Habitat and Macroinvertebrate Assessment Report

Wolf Run Watershed Fayette County, Kentucky

Prepared for
Lexington-Fayette Urban County Government
Division of Environmental Quality

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Prepared by
Third Rock Consultants, LLC
2526 Regency Road, Suite 180
Lexington, KY 40503
859.977.2000

Prepared by:

Willia C. a.

Reviewed by:

Chelsey Olson

Steve Evans



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I. INTRODUCTION

This report summarizes results for benthic macroinvertebrate collections and habitat assessments in the Wolf Run watershed. The survey was conducted under a Section 319(h) Nonpoint Source Implementation Program Agreement (#C9994861-09) Cooperative awarded by the Commonwealth of Kentucky, Energy and Environment Cabinet, Department for Environmental Protection, Division of Water (KDOW) to Lexington-Fayette Urban County Government (LFUCG) based on an approved work plan. The survey was conducted according to the preapproved Quality Assurance Project Plan (QAPP, Third Rock 2011).

The benthic macroinvertebrate sampling was intended to evaluate the macroinvertebrate communities in the tributaries and headwaters of Wolf Run for comparison to the data collected over multiple years near the mouth of the watershed.

Habitat assessments were intended to supplement the biological and physicochemical data when determining the overall health of the stream reaches and stream-use designation. Additionally, the habitat assessments were intended to provide a baseline to document physical changes that occur over time and to identify potential areas for BMP implementation.

Benthic macroinvertebrates were collected by Third Rock Consultants, LLC (Third Rock) from seven sites within the Wolf Run watershed. Third Rock biologists also performed habitat assessments at these sites. Trained volunteers from the Friends of Wolf Run (FOWR), performed habitat assessments on 22 reaches within the watershed.

II. METHODS

A. Macroinvertebrates

Sampling for benthic macroinvertebrates was conducted according to KDOW's *Methods for*

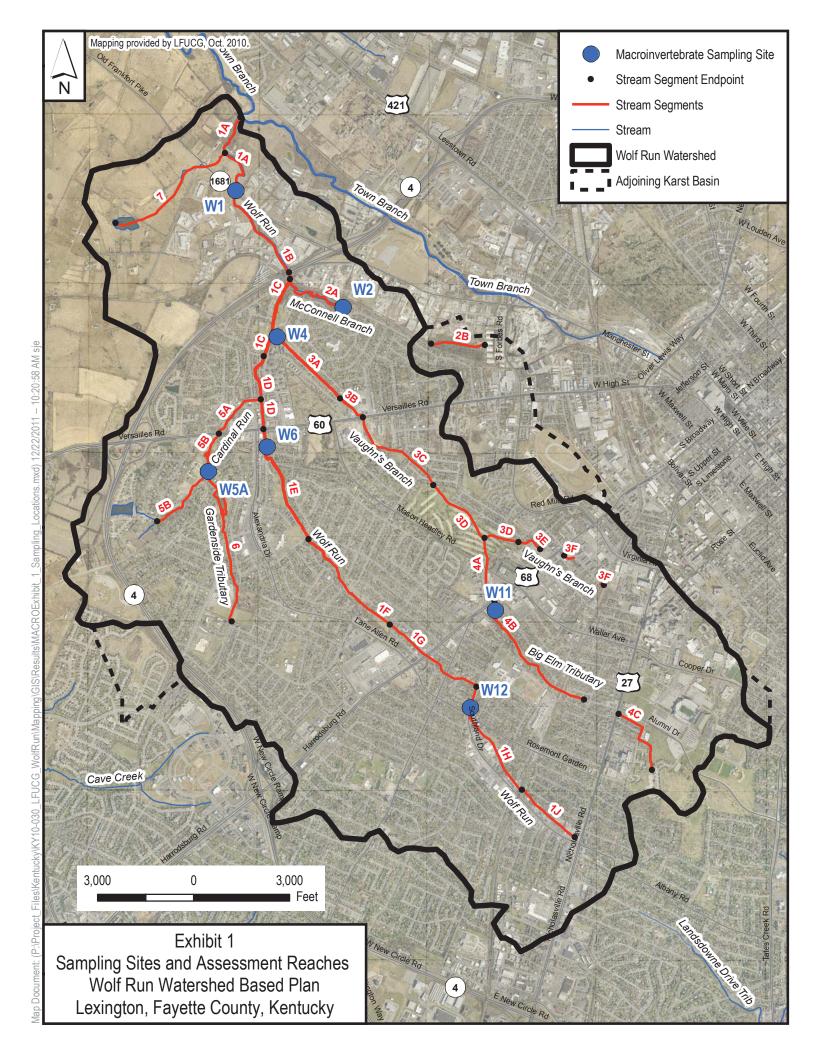
Samplina **Benthic** *Macroinvertebrate* Communities in Wadeable Waters (KDOW 2009b). A total of seven sites were sampled in the watershed as shown in Exhibit 1, page 2. Six of these sites are headwater sites (<5 mi² upstream watershed) and were sampled under the 319(h) grant funding. Site W1, is a wadeable site (>5 mi² upstream watershed) and was LFUCG's sampled under MS4 permit. Descriptions of the seven sampling sites are found in Table 1.

TABLE 1 – MACROINVERTEBRATE SAMPLING SITE DESCRIPTION

Site Name	Stream	Location	Latitude	Longitude
W1	Wolf Run	Old Frankfort Pike	38.067303	-84.554182
W2	McConnell Br	Prestons Cave	38.057333	-84.542169
W4	Vaughn's Br	Valley Park	38.054904	-84.549624
W5A	Cardinal Run	Parkers Mill Rd	38.043212	-84.557131
W6	Wolf Run	Wolf Run Park	38.045274	-84.550661
W11	Big Elm Trib.	Harrodsburg Rd	38.031245	-84.526027
W12	Wolf Run	Lafayette Pkwy	38.022932	-84.528581

Sampling was performed within the index periods for wadeable and headwater streams. The index period for wadeable streams is May 1 to September 30, and W1 was collected on May 12, 2011. For headwater streams, the index period is February 15 to May 31, and the six headwater sites were sampled on May 17 and 18, 2011. Sampling did not occur during periods of excessively high or low flow or within two weeks of a known scouring flow event.

Collection events consisted of a composited semi-quantitative sample and a composited multi-habitat sample. Semi-quantitative samples were collected from a known area in the most productive in-stream habitat (i.e., riffle) to analyze composition population of the the macroinvertebrate community. In both headwater wadeable streams. semi-quantitative sampling consisted of taking four 0.25 m² kick net samples from mid-riffle or the thalweg.



This was be accomplished using a 0.25 m², 600µm mesh kick net, dislodging benthos by vigorously disturbing the 0.25 m² (20 x 20 in.) of substrate in front of the net. Large rocks were hand washed into the net. The contents of the net were then washed, and all four samples were composited to yield a one m² semi-quantitative sample. The composited sample was partially field processed using a US No. 30 sieve (600µm) and wash bucket. Large stones, leaves and sticks were individually rinsed and inspected for organisms and then discarded. Small stones and sediment were removed by elutriation using the wash bucket and US No. 30 sieve. headwater sites, two kick net samples were allocated to each of two distinct riffles (at minimum) that were separated by at least one pool or run. This was done to help reduce between-riffle variability.

Multi-habitat samples were collected to identify taxa present in stream habitats not sampled by the semi-quantitative sample (*i.e.*, root wads, undercut banks). This method sampled a variety of non-riffle habitats with the aid of an 800 x 900µm mesh triangular or D-frame dip net. A summary of the collection techniques used for wadeable and headwater streams is shown in Table 2 below and further described in the following sections.

In order to keep in-stream habitat intended for benthic macroinvertebrate sampling intact and undisturbed until the single and multi-habitat samples were collected, field personnel avoided walking through areas designated for collection of benthic macroinvertebrates until sampling was completed.

TABLE 2 – SUMMARY OF SAMPLING METHODS FOR MACROINVERTEBRATES

Technique	Sampling Device	Habitat	Replicates Composited for Wadeable Sites	Replicates Composited for Headwater Sites		
		Semi-Quantitaive				
1m ² kicknet / seine	Kicknet / seine and wash bucket	Riffle	4 x 0.25m ²	4 x 0.25m ²		
	N	Multi-Habitat Sweep)			
Undercut banks / roots			3	3		
Sticks / Wood			N/A	3		
Emergent vegetation	D-frame or	All applicable	3	N/A		
Bedrock / slabrock	triangular dip net		3	N/A		
J. americana beds	and wash bucket		3	N/A		
Leaf packs		Riffle – Run – Pool	3	3		
Silt, sand, fine gravel	US #10 Sieve	Margins	3	3		
Aufwuchs sample	300 µm nitrex sampler / mesh	Diffic Due	3	N/A		
Rock pick	Fine-tipped	Riffle – Run - Pool	15 total (5 each)	5 small boulders		
Wood sample	forceps and wash bucket	FUUI	3 to 6 linear meters	2 linear meters		

After sampling was completed, all sampling gear was thoroughly cleaned to remove all benthic macroinvertebrates so that specimens would not be carried to the next site. The equipment was examined prior to sampling at the next site to ensure that no benthic macroinvertebrates were present. Habitat assessments were performed at each of the macroinvertebrates sites by Third Rock staff (as detailed in the following section).

Macroinvertebrate samples were delivered to Third Rock for identification according to Laboratory Procedures for Macroinvertebrate Processing and Taxonomic Identification and Reporting (KDOW 2009a). After identification, macroinvertebrate sampling results were evaluated through calculation of several

community metrics prescribed by KDOW 2008. Results of community metrics at each station were combined to compute a Macroinvertebrate Bioassessment Index (MBI) score, ranging from 0 (worst) to 100 (best). MBI scores were compared to scoring criteria developed by KDOW to arrive at water quality ratings of Very Poor, Poor, Fair, Good, or Excellent.

B. Habitat Assessments

In order to delegate the habitat assessment responsibilities amongst volunteers, the watershed was divided into 24 stream segments as shown in Exhibit 1, page 2 and listed in Table 3.

TABLE 3 - HABITAT ASSESSMENT STREAM SEGMENTS

Segment ID	Stream	Stream Segment
1A	Wolf Run	Mouth to Old Frankfort Pike
1B	Wolf Run	Old Frankfort Pike to New Circle Rd
1C	Wolf Run	New Circle Rd. to Cambridge Dr
1D	Wolf Run	Cambridge Dr to Versailles Rd
1E	Wolf Run	Versailles Rd to Appomattox Rd
1F	Wolf Run	Appomattox Rd to Faircrest Dr
1G	Wolf Run	Faircrest Dr to Lafayette Pkwy
1H	Wolf Run	Lafayette Pkwy to railroad tracks north of Southland Dr
1J	Wolf Run	Railroad tracks to Nicholasville Rd
2A	McConnell Branch	Wolf Run to Preston's Cave Spring
2B	McConnell Branch	McConnell Springs Branch through Stormwater Structure
3A	Vaughn's Branch	Wolf Run to Oxford Circle
3B	Vaughn's Branch	Oxford Circle to Versailles Rd
3C	Vaughn's Branch	Versailles Rd to Summerville Rd/Golf Course Fence
3D	Vaughn's Branch	Picadome Golf Course
3E	Vaughn's Branch	Picadome Golf Course Fence to Gibson Ave Culvert
3F	Vaughn's Branch	Simpson Ave to railroad tracks
4A	Big Elm Tributary	Sinkhole on Picadome Golf Course to Harrodsburg Rd
4B	Big Elm Tributary	Harrodsburg Rd to railroad tracks via Bob-O-Link Dr
4C	Big Elm Tributary	Nicholasville Rd to behind Central Baptist Hospital
5A	Cardinal Run	Wolf Run to Versailles Rd
5B	Cardinal Run	Versailles Rd to End of Chinquapin Ln
6A	Gardenside Tributary	Upstream of Parkers Mill Rd
7	Unnamed Tributary	Wolf Run under Alexandria Dr and Old Frankfort Pike to pond

All volunteers involved in the assessments participated in two training sessions on the performance of habitat assessments according to the US EPA's Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers (Barbour et al. 1999) and KDOW protocol (KDOW 2008) prior to conducting the assessments for this study. The initial training on May 15, 2011 was led by staff at Bluegrass Community and Technical College and provided certification in Watershed Watch Phase II Habitat Assessment protocols. PowerPoint presentations used in this training are available at http://www.lrww.org/training/.

On May 23, 2011, Third Rock biologists led a subsequent training session on the use of the rapid bio-assessment habitat form and the QAPP protocols. During the second training session, volunteers performed habitat assessments at sites W2 and W6 and compared their assessments to those generated by Third Rock biologists in order to improve the consistency of scoring by the volunteers during the survey effort.

During habitat assessments, a visual assessment of 10 habitat parameters was used to characterize the stream "micro scale" habitat, the "macro scale" features, and the riparian and bank structure features that are most often influential in affecting the other parameters. Each of the parameters will be evaluated on a "Condition Category" scale from 0 to 20. The categories within this scale include "Optimal" for scores from 20 to 16, "Suboptimal" for scores from 15 to 11, "Marginal" for scores from 10 to 6, and "Poor" for scores from 5 to 0. The score for each parameter was summed to produce a final habitat score (maximum 200).

For parameters 1 to 5, a composite of the entire biological sampling reach is evaluated. These parameters include: 1) epifaunal substrate/ available cover, 2) embeddedness, 3) velocity/depth regime, 4) sediment deposition,

and 5) channel flow status. For parameters 6 to 10, an area beginning approximately 100-m upstream of the sampling reach through the sampling reach was evaluated as a composite. These parameters include: 6) channel alteration. 7) frequency of riffles (or bends), 8) bank stability, 9) bank vegetative protection, and 10) riparian vegetative width. For parameters 8 to 10, each bank was scored independently from 10 to 0, facing downstream to determine left and right banks. At each sampling site, results were the High-Gradient Habitat recorded on Assessment Field Data Sheet. Photographs were taken to document upstream and downstream conditions at each site.

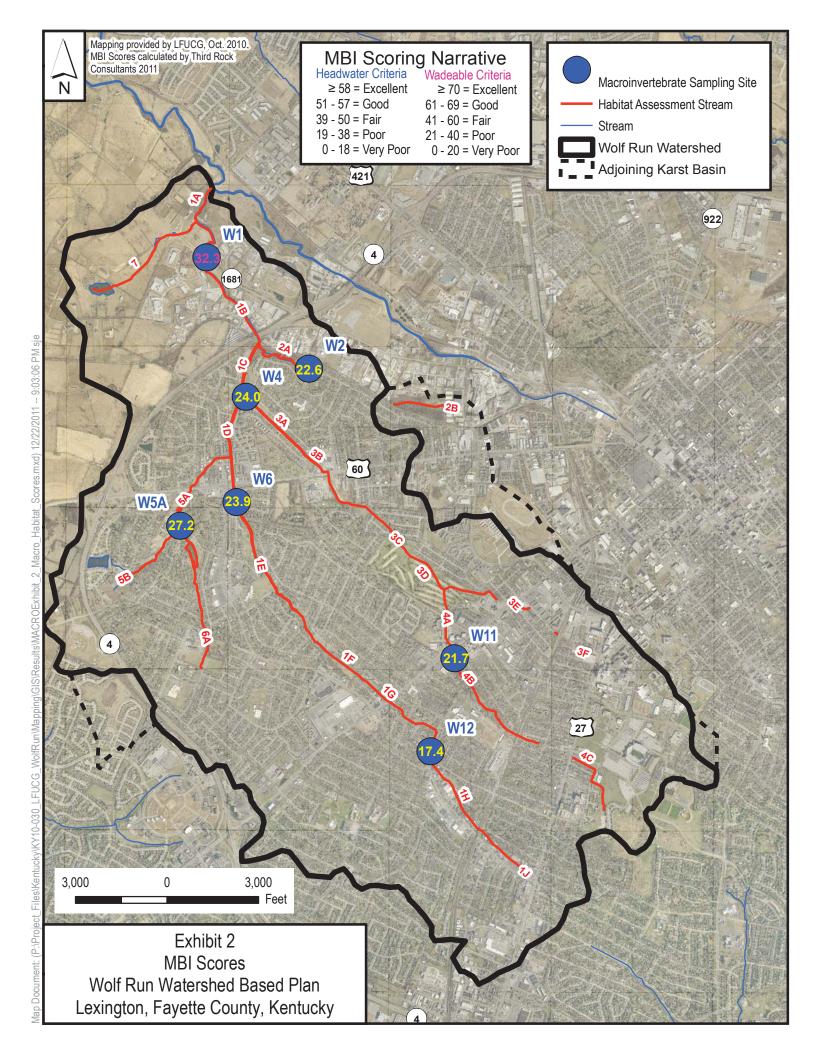
Results were entered into an excel database by the Friends of Wolf Run Sampling Coordinator and submitted to Third Rock for quality review and incorporation into a final report. Habitat assessment results were compared to scoring criteria developed by KDOW for the region to arrive at habitat ratings of Poor, Fair, or Good.

