A Need to Identify "*Special Protection*" Status and Apply Existing Use Protections to Certain Waterways in Greene and Washington Counties Pennsylvania

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I EXECUTIVE SUMMARY

This report provides the technical and regulatory justifications for PADEP to conduct immediately the necessary bioassessment surveys to document the existing "special protection" uses of certain streams within the 9,688-acre approved Enlow Fork Mine expansion area in Washington County, PA, and within the 3,175-acre proposed expansion area for the Bailey Mine in Greene County, PA. Sections of these streams exhibit water quality conditions better than their currently-designated uses, and thus require a higher level of protection to comply with existing law. The urgency of this matter is related to the fact that these streams and their associated wetlands are in imminent danger of being damaged by longwall coal mining and Marcellus Shale gas production, and their currently existing uses are at significant risk of degradation.

II INTRODUCTION

In its review and approval of the 9,688-acre expansion of longwall mining at Consol's Enlow Fork Mine (Bituminous Coal Mining Activity Permit # 3081317, Revision 70, issued 18 January 2008), the California District Mining Office failed to make the required existing use determinations of overlying waters. Likewise, no existing use determinations have yet been made for the streams and wetlands at risk from Consol's proposed Bailey Mine east expansion, which encompasses 3,175 acres (application for revision submitted April 2007, Bituminous Coal Mining Activity Permit # 3081317). Technical data collected for the permittee (Consol Pennsylvania Coal Company, in both cases), and submitted to DEP as part of the respective applications, provide ample evidence that some of the streams in the permit areas have existing uses better than their designated uses. Yet, DEP has not made use of this readily available information, as required by Pa. Code 93.4c(a)(1).

It is imperative that existing use determinations be made right away, for two important reasons:

1. The timeframe for making such determinations is nearing its end for the current field sampling season. According to Tony Shaw (DEP Office of Water Management, personal communication with S. Kunz, 8 April 2010), the optimal sampling "window" for streambed organisms generally is November through May, although special care must be taken toward the end of that period (*i.e.*, in May). Indeed, the Water Quality Antidegradation Implementation Guidance (TGD 391-0300-002; PADEP 2003) reads as follows:

> The recommended months to sample are mid-October through April. .... The months of May and June are a special case because most important insect taxa emerge then. The biologist must consider the effect emergent taxa might have on the results. Because aquatic insects emerge with greater frequency in May and June, it is important that reference and candidate sites be sampled within

a day of each other during this period, to reflect similar phases of emergent activities on both waterbodies.

2. Longwall mining is proceeding in the DEP-approved Enlow Fork Mine expansion area. As of mid-April 2010, mining was occurring in the E19 and F18 Panels. It is possible that the "special protection" headwater streams of Buffalo Creek will be undermined later this year (2010), and there is a high likelihood that some or all of those streams may be damaged by mining-induced changes, including flow loss. The reasons for these expected impacts are explained further below. The Bailey Mine expansion has been under review by DEP for 3 years and could be approved at any time. Additionally, the current frenzy surrounding natural gas exploration and drilling in the Marcellus Shale threatens streams and wetlands throughout southwestern Pennsylvania.

III LOCATION OF AREAS OF CONCERN

There are two primary areas of concern addressed in this report (Figure 1). The first is the **Enlow Fork Mine expansion**, an area covering 9,688 acres to the north of the existing Enlow Fork mine. The approved expansion allows longwall mining in parts of three municipalities in Washington County: East Finley Township, Morris Township, and South Franklin Township (Figure 2). Streams to be undermined in this expansion area (and their Chapter 93 designated uses; Figure 3) are as follows:

Crafts Creek (TSF[1])	Buffalo Creek (HQ-WWF)
Templeton Fork (TSF)	Sawhill Run (HQ-WWF)
Tenmile Creek (TSF)	

Sawhill Run flows into Buffalo Creek, which flows westward into West Virginia to the Ohio River. Fully 40% of the proposed expansion area is in these watersheds currently designated HQ. Thus, this represents the largest expansion ever of longwall mining into "special protection" waters. The TSF streams within the Enlow Fork Mine expansion area are within the Tenmile Creek watershed, which is tributary to the Monongahela River. The Monongahela River in turn joins the Allegheny River at Pittsburgh to form the Ohio River.

The second primary area of concern is the **Bailey Mine expansion**, an area covering 3,175 acres to the east of the existing Bailey mine (see Figure 2). New longwall mining has not yet been approved by DEP for this proposed expansion area. The proposed mine permit area is entirely within Richhill Township in Greene County. Streams proposed to be undermined in this expansion area include the following:

Kent Run (TSF)	Jacobs Run (HQ-WWF)
Polen Run (TSF)	North Fork Dunkard Fork (TSF)
Whitehorn Run (TSF)	

[1] TSF = trout stocking fishes, WWF = warm water fishes, HQ = high quality

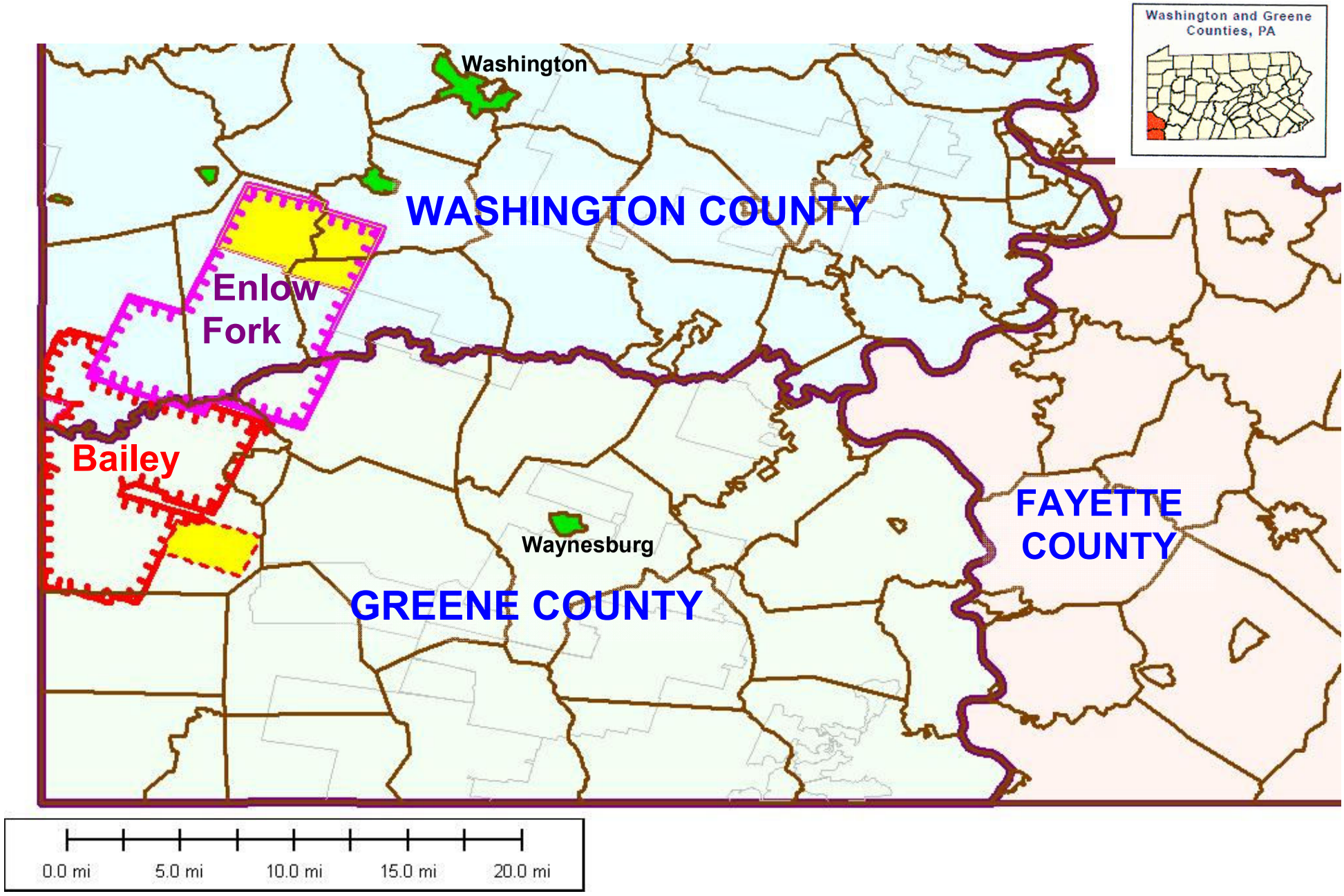

FIGURE 1. Location map showing Enlow Fork Mine (purple outline) and Bailey Mine (red outline) and their expansion areas (yellow shading) in western Greene and Washington Counties, Pennsylvania. Municipalities are outlined in brown. Faint lines indicate other existing or proposed coal mines.

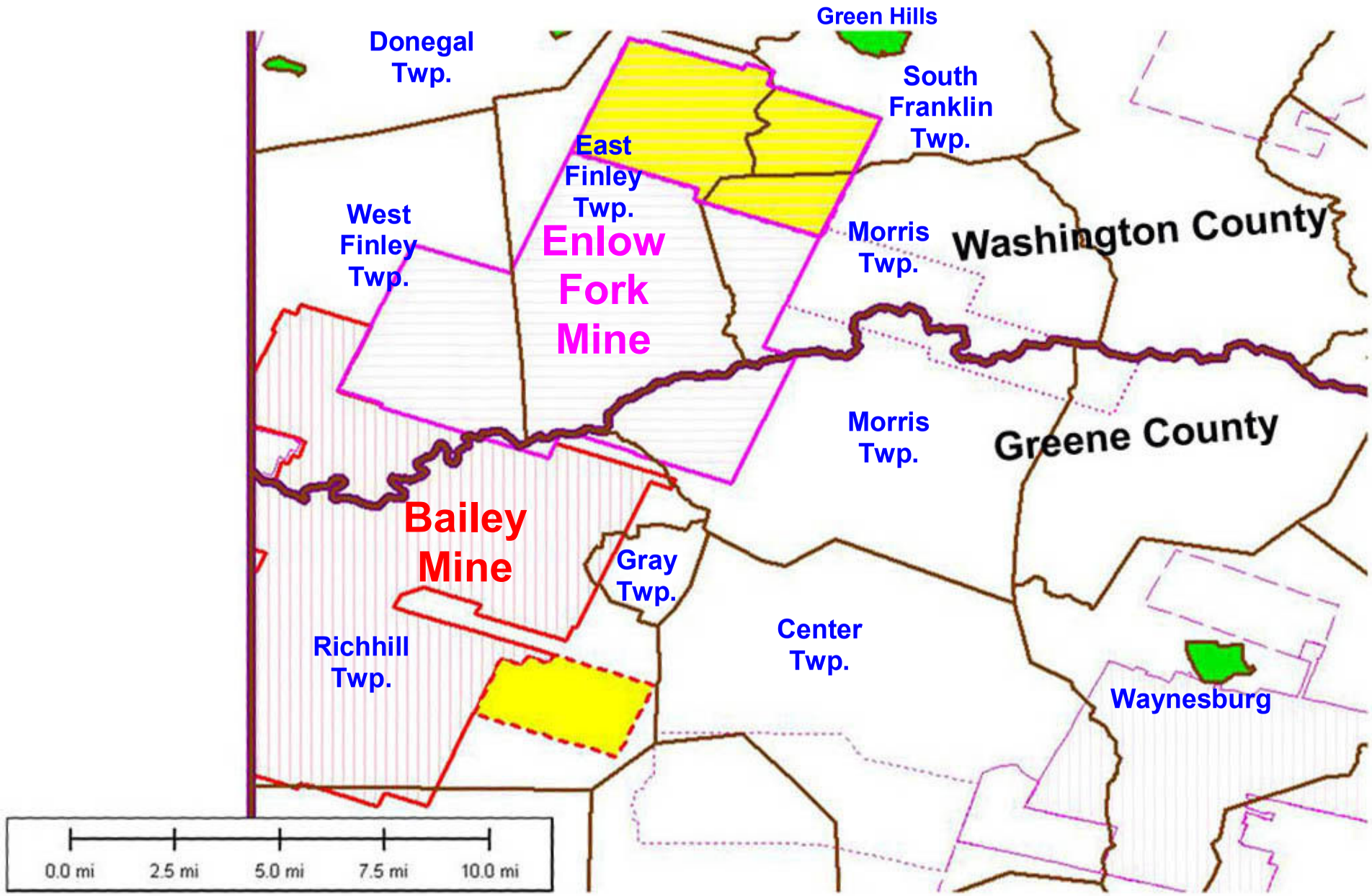

FIGURE 2. Locations of Enlow Fork Mine (purple outline) and Bailey Mine (red outline) and their expansion areas (yellow shading) in southwestern PA. Surrounding municipalities are noted. Faint lines indicate other existing or proposed coal mines in the vicinity.

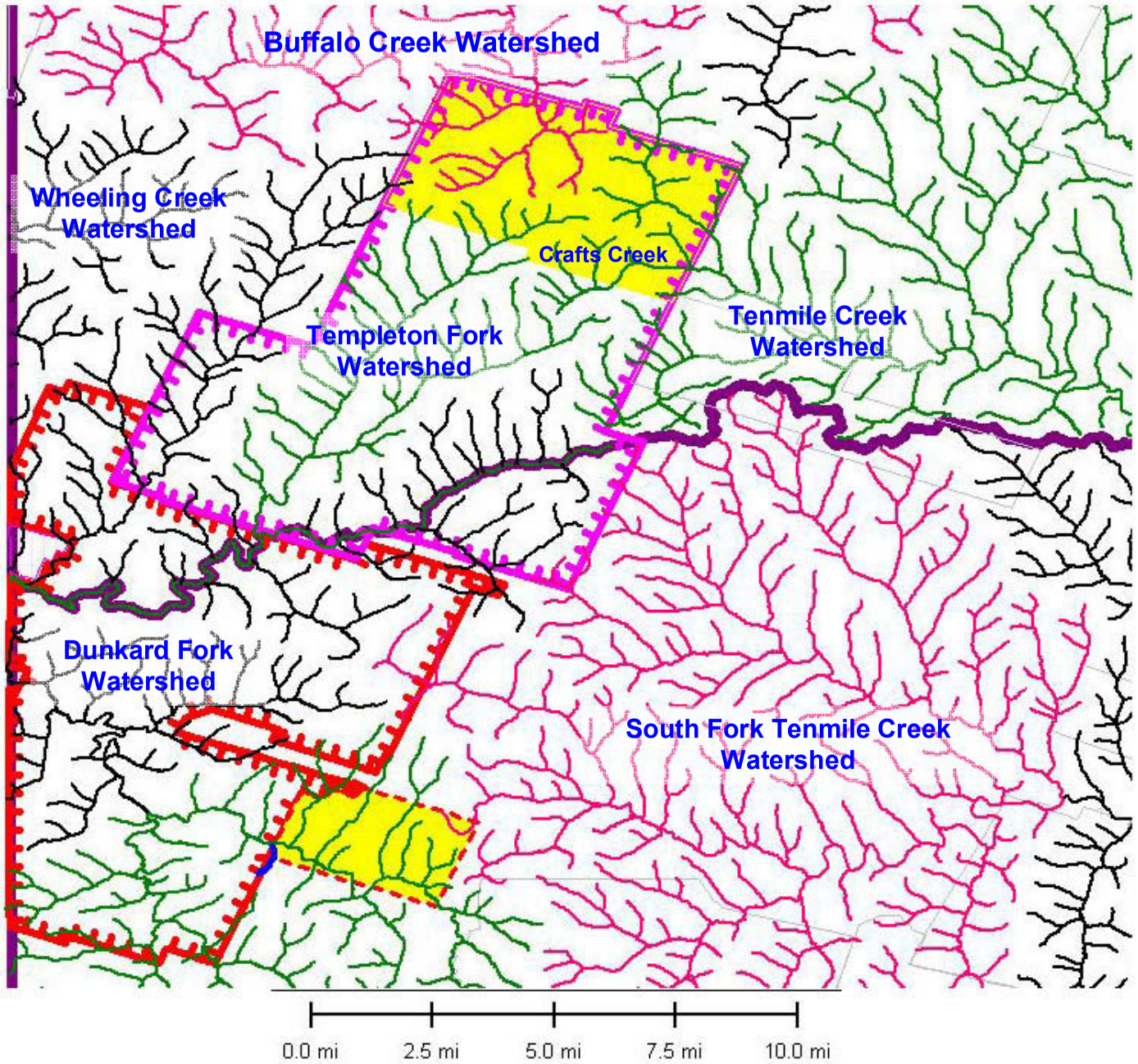

FIGURE 3: Streams and watersheds within and near Enlow Fork Mine (purple outline) and Bailey Mine (red outline) and their expansion areas (yellow shading). Chapter 93 designations are as follows: Pink = HQ-WWF, Green = TSF, Black = WWF.

The TSF streams within the Bailey Mine expansion area are within the Dunkard Fork watershed of the Enlow Fork Creek basin, which is tributary to Wheeling Creek. Wheeling Creek flows westward through West Virginia and discharges into the Ohio River. Jacobs Run (HQ-WWF) is a tributary to South Fork Tenmile Creek, which is a tributary to the Monongahela River.

IV EXISTING USE REQUIREMENTS

Under the federal Clean Water Act, States are required to adopt an antidegradation policy that meets minimum federal requirements. Each State must include the antidegradation policy as an element of its surface water quality standards program in order to gain federal approval. The basic concept of antidegradation is to promote the maintenance and protection of existing water quality for Exceptional Value (EV) and High Quality (HQ) waters, as well as to protect existing uses for all surface waters. The Pennsylvania program, as reflected in 25 Pa. Code Chapter 93 (Water Quality Standards[2]), acknowledges that existing water quality and uses have inherent values worthy of protection and preservation. Furthermore, it recognizes EV and HQ waters as "special protection" waters, and §93.4a provides additional levels of protection for such waters.

An "existing use" is defined at §93.1 as

> *Those uses actually attained in the water body on or after Nov. 28, 1975, whether or not they are included in the water quality standards.*

The same definition appears in the federal regulations at 40 CFR §131.3(e). An "existing use" is different from a "designated use." A "designated use" is defined in §93.1 as those uses specified in §§93.9a-93.9z for each waterbody or segment, whether or not the use is being attained. As described in the Water Quality Antidegradation Implementation Guidance (PADEP 2003):

> ....while a designated use is a regulation that is the product of a rulemaking process, an existing use is a DEP classification for a stream based on valid technical information for a surface water that DEP has reviewed. Existing uses are generally the same as, but in some situations may be more or less protective than, designated uses. [page 6]

Existing use protection is required by regulation to be provided for a waterbody segment when DEP takes a final action on a permit application. Anyone seeking a permit or approval from DEP to conduct an activity that may impact a surface water must demonstrate to DEP that its activity will protect and maintain the more protective of the designated use or the existing use for the waterway. This typically is done in the context of NPDES permit reviews, but it applies equally to all other DEP

[2] http://www.pacode.com/secure/data/025/chapter93/chap93toc.html

permits or approvals. Public participation in the process of making an existing use determination is encouraged (PADEP 2003):

> Interested persons and applicants are encouraged to submit existing use information on other applications [other than NPDES] and requests for DEP approval that may impact a surface water. In addition to NPDES discharges, these activities may include the sewage facilities planning (Act 537) process; **resource extraction activities such as surface and underground mining** and **oil and gas extraction**; landfills; requests for approval of water obstructions, encroachments, and dams; stormwater management planning (Act 167) activities; water withdrawal requests; and other activities which require a DEP permit or approval and may impact a surface water. [emphasis added] [page 12]

Furthermore,

> Classification of existing uses is an on-going process driven by the sources of data listed above. **Individuals, agencies, or organizations outside DEP have the option of** providing sufficient data to substantiate their position that the existing use differs from the designated use, or **simply providing enough information to establish that the waterbody in question warrants an existing use evaluation.** [emphasis added] [page 8]

One of the primary objectives of this report is to provide the existing information that demonstrates that numerous waterbodies in the Enlow Fork Mine and Bailey Mine expansion areas warrant existing use evaluations.

The standard for existing use protection is described in §93.4a(b):

> *Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.*

This directive is mandatory, not discretionary. §93.4c(a)(1) further provides that:

> *(i) Existing use protection shall be provided when the Department's evaluation of information (including data gathered at the Department's own initiative, data contained in a petition to change a designated use submitted to the Environmental Quality Board pursuant to §93.4d(a), or data considered in the context of a Department permit or approval action) indicates that a surface water has attained an existing use.*

and

> *(iv) The Department will make a final determination of existing use protection for the surface water as part of the final approval action.*

Again, these provisions are mandatory, not discretionary. In the context of coal mining, these provisions are repeated in DEP's guidance "*Surface Water Protection - Underground Bituminous Coal Mining Operations*" (PADEP 2005).

The bituminous coal mining regulations in 25 Pa. Code Chapter 89 establish permit application requirements and performance standards for underground coal mining activities. The operation plan for an underground mine requires both the evaluation and protection of overlying streams. Chapter 89 also requires permit applicants to collect baseline hydrologic information on surface and ground waters above the mine area.

Prior to the significant revisions of TGD 563-2000-655 which became effective in part on 8 October 2005 (and fully effective on 8 October 2007), minimal information was being collected on the premining condition of streams. In accordance with the current TGD, however, mine applicants now specifically are required to collect and monitor detailed information on wetlands and streams, including their physical characteristics, their water quality, and their existing uses. The data collected for the two mine expansion areas discussed herein indicate that many of the streams are likely to have existing uses better than their designated uses, but no formal attempt has yet been made by DEP to recognize, disclose, and protect those existing uses.

V DATA REGARDING EXISTING WATER QUALITY AND USES

Approximately 40% of the Enlow Fork Mine expansion area encompasses watersheds of streams that currently are designated HQ-WWF, including the Buffalo Creek watershed and the Sawhill Run watershed. Existing data suggest that some of these waterbodies may have existing uses of "Exceptional Value" (EV). The streams within the remaining 60% of this mine expansion area are designated TSF, but existing data collected as part of the mine application suggest that some of them also have existing uses of "EV" or "HQ". Likewise, in the Bailey Mine expansion area, most of the streams currently are designated TSF, but existing data suggest that some of them have existing uses of "EV" or "HQ".

The TGD requirements applicable to mine applications (including those for *expansions*) include: (1) baseline monitoring of stream flow for at least two years prior to mining, (2) baseline information on wetlands, fish, and macroinvertebrate communities, and (3) physical and chemical characterization of streams. The data collected in accordance with these requirements are not by themselves sufficient to make an existing use determination. To do that requires comparison of the macroinvertebrate data from a subject stream with contemporaneous data from an EV reference stream.

The data collected in these two mine expansion areas, however, sufficiently characterize the macroinvertebrate community to identify streams which clearly are attaining uses higher than their designated uses at the present time. As noted above, the information provided to DEP by outside individuals or organizations needs only to be adequate to establish that the waterbody in question warrants an existing use evaluation. These premining inventory data already in DEP's files clearly do that.

Specific data for eight streams are summarized here and presented in more detail in Appendix A and Appendix B. These eight streams likely are **not** the only streams that potentially have attained existing uses better than their designated uses; they are merely a representative sampling of such streams in these two expansion areas. Five streams within the Enlow Fork Mine expansion area (Figure 4) are highlighted here for their outstanding biological conditions. Three streams in the Bailey Mine expansion area (Figure 5) are similarly highlighted. Appendices A and B provide relevant excerpts from the mining consultant's reports on their bioassessment procedures and the results of their evaluations with respect to these eight streams. The DEP California District Mining Office has copies of the original reports in their entirety.

The table below identifies the eight stream stations selected for discussion in this report. Listed in the table are the highest Habitat Assessment Score (HAS) and the highest Total Biological Score (TBS) identified at each station by CEC (Civil & Environmental Consultants, Inc.) on behalf of Consol. These eight stream segments typically exhibited "optimal" (or high "suboptimal") HASs, and among the highest TBSs of all the streams within the respective mine permit area. Other streams in these areas, by comparison, scored lower on their HASs and TBSs during the same assessment period, although most were at least attaining their designated uses.

