Yellow bullhead	8		E	~	O
Yellow bullhead	1		S	~	O
	293				

Stream: Camp Meeting
Date: 6/11/03
Location: 17896

Stream Order:

Species	N=	Type	Method	Tolerance	Trophic Gp.
Bluegill	5	SF	E	T	IF
Bluegill	5	SF	S	T	IF
Central stoneroller	1	CY	E	~	H
Gambusia affinis	6		E	T	IF
Gambusia affinis	45		S	T	IF
Green sunfish	12	SF	E	T	P
Guadalupe bass	4		E	I	P
Guadalupe bass	14		S	T	P
Lepomis sp.	5	SF	E	~	IF
Longear sunfish	24	SF	E	~	IF
Longear sunfish	12	SF	S	~	IF
Mexican tetra	9		E	~	IF
Mexican tetra	1		S	~	IF
Redbreast	2	SF	E	~	IF
Rio Grande cichlid	1		E	~	IF
Warmouth	2	SF	E	T	P
Yellow bullhead	2		E	~	O
	150				

FISH COLLECTED

Stream: Camp Meeting
Date: 8/6/03
Location: 12546

Species	N=	Type	Method	Tolerance	Trophic Gp.
Blacktail shiner	46	CY	E	~	IF
Blacktail shiner	57	CY	S	~	IF
Bluegill	9	SF	E	~	IF
Bluegill	1	SF	S	~	IF
Central stoneroller	193	CY	E	~	H
Central stoneroller	18	CY	S	~	H
Gambusia	10		E	T	IF
Gambusia	21		S	T	IF
Green sunfish	4	SF	E	T	P
Greenthroat darter	3	D	E	I	IF
Greenthroat darter	4	D	S	I	IF
Guadalupe bass	3		E	I	P
Lepomis	3	SF	E	~	IF
Lepomis	3	SF	S	~	IF
Longear sunfish	6	SF	E	~	IF
Longear sunfish	2	SF	S	~	IF
Mexican tetra	1		E	~	IF
Mexican tetra	2		S	~	IF
Orangethroat darter	6	D	E	~	IF
Orangethroat darter	3	D	S	~	IF
Rio Grande cichlid	1		E	~	IF
Warmouth	3	SF	E	T	P
Yellow bullhead	3		E	~	O
Yellow bullhead	3		S	~	O
	405				

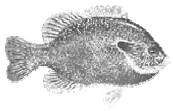
Stream: Camp Meeting
Date: 8/6/03
Location: 17896

Stream Order:

Species	N=	Type	Method	Tolerance	Trophic Gp.
Gambusia	16		E	T	IF
Gambusia	63		S	T	IF
Green sunfish	6	SF	E	T	P
Guadalupe bass	2		E	I	P
Guadalupe bass	4		S	I	P
Lepomis	8	SF	E	~	IF
Lepomis	1	SF	S	~	IF
Longear sunfish	17	SF	E	~	IF
Longear sunfish	3	SF	S	~	IF
Mexican tetra	10		E	~	IF
Mexican tetra	4		S	~	IF
Rio Grande cichlid	1		E	~	IF
Rio Grande cichlid	8		S	~	IF
Warmouth	2	SF	E	T	P
Yellow bullhead	5		E	~	O
	150				

BIOTIC ASSESSMENT – FISH

Indices of Biotic Integrity – Statewide Criteria



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

Stream: Camp Meeting	Date: 9/3/02 Location: 17896	County: Kerr	
Category	**Metric**	**Value**	**Score**
Species Richness and Composition	1. Total number of fish species	12	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	30	1
Trophic Composition	7. Percentage of individuals as omnivores	19	5
	8. Percentage of individuals as insectivores	69	3
	9. Percentage of individuals as piscivores	12	5
Fish Abundance and Condition	10. Number of individuals in sample	67	3
	11. Percentage of individuals as hybrids	1	3
	12. Percentage of individuals with disease/anomalies	0	5
	Aquatic Life Use: LIMITED-INTERMEDIATE	Total Points:	**38**

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

Stream: Camp Meeting	Date: 9/4/02 Location: 12546	County: Kerr	
Category	**Metric**	**Value**	**Score**
Species Richness and Composition	1. Total number of fish species	14	5
	2. Number of darter species	1	3
	3. Number of sunfish species (exc. bass)	6	5
	4. Number of sucker speices	0	1
	5. Number of intolerant species	1	3
	6. Percentage of individuals as tolerants	47	1
Trophic Composition	7. Percentage of individuals as omnivores	13	5
	8. Percentage of individuals as insectivores	68	3
	9. Percentage of individuals as piscivores	18	5
Fish Abundance and Condition	10. Number of individuals in sample	78	3
	11. Percentage of individuals as hybrids	3	1
	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: Camp Meeting	Date: 10/03/02 Location: 17896	County: Kerr	
Category	**Metric**	**Value**	**Score**
Species Richness and Composition	1. Total number of fish species	12	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	55	1
Trophic Composition	7. Percentage of individuals as omnivores	3	5
	8. Percentage of individuals as insectivores	86	5
	9. Percentage of individuals as piscivores	11	5
Fish Abundance and Condition	10. Number of individuals in sample	154	3
	11. Percentage of individuals as hybrids	0	5
	12. Percentage of individuals with disease/anomalies	0	5
	Aquatic Life Use: INTERMEDIATE	Total Points:	**44**

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

Stream: Camp Meeting	Date: 10/03/02	Location: 12546	County: Kerr	
Category	**Metric**		**Value**	**Score**
Species Richness and Composition	1. Total number of fish species		15	5
	2. Number of darter species		2	3
	3. Number of sunfish species (exc. bass)		7	5
	4. Number of sucker speices		0	1
	5. Number of intolerant species		1	3
	6. Percentage of individuals as tolerants		20	3
Trophic Composition	7. Percentage of individuals as omnivores		9	5
	8. Percentage of individuals as insectivores		72	3
	9. Percentage of individuals as piscivores		4	3
Fish Abundance and Condition	10. Number of individuals in sample		123	3
	11. Percentage of individuals as hybrids		0	5
	12. Percentage of individuals with disease/anomalies		0	5
	Aquatic Life Use: INTERMEDIATE		Total Points:	**44**

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

Stream: Camp Meeting	Date: 6/11/03	Location: 12546	County: Kerr	
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)		5	5
	4. Number of sucker species		0	1
	5. Number of intolerant species		1	3
	6. Percentage of individuals as tolerants		25	1
Trophic Composition	7. Percentage of individuals as omnivores		3	5
	8. Percentage of individuals as insectivores		58	3
	9. Percentage of individuals as piscivores		9	5
Fish Abundance and Condition	10. Number of individuals in sample		293	5
	11. Percentage of individuals as hybrids		2	1
	12. Percentage of individuals with disease/anomolies		0	5
	Aquatic Life Use: INTERMEDIATE		Total Points:	42

Stream: Camp Meeting	Date: 6/11/03	Location: 17896	County: Kerr	
Category	**Metric**		**Value**	**Score**
Species Richness and Composition	1. Total # of fish species		12	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		59	1
Trophic Composition	7. Percentage of individuals as omnivores		0.6	5
	8. Percentage of individuals as insectivores		77	3
	9. Percentage of individuals as piscivores		21	5
Fish Abundance and Condition	10. Number of individuals in sample		150	3
	11. Percentage of individuals as hybrids		0	5
	12. Percentage of individuals with disease/anomolies		0	5
	Aquatic Life Use: INTERMEDIATE		Total Points:	42

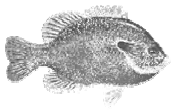
Quantitative Biological Scoring for Evaluating Aquatic Life Use Subcategories Based on Fish Statewide Criteria

Stream: Camp Meeting	Date: 8/6/03	Location:12546	County: Kerr	
Category	**Metric**		**Value**	**Score**
Species Richness and Composition	1. Total # of fish species		14	5
	2. Number of darter species		2	3
	3. Number of sunfish species (exc. bass)		5	5
	4. Number of sucker species		0	1
	5. Number of intolerant species		2	3
	6. Percentage of individuals as tolerants		9.4	3
Trophic Composition	7. Percentage of individuals as omnivores		1.48	5
	8. Percentage of individuals as insectivores		44	3
	9. Percentage of individuals as piscivores		2.47	3
Fish Abundance and Condition	10. Number of individuals in sample		405	5
	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

Stream: Camp Meeting	Date: 8/6/03	Location: 17896	County: Kerr	
Category	**Metric**		**Value**	**Score**
Species Richness and Composition	1. Total # of fish species		9	3
	2. Number of darter species		0	1
	3. Number of sunfish species (exc. bass)		4	5
	4. Number of sucker species		0	1
	5. Number of intolerant species		1	3
	6. Percentage of individuals as tolerants		58	1
Trophic Composition	7. Percentage of individuals as omnivores		3.3	5
	8. Percentage of individuals as insectivores		87.3	5
	9. Percentage of individuals as piscivores		9.3	5
Fish Abundance and Condition	10. Number of individuals in sample		150	3
	11. Percentage of individuals as hybrids		0	5
	12. Percentage of individuals with disease/anomolies		0	5
	Aquatic Life Use: INTERMEDIATE		Total Points:	42

BIOTIC ASSESSMENT – FISH

Indices of Biotic Integrity – Regional Criteria



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

Stream:Camp Meeting	Date: 09/03/02	Location: 17896	County: Kerr	
Metric			**Value**	**Score**
1. Total number of fish species			12	5
2. Number of native cyprinid species			0	1
3. Number of benthic invertivore species			0	1
4. Number of sunfish species			6	5
5. Number of intolerant species			0	1
6. Percentage of individuals as tolerants (exc. G. affinis)			11.9	5
7. Percentage of individuals as omnivores			19	1
8. Percentage of individuals as insectivores			69	5
9. Percentage of individuals as piscivores			12	5
10. Number of individuals in sample			67	-
a. number of ind/seine haul			1.5	1
b. number of ind/min electrofishing			3.9	3
11. Percentage of ind. as non-native species			8.96	1
12. Percentage of individuals with disease/anomalies			0	5
Aquatic Life Use:	INTERMEDIATE		Total Points:	**37**

2*

*Average of 10a and 10b

Drainage area upstream of 17896 ~ 11.62 sq. km.

