BIOLOGICAL MONITORING PROGRAM EXPANSION: GREEN RIVER BASIN

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Executive Summary

In 2001, the Ecological Support Section of the Kentucky Division of Water (KDOW) focused on a basinwide watershed monitoring effort in the Green River Basin. The main objectives of this study were (a) establish approximately 30 new sites in the Green River basin, (b) comparing resulting biological data to KDOW reference reach sites to determine if the aquatic communities deviated from expected conditions, (c) developed baseline databases for biological data, (d) identify biological indicators that are sensitive to, and/or specific for, nonpoint source (NPS) pollution impacts such as siltation and nutrient enrichment, and (e) identify sites that are the most severely impacted by NPS pollution so that resources can be directed toward remediation of those impacts. While this project will be managed by ESS, biological sampling and analysis was contracted through Western Kentucky University (WKU).

I. Introduction

Within the past several decades biological monitoring, or biomonitoring for short, has become a common method of assessing water quality of streams and rivers (Rosenberg and Resh, 1993). Physical and chemical parameters, such as pH, turbidity, and nutrient concentrations, are commonly measured. Yet time- and point-specific data may not reveal water quality conditions averaged over longer temporal periods (i.e., one year) (Barbour et al., 1999). Therefore, biomonitoring is often preferred because of the ability of aquatic biota to assimilate cumulative effects of multiple environmental stressors (Ohio EPA, 1999). Biomonitoring using algae, fish or macroinvertebrates are relatively inexpensive and results may be obtained more quickly than by testing physical and chemical parameters (Barbour et al., 1999).

Water quality in the Green River Basin, Kentucky, U.S.A., has been historically monitored through a limited ambient monitoring program. The Kentucky Watershed Management Framework increased the number of monitoring sites within the basin in 2001. The Kentucky Division of Water (KDOW) has initiated, also under the watershed management approach, an effort to increase aquatic life use assessments in more streams and focused monitoring efforts during 2001 throughout the Green River basin. At that time, the Ecological Support Section (ESS) of KDOW had only 15 biological monitoring program (BMP) sites in the basin. Several subbasins in the Green River Basins are listed as high-priority, non-point source (NPS) impacted. The Green River Basin covers a large area and contains more streams than KDOW staff can monitor. Expansion of this monitoring network was deemed necessary in order to effectively identify priority watersheds impacted by NPS.

Increasing the number of sampling stations in the biological monitoring network was launched to ensure a more valid and thorough identification of biological indicators of NPS pollution and thusly enable the KDOW to more accurately assess and monitor the effects of siltation, nutrient enrichment, pesticides, and other pollution on aquatic communities. These data are necessary for effectively documenting NPS impacts and subsequently targeting NPS remediation efforts.

The Green River Basin has been divided into eleven-digit hydrological units by KDOW. These are the watershed units that KDOW has selected for placement of basinwide monitoring stations. Some of those segments are portions of the Green River mainstem, and the remainder is generally fourth-order or greater stream segments. In the summer of 2001 several agencies, including ESS and Western Kentucky University (WKU), collaborated on a watershed-scale bioassessment of both basins using macroinvertebrates and fish. Through this joint effort, all the major stream reaches were sampled, and specifically, 30 of the fourth-order and above segments were sampled by WKU.

The general purpose of this study was two-fold: (1) expand the number of monitoring sites by 30 and use the resulting macroinvertebrate and fish data to assess stream usage, extrapolate the results to cover the entire watershed, and estimate NPS impacts on streams throughout the study area, and (2) attempt to pinpoint sources of NPS impacts.

More specifically, the resulting biological data from these sites will compared to KDOW reference reach sites to determine if the aquatic communities deviate from expected conditions, develop baseline databases for macroinvertebrate data, identify biological indicators that are sensitive to, and/or specific for, NPS impacts such as siltation and nutrient enrichment, and identify sites that are the most severely impacted by NPS pollution so that resources can be directed toward remediation of these impacts. IN addition, the data will also be supplied to the River Basin Management team to make decisions on where to target resources for further monitoring, used by KDOW to make permitting decisions in the watershed, used by KDOW in preparing the Kentucky 305(b) Report to Congress on Water Quality and determining 303(d) listings, and used by the NPS section of KDOW to determine priority watersheds.

II. Description of Study Area

General Description

The Green River Basin drains 23,906 km^2 of the Interior Plateau and Interior Valley and Hills Level III Ecoregions. The Green River eventually drains into the Ohio River and the basin is impacted by a variety of land use practices including agriculture, coal mining, oil drilling, and forest and commercial use (Burr & Warren, 1986). The impact of these practices on stream quality within this basin, however, has not been studied in great detail.

Macroinvertebrate and Fish Sampling Sites

In total, 30 wadable streams sites (Tables I-III) were sampled for benthic macroinvertebrates and fish. In particular, 25 high-gradient stream sites and 5 low-gradient stream sites were assessed by WKU using standard biomonitoring procedures according to KDOW Methods for Assessing Biological Integrity of Surface Waters (KDEP, 1993) and Barbour et al. (1999).

Table I. General location data for 30 stream sites in the Green River Basin.

Stream name	Site code	County	Location
Glens Fork, Russell Creek	GRBEX-01	Adair	6 km SE Columbia
Russell Creek	GRBEX-02	Adair	1 km E Columbia
Butlers Fork, Russell Creek	GRBEX-03	Adair	Bliss
Sulphur Creek	GRBEX-04	Adair	6 km ENE Columbia
Pettys Fork, Russell Creek	GRBEX-05	Adair	3.5 km E Columbia
Big Creek	GRBEX-06	Adair	Gradyville
Poplar Grove Branch, Upper Brush Creek	GRBEX-07	Taylor	14 km SE Buffalo
Upper Brush Creek	GRBEX-08	Taylor	14 km SE Buffalo
Big Reedy Creek	GRBEX-09	Butler	4 km NNW Roundhill
Claylick Creek	GRBEX-10	Warren	3 km W Riverside
Wolf Lick Creek	GRBEX-11	Logan	3 km W Lewisburg
Indian Camp Creek	GRBEX-12	Butler	9 km N Morgantown
Bat East Creek	GRBEX-13	Muhlenberg	8.5 km SE Greenville
Plum Creek	GRBEX-14	Muhlenberg	1 km NW Drakesboro
Lewis Creek	GRBEX-15	Ohio	2 km NE Rockport
Caney Creek	GRBEX-16	Grayson	10.5 km W Caneyville
Caney Creek	GRBEX-17	Ohio	2 km NE Horse Branch
McGrady Creek	GRBEX-18	Ohio	16 km WNW Caneyville
Muddy Creek	GRBEX-19	Ohio	19.5 km WNW Caneyville
Deserter Creek	GRBEX-20	Daviess	6 km SW Whitesville
South Fork Panther Creek	GRBEX-21	Daviess	8.5 km SW Whitesville
East Fork Pond River	GRBEX-22	Muhlenberg	7 km N Kirkmansville
Buck Fork Pond River	GRBEX-23	Christian	5 km SW Kirkmansville
Buck Creek	GRBEX-24	Christian	1 km E Fearsville
Jarrels Creek	GRBEX-25	Muhlenberg	7 km SE White Plains
East Branch West Fork Pond River	GRBEX-26	Christian	7.5 km SE Crofton
unnamed tributary to Elk Pond Creek	GRBEX-27	Muhlenberg	10.5 km WSW Greenville
Craborchard Creek	GRBEX-28	Hopkins	4 km SSW Nortonville
Pleasant Run	GRBEX-29	Hopkins	Nortonville
Flat Creek	GRBEX-30	Hopkins	3 km NE Mortons Gap

Table II. Hydrologic and specific location data for 30 stream sites in the Green River Basin. 71a = Interior Plateau (IP)/Crawford Mammoth Cave Uplands; 71g = IP/Eastern Highland Rim; 72c = Interior River Valley and Hills (IRVH)/Green River-Southern Wabash Lowlands; 72h = IRVH/Caseyville Hills. See Table I for site code information. Sites organized as in Table I.

Site code	Latitude	Longitude	Level IV Ecoregion	Strahler Order	Distance to source (km)	Basin area (km^2)
GRBEX-01	37.0520	85.2643	71g	3	7.79	5.92
GRBEX-02	37.1053	85.2883	71g	5	40.32	73.72
GRBEX-03	37.0810	85.3725	71g	2	4.64	4.80
GRBEX-04	37.1128	85.2339	71g	5	22.00	27.50
GRBEX-05	37.0974	85.3340	71g	5	15.12	25.62
GRBEX-06	37.0624	85.4295	71g	3	6.13	12.92
GRBEX-07	37.4338	85.5714	71a	4	4.96	4.16
GRBEX-08	37.4311	85.5849	71a	4	4.53	5.55
GRBEX-09	37.2725	86.4431	72h	4	11.52	20.65
GRBEX-10	37.1556	86.5722	72h	2	7.57	7.99
GRBEX-11	36.9872	86.9953	71a	4	25.31	65.79
GRBEX-12	37.2855	86.7183	72h	4	23.15	32.17
GRBEX-13	37.1560	87.0973	72c	4	10.70	21.41
GRBEX-14	37.2039	87.0371	72c	5	6.70	10.50
GRBEX-15	37.3475	86.9843	72c	4	14.72	24.96
GRBEX-16	37.4228	86.6105	72h	5	32.69	98.25
GRBEX-17	37.4640	86.6555	72h	5	44.50	116.89
GRBEX-18	37.4885	86.6490	72h	2	5.34	3.14
GRBEX-19	37.5009	86.6853	72h	4	6.94	8.51
GRBEX-20	37.6362	86.9016	72c	4	11.23	14.83
GRBEX-21	37.6284	86.9434	72c	5	36.32	83.96
GRBEX-22	37.0695	87.2546	71a	5	35.63	140.10
GRBEX-23	36.9925	87.2986	71a	4	20.16	32.56
GRBEX-24	36.9813	87.3522	71a	3	7.09	5.35
GRBEX-25	37.1573	87.3171	72c	5	12.74	19.30
GRBEX-26	37.0247	87.4032	71a	4	8.53	14.15
GRBEX-27	37.1618	87.2885	72c	2	0.78	1.40
GRBEX-28	37.1577	87.4644	72c	4	8.19	10.40
GRBEX-29	37.1918	87.4523	72c	4	9.58	11.95
GRBEX-30	37.2506	87.4547	72c	3	8.46	12.84

Table III. Characterization of 30 stream sites in the Green River Basin as low- (= lacking riffles) or high-gradient (= with at least one natural riffle). See Table I for site code information. Sites organized as in Table I.

Site code	High-gradient	Low-gradient
GRBEX-01	X	
GRBEX-02	X	
GRBEX-03	X	
GRBEX-04	X	
GRBEX-05	X	
GRBEX-06	X	
GRBEX-07	X	
GRBEX-08	X	
GRBEX-09	X	
GRBEX-10	X	
GRBEX-11	X	
GRBEX-12	X	
GRBEX-13		X
GRBEX-14	X	
GRBEX-15		X
GRBEX-16	X	
GRBEX-17		X
GRBEX-18	X	
GRBEX-19	X	
GRBEX-20	X	
GRBEX-21	X	
GRBEX-22	X	
GRBEX-23	X	
GRBEX-24	X	
GRBEX-25		X
GRBEX-26	X	
GRBEX-27	X	
GRBEX-28		X
GRBEX-29	X	
GRBEX-30	X	

Table IV. Water chemistry data for 25 stream sites characterized as high-gradient. See Table I for site code information. n.a. = no data available.

Site code	pH	Conductivity
GRBEX-01	7.63	454.5
GRBEX-02	7.62	218.0
GRBEX-03	7.60	634.5
GRBEX-04	7.52	155.7
GRBEX-05	7.54	478.0
GRBEX-06	7.65	450.0
GRBEX-07	7.48	195.3
GRBEX-08	7.51	214.0
GRBEX-09	7.26	131.7
GRBEX-10	7.11	275.0
GRBEX-11	7.35	217.0
GRBEX-12	7.14	171.5
GRBEX-14	7.14	437.0
GRBEX-16	7.21	154.7
GRBEX-18	7.24	146.3
GRBEX-19	7.38	127.7
GRBEX-20	7.14	187.0
GRBEX-21	7.43	143.5
GRBEX-22	7.34	190.7
GRBEX-23	7.00	210.0
GRBEX-24	7.10	243.3
GRBEX-26	7.30	183.0
GRBEX-27	n.a.	137.0
GRBEX-29	3.43	1340.5
GRBEX-30	4.65	965.3

Table V. Water chemistry data for 5 stream sites characterized as low-gradient. See Table I for site code information. n.a. = no data available.

Site code	pH	Conductivity
GRBEX-13	7.48	159.0
GRBEX-15	7.00	1054.5
GRBEX-17	7.19	160.7
GRBEX-25	n.a.	249.7
GRBEX-28	7.15	383.3

III. Materials and Methods

Field Sampling: Macroinvertebrates

At each site, the proportion of aquatic habitats within a 100-m reach of the stream was visually determined and sampling was based upon these habitats. For high gradient (riffle-bearing) sites, macroinvertebrate samples were collected from the riffles using a 0.5 m^2 kick-seine with a mesh size of 800 x 900 μm. Two one-minute kick samples were collected from two separate riffles within the 100-m reach, composited, and rinsed through a 500-μm sieve. Large objects, such as twigs, leaves and rocks, were washed, visually inspected and picked for macroinvertebrates, and removed from the sample. The high gradient multihabitat sample was comprised of all remaining stream habitat types. If cobble to small boulder-sized rocks were present, 30 rocks were visually inspected and washed into a bucket with care to remove all organisms from the surface. If bedrock was present, a 500-μm mesh D-frame net was placed on the surface and a 0.1 m^2 area above the net was disturbed to detach organisms. This was completed three times and the samples were composited in a bucket. When undercut banks were present, the D-frame net was jabbed into the root mass and shaken vigorously in three different sections. At streams with the presence of *Justacia americana*, the D-frame net was jabbed into the plants in three 1-m sections. The same procedure was followed for other aquatic vegetation. For submerged wood, a total of 6 m in length, ranging between 5 and 25 cm in diameter, was inspected and washed into a bucket. Sediment was sampled by filling a 2-mm mesh sieve with sediment from three areas along the streambed. In addition, a 250-μm mesh sieve was dragged lightly along the streambed in three different places and these samples were added to the rest of the sediment sample.

At low gradient multihabitat sites, the proportion of each habitat type was visually determined within the 100-m reach. A total of 20 sample units were collected from available habitats based upon the proportion of the total habitat that they comprised. For each sample unit of submerged wood, undercut banks, and aquatic vegetation habitats, a D-frame net was thrust into the habitat for

approximately 1 m. If large cobble sized rocks were present, each rock was considered a sample unit and all organisms were picked from the surface and washed into a bucket. Sediment was collected and processed as described above with the high gradient sites. All samples from all habitats were preserved in 95% ethanol and later transferred to 70% ethanol.

Selected in-stream physical and chemical parameters were obtained with an YSI 6820 multiprobe sonde (Tables IV-V). In-stream, stream bank, and riparian habitat features were quantified following standard EPA guidelines (Barbour et al., 1999) (Tables VI-IX). Specifically, % sand, % silt, and % clay were combined into one variable (% fines).

Laboratory Methods: Macroinvertebrates

Riffle samples were full sorted at 7x magnification. Rock-pick, wood, undercut bank, sediment, bedrock and aquatic plant samples from both high-gradient multihabitat and low gradient sites were composited prior to sorting. Both sets of multihabitat samples were sorted using a fixed-count subsampling of 300 organisms at 7x. This method used a higher fixed-count value than the surveyed results found by Carter and Resh (2001) for EPA Region 4 and was a moderate value for the United States. All macroinvertebrates were identified to genus with the exceptions of Chironomidae, Hydracarina, and Oligochaeta and some damaged and juvenile individuals that could not be identified below family or order.

Data Analysis: Macroinvertebrates

Data were categorized into six groups based on taxonomic level (family, genus) and habitat (single habitat-riffle, multihabitat-all habitats excluding riffle, and low gradient-all habitats). All juvenile individuals that could not be identified to at least family level were removed from the analysis. Six metrics were calculated for each data group: taxa richness, Ephemeroptera, Plecoptera and Trichoptera (EPT) Richness, the modified Hilsenhoff Biotic Index (HBI), modified % EPT (minus Cheumatopsyche), and % Chironomidae+Oligochaeta, and % clingers. The tolerance values used to calculate the HBI were obtained from Barbour et al. (1999), Lenat

Table VI. Habitat data for 25 stream sites treated as high-gradient. See Table I for site code information. EpSb = epifaunal substrate/available cover; Emb = embeddedness; VlDp = velocity/depth regime; SdDp = sediment deposition; Chan = channel flow status; ChAl = channel alteration; FqBn = frequency of riffles; Stb-L = left bank stability; Stb-R = right bank stability; Prt-L = left bank vegetation protection; Prt-R = right bank vegetation protection; Rip-L = left bank riparian protection; Rip-R = right bank riparian protection. See Table I for site code information.

Site code	EpSb	Emb	VlDp	SDp	Chan	ChAl	FqBn	Stb - L	Stb - R	Prt - L	Prt - R	Rip - L	Rip - R	TOTAL
GRBEX-01	10	16	8	11	14	17	7	4	2	6	2	9	1	107
GRBEX-02	12	16	13	13	18	18	8	7	6	9	8	6	4	138
GRBEX-03	10	16	10	14	14	18	8	8	5	7	7	5	2	124
GRBEX-04	14	18	12	16	15	18	17	7	8	8	8	5	2	148
GRBEX-05	10	15	10	15	14	18	13	8	7	8	6	9	3	136
GRBEX-06	11	18	10	15	16	18	7	6	9	2	9	1	9	131
GRBEX-07	13	15	14	9	14	16	14	4	7	5	3	3	2	119
GRBEX-08	14	18	13	16	12	16	19	7	6	9	6	9	4	149
GRBEX-09	9	15	13	13	14	13	15	7	7	6	6	3	3	124
GRBEX-10	10	13	11	18	18	9	4	5	5	5	5	3	3	109
GRBEX-11	14	18	8	18	16	15	3	4	6	4	5	3	8	122
GRBEX-12	5	11	10	5	7	13	2	2	2	2	2	2	3	66
GRBEX-14	2	2	6	17	13	18	3	6	6	9	6	9	5	102
GRBEX-16	13	14	10	10	8	10	8	6	7	9	9	1	3	108
GRBEX-18	7	8	10	12	13	15	8	7	7	7	7	9	4	114
GRBEX-19	10	10	11	15	13	9	17	8	8	7	7	4	4	123
GRBEX-20	8	13	13	13	8	17	13	7	7	7	6	9	5	126
GRBEX-21	8	13	8	8	16	15	13	3	4	6	7	3	4	108
GRBEX-22	8	14	13	16	15	8	8	6	6	6	6	7	6	119
GRBEX-23	6	13	13	8	12	13	8	2	2	2	2	5	5	91
GRBEX-24	13	18	10	18	12	18	9	9	9	8	8	9	7	148
GRBEX-26	13	13	13	17	16	18	3	7	7	7	7	8	5	134
GRBEX-27	2	2	2	13	13	8	3	4	4	6	6	1	1	65
GRBEX-29	6	8	5	9	13	8	2	5	5	4	4	4	4	77
GRBEX-30	8	8	9	7	12	13	7	4	2	6	4	9	2	91

Table VII. Habitat data for 5 stream sites treated as low-gradient. See Table I for site code information. EpSb = epifaunal substrate/available cover; PlSb = pool substrate characterization; PlVr = pool variability = velocity/depth regime; SdDp = sediment deposition; Chan = channel flow status; ChAl = channel alteration; ChSn = channel sinuosity; Stb-L = left bank stability; Stb-R = right bank stability; Prt-L = left bank vegetation protection; Prt-R = right bank vegetation protection; Rip-L = left bank riparian protection; Rip-R = right bank riparian protection. See Table I for site code information.

Site code	EpSb	PlSb	PlVr	SdDp	Chan	ChAl	ChSn	Stb - L	Stb - R	Prt - L	Prt - R	Rip - L	Rip - R	TOTAL
GRBEX-13	5	8	8	11	17	8	3	4	4	6	6	4	1	107
GRBEX-15	16	14	10	18	18	18	16	9	9	9	9	9	9	138
GRBEX-17	11	13	14	13	15	19	6	5	5	5	5	2	2	124
GRBEX-25	6	7	12	8	13	8	2	2	2	2	2	9	9	148
GRBEX-28	3	13	8	13	14	12	7	4	4	4	4	7	5	136

Table VIII. Geomorphic characteristics for 25 stream sites characterized as high-gradient. See Table I for site code information. Bedr = bedrock, bldr= boulder, cobl = cobble, grvl = gravel. n.a. = no data available.

Site code	% riffle	% run	% pool	% bedr	% bldr	% cobl	% grvl	% sand	% silt	% clay
GRBEX-01	2	98	0	90	0	5	0	5	0	0
GRBEX-02	5	95	0	5	5	35	35	15	5	0
GRBEX-03	10	85	5	85	5	5	5	0	0	0
GRBEX-04	55	30	15	0	0	45	45	5	5	0
GRBEX-05	10	85	5	85	5	5	5	0	0	0
GRBEX-06	5	90	5	60	15	15	10	0	0	0
GRBEX-07	40	40	20	0	0	40	10	0	50	0
GRBEX-08	75	5	20	5	0	50	45	0	0	0
GRBEX-09	25	50	25	0	0	20	30	30	20	0
GRBEX-10	5	45	50	0	0	10	20	35	35	0
GRBEX-11	5	0	95	0	2	4	4	20	10	60
GRBEX-12	5	70	25	0	0	10	0	0	5	85
GRBEX-14	40	40	20	0	0	0	0	0	0	100
GRBEX-16	15	85	0	0	0	30	40	0	30	0
GRBEX-18	10	70	20	0	0	10	70	20	0	0
GRBEX-19	30	70	0	0	0	20	60	20	0	0
GRBEX-20	10	70	20	0	0	0	60	40	0	0
GRBEX-21	5	0	95	0	0	5	5	90	0	0
GRBEX-22	10	50	40	0	0	80	10	5	5	0
GRBEX-23	5	10	85	0	0	15	40	20	25	0
GRBEX-24	10	60	30	75	0	15	10	0	0	0
GRBEX-26	10	20	70	0	0	10	10	70	10	0
GRBEX-27	5	0	95	0	0	0	40	0	0	60
GRBEX-29	5	0	95	0	0	5	0	95	0	0
GRBEX-30	10	70	20	0	0	0	20	80	0	0

Table IX. Geomorphic characteristics for 5 stream sites characterized as low-gradient. See Table I for site code information. Bedr = bedrock, bldr= boulder, cobl = cobble, grvl = gravel. n.a. = no data available.

Site code	% riffle	% run	% pool	% bedr	% bldr	% cobl	% grvl	% sand	% silt	% clay
GRBEX-13	0	0	100	0	0	0	25	25	20	30
GRBEX-15	0	0	100	0	0	0	0	0	50	50
GRBEX-17	0	10	90	0	5	10	30	40	15	0
GRBEX-25	0	0	100	0	0	0	0	25	25	50
GRBEX-28	0	0	100	0	0	0	10	20	10	60

(1993), and the KDOW Ecological Data Application System (EDAS (vKY3.0), 2001). Lastly, a multimetric macroinvertebrate index (MBI) was calculated for riffle and low-gradient data. The MBI incorporates each of the six equally-weighted metrics (Table XII).

To assess potential differences between sites both according to environmental parameters and macroinvertebrate assemblages, data were exposed to detrended correspondence analysis (DCA) (PC-ORD, Version 4.17 for Windows, MjM Software, 1999). Environmental data (Tables VI – XI) were left untransformed and macroinvertebrate data were transformed as log 1+x, where x = abundance of a taxon for a given composite sample. For the macroinvertebrate DCA, I chose to both include and downweight rare species. Macroinvertebrates that could not be identified below the level of family, but included individuals of that family taken to genus or species, were omitted.

Two DCA plots were prepared per analysis, one coding sites as either high-gradient or low-gradient, and the second coding sites as residing either within Level III Ecoregion 71 (Interior Plateau) or Ecoregion 72 (Interior River Valley and Hills). DCA was chosen because this ordination technique can handle large, complex datasets and uncover extremely long gradients. Species-site data are typically non-linear and unimodal and thus DCA is considered superior to other ordination techniques (e.g., Principal Components Analysis) when analyzing community data (McGarigal et al., 2000).

Canonical correspondence analysis (CCA) (PC-ORD, 1999) was used to address which environmental variables were attributable for potentially distinct macroinvertebrate assemblages. CCA (ter Braak 1986) ordinates a first matrix (by reciprocal averaging) and constrains it by a multiple regression on environmental variables (e.g., pH) within a second overlapping matrix. Due to a high degree of multicollinearity among geomorphic variables, % gravel and % fines were combined as one variable, and % cobble and % boulder were also consolidated as a single variable.

Table X. Macroinvertebrate Multimetric Biotic Index (MBI) scoring method for both genus- and family-level taxonomy. X = metric value, except for %Oligochaeta (= Y). Both GMBI and FMBI are calculated as the average of the six individual values. Individual values > 100 and < 0 are scored as 100 and 0, respectively, prior to calculation of MBI. %C+%O = % Chironomidae + % Oligochaeta, % Clng = % Clingers.

		Metric and scoring criteria					
Taxonomic level		Taxa richness	EPT richness	modified HBI	modified %EPT	%C+%O	%Clng
Genus (GMBI)	=	(X/65)*100	(X/31)*100	((10-X)/7.75)*100	(X/77)*100	((52-(X + Y))/51.1)*100	(X/74)*100
Family (FMBI)	=	(X/40.25)*100	(X/19.7)*100	((10-X)/6.56)*100	(X/77)*100	((52-(X + Y))/51.1)*100	(X/74)*100

Field Sampling and Laboratory Methods: Fishes

Sampling for stream fishes followed KDOW procedures for collecting fish from permanent, wadable high-gradient streams (KDOW, 1993). A two-tiered protocol was used. First, all visible wadable habitats were sampled via back-pack electroshocker for at least 600 shocking seconds to a maximum of 1800 shocking seconds. Habitats subjected to electroshocking included, but were not limited to, riffles, runs, wadable pools, root masses, undercut banks, and large accumulations of coarse woody debris. Second, riffle, runs, and wadable pools were subjected to seining with a 10 x 6 ft. seine with 3/16 in. mesh. Seining proceeded for a period of 30 (minimum) and 60 minutes (maximum). All fish captured were either field-identified to species, if possible, or field-preserved in 10% formalin.

Data Analysis: Fishes

An index of biotic integrity (IBI) was calculated based on eight individual metric values that were each individually adjusted for basin size. Each metric was initially subjected to a regression equation (Table XV) to obtain an expected value based on a given collecting site's basin area. Specifically, each metric was calculated as follows: total basin area upslope of the collecting site was initially $\log_{10}$-transformed. The "negative" metrics, % omnivore and % tolerant species, were inversed as 100 - the metric's value. Following solving for each metric-specific regression equation, the actual metric value was subtracted from he expected value to obtain a residual value. The CAC value was then added to the residual value to obtain an adjusted metric value, which was then divided by the 95th percentile and multiplied by 100. The IBI score was obtained by taking an average of the eight components. The IBI score was then used as a measure of stream classification, although this varied according to Level IV Ecoregion (Table XVI).