	Latitude N.	Longitude W.	Highest Habitat Assess't Score	Highest Total Biological Score	Mine Panel Location
Enlow Fork Mine, North Expansion Area					
Crafts Creek (designated TSF)					
Station **BSW 15**	40°03'12.77"	80°20'42.86"	140	85.4	Panel E18
Station **BSW 18**	40°03'36.42"	80°21'24.70"	156	83.7	Panel E19
UNT Templeton Fork (designated TSF)					
Station **BSW 24**	40°03'56.53"	80°22'17.65"	137	87.1	Panel F18
Buffalo Creek (designated HQ-WWF)					
Station **BSW 38**	40°04'43.25"	80°23'15.41"	161	71.1	Panel F20
Station **BSW 42**	40°04'49.82"	80°22'46.76"	114	80.7	Panel F21
Bailey Mine, East Expansion Area					
Kent Run (designated TSF)					
Station **BSW 02**	39°53'52.86"	80°25'30.26"	161	82.5	Panel A1
UNT North Fork Dunkard Fork (designated TSF)					
Station **BSW 16**	39°52'35.78"	80°23'29.50"	141	83.7	Panel A4
UNT North Fork Dunkard Fork (designated TSF)					
Station **BSW 20**	39°52'33.29"	80°24'09.18"	159	82.3	Panel A5

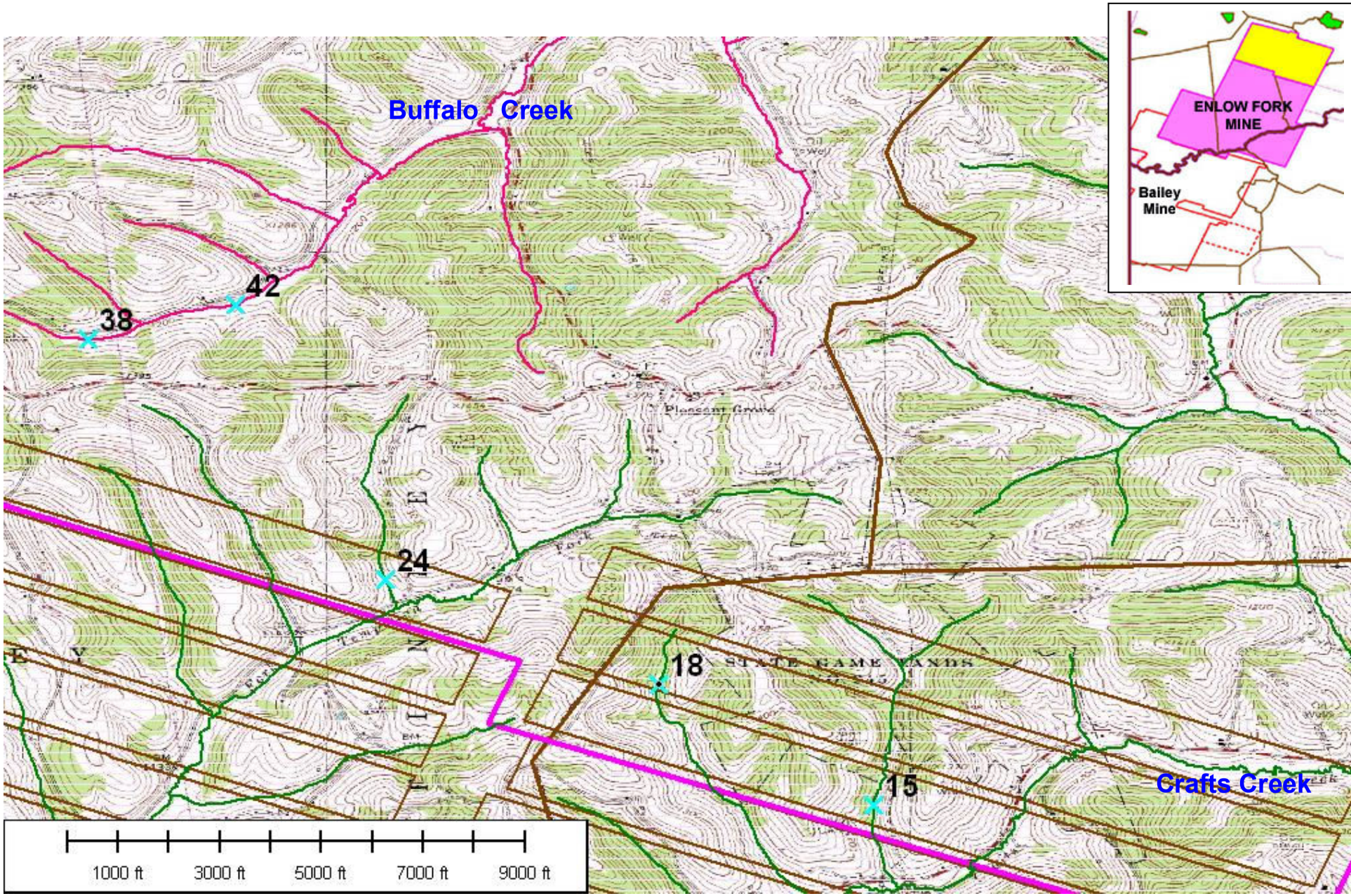

FIGURE 4. Location of the five bioassessment stations discussed in this report (BSW 15, BSW 18, BSW 24, BSW 38, and BSW 42) within the DEP-approved Enlow Fork Mine expansion area (yellow shading in inset). Stations BSW 38 and BSW 42 are along streams currently designated as "HQ-WWF". Longwall mine panels already mined in southern section of view are outlined.

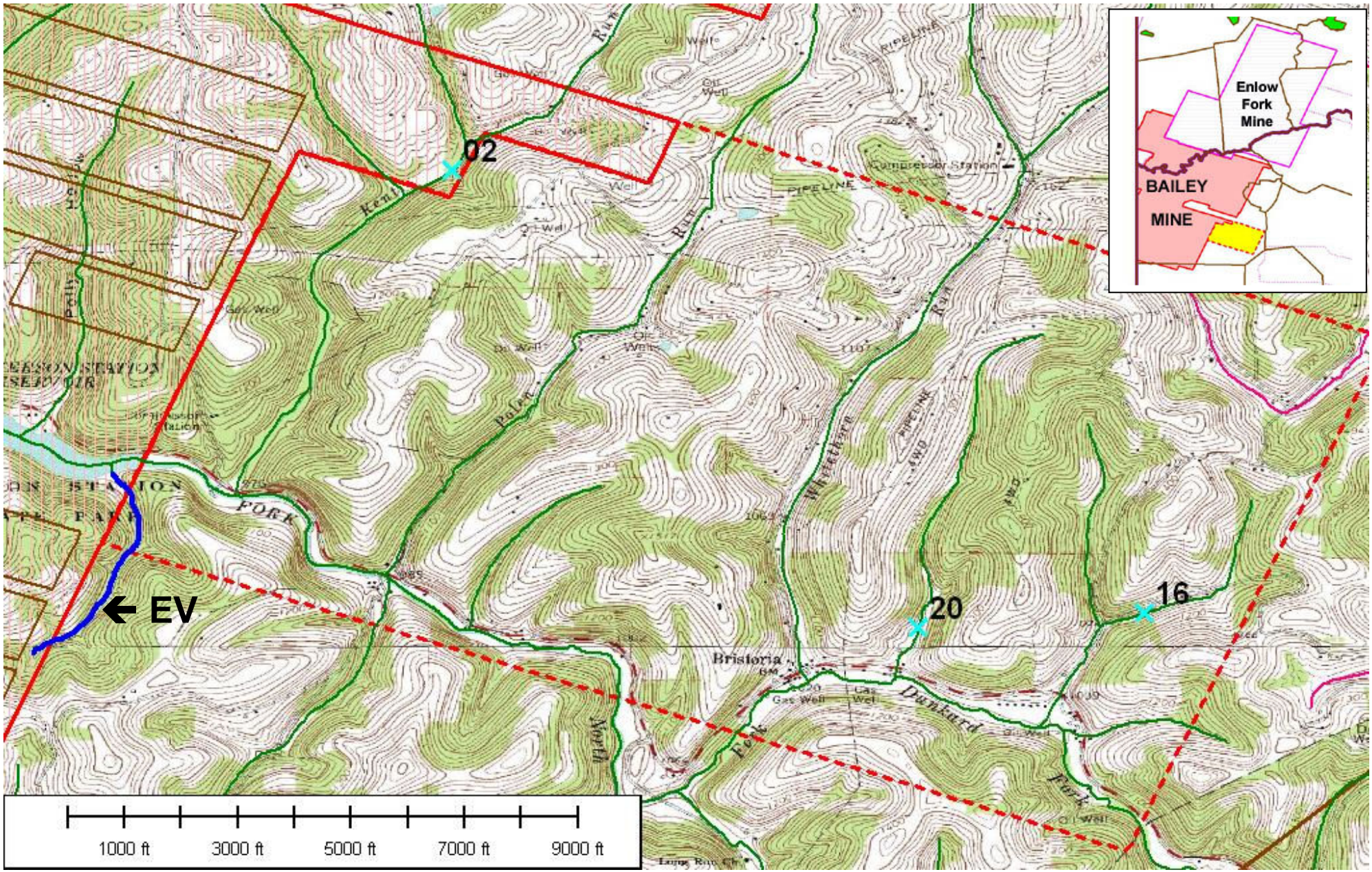

FIGURE 5. Location of the proposed Bailey Mine East Expansion (outlined in dashed red; yellow shading in inset), in Richhill Township, Greene County. Selected bioassessment monitoring locations discussed in this report (BSW 02, BSW 16, and BSW 20) are identified. EV reference stream (blue line) in Ryerson Station State Park is noted at arrow.

Summary of Enlow Fork Mine Expansion Area Bioassessment Data

The premining bioassessment data compiled for streams in the Enlow Fork Mine expansion area were collected between 13 March and 7 May 2007 (CEC 2007a). During that period, CEC sampled 60 biomonitoring stations within the portion of the permit area expected to be mined within the first two years following approval, which included the E18-E23 and F18-F23 longwall panels. CEC performed basic water quality measurements, evaluated physical habitat conditions, and performed habitat and stream assessments in accordance with the stream assessment protocols prescribed in the TGD (PADEP 2005). Five of the 60 stream sections are summarized here and highlighted in Appendix A.

Eight stations were evaluated on tributaries to Crafts Creek, including **BSW 15** and **BSW 18**. The highest TBSs (85.4 and 83.7) were found at BSW 15 and BSW 18, respectively. The overall biological metrics for these two stations suggest excellent macroinvertebrate communities in these streams; they are very diverse (34 and 30 total taxa, respectively), have a very high number of intolerant benthic taxa (23 and 20, respectively), and have a high number of Trichopteran taxa (caddisflies): 7 at BSW 18 and 5 at BSW 15.

Six stations were evaluated on tributaries to Templeton Fork, including **BSW 24**. The highest TBS (87.1) was recorded at station BSW 24. In comparison, the lowest nearby TBS, recorded at BSW 26 (45.8), was only 53% of BSW 24. The biological metrics for Station BSW 24 showed extremely high diversity within the benthic macroinvertebrate community; a total of 37 taxa, a total of 19 intolerant taxa, and a total of 9 Trichoptera. The diversity and richness at this station were attributed to favorable habitats created by the multiple snags and the wide range in sizes of substrate.

Four stations were evaluated on the Buffalo Creek mainstem, including **BSW 38** and **BSW 42**. Station BSW 38 had the highest Habitat Assessment Scores (161 for high gradient [riffle/run] habitats and 160 for low gradient [pool/glide] habitats), indicating optimal conditions for both types of instream habitats. The highest Total Biological Score of 80.7 was found above the F21 Panel at Station BSW 42. The biological metrics for Stations BSW 38 and BSW 42 showed high diversity within the benthic macroinvertebrate community, with 25 and 26 total taxa, respectively. These two stations also exhibited a richness of intolerant taxa (17 and 16, respectively) and a high number of Trichoptera (4 and 6, respectively).

Summary of Bailey Mine Expansion Area Bioassessment Data

Data were collected and evaluated from 24 stations within the Bailey Mine expansion area between October 2006 and January 2007 (CEC 2007b). The consultant for Consol performed basic water quality measurements, evaluated physical habitat conditions, and performed habitat and stream assessments in accordance with the

procedures detailed in the TGD (PADEP 2005). Three of the 24 stream sections are summarized here and highlighted in Appendix B.

Six stations were evaluated on Kent Run by CEC, including Station **BSW 02**. All six stations had optimal Habitat Assessment Scores of 80% or higher for either their high or low gradient habitats, and in many cases for both. Station BSW 02 had the highest TBS (82.5) of all six stations. This station exhibited very high diversity within the benthic macroinvertebrate community, with 34 total taxa, including 19 intolerant taxa and 5 Trichoptera. Stable cobble/gravel substrates and cover habitat were abundant and were believed to have contributed to the establishment and maintenance of a productive macroinvertebrate population at this station.

Five stations on tributaries to North Fork Dunkard Fork were evaluated, including Station **BSW 16** and Station **BSW 20**. All 5 stations had optimal or high suboptimal Habitat Assessment Scores, with Station BSW 20 scoring 80% for high gradient habitat. Gravel (48%) and cobble (35%) were the dominant substrates at Station BSW 20. Station BSW 16 had the highest TBS (83.7) of all five stations on North Fork Dunkard Fork; indeed, that score was the highest of all 24 stations sampled for this mine expansion. Station BSW 20 also had a very high TBS of 82.3. Both Station BSW 16 and Station BSW 20 exhibited high diversity within the benthic macroinvertebrate community, with 26 and 28 total taxa (respectively) and intolerant taxa numbering 18 and 20. Station BSW 16 had the highest number of Trichoptera (7) of all 24 biomonitoring stations. Riffle-pool-riffle sequences reportedly provided varied niche habitats throughout the watercourses at these stations.

The data for these eight streams clearly indicate excellent water quality and biological conditions. Particularly in the streams which currently are designated TSF, these data suggest that EV or HQ conditions probably exist. Some of the streams currently designated HQ-WWF likewise may deserve an even greater (EV) level of protection. <u>At minimum, these data clearly establish that these waterbodies warrant existing use evaluation by DEP</u>. Other streams within the expansion area, not specifically highlighted herein, also may have existing uses better than their currently-designated uses. As discussed below, there is a significant, credible risk that the flow and water quality of these streams will be damaged by prospective resource extraction.

VI LIKELIHOOD OF IMMINENT DAMAGE TO SPECIAL PROTECTION WATERS

A severe loss of water attributed to longwall mining adversely impacted Crafts Creek beginning in November 2008, only months after the Enlow Fork expansion was approved by DEP. Significantly, the loss of streamflow was <u>not expected</u> to occur when the permit application was prepared by Consol's consultants and reviewed by DEP. Using the same criteria and predictive models, no flow loss is expected by the permittee or by DEP in any of the streams in the adjacent Buffalo Creek watershed.

In Consol's July 2005 application for the Enlow Fork Expansion, 38 sections of streams were predicted to experience stream *pooling* (and thus a need for stream restoration), but no adverse *flow loss* impacts were anticipated. In Module 19 of the expansion application, bonding costs were listed for specific actions expected to be taken for stream remediation in each of the streams predicted to be affected. For Crafts Creek and its tributaries, remediation costs totaling more than $69,000 were estimated for the 7 gate cuts predicted to be needed to correct mining-induced pooling. No estimates were provided for grouting or other measures that might be needed to address water loss issues. For Buffalo Creek and its tributaries the estimates totaled more than $236,000 for the 11 gate cuts that will be needed to repair expected pooling, but like Crafts Creek, nothing was proposed to address possible water loss because no such impact was anticipated.

As discussed above, some of the streams in the Buffalo Creek watershed, once evaluated by DEP, are likely to be recognized as having "Exceptional Value" existing uses, whereas currently they are designated "only" as "HQ". Furthermore, any wetland located in or along the floodplain of any EV stream is itself an EV water per Chapter 93, as well as being an "exceptional value wetland" per Chapter 105.

The Pennsylvania Environmental Hearing Board[3] found that changes such as pooling and flow loss fit within the definition of "pollution" under the Clean Streams Law[4], which includes physical alteration of surface waters such as a diminution or deviation in flow. <u>This raises an important policy question as to whether existing use protection is being provided to these "special protection" waterways (whether they are EV or "only" HQ) when an activity has been authorized which is expected to drop the streambed by several feet, resulting in pooling behind the unsubsided gate, which then will require, at minimum, excavation of the streambed through the gate area and other measures to restore flow to that waterway.</u> The proposed cost estimates for restoration mentioned above assume that everything goes as "predicted"; otherwise, sections of the same "special protection" waterways may become dewatered and require a year or more of additional physical disturbances as efforts are undertaken to try to restore premining hydrologic and biologic conditions.

DEP completed a required CHIA (Cumulative Hydrologic Impact Assessment) for the proposed Enlow Fork Mine expansion. In the section of the CHIA entitled "*Underground Mining Effects on Surface Waters"*, which directs DEP to

> Identify all perennial and intermittent streams that will have mining within their "zones of potential influence" and describe the conditions or measures that will serve to prevent their diminution

the DEP response was that flow loss is *"NA* [not applicable] *based on amount of cover present beneath all streams"*; *i.e.,* only pooling was expected to occur.

[3] *Oley Township v. DEP*, 1996 EHB 1098
[4] 35 P.S. §691.1

Despite these predictions and expectations, during November 2008 at least 1,400 feet of a perennial section of Crafts Creek unexpectedly went dry as the result of longwall mining in the newly-authorized expansion of Enlow Fork Mine (Compliance Order #086004, dated 13 November 2008). The documented loss of water above the E18 longwall panel also caused a fishkill. One year later, as explained by DEP representatives to a meeting of residents in Morris Township, the stream still had not returned to its natural condition, despite numerous attempts by Consol to grout the streambed and to artificially provide flow using surface and groundwater sources.

In Module 8 of its 2008 permit application for expansion of its Bailey Mine, Consol provided the following information regarding the greater potential it had observed for flow loss in headwater areas as a result of full-extraction (longwall) mining of coal:

> Percent of watershed mined is a **primary factor** in evaluating the potential for mining induced flow loss. The increase in the percentage of watershed mined directly increases the influence of other primary parameters and incorporates the secondary supplemental variables of mining beneath headwaters/feeder springs and cumulative impacts. The percent of watershed mined influences at least two elements of flow maintenance: contributory flow sources and surface flow dewatering. As the percent of watershed mined increases, one or both of these elements may be affected leading to an impact or increased impact. Streams that are supported by a number of contributory flow sources and multiple subwatersheds generally maintain a higher average baseflow and are less likely to experience long term or irreversible changes to flow conditions as a result of mine subsidence. As more of the watershed is mined, the potential for a change in the hydrologic system is increased and the potential for a flow loss impact in a section of stream is increased. **Particularly is this so under conditions where the contribution from flow sources is limited, as is the case with headwater type streams that are supported by small feeder springs and surface runoff only, the potential for dewatering is significantly higher.**
>
> Based on observations at some undermined streams, it appears the impacts to stream flow by longwall mining are influenced by the number of times the streambed is undermined. In general, the more times the stream is undermined, the greater the potential overall cumulative impact will be to the stream. [emphasis added]

Consol's Enlow Fork Mine was originally known as "Bailey No. 2 Mine" when it was first proposed in the early 1980s. Consol's Bailey (No. 1) Mine began mining near Enlow Fork Creek (which forms the boundary between Greene and Washington Counties) and proceeded generally southwestward. Bailey No. 2 Mine (Enlow Fork Mine) began near Enlow Fork Creek at the edge of Bailey (No. 1) Mine and proceeded northeastward. As illustrated in Figure 6, the general pattern of mining

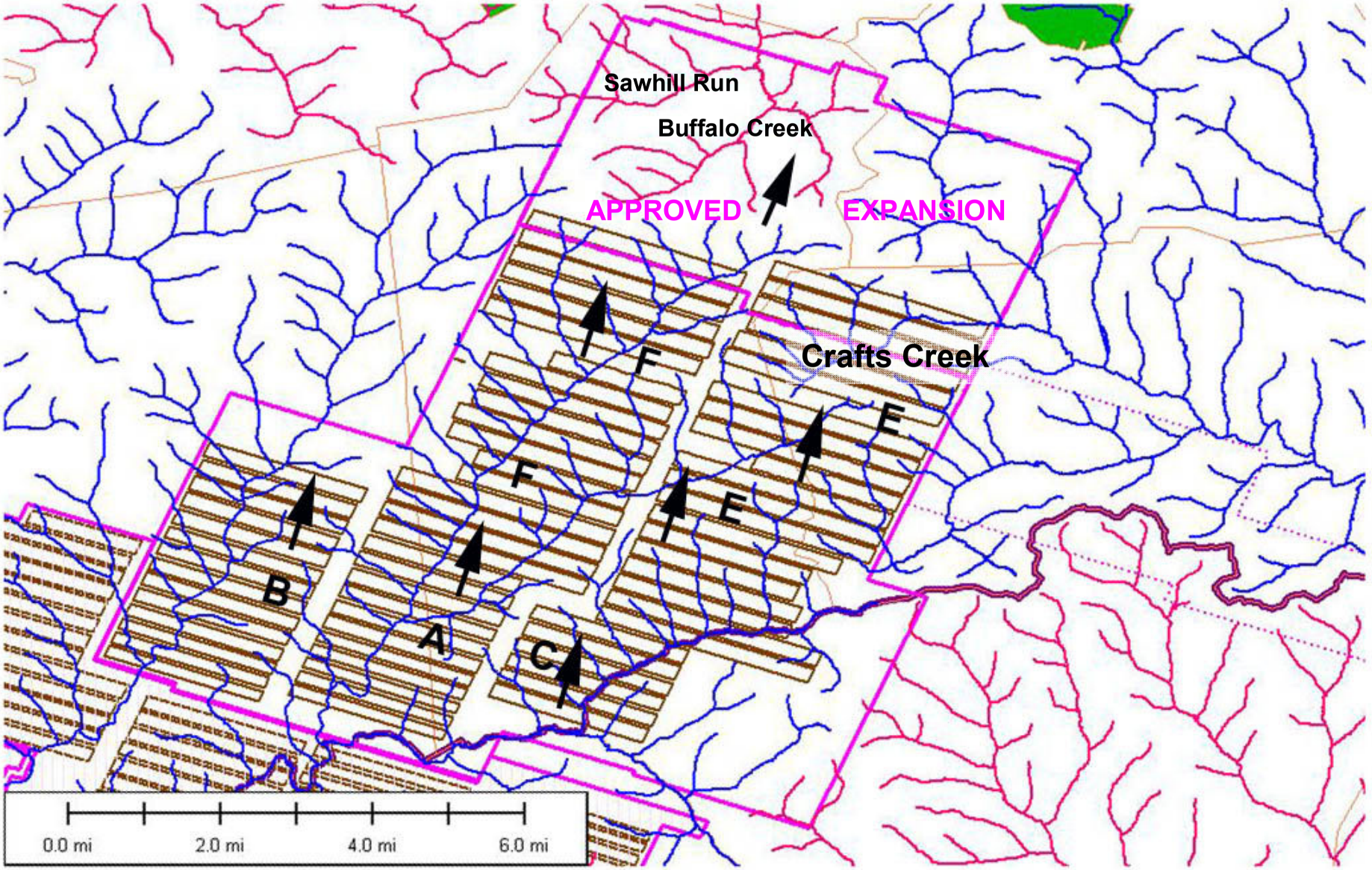

FIGURE 6. Enlow Fork Mine (purple outline) showing longwall panels already mined (A through F) outlined in brown. Direction of mining (arrows) has been to the northeast, beginning near Enlow Fork Creek and proceeding up its tributary watersheds. Crafts Creek was mined first in its headwater watershed, and suffered water loss in 2008. The headwater watersheds of Buffalo Creek and Sawhill Run, both designated HQ, will be undermined in the next few panels.

has been to start near the mouth of streams and proceed upstream towards the headwaters. The Enlow Fork Mine expansion, by contrast, began longwall operations beneath the headwaters of Crafts Creek and proceeded to undermine all of its headwater tributaries. As Consol acknowledged in the quotation above (page 10), when a stream's source of water is limited, as it is in headwater areas, undermining of those sources is more likely to result in dewatering of the stream because a greater percentage of its watershed is affected. Shortly after the headwaters of Crafts Creek were undermined, it suffered an adverse flow loss. The imminent mining of Panels F20 and F21 will undermine the headwaters of Buffalo Creek (Figure 7), quite possibly with the same adverse results.

A progression of total-extraction mining similar to that which occurred beneath Crafts Creek (*i.e.*, longwall mining beginning in the headwaters area instead of near the mouth of a stream) occurred in 2004 under Maple Creek in Fallowfield Township, Washington County, where UMCO's High Quality Mine completely dried up the stream. Restoration of flow in Maple Creek was unable to be accomplished, no matter what mitigation techniques were attempted. PennFuture and DEP litigated and won a case against UMCO[5], whereby it was not allowed to continue to use longwall mining in the subsequent panels planned under nearby streams. DEP determined that additional longwall mining there would have similar adverse impacts on the streams, and so it authorized only room-and-pillar mining (which UMCO elected not to undertake). One acknowledged means of avoiding damage to streams due to full-extraction (longwall) mining is to utilize a different method of underground mining (*e.g.,* room-and-pillar).

As noted above, the percent of watershed mined is a "primary" factor in the potential for mining-induced flow loss in streams. The depth of cover ("overburden") is another primary factor which affects whether a stream may experience flow loss, with the risk increasing as depth of cover decreases. The minimum depths of cover under Buffalo Creek (500 feet) and Sawhill Run (510 feet) are similar to (indeed, slightly *less* than) the cover which existed under nearby Crafts Creek (540 feet). Taken together, these factors portend the significant likelihood of a flow loss in the "special protection" waters of the Buffalo Creek watershed.

VII RECENT LOCAL EXPERIENCES WITH EV DESIGNATIONS

It is not unheard of for streams with designated uses of HQ or lower actually to be attaining EV uses, especially in undisturbed forested headwater sections of those streams in the little-studied hollows of Greene and Washington Counties. Indeed, the DEP maintains a publicly accessible list of surface water segments by county (http://www.portal.state.pa.us/portal/server.pt/community/existing_use/10557) where instream data have been evaluated which indicate an existing use of a waterbody

[5] UMCO Energy, Inc. *vs* PADEP and PennFuture, EHB Docket No. 2004-245-L, 5 September 2006, *aff'd*, 938 A.2d 530 (Pa. Cmwlth. 2007)(*en banc*)

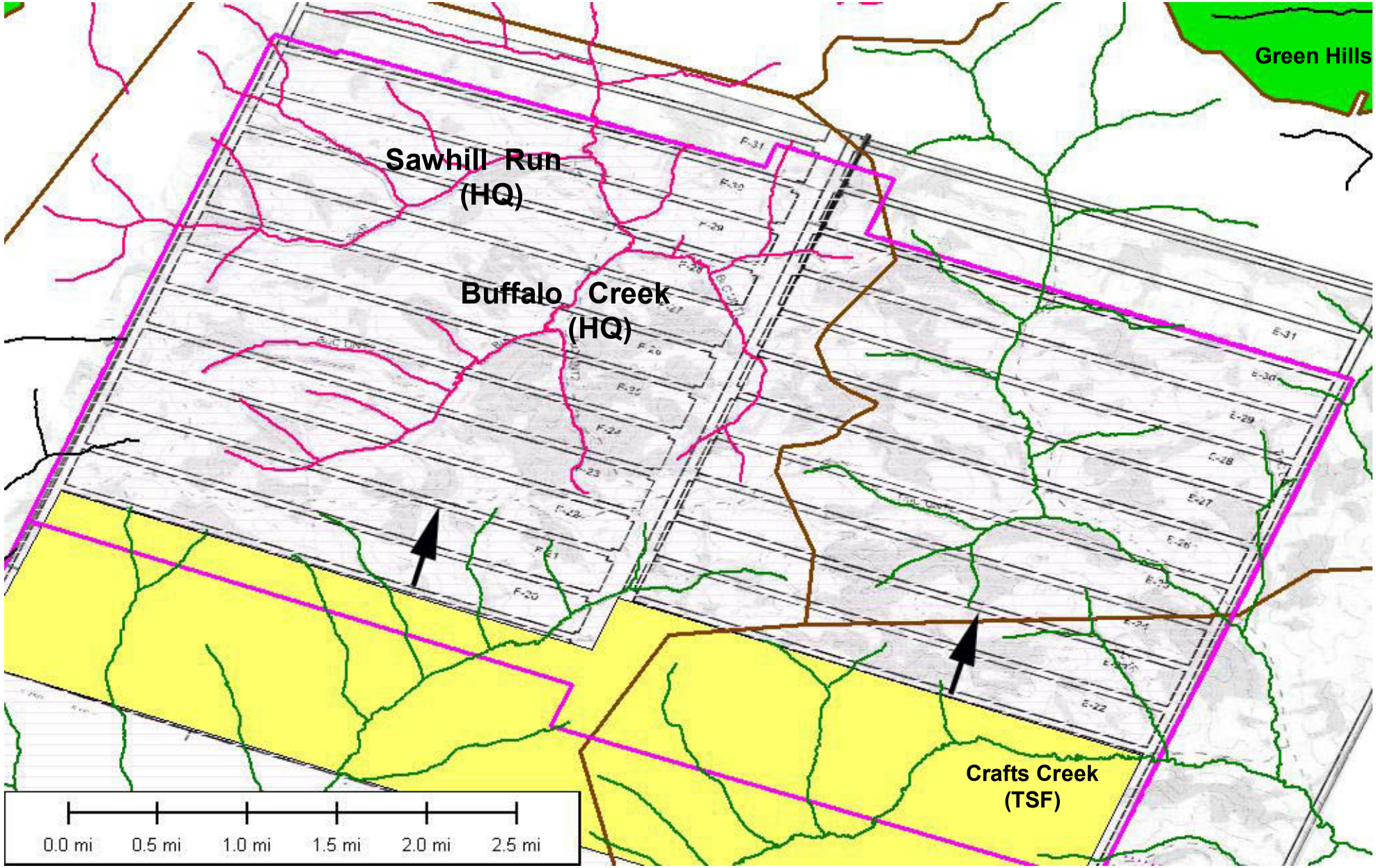

FIGURE 7. Enlow Fork Mine expansion area (purple outline), with already-mined areas shaded yellow, and remaining panels dashed. Undermining will proceed toward the northeast, as noted by arrows. Streams in the Sawhill Run and Buffalo Creek watersheds currently are designated HQ-WWF, but some may have existing uses of "EV". Longwall mining in the headwaters of Crafts Creek caused unpredicted flow loss beginning in November 2008.

that is more protective than the designated use in §§ 93.9a – 93.9z. The list is maintained and updated by the Bureau of Water Supply and Wastewater Management.

