Aquatic Biological Survey

Little Toby Creek,
Brandy Camp Creek &
Mead Run,
Elk County

ADMINISTERED BY HEADWATERS CHARITABLE TRUST
In Cooperation With: Headwaters RC&D Council, Inc.
PA Fish & Boat Commission
Department of Environmental Protection,
Bureau of Mining & Reclamation
Little Toby Creek Watershed Association

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MAY 29, 1997

INTRODUCTION:

An aquatic biological survey was conducted on Little Toby Creek, Brandy Camp Creek and Mead Run, Elk County on April 8-9 and May 7, 1997. The purpose of this study was to evaluate improvements in water quality and the aquatic biota since the construction of acid mine drainage (AMD) treatment systems in the Little Toby Creek watershed. Data collected by PA Fish & Boat Commission (PFBC) in July 1993, before construction of AMD treatment systems, was used for comparison. Benthic macroinvertebrates, fisheries and habitat assessment information were collected by Headwaters Charitable Trust and the PA Fish & Boat Commission (PFBC) personnel. Water quality information was collected by the Department of Environmental Protection (DEP).

HISTORY:

Brandy Camp Creek and Mead Run are tributaries to Little Toby Creek that eventually empties into the Clarion River. For the past year a recently constructed treatment facility has been actively treating AMD that discharges to the headwaters of Little Toby Creek, but the facility has only been running at full capacity for about the last six months. Historic abatement projects have reduced or eliminated AMD in the lower section of Little Toby Creek, enabling the PFBC to manage the lower reaches as a stocked trout fishery. The goal is to continue eliminating AMD and eventually restore the upper reaches as a stocked trout fishery and the lower section as a naturally reproducing wild trout fishery.

An aerobic wetland treatment system was constructed on an alkaline mine discharge to Mead Run in 1995 to try to reduce the overall iron loading to the stream. At the time of this study there appeared to be a problem with retention in the wetland basin, which reduces the overall effectiveness of the treatment system. Mead Run is currently managed by the PFBC with stocked trout in the lower sections.

The Elbon discharge to Brandy Camp Creek is a high flow (about 600 gallons per minute) acidic discharge which severely impacts the aquatic system in Brandy Camp Creek. A pilot study was conducted during the past year to evaluate potential passive treatment options. The results of the study are currently being used in evaluation of treatment options for the discharge.

SURVEY LOCATIONS:

Seven stations were sampled on upper Little Toby Creek, three stations on Brandy Camp Creek and two stations on Mead Run (Table 1). All stations are found on the Brandy Camp quadrangle. The station locations are shown on the attached figure 1.

METHODS:

Water samples were collected at every site and analyzed by DEP laboratory for standard mine drainage analysis. Parameters analyzed include pH, alkalinity, total acidity, sulfates, iron (Fe), manganese (Mn) and aluminum (Al).

Benthic macroinvertebrates were evaluated by six quantitative samples and one qualitative sample. A surber $1ft^2$ ($0.1m^2$) sampler (mesh size 1024u) was used in riffle areas at each station. Qualitative sampling was conducted for the different stream habitats (pool, run, riffles) using a long handled kick net. Each individual sample was placed in a labeled plastic bag, preserved in an alcohol solution and returned to the laboratory for evaluation. Macroinvertebrates were washed in a standard number 30 sieve, separated from debris and preserved in ethanol. The macroinvertebrates were then identified to the lowest taxonomic level using available keys and counted for calculation of density and total number of taxa. The organisms were then compared with previous survey data. (Numbers of benthic macroinvertebrates from each individual surber sample will be on file with PFBC and Headwaters Charitable Trust if they are needed for further scientific calculations).

Electrofishing was conducted at two stations on Little Toby Creek, one station on Brandy Camp Creek and one station on Mead Run. Sites were selected based on past surveys. The electrofishing unit consisted of a Coffelt Model BP-1C variable voltage pulsating electroshocker (Coffelt Electronics Company, Inc.) combined with a model QEG-300 portable AC generator (Tanaka Kogyo Company) mounted on a modified backpack frame with two probes attached to the unit. All fish were captured and identified to species, with measurements and weights being taken for trout captured. Data was recorded as catch-per-unit-effort (CPUE). A 100-meter section was electrofished at station TC06, station BC01 and station MR02. Due to the large size of the stream at station TC07, a 100-meter section was not successfully electrofished. A tow boat is recommended for electrofishing lower stations on Little Toby Creek for future surveys.

