

FINAL REPORT

**A BIOASSESSMENT OF THE FISH COMMUNITY OF HORSE LICK
CREEK, JACKSON COUNTY, KENTUCKY**

**Guenter A. Schuster, Ph.D. and Stephen McMurray
Department of Biological Sciences
Eastern Kentucky University
Richmond, KY 40475**

Prepared for:

**Kentucky Division of Water
Nonpoint Source Program
14 Reilly Rd.
Frankfort, KY 40601**

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EXECUTIVE SUMMARY

The purpose of this study was to assess the fish community of Horse Lick Creek, Jackson County, Kentucky, which has been designated by The Nature Conservancy as a World Bioreserve. To this end nine sites were sampled along the length of the stream. This was the first intensive assessment study done on the fishes of Horse Lick Creek. This stream is relatively inaccessible, but still has a number of serious environmental problems that have impacted the stream over a number of years. These include off-road vehicle (ORV) use, coal mining and logging. Because this stream has such a unique fauna that includes a number of state and federally listed species this study was deemed to be an important undertaking. A companion study by Board and Schuster (1997) on the macroinvertebrate community of Horse Lick Creek was done at the same time.

A total of 6,348 fish specimens representing six families, 15 genera and 28 species was collected during 1994 and 1995 from nine sites over four collection periods. Overall site 1, the most downstream site, yielded the largest number of species and specimens, followed closely by sites 3 and 5. Site 7 had the lowest diversity of fish species and site 8 produced the lowest number of specimens. The calculated IBI values for this stream at all nine sites indicated that the stream water quality rating overall was Fair-Good with an overall average score of 44.6. Sites 1 and 6 had the highest IBI scores (51 and 51.3 respectively); both sites had water quality ratings of Good. The Proportional Similarity index, which was calculated from these data indicated that the sites were relatively similar to each other and across seasons. Lastly, two specimens of *Etheostoma cinereum* were collected from site 1. This was an important find because this fish species is rare throughout its range in Kentucky.

INTRODUCTION

The purpose of this study was to assess the fish community of the Horse Lick Creek, Jackson County, Kentucky, which has been designated by The Nature Conservancy as a World Bioreserve. Nine sites were sampled along the stream. This has been the first bioassessment study done on fishes of Horse Lick Creek.

Horse Lick Creek is a major tributary of the Rockcastle River and originates in northwestern Jackson County, Kentucky, just east of the Rockcastle-Jackson County line and flows for 27 km south to where it enters the Rockcastle River (KNPC 1980). The drainage basin has karst topography with many caves and subterranean streams (KNPC 1980). The watershed has been designated a World Bioreserve because of the large numbers of species of mussels, fish, plants, and mammals inhabiting the drainage system, some of which have either state or federal protection status (KCTNC 1992). Included in these are the federally endangered Cumberland bean pearly mussel (*Villosa trabalis* (Conrad)) and the little wing pearly mussel (*Pegias fabula* (Lea)) (KCTNC 1992). The 30 known species of fish which inhabit Horse Lick Creek system include the ashy darter (*Etheostoma cinereum* Storer) and the olive darter (*Percina squamata* (Gilbert and Swain)), both of which are threatened throughout their range (KCTNC 1992).

Horse Lick Creek is relatively inaccessible stream, which accounts for its high water quality (KCTNC 1992). Because of its inaccessibility it is a favorite area for off-road vehicle (ORV) users, who degrade the stream bed and riparian zone, which increases sedimentation within the stream. In addition, the watershed has been used for coal mining, logging and agriculture.

Coal mining is the cause of many problems in the surface waters of Eastern Kentucky. These are the result of top soil removal, loss of vegetation and increased acidity all of which wreak biological havoc on a stream system (Branson and Batch 1971). The increase in siltation and reduction of pH are known to have major impacts on benthic macroinvertebrates and fishes (Branson and Batch 1971; Branson et al.

1984; Lenat et al. 1981; Taylor and Roff 1986; Rosemond et al. 1992). Like wise, logging also impacts the stream through increased sedimentation as a result of tree removal (Corn and Bury 1989; Harr and Nichols 1993).

Both logging and ORV traffic create roads which scour the hillsides and increase erosion and subsequently increase silt deposition into streams. The greatest impacts of these roads are generally at stream crossings (Eaglin and Hubert 1993). The primary agricultural use in the Horse Lick Creek drainage is through cattle grazing. Cattle increase nutrient input and cause bank erosion and riparian zone trampling which leads to increased sedimentation (Armour et al. 1991).

The Index of Biotic Integrity (IBI) is one method of assessing the biotic integrity or water quality of a site, and the IBI is what RBP V is primarily based on (Plafkin et al. 1989). The IBI, as first described by Karr (1981), uses fish as indicators of water quality. Advantages to using fish as a measure of the biological condition of a stream include their widespread distribution, use of a wide range of trophic levels, and relative ease of identification (Karr et al. 1986). The IBI has been modified for use in different geographical regions. The IBI used for this project was published by the Kentucky Division of Water (KDOW 1997).

The IBI is a multi-metric index that is composed of three categories and twelve different metrics (Karr et al. 1986). Fish collection data from a site are compared to the expected values for that site for each of the twelve metrics. The expected values will change from site to site along a stream, depending on the drainage area of the stream at each site. Each metric is given a value of 5, 3, or 1, and all the values are totaled. The index value can range from 12 to 60, and the values relate to water quality ratings (excellent, good, fair, poor or very poor) and the overall health of the stream (Plafkin et al. 1989).

The objectives of this study were first to determine the fish community composition along nine sites in Horse Lick Creek. A second objective was to determine through the use of the IBI the overall integrity of stream. This study was done in

conjunction with a companion study on the macroinvertebrate community of Horse Lick Creek (Board and Schuster 1997).

