Stillwater Creek

Biological and Water Quality Study Plan
2012
Harrison, Belmont, Guernsey & Tuscarawas Counties

Ohio Environmental Protection Agency
Division of Surface Water
50 W. Town Street, Suite 700
Columbus, OH 43215

Ecological Assessment Section
4675 Homer Ohio Lane
Groveport, Ohio 43125

Southeast District Office
2195 East Front Street
Logan, Ohio 43138
February 19, 2009
WARNING – Before crews sample below the spillways of Piedmont, Clendening and Tappan Lake, make sure you contact the USACE office. Hydrogen sulfide gas has been detected below the dams at dangerous levels and you need to wear a monitor if you are sampling for any period of time. Contact names are listed below for each dam.

**USCOE/Muskingum Area**

<table>
<thead>
<tr>
<th>Assistant Operations Manager</th>
<th>Piedmont Lake</th>
<th>Clendening Lake</th>
<th>Tappan Lake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thomas T. Leach</td>
<td>Tim Butler</td>
<td>Anthony Gardner</td>
<td>Levi Gladdan</td>
</tr>
<tr>
<td>PH: 330.343.4661</td>
<td>740-968-4440</td>
<td>740-658-3743</td>
<td>(740) 269-2681</td>
</tr>
<tr>
<td>CELL: 330.260.0754</td>
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**Ohio EPA/ODNR**

<table>
<thead>
<tr>
<th>Groveport/CO</th>
<th>SEDO</th>
<th>ODNR-MRM</th>
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<tbody>
<tr>
<td>Mike Bolton 614-836-8781</td>
<td>cell: 740-603-5627</td>
<td>Cell 740-541-3331</td>
</tr>
<tr>
<td>Keith Orr 614-644-2885</td>
<td>Randy Spencer 740-380-5240</td>
<td>Mike Mozena 740-439-3640</td>
</tr>
<tr>
<td>Holly Tucker 614-836-8777</td>
<td>Tim Campbell 740-380-5426</td>
<td></td>
</tr>
<tr>
<td>Jeff Deshon 614-836-8780</td>
<td>Jennifer Witte 740-380-5208</td>
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**Safety**

<table>
<thead>
<tr>
<th>Hospitals</th>
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<tr>
<td>Belmont</td>
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<tr>
<td>Tuscarawas</td>
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<table>
<thead>
<tr>
<th>Harrison Community Hospital</th>
<th>Barnesville Hospital Assoc., Inc.</th>
<th>Twin City Medical Group</th>
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<tr>
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<td>639 West Main Street</td>
<td>819 North 1st Street</td>
</tr>
<tr>
<td>Cadiz, OH 43907</td>
<td>Barnesville, OH</td>
<td>Dennison, OH 44621</td>
</tr>
<tr>
<td>(740) 942-4631</td>
<td>43713</td>
<td>(740) 922-7474</td>
</tr>
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<table>
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<th>659 Boulevard Street</th>
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<tr>
<td>Dover, OH 44622</td>
</tr>
<tr>
<td>(330) 343-3311</td>
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**Sheriff**

<table>
<thead>
<tr>
<th>County</th>
<th>Sheriff</th>
<th>Sheriff</th>
<th>Sheriff</th>
<th>Sheriff</th>
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<tbody>
<tr>
<td>Belmont County</td>
<td>Belmont County Sheriff (m-y)</td>
<td>Guernsey County Sheriff (m-n)</td>
<td>Harrison County Sheriff (m-y)</td>
<td>Tuscarawas County Sheriff (m-n)</td>
</tr>
<tr>
<td></td>
<td>68137 Hammond Rd.</td>
<td>601 Southgate Pkwy.</td>
<td>114 Court St.</td>
<td>2295 Reiser Ave S.E.</td>
</tr>
<tr>
<td></td>
<td>St. Clairsville, OH 43950</td>
<td>Cambridge, OH 43725</td>
<td>Cadiz, OH 43907</td>
<td>New Philadelphia, OH</td>
</tr>
<tr>
<td></td>
<td>(740) 695-7933</td>
<td>(740) 439-4455</td>
<td>(740) 942-2197</td>
<td>(330) 339-2000</td>
</tr>
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<tr>
<td>51400 National Road</td>
<td>7051 Glenn Highway Rd</td>
<td>1377 Cadiz Road</td>
<td>2454 East High Avenue</td>
</tr>
<tr>
<td>St. Clairsville, OH 43950</td>
<td>Cambridge, OH 43725</td>
<td>Wintersville, OH</td>
<td>New Philadelphia, OH</td>
</tr>
<tr>
<td>(740) 695-0915</td>
<td>(740) 439-1388</td>
<td>43953</td>
<td>(330) 339-1103</td>
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<table>
<thead>
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<th>ODNR Wildlife Officers</th>
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<table>
<thead>
<tr>
<th>Belmont Brian Baker</th>
<th>Guernsey Roby Williams</th>
<th>Harrison Nick Turner</th>
<th>Tuscarawas Wade Dunlap</th>
</tr>
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<tr>
<td>(740) 589-9981</td>
<td>(740) 589-9984</td>
<td>(330) 245-3049</td>
<td>(330) 245-3047</td>
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</tbody>
</table>
INTRODUCTION