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

Stream:Camp Meeting	Date: 09/04/02	Location: 12546	County: Kerr	
Metric			**Value**	**Score**
1. Total number of fish species			14	5
2. Number of native cyprinid species			1	1
3. Number of benthic invertivore species			1	3
4. Number of sunfish species			6	5
5. Number of intolerant species			1	3
6. Percentage of individuals as tolerants (exc. G. affinis)			47.4	3
7. Percentage of individuals as omnivores			13	3
8. Percentage of individuals as insectivores			68	5
9. Percentage of individuals as piscivores			18	5
10. Number of individuals in sample			78	-
a. number of ind/seine haul			5.3	1
b. number of ind/min electrofishing			3.1	3
11. Percentage of ind. as non-native species			8.97	1
12. Percentage of individuals with disease/anomalies			0	5
Aquatic Life Use:	INTERMEDIATE		Total Points:	**41**

2*

*Average of 10a and 10b

Drainage area upstream of 12546 ~ 25.88 sq. km.

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

Stream:Camp Meeting2	Date: 10/03/02	Location: 17896	County: Kerr	
Metric			**Value**	**Score**
1. Total number of fish species			12	5
2. Number of native cyprinid species			0	1
3. Number of benthic invertivore species			0	1
4. Number of sunfish species			6	5
5. Number of intolerant species			1	3
6. Percentage of individuals as tolerants (exc. G. affinis)			10.39	5
7. Percentage of individuals as omnivores			3	5
8. Percentage of individuals as insectivores			86	5
9. Percentage of individuals as piscivores			11	5
10. Number of individuals in sample			154	-
a. number of ind/seine haul			16.17	1
b. number of ind/min electrofishing			3.8	3
11. Percentage of ind. as non-native species			0	5
12. Percentage of individuals with disease/anomalies			0	5
Aquatic Life Use:	HIGH		Total Points:	**47**

2*

*Average of 10a and 10b

Drainage area upstream of 17896 ~ 11.62 sq. km.

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

Stream:Camp Meeting2	Date: 10/03/02	Location: 12546	County: Kerr	
Metric			**Value**	**Score**
1. Total number of fish species			15	5
2. Number of native cyprinid species			3	3
3. Number of benthic invertivore species			2	5
4. Number of sunfish species			7	5
5. Number of intolerant species			1	3
6. Percentage of individuals as tolerants (exc. G. affinis)			17.1	5
7. Percentage of individuals as omnivores			9	3
8. Percentage of individuals as insectivores			72	5
9. Percentage of individuals as piscivores			4	3
10. Number of individuals in sample			123	
a. number of ind/seine haul			1	1
b. number of ind/min electrofishing			7.8	5
11. Percentage of ind. as non-native species			4.07	1
12. Percentage of individuals with disease/anomalies			0	5
Aquatic Life Use: HIGH			Total Points:	**46**

3*

*Average of 10a and 10b

Drainage area upstream of 12546 ~ 25.88 sq. km.

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

Stream: Camp Meeting (30)	Date: 6/11/03	Location: 12546	County: Kerr	
Metric		**Value**	**Score**	
1. Total # of fish species		13	5	
2.Total Number of cyprinid species		3	3	
3. Number of benthic invertivore species		1	3	
4. Number of sunfish species (exc. bass)		5	5	
5. Number of intolerant species		1	3	
6. Percentage of individuals as tolerants (exc. *G.affinis*)		13	5	
7. Percentage of individuals as omnivores		3	5	
8. Percentage of individuals as insectivores		58.4	3	
9. Percentage of individuals as piscivores		11.3	5	
10. Number of individuals in sample		~	~	
a. Number of individuals/seine hual		23.8	1	3*
b. Number of individuals/min. electroshocking		10	5	
11. Percentage of individuals as non-native species		2	3	
12. Percentage of individuals with disease/anomolies		0	5	
Aquatic Life Use: HIGH		Total Points:	48	

*Average of 10a and 10b

Drainage area upstream of 12546 ~ 25.88 sq. km.

Stream: Camp Meeting (30)	Date: 6/11/03	Location: 17896	County: Kerr	
Metric		**Value**	**Score**	
1. Total # of fish species		12	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. Number of intolerant species		1	3	
6. Percentage of individuals as tolerants (exc. *G.affinis*)		16	5	
7. Percentage of individuals as omnivores		1.3	5	
8. Percentage of individuals as insectivores		76.7	5	
9. Percentage of individuals as piscivores		20	5	
10. Number of individuals in sample		~	~	
a. Number of individuals/seine hual		12.8	1	2*
b. Number of individuals/min. electroshocking		4.9	3	
11. Percentage of individuals as non-native species		1.3	5	
12. Percentage of individuals with disease/anomolies		0	5	
Aquatic Life Use: HIGH		Total Points:	47	

*Average of 10a and 10b

Drainage area upstream of 17896 ~ 11.62 sq. km.

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

Stream: Camp Meeting (30)	Date: 8/6/03	Location: 12546	County: Kerr
Metric	**Value**	**Score**	
1. Total # of fish species	14	5	
2.Total Number of cyprinid species	2	1	
3. Number of benthic invertivore species	2	5	
4. Number of sunfish species (exc. bass)	5	5	
5. Number of intolerant species	2	5	
6. Percentage of individuals as tolerants (exc. *G.affinis*)	1.7	5	
7. Percentage of individuals as omnivores	1.5	5	
8. Percentage of individuals as insectivores	44	3	
9. Percentage of individuals as piscivores	2.5	1	
10. Number of individuals in sample		~	
a. Number of individuals/seine hual	19	1	
b. Number of individuals/min. electroshocking	19.5	5	
11. Percentage of individuals as non-native species	0	5	
12. Percentage of individuals with disease/anomolies	0	5	
Aquatic Life Use: HIGH	Total Points:	46	

Stream:Camp Meeting (30)	Date: 8/5/03	Location: 17896	County: Kerr
Metric	**Value**	**Score**	
1. Total # of fish species	9	3	
2.Total Number of cyprinid species	0	1	
3. Number of benthic invertivore species	0	1	
4. Number of sunfish species (exc. bass)	4	5	
5. Number of intolerant species	1	3	
6. Percentage of individuals as tolerants (exc. *G.affinis*)	5.3	5	
7. Percentage of individuals as omnivores	3.3	5	
8. Percentage of individuals as insectivores	88.7	5	
9. Percentage of individuals as piscivores	9.3	5	
10. Number of individuals in sample		~	
a. Number of individuals/seine hual	13.8	1	
b. Number of individuals/min. electroshocking	4.67	3	
11. Percentage of individuals as non-native species	0	5	
12. Percentage of individuals with disease/anomolies	0	5	
Aquatic Life Use: HIGH	Total Points:	47	

BIOTIC ASSESSMENT – BENTHIC MACROINVERTEBRATES

Species Lists and Preliminary Data Manipulation

Stream	Date	ID
Camp Meeting	9/3/02	17896

Func.Gp	%
P	41.6667
SCR	4.32692
CG	10.4167
FC	42.6282
SHR	1
	100.038

Taxa	N=	Func.Gp.	Tolerance	HBI
Odonata-Coenagrionidae-*Argia*	10	P	6	0.6122449
Odonata-Calopterygidae-*Hetaerina*	16	P	6	0.9795918
Odonata-Libellulidae-*Brechmorhoga*	4	P	6	0.244898
Odonata-Libellulidae-*Erythemis*	1	P	5	0.0510204
Ephemeroptera-Tricorythidae-Tricorythodes	4	CG	5	0.2040816
Ephemeroptera-Tricorythidae-*Leptohypes*	2	CG/SCR	2	0.0408163
Ephemeroptera-Heptageniidae-*Stenonema*	1	SCR/CG	4	0.0408163
Ephemeroptera-Baetidae-*Baetis*	2	SCR/CG	4	0.0816327
Hemiptera-Veliidae-*Rhagovelia*	3	P	-	-
Hemiptera-Gerridae-*Limnoporus*	2	-	-	-
Hemiptera-Gerridae-*Neogerris*	1	-	-	-
Megaloptera-Corydalidae-Corydalus	2	P	6	0.122449
Megaloptera-Sialidae-*Sialis*	1	P	4	0.0408163
Trichoptera-Hydropsychidae-*Cheumatopsyche*	18	FC	6	1.1020408
Trichoptera-Philopotamidae-*Chimarra*	19	FC	3	0.5816327
Trichoptera-Hydrophilidae (Hydropsychidae)-*Hydropsyche*	2	FC	5	0.1020408
Coleoptera-Hydrophilidae-*Tropisternus* (A) *(Berosus)*	1	P	9	0.0918367
Coleoptera-Hydrophilidae-*Helobata* (A)	1	-	-	-
Coleoptera-Scirtidae-*Cyphon* (L)	3	CR/CG/SH	-	-
Diptera-Chironomidae	4	P/CG/FC	6	0.244898
Diptera-Tabanidae-*Tabanus*	4	P	7	0.2857143
Diptera-Simulidae-*Simulium*	4	FC	4	0.1632653
Gastropoda (Limnophila)-Physidae-*Physella*	1	SCR	9	0.0918367
Amphipoda-Hyallelidae-*Hyallela (CG-8)*	2	CG	8	0.1632653
Total	104	98		5.244898
Intolerant/Tolerant	0.58			