DESCRIPTION OF STUDY SITES

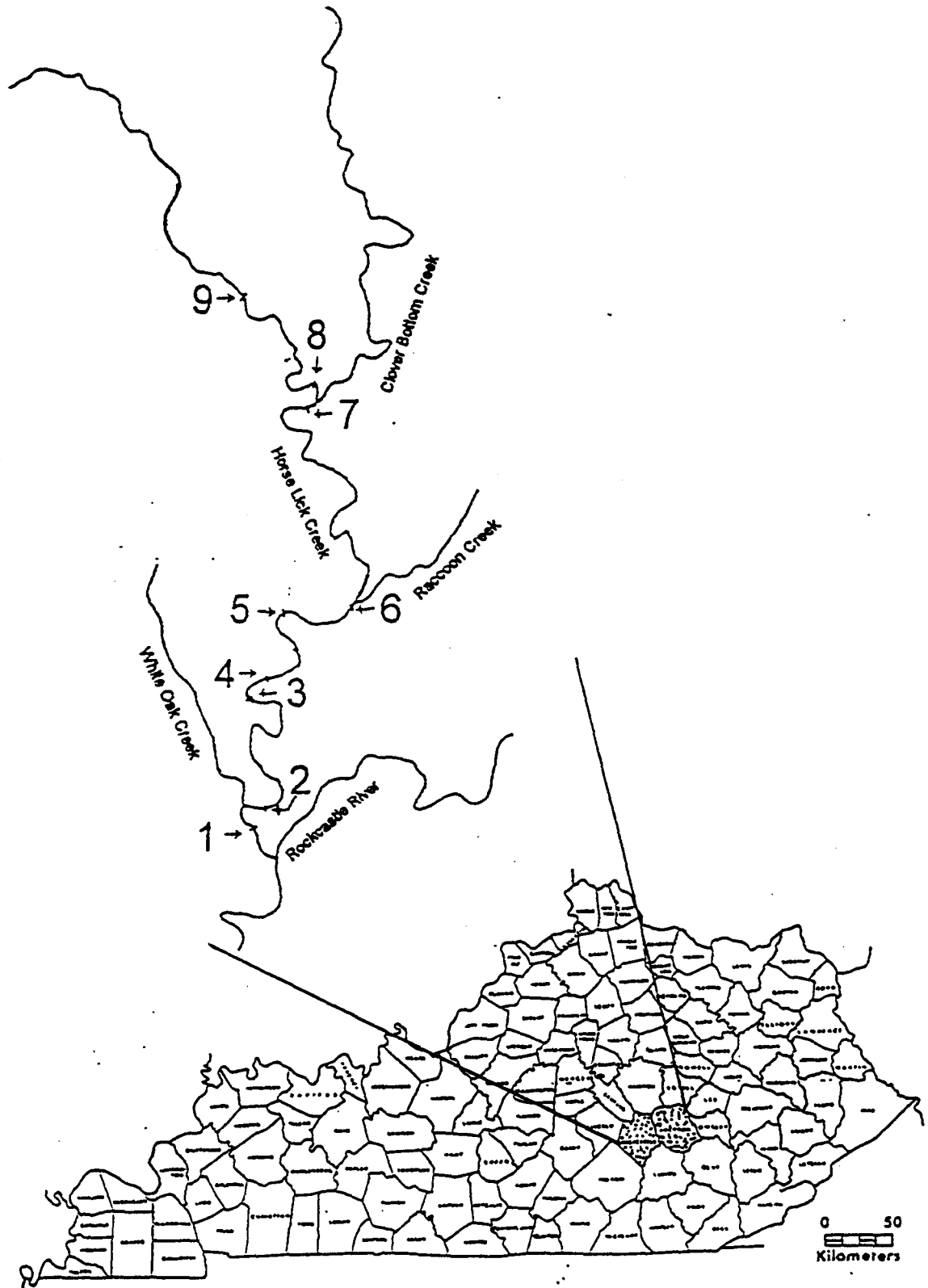
The following description of the study sites is after Board and Schuster (1997), who sampled the same sites in a study of the macroinvertebrates of Horse Lick Creek. Nine sites in Horse Lick Creek in Jackson and Rockcastle counties, Kentucky, were selected for sampling. These sites (Figure 1) were chosen in consultation with the Kentucky Chapter of The Nature Conservancy, which had established these sites for water chemistry sampling. The sampling was conducted over a two year period with spring and fall sampling periods for each site within each year. Each site was sampled once on 11,12 and 14 May 1994, again on 30 September and 1 October 1994, and then again the following year on 10-11 June 1995 and 22-23 September 1995.

Site 1 was located about 1 km upstream from the confluence of the Rockcastle River and about 0.5 km downstream from the White Oak Creek tributary confluence. Along this tributary, logging operations were evident during the time of this study. Horse Lick Creek was a fifth order stream with excellent riparian cover at site 1. A riffle, composed primarily of cobble and gravel, was located just below a long pool/run with a gravel bar on the right downstream bank. The site was on the Jackson County and Rockcastle County border.

Site 2 was located 1 km upstream from site 1 above the White Oak Creek tributary and 1 km downstream from the Laurel Branch tributary confluence on the Jackson-Rockcastle county border. This site also had excellent riparian cover, although a large field bordered the right downstream bank. There was a narrow, gravel riffle area in the center of the site bordered by beds of Justicia americana (Linnaeus)(water willow). A wide and long run was upstream of the riffle, while a deep pool with fine sediment substrate was immediately below the riffle.

Site 3 was located about 4.5 km upstream from site 2 and just downstream of the intermittent Red Dog Creek inlet on the Jackson-Rockcastle county border. Iron precipitate was draining into the stream from a strip mine located to the west at the time

Figure 1. Map of Horse Lick Creek showing the location of nine collection sites (taken from Board and Schuster, 1997).



of this study, and a road crossed Horse Lick Creek at this site just upstream of the sampled riffle area. The substrate at and below the stream crossing was flat limestone bedrock. Riparian cover was excellent at the fast-flowing riffle, and the substrate was primarily composed of boulders and large cobble.

Site 4 was located just upstream of Red Dog Creek inlet and about 0.25 km downstream from the Trace Branch tributary confluence. This site also had a road crossing the stream just downstream from the sampled riffle. The riparian cover at the riffle was fairly open, and a large field was adjacent to the right downstream bank of the stream. The riffle, located in the middle of the stream channel, was bordered by shallow beds of Justicia americana (Linnaeus) and had a gravel, with some cobble, and sand substrate. A long, wide run was upstream and downstream of the site.

Site 5 was located about 2.5 km upstream from site 4 and was just downstream from the confluence of Horse Lick Creek and the Dry Fork tributary. At site 5, there was a road intersecting a cobble beach on the right bank and crossing the stream at the head of the riffle. Off-road vehicles (ORVs) were known to use this road. Riparian cover was only about 50% at this site and even less above the riffle area at the stream crossing. The left downstream bank was extremely eroded with little vegetation. The substrate of the riffle was primarily gravel with fine sediment that had been washed downstream from the crossing.

Site 6 was located 2.0 km upstream from site 5 in Jackson County and was just downstream of the Raccoon Creek inlet. A new concrete road crossing had been constructed at this site, just upstream of the riffle, and an increase of sedimentation was observed below the road during the sampling periods. The substrate of the riffle was primarily boulders and cobble. The stream was approximately 75% shaded with riparian cover at the riffle and the water was flowing swiftly.

Site 7 was located 0.5 km upstream from site 6 in Jackson County and was just downstream of the confluence of Clover Bottom Creek with Horse Lick Creek. A gravel and cobble substrate road crossing also bisected the riffle that was sampled at this site and ORVs and trucks had been seen using this crossing at the time of sampling.

Horse Lick Creek was a fourth order tributary at this site and riparian cover provided approximately 70% shading even though there was a road crossing and exposed dirt banks on both sides of the stream. The substrate of the riffle at the stream crossing was composed primarily of sand and gravel, and the water temperature was lower compared to other sites because of the addition of the cold water from Clover Bottom Creek (personal observation).