Habitats at all stations were scored and compared using the habitat assessment field data sheet, which is an updated version of the EPA Rapid Bioassessment Protocol from Plafkin et al. (1989). The existing habitat was evaluated using 10 habitat parameters at each station. Habitat parameters were rated for each site on a scale from zero to 20 (highest) for specific criteria. Total habitat scores increase as habitat quality increase for each site and range as follows: 0-59 poor, 60-99 marginal, 100-159 suboptimal, and 160-200 optimal (Table 2).

RESULTS:

Little Toby Creek

Results of water quality sampling and benthic macroinvertebrate sampling suggest the degraded nature of the upper Little Toby Creek. Recent water quality samples exhibit

slight improvements in quality in comparison to the 1993 survey (Table 3). Current pH's range from 4.5 to 6.2. In 1993, the pH was more acidic ranging from 3.4 to 4.8, with the metal concentrations showing slight decreases (Figure 2). At station TC02, which had the highest metal concentrations, iron and aluminum has decreased from 8,310 ugh/l and 6,880 ug/l in 1993 to 3,230 ug/l and 4,240 ug/l in 1997 (Figure 3 and 4). Net alkalinity has increased while total acidity has decreased in comparison to 1993 data (Figure 5).

Benthic macroinvertebrate sampling revealed the impacted nature of the upper Little Toby Creek with a depressed density of macroinvertebrates. Station TC04 had the highest number of macroinvertebrates per square meter with only 45 individuals. The number of taxa at each station either increased or stayed the same when compared with the 1993 survey (Table 4). Station TC06 had the most taxa with 11, with only five taxa being found at station TC06 previously (Table 5).

A total of three species of fish were captured while electrofishing station TC06, including Blacknose dace, White sucker and Creek chub. Only Blacknose dace and White suckers were found at station TC07. No trout were captured at either station (Table 6). Other fish were seen, but not captured due to the stream width and depth at these locations.

Habitats scored in the suboptimal range with values of 119-166 for upper Little Toby Creek stations. Most of the sites had plenty of available cover such as fallen logs in the streams, little sediment deposition, the presence of a riparian vegetation zone, and good riffle quality. Bank erosion was observed at station TC07 (Figure 6).

Brandy Camp Creek

Water quality analysis suggests slight improvement when comparing to the 1993 data (Table 7). The 1997 pH measurements ranged from 4.7 to 6.1. Data collected during the 1993 study showed pH ranging from 3.6 to 6.8 (Figure 7). Alkalinity measurements increased from non-detectable limits at station BC02 and BC03 to 10.8 mg/l and 12.2 mg/l from the 1997 data. Metal concentrations for this sampling also showed some changes when comparing the results to 1993. Iron concentrations for BC02 and BC03 for the 1993 study were measured at 40,100 and 7,890 ug/l respectively, while in 1997 were measured at 9,200 and 7,890 ug/l. Aluminum showed similar trends with decreases from 5,030 and 3,930 ug/l at BC02 and BC03 to 1,890 and 2,050 ug/l. Changes in these parameters could be the result of seasonal variations since the 1993 study was conducted in a lower flow period.

Qualitative benthic macroinvertebrate samples reveal an increase in the number of taxa below the discharge. Station BC02 went from five to 12 taxa and station BC03 went from three to four taxa. The density of macroinvertebrates per square meter essentially stayed the same in comparison to the 1993 numbers (Table 8).

Three species of fish were captured while electrofishing station BC01,which is

located upstream of the abandoned deep mine discharge. Only, one Brook trout was captured along with Blacknose dace and Slimy sculpin (Table 9). During the 1993 survey, brook trout were found in numerous size classes. Differences between the two surveys are most likely due to seasonal variation and movement of fish. Recent electrofishing was conducted in April, while the previous 1993 survey was conducted in July, possibly explaining the difference.