Stream	Date	ID
Camp Meeting	9/4/02	12546

Func.Gp	%
P	50.1475
SCR	14.4543
CG	21.2389
FC	13.8643
SHR	0.29499
	100

Taxa	N=	Func.Gp.	Tolerance	HBI
Odonata-Coenagrionidae-*Argia*	13	P	6	0.8478261
Odonata-Calopterygidae-*Hetaerina*	1	P	6	0.0652174
Odonata-Libellulidae-*Perithemis*	1	P	4	0.0434783
Odonata-Libellulidae-*Brechmorhoga*	2	P	6	0.1304348
Odonata-Aeschnidae-*Boyeria*	1	P	3	0.0326087
Ephemeroptera-Tricorythidae-Tricorythodes	1	CG	5	0.0543478
Ephemeroptera-Heptageniidae-*Stenonema*	2	SCR/CG	4	0.0869565
Ephemeroptera-Baetidae-*Baetis*	28	SCR/CG	4	1.2173913
Hemiptera-Naucoridae-*Ambrysus*	1	P	-	-
Hemiptera-Naucoridae-Cryphocricos	5	P	-	-
Hemiptera-Veliidae-*Rhagovelia*	14	P	-	-
Megaloptera-Corydalidae-*Corydalus*	5	P	6	0.326087
Trichoptera-Hydropsychidae-*Cheumatopsyche*	4	FC	6	0.2608696
Coleoptera-Elmidae-*Hexacylloepus* (A)	1	CG/SCR	2	0.0217391
Coleoptera-Elmidae*Microcylloepus* (A)	1	CG/SCR	2	0.0217391
Coleoptera-Scirtidae-*Cyphon* (L)	1	CR/CG/SH	-	-
Diptera-Chironomidae	20	P/CG/FC	6	1.3043478
Diptera-Tabanidae-*Tabanus*	6	P	7	0.4565217
Diptera-Simulidae-*Simulium*	5	FC	4	0.2173913
Tricladida (Dugesia)	1	P	7.5	0.0815217
Total	113	92		5.1684783
Intolerant/Tolerant	0.77			

Stream	Date	ID
Camp Meeting 2	10/3/02	17896

Func.Gp	%
P	28.1746
SCR	9.52381
CG	31.74603
FC	30.55556
SHR	0
	100

Taxa	N=	Func.Gp.	Tolerance	HBI
Odonata-Coenagrionidae-*Argia*	13	P	6	0.9512
Odonata-Calopterygidae-*Hetaerina*	1	P	6	0.0732
Odonata-Libellulidae-*Brechmorhoga*	2	P	6	0.1463
Ephemeroptera-Tricorythidae-Tricorythodes	15	CG	5	0.9146
Ephemeroptera-Tricorythidae-*Leptohypes*	1	CG	2	0.0244
Ephemeroptera-Leptophlebiidae-*Thraulodes*	1	CG/SCR	2	0.0244
Ephemeroptera-Heptageniidae-*Stenonema*	2	SCR/CG	4	0.0976
Ephemeroptera-Baetidae-*Baetis*	5	SCR/CG	4	0.2439
Ephemeroptera-Baetidae-*Camelobaetidius (Dactylobaetis)*	2	SCR/CG	4	0.0976
Hemiptera-Veliidae-*Rhagovelia*	1	P	-	-
Trichoptera-Hydropsychidae-*Cheumatopsyche*	3	FC	6	0.2195
Trichoptera-Hydropsychidae-*Hydropsyche*	3	FC	5	0.1829
Trichoptera-Philopotamidae-*Chimarra*	10	FC	3	0.3659
Trichoptera-Polycentropidae-*Polyplectropus*	2	FC/P	6	0.1463
Trichoptera-Hydroptilidae-*Leucotrichia*	2	CG/SCR	3	0.0732
Coleoptera-Lutrochidae (Limnichidae)-*Lutrochus*	1	CG	-	-
Diptera-Chironomidae	11	P/CG/FC	6	0.8049
Diptera-Simulidae-*Simulium*	5	FC	4	0.2439
Diptera-Stratiomyidae-*Caloparyphus*	1	-	-	-
Hirudinea	1	P	8	0.0976
Tricladida (Degusia)	1	P	7.5	0.0915
Gastropoda (Limnophila)-Physidae-*Physella*	2	SCR	9	0.2195
Total	84	82		5.0183
Intolerant/Tolerant	1.278			

Stream	Date	ID
Camp Meeting 2	10/3/02	12546

Func.Gp	%
P	37.3913
SCR	6.956522
CG	11.30435
FC	44.34783
SHR	0
	100

Taxa	N=	Func.Gp.	Tolerance	HBI
Odonata-Coenagrionidae-*Argia*	5	P	6	0.3333
Odonata-Calopterygidae-*Hetaerina*	3	P	6	0.2
Odonata-Libellulidae-*Brechmorhoga*	5	P	6	0.3333
Odontata-Gomphidae-*Erpetogomphus*	1	P	1	0.0111
Ephemeroptera-Baetidae-*Baetis*	11	SCR/CG	4	0.4889
Hemiptera-Naucoridae-*Ambrysus*	1	P	-	-
Hemiptera-Naucoridae-*Cryphocricos*	1	P	-	-
Hemiptera-Veliidae-*Rhagovelia*	9	P	-	-
Megaloptera-Corydalidae-Corydalus	6	P	6	0.4
Trichoptera-Hydropsychidae-*Cheumatopsyche*	25	FC	6	1.6667
Trichoptera-Hydrophilidae (Hydropsychidae)-*Hydropsyche*	1	FC	5	0.0556
Trichoptera-Hydropsychidae-*Smicridea*	3	FC	4	0.1333
Coleoptera-Elmidae-*Hexacylloepus*	3	CG/SCR	2	0.0667
Coleoptera-Staphylinidae-*Stenus*	4	P	-	-
Diptera-Chironomidae	15	P/CG/FC	6	1
Diptera-Tabanidae-*Tabanus*	1	P	7	0.0778
Diptera-Tabanidae-*Hypomitra*	1	-	-	-
Diptera-Simulidae-*Simulium*	17	FC	4	0.7556
Oligochaeta	1	CG	8	0.0889
Tricladida (Dugesia)	2	P	7.5	0.1667
Gastropoda (Limnophila)-Physidae-*Physella*	1	SCR	9	0.1
Total	115	90		5.8778
Intolerant/Tolerant	0.563			

Stream: Camp Meeting
Date: 6/11/03
Location: 17896

FFG	%
P	46.41745
SCR	0.778816
CG	4.672897
FC	46.41745
SHR	1.713396
	100

Species	N=	Tolerance	FFG	HBI
Argia	32	6	P	1.811320755
Hetaerina	2	6	P	0.113207547
Erpetogomphus	1	1	P	0.009433962
Tricorythodes	2	5	CG	0.094339623
Camelobaetidius	2	4	SCR/CG/SHR	0.075471698
Rhagovelia	3	-	P	-
Cheumatopsyche	12	6	FC	0.679245283
Hydropsyche	1	5	FC	0.047169811
Chimarra	30	3	FC	0.849056604
Microcylloepus (A)	1	2	CG/SCR	0.018867925
Cyphon	1	-	SCR/CG/SHR	-
Chironomidae	2	6	P/CG/FC	0.113207547
Tabanus	1	7	P	0.066037736
Simulium	6	4	FC	0.226415094
Hirudinea	1	8	P	0.075471698
Tricladida	9	7.5	P	0.636792453
Hyallela	3	8	CG/SHR	0.226415094
	109	0.69354839		5.04245283

Stream: Camp Meeting
Date: 6/11/03
Location: 12546

FFG	%
P	48.64865
SCR	12.16216
CG	19.81982
FC	18.91892
SHR	0
SCAV	0.45045
	100

Species	N=	Tolerance	FFG	HBI
Argia	23	6	P	1.289719626
Hetaerina	1	6	P	0.056074766
Brechmorhoga	3	6	P	0.168224299
Erpetogomphus	18	1	P	0.168224299
Tricorythodes	17	5	CG	0.794392523
Ambrysus	1	-	P	-
Cryphocricos	1	-	P	-
Rhagovelia	2	-	P	-
Corydalus	1	6	P	0.056074766
Cheumatopsyche	20	6	FC	1.121495327
Smicridea	1	4	FC	0.037383178
Helicopsyche	1	2	SCR	0.018691589
Petrophila	1	5	SCR	0.046728972
Microcylloepus (A)	3	2	CG/SCR	0.056074766
Hexacylloepus (A)	2	2	CG/SCR	0.037383178
Macrelmis (L)	4	2	CG/SCR	0.074766355
Tabanus	2	7	P	0.130841121
Ostracoda	1	-	CG/SCAV	-
Tricladida	2	7.5	P	0.140186916
Physella	7	9	SCR	0.588785047
	111	0.79661017		4.785046729

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.

Benthic Macroinvertebrates - (Qualitative) Kick Sample

Stream: Camp Meeting
Date: 8/7/03
Location: 17896

FFG	%
P-	35.94771242
SCR-	2.941176471
CG-	9.477124183
FC-	51.63398693
SHR-	
	100

Species	N=	Tolerance	FFG	HBI
Argia	29	6	P	1.775510204
Tricorythodes	5	5	CG	0.255102041
Rhagovelia	2	-	P	-
Cheumatopsyche	14	6	FC	0.857142857
Chimarra	38	3	FC	1.163265306
Hexacylloepus (A)	2	2	CG/SCR	0.040816327
Macrelmis (L)	2	2	CG/SCR	0.040816327
Lutrochus (A)	2	-	CG	-
Chironomidae	2	6	P/CG/FC	0.12244898
Hirudinea	1	8	P	0.081632653
Tricladida	4	7.5	P	0.306122449
Physella	1	9	SCR	0.091836735
	102	0.92156863		4.734693878

Stream: Camp Meeting
Date: 8/7/03
Location: 12546

FFG	%
P	66.96428571
SCR	11.16071429
CG	4.910714286
FC	16.96428571
SHR	
	100

Species	N=	Tolerance	FFG	HBI
Argia	25	6	P	1.546391753
Hetaerina	6	6	P	0.371134021
Brechmorhoga	2	6	P	0.12371134
Erpetogomphus	5	1	P	0.051546392
Tricorythodes	3	5	CG	0.154639175
Ambrysus	2	-	P	-
Cryphocricos	2	-	P	-
Rhagovelia	10	-	P	-
Cheumatopsyche	18	6	FC	1.113402062
Cernotina	3	6	P	0.18556701
Hexacylloepus (A)	1	2	CG/SCR	0.020618557
Macrelmis (L)	4	2	CG/SCR	0.082474227
Tropisternus (L)	1	9	P	-
Petrophila	1	5	SCR	0.051546392
Tricladida	19	7.5	P	1.469072165
Physella	9	9	SCR	0.835051546
Corbicula	1	6	FC	0.06185567
	112	0.1686747		6.067010309

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.