III. RESULTS

A. Macroinvertebrates

MBI scores for the six sites sampled under the 319(h) grant as well as the MS4 permit site located at W1 are shown in Exhibit 2, page 6. The MBI scores and metrics for each site are presented in Table 4, page 7. Data sheets for each site are contained in Appendix A.

Macroinvertebrate sampling results indicate moderately increasing MBI scores as one moves progressively down through the watershed, from the headwaters to higher order, wadeable streams. However, the scoring criteria for wadeable streams are also higher than headwater streams indicating that such increases are expected.



Site ID	Taxa Richness	EPT Richness	mHBI	%EPT	%Ephemeroptera	% Chironomidae + Oligochaeta	%Clingers	MBI Score	MBI Rating
W1	17	1	5.88	0	NA	13.9	14	32	Poor
W2	14	1	7.47	0.3	0	4	2	23	Poor
W4	14	2	7.35	0.9	0.9	0.9	2	24	Poor
W5A	30	2	5.99	0.3	0	34.6	12	27	Poor
W6	14	2	6.5	0.7	0.3	11.8	2	24	Poor
W11	8	0	7.27	0	0	0	3	22	Poor
W12	13	0	6.97	0	0	49.1	8	17	Very Poor

TABLE 4 - MBI SCORES AND METRICS

Macroinvertebrate biotic indices (MBI) calculated for six of the seven sampling stations in the Wolf Run watershed resulted in classifications of "poor." The one exception was W12, which received a classification of "very poor," scoring just below the threshold of 19 for a "poor" rating. The minimum MBI score for a "fair" rating is 41 for wadeable streams, such as W1, and 39 for headwater locations in the Bluegrass Bioregion. This indicates that considerable improvement will be necessary to achieve a "fair" rating.

The low MBI scores observed in the Wolf Run watershed are the result of several conditions, most of which are re-occurring at each of the seven sampling stations. All stations were extremely low in the number of pollution intolerant EPT (ephemeroptera, plecoptera, and trichoptera) taxa. No station had more than two genera of EPT (W11 and W12 had zero genera) and %EPT ranged from 0 to 0.9%. With the exception of W5A, all stations were also relatively low in overall genus taxa richness, which ranged from eight to 14 taxa. The exception, W5A, had 30 total taxa. However, the higher taxa richness observed at this station was primarily the result of an increase in diversity of pollution tolerant taxa

such as chironomidae and annelida, as well as several tolerant members of mollusca. The abundance of clingers (taxa requiring stable substrates to cling to, such as gravel, boulders, root wads, etc) was very low, which is frequently an indicator of unstable substrate or high levels of siltation or embeddedness. The pollution tolerant isopod, *Lirceus fontinalis*, and the tolerant *Cricotopus/Orthocladius* members of Chironomidae were the most abundant organisms, respectively, collected from each station.

B. Habitat Assessment

1. Third Rock Assessments at Macroinvertebrate Sites

Results from habitat assessments performed by Third Rock biologists at the seven macroinvertebrate sites are presented in Table 5, page 8. Habitat assessment field data sheets are included in Appendix B. Photographs were taken in the field of each sampling reach, and included photographs of specific habitat features. A photo log of each site is included in Appendix C.

TABLE 5 – HABITAT SCORES AND WATER CHEMISTRY RESULTS AT MACROINVERTEBRATE SITES

Site ID	W1	W2	W4	W5A	W6	W11	W12
Date	5/12/2011	5/17/2011	5/17/2011	5/17/2011	5/17/2011	5/17/2011	5/18/2011
Temp (°C)	17.3	14.2	12.7	13.4	12.1	11.9	13.3
pH (SU)	7.8	7.1	7.9	7.9	7.9	7.9	7.8
DO (mg/L)	10.8	7.7	9.9	10.4	11	9.7	10.2
DO (% sat)	-	75.5	96	103	105	93	100
Cond (µS/cm)	703	647	605	541	553	917	870
Turb (NTU)	-	0	0	0	0	0	0
Habitat Score	113	149	122	117	125	130	100
Habitat Rating	Poor	Fair	Poor	Poor	Poor	Poor	Poor

All habitat scores rated "poor" except for W2 at the mouth of Prestons Cave, which was rated "fair."

Instream water chemistry measurements. measured at the time of assessment, are presented in Table 5. Dissolved oxygen levels ranged from 7.7 mgL⁻¹ (W2) to 11 mgL⁻¹ (W6), all above the chronic Kentucky Water Quality Standards (> 5.0 mgL⁻¹). Water temperature ranged from 11.9 degrees Celsius (°C) (W11) to 17.3°C (W1), and pH was similar among all stations, ranging from 7.1 to 7.9 standard units. Specific conductance levels were elevated at all stations ranging from 541 µS/cm (W5A) to 917 μS/cm (W11). Specific conductance levels were highest at headwater stations W11 and W12, generally decreasing in lower reaches of the watershed. Turbidity levels were zero at all stations measured.

2. Volunteer Assessments

Eight volunteers performed 33 assessments on 22 of the 24 reaches between May 23 to October 10, 2011. All segments except 3B, Vaughn's Branch from Oxford Circle to Versailles Rd, and 7, the unnamed tributary near Wolf Run at the

intersection of Alexandria Dr and Old Frankfort Pike, were assessed.

When combined with the reaches assessed during the macroinvertebrate sample collection, a total of 33 reaches were assessed. Duplicate assessments were conducted on seven reaches in the watershed. The habitat assessment scores at each of the 33 reaches are depicted on Exhibit 3, page 9, with average results shown for reaches in which assessments were duplicated. Table 6, page 10 shows a summary of the results for each reach. Where more than one reach was assessed in given area, a numeric value was assigned from downstream to upstream to distinguish the results. Individual assessment results are tabulated in Appendix Photographs taken by volunteers are contained on a CD in Appendix E.

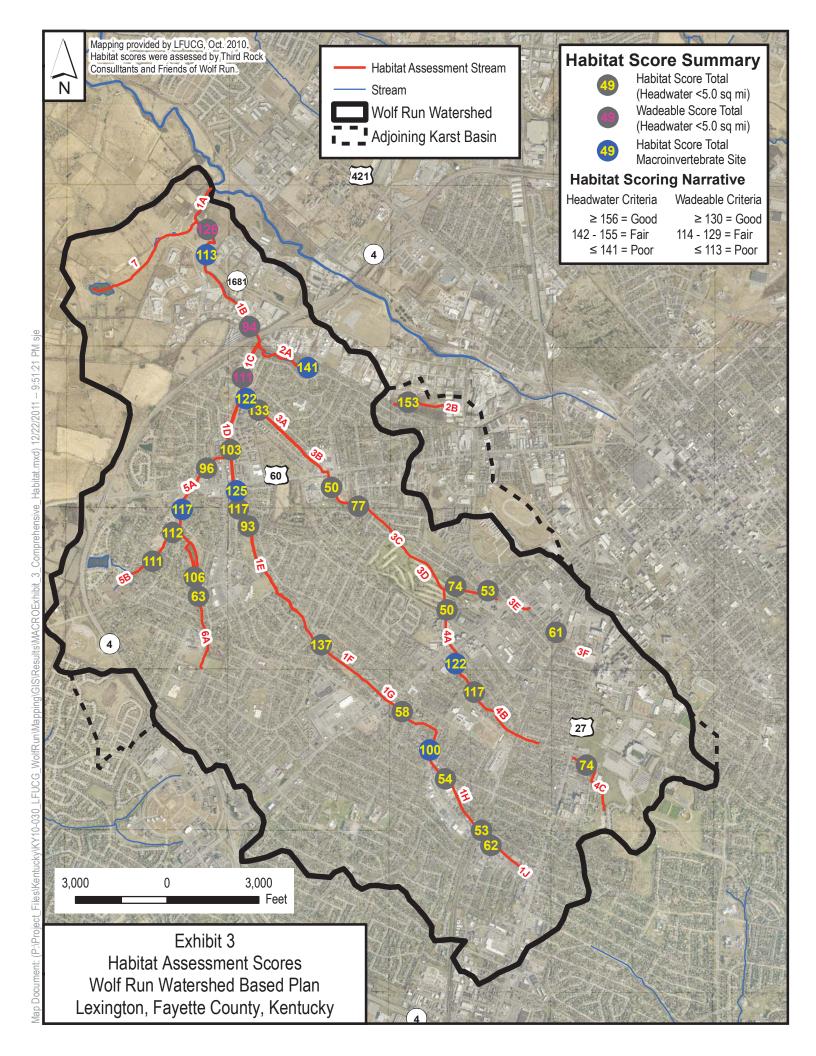


TABLE 6 - HABITAT ASSESSMENT SUMMARY

			0 11/1011/11/100																
Segment ID	Stream	Location	Sampler	EpiFauSub	Embeddedness	Vel-DepRegime	SedDep	ChanFlowS	ChanAlter	FreqOfRiffles	BankSta-LB	BankSta-RB	BankVegP-LB	BankVegP-RB	RipVegZW-LB	RipVegZW-RB	Total	Headwater / Wadeable	Rating
1A1	Wolf Run	Nuti Property upstream of Mouth	K Cooke	7	7	9	15	17	9	18	9	9	8	8	5	5	126	W	Fair
1A2		Wolf Run near site (W1)	Third Rock	15	10	13	10	17	15	17	5	3	2	2	2	2	113	W	Poor
1B	Wolf Run	Upstream of Commerce Drive	K Cooke	7	3	9	7	17	2	12	7	7	7	7	4	5	94	W	Poor
1C	Wolf Run	Valley Park downstream to Vaughns Br	J Anderson	6	12	10	13	18	8	12	5	3	8	8	4	4	111	W	Poor
1D	Wolf Run	Cambridge Drive to New Circle Rd.	K Cooke	6	12	9	12	10	8	12	8	8	6	6	3	3	103	Н	Poor
1E1	Wolf Run	Downstream of Roanoake (W4)	Third Rock	12	13	12	11	15	15	14	8	7	8	7	1	2	125	Н	Poor
1E2	Wolf Run	Sample site W6 at labyrinth upstream	B Bell / W Havens	8.5	13.5	10	13.5	17	12	17.5	4.5	5.5	3.5	5	2	4	116.5	Н	Poor
1E3	Wolf Run	Above swim hole behind Wolf Run Park	B Bell / W Havens	8.5	10.5	6.5	13.5	17.5	12.5	1.5	3.5	4.5	5	5.5	2	2	93	Н	Poor
1F	Wolf Run	Furlong Drive Greenway	K Cooke	12	15	12	13	14	8	18	7	9	7	7	8	7	137	Н	Poor
1G1	Wolf Run	Clays Mill Greenway, Clays Mill Rd	K Cooke / B Hutcheson	2.5	10.5	2	7.5	1	1.5	10.5	5.5	3.5	5	3	4	1.5	58	Н	Poor
1G2	Wolf Run	Downstream of Rosemont Garden (W12)	Third Rock	11	11	10	16	17	5	6	9	9	1	3	1	1	100	Н	Poor
1H	Wolf Run	Behind Good Food co-op	J Anderson	2	5	1	20	6	0	0	10	10	0	0	0	0	54	Н	Poor
1J1	Wolf Run	Near Railroad Crossing and tunnel	J Anderson	3	5	6	4	6	8	3	3	3	7	2	2	1	53	Н	Poor
1J2	Wolf Run	Parallel to Southland Dr.	J Anderson	1	5	1	19	16	0	0	10	10	0	0	0	0	62	Н	Poor
2A		Prestons Cave Spring Park (W2)	Third Rock / J Watts	11	8	12	9	15.5	18	17.5	7	8.5	8	8.5	8.5	9	140.5	Н	Poor
2B	McConnell Br	McConnell Springs Park	K Cooke	18	6	15	8	15	18	19	9	9	9	9	9	9	153	Н	Fair
3A1	5	Conf with Wolf Run	Third Rock	8	14	10	13	15	15	18	5	7	5	7	2	3	122	Н	Poor
3A2	Vaughn's Br	Sample site W4 and upstream	B Bell / W Havens	14	14	11	17	13	15.5	17.5	3.5	6.5	6	6	4.5	4	132.5	Н	Poor
3C1		Pine Meadow Park	j Anderson	5	5	2	2	3	2	1	5	4	9	3	8	1	50	Н	Poor
3C2	Vaughn's Br	Behind Cardinal Hill Hospital	J Anderson	13	11	1	9	3	14	0	2	2	9	9	2	2	77	Н	Poor
3D	Vaughn's Br	Picadome Golf Course	J Anderson	3	14	8	14	7	15	3	2	2	3	3	0	0	74	Н	Poor
3E	Vaughn's Br	Next to Ky Clinic from fence to underground	J Anderson	1	16	1	15	8	2	1	2	5	1	1	0	0	53	Н	Poor
3F	Vaughn's Br	Simpson Ave Stormwater Structure	K Cooke	6	7	4	7	7	1	9	7	7	2	2	1	1	61	Н	Poor
4A		Picadome Golf Course	K Cooke	5	5	0	8	0	8	8	5	2	5	2	1	1	50	Н	Poor
4B1		Behind Bob-o-link Dr behind Fire Station (W11)	Third Rock / B Radcliffe	14.5	11.5	9	14	11	12.5	16.5	6	6.5	6.5	7	4.5	2	121.5	Н	Poor
4B2		Near LaFayette High School	B Radcliffe	14	11	10	11	11	10	17	6	6	7	7	2	5	117	Н	Poor
4C		University to Nicholasville Rd	B Radcliffe	7	7	5	12	17	5	7	7	2	3	1	1	0	74	Н	Poor
5A1		Devonport Dr. bridge to behind apts.	J Anderson	10	8	9	11	13	10	15	2	4	7	5	1	1	96	Н	Poor
5A2		Below Parkers Mill Rd (W5A)	Third Rock	10	12	10	14	18	16	17	4	5	4	5	1	1	117	Н	Poor
5B1		Cross Keys and Parkers Mill Rd.	K Cooke / B Hutcheson	11.5	7	13.5	13.5	14	8.5	16	6	5	7.5	7.5	1	0.5	111.5	Н	Poor
5B2		Chinquapin Lane	B Hutcheson	14	7	10	6	14	15	9	8	5	8	5	8	2	111	Н	Poor
6A1		Cross Keys Park Upstream of Pond	B Hutcheson	14	9	8	9	14	13	17	4	4	5	5	2	2	106	Н	Poor
6A2	Gardenside Trib	Darien Drive	B Hutcheson	7	9	7	6	12	0	4	8	8	1	1	0	0	63	Н	Poor

Note: Yellow highlighting indicates results are averages of duplicate assessments performed on the reach.

Minor adjustments were made to the volunteer data submitted to adjust for consistency in naming, GPS coordinates, and to ensure whole numbers were recorded for each habitat parameter. Where a result was not recorded, site photographs and scores for similar reaches were used to evaluate the parameter.

The averages of the duplicate reaches with the +/- values between assessors are presented in Table 7. On average, assessors differed within two points on individual parameters and nine points between total scores. The correspondence

between duplicate assessment reaches indicates that results are comparable between assessors.

The range of results for each parameter is shown in the box plot chart in Figure 1, page 12. Sediment deposition, channel flow status, frequency of riffles, and bank stability were "Suboptimal" based on median scores for the watershed. Median results for epifaunal substrate/available cover, embeddedness, velocity depth regime, channel alteration, bank vegetative protection, and riparian zone width were "Marginal."