Habitat assessment scores show optimal habitat for station BC01 and BC02 with scores of 170 and 169, while station BC03 scored in the suboptimal range with 122. Habitat at station BC01 and BC02 is preferred scoring high for every parameter. Steep banks, no riparian vegetation zone and few good riffles lowered the score given to station BC03 (Figure 8).

Mead Run

Results of water quality samples taken from Mead Run exhibit the degraded nature of the headwaters. Station MR01 had a pH of 5.7 below the discharge from the aerobic wetland into the stream and a pH of 6.3 at the downstream station MR02 before emptying into Little Toby Creek. Previous water quality samples taken in 1993 were only taken at station MR02 showing a pH of 6.9. Metal concentrations were slightly elevated at station MR01 with iron 943 ug/l and aluminum 1370 ug/l. Station MR02 showed excellent water quality with metal concentrations below the levels for aquatic life protection (Table 10).

Sampling of benthic macroinvertebrates suggest an increase in the number of taxa. Station MR01 went from four taxa in 1993 to nine taxa most recently. In 1993, the macroinvertebrate population at station MR02 consisted of 16 taxa. Most recently, 18 taxa were found (Table 11).

Results of electrofishing at the downstream station revealed six fish species. One Brook trout was captured during the 100-meters of electrofishing with this fish being of legal size (175mm). All other species were indicative of a healthy aquatic system (Table 12).

Assessment of the existing habitat categorized station MR01 and MR02 in the suboptimal range with scores of 121 and 137 (Figure 8). Limiting factors included little or no riparian vegetation zone, unstable banks and deposition of silt that cause the substrate to become embedded.

DISCUSSION:

The Results of water quality measurements taken during the 1997 Little Toby Creek watershed study has shown some improvements in water quality from Brockway upstream to Mead Run. Some changes have occurred in the aquatic system in this reach of stream in comparison to the 1993 study, with a reduction in metal concentrations and the presence of three species of fish. Most of the AMD treatment projects constructed throughout the watershed have just begun to operate and have not been functioning for an extended period of time. Until the treatment systems have been continuously functioning at their full potential for some time, significant positive results are not expected to be seen. As the water quality continues to improve, with further reductions in AMD, the restoration of aquatic life should occur naturally taking into consideration the availability of good aquatic habitats in the Little Toby Creek watershed.

Table 1: Station locations and descriptions of sampling sites on Little Toby Creek, Mead Run and Brandy Camp Creek, Elk County, April 8-9 and May 7, 1997.

Little Toby Creek:

TC01 - Below the small treatment plant on Little Toby Creek on Toby Road, SR2003.
Latitude 41°19'50" Longitude 78°37'38"

TC02 - Downstream of the confluence of Kyler Run, bridge crossing on Toby Road, SR2003. Downstream of main treatment plant.
Latitude 41°19'33" Longitude 78°37'58"

TC03 - Downstream 30 meters of the bridge crossing on Kyler Corner Road, SR2013.
Latitude 41°19'07" Longitude 78°38'25"

TC04 - Upstream of the confluence of Brandy Camp Run on Little Toby Creek.
Latitude 41°17'09" Longitude 78°41'22"

TC05 - Downstream of the confluence of Brandy Camp Run on Little Toby Creek.
Latitude 41°17"04" Longitude 78°41'26"

TC06 - Beside the old Brosky Truck Stop on 219.
Latitude 41°5'26" Longitude 78°43'40"

TC07 - Downstream of the bridge crossing on Fermdntown Road.
Latitude 41°15'10" Longitude 78°44'14"

Mead Run:

MR01- Beside the wetland cells located at the end of SR3003.
Latitude 41°18'40" Longitude 78°43'47"

MR02- Downstream of MR01 on SR3003 across from mine entrance, at old railroad crossing.
Latitude 41°17'20" Longitude 78°43'50"

Brandy Camp Creek:

BC01- Upstream of bridge crossing on SR2011 before the Elbon mine discharge.
Latitude 41°19'18" Longitude 78°41'10"

BC02- Downstream of the Elbon mine discharge on SR2011.
Latitude 41°18'50" Longitude 78°41'13"

BC03- Upstream of the intersection of SR2003 and 219.
Latitude 41°17'22" Longitude 78°41'16"

Elbon Discharge- Latitude 41°19'10" Longitude 78°40'54"

Table 2: Habitat Assessment Scores for Little Toby Creek, Brandy Carap Creek, and Mead Run, Elk County, April & May 1997.