Site 8 was located in Horse Lick Creek in Jackson County just upstream of the confluence of Clover Bottom Creek. Horse Lick Creek was a third order stream at this site. The road, which also crossed site 7, went through site 8 at the sampled riffle area. The exposed dirt banks of both sides of the stream were extremely eroded with little vegetation. There was a cobble island in between the two riffles. The riffle closest to the left downstream bank had mostly gravel and sand substrate, while the riffle on the right bank had cobble and gravel substrate with some downed trees in it. There was a long, deep run upstream of the riffle.

Site 9, the most upstream site, was located 5.0 km upstream of site 8 and just upstream of the Little Clover Creek inlet into Horse Lick Creek. The right downstream bank of this site had a 10 m buffer zone between the bank and County Highway 1955, while the left bank was adjacent to a cattle pasture where cattle have access to the stream. The left bank was eroded and the vegetation was trampled and removed in spots due to the impact of cattle. The grass and shrub-covered right bank was not significantly eroded. There were agricultural fields about 50m from the left bank and a house across the road on the right bank. The riffles which were sampled were separated by a gravel and cobble island. Both riffles had a gravel and cobble substrate, but the riffle to the right of the island had a large established bed of Justicia americana (Linnaeus). Riparian cover was very limited at this site (approximately 25% covered) as a result of agricultural fields and the closeness of County Highway 1955 to the sample site. A long, deep run was upstream of the riffle, and a bridge crossing was approximately 50m downstream.

METHODS AND MATERIALS

Fish Sampling and Processing

Sampling methods for fish were similar to those in Methods for Assessing Biological Integrity of Surface Waters (KDOW 1993) and the USEPA's Rapid Bioassessment Protocol V (Plafkin et al. 1989). At each site run, riffle, and pool habitats were seined using a 3.4 m x 1.2 m fish seine with a mesh size of 0.3 cm. Each site was seined for at least one hour. Collections were preserved in the field in 10% formalin. Preserved fish were transported to the laboratory for enumeration and identification.

Laboratory Analysis

In the laboratory, fish were kept in a buffered formalin solution for up to two weeks before being transferred to tap water. After one day in tap water, fish were placed in 70% ethanol for permanent storage (Etnier and Starnes 1993).

The fish in each sample were identified using Page and Burr (1991), Etnier and Starnes (1993), and were confirmed by Dr. Patrick Ceas (Eastern Kentucky University). After being identified, fish were examined for any anomalies such as sores, deformities, parasites, etc. All identified specimens were retained as voucher specimens, and deposited for permanent storage into the Branley A. Branson Museum of Zoology at Eastern Kentucky University.

Data Analysis

To assess the community structure and biotic integrity of the fishes, an Index of Biotic Integrity (IBI) score was calculated for each study site for each collection period. The IBI permits evaluation of a wide range of characteristics of fish assemblages. There are three broad categories (Species Richness and Composition; Trophic Composition; and Fish Abundance and Condition), which include twelve metrics (Karr et

al. 1986, KDOW 1997). The IBI scores vary with the drainage area of the stream, which has to be calculated for each sampling site. In addition, scoring criteria are adjusted with respect to ecoregion. Each metric is assigned a score of 5, 3, or 1, based on whether its evaluation strongly, somewhat, or does not approximate the value expected at an unimpacted or relatively unimpacted site located in a stream of comparable size in the same ecoregion. The updated guidelines for converting each metric's value into an IBI score are provided by KDOW (1997) for each ecoregion in the state. The sum total of all individual metric scores may range from the lowest possible score of 12 to a maximum score of 60. The IBI score for each site is used to determine the water quality or integrity of the stream at that site. The water quality ratings can be excellent (58-60), good (48-52), fair (38-44), poor (28-34), or very poor (<23). Intermediate scores are simply reported as intermediates (i.e., a score of 55 would classify the site as good-excellent) (KDOW 1997).

The fish data were used also used to calculate the similarities of fish communities among sites. Community similarities were determined using Proportional Similarity (Brower et al. 1990). Values for this index range from 0 to 100%, with a value of 100% indicating that the two communities (i.e., sites) are identical.

RESULTS AND DISCUSSION

A total of 6,348 fish representing six families, 15 genera and 28 species was collected during 1994 and 1995 from nine sites over four collection periods (Table 1). Overall, site 1, the most downstream site, yielded the largest number of species and specimens (24 species, 939 specimens) followed closely by sites 3 and 5. While site 7 had the lowest diversity (15 species) and site 8 yielded the lowest number of specimens (306). Tables 2-10 present the fish collected from each site during each of the four collection dates.

One of the most interesting fish species collected during the study was Etheostoma cinereum Storer, the ashy darter. Two specimens were collected during the study and both came from site 1. This species is important because of its rarity throughout its range (Burr and Warren 1986). It was thought to be extirpated from Buck Creek, Pulaski County, Kentucky (Cicerello and Butler 1985; Burr and Warren 1986), but was recently rediscovered in that stream (Moeykens 1997). It appears that a population is still hanging on in Horse Lick Creek as well.

The IBI values were calculated for each site and for each date during the two year sampling period. During the spring 1994 collections the sites 5 and 6 were treated together, and site 8 was not sampled at all. The results of all of the IBI calculations for each date and the average IBI value for each site are shown in Tables 11-19. Sites 1 and 6 had the highest overall average IBI scores (51 and 51.3 respectively). Both sites on the average had Good water quality. They also had the three highest IBI scores from all sites in both years. These were 56 for site 1 for both the fall 1994 and spring 1995 collections and 58 for site 6 during the fall 1994 collection. Although sites 4 and 9 had averages slightly lower (47 and 49.5 respectively) than sites 1 and 6, they also were determined to have Good water quality. The remaining five sites (sites 2, 3, 5, 7 and 8) were consistently classified as having Fair water quality. When all IBI scores were averaged for all sites and all dates the overall average was calculated to be 44.6 which indicated that the overall water quality of Horse Lick Creek was Fair-Good.

Invariably the categories that caused the lower IBI scores were the number of top carnivores and the number of sunfish species in the samples. The overall water quality designation based on fish data is in contrast with that reported by Board and Schuster (1997), who studied the macroinvertebrate community of Horse Lick Creek. They reported overall Excellent water quality based on the results of Hilsenhoff Biotic Index, Shannon-Wiener Diversity Index. They sampled the same sites on the same dates. This suggests that the macroinvertebrates may be slightly better indicators of water quality. This is due to the relative sessile nature of most macroinvertebrates and to the greater diversity of macroinvertebrate taxa. There are simply more macroinvertebrate species to monitor and they can't move about as freely as fishes can. Compton and Schuster (1997) and Moeykens and Schuster (1997) reported similar results for macroinvertebrate and fish studies done on Buck Creek, Pulaski County, Kentucky.

In addition to the IBI scores proportional similarity was also calculated between all sites for all four collections periods. These data are presented in Tables 20-23. These results indicate that the fish faunas between sites are relatively similar. Most values during all four collection periods exceeding 60% similarity. Although the same seining effort was put forth at all sites during all collection periods, the relatively low similarity values can most probably be attributed to collecting errors (e.g., differences in effectiveness of seining teams).