BIOTIC ASSESSMENT – BENTHIC MACROINVERTEBRATES

Rapid Bioassessment Protocol

Stream: Camp Meeting	**Date: 9/3/02**	**Location: 10006**	**County: Kerr**	
Metric			**Value**	**Score**
1. Taxa Richness			24	4
2. EPT Taxa Abundance			6	2
3. Biotic Index (HBI)			5.24	2
4. % Chironomidae			3.846153846	4
5. % Dominant Taxon			18.26923077	4
6. % Dominant FFG			42.62820481	3
7. % Predators			41.66666635	1
8. Ratio of Intolerant:Tolerant Taxa			0.58	1
9. % of Total Trichoptera as Hydropsychidae			51.28205128	2
10. # of Non-insect Taxa			2	2
11. % Collector-Gatherers			10.41666635	4
12. % of Total Number as Elmidae			0	1
Aqautic Life Use: HIGH			Total Score:	30

Stream: Camp Meeting	**Date: 9/4/02**	**Location: 12546**	**County: Kerr**	
Metric			**Value**	**Score**
1. Taxa Richness			20	3
2. EPT Taxa Abundance			4	2
3. Biotic Index (HBI)			5.17	2
4. % Chironomidae			17.69911504	1
5. % Dominant Taxon			24.77876106	3
6. % Dominant FFG			49.26253982	2
7. % Predators			49.26253982	1
8. Ratio of Intolerant:Tolerant Taxa			0.77	1
9. % of Total Trichoptera as Hydropsychidae			100	1
10. # of Non-insect Taxa			1	1
11. % Collector-Gatherers			21.23893805	3
12. % of Total Number as Elmidae			1.769911504	4
Aqautic Life Use: INTERMEDIATE			Total Score:	24

Stream: Camp Meeting 2	**Date: 10/3/02**	**Location: 10006**	**County: Kerr**	
	Metric		**Value**	**Score**
1. Taxa Richness			22	4
2. EPT Taxa Abundance			11	4
3. Biotic Index (HBI)			5.02	2
4. % Chironomidae			13.0952381	2
5. % Dominant Taxon			17.85714286	4
6. % Dominant FFG			31.74607143	4
7. % Predators			28.17460714	2
8. Ratio of Intolerant:Tolerant Taxa			1.28	1
9. % of Total Trichoptera as Hydropsychidae			30	3
10. # of Non-insect Taxa			3	2
11. % Collector-Gatherers			31.74607143	2
12. % of Total Number as Elmidae			0	1
Aqautic Life Use: HIGH			Total Score:	31

Stream: Camp Meeting 2	**Date: 10/3/02**	**Location: 12546**	**County: Kerr**	
	Metric		**Value**	**Score**
1. Taxa Richness			21	3
2. EPT Taxa Abundance			4	2
3. Biotic Index (HBI)			5.88	1
4. % Chironomidae			13.04347826	2
5. % Dominant Taxon			21.73913043	4
6. % Dominant FFG			44.34782609	3
7. % Predators			37.39130435	1
8. Ratio of Intolerant:Tolerant Taxa			0.56	1
9. % of Total Trichoptera as Hydropsychidae			100	1
10. # of Non-insect Taxa			3	2
11. % Collector-Gatherers			11.30434783	4
12. % of Total Number as Elmidae			2.608695652	4
Aqautic Life Use: INTERMEDIATE			Total Score:	28

Stream: Camp Meeting Date: 6/11/03 Location: 17896	**County: Kerr**	
Metric	**Value**	**Score**
1. Taxa Richness	17	3
2. EPT Taxa Abundance	5	2
3. Biotic Index (HBI)	5.04	2
4. % Chironomidae	1.834862385	4
5. % Dominant Taxon	29.35779817	3
6. % Dominant FFG	45.56605505	2
7. % Predators	45.56605505	1
8. Ratio of Intolerant:Tolerant Taxa	0.69	1
9. % of Total Trichoptera as Hydropsychidae	30.23255814	3
10. # of Non-insect Taxa	3	2
11. % Collector-Gatherers	4.587155963	1
12. % of Total Number as Elmidae	0.917431193	4
Aqautic Life Use: INT	Total Score:	28

Stream: Camp Meeting Date: 6/11/03 Location: 12546	**County: Kerr**	
Metric	**Value**	**Score**
1. Taxa Richness	20	3
2. EPT Taxa Abundance	4	2
3. Biotic Index (HBI)	4.79	2
4. % Chironomidae	No Chironomidae	1
5. % Dominant Taxon	20.72072072	4
6. % Dominant FFG	48.64864865	2
7. % Predators	48.64864865	1
8. Ratio of Intolerant:Tolerant Taxa	0.8	1
9. % of Total Trichoptera as Hydropsychidae	95.45454545	1
10. # of Non-insect Taxa	3	2
11. % Collector-Gatherers	19.81981982	3
12. % of Total Number as Elmidae	8.108108108	4
Aqautic Life Use: INTERMEDIATE	Total Score:	26

Stream: Camp Meeting 2 Date: 8/7/03 Location: 17896	**County: Kerr**	
Metric	**Value**	**Score**
1. Taxa Richness	12	2
2. EPT Taxa Abundance	5	2
3. Biotic Index (HBI)	4.73	2
4. % Chironomidae	1.960784314	4
5. % Dominant Taxon	31.37254902	2
6. % Dominant FFG	51.63431373	2
7. % Predators	35.94803922	2
8. Ratio of Intolerant:Tolerant Taxa	0.92	1
9. % of Total Trichoptera as Hydropsychidae	30.23255814	3
10. # of Non-insect Taxa	3	2
11. % Collector-Gatherers	9.47745098	4
12. % of Total Number as Elmidae	0.980392157	4
Aqautic Life Use: HIGH	Total Score:	30

Stream: Camp Meeting 2 Date: 8/7/03 Location: 12546	**County: Kerr**	
Metric	**Value**	**Score**
1. Taxa Richness	17	3
2. EPT Taxa Abundance	4	2
3. Biotic Index (HBI)	6.07	1
4. % Chironomidae	0	1
5. % Dominant Taxon	22.32142857	3
6. % Dominant FFG	66.96428571	1
7. % Predators	66.96428571	1
8. Ratio of Intolerant:Tolerant Taxa	0.17	1
9. % of Total Trichoptera as Hydropsychidae	95.45454545	1
10. # of Non-insect Taxa	3	2
11. % Collector-Gatherers	4.910714286	1
12. % of Total Number as Elmidae	8.035714286	4
Aqautic Life Use: LIMITED	Total Score:	21

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, SF Date: 9/3/02 Time: 2p Weather conditions: Cloudy

Stream: Camp Meeting Location of site: 10006 Length of stream reach: 180m

Stream Segment No.: 1806 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 1; No. Poorly Defined 0

Channel Obstructions/Modifications: dam at up tran No. of Riffles: 5 Channel Flow Status (circle one): **high** **moderate** **low** **no flow**

Riparian Vegetation (%):
Left Bank: Trees 15 Shrubs 5 Grasses, Forbs 70 Cult. Fields _ Other 10
Right Bank: Trees 10 Shrubs 10 Grasses, Forbs 40 Cult. Fields _ Other 40

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 (%)
	3.7m	12	40%	0.03	0.06	0.07	0.05	0.05	0	0.14	0.14	0.11	0.10	0.05	18	35%	88%
U1 @ small dam @ base of large pond NOTE-stream runs through established, large-lot residential area.	Habitat Type (Circle One) **Riffle** **Run** **Glide** **Pool**	Dominant Substrate Type Cobble		Dominant Types Riparian Vegetation: Left Bank: Cottonwood/Willow/Grasses-60% Forb; 30% Tree; 10% Other Right Bank: Willow/Viney Shrub-50% Shrub; 20% Forb; 15% Tree; 15% Other												% Gravel or Larger 100%	
	Algae or Macrophytes (Circle One) **Abundant** **Common** **Rare** **Absent**	Width of Natural Buffer Vegetation (m) LB: >20 RB: >20		Instream Cover Types: Macrophytes, cobble, Boulder, Overhanging vegetation, Snag												% Instream Cover 80%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth:)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	3.48m	90	60%	0.33	0.30	0.23	0.03	0.06	0.06	0.06	0.06	0.03	0.03	0.01	18	75%	0
U2 @ access point ~ 45m downstream from dam	Habitat Type (Circle One) **Riffle** **Run** **Glide** **Pool**	Dominant Substrate Type Clay		Dominant Types Riparian Vegetation: Left Bank: juniper/grasses-5% Tree; 10% Shrub; 65% Forb; 20% Other Right Bank: juniper/grasses-10% Tree; 15% Shrub; 40% Forb; 35% Other												% 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: Undercut bank, Macrophytes												% Instream Cover 85%	

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 ~ 25m downstream from waterfall mostly in open grass field	9.25m	23	50%	0.01	0	0.10	0.23	0.26	0.27	0.27	0.28	0.28	0	0.03	20	0	18%

Habitat Type (Circle One)	Dominant Substrate Type	Dominant Types Riparian Vegetation	% Gravel or Larger
Riffle Run Glide Pool	Bedrock	Left Bank: Cypress/Juniper/Willow-40% Tree; 30% Forb; 30% Other Right Bank: Juniper/ Grasses-15% Tree; 5% Shrub; 40% Forb; 40% Other	10%

Algae or Macrophytes (Circle One)	Width of Natural Buffer Vegetation (m)	Instream Cover Types:	% Instream Cover
Abundant Common Rare Absent	LB: >20 RB: 15	Udercut bank, Macrophytes, Overhanging vegetation, Boulders	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 (%)
U4 ~65m downstream from waterfall	4.60m	53	60%	0.11	0.14	0.26	0.13	0.23	0.15	0.15	0.24	0.36	0.33	0.30	130	60%	100%

Habitat Type (Circle One)	Dominant Substrate Type	Dominant Types Riparian Vegetation	% Gravel or Larger
Riffle Run Glide Pool	Boulder	Left Bank: Juniper/Pcan/Willow/Grasses-50% Forb; 10% Tree; 40% Other Right Bank: Oak/Cottonwood/Grasses-15% Tree; 10% Shrub; 20% Grasses;50% O	85%