During the 2012 field seasons (June through October) chemical, physical, and biological sampling will be conducted in the Stillwater Creek basin to assess and characterize water quality conditions. The study area is composed of 16 watershed assessment units (HUC 12s) with a total of 49 sampling stations. The Stillwater Creek watershed has not been thoroughly assessed so most of the mainstem and tributaries have unverified use designations. Table 1 contains a list of all the NPDES facilities on the mainstem. The sampling effort is structured to characterize point source and non point source impacts, including those from historic and active mining, unsewered communities and agricultural activities. Sampling locations, geographical coordinates, and types of sampling scheduled for the study area are listed in Table 2.

Objectives:
- Monitor and assess the chemical, physical and biological integrity of the Stillwater Creek watershed
- Determine aquatic impacts from known potential pollution sources including point source dischargers and active/historic mining impacts
- Assess physical habitat influences on stream biotic integrity
- Determine recreational water quality
- Support of, coordination with, and incorporation of DDAGW PWS sampling.
- Support of, coordination with, and incorporation of modeler sampling requirements if initial sampling indicates potential non-attainment.
- Coordinate with ODNR-Mineral Resources Management (MRM) to determine beneficial reclamation projects within the watershed.

SAMPLING ACTIVITIES

Chemical/Physical Water
Chemical sampling locations within the study area are listed in Table 2. Conventional chemical/physical water quality samples will be collected 5 times at each designated location during the survey. Datasondes® will be deployed at ten locations. Surface water sampling will occur across a variety of flow conditions, from lower flows to moderate and higher flows. Nine sentinel locations will be monitored monthly from November 2011 to November 2013 for modeling purposes.

Bacteriological Sampling
Water samples will be collected at 20 sites for bacteriological analyses to determine the attainment status of the Primary Contact recreational use. Testing will include Escherichia coli (E. coli) bacteria. Each site will be sampled 5 to 10 times.

Macroinvertebrate and Fish Assemblages
Quantitative or qualitative macroinvertebrate sampling methods will be used as for stations noted in Table 2. Fish assemblages will be sampled once for locations with a drainage area less than 20 square miles and twice at locations with a drainage area greater than 20 square miles (listed in Table 2). QHEI scores will be calculated at all fish sampling locations.

Lake Sampling
Piedmont, Clendening and Tappan Lakes will be sampled 5 times in 2012 and 5 times in 2013 from May through September. Lake sampling procedures will follow the protocols developed by the OEPA and the Lakes Sampling Manual.
QUALITY ASSURANCE/SAMPLING METHODS

Ohio EPA Manuals
All biological, chemical, EPA laboratory, data processing, and data analysis methods and procedures adhere to those specified in the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 2008), Biological Criteria for the Protection of Aquatic Life, Volumes II - III (Ohio Environmental Protection Agency 1987, 1989a, 1989b), and The Qualitative Habitat Evaluation Index (QHEI); Rationale, Methods, and Application (Rankin 1989) for habitat assessment. Fish Tissue samples will follow the Fish Tissue Collection Manual (April 2012).

Use Attainment
Attainment/non-attainment of aquatic life uses will be determined by using biological criteria codified in Ohio Administrative Code (OAC) 3745-1-07, Table 7-17. Numerical biological criteria are based on multimetric biological indices including the Index of Biotic Integrity (IBI) and modified Index of Well-Being (MIwb), indices measuring the response of the fish community, and the Invertebrate Community Index (ICI), which indicates the response of the macroinvertebrate community.