	TC01	TC02	TC03	TC04	TC05	TC06	TC07	BC01	BC02	BC03	MR01	MR02
1. Available Cover	9	11	8	19	19	19	19	17	16	9	11	16
2. Riffle Quality	7	18	11	18	18	14	10	18	16	17	14	13
3. Embeddedness	4	13	15	18	18	16	16	17	16	11	13	10
4. Channel Alteration	20	20	11	18	19	20	19	19	20	13	19	16
5. Sediment Deposition	3	17	17	18	19	19	10	18	16	16	15	14
6. Frequency of Riffles	9	14	13	19	18	10	13	16	15	6	14	12
7. Channel Flow Status	17	13	11	19	19	19	18	18	18	19	18	13
8. Bank Vegetation Protection	20	19	17	10	10	10	8	18	18	12	6	16
9. Bank Stability	16	16	16	16	10	10	10	17	15	16	8	10
10. Riparian Vegetation Zone	14	14	14	16	16	10	20	12	19	3	3	17
TOTAL	**119**	**155**	**133**	**155**	**166**	**147**	**143**	**170**	**169**	**122**	**121**	**137**

Table 3: Results of water quality sampling at seven sites on Little Toby Creek, April 8-9, May 7, 1997 and July 1993.

Little Toby Creek, Elk County, April & May 1997

		TC01	TC02	TC03	TC04	TC05	TC06	TC07
Parameter	Conc.	Result	Result	Result	Result	Result	Result	Result
pH		4.80	4.50	4.80	5.10	5.60	6.20	6.10
Alkalinity	MG/L	11.20	9.60	11.60	11.20	11.80	20.00	17.80
Sulfates	MG/L	309.00	384.00	403.60	274.60	206.00	139.00	133.20
Fe	UG/L	952.00	3230.00	2970.00	1220.00	3280.00	1150.00	1160.00
Manganese	UG/L	3350.00	5820.00	5620.00	3500.00	2370.00	1410.00	1410.00
Aluminum	UG/L	3870.00	4240.00	4260.00	1810.00	1300.00	551.00	560.00
Total Acidity	MG/L	24.00	40.00	40.00	18.00	18.00	5.80	4.60

Little Toby Creek, Elk County, July 1993

		TC01	TC02	TC03	TC04	TC05	TC06	TC07
Parameter	Conc.	Result	Result	Result	Result	Result	Result	Result
pH		3.80	3.60	3.40	4.30	4.00	4.60	4.80
Alkalinity	MG/L	0.00	0.00	0.00	0.00	0.00	2.00	2.00
Sulfates	MG/L	398.00	439.00	425.00	433.00	439.00	402.00	385.00
Fe	UG/L	876.00	8310.00	4240.00	348.00	1980.00	390.00	526.00
Manganese	UG/L	7000.00	12200.00	9710.00	9070.00	8240.00	6000.00	5170.00
Aluminum	UG/L	6560.00	6880.00	8970.00	6750.00	5680.00	4530.00	2410.00
Total Acidity	MG/L	52.00	66.00	84.00	42.00	42.00	28.00	14.80

Table 4: Results of quantitative macroinvertebrate sampling on Little Toby Creek, Elk County, April 8-9, 1997 and May 7, 1997.

TAXA	TC01	TC02	TC03	TC04	TC05	TC06	TC07
COLEOPTERA							
DYTISCIDAE							
HYDROPORUS						1	
ELMIDAE							
OPTIOSERVUS						2	1
STENELMUS							1
DIPTERA							
CERATOPOGONIDAE	1	1	3			1	
CHIRONOMIDAE	2	9	7	19	2	6	2
EMPIDIDAE							
HEMERODROMIA			1				
TABANIDAE							
TABANUS			1				
TIPULIDAE							
ANTOCHA						1	
TIPULA				1			
EPHEMEROPTERA							
HEPTAGENIIDAE							
EPEORUS						1	
MEGALOPTERA							
SIALIDAE							
SIALIS		2	1				
PLECOPTERA							
LEUCTRIDAE							
LEUCTRA				2		1	
NEMOURIDAE							
NEMOURA							1
PARANEMOURA				1			
TRICHOPTERA							
HYDROPSYCHIDAE							
DIPLECTONA				4		1	
HYDROPSYCHE						2	1
LIMNOPHILIDAE							
PLATYCENTROPUS							1
POLYCENTROPODIDAE							
NEURECLIPSIS						1	
DECAPODA						1	
OLIGOCHAETA		1			1		