Algae or Macrophytes (Circle One)	Width of Natural Buffer Vegetation (m)	Instream Cover Types:	% Instream Cover
Abundant Common Rare Absent	LB: >20 RB: 10	Overhangin vegetation, Boulder, Leaf pack	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 (%)
U5 ~110m downstream from waterfall	5.59m	90	50%	0.28	0.33	0.31	0.38	0.56	0.53	0.58	0.51	0.53	0.46	0.23	90	50%	3%

Habitat Type (Circle One)	Dominant Substrate Type	Dominant Types Riparian Vegetation	% Gravel or Larger
Riffle Run Glide Pool	Boulder	Left Bank: Oak/Pecan/Juniper/Grasses-45% Tree; 30% Forb; 25% Other Right Bank: Manicured lawn-80% Forbs; 20% Other	90%

Algae or Macrophytes (Circle One)	Width of Natural Buffer Vegetation (m)	Instream Cover Types:	% Instream Cover
Abundant Common Rare Absent	LB>20 RB: 1m	Boulder, Root wad, Macrophytes	80%

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

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

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

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

Part I - Stream Physical Characteristics Worksheet

Observers: JW, SF Date: 9/3/02 Time: 2p Weather conditions: Cloudy

Stream: Camp Meeting Location of site: 10006 Length of stream reach: 180m

Stream Segment No.: 1806 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 1; No. Poorly Defined 0

Channel Obstructions/Modifications: dam at up tran No. of Riffles: 5 Channel Flow Status (circle one): **high** **moderate** **low** **no flow**

Riparian Vegetation (%):
Left Bank: Trees 15 Shrubs 5 Grasses, Forbs 70 Cult. Fields _ Other 10
Right Bank: Trees 10 Shrubs 10 Grasses, Forbs 40 Cult. Fields _ Other 40

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 (%)
	3.7m	12	40%	0.03	0.06	0.07	0.05	0.05	0	0.14	0.14	0.11	0.10	0.05	18	35%	88%
U1 @ small dam @ base of large pond NOTE-stream runs through established, large-lot residential area.	Habitat Type (Circle One) **Riffle** **Run** **Glide** **Pool**	Dominant Substrate Type Cobble		Dominant Types Riparian Vegetation: Left Bank: Cottonwood/Willow/Grasses-60% Forb; 30% Tree; 10% Other Right Bank: Willow/Viney Shrub-50% Shrub; 20% Forb; 15% Tree; 15% Other											% Gravel or Larger 100%		
	Algae or Macrophytes (Circle One) **Abundant** **Common** **Rare** **Absent**	Width of Natural Buffer Vegetation (m) LB: >20 RB: >20		Instream Cover Types: Macrophytes, cobble, Boulder, Overhanging vegetation, Snag											% Instream Cover 80%		

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth:)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	3.48m	90	60%	0.33	0.30	0.23	0.03	0.06	0.06	0.06	0.06	0.03	0.03	0.01	18	75%	0
U2 @ access point ~ 45m downstream from dam	Habitat Type (Circle One) **Riffle** **Run** **Glide** **Pool**	Dominant Substrate Type Clay		Dominant Types Riparian Vegetation: Left Bank: juniper/grasses-5% Tree; 10% Shrub; 65% Forb; 20% Other Right Bank: juniper/grasses-10% Tree; 15% Shrub; 40% Forb; 35% Other											% 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: Undercut bank, Macrophytes											% Instream Cover 85%		

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 ~ 25m downstream from waterfall mostly in open grass field	9.25m	23	50%	0.01	0	0.10	0.23	0.26	0.27	0.27	0.28	0.28	0	0.03	20	0	18%
	Habitat Type (Circle One) **Riffle** Run Glide Pool		Dominant Substrate Type Bedrock												Dominant Types Riparian Vegetation: Left Bank: Cypress/Juniper/Willow-40% Tree; 30% Forb; 30% Other Right Bank: Juniper/ Grasses-15% Tree; 5% Shrub; 40% Forb; 40% Other		% Gravel or Larger 10%
	Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: 15												Instream Cover Types: Udercut bank, Macrophytes, Overhanging vegetation, Boulders		% Instream Cover 20%

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 ~65m downstream from waterfall	4.60m	53	60%	0.11	0.14	0.26	0.13	0.23	0.15	0.15	0.24	0.36	0.33	0.30	130	60%	100%
	Habitat Type (Circle One) **Riffle** Run Glide Pool		Dominant Substrate Type Boulder												Dominant Types Riparian Vegetation: Left Bank: Juniper/Pcan/Willow/Grasses-50% Forb; 10% Tree; 40% Other Right Bank: Oak/Cottonwood/Grasses-15% Tree; 10% Shrub; 20% Grasses;50% O		% Gravel or Larger 85%
	Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: 10												Instream Cover Types: Overhangin vegetation, Boulder, Leaf pack		% 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:													
U5 ~110m downstream from waterfall	5.59m	90	50%	0.28	0.33	0.31	0.38	0.56	0.53	0.58	0.51	0.53	0.46	0.23	90	50%	3%
	Habitat Type (Circle One) **Riffle** Run Glide Pool		Dominant Substrate Type Boulder												Dominant Types Riparian Vegetation: Left Bank: Oak/Pecan/Juniper/Grasses-45% Tree; 30% Forb; 25% Other Right Bank: Manicured lawn-80% Forbs; 20% Other		% Gravel or Larger 90%
	Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent		Width of Natural Buffer Vegetation (m) LB>20 RB: 1m												Instream Cover Types: Boulder, Root wad, Macrophytes		% Instream Cover 80%

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, SF Date: 9/3/02 Time: 2p Weather conditions: Cloudy

Stream: Camp Meeting Location of site: 10006 Length of stream reach: 180m

Stream Segment No.: 1806 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 1; No. Poorly Defined 0

Channel Obstructions/Modifications: dam at up tran No. of Riffles: 5 Channel Flow Status (circle one): **high** **moderate** **low** **no flow**

Riparian Vegetation (%):
Left Bank: Trees 15 Shrubs 5 Grasses, Forbs 70 Cult. Fields _ Other 10
Right Bank: Trees 10 Shrubs 10 Grasses, Forbs 40 Cult. Fields _ Other 40

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 (%)
	3.7m	12	40%	0.03	0.06	0.07	0.05	0.05	0	0.14	0.14	0.11	0.10	0.05	18	35%	88%
U1 @ small dam @ base of large pond NOTE-stream runs through established, large-lot residential area.	Habitat Type (Circle One) **Riffle** **Run** **Glide** **Pool**	Dominant Substrate Type Cobble		Dominant Types Riparian Vegetation: Left Bank: Cottonwood/Willow/Grasses-60% Forb; 30% Tree; 10% Other Right Bank: Willow/Viney Shrub-50% Shrub; 20% Forb; 15% Tree; 15% Other											% Gravel or Larger 100%		
	Algae or Macrophytes (Circle One) **Abundant** **Common** **Rare** **Absent**	Width of Natural Buffer Vegetation (m) LB: >20 RB: >20		Instream Cover Types: Macrophytes, cobble, Boulder, Overhanging vegetation, Snag											% Instream Cover 80%		

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth:)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	3.48m	90	60%	0.33	0.30	0.23	0.03	0.06	0.06	0.06	0.06	0.03	0.03	0.01	18	75%	0
U2 @ access point ~ 45m downstream from dam	Habitat Type (Circle One) **Riffle** **Run** **Glide** **Pool**	Dominant Substrate Type Clay		Dominant Types Riparian Vegetation: Left Bank: juniper/grasses-5% Tree; 10% Shrub; 65% Forb; 20% Other Right Bank: juniper/grasses-10% Tree; 15% Shrub; 40% Forb; 35% Other											% 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: Undercut bank, Macrophytes											% Instream Cover 85%		

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 ~ 25m downstream from waterfall mostly in open grass field	9.25m	23	50%	0.01	0	0.10	0.23	0.26	0.27	0.27	0.28	0.28	0	0.03	20	0	18%
	Habitat Type (Circle One) **Riffle** Run Glide Pool		Dominant Substrate Type Bedrock												Dominant Types Riparian Vegetation: Left Bank: Cypress/Juniper/Willow-40% Tree; 30% Forb; 30% Other Right Bank: Juniper/ Grasses-15% Tree; 5% Shrub; 40% Forb; 40% Other		% Gravel or Larger 10%
	Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: 15												Instream Cover Types: Udercut bank, Macrophytes, Overhanging vegetation, Boulders		% Instream Cover 20%

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 ~65m downstream from waterfall	4.60m	53	60%	0.11	0.14	0.26	0.13	0.23	0.15	0.15	0.24	0.36	0.33	0.30	130	60%	100%
	Habitat Type (Circle One) **Riffle** Run Glide Pool		Dominant Substrate Type Boulder												Dominant Types Riparian Vegetation: Left Bank: Juniper/Pcan/Willow/Grasses-50% Forb; 10% Tree; 40% Other Right Bank: Oak/Cottonwood/Grasses-15% Tree; 10% Shrub; 20% Grasses;50% O		% Gravel or Larger 85%
	Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: 10												Instream Cover Types: Overhangin vegetation, Boulder, Leaf pack		% 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:													
U5 ~110m downstream from waterfall	5.59m	90	50%	0.28	0.33	0.31	0.38	0.56	0.53	0.58	0.51	0.53	0.46	0.23	90	50%	3%
	Habitat Type (Circle One) **Riffle** Run Glide Pool		Dominant Substrate Type Boulder												Dominant Types Riparian Vegetation: Left Bank: Oak/Pecan/Juniper/Grasses-45% Tree; 30% Forb; 25% Other Right Bank: Manicured lawn-80% Forbs; 20% Other		% Gravel or Larger 90%
	Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent		Width of Natural Buffer Vegetation (m) LB>20 RB: 1m												Instream Cover Types: Boulder, Root wad, Macrophytes		% Instream Cover 80%

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, SF Date: 9/3/02 Time: 2p Weather conditions: Cloudy

Stream: Camp Meeting Location of site: 10006 Length of stream reach: 180m

Stream Segment No.: 180 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 1; No. Poorly Defined 0

Channel Obstructions/Modifications: dam at up tran No. of Riffles: 5 Channel Flow Status (circle one): **high** **moderate** **low** **no flow**