During 2008, in conjunction with routine stream assessment fieldwork, DEP aquatic biologists identified the very first Exceptional Value (EV) streams ever recognized in all of Greene and Washington Counties. UNT North Fork Dunkard Fork (Stream Code 32599), which previously had been designated TSF, was found to be attaining EV uses. UNT Owens Run (Stream Code 32704), which previously had been designated WWF, also was found to be attaining EV uses. Both of those streams are in Richhill Township, Greene County. Notably, UNT North Fork Dunkard Fork was found to be among the best of all EV streams, and thus qualifies as a "reference EV" stream.

During June 2008, a formal petition was submitted to the Pennsylvania EQB (Environmental Quality Board) by Foundation Mining, L.P., to redesignate to WWF several streams that were designated HQ-WWF in the upper South Fork Tenmile Creek basin. Foundation Mining planned to conduct longwall mining activities in the vicinity of the subject streams and knew it would have to comply with more stringent discharge requirements if the streams maintained their "special protection" designation as HQ than if they were redesignated WWF. In conjunction with the petition, Foundation Mining submitted stream assessment data documenting relatively poor water quality conditions in the streams for which it was seeking a downgrade in designation.

In response to the petition, and on behalf of PennFuture and local environmental protection groups, Dr. Ben Stout conducted independent bioassessment studies on the streams (Stout 2009; Schmid and Company, Inc. 2009). Dr. Stout's analyses demonstrated, and DEP's own studies subsequently confirmed, that several of the subject streams actually were attaining EV uses. Consequently, instead of reducing the regulatory protections afforded to them, five HQ-designated waterways[6] were immediately reassigned in 2009 to the most protective classification of all - *Exceptional Value* - on the DEP statewide list.

That the coal company consultants' data on stream conditions and water quality differed so sharply from what Dr. Stout and DEP actually documented must be kept in mind in the current situation. The premining bioassessment data provided in the Enlow Fork and Bailey mine expansion applications (which are discussed herein in part) suggest that some of the streams have very good water quality, but even those data must be viewed skeptically as minimum indicators of the aquatic uses and conditions of streams in the areas where coal extraction is intended.

[6] UNT #40637 House Run, UNT #40638 House Run, UNT#40629 McCourtney Run, UNT #40634 Hoge Run, and UNT #40633 Hoge Run.

VIII SUMMARY AND CONCLUSIONS

This report provides existing technical data which clearly establish that numerous waterbodies in Greene and Washington Counties warrant existing use evaluation by DEP. In accordance with the requirements of Chapter 93, the DEP should conduct immediately the necessary bioassessment surveys to document the existing "special protection" uses of streams within the 9,688-acre DEP-approved Enlow Fork Mine expansion area and within the 3,175-acre proposed expansion area for the Bailey Mine. The need for these specific evaluations is urgent in light of the imminent threats to these streams, to their existing uses, and to their associated wetlands posed by longwall coal mining and Marcellus Shale natural gas production.

Looking forward, the DEP District Mining Offices should formalize an arrangement with the DEP Office of Water Management so that the latter's aquatic biologists can perform routine reviews of premining inventory data, with followup in-field investigations as warranted, prior to approving any permits for surface or underground coal mining activities.

IX AUTHORSHIP

This report was compiled by Stephen P. Kunz , with assistance from James A. Schmid, senior ecologists with Schmid & Company, Inc. Mr. Kunz has been an environmental consultant since receiving a degree in human ecology from Rutgers University in 1977. Dr. Schmid is a biogeographer with 40 years of experience in ecological consulting. Both Mr. Kunz and Dr. Schmid are certified as *Senior Ecologists* by the Ecological Society of America and as *Professional Wetland Scientists* by the Society of Wetland Scientists.

Mr. Kunz and Dr. Schmid offer outstanding credentials as experts in ecology, wetlands, environmental regulation, and impact assessment. They have analyzed the environmental impacts of many kinds of proposed development activities in 10 states, including coal mining facilities, industrial facilities, transportation facilities, commercial developments, and residential developments. They have written Environmental Impact Statements under contract to the US Environmental Protection Agency, Army Corps of Engineers, Interstate Commerce Commission, various agencies of state and local governments, and a diverse array of private sector entities. They have prepared comprehensive analyses of environmental regulations of nationwide scope.

X ACKNOWLEDGMENTS

Much of the information and underlying mine permit documents presented herein were obtained by the authors from the files of the Pennsylvania DEP's Bureau of Mining and Reclamation offices pursuant to the Pennsylvania Right to Know Law (Act

3 of 2008). The authors sincerely appreciate the cooperation of the Department, and in particular the assistance of the staff of the California District Mining Office in Coal Center, PA. The authors' review of those records, and the consequent discovery of the significant and serious issues regarding current and ongoing longwall coal mining operations and permitting as presented in this report, were made possible by grants from the Pennsylvania Chapter of the Sierra Club (Bernheim Fund) and the Allegheny Group of the Pennsylvania Chapter of the Sierra Club (Huplits Wildlife Fund).

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APPENDIX A:

Excerpts from

CEC Bioassessment Report for the Enlow Fork Mine Expansion Area

dated 12 November 2007

Appendix A

Selected excerpts provided herewith

BIOLOGICAL MONITORING REPORT
ENLOW FORK MINE NORTH EXPANSION
E18-E23 AND F18-F23 PANELS
EAST FINLEY, MORRIS AND SOUTH FRANKLIN TOWNSHIPS
WASHINGTON COUNTY, PENNSYLVANIA

Prepared for:

CONSOL PENNSYLVANIA COAL COMPANY
CLAYSVILLE, PENNSYLVANIA

CEC Projects 070-338.0003

November 12, 2007

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1.0 INTRODUCTION

1.1 BACKGROUND

Consol Pennsylvania Coal Company (CPCC) retained Civil & Environmental Consultants, Inc. (CEC) to collect and interpret baseline ecological monitoring data for the two-year mining plan of the proposed Enlow Fork Mine North Expansion area located in East Finley, Morris and South Franklin Townships, Washington County, Pennsylvania. The study area includes the E18-E23 Panels and the F18-F23 Panels longwall mining panels, and the shared main, which exceeds the two-year mining plan area (Figure 1 – Site Location Map). Pike Environmental Consulting (PEC) was a subconsultant to CEC and performed the biomonitoring for the F18-F23 Panels.

The ecological data collection involved sampling representative stream reaches for water quality, habitat characteristics, benthic macroinvertebrates, and fish. The biological sampling was performed in accordance with the low gradient stream sampling protocol presented in Appendix B of the Pennsylvania Department of Environmental Protection (PADEP) Technical Guidance Document (TGD) 563-2000-655, *Surface Water Protection – Underground Bituminous Coal Mining Operations* (PADEP 2005). The Appendix B data collected include total biological scores based on the low gradient benthic macroinvertebrate sampling, Wolman pebble counts, and low gradient stream habitat assessment scores.

The data presented in this report were collected between March 13 and May 7, 2007. These data supplement the initial baseline data presented in *Biological Monitoring Data Report, Enlow Fork Mine North Expansion Area, Washington County, Pennsylvania* dated June 24, 2005 (CEC 2005).

1.2 PURPOSE

The purpose of this study was to collect ecological data that will be used by CPCC in preparing various permit applications, as well as fulfilling the biological monitoring requirements of the

PADEP TGD 563-2000-655. The permit applications will address potential ecological impacts to streams as well as the proposed stream restoration activities.

1.3 STUDY AREA CHARACTERISTICS

This study area encompasses approximately 7,865 acres including the proposed permit boundary (Panels E18-E23 and F18-F23) and a shared main as shown on Figure 1 – Site Location Map. The study area is located within the Waynesburg Hills physiographic province (Pennsylvania Department of Conservation and Natural Resources, PA DCNR 2000) of the Western Allegheny Plateau Ecoregion (United Stated Environmental Protection Agency, USEPA 1999) located within the Monongahela River catchment area. The study area includes portions of the following watersheds:

Stream Name and PADEP Stream Code	Total Watershed Area (Acres)	Watershed Area within Study Area (Acres)
Buffalo Creek (32777)	104,121	3,997
Crafts Creek (40938)	2,405	1,652
Robinson Fork (32650)	14,343	235
Sawhill Run (32982)	1,806	1,124
Templeton Fork (32708)	13,280	1,371
Tenmile Creek (40285)	216,255	4,096

Crafts Creek is a tributary to Tenmile Creek which flows into the Monongahela River. Sawhill Run is a tributary to Buffalo Creek which discharges directly into the Ohio River. Both Templeton Fork and Robinson Fork flow into Enlow Fork which then flows into Wheeling Creek. The following table provides the total acreage for each of these watersheds and the acreage for that portion of each watershed located within the study area.

Predominant land-uses within the study area include primarily farmland on floodplains and moderate slopes, and interspersed tracts of forest (second-growth, mixed mesophytic). The watersheds within the study area display dendritic patterns of drainage within their catchment

areas. The streams for the most part are moderate-gradient (2 to 4% slope) (Rosgen 1996). The stream order (Strahler 1964) for streams within the study area ranges from unmapped headwater tributaries to second-order streams based on United States Geological Survey (USGS) topographic mapping.

1.4 PA CHAPTER 93 AQUATIC LIFE PROTECTED USE

According to Pennsylvania's *Water Quality Standards* (Chapter 93, Title 25, Pennsylvania Code; Pennsylvania Code Online 2006), Templeton Fork, Crafts Creek, Tenmile Creek and their unnamed tributaries, including the headwater stream reaches contained within the site boundaries, all have a protected aquatic life use designation of Trout Stocking (TSF). The TSF protected use is defined as "maintenance of stocked trout from February 15 to July 31 and maintenance and propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat.

Buffalo Creek, Sawhill Run, and their unnamed tributaries, including headwater streams contained within the site boundaries have a protected aquatic life use designation of Warm Water Fishes (WWF) and special protection use of High Quality (HQ). The WWF protected use is defined as "maintenance and propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat".

2.0 METHODS

2.1 APPENDIX B STREAM BIOLOGICAL MONITORING

The Appendix A stream classification data presented in CEC's *Stream Classification Report, Enlow Fork Mine North Expansion E18-E23 and F18-F23 Panels, East Finley, Morris and South Franklin Townships, Washington County, Pennsylvania* (CEC 2007) was examined to determine the extent of biologically diverse streams within the study area. Sixty biomonitoring stations were established on biologically diverse stream reaches within the study area for the TGD Appendix B (PADEP 2005) benthic macroinvertebrate sampling. The stations were located based on geographical distribution, stream order, gradient of the streams within the panels, and potential for undermining effects (Figure 2). Photographs of each station are included in Appendix B of this report.

CEC performed basic water quality measurements, evaluated physical habitat conditions, performed USEPA (1999) habitat assessments and modified Wolman pebble counts in conjunction with the Appendix B benthic macroinvertebrate sampling. Field data forms for the stream biomonitoring are in Appendix A. The methods used to collect this information are presented in the following sections.

2.1.1 Stream Physical and Chemical Parameters

Field water quality parameters, including temperature, dissolved oxygen (DO), pH, and conductivity were measured at the biomonitoring stations concurrent with benthic macroinvertebrate sampling. Temperature, conductivity, and DO were measured in situ using a handheld YSI Model 85 meter. The pH was measured in situ using a handheld Cole Parmer Model 300 meter. Water velocity was measured across a representative slow riffle/run cross-section with a uniform bottom and laminar flow (if possible) using a calibrated Marsh-McBirney Model 2000 Flow-Mate stream velocity meter. These meters were maintained, operated, and calibrated per the manufacturer's instructions. Stream flow rates were calculated using the U.S.

Geological Survey midsection, current meter method (Nolan and Shields 2000, Carter and Davidian 1968, Buchanan and Somers 1968).

Water quality measurements were recorded on a modified U.S. Environmental Protection Agency (USEPA 1999) Physical Habitat/Water Quality Field Data Sheet. Stream velocity, width, and depth measurements were recorded on a modified USEPA (1998) Stream Discharge Field Data Form.

2.1.2 Stream Habitat Characteristics

Stream habitat characteristics were recorded at biomonitoring stations. Habitat characteristics observed and recorded during the stream sampling included the following physical habitat descriptors and features: (1) visual appearance of water and sediment quality; (2) dimensions (length and width) of the wetted channel; (3) minimum and maximum water depth; and (4) degree of channel canopy cover (e.g., open, partly open, shaded, or partly shaded). These data were recorded on a modified USEPA (1999) Physical Habitat/Water Quality Field Data Sheet (Appendix A). Stream habitat was evaluated using the USEPA Habitat Assessment Field Data Sheets (modified from USEPA 1999). The Habitat Assessment Field Data Sheet - Low Gradient Streams was used to score reaches comprised predominantly of pool and glide habitats and the Habitat Assessment Field Data Sheet - High Gradient Streams was used to score reaches comprised predominantly of riffle and run habitats. A modified Wolman Pebble Count was also performed at each station according to methods presented in Harrelson, et al. (1994) to characterize the particle size distribution of the stream substrate.

2.1.3 Stream Benthic Macroinvertebrate Community Data

The following sections describe the methods used to collect and analyze benthic macroinvertebrate community data for the streams surveyed in this study.

2.1.3.1 Benthic Macroinvertebrate Community Sampling

Benthic macroinvertebrate samples were collected in accordance with the conditions of Pennsylvania Fish and Boat Commission (PAFBC) 2007 Pennsylvania Scientific Collector Type III, Permit No. 159. The benthic macroinvertebrate community sampling procedure employed by CEC is described in detail in the following paragraphs.

The field sampling of benthic macroinvertebrates was performed in accordance with PADEP TGD 563-2000-655, *Surface Water Protection – Underground Bituminous Coal Mining Operations* (PADEP 2005). CEC followed the specific procedures outlined in, "Appendix B – PADEP Low Gradient Stream Assessment Protocol" presented on pages 30-41 of the TGD.

Stream biomonitoring stations were established in the field based on stream habitat characteristics within the individual stream reaches initially identified for Appendix B sampling (Figure 2 and Section 3.1). Each sampling station identified for assessment was 100 meters long. After identifying and quantifying the available habitat types present within the stream reach (i.e., snag, submerged aquatic vegetation, cobble/gravel, sand/fine sediment, and coarse particulate organic matter (CPOM)), ten benthic sampling locations were selected that effectively represented the observed habitats so that at least two jab samples were collected with a D-frame net in each type of habitat present. Detailed descriptions of each habitat type (e.g., snag, submerged aquatic vegetation, etc.) are presented on PADEP Appendix B-Benthic Macroinvertebrate Field Data Sheets located in Appendix A. When one or more of the specified habitats was absent from the sampling reach, the D-frame jab samples allocated to these missing habitats were re-assigned to the available habitats, proportionately among the most extensive habitat type(s) in the stream reach.

After selecting the ten prospective jab locations, a D-frame dip net (12 inches wide x 10 inches high x 18 inches deep) with nylon Nitex multifilament net (500 micron mesh size) was used to perform one jab at each location. One jab consisted of sampling a 30-inch long path within the habitat type using the D-frame net. The specific methods and mechanics used to physically collect jabs in the five different habitat types are presented in the TGD Appendix B document.

The number of proposed jabs and actual jabs collected in each available habitat type were recorded on a modified PADEP Appendix B-Low Gradient Stream Assessment Protocol Benthic Macroinvertebrate Field Data Sheet (Appendix A).

Immediately after collecting an individual jab, the net was carefully inverted and the contents emptied into a benthos bucket equipped with a 500 micron screen bottom. The net was examined for clinging organisms, which were also transferred into the bucket. After the ten jabs were collected, the organisms and material retained in the bucket were combined into one 2-gallon sample bucket and preserved with ethanol (>70% final concentration). The station number, stream name, station location, PADEP Appendix B sample and date were clearly marked on each sample container. The container was sealed and returned to the CEC laboratory for analysis.

A 200 ±20% subsample of benthic macroinvertebrates was processed in the laboratory from the composite sample collected at each biomonitoring station, according to the methods presented in the PADEP TGD (2005). Each composite macroinvertebrate sample was initially washed in a U.S. Standard No. 35 sieve. Large rocks and sticks were washed over the sieve, carefully examined for organisms, then discarded. The sieve contents were then transferred into a shallow pan with a numbered grid consisting of 28 squares (each square measured 2" x 2") with 4 rows consisting of 7 squares per row. Approximately 1½ to 2 inches of water was then added to the pan and the sample material was gently stirred to disperse the contents evenly throughout the pan.

Grid cutters (stainless steel tubular pipe sections), each with an inside area of approximately 4 in^2, were used as the subsampling devices. First, a random numbers table for the 28 grid squares was created for the sample using Microsoft® Excel. Starting with the first random number, the grid cutter was centered over that selected grid number and gently "cut" into the sample material. The material within the grid cutter was carefully removed and placed in a white enamel pan, then dispersed with tap water and examined for identifiable benthic macroinvertebrates which were removed, counted and temporarily placed in a Petri dish containing water. This process was repeated for the next three grids, resulting in the first four grid numbers being sorted.

If the subsample count was within the targeted 200±20% (160-240 range) organism count, then subsampling was complete and the organisms were transferred into a 4-ounce glass jar that contained 70% ethanol and was labeled with the required sample information. If the sample count was below the minimum 160 organism count after sorting four grids, then a grid cutter was placed on the fifth grid listed on the random numbers table and the material was removed and sorted for macroinvertebrates. Additional grids were sorted until the 200±20% organism goal was met, at which point the organisms were transferred to labeled sample jars containing 70% ethanol. Once a square was chosen, it was entirely sorted for macroinvertebrates. In those instances where the 240 organism limit was exceeded by sorting the initial four grids for the sample, secondary subsampling was required to bring the organism total back under the specified maximum limit. In these cases, the organisms collected from the first four grids were placed in a second gridded pan containing a small amount of cold water. The organisms were distributed as evenly as possible within the pan. A new random numbers table was generated for the selection of grid numbers. Grids were sorted in order until the 200 ±20% organism goal was reached.

Identification of benthic macroinvertebrates was performed employing a variable magnification (20 to 120X) stereomicroscope, a tungsten halogen light with a bifurcated gooseneck extension, and keys by Peckarsky et al. (1990), Merritt and Cummins (1996), Smith (2001), Stewart and Stark (2002), Wiggins (2000), and Thorp and Covich (1991). All sorted macroinvertebrates were stored in 70% ethanol solution and archived for future reference. CEC identified most insect taxa to the genus level and other taxa to the lowest practical level, with the exception of Annelids, which were identified to class level, and Curculionidae, Chironomidae, Ceratopogonidae, Talitridae, Decapoda, Gastropoda, and Pelecypoda, which were identified to family level. Data reports for the benthic macroinvertebrates are presented in Appendix C.

Collembola (spring-tails), Hemipterans and aquatic beetles other than larval Gyrinidae, Hydroscaphidae, Haliplidae, Psephenidae and Ptilodactylidae and larval and adult Elmidae were excluded from the 200 organism subsample used to generate the benthic metrics. Tolerance values and Functional Feeding Group (FFG) designations used to calculate the Intolerant taxa richness and Filterer-Collector + Predator taxa richness metrics were obtained from an expanded taxa list provided to Michael Davison of CEC by Mr. Charles McGarrell of the PADEP Central

Office via e-mail transmission dated November 23, 2005. The expanded taxa list includes additional taxa not present in the original list in the PADEP TGD Appendix B section.

2.1.3.2 Benthic Macroinvertebrate Community Metrics

The taxonomic identification of benthic macroinvertebrates present within the 200 ±20% organism subsample produced for each sampling station resulted in the generation of a taxa list with the number of organisms present for each distinct taxon. These data were used to calculate the values for the five biological metrics presented in PADEP TGD, Appendix B – Low Gradient Stream Assessment Protocol. These five benthic metrics, which are all based on taxa richness rather than percent abundance, are presented on the following table:

Biological Metric	Metric Category	Description
Taxonomic Richness	Richness	Total Number of taxa
Trichoptera Taxa Richness	Richness	Total Number of caddisfly taxa
Percent EPT Taxa	Composition	The total number of Ephemeroptera (mayfly), Plecoptera (stonefly), and Trichoptera (caddisfly) taxa divided by the total number of taxa
Intolerant Taxa Richness	Tolerance	The total number of taxa with a pollution tolerance value <5
Filterer-Collector + Predator Taxa Richness	Trophic	The total number of taxa in the filterer-collector and predator functional feeding groups

All five of these metrics generally show a decrease in values in response to degradation in water quality or other environmental perturbation.

The observed values for the five biological metrics were calculated for each sampling station. It was then necessary to normalize each observed value obtained for the five metrics to a scale of 0 to 100 based on the 95th percentile value from the PADEP's statewide low gradient stream dataset using the following equation:

Normalized Metric score = (Observed Value / 95th Percentile Value) x 100

The 95th percentile values from the Pennsylvania statewide, low gradient stream dataset are presented in the following table, which provides an example of the metric calculations performed for Station BSW16 on Crafts Creek within the study area:

Biological Metric	**Station BSW16 Crafts Creek (Observed Values)**	**95th Percentile Value of PA Statewide Dataset**	**Normalized Score (Observed Value / 95th percentile value) x 100**
Taxonomic Richness	22	30.5	72.1
Trichoptera Taxa Richness	1	10.5	9.5
Percent EPT Taxa	36.4	61.6	59.1
Intolerant Taxa Richness	8	16.0	50.0
Filterer-Collector + Predator Taxa Richness	7	13.5	51.9
Total Biological Score (mean of adjusted values)			48.5

The total biological score was calculated as the mean of the five normalized metric scores. In those instances where the observed value is better than the 95th percentile value for a metric, the normalized score is converted to a maximum of 100 before the total biological score is calculated for the sampling station. The total biological score was calculated for the 45 Appendix B benthic macroinvertebrate sampling stations in the E18-E23 and F18-F23 panel study area.

2.2 FISH COMMUNITY DATA

Fish community sampling procedures and the metrics used to analyze fish community data are described in the following sections.

2.2.1 Fish Community Sampling

Electrofishing surveys were conducted by CEC at the 26 biomonitoring stations on the E18 through E23 panels. Fish sampling was not performed concurrently with the Appendix B

3.0 STREAM BIOLOGICAL MONITORING RESULTS

3.1 STREAM BIOMONITORING STATIONS

During March through May 2007, CEC and PEC sampled 60 biomonitoring stations within the projected two-year monitoring plan of the permit area, which includes the E18-E23 and F18-F23 Panels. The biomonitoring stations are listed in the table below and are shown in Figure 2. Field data forms and photographs collected at the biomonitoring stations are provided in appendices A and B, respectively. Stream water quality, habitat, and biological data are presented in Tables 1 – 19. The following sections present the biomonitoring results for each major watershed and the streams sampled in the study area.