Stream Usage Assessments

An assessment was performed for each sampling site as according to EPA-delineated guidelines 305(b) reporting for water quality (e.g., Appendix IV). The National Water Quality Inventory Report

to Congress (305(b) report) is the primary vehicle for informing Congress and the public about general water quality conditions.

Quality Assurance/Quality Control

All standard quality assurance/quality control (QA/QC) procedures, as outlined in APHA (1998) and KDOW Quality Assurance Guideline (1986), were followed. Selected and random WKU macroinvertebrate collections were examined by SSS personnel to ensure consistency with taxonomic identifications. The internal KDOW protocols and QA guidelines mentioned above are part of the then-approved EPA-approved Kentucky Department of Environmental Protection (DEP) QA/QC plan. A QA/QC plan had been submitted to the KDOW for approval. All monitoring activities that were conducted as part of this project were consistent with the approved QA/QC plan.

Table XI. Individual metric values and multimetric (G-MBI) index values at genus-level resolution for 25 stream sites characterized as high-gradient. See Table I for site code information. Values in bold represent individual components of the G-MBI.

Site code		Taxa Richness		EPT Richness			Modified HBI		Modified %EPT
GRBEX-01	34	**52.31**	12	**38.71**	5.08	4.93	**63.55**	27.28	**35.43**
GRBEX-02	34	**52.31**	18	**58.06**	4.62	5.38	**69.47**	24.00	**31.17**
GRBEX-03	39	**60.00**	15	**48.39**	5.28	4.72	**60.94**	24.15	**31.36**
GRBEX-04	29	**44.62**	13	**41.94**	4.64	5.37	**69.23**	46.83	**60.82**
GRBEX-05	22	**33.85**	13	**41.94**	5.63	4.37	**56.36**	21.50	**27.92**
GRBEX-06	32	**49.23**	14	**45.16**	5.40	4.60	**59.32**	24.21	**31.44**
GRBEX-07	35	**53.85**	12	**38.71**	4.54	5.46	**70.50**	23.87	**31.00**
GRBEX-08	46	**70.77**	21	**67.74**	4.33	5.67	**73.21**	52.59	**68.30**
GRBEX-09	28	**43.08**	10	**32.26**	5.40	4.60	**59.38**	13.56	**17.61**
GRBEX-10	23	**35.38**	7	**22.58**	5.91	4.09	**52.76**	8.47	**11.00**
GRBEX-11	20	**30.77**	6	**19.35**	5.78	4.22	**54.40**	1.47	**1.91**
GRBEX-12	16	**24.62**	8	**25.81**	5.52	4.48	**57.83**	20.93	**27.18**
GRBEX-14	10	**15.38**	1	**3.23**	7.32	2.68	**34.54**	0.00	**0.00**
GRBEX-16	16	**24.62**	8	**25.81**	4.97	5.03	**64.88**	21.87	**28.40**
GRBEX-18	21	**32.31**	7	**22.58**	5.54	4.46	**57.59**	12.89	**16.74**
GRBEX-19	25	**38.46**	8	**25.81**	5.85	4.15	**53.55**	12.82	**16.65**
GRBEX-20	19	**29.23**	5	**16.13**	6.28	3.72	**47.99**	1.21	**1.57**
GRBEX-21	21	**32.31**	7	**22.58**	5.91	4.09	**52.77**	11.67	**15.16**
GRBEX-22	30	**46.15**	12	**38.71**	5.97	4.03	**52.00**	7.67	**9.96**
GRBEX-23	31	**47.69**	8	**25.81**	5.70	4.30	**55.48**	6.95	**9.03**
GRBEX-24	29	**44.62**	11	**35.48**	6.35	3.65	**47.15**	10.42	**13.53**
GRBEX-26	34	**52.31**	10	**32.26**	5.50	4.50	**58.03**	18.21	**23.65**
GRBEX-27	8	**12.31**	0	**0.00**	7.13	2.87	**37.07**	0.00	**0.00**
GRBEX-29	7	**10.77**	0	**0.00**	6.89	3.11	**40.08**	0.00	**0.00**
GRBEX-30	11	**16.92**	0	**0.00**	6.81	3.19	**41.17**	0.00	**0.00**
				%C + %O		%Clng		G-MBI	
GRBEX-01	17.67	2.36	20.03	**62.56**	67.06	**90.62**		**57.20**	
GRBEX-02	2.06	1.96	4.02	**93.90**	64.98	**87.81**		**65.45**	
GRBEX-03	50.60	0.01	50.61	**2.72**	26.05	**35.20**		**39.77**	
GRBEX-04	1.45	1.47	2.92	**96.05**	59.06	**79.81**		**65.41**	
GRBEX-05	45.94	0.98	46.92	**9.94**	38.80	**52.43**		**37.07**	
GRBEX-06	39.79	0.29	40.08	**23.33**	37.81	**51.09**		**43.26**	
GRBEX-07	3.13	1.02	4.15	**93.65**	70.19	**94.85**		**63.76**	
GRBEX-08	8.03	0.86	8.89	**84.37**	38.14	**51.54**		**69.32**	
GRBEX-09	30.84	0.18	31.02	**41.06**	59.92	**80.97**		**45.73**	
GRBEX-10	24.45	0.00	24.45	**53.91**	57.21	**77.31**		**42.16**	
GRBEX-11	21.98	0.08	22.06	**58.59**	67.90	**91.76**		**42.80**	
GRBEX-12	6.51	0.47	6.98	**88.10**	84.34	**100.00**		**53.92**	
GRBEX-14	0.50	0.00	0.50	**100.00**	95.81	**100.00**		**42.19**	
GRBEX-16	20.80	0.00	20.80	**61.06**	64.90	**87.70**		**48.74**	
GRBEX-18	22.22	0.00	22.22	**58.28**	69.90	**94.46**		**46.99**	
GRBEX-19	13.46	0.03	13.49	**75.36**	75.92	**100.00**		**51.64**	
GRBEX-20	56.85	0.39	57.24	**0.00**	20.38	**27.54**		**20.41**	
GRBEX-21	21.50	0.08	21.58	**59.53**	61.92	**83.68**		**44.34**	
GRBEX-22	37.51	1.10	38.61	**26.20**	50.87	**68.74**		**40.30**	
GRBEX-23	10.21	0.11	10.32	**81.57**	81.06	**100.00**		**53.26**	
GRBEX-24	55.49	0.00	55.49	**0.00**	30.86	**41.70**		**30.41**	
GRBEX-26	24.12	0.80	24.92	**52.99**	33.06	**44.68**		**43.99**	
GRBEX-27	12.00	40.00	52.00	**0.00**	0.00	**0.00**		**8.23**	
GRBEX-29	85.11	0.00	85.11	**0.00**	0.35	**0.47**		**8.55**	
GRBEX-30	56.25	21.10	77.35	**0.00**	0.00	**0.00**		**9.68**	

Table XII. Individual metric values and multimetric (F-MBI) index values at genus-level resolution for 25 stream sites characterized as high-gradient. See Table I for site code information. Values in bold represent individual components of the FBI.

Site code		Taxa Richness		EPT Richness			Modified HBI		Modified %EPT
GRBEX-01	27	**67.08**	8	**40.61**	5.04	4.96	**75.61**	27.28	**35.43**
GRBEX-02	26	**64.60**	13	**65.99**	4.61	5.39	**82.16**	24.00	**31.17**
GRBEX-03	28	**69.57**	10	**50.76**	5.21	4.79	**73.02**	24.15	**31.36**
GRBEX-04	23	**57.14**	10	**50.76**	4.66	5.34	**81.40**	46.83	**60.82**
GRBEX-05	20	**49.69**	11	**55.84**	5.20	4.80	**73.17**	21.50	**27.92**
GRBEX-06	23	**57.14**	9	**45.69**	5.17	4.83	**73.63**	24.21	**31.44**
GRBEX-07	28	**69.57**	9	**45.69**	4.90	5.10	**77.74**	23.87	**31.00**
GRBEX-08	32	**79.50**	14	**71.07**	4.60	5.40	**82.32**	52.59	**68.30**
GRBEX-09	23	**57.14**	6	**30.46**	5.08	4.92	**75.00**	13.56	**17.61**
GRBEX-10	21	**52.17**	6	**30.46**	5.45	4.55	**69.36**	8.47	**11.00**
GRBEX-11	17	**42.24**	4	**20.30**	5.56	4.44	**67.68**	1.47	**1.91**
GRBEX-12	15	**37.27**	6	**30.46**	5.03	4.97	**75.76**	20.93	**27.18**
GRBEX-14	10	**24.84**	1	**5.08**	6.36	3.64	**55.49**	0.00	**0.00**
GRBEX-16	14	**34.78**	6	**30.46**	4.65	5.35	**81.55**	21.87	**28.40**
GRBEX-18	19	**47.20**	5	**25.38**	5.03	4.97	**75.76**	12.89	**16.74**
GRBEX-19	23	**57.14**	6	**30.46**	5.81	4.19	**63.87**	12.82	**16.65**
GRBEX-20	16	**39.75**	4	**20.30**	6.09	3.91	**59.60**	1.21	**1.57**
GRBEX-21	17	**42.24**	4	**20.30**	5.82	4.18	**63.72**	11.67	**15.16**
GRBEX-22	23	**57.14**	8	**40.61**	5.89	4.11	**62.65**	7.67	**9.96**
GRBEX-23	23	**57.14**	6	**30.46**	5.37	4.63	**70.58**	6.95	**9.03**
GRBEX-24	23	**57.14**	7	**35.53**	6.01	3.99	**60.82**	10.42	**13.53**
GRBEX-26	27	**67.08**	6	**30.46**	5.30	4.70	**71.65**	18.21	**23.65**
GRBEX-27	6	**14.91**	0	**0.00**	7.44	2.56	**39.02**	0.00	**0.00**
GRBEX-29	6	**14.91**	0	**0.00**	7.62	2.38	**36.28**	0.00	**0.00**
GRBEX-30	9	**22.36**	0	**0.00**	7.52	2.48	**37.80**	0.00	**0.00**
				%C + %O		%Clng		F-MBI	
GRBEX-01	17.67	2.36	20.03	**62.56**	67.06	**90.62**		**61.99**	
GRBEX-02	2.06	1.96	4.02	**93.90**	64.98	**87.81**		**70.94**	
GRBEX-03	50.60	0.01	50.61	**2.72**	26.05	**35.20**		**43.77**	
GRBEX-04	1.45	1.47	2.92	**96.05**	59.06	**79.81**		**71.00**	
GRBEX-05	45.94	0.98	46.92	**9.94**	38.80	**52.43**		**44.83**	
GRBEX-06	39.79	0.29	40.08	**23.33**	37.81	**51.09**		**47.05**	
GRBEX-07	3.13	1.02	4.15	**93.65**	70.19	**94.85**		**68.75**	
GRBEX-08	8.03	0.86	8.89	**84.37**	38.14	**51.54**		**72.85**	
GRBEX-09	30.84	0.18	31.02	**41.06**	59.92	**80.97**		**50.37**	
GRBEX-10	24.45	0.00	24.45	**53.91**	57.21	**77.31**		**49.04**	
GRBEX-11	21.98	0.08	22.06	**58.59**	67.90	**91.76**		**47.08**	
GRBEX-12	6.51	0.47	6.98	**88.10**	84.34	**100.00**		**59.79**	
GRBEX-14	0.50	0.00	0.50	**100.79**	95.81	**100.00**		**47.70**	
GRBEX-16	20.80	0.00	20.80	**61.06**	64.90	**87.70**		**53.99**	

GRBEX-18	22.22	0.00	22.22	**58.28**	69.90	**94.46**	**52.97**
GRBEX-19	13.46	0.03	13.49	**75.36**	75.92	**100.00**	**57.25**
GRBEX-20	56.85	0.39	57.24	**0.00**	20.38	**27.54**	**24.80**
GRBEX-21	21.50	0.08	21.58	**59.53**	61.92	**83.68**	**47.44**
GRBEX-22	37.51	1.10	38.61	**26.20**	50.87	**68.74**	**44.22**
GRBEX-23	10.21	0.11	10.32	**81.57**	81.06	**100.00**	**58.13**
GRBEX-24	55.49	0.00	55.49	**0.00**	30.86	**41.70**	**34.79**
GRBEX-26	24.12	0.80	24.92	**52.99**	33.06	**44.68**	**48.42**
GRBEX-27	12.00	40.00	52.00	**0.00**	0.00	**0.00**	**8.99**
GRBEX-29	85.11	0.00	85.11	**0.00**	0.35	**0.47**	**8.61**
GRBEX-30	56.25	21.10	77.35	**0.00**	0.00	**0.00**	**10.03**

Table XIII. Individual metric values and multimetric (G-MBI) index values at genus-level resolution for 5 stream sites characterized as low-gradient. See Table I for site code information. Values in bold represent individual components of the G-MBI.

Site code		Taxa Richness		EPT Richness			Modified HBI		Modified %EPT
GRBEX-13	30	**46.15**	7	**22.58**	6.55	3.45	**44.52**	7.52	**9.77**
GRBEX-15	26	**40.00**	10	**32.26**	6.43	3.57	**46.09**	21.49	**27.91**
GRBEX-17	20	**30.77**	6	**19.35**	5.59	4.41	**56.93**	52.81	**68.58**
GRBEX-25	35	**53.85**	4	**12.90**	7.11	2.89	**37.30**	10.10	**13.12**
GRBEX-28	17	**26.15**	2	**6.45**	6.84	3.16	**40.80**	1.64	**2.13**
				%C + %O		%Clng		G-MBI	
GRBEX-13	73.85	3.59	77.44	**0.00**	4.25	**5.74**		**21.46**	
GRBEX-15	42.69	0.00	42.69	**18.22**	17.90	**24.19**		**31.44**	
GRBEX-17	31.78	0.00	31.78	**39.57**	57.21	**77.31**		**48.75**	
GRBEX-25	14.64	0.51	15.15	**72.11**	6.06	**8.19**		**32.91**	
GRBEX-28	65.88	0.00	65.88	**-27.16**	5.84	**7.89**		**9.38**	

Table XIV. Individual metric values and multimetric (F-MBI) index values at genus-level resolution for 5 stream sites characterized as low-gradient. See Table I for site code information. Values in bold represent individual components of the F-MBI.

Site code		Taxa Richness		EPT Richness			Modified HBI		Modified %EPT
GRBEX-13	25	**62.11**	6	**30.46**	6.98	3.02	**46.04**	7.52	**9.77**
GRBEX-15	23	**57.14**	7	**35.53**	5.83	4.17	**63.57**	21.49	**27.91**
GRBEX-17	18	**44.72**	5	**25.38**	5.36	4.64	**70.73**	52.81	**68.58**
GRBEX-25	27	**67.08**	3	**15.23**	7.28	2.72	**41.46**	10.10	**13.12**
GRBEX-28	15	**37.27**	2	**10.15**	7.08	2.92	**44.51**	1.64	**2.13**
				%C + %O		%Clng		F-MBI	
GRBEX-13	73.85	3.59	77.44	**-49.78**	4.25	**5.74**		**17.39**	
GRBEX-15	42.69	0.00	42.69	**18.22**	17.90	**24.19**		**37.76**	
GRBEX-17	31.78	0.00	31.78	**39.57**	57.21	**77.31**		**54.38**	
GRBEX-25	14.64	0.51	15.15	**72.11**	6.06	**8.19**		**36.20**	
GRBEX-28	65.88	0.00	65.88	**-27.16**	5.84	**7.89**		**12.47**	

Table XV. Individual fish metric values for all 30 stream sites. See Table I for site code information. DMS = darters + madtoms + sculpins, WC = water column, SL = simple lithophilic.

		Metric							
Site code	Gradient	Native species richness	DMS species richness	Intolerant. species richness	WC species richness	SL spawning species richness	% insectivores	% omnivores	% tolerants
GRBEX-01	High	16	6	4	5	6	56.5	30.3	31.9
GRBEX-02	High	30	9	10	14	14	38.5	31.1	49.9
GRBEX-03	High	16	5	3	2	6	46.5	40.6	37.4
GRBEX-04	High	21	9	7	6	11	57.3	9.6	26.6
GRBEX-05	High	22	6	5	9	9	41.8	33.4	44.3
GRBEX-06	High	21	6	5	6	9	50.9	35.6	36.7
GRBEX-07	High	17	5	5	6	7	42.3	36.7	35.7
GRBEX-08	High	19	5	3	5	8	51.5	17.2	32.4
GRBEX-09	High	14	2	1	7	4	39.9	53.1	58.0
GRBEX-10	High	14	2	1	6	2	50.0	3.5	47.4
GRBEX-11	High	15	2	1	8	2	47.0	50.0	45.8
GRBEX-12	High	10	1	2	5	3	50.0	50.0	50.0
GRBEX-14	High	3	0	0	2	0	0.0	100.0	100.0
GRBEX-16	High	23	5	2	9	6	32.6	57.9	50.2
GRBEX-18	High	13	1	1	4	0	30.8	48.7	66.5
GRBEX-19	High	14	3	2	3	1	19.9	44.7	75.2
GRBEX-20	High	14	1	1	4	2	70.8	16.2	29.2
GRBEX-21	High	16	2	1	7	1	66.8	29.7	31.3
GRBEX-22	High	18	4	2	6	5	46.2	43.8	50.4
GRBEX-23	High	17	4	2	5	5	26.1	58.5	71.8
GRBEX-24	High	17	3	1	4	4	30.7	27.8	43.2
GRBEX-26	High	14	1	1	7	0	50.4	21.2	13.1
GRBEX-27	High	6	1	0	2	0	26.2	50.0	73.8
GRBEX-29	High	0	0	0	0	0	0.0	0.0	0.0
GRBEX-30	High	0	0	0	0	0	0.0	0.0	0.0
GRBEX-13	Low	17	1	0	9	3	52.0	1.6	45.1
GRBEX-15	Low	8	0	0	5	1	0.0	100.0	100.0
GRBEX-17	Low	13	2	1	6	3	44.1	100.0	100.0
GRBEX-25	Low	8	1	1	3	0	0.0	100.0	100.0
GRBEX-28	Low	9	1	0	3	0	39.5	0.9	57.8

Table XVI. Fish Index of Biotic Integrity (IBI) scoring protocol. Spp. = species, X = metric value, DMS = darters + madtoms + sculpins, WC = water column, SL = simple lithophilic.

Metric		Regression equation	Catchment area constant (CAC)	Predicted 95th percentile
Native spp. richness	y =	9.1556x + 4.5843	19.11	25.74
DMS spp. richness	y =	2.7214x + 1.4948	5.81	9.39
Intolerant spp. richness	y =	2.6440x + 0.4006	4.60	7.78
WC spp. richness	y =	4.7306x - 0.7617	6.74	10.36
SL spawning spp. richness	y =	3.9118x + 1.6050	7.81	12.33
% insectivores	y =	22.6250x + 20.2780	56.18	86.05
% omnivores	y =	29.7690x + 37.0530	84.29	111.16
% tolerants	y =	21.7070x + 38.7100	73.15	99.00

Table XVII. Stream classification protocol adjusted for region (= Level IV Ecoregion). IBI = Fish Index of Biotic Integrity. See Table II for Level IV Ecoregion explanation.

Classification	71a, 71e IBI range	71g IBI range	72c, 72h IBI range
Excellent	> 75.6	> 87.9	> 65.6
Good	63.2 - 76.4	74.0 - 87.8	52.0 - 65.5
Fair	42.1 - 63.2	49.3 - 73.9	34.7 - 51.9
Poor	21.1 - 42.0	24.7 - 49.2	17.3 - 34.6
Very Poor	< 21.0	< 24.7	< 17.2

Table XVIII. Fish Index of Biotic Integrity (IBI) scores and classification for all 30 stream sites. See Table I for site code information.

Site code	Gradient	Final IBI	Classification
GRBEX-01	High	84.49	GOOD
GRBEX-02	High	77.98	GOOD
GRBEX-03	High	77.46	GOOD
GRBEX-04	High	84.18	GOOD
GRBEX-05	High	72.87	FAIR
GRBEX-06	High	80.11	GOOD
GRBEX-07	High	88.72	EXCELLENT
GRBEX-08	High	86.11	EXCELLENT
GRBEX-09	High	48.45	FAIR
GRBEX-10	High	65.91	EXCELLENT
GRBEX-11	High	35.26	POOR
GRBEX-12	High	40.16	FAIR
GRBEX-14	High	21.60	POOR
GRBEX-16	High	41.00	FAIR
GRBEX-18	High	62.74	GOOD
GRBEX-19	High	51.47	FAIR
GRBEX-20	High	58.26	GOOD
GRBEX-21	High	37.52	FAIR
GRBEX-22	High	31.32	POOR
GRBEX-23	High	42.24	FAIR
GRBEX-24	High	69.41	GOOD
GRBEX-26	High	61.04	FAIR
GRBEX-27	High	64.58	GOOD
GRBEX-29	High	15.97	VERY POOR
GRBEX-30	High	14.99	VERY POOR
GRBEX-13	Low	57.06	GOOD
GRBEX-15	Low	16.87	VERY POOR
GRBEX-17	Low	24.05	POOR
GRBEX-25	Low	19.89	POOR
GRBEX-28	Low	48.84	FAIR

IV. Results and Discussion

High-Gradient Sites: Green River Basin

The composite macroinvertebrate riffle sample of GRBEX-01 (Glens Fork, Russell Creek) was dominated by individuals of six taxa (*Stenelmis* sp., *Cheumatopsyche* sp., Chironomidae, *Stenonema* sp*., Baetis* sp., and *Nigronia* sp.), comprising 89% of the total sample (Appendix I). The multihabitat macroinvertebrate sample contributed only an additional 3 taxa (*Pleurocera* sp., *Choroterpes* sp., *Neophylax* sp.; Appendix II). The fish assemblage consisted of 16 species, including five *Etheostoma* species (Appendix III; Table XV). The most common species were *Pimephales notatus* (30%), *E. rafinesquei* (28%), and *Campostoma oligolepis* (11%).

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of fair water quality (Tables X-XI), yet designated as non-supportive according to the macroinvertebrate assemblage (Appendix IV). Overall, biological use support for this site was characterized as partial. In contrast, this stream site was classified per fish IBI score as good (Table XVIII). Additionally, this site was characterized by moderately alkaline pH (7.63; Table IV), moderately-high conductivity (455; Table IV), and a stream reach with a mediocre total habitat score (107; Table VI) and composed mainly of a bedrock-dominated run (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-02 (Russell Creek) was dominated by four taxa (*Stenelmis* sp., *Elimia* sp., *Cheumatopsyche* sp., and *Stenonema* sp.), comprising 75% of the total sample (Appendix V). The multihabitat macroinvertebrate sample contributed an additional seven taxa (*Dubiraphia* sp., *Physella* sp., *Enallagma* sp., *Boyeria* sp., *Helichus* sp., *Ancyronyx variegatus*, and *Probezzia* sp.; Appendix VI). The fish assemblage was remarkably rich and consisted of 30 species, including six *Etheostoma* and two *Percina* species (Appendix VII; Table XV). The most abundant species obtained were *Pimephales notatus* (31%), *Luxilis chrysocephalus* (18%), *Lepomis megalotis* (9%), and *Campostoma oligolepsis* (9%).

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of good water quality (Tables X-XI), and despite resulting in the second highest MIB score amongst the 30 stream sites was yet designated as non-supportive according to the

macroinvertebrate assemblage (Appendix VIII). In contrast, this stream site was classified per fish IBI score as good (Table XVIII). Overall, biological use support for this site was characterized as partial. This site was characterized by moderately-high pH (7.62; Table IV), moderately-low conductivity (218; Table IV), and a stream reach with a mediocre total habitat score (138; Table VI) and with meager riffle coverage that was composed of cobble-gravel mix (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-03 (Butlers Fork, Russell Creek) was dominated by three taxa (*Caenis* sp., *Cheumatopsyche* sp., and Chironomidae), comprising 88% of the total sample (Appendix IX). The multihabitat macroinvertebrate sample contributed an additional nine taxa (*Fossaria* sp., *Acerpenna* sp., *Hydroptila* sp., *Peltodytes* sp., *Berosus* sp., *Anopheles* sp., *Limonia* sp., *Bezzia* sp. and Hydracarina; Appendix X). The fish assemble consisted of 16 species, including five *Etheostoma* species (Appendix XI; Table XV). The only abundant species collected were *Pimephales notatus* (34%) and *E. spectabile* (26%).

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of poor water quality (Tables X-XI), and likewise designated as non-supportive according to the macroinvertebrate assemblage (Appendix XII). In contrast, this stream site was classified per fish IBI score as good (Table XVIII). Overall, biological use support for this site was characterized as partial. This site was characterized by moderately-high pH (7.60; Table IV), high conductivity (635; Table IV), and a stream reach with a mediocre total habitat score (124; Table VI) and composed mainly of a bedrock-dominated run (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-04 (Sulphur Creek) was not particularly dominated by any taxa, although three genera (*Cheumatopsyche* sp., *Isonychia* sp., and *Stenonema* sp.), comprised 61% of the total sample (Appendix XIII). The multihabitat macroinvertebrate sample contributed an additional three taxa (*Argia* sp., *Chauliodes* sp., *and Dubiraphia* sp.; Appendix XIV). The fish assemblage consisted of 21 species, including seven *Etheostoma* species and a single species of *Percina* (Appendix XV; Table XV). No individual species contributed at least 20% of individuals collected. *Lepomis megalotis* (19%), *Luxilis*

chrysocephalus (17%), *Campostoma oligolepis* (15%), and *Lythrurus fasciolaris* (11%) were the most abundant species.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of good water quality (Tables X-XI), and resulted in the third-highest MBI value recorded from this study yet was designated as non-supportive according to the macroinvertebrate assemblage (Appendix XVI). In contrast, this stream site was classified per fish IBI score as good (Table XVIII). Overall, biological use support for this site was characterized as partial. This site was characterized by moderately-high pH (7.52; Table IV), moderately-low conductivity (156; Table IV), and a stream reach with a fair total habitat score (148; Table VI) and with moderate riffle coverage that was composed of cobble-gravel mix (Table X).

The composite macroinvertebrate riffle sample of GRBEX-05 (Pettys Fork, Russell Creek) was dominated by seven taxa (Chironomidae, *Stenelmis* sp., *Caenis* sp., *Cheumatopsyche* sp., *Neoperla* sp., *Baetis* sp., and *Stenonema* sp.), comprising 95% of the total sample (Appendix XVII). The multihabitat macroinvertebrate sample contributed an additional six taxa (*Dubiraphia* sp., *Elimia* sp., *Hydroptila* sp., *Dineutus* sp., *Dubiraphia* sp., and *Simulium* sp.; Appendix XVIII). The fish assemblage was comprised of 23 species, including six species of *Etheostoma* (Appendix XIX; Table XV). The most abundant species obtained were *Pimephales notatus* (33%), *Campstoma oligolepis* (13%), and *Notropis photogenis* (11%).