Performance expectations for the basic aquatic life uses (Warmwater Habitat [WWH], Exceptional Warmwater Habitat [EWH], and Modified Warmwater Habitat [MWH] were developed using the regional reference site approach (Hughes et al. 1986; Omernik 1987). This fits the practical definition of biological integrity as the biological performance of the natural habitats within a region (Karr and Dudley 1981). Attainment of an aquatic life use is FULL if all three indices (or those available) meet the applicable criteria, PARTIAL if at least one of the indices did not attain and performance did not fall below the fair category, and NON if all indices either fail to attain or any index indicates poor or very poor performance. The results will be compared to WWH biocriteria for the Western Allegheny Plateau ecoregion.

Recreational use attainment will be determined using E. coli bacteria. E. coli is an indicator organism for the potential presence of pathogens in surface water resulting from the presence of untreated human or animal wastes, and is the basis for recreational use water quality criteria in Rule 3745-1-07 of the Ohio Administrative Code (OAC).

Stream Habitat Evaluation
Physical habitat is evaluated using the Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA for streams and rivers in Ohio (Rankin 1989). Various attributes of the available habitat are scored based on their overall importance to the establishment of viable, diverse aquatic faunas. Evaluations of type and quality of substrate, amount of instream cover, channel morphology, extent of riparian canopy, pool and riffle development and quality, and stream gradient are among the metrics used to evaluate the characteristics of a stream segment, not just the characteristics of a single sampling site. As such, individual sites may have much poorer physical habitat due to a localized disturbance yet still support aquatic communities closely resembling those sampled at adjacent sites with better habitat, provided water quality conditions are similar. QHEI scores from hundreds of segments around the state have indicated that values higher than 60 were generally conducive to the establishment of warmwater faunas while those which scored in excess of 75-80 often typify habitat conditions which have the ability to support exceptional faunas.

Biological Community Assessment
The macroinvertebrates will be sampled quantitatively. Macroinvertebrates will be collected from artificial substrates and from the natural habitats. The artificial substrate collection provides quantitative data and consists of a composite sample of 5 modified Hester-Dendy (HD) multiple-plate samplers colonized for six weeks. At the time of the artificial substrate collection, a qualitative multihabitat composite sample is also collected. This sampling effort consists of an inventory of all observed macroinvertebrate taxa from the natural habitats at each site with no attempt to quantify populations other than notations on the predominance of specific taxa or taxa groups within major macrohabitat types (e.g., riffle, run, pool, margin). Fish will be sampled twice at each sampling location with pulsed DC current boat electrofishing. Detailed biological sampling protocols are documented in the Ohio EPA manual Biological Criteria for the Protection of Aquatic Life, Volume III (1989).
Surface Water
Surface water grab samples will be collected from the upper 12 inches of river water and sampled directly into appropriate containers. Collected water will be preserved using appropriate methods, as outlined in Parts II and III of the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 2012) and delivered to the Ohio EPA lab for analyses. Datasonde© continuous recorders will be placed at select locations to evaluate diurnal measurements of dissolved oxygen, pH, temperature, and conductivity. Continuous temperature recorders will be placed for a minimum of 6 weeks (with the placement of HD samplers) at three sites – sites located upstream and downstream from the Picway power station.

Bacteria
Water samples will be collected directly from the river into sterilized polyethylene containers, cooled to 4°C, and transported to the Ohio EPA lab in Columbus within 6 hours of sample collection. All samples will be analyzed for E. coli bacteria using U.S.EPA approved methods.

Field Quality Control Samples
Five percent of the water and bacteria samples will be submitted to the lab as field duplicates. One Datasonde© recorder site will have two instruments placed in the river as field duplicates. Field blanks will occur at a minimum of 5 percent of the water samples. Field instruments will be calibrated daily, using manufacturer guidelines and requirements noted in the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 2012). An acid blank will be run on new lots of acid ampules. A cubitainer blank will be run on new lots of cubitainers.

Table 1 Facilities regulated by the National Pollution Discharge Elimination System (NPDES) permit

<table>
<thead>
<tr>
<th>Permit No.</th>
<th>Permit Name</th>
<th>Oufall</th>
<th>Receiving Waters</th>
<th>Design Flow (GPD)</th>
<th>Latitude</th>
<th>Longitude</th>
<th>HUC 12</th>
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<td>0IJ00049</td>
<td>Egypt Valley Stone - Shugert Mine</td>
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<td>UTO Stillwater Cr</td>
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<td>UT to UT to Clear Fork</td>
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Table 2 Sampling stations in the Stillwater Creek Watershed 2012.