Proportional similarities were also calculated to measure seasonal differences in the fish fauna at each site. These data are presented in Tables 24-32. These results also indicate a relatively high similarity of fish faunas at a site between seasons. Most of the values were in excess of 60%, however, seasonal data for sites 4 and 5 indicated lower similarities between seasons. It is not known why these discrepancies exist, but they may be a result of collecting errors.

Table 1: Total Numbers of Fishes Collected at Nine Sites in Horse Lick Creek From Four Collecting Periods (Spring and Fall 1994, Spring and Fall 1995).

Taxa	Site									Totals
	1	2	3	4	5	6	7	8	9	
Petromyzontidae:										
<i>Lampetra aepyptera</i>							1			1
Cyprinidae:										
<i>Campostoma anomalum</i>	35	28	96	63	67	25	49	23	26	412
<i>Luxilus chrysocephalus</i>	272	155	190	96	153	104	144	86	187	1387
<i>Lythrurus fasciolaris</i>	272	281	296	171	402	334	92	65	361	2274
<i>Notropis anoblops</i>									2	2
<i>Notropis rubellus</i>	150	111	102	59	49	30		6	4	511
<i>Notropis volucellus</i>	7		12	25	10	2	1		4	61
<i>Pimephales notatus</i>	43	44	77	139	29	3		1	7	343
<i>Semotilus atromaculatus</i>	39	6	14	61	55	39	66	25	28	333
Catostomidae:										
<i>Hypentelium nigricans</i>	11	1		18		2	2	3	2	39
<i>Moxostoma erythrurum</i>	3	1		9	6	25			2	46
Cottidae:										
<i>Cottus carolinae</i>	15	4	18	10	16	12	29	19	24	147
Centrarchidae:										
<i>Ambloplites rupestris</i>	3	1	1	5	1	1	4	11	14	41
<i>Lepomis macrochirus</i>	3					2				5
<i>Lepomis megalotis</i>		1		5						6
<i>Micropterus dolomieu</i>	4		1	6	1	2			1	15
Percidae:										
<i>Etheostoma baileyi</i>					1	4				5
<i>Etheostoma blennioides</i>	7	19	26	22	22	10	8	3	2	119
<i>Etheostoma caeruleum</i>	23	12	29	22	22	51	34	24	53	270
<i>Etheostoma camurum</i>	3				1					4
<i>Etheostoma cinereum</i>	2									2
<i>Etheostoma flabellare</i>	2		3	4	2	6	5	2	2	26
<i>Etheostoma spectabile</i>	3				7	5	21	12	6	54
<i>Etheostoma stigmaeum</i>	26	42	10	8	32	15				133
<i>Etheostoma virgatum</i>	8	14	4	8	3	3	9	21	8	78
<i>Etheostoma zonale</i>	2		1				2	3		8
<i>Percina caprodes</i>	3	2	2	1		3	4	2	1	18
<i>Percina maculata</i>	3	1			2	2				8
Totals:	939	723	882	732	881	680	471	306	734	6348

Table 2: Fish Species Collected, and the Corresponding IBI Values, For Horse Lick Creek Site 1
During Spring and Fall 1994 and Spring and Fall 1995.

Taxa	Collection Date			
	Spring 1994	Fall 1994	Spring 1995	Fall 1995
Cyprinidae:				
<i>Campostoma anomalum</i>	2	11	16	6
<i>Luxilus chrysocephalus</i>	96	67	65	44
<i>Lythrurus fasciolaris</i>	76	88	39	69
<i>Notropis rubellus</i>	25	43	9	73
<i>Notropis volucellus</i>	7			
<i>Pimephales notatus</i>	8	18	3	14
<i>Semotilus atromaculatus</i>	5	16	5	13
Catostomidae:				
<i>Hypentelium nigricans</i>			1	10
<i>Moxostoma erythrurum</i>	1	2		
Cottidae:				
<i>Cottus carolinae</i>	1	5		9
Centrarchidae:				
<i>Ambloplites rupestris</i>		1		2
<i>Lepomis macrochirus</i>	1	1		1
<i>Micropterus dolomieu</i>		1		3
Percidae:				
<i>Etheostoma blennioides</i>	2	1	1	3
<i>Etheostoma caeruleum</i>	3	18		2
<i>Etheostoma camurum</i>		1		2
<i>Etheostoma cinereum</i>				2
<i>Etheostoma flabellare</i>		1	1	
<i>Etheostoma spectabile</i>	1			2
<i>Etheostoma stigmaeum</i>	1	10	6	9
<i>Etheostoma virgatum</i>	1	5		2
<i>Etheostoma zonale</i>		1		1
<i>Percina caprodes</i>			2	1
<i>Percina maculata</i>		1	1	1
Totals:	230	291	149	269
IBI:	48	56	44	56

Table 3: Fish Species Collected, and the Corresponding IBI Values, For Horse Lick Creek Site 2
During Spring and Fall 1994 and Spring and Fall 1995.

Taxa	Collection Date			
	Spring 1994	Fall 1994	Spring 1995	Fall 1995
Cyprinidae:				
<i>Campostoma anomalum</i>	12	4	6	6
<i>Luxilus chrysocephalus</i>	17	91	25	22
<i>Lythrurus fasciolaris</i>	47	100	34	100
<i>Notropis rubellus</i>	16	54	5	36
<i>Pimephales notatus</i>	15	15	5	9
<i>Semotilus atromaculatus</i>	2	2		2
Catostomidae:				
<i>Hypentelium nigricans</i>	1			
<i>Moxostoma erythrurum</i>		1		
Cottidae:				
<i>Cottus carolinae</i>	1		1	2
Centrarchidae:				
<i>Ambloplites rupestris</i>				1
<i>Lepomis megalotis</i>			1	
Percidae:				
<i>Etheostoma blennioides</i>	2	12		5
<i>Etheostoma caeruleum</i>	3		1	8
<i>Etheostoma stigmaeum</i>		11	4	27
<i>Etheostoma virgatum</i>	3			11
<i>Percina caprodes</i>			2	
<i>Percina maculata</i>			1	
Totals:	119	290	85	229
IBI:	38	40	40	38

Table 4: Fish Species Collected, and the Corresponding IBI Values, For Horse Lick Creek Site 3
During Spring and Fall 1994 and Spring and Fall 1995.

Taxa	Collection Date			
	Spring 1994	Fall 1994	Spring 1995	Fall 1995
Cyprinidae:				
<i>Campostoma anomalum</i>	5	19	53	19
<i>Luxilus chrysocephalus</i>	75	35	64	16
<i>Lythrurus fasciolaris</i>	69	29	67	131
<i>Notropis rubellus</i>	5	44		53
<i>Notropis volucellus</i>	9	3		
<i>Pimephales notatus</i>	32	12	15	18
<i>Semotilus atromaculatus</i>	6	2	2	4
Cottidae:				
<i>Cottus carolinae</i>	2	10	1	5
Centrarchidae:				
<i>Ambloplites rupestris</i>				1
<i>Micropterus dolomieu</i>			1	
Percidae:				
<i>Etheostoma blennioides</i>	2	18	5	1
<i>Etheostoma caeruleum</i>		23		6
<i>Etheostoma flabellare</i>		3		
<i>Etheostoma stigmaeum</i>	3	3		4
<i>Etheostoma virgatum</i>	2	1		1
<i>Etheostoma zonale</i>		1		
<i>Percina caprodes</i>				2
Totals:	210	203	207	259
IBI:	36	44	32	38

Table 5: Fish Species Collected, and the Corresponding IBI Values, For Horse Lick Creek Site 4
During Spring and Fall 1994 and Spring and Fall 1995.