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of poor water quality (Tables X-XI), and likewise designated as non-supportive according to the macroinvertebrate assemblage (Appendix XX). Similarly, this stream site was classified per fish IBI score as only fair (Table XVIII). Overall, biological use support for this site was characterized as non-supportive. This site was characterized by moderately alkaline pH (7.54; Table IV), moderately-high conductivity (478; Table IV), and a stream reach with a mediocre total habitat score (136; Table VI) and composed mainly of a bedrock-dominated run (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-06 (Big Creek) was dominated by four taxa (Chironomidae, *Cheumatopsyche* sp., *Caenis* sp. and *Stenelmis* sp.), comprising 91% of

the total sample (Appendix XXI). The multihabitat macroinvertebrate sample contributed an additional seven taxa (*Physella* sp., *Pleurocera* sp., *Acerpenna* sp., *Enallagma* sp., *Helochares* sp., *Limonia* sp., and *Tipula* sp.; Appendix XXII). The fish assemblage consisted of 22 species, including seven *Etheostoma* species (Appendix XXIII; Table XV). In particular, *Pimephales notatus* (35%), *E. spectabile* (19%), and *Campostoma oligolepis* (12%) were easily the most abundant species obtained.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of poor water quality (Tables X-XI), and likewise designated as non-supportive according to the macroinvertebrate assemblage (Appendix XXIV). In contrast, this stream site was classified per fish IBI score as good (Table XVIII). Overall, biological use support for this site was characterized as partial. This site was characterized by moderately alkaline pH (7.65; Table IV), moderately-high conductivity (450; Table IV), and a stream reach with a mediocre total habitat score (131; Table VIII) and composed mainly of a bedrock-dominated run (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-07 (Poplar Grove Branch, Upper Brush Creek) was dominated by four taxa (*Optioservus* sp., *Cheumatopsyche* sp., *Isonychia* sp., and *Leuctra* sp.), comprising 80% of the total sample (Appendix XXV). The multihabitat macroinvertebrate sample contributed an additional seven taxa (*Dubiraphia* sp., *Sphaerium* sp., *Eurylophella* sp., *Macromia* sp., *Sialis* sp., *Pycnopsyche* sp., Leptoceridae, and *Macronychus glabratus*; Appendix XXVI). The fish assemblage consisted of 18 species, including four *Etheostoma* species (Appendix XXVII; Table XV). Only one species comprised > 20% of the total sample (*Semotilus atromaculatus*, 24%). The next most common species obtained were *Campostoma oligolepis* (19%) and *Pimephales notatus* (12%).

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of good water quality (Tables X-XI), yet was designated as non-supportive according to the macroinvertebrate assemblage (Appendix XXVIII). In sharp contrast, this stream site was classified per fish IBI score as excellent and produced the highest IBI score (Table XVIII). Overall, biological use support for this site was characterized as partial. This site was characterized by moderately-

high pH (7.48; Table IV), moderately-low conductivity (195; Table IV), and a stream reach with a mediocre total habitat score (119; Table VI). The stream reach was also characterized by fair riffle coverage of cobble-gravel (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-08 (Upper Brush Creek) was dominated by five taxa (*Leuctra* sp., *Optioservus* sp., *Psephenus herricki*, Chironomidae, and *Stylogomphus albistylus*), comprising 83% of the total sample (Appendix XXIX). The multihabitat macroinvertebrate sample contributed an additional eight taxa (*Dubiraphia* sp., Cambaridae, *Boyeria* sp., *Chauliodes* sp., *Lepidostoma* sp., *Neophylax* sp., *Dolophilodes* sp., and *Simulium* sp.; Appendix XXX). The fish assemblage consisted of 20 species, including four *Etheostoma* species (Appendix XXXI; Table XV). The most common species (*Phoxinus erythrogaster*) comprised only 19% of the total sample. The remaining most common species were *E. rafinesquei* (15%), *Cottus carolinae* (13%), *Luxilus chrysocephalus* (13%), and *Campostoma oligolepis* (13%).

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of only good water quality (Tables X-XI), and despite posting the highest MBI scored from this project was designated as non-supportive according to the macroinvertebrate assemblage (Appendix XXXII). Similar to GRBEX-07, this stream site was classified per fish IBI score as excellent and produced the second-highest IBI score (Table XVIII). Overall, biological use support for this site was characterized as partial. This site was characterized by moderately-high pH (7.51; Table IV), moderately-low conductivity (214; Table IV), and a stream reach with a fair total habitat score (149; Table VI) and with moderate riffle coverage that was composed mainly of a cobble-gravel mix (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-09 (Big Reedy Creek) was dominated by three taxa (*Stenelmis* sp., Chironomidae, and *Cheumatopsyche* sp.), comprising 82% of the total sample (Appendix XXXIII). The multihabitat macroinvertebrate sample contributed an additional seven taxa (*Dubiraphia* sp., *Centroptilum* sp., Calopterygidae, *Ancyronyx variegatus*, *Tipula* sp., *Simulium* sp., and *Chrysop*s sp.; Appendix XXXIV). The fish assemblage was characterized by 14 species, including only a single species each of *Etheostoma* and *Percina*

(Appendix XXXV; Table XV). Only 143 individuals were obtained, with *Pimephales notatus* (39%) and *Semotilus atromaculatus* (13%) as the only species comprising >10% of the total sample.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of fair water quality (Tables X-XI), yet designated as non-supportive according to the macroinvertebrate assemblage (Appendix XXXVI). Similarly, this stream site was classified per fish IBI score as fair (Table XVIII). Overall, biological use support for this site was characterized as non-supportive. This site was characterized by moderately-alkaline pH (7.26; Table IV), moderately-low conductivity (132; Table IV), and a stream reach with a poor total habitat score (124; Table VI) and with meager riffle coverage that was composed mainly of cobble-gravel-sand mix (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-10 (Claylick Creek) was dominated by three taxa (*Cheumatopsyche* sp., Chironomidae, and *Sphaerium* sp.), comprising 81% of the total sample (Appendix XXXVII). The multihabitat macroinvertebrate sample contributed an additional nine taxa (*Psychoda* sp., Oligochaeta, *Caenis* sp., *Procloeon* sp., *Enallagma* sp., *Boyeria* sp., *Dromogomphus* sp., *Crangonyx* sp., and *Hyalella azteca*; Appendix XXXVIII). The fish assemblage consisted of 14 species, including only a single species each of *Etheostoma* and *Percina* (Appendix XXXIX; Table XV). Only 114 individuals were obtained, with *Lepomis macrochirus* (35%) and *L. megalotis* (30%) as the only species comprising >10% of the total sample.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of fair water quality (Tables X-XI), yet designated as non-supportive according to the macroinvertebrate assemblage (Appendix XL). In contrast, this stream site was classified per fish IBI score as excellent (Table XVIII). Overall, biological use support for this site was characterized as partial. This site was characterized by slightly alkaline pH (7.11; Table IV), moderately-low conductivity (275; Table IV), and a stream reach with a mediocre total habitat score (109; Table VI) and with poor riffle coverage (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-11 (Wolf Lick Creek) was especially dominated by five taxa (*Cheumatopsyche* sp., Chironomidae, *Lirceus* sp., *Stenelmis* sp., and *Sphaerium* sp.), comprising 98% of the total sample (Appendix XLI). The multihabitat

macroinvertebrate sample contributed an additional five taxa (*Caenis* sp., *Procloeon* sp., *Gyretes* sp., *Macronychus glabratus*, and *Hyalella azteca*; Appendix XLII). The fish assemblage consisted of 15 species, including only a single species each of *Etheostoma* and *Percina* (Appendix XLIII; Table XV). Only 83 individuals were obtained, with *Lepomis macrochirus* (40%) and *L. megalotis* (14%) as the only species that comprised >10% of the total sample.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of fair water quality (Tables X-XI), yet designated as non-supportive according to the macroinvertebrate assemblage (Appendix XLIV). Similarly, this stream site was classified per fish IBI score as poor (Table XVIII). Overall, biological use support for this site was characterized as non-supportive. This site was characterized by moderately-high pH (7.35; Table IV), moderately-low conductivity (217; Table IV), and a stream reach with a mediocre total habitat score (122; Table VI) and with a nearly-absent riffle (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-12 (Indian Camp Creek) was dominated by two taxa (*Cheumatopsyche* sp. and *Stenacron* sp.), comprising 77% of the total sample (Appendix XLV). The multihabitat macroinvertebrate sample contributed an additional nine taxa (*Physella* sp., *Pisidium* sp., *Sphaerium* sp., *Corbicula fluminea*, *Caenis* sp., *Centroptilum* sp., *Procloeon* sp., *Argia* sp., and Corixidae; Appendix XLVI). The site was both individual- (52) and species-poor (11) (Appendix XLVII; Table XV). Only one species of *Etheostoma* or *Percina* was collected (*P. phoxocephala*) and *Lythrurus fasciolaris* (23%) was the most abundant species.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of fair water quality (Tables X-XI), yet designated as non-supportive according to the macroinvertebrate assemblage (Appendix XLVIII). In addition, this stream site was classified per fish IBI score as fair (Table XVIII). Overall, biological use support for this site was characterized as non-supportive. This site was characterized by slightly alkaline pH (7.14; Table IV), moderately-low conductivity (172; Table IV), and a stream reach with a poor total habitat score (66; Table VI) and with poor riffle coverage that was composed mainly of cobble (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-14 (Plum Creek) was dominated by only one taxon (*Cheumatopsyche* sp.), comprising an astonishing 96% of the total sample (Appendix IL). The multihabitat macroinvertebrate sample contributed an additional eleven taxa (*Sphaerium* sp., *Chauliodes* sp., *Chimarra* sp., *Enochrus* sp., *Limonia* sp., *Pseudolimnophila* sp., *Tipula* sp., Ephydridae, *Simulium* sp., *Myxosargus* sp., and *Odontomyia* sp.; Appendix L). The fish collection consisted of only three species (*Ameiurus natalis*, *Cyprinella spiloptera*, and *Lepomis gulosus*) across five total individuals (Appendix LI; Table XV).

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of fair water quality (Tables X-XI), yet designated as non-supportive according to the macroinvertebrate assemblage (Appendix LII). Similarly, this stream site was classified per fish IBI score as poor (Table XVIII). Overall, biological use support for this site was characterized as non-supportive. This site was characterized by slightly alkaline pH (7.14; Table IV), moderately-high conductivity (437; Table IV), and a stream reach with a good total habitat score (102; Table VI) and with a moderate riffle coverage that was composed mainly of clumped clays (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-16 (Caney Run) was dominated by dominated by five taxa (*Stenelmis* sp., *Cheumatopsyche* sp., Chironomidae, *Baetis* sp., and Chimarra sp.), comprising 97% of the total sample (Appendix LIII). The multihabitat macroinvertebrate sample contributed an additional 15 taxa (*Dubiraphia* sp., *Dugesia* sp., *Fossaria* sp., *Physella* sp., *Stenacron* sp., *Acentrella* sp., *Centroptilum* sp., *Procloeon* sp., *Argia* sp., *Enallagma* sp., Gerridae, *Hydroptila* sp., *Ceraclea* sp., *Berosus* sp., and *Hyalella azteca*; Appendix LIV). The fish assemblage was characterized by 23 species, including a pair of *Etheostoma* species and three *Percina* species (Appendix LV; Table XV). *Pimephales notatus* (44%) and *Dorosoma cepedianum* (14%) were easy the most abundant species obtained.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of fair water quality (Tables X-XI), yet designated as non-supportive according to the macroinvertebrate assemblage (Appendix LVI). This stream site was classified per fish IBI score as fair (Table XVIII). Overall, biological use support for this site was characterized as partial. This site

was characterized by slightly alkaline pH (7.21; Table IV), moderately-low conductivity (155; Table IV), and a stream reach with a good total habitat score (108; Table VI) and with a meager riffle coverage that was composed mainly of cobble-gravel mix (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-18 (McGrady Creek) was dominated by five taxa (*Stenelmis* sp., Chironomidae, *Cheumatopsyche* sp., *Stenonema* sp., and *Acerpenna* sp.), comprising 96% of the total sample (Appendix LVII). The multihabitat macroinvertebrate sample contributed an additional six taxa (Oligochaeta, *Paraleptophlebia* sp., *Caenis* sp., *Centroptilum* sp., *Procloeon* sp., and *Helichus* sp; Appendix LVIII). The fish assemblage consisted of 13 species, including only a single darter species (*Etheostoma squamiceps*; Appendix LIX; Table XV). *Pimephales notatus* (35%), *Lepomis megalotis* (15%), and *Semotilus atromaculatus* (13%) were the most common species obtained.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of fair water quality (Tables X-XI), yet designated as non-supportive according to the macroinvertebrate assemblage (Appendix LX). In contrast, this stream site was classified per fish IBI score as good (Table XVIII). Overall, biological use support for this site was characterized as partial. This site was characterized by slightly alkaline pH (7.24; Table IV), moderately-low conductivity (146; Table IV), and a stream reach with a mediocre total habitat score (114; Table VI) and with a meager riffle coverage that was composed mainly of gravel Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-19 (Muddy Creek) was dominated by five taxa (*Cheumatopsyche* sp., Chironomidae, *Stenelmis* sp., *Acentrella* sp., and *Stenonema* sp.), comprising 91% of the total sample (Appendix LXI). The multihabitat macroinvertebrate sample contributed an additional nine taxa (Unionidae, *Hexagenia* sp., Acerpenna sp., *Baetis* sp., *Procloeon* sp., *Hydroptila* sp., *Berosus* sp., *Enochrus* sp., and *Lirceus* sp.; Appendix LXII). The fish assemblage consisted of 14 species, including two species of *Etheostoma* (Appendix LXIII; Table XV). *Pimephales notatus* (40%), *Lepomis cyanellus* (16%), and *L. megalotis* (14%) were the most common species obtained.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of only fair water quality (Tables X-XI), yet designated as non-supportive according to the macroinvertebrate assemblage (Appendix LXIV). This stream site was classified per fish IBI score as fair (Table XVIII). Overall, biological use support for this site was characterized as partial. This site was characterized by moderately alkaline pH (7.38; Table IV), moderately-low conductivity (128; Table IV), and a stream reach with a mediocre total habitat score (123; Table VI) and with a moderate riffle coverage that was composed mainly of cobble-gravel mix (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-20 (Deserter Creek) was dominated by three taxa (Chironomidae, *Cheumatopsyche* sp., and *Sphaerium* sp.) comprising 96% of the total sample (Appendix LXV). The multihabitat macroinvertebrate sample contributed only two additional taxa (*Centroptilum* sp. and Hydracarina; Appendix LXVI). The fish assemblage was characterized by 14 species, but only a single darter species (*Etheostoma squamiceps*; Appendix LXVII; Table XV). Three species contributed >10% to the total sample: *Lythrurus fasciolaris* (28%), *Lepomis megalotis* (23%), and *Pimephales notatus* (11%).

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of very poor water quality (Tables X-XI), and likewise designated as non-supportive according to the macroinvertebrate assemblage (Appendix LXVIII). In contrast, this stream site was classified per fish IBI score as good (Table XVIII). Overall, biological use support for this site was characterized as partial. This site was characterized by slightly alkaline pH (7.14; Table IV), moderately-low conductivity (187; Table IV), and a stream reach with a mediocre total habitat score (126; Table VI) and with meager riffle coverage that was composed mainly of gravel-sand mix (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-21 (South Fork Panther Creek) was dominated by four taxa (*Cheumatopsyche* sp., Chironomidae, *Stenelmis* sp., and *Baetis* sp.), comprising 93% of the total sample (Appendix LXIX). The multihabitat macroinvertebrate sample contributed an additional seven taxa (*Sphaerium* sp., *Stenacron* sp., *Hexagenia* sp., *Boyeria* sp., *Didymops* sp., *Hydroptila* sp., and *Ancyronyx variegatus*; Appendix LXX). The fish assemblage was

comprised of 16 species, including a pair of species of *Etheostoma* (Appendix LXXI; Table XV). Only three species contributed >10% tot he total sample: *Lepomis megalotis* (35%), *Pimephales notatus* (29%), and *Cyprinella spiloptera* (11%).

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of fair water quality (Tables X-XI), yet designated as non-supportive according to the macroinvertebrate assemblage (Appendix LXXII). This stream site was classified per fish IBI score as fair (Table XVIII). Overall, biological use support for this site was characterized as partial. This site was characterized by moderately alkaline pH (7.43; Table IV), moderately-low conductivity (144; Table IV), and a stream reach with a mediocre total habitat score (108; Table VI) and with meager riffle coverage that was composed mainly of sand interspersed with cobble and gravel (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-22 (East Fork Pond River) was dominated by four taxa (Chironomidae, *Cheumatopsyche* sp., *Stenelmis* sp., and *Acerpenna* sp.) comprising 90% of the total sample (Appendix LXXIII). The multihabitat macroinvertebrate sample contributed an additional seven taxa (Hirudinea, *Macromia* sp., *Acroneuria* sp., *Rheumatobates* sp., *Trepobates* sp., *Culex* sp., and *Palaemonetes* sp.; Appendix LXXIV). The fish assemblage consisted of 18 species, including two species each of *Etheostoma* and *Percina* (Appendix LXXV; Table XV). *Pimephales notatus* (44%) and *Lepomis megalotis* (25%) were easily the most common species obtained.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of fair water quality (Tables X-XI), yet designated as non-supportive according to the macroinvertebrate assemblage (Appendix LXXVI). Similarly, this stream site was classified per fish IBI score as poor (Table XVIII). Overall, biological use support for this site was characterized as non-supportive. This site was characterized by moderately alkaline pH (7.34; Table IV), moderately-low conductivity (191; Table IV), and a stream reach with a mediocre total habitat score (119; Table VI) and with meager riffle coverage that was composed mainly of cobble (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-23 (Buck Fork Pond River) was dominated by five taxa (*Cheumatopsyche* sp., *Stenelmis* sp., Chironomidae, *Neoperla* sp., and

Sphaerium sp.) comprising 93% of the total sample (Appendix LXXVII). The multihabitat macroinvertebrate sample contributed an additional ten taxa (*Elimia* sp., Hirudinea, *Choroterpes* sp., *Caenis* sp., *Centroptilum* sp., *Procloeon* sp., *Argia* sp., *Boyeria* sp., *Nasiaeschna* sp., *Gyretes* sp., and *Crangonyx* sp.; Appendix LXXVIII). The fish assemblage was characterized by 17 total species, including three *Etheostoma* species and a single species of *Percina* (Appendix LXXIX; Table XV). Only one species comprised >10% of the total sample (*Pimephales notatus*, 56%).

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of fair water quality (Tables X-XI), yet designated as non-supportive according to the macroinvertebrate assemblage (Appendix LXXX). This stream site was classified per fish IBI score as fair (Table XVIII). Overall, biological use support for this site was characterized as partial. This site was characterized by neutral pH (7.00; Table IV), moderately-low conductivity (210; Table IV), and a stream reach with a poor total habitat score (91; Table VI) and with meager riffle coverage that was composed mainly of cobble-gravel-sand mix (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-24 (Buck Creek) was dominated by seven taxa (Chironomidae, *Cheumatopsyche* sp., *Caenis* sp., *Lirceus* sp., *Acerpenna* sp., *Stenelmis* sp., and *Hydropsyche* sp.) comprising 97% of the total sample (Appendix LXXXI). The multihabitat macroinvertebrate sample contributed one additional taxon (*Lioporeus* sp.; Appendix LXXXII). The fish assemblage consisted of 17 species, including a trio of *Etheostoma* species (Appendix LXXXIII; Table XV). A high number of individuals were obtained (807) and two species, *Campostoma oligolepis* (26%) and *Pimephales notatus* (23%), comprised nearly half of the sample.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of poor water quality (Tables X-XI), and likewise designated as non-supportive according to the macroinvertebrate assemblage (Appendix LXXXIV). In contrast, this stream site was classified per fish IBI score as good (Table XVIII). Overall, biological use support for this site was characterized as partial. This site was characterized by slightly alkaline pH (7.10; Table IV), moderately-low conductivity (243; Table IV), and a stream reach with a fair total habitat score (148;

Table VI) and with meager riffle coverage that was composed mainly of cobble-gravel mix (Table VIII). In addition, bedrock-dominated runs were a dominant geomorphic feature at this site.

The composite macroinvertebrate riffle sample of GRBEX-26 (East Branch West Fork Pond River) was dominated by six taxa (Chironomidae, *Corbicula fluminea*, *Neoperla* sp., *Stenelmis* sp. *Cheumatopsyche* sp., and *Elimia* sp.) comprising 83% of the total sample (Appendix LXXXV). The multihabitat macroinvertebrate sample contributed an additional eight taxa (*Physella* sp., *Sphaerium* sp., *Centroptilum* sp., *Hydroptila* sp., *Phylocentropus* sp., *Polycentropus* sp., *Limonia* sp., and *Pseudolimnophila* sp.; Appendix LXXXVI). The fish assemblage was comprised of only 14 species, with only a solitary darter species (*Etheostoma stigmaeum*; Appendix LXXXVII; Table XV). Four species, *Lepomis megalotis* (37%), *Pimephales notatus* (20%), *L. macrochirus* (19%), and *Lythrurus fasciolaris* (9%), contributed to the lion's share of individuals obtained.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of fair water quality (Tables X-XI), yet designated as non-supportive according to the macroinvertebrate assemblage (Appendix LXXXVIII). This stream site was classified per fish IBI score as fair (Table XVIII). Overall, biological use support for this site was characterized as partial. This site was characterized by moderately alkaline pH (7.30; Table IV), moderately-low conductivity (183; Table IV), and a stream reach with a mediocre total habitat score (134; Table VI) and with meager riffle coverage that was composed mainly of sand interspersed with cobble and gravel (Table VIII).

The composite macroinvertebrate riffle sample of GRBEX-27 (Elk Pond Creek) was not characterized by any particular set of taxa, as only 25 individuals representing eight taxa were recovered from the kick-seine sample (Appendix LXXXIX). The multihabitat macroinvertebrate sample only contributed one additional taxon (out of only 18 specimens), an immature Libellulidae individual (Appendix XC). Only five fish species across 61 individuals were obtained from this site (Appendix XCI; Table XV). The dominant species within this small sample were *Lepomis macrochirus* (38%), *Gambusia affinis* (33%), and *Cyprinella spiloptera* (21%).

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of very poor water quality and generated the lowest MBI score from this project (Tables X-XI), and likewise designated as non-supportive according to the macroinvertebrate assemblage (Appendix XCII). In contrast, this stream site was classified per fish IBI score as good (Table XVIII). Overall, biological use support for this site was characterized as partial. This site was characterized by moderately-low conductivity (137; Table IV), and a stream reach with a very poor total habitat score (65; Table VI) and with poor riffle coverage (Table VIII). The dominant hydro-geomorphic features were shallow runs flowing over sand and slits. Due to instrument error, pH data was not obtained at this site.

The composite macroinvertebrate riffle sample of GRBEX-29 (Pleasant Run) was dominated by three taxa (Chironomidae, *Sialis* sp., and *Probezzia* sp.) comprising 96% of the total sample (Appendix XCIII), although only seven taxa in total were obtained. The multihabitat macroinvertebrate sample did not contribute any additional taxa (Appendix XCIV). No fish were obtained at this site.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of very poor water quality (Tables X-XI), and likewise designated as non-supportive according to the macroinvertebrate assemblage (Appendix XCV). Due to the lack of fish collected, this stream site was classified per fish IBI score as very poor (Table XVIII). Overall, biological use support for this site was characterized as non-supportive. This site was characterized by very acidic pH and the lowest values recorded during this study (3.43; Table IV), and likewise the highest conductivity values (1341; Table IV), and a stream reach with a poor total habitat score (77; Table VI) and with poor riffle coverage (Table VIII). Similar to GRBEX-27, although influenced by distinctive local landuse features, the dominant hydro-geomorphic feature were shallow runs flowing over sand and slits.

The composite macroinvertebrate riffle sample of GRBEX-30 (Flat Creek) was dominated by three taxa (Chironomidae, Oligochaeta, and *Sialis* sp.) comprising 92% of the total sample (Appendix XCVI). The multihabitat macroinvertebrate sample contributed an additional three taxa

(*Polycentropus* sp., *Tropisternus* sp., and *Ceratopogon* sp.; Appendix XCVII). No fish were collected form this site.

Similar to GRBEX-29, both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of poor water quality (Tables X-XI), and likewise designated as non-supportive according to the macroinvertebrate assemblage (Appendix XCVIII). Due to the lack of fish collected, this stream site was classified per fish IBI score as very poor (Table XVIII). Overall, biological use support for this site was characterized as non-supportive. Also similar to GRBEX-29, this site was characterized by very acid pH (4.65; Table IV), high conductivity (965; Table IV), and a stream reach with a poor total habitat score (91; Table VI) and with meager riffle coverage that was composed mainly of gravel-sand mix (Table VII).

Low-Gradient Sites: Green River Basin

The composite low-gradient macroinvertebrate sample of GRBEX-13 (Bat East Creek) was not dominated by any particular taxon, as Chironomidae comprised 74% of the total sample and no additional taxon contributed > 4% (Appendix IC). The fish assemblage at this site was comprised of 17 species, including a single individual of *Amia calva* (Appendix C; Table XV). Four species, *Lepomis macrochirus* (43%), *Lythrurus fasciolaris* (20%), *Labidesthes sicculus* (16%), and *Lepomis megalotis* (9%), provided the majority of collected individuals.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of poor water quality (Tables XII-XIII), and likewise designated as non-supportive according to the macroinvertebrate assemblage (Appendix CI). Similarly, this stream site was classified per fish IBI score as poor (Table XVIII). Overall, biological use support for this site was characterized as non-supportive. This site was characterized by moderately-alkaline pH (7.48; Table V), low conductivity (159; Table V), and a stream reach with a poor total habitat score (85; Table VII).

The composite low-gradient macroinvertebrate sample of GRBEX-15 (Lewis Creek) was not dominated by any particular taxon. The most abundant taxa (*Chironomidae*, *Munroessa*/*Synclita* sp., and *Caenis* sp.) only comprised 67% of the total sample (Appendix CII). Only eight species across

24 individuals of fish were collected at this site (Appendix CIII; Table XV). The only fish species were >1 individual were obtained were *Lepomis megalotis* and *L. macrochirus*.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of poor water quality (Tables XII-XIII), and likewise designated as non-supportive according to the macroinvertebrate assemblage (Appendix CIV). Similarly, this stream site was classified per fish IBI score as very poor (Table XVIII). Overall, biological use support for this site was characterized as non-supportive. This site was characterized by moderately-alkaline pH (7.51; Table VII), moderately-low conductivity (201; Table VII), and a stream reach with a high total habitat score (164; Table VII).