TABLE 7 – AVERAGES AND DIFFERENCE BETWEEN DUPLICATE REACHES

		B Bell /		K Co	ooke/	Third Rock/	Third Rock/	Average
Sampler	W Havens			B Hute	cheson	J Watts	B Radcliffe	Difference
Segment ID	1E2	1E3	3A2	1G1	5B1	2A	4B1	in Scores
Epifaunal Sub	8.5+/-0.5	8.5+/-0.5	14+/-1	2.5+/-0.5	11.5+/-2.5	11+/-1	14.5+/-1.5	2
Embeddedness	13.5+/-0.5	10.5+/-0.5	14+/-1	10.5+/-1.5	7+/-0	8+/-4	11.5+/-2.5	3
Velocity Depth	10+/-0	6.5+/-0.5	11+/-0	2+/-0	13.5+/-0.5	12+/-1	9+/-1	1
Sediment Dep	13.5+/-1.5	13.5+/-1.5	17+/-0	7.5+/-0.5	13.5+/-0.5	9+/-4	14+/-1	3
Channel Flow	17+/-1	17.5+/-0.5	13+/-0	1+/-1	14+/-2	15.5+/-1.5	11+/-2	2
Channel Alt	12+/-1	12.5+/-1.5	15.5+/-1.5	1.5+/-0.5	8.5+/-0.5	18+/-0	12.5+/-0.5	2
Freq of Riffles	17.5+/-0.5	1.5+/-0.5	17.5+/-0.5	10.5+/-3.5	16+/-0	17.5+/-1.5	16.5+/-0.5	2
Bank Stab-LB	4.5+/-0.5	3.5+/-0.5	3.5+/-1.5	5.5+/-1.5	6+/-0	7+/-1	6+/-1	2
Bank Stab-RB	5.5+/-0.5	4.5+/-0.5	6.5+/-0.5	3.5+/-0.5	5+/-1	8.5+/-0.5	6.5+/-1.5	1
Bank Veg Pro-LB	3.5+/-0.5	5+/-0	6+/-0	5+/-0	7.5+/-0.5	8+/-0	6.5+/-0.5	0
Bank Veg Pro-RB	5+/-0	5.5+/-0.5	6+/-0	3+/-0	7.5+/-0.5	8.5+/-0.5	7+/-0	0
Rip Veg Wid-LB	2+/-0	2+/-0	4.5+/-0.5	4+/-0	1+/-0	8.5+/-0.5	4.5+/-2.5	1
Rip Veg Wid-RB	4+/-1	2+/-0	4+/-0	1.5+/-0.5	0.5+/-0.5	9+/-0	2+/-0	1
Total Habitat	116.5+/-1.5	93+/-5	132.5+/-0.5	58+/-7	111.5+/- 0.5	140.5+/-8.5	121.5+/-8.5	9

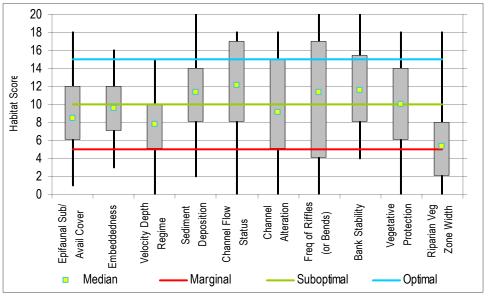


FIGURE 1 - WOLF RUN WATERSHED HABITAT PARAMETER SCORES

Note: Lines indicate the maximum and minimum results. Bars indicate the middle 50% of results. Values above the lines labeled "Marginal", "Suboptimal", and "Optimal" score in these respective categories. Values les than 5 are "Poor".

Total habitat scores ranged from 50 to 153. Out of the 33 reaches assessed, only two were "fair" with all others "poor." The "fair" scores were assessed within McConnell Springs Park (2A) and at the mouth of Wolf Run (1A1). Downstream of Prestons Cave (2B), scores were at the threshold between "fair" and "poor" with marginal sediment deposition and embeddedness scores causing the poor rating at that location. Wolf Run at the Furlong Drive Greenway (1F), where the riparian width is wider, also approaches a "fair" rating.

The lowest scores (50) were assessed at Vaughn's Branch at Pine Meadow Park (3C1) and at Big Elm Tributary on the Picadome Golf Course flowing into the sinkhole (4A). Each of these streams have poor scores across all parameters. Other extremely low sites are

located in the headwaters of Wolf Run (1G1, 1H, 1J) and Vaughn's Branch (3E, 3F).

As noted previously, several factors contributed to the poor habitat scores in the watershed. The riparian zone width was routinely the lowest overall parameter indicating that remediation activities focusing on expanding the width of the vegetated area beside the stream will provide the greatest benefit throughout the watershed. Low scores for epifaunal substrate/available cover, embeddedness, and velocity depth regime together suggest that little habitat is available for macroinvertebrates due to an lack of pools and available cobble habitat in the stream. Restoration activities focused on creating pools, increasing base flows, and increasing instream habitat will aid in improving the macroinvertebrate community within the watershed.

REFERENCES

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- Third Rock Consultants. 2011. "Quality Plan: Wolf Assurance Project Run Watershed Based Plna: EPA 319(h) Grant No. C9994861-09". Prepared for Lexington-Favette Urban County Government Department of Environmental Quality and Kentucky Department for Environmental Protection Division of Water. Revision 1. May 10, 2011.







Macroinvertebrate Sample Chain of Custody **Project Information Sheet**

٤			-	W,				T .		_			-					
Nov. 7	State: \/ \/	2 Total Number of Containers: 12	Hardcopy;Both	Date/Time: 5-18-11 1/32 Sample Received By? Consult Selection Date/Time: 5-18-11 / 1/3	Date/Time:	lowed For Kicknet			Analysis Required (KDOW Protocol, ID Level; etc.)	KOCW 55-360 allowed								>
ber: 49 10-0			omittal; — Ha	is Sieter		to 300 allowed		# of Containers	Per Sample	_								>
$(e_\ell v_{\ell \ell'}) = v_{\ell \ell'} v_{\ell'}$ Project Administrator: $\frac{f_\ell v_{\ell \ell'}}{2^{\ell \ell n \ell'}}$ Project Number: $\frac{f_\ell}{2^{\ell \ell'}} \frac{f_{\ell' \ell'}}{2^{\ell \ell'}}$	County: Fage HE	Blue 319 55 Total Number of Samples:	tions viae-Sul	eived By? Lann	eived By:	Sub-sempling			Preservative	Ethan!		-						<i>/</i>
Gerry Fistury Steve Evans	. County:	_Total Num	MBI Calcula	sample Rece	Sample Received By: 👱	5-46-5	-			7	カル	KN	かん	KN	H W	X	HW.	ţ
dministrator:_		lue 91955	eadsheet; \overline{acksim}	8-4 1132°		Pretuculs,			Collection Date	5-1711							>	11-8)-5
Project Ac	+tribs.	9	et;Excel Spr	Date/Time: 5-1	_Date/Time:	Know P			Collected By	Balon	_				-			<u> </u>
	- 1		ratory Data She	Carlor		Regular h		Oualitative	or Quantitative	Quant	Gua (Quant	Qua (Quent	Qua (Quent	qual	Bucht
Client Name: LFUC(0	Sampling Site Location: $M_{a} \not \vdash h^{\omega_{n}}$	Headwater	Reporting Requirements:Laboratory Data Sheet;Excel Spreadsheet;MBI Calculations viae-Submittal;	Samples Relinquished By: Well Houlpy	Samples Relinquished By:	Comments/Special Instructions:	Samples		Sample Reference ID	7-11	W-2	W-4	W-Y	W-SA	W-54	W-6	N-6	11/-11

- Continue on Reverse for More Samples -

_; NA Not Available

Date Date 11-2-11 ; Invoiced By __ Date 10-27-1 ; Reported By North MacLIMS: Client Setup/Login By Confus

Continued from Reverse Side

							,						 			 	
	Analysis Required (KDOW Protocol, ID Level; etc.)	KDOW protocol															
# of Containers	Per Sample			· //								-		:			
	Preservative	EThus /	1														
		14 11	KR	114					•								
	Collection Date	uλ		→			-		-			-					
		BIRLAM) -			-	-						-		
Oualitative	or Quantitative	Qual	Quent	qual													
	Sample Reference ID		W-(2	W-12													



Third Rock Pjt #:	KY10-030	Client Name:	TRC In-House LFUCG-WR
Water Body:	Wolf Run and Tributaries	State/County:	KY / Fayette
Sample ID:	W-2 QT	Collection Date:	5/17/2011
Collector:	Bert Remley	Sampling Method:	Kick Net
Sorter:	Sarah Chandler	Sample Sorting:	Subsample
Taxonomist:	Bert Remley	No. Grids of 30 Picked:	2
		No. Organisms Picked:	332

	<u> </u>		<u> </u>		
Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.
ANNELIDA		PLECOPTERA		DIPTERA (CHIRONOMIDAE)	
				Rheotanytarsus exiguus gr	3
				Tanytarsus sp	9
				Thienemannimyia gr	1
AMPHIPODA					
Crangonyx sp	12				
orangonyx sp	12				
ISOPODA					
Lirceus fontinalis	299				
DECARODA					
DECAPODA		TRICHOPTERA			
		Hydroptila sp	1		
EPHEMEROPTERA		optna op	<u> </u>		
				DIPTERA (OTHER)	1
				Simulium sp	1
	+				
		MEGALOPTERA			
ODOMATA				MOLLUSCA	
ODONATA					
	+ +				
	-	COLEOPTERA			
	 	JOLEON TENA			
				OTHER TAXA	
	+				
	+				+
	+ +				
	 				
				Number of Individuals	326



TRC In-House LFUCG-WR	Client Name:	KY10-030	Γhird Rock Pjt #:
KY / Fayette	State/County:	Wolf Run and Tributaries	Water Body:
5/17/2011	Collection Date:	W-2 QL	Sample ID:
Multihabitat	Sampling Method:	Bert Remley	Collector:
Pick-All	Sample Sorting:	Tammie Fister	Sorter:
30	No. Grids of 30 Picked:	Chelsey Olson	Taxonomist:
NA	No. Organisms Picked:		

Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No Org
ANNELIDA		PLECOPTERA		DIPTERA (CHIRONOMIDAE)	
Naididae				Cricotopus trifascia	
				Cricotopus/Orthocladius gr	
				Micropsectra sp	
				Parametriocnemus sp	
AMPHIPODA				Stictochironomus sp	
Crangonyx sp					
1000004					
ISOPODA					-
Lirceus fontinalis					
DECADODA					
DECAPODA		TDICHODTEDA			
	+	TRICHOPTERA Hydroptila sp			+
EPHEMEROPTERA		нуш орша ѕр	+		
EPHEINEROPTERA					
					-
					-
				DIPTERA (OTHER)	
			1	Simulium sp	
			1	Simulati sp	
		MEGALOPTERA			
				MOLLUSCA	
ODONATA				Sphaerium sp	
		COLEOPTERA			
				OTHER TAXA	
				Turbellaria	
					-
					-
					+-
			_		
	i				



TRC In-House LFUCG-W	Client Name:	KY10-030	Third Rock Pjt #:
KY / Fayett	State/County:	Wolf Run and Tributaries	Water Body:
5/17/201	Collection Date:	W-4 QT	Sample ID:
Kick Ne	Sampling Method:	Bert Remley	Collector:
Subsampl	Sample Sorting:	Sarah Chandler	Sorter:
	No. Grids of 30 Picked:	Chelsey Olson	Taxonomist:
34	No. Organisms Picked:		

Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.
ANNELIDA		PLECOPTERA		DIPTERA (CHIRONOMIDAE)	
Erpobdellidae	2			Cricotopus/Orthocladius gr	3
Naididae	8				
AMPHIPODA					
Crangonyx sp	10				
ISOPODA					
Lirceus fontinalis	303				
	+ +				
DECAROR A					
DECAPODA	1	TRICHORTERA			
Cambaridae	1	TRICHOPTERA			
EPHEMEROPTERA					+
	3		-		+
Baetis flavistriga	3				
	-				
	+ +				
	+			DIPTERA (OTHER)	
				Simulium sp	2
				Simulati sp	
		MEGALOPTERA			
				MOLLUSCA	
ODONATA					
		COLEOPTERA			
		Ectopria (L) 1	1		
		Stenelmis (L) 2	2		
				OTHER TAXA	
				Turbellaria	7
				Number of Individuals	342



TRC In-House LFUCG-WR	Client Name:	KY10-030	Γhird Rock Pjt #:
KY / Fayette	State/County:	Wolf Run and Tributaries	Water Body:
5/17/2011	Collection Date:	W-4 QL	Sample ID:
Multihabitat	Sampling Method:	Bert Remley	Collector:
Pick-All	Sample Sorting:	Tammie Fister	Sorter:
30	No. Grids of 30 Picked:	Chelsey Olson	Taxonomist:
NA	No. Organisms Picked:		

	No. Orgs.	Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.
ANNELIDA		PLECOPTERA		DIPTERA (CHIRONOMIDAE)	
Naididae				Cricotopus/Orthocladius gr	
AMPHIPODA					
Crangonyx sp					
<u> </u>					
ISOPODA					
Lirceus fontinalis					
DECAPODA					
Cambaridae		TRICHOPTERA			
		Hydroptila sp			1
EPHEMEROPTERA		, ,			
					1
				DIPTERA (OTHER)	
				Simulium sp	
					+
					+
		MEGALOPTERA			+
				MOLLUSCA	
ODONATA				Elimia sp	
050.11.1.71				Gyraulus sp	+
				- J. S. S. S. S. S. S.	
-		COLEOPTERA			1
		Ectopria (L)			1
		1 2 /			1
				OTHER TAXA	
-				Turbellaria	
					1
					1
					1
					1
-					1
-					1
					1
			+		+
	<u> </u>		+ -	Number of Individuals	+



TRC In-House LFUCG-WR	Client Name:	KY10-030	Third Rock Pjt #:
KY / Fayette	State/County:	Wolf Run and Tributaries	Water Body:
5/17/2011	Collection Date:	W-5A QT	Sample ID:
Kick Net	Sampling Method:	Bert Remley	Collector:
Subsample	Sample Sorting:	Sarah Chandler	Sorter:
1	No. Grids of 30 Picked:	Chelsey Olson	Taxonomist:
334	No. Organisms Picked:		

Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.
ANNELIDA		PLECOPTERA		DIPTERA (CHIRONOMIDAE)	
Erpobdellidae (Immature)	1			Chironomidae (Damaged)	1
Naididae	2			Cricotopus/Orthocladius gr	91
				Micropsectra sp	2
				Microtendipes pedellus gr	1
AMPHIPODA				Parametriocnemus sp	3
Crangonyx sp	4			Tanytarsus sp	1
				Thienemanniella xena	3
1000004					
ISOPODA	105				
Lirceus fontinalis	135				
DECAPODA					
Cambaridae	1	TRICHOPTERA			
Carribaridae	- '	Cheumatopsyche sp	2		
EPHEMEROPTERA		Hydroptila sp	1		
EFFIEWEROF TERA		туш орша зр			
				DIPTERA (OTHER)	
				Simulium sp	20
		MEGALOPTERA			
				MOLLUSCA	
ODONATA					
		COLEOPTERA			
		Optioservus (L) 4 Stenelmis (A) 3 (L) 6	4		
		Stenelmis (A) 3 (L) 6	9		
				OTHER TAXA	
				Turbellaria	20
					1
			-		
			-		-
			-		-
			-		1
	+				
	+				
			-		
				Number of Individuals	301



TRC In-House LFUCG-WR	Client Name:	KY10-030	Third Rock Pjt #:
KY / Fayette	State/County:	Wolf Run and Tributaries	Water Body:
5/17/2011	Collection Date:	W-5A QL	Sample ID:
Multihabita	Sampling Method:	Bert Remley	Collector:
Pick-Al	Sample Sorting:	Tammie Fister	Sorter:
30	No. Grids of 30 Picked:	Chelsey Olson	Taxonomist:
NA	No. Organisms Picked:		

Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.
ANNELIDA		PLECOPTERA		DIPTERA (CHIRONOMIDAE)	
Erpobdellidae				Chironomus sp	
Helobdella triserialis				Cricotopus/Orthocladius gr	
Helobdella stagnalis				Larsia sp	
Naididae				Micropsectra sp	
AMPHIPODA				Parametriocnemus sp	
Crangonyx sp				Thienemannimyia gr	
ISOPODA					
Lirceus fontinalis					
Linceus foritifians					
DECAPODA					
Cambaridae		TRICHOPTERA			
		Hydroptila sp			
EPHEMEROPTERA					
				DIPTERA (OTHER)	
				Simulium sp	
				Simulum sp	
		MEGALOPTERA			
				MOLLUSCA	
ODONATA				Elimia sp	
Calopteryx maculata				Gyraulus sp	
Enallagma sp				Physella sp	
Ischnura sp		COLEOPTERA		Physidae	
		Dubiraphia (L)		Sphaerium sp	
		Stenelmis (A) (L)		071155 7414	
				OTHER TAXA	
				Turbellaria	
			+		
			+		
	+ +				
	 				
				Number of Individuals	-



TRC In-House LFUCG-WR	Client Name:	KY10-030	Third Rock Pjt #:
KY / Fayette	State/County:	Wolf Run and Tributaries	Water Body:
5/17/2011	Collection Date:	W-6 QT	Sample ID:
Kick Net	Sampling Method:	Bert Remley	Collector:
Subsample	Sample Sorting:	Sarah Chandler	Sorter:
1	No. Grids of 30 Picked:	Chelsey Olson	Taxonomist:
335	No. Organisms Picked:		

Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.
ANNELIDA		PLECOPTERA		DIPTERA (CHIRONOMIDAE)	
Erpobdellidae	1			Cricotopus/Orthocladius gr	34
Naididae	2				
AMPHIPODA					
Crangonyx sp	5				
ISOPODA					
Lirceus fontinalis	224		+		
Lirceus fortifialis	224				
DECAPODA					
DEGAT ODA		TRICHOPTERA			+
		Hydroptila sp	1		+
EPHEMEROPTERA			 		1
Baetis tricaudatus	1				
				DIPTERA (OTHER)	
				Simulium sp	33
		15011007501			
		MEGALOPTERA		140111100A	
ODONATA				MOLLUSCA	
ODONATA			_		
			+		+
		COLEOPTERA			+
		Stenelmis (A) 1 (L) 3	4		
	+ +	Sterionins (A) I (L) J	+ -		1
	+		+ -	OTHER TAXA	
			+	5 <u>2</u> 1. 17001	
				Number of Individuals	305



TRC In-House LFUCG-WR	Client Name:	KY10-030	Third Rock Pjt #:
KY / Fayette	State/County:	Wolf Run and Tributaries	Water Body:
5/17/2011	Collection Date:	W-6 QL	Sample ID:
Multihabitat	Sampling Method:	Bert Remley	Collector:
Pick-All	Sample Sorting:	Brenda McGregor	Sorter:
30	No. Grids of 30 Picked:	Chelsey Olson	Taxonomist:
NA	No. Organisms Picked:		

Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.
ANNELIDA		PLECOPTERA		DIPTERA (CHIRONOMIDAE)	
Naididae				Cricotopus/Orthocladius gr	
AMPLIIDODA					
AMPHIPODA					
Crangonyx sp					
ISOPODA					
Lirceus fontinalis					
DECAPODA					
		TRICHOPTERA			
EPHEMEROPTERA					
Baetis flavistriga					
				DIPTERA (OTHER)	
				Simulium sp	
		MEGALOPTERA			
				MOLLUSCA	
ODONATA				Elimia sp	
				Gyraulus sp	
				Pisidium sp	
		COLEOPTERA		Sphaerium sp	
		Stenelmis (A)			
				OTHER TAXA	
				Turbellaria	
	+				
				Number of Individuals	



TRC In-House LFUCG-WR	Client Name:	KY10-030	Third Rock Pjt #:
KY / Fayette	State/County:	Wolf Run and Tributaries	Water Body:
5/17/2011	Collection Date:	W-11 QT	Sample ID:
Kick Net	Sampling Method:	Bert Remley	Collector:
Subsample	Sample Sorting:	Sarah Chandler	Sorter:
1	No. Grids of 30 Picked:	Chelsey Olson	Taxonomist:
316	No. Organisms Picked:		

Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.
ANNELIDA		PLECOPTERA		DIPTERA (CHIRONOMIDAE)	
				,	
AMPHIPODA					
Crangonyx sp	6				
ISOPODA					
Lirceus fontinalis	275				
DECAPODA					
		TRICHOPTERA			
EPHEMEROPTERA					
				DIPTERA (OTHER)	
				Simulium sp	2
		MEGALOPTERA			
		WEGNEOT TERM		MOLLUSCA	
ODONATA				WIGEEGSGIT	
ODONATA					
		COLEOPTERA			
	 	Stenelmis (A) 4 (L) 2	6		
	 	01011011110 (11) 7 (L) Z			
				OTHER TAXA	
	1			JIIILK IIVV	
	+				
				Number of Individuals	289



TRC In-House LFUCG-WR	Client Name:	KY10-030	Third Rock Pjt #:
KY / Fayette	State/County:	Wolf Run and Tributaries	Water Body:
5/17/2011	Collection Date:	W-11 QL	Sample ID:
Multihabitat	Sampling Method:	Bert Remley	Collector:
Pick-All	Sample Sorting:	Brenda McGregor	Sorter:
30	No. Grids of 30 Picked:	Chelsey Olson	Taxonomist:
NA	No. Organisms Picked:		

ANNELIDA PLECOPTERA DIPTERA (CHIRNOMIDAE) Erpobdellidae Micropsectra sp Rheocricotopus glabricollis AMPHIPODA Crangonyx sp ISOPODA Lirceus fontinalis DECAPODA EPHEMEROPTERA DIPTERA (OTHER) Simulium sp MEGALOPTERA ODONATA ODONATA OTHER TAXA	Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.
Erpobdellidae Micropsectra sp Rheocricotopus glabricollis AMPHIPODA Crangonyx sp ISOPODA Lirceus fontinalis DECAPODA TRICHOPTERA EPHEMEROPTERA DIPTERA (OTHER) Simulium sp MEGALOPTERA MOLLUSCA Sphaerium sp COLEOPTERA	ANNELIDA		PLECOPTERA		DIPTERA (CHIRONOMIDAE)	
Rheocricotopus glabricollis AMPHIPODA Crangonyx sp ISOPODA Lirceus fontinalis DECAPODA TRICHOPTERA EPHEMEROPTERA DIPTERA (OTHER) Simulium sp MEGALOPTERA ODONATA MOLLUSCA Sphaerium sp COLEOPTERA	Erpobdellidae				Micropsectra sp	
AMPHIPODA Crangonyx sp ISOPODA Lirceus fontinalis DECAPODA TRICHOPTERA EPHEMEROPTERA DIPTERA (OTHER) Simulium sp MEGALOPTERA MOLLUSCA Sphaerium sp COLEOPTERA					Rheocricotopus glabricollis	
Crangonyx sp ISOPODA Lirceus fontinalis DECAPODA TRICHOPTERA EPHEMEROPTERA DIPTERA (OTHER) Simulium sp MEGALOPTERA MOLLUSCA ODONATA COLEOPTERA					1 3	
Crangonyx sp ISOPODA Lirceus fontinalis DECAPODA TRICHOPTERA EPHEMEROPTERA DIPTERA (OTHER) Simulium sp MEGALOPTERA MOLLUSCA ODONATA COLEOPTERA						
Crangonyx sp ISOPODA Lirceus fontinalis DECAPODA TRICHOPTERA EPHEMEROPTERA DIPTERA (OTHER) Simulium sp MEGALOPTERA MOLLUSCA ODONATA COLEOPTERA	AMPHIPODA					
ISOPODA Lirceus fontinalis DECAPODA TRICHOPTERA EPHEMEROPTERA DIPTERA (OTHER) Simulium sp MEGALOPTERA MOLLUSCA ODONATA COLEOPTERA						
Lirceus fontinalis DECAPODA TRICHOPTERA EPHEMEROPTERA DIPTERA (OTHER) Simulium sp MEGALOPTERA MOLLUSCA ODONATA COLEOPTERA	Crangoriyx sp					
Lirceus fontinalis DECAPODA TRICHOPTERA EPHEMEROPTERA DIPTERA (OTHER) Simulium sp MEGALOPTERA MOLLUSCA ODONATA COLEOPTERA						
Lirceus fontinalis DECAPODA TRICHOPTERA EPHEMEROPTERA DIPTERA (OTHER) Simulium sp MEGALOPTERA MOLLUSCA ODONATA COLEOPTERA	1000004			-		
DECAPODA TRICHOPTERA EPHEMEROPTERA DIPTERA (OTHER) Simulium sp MEGALOPTERA MOLLUSCA Sphaerium sp COLEOPTERA	ISOPODA			_		-
EPHEMEROPTERA EPHEMEROPTERA DIPTERA (OTHER) Simulium sp Simulium sp MEGALOPTERA MOLLUSCA Sphaerium sp COLEOPTERA	Lirceus fontinalis					
EPHEMEROPTERA EPHEMEROPTERA DIPTERA (OTHER) Simulium sp Simulium sp MEGALOPTERA MOLLUSCA Sphaerium sp COLEOPTERA						
EPHEMEROPTERA EPHEMEROPTERA DIPTERA (OTHER) Simulium sp Simulium sp MEGALOPTERA MOLLUSCA Sphaerium sp COLEOPTERA						
EPHEMEROPTERA DIPTERA (OTHER) Simulium sp MEGALOPTERA MOLLUSCA Sphaerium sp COLEOPTERA	DECAPODA					
EPHEMEROPTERA DIPTERA (OTHER) Simulium sp MEGALOPTERA MOLLUSCA Sphaerium sp COLEOPTERA			TRICHOPTERA			
MEGALOPTERA ODONATA ODONATA COLEOPTERA DIPTERA (OTHER) Simulium sp MEGALOPTERA MOLLUSCA Sphaerium sp						
MEGALOPTERA ODONATA ODONATA COLEOPTERA DIPTERA (OTHER) Simulium sp MEGALOPTERA MOLLUSCA Sphaerium sp	EPHEMEROPTERA					
Simulium sp Simulium sp MEGALOPTERA MOLLUSCA Sphaerium sp COLEOPTERA						
Simulium sp Simulium sp MEGALOPTERA MOLLUSCA Sphaerium sp COLEOPTERA		1				
Simulium sp Simulium sp MEGALOPTERA MOLLUSCA Sphaerium sp COLEOPTERA						
Simulium sp Simulium sp MEGALOPTERA MOLLUSCA Sphaerium sp COLEOPTERA						1
Simulium sp Simulium sp MEGALOPTERA MOLLUSCA Sphaerium sp COLEOPTERA					DIDTEDA (OTLIED)	
MEGALOPTERA MOLLUSCA Sphaerium sp COLEOPTERA						
ODONATA ODONATA Sphaerium sp COLEOPTERA					Simulium sp	
ODONATA ODONATA Sphaerium sp COLEOPTERA						
ODONATA ODONATA Sphaerium sp COLEOPTERA						
ODONATA ODONATA Sphaerium sp COLEOPTERA						
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ODONATA ODONATA Sphaerium sp COLEOPTERA						
ODONATA ODONATA Sphaerium sp COLEOPTERA						
ODONATA ODONATA Sphaerium sp COLEOPTERA						
ODONATA Sphaerium sp COLEOPTERA			MEGAL OPTERA			
ODONATA Sphaerium sp COLEOPTERA			WEGALOT TERA		MOLLUSCA	
COLEOPTERA	ODONATA					
	ODONATA				эрпаенин зр	1
				+		
			001505755			+
OTHER TAXA			COLEOPTERA			
OTHER TAXA						
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		╅		+		+
		╫		+		+
						+
Number of Individuals -					Number of Individuals	



TRC In-House LFUCG-WR	Client Name:	KY10-030	Third Rock Pjt #:
KY / Fayette	State/County:	Wolf Run and Tributaries	Water Body:
5/17/2011	Collection Date:	W-12 QT	Sample ID:
Kick Net	Sampling Method:	Bert Remley	Collector:
Subsample	Sample Sorting:	Sarah Chandler	Sorter:
1	No. Grids of 30 Picked:	Chelsey Olson	Taxonomist:
320	No. Organisms Picked:		

Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.
ANNELIDA		PLECOPTERA		DIPTERA (CHIRONOMIDAE)	
Naididae	52			Cricotopus/Orthocladius gr	169
				Thienemanniella xena	2
AMPHIPODA					
AWPHIPODA					
ISOPODA					
Lirceus fontinalis	93				
DECAPODA					
		TRICHOPTERA			
EPHEMEROPTERA					
				DIPTERA (OTHER)	
				Simulium sp	26
		MEGALOPTERA			
				MOLLUSCA	
ODONATA					
		COLEOPTERA			
		COLLOTTERA			
				OTHER TAXA	
				Turbellaria	6
				Number of Individuals	348



TRC In-House LFUCG-WR	Client Name:	KY10-030	Third Rock Pjt #:
KY / Fayette	State/County:	Wolf Run and Tributaries	Water Body:
5/17/2011	Collection Date:	W-12 QL	Sample ID:
Multihabitat	Sampling Method:	Bert Remley	Collector:
Pick-All	Sample Sorting:	Brenda McGregor	Sorter:
30	No. Grids of 30 Picked:	Chelsey Olson	Taxonomist:
NA	No. Organisms Picked:		

Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.
ANNELIDA		PLECOPTERA		DIPTERA (CHIRONOMIDAE)	
Naididae				Chironomus sp	
				Cricotopus/Orthocladius gr	
				Dicrotendipes neomodestus	
				Tanytarsus sp	
AMPHIPODA					
ISOPODA					
Lirceus fontinalis					
DECAPODA					
		TRICHOPTERA			
EPHEMEROPTERA					
				DIPTERA (OTHER)	
		MEGALOPTERA			
				MOLLUSCA	
ODONATA				Lymnaea sp	
Enallagma sp				Physella sp	
				Sphaerium sp	
		COLEOPTERA			
				OTHER TAXA	
				Turbellaria	
				Number of Individuals	-

Third Rock Consultants, LLC Macroinvertebrate Sample Sorting Efficiency Form

	Client Name: <u>LFUCG</u> Sample ID: <u>W - 51 (QT</u> Third Rock Project #: <u>KY-10 - (</u>	<u> </u>
Original Sorter: S. Chandler	Resorted By: TFISTER	
Date Sorted: 10-21-11	Date Resorted: /0 21-//	
# of Grids Sorted: 15 of 30 of 2	# of Grids Sorted: 15 of 30 of 1	_
# of Organisms Originally Sorted: 334	# Additional Organisms Recovered: /	,
# organisms originally sorted : # additional organisms recovered	# organisms originally sorted + 334 = 99.7	ency
Additional Or	rganisms Located	
		nber
The second second	1	
-		_
	-	
	-	
		_
·		
	Total: /	
Comments: LFUCG		
KY-10-03D	55 QC	

Third Rock Consultants, LLC Macroinvertebrate Sample Taxonomic & Enumeration Efficiency Form

Client Name: LFUCG - Wolf Run

Sample ID: W-5A QT Third Rock Project #: KY10-030

Original Taxonomist: Chelsey Olson	Second Taxonomist: Bert Remley
Original Date Completed: 10/28/11	Review Date Completed: 11/1/11
# Organisms Enumerated (Taxonomist 1): 296	# Organisms Enumerated (<i>Taxonomist 2</i>): 307
# Organisms Enumerated (<i>Taxonomist 1</i>): 296	# Organisms Enumerated (<i>Taxonomist 2</i>): 307

Percent Difference in Enumeration (PDE) =1.8

 $(296 - 307) \div (296 + 307) \times 100 = \%$ Difference in Enumeration (PDE)

 n_1 = # organisms counted by Taxonomist 1 n_2 = # organisms counted by Taxonomist 2

Percent Taxonomic Disagreement (PTD) =4.6

$$PTD = [1 - (293 \div 307)] \times 100$$

 $Comp_{pos}$ = number of taxonomic agreements (see Taxonomic Comparison Form) N = total number of organisms

Comments: Pass QA/QC, discussed immature Cheumatopscyhe, Optioservus vs Stenelmis