TOTAL NO. INDIVIDUALS	3	13	13	27	3	18	7
TOTAL NO. IND./M^2	5	22	22	45	5	30	12
TOTAL TAXA	2	4	5	5	2	11	6

Table 5: Results of qualitative macroinvertebrate sampling on Little Toby Creek, Elk County, April 8-9, 1997 and May 7, 1997.

TAXA	TC01	TC02	TC03	TC04	TC05	TC06	TC07
COLEOPTERA							
DYTISCIDAE							
AGABUS	X						
HYDROPORUS						X	
ELMIDAE							
OPTIOSERVUS						X	X
STENELMUS							X
DIPTERA							
CERATOPOGONIDAE	X	X	X	X		X	X
CHIRONOMIDAE	X	X	X	X	X	X	X
EMPIDIDAE							
HEMERODROMIA			X				
TABANIDAE							
TABANUS			X				
TIPULIDAE							
ANTOCHA						X	
TIPULA				X			
EPHEMEROPTERA							
HEPTAGENIIDAE							
EPEORUS						X	
MEGALOPTERA							
SIALIDAE							
SIALIS	X	X	X	X			
PLECOPTERA							
LEUCTRIDAE							
LEUCTRA				X		X	
NEMOURIDAE							
NEMOURA							X
PARANEMOURA				X			
TRICHOPTERA							
HYDROPSYCHIDAE							
DIPLECTONA				X		X	
HYDROPSYCHE						X	X
LIMNOPHILIDAE							

HYDATOPHYLAX							X
PLATYCENTROPUS							X
POLYCENTROPODIDAE							
NEURECLIPSIS						X	
COLLEMBOLA		X					
DECAPODA						X	
HYDRACHNIDIA					X		
OLIGOCHAETA		X			X		
TOTAL TAXA IN 1997	4	5	5	7	3	11	8
TOTAL TAXA IN 1993	4	1	5	1	1	5	6

Table 6: Results of electrofishing two stations on Little Toby Creek, Elk County, May 7, 1997.

Species	TC06	TC07
Blacknose dace	X	
White sucker	X	X
Creek chub	X	X

Table 7: Results of water quality sampling at four sites on Brandy Camp Run, April 8-9, 1997 and July 1993.

Brandy Camp Creek, Elk County, April & May 1997

		BC01	EMDS	BC02	BC03
Parameter	**Conc.**	**Result**	**Result**	**Result**	**Result**
pH		6.10	4.70	5.10	5.60
Alkalinity	MG/L	15.00	11.60	10.80	12.20
Sulfates	MG/L	125.60	620.70	248.90	284.90
Fe	UG/L	<300.00	36100.00	9200.00	7820.00
Manganese	UG/L	1720.00	7710.00	2970.00	2920.00
Aluminum	UG/L	<500.00	7530.00	1890.00	2050.00
Total Acidity	MG/L	2.40	126.00	30.00	26.00

Brandy Camp Creek, Elk County, July 1993

		BC01	EMDS	BC02	BC03
Parameter	Conc.	Result	Result	Result	Result
pH		6.80	4.50	3.80	3.60
Alkalinity	MG/L	26.00	0.00	0.00	0.00
Sulfates	MG/L	213.00	542.00	501.00	492.00
Fe	UG/L	1020.00	73200.00	40100.00	7890.00
Manganese	UG/L	1250.00	8640.00	6660.00	6120.00
Aluminum	UG/L	636.00	5870.00	5030.00	3930.00
Total Acidity	MG/L	0.00	162.00	98.00	50.00

Table 8: Results of quantitative and qualitative macroinvertebrate sampling on Brandy Camp Creek, Elk County, April 8-9, 1997 and May 7, 1997.