The composite low-gradient macroinvertebrate sample of GRBEX-17 (Caney Creek) was dominated by four taxa (*Stenonema* sp., Chironomidae, *Stenacron* sp., and *Stenelmis* sp.), comprising 85% of the total sample (Appendix CV). Twelve species of fish were collected at this site (Appendix CVI; Table XV). Four species, *Lepomis macrochirus* (33%), *L. megalotis* (19%), *Pimephales notatus* (14%), and *Labidesthes sicculus* (11%), comprised the majority of collected individuals.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of only good water quality (Tables XII-XIII), yet likewise designated as fully-supportive according to the macroinvertebrate assemblage (Appendix CVII). In contrast, this stream site was classified per fish IBI score as poor (Table XVIII). Overall, biological use support for this site was characterized as partial. This site was characterized by slightly alkaline pH (7.19; Table V), moderately-low conductivity (161; Table V), and a stream reach with a mediocre total habitat score (105; Table VII).

The composite low-gradient macroinvertebrate sample of GRBEX-25 (Jarrels Creek) was dominated by four taxa (*Palaemonetes* sp., immature Corixidae, Chironomidae, and *Caenis* sp.), comprising 74% of the total sample (Appendix CVIII). Only eight fish species across 45 individuals were obtained form this site (Appendix CIX; Table XV), with *Lepomis macrochirus* (44%) and *Gambusia affinis* (29%) as the most abundant species.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of poor water quality (Tables XII-XIII), and likewise designated as non-supportive according to the macroinvertebrate assemblage (Appendix CX). Similarly, this stream site was classified per fish IBI score as poor (Table XVIII). Overall, biological use support for this site was characterized as partial. This site was characterized by moderately-low conductivity (250; Table V), and a stream reach with a poor total habitat score (85; Table VII). The habitat score is hardly surprising as this stream reach has been channelized. Due to instrument error, pH data was not obtained at this site.

The composite low-gradient macroinvertebrate sample of GRBEX-28 (Craborchard Creek) was characterized by only one particularly dominant taxon (Chironomidae; Appendix CXI). The fish assemblage was characterized by only nine species, including three individuals of *Etheostoma gracile* (Appendix CXII; Table XV). In particular, three species, *Lepomis macrochirus* (54%), *Fundulus olivaceus* (22%), and *Aphredoderus sayanus* (10%) each contributed >10% to the total sample.

Both the individual macroinvertebrate metric scores and the MBI values are indicative of a stream of poor water quality (Tables XII-XIII), and likewise designated as non-supportive according to the macroinvertebrate assemblage (Appendix CXIII). Overall, biological use support for this site was characterized as partial. This stream site was classified per fish IBI score as fair (Table XVIII). This site was characterized by moderately-low pH (7.15; Table V), moderate conductivity (383; Table V), and a stream reach with a poor total habitat score (98; Table VII).

Ordinations

Examination of the environmental DCA ordination plots revealed that there was reasonable separation of low-gradient and high-gradient sites (Fig. IA), yet not a considerable distinction between sites according to ecoregions (Fig. IB). Similarly, both macroinvertebrate and fish assemblages were separated more effectively according to gradient (Figs. IIA, IIIA) than ecoregion (Figs. IIB, IIIB).

Overall, examination of the physical and water chemistry variables indicated that no individual

Table XIX. Summary of CCA eigenvalues and cumulative percentage of macroinvertebrate taxa data explained on the first three canonical axes.

	Axis 1	Axis 2	Axis 3
Eigenvalue	10.3	8.2	6.5
Cumulative % variance of species data explained	10.3	18.5	25.0

Table XX. Summary of CCA eigenvalues and cumulative percentage of fish species data explained on the first three canonical axes.

	Axis 1	Axis 2	Axis 3
Eigenvalue	14.5	7.7	9.8
Cumulative % variance of species data explained	14.5	22.2	32.0

parameter strongly structured macroinvertebrate assemblages. The first three canonical axes accounted for only 25% of the variance for macroinvertebrate abundance data (Table XIX). The CCA biplot Axis 1 revealed a gradient of geomorphology, associated hydrologic parameters (e.g., % pool and % fine substrates), and habitat quality, but the second axis contributed little to separation of sites in ordination space (Figs. IVA, IVB). The relative isolation of both low-gradient and Ecoregion 72 sites, although understandably the majority of the low-gradient streams were located in this Ecoregion, was mainly geomorphic and hydrologic. Similar to the environmental-macroinvertebrae relationship, the first three canonical axes accounted for relatively little variance (32%) for fish species abundance data (Table XX). The first axis alone, however, contributed to separation of sites in ordination space (Figs. VA, VB). The CCA biplot Axis 1 revealed a gradient mainly of geomorphology and associated hydrologic parameters.

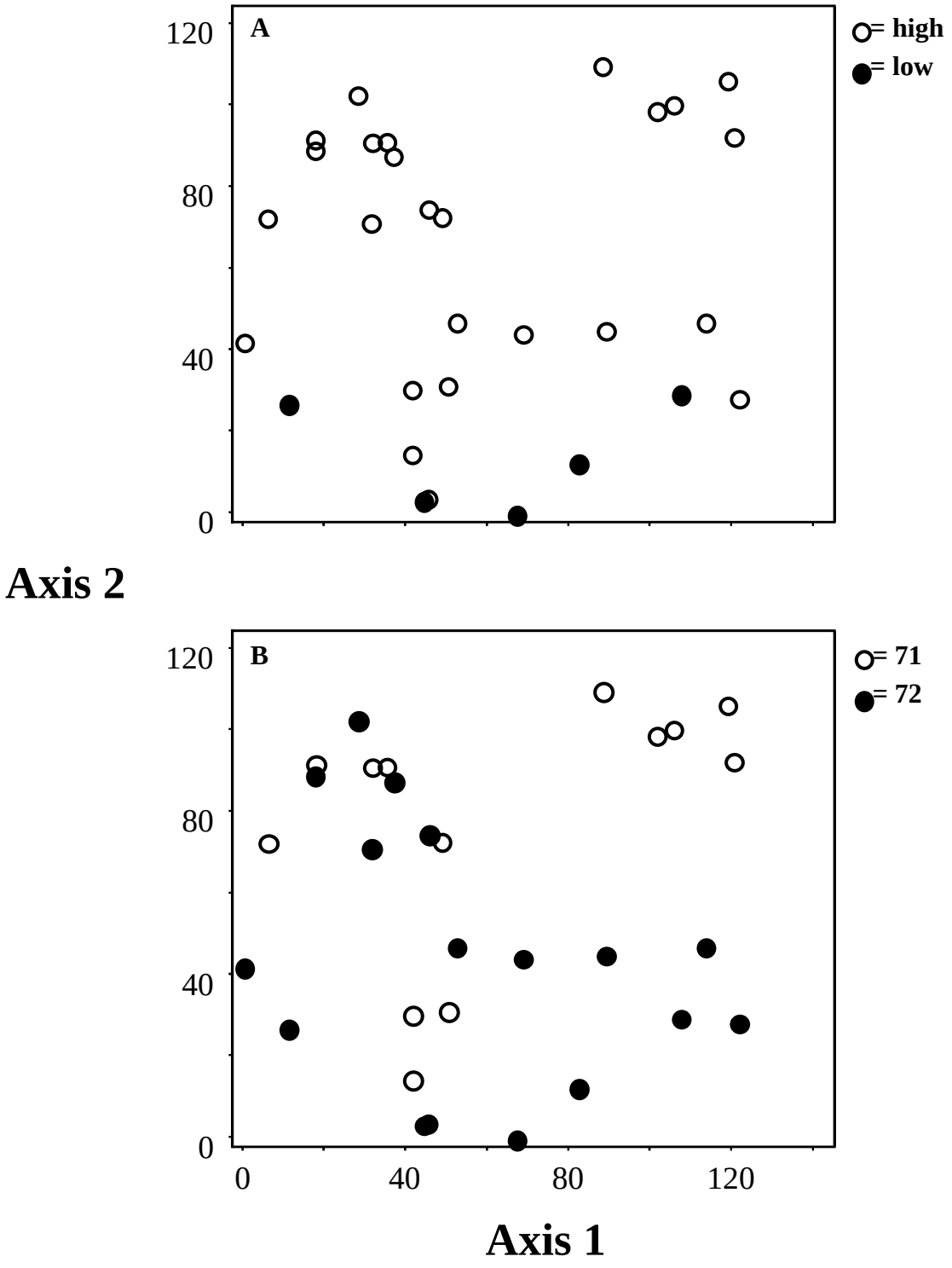

Figure I. Detrended correspondence analysis (DCA) ordination plot of sites according to environmental data. A = DCA plot with sites coded as either high-gradient or low gradient; B = DCA plot of sites coded as either located in Level III Ecoregion 71 (Interior Plateau) or Ecoregion 72 (Interior River Valley and Hills).

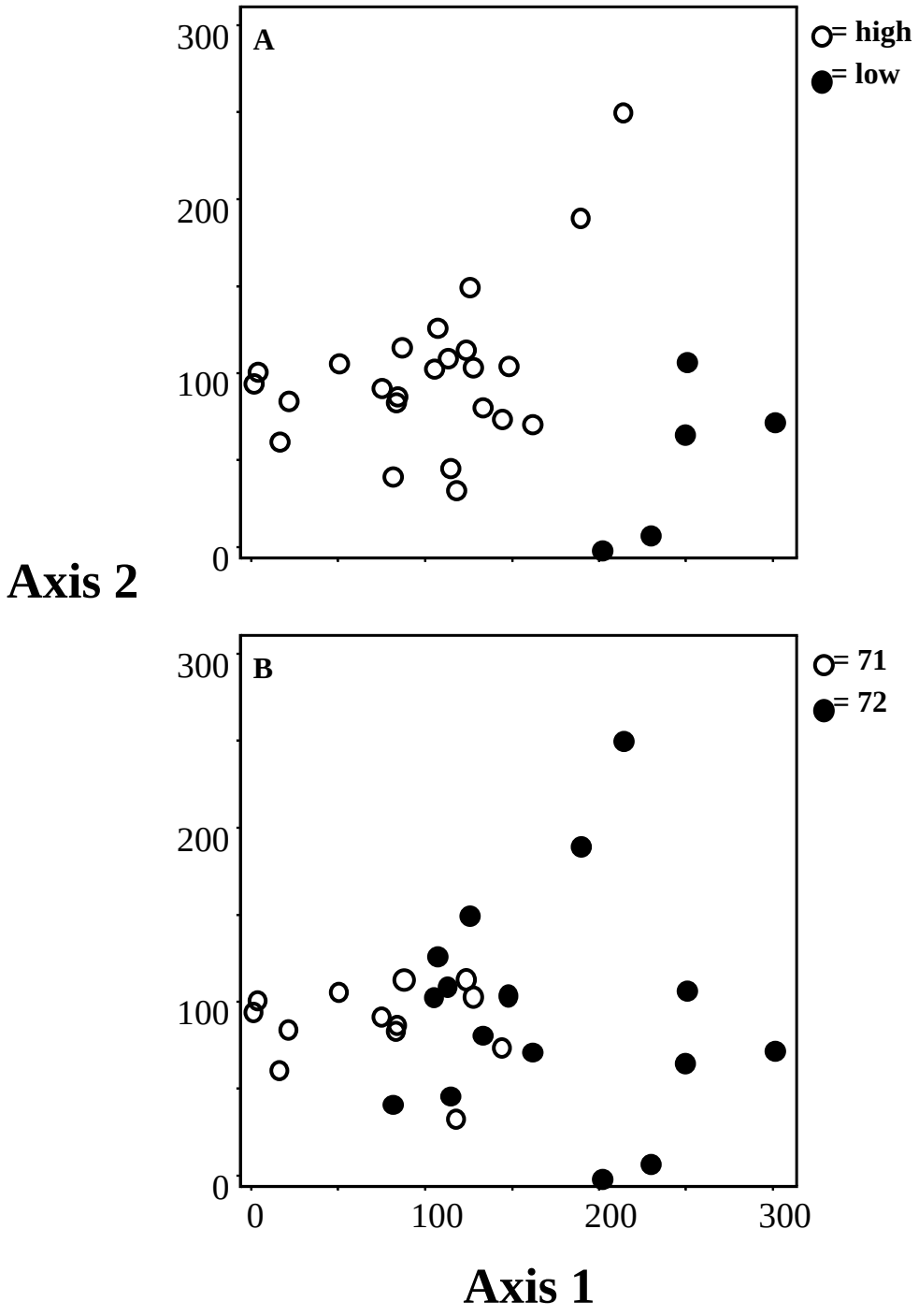

Figure II. Detrended correspondence analysis (DCA) ordination plot of sites according to macroinvertebrate abundance data. A = DCA plot with sites coded as either high-gradient or low gradient; B = DCA plot of sites coded as either located in Level III Ecoregion 71 (Interior Plateau) or Ecoregion 72 (Interior River Valley and Hills).

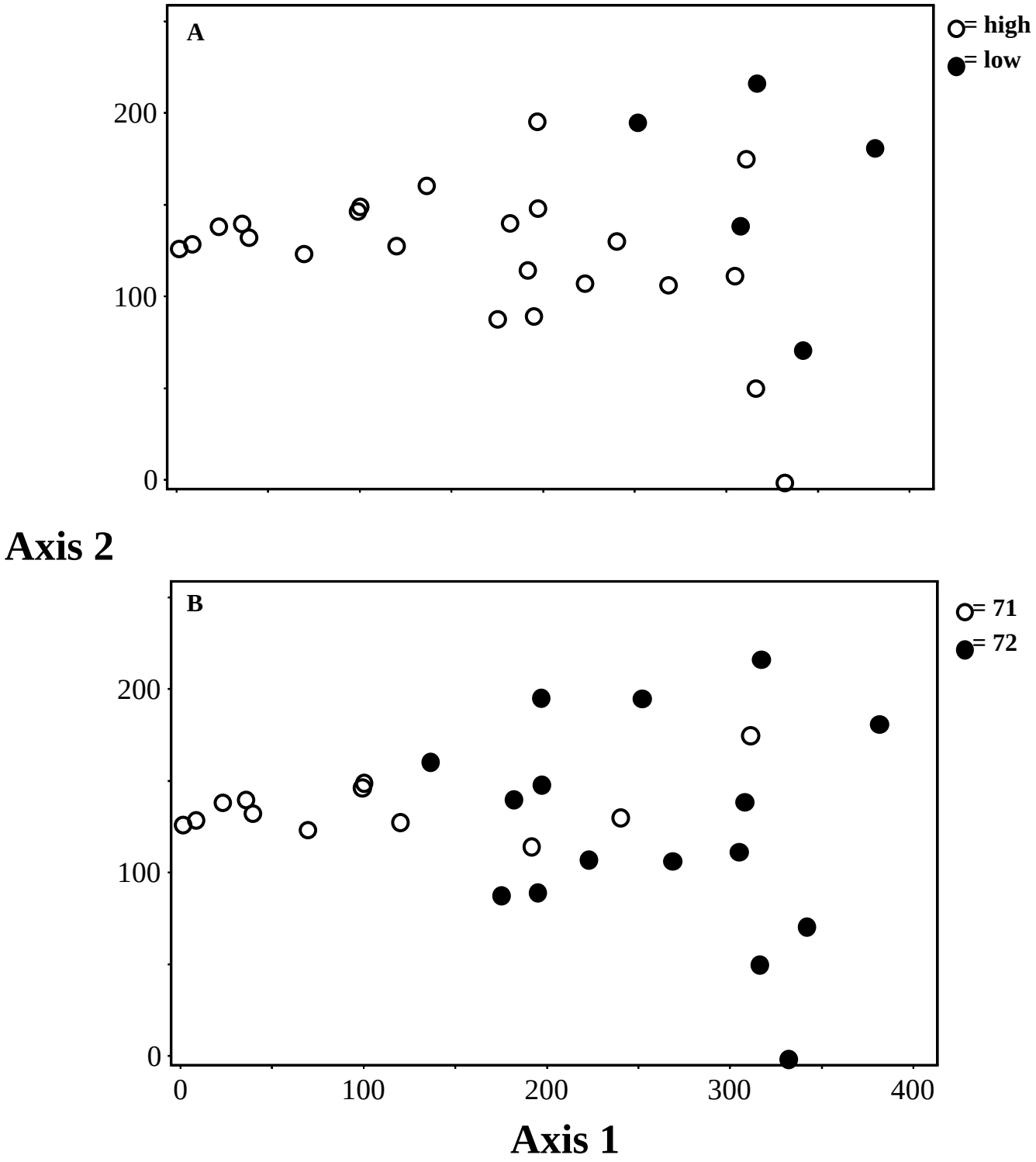

Figure III. Detrended correspondence analysis (DCA) ordination plot of sites according to fish abundance data. A = DCA plot with sites coded as either high-gradient or low gradient; B = DCA plot of sites coded as either located in Level III Ecoregion 71 (Interior Plateau) or Ecoregion 72 (Interior River Valley and Hills).

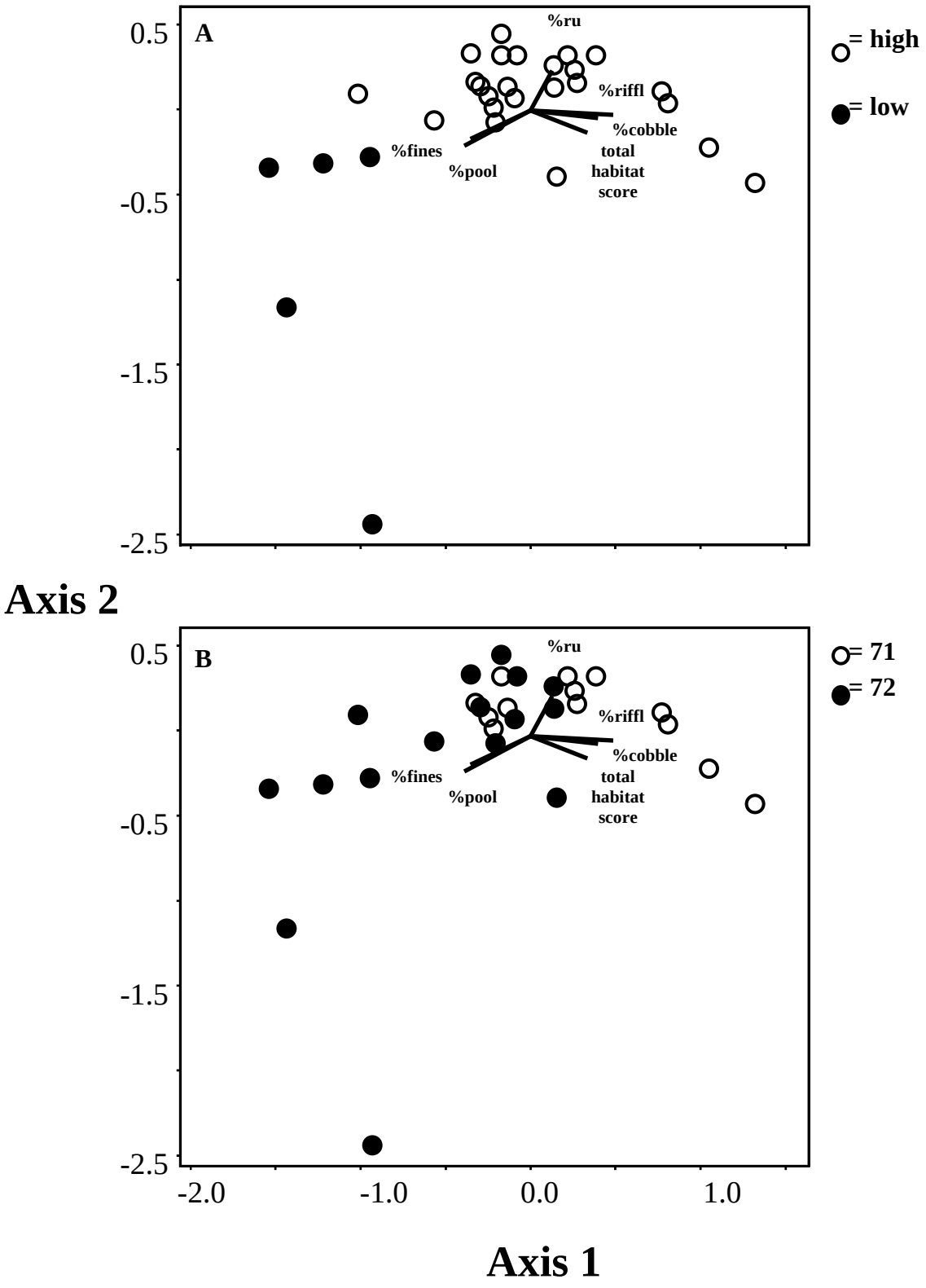

Figure IV. Canonical correspondence analysis (CCA) biplots of sites according to macroinvertebrate abundance data. A = CCA plot with sites coded as either high-gradient or low gradient; B = CCA plot of sites coded as either located in Level III Ecoregion 71 (Interior Plateau) or Ecoregion 72 (Interior River Valley and Hills).

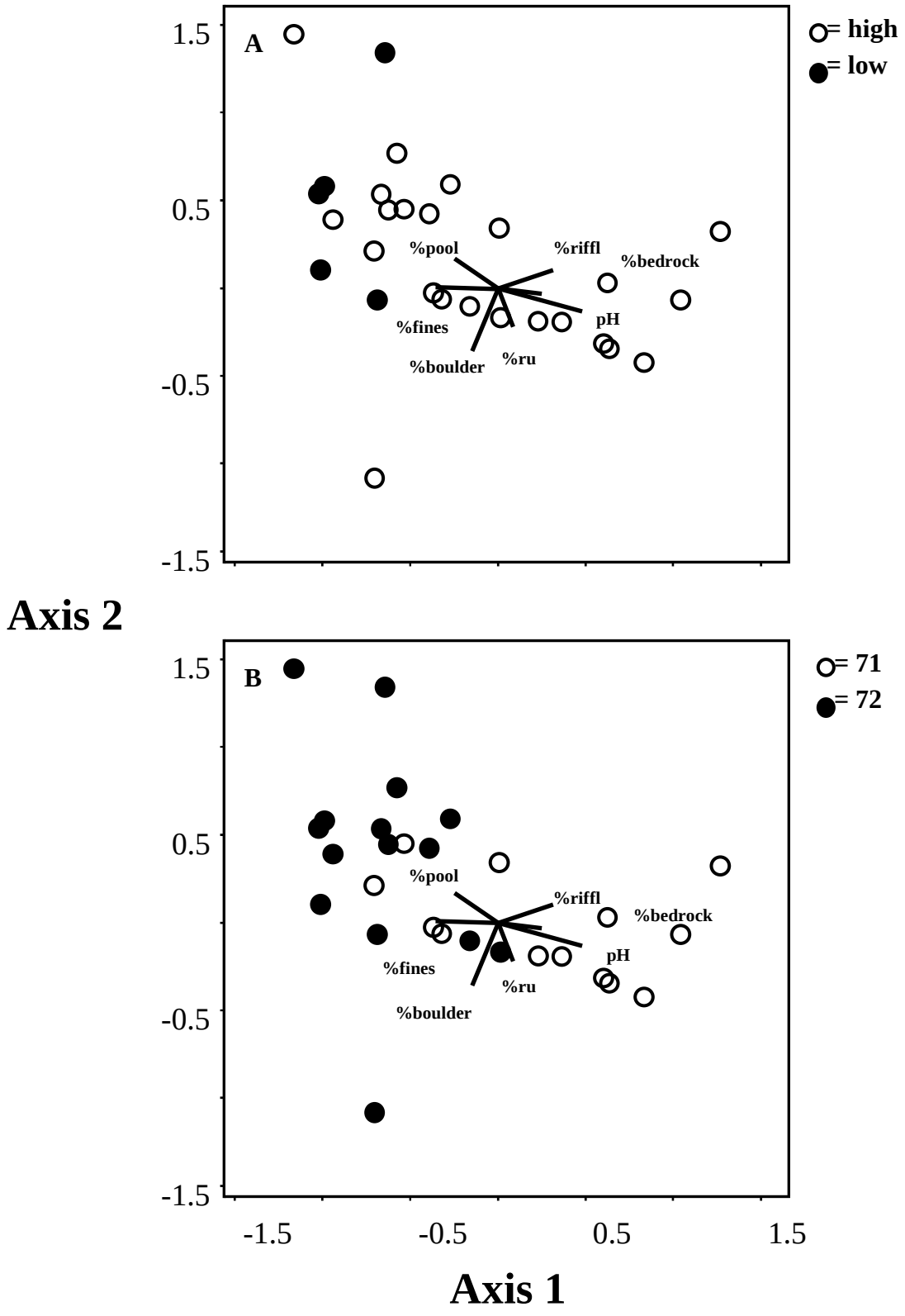

Figure V. Canonical correspondence analysis (CCA) biplots of sites according to fish abundance data. A = CCA plot with sites coded as either high-gradient or low gradient; B = CCA plot of sites coded as either located in Level III Ecoregion 71 (Interior Plateau) or Ecoregion 72 (Interior River Valley and Hills).

V. Summary and Conclusions

This project revealed few sites of exceptional water quality as defined by biological attributes. According to macroinvertebrate assemblage data, only one site total (low-gradient) was designated as providing full biological support. In contrast, 11 of 25 high-gradient sites were characterized by fish data as providing at least good biological support. All five low-gradient sites were designated no better than fair. Additionally, two sites (GRBEX-29, Pleasant Run; GRBEX-30, Flat Creek) in Hopkins County lacked fish and each were clearly impacted by acid mine drainage emananting form the Western Kentucky Coalfield as evidenced by pH values of 3.4 and 4.7, respectively. Ordination analysis by detrended correspondence analysis (DCA) revealed a relatively clear separation of sites categorized as either high- or low-gradient according toenviro nmental parameters and biota (i.e., macroinvertebrate and fish assemblages). In contrast, DCA showed a much less evident separation of sites as defined by Level III Ecoregion 71 (Interior Plateau) and Ecoregion 72 (Interior River Valley and Hills). The latter ordination demonstrated a similar pattern with environmental and biological parameters. The relative unimportance of geography, coupled with the apparent importance of geomorphic and associated hydrologic characteristics, suggest that local scale habitat features at least partially regulate both fish macroinvertebrate assemblage composition across the 30 sampling sites.

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Appendices

Appendix A. Financial and administrative closeout.

Milestone	Expected Begin Date	Expected End Date	Actual Begin Date	Actual End Date
1. Submit all draft materials to the Division of Water, Nonpoint Source Section for review and approval	Duration			
2. Submit Annual Reports and/or participate in Division of Water sponsored NPS Conference(s)	Duration			
3. Request most current Final and Close Out Report Guidelines	Jun.02	Oct.02	Oct.02	Oct.02
4. Submit three copies of Final and Close Out Reports and submit three copies of all products produced by this project	Oct.02	Oct.02	Oct.02	Aug.03
5. Select 30 sites in the Green River basin	Apr.01	Jun.01	Jun.01	Jun.01
6. Collect biological samples from all sites	Apr.01	Sep.01	Jun.01	Sep.01
7. Taxonomic identification of biological samples	Jun.01	Dec.01	Jul.01	Aug.02
8. Calculation of IBI and macroinvertebrate metrics and assessments presented to ESS for inclusion in watershed monitoring report	Jan.02	Oct.02	Oct.01	Dec.02
9. Written report with assessments of biological data submitted to NPS Section	Nov.02	Nov.02	Jan.03	Aug.03

Appendix A. Cont.