Riparian Vegetation (%):
Left Bank: Trees 15 Shrubs 5 Grasses, Forbs 70 Cult. Fields _ Other 10
Right Bank: Trees 10 Shrubs 10 Grasses, Forbs 40 Cult. Fields _ Other 40

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 (%)
	3.7m	12	40%	0.03	0.06	0.07	0.05	0.05	0	0.14	0.14	0.11	0.10	0.05	18	35%	88%
U1 @ small dam @ base of large pond NOTE-stream runs through established, large-lot residential area.	Habitat Type (Circle One) **Riffle** **Run** **Glide** **Pool**	Dominant Substrate Type Cobble		Dominant Types Riparian Vegetation: Left Bank: Cottonwood/Willow/Grasses-60% Forb; 30% Tree; 10% Other Right Bank: Willow/Viney Shrub-50% Shrub; 20% Forb; 15% Tree; 15% Other											% Gravel or Larger 100%		
	Algae or Macrophytes (Circle One) **Abundant** **Common** **Rare** **Absent**	Width of Natural Buffer Vegetation (m) LB: >20 RB: >20		Instream Cover Types: Macrophytes, cobble, Boulder, Overhanging vegetation, Snag											% Instream Cover 80%		

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (Thalweg Depth:)											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	3.48m	90	60%	0.33	0.30	0.23	0.03	0.06	0.06	0.06	0.06	0.03	0.03	0.01	18	75%	0
U2 @ access point ~ 45m downstream from dam	Habitat Type (Circle One) **Riffle** **Run** **Glide** **Pool**	Dominant Substrate Type Clay		Dominant Types Riparian Vegetation: Left Bank: juniper/grasses-5% Tree; 10% Shrub; 65% Forb; 20% Other Right Bank: juniper/grasses-10% Tree; 15% Shrub; 40% Forb; 35% Other											% 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: Undercut bank, Macrophytes											% Instream Cover 85%		

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 ~ 25m downstream from waterfall mostly in open grass field	9.25m	23	50%	0.01	0	0.10	0.23	0.26	0.27	0.27	0.28	0.28	0	0.03	20	0	18%
	Habitat Type (Circle One) **Riffle** Run Glide Pool		Dominant Substrate Type Bedrock												Dominant Types Riparian Vegetation: Left Bank: Cypress/Juniper/Willow-40% Tree; 30% Forb; 30% Other Right Bank: Juniper/ Grasses-15% Tree; 5% Shrub; 40% Forb; 40% Other		% Gravel or Larger 10%
	Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: 15												Instream Cover Types: Udercut bank, Macrophytes, Overhanging vegetation, Boulders		% Instream Cover 20%

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 ~65m downstream from waterfall	4.60m	53	60%	0.11	0.14	0.26	0.13	0.23	0.15	0.15	0.24	0.36	0.33	0.30	130	60%	100%
	Habitat Type (Circle One) **Riffle** Run Glide Pool		Dominant Substrate Type Boulder												Dominant Types Riparian Vegetation: Left Bank: Juniper/Pcan/Willow/Grasses-50% Forb; 10% Tree; 40% Other Right Bank: Oak/Cottonwood/Grasses-15% Tree; 10% Shrub; 20% Grasses;50% O		% Gravel or Larger 85%
	Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: >20 RB: 10												Instream Cover Types: Overhangin vegetation, Boulder, Leaf pack		% 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:													
U5 ~110m downstream from waterfall	5.59m	90	50%	0.28	0.33	0.31	0.38	0.56	0.53	0.58	0.51	0.53	0.46	0.23	90	50%	3%
	Habitat Type (Circle One) **Riffle** Run Glide Pool		Dominant Substrate Type Boulder												Dominant Types Riparian Vegetation: Left Bank: Oak/Pecan/Juniper/Grasses-45% Tree; 30% Forb; 25% Other Right Bank: Manicured lawn-80% Forbs; 20% Other		% Gravel or Larger 90%
	Algae or Macrophytes (Circle One) **Abundant** Common Rare Absent		Width of Natural Buffer Vegetation (m) LB>20 RB: 1m												Instream Cover Types: Boulder, Root wad, Macrophytes		% Instream Cover 80%

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 - 1
Riffle - III
Run - III
Glide -
Bend - I

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

Part I - Stream Physical Characteristics Worksheet

Observers: LV VP Date: 6/11/93 Time: 4 Weather conditions: S

Stream: CM Location of site: 1000 G Length of stream reach: 175

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

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

Channel Obstructions/Modifications: FW No. of Riffles: 4 Channel Flow Status (circle one): high moderate low no flow

Riparian Vegetation (%):
Left Bank: Trees 15 Shrubs 10 Grasses, Forbs 17 Cult. Fields _ Other 1
Right Bank: Trees 4 Shrubs 3 Grasses, Forbs 3 Cult, Fields _ Other 10

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: .06											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	4.4m	10°	65%	.03	.01	.07	.1	.06	.09	.03	.04	.11	.10	.04	18°	70%	17/17
U @ small dam	Habitat Type (Circle One) Riffle Run Glide Pool		Dominant Substrate Type: Gravel												Dominant Types Riparian Vegetation: Left Bank: 25 Tree - 5 shrub - 55 forbs - X other; Right Bank: 20 tree - 10 shrub - 50 forb - X other		% Gravel or Larger: 100%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: 220 RB: 220												Instream Cover Types: Root wads, gravel, boulder, cobble, macrophytes,		% Instream Cover: 80%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: .09											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U2 @ mouth	1.8m.	11°	60%	.01	.12	.13	.17	.17	.10	.06	.08	.09	.1	.03	55°	60%	0°
	Habitat Type (Circle One) Riffle Run Glide Pool		Dominant Substrate Type: SILT												Dominant Types Riparian Vegetation: Left Bank: 2% tree, 10 shrub, 70 Forb, 18 other; Right Bank: 2 Trees, 2 shrub - 90 forb, 6 other		% Gravel or Larger: 15%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent		Width of Natural Buffer Vegetation (m) LB: 220 RB: 220												Instream Cover Types: Obs veg., macrophytes, gravel & boulder		% Instream Cover: 90%	

17
24
101

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: .18	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
US 25m downstr. waterfall	9.7	30°	60%	.09 .12 .16 .16 .20 .23 .24 .22 .28 .21 .20	51	70%	1.5/12

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation: Left Bank: 25 tree, 5 shrub, 50 forb, 20 Other; Right Bank: 10 10 60 20	% Gravel or Larger
	Bedrock		95%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: RB:	Instream Cover Type:	% Instream Cover
	720 5	macrophytes, gravel, boulder, cobble	20%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: .10	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
US 55m downstream waterfall	4.7	40°	75%	.03 .1 .17 .14 .16 .20 .25 .33 .24 .29 .28	130	80	100

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation: Left Bank: 20 tree, 10 shrub, 40 forb, 30 Other; Right Bank: 95 forb, 2 tree, 3 Other	% Gravel or Larger
	Cobble		95%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: RB:	Instream Cover Types:	% Instream Cover
	720 2	gravel, cobble, boulder, macrophytes, snag	60%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: .46	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
US 100m DS of waterfall	5.39	40°	75%	.07 .15 .27 .38 .47 .60 .69 .77 .74 .55 .31	40°	75%	0%

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation: Left Bank: 40 tree - 20 shrub - 20 forb - 20 Other; Right Bank: 20 tree, 98 forb	% Gravel or Larger
	Bedrock		15

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: RB:	Instream Cover Types:	% Instream Cover
	720 1	off veg. macrophytes, boulder, gravel,	70%

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
Riffle - 11
Bends -
Glides - 1
Runs -

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

Part I - Stream Physical Characteristics Worksheet

Observers: VP, JW Date: 6/11 Time: [illegible] Weather conditions: Cloudy

Stream: CM Location of site: 13546 Length of stream reach: 200

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

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

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

Riparian Vegetation (%):
Left Bank: Trees 10 Shrubs 5 Grasses, Forbs 61 Cult. Fields _ Other 24
Right Bank: Trees 30 Shrubs 5 Grasses, Forbs 47 Cult. Fields _ Other 18

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect (L → R); Thalweg Depth: .49											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D1 55m down from 173 bridge	6.4 m	22°	85%	.04	.47	.54	.58	.65	.72	.72	.73	.74	.2	.04	[illegible]	90%	8.5/17

- Habitat Type (Circle One): Riffle Run Glide Pool — Pool
- Dominant Substrate Type: silt
- Dominant Types Riparian Vegetation: Left Bank: 10% Tree, 75% Forbs, 15% other; Right Bank: 30% tree, 5% shrub, 2% forb, X% other
- % Gravel or Larger: 25
- Algae or Macrophytes (Circle One): Abundant Common Rare Absent — Rare
- Width of Natural Buffer Vegetation (m): LB: 220 RB: 220
- Instream Cover Types: Gravel, cobble, snags, algae, overhanging veg. + artificial
- % 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: .15											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D2 - 5m down from bridge	3.15	8°	10°	.02	.05	.12	.18	.15	.24	.27	.24	.2	.13	.07	83°	30°	13.5/17

- Habitat Type (Circle One): Riffle Run Glide Pool — Riffle
- Dominant Substrate Type: Gravel
- Dominant Types Riparian Vegetation: Left Bank: 15% Tree, 5% shrub, 40 Forb, x other; Right Bank: 15% tree, 10% shrub, 60 other, 15% Forb
- % Gravel or Larger: 95%
- Algae or Macrophytes (Circle One): Abundant Common Rare Absent — Rare
- Width of Natural Buffer Vegetation (m): LB: 220 RB: 5m
- Instream Cover Types: gravel, cobble, boulder, algae, undercut banks, artificial, overhanging veg.
- % Instream Cover: 40%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: .29											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D3 ~40 up from D2	4.75m	105°	80%	.2	.25	.28	.27	.31	.41	.45	.45	.29	.22	.02	20%	90%	7/17
	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type: Gravel		Dominant Types Riparian Vegetation: Left Bank: 5 Tree, 15 Shrub, 50 FORB, X Other; Right Bank: 2 Tree, 5 Shrub, 5 FORB, X Other												% Gravel or Larger: 50%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 10 RB: 5		Instream Cover Types: Undercut bank, gravel, cobble, algae, snags, overhang. veg.												% 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: .67											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D4 ~40 up from D3 Camp	7.2m	125°	85%	.2	.52	.58	.67	.82	.86	.85	.90	.80	.77	.40	79°	0%	13/17
	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type: SILT		Dominant Types Riparian Vegetation: Left Bank: 15 Tree - 20 forb - 25 Other; Right Bank: 30 Tree - 30 shrub - 10 FORB - 30 other												% Gravel or Larger: 20%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 5 RB: 5		Instream Cover Types: gravel, algae, undercut banks, overhanging veg, snags, boulders.												% 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: 1 .07											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D5 ~45 up from D4	4.5	80	0%	.01	.0	.01	.06	.07	.10	.09	.12	.16	.10	.03	60°	50%	16/17
	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type: cobble		Dominant Types Riparian Vegetation: Left Bank: 80 forb / 10 Other, 5 shrub, 5 Tree; Right Bank: 25 Tree - 25 shrub - 35 FORB - 15 other												% Gravel or Larger: 100%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 5 RB: 5		Instream Cover Types: gravel, cobble, boulder, algae, macrophytes, OH veg.												% 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	