TAXA	BC01		BC02		BC03	
COLEOPTERA						
DYTISCIDAE						
HYDROPORUS						
ELMIDAE						
OPTIOSERVUS	10	X	1	X		
PROMORESIA	8	X				
STENELMUS			1	X		
DIPTERA						
CERATOPOGONIDAE	4	X	1	X	4	X
CHIRONOMIDAE	5	X	2	X	3	X
EMPIDIDAE						
HEMERODROMIA						
SIMULIIDAE						
SIMULIDAE	1	X				
TABANIDAE						
TABANUS		X				
TIPULIDAE						
ANTOCHA	1	X				
DICRANOTA	1	X				
HEXATOMA	1	X				
TIPULA						
EPHEMEROPTERA						
EPHEMERELLIDAE						
EPHEMERELLA	1	X				
HEPTAGENIIDAE						
EPEORUS	6	X	1	X		

HEMIPTERA						
VELIIDAE						
MICROVELIA		X				
MEGALOPTERA						
SIALIDAE						
SIALIS					2	X
ODONATA						
COENAGRIONIDAE						
ARGIA		X				
PLECOPTERA						
CAPNIIDAE						
PARACAPNIA			2	X		
CHLOROPERLIDAE						
SWELTSA	6	X				
LEUCTRIDAE						
LEUCTRA	26	X	1	X		
NEMOURIDAE						
APHINEMURA	30	X	3	X		
NEMOURA	1	X				
PARANEMOURA						
TRICHOPTERA						
HYDROPSYCHIDAE						
DIPLECTONA				X	1	X
HYDROPSYCHE	21	X	1	X		
LEPIDOSTOMATIDAE						
LEPIDOSTOMA		X				
LIMNOPHILIDAE						
PLATYCENTROPUS						
POLYCENTROPODIDAE						
NEURECLIPSIS	2	X				
NYCTIOPHYLAX				X		
POLYCENTROPUS	3	X				
DECAPODA	5	X				
OLIGOCHAETA			2	X		
TOTAL NO. INDIVIDUALS	**132**	**~**	**15**	**~**	**10**	**~**
TOTAL NO. IND./M^2	**220**	**~**	**25**	**~**	**17**	**~**
TOTAL TAXA IN 1997	**18**	**22**	**10**	**12**	**4**	**4**
TOTAL TAXA IN 1993	**~**	**16**	**~**	**5**	**~**	**3**

Table 9: Results of elcetrofishing one station on Brandy Camp Run, Elk County, April 9, 1997.

Species	Size Class (mm)	BCO1
Brook Trout (Salvelinus fontinalis)	100-124	1
Other Species Collected:		
Blacknose dace		X
Slimy sculpin		X

Table 10: Results of water quality sampling at two sites on Mead Run, April 8, 1997 and July 1993.

Mead Run, Elk County, April 1997

		MR01	MR02
Parameter	Conc.	Result	Result
pH		5.70	6.30
Alkalinity	MG/L	13.6	24.00
Sulfates	MG/L	194.3	144.80
Fe	UG/L	943.00	354.00
Manganese	UG/L	3150.00	1420.00
Aluminum	UG/L	1370.00	<500.00
Total Acidity	MG/L	10.00	0.00

Mead Run, Elk County, July 1993

		MR02
Parameter	Conc.	Result
pH		6.90
Alkalinity	MG/L	28.00
Sulfates	MG/L	194.00
Fe	UG/L	179.00
Manganese	UG/L	759.00
Aluminum	UG/L	<135.0 0
Total Acidity	MG/L	0.00

Table 11: Results of quantitative and qualitative macroinvertebrate sampling on Mead Run, Elk County, April 8-9, 1997 and May 7, 1997.