Workplan outputs

1.) The only drafted materials that were submitted were (a) sampling protocols for fecal coliform bacteria, and (b) QA/QG guidelines. Both were approved prior to funding.

2.) The final report is submitted here.

3.) The Final and Closeout Reports were initiated October 2002. Guidelines were requested.

4.) The Final and Closeout Reports were submitted within this final report.

5.) Field reconnaissance for selection of 30 sites transpired June 18-27, 2001.

6.) Sampling for aquatic macroinvertebrates occurred between June 20 and July 27, 2001. Sampling for fish from all 30 sites transpired between July 29 and September 24, 2001.

7.) Identification of macroinvertebrates (except Chironomidae) was completed for riffle habitats from 25 sites treated as high-gradient. Identification of macroinvertebrates from other habitats (i.e., non-riffle or "multihabitat") in high-gradients was completed. Identification of macroinvertebrates from the five streams treated as low-gradient was completed. Identification of fish from all 30 sites was completed.

8.) Calculation of metrics and IBI for fish were completed for all 30 sites. Calculation of metrics for macroinvertebrates was completed for 25 sites treated as high-gradient. Metric calculation for macroinvertebrates from the five low-gradient streams, and from "multihabitat" samples in the high-gradient streams was completed.

9.) Submitted as part of final report.

Appendix A.
Cont.

Detailed Budget

Budget Categories	Section 319 (h)	Non-Federal Match	Total
Personnel	$ 41,902	$ 16,000	$ 57,902
Supplies	$ 78	$ 1,780	$ 1,858
Equipment	$ -	$ 5,800	$ 5,800
Travel	$ -	$ 6,900	$ 6,900
Contractual	$ -	$ 1,000	$ 1,000
Operating Costs	$ 8,020	$ 3,520	$ 11,540
Other	$ -	$ -	$ -
Total	$ 50,000	$ 35,000	$ 85,000

All federal dollars budgeted originally ($50,000) were expended

Appendix B. DOW-approved Quality Assurance / Quality-Control Plan (QA/QC).

Quality Assurance / Quality Control

All standard QA/QC procedures, as outlined in DOW Quality Assurance Guideline (1986), will be followed by the contractor. Selected and random WKU collections will be examined by ESS and/or SSS personnel to ensure consistency in taxa identification. The internal DOW protocols and quality assurance guidelines mentioned above are a part of the EPA-approved DEP QA/QC plan. A QA/QC plan has been submitted to the DOW for approval. All monitoring activities conducted as part of this project will be consistent with the approved QA/QC plan.

Appendix I. Macroinvertebrate taxa list for GRBEX-01 (Glens Fork, Russell Creek) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			43
CRUSTACEA			
	Asellidae		
		Lirceus sp.	1
	Cambaridae		
		Orconectes sp.	5
	Gammaridae		
		Gammarus sp.	1
MOLLUSCA			
	Pleuroceridae		
		Elimia sp.	15
	Sphaeriidae		
		Pisidium sp.	7
EPHEMEROPTERA			
	Baetidae		
		Baetis sp.	149
		Procloeon sp.	13
	Caenidae		
		Caenis sp.	3
	Heptageniidae		
		Stenacron sp.	4
		Stenonema sp.	272
	Isonychiidae		
		Isonychia sp.	5
ODONATA			
	Aeshnidae		
		Boyeria sp.	1
	Gomphidae		
		Stylogomphus albistylus	8
PLECOPTERA			
	Perlidae		
		Neoperla sp.	20
		Perlesta sp.	8
HEMIPTERA			
	Veliidae		
		Microvelia sp.	2
MEGALOPTERA			
	Corydalidae		
		Nigronia sp.	112
NEUROPTERA			
	Sialidae		
		Sialis sp.	16
TRICHOPTERA			
	Brachycentridae		
		Micrasema sp.	10
	Helicopsychidae		
		Helicopsyche sp.	2

Appendix I. Cont.

Taxon			
	Hydropsychidae		
		Cheumatopsyche sp.	354
		Hydropsyche sp.	11
COLEOPTERA			
	Elmidae		
		Optioservus sp.	2
		Stenelmis sp.	404
	Hydrophilidae		
		Cercyon sp.	1
	Psephenidae		
		Ectopria sp.	6
		Psephenus herricki	17
DIPTERA			
	Ceratopogonidae		
		Probezzia sp.	2
	Chironomidae		
	Empididae		322
		Hemerodromia sp.	1
	Tabanidae		
		Tabanus sp.	1
	Tipulidae		
		Hexatoma sp.	3
		Tipula sp.	1
		SUM	**1822**

Appendix II. Macroinvertebrate taxa list for GRBEX-01 (Glens Fork, Russell Creek) based on high-gradient, multihabitat sampling.

Taxon			
CRUSTACEA			
	Cambaridae		
		Orconectes sp.	2
MOLLUSCA			
	Pleuroceridae		
		Elimia sp.	8
		Pleurocera sp.	16
EPHEMEROPTERA			
	Baetidae		
		Baetis sp.	12
		Procloeon sp.	6
	Caenidae		
		Caenis sp.	9
	Heptageniidae		
		Stenacron sp.	2
		Stenonema sp.	31
	Leptophlebiidae		
		Choroterpes sp.	3
PLECOPTERA			
	Perlidae		
		Neoperla sp.	1
MEGALOPTERA			
	Corydalidae		
		Nigronia sp.	1
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	5
		Hydropsyche sp.	2
	Uenoidae		
		Neophylax sp.	1
COLEOPTERA			
	Elmidae		
		Stenelmis sp.	2
	Psephenidae		
		Ectopria sp.	1
		Psephenus herricki	5
DIPTERA			
	Chironomidae		93
		SUM	**200**

Appendix III. Fish species list for GRBEX-01 (Glens Fork, Russell Creek).

Taxon	
Ambloplites rupestris	2
Campostoma oligolepis	49
Catostomus commersoni	6
Cottus carolinae	5
Cyprinella spiloptera	4
Etheostoma blennoides	18
E. caeruleum	32
E. flabellare	2
E. rafinesquei	122
E. spectabile	31
Fundulus catenatus	7
Lepomis cyanellus	1
L. megalotis	18
Lythrurus fasciolaris	2
Notropis photogenis	7
Pimephales notatus	133
SUM	**439**

Appendix IV. Stream usage assessment for GRBEX-01 (Glens Fork, Russell Creek).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: GLENS FORK RUSSELL CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 492907 Segment No.: __ __Station ID: WKU0301 (GRBEX-01)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: RUSSELL CREEK

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110001

County 1: ADAIR County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: COLUMBIA

Latitude: 37.0520 Longitude: -85.2643 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 06-25-01 (Macroinvertebrate), 08-03-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 1400
Cause Code: 1600__ Source Code(s): 1400, 7550
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix V. Macroinvertebrate taxa list for GRBEX-02 (Russell Creek) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			19
CRUSTACEA			
	Cambaridae		
		Orconectes sp.	3
MOLLUSCA			
	Pleuroceridae		
		Elimia sp.	186
		Pleurocera sp.	2
EPHEMEROPTERA			
	Baetidae		
		Acentrella sp.	1
		Baetis sp.	40
	Caenidae		
		Caenis sp.	9
	Ephemeridae		
		Hexagenia sp.	3
	Heptageniidae		
		Leucrocuta sp.	2
		Stenacron sp.	2
		Stenonema sp.	99
	Isonychiidae		
		Isonychia sp.	39
	Tricorythidae		
		Tricorythodes sp.	2
PLECOPTERA			
	Leuctridae		
		Leuctra sp.	7
	Perlidae		
		Acroneuria sp.	1
		Neoperla sp.	17
HEMIPTERA			
	Veliidae		
		Microvelia sp.	5
MEGALOPTERA			
	Corydalidae		
		Corydalus cornutus	4
		Nigronia sp.	5
NEUROPTERA			
	Sialidae		
		Sialis sp.	2
TRICHOPTERA			
	Glossosomatidae		
		Protoptila sp.	4
	Helicopsychidae		
		Helicopsyche sp.	1

Appendix V. Cont.

Taxon			
	Hydropsychidae		
		Cheumatopsyche sp.	130
		Hydropsyche sp.	4
	Philopotamidae		
		Chimarra sp.	1
	Uenoidae		
		Neophylax sp.	1
LEPIDOPTERA			
	Pyralidae		
		Petrophila sp.	1
COLEOPTERA			
	Elmidae		
		Macronychus glabratus	1
		Stenelmis sp.	317
	Psephenidae		
		Psephenus herricki	38
DIPTERA			
	Athericidae		
		Atherix sp.	1
	Chironomidae		20
	Simuliidae		
		Simulium sp.	3
	Tanyderidae		
		Protoplasa fitchii	1
		SUM	**971**

Appendix VI. Macroinvertebrate taxa list for GRBEX-02 (Russell Creek) based on high-gradient, multihabitat sampling.

Taxon			
OLIGOCHAETA			4
CRUSTACEA			
	Asellidae		
		Caecidotea sp.	49
	Talitridae		
		Hyalella azteca	91
MOLLUSCA			
	Corbiculiidae		
		Corbicula fluminea	8
	Physidae		
		Physella sp.	19
	Planorbidae		
		Helisoma sp.	14
	Sphaeriidae		
		Pisidium sp.	2
		Sphaerium sp.	6
EPHEMEROPTERA			
	Baetidae		
		Centroptilum sp.	1
	Caenidae		
		Caenis sp.	11
	Heptageniidae		
		Stenacron sp.	5
		Stenonema sp.	5
ODONATA			
	Aeshnidae		
		Basiaeschna sp.	1
	Coenagrionidae		
		Enallagma sp.	2
	Libellulidae		
		Neurocordulia sp.	1
NEUROPTERA			
	Sialidae		
		Sialis sp.	6
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	5
		Hydropsyche sp.	2
COLEOPTERA			
	Elmidae		
		Dubiraphia sp.	7
		Stenelmis sp.	1
	Gyrinidae		
		Dineutus sp.	1

Appendix VI. Cont.

Taxon		
DIPTERA		
	Ceratopogonidae	
	Bezzia sp.	1
	Chironomidae	74
	SUM	**316**

Appendix VII. Fish species list for GRBEX-02 (Russell Creek).

Taxon	
Ambloplites rupestris	5
Campostoma oligolepis	65
Cottus carolinae	1
Cyprinella spiloptera	2
C. whipplei	1
Erimystax dissimilis	7
Etheostoma bellum	2
E. blennoides	16
E. caeruleum	3
E. rafinesquei	2
E. stigmaeum	16
E. zonale	1
Fundulus catenatus	15
Hybopsis amplops	1
Hypentelium nigricans	25
Ichthyomyzon bdellium	1
Lepisosteus osseus	1
Lepomis cyanellus	1
L. macrochirus	5
L. megalotis	66
Luxilis fasciolaris	125
Lythrurus fasciolaris	17
Micropterus dolomieu	4
M. punctulatus	5
Moxostoma erythrurum	30
Notropis photogenis	47
N. rubellus	6
Percina maculata	2
P. stictogaster	8
Pimephales notatus	217
SUM	**697**

Appendix VIII. Stream usage assessment for GRBEX-02 (Russell Creek).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: RUSSELL CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 502521 Segment No.: __ __Station ID: WKU0302 (GRBEX-02)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: GREEN RIVER

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110001

County 1: ADAIR County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: COLUMBIA

Latitude: 37.1053 Longitude: -85.2883 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 06-25-01 (macroinvertebrate), 07-02-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550_____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix IX. Macroinvertebrate taxa list for GRBEX-03 (Butlers Fork, Russell Creek) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			1
CRUSTACEA			
	Asellidae		
		Lirceus sp.	2
	Cambaridae		
		Orconectes sp.	2
MOLLUSCA			
	Corbiculiidae		
		Corbicula fluminea	5
	Physidae		
		Physella sp.	1
EPHEMEROPTERA			
	Baetidae		
		Baetis sp.	178
		Procloeon sp.	2
	Caenidae		
		Caenis sp.	1351
	Heptageniidae		
		Stenacron sp.	2
		Stenonema sp.	29
		immature heptageniid	19
	Isonychiidae		
		Isonychia sp.	6
ODONATA			
	Gomphidae		
		Stylogomphus albistylus	1
PLECOPTERA			
	Perlidae		
		Neoperla sp.	9
		Perlesta sp.	1
HEMIPTERA			
	Veliidae		
		Microvelia sp.	2
MEGALOPTERA			
	Corydalidae		
		Corydalus sp.	2
		Nigronia sp.	17
NEUROPTERA			
	Sialidae		
		Sialis sp.	3
TRICHOPTERA			
	Brachycentridae		
		Micrasema sp.	1
	Hydropsychidae		
		Cheumatopsyche sp.	1189
		Hydropsyche sp.	36

Appendix IX. Cont.

Taxon			
	Hydroptilidae		
		Agraylea sp.	2
	Philopotamidae		
		Chimarra sp.	12
	Polycentropodidae		
		Polycentropus sp.	1
COLEOPTERA			
	Dytiscidae		
		Cybister sp.	1
		Hydroporus sp.	10
	Elmidae		
		Optioservus sp.	
		Stenelmis sp.	400
	Hydrophilidae		
		Enochrus sp.	1
		Helocombus sp.	1
		Laccobius sp.	3
		Tropisternus sp.	2
	Psephenidae		
		Ectopria sp.	4
		Psephenus herricki	5
DIPTERA			
	Ceratopogonidae		
		immature ceratopogonid	10
	Chironomidae		3456
	Empididae		
		Hemerodromia sp.	7
	Simuliidae		
		Simulium sp.	50
	Tipulidae		
		Hexatoma sp.	2
		Pseudolimnophila sp.	3
		SUM	**6829**

Appendix X. Macroinvertebrate taxa list for GRBEX-03 (Butlers Fork, Russell Creek) based on high-gradient, multihabitat sampling.

Taxon			
HYDRACARINA			3
MOLLUSCA			
	Lymnaeidae		
		Fossaria sp.	2
	Physidae		
		Physella sp.	3
EPHEMEROPTERA			
	Baetidae		
		Acerpenna sp.	6
		Baetis sp.	53
		Procloeon sp.	13
	Caenidae		
		Caenis sp.	113
	Heptageniidae		
		Stenacron sp.	1
		Stenonema sp.	46
		immature heptageniid	9
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	9
		Hydropsyche sp.	5
		immature hydropsychid	14
	Hydroptilidae		
		Hydroptila sp.	3
COLEOPTERA			
	Elmidae		
		Stenelmis sp.	6
	Haliplidae		
		Peltodytes sp.	3
	Hydrophilidae		
		Berosus sp.	1
		Tropisternus sp.	3
	Psephenidae		
		Ectopria sp.	1
DIPTERA			
	Ceratopogonidae		
		Bezzia sp.	11
	Chironomidae		750
	Culicidae		
		Anopheles sp.	1
	Tipulidae		
		Limonia sp.	1
		SUM	**1057**

Appendix XI. Fish species list for GRBEX-03 (Butlers Fork, Russell Creek).

Taxon	
Ameiurus natalis	1
Campostoma oligolepis	36
Etheostoma blennoides	22
E. caeruleum	9
E. flabellare	13
E. rafinesquei	2
E. spectabile	81
Fundulus catenatus	3
Gambusia affinis	1
Hybopsis amplops	1
Lepomis cyanellus	2
L. macrochirus	1
L. megalotis	13
Pimephales notatus	105
Phoxinus erythrogaster	14
Semotilus atromaculatus	6
SUM	**310**

Appendix XII. Stream usage assessment for GRBEX-03 (Butlers Fork, Russell Creek).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: BUTLER'S FORK, RUSSELL CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 488519 Segment No.: __ __Station ID: WKU0303 (GRBEX-03)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: RUSSELL CREEK

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110001

County 1: ADAIR County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: COLUMBIA

Latitude: 37.0810 Longitude: -85.3725 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 06-20-01 (macroinvertebrate), 08-03-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550_____
Cause Code: 1600__ Source Code(s): 7550_____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix XIII. Macroinvertebrate taxa list for GRBEX-04 (Sulphur Creek) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			13
CRUSTACEA			
	Asellidae		
		Lirceus sp.	1
	Cambaridae		
		Orconectes sp.	1
	Gammaridae		
		Gammarus sp.	2
MOLLUSCA			
	Corbiculiidae		
		Corbicula fluminea	6
	Pleuroceridae		
		Elimia sp.	43
EPHEMEROPTERA			
	Baetidae		
		Baetis sp.	30
	Caenidae		
		Caenis sp.	66
	Ephemeridae		
		Ephemera sp.	1
	Heptageniidae		
		Heptagenia sp.	1
		Stenacron sp.	2
		Stenonema sp.	109
	Isonychiidae		
		Isonychia sp.	161
	Tricorythidae		
		Tricorythodes sp.	3
ODONATA			
	Gomphidae		
		Stylogomphus albistylus	2
PLECOPTERA			
	Leuctridae		
		Leuctra sp.	24
MEGALOPTERA			
	Corydalidae		
		Corydalus sp.	13
		Nigronia sp.	68
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	284
		Hydropsyche sp.	16
	Philopotamidae		
		Chimarra sp.	7
	Uenoidae		
		Neophylax sp.	1

Appendix XIII. Cont.

Taxon			
COLEOPTERA			
	Elmidae		
		Macronychus glabratus	2
		Stenelmis sp.	25
	Psephenidae		
		Ectopria sp.	1
		Psephenus herricki	1
	Ptilodactylidae		
		Anchytarsus bicolor	1
DIPTERA			
	Athericidae		
		Atherix sp.	2
	Ceratopogonidae		
		immature ceratopogonid	
	Chironomidae		13
		SUM	**899**

Appendix XIV. Macroinvertebrate taxa list for GRBEX-04 (Sulphur Creek) based on high-gradient, multihabitat sampling.

Taxon			
OLIGOCHAETA			3
MOLLUSCA			
	Pleuroceridae		
		Elimia sp.	38
EPHEMEROPTERA			
	Baetidae		
		Baetis sp.	5
	Caenidae		
		Caenis sp.	1
	Heptageniidae		
		Stenacron sp.	12
		Stenonema sp.	12
		immature heptageniid	5
ODONATA			
	Coenagrionidae		
		Argia sp.	1
PLECOPTERA			
	Leuctridae		
		Leuctra sp.	1
MEGALOPTERA			
	Corydalidae		
		Chauliodes sp.	1
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	7
		Hydropsyche sp.	2
		immature hydropsychid	2
	Uenoidae		
		Neophylax sp.	71
COLEOPTERA			
	Elmidae		
		Dubiraphia sp.	1
		Macronychus glabratus	4
DIPTERA			
	Chironomidae		73
		SUM	**239**

Appendix XV. Fish species list for GRBEX-04 (Sulphur Creek).

Taxon	
Ambloplites rupestris	3
Campostoma oligolepis	48
Cottus carolinae	1
Cyprinella spiloptera	2
Etheostoma bellum	15
E. blennoides	17
E. caeruleum	19
E. rafinesquei	10
E. spectabile	12
E. stigmaeum	1
E. zonale	1
Fundulus catenatus	1
Hypentelium nigricans	1
Lepomis megalotis	62
Luxilis chrysocephalus	56
Lythrurus fasciolaris	34
Moxostoma duquesni	6
Percina sciera	3
Pimephales notatus	18
Phoximus erythrogaster	1
Semotilus atromaculatus	12
SUM	**323**

Appendix XVI. Stream usage assessment for GRBEX-04 (Sulphur Creek).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: SULPHUR CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 504734 Segment No.: __ __Station ID: WKU0304 (GRBEX-04)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: RUSSELL CREEK

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110001

County 1: ADAIR County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: MONTPELIER

Latitude: 37.1128 Longitude: -85.2339 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 06-21-01 (macroinvertebrate), 07-25-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 1400, 7550
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix XVII. Macroinvertebrate taxa list for GRBEX-05 (Pettys Fork, Russell Creek) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			11
CRUSTACEA			
	Cambaridae		
		Orconectes sp.	7
EPHEMEROPTERA			
	Baetidae		
		Baetis sp.	48
	Caenidae		
		Caenis sp.	80
	Heptageniidae		
		Stenacron sp.	2
		Stenonema sp.	39
	Isonychiidae		
		Isonychia sp.	1
	Tricorythidae		
		Tricorythodes sp.	9
ODONATA			
	Calopterygidae		
		Hetaerina sp.	1
PLECOPTERA			
	Perlidae		
		Neoperla sp.	49
HEMIPTERA			
	Veliidae		
		Microvelia sp.	5
MEGALOPTERA			
	Corydalidae		
		Nigronia sp.	3
NEUROPTERA			
	Sialidae		
		Sialis sp.	5
TRICHOPTERA			
	Helicopsychidae		
		Helicopsyche sp.	3
	Hydropsychidae		
		Cheumatopsyche sp.	78
		Hydropsyche sp.	5
	Hydroptilidae		
		Agraylea sp.	3
	Leptoceridae		
		immature leptocerid	1
	Philopotamidae		
		Chimarra sp.	1

Appendix XVII. Cont.

Taxon			
COLEOPTERA			
	Elmidae		
		Stenelmis sp.	252
	Hydrophilidae		
		Laccobius sp.	3
DIPTERA			
	Chironomidae		515
		SUM	**1121**

Appendix XVIII. Macroinvertebrate taxa list for GRBEX-05 (Pettys Fork, Russell Creek) based on high-gradient multihabitat sampling.

Taxon			
MOLLUSCA			
	Pleuroceridae		
		Elimia sp.	2
EPHEMEROPTERA			
	Baetidae		
		Baetis sp.	70
	Caenidae		
		Caenis sp.	19
	Heptageniidae		
		Stenonema sp.	22
		immature heptageniid	7
ODONATA			
	Calopterygidae		
		Hetaerina sp.	5
PLECOPTERA			
	Perlidae		
		Neoperla sp.	4
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	48
		Hydropsyche sp.	7
		immature hydropsychid	18
	Hydroptilidae		
		Hydroptila sp.	1
COLEOPTERA			
	Elmidae		
		Dubiraphia sp.	2
		Stenelmis sp.	13
	Gyrinidae		
		Dineutus sp.	1
DIPTERA			
	Chironomidae		123
	Simuliidae		
		Simulium sp.	2
		SUM	**344**

Appendix XIX. Fish species list for GRBEX-05 (Pettys Fork, Russell Creek).

Taxon	
Ambloplites rupestris	1
Campostoma oligolepis	103
Cyprinella spiloptera	12
Etheostoma bellum	5
E. blennoides	9
E. caeruleum	30
E. flabellare	5
E. rafinesquei	18
E. stigmaeum	1
Fundulus catenatus	20
Hypentelium nigricans	11
Labidesthes sicculus	1
Lepomis cyanellus	3
L. gulosus	1
L. macrochirus	27
L. megalotis	68
Luxilis chrysocephalus	54
Lythrurus fasciolaris	48
Micropterus punctalatus	4
Moxostoma duquesni	4
Minytrema melanops	1
Notropis photogenis	87
Pimephales notatus	257
SUM	**770**

Appendix XX. Stream usage assessment for GRBEX-05 (Pettys Fork, Russell Creek).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: PETTYS FORK, RUSSELL CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 500492 Segment No.: __ __Station ID: WKU0305 (GRBEX-05)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: RUSSELL CREEK

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110001

County 1: ADAIR County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: COLUMBIA

Latitude: 37.0974 Longitude: -85.3340 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 06-20-01 (macroinvertebrate), 08-03-01 (mm-dd-yy)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL				X	
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 1400, 7550
Cause Code: 1600__ Source Code(s): 1400, 7550
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix XXI. Macroinvertebrate taxa list for GRBEX-06 (Big Creek) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			12
CRUSTACEA			
	Asellidae		
		Lirceus sp.	1
	Cambaridae		
		Orconectes sp.	8
EPHEMEROPTERA			
	Baetidae		
		Acentrella sp.	1
		Baetis sp.	149
		Procloeon sp.	5
	Caenidae		
		Caenis sp.	729
	Heptageniidae		
		Stenacron sp.	1
		Stenonema sp.	74
	Leptophlebiidae		
		Choroterpes sp.	5
ODONATA			
	Coenagrionidae		
		Argia sp.	2
		immature coenagrionid	1
PLECOPTERA			
	Leuctridae		
		Leuctra sp.	2
	Perlidae		
		Neoperla sp.	13
		Perlesta sp.	5
HEMIPTERA			
	Veliidae		
		Microvelia sp.	2
MEGALOPTERA			
	Corydalidae		
		Corydalus sp.	1
		Nigronia sp.	19
NEUROPTERA			
	Sialidae		
		Sialis sp.	13
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	967
		Hydropsyche sp.	4
	Hydroptilidae		
		Hydroptila sp.	10
	Philopotamidae		
		Chimarra sp.	13

Appendix XXI. Cont.

Taxon			
COLEOPTERA			
	Elmidae		
		Stenelmis sp.	453
	Hydrophilidae		
		Laccobius sp.	2
	Psephenidae		
		Ectopria sp.	1
		Psephenus herricki	9
	Ptilodactylidae		
		Anchytarsus bicolor	4
DIPTERA			
	Ceratopogonidae		
		Atrichopogon sp.	2
		Probezzia sp.	4
	Chironomidae		1662
	Empididae		
		Hemerodromia sp.	2
		SUM	**4176**

Appendix XXII. Macroinvertebrate taxa list for GRBEX-06 (Big Creek) based on high-gradient, multihabitat sampling.

Taxon			
MOLLUSCA			
	Physidae		
		Physella sp.	2
	Pleuroceridae		
		Pleurocera sp.	34
EPHEMEROPTERA			
	Baetidae		
		Acerpenna sp.	5
		Baetis sp.	19
		Procloeon sp.	5
	Caenidae		
		Caenis sp.	49
	Heptageniidae		
		Stenonema sp.	45
		immature heptageniid	1
	Leptophlebiidae		
		Choroterpes sp.	1
ODONATA			
	Coenagrionidae		
		Argia sp.	1
		Enallagma sp.	1
MEGALOPTERA			
	Corydalidae		
		Corydalus sp.	1
		Nigronia sp.	1
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	29
		Hydropsyche sp.	2
		unidentified hydropsychid	3
	Hydroptilidae		
		Hydroptila sp.	1
COLEOPTERA			
	Elmidae		
		Stenelmis sp.	1
	Hydrophilidae		
		Helochares sp.	2
DIPTERA			
	Chironomidae		120
	Tipulidae		
		Limonia sp.	4
		Tipula sp.	2
		SUM	**329**

Appendix XXIII. Fish species list for GRBEX-06 (Big Creek).