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<tr>
<th>River Mile</th>
<th>Sample Type</th>
<th>Location</th>
<th>Latitude</th>
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<th>Drainage Area</th>
<th>Station</th>
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<tr>
<td>1.34</td>
<td>F, M, C¹, B</td>
<td>STILLWATER CREEK N OF URICHSVILLE @ Johnson Drive</td>
<td>40.426900</td>
<td>-81.355300</td>
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<td>2.60</td>
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<td>-81.346400</td>
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<td>TWIN CITIES WWTP 001 OUTFALL TO STILLWATER CREEK</td>
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<td>5.10</td>
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<td>STILLWATER CREEK AT URICHSVILLE @ Trenton Ave (DST dam)</td>
<td>40.388071</td>
<td>-81.346628</td>
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<td>7.00</td>
<td>F, M, C, O</td>
<td>STILLWATER CREEK SE OF URICHSVILLE, NEAR FILTRATION PLANT</td>
<td>40.376400</td>
<td>-81.337500</td>
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<td>R09K05</td>
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<td>9.93</td>
<td>F, M, C</td>
<td>STILLWATER CREEK Wolford Rd</td>
<td>40.348425</td>
<td>-81.337166</td>
<td>357.5</td>
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<td>18.51</td>
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<td>STILLWATER CREEK AT STILLWATER @ ST. RT. 800</td>
<td>40.317500</td>
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<td>F, M, C, D, FT</td>
<td>STILLWATER CREEK AT TIPPECANOE @ NORRIS RD.</td>
<td>40.269700</td>
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<td>282.0</td>
<td>R09K06</td>
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<td>F, M, C, B</td>
<td>STILLWATER CREEK NW OF FREEPORT, JUST DST. CRABORCHARD CREEK</td>
<td>40.218300</td>
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<td>38.24</td>
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<td>Stillwater Cr., dst of Piedmont Lake</td>
<td>40.195000</td>
<td>-81.215600</td>
<td>86.0</td>
<td>R09S06</td>
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<td>50.20</td>
<td>F, M, C, B, D</td>
<td>Stillwater Creek Farm Lane off Egypt Lane</td>
<td>40.095675</td>
<td>-81.131863</td>
<td>74.0</td>
<td>301718</td>
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<td>52.80</td>
<td>F, M, C</td>
<td>Stillwater Creek at Egypt N. Rd</td>
<td>40.060185</td>
<td>-81.120568</td>
<td>12.6</td>
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<td>54.00</td>
<td>F, M, C, B</td>
<td>Stillwater Creek at Olivett Rd</td>
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<td>ATKINSON CREEK NW OF FREEPORT @ RIGGS HOLLOW RD.</td>
<td>40.231700</td>
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<td>0.80</td>
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<td>CRABORCHARD CREEK W OF FREEPORT@ BIRMINGHAM RD.</td>
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<td>2.80</td>
<td>F, M, C</td>
<td>L. STILLWATER CREEK AT DENNISON @ ST. RT. 800</td>
<td>40.393900</td>
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<td>5.50</td>
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<td>L. STILLWATER at CR 37</td>
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<td>96.4</td>
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<td>10.50</td>
<td>F, M, C, B, D, FT</td>
<td>L. STILLWATER CREEK JUST DST. TAPPAN LAKE DAM</td>
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<td>71.0</td>
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<td>Plum Run at Plum Run Rd W of Tappan Lake</td>
<td>40.371856</td>
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<td>3.9</td>
<td>301964</td>
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<td>F, M, C</td>
<td>Trib to Little Stillwater (RM 7.6) at Yager Rd</td>
<td>40.389711</td>
<td>-81.256941</td>
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<td>F, M, C, B, D</td>
<td>CLEAR FORK Mizer Road TR 235</td>
<td>40.337030</td>
<td>-81.099205</td>
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<td>301720</td>
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<td>8.5</td>
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### 2012 Stillwater Creek Study Plan

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<th>River Mile</th>
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**Type Codes**
- C: Inorganic water chemistry AMD template (Bold is Sentinel Site – include CBOD20 and OrthoP)
- C*: Inorganic water chemistry large river template
- O: Organic water chemistry (525.2 atrazine)
- B: Bacteria
- F: Fish (2 passes at site >20Sq Mi; 1 pass at sites <20 Sq Mi)
- M: Macroinvertebrate
- D: Datasonde©
- FT: Fish Tissue

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REFERENCES