Stream Name	Biomonitoring Stations
Buffalo Creek (main stem)	32777-Enlow-F20 Panel-BSW38 32777-Enlow-F21 Panel-BSW42 32777-Enlow-F22 Panel-BSW46 32777-Enlow-F23 Panel-BSW51
Buffalo Creek tributaries	32777(23)-Enlow-F20 Panel-BSW39 32777(16)-Enlow-F21 Panel-BSW41 33000-Enlow-F21 Panel-BSW43 32996(6)-Enlow-F22 Panel-BSW44 32996-Enlow-F22 Panel-BSW45 32999-Enlow-F22 Panel-BSW47 32998-Enlow-F22 Panel-BSW48 32996(3)-Enlow-F23 Panel-BSW50 32998-Enlow-F23 Panel-BSW52 32998-Enlow-F23 Panel-BSW53
Crafts Creek (main stem)	40938-Enlow-E18 Panel-BSW16 40938-Enlow-E19 Panel-BSW20 40938-Enlow-E20 Panel-BSW26

Stream Name	Biomonitoring Stations
Crafts Creek tributaries	40944-Enlow-E18 Panel-BSW13 40944(1)-Enlow-E18 Panel-BSW14 40942-Enlow-E18 Panel-BSW15 40944-Enlow-E19 Panel-BSW18 40942-Enlow-E19 Panel-BSW19 40938(5)-Enlow-E19 Panel-BSW21 40942-Enlow-E20 Panel-BSW22 40943-Enlow-E20 Panel-BSW23 40941-Enlow-E20 Panel-BSW24 40938(6)-Enlow-E20 Panel-BSW25 40943(1)-Enlow-E21 Panel-BSW28 40938(3)-Enlow-E21 Panel-BSW29 40939-Enlow-E22 Panel-BSW32 40939-Enlow-E22 Panel-BSW33 40940-Enlow-E23 Panel-BSW38
Tributary 32682 to Robinson Run	32650-Enlow-F22 Panel-BSW49 32682-Enlow-F19 Panel-BSW35 32682-Enlow-F20 Panel-BSW40
Templeton Fork (main stem)	32708-Enlow-E21 Panel-BSW27 32708-Enlow-E22 Panel-BSW31 32708-Enlow-E22 Panel-BSW34 32708-Enlow-F18 Panel-BSW23 32708-Enlow-F19 Panel-BSW30
Templeton Fork tributaries	32741-Enlow-E18 Panel BSW10 32708(50)-Enlow-E19 Panel-BSW11 32708(50)-Enlow-E20 Panel-BSW12 32708(9)-Enlow-E22 Panel-BSW30 32744-Enlow-F18 Panel-BSW24 32743-Enlow-F18 Panel-BSW25 32742-Enlow-F18 Panel-BSW26 32738-Enlow-F18 Panel-BSW27 32739-Enlow-F18 Panel-BSW28 32739(2)-Enlow-F18 Panel-BSW29 32745-Enlow-F19 Panel-BSW31 32744-Enlow-F19 Panel-BSW32 32743-Enlow-F19 Panel-BSW33 32739-Enlow-F19 Panel-BSW34 32745-Enlow-F20 Panel-BSW36 32744-Enlow-F20 Panel-BSW37
Tenmile Creek tributaries	40937-Enlow-E18 Panel-BSW17 40949(1)-Enlow-E23 Panel-BSW35 40949-Enlow-E23 Panel-BSW36 40951-Enlow-E23 Panel-BSW37

TABLE 9

STREAM WATER QUALITY, HABITAT CHARACTERISTICS, AND BENTHIC MACROINVERTEBRATE APPENDIX B SCORES
TRIBUTARIES 40942, 40943, AND 40943(1) TO CRAFTS CREEK
ENLOW FORK MINE NORTH EXPANSION, PANELS E18-E23 AND F18-F23
CONSOL PENNSYLVANIA COAL COMPANY
WASHINGTON COUNTY, PENNSYLVANIA
CEC Project 070-338

BSW 15

STREAM WATER QUALITY AND HABITAT CHARACTERISTICS

PARAMETER	CRAFTS CREEK TRIBUTARY STATIONS									
	40942-Enlow-E18 Panel-BSW15		40942-Enlow-E19 Panel-BSW19		40942-Enlow-E20 Panel-BSW22		40943-Enlow-E20 Panel-BSW23		40943(1)-Enlow-E21 Panel-BSW28	
	March 13, 2007		March 13, 2007		March 14, 2004		March 14, 2007		March 19, 2007	
	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool
Water Temperature (°C)	5.0	5.0	9.7	9.7	7.8	7.8	9.5	9.5	4.3	4.3
Dissolved Oxygen (mg/L)	11.9	10.5	10.0	10.0	10.6	10.1	10.2	8.9	10.7	9.4
pH (Standard Units)	7.19	7.29	7.47	7.43	7.32	7.38	7.30	7.32	6.46	6.37
Conductivity (µS/cm)	209	208	146	206	123	125	149	150	109	110
Habitat Reach Length (feet)	238	90	198	130	297	31	262	66	264	64
Stream Width (feet)	2-5		3-5		2-4		1.5-6		1-4	
Stream Depth (inches)	1-18		1-24		1-6		2-12		1-6	
Stream Flow Rate (cubic feet per second)	0.37		0.71		0.06		0.08		0.04	
Substrate Composition (%): [a]										
bedrock (> 2,084 millimeters)					6%					
boulder (256 - 2,084 millimeters)	1%								1%	
cobble (64 - 256 millimeters)	30%		8%		35%		4%		14%	
gravel (2 - 64 millimeters)	35%		66%		36%		40%		34%	
sand (0.062 - 2 millimeters)	25%		24%		13%		36%		28%	
silt (0.004- 0.062 millimeters)	9%		2%		10%		20%		23%	
clay (< 0.004 millimeters)										
USEPA (1999) Habitat Assessment Score (out of possible 200) [b]	140	124	148	135	142	133	103	107	121	118
Percent of Maximum Possible USEPA (1999) Habitat Assessment Score (Narrative Criteria) [b]	70% Suboptimal	62% Suboptimal	74% Suboptimal	68% Suboptimal	71% Suboptimal	67% Suboptimal	52% Marginal	54% Suboptimal	61% Suboptimal	59% Suboptimal

[a] A Modified Wolman (1954) Pebble Count technique was employed to determine percent substrate composition as Wentworth (1922) Size Classes.
[b] U.S. Environmental Protection Agency (1999).

APPENDIX B MACROINVERTEBRATE COMMUNITY METRICS

BIOLOGICAL METRIC	CRAFTS CREEK TRIBUTARY STATIONS										Mean (Observed Value)	Standard Deviation
	40942-Enlow-E18 Panel-BSW15		40942-Enlow-E19 Panel-BSW19		40942-Enlow-E20 Panel-BSW22		40943-Enlow-E20 Panel-BSW23		40943(1)-Enlow-E21 Panel-BSW28			
	March 13, 2007		March 13, 2007		March 14, 2004		March 14, 2007		March 19, 2007			
	Observed Value	Normalized Score	Observed Value	Normalized Score	Observed Value	Normalized Score	Observed Value	Normalized Score	Observed Value	Normalized Score		
Taxa Richness	34	100.0	34	100.0	31	100.0	25	82.0	15	49.2	28	8.0
Trichoptera Richness	5	47.6	4	38.1	4	38.1	4	38.1	2	19.0	4	1.1
% EPT Richness	55.9	90.7	55.9	90.7	45.2	73.4	56.0	90.9	40.0	64.9	51	7.5
Intolerant Taxa Richness	23	100.0	24	100.0	21	100.0	18	100.0	9	56.3	19	6.0
FC + PR Taxa Richness	12	88.9	11	81.5	11	81.5	12	88.9	5	37.0	10	2.9
Total Biological Score (Mean of Adjusted Values)		85.4		82.1		78.6		80.0		45.3		

TABLE 7
STREAM WATER QUALITY, HABITAT CHARACTERISTICS, AND BENTHIC MACROINVERTEBRATE APPENDIX B SCORES
TRIBUTARIES 40944 AND 40944(1) TO CRAFTS CREEK
ENLOW FORK MINE NORTH EXPANSION, PANELS E18-E23 AND F18-F23
CONSOL PENNSYLVANIA COAL COMPANY
WASHINGTON COUNTY, PENNSYLVANIA
CEC Project 070-338

BSW 18

STREAM WATER QUALITY AND HABITAT CHARACTERISTICS

PARAMETER	CRAFTS CREEK TRIBUTARY STATIONS					
	40944-Enlow-E18 Panel-BSW13		40944(1)-Enlow-E18 Panel-BSW14		40944-Enlow-E19 Panel-BSW18	
	March 30, 2007		March 30, 2007		March 22, 2007	
	Riffle	Pool	Riffle	Pool	Riffle	Pool
Water Temperature (°C)	11.9	11.9	6.9	6.9	10.8	10.9
Dissolved Oxygen (mg/L)	9.8	9.2	9.9	7.8	8.8	8.3
pH (Standard Units)	7.13	7.20	6.85	6.77	7.18	7.18
Conductivity (µS/cm)	166	170	136	135	154	154
Habitat Reach Length (feet)	293	35	287	41	297	31
Stream Width (feet)	1-3.5		1-5		1-5	
Stream Depth (inches)	3-12		1-5		2-6	
Stream Flow Rate (cubic feet per second)	0.24		0.03		0.26	
Substrate Composition (%): [a]						
bedrock (> 2,084 millimeters)			27%			
boulder (256 - 2,084 millimeters)	1%		2%		1%	
cobble (64 - 256 millimeters)	9%		24%		21%	
gravel (2 - 64 millimeters)	58%		26%		66%	
sand (0.062 - 2 millimeters)	16%		12%		9%	
silt (0.004- 0.062 millimeters)	16%		9%		3%	
clay (< 0.004 millimeters)						
USEPA (1999) Habitat Assessment Score (out of possible 200) [b]	112	100	156	139	156	153
Percent of Maximum Possible USEPA (1999) Habitat Assessment Score (Narrative Criteria) [b]	56% Suboptimal	50% Marginal	78% Optimal	70% Suboptimal	78% Optimal	77% Suboptimal

[a] A Modified Wolman (1954) Pebble Count technique was employed to determine percent substrate composition as Wentworth (1922) Size Classes.
[b] U.S. Environmental Protection Agency (1999).

APPENDIX B MACROINVERTEBRATE COMMUNITY METRICS

BIOLOGICAL METRIC	CRAFTS CREEK TRIBUTARY STATIONS						Mean (Observed Value)	Standard Deviation
	40944-Enlow-E18 Panel-BSW13		40944(1)-Enlow-E18 Panel-BSW14		40944-Enlow-E19 Panel-BSW18			
	March 30, 2007		March 30, 2007		March 22, 2007			
	Observed Value	Normalized Score	Observed Value	Normalized Score	Observed Value	Normalized Score		
Taxa Richness	20	65.6	25	82.0	30	98.4	25	5.0
Trichoptera Richness	4	38.1	4	38.1	7	66.7	5	1.7
% EPT Richness	30.0	48.7	40.0	64.9	53.3	86.5	41	11.7
Intolerant Taxa Richness	8	50.0	14	87.5	20	100.0	14	6.0
FC + PR Taxa Richness	6	44.4	10	74.1	9	66.7	8	2.1
Total Biological Score (Mean of Adjusted Values)		49.4		69.3		83.7		

STREAM WATER QUALITY, HABITAT CHARACTERISTICS, AND BENTHIC MACROINVERTEBRATE APPENDIX B SCORES
TRIBUTARIES 32742, 32743, 32744 TO TEMPLETON FORK
ENLOW FORK NORTH EXPANSION, PANELS E18-E23 AND F18-F23
CONSOL PENNSYLVANIA COAL COMPANY
WASHINGTON COUNTY, PENNSYLVANIA
CEC Project: 070-338

BSW 24

STREAM WATER QUALITY AND HABITAT CHARACTERISTICS

PARAMETER	TEMPLETON FORK TRIBUTARY STATIONS											
	TemF27L-32744-Enlow-F18 Panel- BSW24 April 2, 2007		TemF26L-32743-Enlow-F18 Panel-BSW25 April 2, 2007		TemF25L-32742-Enlow-F18 Panel-BSW26 May 14, 2007		TemF27L-32744-Enlow-F19 Panel-BSW32 May 21, 2007		TemF26L-32743-Enlow-F19 Panel-BSW33 April 2, 2007		TemF27L-32744-Enlow-F20 Panel-BSW37 April 6, 2007	
	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool
Water Temperature (°C)	8.88	n/a	11.6	n/a	15.8	n/a	11.33	n/a	14.9	n/a	4.1	n/a
Dissolved Oxygen (mg/L)	10.47	n/a	10.2	n/a	8.86	n/a	8.97	n/a	9.33	n/a	11.98	n/a
pH (Standard Units)	7.65	n/a	7.91	n/a	7.92	n/a	8.10	n/a	8.00	n/a	7.83	n/a
Conductivity (µS/cm)	216	n/a	266	n/a	266	n/a	334	n/a	252	n/a	359	n/a
Habitat Reach Length (feet)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Stream Width (feet)[c]	2.08		1.75		0.83		1.5		2.4		1.5	
Stream Depth (inches)[c]	3.25-5.75		3.5-4.25		1.75		0.5-12		1.25-3		1.5-2.5	
Stream Flow Rate (cubic feet per second)	0.53		0.43		0.01		0.13		0.36		0.05	
Substrate Composition (%): [a]												
bedrock (> 2,084 millimeters)	5%		3%				4%					
boulder (256 - 2,084 millimeters)	5%		1%				9%					
cobble (64 - 256 millimeters)	22%		8%		4%		10%		6%		1%	
gravel (2 - 64 millimeters)	43%		65%		23%		52%		65%		44%	
sand (0.062 - 2 millimeters)	17%		21%		29%		19%		20%		40%	
silt (0.004- 0.062 millimeters) clay (< 0.004 millimeters)	8%		2%		44%		6%		9%		15%	
USEPA (1999) Habitat Assessment Score (out of possible 200) [b]	133	137	112	99	137	147	154	150	138	123	136	131
Percent of Maximum Possible USEPA (1999) Habitat Assessment Score (Narrative Criteria) [b]	67% Suboptimal	69% Suboptimal	56% Suboptimal	50% Marginal	69% Suboptimal	74% Suboptimal	77% Suboptimal	75% Suboptimal	69% Suboptimal	62% Suboptimal	68% Suboptimal	66% Suboptimal

[a] A Modified Wolman (1954) Pebble Count technique was employed to determine percent substrate composition as Wentworth (1922) Size Classes.
[b] U.S. Environmental Protection Agency (1999).
[c] Measured at the stream discharge monitoring location
NM = Not Measured (i.e., habitat very limited or not present).

APPENDIX B MACROINVERTEBRATE COMMUNITY METRICS

BIOLOGICAL METRIC	TEMPLETON FORK TRIBUTARY STATIONS												Mean (Observed Value)	Standard Deviation
	TemF27L-32744-Enlow-F18 Panel-BSW24 April 2, 2007		TemF26L-32743-Enlow-F18 Panel-BSW25 April 2, 2007		TemF25L-32742-Enlow-F18 Panel-BSW26 May 14, 2007		TemF27L-32744-Enlow-F19 Panel-BSW32 May 21, 2007		TemF26L-32743-Enlow-F19 Panel-BSW33 April 2, 2007		TemF27L-32744-Enlow-F20 Panel-BSW37 April 6, 2007			
	Observed Value	Normalized Score	Observed Value	Normalized Score	Observed Value	Normalized Score	Observed Value	Normalized Score	Observed Value	Normalized Score	Observed Value	Normalized Score		
Taxa Richness	37	100.0	29	95.0	18	59.0	24	78.6	28	91.8	20	65.6	26	6.9
Trichoptera Richness	9	85.7	4	38.0	2	19.0	6	57.1	6	57.1	4	38.1	5	2.4
% EPT Richness	51.3	83.2	41.3	67.0	38.8	62.9	54.1	87.8	46.4	72.7	45.0	73.1	46	5.8
Intolerant Taxa Richness	19	100.0	15	93.7	7	43.7	16	100.0	16	100.0	11	68.8	14	4.3
FC + PR Taxa Richness	9	66.6	9	66.6	6	44.4	8	59.2	13	96.3	8	59.3	9	2.3
Total Biological Score (Mean of Adjusted Values)		87.1		72.0		45.8		76.5		83.5		61.0		

TABLE 1

STREAM WATER QUALITY, HABITAT CHARACTERISTICS, AND BENTHIC MACROINVERTEBRATE APPENDIX B SCORES
BUFFALO CREEK MAIN STEM (PADEP STREAM CODE: 32777)
ENLOW FORK MINE NORTH EXPANSION, PANELS E18-E23 AND F18-F23
CONSOL PENNSYLVANIA COAL COMPANY
WASHINGTON COUNTY, PENNSYLVANIA
C[illegible]070-338

BSW 38 BSW 42

STREAM WATER QUALITY AND HABITAT CHARACTERISTICS

PARAMETER	BUFFALO CREEK STATIONS							
	BufC-32777-Enlow Fork Mine-F20 Panel-BSW38		BufC-32777-Enlow Fork Mine-F21 Panel-BSW42		BufC-32777-Enlow Fork Mine-F22 Panel-BSW46		BufC-32777-Enlow Fork Mine-F23 Panel-BSW51	
	April 3, 2007		April 10, 2007		April 23, 2007		May 1, 2007	
	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool
Water Temperature (°C)	12.7	n/a	8.7	n/a	18.5	n/a	15.2	n/a
Dissolved Oxygen (mg/L)	9.9	n/a	12.1	n/a	11.1	n/a	11.8	n/a
pH (Standard Units)	7.8	n/a	8.1	n/a	8.8	n/a	8.3	n/a
Conductivity (µS/cm)	232.0	n/a	295.0	n/a	220.0	n/a	300.0	n/a
Habitat Reach Length (feet)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Stream Width (feet)	2.6[c]		2.3[c]		3.25[c]		4.5[c]	
Stream Depth (inches)	2.5-4[c]		2.5-5[c]		2.0-20		1-7.5[c]	
Stream Flow Rate (cubic feet per second)	0.4		0.5		0.9		1.8	
Substrate Composition (%): [a]								
bedrock (> 2,084 millimeters)	7.0%		5.0%		0.0%		2.0%	
boulder (256 - 2,084 millimeters)	12.0%		2.0%		0.0%		14.0%	
cobble (64 - 256 millimeters)	7.0%		21.0%		2.0%		8.0%	
gravel (2 - 64 millimeters)	53.0%		47.0%		43.0%		47.0%	
sand (0.062 - 2 millimeters)	18.0%		23.0%		28.0%		25.0%	
silt (0.004- 0.062 millimeters) / clay (< 0.004 millimeters)	3.0%		2.0%		27.0%		4.0%	
USEPA (1999) Habitat Assessment Score (out of possible 200) [b]	161.0	160.0	114.0	108.0	124.0	132.0	129.0	125.0
Percent of Maximum Possible USEPA (1999) Habitat Assessment Score (Narrative Criteria) [b]	80% Optimal	80% Optimal	57% Suboptimal	54% Suboptimal	62% Suboptimal	66% Suboptimal	65% Suboptimal	63% Suboptimal

[a] A Modified Wolman (1954) Pebble Count technique was employed to determine percent substrate composition as Wentworth (1922) Size Classes.
[b] U.S. Environmental Protection Agency (1999).
[c] Measured at the stream discharge monitoring location

APPENDIX B MACROINVERTEBRATE COMMUNITY METRICS

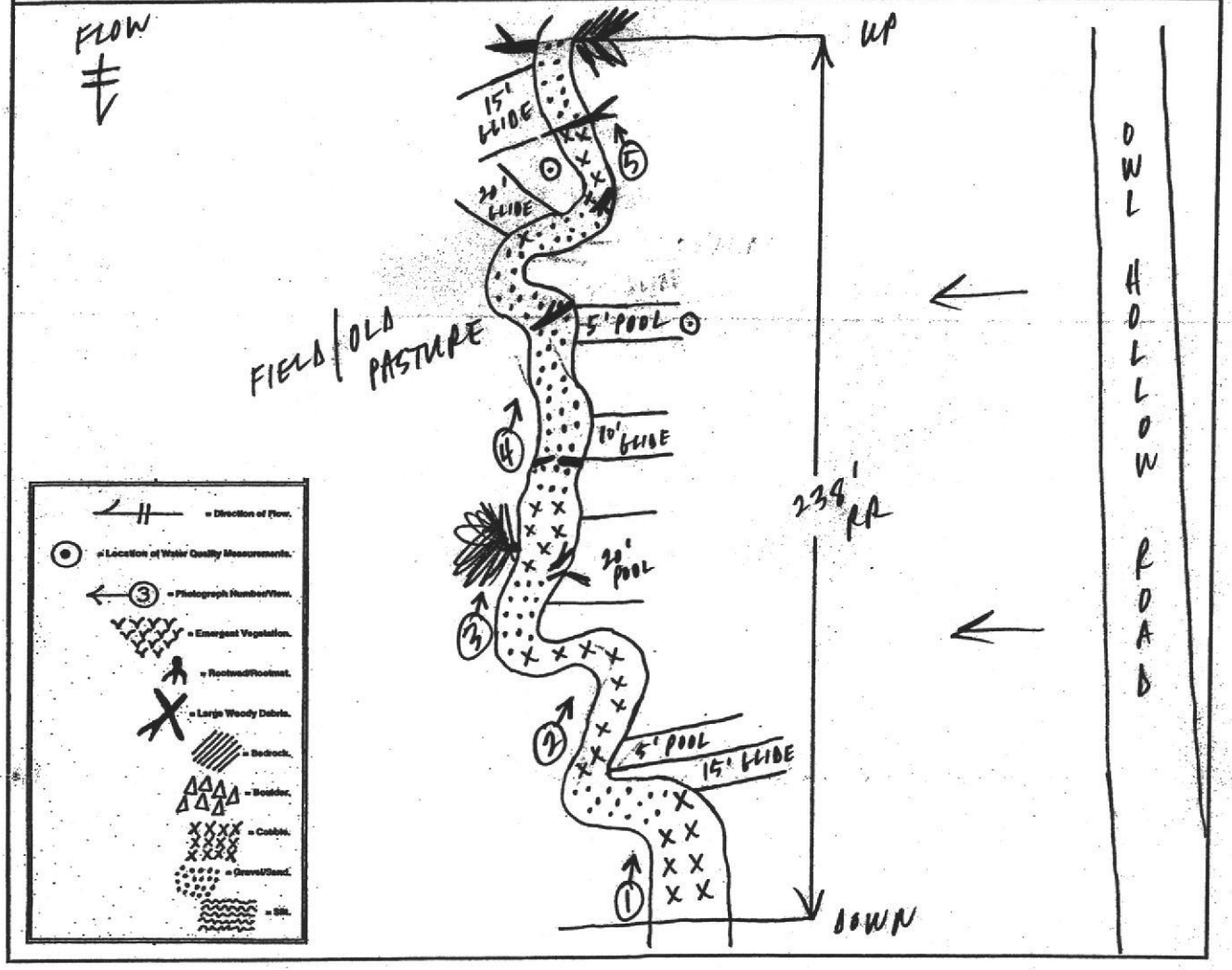
BIOLOGICAL METRIC	BUFFALO CREEK STATIONS								Mean (Observed Value)	Standard Deviation
	BufC-32777-Enlow Fork mine-F20 Panel-BSW38		BufC-32777-Enlow Fork Mine-F21 Panel-BSW42		BufC-32777-Enlow Fork Mine-F22 Panel-BSW46		BufC-32777-Enlow Fork Mine-F23 Panel-BSW51			
	April 3, 2007		April 10, 2007		April 23, 2007		May 1, 2007			
	Observed Value	Normalized Score	Observed Value	Normalized Score	Observed Value	Normalized Score	Observed Value	Normalized Score		
Taxa Richness	25	82.0	26	85.2	18	59.0	18	59.0	22	4.3
Trichoptera Richness	4	38.1	6	57.1	2	19.0	2	19.0	4	1.9
% EPT Richness	42.3	68.7	53.8	87.3	31.6	51.3	33.3	54.1	40	10.2
Intolerant Taxa Richness	17	100.0	16	100.0	7	43.8	7	43.8	12	5.5
FC + PR Taxa Richness	9	66.7	10	74.1	5	37.0	7	51.9	8	2.2
Total Biological Score (Mean of Adjusted Values)		71.1		80.7		42.0		45.6		

BSW 15

PHYSICAL HABITAT/WATER QUALITY FIELD DATA SHEET (Page 1)

Station: UNT C. C-40942-EULIN-EIBI-BSW15		Project No.: 220502.0452	
Stream Name: 40942 TO CARTS CREEK		Date/Time: 3.13.07	9:15 AM
River Basin: MONONGAHELA		Investigators: NLS, JWC, MDE, DJT	

SKETCH MAP



	Air Temperature: 60 C			
	Weather	Now	Past 24 hrs	Past 7 days
WEATHER CONDITIONS	Heavy Rain			
	Steady Rain			
	Intermit. Rain			
	% Cloud Cover	30%		
	Clear/Sunny	✓		
	Other:			

HABITAT LENGTHS IN SAMPLING REACH

Habitat	Length (steps)	Length (ft)
Riffle	→	238
Run		
Pool	→	90
Glide		
Total		328

STREAM CHARACTER-IZATION	Subsystem:	Perennial ✓	Intermittent	Tidal			
	Type:	Coldwater	Warmwater ✓				
	Origin:	Spring-fed	Wetland	Montane	Glacial	Mixture ✓	Other

GPS UNIT USED: 6	CAMERA USED: D	PHOTO NO.S: 1 – 5

BSW 15

HIGH GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 1)

Station: UNT CrC-40942-ENLOW-EISP-BSW15	Project No.: 270502.0452
Stream Name: 40942 TO CRAFTS CREEK	Date/Time: 3.13.07
River Basin: MONONGAHELA	Investigators: NLS, JWC, MBE, DVP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 18	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 15	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 15	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 18	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

BSW 15

HIGH GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 2)

Station: UNTC, C – 40942 – ENLOW – E1&P – BSW15	Project No.: 220502.1452
Stream Name: 40942 TO CRAFTS CREEK	Date/Time: 3.13.07
River Basin: MONONGAHELA	Investigators: NLS, JWC, MDE, DJP

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 19	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 18	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 6 (LB)	Left Bank 10 9	8 7 (6)	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 (6)	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 1 (LB)	Left Bank 10 9	8 (7) 6	5 4 3	2 1 0
SCORE 3 (RB)	Right Bank 10 9	8 7 6	5 4 (3)	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE 3 (LB)	Left Bank 10 9	8 7 6	5 4 (3)	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	(5) 4 3	2 1 0

Total Score 140

Narrative categories and scoring ranges: Optimal = 156-200; Sub-optimal = 106-155; Marginal = 56-105; Poor = 0-55

Macroinvertebrates

Benthic Macroinvertebrate Data
Enlow Fork North Expansion
3/01/2007-5/31/2007

Station (Data Base Name)	Rep	Date	Enumerated By	Sample Type	Phylum	Class	Order	Family	Genus	Quantity	PA Tolerance	EPA Tolerance	FFG
UNTCrC-40941-EFM-E20-BSW24_Apdx. B	1	3/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Unidentified	18	4	4	SH
UNTCrC-40941-EFM-E20-BSW24_Apdx. B	1	3/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopsyche	4	4	4	SH
UNTCrC-40941-EFM-E20-BSW24_Apdx. B	1	3/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Trichoptera	Phryganeidae	Ptilostomis	1	5	5	SH
UNTCrC-40941-EFM-E20-BSW24_Apdx. B	1	3/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	5	1	2	PR
UNTCrC-40941-EFM-E20-BSW24_Apdx. B	1	3/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Trichoptera	Uenoidae	Neophylax	3	3	5	SC
UNTCrC-40941-EFM-E20-BSW24_Apdx. B	1	3/19/2007	N. Newcomer	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	5	8	8	FC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	2	10	10	GC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Crustacea	Amphipoda	Crangonyctidae	Crangonyx	1	4	4	GC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Crustacea	Decapoda	Cambaridae	Cambarus	1	6	5	GC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Optioservus	11	4	4	SC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Coleoptera	Psephenidae	Ectopria	3	5	5	SC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	6	6	5.7	PR
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	29	6	5	GC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Empididae	Clinocera	1	6	5	PR
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Simuliidae	Prosimulium	30	2	5	FC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	2	7	4.7	GC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Unidentified	2	4	5	SH
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Molophilus	1	4	5	SH
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	1	2	2	GC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	5	4	4	SH
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ameletidae	Ameletus	1	0	0	GC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Baetidae	Diphetor	1	6	5	GC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella	7	1	2.9	GC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella	2	4	4	SC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenonema	1	3	4	SC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	Unidentified	2	4	5	GC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Capniidae	Allocapnia	2	3	3	SH
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Chloroperlidae	Sweltsa	1	0	0	PR
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	29	3	5	SH
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Prostoia	7	2	5	SH
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Soyedina	1	0	5	SH
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Clioperla	1	2	2	PR
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Cultus	5	2	2	PR
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	2	2	2	PR
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche	2	6	5	FC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Diplectrona	2	0	5	FC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopschye	2	4	4	SH
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	10	1	2	PR
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Trichoptera	Uenoidae	Neophylax	12	3	5	SC
UNTCrC-40942-Enlow-E18P-BSW15_APDX B	1	3/13/2007	M. Logan	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	6	8	8	FC
UNTCrC-40942-Enlow-E19P-BSW19_APDX B	1	3/13/2007	M. Logan	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	1	10	10	GC
UNTCrC-40942-Enlow-E19P-BSW19_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Crustacea	Amphipoda	Crangonyctidae	Crangonyx	2	4	4	GC
UNTCrC-40942-Enlow-E19P-BSW19_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Optioservus	5	4	4	SC
UNTCrC-40942-Enlow-E19P-BSW19_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Stenelmis	1	5	5	SC
UNTCrC-40942-Enlow-E19P-BSW19_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	2	6	5.7	PR
UNTCrC-40942-Enlow-E19P-BSW19_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	38	6	5	GC
UNTCrC-40942-Enlow-E19P-BSW19_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Simuliidae	Prosimulium	1	2	5	FC
UNTCrC-40942-Enlow-E19P-BSW19_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	5	7	4.7	GC
UNTCrC-40942-Enlow-E19P-BSW19_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	2	2	2	GC
UNTCrC-40942-Enlow-E19P-BSW19_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	3	4	4	SH
UNTCrC-40942-Enlow-E19P-BSW19_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ameletidae	Ameletus	10	0	0	GC
UNTCrC-40942-Enlow-E19P-BSW19_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Baetidae	Diphetor	10	6	5	GC
UNTCrC-40942-Enlow-E19P-BSW19_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella	17	1	2.9	GC
UNTCrC-40942-Enlow-E19P-BSW19_APDX B	1	3/13/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella	5	4	4	SC