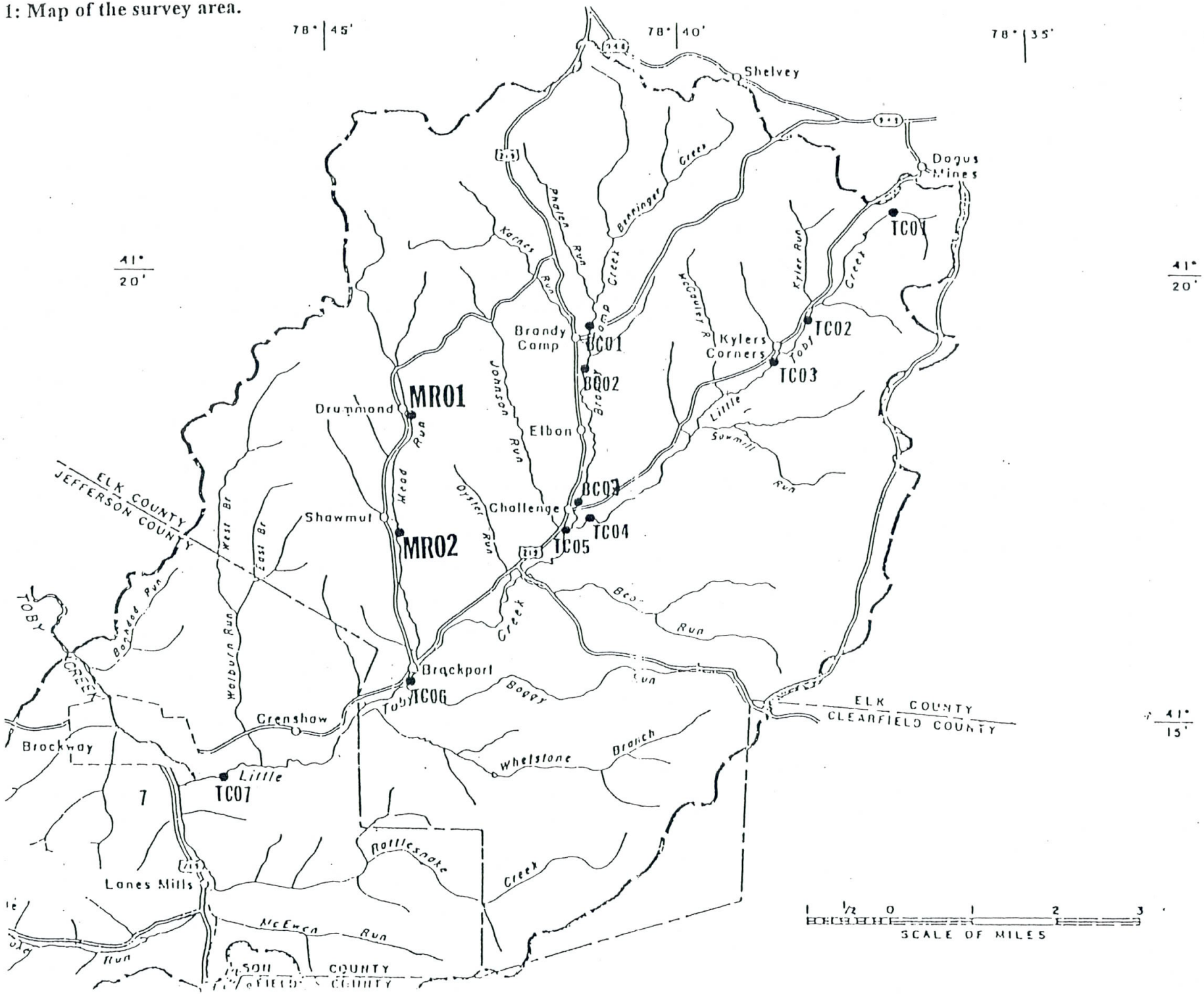
TAXA	MR01		MR02	
COLEOPTERA				
ELMIDAE				
OPTIOSERVUS			3	X
DIPTERA				
CERATOPOGONIDAE			5	X
CHIRONOMIDAE	2	X	5	X
EMPIDIDAE				
CHELIFERA			1	X
HEMERODROMIA			1	X
SIMULIIDAE				
SIMULIDAE			3	X
TIPULIDAE				
TIPULA			1	X
EPHEMEROPTERA				
BAETIDAE				
BAETIS			6	X
EPHEMERELLIDAE				
EPHEMERELLA			7	X
MEGALOPTERA				
CORYDALIDAE				
NIGRONIA				X
PLECOPTERA				
CAPNIIDAE				
PARACAPNIA	3	X		
LEUCTRIDAE				
LEUCTRA	5	X		
NEMOURIDAE				
APHINEMURA	1	X	2	X
NEMOURA		X	3	X
PARANEMOURA	2	X		
TRICHOPTERA				
HYDROPSYCHIDAE				
HYDROPSYCHE	2	X	6	X
PHILOPOTAMIDAE				
CHIMARRA				X
POLYCENTROPODIDAE				
NEURECLIPSIS			2	X