Taxa	Collection Date			
	Spring 1994	Fall 1994	Spring 1995	Fall 1995
Cyprinidae:				
<i>Campostoma anomalum</i>	16	20	25	2
<i>Luxilus chrysocephalus</i>	21	23	46	6
<i>Lythrurus fasciolaris</i>	36	10	102	23
<i>Notropis rubellus</i>		12	6	41
<i>Notropis volucellus</i>	25			
<i>Pimephales notatus</i>	66	8	51	14
<i>Semotilus atromaculatus</i>	1	55		5
Catostomidae:				
<i>Hypentelium nigricans</i>		17		1
<i>Moxostoma erythrurum</i>		9		
Cottidae:				
<i>Cottus carolinae</i>	3	5		2
Centrarchidae:				
<i>Ambloplites rupestris</i>	1			4
<i>Lepomis megalotis</i>	5			
<i>Micropterus dolomieu</i>		1	1	4
Percidae:				
<i>Etheostoma blennioides</i>	2	2	11	7
<i>Etheostoma caeruleum</i>	2	8	1	21
<i>Etheostoma flabellare</i>	2			2
<i>Etheostoma stigmaeum</i>	1	3	1	3
<i>Etheostoma virgatum</i>	3		3	2
<i>Percina caprodes</i>			1	
Totals:	184	173	102	139
IBI:	46	44	44	54

Table 6: Fish Species Collected, and the Corresponding IBI Values, For Horse Lick Creek Site 5
During Spring and Fall 1994 and Spring and Fall 1995.

Taxa	Collection Date			
	Spring	Fall	Spring	Fall
	1994	1994	1995	1995
Cyprinidae:				
<i>Campostoma anomalum</i>	11	12	16	28
<i>Luxilus chrysocephalus</i>	68	12	59	14
<i>Lythrurus fasciolaris</i>	268	4	78	52
<i>Notropis rubellus</i>	1		29	19
<i>Notropis volucellus</i>	10		12	
<i>Pimephales notatus</i>	5		11	12
<i>Semotilus atromaculatus</i>	3	9		32
Catostomidae:				
<i>Moxostoma erythrurum</i>				6
Cottidae:				
<i>Cottus carolinae</i>	2	8	1	5
Centrarchidae:				
<i>Ambloplites rupestris</i>				1
<i>Micropterus dolomieu</i>				1
Percidae:				
<i>Etheostoma baileyi</i>		1		
<i>Etheostoma blennioides</i>	4	5		13
<i>Etheostoma caeruleum</i>	10	17	6	57
<i>Etheostoma camurum</i>	1			
<i>Etheostoma flabellare</i>		1	1	
<i>Etheostoma spectabile</i>		6		1
<i>Etheostoma stigmaeum</i>		5	5	52
<i>Etheostoma virgatum</i>	1	1		1
<i>Percina maculata</i>		1		1
Totals:	384	82	218	265
IBI:	38	44	38	52

Table 7: Fish Species Collected, and the Corresponding IBI Values, For Horse Lick Creek Site 6 During Spring and Fall 1994 and Spring and Fall 1995.

Taxa	Collection Date			
	Spring 1994 ^a	Fall 1994	Spring 1995	Fall 1995
Cyprinidae:				
<i>Campostoma anomalum</i>		5	12	8
<i>Luxilus chrysocephalus</i>		23	64	17
<i>Lythrurus fasciolaris</i>		45	73	216
<i>Notropis rubellus</i>			3	27
<i>Notropis volucellus</i>		2		
<i>Pimephales notatus</i>		2		
<i>Semotilus atromaculatus</i>		5	2	32
Catostomidae:				
<i>Hypentelium nigricans</i>		1	1	
<i>Moxostoma erythrurum</i>		20		5
Cottidae:				
<i>Cottus carolinae</i>		6	5	1
Centrarchidae:				
<i>Ambloplites rupestris</i>		1		
<i>Lepomis macrochirus</i>				2
<i>Micropterus dolomieu</i>		1	1	
Percidae:				
<i>Etheostoma baileyi</i>		4		
<i>Etheostoma blennioides</i>		1	2	7
<i>Etheostoma caeruleum</i>		8	15	28
<i>Etheostoma flabellare</i>		2	2	2
<i>Etheostoma spectabile</i>		5		
<i>Etheostoma stigmaeum</i>		8		7
<i>Etheostoma virgatum</i>		1		2
<i>Percina caprodes</i>		1	1	1
<i>Percina maculata</i>		2		
Totals:		217	181	356
IBI:		58	46	50

^a This Site was combined with Site 5 during the Spring 1994 sampling.

Table 8: Fish Species Collected, and the Corresponding IBI Values, For Horse Lick Creek Site 7
During Spring and Fall 1994 and Spring and Fall 1995.

Taxa	Collection Date			
	Spring 1994	Fall 1994	Spring 1995	Fall 1995
Petromyzontidae:				
<i>Lampetra aepyptera</i>		1		
Cyprinidae:				
<i>Campostoma anomalum</i>	5	16	28	
<i>Luxilus chrysocephalus</i>	47	12	64	21
<i>Lythrurus fasciolaris</i>	45	31	10	6
<i>Notropis volucellus</i>	1			
<i>Semotilus atromaculatus</i>	7	23	30	6
Catostomidae:				
<i>Hypentelium nigricans</i>				2
Cottidae:				
<i>Cottus carolinae</i>	2	7	9	11
Centrarchidae:				
<i>Ambloplites rupestris</i>	1	1	1	1
Percidae:				
<i>Etheostoma blennioides</i>	1	1	4	2
<i>Etheostoma caeruleum</i>	1	8	4	21
<i>Etheostoma flabellare</i>	5			
<i>Etheostoma spectabile</i>		7		14
<i>Etheostoma virgatum</i>		2		7
<i>Etheostoma zonale</i>			2	
<i>Percina caprodes</i>			4	
Totals:	115	109	156	91
IBI:	36	42	42	44

Table 9: Fish Species Collected, and the Corresponding IBI Values, For Horse Lick Creek Site 8
During Spring and Fall 1994 and Spring and Fall 1995.