BSW 15

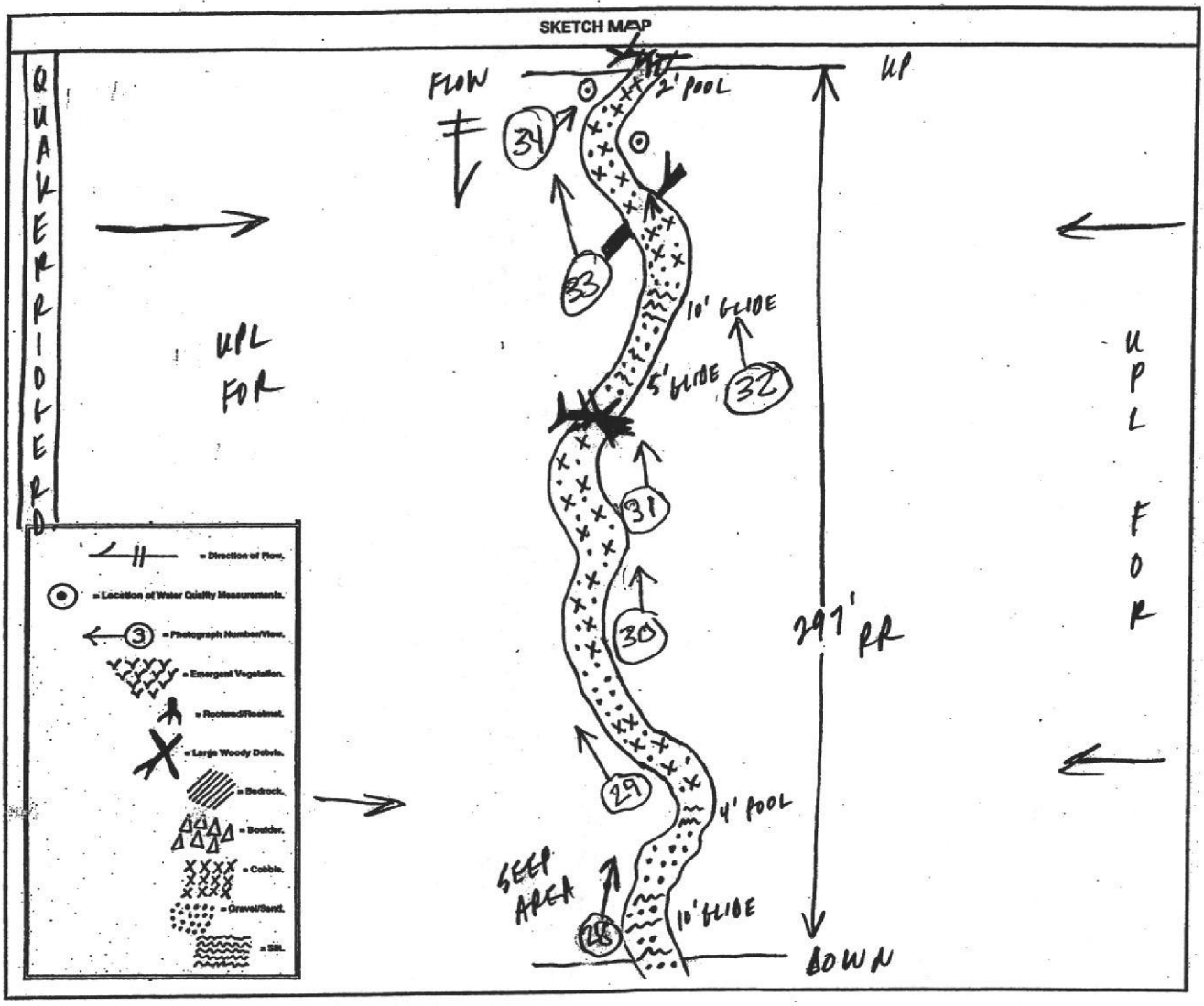
BSW 15

BSW 18

PHYSICAL HABITAT/WATER QUALITY FIELD DATA SHEET (Page 1)

Station: UNTC.C – 40944 – ENLOW – E19P – BSW18		Project No.: 220502.0452	
Stream Name: 40944 TO CRAFTS CREEK		Date/Time: 3.22.07	10:30 AM
River Basin: MONONGAHELA		Investigators: SMF, MDE, DJP	

SKETCH MAP



WEATHER CONDITIONS

Air Temperature: 60 C

Weather	Now	Past 24 hrs	Past 7 days
Heavy Rain			
Steady Rain			
Intermit. Rain			
% Cloud Cover	30%		
Clear/Sunny			

Other:

HABITAT LENGTHS IN SAMPLING REACH

Habitat	Length (steps)	Length (ft)
Riffle	→	291
Run		
Pool	→	31
Glide		
Total		328

STREAM CHARACTERIZATION

Subsystem:	Perennial ✓	Intermittent ____	Tidal ____				
Type:	Coldwater ____	Warmwater ✓					
Origin:	Spring-fed ____	Wetland ____	Montane ____	Glacial ____	Mixture ✓	Other ____	

GPS UNIT USED: 6	CAMERA USED: D	PHOTO NO.S: 28-34

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California District Office

BSW 18

HIGH GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 1)

Station:	UNTCrC-40944-ENLOW-E19P-BSW18	Project No.:	220502.0452
Stream Name:	40944 TO CRAFTS CREEK	Date/Time:	3.22.07 11:50 AM
River Basin:	MONONGAHELA	Investigators:	SMF, MDE, AMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 16	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 13	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 12	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 11	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 16	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

BSW 18

HIGH GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 2)

Station: UNTCoC-40944-ENLOW-E19P-BSW18		Project No.: 220502.0452	
Stream Name: 40944 TO CRAFTS CREEK		Date/Time: 3.22.07	11:50 AM
River Basin: MONONGAHELA		Investigators: SMF, MOE, MP	

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 19	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 17	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 6 (LB)	Left Bank 10 9	8 7 (6)	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 (6)	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0

Total Score 156

Narrative categories and scoring ranges: Optimal = 156-200; Sub-optimal = 106-155; Marginal = 56-105; Poor = 0-55

Macroinvertebrates

Benthic Macroinvertebrate Data
Enlow Fork North Expansion
3/01/2007-5/31/2007

Station (Data Base Name)	Rep	Date	Enumerated By	Sample Type	Phylum	Class	Order	Family	Genus	Quantity	PA Tolerance	EPA Tolerance	FFG
40944(1)-Enlow-E18P-BSW14_APDX B	1	3/30/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	14	2	2	GC
40944(1)-Enlow-E18P-BSW14_APDX B	1	3/30/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ameletidae	Ameletus	4	0	0	GC
40944(1)-Enlow-E18P-BSW14_APDX B	1	3/30/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella	1	1	2.9	GC
40944(1)-Enlow-E18P-BSW14_APDX B	1	3/30/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	Unidentified	2	4	5	GC
40944(1)-Enlow-E18P-BSW14_APDX B	1	3/30/2007	M. Logan	Qualitative	Arthropoda	Insecta	Megaloptera	Corydalidae	Nigronia	1	2	3.6	PR
40944(1)-Enlow-E18P-BSW14_APDX B	1	3/30/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Leuctridae	Leuctra	3	0	0	SH
40944(1)-Enlow-E18P-BSW14_APDX B	1	3/30/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	6	3	5	SH
40944(1)-Enlow-E18P-BSW14_APDX B	1	3/30/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	2	2	2	PR
40944(1)-Enlow-E18P-BSW14_APDX B	1	3/30/2007	M. Logan	Qualitative	Arthropoda	Insecta	Trichoptera	Leptoceridae	Unidentified	1	4	5	
40944(1)-Enlow-E18P-BSW14_APDX B	1	3/30/2007	M. Logan	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Anabolia	7	5	5	SH
40944(1)-Enlow-E18P-BSW14_APDX B	1	3/30/2007	M. Logan	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopschye	4	4	4	SH
40944(1)-Enlow-E18P-BSW14_APDX B	1	3/30/2007	M. Logan	Qualitative	Arthropoda	Insecta	Trichoptera	Molannidae	Molanna	2	6	6	SC
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	5	8	8	FC
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Crustacea	Amphipoda	Crangonyctidae	Crangonyx	2	10	10	GC
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Crustacea	Decapoda	Cambaridae	Cambarus	10	4	4	GC
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Dubiraphia	2	6	5	GC
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Optioservus	5	6	6	GC
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Unidentified	3	4	4	SC
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	10	6	5.7	PR
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	19	6	5	GC
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Insecta	Diptera	Simuliidae	Prosimulium	89	2	5	FC
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	4	7	4.7	GC
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	5	2	2	GC
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ameletidae	Ameletus	2	0	0	GC
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Insecta	Odonata	Cordulegastridae	Cordulegaster	1	3	3	PR
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	21	3	5	SH
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Unidentified	4	4	4	SH
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Anabolia	2	5	5	SH
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopschye	1	4	4	SH
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Insecta	Trichoptera	Phryganeidae	Ptilostomis	1	5	5	SH
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	1	1	2	PR
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	10	8	8	FC
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Mollusca	Gastropoda	Basommatophora	Lymnaeidae	Unidentified	1	7	6	SC
UNTCrC-40944-Enlow-E18P-BSW13_APDX B	1	3/30/2007	M. Nagy	Qualitative	Mollusca	Gastropoda	Basommatophora	Planorbidae	Unidentified	1	6	5	SC
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	10	10	10	GC
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Crustacea	Amphipoda	Crangonyctidae	Crangonyx	4	4	4	GC
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Crustacea	Decapoda	Cambaridae	Cambarus	1	6	5	GC
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Coleoptera	Dryopidae	Helichus	1	5	5	SH
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Optioservus	3	4	4	SC
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Coleoptera	Psephenidae	Ectopria	1	5	5	SC
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	7	6	5.7	PR
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	38	6	5	GC
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Diptera	Simuliidae	Prosimulium	8	2	5	FC
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	7	7	4.7	GC
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Dicranota	1	3	5	PR
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	13	2	2	GC
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	4	4	4	SH
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ameletidae	Ameletus	1	0	0	GC
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella	12	1	2.9	GC
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenacron	1	4	4	SC
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	Unidentified	1	4	5	GC
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Plecoptera	Capniidae	Allocapnia	1	3	3	SH
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Plecoptera	Leuctridae	Leuctra	1	0	0	SH
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	24	3	5	SH

BSW 18

BSW 18

Macroinvertebrates

BSW 18

BSW 18

Benthic Macroinvertebrate Data
Enlow Fork North Expansion
3/01/2007-5/31/2007

Station (Data Base Name)	Rep	Date	Enumerated By	Sample Type	Phylum	Class	Order	Family	Genus	Quantity	PA Tolerance	EPA Tolerance	FFG
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Cultus	2	2	2	PR
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	2	2	2	PR
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Diplectrona	11	0	5	FC
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Trichoptera	Lepidostomatidae	Lepidostoma	2	1	1	SH
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Hydatophylax	1	2	5	SH
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopschye	2	4	4	SH
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Trichoptera	Molannidae	Molanna	1	6	6	SC
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	8	1	2	PR
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Arthropoda	Insecta	Trichoptera	Uenoidae	Neophylax	11	3	5	SC
UNTCrC-40944-Enlow-E19P-BSW18_APDX B	1	3/22/2007	M. Engelhardt	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	7	8	8	FC
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Mollusca	Gastropoda	Basommatophora	Lymnaeidae	Unidentified	1	7	6	SC
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Crustacea	Decapoda	Cambaridae	Unidentified	2	6	6	GC
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Dubiraphia	5	6	6	GC
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Ptilodactylidae	Anchytarsus	2	4	5	SH
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	4	6	5.7	PR
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	66	6	5	GC
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Simuliidae	Unidentified	39	6	5	FC
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	4	7	4.7	GC
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Hexatoma	1	2	2	PR
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	3	2	2	GC
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Baetidae	Acerpenna	1	6	4	SH
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	Leptophlebia	4	4	5	GC
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	Paraleptophlebia	3	1	1	GC
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Megaloptera	Sialidae	Sialis	2	6	4	PR
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Leuctridae	Leuctra	1	0	0	SH
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	37	3	5	SH
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche	1	6	5	FC
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Ironoquia	1	3	4	SH
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopsyche	6	4	4	SH
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	4	1	2	PR
RobF-20R-Enlow Fork-F19P-BSW35-Apdx_B	1	4/3/2007	PEC	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	8	8	8	FC
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Mollusca	Gastropoda	Basommatophora	Physidae	Unidentified	2	8	8	SC
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	1	10	10	GC
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	10	6	5.7	PR
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	77	6	5	GC
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	7	7	4.7	GC
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Dicranota	1	3	5	PR
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Hexatoma	1	2	2	PR
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	8	2	2	GC
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ameletidae	Ameletus	4	0	0	GC
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	Leptophlebia	6	4	5	GC
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Leuctridae	Leuctra	1	0	0	SH
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	14	3	5	SH
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Unidentified	5	2	2	PR
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	6	2	2	PR
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Diplectrona	2	0	5	FC
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Unidentified	1	4	4	SH
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Ironoquia	3	3	4	SH
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopsyche	4	4	4	SH
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	2	1	2	PR
RobF-20R-Enlow Fork-F20P-BSW40-Apdx_B	1	4/3/2007	PEC	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	17	8	8	FC
TemF-24R-Enlow Fork Mine-E19P-BSW11-	1	3/29/2007	PEC	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	1	7	6	SC
TemF-24R-Enlow Fork Mine-E19P-BSW11-	1	3/29/2007	PEC	Qualitative	Arthropoda	Crustacea	Amphipoda	Crangonyctidae	Crangonyx	39	4	4	GC

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET
(FRONT)

BSW 24

trib #32744 to Templeton Fork

[redacted] BSW24

This is the F18 panel on new Consol maps.

Upper Coordinates:
39.065955838°N
81.371602739°W

Lower Coordinates:
39.065252883°N
81.371343059°W

STREAM NAME TemF-27L F18 Panel	LOCATION TemF27L-32744-EnlowForkMine-F18 Panel-BSW24
STATION # BSW24 RIVERMILE	STREAM CLASS
LAT LONG	RIVER BASIN Ohio River
STORET #	AGENCY [redacted] Pike Environmental Consulting
INVESTIGATORS D. Pike & T. Booze	
FORM COMPLETED BY T. Booze	DATE 4-2-07 TIME 9:18 AM PM
REASON FOR SURVEY Baseline Stream Biomonitoring	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
☐	%cloud cover	☒ 100 %
☒	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature 60°F

Other

SITE LOCATION/MAP

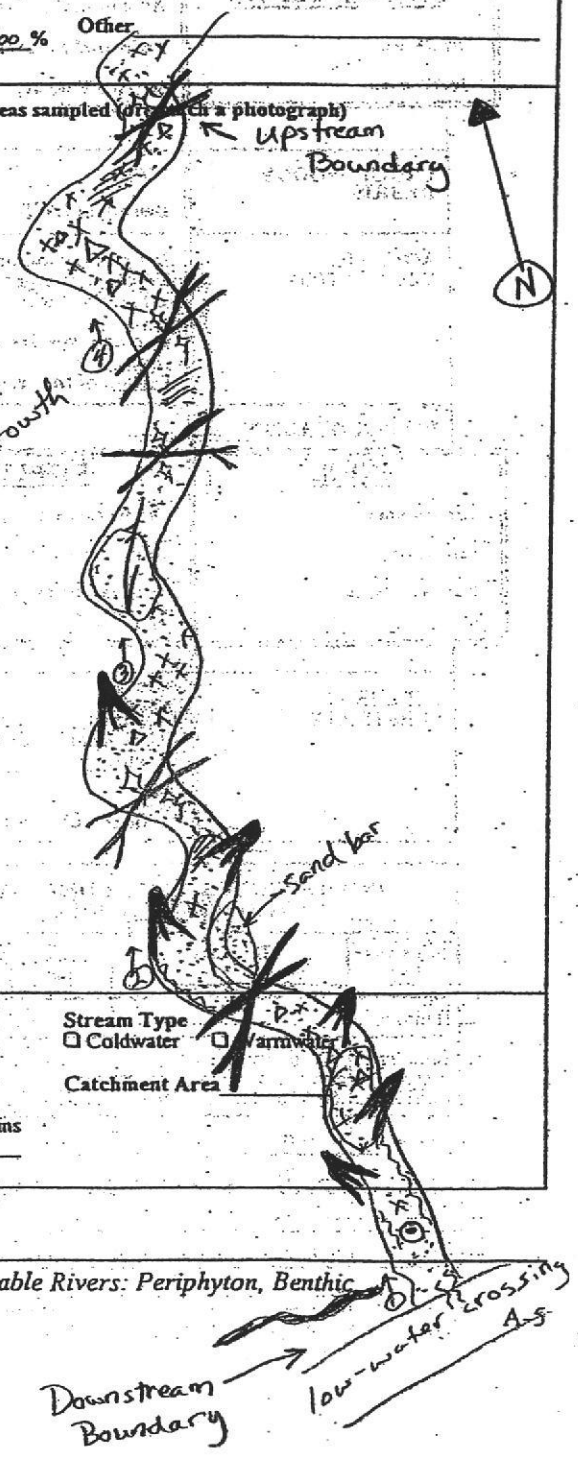
Draw a map of the site and indicate the areas sampled (or attach a photograph)

= Direction of Flow.
= Location of Water Quality Measurements.
= Photograph Number/View.
= Emergent Vegetation.
= Rootwad/Rootmat.
= Large Woody Debris.
= Bedrock.
= Boulder.
= Cobble.
= Gravel/Sand.
= Silt.

4 Photos

CPOM/ SNAGS

There is a lot of woody debris in this stretch of stream, many snags. The flow is pretty high, so it is mostly riffle/run habitat, but there are a few nice pools. There is a thin strip of trees along the stream-most of them are hawthorn w/ a thick understory of multiflora rose. Sampled downstream of fork ~200 ft



STREAM CHARACTERIZATION

Stream Subsystem ☐ Perennial ☐ Intermittent ☐ Tidal

Stream Type ☐ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial ☐ Spring-fed
☐ Non-glacial montane ☐ Mixture of origins
☐ Swamp and bog ☐ Other

Catchment Area

Riffle Length = Pool Length =
Run Length = Glide Length =
REACH LENGTH =

BSW 24

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (FRONT)

STREAM NAME **Templeton Fork tributary 27L F18 Panel**		LOCATION	**TemF27L-32744-EFM-F18 Panel-BSW24**
STATION # **BSW24 (F18)** RIVERMILE		STREAM CLASS	
Upper Bndry LAT **40.065955838°N** LONG **80.371602739°W**		RIVER BASIN	**Ohio River**
Lower Bndry LAT **40.065252883°N** LONG **80.371343059°W**		AGENCY	**Pike Environmental Consulting**
INVESTIGATORS **D. Pike and T. Boone**			
FORM COMPLETED BY **T. Boone**	DATE **4/2/2007** TIME **10:20 a.m.**	REASON FOR SURVEY	**Baseline Stream Biomonitoring**

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/Available Cover	Greater than 50% of substrate favorable for eifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at a stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disurbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate depostion of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; modrate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

BSW 24

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (BACK)

STREAM NAME	Templeton Fork tributary 27L F18 Panel	LOCATION	TemF27L-32744-EFM-F18 Panel-BSW24
AGENCY	Pike Environmental Consulting	DATE	April 2, 2007

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing 60-100% of bank has erosional scars.
SCORE (LB) 5	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB) 5	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophtes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB) 6	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB) 6	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impaced zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters' little or no riparian vegetation due to human activities.
SCORE (LB) 8	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB) 8	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 137

Macroinvertebrates

Benthic Macroinvertebrate Data
Enlow Fork North Expansion
3/01/2007-5/31/2007

Station (Data Base Name)	Rep	Date	Enumerated By	Sample Type	Phylum	Class	Order	Family	Genus	Quantity	PA Tolerance	EPA Tolerance	FFG
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Empididae	Hemerodromia	1	6	6	PR
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Simuliidae	Unidentified	2	6	5	FC
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	3	7	4.7	GC
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Hexatoma	4	2	2	PR
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	16	2	2	GC
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	2	4	4	SH
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ameletidae	Ameletus	1	0	0	GC
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella	5	1	2.9	GC
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella	2	4	4	SC
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	Leptophlebia	3	4	5	GC
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Megaloptera	Sialidae	Sialis	1	6	4	PR
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	20	3	5	SH
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Clioperla	1	2	2	PR
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Diploperla	2	2	2	PR
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche	1	6	5	FC
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Diplectrona	9	0	5	FC
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopsyche	4	4	4	SH
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Philopotamidae	Chimarra	1	4	4	FC
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Phryganeidae	Ptilostomis	1	5	5	SH
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	1	1	2	PR
TemF-26L-Enlow Fork-F19P-BSW33-Apdx_B	1	4/2/2007	PEC	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	5	8	8	FC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	7	10	10	GC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Crustacea	Amphipoda	Crangonyctidae	Crangonyx	2	4	4	GC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Crustacea	Decapoda	Cambaridae	Unidentified	1	6	6	GC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Dubiraphia	1	6	6	GC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	3	6	5.7	PR
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	31	6	5	GC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Dixidae	Dixa	1	1	1	GC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Simuliidae	Unidentified	3	6	5	FC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Stratiomyidae	Oxycera	1	8	5	GC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Stratiomyidae	Stratiomys	1	5	5	FG
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	2	7	4.7	GC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	7	2	2	GC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	2	4	4	SH
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ameletidae	Ameletus	3	0	0	GC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Baetidae	Acerpenna	3	6	4	SH
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella	2	4	4	SC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemeridae	Ephemera	4	2	3.1	GC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenonema	7	3	4	SC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	Leptophlebia	7	4	5	GC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	Paraleptophlebia	1	1	1	GC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Lepidoptera	Unidentified	Unidentified	1	5	5	SH
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Odonata	Gomphidae	Gomphus	1	5	5	PR
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Leuctridae	Leuctra	1	0	0	SH
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	28	3	5	SH
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	5	2	2	PR
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Goeridae	Goera	1	0	0.3	SC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche	2	6	5	FC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Diplectrona	5	0	5	FC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsyche	1	5	4	FC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Ironoquia	1	3	4	SH
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopsyche	2	4	4	SH
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Phryganeidae	Ptilostomis	1	5	5	SH
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	16	1	2	PR

BSW 24

BSW 24

BSW 24

Macroinvertebrates

BSW 24

Benthic Macroinvertebrate Data
Enlow Fork North Expansion
3/01/2007-5/31/2007

Station (Data Base Name)	Rep	Date	Enumerated By	Sample Type	Phylum	Class	Order	Family	Genus	Quantity	PA Tolerance	EPA Tolerance	FFG
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Uenoidae	Neophylax	4	3	5	SC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	37	8	8	FC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Mollusca	Gastropoda	Basommatophora	Planorbidae	Unidentified	1	6	5	SC
TemF-27L-Enlow Fork-F18P-BSW24-Apdx_B	1	4/2/2007	PEC	Qualitative	Mollusca	Gastropoda	Physidae	Unidentified	Unidentified	3	8	8	SC
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Crustacea	Decapoda	Cambaridae	Unidentified	1	6	6	GC
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Dubiraphia	11	6	6	GC
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Optioservus	1	4	4	SC
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Ptilodactylidae	Anchytarsus	1	4	5	SH
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	4	6	5.7	PR
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	26	6	5	GC
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Simuliidae	Unidentified	1	6	5	FC
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	3	7	4.7	GC
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	6	2	2	GC
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	2	4	4	SH
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Baetidae	Acerpenna	38	6	4	SH
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemeridae	Ephemera	3	2	3.1	GC
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenonema	3	3	4	SC
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	Paraleptophlebia	5	1	1	GC
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	50	3	5	SH
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlidae	Perlesta	2	4	4.5	PR
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	1	2	2	PR
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Diplectrona	3	0	5	FC
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Ironoquia	1	3	4	SH
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Limnephilus	9	3	5	SH
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopsyche	1	4	4	SH
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	4	1	2	PR
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Uenoidae	Neophylax	2	3	5	SC
TemF-27L-Enlow Fork-F19P-BSW32-Apdx_B	1	5/21/2007	PEC	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	8	8	8	FC
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	1	10	10	GC
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	6	6	5.7	PR
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	97	6	5	GC
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Ptychopteridae	Ptychoptera	5	8	5	GC
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	4	7	4.7	GC
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Dicranota	3	3	5	PR
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	14	2	2	GC
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	1	4	4	SH
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella	1	1	2.9	GC
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	Leptophlebia	5	4	5	GC
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Megaloptera	Sialidae	Sialis	1	6	4	PR
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	13	3	5	SH
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Diploperla	1	2	2	PR
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	2	2	2	PR
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Diplectrona	3	0	5	FC
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Unidentified	5	4	4	SH
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Ironoquia	6	3	4	SH
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopsyche	12	4	4	SH
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Phryganeidae	Ptilostomis	2	5	5	SH
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	7	8	8	FC
TemF-27L-Enlow Fork-F20P-BSW37-Apdx_B	1	4/6/2007	PEC	Qualitative	Mollusca	Gastropoda	Basommatophora	Physidae	Unidentified	2	8	8	SC
TemF-28L-Enlow Fork-F19P-BSW31-Apdx_B	1	3/30/2007	PEC	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	7	10	10	GC
TemF-28L-Enlow Fork-F19P-BSW31-Apdx_B	1	3/30/2007	PEC	Qualitative	Arthropoda	Crustacea	Decapoda	Cambaridae	Unidentified	1	6	6	GC
TemF-28L-Enlow Fork-F19P-BSW31-Apdx_B	1	3/30/2007	PEC	Qualitative	Arthropoda	Crustacea	Isopoda	Asellidae	Unidentified	2	8	8	GC
TemF-28L-Enlow Fork-F19P-BSW31-Apdx_B	1	3/30/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Stenelmis	2	5	5	SC
TemF-28L-Enlow Fork-F19P-BSW31-Apdx_B	1	3/30/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Ptilodactylidae	Anchytarsus	2	4	5	SH

BSW 38

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET
(FRONT)

[redacted] BSW38

This is the F20 panel on new Consol maps

Upstream boundary:
4. 18661047°N
80.38821082°W

Downstream Boundary:
40.07859806°N
80.38768693°W

STREAM NAME Buffalo Creek F20 Panel	LOCATION BuC-3277-Enlow Fork Mine-F20 Panel-BSW38
STATION # BSW 38 RIVERMILE	STREAM CLASS
LAT LONG	RIVER BASIN Ohio River
STORET #	AGENCY [redacted] Pike Environmental Consulting
INVESTIGATORS D. Pike + T. Boone	
FORM COMPLETED BY T. Boone	DATE 4-3-07 TIME 11:36 AM PM
REASON FOR SURVEY Baseline Stream Biomonitoring	

WEATHER CONDITIONS

Now: ☐ Storm (heavy rain) ☐ Rain (steady rain) ☐ Showers (intermittent) ☒ Cloudy/overcast ___% ☐ Clear/sunny ___%

Past 24 hours: ☐ ☐ ☐ ☐

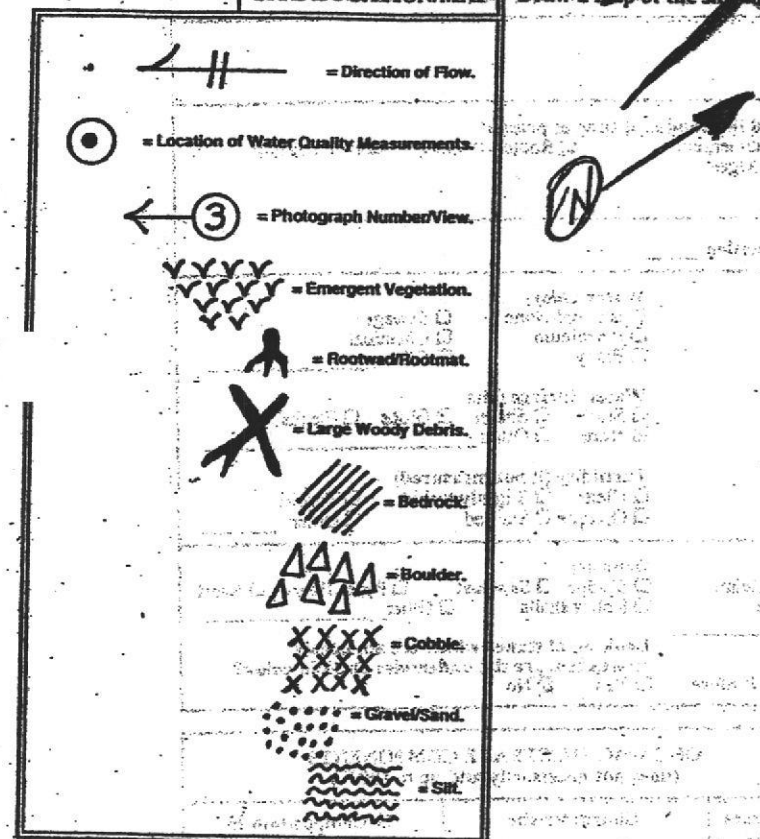
Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No 3-31-07 + 4-1-07

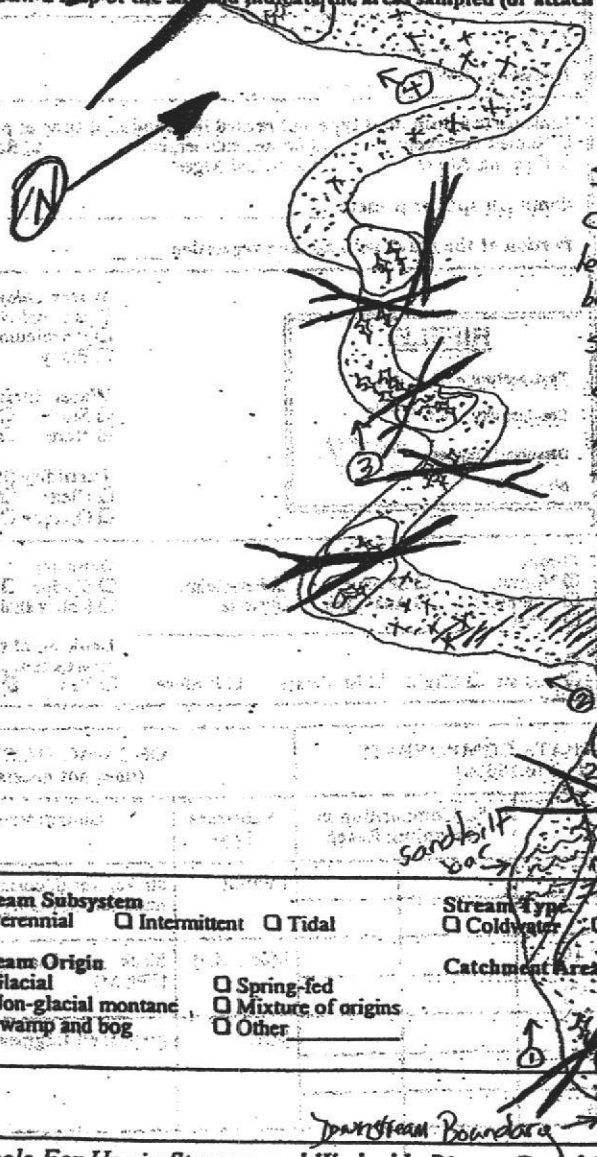
Air Temperature 65°F

Other

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)





Very nice habitat, many snags + a lot of Large woody debris. Stream has a skunk cabbage wetland on at least one side (sometimes both) throughout this whole stretch. Nice pools around some of the LWD in the stream. This area has mature trees along this entire stretch.

STREAM CHARACTERIZATION

Stream Subsystem ☐ Perennial ☐ Intermittent ☐ Tidal

Stream Type ☐ Coldwater ☐ Warmwater

Stream Origin ☐ Glacial ☐ Non-glacial montane ☐ Swamp and bog ☐ Spring-fed ☐ Mixture of origins ☐ Other

Catchment Area

Riffle Length = Pool Length =

Run Length = Glide Length =

REACH LENGTH =

BSW 38

HABITAT ASSESSMENT FIELD DATA SHEET - HIGH GRADIENT STREAMS (FRONT)

STREAM NAME **Buffalo Creek F20 Panel**		LOCATION **BufC-32777-EFM-F20 Panel-BSW38**	
STATION # **BSW38 (F20)** RIVERMILE		STREAM CLASS	
Upper Bndry LAT **40.078661047°N** LONG **80.388210820°W**		RIVER BASIN **Ohio River**	
Lower Bndry LAT **40.078598061°N** LONG **80.387686935°W**		AGENCY **Pike Environmental Consulting**	
INVESTIGATORS **D. Pike and T. Boone**			
FORM COMPLETED BY **T. Boone**	DATE **4/3/2007** TIME **12:35 p.m.**	REASON FOR SURVEY **Baseline Stream Biomonitoring**	

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble, or other stable habitat and at a stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. (Slow is <0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate depostion of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; modrate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

BSW 38

HABITAT ASSESSMENT FIELD DATA SHEET - HIGH GRADIENT STREAMS (BACK)

STREAM NAME	Buffalo Creek F20 Panel	LOCATION	BufC-32777-EFM-F20 Panel-BSW38
AGENCY	Pike Environmental Consulting	DATE	April 3, 2007

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing 60-100% of bank has erosional scars.
SCORE (LB) 7	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB) 7	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophtes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB) 7	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB) 7	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impaced zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters' little or no riparian vegetation due to human activities.
SCORE (LB) 9	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB) 9	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 161

Macroinvertebrates

Benthic Macroinvertebrate Data
Enlow Fork North Expansion
3/01/2007-5/31/2007

Station (Data Base Name)	Rep	Date	Enumerated By	Sample Type	Phylum	Class	Order	Family	Genus	Quantity	PA Tolerance	EPA Tolerance	FFG
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	1	10	10	GC
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	3	6	5.7	PR
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	107	6	5	GC
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Dicranota	2	3	5	PR
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Hexatoma	1	2	2	PR
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Ormosia	2	6	5	SH
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	2	2	2	GC
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	4	4	4	SH
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ameletidae	Ameletus	1	0	0	GC
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella	7	1	2.9	GC
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Epeorus	8	0	1.2	SC
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Leuctridae	Leuctra	1	0	0	SH
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	53	3	5	SH
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Diploperla	3	2	2	PR
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	5	2	2	PR
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Diplectrona	3	0	5	FC
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopsyche	5	4	4	SH
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	1	1	2	PR
BufC-16L-Enlow Fork-F21P-BSW41-Apdx_B	1	4/23/2007	PEC	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	1	8	8	FC
BufC-22L-Enlow Fork-F20P-BSW39-Apdx_B	1	4/10/2007	PEC	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	1	10	10	GC
BufC-22L-Enlow Fork-F20P-BSW39-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	10	6	5.7	PR
BufC-22L-Enlow Fork-F20P-BSW39-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	85	6	5	GC
BufC-22L-Enlow Fork-F20P-BSW39-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	5	7	4.7	GC
BufC-22L-Enlow Fork-F20P-BSW39-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Dicranota	3	3	5	PR
BufC-22L-Enlow Fork-F20P-BSW39-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	3	2	2	GC
BufC-22L-Enlow Fork-F20P-BSW39-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ameletidae	Ameletus	3	0	0	GC
BufC-22L-Enlow Fork-F20P-BSW39-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella	5	1	2.9	GC
BufC-22L-Enlow Fork-F20P-BSW39-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Epeorus	2	0	1.2	SC
BufC-22L-Enlow Fork-F20P-BSW39-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Odonata	Gomphidae	Gomphus	1	5	5	PR
BufC-22L-Enlow Fork-F20P-BSW39-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	23	3	5	SH
BufC-22L-Enlow Fork-F20P-BSW39-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Nemoura	4	1	5	SH
BufC-22L-Enlow Fork-F20P-BSW39-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	12	2	2	PR
BufC-22L-Enlow Fork-F20P-BSW39-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Diplectrona	1	0	5	FC
BufC-22L-Enlow Fork-F20P-BSW39-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopsyche	7	4	4	SH
BufC-22L-Enlow Fork-F20P-BSW39-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	5	1	2	PR
BufC-22L-Enlow Fork-F20P-BSW39-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Uenoidae	Neophylax	1	3	5	SC
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	3	10	10	GC
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Crustacea	Decapoda	Cambaridae	Unidentified	2	6	6	GC
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Optioservus	2	4	4	SC
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	2	6	5.7	PR
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	102	6	5	GC
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Dixidae	Dixa	1	1	1	GC
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	1	7	4.7	GC
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Dicranota	1	3	5	PR
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Ormosia	2	6	5	SH
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	9	2	2	GC
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	2	4	4	SH
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella	4	1	2.9	GC
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenacron	1	4	4	SC
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Megaloptera	Corydalidae	Nigronia	2	2	3.6	PR
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Capniidae	Allocapnia	1	3	3	SH
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Leuctridae	Leuctra	3	0	0	SH
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	19	3	5	SH
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Diploperla	5	2	2	PR

BSW 38

BSW 38

BSW 38

BSW 38

Benthic Macroinvertebrate Data
Enlow Fork North Expansion
3/01/2007-5/31/2007

Station (Data Base Name)	Rep	Date	Enumerated By	Sample Type	Phylum	Class	Order	Family	Genus	Quantity	PA Tolerance	EPA Tolerance	FFG
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	9	2	2	PR
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Diplectrona	1	0	5	FC
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Ironoquia	1	3	4	SH
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopsyche	10	4	4	SH
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	6	1	2	PR
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	3	8	8	FC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	3	10	10	GC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Dubiraphia	2	6	6	GC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	2	6	5.7	PR
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	77	6	5	GC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Simuliidae	Unidentified	5	6	5	FC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	8	7	4.7	GC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Dicranota	1	3	5	PR
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pedicia	1	6	5	PR
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	6	2	2	GC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	1	4	4	SH
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ameletidae	Ameletus	1	0	0	GC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella	1	4	4	SC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemeridae	Ephemera	1	2	3.1	GC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenacron	1	4	4	SC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	Leptophlebia	1	4	5	GC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Megaloptera	Sialidae	Sialis	1	6	4	PR
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Leuctridae	Leuctra	1	0	0	SH
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	19	3	5	SH
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	12	2	2	PR
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Diplectrona	2	0	5	FC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Unidentified	5	4	4	SH
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Ironoquia	1	3	4	SH
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopsyche	5	4	4	SH
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Phryganeidae	Ptilostomis	3	5	5	SH
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	11	1	2	PR
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Uenoidae	Neophylax	2	3	5	SC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	6	8	8	FC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Mollusca	Gastropoda	Basommatophora	Physidae	Unidentified	10	8	8	SC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	1	10	10	GC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Dubiraphia	1	6	6	GC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Optioservus	1	4	4	SC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Stenelmis	4	5	5	SC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	2	6	5.7	PR
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	123	6	5	GC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Simuliidae	Unidentified	1	6	5	FC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Stratiomyidae	Stratiomys	2	5	5	FG
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	6	7	4.7	GC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemeridae	Ephemera	1	2	3.1	GC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Epeorus	1	0	1.2	SC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	13	3	5	SH
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	2	2	2	PR
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Limnephilus	1	3	5	SH
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	4	1	2	PR
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	15	8	8	FC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Mollusca	Gastropoda	Basommatophora	Lymnaeidae	Unidentified	2	7	6	SC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Mollusca	Gastropoda	Basommatophora	Physidae	Unidentified	18	8	8	SC
BufC-Enlow Fork Mine-F23P-BSW51-Apdx_B	1	5/1/2007	PEC	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	7	10	10	GC
BufC-Enlow Fork Mine-F23P-BSW51-Apdx_B	1	5/1/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Dubiraphia	2	6	6	GC

Upper Boundary → 40.079655616°N 80.383904605°W

Lower Boundary → 40.080036836°N 80.383091205°W

BSW 42

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Buffalo Creek F2 Panel BSW42	LOCATION BuC-32777-Elbow Fork Mine-F2l Panel-BSW4
STATION # BSW42 RIVERMILE	STREAM CLASS
RIFFLE LAT LONG	RIVER BASIN Ohio River
REACH LAT LONG	AGENCY Pike Environmental Consulting
STORET #	INVESTIGATORS D. Pike & T. Boone
FORM COMPLETED BY T. Boone	DATE 4-10-2007 TIME 1:10 pm
	REASON FOR SURVEY Baseline Stream Biomonitoring

WEATHER CONDITIONS

	Past 24 hours	Has there been a heavy rain in the last 7 days?
storm (heavy rain)	☐	☐Yes ☒No
rain (steady rain)	☐	
showers (intermittent)	☒	Air Temperature 40 °F
%cloud cover	☐ ___%	Other
clear/sunny	☐	

SITE LOCATION/MAP

Direction of flow=

Location of WQ measurements=

Photo No. and View= 3

Emergent Vegetation=

Rootwad/Rootmat=

Large Woody Debris=

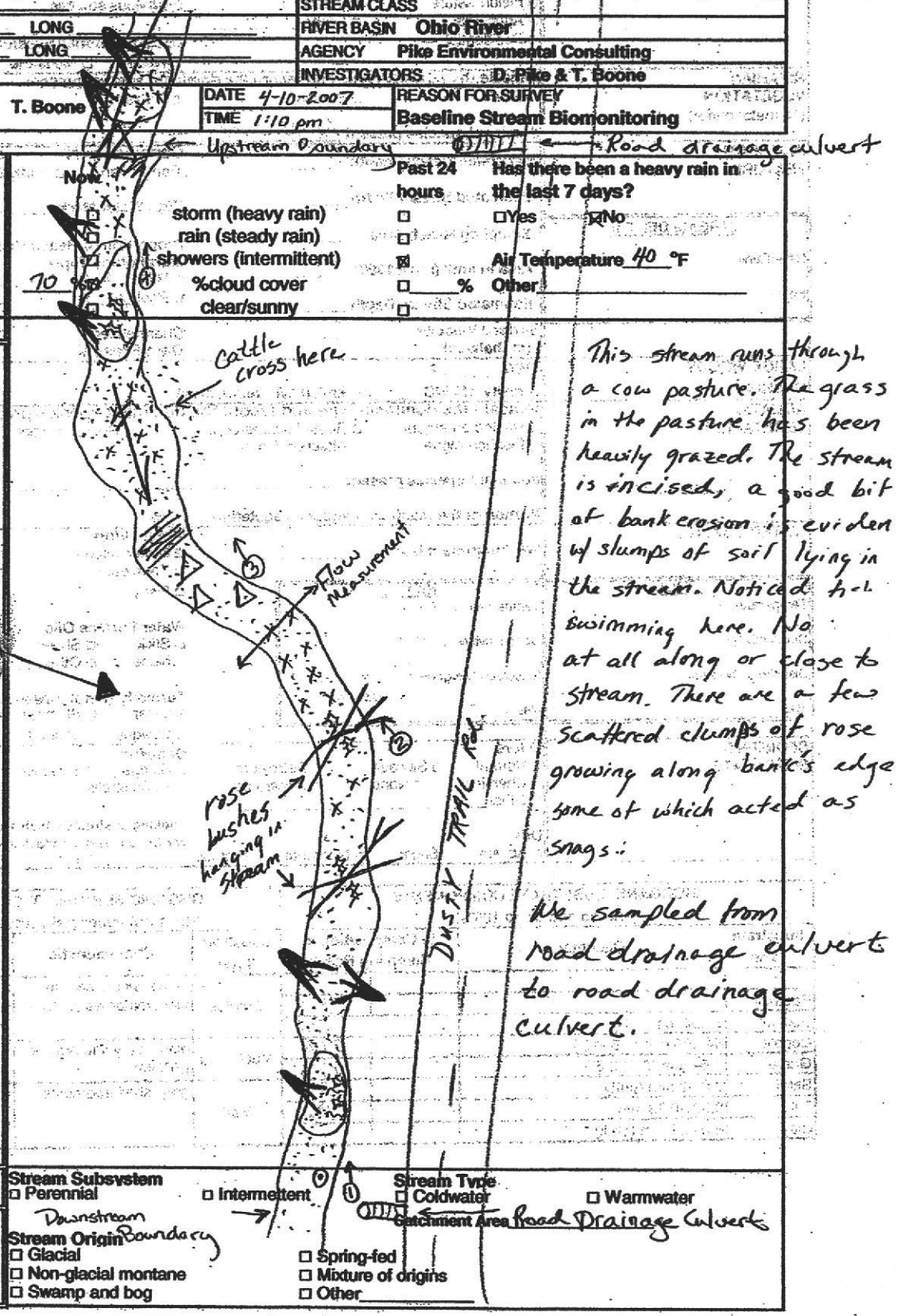
Bedrock=

Boulder=

Cobble=

Gravel/Sand=

Silt=



This stream runs through a cow pasture. The grass in the pasture has been heavily grazed. The stream is incised, a good bit of bank erosion is evident w/ slumps of soil lying in the stream. Noticed fish swimming here. No trees at all along or close to stream. There are a few scattered clumps of rose growing along bank's edge some of which acted as snags.

We sampled from road drainage culvert to road drainage culvert.

STREAM CHARACTERIZATION

Riffle Length= Pool Length=

Run Length= Glide Length=

REACH LENGTH=

Stream Subsystem ☐ Perennial ☐ Intermittent

Stream Origin ☐ Glacial ☐ Non-glacial montane ☐ Swamp and bog ☐ Spring-fed ☐ Mixture of origins ☐ Other

Stream Type ☐ Coldwater ☐ Warmwater

Catchment Area

BSW 42

HABITAT ASSESSMENT FIELD DATA SHEET - HIGH GRADIENT STREAMS (FRONT)

STREAM NAME **Buffalo Creek F21 Panel**		LOCATION	**BufC-32777-EFM-F21 Panel-BSW42**
STATION # **BSW42 (F21)** RIVERMILE		STREAM CLASS	
Upper Bndry LAT **40.079655616°N** LONG **80.383904605°W**		RIVER BASIN	**Ohio River**
Lower Bndry LAT **40.080036836°N** LONG **80.383091205°W**		AGENCY	**Pike Environmental Consulting**
INVESTIGATORS **D. Pike and T. Boone**			
FORM COMPLETED BY **T. Boone**	DATE **4/10/2007** TIME **2:19 p.m.**	REASON FOR SURVEY	**Baseline Stream Biomonitoring**

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble, or other stable habitat and at a stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. (Slow is <0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate depostion of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; modrate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

BSW 42

HABITAT ASSESSMENT FIELD DATA SHEET - HIGH GRADIENT STREAMS (BACK)

STREAM NAME	Buffalo Creek F21 Panel	LOCATION	BufC-32777-EFM-F21 Panel-BSW42
AGENCY	Pike Environmental Consulting	DATE	April 10, 2007

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing 60-100% of bank has erosional scars.
SCORE (LB) 3	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB) 2	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophtes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB) 2	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB) 2	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impaced zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters' little or no riparian vegetation due to human activities.
SCORE (LB) 3	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB) 3	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 114

Macroinvertebrates

Benthic Macroinvertebrate Data
Enlow Fork North Expansion
3/01/2007-5/31/2007

BSW 42

BSW 42

Station (Data Base Name)	Rep	Date	Enumerated By	Sample Type	Phylum	Class	Order	Family	Genus	Quantity	PA Tolerance	EPA Tolerance	FFG
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	9	2	2	PR
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Diplectrona	1	0	5	FC
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Ironoquia	1	3	4	SH
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopsyche	10	4	4	SH
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	6	1	2	PR
BufC-Enlow Fork Mine-F20P-BSW38-Apdx_B	1	4/3/2007	PEC	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	3	8	8	FC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	3	10	10	GC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Dubiraphia	2	6	6	GC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	2	6	5.7	PR
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	77	6	5	GC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Simuliidae	Unidentified	5	6	5	FC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	8	7	4.7	GC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Dicranota	1	3	5	PR
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pedicia	1	6	5	PR
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	6	2	2	GC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	1	4	4	SH
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ameletidae	Ameletus	1	0	0	GC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella	1	4	4	SC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemeridae	Ephemera	1	2	3.1	GC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenacron	1	4	4	SC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	Leptophlebia	1	4	5	GC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Megaloptera	Sialidae	Sialis	1	6	4	PR
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Leuctridae	Leuctra	1	0	0	SH
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	19	3	5	SH
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	12	2	2	PR
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Diplectrona	2	0	5	FC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Unidentified	5	4	4	SH
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Ironoquia	1	3	4	SH
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopsyche	5	4	4	SH
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Phryganeidae	Ptilostomis	3	5	5	SH
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	11	1	2	PR
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Uenoidae	Neophylax	2	3	5	SC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	6	8	8	FC
BufC-Enlow Fork Mine-F21P-BSW42-Apdx_B	1	4/10/2007	PEC	Qualitative	Mollusca	Gastropoda	Basommatophora	Physidae	Unidentified	10	8	8	SC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	1	10	10	GC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Dubiraphia	1	6	6	GC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Optioservus	1	4	4	SC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Stenelmis	4	5	5	SC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	2	6	5.7	PR
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	123	6	5	GC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Simuliidae	Unidentified	1	6	5	FC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Stratiomyidae	Stratiomys	2	5	5	FG
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	6	7	4.7	GC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemeridae	Ephemera	1	2	3.1	GC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Epeorus	1	0	1.2	SC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	13	3	5	SH
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	2	2	2	PR
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Limnephilus	1	3	5	SH
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	4	1	2	PR
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	15	8	8	FC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Mollusca	Gastropoda	Basommatophora	Lymnaeidae	Unidentified	2	7	6	SC
BufC-Enlow Fork Mine-F22P-BSW46-Apdx_B	1	4/23/2007	PEC	Qualitative	Mollusca	Gastropoda	Basommatophora	Physidae	Unidentified	18	8	8	SC
BufC-Enlow Fork Mine-F23P-BSW51-Apdx_B	1	5/1/2007	PEC	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	7	10	10	GC
BufC-Enlow Fork Mine-F23P-BSW51-Apdx_B	1	5/1/2007	PEC	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Dubiraphia	2	6	6	GC

APPENDIX B:

Excerpts from

CEC Bioassessment Report for the Bailey Mine Expansion Area

dated 28 March 2007

Appendix B

Selected excerpts included herewith

BIOLOGICAL MONITORING REPORT
BAILEY EAST MINE EXPANSION AREA
RICHHILL TOWNSHIP
GREENE COUNTY, PENNSYLVANIA

Prepared for:

CONSOL PENNSYLVANIA COAL COMPANY
CLAYSVILLE, PENNSYLVANIA

CEC Project 060-851

March 28, 2007

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1.0 INTRODUCTION

1.1 BACKGROUND

Consol Pennsylvania Coal Company (CPCC) retained Civil & Environmental Consultants, Inc. (CEC) to collect and interpret baseline biological monitoring data for the proposed Bailey Mine East Expansion area located in Richhill Township, Greene County, Pennsylvania. The study area includes the proposed A1 through A6 longwall mining panels, plus a 1000-foot buffer surrounding the perimeter of the six panels (Figure 1 – Site Location Map). The biological data collection included identifying and classifying streams within the study area; sampling representative stream reaches for water quality, habitat characteristics, and benthic macroinvertebrate and fish communities; identifying and delineating wetlands; and sampling representative ponds for water quality, habitat characteristics, and benthic macroinvertebrate and fish communities. The data presented in this report was collected between October 2006 and January 2007 and represents the initial baseline data for the Bailey Mine East Expansion study area.

1.2 PURPOSE

The purpose of this study was to collect ecological data that will be used by CPCC in preparing various permit applications, as well as fulfilling the initial biological monitoring requirements of the Pennsylvania Department of Environmental Protection (PADEP), Technical Guidance Document (TGD) 563-2000-655, *Surface Water Protection – Underground Bituminous Coal Mining Operations* (PADEP 2005). The permit applications will address potential stream and wetland impacts as well as the anticipated restoration activities.

1.3 STUDY AREA CHARACTERISTICS

This study area encompasses approximately 3,904 acres including the expansion area permit boundary (Panels A1-A6) and a 1000-ft. buffer surrounding the permit area as shown on Figure 1 – Site Location Map. The streams within the study area are warmwater streams located within

the Waynesburg Hills Section physiographic province of Pennsylvania (Pennsylvania Department of Conservation and Natural Resources, PA DCNR 2000) of the Western Allegheny Plateau – Permian Hills ecoregion (United Stated Environmental Protection Agency, USEPA 1999) within the Ohio River and Monongahela River catchment areas. The study area includes portions of the North Fork Dunkard Fork (PADEP Stream Code: 32594), Kent Run (PADEP Stream Code: 32600), Polen Run (PADEP Stream Code: 32603), Whitethorn Run (PADEP Stream Code: 32616), Long Run (PADEP Stream Code: 32604), and Jacobs Run (PADEP Stream Code: 40709) watersheds. The following table provides the total acreage for each of these watersheds and the acreage for that portion of each watershed located within the study area.

Stream Name and Stream Code	Size of Watershed (Total Acres)	Size of Watershed within Study Area (Acres)
Jacobs Run (40709)	1,389	250
Whitethorn Run (32616)	1,297	536
Polen Run (32603)	885	623
Kent Run (32600)	1,703	663
Long Run (32604)	2,405	47
North Fork Dunkard Fork (32594)	17,907	3,635

Predominant land-uses within the study area include farmland on floodplains and moderate slopes, and large tracts of forest (second-growth, mixed mesophytic) located on steep slopes. The watersheds within the study area display dendritic patterns of drainage within their catchment areas. The streams range from low-gradient (< 2% slope) to high-gradient (> 4% slope) (Rosgen 1996). The stream order (Strahler 1964) for streams within the study area ranges from unmapped headwater tributaries to second-order streams based on United States Geological Survey (USGS) topographic mapping.

Precipitation data was obtained from a National Weather Service (NWS) station located in Waynesburg, Pennsylvania for the six month period prior to the start of this study (April through September 2006) and for the four month interval (October 2006 through January 2007) during which this work was performed (AWIS 2006). Although, this NWS station is not located

directly within the study area (approximately 10 miles due east), it provides trends for precipitation to aid in the interpretation of the data, particularly for the PADEP TGD Appendix A stream classification task (Section 2.1) which involves investigating the headwaters of these watersheds up to their points of origin.

1.4 PA CHAPTER 93 AQUATIC LIFE PROTECTED USE

According to Pennsylvania's *Water Quality Standards* (Title 25, Pennsylvania Code, Chapter 93; Pennsylvania Code Online 2006), North Fork Dunkard Fork, Kent Run, Polen Run, Whitethorn Run and their unnamed tributaries, including the headwater stream reaches contained within the study area, have a protected aquatic life use designation of Trout Stocking (TSF). The TSF protected use is defined as "maintenance of stocked trout from February 15 to July 31 and maintenance and propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat."

Long Run and its unnamed tributaries have a protected aquatic life use designation of Warm Water Fishes (WWF). The WWF protected use is defined as "maintenance and propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat." An unnamed tributary to Long Run located in the 1000-ft. buffer south of the A-6 panel was evaluated by CEC as part of the PADEP TGD Appendix A sampling task (Section 2.1).

Jacobs Run and its unnamed tributaries have a protected aquatic life use of High Quality-Warm Water Fishes (HQ-WWF). This stream is a headwater tributary in the South Fork Tenmile Creek watershed (Monongahela River basin) which carries the HQ-WWF classification from its source downstream to the confluence with Browns Creek near Waynesburg, Pennsylvania. The HQ-WWF protected use is defined as "high quality waters-maintenance and propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat."

The following table presents a summary of the study area stream reaches, sampling locations, and their corresponding protected aquatic life use designation:

NORTH FORK DUNKARD FORK		
Stream Name	**Biomonitoring Station(s)**	**Ch. 93 Designation**
North Fork Dunkard Fork 32594	NoF-Bailey-A6 Panel-BSW22 NoF-Bailey-A6 Panel-BSW23 NoF-Bailey-A6 Panel-BSW24	TSF
32618	32618-Bailey-A3 Panel-BSW11 32618-Bailey-A5 Panel-BSW20	TSF
32620	32620-Bailey-A3 Panel-BSW12 32620-Bailey-A5 Panel-BSW21	TSF
32619	32619-Bailey-A4 Panel-BSW16	TSF
KENT RUN		
Stream Name	**Biomonitoring Station(s)**	**Ch. 93 Designation**
Kent Run 32600	KeR-Bailey-A1 Panel-BSW02 KeR-Bailey-A2 Panel-BSW05 KeR-Bailey-A3 Panel-BSW08 KeR-Bailey-A4 Panel-BSW13 KeR-Bailey-A5 Panel-BSW17	TSF
32601	32601-Bailey-A1 Panel-BSW01	TSF
POLEN RUN		
Stream Name	**Biomonitoring Station(s)**	**Ch. 93 Designation**
Polen Run 32603	PolR-Bailey-A2 Panel-BSW06 PolR-Bailey-A3 Panel-BSW09 PolR-Bailey-A4 Panel-BSW14 PolR-Bailey-A5 Panel-BSW18	TSF
WHITETHORN RUN		
Stream Name	**Biomonitoring Station**	**Ch. 93 Designation**
Whitethorn Run 32616	WhiR-Bailey-A1 Panel-BSW03 WhiR-Bailey-A2 Panel-BSW07 WhiR-Bailey-A3 Panel-BSW10 WhiR-Bailey-A4 Panel-BSW15 WhiR-Bailey-A5 Panel-BSW19	TSF
JACOBS RUN		
Stream Name	**Biomonitoring Station**	**Ch. 93 Designation**
Jacobs Run 40709	JaR-Bailey-A1 Panel-BSW04	HQ-WWF

2.2 APPENDIX B STREAM BIOLOGICAL MONITORING

The Appendix A stream classification data was examined to determine the extent of biologically diverse streams within the study area. The North Fork Dunkard Fork (second-order stream within study area) and several first-order streams flowing into that stream were determined to be biologically diverse based on a review of the Appendix A data. Twenty-four biomonitoring stations were established on biologically diverse stream reaches within the study area for the TGD Appendix B (PADEP 2005) benthic macroinvertebrate sampling based on being representative of the geographical distribution, stream order, gradient of the streams within the panels and potential for undermining effects (Figure 3). Three to five biomonitoring stations were established within the footprint of each panel for the A1-A6 panels. A biomonitoring station was established on Jacobs Run before the Appendix A classification could be performed for this stream. The Appendix A data indicated that this stream was biologically variable at the location of biomonitoring station BSW04.

CEC performed basic water quality measurements, evaluated physical habitat conditions and performed habitat assessments in conjunction with the Appendix B benthic macroinvertebrate sampling. The methods used to collect this information are presented in the following sections.

2.2.1 Stream Physical and Chemical Parameters

Field water quality parameters, including temperature, dissolved oxygen (DO), pH, and conductivity were measured at all biomonitoring stations concurrent with benthic macroinvertebrate sampling. Temperature, conductivity, and DO were measured in situ using a handheld YSI Model 85 meter. The pH was measured in situ using a handheld Cole Parmer Model 59002 meter. Water velocity was measured across a representative slow riffle/run cross-section with a uniform bottom and laminar flow (if possible) using a calibrated Marsh-McBirney Model 2000 Flow-Mate stream velocity meter. These meters were maintained, operated, and calibrated per the manufacturer's instructions. Stream flow rates were calculated using the U.S. Geological Survey midsection, current meter method (Nolan and Shields 2000, Carter and Davidian 1968, Buchanan and Somers 1968).

Water quality measurements were recorded on a modified U.S. Environmental Protection Agency (USEPA 1999) Physical Habitat/Water Quality Field Data Sheet. Stream velocity, width, and depth measurements were recorded on a modified USEPA (1998) Stream Discharge Field Data Form (Appendix 2).

2.2.2 Stream Habitat Characteristics

Stream habitat characteristics were recorded at all biomonitoring stations. Habitat characteristics observed and recorded during the stream sampling included the following physical habitat descriptors and features: (1) visual appearance of water and sediment quality; (2) dimensions (length and width) of the wetted channel; (3) minimum and maximum water depth; and (4) degree of channel canopy cover (e.g., open, partly open, shaded, or partly shaded). These data were recorded on a modified USEPA (1999) Physical Habitat/Water Quality Field Data Sheet (Appendix 2). Stream habitat was evaluated using the USEPA Habitat Assessment Field Data Sheets (modified from USEPA 1999). The Habitat Assessment Field Data Sheet - Low Gradient Streams was used to score reaches comprised predominantly of pool and glide habitats and the Habitat Assessment Field Data Sheet - High Gradient Streams was used to score reaches comprised predominantly of riffle and run habitats. A modified Wolman Pebble Count was also performed at each station according to methods presented in Harrelson, et al. (1994) to characterize the particle size distribution of the stream substrate.

2.2.3 Stream Benthic Macroinvertebrate Community Data

The following sections describe the methods used to collect and analyze benthic macroinvertebrate community data for the streams surveyed in this study.

2.2.3.1 Benthic Macroinvertebrate Community Sampling

Benthic macroinvertebrate samples were collected in accordance with the conditions of Pennsylvania Fish and Boat Commission (PAFBC) 2007 Pennsylvania Scientific Collector Type

III, Permits No. 043, No. 124, and No. 159. The benthic macroinvertebrate community sampling procedure employed by CEC is described in detail in the following paragraphs.

The field sampling of benthic macroinvertebrates was performed in accordance with PADEP TGD 563-2000-655, *Surface Water Protection – Underground Bituminous Coal Mining Operations* (PADEP 2005). CEC followed the specific procedures outlined in, "Appendix B – PADEP Low Gradient Stream Assessment Protocol" presented on pages 30-41 of the TGD.

First, individual stream reaches that were initially identified for Appendix B sampling (Section 2.2) were established in the field based on stream habitat characteristics. Each sampling station identified for assessment was approximately 100 meters in length. After identifying the available habitat types that were present within the stream reach, 10 sampling locations were selected that effectively represented the observed habitats so that at least 2 jabs were collected in each type of habitat present. Descriptions of each habitat type (e.g., snag, submerged aquatic vegetation) are presented on PADEP Appendix B-Benthic Macroinvertebrate Field Data Sheets located in Appendix 2. When, the total number of jabs (10) was not divisible by the number of habitats present, the remaining jab(s) were distributed proportionately among the most extensive habitat type(s) in the stream reach.

After selecting the 10 prospective jab locations, a D-frame dip net (12 inches wide x 10 inches high x 18 inches deep) with nylon Nitex multifilament net (500 micron mesh size) was used to perform one jab at each location. One jab consisted of sampling a 30-inch long path within the habitat type using the D-frame net. The specific methods and mechanics used to physically collect jabs in the five different habitat types are presented in the TGD Appendix B document. The number of proposed jabs and actual jabs collected in each available habitat type were recorded on a modified PADEP Appendix B-Low Gradient Stream Assessment Protocol Benthic Macroinvertebrate Field Data Sheet (Appendix 2).

Immediately after collecting an individual jab, the net was carefully inverted and the contents emptied into a rinse bucket equipped with a 500 micron screen bottom. The net was examined for clinging organisms, which were also transferred into the rinse bucket. After the ten jabs were

collected, the organisms and material retained in the rinse bucket were composited into one 2-gallon sample bucket and preserved with ethanol (>70% final concentration). The station number, stream name, station location, and date were clearly marked on each sample container. The container was sealed and returned to the CEC laboratory for analysis.

A 200 ±20% subsample of benthic macroinvertebrates was processed in the laboratory from the composite sample collected at each biomonitoring station according to methods presented in the PADEP TGD (2005). Each composite macroinvertebrate sample was initially washed in a U.S. Standard No. 35 sieve then transferred into a shallow pan with a numbered grid consisting of 28 squares (each square measured 2" x 2") with 4 rows consisting of 7 squares per row. Approximately 1½ to 2 inches of water was then added to the pan and the sample material was gently stirred to disperse the contents evenly throughout the pan.

Grid cutters (stainless steel tubular pipe sections), each with an inside area of approximately 4 in^2, were used as the subsampling devices. First, a random numbers table for the 28 grid squares was created for the sample using Microsoft® Excel. Starting with the first random number, the grid cutter was centered over that selected grid number and gently "cut" into the sample material. The material within the grid cutter was carefully removed and placed in a white enamel pan, then dispersed with tap water and examined for identifiable benthic macroinvertebrates which were removed, counted and temporarily placed in a Petri dish containing water. This process was repeated for the next three grids resulting in the first four grid numbers being sorted.

If the subsample count was within the targeted 200±20% (160-240 range) organism count, then subsampling was complete and the organisms were transferred into a 4-ounce glass jar that contained 70% ethanol and was labeled with the required sample information. If the sample count was below the targeted 160 organism count after sorting four grids, then a grid cutter was placed on the fifth grid listed on the random numbers table and the material was removed and sorted for macroinvertebrates. Additional squares were sorted until the 200±20% organism goal was met, at which point the organisms were transferred to labeled sample jars containing 70% ethanol. Once a square was chosen, it was entirely sorted for macroinvertebrates. In those instances where the 240 organism limit was exceeded by sorting the initial four grids for the

sample, secondary subsampling was required to bring the organism total back under the specified maximum limit. In these cases, the organisms collected from the first four grids were placed in a second gridded pan containing a small amount of cold water. The organisms were distributed as evenly as possible within the pan. A new random numbers table was generated for the selection of grid numbers. Grids were sorted in order until the 200 ±20% organism goal was reached.

Identifications were made employing a (20 to 120X) stereomicroscope, a tungsten halogen light with a bifurcated gooseneck extension, and keys by Peckarsky et al. (1990), Merritt and Cummins (1996), Smith (2001), Stewart and Stark (2002), Wiggins (2000), and Thorp and Covich (1991). All sorted macroinvertebrates were stored in 70% ethanol solution and archived for future reference. CEC identified most insect taxa to the genus level and other taxa to the lowest practical level, with the exception of Annelids, which were identified to class level and Curculionidae, Chironomidae, Ceratopogonidae, Talitridae, Decapoda, Gastropoda, and Pelecypoda which were identified to family level. Data reports for the benthic macroinvertebrates are presented in Appendix 5.

Hemipterans and aquatic beetles other than larval Gyrinidae, Hydroscaphidae, Haliplidae, Psephenidae and Ptilodactylidae and larval and adult Elmidae were excluded from the 200 organism subsample used to generate the benthic metrics. Tolerance values and Functional Feeding Group (FFG) designations used to calculate the Intolerant taxa richness and Filterer-Collector + Predator taxa richness metrics were obtained from an expanded taxa list provided to CEC (Michael Davison) by Mr. Charles McGarrell (PADEP Central Office) via e-mail transmission dated November 23, 2005, which listed additional taxa not present in the original list in the PADEP TGD Appendix B section.

2.2.3.2 Benthic Macroinvertebrate Community Metrics

The taxonomic identification of benthic macroinvertebrates present within the 200 ±20% organism subsample produced for each sampling station resulted in the generation of a taxa list with the number of organisms present for each distinct taxon. This data was used to calculate the values for the five biological metrics that are presented in PADEP TGD, Appendix B – Low

Gradient Stream Assessment Protocol. These five benthic metrics, which are all based on taxa richness rather than percent abundance, are presented below:

Biological Metric	Metric Category	Description
Taxonomic Richness	Richness	Total Number of taxa
Trichoptera Taxa Richness	Richness	Total Number of caddisfly taxa
Percent EPT Taxa	Composition	The total number of Ephemeroptera (mayfly), Plecoptera (stonefly), and Trichoptera (caddisfly) taxa divided by the total number of taxa
Intolerant Taxa Richness	Tolerance	The total number of taxa with a pollution tolerance value <5
Filterer-Collector + Predator Taxa Richness	Trophic	The total number of taxa in the filterer-collector and predator functional feeding groups

All five of these metrics generally show a decrease in values in response to degradation in water quality or other environmental perturbation.

The observed values for the five biological metrics were calculated for each sampling station. It was then necessary to normalize each observed value obtained for the five metrics to a scale of 0 to 100 based on the 95th percentile value from the PADEP's statewide low gradient stream dataset using the following equation:

Normalized Metric score = (Observed Value / 95th Percentile Value) x 100

The 95th percentile values from the Pennsylvania statewide, low gradient stream dataset are presented in the following table which provides an example of the metric calculations performed for Station BSW05 on Kent Run within the study area:

Biological Metric	Station BSW05 Kent Run (Observed Values)	95th Percentile Value of PA Statewide Dataset	Normalized Score (Observed Value / 95th percentile value) x 100
Taxonomic Richness	27	30.5	88.5
Trichoptera Taxa Richness	4	10.5	38.1
Percent EPT Taxa	55.6	61.6	90.3
Intolerant Taxa Richness	17	16.0	100.0
Filterer-Collector + Predator Taxa Richness	8	13.5	59.3
Total Biological Score (mean of adjusted values)			**75.2**

The total biological score was calculated as the mean of the five normalized metric scores. In the one instance where the observed value was better than the 95th percentile value for a metric (Intolerant Taxa Richness), the normalized score was converted to a maximum of 100 before the total biological score was calculated for the sampling station. The total biological score was calculated for the 24 benthic macroinvertebrate sampling stations in the A1-A6 panel study area.

2.2.4 Stream Fish Community Data

Fish community sampling procedures and the metrics used to analyze fish community data are described in the following sections.

2.2.4.1 Fish Community Sampling

Fish community sampling was conducted at all twenty-four biomonitoring stations using a combination of sampling protocols described in the following guidance documents:

- American Fisheries Society's *Fisheries Techniques, Second Edition* (AFS 1996) was consulted for electrofishing operational and safety guidelines;

TAB

STREAM WATER QUALITY AND HABITAT CHARACTERISTICS
KENT RUN (PADEP STREAM
BAILEY EAST EXPAN
CONSOL PENNSYLVA
GREENE COUNTY
CEC Proje

BSW 02

STREAM WATER QUALITY AND HABITAT

PARAMETER	TRIB TO KENT RUN 32601-Bailey-A1 Panel-BSW01 January 17, 2007		KeR-Bailey-A1 Panel-BSW02 January 17, 2007		KeR-Bailey BSV January
	Riffle	Pool	Riffle	Pool	Riffle
Water Temperature (°C)	3.7	3.8	5.8	5.7	5.8
Dissolved Oxygen (mg/L)	9.6	9.3	9.3	8.9	9.5
pH (Standard Units)	7.47	7.45	7.78	7.77	7.71
Conductivity (µS/cm)	126	136	185	184	188
Habitat Reach Length (feet)	235	93	273	54	268
Stream Width (feet)	3-15		5-15		7-1
Stream Depth (inches)	1-18		4-24		1-2
Stream Flow Rate (cubic feet per second)	0.77		5.79		3.0
Substrate Composition (%): [a]					
bedrock (> 2,084 millimeters)	1%		5%		
boulder (256 - 2,084 millimeters)	1%		5%		2%
cobble (64 - 256 millimeters)	25%		30%		45%
gravel (2 - 64 millimeters)	52%		43%		44%
sand (0.062 - 2 millimeters)	12%		12%		9%
silt (0.004- 0.062 millimeters)	9%		5%		
clay (< 0.004 millimeters)					
USEPA (1999) Habitat Assessment Score (out of possible 200) [b]	169	150	161	142	174
Percent of Maximum Possible USEPA (1999) Habitat Assessment Score (Narrative Criteria) [b]	85% Optimal	75% Suboptimal	81% Optimal	71% Suboptimal	87% Optimal

[a] A Modified Wolman (1954) Pebble Count technique was employed to determine percent substrate composition as Wentworth (192
[b] U.S. Environmental Protection Agency (1999).
NM = Not Measured (i.e., no pool habitat present).

APPENDIX B MACROINVERTE

BIOLOGICAL METRIC	TRIB TO KENT RUN 32601-Bailey-A1 Panel-BSW01 January 17, 2007		KeR-Bailey-A1 Panel-BSW02 January 17, 2007		KeR-Bailey-BSW January
	Observed Value	Normalized Score	Observed Value	Normalized Score	Observed Value
Taxa Richness	27	88.5	34	100.0	27
Trichoptera Richness	3	28.6	6	57.1	4
% EPT Richness	51.9	84.3	50	81.2	55.6
Intolerant Taxa Richness	21	100.0	19	100.0	17
FC + PR Taxa Richness	8	59.3	11	74.1	8
Total Biological Score (Mean of Adjusted Values)		72.1		82.5	

STREAM WATER QUALITY AND HABITAT CHARAC/ERTEBRATE METRIC S(
JACOBS RUN (PADEP STREAM CODE: 40709) AND TRIB)RK DUNKARD FORK W
BAILEY EA
CONSOL P
GREEN

BSW 20 BSW 16

STREAM WATER QUALITY AN

PARAMETER	TRIBUTARY 32618 TO NORTH FORK				NORTH FORK	
	32618-Bailey-A3 Panel-BSW11		32618-Bailey-A5 Panel-BSW20		21 32619-Bailey-A4 Panel-BSW16	
	January 21, 2007		January 21, 2007		January 24, 2007	
	Riffle	Pool	Riffle	Pool	Riffle	Pool
Water Temperature (°C)	0.1	NM	0.3	0.4	2.7	2.8
Dissolved Oxygen (mg/L)	13.0	NM	11.0	10.4	11.3	10.7
pH (Standard Units)	7.43	NM	7.30	7.32	7.49	7.46
Conductivity (µS/cm)	89	NM	97	91	120	121
Habitat Reach Length (feet)	328	0	283	45	306	22
Stream Width (feet)	2-8		3-7		1-7	
Stream Depth (inches)	1-12		1-10		1-10	
Stream Flow Rate (cubic feet per second)	0.15		0.25		0.10	
Substrate Composition (%): [a]						
bedrock (> 2,084 millimeters)	34%		6%			
boulder (256 - 2,084 millimeters)			2%		5%	
cobble (64 - 256 millimeters)	27%		35%		41%	
gravel (2 - 64 millimeters)	35%		48%		47%	
sand (0.062 - 2 millimeters)	4%		6%		5%	
silt (0.004- 0.062 millimeters)			3%		2%	
clay (< 0.004 millimeters)						
SEPA (1999) Habitat Assessment Score (out of ssible 200) [b]	158	NM	159	149	141	132
rcent of Maximum Possible USEPA (1999) abitat Assessment Score (Narrative Criteria) [b]	79% Optimal		80% Optimal	75% Suboptimal	71% Suboptimal	66% Suboptimal

Modified Wolman (1954) Pebble Count technique was employed to determine percent substrate composition as W
S. Environmental Protection Agency (1999).
= Not Measured (i.e., no pool habitat present).

APPENDIX B MACR

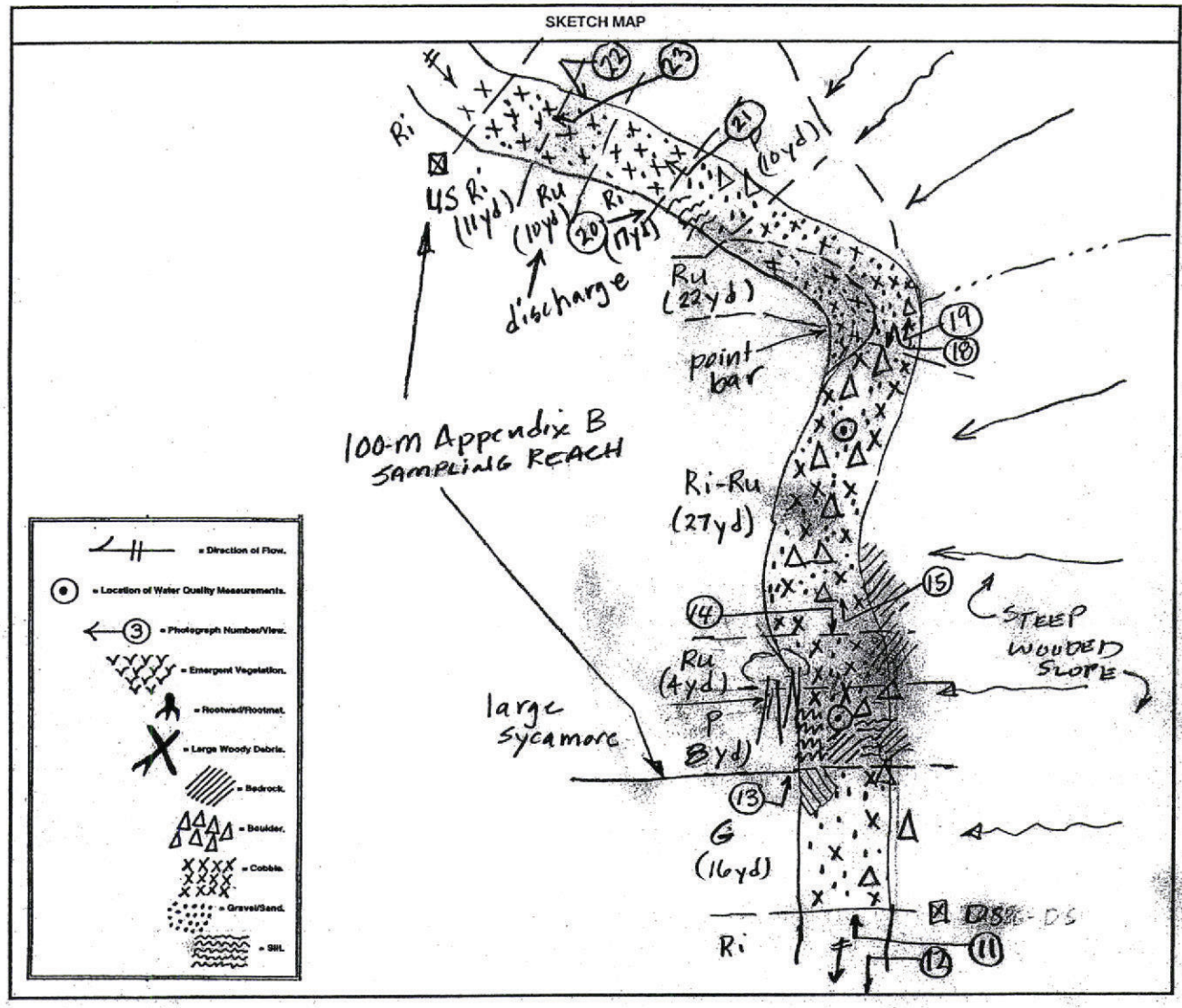
BIOLOGICAL METRIC	TRIBUTARY 32618 TO NORTH FORK				RTH FORK	
	32618-Bailey-A3 Panel-BSW11		32618-Bailey-A5 Panel-BSW20		32 32619-Bailey-A4 Panel-BSW16	
	January 21, 2007		January 21, 2007		January 24, 2007	
	Observed	Normalized	Observed	Normalized	Observed Value	Normalized Score
xa Richness	23	75.4	28	91.8	26	85.2
choptera Richness	4	38.1	4	38.1	7	66.7
EPT Richness	69.6	100.0	64.3	100.0	73.1	100.0
olerant Taxa Richness	18	100.0	20	100.0	18	100.0
+ PR Taxa Richness	9	66.7	11	81.5	9	66.7
l Biological Score (Mean of Adjusted Values)		76.0		82.3		83.7