Taxon	
Ameiurus natalis	4
Campostoma oligolepis	78
Cyprinella whipplei	1
Etheostoma barbouri	3
E. bellum	1
E. blennoides	18
E. caeruleum	21
E. flabellare	22
E. rafinesquei	43
E. spectabile	121
Fundulus catenatus	42
Hybopsis amblops	27
Hypentelium nigricans	1
Lepomis cyanellus	4
L. macrochirus	2
L. megalotis	22
Luxilis chrysocephalus	3
Lythrurus fasciolaris	7
Moxostoma duquesni	1
Phoxinus erythrogaster	2
Pimephales notatus	222
Semotilus atromaculatus	1
SUM	**646**

Appendix XXIV. Stream usage assessment for GRBEX-06 (Big Creek).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: BIG CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 487159 Segment No.: __ __Station ID: WKU0306 (GRBEX-06)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: RUSSELL CREEK

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110001

County 1: ADAIR County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: GRADYVILLE

Latitude: 37.0624 Longitude: -85.4295 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 06-21-01 (macroinvertebrate), 08-03-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550_____
Cause Code: 1600__ Source Code(s): 7550_____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix XXV. Macroinvertebrate taxa list for GRBEX-07 (Poplar Grove Branch, Upper Brush Creek) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			16
MOLLUSCA			
	Pleuroceridae		
		Elimia sp.	2
CRUSTACEA			
	Asellidae		
		Lirceus sp.	2
	Cambaridae		
		Orconectes sp.	2
EPHEMEROPTERA			
	Baetidae		
		Acentrella sp.	3
		Baetis sp.	30
	Caenidae		
		Caenis sp.	1
	Heptageniidae		
		Stenacron sp.	1
		Stenonema sp.	28
	Isonychiidae		
		Isonychia sp.	194
ODONATA			
	Aeshnidae		
		Boyeria sp.	2
	Gomphidae		
		Stylogomphus albistylus	28
PLECOPTERA			
	Leuctridae		
		Leuctra sp.	94
	Perlidae		
		Acroneuria sp.	1
HEMIPTERA			
	Veliidae		
		Microvelia sp.	1
MEGALOPTERA			
	Corydalidae		
		Corydalus sp.	4
		Nigronia sp.	42
TRICHOPTERA			
	Glossosomatidae		
		Glossosoma sp.	2
	Hydropsychidae		
		Cheumatopsyche sp.	301
		Hydropsyche sp.	18
	Philopotamidae		
		Chimarra sp.	2

Appendix XXV. Cont.

Taxon			
COLEOPTERA			
	Dryopidae		
		Helichus sp.	7
	Elmidae		
		Optioservus sp.	662
		Stenelmis sp.	10
	Psephenidae		
		Ectopria sp.	2
		Psephenus herricki	12
	Ptilodactylidae		
		Anchytarsus bicolor	2
DIPTERA			
	Athericidae		
		Atherix sp.	8
	Chironomidae		49
	Empididae		
		Hemerodromia sp.	18
	Simuliidae		
		Simulium sp.	3
	Tabanidae		
		Chrysops sp.	4
	Tanyderidae		
		Protoplasa fitchii	8
	Tipulidae		
		Antocha sp.	3
		Tipula sp.	5
		SUM	**1567**

Appendix XXVI. Macroinvertebrate taxa list for GRBEX-07 (Poplar Grove Branch, Upper Brush Creek) based on high-gradient, multihabitat sampling.

Taxon			
OLIGOCHAETA			1
MOLLUSCA			
	Pleuroceridae		
		Elimia sp.	1
	Sphaeriidae		
		Sphaerium sp.	1
CRUSTACEA			
	Cambaridae		
		immature cambarid	1
EPHEMEROPTERA			
	Baetidae		
		Baetis sp.	3
	Ephemerellidae		
		Eurylophella sp.	1
	Heptageniidae		
		Stenacron sp.	5
		Stenonema sp.	31
	Isonychiidae		
		Isonychia sp.	3
ODONATA			
	Aeshnidae		
		Boyeria sp.	5
	Libellulidae		
		Macromia sp.	2
PLECOPTERA			
	Leuctridae		
		Leuctra sp.	1
NEUROPTERA			
	Sialidae		
		Sialis sp.	1
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	13
		Hydropsyche sp.	3
	Leptoceridae		
		immature leptocerid	1
	Limnephilidae		
		Pycnopsyche sp.	1
COLEOPTERA			
	Dryopidae		
		Helichus sp.	2
	Elmidae		
		Dubiraphia sp.	2
		Macronychus glabratus	3
		Optioservus sp.	5

Appendix XXVI. Cont.

Taxon			
	Psephenidae		
		Ectopria sp.	1
DIPTERA			
	Athericidae		
		Atherix sp.	1
	Chironomidae		217
	Tipulidae		
		Antocha sp.	1
		SUM	**306**

Appendix XXVII. Fish species list for GRBEX-07 (Poplar Grove Branch, Upper Brush Creek).

Taxon	
Ambloplites rupestris	4
Campostoma oligolepis	56
Cottus carolinae	1
Etheostoma caeruleum	22
E. flabellare	10
E. rafinesquei	28
E. spectabile	4
Fundulus catenatus	6
Hybopsis amblops	28
Hypentelium nigricans	10
Ichthyomyzon bdellium	2
Luxilis chrysocephalus	2
Lythrurus fasciolaris	26
Micropterus dolomieu	1
Moxostoma erythrurum	1
Phoxinus erythrogaster	3
Pimephales notatus	35
Semotilus atromaculatus	72
SUM	**311**

Appendix XXVIII. Stream usage assessment for GRBEX-07 (Poplar Grove Branch, Upper Brush Creek).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER

Stream Name: POPLAR GROVE BRANCH, UPPER BRUSH CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 501108 Segment No.: __ __Station ID: WKU0307 (GRBEX-07)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: UPPER BRUSH CREEK

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110001

County 1: TAYLOR County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: HIBERNIA

Latitude: 37.4338 Longitude: -85.5714 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 06-22-01 (macroinvertebrate), 08-06-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550_____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix XXIX. Macroinvertebrate taxa list for GRBEX-08 (Upper Brush Creek) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			23
MOLLUSCA			
	Pleuroceridae		
		Elimia sp.	8
CRUSTACEA			
	Cambaridae		
		Orconectes sp.	2
EPHEMEROPTERA			
	Baetidae		
		Acentrella sp.	2
		Baetis sp.	43
	Caenidae		
		Caenis sp.	2
	Heptageniidae		
		Leucrocuta sp.	9
		Stenacron sp.	50
		Stenonema sp.	58
	Isonychiidae		
		Isonychia sp.	10
	Leptophlebiidae		
		Choroterpes sp.	1
		Paraleptophlebia sp.	9
	Tricorythidae		
		Tricorythodes sp.	5
ODONATA			
	Gomphidae		
		Stylogomphus albistylus	126
PLECOPTERA			
	Leuctridae		
		Leuctra sp.	1160
	Nemouridae		
		Amphinemura sp.	2
	Perlidae		
		Acroneuria sp.	3
		Neoperla sp.	1
		Perlesta sp.	6
HEMIPTERA			
	Veliidae		
		Microvelia sp.	2
		Rhagovelia sp.	2
MEGALOPTERA			
	Corydalidae		
		Nigronia sp.	25
NEUROPTERA			
	Sialidae		
		Sialis sp.	1

Appendix XXIX. Cont.

Taxon			
TRICHOPTERA			
	Glossosomatidae		
		Glossosoma sp.	2
	Hydropsychidae		
		Cheumatopsyche sp.	88
		Hydropsyche sp.	1
	Limnephilidae		
		Pycnopsyche sp.	5
	Philopotamidae		
		Chimarra sp.	30
	Polycentropodidae		
		Polycentropus sp.	3
COLEOPTERA			
	Dryopidae		
		Helichus sp.	4
	Dytiscidae		
		Nebrioporus/Stictotarsus sp.	4
	Elmidae		
		Optioservus sp.	485
		Stenelmis sp.	4
	Psephenidae		
		Ectopria sp.	5
		Psephenus herricki	241
	Ptilodactylidae		
		Anchytarsus bicolor	1
DIPTERA			
	Ceratopogonidae		
		immature ceratopogonid	1
	Chironomidae		214
	Empididae		
		Chelifera sp.	1
		Hemerodromia sp.	10
	Tabanidae		
		Chrysops sp.	2
	Tanyderidae		
		Protoplasa fitchii	2
	Tipulidae		
		Hexatoma sp.	3
		Limnophila sp.	1
		Pseudolimnophila sp.	5
		Tipula sp.	4
		SUM	**2666**

Appendix XXX. Macroinvertebrate taxa list for GRBEX-08 (Upper Brush Creek) based on high-gradient, multihabitat sampling.

Taxon			
MOLLUSCA			
	Pleuroceridae		
		Elimia sp.	28
CRUSTACEA			
	Cambaridae		
		immature cambarid	2
EPHEMEROPTERA			
	Baetidae		
		Baetis sp.	19
	Caenidae		
		Caenis sp.	1
	Heptageniidae		
		Leucrocuta sp.	1
		Stenonema sp.	17
		immature heptageniid	5
ODONATA			
	Aeshnidae		
		Boyeria sp.	1
PLECOPTERA			
	Leuctridae		
		Leuctra sp.	15
	Perlidae		
		Perlesta sp.	1
MEGALOPTERA			
	Corydalidae		
		Chauliodes sp.	1
TRICHOPTERA			
	Glossosomatidae		
		Glossosoma sp.	10
	Hydropsychidae		
		Cheumatopsyche sp.	37
		Hydropsyche sp.	9
		immature hydropsychid	3
	Lepidostomatidae		
		Lepidostoma sp.	1
	Philopotamidae		
		Chimarra sp.	14
		Dolophilodes sp.	1
	Polycentropodidae		
		immature polycentropodid	1
	Uenoidae		
		Neophylax sp.	3
COLEOPTERA			
	Elmidae		
		Dubiraphia sp.	1
		Optioservus sp.	7

Appendix XXX. Cont.

Taxon			
	Psephenidae		
		Psephenus herricki	8
DIPTERA			
	Chironomidae		10
	Empididae		
		Hemerodromia sp.	1
	Simuliidae		
		Simulium sp.	1
	Tipulidae		
		Limonia sp.	1
		SUM	**199**

Appendix XXXI. Fish species list for GRBEX-08 (Upper Brush Creek).

Taxon	
Ameiurus natalis	1
Campostoma oligolepis	34
Catostomus commersoni	4
Cottus carolinae	35
Etheostoma blennoides	3
E. caeruleum	27
E. flabellare	2
E. rafinesquei	40
Fundulus catenatus	16
Hybopsis amblops	3
Hypentelium nigricans	11
Lampetra aepyptera	6
Lepomis cyanellus	1
Luxilis chrysocephalus	35
Lythrurus fasciolaris	16
Microptera dolomieu	2
Moxostoma duquesni	2
Phoxinus erythrogaster	49
Pimephales notatus	19
Semotilus atromaculatus	25
SUM	**331**

Appendix XXXII. Stream usage assessment for GRBEX-08 (Upper Brush Creek).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: UPPER BRUSH CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 505864 Segment No.: __ __Station ID: WKU0308 (GRBEX-08)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: BRUSH CREEK

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110001

County 1: TAYLOR County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: HIBERNIA

Latitude: 37.4311 Longitude: -85.5849 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 06-22-01 (macroinvertebrate), 08-06-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT	X				
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550_____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix XXXIII. Macroinvertebrate taxa list for GRBEX-09 (Big Reedy Creek) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			5
CRUSTACEA			
	Asellidae		
		Lirceus sp.	2
	Cambaridae		
		Orconectes sp.	12
MOLLUSCA			
	Corbiculiidae		
		Corbicula fluminea	13
	Lymnaeidae		
		Stagnicola sp.	2
	Physidae		
		Physella sp.	4
	Planorbidae		
		Helisoma sp.	1
	Sphaeriidae		
		Pisidium sp.	20
		Sphaerium sp.	2
EPHEMEROPTERA			
	Baetidae		
		Acerpenna sp.	63
		Baetis sp.	15
		Procloeon sp.	65
	Caenidae		
		Caenis sp.	1
	Heptageniidae		
		Stenacron sp.	19
		Stenonema sp.	115
ODONATA			
	Aeshnidae		
		Boyeria sp.	1
PLECOPTERA			
	Perlidae		
		Neoperla sp.	70
HEMIPTERA			
	Veliidae		
		Microvelia sp.	4
NEUROPTERA			
	Sialidae		
		Sialis sp.	15
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	357
		Hydropsyche sp.	1

Appendix XXXIII. Cont.

Taxon			
	Philopotamidae		
		Chimarra sp.	11
COLEOPTERA			
	Dryopidae		
		Helichus sp.	3
	Elmidae		
		Stenelmis sp.	1015
DIPTERA			
	Ceratopogonidae		
		Bezzia sp.	1
	Chironomidae		819
	Empididae		
		Hemerodromia sp.	5
	Tipulidae		
		Hexatoma sp.	14
		SUM	**2655**

Appendix XXXIV. Macroinvertebrate taxa list for GRBEX-09 (Big Reedy Creek) based on high-gradient, multihabitat sampling.

Taxon			
OLIGOCHAETA			1
	Cambaridae		
		immature cambarid	1
MOLLUSCA			
	Physidae		
		Physella sp.	3
	Planorbidae		
		Helisoma sp.	61
	Sphaeriidae		
		Pisidium sp.	1
EPHEMEROPTERA			
	Baetidae		
		Acerpenna sp.	12
		Baetis sp.	7
		Centroptilum sp.	10
		Procloeon sp.	30
	Caenidae		
		Caenis sp.	5
	Heptageniidae		
		Stenacron sp.	31
		Stenonema sp.	148
		immature heptageniid	3
ODONATA			
	Calopterygidae		
		damaged calopterygid	1
PLECOPTERA			
	Perlidae		
		Neoperla sp.	10
HEMIPTERA			
	Veliidae		
		Microvelia sp.	1
NEUROPTERA			
	Sialidae		
		Sialis sp.	1
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	35
	Philopotamidae		
		Chimarra sp.	2
COLEOPTERA			
	Elmidae		
		Ancyronyx variegatus	1
		Dubiraphia sp.	3
		Stenelmis sp.	13

Appendix XXXIV. Cont.

Taxon			
DIPTERA			
	Chironomidae		183
	Simuliidae		
		Simulium sp.	1
	Tabanidae		
		Chrysops sp.	1
	Tipulidae		
		Tipula sp.	1
		SUM	**566**

Appendix XXXV. Fish species list for GRBEX-9 (Big Reedy Creek)

Taxon	
Ameiurus natalis	1
Cyprinella spiloptera	10
Erimyzon oblongus	2
Etheostoma caeruleum	1
Fundulus notatus	7
Lepomis cyanellus	7
L. megalotis	9
Lythrurus fasciolaris	13
Micropterus punctulatus	3
Moxostoma erythrurum	3
Notropis photogenis	7
Percina maculata	5
Pimephales notatus	56
Semotilus atromaculatus	19
SUM	**143**

Appendix XXXVI. Stream usage assessment for GRBEX-9 (Big Reedy Creek)

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: BIG REEDY CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 487231 Segment No.: __ __Station ID: WKU0309 (GRBEX-09)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: GREEN RIVER

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110001

County 1: BUTLER County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: READY

Latitude: 37.2725 Longitude: -86.4431 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 07-02-01 (macroinvertebrate), 08-01-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT				X	
BIOLOGICAL				X	
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 1000, 7550
Cause Code: 1600__ Source Code(s): 1000, 7550
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix XXXVII. Macroinvertebrate taxa list for GRBEX-10 (Claylick Creek) based on high-gradient, kicknet sampling.

Taxon			
HIRUDINEA			3
CRUSTACEA			
	Asellidae		
		Caecidotea sp.	15
MOLLUSCA			
	Physidae		
		Physella sp.	3
	Planorbidae		
		Helisoma sp.	1
	Sphaeriidae		
		Pisidium sp.	1
		Sphaerium sp.	145
EPHEMEROPTERA			
	Baetidae		
		immature baetid	1
	Heptageniidae		
		Stenonema sp.	57
	Leptophlebiidae		
		Paraleptophlebia sp.	1
ODONATA			
	Libellulidae		
		Tetragoneuria sp.	1
PLECOPTERA			
	Perlidae		
		Neoperla sp.	33
MEGALOPTERA			
	Corydalidae		
		Nigronia sp.	16
NEUROPTERA			
	Sialidae		
		Sialis sp.	34
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	509
		Hydropsyche sp.	3
	Hydroptilidae		
		Hydroptila sp.	3
COLEOPTERA			
	Dryopidae		
		Helichus sp.	4
	Elmidae		
		Stenelmis sp.	27
	Gyrinidae		
		Dineutus sp.	4

Appendix XXXVII. Cont.

Taxon			
DIPTERA			
	Chironomidae		283
	Empididae		
		Hemerodromia sp.	1
	Simuliidae		
		Simulium sp.	10
	Tipulidae		
		Tipula sp.	2
		SUM	**1157**

Appendix XXXVIII. Macroinvertebrate taxa list for GRBEX-10 (Claylick Creek) based on high-gradient, multihabitat sampling.

Taxon			
OLIGOCHAETA			4
CRUSTACEA			
	Asellidae		
		Caecidotea sp.	8
	Crangonyctidae		
		Crangonyx sp.	1
	Talitridae		
		Hyalella azteca	8
MOLLUSCA			
	Physidae		
		Physella sp.	13
	Planorbidae		
		Helisoma sp.	4
	Sphaeriidae		
		Pisidium sp.	3
		Sphaerium sp.	4
EPHEMEROPTERA			
	Baetidae		
		Procloeon sp.	22
	Caenidae		
		Caenis sp.	9
	Heptageniidae		
		Stenonema sp.	36
ODONATA			
	Aeshnidae		
		Boyeria sp.	2
	Coenagrionidae		
		Enallagma sp,	6
	Gomphidae		
		Dromogomphus sp.	1
	Libellulidae		
		immature libellulid	4
PLECOPTERA			
	Perlidae		
		Neoperla sp.	1
NEUROPTERA			
	Sialidae		
		Sialis sp.	16
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	10
COLEOPTERA			
	Gyrinidae		
		Dineutus sp.	3

Appendix XXXVIII. Cont.

Taxon			
DIPTERA			
	Chironomidae		165
	Psychodidae		
		Psychoda sp.	1
	Simuliidae		
		Simulium sp.	5
		SUM	**326**

Appendix XXXIX. Fish species list for GRBEX-10 (Claylick Creek)

Taxon	
Aphredoderus sayanus	5
Cyprinella whipplei	1
Etheostoma squamiceps	2
Gambusia affinis	9
Lepomis cyanellus	1
L. gulosus	6
L. macrochirus	40
L. megalotis	35
Lythrurus fasciolaris	5
Micropterus punctulatus	1
M. salmoides	2
Minytrema melanops	1
Percina maculata	2
Pimephales notatus	4
SUM	**114**

Appendix XL. Stream usage assessment for GRBEX-10 (Claylick Creek)

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: CLAYLICK CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 489590 Segment No.: __ __Station ID: WKU0310 (GRBEX-10)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: GREEN RIVER

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110001

County 1: WARREN County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: RIVERSIDE

Latitude: 37.1556 Longitude: -86.5722 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 07-02-01 (macroinvertebrate), 08-07-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550_____
Cause Code: 1600__ Source Code(s): 7550_____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix XLI. Macroinvertebrate taxa list for GRBEX-11 (Wolflick Creek) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			5
HIRUDINEA			6
CRUSTACEA			
	Asellidae		
		Lirceus sp.	379
	Cambaridae		
		immature cambarid	1
MOLLUSCA			
	Corbiculiidae		
		Corbicula fluminea	1
	Sphaeriidae		
		Sphaerium sp.	216
EPHEMEROPTERA			
	Baetidae		
		Acerpenna sp.	28
		Paracloeodes sp.	1
	Heptageniidae		
		Stenacron sp.	51
		Stenonema sp.	10
NEUROPTERA			
	Sialidae		
		Sialis sp.	4
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	3942
	Philopotamidae		
		Chimarra sp.	5
COLEOPTERA			
	Elmidae		
		Dubiraphia sp.	1
		Stenelmis sp.	378
	Gyrinidae		
		Dineutus sp.	11
DIPTERA			
	Chironomidae		1423
	Empididae		
		Hemerodromia sp.	1
	Simuliidae		
		Simulium sp.	8
	Tabanidae		
		Chlorotabanus sp.	1
		SUM	**6472**

Appendix XLII. Macroinvertebrate taxa list for GRBEX-11 (Wolflick Creek) based on high-gradient, multihabitat sampling.

Taxon			
CRUSTACEA			
	Asellidae		
		Lirceus sp.	1
	Talitridae		
		Hyalella azteca	5
EPHEMEROPTERA			
	Baetidae		
		Procloeon sp.	1
	Caenidae		
		Caenis sp.	2
	Heptageniidae		
		Stenacron sp.	15
		Stenonema sp.	1
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	33
COLEOPTERA			
	Elmidae		
		Dubiraphia sp.	1
		Macronychus glabratus	2
		Stenelmis sp.	1
	Gyrinidae		
		Dineutus sp.	3
		Gyretes sp.	1
DIPTERA			
	Chironomidae		127
	Simuliidae		
		Simulium sp.	107
		SUM	**300**

Appendix XLIII. Fish species list for GRBEX-11 (Wolflick Creek).

Taxon	
Aphredoderus sayanus	1
Cyprinus carpio	2
Esox americanus	1
Etheostoma nigrum	2
Gambusia affinis	1
Labidesthes sicculus	5
Lepisosteus oculatus	2
Lepomis gulosus	5
L. macrochirus	33
L. megalotis	12
L. miniatus	3
Lythrurus fasciolaris	7
Micropterus punctulatus	3
Minytrema melanops	1
Percina maculata	3
Pimephales notatus	2
SUM	**83**

Appendix XLIV. Stream usage assessment for GRBEX-11 (Wolflick Creek).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: WOLFLICK CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 507017 Segment No.: __ __Station ID: WKU0311 (GRBEX-11)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: MUD RIVER

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110003

County 1: LOGAN County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: LEWISBURG

Latitude: 36.9872 Longitude: -86.9953 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 07-09-01 (macroinvertebrate), 08-08-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL				X	
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550_____
Cause Code: 1600__ Source Code(s): 7550_____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix XLV. Macroinvertebrate taxa list for GRBEX-12 (Indian Camp Creek) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			3
CRUSTACEA			
	Asellidae		
		Caecidotea sp.	29
	Cambaridae		
		immature cambarid	2
EPHEMEROPTERA			
	Baetidae		
		Acerpenna sp.	13
		immature baetid	1
	Heptageniidae		
		Stenacron sp.	91
		Stenonema sp.	21
PLECOPTERA			
	Capniidae		
		Allocapnia sp.	2
	Perlidae		
		Neoperla sp.	1
NEUROPTERA			
	Sialidae		
		Sialis sp.	1
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	406
	Philopotamidae		
		Chimarra sp.	6
COLEOPTERA			
	Dryopidae		
		Helichus sp.	1
	Elmidae		
		Stenelmis sp.	18
	Gyrinidae		
		Dineutus sp.	7
DIPTERA			
	Chironomidae		42
	Empididae		
		Hemerodromia sp.	1
		SUM	**645**

Appendix XLVI. Macroinvertebrate taxa list for GRBEX-12 (Indian Camp Creek) based on high-gradient, multihabitat sampling.

Taxon			
OLIGOCHAETA			2
MOLLUSCA			
	Corbiculiidae		
		Corbicula fluminea	1
	Physidae		
		Physella sp.	2
	Sphaeriidae		
		Pisidium sp.	1
		Sphaerium sp.	1
CRUSTACEA			
	Asellidae		
		Caecidotea sp.	14
EPHEMEROPTERA			
	Baetidae		
		Centroptilum sp.	2
		Procloeon sp.	2
	Caenidae		
		Caenis sp.	5
	Heptageniidae		
		Stenacron sp.	18
		Stenonema sp.	11
ODONATA			
	Coenagrionidae		
		Argia sp.	3
HEMIPTERA			
	Corixidae		
		immature corixid	1
NEUROPTERA			
	Sialidae		
		Sialis sp.	16
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	18
		immature hydropsychid	1
DIPTERA			
	Chironomidae		156
		SUM	**254**

Appendix XLVII. Fish species list for GRBEX-12 (Indian Camp Creek)

Taxon	
Aphredoderus sayanus	1
Cyprinella whipplei	5
Lepomis cyanellus	3
L. macrochirus	8
L. megalotis	6
Lythrurus fasciolaris	12
Moxostoma erythrurum	2
Notropis photogenis	3
Percina phoxocephala	1
Pimephales notatus	11
P. vigilas	1
SUM	**53**

Appendix XLVIII. Stream usage assessment for GRBEX-12 (Indian Camp Creek)

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: INDIAN CAMP CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 494914 Segment No.: __ __Station ID: WKU0312 (GRBEX-12)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: GREEN RIVER

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110003

County 1: BUTLER County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: FLENER

Latitude: 37.2855 Longitude: -86.7183 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 07-26-01 (macroinvertebrate), 09-17-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT				X	
BIOLOGICAL				X	
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 1000, 7550
Cause Code: 1600__ Source Code(s): 1000, 7550
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix IL. Macroinvertebrate taxa list for GRBEX-14 (Plum Creek) based on high-gradient, kicknet sampling.

Taxon			
CRUSTACEA			
	Asellidae		
		Caecidotea sp.	35
	Cambaridae		
		immature cambarid	2
	Crangonyctidae		
		immature crangonyctid	8
	Gammaridae		
		Gammarus sp.	2
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	1347
DIPTERA			
	Chironomidae		7
	Empididae		
		Hemerodromia sp.	1
	Simuliidae		
		Simulium sp.	3
	Stratiomyiidae		
		Stratiomys sp.	1
	Tipulidae		
		Pseudolimnophila sp.	3
		SUM	**1409**

Appendix L. Macroinvertebrate taxa list for GRBEX-14 (Plum Creek) based on high-gradient, multihabitat sampling.

Taxon			
MOLLUSCA			
	Sphaeriidae		
		Sphaerium sp.	1
CRUSTACEA			
	Asellidae		
		Caecidotea sp.	15
MEGALOPTERA			
	Corydalidae		
		Chauliodes sp.	1
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	536
	Philopotamidae		
		Chimarra sp.	1
COLEOPTERA			
	Hydrophilidae		
		Enochrus sp.	1
DIPTERA			
	Chironomidae		3
	Ephydridae		
		immature ephydrid	1
	Simuliidae		
		Simulium sp.	2
	Stratiomyiidae		
		Myxosargus sp.	1
		Odontomyia sp.	1
	Tipulidae		
		Limonia sp.	1
		Pseudolimnophila sp.	1
		Tipula sp.	1
		SUM	**566**

Appendix LI. Fish species list for GRBEX-14 (Plum Creek)

Taxon	
Ameiurus natalis	2
Cyprinella spiloptera	1
Lepomis gulosus	2
SUM	**5**

Appendix LII. Stream usage assessment for GRBEX-14 (Plum Creek)

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: PLUM CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 500964 Segment No.: __ __Station ID: WKU0314 (GRBEX-14)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: POND CREEK

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110003

County 1: MUHLENBERG County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: DRAKESBORO

Latitude: 37.2039 Longitude: -87.0371 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 06-26-01 (macroinvertebrate), 08-08-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL				X	
TOXICITY					
PHYSICAL/CHEM			X		

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550_____
Cause Code: 1600__ Source Code(s): 7550_____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix LIII. Macroinvertebrate taxa list for GRBEX-16 (Caney Creek) based on high-gradient, kicknet sampling.