Third Rock Consultants, LLC Macroinvertebrate Sample Taxonomy Precision Form

Client Name: LFUCG - Wolf Run

Sample ID: W-5A QT

Third Rock Project #: KY10-030

Taxon	Taxonomist 1	Taxonomist 2	# Agreements
Crangonyx sp	4	6	4
Optioservus sp	2	4	2
Stenelmis sp	7	6	6
Stenelmis sp	3	3	3
Cambaridae	1	1	1
Chironomidae	1	0	0
Cricotopus/Orthocladius gr	91	93	91
Micropsectra sp	2	2	2
Microtendipes pedellus gr	1	1	1
Parametriocnemus sp	3	3	3
Tanytarsus sp	1	1	1
Thienemanniella xena	3	3	3
Simulium sp	20	21	20
Lirceus fontinalis	135	138	135
Erpobdellidae	1	1	1
Hydroptila sp	1	1	1
Turbellaria	20	19	19
Cheumatopsyche	0	2	0
Naididae	0	2	0
Totals:	296	307	293



HABITAT ASSESSMENT FIELD DATA SHEET — HIGH GRADIENT STREAMS, PAGE 1

STREAM NAME: Wolf Run								LOCATION: Old Frankfort Pike																
STREAM WDTH (FT): 25 DEPTH (FT): 0.3-1.5								PERE	NNIA	L 🖂	INTERMITTENT EPHEMERAL													
STATION #: WR-S2 / W1 RIVERMILE:								COU	OUNTY: Fayette STATE: KY															
LAT: LONG:								RIVER BASIN: Kentucky – Wolf Run Watershed																
CLIENT: LFUCG							PROJECT NO. KY11-051																	
INVESTIGATORS/CREW: E. Hartowicz																								
FORM COMPLETED BY: DATE: 5/12/2011						11		REASON FOR SURVEY:																
E. Hartowicz									Macroinvertebrate survey for LFUCG MS4 Permit															
TIME:					: 113	30				1 Gillin														
				1	Condition Category																			
	Habitat Parameter		0	ptima	al		Suboptimal						M	argin	al		Poor							
	1. Epifaunal Substrate/ Available Cover	subs epifa fish o subn bank stabl to all poter	trate faunal cover; cover; nerged s, cobie habirow full ntial (i.are not	in 70% avorab olonizamix of logs, ble or data and colonie., logs in new f	le for ation a snags under other I at sta ization s/snag	; cut ge s	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).					20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.					Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.							
_	SCORE: 15	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
evaluated in sampling reach	2. Embeddedness	partic surro sedir cobb	cles ar ounded nent.	oble, ar e 0-25 I by fin Layerii vides d e.	% e ng of		Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.					Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.					Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.							
ated	SCORE: 10	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
Parameters to be evalua	3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)					pres miss	ent (if	ne 4 re fast-sh core lov ner reg	allow i	an if	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).					Dominated by 1 velocity/depth regime (usually slow-deep).							
ram	SCORE: 13	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
Pa	4. Sediment Deposition	islan	enlarg point ba % of th sedim	ars and ne bott	b	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.					Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.						Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.							
	SCORE: 10	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
	5. Channel Flow Status	lower banks, and minimal amount of channel						Nater fills > 75% of the available channel; or <25% of channel substrate is exposed.					Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.						Very little water in channel and mostly present as standing pools.					
	SCORE: 17	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		

		AT ASSESS		ILLD	Dittitt		ondition (L7 (111 0 , 1	NOL Z		
	Habitat Parameter	Opt	timal		S	uboptim	al		Margina	l		Poor	
	6. Channel Alteration	Channelizatio absent or min with normal p	imal; stre		present, bridge at of past cl dredging 20 yr) ma	annelizatio usually in a putments; o hannelizati , (greater t ay be preso nannelizatio	areas of evidence ion, i.e., han past ent, but	extension or shoring present and 40 to	lization ma re; embanl ng structur on both ba to 80% of s nannelized d.	kments es anks; stream	or ceme the strea channeli disrupte habitat g	hored with nt; over 80 am reach zed and d. Instrea greatly alte d entirely.)% of m
	SCORE: 15	20 19	18 17	16	15 14	13	12 11	10 9	8	7 6	5 4	3 2	1 0
ng reach	7. Frequency of Riffles (or bends)	Occurrence or relatively freq distance between divided by with stream < 7:1 (7); variety of linistreams who continuous, proposition of the stream of the str	uent; ration ween riffled the of the (generally nabitat is nere riffled lacement ther large	s / 5 to key. s are of	infrequer between	nce of riffle nt; distance riffles divid of the stre 7 to 15.	e ded by	bottom of some had between the widt	nal riffle o contours p abitat; dista riffles div h of the sta n 15 to 25.	rovide ance ided by	shallow habitat; riffles div	ly all flat w riffles; poo distance b vided by th ream is a	or etween ne width
mpli	SCORE: 17	20 19	18 17	16	15 14	13	12 11	10 9	8	7 6	5 4	3 2	1 0
Parameters to be evaluated in sampling reach	8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; erosion or bar absent or min potential for fu problems. < ! affected.	nk failure imal; little uture)	infrequer erosion r	ely stable; nt, small ar nostly heal bank in re erosion.	led over.	60% of areas of	ely unstat pank in rea erosion; h potential c	ach has nigh	areas; "i frequent sections obvious	e; many er aw" areas along stra and bend bank slou 6 of bank h	aight s; ghing;
ers to	SCORE: (LB) 5	Left Bank	10	9	8	7	6	5	4	3	2	1	0
mete	SCORE: (RB) 3	Right Bank	10	9	8	7	6	5	4	3	2	1	0
Para	9. Vegetative Protection (score each bank)	More than 90 streambank s immediate rip covered by na vegetation, in understory sh woody macro vegetative disthrough grazi minimal or no almost all plan grow naturally	urfaces a arian zon ative cluding tr irubs, or r phytes; cruption ng or mov t evident; nts allowe	ees, non- wing	surfaces vegetation plants is represent evident be plant ground great ext one-half	ted; disrup out not affe wth potent ent; more of the pote oble heigh	y native class of stion cting full ial to any than ential	surfaces vegetati obvious soil or c vegetati than one potentia	of the street covered on; disrup; patches closely crop on common e-half of the light part of the light	by tion of bare oped on; less e	streamb covered disruption vegetation vegetation removed	in 50% of ank surface by vegeta on of stread on is very on has been to 5 cent on average	ces ation; mbank high; en imeters
	SCORE: (LB) 2	Left Bank	10	9	8	7	6	5	4	3	2	1	0
	SCORE: (RB) 2	Right Bank	10	9	8	7	6	5	4	3	2	1	0
	10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of ripar meters; huma (i.e., parking l clear-cuts, lav have not impa	n activition ots, road vns, or cr	es beds, ops)	18 meter	riparian zo s; human a pacted zon /.	activities	12 mete activities	friparian z rs; human s have imp great deal.	acted	meters:	riparian z little or no on due to l	riparian
	SCORE: (LB) 2	Left Bank	10	9	8	7	6	5	4	3	2	1	0
	SCORE: (RB) 2	Right Bank	10	9	8	7	6	5	4	3	2	1	0

STF	REAM NAME: McCor	NAME: McConnell Branch									l: Pre	ston	Cave)								
STF	REAM WDTH (FT): 1	2	DEP	TH (F	T): 1	1.5			PERE	NNIA	L 🖂	I	NTER	RMITT	ENT			EPH	EME	RAL		
STA	ATION #: W2		RIVI	ERMIL	E:				COU	NTY:	Fayet	te				ST	ATE:	: KY	7			
LA	Γ:		LON	IG:					RIVE	R BAS	SIN: H	Centu	ıcky -	- Wol	f Run	Wate	ershe	ed				
CLI	ENT: LFUCG								PRO.	IECT	NO.	KY10	0-030									
INV	ESTIGATORS/CREW	': B. F	Remle	y / D.	Mille	r																
FOI	RM COMPLETED BY:				DAT	E: 5/	17/201	11				l	REAS	ON F	OR S	URV	EY:					
B. F	Remley											ı	Macro	oinve	rtebra	ate su	ırvey	for	319(h) gr	ant	
					TIME	: 113	30															
	Habitat						ı			Cond	lition	Cate	gory				1					
	Parameter		C)ptima	al			Su	boptir	nal			M	argin	al				Po	or		
	1. Epifaunal Substrate/ Available Cover	subs epifa fish (subr bank stab) to all pote	trate faunal cover; nergects, cob le habilow full ntial (i.	an 70% avorabe olonization of the ortal transfer of the ortal and the olonization of the olonization ol	lle for ation a snags under other d at sta ization s/snag	, cut ige is	habit color adec main preso subs newf prep	rat; we nizatio juate h tenan ence c trate i all, bu ared fo rate a	x of sta Il suite n poten nabitat ce of p of addit n the fo t not your or color	d for funtial; for opulati ional orm of et	ions; n	habi less subs	tat; ha than c strate f urbed c	bitat a desirat reque	ivailab ole; ntly	ility	hab obvi	itat; I	n 20% ack o subs g.	f habi	tat is	ble
	SCORE: 12	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
evaluated in sampling reach	2. Embeddedness	parti surro sedii cobb	cles ar ounded ment.	oble, and the ob	% e ng of		partio surro	cles ar	oble, and e e 25-5 d by fin	0%	lder	boul 75%		rticles	and are 50 by fin		part surr	icles	are n led by t.	nore t		
ted i	SCORE: 12	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Parameters to be evalua	3. Velocity/Depth Regime	regir deep deep	nes pro , slow), fast-	ocity/de esent (-shallo shallov s, deep	(slow- w, fast v). (Sl	OW	preso	ent (if ing, so	ne 4 re fast-sh core lov ner reg	allow i wer tha		regir shal	low or	esent slow-	abitat (if fasi shallov re low)	N	velo	city/o	ed by depth slow-	regin		
amel	SCORE: 13	20 19 18 17 16					15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Para	4. Sediment Deposition	islan less affec	ds or p than 5	enlarg point b % of th sedim	ars and ne bott	d	forma grave sedir botto	ation, el, sar ment; l om affe	increa mostly id or fir 5-30% ected; s in pool	from ne of the slight	oar	new sedi bars botto depo cons mod	grave ment of 30-5 om affo osits a strictio	I, sand on old 0% of ected; t obstr ns, an depos	ition of d or fin and no the sedim suction d beno ition of	ew nent s, ds;	mat devenue 50% freq abse	erial, elopr 6 of tl uentl ent d	eposit incre ment; he bo ly; poo ue to t depo	ased more ttom o ols alr subst	bar than chang nost antia	ging
	SCORE: 13	20 19 18 17 16						14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	5. Channel Flow Status Water reaches base of lower banks, and minim amount of channel substrate is exposed.						avail	able c annel	> 75% hannel substr	; or <2	5%	avai	lable o	:hanne	% of the el, and are mo	/or	and	mos	e wate tly pre pools	esent		el
	SCORE: 17						15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

		AT ASSESS	IVILIVI I	ILLU	DATAS		ondition (LAIVIO, F	AGL Z		
	Habitat Parameter	Opt	imal		S	uboptima	al		Margina			Poor	
	6. Channel Alteration	Channelizatio absent or min with normal p	imal; stre		present, bridge at of past cl dredging 20 yr) ma	annelizatio usually in a outments; e nannelizati , (greater t ay be prese annelizatio	areas of evidence on, i.e., han past ent, but	extensiv or shorin present and 40 to	ization ma e; embanl ng structur on both ba o 80% of s annelized	es enks; anks;	or ceme the strea channeli disrupte habitat g	hored with nt; over 80 am reach zed and d. Instrea greatly alte d entirely.	0% of m
	SCORE: 18	20 19	18 17	16	15 14	13	12 11	10 9	8	7 6	5 4	3 2	1 0
ng reach	7. Frequency of Riffles (or bends)	Occurrence or relatively freq distance betwo divided by wick stream < 7:1 or 7); variety of land streams who continuous, produlders or of natural obstruimportant.	uent; ration teen rifflet th of the (generally nabitat is there riffles there large	s y 5 to key. s are of	infrequer between	nce of riffle nt; distance riffles divid of the stre 7 to 15.	led by	bottom of some had between the width	nal riffle or contours p ibitat; dista riffles div n of the str 15 to 25.	rovide ance ided by	shallow habitat; riffles div	ly all flat w riffles; poo distance b vided by th ream is a i	or etween ne width
mplii	SCORE: 16	· .	18 17	16	15 14	13	12 11	10 9	8	7 6	5 4	3 2	1 0
Parameters to be evaluated in sampling reach	8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; erosion or bar absent or min potential for fu problems. < ! affected.	nk failure imal; little uture)	infrequer erosion r	ely stable; nt, small ar nostly heal bank in re erosion.	ed over.	60% of bareas of	ely unstab pank in rea erosion; h potential d	ich has iigh	areas; "r frequent sections obvious	e; many er raw" areas along stra and bend bank slou of bank h ll scars.	aight s; ghing;
ers to	SCORE: (LB) 6	Left Bank	10	9	8	7	6	5	4	3	2	1	0
mete	SCORE: (RB) 8	Right Bank	10	9	8	7	6	5	4	3	2	1	0
Para	9. Vegetative Protection (score each bank)	More than 90' streambank s immediate rip covered by na vegetation, in understory sh woody macro vegetative dis through grazi minimal or no almost all plan grow naturally	urfaces a arian zon ative cluding tr rubs, or r phytes; ruption ng or mov t evident; nts allowe	e ees, non- wing	surfaces vegetatic plants is represen evident b plant gro great ext one-half	ted; disrup out not affe wth potent ent; more to of the pote oble height	y native class of tion cting full ial to any han ntial	surfaces vegetation obvious; soil or cl vegetation than one potential	of the street covered lon; disrupt patches cosely cropen commoe-half of the plant stule emaining.	oy ion of bare oped n; less e	streamb covered disruptio vegetation vegetation removed	in 50% of ank surface by vegeta on of stread on is very on has bee it to 5 cent n average	ces ation; mbank high; en imeters
	SCORE: (LB) 8	Left Bank	8	7	6	5	4	3	2	1	0		
	SCORE: (RB) 9	Right Bank	10	9	8	7	6	5	4	3	2	1	0
	10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of ripar meters; huma (i.e., parking l clear-cuts, lav have not impa	n activitie ots, roadl vns, or cr	es beds, ops)	18 meter	riparian zo s; human a acted zon 1.	activities	12 meter activities	riparian z rs; human have imp reat deal.		meters:	riparian z little or no on due to l	riparian
	SCORE: (LB) 8	Left Bank					6	5	4	3	2	1	0
	SCORE: (RB) 9	Right Bank					6	5	4	3	2	1	0