Taxa	Collection Date			
	Spring 1994 ^b	Fall 1994	Spring 1995	Fall 1995
Cyprinidae:				
<i>Campostoma anomalum</i>		8	12	3
<i>Luxilus chrysocephalus</i>		7	40	39
<i>Lythrurus fasciolaris</i>		22	20	23
<i>Notropis rubellus</i>			6	
<i>Pimephales notatus</i>				1
<i>Semotilus atromaculatus</i>		2	7	16
Catostomidae:				
<i>Hypentelium nigricans</i>			2	1
Cottidae:				
<i>Cottus carolinae</i>		10	4	5
Centrarchidae:				
<i>Ambloplites rupestris</i>			3	8
Percidae:				
<i>Etheostoma blennioides</i>				3
<i>Etheostoma caeruleum</i>		15	4	5
<i>Etheostoma flabellare</i>		2		
<i>Etheostoma spectabile</i>		8		4
<i>Etheostoma virgatum</i>		1	5	15
<i>Etheostoma zonale</i>				3
<i>Percina caprodes</i>				2
Totals:		75	103	128
IBI:		38	42	50

^b This Site was not sampled during Spring 1994.

Table 10: Fish Species Collected, and the Corresponding IBI Values, For Horse Lick Creek Site 9
During Spring and Fall 1994 and Spring and Fall 1995.

Taxa	Collection Date			
	Spring 1994	Fall 1994	Spring 1995	Fall 1995
Cyprinidae:				
<i>Campostoma anomalum</i>	4	11	1	10
<i>Luxilus chrysocephalus</i>	32	30	30	95
<i>Lythrurus fasciolaris</i>	102	47	74	138
<i>Notropis anoblops</i>				2
<i>Notropis rubellus</i>			4	
<i>Notropis volucellus</i>	3			1
<i>Pimephales notatus</i>	2	5		
<i>Semotilus atromaculatus</i>	4	6	4	14
Catostomidae:				
<i>Hypentelium nigricans</i>		2		
<i>Moxostoma erythrurum</i>		2		
Cottidae:				
<i>Cottus carolinae</i>	8	12	4	
Centrarchidae:				
<i>Ambloplites rupestris</i>	2	1	1	10
<i>Micropterus dolomieu</i>				1
Percidae:				
<i>Etheostoma blennioides</i>	1	1		
<i>Etheostoma caeruleum</i>	1	19	22	11
<i>Etheostoma flabellare</i>		2		
<i>Etheostoma spectabile</i>	1	2		3
<i>Etheostoma virgatum</i>	2	2		4
<i>Percina caprodes</i>				1
Totals:	162	142	140	290
IBI:	50	52	44	52

Table 11: Index of Biotic Integrity (IBI) Values for Horse Lick Creek Site 1 Using Western Allegheny Ecoregion Metrics.

DATE	# SPECIES	# INDIVIDS	# DAR SP.	# SUN SP.	# SUC SP.	# INTOL	% OMNI	% INSECT	% TOL	# TO CA	# SIMP LITH	% DELT	SCORE	CLASS
Spr. '94	15 (5)	230 (5)	5 (5)	1 (3)	1 (3)	8 (5)	26.7 (3)	60.0 (5)	13.3 (5)	0 (1)	6 (3)	0 (5)	48	Good
Fall '94	19 (5)	291 (5)	8 (5)	1 (3)	1 (3)	12 (5)	15.8 (5)	63.2 (5)	10.5 (5)	2 (5)	9 (5)	0 (5)	56	Exc.
Spr. '95	12 (3)	149 (5)	5 (5)	0 (1)	1 (3)	7 (3)	25.0 (3)	66.7 (5)	16.7 (5)	0 (1)	7 (5)	0 (5)	44	Fair
Fall '95	21 (5)	269 (5)	10 (5)	1 (3)	1 (3)	15 (5)	14.3 (5)	66.7 (5)	9.5 (5)	2 (5)	11 (5)	0 (5)	56	Exc.

Drainage Area = 60.3 square miles

Average = 51 Good

22

Table 12: Index of Biotic Integrity (IBI) Values for Horse Lick Creek Site 2 Using Western Allegheny Ecoregion Metrics.

DATE	# SPECIES	# INDIVIDS	# DAR SP.	# SUN SP.	# SUC SP.	# INTOL	% OMNI	% INSECT	% TOL	# TO CA	# SIMP LITH	% DELT	SCORE	CLASS
Spr. '94	11 (3)	119 (5)	3 (3)	0 (1)	1 (3)	7 (3)	27.3 (3)	54.5 (3)	18.2 (5)	0 (1)	5 (3)	0 (5)	38	Fair
Fall '94	9 (3)	290 (5)	2 (3)	0 (1)	1 (3)	5 (3)	33.3 (3)	55.6 (5)	22.2 (5)	0 (1)	5 (3)	0 (5)	40	Fair
Spr. '95	11 (3)	85 (3)	4 (3)	1 (3)	0 (1)	8 (3)	9.1 (5)	72.7 (5)	9.1 (5)	0 (1)	6 (3)	0 (5)	40	Fair
Fall '95	12 (3)	229 (5)	4 (3)	0 (1)	0 (1)	8 (3)	25.0 (3)	50.0 (3)	16.7 (5)	1 (3)	5 (3)	0 (5)	38	Fair

Drainage Area = 55.4 square miles

Average = 39 Fair

Table 13: Index of Biotic Integrity (IBI) Values for Horse Lick Creek Site 3 Using Western Allegheny Ecoregion Metrics.

DATE	# SPECIES	# INDIVIDS	# DAR SP.	# SUN SP.	# SUC SP.	# INTOL	% OMNI	% INSECT	% TOL	# TO CA	# SIMP LITH	% DELT	SCORE	CLASS
Spr. '94	11 (3)	210 (5)	3 (3)	0 (1)	0 (1)	7 (3)	36.4 (3)	45.5 (3)	18.2 (5)	0 (1)	4 (3)	0 (5)	36	Poor
Fall '94	14 (5)	203 (5)	6 (5)	0 (1)	0 (1)	9 (5)	28.6 (3)	57.1 (5)	14.3 (5)	0 (1)	6 (3)	0 (5)	44	Fair
Spr. '95	8 (3)	207 (5)	1 (1)	0 (1)	0 (1)	4 (3)	37.5 (3)	37.5 (3)	25.0 (5)	0 (1)	2 (1)	0 (5)	32	Poor
Fall '95	12 (3)	259 (5)	4 (3)	0 (1)	0 (1)	7 (3)	25.0 (3)	50.0 (3)	16.7 (5)	1 (3)	5 (3)	0 (5)	38	Fair

Drainage Area = 53.1 square miles

Average = 37.5 Fair

23

Table 14: Index of Biotic Integrity (IBI) Values for Horse Lick Creek Site 4 Using Western Allegheny Ecoregion Metrics.