Part II
Run
Riffle ||||
Pool 卌
Glide
mod Bend ||

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

Part I - Stream Physical Characteristics Worksheet

Observers: JW BH Date: 8-1-03 Time: 1200 Weather conditions: S

Stream: Campbell Location of site: 10006 Length of stream reach: 150

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

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

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

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: 10 0.05											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U1	1.8	14	90	2	7	11	10	9	8	5	3	1	1	1	9	80	100%

@ dam

- Habitat Type (Circle One) Riffle Run Glide Pool [circled: Riffle]
- Dominant Substrate Type: gravel
- Dominant Types Riparian Vegetation: Left Bank: 30% tree 30 grass 40 other; Right Bank: 10% tree 25% shrub 35% forb 30% other
- % Gravel or Larger: 90
- Algae or Macrophytes (Circle One) Abundant Common Rare Absent [circled: Common]
- Width of Natural Buffer Vegetation (m) LB: 120 RB: 720
- Instream Cover Types: overhang veg. gravel, boulder, algae, woody, macrophytes,
- % Instream Cover: 70%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 31 0.29											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
02 M	0.9	125°	95	24	29	27	28	28	30	31	31	30	29	29	120	95	0.5/17

- Habitat Type (Circle One) Riffle Run Glide Pool [circled: Pool]
- Dominant Substrate Type: clay
- Dominant Types Riparian Vegetation: Left Bank: 5% tree 25% shrub 60% grass, 10% other; Right Bank: 5% tree 85% grass 10% other
- % Gravel or Larger: 5
- Algae or Macrophytes (Circle One) Abundant Common Rare Absent
- Width of Natural Buffer Vegetation (m) LB: 710 RB: 720
- Instream Cover Types: macrophyte, snag, undercut bank, gravel
- % Instream Cover: 90%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 0.19											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U3	8.3	20	40	1	10	16	21	17	21	25	21	25	30	11	4	75	2/17

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation: Left Bank: 5% tree, 5% shrub, 90% grass, 10% other; Right Bank: 10% tree, 60% shrub, 5% grass, 35% other	% Gravel or Larger
	bedrock		95%

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 20 RB: 10	Instream Cover Types: algae, macrophytes, snags, boulder	% Instream Cover
			30

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 0.25											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U4	4.8	64°	80	4	10	15	13	13	15	17	26	31	20	16	90	90	10%

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation: Left Bank: 30% tree, 70% grass, 5% shrub, 35% other; Right Bank: 5% tree, 70% grass, 5% other	% Gravel or Larger
	boulder		75

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 20 RB: 1 m	Instream Cover Types: macrophytes, undercut bank, boulder, algae, leaf pack, 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: 76 0.38											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
U5	5.2	30	80%	4	10	20	28	41	47	64	69	76	56	10	65	80%	0.5/17

Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type	Dominant Types Riparian Vegetation: Left Bank: 10% tree, 40% grass, 10% shrub, 10% other; Right Bank: 5% tree, 95% grass	% Gravel or Larger
	bedrock		85

Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 20 RB: 0	Instream Cover Types: undercut bank, algae, macrophyte, snag	% Instream Cover
			95

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

Part II
8/06

Run
Pool |
Riffle |||
Glide
Bend ?

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

a12546

Part I - Stream Physical Characteristics Worksheet

Observers: AW, RA Date: 8/7/03 0930 Time:__ Weather conditions: S

Stream: Carr Mtn Location of site: Hw 173 Length of stream reach: 100

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

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

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

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

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 60 0.40											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
D1	6.9	130	95%	16	49	46	60	60	47	49	58	57	10	1	70°	95%	14/17

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

Dominant Substrate Type: ~~gravel~~ silt

Dominant Types Riparian Vegetation:
Left Bank: 55% forb, 25% tree, 20% other
Right Bank: 30% tree, 50% forb, 20% other

% Gravel or Larger: 30%

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

Width of Natural Buffer Vegetation (m) LB: 720 RB: ~~720~~ 720

Instream Cover Types: cobble, boulder, undercut bank, algae, snag, gravel, overhanging veg.

% Instream Cover: 85%

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect — Thalweg Depth: 0.12											Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	3.8	7	20	2	8	13	19	19	20	21	15	11	12	1	76	30	14.5/17

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

Dominant Substrate Type: gravel

Dominant Types Riparian Vegetation:
Left Bank: 10% tree 40% grass 50% other
Right Bank: 10% tree 15% grass 75% other

% Gravel or Larger: 80%

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

Width of Natural Buffer Vegetation (m) LB: 10 RB: 720

Instream Cover Types: gravel, boulder, cobble, algae, roots

% Instream Cover: 65

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect Thalweg Depth: 36 0.25	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	4.2	93	55%	14 24 27 21 23 21 30 36 28 23 3	34	80	7/17
	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type gravel	Dominant Types Riparian Vegetation: Left Bank: 5% tree 20% shrub, 55% other 20% forb Right Bank: 5% tree, 25% grass, 70%			% Gravel or Larger 55%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 10 RB: 2	Instream Cover Types: undercut bank, gravel, algae, woody veg. artic, snags			% 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: 0.49	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	6.1	58	85%	14 36 46 54 57 60 56 65 59 55 40	75	5%	15.5/17
	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type silt	Dominant Types Riparian Vegetation: Left Bank: 5% tree, 5% shrub, 50% grass, 40% other Right Bank: 10% tree, 0% shrub, 10% grass, 70% other			% Gravel or Larger 5%	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 10 RB: 5	Instream Cover Types: algae, gravel, boulder, roots			% Instream Cover 45%	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect Thalweg Depth: 8 0.05	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	2.4	8°	0	1 5 4° 5 8 4 4 8 8 3 1	64°	30	75/17
	Habitat Type (Circle One) Riffle Run Glide Pool	Dominant Substrate Type boulder	Dominant Types Riparian Vegetation: Left Bank: 5% tree 15% shrub, 65% grass, 15% other Right Bank: 5% tree, 10% forb, 85% other			% Gravel or Larger 100	
	Algae or Macrophytes (Circle One) Abundant Common Rare Absent	Width of Natural Buffer Vegetation (m) LB: 10 RB: 5	Instream Cover Types: snag, roots, boulder, algae			% Instream Cover 80	

Location of Transect	Stream Width (m)	Left Bank Slope (°)	Left Bank Erosion Potential (%)	Stream Depths (m) at Points Across Transect Thalweg Depth:	Right Bank Slope (°)	Right Bank Erosion Potential (%)	Tree Canopy (%)
	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	Camp Meeting 10006
Date of assessment	9/3/2002
Stream bed slope over evaluated reach	0.0055
Approximate drainage area above transect furthest downstream	12km²
Stream order	3
Length of stream evaluated	165m
Number of lateral transects made	5
Average stream width	5.3m
Average stream depth	0.22m
Instantaneous flow	1.56 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	1
Number of poorly defined bends	0
Total number of riffles	5
Dominant substrate type	Boulder
Average percent of substrate gravel sized or larger	57%
Average percent instream cover	65%
Number of stream cover types	8
Average percent stream bank erosion potential	48%
Average stream bank slope	54°
Average width of vegetative buffer	14m
Average riparian vegetation percent composition by:	
Trees	18.5%
Shrubs	9.5%
Grasses/Forbes	43.5%
Cultivated Fields	
Other	28.5%
Average percent tree canopy coverage	42.0%
Overall aesthetic appraisal of stream	Common

Part II - Summary of Physical Characteristics of Water Body

Stream name	Camp Meeting 12546
Date of assessment	9/4/2002
Stream bed slope over evaluated reach	0.0052
Approximate drainage area above transect furthest downstream	26km²
Stream order	3
Length of stream evaluated	175m
Number of lateral transects made	5
Average stream width	4.85m
Average stream depth	0.37m
Instantaneous flow	0.79 ft^3/sec
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	7m
Maximum pool depth	0.5 - 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	4
Dominant substrate type	Gravel
Average percent of substrate gravel sized or larger	85%
Average percent instream cover	57%
Number of stream cover types	6
Average percent stream bank erosion potential	47.50%
Average stream bank slope	47°
Average width of vegetative buffer	8.2m
Average riparian vegetation percent composition by:	
Trees	14.50%
Shrubs	10%
Grasses/Forbes	25.50%
Cultivated Fields	
Other	50%
Average percent tree canopy coverage	69%
Overall aesthetic appraisal of stream	Common

Part II - Summary of Physical Characteristics of Water Body

Stream name	Camp Meeting2 10006
Date of assessment	10/3/2002
Stream bed slope over evaluated reach	0.0055
Approximate drainage area above transect furthest downstream	12km²
Stream order	3
Length of stream evaluated	180m
Number of lateral transects made	5
Average stream width	4.6m
Average stream depth	0.23m
Instantaneous flow	0.63 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	1
Number of poorly defined bends	0
Total number of riffles	5
Dominant substrate type	Boulder
Average percent of substrate gravel sized or larger	41%
Average percent instream cover	51%
Number of stream cover types	6
Average percent stream bank erosion potential	48%
Average stream bank slope	54°
Average width of vegetative buffer	8m
Average riparian vegetation percent composition by:	
Trees	15%
Shrubs	10%
Grasses/Forbes	45%
Cultivated Fields	
Other	30%
Average percent tree canopy coverage	59%
Overall aesthetic appraisal of stream	Common

Part II - Summary of Physical Characteristics of Water Body

Stream name	Camp Meeting2 12546
Date of assessment	10/3/2002
Stream bed slope over evaluated reach	0.0052
Approximate drainage area above transect furthest downstream	26km²
Stream order	3
Length of stream evaluated	180m
Number of lateral transects made	5
Average stream width	5.1m
Average stream depth	0.35m
Instantaneous flow	0.4 ft^3/sec
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	6m
Maximum pool depth	0.5 - 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	4
Dominant substrate type	Gravel
Average percent of substrate gravel sized or larger	72%
Average percent instream cover	62%
Number of stream cover types	8
Average percent stream bank erosion potential	55%
Average stream bank slope	50°
Average width of vegetative buffer	6m
Average riparian vegetation percent composition by:	
Trees	16%
Shrubs	10%
Grasses/Forbes	24%
Cultivated Fields	
Other	50%
Average percent tree canopy coverage	62%
Overall aesthetic appraisal of stream	Common

Part II - Summary of Physical Characteristics of Water Body

Stream name	Camp Meeting 17896
Date of assessment	6/11/2003
Stream bed slope over evaluated reach	0.0055
Approximate drainage area above transect furthest downstream	12km²
Stream order	3
Length of stream evaluated	165m
Number of lateral transects made	5
Average stream width	5.2m
Average stream depth	0.20m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	10m
Maximum pool depth	0.5m - 1m
Total number of stream bends	1
Number of well defined bends	0
Number of moderately defined bends	1
Number of poorly defined bends	0
Total number of riffles	4
Dominant substrate type	Cobble
Average percent of substrate gravel sized or larger	64%
Average percent instream cover	64%
Number of stream cover types	7
Average percent stream bank erosion potential	69%
Average stream bank slope	43°
Average width of vegetative buffer	15 - 20m
Average riparian vegetation percent composition by:	
Trees	15.0%
Shrubs	7.0%
Grasses/Forbes	63.0%
Cultivated Fields	
Other	15.0%
Average percent tree canopy coverage	42.0%
Overall aesthetic appraisal of stream	Natural

Part II - Summary of Physical Characteristics of Water Body

Stream name	Camp Meeting 12546
Date of assessment	6/11/2003
Stream bed slope over evaluated reach	0.0052
Approximate drainage area above transect furthest downstream	26km²
Stream order	3
Length of stream evaluated	175m
Number of lateral transects made	5
Average stream width	4.73m
Average stream depth	0.33m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	7m
Maximum pool depth	0.5 - 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	58%
Average percent instream cover	32%
Number of stream cover types	8
Average percent stream bank erosion potential	47.00%
Average stream bank slope	62°
Average width of vegetative buffer	5-15m
Average riparian vegetation percent composition by:	
Trees	15.00%
Shrubs	10%
Grasses/Forbes	39.00%
Cultivated Fields	
Other	36%
Average percent tree canopy coverage	68%
Overall aesthetic appraisal of stream	Common

Part II - Summary of Physical Characteristics of Water Body

Stream name	Camp Meeting2 17896
Date of assessment	8/7/2003
Stream bed slope over evaluated reach	0.0055
Approximate drainage area above transect furthest downstream	12km²
Stream order	3
Length of stream evaluated	180m
Number of lateral transects made	5
Average stream width	4.2m
Average stream depth	0.23m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	10m
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	4
Dominant substrate type	Boulder
Average percent of substrate gravel sized or larger	70%
Average percent instream cover	63%
Number of stream cover types	7
Average percent stream bank erosion potential	81%
Average stream bank slope	53°
Average width of vegetative buffer	20m
Average riparian vegetation percent composition by:	
Trees	19%
Shrubs	13%
Grasses/Forbes	51%
Cultivated Fields	
Other	17%
Average percent tree canopy coverage	44%
Overall aesthetic appraisal of stream	Common

Part II - Summary of Physical Characteristics of Water Body

Stream name	Camp Meeting2 12546
Date of assessment	8/7/2003
Stream bed slope over evaluated reach	0.0052
Approximate drainage area above transect furthest downstream	26km²
Stream order	3
Length of stream evaluated	180m
Number of lateral transects made	5
Average stream width	4.5m
Average stream depth	0.11m
Instantaneous flow	
Indicate flow measurement method	Current Meter
Channel flow status	Moderate
Maximum pool width	7m
Maximum pool depth	0.5 - 1m
Total number of stream bends	1
Number of well defined bends	0
Number of moderately defined bends	0
Number of poorly defined bends	1
Total number of riffles	3
Dominant substrate type	Gravel
Average percent of substrate gravel sized or larger	54%
Average percent instream cover	70%
Number of stream cover types	8
Average percent stream bank erosion potential	54%
Average stream bank slope	63°
Average width of vegetative buffer	15m
Average riparian vegetation percent composition by:	
Trees	11%
Shrubs	5%
Grasses/Forbes	32%
Cultivated Fields	
Other	52%
Average percent tree canopy coverage	69%
Overall aesthetic appraisal of stream	Common

HABITAT ASSESSMENT

Part III – Habitat Quality Indices

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 10006	Date: 9/3/02
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: 4	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: 22	HIGH			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 12546	Date: 9/4/02
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports a stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score: 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: 2	**3**	**2**	**1**	**0**
Channel Flow Status	**High** Water reaches the base of both the lower banks; <5% of channel substrate is exposed	**Moderate** Water fills <75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score: 2	**3**	**2**	**1**	**0**
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 1	**3**	**2**	**1**	**0**
Channel Sinuosity	**High** ≥2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) are present	**Moderate** 1 well-defined bend OR ≥3 moderately-defined bends present	**Low** <3 moderately-defined bends OR only poorly-defined bends present	**None** Straight channel; may be channelized
Score: 1	**3**	**2**	**1**	**0**
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score: 1	**3**	**2**	**1**	**0**
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Tree and/or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score: 1	**3**	**2**	**1**	**0**
Total Score: 19	INTERMEDIATE			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 10006	Date: 10/3/02
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: 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: 4	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: 1	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Tree and/or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score: 1	3	2	1	0
Total Score: 20	HIGH			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 12546	Date: 10/3/02
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: 2	3	2	1	0
Channel Flow Status	**High** Water reaches the base of both the lower banks; <5% of channel substrate is exposed	**Moderate** Water fills <75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score: 2	3	2	1	0
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 0	3	2	1	0
Channel Sinuosity	**High** ≥2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) are present	**Moderate** 1 well-defined bend OR ≥3 moderately-defined bends present	**Low** <3 moderately-defined bends OR only poorly-defined bends present	**None** Straight channel; may be channelized
Score: 1	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score: 1	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Tree and/or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score: 1	3	2	1	0
Total Score: 18	INTERMEDIATE			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 17896	Date: 6/11/03
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: 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: 2	**3**	**2**	**1**	**0**
Channel Flow Status	**High** Water reaches the base of both the lower banks; <5% of channel substrate is exposed	**Moderate** Water fills <75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score: 2	**3**	**2**	**1**	**0**
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 1	**3**	**2**	**1**	**0**
Channel Sinuosity	**High** ≥2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) are present	**Moderate** 1 well-defined bend OR ≥3 moderately-defined bends present	**Low** <3 moderately-defined bends OR only poorly-defined bends present	**None** Straight channel; may be channelized
Score: 1	**3**	**2**	**1**	**0**
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score: 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: 2	**3**	**2**	**1**	**0**
Total Score: 21	HIGH			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 12546	Date: 6/11/03
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports a stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score: 3	**4**	**3**	**2**	**1**
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate, i.e., gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be in mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score: 4	**4**	**3**	**2**	**1**
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score: 3	**4**	**3**	**2**	**1**
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is > 1m	**Moderate** Pool covers approximately 50% or slightly less than the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxillary pockets
Score: 2	**3**	**2**	**1**	**0**
Channel Flow Status	**High** Water reaches the base of both the lower banks; <5% of channel substrate is exposed	**Moderate** Water fills <75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score: 2	**3**	**2**	**1**	**0**
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 1	**3**	**2**	**1**	**0**
Channel Sinuosity	**High** ≥2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) are present	**Moderate** 1 well-defined bend OR ≥3 moderately-defined bends present	**Low** <3 moderately-defined bends OR only poorly-defined bends present	**None** Straight channel; may be channelized
Score: 1	**3**	**2**	**1**	**0**
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score: 1	**3**	**2**	**1**	**0**
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Tree and/or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score: 1	**3**	**2**	**1**	**0**
Total Score: 18	INTERMEDIATE			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 17896	Date: 8/7/03
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: 4	**4**	**3**	**2**	**1**
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate, i.e., gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be in mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score: 4	**4**	**3**	**2**	**1**
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score: 3	**4**	**3**	**2**	**1**
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is > 1m	**Moderate** Pool covers approximately 50% or slightly less than the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxillary pockets
Score: 3	**3**	**2**	**1**	**0**
Channel Flow Status	**High** Water reaches the base of both the lower banks; <5% of channel substrate is exposed	**Moderate** Water fills <75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score: 2	**3**	**2**	**1**	**0**
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 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: 2	**3**	**2**	**1**	**0**
Total Score: 21	HIGH			

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category		Location: 12546	Date: 8/7/03
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: 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: 2	**3**	**2**	**1**	**0**
Channel Flow Status	**High** Water reaches the base of both the lower banks; <5% of channel substrate is exposed	**Moderate** Water fills <75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score: 2	**3**	**2**	**1**	**0**
Bank Stability	**Stable** Little evidence (<10%) of erosion bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score: 0	**3**	**2**	**1**	**0**
Channel Sinuosity	**High** ≥2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) are present	**Moderate** 1 well-defined bend OR ≥3 moderately-defined bends present	**Low** <3 moderately-defined bends OR only poorly-defined bends present	**None** Straight channel; may be channelized
Score: 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: 1	**3**	**2**	**1**	**0**
Total Score: 21	HIGH			