STF	REAM NAME: Vaugh	ns Br	anch						LOCA	ATION	l: Abo	ove c	onflu	ence	with	Wolf	Run					
STF	REAM WDTH (FT): 1	5	DEP	TH (F	T): ().67			PERE	NNIA	L 🖂	I	NTER	MITT	ENT			EPH	EME	RAL		
STA	ATION #: W4		RIVI	ERMIL	E:				COU	NTY:	Fayet	te				ST	ATE:	KY	•			
LAT	Γ:		LON	IG:					RIVE	R BAS	SIN: H	Centu	ıcky -	- Wol	f Run	Wate	ershe	ed				
CLI	ENT: LFUCG								PROJ	IECT	NO.	KY10	0-030									
INV	ESTIGATORS/CREW	: B. F	Remle	y / D.	Mille	r																
FO	RM COMPLETED BY:				DAT	E: 5/	17/20 1	11				ı	REAS	ON F	OR S	URV	EY:					
B. F	Remley				TIME	: 020	00					ı	Macro	oinve	rtebra	ate su	ırvey	for	319(h) gr	ant	
										0		0-1-										
	Habitat			ptima	al			Sul	boptir		lition	Cate		argin	al				Po	or		
	Parameter 1 Eniformal	Cross		•			40.7		-			20. 4					Loca	o the			ulo.	
	Epifaunal Substrate/ Available Cover	subs epifa fish o subn bank stabl to all pote	strate fa nunal c cover; nergec ss, cob le habi low full ntial (i. are <u>no</u>	mix of l logs, ble or tat and l colon e., log	le for ation a snags underd	, cut ige is	habit color adeq main prese subs newf prepa	at; we nization juate he tenandence contrate in all, but ared for rate a	x of sta Il suite n poten nabitat ce of p of addit n the fo t not ye or colon at high	d for funtial; for opulational orm of et nizatio	ions; n	habi less subs	10% m tat; ha than c strate f urbed c	bitat a lesirat reque	ivailab ole; ntly	ility	habi obvi	itat; I	n 20% ack o subs g.	f habi	tat is	ble
	SCORE: 8	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
evaluated in sampling reach	2. Embeddedness	parti surro sedir cobb	cles ar ounded ment. ole prov	e 0-25 I by fin Layeri vides c	e ng of		partio	cles ar ounded	oble, ar e 25-5 I by fin	0%	lder	boul 75%	vel, co der pa surro ment.	rticles	are 5		part surr	icles	are n led by	nore t		
ted in	SCORE: 14	20	oble provides diversity of he space.				15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Parameters to be evalua	3. Velocity/Depth Regime	regir deep deep	nes pro o, slow o, fast-	shallov		OW	prese	ent (if t ing, so	ne 4 re fast-sh core lov ner reg	allow i ver tha		regir shal	/ 2 of t mes pr low or missin	esent slow-	(if fas shallov	N	velo	city/o	ed by depth slow-o	regin		
amet	SCORE: 10	20	20 19 18 17 16					14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Para	4. Sediment Deposition	islan less affec	ds or p than 5	ooint b % of the sedim	ement ars and ne bott nent	d	forma grave sedir botto	ation, lel, san ment; s m affe	increa mostly d or fir 5-30% ected; s in pool	from ne of the slight	oar	new sedi bars botto depo cons mod	erate grave ment of 30-50 m afformation derate sprey	I, sand on old 0% of ected; t obstr ns, an depos	d or fin and no the sedim ruction d beno	ew nent s, ds;	mate deve 50% freq abse	erial, elopr 5 of tl uentl ent d	eposit incre ment; he bo y; poo ue to t depo	ased more ttom o ols ali subst	bar than chang nost tantia	ging
	SCORE: 13	20 19 18 17 16 Water reaches base of both					15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	5. Channel Flow Status	s, and channe	minim el		avail	able c annel	> 75% hannel substra	; or <2	5%	avai	er fills lable o subst osed.	hanne	el, and	/or	and	mos	e wate tly pre pools	esent		el		
	SCORE: 15	substrate is exposed. 20 19 18 17					15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

		41 ASSESS	.vı∟!¥!	ILLU	DAIAS		ondition (*1 JIK	LMIVIO, F	AUL Z		
	Habitat Parameter	Opt	timal		S	uboptim	al		Margina			Poor	
	6. Channel Alteration	Channelizatio absent or min with normal p	imal; stre		present, bridge at of past cl dredging 20 yr) ma	annelizatio usually in a outments; e nannelizati , (greater t ay be preso nannelizatio	areas of evidence ion, i.e., han past ent, but	extensive or shorin present of and 40 to	zation mage; embant g structur on both ba o 80% of s annelized	kments es anks; stream	or ceme the strea channeli disrupte habitat g	hored with nt; over 80 am reach zed and d. Instrea greatly alte d entirely.	0% of m
	SCORE: 15	20 19	18 17	16	15 14	13	12 11	10 9	8	7 6	5 4	3 2	1 0
ng reach	7. Frequency of Riffles (or bends)	Occurrence of relatively frequency distance between continuous, public boundaries of or or natural obstruimportant.	uent; ration ween rifflest the digenerally that is nere rifflest lacement the large	s / 5 to key. s are of	infrequer between	nce of riffle nt; distance riffles divid of the stre 7 to 15.	e ded by	bottom c some ha between the width	nal riffle or ontours p bitat; dista riffles div of the str 15 to 25.	rovide ance ided by	shallow habitat; riffles div	ly all flat w riffles; poo distance b vided by th ream is a i	or etween ne width
mpli	SCORE: 18	20 19	18 17	16	15 14	13	12 11	10 9	8	7 6	5 4	3 2	1 0
Parameters to be evaluated in sampling reach	8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; erosion or bar absent or min potential for fu problems. < ! affected.	nk failure iimal; little uture)	infrequer erosion r	ely stable; nt, small ar nostly heal bank in re erosion.	led over.	60% of bareas of	ely unstab ank in rea erosion; b ootential d	ach has nigh	areas; "r frequent sections obvious	e; many er raw" areas along stra and bend bank slou 6 of bank h ll scars.	aight s; ghing;
ers to	SCORE: (LB) 5	Left Bank	10	9	8	7	6	5	4	3	2	1	0
mete	SCORE: (RB) 7	Right Bank	10	9	8	7	6	5	4	3	2	1	0
Para	9. Vegetative Protection (score each bank)	More than 90 streambank s immediate rip covered by na vegetation, in understory sh woody macro vegetative disthrough grazi minimal or no almost all pla grow naturally	urfaces a arian zon ative cluding tr irubs, or r phytes; cruption ng or mov t evident; nts allowe	ees, non- wing	surfaces vegetatic plants is represen evident b plant gro great ext one-half	ted; disrup out not affe wth potent ent; more of the pote oble heigh	y native class of stion cting full ial to any than ential	surfaces vegetation obvious; soil or cloud vegetation than one	of the stree covered lon; disrupi patches co posely crop on common chalf of the plant stul maining.	by tion of bare oped on; less e	streamb covered disruptic vegetation vegetation removed	in 50% of ank surface by vegeta on of stread on is very on has been to 5 cent n average	ces ation; mbank high; en imeters
	SCORE: (LB) 5	Left Bank	10	9	8	7	6	5	4	3	2	1	0
	SCORE: (RB) 7 10. Riparian Vegetative Zone Width (score each bank riparian zone)	Right Bank Width of ripar meters; huma (i.e., parking I clear-cuts, lav have not impa	n activitie ots, roadl vns, or cr	es beds, ops)	18 meter	7 riparian zo s; human a acted zon /.	activities	12 meter activities	riparian z rs; human have imp reat deal.	acted	meters:	riparian z little or no on due to	riparian
	SCORE: (LB) 2	Left Bank	10	9	8	7	6	5	4	3	2	1	0
	SCORE: (RB) 3	Right Bank	10	9	8	7	6	5	4	3	2	1	0

STF	REAM NAME: Cardin			LOCA	ATION	l: Bel	ow P	arker	s Mil	Rd												
STF	REAM WDTH (FT): 6		DEP	TH (F	T): 1	l			PERE	NNIA	L⊠	I	NTER	RMITT	ENT		E	PH	EME	RAL		
STA	ATION #: W5A		RIVI	ERMIL	.E:				COU	NTY:	Fayet	te				ST	ATE:	ΚY				
LAT	Γ:		LON	IG:					RIVEI	R BAS	SIN: k	Centu	ıcky -	- Wol	f Run	Wat	ershe	d				
CLI	ENT: LFUCG								PROJ	ECT	NO.	KY10	0-030									
INV	ESTIGATORS/CREW	: B. F	Remle	y / D.	Mille	r																
FO	RM COMPLETED BY:				DAT	E: 5/	17/201	11				ı	REAS	ON F	OR S	URV	EY:					
B. F	Remley											ı	Macro	oinve	rtebra	ate su	ırvey	for	319(l	n) gr	ant	
					TIME	: 043	30															
	Habitat			•						Cond	lition	Cate	gory				ı					
	Parameter		C)ptima	al			Sul	boptir	nal			M	argin	al				Ро	or		
	1. Epifaunal Substrate/ Available Cover	subs epifa fish o subn bank stabl to all pote	strate fa nunal c cover; nergec ss, cob le habi low full ntial (i. are <u>no</u>	an 70% avorab olonizamix of I logs, ble or tat and colonie., logs to new f	le for ation a snags undero other I at sta ization s/snag	, cut ige is	habit color adec main preso subs newf prep	at; we nization juate hitenandence contrate in all, but ared for rate a	x of sta Il suite n poter nabitat ce of p of addit n the fo t not ye or color at high	d for funtial; for opulati ional orm of et nizatio	ions; n	habi less subs	.0% m tat; ha than c strate f ırbed c	bitat a desirat reque	vailab ole; ntly	ility	habit	at; la ous;	n 20% ack of subst J.	f habi	tat is	ble
	SCORE: 10	20 19 18 ess Gravel, cobble, a particles are 0-25				16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
evaluated in sampling reach	2. Embeddedness	parti surro sedir cobb	cles ar ounded ment.	e 0-25 I by fin Layeri vides d	% e ng of		partio	cles ar ounded	oble, ai e 25-5 I by fin	0%	lder	boul 75%	vel, co der pa surro ment.	ırticles	are 5		partio	cles ound	obble are m ed by	ore t		
ted in	SCORE: 12	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Parameters to be evaluat	3. Velocity/Depth Regime	regir deep deep	nes pro o, slow o, fast-	ocity/de esent (-shallo shallov s, deep	slow- w, fast v). (Sl	OW	preso miss	ent (if t ing, so	ne 4 re fast-sh core lov ner reg	allow i ver tha		regir shal	2 of t mes pr low or missin	esent slow-	(if fast shallov	٧	velo	city/d	ed by lepth slow-c	regin		
amet	SCORE: 10	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Para	4. Sediment Deposition	islan less affec	ds or p than 5	enlarg point ba % of th sedim	ars and ne bott	d	forma grave sedir botto	ation, lel, san ment; som ment; som	increa mostly d or fir 5-30% ected; s in pool	from ne of the slight	oar	new sedii bars botto depo cons mod	erate grave ment of 30-50 om afformations a striction erate s	I, sand on old 0% of ected; t obstr ns, an depos	d or fin and no the sedim uction d beno	e ew ent s, ds;	mate deve 50% frequ abse	erial, lopn of the lently	eposit incre nent; ne bot y; poo ue to depo	ased more ttom o ols alr subst	bar than chang nost antia	ging
	SCORE: 14 20 19 18				17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
5. Channel Flow Status Water reach lower banks, amount of change is a substrate in the substrate in the substrate is a substrate in the substrate in the substrate is a substrate in the substrate in					minim el		avail	able c annel	> 75% hannel substr	; or <2	5%	avai	er fills lable o subst osed.	hanne	el, and	/or	and	most	wate tly pre pools	esent		el
	SCORE: 18 substrate is 20 19				17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

		AT ASSESS	IVILIVI I	ILLU	DAIAS		ondition (41 JIK		AUL Z		
	Habitat Parameter	Opt	timal		S	uboptim	al		Margina			Poor	
	6. Channel Alteration	Channelizatio absent or min with normal p	imal; stre		present, bridge at of past cl dredging 20 yr) ma	annelizatio usually in a outments; e nannelizati , (greater t ay be preso annelizatio	areas of evidence ion, i.e., han past ent, but	extensive or shorin present of and 40 to	zation ma e; embanl g structur on both ba o 80% of s annelized	kments es anks; stream	or ceme the strea channeli disrupte habitat g	hored with nt; over 80 nm reach zed and d. Instrea greatly alte I entirely.	ow of m
	SCORE: 16	20 19	18 17	16	15 14	13	12 11	10 9	8	7 6	5 4	3 2	1 0
ng reach	7. Frequency of Riffles (or bends)	Occurrence of relatively frequency distance between continuous, public boundaries of the continuous, public boulders or of the continuous	uent; ration ween rifflest the digenerally that is nere rifflest lacement the large	s y 5 to key. s are of	infrequer between	nce of riffle nt; distance riffles divid of the stre 7 to 15.	e ded by	bottom c some ha between the width	nal riffle or ontours p bitat; dista riffles div of the str 15 to 25.	rovide ance ided by	shallow habitat; riffles div	y all flat w riffles; poo distance b rided by th ream is a	or between ne width
mpli	SCORE: 17	20 19	18 17	16	15 14	13	12 11	10 9	8	7 6	5 4	3 2	1 0
Parameters to be evaluated in sampling reach	8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; erosion or bar absent or min potential for fi problems. < ! affected.	nk failure iimal; little uture)	infrequer erosion r	ely stable; nt, small ar nostly heal bank in re erosion.	led over.	60% of bareas of	ely unstab ank in rea erosion; b ootential d	ach has nigh	areas; "r frequent sections obvious	e; many er aw" areas along stra and bend bank slou 6 of bank I Il scars.	aight ls; ghing;
ers to	SCORE: (LB) 4	Left Bank	10	9	8	7	6	5	4	3	2	1	0
mete	SCORE: (RB) 5	Right Bank	10	9	8	7	6	5	4	3	2	1	0
Parai	9. Vegetative Protection (score each bank)	More than 90 streambank s immediate rip covered by na vegetation, in understory sh woody macro vegetative disthrough grazi minimal or no almost all plai grow naturally	urfaces a arian zon ative cluding tr irubs, or r phytes; cruption ng or mov t evident; nts allowe	e ees, non- ving	surfaces vegetatic plants is represen evident b plant gro great ext one-half	ted; disrup out not affe wth potent ent; more of the pote oble heigh	y native class of stion cting full ial to any than ential	surfaces vegetation obvious; soil or cloud vegetation than one	of the street covered in the street covered	oy ion of bare oped in; less e	streamb covered disruption vegetation vegetation removed	n 50% of ank surfac by vegeta on of strea on is very on has bea I to 5 cent on average	ces ation; mbank high; en imeters
	SCORE: (LB) 4	Left Bank	10	9	8	7	6	5	4	3	2	1	0
	SCORE: (RB) 5 10. Riparian Vegetative Zone Width (score each bank riparian zone)	Right Bank Width of ripar meters; huma (i.e., parking I clear-cuts, lav have not impa	n activitie ots, roadl vns, or cr	es beds, ops)	18 meter	7 riparian zo s; human a acted zon /.	activities	12 meter activities	riparian z s; human have imp reat deal.		meters:	riparian z little or no on due to	riparian
	SCORE: (LB) 1	Left Bank	10	9	8	7	6	5	4	3	2	1	0
	SCORE: (RB) 1	Right Bank	10	9	8	7	6	5	4	3	2	1	0

STF	REAM NAME: Wolf R		LOCA	ATION	l: Do	wnstı	ream	of Ro	anoa	ke												
STF	REAM WDTH (FT): 2	0	DEP	TH (F	T): 1	1.5			PERE	NNIA	L 🖂	I	NTER	RMITT	ENT			EPH	EME	RAL		
STA	ATION #: W6		RIVI	ERMIL	E:				COU	NTY:	Fayet	te				ST	ATE:	: KY	7			
LAT	Γ:		LON	IG:					RIVE	R BAS	SIN: I	Centu	ıcky -	- Wol	f Run) Wat	ershe	ed				
CLI	ENT: LFUCG								PRO.	IECT	NO.	KY10	0-030									
INV	ESTIGATORS/CREW	': B. F	Remle	y / D.	Mille	r																
FO	RM COMPLETED BY:				DAT	E: 5/	17/201	11				ı	REAS	ON F	OR S	URV	EY:					
B. F	Remley											ı	Macro	oinve	rtebra	ate su	ırvey	for	319(h) gr	ant	
					TIME	: 030	00															
	Habitat						ı			Cond	lition	Cate	gory				1					
	Parameter		C	ptima	al			Su	boptir	nal			M	argin	al				Po	or		
	1. Epifaunal Substrate/ Available Cover	subs epifa fish (subr bank stab) to all pote	trate faunal cover; nergects, cob le habilow full ntial (i.	mix of l logs, ble or tat and l colon e., log	le for ation a snags underd	, cut ige is	habit color aded main preso subs newf prep	rat; we nizatio juate h tenan ence c trate ii all, bu ared fo rate a	x of sta Il suite n poten nabitat ce of p of addit n the fo t not your or color	d for funtial; for opulat ional orm of et	ions; n	habi less subs	tat; ha tat; ha than c strate t urbed	bitat a desiral reque	ivailab ole; ntly	ility	hab obv	itat; I	n 20% ack o subs g.	f habi	tat is	ble
	SCORE: 12	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
evaluated in sampling reach	2. Embeddedness	parti surro sedii cobb	cles ar ounded ment.	e 0-25 I by fin Layeri vides c	e		partio surro	cles ar	oble, and the control of the control	0%	lder	boul 75%		rticles	and are 5 by fin		part surr	icles	are n led by t.	nore t		
ted i	SCORE: 13	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Parameters to be evalua	3. Velocity/Depth Regime	regir deep deep	nes pro , slow), fast-	shallov		OW	preso	ent (if ing, so	ne 4 re fast-sh core lov ner reg	allow i wer tha		regir shal	mes po low or	esent slow-	abitat (if fas shallov re low	t- N	velo	city/o	ed by depth slow-	regin		
ımet	SCORE: 12	m.) 20 19 18 17 16					15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Para	4. Sediment Deposition	islan less affec	ds or p than 5	ooint ba % of the sedim	ement ars and ne bott nent	d	forma grave sedir botto	ation, el, san nent; ! om affe	increa mostly d or fir 5-30% ected; s in pool	from ne of the slight	oar	new sedi bars botto depo cons mod	grave ment of 30-5 om affo osits a strictio	I, sand on old 0% of ected; t obstr ns, an depos	ition of d or fin and no the sedim ruction d beno ition of	ne ew nent is, ds;	mat dev 50% freq abs	erial, elopr 6 of tl uentl ent d	eposition incre ment; he bo by; poo ue to t depo	ased more ttom o ols alr subst	bar than chang nost antia	ging
	SCORE: 11	20 19 18 17 16						14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	5. Channel Flow Status								> 75% hannel substr	; or <2	5%	avai	lable o	:hanne	% of the el, and are mo	/or	and	mos	e wate tly pre pools	esent		el
	SCORE: 15						15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

		AT ASSESS	.vı∟!¥!	ILLU	DAIAS		ondition (*1 JIK	LMIVIO, F	AUL Z		
	Habitat Parameter	Opt	timal		S	uboptim	al		Margina			Poor	
	6. Channel Alteration	Channelizatio absent or min with normal p	imal; stre		present, bridge at of past cl dredging 20 yr) ma	annelizatio usually in a outments; e nannelizati , (greater t ay be preso nannelizatio	areas of evidence ion, i.e., han past ent, but	extensive or shorin present of and 40 to	zation mage; embant g structur on both ba o 80% of s annelized	kments es anks; stream	or ceme the strea channeli disrupte habitat g	hored with nt; over 80 am reach zed and d. Instrea greatly alte d entirely.	0% of m
	SCORE: 15	20 19	18 17	16	15 14	13	12 11	10 9	8	7 6	5 4	3 2	1 0
ng reach	7. Frequency of Riffles (or bends)	Occurrence or relatively freq distance between divided by wire stream < 7:1 7); variety of lin streams who continuous, poulders or or natural obstruimportant.	uent; ration ween rifflest the digenerally that is nere rifflest lacement the large	s / 5 to key. s are of	infrequer between	nce of riffle nt; distance riffles divid of the stre 7 to 15.	e ded by	bottom c some ha between the width	nal riffle or ontours p bitat; dista riffles div of the str 15 to 25.	rovide ance ided by	shallow habitat; riffles div	ly all flat w riffles; poo distance b vided by th ream is a i	or etween ne width
mpli	SCORE: 14	20 19	18 17	16	15 14	13	12 11	10 9	8	7 6	5 4	3 2	1 0
Parameters to be evaluated in sampling reach	8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; erosion or bar absent or min potential for fr problems. < ! affected.	nk failure iimal; little uture	è	infrequer erosion r	ely stable; nt, small ar nostly heal bank in re erosion.	led over.	60% of bareas of	ely unstab ank in rea erosion; b potential d	ach has nigh	areas; "r frequent sections obvious	e; many er aw" areas along stra and bend bank slou 6 of bank h Il scars.	aight s; ghing;
ers t	SCORE: (LB) 8	Left Bank	10	9	8	7	6	5	4	3	2	1	0
mete	SCORE: (RB) 7	Right Bank	10	9	8	7	6	5	4	3	2	1	0
Para	9. Vegetative Protection (score each bank)	More than 90 streambank s immediate rip covered by na vegetation, in understory sh woody macro vegetative disthrough grazi minimal or no almost all plai grow naturally	urfaces a arian zon ative cluding tr irubs, or r phytes; cruption ng or mov t evident; nts allowe	ees, non- wing	surfaces vegetatic plants is represen evident b plant gro great ext one-half	ted; disrup out not affe wth potent ent; more of the pote oble heigh	y native class of stion cting full ial to any than ential	surfaces vegetation obvious; soil or cloud vegetation than one	of the street covered in covered	by tion of bare oped on; less e	streamb covered disruptic vegetation vegetation removed	in 50% of ank surface by vegeta on of stread on is very on has been to 5 cent n average	ces ation; mbank high; en imeters
	SCORE: (LB) 8	Left Bank	10	9	8	7	6	5	4	3	2	1	0
	SCORE: (RB) 7 10. Riparian Vegetative Zone Width (score each bank riparian zone)	Right Bank Width of ripar meters; huma (i.e., parking I clear-cuts, lav have not impa	n activitie ots, roadl vns, or cr	es beds, ops)	18 meter	7 riparian zo s; human a acted zon /.	activities	12 meter activities	riparian z rs; human have imp reat deal.	acted	meters:	riparian z little or no on due to	riparian
	SCORE: (LB) 1	Left Bank	10	9	8	7	6	5	4	3	2	1	0
	SCORE: (RB) 2	Right Bank	10	9	8	7	6	5	4	3	2	1	0

STF	REAM NAME: Big Elr		LOCA	ATION	l: Soi	uth o	f Harı	odsb	urg F	₹d												
STF	REAM WDTH (FT): 2	0	DEP	TH (F	T): 1	1.5			PERE	NNIA	L 🗆	I	NTER	RMITT	ENT			EPH	IEME	RAL		
STA	ATION #: W11		RIVI	ERMIL	E:				COU	NTY:	Fayet	te				ST	ATE:	KY	,			
LAT	Γ:		LON	IG:					RIVE	R BAS	SIN: I	Centu	ıcky -	- Wol	f Run) Wat	ershe	ed				
CLI	ENT: LFUCG								PRO.	IECT	NO.	KY10	0-030									
INV	ESTIGATORS/CREW	': B. F	Remle	y / D.	Mille	r																
FO	RM COMPLETED BY:				DAT	E: 5/	18/201	11				ı	REAS	ON F	OR S	URV	EY:					
B. F	Remley											ı	Macro	oinve	rtebra	ate su	ırvey	for	319(h) gr	ant	
					TIME	: 090	00															
	Habitat						ı			Cond	lition	Cate	gory									
	Parameter		C	ptima	al			Su	boptir	nal			M	argin	al				Po	or		
	1. Epifaunal Substrate/ Available Cover	subs epifa fish o subn bank stabl to all pote	strate fa nunal c cover; nergec ss, cob le habi low full ntial (i. are <u>no</u>	mix of l logs, ble or tat and l colon e., log	le for ation a snags underd	, cut ige is	habit color adeq main preso subs newf prep	at; we nizatio juate h tenan- ence c trate ii all, bu ared fo rate a	x of sta ell suite n poten nabitat ce of p of addit n the fo t not you or color	d for funtial; for opulati ional orm of et	ions; n	habi less subs	tat; ha than c strate f urbed c	bitat a desiral reque	ivailab ole; ntly	ility	hab obvi	itat; I	n 20% ack o subs g.	f habi	tat is	ble
	SCORE: 13	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
evaluated in sampling reach	2. Embeddedness	parti surro sedir cobb	cles ar ounded ment.	e 0-25 I by fin Layeri vides c	e		partio	cles ar ounded	oble, a re 25-5 d by fin	0%	lder	boul 75%		rticles	and are 5 by fin		part surr	icles	are n led by t.	nore t		
ted i	SCORE: 14	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Parameters to be evalua	3. Velocity/Depth Regime	regir deep deep	nes pro o, slow o, fast-	shallov		OW	preso	ent (if ing, so	ne 4 re fast-sh core lov ner reg	allow i wer tha		regir shal	low or	esent slow-	abitat (if fas shallov re low)	t- N	velo	city/	ed by depth slow-	regin		
amel	SCORE: 10	20						14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Para	4. Sediment Deposition	islan less affec	ds or p than 5	ooint ba % of the sedim	ement ars and ne bott nent	d	forma grave sedir botto	ation, el, san nent; ! m affe	increa mostly nd or fir 5-30% ected; s in pool	from ne of the slight	oar	new sedi bars botto depo cons mod	grave ment of 30-5 om affo osits a strictio	I, sand on old 0% of ected; t obstr ns, an depos	ition of d or find and no the sedim suction d beno ition of	ne ew nent is, ds;	mate developed 50% freq abse	erial, elopr 6 of t uent ent d	eposit incre ment; he bo ly; pool ue to t depo	ased more ttom o ols alr subst	bar than chang nost antia	ging
	SCORE: 15	20 19 18 17 16					15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	5. Channel Flow Status	el Flow Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.						able c	> 75% hannel substr	; or <2	5%	avai	lable o	:hanne	% of the el, and are mo	/or	and	mos	e wate tly pre pools	esent		el
	SCORE: 13						15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

		AT ASSESS	IVILIVI I	ILLU	DATAS		ondition (LMIVIO, F	AUE Z		
	Habitat Parameter	Opt	imal		S	uboptima		1	Margina			Poor	
	6. Channel Alteration	Channelizatio absent or min with normal p	imal; stre		present, bridge at of past c dredging 20 yr) ma	annelizatio usually in a putments; e hannelizati , (greater t ay be prese nannelizatio	areas of evidence on, i.e., han past ent, but	extensiv or shorin present and 40 to	ization ma e; embank ng structur on both ba o 80% of s annelized	es enks; anks;	or ceme the strea channeli disrupte habitat g	hored with nt; over 80 nm reach zed and d. Instrea reatly alte I entirely.	0% of m
	SCORE: 12	20 19	18 17	16	15 14	13	12 11	10 9	8	7 6	5 4	3 2	1 0
ng reach	7. Frequency of Riffles (or bends)	Occurrence or relatively freq distance betwo divided by wick stream < 7:1 or 7); variety of land streams who continuous, produlders or of natural obstruimportant.	uent; ration een riffle: Ith of the (generally nabitat is here riffles her large	s / 5 to key. s are of	infrequer between	nce of rifflent; distance riffles divid of the stre 7 to 15.	led by	bottom of some had between the width	nal riffle or contours p ibitat; dista riffles div n of the str 15 to 25.	rovide ance ided by	shallow habitat; riffles div	y all flat w riffles; poo distance b rided by th ream is a r	or etween ne width
mplii	SCORE: 16	· .	18 17	16	15 14	13	12 11	10 9	8	7 6	5 4	3 2	1 0
Parameters to be evaluated in sampling reach	8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; erosion or bar absent or min potential for fu problems. < ! affected.	nk failure imal; little uture)	infrequer erosion r	ely stable; nt, small ar nostly heal bank in re erosion.	ed over.	60% of bareas of	ely unstab pank in rea erosion; h potential d	ich has iigh	areas; "r frequent sections obvious	e; many er aw" areas along stra and bend bank slou 5 of bank h Il scars.	aight s; ghing;
ers to	SCORE: (LB) 7	Left Bank	10	9	8	7	6	5	4	3	2	1	0
mete	SCORE: (RB) 8	Right Bank	10	9	8	7	6	5	4	3	2	1	0
Para	9. Vegetative Protection (score each bank)	More than 90' streambank s immediate rip covered by na vegetation, in understory sh woody macro vegetative dis through grazi minimal or no almost all plan grow naturally	urfaces a arian zon ative cluding tr rubs, or r phytes; ruption ng or mov t evident; nts allowe	ees, non- wing	surfaces vegetatic plants is represen evident t plant gro great ext one-half	ted; disrup out not affe wth potent ent; more t of the pote oble height	y native class of tion cting full ial to any han ntial	surfaces vegetation obvious; soil or cl vegetation than one potential	of the street covered lon; disrupt patches cosely cropen commoe-half of the plant stule emaining.	oy ion of bare oped n; less e	streamb covered disruptio vegetation vegetation removed	n 50% of tank surface by vegeta n of streau on is very on has been average	ees tion; mbank high; en imeters
	SCORE: (LB) 6	Left Bank	8	7	6	5	4	3	2	1	0		
	SCORE: (RB) 7 10. Riparian Vegetative Zone Width (score each bank riparian zone)	Right Bank Width of ripar meters; huma (i.e., parking I clear-cuts, lav have not impa	n activitie ots, roadl vns, or cr	es beds, ops)	18 meter	riparian zo s; human a pacted zone /.	activities	12 meter activities	riparian z rs; human s have imp reat deal.		meters:	riparian zo little or no on due to l	riparian
	SCORE: (LB) 1	Left Bank	10	9	8	7	6	5	4	3	2	1	0
	SCORE: (RB) 2	Right Bank	10	9	8	7	6	5	4	3	2	1	0

STF	STREAM NAME: Wolf Run									ATION	l: Do	wnstı	ream	of Ro	semo	ont G	arde	n				
STF	REAM WDTH (FT): 1	0	DEP	TH (F	T): (0.83			PERE	NNIA	L 🔲	I	NTER	RMITT	ENT			EPH	EME	RAL		
STA	ATION #: W11		RIVI	ERMIL	E:				COU	NTY:	Fayet	te				ST	ATE:	KY	,			
LAT	Γ:		LON	IG:					RIVE	R BAS	SIN: H	Centu	ıcky -	- Wol	f Run	Wate	ershe	ed				
CLI	ENT: LFUCG								PRO.	IECT	NO.	KY10	0-030									
INV	ESTIGATORS/CREW	': B. F	Remle	y / D.	Mille	r																
FO	RM COMPLETED BY:				DAT	E: 5/	18/201	11				ı	REAS	ON F	OR S	URV	EY:					
B. F	Remley											ı	Macro	oinve	rtebra	ate su	ırvey	for	319(h) gr	ant	
					TIME	: 110	00															
	Habitat						ı			Cond	lition	Cate	gory				1					
	Parameter		C	ptima	al			Su	boptir	nal			M	argin	al				Po	or		
	1. Epifaunal Substrate/ Available Cover	subs epifa fish (subr bank stab) to all pote	strate fa nunal c cover; nergec ss, cob le habi low full ntial (i. are <u>no</u>	mix of l logs, ble or tat and l colon e., log	le for ation a snags under	, cut ige is	habit color aded main preso subs newf prep	rat; we nizatio juate h tenan ence c trate ii all, bu ared fo rate a	x of sta ell suite n poten nabitat ce of p of addit n the fo t not you or color	d for funtial; for opulati ional orm of et nizatio	ions; n	habi less subs	tat; ha tat; ha than c strate f urbed c	bitat a desirat reque	ivailab ole; ntly	ility	hab obv	itat; I	n 20% ack o subs g.	f habi	tat is	
	SCORE: 11	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
evaluated in sampling reach	2. Embeddedness	e 0-25 I by fin Layeri	ie		partio	cles ar ounded	oble, a re 25-5 d by fin	0%	lder	boul 75%	vel, co der pa surro ment.	rticles	are 5		part surr	icles	are n led by t.	nore t				
ted i	SCORE: 11	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Parameters to be evalua	3. Velocity/Depth Regime	regir deep deep	nes pro o, slow o, fast-	shallov		OW	preso	ent (if ing, so	ne 4 re fast-sh core lov ner reg	allow i wer tha		regir shal	/ 2 of t mes pr low or missin	esent slow-	(if fas shallov	N	velo	city/o	ed by depth slow-	regin		
ımet	SCORE: 10	20						14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Para	4. Sediment Deposition	islan less affec	ds or p than 5	ooint ba % of the sedim	ement ars and ne bott nent	d	forma grave sedir botto	ation, el, san nent; ! om affe	increa mostly nd or fir 5-30% ected; s in pool	from ne of the slight	oar	new sedi bars botto depo cons mod	erate grave ment of 30-50 m afformation derate sprey	I, sand on old 0% of ected; t obstr ns, an depos	d or fin and no the sedim ruction d beno	ew nent s, ds;	mat dev 50% freq abs	erial, elopr 6 of tl uentl ent d	eposition incre ment; he bo by; poo ue to t depo	ased more ttom o ols alr subst	bar than chang nost antia	ging
	SCORE: 16	20 19 18 17 16						14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	5. Channel Flow Status Water reaches base of boliower banks, and minimal amount of channel substrate is exposed.						avail	able c annel	> 75% hannel substr	; or <2	5%	avai	er fills lable o subst osed.	:hanne	el, and	/or	and	mos	e wate tly pre pools	esent		el
	SCORE: 17 20 19 18					16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

		11 A33E33	ESSMENT FIELD DATA SHEET — HIGH GRADIENT STREAMS, PAGE 2 Condition Category												
	Habitat Parameter	Optimal			S	uboptima	al		Margina		Poor				
	6. Channel Alteration	Channelizatio absent or min with normal p		present, bridge at of past cl dredging 20 yr) ma	annelizatio usually in a outments; e nannelizati , (greater t ay be prese annelizatio	areas of evidence on, i.e., han past ent, but	extensiv or shorin present and 40 to	ization ma e; embanl ng structur on both ba o 80% of s annelized	es enks; anks;	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
	SCORE: 5	20 19	18 17	16	15 14	13	12 11	10 9	8	7 6	5 4	3 2	1 0		
ng reach	7. Frequency of Riffles (or bends)	Occurrence or relatively freq distance betwood divided by wick stream < 7:1 (7); variety of land streams who continuous, proposed boulders or of natural obstruimportant.	uent; ration ween rifflet of the generally mabitat is mere rifflet were large	s y 5 to key. s are of	infrequer between	nce of rifflent; distance riffles divident of the streent to 15.	led by	bottom of some had between the width	nal riffle or contours p ibitat; dista riffles div n of the str 15 to 25.	rovide ance ided by	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ration of > 25.				
mpli	SCORE: 6	20 19	18 17	16	15 14	13	12 11	10 9	8	7 6	5 4	3 2	1 0		
Parameters to be evaluated in sampling reach	8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.			infrequer erosion r	ely stable; nt, small ar nostly heal bank in re erosion.	ed over.	60% of bareas of	ely unstab pank in rea erosion; h potential d	ich has iigh	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.				
ers to	SCORE: (LB) 9	Left Bank	10	9	8	7	6	5	4	3	2	1	0		
mete	SCORE: (RB) 9	Right Bank	10	9	8	7	6	5	4	3	2	1	0		
Para	9. Vegetative Protection (score each bank)	More than 90 streambank s immediate rip covered by na vegetation, in understory sh woody macro vegetative disthrough grazi minimal or no almost all plan grow naturally	urfaces a arian zon ative cluding tr rubs, or r phytes; ruption ng or mov t evident; nts allowe	e ees, non- ving	surfaces vegetation plants is represent evident be plant ground great ext one-half	ted; disrup out not affe wth potent ent; more to of the pote oble height	y native class of tion cting full ial to any han ntial	surfaces vegetation obvious; soil or cl vegetation than one potential	of the street covered lon; disrupt patches cosely crop on commo e-half of the plant stutemaining.	oy ion of bare oped n; less e	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.				
	SCORE: (LB) 1	Left Bank	10	9	8	7	6	5	4	3	2	1	0		
	SCORE: (RB) 3 10. Riparian Vegetative Zone Width (score each bank riparian zone)	Right Bank 10 9 Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.			18 meter	7 riparian zo s; human a acted zono	activities	12 meter activities	riparian z rs; human s have imp reat deal.		2 1 0 Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.				
	SCORE: (LB) 1	Left Bank	10	9	8	7	6	5	4	3	2	1	0		
	SCORE: (RB) 1	Right Bank	10	9	8	7	6	5	4	3	2	1	0		





W-2 Algae



W-2 Downstream



W-2 Left Descending Bank



W-2 Riffle



W-2 Right Descending Bank



W-2 Root wad



W-2 Run



W-2 Spring



W-2 Upstream



W-4 Bedrock Substrate



W-4 Downstream



W-4 Eroding Left Descending Bank



W-4 Left Descending Bank



W-4 Left Descending Bank Erosion



W-4 Riffle



W-4 Right Descending Bank



W-4 Right Descending Bank



W-4 Sediment Deposition



W-4 Shallow Root wad



W-4 Upstream



W-5A Confluence



W-5A Downstream



W-5A Left Descending Bank



W-5A Left Descending Bank



W-5A Right Descending Bank



W-5A Right Descending Bank



W-5A Upstream



W-6 Downstream



W-6 Left Descending Bank



W-6 Riffle



W-6 Right Descending Bank



W-6 Upstream



W-6 Upstream View from Downstream End



W-11 Downstream



W-11 Downstream from Upper Limit



W-11 Lower Right Descending Bank



W-11 Pool

W-11 Riffle



W-11 Right Descending Bank



W-11 Upper Limit



W-11 Upstream



W-12 Downstream



W-12 Left Descending Bank

W-12 Riffle



W-12 Over-hanging Vegetation



W-12 Right Descending Bank



W-12 Upstream

APPENDIX D – HABITAT RESULTS FROM FRIENDS OF WOLF RUN AND THIRD ROCK CONSULTANTS

Segment ID	Stream	Location	Date	Time	Sampler	Latitude	Longitude	EpiFauSub	Vel-DepRegime	SedDep	ChanFlowS	FreqOfRiffles ChanAlter	BankSta-LB	BankSta-RB	BankVegP-LB	BankVegP-RB	RipVegZW-LB	l otal	Wadeable	Rating	Picture File Names
1A1	Wolf Run	Nuti Property upstream of Mouth	7/9/2011	2:00 PM	K Cooke	38.070040	-84.554356	7 7	9	15	17	9 18	3 9	9	8	8	5 5	5 12	6 W	Fair	1A-Downstream-OldFrankfortPike (2).JPG
1A2 - W1	Wolf Run	Wolf Run at Mouth	5/12/11	11:30 AM	E Hartowicz	38.067303	-84.554182	15 10	13	10	17	15 17	7 5	3	2	2	2 2	2 11	3 W	Poor	
1B	Wolf Run	Upstream of Commerce Drive	7/9/2011	1:30 PM	K Cooke	38.061035	-84.549440	7 3	9	7	17	2 12	2 7	7	7	7	4 5	5 94	1 W	Poor	1B-upstream-commercedr.JPG
1C	Wolf Run	Valley Park downstream to Vaughns Bra	7/13/2011	3:00 PM	J Anderson	38.054630	-84.550395	6 1	2 10	13	18	8 12	2 5	3	8	8	4 4	1 11	1 W	Poor	1C-Wolfs Run @ Valley Park - Copy.jpg
1D	Wolf Run	Cambridge Drive to New Circle Rd.	9/11/2011	6:21 PM	K Cooke	38.050097	-84.551389	6 1	2 9	12	10	8 12	2 8	8	6	6	3 3	3 10	3 H	Poor	1D-WolfRun-below-CardinalRun.jpg
1E1 - W6	Wolf Run	Downstream of Roanoake	5/17/11	3:00 PM	B Remley / D Miller	38.045274	-84.550661	12 13	3 12	11	15	15 14	1 8	7	8	7	1 2	2 12	5 H	Poor	
1E2	Wolf Run	Sample site W6 at labyrinth upstream	5/28/2011	11:25 AM	W Havens	38.045370	-84.550740	9 1	3 10	15	16	13 17	7 5	6	4	5	2 3	3 11	8 H	Poor	DSC1021.jpg
1E2	Wolf Run	Sample site W6 at labyrinth upstream	5/28/2011	11:25 AM	B Bell	38.045370	-84.550740	8 14	1 10	12	18	11 18	3 4	5	3	5	2 5	5 11	5 H	Poor	DSC1024.jpg,DSC1025.jpg
1E3	Wolf Run	Above swim hole behind Wolf Run Park	5/28/2011	12:20 PM	W Havens	38.043260	-84.549400	8 1	1 7	15	17	14 2	4	5	5	6	2 2	2 98	3 H	Poor	DSC1033.jpg
1E3	Wolf Run	Above swim hole behind Wolf Run Park	5/28/2011	12:20 PM	B Bell	38.043260	-84.549400	9 1	6	12	18	11 1	3	4	5	5	2 2	2 88	3 H	Poor	DSC1035.jpg
1F	Wolf Run	Furlong Drive Greenway	10/10/2011	3:26 PM	K Cooke	38.032454	-84.541169	12 1	5 12	13	14	8 18	3 7	9	7	7	8 7	7 13	7 H	Poor	1F-FurlongDrGreenway.JPG
1G1	Wolf Run	Clays Mill Greenway, Clays Mill Rd	9/13/2011	5:00 PM	B Hutcheson	38.026559	-84.531788	2 9	2	7	2	1 7	4	3	5	3	4 2	2 5	1 H	Poor	1G-WolfRun-ClaysMillGreenway.JPG
1G1	Wolf Run	Clays Mill Greenway, Clays Mill Rd	9/13/2011	5:00 PM	K Cooke	38.026559	-84.531788	3 12	2 2	8	0	2 14	1 7	4	5	3	4 ′	1 6	5 H	Poor	1G-WolfRun-ClaysMillGreenway.JPG
1G2 - W12	Wolf Run	Downstream of Rosemont Garden	5/18/11	11:00 AM	B Remley / D Miller	38.022932	-84.528581	11 1	1 10	16	17	5 6	9	9	1	3	1 '	1 10	0 H	Poor	
1H	Wolf Run	Behind Good Food co-op	8/1/2011	5:50 PM	J Anderson	38.020503	-84.527086	2 5	1	20	6	0 0	10	10	0	0	0 () 54	4 H	Poor	1H behind GFco-op (2).jpg
1J1	Wolf Run	Near Railroad Crossing and tunnel	8/1/2011	4:45 PM	J Anderson	38.015858	-84.522662	3 5	6	4	6	8 3	3	3	7	2	2 ′	1 53	3 H	Poor	1J North section next to RR (4).jpg
1J2	Wolf Run	Parallel to Southland Dr.	8/1/2011	5:25 PM	J Anderson	38.014803	-84.522330	1 5	1	19	16	0 0	10	10	0	0	0 (62	2 H	Poor	1J on Southland.jpg
2A - W2	McConnell Br	Preston Cave	5/17/11	11:30 AM	B Remley / D Miller	38.057333	-84.542169	12 1	2 13	13	17	18 16	6	8	8	9	8 9	9 14	9 H	Fair	
2A	McConnell Br	Prestons Cave Spring Park	5/23/2011	5:41 PM	J Watts	38.057146	-84.542509	10 4	- 11	5	14	18 19	8 (9	8	8	9 9	13	2 H	Poor	2A-Prestons Cave Spring (2) - Copy.jpg
2B	McConnell Br	McConnell Springs Park	10/6/2011	9:44 AM	K Cooke	38.054348	-84.531181	18 6	15	8	15	18 19	9	9	9	9	9 9	15	3 H	Fair	2B-McConnellsSp04.JPG
3A 1- W4	Vaughns Br	Conf with Wolf Run	5/17/11	2:00 PM	B Remley / D Miller	38.054904	-84.549624	8 1	10	13	15	15 18	3 5	7	5	7	2 3	3 12	2 H	Poor	
3A2	Vaughn's Br	Sample site W4 and upstream	5/28/2011	3:30 PM	W Havens	38.054990	-84.549880	13 1:	3 11	17	13	17 17	7 5	7	6	6	4 4	1 13	3 H	Poor	DSC1037.jpg,DSC1038.jpg
3A2	Vaughn's Br	Sample site W4 and upstream	5/28/2011	3:30 PM	B Bell	38.054990	-84.549880	15 1	5 11	17	13	14 18	3 2	6	6	6	5 4	1 13	2 H	Poor	DSC1040.jpg
3C1	Vaughn's Br	Behind Cardinal Hill Hospital	6/5/2011	2:00 PM	j Anderson	38.046660	-84.539850	5 5	2	2	3	2 1	5	4	9	3	8 ′	1 50	Н	Poor	3c Versailes rd to Summerville dr (8).JPG
3C2	Vaughn's Br	Pine Meadow Park	7/21/2011	3:35 PM	J Anderson	38.045075	-84.536936	13 1	1 1	9	3	14 0	2	2	9	9	2 2	2 7	7 H	Poor	3C-Pine Meadow Park (11).jpg
3D	Vaughn's Br	Picadome Golf Course	7/21/2011	2:45 PM	J Anderson	38.037597	-84.525697	3 1	4 8	14	7	15 3	2	2	3	3	0 (74	4 H	Poor	3D-PicadomeGolfCourse13.jpg
3E	Vaughn's Br	Next to Ky Clinic from fence to underground	7/21/2011	2:00 PM	J Anderson	38.037372	-84.522060	1 1	3 1	15	8	2 1	2	5	1	1	0 (53	3 H	Poor	3E-Ky Clinic, Harrodsburg Rd (7).JPG
3F	Vaughns Br	Simpson Ave Stormwater Structure	7/9/2011	10:00 AM	K Cooke	38.033692	-84.514507	6 7	4	7	7	1 9	7	7	2	2	1 '	1 6	1 H	Poor	3F-Simpson-Ave.JPG
4A	Big Elm Trib	Picadome Golf Course	10/10/2011	11:10 AM	K Cooke	38.035575	-84.526831	5 5	0	8	0	8 8	5	2	5	2	1 '	1 50) H	Poor	4A-PicadomeSinkHoleTrib3.JPG
4B1 - W11	Big Elm Trib	Upstream of Harrodsburg Rd	5/18/11	9:00 AM	B Remley / D Miller	38.031245	-84.526027	13 14	1 10	15	13	12 16	3 7	8	6	7	7 2	2 13	0 H	Poor	
4B1	Big Elm Trib	Behind Bob-o-link Dr behind Fire Station	6/16/2011	11:30 AM	B Radcliffe	38.0277	-84.5231	16 9	8	13	9	13 17	5	5	7	7	2 2	2 11	3 H	Poor	4B-BigElm-Bob-o-Link2.JPG
4B2	Big Elm Trib	Near LaFayette High School	6/16/2011	12:00 PM	B Radcliffe	38.0291	-84.5242	14 1	1 10	11	11	10 17	6	6	7	7	2 5	5 11	7 H	Poor	4B-BigElm-Bob-o-Link6.JPG
4C	Big Elm Trib	University to Nicholasville Rd	6/16/2011	10:30 AM	B Radcliffe	38.0219	-84.511	7 7	5	12	17	5 7	7	2	3	1	1 (74	4 H	Poor	4C-BigElm-1.JPG
5A1	Cardinal Run	Devonport Dr. bridge to behind apts.	7/6/2011	8:00 PM	J Anderson	38.048340	-84.535850	10 8	9	11	13	10 15	5 2	4	7	5	1	1 96	6 H	Poor	5A-Devonport Dr (5).jpg
5A2 - W5A	Cardinal Run	Below Parkers Mill Rd	5/17/11	4:30 PM	B Remley / D Miller	38.043212	-84.557131	10 12	2 10	14	18	16 17	7 4	5	4	5	1	1 11	7 H	Poor	
5B1	Gardenside Trib	Cross Keys and Parkers Mill Rd.	9/13/2011	4:31 PM	B Hutcheson	38.042966	-84.557147	9 7	13	14	16	9 16	6	6	7	7	1	1 11	2 H	Poor	
5B1	Gardenside Trib	Cross Keys and Parkers Mill Rd.	9/13/2011	4:31 PM	K Cooke	38.042966	-84.557147	14 7	14	13	12	8 16	6	4	8	8	1 () 11	1 H	Poor	
5B2	Cardinal Run	Chinquapin Lane	9/13/2011	4:00 PM	B Hutcheson	38.040002	-84.560043	14 7	10	6	14	15 9	8	5	8	5	8 2	2 11	1 H	Poor	5B-WilliamsburgEstates02.JPG
6A1	Gardenside Trib	Cross Keys Park Upstream of Pond	9/13/2011	3:24 PM	B Hutcheson	38.038278	-84.555382	14 9	8	9	14	13 17	7 4	4	5	5	2 2	2 10	6 H	Poor	6-GardensideBr-CrossKeysPark1.JPG
6A2	Gardenside Trib	Darien Drive	9/13/2011	3:11 AM	B Hutcheson	38.037292	-84.555116	7 9	7	6	12	0 4	8	8	1	1	0 (63	3 H	Poor	6-DarinDriveUpstream.JPG