BSW 02

PHYSICAL HABITAT/WATER QUALITY FIELD DATA SHEET (Page 1)

Station: KeR-Bailey AI-BSW02		Project No.: 060851.0003	
Stream Name: Kent Run	Date/Time: 1/17/07 1415		Pre mining
River Basin: Ohio	Investigators: MRH, JAD, LFO		

SKETCH MAP



WEATHER CONDITIONS	Air Temperature: _____ C			
	Weather	Now	Past 24 hrs	Past 7 days
	Heavy Rain			✓
	Steady Rain			✓
	Intermit. Rain		✓	✓
	% Cloud Cover			
	Clear/Sunny	✓		
	Other:			

HABITAT LENGTHS IN SAMPLING REACH

Habitat	Length (steps)	Length (ft)
Riffle	]	273
Run		
Pool	]	54'
Glide		
Total		327'

STREAM CHARACTER-IZATION								
	Subsystem:	Perennial ✓	Intermittent ____	Tidal ____				
	Type:	Coldwater ____	Warmwater ✓					
	Origin:	Spring-fed ✓	Wetland ____	Montane ____	Glacial ____	Mixture ✓	Other ____	

GPS UNIT USED: GeoXT 8	CAMERA USED: H	PHOTO NO.S: 11-23

BSW 02

LOW GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 1)

Station: KeR-Bailey A1- BSW02	Project No.: 060851.0003
Stream Name: Kent Run (PA DEP 32600)	Date/Time: 1/17/07 1130
River Basin: Ohio	Investigators: MRH

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 16	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization BR, Sand Gravel, Cobble	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 11	20 19 18 17 16	15 14 13 12 **11**	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 10	20 19 18 17 16	15 14 13 12 11	**10** 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 15	20 19 18 17 16	**15** 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 16	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

BSW 02

HIGH GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 2)

Station:	KER-Bailey A1-BSW02	Project No.:	060851.0003
Stream Name:	Kent Run (PADEP 32600)	Date/Time:	1/17/07 1730
River Basin:	Ohio	Investigators:	MRH

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends) 18+30/2 ~ 54; 54/8 ~ 7	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 16	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 (LB)	Left Bank 10 (9)	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 (7) 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8 (LB)	Left Bank 10 9	(8) (7) 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 (7) 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0

Total Score 164

Narrative categories and scoring ranges: Optimal = 156-200; Sub-optimal = 106-155; Marginal = 56-105; Poor = 0-55

AP[illegible]DIX 5
BAILEY EAST EXPANSION PANELS A1-A6
CONSOL PENNSLYVANIA COAL COMPANY
GREENE COUNTY, PENNSYLVANIA
CEC PROJECT 060-851

Macroinvertebrates

Station	Date	Enumerated By	Sample Type	Phylum	Class	Order	Family	Genus	Quantity	PA Tolerance	EPA Tolerance	FFG
JaR-Bailey Mine-A1 Panel-BSW04_Apdx. B	1/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Dubiraphia	1	6	6	GC
JaR-Bailey Mine-A1 Panel-BSW04_Apdx. B	1/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	11	6	5.7	PR
JaR-Bailey Mine-A1 Panel-BSW04_Apdx. B	1/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	76	6	5	GC
JaR-Bailey Mine-A1 Panel-BSW04_Apdx. B	1/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Diptera	Psychodidae	Unidentified	1	10	5	GC
JaR-Bailey Mine-A1 Panel-BSW04_Apdx. B	1/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	1	7	4.7	GC
JaR-Bailey Mine-A1 Panel-BSW04_Apdx. B	1/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Tabanus	6	5	5	PR
JaR-Bailey Mine-A1 Panel-BSW04_Apdx. B	1/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	12	2	2	GC
JaR-Bailey Mine-A1 Panel-BSW04_Apdx. B	1/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	3	4	4	SH
JaR-Bailey Mine-A1 Panel-BSW04_Apdx. B	1/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ameletidae	Ameletus	7	0	0	GC
JaR-Bailey Mine-A1 Panel-BSW04_Apdx. B	1/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Ephemeroptera	Baetidae	Unidentified	1	6	5	GC
JaR-Bailey Mine-A1 Panel-BSW04_Apdx. B	1/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella	1	4	4	SC
JaR-Bailey Mine-A1 Panel-BSW04_Apdx. B	1/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Plecoptera	Capnildae	Unidentified	2	3	1	SH
JaR-Bailey Mine-A1 Panel-BSW04_Apdx. B	1/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	4	2	2	PR
JaR-Bailey Mine-A1 Panel-BSW04_Apdx. B	1/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Trichoptera	Phryganeidae	Ptilostomis	1	5	5	SH
JaR-Bailey Mine-A1 Panel-BSW04_Apdx. B	1/19/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Trichoptera	Uenoidae	Neophylax	4	3	5	SC
JaR-Bailey Mine-A1 Panel-BSW04_Apdx. B	1/19/2007	N. Newcomer	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	9	8	8	FC
JaR-Bailey Mine-A1 Panel-BSW04_Apdx. B	1/19/2007	N. Newcomer	Qualitative	Mollusca	Gastropoda	Basommatophora	Lymnaeidae	Unidentified	3	7	6	SC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	4	10	10	GC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Crustacea	Isopoda	Asellidae	Caecidotea	1	6	6	GC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Dubiraphia	5	6	6	GC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Coleoptera	Elmidae	Optioservus	1	4	4	SC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	3	6	5.7	PR
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Atrichopogon	1	2	4.5	PR
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	68	6	5	GC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Diptera	Psychodidae	Unidentified	1	10	5	GC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Diptera	Simulidae	Prosimulium	2	2	5	FC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Diptera	Stratiomyidae	Unidentified	1	8	5	GC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	1	7	4.7	GC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella	3	1	2.9	GC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella	7	4	4	SC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemeridae	Ephemera	9	2	3.1	GC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenonema	1	3	4	SC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Megaloptera	Corydalidae	Nigronia	1	2	3.6	PR
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Megaloptera	Sialidae	Sialis	1	6	4	PR
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Odonata	Calopterygidae	Calopteryx	1	6	6	PR
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Odonata	Gomphidae	Unidentified	1	4	5	PR
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Plecoptera	Capniidae	Allocapnia	34	3	3	SH
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Plecoptera	Chloroperlidae	Sweltsa	4	0	0	PR
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	8	3	5	SH
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Prostoia	9	2	5	SH
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Soyedina	1	0	5	SH
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Taeniopteryx	1	2	2	SH
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Trichoptera	Glossosomatidae	Glossosoma	1	0	1.5	SC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Diplectrona	3	0	5	FC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Unidentified	1	4	4	SH
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopsche	15	4	4	SH
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	1	1	2	PR
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Arthropoda	Insecta	Trichoptera	Uenoidae	Neophylax	5	3	5	SC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Mollusca	Gastropoda	Basommatophora	Ancylidae	Ferrissia	1	7	7	SC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Mollusca	Gastropoda	Basommatophora	Lymnaeidae	Unidentified	2	7	6	SC
KR-Bailey Mine-A1 Panel-BSW02_Apdx. B	1/17/2007	N. Newcomer	Qualitative	Mollusca	Gastropoda	Basommatophora	Physidae	Physella	1	8	8	SC

BSW 02

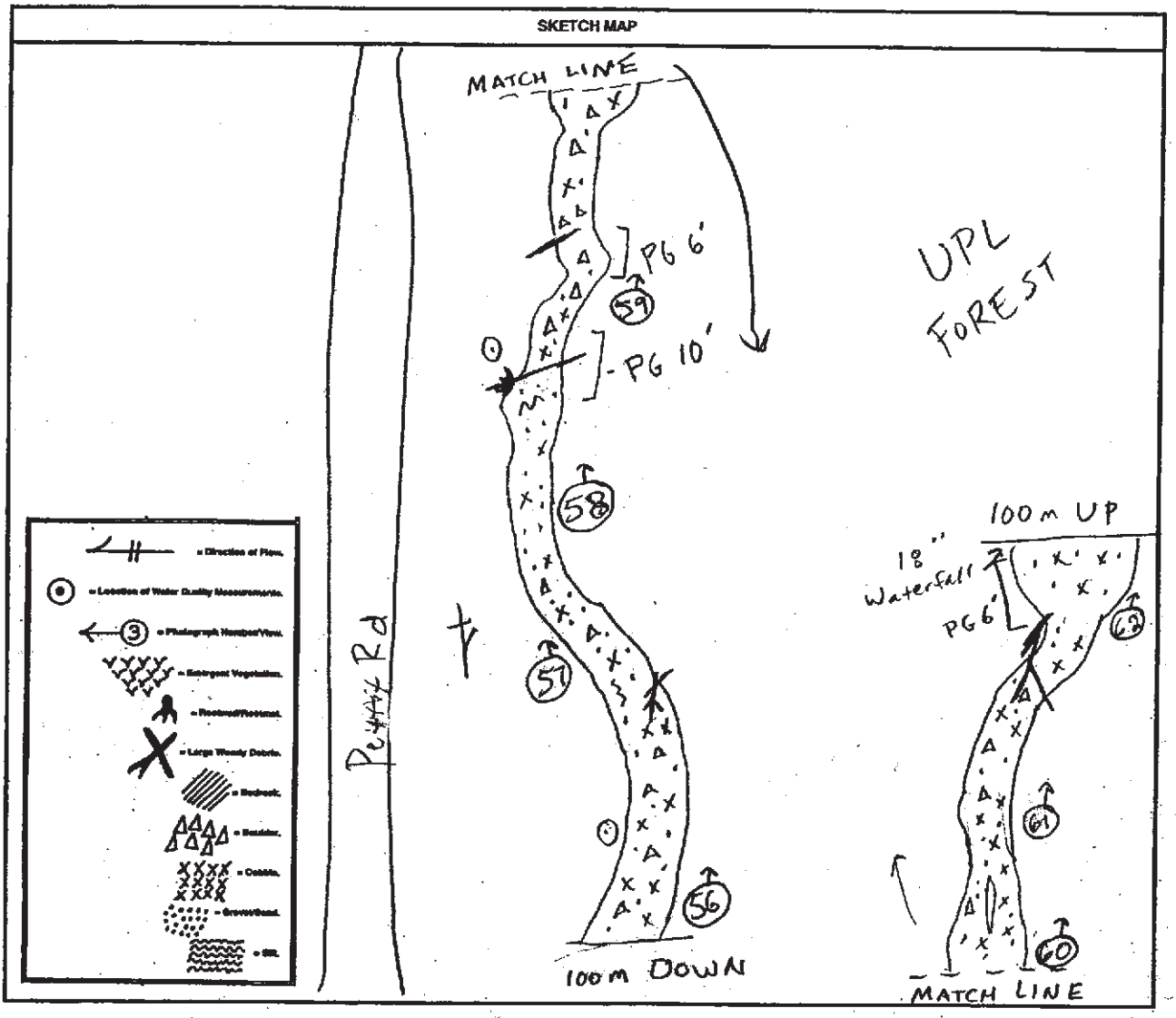
BSW 02

BSW 16

PHYSICAL HABITAT/WATER QUALITY FIELD DATA SHEET (Page 1)

Station: 32619 - Bailey A4 - BSW 16		Project No.: 060851.0003	
Stream Name: UNT to NORTH FORK (32619)		Date/Time: 1/24/07 1315	Pre mining
River Basin: Ohio		Investigators: DJP, JAD, MDE, JWC, LFO	

SKETCH MAP



WEATHER CONDITIONS

Air Temperature: 27 ± F

Weather	Now	Past 24 hrs	Past 7 days
Heavy Rain			
Steady Rain			
Intermit. Rain			
% Cloud Cover	100 %		
Clear/Sunny			
Other: SNOW		✓	✓

HABITAT LENGTHS IN SAMPLING REACH

Habitat	Length (steps)	Length (ft)
Riffle	3	306'
Run		
Pool	2	22'
Glide		
Total		328'

306'
22'
328'

STREAM CHARACTERIZATION

Subsystem:	Perennial ✓	Intermittent	Tidal				
Type:	Coldwater	Warmwater ✓					
Origin:	Spring-fed	Wetland	Montane	Glacial	Mixture ✓	Other	

GPS UNIT USED: Geo XT	CAMERA USED: B	PHOTO NO.S:	56 - 62

BSW 16

LOW GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 1)

Station: 32619 – BAILEY – AY – BSW16	Project No.: 060851.0003
Stream Name: UNT – NORTH FORK (32619)	Date/Time: 1/24/07
River Basin: Ohio	Investigators: [illegible], MOE, LFO, JWC, JAB

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover SCORE 14	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient). 20 19 18 17 16	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). 15 (14) 13 12 11	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. 10 9 8 7 6	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking. 5 4 3 2 1 0
2. Pool Substrate Characterization SCORE 11	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. 20 19 18 17 16	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. 15 14 13 12 (11)	All mud or clay or sand bottom; little or no root mat; no submerged vegetation. 10 9 8 7 6	Hard-pan clay or bedrock; no root mat or vegetation. 5 4 3 2 1 0
3. Pool Variability SCORE 5	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present. 20 19 18 17 16	Majority of pools large-deep; very few shallow. 15 14 13 12 11	Shallow pools much more prevalent than deep pools. 10 9 8 7 6	Majority of pools small-shallow or pools absent. (5) 4 3 2 1 0
4. Sediment Deposition SCORE 9	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition. 20 19 18 17 16	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools. 15 14 13 12 11	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. 10 (9) 8 7 6	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. 5 4 3 2 1 0
5. Channel Flow Status SCORE 15	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. 20 19 18 17 16	Water fills >75% of the available channel; or <25% of channel substrate is exposed. (15) 14 13 12 11	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. 10 9 8 7 6	Very little water in channel and mostly present as standing pools. 5 4 3 2 1 0

BSW 16

HIGH GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 2)

Station:	32619-BAILEY-AY-BSW16	Project No.:	060851.0003
Stream Name:	UNT - NORTH FORK (32619)	Date/Time:	1/24/07
River Basin:	Ohio	Investigators:	KT, MDE, LFO, JWC, JAD

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 19	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 18	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 (LB)	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 (LB)	Left Bank 10 (9) 8 7 6		5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 (6)	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE 9 (LB)	Left Bank 10 (9) 8 7 6		5 4 3	2 1 0
SCORE 3 (RB)	Right Bank 10 9	8 7 6	5 4 (3)	2 1 0

Total Score 141

Narrative categories and scoring ranges: Optimal = 156-200; Sub-optimal = 106-155; Marginal = 56-105; Poor = 0-55

AP IX 5
BAILEY EAST EXPANSION PANELS A1-A6
CONSOL PENNSLYVANIA COAL COMPANY
GREENE COUNTY, PENNSYLVANIA
CEC PROJECT 060-851

Macroinvertebrates

Station	Date	Enumerated By	Sample Type	Phylum	Class	Order	Family	Genus	Quantity	PA Tolerance	EPA Tolerance	FFG
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	5	10	10	GC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	7	6	5.7	PR
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	55	6	5	GC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Stratiomyidae	Caloparyphus	1	8	5	GC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	4	7	4.7	GC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	4	2	2	GC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	2	4	4	SH
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ameletidae	Ameletus	16	0	0	GC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella	6	4	4	SC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Serratella	8	2	2	GC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Epeorus	17	0	1.2	SC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Megaloptera	Sialidae	Sialis	1	6	4	PR
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Capnildae	Allocapnia	16	3	3	SH
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Capnildae	Paracapnia	1	1	1	SH
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Chloroperlidae	Alloperla	6	0	1.4	PR
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Leuctridae	Leuctra	2	0	0	SH
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	1	3	5	SH
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Clioperla	1	2	2	PR
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Cultus	1	2	2	PR
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	5	2	2	PR
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Malirekus	1	2	2	PR
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopsyche	6	4	4	SH
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Trichoptera	Philopotamidae	Wormaldia	1	0	5	FC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	1	1	2	PR
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Trichoptera	Uenoidae	Neophylax	10	3	5	SC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	4	8	8	FC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Mollusca	Gastropoda	Basommatophora	Lymnaeidae	Unidentified	1	7	6	SC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	5	10	10	GC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	6	6	5.7	PR
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	46	6	5	GC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	3	7	4.7	GC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	3	2	2	GC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	2	4	4	SH
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ameletidae	Ameletus	35	0	0	GC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Ephemeroptera	Baetidae	Unidentified	1	6	5	GC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Unidentified	11	2	5	GC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella	18	4	4	SC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	Unidentified	2	4	5	GC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Plecoptera	Capnildae	Allocapnia	16	3	3	SH
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Plecoptera	Chloroperlidae	Unidentified	8	0	1	PR
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Plecoptera	Leuctridae	Leuctra	1	0	0	SH
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	6	3	5	SH
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Unidentified	1	2	2	PR
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Cultus	1	2	2	PR
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Trichoptera	Goeridae	Goera	1	0	0.3	SC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Diplectrona	2	0	5	FC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsyche	2	5	4	FC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopschye	7	4	4	SH
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Trichoptera	Phryganeidae	Oligostomis	1	5	5	SH
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	1	1	2	PR
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Trichoptera	Uenoidae	Neophylax	10	3	5	SC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	1	8	8	FC

BSW 16

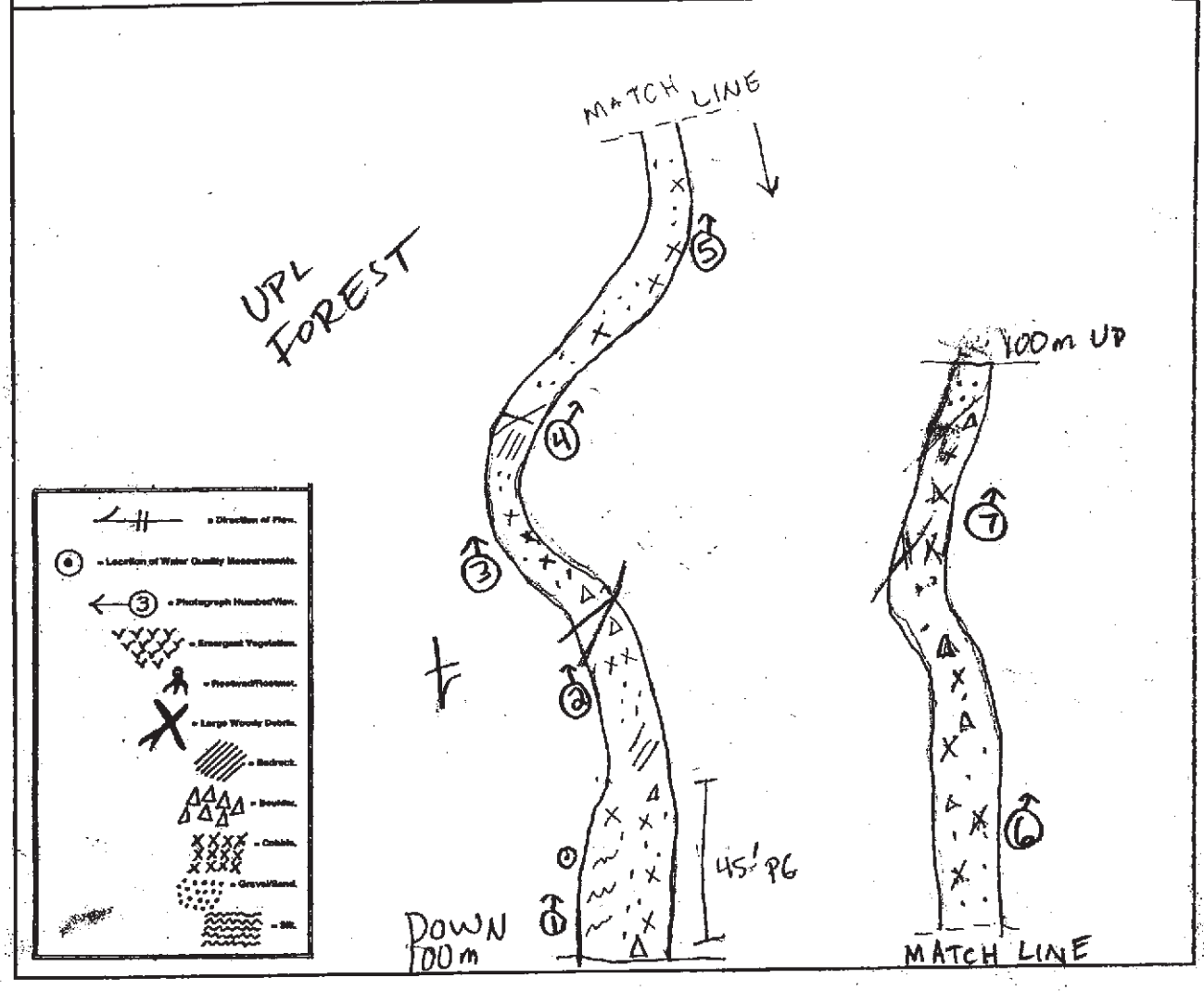
BSW 16

BSW 20

PHYSICAL HABITAT/WATER QUALITY FIELD DATA SHEET (Page 1)

Station: 32618 Bailey-AS-BSW 20		Project No.: 060851.0003	
Stream Name: 32618	Date/Time: 1/21/07 1030		Pre mining
River Basin: Ohio	Investigators: MNL JAD LFO JWC		

SKETCH MAP



WEATHER CONDITIONS	Air Temperature: 20 °F			
Weather	Now	Past 24 hrs	Past 7 days	
Heavy Rain				
Steady Rain (Snow)	✓	✓	✓	
Intermit. Rain			✓	
% Cloud Cover		✓	✓	
Clear/Sunny		✓	✓	
Other:				

HABITAT LENGTHS IN SAMPLING REACH

Habitat	Length (steps)	Length (ft)
Riffle		283'
Run		
Pool		451
Glide		
Total		300

STREAM CHARACTERIZATION								
Subsystem:	Perennial ✓	Intermittent ____	Tidal ____					
Type:	Coldwater ____	Warmwater ✓						
Origin:	Spring-fed ____	Wetland ____	Montane ____		Glacial ____		Mixture ✓	Other ____

GPS UNIT USED: GEOXT-S	CAMERA USED: B	PHOTO NO.S: 1-7

BSW 20

LOW GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 1)

Station: 32618 - Bailey AS-BSW 20	Project No.: 060851.0003
Stream Name: 32618	Date/Time: 1/21/07
River Basin: Ohio	Investigators: MNL

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 13	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 14	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 10	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 15	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 15	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

BSW 20

HIGH GRADIENT STREAMS HABITAT ASSESSMENT FIELD DATA SHEET (Page 2)

Station: 32618 - Bailey A5-BSW20	Project No.: 060851.0003
Stream Name: 32618	Date/Time: 1/21/07
River Basin: Ohio	Investigators: MNC

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 16	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 (LB)	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 (9)	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 (9)	8 7 6	5 4 3	2 1 0

Total Score 159

Narrative categories and scoring ranges: Optimal = 156-200; Sub-optimal = 106-155; Marginal = 56-105; Poor = 0-55

AP IX 5
BAILEY EAST EXPANSION PANELS A1-A6
CONSOL PENNSLYVANIA COAL COMPANY
GREENE COUNTY, PENNSYLVANIA
CEC PROJECT 060-851

Macroinvertebrates

BSW 20

BSW 20

Station	Date	Enumerated By	Sample Type	Phylum	Class	Order	Family	Genus	Quantity	PA Tolerance	EPA Tolerance	FFG
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	5	10	10	GC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	7	6	5.7	PR
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	55	6	5	GC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Stratiomyidae	Caloparyphus	1	8	5	GC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	4	7	4.7	GC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	4	2	2	GC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	2	4	4	SH
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ameletidae	Ameletus	16	0	0	GC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella	6	4	4	SC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Serratella	8	2	2	GC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Epeorus	17	0	1.2	SC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Megaloptera	Sialidae	Sialis	1	6	4	PR
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Capnildae	Allocapnia	16	3	3	SH
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Capnildae	Paracapnia	1	1	1	SH
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Chloroperlidae	Alloperla	6	0	1.4	PR
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Leuctridae	Leuctra	2	0	0	SH
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	1	3	5	SH
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Clioperla	1	2	2	PR
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Cultus	1	2	2	PR
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	5	2	2	PR
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Malirekus	1	2	2	PR
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopsyche	6	4	4	SH
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Trichoptera	Philopotamidae	Wormaldia	1	0	5	FC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	1	1	2	PR
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Arthropoda	Insecta	Trichoptera	Uenoidae	Neophylax	10	3	5	SC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	4	8	8	FC
32618B-Bailey Mine-A5 Panel-BSW20_Apdx. B	1/21/2007	M. Logan	Qualitative	Mollusca	Gastropoda	Basommatophora	Lymnaeidae	Unidentified	1	7	6	SC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Annelida	Oligochaeta	Unidentified	Unidentified	Unidentified	5	10	10	GC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Diptera	Ceratopogonidae	Unidentified	6	6	5.7	PR
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Diptera	Chironomidae	Unidentified	46	6	5	GC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Diptera	Tabanidae	Chrysops	3	7	4.7	GC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Pseudolimnophila	3	2	2	GC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	2	4	4	SH
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ameletidae	Ameletus	35	0	0	GC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Ephemeroptera	Baetidae	Unidentified	1	6	5	GC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Unidentified	11	2	5	GC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella	18	4	4	SC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	Unidentified	2	4	5	GC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Plecoptera	Capnildae	Allocapnia	16	3	3	SH
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Plecoptera	Chloroperlidae	Unidentified	8	0	1	PR
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Plecoptera	Leuctridae	Leuctra	1	0	0	SH
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	6	3	5	SH
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Unidentified	1	2	2	PR
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Plecoptera	Perlodidae	Cultus	1	2	2	PR
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Trichoptera	Goeridae	Goera	1	0	0.3	SC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Diplectrona	2	0	5	FC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsyche	2	5	4	FC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pycnopschye	7	4	4	SH
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Trichoptera	Phryganeidae	Oligostomis	1	5	5	SH
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila	1	1	2	PR
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Arthropoda	Insecta	Trichoptera	Uenoidae	Neophylax	10	3	5	SC
32619-Bailey Mine_A4 Panel-BSW16_Apdx. B	1/24/2007	W. Trimbath	Qualitative	Mollusca	Bivalvia	Veneroida	Sphaeriidae	Unidentified	1	8	8	FC