Taxon			
MOLLUSCA			
	Corbiculiidae		
		Corbicula fluminea	9
	Sphaeriidae		
		Sphaerium sp.	7
CRUSTACEA			
	Cambaridae		
		immature cambarid	1
EPHEMEROPTERA			
	Baetidae		
		Acerpenna sp.	8
		Baetis sp.	317
	Caenidae		
		Caenis sp.	1
	Heptageniidae		
		Stenonema sp.	24
	Tricorythidae		
		Tricorythodes sp.	13
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	675
		Hydropsyche sp.	6
	Philopotamidae		
		Chimarra sp.	182
COLEOPTERA			
	Elmidae		
		Stenelmis sp.	748
	Gyrinidae		
		Dineutus sp.	1
DIPTERA			
	Chironomidae		524
	Tabanidae		
		Chrysops sp.	2
	Tipulidae		
		Limnophila sp.	1
		SUM	**2519**

Appendix LIV. Macroinvertebrate taxa list for GRBEX-16 (Caney Creek) based on high-gradient, multihabitat sampling.

Taxon			
TRICLADIDA			
	Planariidae		
		Dugesia sp.	1
MOLLUSCA			
	Lymnaeidae		
		Fossaria sp.	1
	Physidae		
		Physella sp.	2
CRUSTACEA			
	Talitridae		
		Hyalella azteca	3
EPHEMEROPTERA			
	Baetidae		
		Acentrella sp.	1
		Baetis sp.	1
		Centroptilum sp.	1
		Procloeon sp.	1
	Caenidae		
		Caenis sp.	2
	Heptageniidae		
		Stenacron sp.	3
		Stenonema sp.	62
ODONATA			
	Coenagrionidae		
		Argia sp.	1
		Enallagma sp.	16
HEMIPTERA			
	Gerridae		
		immature gerrid	1
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	14
		Hydropsyche sp.	1
		immature hydropsychid	2
	Hydroptilidae		
		Hydroptila sp.	2
	Leptoceridae		
		Ceraclea sp.	1
	Philopotamidae		
		Chimarra sp.	7
COLEOPTERA			
	Elmidae		
		Dubiraphia sp.	3
		Stenelmis sp.	15

Appendix LIV. Cont.

Taxon			
DIPTERA	Hydrophilidae	Berosus sp.	2
	Chironomidae		131
		SUM	**274**

Appendix LV. Fish species list for GRBEX-16 (Caney Creek)

Taxon	
Campostoma oligolepis	10
Cyprinella spiloptera	34
C. whipplei	15
Dorosoma cepedianum	95
Ericymba buccata	1
Etheostoma nigrum	7
E. squamiceps	4
Fundulus olivaceus	16
Gambusia affinis	10
Labidesthes sicculus	53
Lepisosteus oculatus	1
Lepomis cyanellus	2
L. macrochirus	32
L. megalotis	37
Lythrurus fasciolaris	25
Micropterus punctulatus	9
Minytrema melanops	2
Moxostoma erythrurum	14
Percina caprodes	7
P. evides	1
P. maculata	4
Phenacobius mirabilis	1
Pimephales notatus	295
SUM	**675**

Appendix LVI. Stream usage assessment for GRBEX-16 (Caney Creek)

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: CANEY CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 488846 Segment No.: __ __Station ID: WKU0316 (GRBEX-16)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: ROUGH RIVER

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110004

County 1: GRAYSON County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: SPRING LICK

Latitude: 37.4228 Longitude: -86.6105 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 07-13-01 (macroinvertebrate), 08-01-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550_____
Cause Code: 1600__ Source Code(s): 7550_____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix LVII. Macroinvertebrate taxa list for GRBEX-18 (McGrady Creek) based on high-gradient, kicknet sampling.

Taxon			
MOLLUSCA			
	Lymnaeidae		
		damaged lymnaeid	1
	Physidae		
		Physella sp.	2
CRUSTACEA			
	Asellidae		
		Lirceus sp.	5
	Cambaridae		
		Orconectes sp.	2
EPHEMEROPTERA			
	Baetidae		
		Acerpenna sp.	89
	Heptageniidae		
		Stenonema sp.	92
PLECOPTERA			
	Perlidae		
		Neoperla sp.	4
		Perlesta sp.	15
HEMIPTERA			
	Corixidae		
		immature corixid	1
	Veliidae		
		Microvelia sp.	2
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	265
		Hydropsyche sp.	1
	Philopotamidae		
		Chimarra sp.	2
COLEOPTERA			
	Dytiscidae		
		Hydroporus sp.	5
	Elmidae		
		Stenelmis sp.	722
	Gyrinidae		
		Dineutus sp.	1
	Hydrophilidae		
		Tropisternus sp.	1
DIPTERA			
	Ceratopogonidae		
		Bezzia sp.	6
	Chironomidae		350
	Empididae		
		Hemerodromia sp.	6

Appendix LVII. Cont.

Taxon		
Tipulidae		
	Tipula sp.	3
	SUM	**1575**

Appendix LVIII. Macroinvertebrate taxa list for GRBEX-18 (McGrady Creek) based on high-gradient, multihabitat sampling.

Taxon			
OLIGOCHAETA			7
MOLLUSCA			
	Physidae		
		Physella sp.	2
EPHEMEROPTERA			
	Baetidae		
		Centroptilum sp.	1
		Procloeon sp.	5
	Caenidae		
		Caenis sp.	18
	Heptageniidae		
		Stenonema sp.	49
	Leptophlebiidae		
		Paraleptophlebia sp.	1
HEMIPTERA			
	Corixidae		
		immature corixid	2
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	10
COLEOPTERA			
	Dryopidae		
		Helichus sp.	1
	Elmidae		
		Stenelmis sp.	18
DIPTERA			
	Ceratopogonidae		
		immature ceratopogonid	1
	Chironomidae		105
	Empididae		
		Hemerodromia sp.	1
		SUM	**221**

Appendix LIX. Fish species list for GRBEX-18 (McGrady Creek)

Taxon	
Ameiurus natalis	1
Aphredoderus sayanus	2
Campostoma oligolepis	5
Erimyzon oblongus	21
Esox americanus	1
Etheostoma squamiceps	11
Gambusia affinis	13
Lepomis cyanellus	22
L. macrochirus	5
L. megalotis	34
Lythrurus fasciolaris	1
Pimephales notatus	79
Semotilus atromaculatus	29
SUM	**224**

Appendix LX. Stream usage assessment for GRBEX-18 (McGrady Creek)

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: MCGRADY CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 497869 Segment No.: __ __Station ID: WKU0318 (GRBEX-18)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: CANEY CREEK

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110004

County 1: OHIO County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: ROSINE

Latitude: 37.4885 Longitude: -86.6490 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 08-07-01 (macroinvertebrate), 08-07-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550_____
Cause Code: 1600__ Source Code(s): 7550_____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix LXI. Macroinvertebrate taxa list for GRBEX-19 (Muddy Creek) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			1
MOLLUSCA			
	Planorbidae		
		Helisoma sp.	1
	Physidae		
		Physella sp.	24
CRUSTACEA			
	Asellidae		
		Caecidotea sp.	7
	Cambaridae		
		Orconectes sp.	37
	Gammaridae		
		Gammarus sp.	5
EPHEMEROPTERA			
	Baetidae		
		Acentrella sp.	150
		immature baetid	5
	Caenidae		
		Caenis sp.	31
	Heptageniidae		
		Stenacron sp.	3
		Stenonema sp.	123
ODONATA			
	Coenagrionidae		
		immature coenagrionid	1
PLECOPTERA			
	Perlidae		
		Neoperla sp.	13
HEMIPTERA			
	Veliidae		
		Microvelia sp.	9
MEGALOPTERA			
	Corydalidae		
		Chauliodes sp.	1
		Corydalus sp.	1
NEUROPTERA			
	Sialidae		
		Sialis sp.	29
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	1945
	Philopotamidae		
		Chimarra sp.	71

Appendix LXI. Cont.

Taxon			
COLEOPTERA			
	Dryopidae		
		Helichus sp.	9
	Elmidae		
		Stenelmis sp.	180
	Gyrinidae		
		Dineutus sp.	1
	Scirtidae		
		Elodes sp.	1
DIPTERA			
	Chironomidae		416
	Empididae		
		Hemerodromia sp.	21
	Tipulidae		
		Hexatoma sp.	5
		SUM	**3090**

Appendix LXII. Macroinvertebrate taxa list for GRBEX-19 (Muddy Creek) based on high-gradient, multihabitat sampling.

Taxon			
OLIGOCHAETA			1
MOLLUSCA			
	Planorbidae		
		Helisoma sp.	24
	Physidae		
		Physella sp.	21
	Unionidae		
		immature unionid	1
CRUSTACEA			
	Asellidae		
		Lirceus sp.	1
EPHEMEROPTERA			
	Baetidae		
		Acerpenna sp.	7
		Baetis sp.	3
		Procloeon sp.	11
	Caenidae		
		Caenis sp.	20
	Ephemeridae		
		Hexagenia sp.	1
	Heptageniidae		
		Stenacron sp.	7
		Stenonema sp.	264
PLECOPTERA			
	Perlidae		
		Neoperla sp.	1
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	8
	Hydroptilidae		
		Hydroptila sp.	1
COLEOPTERA			
	Elmidae		
		Stenelmis sp.	3
	Hydrophilidae		
		Berosus sp.	1
		Enochrus sp.	1
DIPTERA			
	Chironomidae		48
		SUM	**424**

Appendix LXIII. Fish species list for GRBEX-19 (Muddy Creek)

Taxon	
Ameiurus natalis	12
Campostoma oligolepis	15
Cottus carolinae	2
Erimyzon oblongus	11
Etheostoma nigrum	1
E. squamiceps	1
Gambusia affinis	27
Lepomis cyanellus	51
L. macrochirus	16
L. megalotis	43
Luxilis chrysocephalus	1
Lythrurus fasciolaris	4
Pimephales notatus	124
Semotilus atromaculatus	3
SUM	**311**

Appendix LXIV. Stream usage assessment for GRBEX-19 (Muddy Creek)

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: MUDDY CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 499037 Segment No.: __ __Station ID: WKU0319 (GRBEX-19)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: CANEY CREEK

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110004

County 1: OHIO County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: OLATON

Latitude: 37.5009 Longitude: -86.6853 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 08-07-01 (macroinvertebrate), 08-07-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550_____
Cause Code: 1600__ Source Code(s): 7550_____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix LXV. Macroinvertebrate taxa list for GRBEX-20 (Deserter Creek) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			7
MOLLUSCA			
	Planorbidae		
		Helisoma sp.	1
	Physidae		
		Physella sp.	6
	Sphaeriidae		
		Pisidium sp.	5
		Sphaerium sp.	352
	Unionidae		
		immature unionid	1
CRUSTACEA			
	Cambaridae		
		immature cambarid	1
EPHEMEROPTERA			
	Baetidae		
		Baetis sp.	13
		Paracloeodes sp.	2
	Caenidae		
		Caenis sp.	6
	Heptageniidae		
		Stenonema sp.	1
ODONATA			
	Calopterygidae		
		Hetaerina sp.	1
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	352
COLEOPTERA			
	Elmidae		
		Dubiraphia sp.	1
		Stenelmis sp.	17
	Gyrinidae		
		Dineutus sp.	13
	Hydrophilidae		
		Berosus sp.	1
DIPTERA			
	Chironomidae		1032
	Tipulidae		
		Tipula sp.	3
		SUM	**1815**

Appendix LXVI. Macroinvertebrate taxa list for GRBEX-20 (Deserter Creek) based on high-gradient, multihabitat sampling.

Taxon			
OLIGOCHAETA			14
MOLLUSCA			
	Sphaeriidae		
		Sphaerium sp.	15
HYDRACARINA			1
EPHEMEROPTERA			
	Baetidae		
		Centroptilum sp.	1
DIPTERA			
	Chironomidae		39
		SUM	**70**

Appendix LXVII. Fish species list for GRBEX-20 (Deserter Creek)

Taxon	
Ameiurus natalis	2
Aphredoderus sayanus	5
Catostomus commersoni	7
Erimyzon oblongus	24
Etheostoma squamiceps	1
Fundulus olivaceus	6
Gambusia affinis	3
Labidesthes sicculus	13
Lepomis macrochirus	23
L. megalotis	59
Lythrurus fasciolaris	70
Notemigonus crysoleucas	10
Phenacobius mirabilis	1
Pimephales notatus	29
SUM	**253**

Appendix LXVIII. Stream usage assessment list for GRBEX-20 (Deserter Creek)

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: DESERTER CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 490828 Segment No.: __ __Station ID: WKU0320 (GRBEX-20)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: SOUTH FORK PANTHER CREEK

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110005

County 1: DAVIESS County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: PHILPOT

Latitude: 37.6362 Longitude: -86.9016 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 06-28-01 (macroinvertebrate), 08-15-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 1000, 7550
Cause Code: 1500__ Source Code(s): 1000, 7100
Cause Code: 1600__ Source Code(s): 1000, 7550
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix LXIX. Macroinvertebrate taxa list for GRBEX-21 (South Fork Panther Creek) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			2
MOLLUSCA			
	Corbiculiidae		
		Corbicula fluminea	82
	Planorbidae		
		Helisoma sp.	1
CRUSTACEA			
	Cambaridae		
		Orconectes sp.	6
EPHEMEROPTERA			
	Baetidae		
		Acentrella sp.	1
		Acerpenna sp.	14
		Baetis sp.	252
		Centroptilum sp.	8
	Caenidae		
		Caenis sp.	3
	Heptageniidae		
		Stenonema sp.	15
ODONATA			
	Libellulidae		
		Macromia sp.	1
MEGALOPTERA			
	Corydalidae		
		Nigronia sp.	1
NEUROPTERA			
	Sialidae		
		Sialis sp.	4
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	1093
COLEOPTERA			
	Elmidae		
		Stenelmis sp.	446
	Gyrinidae		
		Dineutus sp.	13
	Hydrophilidae		
		Berosus sp.	23
		Tropisternus sp.	2
DIPTERA			
	Ceratopogonidae		
		Bezzia sp.	1

Appendix LXIX. Cont.

Taxon		
Chironomidae		540
Empididae		
	Hemerodromia sp.	3
	SUM	**2511**

Appendix LXX. Macroinvertebrate taxa list for GRBEX-21 (South Fork Panther Creek) based on high-gradient, multihabitat sampling

Taxon			
OLIGOCHAETA			4
MOLLUSCA			
	Corbiculiidae		
		Corbicula fluminea	7
	Sphaeriidae		
		Sphaerium sp.	1
CRUSTACEA			
	Cambaridae		
		Orconectes sp.	1
EPHEMEROPTERA			
	Baetidae		
		Acerpenna sp.	1
		Baetis sp.	19
		Centroptilum sp.	10
	Caenidae		
		Caenis sp.	4
	Ephemeridae		
		Hexagenia sp.	1
	Heptageniidae		
		Stenacron sp.	32
		Stenonema sp.	20
ODONATA			
	Aeshnidae		
		Boyeria sp.	1
	Libellulidae		
		Didymops sp.	1
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	15
	Hydroptilidae		
		Hydroptila sp.	2
COLEOPTERA			
	Elmidae		
		Ancyronyx variegatus	4
		Stenelmis sp.	2
	Gyrinidae		
		Dineutus sp.	1
DIPTERA			
	Chironomidae		196
		SUM	**322**

Appendix LXXI. Fish species list for GRBEX-21 (South Fork Panther Creek).

Taxon	
Ameiurus natalis	3
Aphredoderus sayanus	4
Cyprinella spiloptera	33
Erimyzon oblongus	10
Esox americanus	4
Etheostoma nigrum	7
E. squamiceps	5
Fundulus olivaceus	9
Labidesthes sicculus	6
Lepomis cyanellus	1
L. macrochirus	4
L. megalotis	110
Lythrurus fasciolaris	23
Micropterus punctulatus	2
Phenacobius mirabilis	2
Pimephales notatus	90
SUM	**313**

Appendix LXXII. Stream usage assessment list for GRBEX-21 (South Fork Panther Creek).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: SOUTH FORK PANTHER CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 503939 Segment No.: __ __Station ID: WKU0321 (GRBEX-21)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: NORTH FORK PANTHER CREEK

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110005

County 1: DAVIESS County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: PHILPOT

Latitude: 37.6284 Longitude: -86.9434 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 06-28-01 (macroinvertebrate), 08-15-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 1000, 7550
Cause Code: 1500__ Source Code(s): 1000, 7100
Cause Code: 1600__ Source Code(s): 1000, 7550
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix LXXIII. Macroinvertebrate taxa list for GRBEX-22 (East Fork Pond River) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			39
MOLLUSCA			
	Corbiculiidae		
		Corbicula fluminea	28
	Pleuroceridae		
		Elimia sp.	1
	Sphaeriidae		
		Sphaerium sp.	33
EPHEMEROPTERA			
	Baetidae		
		Acerpenna sp.	170
		Baetis sp.	16
	Caenidae		
		Caenis sp.	11
	Heptageniidae		
		Stenacron sp.	3
		Stenonema sp.	1
ODONATA			
	Coenagrionidae		
		Argia sp.	38
		Enallagma sp.	4
HEMIPTERA			
	Veliidae		
		immature veliid	10
MEGALOPTERA			
	Corydalidae		
		Corydalus cornutus	1
		Nigronia sp.	10
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	1127
		Hydropsyche sp.	35
	Hydroptilidae		
		Hydroptila sp.	2
	Leptoceridae		
		Ceraclea sp.	5
		Oecetis sp.	11
	Philopotamidae		
		Chimarra sp.	15
	Polycentropodidae		
		Cyrnellus fraternus	3
LEPIDOPTERA			
	Pyralidae		
		Petrophila sp.	3

Appendix LXXIII. Cont.

Taxon			
COLEOPTERA			
	Dryopidae		
		Helichus sp.	6
	Dytiscidae		
		Copelatus sp.	1
	Elmidae		
		Dubiraphia sp.,	35
		Stenelmis sp.	579
	Hydrophilidae		
		Tropisternus sp.	1
DIPTERA			
	Chironomidae		1331
	Empididae		
		Hemerodromia sp.	16
	Simuliidae		
		Simulium sp.	13
		SUM	**3548**

Appendix LXXIV. Macroinvertebrate taxa list for GRBEX-22 (East Fork Pond River) based on high-gradient, multihabitat sampling.

Taxon			
OLIGOCHAETA			2
HIRUDINEA			1
MOLLUSCA			
	Corbiculiidae		
		Corbicula fluminea	3
	Pleuroceridae		
		Elimia sp.	5
	Sphaeriidae		
		Sphaerium sp.	2
CRUSTACEA			
	Atyidae		
		Palaemonetes sp.	17
EPHEMEROPTERA			
	Baetidae		
		Acerpenna sp.	2
	Caenidae		
		Caenis sp.	5
	Heptageniidae		
		Stenacron sp.	26
		immature heptageniid	1
ODONATA			
	Coenagrionidae		
		Argia sp.	62
		Enallagma sp.	47
	Libellulidae		
		Macromia sp.	1
PLECOPTERA			
	Perlidae		
		Acroneuria sp.	1
HEMIPTERA			
	Gerridae		
		Rheumatobates sp.	3
		Trepobates sp.	1
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	6
		immature hydropsychid	1
	Leptoceridae		
		Ceraclea sp.	8
		Oecetis sp.	1
	Polycentropodidae		
		Cyrnellus fraternus	1
COLEOPTERA			
	Elmidae		
		Stenelmis sp.	34

Appendix LXXIV. Cont.

Taxon			
DIPTERA			
	Chironomidae		616
	Culicidae		
		Culex sp.	1
		SUM	**847**

Appendix LXXV. Fish species list for GRBEX-22 (East Fork Pond River).

Taxon	
Amia calva	2
Aplodinotus grunniens	1
Campstoma oligolepis	6
Cyprinella spiloptera	53
Etheostoma blennioides	5
E. kennicotti	2
Fundulus notatus	2
F. olivaceus	5
Labidesthes sicculus	7
Lepomis cyanellus	24
L. macrochirus	1
L. megalotis	94
L. miniatus	1
Micropterus punctulatus	4
Minytrema melanops	2
Percina caprodes	1
P. phoxocephala	2
Pimephales notatus	165
SUM	**377**

Appendix LXXVI. Stream usage assessment for GRBEX-22 (East Fork Pond River).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: EAST FORK POND RIVER (Stream must be on 1:100k map)

GNIS Feature ID: 491428 Segment No.: __ __Station ID: WKU0322 (GRBEX-22)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: WEST FORK POND RIVER

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110006

County 1: MUHLENBERG County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: HALEYS MILL

Latitude: 37.0695 Longitude: -87.2546 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 07-25-01 (macroinvertebrate), 08-14-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL				X	
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550_____
Cause Code: 1600__ Source Code(s): 7550_____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix LXXVII. Macroinvertebrate taxa list for GRBEX-23 (Buck Fork Pond River) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			3
MOLLUSCA			
	Corbiculiidae		
		Corbicula fluminea	12
	Sphaeriidae		
		Sphaerium sp.	119
CRUSTACEA			
	Asellidae		
		Caecidotea sp.	5
		Lirceus sp.	2
	Cambaridae		
		Orconectes sp.	12
EPHEMEROPTERA			
	Baetidae		
		Acerpenna sp.	36
	Heptageniidae		
		Stenacron sp.	18
		Stenonema sp.	10
PLECOPTERA			
	Perlidae		
		Neoperla sp.	124
MEGALOPTERA			
	Corydalidae		
		Nigronia sp.	1
NEUROPTERA			
	Sialidae		
		Sialis sp.	39
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	1495
		Hydropsyche sp.	4
	Leptoceridae		
		Ceraclea sp.	1
	Philopotamidae		
		Chimarra sp.	3
COLEOPTERA			
	Dryopidae		
		Helichus sp.	19
	Dytiscidae		
		Hydroporus sp.	2
		Lioporeus sp.	1
	Elmidae		
		Dubiraphia sp.	1
		Macronychus glabratus	1
		Stenelmis sp.	609

Appendix LXXVII. Cont.

Taxon			
	Gyrinidae		
		Dineutus sp.	1
DIPTERA			
	Ceratopogonidae		
		Bezzia sp.	2
		Probezzia sp.	2
	Chironomidae		288
	Empididae		
		Hemerodromia sp.	5
	Simuliidae		
		Simulium sp.	1
	Tabanidae		
		Chrysops sp.	2
	Tipulidae		
		Limnophila sp.	1
		Tipula sp.	1
		SUM	**2820**

Appendix LXXVIII. Macroinvertebrate taxa list for GRBEX-23 (Buck Fork Pond River) based on high-gradient, multihabitat sampling.

Taxon			
OLIGOCHAETA			4
HIRUDINEA			1
MOLLUSCA			
	Corbiculiidae		
		Corbicula fluminea	2
	Pleuroceridae		
		Elimia sp.	6
	Sphaeriidae		
		Pisidium sp.	2
		Sphaerium sp.	2
CRUSTACEA			
	Asellidae		
		Caecidotea sp.	2
		Lirceus sp.	6
	Crangonyctidae		
		Crangonyx sp.	13
EPHEMEROPTERA			
	Baetidae		
		Acerpenna sp.	4
		Centroptilum sp.	3
		Procloeon sp.	1
	Caenidae		
		Caenis sp.	3
	Heptageniidae		
		Stenacron sp.	52
		Stenonema sp.	8
	Leptophlebiidae		
		Choroterpes sp.	4
ODONATA			
	Aeshnidae		
		Boyeria sp.	1
		Nasiaeschna sp.	1
	Coenagrionidae		
		Argia sp.	8
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	1
COLEOPTERA			
	Dryopidae		
		Helichus sp.	1
	Dytiscidae		
		Hydroporus sp.	2
	Elmidae		
		Dubiraphia sp.	2
		Macronychus glabratus	
		Stenelmis sp.	7

Appendix LXXVIII. Cont.

Taxon			
	Gyrinidae		
		Gyretes sp.	1
DIPTERA			
	Ceratopogonidae		
		immature ceratopogonid	1
	Chironomidae		130
		SUM	**268**

Appendix LXXIX. Fish species list for GRBEX-23 (Buck Fork Pond River).

Taxon	
Ameiurus natalis	5
Cyprinella spiloptera	7
Esox americanus	5
Etheostoma blennioides	8
E. spectabile	13
E. stigmaeum	6
Fundulus notatus	3
Gambusia affinis	5
Labidesthes sicculus	3
Lepomis cyanellus	5
L. macrochirus	22
L. megalotis	11
Lythrurus fasciolaris	5
Minytrema melanops	2
P. phoxocephala	5
Pimephales notatus	135
P. promelas	1
SUM	**241**

Appendix LXXX. Stream usage assessment for GRBEX-23 (Buck Fork Pond River).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: BUCK FORK POND RIVER (Stream must be on 1:100k map)

GNIS Feature ID: 488223 Segment No.: __ __Station ID: WKU0323 (GRBEX-23)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: EAST FORK POND RIVER

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110006

County 1: CHRISTIAN County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: HONEY GROVE

Latitude: 36.9925 Longitude: -87.2986 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 07-27-01 (macroinvertebrate), 08-09-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT				X	
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550_____
Cause Code: 1600__ Source Code(s): 7550_____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix LXXXI. Macroinvertebrate taxa list for GRBEX-24 (Buck Creek) based on high-gradient, kicknet sampling.

Taxon			
MOLLUSCA			
	Physidae		
		Physella sp.	30
CRUSTACEA			
	Asellidae		
		Lirceus sp.	228
	Cambaridae		
		Orconectes sp.	2
EPHEMEROPTERA			
	Baetidae		
		Acentrella sp.	1
		Acerpenna sp.	180
		Procloeon sp.	1
	Caenidae		
		Caenis sp.	247
	Heptageniidae		
		Stenonema sp.	9
ODONATA			
	Gomphidae		
		Stylogomphus albistylus	1
PLECOPTERA			
	Perlidae		
		Neoperla sp.	21
		Perlesta sp.	1
HEMIPTERA			
	Corixidae		
		immature corixid	4
	Veliidae		
		Microvelia sp.	11
MEGALOPTERA			
	Corydalidae		
		Nigronia sp.	12
NEUROPTERA			
	Sialidae		
		Sialis sp.	2
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	1418
		Hydropsyche sp.	105
	Hydroptilidae		
		Hydroptila sp.	16
	Philopotamidae		
		Chimarra sp.	2

Appendix LXXXI. Cont.