DECAPODA	1	X	2	X
OLIGOCHAETA	3	X		X
PELECYPODA			1	X
TOTAL NO. INDIVIDUALS	19	~	48	~
TOTAL NO. IND./M²	32	~	80	~
TOTAL TAXA IN 1997	8	9	15	18
TOTAL TAXA IN 1993	~	4	~	16

Table 12: Results of electrofishing one station on Mead Run, Elk County, April 8, 1997.

Species	Size Class (mm)	MR02
Brook Trout (*Salvelinus fontinalis*)	175-199	1
Other Species Collected:		
Blacknose dace		X
Creek chub		X
Hogsucker		X
Slimy sculpin		X
Redside dace		X

Figure 1: Map of the survey area.



WATER QUALITY DATA SUMMARY

Little Toby Creek - Stream water quality

File Created:

Last Revised:

SAMPLE DATE	SOURCE	FLOW (gpm)	pH (field)	pH (lab)	Specific Conduct. (umhos/cm)	Temp. (field) (deg. C)	Total Acidity (calculated) (mg/l)	Net Acidity (lab) (mg/l)	Total Alkalinity (mg/l)	Total Fe (mg/l)	Ferrous Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfates (mg/l)	Susp. Solids (mg/l)	Acid Loading (lbs/day)	Fe Loading (lbs/day)	Mn Loading (lbs/day)	Al Loading (lbs/day)
TC-1 Upstream of Treatment system																			
8/11/98	7485519	139.1	3.6	3.8	840	18	53.1	50	0.0	2.72	0.72	5.05	6.76	328	22	83.62	4.55	11.30	8.45
TC-2 200 feet Downstream of Kyler Run																			
8/11/98	7485519	2428	4.2	4.2	840	17	47.9	38	0.0	3.75	1.56	4.5	7.19	346	14	1109.02	109.44	209.84	131.33
TC-3 500 feet upstream of Brandy Camp Run																			
8/11/98	7485515	2549	4.9	4.7	810	17	39.8	30	2.0	2.09	0.62	3.94	7.24	380	52	919.24	64.04	221.84	120.73
TC-4 Between Kyler Run and Brandy Camp Run																			
8/11/98	7485517	3541	5.6	5.1	840	19	19.6	10	2.8	1.31	0.17	1.05	6.07	375	30	425.63	55.76	258.36	44.69
BCR Brandy Camp Run																			
8/11/98	7485518	4627	6.2	5.3	510	19.5	16.7	13.4	3.0	4.91	4.38	0.445	2.84	203	6	745.28	273.08	157.96	24.75
TC-5 Downstream of Brandy Camp Run																			
8/12/98	7485522	5045	5.1	4.8	510	18	19.6	13.2	1.8	1.26	0.76	1.17	5.52	302	<2	800.38	76.40	334.71	70.94
TC-6 Downstream of Meade Run																			
8/11/98	7485516	10430	6.6	6.0	510	20	8.5	1.0	7.6	1.06	0.25	0.42	2.33	172	6	125.37	132.89	292.11	52.66
TC-7 Downstream near Brockway																			
8/12/98	7485521	8397	7.1	6.0	540	19	6.2	0	7.8	0.522	0.22	<.2	2.85	197	<2	0.00	52.69	287.66	<20

Note: A significant rainfall event occurred on August 10, 1998.
Stream flow decline was visibly noticeable during the survey on 8/11 and
is reflected by the flow data collected at points TC-5 and TC-7 two days after the event (8/12).