DATE	# SPECIES	# INDIVIDS	# DAR SP.	# SUN SP.	# SUC SP.	# INTOL	% OMNI	% INSECT	% TOL	# TO CA	# SIMP LITH	% DELT	SCORE	CLASS
Spr. '94	14 (5)	184 (5)	5 (5)	1 (3)	0 (1)	9 (5)	28.6 (3)	50.0 (3)	14.3 (5)	1 (3)	4 (3)	0 (5)	46	Good
Fall '94	13 (3)	173 (5)	3 (3)	0 (1)	2 (5)	9 (5)	23.1 (3)	61.5 (5)	15.4 (5)	1 (3)	7 (5)	11.6 (1)	44	Fair
Spr. '95	11 (3)	102 (5)	5 (5)	0 (1)	0 (1)	8 (5)	18.2 (5)	54.5 (3)	9.1 (5)	1 (3)	6 (3)	0 (5)	44	Fair
Fall '95	16 (5)	139 (5)	6 (5)	0 (1)	1 (3)	11 (5)	18.8 (5)	62.5 (5)	12.5 (5)	2 (5)	7 (5)	0 (5)	54	Good

Drainage Area = 53.0 square miles

Average = 47 Good

Table 15: Index of Biotic Integrity (IBI) Values for Horse Lick Creek Site 5 Using Western Allegheny Ecoregion Metrics.

DATE	# SPECIES	# INDIVIDS	# DAR SP.	# SUN SP.	# SUC SP.	# INTOL	% OMNI	% INSECT	% TOL	# TO CA	# SIMP LITH	% DELT	SCORE	CLASS
Spr. '94	12 (3)	384 (5)	4 (3)	0 (1)	0 (1)	8 (5)	33.3 (3)	50.0 (3)	16.7 (5)	0 (1)	4 (3)	0 (5)	38	Fair
Fall '94	13 (3)	82 (3)	8 (5)	0 (1)	0 (1)	8 (5)	15.4 (5)	69.2 (5)	7.7 (5)	0 (1)	7 (5)	0 (5)	44	Fair
Spr. '95	10 (3)	218 (5)	3 (3)	0 (1)	0 (1)	5 (3)	30.0 (3)	60.0 (5)	20.0 (5)	0 (1)	4 (3)	0 (5)	38	Fair
Fall '95	16 (5)	265 (5)	6 (5)	0 (1)	1 (3)	10 (5)	18.8 (5)	56.3 (5)	12.5 (5)	2 (3)	8 (5)	0 (5)	52	Good

Drainage Area = 49.7 square miles

Average = 43 Fair

24

Table 16: Index of Biotic Integrity (IBI) Values for Horse Lick Creek Site 6^a Using Western Allegheny Ecoregion Metrics.

DATE	# SPECIES	# INDIVIDS	# DAR SP.	# SUN SP.	# SUC SP.	# INTOL	% OMNI	% INSECT	% TOL	# TO CA	# SIMP LITH	% DELT	SCORE	CLASS
Spr. '94	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fall '94	21 (5)	217 (5)	9 (5)	1 (3)	2 (5)	13 (5)	19.0 (5)	57.1 (5)	9.5 (5)	2 (5)	10 (5)	0 (5)	58	Exc.
Spr. '95	12 (3)	181 (5)	4 (3)	0 (1)	1 (3)	8 (5)	16.7 (5)	66.7 (5)	8.3 (5)	1 (3)	5 (3)	0 (5)	46	Good
Fall '95	15 (5)	356 (5)	6 (5)	1 (3)	1 (3)	9 (5)	20.0 (3)	66.7 (5)	13.3 (5)	0 (1)	7 (5)	0 (5)	50	Good

Drainage Area = 43.9 square miles

Average = 51.3 Good

^a This site was combined with Site 5 during the Spring 1994 sampling.

Table 17: Index of Biotic Integrity (IBI) Values for Horse Lick Creek Site 7 Using Western Allegheny Ecoregion Metrics.

DATE	# SPECIES	# INDIVIDS	# DAR SP.	# SUN SP.	# SUC SP.	# INTOL	% OMNI	% INSECT	% TOL	# TO CA	# SIMP LITH	% DELT	SCORE	CLASS
Spr. '94	10 (3)	115 (5)	3 (3)	0 (1)	0 (1)	6 (3)	30.0 (3)	50.0 (3)	10.0 (5)	1 (3)	3 (1)	0 (5)	36	Poor
Fall '94	11 (3)	109 (5)	4 (5)	0 (1)	0 (1)	6 (3)	18.2 (5)	45.5 (3)	9.1 (5)	1 (3)	4 (3)	0 (5)	42	Fair
Spr. '95	10 (3)	156 (5)	3 (3)	0 (1)	0 (1)	7 (5)	20.0 (3)	60.0 (5)	10.0 (5)	1 (3)	5 (3)	0 (5)	42	Fair
Fall '95	10 (3)	91 (3)	4 (5)	0 (1)	1 (3)	7 (5)	20.0 (3)	60.0 (5)	10.0 (5)	1 (3)	5 (3)	0 (5)	44	Fair

Drainage Area = 33.7 square miles

Average = 41 Fair

25

Table 18: Index of Biotic Integrity (IBI) Values for Horse Lick Creek Site 8^b Using Western Allegheny Ecoregion Metrics.

DATE	# SPECIES	# INDIVIDS	# DAR SP.	# SUN SP.	# SUC SP.	# INTOL	% OMNI	% INSECT	% TOL	# TO CA	# SIMP LITH	% DELT	SCORE	CLASS
Spr. '94	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fall '94	9 (3)	75 (3)	4 (5)	0 (1)	0 (1)	4 (3)	22.2 (3)	55.6 (5)	11.1 (5)	0 (1)	3 (3)	0 (5)	38	Fair
Spr. '95	10 (3)	103 (5)	2 (3)	0 (1)	1 (3)	7 (5)	20.0 (3)	50.0 (3)	10.0 (5)	1 (3)	4 (3)	0 (5)	42	Fair
Fall '95	14 (5)	128 (5)	6 (5)	0 (1)	1 (3)	9 (5)	21.4 (3)	57.1 (5)	14.3 (5)	1 (3)	7 (5)	0 (5)	50	Good

Drainage Area = 15.1 square miles

Average = 43.3 Fair

^b This site was not sampled during Spring 1994.

Table 19: Index of Biotic Integrity (IBI) Values for Horse Lick Creek Site 9 Using Western Allegheny Ecoregion Metrics.

DATE	# SPECIES	# INDIVIDS	# S & D SP.	# HEAD SP.	# MINN SP.	# INTOL	% OMNI	% INSECT	% TOL	% PIO SP.	# SIMP LITH	% DELT	SCORE	CLASS
Spr. '94	12 (5)	162 (5)	5 (5)	0 (1)	6 (5)	8 (5)	33.3 (3)	41.7 (3)	16.7 (5)	25.0 (5)	3 (3)	0 (5)	50	Good
Fall '94	14 (5)	142 (5)	6 (5)	1 (1)	5 (5)	10 (5)	21.4 (3)	57.1 (5)	14.3 (5)	21.4 (5)	4 (3)	0 (5)	52	Good
Spr. '95	8 (3)	140 (5)	2 (3)	0 (1)	5 (5)	5 (3)	25.0 (3)	50.0 (3)	12.5 (5)	12.5 (5)	3 (3)	0 (5)	44	Fair
Fall '95	12 (5)	290 (5)	4 (5)	0 (1)	6 (5)	8 (5)	25.0 (3)	41.0 (3)	8.3 (5)	8.3 (5)	5 (5)	0 (5)	52	Good

Drainage Area = 12.0 square miles

Average = 49.5 Good

Table 20: Proportional Similarity of Nine Sites in Horse Lick Creek During the Spring 1994 Sampling Period.

SITE NO.	1	2	3	4	5	6	7	8
2	67.27							
3	82.69	68.94						
4	42.17	57.47	56.83					
5	59.44	63.33	59.63	41.20				
6	*	*	*	*	*			
7	80.00	62.02	76.50	41.74	63.61	*		
8	*	*	*	*	*	*	*	
9	61.47	62.48	63.07	41.72	89.02	*	68.53	*

* Sites 6 and 8 were not sampled during Spring 1994

Table 21: Proportional Similarity of Nine Sites in Horse Lick Creek During the Fall 1994 Sampling Period.

SITE NO.	1	2	3	4	5	6	7	8
2	79.41							
3	67.89	63.00						
4	49.37	35.94	51.13					
5	42.38	29.51	55.40	51.11				
6	68.57	55.86	51.51	43.89	50.44			
7	59.04	42.44	49.32	57.88	63.82	61.83		
8	54.69	40.74	52.19	35.96	67.06	60.21	72.62	
9	73.92	60.86	62.64	45.60	57.87	72.75	69.41	75.06

Table 22: Proportional Similarity of Nine Sites in Horse Lick Creek During the Spring 1995 Sampling Period.

SITE NO.	1	2	3	4	5	6	7	8
2	76.58							
3	71.33	75.05						
4	60.71	75.12	70.86					
5	74.74	85.22	73.54	70.40				
6	73.37	80.60	72.64	69.48	75.91			
7	63.61	47.51	58.67	38.30	48.77	56.93		
8	79.44	64.51	63.89	52.46	68.40	71.28	71.87	
9	54.03	67.35	55.80	63.21	66.85	76.29	37.35	55.19

Table 23: Proportional Similarity of Nine Sites in Horse Lick Creek During the Fall 1995 Sampling Period.

SITE NO.	1	2	3	4	5	6	7	8
2	65.27							
3	66.77	78.80						
4	67.46	53.79	57.80					
5	52.64	55.11	52.27	62.99				
6	50.67	67.70	71.77	47.34	56.95			
7	37.42	28.86	19.62	36.90	45.20	28.64		
8	51.13	43.36	34.89	39.88	47.72	41.26	58.97	
9	52.74	62.09	62.46	34.75	38.54	64.46	41.88	65.71

Table 24: Proportional Similarity of Horse Lick Creek Site 1 Collections From Four Sampling Periods.

COLL. DATE	SPRING 1994	FALL 1994	SPRING 1995
FALL 1994	74.4		
SPRING 1995	77.5	66.7	
FALL 1995	63.1	78.0	62.5

Table 25: Proportional Similarity of Horse Lick Creek Site 2 Collections From Four Sampling Periods.

COLL. DATE	SPRING 1994	FALL 1994	SPRING 1995
FALL 1994	71.1		
SPRING 1995	74.6	80.1	
FALL 1995	77.5	71.8	68.8

Table 26: Proportional Similarity of Horse Lick Creek Site 3 Collections From Four Sampling Periods.

COLL. DATE	SPRING 1994	FALL 1994	SPRING 1995
FALL 1994	48.5		
SPRING 1995	75.0	50.6	
FALL 1995	55.3	61.3	54.3

Table 27: Proportional Similarity of Horse Lick Creek Site 4 Collections From Four Sampling Periods.

COLL. DATE	SPRING 1994	FALL 1994	SPRING 1995
FALL 1994	35.4		
SPRING 1995	63.3	38.6	
FALL 1995	40.7	37.1	42.1

Table 28: Proportional Similarity of Horse Lick Creek Site 5 Collections From Four Sampling Periods.

COLL. DATE	SPRING 1994	FALL 1994	SPRING 1995
FALL 1994	27.6		
SPRING 1995	63.6	32.8	
FALL 1995	34.5	66.5	49.4

Table 29: Proportional Similarity of Horse Lick Creek Site 6 Collections From Four Sampling Periods.

COLL. DATE	SPRING 1994	FALL 1994	SPRING 1995
FALL 1994	*		
SPRING 1995	*	64.0	
FALL 1995	*	53.6	60.2

* Site 6 was combined with Site 5 during Spring 1994.

Table 30: Proportional Similarity of Horse Lick Creek Site 7 Collections From Four Sampling Periods.

COLL. DATE	SPRING 1994	FALL 1994	SPRING 1995
FALL 1994	54.2		
SPRING 1995	61.8	61.2	
FALL 1995	40.1	48.0	47.3

Table 31: Proportional Similarity of Horse Lick Creek Site 8 Collections From Four Sampling Periods.

COLL. DATE	SPRING 1994	FALL 1994	SPRING 1995
FALL 1994	*		
SPRING 1995	*	51.2	
FALL 1995	*	44.6	73.9

* Site 8 was not sampled during Spring 1994.

Table 32: Proportional Similarity of Horse Lick Creek Site 9 Collections From Four Sampling Periods.

COLL. DATE	SPRING 1994	FALL 1994	SPRING 1995
FALL 1994	67.8		
SPRING 1995	80.0	74.7	
FALL 1995	76.3	68.8	77.1

SUMMARY

The purpose of this study was to assess the fish community of Horse Lick Creek, Jackson County, Kentucky, which has been designated by The Nature Conservancy as a World Bioreserve. To this end nine sites were sampled along the length of the stream. This was the first intensive assessment study done on the fishes of Horse Lick Creek. This stream is relatively inaccessible, but still has a number of a number of serious environmental problems that have impacted the stream over a number of years. These include off-road vehicle (ORV) use, coal mining and logging. Because this stream has such a unique fauna that includes a number of state and federally listed species this study was deemed to be an important undertaking. A companion study by Board and Schuster (1997) on the macroinvertebrate community of Horse Lick Creek was done at the same time.

A total of 6,348 fish specimens representing six families, 15 genera and 28 species was collected during 1994 and 1995 from nine sites over four collection periods. Overall site 1, the most downstream site, yielded the largest number of species and specimens, followed closely by sites 3 and 5. Site 7 had the lowest diversity of fish species and site 8 produced the lowest number of specimens. The calculated IBI values for this stream at all nine sites indicated that the stream water quality rating overall was Fair-Good with an overall average score of 44.6. Sites 1 and 6 had the highest IBI scores (51 and 51.3 respectively); both sites had water quality ratings of Good. The Proportional Similarity index, which was calculated from these data indicated that the sites were relatively similar to each other and across seasons. Lastly, two specimens of

Etheostoma cinereum were collected from site 1. This was an important find because this fish species is rare throughout its range in Kentucky.

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