Taxon			
COLEOPTERA			
	Dytiscidae		
		Hydroporus sp.	4
	Elmidae		
		Dubiraphia sp.	1
		Stenelmis sp.	141
	Hydrophilidae		
		Laccobius sp.	9
DIPTERA			
	Ceratopogonidae		
		Bezzia sp.	2
	Chironomidae		3104
	Empididae		
		Hemerodromia sp.	26
	Simuliidae		
		Simulium sp.	1
	Tipulidae		
		Hexatoma sp.	1
		Tipula sp.	13
		SUM	**5593**

Appendix LXXXII. Macroinvertebrate taxa list for GRBEX-24 (Buck Creek) based on high-gradient, multihabitat sampling.

Taxon		
EPHEMEROPTERA		
Baetidae		
	Procloeon sp.	1
Caenidae		
	Caenis sp.	24
Heptageniidae		
	Stenonema sp.	50
HEMIPTERA		
Veliidae		
	Microvelia sp.	1
MEGALOPTERA		
Corydalidae		
	Nigronia sp.	1
COLEOPTERA		
Dytiscidae		
	Lioporeus sp.	2
Elmidae		
	Stenelmis sp.	1
	SUM	**80**

Appendix LXXXIII. Fish species list for GRBEX-24 (Buck Creek).

Taxon	
Campostoma oligolepis	210
Catostomus commersoni	13
Erimyzon oblongus	11
Etheostoma nigrum	10
E. spectabile	66
E. stigmaeum	22
Fundulus notatus	4
Gambusia affinis	2
Lepomis cyanellus	24
L. macrochirus	11
L. megalotis	55
Luxilis chrysocephalus	75
Lythrurus fasciolaris	77
Moxostoma erythrurum	3
Notemigonus crysoleucas	2
Pimephales notatus	193
Semotilus atromaculatus	29
SUM	**807**

Appendix LXXXIV. Stream usage assessment for GRBEX-24 (Buck Creek).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: BUCK CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 488210 Segment No.: __ __Station ID: WKU0324 (GRBEX-24)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: BUCK FORK POND RIVER

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110006

County 1: CHRISTIAN County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: HONEY GROVE

Latitude: 36.9813 Longitude: -87.3522 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 06-29-01 (macroinvertebrate), 08-09-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550
Cause Code: 1600__ Source Code(s): 7550
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix LXXXV. Macroinvertebrate taxa list for GRBEX-26 (East Branch West Fork Pond River) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			5
MOLLUSCA			
	Corbiculiidae		
		Corbicula fluminea	139
	Pleuroceridae		
		Elimia sp.	41
CRUSTACEA			
	Asellidae		
		Lirceus sp.	1
	Cambaridae		
		Orconectes sp.	18
EPHEMEROPTERA			
	Baetidae		
		Acerpenna sp.	14
		Baetis sp.	1
		Procloeon sp.	3
	Caenidae		
		Caenis sp.	1
	Heptageniidae		
		Stenacron sp.	6
ODONATA			
	Aeshnidae		
		Boyeria sp.	2
PLECOPTERA			
	Perlidae		
		Acroneuria sp.	1
		Neoperla sp.	86
HEMIPTERA			
	Veliidae		
		Microvelia sp.	9
NEUROPTERA			
	Sialidae		
		Sialis sp.	14
TRICHOPTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	47
		Hydropsyche sp.	1
	Philopotamidae		
		Chimarra sp.	1
COLEOPTERA			
	Dryopidae		
		Helichus sp.	6
	Dytiscidae		
		Neoporus sp.	2

Appendix LXXXV. Cont.

Taxon			
	Gyrinidae		
		Dineutus sp.	1
	Elmidae		
		Dubiraphia sp.	2
		Macronychus glabratus	2
		Stenelmis sp.	53
	Hydrophilidae		
		Enochrus sp.	1
		Paracymus sp.	2
	Scirtidae		
		Scirtes sp.	2
DIPTERA			
	Ceratopogonidae		
		Probezzia sp.	1
	Chironomidae		151
	Empididae		
		Hemerodromia sp.	7
	Ephydridae		
		Brachydeutera sp.	1
	Simuliidae		
		Simulium sp.	3
	Stratiomyiidae		
		Stratiomys sp.	1
	Tipulidae		
		Tipula sp.	1
		SUM	**626**

Appendix LXXXVI. Macroinvertebrate taxa list for GRBEX-26 (East Branch West Fork Pond River) based on high-gradient, multihabitat sampling.

Taxon			
MOLLUSCA			
	Sphaeriidae		
		Sphaerium sp.	24
	Physidae		
		Physella sp.	2
	Pleuroceridae		
		Elimia sp.	42
EPHEMEROPTERA			
	Baetidae		
		Acerpenna sp.	15
		Centroptilum sp.	2
		Procloeon sp.	43
	Heptageniidae		
		Stenacron sp.	6
ODONATA			
	Aeshnidae		
		Boyeria sp.	2
PLECOPTERA			
	Perlidae		
		Neoperla sp.	5
NEUROPTERA			
	Sialidae		
		Sialis sp.	5
TRICHOPTERA			
	Dipseudopsidae		
		Phylocentropus sp.	1
	Hydroptilidae		
		Hydroptila sp.	1
	Polycentropodidae		
		Polycentropus sp.	1
		immature polycentropodid	1
COLEOPTERA			
	Dryopidae		
		Helichus sp.	6
	Elmidae		
		Dubiraphia sp.	1
		Macronychus glabratus	20
DIPTERA			
	Chironomidae		124
	Simuliidae		
		Simulium sp.	1

Appendix LXXXVI Cont.

Taxon		
Tipulidae		
	Limonia sp.	1
	Pseudolimnophila sp.	1
	SUM	**304**

Appendix LXXXVII. Fish species list for GRBEX-26 (East Branch West Fork Pond River).

Taxon	
Campostoma oligolepis	4
Cyprinella whipplei	2
Erimyzon oblongus	4
Esox americanus	2
Etheostoma stigmaeum	1
Lepomis cyanellus	2
L. gulosus	2
L. macrochirus	26
L. megalotis	47
Luxilis chrysocephalus	2
Lythrurus fasciolaris	13
Micropterus punctulatus	3
Notemigonus crysoleucas	2
Semotilus atromaculatus	27
SUM	**137**

Appendix LXXXVIII. Stream usage assessment for GRBEX-26 (East Branch West Fork Pond River)

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER

Stream Name: EAST BRANCH WEST FORK POND RIVER (Stream must be on 1:100k map)

GNIS Feature ID: 506444 Segment No.: __ __Station ID: WKU0326 (GRBEX-26)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: WEST FORK POND RIVER

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110006

County 1: CHRISTIAN County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: CROFTON

Latitude: 37.0247 Longitude: -87.4032 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 07-05-01 (macroinvertebrate), 08-09-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550
Cause Code: 1600__ Source Code(s): 7550
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix LXXXIX. Macroinvertebrate taxa list for GRBEX-27 (Elk Pond Creek) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			10
CRUSTACEA			
	Asellidae		
		Lirceus sp.	3
HEMIPTERA			
	Corixidae		
		immature corixid	3
DIPTERA			
	Chironomidae		3
	Tabanidae		
		Chrysops sp.	1
	Tipulidae		
		Erioptera sp.	2
		Molophilus sp.	2
		Ormosia sp.	1
		SUM	**25**

Appendix XC. Macroinvertebrate taxa list for GRBEX-27 (Elk Pond Creek) based on high-gradient, multihabitat sampling.

Taxon			
OLIGOCHAETA			12
ODONATA			
	Libellulidae		
		immature libellulid	1
DIPTERA			
	Chironomidae		2
	Tipulidae		
		Erioptera sp.	3
		SUM	**18**

Appendix XCI. Fish species list for GRBEX-27 (Elk Pond Creek)

Taxon	
Cyprinella spiloptera	13
Etheostoma nigrum	1
Gambusia affinis	20
Lepomis gulosus	2
L. macrochirus	23
Semotilus atromaculatus	2
SUM	**61**

Appendix XCII. Stream usage assessment for GRBEX-27 (Elk Pond Creek)

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: ELK POND CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 491671 Segment No.: __ __Station ID: WKU0327 (GRBEX-27)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: POND RIVER

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110006

County 1: MUHLENBERG County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: GRAHAM

Latitude: 37.1618 Longitude: -87.2885 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 08-31-01 (macroinvertebrate), 09-14-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT				X	
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 1000, 7550
Cause Code: 1600__ Source Code(s): 1000, 7550
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix XCIII. Macroinvertebrate taxa list for GRBEX-29 (Pleasant Run) based on high-gradient, kicknet sampling.

Taxon			
HEMIPTERA			
	Corixidae		
		immature corixid	8
	Veliidae		
		Microvelia sp.	9
MEGALOPTERA			
	Corydalidae		
		Chauliodes sp.	2
NEUROPTERA			
	Sialidae		
		Sialis sp.	38
DIPTERA			
	Ceratopogonidae		
		Bezzia sp.	4
		Probezzia sp.	24
	Chironomidae		486
		SUM	**571**

Appendix XCIV. Macroinvertebrate taxa list for GRBEX-29 (Pleasant Run) based on high-gradient, multihabitat sampling.

Taxon			
HEMIPTERA			
	Corixidae		
		immature corixid	4
NEUROPTERA			
	Sialidae		
		Sialis sp.	33
DIPTERA			
	Ceratopogonidae		
		Probezzia sp.	2
	Chironomidae		356
		SUM	**395**

Appendix XCV. Stream usage assessment for GRBEX-29 (Pleasant Run)

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: PLEASANT RUN (Stream must be on 1:100k map)

GNIS Feature ID: 500906 Segment No.: __ __Station ID: WKU0329 (GRBEX-29)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: DRAKES CREEK

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110006

County 1: HOPKINS County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: NORTONVILLE

Latitude: 37.1918 Longitude: -87.4523 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 08-13-01 (macroinvertebrate), 08-13-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT				X	
BIOLOGICAL				X	
TOXICITY					
PHYSICAL/CHEM				X	

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1000__ Source Code(s): 5800_____
Cause Code: 1100__ Source Code(s): 7550_____
Cause Code: 1600__ Source Code(s): 7550_____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix XCVI. Macroinvertebrate taxa list for GRBEX-30 (Flat Creek) based on high-gradient, kicknet sampling.

Taxon			
OLIGOCHAETA			27
CRUSTACEA			
	Asellidae		
		Caecidotea sp.	1
		Lirceus sp.	1
ODONATA			
	Aeshnidae		
		immature aeshnid	1
HEMIPTERA			
	Notonectidae		
		immature notonectid	1
NEUROPTERA			
	Sialidae		
		Sialis sp.	19
COLEOPTERA			
	Gyrinidae		
		Dineutus sp.	1
DIPTERA			
	Ceratopogonidae		
		Bezzia sp.	1
		Probezzia sp.	1
	Chironomidae		72
	Tipulidae		
		Tipula sp.	3
		SUM	**128**

Appendix XCVII. Macroinvertebrate taxa list for GRBEX-30 (Flat Creek) based on high-gradient, multihabitat sampling.

Taxon			
ODONATA			
	Aeshnidae		
		Aeshna sp.	3
HEMIPTERA			
	Corixidae		
		immature corixid	6
NEUROPTERA			
	Sialidae		
		Sialis sp.	27
TRICHOPTERA			
	Polycentropodidae		
		Polycentropus sp.	1
COLEOPTERA			
	Hydrophilidae		
		Tropisternus sp.	1
DIPTERA			
	Ceratopogonidae		
		Bezzia sp.	23
		Ceratopogon sp.	2
		Probezzia sp.	10
	Chironomidae		247
		SUM	**320**

Appendix XCVIII. Stream usage assessment for GRBEX-30 (Flat Creek)

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: FLAT CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 492181 Segment No.: __ __Station ID: WKU0330 (GRBEX-30)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: POND RIVER

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110006

County 1: HOPKINS County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: MADISONVILLE EAST

Latitude: 37.2506 Longitude: -87.4547 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 06-29-01 (macroinvertebrate), 08-13-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT				X	
BIOLOGICAL				X	
TOXICITY					
PHYSICAL/CHEM				X	

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1000__ Source Code(s): 5800_____
Cause Code: 1100__ Source Code(s): 7550_____
Cause Code: 1600__ Source Code(s): 7550_____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix IC. Macroinvertebrate taxa list for GRBEX-13 (Bat East Creek) based on low-gradient, multihabitat sampling.

Taxon			
OLIGOCHAETA			11
MOLLUSCA			
	Planorbidae		
		Helisoma sp.	2
	Physidae		
		Physella sp.	3
	Sphaeriidae		
		Sphaerium sp.	1
	Unionidae		
		immature unionid	1
EPHEMEROPTERA			
	Baetidae		
		Centroptilum sp.	2
	Caenidae		
		Caenis sp.	10
	Heptageniidae		
		Stenonema sp.	8
ODONATA			
	Aeshnidae		
		Basiaeschna sp.	1
	Coenagrionidae		
		Argia sp.	1
		Enallagma sp.	2
	Gomphidae		
		Gomphus sp.	2
	Libellulidae		
		Macromia sp.	1
		Neurocordulia sp.	4
HEMIPTERA			
	Gerridae		
		Trepobates sp.	1
TRICHOPOTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	1
	Hydroptilidae		
		Hydroptila sp.	1
	Leptoceridae		
		Oecetis sp.	1
		Triaenodes sp.	1
COLEOPTERA			
	Dytiscidae		
		Cybister sp.	1
	Elmidae		
		Dubiraphia sp.	3

Appendix IC. Cont.

Taxon			
	Haliplidae		
		Peltodytes sp.	7
	Hydrophilidae		
		Berosus sp.	6
DIPTERA			
	Ceratopogonidae		
		Atrichopogon sp.	2
		Bezzia sp.	1
		Forcipomyia sp.	1
		immature ceratopogonid	2
	Chaoboridae		
		Chaoborus sp.	1
	Chironomidae		226
	Tabanidae		
		Chrysops sp.	1
	Tipulidae		
		Tipula sp.	1
		SUM	**306**

Appendix C. Fish species list for GRBEX-13 (Bat East Creek).

Taxon	
Amia calva	1
Aphredoderus sayanus	1
Erimyzon oblongus	1
Esox americanus	2
Fundulus olivaceus	4
Gambusia affinis	1
Labidesthes sicculus	39
Lepomis macrochirus	106
L. megalotis	23
L. microlophus	1
Lythrurus fasciolaris	48
Micropterus punctulatus	3
M. salmoides	1
Minytrema melanops	2
Moxostoma erythrurum	7
Percina maculata	2
Pimephales notatus	4
SUM	**246**

Appendix CI. Stream usage assessment for GRBEX-13 (Bat East Creek).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: BAT EAST CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 486462 Segment No.: __ __Station ID: WKU0313 (GRBEX-13)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: POND CREEK

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110003

County 1: MUHLENBERG County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: DRAKESBORO

Latitude: 37.1560 Longitude: -87.0973 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 07-19-01 (macroinvertebrate), 08-08-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT				X	
BIOLOGICAL				X	
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550_____
Cause Code: 1600__ Source Code(s): 7550_____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix CII. Macroinvertebrate taxa list for GRBEX-15 (Lewis Creek) based on low-gradient, multihabitat sampling.

Taxon			
MOLLUSCA			
	Physidae		
		Physella sp.	13
CRUSTACEA			
	Asellidae		
		Caecidotea sp.	5
EPHEMEROPTERA			
	Baetidae		
		Callibaetis sp.	2
	Caenidae		
		Caenis sp.	34
	Ephemeridae		
		Hexagenia sp.	1
ODONATA			
	Aeshnidae		
		Basiaeschna sp.	1
	Coenagrionidae		
		Argia sp.	1
		Enallagma sp.	6
	Gomphidae		
		Gomphus sp.	1
	Libellulidae		
		immature libellulid	1
HEMIPTERA			
	Veliidae		
		Steinovelia sp.	2
NEUROPTERA			
	Sialidae		
		Sialis sp.	11
TRICHOPOTERA			
	Hydropsychidae		
		Cheumatopsyche sp.	21
		Hydropsyche sp.	1
	Hydroptilidae		
		Hydroptila sp.	2
		Neotrichia sp.	3
	Leptoceridae		
		Oecetis sp.	1
	Polycentropodidae		
		Cyrnellus fraternus	16
		Polycentropus sp.	18
LEPIDOPTERA			
	Pyralidae		
		Munroessa/Synclita sp.	53

Appendix CII. Cont.

Taxon			
COLEOPTERA			
	Dytiscidae		
		Nebrioporus/Stictotarsus sp.	1
	Elmidae		
		Dubiraphia sp.	4
	Gyrinidae		
		Dineutus sp.	6
	Scirtidae		
		Prionocyphon sp.	1
DIPTERA			
	Ceratopogonidae		
		Probezzia sp.	1
	Chironomidae		155
	Tipulidae		
		Pedicia sp.	1
		immature tipulid	1
		SUM	**363**

Appendix CIII. Fish species list for GRBEX-15 (Lewis Creek).

Taxon	
Fundulus catenatus	1
Lepisosteus oculatus	1
Lepomis macrochirus	7
L. megalotis	11
L. microlophus	1
Micropterus salmoides	1
Pomoxis annularis	1
Pylodictus olivaris	1
SUM	**24**

Appendix CIV. Stream usage assessment for GRBEX-15 (Lewis Creek).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: LEWIS CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 496327 Segment No.: __ __Station ID: WKU0315 (GRBEX-15)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: GREEN RIVER

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110003

County 1: OHIO County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: PARADISE

Latitude: 37.3475 Longitude: -86.9843 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 06-26-01 (macroinvertebrate), 08-16-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT	X				
BIOLOGICAL				X	
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550_____
Cause Code: 1600__ Source Code(s): 7550_____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix CV. Macroinvertebrate taxa list for GRBEX-17 (Caney Creek) based on low-gradient, multihabitat sampling.

Taxon			
HIRUDINEA			1
MOLLUSCA			
	Corbiculiidae		
		Corbicula fluminea	1
CRUSTACEA			
	Talitridae		
		Hyalella azteca	3
EPHEMEROPTERA			
	Caenidae		
		Caenis sp.	12
	Heptageniidae		
		Stenacron sp.	51
		Stenonema sp.	141
ODONATA			
	Libellulidae		
		Neurocordulia sp.	1
HEMIPTERA			
	Corixidae		
		immature corixid	4
	Gerridae		
		Trepobates sp.	7
	Hydrometridae		
		Hydrometra sp.	1
	Nepidae		
		Nepa sp.	2
	Veliidae		
		Steinovelia sp.	2
TRICHOPOTERA			
	Hydroptilidae		
		Hydroptila sp.	4
	Leptoceridae		
		Oecetis sp.	3
	Polycentropodidae		
		Cyrnellus fraternus	5
COLEOPTERA			
	Elmidae		
		Dubiraphia sp.	9
		Stenelmis sp.	27
	Hydrophilidae		
		Berosus sp.	4
	Scirtidae		
		Prionocyphon sp.	1

Appendix CV. Cont.

Taxon		
DIPTERA		
	Chironomidae	130
	SUM	**409**

Appendix CVI. Fish species list for GRBEX-17 (Caney Creek).

Taxon	
Cyprinella spiloptera	1
Hybopsis amblops	3
Labidesthes sicculus	10
Lepisosteus oculatus	1
Lepomis cyanellus	3
L. gulosus	1
L. macrochirus	28
L. megalotis	16
Micropterus punctulatus	3
Percina caprodes	2
P. maculata	4
Pimephales notatus	12
SUM	**84**

Appendix CVII. Stream usage assessment for GRBEX-17 (Caney Creek).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: CANEY CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 488846 Segment No.: __ __Station ID: WKU0317 (GRBEX-17)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: ROUGH RIVER

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110004

County 1: OHIO County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: ROSINE

Latitude: 37.4640 Longitude: -86.6555 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 07-13-01 (macroinvertebrate), 09-24-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550
Cause Code: 1600__ Source Code(s): 7550
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix CVIII. Macroinvertebrate taxa list for GRBEX-25 (Jarrels Creek) based on low-gradient, multihabitat sampling.

Taxon			
OLIGOCHAETA			1
MOLLUSCA			
	Planorbidae		
		Helisoma sp.	1
	Sphaeriidae		
		Pisidium sp.	2
		Sphaerium sp.	1
CRUSTACEA			
	Asellidae		
		Caecidotea sp.	2
		Lirceus sp.	1
	Atyidae		
		Palaemonetes sp.	54
	Talitridae		
		Hyalella azteca	1
EPHEMEROPTERA			
	Baetidae		
		Callibaetis sp.	1
	Caenidae		
		Caenis sp.	16
	Heptageniidae		
		Stenacron sp.	1
		Stenonema sp.	2
ODONATA			
	Aeshnidae		
		Nasiaeschna sp.	2
	Coenagrionidae		
		Enallagma sp.	4
	Libellulidae		
		Epicordulia sp.	1
		Libellula sp.	3
		Neurocordulia sp.	2
HEMIPTERA			
	Belostomatidae		
		Belostoma sp.	1
	Corixidae		
		immature corixid	48
	Gerridae		
		Trepobates sp.	1
	Nepidae		
		Ranatra sp.	1
MEGALOPTERA			
	Corydalidae		
		Chauliodes sp.	1

Appendix CVIII. Cont.

Taxon			
NEUROPTERA			
	Sialidae		
		Sialis sp.	1
LEPIDOPTERA			
	Nepticulidae		
		Nepticula sp.	1
COLEOPTERA			
	Elmidae		
		Dubiraphia sp.	5
		Stenelmis sp.	5
	Haliplidae		
		Peltodytes sp.	1
	Hydrophilidae		
		Berosus sp.	1
		Helobata sp.	1
		Helochares sp.	1
DIPTERA			
	Chaoboridae		
		Chaoborus sp.	1
	Chironomidae		29
	Tabanidae		
		Chlorotabanus sp.	1
	Tipulidae		
		Helius sp.	3
		Tipula sp.	1
		SUM	**198**

Appendix CIX. Fish species list for GRBEX-25 (Jarrells Creek).

Taxon	
Aphredoderus sayanus	2
Esox americanus	1
Gambusia affinis	13
Lepomis gulosus	2
L. macrochirus	20
L. megalotis	5
Noturus gyrinus	1
Pimephales notatus	1
SUM	**45**

Appendix CX. Stream usage assessment for GRBEX-25 (Jarrells Creek).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: JARRELLS CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 495175 Segment No.: __ __Station ID: WKU0325 (GRBEX-25)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: POND RIVER

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110006

County 1: MUHLENBERG County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: GRAHAM

Latitude: 37.1573 Longitude: -87.3171 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 07-27-01 (macroinvertebrate), 08-13-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT				X	
BIOLOGICAL				X	
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550
Cause Code: 1500__ Source Code(s): 7100, 7200
Cause Code: 1600__ Source Code(s): 7550
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments:

Appendix CXI. Macroinvertebrate taxa list for GRBEX-28 (Craborchard Creek) based on low-gradient, multihabitat sampling.

Taxon			
MOLLUSCA			
	Physidae		
		Physella sp.	1
	Sphaeriidae		
		Pisidium sp.	4
		Sphaerium sp.	19
CRUSTACEA			
	Asellidae		
		Caecidotea sp.	15
	Talitridae		
		Hyalella azteca	14
EPHEMEROPTERA			
	Baetidae		
		Callibaetis sp.	1
	Caenidae		
		Caenis sp.	6
ODONATA			
	Aeshnidae		
		Basiaeschna sp.	3
		Nasiaeschna sp.	2
	Coenagrionidae		
		Enallagma sp.	20
	Libellulidae		
		Neurocordulia sp.	19
		immature libellulid	2
NEUROPTERA			
	Sialidae		
		Sialis sp.	11
COLEOPTERA			
	Dytiscidae		
		Cybister sp.	
	Elmidae		
		Dubiraphia sp.	25
	Haliplidae		
		Peltodytes sp.	3
	Scirtidae		
		Prionocyphon sp.	1
DIPTERA			
	Chironomidae		282
		SUM	**428**

Appendix CXII. Fish species list for GRBEX-28 (Craborchard Creek).

Taxon	
Aphredoderus sayanus	11
Esox americanus	3
Etheostoma gracile	3
Fundulus olivaceus	24
Lepomis cyanellus	3
L. gulosus	2
L. macrochirus	59
L. megalotis	3
Notemigonus crysoleucas	1
SUM	**109**

Appendix CXIII. Stream usage assessment for GRBEX-28 (Craborchard Creek).

305b ASSESSMENT FORM
Sampling Year: 2001
Basin Management Unit: GREEN & TRADEWATER
(Complete a form for each assessed segment.)

Stream Name: CRABORCHARD CREEK (Stream must be on 1:100k map)

GNIS Feature ID: 490247 Segment No.: __ __Station ID: WKU0328 (GRBEX-28)

Total length of stream (in miles, excluding reservoirs): _____ . ___

Receiving Stream: DRAKES CREEK

Downstream/Upstream Mile Point: _____.___ to _____.___ Segment Length: _____.___

Downstream/Upstream Description: _____to _____
Major Basin: Big Sandy; Little Sandy; Tygarts; Licking; Kentucky; Salt; Green; Tradewater; Tennessee; Mississippi; Upper Cumberland; Lower Cumberland; Ohio (circle one)

USGS (8-digit) Cataloging Unit: 05110006

County 1: HOPKINS County 2: _____ (sample site county(s))

Sample Site Mile Point: _____.___ Topographic Map Name: NORTONVILLE

Latitude: 37.1577 Longitude: -87.4644 (dd.dddd or dms)

Assessment Date: 08-02-03 (mm-dd-yy) Type: Monitored or Evaluated (circle one)

Sampling Dates: Start: 07-05-01 (macroinvertebrate), 08-13-01 (Fish)

Biological Integrity: Excellent; Good; Fair; Poor (circle one) Number of Sites: 1

AQUATIC LIFE USE SUPPORT TABLE (Check all that apply)

AQUATIC LIFE	FULL	FULL, but THREATENED	PARTIAL	NONSUPPORT	Level of Info 1 to 4
HABITAT			X		
BIOLOGICAL			X		
TOXICITY					
PHYSICAL/CHEM	X				

USE SUPPORT
AQUATIC LIFE (circle one)
Full Threatened Partial Nonsupport
Cause Code: 1100__ Source Code(s): 7550
Cause Code: 1600__ Source Code(s): 7550
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
Cause Code: _____ Source Code(s): _____
(One or more sources must be designated for each cause)

FISH CONSUMPTION (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

SWIMMING (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

DRINKING WATER (circle one)

Full Threatened Partial Nonsupport

Cause Code: _____ Source Code(s): _____

Cause Code: _____ Source Code(s): _____

OVERALL USE (DOW use only – do not circle)

Full Threatened Partial Nonsupport

Assessment Method Code(s): _____

Assessment Performed by: (circle all that apply)

DOW	DOW	University	Federal	State	Other
Amb WQ	NPS	EKU	COE	KDFWR	ORSANCO
Amb Bio	GDW	WKU	USFS	KSNPC	MSD
WMB	Probmon	MoreheadU	USFW	VA	LFUCG
Bact	DMR		TVA	WVA	
IS				TN	
RR					
FO					

Names of Contributors: Scott Grubbs

Comments: