Introduction

This report characterizes the biological integrity of the affected reach of West Fork Lewis Creek, as requested by the U.S. Army Corps of Engineers, Newburg Office. Biological, habitat and field water quality data were collected in order to assess the reach. The sample station was located immediately downstream of the proposed haul road crossing of West Fork leading from the Lewis Creek East mine site to the Lewis Creek West mine site (refer to Exhibit I – Site Map). Coordinates for the station are 37°21’46.5” latitude and 86°59’54.0” longitude. The project area lies approximately 4.1 miles south of Centertown, Kentucky, in Ohio County (Central City East, Paradise, and Equality USGS 7.5 minute topographic quadrangles).

Site Description

West Fork Lewis Creek is a fourth-order perennial stream of Lewis Creek within the Green River basin (refer to Exhibit II – site photos). The physical character and water quality of this reach have been degraded from previous disturbances. Stream straightening and dredging, common agricultural practices, have occurred evidenced by old berms near the mouth of West Fork. This has resulted in an incised, entrenched, unstable channel with little or no floodplain access during rain events (Rosgen stream type F6). A bankfull channel is in the process of forming within the old channel, and the reach has fairly nice riparian vegetation. The Rapid Bio-assessment (RBI) Habitat score for the affected reach was 99, indicating that the reach does not meet its use for aquatic habitat. An elevated conductivity value of 1,277 $\mu$S/cm suggests that water quality has been impaired from previous activities.

The surrounding area consists of rolling to hilly terrain with floodplain adjacent to the channel of West Fork. Approximately eighty percent of the study area was forested; however, much of it was recently logged. The remaining land use is predominately cropland and pasture. Land features in the area include ponds, wetlands and brushy/grassy fields. The forested sections are comprised of mostly small to medium sized trees, including maples ($Acer$ sp.), sycamore ($Platanus occidentalis$), oaks ($Quercus$ sp.), hickory species ($Carya$ sp.) and sweetgum ($Liquidamber styraciflua$).

Methodology

Field water quality measurements taken at the site included dissolved oxygen, conductivity, water temperature and pH. As previously stated, a RBI habitat assessment was performed. In addition to water quality and habitat data, macroinvertebrate and fish samples were collected from a 100-meter section of West Fork at the afore mentioned location (Exhibit I).
EXHIBIT II: (A) Upstream and (B) downstream photos of West Fork Lewis Creek
Macroinvertebrates were sampled by the “20-jab” technique in accordance with KY Division of Water (2010) *Methods for Conducting Resource Extraction Intensive Surveys in Non-OSRW Streams of the Western Kentucky Coalfields*. The following habitat features were sampled – gravel (3-10 ft, 1-minute kicknets), woody debris (4 logs picked with forceps), leaf packs (2), vegetation beds (3 jabs), exposed roots (4 jabs), and sediment (4 surface skims). Field processed material was deposited into a one-gallon container and preserved with a 95% ethanol solution.

At the laboratory, the macroinvertebrate sample was sorted on a white background, identified then transferred to a 70% ethanol solution. Samples were identified to the lowest taxonomic level practicable. After identification, the KDOW Macroinvertebrate Index of Biotic Integrity (MBI) was calculated for the sample as described in “Laboratory Procedures for Macroinvertebrate Processing, Taxonomic Identification and Reporting (KDOE 2009)” and “The Kentucky Macroinvertebrate Bioassessment Index” (KDOE 2003). The macroinvertebrate sample will be maintained at T.H.E. Engineers office. Refer to Table 1 for the macroinvertebrate data.

Fishes were sampled with the use of a Smith Root LR-24 Backpack Electrofisher. Fish collection followed protocols outlined in “Standard Operating Procedure Collection Methods for Fish in Wadable Streams” (KDOE 2010). Riffle, run and pool flow regimes were sampled, as were other available habitat features such as exposed roots and vegetation beds. Fishes collected were identified and enumerated in the field and released. The Kentucky Index of Biotic Integrity (KIBI) was calculated for the sample. Refer to Table 2 for the Fish data.

The fish and macroinvertebrate samples were collected, identified and analyzed by Bill Sampson. Collection was conducted under Kentucky Scientific Collecting Permit SC1211028.

**Results and Discussion**

As previously referenced, the RBI habitat score was 99 (not meeting use for aquatic habitat). The water quality values were – water temperature (19.0°F), dissolved oxygen (3.0 mg/l), pH (7.45) and conductivity (1,277 uS/cm). The findings from the macroinvertebrate and fish data collaborates the low RBI habitat score and high conductivity reading. The Macroinvertebrate Biotic Index (MBI) score was 19.33, considered “Poor” for the Interior River ecosystem (Table 1). The fish KIBI score was 32, which falls on the low end of “Fair” for that ecoregion (Table 2).
Table 1: Macroinvertebrate Data for West Fork Lewis Creek

<table>
<thead>
<tr>
<th>Order</th>
<th>Family</th>
<th>Genus/Species</th>
<th>Number Individuals</th>
<th>Clinger</th>
<th>Tolerance Value (ai)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pelcypoda</td>
<td>Corbiculidae</td>
<td><em>Corbicula fluminea</em></td>
<td>35</td>
<td></td>
<td>6.12</td>
</tr>
<tr>
<td>Basomat.</td>
<td>Physidae</td>
<td><em>Physella sp.</em></td>
<td>4</td>
<td></td>
<td>8.84</td>
</tr>
<tr>
<td>Trichoptera</td>
<td>Hydropsychidae</td>
<td><em>Hydropsyche sp.</em></td>
<td>137</td>
<td>C</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>Philopotamidae</td>
<td><em>Chimarra sp.</em></td>
<td>44</td>
<td>C</td>
<td>2.76</td>
</tr>
<tr>
<td>Odonata</td>
<td>Coenagrionidae</td>
<td><em>Argia sp.</em></td>
<td>5</td>
<td></td>
<td>8.17</td>
</tr>
<tr>
<td>Coleoptera</td>
<td>Gyrinidae</td>
<td><em>Dineutes sp.</em></td>
<td>2 (larvae)</td>
<td>C</td>
<td>5.50</td>
</tr>
<tr>
<td></td>
<td>Elmidae</td>
<td><em>Stenelmis sp.</em></td>
<td>2 (larvae)</td>
<td></td>
<td>5.10</td>
</tr>
<tr>
<td>Diptera</td>
<td>Chironomidae</td>
<td></td>
<td>72</td>
<td></td>
<td>7.00</td>
</tr>
<tr>
<td></td>
<td>Tabanidae</td>
<td></td>
<td>1</td>
<td></td>
<td>9.20</td>
</tr>
<tr>
<td></td>
<td>Culicidae</td>
<td></td>
<td>1</td>
<td></td>
<td>9.00</td>
</tr>
</tbody>
</table>

Taxa richness = 10; Total individuals = 303  
EPT richness = 2  
mHBI = 5.33  
% EPT = 14.52%  
% Clingers = 60.39%  
% Chiron + Oligo = 23.76%  

MBI = 19.33; Classification = Poor

Table 2: Fish Data for West Fork Lewis Creek

<table>
<thead>
<tr>
<th>Species</th>
<th>Common name</th>
<th>Number Individuals</th>
<th>Functional Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Lepomis macrochirus</em></td>
<td>Blugill sunfish</td>
<td>2</td>
<td>NAT, INS, TOL</td>
</tr>
<tr>
<td><em>Lepomis cyannellus</em></td>
<td>Green sunfish</td>
<td>1</td>
<td>NAT, FHW, INS, TOL</td>
</tr>
<tr>
<td><em>Gambusia affinis</em></td>
<td>Mosquitofish</td>
<td>2</td>
<td>NAT, FHW, INS, TOL</td>
</tr>
<tr>
<td><em>Etheostoma barbouri</em></td>
<td>Teardrop darter</td>
<td>1</td>
<td>NAT, INS, INT</td>
</tr>
</tbody>
</table>

Taxa richness = 4; Total individual = 6  
Darter, Madtom, Sculpin Richness = 1  
Intolerant Species Richness = 1  
Simple lithophils = 0  
% Insectivores = 100%  
% Tolerant species = 83%  
% Headwater species = 50%  

Wadeable stream KIBI = 32; Classification = Fair
References


Clay, W.M. 1975. The Fishes of Kentucky. Kentucky Department of Fish and Wildlife Resources. Frankfort, KY.

KDOW. 2003. The Kentucky Macroinvertebrate Bioassessment Index. Kentucky Department for Environmental Protection, Division of Water. Frankfort, KY.

KDOW. 2003. Development and Application of the Kentucky Index of Biotic Integrity (KIBI). Kentucky Department for Environmental Protection, Division of Water. Frankfort, KY.

KDOW. 2009. Laboratory Procedures for Macroinvertebrate Processing, Taxonomic Identification and Reporting. Kentucky Department for Environmental Protection, Division of Water. Frankfort, KY.

KDOW. 2010. Standard Operating Procedure Collection Methods for Fish in Wadeable Streams. Kentucky Department of Environmental Protection, Division of Water. Frankfort, KY.


